

## HYDRO FREE

### Technical Catalogue

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HYDRO FREE Low temperature

RWLT-3.0VNE

RWLT-5.0VNE

RWLT-10.0VNE

HYDRO FREE High temperature

RWHT-5.0VNFE





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# 1 . General information

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## 1.1 General information

### 1.1.1 General notes

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



#### NOTE

*This air to water heat pump has been designed for standard water heating for human beings. For use in other applications, please contact your HITACHI dealer or service contractor.*

### 1.1.2 Introduction

HITACHI proudly announces the newest complete range of air-to-water heat pumps in its award-winning HYDRO FREE range.

HYDRO FREE units produce heating and domestic hot water like any oil or gas boiler, but transforming renewable energy from the outside air into heat. Air to water heat pumps extract 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. Every kW of electricity used to power the heat pump can yield up to more than 5 kW of energy for heating; this provides savings of up to 80% on heating expenses compared to a traditional fossil fuel boiler.

The new HYDRO FREE series, based on state-of-the-art technology, does not only achieve an outstanding performance in space heating, but it is also provides domestic hot water with high efficiency. Additionally, cooling operation for summer can also be provided installing the dedicated "Cooling kit" accessory of HITACHI (Depending on the model).

The system is simple to control; its new user controller (PC-ARFWE) improves the acclaimed and successful design used with the existing LCD controller, and provides a great deal of new functions like: wizard start-up configuration, auto cool/heat, improved timer, etc.

#### 1.1.2.1 Overview of HYDRO FREE system

The range of HYDRO FREE products is basically divided in two types of system:

- Low temperature system
- High temperature system

##### ◆ Low Temperature range

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

Three types of indoor unit can be used in heating split systems:

This HYDRO FREE indoor unit is designed for space heating, in wall-mounted installation. It is convenient for new installations with low capacity requirements (Well isolated installations, high efficiency radiators...).

## High temperature range

This HYDRO FREE is a standalone indoor unit that generates hot water up to 80°C; the hottest water temperature in the domestic heating market using renewable energy.

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

The HYDRO FREE High temperature unit is ideal for existing properties, in particular older installations where high water supply temperatures may be required to keep the house warm – as well as for new buildings. It is designed for the replacement of boilers, offering heating and sanitary hot water all year round, without boiler back-up.

### 1.1.2.2 Summary of operations

#### Space heating

HYDRO FREE units are factory-supplied ready for space heating operation. Different heating installation configurations can be selected, providing a comfortable atmosphere all year long, even in the coldest climates:

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

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: Radiator, heating floor or both (2nd temperature area).

#### Domestic hot water production

HYDRO FREE models also give the option of domestic hot water production, allowing the user to benefit from the heat pump's high efficiency and achieve domestic hot water.

This is made possible by a domestic hot water tank. The domestic hot water tank is an accessory "DHWT-(200/300) S-3.0H2E" can be used for the production of DHW.

#### Space cooling

HYDRO FREE Low temperature units can also be operated in cooling operation. The dedicated "Cooling kit" accessory has been designed for this purpose. Combining the heating only models with these cooling kits, the reversible models become available. In this case, combination with fan-coils, refreshing floor or both (2nd temperature area) can be applied.

## 1.2 Applied symbols

During normal air to water heat pump 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 pose a risk to the safety of those in the surrounding area or to the unit itself are clearly indicated in this manual.

A series of special symbols are 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.*
- *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 safety procedures during unit installation.

### CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety.*
- *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 safety 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 Norms and Regulations

Following Regulation EU No. 517/2014 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R410A / R134a into the atmosphere: R410A / R134a are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP): R410A = 2088 , R134a = 1430.

Tn of CO2 equivalent of fluorinated greenhouse gases contained is calculated by indicated:

GWP multiply by Total Charge (in kg) indicated in the product label and divided by 1000.

### **Appropriate refrigerant**

The refrigerant used in each unit is identified on the specification label and manuals of the unit. HITACHI shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

### **Consequences of charging non-specified refrigerant**

It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the nonspecified refrigerant shall be asked to fix the unit.

HITACHI will accept no responsibility for units that have been charged with non-specified refrigerant once.

## 1.4 Product guide

### 1.4.1 Classification of the units

#### ◆ Low temperature indoor unit models

|                                                                                        |   |     |   |   |   |  |
|----------------------------------------------------------------------------------------|---|-----|---|---|---|--|
| Unit type: HYDRO FREE (Split system - Single HYDRO FREE Low temperature (Indoor unit)) |   |     |   |   |   |  |
| Position-separating hyphen (fixed)                                                     |   |     |   |   |   |  |
| Capacity (HP): 3.0, 5.0, 10.0.                                                         |   |     |   |   |   |  |
| V: Single phase unit (1~ 230V 50Hz)                                                    |   |     |   |   |   |  |
| R410A refrigerant                                                                      |   |     |   |   |   |  |
| Made in Europe                                                                         |   |     |   |   |   |  |
| RWLT                                                                                   | - | X.X | V | N | E |  |

#### ◆ High temperature indoor unit models

|                                                                                         |   |     |   |   |   |   |
|-----------------------------------------------------------------------------------------|---|-----|---|---|---|---|
| Unit type: HYDRO FREE (Split system - Single HYDRO FREE High temperature (Indoor unit)) |   |     |   |   |   |   |
| Position-separating hyphen (fixed)                                                      |   |     |   |   |   |   |
| Capacity (HP): 5.0                                                                      |   |     |   |   |   |   |
| V: Single phase unit (1~ 230V 50Hz)                                                     |   |     |   |   |   |   |
| R-410A refrigerant                                                                      |   |     |   |   |   |   |
| R-134a refrigerant                                                                      |   |     |   |   |   |   |
| Made in Europe                                                                          |   |     |   |   |   |   |
| RWHT                                                                                    | - | X.X | V | N | F | E |



## 1.4.2 Product guide

### 1.4.2.1 HYDRO FREE Low temperature - Indoor unit

|  |          |                                                                                   |          |                                                                                     |          |
|-----------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------|----------|
| 1~ 230V 50Hz                                                                      |          |                                                                                   |          |                                                                                     |          |
| Unit                                                                              | Code     | Unit                                                                              | Code     | Unit                                                                                | Code     |
| RWLT-3.0VNE                                                                       | 7E476005 | -                                                                                 | -        | -                                                                                   | -        |
|                                                                                   |          | RWLT-5.0VNE                                                                       | 7E476008 | -                                                                                   | -        |
|                                                                                   |          | -                                                                                 | -        | RWLT-10.0VNE                                                                        | 7E476011 |
|  |          |  |          |  |          |



#### NOTE

- For cooling operation, refer to the Cooling kit accessory for HYDRO FREE Low temperature unit.
- The PC-ARFWE controller required for the operation of the HYDRO FREE Low temperature is factory supplied in these models.

### 1.4.2.2 HYDRO FREE High temperature - Indoor unit

|  |          |
|-------------------------------------------------------------------------------------|----------|
| 1~ 230V 50Hz                                                                        |          |
| Unit                                                                                | Code     |
| RWHT-5.0VNFE                                                                        | 7E484008 |
|  |          |



#### NOTE

The PC-ARFWE controller required for the operation of the HYDRO FREE High temperature is not factory supplied in these models, and must be ordered as an accessory separately.

#### Icons description

Icons between brackets mean possible extra operations to the factory-supplied operations (additional accessories, field-supplied accessories or systems can be needed)



: Heating operation



: Domestic hot water (DHW)



: Additional heater (electrical heater accessory or boiler)



: Swimming pool application



: Solar combination



: Cooling operation

### 1.4.3 Accessory code list

#### ◆ Cooling kit accessories

| Accessory  | Name                                   | Code     | Figure                                                                              |
|------------|----------------------------------------|----------|-------------------------------------------------------------------------------------|
| HF-CKLT-01 | Cooling operation kit for RWLT-3.0VNE  | 7E549939 |  |
| HF-CKLT-02 | Cooling operation kit for RWLT-5.0VNE  | 7E549940 |                                                                                     |
| HF-CKLT-03 | Cooling operation kit for RWLT-10.0VNE | 7E549941 |                                                                                     |

#### ◆ Control accessories

| Accessory  | Name                                                                          | Code     | Figure                                                                                |
|------------|-------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------|
| PC-ARFWE   | Unit controller wired room thermostat (*)<br>(Languages EN/ES/DE/FR/IT/SL/PT) | 7E543007 |    |
| ATW-RTU-04 | Wireless ON/OFF thermostat (Receiver + Room thermostat)                       | 7E543003 |    |
| ATW-MAK-01 | Kit for 4-20 mA application                                                   | 7E549933 |   |
| ATW-FCP-01 | Unit controller cover                                                         | 7E549938 |  |



#### NOTE

(\*) The Unit controller is factory supplied for HYDRO FREE Low temperature. The HYDRO FREE High temperature require the unit controller PC-ARFWE that has to be ordered as accessory.

#### ◆ Temperature sensor accessories

| Accessory   | Name                                 | Code     | Figure                                                                                |
|-------------|--------------------------------------|----------|---------------------------------------------------------------------------------------|
| ATW-2OS-02  | 2nd. outdoor temperature sensor      | 9E500017 |  |
| ATW-ITS-01  | Indoor wired room temperature sensor | 7E549932 |  |
| ATW-WTS-02Y | Universal water temperature sensor   | 9E500004 |  |

## ◆ Water circuit accessories

| Accessory        | Name                                                  | Code     | Figure                                                                                |
|------------------|-------------------------------------------------------|----------|---------------------------------------------------------------------------------------|
| ATW-2TK-04       | 2nd zone mixing kit (Wall mounted model)              | 7E549922 |    |
| DHWT-200S-3.0H2E | Domestic hot water tank (200 L)                       | 70544002 |    |
| DHWT-300S-3.0H2E | Domestic hot water tank (300 L)                       | 70544003 |                                                                                       |
| ATW-HSK-01       | Hydraulic separator                                   | 7E549905 |    |
| ATW-AQT-01       | Aquastat security                                     | 7E549907 |   |
| ATW-3WV-01       | 3-way valve (Internal thread and spring return)       | 7E549906 |  |
| ATW-WCV-01       | Water check valve                                     | 9E500014 |  |
| WEH-6E           | Water electric heater                                 | 90500002 |  |
| ATW-DPOV-01      | Differential pressure overflow valve                  | 7E549916 |  |
| ATW-FWP-03       | Flexible water pipe for a HYDRO FREE High temperature | 7E549937 |  |

◆ **Centralised remote controls (HYDRO FREE control: only ON-OFF is possible, settings other than ON-OFF control are not available)**

| Name      | Description                       | Code     | Figure                                                                              |
|-----------|-----------------------------------|----------|-------------------------------------------------------------------------------------|
| PSC-A64GT | Touch screen central station      | 60291730 |  |
| PSC-A32MN | Touch screen central station mini | 60291966 |  |
| PSC-A64S  | Centralised remote control        | 60291479 |  |
| PSC-A16RS | Centralised ON/OFF control        | 60291484 |  |

◆ **Building air conditioning controls controls (HYDRO FREE control: only ON-OFF is possible, settings other than ON-OFF control are not available)**

| Name             | Description                                                                                 | Code     | Figure                                                                                |
|------------------|---------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------|
| CSNET WEB        | CSNET WEB software to control the indoor units (PSC-A160WEB1)                               | 7E512000 |   |
| CSNET Manager LT | Touch interface of 12 inches which runs CSNET MANAGER software to control the indoor units. | 7E512201 |  |
| CSNET Manager XT | Touch interface of 17 inches which runs CSNET MANAGER software to control the indoor units. | 7E512202 |  |

◆ **Gateways for building management systems (BMS) controls (HYDRO FREE control: only ON-OFF is possible, settings other than ON-OFF control are not available)**

| Name          | Description                                                                                                                                                                            | Code     | Figure                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------|
| HC-A8MB       | Integration with installation with intelligent control (Building Management System) Gateway Interface to MODBUS systems (Max. 8 indoor units).                                         | 7E513204 |  |
| HC-A64MB      | Integration with installation with intelligent control (Building Management System) Gateway Interface to MODBUS systems (Max. 64 indoor units).                                        | 7E513205 |                                                                                       |
| HC-A16KNX     | Integration with installations with intelligent control (BMS). Gateway Interface to KNX systems.                                                                                       | 7E513300 |  |
| KNX001        | Integration with installations with intelligent control (BMS) through CSNET WEB. Gateway Interface to KNX systems.                                                                     | 7E512100 |  |
| HARC-BX E (A) | Integration with installation with intelligent control (Building Management System) Gateway Interface to LONWORKS systems. (H-LINK I communication) (Max. 64 units with 8 parameters)  | 60290874 |  |
| HARC-BX E (B) | Integration with installation with intelligent control (Building Management System) Gateway Interface to LONWORKS systems. (H-LINK I communication) (Max. 32 units with 16 parameters) | 60290875 |  |



## 2. Features and benefits

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2.1 Selection benefits

2.1.1 Range

The new models of "HYDRO FREE" are covering a complete wide range of possibilities to satisfy the customer needs.

| Size/<br>Model | HYDRO FREE<br>Low temperature                                                      | HYDRO FREE<br>High temperature                                                     |
|----------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 3 HP           |   | -                                                                                  |
| 5 HP           |   |  |
| 10 HP          |  | -                                                                                  |

◆ Domestic hot water tank, improved flexibility

HITACHI offers a remote domestic hot water tank unit installed beside the indoor units ready to satisfy specific customer requirements. Two options of DHWT are available in two capacities: 200 and 300 liters.



## 2.1.2 Main concept

The new HYDRO FREE is the integration of an indoor unit able to heat/cool water in a VRF SET FREE system offering two temperature options:

- Low temperature series (up to 45 °C water outlet temperature)
- High temperature series (up to 80 °C water outlet temperature)

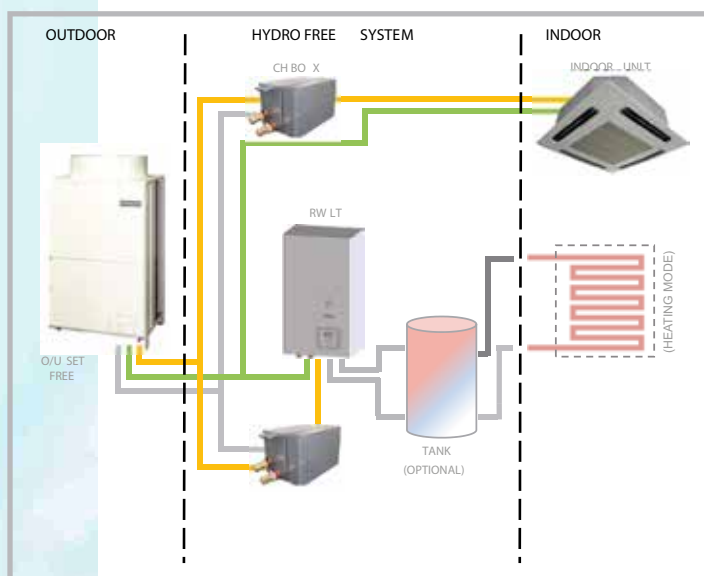
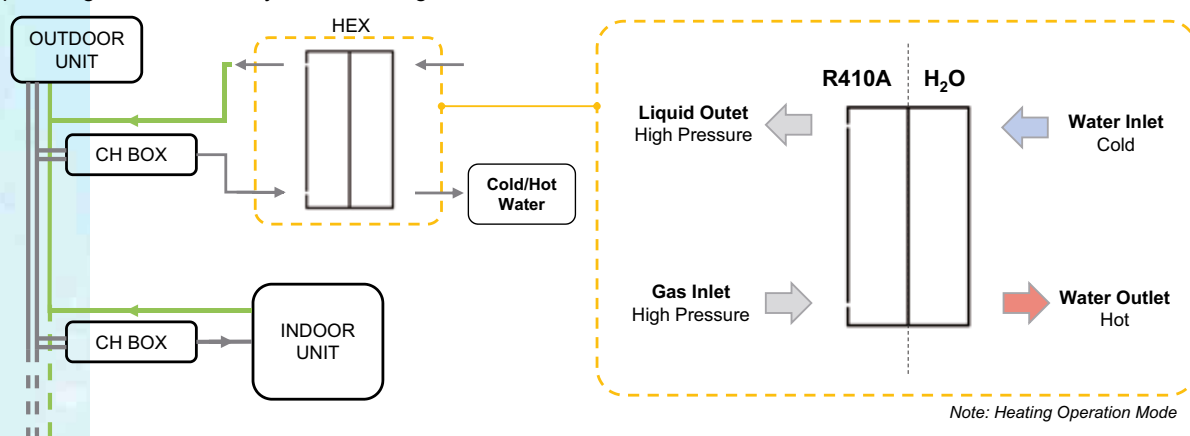
Most of the options currently available for the YUTAKI systems can also be applied in the HYDRO FREE units installed as an add-on to SET FREE VRF systems; they expand system functionality, providing a wide range of versatile and efficient heating solutions.

### **i** NOTE

The operation principle of Set Free systems is based on demand balance, which behaves in different manners depending on the combinability and working conditions of the system. Under particular working conditions, outlet water temperature may be lower than the requested temperature.

### ◆ HYDRO FREE Low temperature series

Simple refrigerant-to-water system, allowing to have hot or cold water.



- **Water outlet temperature:**  
Cooling mode from 7°C ~ 22°C  
Heating mode from 20°C ~ 45°C
- **Main application:**  
Low-temperature system  
Radian floor / wall  
Low temperature radiators
- **Outdoor unit application:**  
Heat Pump and Heat Recovery Set Free series

### **i** NOTE

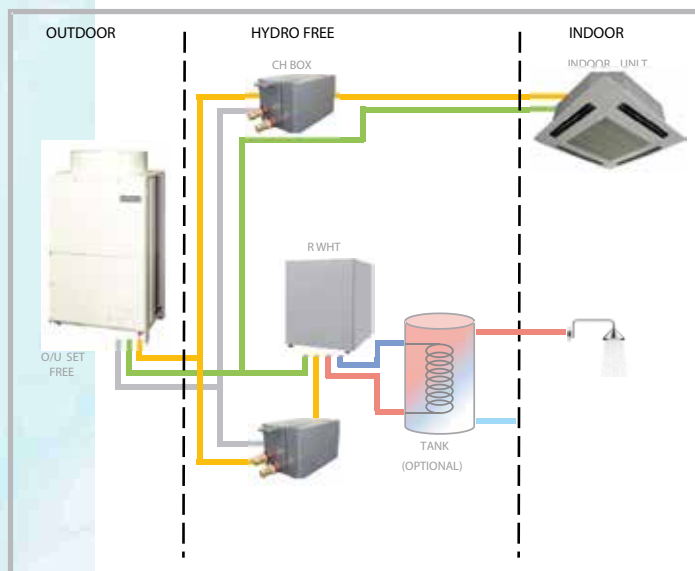
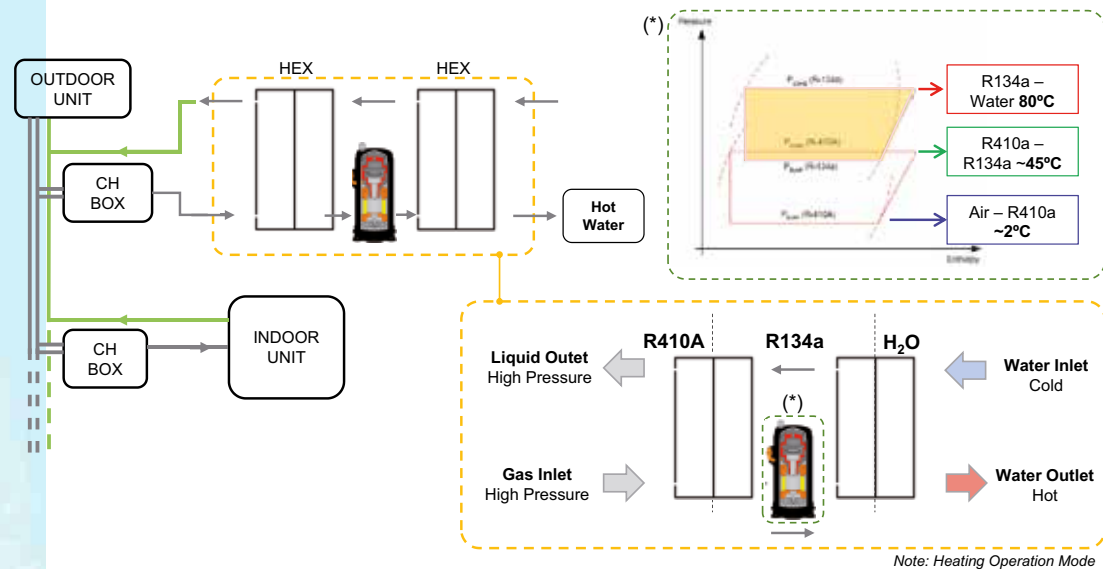
The above configuration examples are simplified diagrams presented for illustration purposes only. These examples are not comprehensive, since they lack some components and do not reflect all the possible system combinations.

### ◆ HYDRO FREE High temperature series

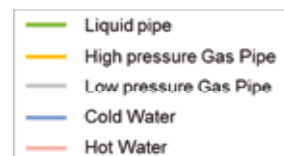
The HYDRO FREE is a standalone indoor unit that generates hot water up to 80°C (Depending on the working conditions of the system); the hottest water temperature in the domestic heating market using renewable energy.

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

This application will be available for heating mode only.



- **Water outlet temperature:**  
Heating mode from 20°C ~ 80°C
- **Main application:**  
High-temperature system  
Domestic Hot Water (DHW)
- **Outdoor unit application:**  
Heat Pump and Heat Recovery Set Free series



### **i** NOTE

The above configuration examples are simplified diagrams presented for illustration purposes only. These examples are not comprehensive, since they lack some components and do not reflect all the possible system combinations.

### 2.1.3 SMART cascade cycle

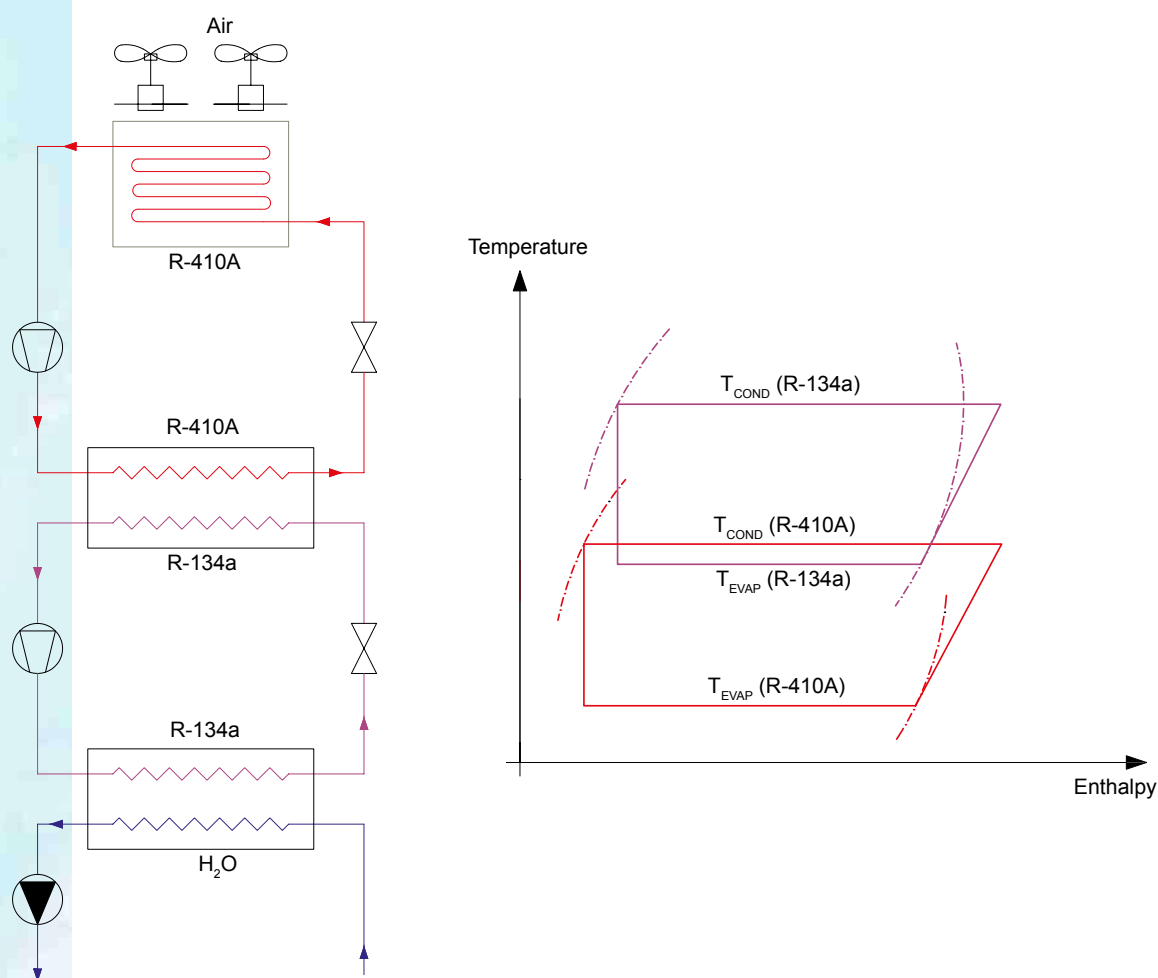
SMART cascade cycle, which combines the best performance of 1 cycle (R410A-H<sub>2</sub>O for low water temperatures) and 2 cycles (R410A-R134a and R134a-H<sub>2</sub>O for high water temperatures), providing a better COP than conventional systems.

#### Concept of normal cascade cycle

There exist some cycles which could require working at very low evaporation temperatures. For this type of application a single refrigerant is not able to evaporate at low temperatures with positive pressures (higher than 1 atm) and to condensate at high temperatures with pressures not too high with a good performance.

In this situation it must resort to an installation consisting on two single-stage cycles (high and low temperatures), thermally connected by an intermediate heat exchanger. This cycle is known as cascade cycle.

The low temperature cycle use a refrigerant (R-410A) which allows to evaporate at very low temperatures at positive pressures, but condensing in the intermediate heat exchanger at pressures not too high by transferring heat to the evaporator of the high-temperature cycle, where is circulating a different refrigerant (R-134a) at lower temperature. The condensation of the low-temperature refrigerant (R-410A) causes the evaporation of the high-temperature refrigerant (R-134a).

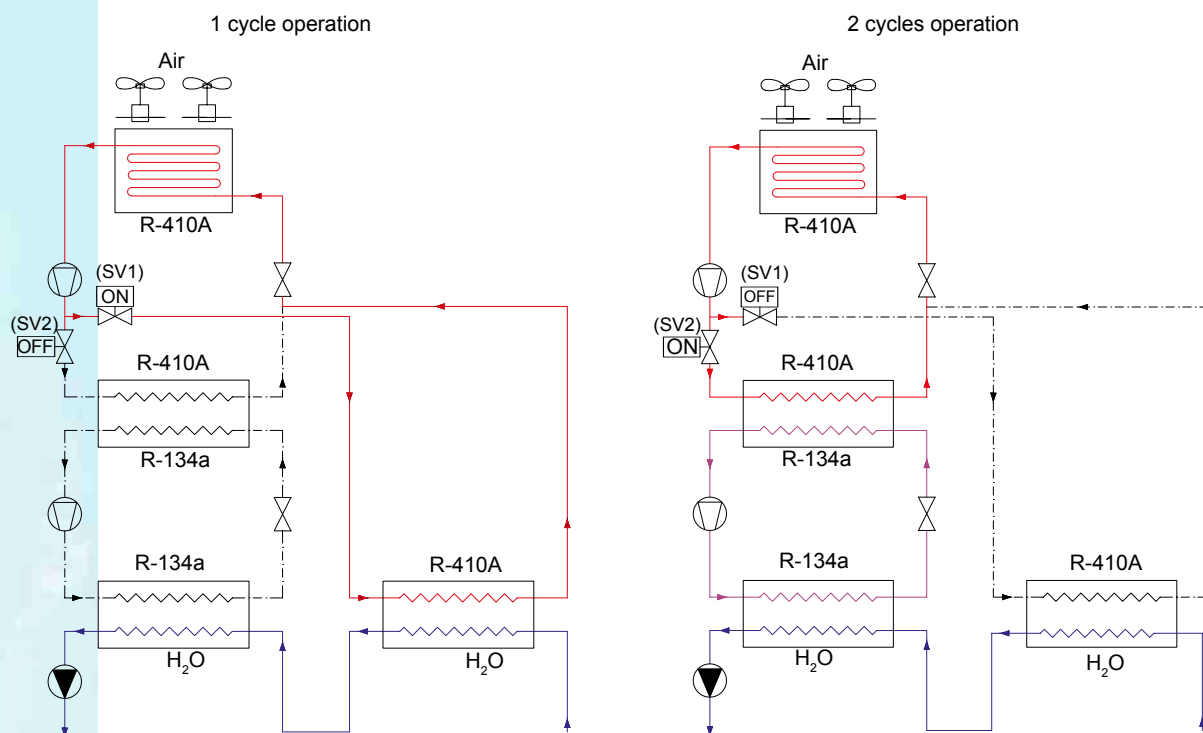


**Concept of SMART cascade cycle**

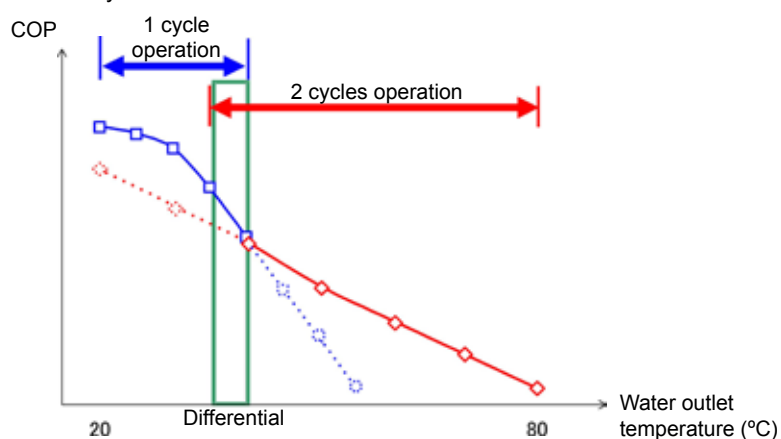
The normal cascade cycle would work continuously using two single-stage cycles; the innovative HYDRO FREE SMART cascade cycle allows to take advantage of the best possible performance depending on the water outlet temperature required.

