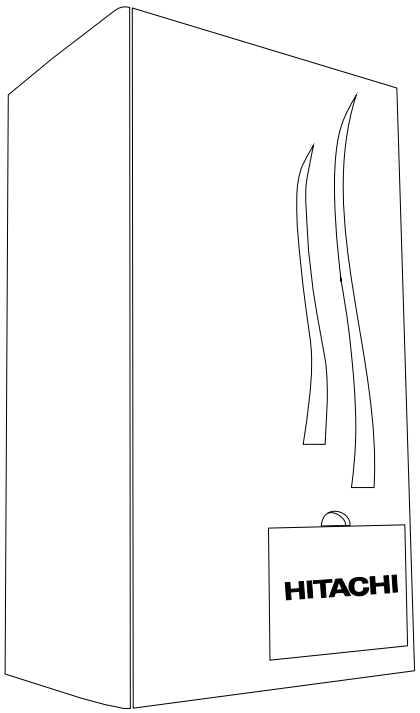
HITACHI
Inspire the Next

YUTAKI S SERIES



Technical Catalogue

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

HITACHI
Inspire the Next

Contents

General Index

HITACHI
Inspire the Next

1. General information

Index

1.1 General information

1.1.1 General notes

No part of this publication may be reproduced, copied, filed or transmitted in any shape or form without the permission of HITACHI Air Conditioning Products Europe, S.A.

Within the policy of continuous improvement of its products, HITACHI Air Conditioning Products Europe, S.A. 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.

1.1.2 Introduction

Yutaki S indoor unit has two different ranges:

- Heating and cooling version (RWM-(2.0-10.0)FSN3E)
- Heating only version (RWM-(2.0-10.0)HFSN3E).

All the information in this manual, related to cooling operation, only applies to heating and cooling version (RWM-(2.0-10.0) FSN3E).

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

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

◆ For winter time

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

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

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

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

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

◆ For summer time

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

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

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

◆ Domestic Hot Water (DHW) production

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

◆ Additional combinations

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

Solar combination for DHW

YUTAKI S system can be combined with solar panel.

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

Swimming pool operation

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

1.1.3 Environment-friendly units

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

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

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

1.2 Applied symbols

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

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

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

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

DANGER

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

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

CAUTION

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

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

NOTE

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

1.3 Product guide

1.3.1 Classification of indoor unit models

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

1.3.2 Classification of outdoor unit models

◆ RAS-HVRN2

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

◆ RAS-H(V)RNME-AF

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

1.3.3 Classification of Domestic Hot Water Tank accessory

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

1.3.4 Product guide: indoor unit

RWM-FSN3E indoor units			
1~		3N~	
Unit	Code	Unit	Code
RWM-2.0FSN3E	7E474003	-	-
RWM-3.0FSN3E	7E474005	-	-
RWM-4.0FSN3E	7E474107	RWM-4.0FSN3E	7E474107
RWM-5.0FSN3E	7E474108	RWM-5.0FSN3E	7E474108
RWM-6.0FSN3E	7E474109	RWM-6.0FSN3E	7E474109
-	-	RWM-8.0FSN3E	7E474110
-	-	RWM-10.0FSN3E	7E474111

RWM-HFSN3E indoor units			
1~		3N~	
Unit	Code	Unit	Code
RWM-2.0HFSN3E	7E474016	-	-
RWM-3.0HFSN3E	7E474018	-	-
RWM-4.0HFSN3E	7E474120	RWM-4.0HFSN3E	7E474120
RWM-5.0HFSN3E	7E474121	RWM-5.0HFSN3E	7E474121
RWM-6.0HFSN3E	7E474122	RWM-6.0HFSN3E	7E474122
-	-	RWM-8.0HFSN3E	7E474123
-	-	RWM-10.0HFSN3E	7E474124

1.3.5 Product guide: outdoor unit

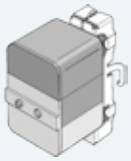
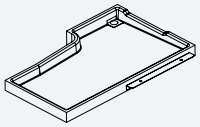
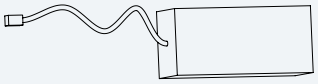
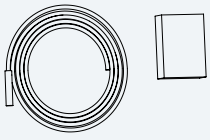
RAS-H(V)RNME-AF outdoor units			
RAS-HVRNME-AF units ☀ ❄ 1~		RAS-HRNME-AF units ☀ ❄ 3N~	
Unit	Code	Unit	Code
RAS-2HVRN2	60288093	-	-
RAS-3HVRNME-AF	7E300018	-	-
RAS-4HVRNME-AF	7E300020	RAS-4HRNME-AF	7E300120
RAS-5HVRNME-AF	7E300021	RAS-5HRNME-AF	7E300121
RAS-6HVRNME-AF	7E300022	RAS-6HRNME-AF	7E300122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

1.3.6 Accessory code list

◆ Room Thermostats

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

◆ Other accessories

Accessory	Name	Code	Figure
ATW-HSK-01 (BDHM1)	Hydraulic separator	7E549905 (BDHM1)	
ATW-3WV-01 (VID3V1)	3-way valve	7E549906 (VID3V1)	
ATW-AQT-01 (ASMSH1)	Aquastat	7E549907 (ASMSH1)	
ATW-2KT-01 (CDH2Z1)	2nd. temperature kit	7E549904 (CDH2Z1)	
ATW-MVM-01 NEW	Mixing valve motor	7E549912	
ATW-DPK-01	Drain pan kit (For RWM-(2.0-6.0)FSN3E)	7E549902	
ATW-DPK-02 NEW	Drain pan kit (For RWM-(8.0/10.0)FSN3E)	7E549903	
ATW-AOS-01	Auxilliary output signal box (Relay board for additional output signals)	7E549910	
ATW-2OS-01	Ambient temperature sensor (2nd. outdoor temperature sensor)	7E549909	
ATW-WTS-02	Water temperature sensor (2nd. temperature control, boiler combination)	7E549911	
ATW-SPS-01	Swimming pool sensor	7E549908	
ATW-WTS-02Y	Water temperature sensor (for Domestic Hot Water Tank)	9E500004	

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 valve	70544902	

2. Features and benefits

Index

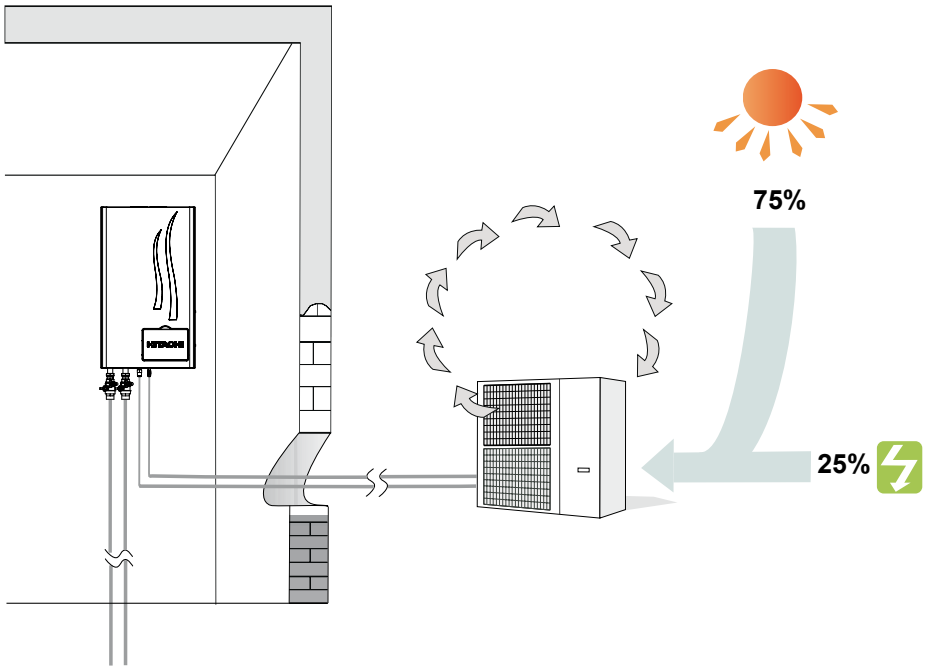
2.1 Selection benefits

2.1.1 Environment-friendly system

◆ Free energy

The air to water heat pump extracts the free energy present in the air, which is enough to heat a home up to a comfortable temperature, even on the coldest winter day.

The air to water heat pump can attain efficiency of over 4. This means less electrical power input and therefore a reduction in CO_2 emissions.



◆ Combinability with solar energy

New air to water heat pump allows the combination with solar panels for the Domestic Hot Water operation. The air to water heat pump will provide a part of the required heating, and the rest of required heating will be provided by the solar panel.

As it is known, the solar panels get the heat from the solar radiation, resulting in an environment friendly system.

NOTE

For more information, please refer to the section *Installation configurations****.***

2.1.2 Expanded selection range

The selection range has been extended up to (2-10)HP as shown in the tables below:

◆ Outdoor unit

RAS outdoor unit series allows (2-10)HP units for being selected in single or three phase combinations, depending on the model.

UTOPIA outdoor units		Phase	Capacity (HP)						
			2	3	4	5	6	8	10
RAS-HVRN2		1~	● NEW	-	-	-	-	-	-
RAS-HVRNME-AF		1~	-	●	-	-	-	-	-
RAS-HR(V)NME-AF		1~	-	-	●	●	●	-	-
		3N~			●	●	●	-	-
RAS-HRNME-AF		3N~	-	-	-	-	-	● NEW	● NEW

◆ Indoor unit

RWM-(H)FSN3E indoor unit series range allows single-phase and three-phase connection.

All models are factory supplied with electric heater.

RWM indoor units		Phase	Capacity (HP)						
			2.0	3.0	4.0	5.0	6.0	8.0	10.0
RWM-(H)FSN3E		1~	● NEW	●	●	●	●	-	-
		3N~	-	-				● NEW	● NEW
Electric heater		-	3 kW	3 kW	6 kW	6 kW	6 kW	9 kW	9 kW

2.1.3 Adaptability to the customer's/system needs

As it have been seen in the Introduction, depending on the type of heating installation system (existing or new) and the user's needs, the most suitable system for each situation can be chosen with:

◆ Space heating

Three main system configurations:

- Mono-valent systems (Heater disabled)
- Mono-energy systems (Heater enabled)
- Parallel bi-valent systems (For boiler combination)

Selecting the different configuration types it is possible to adapt the system to all customer requirements, providing a wide application range from the simplest configuration to complete configuration, as shown below:

Radiator/(fan coil), heating floor or both (2nd temperature area). Also combinable with the following options:

- Domestic Hot Water (DHW)
- Use of electric heater, boiler or both for low ambient temperature conditions.
- Solar combination for DHW

◆ Space cooling

Fan coil, refreshing floor or both (2nd temperature area). Also combinable with the following options:

- Domestic Hot Water (DHW)
- Solar combination for DHW
- Swimming pool combination in summer season period (Heating mode)

NOTE

For the typical installation examples, please refer to the section** Installation configurations**.

Wide range of accessories

In order to enable all the possible system configurations explained previously, there are available a large set of accessories designed to adapt the unit to the type of installation which the system needs.

NOTE

For knowing the different accessories that offers the system, please refer to the section** Accessory code list **on chapter** General information**.

2.2 Installation benefits

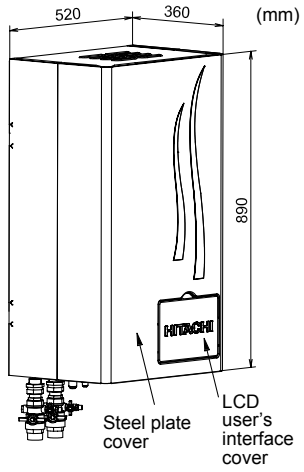
2.2.1 Easy unit installation

More straightforward installation due to the following aspects:

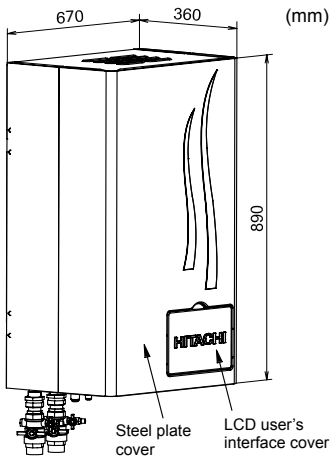
◆ Compact size

- Reduced unit dimensions: The dimensions of new air to water heat pump have been reduced slightly in relation with previous models.
- Steel plate cover: The new material used for the service cover improves its rigidity.
- Hidden new LCD user's interface: The new LCD user's interface is located inside the LCD user's interface cover.

RWM-(2.0-6.0)(H)FSN3E

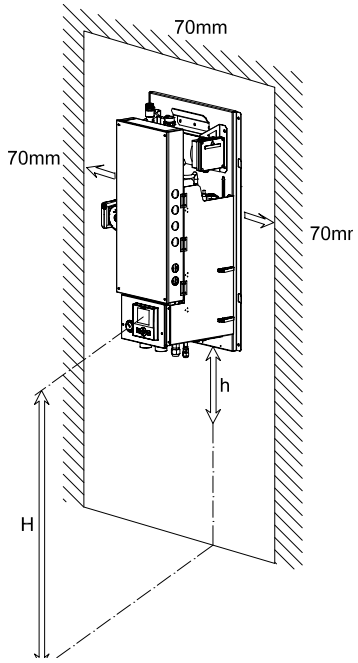


RWM-(8.0/10.0)(H)FSN3E



◆ Reduced installation space

The small installation space allows the location of the indoor unit on very narrow rooms.



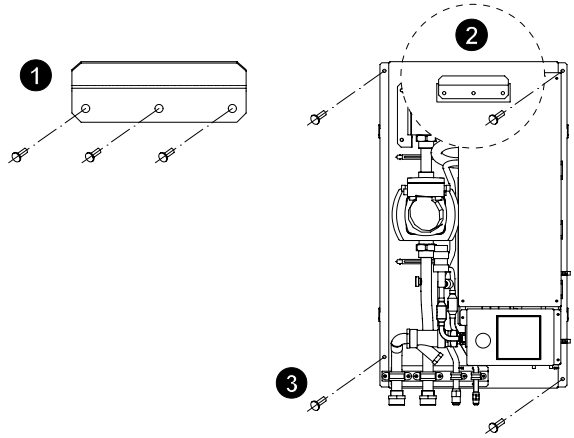
NOTE

- ***H= 1200~1500mm: Recommended unit height for proper access to the control panel (LCD user's interface).***
- ***h= 350mm: Minimum unit height for installing the shutdown valves and the first bending pipe line.***

◆ New wall support (Factory supplied)

A new wall support has been designed to allow an easy installation work by following these steps:

- Step ❶: The wall support must be fixed on the wall using appropriate plugs and screws.
- Step ❷: The unit should be placed on the wall hanging it on the wall support.
- Step ❸: The unit installation should be finished fixing it 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).



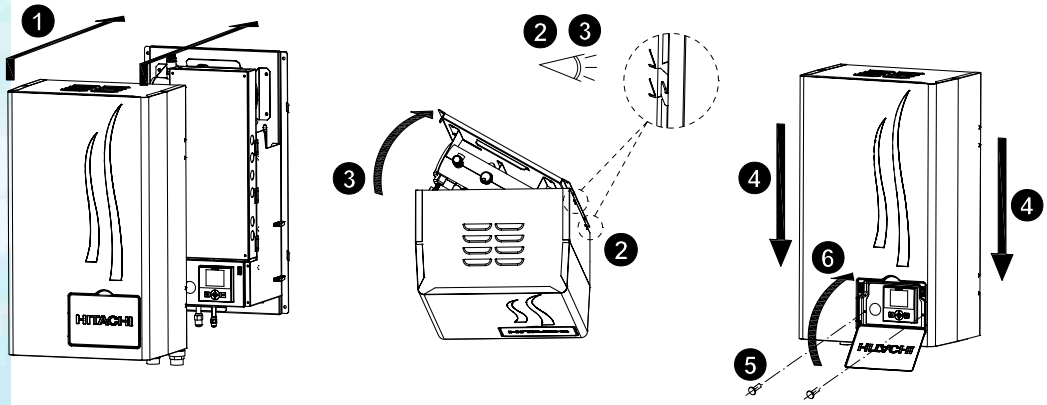
NOTE

For more information, please refer to the Service Manual (SMXX0070).

◆ Easy cabinet assembling

The design of the new cabinet enables a better assembling by following these steps:

- Step ❶: Place the unit's cover at same level of the wall mounted unit by taking it from the bottom side.
- 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 centered, repeat the operation on the left side.
- 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 user's interface service cover and screw the two screws fixing with the nylon washers.
- Step ❻: Finally, close the LCD user's interface service cover.

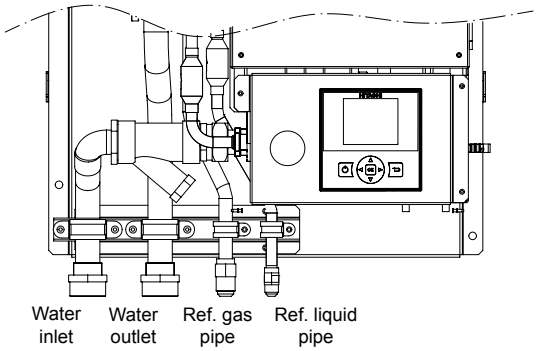


NOTE

For more information, please refer to Service Manual (SMXX0070).

Aligned piping

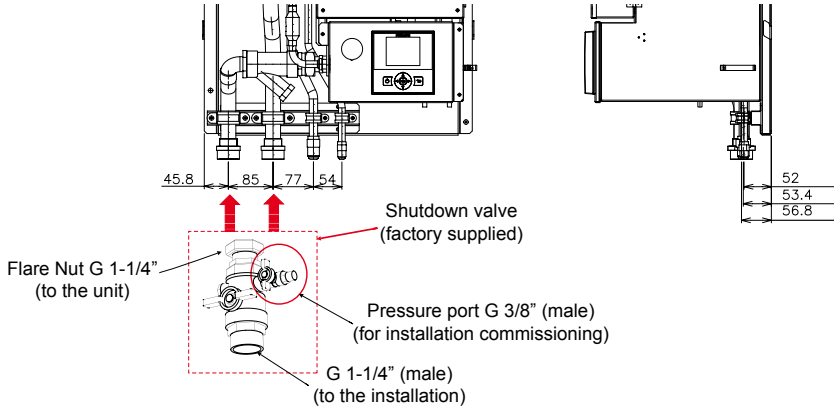
Refrigerant gas/liquid piping and water inlet/outlet piping are aligned on the lower side of the unit to make easy the piping work to the installer.



Shutdown valves (Factory supplied)

New air to water heat pump have incorporated two shutdown valves in water inlet/outlet pipes with the following features:

- Quick installation: This accessory allows to the installer a quick piping work.
- Pressure port for installation commissioning: Each shutdown valve is equipped with a mini-valve, giving the possibility to know the pressure drop of the installation in order to regulate the pump flow.



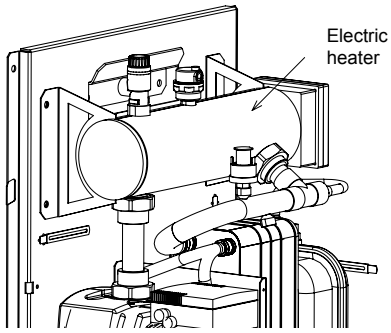
NOTE

For more information, please refer to the Service Manual (SMXX0070).

Incorporated electric heater (Factory supplied)

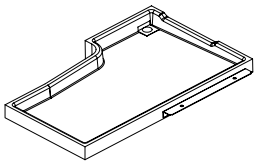
All the new RWM-(H)FSN3E models have incorporated an electric heater for the most low ambient temperature conditions, without the need to install it in case that its use was necessary (Mono-energy system).

If it is desired the performance of the air to water heat pump without the use of the electric heater, we only might to disable the electric heater and the air to water heat pump will provide the 100% of the required heating (Mono-valent system).



◆ Drain pan for cooling installation (Accessory)

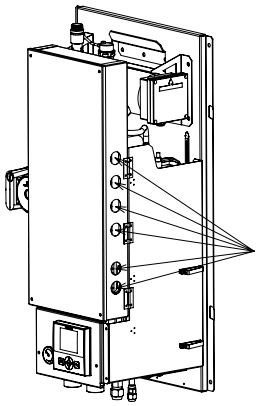
For cooling mode it is necessary to collect the draining. Hitachi supplies a new easy to install drain pan accessory designed to integrate it into the unit's cabinet for this purpose.



2.2.2 Easy and flexible electrical installation

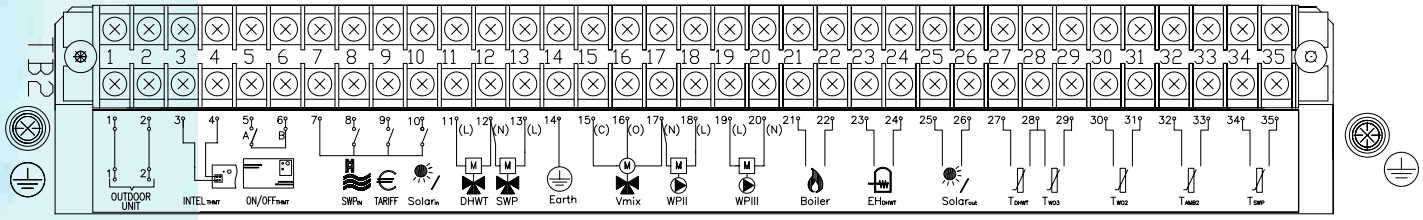
◆ Side access for wiring

The electrical box has been designed with six holes on the right side for the wiring access, keeping the front side of the box free of wires.



◆ Easy wiring

It has been designed a big terminal board in order to allow the easy electrical connection which provides all the different possible configurations (3-way valve, water pumps, boiler...).



Additionally, in order to help with the electrical installation works, HITACHI offers the following specific documentation:

- Service Manual (SMXX0070) and Installation and Operation Manual: All the necessary information about how to perform the electrical works (electrical installation, connection, dip switch setting, ...) is reflected in these documents.
- Schematic label: The different possible connections to the terminal boards are indicated by means of a schematic label with the figure corresponding at the required configuration (see previous figure).
- Big Electrical Wiring Diagram and Caution Label: There are two labels sticked on the rear side of the electrical box cover for a quick referring when electrical works are required. So, installer can get easy and clear wiring understanding and LCD user's interface icons/alarms by directly refering to these labels.
- Inclined terminal board: To make easier the wiring connection, the terminal board has been designed with a little slope in order to bring to the installer a new confortable working position for wiring. NEW
- New separated terminal boards. The TB1 is the power connection board, and the TB2 is the accessories connection board, with four new positions for the SWP (34/35) and for the 2nd sensor control (32/33), and one new position for a third ground socket. NEW

NOTE

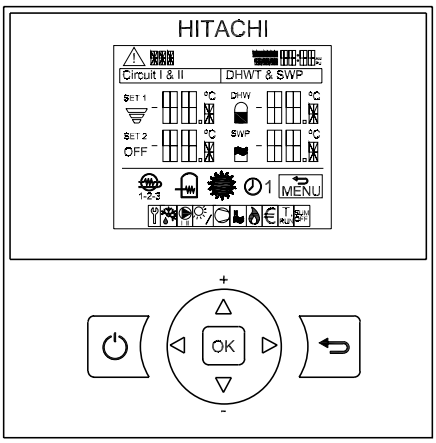
These points can be also understood as Maintenance benefits.

2.3 Start-up benefits

2.3.1 Start-up by pressing the Run/Stop button of LCD user's interface

The unit is factory set to work only by pressing the Run/Stop button of the LCD user's interface.

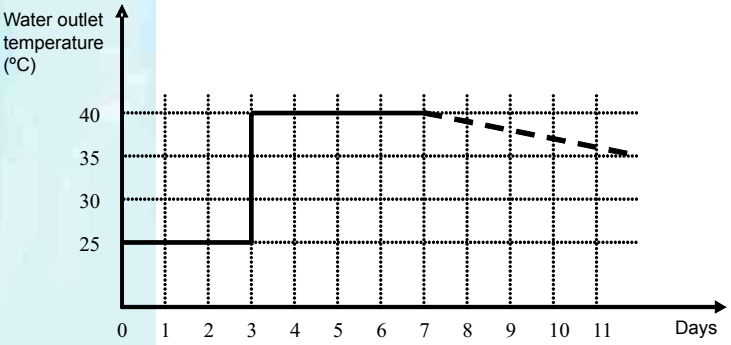
The default value is set for one circuit (Direct) with OTC gradient for heating space of 0.6 (corresponding to a heating floor).



2.3.2 Floor screed drying (Circuits 1 & 2) (Optional function)

The new air to water heat pump has a new special optional function used exclusively for the process of drying screed that has been newly applied to floor heating system. This process is based on EN-1264 par 4.

When user activates the floor screed drying function, the water set-point follows a predetermined schedule:



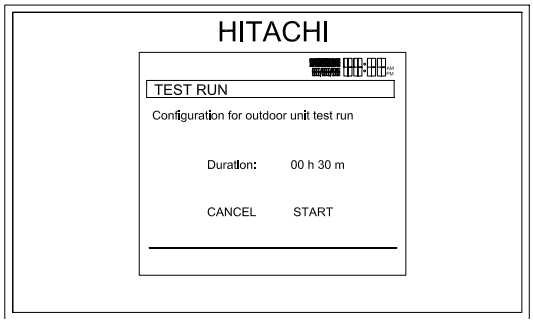
1 Water set-point is kept constant at 25ºC for 3 days.

2 Water set-point is set to the maximum heating supply temperature (but always limited to ≤ 55ºC) for 4 days.

3 After 7 days started the floor screed drying, the water outlet temperature will return at the assigned water temperature setting, depending on the water rule selected.

2.3.3 Test run operation from LCD user's interface

In addition to the usual test run by outdoor unit, there is available a test run function from the LCD user's interface of the indoor unit to check the system performance.



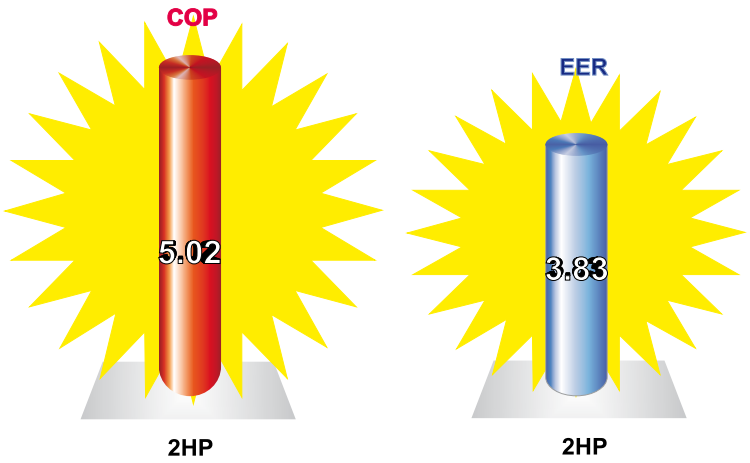
NOTE

For more information, please refer to Service Manual (SMXX0070).

2.4 Functionality benefits

2.4.1 High efficiency system

The combination of the scroll compressor and the inverter type continuous control, the high efficiency plate heat exchanger and the water pumps classified as low power input allow the maximum energy efficiency, resulting in a high COP and EER performance.



NOTE:

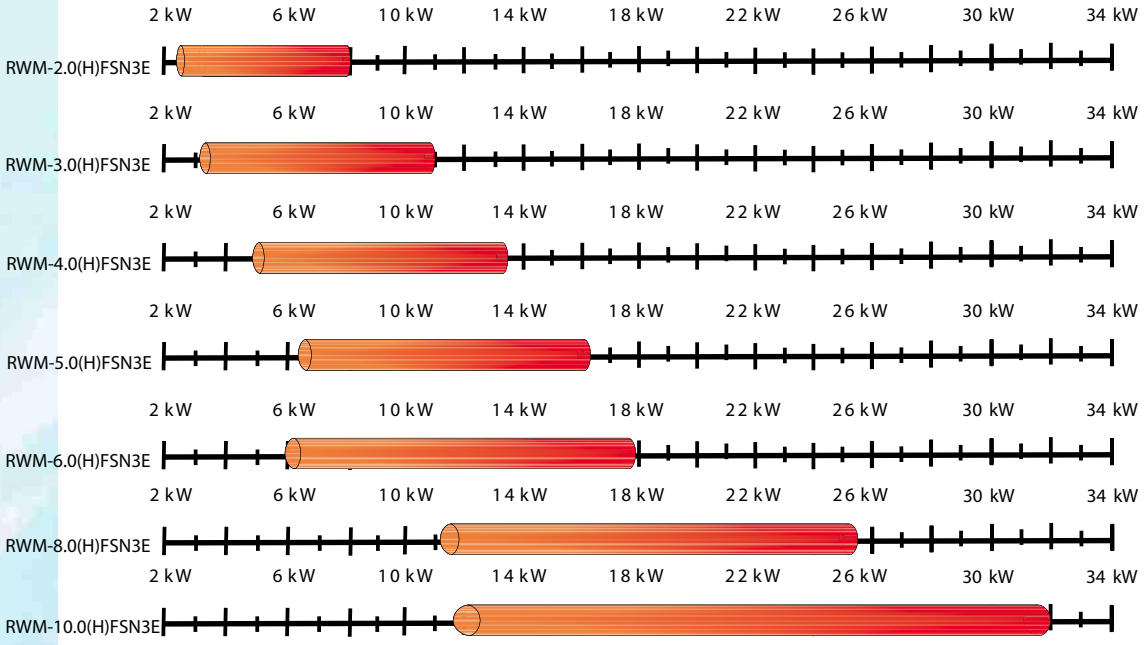
Conditions Range:

- COP: Water in/out: 30/35 ºC; Out Temp. (DB/WB): 7/6 ºC
- EER: Water in/out: 23/18 ºC; Out Temp. (DB): 35 ºC

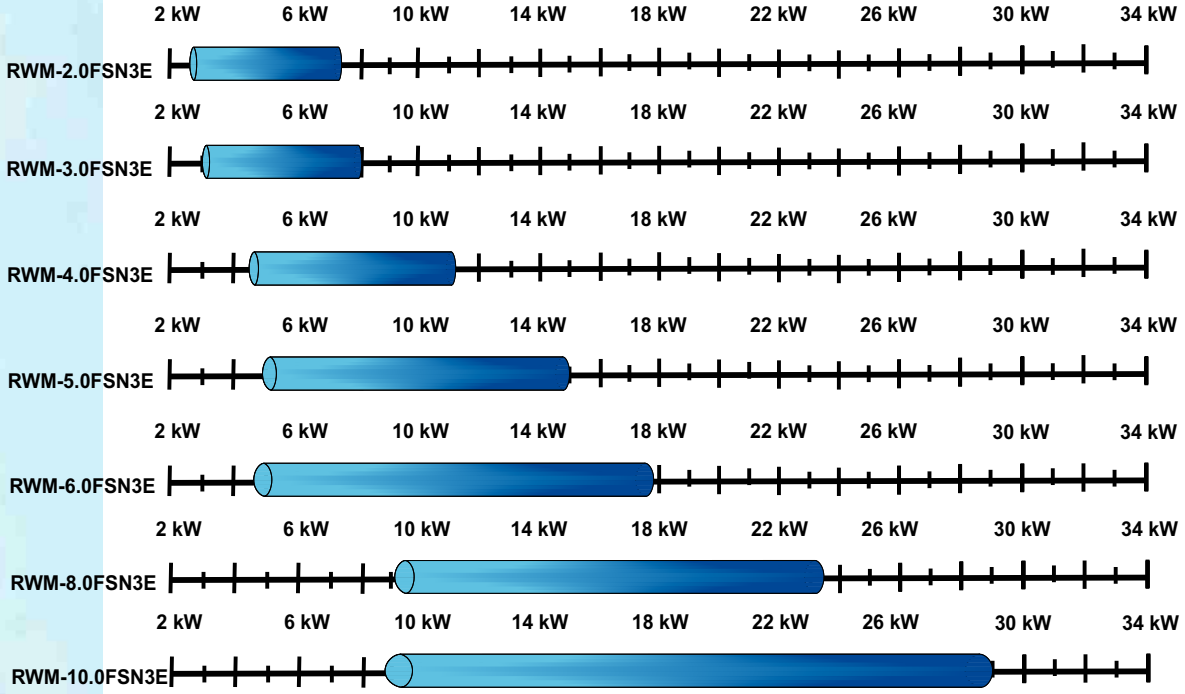
2.4.2 Wide capacity range

The new control frequency system allows a wide capacity application range as shown below:

- Heating capacity range at conditions: Water inlet/outlet: 30/35 ºC; Outdoor temperature: 7/6 ºC (DB/WB)



- Cooling capacity range at conditions: Water inlet/outlet: 23/18 ºC; Outdoor temperature: 35 (ºC DB)



2.4.3 Expanded working range

The working range of new air to water heat pump has been extended for both heating/cooling space as shown below:

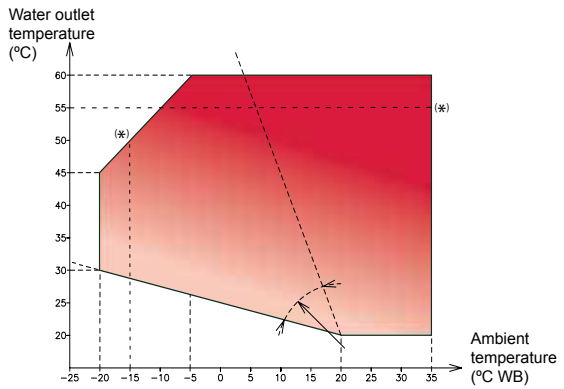
- Space heating

The water outlet temperature has been extended up to a range from 20 to 60ºC. The water outlet temperature can keep high temperature up to 60ºC even in low ambient temperature conditions of -5 (ºC WB).

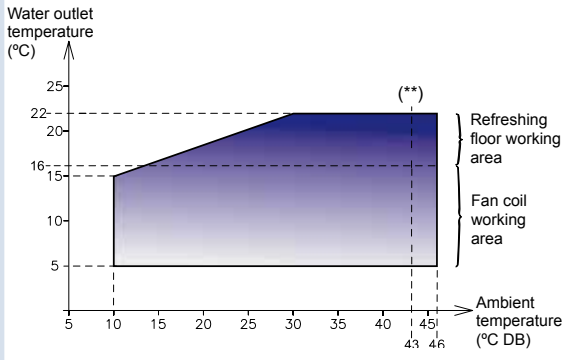
- Space cooling

The water outlet temperature range is from 5 to 22ºC, allowing the use of fan coils or refreshing floor in ambient temperatures from 10 to 46 (ºC DB).

Space heating



Space cooling



NOTE

(*) Only for RAS-2HVRN2 + RWM-2.0(H)FSN3E

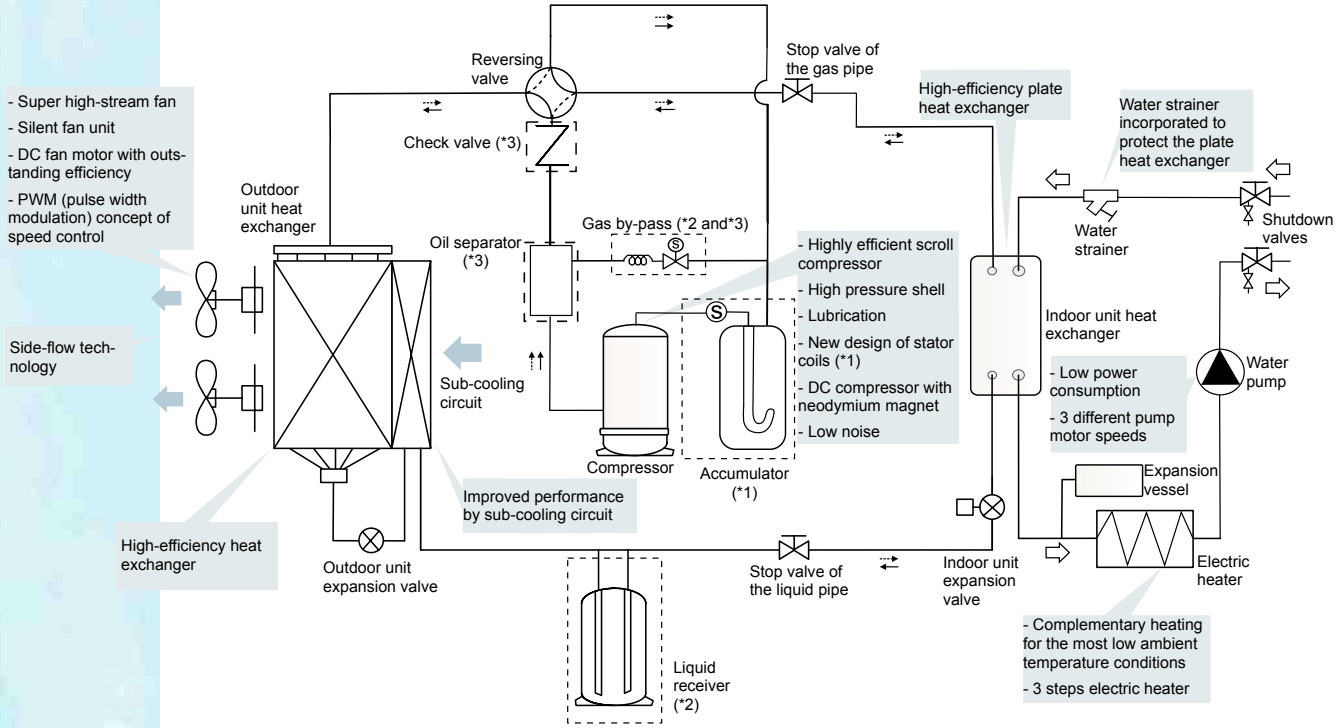
(**) Only for RAS-2HVRN2 + RWM-2.0(H)FSN3E

For more information, please refer to the section** Working range**.

2.4.4 Advanced technology

The functionality benefits explained before (Highly efficiency system, wide capacity range and expanded working range) are direct consequence of the advanced technology applied on all the system components.

Then, the main features on different components of the system will be detailed:



(*4)	
Cooling refrigerant flow	Heating refrigerant flow

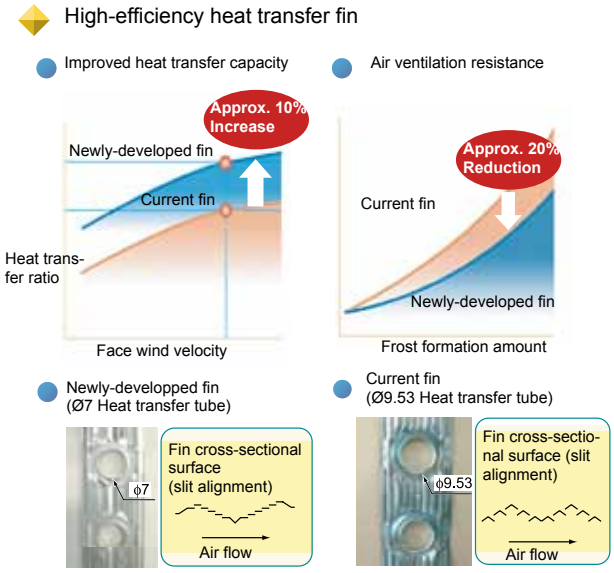
NOTE

- ***(*1): Only for RAS-2HVRN2 and RAS-3HVRNME-AF***
- ***(*2): Only for RAS-(4-6)H(V)RNME-AF***
- ***(*3): Only for RAS-(8/10)HRNME-AF. For detailed information about gas by-pass on these units, please refer it is specific refrigerant cycle.***
- ***(*4): Only for RWM-(2.0-10.0)FSN3E***

Outdoor unit heat exchanger

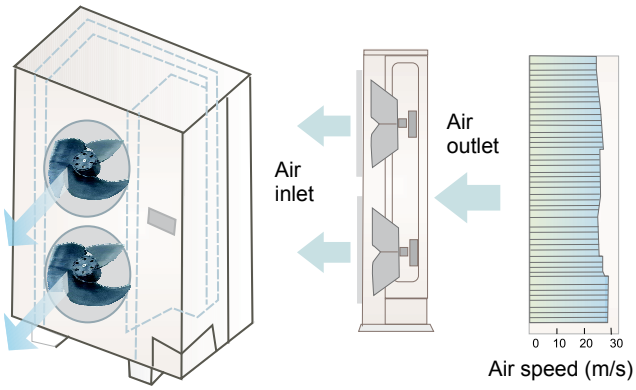
High-efficiency heat exchanger

- Compact design and high-efficiency by arranging narrow heat exchanger tubes in 3 rows. (before Ø9.53mm, now Ø7mm).
- Newly-developed high-efficiency heat transfer fin. The ventilating resistance is reduced by 20% from previous models.
- Heat exchanger configuration aiming at fluid loss reduction.



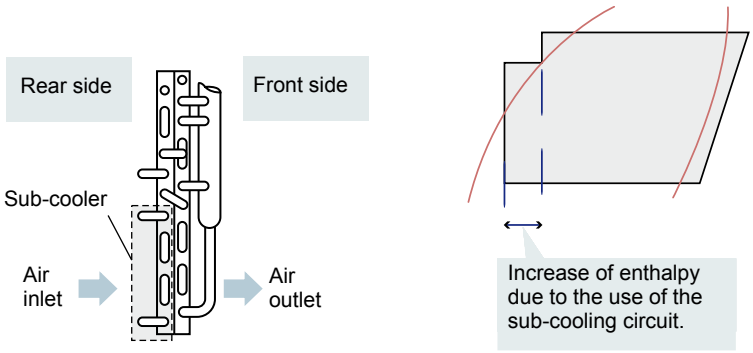
Side flow technology

Energy-saving and uniform air velocity distribution by side flow technology.



Improved performance by subcooling circuit

The system performance is improved by enlarged heat transfer area of outdoor unit and subcooler heat exchanger.



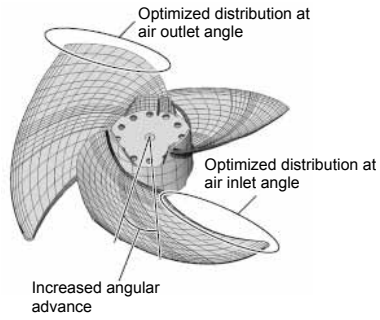
◆ Fan unit

Super high-stream fan

The outdoor units have been designed with a new super high-stream fan of Ø544 mm, reducing the sound level and increasing its reliability, by the use of a three-blade design propeller.

This fan is much more aerodynamic than earlier models. It has a greater surface area in contact with the air and a better turning angle, preventing turbulence and allowing the ventilator to be fitted lower.

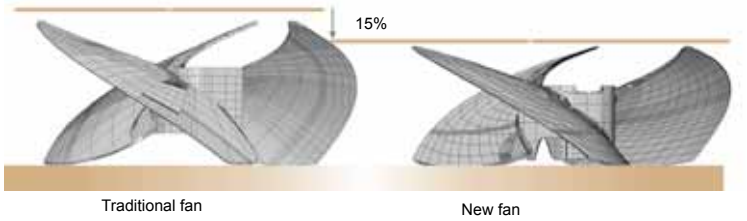
Additionally, the rib structure synchronized with rotation flow from the fan reduces the air resistance at the air outlet grille.



