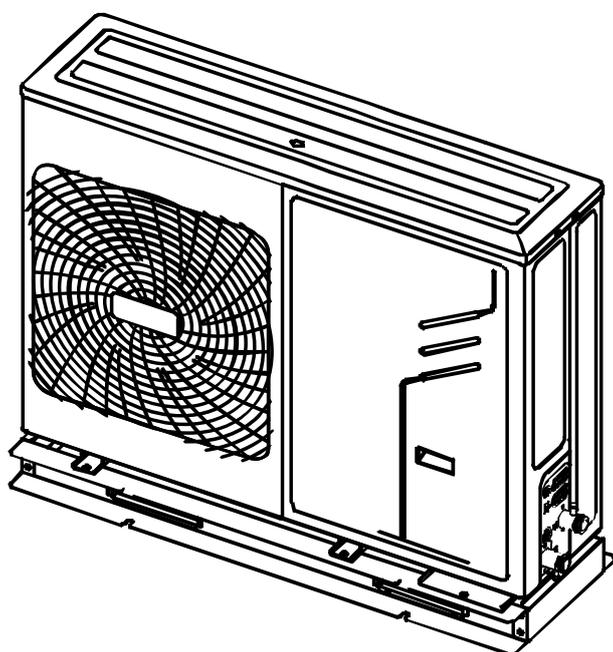




# RVL-I PLUS

REVERSIBLE HEAT PUMP FOR OUTDOOR INSTALLATION  
WITH DC INVERTER COMPRESSOR



CE

INSTALLATION AND MAINTENANCE MANUAL

Dear Customer,

Thank you for having purchased a FERROLI product. It is the result of many years of experiences and of particular research studies and has been made with top quality materials and advanced technologies. The CE mark guarantees that the products satisfy all the applicable European Directives.

The qualitative level is kept under constant control and FERROLI products therefore offer SAFETY, QUALITY and RELIABILITY. Due to the continuous improvements in technologies and materials, the product specification as well as performances are subject to variations without prior notice.

Thank you once again for your preference  
FERROLI S.p.A

## SUMMARY

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## SAFETY INFORMATION

CONTAINS FLUORINATED GREENHOUSE GASES COVERED BY THE KYOTO PROTOCOL:  
- R410A (GLOBAL WARMING POTENTIAL GWP = 2088)

- This manual supplied with the unit must be kept in a dry place and ready to hand for future consultation when required.
- This manual has been compiled to ensure that the unit is installed in the correct way and to supply comprehensive information about how to correctly use and service the appliance. **Before proceeding with the installation phase, please carefully read all the information in this manual, which describes the procedures required to correctly install and use the unit.**
- Strictly comply with the instructions in this manual and conform to the current safety standards.
- The appliance must be installed in accordance with the laws in force in the country in which the unit is installed.
- Unauthorized tampering with the electrical and mechanical equipment will **VOID THE WARRANTY**.
- Check the electrical specifications on the identification plate before making the electrical connections. Read the instructions in the specific section where the electrical connections are described.
- If the unit must be repaired for any reason, this must only be done by a specialized assistance center recognized by the manufacturer and using genuine spare parts.
- The manufacturer also declines all liability for any damage to persons or property deriving from failure of the information in this manual to correspond to the actual machine in your possession.

The precautions listed here are divided into the following types. They are quite important, so be sure to follow them carefully. Meanings of DANGER, WARNING, CAUTION and NOTE symbols.



### DANGER

Indicates an imminently hazardous situation which if not avoided, will result in death or serious injury.



### WARNING

Indicates a potentially hazardous situation which if not avoided, could result in death or serious injury.



### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices.



### NOTE

Indicates situations that could only result in accidental equipment or property damage.



### DANGER

- Before touching electric terminal parts, turn off power switch.
- When service panels are removed, live parts can be easily touched by accident.  
Never leave the unit unattended during installation or servicing when the service panel is removed.
- Do not touch water pipes during and immediately after operation as the pipes may be hot and could burn your hand. To avoid injury, give the piping time to return to normal temperature or be sure to wear protective gloves.
- Do not touch any switch with wet fingers. Touching a switch with wet fingers can cause electrical shock.
- Before touching electrical parts, turn off all applicable power to the unit.



### WARNING

- Tear apart and throw away plastic packaging bags so that children will not play with them. Children playing with plastic bags face danger of death by suffocation.
- Safely dispose of packing materials such as nails and other metal or wood parts that could cause injuries.
- Ask your dealer or qualified personnel to perform installation work in accordance with this manual. Do not install the unit yourself.  
Improper installation could result in water leakage, electric shocks or fire
- Be sure to use only specified accessories and parts for installation work. Failure to use specified parts may result in water leakage, electric shocks, fire, or the unit falling from its mount.
- Install the unit on a foundation that can withstand its weight.
- Insufficient physical strength may cause the equipment to fall and possible injury
- Perform specified installation work with full consideration of strong wind, hurricanes, or earthquakes. Improper installation work may result in accidents due to equipment falling.
- Make certain that all electrical work is carried out by

## SAFETY INFORMATION

qualified personnel according to the local laws and regulations and this manual using a separate circuit. Insufficient capacity of the power supply circuit or improper electrical construction may lead to electric shocks or fire.

- Be sure to install a ground fault circuit interrupter according to local laws and regulations. Failure to install a ground fault circuit interrupter may cause electric shocks and fire.

- Make sure all wiring is secure. Use the specified wires and ensure that terminal connections or wires are protected from water and other adverse external forces. Incomplete connection or affixing may cause a fire.

- When wiring the power supply, form the wires so that the front panel can be securely fastened. If the front panel is not in place there could be overheating of the terminals, electric shocks or fire.

- After completing the installation work, check to make sure that there is no refrigerant leakage.

- Never directly touch any leaking refrigerant as it could cause severe frostbite.

- Do not touch the refrigerant pipes during and immediately after operation as the refrigerant pipes may be hot or cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor and other refrigerant cycle parts. Burns or frostbite are possible if you touch the refrigerant pipes. To avoid injury, give the pipes time to return to normal temperature or, if you must touch them be sure to wear protective gloves.

