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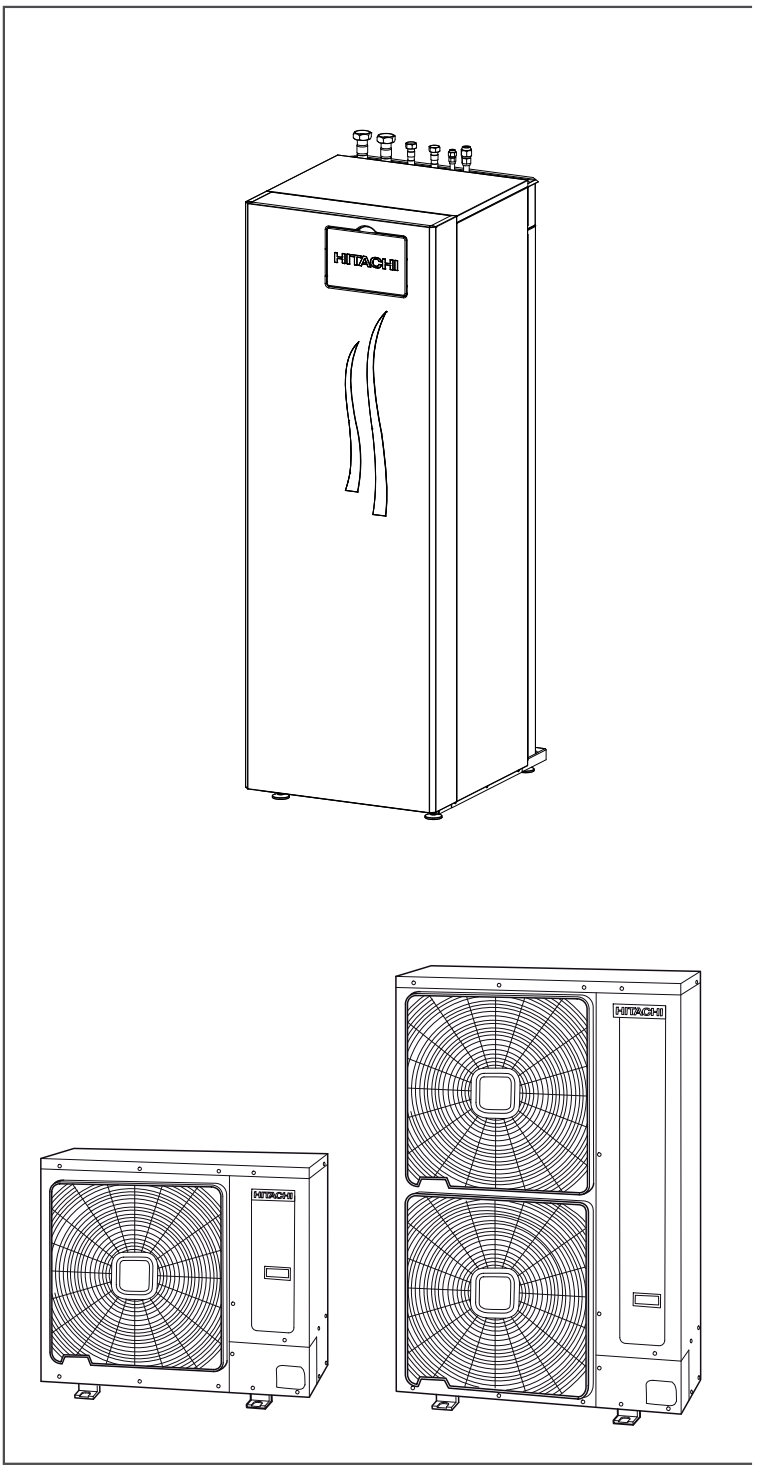
YUTAKI S COMBI SERIES



Technical Catalogue

RWD-(2.0-6.0)(H)FSNWE-(200/260)S Indoor unit
RAS-(2-6)H(V)RN(2/ME-AF) Outdoor unit

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1.1 General information

1.1.1 General notes

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

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

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

NOTE

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

CAUTION

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

1.1.2 Introduction

NOTE

- *YUTAKI S COMBI indoor unit has two different ranges:*
  - Heating and cooling version: RWD-(2.0-6.*0)FSNWE-(200/260)S.*
  - *Heating only version: RWD-(2.0-6.0)**HF**S*NWE-(200/260)S.
- *All the information in this manual related to cooling operation, only applies to heating and cooling version RWD-(2.0-6.0) FSNWE-(200/260)S.*

HITACHI proudly announces the newest heat pump in its award-winning YUTAKI range. The new YUTAKI S COMBI system, based on state-of-the-art technology, does not only achieve an outstanding performance in space heating as well as providing domestic hot water, but is also suitable for cooling homes in summer.

YUTAKI S COMBI produces sanitary hot water and heating like any oil or gas boiler, but transforming renewable energy from the outside air into heat. Every 1 kW of electricity used to power the heat pump can yield up to more than 4kW of energy for heating; this provides savings of up to 80% on heating expenses compared to a traditional fossil fuel boiler.

The YUTAKI S COMBI is easy to install and operate. It is made up of an outdoor unit and a new all-in-one indoor unit (with a built-in domestic hot water tank). Being only 600 mm of width, this system fits perfectly into kitchens and utility rooms. The hydraulic components needed for space heating and DHW operation are all included in a mono-bloc indoor unit. Consequently, the amount of work required for installation is very reduced, as well as the installation space.

YUTAKI S COMBI offers a wide selection range, from 2 HP to 6 HP, with the possibility to choose between:

- Reversible models (heating and cooling) or heating only models.
- Two tank capacities (200/260 L), both fitting into a common design of the unit.

At the forefront of energy innovation, HITACHI is resolutely involved in the fulfilment of the new regulations regarding energy efficiency. For example, the YUTAKI S COMBI water pump is a high efficiency water pump which fulfils the new requirements of ErP regulation (ready for 2015 requirements).

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

A high performance is obtained in DHW operation as a result of the intelligent control, the well insulated structure and the internal arrangement of the DHW pipes (cold water inlet at the bottom side, hot water outlet at the upper side). Moreover, the DHW Tank has been designed to eliminate the cold zones at the bottom of the storage tank, so the risk of bacteria proliferation (e.g. Legionella) can be prevented. In addition to the effective design of the DHW tank pipes, the system incorporates an anti-legionella protection with a backup electrical heater.

The system is simple to control; YUTAKI S COMBI comes with a built-in, easy-to-use LCD controller with a complete display menu for comprehensive view and with the possibility to check all the important parameters and status of the unit at any moment. Useful information like energy consumption, capacity data and water flow can be displayed at any moment at the LCD screen of the controller.

Besides the main installation configurations, YUTAKI S COMBI provides additional combinations with existing boilers, for installations where a high temperature (80 ºC) on the space heating circuit is required.

Finally, YUTAKI S COMBI system can also be used for the warming of swimming pools. In this case, the water temperature of the swimming pool can be raised by the heat pump up to a value between 24 and 33 ºC.

1.1.3 Environment-friendly units

The new HITACHI's YUTAKI S COMBI 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 potential) = 0.

HITACHI's YUTAKI S COMBI series is very efficient and allows 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 texts following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

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

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

NOTE

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

1.3 Product guide

1.3.1 Classification of the units

◆ Outdoor unit

RAS-HVRN2

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

RAS-H(V)RNME-AF

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

◆ Indoor unit

Unit type: indoor dual module (indoor unit + domestic hot water tank)											
	Position-separating hyphen (fixed)										
		Compressor power (HP): 2.0, 3.0, 4.0, 5.0, 6.0.									
			H : Heating only version - : Heating and cooling version								
				System Free							
					R-410A refrigerant						
						Water-to-water DHW heat exchanger					
							Made in Europe				
								Position-separating hyphen (fixed)			
									Tank model: 200/260		
										Tank material: Stainless steel	
RWD	-	X.X	(X)	FS	N	W	E	-	XXX	S	

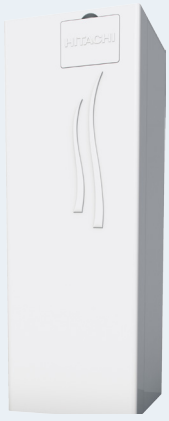
1.3.2 Product guide

◆ Outdoor unit

Outdoor unit							
Single phase (1~ 230 V 50 Hz)						Three phase (3N~ 400 V 50 Hz)	
Unit	Code	Unit	Code	Unit	Code	Unit	Code
RAS-2HVRN2	60288390	-	-	-	-	-	-
-	-	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
							

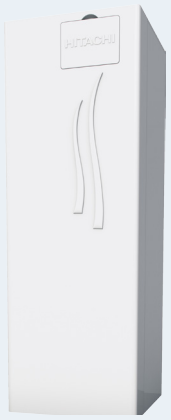
◆ Indoor unit

Heating and cooling version

Indoor unit			
Single phase (1~ 230 V 50 Hz)		Three phase (3N~ 400 V 50 Hz)	
Unit	Code	Unit	Code
RWD-2.0FSNWE-200S	7E481103	-	-
RWD-2.0FSNWE-260S	7E481116	-	-
RWD-3.0FSNWE-200S	7E481105	-	-
RWD-3.0FSNWE-260S	7E481118	-	-
RWD-4.0FSNWE-200S	7E481107	RWD-4.0FSNWE-200S	7E481107
RWD-4.0FSNWE-260S	7E481120	RWD-4.0FSNWE-260S	7E481120
RWD-5.0FSNWE-200S	7E481108	RWD-5.0FSNWE-200S	7E481108
RWD-5.0FSNWE-260S	7E481121	RWD-5.0FSNWE-260S	7E481121
RWD-6.0FSNWE-200S	7E481109	RWD-6.0FSNWE-200S	7E481109
RWD-6.0FSNWE-260S	7E481122	RWD-6.0FSNWE-260S	7E481122
			

Heating only version

Indoor unit			
Single phase (1~ 230 V 50 Hz)		Three phase (3N~ 400 V 50 Hz)	
Unit	Code	Unit	Code
RWD-2.0HFSNWE-200S	7E481303	-	-
RWD-2.0HFSNWE-260S	7E481316	-	-
RWD-3.0HFSNWE-200S	7E481305	-	-
RWD-3.0HFSNWE-260S	7E481318	-	-
RWD-4.0HFSNWE-200S	7E481307	RWD-4.0HFSNWE-200S	7E481307
RWD-4.0HFSNWE-260S	7E481320	RWD-4.0HFSNWE-260S	7E481320
RWD-5.0HFSNWE-200S	7E481308	RWD-5.0HFSNWE-200S	7E481308
RWD-5.0HFSNWE-260S	7E481321	RWD-5.0HFSNWE-260S	7E481321
RWD-6.0HFSNWE-200S	7E481309	RWD-6.0HFSNWE-200S	7E481309
RWD-6.0HFSNWE-260S	7E481322	RWD-6.0HFSNWE-260S	7E481322



1.3.3 Accessory code list

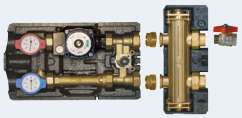
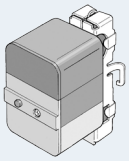
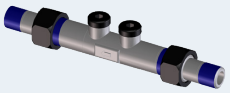
◆ Control accessories

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	
ATW-AOS-01	Auxilliary output signal box (Relay board for additional output signals)	7E549910	
ATW-KNX-01	YUTAKI KNX Interface	7E549913	

◆ Temperature sensor accessories

Accessory	Name	Code	Figure
ATW-WTS-02Y	Universal water temperature sensor	9E500004	
ATW-2OS-01	Ambient temperature sensor (2nd. outdoor temperature sensor)	7E549909	
ATW-SPS-01	Swimming pool sensor (Only for RWD-(2.0-6.0)FSNWE-(200/260)S models)	7E549908	

◆ Water circuit accessories

Accessory	Name	Code	Figure
NEW ATW-2TK-03	2nd zone mixing kit (Integrated for 200 L model)	7E549921	
ATW-HSK-01	Hydraulic separator	7E549905	
ATW-2KT-02	2nd. temperature kit (*)	7E549917	
ATW-MVM-01	Mixing valve motor	7E549912	
ATW-AQT-01	Aquastat security (for heating floor protection)	7E549907	
ATW-WCV-01	Water check valve	9E500014	
DHWT-SWG-01	Security water valve for DHW tank	70544902	
ATW-DPOV-01	Differential pressure overflow valve	7E549916	

NOTE

(*): The 2nd temperature kit (ATW-2KT-02) must be installed with the following accessories:

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

All these products are separately sold.

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2.1 Main features

■ **Compact size**
Compact size (600 mm width), very suitable for indoor utility rooms.

■ **Hassle free installation**
The hydraulic components needed for space heating and DHW operation are all included in a one-bloc indoor unit. Consequently, the amount of work required for installation has been reduced, as well as the installation space.

■ **Easy pipe installation**
Both refrigerant and water pipes (space heating and DHW) are placed at the top of the unit, allowing an easier installation work.

■ **Wide selection range**
There are different models available, ranging from 2 HP to 6 HP, with the possibility to choose between:

- Reversible models (heating and cooling) or heating only models.
- Two tank capacities (200/260 L), both fitting into a common design of the unit.

■ **High efficiency**
High efficiency system, especially in heating mode, with COP values even higher than 5.0.

■ **High COP_{DHW}**
A high performance is achieved in the DHW operation as a result of the intelligent control, the well insulated structure and the internal layout of the DHW pipes.

■ **Optimum DHW tank design concept**
The DHW tank internal piping layout (cold water inlet at the bottom side, hot water outlet at the upper side) has been designed with the aim to achieve optimal performance characteristics.

■ **Energy-saving high-efficiency water pump (ErP ready)**
The YUTAKI S COMBI water pump is a high efficiency water pump which fulfils the new requirements of ErP regulation (ready for 2015 requirements).

■ **Wide operation possibilities**
Space heating, domestic hot water operation, warming of swimming pools, combinability with existing boilers or with the built-in electric heater, and application in different heating systems (radiator/fan coil, heating floor or both (2nd temperature area)).

■ **Easy-to-use LCD controller**
LCD controller with a really complete display menu for comprehensive view and with the possibility to check all the important parameters and status of the unit at any moment.

■ **Useful information through the LCD controller**

- Energy consumption can be checked at any moment by connecting a power meter to the YUTAKI S COMBI unit.
- Capacity data is obtained from the information provided by the flow meter.
- Water flow can be displayed for an easier commissioning and service operation.

■ **Easy servicing**
The main components can be accessed from the front of the unit, and the electrical box is conveniently located at the upper side of the unit.

■ **Easy draining**
The YUTAKI S COMBI includes two built-in drain ports (one for the water of the indoor unit and the other for DHW tank), located at the lowermost part of the unit to allow an easier servicing.

■ **Easy wiring**
The large terminal board comes with a schematic label, which makes the wiring installation easy. The location of the electrical box, at the upper side of the unit, allows a good access to the installer.

■ Advanced control

The YUTAKI S COMBI can control the water pump by means of the flow meter, allowing three different kinds of water control (fixed water flow, fixed temperature difference between inlet and outlet, and an additional control for the defrost operation). Moreover, an additional manual mode by a rotary switch placed in the water pump is available.

Additionally, YUTAKI S COMBI provides a large variety of control functions, with special functions like “Floor screed drying”, “DHW Anti-legionella protection”, “Water pump operation mode”, “Power input by power meter” or “Capacity data by flow meter”, among others.

■ Practical unit timer

Unit timer for space heating/cooling, DHW and swimming pool, in order to enable/disable operation depending on the day of the week or the time of the day.

■ Several water outlet temperature set-point configurations

Three different possible water outlet temperature set-point configuration modes for each zone (OTC points, OTC gradient and fixed temperature).

■ Safety devices

The YUTAKI S COMBI is designed with safety in mind, thanks to a unique combination of safety devices, such as the low water pressure switch, the safety valve or the flow meter. Moreover, the electrical risk in case of a water leakage is reduced because of the location of the electrical box, which is mounted at a higher position than the main water components.

2.2 Selection benefits

2.2.1 Wide selection range

◆ Outdoor unit

RAS outdoor unit series allows (2-6)HP units for being selected in single or three phase combinations, depending on the model.

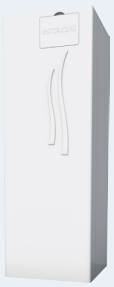
Outdoor units		Phase	Capacity (HP)				
			2	3	4	5	6
RAS-HVRN2		1~	●	-	-	-	-
RAS-HVRNME-AF		1~	-	●	-	-	-
RAS-HR(V)NME-AF		1~	-	-	●	●	●
		3N~			●	●	●

◆ Indoor unit

There is a wide range of indoor units to be selected depending on the following points:

- Version: Reversible models (heating and cooling) or heating only models.
- Tank capacity: Two different tanks (200/260 L) can be chosen.
- Phase: Depending on the models, a single-phase or three-phase connection is allowed.

All the models have a built-in electric heater with the power input indicated below:

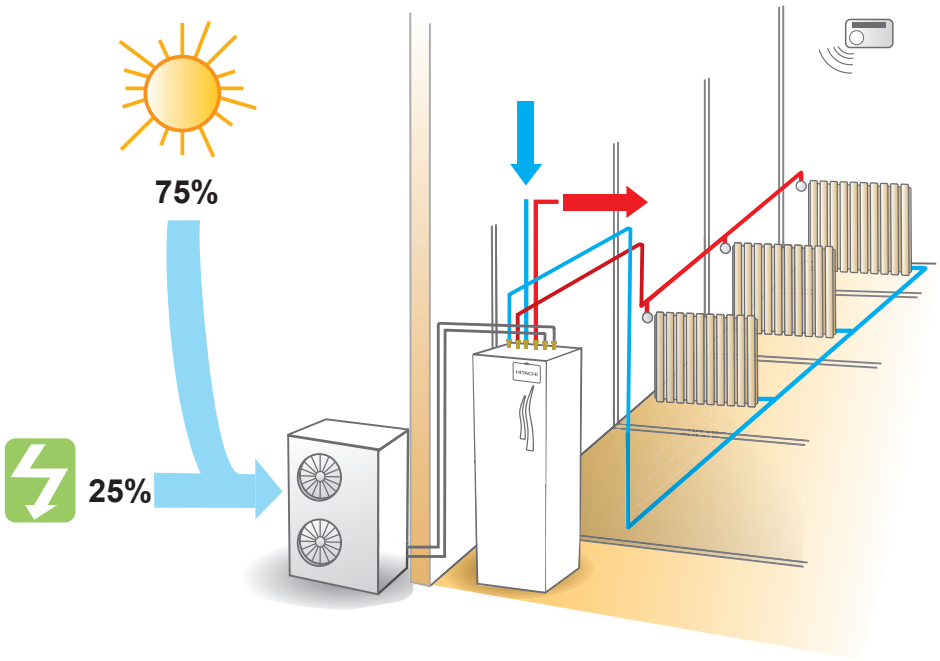
Indoor units			Phase	Capacity (HP)				
Version	Tank	Picture		2.0	3.0	4.0	5.0	6.0
RWD-FSNWE-S (Heating and cooling)	200 L		1~	●	●	●	●	●
			3N~	-	-	●	●	●
	260 L		1~	●	●	●	●	●
			3N~	-	-	●	●	●
RWD-HFSNWE-S (Heating only)	200 L		1~	●	●	●	●	●
			3N~	-	-	●	●	●
	260 L		1~	●	●	●	●	●
			3N~	-	-	●	●	●
Electric heater power input			-	3 kW	3 kW	6 kW	6 kW	6 kW

2.2.2 Environment-friendly system

◆ **Free energy**

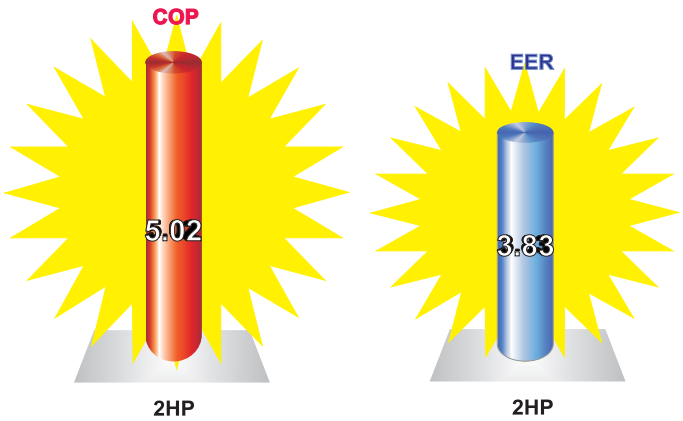
The air to water heat pump extracts the free energy present in the air, which is enough to heat a home up to a comfortable temperature, even on the coldest winter day.

The air to water heat pump can attain efficiency of over 4.0. This means less electrical consumption and therefore a reduction in CO_2 emissions.



2.2.3 High efficiency system

The state-of-the-art technology of HITACHI as the scroll compressor and the inverter type continuous control, the energy saving water pump and the high efficiency plate heat exchangers allow the maximum energy efficiency, resulting in a high coefficient of performance (COP).



NOTE

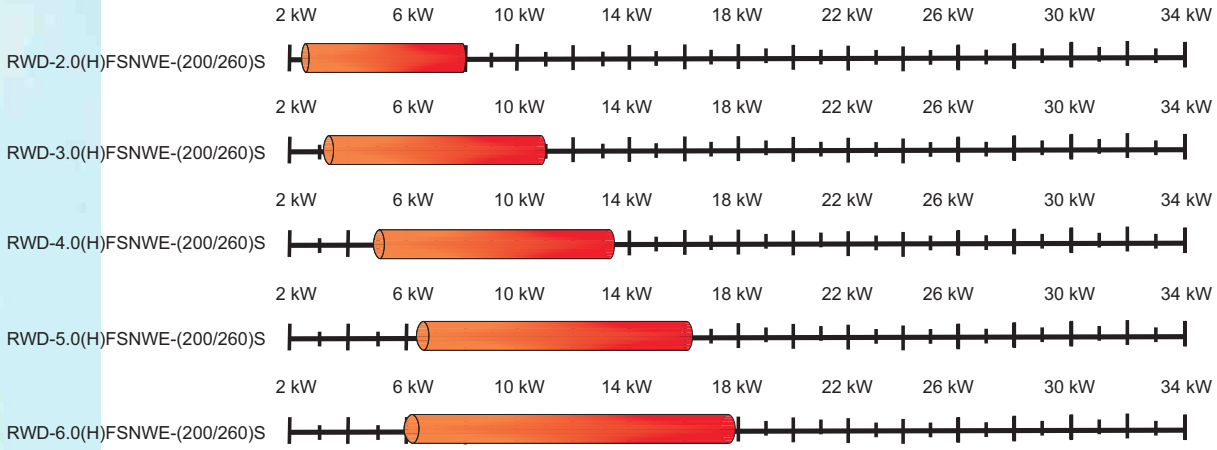
Conditions range:

- *COP: Water inlet / outlet temperature: 30/35 °C; Outdoor ambient temperature (DB/WB): 7/6 °C*
- *EER: Water inlet / outlet temperature: 23/18 °C; Outdoor ambient temperature (DB): 35 °C*

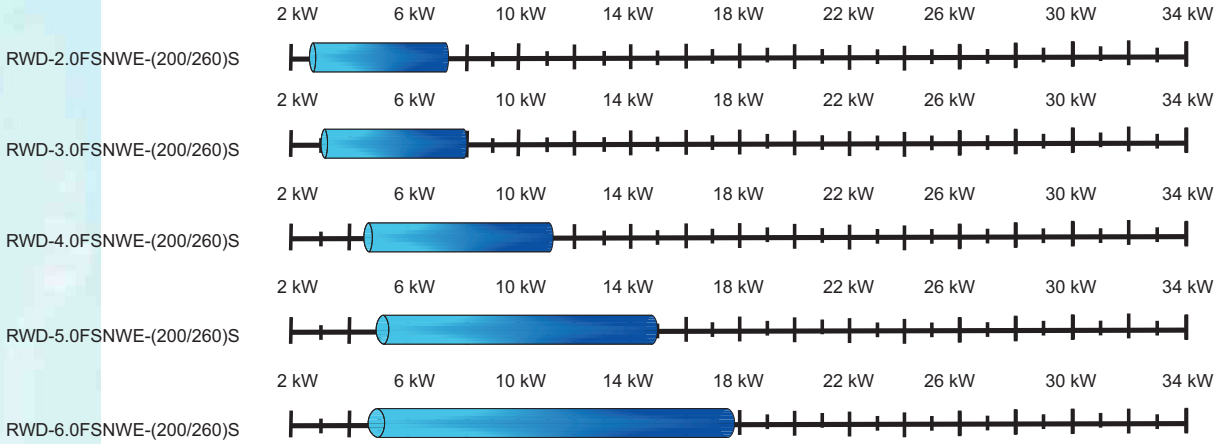
2.2.4 Wide capacity range

The 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)



2.2.5 Adaptability to the customer's/system needs

Depending on the type of installation system (existing or new) and the user's needs, the most suitable system for each situation can be chosen.

◆ **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.

◆ **Space cooling (only for Heating and cooling version)**

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

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

NOTE

For the typical installation examples, please refer to the section "11. Installation configuration".

2.2.6 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.

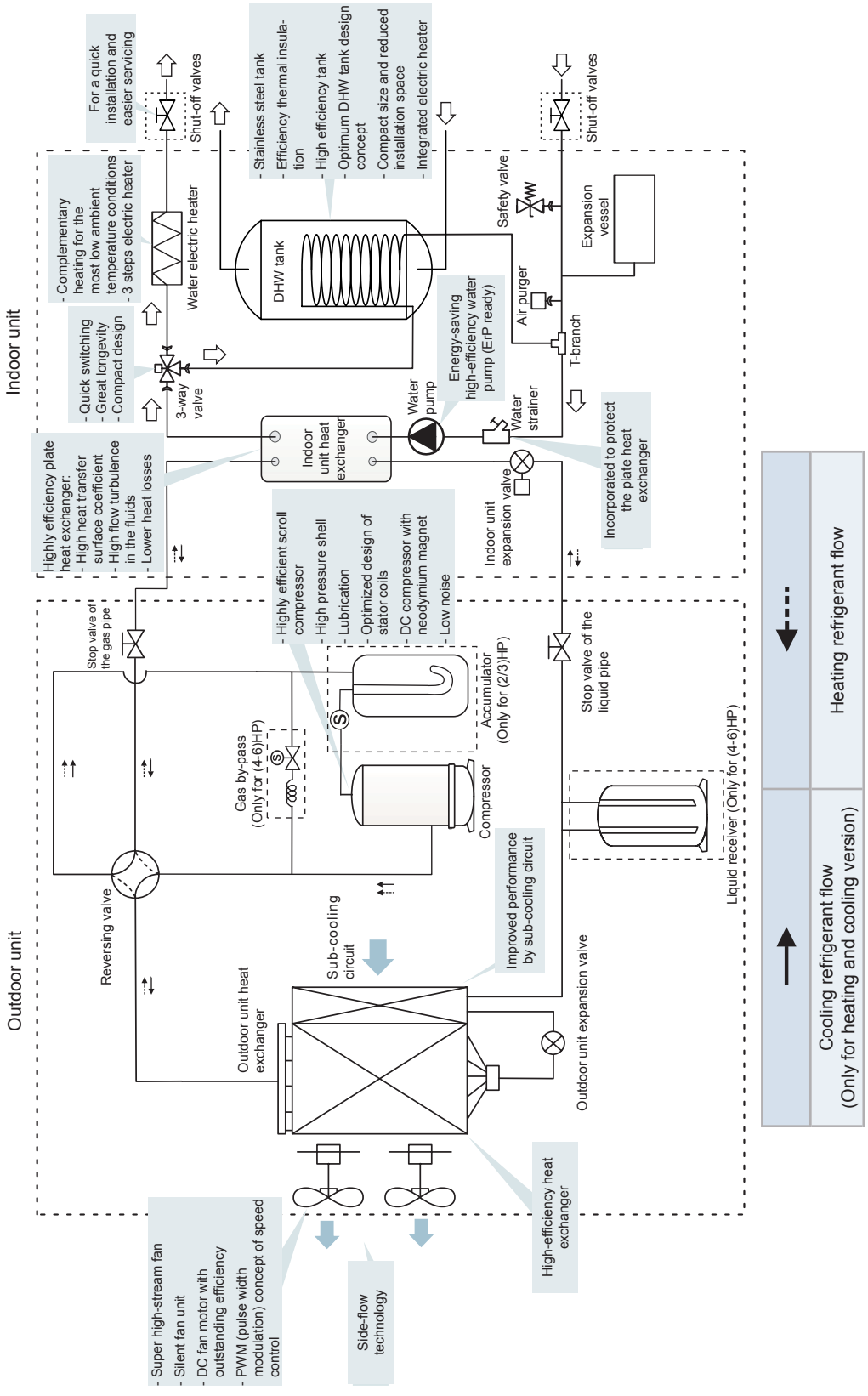
NOTE

For knowing the different accessories that offers the system, please refer to the section "1.3.3 Accessory code list" on chapter "1. General information".

2.2.7 Advanced technology

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

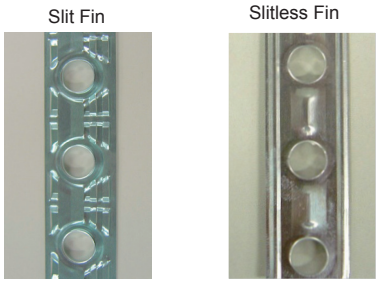
Then, the main features on different components of the system will be detailed:



◆ Outdoor unit heat exchanger

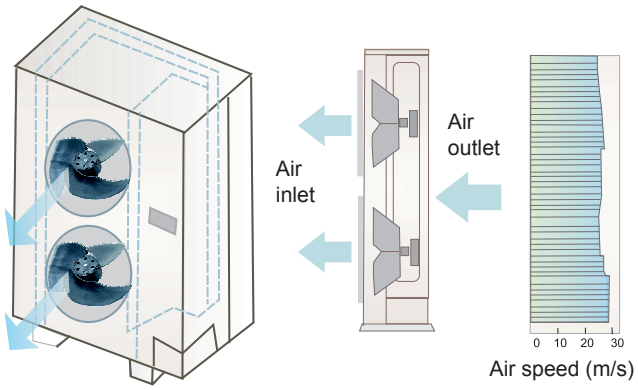
High-efficiency heat exchanger

- The slitless fin design is adapted to the heat exchanger. As a result, the frosting effect is prevented by the surface of the slitless fin and the heating performance is improved under the low temperature conditions.
- Compact design and high-efficiency by arranging narrow heat exchanger tubes in 3 rows.
- Heat exchanger configuration aiming at fluid loss reduction.



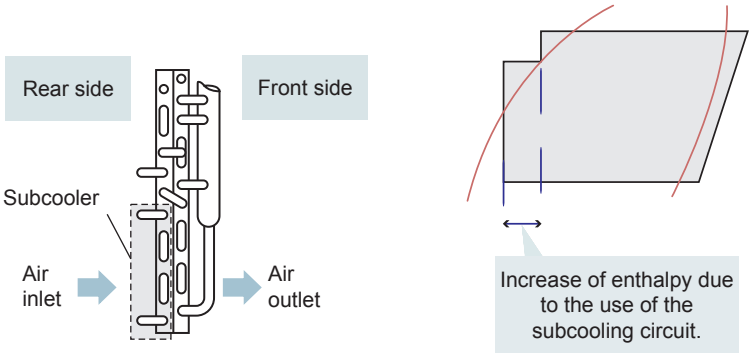
Side flow technology

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.



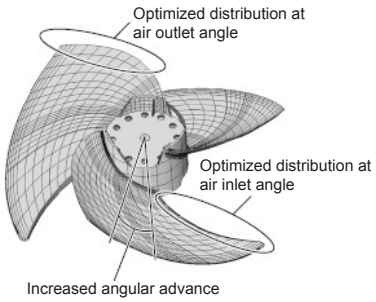
◆ Fan unit

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.

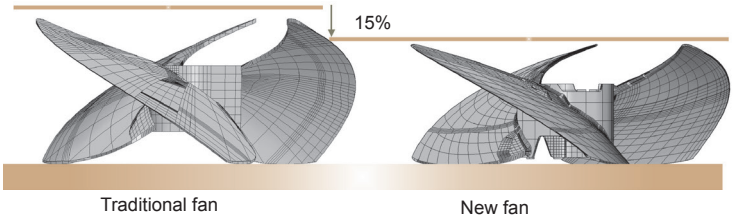
Additionally, the rib structure synchronized with rotation flow from the fan reduces the air resistance at the air outlet grille.



Silent fan unit

Low noise due to the following aspects:

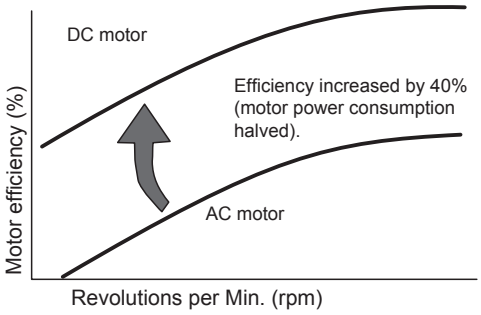
- Combination of the three-blade and slim fan: The fan has been designed to have a lower body than traditional fans, and achieves surprising results, with a noise reduction of up to 4 dB (A).



- 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 10 m/s on the front face of the outdoor unit.



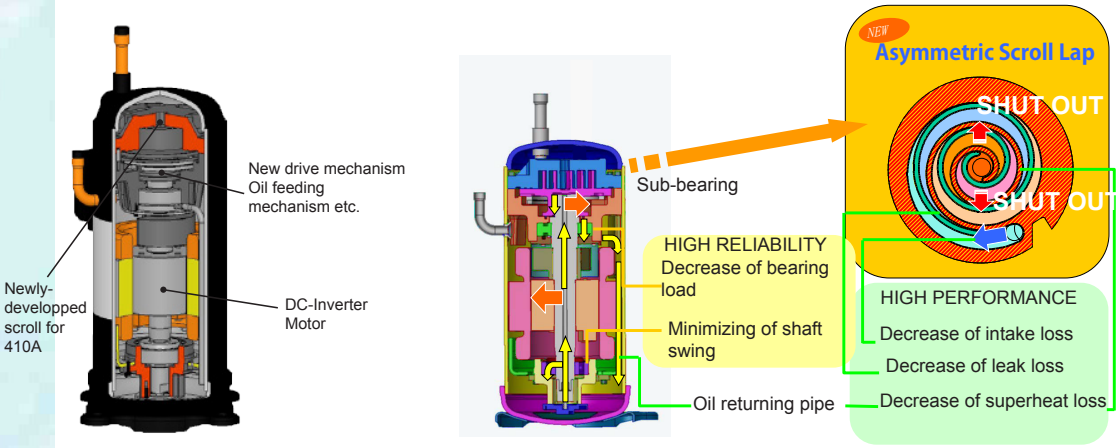
PWM (pulse width modulation) concept of speed control

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 scroll compressors (R410A for the outdoor unit and R134a for the indoor unit)

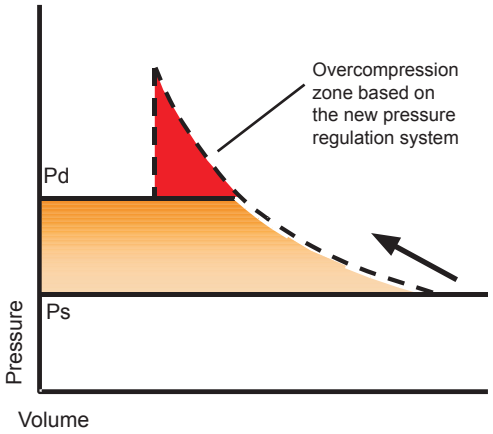
Highly efficient scroll compressor

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



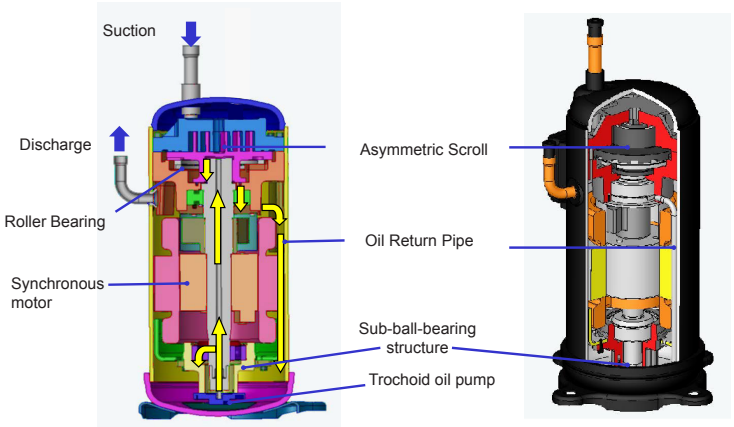
High pressure shell

- 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.
- System of regulating pressure, 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:



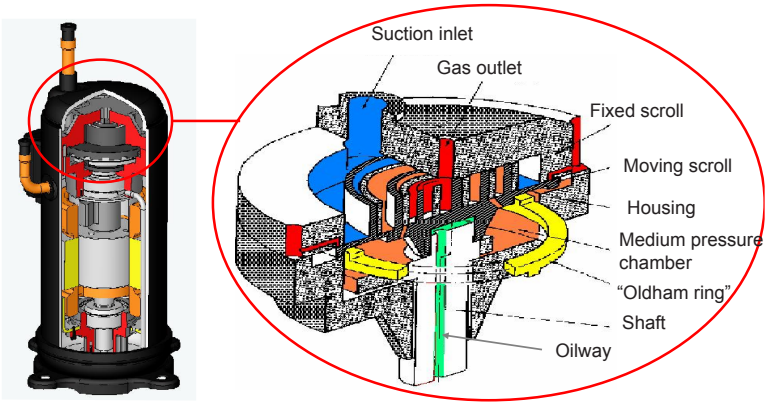
Lubrication

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.



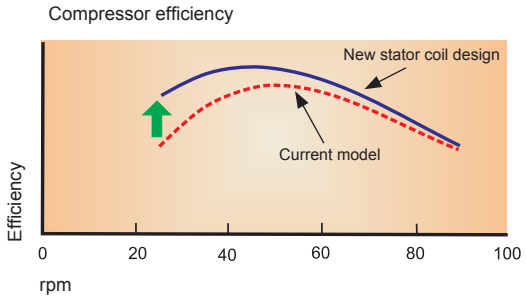
Protection against liquid return

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.



Optimized design of stator coils

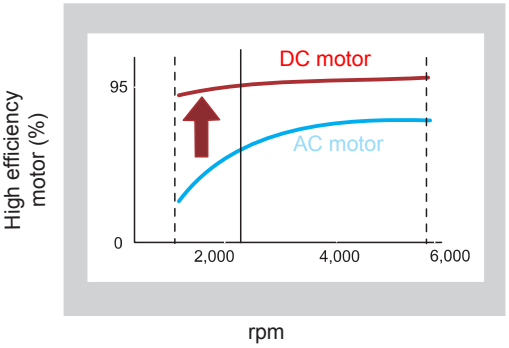
The design of the stator coils positioned to optimize the magnetic field significantly reduce heat losses, and increase the motor's efficiency at low speeds.

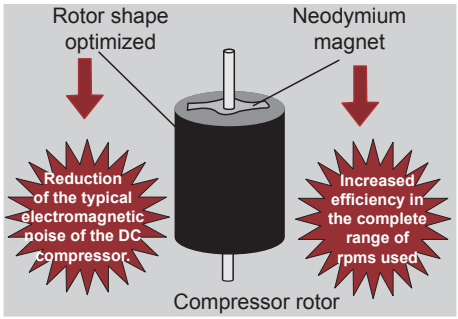


DC compressor with neodymium magnet

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.

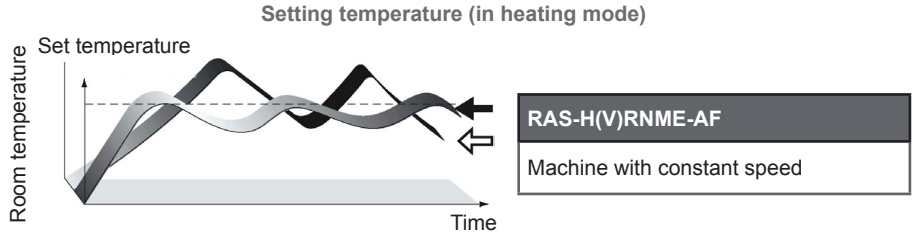
Characteristics at low speed, which affect the annual running cost, have been significantly improved.



