HITACHI
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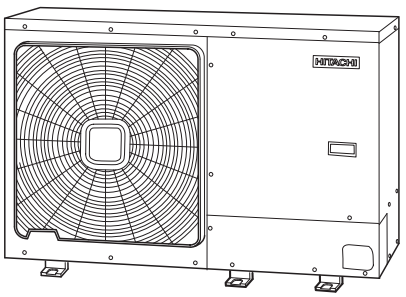
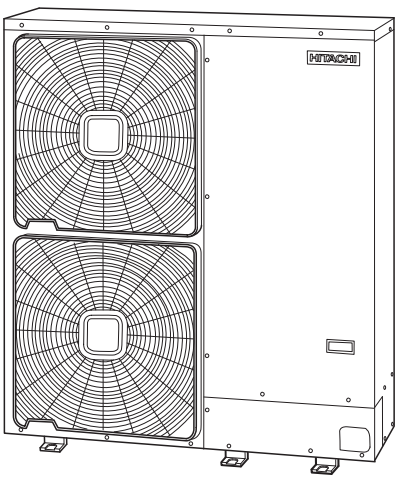
YUTAKI M SERIES





Service Manual

RHUE-3AVHN1
RHUE-(3-6)A(V)HN-HM

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1. General information

Index

1.1 Scope of this document

IMPORTANT NOTE

The information in this document refers to units produced from November 2013, with a serial number starting from "4KE26451 ".

The information related with formerly produced units can be found in the documents "SMGB0066 rev.1 - 03/2010" and "SMGB0072 rev.0 - 06/2011" .

Serial number	Related document
Before 4KE26451	SMGB0066 rev.1 - 03/2010 RHUE-(3-6)A(V)HN(-HM)
	SMGB0072 rev.0 - 06/2011 RHUE-(3-6)A(V)HN1
Starting from 4KE26451	SMGB0090 rev.0 - 01/2014 RHUE-(3-6)A(V)HN(1)(-HM)

1.2 General information

1.2.1 General notes

Within the policy of continuous improvement of its products, HITACHI Air Conditioning Products Europe, S.A.U. reserves the right to make changes at any time without prior notification and without being compelled to introducing them into products subsequently sold. This document may therefore have been subject to amendments during the life of the product.

HITACHI makes every effort to offer correct, up-to-date documentation. Despite this, printing errors cannot be controlled by HITACHI and are not its responsibility.

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.

1.2.2 Introduction

YUTAKI M system is a high energy-efficiency household solution for space heating and water boiling.

YUTAKI M is designed to be installed outside of any kind of dwelling (house, apartment, villa,…), whether in a new construction or existing building. Only a few installation work is needed due to the lack of any chimney, fuel tank or gas connections. YUTAKI M is a monobloc system composed by only an outdoor unit, which carries out the function of an air-to-water heat pump. Thus being also an excellent solution when installation space available is limited.

YUTAKI M unit shall be always combined with either the Controller Pack or the Hydraulic Module (offered as accessories). Instead of burning fossil fuels as conventional boilers do, YUTAKI M extracts the heat present in the air, increases its temperature and then transmits this heat to the water of the installation by means of a heat-exchanger. Then, Hydraulic Module drives the water inside the building, to the heating elements (radiators, heating floor or fan-coils).

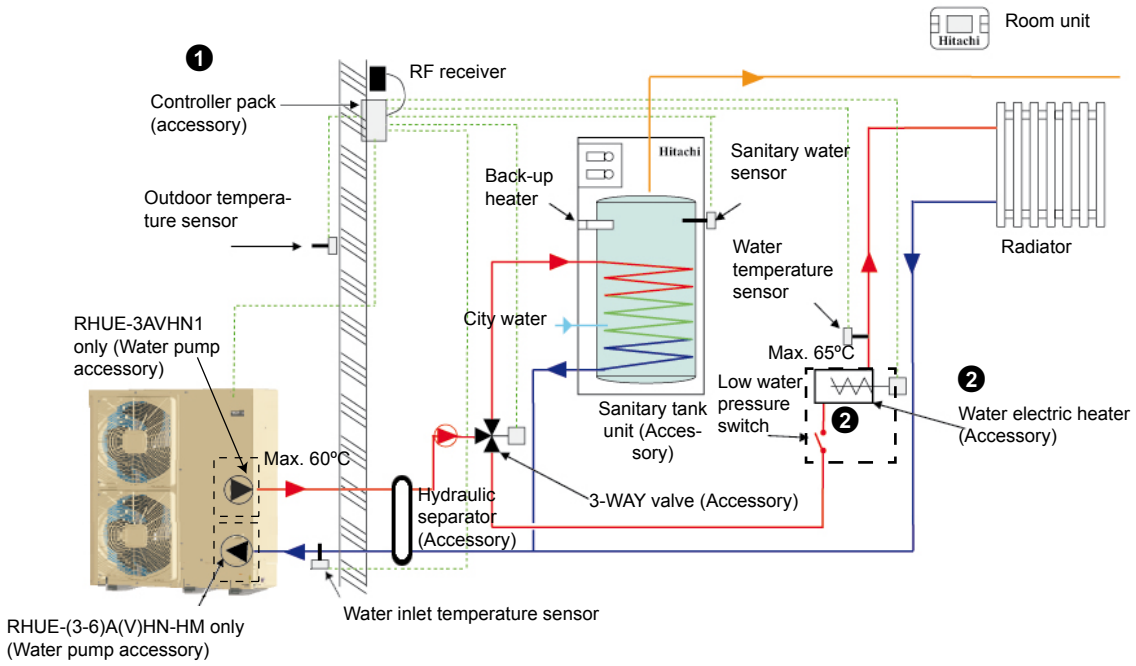
YUTAKI M also gives the option of sanitary hot water production, allowing the user to benefit from the heat pump's high

efficiency and achieve hot water at 65ºC and above. This is made possible by a specific hot water tank, which is heated in the heat pump from below using water pre-heated at 60ºC. An electrical resistance, at the top of the tank, increases the temperature in accordance with the user's needs.

As well as increased efficiency and reduced CO2 emissions due to the extraction of free heat from the outside air, the system also boasts proven reliability and minimum maintenance. YUTAKI M provides a comfortable atmosphere all year long, even in the coldest climates. The popular setting leaves the entire heating load in the heat pump's control for 90-95% of the year, and uses a back-up electrical resistance so that it is responsible for 5-10% of the load on the coldest days. This option usually results in an ideal balance between installation costs and future energy consumption, as proven by its popularity in colder climates than ours, such as Sweden and Norway.

The YUTAKI M system comes with many installation options. For instance, the heat pump can be set so that it provides all of the heating capacity itself, and it can also be connected in series to boilers supplied with fossil fuels to optimize the system's overall energy efficiency.

While conventional boilers can only achieve energy efficiency levels less than 1, the YUTAKI M system can attain efficiency of over 4. This means less electrical consumption and therefore a reduction in CO2 emissions.



1 For more information, refer to Installation and Operation manual of Advanced system controller (ATW-CPA-02)

2 For more information, refer to Installation and Operation manual of Water elecric heater (WEH-6E).

1.2.3 Environment-friendly units

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

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

HITACHI's YUTAKI M 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.

1.3 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 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.*
- *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

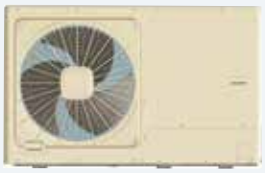
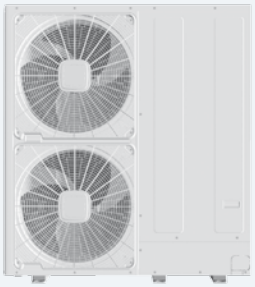
- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.4 Product guide

1.4.1 Classification of the units

RHUE	-	X	A	(X)	H	N	(X)
Unit type (made in Europe)							
	Position-separating hyphen (fixed)						
		Compressor power (HP): 3/4/5/6					
			Air-to-water unit				
				V= Single phase unit (1~ 230V 50Hz)			
				- = Three phase unit (3N~ 400V 50Hz)			
					Heating only		
						R410A refrigerant	
							-HM: Series 0 (version)
							1: Series 1

1.4.2 Product guide

YUTAKI M UNITS					
AVHN1		AVHN		AHN	
1~		1~		3N~	
Unit	Code	Unit	Code	Unit	Code
RHUE-3AVHN1	9E311104	RHUE-3AVHN-HM	9E311103	-	-
-	-	RHUE-4AVHN-HM	9E411103	-	-
-	-	RHUE-5AVHN-HM	9E511103	RHUE-5AHN-HM	9E531103
-	-	RHUE-6AVHN-HM	9E611103	RHUE-6AHN-HM	9E631103
					

1.4.3 Accessory code list

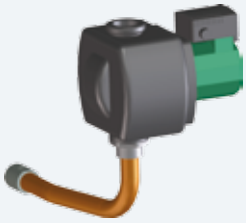
◆ Controller

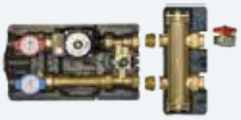
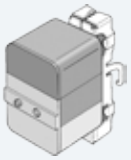
Accessory	Name	Code	Figure
ATW-CPA-02 NEW	Advanced system controller (Controller pack 2)	90500016	

◆ Hydraulic Module

Accessory	Name	Code	Figure
RHM-EH01E	Hydraulic module for electric heater combination (Controller pack 1 included)	9E500008	
RHM-BC01E	Hydraulic module for boiler combination (Controller pack 1 included)	9E500009	

◆ Other accessories

Accessory	Name	Code	Figure
ATW-PK1-01	Pump kit 1 (For RHUE-3AVHN1)	9E500012	
ATW-PK2-01	Pump kit 2 (For RHUE-3AVHN1)	9E500013	
ATW-PK3-01	Pump Kit 3 (For RHUE-3AVHN1)	9E500015	
Pump Kit A	Pump kit A (For RHUE-(3-6)A(V)HN-HM)	9E500006	
Pump Kit B	Pump kit B (For RHUE-(3-6)A(V)HN-HM)	9E500007	

Accessory	Name	Code	Figure
WEH-6E	Water Electric Heater	90500002	
ATW-HSK-01	Hydraulic separator	7E549905	
ATW-3WV-01	3-way valve (Internal thread and spring return)	7E549906	
ATW-2KT-02 NEW	2nd. temperature kit (*)	7E549917	
ATW-MVM-01	Mixing valve motor	7E549912	
ATW-AQT-01	Aquastat	7E549907	
ATW-WCV-01	Water check valve	9E500014	
ATW-2OS-02 NEW	2nd. outdoor temperature sensor	9E500017	
ATW-WTS-02Y	Universal water temperature sensor	9E500004	
DBS-26	Drain Boss	60299192	

Accessory	Name	Code	Figure
DHWT200E-2.5H1E	Domestic Hot Water Tank Enamelled (200 L.)	70544000	
DHWT300E-2.5H1E	Domestic Hot Water Tank Enamelled (300 L.)	70544001	
DHWT200S-2.5H1E	Domestic Hot Water Tank Stainless (200 L.)	70544100	
DHWT300S-2.5H1E	Domestic Hot Water Tank Stainless (300 L.)	70544101	
DHWT-CP-01	Permanent cathode protection for enamelled tank (200 L.)	70544900	
DHWT-CP-03	Permanent cathode protection for enamelled tank (300 L.)	70544903	
DHWT-CP-02	Permanent cathode protection for stainless tank (200 L.)	70544901	
DHWT-CP-04	Permanent cathode protection for stainless tank (300 L.)	70544904	
DHWT-SWG-01	Security water valve for DHW tank	70544902	
NEW ATW-DPOV-01	Differential pressure overflow valve	7E549916	

NOTE

- *For more information refer to the Installation and Operation Manual of each accessory.*
- *(*): The 2nd temperature kit (ATW-2KT-02) must be installed with the following accessories:*
  - *Mixing valve motor (ATW-MVM-01)*
  - *Universal water temperature sensor for second temperature control (ATW-WTS-02Y)*
  - *Aquastat for heating floor protection (ATW-AQT-01)*

  All these products are separately sold.

2. Unit installation

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2.1 YUTAKI M installation

2.1.1 Initial check

DANGER

Electrical hazard. Risk of death.

- ***Before gaining access to terminals or performing any maintenance operation, turn OFF all power switches and disconnect all supply circuits.***
- ***Check that the LED201 (red) located on the DIP-IPM is OFF***
- ***Do not touch the electrical components when LED201 (Red) is ON in order to avoid an electrical shock.***
- ***Do not touch the electrical components of the PCB directly.***

CAUTION

Damage by water. Electrical hazard.

- *Install the unit indoors to prevent water contact. The water proof class is IPX0.*
- *Install the unit where no high level of oil mist, salty air or sulphurous atmosphere exists.*
- *Attach a water proof cover in order to prevent water getting into the unit when installing.*
- *Risk of explosion. A fire may occur. Use of inflammable agent may cause explosion or fire. For cleaning operation, use non-inflammable and nontoxic cleaning liquid.*
- *Oxygen deficiency. Toxic gases may be produced. Work with sufficient ventilation. Working in an enclosed space is dangerous. Toxic gas may be produced when cleaning agent is heated to high temperature by, e.g., being exposed to fire.*
- *Electric shock. Electrical hazard. In order to avoid electric shock or fire, pay attention not to clamp cables when attaching the service cover.*
- *Electrical hazard. Electrical discharge. This unit contains condensers that might remain charged once the unit is switched off. Wait at least five minutes after the stop of the unit before to start any cleaning or maintenance operation, allowing the discharge of the condensers.*
- *Malfunction. Unit failure. When installing more than one unit together, keep clearance of more than 500 mm between units and avoid obstacles that could hamper air intake.*
- *Malfunction. Short circuit. Keep cleareance of more than 3000 mm between the wall (without vent holes) and air inlet/outlet.*
- *Electromagnetic contamination. Equipment failures. Install the unit as far as possible (being at least 3 meters) from electromagnetic wave radiator, such as medical equipment.*
- *Overheat of the unit. Malfunction. Install the unit in the shade or not exposed to direct sunshine or direct radiation from high temperature heat source.*
- *Sharp fins. Risk of injury. Aluminium fins have very sharp edges. Pay attention to the fins in order to avoid injury. Use gloves.*

NOTE

- *This appliance must be used only by adult and capable people, having received the technical information or instructions to handle this appliance properly and safely.*
- *Children should be supervised to ensure that they do not play with the appliance.*
- *For easy operation and maintenance, install the unit with sufficient clearance around it as shown in the next pages.*
- *Transport the package as close as possible to the intallation location before unpacking.*
- *Make sure that the foundation is flat, levelled and strong enough.*
- *Install the unit in a place where no seasonal wind might directly blow into the outdoor fan.*
- *Install the unit in a restricted area not accessible by the general public.*
- *Install the unit in a location where noise emitted by the unit does not disturb neighbours.*
- *Cleaning liquid shall be collected after cleaning operation.*

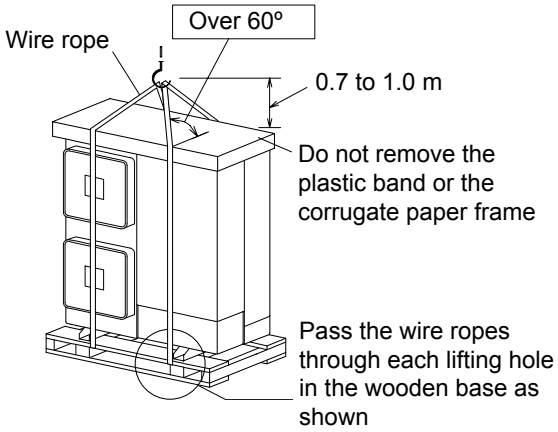
2.1.2 Transportation

DANGER

Do not put any foreign material into the unit and make sure that none exists inside the unit before the installation or test run.

◆ Hanging method

When hanging the unit, ensure its balance and lift it up smoothly and safely. Do not remove any packing materials until the unit is positioned and hang the unit under packing condition with two ropes, as shown in the figure below.



CAUTION

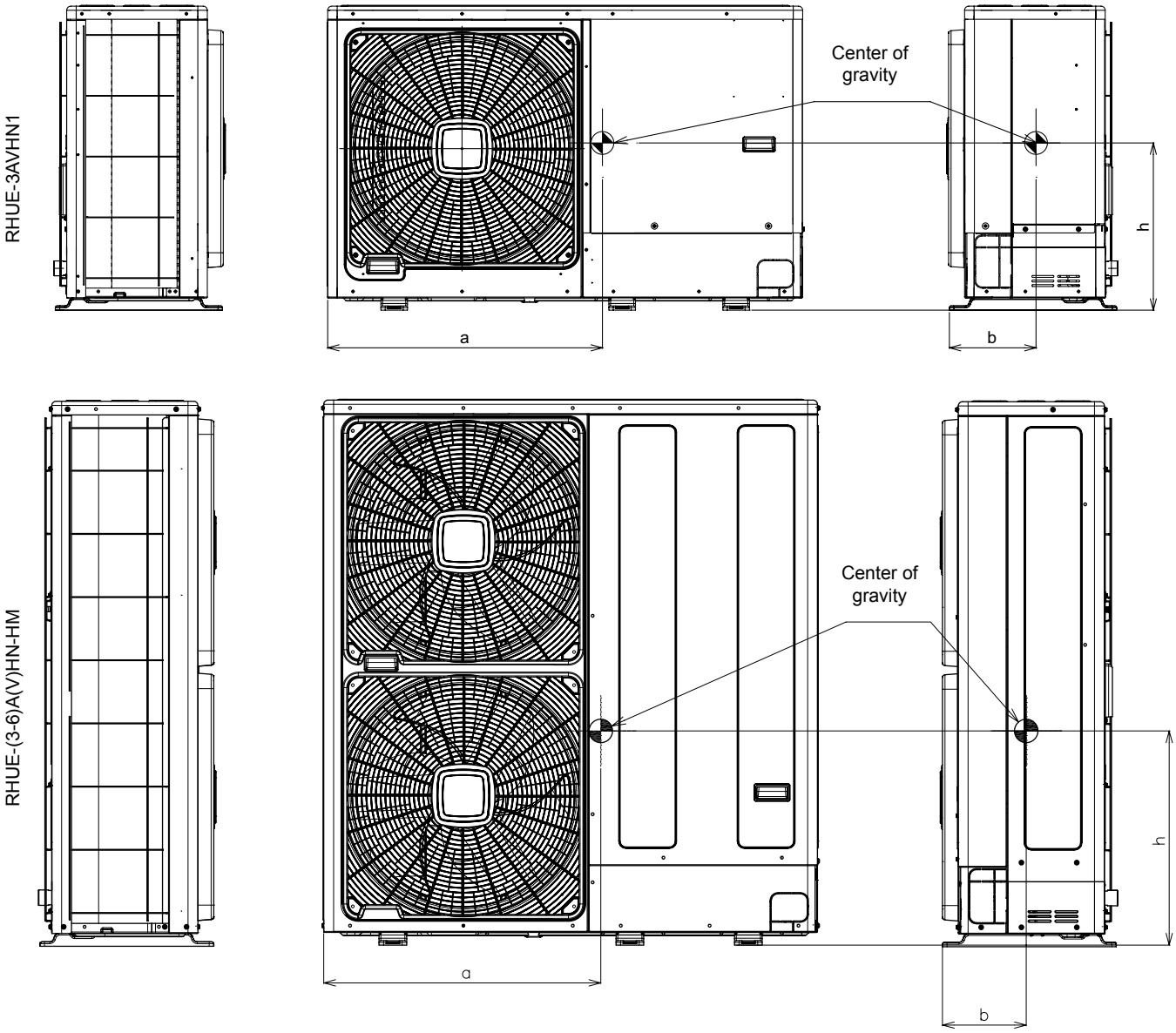
- *Lift the unit with 2 wire ropes and without removing its factory packaging.*
- *Make sure that the unit is lifted smoothly and does not lean.*
- *Do not attach lifting equipment to the plastic band or the corrugated paper frame, since the ropes might slip or break the materials.*
- *Make sure that 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:



Unit model	Operation weight (kg)	Center of gravity position (mm)		
		a	b	h
RHUE-3AVHN1	110	723	228	440
RHUE-3AVHN-HM	130	705	223	545
RHUE-4AVHN-HM	130	705	223	545
RHUE-5AVHN-HM	135	695	228	560
RHUE-6AVHN-HM	139	695	228	560
RHUE-5AHN-HM	140	695	228	560
RHUE-6AHN-HM	144	695	228	560

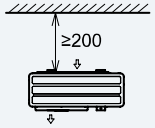
3 Take into account the high weight of the unit (shown on the previous table) before moving it manually. Various people are necessary for this purpose.

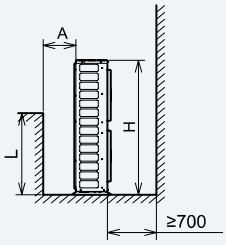
2.1.3 Installation space

The following pictures are only for ilustration purposes. RHUE-3AVHN1 unit contains a single fan, while the image shows the unit with two fans (case of RHUE-(3-6)A(V)HN-HM units)

Single installation

Around sides are open



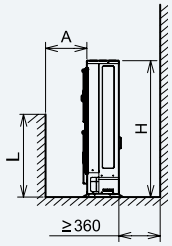


0<L≤1/2H→A≥350

1/2H<L≤H→A≥450

H=800 (*)

H=1380 (**)



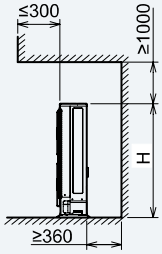
0<L≤1/2H→A≥600

1/2H<L≤H→A≥1200

H= 800 (*)

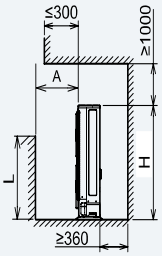
H=1380 (**)

Around sides are open with obstacles above



H= 800 (*)

H=1380 (**)



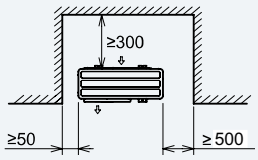
0<L≤1/2H→A≥600

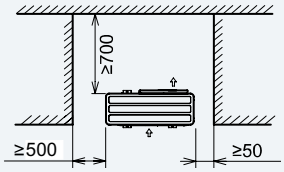
1/2H<L≤H→A≥1200

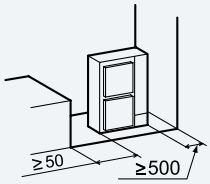
H= 800 (*)

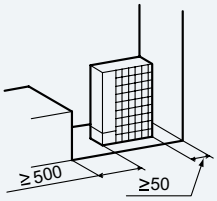
H=1380 (**)

Around sides are closed

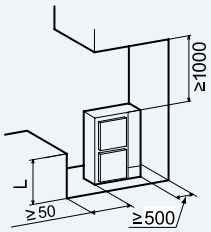


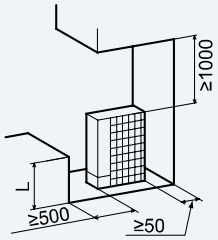






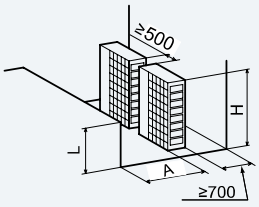
Around sides are open with obstacles above





Multiple installation

Around sides are open



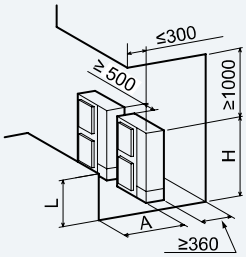
0<L≤1/2H→A≥350

1/2H<L≤H→A≥450

H= 800 (*)

H=1380 (**)

Around sides are open with obstacles above



0<L≤1/2H→A≥600

1/2H<L≤H→A≥1200

H= 800 (*)

H=1380 (**)

(*) RHUE-3AVHN1 (**) RHUE-(3-6)A(V)HN-HM

NOTE

All measuring units are in milimetres (mm).

2.1.4 Installation place provision

◆ Concrete Foundation

- Foundation shall be on a level surface and it is recommended to be 100-300 mm higher than ground level.
- Use M10 anchor bolts to fix the unit to the foundation. (Foundation bolts, nuts and washers are not included, and must be field supplied).
- Drain water might turn into ice on cold weather areas. Therefore, when installing the unit on a roof or a veranda, avoid the draining on a public area since it may become slippery.

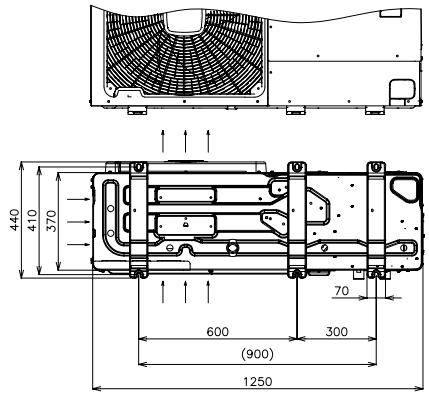
❶ Drain water

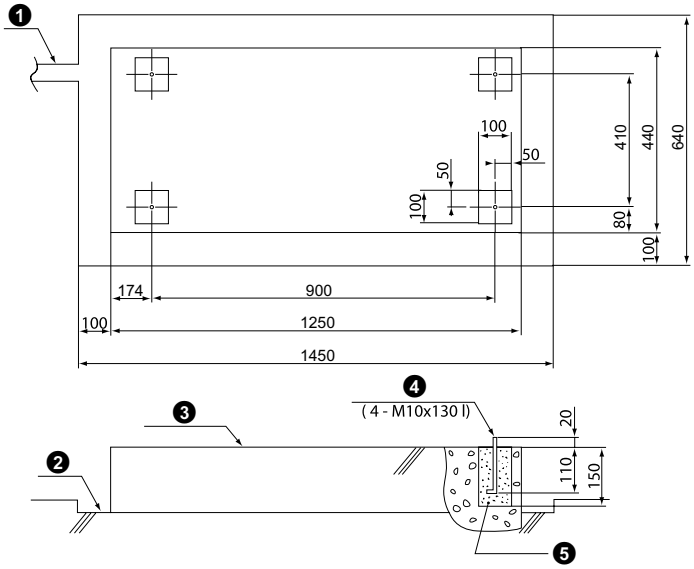
❷ Drain water place

❸ Concrete base

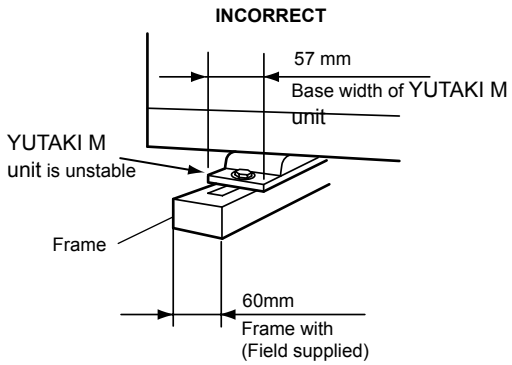
❹ Foundation bolt

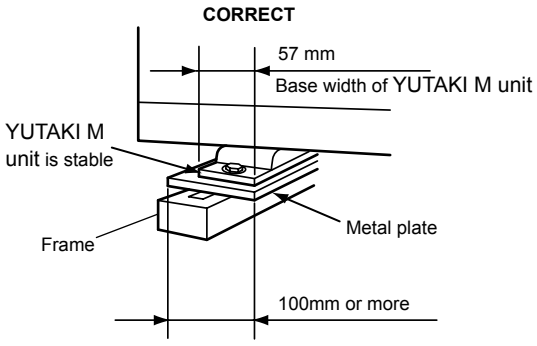
❺ Mortar charge





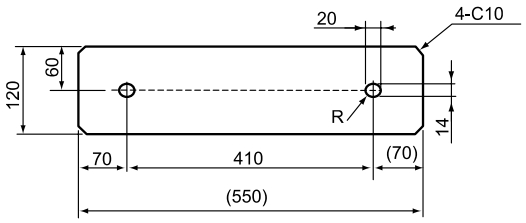
- The whole of the base of the YUTAKI M unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way. When installing the YUTAKI M unit on a fieldsupplied frame, use metal plates to adjust the frame width for stable installation as shown in below figure.





Recommended Metal Plate Size

- (Field-Supplied) Material: Hot-Rolled Mild Steel
- Plate (SPHC) Plate Thickness: 4.5 T

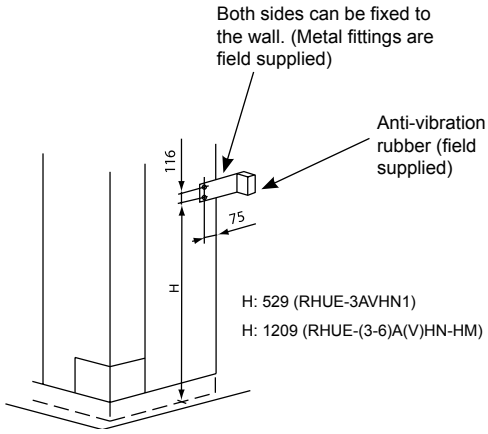


The foundation drawing shown previously is an example.

- The unit is low-vibration model, but consider using some floor reinforcement or anti-vibration mat/rubber when vibration should occur due to weakness of attached surface.
- The foundation shall be unified with the floor slab. If not, calculate the vibration proof of the installation of YUTAKI M Unit as well as of the YUTAKI M Unit with the foundation in order to ensure strength against a fall or for when the unit has to be moved.
- Drain water and rainwater are discharged from the bottom of the unit when in operation as well as when stopped.
- Choose a location with good drainage or place a water drain as in the drawing.
- Make the foundation flat and waterproof, as a water pool may appear in case of, for instance, rain.
- This is a low-profile product with a shallow depth. It may also be able to fix on the wall as shown below when fixing only with the foundation bolt does not seem sufficiently stable depending on the conditions of the installation. (Metal fittings must be field supplied).

◆ Fix unit to the wall

1. Fix the unit onto the wall as indicated in the figure. (Stay field supplied).
2. The foundation shall be strong enough to avoid any deformation and vibration.
3. In order to prevent vibration transfer to the building, place rubber material between the stay and the wall.



⚠ CAUTION

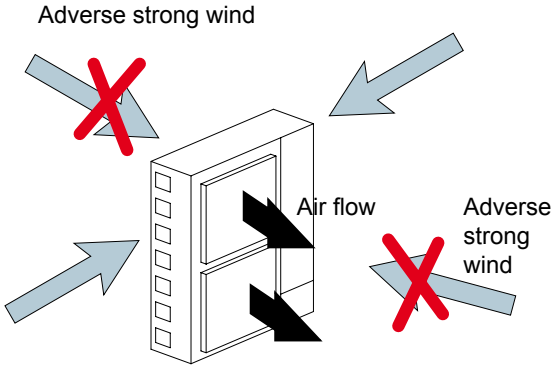
- *Installation must ensure that the unit will not incline, vibrate, make noise or fall down by a blast of wind or in an earthquake.*
- *Calculate quake-resistance strength to ensure that installation is strong enough against falling. Fix the unit with wires (field supplied) when installing in a location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

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

Strong winds against the unit´s air outlet causes short circuits and these can be the consequences:

- Lack of air flow and adversely affect to normal function.
- Frequent frost acceleration.
- Fan can rotating very fast until it breaks.

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



1. Choose a location where the outlet or inlet side of the product will not be exposed to strong wind.
2. In case the fulfillment of point 1 is not possible, it is recommended to use the optional parts (refer to the following section *"2.1.5 Optional parts"*

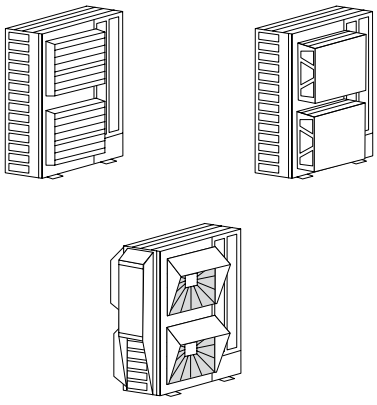
⚠ CAUTION

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

2.1.5 Optional parts

◆ Air flow guide, wind guard and snow protection hood

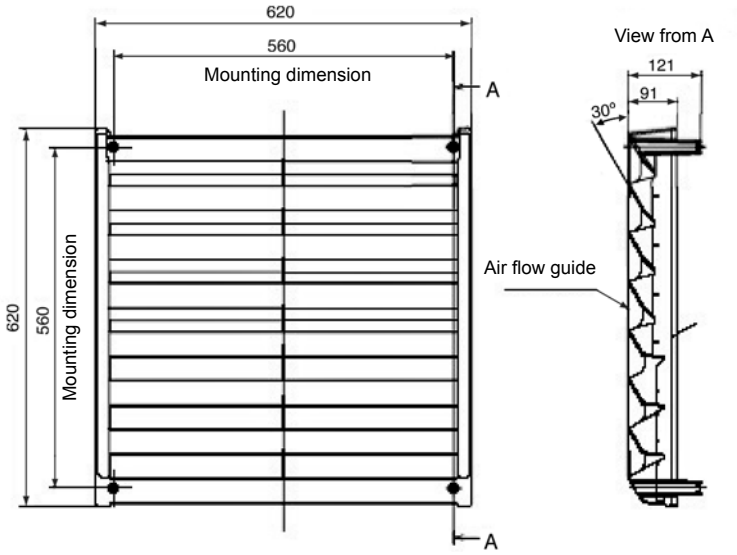
Optional parts			HP	Model
Air flow guide			(3-6)	AG-335A X 2
Wind guard				WSP-335A X 2
Snow protection hood	Stainless plate (SUS304)	Air outlet		ASG-NP335F X 2
		Air inlet of rear side		ASG-NP335B
		Air inlet of side face		ASG-NP335L
		Air outlet		ASG-NP335F X 2
		Air inlet of rear side		ASG-NP335B
		Air inlet of rear side		ASG-NP335L
	Zinc plate	Air outlet		ASG-NP335FS X 2
		Air inlet of rear side		ASG-335BS
		Air inlet of side face		ASG-NP335LS
		Air outlet		ASG-NP335FS X 2
		Air inlet of rear side		ASG-NP335BS
		Air inlet of rear side		ASG-NP335LS



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.)

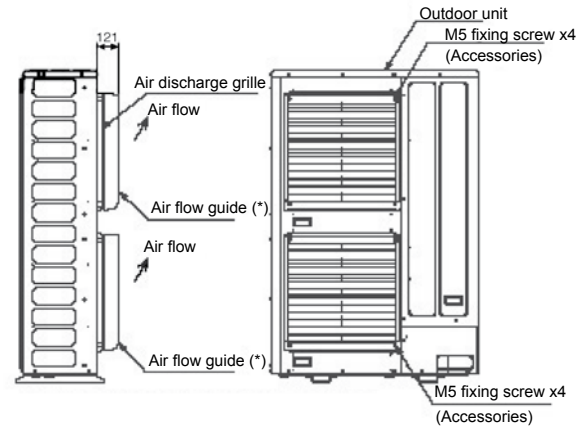


- Attaching example of air flow guide
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1N.m)
  - Do not remove the air discharge grille for air flow guide installation.

⚠ CAUTION

Rotating fan blades. Risk of cut. If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

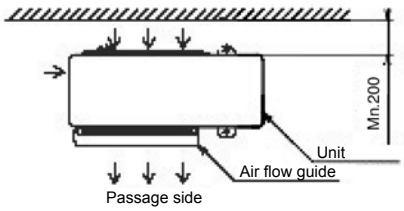
Two windbreak covers installation



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

Service space (In case of upward air discharge)

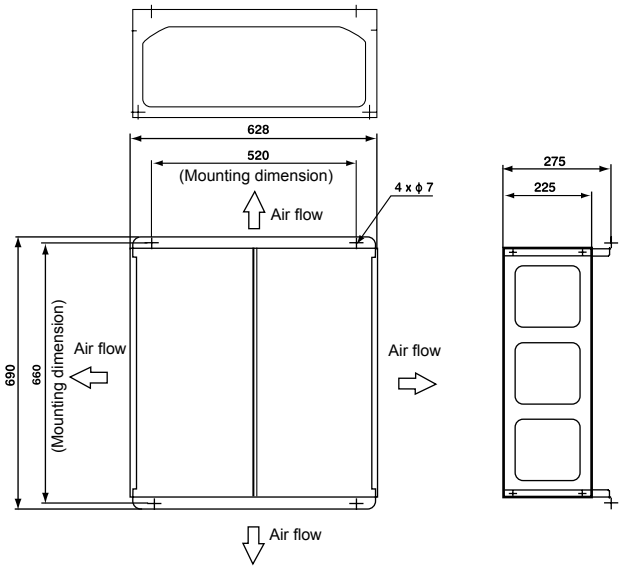
- In case of right and left sides air discharge, enough space for air discharge is required.
- The downward air discharge is also available. In such case, install the base under the unit to secure enough space for air discharge.
- In case of serial units installation, air discharge should be upward.



Wind guard

Specifications

Model	WSP-335A
Quantity	2 per unit
Material	Galvanized sheet metal + baked painting
Color	Gray (1.oY8.5/0.5)
Weight	5.5 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual
Installation restriction	“Guard net”, “Air flow guide” or “Snow protection hood” is not available to install with Wind guard

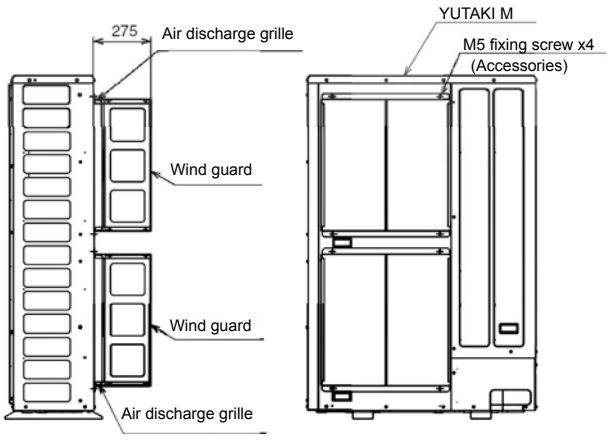


- Attaching example of air wind guard
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1N.m)
  - Do not remove the air discharge grille for air flow guide installation.

⚠ CAUTION

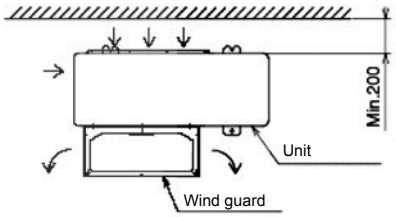
Rotating fan blades. Risk of cut. If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

Two windguard covers installation



Service space

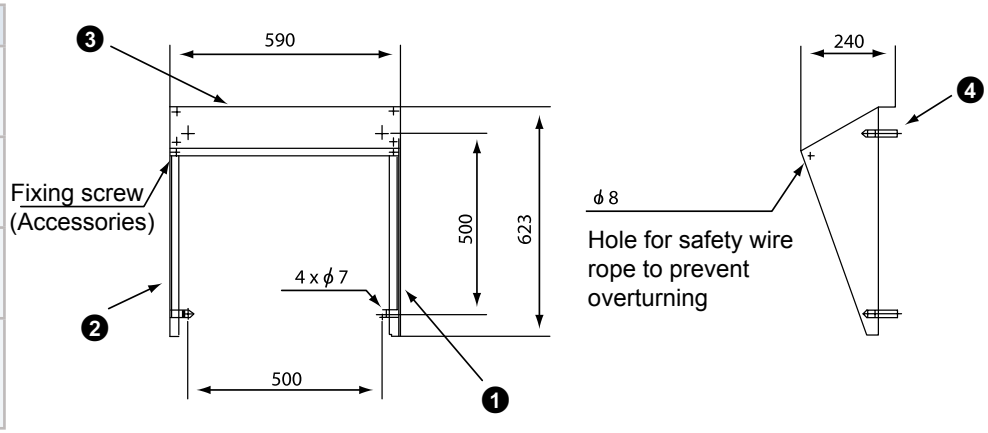
- Both sides of the unit should be open.
- No obstacles should be placed in the air discharge side.



Snow protection hood

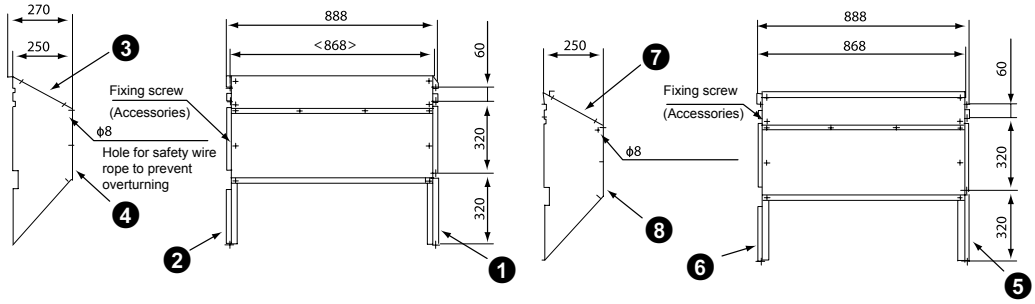
- Air discharge hood

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



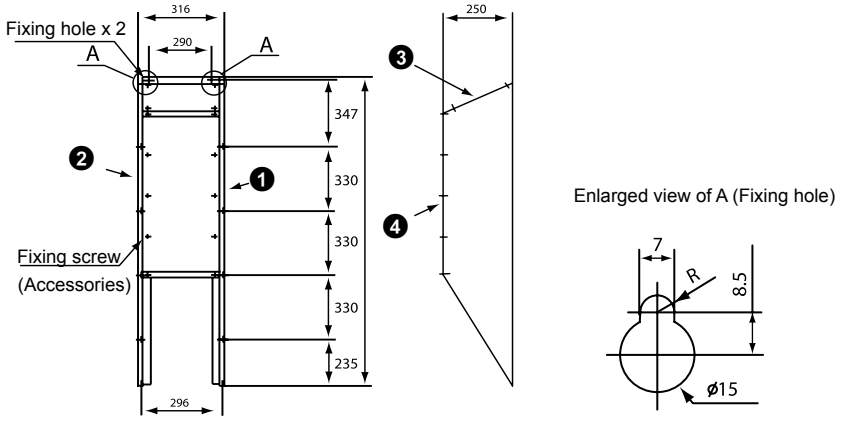
- Rear suction hood

No.	Part name	Qty.
❶	Upper right side plate	1
❷	Upper left side plate	1
❸	Upper front panel (Up-side)	1
❹	Upper front panel (Downside)	1
❺	Lower right side plate	1
❻	Lower left side plate	1
❼	Upper front panel (Up-side)	1
❽	Upper front panel (Downside)	1

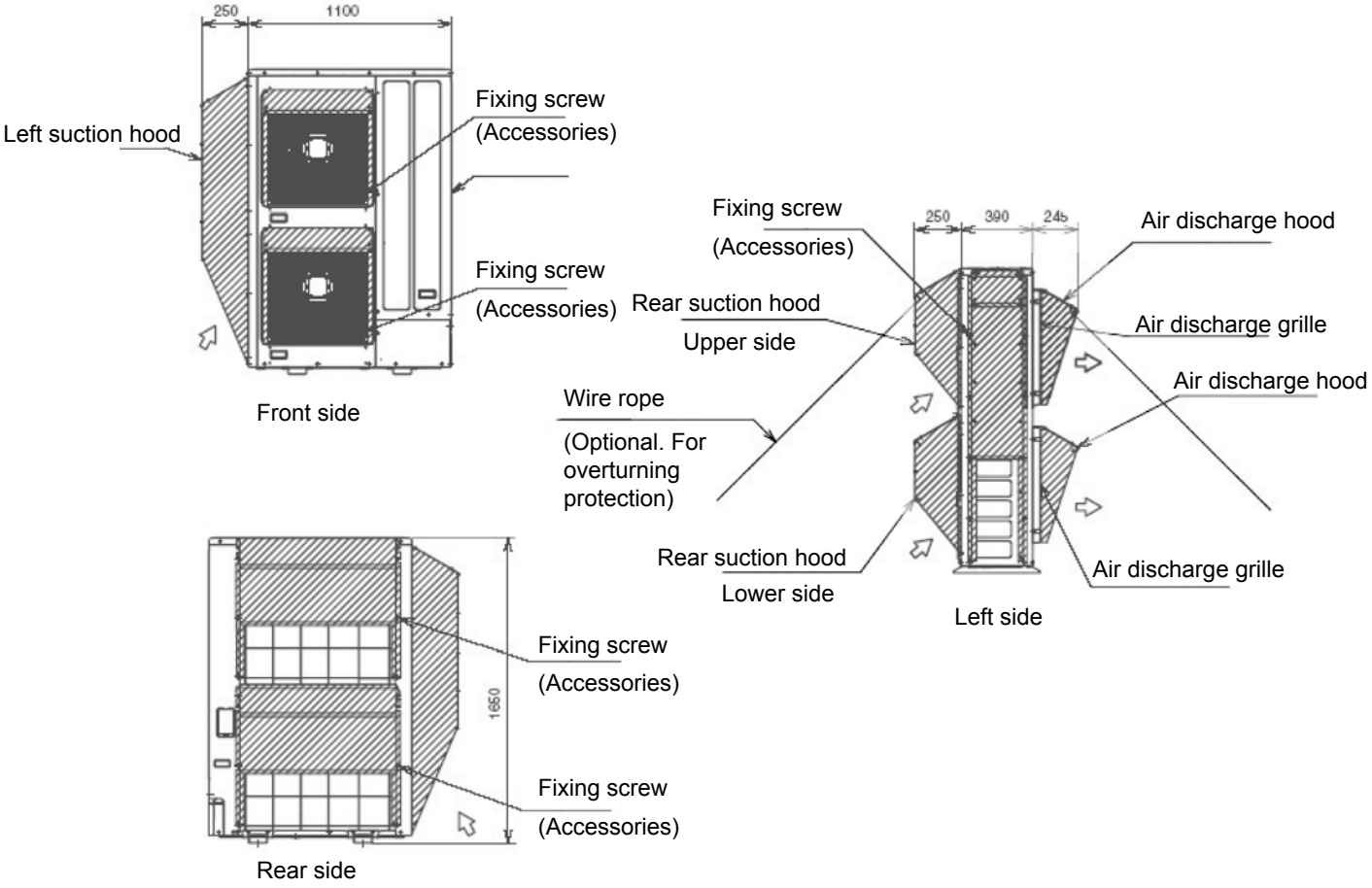


- Left suction hood

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



- Attaching example of snow protection hood



Specifications of snow protection hood

Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP335F	ASG-NP335FS	ASG-NP335B	ASG-NP335BS	ASG-NP335L	ASG-NP335LS
Quantity		2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (SUS304)	Bonderized steel sheet Iron	Stainless (SUS304)	Bonderized steel sheet Iron	Stainless (SUS304)
Color		Gray (1.0Y8.5/0.5 or approximation)	-	Gray (1.0Y8.5/0.5 or approximation)		Gray (1.0Y8.5/0.5 or approximation)	-
Weight		3 kg		14 kg		8 kg	
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discherge part x 1		For rear side air intake x 1 (Upper side x 1, lowe side x 1)		For left side air intake x 1	
	Fixing screw	8 (M5x12 tapping screw)		10 (M5x14 tapping screw)		8 (M5x12 tapping screw)	
	Fixing screw (SUS)	6 (M5x12 tapping screw)	6 (M5x14)	24 (M5x12 tapping screw)	24 (M5x14)	14 (M5x12 tapping screw)	14 (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 Accessories Installation

2.2.1 Advanced system controller

◆ **Factory-supplied components**

System Controller

- Controls the Heat Pump
- Controls other system components
- Measures system sensors and Heat Pump parameters
- Allows system configuration and settings
- 2x Terminal covers for protection
- 2x Terminal kits for connections
- 1x Strain-relief kit

System Controller

System MMI Pack

- Room Unit - The user interface for the system and allows time / temperature profile programming.
- RF Receiver - Receives wireless signals from the Room Unit and is wired directly to the System Controller.

Room Unit

RF Receiver

Sensors

- 2 x Water Temperature Sensors
- Sensors connect directly to System Controller for mixing circuit and DHW tank control

Water Temperature Sensors

Plug terminal kit

- 1 x Plug terminals kit for easy connection
- 1 x Installation and operation manual

Plug in terminals

Installation and operation manual

- 1 x Installation and operation manual

Installation and operation manual

◆ Installation

The **System Controller** is designed to be mounted either directly onto the wall or on a DIN-rail.

CAUTION

Incorrect wall mounting lowers the IP protection.

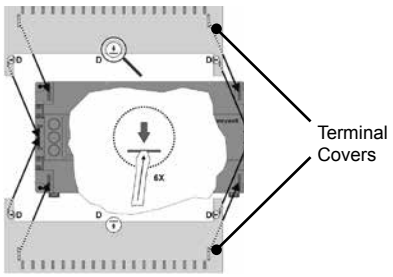
Removing or fitting the terminal covers

Fitting

Line up each cover with the relevant guide slots and push until it clicks in place.

Removal

Insert a screwdriver in the 3 arrowed locations in each cover to remove each cover, if installed.

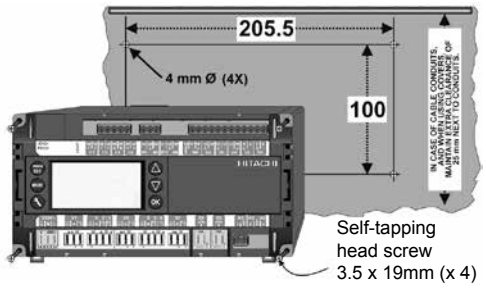


Wall mounting

Four 3.5mm diameter holes are located on the System Controller mounting base for wall mounting installations.

These can only be accessed with the terminal covers removed.

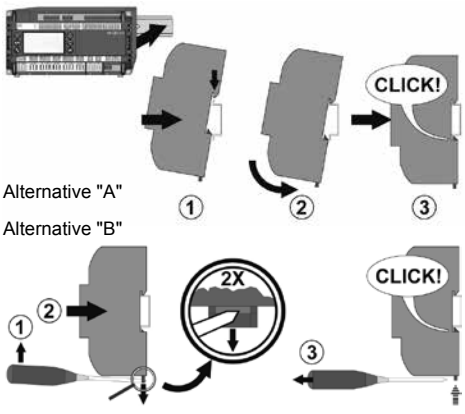
Screws are not supplied.



Din-Rail Mounting

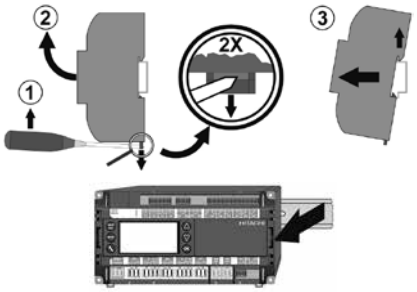
Mounting

The System Controller can also be mounted on a DIN-rail via the locating clips on both sides. Two alternative mounting methods (A or B) are shown in the diagrams.



Removal

Insert a screwdriver into each of the clips in turn to release them and allow the System Controller to be unclipped from the DIN-rail.



Mounting the sensors

- Water Temperature Sensor

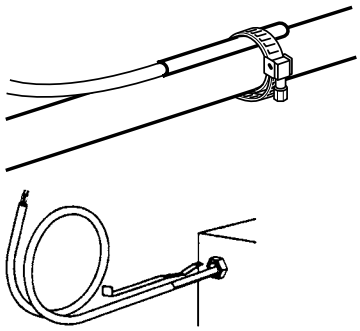
The water temperature sensors can be inserted into suitable immersion wells or strapped on to a pipe using the supplied metal clip.

NOTE

For strap-on mounting, the metal clip must be used and tightened firmly to provide a good thermal connection. A badly-mounted sensor can cause control problems.

If available, the best location for measuring the temperature and, therefore, inserting the sensor, is an immersion well. The sensor is sized to fit in most wells (sensor cartridge: 6.5mm diameter, 50mm long).

In order to have good heat transmission between the sensor cartridge and the immersion well, the contact strip supplied must be inserted along with the cartridge. If there is no space in the well for the sensor, another separate well can be used near the aforementioned immersion well.



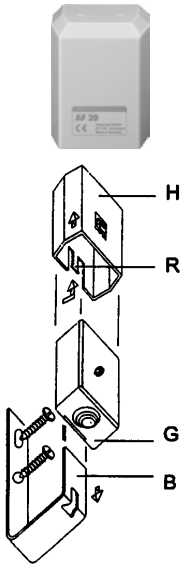
- Outside Temperature Sensor (optional – not supplied in kit)

Location

The most important rule for locating the outdoor temperature sensor is that it should have the same temperature, wind, and solar conditions as the occupied rooms. In most cases, the outdoor temperature sensor is to be mounted on the coldest side of the building (N–NW side) so as not to be affected by direct sunshine. This is to ensure that it will be warm enough in each room of the house. Only when the windows of all the rooms to be regulated face in the same direction can the sensor element be mounted onto the outside of this same wall. This can also be the south side of the house. The outdoor temperature sensor's protective housing prevents the sun's rays from affecting the sensor. If the sensor has been mounted on the south side of a house with large windows facing in this direction, it is recommended that you remove the sun guard. Do not mount the outdoor temperature sensor in a protected area, such as a wall niche or under the balcony. It should be put on an open façade so that it can detect all weather conditions. Avoid mounting the sensor above doors and windows since warm air movements may otherwise influence the measurement results. The temperature sensor should be mounted about 2/3 the way up the wall on buildings of not more that 3 stories; on taller buildings, between the second and third stories.

Mounting

Press in the clasp (**R**) and pull off the top (**H**). Pull the clip (**B**) out of the housing (**G**). Screw on the clip (**B**) and put on the housing. To wire, unscrew the lid. Slide the top (**H**) over the housing until the clasp is firmly attached.



2.2.2 Hydraulic module

◆ Initial check

Piping location and connection size

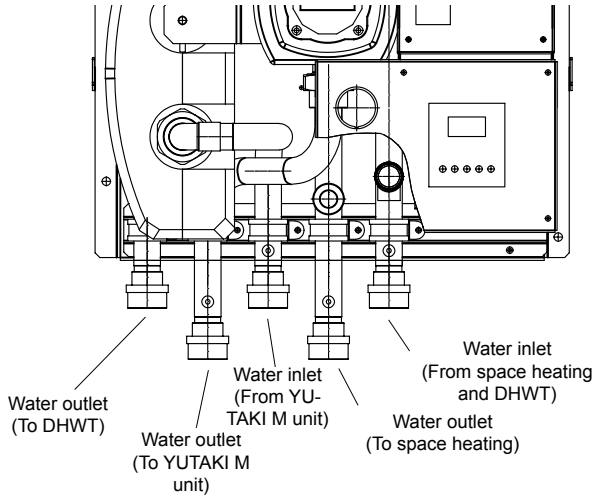
Refer to the figure below where it is detailled the water pipes location.

The Hydraulic Module is factory supplied with threaded unions (1” GAS m) for being connected to the circuit. It is recommended to use shutdown valves (field supplied) for the Hydraulic Module connection to the heating circuit.

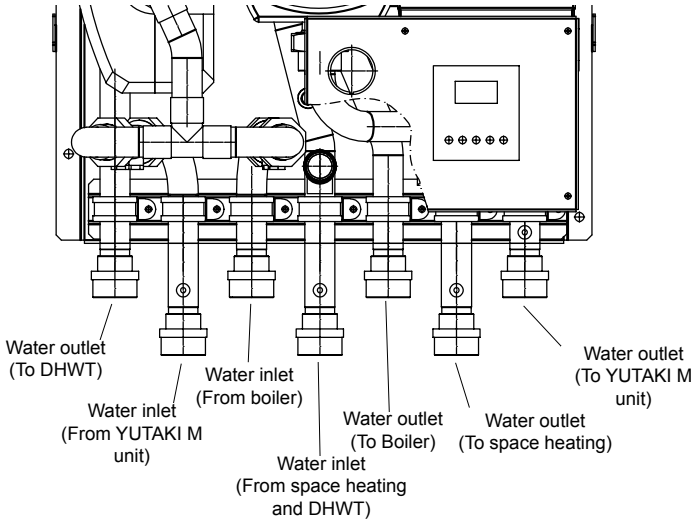
NOTE

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

RHM-EH01E



RHM-BC01E



Factory supplied components

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

Accessory	Qty	Purpose
Wall suppport	1	For hanging the unit on the wall
Water strainer	1	Yutaki M plate HEX protection (Water IN pipe)
Installation manual	1	Instructions of the unit
Declaration of conformity	1	-
Room unit + receiver (System MMI pack)	1	Room unit for heating demand control
Water sensor	1	Water sensor for DHWT

NOTE

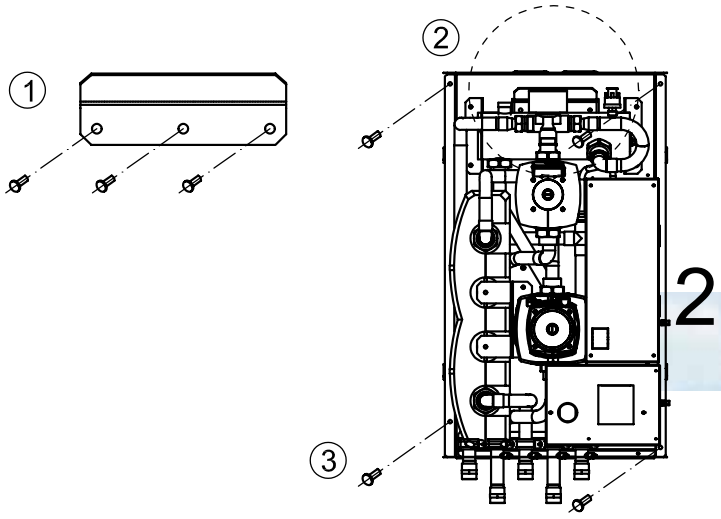
If any of these accessories are not packed with the unit or any damage to the unit is detected, please contact your dealer.

◆ Installation

Wall support

- Step ❶: Fix the wall support
  Fix the wall support to the wall using appropriate plugs and screws. Make sure that the wall support is completely levelled.
- Step ❷: Hang the Hydraulic Module on the wall support (two persons are required for bringing up the unit, the weight of the unit is approximately 60kg.)
- Step ❸: Fix the Hydraulic Module at the bottom side using appropriate plugs and screws. To do so, the unit is equipped with two holes at the bottom outer edges of back plate frame (there are two additional holes on the upper outer edges of the back plate frame in cases where the wall support could not be installed).

RHM-EH/BC-01E



2

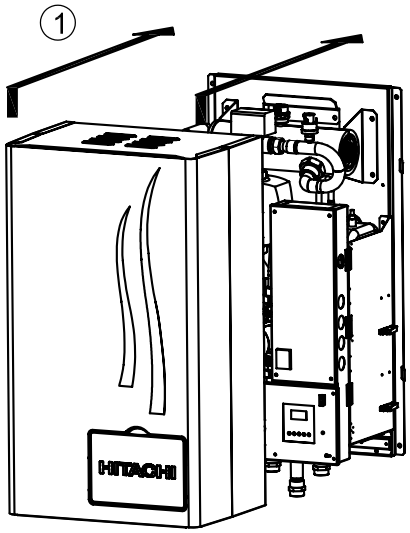
Cover assembly

RHM-EH/BC-01E

NOTE

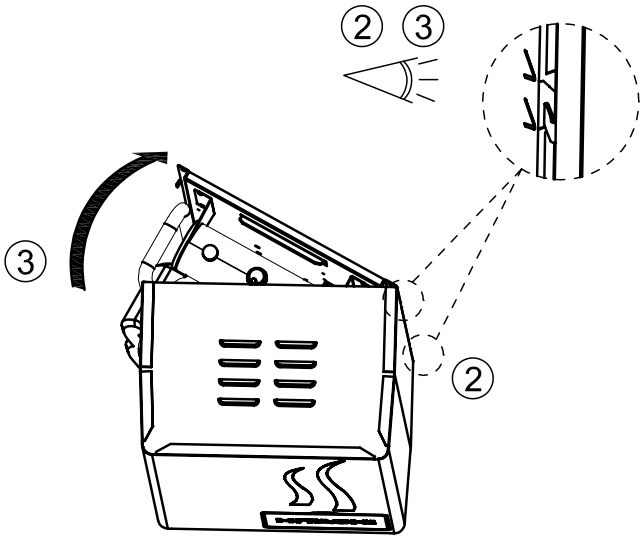
This operation should be performed once the pipes work of the unit is completed.

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



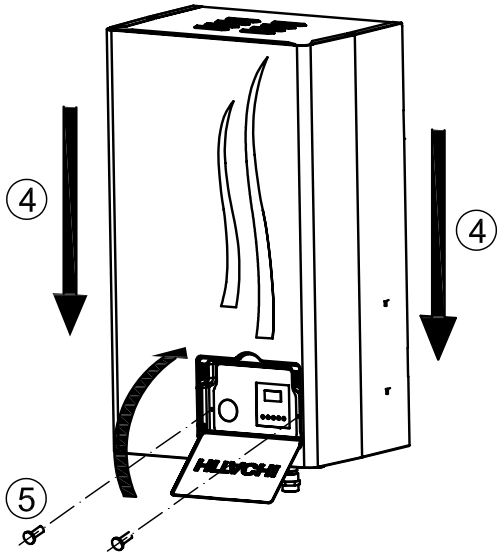
RHM-EH/BC-01E

- Step ❷: Put the right side cover holes into the back plate frame hooks (x2 locations) by the help of the external marks indicated by ">").
- Step ❸: When the right side is centred, repeat the operation on the left side. Put the left side cover holes into the back plate frame hooks (x2 locations) by the help of the external marks indicated by ">").



- Step ❹: Once the 4 hooks are placed into its corresponding cover holes, move down the cover until the end of the hooks.
- Step ❺: For the final fixation of the cover, open the LCD service cover and screw the two screws with the nylon washers between the screw and the cover.
- Step ❻: Finally, close the user's interface service cover.

RHM-EH/BC-01E



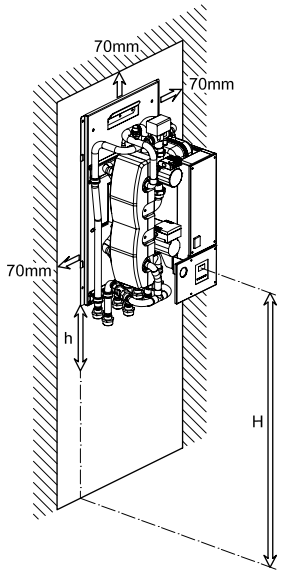
◆ Service space

- Install the Hydraulic Module with sufficient clearance around it to provide good conditions for electrical cables, water connections installation and maintenance.
- Minimum recommended space:

NOTE

H= 1200mm ~ 1500mm.Recommended unit height for proper access to the control panel (System Controller interface).

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



2.2.3 Water pump

◆ Factory-supplied accessories

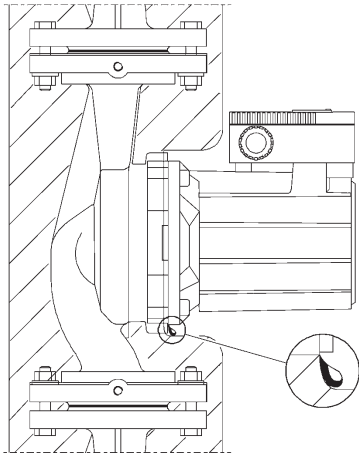
Accessory	Qty	Purpose
Pump	1	-
Pump insulation	2	Only for ATW-PK(1/2/3)-01 models
Gasket	2	Only for ATW-PK(1/2/3)-01 models
Water pipe 2	1	Only for ATW-PK(1/2/3)-01 models
Pump cable	1	-

◆ Installation guidelines:

- Installation should only take place once all welding and soldering work has been completed and the pipe network has been rinsed. Dirt can have an adverse effect on the functioning of the pump.
- The flow direction of the pump must correspond to the directional arrow on the pump housing.

⚠ CAUTION

- *Crash damage. Risk of damage to the O-ring. When turning the motor housing round, ensure the O-ring between the can pot and the pump housing does not become damaged. The O-ring must not be turned and must remain at the edge of the can pot pointing towards the impeller.*
- *Damage by water. Risk of build-up of condensation water. For units that require insulation and for which the standard insulation provided cannot be used, only the pump housing may be insulated. The condensation water openings on the motor flange must be left open.*



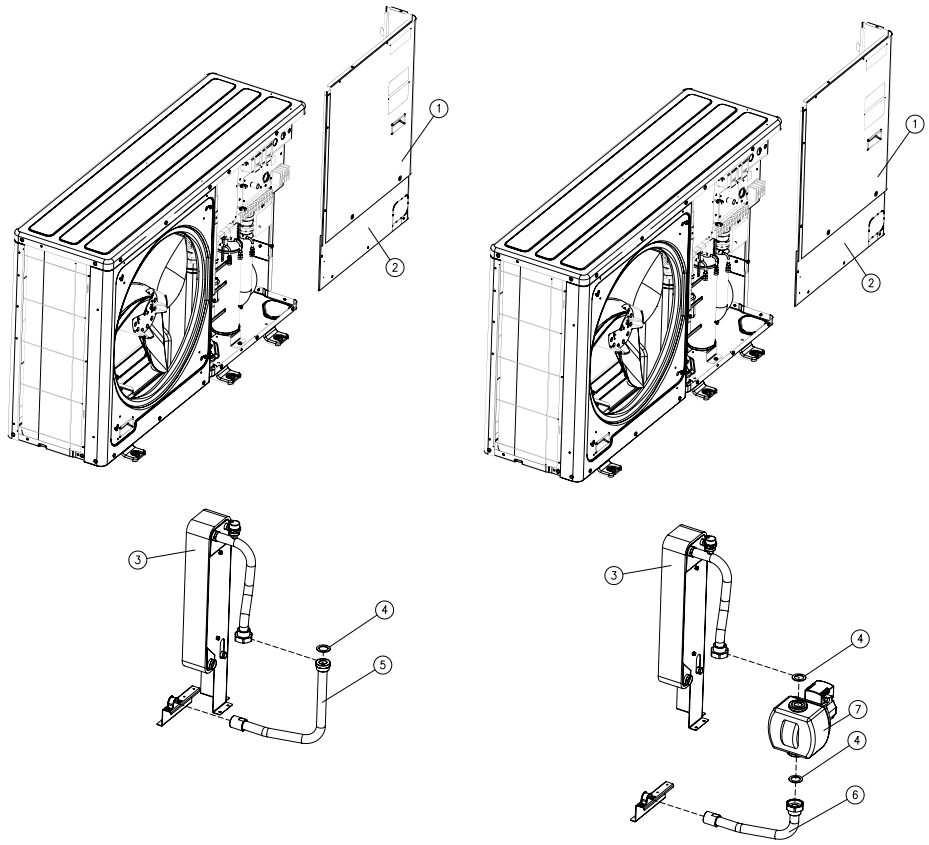
Lateral view of a generic pump

⚠ CAUTION:

- *Untrained personnel. General malfunction and other damages. Assembly and installation should only be carried out by qualified personnel.*
- *Contamination. Risk of poisoning.The pumps must not be used for drinking water or foodstuffs.*

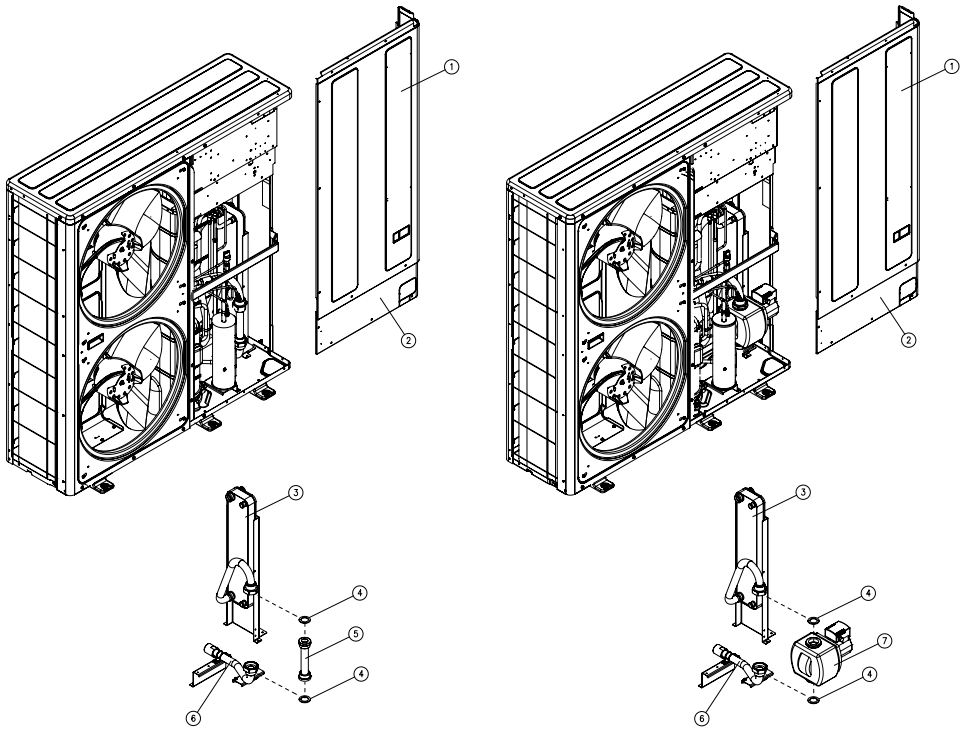
◆ Pump kit assembly

ATW-PK(1/2/3)-01 (For RHUE-3AVHN1)



1. Service Cover 1
2. Service Cover 2
3. Plate Heat Exchanger
4. Gasket
5. Water pipe 1
6. Water pipe 2
7. Water Pump

Pump kit (A/B) (For RHUE-(3-6)A(V)HN-HM



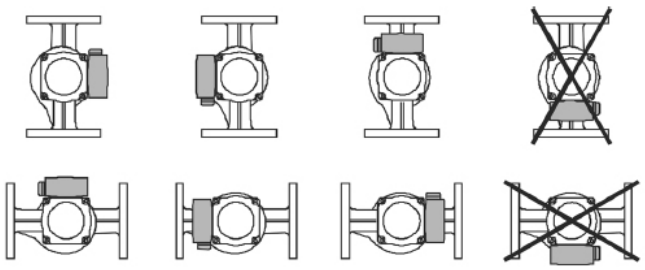
1. Service Cover 1
2. Service Cover 2
3. Plate Heat Exchanger Assembly
4. Gasket (Qty. 2)
5. Water pipe 1
6. Water pipe 2 Assembly
7. Water Pump

Procedure:

- Remove Service cover 1 (item 1) and service cover 2 (item 2).
- Unscrew the nut of the plate heat exchanger assembly (item 3).
- Only for Pump kit (A/B): Unscrew the nut of the water pipe 2 assembly (item 6) in order to disassembly water pipe 1 (item 5) from the YUTAKI M unit.
- Separate the gasket (item 4) to make possible to remove the water pipe 1 (item 5).
- Put the gasket and connect the water pump (item 7) to the YUTAKI M unit and screw again the nut of the plate heat exchanger assembly (item 3) and the nut of the water pipe 2 (item 6).
- Connect the pump cable from the electrical box to the pump according to the detail.
- Assemble the service cover 2 (item 2) and service cover 1 (item 1) to finish the installation.

Additionally, when the pump is installed out of the YUTAKI M unit, the installation must be in accordance with the following guidelines:

- The pump must be installed in an easily accessible place to facilitate inspection and replacement.
- Assemble the pump such that water can not drip into the pump motor or terminal box.
- Carry out stress- free installation with the pump motor shift in horizontal plane (see installation position in the next figure):



- The motor terminal box must not point downwards (see admissible installation position in previous figure). It may be necessary to turn the motor housing round after loosening the hexagon socket screws.

2.2.4 WEH - Water Electric Heater

◆ Factory-supplied components

Transport the products as close as possible to the installation location before unpacking.

Check the contents of the package:

Accessory	Qty
Water electric heater (WEH-6E)	1
Installation and operation manual	1
Wall fixing support	1
M6 x 15 screw	2
M6 washer	2

◆ Selection procedure for YUTAKI M units

NOTE

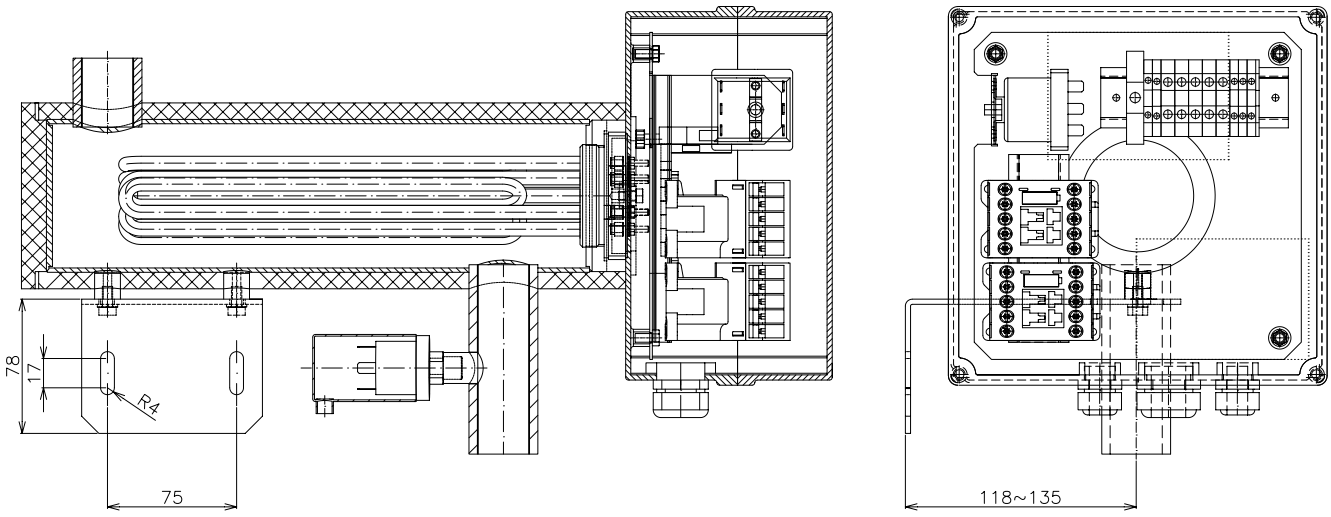
- *WEH appliance must be installed in an indoor place.*
- *WEH installation must be done by professional installers.*
- *Install the WEH with sufficient clearance around it for operation and maintenance as shown in the following figures.*
- *Install the WEH where good ventilation is available. Do not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

NOTE

- *Insufficient ventilation. Can cause oxygen deficiency.*
- *Working with insufficient ventilation, in an enclosed space, can produce toxic gas, especially when cleaning agent is heated to high temperature by, e.g., being exposed to fire.*
- *Do not install WEH near any flammable substance.*

◆ Place provision

Drill 2 holes Ø 8mm on the wall for fixing WEH according to the dimensions of the Wall Support attached.



- Fix the supplied support to the wall by using previous drill holes.
- Use attached screws for fixing WEH to the supplied support.
- Check that WEH are installed horizontally.
- For cleaning, use non flammable and non toxic cleaning liquid. The use of flammable agents should cause explosion or fire.
- Cleaning liquid shall be collected after cleaning.
- Pay attention do not trapp cables when closing the electrical box cover. It could cause a electric shock.

2.2.5 DHWT - Domestic Hot Water Tank

◆ Factory-supplied components

Transport the products as close as possible to the installation location before unpacking.

Check the contents of the package:

- DHWT Model
- Installation and Operation Manual & Documents

Selection procedure for DHWT units

NOTE

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

CAUTION

- *Insufficient ventilation. Can cause oxygen deficiency.*
- *Working with insufficient ventilation, in an enclosed space, can produce toxic gas, especially when cleaning agent is heated to high temperature by, e.g., being exposed to fire.*
- *Do not install DHWT near any flammable substance.*

Working space

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

3. Refrigerant and water piping

Index

3.1 Refrigerant charge

YUTAKI M has been charged from factory.

⚠CAUTION

If charging refrigerant accurately measure refrigerant to be charged.

Overcharging or undercharging of refrigerant might cause compressor trouble.

O/U MODEL	Wo (Kg)
RHUE-3AVHN1 and RHUE-(3/4)AVHN-HM	2.6
RHUE-5A(V)HN-HM	3.4
RHUE-6A(V)HN-HM	4.2

NOTE

YUTAKI M is an appliance designed to be installed outdoor. Should it be covered by an enclosure, this shall be done according to the EN378 (KHK standard can also be considered as a reference), so that the refrigerant concentration be below 0.44 kg/m³ (i.e., provide a shutterless opening that will allow fresh air to flow into the enclosure).

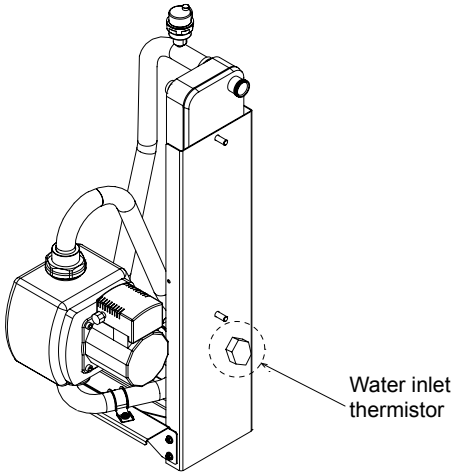
3.2 Hydraulic circuit of YUTAKI M

3.2.1 General notes

1. Connect all pipes as close as possible to the unit, so that disconnection can be easily performed when required.
2. Water Check Valve shall be installed to protect the system against back pressure, back flow and back syphonage of non-potable water into service pipe, plant and equipment. It is supplied as accessory (ATW-WCV-01).
3. It is recommended to use flexible joints for the piping of water inlet and outlet, so vibration will not be transmitted.
4. Whenever possible, sluice valves should be installed for water piping, in order to minimise flow resistance and to maintain sufficient water flow.
5. Proper inspection should be performed to check for leaking parts inside and outside the system, by completely opening the hot water inlet and outlet valves to the water condenser.
   Additionally, install equip valves to the inlet and outlet piping.
6. This unit is equipped with an air purge at the highest position of the water system. If this position is not the highest one within the whole water installation, equip another air purge.
   Also, equip a drain cock on the outlet piping. The cock handle should be removed so that the cock can not be opened under normal circumstances. If this cock is opened during operation, trouble will occur due to water blow-off.
7. When necessary, put insulation on the pipes in order to avoid heat losses.
8. When the unit is stopped during shutdown periods and the ambient temperature is very low, it is possible that the water in the pipes and in the circulating pump freeze, thus damaging the pipes and the water pump.
   In order to prevent this, during shutdown periods it is useful to empty the water from the installation.

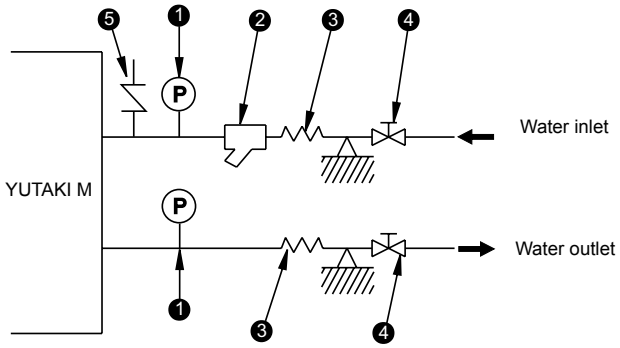
NOTE

Example for RHUE-(3-6)A(V)HN-HM units: Open the unit by removing the service cover and unscrew the water inlet thermistor in order to drain the water of the circuit (as shown below)



Otherwise, it is recommended to maintain the power supply to the installation, since an electric cord could prevent the freezing of the water contained in the circuit. Additionally, in cases where water drainage is difficult, an antifreeze mixture of glycol (ethylene or propylene) should be used (content between 10 % and 40 %)

The performance of the unit working with glycol may decrease in proportion to the percentage of glycol used, since the density of glycol is higher than that of water. (For more information, see the Technical Catalogue).



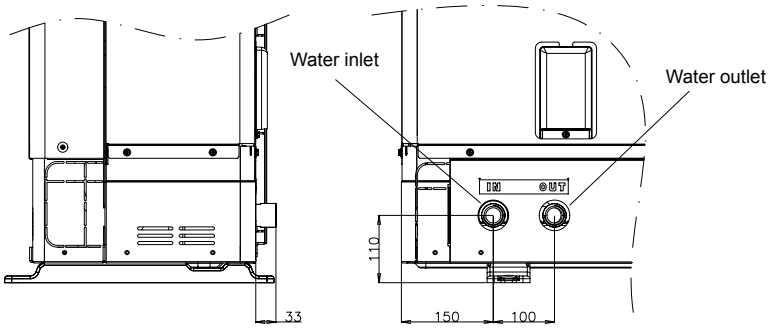
No.	Name of item
①	Pressure gauge
②	Strainer
③	Flexible joint
④	Valve
⑤	Check valve

⚠ CAUTION

- *This product is equipped with plate type heat exchanger. In the plate heat exchanger water flows through a narrow space between the plates. Therefore, there is a possibility that freezing should occur if foreign particles or dust are clogged. In order to avoid this clogging, 20 mesh water strainer shall be attached at the inlet of chilled water piping near the product. In case of punching metal type strainer, mesh hole size shall be Ø1.5 mm or less.*
- *Never use the salt type antifreeze mixture, because it possesses strong corrosion characteristics, and water equipment will be damaged.*
- *When connecting several units to a common pipe, its design should ensure that the water flow on each unit is the same. Imbalance of water distribution may cause a serious damage like water freezing in the plate heat exchanger*

3.2.2 Water piping location and connection size

The unit is factory supplied with two unions to be connected to the water inlet/outlet pipe. Refer to the next figure detailing the location of the water pipes location, dimensions and connection sizes



Description	Connection size
Water Inlet	Rp1”
Water Outlet	Rp1”

3.2.3 Pressure drop

The following diagrams show the curves for the YUTAKI M unit (without pump).

This pressure drop it's calculated by the following formula:

$$PD = \alpha \, x \, Q^{\beta}$$

Where:

- *PD*: Pressure Drop (mca)
- *Q*: Water flow (m3/h)
- *α, β*: Parameters (see table)

Model	α	β
RHUE-3AVHN1	0.6075	1.7645
RHUE-(3/4)AVHN-HM	1.2006	1.9271
RHUE-5A(V)HN-HM	0.782	1.9334
RHUE-6A(V)HN-HM	0.2197	1.9339

Diagram for RHUE-3AVHN1

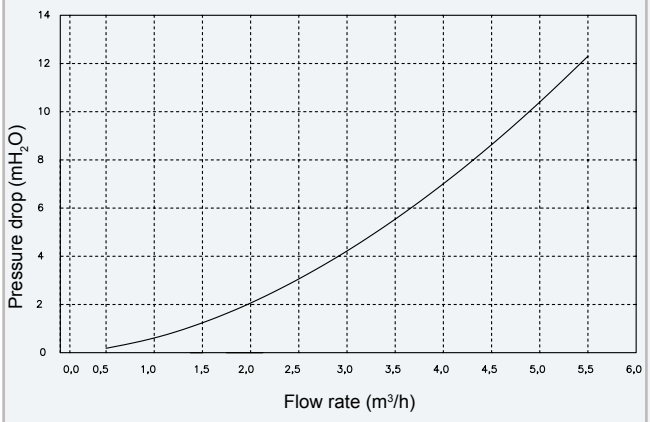


Diagram for RHUE-(3/4)AVHN-HM

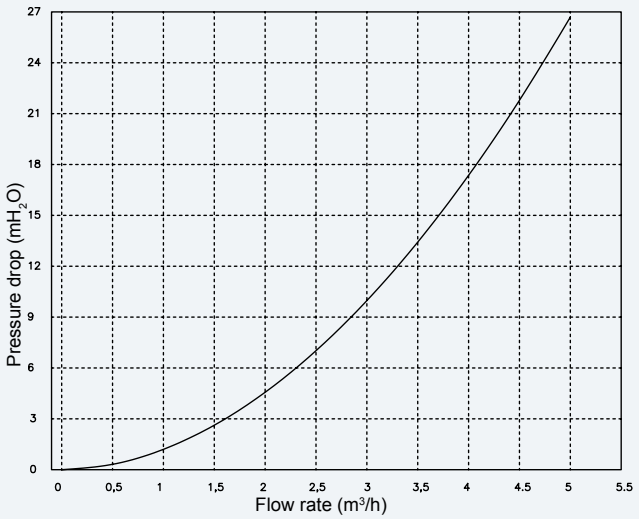


Diagram for RHUE-5A(V)HN-HM

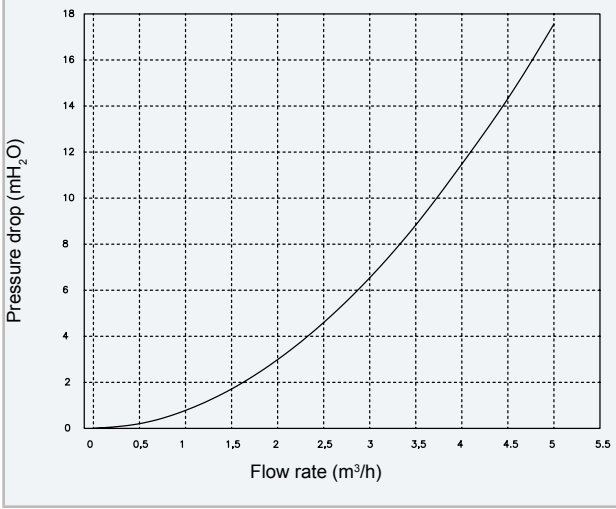
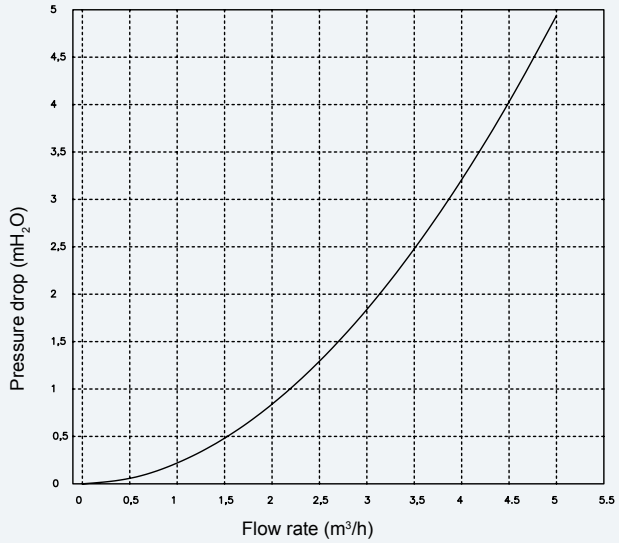


Diagram for RHUE-6A(V)HN-HM



3.2.4 Minimum water volume description

◆ Necessity of Water in System and Summary of Calculation

The following problems should occur when the quantity of water in the forced circulation system(1) on water side is insufficient.

- Compressor in operation repeats rough stops when light-loaded, which should result in shorter life or an accident.
- Low temperature in water circulation system at defrosting, which should cause an alarm (freeze protection).

NOTE

(1) The shaded part of the pipe system below.

** Excluding the expansion tank (cistern).*

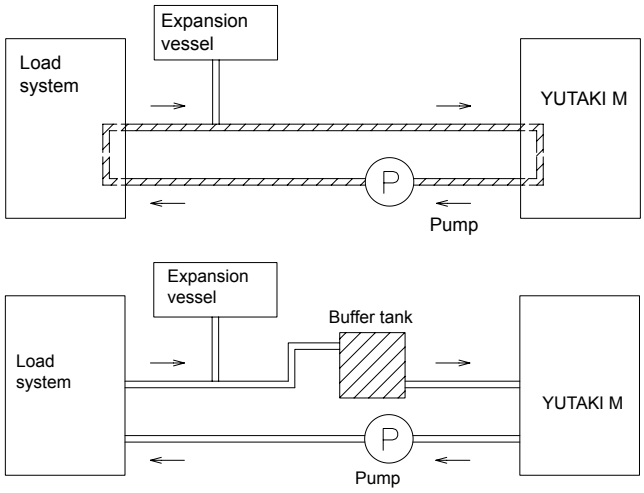
Calculate and ensure that the water volume in the system is equal or greater than the larger value obtained from:

1. "Protective Water Volume for Product" and
2. "Minimum Water volume for Temperature Drop at Defrosting", as shown to the right. Use a "buffer tank " to supply water shortage as shown below(2), when the minimum water volume cannot be ensured.

NOTE

(2) Shortage = Minimum Water Volume – Water Volume in Circulation System

Example for 3AVHN1



The following part shows how to calculate the minimum water volume in the system for product protection (anti-hunting) and temperature drop at defrosting.

1. **Protective Water Volume for Product**

Ensure that the water volume is equal or greater than those shown below, in order to lower ON/OFF frequency of YUTAKI M unit at no load or extreme light load. When water volume is less than the volume indicated (minimum water volume), compressor operation frequently stops at light load, which should result in shorter life or failure.

NOTE

The factory default ON/OFF temperature differential is "4 °C". Note that the minimum water volume varies for different setting for each purpose as shown in the next table:

(Unit: ltrs.)