Thereby, when the installation would require low water outlet temperatures, only one cycle will work (R410-H<sub>2</sub>O) whereas that when the installation would require high water outlet temperatures, the two cycles will be activated (R410A-R134a and R134a-H<sub>2</sub>O).

This control is possible by the actuation over the solenoid valves (SV1 and SV2). When the unit requires working with only one cycle the SV1 remains ON and SV2 OFF, whereas that when the installation requires working with the cascade cycle the SV1 pass to OFF and SV2 pass to ON.

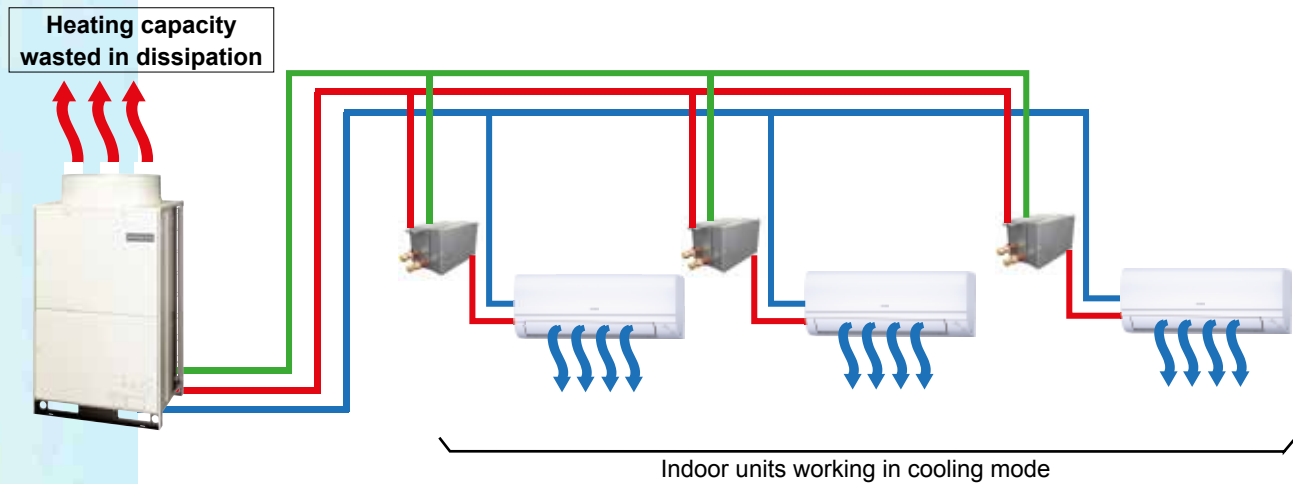


The innovative SMART cascade cycle results in a better COP than cascade conventional cycles, because it leverages the best working conditions for any moment.

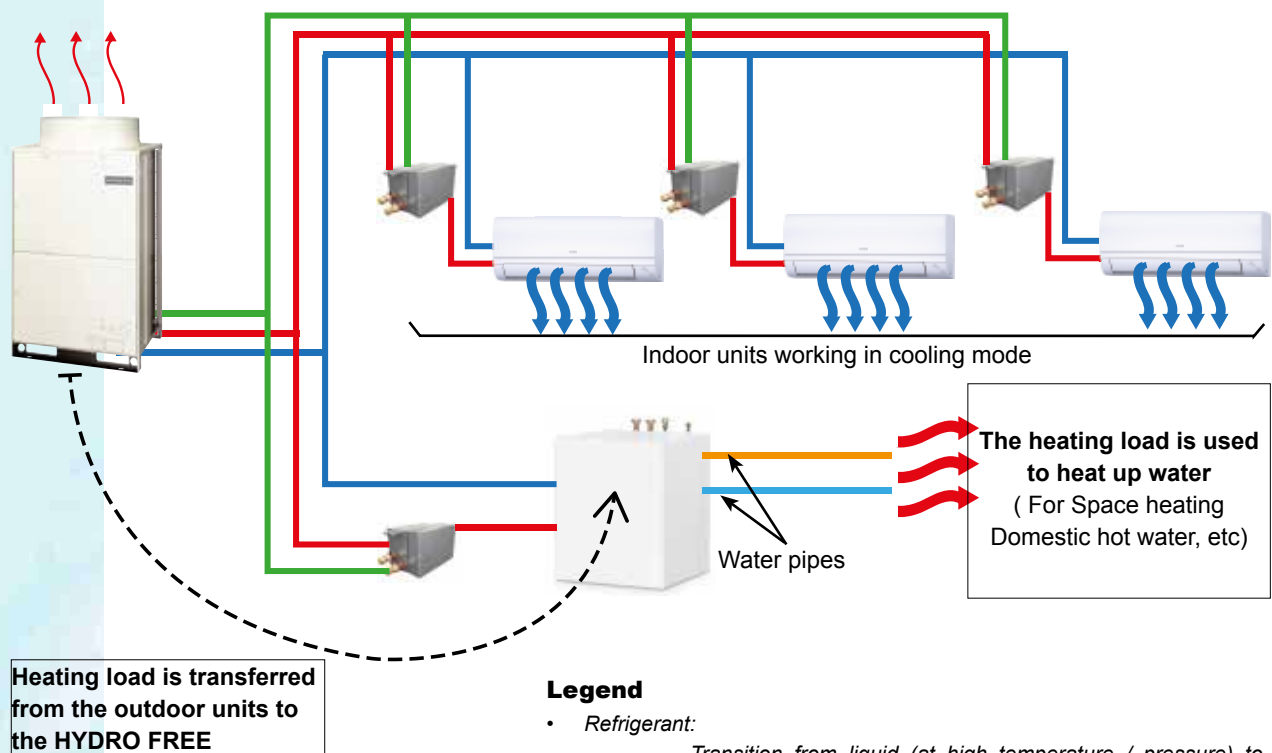


### 2.1.4 Energy saving

- In summer, a SET FREE Heat Recovery system works with all indoor units in a cooling mode, whereas the outdoor units heat up the air at outdoor side. The heating capacity is wasted, as it is dissipated to the atmosphere.



- With the installation of the HYDRO FREE, the energy wasted as exhaust heat of the outdoor unit can be used to heat up water.



#### Legend

- Refrigerant:

- Transition from liquid (at high temperature / pressure) to L+G (at low temperature / pressure)
- Gas [High pressure and high temperature]
- Gas [Low pressure and low temperature]

- Water in Heat exchanger unit:

- Cold water
- Hot water

2.2 Installation benefits

2.2.1 Units compatibilities

HYDRO FREE are compatible with the following SET FREE series:

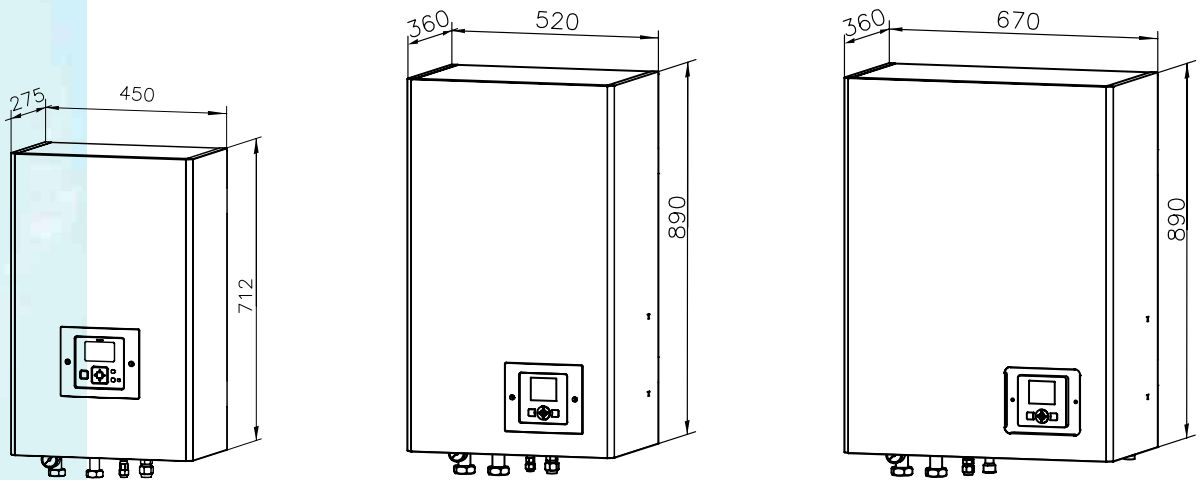
| HYDRO FREE       | Outdoor Units                     |                               |                                   |                               |                               |
|------------------|-----------------------------------|-------------------------------|-----------------------------------|-------------------------------|-------------------------------|
|                  | RAS-(8~54)FSXN1E(-P)              |                               | RAS-(5~36)FSXNHE(-P)              |                               | RAS-(8~54)FSN3E               |
|                  | Heat Recovery<br>(3 pipes system) | Heat Pump<br>(2 pipes system) | Heat Recovery<br>(3 pipes system) | Heat Pump<br>(2 pipes system) | Heat Pump<br>(2 pipes system) |
| Low temperature  | ●                                 | ●                             | ●                                 | ●                             | ●                             |
| High temperature | ●                                 | ●                             | ●                                 | ●                             | ●                             |

 NOTE

- Connections with indoor HYDRO FREE unit is possible
- Follow the HYDRO FREE assembly and restriction details.

2.2.2 Compact dimensions

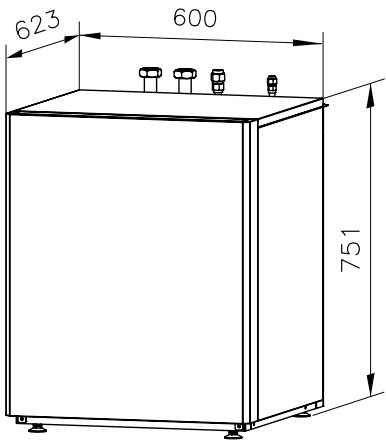
HYDRO FREE Low temperatures



Units in mm

HYDRO FREE High temperatures

The standard dimension can be installed in a similar space than other standard electrical household appliance



Units in mm



Water and refrigerant connections have been designed in order to give a more safe installation thus avoiding later problems with the installation.

Professionals can now work with more efficiency and safety thanks to the new easy-to-install units of HYDRO FREE series.

Water and refrigerant connections are now more accessible in all the models. Developers and designers have taken into account all the customers claims and specifications to match their requirements and needs.

2

## 2.3 Maintenance benefits

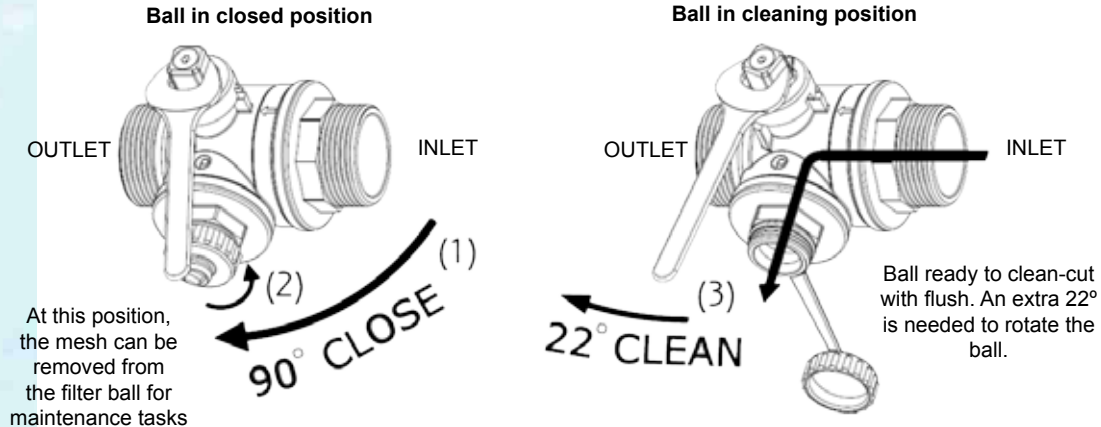
HITACHI HYDRO FREE series incorporates new components that make the maintenance an easier work to do. Aspects that makes the new models the most confident in the market:

- High quality components
- Longer life cycle assets
- More reliability-centered designs
- etc.

### 2.3.1 Filter + for the water circuit

Filter + is an on-off ball valve containing an interchangeable cylindrical filter which is easy to inspect and remove for normal maintenance operations. A single valve therefore has two important functions: perfect sealing of the ball valves and careful filtering of the fluid, so that their great reliability protects all the components of the HYDRO FREE units.

Compared with the traditional use of three components (one filter and two shut-off valves), apart from the obvious advantages in terms of cost, installation and space, the Filter + means much smaller load losses.



## 2.4 Control features

---

### 2.4.1 Wired unit controller

#### User-friendly

The new wired unit controller PC-ARFWE is adopted for HYDRO FREE series (always as local). PC-ARFWE is more user-friendly and easy to use. It is more visually pleasant and even more intuitive.



#### Multifunction

The new unit controller is a multifunctional device with an updated hardware and an optimised software. Allows users to set up the unit to a wide range of possibilities.

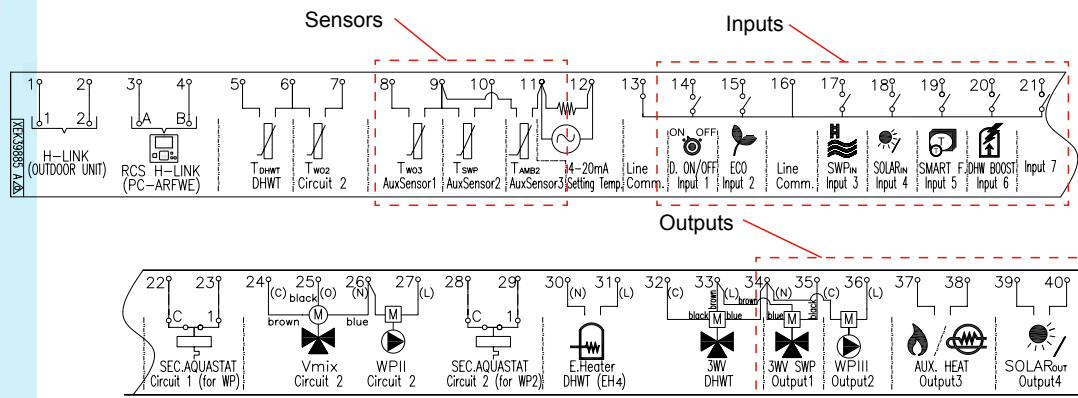
The HYDRO FREE series incorporate a unit controller which provides a great deal of functions. Some of the special functions are:

- Auto cool/heat
- Quick actions menu for more comprehensive view: Functions Timer, ECO, Status, Schedule and OTC.
- Boost action: It allows an immediate heating of the domestic hot water.
- Timer with better aesthetic and function of simple timer to create easily a timer configuration.
- Air purge function for the test run.
- Many other improvements like: possibility to modify the name of the circuits, configuration of phone contact, etc.

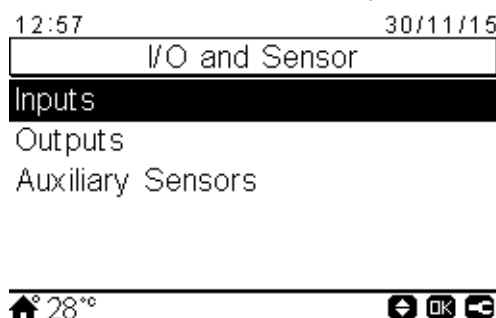
## 2.4.2 I/O and sensor functions

The HYDRO FREE models have a wide range of configurations. Added to the factory presets, there is a wide variety of possible different input, output and sensor settings that can be performed from the unit controller.

The factory-set functions of the controller are those indicated in the label of the terminal board 2 of the indoor unit:



The following input, output and sensor functions can be selected through the “I/O and sensor” menu of the controller:



- Inputs: Demand ON/OFF, Smart act., Swimming pool input, Solar, Operation mode, DHW boost, Demand ON/OFF C1, Demand ON/FF C2, Forced heating, Forced cooling, ECO mode C1 and C2, ECO mode C1, ECO mode C2, Forced OFF, SG 2.
- Outputs: 3-way valve swimming pool, water pump 3, Boiler, Solar pump, Alarm, Operation, Cooling, Demand-ON C1, Heating, DHW, Defrost, DHW recirculation, Heater relay 1, Heater relay 2.
- Sensors: Two3, Swimming pool, Solar panel sensor, C1 & C2 ambient, C1 ambient, C2 ambient, Outdoor sensor.



3. General data

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## 3.1 Capacity tables

### 3.1.1 Considerations

- The heating capacity tables show the capacity data in integrated values (with defrost correction factor included).
- The nominal heating and cooling capacities measurements are based on the EN 14511 standard.

Keywords:

- CAP: Nominal capacity (kW)
- DB: Dry bulb; WB: Wet bulb (°C)
- OAT: Outdoor ambient temperature (°C)
- WIT: Water inlet temperature (°C)
- WOT: Water outlet temperature (°C)

### 3.1.2 Capacity data

#### ◆ HYDRO FREE Low temperature series

| Indoor unit model |            |      | RWLT-3.0VNE       | RWLT-5.0VNE | RWLT-10.0VNE |
|-------------------|------------|------|-------------------|-------------|--------------|
| OAT<br>(DB/WB)    | WIT / WOT  | Unit | Heating operation |             |              |
| 7 / 6 °C          | 30 / 35 °C | kW   | 9.0               | 16.0        | 31.0         |
|                   | 40 / 45 °C | kW   | 8.2               | 15.0        | 31.0         |
| 2 / 1 °C          | 30 / 35 °C | kW   | 7.3               | 13.3        | 20.1         |
| -7 / -8 °C        | 30 / 35 °C | kW   | 5.5               | 11.5        | 20.3         |
|                   | 40 / 45 °C | kW   | 5.2               | 11.1        | 17.9         |

| OAT<br>(DB/WB) | WIT / WOT  | Unit | Cooling operation<br>(Using cooling kit accessory) |      |      |
|----------------|------------|------|----------------------------------------------------|------|------|
| 35 / -- °C     | 12 / 7 °C  | kW   | 7                                                  | 12.6 | 20.6 |
|                | 23 / 18 °C | kW   | 8.5                                                | 16   | 27   |

#### ◆ HYDRO FREE High temperature series

| Indoor unit model |            |      | RWHT-5.0VNFE      |
|-------------------|------------|------|-------------------|
| OAT<br>(DB/WB)    | WIT / WOT  | Unit | Heating operation |
| 7 / 6 °C          | 30 / 35 °C | kW   | 16.0              |
|                   | 40 / 45 °C | kW   | 16.3              |
|                   | 47 / 55 °C | kW   | 16.3              |
|                   | 55 / 65 °C | kW   | 16.3              |
| -7 / -8 °C        | 30 / 35 °C | kW   | 11.7              |
|                   | 40 / 45 °C | kW   | 13.9              |
|                   | 47 / 55 °C | kW   | 13.9              |
|                   | 55 / 65 °C | kW   | 13.9              |

### 3.1.3 General data

### 3.1.4 Considerations

- The sound data is based on the following conditions:
  - Outdoor ambient temperature (DB/WB): 7/6°C.
  - Water inlet/outlet temperature: 30/35°C.
  - Distance of the unit from the measuring point: At 1 meter from the unit's front surface; 1,5 meter from floor level.
  - Measured in a reverberant room, in accordance with the standard EN12102. Used environment conditions are the same that specified in EN14511 for performance test.
- The nominal water flow rate is calculated under the following conditions:
  - Outdoor ambient temperature (DB/WB): 7/6°C.
  - Water inlet/outlet temperature: 30/35°C.
- Regarding data market with mark (\*) in the HYDRO FREE High temperature table, corresponds to the height of the unit with the minimum mounting foot height. This value can be adjusted up to +30 mm.
- For specific details about data corresponding to the working range, please refer to the chapter *"Working range"*.

Keywords:

- DB: Dry bulb
- WB: Wet bulb

### 3.1.5 HYDRO FREE Low temperature

| Model                          |                                     |             | RWLT-3.0VNE                | RWLT-5.0VNE                       | RWLT-10.0VNE                                                      |
|--------------------------------|-------------------------------------|-------------|----------------------------|-----------------------------------|-------------------------------------------------------------------|
| Power supply                   |                                     | -           | 1~ 230V 50Hz               | 1~ 230V 50Hz                      | 1~ 230V 50Hz                                                      |
| Noise level (sound power)      |                                     | dB(A)       | 37                         | 39                                | 47                                                                |
| Nominal water flow             | WIT: 30 °C / WOT: 35 °C<br>ΔT: 5 °C | m³/h        | 1.29                       | 2.41                              | 4.13                                                              |
| Cabinet                        | Material                            | -           | Precoated galvanised steel | Precoated galvanised steel        | Precoated galvanised steel                                        |
|                                | Colour                              | -           | Pure white (RAL 9010)      | Pure white (RAL 9010)             | Pure white (RAL 9010)                                             |
| Unit dimensions                | Height (with connections)           | mm          | 712 (782)                  | 890 (960)                         | 890 (960)                                                         |
|                                | Width                               | mm          | 450                        | 520                               | 670                                                               |
|                                | Depth                               | mm          | 275                        | 360                               | 360                                                               |
| Packaging dimensions           | Height                              | mm          | 468                        | 546                               | 546                                                               |
|                                | Width                               | mm          | 905                        | 1120                              | 1120                                                              |
|                                | Depth                               | mm          | 539                        | 610                               | 760                                                               |
| Packaging volume               |                                     | m³          | 0.23                       | 0.37                              | 0.46                                                              |
| Packaging materials            |                                     | -           | Wood - Carton - Plastic    | Wood - Carton - Plastic           | Wood - Carton - Plastic                                           |
| Net weight                     |                                     | kg          | 35                         | 50                                | 62                                                                |
| Gross weight                   |                                     | kg          | 44                         | 65                                | 78                                                                |
| Refrigerant pipes connection   | Connection type                     | -           | Flare nut connection       | Flare nut connection              | Liquid pipe: Flare nut connection;<br>Gas pipe: Brazed connection |
|                                | Liquid pipe diameter                | mm (inches) | Ø9.52 (3/8")               | Ø9.52 (3/8")                      | Ø9.52 (3/8")                                                      |
|                                | Gas pipe diameter                   | mm (inches) | Ø15.88 (5/8")              | Ø15.88 (5/8")                     | Ø22.2 (7/8")                                                      |
| Space heating pipes connection | Connection type                     | -           | Screwed connection         | Screwed connection                | Screwed connection                                                |
|                                | Shut-off valves                     | inches      | G 1" (male) - G 1" (male)  | G 1-1/4" (male) - G 1-1/4" (male) | G 1-1/4" (male) - G 1-1/4" (male)                                 |
|                                | Inlet pipe diameter                 | inches      | G 1" (female)              | G 1-1/4" (female)                 | G 1-1/4" (female)                                                 |
|                                | Outlet pipe diameter                | inches      | G 1" (female)              | G 1-1/4" (female)                 | G 1-1/4" (female)                                                 |

**3.1.6 HYDRO FREE High temperature**

| Model                          |                                     |             | RWHT-5.0VNFE                                        |
|--------------------------------|-------------------------------------|-------------|-----------------------------------------------------|
| Power supply                   |                                     | -           | 1~ 230V 50Hz                                        |
| Nominal water flow             | WIT: 47 °C / WOT: 55 °C<br>ΔT: 5 °C | m³/h        | 1.64                                                |
| Noise level (sound power)      |                                     | dB(A)       | 57                                                  |
| Cabinet                        | Material                            | -           | Precoated galvanised steel                          |
|                                | Colour                              | -           | Pure white (RAL 9010)                               |
| Unit dimensions                | Height (with connections) (*)       | mm          | 751 (802)                                           |
|                                | Width                               | mm          | 600                                                 |
|                                | Depth                               | mm          | 623                                                 |
| Packaging dimensions           | Height                              | mm          | 982                                                 |
|                                | Width                               | mm          | 675                                                 |
|                                | Depth                               | mm          | 671                                                 |
| Packaging volume               |                                     | m³          | 0.44                                                |
| Packaging materials            |                                     | -           | Wood - Carton<br>- Plastic -<br>Polypropylene bands |
| Net weight                     |                                     | kg          | 129                                                 |
| Gross weight                   |                                     | kg          | 140                                                 |
| Refrigerant pipes connection   | Connection type                     | -           | Flare nut connection                                |
|                                | Liquid pipe diameter                | mm (inches) | Ø9.52 (3/8")                                        |
|                                | Gas pipe diameter                   | mm (inches) | Ø15.88 (5/8")                                       |
| Space heating pipes connection | Connection type                     | -           | Screwed connection                                  |
|                                | Shut-off valves                     | inches      | G 1-1/4" (male) -<br>G 1-1/4" (male)                |
|                                | Inlet pipe diameter                 | inches      | G 1-1/4" (female)                                   |
|                                | Outlet pipe diameter                | inches      | G 1-1/4" (female)                                   |
| Working range (DHW)            | Outdoor ambient temperature         | °C (DB)     | -25~35                                              |
|                                | Tank water temperature              | °C          | 30~75                                               |
| Refrigerant                    |                                     | -           | R-134a                                              |
| Refrigerant charge             |                                     | kg          | 1.9                                                 |
| Compressor type                |                                     | -           | Scroll DC Inverter driven                           |

## 3.1.7 Domestic Hot Water Tank

| Model                            |                                  |                                                |          | DHWT-200S-3.0H2E      | DHWT-300S-3.0H2E |  |
|----------------------------------|----------------------------------|------------------------------------------------|----------|-----------------------|------------------|--|
| Casing                           | Color                            |                                                |          | White                 |                  |  |
|                                  | Material                         |                                                |          | Polypropylene jacked  |                  |  |
| Dimensions                       | Packing                          | Height                                         | mm       | 1300                  | 1880             |  |
|                                  |                                  | Width                                          | mm       | 600                   | 600              |  |
|                                  |                                  | Depth                                          | mm       | 600                   | 600              |  |
|                                  | Unit                             | Height                                         | mm       | 1270                  | 1750             |  |
|                                  |                                  | Width                                          | mm       | 595                   | 595              |  |
|                                  |                                  | Depth                                          | mm       | 595                   | 595              |  |
| Weight                           | Unit                             |                                                | kg       | 53                    | 63               |  |
|                                  | Packed unit                      |                                                | kg       | 63.5                  | 73               |  |
| Packing                          | Material                         |                                                |          | EPS                   |                  |  |
|                                  |                                  |                                                |          | CARTON                |                  |  |
|                                  | Weight                           |                                                | kg       | 10.5                  | 11               |  |
| Main components                  | Tank                             | Water volume                                   | L        | 194                   | 282              |  |
|                                  |                                  | Material                                       |          |                       | Stainless Steel  |  |
|                                  |                                  | Max tank temperature                           | °C       | 75                    | 75               |  |
|                                  |                                  | Max tank water pressure                        | bar      | 10                    | 10               |  |
|                                  |                                  | Maximum heating coil water working temperature | °C       | 99                    | 99               |  |
|                                  |                                  | Maximum heating coil water working pressure    | bar      | 10                    | 10               |  |
| Tank                             | Insulation                       | Material                                       |          |                       | Polyurethane     |  |
|                                  |                                  | Heat loss (*)                                  | kW·h/day | 1.4                   | 1.8              |  |
|                                  |                                  | Min thickness                                  | mm       | 50                    | 50               |  |
| Main components                  | Heat exchanger                   | Quantity                                       |          | 1                     | 1                |  |
|                                  |                                  | Coil surface area                              | m²       | 0.8                   | 0.8              |  |
|                                  | Booster heater                   | Quantity                                       |          | 1                     | 1                |  |
|                                  |                                  | Heater rating                                  | kW       | 3                     | 3                |  |
|                                  | Type                             |                                                |          | Immersion heater type |                  |  |
| Piping connections               | Water inlet domestic connection  |                                                | inches   | G 3/4" (female)       |                  |  |
|                                  | Water outlet domestic connection |                                                | inches   | G 3/4" (female)       |                  |  |
|                                  | Recirculation                    |                                                | inches   | G 3/4" (female)       |                  |  |
|                                  | In coil connection               |                                                | inches   | G 3/4" (female)       |                  |  |
|                                  | Out coil connection              |                                                | inches   | G 3/4" (female)       |                  |  |
| Thermometer                      |                                  |                                                |          | Yes                   |                  |  |
| Mechanical thermostat (security) |                                  |                                                |          | Yes                   |                  |  |
| Protection                       |                                  |                                                |          | -                     |                  |  |