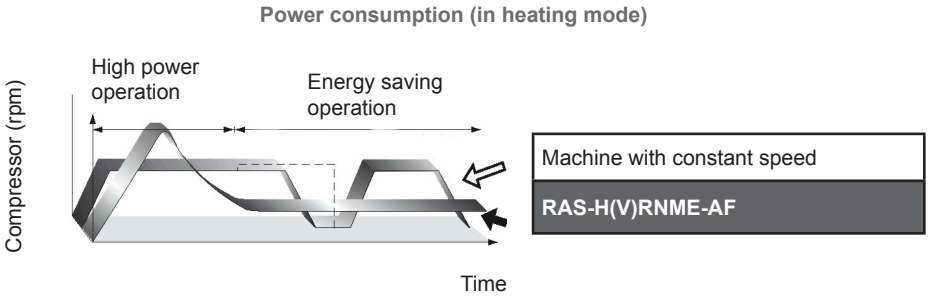


Low noise

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

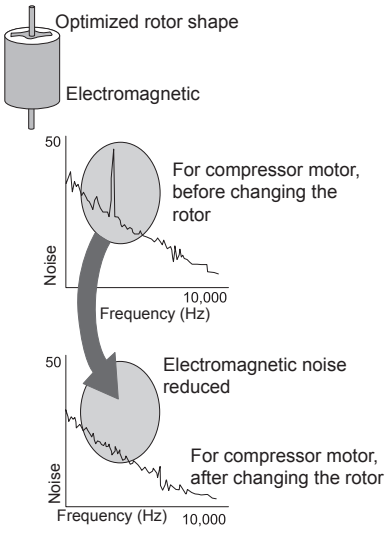


  - In the case of RAS-H(V)RNME-AF: Quickly reaches the temperature set at high power, then maintains stable energy-saving operation.
  - In the case of other constant speed machines: Slowly reaches the set temperature, then turns on and off repeatedly to maintain the temperature, operating uneconomically 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 (R410A - H_2O) 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

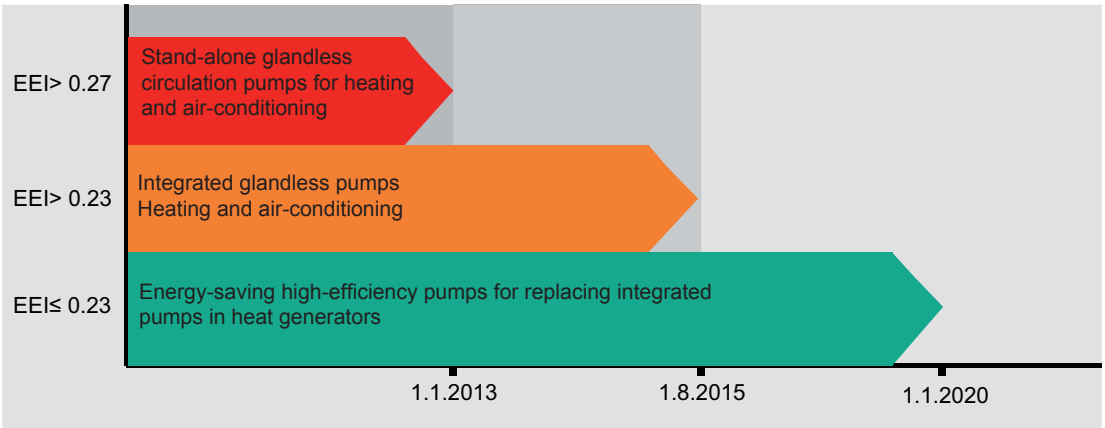
A water strainer is located near to the water inlet of the plate heat exchanger in order to prevent any damage caused by dirty water or suspended particles into the circuit.

◆ Water pump

Energy-saving high-efficiency water pump (ErP ready)

The YUTAKI S COMBI water pump is a high efficiency water pump which fulfils the new requirements of ErP regulation (ready for 2015 requirements).

This pump has a reduced value of Energy Efficiency Index (EEI ≤ 0.21), as defined by the Energy-related Products (ErP) Directive (2009/125/EC Directive), which allows to classify it as a low water consumption pump, resulting in a higher performance of the unit.



◆ 3-way valve

Quick switching

The fast change-over in diverting applications reduces unnecessary energy consumption. This valve is extremely fast: it change from A to B circuit taking only 3 seconds.

The job of the diverting valve is to divert hot water between the space heating and DHW production. Optimal heat production is achieved through well-functioning cooperation between the diverting valve and the heat pump.

Great longevity

In order to reduce friction the valve housing is made of brass and has a Teflon-blended composite regulating cone, sealing against specially prepared O-rings.

The actuator's basic design is uncomplicated with its integrated transmission. A micro processor based circuit board is located under the cover and it among other things has an integrated anti-jamming program, which makes sure that at least every 7th day a complete change-over cycle is made to prevent the regulating cone from jamming.

Other life-shortening hazards by developing a secure lid solution, 0-percentage internal leakage and corrosion protection have been eliminated.

Compact design

This valve is easy to use, easy to control and easy to understand.

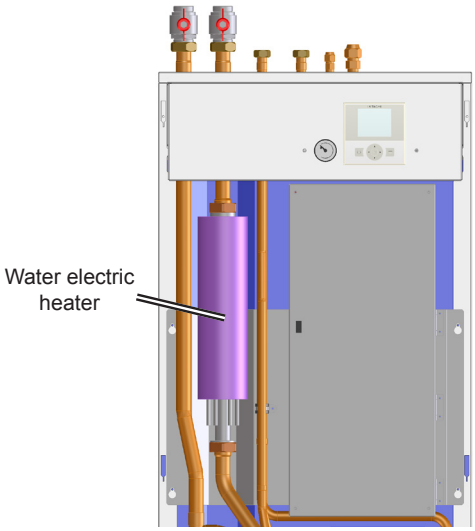
The actuator can easily be removed by just ushing the release button. Pushing the release-button once more allows it to be re-attached - let go of the button, and the actuator is mounted.

At occasions when the heat pump for some reason shuts off or is not fully operational, an even flow may still be maintained in both circuits by quite simply removing the actuator. The diverting valve will then automatically position itself so that flow is allowed in both circuits simultaneously.

◆ 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)	
	(2.0/3.0)HP	(4.0-6.0)HP
0	0.0	0.0
1	1.0	2.0
2	2.0	4.0
3	3.0	6.0

NOTE

For more details, please refer to the section "2.5 Control features" in this chapter.

◆ Domestic hot water tank

The DHW tank, built-in the indoor unit, allows the domestic hot water production, with the following characteristics:

Stainless steel tank

Tank models are made in stainless steel chemically descaled and passivated.

Efficiency thermal insulation

The tank has been designed to achieve high thermal efficiency, being insulated with rigid, mould-injected, Neopor EPS.

High efficiency tank

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

Optimum DHW tank design concept

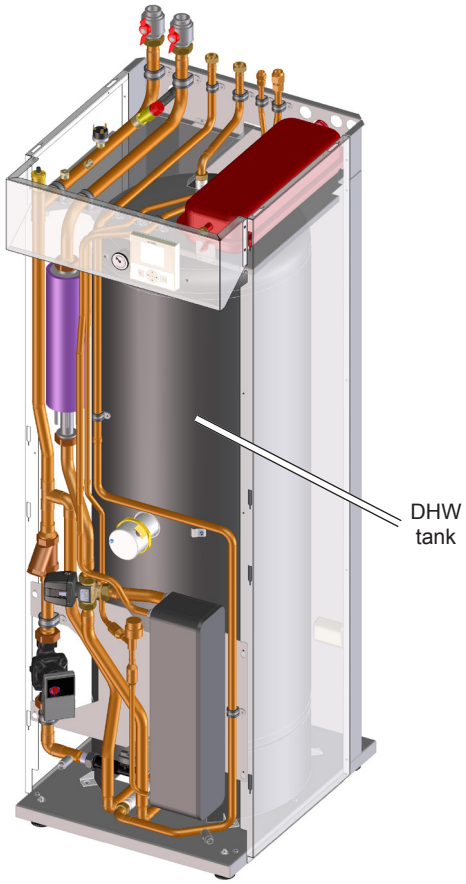
The DHW tank internal piping layout (cold water inlet at the bottom side, hot water outlet at the upper side) has been designed with the aim to achieve optimal performance characteristics.

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).

Integrated electric heater

Standard factory supplied 2.7 kW immersion electric heater element fitted into the side sealed gasket, for control and emergency operation.



2.3 Installation benefits

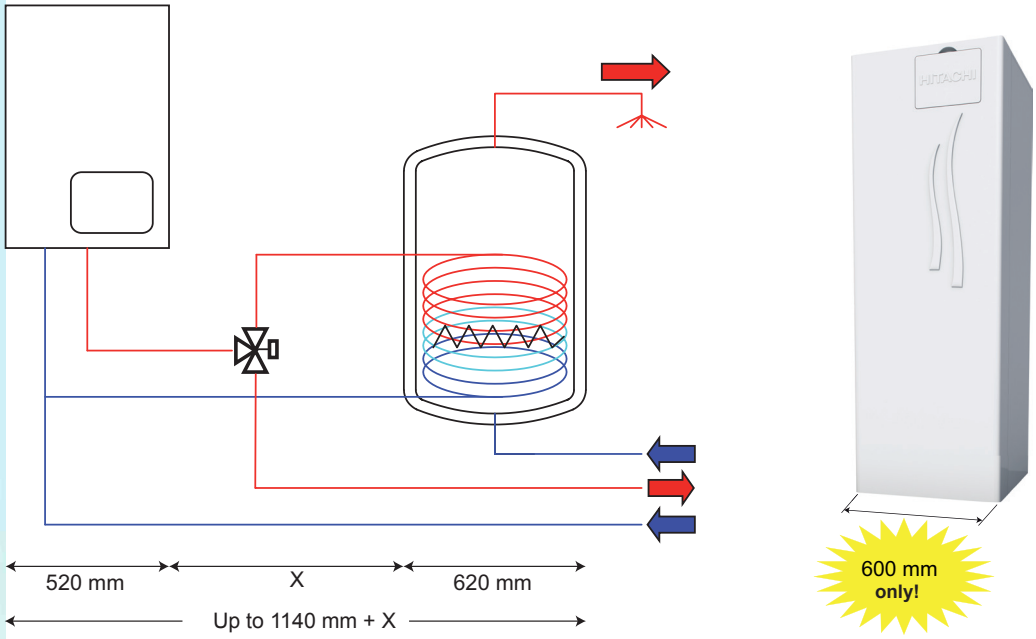
2.3.1 Easy unit installation

■ Compact size

YUTAKI S COMBI units presents a compact size with an attractive design, which offers several benefits.

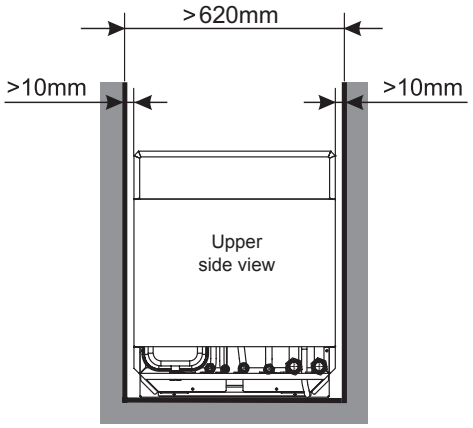
Highly reduced overall installation space

Unlike the systems with one indoor unit and one DHW tank by separate, the YUTAKI S COMBI all-in-one system is very suitable for being installed on reduced spaces, such as an indoor utility room, since all the internal water piping is integrated in a one-bloc indoor. Thus, the needed space for installation can be reduced significantly (around 70%).



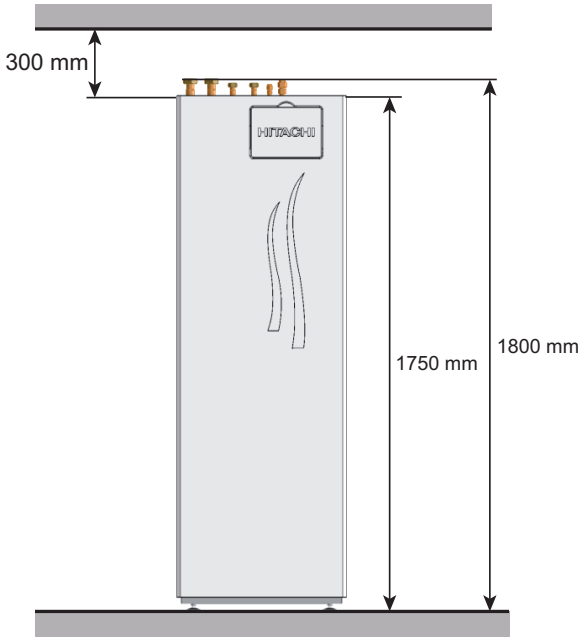
Installation space saving

There is a minimum installation space required for YUTAKI S COMBI (no needed space at the back side and only 10 mm on either side of the unit are required).



Reduced and unified unit height both for 200 L and 260 L

The overall height of the YUTAKI S COMBI system fits perfectly into the normal average values of room heights. Moreover, the same height is respected both for the combination with 200 L DHW tank and 260 L. Consequently, all the range of units is covered by the same cabinet.



■ Hassle free installation

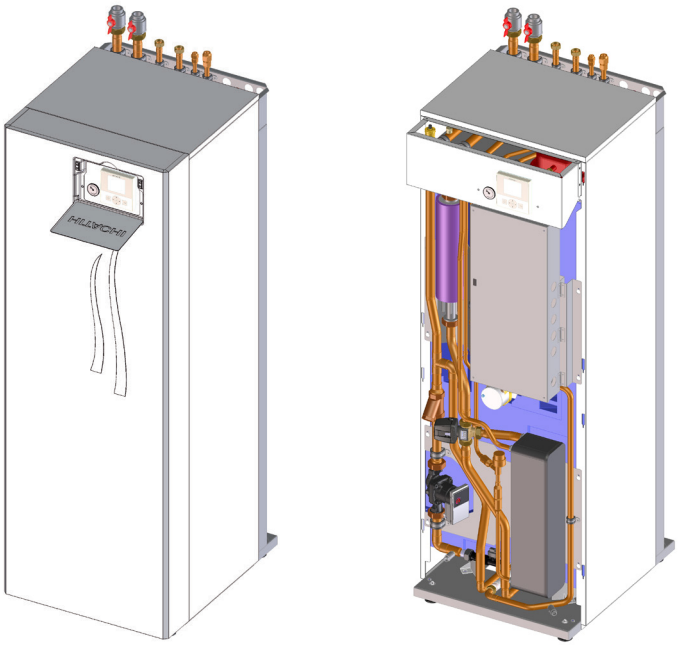
The YUTAKI S COMBI design concept is the best solution for the installer because of some of the following features.

"Plug and play" installation

Thanks to that the hydraulic components needed for space heating and DHW operation are all included in a one-bloc indoor unit, the amount of work required for installation has been reduced, as well as the installation space.

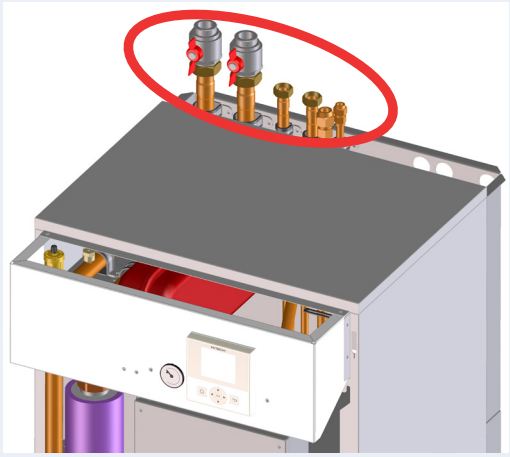
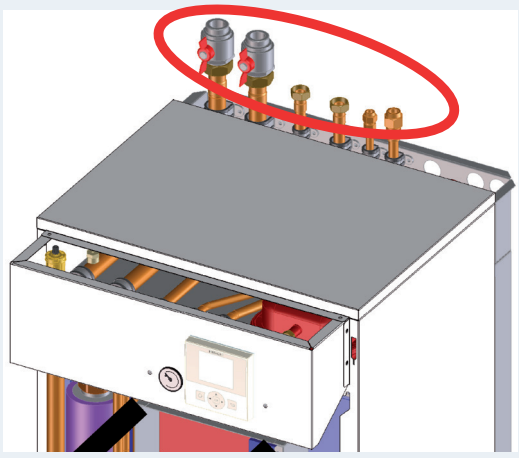
The following list of tasks can be avoided by the installation of YUTAKI S COMBI:

- Water module: Measure, drilling and installation (~1 hour).
- Water piping between indoor unit and DHW tank: Cutting, connecting pipes and valve and waterproofing (~4 hours).
- Wiring between indoor unit and DHW tank: Sensor, heater and 3-way valve (~1 hour).



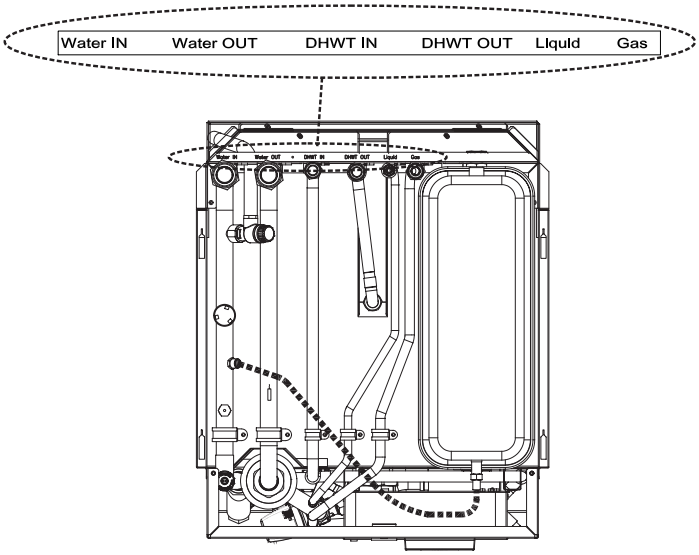
All piping connections at the top of the unit

Both refrigerant and water pipes (space heating and DHW) are placed at the top of the unit, allowing an easier installation work as well as a better servicing.

RWD-(2.0-6.0)(H)FSNWE-200S	RWD-(2.0-6.0)(H)FSNWE-260S
	

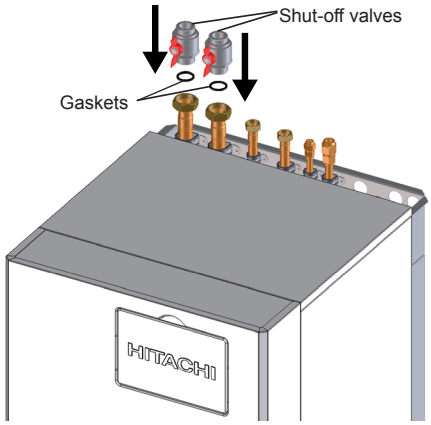
Furthermore, there is an indication label situated beside the pipes so as to help to the installer at the moment of installation.

- Example for RWD-(2.0-6.0)(H)FSNWE-260S:



2.3.2 Shut-off valves (Factory-supplied)

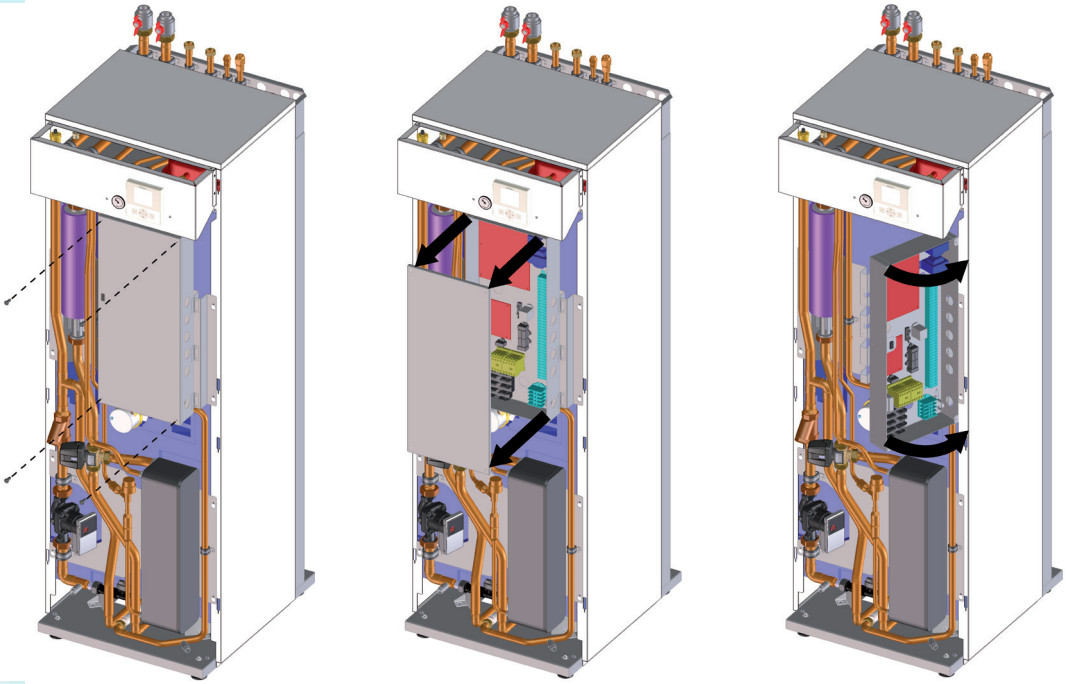
The unit is factory supplied with two shut-off valves to be connected to the water inlet / outlet pipe. With these shut-off valves it is very practical to connect the indoor unit to the heating system by using the factory supplied gaskets just below the valves (G 1-1/4" connection). Then, the space heating installation can be carried out.



2.3.3 Easy and flexible electrical installation

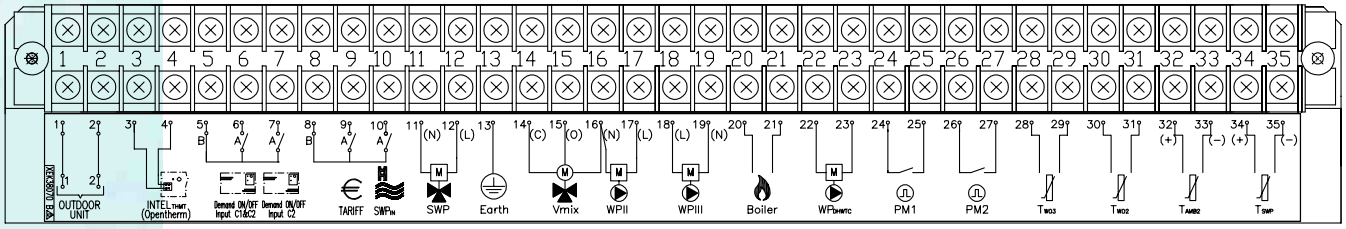
◆ Easy wiring

The location of the electrical box, at the upper side of the unit, allows a good access to the installer. Additionally, the electrical box turns on itself it is possible to access to all electrical components without the necessity of removing the whole electrical box.



◆ Large terminal board for the connection of several accessories

A big terminal board (TB2) has been designed in order to allow the easy electrical connection which provide 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 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 attached 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 referring to these labels.
- Separated terminal boards. The TB1 is the power connection board, and the TB2 is the accessories connection board, with an additional ground socket (position 14).

NOTE

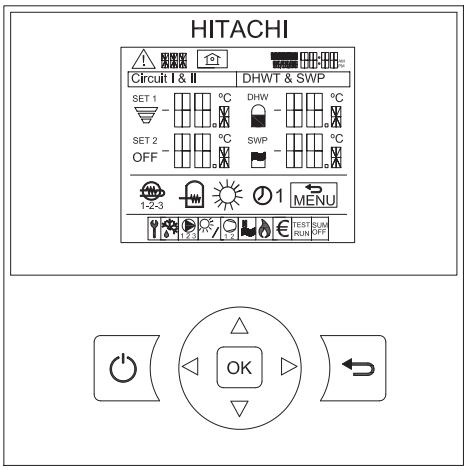
These points can be also understood as Maintenance benefits.

2.4 Start-up benefits

2.4.1 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.

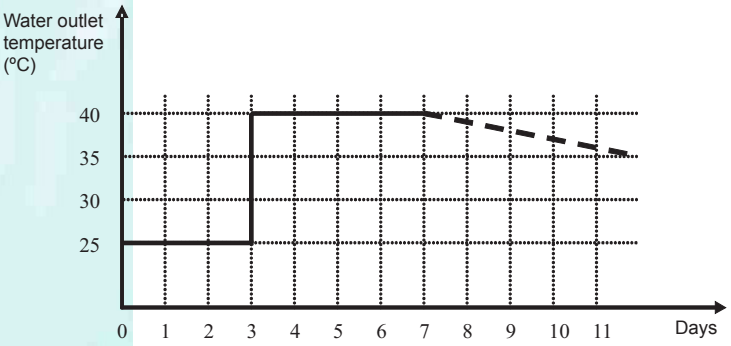
The default value is set for one circuit (Direct) with OTC gradient for heating space of 1.4, corresponding to a high temperature system (for example, radiators).



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

YUTAKI S COMBI system has an 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 part 4.

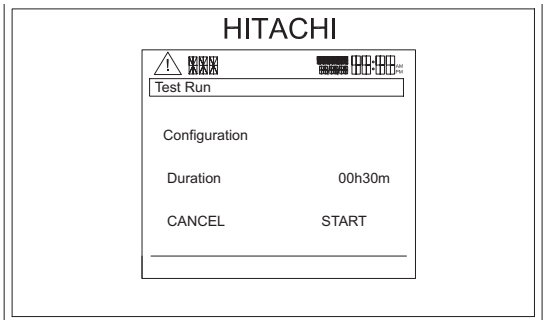
The water temperature set-point follows a predetermined schedule upon activation of the floor screed drying function.



1. Water set-point is kept constant at 25 ºC for 3 days.
2. Water set-point is set to the maximum heating supply temperature (but always limited to ≤ 55 ºC) 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.

2.4.3 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.



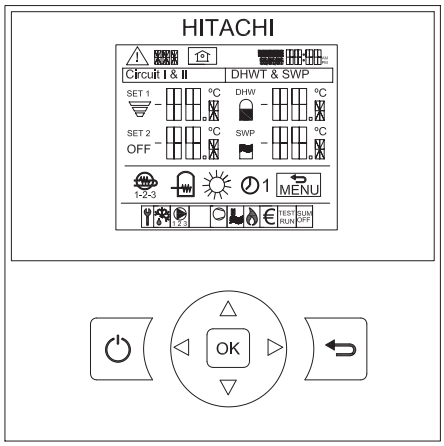
NOTE

For more information, please refer to YUTAKI S COMBI indoor unit Installation and operation manual.

2.5 Control features

2.5.1 Easy-to-use LCD controller

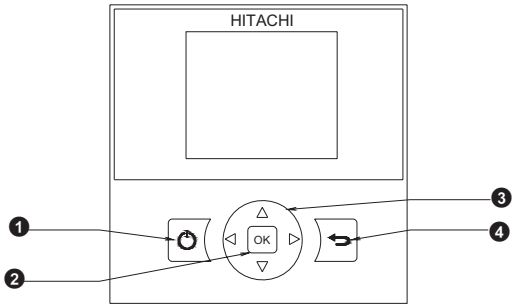
The user-friendly interface control is designed integrated on the air to water heat pump. This controller allows the remote control of the air to water heat pump by using the “Intelligent” Thermostat (as accessory).



The design of the 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 RUN/STOP unit: Pressing this button, it will be switched ON/OFF the selected zone, or all the unit if there is no zone selected.
- ❷ OK: Used to select items and confirm the edition of them.
- ❸ 4 Arrows: For moving inside the menus and views.
- ❹ Return: Used as a cancel button when editing an item or for going back to the main menu from the global 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:

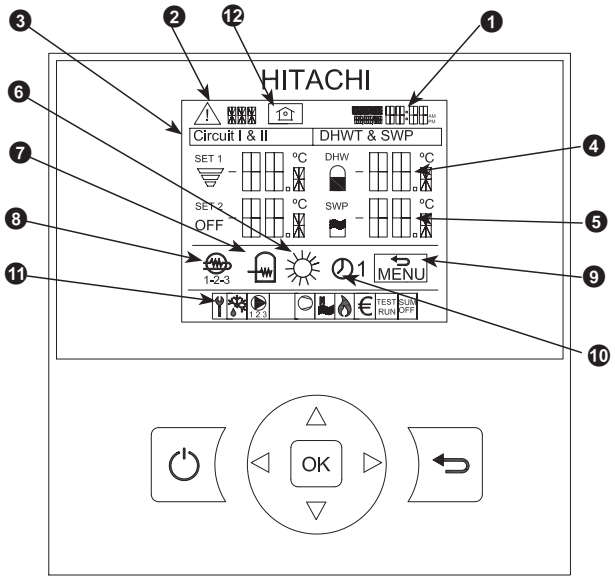
- Space heating
- Space cooling
- DHW
- Swimming pool
- Hystorical data
- Optional functions
- Etc.

NOTE

For more information, please refer to YUTAKI S COMBI Installation and operation manual.

◆ 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.



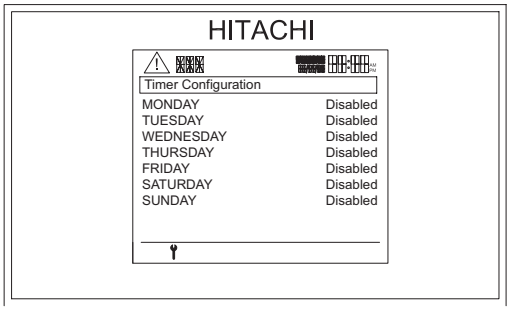
- ❶ Time and date
- ❷ Alarm indication
- ❸ Control of circuits I & II
- ❹ DHW control
- ❺ Swimming pool control
- ❻ Unit mode (Heating/Cooling)
- ❼ DHW heater operation
- ❽ Heater steps
- ❾ Configuration menu
- ❿ Timer indication
- ⓫ Unit status signals
- ⓬ Unit mode local/central

◆ Two configuration modes

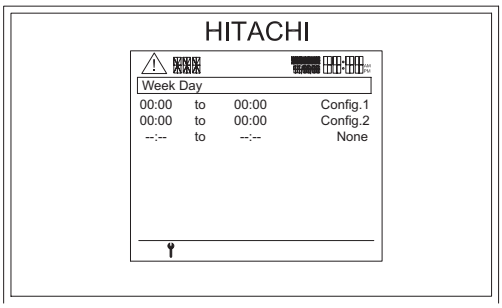
- User mode: This mode allows to the user the setting of some parameters and the selection of some options of the LCD user’s interface.
- Installer mode: High privilege mode for setting other configuration parameters available only for the installer. To work in installer mode, it is necessary to enter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

■ Practical unit timer

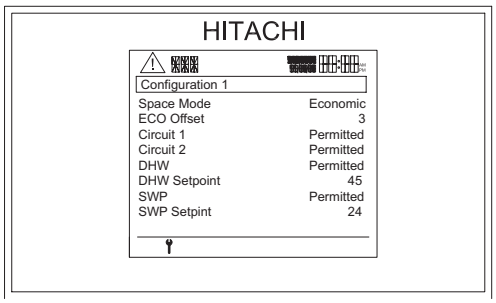
The LCD controller is provided with a timer option. Thereby, it is possible to set many different operation configurations for each day, as shown below:



Once selected other state than “Disabled” at any day, a specific schedule for each day can be created by pressing the (►) button.



The assignation of up to 7 periods for each day can be done, and additionally, by pressing the (►) button again, the main operation modes can be customized for any day (space heating/cooling, DHW and swimming pool operation).



NOTE

For more information, please refer to the Service Manual.

2.5.2 Flexible space heating/cooling configuration and control

NOTE

- *(Only for heating and cooling version): 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 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.*

◆ Many available system configurations

As mentioned before, the YUTAKI S COMBI allows the control of a large variety of configurations.

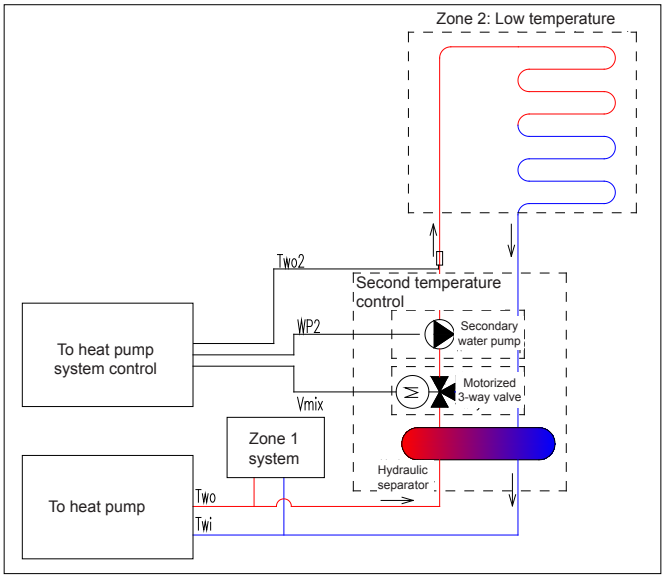
NOTE

For the detailed information, please refer to the section "11. Installation configuration".

◆ Second water temperature control

YUTAKI S COMBI 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.

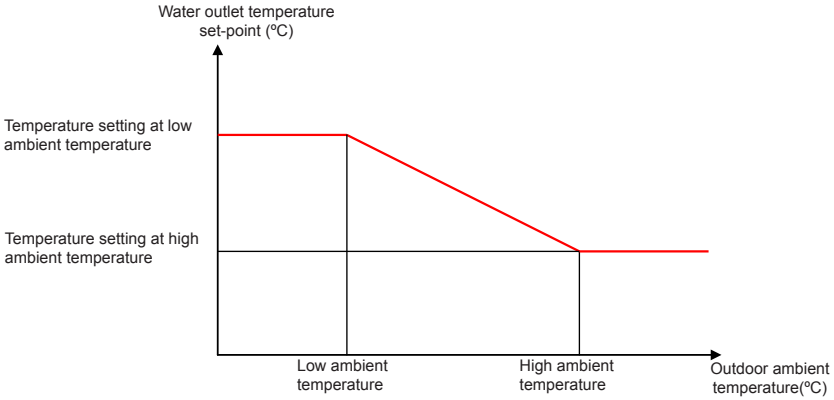


NOTE

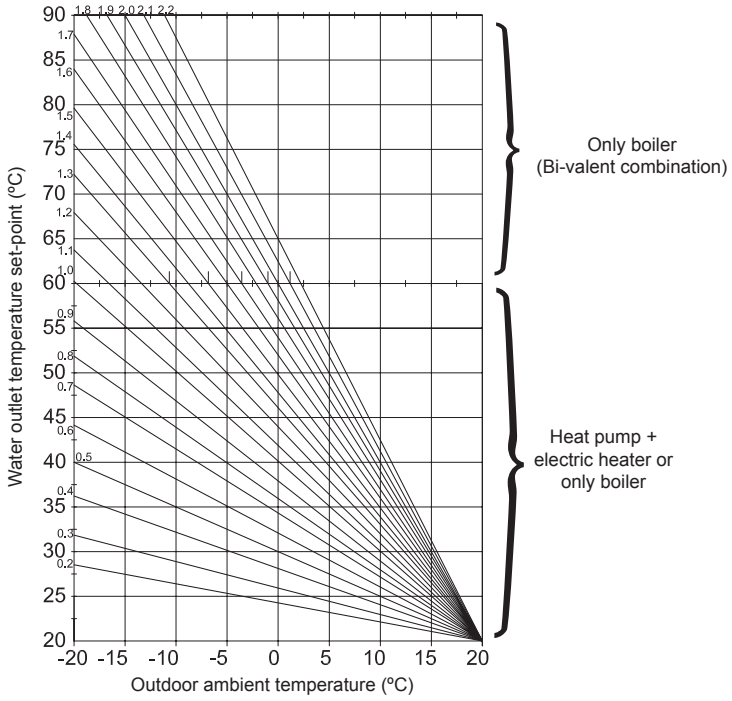
High temperature must be the direct circuit and low temperature must be the second circuit.

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

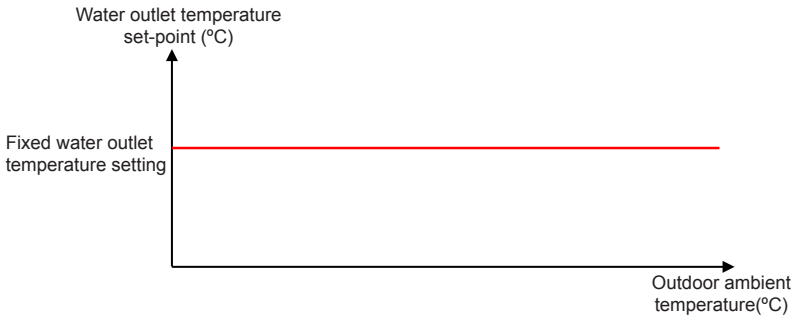
- OTC Points: Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points (Minimum and maximum water outlet temperature vs Minimum and maximum outdoor ambient temperature).



- 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 20 ºC-20 ºC (Water outlet target 20 ºC at outdoor ambient temperature of 20 ºC).

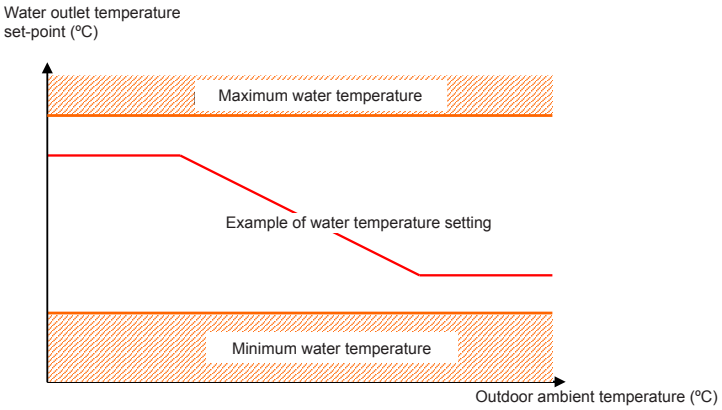


- Fixed temperature: Water target value is defined by a fixed temperature set by the user.



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

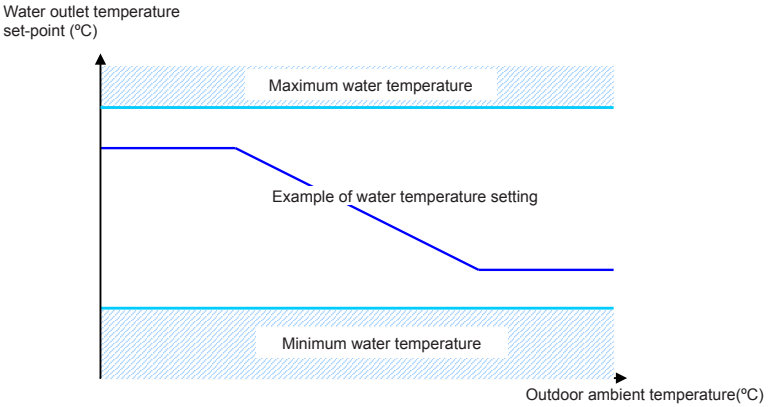
- Heating circuit minimum/maximum temperature limits selection by installer: The installer will limit the space heating temperature set-point in order to prevent excessively high or low temperatures.



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.*
- *Temperature limits have priority against all other temperature set point modifications, and minimum/maximum water temperature is limited by air to water heat pump's working range.*

◆ 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.

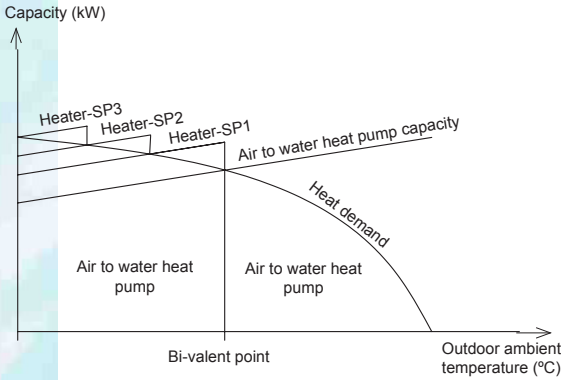
- Intelligent room thermostat unit (accessory) with extension room thermostat (accessory) for the second circuit: Based on Outside Temperature Compensation (OTC). Water outlet target temperature is automatically recalculated taking into account the outdoor ambient temperature and the difference between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

◆ Complementary heating

Electric heater (built-in indoor unit)

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.