	Model				
ON/OFF Temp. Differential	RHUE-3AVHN1	RHUE-3AVHN-HM	RHUE-4AVHN-HM	RHUE-5A(V)HN-HM	RHUE-6A(V)HN-HM
4ºC	28	28	38	46	56
3ºC	36	36	48	58	70
2ºC	50	50	65	80	96
1ºC	80	80	107	130	156

2. **Minimum required water volume during defrosting**

The following formula is used to make the calculation:

Where:

$$V = \frac{360 \, x \, Q_{DEF}}{\Delta T \, x \, 4168.8} \; ; \; Q_{DEF} = Q_I + Q_Y$$

V = Required water volume (m^3)

The minimum volume of water needed in the installation to cover the heat loss caused by a reduction in the delivery water temperature during defrosting.

ΔT = Permissible water temperature drop (ºC)

Drop in the delivery water temperature that the client is willing to allow in the installation.

Q_{DEF} = Heat loss during defrosting (kW)

Heat loss caused in the system by reducing the delivery water temperature, which may affect the user's comfort level of warmth. This value is the sum of the two following items:

Q_I = Heat demand from the installation (kW)

While defrosting is taking place, the unit is not providing the heat required to cover the heat demand from the installation. This value can be obtained in 2 ways:

1. By using the value of the energy demand from the installation, if known.

2. If this value is not known, it can be estimated by using the heating capacity of the unit at an air temperature of 0ºC WB and a delivery water temperature at, for example, 45ºC.

Q_Y = Cooling load on the YUTAKI M unit (kW)

In addition to not providing the heat required to cover the heat demanded by the installation during defrosting, the unit is also producing cold. It can be estimated that this value is approximately 85% of the heating capacity on the unit under standard conditions (air temperature: 6/7ºC (WB/DB) and input/output temperature of the water: 40 / 45 ºC).

NOTE

The maximum time for defrosting considered is 10 minutes per hour.

To obtain the capacity data, it's necessary refer to the Technical Catalogue.

The following table shows the minimum water volume needed in each YUTAKI M unit in case of a permitted drop in temperature of 10ºC.

(Unit: ltrs.)

	Model				
Water temperature drop	RHUE-3AVHN1	RHUE-3AVHN-HM	RHUE-4AVHN-HM	RHUE-5A(V)HN-HM	RHUE-6A(V)HN-HM
5ºC	232	212	276	342	410
10ºC	116	106	138	171	205
15ºC	77	71	92	114	137
20ºC	58	53	69	86	103
25ºC	46	42	55	68	82

NOTE

The values shown on the table are based on theoretical installation conditions. In addition, YUTAKI M unit admits several hydraulic circuits configurations, and the value can be different depending on each specific installation.

Therefore, it rests with the client to recalculate these values depending on the real conditions of the installation.

3.2.5 Water control

⚠CAUTION

- *When industrial water is applied for chilled water and condenser water, industrial water it rarely causes deposits of scales or other foreign substances on the equipment. However, well water or river water should in most cases contain suspended solid matter, organic matter, and scales in great quantities. Therefore, such water should be subjected to filtration or to a softening treatment with chemicals before application as chilled 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.*

The following is the recommended standard water quality.

Item	Chilled Water System		Tendency (1)	
	Circulating Water (20 C Less than)	Supply Water	Corrosion	Deposits of Scales
Standard Quality pH (25 °C)	6.8 ~ 8.0	6.8 ~ 8.0	●	●
Electrical Conductivity (mS/m) (25°C) {μS/cm} (25 °C) (2)	Less than 40 Less than 400	Less than 30 Less than 300	●	●
Chlorine Ion (mg Cl^-/l)	Less than 50	Less than 50	●	
Sulphur Acid Ion (mg SO_4^{2-}/l)	Less than 50	Less than 50	●	
The Amount of Acid Consumption (pH 4.8) (mg $CaCO_3$/l)	Less than 50	Less than 50		●
Total Hardness (mg $CaCO_3$/l)	Less than 70	Less than 70		●
Calcium Hardness (mg $CaCO_3$/l)	Less than 50	Less than 50		●
Silica L (mg SIO_2/l)	Less than 30	Less than 30		●
Reference Quality Total Iron (mg Fe/l)	Less than 1.0	Less than 0.3	●	●
Total Copper (mg Cu/l)	Less than 1.0	Less than 0.1	●	
Sulphur Ion (mg S^{2-}/l)	It shall not be detected.		●	
Ammonium Ion (mg NH_4^+/l)	Less than 1.0	Less than 0.1	●	
Remaining Chlorine (mg Cl/l)	Less than 0.3	Less than 0.3	●	
Floating Carbonic Acid (mg CO_2/l)	Less than 4.0	Less than 4.0	●	
Index of Stability	6.8 ~ 8.0	-	●	●

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.*

3.3 Hydraulic circuit of accessories

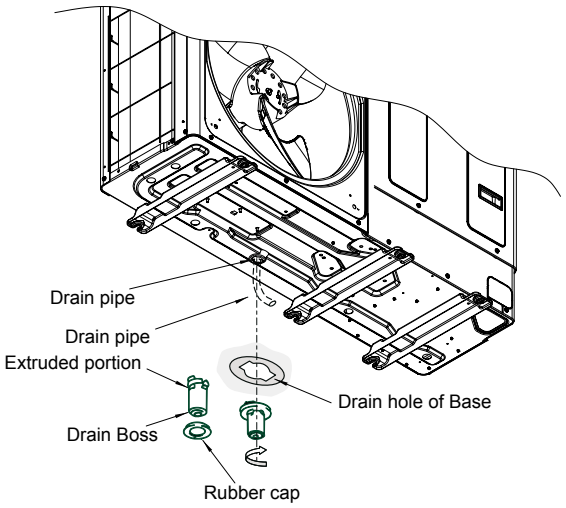
3.3.1 Accessory for the connection of the water drain discharge

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

Model	Applicable Model
DBS-26	RHUE-(3-6)A(V)HN(1)(-HM)

◆ **Connecting 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 counter-clockwise.
3 Size of the drain boss is 32 mm (O.D.)
4 A drain pipe should be field-supplied



NOTE

Do not use this drain boss set in a cold area because the drain water should freeze. This drain boss is not sufficient to collect all the drain water. If collecting drain water is completely required, provide a drain-pan that is bigger than the unit base and install it under the unit with drainage.

3.3.2 Hydraulic module

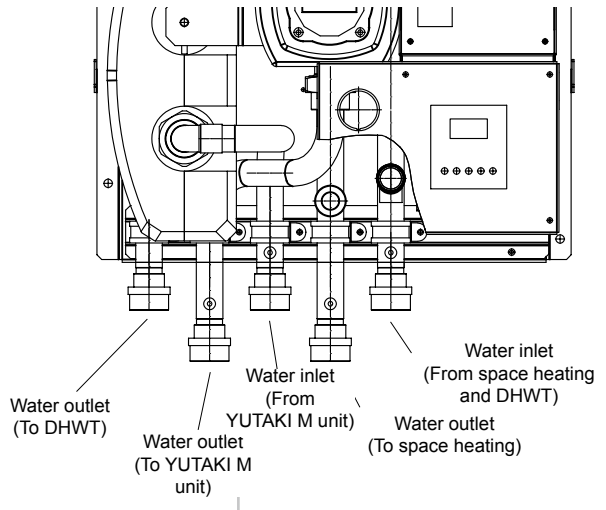
◆ **Water piping connection**

Refer to the figure below where it is detailled the water pipes location.
The Hydraulic Module is factory supplied with threaded unions (1" GAS m) for being connected to the circuit. It is recommended to use shutdown valves (field supplied) for the Hydraulic Module connection to the heating circuit.

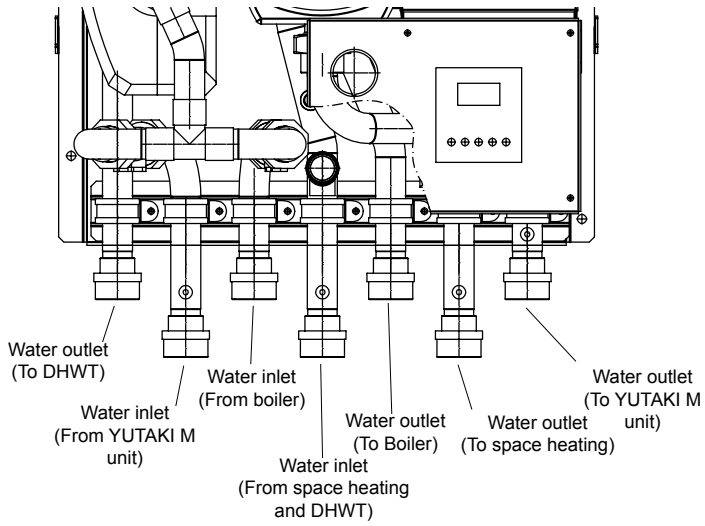
NOTE

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

RHM-EH01E



RHM-BC01E



◆ Draining pipe work

Connect the drain pipe coming from the safety valve (located at the bottom side of the unit) to the general draining system.

NOTE:

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

⚠ CAUTION:

- *Drain taps must be provided at all low points of the installation to permit complete drainage of the circuit during servicing.*
- *Do not drain the water circuit when the system is operationg, water will blow-off and damages will ocure.*

◆ Circuit water filling

The installation shall be filled in throw a shutdown valve (field supplied) which has to be connected to the water circuit between the Hydraulic Module and the heating circuit.

It is necessary to install a check valve (non return valve) at the water fill in point. The check valve actuates as safety device to protect the installation against back pressure, back flow and back syphonage of non potable water into drinking water supply net. The check valve should be field supplied.

Charge the water circuit until a water pressure of 1.7~2.0 bar (recommended 1.8 bar).

Fill in the water circuit with water (from the drinking water supply net). The water of the heating installation must be according to EN directive 98/83 EC. It is not recomended non sanitary controlled water (as per example, well, river, lake, etc…).

⚠ CAUTION:

- *The maximum water pressure is 3 bar (safety valve nominal opening pressure).*
- *Take care 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.*
- *Two automatic air vent are provided inside the Hydraulic Module. Additional air vents shall be provided at all high points of the circuit. The air vents should be located at points which are easily accessible for servicing. Check that the air vent is not tightened too much so that automatic release of air in the water circuit remains possible.*
- *The internal air pressure of the expansion vessel tank shall be addapted to the final installation water volume (factory supplied with 1 bar. of internal air pressure). Refer to the technical catalogue data for expansion vessel tank air pressure compensation.*

◆ Water flow adjustment

In every installation the water flow of the circuit must be adjusted according to its particular internal pressure lost. In additions to this, the circuit should be setted according to heating circuit (heating floor, radiators, fan coils) and its corresponding water outlet temperature. So, the procedure for adjusting the water flow is described below:

- 1st., measurement of the pressure lost
- 2nd., check the pump performance curves
- 3rd., selection of the pump speed
- 4th., adjustment of the water flow

• Pressure lost calculation

The Hydraulic Module is factory supplied with four shutdown valves which are provided with a pressure port.

The object of these pressure ports, is giving to the Installer a quick connection for reading the pressure lost of the circuit when commissioning.

Plug a differential manometer on 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] In case of not having a differential manometer, it is possible to do this operation with just one std. manometer (it is recommended to use the same manometer in order to avoid reading mistakes if different devices because of different tolerances or adjustment).*

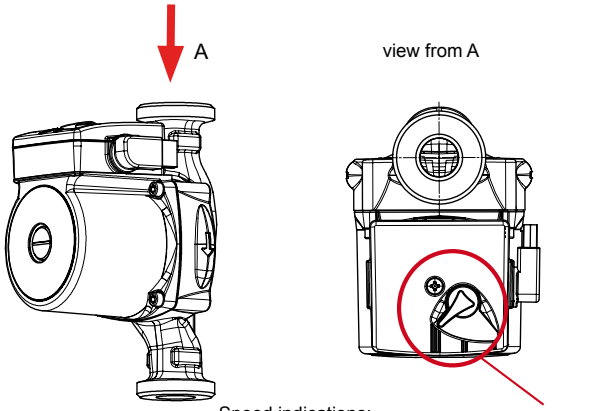
- Check the pump performance curves

Refer to the pumps performance curves for calculating the water flow of the circuit depending on the actual pressure drop and the heating circuit type (heating floor, radiators, fan coils).

- Selection of the pump speed

The pump of the Hydraulic Module, 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.

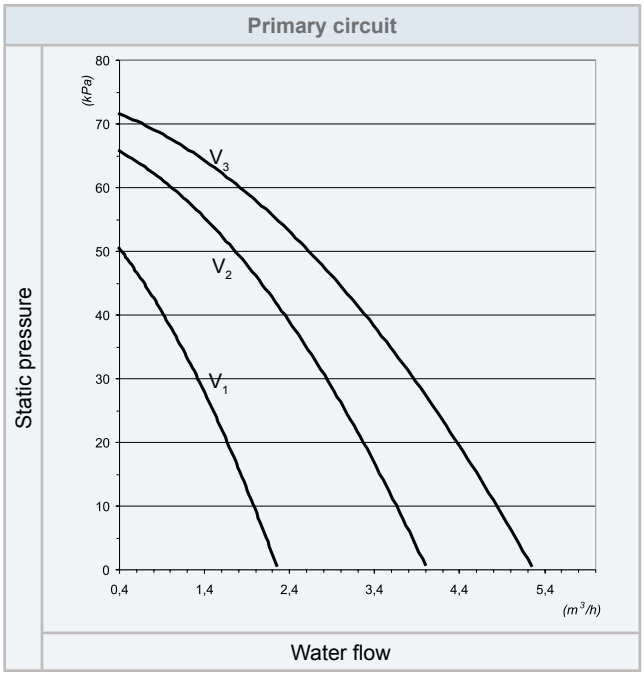


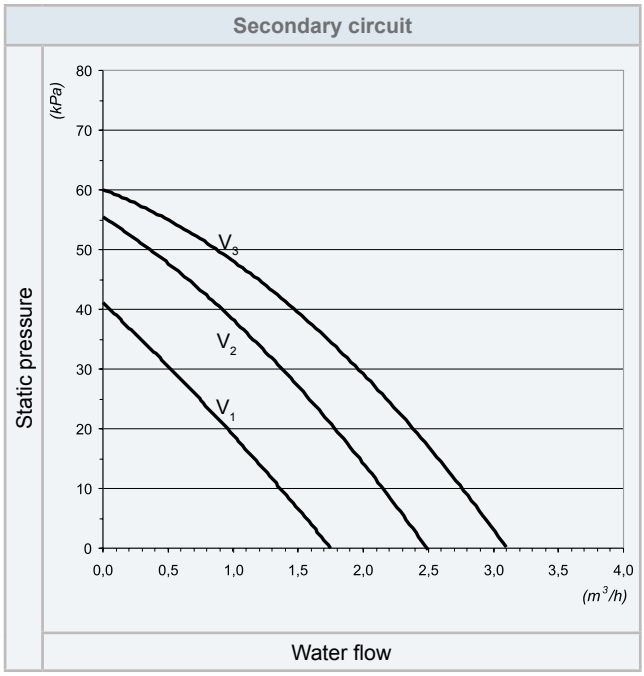
Speed indications:
Speed 1 (Low)
Speed 2 (Medium)
Speed 3 (High)

◆ Pump performance curves

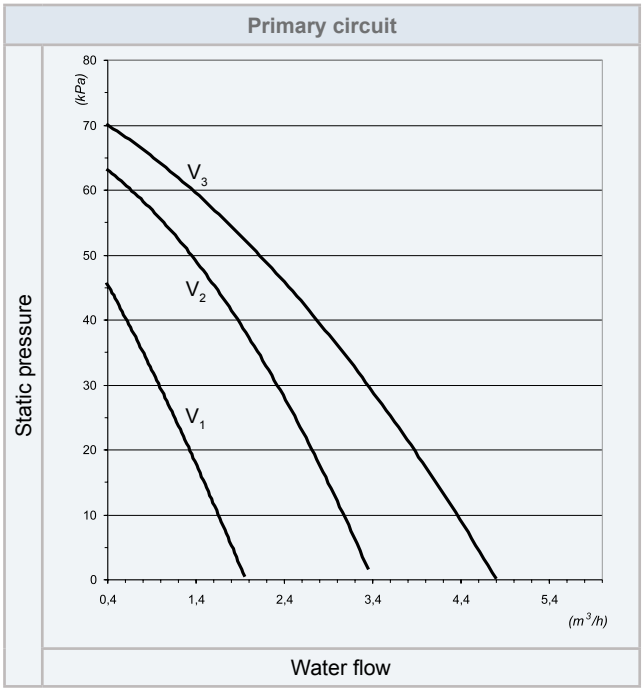
Only Hydraulic Module accessory

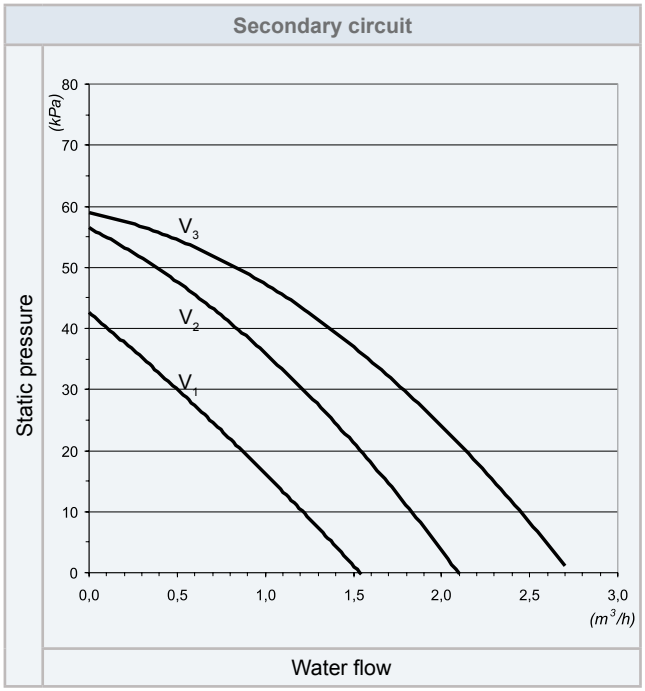
RHM-EH01E





RHM-BC01E





NOTE

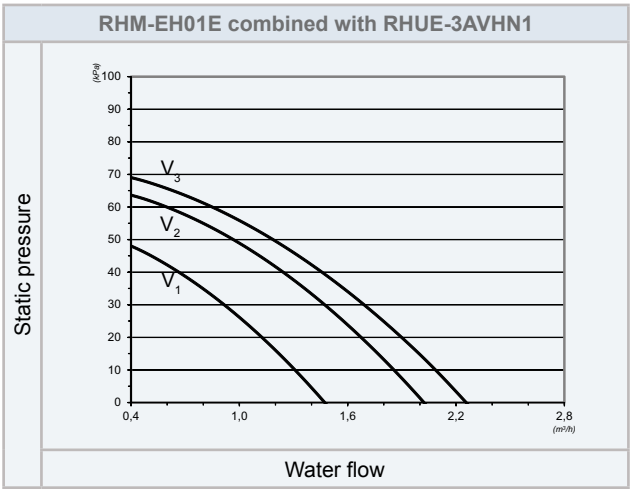
V: Pump motor speed (V_1: Low, V_2: Medium, V_3: High)

YUTAKI M + Hydraulic Module accessory

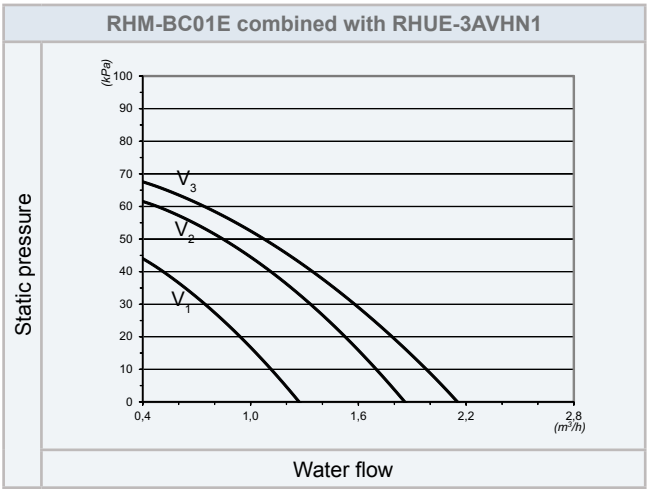
NOTE

- *The following graphics show the available pump performance curves (primary circuit) when the Hydraulic Module is combined with the YUTAKI M unit (internal plate heat exchanger pressure drop has been taken into account).*
- *V: Pump motor speed (V_1: Low, V_2: Medium, V_3: High)*

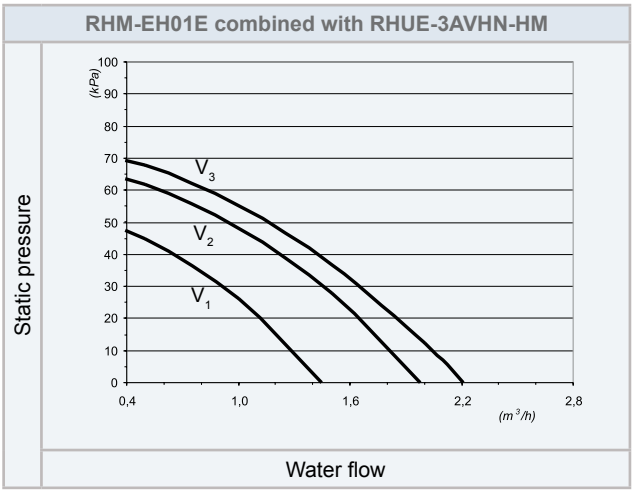
RHM-EH01E combined with RHUE-3AVHN1



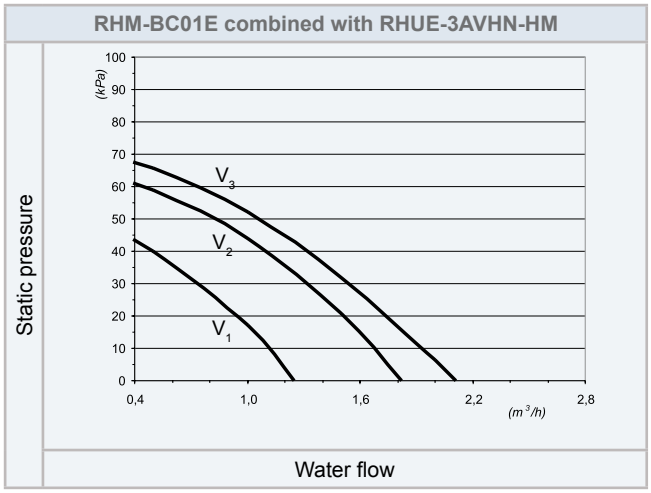
RHM-BC01E combined with RHUE-3AVHN1



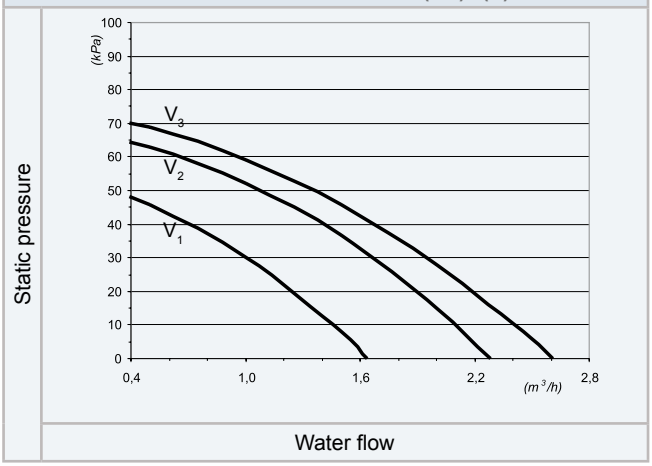
RHM-EH01E combined with RHUE-3AVHN-HM



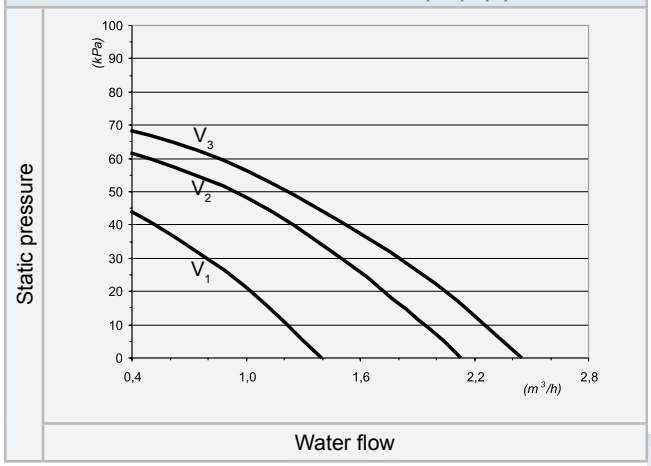
RHM-BC01E combined with RHUE-3AVHN-HM



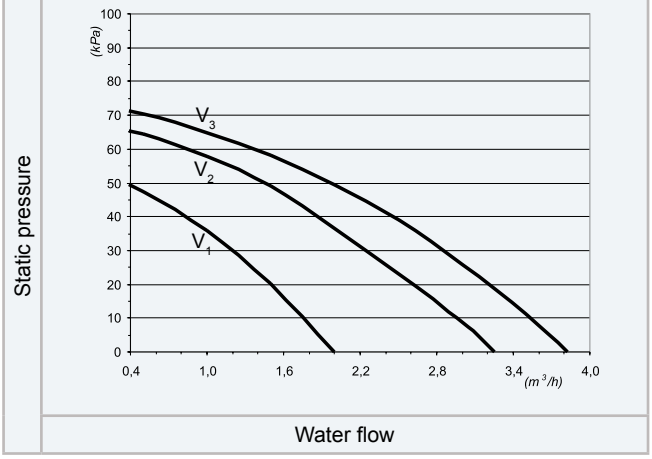
RHM-EH01E combined with RHUE-(4/5)A(V)HN-HM



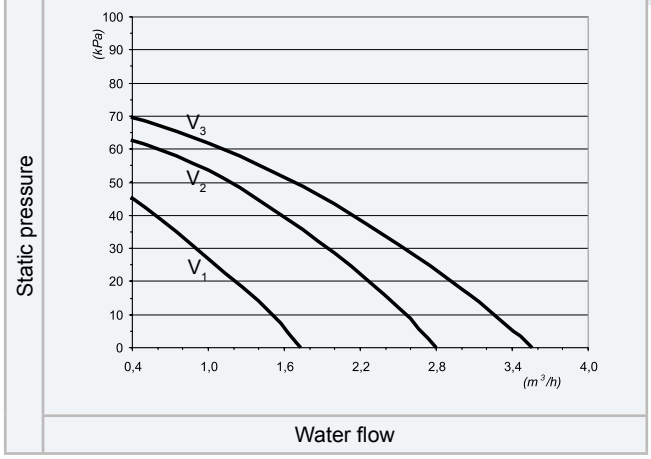
RHM-BC01E combined with RHUE-(4/5)A(V)HN-HM



RHM-EH01E combined with RHUE-6A(V)HN-HM



RHM-BC01E combined with RHUE-6A(V)HN-HM

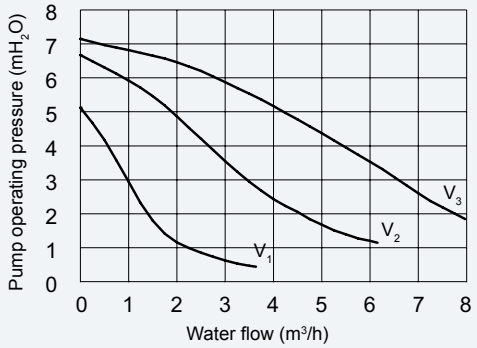


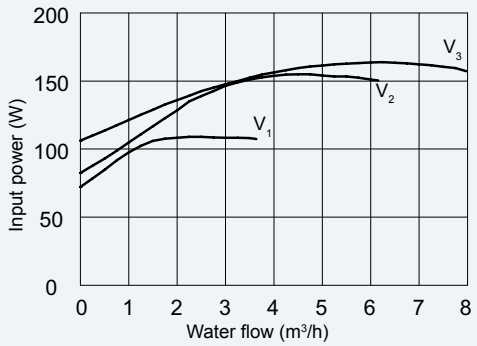
3.3.3 Water pump

◆ ATW-PK(1/2/3)-01 (For RHUE-3AVHN1)

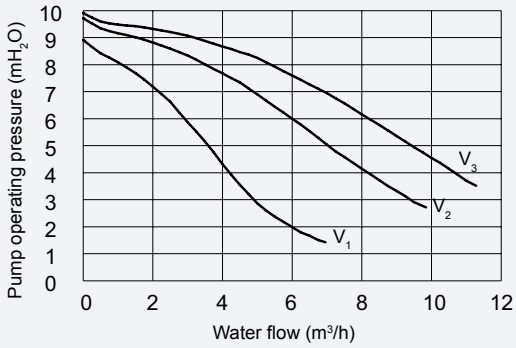
The followings diagrams show the operating curves for the circulating pumps:

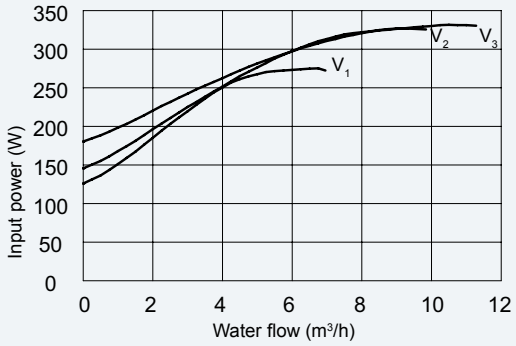
ATW-PK1-01



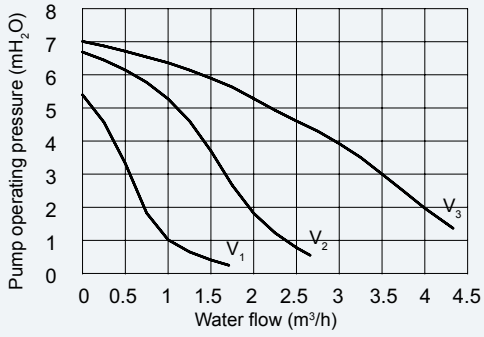


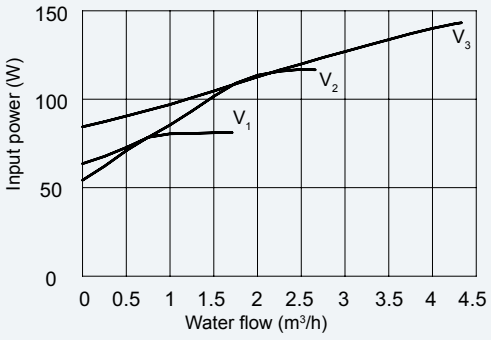
ATW-PK2-01





ATW-PK3-01





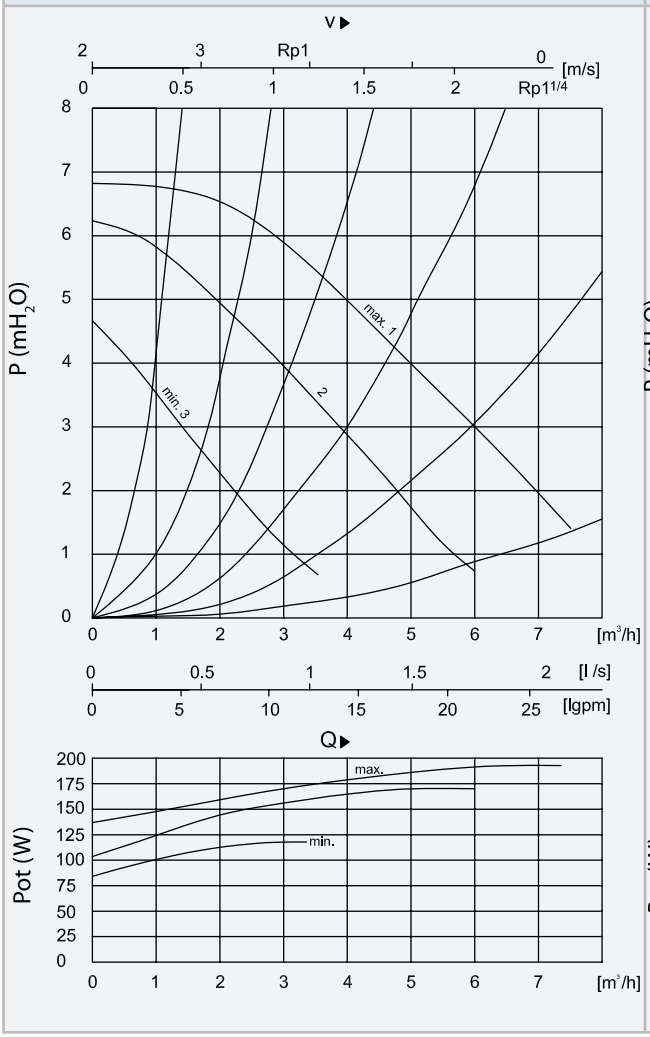
NOTE

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

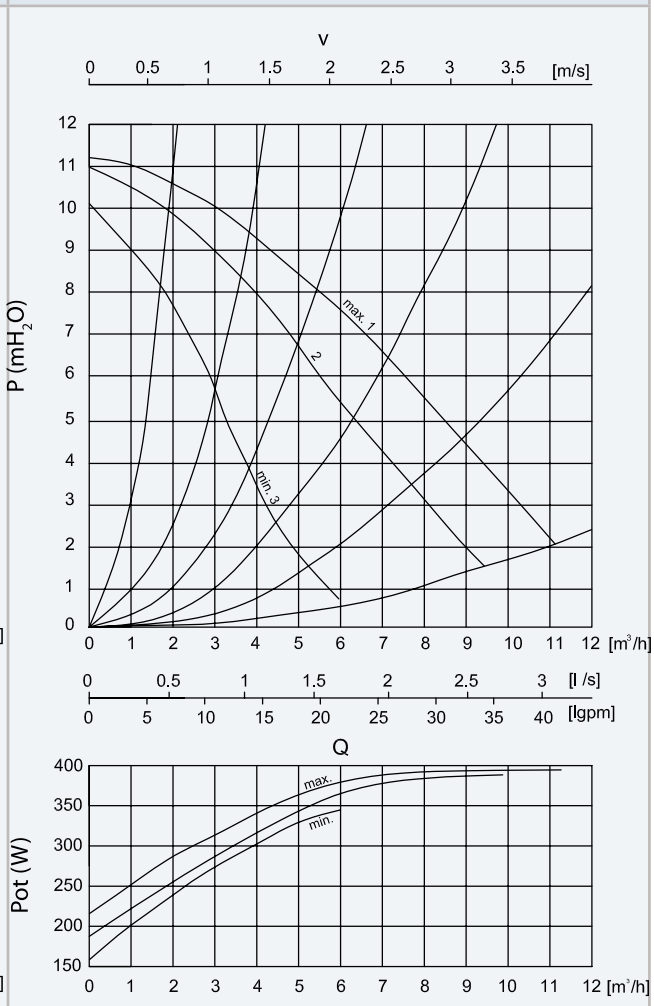
◆ Pump kit (A/B) (For RHUE-(3-6)A(V)HN-HM)

The followings diagrams show the operating curves for the circulating pumps:

Pump Kit A



Pump Kit B

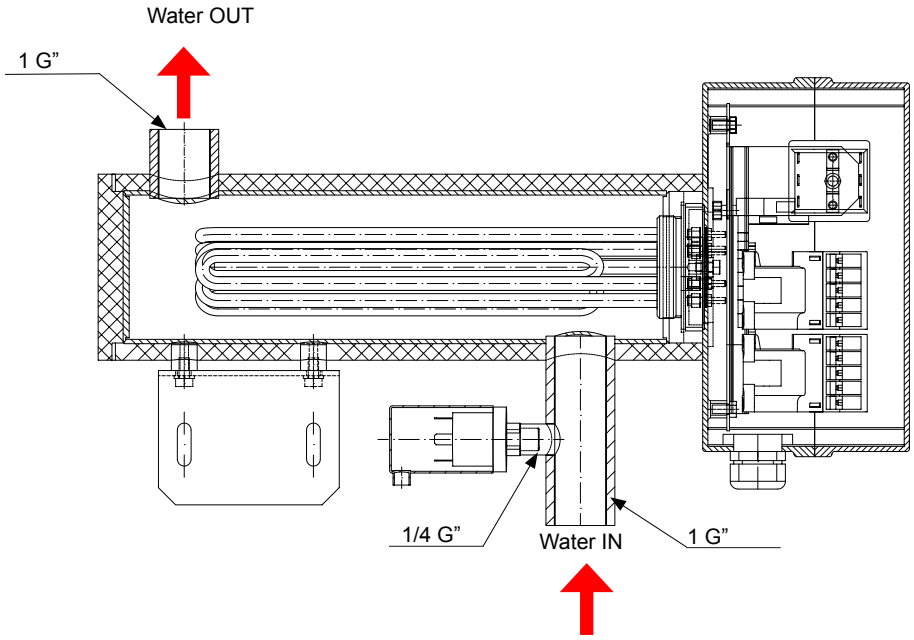


3.3.4 WEH-Water electric heater

◆ General notes

In a mono-energetic system (CONF 2), the electric heater is used if required to increase the supply water temperature:

- It must be kept the water flow direction indicated in the following drawing:



- A low water pressure switch (LPSW) needs to be connected in inlet pipe: 1/8’’ G
- Inlet and outlet connection pipes must be 1 G”

◆ Minim water volume description

The following problems should occur when the quantity of water in the forced circulation system (1) on water side is insufficient.

1 WEH frequently ON/OFF cycles affecting YUTAKI M performance.
2 Low temperature in water circulation system at defrosting, which should cause an alarm (freeze protection).
3 LWPS or Cut-Out thermostat activation due to low water pressure (< 1 bar) or due to excessive high water temperature inside WEH.

NOTE

Calculate and ensure that the water volume in the system is enough (see “3.2.4 Minimum water volume description”)

3.3.5 DHWT-Domestic hot water tank

◆ General Data

Technical specification			DHWT200E-2.5H1E	DHWT300E-2.5H1E	DHWT200S-2.5H1E	DHWT300S-2.5H1E
Tank Water Volume		l	200	300	200	300
Piping connections	Water Inlet domestic connection	inch	1” (male)		1” (male)	
	Water Outlet domestic connection	inch	1” (male)		1” (male)	
	Recirculation	inch	1” (male)		1” (male)	
	In Coil connection	inch	1” (female)		1” (female)	
	Out Coil connection	inch	1” (female)		1” (female)	

◆ General notes

When Piping connections are performed:

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

NOTE

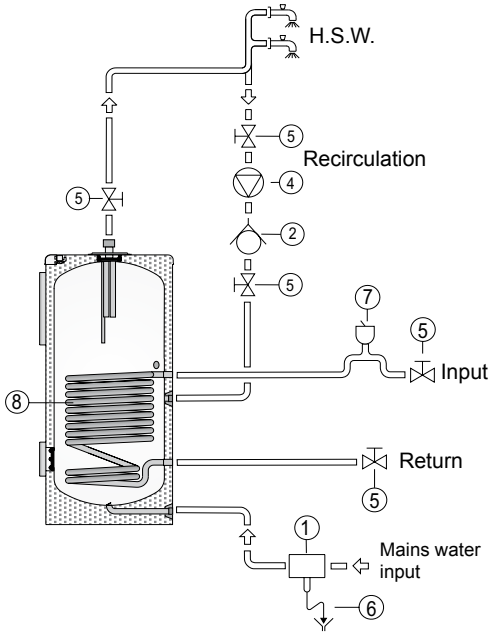
Check periodically:

- *Water flow and pressure*
- *Water leakage's*
- *Fixing points tightening*

CAUTION

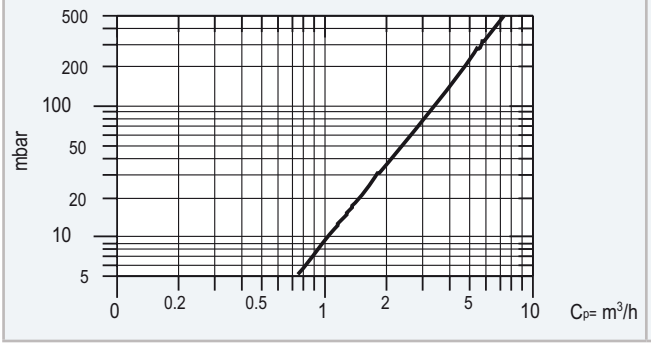
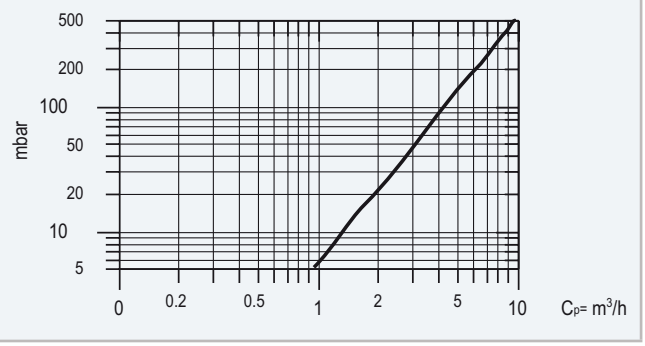
Inlet and outlet connection pipes must be 1G"
It must be kept the water flow direction indicated in previous drawing.

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



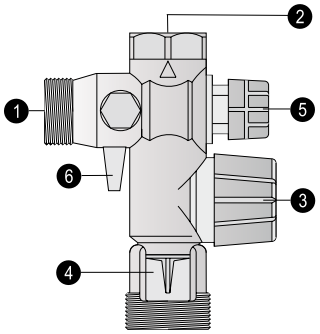
1	Sanitary safety valve unit
2	Non-return valve
3	Circulator
4	Recirculation pump
5	Shutoff cock
6	Drain
7	Drain valve
8	Heating coil

◆ Pressure drops

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

◆ General standard for hydraulic installation

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



Ref.	Name
❶	Main inlet water
❷	DHWT inlet connection
❸	Security valve and manual empty
❹	Emptying connection
❺	Check valve
❻	Close valve

3.3.6 Water check valve

Water check valve (ATW-WCV-01) is a safety device to protect the system against back pressure, back flow and back syphonage of non-potable water into service pipe, plants and equipments.

This valve shall be installed at site.

Main Characteristics:

- Maximum working Pressure: 16bar
- Maximum working Temperature: 70ºC (short term 90ºC)
- Threaded connection R1/2”
- Available test and drain plugs 1/4”
- Length: 137mm
- Kvs value: 6
- Weight: 0.24kg

Installation guidelines:

1. Note flow direction (indicated by arrow) when installing the check valve.
2. In a drinking water supply the check valves are fitted immediately after water meter. This position ensures optimum protection for the drinking water supply.
3. Install in horizontal pipework with test plugs directed downwards. This position ensures optimum protection efficiency and is the best for testing the valve.
4. Shut off valves should be fitted on each side of the check valve for easier and faster valve testing.
5. The installation location should be protected against frost and be easily accessible.

4. Electrical and control settings

Index

4.1 General check

4.1.1 Main notes

- Make sure that the following conditions related to power supply installation are satisfied:
  - The power capacity of the electrical installation is large enough to support the power demand of the YUTAKI M system.
  - The power supply voltage is within ±10% of the rated voltage.
  - The impedance of the power supply line is low enough to avoid any voltage drop of more than 15% of the rated voltage.
- Following the Council Directive 2004/108/EC, relating to electromagnetic compatibility, the table below indicates the Maximum permitted system impedance Zmax at the interface point of the user's supply, in accordance with EN61000-3-11.

MODEL	Zmax (Ω)
RHUE-3AVHN1	0.34
RHUE-3AVHN-HM	0.41
RHUE-4AVHN-HM	0.41
RHUE-5AVHN-HM	0.29
RHUE-6AVHN-HM	0.26
RHUE-5AHN-HM	-
RHUE-6AHN-HM	-

NOTE

In case of outdoor unit three phases connection, Z_{max} is not considered.

- The status of Harmonics for each model, regarding compliance with IEC 61000-3-2 and IEC 61000-3-12, is as follows:

Status regarding compliance with IEC 61000-3-2 and IEC 61000-3-12	Models
Equipment complying with IEC 61000-3-12	RHUE-3AVHN1 RHUE-3AVHN-HM RHUE-4AVHN-HM RHUE-5AVHN-HM RHUE-6AVHN-HM
Equipment complying with IEC 61000-3-2 (professional use only)	RHUE-5AHN-HM RHUE-6AHN-HM

- Check to 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 on this chapter and they comply with national and local codes. If it is necessary, contact with your local authority in regards to standards, rules, regulations, etc.
- Use wires which are not lighter than the polychloroprene sheathed flexible cord (code designation 60245 IEC 57).
- Ensure specifically that there is an Earth Leakage Breaker (ELB) installed for the system.
- If the installation is already equipped with an Earth Leakage Breaker (ELB), ensure that its rated current is large enough to hold the current of the units (indoor, outdoor and the optional DHW tank).

NOTE

- *Electric fuses can be used instead of magnetic Circuit Breakers (CB). In that case, select fuses with similar rated values as the CB.*
- *The Earth Leakage Breaker (ELB) mentioned on this manual is also commonly known as Residual Current Device (RCD) or Residual Current Circuit Breaker (RCCB).*
- *The Circuit Breakers (CB) are also known as Thermal-Magnetic Circuit Breakers or just Magnetic Circuit Breakers (MCB).*

4.1.2 Safety notes

DANGER

Electrical hazard. Can cause serious injuries or death.

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

Crash hazard. Can cause serious injuries.

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

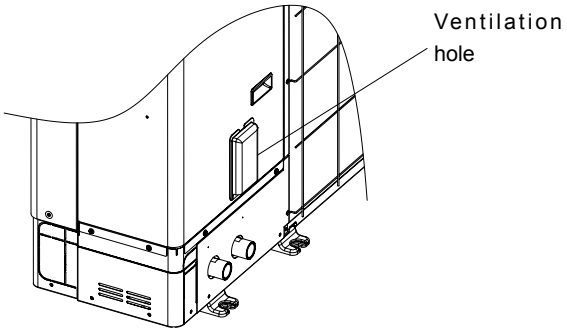
CAUTION

Damage to wires. Risk of fire.

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

Electrical hazard. Risk of fire.

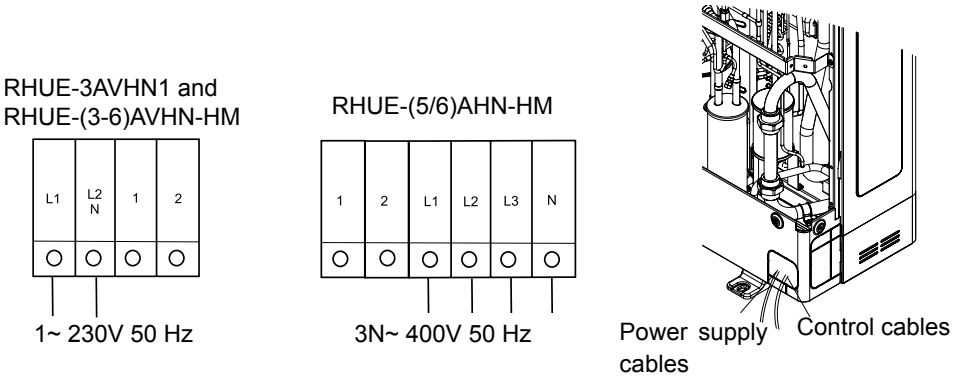
- *Connect a fuse of specified capacity.*
- *Do not pass cables through the ventilation hole.*



4.2 YUTAKI M unit

4.2.1 System wiring diagram

Connect the YUTAKI M unit according to the following figure:



4.2.2 Electrical connection

◆ **Wiring size**

Model	Power supply	Max. current (A)	Power supply cables	Transmission cables
			EN60335-1	EN60335-1
RHUE-3AVHN1	1~ 230V 50Hz	21.8 (*)(18.5)	2 x 4.0 mm² + GND	2 x 0.75 mm²
RHUE-3AVHN-HM		21.0 (*)(18.0)	2 x 4.0 mm² + GND	
RHUE-4AVHN-HM		21.0 (*)(18.0)	2 x 4.0 mm² + GND	
RHUE-5AVHN-HM		29.0 (*)(26.0)	2 x 6.0 mm² + GND	
RHUE-6AVHN-HM		32.0 (*)(29.0)	2 x 6.0 mm² + GND	
RHUE-5AHN-HM	3N~ 400V 50 Hz	14.0 (*)(11.0)	4 x 2.5 mm² + GND	
RHUE-6AHN-HM		18.0 (*)(15.0)	4 x 4.0 mm² + GND	

◆ **Minimum requirements of the protection devices**

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U max. (V)	U min. (V)			
RHUE-3AVHN1	1~ 230V 50Hz	253	207	21.8 (*)(18.5)	32	2/40/30
RHUE-3AVHN-HM				21.0 (*)(18.0)	32	
RHUE-4AVHN-HM				21.0 (*)(18.0)	32	
RHUE-5AVHN-HM				29.0 (*)(26.0)	32	
RHUE-6AVHN-HM				32.0 (*)(29.0)	32	4/40/30
RHUE-5AHN-HM	3N~ 400V 50 Hz	440	360	14.0 (*)(11.0)	20	
RHUE-6AHN-HM				18.0 (*)(15.0)	20	
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker						

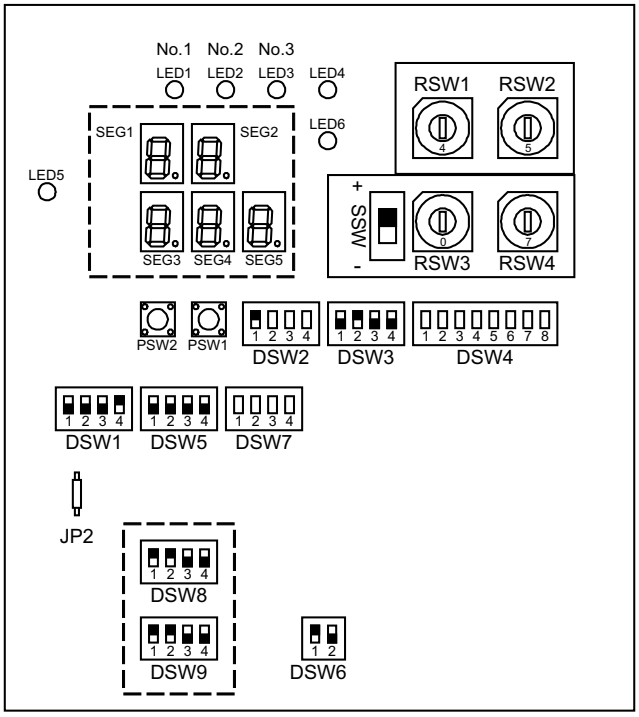
NOTE

(*): Values without connected pump.

4.2.3 Setting of DIP switches and RSW switches

◆ Location of DIP switches and RSW switches

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



RSW1 & RSW2	Heating Setting Temperature
RSW3 & RSW4	Not used
SSW	Up = “+ Temp.” / Down = “-Temp.”
DSW1	Optional Functions
DSW2	Unit Control Configuration / Unit HP
DSW3	Unit Control Configuration
DSW4	Unit Model Configuration
DSW5	H-Link Available / H-Link Address
DSW6	End Resistance / Fuse Recovery
DSW7	Unit Control Configuration
DSW8	Setting Pd Pressure Sensor Type
DSW9	Setting Ps Pressure Sensor Type
LED1,2 & 3	Power Supply Indication
LED4	Operation Status Indication
LED5	Alarm Indication
LED6	Setting Mode Indication
JP2	Cut: Re-Start after Power Failure

NOTE

The mark “■“ indicates the position of dips switches.

No mark “■” or “not available” indicates pin position is not affecting.

The figures show the settings before shipment or after selection.

“Not used” means that the pin must not be changed. A malfunction might happen if changed.

Before setting dips switches, first turn the power source off. Otherwise, the changes will not be taken into account.

◆ Function of the of DIP switches and RSW switches

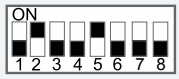
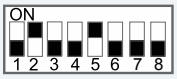
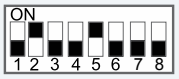
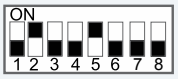
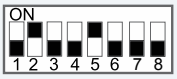
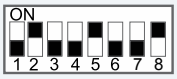
NOTE

- *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.

DIP switch factory setting for all units

DSW	RHUE-3 AVHN1	RHUE-3 AVHN-HM	RHUE-4 AVHN-HM	RHUE-5 AVHN-HM	RHUE-6 AVHN-HM	RHUE-5 AHN-HM	RHUE-6 AHN-HM
DSW1							
DSW2							
DSW3							
DSW4							
DSW5							
DSW6							
DSW7							

DSW8 = DSW9 (For all units)	

Rotary switches

RSW1 & RSW2: heating temperature setting
RSW3 & RSW4 & SSW: not used

DSW1: optional functions

Function	Set PINs
Factory setting	
PCB self checking	
Pump / High cut test	
Optional functions setting mode	
Compressor enable	

DSW2: unit control configuration / unit HP

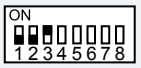
Function		Set PINs
Remote ON/OFF signal	Pulse signal commissioning	
	Level signal (System controller)	
PHEX flow direction	(Not used)	
	Counter flow (YUTAKI M)	

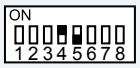
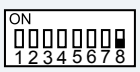
Function	Set PINs
3HP unit	
4HP unit	
5 HP unit	
6 HP unit	

DSW3: unit control configuration

Function	Set PINs
YUTAKI M unit	
Available low ambient for cooling mode (Not available)	
Heating only (Not used)	
Set temp by rotary switch (Commissioning)	
Set temp by system controller (4 to 20 mA)	

DSW4: unit model confgurations

Function	Set PINs
(Not used)	
(Not used)	
Heat pump	
YUTAKI M heat pump	
(Not used)	
(Not used)	
(Not used)	
(Not used)	

Function	Set PINs
(Not used)	
(Not used)	
R410A	
CO_2 (Not used)	
Power save (Max Hz=Nominal)	
(Not available)	
230 V	
400 V	

DSW5: H-LINK available / settings

Function	Set PINs
Not used	
Not used	

DSW6: end resistance / fuse recovery

Function	Set PINs
Not used	
Not used	

DSW7: unit control configuration

Function	Set PINs
Three phase	
Single phase	
Not used	
Inverter compresor	
Cancel zero-reset expansion valve	
Liquid injection enable	

DSW8 (Pd) / DSW9 (Ps): setting Pd / Ps pressure sensor type

Function	Set PINs
Not used	
Pressure sensor R410A	

◆ Jumpers

Jumper lead setting (JP2): Automatic restart after power failure

Keep the same status as before. Setting before shipment:

0 = Open; 1 = Short circuit

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

Setting	Function	Details
0	Enable	If this function is 'Enable', in case of power failure the unit will restart automatically once the power is recovered
1	Disable	

◆ LED indication

LED1, LED2 and LED3: Power supply indication

Status	LED1	LED2	LED3
Power supply ON	ON	OFF	OFF
Power supply OFF	OFF	OFF	OFF
		Not available	

LED4: Operation status indication

Status	LED4
Unit stopped	OFF
Unit running	ON
Alarm	OFF

LED5: Alarm indication

Status	LED5
Normal	OFF
Alarm	ON

LED6: Setting mode indication

Status	LED6
Setting mode disable	OFF
Setting mode enable (DSW1#3: ON)	ON

4.3 Accessories

4.3.1 Advanced system controller

◆ General notes

CAUTION

- *Disconnect the mains power supply before installing the System Controller.*
- *Do not reconnect the mains power supply until you have completed the installation.*
- *The System Controller must be installed by a suitably qualified person, in accordance with local standards and guidelines.*

For safety reasons the wiring of the mains and the low voltage wires are separated and in different compartments of the mounting base.

- On the top side the low voltage wiring is laid out (inputs, mainly sensors).
- On the bottom side the mains and the earth wiring is situated (power and output relay contacts).

NOTE

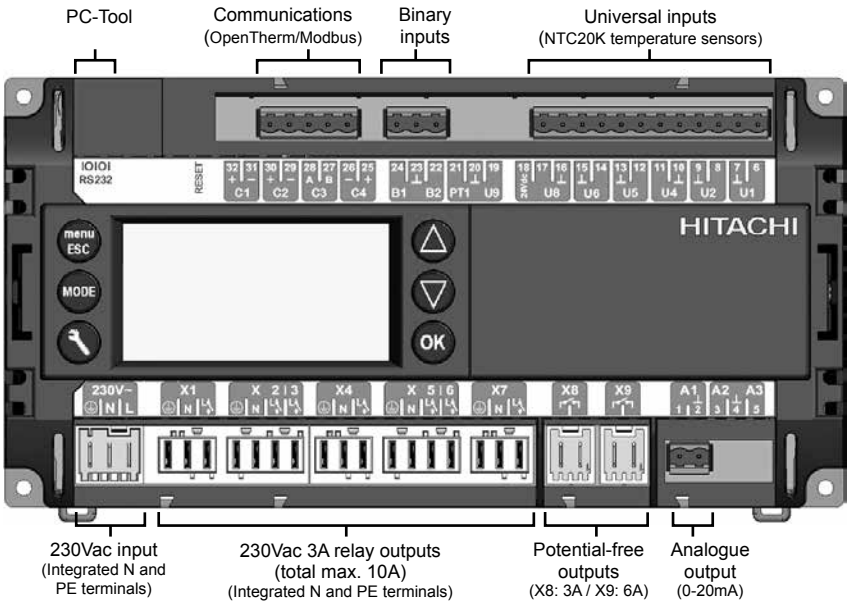
It is important that power supply lines are kept separate from signal / data communications lines. This is to minimise the risk of electrical interference.

◆ Wiring connections location

CAUTION

- *The electronic components within the System Controller are susceptible to damage from static electricity. Therefore, appropriate measures must be taken when handling the device.*
  - *Do not touch the internal components.*
  - *Touch an earthed piece of metal to discharge static electricity from your body.*
- *A short circuit or incorrect installation will damage the System Controller.*

Separate push-on terminal blocks are supplied for connection to the System Controller. These are labelled with the ID of each connection and can be wired prior to pushing onto the appropriate location on the System Controller.



◆ Summary of wiring connections

The water temperature sensors can be inserted into suitable immersion wells or strapped on to a pipe using the supplied metal clip.

Mains input and control wiring connections

ID	Description	Type & rating	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1
230V~	Mains power	230V~ input	●	●	●	●	●	●	●
X1	HC1 Pump	230V~ Relay with N & E, 3A	●	●	●	●	●	●	●
X2:X3	HC1 Mixing Valve	230V~ 2 x Relay with N & E, 3A	–	●	–	●	●	●	●
X4	HC2 Pump	230V~ Relay with N & E, 3A	–	●	–	●	●	●	●
X5:X6	HC2 Mixing Valve	230V~ 2 x Relay with N & E, 3A	–	●	–	–	–	●	–
X5	Electric Heater stage 1	230V~ Relay with N & E	–	–	●	●	–	–	–
X6	Electric Heater stage 2	230V~ Relay with N & E	–	–	●	●	–	–	–
X5:X6	Bypass / Mixing Valve	230V~ 2 x Relay with N & E, 3A	–	–	–	–	–	–	●
X7	DHW Pump	230V~ Relay with N & E	–	●	–	●	●	●	●
X7	DHW Valve	230V~ Relay with N & E	●	–	●	–	–	–	–
X8	Heat Pump	230V~ Potential-free 3A, min 5Vdc	●	●	●	●	●	●	●
X9	DHW Electric Heater	230V~ Potential-free 6A, min 5Vdc	●	●	●	●	–	–	–
X9	Boiler	230V~ Potential-free 6A, min 5Vdc	–	–	–	–	●	●	●
X5	Boiler Pump	230V~ Relay with N & E, 3A	–	–	–	–	●	–	–
A1	Heat Pump Control	0-20mA	●	●	●	●	●	●	●

Communications and input wiring connections

ID	Description	Type & rating	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1
C2	RF Receiver	OpenTherm 2-wire (polarity-free)	●	●	●	●	●	●	●
C3	YUTAKI M communication	RS485 Modbus (polarity-sensitive)	●	●	●	●	●	●	●
B1	Blocking/Tariff Input	Potential-free contact (24Vdc, 1mA)	●	●	●	●	●	●	●
B2	DHW Boost Input	Potential-free contact (24Vdc, 1mA)	●	●	●	●	●	●	●
U1	System Supply Sensor	NTC 20k @ 25ºC	●	●	●	●	●	●	●
U2	HC1 Supply Sensor	NTC 20k @ 25ºC	–	●	–	●	●	●	●
U4	HC2 Supply Sensor	NTC 20k @ 25ºC	–	●	–	–	–	●	–
U5	DHW Sensor	NTC 20k @ 25ºC	●	●	●	●	●	●	●
U6	Boiler Sensor	NTC 20k @ 25ºC	–	–	–	–	–	–	●
U8	Outside Sensor	NTC 20k @ 25ºC (Optional)	○	○	○	○	○	○	○

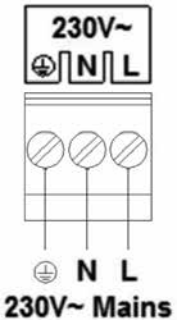
NOTE

- *Connections X1 to X7 have integrated Neutral and protective Earth terminals.*
- *Connections X8 and X9 are potential free.*
- *Connection A1 is 0-20mA.*
- *Maximum combined load of all relays 1-7 is 10A.*
- *Connection C2 is OpenTherm*
- *Connection C3 is Modbus*
- *Connection U8 is optional - if not connected, the outside temperature measured by the Outside Unit is used.*
- ***For the detailed information about the different installation configurations, refer to the section** "5.2 System configuration". **For the detailed description of terminal connections, refer to the section** "Detailed wiring connections".*

◆ Detailed wiring connections

Mains Power

Connect the mains supply to the three terminals as shown. Note: The absolute total maximum input current is 10A, so appropriate wire dimensions and circuit protection should be observed.



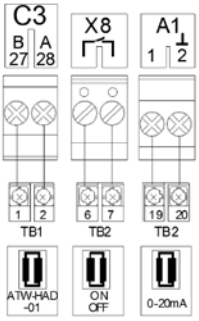
Heat Pump

The System Controller controls the Heat Pump outlet water temperature by a 0-20mA signal. When there is no demand for the Heat Pump to be on, the System Controller directly switches the Heat Pump off (X8). The Heat Pump can signal to the System Controller when it has a fault so that a fault code can be displayed and appropriate action taken.

NOTE

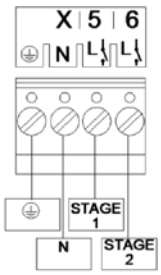
The 0-20mA signal (A1) is polarity-sensitive. You must connect the wires as shown. Please refer to Heat Pump installation manual for terminal connections.

The Modbus signal (C3) is polarity-sensitive. Please refer to Heat Pump installation manual for terminal connections.



Three-Power Level Electric Heater

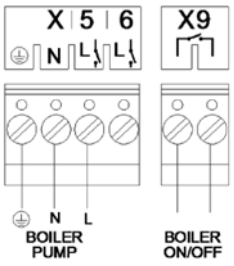
In Mono-Energetic Systems (CONF 2.1 , CONF 2.2), the Electric Heater is used if required to increase the supply water temperature.



Boiler

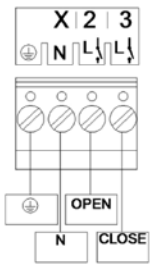
In Bi-Valent Systems (CONF 3.1, CONF 3.2, CONF 4.1) the boiler is used when the Heat Pump cannot achieve the desired supply temperature on its own.

Note: the boiler pump is only connected in CONF 3.1 .



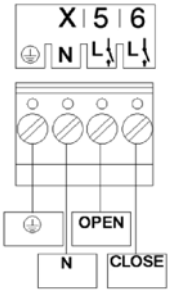
HC1 Mixing Valve

In a mixing system (CONF 1.2, CONF 2.2, CONF 3.1, CONF 3.2, CONF 4.1), the mixing valve for circuit 1 is controlled to maintain the required supply temperature.



HC2 Mixing Valve

In a mixing system (CONF 1.2, CONF 3.2), the mixing valve for circuit 2 is controlled to maintain the required supply temperature.

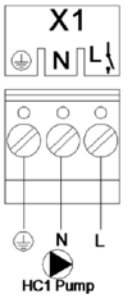


HC1 Water Pump

The circuit 1 pump is the circulating pump for the circuit 1 heating loop in systems (CONF 1.2, CONF 2.2, CONF 3.1, CONF 3.2, CONF 4.1).

After the heating is switched off, the pump continues to run for a short time.

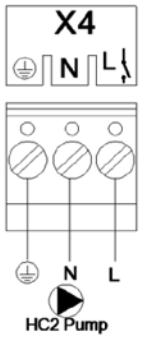
Systems CONF 1.1, CONF 2.1 use the internal water pump of the Heat Pump instead.



HC2 Water Pump

The circuit 2 pump is the circulating pump for the circuit 2 heating loop in systems (CONF 1.2, CONF 2.2, CONF 3.1, CONF 3.2, CONF 4.1).

After the heating is switched off, the pump continues to run for a short time.

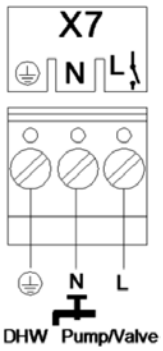


Domestic Hot Water (DHW)

The System Controller can use the Heat Pump and Boiler (bi-valent systems) to maintain the DHW storage tank at the DHW setpoint.

For systems CONF 1.2, CONF 2.2, CONF 3.1, CONF 3.2, CONF 4.1 the connection is to the DHW pump.

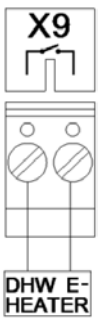
For system CONF 1.1 and CONF 2.1 the connection is to the DHW valve.



DHW Electric Heater

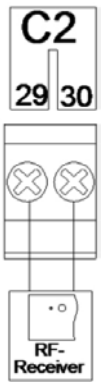
(CONF 1.1, CONF 1.2, CONF 2.1, CONF 2.2 only)

If the DHW storage tank contains a thermostatic electric heater, the System Controller can enable it if the Heat Pump cannot achieve the required DHW temperature by itself. The System Controller does not switch the electric heater on immediately, but only after a specified waiting time.



RF Receiver

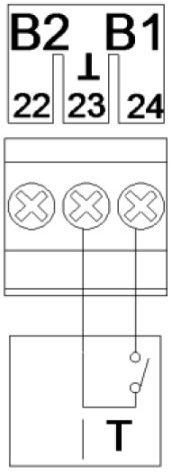
The RF Receiver is connected to the polarity-free terminals. The Room Unit and RF Receiver are already configured to communicate with each other. If the Room Unit or RF Receiver are replaced, or a second Room Unit is to be connected for Heating Circuit 2, it is necessary to



DHW and Heat Pump Time Clock

It is possible to connect an external time clock to the System Controller to provide time-of-day switching of the DHW storage. The input can be configured so that heating of the DHW storage tank is blocked (disabled) on either an open circuit or closed circuit condition.

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, and the System Controller will use the boiler instead to satisfy the heating requirements (bivalent systems only). The input can be configured so that the Heat Pump is blocked (disabled) on either an open circuit or closed circuit condition. This is set by a parameter and the options are shown in the table.



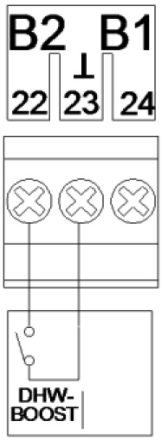
P611-Blocking Input Configuration (set to OFF if blocking)

Value	Configurations CONF 1.1, CONF 1.2, CONF 2.1, CONF 2.2	Configurations CONF 3.1, CONF 3.2, CONF 4.1
0	No function	No function
1	Heat Pump blocking not possible	Closed contact: Heat Pump blocking is active
2	Heat Pump blocking not possible	Open contact: Heat Pump blocking is active
3	Open contact: DHW blocking is active	Open contact: DHW blocking is active
4	Closed contact: DHW blocking is active	Closed contact: DHW blocking is active

DHW Boost Operation Input

It is possible to connect an external push-button input to the System Controller to provide boost operation of DHW storage.

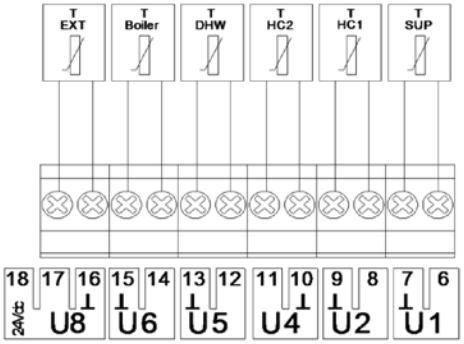
Note that the Tariff/Timer input can be used for DHW Time Switching OR Tariff-Switching, not both.



Temperature Sensors

All sensors used are of type NTC 20K (at 25°C).

In all cases, please see hydraulic diagrams for sensor positioning.



- The optional outdoor sensor as accessory (T EXT) (U8) is used for OTC control, frost protection, summer switch-off, and bi-valent system management (if not connected, control is performed using the measured outdoor unit temperature).
- The DHW sensor (T DHW) (U5) is used for control of the domestic hot water storage tank.
- The supply sensor (T SUP) (U1) is used to control the water temperature from the heat sources. Circuit 1 supply temperature sensor (T HC1) (U2) is used to control the water temperature for circuit 1.
- Circuit 2 supply temperature sensor (T HC2) (U4) is used to control the water temperature for circuit 2.
- Boiler temperature sensor (T BOILER) (U6) is used to control the water temperature for the boiler combination.

◆ Minimum requirements of the protection devices

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U min. (V)	U max. (V)			
ATW-CPA-02	1~ 230V 50Hz	207	253	5.0	6	2/40/30

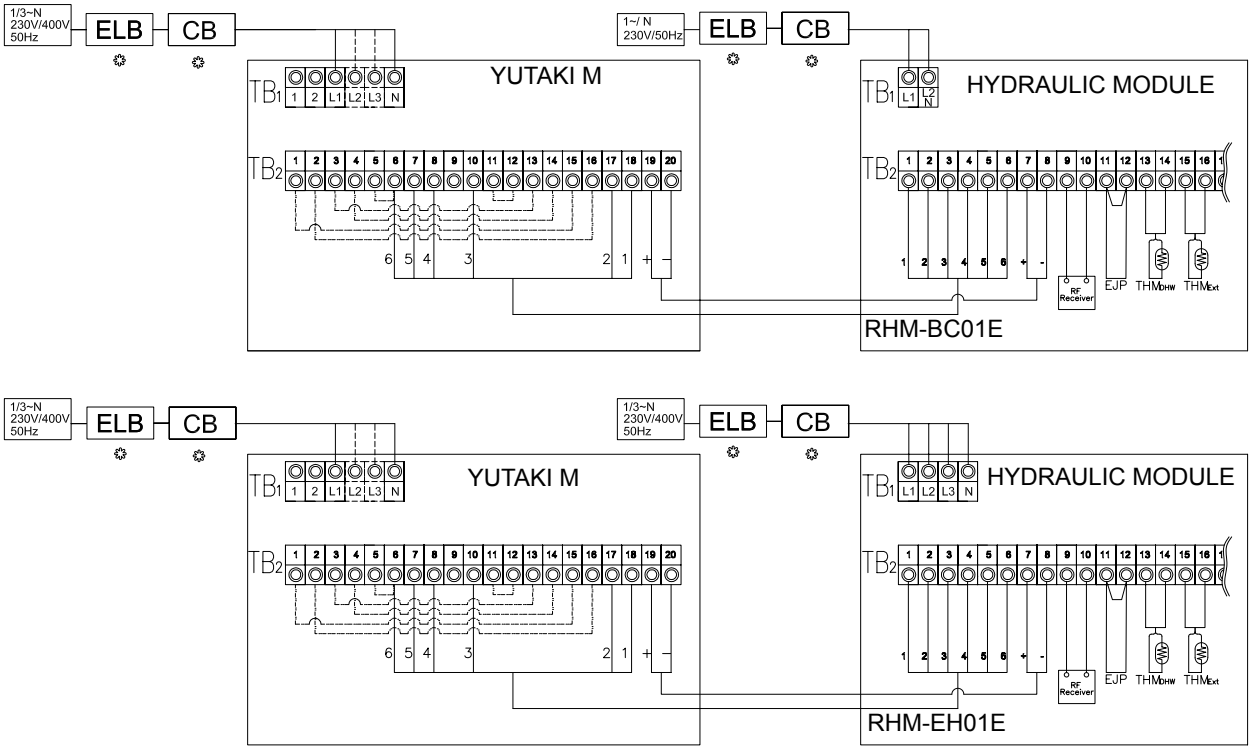
4.3.2 Hydraulic module

◆ System wiring diagram

- Connect the units (YUTAKI M and Hydraulic module) according to the following electrical diagram.
- Follow the local codes and regulations when performing the electrical wiring.
- Use wires (more than 0.75 mm²) for operation wiring between Hydraulic Module and Yutaki M unit.
- The System Controller controls the heat pump outlet water temperature by a 4-20mA signal. When there is no demand for the heat pump to be on, the System Controller directly switches the heat pump off. The heat pump can signal to the System Controller when it has a fault so that a fault code can be displayed and appropriate action taken.

⚠ DANGER

- ***The 4-20mA signal is polarity-sensitive. You must connect the wires as shown.***
- ***Be sure to use a dedicated power circuit for the Hydraulic Module. Never use a power circuit shared by another appliance (Yutaki M unit).***



TB	Terminal board
CB	Circuit breaker
ELB	Earthleakage breaker

_ _ _	Internal wiring
——	Field wiring
⚙	Field-supplied

◆ Wiring connection method

The correct electrical wiring connection for the Hydraulic Module is shown below.

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

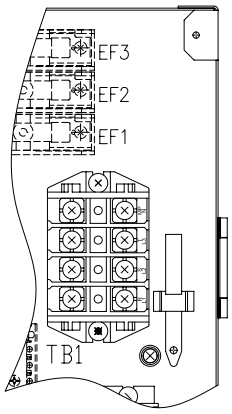
NOTE

Be sure to use a dedicated power circuit for the Hydraulic Module.
Never use a power circuit shared by another appliance (YUTAKI M unit).

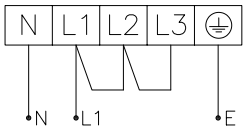
2 Connect the power supply source wires to the terminal board.

3 Connect the earth conductor to the earhing screw in the electrical box base plate.

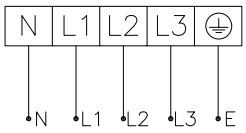
RHM-EH01E unit power terminal



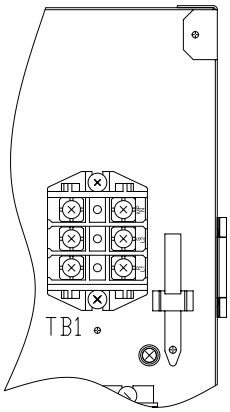
Case 1. Power supply:
1~230 V, 50 Hz



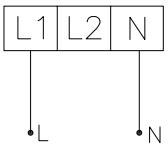
Case 2. Power supply:
3N~400 V, 50 Hz



RHM-BC01E unit power terminal



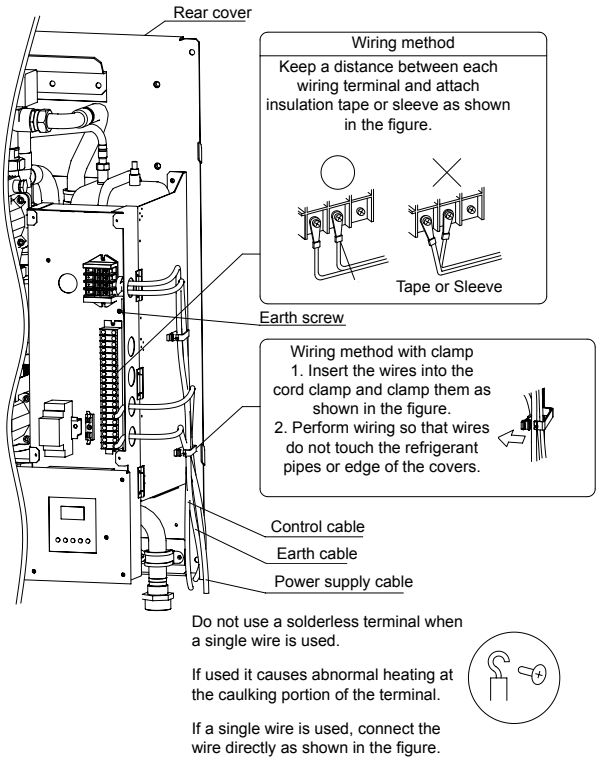
Power supply:
1~230 V, 50 Hz



4 Fix the cable with the clamp supplied in the electrical box to ensure strain relief

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

RHM-BC01E example



◆ Electrical connection

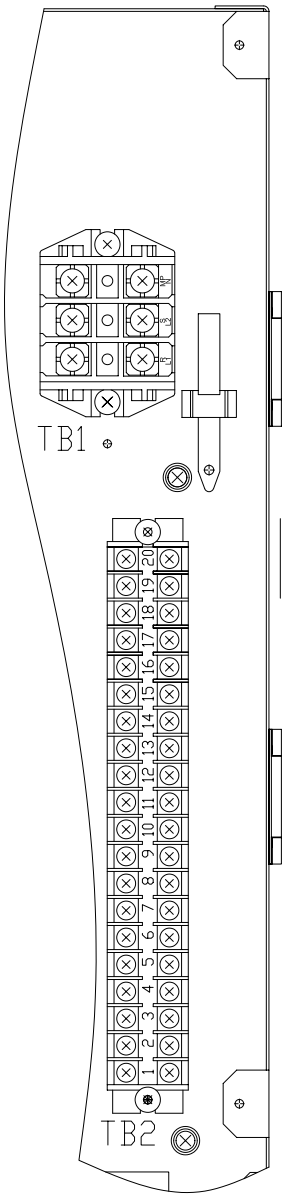
Wiring size

Model	Power supply	Max. current (A)	Power supply cables
			EN60335-1
RHM-EH01E	1~ 230V 50Hz	32.0	2 x 4.0 mm² + GND
	3N~ 400V 50 Hz	15.0	2 x 4.0 mm² + GND
RHM-BC01E	1~ 230V 50Hz	5.0	2 x 0.75 mm² + GND

Minimum requirements of the protection devices

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U max. (V)	U min. (V)			
RHM-EH01E	1~ 230V 50Hz	253	207	32.0	32	2/40/30
	3N~ 400V 50 Hz	440	360	15.0	15	4/40/30
RHM-BC01E	1~ 230V 50Hz	253	207	5.0	6	2/40/30
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker						

◆ Summary of the terminal board connections



Mark	Part name		Description
TERMINAL BOARD 1			
N	AC 230V	AC 400V	-
L1			
L2	-		
L3			
TERMINAL BOARD 2			
1	YUTAKI M & Hydraulic Module connection (WP1)		Connection for primary water pump controlled by YUTAKI M outdoor unit
2			
3	YUTAKI M & Hydraulic Module connection (Alarm signal)		Connection for YUTAKI M alarm signal feedback
4			
5	YUTAKI M & Hydraulic Module connection (Remote signal)		Connection for remote ON/OFF YUTAKI M by System Controller (Hydraulic Module)
6			
7	YUTAKI M & Hydraulic Module connection (4-20mA signal)		The System Controller of Hydraulic Module controls the heat pump outlet water temperature by a 4-20 mA signal. When there is no demand for the heat pump to be on, the System Controller directly switches the heat pump off. The heat pump can signal to the System Controller when it has a fault so that a fault code can be displayed and appropriate action taken.
8			
9	RF receiver box		The RF receiver is connected to the polarity-free terminals 9 and 10. The room unit and RF receiver are already configured to communicate with each other. If the room unit or RF receiver is replaced, it is necessary to use the RF binding procedure.
10			
11	Tariff-switch device		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 condition and the System Controller will use the boiler instead to satisfy the heating requirements (RHM-BC01E systems only). The input can be configured so that the heat pump is blocked (disabled) on either an open circuit or closed circuit. Note that the tariff/timer input can be used for DHW timer OR tariff-switching, not both. In case of use input as tariff switching, put timer (TM1) at PERMANENT OVERRIDE and set the parameter P24 of System Controller to 1 or 2 (depending configuration)
12			
13	DHW temperature sensor		The DHW sensor (T DHW) is used for control of the domestic hot water storage tank
14			
15	Outdoor temperature sensor		The outdoor sensor (T EXT) is used for OTC control, frost protection, summer switch-off, and bi-valent system management.
16			
17	DHW electric heater for RHM-EH01E.		If the DHW storage tank contains a thermostatic electric heater, the System Controller can enable it if the heat pump cannot achieve the required DHW temperature by itself.
18	Boiler output for RHM-BC01E		The boiler is used when the heat pump cannot achieve the desired supply temperature on its own.
19	Boiler pump control for RHM-BC01E		In order to switch ON boiler water pump when boiler demand
20			

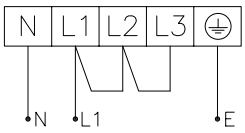
◆ Terminal board detailed connection

Main power supply (TB1)

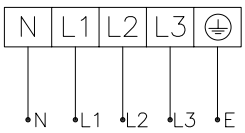
The mains power connection is wired to terminal board 1 (TB1) as follows:

RHM-EH01E unit power terminals

Case 1. Power supply:
1~230 V, 50 Hz

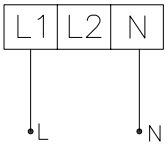


Case 2. Power supply:
3N~400 V, 50 Hz



RHM-BC01E unit power terminals

Power supply:
1~230 V, 50 Hz

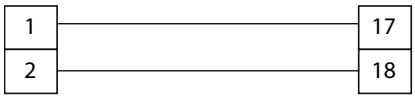


4

YUTAKI M heat pump connection (TB2)

1 Primary water pump connection

Connection for primary water pump controlled by YUTAKI M outdoor unit

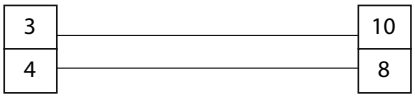


Hydraulic Module terminal board (TB2)

YUTAKI M unit terminal board (TB2)

2 YUTAKI M alarm signal report

Connection for Yutaki alarm signal feedback

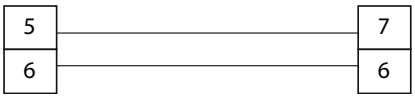


Hydraulic Module terminal board (TB2)

YUTAKI M unit terminal board (TB2)

3 YUTAKI M remote ON/OFF signal

Connection for remote ON/OFF Yutaki by System Controller (Hydraulic Module)

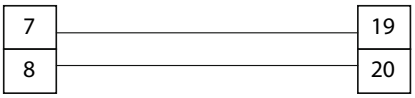


Hydraulic Module terminal board (TB2)

YUTAKI M unit terminal board (TB2)

4 YUTAKI M 4-20mA signal

The System Controller of Hydraulic Module controls the heat pump outlet water temperature by a 4-20 mA signal. When there is no demand for the heat pump to be on, the System Controller directly switches the heat pump off. The heat pump can signal to the System Controller when it has a fault so that a fault code can be displayed and appropriate action taken.

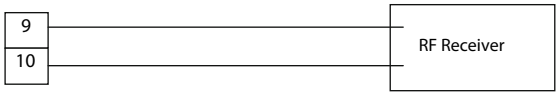


Hydraulic Module terminal board (TB2)

YUTAKI M unit terminal board (TB2)

RF receiver box

The RF receiver is connected to the polarity-free terminals 9 and 10. The room unit and RF receiver are already configured to communicate with each other. If the room unit or RF receiver is replaced, it is necessary to use the RF binding procedure.



Hydraulic Module terminal board (TB2)

NOTE

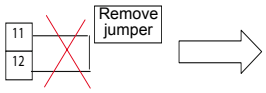
The receiver is connected to the polarity-free terminals

Tariff-switch device

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 condition and the System Controller will use the boiler instead to satisfy the heating requirements (RHM-BC01E systems only). The input can be configured so that the heat pump is blocked (disabled) on either an open circuit or closed circuit.

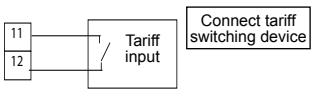
Tariff switching installation procedure:

Step 1:



Hydraulic Module terminal board (TB2)

Step 2:



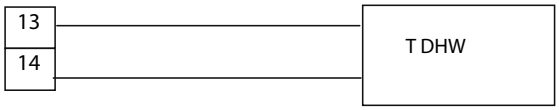
Hydraulic Module terminal board (TB2)

NOTE

Note that the tariff/timer input can be used for DHW timer OR tariff-switching, not both. In case of use input as tariff switching, put timer (TM1) at PERMANENT OVERRIDE and set the parameter P24 of System Controller to 1 or 2 (depending configuration)

DHW temperature sensor

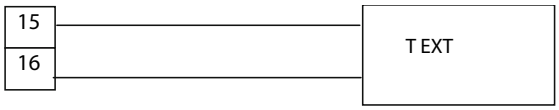
The DHW sensor (T DHW) is used for control of the domestic hot water storage tank.



Hydraulic Module terminal board (TB2)

Outdoor temperature sensor

The outdoor sensor (T EXT) is used for OTC control, frost protection, summer switch-off, and bi-valent system management.



Hydraulic Module terminal board (TB2)

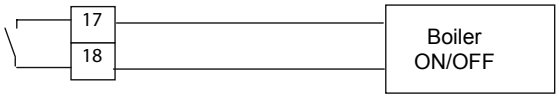
DHW electric heater (only for RHM-EH01E models)

If the DHW storage tank contains a thermostatic electric heater, the System Controller can enable it if the heat pump cannot achieve the required DHW temperature by itself.

Hydraulic Module terminal board (TB2)

Boiler output (only for RHM-BC01E models)

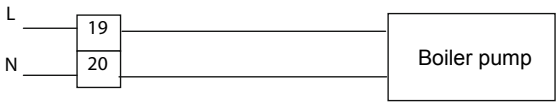
The boiler is used when the heat pump cannot achieve the desired supply temperature on its own.



Hydraulic Module terminal board (TB2)

Boiler pump control (only for RHM-BC01E)

In order to switch ON Boiler water pump when boiler demand



Hydraulic Module terminal board (TB2)

NOTE

Using the appropriate cable, connect valve 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)

4.3.3 Water pump

◆ **Safety notes**

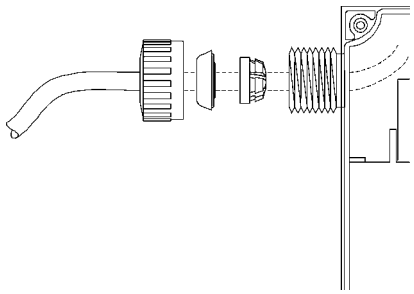
Electrical connection

DANGER:

- ***All electrical connections must be completed by a qualified and licensed electrician in strict compliance with local regulations.***
- ***Before working on the pump, switch OFF all the terminals of the supply voltage and wait five minutes due to the presence of a hazardous contact voltage (capacitors).***
- ***Check that all connections including potential-free contacts are neutral.***
- ***(For Pump kit (A/B) only):According to Part 1 of VDE 0730, the pump must be connected to the electrical supply by a solid wire equipped with a plug or an all-pole switch. The width of the contact gap must be at least 3 mm.***
- ***Main fuse: 3.3 A, time-lag.***
- ***The pump/ installation must be earthed in compliance with the applicable regulations.***
- ***Check that the mains current and connection voltage comply with the data on the rating plate.***

NOTE:

- *The motor may become damaged by overvoltage.*
- *Before applying voltage to the motor, double-check the voltage.*
- *Connect to the mains and connect the SK 602/ SK 622 and SK-C2 tripping unit (observe rating plate data) in accordance with the switching diagrams.*
- *(For pump kit (A/B) only: To guarantee protection against dripping water and to ensure strain relief of the cable gland (PG 13.5), a connecting cable with an external diameter of 10 - 12 mm is to be used and assembled. In addition, the cables in the vicinity of the cable gland are to be bent into a run-off loop to drain off any dripping water.*



Operation

The system must be filled and vented properly. The pump rotor chamber will vent automatically after a short running period. Brief dry running will not damage the pump. The pumps wich are equipped with vent screws can be ventilated as follows if necessary:

1 Switch off the pump.

2 Close the shut-off valve on the discharge side.

CAUTION

Damage by water or gas. Risk of scalding.

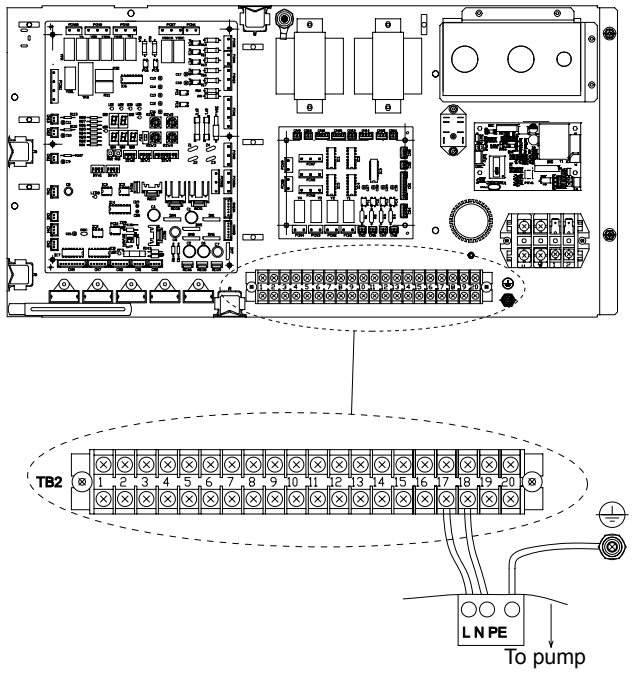
Depending on the fluid temperature and the system pressure, if the vent screw is completely loosened, hot liquid or gas should escape or even shoot out at high pressure.