- Do not touch the internal parts (pump, backup heater, etc.) during and immediately after operation. Touching the internal parts can cause burns. To avoid injury, give the internal parts time to return to normal temperature or, if you must touch them, be sure to wear protective gloves.



### CAUTION

- Ground the unit.

Grounding resistance should be according to local laws and regulations. Do not connect the ground wire to gas or water pipes, lightning conductors or telephone ground wires.

Incomplete grounding may cause electric shocks.



a) Gas pipes. Fire or an explosion might occur if the gas leaks.

b) Water pipes. Hard vinyl tubes are not effective grounds.

c) Lightning conductors or telephone ground wires.

Electrical threshold may rise abnormally if struck by a lightning bolt.

- Install the power wire at least 3 feet (1 meter) away from televisions or radios to prevent interference or noise. (Depending on the radio waves, a distance of 3 feet (1 meter) may not be sufficient to eliminate the noise.)

- Do not wash the unit. This may cause electric shocks or fire. The appliance must be installed in accordance with national wiring regulations. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

- Do not install the unit in the following places:

a) Where there is mist of mineral oil, oil spray or vapors.

Plastic parts may deteriorate, and cause them to come loose or water to leak.

b) Where corrosive gases (such as sulphurous acid gas) are produced.

Where corrosion of copper pipes or soldered parts may cause refrigerant to leak.

c) Where there is machinery which emits electromagnetic waves.

Electromagnetic waves can disturb the control system and cause equipment malfunction.

d) Where flammable gases may leak, where carbon fiber or ignitable dust is suspended in the air or where volatile flammables

such as paint thinner or gasoline are handled. These types of gases might cause a fire.

e) Where the air contains high levels of salt such as near the ocean.

f) Where voltage fluctuates a lot, such as in factories.

g) In vehicles or vessels.

h) Where acidic or alkaline vapors are present.

- This appliance can be used by children 8 years old and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they are supervised or given instruction on using the unit in a safe manner and understand the hazards involved. Children should not play with the unit. Cleaning and user maintenance should not be done by children without supervision.

- Children should be supervised to ensure that they do not play with the appliance.

- If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person.

- DISPOSAL: Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary. Do not dispose of electrical appliances as municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substance can leak into the groundwater and get into the food chain, damaging your health and well-being.

- The wiring must be performed by professional technicians in accordance with national wiring regulation and this circuit diagram.

An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device (RCD) with the rating not exceeding 30mA shall be incorporated in the fixed wiring according to the national rule.

# GENERAL FEATURES

## European Directives

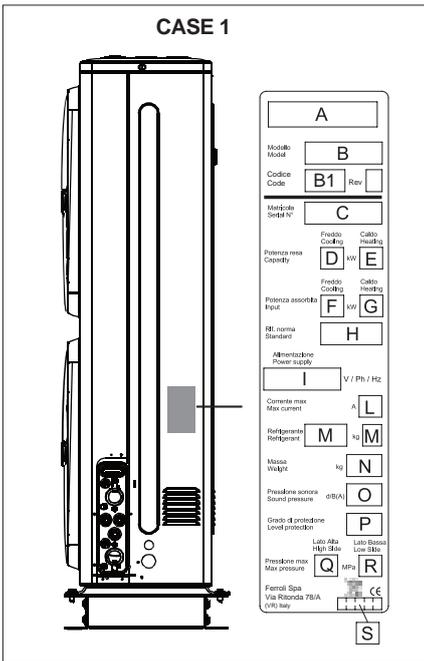
The company hereby declares that the machine in question complies with the matters prescribed by the following Directives:

- Low voltage directive 2014/35/EU
- Electromagnetic Compatibility directive 2014/30/EU
- ERP directive 2009/125/EC (EU) No 811/2013 (EU) No 813/2013
- Energy labelling directive 2010/30/UE
- WEE directive 2002/96/EC
- RoHS directive 2011/65/EU
- REACH (EC) European regulation No 1907/2006

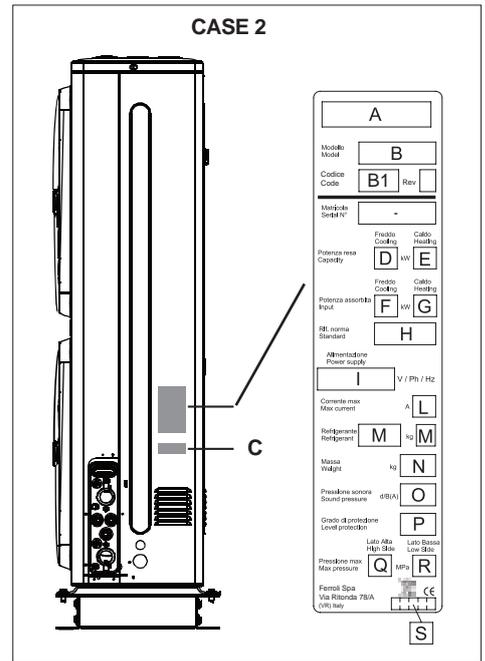
Any other Directives have to be considered not applicable.

## Identification plate of the Unit

The figure on the left depicts the identification plate of the unit, affixed to the outer left-hand side of the Electric Panel. A description of the data is given below:



- A - Trademark
- B - Model
- B1- Code
- C - Serial number
- D - Cooling Capacity
- E - Heating Capacity
- F - Power input in COOLING mode
- G - Power input in HEATING mode
- H - Reference standard
- I - Electric power supply
- L - Maximum load current
- M - Type of refrigerant and charge
- N - Shipping weight of the unit
- O - Sound pressure level at 1m
- P - IP Level Protection
- Q - Maximum pressure - High Side
- R - Maximum pressure - Low Side
- S - PED certification authority



## Presentation of the unit

This series of air-water heat pumps meets the needs of winter and summer air conditioning of residential and commercial installations of small and medium power.

All units are suitable for outdoor installation and being able to produce water up to 60 ° C may be employed in systems with radiant floor, fancoils, radiators and for the indirect production of domestic hot water (DHW) via an external boiler (not provided).