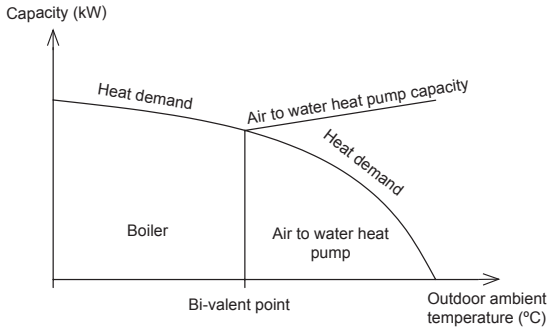


Step	Total input power (kW)	
	(2.0/3.0)HP	(4.0-6.0)HP
1	1.0	2.0
2	2.0	4.0
3	3.0	6.0

- 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

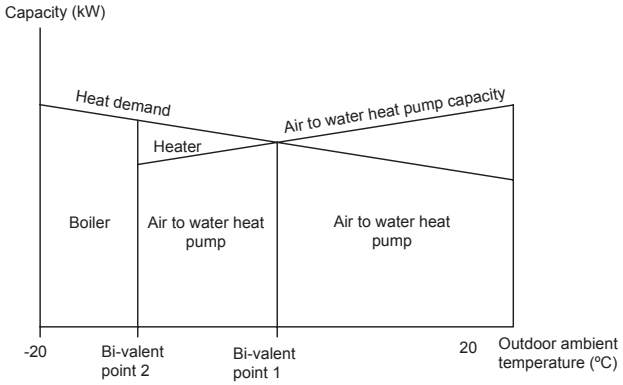
When the unit is not able to provide the necessary heating capacity in low ambient temperature conditions, it will be stopped and the boiler starts to operate providing the necessary heating capacity. The unit should be sized in order to operate mainly with the air to water heat pump, and boiler will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

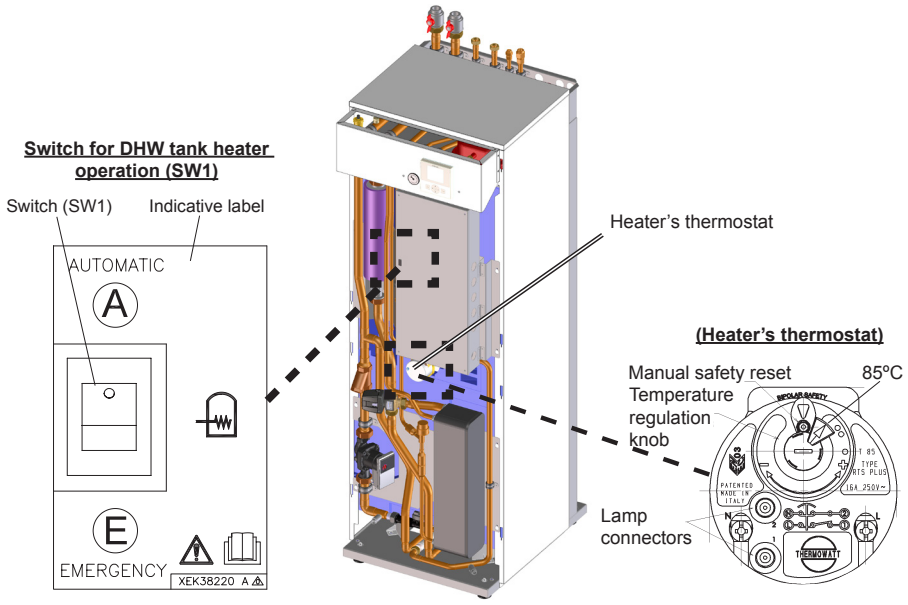


2.5.3 Flexible Domestic Hot Water (DHW) control

◆ DHW tank electric heater “emergency” operation

The domestic hot water tank can be heated by means of an internal heater in the event of malfunction of either the outdoor or the indoor unit. A dedicated switch (SW1) is used to activate this function. This switch (SW1) is located at the front cover of the electrical box (accessible by removing the indoor unit front cover) and it is in “Automatic” operation by factory setting.

In order to activate the internal heater of the tank, select the “Emergency” operation in the switch. In this case, the temperature setting shall be performed through the heater’s thermostat. Select the temperature with the temperature regulator located at the front side of the tank (maximum position is 85ºC, but the selected temperature cannot be higher than 75ºC).



NOTE

Refer to the Electrical data for the details of CB and ELB.

◆ DHW priority mode

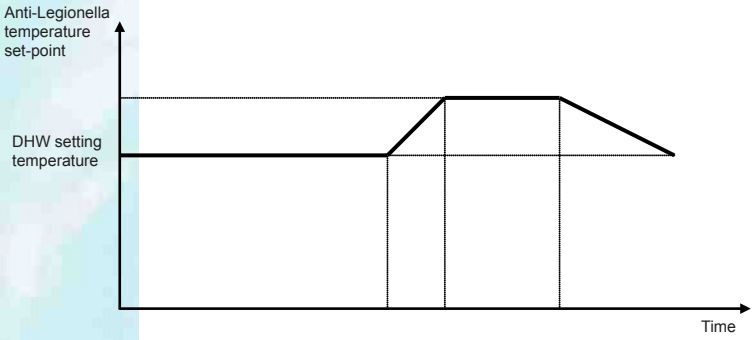
The Domestic Hot Water (DHW) operation has priority over all other operation modes unless otherwise noted.

It should be taken into account that when DHW requires the heat pump operation, no other modes can require heat pump operation.

◆ Anti-Legionella protection (Optional function)

In order to prevent against Legionella into the DHW system, it is available a specific setting which will raise up the DHW periodically 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.

◆ 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 DHW tank.

◆ 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 water tank electric heater will start heating unless DHW temperature goes below the heat pump starting temperature.

2.5.4 Swimming pool combination control

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 comfortable value.

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

2.5.5 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 is enabled, but when space heating 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.

◆ Water pump regulation

Control modes

The water pump of YUTAKI S COMBI (WP1) can be controlled by means of two optional modes in the "Water pump" menu of the LCD controller: dT mode or Fix mode.

- Temperature difference control (dT); The value of temperature difference between water inlet and outlet is kept fix. This temperature difference may range between 3 and 8ºC depending on the water temperature setting. The water pump speed is adjusted every minute taking into account the water inlet and outlet temperature and the target value of temperature difference.
- Fixed speed control (Fix): The water pump is controlled by means of a fixed water pump speed. Once "Fix" mode has been selected on the LCD controller (when in Installer mode), the "Water pump speed" parameter is displayed on the screen. It can be used to set the water pump speed to a value between 10 and 100% (100% as default).

The water pump speed percentage can be selected for Space heating/cooling.

Reading of some water pump parameters

The water flow (m^3/h) and the water pump speed (%) can be checked at any moment through the LCD controller in the "Unit status" list of the "Operation display parameters" menu.

2.5.6 Other optional functions

◆ 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 accessory.

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

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

- Auxiliary sensor instead of outdoor unit sensor for both circuits.
- Outdoor unit sensor for circuit 1; Auxiliary sensor for circuit 2.
- Auxiliary sensor for circuit 1; Outdoor unit sensor for circuit 2.

NOTE

For more information, please refer to DSW setting section on Service Manual.

◆ Tariff switch 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 will be enabled instead heat pump when this mode is ON.

◆ KNX combination

New KNX is an interface that makes compatible YUTAKI S COMBI with KNX systems permitting the remote control and data viewing of the YUTAKI S COMBI.

KNX systems are domotic networks for the centralized management of home items like lights, doors, fire systems, blinds, thermostats and others.

YUTAKI S COMBI is managed from KNX system as a Heating item so it can be integrated in any KNX system.

KNX system can be managed remotely from Internet.

◆ 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.

◆ 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

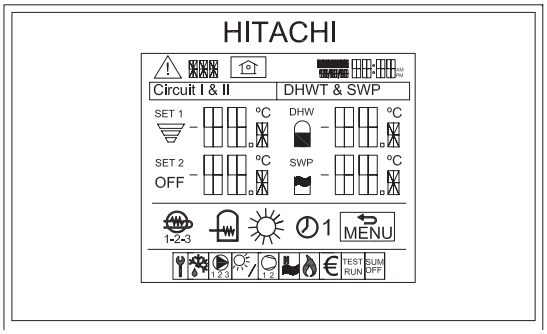
- *In order to make easy the electrical connection works, HITACHI offers (as accessory) a relay board for the additional output signals.*
- *For more information about the Optional functions, please refer to the YUTAKI S COMBI Service Manual.*

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 series 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.

◆ Useful information through the LCD controller

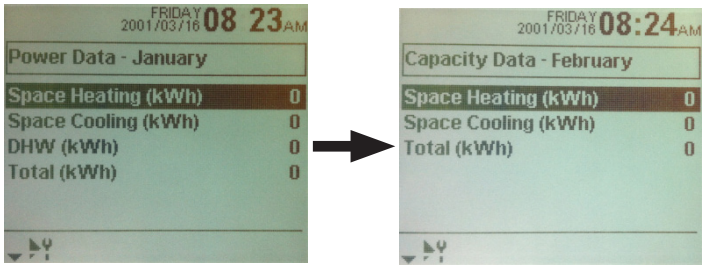
Many operating parameters can be checked through the LCD controller in the "Operation display parameters" menu during normal operation:

Energy consumption

The energy consumption of the system can be measured and displayed at any moment on the LCD controller by connecting a power meter to the terminal board 2. The number of pulses of the power meter is a variable which must be set on the LCD controller. There are two possible usage options for the power meter:

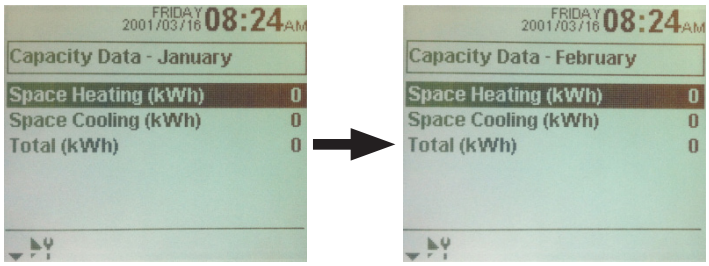
- One power meter for all installation (indoor unit + outdoor unit).
- Two separated power meters (one for indoor unit and other one for outdoor unit).

The energy consumption data is shown separately for space heating, space cooling and DHW operation. Additionally, the data can be displayed by each month or for the whole year pressing the (►) button.



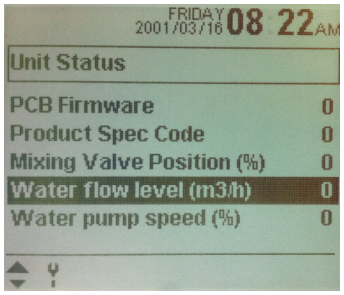
Capacity

The capacity data is obtained from the information provided by the flow meter. As well as for the energy consumption, the actual capacity data can be displayed at any moment separately for space heating, space cooling and DHW operation, and by each month or for the whole year pressing the (►) button.



Water pump parameters

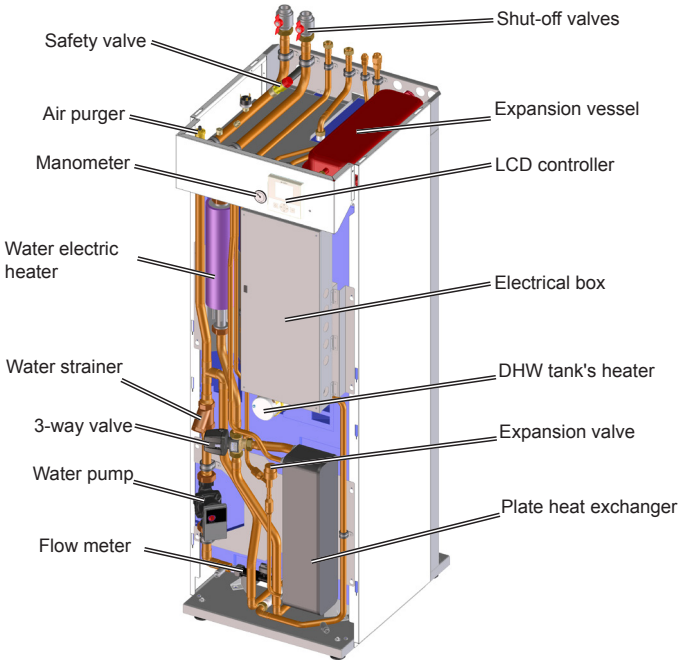
The water flow (m^3/h) and the water pump speed (%) can be checked at any moment through the LCD controller in the “Unit status” list of the “Operation display parameters” menu.



- Water flow (m^3/h): The display of the water flow is a tool which allows an easier commissioning and service operation, since no water pressure port is needed.
- Water pump speed (%): If the pump control mode has been selected as fixed speed control (Fix), the actual value will be displayed on this screen and it may be compared with the setting value of the “Water pump parameters“ menu (value between 10 and 100%; 100% as default).

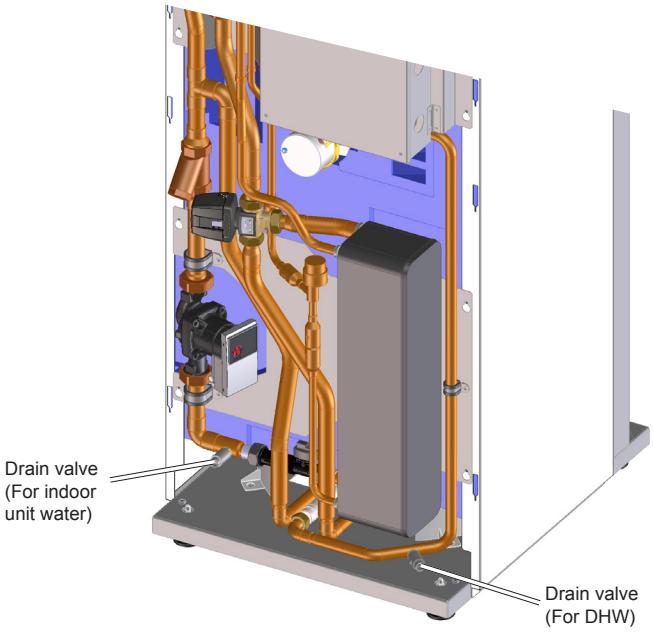
2.6.2 Easy servicing

The majority of main components can be accessed from the front of the unit (by only removing the front cover). The rest of the components are located at the top of the unit (accessible by only removing the upper cover).



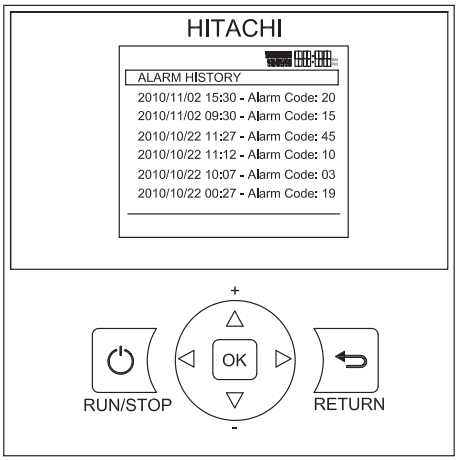
2.6.3 Easy draining

The YUTAKI S COMBI includes two built-in drain ports (one for the water of the indoor unit and the other for DHW tank), located at the lowermost part of the unit to allow an easier servicing.



2.6.4 Alarm historical data

This option is available in order to facilitate a knowledge of the last alarms registered on the LCD user's interface.



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

- Date
- Time
- Alarm code

3. General data

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3.1 Capacity-performance tables

Model	Indoor unit		RWD-2.0(H)FSNWE -(200/260)S	RWD-3.0(H)FSNWE -(200/260)S	RWD-4.0(H)FSNWE -(200/260)S	RWD-5.0(H)FSNWE -(200/260)S	RWD-6.0(H)FSNWE -(200/260)S
	Outdoor 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
Heating capacity	(Min/Nominal/Max) ❶ Conditions: Water inlet/outlet temperature: 30/35 °C Outdoor temperature: (DB/WB): 7/6 °C	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
	COP	-	5.02	4.55	4.47	4.36	4.11
	(Min/Nominal/Max) ❷ Conditions: Water inlet/outlet temperature: 40/45 °C Outdoor temperature: (DB/WB): 7/6 °C	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
	COP	-	3.51	3.47	3.42	3.16	3.01
	(Min/Nominal/Max) ❸ Conditions: Water inlet/outlet temperature: 47/55 °C Outdoor temperature: (DB/WB): 7/6 °C	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
	COP	-	2.63	2.65	2.59	2.60	2.47
	(Min/Nominal/Max) ❹ Conditions: Water inlet/outlet temperature: */35 °C Outdoor temperature: (DB/WB): -7/-8 °C	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
	COP	-	2.65	2.51	2.42	2.40	2.34
	(Min/Nominal/Max) ❺ Conditions: Water inlet/outlet temperature: */45 °C Outdoor temperature: (DB/WB): -7/-8 °C	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
	COP	-	2.10	2.07	2.14	1.92	1.81
	(Min/Nominal/Max) ❻ Conditions: Water inlet/outlet temperature: */55 °C Outdoor temperature: (DB/WB): -7/-8 °C	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
	COP	-	1.62	1.65	1.55	1.55	1.46

Model	Indoor unit		RWD-2.0FSNWE -(200/260)S	RWD-3.0FSNWE -(200/260)S	RWD-4.0FSNWE -(200/260)S	RWD-5.0FSNWE -(200/260)S	RWD-6.0FSNWE -(200/260)S
	Outdoor 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
Cooling capacity	(Min/Nominal/Max) ❼ Conditions: Water inlet/outlet temperature: 12/7 °C Outdoor temperature: (DB/WB): 35/-- °C	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
	EER	-	3.05	3.07	3.06	3.03	2.61
	(Min/Nominal/Max) ❽ Conditions: Water inlet/outlet temperature: 23/18 °C Outdoor temperature: (DB/WB): 35/-- °C	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
	EER	-	3.83	4.03	3.88	4.02	3.50

NOTE

- *The table above shows the capacity and performance data in integrated values (with defrost factor included).*
- *The nominal heating and cooling capacity is based on the EN 14511 standard: Piping length: 7.5 meters; Piping lift: 0 meters.*
- *(*) Water inlet temperature is not fixed for additional conditions. The test is performed fixing the flow rate obtained during the test at nominal conditions:*
  - *Outdoor temperature: (DB/WB): 7/6 °C*
- *DB: dry bulb; WB: wet bulb.*

3.2 General data

3.2.1 Outdoor unit

◆ RAS-(2-6)HVRN(2/ME-AF)

Model			RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4HVRNME-AF	RAS-5HVRNME-AF	RAS-6HVRNME-AF
Electrical power supply			1~ 230 V 50 Hz				
Color (Munsell code)		-	Natural gray (1.0Y8.5/0.5)				
Noise level (sound pressure) (night mode)		dB(A)	45(43)	42(38)	44(40)	46(42)	48(45)
Noise level (sound power)		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")	Ø9.52 (3/8")	Ø9.52 (3/8")	Ø9.52 (3/8")	Ø9.52 (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	11.0	14.0	18.0	26.0	26.0
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 230 V.*

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

◆ RAS-(4-6)HRNME-AF

Model			RAS-4HRNME-AF	RAS-5HRNME-AF	RAS-6HRNME-AF
Electrical power supply			3 N~ 400 V 50 Hz		
Color (Munsell code)		-	Natural gray (1.0Y8.5/0.5)		
Noise level (sound pressure) (night mode)		dB(A)	44(40)	46(42)	48(45)
Noise level (sound power)		dB(A)	65	67	69
Outside measurements	Height	mm	1,380	1,380	1,380
	Width	mm	950	950	950
	Depth	mm	370	370	370
Net weight		kg	107	108	108
Refrigerant		-	R-410A		
Flow control		-	Microprocessor-controlled expansion valve		
Compressor		-	DC inverter driven		
Quantity		-	1	1	1
Power		kW	2.20	3.00	3.00
Heat exchanger		-	Multi-pass cross-finned tube		
Outdoor fan		-	Propeller fan		
Quantity		-	1+1	1+1	1+1
Air flow rate		m³/min	80	90	100
Power		W	70+70	70+70	70+70
Refrigerant pipe connection		-	Flare-nut connection (factory supplied)		
Size	Liquid piping	mm (in)	Ø9.52 (3/8")	Ø9.52 (3/8")	Ø9.52 (3/8")
	Gas piping	mm (in)	Ø15.88 (5/8")	Ø15.88 (5/8")	Ø15.88 (5/8")
Refrigerant charge		kg	3.90	4.00	4.00
Maximum current		A	7.0	11.0	13.0
Packaging measurements		m³	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 400 V.*

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

3.2.2 Indoor unit

Model			RWD-2.0(H)FSNWE -(200/260)S	RWD-3.0(H)FSNWE -(200/260)S	RWD-4.0(H)FSNWE -(200/260)S	RWD-5.0(H)FSNWE -(200/260)S	RWD-6.0(H)FSNWE -(200/260)S
Electrical power supply		-	1~ 230 V 50 Hz		1~ 230 V 50 Hz 3N~ 400 V 50 Hz		
Pump input power		W	45	45	75	75	75
Electric heater power: Total (step 1/ step 2/ step 3)		kW	3.0 (1.0/2.0/3.0)		6.0 (2.0/4.0/6.0)		
Maximum current (1~ / 3N~) (Unit heater and DHW tank heater disabled)		A	6 / -	6 / -	6 / -	6 / -	6 / -
Maximum current (1~ / 3N~) (Unit heater enabled; DHW tank heater disabled (Default operation))		A	15 / -	15 / -	30 / 10	30 / 10	30 / 10
Maximum current (1~ / 3N~) (Unit heater and DHW tank heater enabled)		A	28 / -	28 / -	42 / 23	42 / 23	42 / 23
Nominal water flow (condition ❶)		m³/h	0.9	1.3	1.7	2.1	2.4
Noise level (sound pressure) (*1)		dB(A)	29	29	28	28	28
Noise level (sound power) (*1)		dB(A)					
Unit dimensions	Height (with connections)	mm	1750 (1800) (*2)				
	Width	mm	600				
	Depth	mm	733				
Packaging dimensions	Height	mm	1950				
	Width	mm	651				
	Depth	mm	770				
Packaging dimensions		m³	0.98				
Packaging materials		-	Wood - Carton - Plastic				
Net weight		kg	125 (200 L) 140 (260 L)	126 (200 L) 141 (260 L)	129 (200 L) 144 (260 L)	131 (200 L) 146 (260 L)	131 (200 L) 146 (260 L)
Gross weight		kg	136 (200 L) 151 (260 L)	137 (200 L) 152 (260 L)	140 (200 L) 155 (260 L)	142 (200 L) 157 (260 L)	142 (200 L) 157 (260 L)
Refrigerant		-	R-410A				
Refrigerant pipe connection		-	Flare nut connection				
Dimensions	Liquid pipe	mm	Ø6.35 (1/4”)	Ø9.52 (3/8”)	Ø9.52 (3/8”)	Ø9.52 (3/8”)	Ø9.52 (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		-	Screwed connection				
Space heating	Shutdown valves	inch	G 1-1/4” (male) - G 1-1/4” (male)				
	Inlet diameter	inch	G 1-1/4” (female)				
	Outlet diameter	inch	G 1-1/4” (female)				
DHW	Inlet diameter	inch	G 3/4” (female)				
	Outlet diameter	inch	G 3/4” (female)				
Color		-	White (RAL 9016)				

NOTE

- *(*1): The sound data is based on the following conditions:*
  - *Water inlet / outlet temperature: 47/55 °C; Outdoor ambient temperature (DB/WB): 7/6 °C*
  - *The data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.*
- *(*2): Dimensions with the minimum mounting foot height. This value can be adjusted up to +30 mm.*
- *Condition ❶ in table of section “3.1 Capacity-performance tables”.*
- *Blank data: To be informed.*

3.3 Component data

3.3.1 Outdoor unit

◆ **RAS-(2-6)HVRN(2/ME-AF)**

Model				RAS-2 HVRN2	RAS-3 HVRNME-AF	RAS-4 HVRNME-AF	RAS-5 HVRNME-AF	RAS-6 HVRNME-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-(4-6)HRNME-AF

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

3.3.2 Indoor unit

Model				RWD-2.0(H)FSNWE-(200/260)S	RWD-3.0(H)FSNWE-(200/260)S	RWD-4.0(H)FSNWE-(200/260)S	RWD-5.0(H)FSNWE-(200/260)S	RWD-6.0(H)FSNWE-(200/260)S
Domestic hot water tank	Casing material			Stainless steel				
	Dimensions	Height	mm	1252 (200 L)				
			mm	1561 (260 L)				
		Diameter	mm	Ø500				
	Tank	Nominal water volume	L	RWD-(H)FSNWE-200S: 200 L RWD-(H)FSNWE-260S: 260 L				
		Net water volume	L	RWD-(H)FSNWE-200S: 190L RWD-(H)FSNWE-260S: 250L				
		Material		AISI 444				
		Max tank working temperature	°C	70				
		Max tank water working pressure	bar	10				
	Tank insulation	Material		NEOPOR				
		Thickness	mm	50				
	Heat exchanger	Quantity		1				
		Coil surface area	m^2	1.6				
	Tank's heater	Quantity		1				
		Heater rating	kW	2.7				
		Type		Immersion heater type				
	Mechanical thermostat (adjustable and security)			Yes (adjustable 35~85ºC ; cut-out: 90ºC)				
Heat exchanger	Type		-	Brazed plate				
	Material		-	Stainless steel				
	Transfer fluids		-	R410A - H_2O				
	Quantity		-	1				
	Internal refrigerant volume		l	1.55	1.55	2.11	2.89	2.89
	Internal water volume		l	1.66	1.66	2.22	3.00	3.00
	Insulation material		-	EPDM				
Water pump	Model		-	Yonos PARA 25/7.0		Yonos PARA 25/7.5		
	Type		-	Inverter				
	Control		-	PWM control				
	Power supply		-	1~ 230 V 50 Hz				
	Maximum lift pressure		kPa	72		76		
	Maximum water flow		m^3/h	3.3		4.0		
	Piping	Water inlet	(in)	1-1/2" G				
		Water outlet	(in)	1-1/2" G				
		Inlet/outlet distance	mm	180				

Model				RWD-2.0(H)FSNWE -(200/260)S	RWD-3.0(H)FSNWE -(200/260)S	RWD-4.0(H)FSNWE -(200/260)S	RWD-5.0(H)FSNWE -(200/260)S	RWD-6.0(H)FSNWE -(200/260)S
Water electric heater	Material		-	Stainless steel (Immersion heating element)				
	Dimensions	Height (H)	mm	463				
		Diameter (ø)	mm	Ø76				
	Power supply		-	1~ 230 V 50 Hz		1~ 230 V 50 Hz 3N~ 400 V 50 Hz		
	Maximum electric heater power		kW	3.0		6.0		
	Regulated electric heater power (step 1/ step 2/ step 3)		kW	1.0/2.0/3.0		2.0/4.0/6.0		
	Thermostat security		-	Yes (Cut-out: 88 ºC)				
Expansion vessel	Material		-	Steel (with stainless/galvanized steel connections)				
	Internal water volume		l	6				
	Working pressure		MPa	0.3				
	Pre-loading pressure (Air side)		MPa	0.1				
Water strainer	Type		-	Y shape				
	Material		-	Brass				
	Piping connection		(in)	DI 41.4 (brazed)				
	Mesh (hole size)		mm	0.5				
Flow meter			-	Yes				
Safety valve			-	Yes (3 bar)				
Low pressure switch			-	Yes (<0.5 bar)				
Unit drain valve			-	Yes				
DHW drain valve			-	Yes				
Shut-off valve			-	Yes (2 factory-supplied valves)				
Air purger			-	Yes				
Manometer			-	Yes				
LCD controller			-	Yes				
Drain pan			-	Only for heating and cooling version				

3.4 Electrical data

3.4.1 Considerations

Key words:

- PH: Phase.
- IPT: Total input power.
- STC: Starting current: Less than maximum current.
- RNC: Running current.
- MC: Maximum current.
- CB: Recommended circuit breaker.
- ELB: Earth leakage breaker.

NOTE

- *Heating conditions: Inlet/outlet water temperature: 30/35 ºC ; Outdoor ambient temperature (DB/WB): 7/6 ºC*
- *Cooling conditions: Inlet/outlet water temperature: 12/7 ºC ; Outdoor ambient temperature (DB): 35 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.*
- ***Please refer to the general information, cautions and notes regarding protective devices (CB, ELB) throughout the** "10. Electrical and control settings" **chapter.***

3.4.2 Outdoor unit

Model	Power supply	Applicable voltage		Compressor and fan motors					Max. IPT (kW)	MC (A)
		U max. (V)	U min (V)	STC (A)	Cooling operation		Heating operation			
					IPT (KW)	RNC (A)	IPT (KW)	RNC (A)		
RAS-2HVRN2	1~ 230 V 50 Hz	253	207	-	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	3N~ 400 V 50 Hz	440	360		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

3.4.3 Indoor unit

Model	Operation mode (*1)	Operation	Power supply	Applicable voltage		Water pump motor			Back-up heater + DHW tank heater			Max. IPT (kW)	MC (A)
				U max. (V)	U min. (V)	PH	IPT (kW)	RNC (A)	PH	IPT (kW)	RNC (A)		
RWD-2.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater disabled	Cooling	1~ 230 V 50 Hz	253	207	1~	0.05	0.4	1~	-	-	1.40	6
		Heating					0.05	0.4		-	-		
RWD-3.0(H)FSNWE-(200/260)S		Cooling					0.05	0.4		-	-	1.40	6
		Heating					0.05	0.4		-	-		
RWD-4.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	1.40	6
		Heating					0.08	0.7		-	-		
RWD-5.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	1.40	6
		Heating					0.08	0.7		-	-		
RWD-6.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	1.40	6
		Heating					0.08	0.7		-	-		
RWD-2.0(H)FSNWE-(200/260)S	Unit heater enabled; DHW tank heater disabled (Default operation)	Cooling					0.05	0.4		-	-	3.20	15
		Heating					0.05	0.4		3.00	13.0		
RWD-3.0(H)FSNWE-(200/260)S		Cooling					0.05	0.4		-	-	3.20	15
		Heating					0.05	0.4		3.00	13.0		
RWD-4.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	6.40	30
		Heating					0.08	0.7		6.00	26.1		
RWD-5.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	6.40	30
		Heating					0.08	0.7		6.00	26.1		
RWD-6.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	6.40	30
		Heating					0.08	0.7		6.00	26.1		
RWD-2.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater enabled	Cooling					0.05	0.4		-	-	6.00	28
		Heating					0.05	0.4		5.70	24.8		
RWD-3.0(H)FSNWE-(200/260)S		Cooling					0.05	0.4		-	-	6.00	28
		Heating					0.05	0.4		5.70	24.8		
RWD-4.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	9.20	42
		Heating					0.08	0.7		8.70	37.8		
RWD-5.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	9.20	42
		Heating					0.08	0.7		8.70	37.8		
RWD-6.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	9.20	42
		Heating					0.08	0.7		8.70	37.8		
RWD-4.0(H)FSNWE-(200/260)S	Unit heater enabled; DHW tank heater disabled (Default operation)	Cooling	3N~ 400 V 50 Hz	440	360	1~	0.08	0.7	3N~	-	-	6.40	10
		Heating					0.08	0.7		6.00	8.7		
RWD-5.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	6.40	10
		Heating					0.08	0.7		6.00	8.7		
RWD-6.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	6.40	10
		Heating					0.08	0.7		6.00	8.7		
RWD-4.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater enabled	Cooling					0.08	0.7		-	-	9.20	23
		Heating					0.08	0.7		8.70	12.6		
RWD-5.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	9.20	23
		Heating					0.08	0.7		8.70	12.6		
RWD-6.0(H)FSNWE-(200/260)S		Cooling					0.08	0.7		-	-	9.20	23
		Heating					0.08	0.7		8.70	12.6		

4. Capacity and selection data

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4.1 System selection procedure

The following procedure gives an example of selection of YUTAKI S COMBI 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 COMBI 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 heating design conditions. Then, the theoretical capacity values taken from the different maximum capacity tables are corrected by means of the correction factors, resulting in the actual capacity which will provide the selected system for heating operation. Afterwards, the suitable tank (200/260 L) has to be selected for the hot sanitary water production depending on the daily water needs. Finally, the pre-selected system combination for heating operation needs to be checked for cooling operation.

◆ **Heating mode**

Installation configurations

The YUTAKI S COMBI is designed to work in a mono-valent, 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 YUTAKI S COMBI unit depends on the installed components and the selected configuration and it can be configured and upgraded to meet many installation requirements.

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.

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.

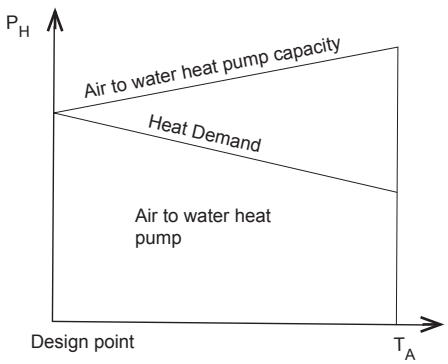
NOTE

For more information about the various energy systems, please refer to the chapter "11. Installation configuration".

- Mono-valent system

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

Example of Mono-valent system



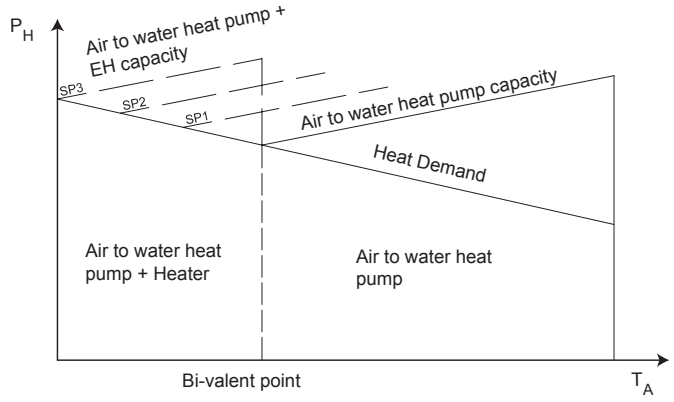
NOTE

- *T_A: Outdoor ambient temperature.*
- *P_H: Heating capacity.*

- Mono-energy system

The YUTAKI S COMBI is sized to provide approximately 80% of the heating requirements in the coldest days of the year. An auxiliary electric heater built-in the indoor unit is used to provide the additional heating required on cold days.

Example of Mono-energy system



NOTE

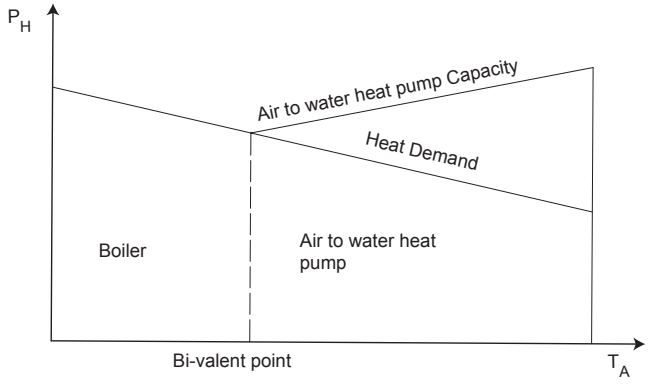
- *T_A: Outdoor ambient temperature.*
- *P_H: Heating capacity.*
- *SP1/2/3: Heater steps.*
- *Bivalent point can be set through the LCD user's interface.*

4

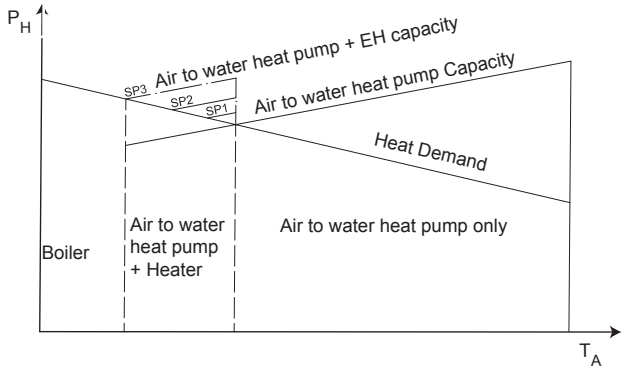
- Alternating Bi-valent system

The boiler is configured to alternate with the air to water heat pump. A hydraulic separator of buffer tank has to be used to ensure hydraulic balancing.

Example of Alternating Bi-valent system (Only boiler)



Example of Alternating Bi-valent system (Heater + boiler)



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.*

◆ Procedure description

Follow the next selection procedure given in this chapter:

a. System combination (outdoor unit + indoor unit) selection

i. Without heating source (Mono-valent system)

ii. With additional heating source (Mono-energy / Bivalent system)

b. It will be selected the domestic hot water tank size (200/260 L).

a.i) Mono-valent system (regular election)

In case of normal selection of Mono-valent system (without additional heating sources) the YUTAKI S COMBI will be selected depending on the required heating load.

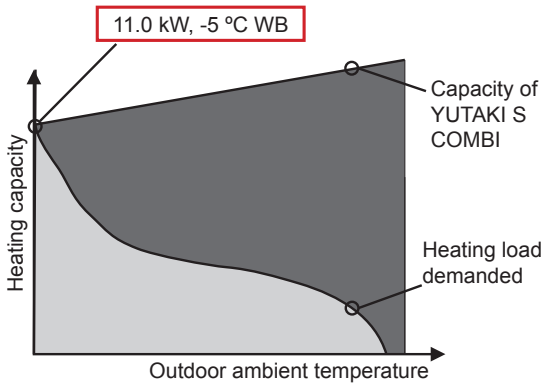
NOTE

The example given in this chapter is the regular election as the YUTAKI S COMBI has been performed to cover all the heating requirements, even the coldest days of the year.

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

Proposed energy system	Mono-valent
Inlet/outlet water temperature	30/35 ºC
Ambient temperature DB/WB in the coldest day of the year (HR = 85%)	-4/-5 ºC
Heating load required on the coldest day of the year	11.0 kW

Installation restrictions	
Installation type	Radiant floor
Power supply	1~ 230 V 50 Hz
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 *"4.2.1 Maximum heating capacity (kW)"* where it is possible to identify which unit has the heating capacity to cover the required heating load on the coldest day of the year by the installation (11.0 kW for an inlet/outlet water temperature of 30/35 ºC and an ambient temperature of -5ºC WB).

YUTAKI S COMBI System	Maximum heating capacity (kW)
RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S	5.7
RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S	8.9
☛ **RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200/260)S**	**11.2**
RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S	13.3
RAS-6H(V)RNME-AF + RWD-6.0(H)FSNWE-(200/260)S	13.9

NOTE

Although the RAS-4HVRNME-AF + RWD-4.0(H)FSNWE-(200/260)S combination has a slightly higher maximum heating capacity than the heating load required, we must take the next combination cause this heating capacity will be lower after applying the correction factors.

As it is visible in the table, the YUTAKI S COMBI system that covers the installation's heating requirements is the combination of RAS-5HVRNME-AF + RWD-5.0(H)FSNWE-(200/260)S. Therefore, this will be the pre-selected YUTAKI S COMBI system.

NOTE

In case of working with an ambient temperature value not included in the Maximum heating capacity tables of section"4.2.1 Maximum heating capacity (kW)", (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-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S system is 13.3 kW.

- Calculation of f_D:

In situations where the ambient temperature is lower than 7 ºC DB,the frost may build up on the heat exchanger. In this 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 into account this time and applies the heating capacity correction.

To calculate the correction factor, please see section *"4.4.1 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 does not appear on the table, an interpolation is needed.

Finally, the resulting defrosting correction factor for our outdoor ambient temperature of -4 ºC DB 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 unit performance. 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 the characteristics of this example: equivalent piping length of 20 meters and the indoor unit is located 15 meters lower than outdoor unit. The resulting piping length correction factor is ***0.993.***

- Calculation of Q_H:

Once the correction factors to be applied have been determined, the formula for actual heating capacity of the RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S system can be applied:

Q_H= 13.3 kW x 0.885 x 0.993 = 11.69 kW

As it can be seen, the actual heating capacity of the RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S system (11.69 kW) is greater than the heating load required by the installation (11.0 kW). Therefore, the pre-selection will be considered valid.

NOTE

If the actual heating capacity calculated is lower than the required 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 or electric heater accessory for example) should be considered.

a.ii) Use of auxiliary heating source (electric heater or boiler combination)

In installations which already have a conventional boiler (gas/oil), it can be used to alternate with YUTAKI S COMBI (Bi-valent system) which it will help to increase the overall performance of the whole installation significantly.

Equally, the indoor unit has a built-in electric heater which can provide the additional heat load if required (Mono-energy system).

In any case, the Procedure description explained before can be applied to all the energy systems mentioned but including a heat load check when using auxiliary heating source (Mono-energy or Bi-valent systems) and recalculating the new heating points.

It will be checked that the combination (YUTAKI S COMBI + electric heater / boiler) covers the temporary needs in the coldest days of the year.

Mono-energy and Bi-valent systems are useful when there is a constant regular heating load and low periods of heating load peaks related to the coldest days of the year.