Protect all electrical parts against the water released from the unit.

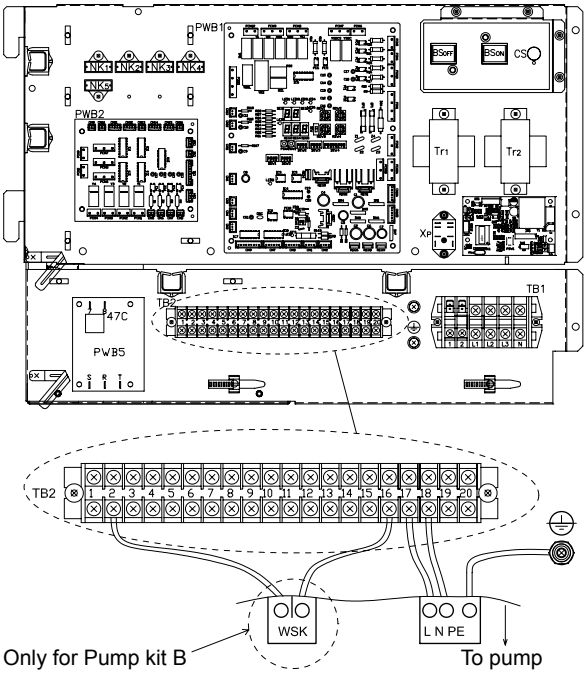
◆ System wiring diagram

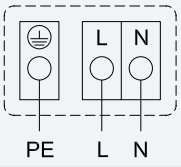
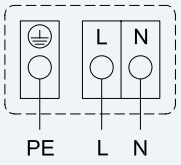
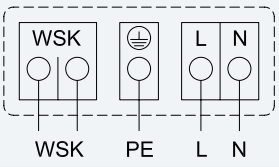
YUTAKI M is controlling the pump by itself. The pump kit must be always connected according to the wiring below.

RHUE-3AVHN1 + ATW-PK(1/2/3)-01



RHUE-(3-6)A(V)HN-HM + Pump kit (A/B)



Model	Pump kit	Protection type (Cut-out)	Connection terminals	
RHUE-3AVHN1	ATW-PK1-01 ATW-PK2-01 ATW-PK3-01	Auto reset		1~ 230V 50Hz
RHUE-(3-6)AVHN-HM	Pump kit A	Auto reset		
	Pump kit B	Manual reset		

NOTE

- *The pump power supply must be connected to the terminals 17, 18 of TB2 and earth terminal. Terminals 17 and 18 were designed for 230V/3A. Take it into account when installing the pump. An external relay might be necessary. Do not install a pump with more than 3A consumption.*
- *Earth screw terminal is used for both pump and power supply wiring connection.*
- *For Pump kit B accessory, connect wires from WSK to terminal 2 and 16 in the terminal board (TB2).*
- *Shunt between 2 and 16 have to be removed.*
- *Hitachi recommends the use of these accessory pump.*

◆ Motor protection

Model	Pump kit	Max. power consumption P_1max (see rating plate data)	Tripping	Reset	Speed switching
RHUE-3 AVHN1	ATW-PK1-01	P_1max ≤ 165W	Internal switch off of the motor main power supply	Auto-reset-once the motor has cooled down the pump will automatically switch back on	Speed adjustment switch, 3 settings
	ATW-PK2-01	P_1max ≤ 345W			
	ATW-PK3-01	P_1max ≤ 140W			
RHUE-(3-6) AVHN-HM	Pump kit A	P_1max ≤ 245W	Internal switch off of the motor main power supply	Auto-reset-once the motor has cooled down the pump will automatically switch back on	Speed adjustment switch, 3 settings
	Pump kit B	330W ≤ P_1max ≤ 400W	WSK and external switch (SK602/ SK622, C-SK or other control unit)	Manually at the external switch box once the motor has cooled down	Speed adjustment switch, 3 settings

◆ Electrical connection

Wiring size

Model	Pump kit	Power supply	Fuse protection for pump current (A)	Pump power cables
				EN60335-1
RHUE-3 AVHN1	ATW-PK1-01	1~ 230V 50Hz	3.0	2 x 0.75 mm² + GND
	ATW-PK2-01			
	ATW-PK3-01			
RHUE-(3-6) AVHN-HM	Pump kit A			
	Pump kit B			

Minimum requirements of the protection devices

NOTE

Refer to the section "4.2.2 Electrical connection". In the tables, the maximum current of the pumps is considered.

4.3.4 WEH - Water electric heater

◆ General check

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

2 Electrical connection must be done by professional installer.

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

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

5 Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.

6 Connect a fuse of specified capacity.

7 Check periodically the electrical connection tightening.

⚠ DANGER

Electrical hazard. Can cause serious injuries or death.

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

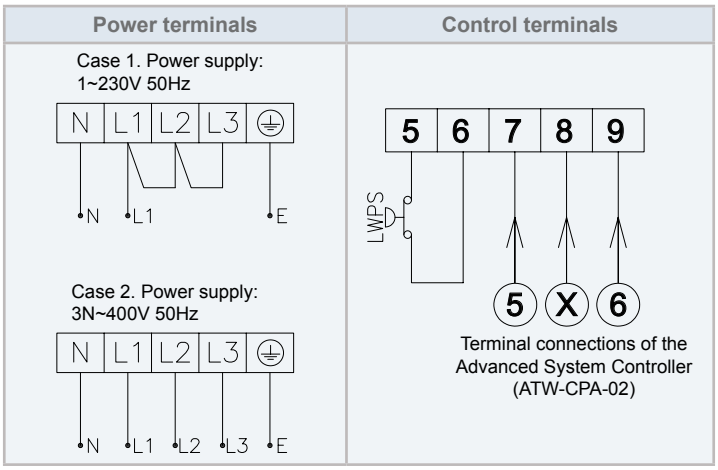
⚠ CAUTION

Damage to wires. Risk of fire.

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

◆ System wiring diagram

The water electric heater accessory needs to be connected to the YUTAKI M unit and Advanced system controller. Perform the connection according to the following electrical diagram.



◆ Electrical connection

Wiring size

Model	Power supply	Max. current (A)	Power supply cables	Transmission cables
			EN60335-1	EN60335-1
WEH-6E	1~ 230V 50Hz	30.0	2 x 6.0 mm² + GND	2 x 0.75 mm²
	3N~ 400V 50 Hz	10.0	4 x 2.5 mm² + GND	

Minimum requirements of the protection devices

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U max. (V)	U min. (V)			
WEH-6E	1~ 230V 50Hz	253	207	30.0	32	2/40/30
	3N~ 400V 50 Hz	440	360	10.0	10	4/40/30
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker						

4.3.5 DHWT - Domestic hot water tank

◆ General check

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

2 Electrical connection must be done by professional installer.

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

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

5 Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.

6 Connect a fuse of specified capacity.

7 Check periodically the electrical connection tightening.

⚠ DANGER

Electrical hazard. Can cause serious injuries or death.

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

⚠ CAUTION

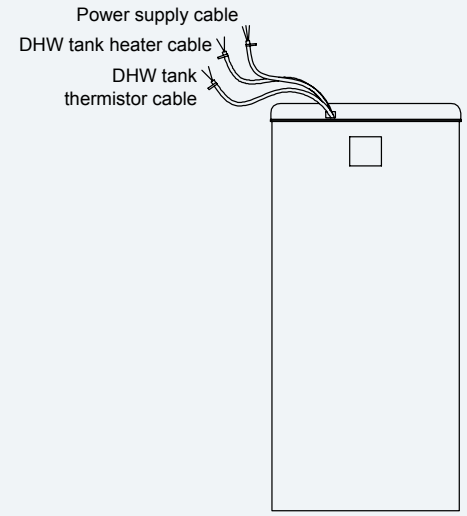
Damage to wires. Risk of fire.

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

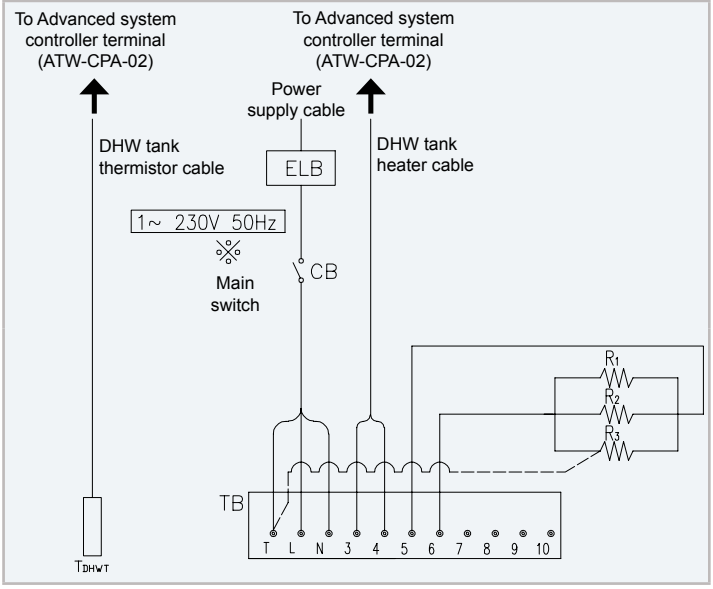
◆ System wiring diagram

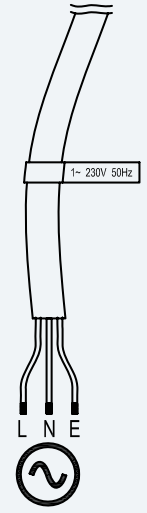
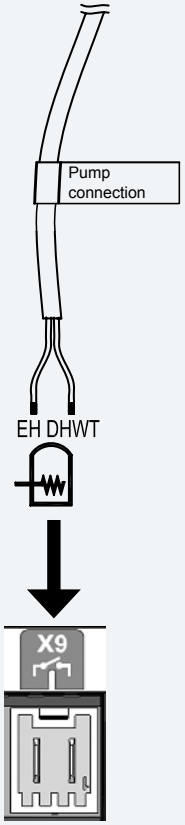
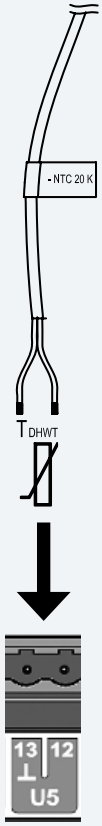
One end of the supplied wires for the connection of the DHW tank is already connected to the DHW tank (located on the upper side of the tank). The other free end must be connected according to the following electrical diagrams:

Location of the DHW tank electrical cables



DHW tank wiring diagram

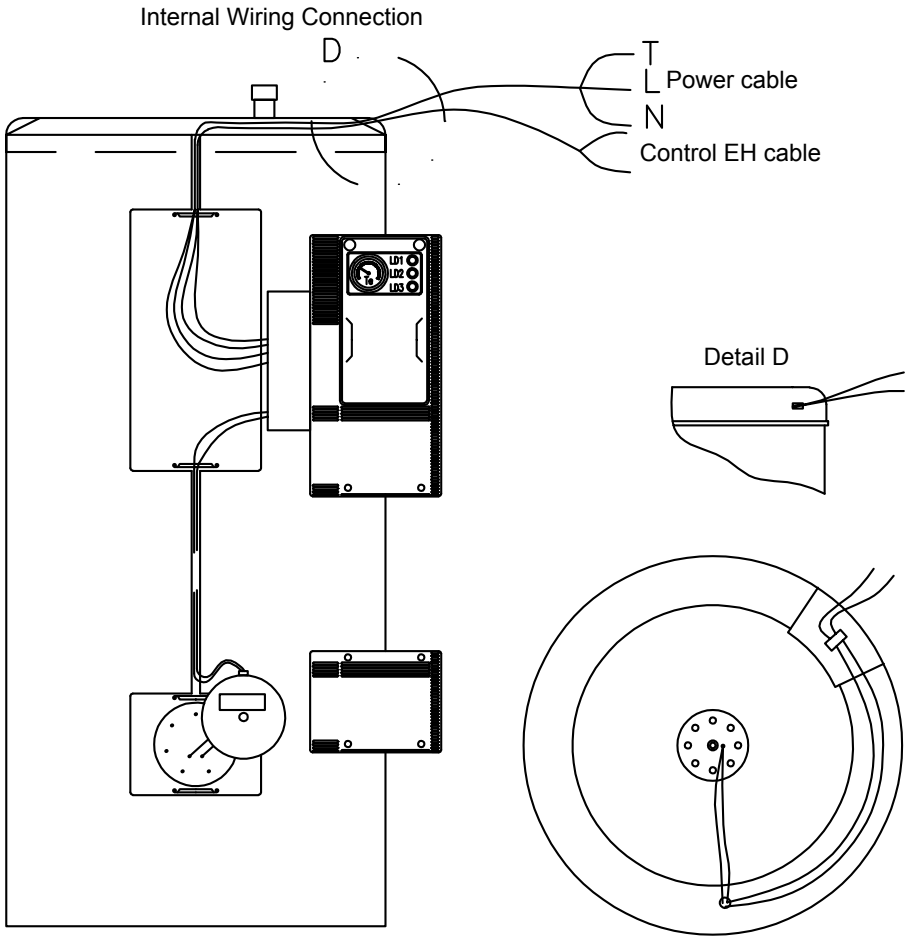


Power supply cable (A)	DHW tank heater cable (B)	DHW tank thermistor cable (C)
		

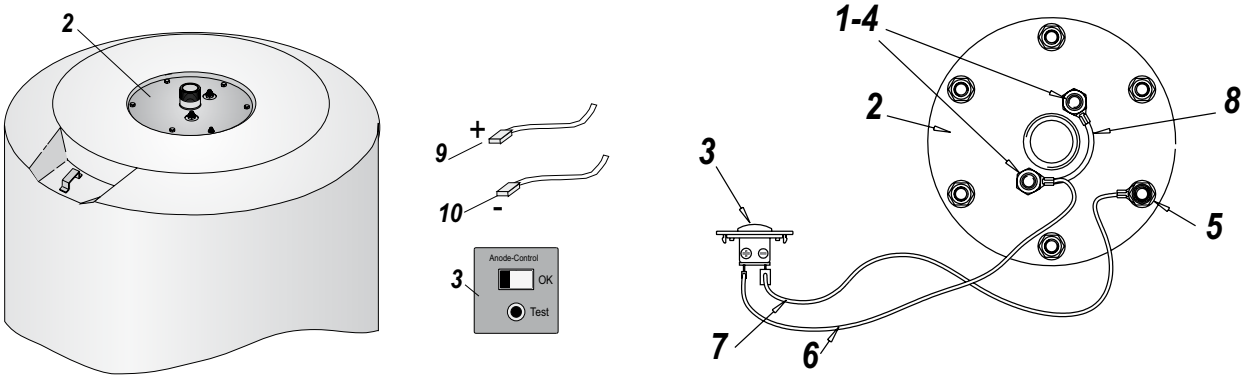
DANGER

Be sure to use a dedicated power circuit for the DHW tank. Never use a power circuit shared by another appliance.

◆ Internal wiring



◆ Cathodic protection



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

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

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

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

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

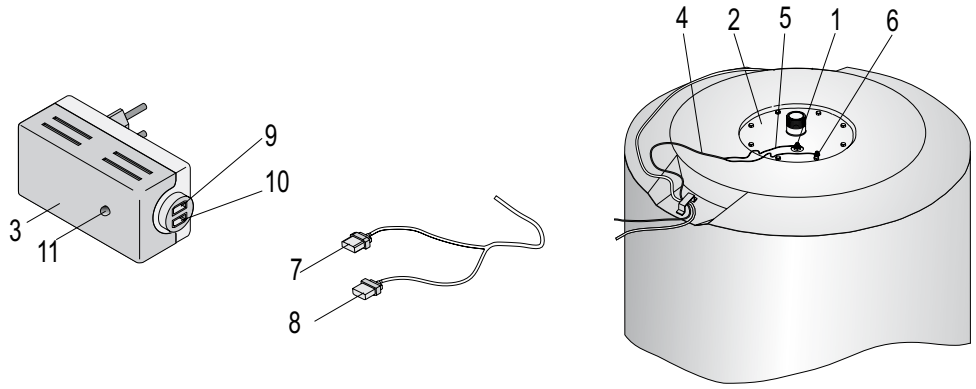
- To earth: U shaped terminal M10 (5)
- To the load measured: female Faston terminal 6.3 (10)

⚠ CAUTION

Check the magnesium anode load periodically by pushing the button. If the gauge is in the red zone, the magnesium anode must be replaced.

Do not install the permanent cathode protection and the cathodic protection together.

◆ Titanium protection accessory



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

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

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

NOTE

Use original wires only. To avoid any risk of corrosion due to reverse polarity do not lengthen nor shorten the wires.

Use a socket base near to the storage heater for this purpose.The protective anode starts comes into operation when the storage heater is full of water. When there is no water the control pilot light (11) lights up red and blinks on and off.

If the pilot light (11) is green, this shows that the storage heater is receiving a protective current. If the pilot light is not on or lights up red and blinks, check the connections, contacts and mains supply. If this anomaly continues, contact the fitter or our Customer Technical Service Department.

In the case of vertically installed storage heaters from which water is not going to be extracted for periods of more than 3 months, we recommend fitting an automatic purger at the D.H.W. outlet.

If the storage heater is installed horizontally, we recommend the extraction of water at least once every 3 months.

The potentiostat (3) and connecting wires (4) must not be disconnected, except when the storage heater is emptied.

Do not disconnect the protection system during periods of absense (holidays, etc.).

Occasionally check that the pilot light is working correctly (11).

◆ Electric heater

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

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

- Replace electric heater

The steps to be followed are:

1 Totally disconnect the unit from the main power supply.

2 With the help of a tool remove the heater to be replaced. Be careful not to damage the enamel surface in case of enamelled tanks.

3 Insert the new heater in the same position as the old one.

4 Connect again and plug into the main power supply.

- Safety measures

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

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

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

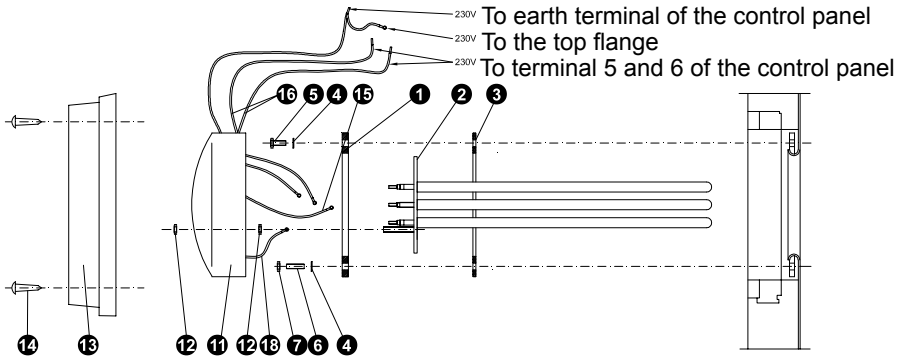
Electric heating elements generates high temperatures. Precautions should be taken to protect goods and persons from accidental burns during the operation and after the equipment has been disconnected or installed.

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

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

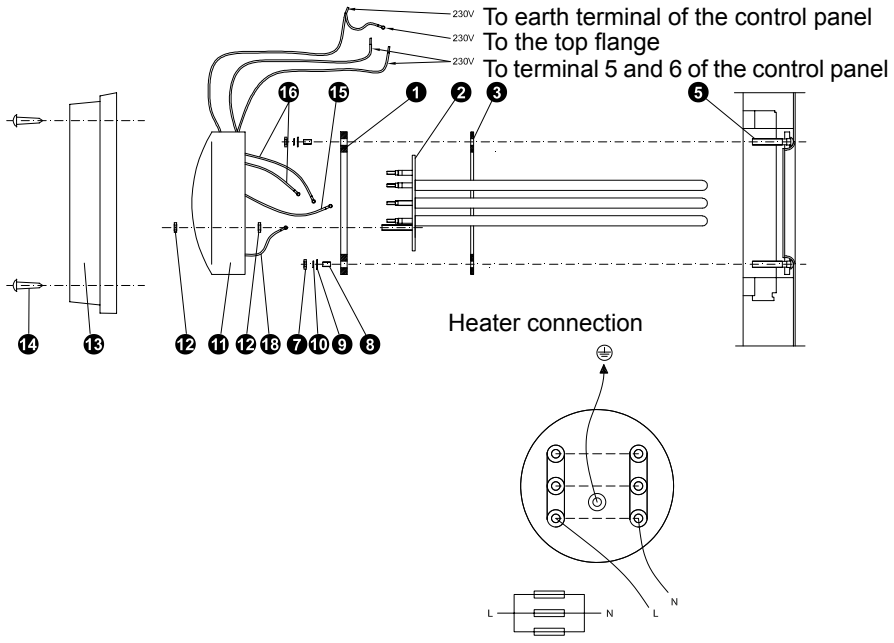
We recommend installing appropriate safety devices (temperature safety device, safety level for heating liquids by natural convection, flow safety device for liquids in circulation, etc.).

DHWT(200/300)S-2.5H1E



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

DHWT(200/300)E-2.5H1E



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

4

◆ Electrical connection

Wiring size

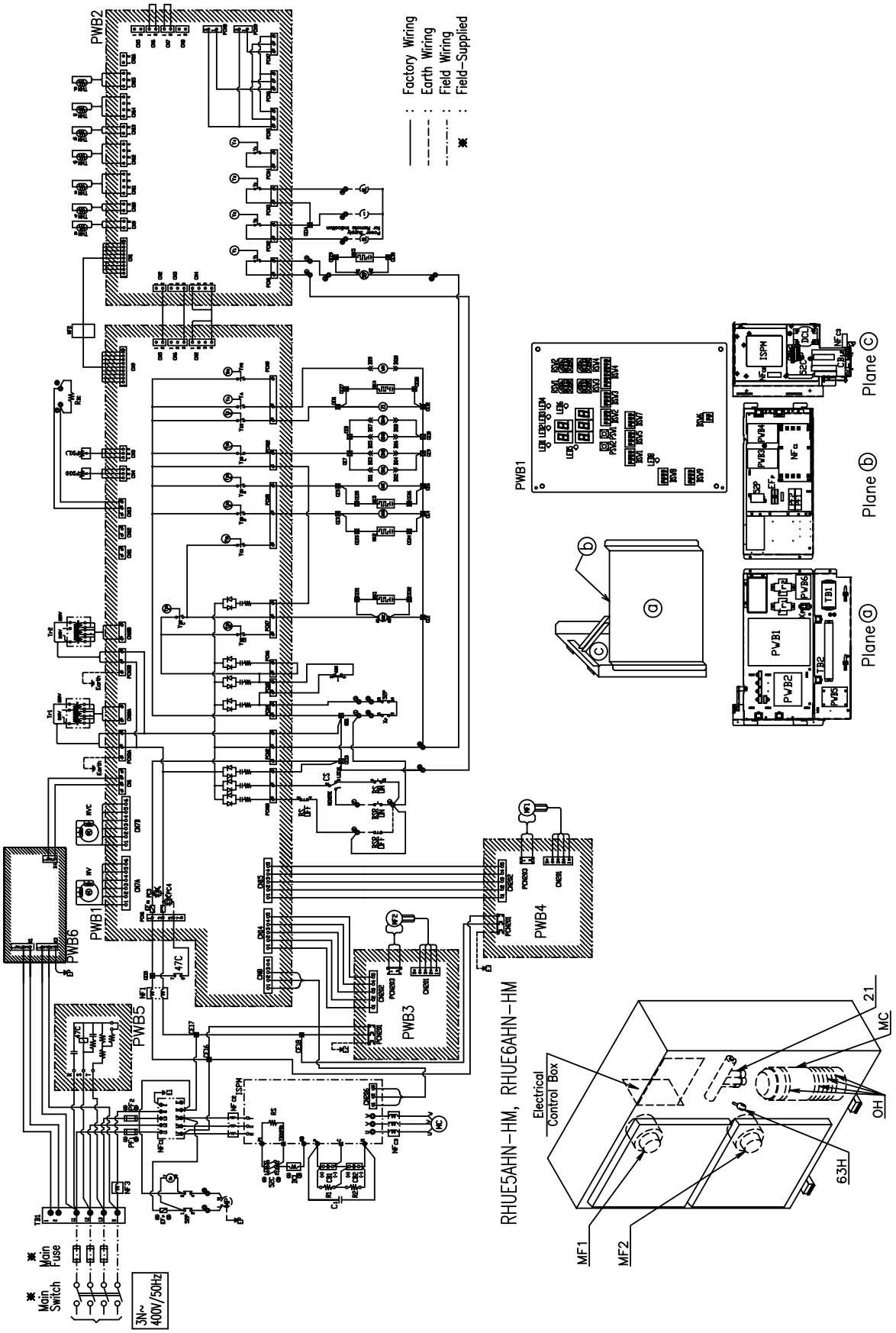
Model	Power supply	Max. current (A)	Power supply cable size	DHW tank heater cable size	DHW tank thermistor cable size
			EN60335-1	EN60335-1	EN60335-1
DHWT(200/300) (E/S)-2.5H1E	1~ 230V 50Hz	15.0	2 x 2.5 mm² + GND	2 x 1.0 mm²	2 x 0.75 mm²

Minimum requirements of the protection devices

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U min. (V)	U max. (V)			
DHWT(200/300) (E/S)-2.5H1E	1~ 230V 50Hz	207	253	15.0	20	2/40/30
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker						

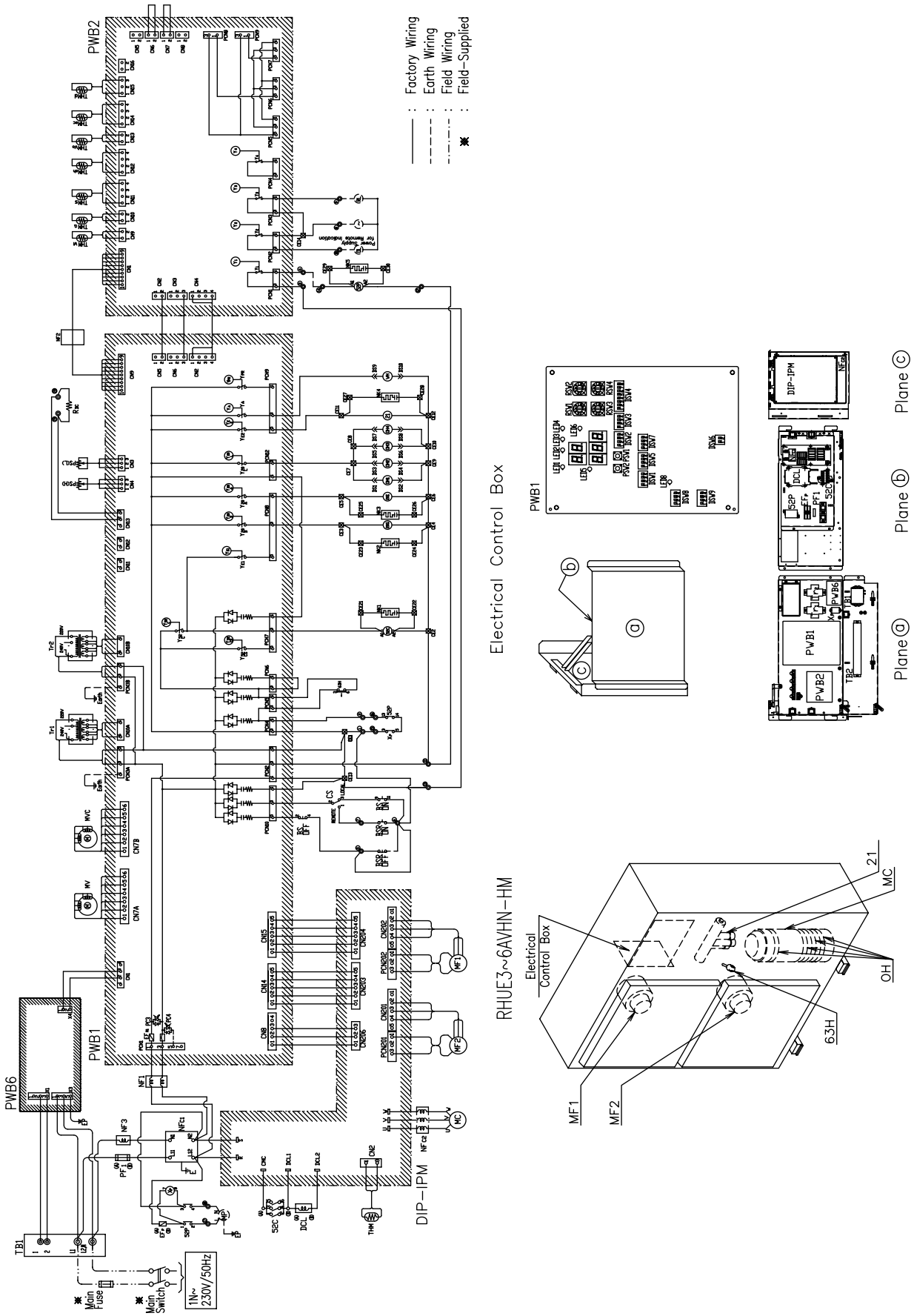
4.4 Electrical wiring diagrams

4.4.1 RHUE-3AVHN1(1~230V 50Hz)



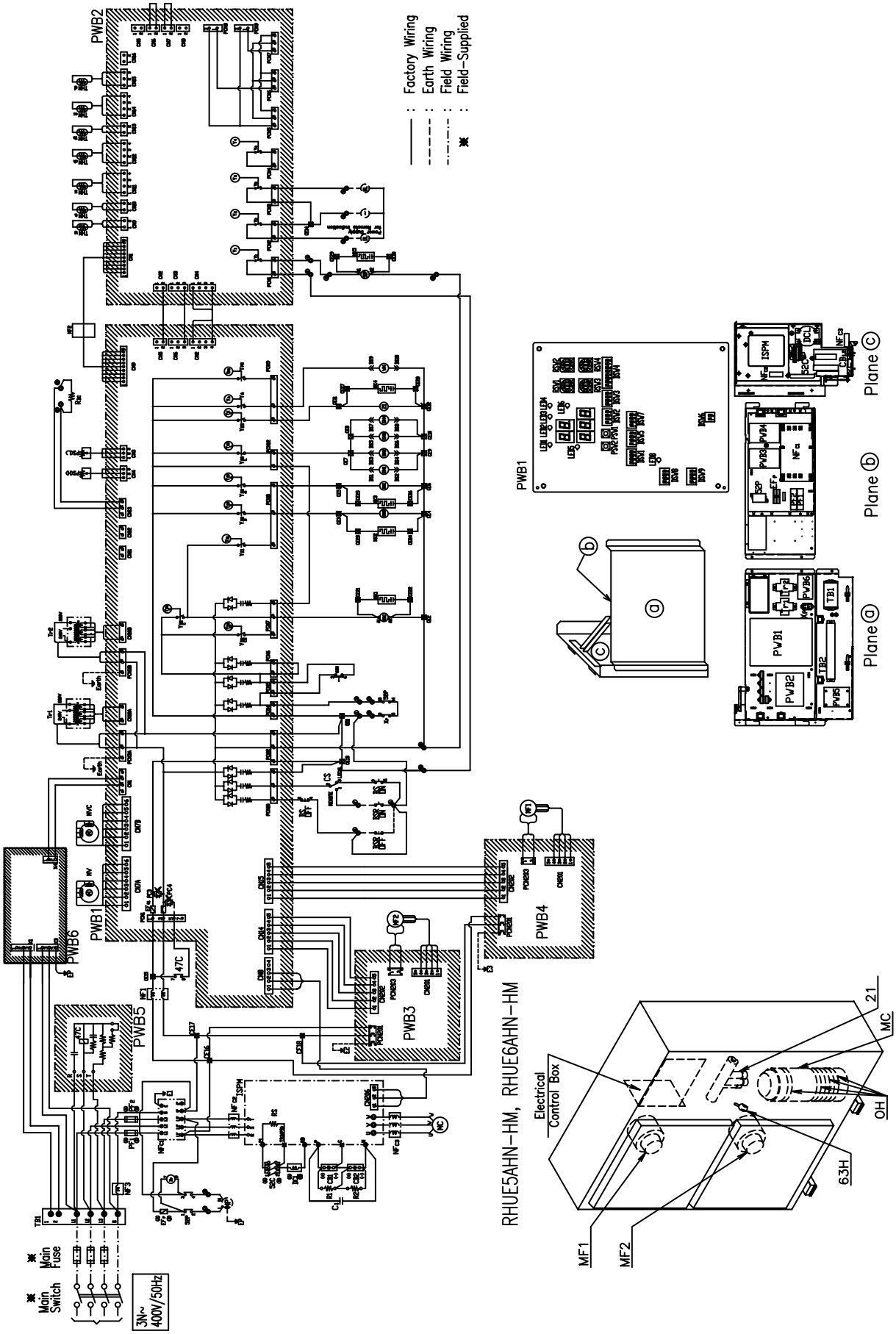
Mark	Name
MC	Motor (for Compressor)
MF1	Motor (for Fan)
52C	Contactor (for Compressor)
PF_1	Power fuse for Compressor
63H	High pressure switch
$OH_{1,2,3,4}$	Oil heater
PWB1	Printed wiring board (for main control)
PWB2	Printed wiring board (for I/O)
PWB6	Printed wiring board (for system controller)
DCL	Reactor
DIP-IPM	Inverter module
$NF_{1,2,C2}$	Noise filter
NF_{C1}	Noise filter
$NK_{1~5}$	Noise filter
EF_{R1}	Fuse for control circuit
$Tr_{1~2}$	Transformer
TB_1	Terminal board (for power supply, H-Link)
TB_2	Terminal board (for control circuit (1) to (20))
20G	Soleoid valve (for hot gas by-pass)
20I	Solenoid valve (for liquid injection)
21	Magnetic 4-way valve
MV, MVC	Electrical expansion valve
WH	Frozen prevention heater for piping
CS	Changeover switch
DSW1~6	Dip switch on PWB1
BS_{ON}	Push button switch (for starting)
BS_{OFF}	Push button switch (for stoppage)
THM_{Wi}	Thermistor (for inlet water temperature)
THM_{Wo}	Thermistor (for outlet water temperatue)
THM_d	Thermistor (for discharge gas temperature)
THM_{eh}	Thermistor (for evaporating gas temperature)
THM_{ec}	Thermistor (for liquid refrigerant temperature)
THM_s	Thermistor (for suction gas temperature)
THM_a	Thermistor (for ambient temperature)
PS(H)	High pressure sensor
PS(L)	Low pressure sensor
$CE_{1~14}$	Connector (terminating connector)
$CE_{21~30}$	Connector (Terminating connector)
$DS_{1~10}$	Connector (Relay connector)
R_{DC}	Resistance (for 4-20mADC Signal)
MP	Motor (for Pump)
52P	Contactor (for Pump)
EF_P	Power fuse for Pump
X_P	Auxiliary relay
E	Earth
BSR_{ON}	Push button switch (for starting)
BSR_{OFF}	Push button switch (for stoppage)
RL, OL	Pilot lamp

4.4.3 RHUE-(3-6)AVHN-HM (1~230V 50Hz)



Mark	Name
MC	Motor (for Compressor)
MF1,2	Motor (for Fan)
52C	Contactor (for Compressor)
PF_1	Power fuse for Compressor
63H	High pressure switch
$OH_{1,2,3,4}$	Oil heater
PWB1	Printed wiring board (for main control)
PWB2	Printed wiring board (for I/O)
PWB6	Printed wiring board (for system controller)
DCL	Reactor
DIP-IPM	Inverter module
$NF_{1,2,C2}$	Noise filter
NF_{C1}	Noise filter
$NK_{1~5}$	Noise filter
EF_{R1}	Fuse for control circuit
$Tr_{1~2}$	Transformer
TB_1	Terminal board (for power supply, H-Link)
TB_2	Terminal board (for control circuit (1) to (20))
20G	Soleoid valve (for hot gas by-pass)
20I	Solenoid valve (for liquid injection)
21	Magnetic 4-way valve
MV, MVC	Electrical expansion valve
WH	Frozen prevention heater for piping
CS	Changeover switch
DSW1~9	Dip switch on PWB1
BS_{ON}	Push button switch (for starting)
BS_{OFF}	Push button switch (for stoppage)
THM_{Wi}	Thermistor (for inlet water temperature)
THM_{Wo}	Thermistor (for outlet water temperatue)
THM_d	Thermistor (for discharge gas temperature)
THM_{eh}	Thermistor (for evaporating gas temperature)
THM_{ec}	Thermistor (for liquid refrigerant temperature)
THM_s	Thermistor (for suction gas temperature)
THM_a	Thermistor (for ambient temperature)
PS(H)	High pressure sensor
PS(L)	Low pressure sensor
$CE_{1~14}$	Connector (terminating connector)
$CE_{21~30}$	Connector (Terminating connector)
$DS_{1~10}$	Connector (Relay connector)
R_{DC}	Resistance (for 4-20mADC Signal)
MP	Motor (for Pump)
52P	Contactor (for Pump)
EF_P	Power fuse for Pump
X_P	Auxiliary relay
E	Earth
BSR_{ON}	Push button switch (for starting)
BSR_{OFF}	Push button switch (for stoppage)
RL, OL	Pilot lamp

4.4.4 RHUE-(5/6)AHN-HM (3N~ 400V 50Hz)



Mark	Name
MC	Motor (for Compressor)
MF1,2	Motor (for Fan)
52C	Contactor (for Compressor)
PF_{1}	Power fuse for Compressor
63H	High pressure switch
$OH_{1,2,3,4}$	Oil heater
PWB1	Printed wiring board (for main control)
PWB2	Printed wiring board (for I/O)
PWB3,4	Printed wiring board (for fan power supply)
PW5	Printed wiring board (for reverse protection)
PWB6	Printed wiring board (for system controller)
DCL	Reactor
$CB_{1,2}$	Capacitor
ISPM	Inverter module
C1	Capacitor
$R_{1,2}$	Resistance (for starting)
47C	Reverse protection relay
$NF_{1,2,C2,C3}$	Noise filter
NF_{C1}	Noise filter
DSW1~9	Dip switch on PWB1
R_{DC}	Resistance (for 4-20mADC Signal)
MP	Motor (for Pump)
52P	Contactor (for Pump)
EF_{P}	Power fuse for Pump
X_{P}	Auxiliary relay
BS_{ON}	Push button switch (for starting)
BS_{OFF}	Push button switch (for stoppage)

Mark	Name
$NK_{1~5}$	Noise filter
EF_{R1}	Fuse for control circuit
$Tr_{1~2}$	Transformer
TB_{1}	Terminal board (for power supply, H-Link)
TB_{2}	Terminal board (for control circuit (1) to (20))
20G	Soleoid valve (for hot gas by-pass)
20I	Solenoid valve (for liquid injection)
21	Magnetic 4-way valve
MV, MVC	Electrical expansion valve
WH	Frozen prevention heater for piping
BS_{ON}	Push button switch (for starting)
BS_{OFF}	Push button switch (for stoppage)
CS	Changeover switch
THM_{Wi}	Thermistor (for inlet water temperature)
THM_{Wo}	Thermistor (for outlet water temperatue)
THM_{d}	Thermistor (for discharge gas temperature)
THM_{eh}	Thermistor (for evaporating gas temperature)
THM_{ec}	Thermistor (for liquid refrigerant temperature)
THM_{s}	Thermistor (for suction gas temperature)
THM_{a}	Thermistor (for ambient temperature)
PS(H)	High pressure sensor
PS(L)	Low pressure sensor
$CE_{1~18}$	Connector (terminating connector)
$CE_{21~30}$	Connector (Terminating connector)
$DS_{1~10}$	Connector (Relay connector)
RL, OL	Pilot lamp
E	Earth

5. Control system

Index

5.1 General information

5.1.1 Description

The System Controller is a configurable outdoor temperature compensated heating controller.

The System Controller is a part of the Heat Pump Controller Pack and is linked to the other components of the hydronic control system, such as the wireless Room Unit, RF Receiver, Water Temperature Sensors.

The Room Unit communicates with the System Controller using radio signals detected by the RF Receiver, enabling simpler installation and offering the end user a choice of how they operate the system.

The System Controller operates the Heat Pump, electric heater or boiler, valves and pumps to ensure optimal operation of the heating system.

The System Controller has a digital display with a simple menu structure operated by six buttons, so that it can easily be configured to many different applications with specific installation settings.

5.1.2 Safety instructions

- When performing any work with this product (installation, mounting, start-up), all instructions given by the manufacturer and in particular the safety instructions provided in the Installation instructions must be followed.
- The System Controller may only be installed and mounted by authorised and suitably trained personnel.
- If the unit is modified in any way, except by the manufacturer, all warranties concerning operation and safety are invalidated.
- Make sure that local standards and regulations are respected at all times.
- Use only accessory equipment that comes from or has been approved by the manufacturer.
- Before the controller is dismantled, disconnect the mains power supply.

CAUTION

- *Disconnect the mains power supply before you start to install the System Controller.*
- *Do not reconnect the power supply until you have completed installation.*

5.1.3 System overview

The System Controller is designed for controlling the Heat Pump in a mono-valent, mono-energetic or bi-valent heating system. It provides efficient control and reduces energy use while maintaining comfort in the building.

Features:

- Modulating Control of Heat Pump
- Control of an Auxiliary Heat Source (3-stage electric heater or boiler)
- Outside Temperature Compensated (OTC) Control
- Control of up to two Heating Circuits
- Control of Domestic Hot Water Storage with integrated time-program
- Control of DHW electric heater
- DHW Anti-Legionella Protection
- Frost Protection
- Automatic Summer Switch-Off
- RF interface to Room Units (user heating time-programs, setpoint adjustment, room temperature sensing)
- Communication with Heat Pump improves system performance, and reduces installation cost/effort
- Installation/Commissioning aids (manual overrides)
- Input for tariff switch device to switch between Heat Pump and boiler operation.
- Integrated simple multi-language user interface
- Installation mounting options
- Easy-to-wire (one-wire per terminal / one-plug per device)

NOTE

- *The functionality of the System Controller depends on the installed components and the selected configuration.*
- *The System Controller is designed in a way that it can be configured and upgraded to meet many application requirements.*

5.1.4 Contents of the controller pack

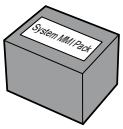
System Controller

- Controls the Heat Pump
- Controls other system components
- Measures system sensors and Heat Pump parameters
- Allows system configuration and settings
- 2x Terminal covers for protection
- 2x Terminal kits for connections
- 1x Strain-relief kit

System Controller

System MMI Pack

- Room Unit - The user interface for the system and allows time / temperature profile programming.
- RF Receiver - Receives wireless signals from the Room Unit and is wired directly to the System Controller.



Room Unit

RF Receiver

Sensors

- 2 x Water Temperature Sensors
- Sensors connect directly to System Controller for mixing circuit and DHW tank control

Water Temperature Sensors

Plug terminal kit

- 1 x Plug terminals kit for easy connection
- 1 x Installation and operation manual

Plug in terminals

Installation and operation manual

- 1 x Installation and operation manual

Installation and operation manual

5.2 System configuration

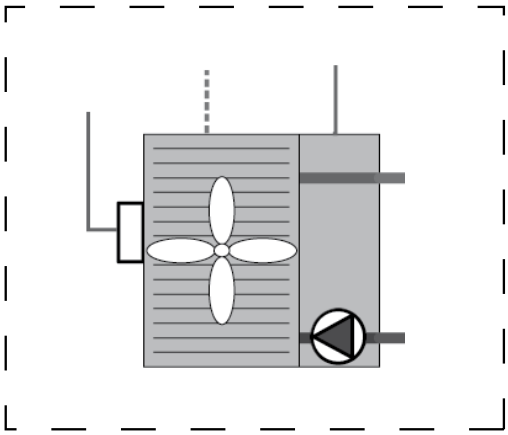
The System Controller can be used for several different hydraulic system configurations, including mono-valent systems, mono-energetic systems with auxiliary electric heater, and bi-valent systems with gas/oil boiler.

Valid hydraulic configurations are:

Hydraulic configura-tion	Description	Heat pump	Electric heater	Boiler	Boiler pump	Boiler by-pass	DHW	DHW E-Heater	HC1 Circuit	HC2 Circuit
CONF 1.1	**Mono-Valent System** Heat pump only without hydraulic separator 1x Direct Circuit	✓	-	-	-	-	✓ DHW valve	✓	Direct circuit	-
CONF 1.2	**Mono-Valent System** Heat pump only 2x Mixing/Direct circuits	✓	-	-	-	-	✓ DHW pump	✓	Direct or mixing circuit	Direct or mixing circuit
CONF 2.1	**Mono-Energetic System** Heat pump & electric heater without hydraulic separator 1x direct circuit	✓	✓	-	-	-	✓ DHW valve	✓	Direct circuit	-
CONF 2.2	**Mono-Energetic System** Heat pump & electric heater 1x Mixing/Direct circuit 1x Direct circuit	✓	✓	-	-	-	✓ DHW pump	✓	Direct or mixing circuit	Direct circuit
CONF 3.1	**Bi-Valent Parallel System** Heat pump & boiler Boiler pump control 1x Mixing/Direct circuit 1x Direct circuit	✓	-	✓	✓	-	✓ DHW pump	-	Direct or mixing circuit	Direct circuit
CONF 3.2	**Bi-Valent Parallel System** Heat pump & boiler 2x Mixing/Direct circuits	✓	-	✓	-	-	✓ DHW pump	-	Direct or mixing circuit	Direct or mixing circuit
CONF 4.1	**Bi-Valent Series System** Heat pump & boiler 1x Mixing/Direct circuit 1x Direct circuit	✓	-	✓	-	✓	✓ DHW pump	-	Direct or mixing circuit	Direct circuit

NOTE

In the following illustrations, the YUTAKI M main pump is located at the outlet (corresponding to RHUE-3AVHN1 unit). Take into account that for the other units RHUE-(3-6)A(V)HN-HM this pump is located at the inlet.

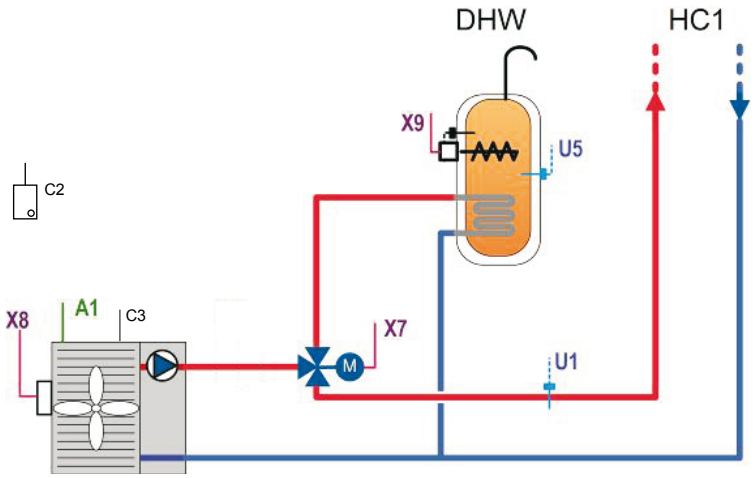


5.2.1 Configuration 1: Mono-Valent systems

In mono-valent systems, the Heat Pump is the sole provider of heating energy to the system. The Heat Pump is sized to provide 100% of the heating requirements on the coldest day of the year. It is recommended for low-energy houses and for moderate climates without severe winters. Used in new builds or in boiler-replacement applications. This configuration is suitable for low-temperature radiators and underfloor heating systems. In order to achieve higher DHW temperatures, the system can operate with an auxiliary DHW electric heater.

◆ CONF 1.1 – Simple system without hydraulic separator

The maximum system configuration is shown in the diagram below. (DHW can be selected with a parameter).

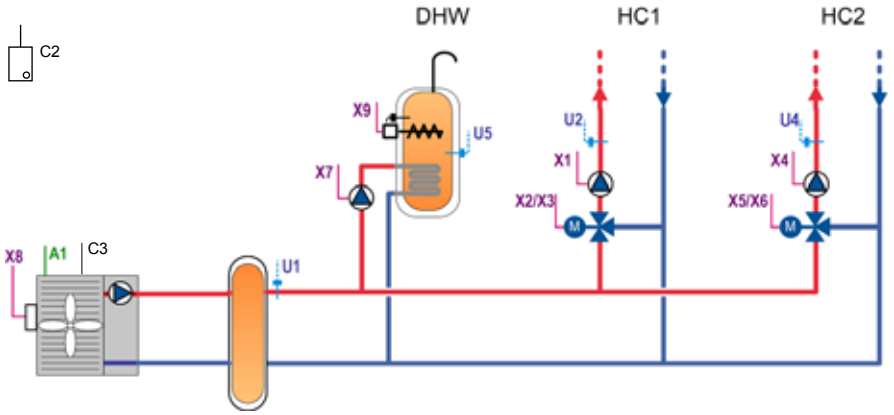


Inputs	
U1	System supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

Outputs	
X7	DHW valve
X8	Heat pump on/off
X9	DHW electric heater
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

◆ CONF 1.2 – System with hydraulic separator, up to two heating circuits

The maximum system configuration is shown in the diagram below. (DHW, HC1 and HC2 options can be selected with parameters).



Inputs	
U1	System supply temperature sensor
U2	HC1 Supply temperature sensor
U4	HC2 Supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

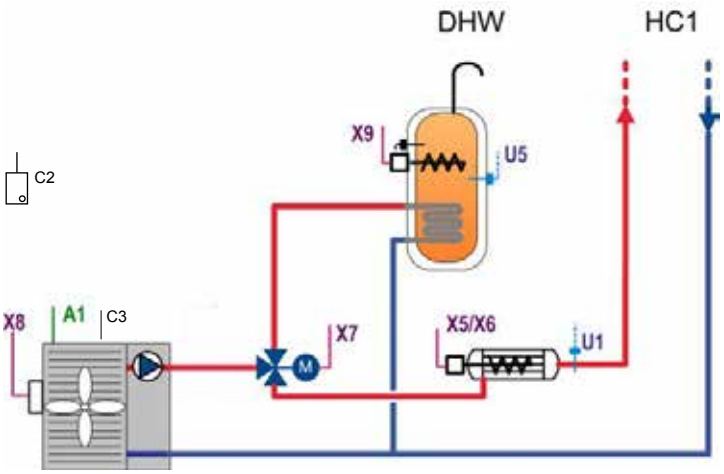
Outputs	
X1	HC1 pump
X2/X3	HC1 mixing valve : 2x relays
X4	HC2 pump
X5/X6	HC2 mixing valve : 2x relays
X7	DHW pump
X8	Heat pump on/off
X9	DHW electric heater
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

5.2.2 Configuration 2: Mono-energetic systems

In mono-energetic systems, the Heat Pump is supplemented by a 3-stage electric heater to provide additional heating energy to the system. The Heat Pump is sized to provide around 60% of the heating requirements on the coldest day of the year, and will typically provide 90-95% of the heating requirements over the whole heating season. An electric auxiliary heater is used to provide the additional heating required on cold days. Used in new builds or in boiler-replacement applications. In order to achieve higher DHW temperatures, the system can operate with an auxiliary DHW electric heater.

◆ **CONF 2.1 – System with electric heater control, without hydraulic separator**

The maximum system configuration is shown in the diagram below (DHW can be selected with a parameter).



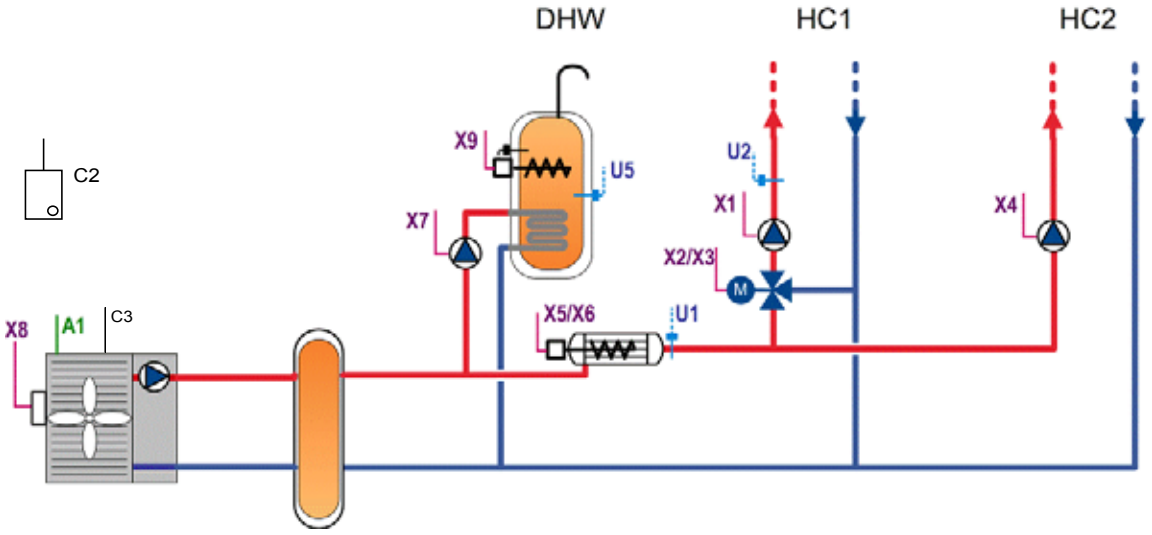
Inputs	
U1	System supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

Outputs	
X5/X6	Electric heater: 2x relays
X7	DHW valve
X8	Heat pump on/off
X9	DHW electric heater
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

5

◆ **CONF 2.2 – System with electric heater control, hydraulic separator, up to two heating circuits**

The maximum system configuration is shown in the diagram below (DHW, HC1 and HC2 options can be selected with parameters).



Inputs	
U1	System supply temperature sensor
U2	HC1 Supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

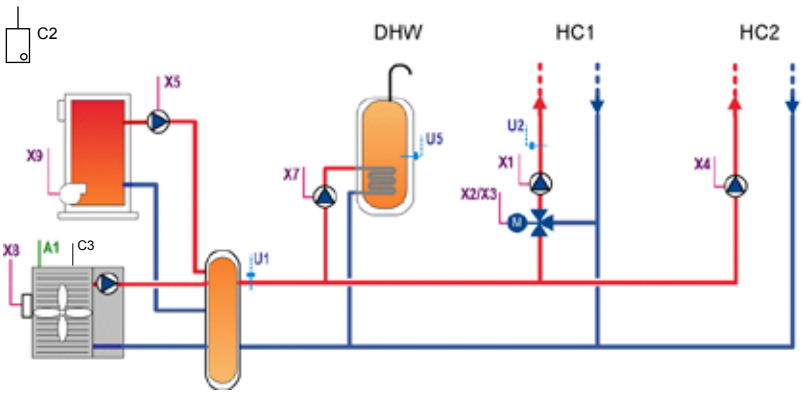
Outputs	
X1	HC1 pump
X2/X3	HC1 mixing valve : 2x relays
X4	HC2 pump
X5/X6	Electric heater: 2x relays
X7	DHW pump
X8	Heat pump on/off
X9	DHW electric heater
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

5.2.3 Configuration 3: Bi-valent parallel (alternative) system

This is a bivalent system where the boiler is configured in parallel with the Heat Pump. A hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing. This system is recommended for retrofit (upgrade) applications where an existing gas/oil boiler will be retained to provide the full heating requirements on the coldest days of the year.

◆ CONF 3.1 – System with boiler pump control

The maximum system configuration is shown in the diagram below (DHW, HC1 and HC2 options can be selected with parameters).

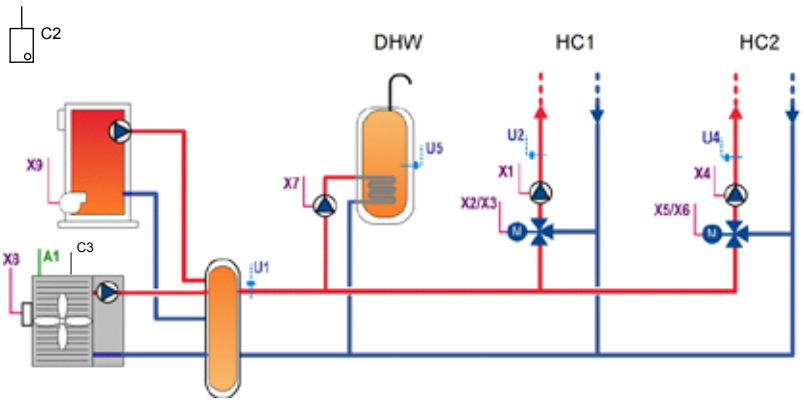


Inputs	
U1	System supply temperature sensor
U2	HC1 Supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

Outputs	
X1	HC1 pump
X2/X3	HC1 mixing valve : 2x relays
X4	HC2 pump
X5	Boiler pump (no output on X6)
X7	DHW pump
X8	Heat pump on/off
X9	Boiler on/off
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

◆ CONF 3.2 – System without boiler pump control, up to two mixing heating circuits

The maximum system configuration is shown in the diagram below.(DHW, HC1 and HC2 options can be selected with parameters)



Inputs	
U1	System supply temperature sensor
U2	HC1 Supply temperature sensor
U4	HC2 Supply temperature sensor
U5	DHW temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

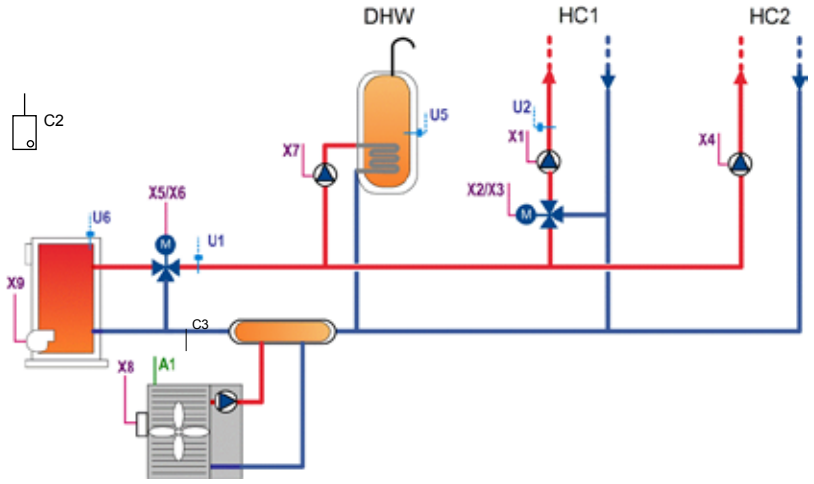
Outputs	
X1	HC1 pump
X2/X3	HC1 mixing valve : 2x relays
X4	HC2 pump
X5/X6	HC2 mixing valve : 2x relays
X7	DHW pump
X8	Heat pump on/off
X9	Boiler on/off
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

5.2.4 Configuration 4: Bi-valent series system

This is a bivalent system where the boiler is configured in series with the Heat Pump. A hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing. This system is also used for retrofit (upgrade) applications, but operates like the mono-energetic system using the gas/oil boiler, similarly to the electric heater, in series with the heat-pump. The boiler only needs to provide the additional peak load capacity.

◆ **CONF 4.1 – System with boiler bypass/mixing valve**

The maximum system configuration is shown in the diagram below (DHW, HC1 and HC2 options can be selected with parameters).



Inputs	
U1	System supply temperature sensor
U2	HC1 Supply temperature sensor
U5	DHW temperature sensor
U6	Boiler temperature sensor
U8	(optional) Outside temperature sensor
B1	Blocking input
B2	DHW boost input

Outputs	
X1	HC1 pump
X2/X3	HC1 mixing valve : 2x relays
X4	HC2 pump
X5/X6	Bypass/mixing valve : 2x relays
X7	DHW pump
X8	Heat pump on/off
X9	Boiler on/off
A1	Heat pump control signal
C2	RF Receiver
C3	Heat Pump communication signal

5.2.5 Mono-valent, mono-energetic and bi-valent operation considerations

Bi-valent and mono-energetic systems use an auxiliary heat source (boiler or electric heater respectively) in addition to the Heat Pump. At higher outside temperatures, the Heat Pump can provide all heating requirements of the system, and it is not necessary to switch on the auxiliary heat source.

However at lower outside temperatures, the electric heater or boiler is used to provide the increased heating demand. The changeover point for bi-valent or mono-energetic operation is called the Balance Point (BP). Furthermore, at very low outside temperatures the Heat Pump should not operate, and the boiler will operate on its own. This setting is the Minimum Outside Temperature for Heat Pump Operation (P601).

◆ **For mono-energetic systems (CONF 2):**

- IF average outside temperature (T003) ≥ Maximum outside temperature for electric heater operation (P801), THEN heating source (K001) = ehat pump only
- IF (average outside temperature (T003) < Maximum outside temperature for electric heater operation (P801) – 0.5K) AND (average outside temperature (T003) > Minimum outside temperature for heat pump operation (P601) + 0.5K), THEN heating source (K001) = heat pump & electric heater
- IF average outside temperature (T003) ≤ Minimum outside temperature for heat pump operation (P601), THEN heating source (K001) = electric heater only

◆ **For bi-valent systems (CONF 3 and 4):**

- IF average outside temperature (T003) ≥ Maximum outside temperature for boiler operation (P701), THEN heating source (K001) = heat pump only
- IF (average outside temperature (T003) < Maximum outside temperature for boiler operation (P701) – 0.5K) AND (average outside temperature (T003) > Minimum outside temperature for heat pump operation (P601) + 0.5K), THEN heating source (K001) = heat pump & boiler
- IF average outside temperature (T003) ≤ Minimum outside temperature for heat pump operation (P601), THEN heating source (K001) = boiler only

◆ **In configuration 3:**

If Bi-valent Alternative Operation is selected (P007 = 1), meaning the Heat Pump and boiler shall not be used for heating at the same time, then P601 is always set = P701 (P601 cannot be changed by the installer) and then:

- IF average outside temperature (T003) ≥ Maximum outside temperature for boiler operation (P701), THEN heating source (K001) = heat pump only
- IF average outside temperature (T003) < Maximum outside temperature for boiler operation (P701), THEN heating source (K001) = boiler only

Parameters	P701	Maximum Outside Temperature for Boiler Operation = Balance Point (BP)
	P801	Maximum Outside Temperature for Electric Heater Operation = Balance Point (BP)
	P601	Minimum Outside Temperature for Heat Pump Operation
	P007	Bi-valent Alternative Operation (enable/disable)
Datapoints	T003	Average Outside Temperature
	K001	Heating Source

5.3 Settings for combination of system controller with RHUE-(3-6)A(V)HN-HM units

In order to combine the new System controller with Yutaki M RHUE-(3~6)A(V)HN-HM (55ºC) model, special setting procedure must be performed in System Controller.

Detailed instructions on this procedure are shown below:

First at all it is necessary to access into parameter settings screen. To do this, log in with a service access code

1 Press and hold button from the home screen (for 1 second).
2 Enter the access code wWhen the screen prompts for a PASS. Use the 6 buttons to enter the 4 digit code:

Service access code is:**6565**

3 If the correct access code is entered, the display shows:W

• Double spanner icon for service access / Message “Passcode OK – Service”

4 The MENU then allows access to setting and system information.

- Press ▽ to scroll though the menu items
- Go down to 04 Parameters
- Press OK to select the menu item (enter sub-menu)
- Go down to 04>04 Heat Pump
- Press OK to select the menu item (enter sub-menu)
- Change the following parameters:

Parameter	Description	Default	New value
P603	Heat Pump Supply Setpoint at 20mA	60ºC	**55ºC**
P604	Heat Pump Maximum Inlet Temperature	60ºC	**55ºC**
P606	Heat Pump Maximum Supply Setpoint above P609	60ºC	**55ºC**

5 After changing these parameters, return to the main screen by pressing the “Esc” button

5.4 Control functions

5.4.1 Control strategy overview

The System Controller uses the “zone of greatest demand” strategy for calculating the supply water temperature required from the Heat Pump (and/or 3-stage electric heater or boiler).

The System Controller manages three “zones”:

1 HC1: Heating Circuit 1 / “Zone 1”
2 HC2: Heating Circuit 2 / “Zone 2”
3 DHW: Domestic Hot Water Circuit / “DHW Zone”

Each circuit can generate a demand to the Heat Pump (and/or boiler/electric heater) for a particular supply water temperature:

T103	The supply setpoint water temperature required by the Heating Circuit 1
T203	The supply setpoint water temperature required by the Heating Circuit 2
T302	The supply setpoint water temperature required by the DHW Circuit

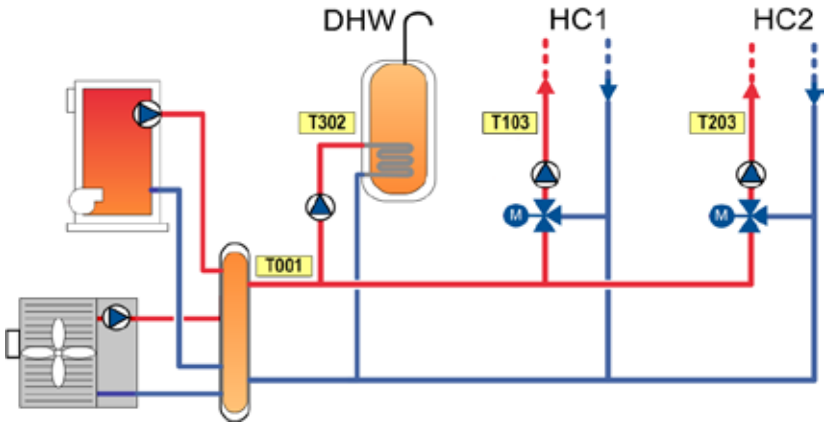
The actual System Supply Setpoint (T005) is dependent on whether DHW Loading (K301) is active.

- IF DHW Loading (K301) is active, THEN System Supply Setpoint (T005) = DHW Supply Setpoint (T302)
- IF DHW Loading (K301) is not active, THEN System Supply Setpoint (T005) = maximum of the heating supply setpoints (T103, T203)

It is the objective of the System Controller to manage the Heat Pump, 3-stage electric heater and boiler appropriately to control the System Supply Temperature (T001) to this System Supply Setpoint (T005).

The diagram below shows the three circuits (“zones”) and illustrates the required water temperatures (T103, T203, T302) for each circuit and the System Supply Temperature (T001).

Required water temperatures:



Datapoints	
T001	System Supply Temperature
T005	System Supply Setpoint
T103	HC1 Supply Setpoint
T203	HC2 Supply Setpoint
T302	DHW Supply Setpoint
K301	DHW Loading

5.4.2 General control functions

◆ Outside temperature

The actual outside temperature is measured by the YUTAKI M Heat Pump. The System Controller uses the actual value and time-averaged values for the control functions:

T002	Actual Outside Temperature; used to calculate the average outside temperatures T003 and T004
T003	Average Outside Temperature (3hr rolling average); used for OTC Function, Frost Protection (K002), Heat Pump Minimum Supply Setpoint (T604), Heat Pump Maximum Supply Setpoint (T602), Heating Source (K001).
T004	Daily Average Outside Temperature (24hr rolling average); used for automatic summer switch-off function.

NOTE

An optional outside temperature sensor can be directly connected to the System Controller in case the Heat Pump is located in a position not suitable for this measurement.

If a Wired Outside Sensor (P006) is selected, then use the wired outside temperature instead of the YUTAKI M outside temperature.

If the wired outside sensor is selected or deselected, the value of the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004) will be reset and the actual value of the selected outside sensor is used for the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004).

If the parameter Average Outside Temperature Reset (P012) is selected, the value of the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004) will be reset and the actual value of the selected outside sensor is used for the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004).

In case that the used Outside Temperature Sensor error disappears the value of the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004) will be reset and the actual value of the selected outside sensor is used for the Average Outside Temperature (T003) and Daily Average Outside Temperature (T004).

Parameters	P006	Wired Outside Sensor
	P012	Average Outside Temperature Reset

◆ Frost protection

The Frost Protection function helps prevent the heating system pipe-work freezing. When the Average Outside Temperature (T003) falls below the Frost Protection Activation Temperature (P001), both heating circuit supply water temperatures will be maintained at least at the Frost Protection HC Minimum Supply Setpoint (P002).

A switching differential of 1K is applied.

The following conditions are met:

- IF Average Outside Temperature (T003) ≤ Frost Protection Activation Temperature (P001), THEN Frost Protection (K002) is active
- IF Average Outside Temperature (T003) > Frost Protection Activation Temperature (P001) + 1K, THEN Frost Protection (K002) is not active

To disable the Frost Protection function set P001 = OFF.

Parameters	P001	Frost Protection Activation Temperature
	P002	Frost Protection HC Minimum Supply Setpoint
Datapoints	T003	Average Outside Temperature
	K002	Frost Protection

◆ Automatic summer switch-Off

At higher outside temperatures it doesn't make sense to keep heating the building.

The System Controller will switch the heating off when the Daily Average Outside Temperature (T004) rises above the Summer Switch-Off Activation Temperature (P003). A switching differential of –0.5K is applied. When Automatic Summer Switch-Off (K003) is active, the heating circuits are disabled.

The following conditions are met:

- IF Daily Average Outside Temperature (T004) ≥ Summer Switch-Off Activation Temperature (P003), THEN Automatic Summer Switch-Off (K003) is active.
- IF Daily Average Outside Temperature (T004) < Summer Switch-Off Activation Temperature (P003) – 0.5K, THEN Automatic Summer Switch-Off (K003) is not active.

To disable the automatic summer switch-off function, set P003 = OFF.

Parameters	P003	Summer Switch-Off Activation Temperature
Datapoints	T004	Daily Average Outside Temperature
	K003	Automatic Summer Switch-Off

◆ Pump and valve seizure protection

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

If the Pump/Valve Seizure Protection Function (P004) is enabled then the pumps and valves which have not been used within the last 168 hours (one week) will be run for a short period:

- Mixing valves are set to 100% for 1 minute an then back to 0%
- Diverting valves are switched on for 1 minute
- Pumps are switched on for 1 minute

Only one component (pump or valve) is operated at one time.

Parameters	P004	Pump/Valve Seizure Protection Function (enable/disable)
	P108	HC1 Mixing Valve Motor Runtime
	P208	HC2 Mixing Valve Motor Runtime
	P707	Bypass/Mixing Valve Motor Runtime (CONF 4)

5.4.3 Heating circuit 1 control functions

◆ Heating circuit 1 control: Enable/Disable

Heating Circuit 1 type (P101) can be direct or mixing circuit.

The heating circuit 1 is usually always enabled which means the System Controller will always try to provide the correct water temperature to maintain the desired comfort conditions based on the heating characteristic curve as described below.

A number of conditions determine whether the heating circuit is enabled.

The Heating Circuit 1 (K101) is enabled when:

- DHW Loading (K301) is not active
  AND Frost Protection (K002) is active
  OR the HC1 Screed Function (P113) is active
  OR HC1 OpMode (K102) is not = OFF (System Operating Mode selection: see section *"Changing the System Operating Mode"*)
  AND Automatic Summer Switch-Off (K003) is not active
  AND HC1 Automatic No-Load Condition (K103) is not active
  OR Boiler Heat Boost Enable (P714) is enabled
  OR Electric Heater Heat Boost Enable (P808) is enabled

Parameters	P101	Heating Circuit 1 type [direct ¦ mixing]
	P113	HC1 Screed Function
	P714	Boiler Heat Boost Enable
	P808	Electric Heater Heat Boost Enable
Datapoints	K101	Heating Circuit 1
	K301	DHW Loading
	K002	Frost Protection
	K003	Automatic Summer Switch-Off
	K102	HC1 Op Mode
	K103	HC1 Automatic No-Load Condition

◆ Heating circuit 1: supply setpoint

If the Heating Circuit 1 (K101) is disabled, the HC1 Supply Setpoint (T103) is set to zero.

If the HC1 Screed Function (P113) is active:

- HC1 Supply Setpoint (T103) = HC1 Screed Setpoint (T104) (see 3.3.8)

If the HC1 Screed Function (P113) is not active:

- HC1 Supply Setpoint (T103) = HC1 OTC Supply Setpoint (T105) (see 3.3.3)
- HC1 Supply Setpoint (T103) is restricted to between the minimum and maximum limits (see 3.3.4)
- If Frost Protection (K002) is active, HC1 Supply Setpoint (T103) is limited to >= Frost Protection HC Minimum Supply Setpoint (P002) (see 3.2.2)

Parameters	P113	HC1 Screed Function
	P002	Frost Protection HC Minimum Supply Setpoint
Datapoints	T103	HC1 Supply Setpoint
	T104	HC1 Screed Setpoint
	T105	HC1 OTC Supply Setpoint
	K101	Heating Circuit 1
	K002	Frost Protection

◆ Heating circuit 1: OTC control characteristic curve

The System Controller is an Outside Temperature Compensated (OTC) control system that uses the outside temperature, the room temperature setpoint, and optionally the room temperature, to calculate the correct supply water temperature for the system in order to maintain comfort conditions. A prerequisite for constant room comfort conditions is the correct setting of the heating characteristic curve as well as the correct design of the heating system by the heating installer according to heat demand calculations.

The heating curve should be selected according to the local climatic conditions, building structure and type of heating distribution system. The gradient of the heating curve describes the relation between the change in the supply temperature and the change in outside temperature. In the case of large heating surfaces (and therefore low supply temperatures) like floor heating systems the heating characteristic curve is less steep compared to smaller heating surfaces (eg radiators). Typically a well-insulated, modern building with underfloor heating would use a heating curve value of 0.4 – 0.6 and one with radiator heating a value of around 1.6. The heating curve is affected by the room setpoint (see 3.3.3.1) and the room compensation (see 3.3.3.2). In addition, the installer can set a heating curve parallel shift to move the heating curve up or down depending on circumstances.

The heating curve calculation uses the Average Outside Temperature (T003).

HC1 OTC Supply Setpoint (T105) = OTC Function { Average Outside Temperature (T003),
HC1 Room Setpoint (T106),
HC1 OTC Heating Curve Gradient (P102),
HC1 Heating Distribution Type (P103) }
+ HC1 Heating Curve Parallel Shift (P114) + HC1 Room Compensation

Parameters	P102	HC1 OTC Heating Curve Gradient
	P103	HC1 Heating Distribution Type (radiators, underfloor heating, convectors)
	P114	HC1 Heating Curve Parallel Shift
Datapoints	T105	HC1 OTC Supply Setpoint
	T106	HC1 Room Setpoint
	T003	Average Outside Temperature

Room setpoint heating curve shift

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

If there is no Room Unit in heating circuit 1 (no Room Unit is bound (RF binding) to heating circuit 1) then:

- If there is a Room Unit in heating circuit 2, the room setpoint of heating circuit 2 is used also for HC1.
- If there is also no Room Unit in heating circuit 2, then a default value of 20°C is used.

Room temperature compensation

If room compensation is enabled, the calculated supply setpoint is adjusted based on the difference between room temperature and room setpoint in order to reduce the room error. The amount of room influence can be adjusted by the room temperature compensation factor setting. To increase or decrease the amount of room compensation, adjust the Room Compensation Factor. A higher value will give more priority to the room temperature error, and a lower value will mean the System Controller follows more closely the selected heating curve.

HC1 Room Compensation = HC1 Room Compensation Factor (P104) x (HC1 Room Setpoint (T106) - HC1 Room Temperature (T102))

If there is no Room Unit in heating circuit 1, HC1 Room Compensation is set to zero.

To disable the room compensation function, set P104 = OFF.

Parameters	P104	HC1 Room Compensation Factor
Datapoints	T106	HC1 Room Setpoint
	T102	HC1 Room Temperature

◆ Heating circuit 1: minimum/maximum temperature limits

The maximum temperature limit can be used for example to prevent high temperatures going to floor heating systems. The minimum temperature limit can be used when it is desired to keep a minimum level of heating in the heating circuit.

The HC1 Supply Setpoint (T103) is limited to HC1 Maximum Supply Setpoint (P106) if T103 is higher than P106.

The HC1 Supply Setpoint (T103) is limited to HC1 Minimum Supply Setpoint (P105) if T103 is lower than P105.

Parameters	P105	HC1 Minimum Supply Setpoint
	P106	HC1 Maximum Supply Setpoint
Datapoints	T103	HC1 Supply Setpoint

◆ Heating circuit 1: heating circuit pump

Normally, the heating circuit pump runs when the heating circuit is enabled. A pump overrun time occurs before switching the pump off. For mixing circuits, the over-temperature limit protection will switch the pump off.

The DHW Type (P301) affects the heating circuit pump operation.

A number of conditions determine whether the heating circuit pump is enabled.

The HC1 Pump (X1) is switched on when:

- (DHW Loading (K301) is active AND DHW Type (P301) = DHW Valve)
  OR DHW Loading (K301) is not active
  AND HC1 Mixing Over-Temperature Protection (K105) is not active
  AND (Heating Circuit 1 (K101) is enabled OR HC1 Pump Overrun Time (P107) has not expired)

The HC1 Pump Overrun Time (P107) starts at the point when the Heating Circuit 1 (K101) becomes disabled AND the DHW Loading (K301) is not active at the same time.

Parameters	P107	HC1 Pump Overrun Time
	P301	DHW Type
Datapoints	K101	Heating Circuit 1
	K105	HC1 Mixing Over-Temperature Protection
	K301	DHW Loading

◆ Heating circuit 1: mixing valve control

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

The following conditions are met:

- HC1 Mixing Valve Position (T107) = PI Function (HC1 Supply Setpoint (T103) – HC1 Supply Temperature (T101))
- If the HC1 Supply Setpoint (T103) = 0, the HC1 Mixing Valve Position (T107) is set to zero.
- If the HC1 Mixing Over-Temperature Protection (K105) is active, the HC1 Mixing Valve Position (T107) is set to zero.

The opening and closing of the valve is dependent on the valve actuator (motor) speed. The HC1 Mixing Valve Motor Runtime (P108) 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.

Parameters	P108	HC1 Mixing Valve Motor Runtime
	P109	HC1 Mixing Valve Control: Proportional Factor
	P110	HC1 Mixing Valve Control: Integral Factor
Datapoints	T101	HC1 Supply Temperature
	T103	HC1 Supply Setpoint
	T107	HC1 Mixing Valve Position
	K105	HC1 Mixing Over-Temperature Protection

Heating circuit 1: mixing over-temperature protection

This function helps prevent damage to floor heating systems by very high temperatures. The heating circuit pump is switched off and the mixing valve closes when the supply temperature approaches the mixing over-temperature protection limit. This limit is usually set a few Kelvin higher than the maximum supply setpoint. It is more usually recommended, and sometimes mandatory, to provide mixing over-temperature limit protection by independent means (e.g. aquastat).

HC1 Mixing Over-Temperature Protection Limit = HC1 Maximum Supply Setpoint (P106)
+ HC1 Mixing Over-Temperature Limit Offset (P111)

IF HC1 Supply Temperature (T101) ≥ HC1 Maximum Supply Setpoint (P106)
+ HC1 Mixing Over-Temperature Limit Offset (P111),
THEN HC1 Mixing Over-Temperature Protection (K105) is active
(HC1 Pump is switched off, HC1 mixing valve is closed)

IF HC1 Supply Temperature (T101) < HC1 Maximum Supply Setpoint (P106),
THEN HC1 Mixing Over-Temperature Protection (K105) is not active
(Returns to normal control)

To disable the mixing over-temperature protection function, set P111 = OFF.

An alarm is generated when the mixing over-temperature limit is exceeded (see alarm table).

Parameters	P111	HC1 Mixing Over-Temperature Limit Offset
	P106	HC1 Maximum Supply Setpoint
Datapoints	T101	HC1 Supply Temperature
	K105	HC1 Mixing Over-Temperature Protection

◆ Heating circuit 1: automatic no-load detection function

When the calculated heating supply setpoint or the room setpoint depending on the parameter setting is less than the room temperature, then the heating circuit can be switched off to save energy.

IF HC1 Automatic No-Load Function (P112) is enabled HC1 Automatic No-Load Condition (K103) is active IF:

- No Load Function depending on Room Setpoint (P115) = 0 (disabled)
  AND HC1 OTC Supply Setpoint (T105) ≤ HC1 Room Temperature (T102)
- OR No Load Function depending on Room Setpoint (P115) = 1 (enabled)
  AND HC1 Room Setpoint (T106) ≤ HC1 Room Temperature (T102)

The HC1 Automatic No-Load Condition (K103) is not active IF:

- HC1 Automatic No-Load Function (P112) = 0 (disabled)
- OR No Load Function depending on Room Setpoint (P115) = 0 (disabled)
  AND HC1 OTC Supply Setpoint (T105) ≥ HC1 Room Temperature (T102)
  + HC1 No Load Function Differential (P118)
- OR No Load Function depending on Room Setpoint (P115) = 1 (enabled)
  AND HC1 Room Setpoint (T106) ≥ HC1 Room Temperature (T102)
  + HC1 No Load Function Differential (P118)

If the HC1 Automatic No-Load Condition (K103) is active and the HC1 Pump Overrun Time (P107) is over, the pump switches OFF for the period of HC1 No Load Function Pump Off Time (P116) and ON for the period of HC1 No Load Function Pump On Time (P117) as long the HC1 Automatic No-Load Condition (K103) is active.

If there is no room temperature value available, the HC1 Room Setpoint (T106) value is used instead.

Parameters	P107	HC1 Pump Overrun Time
	P112	HC1 Automatic No-Load Function (enable/disable)
	P115	No Load Function depending on Room Setpoint (disable ¦ enable)
	P116	HC1 No Load Function Pump Off Time
	P117	HC1 No Load Function Pump On Time
	P118	HC1 No Load Function Differential
Datapoints	T102	HC1 Room Temperature
	T105	HC1 OTC Supply Setpoint
	T106	HC1 Room Setpoint
	K103	HC1 Automatic No-Load Condition

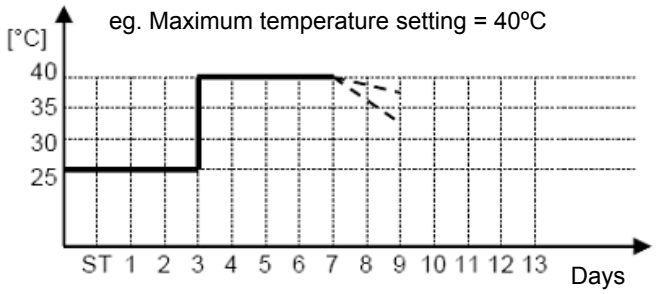
◆ Heating circuit 1: screed drying function

The screed function is used exclusively for the process of drying of newly applied screed on floor heating systems. The process is based on EN 1264 part 4 (installation).

When HC1 Screed Function (P113) is active, the HC1 Screed Setpoint (T104) follows a predetermined schedule:

1 HC1 Screed Setpoint (T104) is kept constant at 25°C for 3 days
2 HC1 Screed Setpoint (T104) is set to the HC1 Maximum Supply Setpoint (P106) for 4 days (but always limited to <= 55ºC)

Screed Drying Function



On completion of the scheduled screed drying sequence, the System Controller returns to normal operation (HC1 Screed Function (P113) is cancelled).

If there is a power interruption, the HC1 Screed Function (P113) will continue when the power is restored.

Parameters	P113	HC1 Screed Function
	P106	HC1 Maximum Supply Setpoint
Datapoints	T104	HC1 Screed Setpoint

5.4.4 Heating circuit 2 control functions

NOTE

- *Heating circuit 2 control functions are identical to heating circuit 1 control functions.*
- *Some parameter / datapoint names are identified by HC2 instead of HC1.*
- *Parameters are identified by P2xx instead of P1xx.*
- *Informations / Datapoints are identified by T2xx instead of T1xx.*
- *Informations / Datapoints are identified by K2xx instead of K1xx.*

In mono-energetic and bi-valent series systems (CONF 2.2 and CONF 4.1) or bi-valent parallel systems with boiler pump control (CONF 3.1) Heating Circuit 2 Type (P201) can only be a direct circuit (mixing circuit is not possible).

The Heating Circuit 2 (K201) is enabled when:

- DHW Loading (K301) is not active
- AND Heating Circuit 2 Type (P201) is not = none

AND Frost Protection (K002) is active
OR the HC2 Screed Function (P213) is active
OR HC2 OpMode (K202) is not = OFF (System Operating Mode selection: see section *"Changing the System Operating Mode"*)
AND Automatic Summer Switch-Off (K003) is not active
AND HC2 Automatic No-Load Condition (K203) is not active
OR Boiler Heat Boost Enable (P714) is enabled
OR Electric Heater Heat Boost Enable (P808) is enabled

Parameters	P201	Heating Circuit 2 Type [none ¦ direct ¦ mixing]
	P213	HC2 Screed Function
	P714	Boiler Heat Boost Enable
	P808	Electric Heater Heat Boost Enable
Datapoints	K002	Frost Protection
	K003	Automatic Summer Switch-Off
	K201	Heating Circuit 2
	K202	HC2 Op Mode
	K203	HC2 Automatic No-Load Condition
	K301	DHW Loading

5.4.5 DHW control functions

◆ DHW Control: Enable/Disable

A number of conditions determine whether the Domestic Hot Water control is enabled.

If DHW Defrost Control (P316) is set to 1 (Standard), then:

If Yutaki M Defrost signal received → Defrost operation will be done in Heating Circuit (HC1/2) always.

If DHW Defrost Control (P316) is set to 0 (Tank), then:

If Yutaki M Defrost signal received → Defrost operation will be done into DHW tank always.

DHW Control (K302) is enabled when:

- DHW Type (P301) is not = none
- AND the DHW temperature sensor has no failure
- AND DHW OpMode (K303) is not = OFF (System Operating Mode selection: see section *"Changing the System Operating Mode"*)
- AND (the Heat Pump does not have any fault OR configuration is not 1 or 2)
- AND Heat Pump is not in defrost mode if DHW Defrost Control (P316) is set to 1 (Standard).
- AND DHW OpMode (K303) = ON

OR (DHW is not blocked by the DHW Time Program

AND not blocked by the Blocking Input

AND the DHW Max Time Mode (K305) is not active)

OR the DHW Boost Mode is active

OR DHW Anti-Legionella Protection (P309) is active

AND the DHW Type (P301) is not none

AND the DHW temperature sensor has no failure

Parameters	P301	DHW Type (0 = none, 1* = DHW valve, 2* = DHW pump) *: depending on hydraulic configuration
	P309	DHW Anti-Legionella Protection
	P316	DHW Defrost Control (0 = Tank, 1 = Standard)
Datapoints	K302	DHW Control
	K303	DHW OpMode
	K304	DHW Anti-Legionella Protection
	K305	DHW Max Time Mode

NOTE

DHW control has priority over the heating circuit. This means that when DHW Loading (K301) is active, the heating circuits are disabled.

◆ DHW control algorithm

If DHW Control (K302) is disabled, the DHW Loading (K301) is not active.

If DHW Control (K302) is enabled, the DHW Loading (K301) is determined by the DHW control algorithm below.

Normally the Heat Pump can heat the DHW tank to the DHW Setpoint (P302), however in configurations 1 & 2, if the DHW Setpoint (P302) is set too high, the Heat Pump may not be able to reach the DHW Setpoint (P302).

(In configurations 3 & 4, the boiler can provide enough heat to achieve the DHW Setpoint (P302).) To prevent the Heat Pump continuing to try to reach a temperature which is not possible, the DHW Control Setpoint (T304) (DHW Setpoint which is used for this DHW control function) is limited.

The maximum temperature to which the Heat Pump can raise the DHW tank is defined as:

DHW-Hpmax (T303) = Heat Pump Maximum Supply Setpoint (T602) – DHW Offset (P305)

NOTE

The Heat Pump Maximum Supply Setpoint (T602) depends on the Average Outside Temperature (T003) (see 3.7.7)

For configurations 1 & 2:

- IF the DHW Setpoint (P302) < DHW-Hpmax (T303), THEN DHW Control Setpoint (T304) = DHW Setpoint (P302)
- IF the DHW Setpoint (P302) ≥ DHW-Hpmax (T303), THEN DHW Control Setpoint (T304) = DHW-Hpmax (T303)

For configurations 3 & 4: DHW Setpoint (HP) = DHW Setpoint (P302)

The basic control algorithm for DHW Control (K302) is that when the DHW Temperature (T301) drops below the DHW Control Setpoint (T304) minus the DHW Differential (P303), the DHW Pump (X7) is switched on (or DHW valve opened). When the DHW Temperature (T301) rises above the DHW Control Setpoint (T304), the DHW loading is complete.