Silent fan unit

Low noise due to the following aspects:

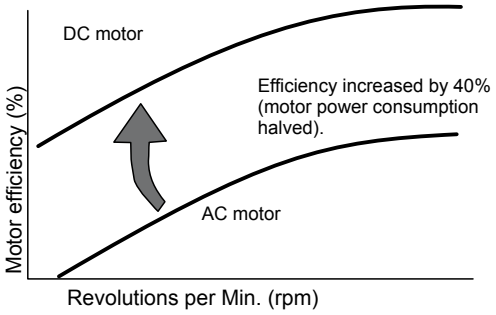
- Combination of the three-blade and slim fan: The fan has been designed to have a lower body than traditional fans, and achieves surprising results, with a noise reduction of up to 4dB (A).



- DC fan motor: The smooth rotating fan motor with low vibration reduces the noise generation.

DC fan motor with outstanding efficiency

The DC fan motor greatly improves efficiency compared to conventional products with AC motors. In addition, air blasts are reduced by controlling the rotation speed of the fan. Stable operation is provided against strong head winds of approximately 10m/s on the front face of the outdoor unit.



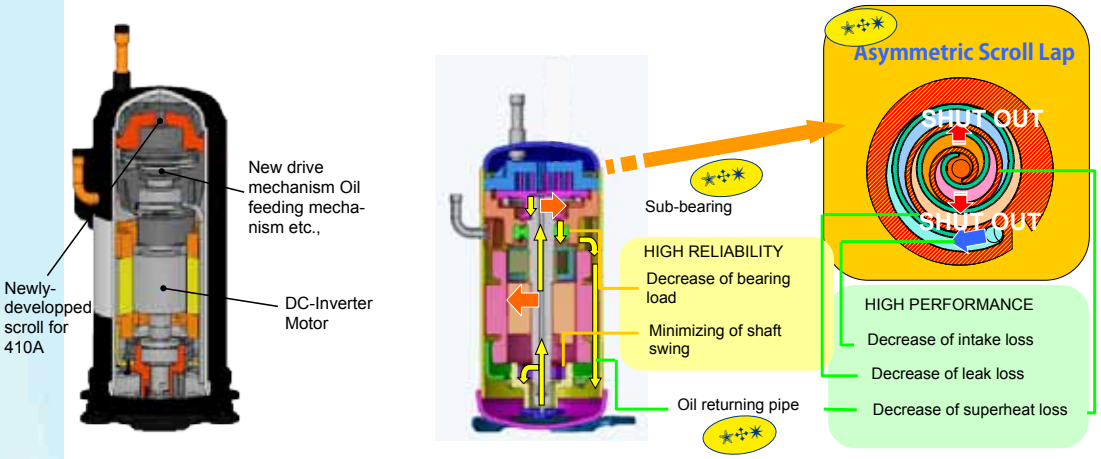
PWM (pulse width modulation) concept of speed control

The switching element (a power MOSFET) switches back and forth at a frequency of several tens of kHz. This controls the ON/OFF duty rate per cycle and changes the voltage applied to the fan motor to control the rotation speed.

◆ HITACHI exclusive scroll compressor

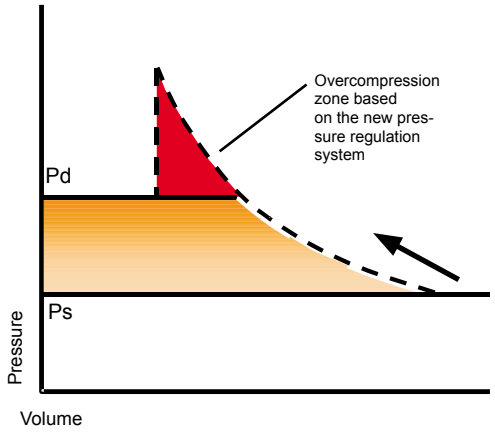
Highly efficient scroll compressor

The HITACHI DC INVERTER scroll compressor has been developed to increase efficiency, reliability and to reduce power input.



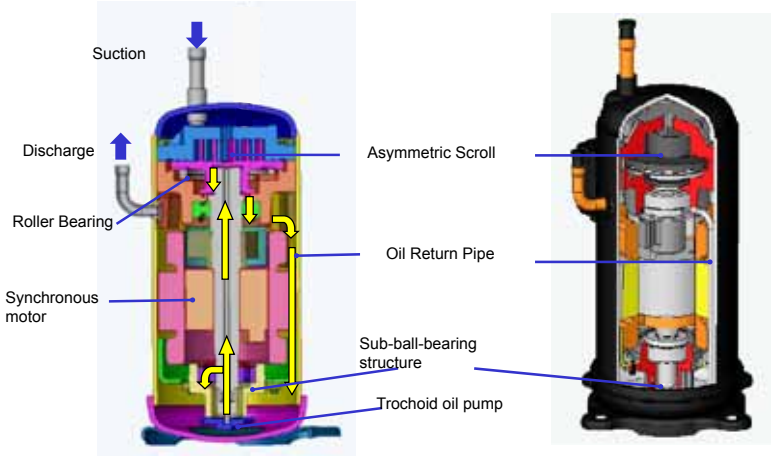
High pressure shell

- It acts as an oil separator reducing the amount of oil circulating in the cooling system giving better heat exchanger efficiency.
- Motor heat is not added to the suction gas before compression, which reduces the discharge gas temperature. This is particularly important at low suction temperatures. The discharge gas cools the motor sufficiently.
- Refrigerant cannot enter the shell during the off cycle causing oil dilution and oil foaming at start up.
- New system of regulating pressure (only for RAS-(4~6)HVRNME-AF), increasing the compressor's efficiency and reliability in part load mode. This system ensures the work pressure of the compressor is always at optimum level regardless of the charge, so that the ratio between the discharge pressure (Pd) and the suction pressure (Ps) is optimum as in the following graphic:



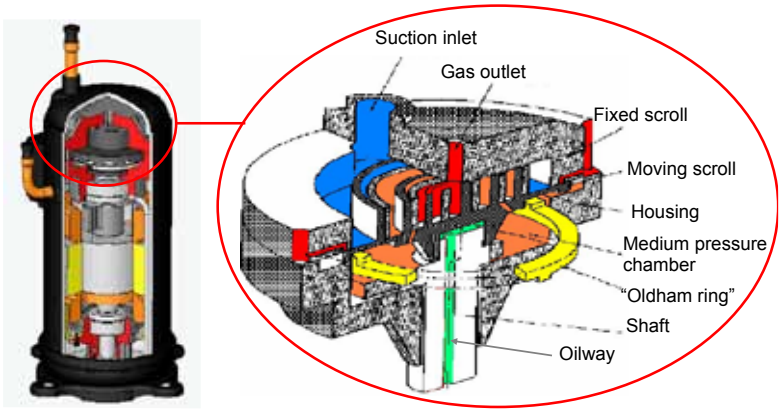
Lubrication

Bearing in mind that lubrication is one of the most important factors in the service life of a compressor, HITACHI has developed a system based on the pressure differences between the suction and discharge using a secondary pump at the base of the compressor. As a result, all of the compressor's moving parts are lubricated evenly, ensuring high reliability in terms of its operating range, even at low frequencies.



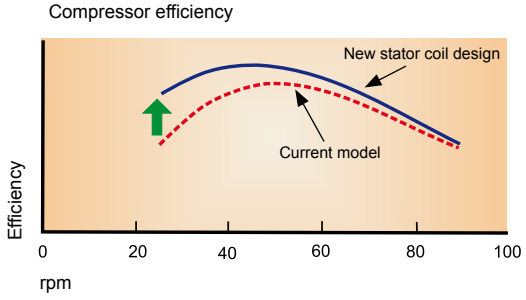
Protection against liquid return

When the compressor is at rest, the moving scroll rests on the casing. When the compressor starts to run, the pressure in the chamber under the scroll builds up through two bleed holes in the medium pressure section of the compression stroke. This pressure then forces the scroll up against the housing and seals the compression chamber. If liquid returns to the compressor, the resulting increase in pressure forces the scroll downwards, breaking the seal and allowing the liquid to pass back into the compressor body, where it will boil off due to the higher temperature.



New design of stator coils (only for RAS-(4~6)H(V)RNME-AF)

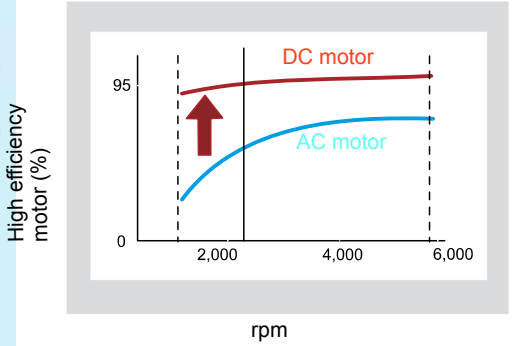
The new design of the stator coils positioned to optimize the magnetic field significantly reduce heat losses, and increase the motor's efficiency at low speeds.

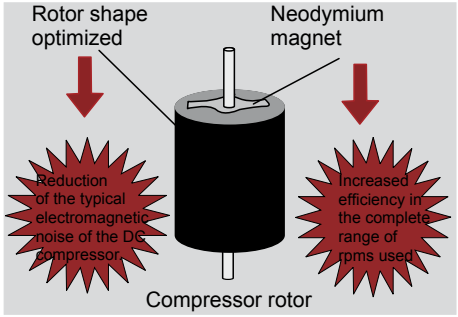


DC compressor with neodymium magnet

The use of a DC compressor with neodymium magnets in the rotor improves the performance at around the 30-40Hz range where the operation time of the inverter compressor is longest. Additionally, to suppress electromagnetic noise interference and achieve low noise, the rotor has been divided into two parts and the electric pole displaced.

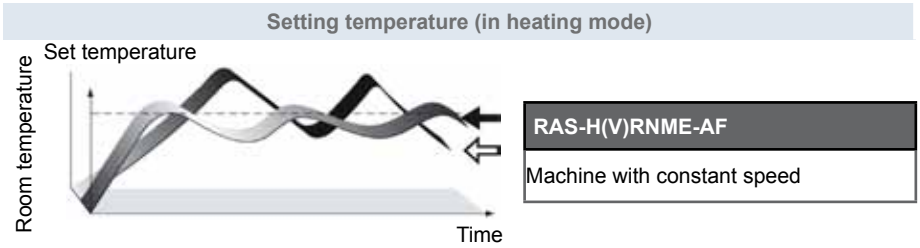
Characteristics at low speed, which affect the annual running cost, have been significantly improved.



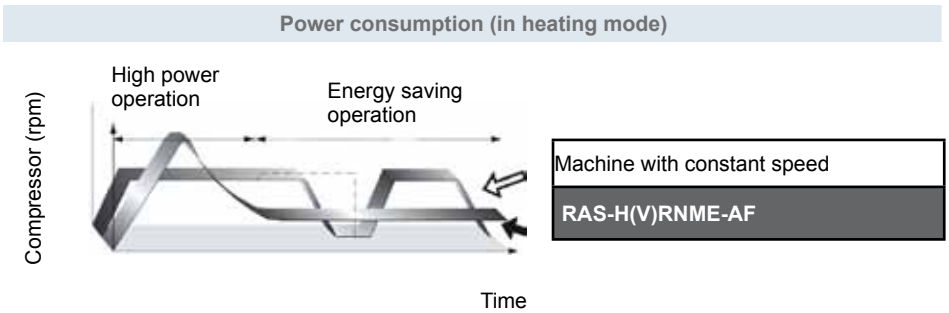


Low noise

- Inverter control: The inverter controls compressor speeds from 30Hz to 115Hz, quickly reaching the set temperature and maintaining a stable energy-saving operation, thus reducing the noise since the compressor is not running continuously.

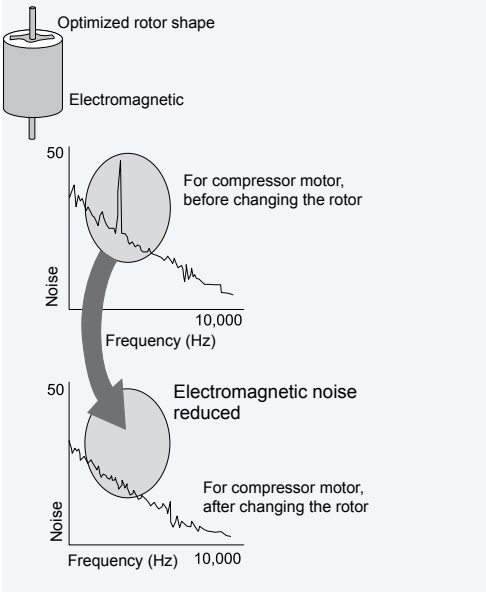


  - In the case of RAS-H(V)RNME-AF: Quickly reaches the temperature set at high power, then maintains stable energy-saving operation.
  - In the case of other constant speed machines: Slowly reaches the set temperature, then turns on and off repeatedly to maintain the temperature, operating uneconomically and wasting energy.



  - In case of existing machines with constant speed, repeated turning on and off wastes energy.

- Optimized rotor shape: The scroll compressor allows reduced noise and vibration levels due to:
  - The compression points are evenly distributed along the compression stroke.
  - The reduced number of components used
  - Use of a high-pressure insulation shell.



- Acoustically insulated compressor: The scroll compressor is insulated by means of a acoustic cover, providing minimum noise levels.

◆ Indoor unit heat exchanger

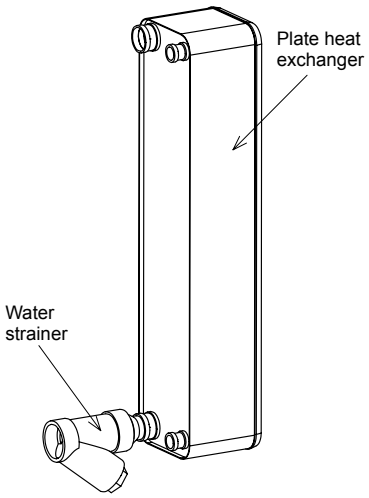
Highly efficiency plate heat exchanger

The use of a plate heat exchanger type allows getting high performance due to the following advantages:

- High heat transfer surface coefficient, leading to very high values of the heat transfer overall coefficient.
- High flow turbulence in the fluids, achieving turbulent regimes for low Reynolds numbers. This high turbulence allows lower circulating speeds on the fluids.
- Lower heat losses, since only the edges of the plates are exposed to the outside environment and additionally to having small thicknesses, it can be readily isolated.

Water strainer incorporated

A water strainer is located on the water inlet of the plate heat exchanger in order to prevent any damage caused by dirty water or suspended particles into the circuit.



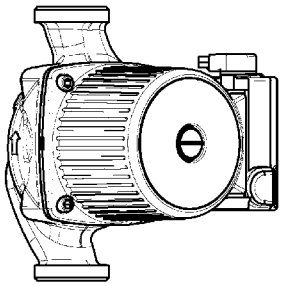
◆ Water pump

Low power consumption

The air to water heat pump incorporates a water pump to circulate the water flow into the system.

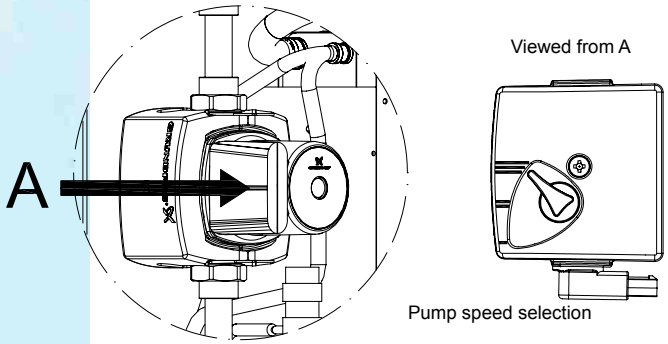
This pump is classified as low power consumption, resulting in a higher unit performance.

Water pump

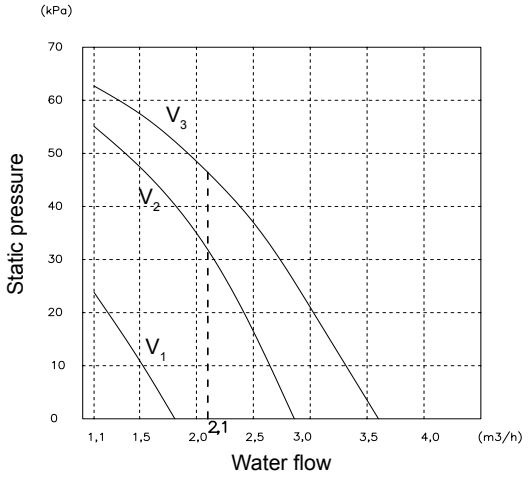


Three different pump motor speeds

In order to adapt the flow rate to the system requirements, there are available three pump motor speeds.



Example of RWM-5.0FSN3E



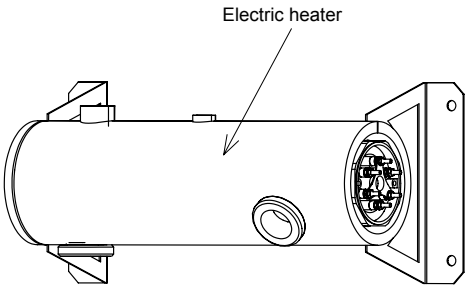
NOTE

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

◆ Electric heater

Complementary heating for the most low ambient temperature conditions

For the most low ambient temperature conditions, the electric heater will be enabled in order to provide the necessary supplementary heating, doing possible the performance in a biggest working temperature range.



Three steps electric heater

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

When the electric heater is working in steps 1 or 2, the power input will be reduced comparing with the total power input of the electric heater.

The following table shows the state of each step:

Step	Total power (kW)		
	RWM-(2.0/3.0)(H)FSN3E	RWM-(4.0-6.0)(H)FSN3E	RWM-(8.0/10.0)(H)FSN3E
0	0.0	0.0	0.0
1	1.0	2.0	3.0
2	2.0	4.0	6.0
3	3.0	6.0	9.0

NOTE

For more details, please refer to the section Control features in this chapter.

◆ Domestic Hot Water Tank (DHWT accessory)

The Domestic Hot Water Tank is an accessory supplied by HITACHI which allows the Domestic Hot Water production, with the following characteristics:

Enamelled and Stainless steel tank

Two models of 200 and 300 litres capacity made in Vitrified steel and, two models more with same capacity made in Stainless steel chemically descaled and passivated.

Efficiency thermal insulation

Thermally insulated with rigid, mould-injected, CFC free polyurethane PU foam and have an external, removable, padded polypropylene film in white color and a top cover in grey color.

High efficiency tank

Optimum design of the heat exchanger coil to provide the maximum domestic hot water production capacity to the system.

Compact size and reduced installation space

Elimination of cold zones at the bottom of the storage tank to prevent the risk of bacteria proliferation (e.g. legionella).

Cathodic protection (only Enamelled steel tank)

Cathodic protection installed with magnesium anode and load measured on the front panel.

Permanent Anti-corrosion System (as accessory)

Exclusive solution for anti-corrosion protection which ensures maximum longevity of the appliance, regardless of water quality. The electronic circuit creates a difference in potential between the hot water tank and the titanium electrode, thereby guaranteeing optimum protection of the tank and preventing corrosion

Electric heater integrated

Standard factory supplied 3.0kW immersion electric heater element fitted into the side sealed gasket.

Low maintenance and easy servicing access

All water and electrical connections within a 90ºC angle that it can be readily fitted in the tightest of spaces.

Control panel

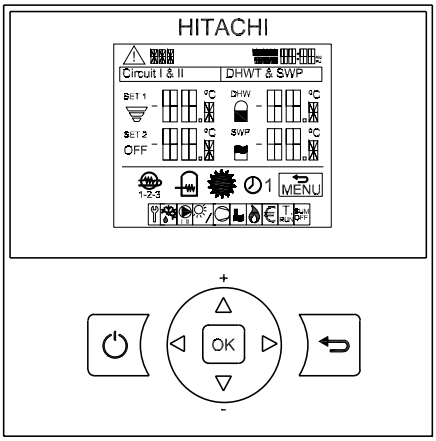
Control panel with all the regulating and control elements required for correct operation in combination with the heating system and included sensor to connect in the heat pump.

DHW Safety unit (as accessory)

DHW Safety unit calibrated at a pressure of 7 bars and with a connection to 3/4".Set comprising pressure relief valve, one-way valve, shut-off valve siphon trap connection to drain.

◆ Easy to use LCD user's interface (PC-AFTE)

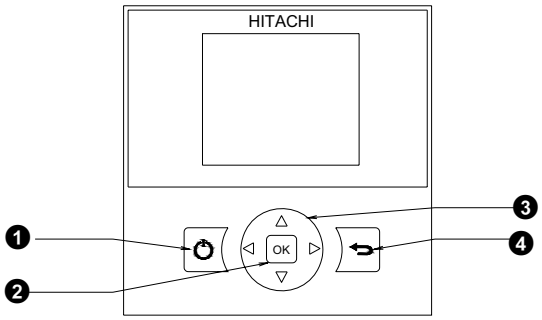
A new user-friendly interface control has been designed integrated on the air to water heat pump.



The design of the new user interface has the following features:

Few number of buttons

The working mode is very simple, with only 7 buttons that make possible to access to all the display menus.



Buttons description:

- ❶ ON/OFF unit: From the comprehensive view, this switches the selected zone ON or OFF, or the entire unit if there is no zone selected. From the rest of the views and menus it will work as an emergency mode, stopping the entire unit but not turning it on.
- ❷ OK: Used to select items and confirm any adjustments.
- ❸ 4 Arrows: Allows for movement inside the menus and views.
- ❹ Return: Used to cancel the adjustment of an item or for going back to the main menu from the comprehensive view.

Easy unit configuration

The LCD user's interface configuration allows the setting of all the values of the air to water heat pump, which are available for the installer.

It is possible the configuration of the following modes:

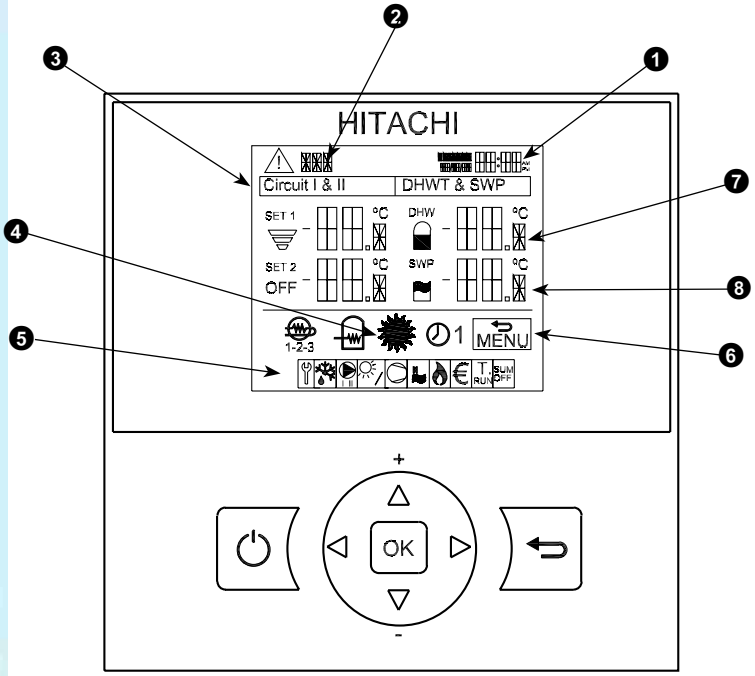
- Space heating
- Space cooling
- DHW
- Swimming pool
- Historical data
- Synchronizing time with solar DHW system.
- Optional functions

NOTE

For more information, please refer to Service Manual (SMXX0070).

Complete display menu (Comprehensive view)

Main screen is called “comprehensive view”. It provides the general system information distributed in 4 zones (Circuit I, Circuit II, Domestic Hot Water and swimming pool) through the screen, separating the different working concepts allowing checking the status of each circuit.



NEW

Layout for swimming pool combination

- ❶ Time and date
- ❷ Alarm indication
- ❸ Control of circuits I & II
- ❹ Unit mode
- ❺ Unit status signals
- ❻ Configuration menu
- ❼ Sanitary Tank control
- ❽ Swimming pool control

Two configuration modes

- User mode: This mode allows to the user the setting of some parameters and the selection of some options of the LCD user’s interface.
- Installer mode: High privilege mode for setting other configuration parameters available only for the installer.
  To work in installer mode, it is necessary to enter a specific password. If the correct access code is entered, it will appear the installer mode icon on the notifications row (bottom line of LCD user’s interface).

2.5 Control features

2.5.1 Flexible space heating/cooling configuration and control

NOTE

- ***The air to water heat pump is pre-configured to work only in heating mode. In order to allow the cooling mode, it is necessary to perform a dip-switch setting and install the drain pan accessory. In the case, all the cooling mode uses for the unit will be permitted and the LCD user's interface cooling configuration will appear.***
- ***For the detailed information, please refer to the Service Manual (SMXX0070).***

◆ Many available system configurations

As mentioned before, the new air to water heat pump allows the control of a large variety of configurations.

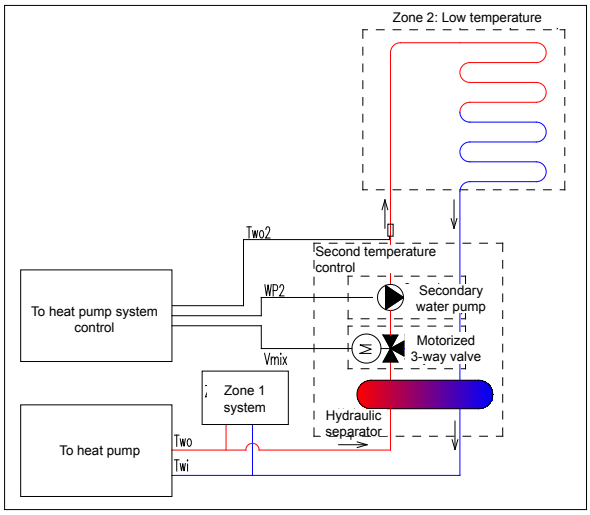
NOTE

For the detailed information, please refer to the section *Installation configurations*.

◆ Second water temperature control

New air to water heat pump allows the water temperature control of two zones with different required temperatures (radiators + heating floor for example) by means of the 2nd Temperature Room Thermostat (as accessory).

The mixing valve is controlled to maintain the second supply temperature at the second temperature set-point. The system control then decides how much to open or close the mixing valve to achieve the desired position for the valve.

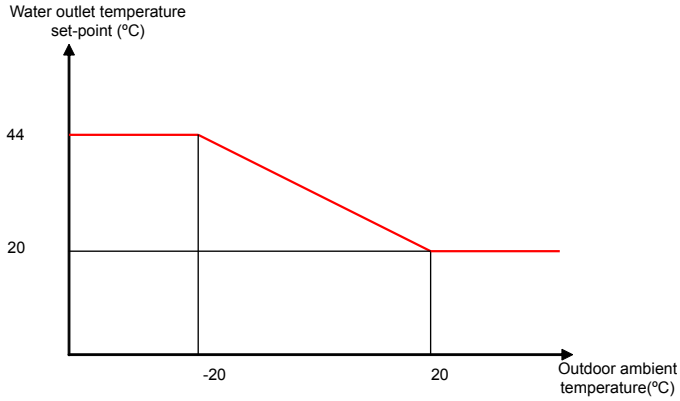


NOTE

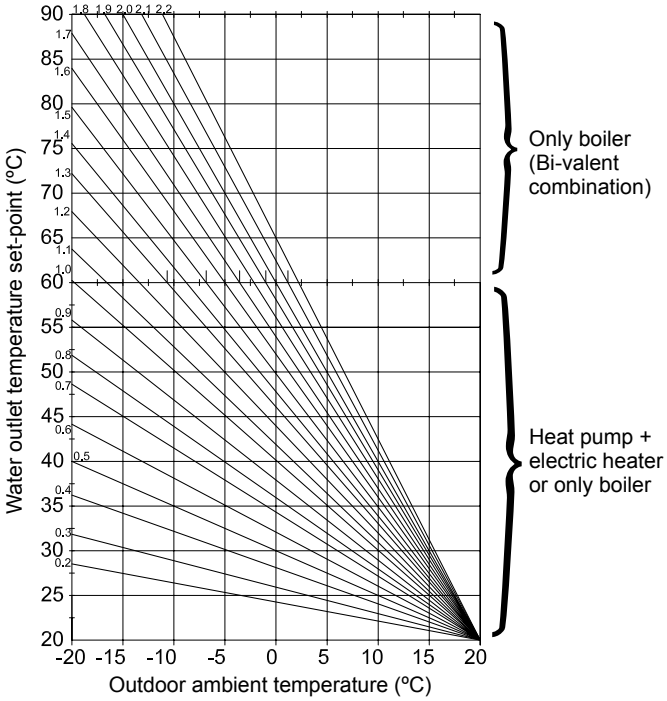
High temperature must be the direct circuit and low temperature must be the second circuit.

Three different possible water temperature set-point configuration modes for each zone

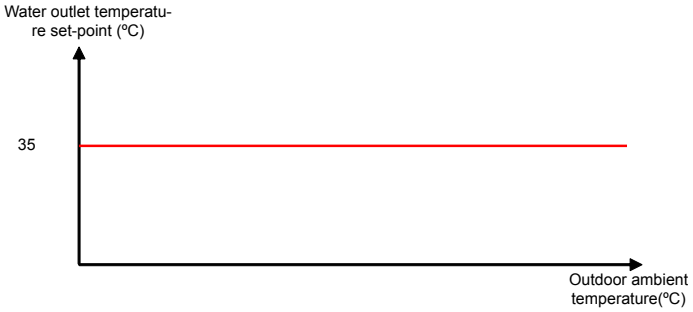
- OTC Points: Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points (Minimum and maximum water outlet temperature vs Minimum and maximum outdoor ambient temperature).



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

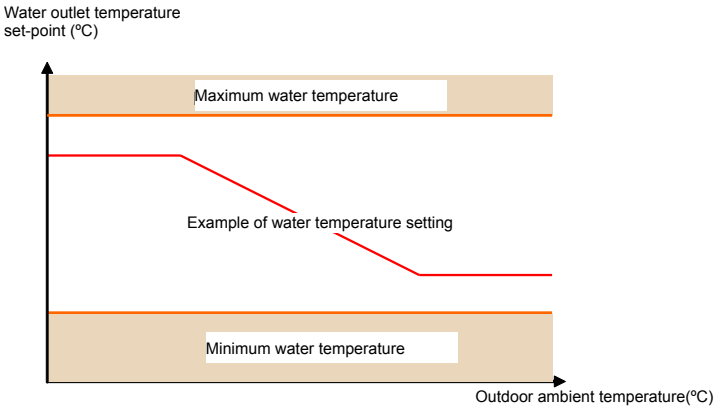


- Fixed temperature: Water target value is defined by a fixed temperature set by the user.



◆ Maximum/minimum water temperature setting for space protection by Installer mode

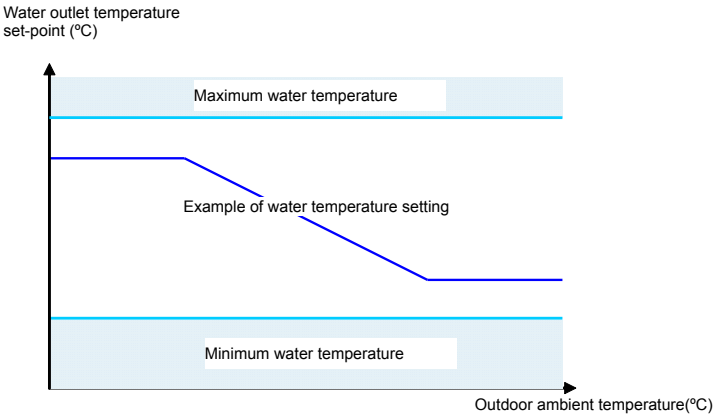
- Heating circuit minimum/maximum temperature limits selection by installer: The installer will limit the space heating temperature set-point in order to prevent excessively high or low temperatures.



NOTE

Very useful when water calculation type selected is by gradient

- Cooling circuit minimum/maximum temperature limits selection by installer: The installer will limit the space cooling temperature set-point in order to prevent excessively high or low temperatures.



NOTE

- ***Very useful for refreshing floor protection.***

Room thermostat units

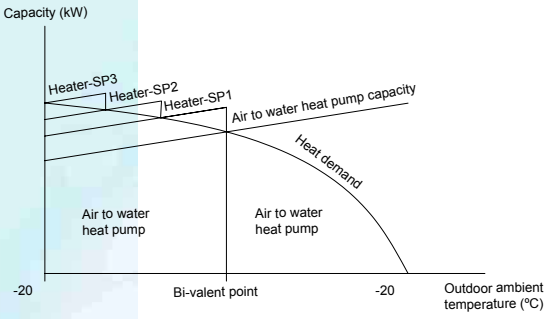
There are available two types of room thermostat units:

- ON/OFF room thermostat unit (accessory): When the room temperature setting is higher than the room actual temperature, it is provided a thermo-ON signal to the system. Once reached the room temperature setting, it will be provided a thermo-OFF signal to the system.

- Intelligent room thermostat unit (accessory) with extension room thermostat (accessory) for the second circuit: Based on Outside Temperature Compensation (OTC). Water outlet target temperature is automatically recalculated taking into account the outdoor ambient temperature and the difference between the room setting temperature and the room actual temperature.

Complementary heating

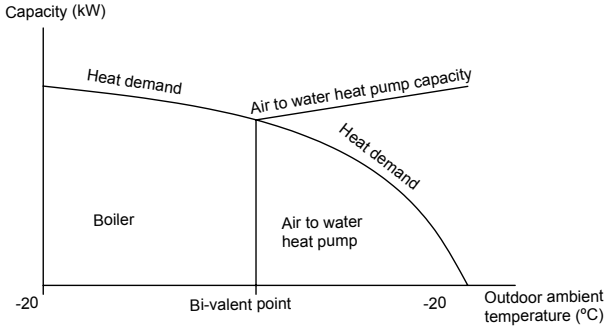
- Electric heater: For the most low ambient temperature conditions, the electric heater will be enabled in order to provide the necessary supplementary heating, but only when the unit is operating in space heating mode.
  - 3 steps heater control: The desired heating supplied by heater is determined by the Load factor, which is calculated by a P+I function ranging from 0 to 100%. Actual heater output will be translated from percentage to a 3 step output using hysteresis system.



Step	Power (kW)		
	RWM-(2.0/3.0)(H) FSN3E	RWM-(4.0-6.0)(H) FSN3E	RWM-(8.0/10.0)(H) FSN3E
1	1.0	2.0	3.0
2	2.0	4.0	6.0
3	3.0	6.0	9.0

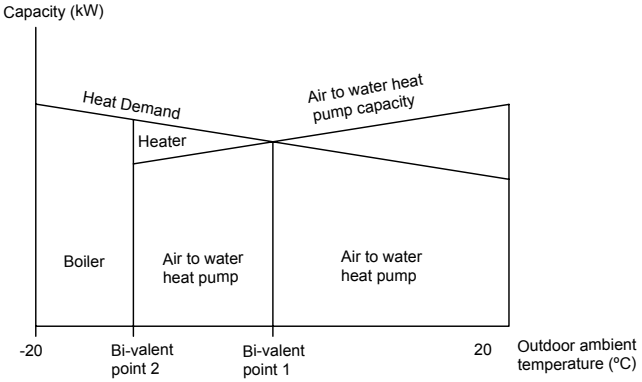
  - Electric heater for emergency mode (Optional function): In case of outdoor unit malfunction, the required heating can be provided by the electric heater.
  - One step heater for 3 phases unbalance (Optional function): For 3 phases units, in order to prevent 3 phases unbalance of the installation by electric heater steps, this option will be used to switch the 3 steps at the same time.

- Boiler combination: When the unit is not able to provide the necessary heating capacity in low ambient temperature conditions, it will be stopped and the boiler starts to operate providing the necessary heating capacity. The unit should be sized in order to operate mainly with the air to water heat pump, and boiler will be only activated in low ambient temperature conditions.



  - Boiler for emergency mode (Optional function): In case of outdoor unit malfunction, the heating required can be provided by the boiler.

- Boiler + electric heater: The unit will normally operate with air to water heat pump and the supplementary heating required will be supplied by the electric heater. The boiler will only operate when the air to water heat pump + electric heater cannot reach the required heating capacity in conditions of very low ambient temperature.



2.5.2 Flexible Domestic Hot Water (DHW) control

An optional Domestic Hot Water Tank (DHWT accessory) can be connected to the air to water heat pump in order to provide the Domestic Hot Water operation. The DHWT is available in four models 200/300 liters enamelled/stainless, with an integrated electric heater of 2.5 kW.

NOTE

Fore more details, please refer to the Installation and Operation manual (PMML0198A).

Space heating priority mode

The Domestic Hot Water (DHW) operation has priority over all other operation modes unless otherwise noted.

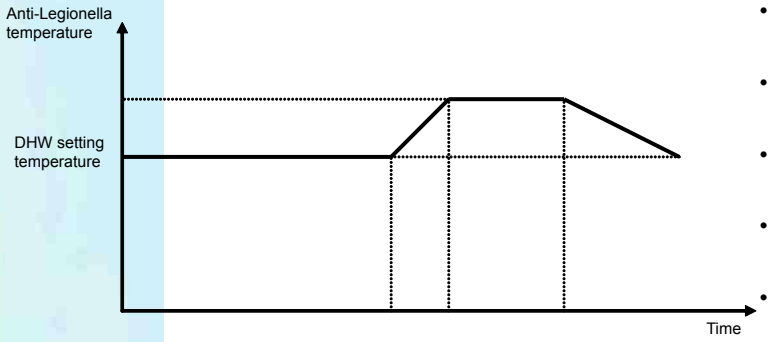
It should be taken into account the following considerations:

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

DHW Anti-Legionella protection (Optional function)

In order to help protect against Legionella into the DHW system, it is available a specific setting which will raise up the DHW periodically (by the DHW tank electric heater or by a boiler) over the normal DHW tank temperature setting.

The following parameters should be configured for the Anti-Legionella function:



- Operation interval: Day(s) of the week at which the domestic water should be heated.
- Status: Defines whether the disinfection function is turned ON or OFF.
- Start time: Time of the day at which the DHW should be heated.
- Anti-Legionella temperature: High water temperature to be reached.
- Interval: Time period during the Anti-Legionella temperature remains constant.

NOTE

For more details about the Anti-Legionella optional function protection, please refer to the Service Manual (SMXX0070).

Maximum water set-point by the installer

The installer can set a maximum water tank temperature in order to avoid excessively hot water in the DHWT.

Two different modes for DHW

The DHW operation will be performed by two different modes:

- Standard mode: The DHWT will start heating when the water tank temperature is low enough for heat pump to be started. In this mode, the DHW is always heated by the heat pump.
- High demand mode: The DHWT will start heating if the difference between the maximum water set point temperature and the actual DHW temperature is bigger than a predetermined value. Only the DHWT electric heater will start heating unless DHW temperature goes below the heat pump starting temperature.

DHWT heating by timer

It is available a DHWT timer program provided in the unit (by the LCD user's interface) in order to enable/disable de DHW operation. It can be programmed each day of the week.

NOTE

For more information, please refer to the Service Manual (SMXX0070).

Combinability with solar panel

As it has been explained in section *Selection benefits*, the air to water heat pump can be combined with solar panel. The solar combination will enable to heat up the DHW by means of the sun. The solar combination is designed to transfer the heat from the solar panels (sun radiation) to the heat exchanger of DHW tank.

NOTE

For more information, please refer to the section** Installation configurations**.

2.5.3 Swimming pool combination control

The swimming pool operation has the lowest priority of the system and only will be possible when space heating/cooling and DHWT are not required.

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

NOTE

For more information, please refer to the section *Installation configurations****.***

2.5.4 Flexible water pumps control

◆ Two different water pump modes

The pump control can be set to standard or economic mode.

- Standard mode: Pump will always be in operation when space heating/cooling is enabled, but when space heating/cooling is disabled using LCD user's interface or Thermostat OFF (intelligent thermostat only), pump must be switched OFF and only will be switched ON by DHW heating request.
- Economic mode: When the system has reached the required temperature, or the system is stopped, the water pump will be stopped (using the thermostat; no other operation is required).

◆ Pump and motorized valve seizure protection (Optional function)

This function helps to prevent these components from sticking during long periods of inactivity by running every week the components during a short period.

2.5.5 Other optional functions

◆ EJP input (Electrical tariff input)

This function allows an external tariff switch device to switch OFF the heat pump during peak electricity demand period. Depending on the setting, the heat pump or DHWT will be blocked when signal is open/closed.

Additionally, it's possible to set that the boiler or the DHWT heater will be enabled instead heat pump when EJP Mode ON.

◆ Automatic summer switch-OFF

The system will switch OFF the heating mode when the daily average outdoor temperature of the previous day rises above certain value at the summer switch-OFF activation temperature.

◆ 2nd. outdoor temperature sensor (Accessory)

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

So, the 2nd. outdoor ambient temperature sensor shall be located in a proper place for getting most representative outdoor ambient temperature.

◆ Available four external outputs signals for optional functions

There are available four output optional signals that provide four optional functions of the system, programmed on the indoor unit PCB.

NOTE

In order to make easy the electrical connection works, HITACHI offers (as accessory) a relay board for the additional output signals.

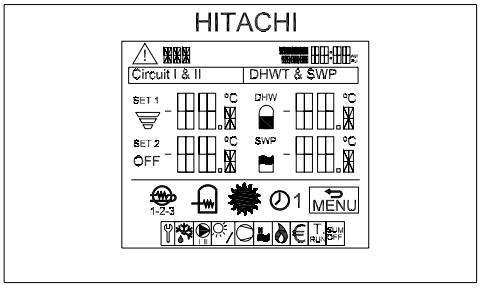
For more information about the Optional functions, please refer to the Service Manual (SMXX0070).

2.6 Maintenance benefits

2.6.1 Complete operation display by LCD user's interface

The LCD user's interface display menu allows to check all the important parameters and status of the unit in any moment.

Most of these variables are the same ones that can be consulted by 7-segment, taking information from the outdoor unit.

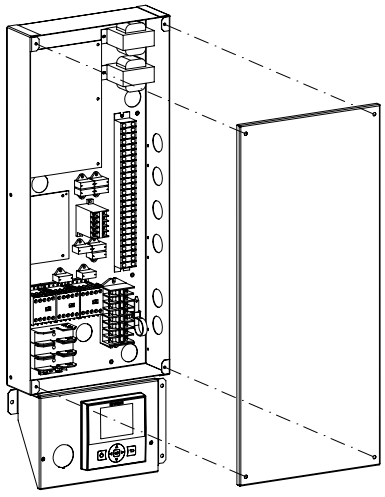


- System operation: Cooling mode, Heating mode, DHW, SWP, ...
- Unit status: Display of more specific parameters (indoor/outdoor expansion valve opening, inverter operation frequency, defrosting, ...).
- Actual temperature: A large serie of operation temperatures (water inlet/outlet temperature, room temperature of circuits 1 and 2, outdoor ambient temperature, gas/liquid temperature, ...).
- Set-point: The set-point temperatures will be displayed in order to allow to the user/installer compare the actual and setting temperatures in any moment (room temperature and OTC supply temperature set-point of circuits 1 and 2, water temperature setting, ...).

Additionally, a large variety of parameters can be set by the installer (most of them also by the user) helping with the service works and resulting in a very dynamic system work.