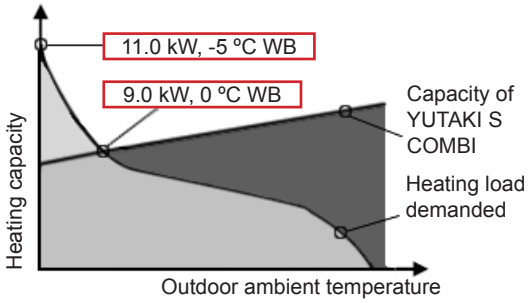
NOTE

The following check can be used as well for the two combinations.

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

Proposed energy system	Mono-energy
Inlet/outlet water temperature	30/35 ºC
Regular ambient temperature DB/WB (HR = 85%)	1/0 °C
Required regular heating load	9.0 kW
Ambient temperature DB/WB on the coldest day of the year (HR = 85%)	-4/-5 ºC
Heating load required on the coldest day of the year	11.0 kW

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



In this new system the heat pump meets with the regular heating load. To reach the peak heating load of 11.0 kW (-5ºC WB) necessary in the coldest days of the year the electric heater can provide the auxiliary heating capacity to cover it.

As the heating load has fallen to 9.0 kW as we are considering this point as regular heating load, it may be reselected the needed unit. The RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S system would provide too much heating capacity so we could take the RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200-260 system for these new conditions.

NOTE

Although the RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S combination has a slightly higher maximum heating capacity than the heating load required, we must take the next combination cause this heating capacity will be lower after applying the correction factors .

YUTAKI S COMBI System	Maximum heating capacity (kW)
RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S	6.8
RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S	10.5
☛ **RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200/260)S**	**12.4**
RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S	15.0
RAS-6H(V)RNME-AF + RWD-6.0(H)FSNWE-(200/260)S	16.2

The maximum heating capacity for this new system for an ambient temperature of 0 ºC WB and a water inlet/outlet temperature of 30/35 ºC is 12.4 kW. We follow the same procedure as in point a.i) to apply the correction (defrost correction factor of 0.84) Heating piping length correction factor of 0.993) and the resulting heating capacity for this system is:

Q_H= *12.4 kW x 0.84 x 0.993 =* ***10.34 kW***

By help of the Maximum heating capacity tables the heating capacity for the new system has to be calculated for the coldest days conditions (-5 ºC).

The maximum heating capacity for an ambient temperature of -5 ºC WB and a water inlet/outlet temperature of 30/35 ºC is 11.2 kW.

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

The actual heating capacity for the system selected in 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 resulting defrost correction factor for our outdoor ambient temperature of -5ºC WB is ***0.885.***

- Calculation of f_{LH}:

The resulting piping length correction factor is ***0.993.***

- Calculation of Q_H:

Once the correction factors to be applied have been determined, the formula for actual heating capacity of the unit RAS-4H(V)RNME-AF + RHM-4.0FS(V)NFE system can be applied:

Q_H= *11.2 kW x 0.885 x 0.993 =* ***9.84 kW***

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

Once applied the applicable correction factors, the actual heating capacity provided by the RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200/260)S system in the coldest days is 9.84 kW. This heating capacity does not cover the required heating load for the coldest days (11.0 kW).

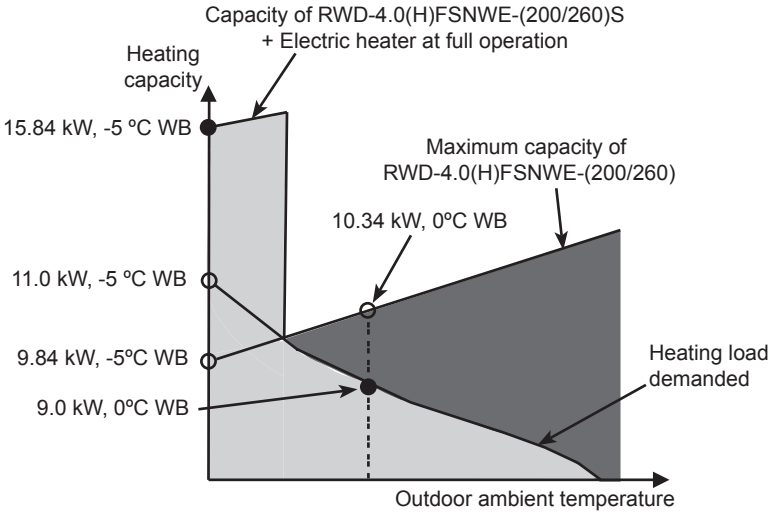
In these cases, the water electric heater built-in the YUTAKI S COMBI indoor unit will provide the auxiliary capacity required to cover temporary heating needs.

This electric heater provides a maximum power of 6.0 kW for this unit which must be added to the heating capacity provided by the pre-selected unit. The result is:

Q_H= *9.84 kW + 6 kW =* ***15.84 kW***

In this example, the heating capacity resulting is higher than the heating demand of 11.0 kW estimated for the coldest days of the year, so that pre-selection of the RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200/260)S system can be taken as valid.

The energy system resulting will be the following:

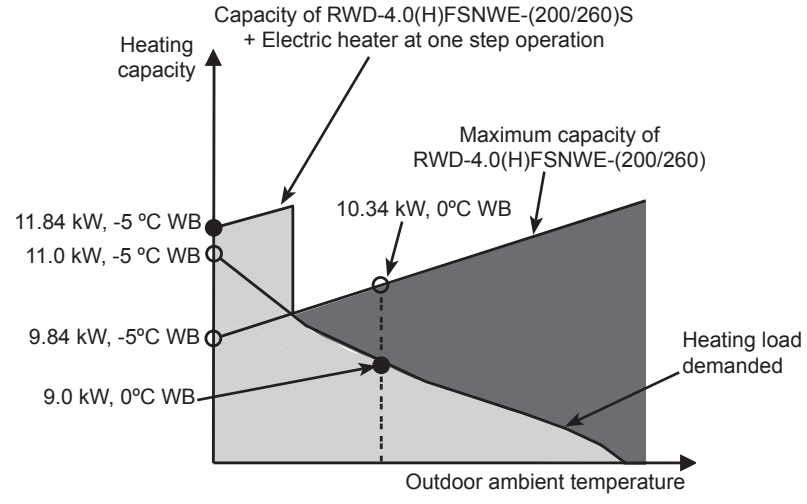


Three steps electric heater control

As it has been explained in chapter *"2. 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 1 step (2.0 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= *9.84 kW + 2.0 kW =* ***11.84 kW***



b) Domestic Hot Water tank selection

Two different DHW tank models (200/260 L) can be selected for each capacity, depending on the water demand. In order to meet the suitable tank size it is necessary to estimate the daily domestic hot water demand. The following expression is used to calculate this consumption:

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

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***, $D_i(60 ºC)$,*** the current technical installation legislation of the country where the installation will be performed must be referred, 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 45 ºC - 65 ºC. In the example below, it has been taken 45 ºC.

- Calculation of ***T_i***:

  The inlet cold water temperature is the temperature of the water that is filling the tank. The cold water tank's temperature is 10ºC - 15ºC. To calculate an approximate water demand, Ti=12 ºC has been used.

- Example:

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

NOTE

(*): Depending on the electric tariff, the installation space and the cost/efficiency relation there are different strategies of accumulation to follow. In case a low cost electric tariff strategy is selected (accumulation strategy) the daily water demand could double the normal case (semi accumulation strategy).

The election of the water tank depends on the next table:

Daily water demand	Domestic Hot Water tank size
<185 Litres	RWD-(2.0-6.0)(H)FSNWE-200S
>185 Litres	RWD-(2.0-6.0)(H)FSNWE-260S

NOTE

- *The storage capacity of the tank has to meet with the daily consumption in order to avoid stagnation of water.*
- *This Domestic Hot Water Tank selection procedure is just orientative, be sure of consulting the local legislation to ensure a good water demand value.*

◆ Cooling mode (Only for heating and cooling version: RWD-(2.0-6.0)FSNWE-(200/260)S)

Procedure description

Once verified that the selected system (Mono-energy) 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 *"4.2.2 Maximum cooling capacity (kW)"*, 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 30 ºC DB).

YUTAKI S COMBI system	Maximum cooling capacity (kW)
RAS-4HVRNME-AF + RWD-4.0FSNWE-(200/260)S	11.6

As can be seen in the table, the RAS-4HVRNME-AF + RWD-4.0FSNWE-(200/260)S 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 + RWD-4.0FSNWE-(200/260)S 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 + RWD-4.0FSNWE-(200/260)S 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 + RWD-4.0FSNWE-(200/260)S 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)
RWD-2.0(H)FSNWE-(200/260)S + 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
	30	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
RWD-3.0(H)FSNWE-(200/260)S + 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
RWD-4.0(H)FSNWE-(200/260)S + 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
RWD-5.0(H)FSNWE-(200/260)S + 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 (°C)	Ambient temperature (°C 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)
RWD-6.0(H)FSNWE -(200/260)S + 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

NOTE

- *CAP: Capacity at compressor maximum frequency. Capacity is valid for difference between water inlet and water outlet of 3-8°C.*
- *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 referring to the section "4.4.1 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)
RWD-2.0FSNWE -(200/260)S + 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
RWD-3.0FSNWE -(200/260)S + 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
RWD-4.0FSNWE -(200/260)S + 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
RWD-5.0FSNWE -(200/260)S + 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
RWD-6.0FSNWE -(200/260)S + 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

NOTE

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

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		RWD-2.0(H)FSNWE -(200/260)S	RWD-3.0(H)FSNWE -(200/260)S	RWD-4.0(H)FSNWE -(200/260)S	RWD-5.0(H)FSNWE -(200/260)S	RWD-6.0(H)FSNWE -(200/260)S
	Outdoor unit		RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4H(V)RNME-AF	RAS-5H(V)RNME-AF	RAS-6H(V)RNME-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
		COP	5.05	4.77	4.78	4.56	4.33
2) Conditions: Water in/out */45ºC Out Temp, (DB/WB): 10/9ºC		CAP (kW)	4.9	7.3	9.6	12.0	14.3
		COP	3.65	3.64	3.62	3.41	3.26
3) Conditions: Water in/out */55ºC Out Temp, (DB/WB): 10/9ºC		CAP (kW)	4.4	6.3	8.5	10.4	13.4
		COP	2.79	2.79	3.37	2.81	2.67
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
		COP	5.02	4.55	4.47	4.36	4.11
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
		COP	3.51	3.47	3.42	3.16	3.01
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
		COP	2.63	2.65	2.59	2.60	2.47
7) Conditions: Water in/out */35ºC Out Temp, (DB/WB): 2/1ºC		CAP (kW)	3.7	5.5	7.0	8.2	8.5
		COP	3.51	3.40	3.30	3.32	3.30
8) Conditions: Water in/out */45ºC Out Temp, (DB/WB): 2/1ºC		CAP (kW)	4.4	6.7	8.5	10.2	11.7
		COP	2.51	2.69	2.44	2.33	2.31
9) Conditions: Water in/out */55ºC Out Temp, (DB/WB): 2/1ºC		CAP (kW)	3.8	5.9	7.5	9.6	10.6
		COP	1.72	1.89	1.87	1.80	1.69
10) Conditions: Water in/out */35ºC Out Temp, (DB/WB): -7/-8ºC		CAP (kW)	4.0	6.4	7.6	9.0	9.4
		COP	2.65	2.51	2.42	2.40	2.34
11) Conditions: Water in/out */45ºC Out Temp, (DB/WB): -7/-8ºC		CAP (kW)	3.8	6.0	7.1	8.3	8.7
		COP	2.10	2.07	2.14	1.92	1.81
12) Conditions: Water in/out */55ºC Out Temp, (DB/WB): -7/-8ºC		CAP (kW)	3.0	5.3	5.9	7.7	7.9
		COP	1.62	1.65	1.55	1.55	1.46

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.

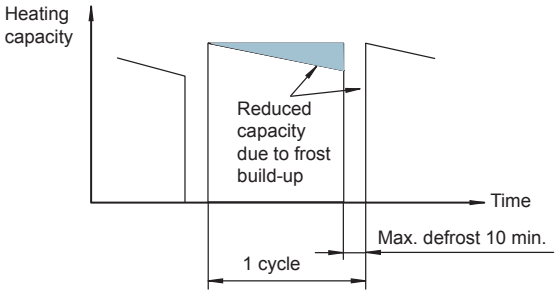
When this type of operation is taken into account, the heating capacity must be corrected according to the following equation:

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

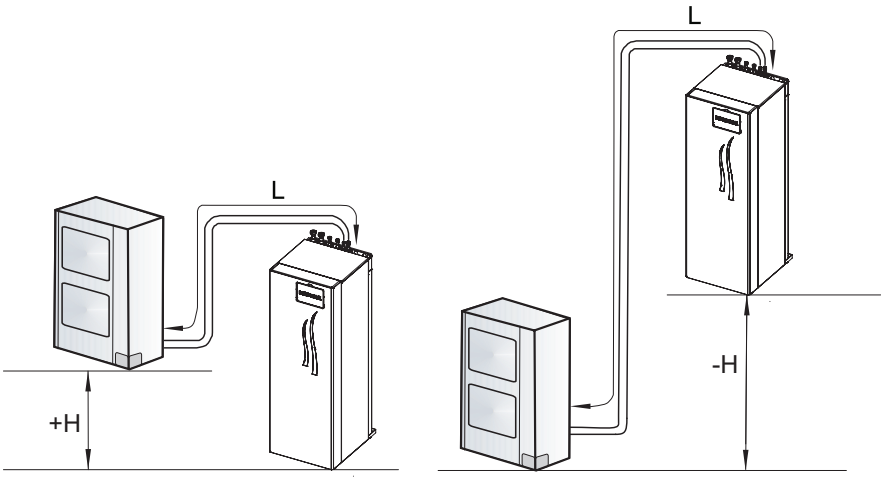
NOTE

- *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.

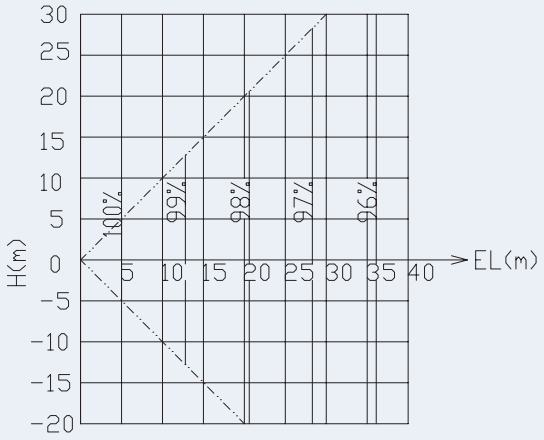
◆ Heating piping length correction factor

NOTE

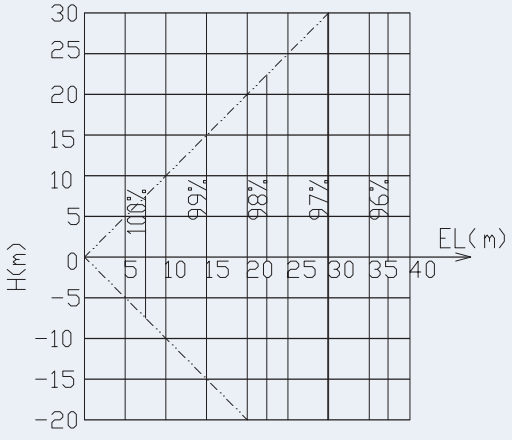
Take note that the piping length specified in the following graphics is the equivalent piping length (EL), considering the possible elbows, bends... The actual piping length (L) is slightly lower, 30 m.

Heating

RAS-2HVRN2

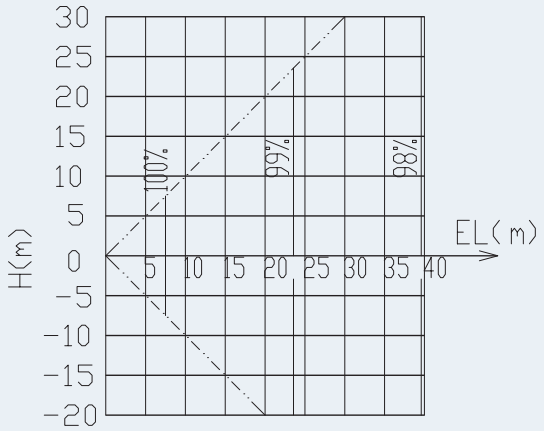


RAS-3HVRNME-AF

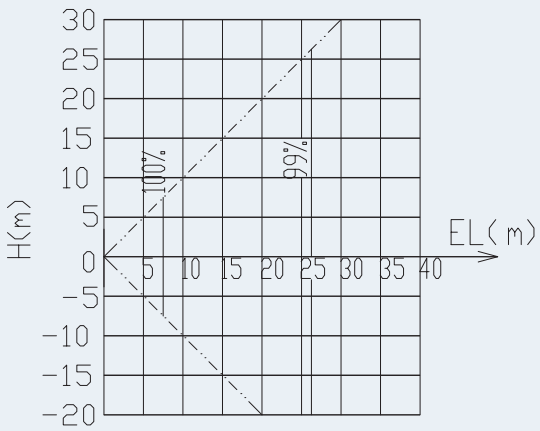


Heating

RAS-4H(V)RNME-AF

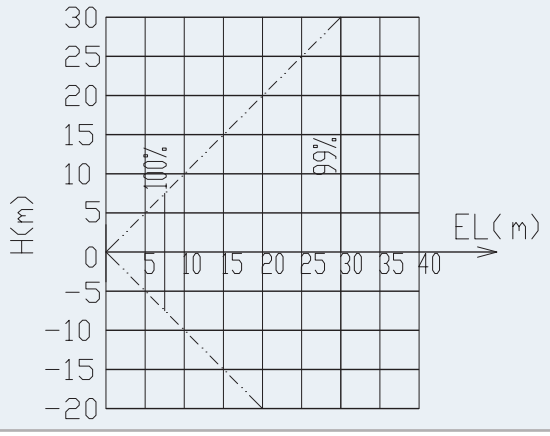


RAS-5H(V)RNME-AF



Heating

RAS-6H(V)RNME-AF



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 %).

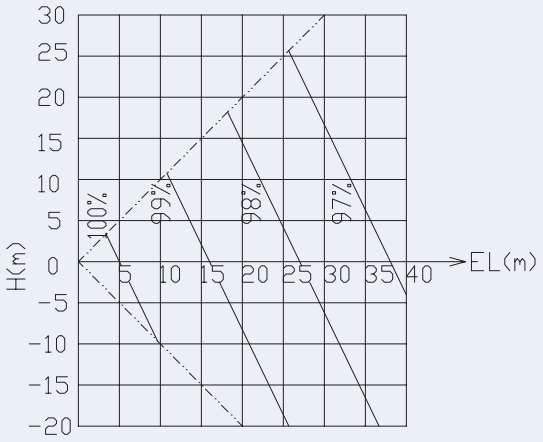
◆ Cooling piping length correction factor

NOTE

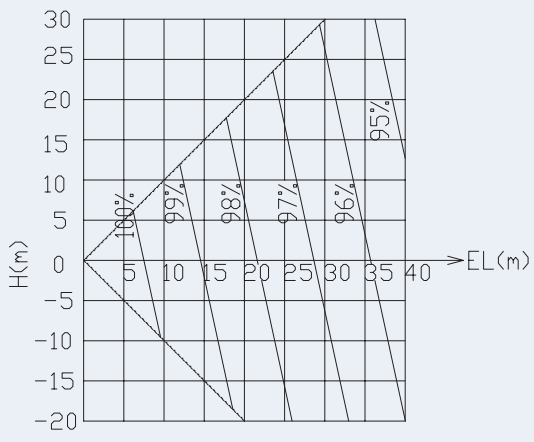
Take note that the piping length specified in the following graphics is the equivalent piping length (EL), considering the possible elbows, bends... The actual piping length (L) is slightly lower, 30 m.

Cooling

RAS-2HVRN2

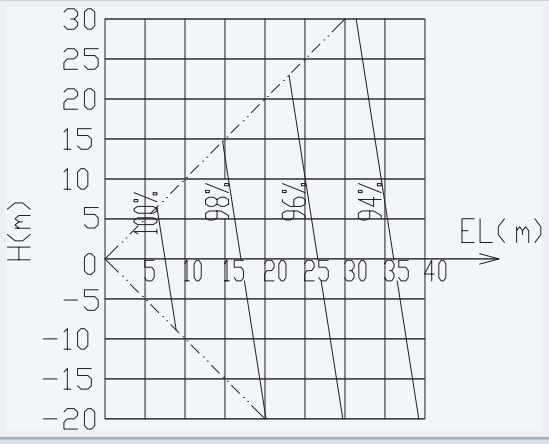


RAS-3HVRNME-AF

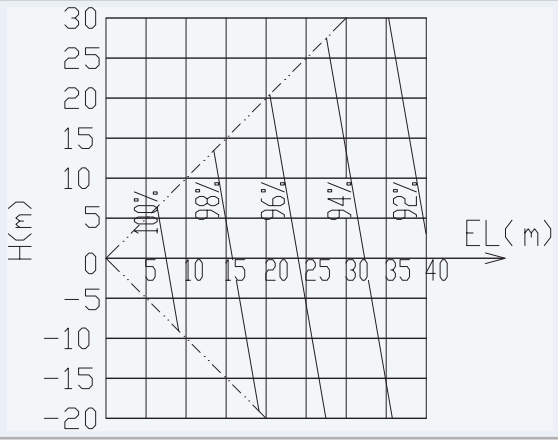


Cooling

RAS-4H(V)RNME-AF

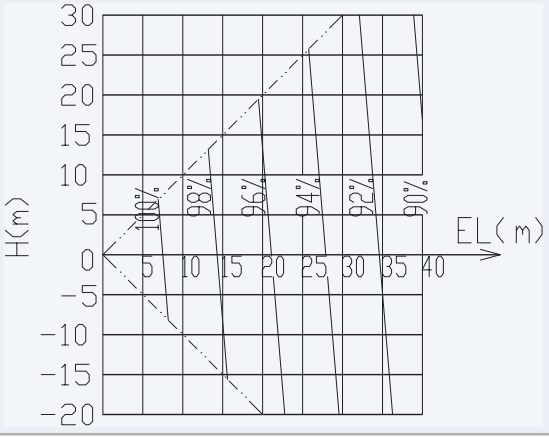


RAS-5H(V)RNME-AF



Cooling

RAS-6H(V)RNME-AF



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

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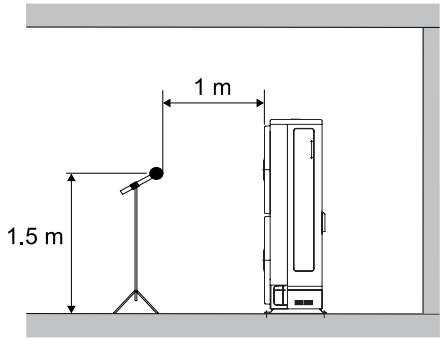
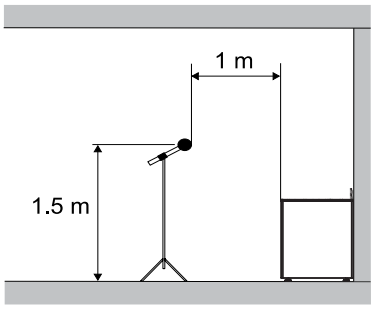
5.1 Considerations

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

Outdoor unit



Indoor unit



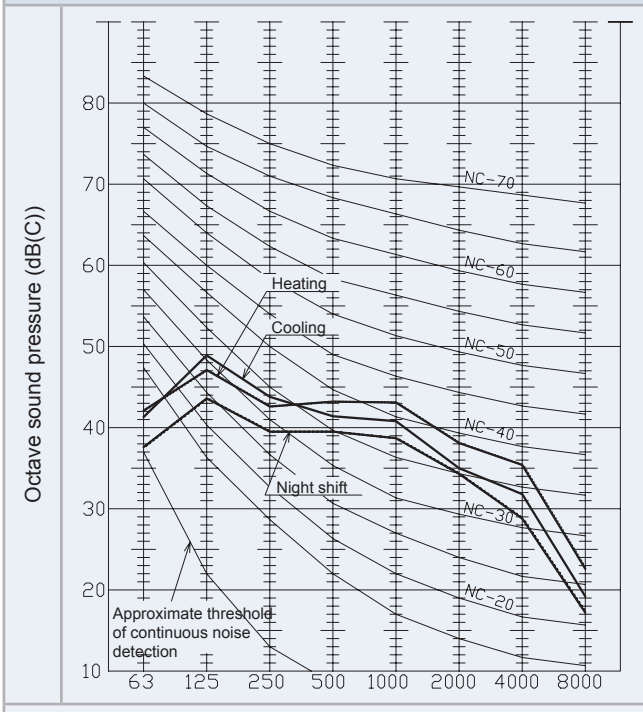
2 The data is measured in an anechoic chamber, so reflected sound should be taken into consideration when installing the unit.

3 The sound measured with the curve A shown in dB(A) represents the attenuation in function of frequency as perceived by the human ear.

4 Reference acoustic pressure 0 dB=20 µPa

5.2 Sound pressure level for outdoor unit

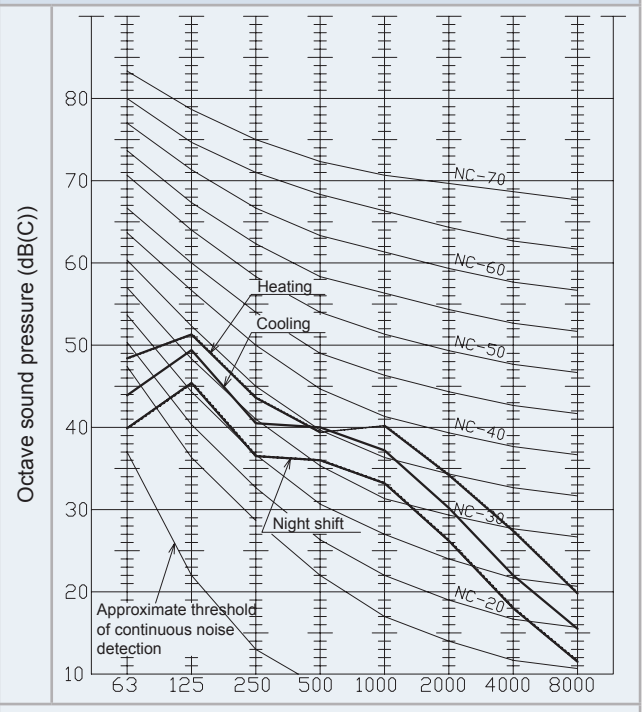
RAS-2HVRN2



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 45 / 47 / 43 dB(A)

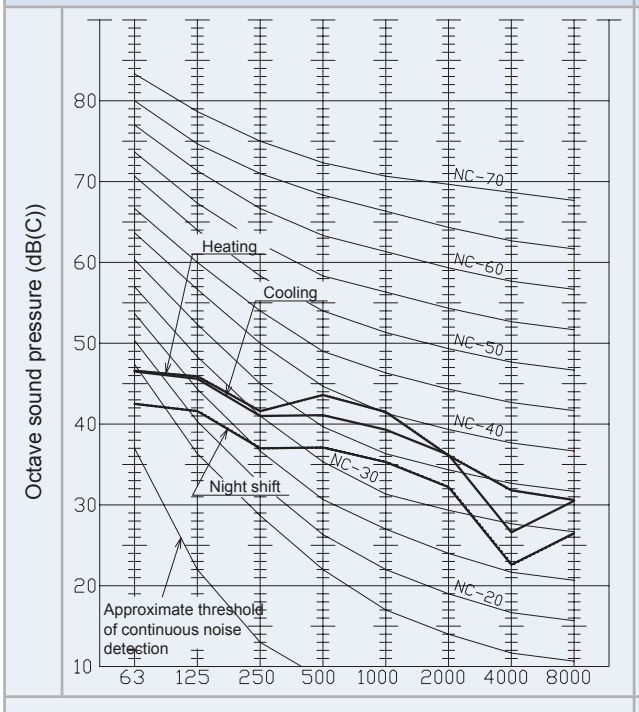
RAS-3HVRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 42 / 44 / 38 dB(A)

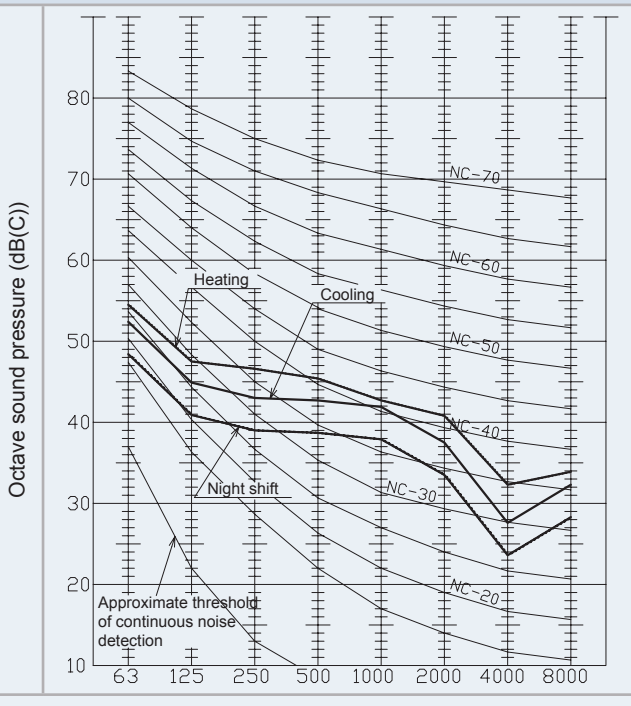
RAS-4HVRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 44 / 46 / 40 dB(A)

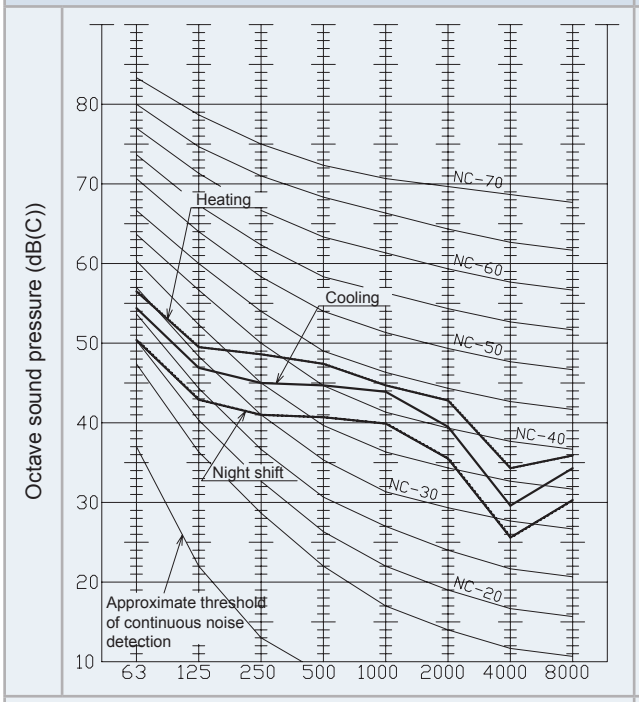
RAS-5HVRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 46 / 48 / 42 dB(A)

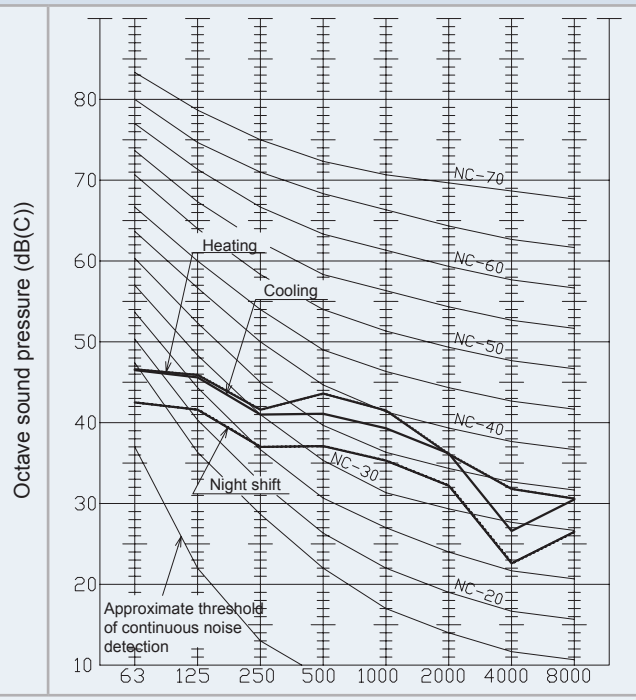
RAS-6HVRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 48 / 50 / 45 dB(A)

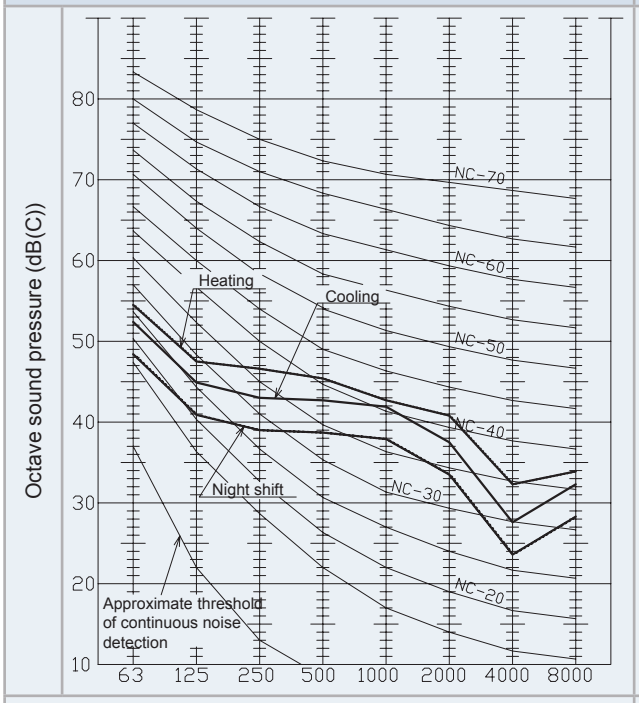
RAS-4HRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 44 / 46 / 40 dB(A)

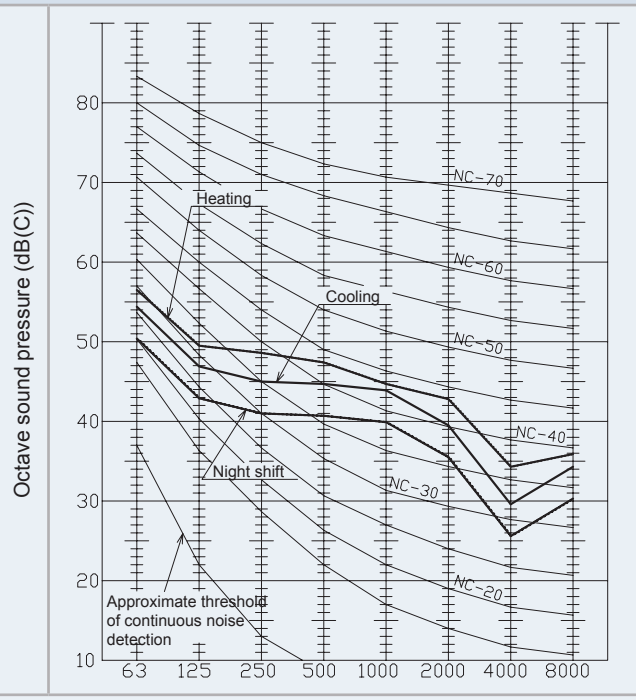
RAS-5HRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 46 / 48 / 42 dB(A)

RAS-6HRNME-AF



Frequency (Hz)

Sound pressure level:
Cooling / Heating / Night mode; 48 / 50 / 45 dB(A)

5.3 Sound pressure level for indoor unit

Model	Sound pressure level (dB(A))
RWD-2.0(H)FSNWE-(200/260)S	29
RWD-3.0(H)FSNWE-(200/260)S	29
RWD-4.0(H)FSNWE-(200/260)S	28
RWD-5.0(H)FSNWE-(200/260)S	28
RWD-6.0(H)FSNWE-(200/260)S	28

6. Working range

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6.2 Working range 84

6.2.1 Heating mode 85

6.2.2 Cooling mode (For heating and cooling version: RWD-(2.0-6.0)FSNWE-(200/260)S) 86

6.1 Power supply range

◆ Nominal power supply

- Single phase: 1~ 230 V 50 Hz
- Three phase: 3N~ 400 V 50 Hz

◆ Operating voltage

Between 90 and 110% of the nominal voltage.

◆ Voltage imbalance for nominal power supply 3N~ 400 V 50 Hz

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

◆ Starting voltage

Always higher than 85% of the nominal voltage.