IF DHW Temperature (T301) < DHW Control Setpoint (T304) – DHW Differential (P303), THEN DHW Loading (K301) is active

IF DHW Temperature (T301) ≥ DHW Control Setpoint (T304), THEN DHW Loading (K301) is not active

When DHW Loading (K301) is active, the DHW Supply Setpoint (T302) is calculated as:

DHW Supply Setpoint (T302) = DHW Setpoint (P302) + DHW Supply Offset (P304)

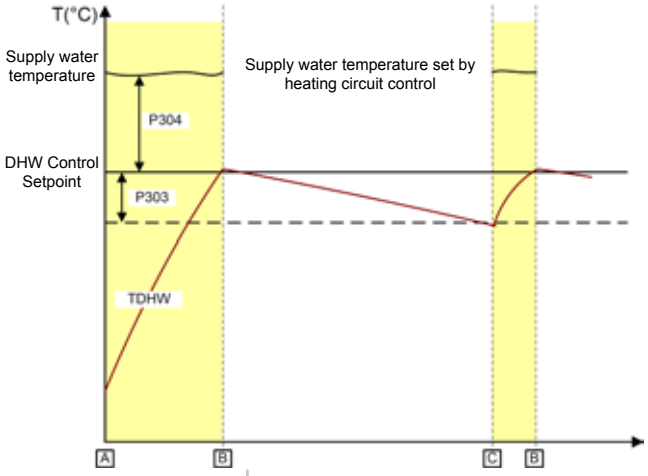
When DHW Anti-Legionella Protection (K304) is active, the DHW Supply Setpoint (T302) is DHW Anti-Legionella Setpoint (P311)

When DHW Loading (K301) is not active, DHW Supply Setpoint (T302) = 0.

Parameters	P302	DHW Setpoint
	P303	DHW differential
	P304	DHW Supply Offset
	P305	DHW Offset
	P311	DHW Anti-Legionella Setpoint

Datapoints	T602	Heat Pump Maximum Supply Setpoint
	T301	DHW Temperature
	T302	DHW Supply Setpoint
	T303	DHW-Hpmax
	T304	DHW Control Setpoint
	K301	DHW Loading
	K302	DHW Control

DHW Control Algorithm



A — DHW loading starts (power-on or DHW Time Program signal)
DHW Supply Setpoint set to DHW Control Setpoint + P304

B — DHW tank temperature rises above DHW Control Setpoint
DHW loading stops
DHW Supply Setpoint is determined by heating circuit

C — DHW tank temperature falls below DHW Control Setpoint - P303
DHW loading starts
DHW Supply Setpoint set to P302 + P304

◆ DHW Pump/Valve Output

The DHW Pump/Valve output X7 is switched on if *DHW Loading* (K301) is active.

The DHW Pump/Valve output X7 is switched off if *DHW Loading* (K301) is not active.

Datapoints	K301	DHW Loading

◆ Maximum DHW loading time

In case there is a continuous high demand for DHW over a very long period, or the DHW Setpoint (P302) is set too high, the Heat Pump may not be able to reach the desired temperature. To prevent that the heating circuit is disabled for a long period, the DHW Control (K302) is disabled after a preset time. After 24hrs, or after the next DHW blocking period, the DHW Control (K302) is re-enabled and the Heat Pump may once again be used to load the DHW tank.

If DHW Loading Time > Maximum DHW Loading Time (P306), DHW Max Time Mode (K305) is active (DHW Control (K302) will be disabled).

The DHW Max Time Mode (K305) is reset after:

- DHW Cycle Time (P317) has passed since DHW Control (K302) was last enabled
- OR DHW Blocking (K307) is active (Blocking Input)
- OR DHW Blocking (K307) is active (DHW Time Program)
- OR DHW Anti-Legionella Protection (K304) is active

Parameters	P306	Maximum DHW Loading Time
	P317	DHW Cycle Time
Datapoints	K302	DHW Control
	K305	DHW Max Time Mode
	K304	DHW Anti-Legionella Protection
	K307	DHW Blocking

◆ Using other heat sources for DHW loading

In configurations 1 and 2, a DHW tank electric heater can be used to achieve higher DHW temperatures (see 3.6 DHW ELECTRIC HEATER CONTROL FUNCTIONS) Note that in configuration 2, the 3-stage electric heater is never used for DHW loading (it is more energy efficient to use a DHW tank electric heater instead).

In configurations 3 and 4, the boiler may be used to raise the temperature of the DHW tank if the Heat Pump is not able to reach the DHW Setpoint (P302) by itself. The boiler will start after a time delay (Boiler Waiting Time (P704)) in order to allow the Heat Pump time to satisfy the DHW loading demand by itself. If the DHW Setpoint (P302) is set too high so that the boiler will always be needed, then the Heat Pump first heats up the DHW tank as high as it can and then the boiler is used.

Parameters	P302	DHW Setpoint
	P704	Boiler Waiting Time
Datapoints	T301	DHW Temperature

◆ DHW time program

A DHW Time Program is provided in the System Controller and can be changed with the integrated Room Unit.

The user can set up to two time periods in the day when DHW Control (K302) is enabled.

The DHW Time Program is the same for every day (daily program only).

NOTE

The default value of the datapoint is 1 and the time setting shows "- - -" that means DHW Time Program always active during default settings.

Datapoints	K302	DHW Control

◆ DHW anti-legionella protection

To help protect against legionella in the domestic hot water system, the DHW Temperature (T301) can be raised to a higher than normal temperature (at least 65°C). This is only possible if there is a DHW electric heater or the system has a boiler to raise the DHW Temperature high enough. If enabled, DHW Anti-Legionella Protection (K304) is activated once a week on a specified day (P312) and at a specified start time (P313). The temperature is raised above a specified DHW Anti-Legionella Setpoint (P311) for a specified time, the DHW Anti-Legionella Activation Period (P314). Should the temperature drop below this point due to a large DHW drawoff, the anti-legionella heating will be reactivated after a short waiting period, DHW Anti-Legionella Restart Interval (P315).

DHW Anti-Legionella Protection (K304) is active every week if DHW Anti-Legionella Protection (P309) is enabled and DHW Anti-Legionella Operation Day (P312) and DHW Anti-Legionella Start Time (P313) are reached.

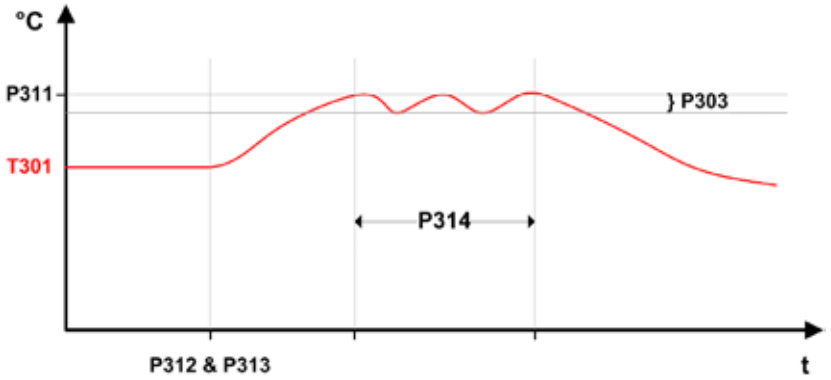
DHW Anti-Legionella Protection (K304) stays for the time of DHW Anti-Legionella Restart Interval (P315) active if the DHW Temperature (T301) < DHW Anti-Legionella Setpoint (P311) – DHW Differential (P303)

If the DHW Temperature (T301) ≥ DHW Anti-Legionella Setpoint (P311) and DHW Anti-Legionella Protection (K304) is active a second timer DHW Anti-Legionella Activation Period (P314) starts.

During the time of DHW Anti-Legionella Activation Period (P314)

- The DHW Anti-Legionella Protection (K304) is active IF the DHW Temperature (T301) < DHW Anti-Legionella Setpoint (P311) – DHW Differential (P303)
- The DHW Anti-Legionella Protection (K304) is not active IF the DHW Temperature (T301) ≥ DHW Anti-Legionella Setpoint (P311)

DHW Anti-Legionella Protection



Parameters	P303	DHW differential
	P309	DHW Anti-Legionella Protection (enable/disable)
	P311	DHW Anti-Legionella Setpoint
	P312	DHW Anti-Legionella Operation Day (Mon=1, Tue=2 … Sat=6, Sunday=7)
	P313	DHW Anti-Legionella Start Time
	P314	DHW Anti-Legionella Activation Period
	P315	DHW Anti-Legionella Restart Interval
Datapoints	T301	DHW Temperature
	K304	DHW Anti-Legionella Protection

5.4.6 DHW electric heater control functions

The DHW tank may have an internal electric heater for situations when higher DHW temperatures are required than can be achieved with the Heat Pump alone. (Configurations 1 & 2 only), or the Heat Pump capacity is reduced (takes too long to heat the DHW tank).

◆ DHW electric heater control: enable/disable

A number of conditions determine whether the Domestic Hot Water Electric Heater (DHW EH Control (K306)) is enabled.

DHW EH Control (K306) is enabled when:

- DHW Type (P301) is not = none
- AND DHW Electric Heater Type (P310) is enabled
- AND DHW OpMode (K303) is not = OFF (System Operating Mode selection: see section *"Changing the System Operating Mode"*)
- AND the DHW temperature sensor has no failure
- AND DHW OpMode (K303) = ON

OR (DHW is not blocked by the DHW Time Program

AND not blocked by the Blocking Input)

OR the DHW Boost Mode is active

OR DHW Anti-Legionella Protection (K304) is active

AND DHW Electric Heater Type (P310) is enabled

AND DHW Type (P301) is not = none

AND the DHW temperature sensor has no failure

Parameters	P301	DHW Type
	P309	DHW Anti-Legionella Protection (enable/disable)
	P310	DHW Electric Heater Type
Datapoints	K303	DHW Op Mode
	K304	DHW Anti-Legionella Protection
	K306	DHW EH Control

◆ DHW Electric Heater Control Algorithm

IF DHW EH Control (K306) is disabled, THEN the DHW EH Output (X9) is OFF.

IF DHW EH Control (K306) is enabled, THEN the DHW EH Output (X9) state is determined by the DHW EH Control Algorithm below.

The DHW EH Output (X9) is switched on when the DHW Temperature (T301) is less than the DHW Setpoint (P302) minus the DHW Differential (P303). However only if the DHW Electric Heater Waiting Time (P307) has expired (to allow the Heat Pump time to heat the tank by itself) or if the DHW Temperature (T301) rises above the DHW Control Setpoint (T304), which is the maximum temperature that the Heat Pump can heat the DHW Temperature (T301) (defined in 3.5.2)

DHW EH Output (X9) is switched ON when:

- DHW Temperature (T301) < DHW Setpoint (P302) – DHW Differential (P303)
- AND (DHW Electric Heater Waiting Time (P307) has expired

OR DHW Temperature (T301) ≥ DHW Control Setpoint (T304))

DHW EH Output (X9) is switched OFF when:

- DHW Temperature (T301) ≥ DHW Setpoint (P302)
- OR (DHW Electric Heater Waiting Time (P307) has not expired

AND DHW Temperature (T301) < DHW Control Setpoint (T304))

The DHW Electric Heater Waiting Time (P307) starts when DHW Loading (K301) becomes active.

In case of DHW Anti-Legionella Protection (K304) is active the DHW EH Output (X9) is switched ON when:

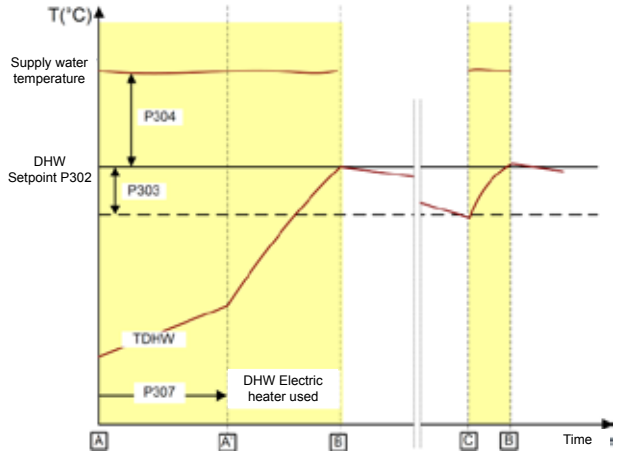
- DHW Temperature (T301) < DHW Anti-Legionella Setpoint (P311) – DHW Differential (P303)

In case of DHW Anti-Legionella Protection (K304) is active the DHW EH Output (X9) is switched OFF when:

- DHW Temperature (T301) >DHW Anti-Legionella Setpoint (P311)

Parameters	P302	DHW Setpoint
	P303	DHW Differential
	P307	DHW Electric Heater Waiting Time
	P311	DHW Anti-Legionella Setpoint
Datapoints	T301	DHW Op Mode
	T304	DHW Control Setpoint
	K301	DHW Loading
	K304	DHW Anti-Legionella Protection

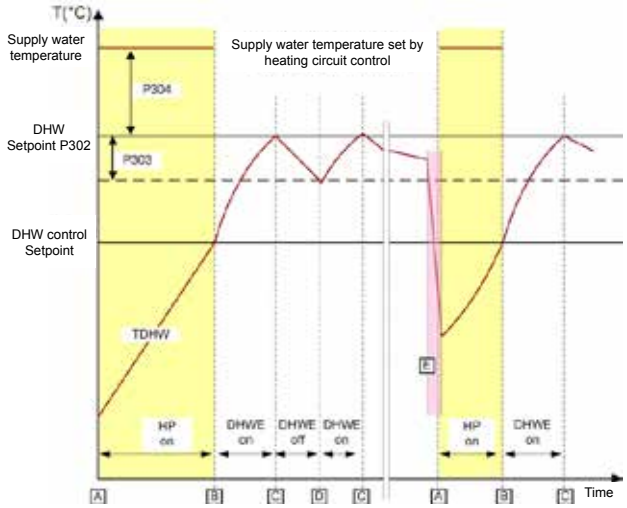
DHW Electric Heater Control Algorithm 1
DHW Setpoint = DHW Control Setpoint



A After the waiting time, the DHW E-Heater is switched on.

Other operation is the same as normal DHW control.

DHW Electric Heater Control Algorithm 2
DHW Setpoint > DHW Control Setpoint



A DHW loading starts. Heat Pump is on, DHW E-Heater is off.

B Heat Pump returns to heating control, DHW E-Heater is switched on.

C DHW setpoint is reached. DHW E-Heater is switched off.

D DHW E-Heater is switched on.

E A large draw-off from the DHW tank or DHW blocking period.

5.4.7 Heat pump control functions

◆ Heat pump control: enable/disable

A number of conditions determine whether the Heat Pump is enabled.

Heat Pump Control (K601) is enabled when:

- Heat Pump Blocking (K603) is not active (Blocking Input)
- AND the Heat Pump has not any fault (F08, F09 or F12)
- AND the Heating Source (K001) = Heat Pump only or Heat Pump & Boiler or Heat Pump & Electric Heater
- AND the Heat Pump Maximum Inlet Temperature Protection (K602) is not active

Datapoints	K001	Heating Source
	K601	Heat Pump Control
	K602	Heat Pump Maximum Inlet Temperature Protection
	K603	Heat Pump Blocking

◆ Heat pump On/Off output

The Heat Pump On/Off Output (X8) of the System Controller is connected to the “remote on/off” input of the Heat Pump. Note that the Heat Pump is responsible for starting the water circulation pump (primary pump) when the remote on/off input is switched on, and enabling its internal control of the compressor and Heat Pump system components.

The Heat Pump On/Off Output (X8) is ON when:

- Heat Pump Control (K601) is enabled
- AND the Heat Pump Supply Setpoint (T601) > 0

The Heat Pump On/Off Output (X8) is OFF when:

- Heat Pump Control (K601) is disabled
- OR the Heat Pump Supply Setpoint (T601) = 0

Datapoints	T601	Heat Pump Supply Setpoint
	K601	Heat Pump Control

◆ Heat pump supply setpoint

The System Controller uses the 4-20mA connection to represent the outlet water temperature setpoint. The Heat Pump will modulate the appliance according to its own control strategy to achieve the correct output water temperature. The Heat Pump Supply Setpoint (T601) is calculated from the System Supply Setpoint (T005) and the Heat Pump Sensor Offset (P610) (see 3.7.5).

Heat Pump Supply Setpoint (T601) = System Supply Setpoint (T005) + Heat Pump Sensor Offset (P610)

The Heat Pump Supply Setpoint (T601) is limited to the min/max operating limits of the Heat Pump (see 3.7.7).

The Heat Pump Supply Setpoint (T601) is set to zero, when the System Supply Setpoint (T005) is zero.

Parameters	P610	Heat Pump Sensor Offset
Datapoints	T601	Heat Pump Supply Setpoint
	T005	System Supply Setpoint

Response of the heat pump to DHW loading

Since the Heat Pump only reads the Heat Pump Control Signal once every 20 minutes there can be a delay before the system responds to the DHW request. In order to improve this response time, the System Controller uses a feature of the Heat Pump: when the Heat Pump Control Signal is set to its highest value, it responds immediately.

If the Heat Pump Supply Setpoint (T601) has to be increased due to DHW Loading, then the Heat Pump Supply Setpoint (T601) is set to the Heat Pump Maximum Supply Setpoint (T602) for a period of time (P308). When this time period expires, the Heat Pump Supply Setpoint (T601) is set to the normal calculated Heat Pump Supply Setpoint.

NOTE

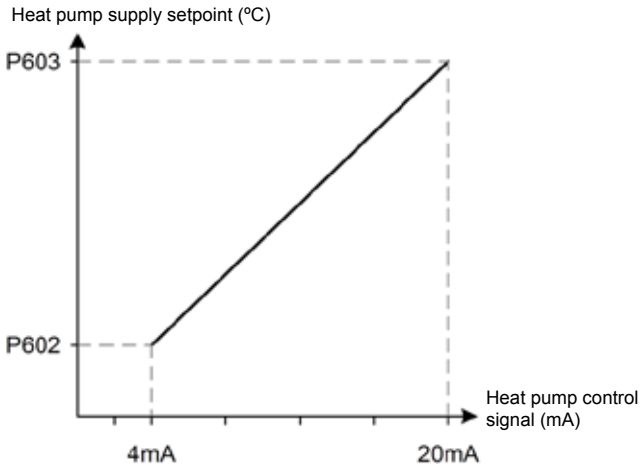
The heat pump maximum supply setpoint depends on the outdoor temperature (see 3.7.7)

Parameters	P308	Heat Pump Max Time High Setpoint for DHW
Datapoints	T601	Heat Pump Supply Setpoint
	T602	Heat Pump Maximum Supply Setpoint

◆ Heat pump control signal

If the Heat Pump = ON the Heat Pump Control Signal (A1) is calculated from the Heat Pump Supply Setpoint (T601) from the graph below.

Heat Pump Control Signal



IF the Heat Pump = ON THEN the Heat Pump Control Signal Minimum Limit is 4mA.

IF the Heat Pump = OFF THEN the Heat Pump Control Signal is 1.8mA

Parameters	P602	Heat Pump Supply Setpoint at 4mA
	P603	Heat Pump Supply Setpoint at 20mA
Datapoints	T601	Heat Pump Supply Setpoint

◆ Heat pump sensor offset

System effects can mean that there can be a difference between the Heat Pump outlet temperature (measured by the Heat Pump) and the supply temperature (measured by the System Controller). This can be caused by:

1 Different measuring position. The Heat Pump is outside and some loss of heat is possible between the Heat Pump and the supply pipes inside the house.
2 Different types of sensor. The Heat Pump measures the outlet temperature using an immersion-type sensor directly in the water flow after the condenser. The System Controller uses a strap-on type sensor, which depending on the ambient conditions, will typically measure a lower temperature than an immersion-type in the same location.

During development, it will be investigated if this parameter can be estimated automatically or installer-assisted during commissioning.

Parameters	P610	Heat Pump Sensor Offset

◆ Heat pump maximum inlet temperature protection

The Heat Pump itself ensures good control of the outlet water temperature, and switches off the compressor when the inlet water temperature gets too high (thermo-off). However, in some circumstances, for example with bi-valent systems, the boiler may be operating at high supply and return temperatures. If the inlet water temperature to the Heat Pump rises above a set value, it will generate a system fault (“excessively high water temperature”). To prevent this happening, the System Controller will directly switch off the Heat Pump if the inlet temperature rises above the maximum inlet temperature setting.

IF Heat Pump Inlet Temperature (T603) ≥ Heat Pump Maximum Inlet Temperature (P604),

- THEN Heat Pump Maximum Inlet Temperature Protection (K602) is active
- AND the Heat Pump is switched off

IF Heat Pump Inlet Temperature (T603) < Heat Pump Maximum Inlet Temperature (P604) – 1K,

- THEN Heat Pump Maximum Inlet Temperature Protection (K602) is not active
- AND the Heat Pump is switched on

To disable the Heat Pump Maximum Inlet Temperature Protection set P604 = OFF.

In case of “No Response” condition of the received Heat Pump Inlet Temperature (T603) the value will be set to Heat Pump Maximum Inlet Temperature (P604), in order to activate Heat Pump Maximum Inlet Temperature Protection (K602).

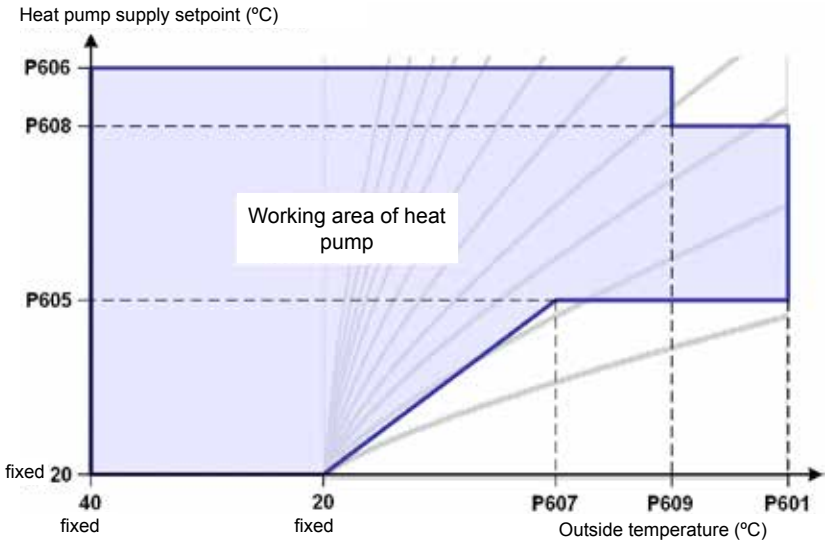
Parameters	P604	Heat Pump Maximum Inlet Temperature
	T603	Heat Pump Inlet Temperature
	K602	Heat Pump Maximum Inlet Temperature Protection

◆ Heat pump operating limits

Heat Pump operation is only possible within certain temperature ranges as de fined below. Parameters are provided in order to adjust the working area if required to do so.

The Heat Pump Operating Limits are defined by fixed values and parameters:

Heat Pump Operating Limits



At any time the actual minimum and maximum supply setpoints are calculated from the graph based on the

Average Outside Temperature (T003):

Heat Pump Minimum Supply Setpoint (T604) is defined as the actual minimum.

Heat Pump Maximum Supply Setpoint (T602) is defined as the actual maximum.

IF the Average Outside Temperature (T003) is < Minimum Outside Temperature for Heat Pump Operation (P601) THEN Heat Pump Minimum Supply Setpoint (T604) = Heat Pump Minimum Supply Setpoint: below outside temperature of P607 (P605)

IF the Average Outside Temperature (T003) is < Minimum Outside Temperature for Heat Pump Operation (P601) THEN Heat Pump Maximum Supply Setpoint (T602) = Heat Pump Maximum Supply Setpoint: below outside temperature of P609 (P608)

Parameters	P601	Minimum Outside Temperature for Heat Pump Operation
	P605	Heat Pump Minimum Supply Setpoint: below outside temperature of P607
	P606	DHW Electric Heater Waiting Time
	P607	Heat Pump Maximum Supply Setpoint: above outside temperature of P609
	P608	Heat Pump Maximum Supply Setpoint: below outside temperature of P609
	P609	Heat Pump Maximum Supply Setpoint: Changing Point
Datapoints	T003	Average Outside Temperature
	T602	Heat Pump Maximum Supply Setpoint
	T604	Heat Pump Minimum Supply Setpoint

◆ Blocking input (heat pump / DHW blocking)

This function can be used to block the Heat Pump or the DHW loading.

It allows an external tariff-switch device to switch off the Heat Pump during times of peak electricity demand, or it can be used with an external device (e.g. solar controller) to block the DHW loading.

Unless otherwise stated, Heat Pump blocking and DHW blocking are NOT active.

Blocking Input Configurations (Heat Pump / DHW blocking)

Value	Configurations 1, 2	Configurations 3, 4
0	No function	No function
1	Heat Pump blocking not possible	Closed contact: Heat Pump blocking is active
2	Heat Pump blocking not possible	Open contact: Heat Pump blocking is active
3	Open contact: DHW blocking is active	Open contact: DHW blocking is active
4	Closed contact: DHW blocking is active	Closed contact: DHW blocking is active

To disable the Blocking Input function set P611 = 0 = OFF.

Parameters	P611	Blocking Input Configuration
Datapoints	K603	Heat Pump Blocking
	K307	DHW Blocking

5.4.8 Boiler control functions

◆ Boiler control enable/disable

A number of conditions determine whether the Boiler Control (K701) is enabled.

The Boiler Control (K701) is enabled when:

- Heating Source (K001) = Boiler only or Heat Pump & Boiler
- OR DHW Loading (K301) is active
- OR the boiler has been manually released (after a Heat Pump fault) (P008)
- OR Heat Pump Blocking (K603) is active)
- OR the DHW Anti-Legionella Protection (K304) is active
- OR the Heat Pump has a Heat Pump fault AND the Boiler Auto Operation (P716) is enabled

Parameters	P008	Boiler Manual Release after Heat Pump fault
	P716	Boiler Auto Operation
Datapoints	K001	Heating Source
	K301	DHW Loading
	K304	DHW Anti-Legionella Protection
	K603	Heat Pump Blocking
	K701	Boiler Control

The Boiler Manual Release (P008) is disabled if the Heat Pump fault has dissapeared AND the Boiler Auto Operation (P716) is disabled.

◆ Boiler Supply Setpoint

The Boiler Supply Setpoint (T702) depends on whether the System Supply Setpoint (T005) is in the range that can be reached by the Heat Pump on its own. If it is, then the Boiler Supply Setpoint (T702) is reduced to help prevent unnecessary use of the boiler.

IF System Supply Setpoint (T005) ≥ Heat Pump Maximum Supply Setpoint (T602) – Heat Pump Sensor Offset (P610) THEN “System Supply Setpoint (T005) is NOT in Heat Pump range”

IF System Supply Setpoint (T005) < Heat Pump Maximum Supply Setpoint (T602) – Heat Pump Sensor Offset (P610) – 1K

THEN “System Supply Setpoint (T005) is in Heat Pump range”

IF the Heat Pump is on AND the Heat Pump has no fault AND “System Supply Setpoint (T005) is in Heat Pump range” THEN Boiler Supply Setpoint (T702) = System Supply Setpoint (T005) – Boiler Setpoint Offset (P710) ELSE Boiler Supply Setpoint (T702) = System Supply Setpoint (T005)

If the Boiler Control (K701) is disabled, the Boiler Supply Setpoint (T702) is set to zero.

In case if the Boiler Heat Boost Mode is enabled, the Boiler Supply Setpoint (T702) = Boiler Heat Boost Setpoint (P715)

Parameters	P710	Boiler Setpoint Offset
	P714	Boiler Heat Boost Enable
	P715	Boiler Heat Boost Setpoint
	P610	Heat Pump Sensor Offset
Datapoints	T702	Boiler Supply Setpoint
	T005	System Supply Setpoint
	T602	Heat Pump Maximum Supply Setpoint
	K701	Boiler Control

◆ Boiler control algorithm

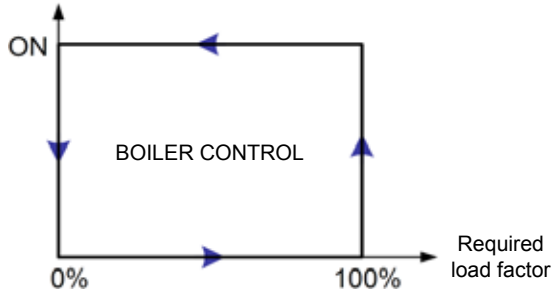
The Boiler Control (K701) decides whether to switch the boiler on or off based on a proportional plus integral action (P+I) control algorithm and the difference between the Boiler Supply Setpoint (T702) and the System Supply Temperature (T001).

The P+I algorithm calculates a “Load factor” from 0% to 100%.

Boiler Load Factor (T703) = PI Function (Boiler Supply Setpoint (T702) – System Supply Temperature (T001))

If the boiler bypass valve (configuration 4 only) is closed, then the System Supply Temperature (T001) is used in the PI Function instead of the Boiler Supply Temperature (T701) (because there is no water flow through the boiler and so this value is unreliable).

Required load factor for boiler



In configuration 4 (bi-valent series system) there is a special requirement for some boilers to make sure that the boiler starts without flow through the boiler to allow the boiler heat exchanger to warm up helping to prevent condensation (also see section *“Boiler pump control (CONF 3.1)”* .For this reason we first check the conditions that the boiler is “ready to switch on”, based on the required load, minimum off time, and Boiler Waiting Time (P704). Then we check that the bypass/ mixing valve is closed before starting the boiler. Also, in situations where the DHW Loading (K301) is active and the DHW Temperature (T301) has reached the maximum that it can achieve with the Heat Pump alone, then the Boiler Waiting Time (P704) is ignored (also see section *“Using other heat sources for DHW loading”*)

In order to prevent inefficient short-cycling of the boiler, this feature prevents the boiler from switching on or switching off until either the Boiler Minimum Off Time (P705) or Boiler Minimum On Time (P706), respectively, has elapsed. If Boiler Control (K701) is disabled, then the Boiler Minimum On Time (P706) does not apply, and the boiler will be switched off immediately.

The Boiler is “ready to switch on” when:

- Boiler Control (K701) is enabled
- AND Boiler Load Factor (T703) = 100%
- AND the Boiler Minimum Off Time (P705) has expired
- AND the Boiler Waiting Time (P704) has expired

  OR Heat Pump Control (K601) is disabled

  OR Heat Pump has a fault

  OR DHW Loading (K301) is active

    AND the DHW Temperature (T301) ≥ DHW Control Setpoint (T304))

  OR DHW Anti-Legionella Protection (K304) is active

    AND the DHW Anti Legionella Setpoint ≥ DHW Temperature (T301)

In Configuration 3:

- The Boiler (X9) is switched on whenThe boiler is “ready to switch on”
- OR Boiler Heat Boost Enable (P714) is enabled

  AND Heating Source (K001) = Boiler only or Heat Pump & Boiler

  AND System Supply Temperature (T001) < Boiler Heat Boost Setpoint (P715)

In Configuration 4:

The Boiler (X9) is switched on when:

- The Boiler is “ready to switch on”

  AND Bypass/Mixing Valve Position (T704) is closed

    OR Heat Pump is ON

    OR Bypass/Mixing Valve Opening Delay Time (P709) = OFF
- OR Boiler Heat Boost Enable (P714) is enabled

  AND Heating Source (K001) = Heat Pump & Boiler

  AND Boiler Supply Temperature (T701) < Boiler Heat Boost Setpoint (P715)

The Boiler is switched off when:

- The Boiler Control (K701) is disabled
- OR (the Boiler Load Factor (T703) = 0% AND the Boiler Minimum On Time (P706) has expired)
- OR in case of (CONF 3 AND Boiler Heat Boost Mode = active) IF the System Supply Temperature (T001) > Boiler Heat Boost Setpoint (P715)
- OR in case of (CONF 4 AND Boiler Heat Boost Mode = active) IF the Boiler Supply Temperature (T701) > Boiler Heat Boost Setpoint (P715)

The Boiler Waiting Time (P704) is reset when

- The Heat Pump is switched on
- OR (the Heat Pump is on
  AND the Heat Pump has no fault
  AND the Boiler switches off OR DHW Loading (K301) will be active
  AND System Supply Setpoint (T005) < Heat Pump Maximum Supply Setpoint (T602) Heat Pump Sensor Offset (P610))

Parameters	P702	Boiler Control: Integral Factor
	P703	Boiler Control: Proportional Factor
	P704	Boiler Waiting Time
	P705	Boiler Minimum Off Time
	P706	Boiler Minimum On Time
	P709	Bypass/Mixing Valve Opening Delay Time
	P714	Boiler Heat Boost Enable
	P715	Boiler Heat Boost Setpoint
	P610	Heat Pump Sensor Offset
Datapoints	T701	Boiler Supply Temperature
	T702	Boiler Supply Setpoint
	T703	Boiler Load Factor
	T704	Bypass/Mixing Valve Position
	T005	System Supply Setpoint
	T304	DHW Control Setpoint
	T602	Heat Pump Maximum Supply Setpoint
	T001	System Supply Temperature
	T301	DHW temperature
	K001	Heating source
	K301	DHW loading
	K601	Heat pump control
	K701	Boiler control

◆ Boiler pump control (CONF 3.1)

The Boiler Pump (X5) is switched on when the Boiler (X9) is switched on. A pump overrun time occurs before switching the pump off.

The Boiler Pump (X5) is switched on when the Boiler (X9) is switched on.

The Boiler Pump (X5) is switched off when the Boiler (X9) is switched off and the Boiler Pump Overrun Time (P713) has expired.

The Boiler Pump Overrun Time (P713) starts when the Boiler (X9) is switched off.

Parameters	P713	Boiler Pump Overrun Time

◆ Boiler bypass/mixing valve control (CONF 4.1)

When the boiler is switched on, the bypass valve operates like a mixing valve. When the boiler is switched off, and the difference between the Boiler Supply Temperature (T701) and mixed System Supply Temperature (T001) is small, the bypass valve is always closed so that the hot supply water from the Heat Pump does not circulate through the boiler heat exchanger, which may cause unnecessary heat loss and reduction in system efficiency. While the water from the boiler is much hotter than the System Supply Temperature (T001), the mixing control continues to operate.

With some boilers, especially oil boilers, there is a risk of unwanted liquid condensation on the gas side of the boiler heat exchanger if the temperature falls below the water condensation temperature. This can cause reduced boiler life. In these situations, it is desirable to allow the boiler heat exchanger to warm up before the heating circuit water is circulated through the heat exchanger. To do this the mixing valve is prevented from opening until after the boiler has been switched on for a set period of time. The setting will depend on the size and type of boiler.

Bypass/Mixing Valve Control (K702) is enabled when

- The Boiler (X9) is switched on
- AND the Bypass/Mixing Valve Opening Delay Time (P709) has expired OR is set to OFF.

Bypass/Mixing Valve Control (K702) is disabled when

- The Boiler is switched off
- AND Boiler Supply Temperature (T701) ≤ System Supply Temperature (T001) + Bypass/Mixing Valve Difference Threshold (P708)

The Bypass/Mixing Valve Opening Delay Time (P709) starts when the boiler switches on.

The Bypass/Mixing Valve Opening Delay Time (P709) is reset when the Bypass/Mixing Valve Control (K702) is disabled.

To disable the bypass/mixing valve opening delay function, set P709 = OFF

Parameters	P708	Bypass/Mixing Valve Difference Threshold
	P709	Bypass/Mixing Valve Opening Delay Time
	P711	Bypass/Mixing Valve Control: Proportional Factor
	P712	Bypass/Mixing Valve Control: Integral Factor
Datapoints	T701	Boiler Supply Temperature
	K702	Bypass/Mixing Valve Control
	T701	System Supply Temperature

◆ Boiler bypass/mixing valve position (CONF 4.1)

When the Bypass/Mixing Valve Control (K702) is enabled, the bypass/mixing valve is controlled to maintain the System Supply Temperature (T001) at the System Supply Setpoint (T005). The bypass/mixing valve position is calculated with a proportional plus integral action (P+I) control algorithm based on the difference between the System Supply Setpoint (T005) and the System Supply Temperature (T001).

Bypass/Mixing Valve Position (T704) = PI Function (System Supply Setpoint (T005) - System Supply Temperature (T001))

The Bypass/Mixing Valve Position (T704) is set to 0 (bypass position) when:

- System Supply Setpoint (T005) = 0
- OR Bypass/Mixing Valve Control (K702) is disabled

When the Bypass/Mixing Valve Position (T704) is set to zero, the I-part of the PI-Control will be disabled

When the Bypass/Mixing Valve Position (T704) is > 0, the I-part will be enabled

The opening and closing of the valve is dependent on the valve actuator (motor) speed. The Bypass/Mixing Valve Motor Runtime (P707) 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.

Parameters	P707	Bypass/Mixing Valve Motor Runtime
	P711	Bypass/Mixing Valve Control: Proportional Factor
	P712	Bypass/Mixing Valve Control: Integral Factor
Datapoints	T005	System Supply Setpoint
	T001	System Supply Temperature
	T704	Bypass/Mixing Valve Position
	K702	Bypass/Mixing Valve Control

◆ Boiler heat boost mode

It’s possible to request a one-time heating up of the supply temperature by selecting Boiler Heat Boost Mode. This can be useful during commission (first start up) and when the system water temperature is very low. If the supply water temperature (between 10°C to 20°C) and outside temperature (< 10°C) are to low the Heat Pump can be damaged during defrosting.

To activate the Boiler Heat Boost Mode enable Parameter Boiler Heat Boost Enable (P714).

The Boiler Heat Boost Mode stays in configuration 3 enabled as long as the System Supply Temperature (T001) < Boiler Supply Setpoint (T702).

The Boiler Heat Boost Mode stays in configuration 4 enabled as long as the Boiler Supply Temperature (T701) < Boiler Supply Setpoint (T702).

During the Boiler Heat Boost Mode no additional conditions are considered (for example Heat Pump operation modes, waiting times, …) except the Heating Source.

Parameters	P714	Boiler Heat Boost Enable
	P715	Boiler Heat Boost Setpoint
Datapoints	T001	System Supply Temperature
	T701	Boiler Supply Temperature
	T702	Boiler Supply Setpoint

5.4.9 Electric heater control functions

◆ Electric heater control: enable/disable

A number of conditions determine whether the Electric Heater Control (K801) is enabled.

The Electric Heater Control (K801) is enabled when:

- the Heat Pump has a fault AND the Electric Heater Auto Operation (P810) is enabled
- OR the Electric Heater has been manually released (after a Heat Pump fault) (P009)
- OR (DHW Loading (K301) is not active AND the Heating Source (K001) = Electric Heater only, or Heat Pump & Electric Heater)

Parameters	P009	Electric Heater Manual Release after Heat Pump fault
	P810	Electric Heater Auto Operation
	K801	Electric Heater Control
	K001	Heating Source
	K301	DHW Loading

The Electric Heater Manual Release (P009) is disabled if the Heat Pump Fault has dissapeared AND the Electric Heater Auto Operation (P810) is disabled.

◆ Electric heater supply setpoint

The Electric Heater Supply Setpoint (T801) depends on whether the System Supply Setpoint (T005) is in the range that can be reached by the Heat Pump on its own. If it is, then the Electric Heater Supply Setpoint (T801) is reduced to help prevent unnecessary use of the electric heater.

IF System Supply Setpoint (T005) > Heat Pump Maximum Supply Setpoint (T602) – Heat Pump Sensor Offset (P610) THEN “System Supply Setpoint (T005) is NOT in Heat Pump range”

IF System Supply Setpoint (T005) < Heat Pump Maximum Supply Setpoint (T602) – Heat Pump Sensor Offset (P610) – 1K THEN “System Supply Setpoint (T005) is in Heat Pump range”

IF the Heat Pump is on, the Heat Pump has no fault AND “System Supply Setpoint (T005) is in Heat Pump range” THEN Electric Heater Supply Setpoint (T801) = System Supply Setpoint (T005) – Electric Heater Setpoint Offset (P806) ELSE Electric Heater Supply Setpoint (T801) = System Supply Setpoint (T005)

If the Electric Heater Control (K801) is disabled, the Electric Heater Supply Setpoint (T801) is set to zero, and all electric heater stages are switched off immediately.

The Electric Heater Supply Setpoint (T801) = Electric Heater Heat Boost Setpoint (P809) if the Electric Heater Heat Boost Mode is enabled (P808) and the System Supply Setpoint (T005) is < Electric Heater Heat Boost Setpoint (P809).

Parameters	P806	Electric Heater Setpoint Offset
	P808	Electric Heater Boost Enable
	P809	Electric Heater Heat Boost Setpoint
	P610	Heat Pump Sensor Offset
Datapoints	T801	Electric Heater Supply Setpoint
	T005	System Supply Setpoint
	T602	Heat Pump Maximum Supply Setpoint
	K801	Electric Heater Control

◆ Electric heater control algorithm

The Electric Heater Control (K801) decides whether to switch on one or more of the electric heater stages based on a proportional plus integral action (P+I) control algorithm and the difference between the Electric Heater Supply Setpoint (T801) and the System Supply Temperature (T001).

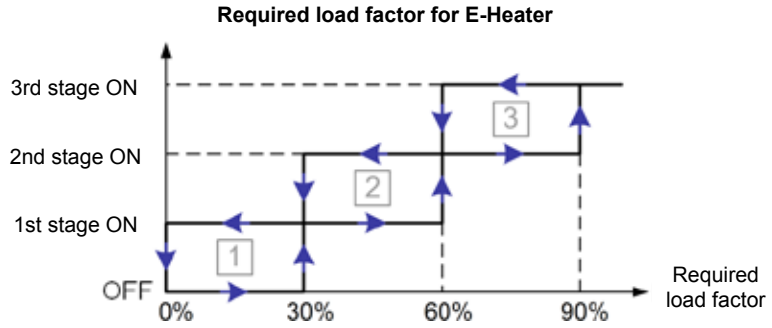
The P+I algorithm calculates a “Load factor” from 0% to 100%.

Electric Heater Load Factor (T802) = PI Function (Electric Heater Supply Setpoint (T801) - System Supply Temperature (T001))

Parameters	P802	Electric Heater Control: Integral Factor
	P803	Electric Heater Control : Proportional Factor
Datapoints	T801	Electric Heater Supply Setpoint
	T802	Electric Heater Load Factor
	T001	System Supply Temperature
	K801	Electric Heater Control

Electric heater serial switch stages function

If the parameter Electric Heater One Step Function (P807) = 0, the electric heater stages are switched on depending on the load factor, as follows:



It is important with mono-energetic systems that the Heat Pump should first try to satisfy the heating demand by itself. For this reason the Electric Heater Waiting Time (P805) applies. The electric heater will not switch on until the waiting time has elapsed. The waiting time is ignored if the Heat Pump has a fault OR if the Heat Pump is disabled. Before switching in more or fewer stages (for example between stage 1 and stage 2), the System Controller waits for a certain time to prevent rapid switching. This time is the Electric Heater Inter-Stage Waiting Time (P804). While the Heat Pump is in thermo-off or defrost, no additional electric heater stages should be switched on.

These points are covered in the switching logic for the electric heater stages below:

The first stage of the Electric Heater is switched ON when:

- Electric Heater Control (K801) is enabled
- AND the Electric Heater Load Factor (T802) is equal or above 30%
- AND (the Electric Heater Waiting Time (P805) has expired
  OR Heat Pump Control (K601) is disabled
  OR the Heat Pump has a fault)
- AND the Heat Pump is not in defrost mode or thermo-off mode OR the Heat Pump has a fault.

The second stage of the Electric Heater is switched ON when:

- The Electric Heater Load Factor (T802) is equal or above 60%
- AND the first stage is switched on
- AND the Electric Heater Inter-Stage Waiting Time (P804) has expired
- AND the Heat Pump is not in defrost mode or thermo-off mode OR the Heat Pump has a fault.

The third stage of the 3-Stage Electric Heater is switched ON when:

- The Electric Heater Load Factor (T802) is equal or above 90%
- AND first and second stage are switched on

- AND the Electric Heater Inter-Stage Waiting Time (P804) has expired
- AND the Heat Pump is not in defrost mode or thermo-off mode OR the Heat Pump has a fault.

The first stage of the Electric Heater is switched OFF when:

- The Electric Heater Load Factor (T802) is equal to 0%
  AND the Electric Heater Inter-Stage Waiting Time (P804) has expired
  AND Stage 2 and 3 are switched off
- OR Electric Heater Control (K801) is disabled.

The second stage of the Electric Heater is switched OFF when:

- The Electric Heater Load Factor (T802) is below or equal to 30%
  AND the Electric Heater Inter-Stage Waiting Time (P804) has expired
  AND Stage 3 is switched off
- OR Electric Heater Control (K801) is disabled

The third stage of the Electric Heater is switched OFF when:

- The Electric Heater Load Factor (T802) is below or equal to 60%
  AND the Electric Heater Inter-Stage Waiting Time (P804) has expired
- OR Electric Heater Control (K801) is disabled

The Electric Heater Waiting Time (P805) is reset when:

- The Heat Pump is switched on
- OR The Heat Pump is on
  AND the Heat Pump has no fault
  AND the first Heater Stage switches off
  AND the System Supply Setpoint (T005) <= (Heat Pump Maximum Supply Setpoint (T602) - HP Sensor Offset (P610))

The Electric Heater Inter-Stage Waiting Time (P804) is reset when:

- A Heater Stage is switched on
- OR A Heater Stage is switched off

If the Electric Heater Heat Boost Mode is active the first stage of the Electric Heater is switched ON when:

- the Electric Heater Load Factor (T802) is above or equal to 30%.
- AND the Heating Source (K001) is (Electric Heater only or Electric Heater and Heat Pump)

If the Electric Heater Heat Boost Mode is active the Electric Heater is switched over from first stage to second stage when:

- The Electric Heater Load Factor (T802) is above or equal to 60%.
- AND the Electric Heater Inter-Stage Waiting Time (P804) has expired.
- AND the Heating Source (K001) is (Electric Heater only or Electric Heater and Heat Pump)

If the Electric Heater Heat Boost Mode is active the Electric Heater is switched over from second stage to third stage when:

- The Electric Heater Load Factor (T802) is above or equal to 90%.
- AND the Electric Heater Inter-Stage Waiting Time (P804) has expired.
- AND the Heating Source (K001) is (Electric Heater only or Electric Heater and Heat Pump)

Parameters	P804	Electric Heater Inter-Stage Waiting Time
	P805	Electric Heater Waiting Time
	P807	Electric Heater One Step Function
	P610	Heat Pump Sensor Offset
Datapoints	T802	Electric Heater Load Factor
	T005	System Supply Setpoint
	T602	Heat Pump Maximum Supply Setpoint
	K801	Electric Heater Control
	K601	Heat Pump Control
	K001	Heating Source

Electric heater one step function

If the parameter Electric Heater One Step Function (P807) = 1 all stages switch on together at the same time if the Electric Heater Load Factor (T802) > 50% and all other conditions which are described in “Electric Heater Serial Switch Stages Function” are fulfilled.

ll stages switch off together if the Electric Heater Load Factor (T802) = 0 and all other conditions which are described in *Electric Heater Serial Switch Stages Function* are fulfilled.

All stages have to be on for the minimum time of Electric Heater Inter-Stage Waiting Time (P804).

If the Electric Heater Heat Boost Mode is active all stages of the Electric Heater are switched ON when:

- the Electric Heater Load Factor (T802) is above 50%.
- AND the Heating Source (K001) is (Electric Heater only or Electric Heater and Heat Pump)

If the Electric Heater Heat Boost Mode is active all stages of the Electric Heater are switched OFF when:

- the Electric Heater Load Factor (T802) is <1%.
- AND the Heating Source (K001) is (Electric Heater only or Electric Heater and Heat Pump)

Parameters	P804	Electric Heater Inter-Stage Waiting Time
	P807	Electric Heater One Step Function
Datapoints	T802	Electric Heater Load Factor
	K001	Heating Source

◆ Electric Heater Heat Boost Mode

It’s possible to request a one-time heating up of the supply temperature by selecting Electric Heater Heat Boost Mode. This can be useful during commission (first start up) and when the system water temperature is very low. If the supply water temperature (between 10°C to 20°C) and outside temperature (< 10°C) are to low the Heat Pump can be damaged during defrosting.

To activate the Electric Heater Heat Boost Mode enable parameter Electric Heater Heat Boost Enable (P808).

The Electric Heater Heat Boost Mode stays as long as the System Supply Temperature (T001) < Electric Heater Supply Setpoint (T801).

During the Electric Heater Heat Boost Mode no additional conditions are considered (for example Heat Pump operation modes, waiting times …) except the Heating Source (K001).

Parameters	P808	Electric Heater Heat Boost Enable
Datapoints	T005	System Supply Temperature
	T801	Electric Heater Supply Setpoint
	K001	Heating Source

5.5 Integrated user inerface

5.5.1 General Functions

The integrated system controller provides access to the following functions:

- View status / measurements of all System Controller inputs and outputs
- View current alarms (faults) and recent alarm history
- Setting of all adjustable parameters
- Viewing system internal datapoints (calculated setpoints)
- Two-levels of parameter access (installer and service level) with passcode entry
- Local language line-of-text descriptions
- Set date and time
- Set daily DHW Time Program
- Manual override of inputs or outputs for commissioning
- Viewing of Heat Pump status and error codes
- Display icons showing current System Operating Mode
- Identification of heating circuit (“zone”) during room unit RF binding process.

5.5.2 Display and Keypad

Display and keypad

Button Functions:

Button	Description
MENU/ESC	Accesses the MENU functions or returns to the previous screen without changes.
MODE	Changes the System Operating Mode.
SERVICE	Displays the status of the relay outputs, or access to Installer/Service functions (via passcode)
UP	Scrolls up through a list of options, or increases a value.
DOWN	Scrolls down through a list of options, or decreases a value.
OK	Selects an option, selects an item to change, or confirms a change.

5.5.3 Power-on Startup & Reset Behaviour

At first power-on, the following start-up sequence takes place:

1 Select language “LANG” (default 01 = Language: English)
2 Set date/time
3 Select hydraulic configuration “CONF” (default 2.2 = Mono Energetic 2 HC)

After pressing the reset button, the following reset sequence takes place:

1 Prompt “RST” to reset all parameters to default factory-delivered values (default 1 = Factory Reset)
2 Select language “LANG” (default 01 = Language: English)
3 Select Hydraulic configuration “CONF” (default 2.2 = Mono Energetic 2 HC)

In the event of a power failure, all outputs are switched off. The real-time clock is maintained for up to 24 hours. When power is restored, the following power-on sequence takes place:

1 Set date/time (only if power failure > 24 hours)

The previously selected language and hydraulic configuration are used.

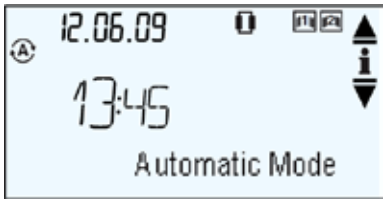
The language can be changed via the menu, but the hydraulic configuration can only be changed by at first power-on or with a reset.

5.5.4 User Interface Functions

◆ Home Screen

The home screen shows the current System Operating Mode, the current date and time, and application status indicators.

Example Screen



The application status indicators are:

Icon	Meaning	Active Condition
	Stages	Electric Heater first stage switched on
	Stages	Electric Heater second stage switched on
	Stages	Electric Heater third stage switched on
	Heat Pump	Heat Pump Control enabled
	Flame	Boiler Control enabled
	Heater	Electric Heater Control enabled
	DHW	DHW loading active
	HC1	Heating Circuit 1 enabled
	HC2	Heating Circuit 2 enabled
	ASSO	Automatic Summer Switch Off active
	Tariff	Heat Pump blocking active (blocking input)
	Frost	Frost Protection active

From the home screen, the following key actions are possible:

Key actions from home screen:

Key	Action
menu	Access the Menu functions
mode	Change System Operating Mode
service	(single press) Quick Relay Status Display; (press and hold) Installer/Service Access
up/down	Quick System Information Display
ok	no action

◆ Changing the System Operating Mode

The System Controller will normally operate in fully Automatic Mode, which means that the domestic hot water follows the DHW Time Program and the heating follows the schedule programmed in the Room Unit(s).

Press MODE from the home screen and then up/down, to change the System Operating Mode to:

Holiday Mode	When going on holiday, the heating will be switched to standby and DHW switched off, until the set holiday return date. After selecting Holiday Mode, the return day can be programmed.
Standby Mode	The heating and hot water is switched off, except for automatic frost protection.
DHW Boost Mode	It is possible to request a one-time heating up of the DHW tank by selecting DHW Boost Mode. This can be useful during a period when the DHW tank is not heated. For example DHW is disabled by the Time Program or DHW Blocking (K307) is activated (via input B1) or if (DHW Control Setpoint (T304) – DHW Differential (P303)) < DHW Temperature (T301) < DHW Control Setpoint (T304) or the System Controller is in Standby Mode.

Example Screen

Press OK to confirm the System Operating Mode selection. Press ESC to cancel the selection.

The operating modes for each of the heating circuits and DHW can be:

HC1 OpMode (K102) = [OFF ¦ Auto ¦ ON]

HC2 OpMode (K202) = [OFF ¦ Auto ¦ ON]

DHW OpMode (K303) = [OFF ¦ Auto ¦ ON]

Operating Mode actions:

Operating Mode	HC1 OpMode	HC2 OpMode	DHW OpMode
Automatic	Auto	Auto	Auto
Holiday	OFF	OFF	OFF
Standby	OFF	OFF	OFF
DHW Boost	no change	no change	ON

The System Operating Mode indicators are:

Icon	Operating mode
	Automatic
	Holiday
	Standby
	DHW Boost

DHW Boost Mode selection is not available if DHW Type (P301) = none.

DHW Boost Mode is cancelled when DHW Temperature (T301) ≥ DHW Control Setpoint (T304).

When DHW Boost Mode is cancelled, the System Operating Mode (K004) returns to the previous selected value.

It is also possible to activate the DHW Boost Mode via the “B2 DHW Boost Input”.

The DHW Boost Mode will be activated once if the “B2 DHW Boost Input” = 1.

DHW Boost Mode is cancelled when DHW Temperature (T301) ≥ DHW Control Setpoint (T304).

When DHW Boost Mode is cancelled, the System Operating Mode (K004) returns to the previous selected value.

It is required to use a push button instead of a switch to activate the DHW Boost Mode with the digital input.

In Holiday Mode, when Holiday timer expires, the System Operating Mode (K004) is set to Automatic.

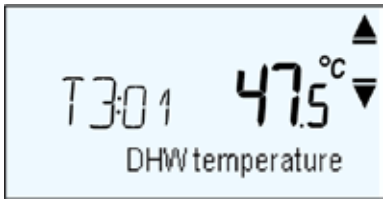
Parameters	P301	DHW Type
Datapoints	T301	DHW Temperature
	T304	DHW Control Setpoint
	K004	System Operating Mode

◆ Quick system information display

Press UP/DOWN from the home screen.

The display shows important information about system temperatures and setpoints.

Example Screen



Quick System Information Display

	Left value	Right value	Notes
1	-	Actual Outside Temperature	from Modbus or sensor U8
2	HC1 Room Setpoint	HC1 Room Temperature	Only if a room unit was bound for HC1
3	HC2 Room Setpoint	HC2 Room Temperature	Only if a room unit was bound for HC2
4	HC1 Supply Setpoint	HC1 Supply Temperature	-
5	HC2 Supply Setpoint	HC2 Supply Temperature	-
6	DHW Setpoint	DHW Temperature	Only if DHW Type is not = none
7	Heat Pump Supply Setpoint	Heat Pump Outlet Temperature	from Modbus
8	Boiler Supply Setpoint	Boiler Supply Temperature	Only if Configuration = 4
9	Boiler Supply Setpoint	System Supply Temperature	Only if Configuration = 3

Press ESC to return to the home screen

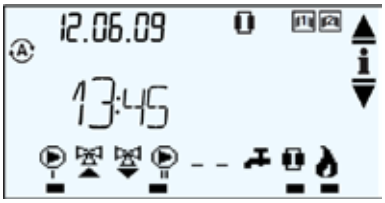
◆ Quick relay status display

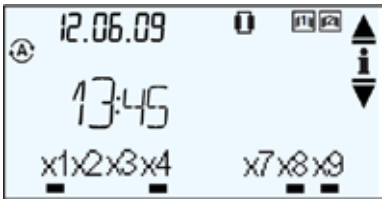
Press SERVICE from Home Screen or from Quick System Information Display.

The display shows the relay output status using graphical icons.

Press SERVICE again to show the relay output status using plug labels.

Example screens for relay status display





Press SERVICE again or press ESC to return to the previous screen.

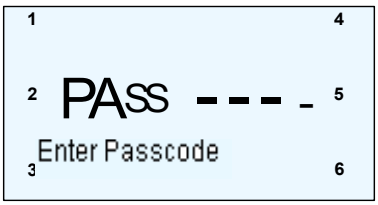
◆ Installer/Service Access

In order to access parameter settings and other information it is necessary to log in with an installer or service access code.

Press and hold (1 sec) SERVICE from the home screen.

The display shows a prompt to enter the access code – the ---- field is blinking.

Example Screen



Use the six buttons to enter the four digit access code.

Installer access code is: 3636

Service access code is: 6565

If the correct access code is entered, the spanner icon together with a message is shown:

- Single spanner icon for installer access / Message “Passcode OK – Installer”
- Double spanner icon for service access / Message “Passcode OK – Service”

The display then shows the first Menu item.

If an incorrect access code is entered, the message “Incorrect Passcode” is displayed and the display returns to the home screen.

Installer / Service level access remains active for 30 minutes. After that time, it is necessary to repeat the log in process.

The Installer/Service level can be cancelled by pressing and holding (1 sec) the MENU/ESC button in the home screen – the spanner icon disappears.

◆ Menu

The menu provides access to settings and system information.

Press MENU from the home screen to enter the menu screens.

Example Screen

Press UP/DOWN to scroll though the menu items.

Press OK to select the menu item (enter sub-menu or select item to modify)

MENU Structure:

Menu	Description	Sub-Menu	Description
00	Current Active Alarms (only if alarms are active)	-	-
01	Time Programs (only if DHW type is not = none)	02>01	DHW Time Program
02	Set Date and Time	-	-
03	Configurations	-	(see Table 16: Configuration Options)
04	Parameters (only if installer/service level)	04>00 04>01 04>02 04>03 04>04 04>05 04>06	(see Table 17: Parameters) System Heating Circuit 1 Heating Circuit 2 DHW Heat Pump Boiler Electric Heater
05	Information	05>00 05>01 05>02 05>03 05>04 05>05 05>06	(see Table 18: Information) System Heating Circuit 1 Heating Circuit 2 DHW Heat Pump Boiler Electric Heater
06	Alarm History (only if installer/service level)	-	-
07	System Controller Inputs (only if installer/service level)	-	(see Table 19: System Controller Inputs)
08	System Controller Outputs (only if installer/service level)	-	(see Table 20: System Controller Outputs)

◆ Room unit RF binding

1 The process for binding a room unit to the System Controller isPress and hold the button on the RF Receiver until the red LED will start blinking; the RF Receiver is in Binding Mode.
2 The display will show “Select heating zone”, zone number “1” and radio icon (see example screen below).
3 Press UP/DOWN to select zone number ”2” if required. (only available if Heating Circuit 2 is not = none)
4 Activate the RF Binding mode in the Room Unit and send the installation (binding) message.
5 The display will show a confirmation if the binding message was received successfully.

Example Screen RF Binding

Press ESC to return to the home screen (The RF Receiver remains in Binding Mode till its timeout of 3 minutes expire).

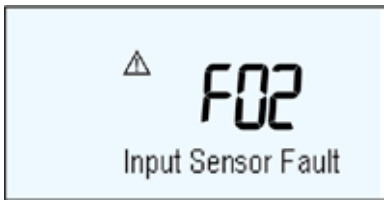
If no binding message was received for about 3 minutes the display “Select Heating Zone” automatically returns to the home screen.

Press and hold the button on the RF Receiver for 15 seconds (factory reset), the display will show a “RF Binding cancelled” message.

◆ Alarm Code Display

When a fault occurs in the system, the display will show an alarm screen. See section *"10.2.2 Alarm code"*.

Example screen for alarm code display



If more than one alarm is active, the scroll UP/DOWN indicators appear. Press UP/DOWN to view the other active alarms.

Press ESC to return to the home screen. If an alarm is active, the alarm icon ⚠ will be displayed (blinking).

If an alarm is active, the "Current Active Alarms" menu item is available to view the active alarm codes.

◆ DHW time program

The System Controller will normally operate in fully Automatic Mode, which means that the domestic hot water follows the DHW Time Program.

Select '01 Time Programs' in the menu screen and press OK to enter the DHW Time Program screen.

Example Screen DHW Time Program

The DHW Time Program has 4 switch points.

Each press of ▼ will select the next switch point (first, second, third, fourth, first, …).

Press and hold ▼ will select the next switch point till ▼ is released.

Each press of ▲ will select the previous switch point (first, fourth, third, second, first, …)

Press and hold ▲ will select the previous switch point till ▲ is released.

There is a wrap around selecting the next or previous switch point.

A switch point consists of a time and a value.

The time of a switch point consists of hour and minute.

The value of the first and third switch point is fix 1 = ON.

The value of the second and fourth switch point is fix 0 = OFF.

The time – hour and minute – of each switch point is changeable. The field – hour or minute – which is currently changeable is blinking.

Press OK to open the selected switch point for changing. The hour field is blinking.

Each press of ▲ will increase hour or minute by 1.

Press and hold ▲ will increase hour or minute till ▲ is released.

Each press of ▼ will decrease hour or minute by 1.

Press and hold ▼ will decrease hour or minute till ▼ is released.

Press ▲ to change the dashes of hour, 12 will be displayed.

Press ▼ to change the dashes of hour, 11 will be displayed.

Press ▲ to change the dashes of minute, 00 will be displayed.

Press ▼ to change the dashes of minute, 59 will be displayed.

There is a wrap around changing hour value and minute value.

Press OK to confirm the input of the hour field and change to the minute field of the selected switch point.

The minute field is blinking.

Press OK to confirm the input of the minute field and return to the switch point selection screen.

Press ESC to cancel all changes made so far for the selected switch point and return to the switch point selection screen.

The data of a switch point will be saved after pressing OK to confirm the input of the minute field.

A switch point is only valid if hour and minute contain valid values.

A valid switch point can be changed to invalid by setting dashes for hour or minute or both fields.

If the time of a switch point is equal to the real time, the datapoint HMI_DHW_TimProgAct will be set to the switch point value.

The DHW Time Program is 24 hours active in case that no time (hours and minutes) “--:--“ is entered in all 4 switch points.

◆ Holiday mode

After selecting Holiday Mode, the return day can be programmed.

Select the System Operating Mode ‘Set Holiday Mode’ and press OK to enter the display where the return day can be set.

Example Screen Holiday Mode

The return day field is changeable and blinking.

The date field shows the date when the Holiday Mode ends. While changing the return day the date will be updated.

Each press of ▲ will increase the return day by 1.

Press and hold ▲ will increase the return day till ▲ is released.

Each press of ▼ will decrease the return day by 1.

Press and hold ▼ will decrease the return day till ▼ is released.

There is a wrap around changing the return day value.

After pressing OK the return day will be saved and the display returns to the home screen. In this case the home screen shows the text “Holiday”, the holiday icon and the number of days until return.

Press ESC to cancel the changes and return to the home screen.

The range of holiday mode is limited between 1 … 99 days.

◆ YUTAKI M Informations which are shown by the System controller display

YUTAKI M Informations which are shown by the System controller display

Contents	Remarks
Heating Setting Temperature	
Water Inlet Temperature	-40 to 100 ºC
Water Outlet Temperature	-40 to 100 ºC
Ambient Temperature	-40 to 100 ºC
Operation Condition	1) On/Off 2) Manual Fan (not available) 3) Protection Status (0: No Prot., 1 Pressure, 2 Abnormal Stop) 4) Pump Feedback 5) Compressor Guard 6) Thermo Off 7) Current Limit
Unit Alarm	0: No alarm, Other Alarm Code
Individual Alarm	0: No alarm, Other Alarm Code (Not used) (TBC)
Defrost	0: No Defrost, 1: Defrost
Compressor Frequency	00~100Hz aprox (Hz)
Discharge Pressure	
Suction Pressure	
Discharge Gas Temperature	-127 to 127 ºC
Suction Gas Temperature	-127 to 127 ºC
Liquid Temperature	-127 to 127 ºC
Evaporating Temperature	-127 to 127 ºC
Suction Temperature	-127 to 127 ºC

Each information which is shown by the system controller will be visible in the “Heat Pump Information” menu.

YUTAKI M Alarm for system controller

Alarm Code	Name
02 – H1	Activation of high pressure switch
02↔h1	Activation of protection control for excessively high pressure
02↔¬1	Activation of low pressure control
02↔E1	Excessively low pressure difference
02↔61	Excessively high discharge gas temperature
02↔91	Excessively low temperature of heat exchanger refrigerant inlet
02↔t1	Excessively low suction gas temperature
04	Abnormal transmission between Inverter PCB and Main PCB
05	Abnormality of Power Supply Phase
06	Excessively low voltage or excessively high voltage for the inverter
11	Failure of water inlet temperature thermistor
12	Failure of water outlet temperature thermistor
13	Activation of freeze protection control (water inlet)
02↔13	Activation of freeze protection control (water outlet)
14	Excessively high water temperature (compressor running)
21	Failure of refrigerant evaporating temperature thermistor (Open/Short)
22	Failure of ambient temperature thermistor (Open/Short)
23	Failure of discharge gas temperature thermistor (Open/Short)
24	Failure of refrigerant liquid temperature thermistor (Open/Short)
26	Failure of suction gas temperature thermistor (Open/Short)
27	Failure of discharge gas pressure sensor (Open/Short)
28	Failure of suction gas pressure sensor (Open/Short)
30	Incorrect PCB Setting
40	Incorrect PCB operation
51	Abnormal operation of the current sensor
52	Activation of protection for inverter instantaneous over current
53	Transistor module protection activation
54	Increase in the inverter fin temperature
57	Abnormality of fan motor protection
5P	No feed back signal from water pump
PU	Excessively high water temperature (compressor stop)
FA	Failure of fan motor (MF1)
Fb	Failure of fan motor (MF2)

5.6 Installation & commissioning

5.6.1 Output terminal assignments

Output Terminal Assignments

CONFIGURATION		X1	X2	X3	X4	X5	X6	X7	X8	X9	A1
1.1	Mono-valent (w/o separator)	HC1 pump	-	-	-	-	-	DHW valve	Heat pump on/off	DHW electric heater	Heat pump control signal
1.2	Mono-valent	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	HC2 Mixing valve open	HC2 Mixing valve close	DHW pump	Heat pump on/off	DHW electric heater	Heat pump control signal
2.1	Mono-energetic (w/o separator)	HC1 pump	-	-	-	Electric heater stage 1	Electric heater stage 2	DHW valve	Heat pump on/off	DHW electric heater	Heat pump control signal
2.2	Mono-energetic	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Electric heater stage 1	Electric heater stage 2	DHW pump	Heat pump on/off	DHW electric heater	Heat pump control signal
3.1	Bi-valent parallel	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Boiler pump	-	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal
3.2	Bi-valent parallel (w/ boiler pump)	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	HC2 Mixing valve open	HC2 Mixing valve close	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal
4.1	Bi-valent series	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Bypass/ Mixing valve open	Bypass/ Mixing valve close	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal

5.6.2 Input terminal assignments

Input Terminal Assignments

CONFIGURATION		C1	C2	B1	B2	U8	U6	U5	U4	U2	U1
1.1	Mono-valent (w/o separator)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	-	System supply sensor
1.2	Mono-valent	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	HC2 supply sensor	HC1 supply sensor	System supply sensor
2.1	Mono-energetic (w/o separator)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	-	System supply sensor
2.2	Mono-energetic	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	HC1 supply sensor	System supply sensor
3.1	Bi-valent parallel	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	HC1 supply sensor	System supply sensor
3.2	Bi-valent parallel (w/ boiler pump)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	HC2 supply sensor	HC1 supply sensor	System supply sensor
4.1	Bi-valent series	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	Boiler sensor	DHW sensor	-	HC1 supply sensor	System supply sensor

5.7 Technical data of system controller

Power supply	230Vac +10%, -15%, 50Hz
Power Consumption	Max. 12VA
Ambient Operating Temperature	0 to 50°C (0 to 40°C with terminal covers)
Storage Temperature	-20 to 55ºC
Humidity	0 to 90% RH non-condensing
Dimensions	215.5 x 110 x 57.5 mm, 215.5 x 147 x 57.5 mm with terminal covers
Material Base	Noryl HS2000X, color code GY2D015 (gray)
Material Cover, Terminal Covers	PC/ABS, C2950, color black (RAL 9011)
Degree of Protection	IP20 (IP30 with terminal covers)
Fire Class	V0
Protection class	Class I (according to EN60730-1)
Emissions Standards	Complies with EN61000-6-3
Immunity Standards	Complies with EN61000-6-1
Safety Standards	Complies with EN60730-1:2007
CE Compliance	93/68/EEC
WEEE Compliance	2002/96/EC
RoHS Compliance	2002/95/EC

A1: Heat Pump Control Signal	0-20mA, (max. 10V / 20mA @ 500Ω), cable length max. 20m (wire Ø 0.5mm^2)
X8: relay	Potential free contacts (24V-230VAC, 3A)
X9: relay	Potential-free contacts (24V-230VAC, 6A)
X1-X7: all other output relays	Switched line voltage 230VAC, 3A (10A total)
B1: Blocking / Tariff Input	Input for potential-free contact (rated 24VDC, switching current 1mA)
B2: DHW Boost Input	Input for potential-free contact (rated 24VDC, switching current 1mA)
C2: RF Receiver connection	Device complies with OpenTherm™ Protocol Specifications 3.0. Serial communications according to OpenTherm™ technical specification V2.3 (max 18V, 23mA, 1000 baud)
C3: Heat Pump Modbus connection	RS485, two-wire twisted pair, 9600 baud, Max. cable length 40m Note: cable shield can be connected to C4.26 (-)
U1-U8: Sensor Inputs	NTC 20k @ 25ºC

5.8 Data tables

NOTE

- *Each of the tables has columns 1, 2, 3 referencing the access level.*
  1 = user access
  2 = installer access (passcode)
  3 = service access (passcode)
- *Column "SC" refers to what conditions affect whether the item is visible in the system controller (in addition to access level).*

5.8.1 Configuration options table

The hydraulic system configuration is selected on start-up or reset from section *"5.2 System configuration"*.

Additional configuration options can be selected from the menu according to the table below.

Configuration Options:

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Special
W	W	W	✓	LANG	Language [1=EN, 2=DE, 3=FR, 4=ES, 5=PO, 6=NL, 7=IT, 8=SE, 9=NO, 10=GR]	1	10	1	1	-
R	W	W	(1)	P101	Heating Circuit 1 Type [0=direct ¦ 1=mixing]	0	1	1	0	-
R	W	W	(1)	P201	Heating Circuit 2 Type [0=none ¦ 1=direct ¦ 2=mixing]	0	2 (1)	1	0	-
R	W	W		P301	DHW Type [0=none ¦ 1=valve ¦ 2=pump]	0	2 (2)	1 (3)	0	-
R	W	W	(2)	P310	DHW Electric Heater Type [0=no ¦ 1=yes]	0	1	1	0	-
W	W	W	(3)	P008	Boiler Manual Release after Heat Pump fault	0	1	1	0	-
W	W	W	(4)	P009	Electric Heater Manual Release after Heat Pump fault	0	1	1	0	-
W	W	W		P010	Automatic Summer/Winter Timer Changeover [0=disable ¦ 1=enable]	0	1	1	1	-
W	W	W		P011	24 hours / 12 hours clock (am/pm) [0=24hrs ¦ 1=12hrs]	0	1	1	0	-

System controller Visibility Notes

(1) Not shown if Configuration = 1.1 or 2.1
(2) Only shown if Configuration = 1 or 2 and if DHW Type is not = none
(3) Only shown if there is a Heat Pump fault and configuration = 3 or 4 and Boiler Auto Operation (P716) is disabled.
(4) Only shown if there is a Heat Pump fault and configuration = 2 and Electric Heater Auto Operation (P810) is disabled.

Range & Default Notes

(1) maximum = 1 if Configuration = 2.2, 3.1 or 4.1 (only direct circuit allowed in HC2)
(2) maximum = 1 if Configuration = 1.1 or 2.1 (only DHW valve allowed)
(3) step = 2 if Configuration = 1.2, 2.2, 3.1, 3.2, or 4.1 (only DHW pump allowed)

5.8.2 Parameters table

Parameters:

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Special
System										
-	W	W	✓	P001	Frost Protection Activation Temperature	-20	5	1	2°C	OFF
-	W	W	✓	P002	Frost protection HC minimum supply setpoint	10	35	1	20°C	-
-	W	W	✓	P003	Summer Switch-off Activation Temperature	10	25	1	20°C	OFF
-	W	W	✓	P004	Pump/Valve Seizure Protection Function [disable ¦ enable]	0	1	1	1	-
-	W	W	✓	P006	Wired Outside Sensor [disable ¦ enable]	0	1	1	0	-
-	W	W	(1)	P007	Bivalent Alternative Operation [disable ¦ enable]	0	1	1	1	-
-	W	W	✓	P012	Average Outside Temperature Reset	0	1	1	0	-
Heating circuit 1										
-	W	W	✓	P102	HC1 OTC Heating Curve Gradient	0.4	4.5	0.1	1.6	-
-	W	W	✓	P103	HC1 Heating Distribution Type [0=underfloor¦1=radiator¦2=convector]	0	2	1	1	-
-	W	W	✓	P104	HC1 Room Compensation Factor	0.0	5.0	0.5	2.0 K/K	OFF

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Special
-	W	W	✓	P105	HC1 Minimum Supply Setpoint	0	40	1	15°C	-
-	W	W	✓	P106	HC1 Maximum Supply Setpoint	20	55 (2)	1	55°C	-
-	W	W	✓	P107	HC1 Pump Overrun Time	1	10	1	2 min	-
-	W	W	(2)	P108	HC1 Mixing Valve Motor Runtime	30	600	10	120 s	-
-		W	(2)	P109	HC1 Mixing Valve Control: Proportional Factor	2	100	1	15	-
-		W	(2)	P110	HC1 Mixing Valve Control: Integral Factor	0	4000	1	200	-
-	W	W	(2)	P111	HC1 Mixing Over-Temperature Limit Offset	0	10	1	5 K	OFF
-	W	W	✓	P112	HC1 Automatic No-Load Function [disable ¦ enable]	0	1	1	1	-
-	W	W	✓	P113	HC1 Screed Function [off ¦ on]	0	1	1	0	-
-	W	W	✓	P114	HC1 Heating Curve Parallel Shift	0	5	1	0 K	-
-	W	W	(13)	P115	HC1 Auto No Load Function depending on Room Setpoint [disable¦enable]	0	1	1	0	-
-	W	W	(13)	P116	HC1 Auto No Load Function Pump Off Time	0	120	1	45 min	-
-	W	W	(13)	P117	HC1 Auto No Load Function Pump On Time	0	120	1	10 min	-
-	W	W	(13)	P118	HC1 Auto No Load Function Differential	0	5	0.5	3 K	-
Heating circuit 2										
-	W	W	(3)	P202	HC2 OTC Heating Curve Gradient	0.4	4.5	0.1	1.6	-
-	W	W	(3)	P203	HC2 Heating Distribution Type [0=underfloor¦1=radiator¦2=convector]	0	2	1	1	-
-	W	W	(3)	P204	HC2 Room Compensation Factor	0.0	5.0	0.5	2.0 K/K	OFF
-	W	W	(3)	P205	HC2 Minimum Supply Setpoint	0	40	1	15°C	-
-	W	W	(3)	P206	HC2 Maximum Supply Setpoint	20	55 (2)	1	55°C	-
-	W	W	(3)	P207	HC2 Pump Overrun Time	1	10	1	2 min	-
-	W	W	(4)	P208	HC2 Mixing Valve Motor Runtime	30	600	10	120 s	-
-	-	W	(4)	P209	HC2 Mixing Valve Control: Proportional Factor	2	100	1	15	-
-	-	W	(4)	P210	HC2 Mixing Valve Control: Integral Factor	0	4000	1	200	-
-	W	W	(4)	P211	HC2 Mixing Over-Temperature Limit Offset	0	10	1	5 K	OFF
-	W	W	(3)	P212	HC2 Automatic No-Load Function [disable ¦ enable]	0	1	1	1	-
-	W	W	(3)	P213	HC2 Screed Function [off ¦ on]	0	1	1	0	-
-	W	W	(3)	P214	HC2 Heating Curve Parallel Shift	0	5	1	0 K	-
-	W	W	(13)	P215	HC2 Auto No Load Function depending on Room Setpoint [disable¦enable]	0	1	1	0	-
-	W	W	(13)	P216	HC2 Auto No Load Function Pump Off Time	0	120	1	45 min	-
-	W	W	(13)	P217	HC2 Auto No Load Function Pump On Time	0	120	1	10 min	-
-	W	W	(13)	P218	HC2 Auto No Load Function Differential	0	5	0.5	3 K	-
DHW										
-	W	W	(5)	P302	DHW Setpoint	45	65	1	45°C	-
-	W	W	(5)	P303	DHW Differential	1	10	1	5 K	-
-	W	W	(5)	P304	DHW Supply Offset	1	30	1	10 K	-
-	-	W	(5)	P305	DHW Offset	0	20	1	7 K	-
-	W	W	(5)	P306	Maximum DHW Loading Time	1	12	0.5	1.5 hr	-
-	W	W	(11)	P307	DHW Electric Heater Waiting Time	0	60	1	45 min	-
-	W	W	(5)	P308	Heat Pump Max Time High Setpoint for DHW	0	180	1	180 s	-
-	W	W	(5)	P309	DHW Anti-Legionella Protection [disable ¦ enable]	0	1	1	0	-
-	W	W	(5)	P311	DHW Anti-Legionella Setpoint	50	70	1	65°C	-
-	W	W	(5)	P312	DHW Anti-Legionella Operation Day (Mon=1, Tue=2 … Sat=6, Sunday=7)	1	7	1	6	-
-	W	W	(5)	P313	DHW Anti-Legionella Start Time	0	23	1	2 hr	-
-	W	W	(5)	P314	DHW Anti-Legionella Activation Period	10	60	1	10 min	

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Special
-	W	W	(5)	P315	DHW Anti-Legionella Restart Interval	1	6	1	2 hr	-
-	W	W	(5)	P316	DHW Defrost Control (0 = Tank, 1 = Standard)	0	1	1	1	-
-	W	W	(5)	P317	DHW Cycle Time	0	24	1	24 hr	-
Heat pump										
-	W	W	(10)	P601	Minimum Outside Temperature for Heat Pump Operation	-25	20	1	-20°C (3)	OFF
-	-	W	✓	P602	Heat Pump Supply Setpoint at 4mA	10	30	1	20°C	-
-	-	W	✓	P603	Heat Pump Supply Setpoint at 20mA	40	70	1	60°C	-
-	-	W	✓	P604	Heat Pump Maximum Inlet Temperature	20	70	1	60°C	OFF
-	-	W	✓	P605	Heat Pump Minimum Supply Setpoint: below P607	10	40	1	35°C	-
-	-	W	✓	P606	Heat Pump Maximum Supply Setpoint: above P609	40	70	1	60°C	-
-	-	W	✓	P607	Heat Pump Minimum Supply Inflexion Point	-25	20	1	0°C	-
-	-	W	✓	P608	Heat Pump Maximum Supply Setpoint: below P609	40	70	1	50°C	-
-	-	W	✓	P609	Heat Pump Maximum Supply Changing Point	-25	20	1	-10°C	-
-	W	W	✓	P610	Heat Pump Sensor Offset	0	10	1	3 K	-
-	W	W	✓	P611	Blocking Input Configuration (0=OFF)	0	4	1	OFF	0=OFF
Boiler										
-	W	W	(6)	P701	Maximum Outside Temperature for Boiler Operation	-20	20	1	0°C	OFF
-	-	W	(6)	P702	Boiler Control: Integral Factor	0	4000	1	200	
-	-	W	(6)	P703	Boiler Control: Proportional Factor	2	100	1	15	
-	W	W	(6)	P704	Boiler Waiting Time	1	90	1	30 min	-
-	W	W	(6)	P705	Boiler Minimum Off Time	1	30	1	5 min	-
-	W	W	(6)	P706	Boiler Minimum On Time	1	30	1	2 min	-
-	W	W	(7)	P707	Bypass/Mixing Valve Motor Runtime	30	600	10	120 s	-
-	W	W	(7)	P708	Bypass/Mixing Valve Difference Threshold	0	5	0.5	1.5 K	OFF
-	W	W	(7)	P709	Bypass/Mixing Valve Opening Delay Time	1	15	1	15 min	OFF
-	-	W	(6)	P710	Boiler Setpoint Offset	0	10	1	4 K	-
-	-	W	(7)	P711	Bypass/Mixing Valve Control: Proportional Factor	2	100	1	15	-
-	-	W	(7)	P712	Bypass/Mixing Valve Control: Integral Factor	0	4000	1	200	-
-	W	W	(8)	P713	Boiler Pump Overrun Time	1	60	1	15 min	-
-	W	W	(1)	P714	Boiler Heat Boost Enable	0	1	1	1	-
-	W	W	(1)	P715	Boiler Heat Boost Setpoint	30	50	1	40	-
-	W	W	(6)	P716	Boiler Auto Operation	0	1	1	0	-
Electric heater										
-	W	W	(9)	P801	Maximum Outside Temperature for Electric Heater Operation	-20	20	1	0°C	OFF
-	-	W	(9)	P802	Electric Heater Control: Integral Factor	0	4000	1	200	
-	-	W	(9)	P803	Electric Heater Control: Proportional Factor	2	100	1	15	
-	-	W	(9)	P804	Electric Heater Inter-Stage Waiting Time	10	250	10	20 s	-
-	W	W	(9)	P805	Electric Heater Waiting Time	1	90	1	30 min	-
-	-	W	(9)	P806	Electric Heater Setpoint Offset	0	10	1	4 K	-
-	W	W	(9)	P807	Electric Heater One Step Function	0	1	1	0	-
-	W	W	(9)	P808	Electric Heater Heat Boost Enable	0	1	1	1	-
-	W	W	(9)	P809	Electric Heater Heat Boost Setpoint	30	50	1	40	-
-	W	W	(9)	P810	Electric Heater Heat Auto Operation	0	1	1	0	-

System controller Visibility Notes

(1) Only if Configuration = 3 (2) Only if heating circuit 2 type = mixing (3) Only if heating circuit 2 is not = none (4) Only if heating circuit 2 type = mixing	(5) Only if DHW Type is not = none (6) Only if Configuration = 3 or 4 (7) Only if Configuration = 4 (8) Only if Configuration = 3.1 (9) Only if Configuration = 2	(10) Not shown if P007 = 1 = Bivalent Alternative Operation enabled (11) Only if DHW Electric Heater = yes (12) Only if Configuration = 2 or 3 (13) Only if P112 / P212 = 1 (enabled)

Range & Default Notes

(2) If configuration = 1, maximum is 55°C. If configuration = 2, maximum is 65°C. If configuration = 3 or 4, maximum is 90°C
(3) If P007 = 1 = Bivalent Alternative Operation enabled, P601 = P701

5.8.3 Information table

Information:

1	2	3	SC	ID	DESCRIPTION	
System						
R	R	R	✓	I000	Hydraulic Configuration	[1.1 ¦ 1.2 ¦ 2.1 ¦ 2.2 ¦ 3.1 ¦ 3.2 ¦ 4.1]
R	R	R	✓	I001	Application Version	[nnn]
R	R	R	✓	T001	System Supply Temperature	°C
R	R	R	✓	T002	Actual Outside Temperature	°C
-	R	R	✓	T003	Average Outside Temperature	°C
-	R	R	✓	T004	Daily Average Outside Temperature	°C
R	R	R	✓	T005	System Supply Setpoint	°C
-	R	R	✓	K001	Heating Source	[HP only ¦ HP&BLR ¦ HP&EH ¦ BLR only ¦ EH only]
-	R	R	✓	K002	Frost Protection	[not active ¦ active]
-	R	R	✓	K003	Automatic Summer Switch-Off	[not active ¦ active]
-	R	R	✓	K004	System Operating Mode	[Auto ¦ Holiday ¦ DHW Boost ¦ Standby ¦ Heat Boost]
Heating circuit 1						
-	R	R	(2)	T101	HC1 Supply Temperature	°C
R	R	R	✓	T102	HC1 Room Temperature	°C
-	R	R	✓	T103	HC1 Supply Setpoint	°C
-	-	R	✓	T104	HC1 Screed Setpoint	°C
-	-	R	✓	T105	HC1 OTC Supply Setpoint	°C
R	R	R	✓	T106	HC1 Room Setpoint	°C
-	-	R	(2)	T107	HC1 Mixing Valve Position	%
-	R	R	✓	K101	Heating Circuit 1	[disabled ¦ enabled]
-	R	R	✓	K102	HC1 OpMode	[OFF, Auto, ON]
-	R	R	✓	K103	HC1 Automatic No-Load Condition	[not active ¦ active]
-	R	R	(2)	K105	HC1 Mixing Over-Temperature Protection	[not active ¦ active]
-	R	R		K106	HC1 Room unit	[Not installed ¦ installed]
Heating circuit 2						
-	R	R	(4)	T201	HC2 Supply Temperature	°C
R	R	R	(3)	T202	HC2 Room Temperature	°C
-	R	R	(3)	T203	HC2 Supply Setpoint	°C
-	-	R	(3)	T204	HC2 Screed Setpoint	°C
-	-	R	(3)	T205	HC2 OTC Supply Setpoint	°C
R	R	R	(3)	T206	HC2 Room Setpoint	°C
-	-	R	(4)	T207	HC2 Mixing Valve Position	%
-	R	R	(3)	K201	Heating Circuit 2	[disabled ¦ enabled]
-	R	R	(3)	K202	HC2 OpMode	[OFF, Auto, ON]
-	R	R	(3)	K203	HC2 Automatic No-Load Condition	[not active ¦ active]
-	R	R	(4)	K205	HC2 Mixing Over-Temperature Protection	[not active ¦ active]
-	R	R	(3)	K206	HC2 Room unit	[Not installed ¦ installed]
DHW						
R	R	R	(5)	T301	DHW Temperature	°C
-	R	R	(5)	T302	DHW Supply Setpoint	°C
-	R	R	(5)	T303	DHW-HPmax	°C
-	R	R	(5)	T304	DHW Control Setpoint	°C
-	R	R	(5)	K301	DHW Loading	[not active ¦ active]
-	R	R	(5)	K302	DHW Control	[disabled ¦ enabled]
-	R	R	(5)	K303	DHW OpMode	[OFF, Auto, ON]
-	R	R	(5)	K304	DHW Anti-Legionella Protection	[not active ¦ active]

1	2	3	SC	ID	DESCRIPTION	
-	R	R	(5)	K305	DHW Max Time Mode	[not active ¦ active]
-	R	R	(10)	K306	DHW EH Control	[disabled ¦ enabled]
-	R	R	(5)	K307	DHW Blocking	[not active ¦ active]
Heat pump						
-	R	R		T601	Heat Pump Supply Setpoint	°C
-	-	R		T602	Heat Pump Maximum Supply Setpoint	°C
-	R	R		T603	Heat Pump Inlet Temperature	°C
-	-	R		T604	Heat Pump Minimum Supply Setpoint	°C
-	R	R		K601	Heat Pump Control	[disabled ¦ enabled]
-	R	R		K602	Heat Pump Maximum Inlet Temperature Protection	[not active ¦ active]
-	R	R	✓	K603	Heat Pump Blocking	[not active ¦ active]
-	R	R	✓	K604	Heat Pump Current Limit	[not active ¦ active]
-	R	R	✓	K605	Heat Pump Thermo Off	[not active ¦ active]
-	R	R	✓	K606	Heat Pump Compressor Guard	[not active ¦ active]
-	R	R	✓	K607	Heat Pump Feedback Pump	[not active ¦ active]
-	R	R	✓	K608	Heat Pump Protection Status	[0 = No Protection / 1 = Pressure / 2 = Abnormal Stop]
-	R	R	✓	K609	Heat Pump Fan Manual	[not active ¦ active]
-	R	R	✓	K610	Heat Pump On / Off	[not active ¦ active]
-	R	R	✓	K611	Heat Pump Unit Alarm	See Table 12
-	R	R	✓	K612	Heat Pump Individual Alarm	See Table 12
-	R	R	✓	K613	Heat Pump Defrost	[not active ¦ active]
-	R	R	✓	K614	Heat Pump Compressor Frequency	Hz
-	R	R	✓	K615	Heat Pump Discharge Pressure	Pa
-	R	R	✓	K616	Heat Pump Suction Pressure	Pa
-	R	R	✓	K617	Heat Pump Discharge Gas Temperature	°C
-	R	R	✓	K618	Heat Pump Suction Gas Temperature	°C
-	R	R	✓	K619	Heat Pump Liquid Temperature	°C
-	R	R	✓	K620	Heat Pump Evaporating Temperature	°C
-	R	R	✓	K621	Heat Pump Suction Temperature	°C
Boiler						
-	R	R	(6)	T701	Boiler Supply Temperature	°C
-	R	R	(6)	T702	Boiler Supply Setpoint	°C
-	-	R	(6)	T703	Boiler Load Factor	%
-	-	R	(7)	T704	Bypass/Mixing Valve Position	%
-	R	R	(6)	K701	Boiler Control	[disabled ¦ enabled]
-	R	R	(7)	K702	Bypass/Mixing Valve Control	[disabled ¦ enabled]
Electric heater						
-	R	R	(9)	T801	Electric Heater Supply Setpoint	°C
-	-	R	(9)	T802	Electric Heater Load Factor	%
-	R	R	(9)	K801	Electric Heater Control	[disabled ¦ enabled]

System controller Visibility Notes

(2) Only if heating circuit 1 type = mixing (3) Only if heating circuit 2 type is not = none (4) Only if heating circuit 2 type = mixing (5) Only if DHW Type is not = none	(6) Only if Configuration = 3 or 4 (7) Only if Configuration = 4 (9) Only if Configuration = 2 (10) Only if DHW Electric Heater = yes

The individual alarms are displayed under Information/Heat Pump.