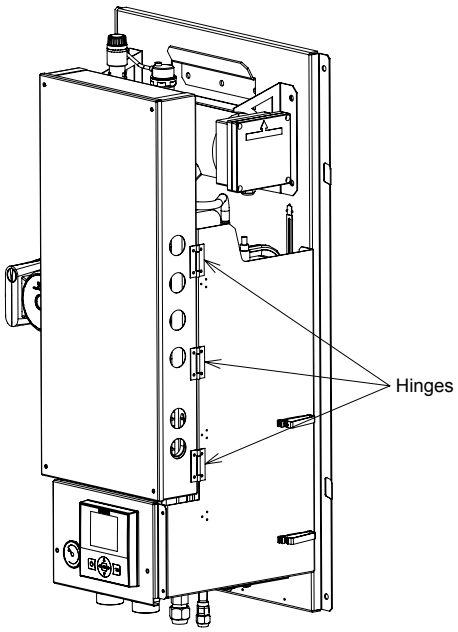
2.6.2 Front access to the electrical box

By removing the cover it is possible to have a frontal access to the electrical box components, allowing an easy service work.



2.6.3 Electrical box turns on itself

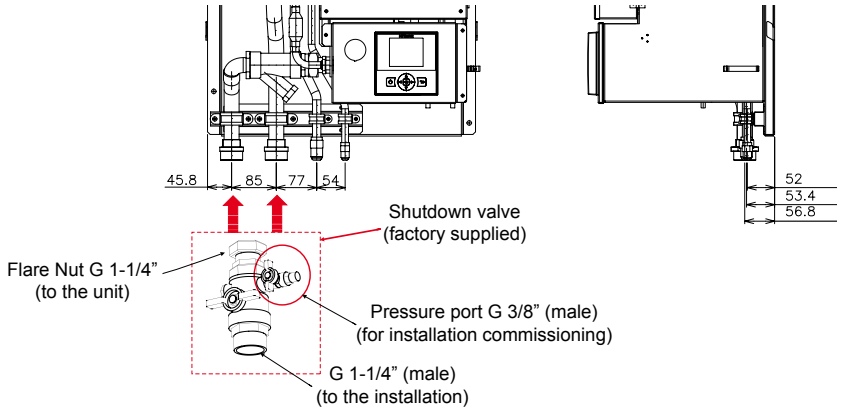
The electrical box includes three hinges on the right side which allow the rotation of the electrical box in order to allow an easier access for the maintenance of the inner part of the unit.



2.6.4 Shutdown valves

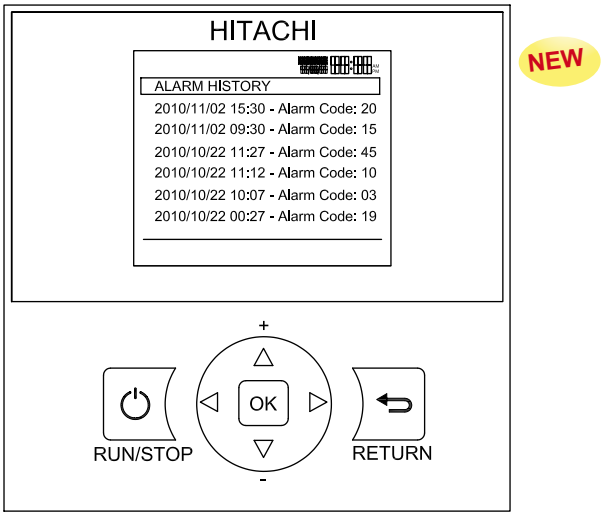
Additionally to the installation benefits (quick installation and pressure port for installation commissioning), the use of the shutdown valves allows a better service works in case of need to drain the water contained in the system.

In this case, close the main valve, and drain the water contained into the unit through the mini-valve.



2.6.5 Alarm hystorical data

A new option is available in order to facilitate a knowledge of the last alarms registered on the LCD user's interface. This option is known as "Alarm hystorical data".



The software can save up to the last 20 alarms, showing on the screen the following data:

- Date
- Time
- Alarm code

3. General data

Index

3.1 YUTAKI S system

	Model			RWM-2.0 (H)FSN3E	RWM-3.0 (H)FSN3E	RWM-4.0 (H)FSN3E	RWM-5.0 (H)FSN3E	RWM-6.0 (H)FSN3E	RWM-8.0 (H)FSN3E	RWM-10.0 (H)FSN3E
	Indoor unit			RAS-2 HVRN2	RAS-3 HVRNME-AF	RAS-4 H(V)RNME-AF	RAS-5 H(V)RNME-AF	RAS-6 H(V)RNME-AF	RAS-8 HRNME-AF	RAS-10 HRNME-AF
	Outdoor unit									
Heating capacity	(Min/Nominal/Max) ❶ Conditions: Water inlet/outlet: 30/35ºC Outdoor temperature: (DB/WB): 7/6 ºC	kW		2.3/5.1/8.0	3.1/7.5/11.0	4.8/9.8/13.5	6.3/12.0/16.3	5.9/14.0/17.8	11.3/19.6/25.5	11.6/24.0/32.0
	COP	-		5.02	4.55	4.47	4.36	4.11	4.45	4.41
	(Min/Nominal/Max) ❷ Conditions: Water inlet/outlet: 40/45ºC Outdoor temperature: (DB/WB): 7/6 ºC	kW		2.2/4.7/7.5	2.8/7.1/9.7	4.5/9.2/12.5	5.6/11.3/15.5	5.6/13.3/16.5	10.6/18.4/24.5	10.9/22.6/31.0
	COP	-		3.51	3.47	3.42	3.16	3.01	3.43	3.40
	(Min/Nominal/Max) ❸ Conditions: Water inlet/outlet: 47/55ºC Outdoor temperature: (DB/WB): 7/6 ºC	kW		2.0/4.2/5.5	2.4/6.2/7.6	4.0/8.1/10.0	5.1/10.1/13.7	5.4/12.6/13.9	9.3/16.2/20.5	9.8/20.2/27.4
	COP	-		2.63	2.65	2.59	2.60	2.47	2.70	2.67
	(Min/Nominal/Max) ❹ Conditions: Water inlet/outlet: */35ºC Outdoor temperature: (DB/WB): -7/-8 ºC	kW		1.9/4.0/4.7	3.5/6.4/7.5	2.9/7.6/9.8	3.3/9.0/11.5	3.5/9.4/12.0	8.8/14.8/17.8	8.9/18.0/21.6
	COP	-		2.65	2.51	2.42	2.40	2.34	2.63	2.61
	(Min/Nominal/Max) ❺ Conditions: Water inlet/outlet: */45ºC Outdoor temperature: (DB/WB): -7/-8 ºC	kW		1.8/3.8/4.4	3.3/6.0/6.9	2.8/7.1/8.5	3.1/8.3/10.2	3.2/8.7/10.4	8.4/14.2/16.6	8.2/16.6/20.4
	COP	-		2.10	2.07	2.14	1.92	1.81	2.17	2.16
	(Min/Nominal/Max) ❻ Conditions: Water inlet/outlet: */55ºC Outdoor temperature: (DB/WB): -7/-8 ºC	kW		1.6/3.0/3.9	2.9/5.3/5.5	2.4/5.9/6.3	2.9/7.7/8.7	3.0/7.9/8.9	7.0/11.8/12.6	7.6/15.4/17.3
	COP	-		1.62	1.65	1.55	1.55	1.46	1.73	1.72

	Model			RWM-2.0 FSN3E	RWM-3.0 FSN3E	RWM-4.0 FSN3E	RWM-5.0 FSN3E	RWM-6.0 FSN3E	RWM-8.0 FSN3E	RWM-10.0 FSN3E
	Indoor unit			RAS-2 HVRN2	RAS-3 HVRNME-AF	RAS-4 H(V)RNME-AF	RAS-5 H(V)RNME-AF	RAS-6 H(V)RNME-AF	RAS-8 HRNME-AF	RAS-10 HRNME-AF
	Outdoor unit									
Cooling capacity	(Min/Nominal/Max) ❼ Conditions: Water inlet/outlet: 12/7ºC Outdoor temperature: (DB/WB): 35/-- ºC	kW		1.8/3.8/5.4	2.5/6.0/6.9	3.6/7.2/8.2	3.3/9.2/10.3	3.1/10.5/11.5	6.7/14.4/16.4	6.4/18.4/20.6
	EER	-		3.05	3.07	3.06	3.03	2.61	3.53	3.12
	(Min/Nominal/Max) ❽ Conditions: Water inlet/outlet: 23/18ºC Outdoor temperature: (DB/WB): 35/-- ºC	kW		2.6/5.4/7.5	3.0/7.1/8.0	4.9/10.0/11.2	4.7/12.9/15.0	4.4/15.0/17.8	9.3/20.0/23.5	8.6/24.5/29.0
	EER	-		3.83	4.03	3.88	4.02	3.50	4.43	3.57

NOTE

The nominal heating and cooling capacity is based on the EN 14511 standard.

Operating Conditions		Heating						Cooling	
		Standard rating conditions			Application rating conditions				
		Low temperatures	Medium temperatures	High temperatures	Low temperatures	Medium temperatures	High temperatures	Fan coils	Refreshing floor
Water temperature	Inlet	30ºC	40ºC	47ºC	(*)	(*)	(*)	12ºC	23ºC
	Outlet	35ºC	45ºC	55ºC	35ºC	45ºC	55ºC	7ºC	18ºC
Outdoor air inlet temperature	DB	7ºC			-7ºC			35ºC	
	WB	6ºC			-8ºC			-	

Piping length: 7.5 meters; Piping lift: 0 meters

DB: dry bulb; WB: wet bulb

(*): The test is performed at the flow rate obtained during the test of the standard rating conditions.

3.2 Indoor unit

Model			RWM-2.0 (H)FSN3E	RWM-3.0 (H)FSN3E	RWM-4.0 (H)FSN3E	RWM-5.0 (H)FSN3E	RWM-6.0 (H)FSN3E
Electrical power supply		-	1~ 230V 50Hz	1~ 230V 50Hz	1~ 230V 50Hz 3N~ 400V 50Hz	1~ 230V 50Hz 3N~ 400V 50Hz	1~ 230V 50Hz 3N~ 400V 50Hz
Pump input power		W	75	100	130	140	140
Electric heater power	3 kW (step 1/ step 2/ step 3)	kW	1.0/2.0/3.0	1.0/2.0/3.0	-	-	-
	6 kW (step 1/ step 2/ step 3)	kW	-	-	2.0/4.0/6.0	2.0/4.0/6.0	2.0/4.0/6.0
	9 kW (step 1/ step 2/ step 3)	kW	-	-	-	-	-
Maximum electrical power consumption (1~ / 3N~)		A	20/-	20/-	32/11	32/11	32/11
Nominal water flow (condition ❶)		m³/h	0.9	1.3	1.7	2.1	2.4
Outer dimensions	Height	mm	890				
	Width	mm	520				
	Depth	mm	360				
Net weight		kg	55	56	59	61	61
Packaging dimensions		m³	0.36	0.36	0.36	0.36	0.36
Sound pressure level		dB (A)	29	29	28	28	28
Refrigerant		-	R410A				
Refrigerant pipe connection		-	Flare nut connection				
Dimensions	Liquid pipe	mm	Ø6.35(1/4")	Ø9,53 (3/8")	Ø9,53 (3/8")	Ø9,53 (3/8")	Ø9,53 (3/8")
	Gas pipe	mm	Ø15,88 (5/8")	Ø15,88 (5/8")	Ø15,88 (5/8")	Ø15,88 (5/8")	Ø15,88 (5/8")
Water pipe connection		-	Shutdown valves (factory supplied)				
Dimensions	Inlet	mm	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)
	Outlet	mm	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)	G 1-1/4" (male)
Water pipe diameter (recommended)		mm	Ø22	Ø22	Ø25	Ø25	Ø25
Expansion vessel volume		l	6.0				
Color		-	White (RAL 9016)				

Model			RWM-8.0(H)FSN3E	RWM-10.0(H)FSN3E
Electrical power supply		-	3N~ 400V 50Hz	3N~ 400V 50Hz
Pump input power		W	250	260
Electric heater power	3 kW (step 1/ step 2/ step 3)	kW	-	-
	6 kW (step 1/ step 2/ step 3)	kW	-	-
	9 kW (step 1/ step 2/ step 3)	kW	3.0/6.0/9.0	3.0/6.0/9.0
Maximum electrical power consumption (1~ / 3N~)		A	-/23	-/23
Nominal water flow (condition ❶)		m^3/h	3.4	4.1
Outer dimensions	Height	mm	890	
	Width	mm	670	
	Depth	mm	360	
Net weight		kg	81	85
Packaging dimensions		m^3	0.46	0.46
Sound pressure level		dB (A)	29	29
Refrigerant		-	R410A	
Refrigerant pipe connection		-	Flare nut connection	
Dimensions	Liquid pipe	mm	Ø9,53 (3/8”)	Ø12,7 (3/8”)
	Gas pipe	mm	Ø25,4 (1”)	Ø25,4 (1”)
Water pipe connection		-	Shutdown valves (factory supplied)	
Dimensions	Inlet	mm	G 1-1/4” (male)	G 1-1/4” (male)
	Outlet	mm	G 1-1/4” (male)	G 1-1/4” (male)
Water pipe diameter (recommended)		mm	Ø28	Ø28
Expansion vessel volume		l	10.0	
Color		-	White (RAL 9016)	

NOTE

The sound pressure level is measured at 1 meter distance from the unit’s front surface with the pump running at speed 2. This data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.

3.3 Outdoor unit

3.3.1 RAS-(2-6)(HVRN2/HVRNME-AF)

RAS Model			RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4HVRNME-AF	RAS-5HVRNME-AF	RAS-6HVRNME-AF
Electrical power supply			1~ 230V 50Hz				
Color (Munsell code)		-	Natural gray (1.0Y8.5/0.5)				
Sound pressure level (night mode)		dB(A)	45(43)	42(38)	44(40)	46(42)	48(45)
Sound power level		dB(A)	63	63	65	67	69
Outside measurements	Height	mm	600	800	1,380	1,380	1,380
	Width	mm	792	950	950	950	950
	Depth	mm	300	370	370	370	370
Net weight		kg	42	67	103	104	104
Refrigerant		-	R410A				
Flow control		-	Microprocessor-controlled expansion valve				
Compressor		-	DC inverter driven				
Quantity		-	1	1	1	1	1
Power		kW	0.95	1.38	1.80	2.50	2.50
Heat exchanger		-	Multi-pass cross-finned tube				
Outdoor fan		-	Propeller fan				
Quantity		-	1	1	2	2	2
Air flow rate		m³/min	35	45	80	90	100
Power		W	40	40	70+70	70+70	70+70
Refrigerant pipe connection		-	Flare-nut connection (factory supplied)				
Size	Liquid piping	mm (in)	Ø6.35 (1/4")	Ø9.53 (3/8")	Ø9.53 (3/8")	Ø9.53 (3/8")	Ø9.53 (3/8")
	Gas piping	mm (in)	Ø12.7 (1/2")	Ø15.88 (5/8")	Ø15.88 (5/8")	Ø15.88 (5/8")	Ø15.88 (5/8")
Refrigerant charge		kg	1.6	2.40	3.90	4.00	4.00
Maximum current		A	11.	14	18	26	26
Packaging measurements		m³	0.26	0.43	0.70	0.70	0.70

NOTE

The sound pressure level is based on following conditions:

- ***1 meter from the frontal surface of the unit; 1.5 meters from floor level.***
- ***Voltage of the power source is 230V.***

The above data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.

3.3.2 RAS-(4-10)HRNME-AF

RAS Model			RAS-4HRNME-AF	RAS-5HRNME-AF	RAS-6HRNME-AF	RAS-8HRNME-AF	RAS-10HRNME-AF
Electrical power supply			3N~ 400V 50Hz				
Color (Munsell code)		-	Natural gray (1.0Y8.5/0.5)				
Sound pressure level (night mode)		dB(A)	44(40)	46(42)	48(45)	52(50)	55(53)
Sound power level		dB(A)	65	67	69	74	77
Outside measure-ments	Height	mm	1,380	1,380	1,380	1,650	1,650
	Width	mm	950	950	950	1,100	1,100
	Depth	mm	370	370	370	390	390
Net weight		kg	107	108	108	170	170
Refrigerant		-	R410A				
Flow control		-	Microprocessor-controlled expansion valve				
Compressor		-	DC inverter driven				
Quantity		-	1	1	1	1	1
Power		kW	2.20	3.00	3.00	4.00	4.00
Heat exchanger		-	Multi-pass cross-finned tube				
Condenser fan		-	Propeller fan				
Quantity		-	1+1	1+1	1+1	1+1	1+1
Air flow rate		m³/ min	80	90	100	121	150
Power		W	70+70	70+70	70+70	170+120	170+120
Refrigerant pipe connection		-	Flare-nut connection (factory supplied)				
Size	Liquid piping	mm (in)	Ø9.53 (3/8”)	Ø9.53 (3/8”)	Ø9.53 (3/8”)	Ø9.53 (3/8”)	Ø12.70 (1/2”)
	Gas piping	mm (in)	Ø15.88 (5/8”)	Ø15.88 (5/8”)	Ø15.88 (5/8”)	Ø25.40 (1”)	Ø25.40 (1”)
Refrigerant charge		kg	3.90	4.00	4.00	7.3	7.8
Maximum current		A	7	11	13	13	17
Packaging measurements		m³	0.70	0.70	0.70	0.71	0.71

NOTE

The sound pressure level is based on following conditions:

- ***1 meter from the frontal surface of the unit; 1.5 meters from floor level.***
- ***Voltage of the power source is 400V.***

The above data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.

3.4 Domestic Hot Water Tank

Model				DHWT200E-2.5H1E	DHWT300E-2.5H1E	DHWT200S-2.5H1E	DHWT300S-2.5H1E
Casing	Color			White			
	Material			Polypropylene jacked			
Dimensions	Packing	Height	mm	1450	1935	1450	1935
		Width	mm	640	640	640	640
		Depth	mm	640	640	640	640
	Unit	Height	mm	1205	1685	1205	1685
		Width	mm	620	620	620	620
		Depth	mm	620	620	620	620
Weight	Unit		kg	85	130	60	85
	Packed unit		kg	95,5	141	70,5	111
Packing	Material			EPS			
				CARTON			
	Weight		kg	10,5	11	10,5	11
Main components	Tank	Water volume	L	200	300	195	287
		Material		Enmalled steel (DIN 4753)		Stainless steel (DIN 14521)	
		Max. tank temperature	°C	90	90	90	90
		Max. tank water pressure	bar	8	8	8	8
		Max. coil water temperature	°C	200	200	200	200
		Max. coil water pressure	bar	25	25	25	25
Tank	Insulation	Material		Polyurethane			
		Heat loss (*)	kW/dia	1.67	2.28	1.42	1.55
		Min thickness	mm	50	50	50	50
Main components	Heat exchanger	Quantity		1	1	1	1
		Coil surface area	m^2	1.4	3.1	1.1	1.4
	Booster heater	Quantity		1	1	1	1
		Heater rating	kW	2.5	2.5	2.5	2.5
	Type			Immersion heater type			
Piping connections	Water inlet domestic connection		in.	1” (male)		1” (male)	
	Water outlet domestic connection		in.	1” (male)		1” (male)	
	Recirculation		in.	1” (male)		1” (male)	
	In coil connection		in.	1” (female)		1” (female)	
	Out coil connection		in.	1” (female)		1” (female)	
Thermometer				Yes		Yes	
Mechanical thermostat (security)				Yes		Yes	
Protection				Cathodic protection		No	

NOTE

(*): Heat loss according to DIN-4753/8

- ***Storage temperature: 65ºC***
- ***Ambient temperature: 20ºC DB***

3.5 Component data

3.5.1 Indoor unit

	Model			RWM-2.0 (H)FSN3E	RWM-3.0 (H)FSN3E	RWM-4.0 (H)FSN3E	RWM-5.0 (H)FSN3E	RWM-6.0 (H)FSN3E	RWM-8.0 (H)FSN3E	RWM-10.0 (H)FSN3E
Heat exchanger	Type		-	Brazed plate						
	Material		-	Stainless steel						
	Dimensions	Height (H)	mm	526	526	526	526	526	526	526
		Width (W)	mm	119	119	119	119	119	119	119
		Depth (D)	mm	71.2	71.2	93.6	125.0	125.0	183.2	228.0
	Piping	Refrigerant connection	mm (in)	ø15.88 (5/8)	ø15.88 (5/8)	ø15.88 (5/8)	ø15.88 (5/8)	ø15.88 (5/8)	ø15.88 (5/8)	ø15.88 (5/8)
		Water connection	mm (in)	ø28.6 (1-1/8)	ø28.6 (1-1/8)	ø28.6 (1-1/8)	ø28.6 (1-1/8)	ø28.6 (1-1/8)	ø28.6 (1-1/8)	ø28.6 (1-1/8)
	Weight		kg	7.5	7.5	9.2	11.7	11.7	16.4	19.9
	Maximum refrigerant operating pressure		MPa	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	Maximum water operating pressure		MPa	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Internal refrigerant volume		l	1.55	1.55	2.11	2.89	2.89	4.33	5.44
	Internal water volume		l	1.66	1.66	2.22	3.00	3.00	4.44	5.55
Electric heater	Material		-	Stainless steel (Immersion heating element)						
	Dimensions	Width (W)	mm	327	327	327	327	327	452	452
		Diameter (ø)	mm	ø108.0	ø108.0	ø108.0	ø108.0	ø108.0	ø108.0	ø108.0
	Power supply		-	1~ 230V 50Hz 3N~ 400V 50Hz						
	Maximum electric heater power		kW	3.0	3.0	6.0	6.0	6.0	9.0	9.0
	Regulated electric heater power (step 1/ step 2/ step 3)		kW	1.0/2.0/3.0	1.0/2.0/3.0	2.0/4.0/6.0	2.0/4.0/6.0	2.0/4.0/6.0	3.0/6.0/9.0	3.0/6.0/9.0
	Piping	Water inlet	(in)	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G
		Water outlet	(in)	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G
	Water operating pressure		MPa	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Water design pressure		MPa	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Pump	Type		-	Glandless						
	Power supply		-	1~ 230V 50Hz						
	Maximum lift pressure		kPa	60	70	70	70	70	100	100
	Maximum water flow		m^3/h	3.5	4.0	8.0	8.0	8.0	10.5	10.5
	Piping	Water inlet	(in)	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G
		Water outlet	(in)	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G	1-1/2" G
		Inlet/outlet distance	mm	180	180	180	180	180	180	180
Expansion vessel	Material		-	Steel (with stainless/galvanized steel connections)						
	Internal water volume		l	6.0	6.0	6.0	6.0	6.0	10.0	10.0
	Dimensions	Height (H)	mm	484	484	484	484	484	484	484
		Width (W)	mm	162	162	162	162	162	162	162
		Depth (D)	mm	100	100	100	100	100	127	127
	Working pressure		MPa	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Test pressure		MPa	0.43	0.43	0.43	0.43	0.43	0.43	0.43
	Pre-loading pressure (Air side)		MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water strainer	Type		-	Y shape						
	Material		-	Brass						
	Piping connection		(in)	DI 41.4 (brazed)						
	Mesh (hole size)		mm	0.5						

3.5.2 Outdoor unit

◆ RAS-(2-6)(HVRN2/HVRNME-AF)

Model				RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4HVRNME-AF	RAS-5HVRNME-AF	RAS-6HVRNME-AF
Heat exchanger	Heat exchanger type		-	Multi-pass cross-finned tube				
	Piping	Material	-	Copper piping				
		Outer diameter	Ømm	8	7	7	7	7
		Rows	-	2	2	2	2	2
		Number of tubes/coil	-	44	76	134	134	134
	Fin	Material	-	Aluminum				
		Pitch	mm	1.45	1.9	1.9	1.9	1.9
	Maximum operating pressure		MPa	4.15	4.15	4.15	4.15	4.15
	Total face area		m^2	0.47	0.76	1.35	1.35	1.35
	Number of coils/unit		-	1	1	1	1	1
Fan unit	Fan	Type	-	Multi-blade centrifugal fan				
		Number/unit	-	1	1	2	2	2
		Outer diameter	mm	449	544	544	544	544
		Revolutions	rpm	850	464	376+459	516+422	573+469
		Nominal air flow/fan	m^3/min	35	45	80	90	100
	Motor	Type	-	Drip-proof enclosure				
		Starting method	-	DC control				
		Power	W	40	40	70+70	70+70	70+70
		Quantity	-	1	1	2	2	2
		Insulation class	-	E	E	E	E	E
Compressor	Model		-	EU1114D6	2YC45DXD	E-306AHD-27A2	E-406AHD-36A2	E-406AHD-36A2
	Type		-	Hermetic scroll				
	Pressure resistance	Discharge	MPa	4.15	4.15	4.15	4.15	4.15
		Suction	MPa	2.21	2.21	2.21	2.21	2.21
	Motor type	Starting method	-	Inverter-driven (I.D.)				
		Poles	-	4	4	4	4	4
		Insulation class	-	E	E	E	E	E
	Oil type		-	HAF68D1 or α68HES-H	FVC50K	FVC68D	FVC68D	FVC68D
	Oil quantity		l	0.75	0.65	1.2	1.2	1.2

◆ RAS-(4-10)HRNME-AF

Model				RAS-4HRNME-AF	RAS-5HRNME-AF	RAS-6HRNME-AF	RAS-8HRNME-AF	RAS-10HRNME-AF
Heat exchanger	Heat exchanger type		-	Multi-pass cross-finned tube				
	Piping	Material	-	Copper piping				
		Outer diameter	Ømm	7	7	7	7	7
		Rows	-	2	2	2	2	2
		Number of tubes/coil	-	134	134	134	160	160
	Fin	Material	-	Aluminum				
		Pitch	mm	1.9	1.9	1.9	2.0	2.0
	Maximum operating pressure		MPa	4.15	4.15	4.15	4.15	4.15
	Total face area		m^2	1.35	1.35	1.35	1.86	1.86
	Number of coils/unit		-	1	1	1	2	2
Fan unit	Fan	Type	-	Multi-blade centrifugal fan				
		Number/unit	-	2	2	2	2	2
		Outer diameter	mm	544	544	544	544	544
		Revolutions	rpm	376+459	516+422	573+469	399+745	630+772
		Nominal air flow/fan	m^3/min	80	90	100	121	150
	Motor	Type	-	Drip-proof enclosure				
		Starting method	-	DC control				
		Power	W	70+70	70+70	70+70	170+120	170+120
		Q´ty	-	2	2	2	2	2
		Insulation class	-	E	E	E	E	E
Compressor	Model		-	E-305AHD-27D2	E-405AHD-36D2	E-405AHD-36D2	E-655DHD-65D2	E-655DHD-65D2
	Type		-	Hermetic scroll				
	Pressure resistance	Discharge	MPa	4.15	4.15	4.15	4.15	4.15
		Suction	MPa	2.21	2.21	2.21	2.21	2.21
	Motor type	Starting method	-	Inverter-driven (I.D.)				
		Poles	-	4	4	4	4	4
		Insulation class	-	E	E	E	E	E
	Oil type		-	FVC68D	FVC68D	FVC68D	FVC68D	FVC68D
	Oil quantity		l	1.2	1.2	1.2	1.9	1.9

3.6 Electrical data

3.6.1 Considerations

Key words:

- U: Power supply.
- PH: Phase.
- f: Frequency.
- IPT: Total input power.
- STC: Starting current: Less than maximum current.
- RNC: Running current.
- MC: Maximum current.

NOTE

- ***Heating inlet/outlet temperature condition: 30/35 ºC.***
- ***Cooling inlet/outlet temperature condition: 12/7 ºC.***
- ***The electrical data of RAS-2HVRN2 is not the same as the data shown in the outdoor unit specification plate. The spec. plate shows the air-to-air configuration data, not the air-to-water configuration, which it is shown in the table.***
- ***Specifications in these tables are subject to change without notice in order that HITACHI may bring the latest innovations to their customers.***

3.6.2 Indoor unit

Model	Power supply			Applicable voltage		Water pump motor			Electrical heater			MC (A)
	U (V)	PH	f (Hz)	U max. (V)	U min. (V)	PH	RNC (A)	IPT (kW)	PH	RNC (A)	Max. IPT (kW)	
RWM-2.0(H)FSN3E	230	1~	50	253	207	1~	0.3	0.08	1~	13.0	3.0	16.0
RWM-3.0(H)FSN3E							0.5	0.10		13.0	3.0	16.0
RWM-4.0(H)FSN3E							0.6	0.13		26.1	6.0	32.0
RWM-5.0(H)FSN3E							0.6	0.14		26.1	6.0	32.0
RWM-6.0(H)FSN3E							0.6	0.14		26.1	6.0	32.0
RWM-4.0(H)FSN3E	400	3N~		440	360		0.6	0.13	3N~	8.7	6.0	11.0
RWM-5.0(H)FSN3E							0.6	0.14		8.7	6.0	11.0
RWM-6.0(H)FSN3E							0.6	0.14		8.7	6.0	11.0
RWM-8.0(H)FSN3E							1.1	0.25		13.0	9.0	17.0
RWM-10.0(H)FSN3E							1.2	0.26		13.0	9.0	17.0

3.6.3 Outdoor unit

Model	Power supply			Applicable voltage		Compressor and fan motors						Max. IPT (kW)	MC (A)
	U (V)	PH	f (Hz)	U max. (V)	U min (V)	PH	STC (A)	Cooling Operation		Heating Operation			
								IPT (KW)	RNC (A)	IPT (KW)	RNC (A)		
RAS-2HVRN2	230	1~	50	253	207	1~	-	1.17	5.2	0.94	4.1	2.50	11.0
RAS-3HVRNME-AF								1.85	8.2	1.55	6.8	3.13	14.0
RAS-4HVRNME-AF								2.22	9.8	2.06	9.2	3.94	18.0
RAS-5HVRNME-AF								2.90	12.8	2.62	11.6	5.75	26.0
RAS-6HVRNME-AF								3.88	17.2	3.27	14.5	5.86	26.0
RAS-4HRNME-AF	400	3N~		440	360	3N~		2.22	3.3	2.06	3.0	4.72	7.0
RAS-5HRNME-AF								2.90	4.3	2.62	3.9	6.76	11.0
RAS-6HRNME-AF								3.88	5.7	3.27	4.8	8.16	13.0
RAS-8HRNME-AF								4.60	6.8	4.22	6.2	7.40	13.0
RAS-10HRNME-AF								5.88	8.6	5.30	7.8	9.90	17.0

3.6.4 Domestic Hot Water Tank

RAS Model	Main unit power			Applicable voltage		IPT (kW)	RNC (A)
	U (V)	PH	f (Hz)	U max. (V)	U min. (V)		
DHWT200E-2.5H1E	230	1~	50	253	207	2.5	12
DHWT300E-2.5H1E						2.5	12
DHWT200S-2.5H1E						2.5	12
DHWT300S-2.5H1E						2.5	12

4. Capacity and selection data

Index

4.1 System selection procedure

The following procedure gives an example of selection of YUTAKI S system based on a series of previously defined installation requirements: heating/cooling load required, operating temperatures and special characteristics on the installation (energy system used, power source, etc.).

4.1.1 Selection parameters

To calculate the YUTAKI S units, it will be necessary to consult and/or use a series of parameters shown in tables and graphics presented in the different chapters of this catalogue. A summarized list is shown below:

Available models	*Maximum cooling and heating capacities*
General information of the units	*COP and EER*
Operation space possibilities	*Different correction factors*
Working range	*Sound data for the different units*
Different possible energy systems	

4.1.2 Selection procedure

The system selection procedure is as follows:

Firstly, the system combination (outdoor unit + indoor unit) is pre-selected according to the design conditions. Then, the theoretical capacity values taken from the different tables are corrected by means of the correction factors, resulting in the actual capacity which will provide the selected system.

The system selection procedure will be divided in two parts: heating and cooling.

◆ Heating mode

YUTAKI S system is a perfect solution for heating requirements. It allows many configuration possibilities which are explained on chapter *Installation configurations*.

Then, the three main types of configuration are described briefly and are taken into account in the selection procedure in order to provide the best solution for the heating requirements.

Three possible Installation configurations

Before proceeding with the selection calculation, first establish the type of system to be designed: Mono-valent, Mono-energy, or Alternating Bi-valent (Only boiler or heater + boiler). These main energy systems with their capacity-time charts are shown below.

NOTE

For more information about the various energy systems, please refer to the chapter** Installation configurations**.

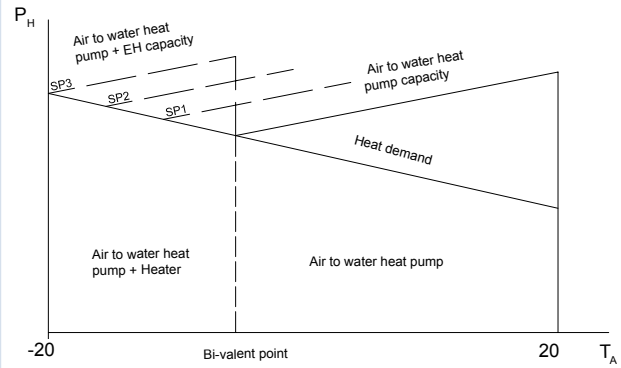
- Mono-valent system

The YUTAKI S system is sized to provide 100% of the heating requirements on the coldest day the year.

- Mono-energy system

The YUTAKI S system is sized to provide 80% of the heating requirements on the coldest day of the year. An auxiliary electric heater (inside the indoor unit) is used to provide the additional heating required on the coldest days.

Example of Mono-energy system (Mono-valent)



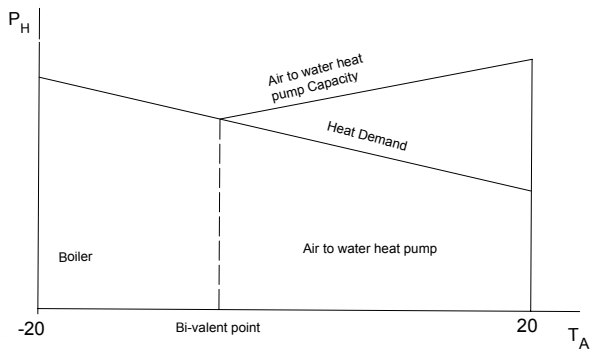
NOTE

- ***T_A : Outdoor ambient temperature (ºC).***
- ***P_H : Heating capacity.***
- ***SP1/2/3: Heater steps.***
- ***Bivalent point can be set through the LCD user's interface.***

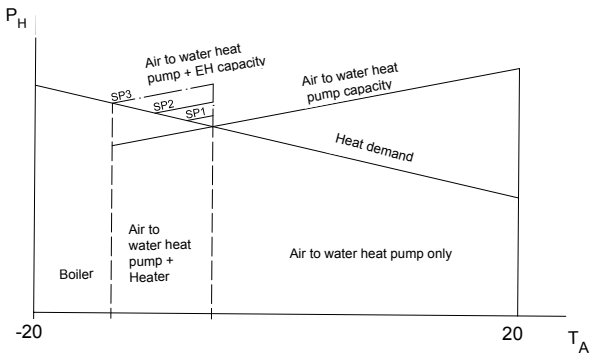
- Alternating Bi-valent system

The boiler is configured to alternate with the YUTAKI S system.

Example of Alternating Bi-valent (Only boiler)



Example of Alternating Bi-valent (Heater + boiler)



The example given in this chapter is based on a Mono-energy system, allowing for an unit with electrical heater to be used (auxiliary electric heater available to cover temporary heating requirements on the coldest days of the year).

In installations which already have a conventional boiler (gas/oil), it can be used to alternate with YUTAKI S system (electric heater enabled or disabled) which will help to increase the overall performance of the whole installation significantly.

In any case, the calculation example can be applied to all the energy systems mentioned.

Procedure description

The selection procedure given in this chapter is a simple example structured into 3 main blocks:

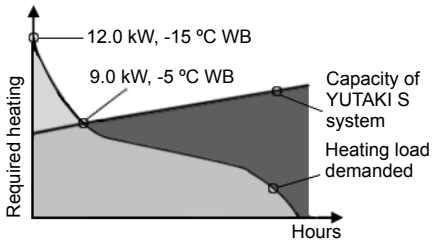
First, a) once the energy system to be used has been chosen (Mono-energy for this example), the YUTAKI S system will be selected depending on the required regular heating load. Next, b) It will be check that the combination (YUTAKI S + electric heater) covers the temporary needs of the coldest days of the year. Finally, c) it will be selected the Domestic Hot Water Tank accessory.

a) Selection for a required regular heating load

- **Step 1: Initial pre-selection**

Proposed energy system	Mono-energy
Inlet/outlet water temperature	30/35 ºC
Regular ambient temperature WB/DB (HR = 85%)	-5/-4 °C
Required regular heating load	9.0 kW
Ambient temperature WB/DB on the coldest day of the year (HR = 85%)	-15/-14.5 ºC
Heating load required on the coldest day of the year	12.0 kW

Installation restrictions	
Installation type	Radiant floor
Power supply	1~ 230V 50Hz
Indoor unit lower than outdoor unit	15 m
Equivalent piping length between outdoor and indoor unit	20 m



These conditions will determine the entry in the Maximum heating capacity tables, see section *Maximum heating capacity tables*, where we can identify which unit has heating capacity to cover the required regular heating load by the installation (9.0 kW for an inlet/outlet water temperature of 30/35 ºC and an ambient temperature of -5ºC WB).

YUTAKI S system	Maximum heating capacity (kW)
RAS-2HVRN2 + RWM-2.0(H)FSN3E	5.7
RAS-3HVRNME-AF + RWM-3.0(H)FSN3E	8.9
☛ **RAS-4HVRNME-AF + RWM-4.0(H)FSN3E**	**11.2**
RAS-5HVRNME-AF + RWM-5.0(H)FSN3E	13.3
RAS-6HVRNME-AF + RWM-6.0(H)FSN3E	13.9
RAS-8HRNME-AF + RWM-8.0(H)FSN3E	20.2
RAS-10HRNME-AF + RWM-10.0(H)FSN3E	24.8

As can be seen in the table, the YUTAKI S system that covers the installation's heating requirements is the combination of RAS-4HVRNME-AF + RWM-4.0FSN3E. Therefore, this will be the pre-selected YUTAKI S system.

NOTE

In case of working with an ambient temperature value not included in the Maximum heating capacity tables of section Maximum heating capacity tables, (for example, -3 ºC), an interpolation will be needed, using the values above and below the ambient temperature.

- **Step 2: Heating capacity correction for defrost and piping length**

The actual heating capacity of the pre-selected unit must be calculated applying the necessary correction factors:

$$Q_H = Q_{MH} \times f_D \times f_{LH}$$

Q_H: Actual heating capacity (kW)

Q_{MH}: Maximum heating capacity (kW)

f_D: Defrost correction factor

f_{LH}: Heating piping length correction factor

The maximum heating capacity (Q_{MH}) of the RAS-4HVRNME-AF + RWM-4.0FSN3E system is 11.2 kW.

- Calculation of f_D:

  In situations where the ambient temperature is lower than 7 ºC DB, frost may build up on the heat exchanger. In the case, the heating capacity of the system may be reduced because of the time spent by the system in removing the frost build-up.

  The defrosting correction factor takes this time into account and applies the heating capacity correction.

  To calculate the correction factor, please see section *Defrost correction factor* which shows a table with different values of f_D depending on the ambient temperature (ºC DB). If the correction factor at an ambient temperature of -4 ºC DB does not appear on the table, an interpolation will be needed.

  Finally, the resulting defrosting correction factor is **0.885**.

- Calculation of f_{LH}:

  Both the length of the refrigerant piping used and the height difference between the outdoor unit and the indoor unit, directly affect the performance of the unit. This concept is quantified by means of the piping length correction factor.

  To determine this value, it is necessary refer to section *Heating piping length correction factor*, where it can be seen that for the characteristics of our example (equivalent piping length of 20 meters and the indoor unit located 15 meters lower than outdoor unit), the resulting piping length correction factor is ***0.992.***

- Calculation of Q_H:

  Once the correction factors to be applied have been determined, the formula for actual heating capacity of the RAS-4HVRNME-AF + RWM-4.0FSN3E system can be applied:

  $Q_H = 11.2\ kW \times 0.885 \times 0.992 =$ ***9.83 kW***

As can be seen, the actual heating capacity of the RAS-4HVRNME-AF + RWM-4.0FSN3E system (9.83 kW) is greater than the heating load required by the installation (9.0 kW). Therefore, the pre-selection will be considered valid.

NOTE

If the actual heating capacity calculated is lower than the required regular heating load, the calculation must be done again with the unit immediately above. If there is no unit higher than the pre-selected one, some other system (combination with boiler for example), or the regular use of the electric heater, should be considered.

b) Selection for the coldest days of the year (use of the auxiliary electric heater)

The previous calculation shows that the RAS-4HVRNME-AF + RWM-4.0FSN3E system provides a heating capacity of 9.83 kW (-5 ºC WB), which is greater than the regular heating load necessary of 9.0 kW, but does not reach the peak heating load of 12.0 kW (-15 ºC WB) necessary on the coldest days of the year. In this cases, the electric heater can provide the auxiliary heating capacity to cover all the peak heating load.

The aim of this section is to check that the energy system chosen (Mono-energy) covers the temporary heating requirements for the coldest days of the year.

- **Step 1: Initial pre-selection**

As the ambient temperature has fallen to -15 ºC, the Maximum heating capacity tables has to be consulted again to determinate the maximum heating capacity that the RAS-4HVRNME-AF + RWM-4.0FSN3E system will provide for these new conditions.

The maximum heating capacity for an ambient temperature of -15 ºC WB and a water inlet/outlet temperature of 30/35 ºC is ***8.9 kW.***

- **Step 2: Heating capacity correction for defrost and piping length**

The actual heating capacity for the system selected for the coldest days of the year is calculated by applying correction factors for defrost and piping length, following the method used above.

$$Q_H = Q_{MH} \times f_D \times f_{LH}$$

Q_H: Actual heating capacity (kW)
Q_{MH}: Maximum heating capacity (kW)
f_D: Defrost correction factor
f_{LH}: Heating piping length correction factor

- Calculation of f_D:

  The tables in section *Defrost correction factor* of this chapter shows that the correction factor for an ambient temperature of -14.5 ºC DB does not appear on the table.

  To know the defrost correction factor for this temperature it will be necessary an interpolation, using the values above and below the ambient temperature. The defrost correction factor obtained is ***0.946.***

- Calculation of f_{LH}:

  The same correction factor than before ***(0.992).***

- Calculation of Q_H:

  Once the correction factors to be applied have been determined, the formula for actual heating capacity of the unit RAS-4HVRNME-AF + RWM-4.0FSN3E system can be applied:

  Q_H= *8.9 kW x 0.946 x 0.992* = ***8.35 kW***

- **Step 3: Calculation for the heating capacity of the combination (YUTAKI S system with electric heater)**

Once applied the applicable correction factors, the actual heating capacity provided by the RAS-4HVRNME-AF + RWM-4.0FSN3E system is 8.35 kW. This heating capacity does not cover the required heating load for the coldest days (12.0 kW).

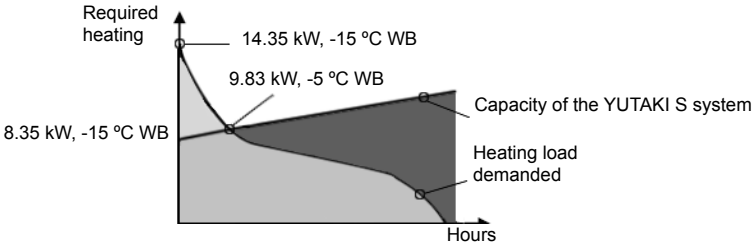
In these cases, the electric heater will provide the auxiliary capacity required to cover temporary heating needs.