The units are characterized by the use of a DC inverter compressor that allows you to modulate the capacity from 30 to 120% of the rated capacity and are complete with a hydronic kit including all the essential components for a quick and safe installation.

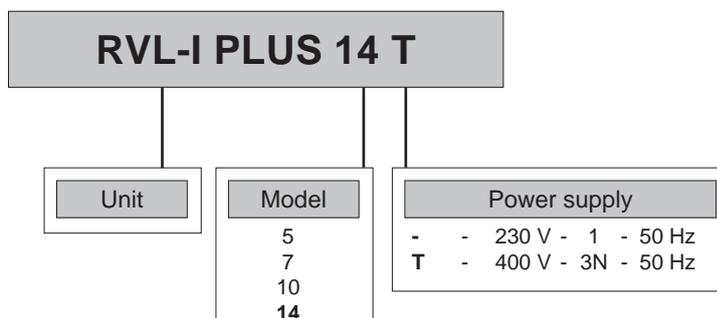
The units are characterized by high energy efficiency and low noise level and they can be used as the sole generator of the system or integrated with other energy sources such as backup electric heaters or boiler.

All units are supplied with temperature probe (included) for domestic hot water tank (DHW) and with external air temperature probe (already installed on the unit) to realize the climatic control in heating and cooling modes.

All the units are accurately built and individually tested in the factory. The installation only requires the electrical and hydraulic connections.

## Unit identification code

The codes that identify the units and the meaning of the letters used are described below.



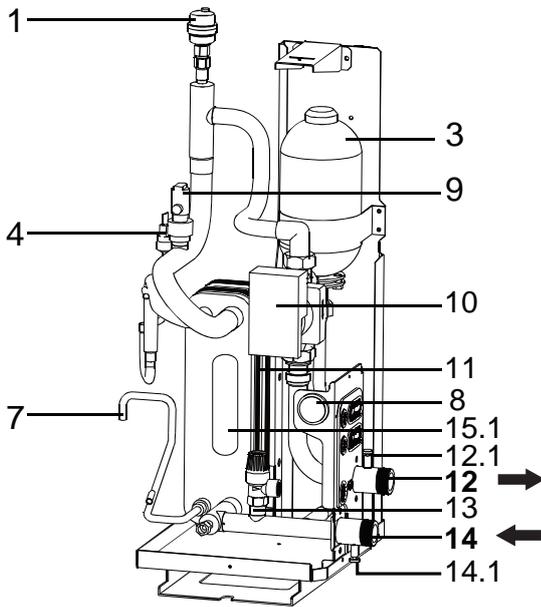
## GENERAL FEATURES

### Main components of the unit

■ **REFRIGERANT CIRCUIT:** contained in a compartment protected from the air flow to simplify the maintenance operations, is equipped with DC inverter motor driven compressor twin rotary type to ensure greater dynamic balancing and reduce vibrations. It is placed on vibration-damping rubber supports and wrapped by a double layer of sound-absorbing material to reduce the noise. Furthermore, the compressor is equipped with crankcase oil heater. The circuit is equipped with stainless steel brazed plates heat exchanger complete with antifreeze heater, bi-flow electronic expansion valve, 4-way valve, axial fans with brushless DC motor complete with safety protection grilles, finned coil made of copper tubes and aluminium fins. The circuit is controlled by means of temperature probes and pressure transducers and protected by high and low pressure switches.

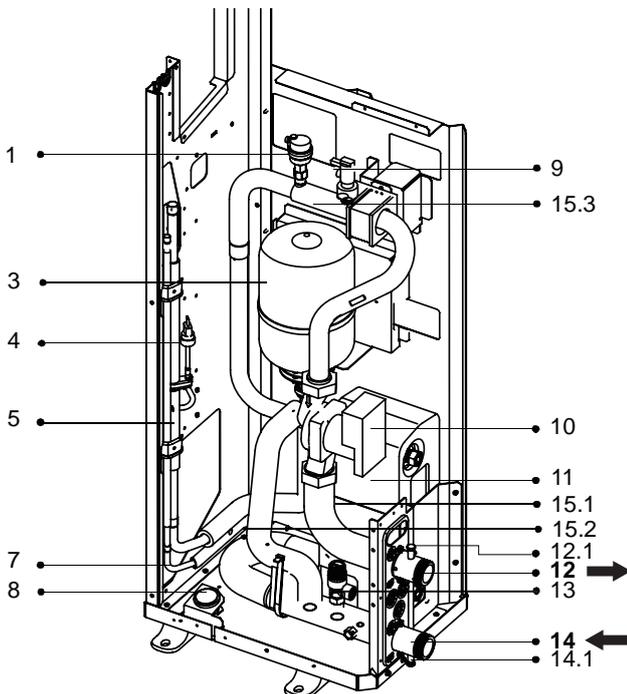
■ **HYDRAULIC CIRCUIT:** contained in a compartment protected from the air flow to simplify the maintenance operations, is equipped with electronic circulator (brushless DC motor), water flow switch, automatic air vent, water manometer, expansion vessel, safety valve, Y water filter (supplied with the unit but not installed). The plate heat exchanger and all the hydraulic pipes are thermally insulated to avoid the formation of condensation and reduce heat loss.

**MOD. 5-7**



- 1. **Air purge valve.** Remaining air in the water circuit will be automatically removed via the air purge valve.
- 3. **Expansion vessel (2 L)**
- 4. **Pressure Sensor**
- 7. **Refrigerant liquid connection**
- 8. **Manometer.** The manometer provides a water pressure readout of the water circuit.
- 9. **Flow switch.** The flow switch checks the flow in the water circuit and protects the heat exchanger against freezing and the pump against damage.
- 10. **Pump.** The pump circulates the water in the water circuit.
- 11. **Heat exchanger**
- 12. **WATER OUTLET CONNECTION**
- 12.1 **Air purge valve**
- 13. **Pressure relief valve.** The pressure relief valve prevents excessive water pressure in the water circuit by opening 3 bar and discharging water.
- 14. **WATER INLET CONNECTION**
- 14.1 **Drain valve**
- 15.1. **Electrical heating tape**
- **Temperature probes.** Four temperature probes determine the water and refrigerant temperatures at various points in the water circuit.