## NOTE

- (\*): Heat loss according to DIN-4753/8
- Storage temperature: 65°C
- Ambient temperature: 20°C DB

## 3.2 Component data

### 3.2.1 HYDRO FREE Low temperature

| Model                |                                        |                       | RWLT-3.0VNE                                         | RWLT-5.0VNE         | RWLT-10.0VNE    |
|----------------------|----------------------------------------|-----------------------|-----------------------------------------------------|---------------------|-----------------|
| Water heat exchanger | Type                                   | -                     | Brazen plate                                        |                     |                 |
|                      | Material                               | -                     | Stainless steel                                     |                     |                 |
|                      | Transfer fluids                        | -                     | R410A - H <sub>2</sub> O                            |                     |                 |
|                      | Quantity                               | -                     | 1                                                   |                     |                 |
|                      | Internal refrigerant volume            | L                     | 0.81                                                | 2.09                | 3.91            |
|                      | Internal water volume                  | L                     | 0.84                                                | 2.18                | 4.00            |
|                      | Insulation material                    | -                     | NBR + PVC                                           |                     |                 |
| Water pump           | Model                                  | -                     | Yonos PARA RS15/7.0                                 | Yonos PARA RS15/7.5 | UPML GEO 25-105 |
|                      | Type                                   | -                     | Inverter                                            |                     |                 |
|                      | Control                                | -                     | PWM                                                 |                     |                 |
|                      | Power supply                           | -                     | 1~ 230V 50Hz                                        |                     |                 |
|                      | Maximum lift pressure                  | kPa                   | 7.2                                                 | 7.6                 | 10.5            |
|                      | Maximum water flow                     | m <sup>3</sup> /h     | 3.3                                                 | 4.0                 | 5.5             |
|                      | Maximum power input                    | W                     | 45                                                  | 75                  | 140             |
|                      | Piping                                 | Water inlet           | inches                                              | G 1"                | G 1-1/2"        |
|                      |                                        | Water outlet          | inches                                              | G 1"                | G 1-1/2"        |
|                      |                                        | Inlet/outlet distance | mm                                                  | 130                 | 180             |
| Expansion vessel     | Material                               | -                     | Steel (with stainless/galvanized steel connections) |                     |                 |
|                      | Internal water volume                  | L                     | 6.0                                                 | 6.0                 | 10.0            |
|                      | Working pressure                       | MPa                   | 0.3                                                 |                     |                 |
|                      | Pre-loading pressure (Air side)        | MPa                   | 0.1                                                 |                     |                 |
| Water strainer       | Type                                   | -                     | Isolated water strainer (Filter ball)               |                     |                 |
|                      | Material                               | -                     | Brass                                               |                     |                 |
|                      | Piping connection                      | inches                | 1", DN25                                            |                     | 1", DN32        |
|                      | Mesh (hole size)                       | mm                    | 0.7                                                 |                     |                 |
|                      | Self-cleaning (with back flush) filter | -                     | Yes                                                 |                     |                 |
| Safety valve         |                                        | -                     | Yes (3 bar)                                         |                     |                 |
| Low pressure switch  |                                        | -                     | Yes (<0.5 bar)                                      |                     |                 |
| Shut-off valve       |                                        | -                     | Yes (2 factory-supplied valves)                     |                     |                 |
| Air purger           |                                        | -                     | Yes                                                 |                     |                 |
| Manometer            |                                        | -                     | Yes                                                 |                     |                 |
| Unit controller      |                                        | -                     | Yes (PC-ARFWE)                                      |                     |                 |

### 3.2.2 HYDRO FREE High temperature

| Model                |                                        |                  |                   | RWHT-5.0VNFE                                        |                                |                     |
|----------------------|----------------------------------------|------------------|-------------------|-----------------------------------------------------|--------------------------------|---------------------|
| Compressor           | Model                                  | 1~ 230V 50Hz     | -                 | H405DHD-64A1                                        |                                |                     |
|                      | Type                                   |                  | -                 | Scroll DC Inverter driven                           |                                |                     |
|                      | Pressure resistance                    | Discharge        | MPa               | 2.94                                                |                                |                     |
|                      |                                        | Suction          | MPa               | 0.15                                                |                                |                     |
|                      | Motor type                             | Starting method  | -                 | Inverter-driven (I.D.)                              |                                |                     |
|                      |                                        | Poles            | -                 | 4                                                   |                                |                     |
|                      |                                        | Insulation class | -                 | E                                                   |                                |                     |
| Water heat exchanger | Oil type                               |                  | -                 | FVC68D                                              |                                |                     |
|                      | Oil quantity                           |                  | L                 | 1.2                                                 |                                |                     |
|                      | Type                                   |                  | -                 | Brazed plate                                        |                                |                     |
|                      | Material                               |                  | -                 | Stainless steel                                     |                                |                     |
|                      | Transfer fluids                        |                  | -                 | R410A                                               | R134a<br>-<br>H <sub>2</sub> O | R410A<br>-<br>R134a |
|                      | Quantity                               |                  | -                 | 1                                                   | 1                              | 1                   |
|                      | Internal refrigerant volume            |                  | L                 | 2.09                                                | 2.09                           | 2.09                |
| Water pump           | Internal water volume                  |                  | L                 | 2.18                                                | 2.18                           | 2.18                |
|                      | Insulation material                    |                  | -                 | NBR + PVC                                           |                                |                     |
|                      | Model                                  |                  | -                 | Yonos PARA RS15/7.5                                 |                                |                     |
|                      | Type                                   |                  | -                 | Inverter                                            |                                |                     |
|                      | Control                                |                  | -                 | PWM                                                 |                                |                     |
|                      | Power supply                           |                  | -                 | 1~ 230V 50Hz                                        |                                |                     |
|                      | Maximum lift pressure                  |                  | kPa               | 7.6                                                 |                                |                     |
| Expansion vessel     | Maximum water flow                     |                  | m <sup>3</sup> /h | 4                                                   |                                |                     |
|                      | Maximum power input                    |                  | W                 | 75                                                  |                                |                     |
|                      | Piping                                 | Water inlet      | inches            | G 1"                                                |                                |                     |
|                      |                                        | Water outlet     | inches            | G 1"                                                |                                |                     |
| Water strainer       | Inlet/outlet distance                  |                  | mm                | 130                                                 |                                |                     |
|                      | Material                               |                  | -                 | Steel (with stainless/galvanized steel connections) |                                |                     |
|                      | Internal water volume                  |                  | L                 | 12                                                  |                                |                     |
|                      | Working pressure                       |                  | MPa               | 0.3                                                 |                                |                     |
| Safety valve         | Pre-loading pressure (Air side)        |                  | MPa               | 0.1                                                 |                                |                     |
|                      | Type                                   |                  | -                 | Isolated water strainer (Filter ball)               |                                |                     |
|                      | Material                               |                  | -                 | Brass                                               |                                |                     |
|                      | Piping connection                      |                  | inches            | 1", DN32                                            |                                |                     |
| Unit drain valve     | Mesh (hole size)                       |                  | mm                | 0.7                                                 |                                |                     |
|                      | Self-cleaning (with back flush) filter |                  | -                 | Yes                                                 |                                |                     |
|                      | Safety valve                           |                  | -                 | Yes (3 bar)                                         |                                |                     |
|                      | Unit drain valve                       |                  | -                 | Yes                                                 |                                |                     |
| Shut-off valve       | Shut-off valve                         |                  | -                 | Yes (2 factory-supplied valves)                     |                                |                     |
|                      | Air purger                             |                  | -                 | Yes                                                 |                                |                     |
|                      | Manometer                              |                  | -                 | Yes                                                 |                                |                     |
|                      | Unit controller                        |                  | -                 | No, available as accessory                          |                                |                     |

### 3.3 Electrical data

#### 3.3.1 Considerations

Keywords:

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



#### NOTE

- Heating conditions: Inlet/outlet water temperature: 30/35 °C; Outdoor ambient temperature (DB/WB): 7/6 °C.
- The compressor data shown in the tables below are based on a combined capacity of 100% of the power supplied.
- The "Maximum current" shown in the above table is the maximum total unit running current at the following conditions:
  - Supply voltage: 90% of the rated voltage.
  - Unit capacity: 100% at maximum operating conditions.
- The power supply cables must be sized to cover this maximum current value.
- Specifications in these tables are subject to change without notice in order that HITACHI may bring the latest innovations to their customers.

| Model        | Power supply | Applicable voltage |            | Heating operation mode          | IPT (kW) | RNC (A) | Max. IPT (kW) | MC (A) | CB (A) | ELB (n/A/mA) |
|--------------|--------------|--------------------|------------|---------------------------------|----------|---------|---------------|--------|--------|--------------|
|              |              | U min. (V)         | U max. (V) |                                 |          |         |               |        |        |              |
| RWLT-3.0VNE  | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 0.05     | 0.2     | 0.05          | 5.0    | 5      | 2/40/30      |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 3.05     | 13.2    | 3.05          | 14.5   | 16     |              |
| RWLT-5.0VNE  | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 0.08     | 0.3     | 0.08          | 5.0    | 5      |              |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 3.08     | 13.4    | 3.08          | 14.7   | 16     |              |
| RWLT-10.0VNE | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 0.14     | 0.6     | 0.14          | 5.0    | 5      |              |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 3.08     | 13.4    | 3.14          | 15.0   | 16     |              |
| RWHT-5.0VNFE | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 2.80     | 12.3    | 6.23          | 28     | 32     | 2/63/30      |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 5.78     | 25.6    | 9.23          | 42     | 50     |              |



#### NOTE

- The data corresponding to DHW tank heater is calculated in combination with the domestic hot water tank accessory "DHWT-(200/300) S-3.0H2E".
- When using a DHW tank other than those from Hitachi, the maximum connectable heater load is 3 kW (connected to TB2 terminals 30-31).
- 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).



#### CAUTION

Ensure specifically that there is an Earth Leakage Breaker (ELB) installed for the units (outdoor and indoor unit) and the installation is already equipped with an earth connection.

4 . Capacity and selection data

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## 4.1 Combinability

### 4.1.1 Operation options

|                                |                   | Heat Pump system<br>(2 pipes system) |                 | Heat Recovery system<br>(3 pipes sytem) |
|--------------------------------|-------------------|--------------------------------------|-----------------|-----------------------------------------|
|                                |                   | In cooling mode                      | In Heating Mode | Simultaneous                            |
| HYDRO FREE<br>Low temperature  | Cooling operation | ✓                                    | ✗               | ✓                                       |
|                                | Heating operation | ✗                                    | ✓               | ✓                                       |
| HYDRO FREE<br>High temperature | Cooling operation | ✗                                    | ✗               | ✗                                       |
|                                | Heating operation | ✗                                    | ✓               | ✓                                       |
| Indoor Unit (DX)               | Cooling operation | ✓                                    | ✗               | ✓                                       |
|                                | Heating operation | ✗                                    | ✓               | ✓                                       |

For Heat Recovery System (3 pipes system) it is necessary the SET FREE CH-Box accessory.

### 4.1.2 Combinability ratio

#### ◆ RWLT-3.0VNE, RWLT-5.0VNE, RWLT-10.0VNE, RWHT-5.0VNFE

|                                                                               | Heat recovery system                                                  | Heat pump system |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------|
| TOTAL ratio HYDRO FREE + IU(DX)                                               | RAS-(8~54)FSXN1E(-P): 50% ~ 150%<br>RAS-(5~36)FSXNHE(-P): 50% ~ 180 % | 50% ~ 130%       |
| Maximum number of IU when HYDRO FREE is installed (IU (DX) + HYDRO FREE) (1*) | 32 (Depending on the outdoor unit model)                              |                  |
| Total ratio of IU (DX) when HYDRO FREE is installed                           | 50% ~ 130%                                                            |                  |
| Total ratio of HYDRO FREE                                                     | 0% ~ 100%                                                             |                  |
| Only HYDRO FREE allowed                                                       | No                                                                    |                  |
| Minimum IU (DX) total ratio                                                   | 50%                                                                   |                  |



#### NOTE

- Simultaneous operation can never be over 100% in heat pump mode
- Simultaneous operation in same working mode can never be over 100% in heat recovery system
- (1\*) The maximum number of IU corresponds to the recommended quantity of IU for each OU size. Please refer to OU technical catalogue for further information

The following table shows the compound combinability ratios of IU(DX) and HYDRO FREE modules, according to the different combinability ratios possible for IU(DX) and HYDRO FREE modules, as well as the limitations derived thereof.

|               |     | HYDRO FREE ratio |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------------|-----|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|               |     | 0                | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 |
| IU (DX) ratio | 0   |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |
|               | 10  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |
|               | 20  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |
|               | 30  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |
|               | 40  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |
|               | 50  | 50               | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 |     |     |     |
|               | 60  | 60               | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 |     |     |     |
|               | 70  | 70               | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 |     |     |     |
|               | 80  | 80               | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |     |     |     |
|               | 90  | 90               | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |     |     |     |     |
|               | 100 | 100              | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |     |     |     |     |     |
|               | 110 | 110              | 120 | 130 | 140 | 150 | 160 | 170 | 180 |     |     |     |     |     |     |
|               | 120 | 120              | 130 | 140 | 150 | 160 | 170 | 180 |     |     |     |     |     |     |     |
| 130           | 130 | 140              | 150 | 160 | 170 | 180 |     |     |     |     |     |     |     |     |     |

A minimum combination ratio of 50% in indoor unit (DX) is required to ensure the correct system operation

Typical VRF + IU(DX) system

#### Combinability ratio limitation

FSXN1E: Max CR= 150%

FSXNHE: Max CR= 180%

150% to 180% (blue area), only with FSXNHE

- Heat Pump (2 pipes) maximum simultaneous operation 100%
- It is allowed to exceed 100% in Heat Recovery (3 pipes) applications  
(The maximum number of units operating in a same mode cannot exceed 100% of the connection ratio anyway)

## 4.2 Maximum capacity tables

### 4.2.1 HYDRO FREE Low temperature

#### 4.2.1.1 Maximum heating capacity table (kW) (Integrated)

| System       | Water outlet temp (°C) | Ambient temperature (°C WB) |          |          |          |          |          |          |          |          |          |          |
|--------------|------------------------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|              |                        | -20                         | -15      | -10      | -7       | -2       | 2        | 7        | 12       | 15       | 20       | 20       |
|              |                        | CAP (kW)                    | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) |
| RWLT-3.0VNE  | 45                     | 4.40                        | 4.50     | 4.66     | 5.24     | 5.84     | 6.30     | 8.18     | 9.00     | 9.41     | 9.57     | 9.67     |
|              | 40                     | 4.41                        | 4.60     | 4.91     | 5.38     | 6.16     | 6.79     | 8.58     | 9.41     | 9.65     | 9.74     | 9.79     |
|              | 35                     | 4.58                        | 4.83     | 5.24     | 5.49     | 6.48     | 7.28     | 9.00     | 9.57     | 9.74     | 9.90     | 10.00    |
|              | 30                     | 4.72                        | 4.99     | 5.45     | 5.73     | 6.63     | 7.69     | 9.08     | 9.82     | 9.90     | 10.06    | 10.16    |
|              | 25                     | -                           | -        | -        | 5.81     | 6.79     | 8.35     | 9.25     | 9.90     | 10.06    | 10.15    | 10.19    |
|              | 20                     | -                           | -        | -        | -        | -        | -        | -        | 9.98     | 10.15    | 10.31    | 10.41    |
| RWLT-5.0VNE  | 45                     | 7.76                        | 9.03     | 10.31    | 11.11    | 12.15    | 13.02    | 15.04    | 16.29    | 16.77    | 17.25    | 17.53    |
|              | 40                     | 8.53                        | 9.60     | 10.68    | 11.32    | 12.35    | 13.17    | 15.45    | 16.43    | 16.96    | 17.72    | 18.18    |
|              | 35                     | 9.29                        | 10.17    | 11.05    | 11.50    | 12.55    | 13.32    | 16.00    | 16.57    | 17.05    | 18.01    | 18.59    |
|              | 30                     | 10.25                       | 10.81    | 11.35    | 11.69    | 12.70    | 13.51    | 16.48    | 17.15    | 17.21    | 18.30    | 18.95    |
|              | 25                     | -                           | -        | -        | 13.41    | 14.08    | 14.63    | 17.15    | 17.72    | 18.01    | 18.68    | 19.09    |
|              | 20                     | -                           | -        | -        | -        | -        | -        | -        | 18.01    | 18.20    | 19.16    | 19.74    |
| RWLT-10.0VNE | 45                     | 12.59                       | 14.35    | 16.59    | 17.92    | 19.27    | 20.34    | 31.00    | 31.97    | 32.16    | 32.55    | 32.78    |
|              | 40                     | 13.76                       | 14.96    | 17.56    | 19.12    | 19.72    | 20.20    | 31.00    | 32.45    | 32.45    | 32.74    | 32.92    |
|              | 35                     | 14.63                       | 15.57    | 17.92    | 20.34    | 20.34    | 21.02    | 31.00    | 32.94    | 33.62    | 33.81    | 33.93    |
|              | 30                     | 15.21                       | 15.51    | 18.12    | 20.95    | 22.23    | 23.25    | 32.16    | 33.23    | 33.91    | 34.00    | 34.06    |
|              | 25                     | -                           | -        | -        | 21.34    | 23.00    | 24.33    | 32.45    | 33.42    | 34.68    | 35.07    | 35.30    |
|              | 20                     | -                           | -        | -        | -        | -        | -        | -        | 33.91    | 34.97    | 35.84    | 36.37    |



#### NOTE

CAP: Capacity is valid for a temperature gradient in the range of 3 to 8 °C between the water inlet and outlet temperatures.

**4.2.1.2 Maximum cooling capacity table (kW)**

| System       | Water outlet temperature (°C) | Ambient temperature (°C DB) |          |          |          |          |          |          |          |
|--------------|-------------------------------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|
|              |                               | 10                          | 15       | 20       | 25       | 30       | 35       | 40       | 43       |
|              |                               | CAP (kW)                    | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) |
| RWLT-3.0VNE  | 20                            | -                           | -        | -        | 8.90     | 8.40     | 8.00     | 7.50     | 7.20     |
|              | 18                            | -                           | 9.06     | 9.00     | 8.90     | 8.70     | 8.50     | 7.50     | 6.90     |
|              | 15                            | 8.90                        | 8.80     | 8.60     | 8.50     | 7.90     | 7.40     | 6.90     | 6.60     |
|              | 10                            | -                           | 8.30     | 8.00     | 7.80     | 7.40     | 6.90     | 6.50     | 6.26     |
|              | 7                             | -                           | -        | 7.80     | 7.30     | 7.20     | 7.00     | 6.50     | 6.20     |
| RWLT-5.0VNE  | 20                            | -                           | -        | -        | 18.30    | 18.00    | 17.70    | 17.30    | 17.12    |
|              | 18                            | -                           | 19.04    | 18.50    | 17.60    | 17.40    | 16.00    | 15.00    | 14.40    |
|              | 15                            | 17.10                       | 17.10    | 17.00    | 17.10    | 16.10    | 15.10    | 14.10    | 13.44    |
|              | 10                            | -                           | 16.50    | 16.40    | 16.20    | 15.00    | 13.80    | 12.60    | 11.88    |
|              | 7                             | -                           | -        | 15.40    | 15.70    | 13.20    | 12.60    | 11.50    | 10.84    |
| RWLT-10.0VNE | 20                            | -                           | -        | -        | 28.60    | 27.70    | 26.80    | 25.90    | 25.36    |
|              | 18                            | -                           | 28.80    | 28.50    | 28.00    | 27.50    | 27.00    | 25.00    | 23.80    |
|              | 15                            | 26.00                       | 26.10    | 26.10    | 26.20    | 25.10    | 23.90    | 22.80    | 22.08    |
|              | 10                            | -                           | 24.60    | 23.90    | 23.20    | 22.20    | 21.30    | 20.30    | 19.76    |
|              | 7                             | -                           | -        | 22.80    | 21.40    | 21.00    | 20.60    | 19.30    | 18.52    |

**NOTE**

CAP: Capacity is valid for a temperature gradient in the range of 3 to 8 °C between the water inlet and outlet temperatures.

**4.2.2 HYDRO FREE High temperature****4.2.2.1 Maximum heating capacity table (kW) (Integrated)**

| System       | Water outlet temp. (°C) | Ambient temperature (°C WB) |          |          |          |          |          |          |          |          |          |          |
|--------------|-------------------------|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|              |                         | -20                         | -15      | -10      | -7       | -2       | 2        | 7        | 12       | 15       | 20       | 23       |
|              |                         | CAP (kW)                    | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) | CAP (kW) |
| RWHT-5.0VNFE | 80                      | 11.16                       | 11.62    | 12.17    | 12.36    | 12.57    | 12.74    | 14.37    | 15.81    | 16.67    | 18.11    | 18.97    |
|              | 75                      | 11.91                       | 12.28    | 12.65    | 12.87    | 13.05    | 13.19    | 14.97    | 16.12    | 16.82    | 17.97    | 18.66    |
|              | 70                      | 12.91                       | 13.15    | 13.29    | 13.55    | 13.68    | 13.79    | 15.77    | 16.56    | 17.03    | 17.80    | 18.27    |
|              | 65                      | 13.41                       | 13.60    | 13.60    | 13.89    | 14.00    | 14.08    | 16.17    | 16.77    | 17.12    | 17.71    | 18.07    |
|              | 60                      | 13.51                       | 13.65    | 13.72    | 13.89    | 14.27    | 14.56    | 16.24    | 16.77    | 17.08    | 17.61    | 17.93    |
|              | 55                      | 13.60                       | 13.72    | 13.83    | 13.89    | 14.53    | 15.04    | 16.31    | 16.77    | 17.04    | 17.50    | 17.78    |
|              | 50                      | 13.75                       | 13.82    | 13.83    | 13.89    | 14.26    | 14.55    | 16.27    | 16.77    | 17.06    | 17.56    | 17.86    |
|              | 45                      | 13.89                       | 13.89    | 13.89    | 13.89    | 14.26    | 14.54    | 16.29    | 16.77    | 17.05    | 17.53    | 17.82    |
|              | 40                      | 11.59                       | 12.03    | 12.47    | 12.73    | 13.40    | 13.94    | 16.06    | 16.67    | 17.04    | 17.66    | 18.03    |
|              | 35                      | 9.29                        | 10.17    | 11.05    | 11.50    | 12.55    | 13.32    | 16.00    | 16.57    | 17.05    | 18.01    | 18.59    |
|              | 30                      | 10.25                       | 10.81    | 11.35    | 11.69    | 12.70    | 13.51    | 16.48    | 17.15    | 17.21    | 18.30    | 18.95    |
|              | 25                      | -                           | -        | -        | 13.41    | 14.08    | 14.63    | 17.15    | 17.72    | 18.01    | 18.68    | 19.09    |
|              | 20                      | -                           | -        | -        | -        | -        | -        | -        | 18.01    | 18.20    | 19.16    | 19.74    |

**NOTE**

CAP: Capacity is valid for a temperature gradient in the range of 3 to 10 °C between the water inlet and outlet temperatures..



# 5. Working range

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## 5.1 Power supply working range

### ◆ Nominal power supply

- Single phase: 1~ 230V 50Hz

### ◆ Operating voltage

Between 90 and 110% of the nominal voltage.

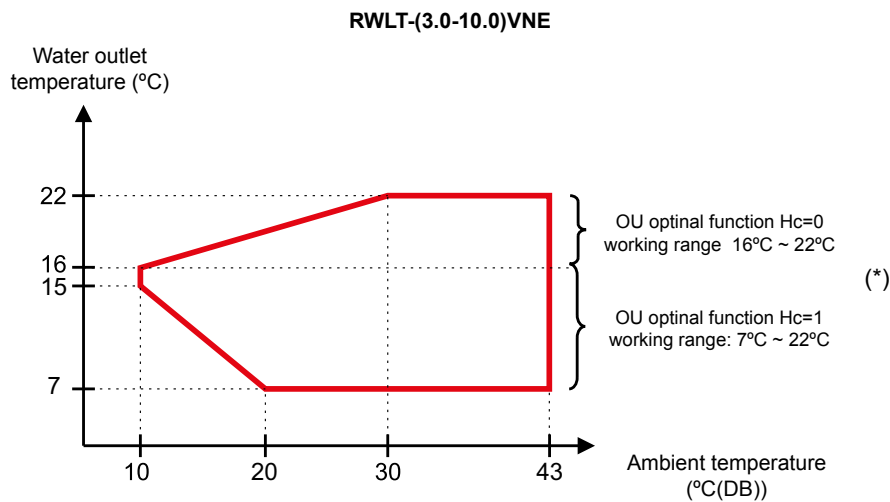
### ◆ Starting voltage

Always higher than 85% of the nominal voltage.

#### 5.1.1 Temperature working range

| MODEL                      |    | 3.0HP                               | 5.0HP | 10.0HP |
|----------------------------|----|-------------------------------------|-------|--------|
| Water temperature          | °C | Refer to the graphics for each case |       |        |
| Indoor ambient temperature |    |                                     |       |        |
|                            |    | 5~30                                |       |        |

### ◆ COOLING MODE



### NOTE

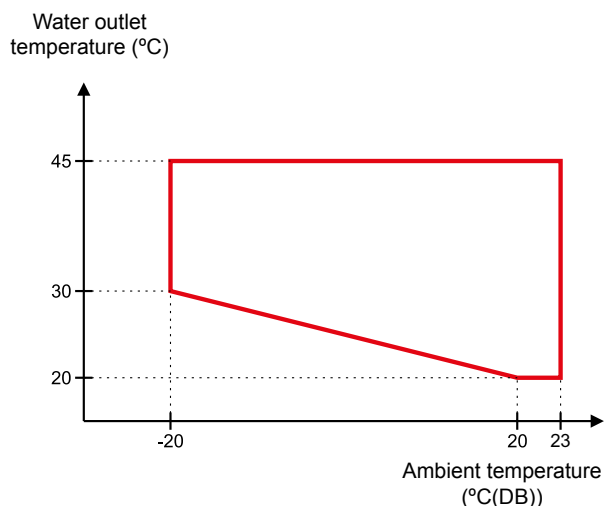
- (\*) When the required water temperature has to reach a temperature below 16°C, it is necessary to set, in the Outdoor Unit, the optional function Hc = 1, then the water temperature working range is from 7 °C to 22 °C.
- With the factory setting Hc = 0, the water temperature working range is from 16 to 22 °C

## ◆ HEATING MODE

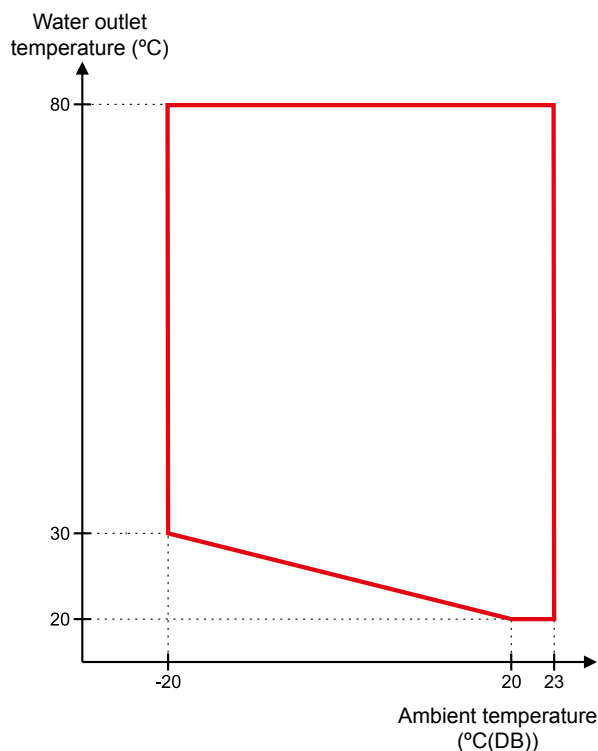
If the ambient temperature is above 23 °C, must be set , on the outdoor unit, the optional funtion GS = 1 (factory setting GS=0)

### Space heating

RWLT-(3.0-10.0)VNE

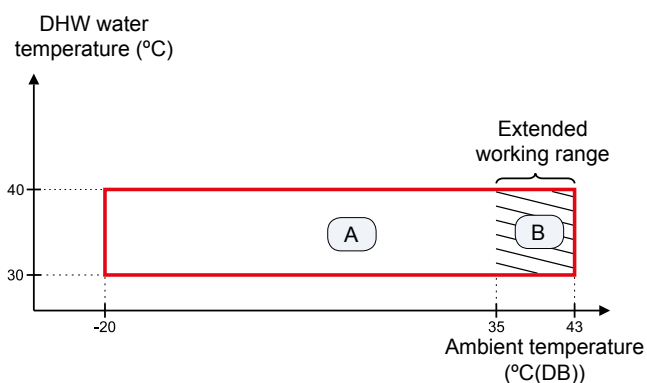


RWHT-5.0VNFE

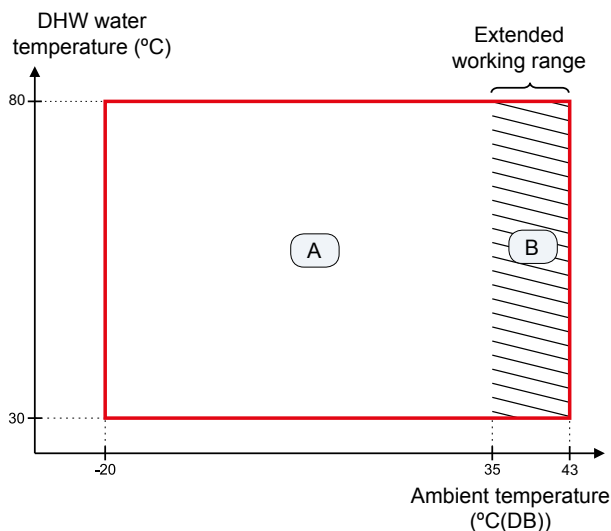


### Domestic Hot Water (DHW)

RWLT-(3.0-10.0)VNE



RWHT-5.0VNFE



**A** The working range of Ambient temperature reaches up to 35°C for those systems that are working in Heat Pump mode or in a Heat Recovery installation with all units of the system working in the heating mode.