6.2 Working range

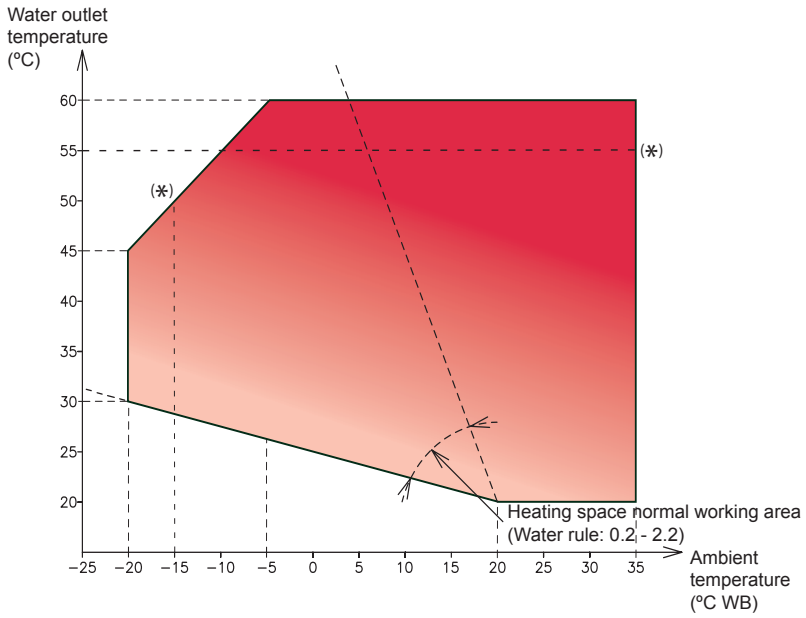
Model		RWD-2.0(H)FSNWE -(200/260)S	RWD-3.0(H)FSNWE -(200/260)S	RWD-4.0(H)FSNWE -(200/260)S	RWD-5.0(H)FSNWE -(200/260)S	RWD-6.0(H)FSNWE -(200/260)S
Water temperature	ºC	Refer to the graphics for each case				
Indoor ambient temperature (Heating / Cooling)	ºC	5~30 / 5~35				
Minimum water flow rate (*1)	m^3/h	0.5	0.6	1.0	1.1	1.2
Maximum water flow rate (*1)	m^3/h	2.1	2.1	2.7	2.9	2.9
Minimum installation water volume (*2)	l	28	28	38	46	55
Minimum allowable water pressure	MPa	0.05				
Maximum allowable water pressure	MPa	0.3				

NOTE

- *(*1): Values calculated based on the following conditions:*
  - *Water inlet/outlet temperature: 30/35 ºC*
  - *Outdoor ambient temperature: (DB/WB): 7/6 ºC*
- *(*2): Values calculated with an ON/OFF temperature differential value of 4 ºC.*

6.2.1 Heating mode

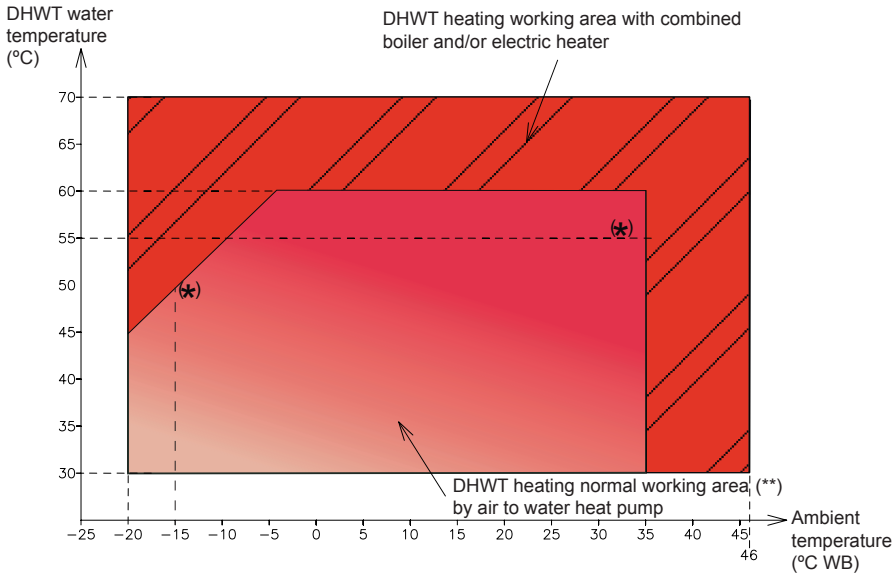
◆ Space heating



NOTE

(*): 2HP system only: RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S

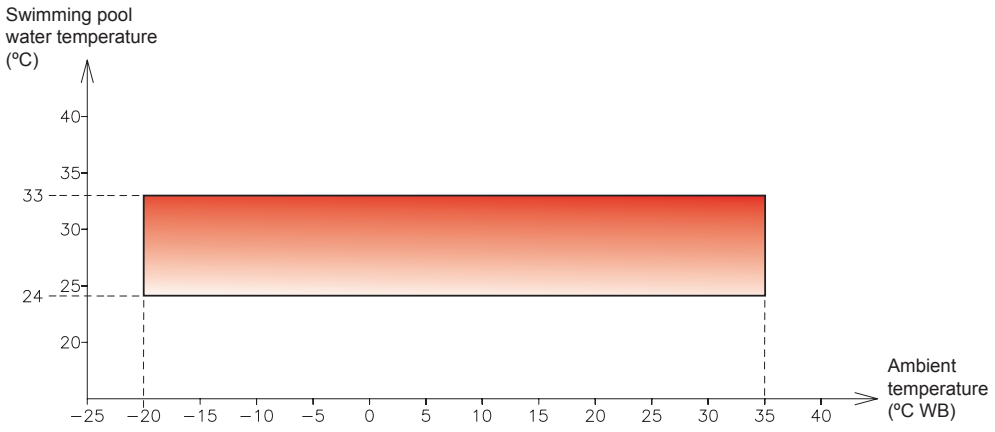
◆ Domestic Hot Water Tank heating



NOTE

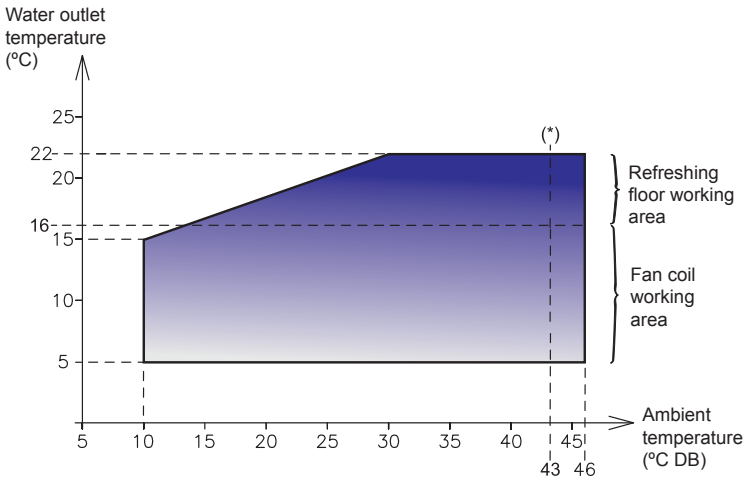
- *(*) 55 ºC (50º C for 2 HP) without DHW tank's heater operation.*
- *(**): The heat pump can produce domestic hot water of 57°C as a maximum (53 °C for 2 HP) by itself, but HITACHI recommends to set tank temperature by heat pump only up to 55 ºC (50 ºC for 2 HP) and keep Thpoff default value. In case of higher setting, tank electrical heater must be used to reach setting temperature (Enabled by Optional function).*

◆ Swimming pool heating



6.2.2 Cooling mode (For heating and cooling version: RWD-(2.0-6.0)FSNWE-(200/260)S)

◆ Space cooling



NOTE

(*): 2HP system only: RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S

7. General dimensions

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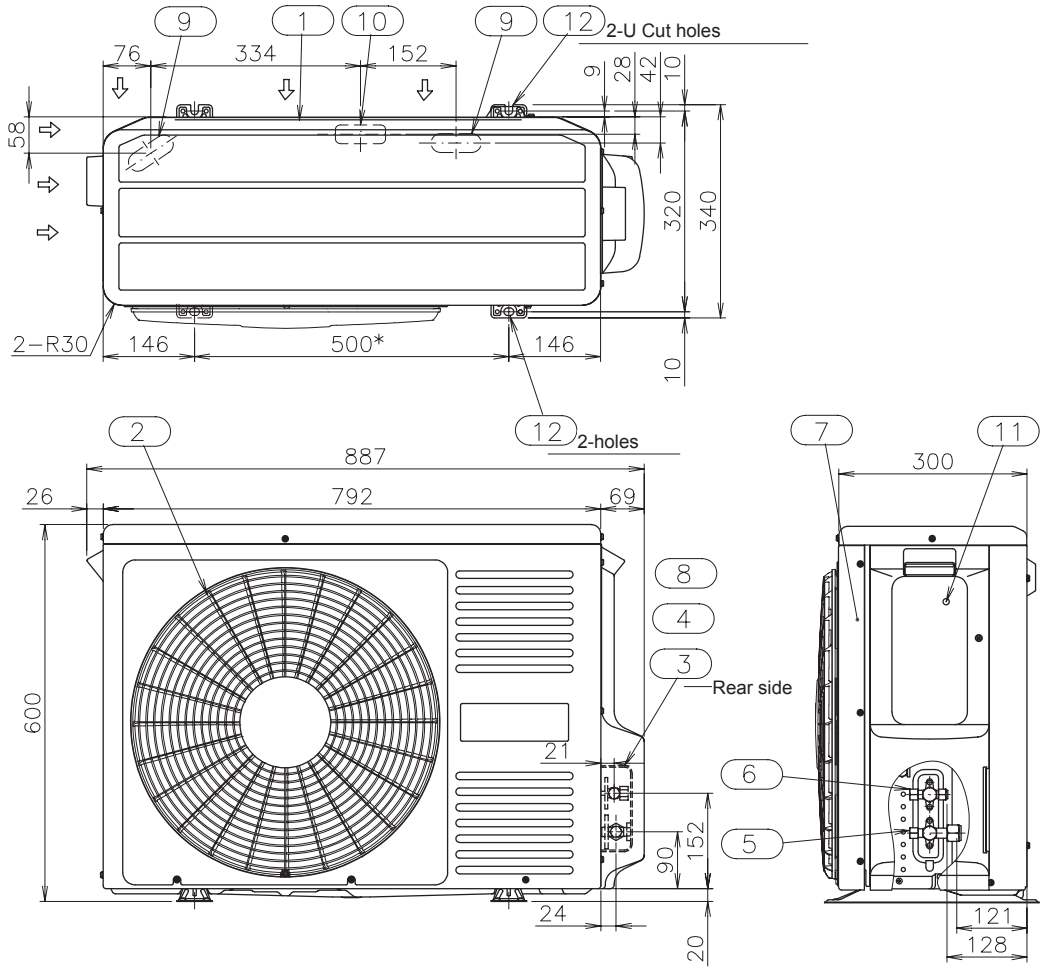
7.1 Name of parts & Dimensional data

7.1.1 Outdoor unit

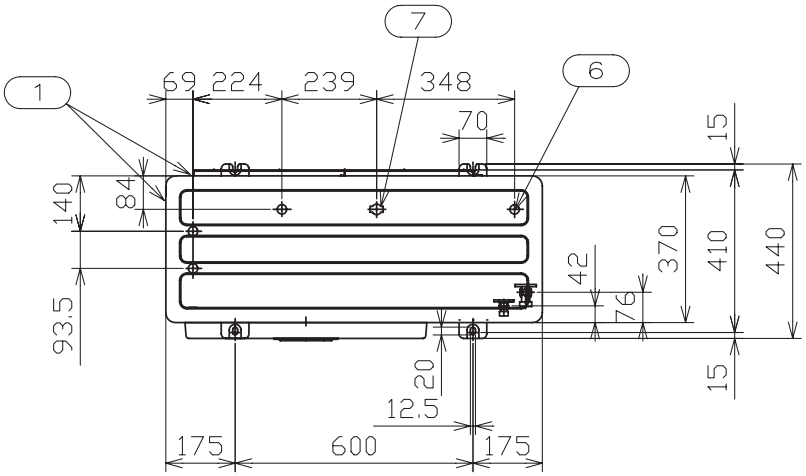
◆ **RAS-2HVRN2**

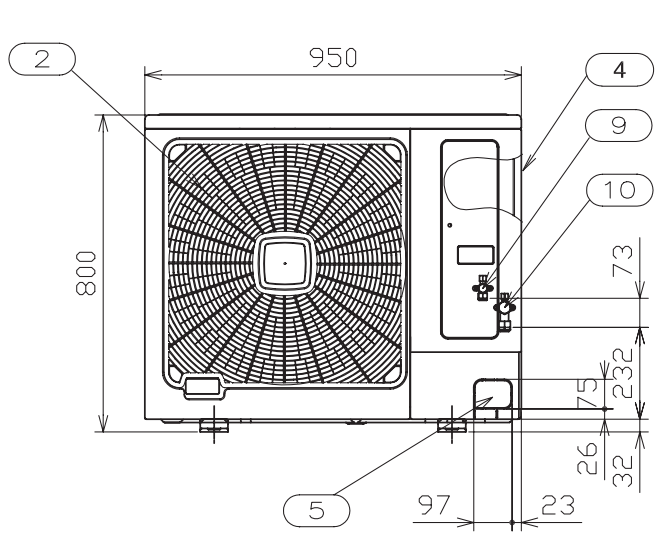


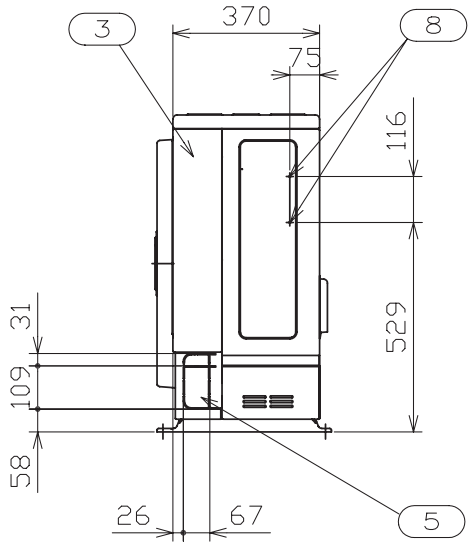
Units: mm

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	Flare nut: Ø12.7 (1/2”)
6	Liquid piping connection	Flare nut: Ø6.35 (1/4”)
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



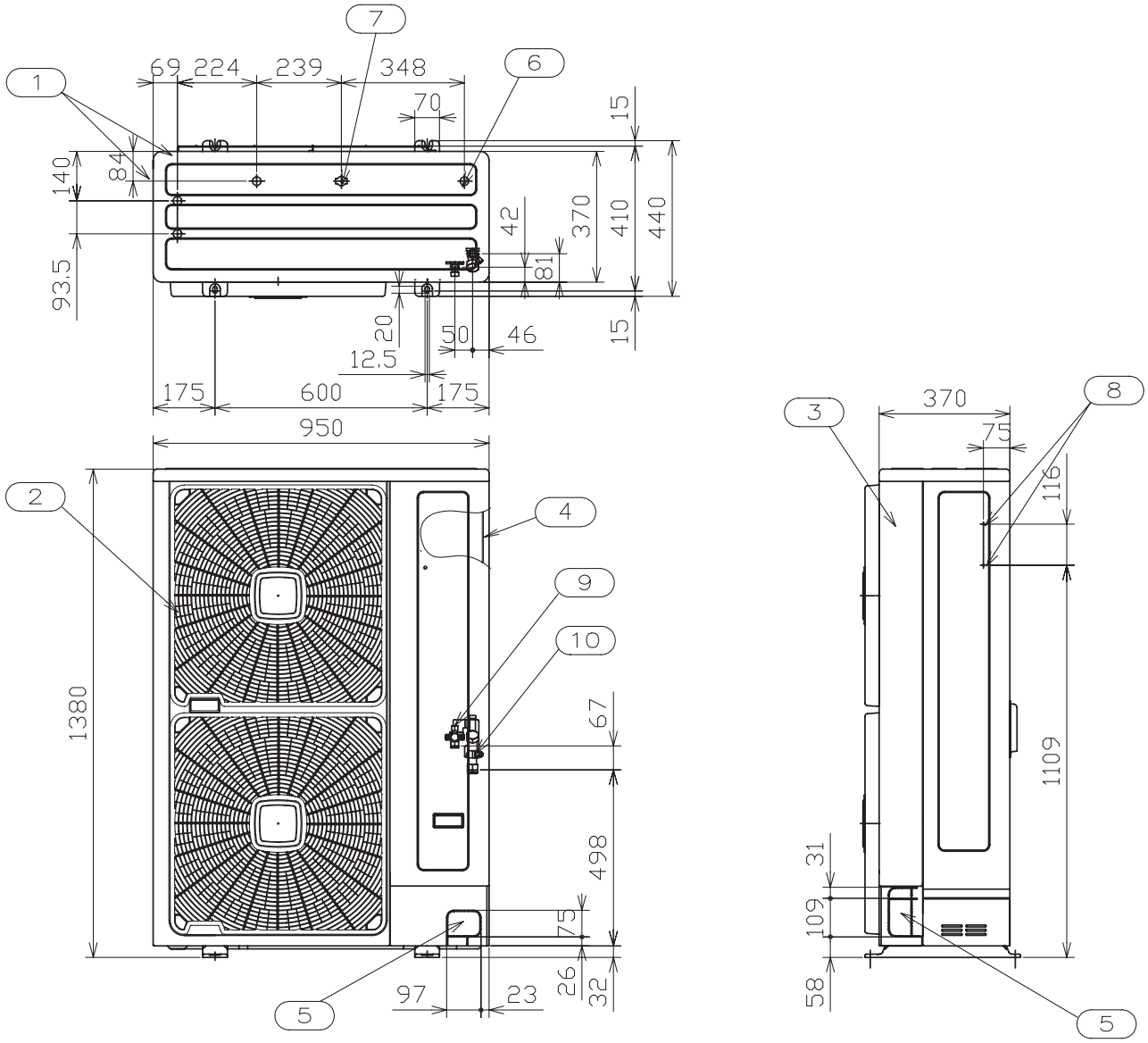




Units in: mm

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: Ø9.52 (3/8”)
10	Refrigerant gas pipe	Flare nut: Ø15.88 (5/8”)

◆ RAS-(4-6)H(V)RNME-AF

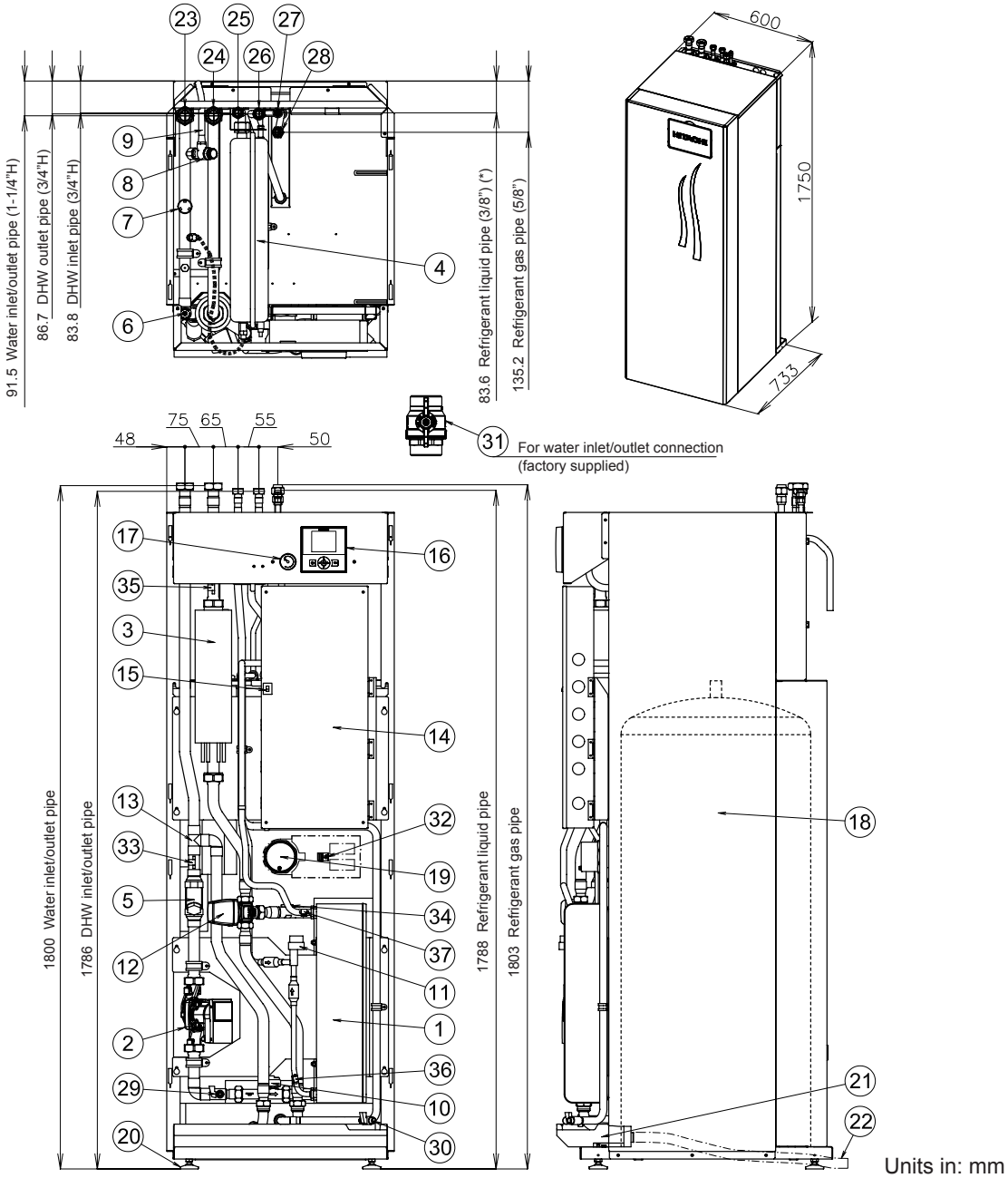


Units in: mm

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: Ø9.52 (3/8”)
10	Refrigerant gas pipe	Flare nut: Ø15.88 (5/8”)

7.1.2 Indoor unit

◆ RWD-(2.0-6.0)(H)FSNWE-200S



Units in: mm

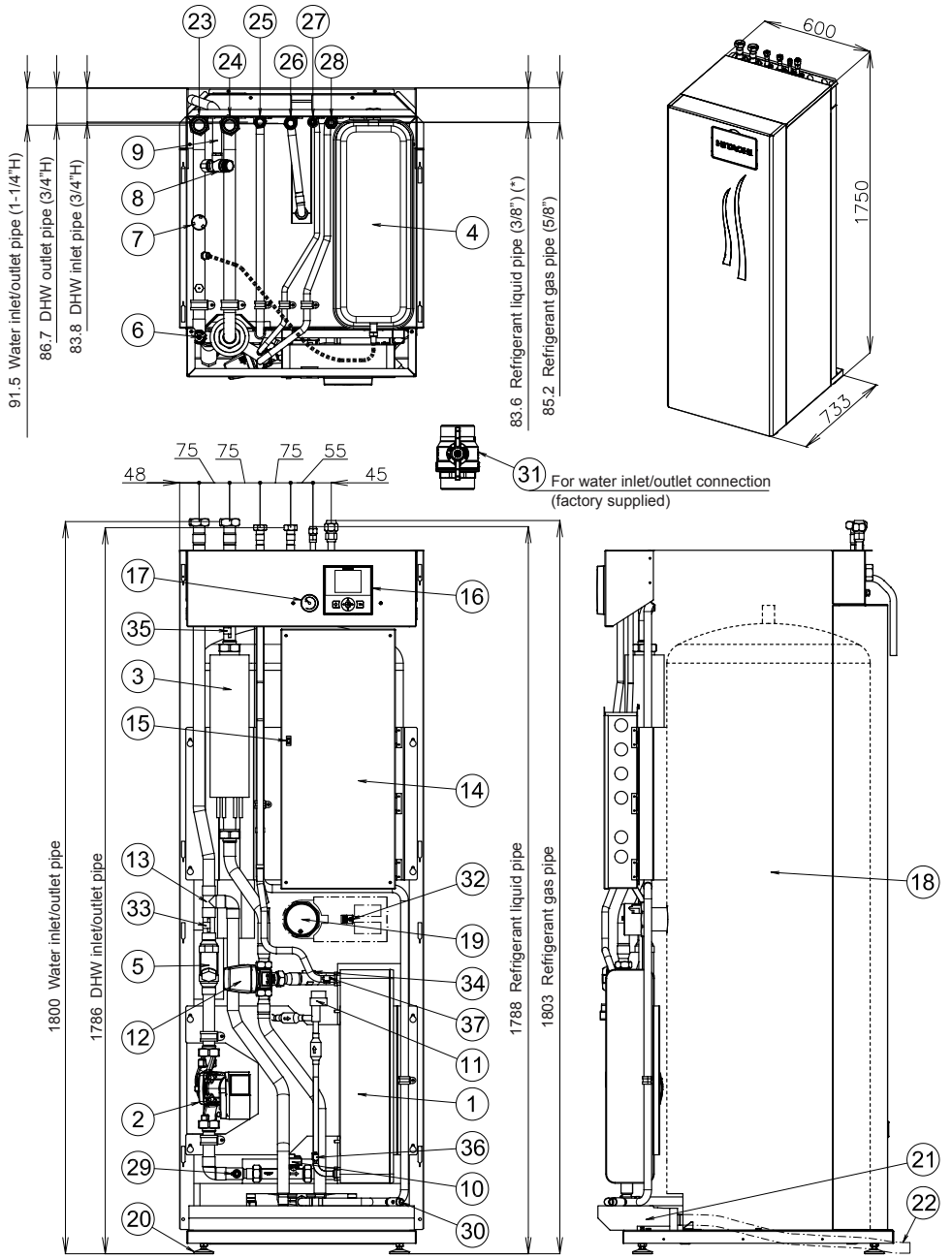
No.	Part name
1	Plate heat exchanger
2	Water pump
3	Electric heater
4	Expansion vessel
5	Water strainer
6	Air purger
7	Low water pressure switch
8	Safety valve
9	Drain pipe for safety valve
10	Flow meter
11	Expansion valve
12	3-way valve (For space heating and DHW)
13	T-branch (For space heating and DHW)

No.	Part name
14	Electrical box
15	Switch for DHW “emergency” operation
16	LCD controller
17	Manometer
18	DHW tank (200 L)
19	DHW tank heater + thermostat
20	Mounting foot (x4)
21	Drain pan (For heating and cooling version)
22	Drain pipe (For heating and cooling version) (field supplied)
23	Water inlet connection
24	Water outlet connection
25	DHW inlet connection
26	DHW outlet connection

No.	Part name
27	Refrigerant liquid connection
28	Refrigerant gas connection
29	Drain port (For indoor unit water) (G3/8”)
30	Drain port (For DHW) (G3/8”)
31	Shut-off valve (factory-supplied accessory)
32	DHW thermistor
33	Water inlet thermistor
34	Water outlet heat pump thermistor
35	Water outlet thermistor
36	Refrigerant liquid pipe thermistor
37	Refrigerant gas pipe thermistor

(*) For 2HP: Refrigerant liquid pipe (1/4”)

◆ RWD-(2.0-6.0)(H)FSNWE-260S



Units in: mm

No	Part name
1	Plate heat exchanger
2	Water pump
3	Electric heater
4	Expansion vessel
5	Water strainer
6	Air purger
7	Low water pressure switch
8	Safety valve
9	Drain pipe for safety valve
10	Flow meter
11	Expansion valve
12	3-way valve (For space heating and DHW)
13	T-branch (For space heating and DHW)

No	Part name
14	Electrical box
15	Switch for DHW “emergency” operation
16	LCD controller
17	Manometer
18	DHW tank (260 L)
19	DHW tank heater + thermostat
20	Mounting foot (x4)
21	Drain pan (For heating and cooling version)
22	Drain pipe (For heating and cooling version) (field supplied)
23	Water inlet connection
24	Water outlet connection
25	DHW inlet connection
26	DHW outlet connection

No	Part name
27	Refrigerant liquid connection
28	Refrigerant gas connection
29	Drain port (For indoor unit water) (G3/8”)
30	Drain port (For DHW) (G3/8”)
31	Shut-off valve (factory-supplied accessory)
32	DHW thermistor
33	Water inlet thermistor
34	Water outlet heat pump thermistor
35	Water outlet thermistor
36	Refrigerant liquid pipe thermistor
37	Refrigerant gas pipe thermistor

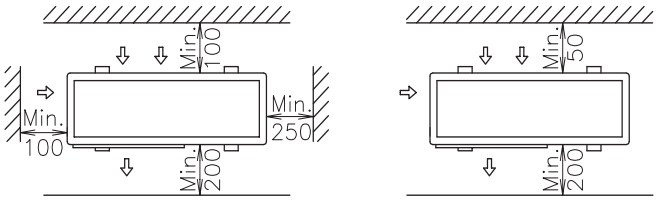
(*) For 2HP: Refrigerant liquid pipe (1/4”)

7.2 Service space

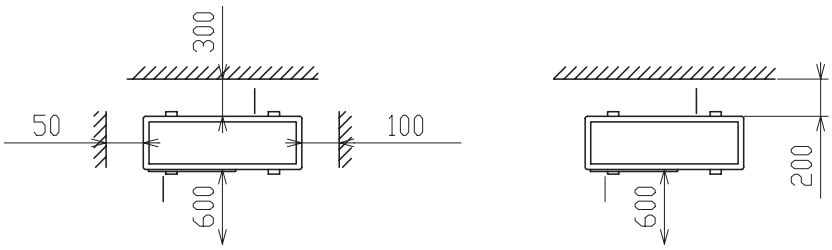
With the aim to assign the correct space for the unit servicing, it must be taken into account the minimum distances allowed.

7.2.1 Outdoor unit

◆ **RAS-2HVRN2**



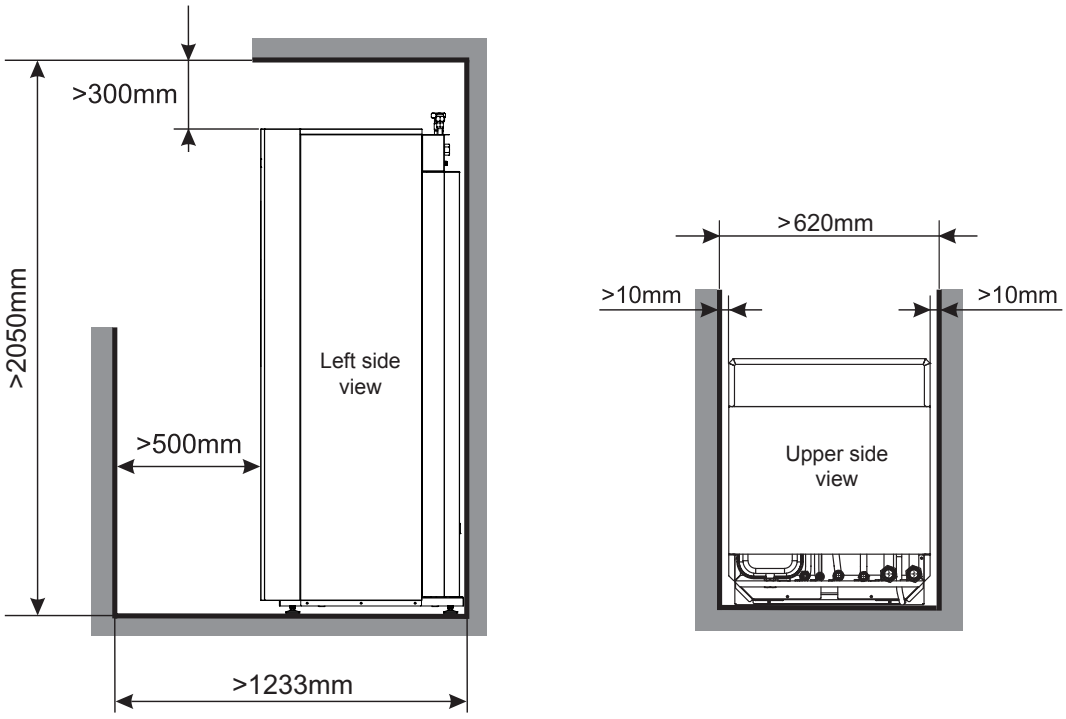
◆ **RAS-(3-6)H(V)RNME-AF**



NOTE

- *Units: mm*
- *For the specific information, please refer to the Service Manual.*

7.2.2 Indoor unit



7

8. Refrigerant cycle and hydraulic circuit

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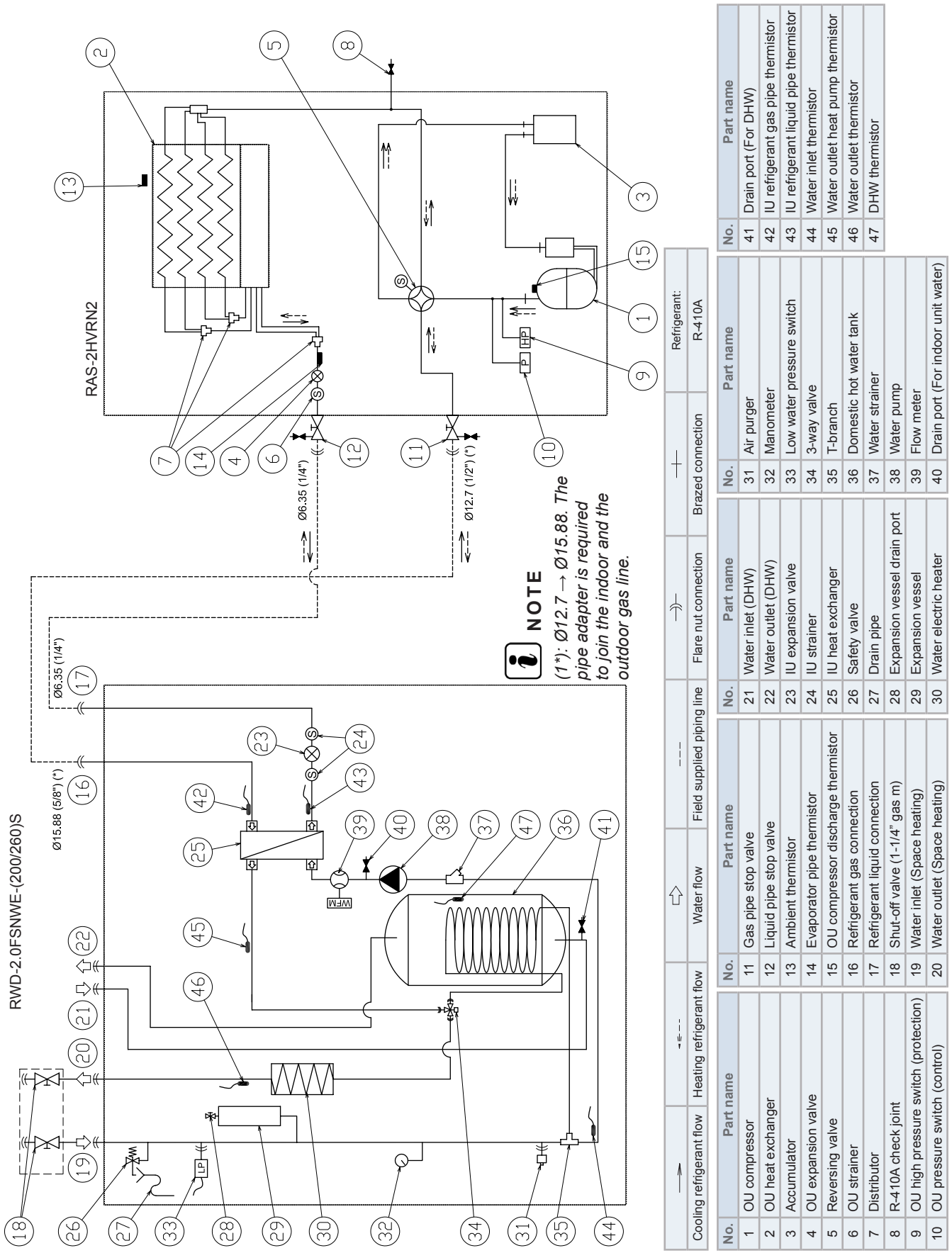
8.2 RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S combination 97

8.3 RAS-(4-6)H(V)RNME-AF + RWD-(4.0-6.0)(H)FSNWE-(200/260)S combination..... 98

8.1 RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S combination



No.	Part name
1	OU compressor
2	OU heat exchanger
3	Accumulator
4	OU expansion valve
5	Reversing valve
6	OU strainer
7	Distributor
8	R-410A check joint
9	OU high pressure switch (protection)
10	OU pressure switch (control)

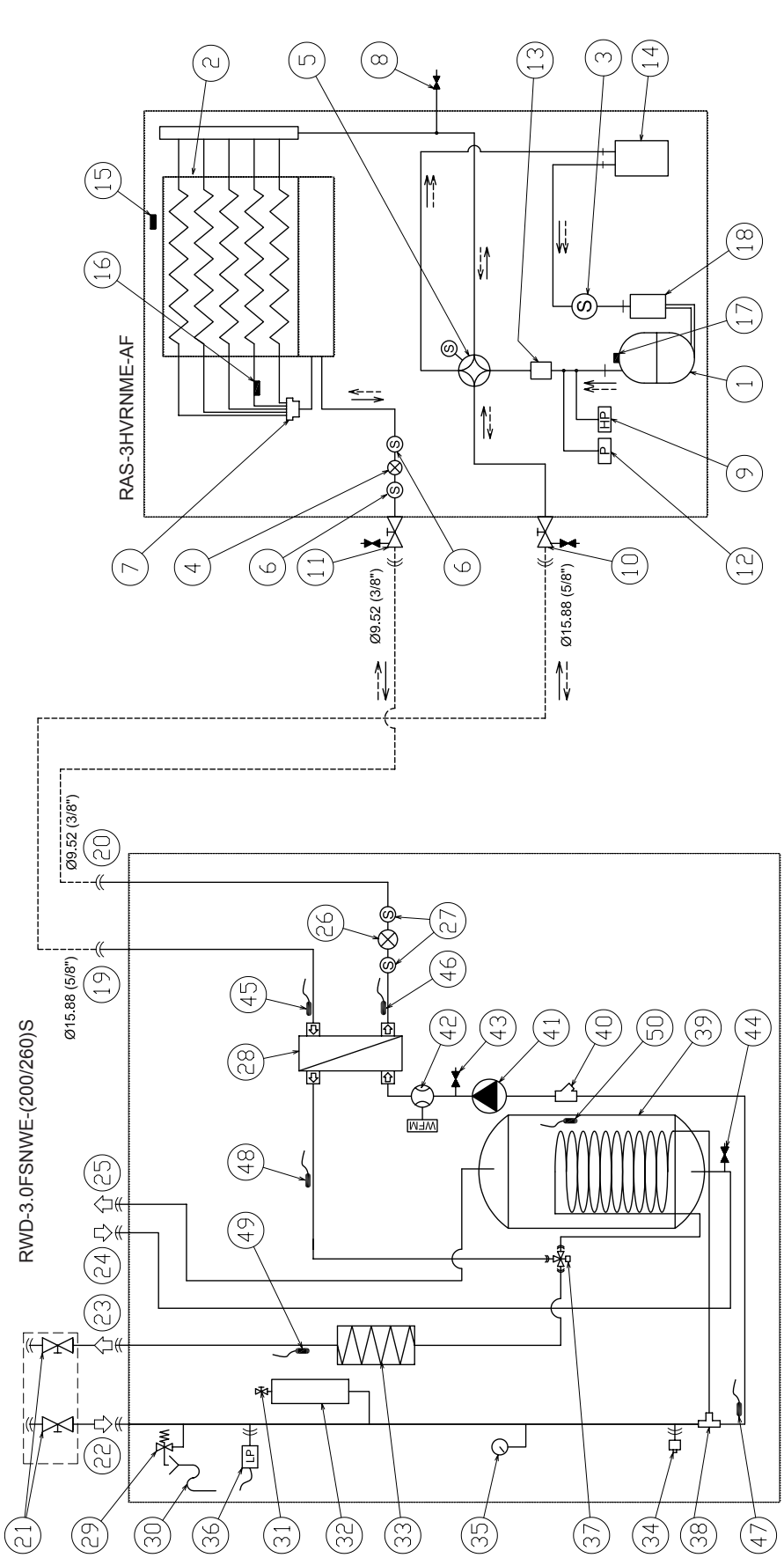
No.	Part name
11	Gas pipe stop valve
12	Liquid pipe stop valve
13	Ambient thermistor
14	Evaporator pipe thermistor
15	OU compressor discharge thermistor
16	Refrigerant gas connection
17	Refrigerant liquid connection
18	Shut-off valve (1-1/4" gas m)
19	Water inlet (Space heating)
20	Water outlet (Space heating)

No.	Part name
21	Water inlet (DHW)
22	Water outlet (DHW)
23	IU expansion valve
24	IU strainer
25	IU heat exchanger
26	Safety valve
27	Drain pipe
28	Expansion vessel drain port
29	Expansion vessel
30	Water electric heater

No.	Part name
31	Air purger
32	Manometer
33	Low water pressure switch
34	3-way valve
35	T-branch
36	Domestic hot water tank
37	Water strainer
38	Water pump
39	Flow meter
40	Drain port (For indoor unit water)

No.	Part name
41	Drain port (For DHW)
42	IU refrigerant gas pipe thermistor
43	IU refrigerant liquid pipe thermistor
44	Water inlet thermistor
45	Water outlet heat pump thermistor
46	Water outlet thermistor
47	DHW thermistor

8.2 RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S combination



No.	Part name
1	OU compressor
2	OU heat exchanger
3	OU strainer
4	OU expansion valve
5	Reversing valve
6	OU strainer
7	Distributor
8	R-410A check joint
9	OU high pressure switch (protection)
10	Gas pipe stop valve
11	Liquid pipe stop valve

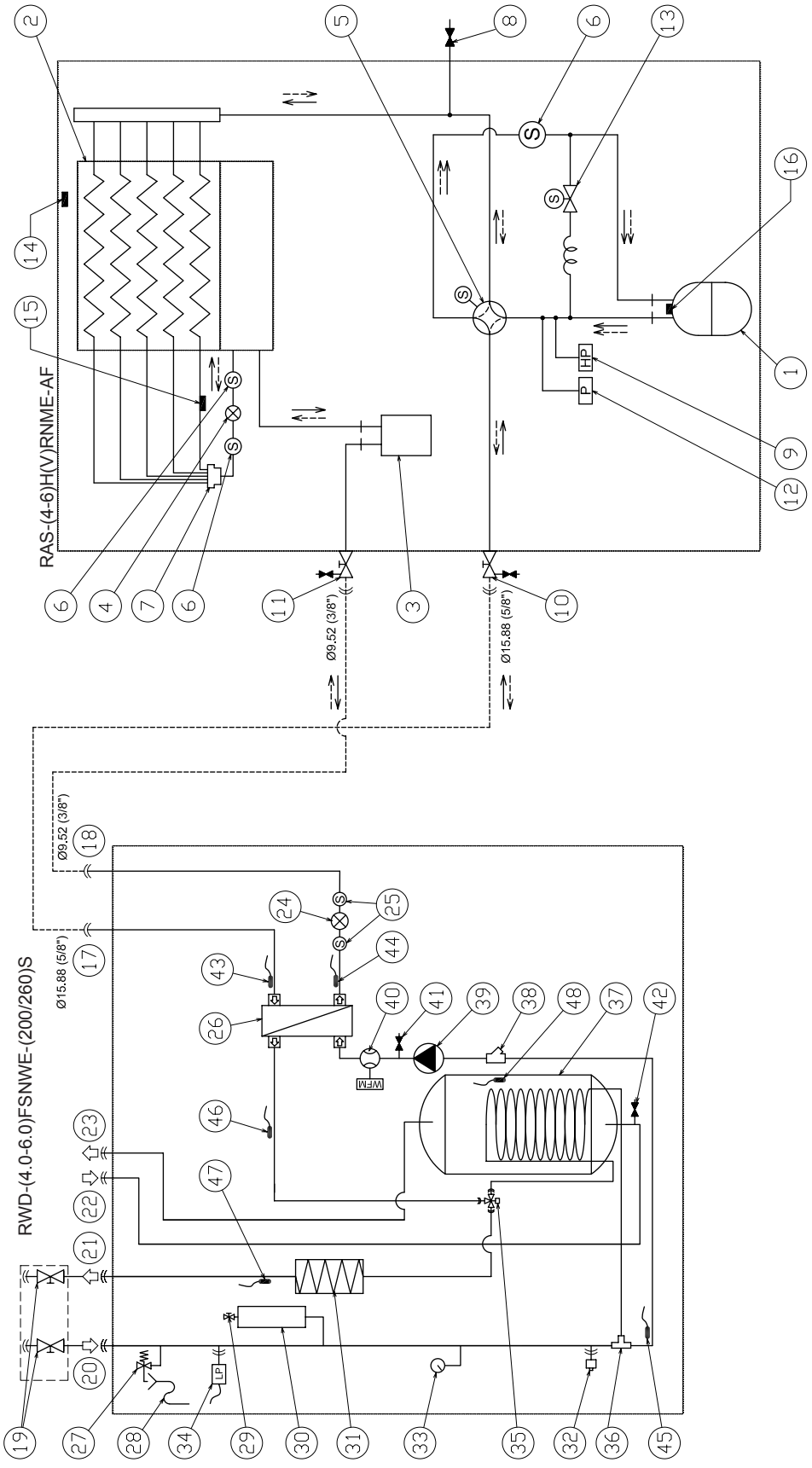
No.	Part name
12	OU pressure switch (control)
13	Silencer
14	Accumulator
15	Ambient thermistor
16	Evaporator pipe thermistor
17	OU compressor discharge thermistor
18	Receiver
19	Refrigerant gas connection
20	Refrigerant liquid connection
21	Shut-off valve (1-1/4" gas m)
22	Water inlet (Space heating)