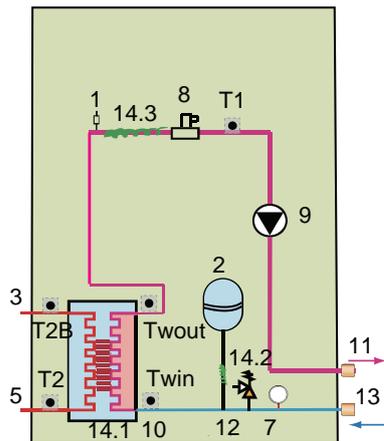
**MOD. 10-14-14T**



- 1. **Air purge valve.** Remaining air in the water circuit will be automatically removed via the air purge valve.
- 3. **Expansion vessel (5 L)**
- 4. **Pressure Sensor**
- 5. **Refrigerant gas connection**
- 7. **Refrigerant liquid connection**
- 8. **Manometer.** The manometer provides a water pressure readout of the water circuit
- 9. **Flow switch.** The flow switch checks the flow in the water circuit and protects the heat exchanger against freezing and the pump against damage
- 10. **Pump.** The pump circulates the water in the water circuit.
- 11. **Heat exchanger.** The manometer provides a water pressure readout of the water circuit
- 12. **WATER OUTLET CONNECTION**
- 12.1 **Air purge valve**
- 13. **Pressure relief valve.** The pressure relief valve prevents excessive water pressure in the water circuit by opening 3 bar and discharges water.
- 14. **WATER INLET CONNECTION**
- 14.1 **Drain valve**
- 15. **Electrical heating tape (15.1-15.3)**
- **Temperature probes.** Four temperature probes determine the water and refrigerant temperatures at various points in the water circuit.

## GENERAL FEATURES

### Functional diagram of hydraulic compartment



- 1 Air purge valve
  - 2 Expansion vessel
  - 3 Refrigerant gas connection
  - 5 Refrigerant liquid connection
  - 7 Manometer
  - 8 Flow switch
  - 9 Circulation Pump
  - 10 Heat exchanger
  - 11 Water outlet connection
  - 12 Pressure relief valve
  - 13 Water inlet connection
  - 14.1 Electrical heating tape
  - 14.2 Electrical heating tape
  - 14.3 Electrical heating tape
- Temperature probes: TW\_in; TW\_out; T1 (water probes)  
T2B; T2 (refrigerant probes)

### The control system

The user interface consists of a wired remote controller (up to 50 m from the unit) which allows the management of:

- **HEATING AND COOLING SYSTEM**, where the heat pump is the sole energy source. The unit, if activated in heat or cool mode, works by modulating the frequency of the compressor to maintain the temperature of the produced water to the setpoint value set by the controller. Through parameter you can use the remote controller (eg. For single-zone systems) as a room thermostat.

- **DOMESTIC HOT WATER PRODUCTION (DHW)**. The unit is activated in a heatt mode to keep the temperature of a DHW tank (not supplied) to the setpoint value. It requires a 3-way diverter valve (not supplied) and a temperature sensor (T5 probe, L = 10m, provided) to be inserted into one well of the DHW tank.

- **ADDITIONAL SOURCES OF ENERGY** (boiler or electrical heater). Depending on the parameters set, these sources can be activated in integration or replacement of the heat pump when the system is used for space heating or for DHW production. The controller also activate additional energy sources in case the heat pump is not working.

- **ELECTRIC HEATER OF THE DHW TANK**. The controller can manage the activation of an electric heater inserted in the DHW tank as a heat integration to the heat pump, for disinfecting function, or as a source of energy reserve for DHW production in case the heat pump is not working.

**FAST DHW**. This function can be activated manually and it allows you to give priority to DHW production by activating all energy sources (heat pumps, electric heaters, boiler) available for DHW heating to bring in the shortest time possible the DHW tank to the setpoint required.

- **DISINFECT FUNCTION**. You can set from the controller weekly cycles for disinfecting the water in the Dhw tank. In order to successfully execute these cycles, the heat pump must be integrated with DHW electric heater or boiler.

- **SILENT MODE**. If active it allows a reduction of the maximum frequency of the compressor and of the fan speed in order to reduce the noise emitted and the power absorbed by the unit. There are 2 levels of silencing. Through time programming, you can define for 2 daily time bands the desired silent level (eg. during the night).

- **ON / OFF** using an external contact. The unit can be turned on and off (eg. thermostat / remote switch) via an external contact: in this case the unit will operate in the mode set by the controller keyboard.

- **HEAT / COOL** via external contacts. The unit can be activated in heat or cool mode via two external contacts (eg. thermostat that manages the heat and cool demand / remote switch).

- **ECO / COMFORT**. For both modes (heat and cool) it is possible to define daily time bands and corresponding set point for ECO and COMFORT modes.

- **WEEKLY SCHEDULING**. It allows a scheduling of 6 time bands for each day of the week: for each time band it is possible to define the mode (COOL / HEAT / DHW) and the required setpoint.

- **Antifreeze protection**. Guaranteed for outdoor air temperature down to -20°C, thanks to the management of the electronic board of the unit which allows you to heat water using antifreeze heater (standard on the plate heat exchanger), the heat pump itself working in heating mode and the electric booster (if installed).

- **Detailed alarms diagnostics with alarms history**.

- **Display of all operating parameters**.



## GENERAL FEATURES

### Components supplied with the unit

NAME	SHAPE	5-7	10-14-14T
Outdoor unit installation & owner's manual(this book)		1	1
Wire control owner's manual		1	1
Y- shape filter *		1	1
Water outlet connection pipe assembly		2	1
User interface kit(digital remote controller)		1	1
Tighten belt for customer wiring use		0	2
		3	3
T5: Thermistor for domestic hot water tank		1	1
temperature sensor clamp		1	0
Transit line	—	1	1

\* : It is mandatory to install it at the water inlet connection of the unit.