Heat Pump Individual Alarm Information:

1	2	3	HMI	ID	Individual alarm number	System controller display
-	R	R	(1)	I001	1	02-H1 High Pressure Act
-	R	R	(1)	I002	4	02-61 High Disc Gas Temp
-	R	R	(1)	I003	10	02-91 Refrig Inl Low Temp
-	R	R	(1)	I004	11	27 Refrig Press Disc Fault
-	R	R	(1)	I005	12	28 Refrig Press Suct Fault
-	R	R	(1)	I006	13	24 Refrig Liq Sensor Fault
-	R	R	(1)	I007	15	23 Refrig Dis Sensor Fault
-	R	R	(1)	I008	16	26 Refrig Su Sensor Fault
-	R	R	(1)	I009	18	04 PCB1-Inv PCB T Fault
-	R	R	(1)	I010	19	21 Refrig Ev Sensor Fault
-	R	R	(1)	I011	21	02-1 Low Pressure Prot
-	R	R	(1)	I012	22	06 Low/High Voltage Inv
-	R	R	(1)	I013	37	51 Current Sensor Fault
-	R	R	(1)	I014	38	52 Over Current Inv Prot
-	R	R	(1)	I015	39	53 Transistor Module Prot
-	R	R	(1)	I016	40	54 Inv Fin Temp Increase
-	R	R	(1)	I017	42	57 Fan Motor Protection
-	R	R	(1)	I018	51	02-E1 Low Pressure Diff
-	R	R	(1)	I019	52	02-h1 High Pressure Prot
-	R	R	(1)	I020	57	FA Fan Motor Fault(MF1)
-	R	R	(1)	I021	58	Fb Fan Motor Fault (MF2)

System controller visibility notes

(1) Only if the alarm is active

The Unit alarms are displayed under Information/Heat Pump.

Heat Pump Unit Alarm Information:

1	2	3	HMI	ID	Unit alarm number	System controller display
-	R	R	(1)	U001	20	11 Inlet Sensor Fault
-	R	R	(1)	U002	21	12 Outlet Sensor Fault
-	R	R	(1)	U003	24	22 Ambient Sensor Fault
-	R	R	(1)	U004	26	5P W.Pump Feedb Fault
-	R	R	(1)	U005	30	30 Incorrect PCB Setting
-	R	R	(1)	U006	31	02-13 Fre Prot Water Out
-	R	R	(1)	U007	32	05 Power Phase Fault
-	R	R	(1)	U008	42	40 Incorrect PCB Operati
-	R	R	(1)	U009	61	13 Freeze Prot Water In
-	R	R	(1)	U010	62	PU High Water(Unit Stop)
-	R	R	(1)	U011	63	14 High Water Temp

System controller Visibility Notes

(1) Only if the alarm is active

5.8.4 System controller inputs table

System Controller Inputs:

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Units
-	R	W	✓	U1	System Supply Temperature	0	100	1	AUTO	°C
-	R	W	(1)	U2	HC1 Supply Temperature	0	100	1	AUTO	°C
-	R	W	(2)	U4	HC2 Supply Temperature	0	100	1	AUTO	°C
-	R	W	(3)	U5	DHW Temperature	0	100	1	AUTO	°C
-	R	W	(4)	U6	Boiler Supply Temperature	0	100	1	AUTO	°C
-	R	W	(5)	U8	Outside Temperature	-50	100	1	AUTO	°C
-	R	W	(6)	B1	Blocking Input	0	1	1	AUTO	-
-	R	W	✓	K901	Set operation mode of all inputs to AUTO [1=AUTO]	0	1	1	AUTO	-

System controller Visibility Notes

(1) Only if heating circuit 1 type = mixing
(2) Only if heating circuit 2 type = mixing
(3) Only if DHW Type is not = none
(4) Only if Configuration = 4
(5) Only if Wired Outside Sensor = enabled
(6) Only if Blocking Input Configuration is not = 0

AUTO means the inputs are according to the connected devices.

If the operation mode of one ore more than one inputs are changed to manu via System controller, the datapoint Set operation mode of all inputs to AUTO (K901) will be 0.

If the datapoint Set operation mode of all inputs to AUTO (K901) is changed via System controller from 0 to 1 all inputs will be run in operation mode Automatic.

Datapoints	K901	Set operation mode of all inputs to AUTO

If an input was changed manually via System controller the hand symbol  appears.

5.8.5 System controller outputs table

System Controller Outputs:

1	2	3	SC	ID	DESCRIPTION	Min	Max	Step	Default	Units
-	W	W	✓	X1	HC1 Pump on/off	0	1	1	AUTO	-
-	W	W	(1)	X2:X3	HC1 Mixing Valve Position	0	100	1	AUTO	%
-	W	W	(2)	X4	HC2 Pump on/off	0	1	1	AUTO	-
-	W	W	(3)	X5:X6	HC2 Mixing Valve Position	0	100	1	AUTO	%
-	W	W	(4)	X5	Electric Heater stage 1	0	1	1	AUTO	-
-	W	W	(4)	X6	Electric Heater stage 2	0	1	1	AUTO	-
-	W	W	(5)	X5:X6	Bypass / Mixing Valve Position	0	100	1	AUTO	%
-	W	W	(6)	X7	DHW Pump/Valve on/off	0	1	1	AUTO	-
-	W	W	✓	X8	Heat Pump on /off	0	1	1	AUTO	-
-	W	W	(7)	X9	DHW Electric Heater on/off	0	1	1	AUTO	-
-	W	W	(8)	X9	Boiler on/off	0	1	1	AUTO	-
-	W	W	(9)	X5	Boiler Pump on /off	0	1	1	AUTO	-
-	W	W	✓	A1	Heat Pump Control Signal	0	100	5	AUTO	%
-	W	W	✓	K902	Set operation mode of all outputs to AUTO [1=AUTO]	0	1	1	AUTO	-

System controller Visibility Notes

(1) Only if heating circuit 1 = mixing system
(2) Only if heating circuit 2 is not = none
(3) Only if heating circuit 2 = mixing system
(4) Only if configuration = 2
(5) Only if configuration = 4.1
(6) Only if DHW Type is not = none
(7) Only if DHW Electric Heater = yes
(8) Only if configuration = 3 or 4
(9) Only if configuration = 3.1

AUTO means the outputs are according to the application control logic.

If the operation mode of one ore more than one outputs are changed to manu via System controller, the datapoint Set operation mode of all outputs to AUTO (K902) will be 0.

If the datapoint Set operation mode of all outputs to AUTO (K902) is changed via System controller from 0 to 1 all outputs will be run in operation mode Automatic.

Datapoints	K902	Set operation mode of all outputs to AUTO

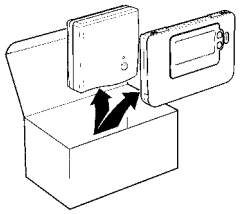
If an output was changed manually via System controller the hand symbol appears.

5.9 System MMI Pack (Room unit and RF receiver)

5.9.1 Room Unit installation guide

Description

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



NOTE

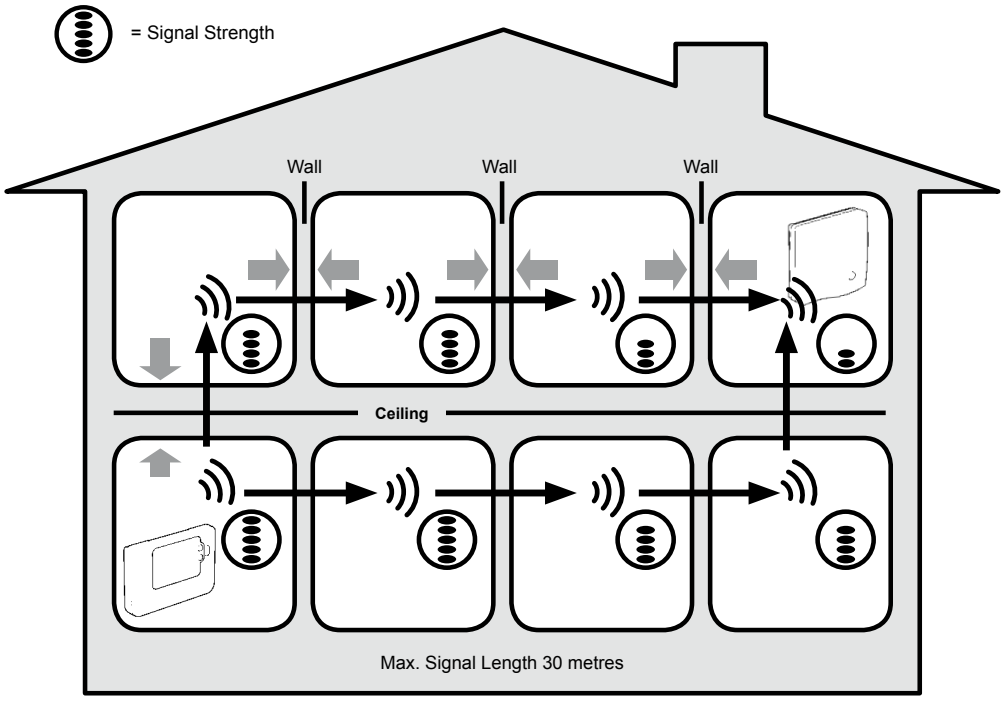
The RF link between the Room Unit and RF Receiver in system packs is pre-configured at the factory and therefore should be installed at the same site. This makes the installation process fast and easy, but if products from individual system packs are separated, or mixed with other pre-configured system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

Installation information

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

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

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



Typical example of building fabric signal losses

Installing the System MMI Pack

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.

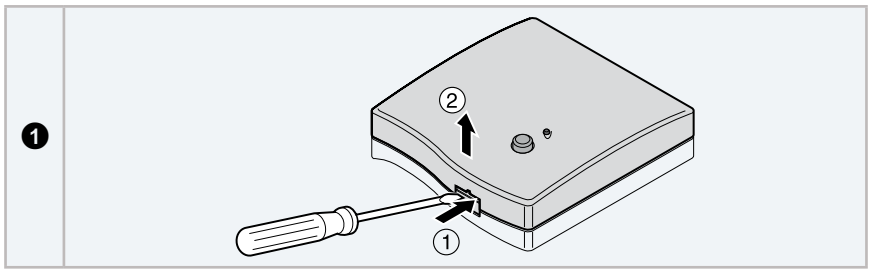
Installing the RF Receiver

NOTE

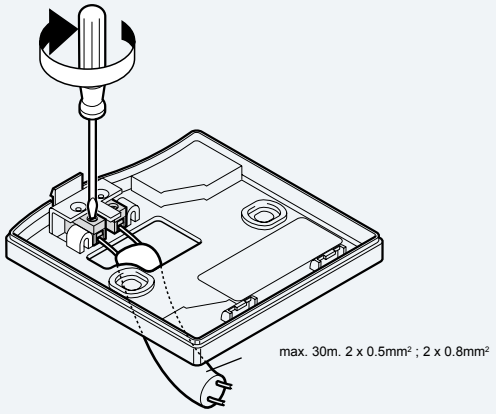
The RF Receiver contains no user serviceable parts. It should be opened and installed by qualified installer only.

CAUTION

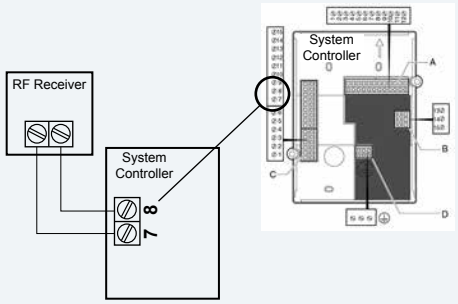
Static electricity. Malfunction. Do not touch the circuit board.



❷

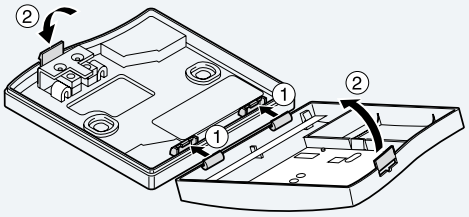


❸



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).

5.9.2 Installing the Room Unit

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:

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.	

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.	
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.)	
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)

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.

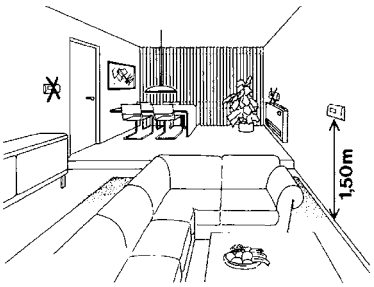
NOTE

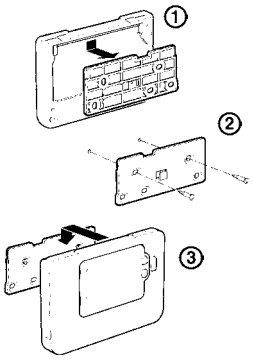
If the LED does not flash or if you are installing a replacement RF Receiver or Room Unit, follow the procedures described in section Binding / Rebinding Procedure.

Locating the Room Unit

While still in the Test Mode, 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 6 seconds.
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

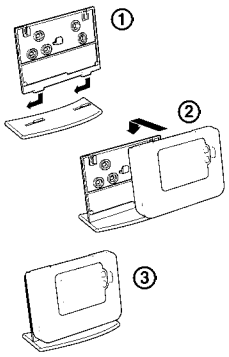


Table stand

- 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 meter from any other electrical equipment as radio, TV, PC etc.

- Do not mount onto metal wall boxes.
- It is recommended that the RF Receiver is fully installed.

5.9.3 Communication loss

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.

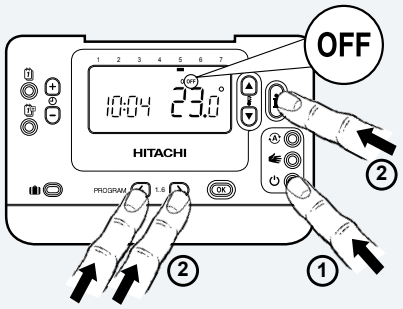
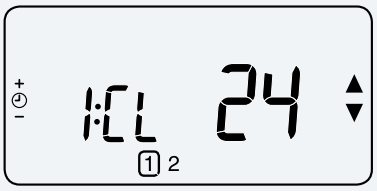
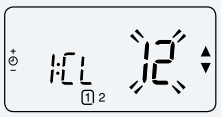
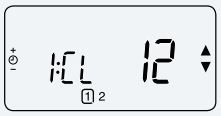
5.9.4 Installer mode

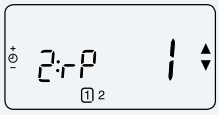
Installer Mode is used to alter the system settings for specific applications, to use the special features of the Room Unit in a different way or to alter the factory preset parameters. Parameters are divided into two groups:

- Category 1 parameters – Room Unit Setup

- Category 2 parameters – System Setup. (These are all listed in section Installer Parameters Table.).

Entering installer mode

❶		Press the ⏻ button. Press and hold the button and the PROGRAM ‹ & › buttons together.
❷		The unit will display the first parameter of installer parameter group **category 1** (from Parameter n.1 to n.19) as shown
❸		Press the ▲ or ▼ to change factory setting. The display will flash indicating that a change has been made.
❹		Press the green OK button to confirm the change. The display will stop flashing. (Continues in the next page)

❺		Press ⏲ ⊕ button to go to the next parameter.
❻	Press the ⟩ button to go to Installer parameter group **category 2** (2) (from Parameter nº 4 to nº 14)	
❼	To exit the installer mode press the Ⓐ **or** ☚ buttons.	

Fail-Safe mode setup

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

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.

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 (see Installer Parameters Table, Category 2 – System Settings). 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 operation	(This feature is not available with the system) This product can be used for heating applications. You can independently modify the profile.	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.

5.9.5 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 Note: This parameter will not function with the System Controller.	8:OP	0	Optimisation Disabled	1	Optimisation Enabled DO NOT CHANGE
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 Note: This function is for use with the extension system only. It will not function with the System Controller alone	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. See note in section Using the Room Unit for Specific Applications.

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 DO NOT CHANGE
Room Temperature Sensor Use	8:Su	0	Programmer and room compensation unit	1	Programmer only. Transmits demand and room setpoint (no temperature displayed)
Maximum Flow Setpoint (extension systems only)	11:uF	55	55°C Maximum Flow Temp.	0 to 99	0°C to 99°C adjustment in 1°C steps
Minimum Flow Setpoint (extension systems only)	12:LF	15	15°C Minimum Flow Temp.	0 to 50	0°C to 50°C adjustment in 1°C steps
Mixing Value Run Time (extension systems only)	13:Ar	150	150 seconds	0 to 240	0 to 240 sec. adjustment in 1sec steps
Pump Overrun Run Time (extension systems only)	14:Pr	15	15 minutes	0 to 99	0 to 99 mins adjustment in 1min steps

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 ESC button.

5.9.6 Binding / Rebinding procedure

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:

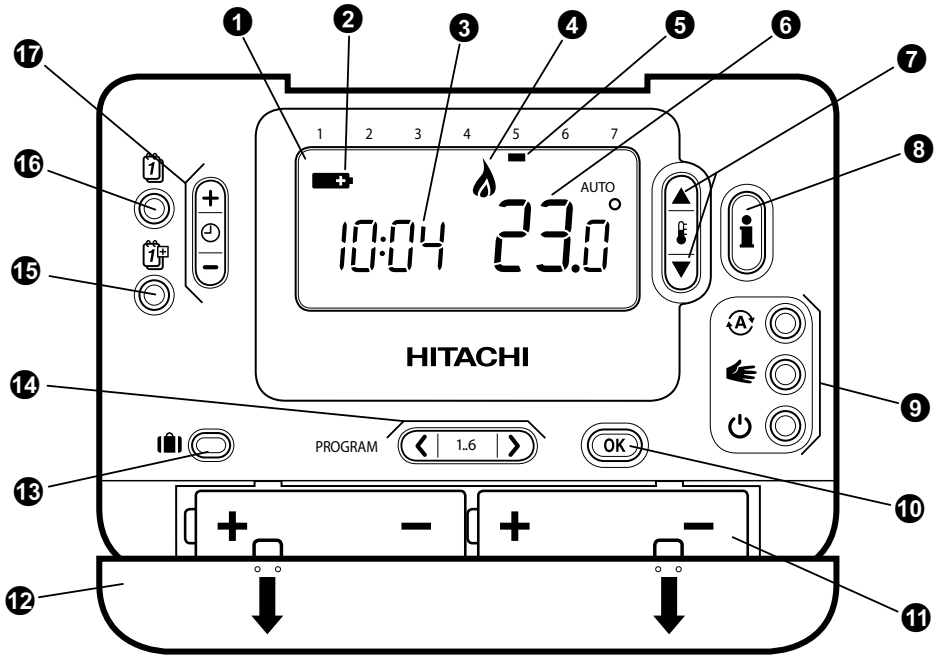
1. Hold button on RF Receiver for 15 seconds. LED will flash red 0.1 sec ON, and 0.9 sec OFF.
2. Hold button on RF Receiver for 5 seconds. LED will flash red for 0.5 sec ON, and 0.5 sec OFF.
3. Press the ⏻ button on the Room Unit.
4. Hold 🌡, ▲, ▼ and ‹ buttons for 2 seconds. Display will show "InSt CO". 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 2. Installing the System MMI Pack to setup the system.

5.9.7 Room Unit user guide

- **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 Hitachi room unit to provide the highest home comfort with a minimum cost.

- **Features**
- Ergonomic user interface featuring an ‘OK-button’.
- Large LCD (Liquid Crystal Display) Screen with backlight.
- 7-day heating 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	❼	Temperature change buttons	⓭	Holiday function button
❷	Battery low indicator	❽	Temperature enquiry button	⓮	Program buttons
❸	Time display	❾	Operating mode buttons	⓯	Copy day button
❹	Burner on indicator	❿	Green OK button	⓰	Set date/Day button
❺	Day indicator	⓫	Battery compartment	⓱	Time change buttons
❻	Temperature display	⓬	Battery cover		

Setting-up

This section shows you how to setup and run the Hitachi room unit in 3 simple steps:

STEP 1: Installing the batteries

NOTE

Please follow the instructions in this section only if the Hitachi 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 date and time.

To install the batteries:

a. Lift up the front cover of the Hitachi 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 Hitachi room unit, ensuring the correct orientation (see 'Controls Layout').

d. After a short pause the Hitachi 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 Hitachi 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 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 Hitachi 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 Hitachi room unit'.

Programming

- The built-in heating program

The built-in heating program has 6 temperature level changes per day that can be set between 3.00am and 2.50am 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	Period	1	2	3	4	5	6
(Day 1 to 5)	Time	6:30	8:00	12:00	14:00	18:00	22:30
	Temperature	21ºC	18ºC	21ºC	18ºC	21ºC	16ºC

Saturday to Sunday	Period	1	2	3	4	5	6
(Day 6 to 7)	Time	8:00	10:00	12:00	14:00	18:00	23:00
	Temperature	21ºC	21ºC	21ºC	21ºC	21ºC	16ºC

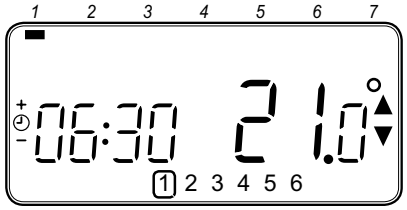
- Reviewing the heating program

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 1 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 1+ 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 1 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 1+ button is pressed again.

OR 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 A , ✋ or ⏻ buttons.

NOTE

To run the adjusted program select the AUTO mode.

Disabling / Enabling time periods

The Hitachi 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.

Operating

- Choosing the operating mode

The Hitachi 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 Hitachi room unit to follow the built-in temperature program (default or personalised). Operating the Hitachi room unit in this mode is the best way to maintain a high level of temperature comfort whilst maximising your energy savings.

• MANUAL (✋) mode sets the Hitachi room unit to act as a simple thermostat with a fixed setpoint throughout the day. The setpoint can be adjusted from 5°C to 35°C by using the 🌡 ▲ or ▼ buttons. The Hitachi room unit will continue to maintain this temperature until another operating mode or temperature is selected.

• OFF (⏻) mode sets the Hitachi 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 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 Hitachi 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 Hitachi 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 Hitachi 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 to 99 days) and press the green OK button to confirm.

d. Press the 🌡 ▲ or ▼ buttons to set the holiday temperature (5°C to 35°C) and press the green OK button to confirm.

The Hitachi 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 Hitachi 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.

5.10 Device control system

Control subject	Purpose	
	Heating operation	Defrost operation
Control frequency of inverter compressor	The frequency control is determined by PI control, through the next parameters: Δ outlet temperature and water target temperature.	Fixed frequency
Opening degree expansion valve for main circuit	- Control range of expansion valve opening degree is determined to optimize TsSH.	Fully open
Opening degree expansion valve for liquid injection	- Specified opening degree controlled by temp. on the top of compressor (Td.).	-
Fan	- Fan Step is controlled according to PS (Suction pressure)	Fan stop.
4-Way valve (RVR)	ON	OFF
Solenoid valve (SVG) (Hot gas bypass)	- Turn ON at starting before 4-way valve ON.	Turn ON for 1 minute at defrosting
Solenoid valve (SVI) (Liquid injection)	- Turn ON if Td≥90ºC continue 3 seconds	OFF

Temp.:Temperature

Td: discharge temperature

TsSH: Suction gas super heat

Ps: suction pressure

6. Optional functions

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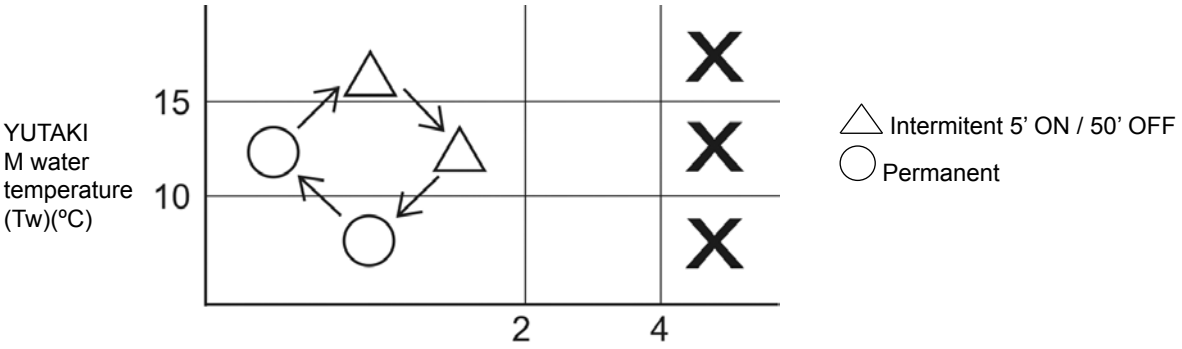
6.1 Freeze protection

Using setting point PR=1. The unit is controlling the pump in order to avoid water circuit freeze as the following graphic indicates:



When in operation in winter in the outdoor air temperature at 2 ºC or lower, the water pump operates to protect YUTAKI M unit from freezing. When the outlet water temperature is 15 ºC higher, the pump performs without interruptions, i.e., runs for five minutes and stops for 55 minutes. The segment displays shows “PU” when the pump is running for five minutes, and “88” when at stop for 55 minutes. This control is released when the outdoor temperature becomes 4 ºC or higher.

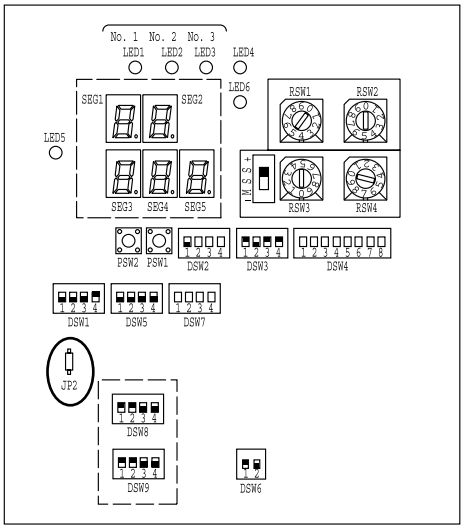
Winter antifreezing control (pump intermittent operation) becomes inactive when OFF is selected in the setting mode. When run operation is performed during this control, release the control and run the pump.

The winter antifreezing control is not performed in any abnormality such as when wiring of outlet water thermistor or outdoor air thermistor is broken or short-circuitted (Alarm display “12” or “22”). The pump turns off after 10 seconds following the fulfillment of winter antifreezing control release conditions.

6.2 Restart after power failure

Jumper JP2 forces the unit to maintain the status before the failure.

If the unit was running, once the power is recovered the unit will run again. On the other hand, if the unit was stopped, it will remain stopped.



- Jumper lead setting (JP2): Automatic restart after power failure

Keep the same status as before. Setting before shipment:

JP2
1

0 = Open; 1 = Short circuit

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

Setting	Function	Details
0	Enable	If this function is 'Enable', in case of power failure the unit will restart automatically once the power is recovered
1	Disable	

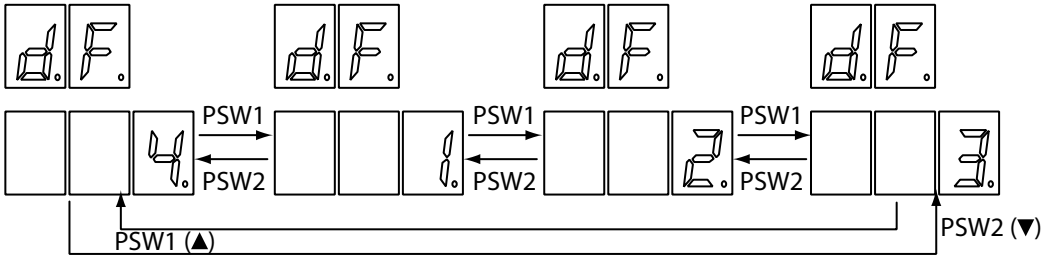
6.3 Compressor ON/OFF control

ON/OFF Temperature Differential (Thermo-ON/OFF Difference) is configurable by 1 ºC, i.e., “1, 2, 3, 4” by setting mode operation. The factory setting (default) is “4 ºC”.

This mode is activated by turning pin 3 of DSW1 ON.

Pressing PSW2 and PSW1 for more than three seconds at the same time allows changing from each item displayed. To finish changing, press PSW2 and PSW1 for more than three seconds again after changing to predetermined setting.

The chart of setting operation is shown below.



PSW1: Value up
PSW2: Value down

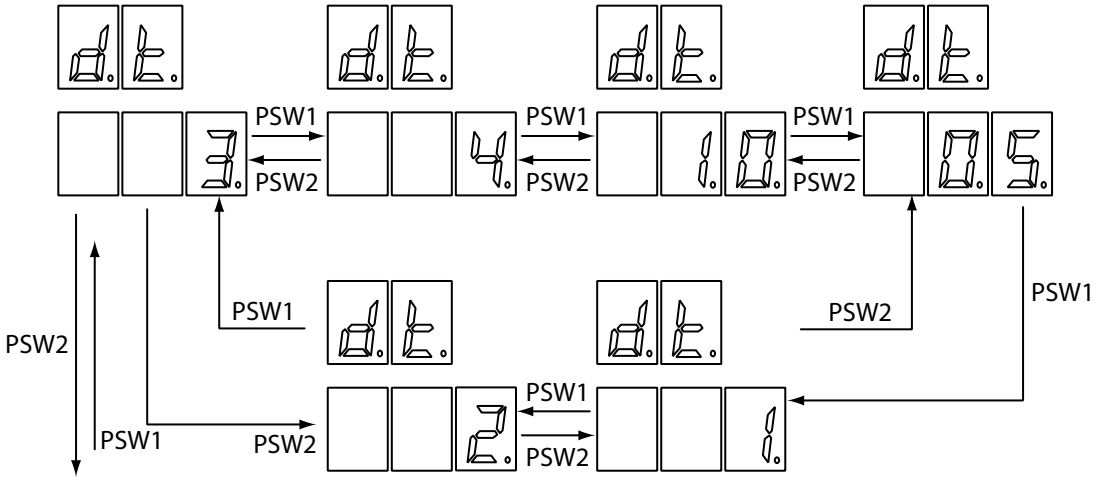
6.4 3 Minutes guard control

Compressor startup by thermo recovery shall always to ensure 3 minutes of compressor OFF status. However, the standard upon operation startup is 3 minutes but it can be, changed by the setting mode in the following chart. The time available for setting is 30 seconds, and by 1 minute between 1 and 10 minutes.

This mode is activated by turning pin 3 of DSW1 to ON.

Pressing PSW2 and PSW1 for more than three seconds at the same time allows changing from each item displayed. To finish changing to predetermined setting.

The chart of setting operation is shown below.



PSW1: Value up
PSW2: Value down

6.5 Power save mode

When power save mode is selected with “DSW4-6” ON, the frequency upper limit for each HP changes from “Standard” --> “Power Saver” (i.e., frequency upper limit lowers by 10%).

This mode only changes the frequency upper limit of the compressor, and does not affect to other configurations. DSW ON/OFF determination is performed only immediately after the Power activation.

6.6 Optional functions from Advanced system controller

The use of the Advanced System Controller accessory (ATW-CPA-02) provides several control functions. Please, refer to the chapter *“5. Control system”* for the specific details of all the functions from the Advanced system controller.

7. Test run

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7.1 Checking procedure before the test run

When you have finished the installation, perform the test run according to the following procedure. After performing the test run, hand over the system to the customer.

- Perform the test run of the YUTAKI M one by one.
  - Make sure that the electrical wiring and the refrigerant piping are correctly connected.
  - You should perform the test run according to the “Test Run Procedure for YUTAKI M” on the next pages.

DANGER

Electrical hazard. Risk of death. Do not push the button of the magnetic switch(es). If you do so, you will cause a serious accident..

CAUTION

Several dangers. Can cause injuries or malfunction. Do not operate the system until all the check points have been cleared.

- *Measure the resistance between the ground and the terminal of the electrical components. Make sure that the electrical resistance is more than 1 MΩ. Otherwise, do not operate the system until you find the electrical leakage and you repair it. Do not impress the voltage on the terminals for transmission 1 and 2.*
- *Make sure that the terminals for the power supply wiring (“L1” to “L1”, “L2” to “L2” , “L3” to “L3” and “N” to “N” of each terminal board for AC230V or AC400V match correctly. Otherwise, you may damage some components.*
- *Make sure that the stop valves of the YUTAKI M are fully open. Then, start the system.*
- *Make sure that the switch on the main power source has been ON for more than twelve hours in order to warm the compressor oil by the oil heater. The operation is not available within 4 hours after turning ON the power supply.*
- *Pay attention to the following items while the system is running:*
- *Do not touch any of the parts at the discharge gas side with your hands because the compressor chamber and the pipes at the discharge gas side are hot at a temperature that is higher than 90°C.*
- *Do not touch any electrical components for more than three minutes after turning OFF the main switch. Make sure that the stop valve of the gas line and the stop valve of the liquid line are fully open.*
- Checking procedure

1 Make sure that the stop valve of the gas line and the stop valve of the liquid line are fully open.

2 Make sure that there is no refrigerant leakage. (The flare nuts sometimes loosen because of the vibration during the transportation).

3 Make sure that the switch on the main power source has been ON for more than twelve hours in order to warm the compressor oil by means of the oil heater.

4 Check whether or not the electrical wiring of the YUTAKI M is connected as shown in chapter “4” Electrical Wiring.

5 Make sure that each wire terminal is correctly connected at the power source.

NOTE

Make sure that the field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breaker, wires and terminals) have been properly selected according to the electrical data in the technical catalog of the unit. Also, make sure that the field-supplied electrical components comply with both national and local codes.

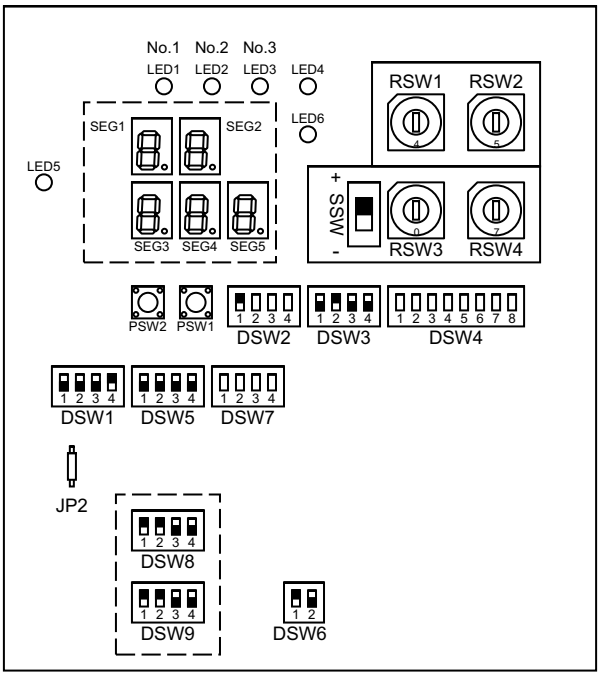
Use the shielded cables for the field wiring in order to avoid electrical noise. (The length of the shielded cable should be less than 1000m. The size of shielded cable should comply with local codes.)

- Check before start up
  - Check that the hydraulic connections are tight.
  - Check that water pressure is 1 bar minimum.
  - Check that the water flow is constant and that the purge of the circuit is correct.
  - Check that the protections and electrical connections are in line with the electrical patterns and this leaflet.
  - Turning on the heat pump YUTAKI M
  - Turning on the electric heater (If necessary)
  - The power relays for heater are controlled by the YUTAKI M controller.
  - Set the temperature for water (on YUTAKI M) to a value of 55ºC (For RHUE-(3-6)A(V)HN-HM) or 60ºC (For RHUE-3AVHN1) to ensure the engagement of the resistance, whatever the temperature outside.

7.2 Test run procedure for YUTAKI M

◆ Check the unit without system controller

- Set Dipswitch for run unit with unit controller

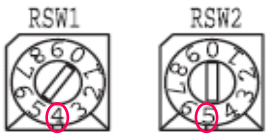


Action	DSW	
Set temperature by rotary switch	DSW3	
Pulse signal ON/OFF (Push button switch available)	DSW2	
Switch local/remote	Local	

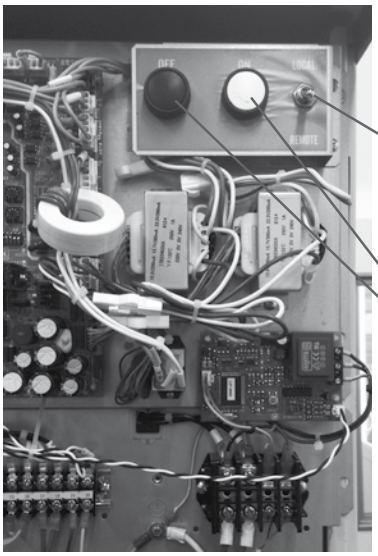
Now the unit can be ON/OFF manually using the local control.

◆ Start the unit without system controller

- Configure Setting Temperature 1 by RSW1 and RSW2
  For example 45º C



- Press ON button



◆ **Pump & high cut test (Optional)**

Set DSW1 as:

7-Segment (1&2) shows: PU

Pushing PSW1 (down) &/or PSW2 (up) select the Test function
- PU: Pump test (only run Pump)
- HH: High Cut test in Heating Mode
- HC: High Cut test in Cooling Mode (Not used)

- Push PSW1 & PSW2 more than 3" and selected test is activated
- Push PSW1 & PSW2 more than 3" and test is finished

7.3 Advanced system controller testing

Once the system has been installed, it is recommended that the following tests are carried out:

7.3.1 Installation configuration and Installation parameters

Check that you have selected the correct configuration, and that the necessary installation parameters have been set.

◆ **Reviewing and setting the installer parameters**

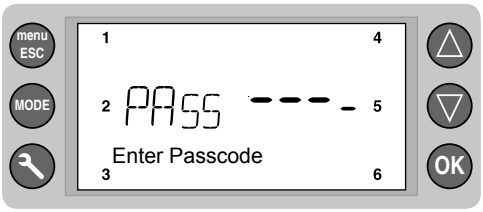
In order to access parameter settings and other information it is necessary to log in with an installer or service access code.

1 Press and hold 🔧 button from the home screen (for 1 second).

2 Enter the access code when the screen prompts for a PASS. Use the 6 buttons to enter the 4 digit code:

Installer access code is: 3636

Service access code is: 6565



3 If the correct access code is entered, the display shows:

- Single spanner icon for installer access / Message “Passcode OK – Installer”
- Double spanner icon for service access / Message “Passcode OK – Service”

The display then shows the first Menu item. If an incorrect access code is entered, the message “Incorrect Passcode” is displayed and the display returns to the home screen. Installer / Service level access remains active for 30 minutes. After that time, it is necessary to repeat the log in process.

The Installer/Service level can be cancelled by pressing and holding (1 sec) the menu/ESC button in the home screen – the spanner icon disappears.

4 The MENU then allows access to setting and system information.

Press △ or ▽ to scroll though the menu items.

Press OK to select the menu item (enter sub-menu or select item to modify)

The menu structure is shown in the table below.
Configuration options are selected from Menu 03, and Parameters from menu 04.

Menu	Description	Sub-Menu	Description
03	Configurations	-	-
04	Parameters (only if installer/service level)	04>00	System
		04>01	Heating Circuit 1
		04>02	Heating Circuit 2
		04>03	DHW
		04>04	Heat Pump
		04>05	Boiler
		04>06	Electric Heater

◆ Installer configuration options & parameter list

ID	Configuration Options	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
LANG	Language	●	●	●	●	●	●	●	1=EN, 2=DE, 3=FR, 4=ES, 5=PO, 6=NL, 7=IT, 8=SE, 9=NO, 10=GR	1
P101	Heating Circuit 1 Type	-	●	-	●	●	●	●	0=direct, 1=mixing	0
P201	Heating Circuit 2 Type	-	●	-	●	●	●	●	0=none, 1=direct, 2=mixing	0
P301	DHW Type	●	●	●	●	●	●	●	0=none, 1=valve, 2=pump	0
P310	DHW Electric Heater	●	●	●	●	-	-	-	0=no, 1=yes	0
P008	Boiler manual release after Heat Pump fault	-	-	-	-	●	●	●	0=no, 1=yes	0
P009	Electric Heater manual release after Heat Pump fault	-	-	●	●	-	-	-	0=no, 1=yes	0
P010	Summer/Winter timer changeover	●	●	●	●	●	●	●	0=disable, 1=enable	1
P011	Clock format	●	●	●	●	●	●	●	0=24hrs, 1=12hrs	0

ID	System	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P001	Frost Protection Activation Temperature	●	●	●	●	●	●	●	-20 to 5°C, or OFF	2°C
P002	Frost protection HC minimum supply set-point	●	●	●	●	●	●	●	10 to 35°C	20°C
P003	Summer Switch-off Activation Temperature	●	●	●	●	●	●	●	10 to 25°C, or OFF	20°C
P004	Pump/Valve Seizure Protection Function	●	●	●	●	●	●	●	0=disable, 1=enable	1
P006	Wired Outside Sensor	●	●	●	●	●	●	●	0=disable, 1=enable	0
P007	Bivalent Alternative Operation	-	-	-	-	●	●	-	0=disable, 1=enable	1
P012	Average Outside Temperature Reset	●	●	●	●	●	●	●	0=disable, 1=enable	0

ID	Heating Circuit 1	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P102	HC1 OTC Heating Curve Gradient	●	●	●	●	●	●	●	0.4 to 4.5	1.6
P103	HC1 Heating Distribution Type	●	●	●	●	●	●	●	0=underfloor, 1=radiator, 2=convector	1
P104	HC1 Room Compensation Factor	●	●	●	●	●	●	●	0 to 5 K/K, or OFF	2 K/K
P105	HC1 Minimum Supply Setpoint	●	●	●	●	●	●	●	0 to 40°C	15°C
P106	HC1 Maximum Supply Setpoint	●	●	●	●	●	●	●	20 to 55°C	55°C
P107	HC1 Pump Overrun Time	●	●	●	●	●	●	●	1 to 10 minutes	2 min
P108	HC1 Mixing Valve Motor Runtime	-	●	-	●	●	●	●	30 to 600 seconds	120 s
P111	HC1 Mixing Over-Temperature Limit Offset	-	●	-	●	●	●	●	0 to 10°C, or OFF	5°C
P112	HC1 Automatic No-Load Function	●	●	●	●	●	●	●	0=disable, 1=enable	1
P113	HC1 Screed Function	●	●	●	●	●	●	●	0=off, 1=on	0
P114	HC1 Heating Curve Parallel Shift	●	●	●	●	●	●	●	0 to 5°C	0°C
P115	HC1 Auto No Load Function depending on Room Setpoint	●	●	●	●	●	●	●	0=disable, 1=enable	0
P116	HC1 Auto No Load Function Pump Off Time	●	●	●	●	●	●	●	0 to 120 minutes	45 min
P117	HC1 Auto No Load Function Pump On Time	●	●	●	●	●	●	●	0 to 120 minutes	10 min
P118	HC1 Auto No Load Function Differential	●	●	●	●	●	●	●	0 to 5°C	3°C

ID	Heating Circuit 2	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P202	HC2 OTC Heating Curve Gradient	-	●	-	●	●	●	●	0.4 to 4.5	1.6
P203	HC2 Heating Distribution Type	-	●	-	●	●	●	●	0=underfloor, 1=radiator, 2=convector	1
P204	HC2 Room Compensation Factor	-	●	-	●	●	●	●	0 to 5 K/K, or OFF	2 K/K
P205	HC2 Minimum Supply Setpoint	-	●	-	●	●	●	●	0 to 40°C	15°C
P206	HC2 Maximum Supply Setpoint	-	●	-	●	●	●	●	20 to 55°C	55°C
P207	HC2 Pump Overrun Time	-	●	-	●	●	●	●	1 to 10 minutes	2 min
P208	HC2 Mixing Valve Motor Runtime	-	●	-	-	-	●	-	30 to 600 seconds	120 s
P211	HC2 Mixing Over-Temperature Limit Offset	-	●	-	-	-	●	-	0 to 10°C, or OFF	5°C
P212	HC2 Automatic No-Load Function	-	●	-	●	●	●	●	0=disable, 1=enable	1
P213	HC2 Screed Function	-	●	-	●	●	●	●	0=off, 1=on	0
P214	HC2 Heating Curve Parallel Shift	-	●	-	●	●	●	●	0 to 5°C	0°C
P215	HC2 Auto No Load Function depending on Room Setpoint	-	●	-	●	●	●	●	0=disable, 1=enable	0
P216	HC2 Auto No Load Function Pump Off Time	-	●	-	●	●	●	●	0 to 120 minutes	45 min
P217	HC2 Auto No Load Function Pump On Time	-	●	-	●	●	●	●	0 to 120 minutes	10 min
P218	HC2 Auto No Load Function Differential	-	●	-	●	●	●	●	0 to 5°C	3°C

ID	DHW	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P302	DHW Setpoint	●	●	●	●	●	●	●	45 to 65°C	45°C
P303	DHW Differential	●	●	●	●	●	●	●	1 to 10°C	5°C
P304	DHW Supply Offset	●	●	●	●	●	●	●	1 to 30°C	10°C
P306	Maximum DHW Loading Time	●	●	●	●	●	●	●	1 to 12 hours	1.5 hr
P307	DHW Electric Heater Waiting Time	●	●	●	●	-	-	-	0 to 60 minutes	45 min
P308	Heat Pump Max Time High Setpoint for DHW	●	●	●	●	●	●	●	0 to 180 seconds	180 s
P309	DHW Anti-Legionella Protection	●	●	●	●	●	●	●	0=disable, 1=enable	0

ID	DHW (Cont.)	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P311	DHW Anti-Legionella Setpoint	●	●	●	●	●	●	●	50 to 70°C	65°C
P312	DHW Anti-Legionella Operation Day	●	●	●	●	●	●	●	(Mon=1, Tue=2 … Sat=6, Sunday=7)	6
P313	DHW Anti-Legionella Start Time	●	●	●	●	●	●	●	0 to 24 hours	2 hr
P314	DHW Anti-Legionella Activation Period	●	●	●	●	●	●	●	10 to 60 minutes	10 min
P315	DHW Anti-Legionella Restart Interval	●	●	●	●	●	●	●	1 to 6 hours	2 hr
P316	DHW Defrost Control	●	●	●	●	●	●	●	0=Tank, 1=Standard	1
P317	DHW Cycle Time	●	●	●	●	●	●	●	0 to 24 hours	24 hr

ID	Heat Pump	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P601	Minimum Outside Temperature for Heat Pump Operation	●	●	●	●	●	●	●	-25 to 20°C, or OFF	-20°C
P610	Heat Pump Sensor Offset	●	●	●	●	●	●	●	0 to 10°C	3°C
P611	Blocking Input Configuration (0=OFF)	●	●	●	●	●	●	●	0=OFF to 4 (see section *"DHW and Heat Pump Time Clock"*)	OFF

ID	Boiler	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P701	Maximum Outside Temperature for Boiler Operation	-	-	-	-	●	●	●	-20 to 20°C, or OFF	0°C
P704	Boiler Waiting Time	-	-	-	-	●	●	●	1 to 90 minutes	30 min
P705	Boiler Minimum Off Time	-	-	-	-	●	●	●	1 to 30 minutes	5 min
P706	Boiler Minimum On Time	-	-	-	-	●	●	●	1 to 30 minutes	2 min
P707	Bypass/Mixing Valve Motor Runtime	-	-	-	-	-	-	●	30 to 600 seconds	120 s
P708	Bypass/Mixing Valve Difference Threshold	-	-	-	-	-	-	●	0 to 5°C, or OFF	1.5°C
P709	Bypass/Mixing Valve Opening Delay Time	-	-	-	-	-	-	●	1 to 15 minutes, or OFF	15 min
P713	Boiler Pump Overrun Time	-	-	-	-	●	-	-	1 to 60 minutes	15 min
P714	Boiler Heat Boost Enable	-	-	-	-	●	●	-	0=disable, 1=enable	1
P715	Boiler Heat Boost Setpoint	-	-	-	-	●	●	-	30 to 50°C	40°C
P716	Boiler Auto Operation (on Heat Pump Fault)	-	-	-	-	●	●	●	0=disable, 1=enable	0

ID	Electric Heater	CONF 1.1	CONF 1.2	CONF 2.1	CONF 2.2	CONF 3.1	CONF 3.2	CONF 4.1	Setting Options	Default Setting
P801	Maximum Outside Temperature for Electric Heater Operation	-	-	●	●	-	-	-	-20 to 20°C, or OFF	0°C
P805	Electric Heater Waiting Time	-	-	●	●	-	-	-	1 to 90 minutes	30 min
P807	Electric Heater One Step Function	-	-	●	●	-	-	-	0=disable, 1=enable	0
P808	Electric Heater Heat Boost Enable	-	-	●	●	-	-	-	0=disable, 1=enable	1
P809	Electric Heater Heat Boost Set-point	-	-	●	●	-	-	-	30 to 50°C	40°C
P810	Electric Heater Auto Operation (on Heat Pump Fault)	-	-	●	●	-	-	-	0=disable, 1=enable	0

7.3.2 Inputs and outputs wiring

Check the wiring of the inputs and outputs. Check alarms / fault codes (see section *"10.2.2 Alarm code"*)

◆ Output terminal assignments

Output Terminal Assignments

CONFIGURATION		X1	X2	X3	X4	X5	X6	X7	X8	X9	A1
1.1	Mono-valent (w/o separator)	HC1 pump	-	-	-	-	-	DHW valve	Heat pump on/off	DHW electric heater	Heat pump control signal
1.2	Mono-valent	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	HC2 Mixing valve open	HC2 Mixing valve close	DHW pump	Heat pump on/off	DHW electric heater	Heat pump control signal
2.1	Mono-energetic (w/o separator)	HC1 pump	-	-	-	Electric heater stage 1	Electric heater stage 2	DHW valve	Heat pump on/off	DHW electric heater	Heat pump control signal
2.2	Mono-energetic	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Electric heater stage 1	Electric heater stage 2	DHW pump	Heat pump on/off	DHW electric heater	Heat pump control signal
3.1	Bi-valent parallel	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Boiler pump	-	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal
3.2	Bi-valent parallel (w/ boiler pump)	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	HC2 Mixing valve open	HC2 Mixing valve close	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal
4.1	Bi-valent series	HC1 pump	HC1 Mixing valve open	HC1 Mixing valve close	HC2 pump	Bypass/ Mixing valve open	Bypass/ Mixing valve close	DHW pump	Heat pump on/off	Boiler on/off	Heat pump control signal

◆ Input terminal assignments

Input Terminal Assignments

CONFIGURATION		C1	C2	B1	B2	U8	U6	U5	U4	U2	U1
1.1	Mono-valent (w/o separator)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	-	System supply sensor
1.2	Mono-valent	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	HC2 supply sensor	HC1 supply sensor	System supply sensor
2.1	Mono-energetic (w/o separator)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	-	System supply sensor
2.2	Mono-energetic	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	HC1 supply sensor	System supply sensor
3.1	Bi-valent parallel	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	-	HC1 supply sensor	System supply sensor
3.2	Bi-valent parallel (w/ boiler pump)	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	-	DHW sensor	HC2 supply sensor	HC1 supply sensor	System supply sensor
4.1	Bi-valent series	Heat pump RS485	RF Receiver	Blocking input	DHW boost input	Outside sensor	Boiler sensor	DHW sensor	-	HC1 supply sensor	System supply sensor

7.3.3 Room unit RF receiver binding

Check that the Room Unit is communicating with the RF Receiver. To do this, change the temperature setpoint on the Room Unit to the maximum or minimum value and check that the Heat Pump reacts appropriately. If not, refer to the section *"5.9 System MMI Pack (Room unit and RF receiver)"*

7.3.4 Data display

Review the Operational Data using the Quick System Information Display which allows system temperatures and setpoints to be viewed, or the Quick Relay Status Display allows the status of any relay to be shown.

◆ Quick system information display

Press △ or ▽ from the Home Screen to view important information about system temperatures and setpoints. The value shown on the left side of the display is always the set-point and the value on the right is the actual measured temperature.

Keep pressing △ or ▽ to scroll through the information available. The text helps identify what values are being displayed.

Left side value	Right side value	Description
-	Actual Outside Temperature	From Modbus or sensor U8
HC1 Room Setpoint	HC1 Room Temperature	Only if a room unit was bound for HC1
HC2 Room Setpoint	HC2 Room Temperature	Only if a room unit was bound for HC2
HC1 Supply Setpoint	HC1 Supply Temperature	-
HC2 Supply Setpoint	HC2 Supply Temperature	-
DHW Setpoint	DHW Temperature	Only if DHW Type is not = none
Heat Pump Supply Se-tpoint	Heat Pump Outlet Temperature	From Modbus
Boiler Supply Setpoint	Boiler Supply Temperature	Only if CONF 4.1
Boiler Supply Setpoint	System Supply Temperature	Only if CONF 3.1 or CONF 3.2

◆ Quick relay status display

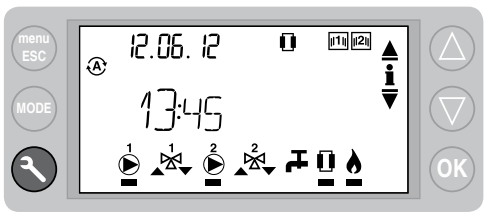
Press 🔧 from the Home Screen or from the Quick System Information Display. The display shows the relay output status using graphical icons.

Press 🔧 again to show the relay output status using plug labels.

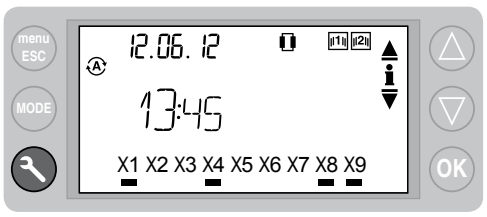
A bar indicator underneath the icon or plug label indicates any relay that is switched on.

Pressing 🔧 again will return to the previous screen.

Relay status by graphical icon



Relay status by plug label



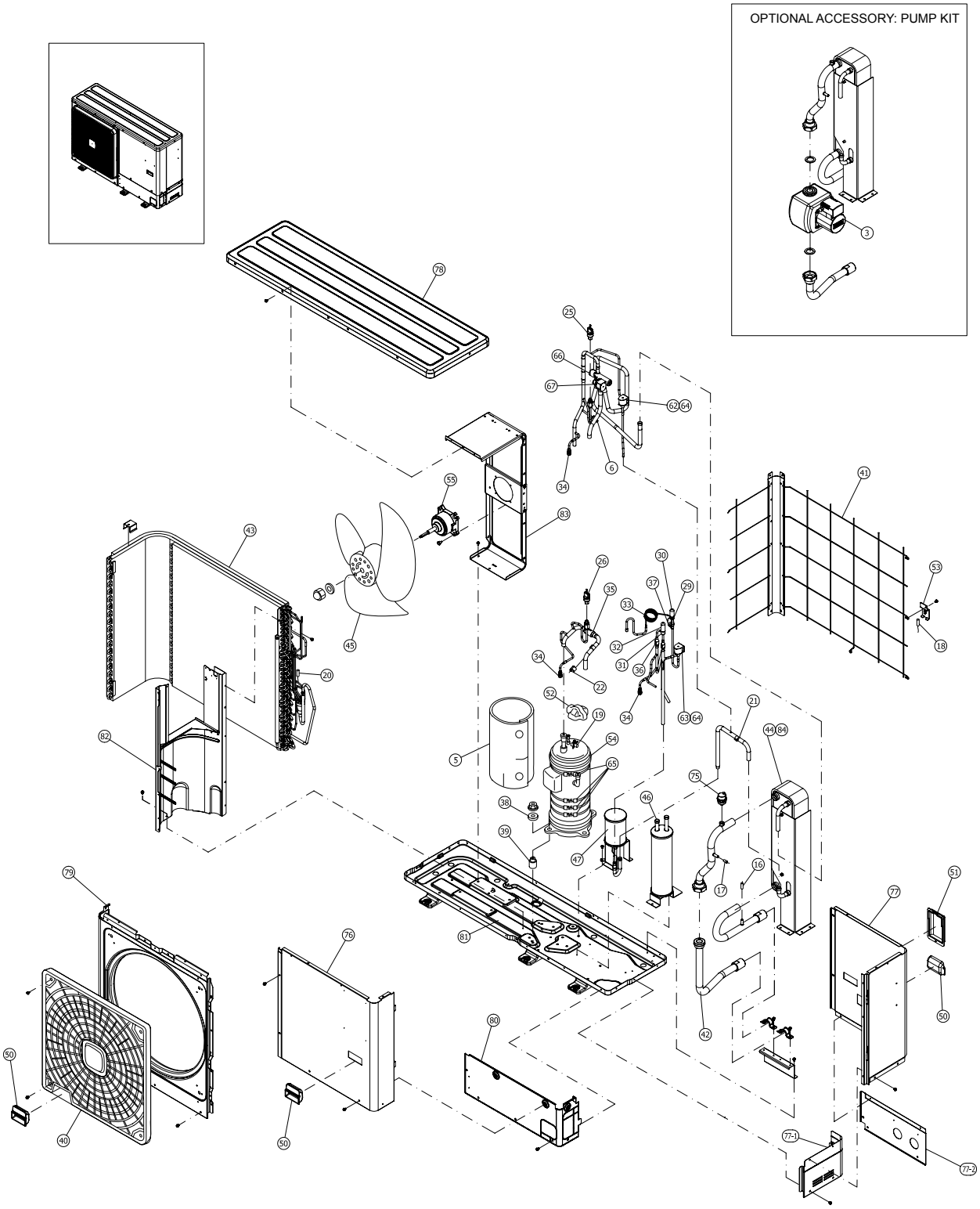
8. Spare parts

Index

8.1 Spare parts of YUTAKI M

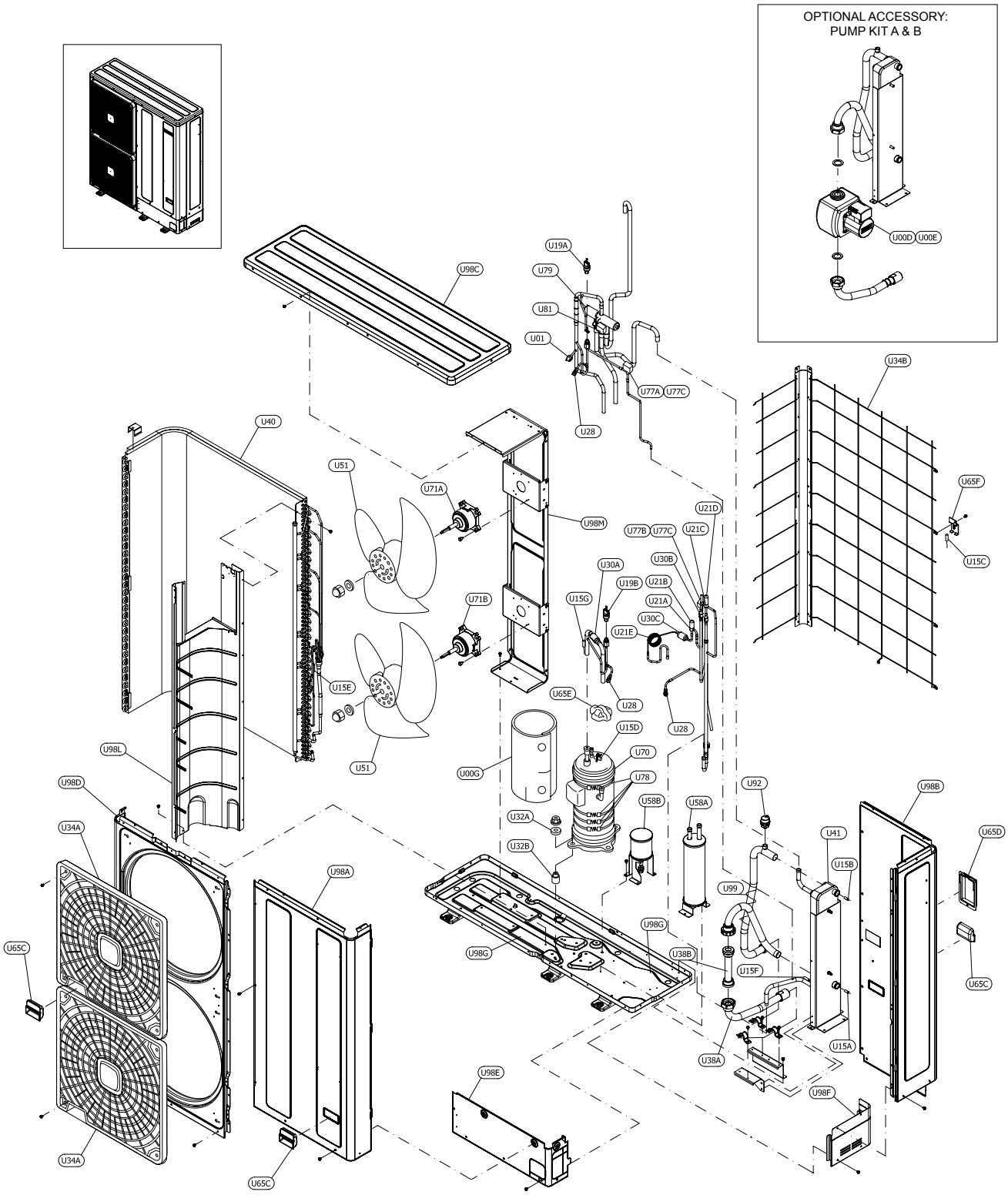
8.1.1 Cycle and estructural parts

◆ **RHUE-3AVHN1**



Spare part document: EPN-201008C-1B

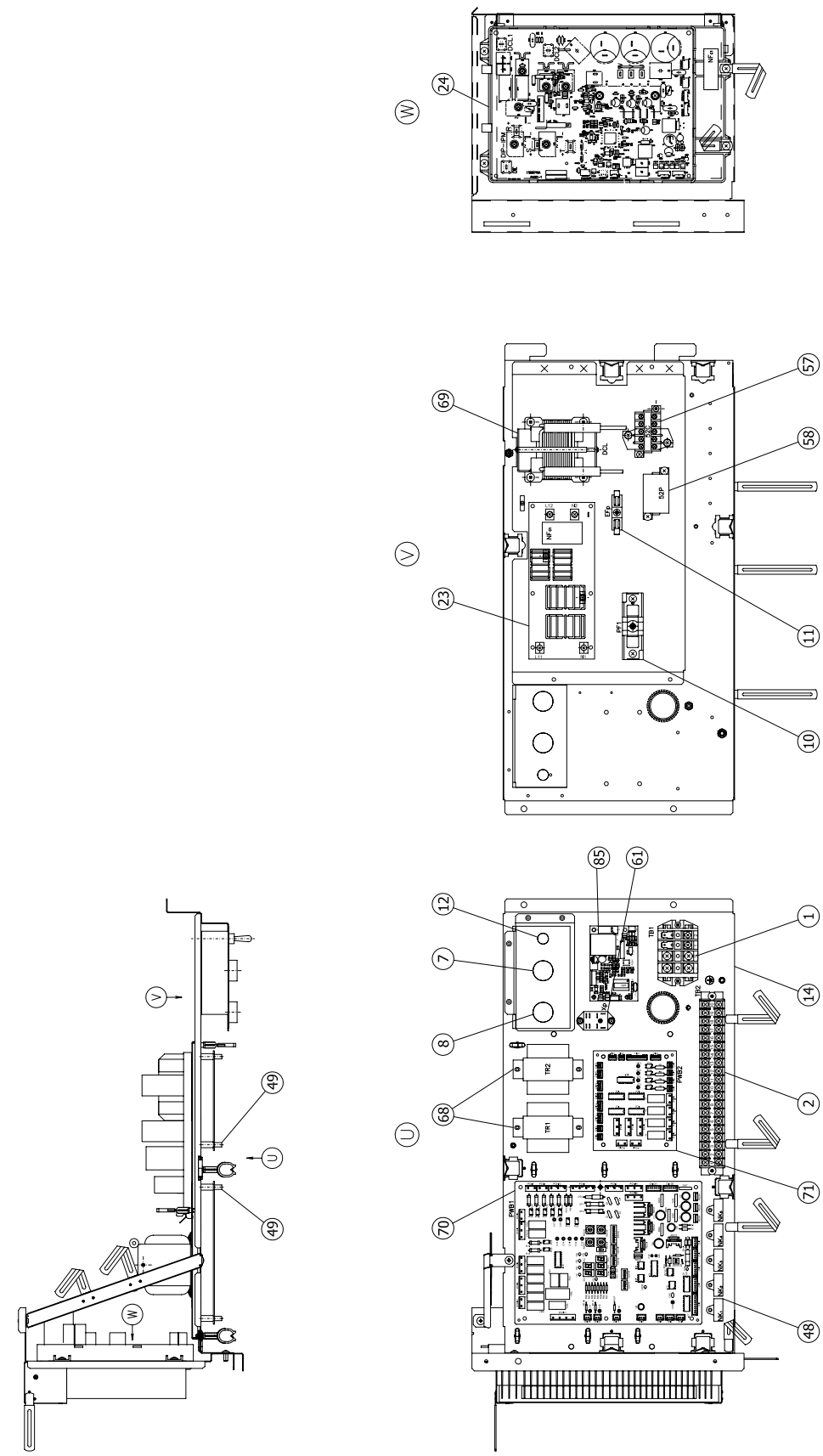
◆ RHUE-(3-6)A(V)HN-HM



Spare part document: EPN-201007C-1B

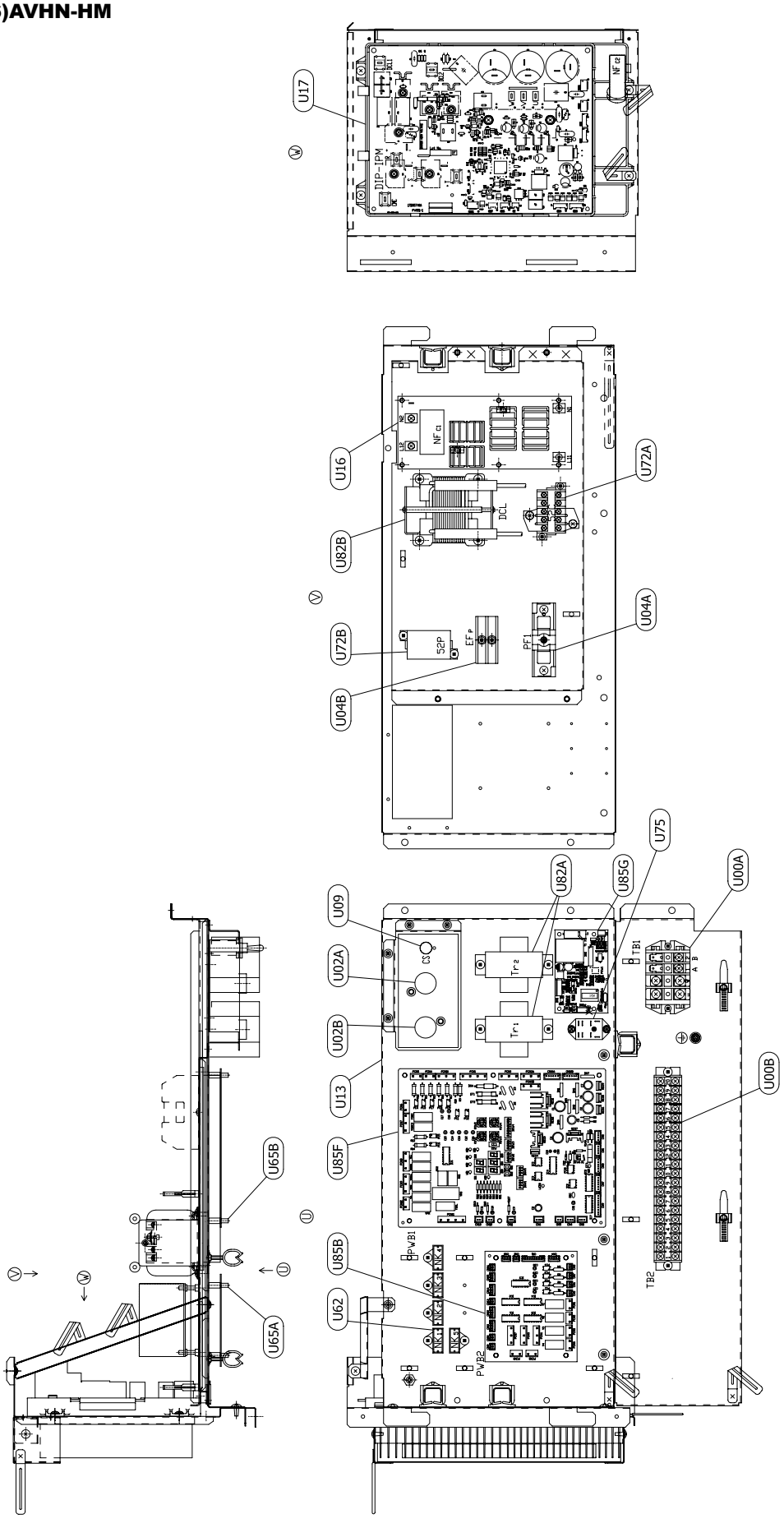
8.1.2 Electrical parts

◆ **RHUE-3AVHN1**



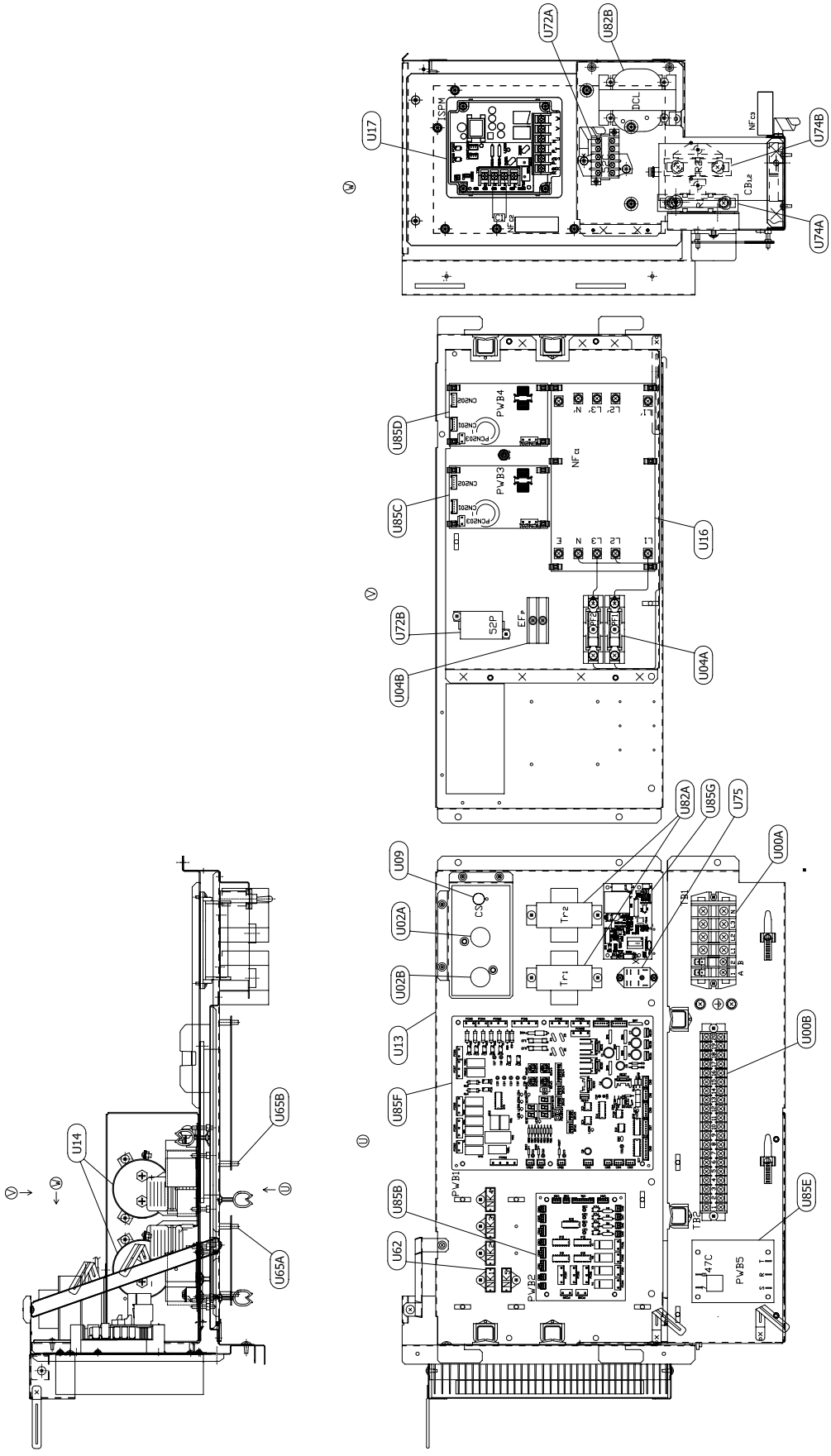
Spare part document: EPN-201008C-2B

◆ RHUE-(3-6)AVHN-HM



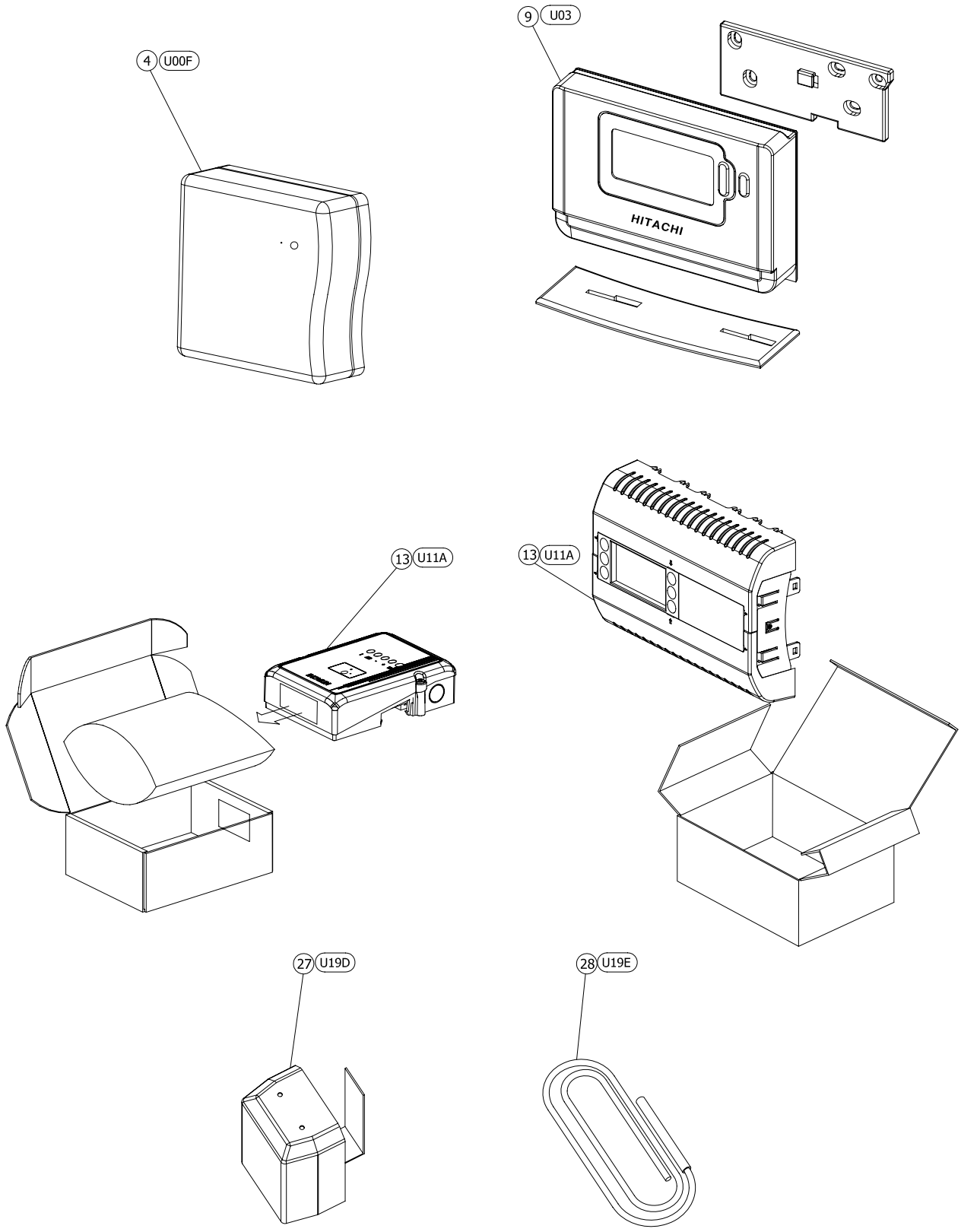
Spare part document: EPN-201007C-2B

◆ RHUE-(5/6)AHN-HM



Spare part document: EPN-201007C-3B

8.1.3 System controller



Spare part document: EPN-201008C-3B/ EPN-201007C-4B

8.1.4 Parts table

◆ **RHUE-3AVHN1**

No	DESCRIPTION	Qty.	REMARKS	
1	Terminal Board	1		
2	Terminal Board	1		
3	Pump	1	Accessory (Pump Kit)	
4	RF Receiver	1	RF Bridge (Part of Controller - Accessory)	
5	Acoustical Cover 46	1	Compressor Jacket	
6	Pressure SW	1	Protection	
7	Push Button Switch	1	ON (white)	
8	Push Button Switch	1	OFF (black)	
9	Room Unit	1	CM700 Room Unit (Part of Controller - Accessory)	
10	Fuse	1	40A	
11	Fuse	1	3A, Power Fuse for Pump	
12	Snap Switch	1		
13	System Controller	1	AQ3000 System Controller (Part of Controller - Accessory) (Before serial nº: 4KE26451)	
			System Controller (Part of Controller - Accessory) (From serial nº: 4KE26451)	
14	Electrical Box	1	Assembly (Steel Plates+Components+Harness) (Before serial nº: 4KE26451) Assembly (Steel Plates+Components+Harness+H-Link) (From serial nº:4KE26451)	
16	Thermistor	1	THMwi	
17	Thermistor	1	THMwo	
18	Thermistor	1	THMa	
19	Thermistor	1	THMd	
20	Thermistor	1	THMeh	
21	Thermistor	1	THMec	
22	Thermistor	1	THMs	
23	Noise Filter	1	30A	
24	Inverter Fin Assy	1	DIP-IPM (17A)	
25	High Pressure Sensor	1	Pd	
26	Low Pressure Sensor	1	Ps	
27	Outside Temperature Sensor	1	Outside Sensor (Part of Controller - Accessory)	
28	Water Temperature Sensor	3	For ATW-CPA-01	Universal / inmersion Sensor
		2	For ATW-CPA-02	(Part of Controller-Accessory)
29	Expansion Valve	1	By-pass line	
30	EXPV Coil	1		
31	Expansion Valve	1	Main line	
32	EXPV Coil	1		
33	Capillary Assy	1		
34	Check JA	3		
35	Strainer	1		
36	Strainer	2		
37	Silencer	1		
38	VP-RUBBER 2	3		
39	VP-RUBBER 1	4		
40	Front Protector Net	1	Outlet (for Fan)	
41	Protector Net S Assy	1	Inlet (for Condenser)	
42	Wpipe Out 2 A	1		
43	Air Heat Exchanger	1	Assembly	
44	Water Heat Exchanger	1	Assembly	

No	DESCRIPTION	Qty.	REMARKS
45	Propeller Fan	1	
46	Accumulator	1	
47	L Tank	1	
48	Spark Killer	5	
49	Spacer	10	
50	Handle	3	
51	H Cover	1	
52	Rubber Cap	1	
53	TH Plate	1	
54	Compressor	1	EK306AHD-27A2
55	Fan Motor	1	138W
57	Magnetic Contactor	1	
58	Magnetic Contactor	1	Contactor for Pump
61	Aux Relay	1	
62	Solenoid Valve	1	
63	Solenoid Valve	1	
64	Coil for Solenoide valve	2	
65	Oil Heater	4	40W
66	4 Way Valve	1	
67	Coil for 4 Way Valve	1	
68	Transformer	2	
69	Reactor	1	
70	Printed Circuit Board	1	PCB Main (CO041 Assy)
71	Printed Circuit Board	1	I/O PCB (CO011 Assy)
75	Air Purge	1	
76	Service Cover S Assy	1	Assembly
77	Rear Cover S Assy	1	Assembly
77-1	Pipe Cover B	1	
77-2	Pipe Cover 2 B	1	
78	Upper Cover Assy	1	Assembly
79	Shroud S	1	
80	S Cover B	1	
81	B-Base Assy	1	Assembly
82	Partition S Assy	1	Assembly
83	Motor Clamp S Assy	1	Assembly
84	Water Heater	1	
85	H-Link adaptor	1	Needed for ATW-CPA-02 (From serial nº: 4KE26451)

Spare part document: EPN-201008C-1A

◆ RHUE-(3-6)A(V)HN-HM

No	DESCRIPTION	Qty.	REMARKS	
U00A	Terminal Board	1		
U00B	Terminal Board	1		
U00D	Pump	1	Accessory (Pump Kit A)	
U00E	Pump	1	Accessory (Pump Kit B)	
U00F	RF Receiver	1	RF Bridge (Part of Controller - Accessory)	
U00G	Acoustical Cover 46	1	Compressor Jacket	
U01	Pressure SW	1	Protection	
U02A	Push Button Switch	1	ON (white)	
U02B	Push Button Switch	1	OFF (black)	
U03	Room Unit	1	CM700 Room Unit (Part of Controller - Accessory)	
U04A	Fuse	1	40A (For RHUE-(3/4)AVHN-HM)	
			50A (For RHUE-(5/6)AVHN-HM)	
		2	20A (For RHUE(5/6)AHN-HM)	
U04B	Fuse	1	3A, Power Fuse for Pump	
U09	Snap Switch	1		
U11A	System Controller	1	ATW-CPA-01	(Part of Controller - Accessory) (Before Serial nº: 4KE26451)
			ATW-CPA-02	(Part of Controller - Accessory) (From Serial nº: 4KE26451)
U13	Electrical Box	1	Assembly (Steel Plates+Components+Harness) (Before Serial nº: 4KE26451)	
			Assembly (Steel Plates+Components+Harness+H-Link) (From Serial nº: 4KE26451)	
U14	Capacitor	2	2700µf (For RHUE-(5/6)AHN-HM)	
U15A	Thermistor	1	THMwi	
U15B	Thermistor	1	THMwo	
U15C	Thermistor	1	THMa	
U15D	Thermistor	1	THMd	
U15E	Thermistor	1	THMeh	
U15F	Thermistor	1	THMec	
U15G	Thermistor	1	THMs	
U16	Noise Filter	1	30A	
U17	Inverter Fin Assy	1	DIP-IPM (17A) (For RHUE(3/4)AVHN-HM)	
			DIP-IPM (25A) (For RHUE-(5/6)AVHN-HM)	
U17	Inverter Module	1	ISPM For (For RHUE-(5/6)AHN-HM)	
U19A	High Pressure Sensor	1	Pd	
U19B	Low Pressure Sensor	1	Ps	
U19D	Outside Temperature Sensor	1	Outside Sensor (Part of Controller - Accessory)	
U19E	Water Temperature Sensor	3	Universal / inmersion Sensor (For Controller Pack)	
		2	Universal / inmersion Sensor (For ATW-CPA-02)	
U21A	Expansion Valve	1	By-pass line	
U21B	EXPV Coil	1		
U21C	Expansion Valve	1	Main line	
U21D	EXPV Coil	1		
U21E	Capillary Assy	1		
U28	Check JA	3		
U30A	Strainer	1		
U30B	Strainer	2		
U30C	Silencer	1		
U32A	VP-RUBBER 2	2		

No	DESCRIPTION	Qty.	REMARKS
U32B	VP-RUBBER 1	4	
U34A	Front Protector Net	2	Outlet (for Fan)
U34B	Protector Net L Assy	1	Inlet (for Condenser)
U38A	Wpipe in 1	1	
U38B	Wpipe in 2	1	
U40	Air Heat Exchanger	1	Assembly
U41	Water Heat Exchanger	1	Assembly
U51	Propeller Fan	2	
U58A	Accumulator	1	
U58B	L-Tank	1	
U62	Spark Killer	5	
U65A	Spacer	4	
U65B	Spacer	6	
U65C	Handle	3	
U65D	H Cover	1	
U65E	Rubber Cap	1	
U65F	TH Plate	1	
U70	Compressor	1	EK306AHD-27A2 (For RHUE-(3/4)AVHN-HM)
			EK406AHD-36A2 (For RHUE-(5/6)AVHN-HM)
			EK405AHD-36D2 (For RHUE-(5/6)AHN-HM)
U71A	Fan Motor	1	74W
U71B	Fan Motor	1	74W
U72A	Magnetic Contactor	1	
U72B	Magnetic Contactor	1	Contactor for Pump
U74A	Resistor	1	Only for RHUE-(5/6)AHN-HM
U74B	Resistor	1	Only for RHUE-(5/6)AHN-HM
U75	Aux Relay	1	
U77A	Solenoid Valve	1	
U77B	Solenoid Valve	1	
U77C	Coil for Solenoide valve	2	
U78	Oil Heater	4	40W
U79	4 Way Valve	1	
U81	Coil for 4 Way Valve	1	
U82A	Transformer	2	
U82B	Reactor	1	
U85B	Printed Circuit Board	1	I/O PCB (CO011 Assy)
U85C	Printed Circuit Board	1	PCB2 For Fan Motor 1(PO024 Assy) (For RHUE-(5/6)AHN-HM)
U85D	Printed Circuit Board	1	PCB2 For Fan Motor 2 (PO024 Assy) (For RHUE-(5/6)AHN-HM)
U85E	RPP Relay	1	Reversing Phase Protection (For RHUE-(5/6)AHN-HM)
U85F	Printed Circuit Board	1	PCB Main (CO041 Assy)
U85G	H-Link adaptor	1	Needed for ATW-CPA-02 (From Serial nº: 4KE26451)
U92	Air Purge	1	
U98A	Service Cover L Assy	1	Assembly
U98B	Rear Cover L Assy	1	Assembly
U98C	Upper Cover Assy	1	Assembly
U98D	Shroud L	1	

No	DESCRIPTION	Qty.	REMARKS
U98E	S Cover B	1	
U98F	Pipe Cover B	1	
U98G	B-Base Assy	1	Assembly
U98L	Partition Assy	1	Assembly
U98M	Motor Clamp L Assy	1	Assembly
U99	Water Heater	1	