**B** The working range of Ambient temperature has been extended from 35°C to 43°C for those systems that are working in Heat Recovery mode (there are indoor units working in cooling mode and indoor units working in heating mode)..

## **i** NOTE

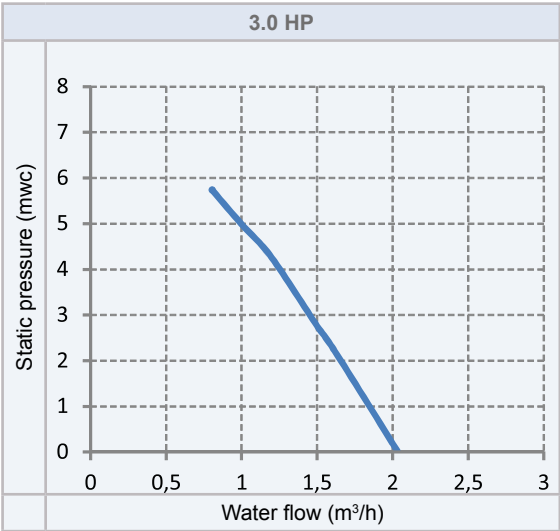
The operation principle of Set Free systems is based on demand balance, which behaves in different manners depending on the combinability and working conditions of the system. Under particular working conditions, outlet water temperature may be lower than the requested temperature.

5.1.2 Pump performance curves

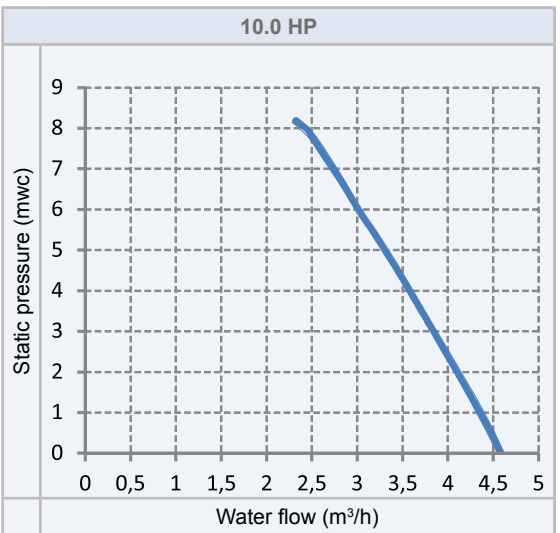
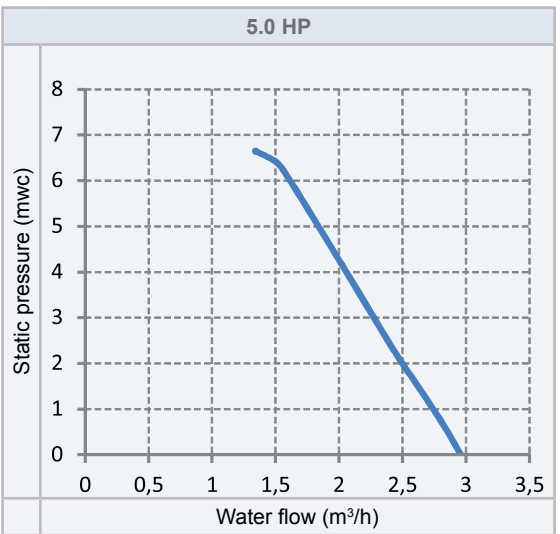
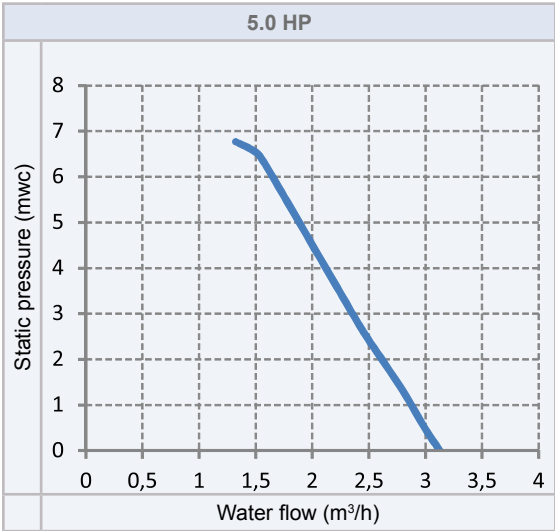
 NOTE

If a water flow rate is selected 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.

◆ HYDRO FREE Low temperature



◆ HYDRO FREE High temperature



**5.1.3 Hydraulic working range****5.1.4 Hydraulic data****◆ HYDRO FREE Low temperature**

| MODEL                                                                 |                   | 3.0 HP | 5.0 HP | 10.0 HP |
|-----------------------------------------------------------------------|-------------------|--------|--------|---------|
| Minimum water flow rate (Cooling)                                     | m <sup>3</sup> /h | 0.9    | 1.5    | 2.5     |
| Minimum water flow rate (Heating)                                     | m <sup>3</sup> /h | 0.8    | 1.3    | 2.3     |
| Maximum water flow rate                                               | m <sup>3</sup> /h | 2.1    | 3.0    | 4.6     |
| Minimum installation water volume                                     | l                 | 100    | 150    | 180     |
| Minimum allowable water pressure                                      | MPa               | 0.1    | 0.1    | 0.1     |
| Maximum allowable water pressure<br>(According to minimum water flow) | MPa               | 0.3    | 0.3    | 0.3     |

**◆ HYDRO FREE High temperature**

| MODEL                                                                 |                   | 5.0 HP |
|-----------------------------------------------------------------------|-------------------|--------|
| Minimum water flow rate                                               | m <sup>3</sup> /h | 1.3    |
| Maximum water flow rate                                               | m <sup>3</sup> /h | 3.2    |
| Minimum installation water volume                                     | l                 | 80     |
| Minimum allowable water pressure                                      | MPa               | 0.1    |
| Maximum allowable water pressure<br>(According to minimum water flow) | MPa               | 0.3    |



# 6 . General dimensions

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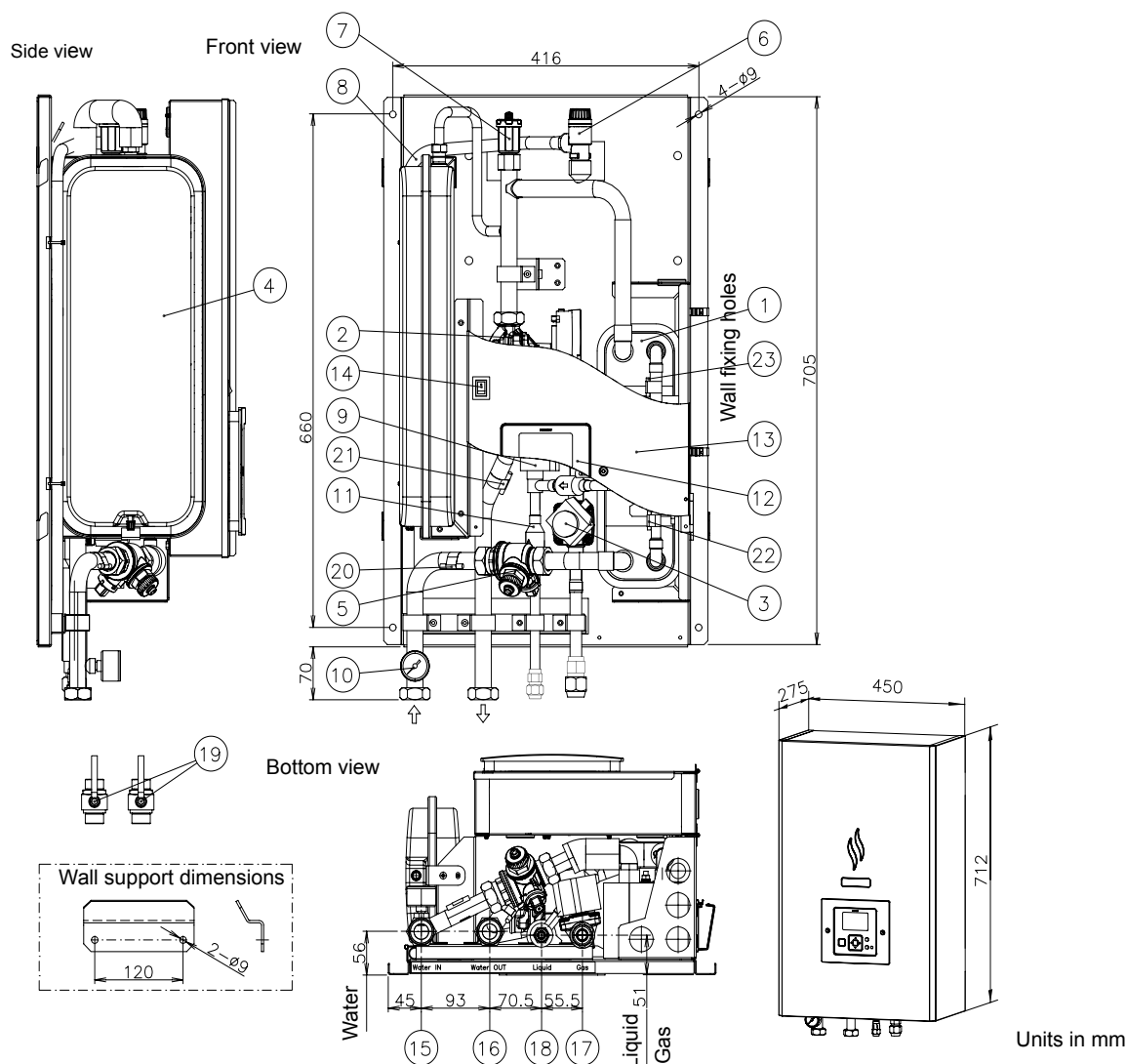
6.2.1 HYDRO FREE Low temperature ..... 48

6.2.2 HYDRO FREE High temperature ..... 48

## 6.1 Name of parts and Dimensional data

### 6.1.1 HYDRO FREE Low temperature

#### ◆ RWLT-3.0VNE

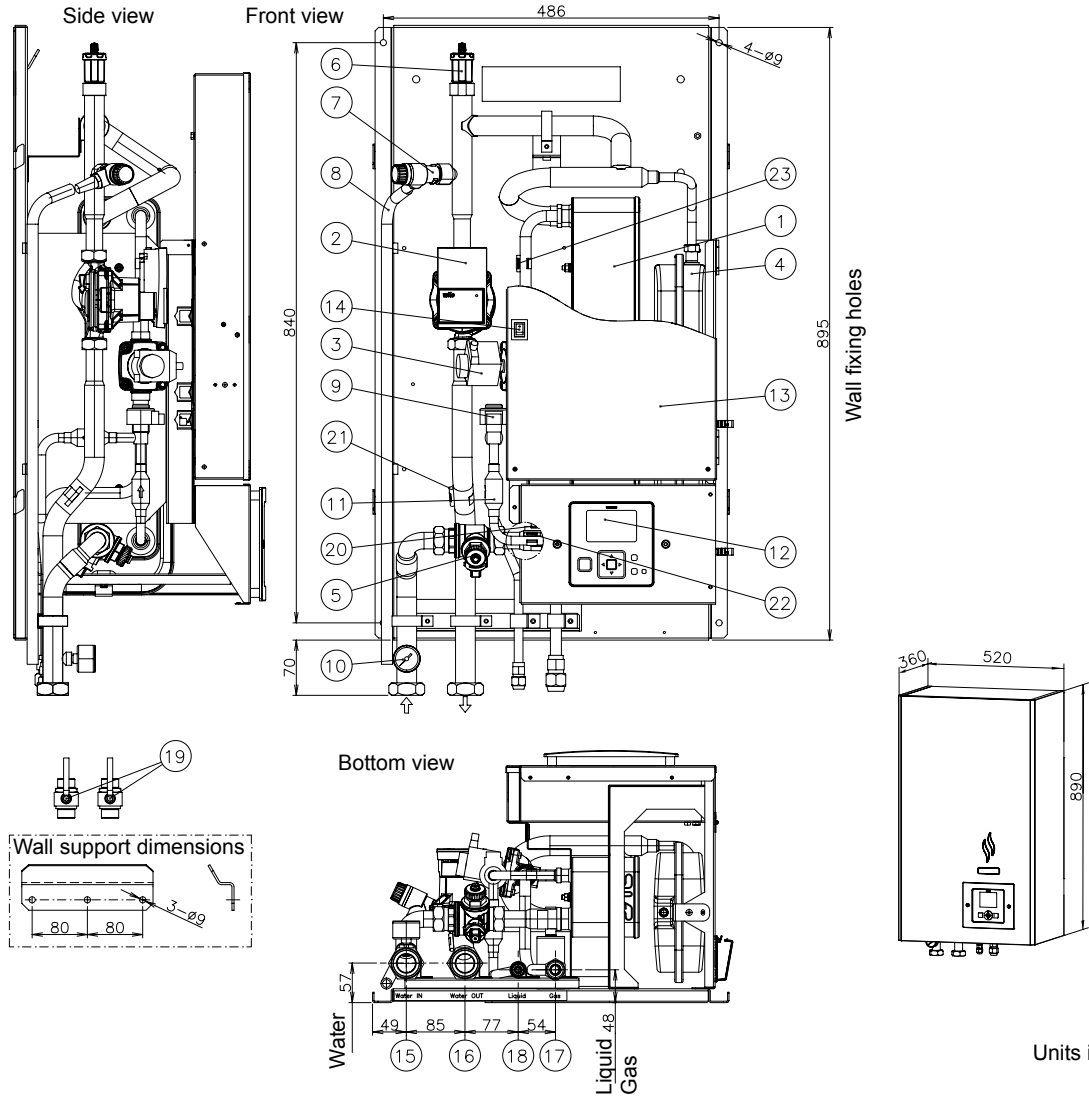


XEKS1793

| N° | Part name                   | N° | Part name                                         |
|----|-----------------------------|----|---------------------------------------------------|
| 1  | Plate heat exchanger        | 13 | Electrical box                                    |
| 2  | Water pump                  | 14 | Switch for DHW emergency operation                |
| 3  | Solenoid valve (SV1)        | 15 | Water inlet pipe connection - G 1" Female         |
| 4  | Expansion vessel 6L         | 16 | Water outlet pipe connection - G 1" Female        |
| 5  | Water strainer              | 17 | Refrigerant gas pipe connection - Ø15.88 (5/8")   |
| 6  | Air purger                  | 18 | Refrigerant liquid pipe connection - Ø9.52 (3/8") |
| 7  | Safety valve                | 19 | Shut-off valve (Factory-supplied accessory)       |
| 8  | Drain pipe for safety valve | 20 | Thermistor (Water inlet pipe)                     |
| 9  | Expansion valve             | 21 | Thermistor (Water outlet pipe)                    |
| 10 | Manometer                   | 22 | Thermistor (Liquid refrigerant pipe)              |
| 11 | Refrigerant strainer (x2)   | 23 | Thermistor (Gas refrigerant pipe)                 |
| 12 | Unit controller             |    |                                                   |



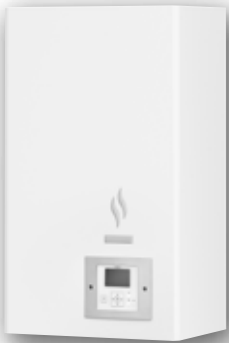
◆ RWLT-5.0VNE



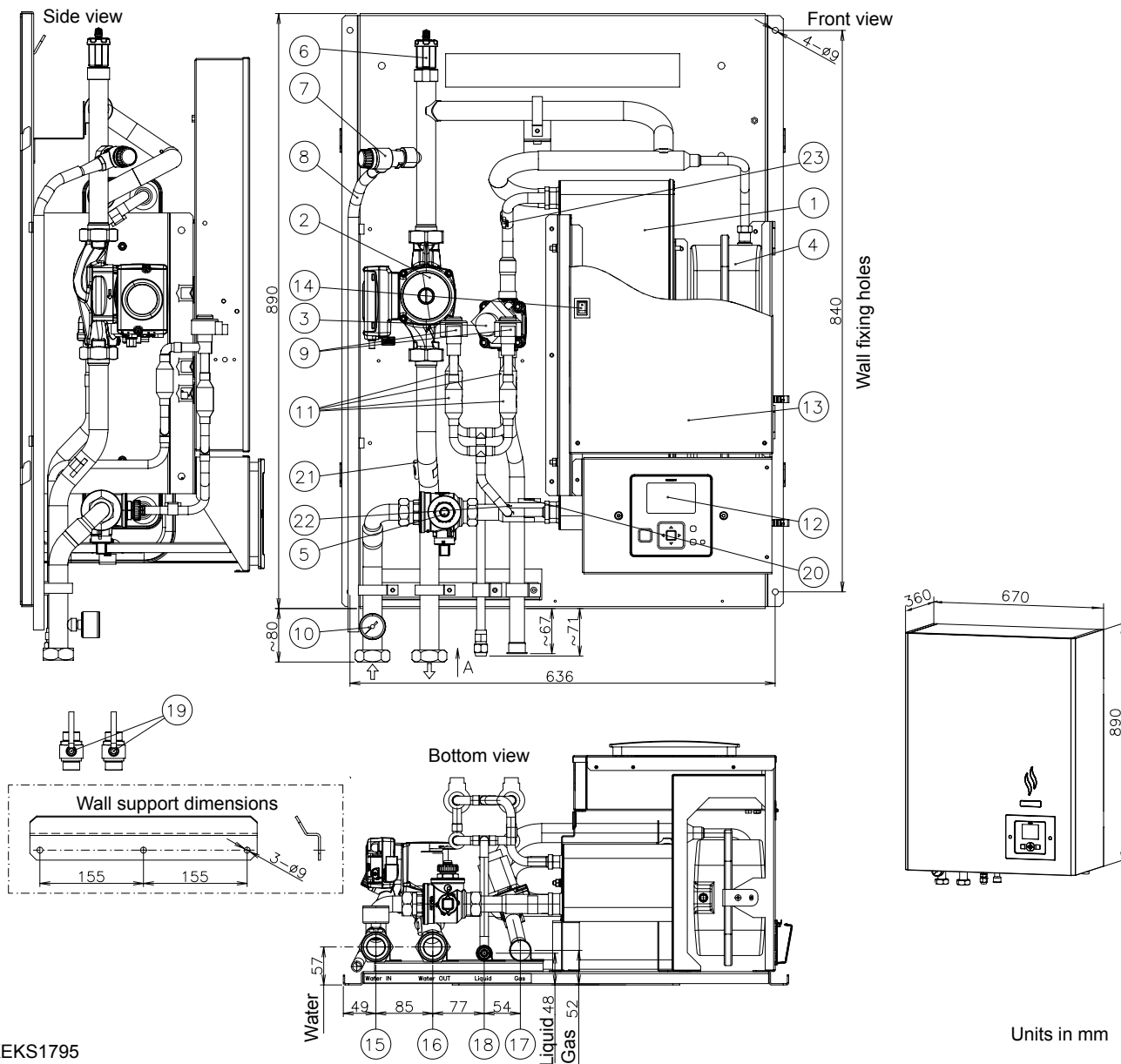
XEKS1794

Units in mm

| N° | Part name                   | N° | Part name                                        |
|----|-----------------------------|----|--------------------------------------------------|
| 1  | Plate heat exchanger        | 13 | Electrical box                                   |
| 2  | Water pump                  | 14 | Switch for DHW emergency operation               |
| 3  | Solenoid valve (SV1)        | 15 | Water inlet pipe connection - G 1 1/4" female    |
| 4  | Expansion vessel 6L         | 16 | Water outlet pipe connection - G 1 1/4" female   |
| 5  | Water strainer              | 17 | Refrigerant gas pipe connection - Ø 15.88 (5/8") |
| 6  | Air purger                  | 18 | Refrigerant liquid pipe - Ø 9.52 (3/8")          |
| 7  | Safety valve                | 19 | Shut-off valve (Factory supplied accessory)      |
| 8  | Drain pipe for safety valve | 20 | Thermistor (Water inlet pipe)                    |
| 9  | Expansion valve             | 21 | Thermistor (Water outlet pipe)                   |
| 10 | Manometer                   | 22 | Thermistor (Liquid refrigerant pipe)             |
| 11 | Refrigerant strainer (x2)   | 23 | Thermistor (Gas refrigerant pipe)                |
| 12 | Unit controller             |    |                                                  |



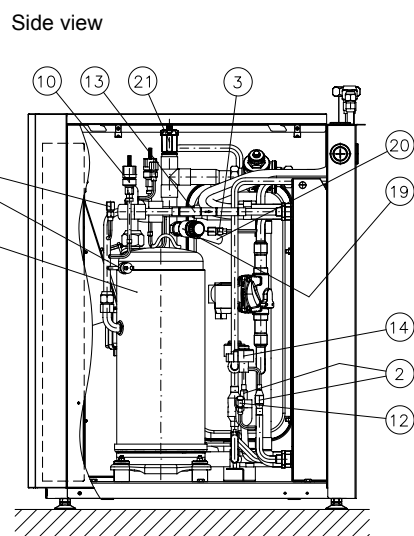
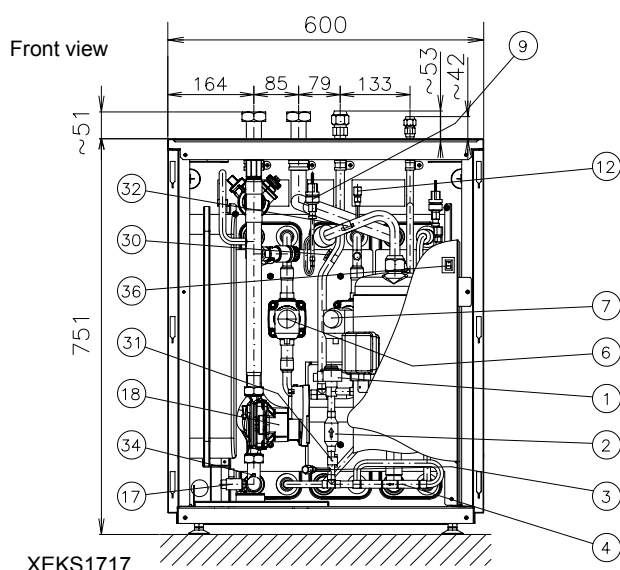
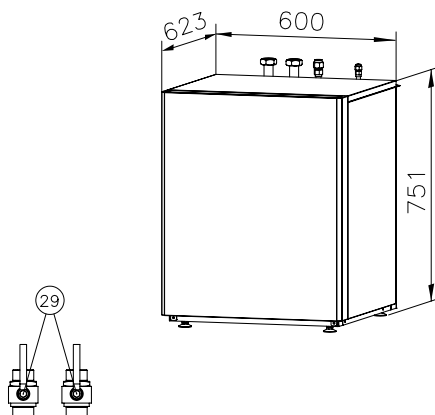
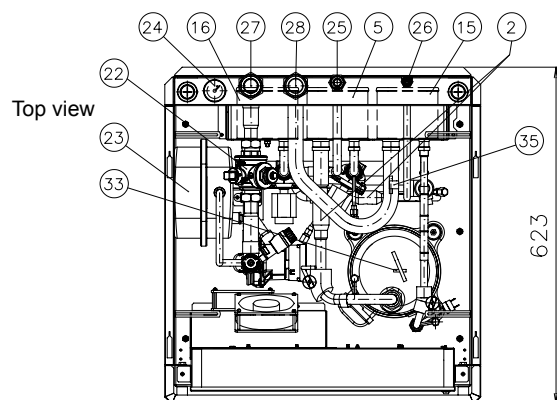
## ◆ RWLT-10.0VNE



XEKS1795

| Nº | Part name                   | Nº | Part name                                         |
|----|-----------------------------|----|---------------------------------------------------|
| 1  | Plate heat exchanger        | 13 | Electrical box                                    |
| 2  | Water pump                  | 14 | Switch for DHW emergency operation                |
| 3  | Solenoid valve (SV1)        | 15 | Water inlet pipe connection - G 1 1/4" Female     |
| 4  | Expansion vessel 10L        | 16 | Water outlet pipe connection - G 1 1/4" Female    |
| 5  | Water strainer              | 17 | Refrigerant gas pipe connection - Ø22.2 (7/8")    |
| 6  | Air purger                  | 18 | Refrigerant liquid pipe connection - Ø9.52 (3/8") |
| 7  | Safety valve                | 19 | Shut-off valve (factory-supplied accessory)       |
| 8  | Drain pipe for safety valve | 20 | Thermistor (Water inlet pipe)                     |
| 9  | Expansion valve (x2)        | 21 | Thermistor (Water outlet pipe)                    |
| 10 | Manometer                   | 22 | Thermistor (Liquid refrigerant pipe)              |
| 11 | Refrigerant strainer (x4)   | 23 | Thermistor (Gas refrigerant pipe)                 |
| 12 | Unit controller             |    |                                                   |



**6.1.2 HYDRO FREE High temperature**◆ **RWHT-5.0VNFE**

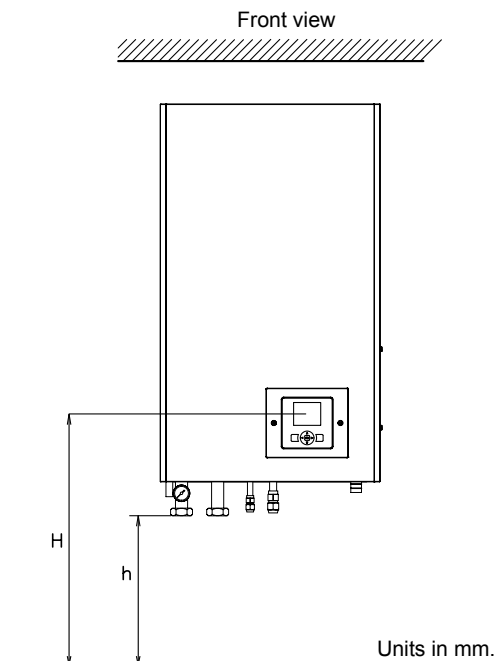
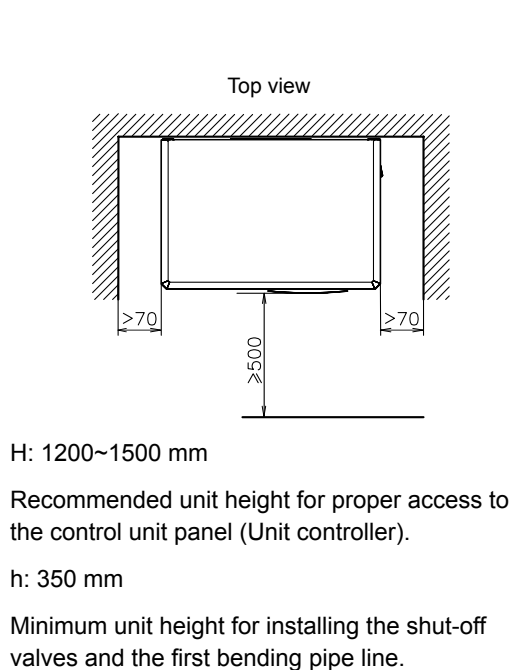
Units in: mm

| N° | Part name                          | N° | Part name                              |
|----|------------------------------------|----|----------------------------------------|
| 1  | Electronic expansion valve (R410A) | 19 | Safety valve                           |
| 2  | Refrigerant strainer (x2)          | 20 | Drain pipe                             |
| 3  | Check joint (R410A)                | 21 | Air purger                             |
| 4  | Check valve (R410A)                | 22 | Water strainer                         |
| 5  | Plate heat exchanger (R410A-R134a) | 23 | Expansion vessel 12L                   |
| 6  | Solenoid valve (1 cycle)           | 24 | Manometer                              |
| 7  | Solenoid valve (2 cycles)          | 25 | Refrigerant gas pipe - Ø15.88 (5/8")   |
| 8  | Compressor                         | 26 | Refrigerant liquid pipe - Ø9.52 (3/8") |
| 9  | Low pressure sensor (Ps)           | 27 | Water inlet pipe - G 1 1/4" female     |
| 10 | High pressure sensor (Pd)          | 28 | Water outlet pipe - G 1 1/4" female    |
| 11 | High pressure switch (PSH)         | 29 | Shut-off valve (Factory supplied)      |
| 12 | Check joint (R134a)                | 30 | Refrigerant gas pipe thermistor        |
| 13 | Check valve (R134a)                | 31 | Refrigerant liquid pipe thermistor     |
| 14 | Electronic expansion valve (R134a) | 32 | Compressor suction thermistor          |
| 15 | Plate heat exchanger (R134a-H2O)   | 33 | Compressor discharge thermistor        |
| 16 | Plate heat exchanger (R410A-H2O)   | 34 | Water inlet thermistor                 |
| 17 | Water pressure port                | 35 | Water outlet thermistor                |
| 18 | Water pump                         | 36 | Switch for DHW "emergency" operation   |