The electric heater of the RWM-4.0FSN3E unit provides a power of 6 kW which must be added to the heating capacity provided by the pre-selected unit. The result is:

Q_H= *8.35 kW + 6 kW =* ***14.35 kW***

The heating capacity resulting with the auxiliary heating capacity provided by the electric heater is higher than the heating demand of 12.0 kW estimated in this example for the coldest days of the year, so that pre-selection of the RAS-4HVRNME-AF + RWM-4.0FSN3E system can be taken as valid.

The energy system resulting will be the following:



Three steps electric heater control

As it has been explained in chapter *Features and benefits*, the desired heating supplied by the electric heater can be more exactly adjusted by means of the 3 steps electric heater control. When the electric heater is working in steps 1 or 2, the power input will be reduced comparing with the total power input of the electric heater.

In this example, this option can be applied. The electric heater can work on 2 steps (4 kW) and the required heating load for the coldest days will be covered with a reduction of power input. The result will be:

Q_H= *8.35 kW + 4 kW =* ***12.35 kW***

c) Selection of the Domestic Hot Water Tank accessory

The Domestic Hot Water Tank accessory applicable by the YUTAKI S system selected is the DHWT-300E/S-2.5H1E or DHWT-200E/S-2.5H1E depending on the water demand and the combination system. To do this measurement, it's necessary to estimate the daily domestic hot water demand. To calculate this consumption is used the following expression:

$$D_i(T) = D_i(60ºC) \times (60-T_i / T-T_i)$$

Where:

D_I(T): Water demand at T temperature.

D_I(60ºC): Domestic hot water demand at 60ºC.

T: Domestic hot water tank's temperature.

T_I: Inlet cold water temperature.

- Calculation of ***D_I(60ºC)***:

To calculate the domestic hot water demand at 60ºC***, D_I(60ºC) ,*** it must be referred the current technical installation legislation of the country where the installation will be performed, in order to know the standard liters per person each day. This is necessary to estimate the consumption in relation with the users of the installation. For the next example the domestic hot water demand at 60º it has been taken 30 liters per person, in a detached house with 4 persons (3 bedrooms).

- Calculation of ***T***:

  The domestic hot water tank's temperature should be estimated. It is referred to the accumulated water temperature inside the tank, before the use. Habitually the temperature's rank is between 45ºC - 65ºC. In the example below, it has been taken 45ºC.

- Calculation of ***Ti***:

  The inlet cold water temperature is the temperature of the water that is filling the tank to accumulate it. The cold water rank's temperature is 10ºC - 15ºC. To calculate an approximate water demand its has been used 12ºC.

- Example:

  $D_i(T)$= 120 x (60-12 / 45-12) = ***174.6 litres/day***

  174.6 x 2(*) = ***349.2 litres/day*** *hot water approximate demand*

NOTE

(*): In the case that the installation would be in a detached house, it could be recommended to multiply the calculated consumption per two. This is donne to ensure the hot water supply with guarantees. In the case of multifamily installation, it is not necessary to increase the prevision of hot water demand due to the existence of a less simultaneity factor.

Therefore, it should be selected a 200 litres tank, otherwise, it is recommended the 300 litres tank when the YUTAKI S system is RAS-4HVRNME-AF + RWM-4.0FSN3E or upper combination power, in order to guarantee a longer hot water supply and a better operation. In the case that the conditions of demand and the YUTAKI S system would be lower than those specifications it could be selected between 200 litres and 300 litres tank depending on the demand conditions.

Below, it is shown a table with the Domestic Hot Water Tank selection recommended by HITACHI for the different existing combinations:

YUTAKI S system	Domestic Hot Water Tank
RAS-2HVRN2 +RWM-2.0(H)FSN3E	DHWT-200(E/S)-2.5H1E DHWT-300(E/S)-2.5H1E
RAS-3HVRNME-AF + RWM-3.0(H)FSN3E	
RAS-4HVRNME-AF + RWM-4.0(H)FSN3E	DHWT-300(E/S)-2.5H1E
RAS-5HVRNME-AF + RWM-5.0(H)FSN3E	
RAS-6HVRNME-AF + RWM-6.0(H)FSN3E	
RAS-8HRNME-AF +RWM-8.0(H)FSN3E	
RAS-10HRNME-AF +RWM-10.0(H)FSN3E	

NOTE

- ***The YUTAKI S system is designed for combination with HITACHI Domestic Hot Water Tank. In case of another tank is being used in combination with YUTAKI S system, HITACHI cannot guarantee neither good operation for reliability of the system.***
- ***This Domestic Hot Water Tank selection procedure is just orientated, be sure of consulting the local legislation to ensure a good water demand value.***

◆ Cooling mode (only for RWM-(2.0-10.0)FSN3E)

Procedure description

Once verified that the selected system is able to cover all the heating needs, it is necessary to perform the same check for cooling mode. Then, it is shown the calculation of the cooling capacity of the system.

- **Step 1: Initial pre-selection**

Inlet/outlet water temperature	23/18 ºC
Ambient temperature DB	30 °C
Required cooling load	10.5 kW

Installation restrictions	
Installation type	Refreshing floor

These conditions will determine the entry in the Maximum cooling capacity tables, see section *Maximum cooling capacity tables*, where we can verify if the unit pre-selected for heating mode provides the required cooling load by the installation (10.5 kW for an inlet/outlet water temperature of 23/18 ºC and an ambient temperature of 30ºC DB).

YUTAKI S system	Maximum cooling capacity (kW)
RAS-4HVRNME-AF + RWM-4.0FSN3E	11.6

As can be seen in the table, the RAS-4HVRNME-AF + RWM-4.0FSN3E system provides a theoretical cooling capacity (11.6 kW) greater than the required cooling load by the installation (10.5 kW). Therefore, the calculation process can continue.

NOTE

If the unit pre-selected for heating mode does not provide the required cooling load by the installation, the pre-selection should be changed and the unit immediately above should be chosen.

- **Step 2: Cooling capacity correction for defrost and piping length**

The actual cooling capacity of the pre-selected unit must be calculated applying the necessary correction factors:

$$Q_C = Q_{MC} \times f_{LC}$$

Q_C: Actual cooling capacity (kW)

Q_{MC}: Maximum cooling capacity (kW)

f_{LC}: Cooling piping length correction factor

The maximum cooling capacity (Q_{MC}) of the RAS-4HVRNME-AF + RWM-4.0FSN3E system is 11.6 kW.

- Calculation of f_{LC}:

To determine this value, it is necessary refer to section *Cooling piping length correction factor*, where it can be seen that for the characteristics of our example (equivalent piping length of 20 meters and the indoor unit located 15 meters lower than outdoor unit), the resulting cooling piping length correction factor is ***0.97*** approximately.

- Calculation of Q_C:

  Once the correction factors to be applied have been determined, the formula for actual cooling capacity of the RAS-4HVRNME-AF + RWM-4.0FSN3E system can be applied:

  Q_C= *11.6 kW x 0.97* = ***11.25 kW***

As can be seen, the actual cooling capacity of the RAS-4HVRNME-AF + RWM-4.0FSN3E system (11.25 kW) is greater than the required cooling load by the installation (10.5 kW). Therefore, the pre-selection will be considered valid both for heating and cooling.

NOTE

If the actual cooling capacity calculated is less than the provided by the pre-selected unit, the calculation must be done again with the unit immediately higher.

4.2 Maximum capacity tables

4.2.1 Maximum heating capacity (kW)

System	Water outlet temperature (ºC)	Ambient temperature (ºC WB)																	
		-20		-15		-10		-5		0		5		10		15		20	
		CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)
RWM-2.0(H)FSN3E + RAS-2RVRN2	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	3.9	2.35	4.4	2.40	4.9	2.45	5.4	2.50	5.9	2.55	6.4	2.60	6.9	2.65
	50	-	-	3.6	2.53	4.1	2.59	4.9	2.64	5.6	2.70	6.4	2.76	7.1	2.82	7.9	2.88	8.6	2.94
	45	3.3	2.02	3.9	2.08	4.5	2.14	5.3	2.20	6.4	2.25	7.4	2.41	8.0	2.47	8.7	2.53	9.4	2.60
	40	3.4	1.82	4.0	1.88	4.6	1.95	5.5	2.02	6.6	2.09	7.6	2.25	8.3	2.32	9.0	2.40	9.7	2.47
	35	3.5	1.61	4.1	1.69	4.8	1.76	5.7	1.84	6.8	1.92	7.9	2.08	8.6	2.17	9.3	2.26	10.0	2.34
	35	3.7	1.40	4.3	1.49	4.9	1.58	5.9	1.86	7.0	1.75	8.1	1.92	8.9	2.02	9.6	2.12	10.4	2.22
	25	-	-	-	-	-	-	-	-	7.2	1.58	8.2	1.76	9.0	1.87	9.8	1.98	10.5	2.09
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.9	1.84	10.7	1.96
RWM-3.0(H)FSN3E + RAS-3HVRNME-AF	60	-	-	-	-	-	-	5.5	3.00	6.0	3.07	6.5	3.13	7.0	3.20	7.5	3.26	8.0	3.32
	55	-	-	-	-	5.7	3.04	6.3	3.11	6.9	3.17	7.5	3.24	8.1	3.31	8.7	3.37	9.3	3.44
	50	-	-	5.6	3.01	6.3	3.07	7.1	3.14	8.1	3.20	8.5	2.98	9.2	3.04	9.9	3.10	10.6	3.16
	45	5.5	2.80	6.2	2.86	7.0	2.92	8.0	2.97	9.3	3.03	9.5	2.71	10.3	2.77	11.1	2.83	11.9	2.88
	40	5.8	2.69	6.5	2.78	7.3	2.88	8.5	2.97	9.9	3.06	10.2	2.70	11.0	2.75	11.8	2.81	12.7	2.86
	35	6.0	2.58	6.8	2.71	7.7	2.83	8.9	2.96	10.5	3.09	10.8	2.68	11.7	2.73	12.6	2.79	13.5	2.84
	30	6.2	2.47	7.1	2.63	7.9	2.79	9.3	2.95	11.0	3.11	11.4	2.66	12.3	2.71	13.3	2.77	14.2	2.82
	25	-	-	-	-	-	-	-	-	11.4	3.14	11.8	2.64	12.8	2.69	13.8	2.75	14.7	2.80
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.2	2.73	15.2	2.78
RWM-4.0(H)FSN3E + RAS-4H(V)RNME-AF	60	-	-	-	-	-	-	6.1	2.96	7.2	3.02	8.2	3.08	9.3	3.14	10.4	3.21	11.5	3.27
	55	-	-	-	-	6.4	4.01	7.4	4.10	8.6	4.19	9.8	4.27	10.9	4.36	12.1	4.45	13.3	4.53
	50	-	-	6.7	3.90	7.5	3.99	8.6	4.07	9.8	4.16	11.0	4.25	12.2	4.33	13.4	4.42	14.7	4.51
	45	6.8	3.45	7.7	3.56	8.6	3.67	9.8	3.78	11.0	3.89	12.3	3.99	13.5	4.10	14.8	4.21	16.0	4.32
	40	7.3	3.46	8.3	3.67	9.3	3.88	10.5	4.10	11.9	4.31	12.7	3.97	14.2	4.11	15.8	4.25	17.3	4.39
	35	7.8	3.16	8.9	3.44	10.0	3.73	11.2	4.01	12.4	4.29	13.2	3.94	14.8	4.11	16.4	4.29	18.0	4.46
	30	8.3	2.87	9.4	3.22	10.5	3.57	11.7	3.91	12.9	4.26	13.7	3.91	15.3	4.12	17.0	4.32	18.6	4.53
	25	-	-	-	-	-	-	-	-	13.2	4.24	14.0	3.88	15.7	4.12	17.3	4.36	19.0	4.60
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.8	4.40	19.5	4.67
RWM-5.0(H)FSN3E + RAS-5H(V)RNME-AF	60	-	-	-	-	-	-	9.0	5.67	10.6	5.79	12.1	5.91	13.6	6.04	15.1	6.16	16.7	6.28
	55	-	-	-	-	8.9	5.57	10.2	5.69	11.8	5.81	13.4	5.93	15.0	6.05	16.5	6.17	18.1	6.29
	50	-	-	8.6	5.22	9.7	5.33	11.1	5.43	12.7	5.54	14.3	5.65	15.9	5.76	17.5	5.87	19.1	5.97
	45	8.2	4.65	9.3	4.73	10.5	4.81	11.9	4.88	13.7	4.96	15.1	4.85	16.9	4.93	18.7	5.01	20.5	5.09
	40	8.7	9.29	9.9	7.57	11.1	5.85	12.5	4.13	14.1	2.41	15.5	4.59	17.4	4.69	19.2	4.79	21.0	4.88
	35	9.3	4.08	10.5	4.24	11.8	4.40	13.3	4.56	15.0	4.72	15.9	4.33	17.8	4.45	19.7	4.56	21.5	4.67
	30	9.7	3.63	11.1	3.83	12.4	4.04	13.9	4.25	15.6	4.45	16.6	4.07	18.5	4.20	20.5	4.33	22.4	4.46
	25	-	-	-	-	-	-	-	-	15.9	4.19	16.8	3.82	18.8	3.96	20.8	4.11	22.7	4.25
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.1	3.88	23.1	4.04

System	Water outlet temperature (ºC)	Ambient temperature (ºC WB)																	
		-20		-15		-10		-5		0		5		10		15		20	
		CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)	CAP (kW)	IPT (kW)
RWM-6.0(H)FSN3E + RAS-6H(V)RNME-AF	60	-	-	-	-	-	-	9.1	5.89	10.6	6.01	12.1	6.14	13.6	6.26	15.1	6.39	16.6	6.51
	55	-	-	-	-	9.1	6.04	10.4	6.17	12.0	6.30	13.6	6.43	15.2	6.56	16.7	6.69	18.3	6.82
	50	-	-	8.8	5.64	9.9	5.77	11.4	5.89	13.1	6.02	14.9	6.15	16.6	6.27	18.4	6.40	20.1	6.52
	45	8.4	4.80	9.5	4.89	10.6	4.98	12.4	5.07	14.5	5.16	16.1	5.25	18.0	5.34	19.9	5.43	21.7	5.52
	40	8.9	4.65	10.1	4.74	11.4	4.84	13.1	4.93	15.1	5.02	16.8	5.11	18.7	5.20	20.6	5.29	22.6	5.38
	35	9.5	4.15	10.8	4.26	12.1	4.37	13.9	4.49	16.2	4.60	17.4	4.71	19.4	4.83	21.4	4.94	23.4	5.05
	30	9.9	3.64	11.3	3.77	12.7	3.91	14.6	4.05	16.8	4.18	18.1	4.32	20.2	4.45	22.2	4.59	24.3	4.73
	25	-	-	-	-	-	-	-	-	17.2	3.76	18.5	3.92	20.6	4.08	22.7	4.24	24.9	4.40
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.2	3.89	25.4	4.07
RWM-8.0(H)FSN3E + RAS-8HRNME-AF	60	-	-	-	-	-	-	14.0	7.13	16.5	7.28	18.9	7.43	21.4	7.58	23.9	7.73	26.4	7.88
	55	-	-	-	-	12.4	6.99	14.9	7.14	17.5	7.30	20.0	7.45	22.5	7.60	25.1	7.75	27.6	7.90
	50	-	-	12.1	6.78	14.6	6.94	17.0	7.09	19.5	7.25	22.0	7.41	24.5	7.57	27.0	7.72	29.4	7.88
	45	9.7	6.64	13.0	6.81	16.4	6.98	19.0	7.15	21.2	7.32	23.9	7.49	26.9	7.66	30.0	7.84	33.0	8.01
	40	10.0	6.13	13.5	6.30	17.0	6.47	19.6	6.65	21.7	6.82	24.4	6.99	27.5	7.17	30.6	7.34	33.7	7.51
	35	10.4	5.62	14.0	5.79	17.6	5.97	20.2	6.15	22.2	6.32	24.9	6.50	28.0	6.67	31.2	6.85	34.3	7.02
	30	10.8	5.11	14.6	5.29	18.3	5.47	21.0	5.64	23.0	5.82	25.8	6.00	29.1	6.17	32.4	6.35	35.6	6.53
	25	-	-	-	-	-	-	-	-	23.5	5.32	26.3	5.50	29.6	5.68	32.9	5.86	36.3	6.04
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.5	5.36	36.9	5.54
RWM-10.0(H)FSN3E + RAS-10HRNME-AF	60	-	-	-	-	-	-	19.4	9.98	22.5	10.20	25.7	10.42	28.9	10.64	32.1	10.86	35.2	11.08
	55	-	-	-	-	17.1	9.32	20.3	9.52	23.5	9.73	26.8	9.93	30.0	10.13	33.2	10.33	36.4	10.54
	50	-	-	15.5	8.88	18.7	9.06	22.0	9.23	25.3	9.41	28.5	9.58	31.8	9.76	35.1	9.93	38.4	10.10
	45	12.6	8.42	16.4	8.55	20.2	8.68	23.6	8.81	26.8	8.94	30.3	9.07	33.9	9.20	37.5	9.33	41.2	9.46
	40	13.0	7.84	16.7	8.02	20.7	8.20	24.2	8.39	27.2	8.57	30.8	8.75	34.5	8.93	38.2	9.11	41.8	9.30
	35	13.4	7.25	17.4	7.49	21.4	7.72	24.8	7.96	27.8	8.19	31.2	8.43	35.0	8.66	38.8	8.90	42.5	9.13
	30	13.7	6.67	17.7	6.96	21.9	7.24	25.6	7.53	28.8	7.82	32.4	8.11	36.3	8.39	40.2	8.68	44.1	8.97
	25	-	-	-	-	-	-	-	-	29.1	7.44	32.7	7.78	36.6	8.12	40.6	8.46	44.5	8.80
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41.3	8.25	45.3	8.64

NOTE

- ***CAP: Capacity at compressor maximum frequency. Capacity is valid for difference between water inlet and water outlet of 3-8ºC.***
- ***IPT: Total input power.***

The table above shows the capacity data in peak values (without considering the defrost value). To calculate the integrated values it is necessary to apply the defrost correction factor refering to the section *Defrost correction factor.*

The table above shows the input power (IPT) at maximum capacity (CAP). Most of the time, the unit will run at partial load, so that the actual input power will be lower.

4.2.2 Maximum cooling capacity (kW)

System	Water outlet temperature (ºC)	Ambient temperature (°C DB)							
		10	15	20	25	30	35	40	45
		CAP (kW)	CAP (kW)	CAP (kW)	CAP (kW)	CAP (kW)	CAP (kW)	CAP (kW)	CAP (kW)
RWM-2.0FSN3E + RAS-2HVRN2	20	-	-	-	8.4	8.1	7.9	7.6	7.4
	18	-	-	8.3	8.0	7.8	7.5	7.2	7.0
	15	8.1	7.9	7.6	7.4	7.2	6.9	6.7	6.5
	10	7.0	6.8	6.6	6.4	6..2	6.0	5.8	5.6
	7	6.4	6.2	6.0	5.8	5.6	5.4	5.2	5.0
RWM-3.0FSN3E + RAS-3HVRNME-AF	20	-	-	-	9.0	8.6	8.2	7.8	7.4
	18	-	-	9.1	8.8	8.4	8.0	7.6	7.3
	15	9.5	9.1	8.8	8.4	8.1	7.7	7.4	7.0
	10	8.8	8.5	8.2	7.8	7.5	7.2	6.9	6.6
	7	8.4	8.1	7.8	7.5	7.2	6.9	6.6	6.3
RWM-4.0FSN3E + RAS-4H(V)RNME-AF	20	-	-	-	12.5	12.1	11.7	11.4	11.0
	18	-	-	12.3	11.9	11.6	11.2	10.8	10.5
	15	12.1	11.8	11.4	11.1	10.7	10.4	10.0	9.7
	10	10.6	10.3	10.0	9.7	9.3	9.0	8.7	8.4
	7	9.7	9.4	9.1	8.8	8.5	8.2	7.9	7.6
RWM-5.0FSN3E + RAS-5H(V)RNME-AF	20	-	-	-	16.6	16.2	15.9	15.5	15.1
	18	-	-	16.1	15.7	15.4	15.0	14.6	14.3
	15	15.5	15.1	14.8	14.4	14.1	13.7	13.4	13.0
	10	13.2	12.9	12.5	12.2	11.9	11.6	11.3	10.9
	7	11.8	11.5	11.2	10.9	10.6	10.3	10.0	9.7
RWM-6.0FSN3E + RAS-6H(V)RNME-AF	20	-	-	-	19.7	19.3	18.9	18.6	18.2
	18	-	-	18.9	18.5	18.2	17.8	17.4	17.1
	15	17.8	17.5	17.1	16.8	16.4	16.1	15.7	15.4
	10	14.8	14.5	14.2	13.9	13.5	13.2	12.9	12.6
	7	13.0	12.7	12.4	12.1	11.8	11.5	11.2	10.9
RWM-8.0FSN3E + RAS-8HRNME-AF	20	-	-	-	26.4	25.6	24.8	24.0	23.2
	18	-	-	25.9	25.1	24.3	23.5	22.7	21.9
	15	25.2	24.5	23.8	23.0	22.3	21.6	20.8	20.1
	10	21.6	20.9	20.3	19.6	19.0	18.3	17.7	17.0
	7	19.4	18.8	18.2	17.6	17.0	16.4	15.8	15.2
RWM-10.0FSN3E + RAS-10HRNME-AF	20	-	-	-	32.4	31.7	30.9	30.2	29.4
	18	-	-	31.2	30.4	29.7	29.0	28.3	27.6
	15	29.5	28.8	28.1	27.5	26.8	26.1	25.4	24.8
	10	24.2	23.6	23.0	22.5	21.9	21.3	20.7	20.1
	7	21.1	20.5	20.0	19.5	18.9	18.4	17.9	17.3

NOTE

CAP: Capacity at compressor maximum frequency. Capacity is valid for difference between water inlet and water outlet of 3-8ºC.

4.3 Heating nominal points of interest

The following table shows the nominal heating capacity and coefficient of performance at the specified conditions:

Model	Indoor unit	RWM-2.0(H)FSN3E	RWM-3.0(H)FSN3E	RWM-4.0(H)FSN3E	RWM-5.0(H)FSN3E	RWM-6.0(H)FSN3E	RWM-8.0(H)FSN3E	RWM-10.0(H)FSN3E
	Outdoor unit	RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4H(V)RNME-AF	RAS-5H(V)RNME-AF	RAS-6H(V)RNME-AF	RAS-8HRNME-AF	RAS-10HRNME-AF
1) Conditions: Water in/out */35ºC Out Temp, (DB/WB): 10/9ºC	CAP (kW)	5.3	7.7	10.3	12.7	15.0	20.6	25.3
	COP	5.05	4.77	4.78	4.56	4.33	4.80	4.63
2) Conditions: Water in/out */45ºC Out Temp, (DB/WB): 10/9ºC	CAP (kW)	4.9	7.3	9.6	12.0	14.3	19.3	23.9
	COP	3.65	3.64	3.62	3.41	3.26	3.72	3.69
3) Conditions: Water in/out */55ºC Out Temp, (DB/WB): 10/9ºC	CAP (kW)	4.4	6.3	8.5	10.4	13.4	17.2	21.2
	COP	2.79	2.79	3.37	2.81	2.67	2.93	2.89
4) Conditions: Water in/out 30/35ºC Out Temp, (DB/WB): 7/6ºC	CAP (kW)	5.1	7.5	9.8	12.0	14.0	19.6	24.0
	COP	5.02	4.55	4.47	4.36	4.11	4.45	4.41
5) Conditions: Water in/out 40/45ºC Out Temp, (DB/WB): 7/6ºC	CAP (kW)	4.7	7.1	9.2	11.3	13.3	18.4	22.6
	COP	3.51	3.47	3.42	3.16	3.01	3.43	3.40
6) Conditions: Water in/out 47/55ºC Out Temp, (DB/WB): 7/6ºC	CAP (kW)	4.2	6.2	8.1	10.1	12.6	16.2	20.2
	COP	2.63	2.65	2.59	2.60	2.47	2.70	2.67
7) Conditions: Water in/out */35ºC Out Temp, (DB/WB): 2/1ºC	CAP (kW)	4.7	7.1	9.0	10.9	12.4	17.9	21.9
	COP	3.21	3.18	2.68	2.92	2.88	3.05	3.00
8) Conditions: Water in/out */45ºC Out Temp, (DB/WB): 2/1ºC	CAP (kW)	4.4	6.7	8.5	10.2	11.7	16.9	20.5
	COP	2.51	2.69	2.44	2.33	2.31	2.51	2.57
9) Conditions: Water in/out */55ºC Out Temp, (DB/WB): 2/1ºC	CAP (kW)	3.8	5.9	7.5	9.6	10.6	14.6	18.5
	COP	1.72	1.89	1.87	1.80	1.69	2.06	2.06
10) Conditions: Water in/out */35ºC Out Temp, (DB/WB): -7/-8ºC	CAP (kW)	4.0	6.4	7.6	9.0	9.4	14.8	18.0
	COP	2.65	2.51	2.42	2.40	2.34	2.63	2.61
11) Conditions: Water in/out */45ºC Out Temp, (DB/WB): -7/-8ºC	CAP (kW)	3.8	6.0	7.1	8.3	8.7	14.2	16.6
	COP	2.10	2.07	2.14	1.92	1.81	2.17	2.16
12) Conditions: Water in/out */55ºC Out Temp, (DB/WB): -7/-8ºC	CAP (kW)	3.0	5.3	5.9	7.7	7.9	11.8	15.4
	COP	1.62	1.65	1.55	1.55	1.46	1.73	1.72

NOTE

- ***CAP: Nominal heating capacity (kW).***
- ***COP: Coefficient of performance.***

The table above shows the capacity data in integrated values (with defrost factor included).

4.4 Correction factors

4.4.1 Defrost correction factor

The maximum heating capacity shown above does not include operation during frost or defrosting.

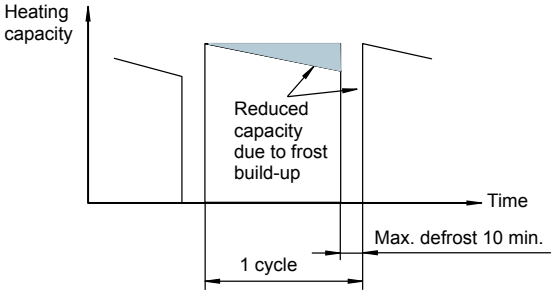
When this type of operation is taken into account, the heating capacity must be corrected according to the following equation:

Correction heating capacity = Correction factor x heating capacity

Outdoor inlet air temp. (ºC DB) (HR = 85%)	-20	-7	-5	-3	0	3	5	7
Defrost correction factor f_d	0.95	0.94	0.92	0.85	0.84	0.85	0.90	1.00

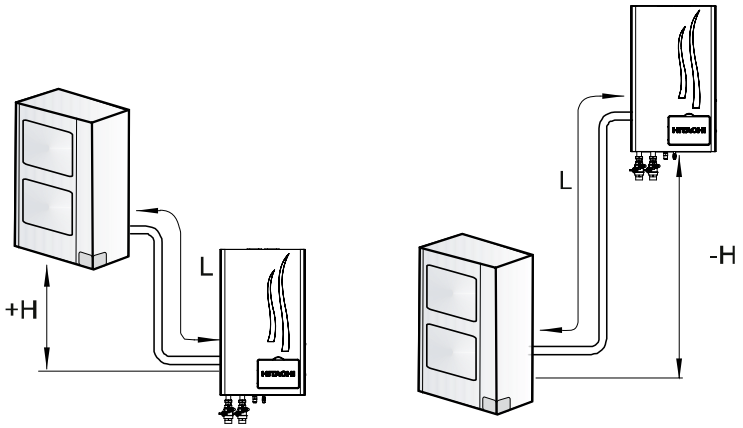
NOTE

- ***Defrost correction factor corresponds to a relative humidity of 85%. If the condition changes, the correction factor will be different.***
- ***Defrost correction factor is not valid for special conditions such as during snow or operation in a transitional period.***



4.4.2 Piping length correction factor

The correction factor is based on the equivalent piping length in meters (EL) and the height between outdoor and indoor unit in meters (H).



H: Height between indoor unit and outdoor unit (m).

- H>0: Position of outdoor unit is higher than position of indoor unit (m).
- H<0: Position of outdoor unit is lower than position of indoor unit (m).

L: Actual one-way piping length between indoor unit and outdoor unit (m).

EL: Equivalent one-way piping length between indoor unit and outdoor unit (m).

- One 90º elbow is 0,5 m.
- One 180º bend is 1,5 m.
- One Multi-kit is 0,5 m.

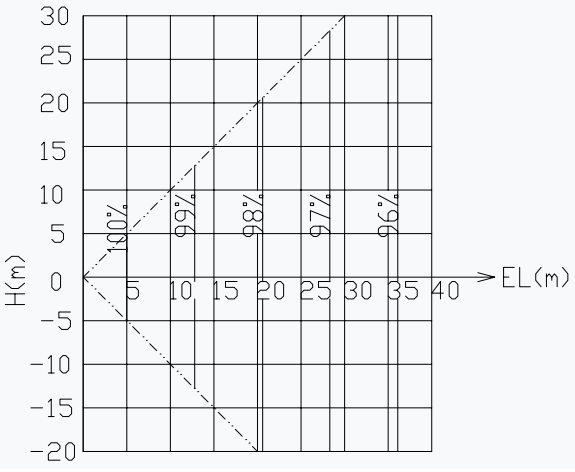
◆ Heating piping length correction factor

NOTE

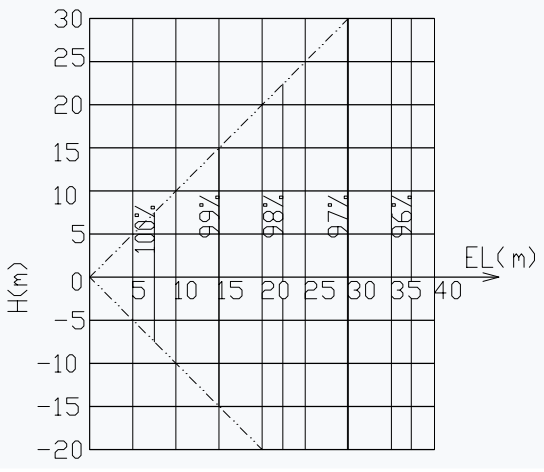
Take note that the piping length specified in the following graphics is the equivalent piping length (EL), considering the possible elbows, bends... The actual piping length (L) is slightly lower, 30 m.

Heating

RAS-2HVRN2

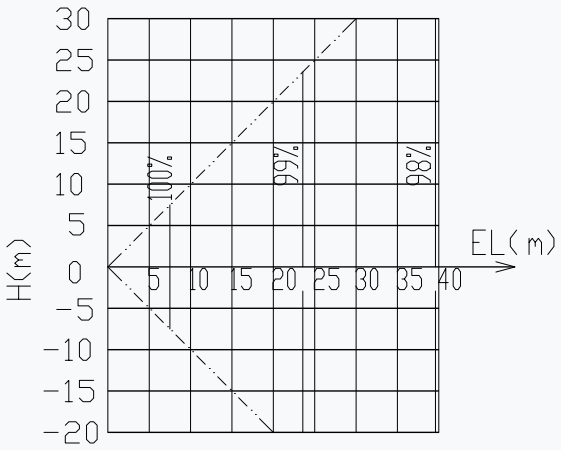


RAS-3HVRNME-AF

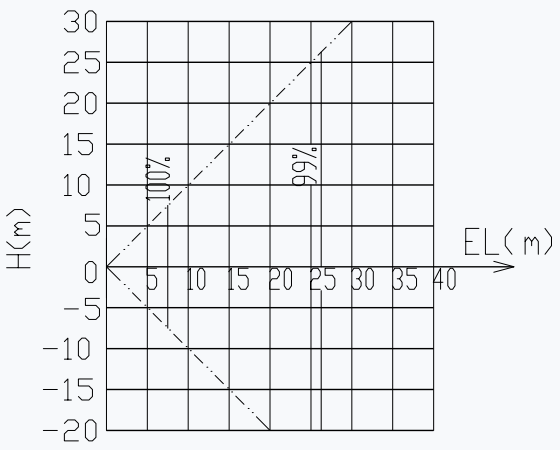


Heating

RAS-4H(V)RNME-AF

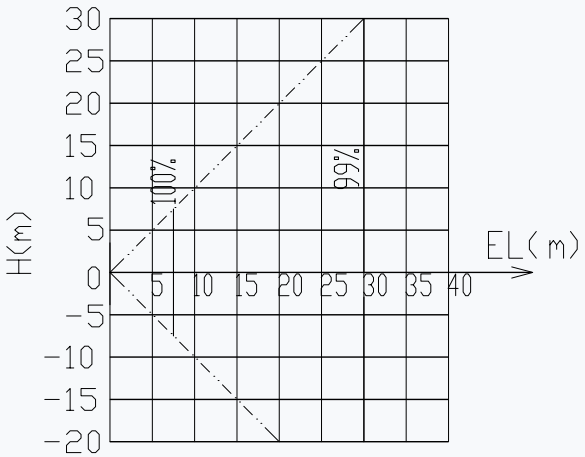


RAS-5H(V)RNME-AF

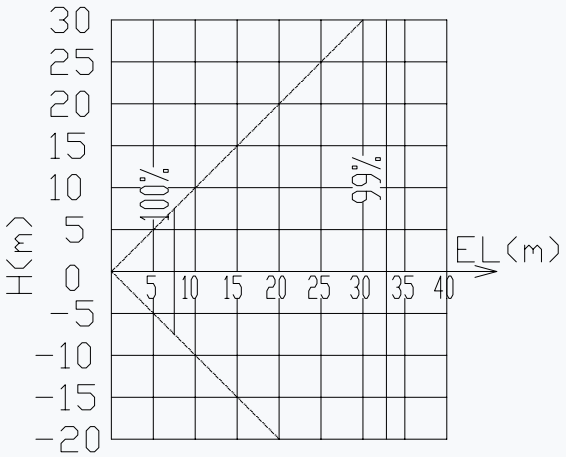


Heating

RAS-6H(V)RNME-AF

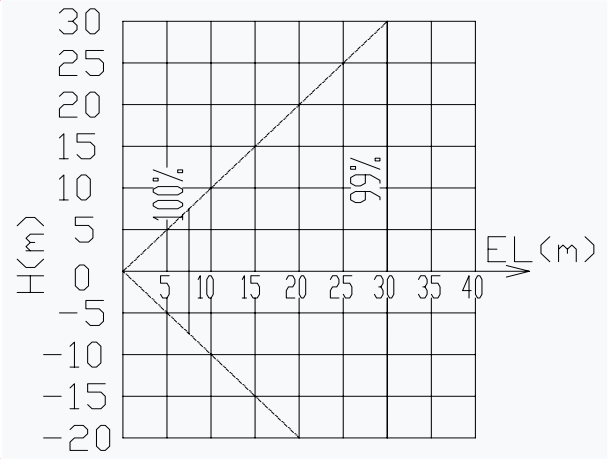


RAS-8HRNME-AF



Heating

RAS-10HRNME-AF



NOTE

The heating capacity should be corrected according to the following formula:

THA = TH x PH

THA: Actual corrected heating capacity (kW)

TH: Heating capacity from heating capacity table (kW).

PH: Heating piping length correction factor (in %).

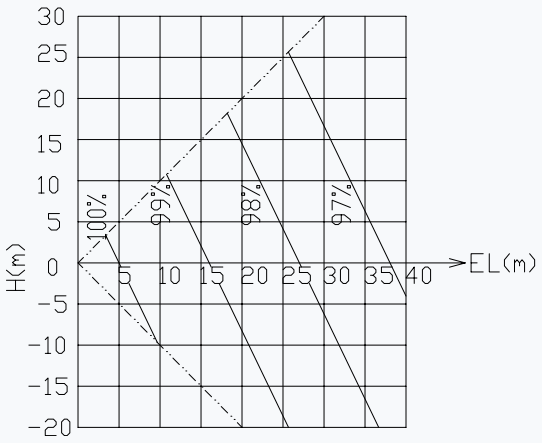
◆ Cooling piping length correction factor

NOTE

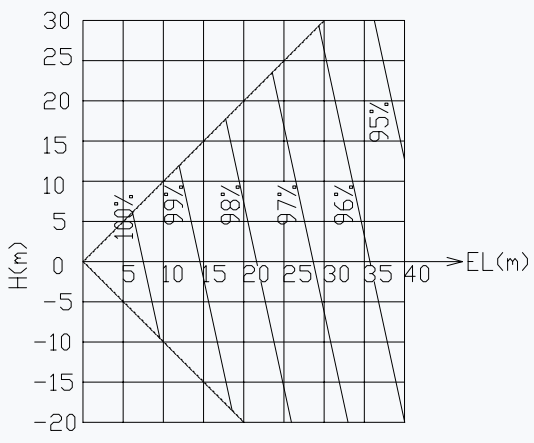
Take note that the piping length specified in the following graphics is the equivalent piping length (EL), considering the possible elbows, bends... The actual piping length (L) is slightly lower, 30 m.

Cooling

RAS-2HVRN2



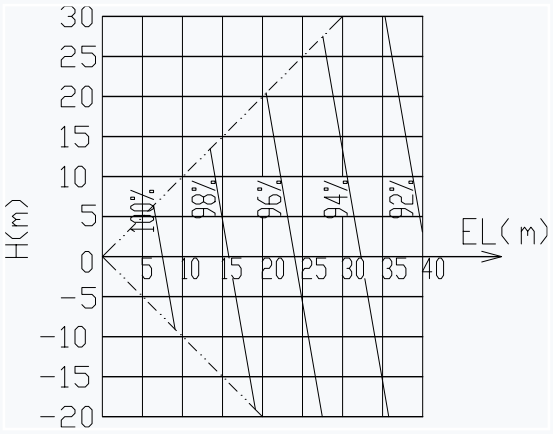
RAS-3HVRNME-AF



Cooling

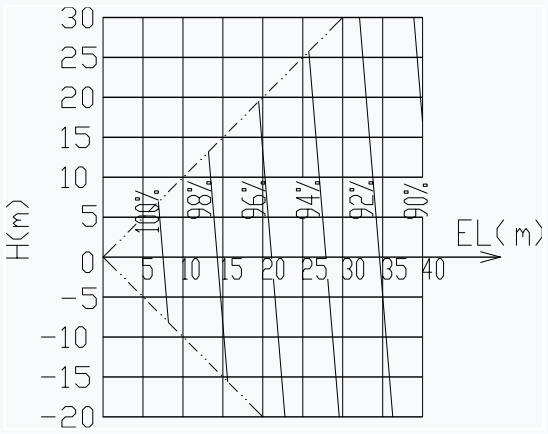
RAS-4H(V)RNME-AF

RAS-5H(V)RNME-AF

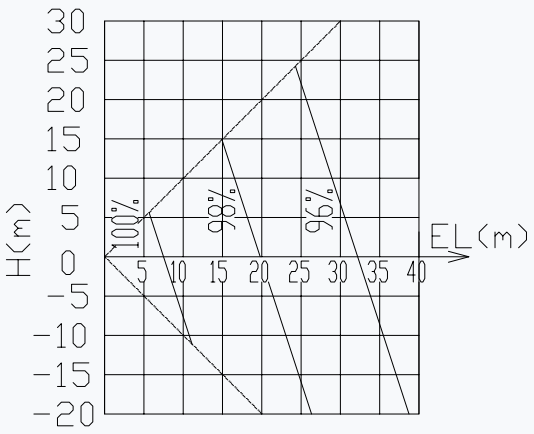


Cooling

RAS-6H(V)RNME-AF

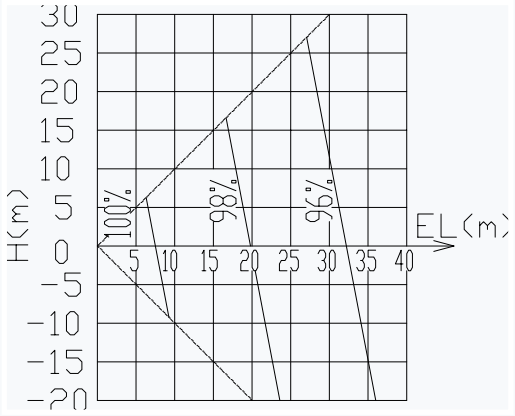


RAS-8HRNME-AF



Cooling

RAS-10HRNME-AF



NOTE

The cooling capacity should be corrected according to the following formula:

TCA = TC x PC

TCA: Actual corrected cooling capacity (kW)

TC: Cooling capacity from the cooling capacity table (kW).

PC: Cooling piping length correction factor (in %).

5. Acoustic characteristic curves

Index

5.1 Overall sound level

The sound pressure level was measured under the following conditions:

1 Distance of the unit from the measuring point: At 1 meter from the unit's front surface; 1,5 meter from floor level.

2 Power supply:

a. RAS-(2-6)(HVRN2/H(V)RNME-AF): 1~ 230V 50Hz.

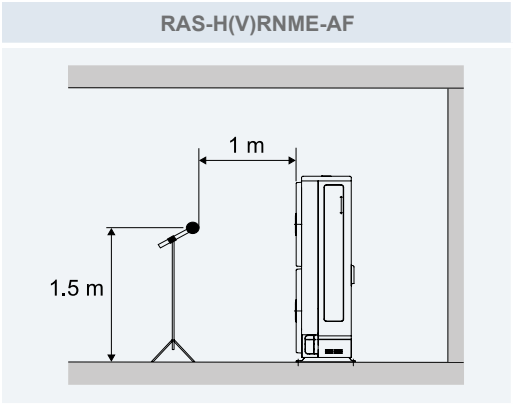
b. RAS-(4-10)HRNME-AF: 3N~ 400V 50Hz.