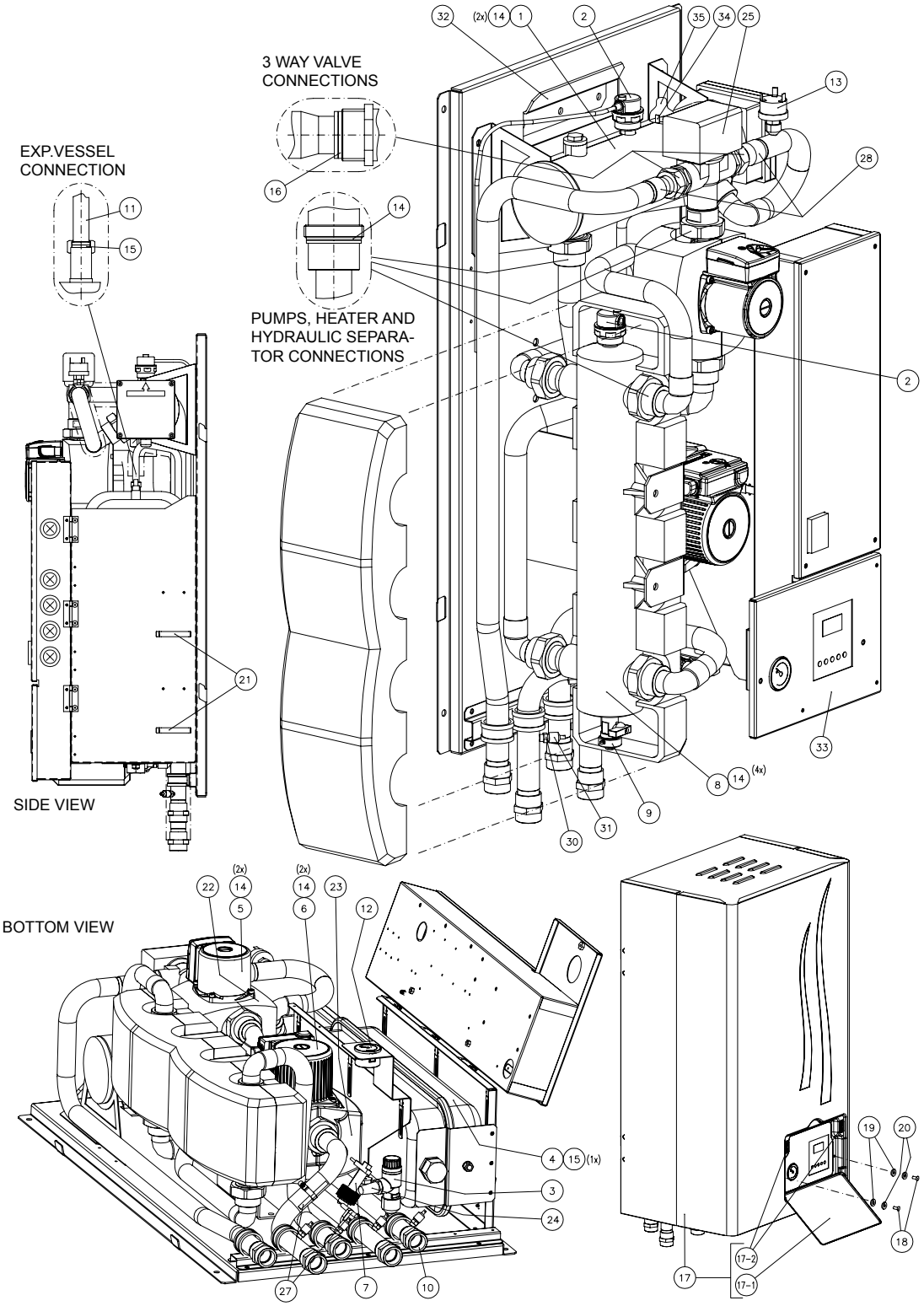
Spare part document: EPN-201007C-1A

8.2 Spare parts of accessories

8.2.1 Hydraulic module

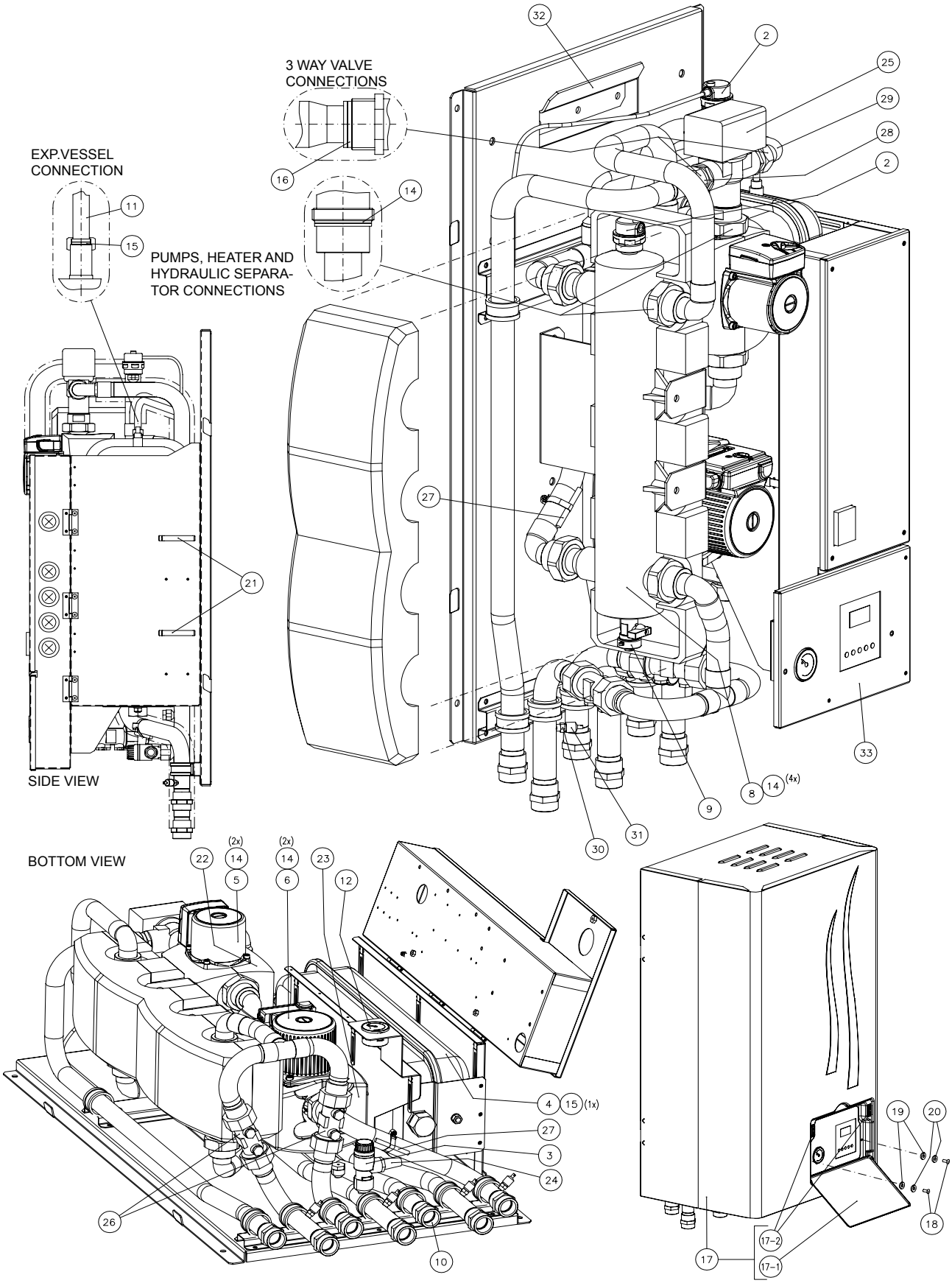
◆ **Cycle and structural parts**

RHM-EH01E



Spare part document: EPN-201011B-1B

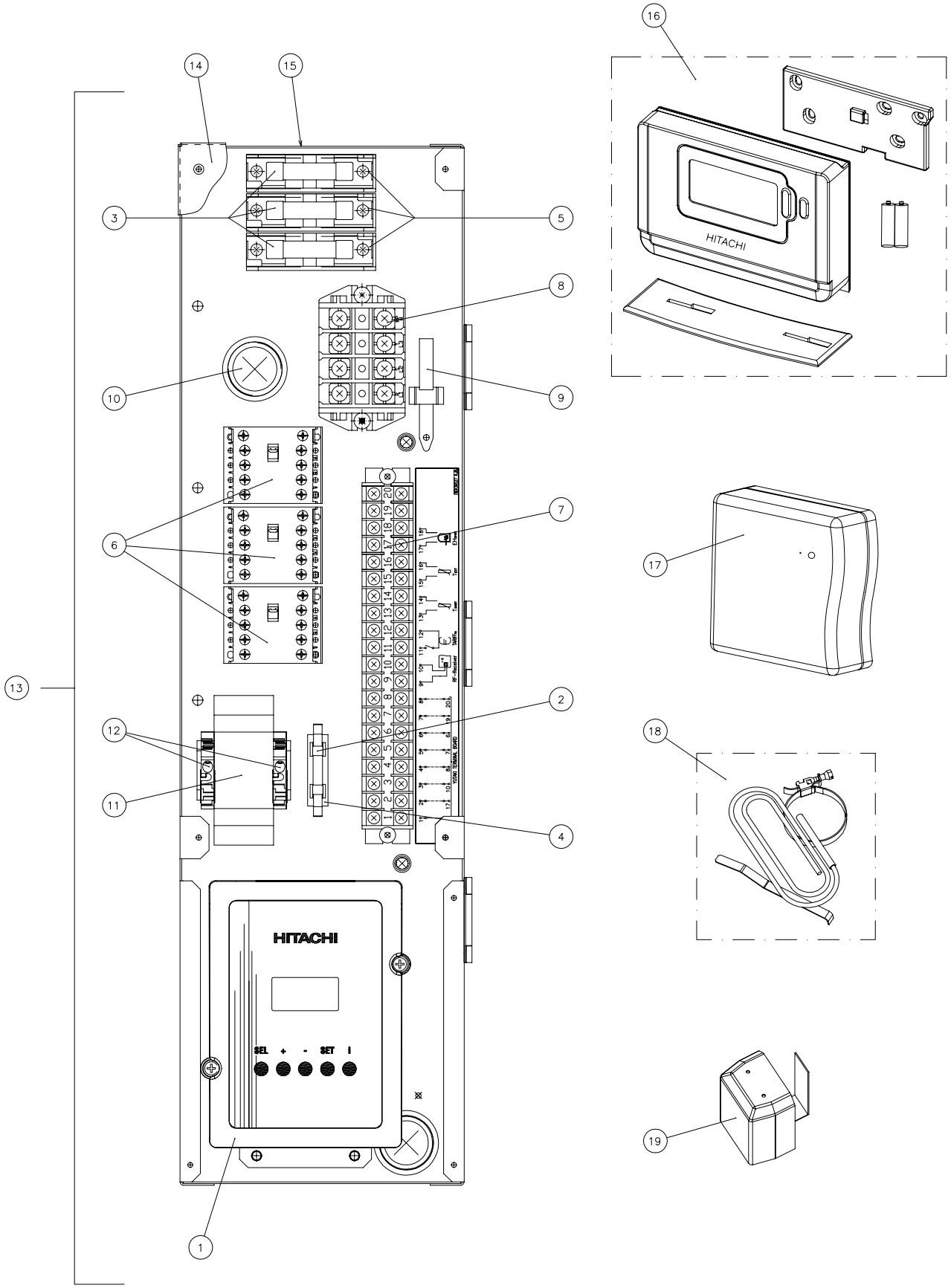
RHM-BC01E



Spare part document: EPN-201011B-2B

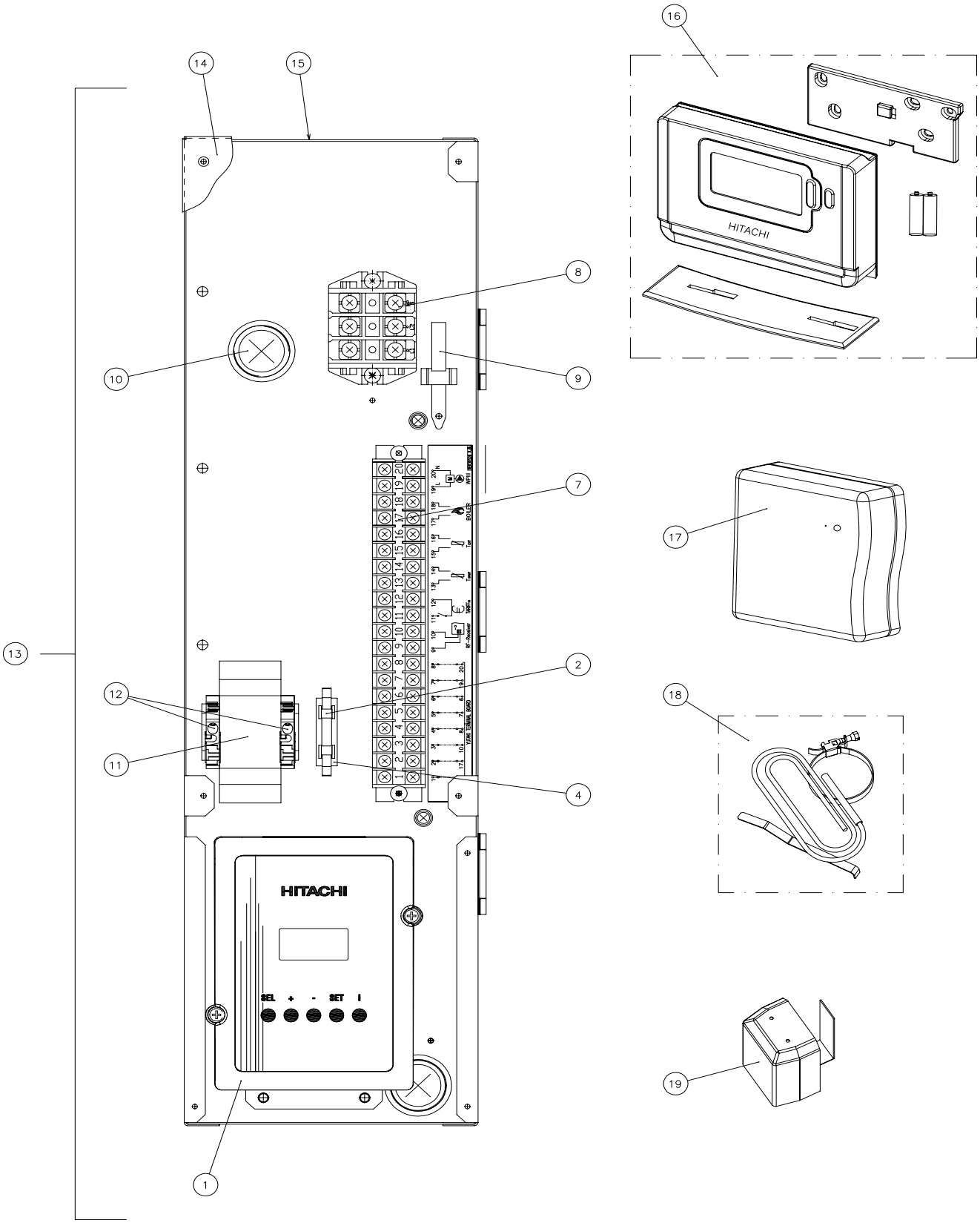
◆ Electrical parts

RHM-EH01E



Spare part document: EPN-201011B-3B

RHM-BC01E



Spare part document: EPN-201011B-4B

◆ Parts table

Cycle and structural parts

No.	DESCRIPTION	Qty	REMARKS	
1	Electric Heater Assy	1	Gaskets 14 not included - Before Serial Number 4JE56681. - Serial Number 4JE56683.	
			Gaskets 14 not included. - Serial Number 4JE56682. - After Serial Number 4JE56684.	
2	Air Purge	2		
3	Security Valve	1		
4	Expansion Vessel 10L	1	Gasket 15 not included	
5	Pump	1	Gaskets 14 and Pump Insulation 22 not included	
6	Pump	1	Gaskets 14 and Pump Insulation 23 not included	
7	Flow Switch	1	For RHM-EH01E	
8	Hydraulic Separator	1	Gaskets 14 not included.	
9	Drain Valve	1		
10	Union	5	For RHM-EH01E	Water Connection
		7	For RHM-BC01E	
11	Pipe 5	1	Vessel Connection	
12	Manometer	1		
13	Pressure Switch	1	For RHM-EH01E	
14	Gasket	10	For RHM-EH01E	for Electric Heater, Pumps and Hyd. Separator connections
		8	For RHM-BC01E	
15	Gasket	1	for Expansion Vessel connection	
16	Gasket	2	for 3-Way Valve connection	
17	Cover Assy.	1	Assembly (Screws and Washers not included)	
17-1	LCD Cover	1	Assembly (LCD Cover + Shaft + Washers)	
17-2	Magnet	2		
18	Screw	2	for Cover Assy fixing	
19	Nylon Washer	2	for Cover Assy fixing (material: nylon)	
20	Washer	2	for Cover Assy fixing (material: steel)	
21	Clamp	2	for installer wiring	
22	Pump Insulation	1	only insulation around the Pump	
23	Pump Insulation	1	only insulation around the Pump	
24	Union	1	for Security Valve drain connection	
25	3-Way Valve	1		
26	Check Valve	2	For RHM-BC01E	
27	Water Temperature Sensor	2		
28	Union	2	for 3-Way Valve connection (For RHM-EH01E)	
		1	for 3-Way Valve connection (For RHM-BC01E)	
29	Union	1	for 3-Way Valve connection (For RHM-BC01E)	
30	Pressure Port	4	Before Serial Number 4JE56677	
		4	After Serial Number 4JE56678	
31	Pressure Port Cap	4	Before Serial Number 4JE56677	
		4	After Serial Number 4JE56678	
32	Wall Support	1		
33	Control Support	1		

No.	DESCRIPTION	Qty	REMARKS
34	Thermostat	1	For RHM-EH01E Thermal cut-off thermostat for Electric Heater. - Before Serial Number 4JE56681. - Serial Number 4JE56683.
34	Thermostat	1	For RHM-EH01E Thermal cut-off thermostat for Electric Heater (Cap included). - Serial Number 4JE56682. - After Serial Number 4JE56684.
35	Thermostat Cap	1	For RHM-EH01E Protector Cap for Thermostat 34. - Before Serial Number 4JE56681. - Serial Number 4JE56683.

Spare part document: EPN-201011B-1A

Electrical parts

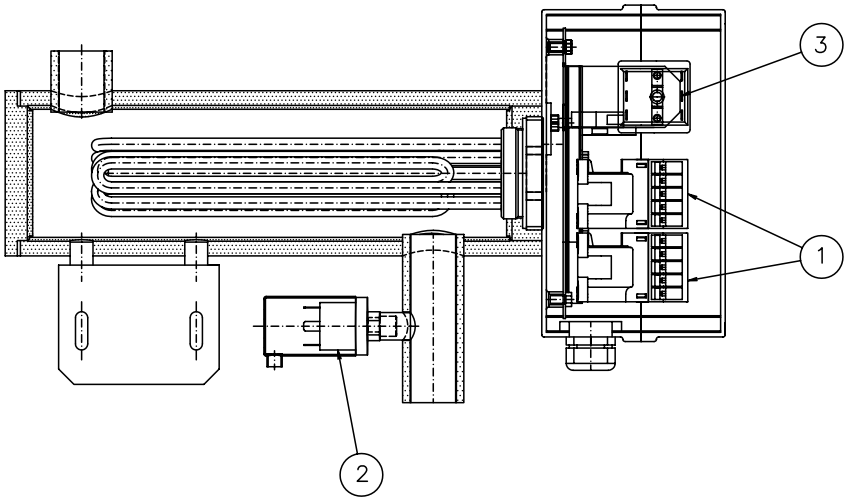
No.	DESCRIPTION	Qty	REMARKS
1	System Controller	1	
2	Fuse	1	5 A
3	Fuse	3	12 A (For RHM-EH01E)
4	Fuse Holder	1	
5	Fuse Holder	3	For RHM-EH01E
6	Magnetic Contactor	3	12 A (For RHM-EH01E)
7	Terminal Board	1	
8	Terminal Board	1	
9	Clamp	1	
10	Rubber Bush	7	
11	Timer	1	
12	End Bracket	2	
13	Electrical Box	1	For RHM-EH01E Assembly (Components + Harness). - Before Serial Number 4JE56681. - Serial Number 4JE56683.
13	Electrical Box	1	For RHM-EH01E Assembly (Components + Harness). - Serial Number 4JE56682. - After Serial Number 4JE56684.
13	Electrical Box	1	(For RHM-BC01E) Assembly (Components + Harness)
14	E-Box Cover Assy	1	Plate + Labels
15	E-Box SubAssy	1	Only plate (without components)
16	Room Unit	1	
17	RF Receiver	1	
18	Water Temperature Sensor	1	
19	Outside Temperature Sensor	1	

Spare part document: EPN-201011B-2A

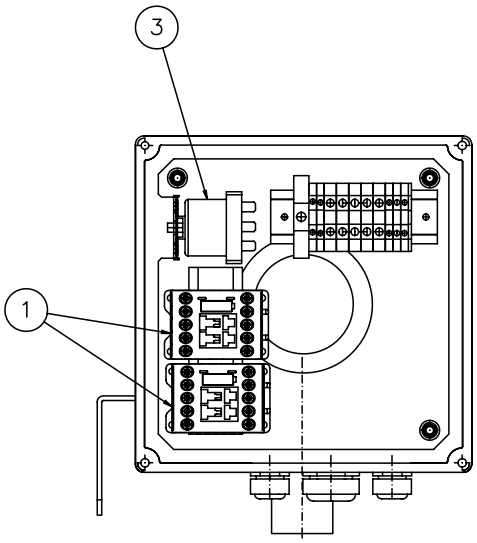
8.2.2 WEH - Water Electric Heater

◆ Structural and electrical parts

LOCATION OF SPARE PARTS IN THE UNIT



LOCATION OF ELECTRICAL EQUIPMENT IN THE ELECTRICAL BOX



Spare part document: EPN-200902B-1B

◆ Parts table

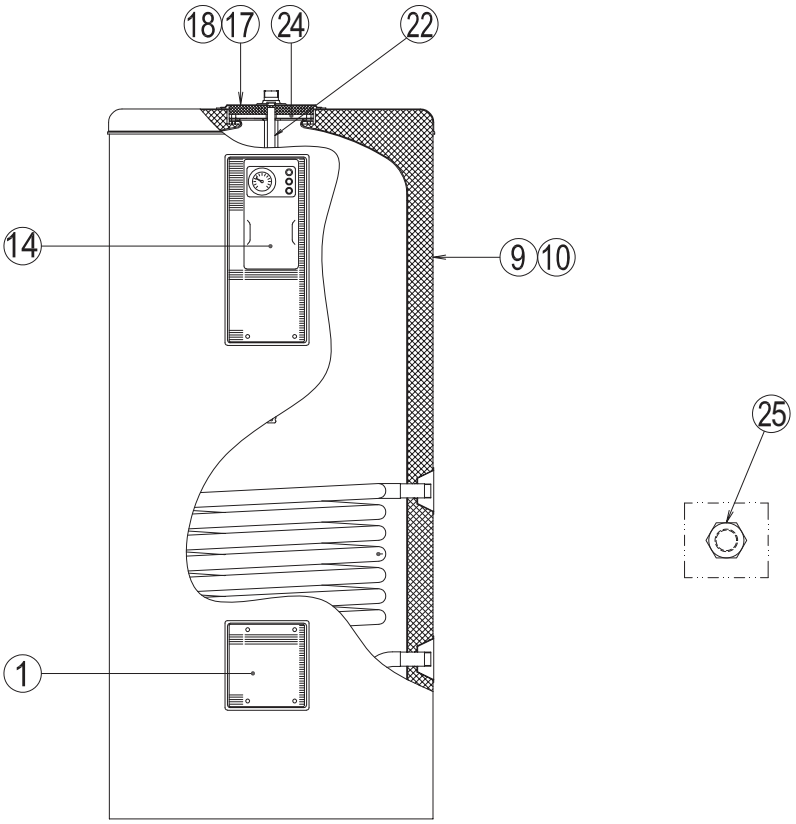
No.	DESCRIPTION	Qty	REMARKS
1	Contactor	2	AS09-30-10-26M (20A AC1)
2	Pressure switch	1	XP600 (1 bar set)
3	Thermostat	1	85°C Cut Out

Spare part document: EPN-200902B-1A

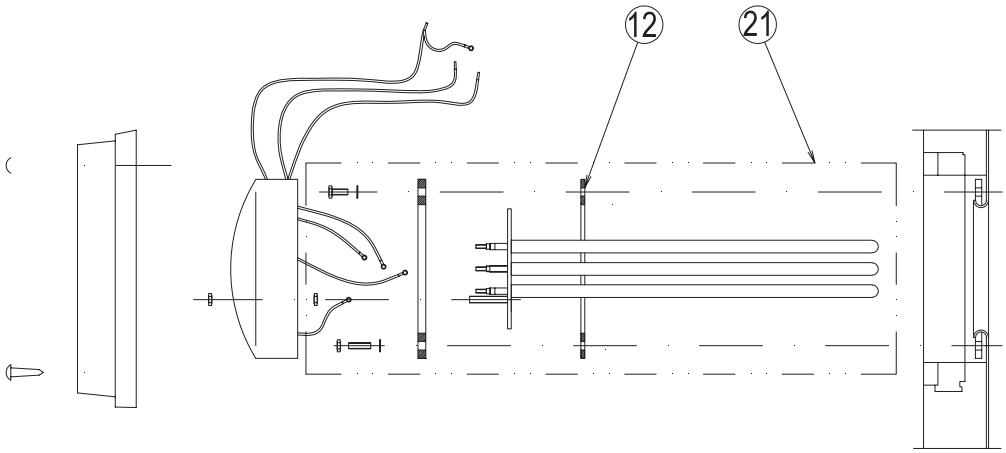
8.2.3 DHWT - Domestic Hot Water Tank

◆ **Structural and electrical parts**

DHWT(200/300)S-2,5H1E

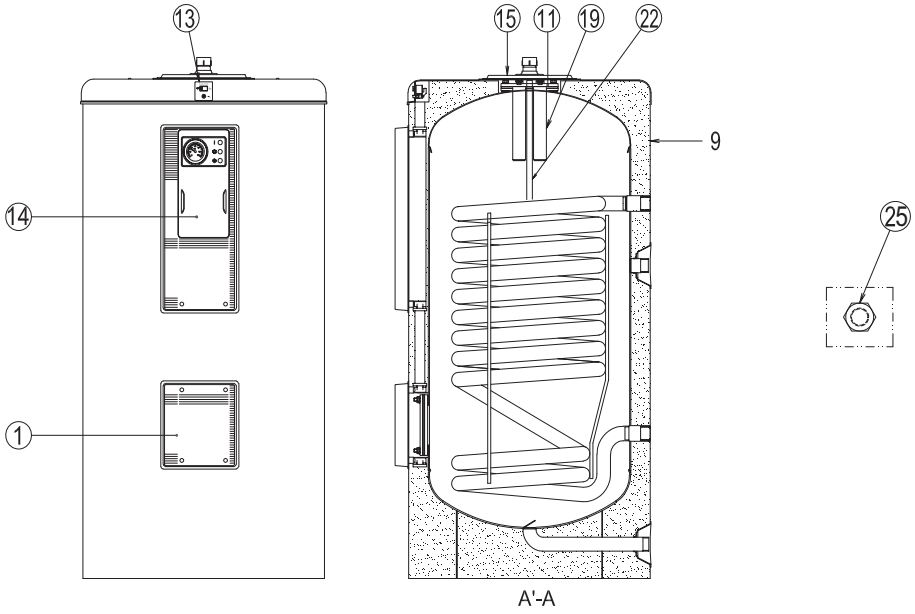


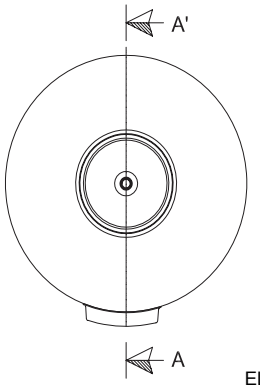
ELECTRIC HEATER



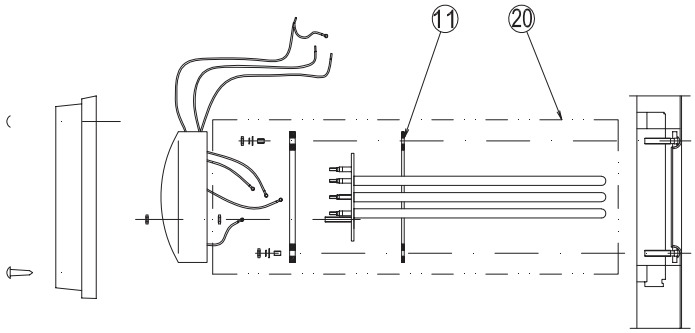
Spare part document: EPN-200908C-1A

DHWT200E-2,5H1E



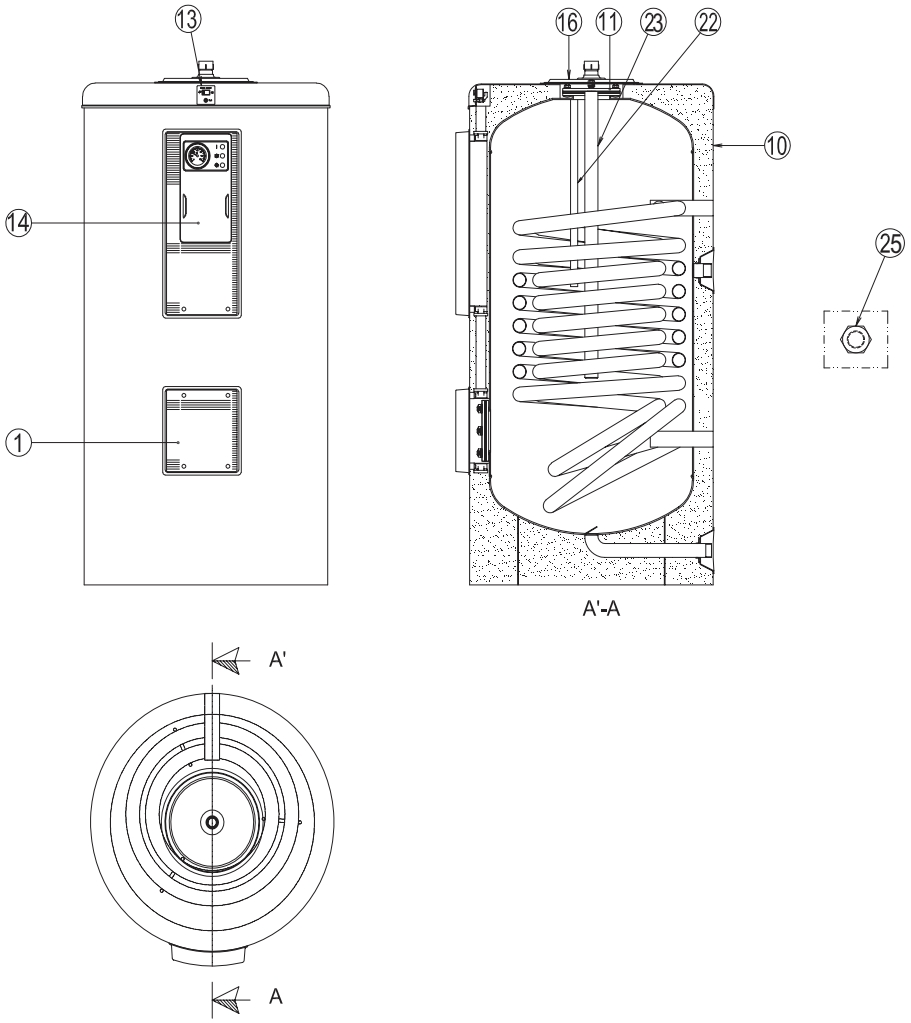


ELECTRIC HEATER

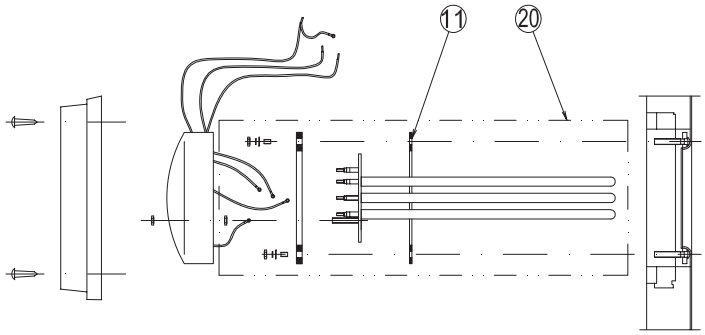


Spare part document: EPN-200908C-1B

DHWT300E-2,5H1E



ELECTRIC HEATER



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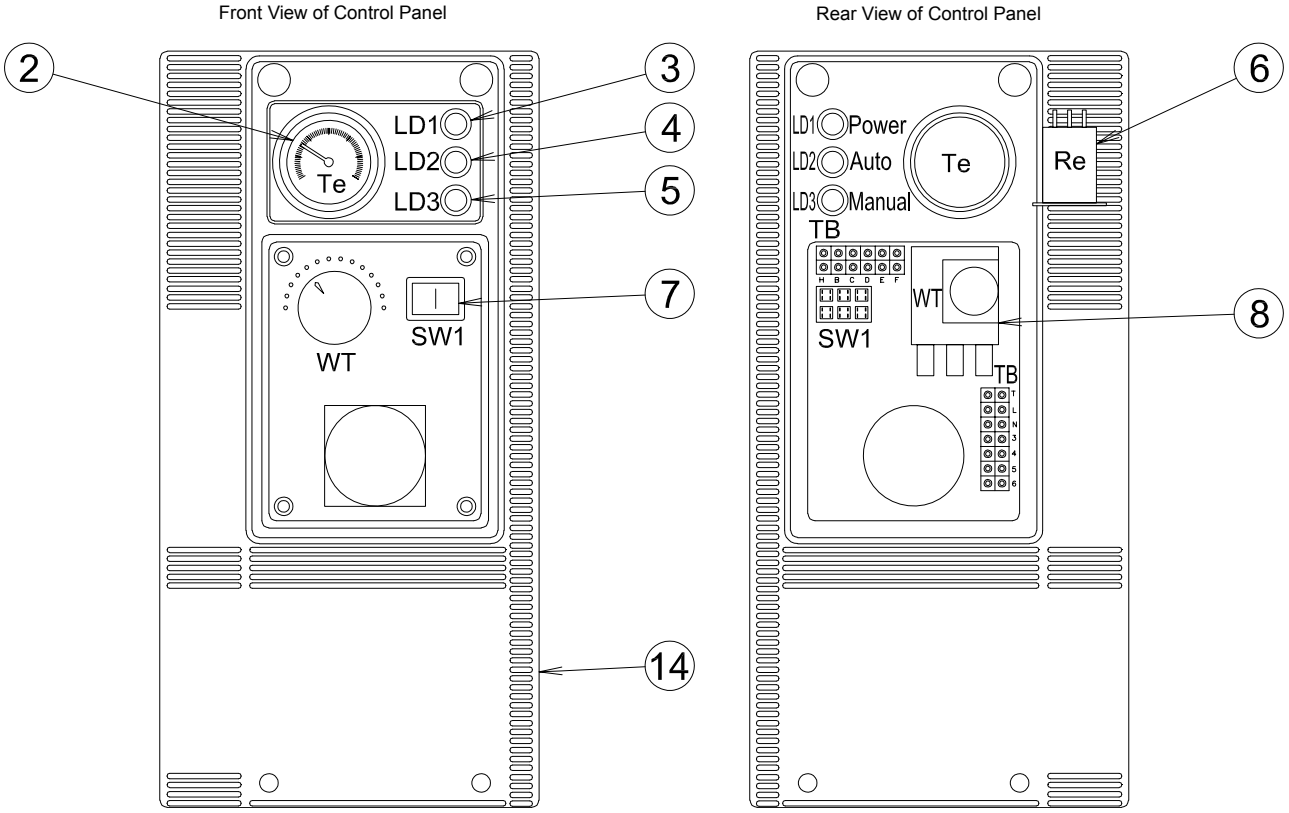


Spare part document: EPN-200908C-4A

◆ Parts table

No.	DESCRIPTION	Qty	REMARKS
1	Side Cover	1	
2	Thermometer	1	
3	Green LED	1	Power ON
4	Orange LED	1	Automatic ON
5	Red LED	1	Manual ON
6	Relay	1	220/240 VAC
7	Bipolar Switch	1	Switch (Auto/Manual)
8	Thermostat	1	
9	External Covering	1	For DHWT200E-2.5H1E and DHWT200S-2.5H1E
10	External Covering	1	For DHWT300E-2.5H1E and DHWT300S-2.5H1E
11	Side Mouth Seal	1	For DHWT200E-2.5H1E and DHWT300E-2.5H1E
12	Side Mouth Seal	1	For DHWT200S-2.5H1E and DHWT300S-2.5H1E
13	Anode Load Meter	1	For DHWT200E-2.5H1E and DHWT300E-2.5H1E
14	Panel Control KIT	1	E-Box Assembly
15	Upper Side KIT	1	Assembly for DHWT200E-2.5H1E
16	Upper Side KIT	1	Assembly for DHWT300E-2.5H1E
17	Upper Side KIT	1	Assembly for DHWT200S-2.5H1E
18	Upper Side KIT	1	Assembly for DHWT300S-2.5H1E
19	Magnesium anodes KIT	1	Assembly for DHWT200E-2.5H1E
20	Electric Heater	1	For DHWT200E-2.5H1E and DHWT300E-2.5H1E
21	Electric Heater	1	For DHWT200S-2.5H1E and DHWT300S-2.5H1E
22	Water Sensor	1	
23	Magnesium anodes KIT	1	For DHWT300E-2.5H1E
24	Upper Mouth Seal		For DHWT200S-2.5H1E and DHWT300S-2.5H1E
25	Re-circulation screw	1	

Spare part document: EPN-200908C

9. Servicing

Index

9.1 General notes

DANGER

Electrical hazard. Risk of death.

- ***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.***
- ***Check and be sure that the LED201 (Red) on the inverter PCB is OFF for all electrical maintenance.***
- ***Do NOT touch the electrical components when the LED201 (Red) on the inverter PCB is ON to avoid electrical shock.***

CAUTION

Crush hazards. Can cause serious injuries.

- *In case of sharped edged parts, as covers, use security gloves to avoid getting injured.*
- *In case of blocked or stucked parts, use appropiated tools and eventually lubricants to release them.*
- *When performing brazing work, besides security gloves it is a must to wear convenient eye protection.*
- *Do not put any strange material (sticks, etc) into the air inlet and outlet. These units have high speed rotating fans and it is dangerous that any object touches them.*

Electrical hazard. Can cause serious injuries.

- *Do not pour water into the unit. These products are equipped with electrical parts. If water contacts with electrical components then it will cause a serious electrical shock.*
- *Do not open the service cover or access the unit without disconnecting the main power supply.*
- *In case of fire turn OFF the main switch, put out the fire at once and contact your service contractor.*

Flamable liquids and objects. Fire risk.

- *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 use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.*

NOTE

Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing compressor, replace it quickly. If exposed for a long period, seal the suction pipe and discharge pipe.

Remove the cap for the compressor just before replacing the compressor. Before mounting the compressor, seal the suction pipe and discharge pipe with a tape to protect the compressor from foreign particles. Remove the tape at pipe connection.

Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing compressor, replace it quickly. If exposed for a long period, seal the suction pipe and discharge pipe.

If circuit breaker or fuse is often activated, stop the system and contact your service contractor.

9.2 YUTAKI M servicing

9.2.1 Removing service cover

Remove the main parts according to the following procedures.

NOTE

Screws are represented as black points in the figures. To reassemble, perform the procedures in reverse.

To prevent contamination of the refrigerant with water or foreign particles, do not expose open pipes atmosphere for long periods.

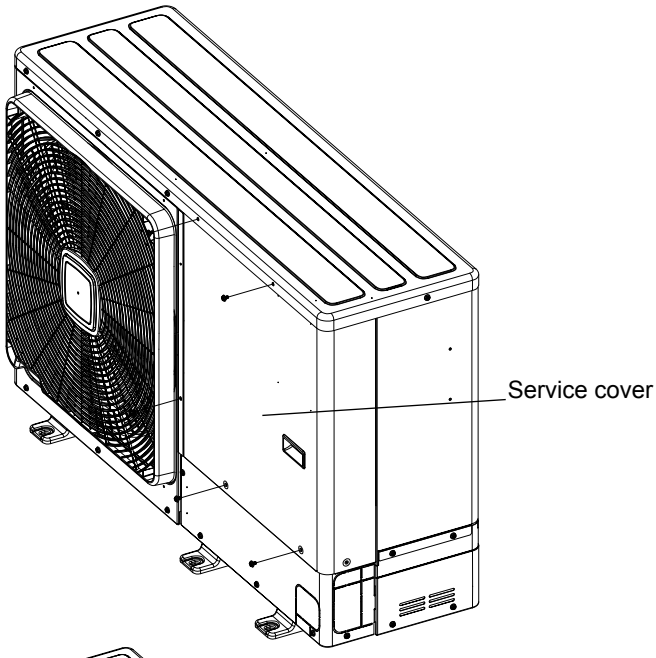
If necessary, seal pipe ends using caps or tape.

◆ **RHUE-3AVHN1**

1 Remove the 2 fixing screws of the upper cover.
2 Remove the 3 fixing screws of the front cover.
3 Slide the service cover downward and remove it.

NOTE

Pay attention of not falling off the service cover.

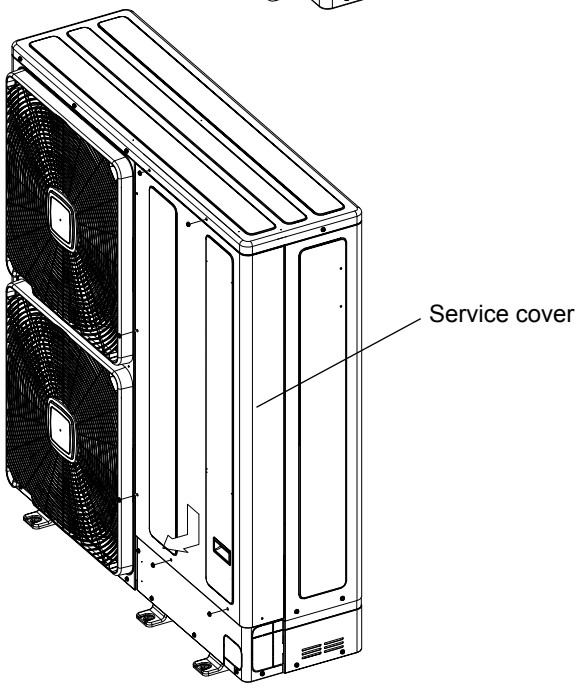


◆ **RHUE-(3-6)A(V)HN-HM**

1 Remove the 2 fixing screws of the upper cover.
2 Remove the 4 fixing screws of the front cover.
3 Slide the service cover downward and remove it.

NOTE

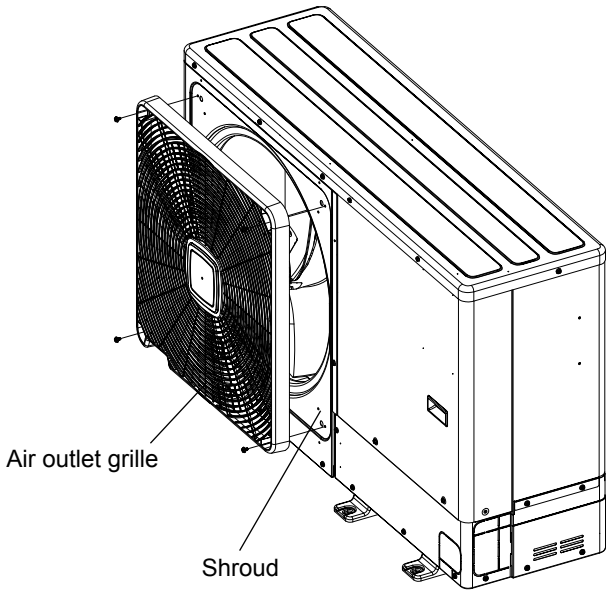
Pay attention of not falling off the service cover.



9.2.2 Removing air outlet grille

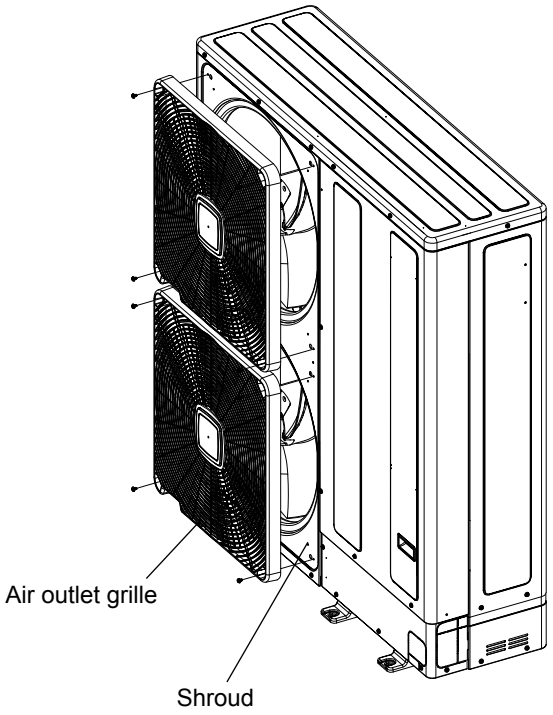
◆ **RHUE-3AVHN1**

1 Remove the 4 fixing screws of the upper cover.
2 Lift the air outlet grille holding the lower parts.
3 Release the extruded hook of the air outlet grille from the shroud.



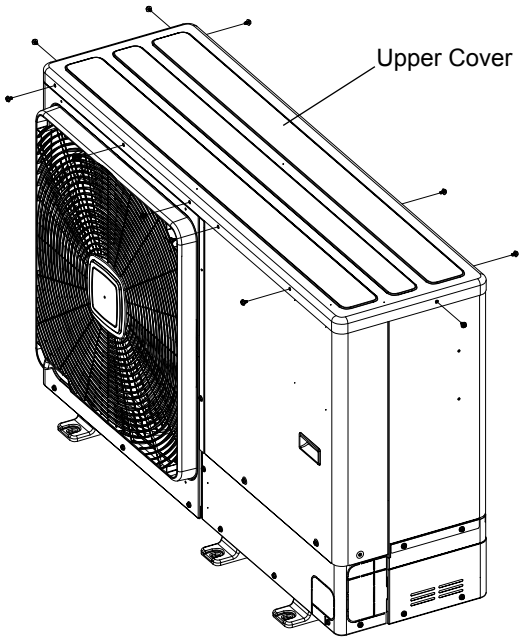
◆ **RHUE-(3-6)A(V)HN-HM**

1 Remove the 8 fixing screws of the upper cover.
2 Lift the air outlet grille holding the lower parts.
3 Release the extruded hook of the air outlet grille from the shroud.

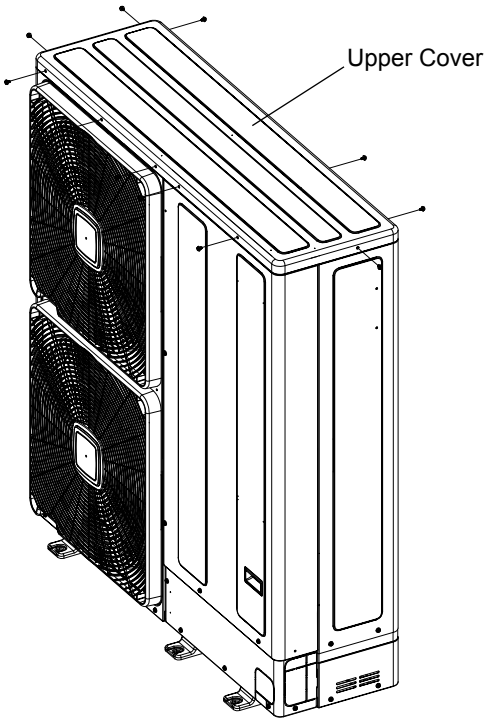


9.2.3 Removing upper cover

◆ **RHUE-3AVHN1**



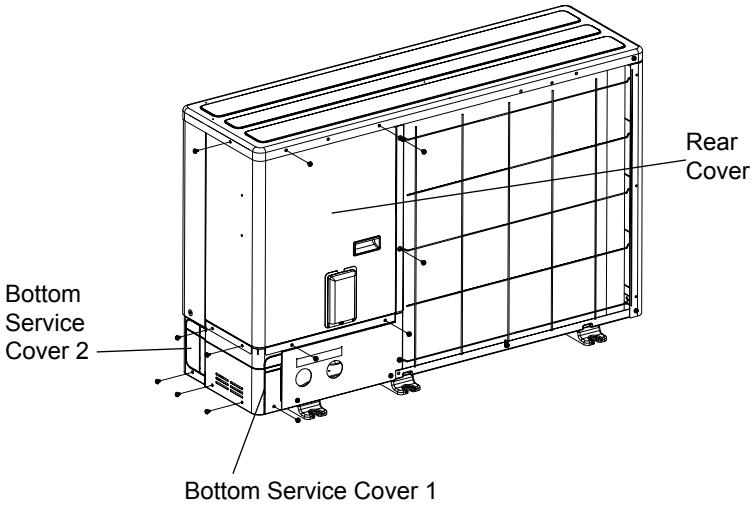
◆ **RHUE-(3-6)A(V)HN-HM**

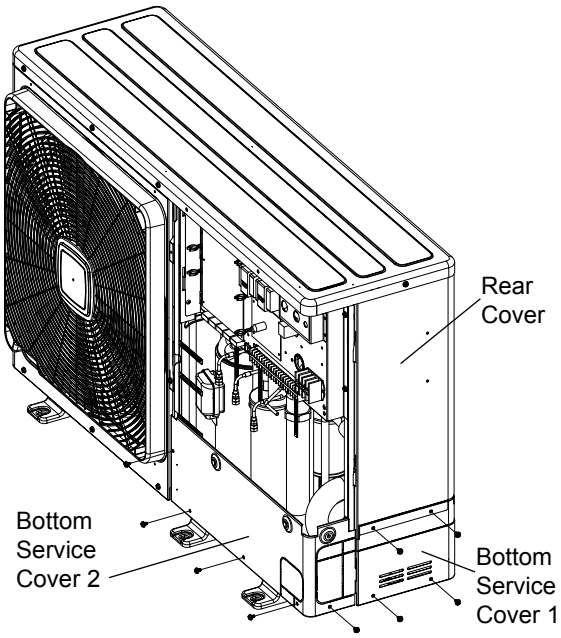


1 Remove the 11 screws fixing the upper cover
2 Lift upper cover upwards.

9.2.4 Removing the lower part of the service panel and rear panel

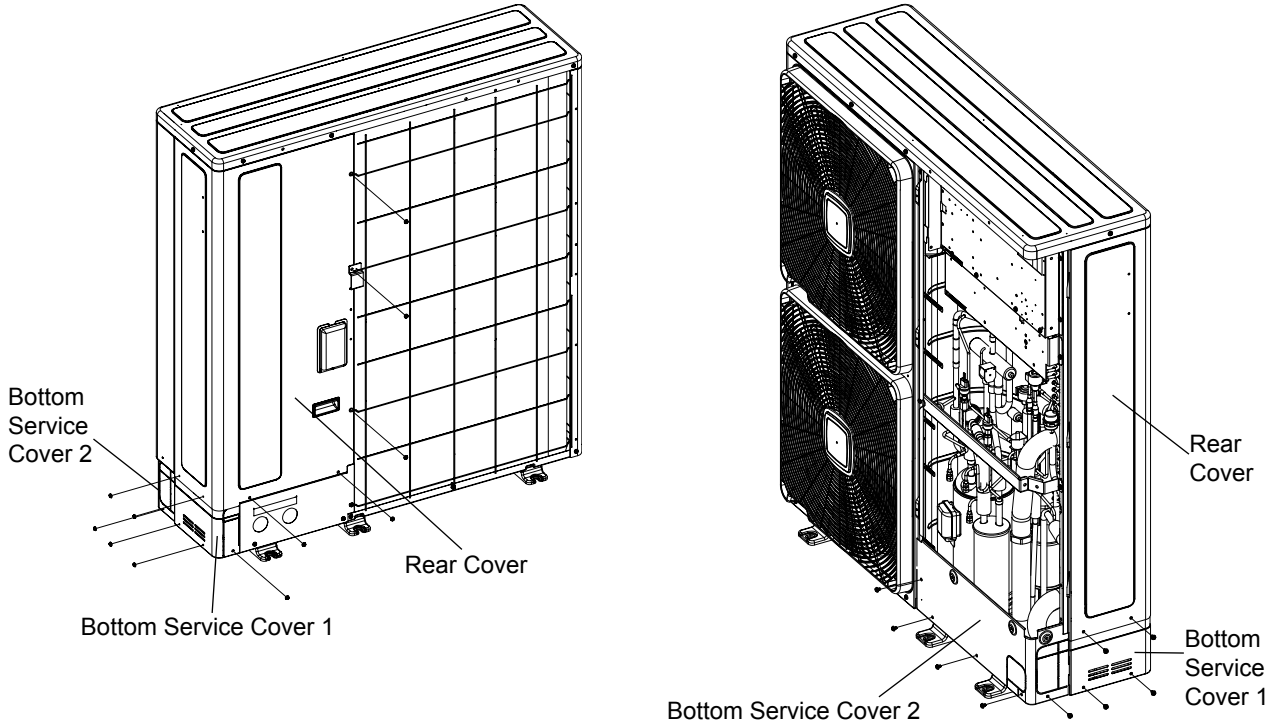
◆ **RHUE-3AVHN1**





1 Remove the service cover following *"9.2.1 Removing service cover"* section.
2 Remove the 5 screws fixing the bottom service cover 1. Pull and remove.
3 Remove the upper cover following *"9.2.3 Removing upper cover"* section.
4 Remove the 4 screws fixing the rear cover. Pull and remove
5 Remove the 5 screws fixing the bottom service cover 2

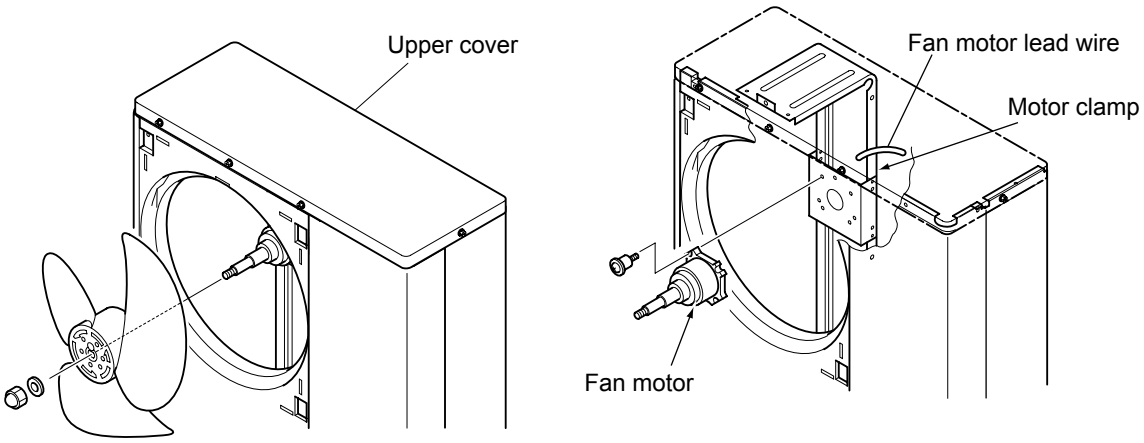
◆ **RHUE-(3-6)A(V)HN-HM**

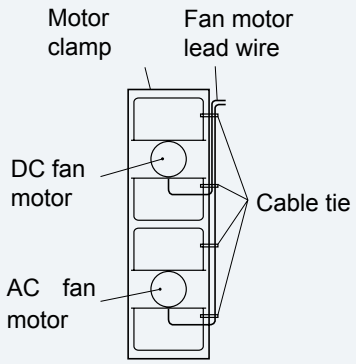


1 Remove the service cover following *"9.2.1 Removing service cover"* section.
2 Remove the 5 screws fixing the bottom service cover 1. Pull and remove.
3 Remove the upper cover following *"9.2.3 Removing upper cover"* section
4 Remove the 5 screws fixing the rear cover. Pull and remove
5 Remove the 5 screws fixing the bottom service cover 2

9.2.5 Removing fan motor

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Remove the air outlet grille according to the section *"9.2.2 Removing air outlet grille"* in this chapter.
3 Remove the upper cover according to the section *"9.2.3 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.



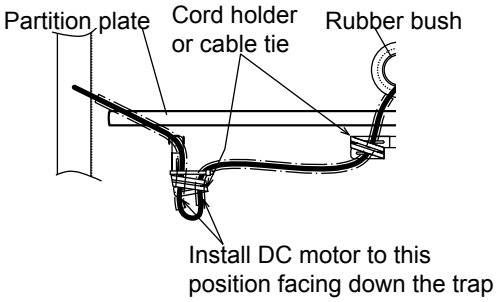
Fan components and technical features		
Power supply		380-415V/50Hz
Fan motor comp. No.	DC fan motor	PCB5 PCN203 (1, 3) CN201 (2, 3, 4)
	AC fan motor	PCB3 PCN404(White)
Screw for motor fixing	DC Fan Motor	M6 Screw with spacer x 4
	AC Fan Motor	M8 Screw x 4
Motor clamp and wiring fixing position		

9.2.6 Mounting fan motor

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Remove the air outlet grille according to the section *"9.2.2 Removing air outlet grille"* in this chapter.
3 Remove the upper cover according to the section *"9.2.3 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.

5 Remove the fan motor connector from the PCB3 and PCB5 at the electrical box.
   - Cut off the cable tie that fixes the lead wire of the fan motor.
   - Remove the 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.
7 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.



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 fan blades.

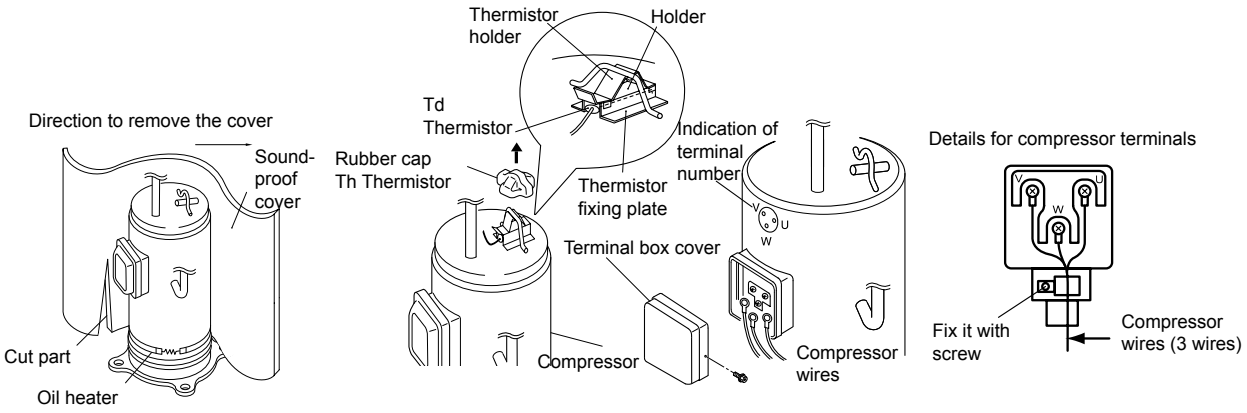
Assembling the fan blade: Insert the skidding protection part of fan boss in accordance with the cutting part of the motor shaft, and fix the screw after dismounting the screwed part of the shaft. (Tightening Torque of 20 N.m)

When connecting the motor wire, check to ensure that the colors of the connectors on the PCB3 and PCB5 are matched with the wires.

Fix the air outlet grille firmly to the shroud.

9.2.7 Removing the compressor

1 Remove the service cover and the lower part of the service panel according to the section *"9.2.1 Removing service cover"* and the section *"9.2.4 Removing the lower part of the service panel and rear panel"*. In case that the YUTAKI M is installed close to a wall closely, sepparate first the YUTAKI M 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).

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

Flamable objects. Fire risk. 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.

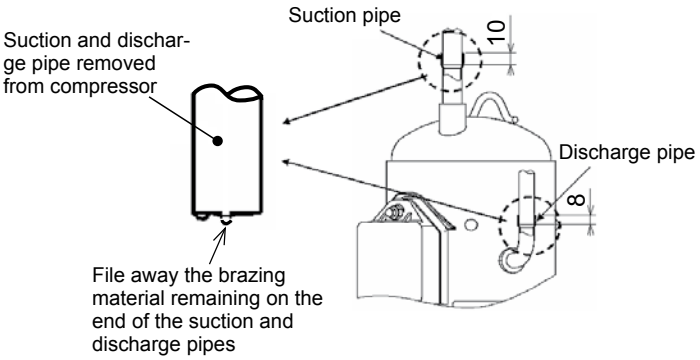
When replacing the compressor, the brazed material used for connecting the compressor and refrigerant pipes can drop into the pipes and get sucked into the compressor, causing a compressor failure. To avoid this, take the following points into account when replacing the compressor:

a. File away brazing material remaining on the end of the refrigerant pipes.

CAUTION

Be careful to avoid filed brazing material entering into the pipes.

b. Insert the pipes fully in to prevent brazing material from entering them.



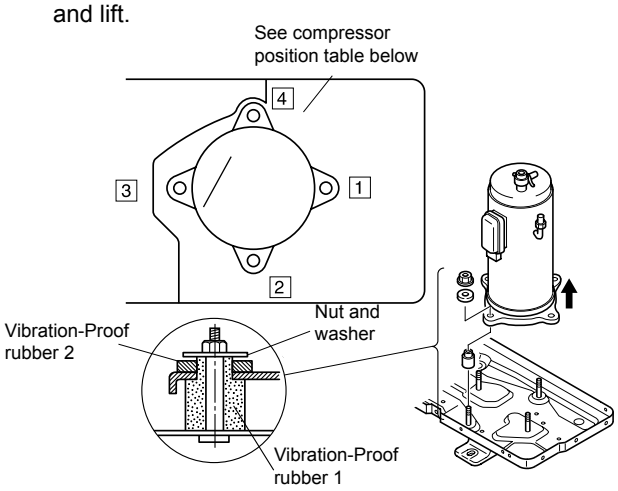
c. Refer to the table for the recommended amount of brazing material. If using more brazing material than the recommended amount, it may drop into the pipes.

CAUTION

When brazing the pipes, prevent oxidized scale formation by nitrogen substitution.

Thickness of brazing material	Piping diameter (refrigerant cycle side) (mm)						
	Ø6.35	Ø9.52	Ø12.7	Ø15.88	Ø19.05	Ø22.2	Ø28.2
Ø1.6mm	25	30	35	75	100	110	225
Ø2.0mm	15	15	20	45	55	70	135
Ø2.4mm	10	10	15	30	35	45	90

7 Remove the 2 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	○	○	–	–

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.

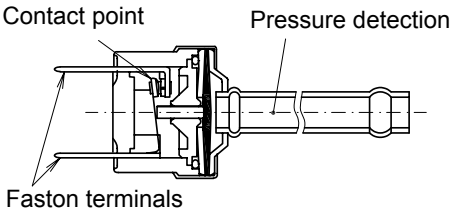
NOTE

Fix the lead wire for the compressor firmly using a cable tie to avoid contacting the metal sheet sharp edges and the high temperature piping.

9.2.8 Removing high pressure switch

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Collect the refrigerant from the check joint according to the section *"9.2.7 Removing the compressor"* in this chapter.
3 For RHUE-3AVHN1 shall be necessary open electrical box according to the section *"9.2.9 Opening electrical box (P-mounting plate)"*.
4 Disconnect the faston terminals from the pressure switch.
5 Cut the high pressure switch from the brazing neck using a burner.

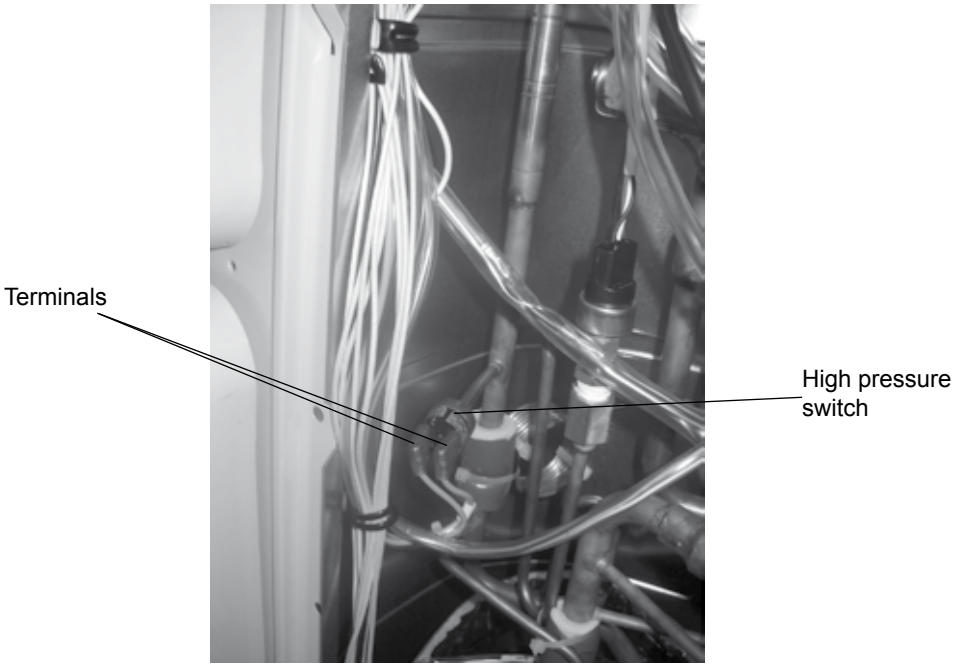
High pressure switch structure



⚠ CAUTION

High pressures. Explosion risk.

- 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.
- Do not attempt to turn service valve rod beyond its stop.



9.2.9 Opening electrical box (P-mounting plate)

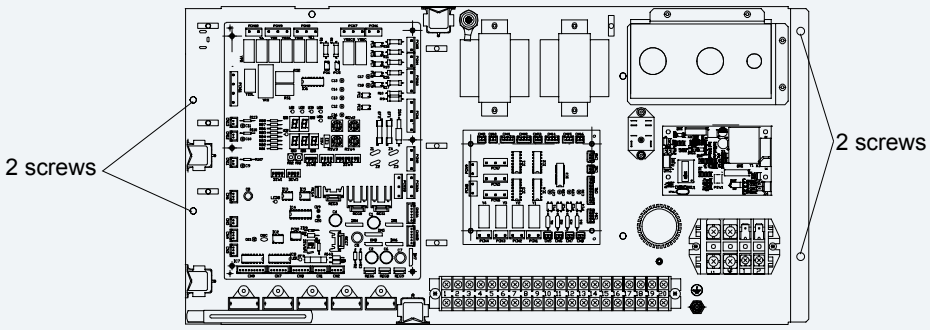
1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Remove the 5 or 4 screws fixing the electrical box. Open the P-mounting plate by rotating it 90 degrees to the left.

DANGER

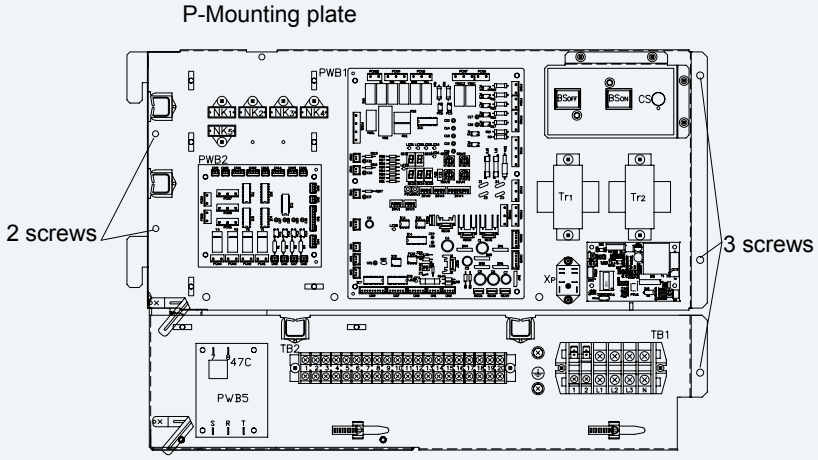
Electrical hazard. Risk of death.

- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

RHUE-3AVHN1



RHUE-(3-6)A(V)HN-HM



9.2.10 Removing the coils for the reversing and solenoid valves

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 For RHUE-3AVHN1 shall be necessary remove the upper cover according to the section *"9.2.3 Removing upper cover"*.
3 Remove the reversing and solenoids valve coils by removing the screw fixing the coil.

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 Remove the connector on the control PCB of the electrical box.

NOTE

Remove the connectors on the control PCB of the electrical box.

9.2.11 Removing electronic expansion valve coils

1 Remove the service cover according to the section *"9.2.1 Removing service cover"*.

DANGER

Electrical hazard. Risk of death.

- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

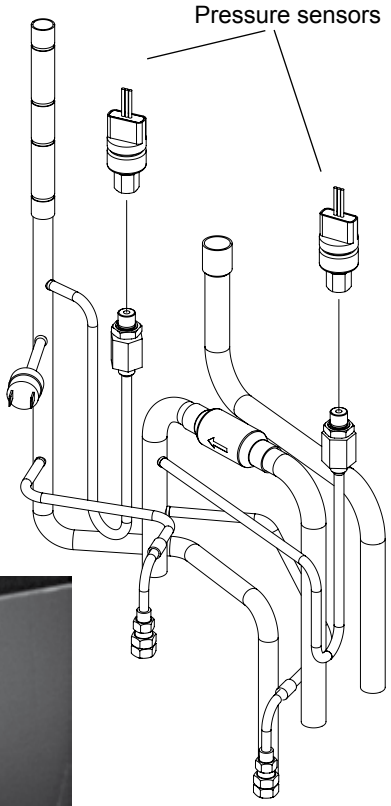
2 For RHUE-3AVHN1 shall be necessary remove the upper cover according to the section *"9.2.3 Removing upper cover"*.

3 Remove the connector on the control PCB of the electrical box.

4 Hold the electronic 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.

Electronic expansion valve coils

9.2.12 Removing pressure sensors



1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 For the RHUE-3AVHN1 shall be necessary open electrical box according to the section *"9.2.9 Opening electrical box (P-mounting plate)"*.
3 There are two pressure sensors: one green (low pressure) and one black (high pressure).
4 Remove the pressure sensors

⚠ 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.

5 Remove the connector on the control PCB of the electrical box.

9.2.13 Removing reversing valve

1 Remove the service cover and the rear service panel according to the section *"9.2.1 Removing service cover"* and the *"9.2.4 Removing the lower part of the service panel and rear panel"* section in this chapter.

2 For the RHUE-3AVHN1 shall be necessary remove upper cover and open electrical box according to the section *"9.2.3 Removing upper cover"* and *"9.2.9 Opening electrical box (P-mounting plate)"*.

3 Collect the refrigerant from the check joint according to the section *"9.2.7 Removing the compressor"*.

4 Remove the reversing valve coil according to the section *"9.2.13 Removing reversing valve"*.

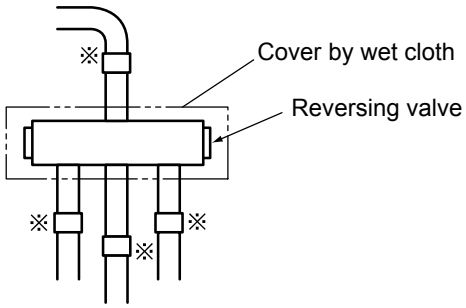
5 Remove 1 fixing screw for the valve-mounting plate.

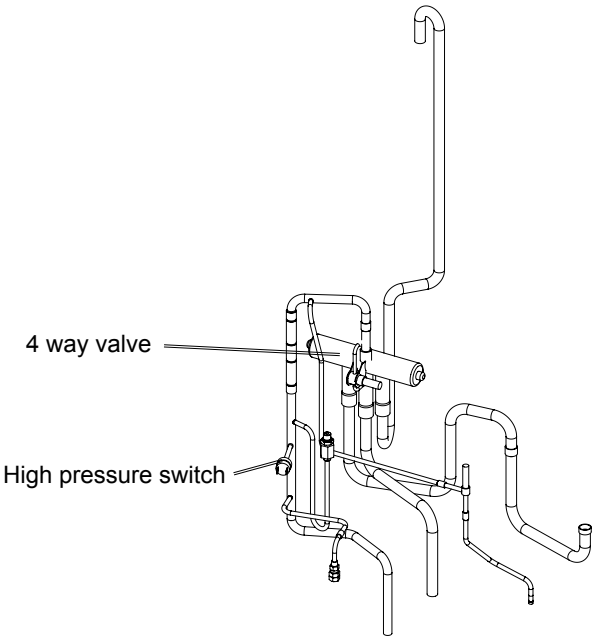
6 Remove the stop valve at the gas side from the valve-mounting plate by removing the 2 screws.

7 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.

8 Remove the reversing valves from its assemblies 4 brazed parts *.Perform the brazing with a blowtorchto remove and reassemble the reversing valve by cooling the pipes first with wet cloth in order to avoid brazing material entering the reversing valve.

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 *"9.2.13 Removing reversing valve"* and *"9.2.15 Removing solenoid valve"* contained in this chapter.





9.2.14 Removing expansion valves

1 Remove the service cover and rear service panel according to the section *"9.2.1 Removing service cover"* and the section *"9.2.4 Removing the lower part of the service panel and rear panel"*.

2 For the RHUE-3AVHN1 shall be necessary remove upper cover and open electrical box according to the section *"9.2.3 Removing upper cover"* and *"9.2.9 Opening electrical box (P-mounting plate)"*.

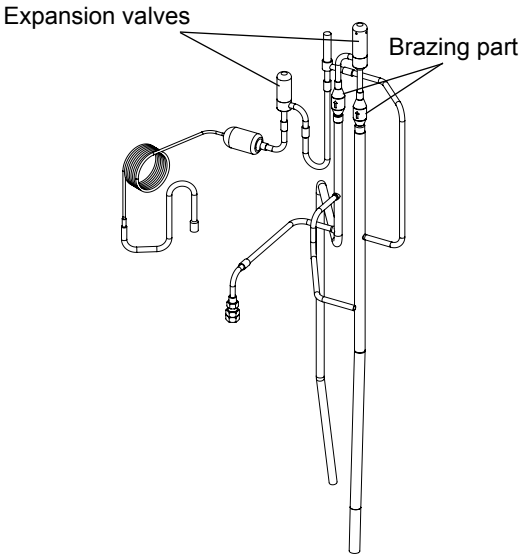
3 Collect the refrigerant from the check joint according to the section *"9.2.7 Removing the compressor"*.

4 Remove the coils according to the section *"9.2.11 Removing electronic expansion valve coils"*.

5 Remove the brazing as shown in the figure below.

- Electronic Expansion Valve: 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.

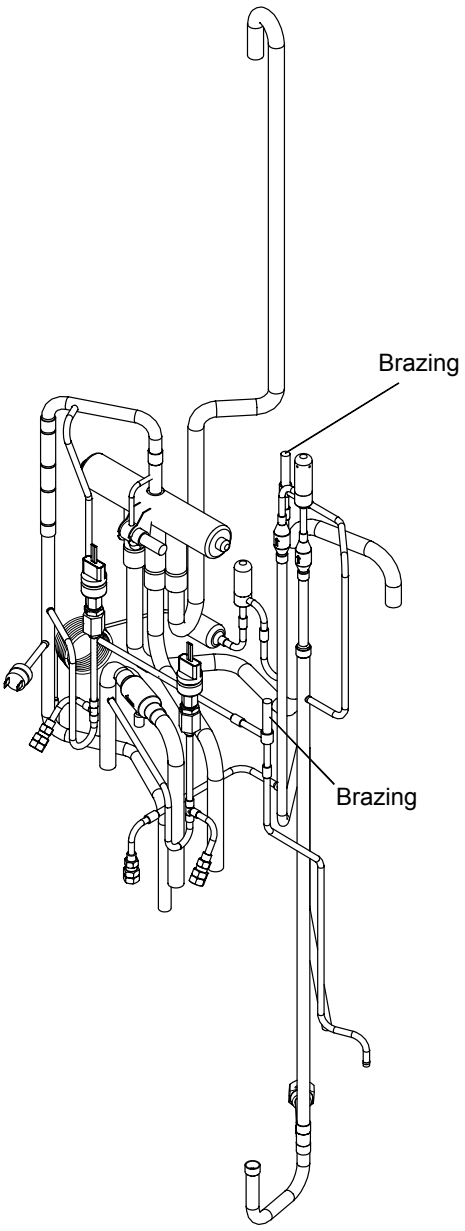
6 Reassemble the parts in the reverse order of removing procedures.



9.2.15 Removing solenoid valve

1 Remove the service cover and the rear service panel according to the sections *"9.2.1 Removing service cover"* and *"9.2.4 Removing the lower part of the service panel and rear panel"*, described in this chapter .
2 Collect the refrigerant from the check joint according to the section *"9.2.7 Removing the compressor"* in this chapter.
3 Remove the solenoid valve coil according to the section *"9.2.10 Removing the coils for the reversing and solenoid valves"* in this chapter.
4 Remove the brazing and flare nuts 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 reversing valve.
   - Solenoid Valve (SVA1): 2 brazing parts
   - Solenoid Valve (SVA2): 2 brazing parts
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 order of removing procedures.

Fix the solenoid valve SVF as shown in the figure.



9.2.16 Removing electrical components

DANGER

Electrical hazard. Risk of death.

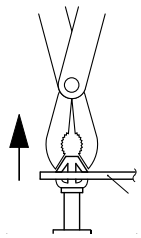
- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

1 Remove the service cover according to section *"9.2.1 Removing service cover"* in this chapter.

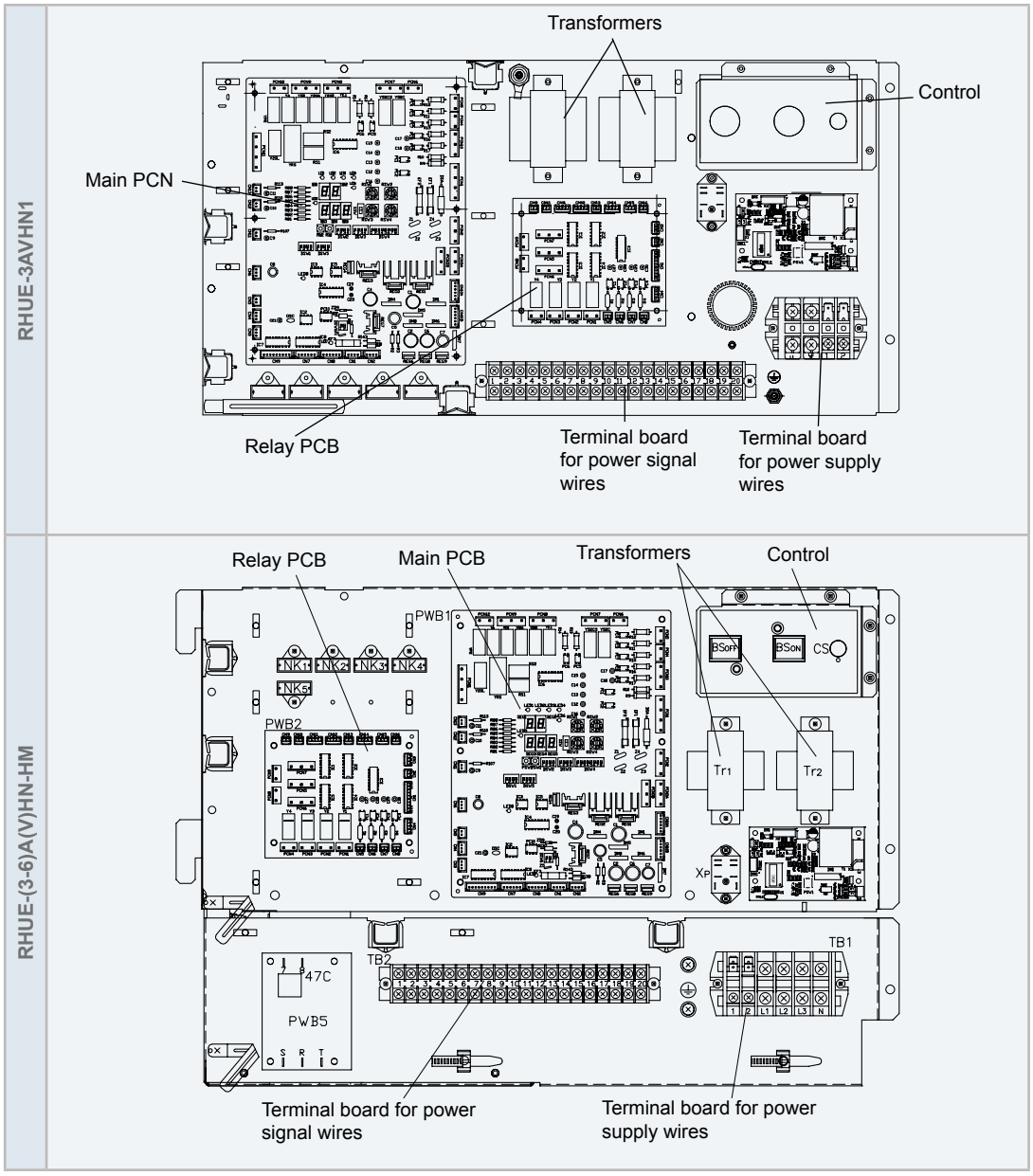
- Disconnect all the connectors in the PCB.
- Remove the PCB by sliding four (4) holders in the arrow direction.
- Remove the PCB for power distribution of the compressor and the motor.

2 Removing the relay PCB

- Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
- Disconnect all the wires connected to the relay PCB.



Extraction of the PCB from the holders



9.2.17 Removing inverter components

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Open the P-mounting plate by rotating 90 degrees to the left according to the section *"9.2.9 Opening electrical box (P-mounting plate)"* in this chapter.
3 For the RHUE-3AVHN1 shall be necessary open electrical box according to the section *"9.2.9 Opening electrical box (P-mounting plate)"*.

DANGER

Electrical hazard. Risk of death.

- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

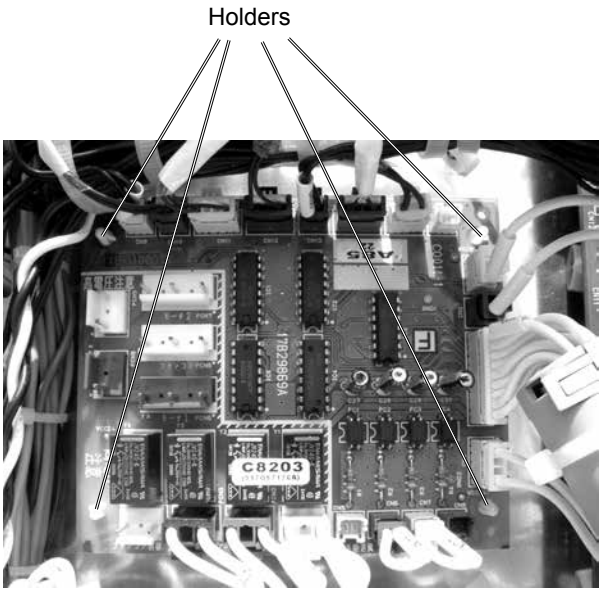
◆ Removing the relay PCB

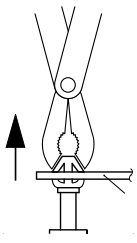
Check to ensure that the LED201 (Red) of the PCB is OFF.

Remove holders from the PCB. When reassembling the components, pass those holders again through the holes of the PCB.

CAUTION

- *Electrical hazard. Risk of electrical shock.Do not touch the electrical parts when LED201 (Red) located on the inverter module is ON to prevent from an electrical shock.*
- *Several hazards. Risk of malfunction.*
- *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.*
- *For safety reason, remove the connectors on the control PCB of the electrical box.*
- *Correctly insert two wires of U and V phases for the power cable of inverter compressor into the current sensor, CTU and CTV on PCB2. Connect Phase U power cable with the current sensor Phase U (CTU) and Phase V power line with current sensor Phase V (CTV). If connected incorrectly, malfunction or electrical component damage will occur.*
- *When mounting PCB and the sheet metal part for PCB, pay attention not to clamp the electrical wiring together.*
- *In case of replacing control PCB, set all the dip switches as the same position before replacing. If not, malfunction may occur.*
- *Do not apply strong force to the electric components and PCBs to avoid damage.*
- *When replacing the transistor module (IPM) and diode module (DM) on heat radiation fin, slightly apply the heat conducting silicon grease (Manufacture: Shin-Etsu Chemical Co., Ltd, Product No.: G-746) over the fin contact surface.*





Extraction of the PCB from the holders

9.2.18 Removing the ISPM

The ISPM is equiped in the RHUE-(5/6)AHN1 unit.

DANGER

Electrical hazard. Risk of death.

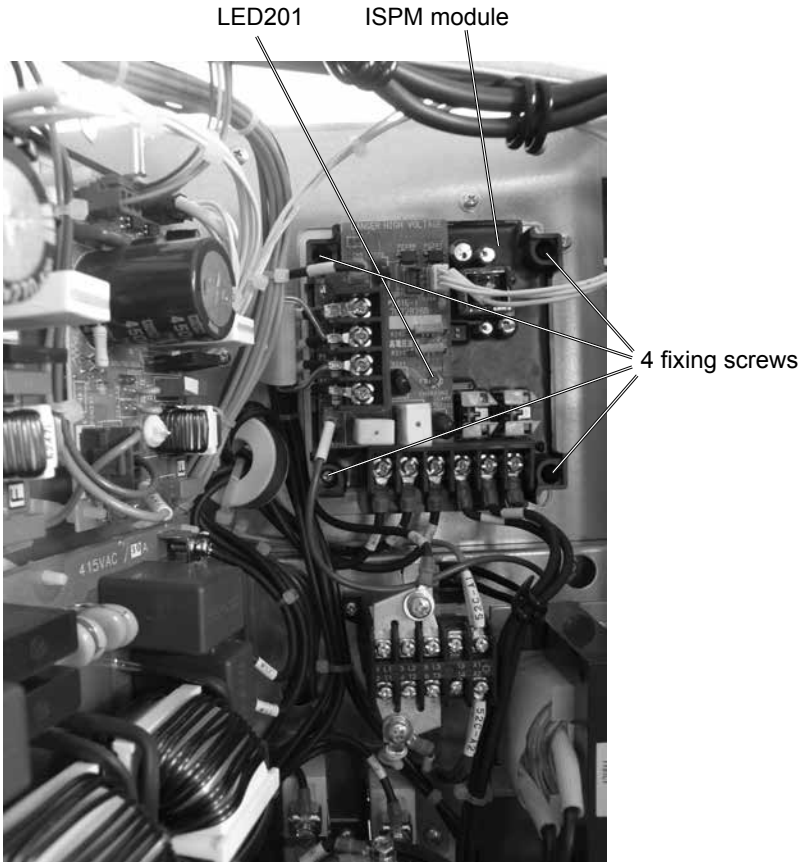
- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

1 Disconnect all the wirings connected to the module.

- Disconnect the wirings of the terminals +,- , U, V, W

2 Disconnect all the wirings connected to the transistor module as shown below.

- Disconnect the wirings of connector CN2, CN206 and CN207.
- Disconnect the wirings from P, N, U, V, W on the transistor module.
- Remove the four (4) fixing screws on the ISPM module to remove it..



NOTE

Several hazards. Risk of malfunction.

- *Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.*
- *Check to ensure that the electrical wires will not be caught between the mounting electrical components and the mounting plates when the PCB is remounted.*
- *Apply silicon grease evenly on the whole rear side of the diode module and the transistor module when mounting. Silicon grease is available as a field-supplied accessory.*

9.2.19 Removing the DIP-IPM

The DIP-IPM is equiped in the RHUE-(3-6)AVHN(1)(-HM) units.

DANGER

Electrical hazard. Risk of death.

- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

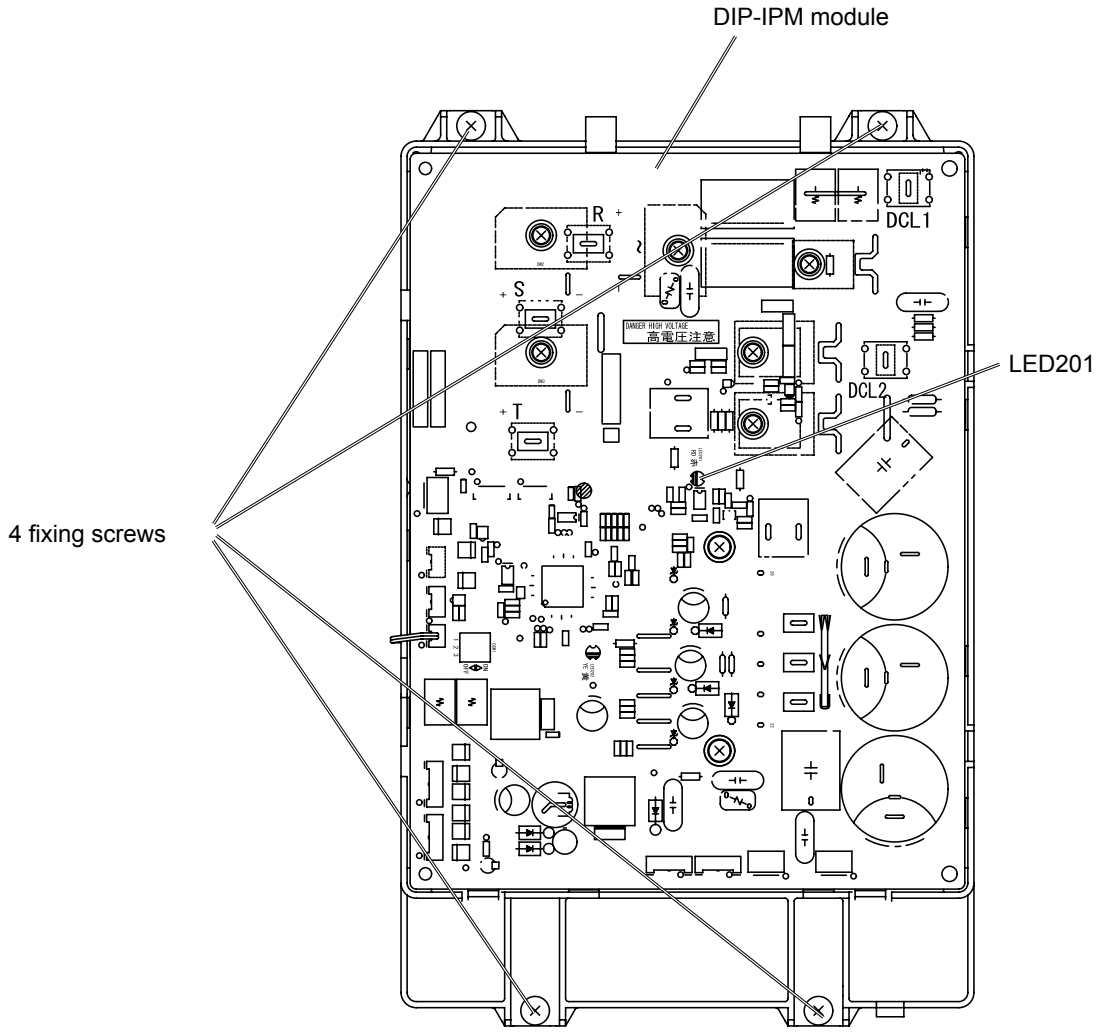
1 Disconnect all the wirings connected to the module.
Disconnect the wirings of the terminals +,- , U, V, W

2 Disconnect all the wirings connected to the module.
Remove the four (4) fixing screws on the DIP-IPM module to remove it.