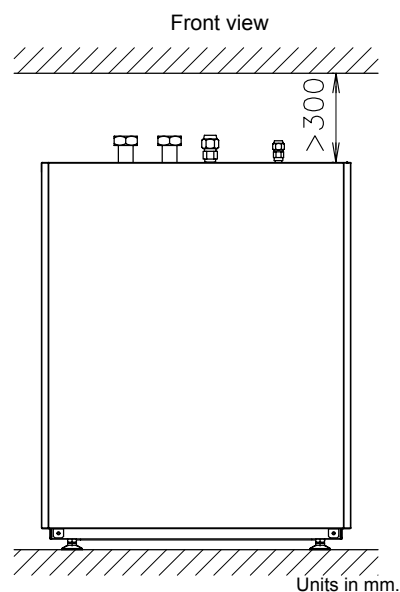
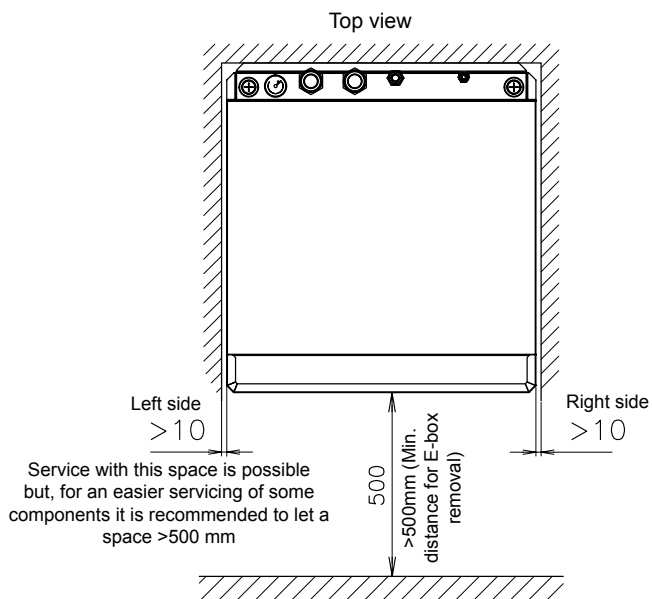


## 6.2 Service space

### 6.2.1 HYDRO FREE Low temperature



### 6.2.2 HYDRO FREE High temperature

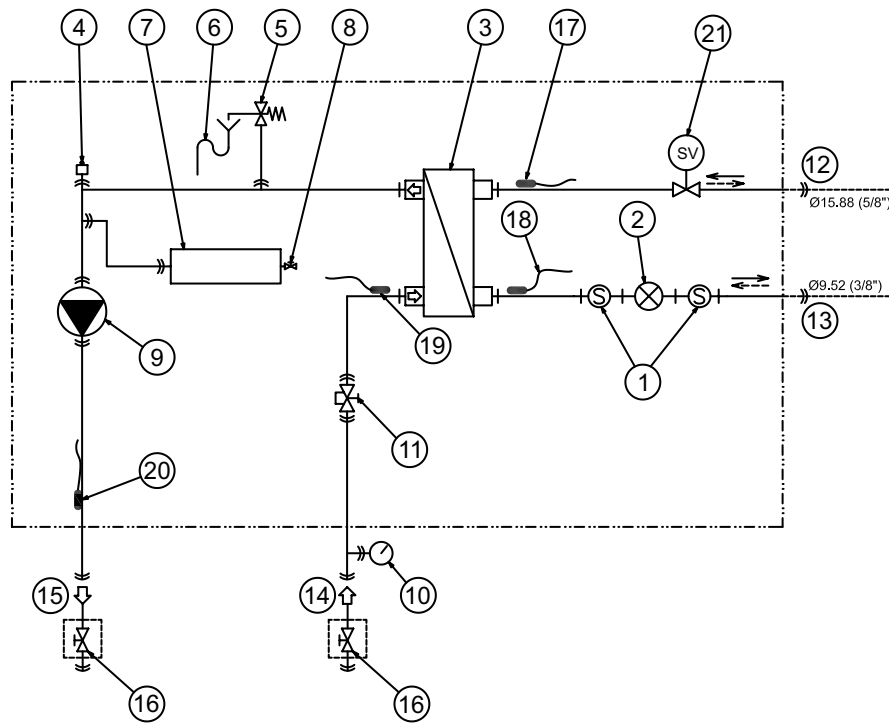


# 7 . Refrigerant cycle and hydraulic circuit

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◆ **RWLT-3.0VNE**



| Nº | Part name                                             |
|----|-------------------------------------------------------|
| 1  | IU refrigerant strainer                               |
| 2  | IU electronic expansion valve                         |
| 3  | Water side heat exchanger                             |
| 4  | Air purger                                            |
| 5  | Safety valve                                          |
| 6  | Drain pipe                                            |
| 7  | Expansion vessel                                      |
| 8  | Air valve for pressure regulation of expansion vessel |
| 9  | Water pump                                            |
| 10 | Manometer                                             |
| 11 | Water strainer                                        |

| N° | Part name                        |
|----|----------------------------------|
| 12 | IU refrigerant gas connection    |
| 13 | IU refrigerant liquid connection |
| 14 | Water inlet connection           |
| 15 | Water outlet connection          |
| 16 | Shut-off valve (Accessory)       |
| 17 | Gas pipe thermistor (Heating)    |
| 18 | Liquid pipe thermistor (Heating) |
| 19 | Water inlet thermistor           |
| 20 | Water outlet thermistor          |
| 21 | Solenoid valve (SV1)             |

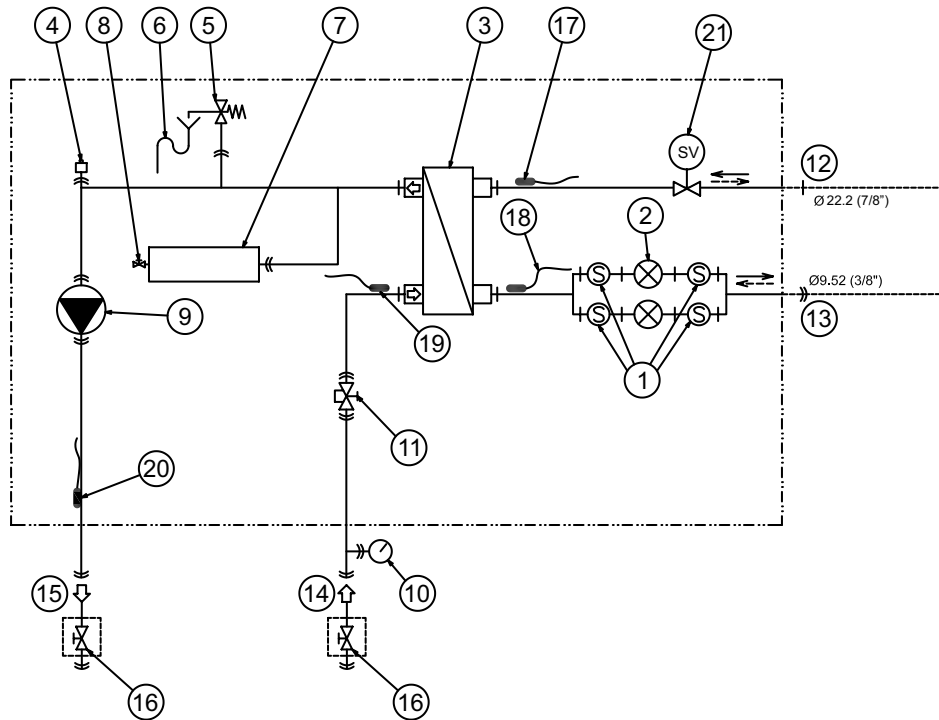
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|
|  |  |  |  |  |  | Refrigerant |
| Heating<br>refrigerant flow                                                         | Cooling<br>refrigerant flow                                                         | Water flow<br>(Heating/Cooling)                                                     | Field supplied<br>piping line                                                       | Flare nut<br>connection                                                             | Brazed<br>connection                                                                | R410A       |

The diagram illustrates a hydraulic circuit for a mobile machine. The main components and their functions are as follows:

- 1:** A 4/3-way directional control valve with a center position, used to direct flow to the actuators.
- 2:** A pressure-reducing valve (PRV) that maintains a set pressure in the lower pressure line.
- 3:** A heat exchanger that transfers heat between the two hydraulic lines.
- 4:** A check valve that prevents backflow from the lower pressure line to the pump.
- 5:** A pressure relief valve (PRV) that limits the maximum pressure in the system.
- 6:** A check valve that prevents backflow from the upper pressure line to the pump.
- 7:** A check valve that prevents backflow from the heat exchanger to the pump.
- 8:** A check valve that prevents backflow from the upper pressure line to the pump.
- 9:** A hydraulic pump that provides the system with pressure.
- 10:** A pressure gauge that monitors the pressure in the lower pressure line.
- 11:** A check valve that prevents backflow from the lower pressure line to the pump.
- 12:** The upper pressure line, with a diameter of  $\varnothing 15.88$  (5/8").
- 13:** The lower pressure line, with a diameter of  $\varnothing 9.52$  (3/8").
- 14:** A check valve that prevents backflow from the lower pressure line to the pump.
- 15:** A check valve that prevents backflow from the lower pressure line to the pump.
- 16:** A check valve that prevents backflow from the lower pressure line to the pump.
- 17:** A check valve that prevents backflow from the heat exchanger to the pump.
- 18:** A check valve that prevents backflow from the heat exchanger to the pump.
- 19:** A check valve that prevents backflow from the heat exchanger to the pump.
- 20:** A check valve that prevents backflow from the lower pressure line to the pump.
- 21:** A solenoid valve (SV) that controls the flow between the two pressure lines.

| N° | Part name                        |
|----|----------------------------------|
| 12 | IU refrigerant gas connection    |
| 13 | IU refrigerant liquid connection |
| 14 | Water inlet connection           |
| 15 | Water outlet connection          |
| 16 | Shut-off valve (Accessory)       |
| 17 | Gas pipe thermistor (Heating)    |
| 18 | Liquid pipe thermistor (Heating) |
| 19 | Water inlet thermistor           |
| 20 | Water outlet thermistor          |
| 21 | Solenoid valve (SV1)             |

|                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|
|  |  |  |  |  |  | Refrigerant |
| Heating<br>refrigerant flow                                                         | Cooling<br>refrigerant flow                                                         | Water flow<br>(Heating/Cooling)                                                     | Field supplied<br>piping line                                                       | Flare nut<br>connection                                                             | Brazed<br>connection                                                                | R410A       |



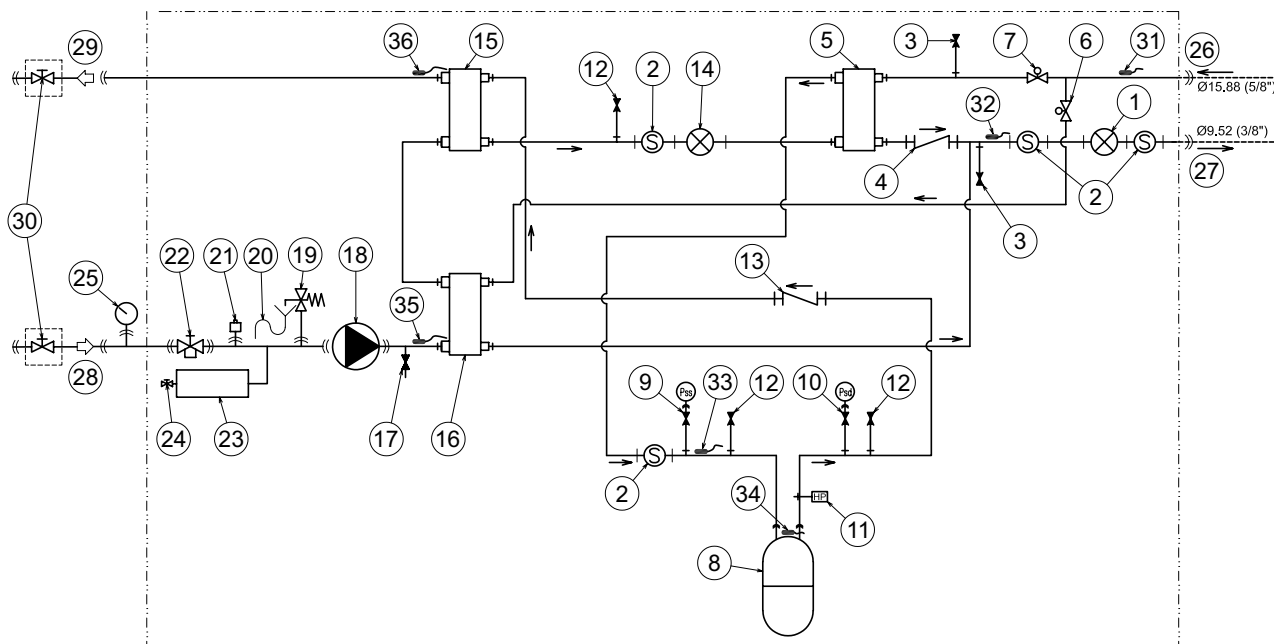
| N° | Part name                                             |
|----|-------------------------------------------------------|
| 1  | IU refrigerant strainer                               |
| 2  | IU electronic expansion valve                         |
| 3  | Water side heat exchanger                             |
| 4  | Air purger                                            |
| 5  | Safety valve                                          |
| 6  | Drain pipe                                            |
| 7  | Expansion vessel                                      |
| 8  | Air valve for pressure regulation of expansion vessel |
| 9  | Water pump                                            |
| 10 | Manometer                                             |
| 11 | Water strainer                                        |

| N° | Part name                        |
|----|----------------------------------|
| 12 | IU refrigerant gas connection    |
| 13 | IU refrigerant liquid connection |
| 14 | Water inlet connection           |
| 15 | Water outlet connection          |
| 16 | Shut-off valve (Accessory)       |
| 17 | Gas pipe thermistor (Heating)    |
| 18 | Liquid pipe thermistor (Heating) |
| 19 | Water inlet thermistor           |
| 20 | Water outlet thermistor          |
| 21 | Solenoid valve (SV1)             |

|                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|
|  |  |  |  |  |  | Refrigerant |
| Heating<br>refrigerant flow                                                         | Cooling<br>refrigerant flow                                                         | Water flow<br>(Heating/Cooling)                                                     | Field supplied<br>piping line                                                       | Flare nut<br>connection                                                             | Brazed<br>connection                                                                | R410A       |

## 7.1.2 HYDRO FREE High temperature

### ◆ RWHT-5.0VNFE



| N° | Part name                              |
|----|----------------------------------------|
| 1  | IU electronic expansion valve (R-410A) |
| 2  | IU refrigerant strainer                |
| 3  | IU R-410A check joint                  |
| 4  | Check valve for R-410A                 |
| 5  | IU heat exchanger (R410A-R134a)        |
| 6  | Solenoid valve 1 (For 1 cycle)         |
| 7  | Solenoid valve 2 (For 2 cycles)        |
| 8  | IU compressor                          |
| 9  | Low pressure sensor (Ps)               |
| 10 | High pressure sensor (Pd)              |
| 11 | IU high pressure switch (protection)   |
| 12 | R-134a check joint                     |
| 13 | Check valve for R-134a                 |
| 14 | IU electronic expansion valve (R-134a) |
| 15 | IU heat exchanger (R134a-H2O)          |
| 16 | IU heat exchanger (R410A-H2O)          |
| 17 | Water pressure port                    |
| 18 | Water pump                             |

| N° | Part name                                             |
|----|-------------------------------------------------------|
| 19 | Safety valve                                          |
| 20 | Drain pipe                                            |
| 21 | Air purger                                            |
| 22 | Water strainer                                        |
| 23 | Expansion vessel                                      |
| 24 | Air valve for pressure regulation of expansion vessel |
| 25 | Manometer                                             |
| 26 | IU refrigerant gas connection                         |
| 27 | IU refrigerant liquid connection                      |
| 28 | Water inlet connection                                |
| 29 | Water outlet connection                               |
| 30 | Shut-off valve (Accessory)                            |
| 31 | IU gas pipe thermistor                                |
| 32 | IU liquid pipe thermistor                             |
| 33 | IU comp. suction gas thermistor                       |
| 34 | IU comp. discharge gas thermistor                     |
| 35 | Water inlet thermistor                                |
| 36 | Water outlet thermistor                               |

|                          |                          |                              |                            |                      |                   |             |
|--------------------------|--------------------------|------------------------------|----------------------------|----------------------|-------------------|-------------|
|                          |                          |                              |                            |                      |                   | Refrigerant |
| Heating refrigerant flow | Cooling refrigerant flow | Water flow (Heating/Cooling) | Field supplied piping line | Flare nut connection | Brazed connection | R410A       |



# 8 . Refrigerant and water piping

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## 8.1 General notes before performing piping work

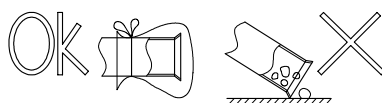
### 8.1.1 Piping work

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

#### NOTE

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

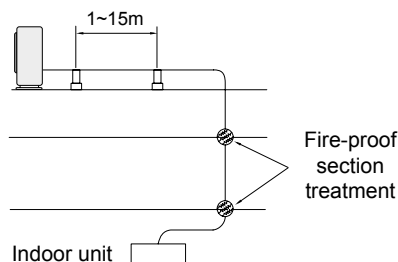
- Cap the end of the pipe when pipe is to be inserted through a wall hole.
- Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.



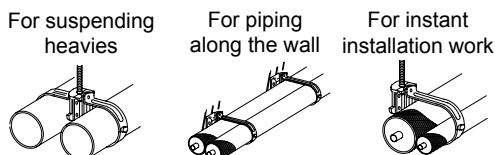
- If piping installation is not completed until next day or over a longer period of time, braze off the ends of the piping and charge with oxygen free nitrogen through a Schrader valve type access fitting to prevent moisture and particle contamination.
- It is advisable to insulate the water pipes, joints and connections in order to avoid heat loss and dew condensation on the surface of the pipes or accidental injuries due to excessive heat on piping surfaces.
- Do not use insulation material that contains NH<sub>3</sub>, as it can damage copper pipe material and become a source of future leakage.
- It is recommended to use flexible joints for the water piping inlet and outlet in order to avoid vibration transmission.
- Refrigerant circuit and Water circuit must be performed and inspected by a licensed technician and must comply with all relevant European and national regulations.
- Proper water pipe inspection should be performed after piping work to assure there is no water leakage in the space heating or DHW circuits and prior to switch on the electrical power.

### 8.1.2 Suspension of refrigerant and water pipes

- Suspend the refrigerant and water piping at certain points and prevent the refrigerant and water piping from being in direct contact with the building: walls, ceilings, etc.. If there is direct contact between pipes, abnormal sound may occur due to the vibration of the piping. Pay special attention in cases of short piping lengths.



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



## 8.2 Refrigerant circuit

### 8.2.1 Refrigerant piping

#### NOTE

Consult the corresponding Set Free outdoor unit technical catalogue for gas refrigerant pipe selection.

#### CAUTION

- Do not use refrigerant pipe sizes other than those indicated in the corresponding Technical Catalogue for outdoor units. The diameter of the refrigerant pipes depends directly on the power of the outdoor unit.
- If larger diameter refrigerant pipes are used, the circuit lubrication oil tends to separate from the gas carrying it. The compressor will be seriously damaged due to a lack of lubrication.
- If smaller diameter refrigerant pipes are used, the gas or liquid refrigerant will have serious difficulties in circulating. System performance will be affected. The compressor will run under more severe conditions than foreseen and will be damaged in a short space of time

### 8.2.2 Copper pipes and sizes

#### CAUTION

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

Prepare the copper pipes provided by the supplier.

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

| Nominal diameter<br>according to European Standards EN-12735-1 |       | Thickness<br>mm | Copper type                                |
|----------------------------------------------------------------|-------|-----------------|--------------------------------------------|
| mm                                                             | in.   |                 |                                            |
| Ø6.35                                                          | 1/4   | 0.80            | Coil (Soft)                                |
| Ø9.52                                                          | 3/8   | 0.80            | Coil (Soft)                                |
| Ø12.70                                                         | 1/2   | 0.80            | Coil (Soft)                                |
| Ø15.87 (15.88)                                                 | 5/8   | 1.00            | Straight lengths (half hard) / Coil (Soft) |
| Ø19.05 (19.06)                                                 | 3/4   | 1.00            | Coil (Soft)                                |
| Ø22.22 (22.23)                                                 | 7/8   | 1.00            | Coil (Soft)                                |
| Ø25.40                                                         | 1     | 1.00            | Straight lengths (half hard)               |
| Ø28.57 (28.60)                                                 | 1 1/8 | 1.00            | Straight lengths (half hard)               |

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

#### NOTE

- If copper pipe is used for piping bigger than Ø19.05, flaring work can not be performed. If necessary, use a joint adapter.
- Ø in brackets: other optional commercial sizes.

#### CAUTION

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

### 8.2.3 Refrigerant charge

#### DANGER

Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge the unit with materials other than R410A, such as hydrocarbon refrigerants (propane, etc.), oxygen, flammable gases (acetylene, etc.) or poisonous gases when installing, maintaining and moving the unit. Contamination of these are extremely dangerous and may cause an explosion, a fire, and an injury.

#### NOTE

For matters relating to the refrigerant charge in the installation, consult the Technical Catalogue and Service Manual corresponding to the outdoor units of the SET-FREE systems.

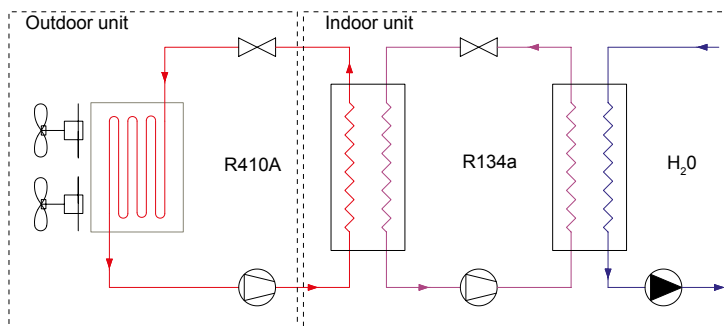
#### 8.2.3.1 Refrigerant charge amount

##### ◆ HYDRO FREE Low temperature - Indoor unit

HYDRO FREE Low temperature - Indoor unit works with R410A refrigerant only. The unit is factory charged with corrosion-proof nitrogen.

##### ◆ HYDRO FREE High temperature - Indoor unit

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



- The 1st cycle (R410A) the unit is factory charged with corrosion-proof nitrogen.
- The 2nd cycle (R134a) connections are factory installed and refrigerant charged so no piping work or refrigerant charge is needed.

#### NOTE

Refer to the outdoor unit technical documentation to charge the R410A refrigerant inside the indoor unit.

#### CAUTION

For HYDRO FREE High temperature, supply power to the indoor unit and switch the DSW1-2 ON of its PCB1. Thereby, solenoid valves SV1 and SV2 of the indoor unit will open to allow the operation of vacuum and refrigerant charge inside the indoor unit. It is very important to remind to switch the DSW1-2 OFF when finishing the whole procedure.

### 8.2.4 Precautions in the event of gas refrigerant leaks

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

#### CAUTION

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

#### ◆ Maximum permitted concentration of HFCs

The refrigerant R410A and the refrigerant R134a (in case of HYDRO FREE High temperature indoor unit) are incombustible and non-toxic gases. However, if leakage occurs and gas fills a room, it may cause suffocation.

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

| Refrigerant | Maximum permissible concentration (kg/m <sup>3</sup> ) |
|-------------|--------------------------------------------------------|
| R410A       | 0.44                                                   |
| R134a       | 0.25                                                   |

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

The formula used for the calculation of the maximum allowed refrigerant concentration in case of refrigerant leakage is the following:

|                   |                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------|
| $\frac{R}{V} = C$ | R: Total quantity of refrigerant charged (kg)<br>V: Room volume (m <sup>3</sup> )<br>C: Refrigerant concentration |
|-------------------|-------------------------------------------------------------------------------------------------------------------|

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 m<sup>3</sup>/min or higher per Japanese refrigeration ton (= compressor displacement volume / (5.7 m<sup>3</sup>/h (R410A) or 14.4 m<sup>3</sup>/h (R134a)) of the air conditioning system using the refrigerant.

#### NOTE

Always take the maximum value between the R410A and R134a.

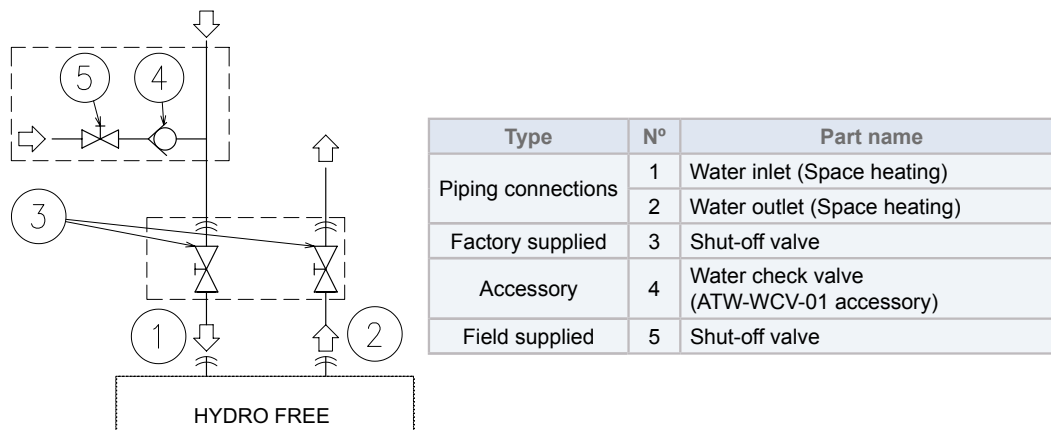
- 4 Pay special attention to the place, such as a basement, etc., where the refrigerant can stay, since refrigerant is heavier than air.

## 8.3 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.*

#### 8.3.1 Additional hydraulic necessary elements for space heating



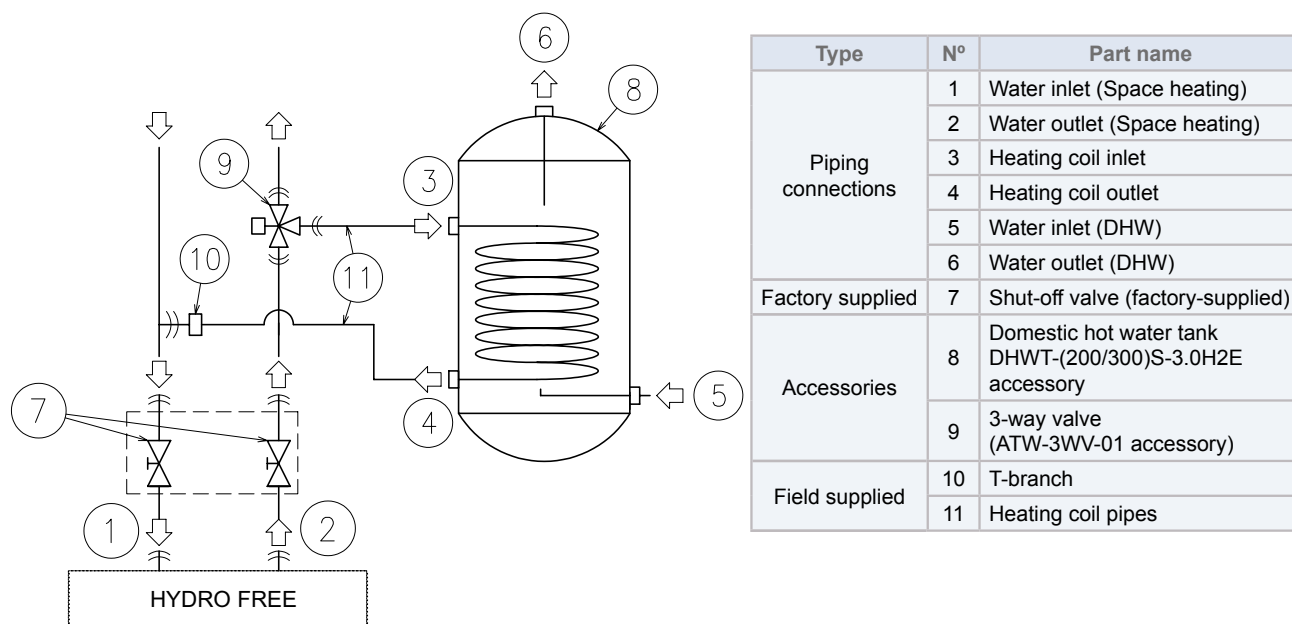
The following hydraulic elements are necessary to correctly perform the space heating water circuit:

- **Two shut-off valves** ③ must be installed in the indoor unit. One at the water inlet connection ① and the other at the water outlet connection ② in order to make easier any maintenance work.
- **A water check valve (ATW-WCV-01 accessory)** ④ with 1 shut-off valve (field supplied) ⑤ 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.