NOTE

- ***The above data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.***
- ***The data indicated is based on cooling mode. In the case of heating mode, the sound pressure level increases from 1 to 2 dB(A).***

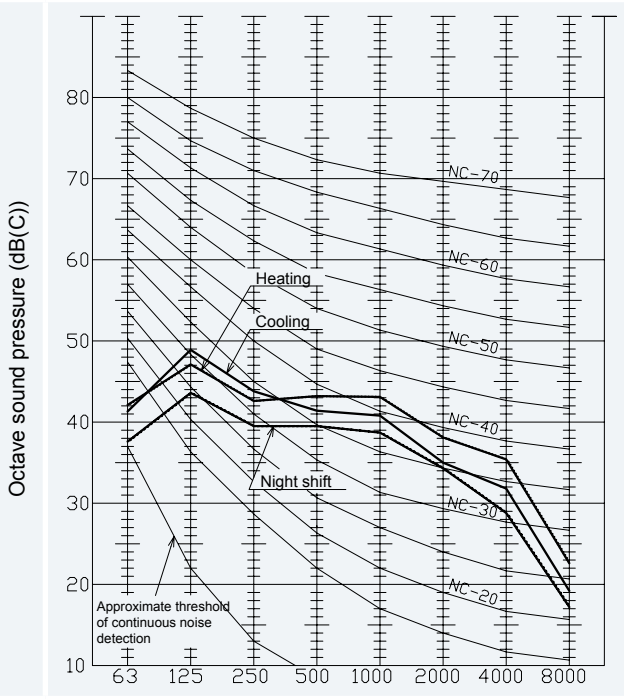
Overall sound level measuring position

RAS-H(V)RNME-AF



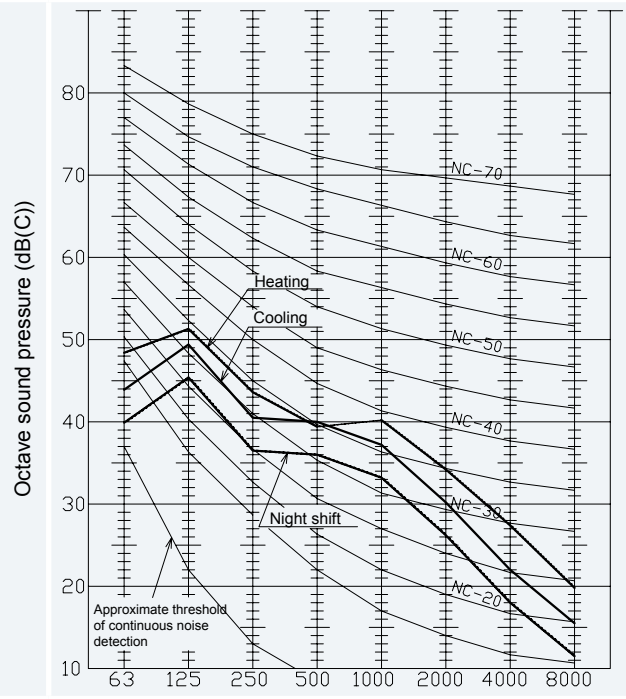
5.1.1 Outdoor unit

RAS-2HVRN2



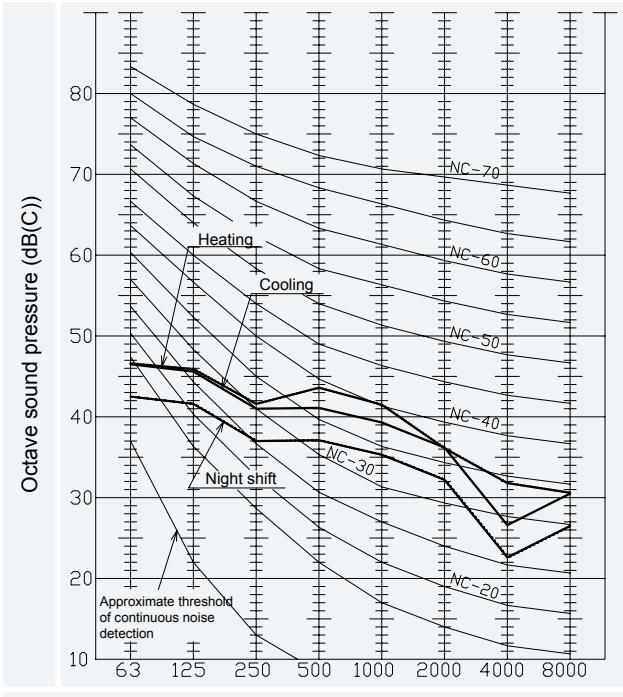
Sound pressure level: Cooling (Night mode); 45 (43) dB(A)

RAS-3HVRNME-AF



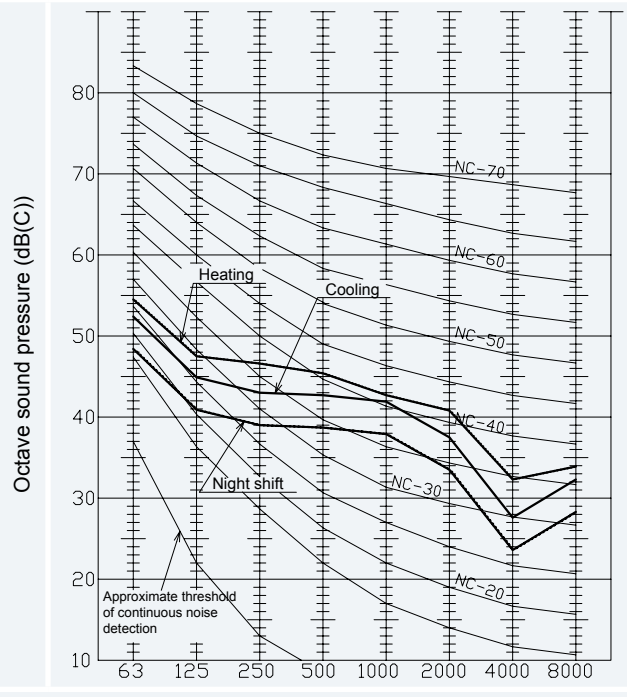
Sound pressure level: Cooling (Night mode); 42 (38) dB(A)

RAS-4HVRNME-AF



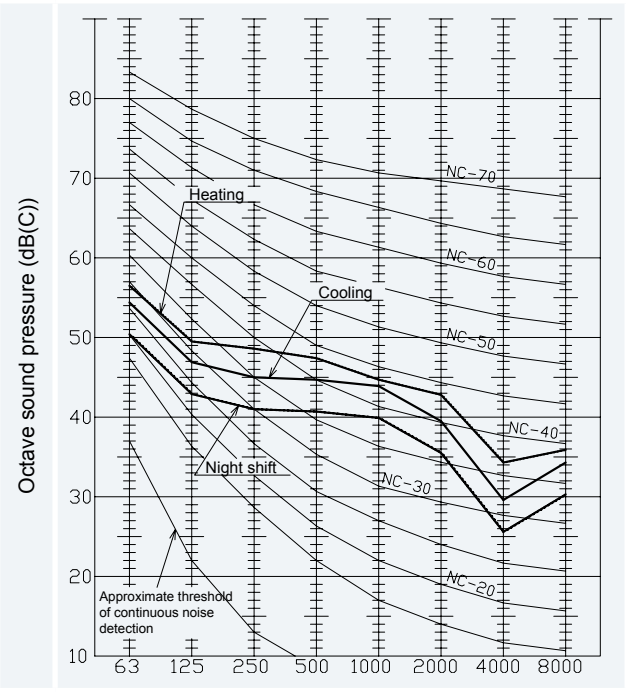
Sound pressure level: Cooling (Night mode); 44 (40) dB(A)

RAS-5HVRNME-AF



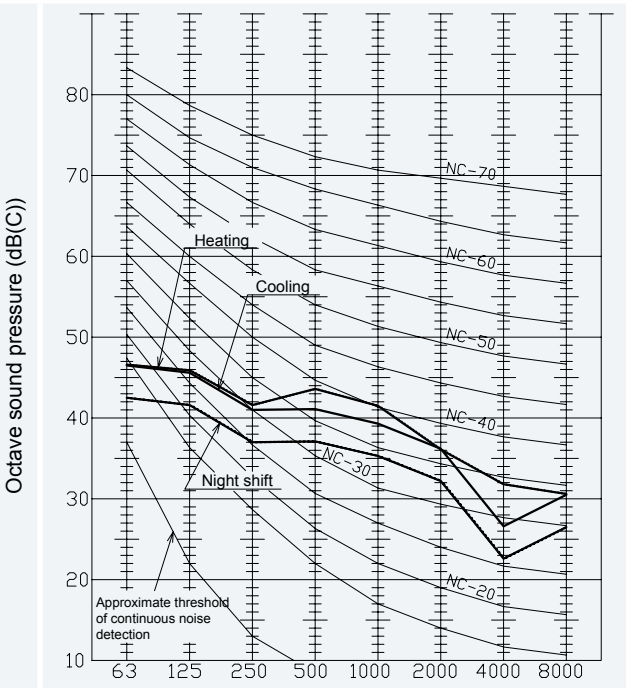
Sound pressure level: Cooling (Night mode); 46 (42) dB(A)

RAS-6HVRNME-AF



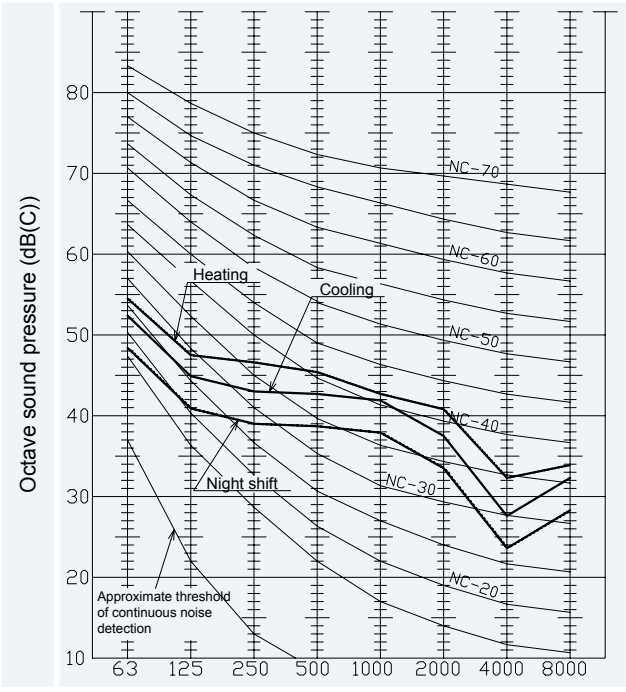
Sound pressure level: Cooling (Night mode); 48 (45) dB(A)

RAS-4HRNME-AF



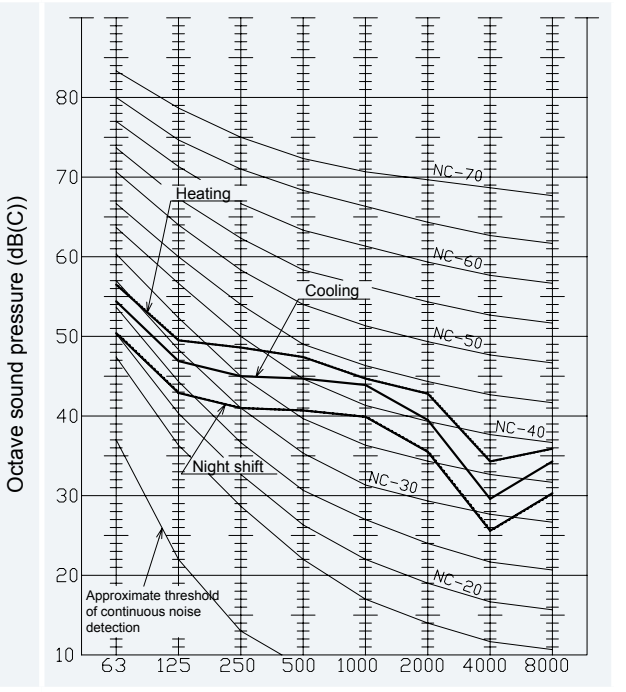
Sound pressure level: Cooling (Night mode); 44 (40) dB(A)

RAS-5HRNME-AF

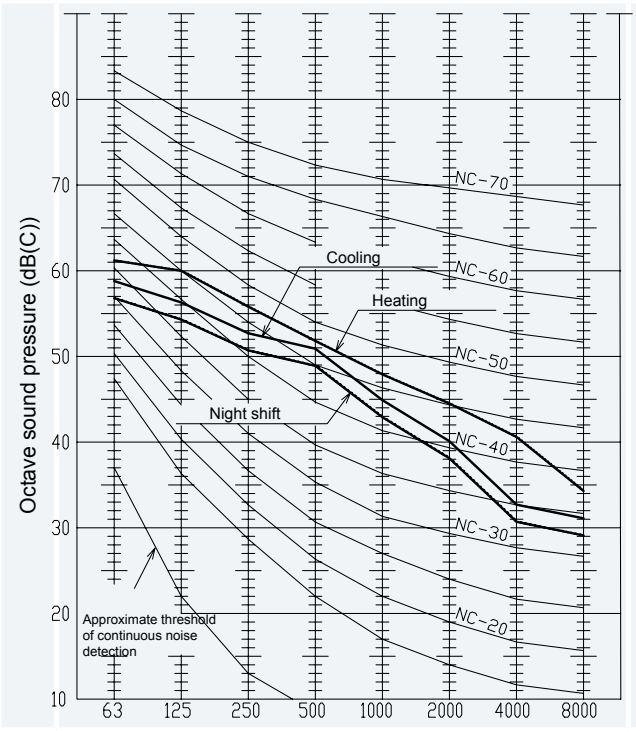
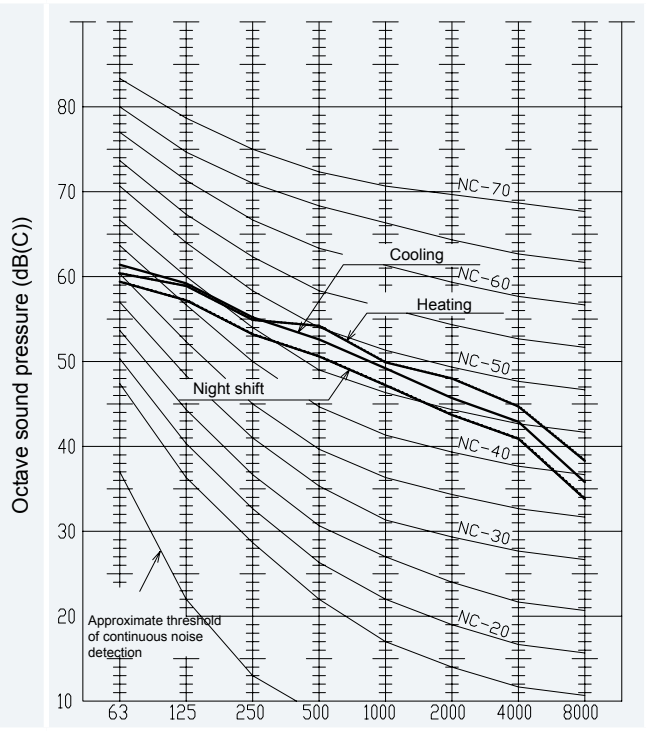


Sound pressure level: Cooling (Night mode); 46 (42) dB(A)

RAS-6HRNME-AF



Sound pressure level: Cooling (Night mode); 48 (45) dB(A)

RAS-8HRNME-AF	RAS-10HRNME-AF
	
Frequency (Hz)	Frequency (Hz)
Sound pressure level: Cooling (Night mode); 52 (50) dB(A)	Sound pressure level: Cooling (Night mode); 55 (53) dB(A)

5

5.1.2 Indoor unit

Model	Sound pressure level (dB(A))
RWM-2.0(H)FSN3E	29
RWM-3.0(H)FSN3E	29
RWM-4.0(H)FSN3E	28
RWM-5.0(H)FSN3E	28
RWM-6.0(H)FSN3E	28
RWM-8.0(H)FSN3E	29
RWM-10.0(H)FSN3E	29

6. Working range

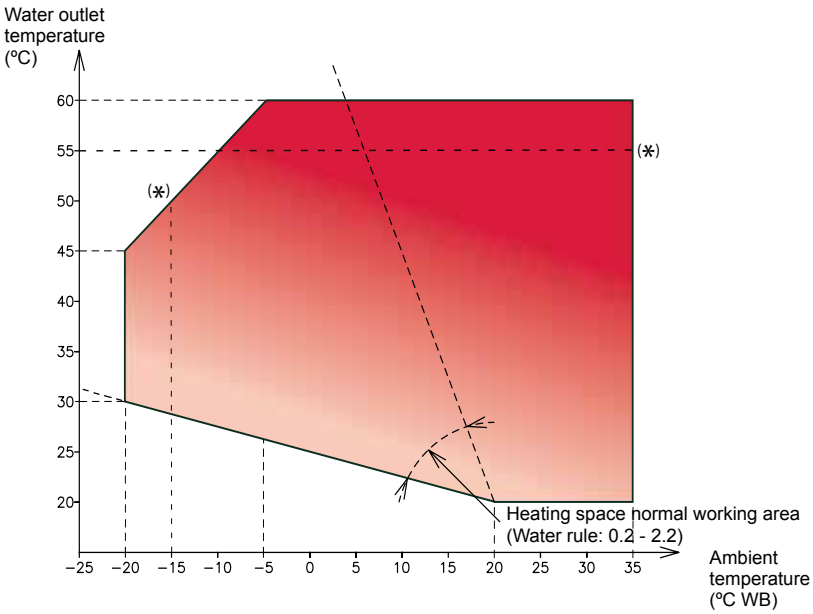
Index

6.1 Temperature range

MODEL		RWM-2.0 (H)FSN3E	RWM-3.0 (H)FSN3E	RWM-4.0 (H)FSN3E	RWM-5.0 (H)FSN3E	RWM-6.0 (H)FSN3E	RWM-8.0 (H)FSN3E	RWM-10.0 (H)FSN3E
Water temperature	ºC	Refer to the graphics for each case						
Minimum flow rate	m³/h	0.5	0.9	1.0	1.1	1.2	2.0	2.2
Maximum flow rate	m³/h	2.2	2.6	3.3	3.6	3.6	4.7	4.8
Minimum installation water volume	l	28	28	38	46	55	76	79
Minimum allowable water pressure	MPa	0.1						
Maximum allowable water pressure	MPa	0.3						

6.1.1 Heating mode

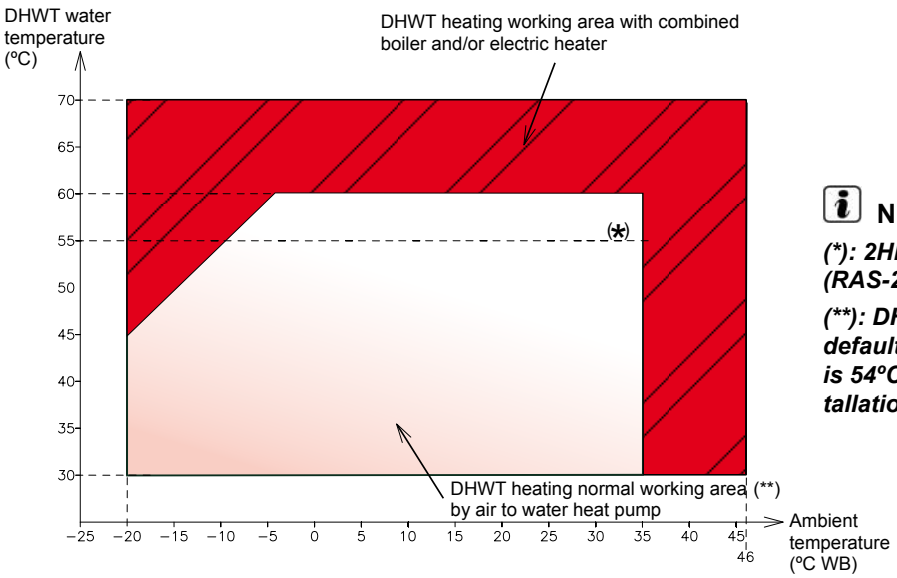
◆ Space heating



NOTE

(*): 2HP system only (RAS-2HVRN2 + RWM-2.0(H)FSN3E).

◆ Domestic Hot Water Tank heating

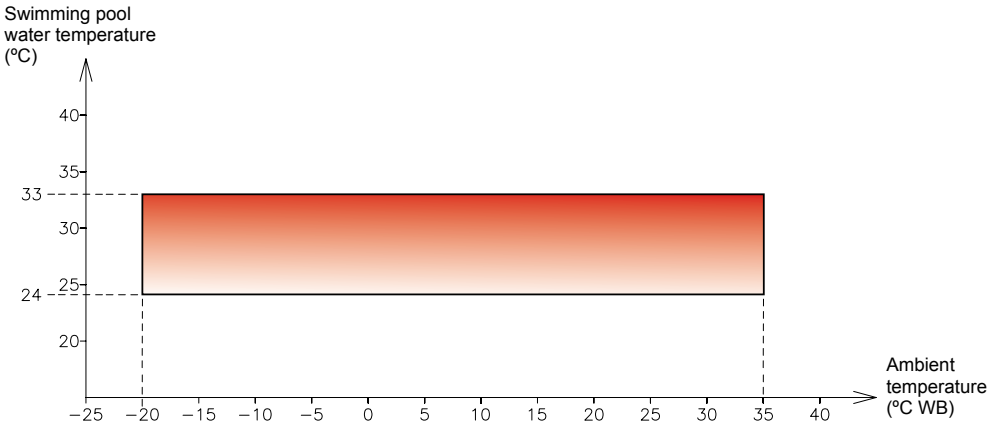


NOTE

(*): 2HP system only (RAS-2HVRN2 + RWM-2.0(H)FSN3E).

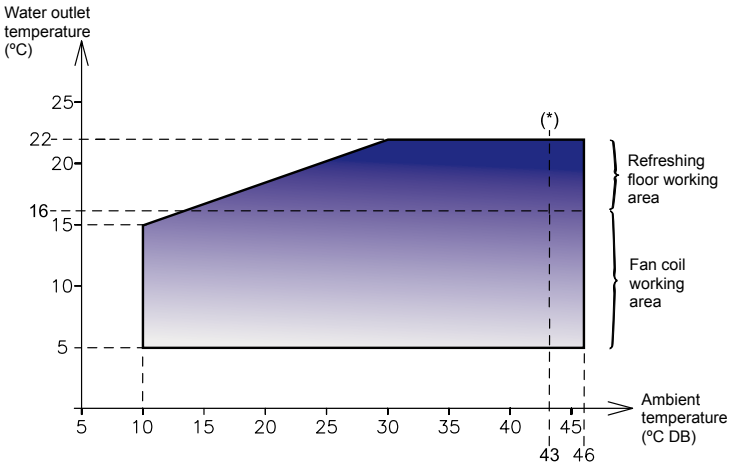
(**): DHWT maximum water temperature default value by air to water heat pump is 54ºC, but it depends on the field installation and the selected tank.

◆ Swimming pool heating



6.1.2 Cooling mode

◆ Space cooling



NOTE

(*): 2HP system only
(RAS-2HVRN2 + RWM-2.0FSN3E).

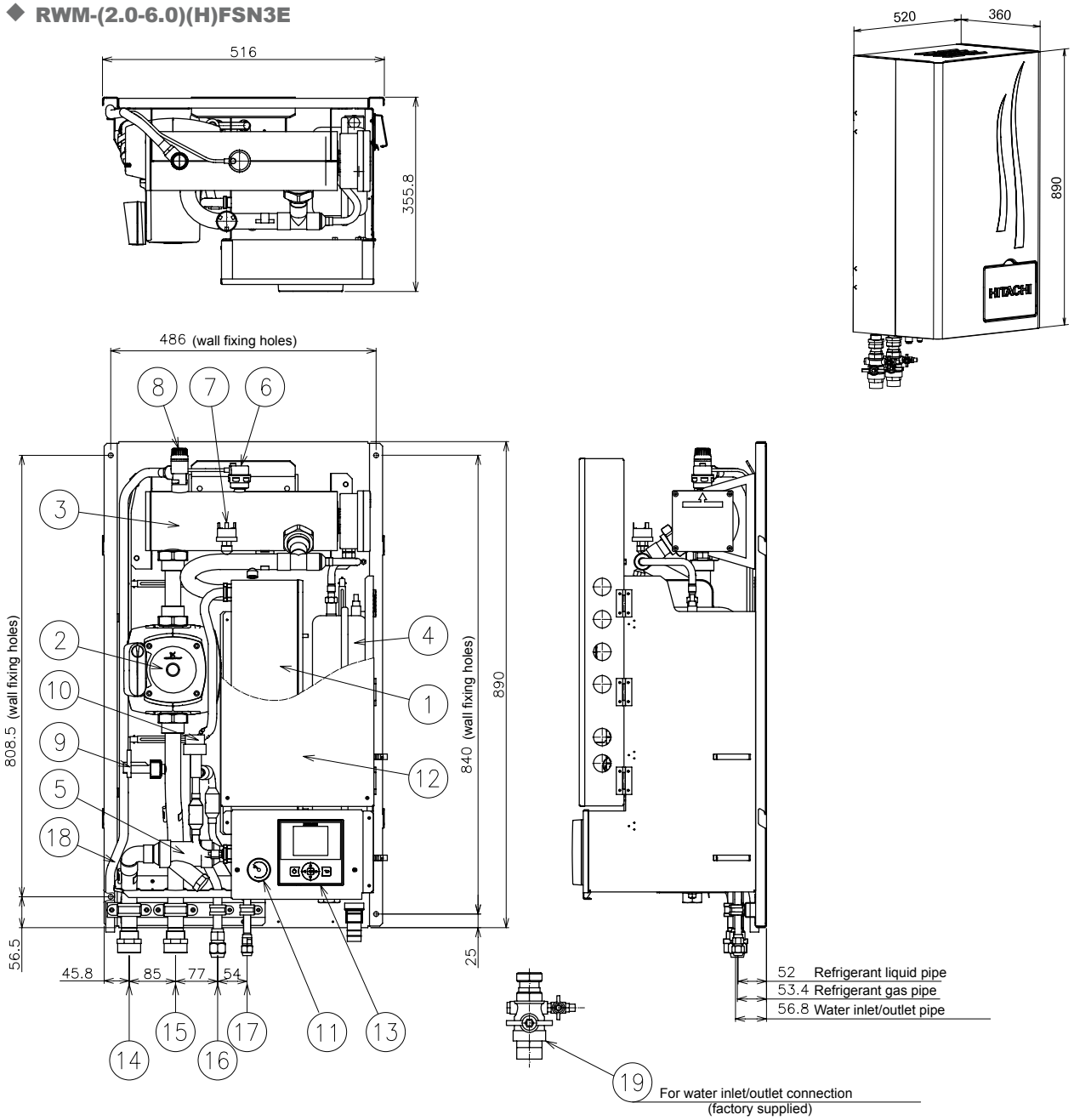
7. General dimensions

Index

7.1 Dimensions

7.1.1 Indoor unit

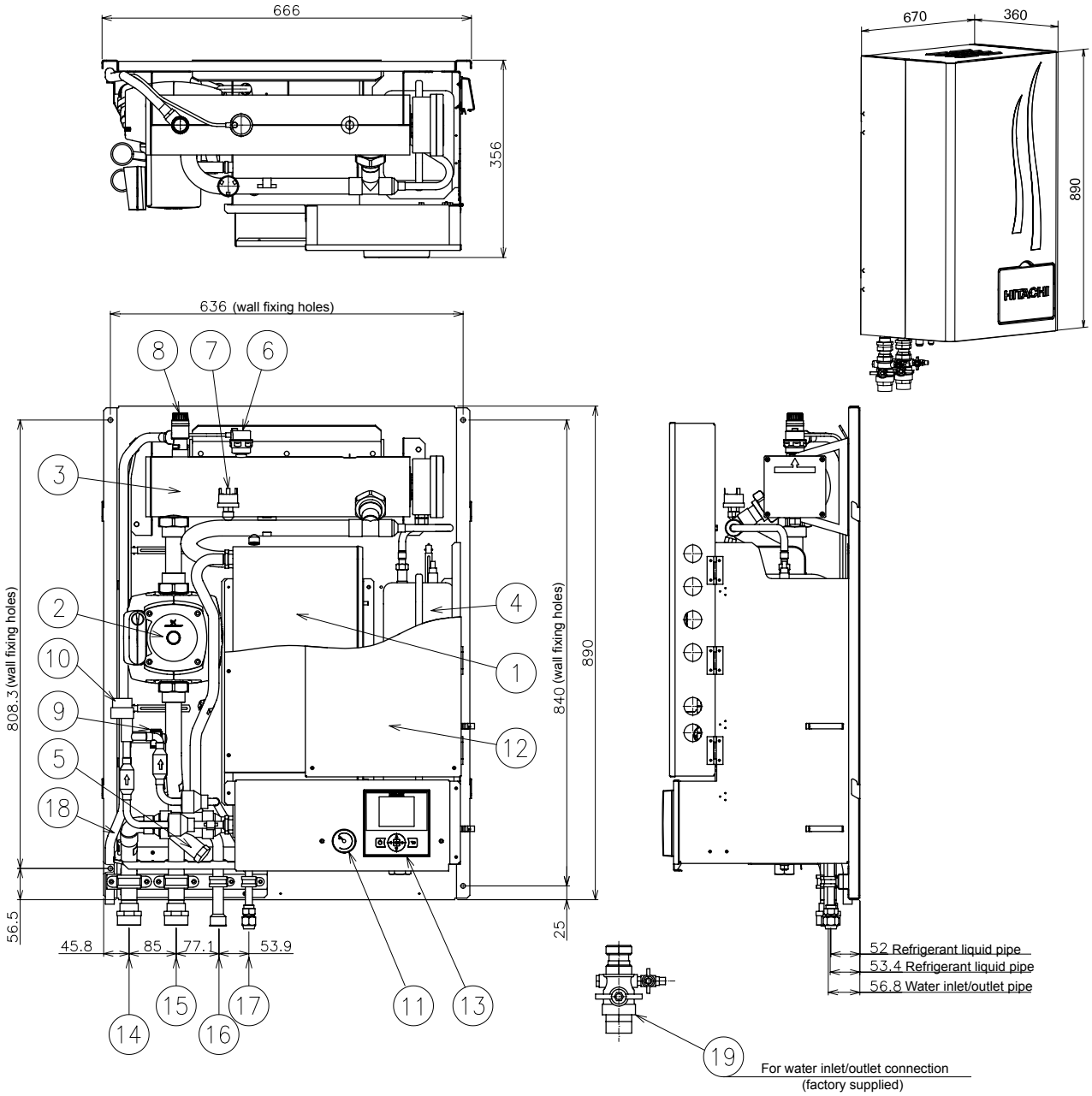
◆ **RWM-(2.0-6.0)(H)FSN3E**



No.	Part name
1	Plate heat exchanger
2	Pump
3	Electric heater
4	Expansion vessel
5	Water strainer
6	Air purger
7	Low pressure switch
8	Safety valve
9	Flow switch
10	Expansion valve

No.	Part name
11	Manometer
12	Electrical box
13	LCD user's interface
14	Water inlet pipe
15	Water outlet pipe
16	Refrigerant gas pipe
17	Refrigerant liquid pipe
18	Drain pipe
19	Shutdown valve

◆ RWM-(8.0/10.0)(H)FSN3E

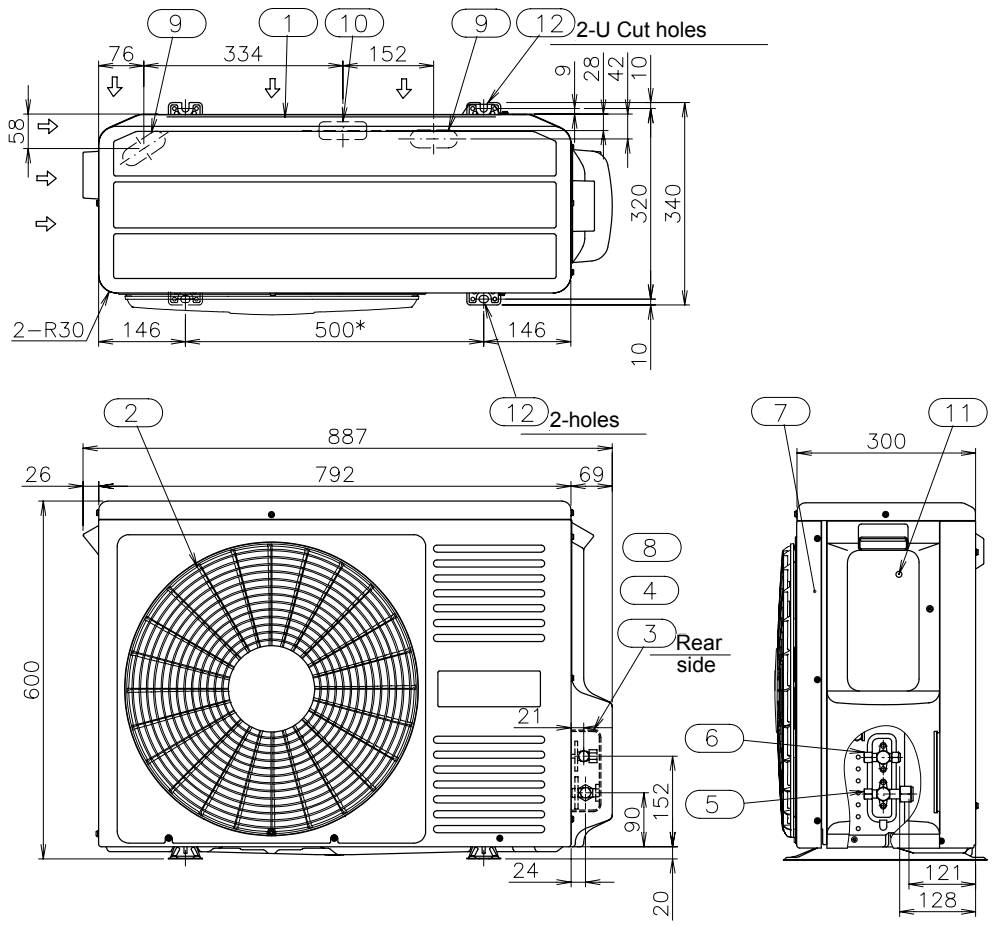


No.	Part name
1	Plate heat exchanger
2	Pump
3	Electric heater
4	Expansion vessel
5	Water strainer
6	Air purger
7	Low pressure switch
8	Safety valve
9	Flow switch
10	Expansion valve

No.	Part name
11	Manometer
12	Electrical box
13	LCD user's interface
14	Water inlet pipe
15	Water outlet pipe
16	Refrigerant gas pipe
17	Refrigerant liquid pipe
18	Drain pipe
19	Shutdown valve

7.1.2 Outdoor unit

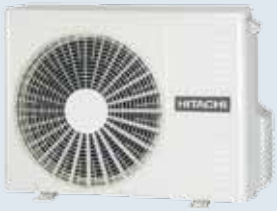
◆ RAS-2HVRN2



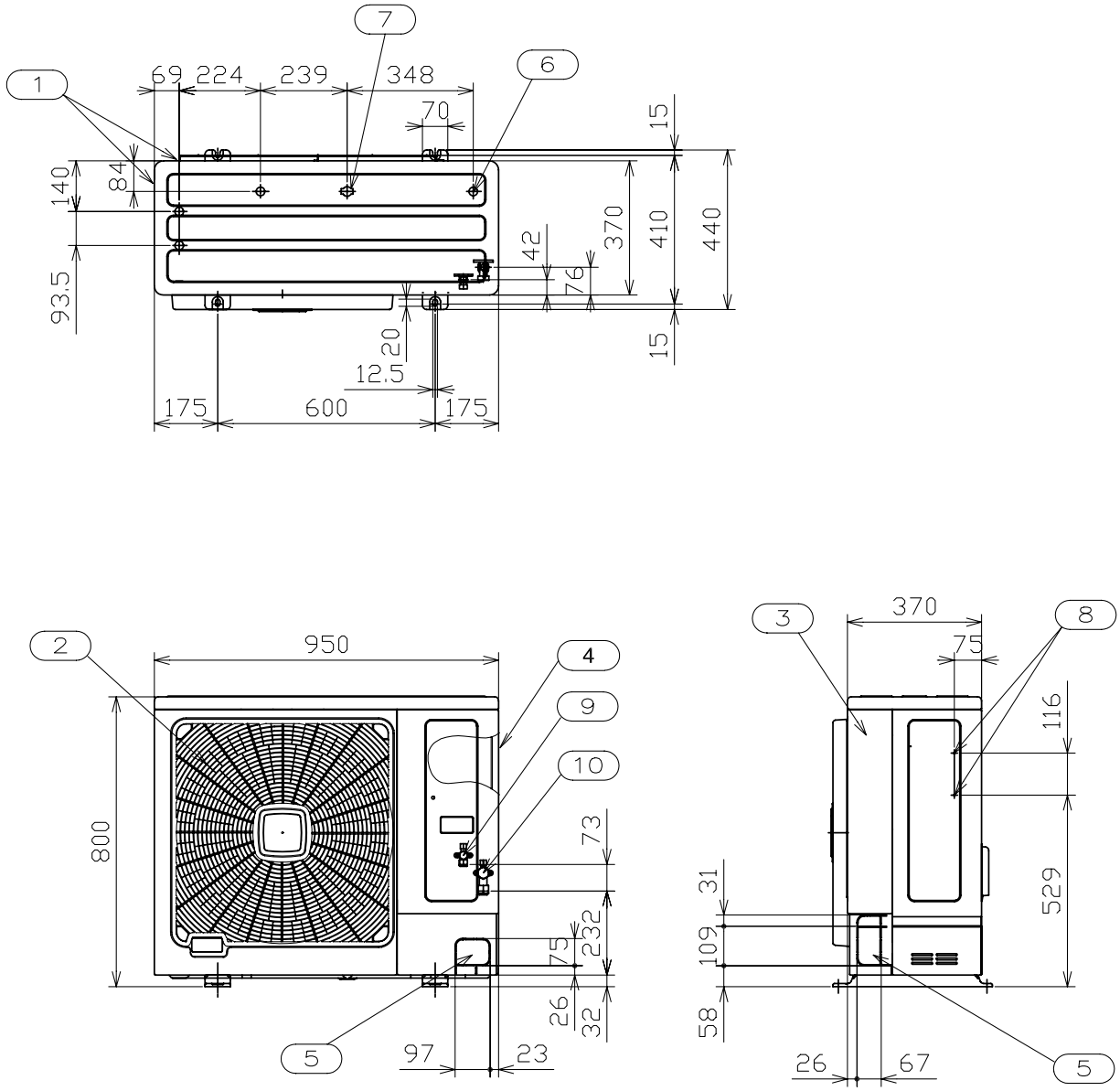
No.	Part name	Remarks
RAS-2HVRN2	Ø12.70	Ø6.35

Units: mm

No.	Part name	Remarks
1	Air inlet	-
2	Air outlet	-
3	Holes for power supply wiring	-
4	Holes for control line wiring	-
5	Gas piping connection	Øa flare nut
6	Liquid piping connection	Øb flare nut
7	Service panel	-
8	Refrigerant piping hole	-
9	Drain hole	-
10	Drain hole	-
11	Earth terminal wiring	(M5)
12	Holes for fixing machine to wall	-



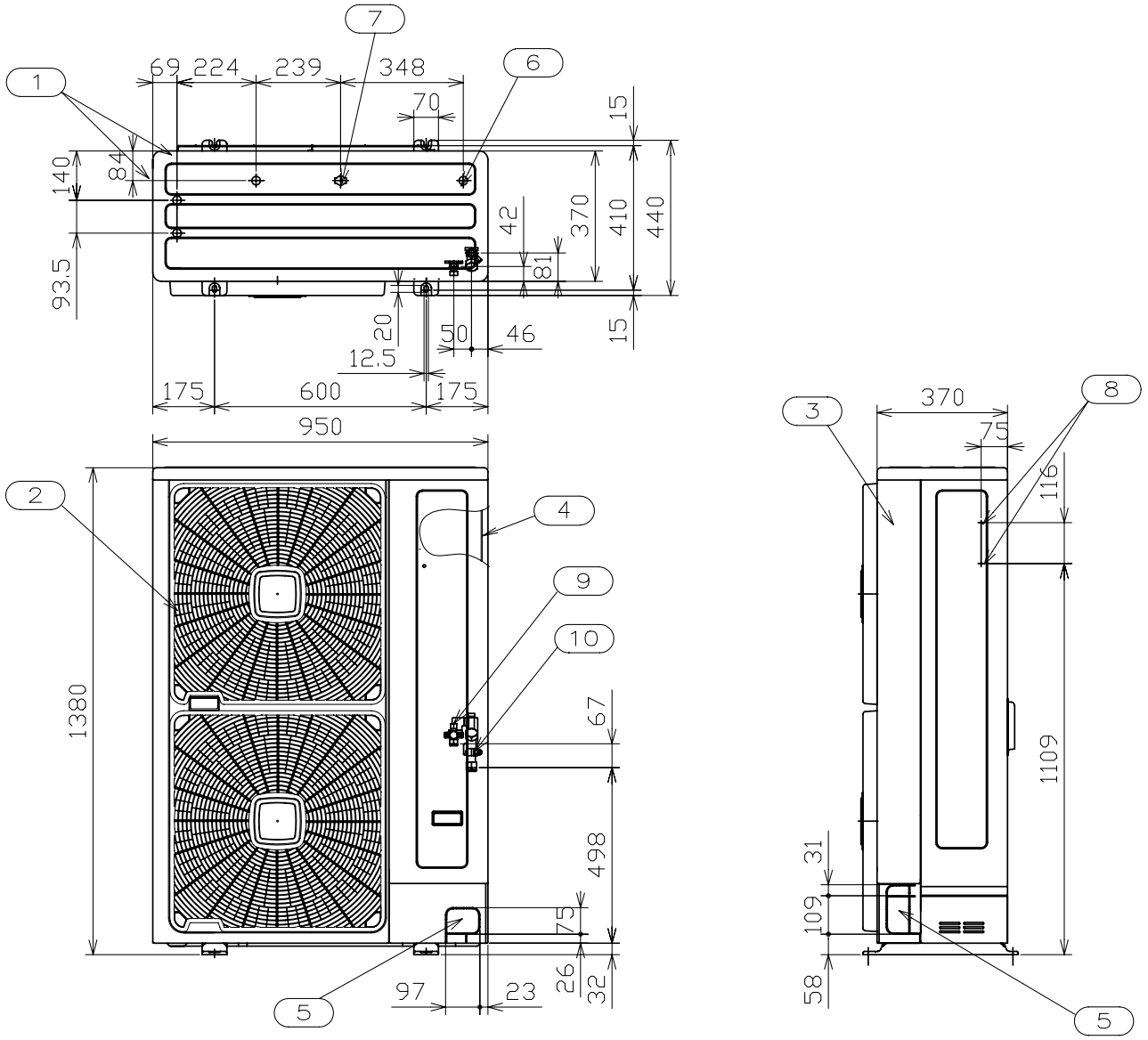
◆ RAS-3HVRNME-AF



Units in: mm

No.	Part name	Remarks
1	Air inlet	-
2	Air outlet	-
3	Service cover	-
4	Electrical switch box	-
5	Holes for refrigerant piping and electrical wiring piping	-
6	Drain holes	4-Ø24
7	Drain holes	1-Ø26
8	Holes for fixing machine to wall	4-(M5)
9	Refrigerant liquid pipe	Flare nut: Ø9.53 (3/8”)
10	Refrigerant gas pipe	Flare nut: Ø15.88 (5/8”)