No.	Part name
23	Water outlet (Space heating)
24	Water inlet (DHW)
25	Water outlet (DHW)
26	IU expansion valve
27	IU strainer
28	IU heat exchanger
29	Safety valve
30	Drain pipe
31	Expansion vessel drain port
32	Expansion vessel
33	Water electric heater

No.	Part name
34	Air purger
35	Manometer
36	Low water pressure switch
37	3-way valve
38	T-branch
39	Domestic hot water tank
40	Water strainer
41	Water pump
42	Flow meter
43	Drain port (For indoor unit water)
44	Drain port (For DHW)

No.	Part name
45	IU refrigerant gas pipe thermistor
46	IU refrigerant liquid pipe thermistor
47	Water inlet thermistor
48	Water outlet heat pump thermistor
49	Water outlet thermistor
50	DHW thermistor

8.3 RAS-(4-6)H(V)RNME-AF + RWD-(4.0-6.0)(H)FSNWE-(200/260)S combination



Cooling refrigerant flow | Heating refrigerant flow | Water flow | Field supplied piping line | Flare nut connection | Brazed connection | Refrigerant: R-410A

No.	Part name
1	OU compressor
2	OU heat exchanger
3	Liquid tank
4	OU expansion valve
5	Reversing valve
6	OU strainer
7	Distributor
8	R-410A check joint
9	OU high pressure switch (protection)
10	Gas pipe stop valve

No.	Part name
11	Liquid pipe stop valve
12	OU pressure switch (control)
13	Solenoid valve
14	Ambient thermistor
15	Evaporator pipe thermistor
16	OU compressor discharge thermistor
17	Refrigerant gas connection
18	Refrigerant liquid connection
19	Shut-off valve (1-1/4" gas m)
	Water inlet (Space heating)

No.	Part name
21	Water outlet (Space heating)
22	Water inlet (DHW)
23	Water outlet (DHW)
24	IU expansion valve
25	IU strainer
26	IU heat exchanger
27	Safety valve
28	Drain pipe
29	Expansion vessel drain port
30	Expansion vessel

No.	Part name
31	Water electric heater
32	Air purger
33	Manometer
34	Low water pressure switch
35	3-way valve
36	T-branch
37	Domestic hot water tank
38	Water strainer
39	Water pump
40	Flow meter

No.	Part name
41	Drain port (For indoor unit water)
42	Drain port (For DHW)
43	IU refrigerant gas pipe thermistor
44	IU refrigerant liquid pipe thermistor
45	Water inlet thermistor
46	Water outlet heat pump thermistor
47	Water outlet thermistor
48	DHW thermistor

9. Refrigerant and water piping

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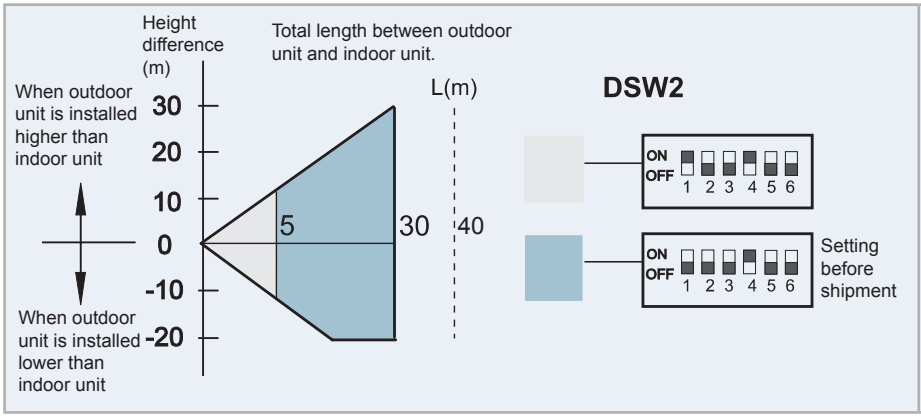
9.1 Refrigerant circuit

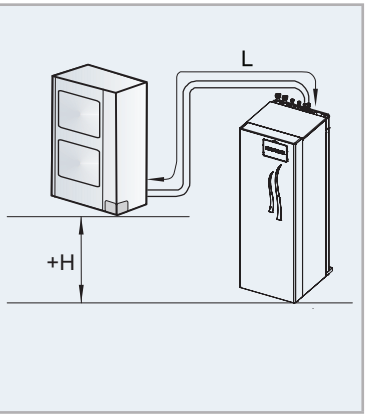
9.1.1 Refrigerant piping

◆ Refrigerant piping length between indoor unit and outdoor unit

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

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





Item		(2-6)HP
Maximum piping length between outdoor unit and indoor unit (Lmax)	Actual piping length	30 m
	Equivalent piping length	40 m
Minimum piping length between outdoor unit and indoor unit (Lmin)	Actual piping length	5 m
Maximum height difference between indoor and outdoor unit (H)	Outdoor unit higher than indoor unit	30 m
	Indoor unit higher than outdoor unit	20 m

NOTE

If the actual piping length between outdoor and indoor unit is less than 5m, contact with your dealer.

◆ 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")	RWD-2.0FSNWE-(200/260)S	Ø 15.88 (5/8")(1*)	Ø 6.35 (1/4")
RAS-3HVRNME-AF	Ø 15.88 (5/8")	Ø 9.52 (3/8")	RWD-3.0FSNWE-(200/260)S	Ø 15.88 (5/8")	Ø 9.52 (3/8")
RAS-4H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.52 (3/8")	RWD-4.0FSNWE-(200/260)S	Ø 15.88 (5/8")	Ø 9.52 (3/8")
RAS-5H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.52 (3/8")	RWD-5.0FSNWE-(200/260)S	Ø 15.88 (5/8")	Ø 9.52 (3/8")
RAS-6H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.52 (3/8")	RWD-6.0FSNWE-(200/260)S	Ø 15.88 (5/8")	Ø 9.52 (3/8")

NOTE

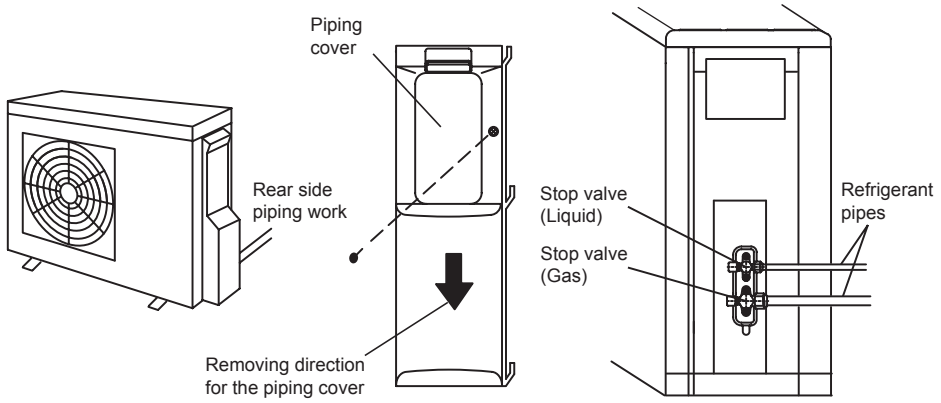
(1): 2HP system only (RAS-2HVRN2 + RWD-2.0FSNWE-(200/260)S): The refrigerant gas piping sizes are different between outdoor and indoor unit, so a refrigerant pipe adapter is required (Ø12.7 → Ø15.88). This pipe adapter is factory supplied with the outdoor unit.*

9.1.2 Piping connections location

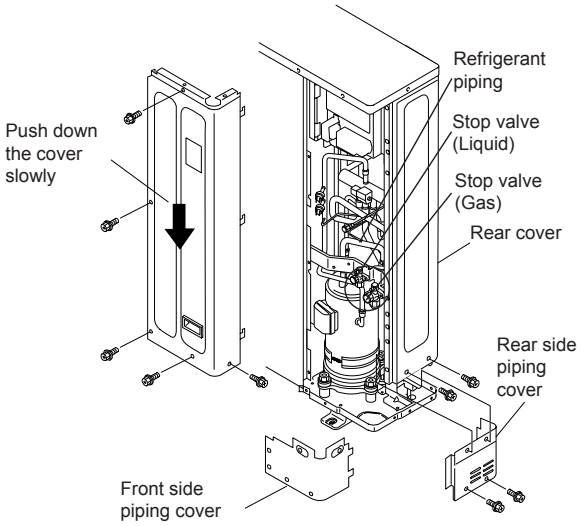
◆ Outdoor unit

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

RAS-2HVRN2



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

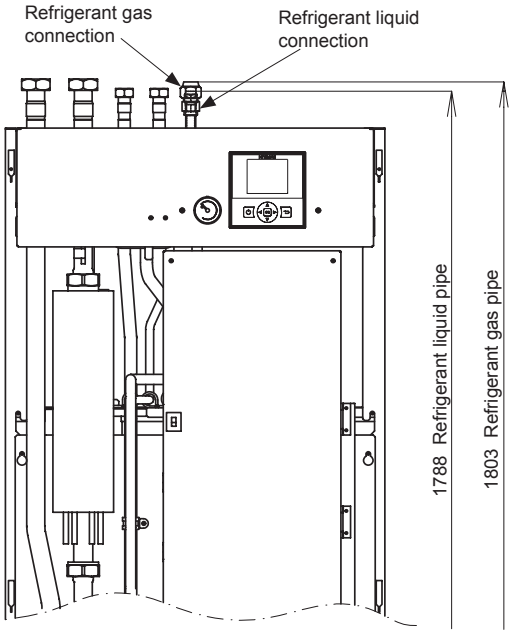


◆ Indoor unit

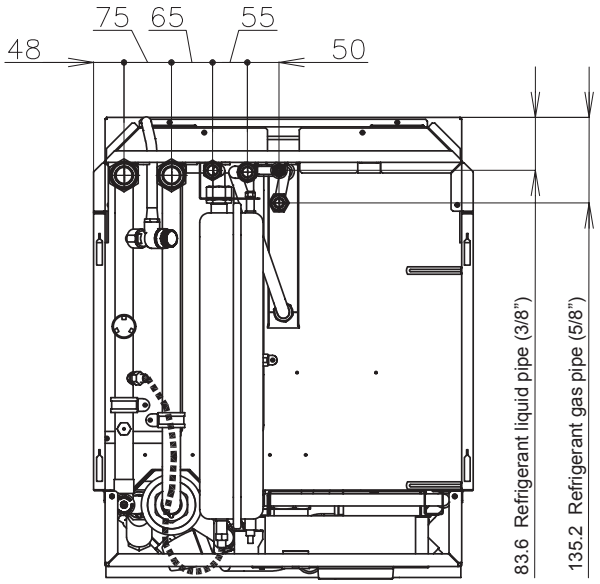
Refrigerant gas/liquid connection (R410A) of indoor unit are located where it is visible in the following images:

RWD-(2.0-6.0)(H)FSNWE-200S

Units in: mm



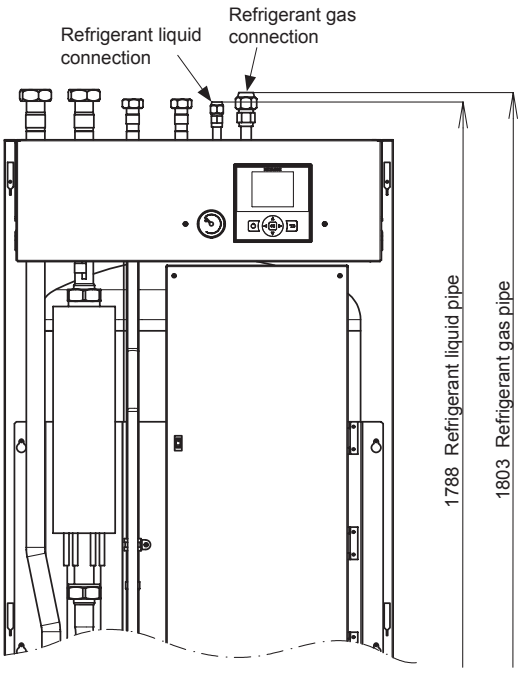
(Front view)



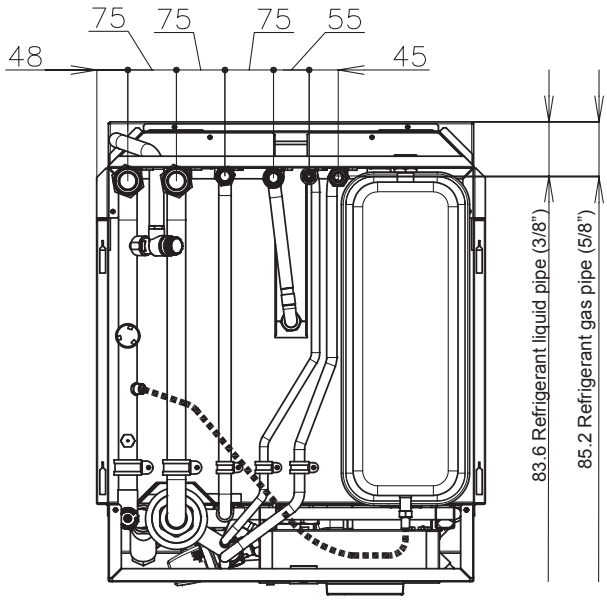
(Upper view)

RWD-(2.0-6.0)(H)FSNWE-260S

Units in: mm



(Front view)



(Upper view)

9.1.3 Refrigerant charge

◆ Refrigerant charge amount

The R410A refrigerant is factory charged with a refrigerant charge amount for 30 m of piping length. The maximum refrigerant piping length is 30 m, so an additional refrigerant charge is not required.

NOTE

Refer to the outdoor unit Installation and operation manual to charge the R410A refrigerant inside the indoor unit.

◆ 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

9.1.4 Precautions in the event of gas refrigerant leaks

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

CAUTION

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

◆ Maximum permitted concentration of HFCs

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

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

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

System combination	Minimum volume (m³)
RAS-2HVRN2 + RWD-2.0(H)FSNWE-(200/260)S	> 3.7
RAS-3HVRNME-AF + RWD-3.0(H)FSNWE-(200/260)S	> 5.5
RAS-4H(V)RNME-AF + RWD-4.0(H)FSNWE-(200/260)S	> 8.9
RAS-5H(V)RNME-AF + RWD-5.0(H)FSNWE-(200/260)S	> 9.1
RAS-6H(V)RNME-AF + RWD-6.0(H)FSNWE-(200/260)S	> 9.1

The formula for the calculation of the refrigerant concentration that there would be in case of refrigerant leakage is the following:

$\frac{R}{V} = C$	R: Total quantity of refrigerant charged (kg) V: Room volume (m³) C: Refrigerant concentration (=0.44* kg/m³ for R410A)

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

◆ Countermeasure in the event of possible refrigerant leakage

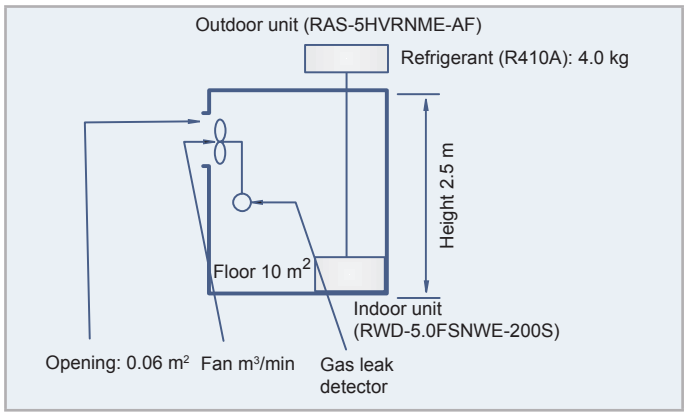
The room must have the following features to prevent suffocation in case a refrigerant leakage occurs:

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

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

Example:



Room	R (kg)	V (m³)	C (kg/m³)	Countermeasure
A	4.0	25	0.16	-

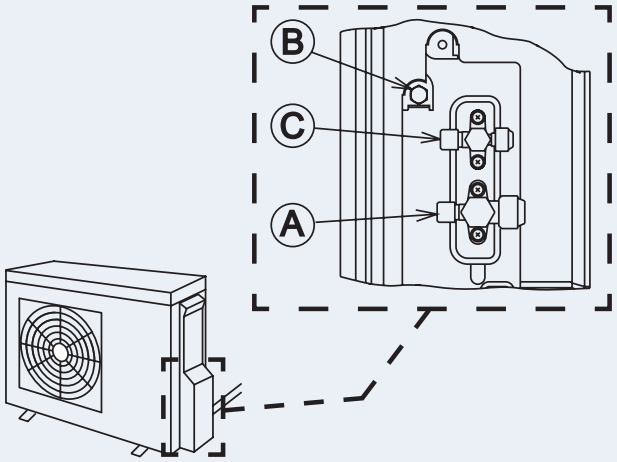
9.1.5 Pump down of refrigerant

CAUTION

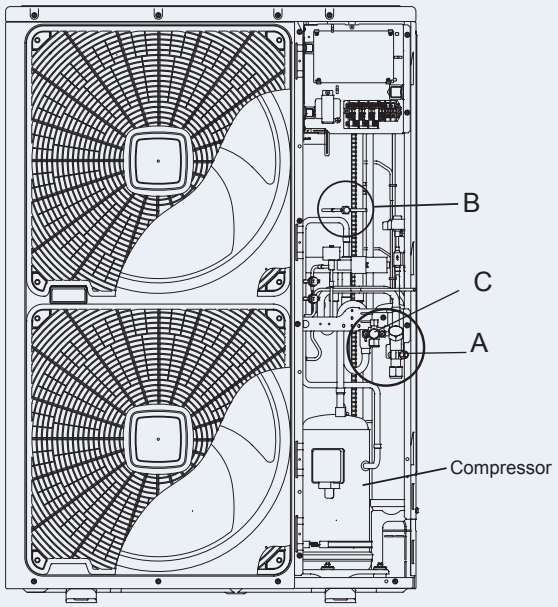
The pumping down of the R410A refrigerant must be done through the outdoor unit. Refer to the outdoor unit Installation and operation manual for the procedure.

9.1.6 Refrigerant check joints

RAS-2HVRN2



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



(Front view)

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

NOTE

The RAS-3HVRNME-AF contains one fan only, instead two, but the location of the check joints is almost the same than for the 4-6 HP models.

9.2 Space heating and DHW

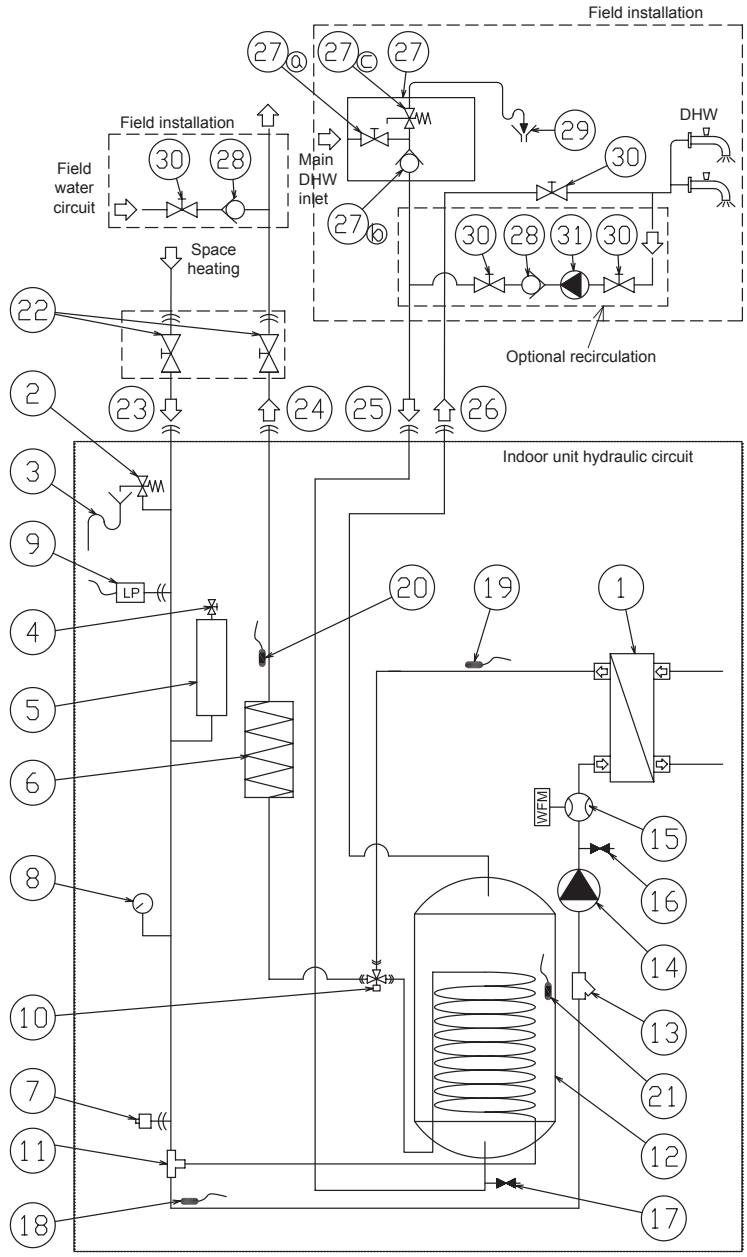
DANGER

Do not connect the power supply to the indoor unit prior to filling the space heating and DHW circuits with water and checking water pressure and the total absence of any water leakage.

NOTE

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

9.2.1 Hydraulic circuit



Water flow	Flare nut connection	Brazed connection

Nature	No.	Part name
Factory installed	1	IU heat exchanger
	2	Safety valve
	3	Drain pipe
	4	Expansion vessel drain port
	5	Expansion vessel
	6	Water electric heater
	7	Air purger
	8	Manometer
	9	Low water pressure switch
	10	3-way valve
	11	T-branch
	12	Domestic hot water tank
	13	Water strainer
	14	Water pump
	15	Flow meter
	16	Drain port (For indoor unit water)
	17	Drain port (For DHW)
	18	Water inlet thermistor
	19	Water outlet heat pump thermistor
	20	Water outlet thermistor
	21	DHW thermistor
Factory supplied	22	Shut-off valve (factory-supplied)
Piping connections	23	Water inlet (Space heating)
	24	Water outlet (Space heating)
	25	Water inlet (DHW)
	26	Water outlet (DHW)
Accessories	27	Security water valve for DHW tank (DHWT-SWG-01)
	27a	Shut-off valve
	27b	Water check valve
	27c	Pressure relief valve
	28	Water check valve (ATW-WCV-01 accessory)
Field supplied	29	Draining
	30	Shut-off valve
	31	Recirculation pump

◆ Additional hydraulic necessary elements

Space heating

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

- 2 shut-off valves (factory supplied accessory) (22) must be installed in the indoor unit. One at the water inlet connection (23) and the other at the water outlet connection (24) in order to make easier any maintenance work.
- 1 water check valve (ATW-WCV-01 accessory) (28) with 1 shut-off valve (field supplied) (30) must be connected to the water filling point when filling the indoor unit. The Check valve acts as a safety device to protect the installation against back pressure, back flow and back syphon of non-potable water into drinking water supply net.

NOTE

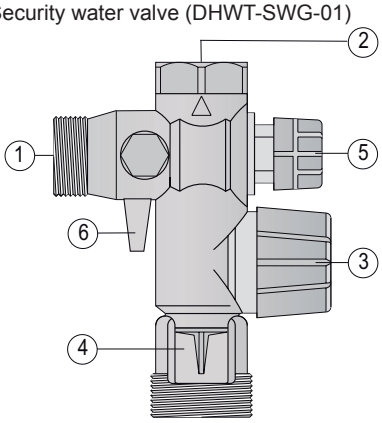
An additional special water filter is highly recommended to be installed on the space heating (field installation), in order to remove possible particles remaining from brazing which cannot be removed by the indoor unit water strainer.

DHW

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

- **1 Security water valve (DHWT-SWG-01 accessory)**: this Hitachi accessory (27) is a pressure and temperature relief valve that must be installed as near as possible at the DHW inlet connection (25) (pressure setting: 7 bar). The security water valve provides:
  - Pressure protection
  - Non-return function
  - Shut-off valve
  - Filling
  - Draining

Security water valve (DHWT-SWG-01)



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

NOTE

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

- **1 Shut-off valve (field supplied)**: one shut-off valve (30) must be connected after the DHW outlet connection (26) in order to make easier any maintenance work.

◆ Additional hydraulic optional elements (For DHW)

In case of a recirculation circuit for the DHW circuit:

- 1 Recirculation pump (field supplied): this pump (31) will help to correctly recirculate the hot water to the DHW inlet.
- 1 Water check valve (ATW-WCV-01 accessory): this Hitachi accessory (27) is connected after the pump (31) in order to ensure the non-return of water.
- 2 Shut-off valves (field supplied) (30): one before the pump (31) and other after the water check valve accessory (27).

NOTE

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

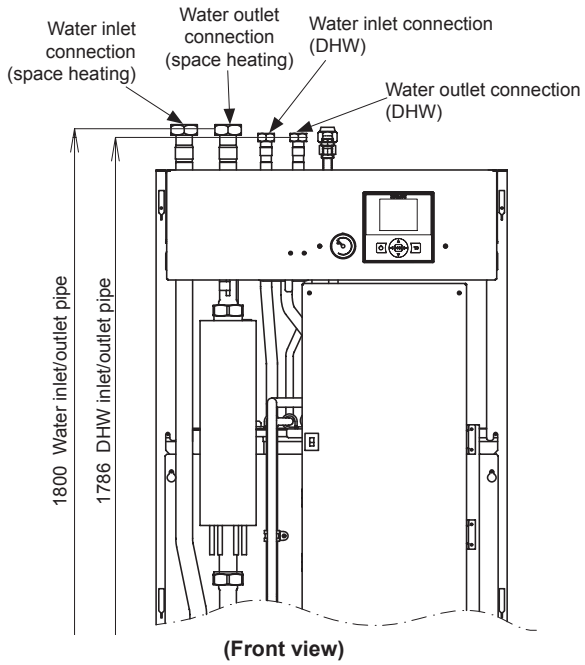
9.2.2 Water piping

◆ Water pipes connection

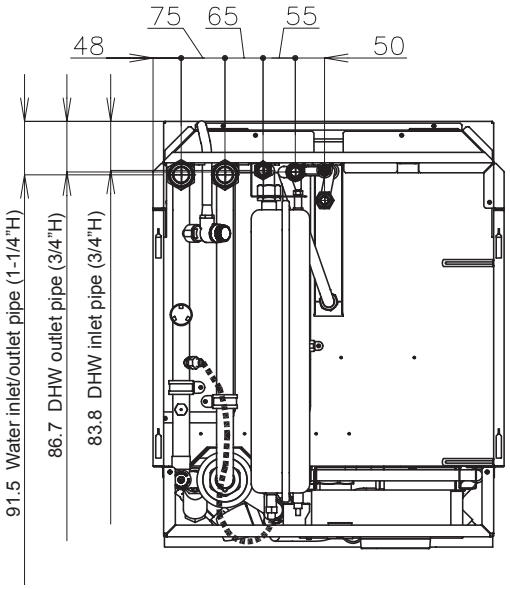
The water connections (space heating and DHW) of the indoor unit are located where it is visible in the following images:

RWD-(2.0-6.0)(H)FSNWE-200S

Units in: mm



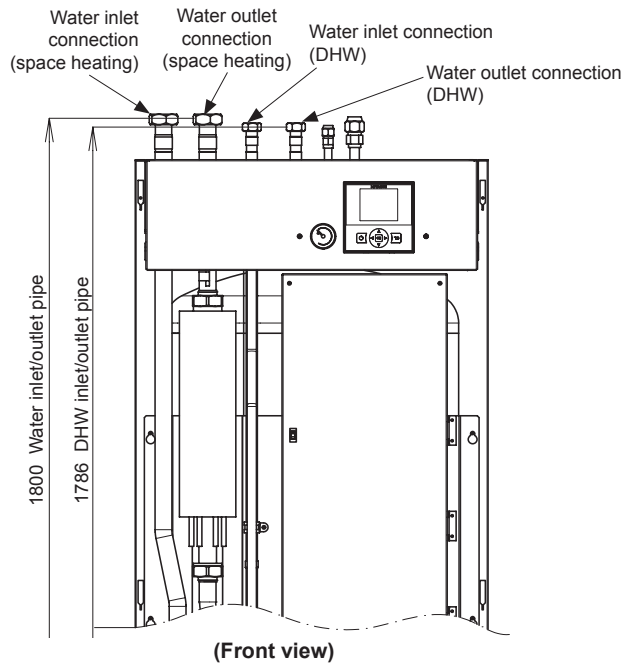
(Front view)



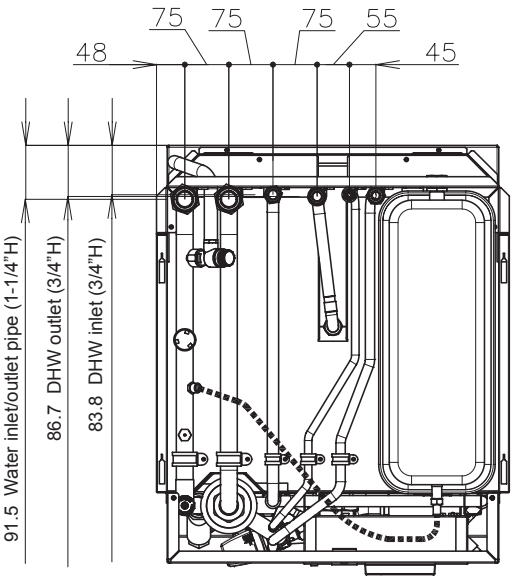
(Upper view)

RWD-(2.0-6.0)(H)FSNWE-260S

Units in: mm



(Front view)



(Upper view)

Piping size

(mm (inches))

	Space heating	DHW
Inlet connection	Ø31.75 (1-1/4")	Ø19.05 (3/4")
Outlet connection	Ø31.75 (1-1/4")	Ø19.05 (3/4")

9.2.3 Water quality

CAUTION

- *Water quality must be according to EU council directive 98/83 EC.*
- *Water should be subjected to filtration or to a softening treatment with chemicals before application as treated water.*
- *It is also necessary to analyse the quality of water by checking pH, electrical conductivity, ammonia ion content, sulphur content, and others. Should the results of the analysis be not good, the use of industrial water would be recommended.*
- *No antifreeze agent shall be added to the water circuit.*
- *To avoid deposits of scale on the heat exchangers surface it is mandatory to ensure a high water quality with low levels of $CaCO_3$.*

◆ Recommendations for the DHW circuit

The following is the recommended standard water quality.

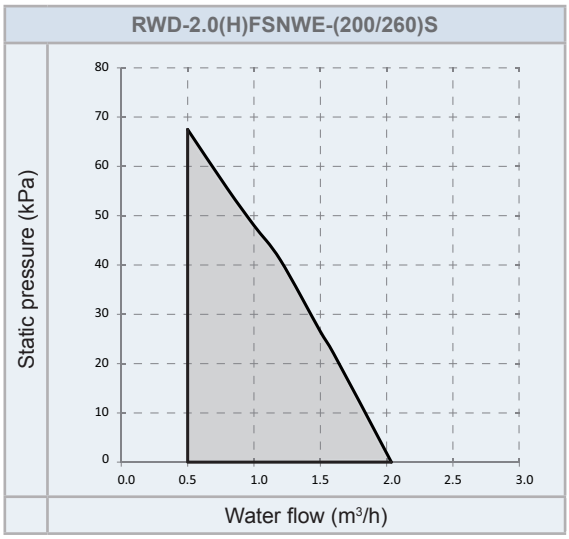
Item	DHW space	Tendency (1)	
	Water supplied (3)	Corrosion	Deposits of scales
Electrical Conductivity (mS/m) (25°C) {µS/cm} (25 °C) (2)	100~2000	●	●
Chlorine Ion (mg Cl^-/l)	max. 250	●	
Sulphate (mg/l)	max. 250	●	
Combination of chloride and sulphate (mg/l)	max. 300	●	●
Total Hardness (mg $CaCO_3$ /l)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

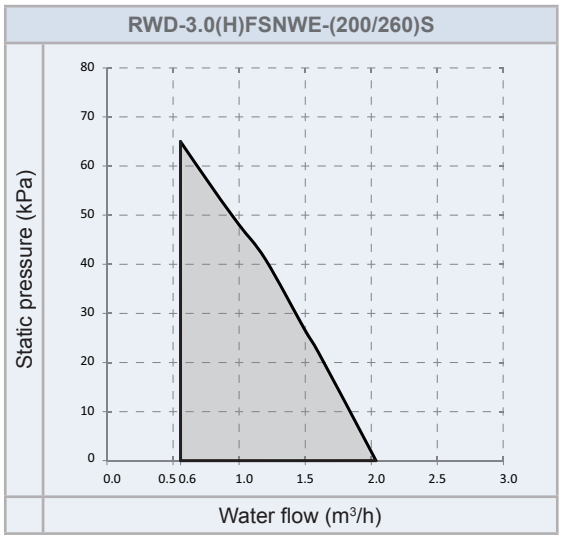
NOTE

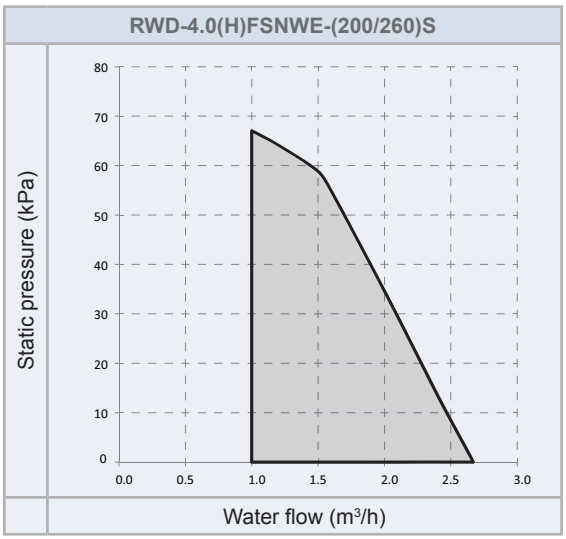
- *(1): The mark "●" in the table means the factor concerned with the tendency of corrosion or deposits of scales.*
- *(2): The value shown in "{}" are for reference only according to the former unit.*
- *(3): Water range will be according s/UNE 112076:2004 IN.*

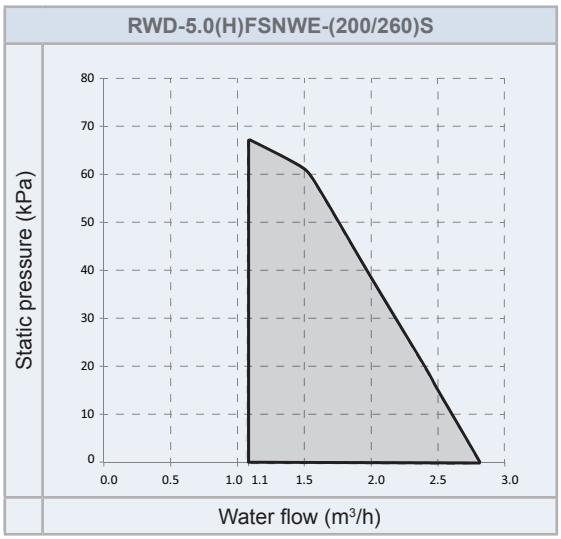
9.2.4 Pressure charts

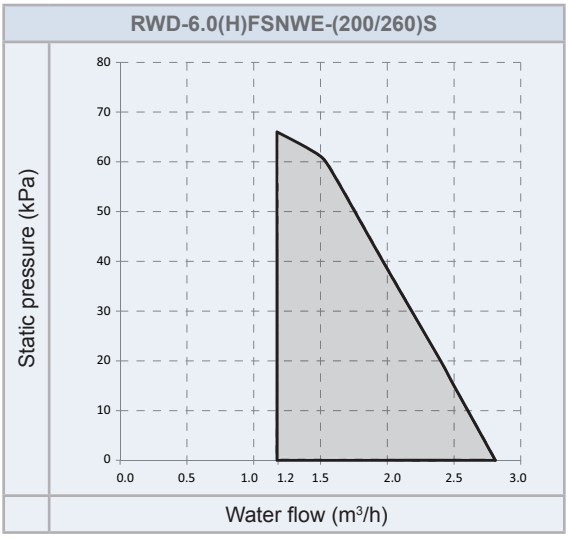
◆ **RWD-(2.0-6.0)(H)FSNWE-(200/260)S**











NOTE

If there is selected a water flow rate out of the working range of the unit, it can cause malfunction on the unit. Please, try to operate the pump within the minimum and maximum water flow of the indoor unit, as it is shown on the previous graphs.

10. Electrical and control settings

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10.1 General check

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

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

Indoor unit	Z_{max} (Ω)			
	Phase	Operation mode		
		Unit heater and DHW tank heater disabled	Unit heater enabled; DHW tank heater disabled (Default operation)	Unit heater and DHW tank heater enabled
RWD-2.0(H)FSNWE-(200/260)S	1~	-	-	0.27
RWD-3.0(H)FSNWE-(200/260)S	1~	-	-	0.27
RWD-4.0(H)FSNWE-(200/260)S	1~	-	0.26	0.18
	3N~	-	-	-
RWD-5.0(H)FSNWE-(200/260)S	1~	-	0.26	0.18
	3N~	-	-	-
RWD-6.0(H)FSNWE-(200/260)S	1~	-	0.26	0.18
	3N~	-	-	-

NOTE

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

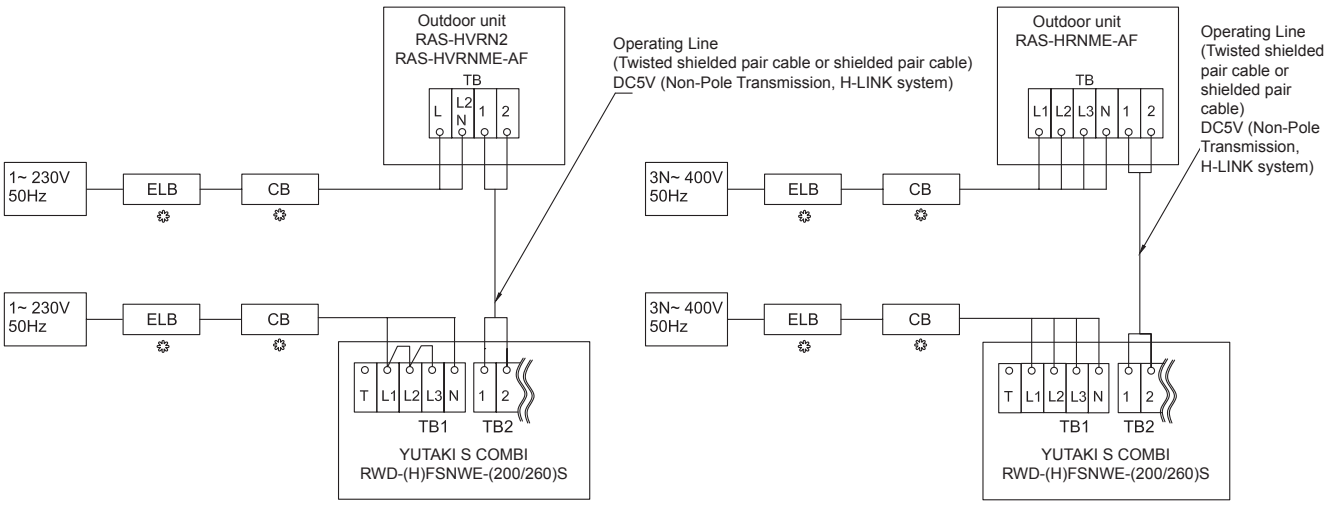
- The status of Harmonics for each model, regarding compliance with IEC 61000-3-2 and IEC 61000-3-12, is as follows:

Status regarding compliance with IEC 61000-3-2 and IEC 61000-3-12	Models	
	Outdoor unit	Indoor unit
Equipment complying with IEC 61000-3-12	RAS-4HVRNME-AF	RWD-4.0(H)FSNWE-(200/260)S (1~)
	RAS-5HVRNME-AF	RWD-5.0(H)FSNWE-(200/260)S (1~)
	RAS-6HVRNME-AF	RWD-6.0(H)FSNWE-(200/260)S (1~)
Equipment complying with IEC 61000-3-2 (professional use (*))	RAS-2HVRN2 (*)	RWD-2.0(H)FSNWE-(200/260)S (1~)
	RAS-3HVRNME-AF	RWD-3.0(H)FSNWE-(200/260)S (1~)
	RAS-4HRNME-AF (*)	RWD-4.0(H)FSNWE-(200/260)S (3N~)
	RAS-5HRNME-AF (*)	RWD-5.0(H)FSNWE-(200/260)S (3N~)
	RAS-6HRNME-AF (*)	RWD-6.0(H)FSNWE-(200/260)S (3N~)

- Check to ensure that existing installation (mains power switches, circuit breakers, wires, connectors and wire terminals) already complies with the national and local regulations.
- The use of the DHW tank heater is disabled as factory setting. If it is desired to enable the DHW tank heater operation during normal indoor unit operation, adjust the DSW4 pin 2 of the PCB1 to the ON position and use the adecuated protections. Refer to the section *"10.3 Electrical connection"* for the detailed information.