## ACCESSORIES

**Electrical booster (backup heater box).** Suitable for indoor installation, is constituted by an electrical heater (3kW, 230V-1-50) mounted inside a painted sheet metal box and complete with electrical control panel. The booster is then handled by the heat pump to integrate / replace in heating mode the hot water production in case the heat pump is stopped for having reached operational limits or for alarm.

**Rubber antivibration dampers.**

**Inertial water tank.** It is constituted of a 60-liter tank in painted sheet metal, thermally insulated and placed inside a painted sheet metal box that can be positioned below the unit.

# TECHNICAL DATA AND PERFORMANCE

## Technical data

### Efficiency capacity in heating mode - Average climate

Model	5	7	10	14	14T
Efficiency capacity - medium temperature (water 55°C)	A++	A++	A++	A++	A++
Efficiency season - medium temperature (water 55°C)	126	126	129	129	128
Efficiency capacity - low temperature (water 35°C)	A++	A++	A++	A++	A++
Efficiency season - low temperature (water 35°C)	176	178	162	173	168

NOTA: Declared according to **European regulation 811/2013**. The values are referred to units without options and accessories.

### Performances data

-	Models	5	7	10	14	14T	
A7W35	<b>Heating capacity</b>	<b>4580</b>	<b>6550</b>	<b>10430</b>	<b>14760</b>	<b>14100</b>	<b>W</b>
	min-max	1566 - 8884	2050 - 10910	3586 - 13395	5207 - 16595	4715 - 16763	W
	<b>Power input</b>	<b>970</b>	<b>1450</b>	<b>2280</b>	<b>3400</b>	<b>3260</b>	<b>W</b>
	min-max	327 - 2226	448 - 2734	771 - 3848	1178 - 4768	1077 - 4816	W
	<b>COP</b>	<b>4,72</b>	<b>4,52</b>	<b>4,57</b>	<b>4,34</b>	<b>4,33</b>	<b>W/W</b>
	<b>Water flow rate</b>	<b>788</b>	<b>1127</b>	<b>1794</b>	<b>2539</b>	<b>2425</b>	<b>l/h</b>
A7W45	<b>Heating capacity</b>	<b>4670</b>	<b>6690</b>	<b>10170</b>	<b>14080</b>	<b>14110</b>	<b>W</b>
	min-max	1581 - 6238	2047 - 7661	3429 - 12207	4870 - 15123	4626 - 15276	W
	<b>Power input</b>	<b>1430</b>	<b>2050</b>	<b>3080</b>	<b>4470</b>	<b>4460</b>	<b>W</b>
	min-max	478 - 1944	623 - 2387	1025 - 3948	1525 - 4892	1451 - 4941	W
	<b>COP</b>	<b>3,27</b>	<b>3,26</b>	<b>3,30</b>	<b>3,15</b>	<b>3,16</b>	<b>W/W</b>
	<b>Water flow rate</b>	<b>803</b>	<b>1151</b>	<b>1749</b>	<b>2422</b>	<b>2427</b>	<b>l/h</b>
A35W18	<b>Cooling capacity</b>	<b>4550</b>	<b>6450</b>	<b>10250</b>	<b>14610</b>	<b>14030</b>	<b>W</b>
	min-max	2255 - 8818	2788 - 10829	5037 - 14203	6423 - 17596	5873 - 17774	W
	<b>Power input</b>	<b>1000</b>	<b>1470</b>	<b>2060</b>	<b>3320</b>	<b>3260</b>	<b>W</b>
	min-max	448 - 2447	581 - 3022	931 - 3867	1314 - 4791	1269 - 4839	W
	<b>EER</b>	<b>4,55</b>	<b>4,39</b>	<b>4,98</b>	<b>4,40</b>	<b>4,30</b>	<b>W/W</b>
	<b>Water flow rate</b>	<b>783</b>	<b>1109</b>	<b>1763</b>	<b>2513</b>	<b>2413</b>	<b>l/h</b>
A35W7	<b>Cooling capacity</b>	<b>4550</b>	<b>6710</b>	<b>10440</b>	<b>12950</b>	<b>13800</b>	<b>W</b>
	min-max	1454 - 5524	1850 - 7136	3485 - 11364	4435 - 13629	4480 - 14566	W
	<b>Power input</b>	<b>1550</b>	<b>2570</b>	<b>3280</b>	<b>4530</b>	<b>5140</b>	<b>W</b>
	min-max	483 - 2097	687 - 3029	1077 - 4249	1520 - 5500	1649 - 6288	W
	<b>EER</b>	<b>2,94</b>	<b>2,61</b>	<b>3,18</b>	<b>2,86</b>	<b>2,68</b>	<b>W/W</b>
	<b>Water flow rate</b>	<b>783</b>	<b>1154</b>	<b>1796</b>	<b>2227</b>	<b>2374</b>	<b>l/h</b>

The values are referred to units without options and accessories.

Data declared according to **EN 14511**:

**EER** (Energy Efficiency Ratio) = ratio of the total cooling capacity to the effective power input of the unit

**COP** (Coefficient Of Performance) = ratio of the total heating capacity to the effective

power input of the unit

**A35W7** = source : air in 35°C d.b. / plant : water in 12°C out 7°C

**A35W18** = source : air in 35°C d.b. / plant : water in 23°C out 18°C

**A7W45** = source : air in 7°C d.b. 6°C w.b. / plant : water in 40°C out 45°C

**A7W35** = source : air in 7°C d.b. 6°C w.b. / plant : water in 30°C out 35°C

### General data

Modelli	5	7	10	14	14T	
Power supply	220-240V~ 50Hz, 1Ph				380-415V~ 50Hz, 3Ph+N	V-ph-Hz
Compressor type	Twin Rotary DC					-
N° compressors / N° refrigerant circuits	1 / 1					n°
Plant side heat exchanger type	stainless steel brazed plates					-
Source side heat exchanger type	finned coil					-
Fans type	DC axial					-
N° fans	1			2		n°
Expansion tank volume	2			5		l
Water safety valve set			3			bar
Hydraulic fittings	1" M			1-1/4" M		"
Minimum water content on the system			20			l
DHW boiler - minimum surface of the coil	1,4			1,7		m²
Refrigerant type			R410A			-
Refrigerant charge	2,40			3,60		kg
Control type	Remote wired					-
SWL - Sound power level*	61	65	66	71	71	dB(A)
SPL - Sound pressure level at 1mt **	46	50	51	56	56	dB(A)
Maximum current input	16	16	32	32	16	A

\* SWL = Sound power levels, with reference to  $1 \times 10^{-12}$  W.