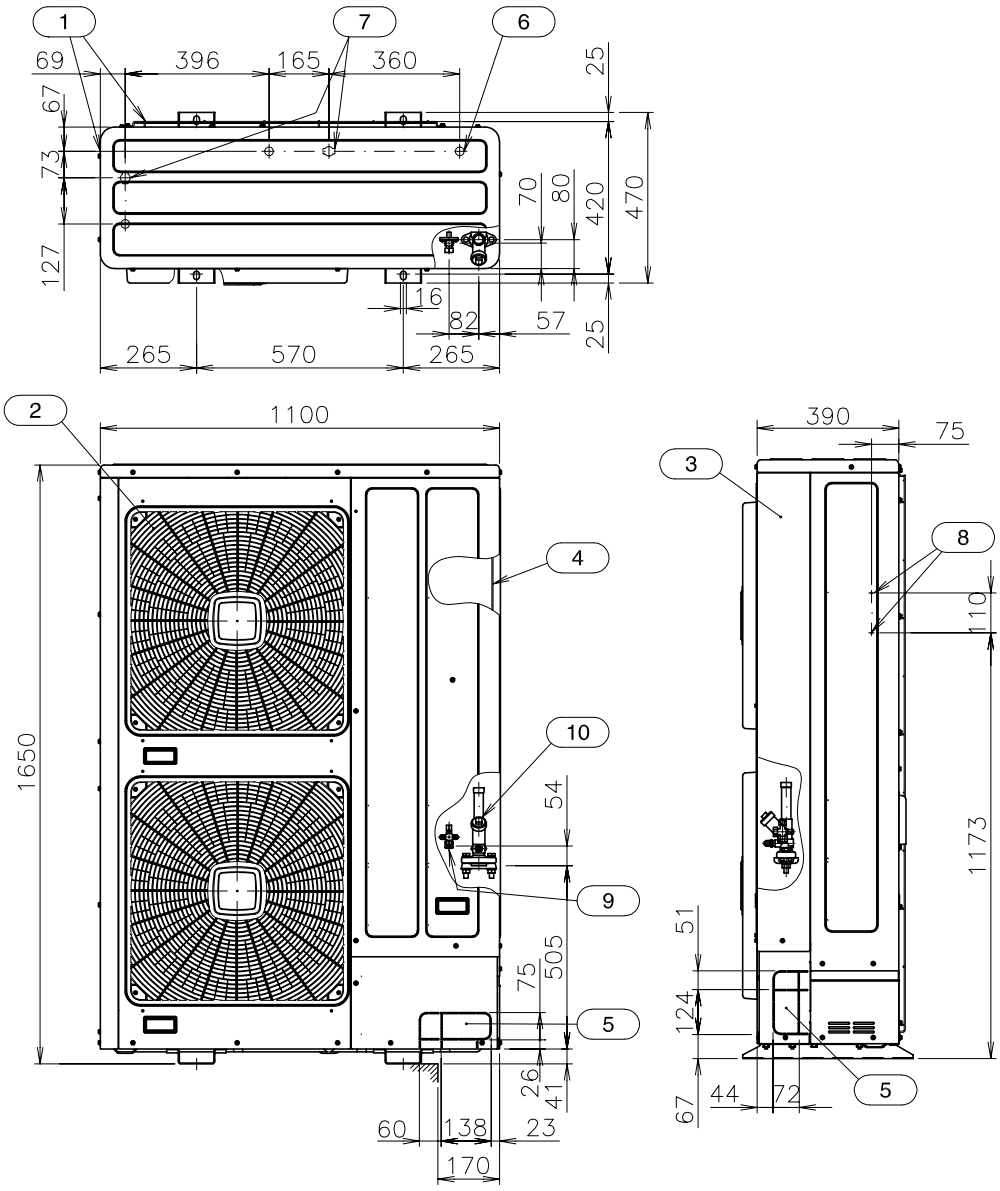
◆ RAS-(4-6)H(V)RNME-AF



Units in: mm

No.	Part name	Remarks
1	Air intake	-
2	Air outlet	-
3	Service cover	-
4	Electrical switch box	-
5	Holes for refrigerant piping and electrical wiring piping	-
6	Drain holes	3-Ø24
7	Drain holes	2-Ø26
8	Holes for fixing machine to wall	4-(M5)
9	Refrigerant liquid pipe	Flare nut: Ø9.53 (3/8”)
10	Refrigerant gas pipe	Flare nut: Ø15.88 (5/8”)

◆ RAS-(8/10)HRNME-AF



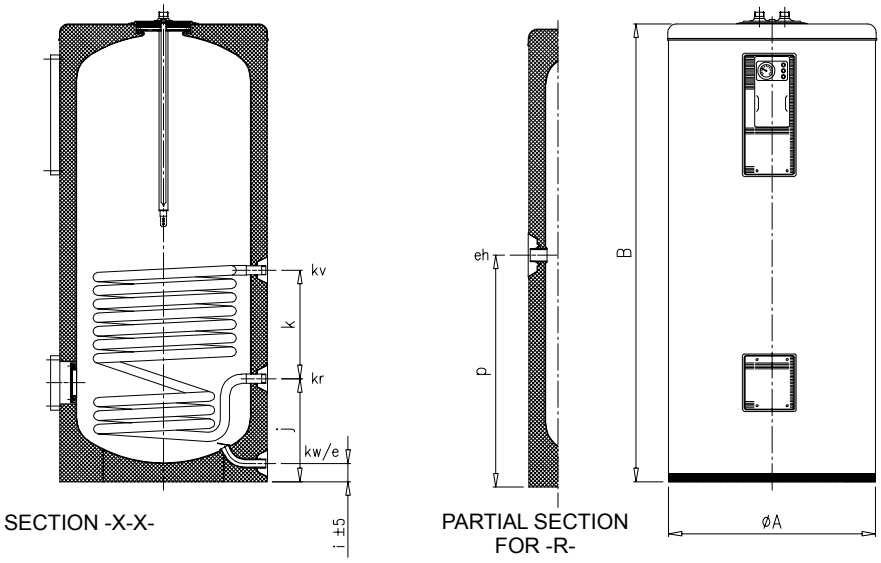
Model	a
RAS-8HRNM-AF	Ø9.53 (3/8”)
RAS-10HRNM-AF	Ø12.7 (1/2”)

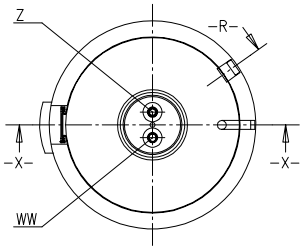
Units in: mm

No.	Part name	Remarks
1	Air inlet	-
2	Air outlet	-
3	Service cover	-
4	Electrical switch box	-
5	Holes for refrigerant piping and electrical wiring piping	-
6	Drain holes	3-Ø24
7	Drain holes	2-Ø26
8	Holes for fixing machine to wall	4-(M5)
9	Refrigerant liquid piping	Flare nut: Øa
10	Refrigerant gas piping	Flare nut: Ø25.4 (1”)

7.1.3 Domestic Hot Water Tank

◆ DHWT (200/300)S-2.5H1E





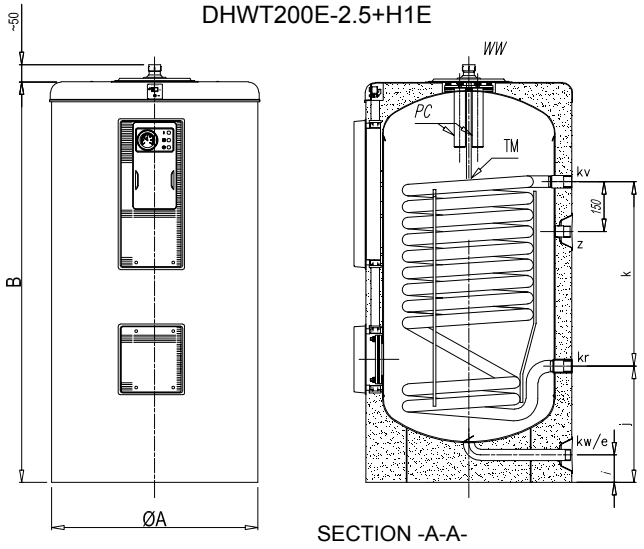
PLAN VIEW

kw/e- Cold water input/drain
ww- Hot water output
z- Recirculation
kv- Heat Pump feed
kr- Heat Pump
eh- Side connection
TM- Sensor

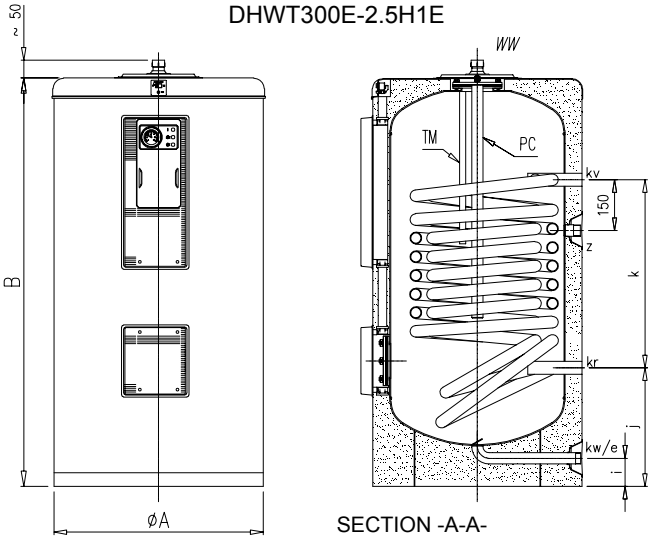
Part name		DHWT200S-2.5H1E	DHWT300S-2.5H1E
A: External diameter	mm	620	620
B: Total length (without pipes)	mm	1205	1685
Kw: Cold water input/drain (external thread)	in.	1”	1”
ww: Hot water output (external thread)	in.	1”	1”
z: Recirculation (external thread)	in.	1”	1”
kv: Heat Pump feed (external thread)	in.	1”	1”
kr: Heat Pump return (external thread)	in.	1”	1”
eh: Side screwed connection (external thread)	in.	1-1/2”	1-1/2”
Dimension i	mm	70	70
Dimension j	mm	308	380
Dimension k	mm	400	500
Dimension p	mm	758	868

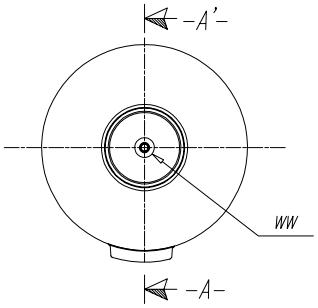
◆ DHWT (200/300)E-2.5H1E

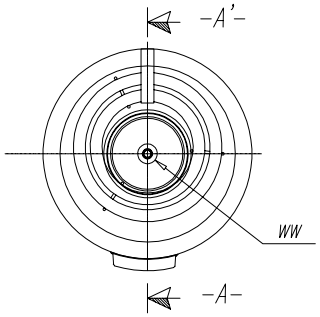
DHWT200E-2.5+H1E



DHWT300E-2.5H1E





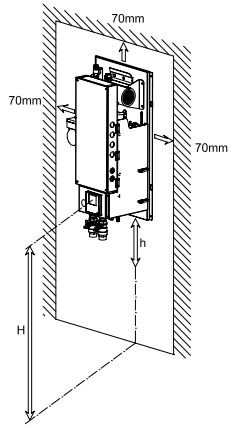


kw/e- Cold water input/drain
ww- Hot water output
z- Recirculation
kv- Heat Pump feed
kr- Heat Pump return
PC- Cathodic protection
TM- Sensor

Part name		DHWT200E-2.5H1E	DHWT300E-2.5H1E
A: External diameter	mm	620	620
B: Total length (without pipes)	mm	1205	1685
Kw: Cold water input/drain (external thread)	in.	1”	1”
ww: Hot water output (external thread)	in.	1”	1”
z: Recirculation (external thread)	in.	1”	1”
kv: Heat Pump feed (external thread)	in.	1”	1”
kr: Heat Pump return (external thread)	in.	1”	1”
eh: Side screwed connection (external thread)	in.	1-1/2”	1-1/2”
Dimension i	mm	70	70
Dimension j	mm	308	380
Dimension k	mm	400	500

7.2 Service space

7.2.1 Indoor unit

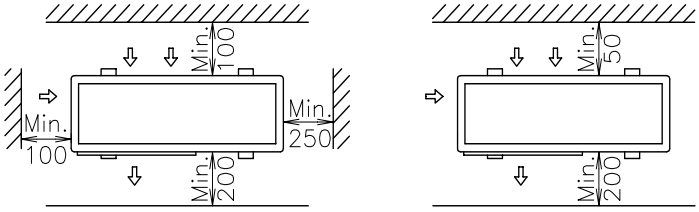


NOTE

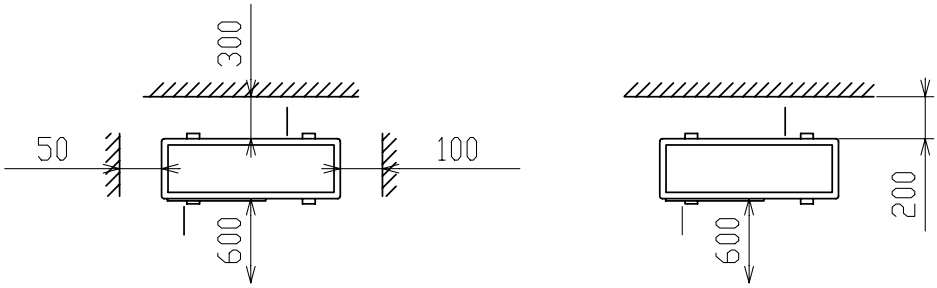
- ***H= 1200mm - 1500mm. Recommended unit height for proper access to the control panel (LCD user's interface).***
- ***h= 350mm. Minimum unit height for installing the shutdown valves and the first bending pipe line.***

7.2.2 Outdoor unit

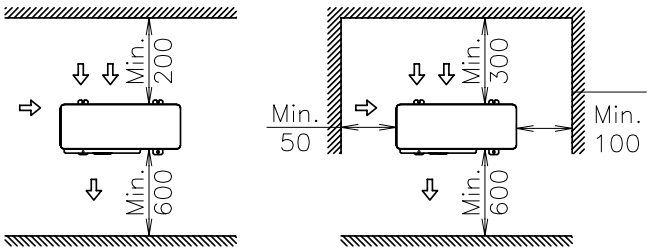
◆ **RAS-2HVRN2**



◆ **RAS-(3-6)H(V)RNME-AF**



◆ **RAS-(8/10)HRNME-AF**



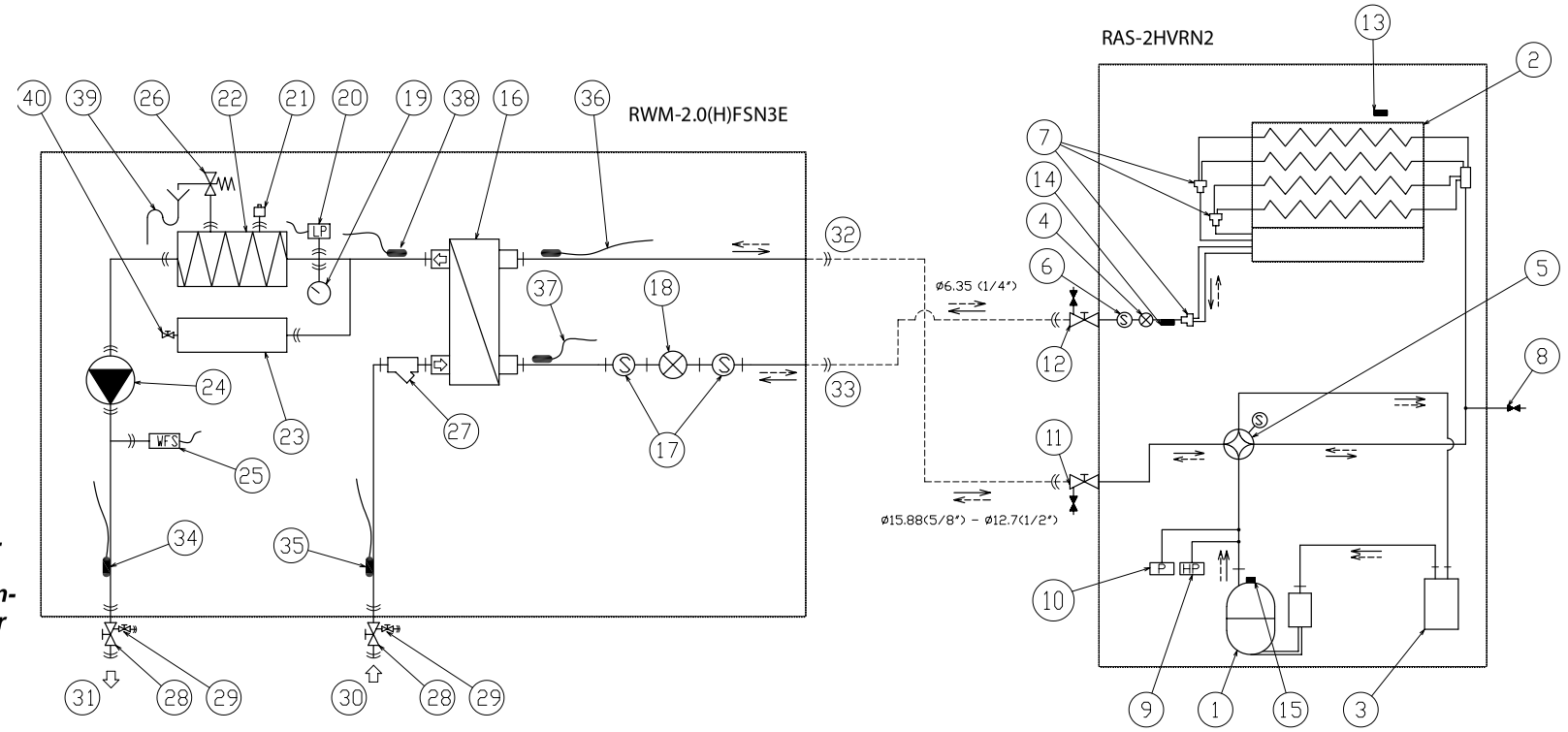
NOTE

For the specific information, please refer to Service Manual (SMXX0070).

8. Refrigerant cycle

Index

8.1 RAS-2HVRN2 + RWM-2.0(H)FSN3E combination



NOTE

(1*): Ø12.7 → Ø15.88. The pipe adapter is required to join the indoor and the outdoor gas line.

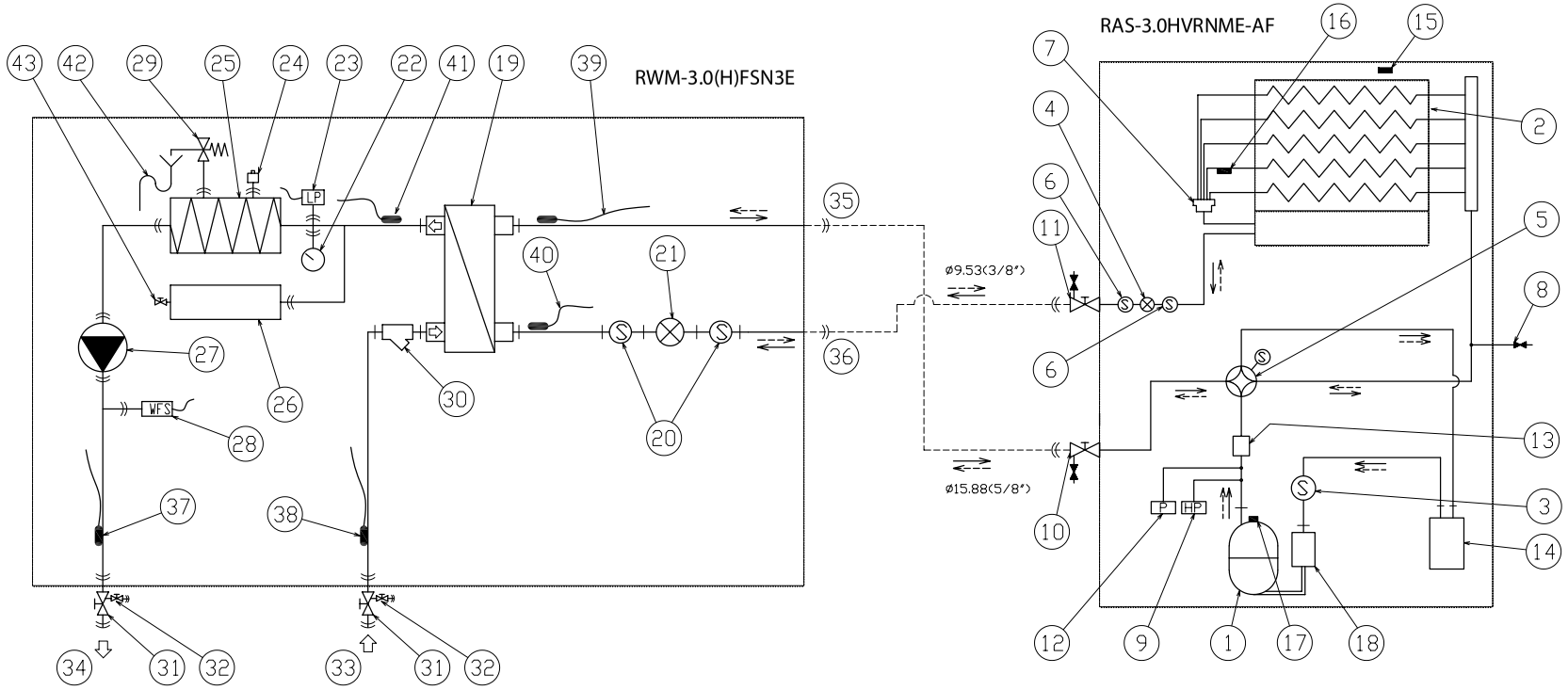
Cooling refrigerant flow	Heating refrigerant flow	Water flow (Heating/Cooling)	Field supplied piping line	Flare Nut connection	Brazed connection	Refrigerant:
						R410A

NOTE

Cooling only for RWM-2.0FSN3E

No.	Part name	No.	Part name	No.	Part name	No.	Part name
1	Compressor	11	Gas pipe stop valve	21	Air purger	31	Water OUT line
2	Outdoor unit heat exchanger	12	Liquid pipe stop valve	22	Electric heater	32	Refrigerant gas connection
3	Accumulator	13	Ambient thermistor	23	Expansion vessel	33	Refrigerant liquid connection
4	Outdoor unit expansion valve	14	Evaporator pipe thermistor	24	Water pump	34	Water OUT thermistor
5	Reversing valve	15	Discharge gas thermistor	25	Water flow switch	35	Water IN thermistor
6	Strainer (1/4)	16	Indoor unit heat exchanger	26	Safety valve	36	Gas pipe thermistor
7	Distributor	17	Strainer	27	Water strainer	37	Liquid pipe thermistor
8	Check joint	18	Indoor unit expansion valve	28	Shutdown valve (1-1/4" gas m)	38	PHEX water outlet thermistor
9	High pressure switch (protection)	19	Manometer	29	Pressure port (3/8" gas m)	39	Drain pipe
10	Pressure switch (control)	20	Water pressure switch	30	Water IN line	40	Expansion vessel drain port

8.2 RAS-3HVRNME-AF + RWM-3.0(H)FSN3E combination



						Refrigerant:
Cooling refrigerant flow	Heating refrigerant flow	Water flow (Heating/Cooling)	Field supplied piping line	Flare Nut connection	Brazed connection	R410A

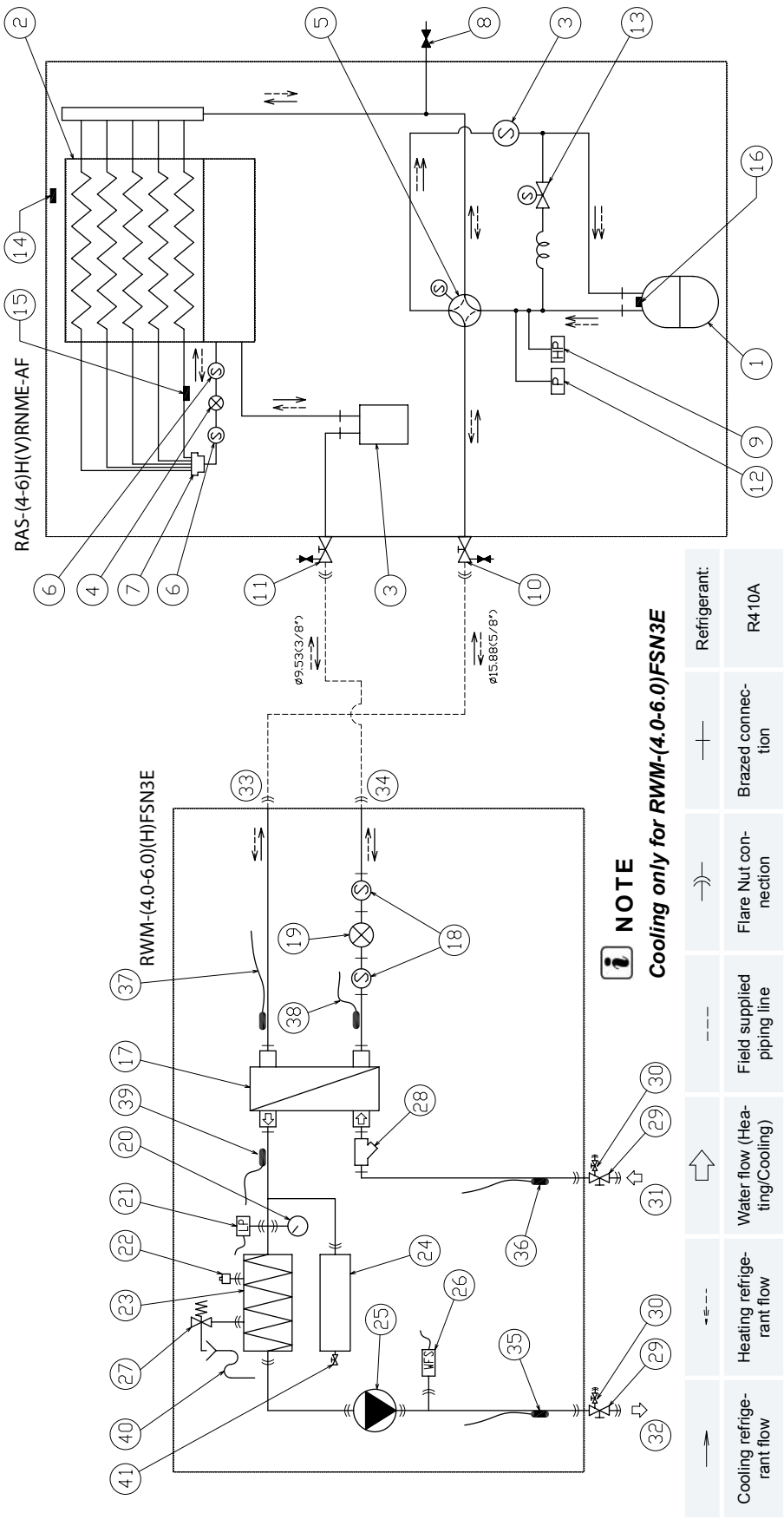
NOTE

Cooling only for RWM-3.0FSN3E

No.	Part name	No.	Part name	No.	Part name	No.	Part name
1	Compressor	12	Pressure switch (control)	23	Water pressure switch	34	Water OUT line
2	Outdoor unit heat exchanger	13	Silencer	24	Air purger	35	Refrigerant gas connection
3	Strainer	14	Accumulator	25	Electric heater	36	Refrigerant liquid connection
4	Outdoor unit expansion valve	15	Ambient thermistor	26	Expansion vessel	37	Water OUT thermistor
5	Reversing valve	16	Evaporator pipe thermistor	27	Water pump	38	Water IN thermistor
6	Strainer	17	Discharge gas thermistor	28	Water flow switch	39	Gas pipe thermistor
7	Distributor	18	Receiver	29	Safety valve	40	Liquid pipe thermistor
8	Check joint	19	Indoor unit heat exchanger	30	Water strainer	41	PHEX water outlet thermistor
9	High pressure switch (protection)	20	Strainer	31	Shutdown valve (1-1/4" gas m)	42	Drain pipe
10	Gas pipe stop valve	21	Indoor unit expansion valve	32	Pressure port (3/8" gas m)	43	Expansion vessel drain port
11	Liquid pipe stop valve	22	Manometer	33	Water IN line		

HITACHI
Inspire the Next

8.3 RAS-(4-6)H(V)RNME-AF + RWM-(4.0-6.0)(H)FSN3E combination



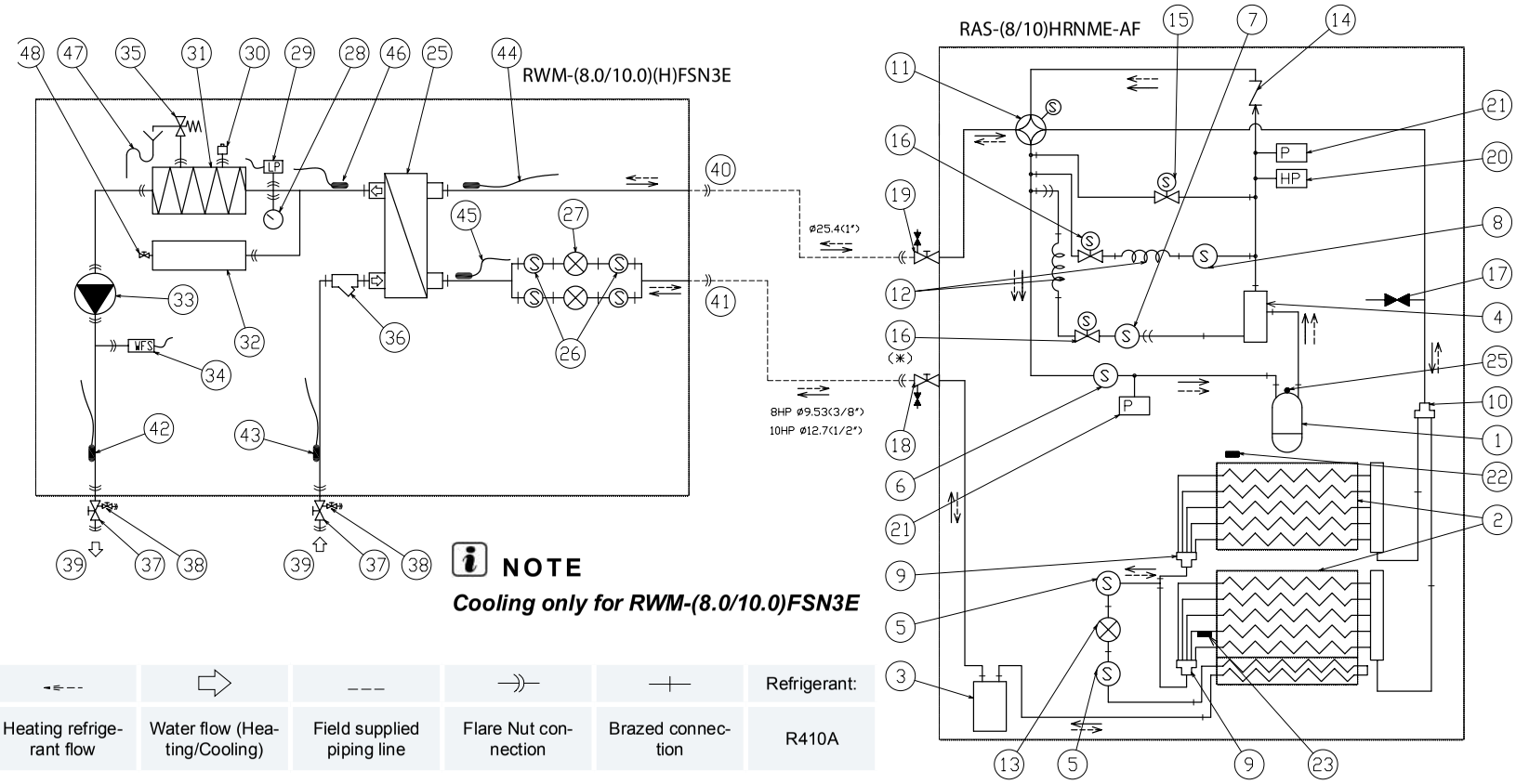
No.	Part name
1	Compressor
2	Outdoor unit heat exchanger
3	Liquid tank
4	Outdoor unit expansion valve
5	Reversing valve
6	Strainer
7	Distributor
8	Check joint
9	High pressure switch (protection)
10	Gas pipe stop valve
11	Liquid pipe stop valve

No.	Part name
12	Pressure switch (control)
13	Solenoid valve
14	Ambient thermistor
15	Evaporator pipe thermistor
16	Discharge gas thermistor
17	Indoor unit heat exchanger
18	Strainer
19	Indoor unit expansion valve
20	Manometer
21	Water pressure switch
22	Air purger

No.	Part name
23	Electric heater
24	Expansion vessel
25	Water pump
26	Water flow switch
27	Safety valve
28	Water strainer
29	Shutdown valve (1-1/4" gas m)
30	Pressure port (3/8" gas m)
31	Water IN line
32	Water OUT line
33	Refrigerant gas connection

No.	Part name
34	Refrigerant liquid connection
35	Water OUT thermistor
36	Water IN thermistor
37	Gas pipe thermistor
38	Liquid pipe thermistor
39	PHEX water outlet thermistor
40	Drain pipe
41	Expansion vessel drain port

8.4 RAS-(8/10)HRNME-AF + RWM-(8.0/10.0)(H)FSN3E combination



NOTE

Cooling only for RWM-(8.0/10.0)FSN3E

Cooling refrigerant flow	Heating refrigerant flow	Water flow (Heating/Cooling)	Field supplied piping line	Flare Nut connection	Brazed connection	Refrigerant: R410A

No.	Part name
1	Compressor
2	Outdoor unit heat exchanger
3	Receiver
4	Oil separator
5	Strainer
6	Strainer
7	Strainer
8	Strainer
9	Distributor
10	Distributor
11	Reversing valve
12	Capillary tube
13	Outdoor unit expansion valve

No.	Part name
14	Check valve
15	Solenoid valve (SVA)
16	Solenoid valve (SVB)
16*	Solenoid valve (SVF)
17	Check joint
18	Stop valve for liquid line
19	Stop valve for gas line
20	High-pressure switch (protection)
21	Pressure switch (control)
22	Evaporator pipe thermistor
23	Discharge gas thermistor
24	Indoor unit heat exchanger
25	Strainer

No.	Part name
26	Indoor unit expansion valve
27	Manometer
28	Water pressure switch
29	Air purger
30	Electric heater
31	Expansion vessel
32	Water pump
33	Water flow switch
34	Safety valve
35	Water strainer
36	Shutdown valve (1-1/4" gas m)
37	Pressure port (3/8" gas m)
38	Water IN line

No.	Part name
39	Water OUT line
40	Refrigerant gas connection
41	Refrigerant liquid connection
42	Water OUT thermistor
43	Water IN thermistor
44	Gas pipe thermistor
45	Liquid pipe thermistor
46	PHEX water outlet thermistor
47	Drain pipe
48	Expansion vessel drain port

-

9. Piping work and refrigerant charge

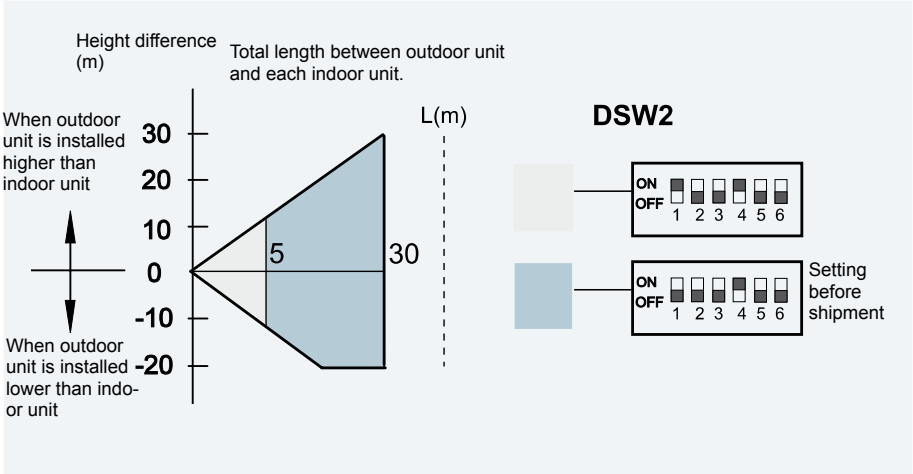
Index

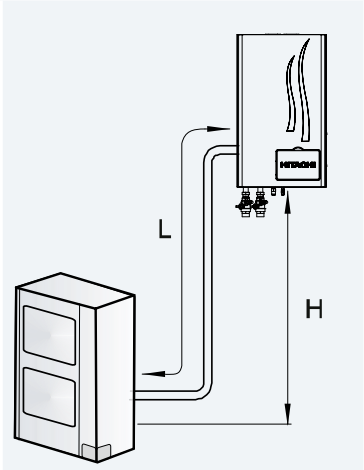
9.1 Refrigerant piping

9.1.1 Refrigerant piping length

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

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





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

9.1.2 Refrigerant piping size

Piping connection size of outdoor unit & indoor unit

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

NOTE

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

The pipe adapter is factory supplied with the outdoor unit.

9.2 Copper pipes, measurements and connection

9.2.1 Copper pipes and measurements

⚠ CAUTION

- ***The copper pipe used in the refrigeration installations is different to the copper pipe used in installations carrying domestic or heating water.***
- ***The copper pipe for refrigeration installations is especially treated for outdoors and indoors. The interior surface finish makes it easier for the refrigerant to circulate and withstands the action of the lubricant oil used in outdoor units.***

Prepare the copper pipes provided by the supplier.

Select the pipe with the appropriate diameter and thickness. Use the table below to select the most appropriate pipe:

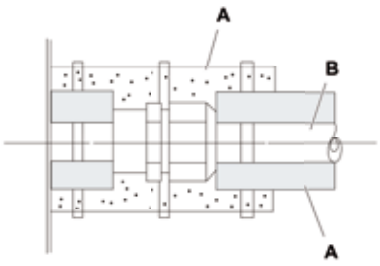
Nominal diameter		Thickness mm	Supply
mm	Inches		
Ø6.35	1/4	0.80	Roll
Ø9.53	3/8	0.80	Roll
Ø12.70	1/2	0.80	Pipe/Roll
Ø15.88	5/8	1.00	Roll
Ø25.40	1	1.00	Roll

Always use clean copper pipes with no signs of knocks or cracks. Make sure there is no dust or dampness on the inside. Before you install the pipes, clean the inside with oxygen-free nitrogen gas to eliminate any remains of dust or other substances.

⚠ CAUTION

- ***Do not use hand saws, circular saws, abrasive grinders or other tools that generate shavings.***
- ***Strictly follow national or local regulations regarding occupational health and safety.***
- ***Wear appropriate means of protection during cutting or brazing operations and installation (gloves, eye protection, etc).***

On completing the installation of the refrigerant pipes -B-, insulate them appropriately using suitable insulating material -A- and seal the open space between the holes made and the pipe, as shown in the figure.



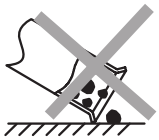
9.2.2 Pipe connection

Cover the end of the pipe appropriately when it is to be inserted through holes in walls and roofs, etc.

Keep the ends of the pipes covered while other installation work is being carried out to avoid the entry of dampness or dirt.

Do not place the pipes directly on the ground without appropriate protection or adhesive vinyl tape to cover the ends.

Where the pipe installation is not completed for a certain amount of time, braze the ends of the pipe to seal. Then fill it with oxygen-free nitrogen gas through a Schrader valve to avoid the accumulation of humidity and/or contamination through dirt.



NOTE

- ***Where polyethylene foam insulation is used, a 10 mm thick layer should be used for the liquid pipe and between 15 and 20 mm for the gas pipe.***
- ***Install the insulation after the pipe surface temperature has dropped to the same temperature as that of the room, otherwise the insulation may melt.***

Do not use insulating material that contains NH_3 (ammonium), as it could damage the copper in the pipe and subsequently cause leaks.

Where the installer has supplied his own branches, these should be appropriately insulated to avoid decreases in capacity in line with to environmental conditions and dew on the surface of the piping due to low pressure.

9.3 Refrigerant charge amount

Refrigerant for 30 m of piping length has been charged into the outdoor units.

NOTE

For YUTAKI S series, the maximum piping length is 30 m, so it is not required an additional refrigerant charge.

◆ **Refrigerant charge before shipment (W_0 (kg))**

Outdoor unit model	W_0 (kg)
RAS-2HVRN2	1.6
RAS-3HVRNME-AF	2.4
RAS-4H(V)RNME-AF	3.9
RAS-(5/6)H(V)RNME-AF	4.0
RAS-8HRNME-AF	7.3
RAS-10HRNME-AF	7.8

9.4 Precautions in the event of gas refrigerant leaks

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

9.4.1 Maximum permitted concentration of HFCs

The refrigerant R410A, charged in the RASC series system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation.

The maximum permissible concentration of HFC gas, R410A in air is 0.44 kg/m³, according to EN378-1.

Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.44 kg/ m³, in case of leakage.

9.4.2 Calculation of refrigerant concentration

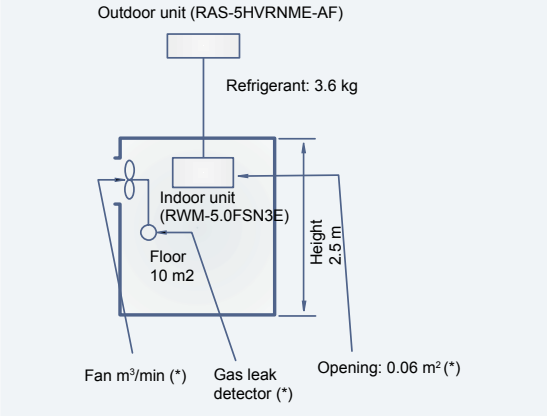
1 Calculate the total quantity of refrigerant R (kg) charged in the system by connecting all the indoor units in the rooms to be air-conditioned.
2 Calculate the room volume V (m³) of each room.
3 Calculate the refrigerant concentration C (kg/m³) of the room according to the following equation:

$$\frac{R}{V} = C$$

R: Total quantity of refrigerant charged (kg)

V: Room volume (m³)

C: Refrigerant concentration (=0.44* kg/m³ for R410A)



Room	R (kg)	V (m³)	C (kg/m³)	Countermeasure
A	3,6	25	0,144	-

9.4.3 Countermeasure in the event of refrigerant leakage

The facility must have the following features in case of a refrigerant leakage occurs:

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

Outdoor unit model	Tonnes
RAS-3HVRN2	0.88
RAS-3HVRNME-AF	1.05
RAS-4H(V)RNME-AF	1.35
RAS-(5/6)H(V)RNME-AF	1.84
RAS-8HRNME-AF	2.49
RAS-10HRNME-AF	3.32

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

9.5 Refrigerant pipe work

9.5.1 General notes before performing pipe work

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

NOTE

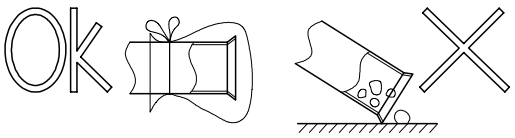
A system with no moisture or oil contamination will give maximum performance and lifecycle compared to that of a poorly prepared system. Take particular care to ensure that all copper piping is clean and dry internally.

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

CAUTION

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

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



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

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

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

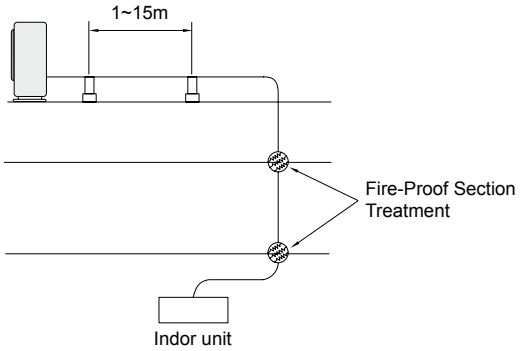
If not insulated, in cooling mode and high ambient humidity conditions, dew will appear on the piping surface.