10.2 System wiring diagram

Connect the units (outdoor and indoor unit) according to the following electric diagram:



TB : Terminal board
CB : Circuit breaker
ELB : Earth leakage breaker
– – – : Internal wiring
—— : Field wiring
☼ : Field-supplied
1,2 : Outdoor-Indoor communication

10.3 Electrical connection

CAUTION

- *Check to ensure that the field supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated on this chapter and they comply with national and local codes. If it is necessary, contact with your local authority in regards to standards, rules, regulations, etc.*
- *Use a dedicated power circuit for the indoor unit. Do not use a power circuit shared with the outdoor unit or any other appliance.*

10.3.1 Wiring size

Use wires which are not lighter than the polychloroprene sheathed flexible cord (code designation 60245 IEC 57).

Outdoor unit

Model	Power supply	Max. current (A)	Power supply cables	Transmiting cables	Actuator cables
			EN60335-1	EN60335-1	EN60335-1
RAS-2HVRN2	1~ 230 V 50 Hz	11.0	2 x 2.5 mm² + GND	2 x 0.75 mm² (*Shielded cable)	2 x 0.75 mm² + GND
RAS-3HVRNME-AF		14.0	2 x 4.0 mm² + GND		
RAS-4HVRNME-AF		18.0	2 x 4.0 mm² + GND		
RAS-5HVRNME-AF		26.0	2 x 6.0 mm² + GND		
RAS-6HVRNME-AF		26.0	2 x 6.0 mm² + GND		
RAS-4HRNME-AF	3N~ 400 V 50 Hz	7.0	4 x 2.5 mm² + GND		
RAS-5HRNME-AF		11.0	4 x 4.0 mm² + GND		
RAS-6HRNME-AF		13.0	4 x 4.0 mm² + GND		

Indoor unit

Model	Operation mode (*1)	Power supply	Max. current (A)	Power supply cables	Transmitting cables	Actuator cables
				EN60335-1	EN60335-1	EN60335-1
RWD-2.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater disabled	1~ 230 V 50 Hz	6	2 x 1.5 mm² + GND	2 x 0.75mm²	2 x 0.75mm² + GND
RWD-3.0(H)FSNWE-(200/260)S			6	2 x 1.5 mm² + GND		
RWD-4.0(H)FSNWE-(200/260)S			6	2 x 1.5 mm² + GND		
RWD-5.0(H)FSNWE-(200/260)S			6	2 x 1.5 mm² + GND		
RWD-6.0(H)FSNWE-(200/260)S			6	2 x 1.5 mm² + GND		
RWD-2.0(H)FSNWE-(200/260)S	Unit heater enabled; DHW tank heater disabled (Default operation)		15	2 x 4.0 mm² + GND		
RWD-3.0(H)FSNWE-(200/260)S			15	2 x 4.0 mm² + GND		
RWD-4.0(H)FSNWE-(200/260)S			30	2 x 6.0 mm² + GND		
RWD-5.0(H)FSNWE-(200/260)S			30	2 x 6.0 mm² + GND		
RWD-6.0(H)FSNWE-(200/260)S			30	2 x 6.0 mm² + GND		
RWD-2.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater enabled		28	2 x 6.0 mm² + GND		
RWD-3.0(H)FSNWE-(200/260)S			28	2 x 6.0 mm² + GND		
RWD-4.0(H)FSNWE-(200/260)S			42	2 x 10.0 mm² + GND		
RWD-5.0(H)FSNWE-(200/260)S			42	2 x 10.0 mm² + GND		
RWD-6.0(H)FSNWE-(200/260)S			42	2 x 10.0 mm² + GND		
RWD-4.0(H)FSNWE-(200/260)S	Unit heater enabled; DHW tank heater disabled (Default operation)	3N~ 400 V 50 Hz	10	4 x 2.5 mm² + GND		
RWD-5.0(H)FSNWE-(200/260)S			10	4 x 2.5 mm² + GND		
RWD-6.0(H)FSNWE-(200/260)S			10	4 x 2.5 mm² + GND		
RWD-4.0(H)FSNWE-(200/260)S	Unit heater and DHW tank heater enabled		23	4 x 6.0 mm² + GND		
RWD-5.0(H)FSNWE-(200/260)S			23	4 x 6.0 mm² + GND		
RWD-6.0(H)FSNWE-(200/260)S			23	4 x 6.0 mm² + GND		

NOTE

*(*1): The DHW tank heater is intended to be used only in case that complementary heating on the DHW is needed by optional function. If the heater operation of the DHW tank is enabled during the indoor unit operation, the indoor unit CB and ELB could be switched off. If it is desired to enable the DHW tank heater operation during normal indoor unit operation, adjust the DSW4 pin 2 of the PCB1 to the ON position and consider the protections as indicated on the previous table.*

10.3.2 Minimum requirements of the protection devices

CAUTION

- *Ensure specifically that there is an Earth Leakage Breaker (ELB) installed for the units (outdoor and indoor unit).*
- *If the installation is already equipped with an Earth Leakage Breaker (ELB), ensure that its rated current is large enough to hold the current of the units (outdoor, indoor and DHW tank).*

NOTE

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

Outdoor unit

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (no. of poles/A/mA)
		U max. (V)	U min. (V)			
RAS-2HVRN2	1~230 V 50 Hz	253	207	11.0	16	2/40/30
RAS-3HVRNME-AF				14.0	20	
RAS-4HVRNME-AF				18.0	20	
RAS-5HVRNME-AF				26.0	32	
RAS-6HVRNME-AF				26.0	32	
RAS-4HRNME-AF	3N~ 400 V 50 Hz	440	360	7.0	15	4/40/30
RAS-5HRNME-AF				11.0	20	
RAS-6HRNME-AF				13.0	20	
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker						

Indoor unit

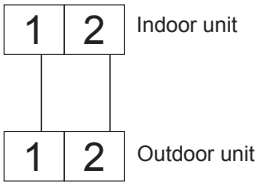
Model	Operation mode (*1)	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (nº poles/A/mA)
			U max. (V)	U min. (V)			
RWD-2.0(H)FSNWE-(200/260)S	Heater unit and DHW tank heater disabled	1~ 230 V 50 Hz	253	207	6	6	2/40/30
RWD-3.0(H)FSNWE-(200/260)S					6	6	
RWD-4.0(H)FSNWE-(200/260)S					6	6	
RWD-5.0(H)FSNWE-(200/260)S					6	6	
RWD-6.0(H)FSNWE-(200/260)S					6	6	
RWD-2.0(H)FSNWE-(200/260)S	Heater unit enabled; DHW tank heater disabled (Default operation)				15	20	2/40/30
RWD-3.0(H)FSNWE-(200/260)S					15	20	
RWD-4.0(H)FSNWE-(200/260)S					30	32	
RWD-5.0(H)FSNWE-(200/260)S					30	32	
RWD-6.0(H)FSNWE-(200/260)S					30	32	
RWD-2.0(H)FSNWE-(200/260)S	Heater unit and DHW tank heater enabled				28	32	2/40/30
RWD-3.0(H)FSNWE-(200/260)S					28	32	
RWD-4.0(H)FSNWE-(200/260)S					42	50	2/63/30
RWD-5.0(H)FSNWE-(200/260)S					42	50	
RWD-6.0(H)FSNWE-(200/260)S					42	50	
RWD-4.0(H)FSNWE-(200/260)S	Heater unit enabled; DHW tank heater disabled (Default operation)	3N~ 400 V 50 Hz	440	360	10	15	4/40/30
RWD-5.0(H)FSNWE-(200/260)S					10	15	
RWD-6.0(H)FSNWE-(200/260)S					10	15	
RWD-4.0(H)FSNWE-(200/260)S	Heater unit and DHW tank heater enabled				23	25	
RWD-5.0(H)FSNWE-(200/260)S					23	25	
RWD-6.0(H)FSNWE-(200/260)S					23	25	
MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker							

NOTE

*(*1): The DHW tank heater is intended to be used only in case that complementary heating on the DHW is needed by optional function. If the heater operation of the DHW tank is enabled during the indoor unit operation, the indoor unit CB and ELB could be switched off. If it is desired to enable the DHW tank heater operation during normal indoor unit operation, adjust the DSW4 pin 2 of the PCB1 to the ON position and consider the protections as indicated on the previous table.*

10.4 Transmission wiring between outdoor and indoor unit

- The transmission is wired to terminals 1-2.
- The H-LINK II wiring system requires only two transmission cables that connect the indoor unit and the outdoor unit.



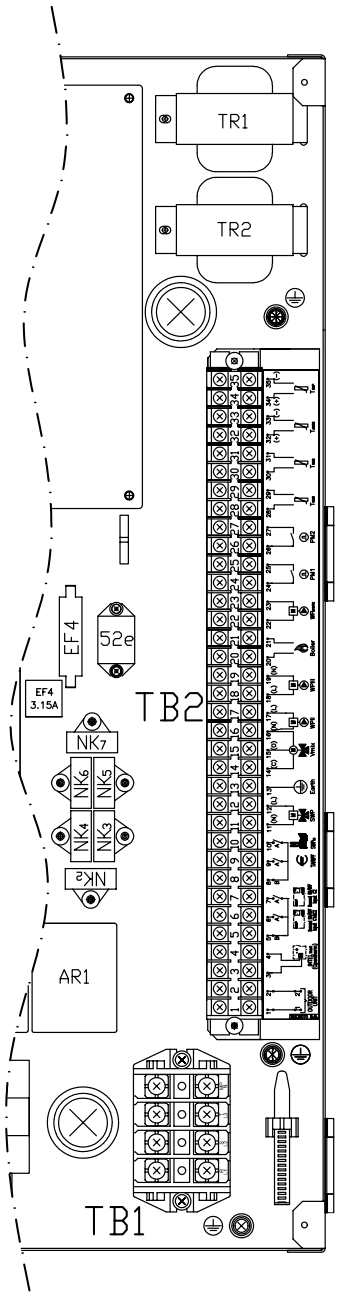
- Use twist pair wires (0.75 mm²) for operation wiring between outdoor unit and indoor unit. The wiring must consist of 2-core wires (Do not use wire with more than 3 cores).
- Use shielded wires for intermediate wiring to protect the units from noise interference, with a length of less than 300 m and a size in compliance with local codes.
- In the event that a conduit tube for field-wiring is not used, fix rubber bushes to the panel with adhesive.

⚠ CAUTION

Ensure that the transmission wiring is not wrongly connected to any live part that could be damaged the PCB.

10.5 Optional indoor unit wiring (accessories)

◆ Summary of the terminal board connections

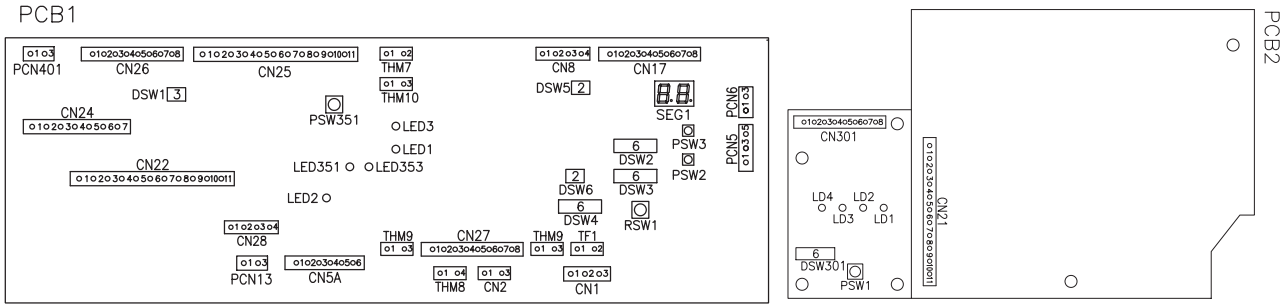


Mark	Part name		Description
TERMINAL BOARD 1 (TB1)			
N L1	1~ 230V 50Hz	3N~ 400V 50Hz	-
L2 L3	-		
TERMINAL BOARD 2 (TB2)			
1 2	Indoor/Outdoor commutation cables		The H-LINK transmission between outdoor unit and indoor unit is wired to terminals 1-2.
3 4	Opentherm communication cables		Only for Intelligent Room thermostat accessory: The receiver is connected to the polarity-free terminals A/B.
5	L Common		Terminal Line common for optional ON/OFF Room thermostat.
6	Optional ON/OFF Room thermostat for circuit 1 or for circuit 1 and 2 (Input 1)		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. If there are 2 circuits, both circuits (circuit 1 and 2) are using the same Demand ON/ OFF input 1 (terminals 5/6).
7	Optional ON/OFF Room thermostat for circuit 2 (Input 2)		If there are 2 circuits, each circuit is using different Demand ON/OFF input: - Input 1: Terminals 5/6 for circuit 1 - Input 2: Terminals 5/7 for circuit 2
8	L Common		Terminal Line common for tariff switch and swimming pool input.
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	Swimming pool input		Only for swimming pool installations: It is necessary to connect an external input to the heat pump to provide signal when water pump of swimming pool is ON.
11	N common		Neutral terminal common for accessory devices.
12	Swimming pool valve		The air to water heat pump can be used to heat Swimming pool. This output will be ON when Swimming pool is activated.
13	Earth Connection		Terminal earth connection for accessories.
14	Mixing valve close		When a mixing system is required for a second temperature control, these two outputs are necessary to control the mixing valve.
15	Mixing valve open		
16	N Common		
17	Water Pump 2 (WP2)		When there is a second temperature application, a secondary pump is the circulating pump for the secondary heating loop.
18 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 to alternate with the heat pump when the heat pump cannot achieve the required temperature by itself.
22 23	DHW re-circulation		Recirculation option for the DHW and Anti-Legionella operation. The same high temperature can be achieved in all the water of the tank by using this option.
24 25	Power meter 1		The measuring of the real power consumption can be done connecting an external power meter. The number of pulses of the power meter is a variable which must be set. By this, every pulse input is added into corresponding operation mode (Heating, Cooling, DHW Operation). Two possible options: - One power meter for all installation (IU+OU). - Two separated power meters (one for IU and one for OU).
26 27	Power meter 2		
28 29	Water outlet 3 thermistor (THMwo3)		Water sensor for the combination of auxilliary devices.
30 31	Water outlet C2 thermistor (THMwo2)		The sensor is used for the second temperature control and should be positioned after the mixing valve and the circulation pump.
32(+) 33(-)	Second ambient thermistor		The sensor is used for the second ambient temperature control and should be positioned outside
34(+) 35(-)	Swimming pool thermistor		The sensor is used for the swimming pool temperature control and should be positioned inside plate HEX of swimming pool

10.6 Printed circuit board (PCB)

10.6.1 Outdoor unit

◆ RAS-2HVRN2



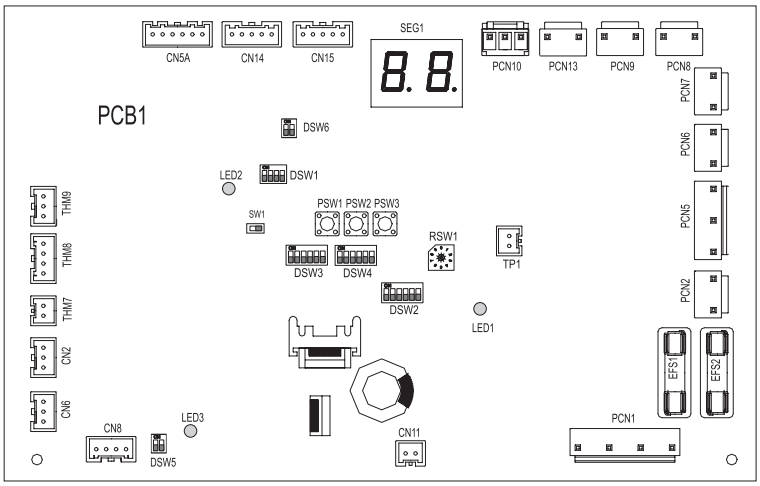
Connector indication		
PCN5	CH	Crankcase heater of compressor (oil)
PCN6	RVR	Reversing valve relay
PCN13	PSC	Pressure switch control
PCN401	PSH	High pressure switch protection
THM7	AIR	Outdoor air temperature thermistor
THM8	PIPE	Pipe temperature thermistor
THM9	COMP	Compressor temperature thermistor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

Switch indication	
DSW1	Test run
DSW2	Piping length
DSW3	Capacity
DSW4	Ref. cycle number
DSW5	End terminal resistance
DSW6	Optional function
DSW301	Test run mode
RSW1	Ref. cycle number
PSW1	Manual defrost operation switch. The defrost option is manually available under the forced defrost area
PSW2	Available optional function. Setting can be selected using the 7-segment display
PSW3	
PSW351	The inverter micro-computer checking

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

PCB2 LED indication		
LED1	Red	These LEDS indicate the cause of unit stop-pages
LED2	Red	
LED3	Red	
LED4	Red	

◆ RAS-(3-6)H(V)RNME-AF



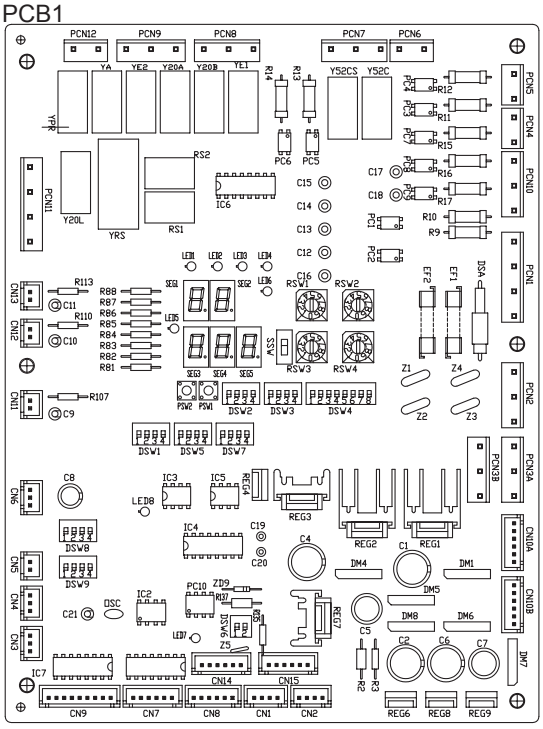
Connector indication	
PCN1	Power supply
PCN2	PCB1 connection from outdoor to indoor unit
PCN5	Crankcase heater of compressor (oil)
PCN6	Output optional function
PCN7	Output optional function
PCN8	Pressure switch protection
PCN9	Compressor contactor
PCN13	Pressure switch control
THM7	Outdoor air temperature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

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

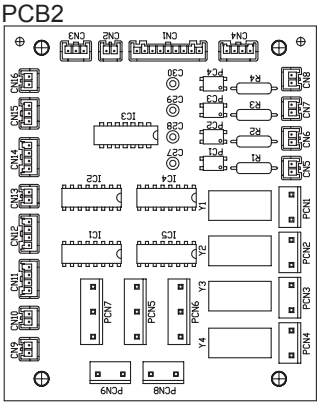
LED indication		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED3	Green	Power source for the PCB

10.6.2 Indoor unit

PCB1



PCB2



PCB1	Switch indication	
	Name	Connector No.
Operation / Display	Not used	DSW1
	Capacity setting	DSW2
	Optional functions 1	DSW3
	Optional functions 2	DSW4
	Additional setting	DSW5
	Not used	DSW6
		DSW7
		DSW8
		DSW9
	Refrigerant unit address	RSW1
		RSW2
	Indoor unit address	RSW3
		RSW4
	Checking Mode (Forward)	PSW1
	Checking Mode (Back)	PSW2

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

PCB1	Connector Indications	
	Name	Connector Nº
Power	Power supply	PCN1
	Devices power supply	PCN2
	Heater step 1	PCN7-5
	Heater step 2	PCN8-5
	Input transformer power supply (230 V)	PCN3A,B
	Output transformer power supply (24V)	CN10A,B
	LCD Power supply	CN15-1/2
Protection Device	Low water pressure	PCN10-1
	Heater protection (Thermostat cut-out)	PCN4-1
	Water flow meter	CN13-1/2/3
Transmis-sion	H-Link communication	CN1-2/3
	PCB1-PCB2 communication	CN2,5,6,9
External Input / Output	Swimming pool temp. thermistor (THM_{SWP})	CN3
	2nd ambient temp. thermistor (THM_{AMB2})	CN4
	R410A expansion valve (EV1)	CN7A
	Water pump PWM control	CN8/CN15
	Room thermostat C1& C2 (ON/OFF) input	PCN6-1
	Room thermostat C2 (ON/OFF) input	PCN7-1
	3-way valve swimming pool output	PCN8-1
	3-way valve DHW output	PCN8-3
	Mixing valve second temperature left	PCN9-5
	Secondary pump output (WP2)	PCN9-3
	Secondary pump output (WP3)	PCN9-1
	Swimming pool input	PCN10-5
	Electrical Tariff input	PCN10-3
	Power supply to SW1 (DHW tank heater operation)	PCN11-5
	Mixing valve second temperature right	PCN12-3

PCB2	Connector Indications	
	Name	Connector Nº
Actuator	Pump actuator	PCN1
	Boiler signal	PCN2
	DHWT heater signal	PCN3
	DHW circulating pump signal	PCN4
Transmis-sion	PCB1-PCB2 communication	CN1,2,3,4
A Input	Water inlet thermistor (THM_{WI})	CN9
	Water sanitary tank thermistor (THM_{DHW})	CN10
	Refrigerant liquid thermistor (THM_{L})	CN11
	Refrigerant gas thermistor (THM_{G})	CN12
	Water outlet thermistor (THM_{WO})	CN13
	Water boiler control thermistor (THM_{WO3})	CN14
	Water outlet heat exchanger thermistor (THM_{WOHP})	CN15
	2nd water circuit thermistor (THM_{WO2})	CN16
D Input	Power meter input 1	CN7
	Power meter input 2	CN6

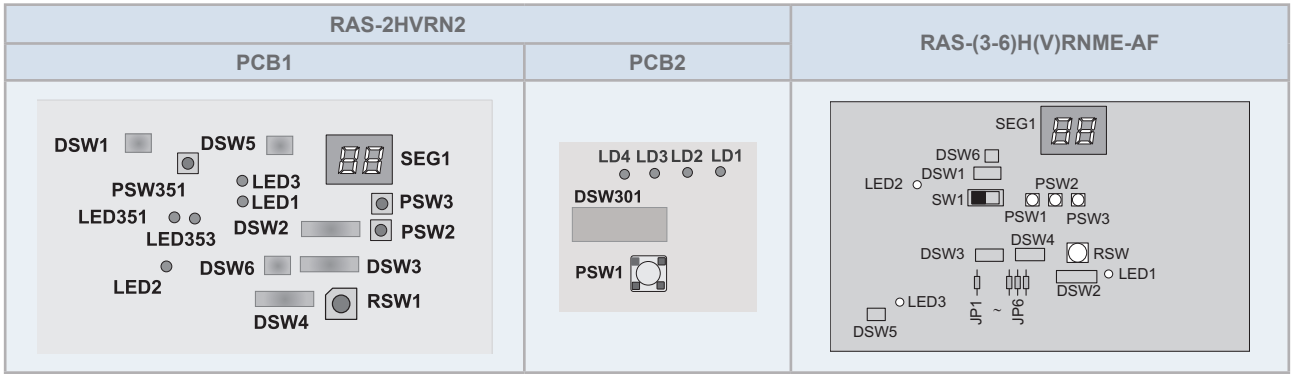
10.7 Setting of DIP switches and RSW switches

10.7.1 Outdoor unit

◆ Location of DIP switches and RSW switches

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

Position switches at the PCB:



◆ Function of the of DIP switches and RSW switches

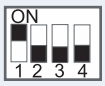
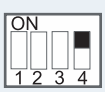
NOTE

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

CAUTION

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

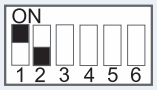
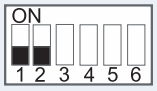
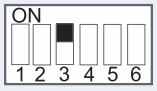
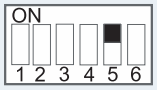
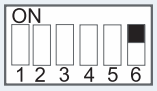
DSW1: Test run

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

NOTE

- *This operation is reset once the compressor is in Thermo-ON mode.*
- *During the test run operation the units will operate continuously during 2 hours without Thermo-OFF and the 3 minutes 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

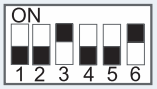
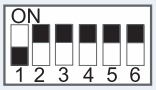
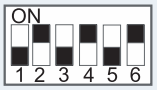
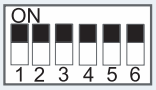
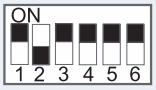
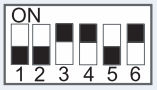
It is possible to select the cancellation of the outdoor hot start control by pushing both PSW1 & PSW3 simultaneously during 3 seconds. The cancellation of the outdoor hot start control configuration could damage the compressor if it is usually used. In that case the unit warranty will be voided.

NOTE

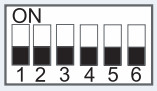
Only for RAS-2HVRN2 units:

In order to heat up the DHW tank in summer, DSW2 pin 4 needs to be on.

DSW3: Capacity setting

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

DSW4/RSW1: Refrigerant cycle setting (Do not 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
230 V (setting before shipment)			
400 V (setting before shipment)	-	-	

◆ Jumpers

Jumper lead setting (JP1~6)

Setting before shipment:

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

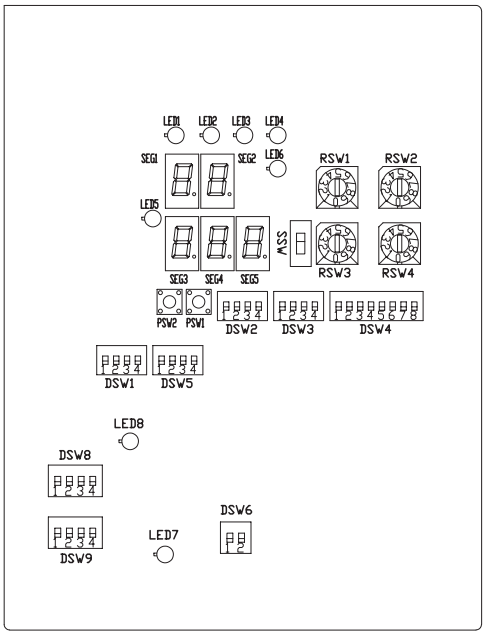
0 = Open; 1 = Short circuit

◆ LED's indication

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

10.7.2 Indoor unit

◆ Location of DIP switches and RSW switches



◆ Functions of dip switches and rotary switches

NOTE

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

CAUTION

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

DSW1: Not used

DSW2: Capacity setting

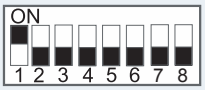
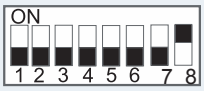
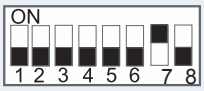
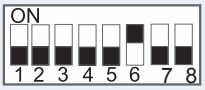
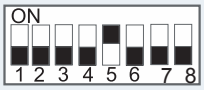
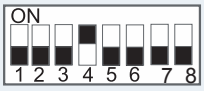
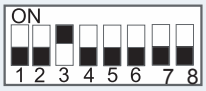
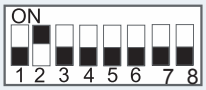
No setting is required.

RWD-2.0(H)FSNWE-(200/260)S	
RWD-3.0(H)FSNWE-(200/260)S	
RWD-4.0(H)FSNWE-(200/260)S	
RWD-5.0(H)FSNWE-(200/260)S	
RWD-6.0(H)FSNWE-(200/260)S	

DSW3: Optional functions 1

Factory setting	
1 step heater for 3 phase unit	
DHW defrost	

DSW4: Optional functions 2

Factory setting	
Optional functions enabled	
Unit heater forced OFF	
Unit and installation pipes antifreeze protection	
Standard / ECO water pump operation	
Emergency operation heater / boiler	
Cooling operation	
DHW tank's heater operation enabled	

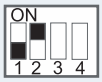
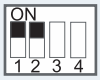
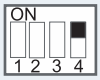
CAUTION

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

DSW5: Additional setting

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

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

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

DSW6: Not used

Factory setting (Do not change)	

DSW7: Not used

Factory setting (Do not change)	

DSW8: Not used

Factory setting (Do not change)	

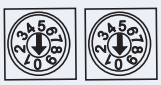
DSW9: Not used

Factory setting (Do not change)	

RSW1 & RSW2: Refrigerant system setting

RSW1: Ten digits RSW2: Unit digits	

RSW3 & RSW4: Indoor unit address setting

RSW3: Ten digits RSW4: Unit digits	

◆ Led indications

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

11. Installation configuration

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11.1 Heating system configurations

The YUTAKI S COMBI is designed to work in a mono-valent, mono-energetic or bi-valent heating systems. It provides efficient control and reduces energy use while maintaining comfort in the building.

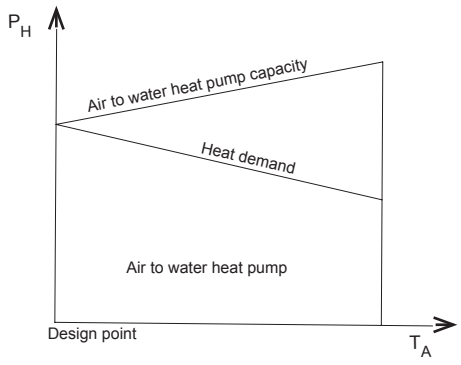
The functionality of the YUTAKI S COMBI unit depends on the installed components and the selected configuration and it can be configured and upgraded to meet many installation requirements.

11.1.1 System configurations

◆ Mono-valent system

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

Example of Mono-valent system



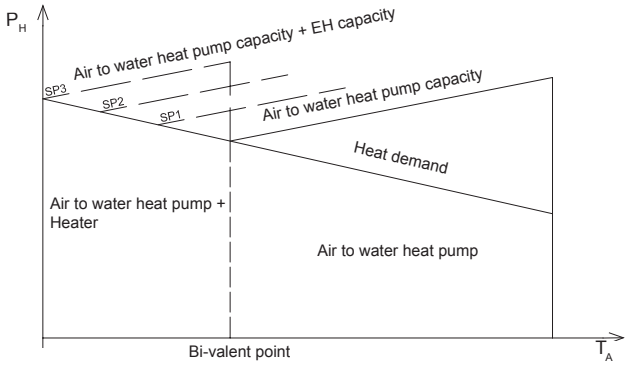
NOTE

- *T_A: Outdoor ambient temperature.*
- *P_H: Heating capacity.*

◆ Mono-energy system

The YUTAKI S COMBI is sized to provide approximately 80% of the heating requirements in the coldest days of the year. An auxiliary electric heater built-in the indoor unit is used to provide the additional heating required on cold days.

Example of Mono-energy system



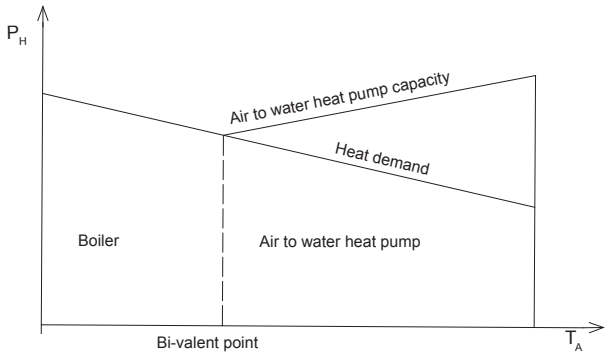
NOTE

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

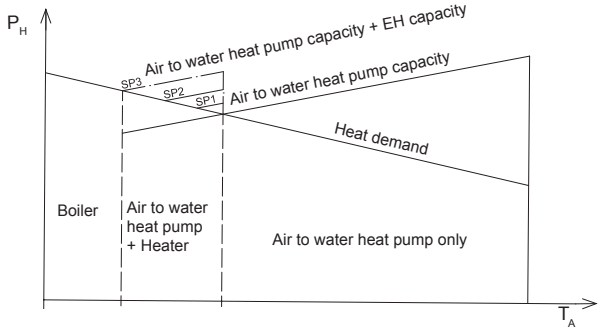
◆ Alternating Bi-valent system

The boiler is configured to alternate with the air to water heat pump. A hydraulic separator of buffer tank has to be used to ensure hydraulic balancing.

Example of Alternating Bi-valent system (Only boiler)



Example of Alternating Bi-valent system (Heater + boiler)



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.*

11.1.2 Typical installation samples

NOTE

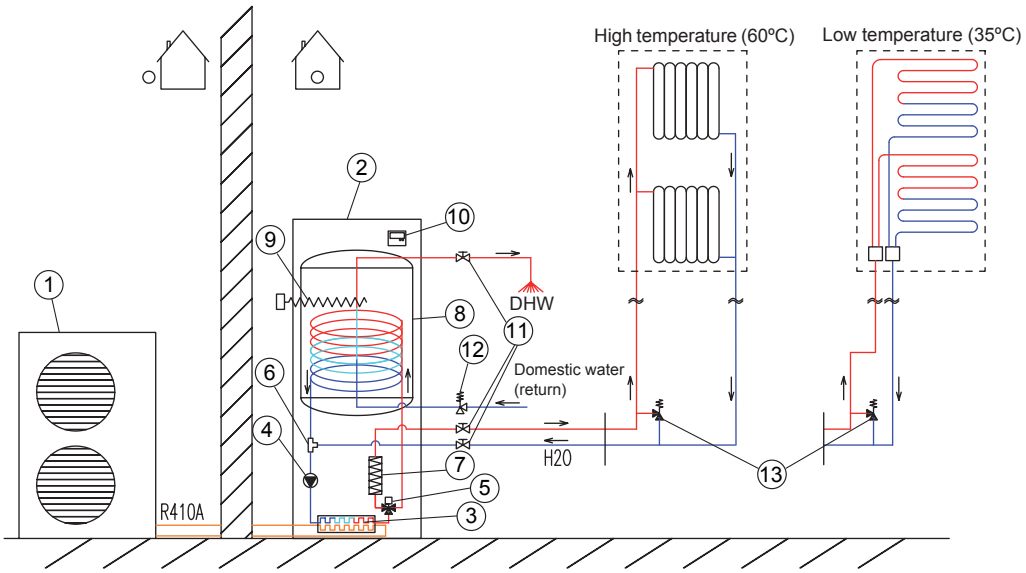
- *The following installation examples show typical configurations. In case of variations of them, the responsibility of correct system functioning will be of the installer.*
- *The configuration examples given below are only for illustration purposes.*

Type	Description	Space heating		DHW Tank (factory supplied)	Thermostat (optional)	Heating complement		Swimming pool (field supplied)
		Radiator/ Fan coil	Floor			Electric heater (factory supplied)	Boiler (field supplied)	
Main configurations								
1	One space heating only and DHW tank Space heating installation (by radiators or fan coils) + DHW tank, with a room thermostat as an option.	○ ✕	✕ ○	○	○	○	(See additional combinations)	
2	Two space heating circuits and DHW tank Two space heating circuits (high & low water temperature) + DHW tank, with a room thermostat as an option.	○	○	○	○	○		
Additional combinations The next configurations are combinable with the main configurations (1 or 2 space heating with tank)								
3	Boiler complement Two possible space heating circuits (high & low water temperature) + Boiler complement + optional DHW tank, with a room thermostat as an option.	○	○	○	○	○	○	(See the TOTAL combination)
4	Swimming pool combination (TOTAL combination) Two possible space heating circuits (high & low water temperature) + Swimming pool combination + optional DHW tank + optional Heating complement + optional Solar combination, with a room thermostat as an option.	○	○	○	○	○	✕ ○	○

11.1.3 Main configurations

◆ One space heating and DHW Tank (Installation example 1)

Space heating using radiators, fan coils or radiant floor installation with an optional room thermostat. Domestic Hot Water Tank is heated by Heat Pump.



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater

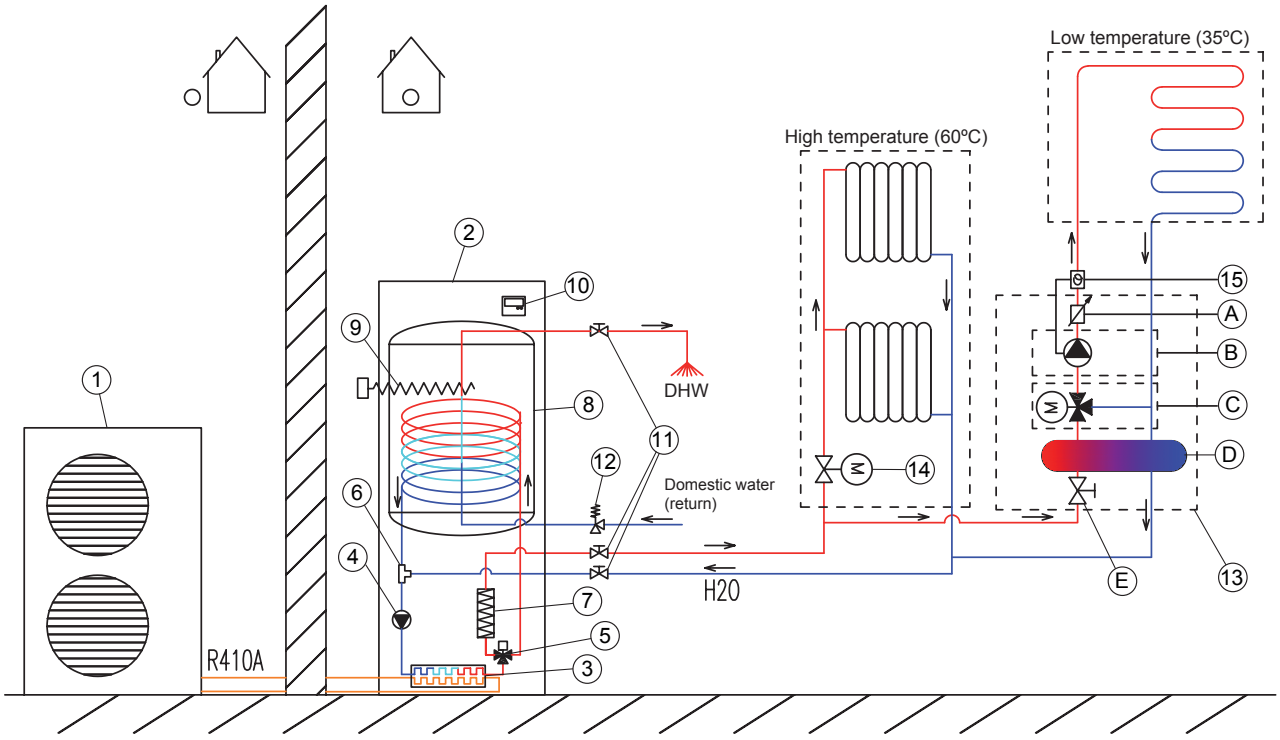
Item	Description
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Differential pressure overflow valve (ATW-DPOV-01 accessory)

◆ Two space heating (High & Low water temperature) and DHW (Installation example 2)

When the air to water heat pump is connected to two different heating circuits, circuit 1 will be direct (high temperature for radiator operation) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve motor (low temperature for floor heating operation). Additionally, a motorized valve must be added in order to close the direct circuit when it is not in use. In order to get these two water temperature levels (high and low), a mixing station is required. This mixing station is controlled using the indoor unit by means of a mixing valve motor and additional water sensor. Domestic Hot Water Tank is heated by Heat Pump. The space heating and DHW operation is alternated (or heating or DHW tank). Optional room thermostat.