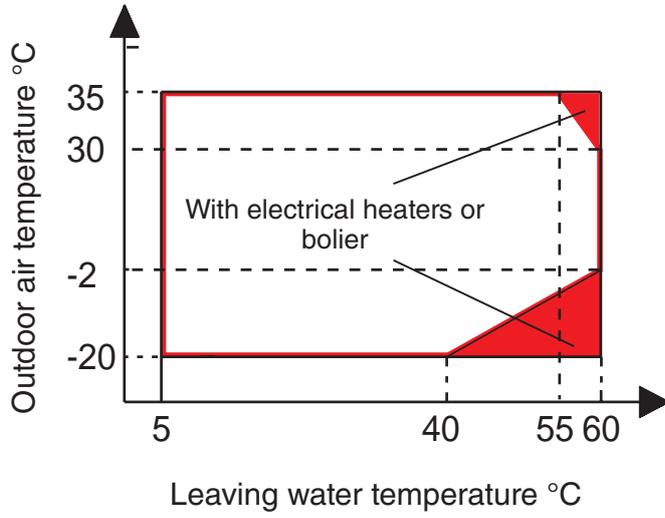
The Total sound power level in dB(A) measured in compliance with ISO 9614 standards. The Total Sound Power in dB(A) the only binding acoustic specification.

\*\* SPL = Sound pressure levels, with reference to  $2 \times 10^{-5}$  Pa.

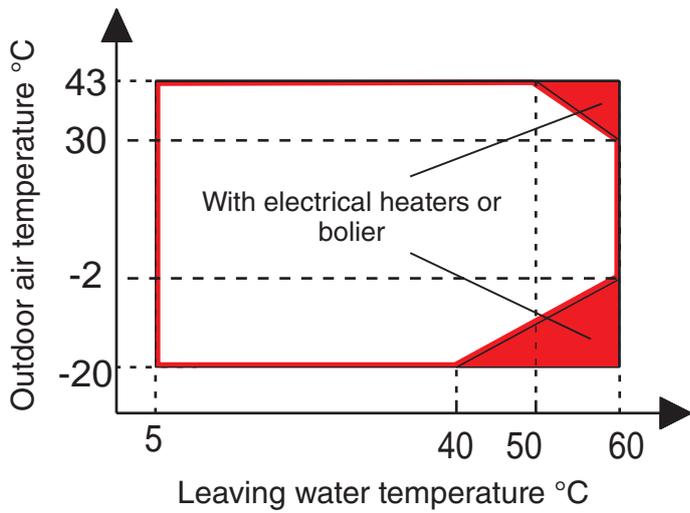
The sound pressure levels are values calculated by applying the ISO-3744 relation.

# OPERATING LIMITS

## HEATING MODE

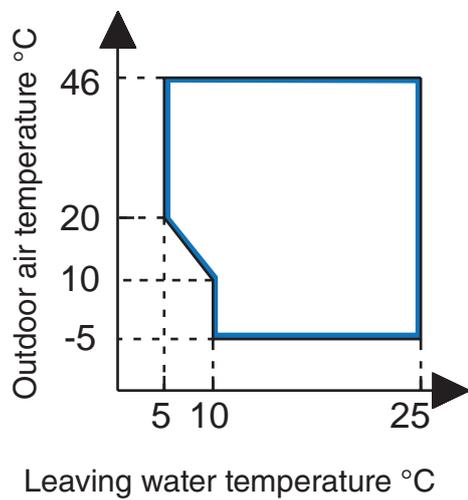


## ACS MODE



NOTE FOR DHW MODE: leaving water temperature is the temperature of the water produced by the unit and not the DHW temperature available to the user; the DHW temperature is in fact a function of this parameter and of the coil surface of the DHW boiler.

## COOLING MODE



# WATER PUMP WORKING HEAD

## Setting the pump speed

The pump speed can be selected by adjusting the red knob on the pump. The notch point indicates pump speed.

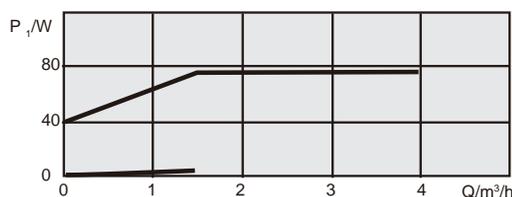
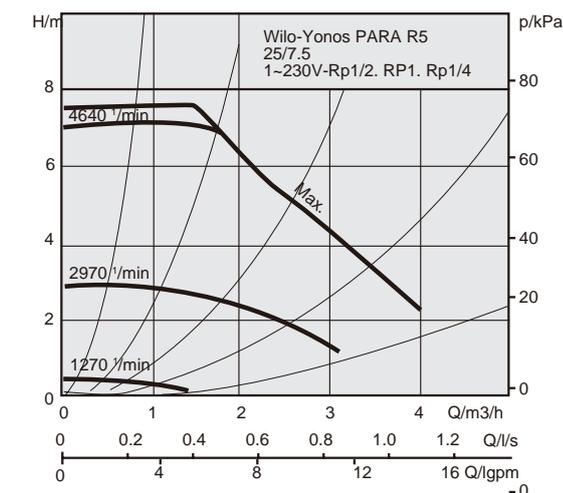
The default setting is the highest speed (III).

If the water flow in the system is too high the speed can be set to low (I).