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

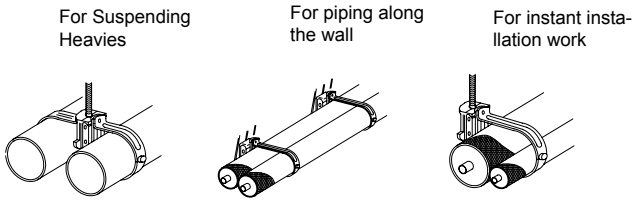
9.5.2 Suspension of refrigerant and water pipes

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

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



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



9.5.3 Pipe work and connection

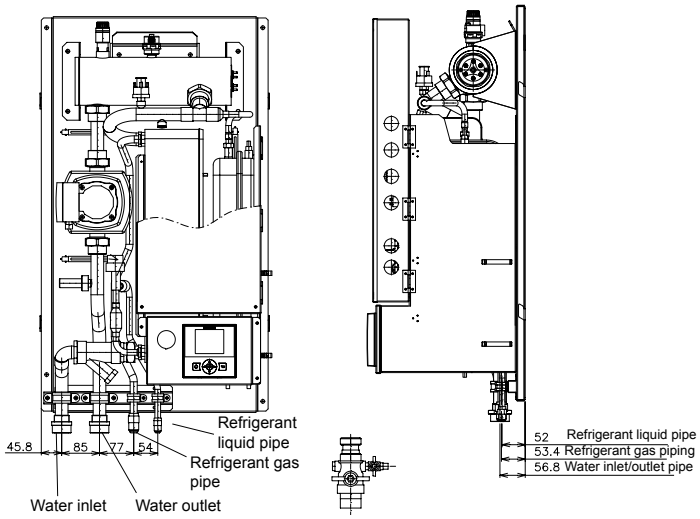
Before performing the pipe work and pipe connections, the unit cover must be removed (follow chapter *Indoor Unit Installation* in reverse).

◆ Piping location

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

NOTE

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

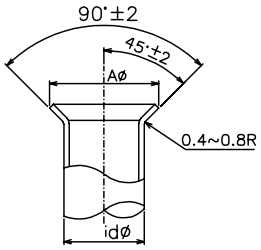


- Refrigerant Pipe Connections
  - The indoor unit is set up to be connected by Flare Nut (factory supplied). Perform the indicated pipe work by maintaining the dimensions indicated in the following tables.

◆ Dimensions of the flared pipe

units: mm (inch)

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



◆ Thickness of the copper pipes

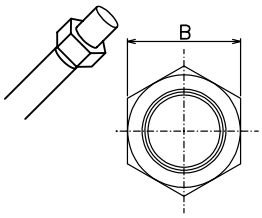
units: mm (inch)

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

◆ Dimensions of the flare nut

units: mm (inch)

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



◆ Flare nuts tightening torque

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

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

unit: N.m

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

9.5.4 Brazing work considerations

CAUTION

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

9.5.5 Refrigerant piping work considerations

CAUTION

- ***Do not charge OXYGEN, ACETYLENE, or other flammable and poisonous gases into the refrigerant, as an explosion could occur. It is recommended that oxygen free nitrogen be charged for these types of test cycles when performing a leakage test or an airtight test. These types of gases are extremely dangerous,***
- ***Insulate the unions and flare-nuts at the piping connection part completely.***
- ***Insulate the liquid piping completely to avoid a decreased performance; if not, it will cause sweating on the surface of the pipe.***
- ***Check for refrigerant leakage in detail. If a large refrigerant leakage occurred, it would cause difficulty with breathing or harmful gases would occur if a fire were in the room.***
- ***If the flare nut is tigthened too hard, it may crack over time and cause refrigerant leakage.***

9.6 Water pipe work and connection

9.6.1 General notes

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

CAUTION

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

NOTE

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

9.6.2 Water piping connection

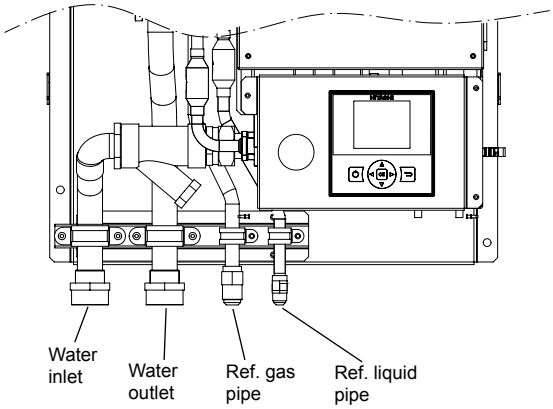
◆ Piping location and connection size

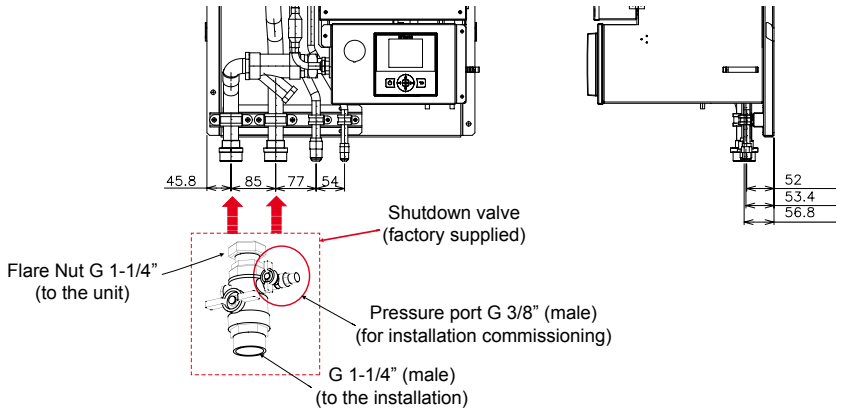
The unit is factory supplied with two shutdown valves to be connected to the water inlet / outlet pipe. By using these shut-down valves it is very practical to connect the indoor unit to the heating system by using flexible joints just bellow the valves (G 1-1/4" connection).

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

NOTE

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





9.6.3 Draining pipe work

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

NOTE

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

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

CAUTION

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

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

9.6.4 Circuit water filling-in

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

CAUTION

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

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

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

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

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

9.6.5 Water flow adjustment

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

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

◆ Pressure lost calculation

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

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

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

NOTE

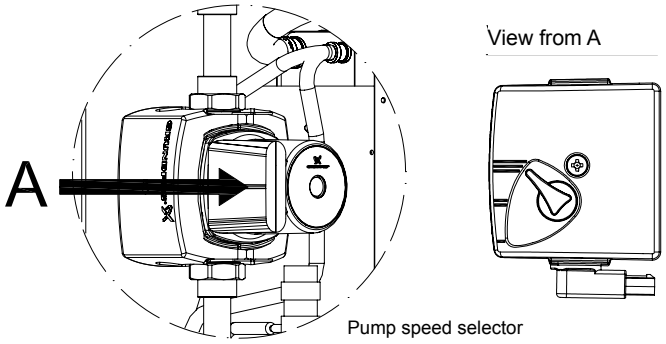
(1*) If there is no having a Differential Manometer, it is possible to do this operation with just one std. Manometer (it is advisable to use the same Manometer in order to avoid reading mistakes from different devices because of different tolerances or adjustment).

◆ Check the pump performance curves

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

◆ Selection of the pump speed

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



Speed indications:

Speed 1 (Low)

Speed 2 (Medium)

Speed 3 (High)

NOTE

The Pumps are factory supplied on speed 3 (High)

◆ Water flow adjustment

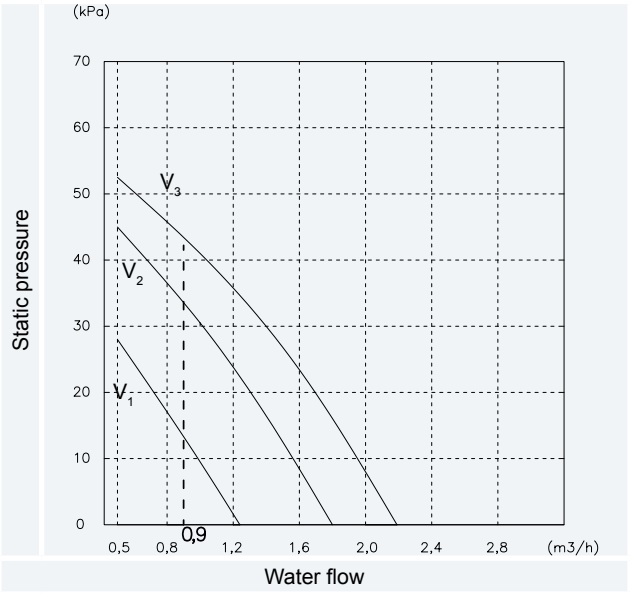
The Water Flow should be adjusted by closing one of the main Shutdown Valves until the pressure matches the Pump Performance Curves.

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

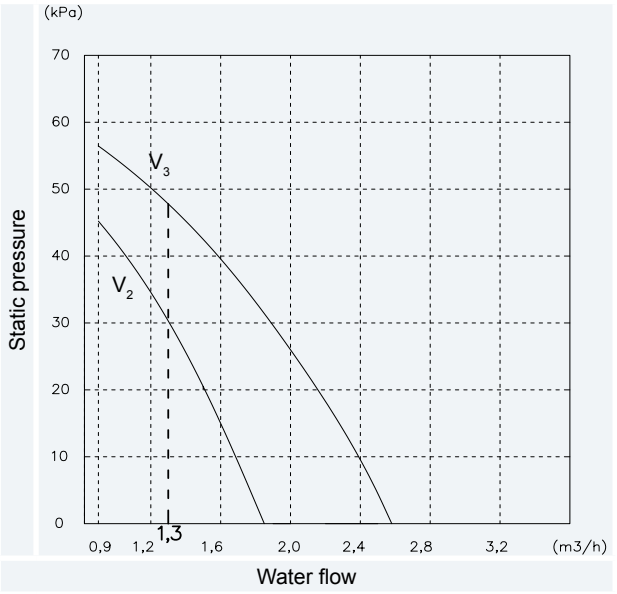
9.7 Pressure charts

◆ RWM-(2.0-10.0)(H)FSN3E

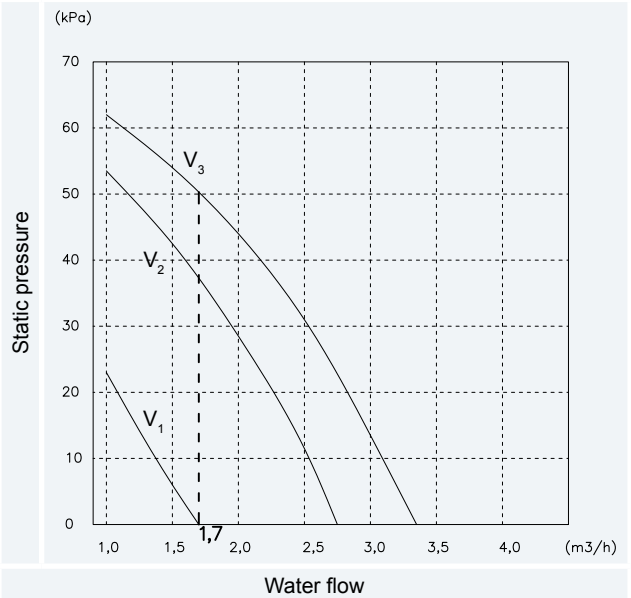
RWM-2.0(H)FSN3E



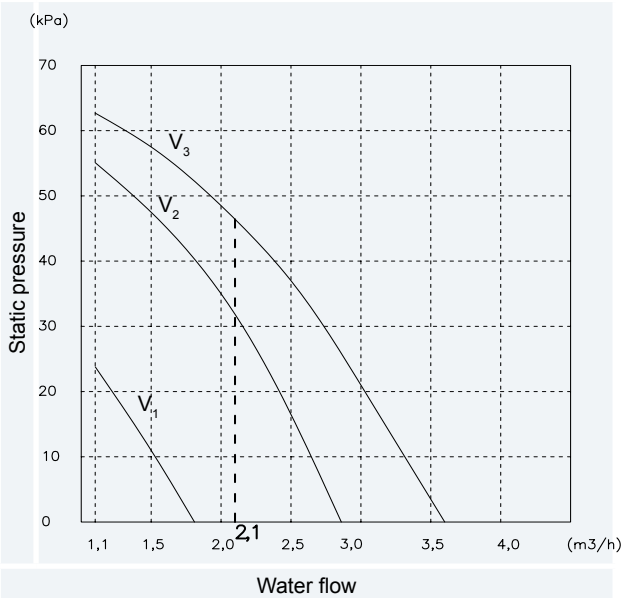
RWM-3.0(H)FSN3E



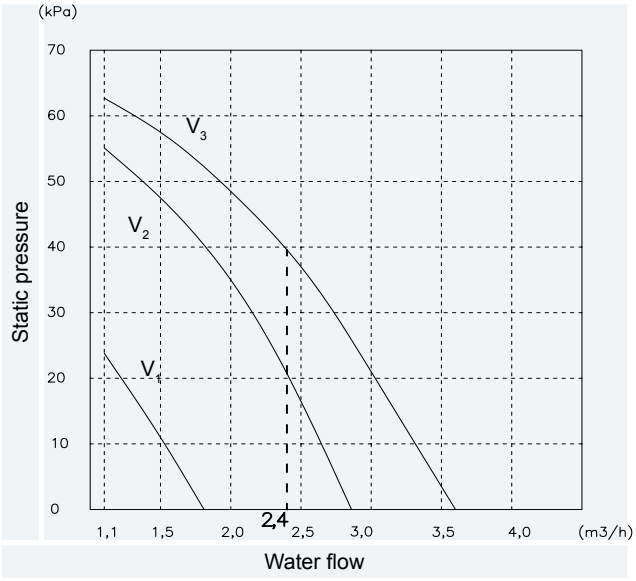
RWM-4.0(H)FSN3E



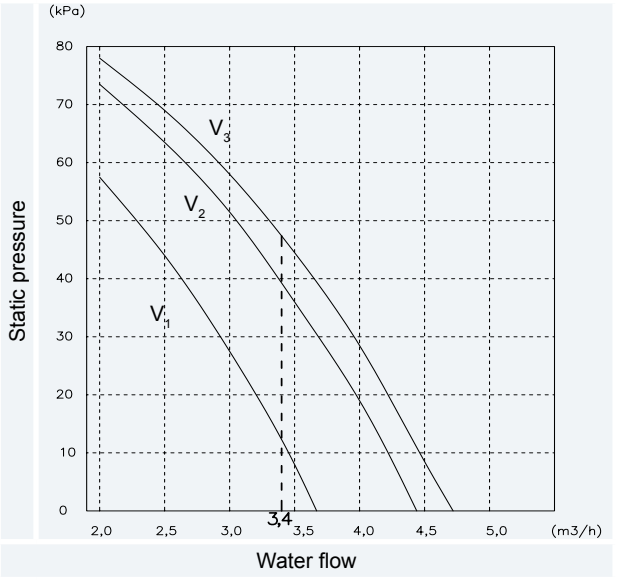
RWM-5.0(H)FSN3E



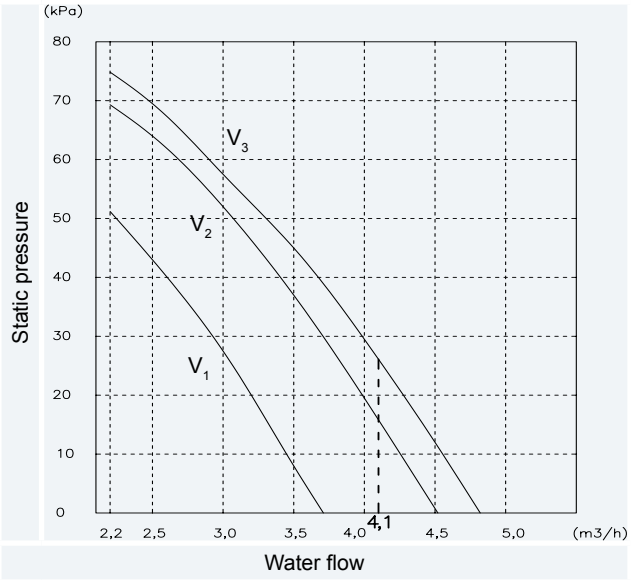
RWM-6.0(H)FSN3E



RWM-8.0(H)FSN3E



RWM-10.0(H)FSN3E



NOTE

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

9.8 DHWT - Domestic Hot Water tank

9.8.1 Hydraulic circuit

When Piping connections are performed:

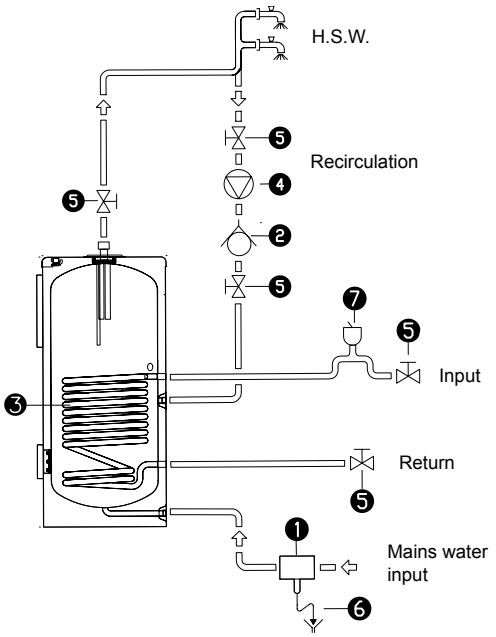
1 Connect all pipes as close as possible to the unit, so that disconnection can be easily performed when required.
2 It is recommended to use flexible joints for the piping of water inlet and outlet, so vibration will not be transmitted.
3 Whenever possible, sluice valves should be installed for water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

NOTE

Check periodically:

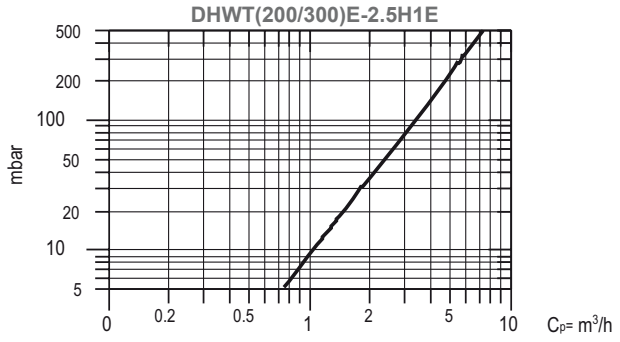
- ***Water flow and pressure***
- ***Water leakage's***
- ***Fixing points tightening***
- ***Inlet and outlet connection pipes must be 1G"***

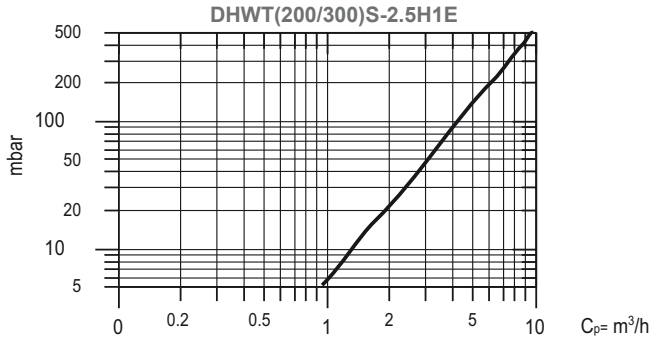
DHWT(200/300)(E/S)-2.5H1E



Ref.	Name
❶	Sanitary safety valve unit
❷	Non-return valve
❸	Heating coil
❹	Recirculation pump
❺	Shutoff cock
❻	Drain
❼	Drain valve

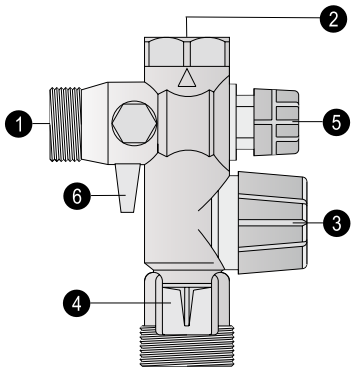
9.8.2 Pressure drop





9.8.3 General standard for hydraulic installation

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



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

10. Electrical wiring

Index

10.1 Power supply

10.1.1 General check

Service voltage

Between 90 and 110% of the rated voltage.

Start-up voltage

Between 85 and 115% of the rated voltage.

Voltage imbalance

Up to 3% in each phase, measured at the main terminal of the outdoor unit.

Electromagnetic compatibility

According to Directive 2004/108/EC (89/336/EEC) regarding electromagnetic compatibility, the following table indicates: the maximum allowed impedance Z_{max} of the system at the connection point of the user's power supply, as per EN 61000-3-11.

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

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

NOTE

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

Harmonics

In relation to IEC 61000-3-2 and IEC 61000-3-12, the situation of harmonics for each model is as follows:

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

DANGER

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

CAUTION

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

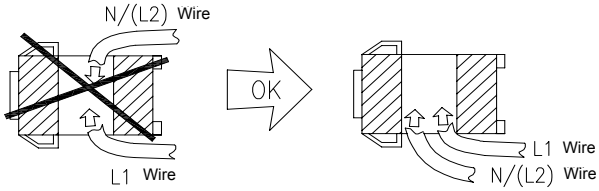
NOTE

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

10.1.2 Electrical connection of outdoor unit

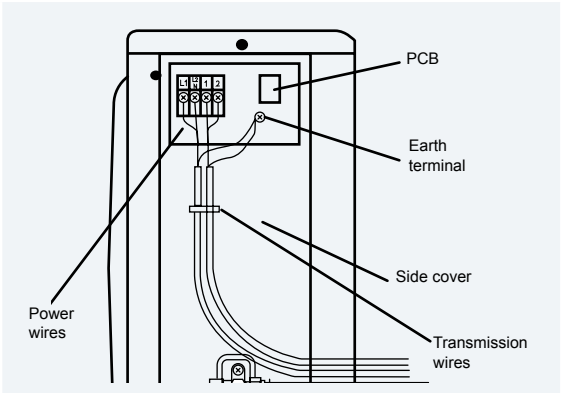
The correct electrical wiring connection for the outdoor unit is shown below:

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

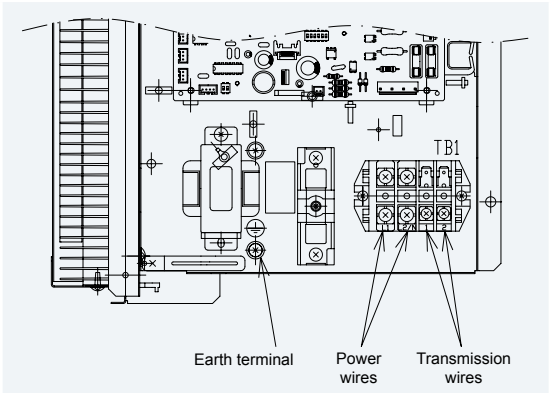


2 Connect the power source cables L1 and N (for 230V 50Hz) or L1, L2, L3 to the terminal board, and N (for 400V 50Hz) and the earth conductor to the earthing screw in the electrical box base plate.

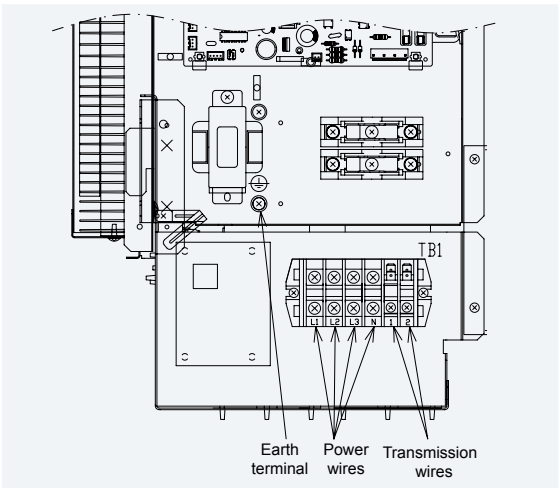
RAS-2HVRN2



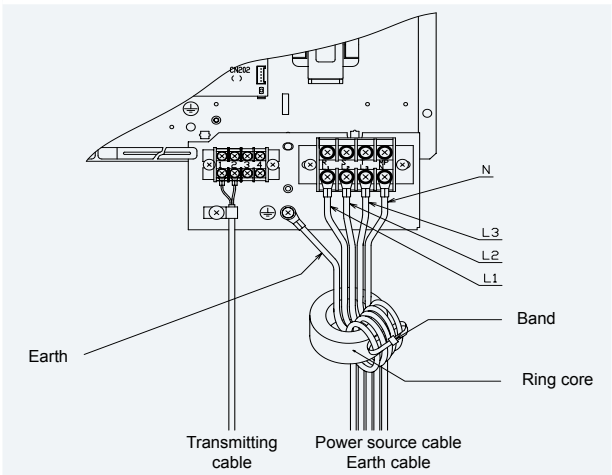
RAS-(3-6)HVRNME-AF



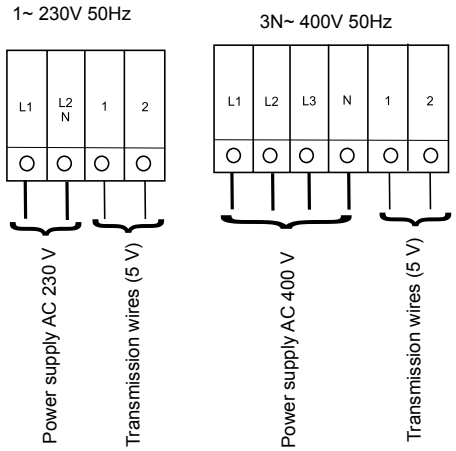
RAS-(4-6)HRNME-AF



RAS-(8/10)HRNME-AF

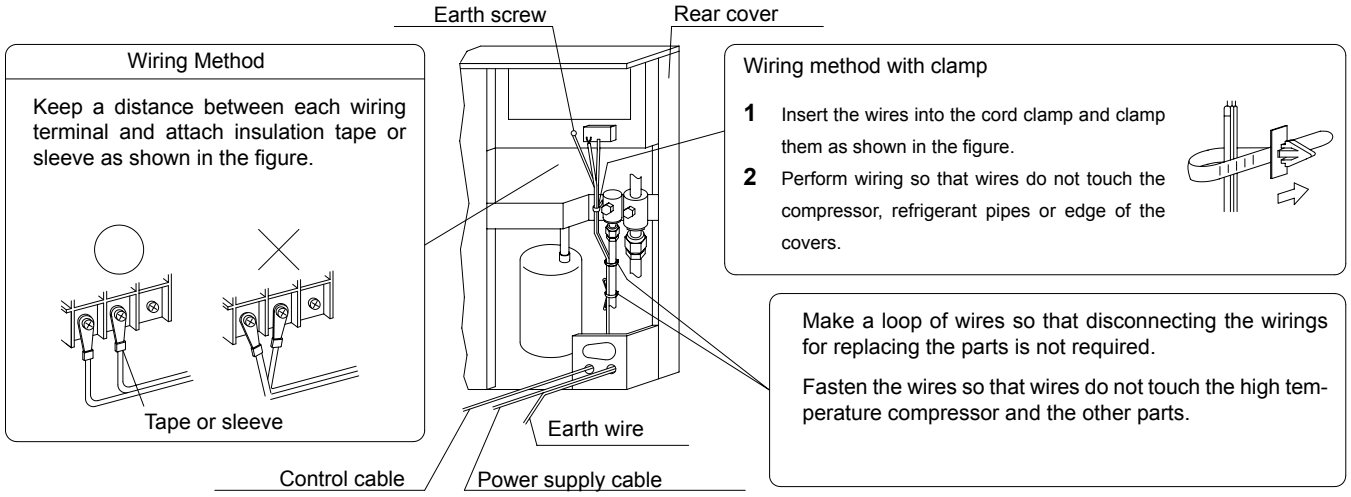


3 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.



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

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

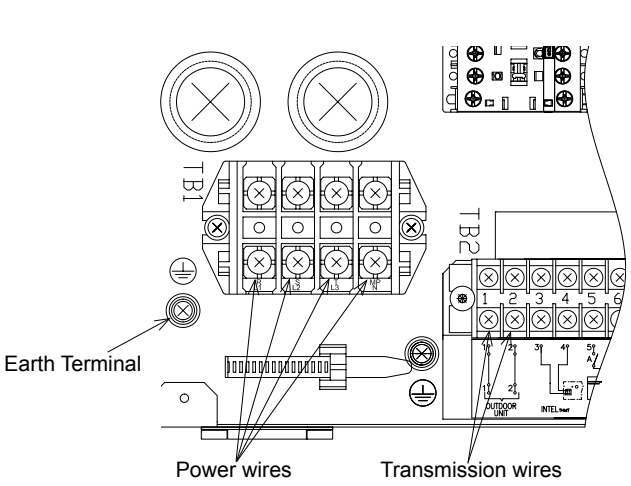


10.1.3 Electrical connection of outdoor unit

◆ Wiring connection

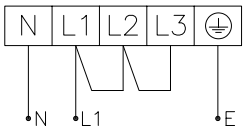
The correct electrical wiring connection for the indoor unit is shown below:

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

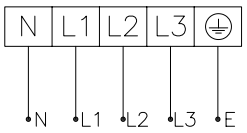


Power terminals

Power supply: 1~ 230V 50Hz



Power supply: 3N~ 400V 50Hz



CAUTION

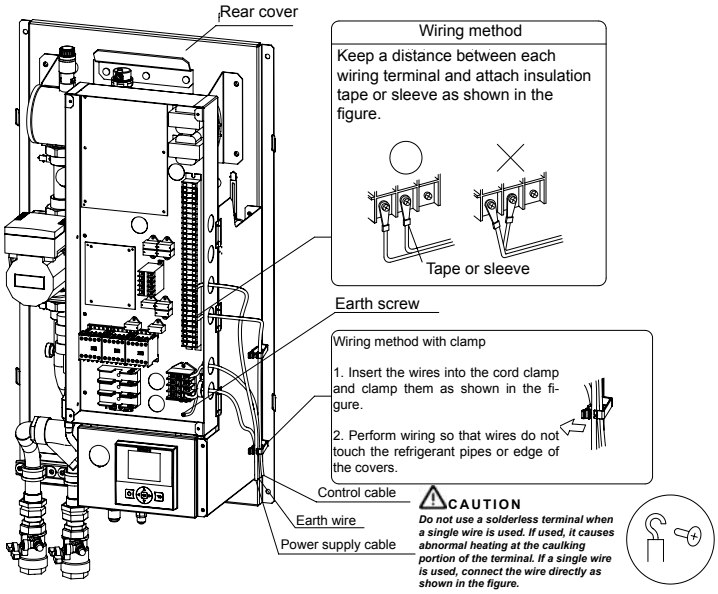
Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).

2 Using the appropiate cables, connect the power source cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) and the ground cable to the earthing screw in the electrical box base plate.

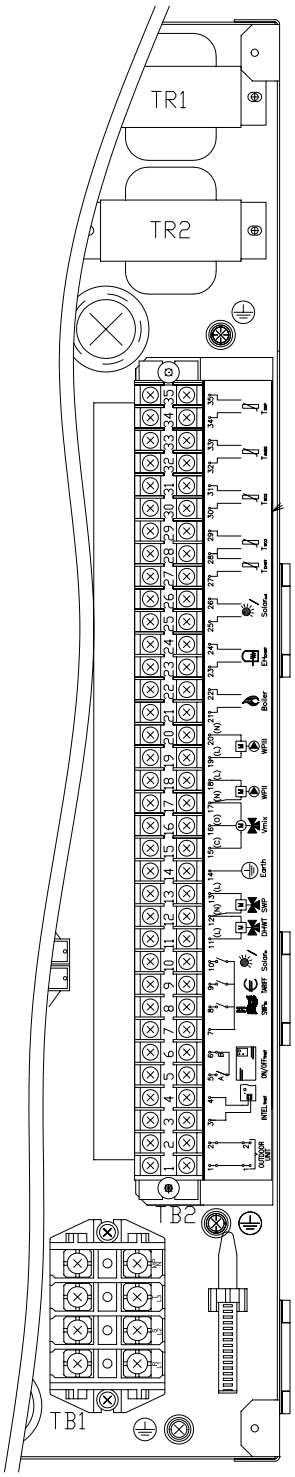
3 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board 2 (TB2).

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

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



◆ Terminal board connections



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

10.2 Setting of DIP switches and RSW switches

10.2.1 Outdoor unit

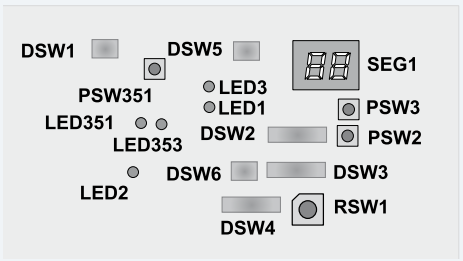
◆ Location of DIP switches and RSW switches

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

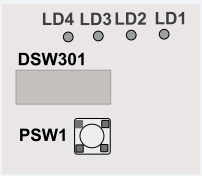
Position switches at the PCB:

RAS-2HVRN2

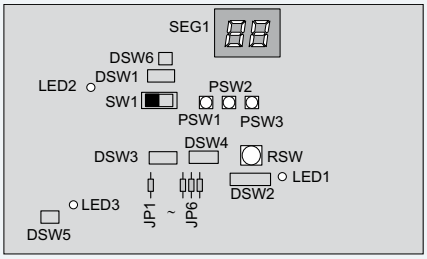
PCB1



PCB2



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



NOTE

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

CAUTION

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

◆ Function of the of DIP switches and RSW switches

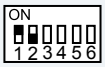
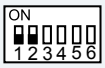
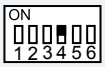
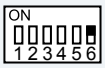
DSW1: Test Run

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

NOTE

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

DSW2: Piping length/selection function

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

CAUTION

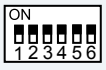
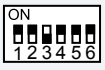
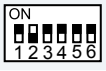
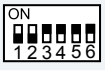
The cancellation of the outdoor hot start control configuration could damage the compressor if it is usually used. In that case the unit warranty will be void.

NOTE

Only for RAS-2HVRN2 units:

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

DSW3: Capacity setting

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

DSW4/RSW1: Refrigerant cycle setting (No change)

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

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

DSW5: Transmission setting of end terminal resistance

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

Function	Setting position
Setting before shipment	

DSW6: Power source setting/individual operation

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

◆ Jumpers

Jumper lead setting (JP1~6)

Setting before shipment:

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

0 = Open; 1 = Short circuit

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

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

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

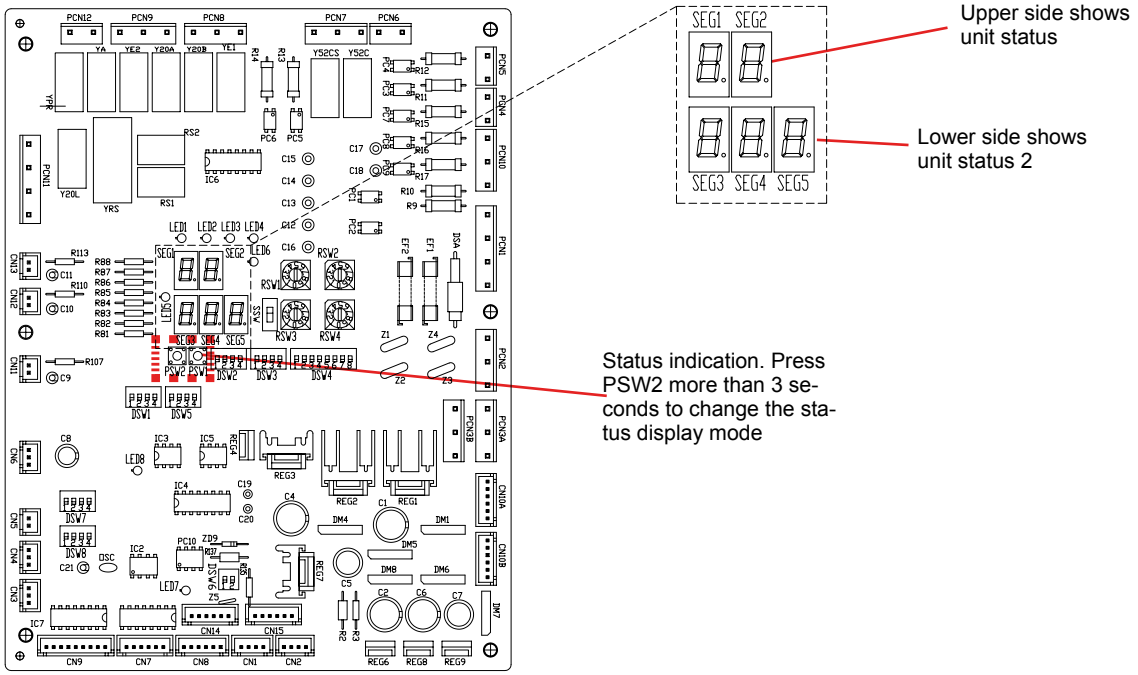
◆ LED's indication

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

10.2.2 Indoor unit

◆ Location of DIP switches and RSW switches

Below are the dip switch positions:



NOTE

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

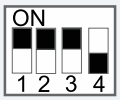
CAUTION

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

◆ Functions of dip switches and rotary switches

DSW1: Not used

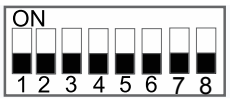
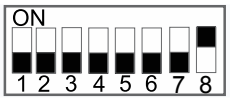
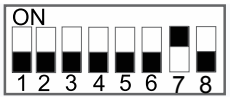
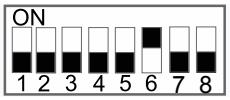
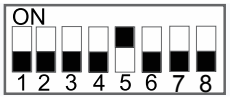
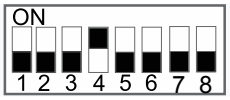
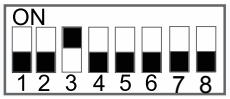
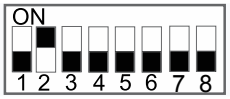
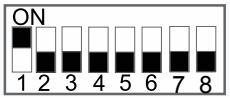
DSW2: Unit capacity setting

RWM-2.0(H)FSN3E	
RWM-3.0(H)FSN3E	
RWM-4.0(H)FSN3E	
RWM-5.0(H)FSN3E	
RWM-6.0(H)FSN3E	
RWM-8.0(H)FSN3E	
RWM-10.0(H)FSN3E	

DSW3: Additional settings

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

DSW4: Additional setting

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

NOTE

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

CAUTION

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

DSW5: Internal configuration

Not used

DSW6: Internal configuration

Not used

DSW7: Internal configuration

Not used

DSW8: Internal configuration

Not used

DSW9: Internal configuration

Not used

RSW1 & RSW2: Refrigerant cycle setting

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

RSW3 & RSW4: Indoor unit address setting

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

◆ Led indications

LED1: Pump operation

Status	LED1
Pump operation ON	ON
Power supply OFF	OFF

LED2: System heater operation

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

LED3: HSW Heater operation

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

LED4: Operation status indication

Status	LED4
Thermo OFF	OFF
Thermo ON	ON

LED5: Power supply indication

Status	LED5
Supply ON	ON
Supply OFF	OFF

LED6: Alarm indication

Status	LED5
Alarm ON	ON (flick)
Alarm OFF	OFF

LED7: Not used

LED8: H-Link transmission indication

10.3 Common wiring

CAUTION

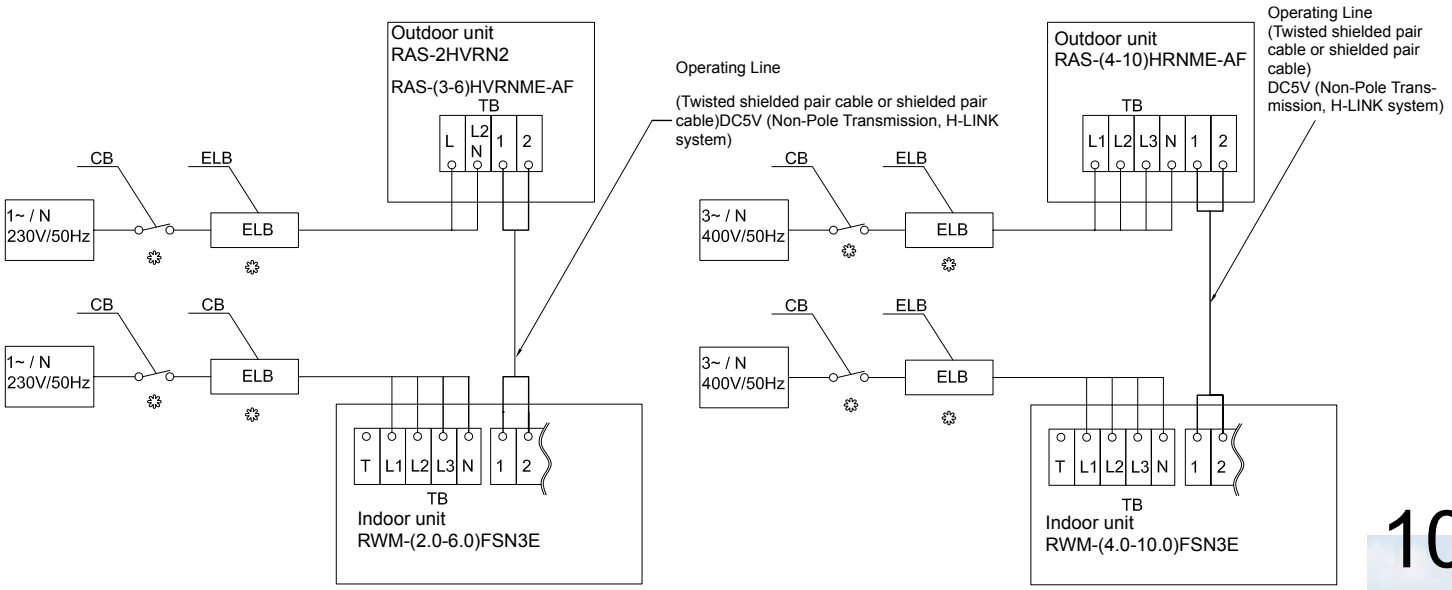
All the field wiring and electrical components must comply with local codes.

10.3.1 Electrical wiring between outdoor and indoor unit

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

CAUTION

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



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

NOTE

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

10.3.2 Wire sizes

- Recommended minimum sizes for field provided wires

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

NOTE

GND: Ground wire

- Types of switches

Select the main switches in accordance with the following table:

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

NOTE

CB: Circuit Breaker

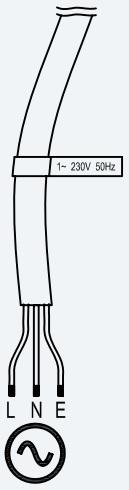
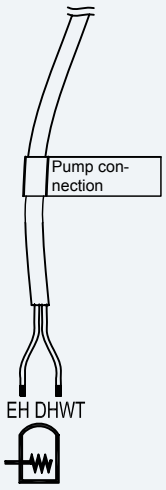
ELB: Earth Leakage Breaker

10.4 Domestic Hot Water Tank

10.4.1 Electrical wiring connection

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

Customer connection:

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

10.4.2 Wire size

- Recommended minimum size for field provided wires:

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

- Type of switches:

Select the main switches in accordance with the following table:

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

NOTE

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

11. Installation configuration

Index

11.1 Heating system configurations

The split air to water heat pump is designed to work in mono-energetic or bi-valent heating systems. It provides efficient control and reduces energy use while maintaining comfort in the building.

The functionality of the split air to water heat pump depends on the installed components and the selected configuration and it can be configured and upgraded to meet many application requirements.

11.1.1 System configuration

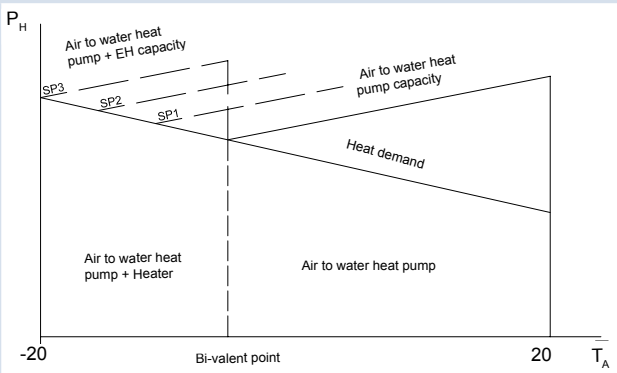
◆ Mono-valent system

The split air to water heat pump is sized to provide 100% of the heating requirements on the coldest day the year.