NOTE

Several hazards. Risk of malfunction.

- *Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.*
- *Check to ensure that the electrical wires will not be caught between the mounting electrical components and the mounting plates when the PCB is remounted.*
- *Apply silicon grease evenly on the whole rear side of the diode module and the transistor module when mounting. Silicon grease is available as a field-supplied accessory.*



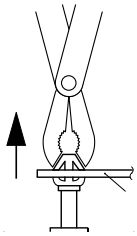
9.2.20 Removing the electrical-noise filter

All YUTAKI M units are equiped with electrical-noise filter PCB.

DANGER

Electrical hazard. Risk of death.

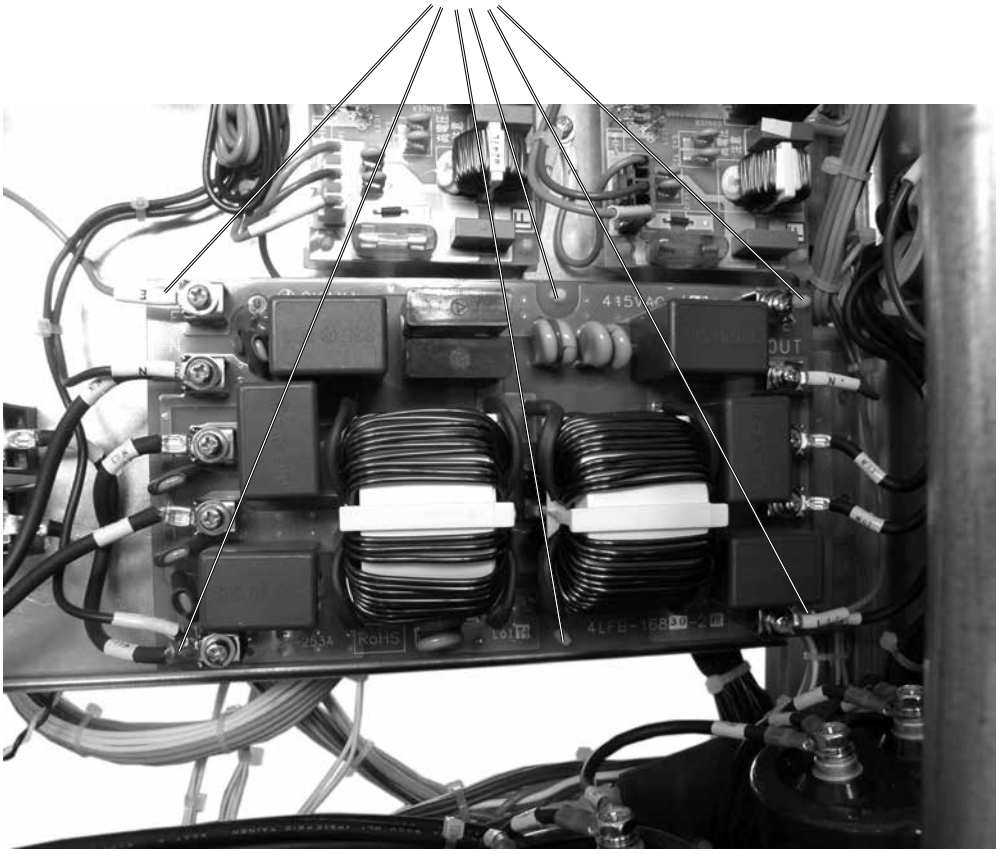
- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***



Extraction of the PCB from the holders

1 Disconnect all the wirings (9 in total) connected to the electrical-noise filter.
2 Remove the six (6) holders from the PCB. When reassembling the components, pass those holders again through the holes of the PCB.

6 plastic holders



9.2.21 Removing other electrical components

1 Remove the service cover according to the section *"9.2.1 Removing service cover"* in this chapter.
2 Open the P-mounting plate by rotating it 90 degrees to the left according to the section *"9.2.9 Opening electrical box (P-mounting plate)"* in this chapter.
3 For RHUE-3AVHN1 shall be necessary remove upper cover according to the section *"9.2.3 Removing upper cover"*.
4 Check to ensure the LED201 (Red) of the inverter PCB is off when opening P-mounting plate.
5 Remove other electrical components according to the procedure below.

DANGER

Electrical hazard. Risk of death.

- ***Check that the LED201 (red) located on the inverter module is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the inverter module is ON in order to avoid an electrical shock.***

Disconnect all the wires connected with the smoothing capacitor (CB, CB1, CB2, CA).

If the wire has polar characters. Identify the wire mark band and the indication on the smoothing capacitor when wire connecting.

Remove the two (2) screws fixing the smoothing capacitor and remove the smoothing capacitor.

Disconnect all the wires connecting with the magnetic contactor (CMC1).

Remove the two (2) screws fixing the magnetic contactor and remove the magnetic contactor.

Remove the four (4) screws fixing the reactor and remove the reactor (DCL).

Disconnect all the wires connected with the electrical-noise filter (NF1).

Remove the noise filter by clamping the top of the holder (6 portions) with a pincher.

NOTE

Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.

10. Troubleshooting

Index

10.1 Initial troubleshooting

10.1.1 Unit and System controller - Power Supply failure

- The LED and the 7-segment display are not indicated.
- Not operated.

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 YUTAKI M 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"	

10.1.2 Abnormal operation of the devices

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Cooling mode (1 minute power on)	Excessively high discharge pressure (high pressure switch activated)	Insufficient air flow to the heat exchanger	clogging of the air side heat exchanger?	Remove the clogging
			Obstacles at the inlet or the outlet of the airside heat exchanger	Remove the obstacles
			Is the service area for the unit sufficient?	Make sure the service area
			correct fan speed?	Replace the fan motor
		Excesive inlet air temperature at the airside exchanger	Short circuited air to the unit?	Remove the cause of the shor-circuit air
			Any heating source near to the unit?	Remove the heat source
		Excessively charged refrigerant	Expansion valve opening & sub cool	Correctly charge the refrigerant
		Non -condensed gas during the cycle	Check each temperature and each pressure	Charge the refrigerant after the vacuum pumping
		Discharge pipe clogged	Check the clogging	Remove the clogging
		Clogging of the strainer	Check for clogging (Symptom: You can appreciate a temperature gradient between strainer inlet and outlet)	Clean or replace the strainer
		Clogging of the heat exchanger	Check for clogging	Remove the clogging
		Failure or malfunction of the expansion valve	Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor for the compressor normal?	Replace the themistor or pressure sensor
			Is the thermistor correctly installed on the suction pipe?	Install correctly the thermistor
		Excessively high water inlet temperature	Check water temperature	Refer to the customer
	Failure fan motor (not running)		Measure the motor´s terminals resistance	Replace fan motor
	Excessively high suction pressure	Malfunction or internal leakage of the 4-way valve	Check the temperature difference between the inlet and outlet of the 4-way valve	Replace the 4-way valve

Abnormal operation of the devices (Cont.)

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Cooling mode (1 minute power on)	Excessively high discharge gas temperature	Too much super-heat	Clogging of the expansion valve	Replace the expansion valve
			Clogging of the strainer	Clean or repair the strainer
			Malfunction or internal leakage of the 4-way valve	Replace the 4-way valve
		Excessively high suction gas temperature	Gas leakage or insufficient refrigerant	Replace the 4-way valve
		Td. thermistor failure	Measure the thermistor resistence	Replace thermistor
		Failure solenoid valve for liquid injection	Check the solenoid valve activation	Replace the solenoid valve
		Clogging of the liquid injection capillary tube	Check for clogging	Replace capilary
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

Abnormal operation of the devices (Cont.)

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
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 4-way valve	Check the clogging	Remove the clogging or replace the 4-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
	Excessively high discharge gas temperature (too much super-heat)	Malfunction of the 4-way valve and also internal leakage	Check gas leakage or shortage of refrigerant	Replace the 4-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

Abnormal operation of the devices (Cont.)

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
	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 deactivated	Failure of the thermistor	Measure the resistance of the thermistor	Replace the thermistor
		Failure of the 4-way valve	Check the activation 4-way valve	Replace the 4-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 high-cut in defrost operation	Failure of high pressure sensor		Check the pressure & actual value of the high pressure sensor	Replace high pressure sensor

Abnormal operation of the devices (Cont.)

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 4-way valve	Replay 4-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

Abnormal operation of the devices (Cont.)

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 4-way valve	Check the difference temp. between inlet & outlet of the 4-way valve	Replace the 4-way valve
		Wiring failure of the 4-way valve	Check the electrical continuity at the termilnals	Repair wiring or replace 4-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 magneto-thermic switch
	Abnormal vibration of the cabinets		Check each fixing screw	Tightly fix each screw

10.1.3 Incidents of operation

The operation of the heater is bonded to the YUTAKI M heat pump.

(If that is in default, the heater can be activated only if specific programming controller YUTAKI M is done). The heater can be activated by the controller YUTAKI M under request for additional power or temperature.

In case of non-functioning heater should check:

- That signals to the heat pump function.
- That fuse protection heater in a state.
- That the water pressure is at least 1 bar.
- That the water flow is assured permanently.

If the above checks are correct:

- Turn off the heater isolating fuses.
- Open the hood of connecting the heater.
- Check the good son tightening supply and command.

Press firmly on the push rearmament security heat between the 2 relays electrical power to rearm security heat. (It is possible that safety heater thermal be triggered due to a stoppage of water flow).

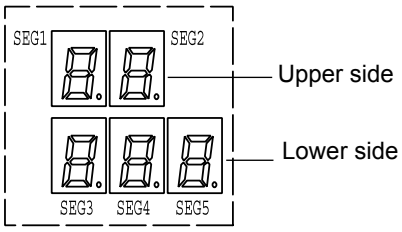
- Close the door connecting the heater.
- Switch on the power and restart the heat pump.

In case of non-functioning heater, remove the heater and demand its replacement.

10.2 Troubleshooting procedure

10.2.1 Checking using the 7-segment display.

◆ **7-seg. display info.**



(See the following table for details)

General Indication	Content
88	Proceeding Initialization
88	Power ON (During unit stoppage)
PU	Pump Operation (During unit stoppage)
PU	Waiting of pump feedback (During unit operation)
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)

General Indication	Content
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)
P-↔06	Retry operation (by alarm 02-91, t1)
P-↔11	Retry operation (by alarm 02-e1)
P-↔12	Retry operation (by alarm 02-h1)
P-↔17	Retry operation (by alarm 51, 52, 53, 54)
P-↔18	Retry operation (by alarm 04, 06)
E0(Flickering)	Initializing electronic expansion valve
Fo	Fan manual operation

Alarm code	Content
02↔H1	Activation of high pressure swicth
02↔h1	Activation of protection control for excessively high pressure
02↔L1	Activation of low pressure control
02↔E1	Excessively low pressure difference
02↔61	Excessively high discharge gas temperature
02↔91	Excessively low temperature of heating exchanger refrigerant inlet
02↔t1	Excessively low suction gas temperature
04	Abnormal transmission between Inverter PCB and Main PCB
05	Abnormality of Power Supply Phase
06	Excessively low voltage or excessively high voltage for the inverter
11	Failure of water inlet temperature thermistor
12	Failure of water outlet temperature thermistor
13	Activation of freeze protection control (water inlet)
02↔13	Activation of freeze protection control (water outlet)
14	Excessively high water temperature (compressor running)
21	Failure of refrigerant liquid temperature thermistor (Open/Short)
22	Failure of ambient temperature thermistor (Open/Short)
23	Failure of discharge gas temperature thermistor (Open/Short)
24	Failure of refrigerant evaporating temperature thermistor (Open/Short)
26	Failure of suction gas temperature thermistor (Open/Short)
27	Failure of discharge gas pressure sensor (Open/Short)
28	Failure of suction gas pressure sensor (Open/Short)
30	Incorrect PCB Setting
32	Transmission error between Main PCBs (this alarm code is not available in this model)

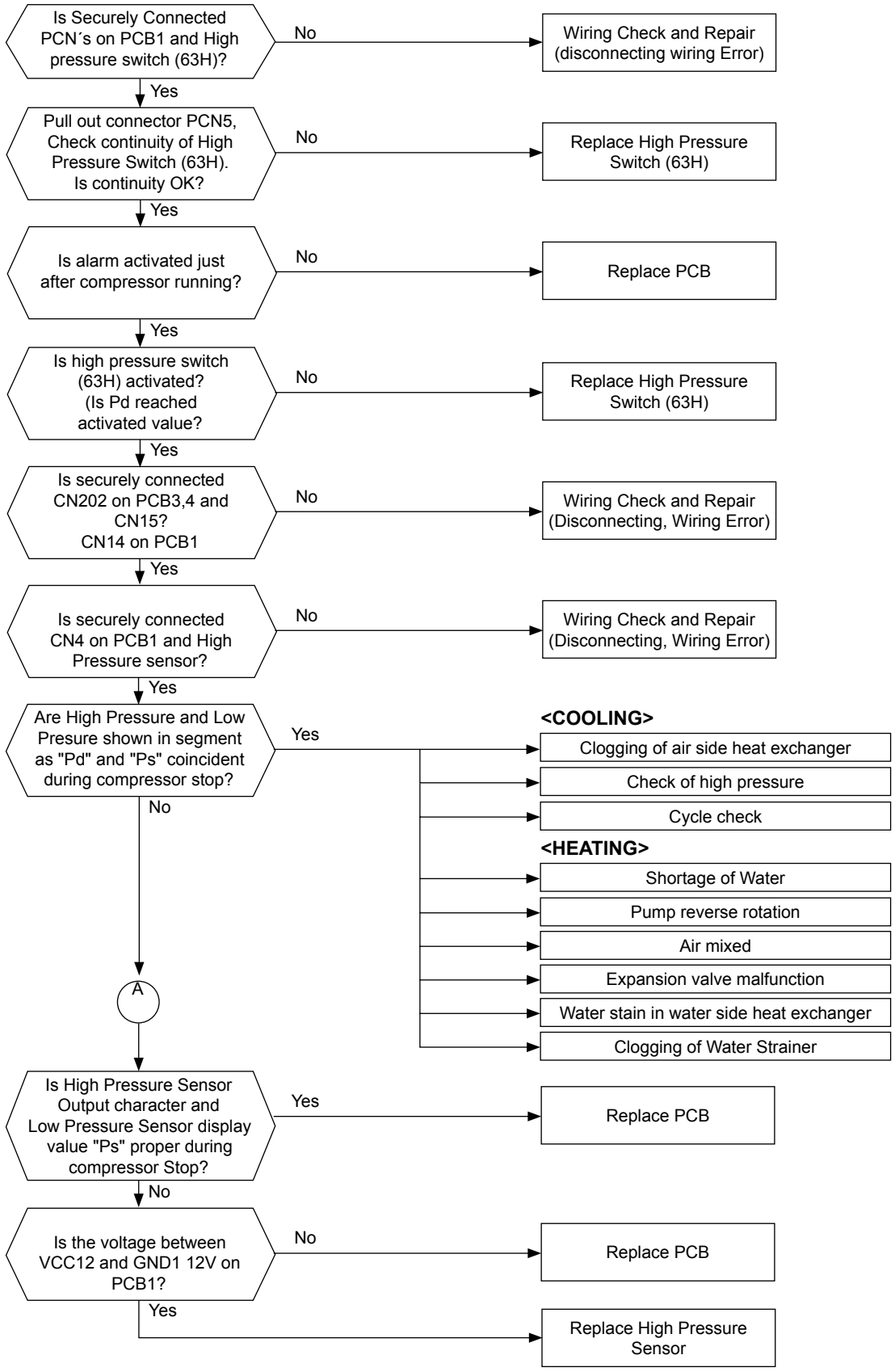
Alarm code	Content
40	Incorrect PCB operation
51	Abnormal operation of the current sensor
52	Activation of protection for inverter instantaneous over current
53	Transistor module protection activation
54	Increase in the inverter fin temperature
57	Abnormality of fan motor protection
5P	No feed back signal from water pump
6E	Cooler water failure (this alarm is not available in this unit)
6C	Condenser water failure (this alarm is not available in this unit)
PU(flickering)	Excessively high water temperature (compressor stop)
FA	Failure of fan motor (MF1)
Fb	Failure of fan motor (MF2)

10.2.2 Alarm code

Alarm code	Description
02↔H 1	Activation of high pressure switch

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the high pressure (Pd) is incresed to more than 4.15 MPa, and high pressure switch (63H) is activated.

- PCB monitoring position: PCB1, PCN5 (See next page)



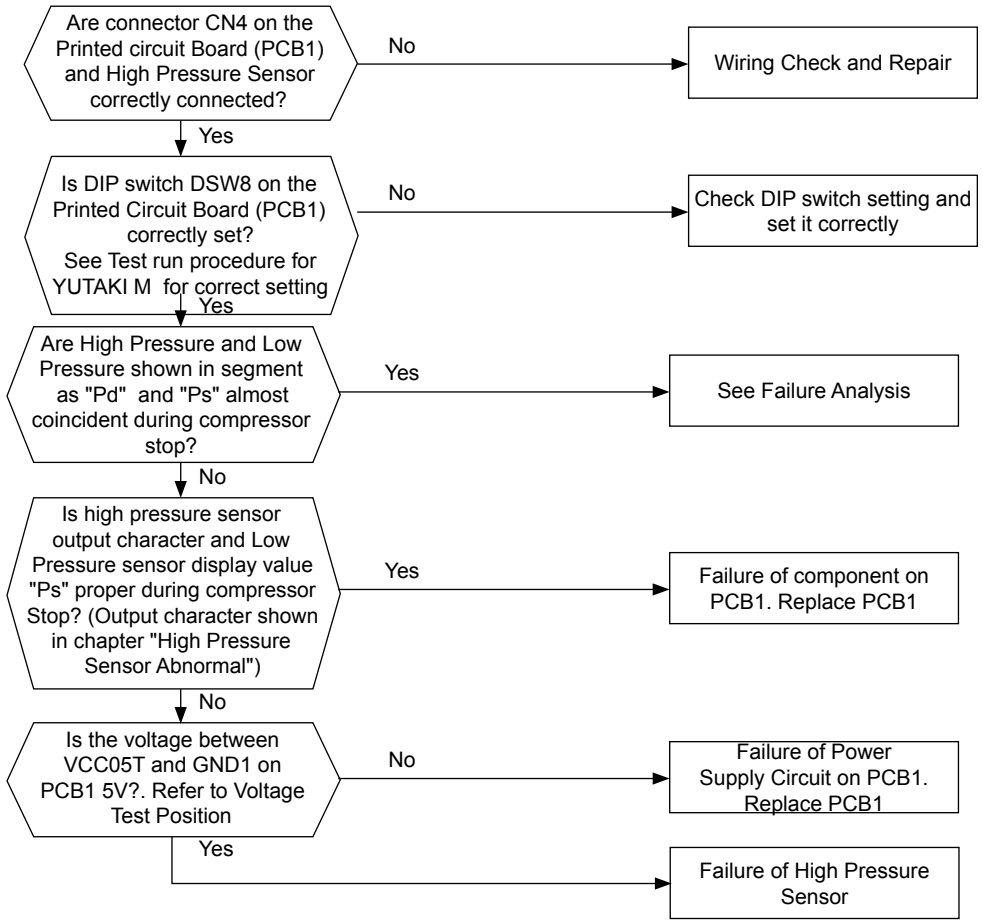
NOTE

In case that the low pressure is higher than 2.2 MPa, segment shows 2.2 MPa.In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge

Alarm code	Description
02↔h1	Activation of protection control for excessively high pressure

- The alarm code is displayed on the PCB´s display.
- During normal operation, (in cooling o heating operation mode) 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 3.9 MPa, during 10 seconds in compressor running frequency more than 40 Hz or,
  - This alarm code is displayed when the high pressure (Pd) is incresed to more than 3.5 MPa, during 10 seconds in compressor running frequency lees than 40 Hz.

- PCB monitoring position: PCB1, CN4
- Retry code: P-12



NOTE

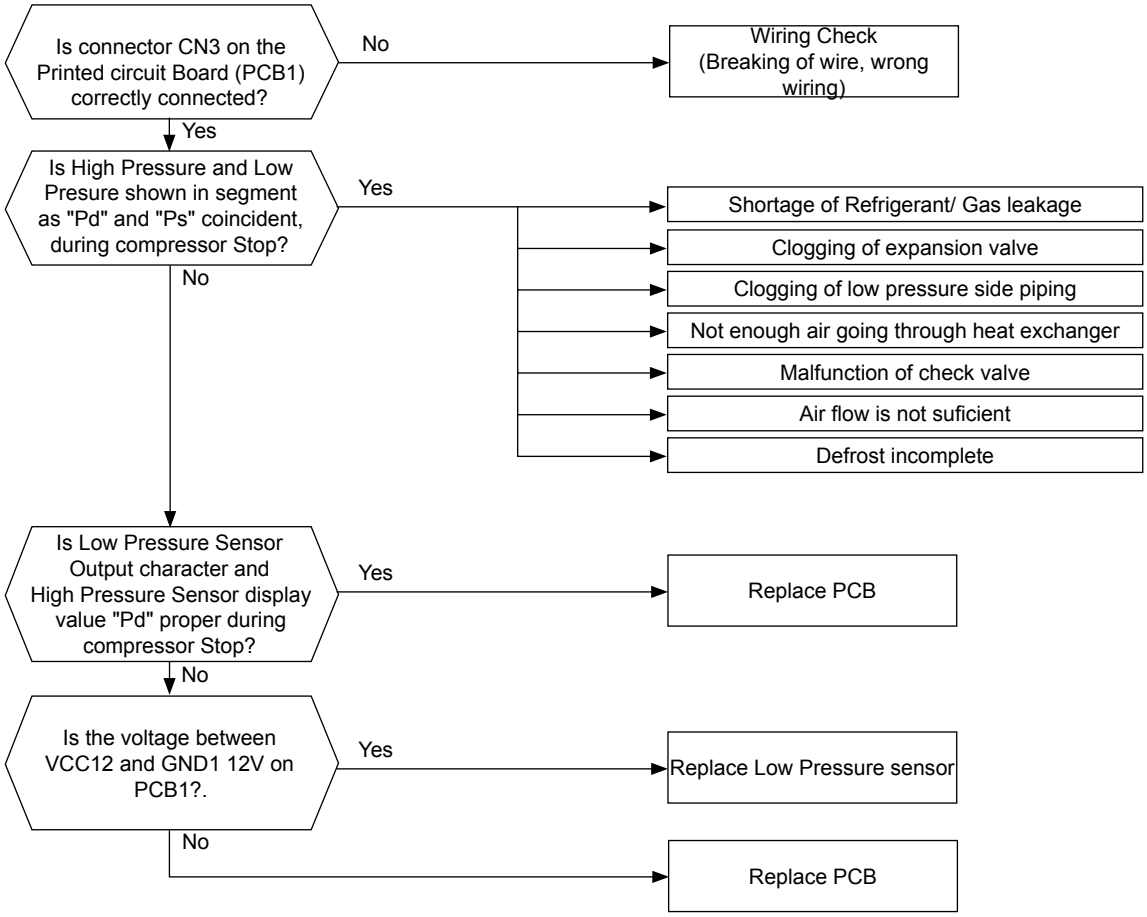
In case that the low pressure is higher than 2.2 MPa, segment shows 2.2 MPa.

In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.

Alarm code	Description
02↔L 1	Activation of low pressure control

- The alarm code is displayed on the PCB´s display.
- It appears The electronic control displays the alarm during the operation in heathing or cooling mode.
  – This alarm code is displayed when the suction pressure (Ps) is less than 0.1 MPa during 3 seconds.

- PCB monitoring position: PCB1, 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	Description
02↔E 1	Excessively low pressure difference

- The alarm code is displayed on the PCB´s display.
- 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: PCB1, CN3 and CN4
- Retry code: P-11
- Calculation Formula for Pressure Ratio:

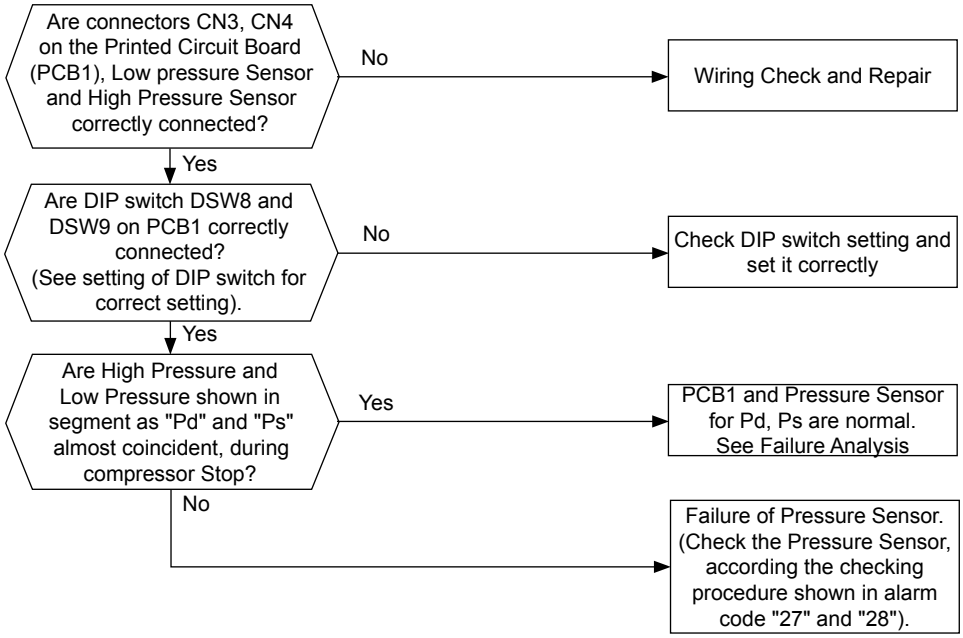
$$\text{Pressure Ratio} = \frac{\text{High Pressure "Pd"} + 0.1}{\text{Low Pressure "Ps"} + 0.1}$$

- Example:

Pd= 1.6 MPa

$$\text{Pressure Ratio} = \frac{1.6 + 0.1}{0.7 + 0.1} = 2.13$$

Ps= 0.7 MPa



NOTE

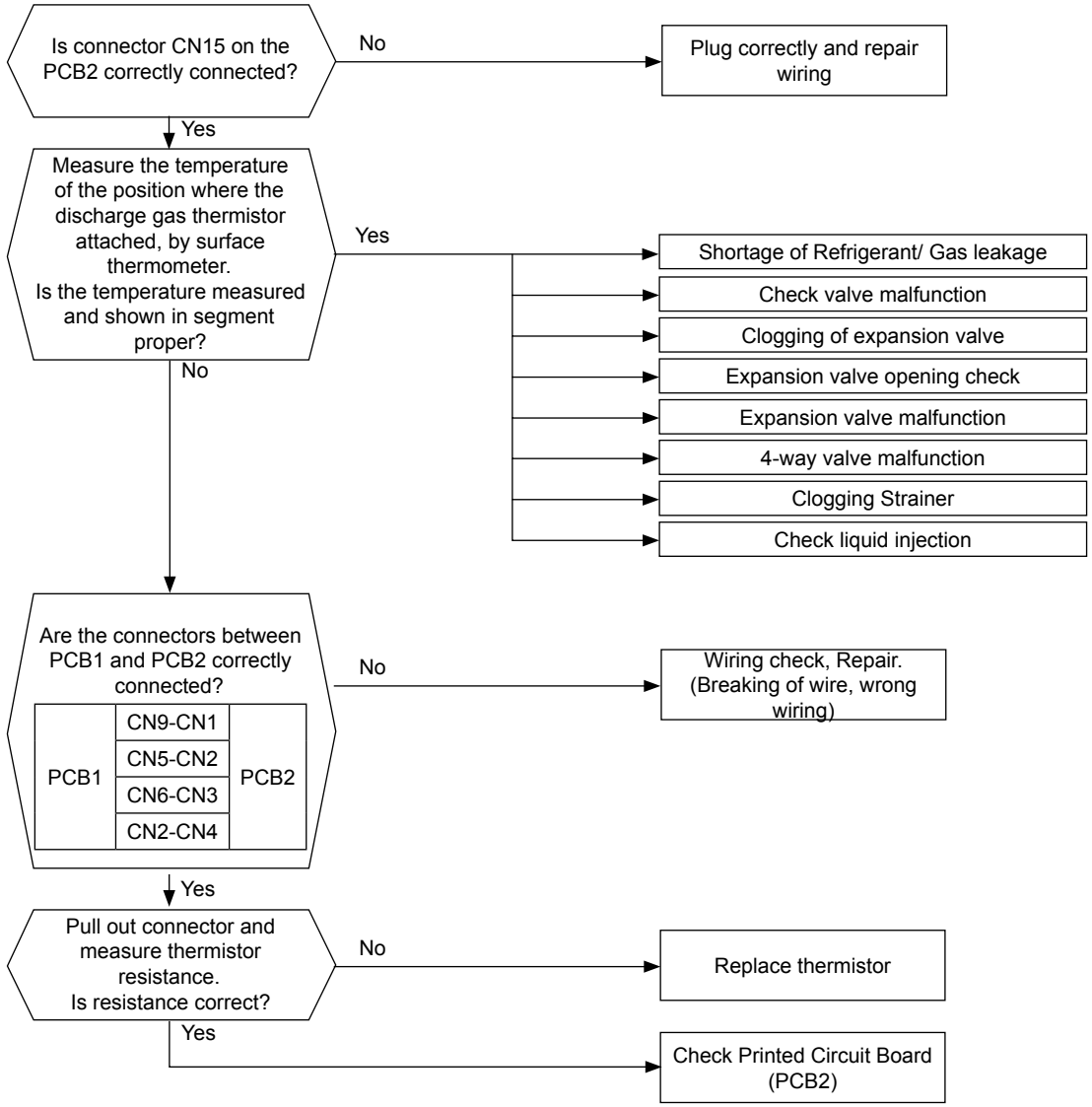
In case that the low pressure is higher than 2.2 MPa, segment shows 2.2 MPa.

In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.

Alarm code	Description
02↔61	Excessively high discharge gas temperature

- The alarm code is displayed on the PCB´s display.
  - 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.

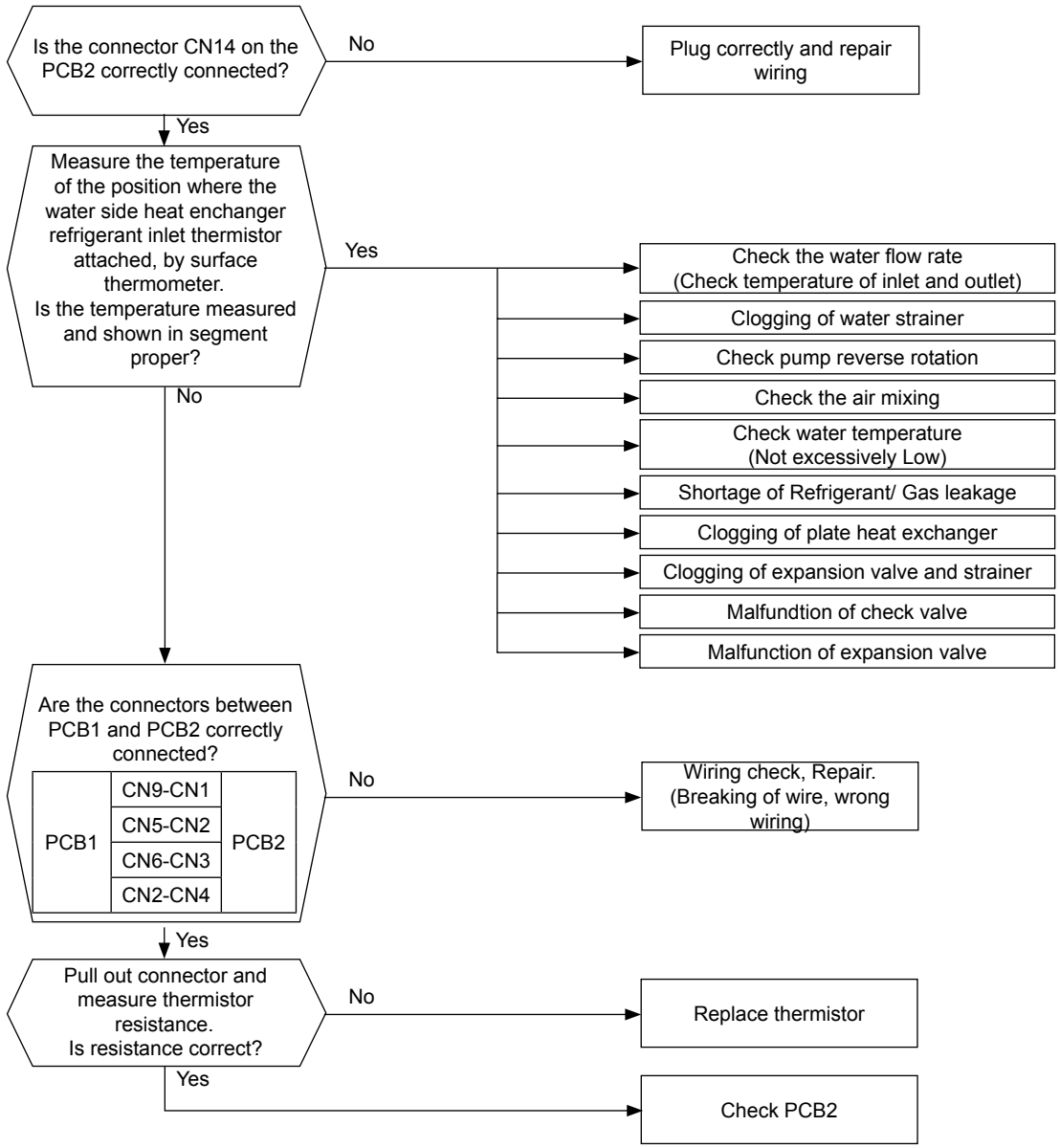
- PCB monitoring position: PCB2, CN15



Alarm code	Description
02↔91	Excessively low temperature of heat exchanger refrigerant inlet

- The alarm code is displayed on the PCB´s display.
- 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 Refrigerant temperature in water side heat exchanger inlet (Tp) is less than -6ºC during 3 seconds. (Only for cooling operation).
  - The Refrigerant temperature in water side heat exchanger inlet (Tp) is less than -20ºC during 10 seconds. (Only for defrosting operation). No retry during defrosting operation. Alarm stop immediately.

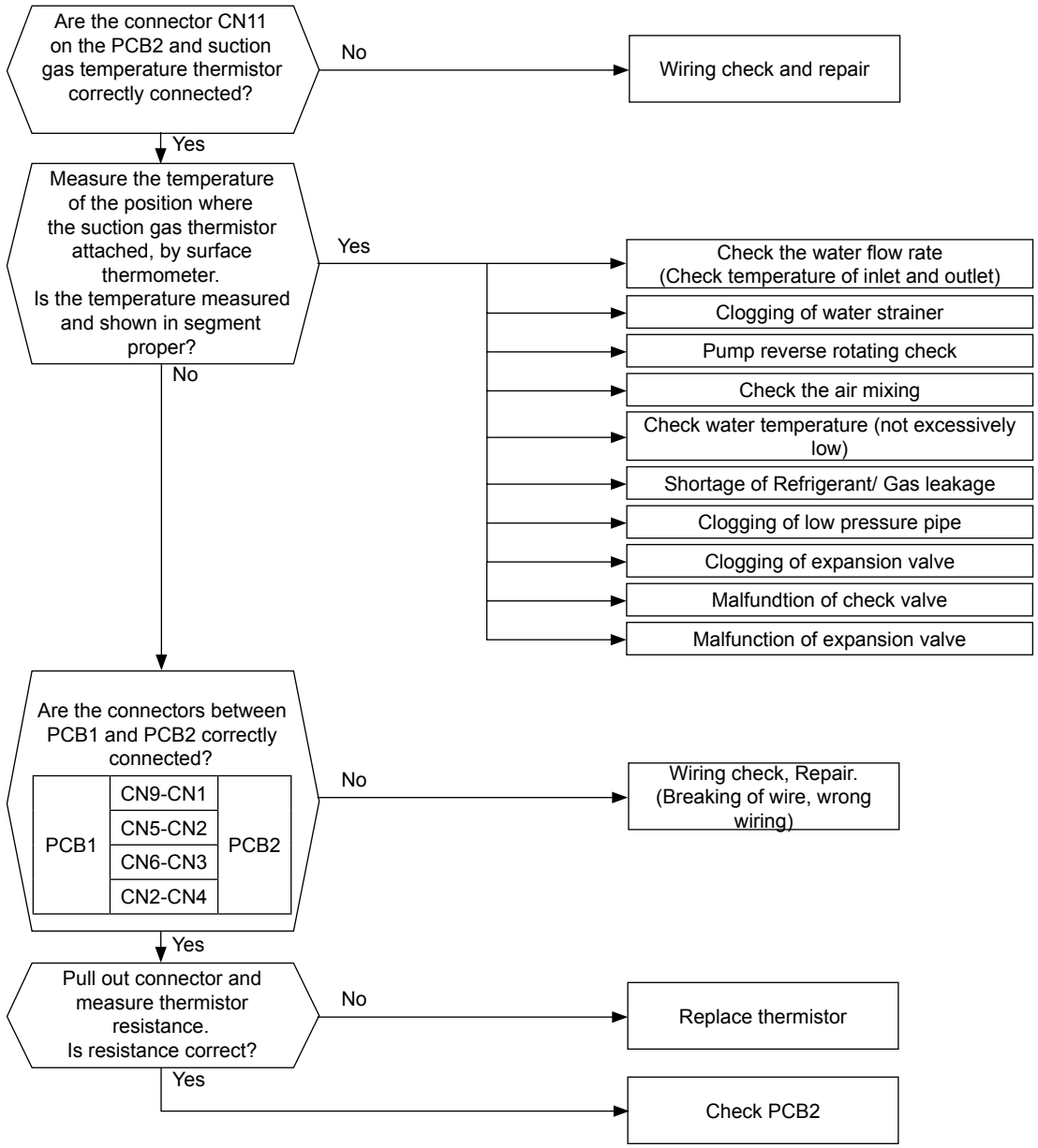
- PCB monitoring position: PCB2, CN14
- Retry code: P- 06



Alarm code	Description
02↔E1	Excessively low suction gas temperature

- The alarm code is displayed on the PCB´s display.
- 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 suction gas temperature (Ts) is lower than -5ºC during 10 seconds. (Only cooling operation).

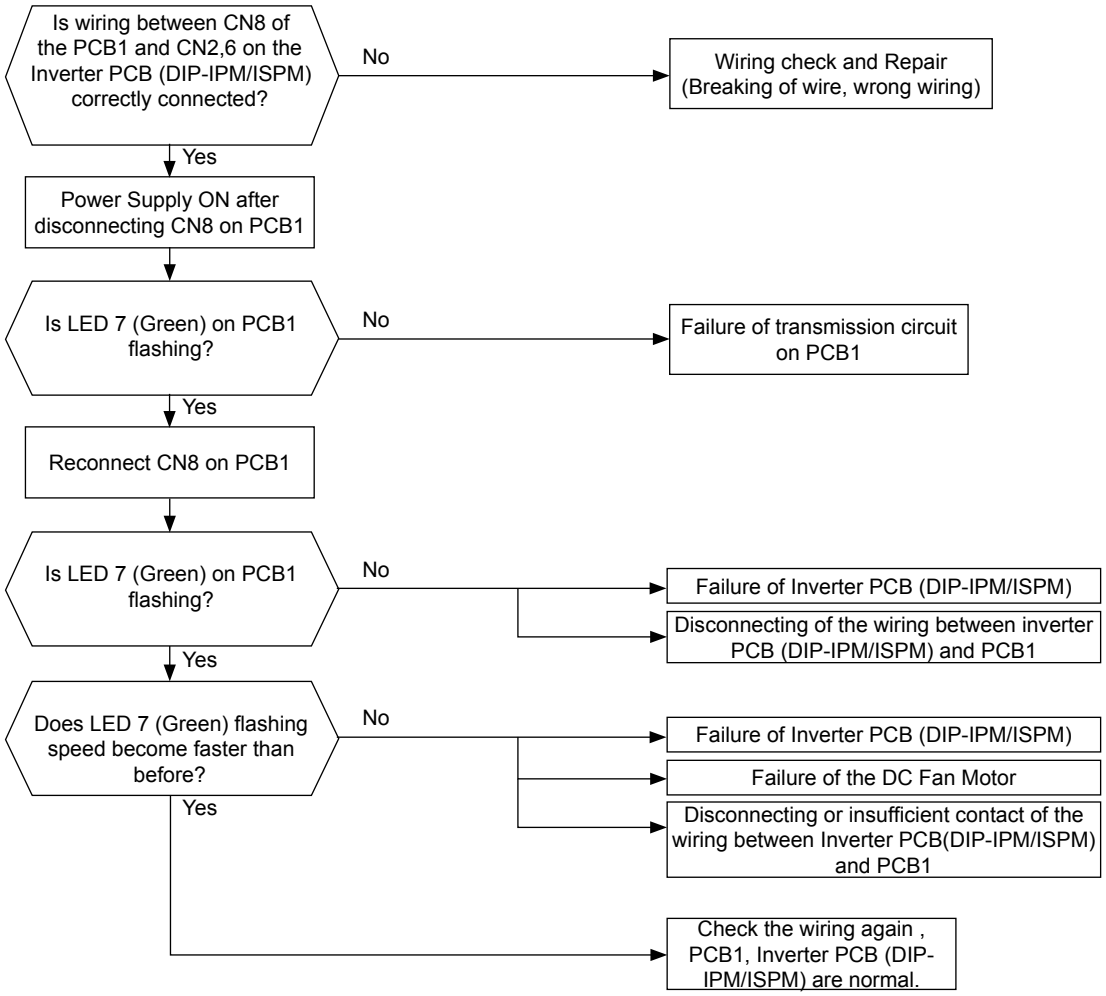
- PCB monitoring position: PCB2, CN11
- Retry code: P-06



Alarm code	Description
04	Abnormal transmission between Inverter PCB and Main PCB

- The alarm code is displayed on the PCB´s display.
  - 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: PCB1, CN8



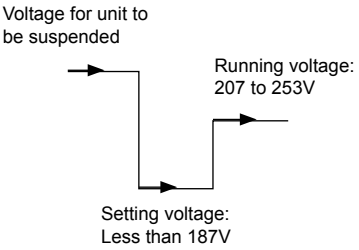
Alarm code	Description
05	Abnormality of Power Supply Phase

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the power source phases are reversely connected or one phase is not connected.

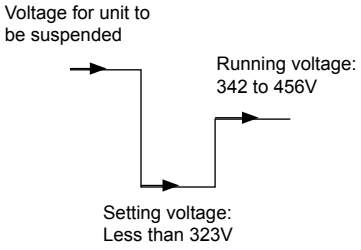
- PCB monitoring position: PCN1,PCB5,PCB1

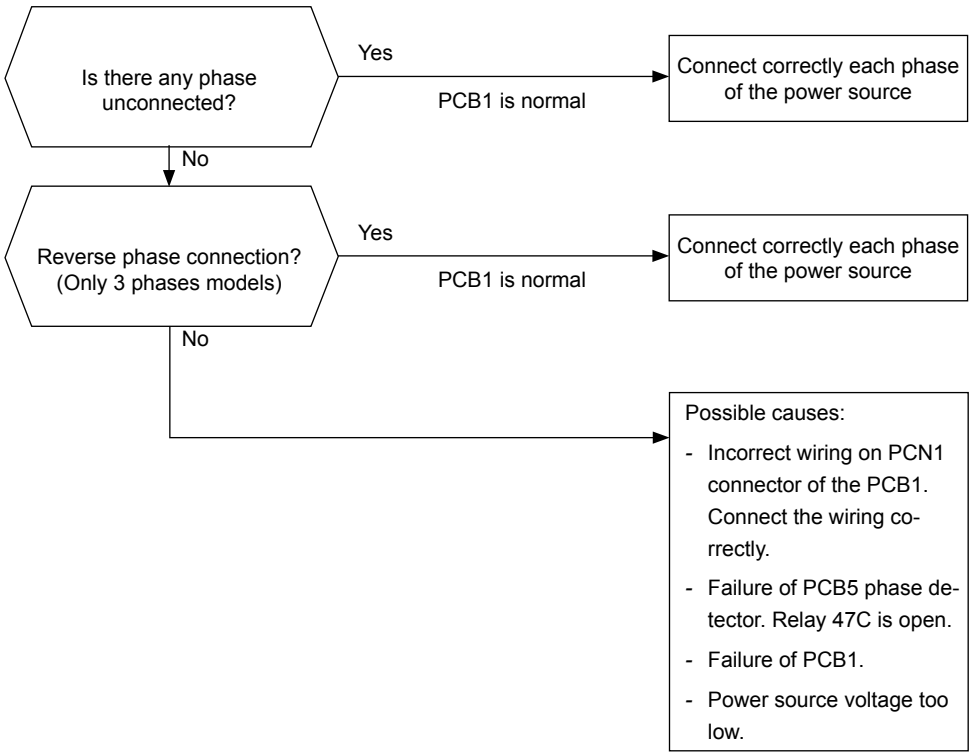
See below:

- RHUE-(3-6)AVHN(1)(-HM) (Single phase)



- RHUE-(5/6)AHN-HM (Three phase)





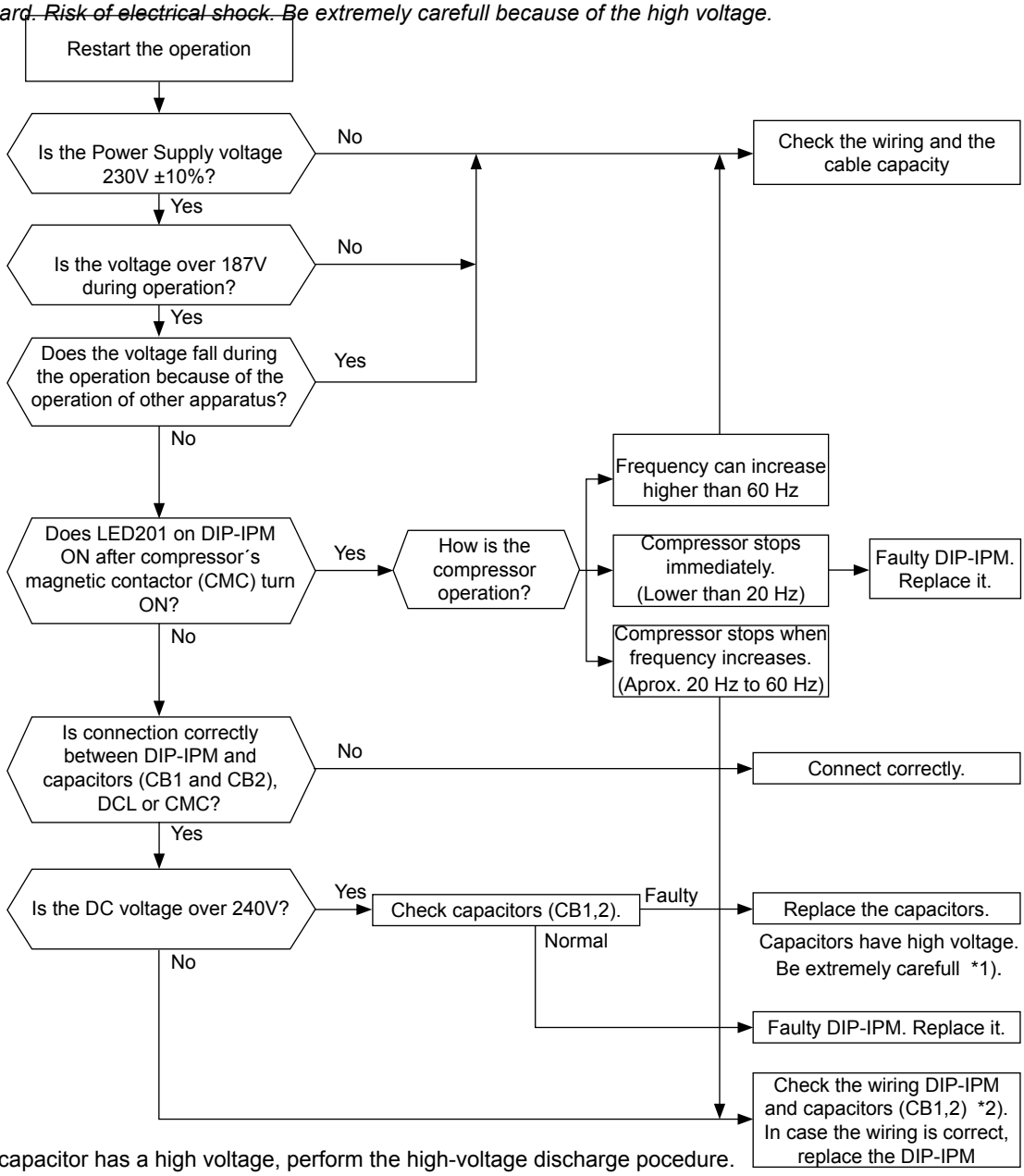
Alarm code	Description
06	Excessively low voltage or excessively high voltage for the inverter RHUE-(3-6)AVHN(1)(-HM)

- The alarm code is displayed on the PCB´s display.
- The alarm appears after 3 retries during 30 minutes.
  – 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 *"10.4.1 RHUE-(3-6)AVHN(1)(-HM). Procedure for checking the DIP-IPM."*.

*2): Checking procedures of the diode module are displayed in item *"10.4.1 RHUE-(3-6)AVHN(1)(-HM). Procedure for checking the DIP-IPM."*

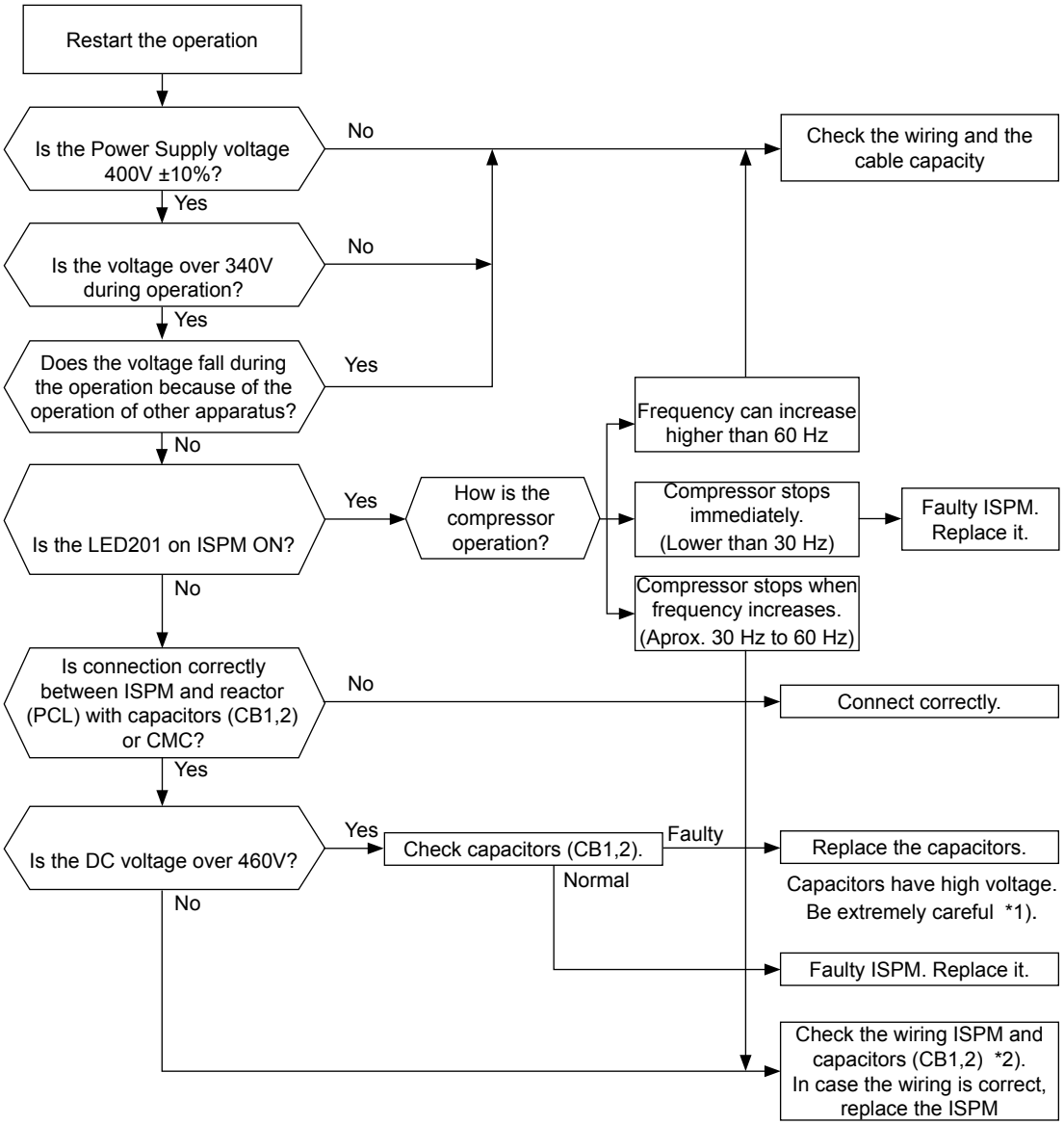
Alarm code	Description
06	Excessively low voltage or excessively high voltage for the inverter RHUE-(5/6)AHN-HM

- The alarm code is displayed on the PCB´s display of the outdoor unit.
- The alarm appears after 3 retries during 30 minutes.
  - This alarm code is displayed when the voltage between terminal "P" and "N" 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 *"10.4.2 RHUE-(5/6)AHN-HM. Procedure for checking the ISPM."*.

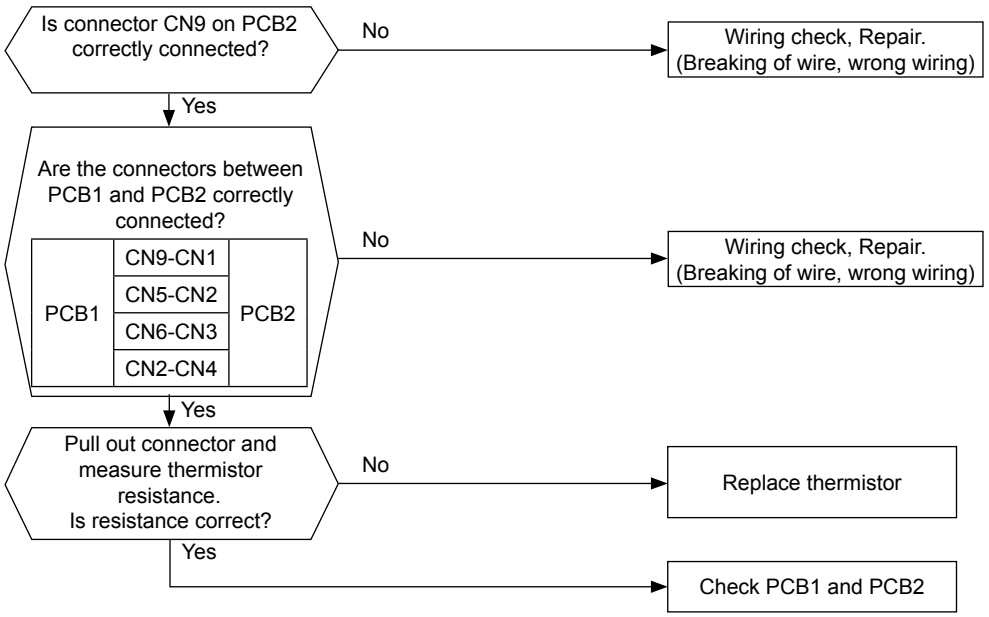
*2): Checking procedures of the diode module are displayed in item *"10.4.2 RHUE-(5/6)AHN-HM. Procedure for checking the ISPM."*.

*3): DC voltage measuring position: ISPM “P” terminal to “+” terminal of tester, “N” terminal to “-” terminal of tester measuring position: DC 1000V.

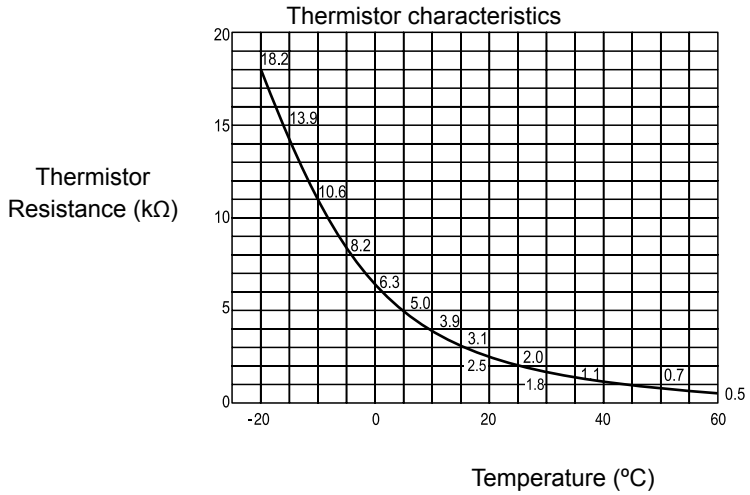
Alarm code	Description
11	Failure of water inlet temperature thermistor

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the water inlet temperature thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN9



Measuring the thermistor resistance value:



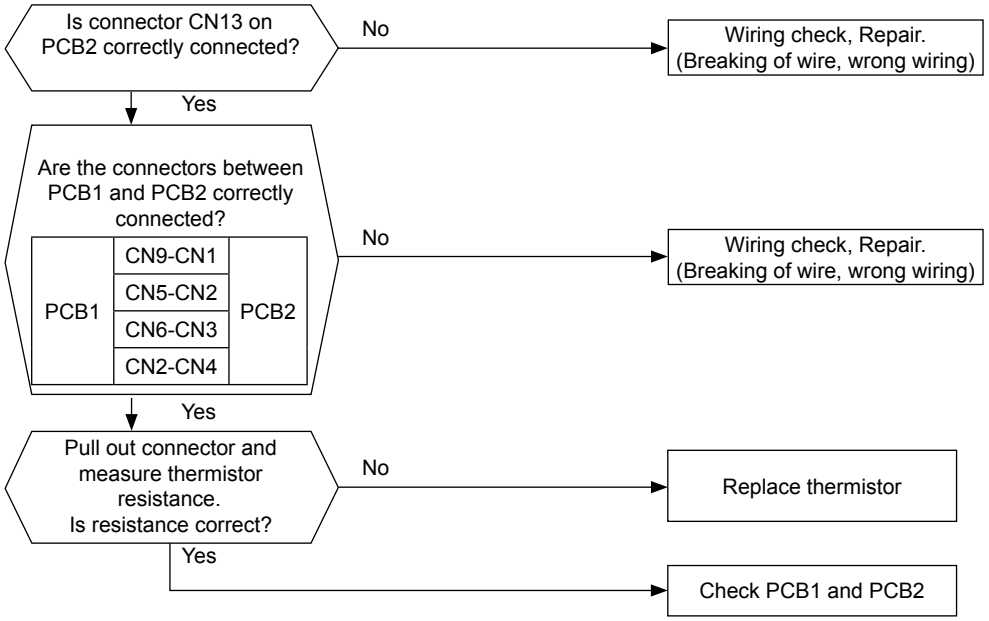
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

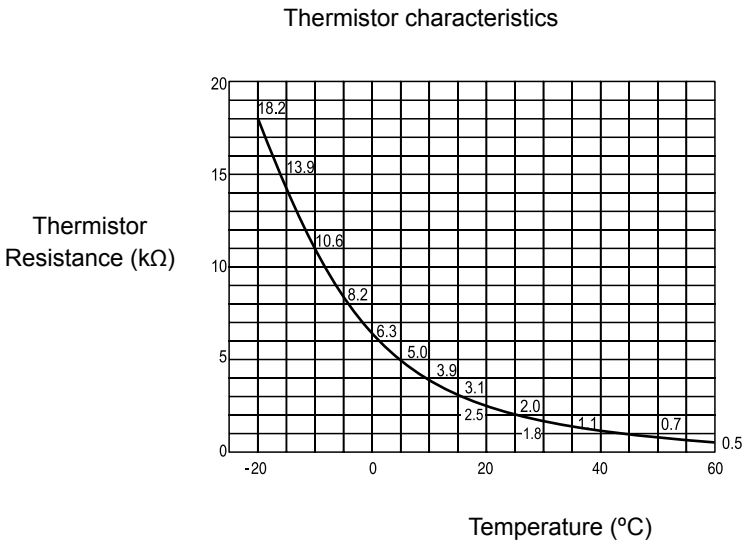
Alarm code	Description
12	Failure of water outlet temperature thermistor

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the water outlet temperature thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN13



Measuring the thermistor resistance value:



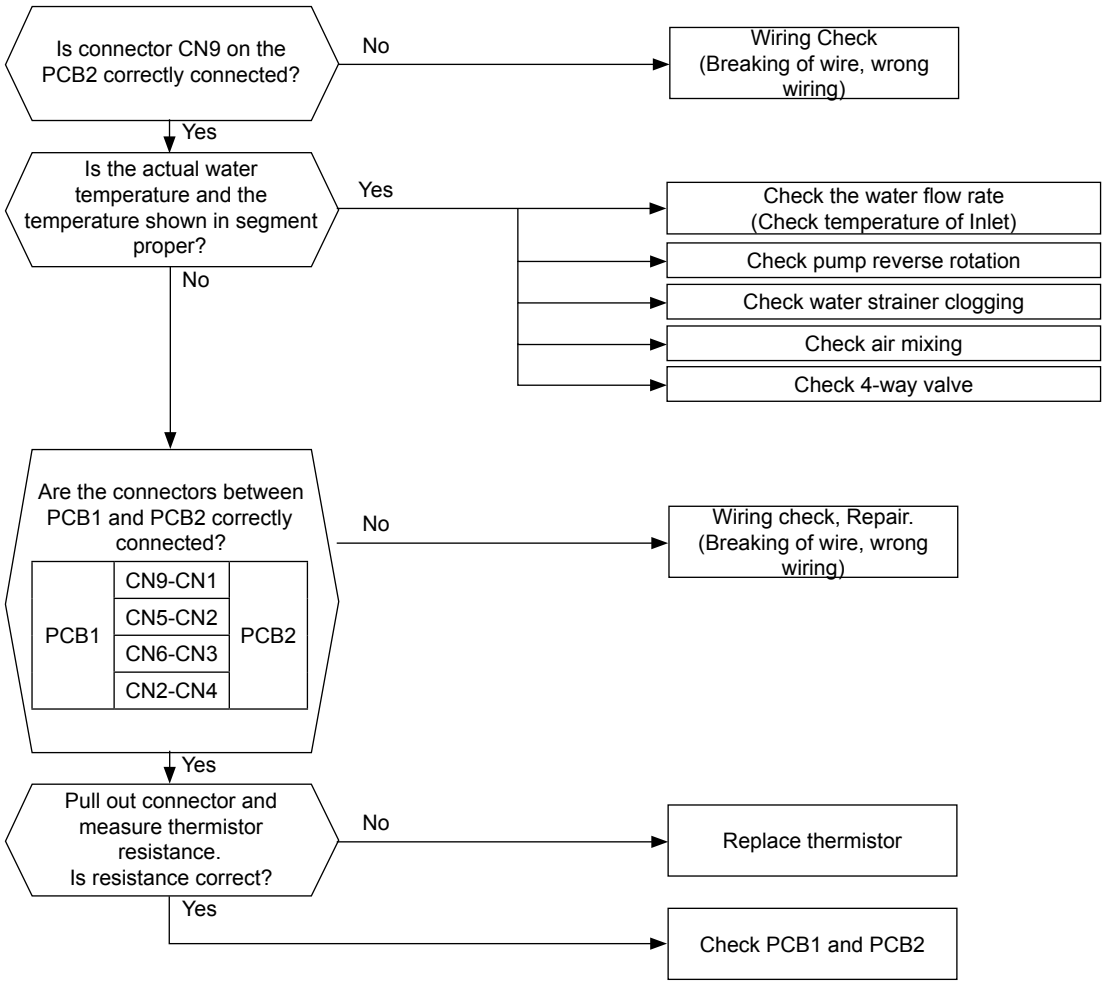
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

Alarm code	Description
13	Activation of freeze protection control (water inlet)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the chilled water temperature is lower than 2ºC.

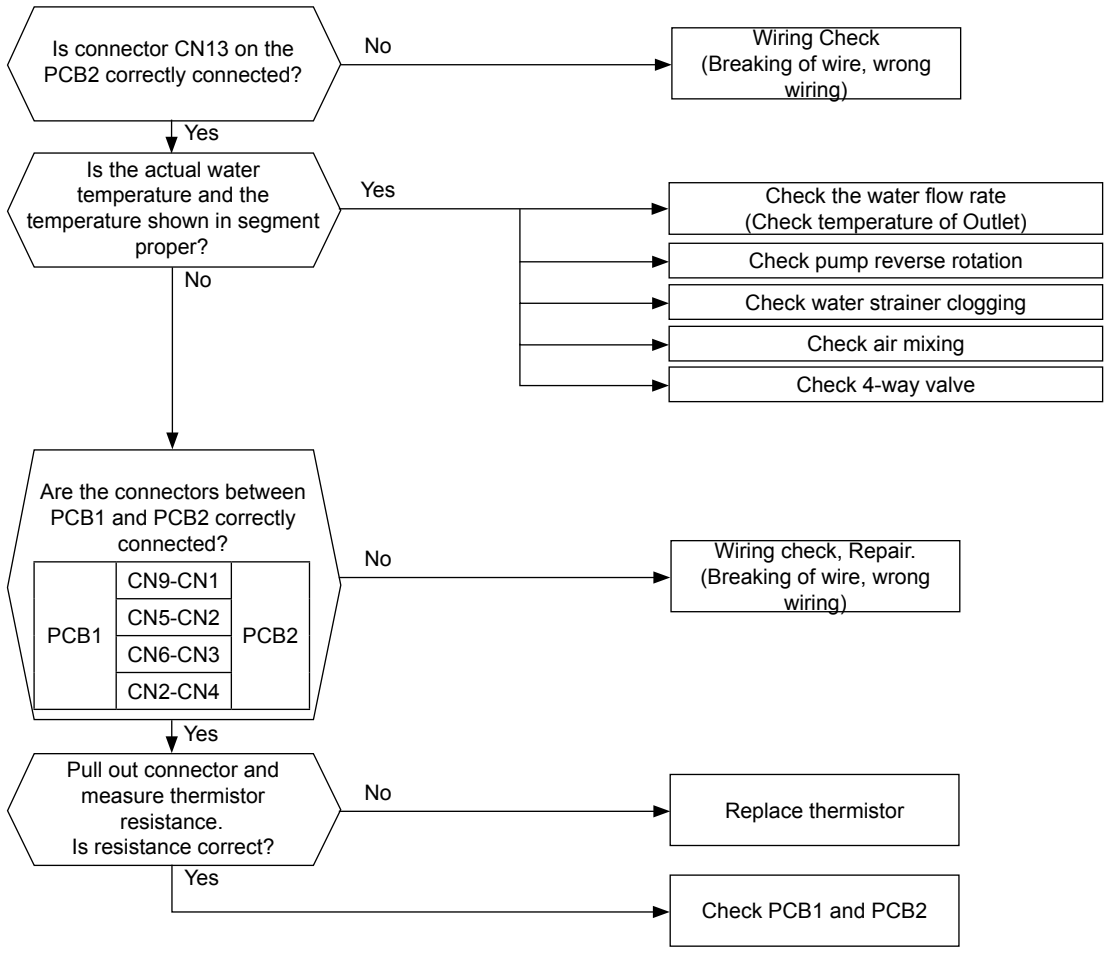
PCB monitoring position: PCB2, CN9



Alarm code	Description
02↔ 13	Activation of freeze protection control (water outlet)

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the chilled water temperature is lower than 2ºC.

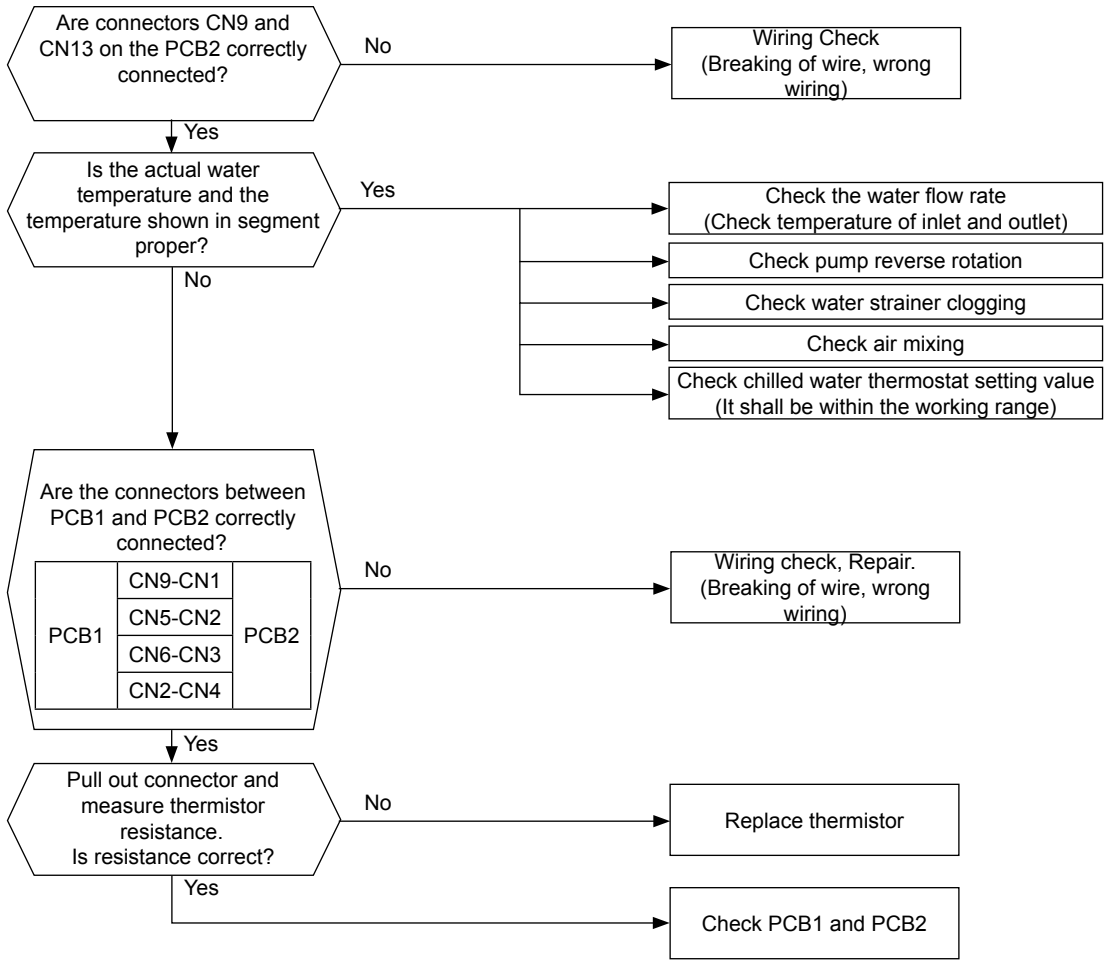
PCB monitoring position: PCB2, CN13



Alarm code	Description
14	Excessively high water temperature (compressor running)

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the water temperature is above 59ºC during compressor operation. (Only heating operation).

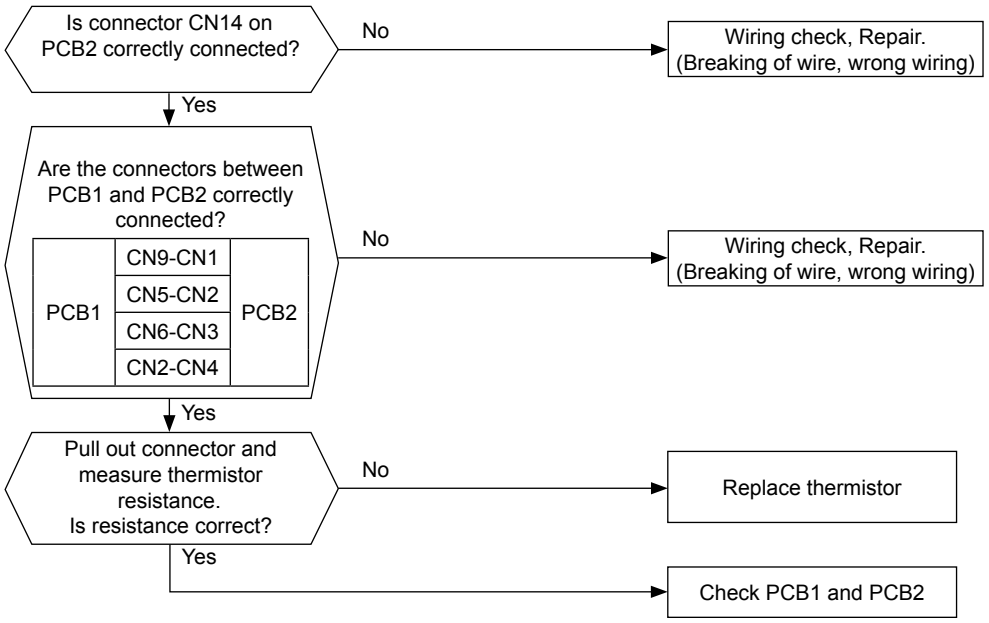
PCB monitoring position: PCB2, CN9 (Water Inlet)
PCB2, CN13 (Water Outlet)



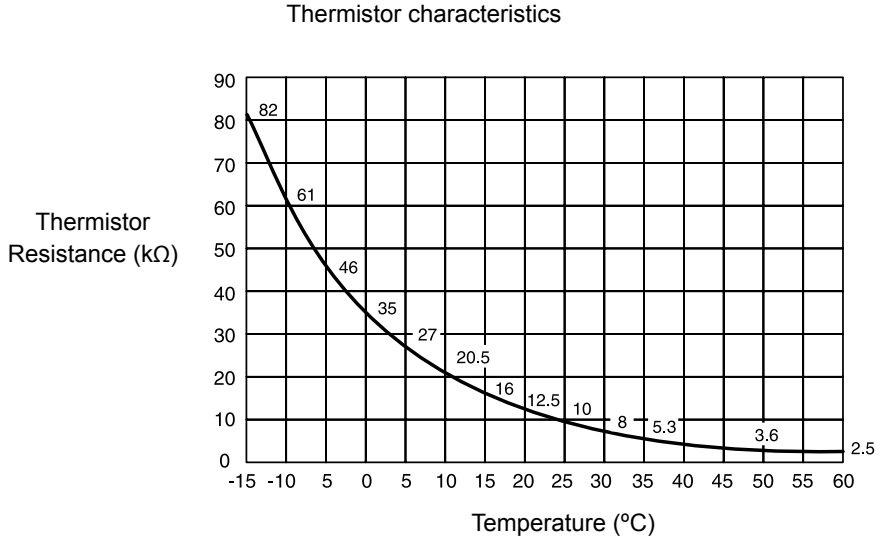
Alarm code	Description
21	Failure of refrigerant liquid temperature thermistor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN14



Measuring the thermistor resistance value:



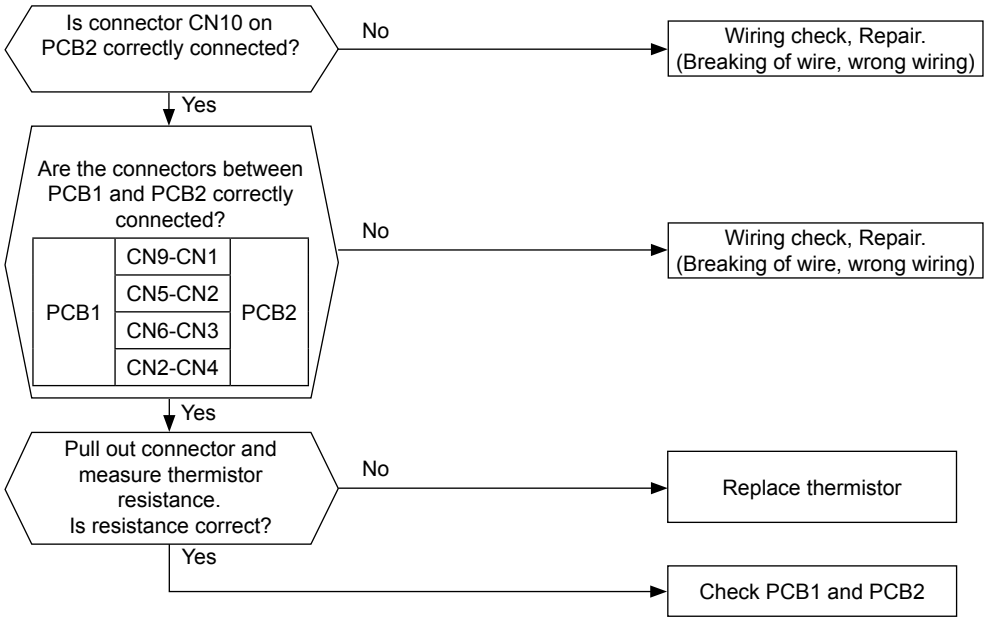
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

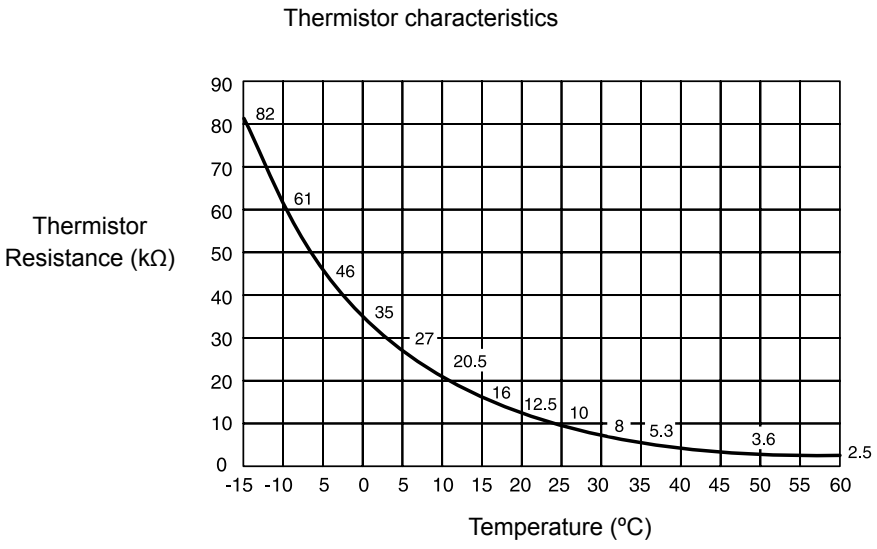
Alarm code	Description
22	Failure of ambient temperature thermistor (Open/short)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN10



Measuring the thermistor resistance value:



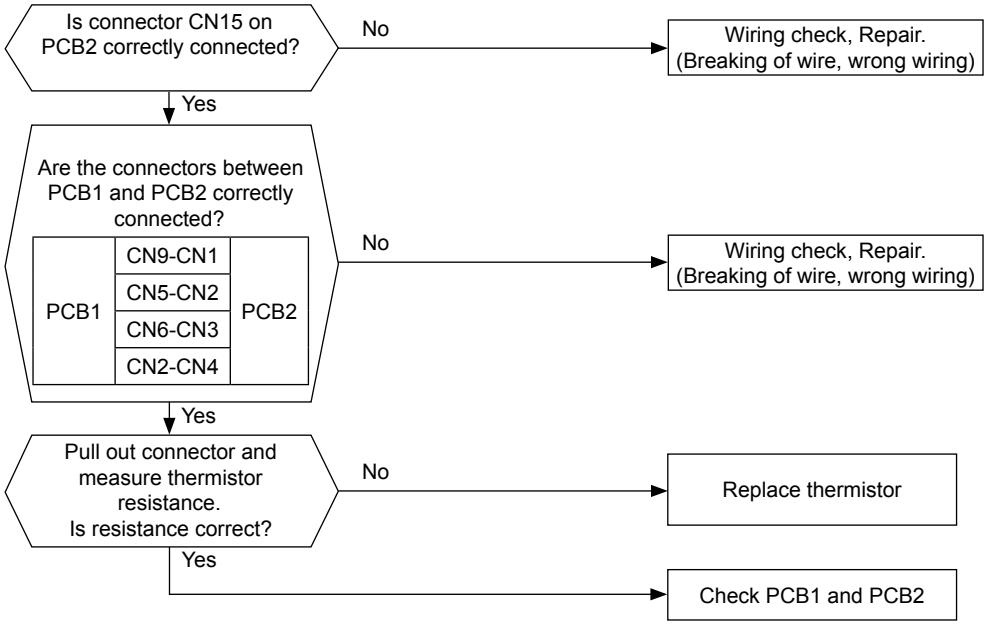
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

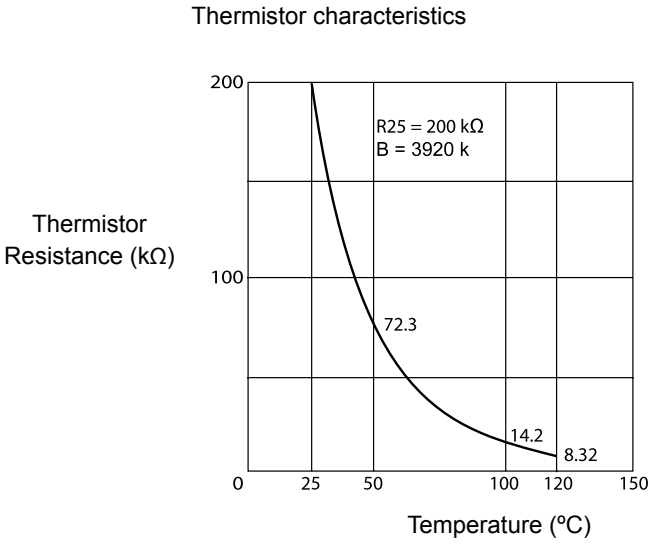
Alarm code	Description
23	Failure of discharge gas temperature thermistor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN15



Measuring the thermistor resistance value:



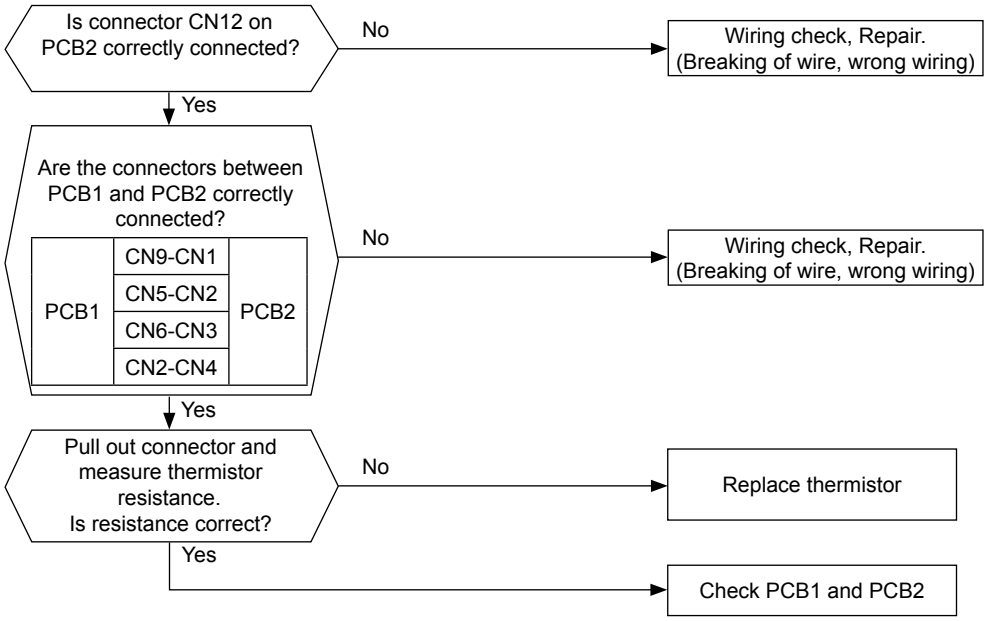
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

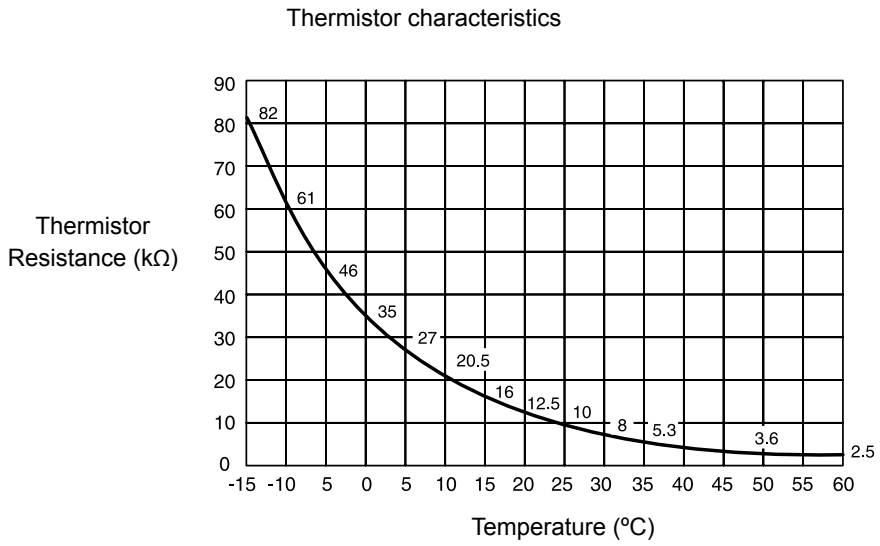
Alarm code	Description
24	Failure of refrigerant evaporating temperature thermistor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN12



Measuring the thermistor resistance value:



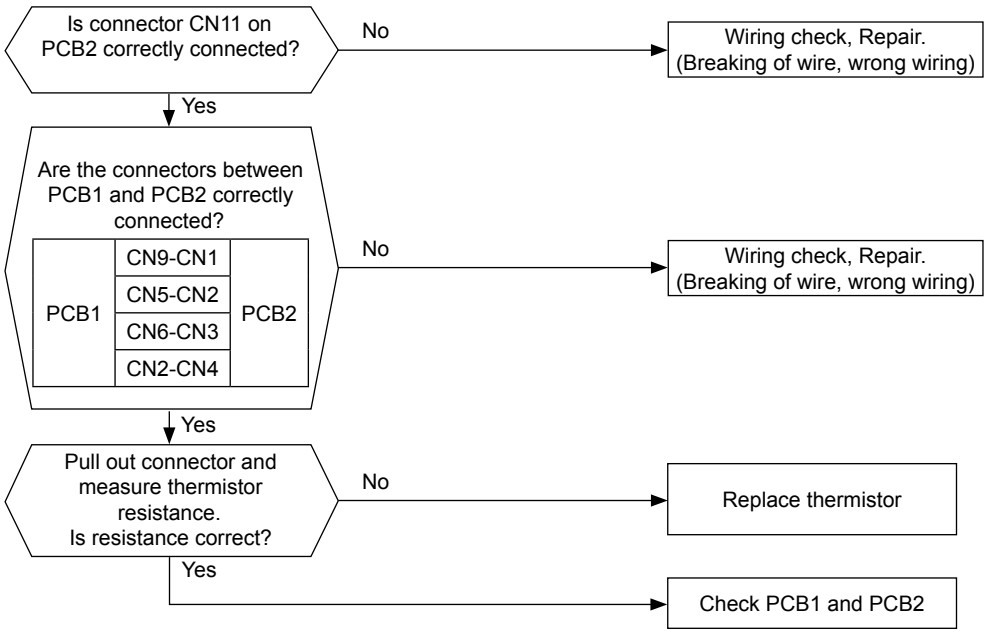
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

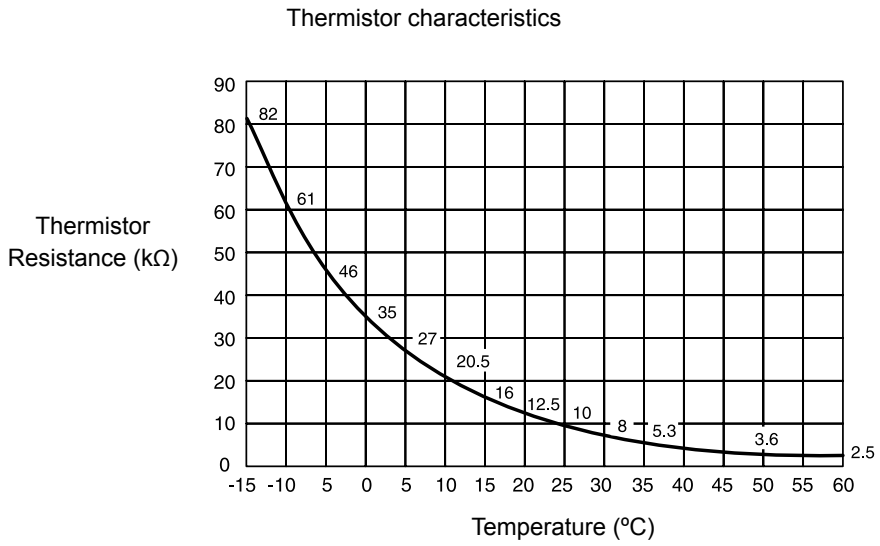
Alarm code	Description
26	Failure of suction gas temperature thermistor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  – This alarm code is displayed when the thermistor is short circuited or cut.