#### 8.3.2 Additional hydraulic necessary elements for DHW

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

##### 8.3.2.1 DHW operation with a remote tank



HYDRO FREE are not factory-supplied ready for DHW operation, but they can be used for the production of DHW if the following elements are installed:

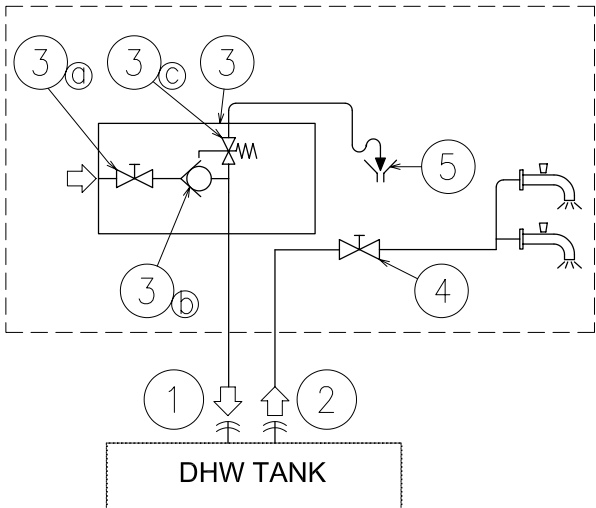
- **A domestic hot water tank (DHWT-(200/300)S-3.0H2E accessory)** ⑧ has to be installed in combination with the indoor unit.
- **A 3-way valve (ATW-3WV-01 accessory)** ⑨ must be connected at one point of the water outlet pipe of the

installation.

- **A T-branch (field supplied) ⑩** must be connected at one point of the water inlet pipe of the installation.
- **Two water pipes (field supplied) ⑪**. One pipe between 3-way valve and the heating coil inlet ③ of the DHW tank, the other one between the T-branch and the heating coil outlet ④ of the DHW tank.

8.3.2.2 DHW safety elements

The following elements are required.



| Type               | N° | Part name                             |
|--------------------|----|---------------------------------------|
| Piping connections | 1  | Water inlet (DHW)                     |
|                    | 2  | Water outlet (DHW)                    |
| Field supplied     | 3  | Pressure and temperature relief valve |
|                    | 3a | Shut-off valve                        |
|                    | 3b | Water check valve                     |
|                    | 3c | Pressure relief valve                 |
|                    | 4  | Shut-off valve                        |
|                    | 5  | Draining                              |

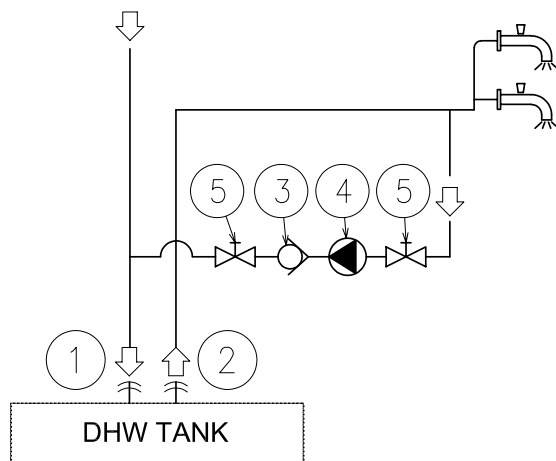
- **1 Shut-off valve (field supplied):** one shut-off valve ④ must be connected after the DHW outlet connection of the DHW tank ② in order to make easier any maintenance work.
- **A Security water valve (Field-supplied):** this accessory ③ is a pressure and temperature relief valve that must be installed as near as possible to the DHW inlet connection of the DHW tank ①. It should ensure a correct draining ⑤ for the discharge valve of this valve. This security water valve should provide the following:
  - Pressure protection
  - Non-return function
  - Shut-off valve
  - Filling
  - Draining

**i** NOTE

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

### 8.3.2.3 Additional hydraulic optional elements for DHW recirculation circuit

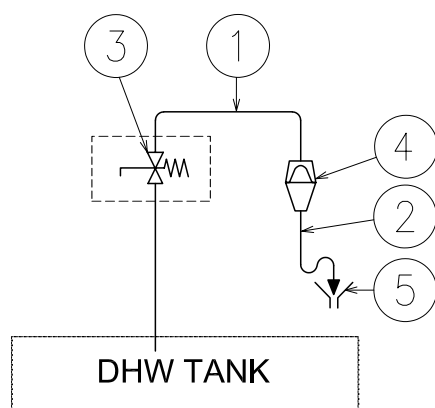
In case of a recirculation circuit for the DHW circuit:



| Type               | N° | Part name                                |
|--------------------|----|------------------------------------------|
| Piping connections | 1  | Water inlet (DHW)                        |
|                    | 2  | Water outlet (DHW)                       |
| Accessories        | 3  | Water check valve (ATW-WCV-01 accessory) |
| Field supplied     | 4  | Water pump                               |
|                    | 5  | Shut-off valve                           |

- 1 Recirculation water pump (field supplied): this water pump ③ will help to correctly recirculate the hot water to the DHW inlet.
- 1 Water check valve (ATW-WCV-01 accessory): this Hitachi accessory ④ is connected after the recirculation water pump ④ in order to ensure the non-return of water.
- 2 Shut-off valves (field supplied) ⑤: one before the recirculation water pump ③ and other after the water check valve accessory ④.

### 8.3.2.4 Additional safety elements for UK market



| Type               | N° | Part name                                                |
|--------------------|----|----------------------------------------------------------|
| Piping connections | 1  | T&P relief valve outlet pipe Ø15 (factory supplied)      |
|                    | 2  | Tundish outlet pipe (Field supplied)                     |
| Accessories        | 3  | Pressure and Temperature relief valve (Factory supplied) |
| Field supplied     | 4  | Tundish (Field supplied)                                 |
|                    | 5  | Drain (Field supplied)                                   |

The following accessories are necessary for the compliance of the HYDRO FREE for UK market with the UK requirements referred in the UK Building Regulations 2000.

- 1 temperature and pressure relief valve (field-supplied), fitted at the hottest part of the DHW tank. This device protects the unit of excessive temperature (>96° C) and excessive pressure (>7 bar) in the DHW tank. Additionally, a Ø15 diameter pipe (field-supplied) is fitted to the outlet of the relief valve and drives the discharge to the tundish ④.
- 1 tundish ④ (field supplied), installed in a vertical position, with no more than 600 mm of pipe between the valve outlet and the tundish.
- 1 Tundish outlet pipe ② (field supplied) with a vertical section at least 300 mm long below the tundish ④, before any elbows or bends in the pipe work. This pipe should be made of metal or other material that has been demonstrated to be capable of safety withstanding temperatures and pressure of the water discharged, as it is referred in the UK Building Regulations.
- The discharge pipe from the tundish ② must terminate in a safe place where is no risk to persons in the vicinity of the discharge. The discharge will consist of high water temperature and pressure.

### 8.3.3 Requirements and recommendations for the hydraulic circuit

- The maximum piping length depends on the maximum pressure availability in the water outlet pipe. Please check the pump curves.
- The indoor unit is equipped with an air purger (factory supplied) at the highest location of the Indoor Unit. If this location is not the highest of the water installation, air might be trapped inside the water pipes, which could cause system malfunction. In that case additional air purgers (field supplied) should be installed to ensure no air enters the water circuit.
- For heating floor system, the air should be purged by means of an external pump and an open circuit to avoid air bags.
- When the unit is stopped during shut-off periods and the ambient temperature is very low, the water inside the pipes and the circulating pump may freeze, thus damaging the pipes and the water pump. In these cases, the installer shall ensure that the water temperature inside the pipes does not fall below the freezing point. In order to prevent this, the unit has a self-protection mechanism which should be activated (refer to the Service manual, "Optional functions" chapter).
- Check that the water pump of the space heating circuit works within the pump operating range and that the water flow is over the pump's minimum. If the water flow is below the minimum water flow established for the unit, alarm is displayed on the unit.
- 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.
- When selecting a DHW tank, take into consideration that the storage capacity of the tank has to meet with the daily consumption in order to avoid stagnation of water.
- Fresh water must circulate inside the DHW tank water circuit at least one time per day during the first days after the installation has been performed. Additionally, flush the system with fresh water when there is no consumption of DHW during long periods of time.
- Try to avoid long runs of water piping between the tank and the DHW installation in order to decrease possible temperature losses.
- For HYDRO FREE High temperature: When using the indoor unit in combination with the DHW tank, the heating coil of the tank is placed in a higher position than the indoor unit air purger. Then, to totally purge the space heating circuit, it is very important that the heating coil of the tank is fully air purged.
- 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.
- Ensure that the installation complies with applicable legislation in terms of piping connection and materials, hygienic measures, testing and the possible required use of some specific components like thermostatic mixing valves, Differential pressure overflow valve, etc.
- The maximum water pressure is 3 bar (nominal opening pressure of the safety valve). Provide adequate reduction pressure device in the water circuit to ensure that the maximum pressure is NOT exceeded.
- Ensure that the drain pipes connected to the safety valve and to the air purger are properly driven to avoid water being in contact with unit components.
- Make sure that all field supplied components installed in the piping circuit can withstand the water pressure and the water temperature range in which the unit can operate.
- HYDRO FREE units are conceived for exclusive use in a closed water circuit.
- The internal air pressure of the expansion vessel tank will be adapted to the water volume of the final installation (factory supplied with 0.1 MPa of internal air pressure).
- Do not add any type of glycol to the water circuit in units.
- Drain taps must be provided at all low points of the installation to permit complete drainage of the circuit during servicing.

### 8.3.4 Water piping

#### ◆ Water piping length

Consider the following guidelines when designing the water circuit.

| Item                                                            | HYDRO FREE Low temperature | HYDRO FREE High temperature |
|-----------------------------------------------------------------|----------------------------|-----------------------------|
| Maximum water piping length between indoor unit and DHW tank    | 10 m                       | 10 m                        |
| Maximum water piping length between indoor unit and 3-way valve | 3 m                        | 3 m                         |
| Maximum water piping length between 3-way valve and DHW tank    | 10 m                       | 10 m                        |



#### NOTE

DHW Piping length: It is recommended to avoid long runs of piping between the domestic hot water tank and hot water outlet side in order to avoid heat losses.

#### ◆ Water piping size

(inches)

| Model      | Space heating pipes connection |                   |                                   |
|------------|--------------------------------|-------------------|-----------------------------------|
|            | Inlet connection               | Outlet connection | Shut-off valves                   |
| 3.0 HP     | G 1" (female)                  | G 1" (female)     | G 1" (male) - G 1" (male)         |
| 5 and 10HP | G 1-1/4" (female)              | G 1-1/4" (female) | G 1-1/4" (male) - G 1-1/4" (male) |

### 8.3.5 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  $\text{CaCO}_3$ .

#### ◆ Recommendations for the DHW circuit

The following is the recommended standard water quality.

| Item                                                                    | DHW space                     | Tendency <sup>(1)</sup> |                    |
|-------------------------------------------------------------------------|-------------------------------|-------------------------|--------------------|
|                                                                         | Water supplied <sup>(3)</sup> | Corrosion               | Deposits of scales |
| Electrical Conductivity (mS/m) (25°C)<br>{μS/cm} (25 °C) <sup>(2)</sup> | 100~2000                      | ●                       | ●                  |
| Chlorine Ion (mg Cl <sup>-</sup> /l)                                    | max. 250                      | ●                       |                    |
| Sulphate (mg/l)                                                         | max. 250                      | ●                       |                    |
| Combination of chloride and sulphate (mg/l)                             | max. 300                      | ●                       | ●                  |
| Total Hardness (mg CaCO <sub>3</sub> /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 . Electrical and control settings

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## 9.1 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 system (outdoor unit + indoor unit + DHW tank (if apply)).
  - The power supply voltage is within  $\pm 10\%$  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  $Z_{\max}$  at the interface point of the user's supply, in accordance with EN61000-3-11.

| Model        | Power supply | Operation mode                  | $Z_{\max}$ ( $\Omega$ ) |
|--------------|--------------|---------------------------------|-------------------------|
| RWLT-3.0VNE  | 1~ 230V 50Hz | HYDRO FREE                      | -                       |
|              |              | HYDRO FREE with DHW tank heater | -                       |
| RWLT-5.0VNE  | 1~ 230V 50Hz | HYDRO FREE                      | -                       |
|              |              | HYDRO FREE with DHW tank heater | -                       |
| RWLT-10.0VNE | 1~ 230V 50Hz | HYDRO FREE                      | -                       |
|              |              | HYDRO FREE with DHW tank heater | -                       |
| RWHT-5.0VNFE | 1~ 230V 50Hz | HYDRO FREE                      | 0.27                    |
|              |              | HYDRO FREE with DHW tank heater | 0.18                    |



### NOTE

The data corresponding to DHW tank heater is calculated in combination with the domestic hot water tank accessory "DHWT-(200/300) S-3.0H2E".

- 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                       | HYDRO FREE                                 |
|-----------------------------------------------------------------------------------------|--------------------------------------------|
| Equipment complying with IEC 61000-3-2                                                  | RWLT-3.0VNE<br>RWLT-5.0VNE<br>RWLT-10.0VNE |
| Equipment complying with IEC 61000-3-12                                                 | RWHT-5.0VNFE<br>+ DHW Tank heater          |
| Installation restrictions may be applied by supply authorities in relation to harmonics | -                                          |

- 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 3 of the PCB1 to the ON position and use the adequate protections. Refer to the section "[Electrical connection](#)" for the detailed information.

## 9.2 System wiring diagram

Connect the units according to the following electric diagram:

TB : Terminal board

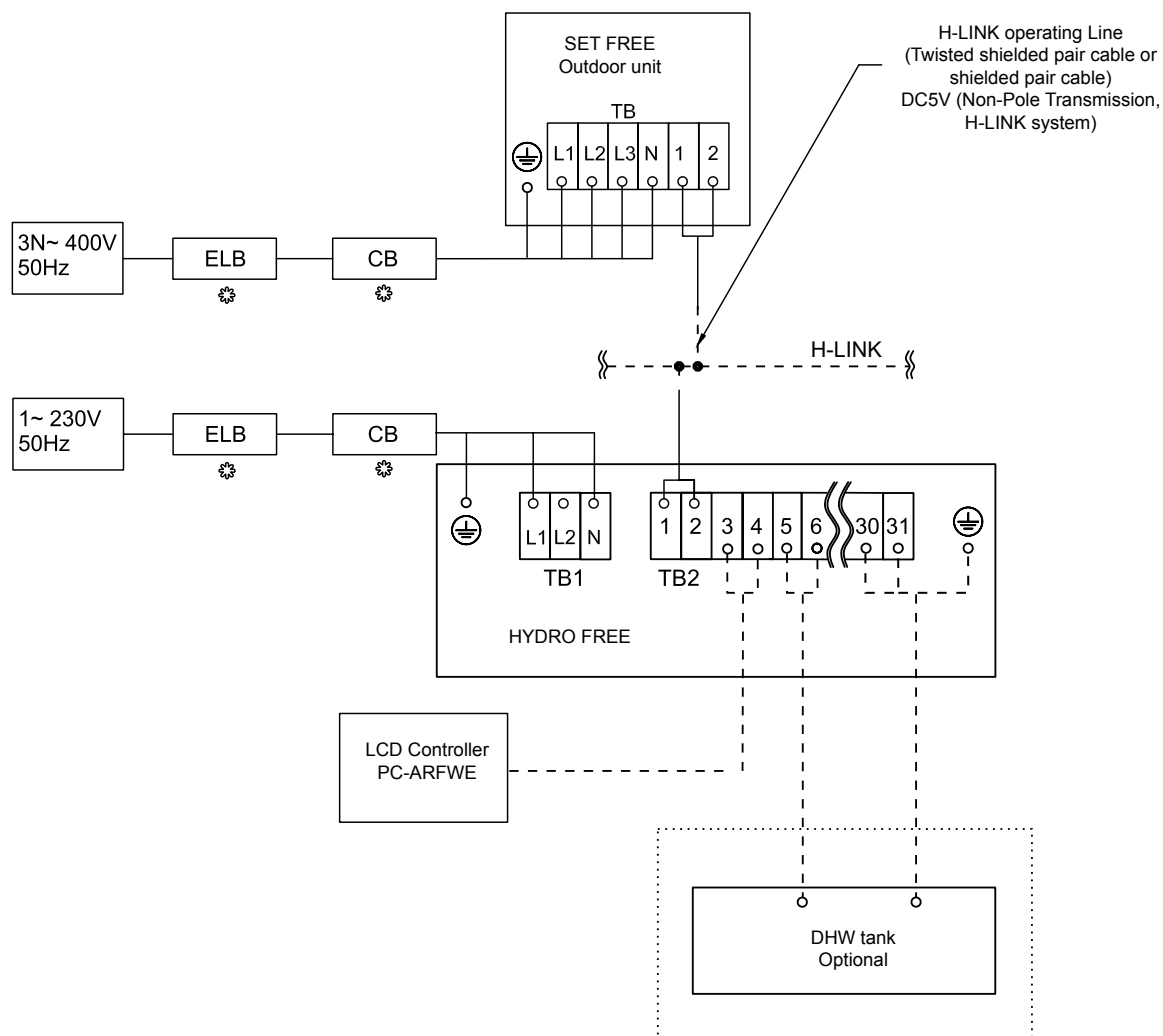
CB : Circuit breaker

ELB : Earth leakage breaker

— : Field wiring

⊗ : Field-supplied

1,2 : Outdoor / HYDRO FREE communication



### NOTE

- For H-Link transmission wiring use twist pair wires. 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 1000 m (up to 5000 in case of using 4 units of PSC-5HR) 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

### 9.3 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.

#### 9.3.1 Wiring size

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

| Model        | Power supply | Heating operation mode          | Max. current (A) | Power supply cables            | Transmitting cables      | Actuator cables               |
|--------------|--------------|---------------------------------|------------------|--------------------------------|--------------------------|-------------------------------|
|              |              |                                 |                  | EN60335-1                      | EN60335-1                | EN60335-1                     |
| RWLT-3.0VNE  | 1~ 230V 50Hz | HYDRO FREE                      | 5.0              | 2 x 0.75 mm <sup>2</sup> + GND | 2 x 0.75 mm <sup>2</sup> | 2 x 0.75mm <sup>2</sup> + GND |
|              |              | HYDRO FREE with DHW tank heater | 14.5             | 2 x 2.5 mm <sup>2</sup> + GND  |                          |                               |
| RWLT-5.0VNE  | 1~ 230V 50Hz | HYDRO FREE                      | 5.0              | 2 x 0.75 mm <sup>2</sup> + GND |                          |                               |
|              |              | HYDRO FREE with DHW tank heater | 14.7             | 2 x 2.5 mm <sup>2</sup> + GND  |                          |                               |
| RWLT-10.0VNE | 1~ 230V 50Hz | HYDRO FREE                      | 5.0              | 2 x 75 mm <sup>2</sup> + GND   |                          |                               |
|              |              | HYDRO FREE with DHW tank heater | 15.0             | 2 x 2.5 mm <sup>2</sup> + GND  |                          |                               |
| RWHT-5.0VNFE | 1~ 230V 50Hz | HYDRO FREE                      | 28               | 2 x 6 mm <sup>2</sup> + GND    |                          |                               |
|              |              | HYDRO FREE with DHW tank heater | 42               | 2 x 10mm <sup>2</sup> + GND    |                          |                               |

#### NOTE

The data corresponding to DHW tank heater is calculated in combination with the domestic hot water tank accessory "DHWT-(200/300) S-3.0H2E".

#### 9.3.2 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 and indoor unit).

#### 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).

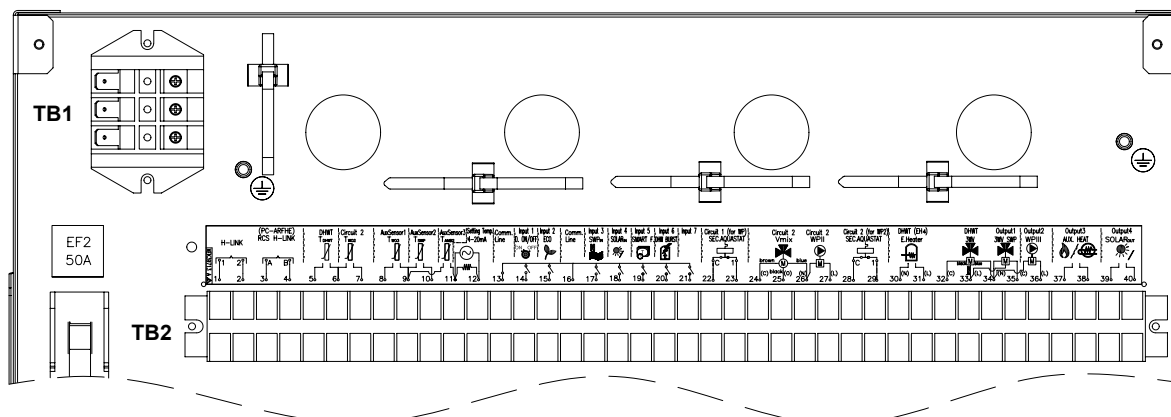
| Model        | Power supply | Applicable voltage |            | Heating operation mode          | MC (A) | CB (A) | ELB (n° of poles/A/ mA) |
|--------------|--------------|--------------------|------------|---------------------------------|--------|--------|-------------------------|
|              |              | U min. (V)         | U max. (V) |                                 |        |        |                         |
| RWLT-3.0VNE  | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 5.0    | 5      | 2/40/30                 |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 14.5   | 16     |                         |
| RWLT-5.0VNE  | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 5.0    | 5      |                         |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 14.7   | 16     |                         |
| RWLT-10.0VNE | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 5.0    | 5      |                         |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 15.0   | 16     |                         |
| RWHT-5.0VNFE | 1~ 230V 50Hz | 207                | 253        | HYDRO FREE                      | 28     | 32     |                         |
|              |              | 207                | 253        | HYDRO FREE with DHW tank heater | 42     | 50     |                         |

#### NOTE

The data corresponding to DHW tank heater is calculated in combination with the domestic hot water tank accessory "DHWT-(200/300) S-3.0H2E".

## 9.4 Optional indoor unit wiring

### ◆ Summary of the terminal board connections



| Mark                   | Part name                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TERMINAL BOARD 1 (TB1) |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| N                      | 1~ 230V 50Hz                                                                                    | Main power supply connection                                                                                                                                                                                                                                                                                                                                                                       |
| L1                     |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| L2                     | -                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                    |
| TERMINAL BOARD 2 (TB2) |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 1                      | H-LINK commutation                                                                              | The H-LINK transmission has to be done between the indoor unit and the terminals 1-2 of either outdoor unit, ATW-RTU-05 or any other central device.                                                                                                                                                                                                                                               |
| 2                      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3                      | H-LINK communication for remote control switch                                                  | PC-ARFWE                                                                                                                                                                                                                                                                                                                                                                                           |
| 4                      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5                      | DHW tank's thermistor                                                                           | The DHW sensor is used to control the temperature of the domestic hot water tank                                                                                                                                                                                                                                                                                                                   |
| 6                      | Common thermistor                                                                               | Common terminal for thermistor                                                                                                                                                                                                                                                                                                                                                                     |
| 7                      | Thermistor for water outlet temperature of second cycle                                         | The sensor is used for the second temperature control and should be positioned after the mixing valve and the circulation pump                                                                                                                                                                                                                                                                     |
| 8                      | Thermistor for water outlet temperature after hydraulic separator<br>(As default: Aux Sensor 1) | Water sensor for hydraulic separator, buffer tank or boiler combination                                                                                                                                                                                                                                                                                                                            |
| 9                      | Common thermistor                                                                               | Common terminal for thermistors                                                                                                                                                                                                                                                                                                                                                                    |
| 10                     | Thermistor for swimming pool water temperature<br>(As default: Aux Sensor 2)                    | The sensor is used for the swimming pool temperature control and should be positioned inside plate heat exchanger of the swimming pool                                                                                                                                                                                                                                                             |
| 11                     | Thermistor for second ambient temperature<br>(As default: Aux Sensor 3)                         | The sensor is used for the second ambient temperature control and it should be positioned outdoors                                                                                                                                                                                                                                                                                                 |
| 11                     | 4-20 mA application                                                                             | HSW (Heating Setting Water) and CSW (Cooling Setting Water) operation can be overridden by external controller using 4~20mA input (CN5). In order to allow override operation a DSW setting must be done, otherwise values selected by 7-segments will be used. When override operation is allowed, external controller decides the target temperature by inputting a 4~20mA value current in CN5. |
| 12                     |                                                                                                 | This connector will transform input current to voltage by means of a grounded 240Ω resistor connected into a terminal board. Unit will convert read voltage to setting temperature proportionately.                                                                                                                                                                                                |
| 13                     | Common line                                                                                     | Terminal Line common (for input 1 to 7)                                                                                                                                                                                                                                                                                                                                                            |
| 14                     | Input 1 (Demand ON/OFF) (*)                                                                     | 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 split air to water heat pump system ON and OFF.                                                                                                                                 |
| 15                     | Input 2 (ECO mode) (*)                                                                          | Available signal which allows to reduce the water temperature setting of circuit 1, circuit 2 or both.                                                                                                                                                                                                                                                                                             |
| 16                     | Common line                                                                                     | Terminal Line common (for inputs 1 to 7)                                                                                                                                                                                                                                                                                                                                                           |
| 17                     | Input 3 (Swimming pool) (*)                                                                     | Only for swimming pool installations: It is necessary to connect an external input to the air to water heat pump to provide signal when the water pump of swimming pool is ON.                                                                                                                                                                                                                     |

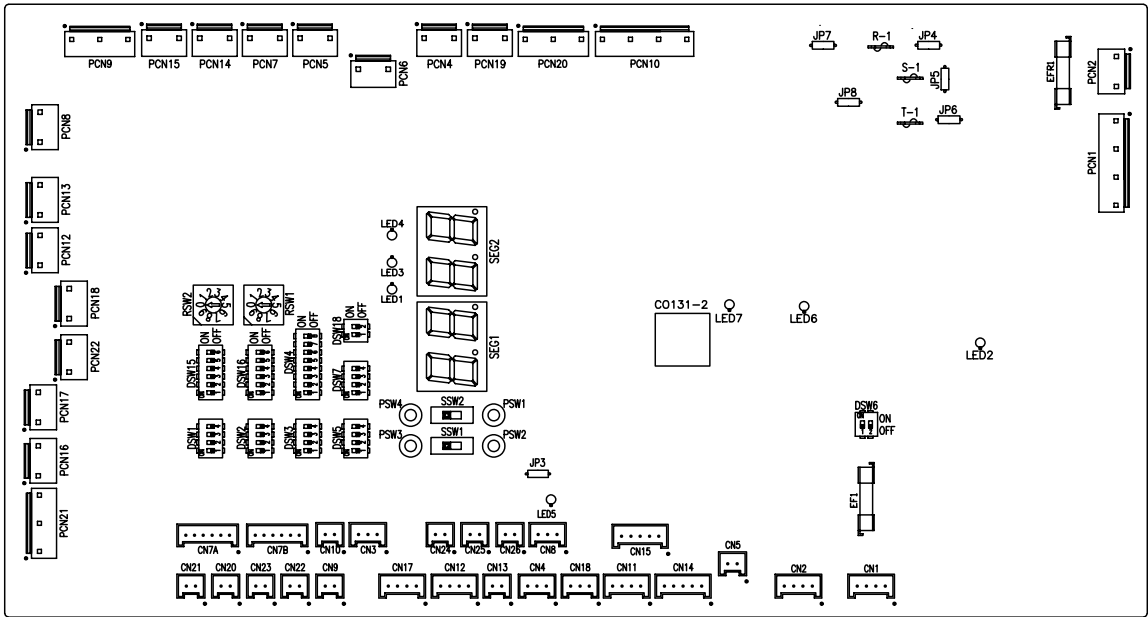
| Mark  | Part name                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18    | Input 4 (Solar) (*)                                | Available input for Solar combination with Domestic Hot Water Tank                                                                                                                                                                                                                                                                                                                                                      |
| 19    | Input 5 (Smart function) (*)                       | 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.                                                                                                                                                  |
| 20    | Input 6 (DHW boost) (*)                            | Available input for an instantaneous heating of the domestic hot water of the tank                                                                                                                                                                                                                                                                                                                                      |
| 21    | Input 7 (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 is added into corresponding operation mode (Heating, Cooling, DHW Operation). Two possible options:<br><br>- One power meter for all installation (IU+OU).<br>- Two separated power meters (one for IU and one for OU). |
| 22    | Aquastat security for circuit 1 (WP1)              | Terminals intended for the connection of the Aquastat security accessory (ATW-AQT-01) to control the water temperature of the circuit 1.<br>Terminals for the connection of the limit thermostat (only for UK market models).                                                                                                                                                                                           |
| 23    | Limit thermostat(Only UK market models)            |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 24(C) | Mixing valve close                                 | When a mixing system is required for a second temperature control, these outputs are necessary to control the mixing valve.                                                                                                                                                                                                                                                                                             |
| 25(O) | Mixing valve open                                  |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 26(N) | N Common                                           |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 27(L) | Water Pump 2 (WP2)                                 | When there is a second temperature application, a secondary pump is the circulating pump for the secondary heating circuit.                                                                                                                                                                                                                                                                                             |
| 28    | Aquastat security for circuit 2 (WP2)              | Terminals intended for the connection of the Aquastat security accessory (ATW-AQT-01) to control the water temperature of the circuit 2.                                                                                                                                                                                                                                                                                |
| 29    |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 30(N) | Electrical Heater DHW Output                       | If DHW tank contains an electric heater, the air to water heat pump can activate it if the heat pump cannot achieve the required DHW temperature by itself.                                                                                                                                                                                                                                                             |
| 31(L) |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 32(C) | Common line                                        | Common terminal for the 3-way valve for DHW tank                                                                                                                                                                                                                                                                                                                                                                        |
| 33(L) | 3-way valve for DHW tank                           | The air to water heat pump can be used to heat DHW. This output will be on when DHW is activated.                                                                                                                                                                                                                                                                                                                       |
| 34(N) | N common                                           | Neutral terminal common for 3-way valve of DHW tank and outputs 1 and 2.                                                                                                                                                                                                                                                                                                                                                |
| 35(C) | Output 1 (3-way valve for swimming pool) (*)       | The air to water heat pump can be use to heat swimming pool. This output will be ON when swimming pool is activated.                                                                                                                                                                                                                                                                                                    |
| 36(L) | Output 2 (Water pump 3 (WP3)) (*)                  | When there is a hydraulic separator or buffer tank, additional water pump (WP3) is needed.                                                                                                                                                                                                                                                                                                                              |
| 37    | Output 3 (Auxiliary boiler or electric heater) (*) | The boiler can be used to alternate with the heat pump when the heat pump cannot achieve the required temperature by itself.                                                                                                                                                                                                                                                                                            |
| 38    |                                                    | A water electric heater (as accessory) can be used to provide the additional heating required on the coldest days of the year.                                                                                                                                                                                                                                                                                          |
| 39    | Output 4 (Solar) (*)                               | Output for solar combination with Domestic Hot Water Tank.                                                                                                                                                                                                                                                                                                                                                              |
| 40    |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                         |

**NOTE**

(\*): Inputs and outputs explained in the table are the factory-set options. By means of the unit controller, some other inputs and outputs functions can be configured and used. Please, refer to the Service Manual for detailed information.