◆ Mono-energy system

The split air to water heat pump is sized to provide 80% of the heating requirements on the coldest day of the year. An auxiliary heater (inside the unit) is used to provide the additional heating required on cold days.

Example of Mono-energy system (Mono-valent)



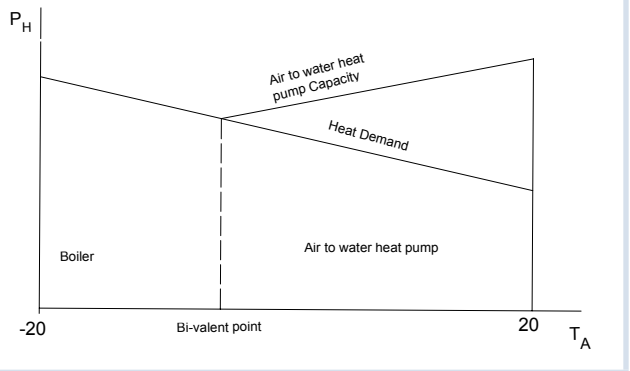
NOTE

- ***T_A : Outdoor ambient temperature (ºC).***
- ***P_H : Heating capacity.***
- ***SP1/2/3: Heater steps.***
- ***Bivalent point can be set through the LCD user's interface.***

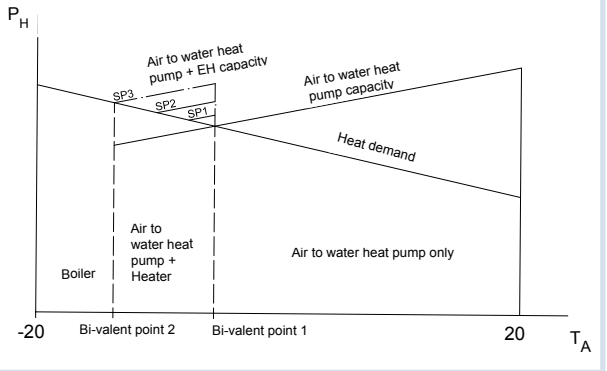
◆ Alternating Bi-valent system

The boiler is configured to alternate with the split air to water heat pump.

Example of Alternating Bi-valent (Only boiler)



Example of Alternating Bi-valent (Heater + boiler)



11.1.2 Typical installation samples

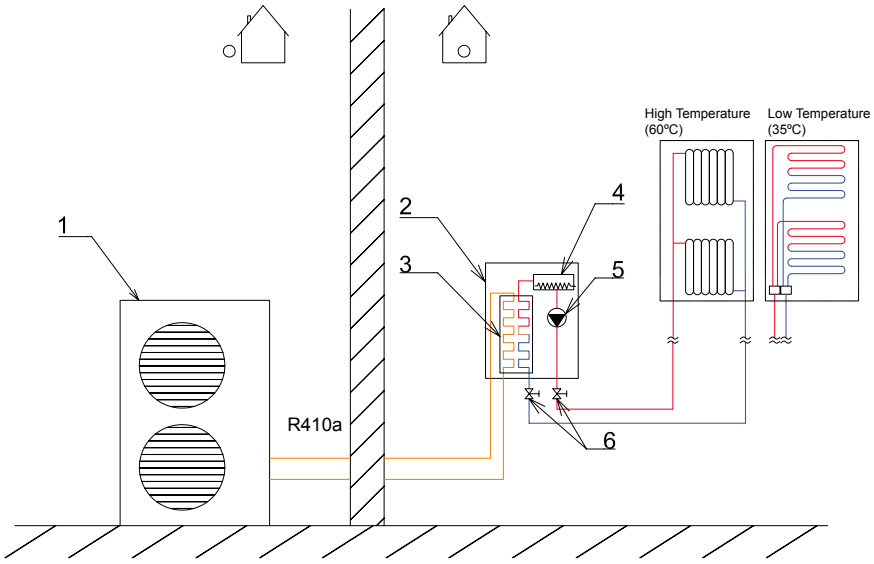
NOTE

The following installation examples show typical configurations only for heating application. In case of variations of them, the responsability of correct system functioning will be of the installer.

The configuration examples given below are only for illustration purposes.

◆ Installation example 1

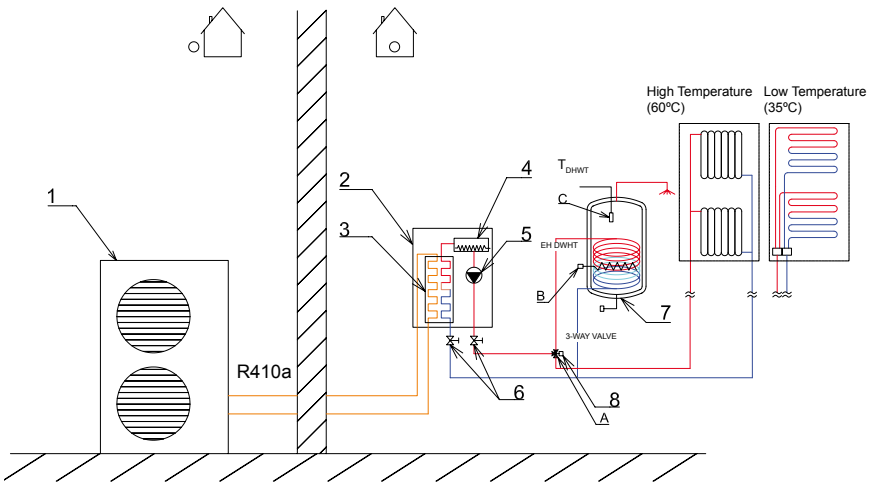
Only space heating application: Space heating using radiators (fan coils) or radiant floor application with an optional room thermostat



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)

◆ Installation example 2

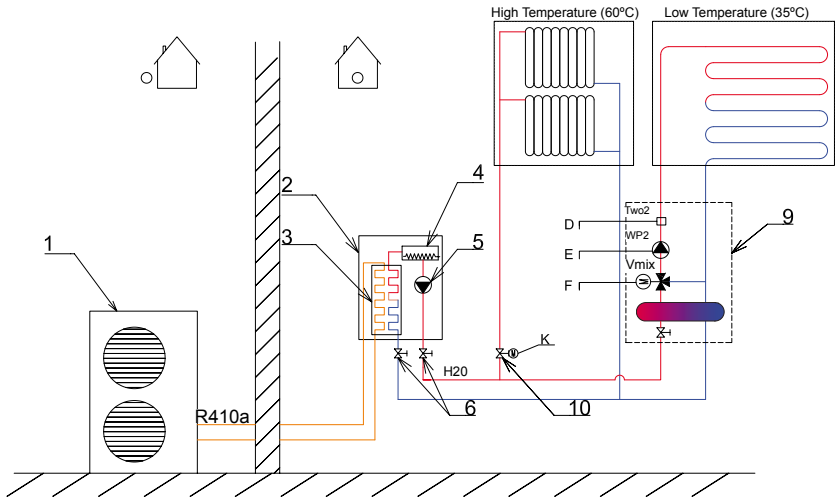
Space heating and Domestic Hot Water Tank application: Space heating using radiators (fan coils) or radiant floor application with an optional room thermostat and domestic hot water tank combination.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
A	3-way valve for DHWT output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)

Installation example 3

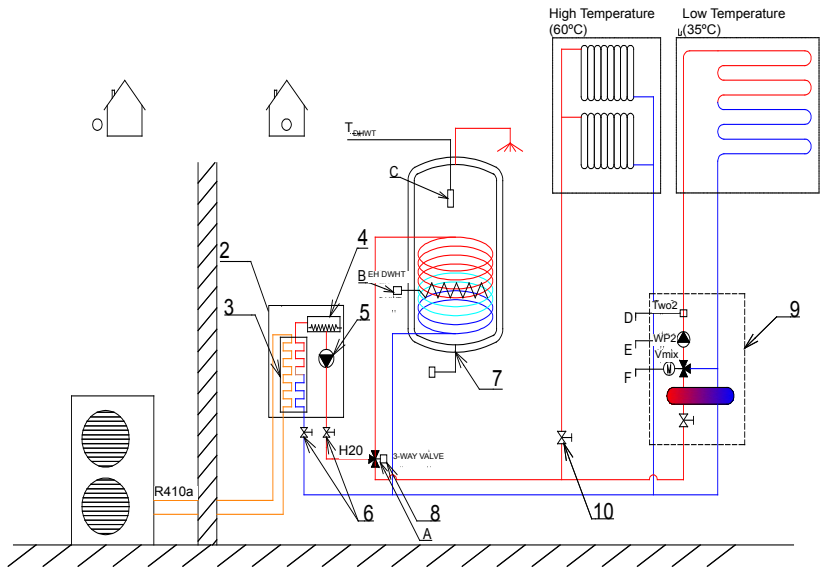
Two space heating applications (High & Low water temperature): When the split air to water heat pump is connected to two different heating circuits, circuit 1 will be direct (high temperature for radiator operation) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve (low temperature for floor heating operation). Optional Room Thermostat



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal
K	Optional signal

Installation example 4

Two space heating applications (High & Low water temperature) and Domestic Hot Water Tank: Two space heating applications with optional Room Thermostat and Domestic Hot Water Tank heated by Heat Pump.

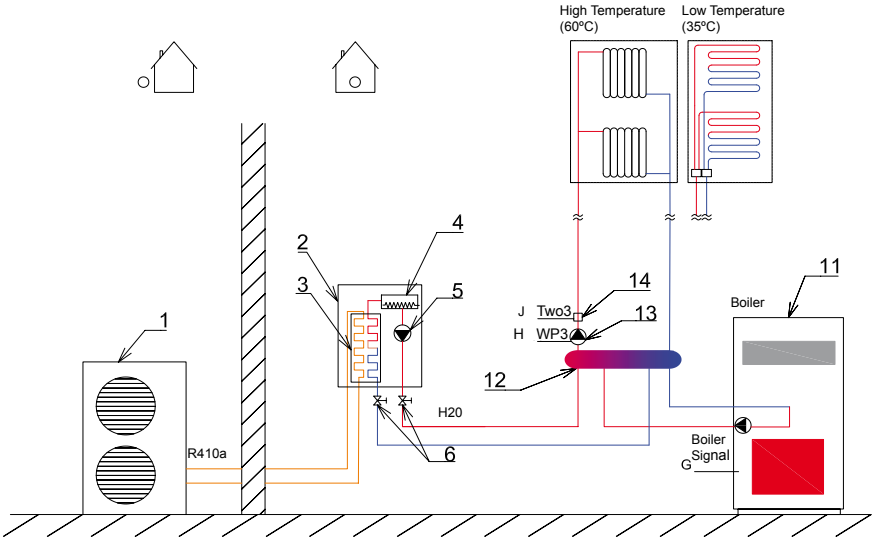


Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal
K	Optional signal

◆ Installation example 5

Alternating Space heating + Boiler combination. Space heating application with optional Room Thermostat and alternating Boiler combination.

Option 1: Hydraulic separator

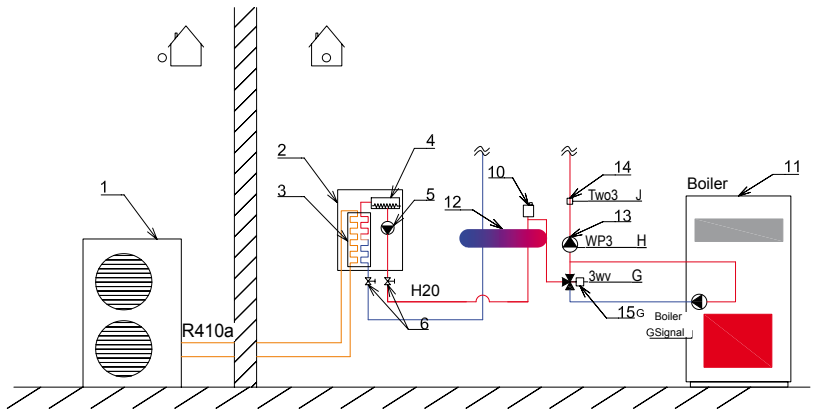


Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
11	Boiler (field supplied)
12	Hydraulic separator (accessory)
13	Water pump (field supplied)
14	Hydraulic separator sensor (accessory)
G	Boiler output signal
H	Water pump 3 signal (WP3)
J	Hydraulic sensor signal (Two3) (accessory)

NOTE

When the unit is configured with a boiler in parallel, a hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing. Additional Water pump (WP3) and water sensor (Two3) it is needed for this.

Option 2: With 3-way valve



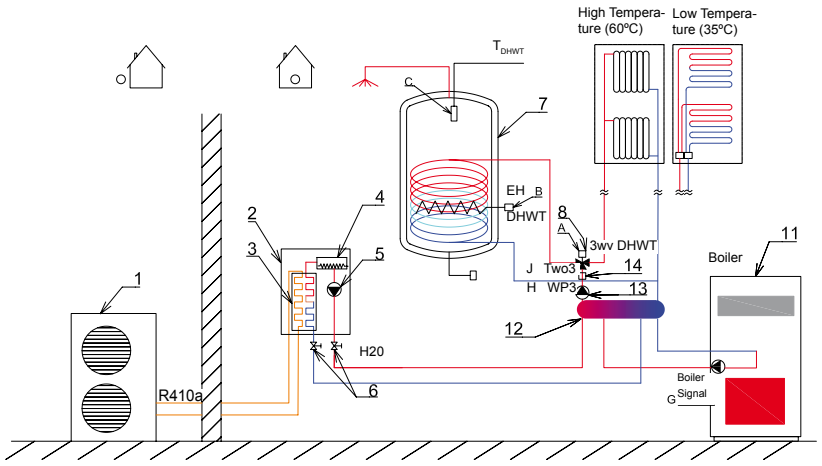
Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
11	Boiler (field supplied)
12	Hydraulic separator (accessory)
13	Water pump (field supplied)
14	Hydraulic separator sensor (accessory)
15	3-way valve for boiler (field supplied)
G	Boiler output signal
H	Water pump 3 signal (WP3)
J	Hydraulic sensor signal (Two3) (accessory)

NOTE

For configurations with alternating boiler.

Installation example 6

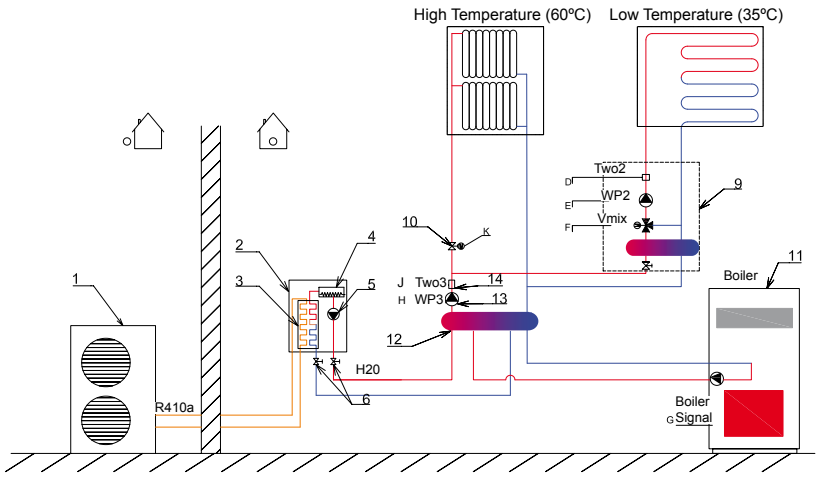
Installation with alternating space heating + Domestic Hot Water Tank + Boiler combination: Space heating application with optional Room Thermostat and Domestic Hot Water Tank heated by alternating Heat Pump and boiler combination.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
9	Second temperature kit (accessory)
11	Boiler (field supplied)
12	Hydraulic separator (accessory)
13	Water pump (field supplied)
14	Hydraulic separator sensor (accessory)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)
G	Boiler output signal
H	Water pump 3 signal (WP3)
J	Hydraulic sensor signal (Two3) (accessory)

Installation example 7

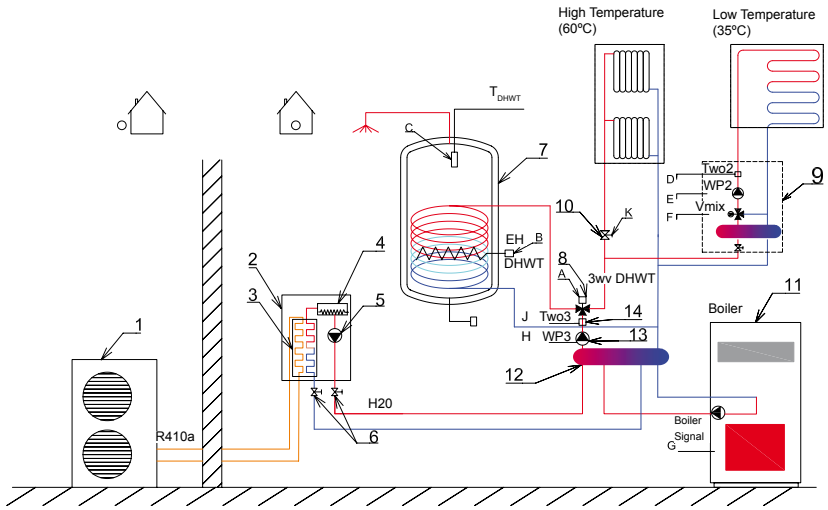
Two space heating applications (High & Low water temperature) + Combination with Boiler in parallel: Two space heating application with a Room Thermostat as an option and Domestic Hot Water Tank heated by Heat Pump and boiler combination in parallel



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
11	Boiler (field supplied)
12	Hydraulic separator (accessory)
13	Water pump (field supplied)
14	Hydraulic separator sensor (accessory)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal
G	Boiler output signal
H	Water pump 3 signal (WP3)
J	Hydraulic sensor signal (Two3)
K	Optional signal

Installation example 8

Two space heating applications (High & Low water temperature) + Domestic Hot Water Tank + Combination with Boiler in parallel: Two space heating application with a Room Thermostat as an option and Domestic Hot Water Tank heated by Heat Pump and boiler combination in parallel



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
11	Boiler (field supplied)
12	Hydraulic separator (accessory)
13	Water pump (field supplied)
14	Hydraulic separator sensor (accessory)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal
G	Boiler output signal
H	Water pump 3 signal (WP3)
J	Hydraulic sensor signal (Two3) (accessory)
K	Optional signal

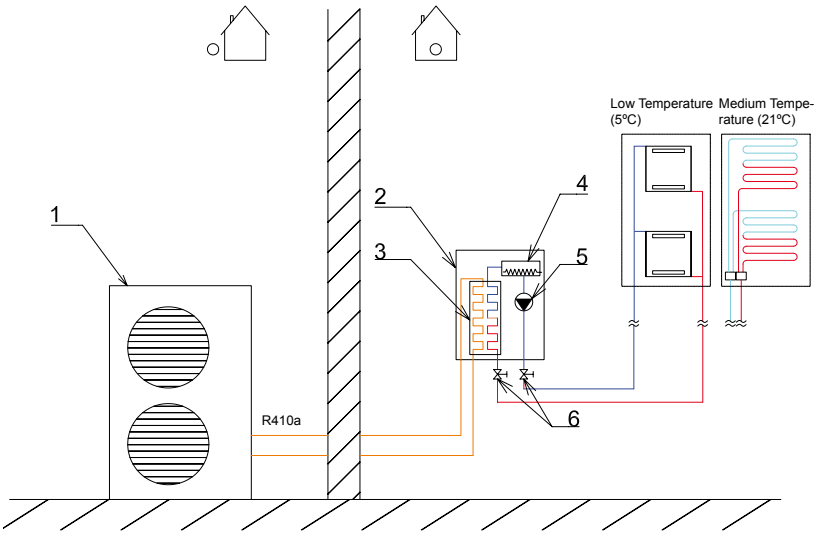
11.2 Cooling system configurations

NOTE

- ***The following installation examples show typical configurations only for cooling application. In case of heating installation working also in cooling operation, the responsability of correct system functioning will be of the installer. The configuration examples given below are only for illustration purposes.***
- ***The split air to water heat pump is pre-configurated to work only in heating mode. In order to allow the only cooling mode, it is necessary to perform a dip-switch setting and install the drain pan accessory. In the case, all the heating mode uses for the unit will be prohibited and the LCD user's interface heating configuration will disappear.***

Installation example 9

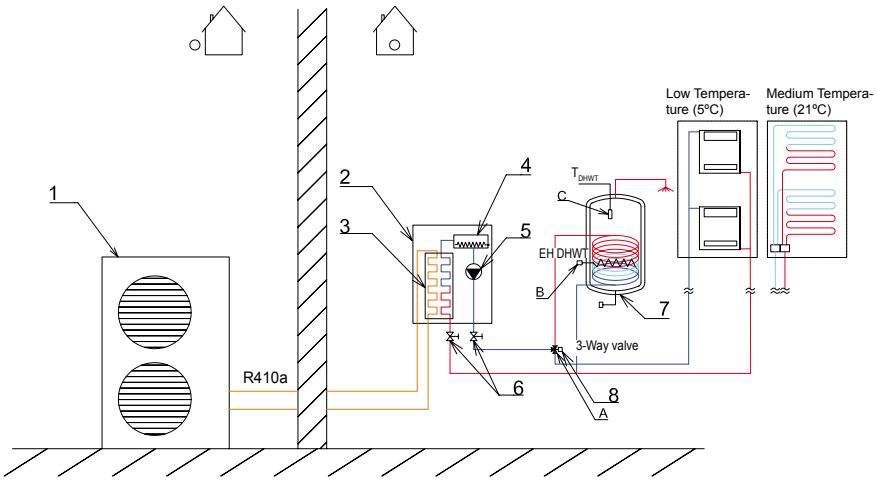
Direct space cooling installations: Space cooling by Fan coil application with optional Room Thermostat.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)

Installation example 10

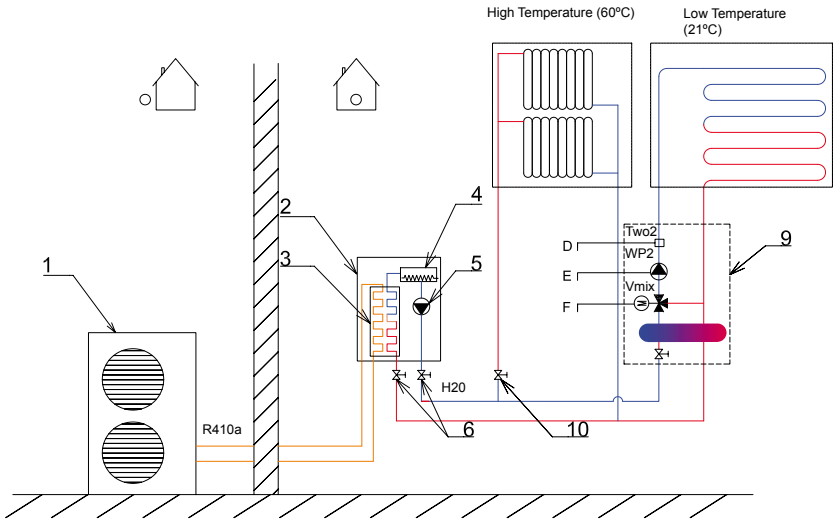
Space cooling + Domestic Hot Water Tank: Space cooling application with optional Room Thermostat and Domestic Hot Water Tank heated by Heat Pump.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)

Installation example 11

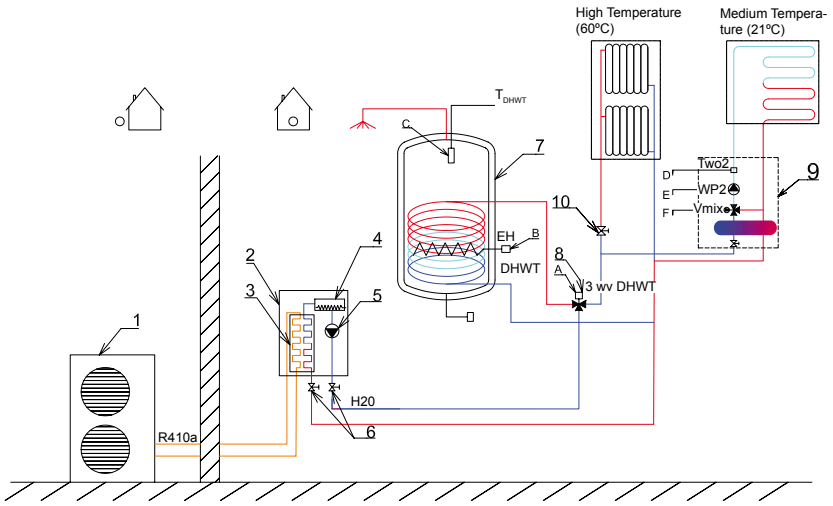
Using Refreshing floor with Heating radiators closed: Use refreshing floor for cooling and close Radiators using Valve.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signals

Installation example 12

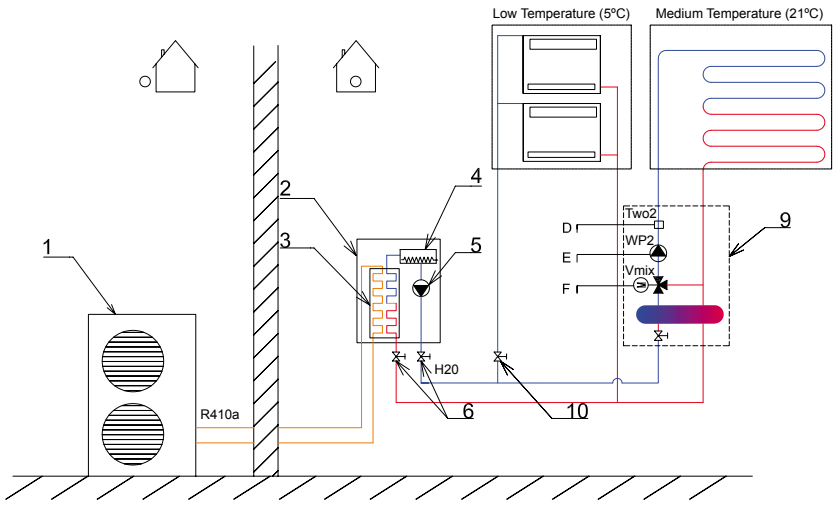
Using Refreshing floor with heating Radiators closed + Domestic Hot Water Tank: Use refreshing floor for cooling and close Radiators using Valve with optional Room Thermostat and Domestic Hot Water Tank heated by Heat Pump.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signals

Installation example 13

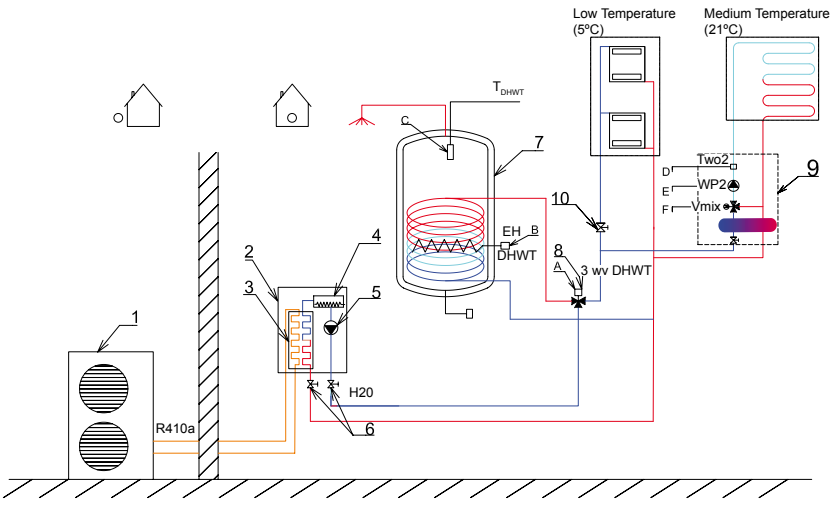
Two space cooling installations (Fan coils +Refreshing floor): Space cooling application with optional Room Thermostat.



Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal

Installation example 14

Two space cooling installations (Fan coils +Refreshing floor + Domestic Hot Water Tank): Space cooling application with optional Room Thermostat and Domestic Hot Water Tank heated by Heat Pump.

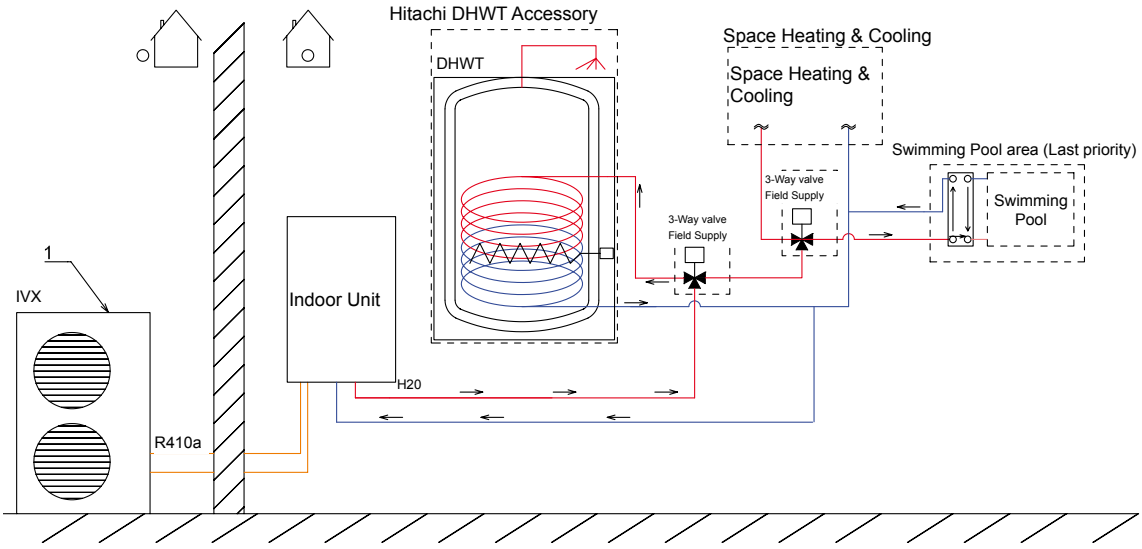


Item	Description
1	Outdoor unit
2	Indoor unit
3	Heat exchanger
4	Electrical heater
5	Water pump (primary)
6	Valves (factory supplied)
7	Domestic Hot Water Tank (DHWT) (accessory)
8	3-way valve for DHWT (accessory)
9	Second temperature kit (accessory)
10	Motorized valve (field supplied)
A	3-way valve output signal
B	DHWT electrical heater signal
C	DHWT sensor signal (accessory)
D	2nd Temperature sensor signal (accessory)
E	Secondary water pump signal
F	Mixing valve signal

11.3 Additional combinations

11.3.1 Swimming pool

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



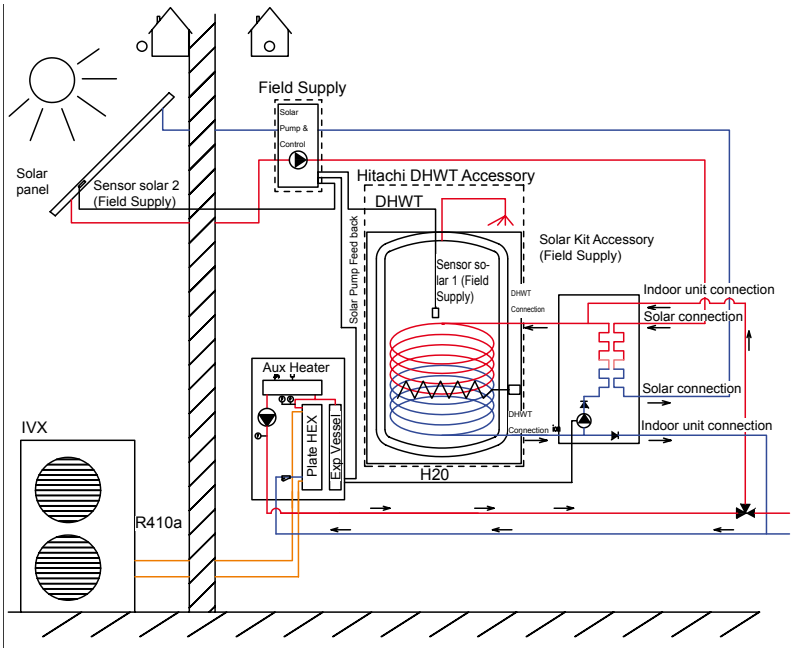
11.3.2 Solar panel

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

The solar option is designed to transfer the heat from the solar panels to the heat exchanger of the domestic hot water tank and is to be installed in the split air to water heat pump system as shown in the schemes below:

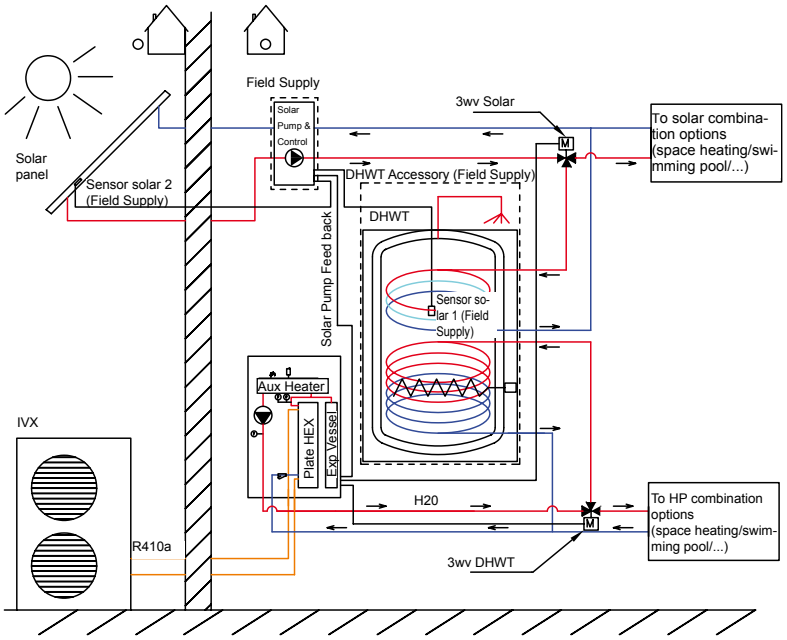
◆ Option 1

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



Option 2

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



HITACHI
Inspire the Next

12. Optional functions

Index

12.1 Optional functions of the indoor unit

	Optional function	Explanation
From LCD user's interface	Floor screed drying function (Circuits 1 & 2)	This function is used exclusively for the process of drying screed that has been newly applied to floor heating system. When the user activates the floor screed drying function, the water temperature set-point will follow a predetermined schedule.
	Automatic summer switch-OFF	The system will switch OFF the heating mode when the daily average outdoor temperature of previous day rises above certain value at the summer switch-OFF activation temperature, avoiding to provide heating at high outdoor temperatures.
	Pump and motorized valve seizure protection	This function prevents the components of being sticked during long periods of inactivity by running every week the components during a short period.
	DHW anti-Legionella protection	In order to help protect against Legionella into the DHW system, it is available an specific setting which will raise up the DHW periodically (by the DHW tank electric heater or by a boiler) over the normal DHW tank temperature setting.
	Electrical tariff input	This function allows an external tariff switch device to switch OFF the heat pump during peak electricity demand period. Depending on the setting, the heat pump or DHWT will be blocked when signal is open/closed.
	Hydraulic separator combination	When the indoor unit's water pump is not sized for heating installation (small water pump) or when the system is configured to alternate when a boiler, an hydraulic separator or buffer tank must be used to ensure proper hydraulic balancing. In this case, the hydraulic separator option can be enabled by the LCD user's interface.
From dip-switch setting	Electrical heater or boiler emergency mode	In the event of outdoor unit failure, the required heating can be provided by the electric heater or by the boiler, by means of a dip-switch setting.
	One step heater for three phase imbalance option	In order to prevent 3-phase imbalance by the electric heater steps, this option can be used to switch all 3 steps at the same time, by means of a dip-switch setting. **NOTE** ***This function only applies when power source of the indoor unit is 3-phase (3N~ 400V 50Hz).***
	2nd. outdoor temperature sensor accessory	In situations where the outdoor unit is installed into a location where its own outdoor ambient temperature sensor can not give a suitable temperature measurement to the system, it is available the 2nd. outdoor ambient temperature sensor. In this case, it is necessary a dip-switch setting to use this temperature value instead of the outdoor ambient temperature value.*.*
Available four external outputs signals		There are available four output optional signals that provide four optional functions of the system, programmed on the indoor unit PCB. **NOTE** ***In order to make easy the electrical connection works, HITACHI offers (as accessory) a relay board for the additional output signals.***

NOTE

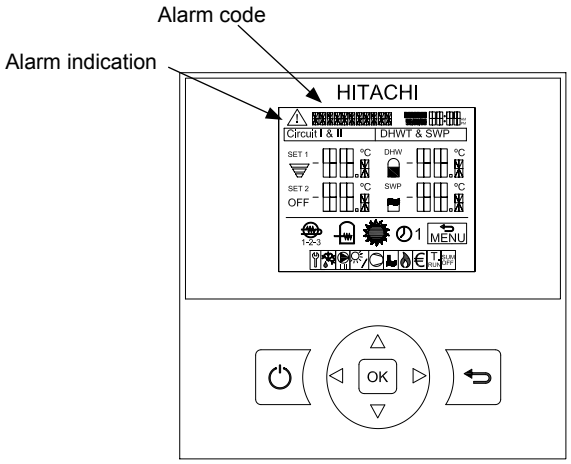
For the detailed information about the Optional functions of the indoor units, please refer to the Service Manual (SMXX0070).

13. Troubleshooting

Index

13.1 On screen during abnormal operation

Alarm Code Indication on LCD user's interface:



13.2 Alarm codes

Alarm Code	Retry Stop Code	Origin	Detail of Abnormality	Main cause
02	–	Outdoor	Activation of Outdoor Unit Protection Device (Except for Alarm Codes 41, 42)	High-pressure interrupting device activated
03	–	Outdoor	Transmission Error	Outdoor fuse meltdown, Indoor/outdoor connection wiring (breaking, wiring error, etc.)
04	–	Outdoor	Inverter Transmission Abnormality	Control PCB – Inverter PCB connection wiring (breaking, wiring error, etc.)
05	–	Outdoor	Power Phase Detection Abnormality	Power source wiring open phase in Indoor Units
06	18	Outdoor	Undervoltage, Overvoltage	Outdoor PCB abnormality, inverter PCB abnormality, DM, CB abnormality
07	16	Outdoor	Abnormal Decrease of Discharge Gas Superheat Degree	Excessive refrigerant, expansion valve open-locked, Fan motor locked
08	15	Outdoor	Compressor-Top Temperature Over-Increase	Shortage or leakage of refrigerant, piping clogging, Fan motor locked
11	–	Indoor	Water Inlet Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
12	–	Indoor	Water Outlet Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
13	–	Indoor	Indoor Liquid Pipe Temperature Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
15	–	Indoor	Water Outlet C2 thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
14	–	Indoor	Indoor Gas Pipe Temperature Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
16	–	Indoor	Water DHW Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
17	–	Indoor	Auxiliary Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
18	–	Indoor	Water Outlet Boiler Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
19	–	Indoor	Water Outlet HP Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
20	–	Outdoor	Compressor-Top Temperature Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
22	–	Outdoor	Outdoor Temperature Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
24	–	Outdoor	Outdoor Heat Exchanger Liquid Pipe Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
31	–	Outdoor	Indoor/Outdoor Combination Setting Error	Outdoor/Indoor Unit capacity setting error, Indoor total capacity excessively large/small

Alarm Code	Retry Stop Code	Origin	Detail of Abnormality	Main cause
35	–	Outdoor	Indoor Unit Number Setting Error	Indoor units with the same number in a refrigerant piping system
38	–	Outdoor	Outdoor Protection Detection Circuit Abnormality	Outdoor PCB abnormality, Error in wiring to outdoor PCB
41	–	Outdoor	Cooling Overload	Outdoor heat exchanger clogging/short circuit, Broken outdoor fan motor
42	–	Outdoor	Heating Overload	Outdoor heat exchanger clogging/short circuit, Expansion valve closed-locked
47	15	Outdoor	Suction Pressure Decrease Prevention Activated	Shortage or leakage of refrigerant, pipe clogging. Expansion valve closed-locked. Fan motor locked
51	17	Outdoor	Inverter Current Sensor Abnormality	Error in CT wiring, Outdoor PCB abnormality, Inverter PCB abnormality
48	17	Outdoor	Overload Operation Protection Activation	Cycle abnormality, Inverter PCB abnormality, DM abnormality, Heat exchanger clogging, etc.
53	17	Outdoor	Inverter Module Error	Compressor, ISPM abnormality, Heat exchanger clogging, etc.
54	17	Outdoor	Inverter Fin Temperature Abnormality	Fin thermistor abnormality, Heat exchanger clogging, Fan motor abnormality
55	18	Outdoor	Inverter Non-Operation	Inverter not operating or broken
59	–	Outdoor	Inverter Fin Temperature Thermistor Abnormality	Loose, disconnected, broken or short-circuited connector
b1	–	Outdoor	Error in Address/Refrigerant System Setting	Address/refrigerant system setting over 64
EE	–	Outdoor	Compressor Factor Alarm	Alarm to notify damage to compressor occurs 3 times within 6 hours
70	P-70	Indoor	Hydraulic alarm	Water pressure or water flow is not detected in the hydraulic cycle
71	–	Indoor	Water Pump Feedback	
72	–	Indoor	Thermostat Heater Alarm	High temperature is detected in Electric Heater T>75ºC
73	–	Indoor	Mixing overheating limit protection for Mixed circuit.	Circuit 2 supply temperature > Target temperature + offset
74	P-74	Indoor	Unit overheating limit protection	Two > Tmax +5K
75	–	Indoor	Freeze Protection by Cold water inlet, outlet temperature detection	
76	–	Indoor	Freeze Protection Stop by Indoor Liquid Temperature Thermistor	TI or Tg < -20ºC for 30 seconds (Only heating mode)
77	–	Indoor	Opentherm Communication Failure	No Opentherm communication for a continuous period of 1 minute.
78	–	Indoor	RF Communication Failure	No communication for 1 hour with one or two RF receivers which are bound to the RF-Bridge.
79	–	Indoor-outdoor	Unit Capacity Setting Error	No concordance between indoor and outdoor unit capacities
80	–	Indoor-LCD	LCD H-link Transmission Error	No H-link communication for a continuous period of 1 minute between Indoor and LCD User control by connection wiring (breaking, wiring error, etc.)

HITACHI
Inspire the Next

Hitachi Air Conditioning Products Europe, S.A.
Ronda Shimizu, 1 - Políg. Ind. Can Torrella
08233 Vacarisses (Barcelona) España

Hitachi certifies that our products have met EU consumer safety, health and environmental requirements.

Hitachi Air Conditioning Products Europe, S.A. is certified with:
ISO 9001 of AENOR, Spain for its Quality Management accordance with the standard
ISO 14001 of AENOR Spain for its Environmental Management systems accordance with the standard.

Hitachi air conditioning products are manufactured according to:
ISO 9001 of JQA, Japan for its Quality Management accordance with the standard
ISO 14001 of JACO, Japan for its Environmental Management accordance with the standard.

Hitachi fulfills with the Certification NF-PAC that recognize the quality requirements for these heat pumps systems.

HITACHI participates in the Eurovent Certification Programme; the certified data of certified models are listed in the Eurovent Certification Online Directory (www.eurovent-certification.com).

TCGB0070 rev.3 - 04/2012 Printed in Spain