PCB monitoring position: PCB2, CN11



Measuring the thermistor resistance value:



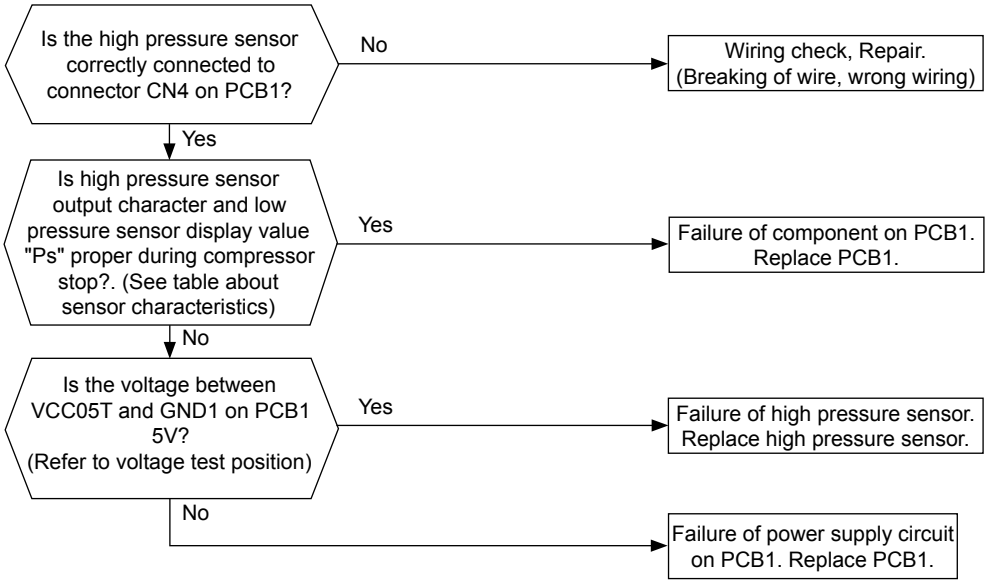
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

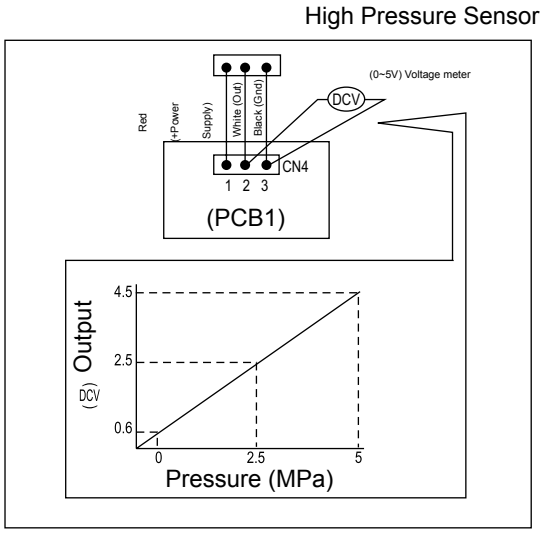
Alarm code	Description
27	Failure of discharge gas pressure sensor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the high pressure sensor is short circuited or cut.

PCB monitoring position: PCB1, CN4



Characteristics of high pressure sensor



NOTE:

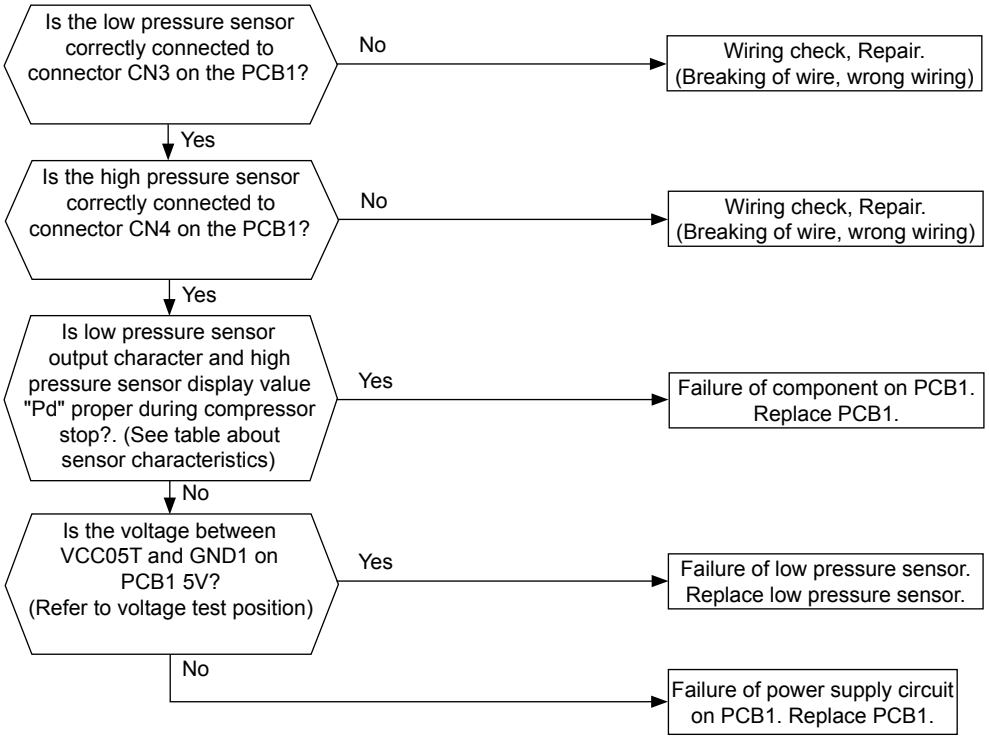
In case that the low pressure is higher than 2.2 MPa, segment shows 2.2 MPa.

In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.

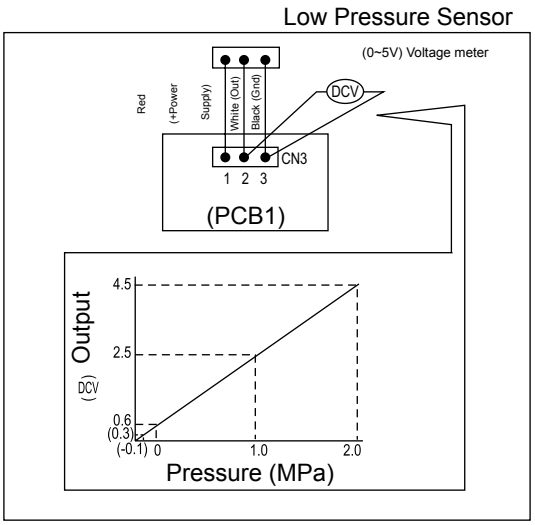
Alarm code	Description
28	Failure of suction gas pressure sensor (Open/Short)

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when the low pressure sensor is short circuited or cut.

PCB monitoring position: PCB1, CN3

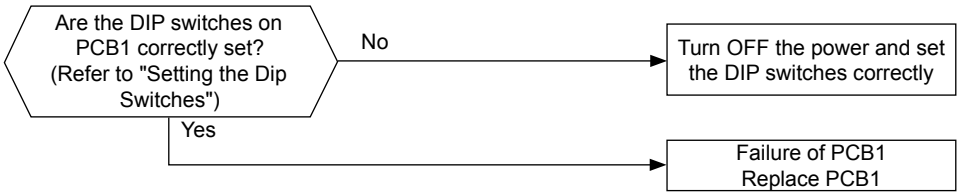


Characteristics of low pressure sensor



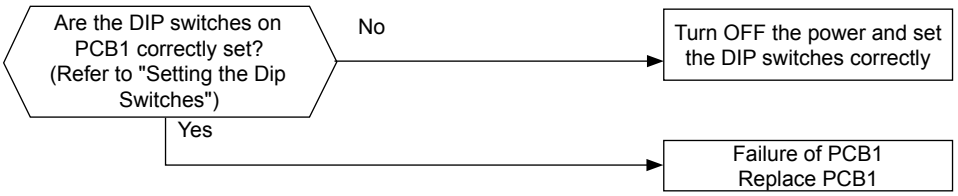
Alarm code	Description
30	Incorrect PCB Setting

- The alarm code is displayed on the PCB´s display.
  - This alarm code is displayed when wrong settings are performed in DIP switches on PCB.



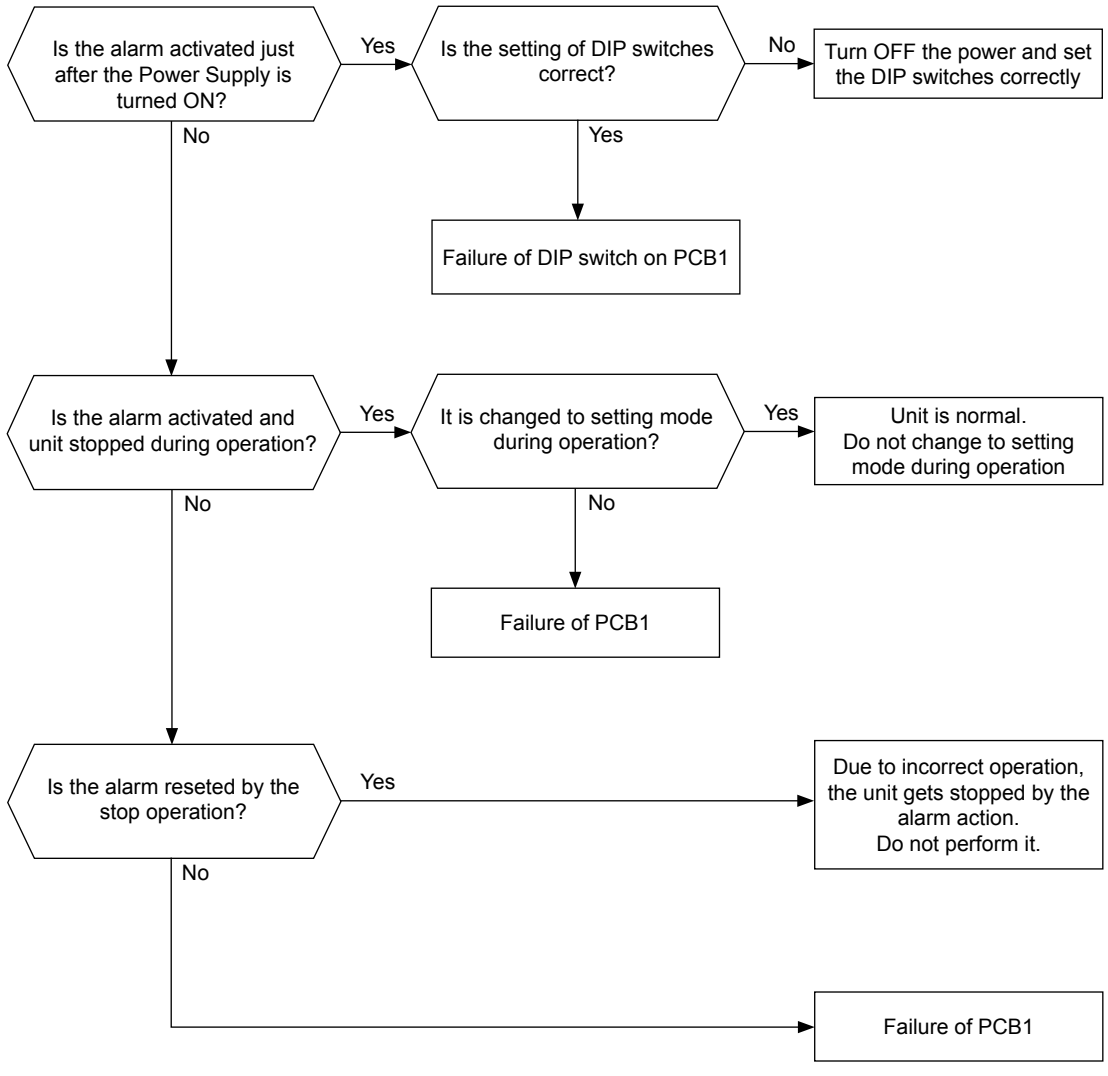
Alarm code	Description
32	Transmission error between Main PCBs (this alarm code is not available in this unit)

- The alarm code is displayed on the PCB´s display.



Alarm code	Description
40	Incorrect operation

- The alarm code is displayed on the PCB´s display
  – This alarm code is displayed when wrong settings is performed in DIP switch on PCB or prohibited operation is performed.



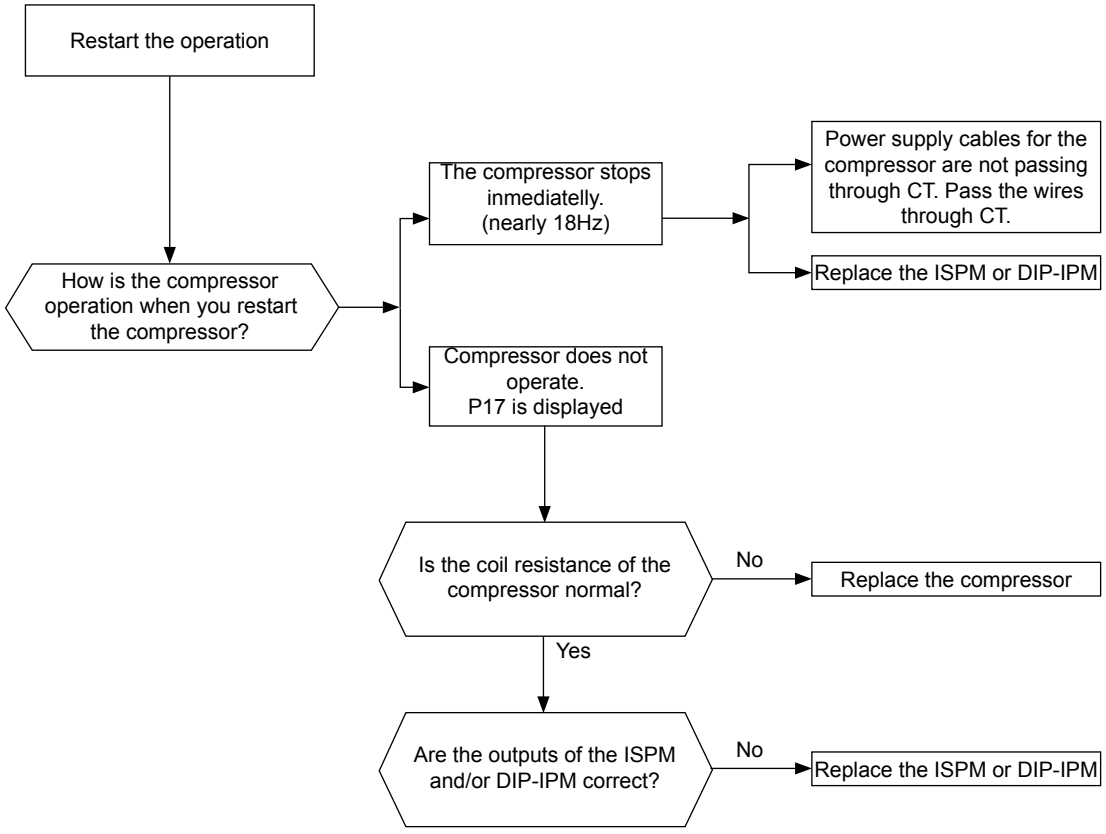
Alarm code	Description
51	Failure of the current sensor for "Inverter" (0 A detection)

- The alarm code is displayed on the PCB´s display
- 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

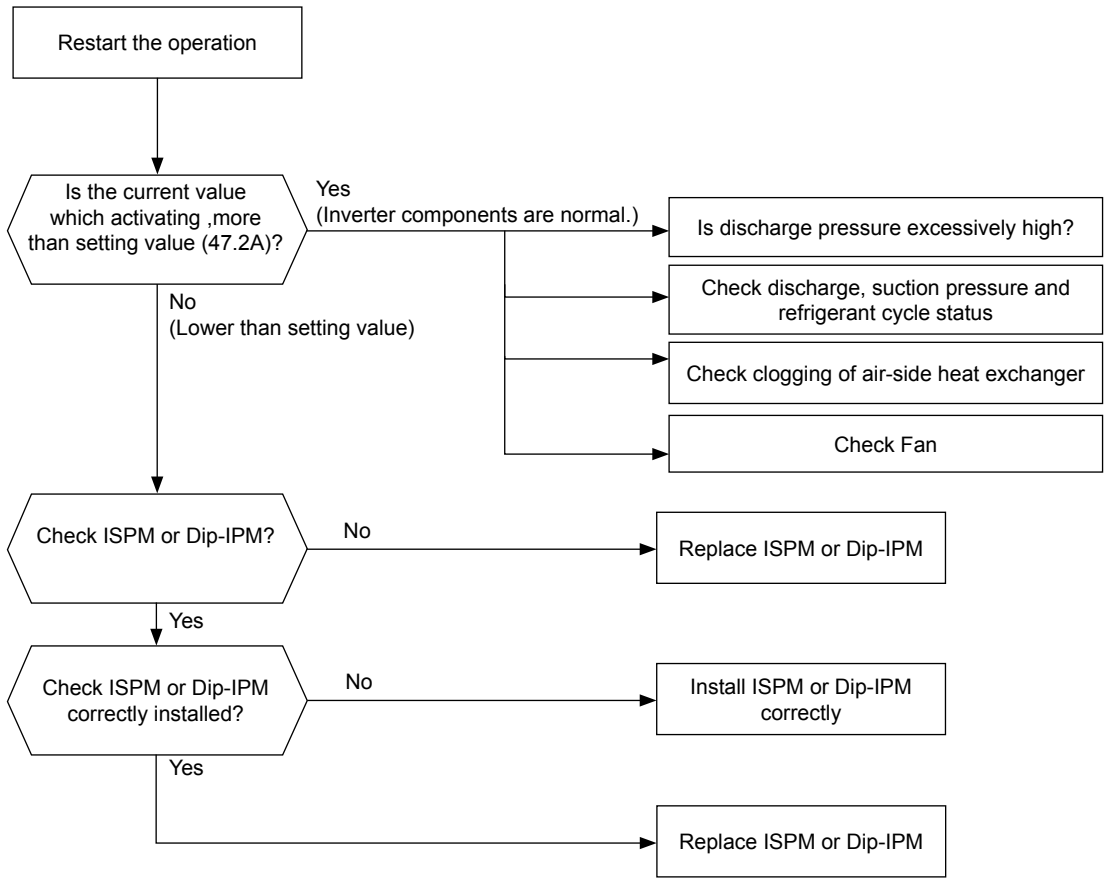
Electrical hazard. Risk of electrical shock. Before checking and replacing the inverter parts perform the high voltage discharge procedure by referring to section “Checking procedure for main parts”.



Alarm code	Description
52	Activation of protection for inverter instantaneous over current (1)

- The alarm code is displayed on the PCB´s display.
- 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



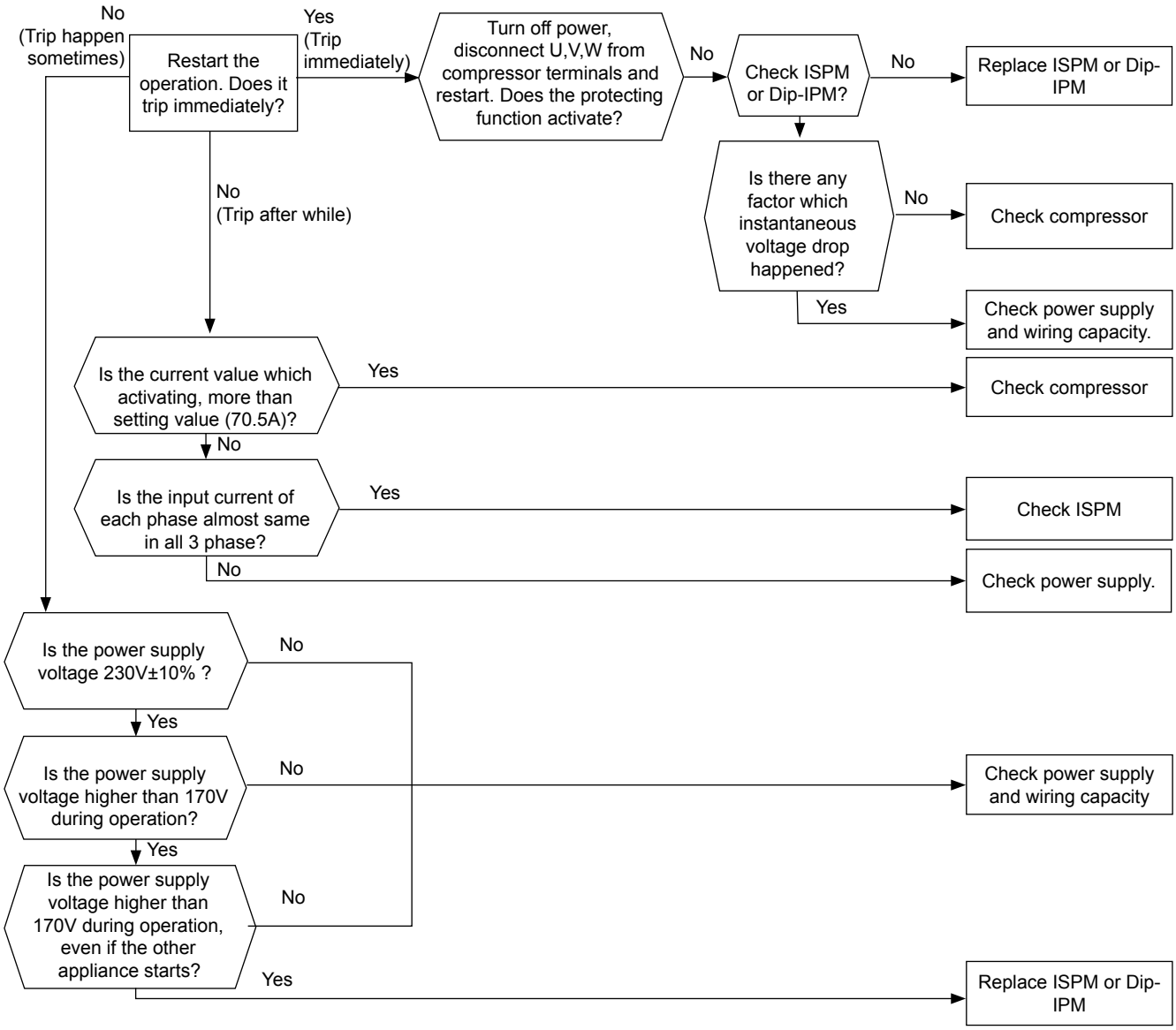
CAUTION

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	Description
52	Activation of protection for inverter instantaneous over current (2)

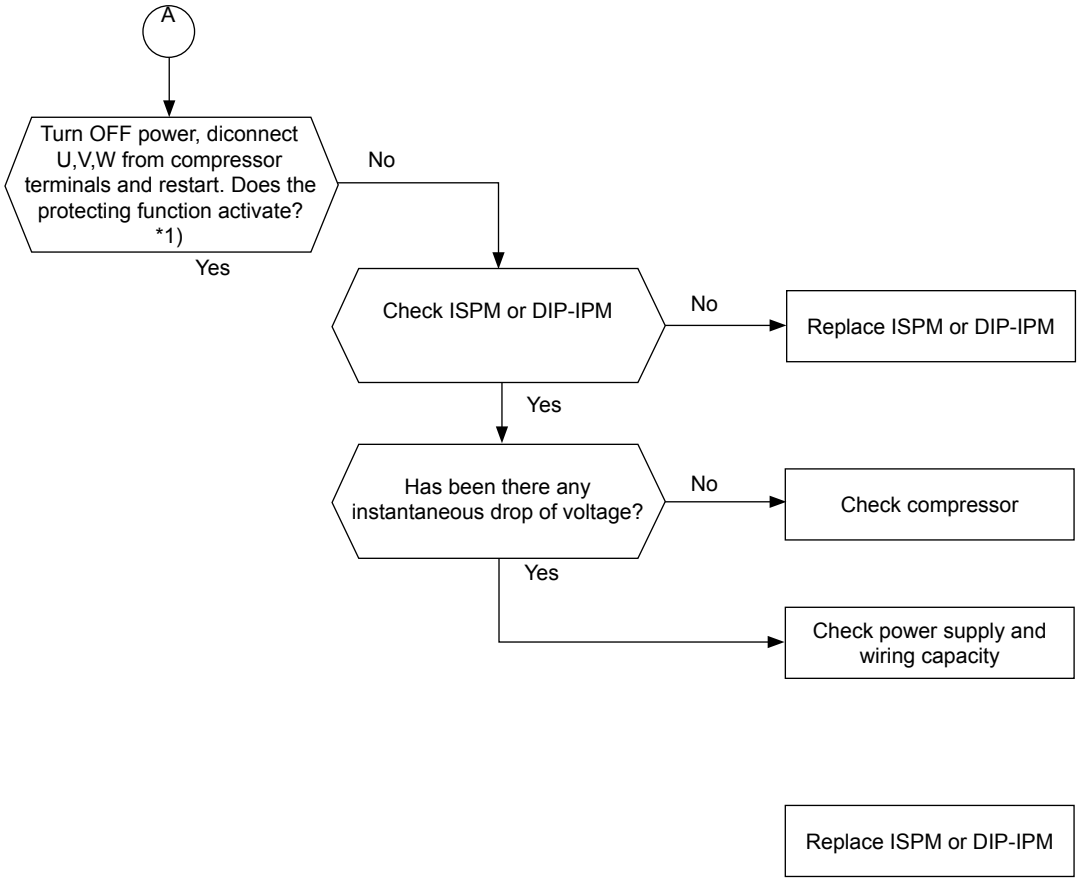
- The alarm code is displayed on the PCB´s display.
- The compressor stops and restarts automatically in 3 minutes.
- The alarm appears after 6 retries during 30 minutes.
  – This alarm code is displayed when the compressor current is higher than the set value.

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	Description
53	ISPM or DIP-IPM protection activation

– IPM or Dip IPM have detecting function of abnormality.

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

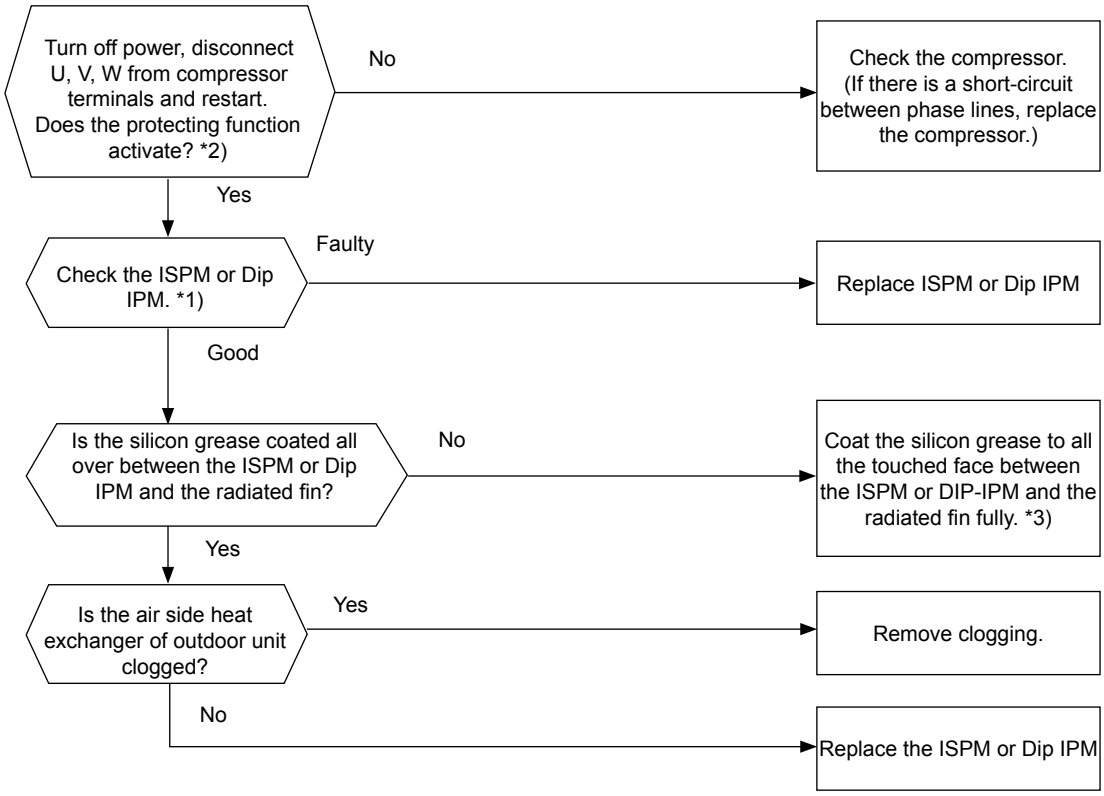
or

Abnormal temperature of the IPM or Dip IPM

or

Control voltage decrease

Retry code: P-17



- *1) Perform the high voltage discharge work by referring to the section “Checking procedure for 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.
- *3) Use the silicon grease provided as accessory (Service parts No. P22760).

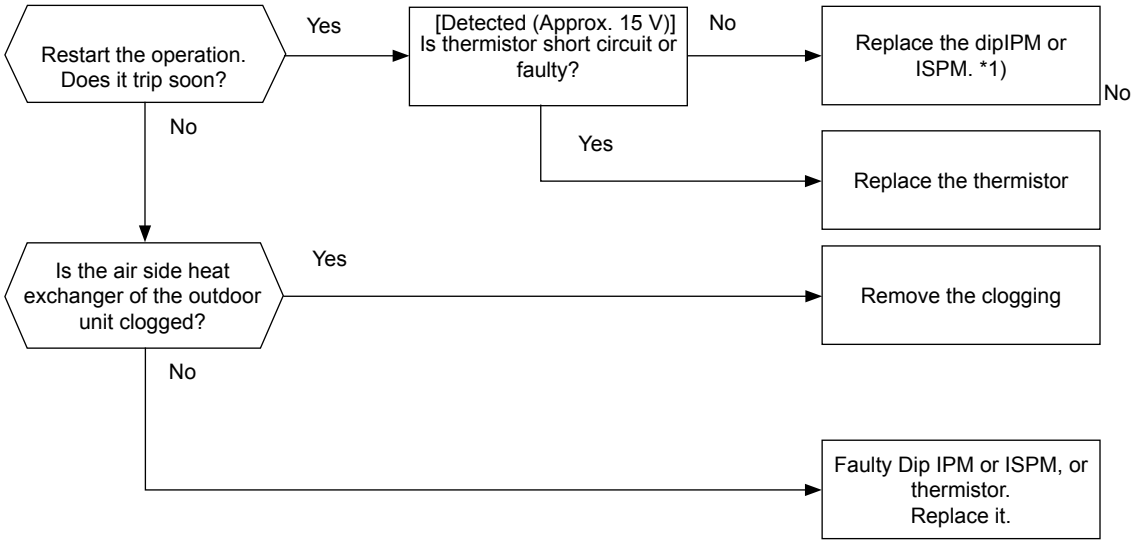
NOTE

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	Description
54	Increase in the inverter fin temperature

- 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.

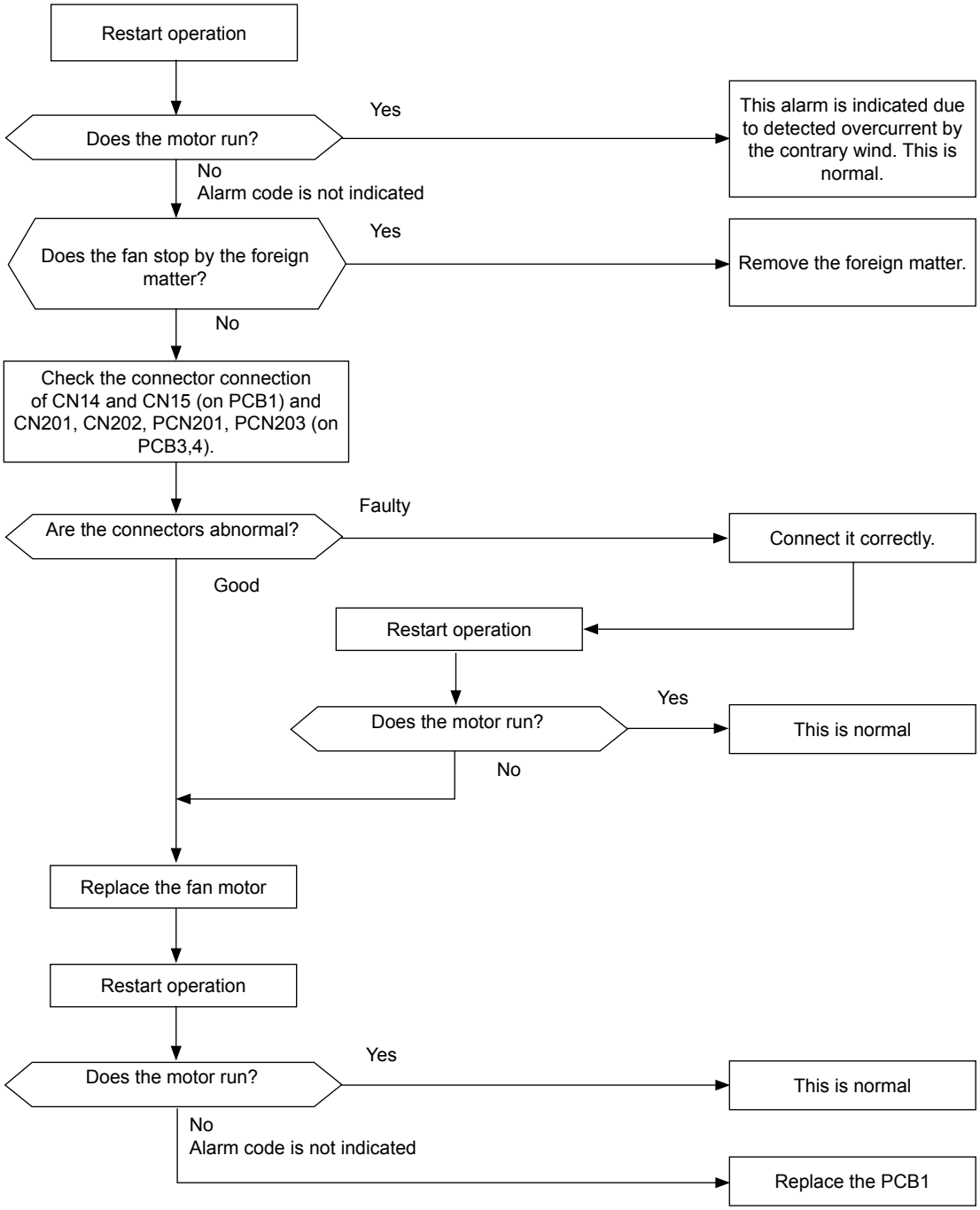
Retry code: P-17



1*): Perform the high voltage discharge work by referring to the section “Checking procedure for main parts” before checking and replacing the inverter components

Alarm code	Description
57	Abnormality of fan motor protector (DC fan motor)

- The fan motor is stopped once, and restarted after 10 seconds.
  This alarm code is displayed when the revolution pulse output detected from the fan motor is 10rpm or less. If it occurs more than 10 times in 30 minutes, this alarm is indicated.
  – This alarm code is displayed when the fan motor is stopped by an abnormal reason like fan motor lock.



NOTE

Check to ensure that DC Fan motor is checked according to the section "Fault diagnosis of DC fan motor"

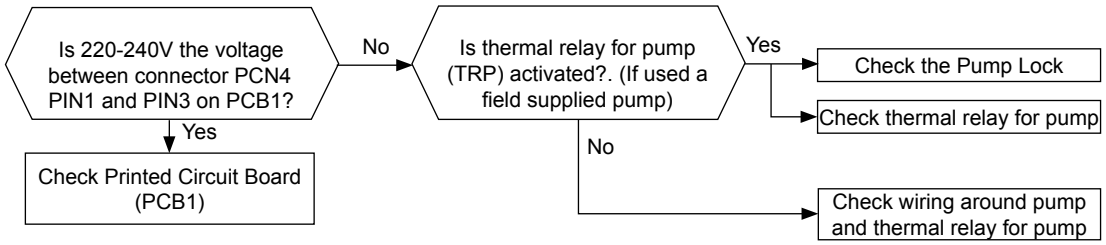
In the case that the fan motor does not run even the PCB1 is replaced, replace fan inverter PCB (PCB4,5).

Alarm code	Description

5P	No feed back signal from water pump

- The alarm code is displayed on the PCB´s display.
- It is available once feedback signal confirmed.
  - This alarm code is displayed when the Pump operation feedback signal (terminals 1-2) is OFF during pump interlock (CMp) ON (terminals 3-4).

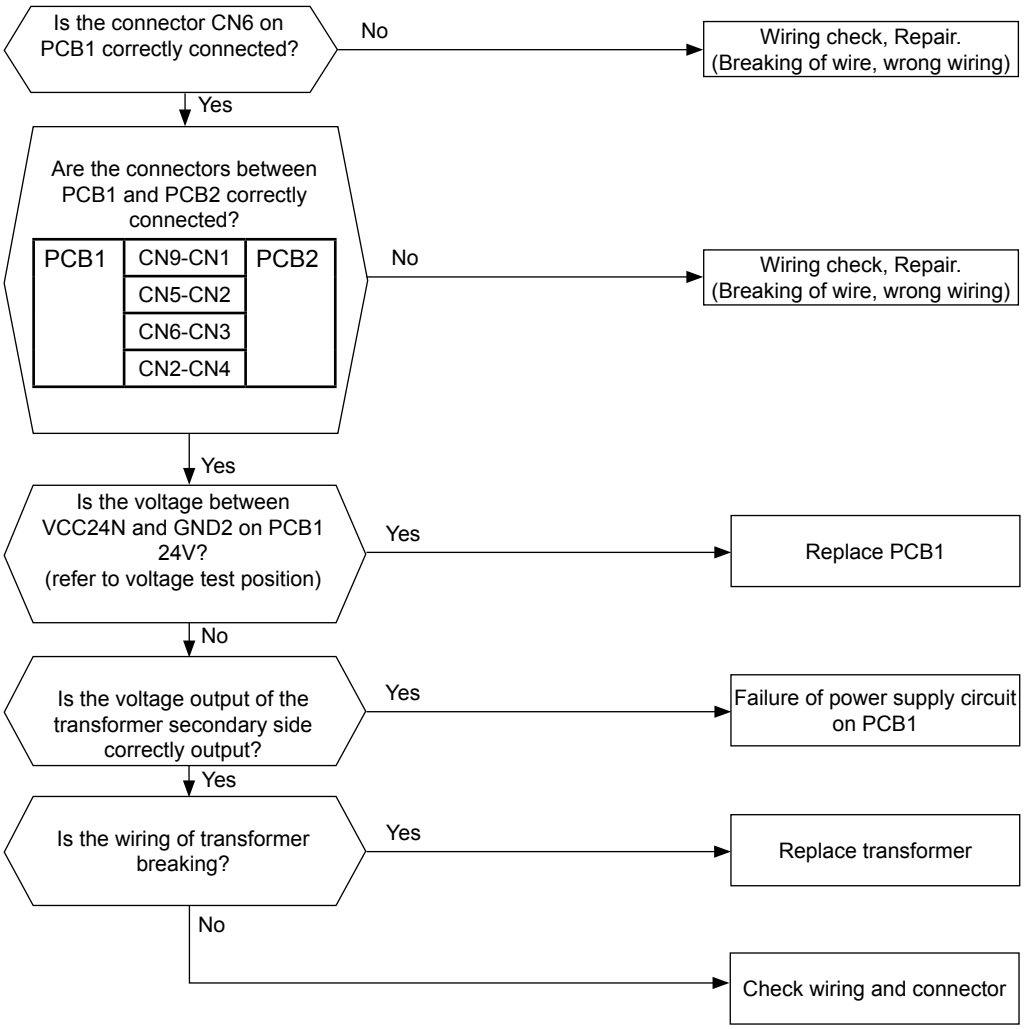
PCB monitoring position: PCB1, PCN4



Alarm code	Description
6E	Cooler water failure (this alarm is not available in this unit)

– This alarm code is displayed when the contact between #1 and #2 of CN6 is not closed.

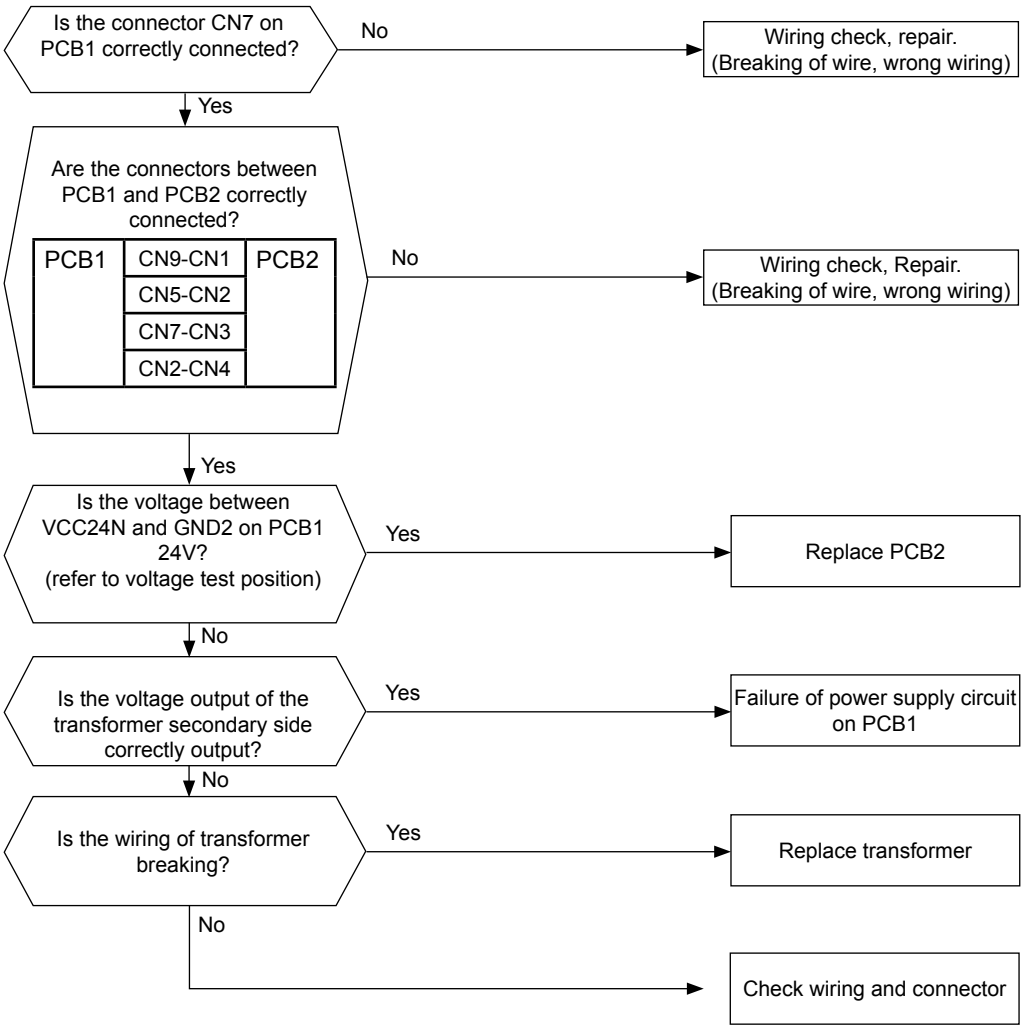
PCB monitoring position: PCB1, CN6



Alarm code	Description
6C	Condenser water failure (this alarm is not available in this unit)

– This alarm code is displayed when the contact between #1 and #2 of CN7 is not closed.

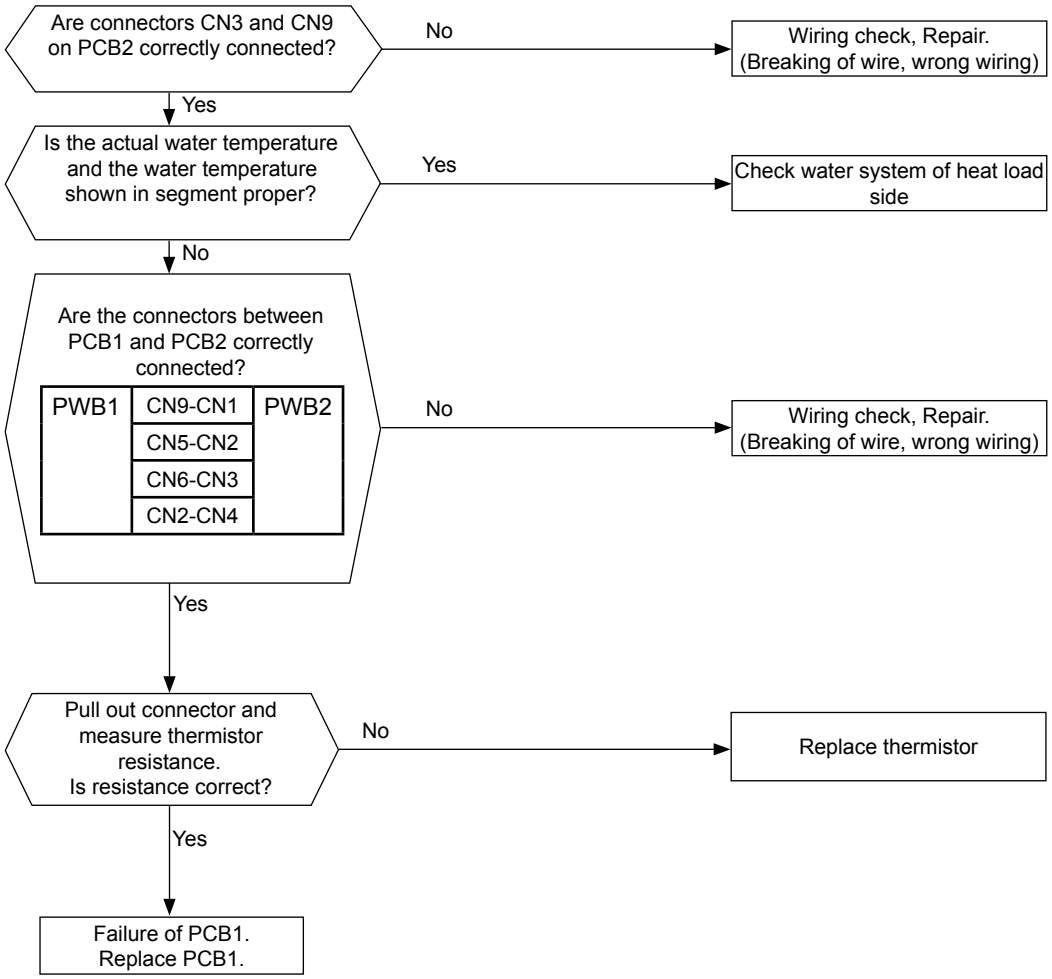
PCB monitoring position: PCB1, CN7



Alarm code	Description
PU (flickering)	Excessively high water temperature (compressor stop)

- Water temperature is increased to 65ºC by heat generation in pump or other heat source during only pump running (during compressor stop: during thermo off or during pump automatic operation in winter).
- If water temperature is decreased less than 6ºC due to pump stop, it becomes normal status automatically.
- Since this is not an abnormality of unit, it is not saved in alarm history.
  When this alarm happen, check the water system first. If any cause can not be detected, check the unit according to the following procedure.

PCB monitoring position: PCB2, CN3 and CN9



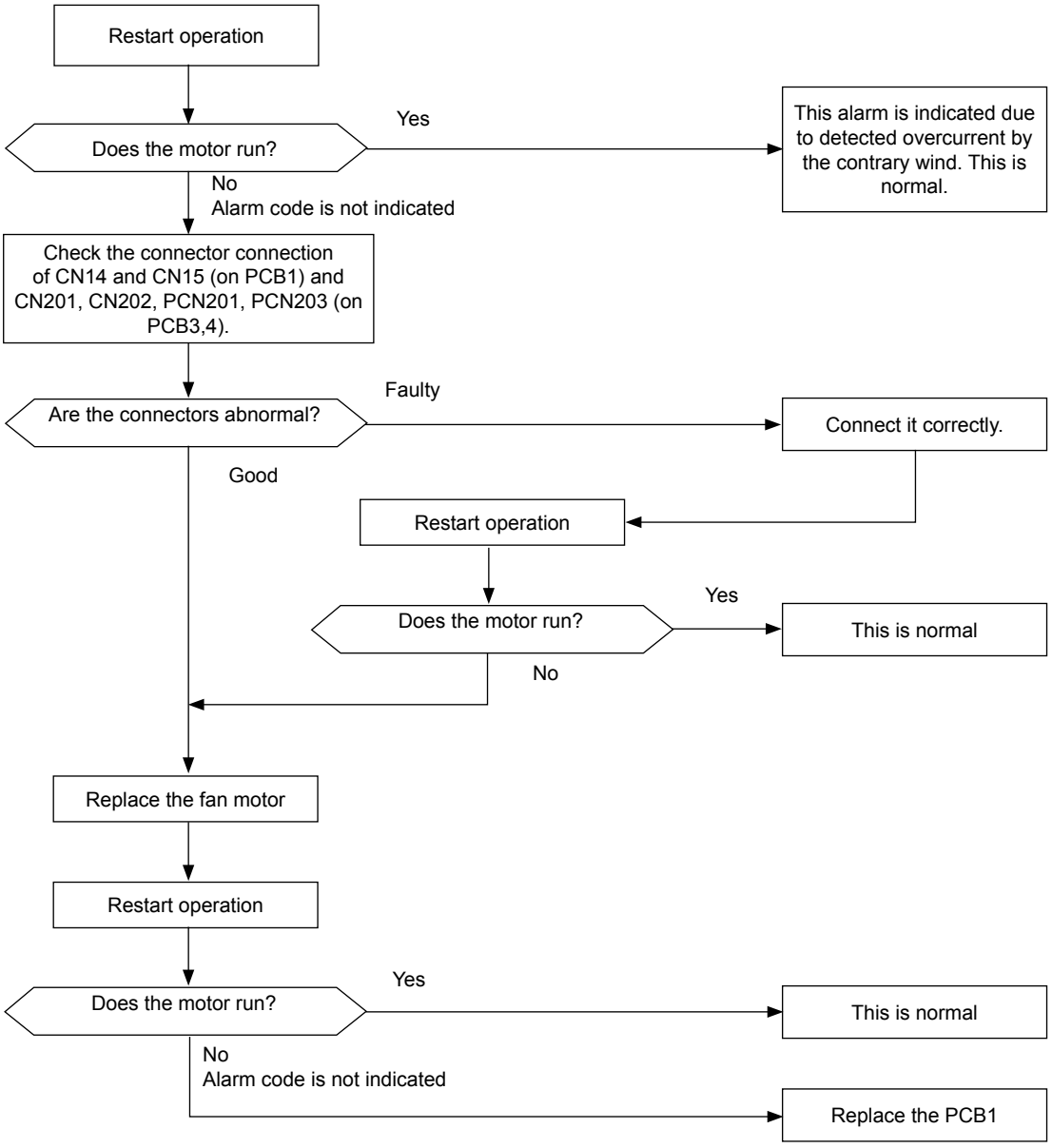
NOTE

Measure the resistance at least in 2 different points which is different more than 10 ºC.

Alarm code	Description
FA,Fb	Failure of fan motor

- This alarm is indicated when the revolution pulse output from the fan motor is the reverse revolution signal is detected. The fan motor is stopped once, and restarted after 10 seconds. If it occurs more than 10 times in 30 minutes, this alarm is indicated.

Alarm code	Fan Motor
FA	MF1
Fb	MF2



NOTE

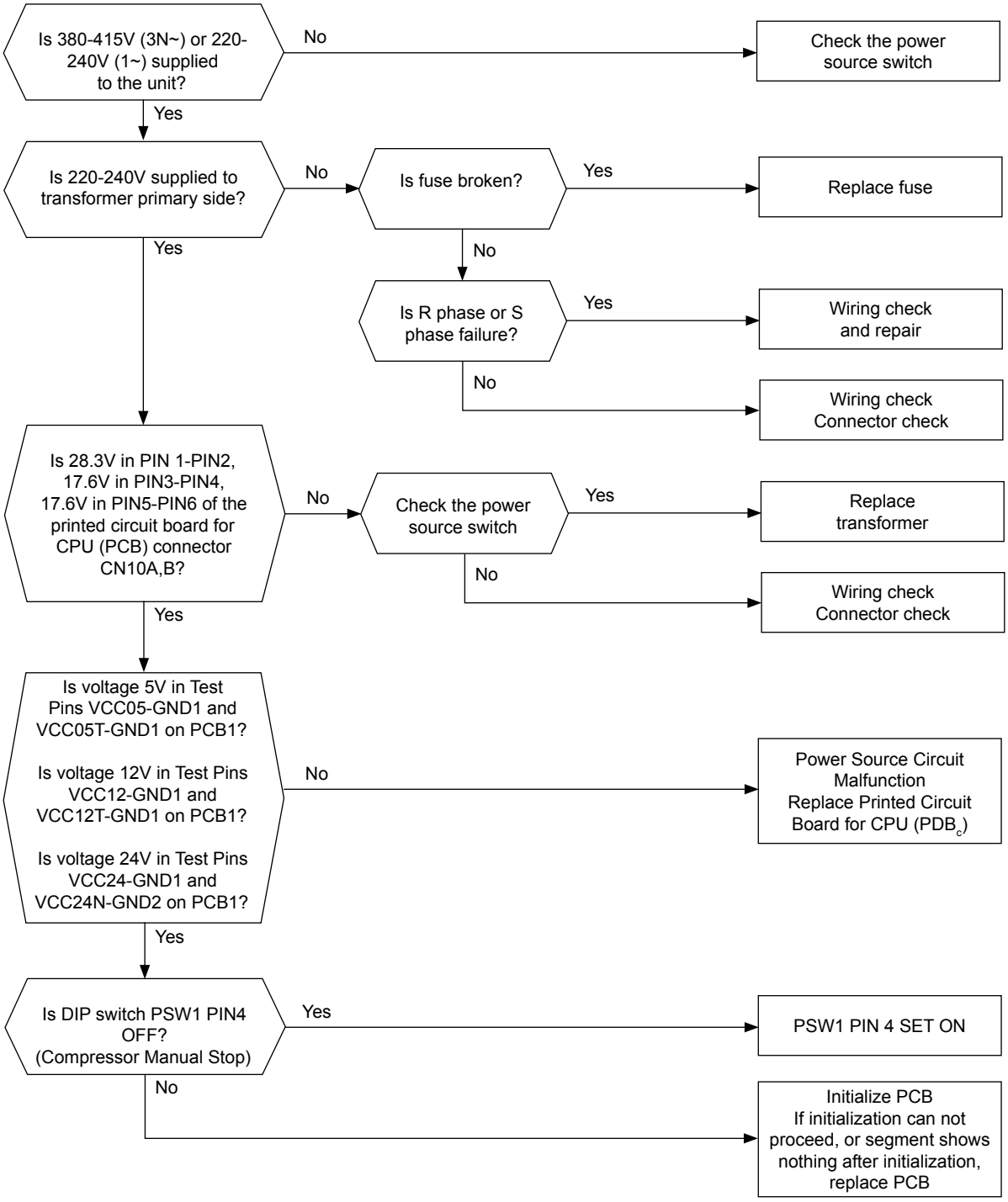
Check to ensure that DC Fan Motor is checked according to the section "Fault diagnosis of DC fan motor".

In the case that the fan motor does not run even the PCB1 is replaced, replace fan inverter PCB (PCB4,5).

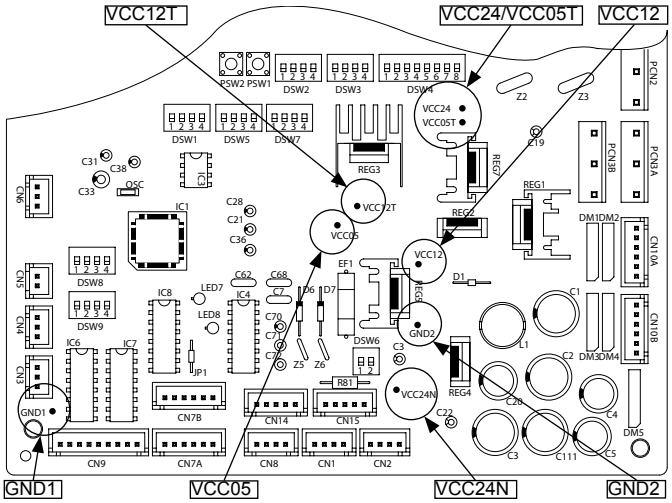
10.3 Failure diagnosis method

- **General check of failure diagnosis.**

In the case of no segment indication, unit can not operate.

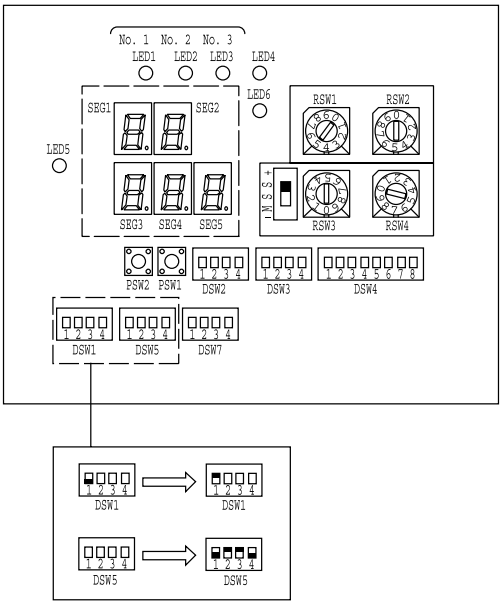


Voltage test position:

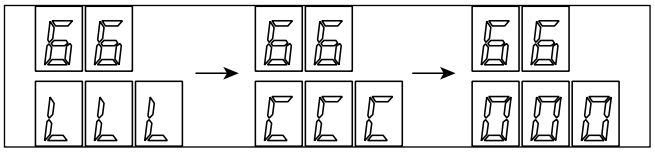


Inicialization procedure

- Power Supply OFF, and set DSW1-1, DSW5-2,3 ON,
- and DSW 5-1,4 OFF on PCB
- (Record original DIP switch setting)

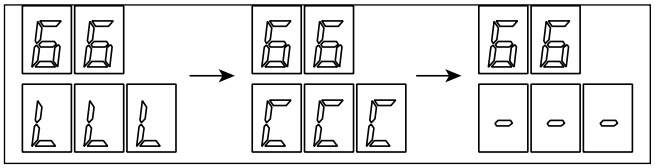


- Power Supply ON, and confirm segment shows as follows:



<Initialization successfully done>

- If segment shows as follows, Power Supply OFF once, and Power ON again:



<Initialization failure>

If segment shows as “Initialization Successfully Done”, Initialization Succeed. Power Supply OFF, and DSW1-1, DSW5-2,3 set original setting again. Initialization is finished. In other case, if segment shows nothing even if doing Initialization procedure, or shown Initialization Failure, PCB1 is broken and replace PCB1.

10.4 Checking procedure for main parts

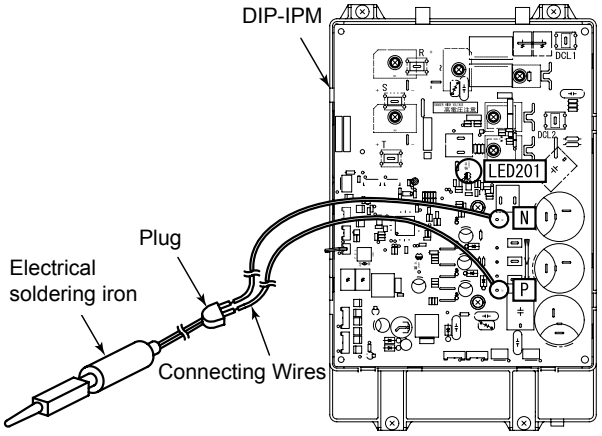
10.4.1 RHUE-(3-6)AVHN(1)(-HM). Procedure for checking the DIP-IPM.

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.



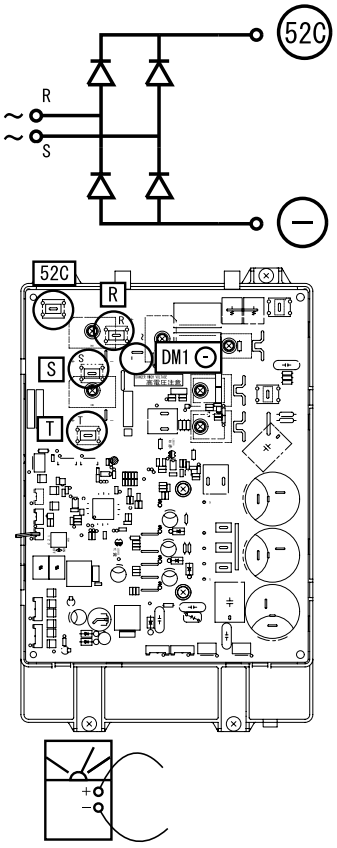
Inverter module checking procedure

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.



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.)

NOTE

DO NOT use a digital tester.

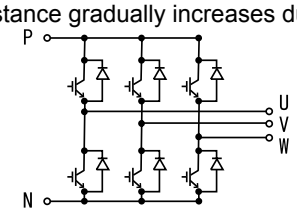
9 Check items [1] – [8].

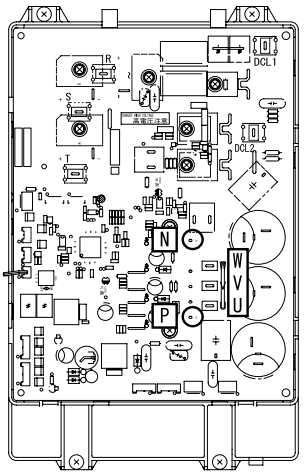
10 Touch [+] of the tester to DIP-IPM DCL2 terminal, and [-] to [P] of ISPM/DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 kΩ or greater

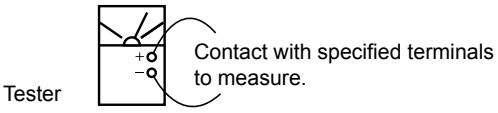
11 Contrary to [10], touch [-] of the tester to DIP-IPM DCL2 terminal, and [+] to [P] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

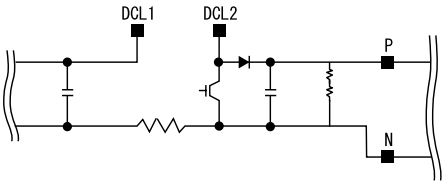
12 Touch [+] of the tester to DIP-IPM DCL2 terminal, and [-] to [N] of DIP-IPM (soldered part) to measure the resistance.
Normal if all three terminals have 100 kΩ or greater.

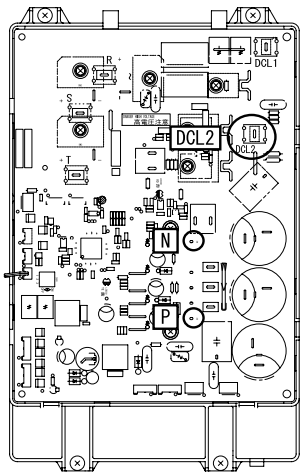
13 Contrary to [12], touch [-] of the tester to DIP-IPM DCL2 terminal, and [+] to [N] of DIP-IPM (soldered part) to measure the resistance.
Normal if all three terminals have 10 kΩ or greater. (Resistance gradually increases during measurement.)









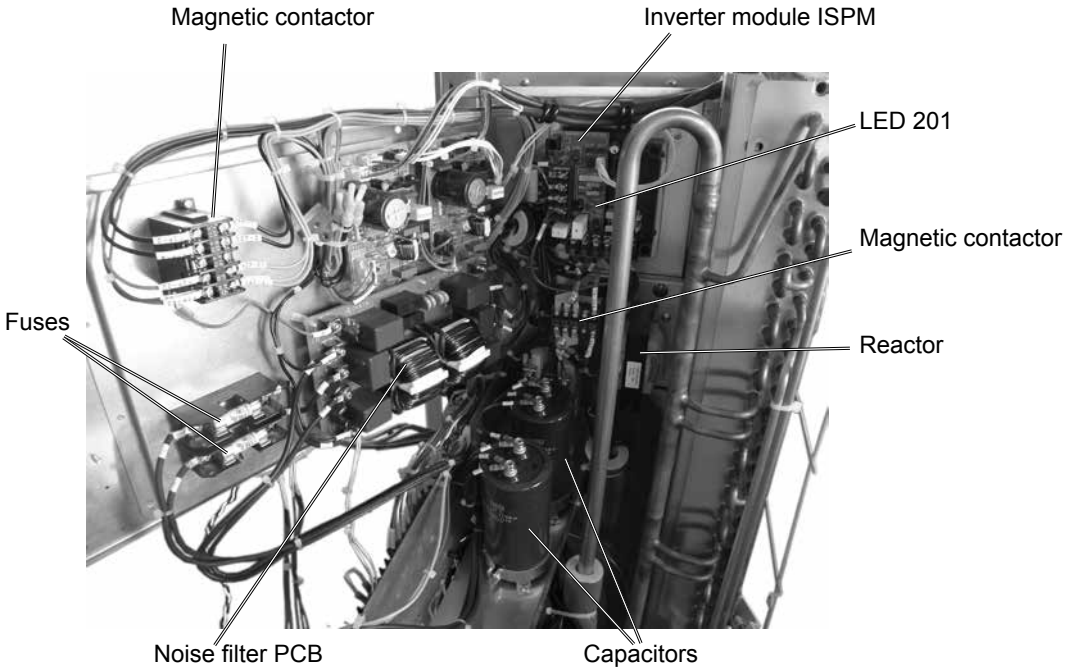


10.4.2 RHUE-(5/6)AHN-HM. Procedure for checking the ISPM.

- Remove all the terminals of the ISPM before check. If items (a) to (h) are performed and the results are satisfactory, ISPM is normal. Measure it under 1 kΩ range of a tester.

⚠ CAUTION

Electrical hazard. Risk of electrical shock. Perform the high voltage discharge procedure as described.

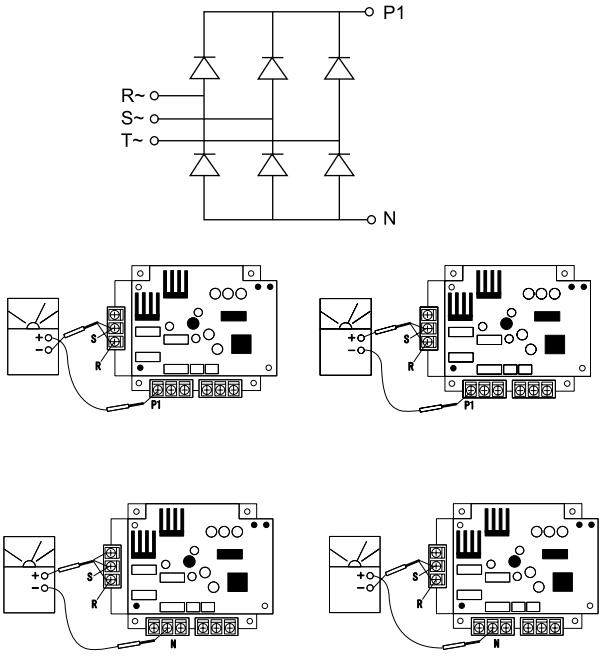


◆ Procedure using an analog tester:

Checking the diode module:

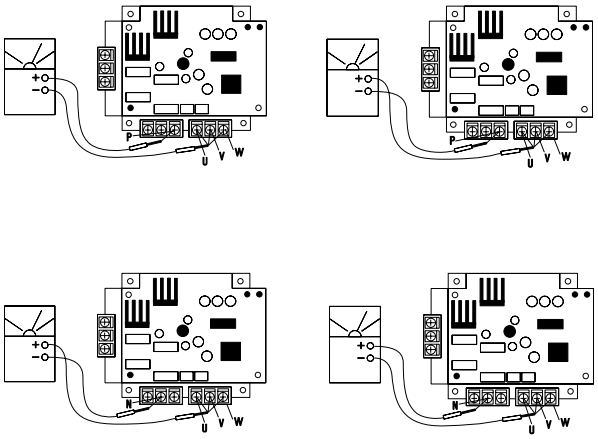
1 By touching the + side of the tester to the P1 terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.
2 By touching the - side of the tester to the P1 terminal of ISPM and the + side of the tester to R and S 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.

Rectification parts of internal circuit of ISPM (common)



Checking the transistor module:

1 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.
2 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.
3 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.
4 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.

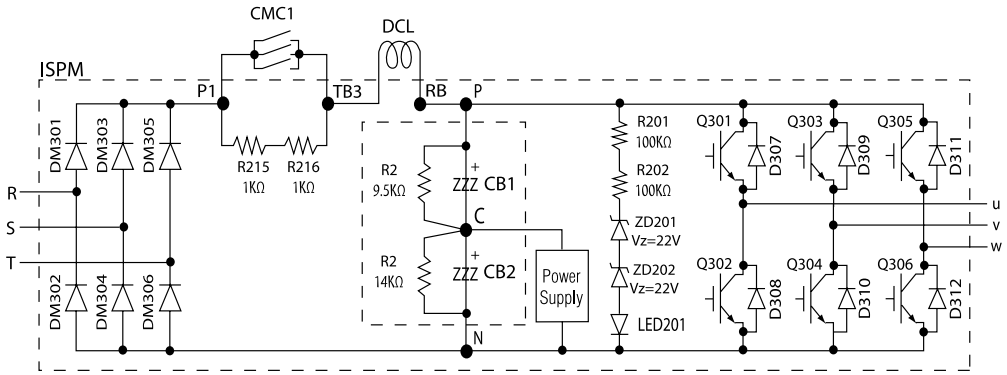


◆ **Procedure using a digital tester:**

NOTE

The digital tester must be able to check semiconductors and continuity.

Based on the folowing 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.

10.4.3 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.***

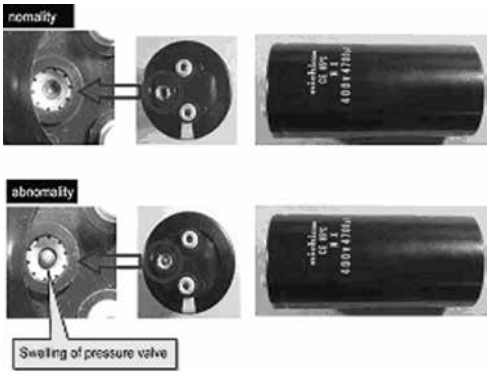
If it's possible, check the capacitance of each capacitor : 4700µF ± 20% (between 3760µF to 5640µF).

A visual check of the pressure valve of capacitors must be done to ensure it's integrity:

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.

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:



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.

10.4.4 Fault diagnosis of DC fan motor.

About DC fan motor fault diagnosis:

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

NOTE

Turn OFF main power before start working.
Working and checking with the power ON may disturb correct diagnosis and may result in failure.

DC motor(s) included in different models:

Model	Pieces
RHUE-3AVHN1	1
RHUE-3AVHN-HM	2
RHUE-4AVHN-HM	2
RHUE-5AVHN-HM	2
RHUE-6AVHN-HM	2
RHUE-5AHN-HM	2
RHUE-6AHN-HM	2

- Fault diagnosis procedure

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 using a tester.

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:	Observed values will be deviated from the normal values in the table below. Generaly 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) Ω			
		Red-black	White-black	Yellow-black	Blue-black
RHUE-3AVHN1	SIC-81FW-D8138-3	1 MΩ or greater	42-78 KΩ	168-312 KΩ	1 MΩ or greater
RHUE-(3-6)A(V)HN-HM	SIC-68FV-D851-7.8	1 MΩ or greater	42-78 KΩ	168-312 KΩ	1 MΩ 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/several kΩ or 0Ω.

- Other parts

Part name	Unit models	Model code	Resistance (Ω)
Solenoid valve for gas bypass	RHUE-3AVHN1 and RHUE-(3-6)A(V)HN-HM	105-52-52 (50Hz)	1540.00 at 20 ºC
Solenoid valve for liquid injection		105-52-52 (50Hz)	1540.00 at 20ºC
Reversing valve		STF-01AJ502D1 (50Hz)	1435.00 at 20ºC
Compressor motor	RHUE-3AVHN1 and RHUE-(3/4)AVHN-HM	EK306AHD-27A2	0.24 at 20ºC
	RHUE-(5/6)AVHN-HM	EK406AHD-36A2	0.20 at 20ºC
	RHUE-(5/6)AHN-HM	EK405AHD-36D2	0.239 at 20ºC

10.5 Troubleshooting of accessories

10.5.1 Advanced system controller

- Fault codes and diagnostics

Alarms and fault-codes can help diagnose system problems. These are available via the menu screens.

Press MENU from the home screen to enter the menu system. The Alarm menu 00> will appear first.

Press OK to select the Alarm menu item and then Δ or ∇ to scroll through the current active items.

Press ESC repeatedly to return to the home screen.

Code	DESCRIPTION	CONDITION	ACTION
F01	No Outside Temperature sensor or short cut or broken	Used outside sensor no response	The control will continue in normal operation with a fixed Outside temperature of 10 ºC. The System controller shows a datapoint alarm
	Outside Temperature sensor out of range	YUTAKI M sensor or wired sensor < -40 ºC or > 99 ºC	The control will continue in normal operation with a fixed Outside temperature of 10 ºC. The System controller shows a datapoint alarm
F02	No DHW Water Temperature sensor or short cut	No response	DHW is disabled. The System controller shows a datapoint alarm
	DHW Water Temperature sensor out of range	Temperature < 0 ºC or > 99 ºC	DHW is disabled. The System controller shows a datapoint alarm
F03	No HC1 Supply Water Temperature sensor or short cut (mixing circuit only)	No response	Disable the heating circuit 1 The System controller shows a datapoint alarm
	HC1 Supply Water Temperature sensor out of range (mixing circuit only)	Temperature < 0 ºC or > 99 ºC	Disable the heating circuit 1 The System controller shows a datapoint alarm
F04	No HC2 Supply Water Temperature sensor or short cut (mixing circuit only)	No response	Disable the heating circuit 2 The System controller shows a datapoint alarm
	HC2 Supply Water Temperature out of range (mixing circuit only)	Temperature < 0 ºC or > 99 ºC	Disable the heating circuit 2 The System controller shows a datapoint alarm
F05	No Boiler Water Temperature sensor or sensor failure	CONF 4 only: no response	Disable the Boiler (if the boiler will be disabled the bypass mixing valve will be closed). The System controller shows a datapoint alarm
	Boiler Water Temperature sensor out of range	CONF 4 only: Temp. < 0 ºC or > 99 ºC	Disable the Boiler (if the boiler will be disabled the bypass mixing valve will be closed). The System controller shows a datapoint alarm
F06	No System Supply Water Temperature sensor or short cut	No response	The Boiler (if present), 3-stage E-Heater (if present) and the Heat Pump will be disabled. The System controller shows a datapoint alarm
	System Supply Water Temperature sensor out of range	Temperature < 0 ºC or > 99 ºC	The Boiler (if present), 3-stage E-Heater (if present) and the Heat Pump will be disabled. The System controller shows a datapoint alarm
F07	OpenTherm™ communication failure	No OpenTherm™ communication for a continuous period of 1 minute	The control will continue in normal operation with the following fixed OpenTherm™ values: Circuit 1: The last received Room Setpoint is used. The Room Temperature is assumed to be equal to the Room Setpoint. Circuit 2: The last received Room Setpoint is used. The Room Temperature is assumed to be equal to the Room Setpoint. The System controller shows a system alarm.
F08	Heat Pump Connection Fault	Occurs if no load is connected to the 0-20mA output. Resets when the load is re-connected.	In case of a Heat Pump connection fault, the Heat Pump and the 3-stage electric heater and the Boiler are disabled and the Boiler (if present) or the 3-Stage Electric Heater (if present) can be released via manually release mode. This is valid until a load is connected again (problem fixed). The System controller shows a datapoint alarm.
F09	Heat Pump Communications Fault	Modbus not working	The Outside Temperature is set to 10°C (fixed). The Heat Pump and the 3-stage electric heater and the Boiler are disabled and the Boiler (if present) or the 3-Stage Electric Heater (if present) can be released via manually release mode. This is valid until the Modbus is working again. (Problem fixed). The System controller shows a datapoint alarm.
F10	Mixing Over-temperature Limit Protection HC1	HC1 supply temperature > P106 + P111	Heating Circuit Pump of HC1 switches off immediately. The System controller shows a datapoint alarm.

Code	DESCRIPTION	CONDITION	ACTION
F11	Mixing Over-temperature Limit Protection HC2	HC2 supply temperature > P206 + P211	Heating Circuit Pump of HC2 switches off immediately. The System controller shows a datapoint alarm.
F12	Heat Pump Fault	“Cricital” Fault code (individual alarm 3) received from Heat Pump	In case of this fault, the Heat Pump and the 3-stage electric heater and the Boiler are disabled and the Boiler (if present) or the 3-Stage Electric Heater (if present) can be released via manually release mode or depending on the Parameters P716 or P810 automatically released. This is valid until a reset of a HP failure signal (problem fixed). System controller shows a datapoint alarm.
F13	RF communication failure	No communication for 1 hour with one or two RF devices which are bound to the RF-bridge.	See F07. The System controller shows a system? Or datapoint? Alarm. Depends if we decide to add to the OpenTherm™ datapoints or not.
F14	Heat Pump Maximum Inlet Temperature Protection Active	HP inlet temperature (T603) ≥ HP maximum inlet temperature (P604)	The Heat Pump is switched off. The System controller shows an alarm.
F15	DHW Anti-Legionella Failure	Time defined in parameter DHW Anti-Legionella Restart Interval (P315) has expired	The control will continue in normal operation. This alarm (fault) code can be deleted: - if the next DHW Anti-Legionella function was successfully passed or - if DHW Anti-Legionella Protection is disabled (P309=0)
F16	HP Individual Alarm	Individual Alarm Code received from Heat Pump except Individual alarm 3 see Table 12	In case of this Fault the 3-Stage Electric Heater and the Boiler are disabled and the Boiler (if present) or the 3-Stage Electric Heater (if present) can be released via manually release mode or depending on the Parameters P716 or P810 automatically released. This is valid until a reset of a HP failure signal (problem fixed). HMI shows a datapoint alarm. Power OFF/ON to remove alarms in Yutaki M and system controller.
F17	HP Unitl Alarm	Unit (common) Alarm Code received from Heat Pump see Table 12	In case of this Fault the 3-Stage Electric Heater and the Boiler are disabled and the Boiler (if present) or the 3-Stage Electric Heater (if present) can be released via manually release mode or depending on the Parameters P716 or P810 automatically released. This is valid until a reset of a HP failure signal (problem fixed). HMI shows a datapoint alarm. Power OFF/ON to remove alarms in Yutaki M and system controller.

- Reset to factory default condition

Should it be necessary to reset the controller to the factory default conditions, remember to re-select the desired hydraulic configuration and set the necessary installation parameters.

The **RESET** button is located in a recess at the top of the System Controller next to the low voltage input terminals. It is clearly labeled “RESET” and can be activated by a pen tip or a screwdriver.

10.5.2 System MMI Pack

Symptom	Possible cause	Remedy
The Hitachi room unit has a blank LCD screen.	Batteries not installed.	Check to see if there are batteries in the battery coM-Partment and the paper tab has been removed.
	Incorrect battery orientation.	Check that the batteries have been installed in the correct orientation.
	Exhausted batteries.	Replace with new batteries.
The Hitachi room unit shows a flashing symbol on the LCD screen.	Batteries are exhausted and need replacing.	Replace with new batteries.
The Hitachi room unit shows a flashing symbol on the LCD screen.	Fault in Hitachi room unit	Remove and re-insert the batteries in the Hitachi room unit. If the symbol does not clear itself in a few minutes call the installer.
The Hitachi room unit's LCD display works but the heating does not switch on.	No power to heating system.	Check that there is power to the heating system.
	Program does not call for heat.	Press the button and then press the to increase the temperature a few degrees above the current room temperature. The heating should come on after a few seconds.
	Wrong electrical connection.	Call the installer to check the electrical connections
The red LED on the receiver located next to heat pump controller is constantly on or flashing.	RF communication lost due to the wrong location of the Hitachi room unit.	Hook the Hitachi room unit back on the wall bracket or replace the Hitachi room unit on the table stand in the position where RF communication was reliable.
	RF communication fault.	Call installer.
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. Incorrect position of the Room Unit during binding.	Repeat the binding procedure. 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. Room Unit batteries are exhausted.	Re-locate the Room Unit following instructions in section 2 of Installation and operation manual of the System MMI Pack. Replace batteries in the Room Unit.

- Diagnostic mode

The Room Unit has a user accessible mode that provides information useful to a remote service person and a means of checking whether the heating system is working. To access this press the ⏻ button then press and hold the ⓘ button for 5 seconds. The Room Unit will enter the user settings mode. Next press and hold the ⓘ and ⊕ buttons together. The following information can be viewed on the display by pressing the ▲ or ▼ buttons : model ID, date code (WW/YY) & checksum.

10.5.3 Hydraulic module

All actions of troubleshooting may only be done by the installer

CAUTION

When water leakage from the Hydraulic Module occurs, stop the operation and contact your service contractor.

When you smell or white smoke occurs from the unit, stop the system and contact your service contractor.

When safety device was activated stop the unit and find out why it was activated before restart the operation. Under no circumstance safety devices may be bridged or changed by another one supplied by Hitachi.

- THIS IS NOT ABNORMAL
  - Sound from deforming part:
    During system starting or stopping, and abrading sound might be heard. However, this is due to thermal deformation of plastic parts. It is not abnormal.
  - Steam from outdoor heat exchanger:
    During defrosting operation, the ice on the outdoor heat exchanger is melted and steam is produced.
  - Sound for the Hydraulic Module heat exchanger:
    During the cooling operation, a sound may be heard from the Hydraulic Module heat exchanger due to water freezing or melting.
  - Water noise:
    During start up or stopping of the unit, noise can appear in water piping.
  - During defrost:
    Noise can appear in unit due to defrosting of water.
- NO OPERATION

Check the configuration for space heating or cooling.

- IF TROUBLE STILL REMAINS...

If the trouble still remains even after checking the above items, contact your service contractor and inform the following data:.

- Unit model name.
- Content of trouble.
- Alarm code no. on liquid crystal display.

NOTE

Except for a long period of shutdown, keep the main switch ON, since the oil heater is energised when the compressor is stopped.

CAUTION

Do not touch the internal parts of the unit (water pump, electrical heater, …) during and after operation.

Do not touch the electrical box internal parts (transformers, PCBs,…) immediately after power OFF as may be very hot

10.5.4 Water pump

Problem	Cause	Remedy
The unit is making noises	There is air in the unit.	Vent the unit.
	The pump volume rate is too strong.	Decrease the pump output by switching to a lower speed.
	The pump lift is too high.	Decrease the pump output by switching to a lower speed.
The pump is making noises	Cavitation noise has occured in the pump due to insufficient inlet pressure.	Check the pressure level/system admission pressure and increase to the admissible range.
	There is a foreign body inside the pump housing or impeller.	Disassemble the pump head and remove the foreign body.
	There is air in the pump.	Vent the pump/unit.
	Shut-off valves are not fully open.	Open the shut-off valves fully.
Pump output too low	There is a foreign body inside the pump housing or impeller.	Disassemble the pump head and remove the foreign body.
	Wrong pumping direction.	Exchange the pump pressure and suction sides. Observe the arrow indicating direction on the pump housing.
	Shut-off valves are not fully open.	Open the shut-off valves fully.
	Wrong direction of rotation.	Correct the electrical connection in the terminal box:
Motor is switched on but fails to run	Elektrical fuse faulty/has switched off.	Change fuse/switch on electrical connection. Should the fuse blow several times in a row: - Check the pump for electrical faults. - Check the pump mains cable and electrical connection.
	Residual current operated circuit-breaker has tiggered.	Switch residual current operated circuit-breakes back on. Should the circuit-breaker trip several times in arow: - Check the pump for electrical faults. - Check the pump mains cable and electrical connection.
	Undervoltage	Check the voltage at the pump (observe rating plate data).
	Winding damage	Call customer Services.
	Faulty terminal box	Call customer Services.
	Faulty capacitor	Replace the capacitor.

Problem	Motor is switched on but fails to run.			
Cause	Motor protection has switched the pump off as a result of:			
	a) Hydraulic overloading	**b)** A blockage	**c)** An excessive pump medium temperature.	**d)** An excessive ambient temperature.
Remedy	**a)** Reduce the pump on the pressure side to an operationg point which is on the characteristic line.	**b)** Fully remove the pump vent screw, check and rectify free runnig of pump rotor by turning the slotted end of the shaft with a screwdriver. **Alternative:** Disassemble the motor head and check; unblock by turning the impeller where necessary. If the blockage cannot be removed, contact Customer Services.	**c)** Decrease the pump medium temperature in accordance with the rating plate.	**d)** Decrease the ambient temperature, e.g. by insulating the pipes and fittings.

10.5.5 WEH - Water Electric Heater

Observed failure	Cause	Check item	Action
Electric power supply problems in WEH	Control signals from Systems Controls miss-connected or wrongly connected	Check connections between System Controller and WEH	Terminals 7, 8, 9 from System Controller connected to Terminals 7, 8, 9 WEH respectively
		Check Voltage (230V) between terminals 8/9 and 8/7 in WEH and also in System Controller	Check Power Supply in System Controller
		Check Voltage (230V) between Terminals A1 & A2 in Contactor Coils of WEH	Repair connections if required
	WEH has no Power Terminals L1~L3 have no voltage (440V/230V)	ELB, CB or Fuse protecting WEH are activated. There is some short-circuit, wrong connection or any earth leak	Check cable connections in WEH power circuit. Repair circuit and replace Fuse or Switch ON ELB/CB
		Check possible miss connections in WEH power circuit	Check cable connections in WEH power circuit. Repair circuit.
		Check Electric Resistances: 26,5 Ohms (5% Tolerance)	Replace Resistances if required
Problems in Water Circuit due to low Water Pressure or no Water in Water Circuit	LWPS is OFF [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 Valves and Water Circuit to ensure water circulation
		Check if there is Water leaks	Check Water circuit and repair leaks if exist
Problems in Water Circuit due to excesive Water Temperature in Water Circuit	Thermostat Cut-Out activated [Excesive water temperature (<85ºC)]	Check Water Temperature and Thermostat state	Push reset button for thermostat re-start

10.5.6 DHWT - Domestic Hot Water Tank

Observed failure	Cause	Check item	Action
"Electric power supply problems in DHWT"	"Control signals from Systems Controls miss-connected or wrongly connected"	"Check connections between System Controller and DHWT"	Terminals 11, 12 from System Controller connected to Terminals 3, 4 DHWT respectively
		"Check Voltage (230V) between terminals N/3 and N/4 in DHWT"	"Check Power Supply in System Controller"
		Check Voltage (230V) between Terminals 7 & 8 in Relay coils of DHWT	Repair connections if required
	"DHWT has no Power Terminals L~N have no voltage (230V)"	"ELB, CB or Fuse protecting DHWT are activated. There is some short-circuit, wrong connection or any earth leak"	"Check cable connections in DHWT power circuit. Repair circuit and replace Fuse or Switch ON ELB/CB"
		Check possible miss connections in DHWT power circuit	"Check cable connections in DHWT power circuit. Repair circuit."
		"Check Electric Resistances: 17,7 Ohms (5% Tolerance)"	Replace Resistances if required
"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 Valves and Water Circuit to ensure water circulation
		Check if there is Water leaks	"Check Water circuit and repair leaks if exist"
"Problems in Water Circuit due to excesive Water Temperature in Water Circuit"	"Thermostat Cut-Out activated [Excesive water temperature (<90ºC)]"	"Check Water Temperature and Thermostat state"	"Push reset button for thermostat re-start"

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