9.5 HYDRO FREE setting of DIP switches and RSW switches

9.5.2.1 Location of DIP switches and rotary switches



9.5.2.2 Function 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: Additional setting 0

Factory setting. No setting is required.

|                             |                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------------|
| HYDRO FREE Low temperature  |  |
| HYDRO FREE High temperature |  |

-  **NOTE**
- (\*): In case of installing the “Cooling kit” accessory, set the pin 4 of DSW1 to ON in order to enable the cooling operation.

### ◆ DSW2: Unit capacity setting

Factory setting. No setting is required.

| 3.0 HP | 5.0 HP | 10.0 HP |
|--------|--------|---------|
|        |        |         |

### ◆ DSW3: Additional setting 1

|                         |  |
|-------------------------|--|
| Setting before shipment |  |
|-------------------------|--|

### ◆ DSW4: Additional setting 2

|                                                                                                                                            |  |
|--------------------------------------------------------------------------------------------------------------------------------------------|--|
| Setting before shipment                                                                                                                    |  |
| DHW defrost                                                                                                                                |  |
| Heater forced OFF                                                                                                                          |  |
| Unit and installation pipes antifreeze protection                                                                                          |  |
| Standard / ECO water pump operation                                                                                                        |  |
| Electric heater or boiler emergency mode                                                                                                   |  |
| DHW tank's heater operation                                                                                                                |  |
| - Open SV1/2 for vacuum and R-410A refrigerant recovery function (HYDRO FREE High temperature)<br>- DHW 3-way valve forced ON (All models) |  |
| - Disabled R-134a compressor (HYDRO FREE High temperature)                                                                                 |  |

### ⚠ 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 "Electric heater or boiler emergency mode" at the same time.

◆ **DSW5: Additional setting 3**

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 DSW1&2 setting, the preferable sensor for each circuit can be selected.

|                                                                                                                                       |  |
|---------------------------------------------------------------------------------------------------------------------------------------|--|
| 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.                                                                    |  |
| 4-20 mA setting temperature<br>(Only manual operation)                                                                                |  |
| Use the maximum temperature value<br>between Two3 (boiler / heater thermistor) and<br>Two (water outlet thermistor) for water control |  |

◆ **DSW6: Not used**

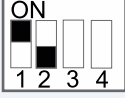
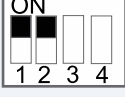
|                                    |  |
|------------------------------------|--|
| Factory setting<br>(Do not change) |  |
|------------------------------------|--|

◆ **DSW7: Not used**

|                                    |  |
|------------------------------------|--|
| Factory setting<br>(Do not change) |  |
|------------------------------------|--|

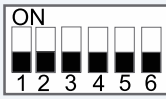
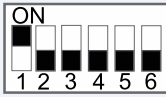
### ◆ DSW18: Additional setting 5 (Capacity control function for HYDRO FREE High temperature only)

This function allows the capacity control by modifying the start and stop conditions of the second cycle, depending on the heat load of the installation when the water temperature is low.

|                                                                            |                                                                                   |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Factory setting                                                            |  |
| Normal power at start<br>(Medium heat load at low water temperature)       |  |
| High power at start<br>(High heat load at low water temperature)           |  |
| Low power at start<br>(Low heat load at low water temperature)             |  |
| Very high power at start<br>(Very high heat load at low water temperature) |  |

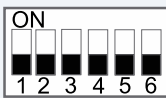
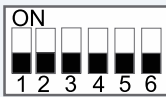
### ◆ DSW15 & RSW2: refrigerant cycle number setting

It is required to change factory default setting, with a value of up to 63. In the same refrigerant cycle, set the same refrigerant cycle number for the outdoor unit and the indoor unit.

|                                               |                                                                                     |                                                                                     |
|-----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Factory setting                               |  |  |
| Example of system setting with a value of: 16 |  |  |

### ◆ DSW16 & RSW1: Unit number setting

It is required to change factory default setting, with any value from 0 up to 63. The address number must be unique for each unit (in the same refrigerant cycle).

|                                              |                                                                                     |                                                                                     |
|----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Factory setting                              |  |  |
| Example of system setting with a value of: 5 |  |  |

### ◆ SSW1: Remote/Local

|                                    |                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------|
| Factory setting (remote operation) | Remote  |
| Local operation                    | Local   |

◆ **SSW2: Heat/Cool (when SSW1 is in local setting)**

|                                                                  |      |                                                                                   |
|------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|
| Factory setting (Heat operation)                                 | Heat |  |
|                                                                  | Cool |  |
| Cooling operation (Only for RWLT and when cooling kit installed) | Heat |  |
|                                                                  | Cool |  |

**9.5.2.3 LED indication**

| Name | Colour | Indication                                               |
|------|--------|----------------------------------------------------------|
| LED1 | Green  | Power indication                                         |
| LED2 | Red    | Power indication                                         |
| LED3 | Red    | Heat pump operation (thermo ON/OFF)                      |
| LED4 | Yellow | Alarm (flickering with 1 sec interval)                   |
| LED5 | Green  | Inverter transmission (HYDRO FREE High temperature only) |
| LED6 | Yellow | H-Link transmission                                      |
| LED7 | Yellow | H-Link transmission for unit controller                  |



# 10. Optional functions

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## 10.1 Indoor unit

### 10.1.1 Optional functions from unit controller

| Optional function                                        | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Floor screed drying function (Circuits 1 &amp; 2)</b> | <p>This function is used exclusively for the process of drying screed that has been newly applied to floor heating system.</p> <p>The water temperature set-point follows a predetermined schedule upon activation of the floor screed drying function (This process is based on EN 1264 part 4)..</p>                                                                                                                                                                                                                                                                  |
| <b>Automatic summer switch-OFF</b>                       | 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.                                                                                                                                                                                                                                                                                                                      |
| <b>Pump and motorized valve seizure protection</b>       | This function prevents sticking of components due to long periods of inactivity, by running the components during a short period every week.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hydraulic separator combination</b>                   | <p>In some cases, water pump of the HYDRO FREE unit is not sized for big heating installation (small water pump). In this case, a hydraulic separator or buffer tank and secondary water pump has to be used to ensure proper water pump dimensioning.</p> <p>The boiler is configured in parallel with the heat pump. A hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing. Additional Water pump (WP3) and water sensor (Two3) are needed for boiler combination control (automatic added when Boiler combination is enabled)</p> |
| <b>Electrical heater or boiler emergency mode</b>        | <p>For the use of the electrical heater accessory or boiler in case of outdoor unit fault, additional setting shall be applied into IU setting:</p> <p>Electrical heater emergency can be both automatic or manual switched ON by the user and the configuration must be done from the Unit controller</p>                                                                                                                                                                                                                                                              |
| <b>Outdoor temperature average timer</b>                 | The average timer corrects the influence of ambient temperature variations. The weather-dependent set point calculation is done on the average outdoor temperature. The outdoor temperature is averaged over the selected time period.                                                                                                                                                                                                                                                                                                                                  |
| <b>DHW anti-Legionella protection</b>                    | 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.                                                                                                                                                                                                                                                                                                                    |
| <b>Smart action</b>                                      | <p>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.</p> <p>When the system is working in combination with boiler, the boiler is switched ON to provide the necessary heating.</p>                                                                                                                                                                   |
| <b>DHW re-circulation</b>                                | <p>This function allows the activation of the water pump for the re-circulation of the hot water from the DHW tank by means of the heat pump.</p> <p>This function can also be used with the anti-legionella protection function.</p>                                                                                                                                                                                                                                                                                                                                   |
| <b>DHW boost</b>                                         | With this function enabled, it is possible to request a heating up of the DHW when user requires an instantaneous delivery of DHW.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Stopping of the water pump mode</b>                   | The water pump stop mode can be selected by means of the unit controller user's interface between two modes "Standard" mode or "Thermo-OFF" mode.                                                                                                                                                                                                                                                                                                                                                                                                                       |

**10.1.2 Optional functions from DIP-switch setting**

| Optional function                                                                                                                             | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit and installation pipes anti freeze protection (Winter operation)</b>                                                                  | 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.<br>In order to avoid this, the water pump anti-freeze control function can be selected by dip-switch setting in order to start the pump operation when the water outlet temperature drops below 5°C and until it raises above 7°C.                                                                                                        |
| <b>2nd outdoor temperature sensor accessory</b>                                                                                               | 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.<br>The preferred sensor for each circuit can be selected by means of DSW setting.                                                                                                                                                                                                       |
| <b>Heater forced OFF</b>                                                                                                                      | 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 unit controller and the heater protections have no effect.                                                                                                                                                                                                   |
| <b>Standard / ECO water pump operation</b>                                                                                                    | 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.<br>It is possible to set the pump to "Economic Mode" by dip-switch setting, so the water pump can be stopped when heat demand by Thermostat (Room ambient temperature is reached) is not required or when the system is stopped.                                                                                                                                                                                      |
| <b>DHW defrost</b>                                                                                                                            | This function allows to perform the defrost operation at the DHW tank instead of at the indoor water installation.                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Use the max. temperature value between Two3 (boiler/heater/buffer tank thermistor) and Two (water outlet thermistor) for water control</b> | 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 water temperature sensor (Two). This option can be activated by dip-switch setting. Only available with universal sensor enabled).                                                                                                                                                                                                                  |
| <b>Electric heater or boiler emergency mode</b>                                                                                               | In the event of outdoor unit failure, the required heating can be provided by the electric heater or by the boiler, by means of DSW setting.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>DHW 3-way valve forced ON</b>                                                                                                              | When combination with domestic hot water tank, the activation of this function changes the position of the 3-way valve to the DHW operation position, then the unit is forced to work against the heating coil of the DHW tank. This can be used, for example, for a quick water filling of the DHW tank's heating coil.                                                                                                                                                                                                                                     |
| <b>DHW tank's heater operation</b>                                                                                                            | The electric heater of the domestic hot water tank is disabled by factory setting. This function allows to activate its operation if needed.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>4-20 mA setting temperature (Only manual operation)</b>                                                                                    | HSW and CSW operation can be overridden by external controller using 4~20mA input (CN5). In order to allow override operation a DSW setting must be done, otherwise values selected by 7-segment will be used. When override operation is allowed, external controller decides the target temperature by inputting a 4~20mA value current in CN5.<br><br>This connector will transform input current to voltage by means of a grounded 240Ω resistor connected into a terminal board. Unit will convert read voltage to setting temperature proportionately. |
| <b>Open SV1/2 for vacuum and R-410A recovery function</b>                                                                                     | In the process of vacuum and R-410A recovery of HYDRO FREE High temperature it is very important to supply power to the indoor unit and to activate this function by DSW setting. Thereby, solenoid valves SV1 and SV2 of the indoor unit are opened to allow the operation of vacuum and refrigerant charge inside the indoor unit. It is very important to bring the DSW back to its original position when finishing the whole procedure.                                                                                                                 |
| <b>Disabled R-134a compressor</b>                                                                                                             | This function disables the compressor for the 2nd cycle (R-134a compressor), so that the unit is forced to operate at medium/low outlet water temperatures (Disabled cascade cycle)                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Capacity control function</b>                                                                                                              | This function allows the capacity control by modifying the start and stop conditions of the second cycle, depending on the heat load of the installation when the water temperature is low.                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Remote/Local operation</b>                                                                                                                 | This function allows the control from the HYDRO FREE PCB the working mode.<br>(In manual operation by seven segments configuration or using PC-ARFWE Controller)                                                                                                                                                                                                                                                                                                                                                                                             |

**NOTE**

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

### 10.1.3 Optional external input/output signals (by 7-segment display)

The system has 7 input and 4 output optional signals (+ 4 output signals when using accessory). HYDRO FREE series allow different ports to be configured for those I/O signals, as well.

The user can configure those input signal to perform different functions from the unit controller. This is briefly explained in the next tables:

#### Input signals and input ports

| Code | Name    | Port       |
|------|---------|------------|
| 1    | Input 1 | PCN20 #1-5 |
| 2    | Input 2 | PCN20 #1-3 |
| 3    | Input 3 | PCN10 #1-9 |
| 4    | Input 4 | PCN10 #1-5 |
| 5    | Input 5 | PCN10 #1-3 |
| 6    | Input 6 | PCN6 #1    |
| 7    | Input 7 | PCN19 #1   |

#### Input functions. (To be configured from the unit controller):

| Function # | Input            | Description                                                                                                                                                                                                                            |
|------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0          | Disabled         | -                                                                                                                                                                                                                                      |
| 1          | Demand ON/OFF    | Send Demand ON or OFF Operation to Circuit 1 and Circuit 2                                                                                                                                                                             |
| 2          | Smart Act./SG1   | This function must be used to block or limit the heat pump when restricted by Electric company. It allows an external Smart switch device to switch off or reduce consumption of the heat pump during time of peak electricity demand. |
| 3          | Swimming pool    | When HYDRO FREE model is used to warm th swimming pool water, this input is used as a feedback for swimming pool water pump.                                                                                                           |
| 4          | Solar            | In case of combine HYDRO FREE with solar panels, this input is used as a feedback for solar station ready operation.                                                                                                                   |
| 5          | Operation mode   | Cool/Heat must be changed by an input of an external contact signal. Contact signal is edge detection; Cool/Heat changeover by unit controller is also available                                                                       |
| 6          | DHW boost        | With this function enabled, it is possible to request a heating up of the DHW when user requires an instantaneous delivery of DHW.                                                                                                     |
| 7          | Demand ON/OFF C1 | Send Demand ON or OFF Operation only to Circuit 1                                                                                                                                                                                      |
| 8          | Demand ON/OFF C2 | Send Demand ON or OFF Operation only to Circuit 2                                                                                                                                                                                      |
| 9          | Forced heating   | Forced Heating Demand by input of contact signal from outside                                                                                                                                                                          |
| 10         | Forced cooling   | Forced Cooling Demand by input of contact signal from outside                                                                                                                                                                          |
| 11         | ECO mode C1 & C2 | Water temperature setting for Circuit 1 and Circuit 2 it is reduced by ECO operation mode (Default 3°C) by input of contact signal from outside                                                                                        |
| 12         | ECO mode C1      | Water temperature setting for Circuit 1 it is reduced by ECO operation mode (Default 3°C) by input of contact signal from outside                                                                                                      |
| 13         | ECO mode C2      | Water temperature setting for Circuit 2 it is reduced by ECO operation mode (Default 3°C) by input of contact signal from outside                                                                                                      |
| 14         | Force OFF        | Force OFF operation for unit. RCS will continue as normally set but will show indication that operation is forbidden                                                                                                                   |
| 15         | SG2              | Available if ("Status" of Smart function in Optional functions menu) is "Enabled" and ("Smart Action" in System option of the Optional functions menu) is set as "SM Grid Ready"                                                       |

**Output signals and output ports**

| Code | Name     | Port       |              |
|------|----------|------------|--------------|
| α1   | Output 1 | PCN21 #3-5 | 230V         |
| α2   | Output 2 | PCN21 #1-5 | 230V         |
| α3   | Output 3 | PCN22 #1-3 | Free voltage |
| α4   | Output 4 | PCN18 #1-3 | Free voltage |
| α5   | Output 5 | CN20 #1-2  | 24Vdc        |
| α6   | Output 6 | CN21 #1-2  | 24Vdc        |
| α7   | Output 7 | CN22 #1-2  | 24Vdc        |
| α8   | Output 8 | CN23 #1-2  | 24Vdc        |

**Output functions. (To be configured from the unit controller):**

| Function # | Output                     | Description                                                                                                  |
|------------|----------------------------|--------------------------------------------------------------------------------------------------------------|
| 0          | Disabled                   |                                                                                                              |
| 1          | 3WV SWP                    | In case of combine HYDRO FREE with swimming pool, this output is used to drive 3 way valve swimming pools.   |
| 2          | WP3                        | In case of combine HYDRO FREE with boiler or hydraulic separator, this output is used to drive water pump 3. |
| 3          | Boiler combination         | In case of combine HYDRO FREE with boiler, this output is used to switch ON it.                              |
| 4          | Solar pump                 | In case of combine HYDRO FREE with solar panel, this output is used to drive water pump station              |
| 5          | Alarm signal               | Output when an "Alarm Code" is received from Indoor Unit or outdoor unit.                                    |
| 6          | Operation signal           | Output in case that "Thermo ON" signal in any condition                                                      |
| 7          | Cooling signal             | Output in case that "Thermo ON" signal in Cooling operation                                                  |
| 8          | Demand-ON signal circuit 1 | Signal is enabled when circuit 1 is operating in Demand-ON                                                   |
| 9          | Heating signal             | Output in case that "Thermo ON" signal in Heating operation                                                  |
| 10         | DHW signal                 | Output in case that "Thermo ON" signal in DHW operation                                                      |
| 11         | Not used                   | Not used                                                                                                     |
| 12         | Defrost                    | Output if the operation state (STUNT) of the outdoor unit is defrosting.                                     |
| 13         | DHW re-circulation pump    | In case of re-circulation pump enabled for HSW tank                                                          |
| 14         | Heater combination relay 1 | In case of Heater operation for HYDRO FREE High temperature. Output for Relay 1.                             |
| 15         | Heater combination relay 2 | In case of Heater operation for HYDRO FREE High temperature. Output for Relay 2.                             |

## 10.2 Additional functions by accessory sensor

HITACHI offers to its users the option to add more functions to the inputs from signals coming from some specific sensors. The configuration for this purpose is explained below:

| I/O Terminal name |         | Port for setting<br>(Connector number) | Factory default setting |            | Input/Output type |
|-------------------|---------|----------------------------------------|-------------------------|------------|-------------------|
| I/O               | Display |                                        | Setting contents        | Function # |                   |
| Sensor 1          | A1      | CN26 #2                                | Disabled                | 0          | NTC               |
| Sensor 2          | A2      | CN25 #1-2                              | Disabled                | 0          | NTC               |
| Sensor 3          | A3      | CN5 #1                                 | Disabled                | 0          | NTC               |

### Function of sensors

| Function # | Input                                      | Description                                                                                                                                                                                                                                                                                                                                                            |
|------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | Boiler combination/Two3<br>(sensor 1 only) | This sensor is used in case to combine any HYDRO FREE model with an external boiler (and in case to combine a HYDRO FREE with an electrical heater)                                                                                                                                                                                                                    |
| 2          | Swimming pool<br>(sensor 2 only)           | When combining HYDRO FREE with swimming pool, this sensor is used to read the temperature from the water of the swimming pool.                                                                                                                                                                                                                                         |
| 3          | Solar panel sensor                         | When combining HYDRO FREE with solar panels, this sensor is used to read the temperature from the solar panel.                                                                                                                                                                                                                                                         |
| 4          | Zone 1 & 2 ambient<br>sensor               | If Aux1 and Aux2 sensors are both connected and enabled at the unit controller configuration, the detection of ambient temperature value is carried out by these sensors. The ambient temperature setting for each circuit is set from the unit controller or central platform. The temperature value detected by each sensor is applied to the corresponding circuit. |
| 5          | Zone 1 ambient sensor                      | If Aux1 and Aux2 sensors are both connected and enabled at the unit controller configuration, the detection of ambient temperature value is carried out by these sensors. The ambient temperature setting for each circuit is set from the unit controller or central platform. The temperature value detected by each sensor is applied to the circuit 1.             |
| 6          | Zone 2 ambient sensor                      | If Aux1 and Aux2 sensors are both connected and enabled at the unit controller configuration, the detection of ambient temperature value is carried out by these sensors. The ambient temperature setting for each circuit is set from the unit controller or central platform. The temperature value detected by each sensor is applied to the circuit 2.             |
| 7          | Second outdoor ambient                     | An outside temperature sensor can be directly connected to the controller in case the heat pump is located in a position not suitable for this measurement.                                                                                                                                                                                                            |

# 11 . Troubleshooting

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## 11.1 Initial troubleshooting

### 11.1.1 Checking by means of the 7-segment display

#### Simple checking procedure by means of the 7-segment display

- 1 Turn on the indoor units connected to the outdoor unit.
- 2 Turn on the outdoor unit
- 3 Auto-addressing starts. (Outdoor unit printed circuit board PCB1).

During the auto-addressing, the following items can be checked by means of the 7-segment display of the outdoor unit.

- Disconnection of the power supply to the Indoor Unit.
- Disconnection of the operating line between the outdoor and the indoor units.
- **Normal case:**  
The 7-segment display of the outdoor unit is not indicated.
- **Abnormal case:**  
If there is something wrong, the 7-segment display of the outdoor unit displays the following indications:

| Cause                                                                                                                   | Indication | Remarks                              |
|-------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------|
| A. The indoor unit is not supplied with power.                                                                          | 03         | Continues to flash after 30 seconds. |
| B. Disconnection of the operating line between the outdoor units and the indoor unit.                                   | 03         | Continues to flash after 30 seconds. |
| C. Duplicated settings of the indoor unit number on the rotary switch RSW, see the description of the alarm code "35"). | —          | —                                    |

### 11.1.2 Power supply failure to the indoor unit and the remote control switch (PC-ARFWE)

- The LED and the Unit controller are not indicated.
- Not operated

If the fuses are blown out or a breaker is activated, investigate the cause of the overcurrent and take the necessary action.

| Phenomenon                                                             | Cause                                                                                               | Check item                                                             | Action<br>(Turn OFF the main switch)                       |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------|
| Power failure or power is not ON                                       |                                                                                                     | Measure the voltage by means of the voltmeter                          | Supply the power                                           |
| Blown out fuse or activation of the breaker at the power source        | Short circuit supplied between the wires                                                            | Check for any uncovered part of the wires                              | Remove the cause of the short circuit and replace the fuse |
|                                                                        | Short circuit of the wires to earth                                                                 | Measure the insulation resistance                                      | Remove the cause of the short circuit and replace the fuse |
| Blown out fuse at the control circuit                                  | Short circuit supplied between the wires                                                            | Check for any uncovered part of the wires                              | Remove the cause of the short circuit and replace the fuse |
|                                                                        | Short circuit of the control circuit to earth                                                       | Measure the insulation resistance                                      | Remove the cause of the short circuit and replace the fuse |
| Disconnected cable of the remote control switch                        |                                                                                                     | Connect the cable                                                      | Replace the cable or repair the cable                      |
| Insufficient contacting at the connectors of the remote control switch | Insufficient connection or incorrect connection of the indoor unit PCB                              | Check the connectors                                                   | Correctly connect the connector                            |
|                                                                        | Insufficient connection or incorrect connection of the indoor unit PCB in the remote control switch |                                                                        |                                                            |
| Failure of the remote control switch                                   |                                                                                                     | Check the remote control switch by means of the self-check mode        | Replace the remote control switch if it failed             |
| Failure of PCB                                                         | Unconnected wires to PCB                                                                            | Check the connectors                                                   | Correctly connect the wires                                |
|                                                                        | Failure of PCB                                                                                      | Check PCB by means of the self-check mode                              | Replace PCB if it failed                                   |
| Incorrect wiring connection                                            |                                                                                                     | Take action according to the procedure explained in "Test run" chapter |                                                            |