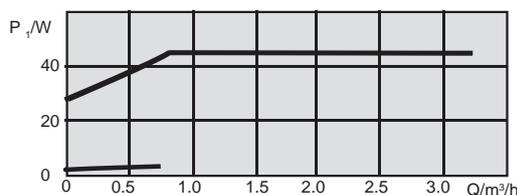
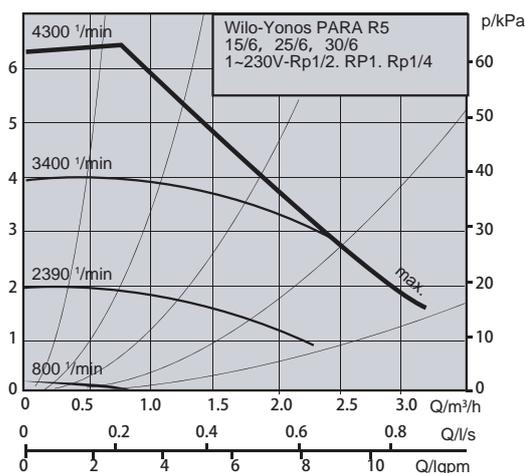
The available external static pressure function for water flow is shown in the graph below.

**Constant speed I II III**



1-phase 10÷14 kW  
3-phase 14 kW

**Constant speed I II III**



1-phase 5/7 kW

## Pump LED diagnosis and solutions

The pump has an LED operating status display. This makes it easy for the technician to search for the cause of a fault in the heating system.

1. If the LED display lights up continuously green, it means the pump is running normally.
2. If the LED display is flashing green, it means the pump is running the venting function. The pump runs during the 10 minute venting function. After its cycle, the installer needs to adjust the targeted performance.
3. If the LED is flashing green/red, it means that the pump has stopped operating due to an external reason. The pump will re-

start by itself after the abnormal situation disappears. The probable reason causing the problem is pump undervoltage or overvoltage ( $U < 160V$  or  $U > 280V$ ), and you should check the voltage supply. Another reason is module overheating, and you should check the water and ambient temperatures.

4. If the LED is flashing red, it means the pump has stopped operating, and a serious fault has happened (e.g. pump blocked). The pump cannot restart itself due to a permanent failure and the pump should be changed.
5. If the LED does not light up, it means no power supply to the pump, possibly the pump is not connected to power supply. Check the cable connection. If the pump is still running, it means the LED is damaged. Or the electronics are damaged and the pump should be changed.

## Failure diagnosis at the moment of first installation

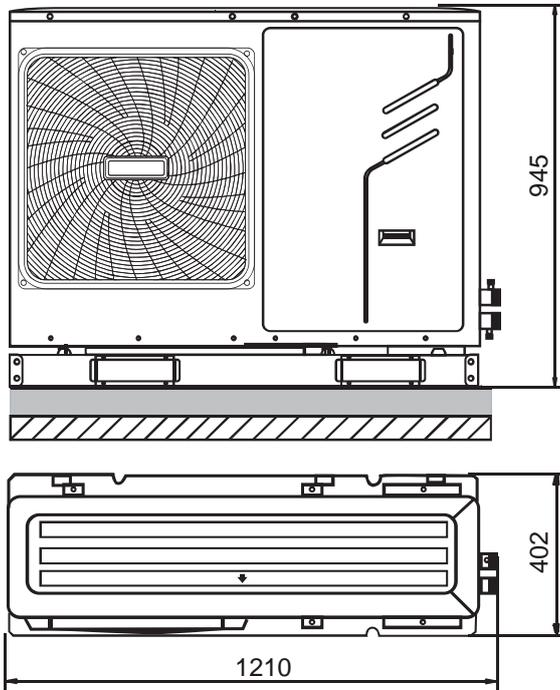
- If nothing is displayed on the user interface, it is necessary to check for any of the following abnormalities before diagnosing possible error codes.
- Disconnection or wiring error (between power supply and unit and between unit and user interface).

- The fuse on the PCB may have blown.
  - If the user interface shows "E8" or "E0" as an error code, there is a possibility that there is air in the system, or the water level in the system is less than the required minimum.
  - If the error code E2 is displayed on the user interface, check the wiring between the user interface and unit.
- More error code and failure causes can be found in 13.3 Error codes.