NOTE

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



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller

Item	Description
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)
15	Aquastat security (ATW-AQT-01 accessory)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve

11.1.4 Additional combinations

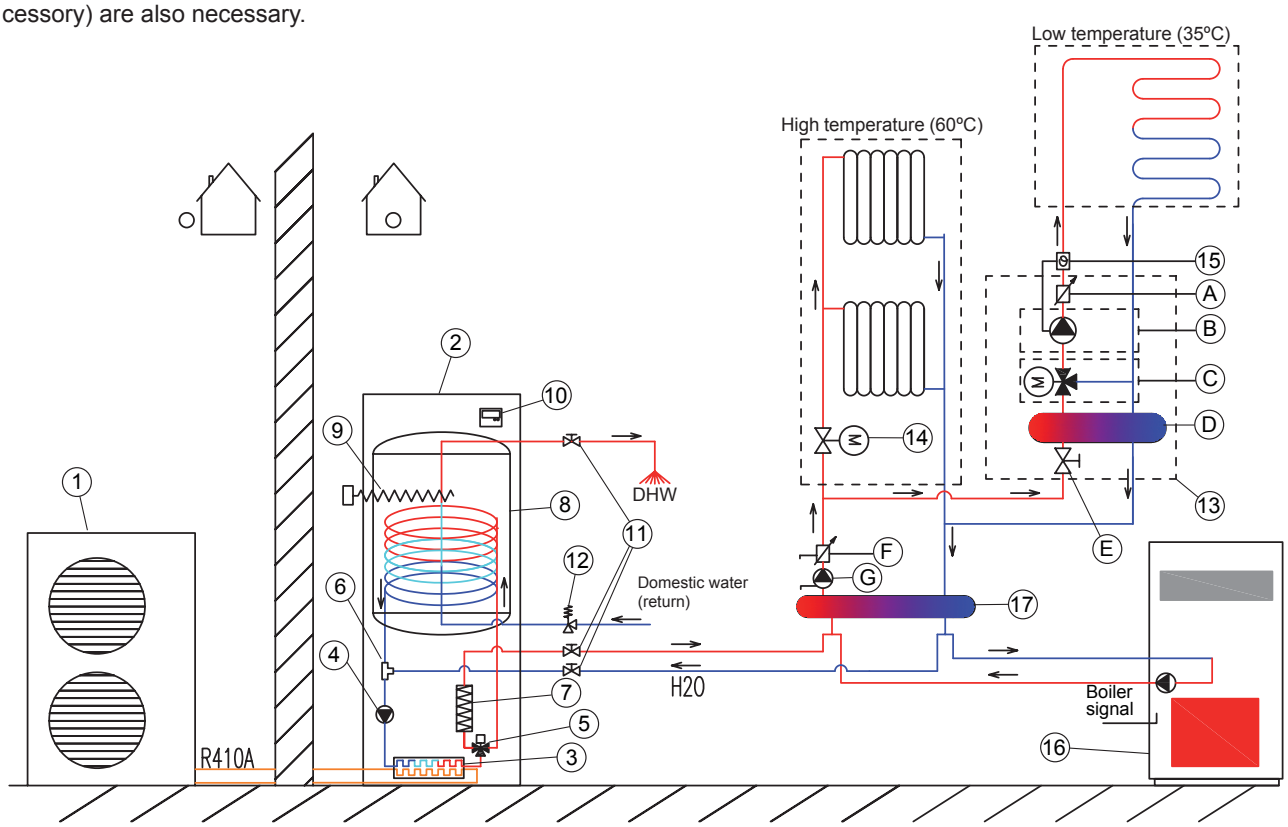
◆ Boiler complement (Installation example 3)

Two space heating circuits (High & Low water temperature) + Boiler combination + DHW: Two space heating circuits with optional Room Thermostat heated by alternating Heat Pump and boiler. Domestic Hot Water Tank is heated by Heat Pump. The space heating and DHW operation is alternated (or heating or DHW tank). Optional room thermostat.

When YUTAKI S COMBI is working in Alternating Bi-valent system (with boiler), a hydraulic separator, 3-way valve or buffer tank has to be used to ensure proper hydraulic balancing.

Option 1: With hydraulic separator

Use the ATW-HSK-01 accessory if needed. Additional Water pump (WP3) and water sensor (Two3) (ATW-WTS-02Y accessory) are also necessary.

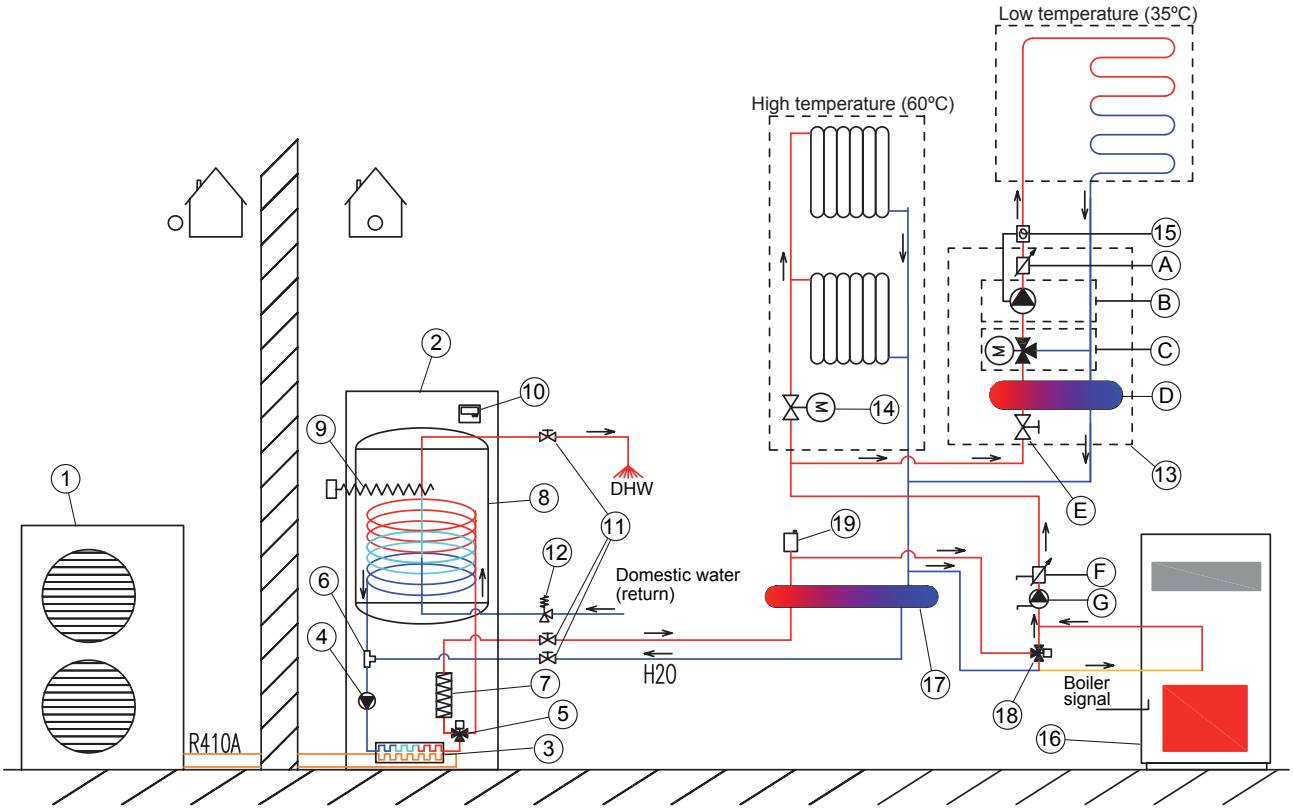


Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)

Item	Description
14	Motorized valve (field supplied)
15	Aquastat security (ATW-AQT-01 accessory)
16	Boiler (field supplied)
17	Hydraulic separator (ATW-HSK-01 accessory)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water temperature sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

Option 2: With 3-way valve

Another option is to install a 3-way valve for an alternatiing operation. In this case, use a field supplied 3-way valve. Additional Water pump (WP3) and water sensor (Two3) (ATW-WTS-02Y accessory) are also necessary.



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)

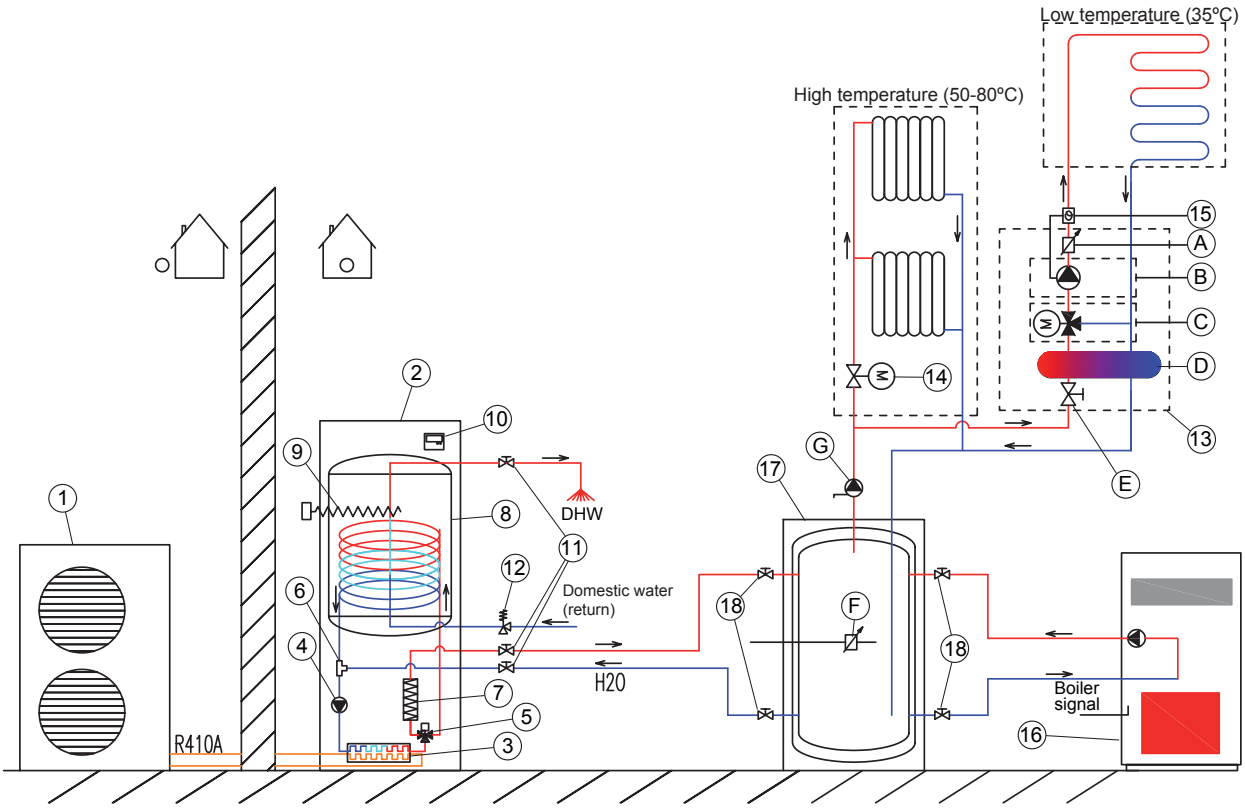
Item	Description
15	Aquastat security (ATW-AQT-01 accessory)
16	Boiler (field supplied)
17	Hydraulic separator (ATW-HSK-01 accessory)
18	3-way valve for boiler combination (field supplied)
19	Air purger
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water temperature sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

Option 3: With buffer tank

When the temperature detected by the external temperature sensor (Two3) reaches this setting temperature, the heater unit stops. This configuration allows to install a boiler (for example, a biomass boiler) and to work against the buffer tank. In this case, the YUTAKI S COMBI unit will operate by temperature control of Two3 sensor.

NOTE

The function "Two3 sensor instead Two sensor" must be selected by dip-switch setting.



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)

Item	Description
15	Aquastat security (ATW-AQT-01 accessory)
16	Boiler (field supplied)
17	Buffer tank (field supplied)
18	Shut-off valves for buffer tank (field supplied)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water temperature sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

Example 1: If installation for only one zone

- Circuit 1: Buffer tank working as a circuit 1.
- Circuit 2: Mixing circuit for space heating.

NOTE

- *User can configure only one thermostat for circuit 2.*
- *Circuit 1 only works as a buffer tank (Thermo ON/OFF mode)*

Example 2: If installation for two zones

- Circuit 1: Direct circuit for space heating zone 1 (temperature of buffer tank must be same than circuit 1).
- Circuit 2: Mixing circuit for space heating zone 2.

NOTE

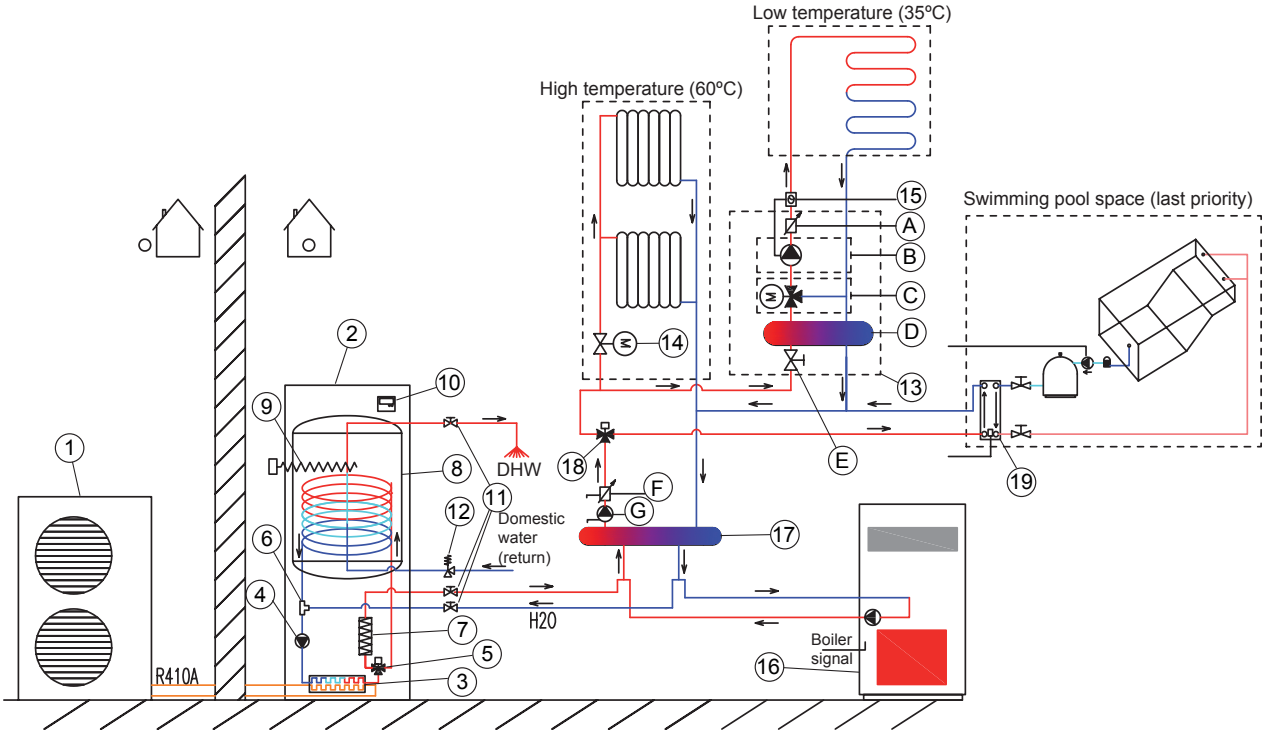
User can configure two thermostats for each circuit.

◆ Swimming pool combination (Installation example 4)

Two space heating circuits (High & Low water temperature) + DHW + Swimming pool combination + Heating complement (Boiler (field supplied) or Electric heater (incorporated in YUTAKI S COMBI) combination): Two space heating circuits with a Room Thermostat as an option and swimming pool space heated by Heat Pump and alternating boiler or supplemented by 3-stage electrical heater. Swimming pool is connected to the main circuit through a 3-way valve (field supplied) and a heat exchanger (field supplied). Domestic Hot Water Tank is heated by Heat Pump.

NOTE

When YUTAKI S COMBI is working with a swimming pool a 3-way valve accessory is needed (field supplied).



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)

Item	Description
15	Aquastat security (ATW-AQT-01 accessory)
16	Boiler (field supplied)
17	Hydraulic separator (ATW-HSK-01 accessory)
18	3-way valve for swimming pool (field supplied)
19	Swimming pool heat exchanger (field supplied)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water temperature sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

11.2 Cooling system configurations

NOTE

- *The following installation examples show typical configurations only for cooling installation. 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 YUTAKI S COMBI is pre-configurated to work only in heating mode. In order to allow the cooling mode, it is necessary to perform a dip-switch setting. In the case, all the heating mode uses for the unit will be prohibited and the LCD user's interface heating configuration will disappear.*

11.2.1 Typical installation samples

NOTE

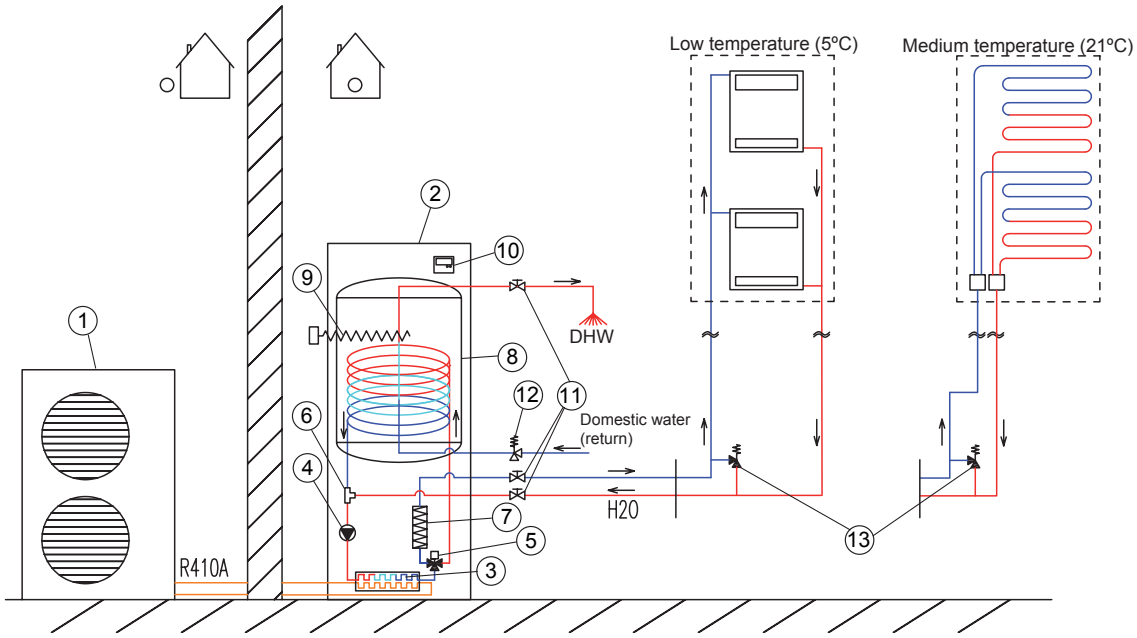
- *The following installation examples show typical configurations. In case of variations of them, the responsibility of correct system functioning will be of the installer.*
- *The configuration examples given below are only for illustration purposes.*

Type	Description	Space heating	Space cooling		DHW Tank (factory supplied)	Thermostat (optional)
		Radiator (closed)	Fan coil	Refreshing floor		
Main configurations						
5	One space heating only and DHW tank Space cooling installation (by fan coils or refreshing floor) + DHW tank, with a room thermostat as an option.	✗	○	✗	○	○
			✗	○		
6	Two space cooling circuits and DHW tank Two space cooling circuits (low & medium water temperature) + DHW tank, with a room thermostat as an option.	✗	○	○	○	○
Additional combinations The next configurations are combinable with the main configurations (1 or 2 space cooling with tank)						
7	Heating installation with radiators closed + DHW tank Heating installation transformed into a cooling installation by closing the radiators. Circuit 1 is closed and the second circuit (refreshing floor) is operating + DHW tank, with a room thermostat as an option.	○	✗	○	○	○

11.2.2 Main configurations

◆ One space cooling and DHW Tank (Installation example 5)

One space cooling using fan coils (low temperature) or refreshing floor (medium temperature) installation with an optional room thermostat. Domestic Hot Water Tank is heated by Heat Pump.



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater

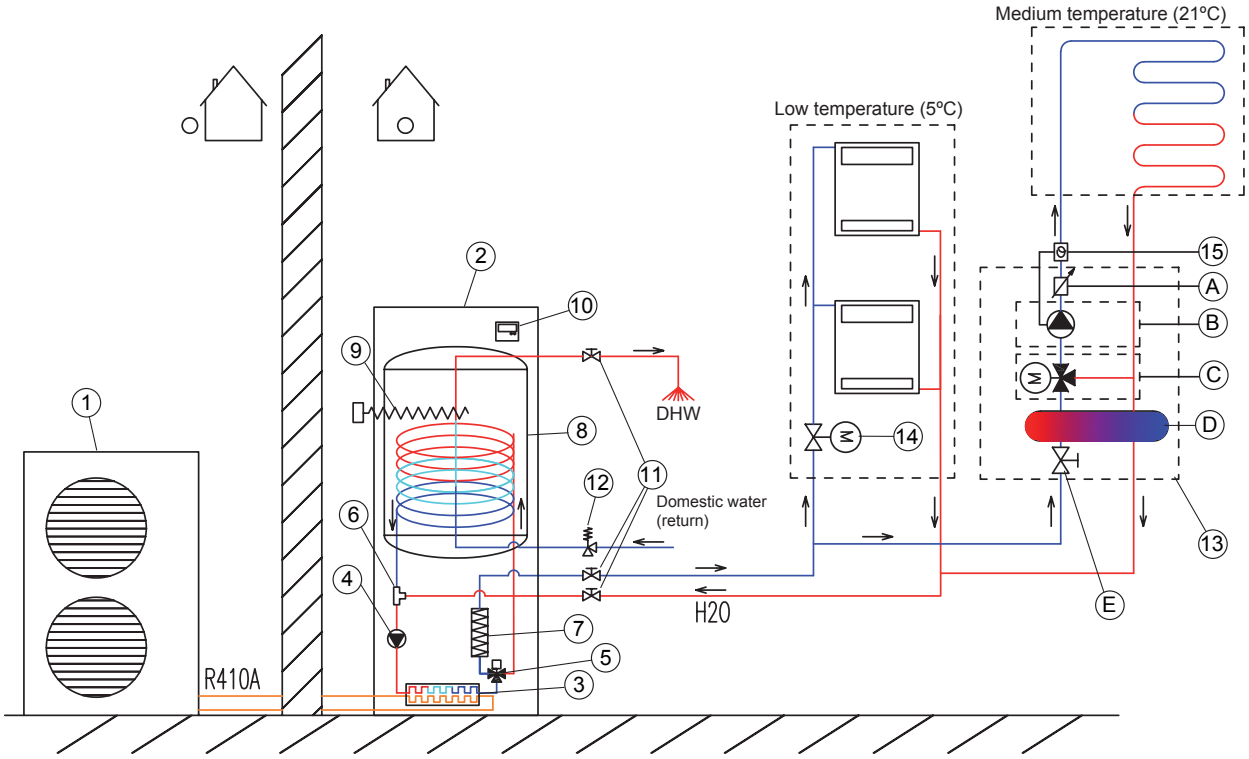
Item	Description
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)
12	Security valve (DHWT-SWG-01 accessory)
13	Differential pressure overflow valve (ATW-DPOV-01 accessory)

◆ Two space cooling (Low & Medium water temperature) and DHW (Installation example 6)

When the air to water heat pump is connected to two different heating circuits, circuit 1 will be direct (low temperature for fan coil operation) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve motor (medium temperature for refreshing floor operation). Additionally, a motorized valve must be added in order to close the direct circuit when it is not in use. In order to get these two water temperature levels (low and medium), a mixing station is required. This mixing station is controlled using the indoor unit by means of a mixing valve motor and additional water sensor. Domestic Hot Water Tank is heated by Heat Pump. The space cooling and DHW operation is alternated (or cooling or DHW tank). Optional room thermostat.

NOTE

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



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)

Item	Description
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)
15	Aquastat security (ATW-AQT-01 accessory)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve

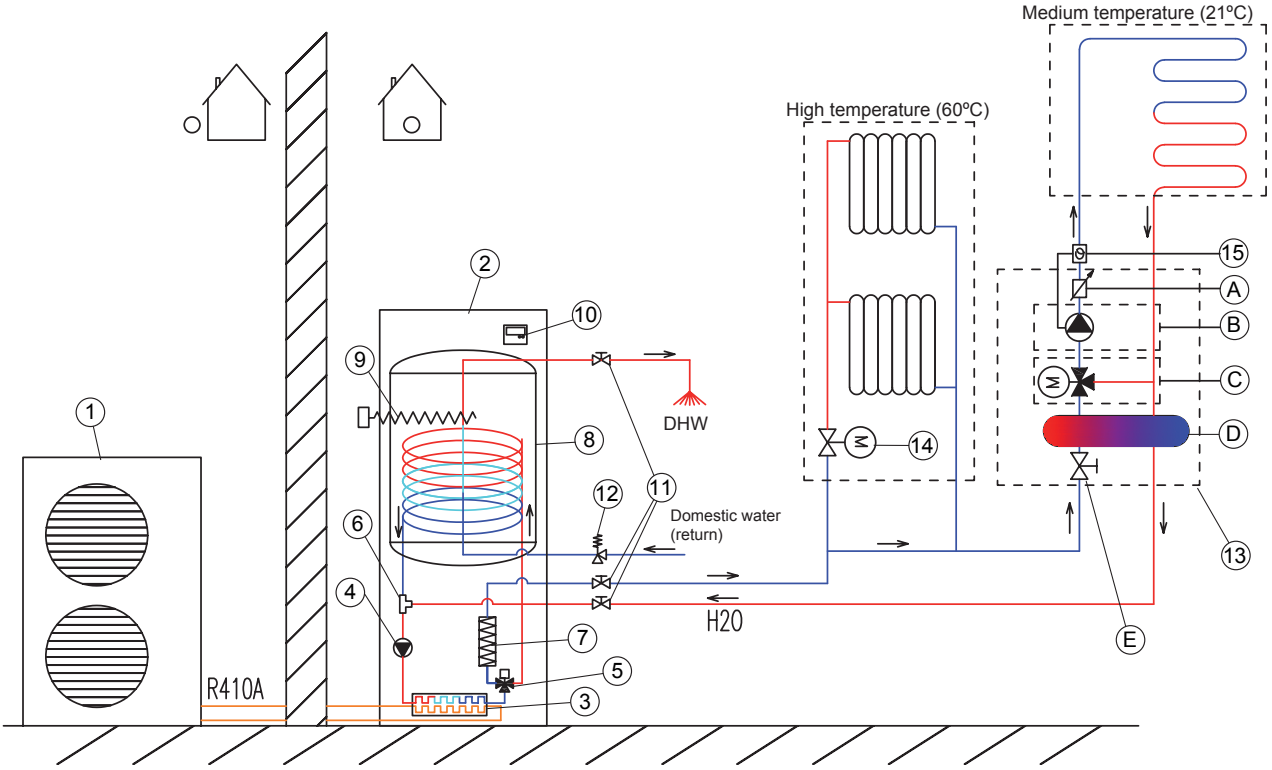
11.2.3 Additional configurations

◆ Refreshing floor with heating radiators closed and DHW (Installation example 7)

It is possible to transform the heating installation into a cooling installation by just permanently closing the radiators with a motorized valve (field supplied). Then, the circuit 1 is closed and there is only the second circuit (refreshing floor) operating. The mixing station for the second circuit is controlled using the indoor unit by means of a mixing valve motor and additional water sensor. Domestic Hot Water Tank is heated by Heat Pump. The space cooling and DHW operation is alternated (or cooling or DHW tank). Optional room thermostat.

NOTE

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



Item	Description
1	Outdoor unit
2	YUTAKI S COMBI
3	Plate heat exchanger
4	Water pump
5	3-way valve
6	T-branch
7	Water electric heater
8	Domestic hot water tank
9	DHWT heater (integrated with DHWT)
10	LCD controller
11	Shut-off valves (field supplied)

Item	Description
12	Security valve (DHWT-SWG-01 accessory)
13	Second temperature kit (ATW-2KT-02 accessory)
14	Motorized valve (field supplied)
15	Aquastat security (ATW-AQT-01 accessory)
A	Universal water temperature sensor (ATW-WTS-02Y accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve

12. Optional functions

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12.1 Indoor unit

12.1.1 Optional functions

	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. The water temperature set-point follows a predetermined schedule upon activation of the floor screed drying function. DHW operation has priority.
	Automatic summer switch-OFF	The system will switch OFF the heating mode when the daily average outdoor temperature of the previous day rises above a certain value at the summer switch-OFF activation temperature, to prevent heating operation at high outdoor temperatures.
	Pump and motorized valve seizure protection	This function prevents sticking of components due to long periods of inactivity, by running the components during a short period every week.
	DHW anti-Legionella protection	A specific setting is available to protect the DHW system against Legionella, which raises up the DHW temperature over the normal DHW tank temperature setting (using the electric heater of the DHW tank and/or the heat pump) on a periodic basis.
	Electrical tariff input	This function allows an external tariff switch device to switch OFF the heat pump and/or the DHW during peak electricity demand period. Depending on the setting, the heat pump and/or DHW become blocked or only is switched ON the DHW when signal is open/closed.
	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. This configuration must be activated at the LCD user interface and can be selected from two modes: Automatic mode (emergency operation is performed when alarm occurs in the outdoor unit) or Manual mode (emergency operation is performed by dip-switch setting).
	Hydraulic separator combination	When the water pump of the indoor unit is not sized for heating installation (small water pump) or when the system is configured to alternate operation with 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 at the LCD user interface.
	Standard / Thermo OFF option for the stopping of the water pump	The water pump stop mode can be selected by means of the LCD user's interface between: - "Standard" (the water pump is switched OFF only when space heating/cooling OFF is selected) - "Thermo-OFF" (when the function "Use Two3 sensor instead Two sensor" is selected by dip-switch setting and the water setting temperature has been reached (by Two3), then the primary water pump (WP1) will be switched OFF). This function is very useful in combination with a big buffer tank.
	Power meter	The measuring of the real power consumption can be done connecting an external power meter. The number of pulses of the power meter is a variable which must be set. By this, every pulse input it is added into corresponding operation mode (Heating, Cooling, DHW Operation). Two possible options: • One power meter for all installation (IU+OU). • Two separated power meters (one for IU and one for OU).
	Capacity control	Capacity delivered for each operation mode (heating, cooling, DHW) is displayed using information from the flow meter and Delta T measures.
	DHW re-circulation	Recirculation option for the DHW operation and Legionella operation. The same high temperature can be achieved in all the water of the tank by using thsi option

Optional function		Explanation
From dip-switch setting	One step heater for three phase imbalance option	This option can be used to switch all 3 steps of the electric heater at the same time, by means of a dip-switch setting, in order to prevent 3-phase imbalance by the electric heater steps. **NOTE** *This function only applies when power source of the indoor unit is 3-phase (3N~ 400V 50 Hz).*
	2nd outdoor temperature sensor accessory	A 2nd outdoor ambient temperature sensor is available as an accessory, in case that the built-in ambient temperature sensor of the outdoor unit can not provide a reliable temperature measurement to the system because of restraints of the installation location. The preferred sensor for each circuit can be selected by means of DSW setting.
	Unit and installation pipes anti-freeze protection	In winter (heating operation), when the outdoor temperature is very low and the unit is in Thermo OFF operation (and water pump OFF), the water outlet temperature can become so low that the pipes become frozen. In order to avoid this, this function can be selected by dip-switch setting in order to start the pump operation when the water outlet temperature drops below 5ºC and until it raises above 7ºC.
	Heater forced OFF	This function forces a permanent OFF of the heater when selecting an installation configuration without the electric heater of the unit (Mono-valent system or Alternating bi-valent system (Only boiler)). In this case, all the uses of the electric heater are forbidden and the settings by LCD and the heater protections have no effect.
	Standard / ECO water pump operation	The pump is set to “Standard mode” by default. In this mode, the pump is always ON, except when space heating/cooling OFF is selected. It is possible to set the pump to “Economic Mode” by dip-switch setting, so the water pump can be stopped when it is not required heat demand by Thermostat (Room ambient temperature is reached) or when the system is stopped.
	DHW defrost	This function allows to perform the defrost operation at the DHW tank instead of at the indoor water installation.
	Use Two3 (boiler/heater/buffer tank thermistor) instead Two (water outlet thermistor) for water control	In some situations, for example in an installation with a big buffer tank in combination with a boiler, it is preferable to perform water control by external water temperature sensor (Two3) instead of unit water temperature sensor (Two). This option can be activated by dip-switch setting. (Only available with universal sensor enabled)
Four external output signals		There are four optional output signals available that provide four optional functions of the system, programmed on the indoor unit PCB. **NOTE** *In order to make the electrical connection works easier, HITACHI offers a relay board for the additional output signals (ATW-AOS-01 accessory).*

NOTE

For the detailed information about optional functions, please refer to the Service Manual.

12.1.2 Optional external output signals (by 7-segment display)

Unit switches to this mode when DSW4-8 is turned ON during unit stoppage.

The unit has the following described optional signals:

Code	Name	Description	Port
o1	Operation signal	This signal allows control of the machine status at all times; it is very useful for centralized applications. The signal will be enabled when Thermo ON operation	CN7b / 1-3
o2	Alarm signal	This signal allows activation of mechanisms that protect from and warn of possible failures in the unit. The signal will be enabled when the unit is in alarm (indoor or outdoor)	CN7b / 1-4
o3	Cooling signal	This signal allows control of the compressor's status. For closed valves in Radiators or On signal for Fan coils. The signal will be enabled when cooling mode	CN7b / 1-5
o4	Thermo-OFF signal during circuit 1	Signal is enabled when circuit 1 is operating in Demand-OFF and circuit 2 in Thermo ON.	CN7b / 1-6

12.2 Outdoor units

◆ Optional functions

Outdoor unit has the following signals that are described in the following table. These signals are set up through the PCB of the outdoor unit.

Output signals (by 7-segment)

Ind.	Output signal	Application	Port
0	No setting application	No setting	-
01	Operation signal	This signal allows to pick up the machine's operation signal. This is very useful to start up additional systems such as humidifiers, fans and other additional air-conditioning systems.	CN7
02	Alarm signal	This signal picks up the machine's alarm. This is very useful to warn that an alarm has been tripped.	CN7
03	Compressor ON signal	This single allows to pick up the compressor's operation signal. It is very useful for checking signals during remote-control operation and for the interlock of the outdoor unit.	CN7
04	Defrost operation signal	This signal allows to pick up the defrosting of the unit. This is very useful to know how the indoor unit is operating if there is an abnormal situation. .	CN7

NOTE

Do not set same function (01~04) to multiple input port.

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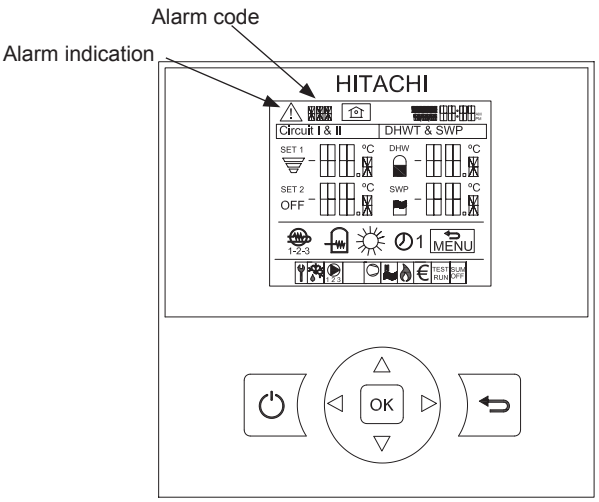
13.1 Alarm display

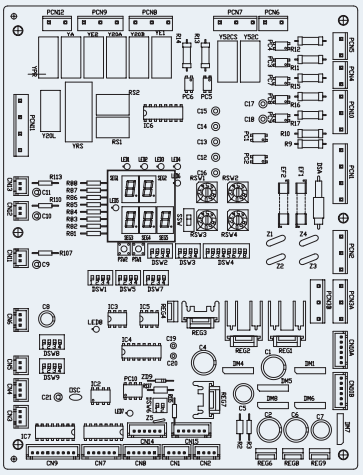
13.1.1 Alarm code indication on LCD controller



13.1.2 Alarm code indication on 7 segment

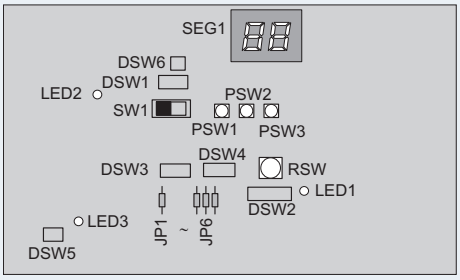
◆ Indoor unit

Position of the 7 segment at the indoor PCB1

RWH-(4-6)FS(V)NFE	
The 7 segment at the indoor PCB1 will show the alarms from the outdoor unit and indoor unit.	

◆ Oudoor unit

Position of the 7 segment at the outdoor PCB:

RAS-(4-6)H(V)RNME-AF	
The 7 segment at the outdoor PCB will show the alarms from the outdoor unit.	

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 /Indoor	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	P8	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	P5	Outdoor	Compressor-Top temperature over-increase	Shortage or leakage of refrigerant, piping clogging, Fan motor locked
11	–	Indoor	Water inlet thermistor abnormally (THM_{WI})	Loose, disconnected, broken or short-circuited connector
12	–	Indoor	Water outlet thermistor abnormally (THM_{WO})	Loose, disconnected, broken or short-circuited connector
13	–	Indoor	Indoor liquid pipe temperature thermistor abnormality (THM_{L})	Loose, disconnected, broken or short-circuited connector
14	–	Indoor	Indoor gas pipe temperature thermistor abnormality (THM_{G})	Loose, disconnected, broken or short-circuited connector
15	–	Indoor	Water outlet C2 thermistor abnormally (THM_{WO2})	Loose, disconnected, broken or short-circuited connector
16	–	Indoor	Water DHWT thermistor abnormally (THM_{DHWT})	Loose, disconnected, broken or short-circuited connector
17	–	Indoor	Swimming pool thermistor abnormally (THM_{SWP})	Loose, disconnected, broken or short-circuited connector
18	–	Indoor	Water outlet boiler thermistor abnormally (THM_{WO3})	Loose, disconnected, broken or short-circuited connector
19	–	Indoor	Water outlet heat pump thermistor abnormally (THM_{WOHP})	Loose, disconnected, broken or short-circuited connector
20	–	Outdoor	Compressor-Top temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
21	–	Indoor	2nd ambient thermistor abnormally (THM_{AMB2})	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
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	P7	Outdoor	Inverter fin temperature abnormality	Fin thermistor abnormality, heat exchanger clogging, fan motor abnormality

Alarm code	Retry stop code	Origin	Detail of abnormality	Main cause
55	18	Outdoor	Inverter non-operation	Inverter not operating or broken
57	–	Outdoor fan	Fan abnormality	-
63	–	Commu-nication	Transmission error between central control inter-face (KNX, etc...) and indoor units	Indoor fuse meltdown, wiring connection of indoor/ central control interface (breaking, wiring error, etc.)
b1	–	Outdoor	Error in address/refrigerant system setting	Address/refrigerant system setting over 64
EE (100)	–	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>75 ºC
73	–	Indoor	Mixing overheating limit protection for mixed circuit.	Circuit 2 supply temperature > Target temperature + offset
74	P-74	Indoor	Unit overheating limit protection	-
75	–	Indoor	Freeze Protection by Cold water inlet, outlet temperature detection	-
76	–	Indoor	Freeze protection stop by indoor liquid tempera-ture thermistor	-
77	–	Indoor	Opentherm communication failure	No Opentherm communication for a continuous period of 10 minutes.
78	–	Indoor	RF communication failure	There is 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	There is no concordance between indoor outdoor unit capacity
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 con-nection wiring (breaking, wiring error, etc.)

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