### 11.1.3 Abnormal operation of the devices

| Phenomenon                                                                                           | Cause                                                                    |                                                                          | Check item                                                                   | Action(Turn OFF the main switch)                                 |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------|
| No defrost operation mode is available during the heating process or the defrost operation continues | Failure of thermistor for outdoor evaporating temperature during heating | Failure of thermistor                                                    | Replace or correctly connect when it is abnormal                             |                                                                  |
|                                                                                                      |                                                                          | Disconnected wire of thermistor                                          |                                                                              |                                                                  |
|                                                                                                      | Failure of 4-way valve                                                   | Disconnected 4-way valve coil                                            | Measure the resistance of coil                                               | Replace the 4-way valve                                          |
|                                                                                                      |                                                                          | Incorrect activation of 4-way valve                                      | Enforced power supply                                                        |                                                                  |
|                                                                                                      | Disconnected control wires between indoor unit and outdoor unit          |                                                                          | Check the connectors                                                         | Correctly connect the wiring                                     |
|                                                                                                      | Failure of the PCB of the indoor unit                                    | Disconnected wiring to PCB                                               | Check the connectors                                                         | Correctly connect the wiring                                     |
|                                                                                                      |                                                                          | Failure of PCB                                                           | Check PCB by means of the self-check mode                                    | Replace PCB when the check mode is not available                 |
|                                                                                                      | Failure of the PCB of the indoor unit                                    | Disconnected wiring to PCB                                               | Check the connectors                                                         | Correctly connect the wiring                                     |
|                                                                                                      |                                                                          | Failure of the PCB                                                       | Check PCB by means of the self-check mode                                    | Replace if PCB fails                                             |
| Insufficient cooling process                                                                         | Indoor cool load is higher than the cooling capacity                     |                                                                          | Calculate the cool load                                                      | Use a bigger unit                                                |
|                                                                                                      | Excessively low suction pressure                                         | Gas leakage or shortage of refrigerant                                   | Measure superheat                                                            | Correctly charge the refrigerant after repairing the gas leakage |
|                                                                                                      |                                                                          | Excessively small diameter tube or long piping                           | Measure and check the field-supplied pipes                                   | Use the correct pipes                                            |
|                                                                                                      |                                                                          | Incorrect activation of the check valve of the outdoor unit              | Check whether or not the temperature difference before/after the check valve | Replace the check valve of the outdoor unit                      |
|                                                                                                      |                                                                          | Failure or malfunction of the expansion valve                            | Check for clogging                                                           | Remove the clogging                                              |
|                                                                                                      |                                                                          |                                                                          | Check the connection cord and the connector                                  | Replace the connector                                            |
|                                                                                                      |                                                                          |                                                                          | Is there an operation sound from the coil?                                   | Replace the coil                                                 |
|                                                                                                      |                                                                          |                                                                          | Is the thermistor on the compressor normal?                                  | Replace the thermistor                                           |
|                                                                                                      |                                                                          |                                                                          | Is the thermistor installed correctly on compressor?                         | Correctly install the thermistor                                 |
|                                                                                                      |                                                                          | Clogged strainer in the indoor unit; clogging at the low pressure piping | Check the temperature difference at the inlet and the outlet of the strainer | Replace the strainer in the indoor unit                          |
|                                                                                                      |                                                                          | Clogging at the low pressure piping                                      | Check the temperature difference                                             | Remove the clogging                                              |

| Phenomenon                   | Cause                                                |                                                                     | Check item                                                                       | Action(Turn OFF the main switch)                      |
|------------------------------|------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| Insufficient cooling process | Excessively high discharge pressure                  | Insufficient air flow at the outdoor unit heat exchanger            | Clogging of the outdoor unit heat exchanger?                                     | Remove the clogging                                   |
|                              |                                                      |                                                                     | Obstacles at the inlet or the outlet of the outdoor unit heat exchanger          | Remove the obstacles                                  |
|                              |                                                      |                                                                     | Is the service area for the outdoor unit sufficient?                             | Secure the service area                               |
|                              |                                                      |                                                                     | Correct fan speed?                                                               | Replace the fan motor                                 |
|                              |                                                      | Excessively high air temperature to the outdoor unit heat exchanger | Short-circuited air to the outdoor unit?                                         | Remove the cause of the short-circuited air           |
|                              |                                                      |                                                                     | Any other heat load near the outdoor unit?                                       | Remove the heat source                                |
|                              |                                                      | Excessively charged refrigerant                                     | Expansion valve opening                                                          | Correctly charge the refrigerant                      |
|                              |                                                      | Non-condensated gas in cycle                                        | Check each temperature and each pressure                                         | Charge the refrigerant after the vacuum pumping       |
|                              |                                                      | Clogging of the discharge piping                                    | Check for clogging                                                               | Remove the clogging                                   |
|                              |                                                      | Failure or malfunction of the expansion valve                       | Check for clogging                                                               | Remove the clogging                                   |
|                              |                                                      |                                                                     | Check the connection cord and the connector                                      | Replace the connector                                 |
|                              |                                                      |                                                                     | Is there an operation sound from the coil?                                       | Replace the coil                                      |
|                              |                                                      |                                                                     | Is the thermistor on the compressor normal?                                      | Replace the thermistor                                |
|                              |                                                      |                                                                     | Is the thermistor installed correctly on the compressor?                         | Correctly install the thermistor                      |
|                              | Malfunction or internal leakage of the 4-way valve   |                                                                     | Check the temperature difference at the inlet and the outlet of the 4-way valve  | Replace the 4-way valve                               |
|                              | Excessively low suction pressure                     | Malfunction or internal leakage of the 4-way valve                  | Check the temperature difference between the inlet and the outlet of 4-way valve | Replace the 4-way valve                               |
|                              |                                                      | Failure of solenoid valve for bypass                                | Check refrigerant leakage of solenoid valve                                      | Replace solenoid valve                                |
|                              | Discharge temperature of the indoor unit is unstable |                                                                     | Check the expansion valve of the indoor unit in the same system                  | Replace the failed expansion valve of the indoor unit |

| Phenomenon                   | Cause                                                 |                                                                         | Check item                                                                      | Action(Turn OFF the main switch)                                           |
|------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Insufficient heating process | Indoor heat load is greater than the heating capacity |                                                                         | Calculate the heat load                                                         | Replace the unit with a bigger unit                                        |
|                              | Excessively low suction pressure                      | Gas leakage or insufficient refrigerant charge                          | Measure superheat                                                               | Correctly charge the refrigerant after the gas leakage check and repairing |
|                              |                                                       | Excessively small diameter or long piping                               | Measure the field supplied piping                                               | Use the specified pipes                                                    |
|                              |                                                       | Failure or malfunction of the expansion valve                           | Check for clogging                                                              | Remove the clogging                                                        |
|                              |                                                       |                                                                         | Check the connection cord and the connector                                     | Replace the connector                                                      |
|                              |                                                       |                                                                         | Is there an operation sound from the coil?                                      | Replace the coil                                                           |
|                              |                                                       |                                                                         | Is the thermistor on the compressor normal?                                     | Replace the thermistor                                                     |
|                              |                                                       |                                                                         | Is the thermistor installed correctly on compressor?                            | Correctly install the thermistor                                           |
|                              |                                                       | Clogging of IU/OU strainer                                              | Check the temperature difference between the inlet and the outlet of strainer   | Replace the strainer for the outdoor unit or the indoor unit               |
|                              |                                                       | Clogging of suction piping                                              | Check the temperature difference of each part                                   | Remove the clogging                                                        |
|                              |                                                       | Insufficient air flow through the outdoor unit heat exchanger           | Is the outdoor unit heat exchanger clogged?                                     | Remove the clogging                                                        |
|                              |                                                       |                                                                         | Are there any obstacles at the inlet or the outlet of outdoor unit?             | Remove the obstacles                                                       |
|                              |                                                       |                                                                         | Is the service area for the outdoor unit sufficient?                            | Secure a sufficient service area                                           |
|                              |                                                       |                                                                         | Check the speed of the outdoor unit fan                                         | Replace the fan motor                                                      |
|                              |                                                       | Excessively low air temperature through the outdoor unit heat exchanger | Check for any short-circuited air to the outdoor unit                           | Remove the cause of the short-circuited air                                |
|                              |                                                       | Defrosting is insufficiently completed                                  | Check the thermistor for the defrost operation                                  | Replace the thermistor for the defrost operation                           |
|                              | Excessively high discharge pressure                   | Excessively charged refrigerant                                         | Check the refrigerant quantity                                                  | Correctly charge the refrigerant                                           |
|                              |                                                       | Non-condensate gas in refrigerant cycle                                 | Check the refrigerant quantity                                                  | Recharge the refrigerant after the vacuum pumping                          |
|                              |                                                       | Clogging of the discharge pressure piping                               | Check for clogging                                                              | Remove the clogging                                                        |
|                              | Malfunction or internal leakage of the 4-way valve    |                                                                         | Check the temperature difference at the inlet and the outlet of the 4-way valve | Replace the 4-way valve                                                    |
|                              | Malfunction of the check valve of the outdoor unit    |                                                                         | Check the temperature difference at the inlet and the outlet of the check valve | Replace the check valve                                                    |
|                              | Excessively high suction pressure                     | Malfunction or internal leakage of 4-way valve                          | Check the temperature difference at the inlet and the outlet of the 4-way valve | Replace the 4-way valve                                                    |
|                              | Discharge temperature of the indoor unit is unstable  |                                                                         | Check the expansion valve of the indoor unit in the same system                 | Replace the failed expansion valve of the indoor unit                      |

| Phenomenon                                        | Cause                                            |                                                   | Check item                                       | Action(Turn OFF the main switch)         |
|---------------------------------------------------|--------------------------------------------------|---------------------------------------------------|--------------------------------------------------|------------------------------------------|
| Cooling or heating process with an abnormal sound | Foreign particles inside of the fan casing       |                                                   | Visually inspect it                              | Remove the foreign particles             |
|                                                   | Outdoor unit propeller fan is hitting the shroud |                                                   | Visually inspect it                              | Adjust the position of the propeller fan |
|                                                   | Abnormal sound from the compressor               | Faulty Installation                               | Check that each part is tightly fixed            | Tightly fix each part                    |
|                                                   |                                                  | Liquid refrigerant compression                    | Adjust the suction gas temperature and pressure  | Ensure superheat                         |
|                                                   |                                                  | Wear or breakage of the internal compressor parts | Abnormal sound from the inside of the compressor | Replace the compressor                   |
|                                                   |                                                  | No heating by the oil heater                      | Check the resistance (oil heater, fuse)          | Replace the oil heater or the fuse       |
|                                                   | Humming sound from the magnetic conductor        |                                                   | Check the surface of the contacts                | Replace the magnetic switch              |
|                                                   | Abnormal vibration of the cabinets               |                                                   | Check each fixing screw                          | Tightly fix each screw                   |

## 11.2 Normal operation

### 11.2.1 Normal operation display on PCB1 (7-Segment display)

|                                                                                                                                     | Segment Display      |                      | Application Unit |      |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|------------------|------|
|                                                                                                                                     | SEG 1 and 2          | SEG 2 and 3          | RWLT             | RWHT |
| Proceeding initialization (Product software XXX)                                                                                    | <i>H</i>             | + code               | ○                | ○    |
| Auxiliary operation (Mirror)                                                                                                        | <i>R<sub>U</sub></i> |                      | -                | -    |
| Unit OFF - Normal                                                                                                                   | <i>aF</i>            |                      | ○                | ○    |
| Unit OFF - Air Purge mode                                                                                                           |                      | <i>P<sub>U</sub></i> | ○                | ○    |
| Cooling – Demand OFF                                                                                                                | <i>Co</i>            | <i>St</i>            | ○                | X    |
| Cooling – Thermo OFF                                                                                                                |                      | <i>aF</i>            | ○                | X    |
| Cooling – Thermo ON                                                                                                                 |                      | <i>on</i>            | ○                | X    |
| Heating – Demand OFF                                                                                                                | <i>HE</i>            | <i>St</i>            | ○                | ○    |
| Heating – Thermo OFF                                                                                                                |                      | <i>aF</i>            | ○                | ○    |
| Heating – Thermo ON                                                                                                                 |                      | <i>on</i>            | ○                | ○    |
| Heating – Boiler ON (Demand OFF, Thermo OFF, Thermo ON)                                                                             |                      | <i>bo</i>            | ○                | ○    |
| Domestic Hot Water – Demand OFF                                                                                                     | <i>HS</i>            | <i>St</i>            | ○                | ○    |
| Domestic Hot Water – Thermo OFF                                                                                                     |                      | <i>aF</i>            | ○                | ○    |
| Domestic Hot Water – Thermo ON                                                                                                      |                      | <i>on</i>            | ○                | ○    |
| Hot Sanitary Water – Boiler Operation (Demand OFF, Thermo OFF, Thermo ON)                                                           |                      | <i>bo</i>            | ○                | ○    |
| Swimming Pool – Demand OFF                                                                                                          | <i>SP</i>            | <i>St</i>            | ○                | ○    |
| Swimming Pool – Thermo OFF                                                                                                          |                      | <i>aF</i>            | ○                | ○    |
| Swimming Pool – Thermo ON                                                                                                           |                      | <i>on</i>            | ○                | ○    |
| Alarm indication (Alarm number)                                                                                                     | <i>R.</i>            | + code               | ○                | ○    |
| Test Run Heating                                                                                                                    | <i>th</i>            |                      | ○                | ○    |
| Test Run Cooling                                                                                                                    | <i>tc</i>            |                      | ○                | X    |
| Tariff function enabled                                                                                                             |                      | <i>t.d.</i>          | ○                | ○    |
| Seizure protection(note code means seizure protection state)                                                                        | <i>SE</i>            | code                 | ○                | ○    |
| Heating operation (Activation of forced compressor frequency control due to low pressure difference: forced up)                     | <i>HE</i>            | <i>P0</i>            | X                | ○    |
| Heating operation (Activation of forced compressor frequency control due to high pressure difference: forced down)                  |                      | <i>P1</i>            | X                | ○    |
| Heating operation (Activation of forced compressor frequency control due to excessive high discharge pressure: forced down)         |                      | <i>P2</i>            | X                | ○    |
| Heating operation (Activation of forced compressor frequency control due to excessively high current: forced down)                  |                      | <i>P3</i>            | X                | ○    |
| Heating operation (activation of forced compressor frequency control due to excessively high inverter fin temperature: forced down) |                      | <i>P4</i>            | X                | ○    |
| Heating operation (activation of forced compressor frequency control due to excessively high suction pressure: forced up)           |                      | <i>P5</i>            | X                | ○    |
| Heating operation (activation of forced compressor frequency control due to low pressure decrease: forced down)                     |                      | <i>P6</i>            | X                | ○    |
| Heating operation (activation of forced compressor stoppage control due to cycle conditions)                                        |                      | <i>P7</i>            | X                | ○    |

### 11.2.2 Protection control code display (7-Segment display)

In case that a protection control is activated during compressor operation and a restriction is applied to the inverter frequency, the protection control codes shown in the table below are displayed on the 7-segment display.

In case of protection control activated that drives to stop the compressor operation but keeps unit operation, the protection control codes shown in the table below are displayed on the 7-segment display.

| Retry operation                                                                  | Segment Display |       | Application Unit |      |   |
|----------------------------------------------------------------------------------|-----------------|-------|------------------|------|---|
|                                                                                  | Seg 1           | SEG 2 | RWLT             | RWHT | M |
| Low pressure decrease retry operation (by alarm 104)                             | P -             | 05    | X                | ○    | X |
| Low pressure difference decrease retry operation (by alarm 105)                  |                 | 11    | X                | ○    |   |
| Excessive high pressure retry operation (by alarm 102)                           |                 | 12    | X                | ○    |   |
| Excessive High Suction Pressure Retry operation (by alarm 107)                   |                 | 13    | X                | ○    |   |
| Inverter retry operation (by alarm 152,153,154,155)                              |                 | 17    | X                | ○    |   |
| Inverter retry operation (by alarm 132,151,156)                                  |                 | 18    | X                | ○    |   |
| Low water flow and water pump abnormally detection retry operation (by alarm 70) | P               | 70    | ○                | ○    | X |
| Mixing over-temperature limit protection (by alarm 73)                           |                 | 73    | ○                | ○    | X |
| Heating over-temperature limit protection (by alarm 74)                          |                 | 74    | ○                | ○    | X |
| Thermo OFF by expansion valve reset                                              |                 | 82    | ○                | ○    |   |
| Low water pressure detection Retry operation (by alarm 83)                       |                 | 83    | ○                | ○    |   |

### 11.2.3 Normal operation display at Unit controller

The Unit controller is an interactive interface that shows all the operation status at real time. At normal operation the unit controller screen shows all the information related to the settings and conditions of the outdoor and indoor unit.

## 11.3 Troubleshooting procedure

### 11.3.1 Alarm code indication on 7 segment

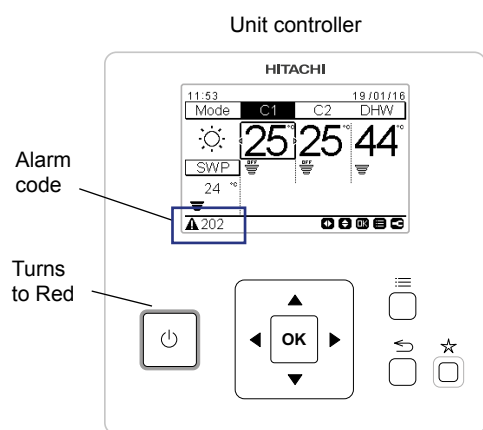
The 7 segment at the indoor unit PCB1 will show the alarms from the outdoor unit and the indoor unit.

The 7 segment at the outdoor unit PCB shows the alarms from the outdoor unit.

### 11.3.2 Alarm code indication in Unit controller

When an alarm is activated it will be displayed in the Unit controller screen of the unit controller. A danger symbol  and the alarm code will be displayed at bottom left of the screen.

The unit screen shows the alarms coming from the outdoor unit, from the indoor unit and also from the unit controller itself (it can happen a problem with the communication between indoor unit and outdoor unit. If that was the case, the unit controller will show an alarm code related to a communication failure between IU and OU).



- Malfunction

The ALARM (Yellow) LED flashes. The ALARM indicator appears on the liquid crystal display: Contact your HITACHI service supplier.

- Power supply failure

All displays disappear. If the unit stops due to a power shortage, it will not start again, even though the power comes back on. Carry out the start-up operations again. If the power failure lasts less than 2 seconds, the unit will start again automatically.

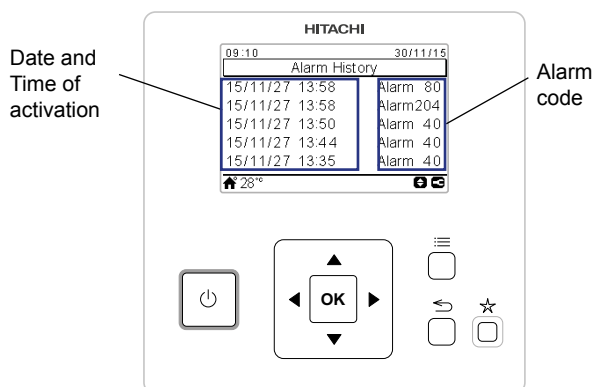
- Electrical noise

The display can disappear from the screen and the unit can stop. This is because the microcomputer has been activated to protect the unit from electrical noise.

### ◆ Alarm history

The system keeps the last 20 alarms stored. Each alarm entry has the following data:

- Date: date of activation in yy/mm/dd format.
- Time: the hour and minute of activation
- Alarm code: The alarm code



### NOTE

- An alarm is registered when activated, not during all the time that is shown on the Unit controller screen.
- Alarms are registered each time appears. Even if that alarm is deactivated, if appears again, will be registered again.
- When an alarm is registered and switches to another alarm, the second one will be registered too.
- If a new alarm appears when the list of 20 registered alarms is full, the oldest one will be removed from the list to allow the new one to be in the list.

In case of being in installer mode, a menu related only to the alarm history window will be displayed by pressing the menu button. 2 options will be shown:

- Delete the selected alarm: It will shown in case of an alarm being selected. It will delete the selected alarm only.
- Clear alarms: Remove all the registered alarms.

### 11.3.3 Alarm codes for the outdoor and indoor units

| Alarm Code | Retry stop code | RWLT | RWHT | Origin                  | Detail of Abnormality                                                              | Main Factors                                                                                                                                                        |
|------------|-----------------|------|------|-------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3          | —               | o    | o    | Transmission            | Transmission Alarm (Not outdoor unit detected)                                     | Wrong or loose connection, disconnected, broken or short-circuited connection wiring.<br>Outdoor fuse meltdown.                                                     |
| 11         | —               | o    | o    | Indoor                  | Water inlet thermistor abnormality (THMwi)                                         | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 12         | —               | o    | o    | Indoor                  | Water outlet thermistor abnormality (THMwo)                                        | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 13         | —               | o    | o    | Indoor                  | Indoor Liquid Pipe Temp Thermistor abnormality (THMI)                              | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 14         | —               | o    | o    | Indoor                  | Indoor Gas Pipe Temp. Thermistor abnormality (THMg)                                | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 15         | —               | (o)  | (o)  | Indoor                  | Water Circuit 2 thermistor abnormality (THMwo2)                                    | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 16         | —               | (o)  | (o)  | Indoor                  | Water DHW thermistor abnormality (THMdhw)                                          | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 17         | —               | (o)  | (o)  | Indoor                  | Auxiliary sensor 2 thermistor abnormality (THMaux2)                                | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 18         | —               | (o)  | (o)  | Indoor                  | Auxiliary sensor 1 thermistor abnormality (THMaux1)                                | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 19         | —               | —    | o    | Indoor                  | Suction R134a pipe thermistor abnormality (THMs)                                   | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 23         | —               | —    | o    | Indoor                  | Discharge R134a pipe thermistor abnormality (THMd)                                 | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 25         | —               | (o)  | (o)  | Indoor                  | Auxiliary sensor 3 thermistor abnormality (THMaux3) / 4-20mA setting abnormally    | Wrong or loose connection, disconnection or short-circuited of thermistor wiring and its connector                                                                  |
| 40         | —               | o    | o    | Indoor                  | Incorrect Unit controller setting                                                  | Current Unit controller configuration does not allow proper operation                                                                                               |
| 63         | —               | o    | o    | Communication           | Transmission error between central and indoor communication                        | Wrong or loose connection, disconnection or short-circuited wiring Connection between control PCB and central device                                                |
| 70         | P70             | o    | o    | Indoor water cycle      | Hydraulic alarm flow & Water Pump malfunction                                      | Water flow is not detected in the hydraulic cycle or Pump defective                                                                                                 |
| 73         | —               | o    | o    | Indoor                  | Mixing over-temperature limit protection for Mixed circuit 2.                      | Circuit 2 supply temperature > Target temperature + offset                                                                                                          |
| 74         | P74             | o    | o    | Indoor                  | Unit over-temperature limit protection                                             | Two > Tmax +5K                                                                                                                                                      |
| 75         | —               | o    | o    | Indoor                  | Freeze Protection by Cold water inlet, outlet temperature detection                |                                                                                                                                                                     |
| 76         | —               | o    | o    | Indoor                  | Freeze Protection Stop by indoor liquid temperature thermistor                     |                                                                                                                                                                     |
| 77         | —               | o    | o    | Transmission            | Abnormality by indoor PCB and wireless receiver communication                      |                                                                                                                                                                     |
| 78         | —               | o    | o    | Transmission            | Abnormality between wireless receiver and room thermostat                          |                                                                                                                                                                     |
| 80         | —               | o    | o    | Indoor- Unit controller | Unit controller - H-Link - RCS transmission error (if no H-LINK, RCS has no power) | No H-Link communication for a continuous period of 1 minute between Indoor and Unit controller.<br>User control by connection wiring (breaking, wiring error, etc.) |
| 81         | P81             | o    | o    | Indoor                  | "Momentary Power interruption" or "Low voltage detected"                           |                                                                                                                                                                     |
| 83         | P83             | o    | o    | Indoor                  | Hydraulic alarm pressure. Low water pressure detection                             | Water pressure is not detected in the hydraulic cycle                                                                                                               |

| Alarm Code | Retry stop code | RWLT | RWHT | Origin                  | Detail of Abnormality                                                          | Main Factors                                                                                                                                                                                                                         |
|------------|-----------------|------|------|-------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 100        | -               | o    | o    | Indoor- Unit controller | Compressor protection                                                          | <p>"Compressor failure. This alarm code appears when the following alarms 02, 07, 08, 45, 47 occur three times within 6 hours."</p> <p><b>i NOTE</b></p> <p><i>This alarm is shown in the outdoor unit with alarm code "EE".</i></p> |
| 101        | -               | -    | o    | Indoor                  | Activation of high pressure switch (R134a circuit)                             | R134a very high pressure detection                                                                                                                                                                                                   |
| 102        | P12             | -    | o    | Indoor                  | Activation of protection control for excessively high pressure (R134a circuit) | Stop after P12 retry due to discharge pressure $P_d \geq 2.78$ MPa continued for 10 seconds.                                                                                                                                         |
| 104        | P06             | -    | o    | Indoor                  | Activation of low control (R134a circuit)                                      | <p>Stop after P06 retry due to <math>P_s \leq 0.15</math> MPa continued for 90 seconds</p> <p>Immediate stop with <math>P_s \leq 0.1</math> MPa</p>                                                                                  |
| 105        | P11             | -    | o    | Indoor                  | Excessive low pressure difference (R134a circuit)                              | Stop after P11 retry due to pressure ratio $\epsilon < 1.8$ continued for 3 minutes.                                                                                                                                                 |
| 106        | -               | -    | o    | Indoor                  | R134a excessive high discharge gas temperature                                 | $T_d \geq 120$ °C continued for 10 minutes, $T_d \geq 140$ °C continued for 5 seconds                                                                                                                                                |
| 107        | -               | -    | o    | Indoor                  | R134a excessively high suctions pressure                                       |                                                                                                                                                                                                                                      |
| 129        | -               | -    | o    | Indoor                  | Failure of discharge gas pressure sensor (R134a circuit)                       | Loose, disconnected, broken or short-circuited connector                                                                                                                                                                             |
| 130        | -               | -    | o    | Indoor                  | Failure of suction gas pressure sensor (R134a circuit)                         | Loose, disconnected, broken or short-circuited connector                                                                                                                                                                             |
| 132        | -               | -    | o    | Indoor                  | Transmission error between Inverter PCB and Main PCB                           | Described in inverter abnormal stop control                                                                                                                                                                                          |
| 134        | -               | -    | o    | Indoor                  | Abnormality of poer sypply phase (R134a circuit)                               | Reverse / open phase                                                                                                                                                                                                                 |
| 135        | -               | -    | o    | Indoor                  | Incorrect PCB Setting                                                          | Wrong DSW setting in the PCB                                                                                                                                                                                                         |
| 151        | P18             | -    | o    | Indoor                  | Excessively low voltage or excessively high voltage for the R134a inverter     | Stop after P18 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 152        | P17             | -    | o    | Indoor                  | Abnormal operation of the R134a inverter current sensor                        | Stop after P17 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 153        | P18             | -    | o    | Indoor                  | Activation of protection for R134a inverter instantaneous over current         | Stop after P18 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 154        | P17             | -    | o    | Indoor                  | Transistor module protection activation (R134a circuit)                        | Stop after P17 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 155        | P17             | -    | o    | Indoor                  | Increase in the R134a inverter fin temperature or abnormality                  | Stop after P17 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 156        | P17             | -    | o    | Indoor                  | Inverter non operation (R134a circuit)                                         | Stop after P18 retry. Described in inverter abnormal stop control                                                                                                                                                                    |
| 157        |                 | -    | o    | Indoor                  | R134a Inverter communication abnormality                                       | Described in inverter abnormal stop control                                                                                                                                                                                          |
| 202        |                 | (o)  | (o)  | Indoor                  | Wrong settings of unit controller                                              |                                                                                                                                                                                                                                      |
| 203        |                 | (o)  | (o)  | Indoor                  | Slave unit controller stops answering to Master unit controller                | Loose, disconnected, broken or short-circuited connector                                                                                                                                                                             |
| 204        |                 | (o)  | (o)  | Indoor                  | Indoor unit stops answering to Master unit controller                          | Loose, disconnected, broken or short-circuited connector                                                                                                                                                                             |
| 205        |                 | (o)  | (o)  | Indoor                  | Central Alarm, no Central message                                              | Loose, disconnected, broken or short-circuited connector                                                                                                                                                                             |

**i NOTE**

(o): Option configurable from Unit controller. This alarm will be displayed if the system has been configured.

o: Default. This alarm will be displayed in the Unit controller.

-: No applicable.

Also refer to the SET FREE Outdoor technical documentation for details about alarms shown from outdoor unit 7 segment

◆ **Cause of compressor stop**

When the compressor stops due any of the factors below, Stop Reason Code (d1 Code) is sent to Indoor Unit.

The Code will be overridden when another Code is sent before it.

| Stop reason code | Stop factors                                                                                         | 52C1 Process | OU | IU |
|------------------|------------------------------------------------------------------------------------------------------|--------------|----|----|
| 00               | Switch OFF                                                                                           | OFF          | o  | o  |
| 01               | Thermo OFF                                                                                           | ON           | o  | o  |
| 02               | Alarm                                                                                                | OFF          | o  | o  |
| 03               | Freeze protection                                                                                    | ON           | o  | —  |
| 05               | Momentary power failure detection in Outdoor unit and reset of the Outdoor PCB micro controller      | OFF          | o  | —  |
| 06               | Momentary power failure detection in Indoor unit and reset of the indoor PCB micro controller        | ON           |    | o  |
| 07               | Outdoor temperature at cooling lower than -5°C (Outdoor temperature -15°C at annual cooling setting) | ON           | o  | —  |
|                  | Outdoor air temperature and indoor suction temperature for heating (Overload condition)              | ON           | o  | —  |
|                  | Stop due to outdoor heating temperature lower than -20°C (Low temperature condition)                 | ON           | o  | —  |
| 10               | Demand (external input)                                                                              | ON           | o  | —  |
|                  | Emergency stop (DSW1-4: ON or forced stop input)                                                     | OFF          | o  | —  |
| 13               | Discharge pressure increase prevention for cooling and heating                                       | ON           | o  | o  |
| 15               | Gas shortage detection (detected by pipe temperature: gas shortage detection I)                      | OFF          | o  | o  |
|                  | Gas shortage detection (detected by compressor-top temperature: gas shortage detection II)           | OFF          | o  | o  |
|                  | Compressor-top overheating (Td)                                                                      | ON           | o  | o  |
| 16               | Abnormal decrease of discharge gas superheat degree (TdSH)                                           | ON           | o  | o  |
| 17               | Inverter trip (Instantaneous overcurrent, Electronic thermal activation, Current sensor abnormality) | OFF          | o  | o  |
| 18               | Inverter trip (Inverter undervoltage, Overvoltage, Transmission error, Microcomputer reset)          | OFF          | o  | o  |
| 19               | Prevention Control for expansion valve opening deviance                                              | ON           | o  | o  |
| 21               | Thermo OFF stop due to oil return control                                                            | ON           | o  | —  |
|                  | Forced Thermo OFF of simultaneous twin or greater (when other units are Thermo OFF)                  | ON           | o  | —  |
| 22               | Outdoor unit Heat Start Control                                                                      | OFF          | o  | —  |
| 26               | Retry stop due to high pressure decrease abnormality                                                 | ON           | o  | o  |
| 28               | Cooling discharge temperature control                                                                | ON           | o  | —  |
| 35               | Refrigerating cycle abnormality (Bad or wrong switch of 4-way valve)                                 | OFF          | o  | —  |



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



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ISO 14001 of AENOR Spain for its Environmental Management systems accordance with the standard.



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