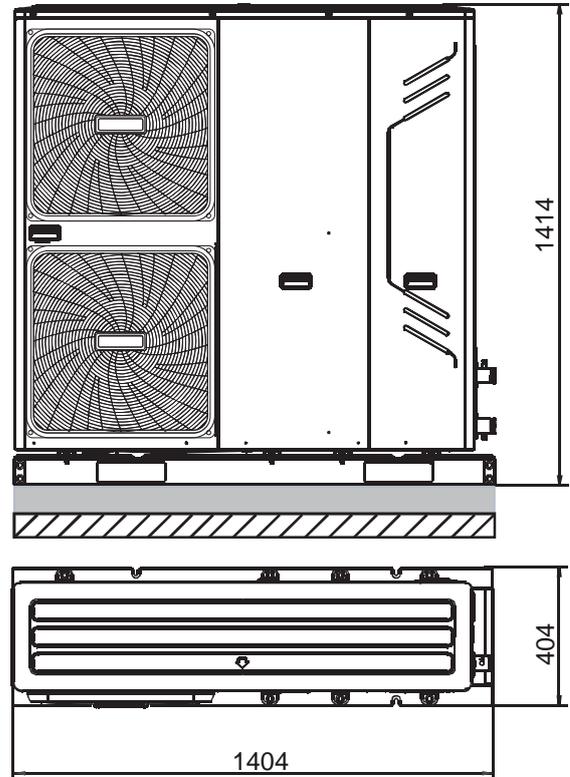
# DIMENSIONAL AND PHYSICAL DATA

## Dimensional data

**Mod. 5 - 7**



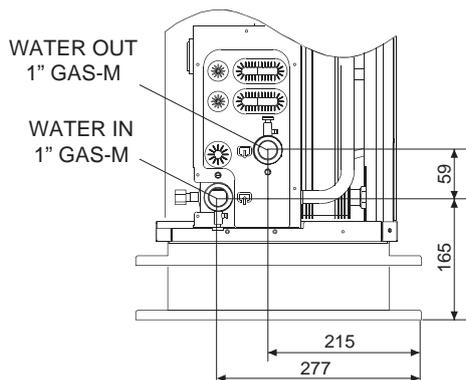
**Mod. 10 - 14 - 14T**



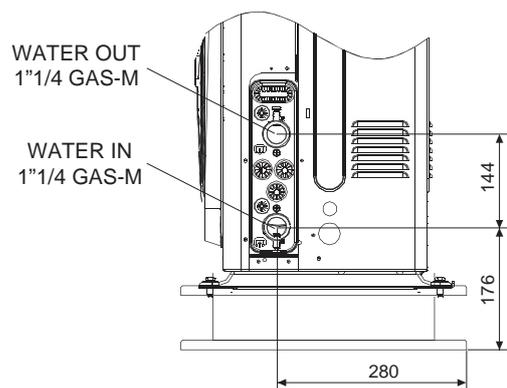
Models	5	7	10	14	14T	
Packaging (WxDxH)	1500x1140x450			1475x1580x440		mm
Weight Net \ Gross	99 / 117			162 / 178		kg

## Hydraulic connections

**Mod. 5 - 7**



**Mod. 10 - 14 - 14T**



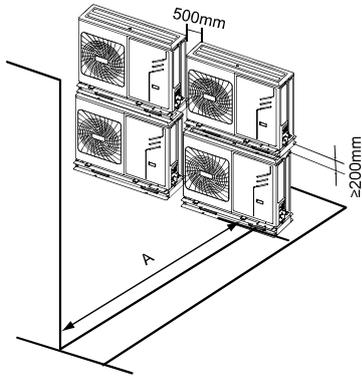
## DIMENSIONAL AND PHYSICAL DATA

### Minimum operating area

To correctly install the unit, comply with the measurements for the free area that must be left around the unit, as shown in the drawing.

#### (A) In case of stacked installation

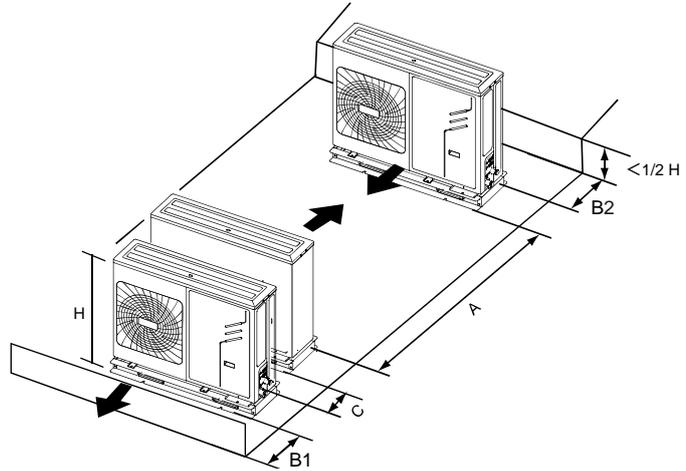
1. In case obstacles exist in front of the outlet side.



Unit	A (mm)
5 - 7	1000
10 - 14 - 14T	1500

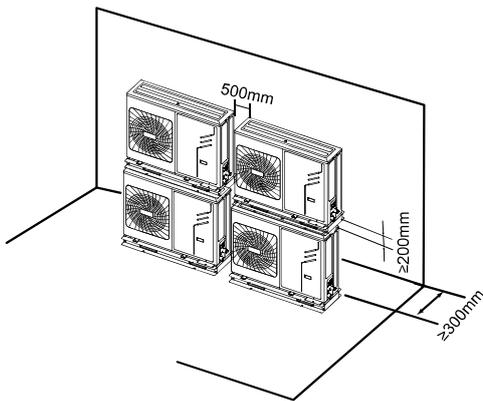
#### (B) In case of multiple-row installation (for roof top use, etc.)

1. In case of installing one unit per row.

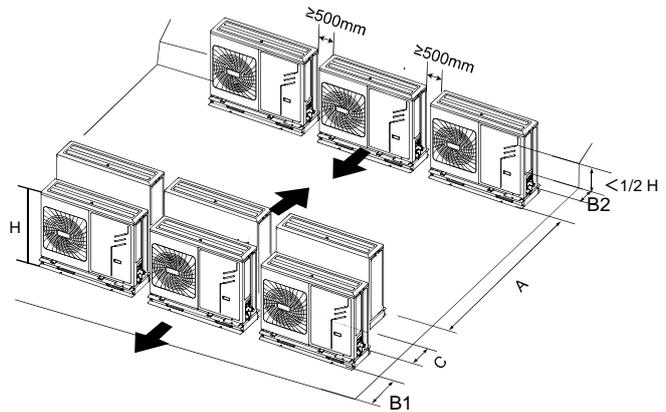


Unit	A (mm)	B1 (mm)	B2 (mm)	C (mm)
5 - 7	1500	500	300	300
10 - 14 - 14T	2000	1000	300	300

2. In case obstacles exist in front of the air inlet.



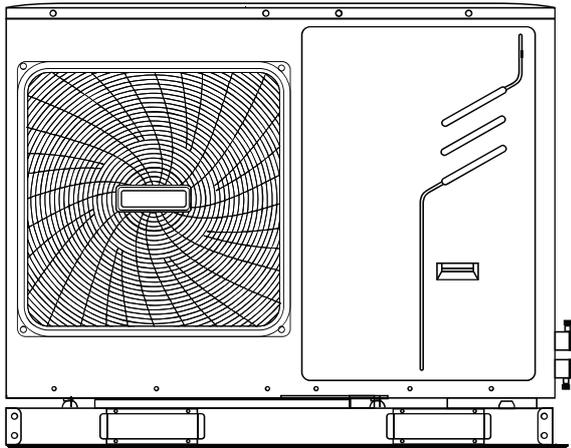
2. In case of installing multiple units (2 units or more) in lateral connection per row.



Unit	A (mm)	B1 (mm)	B2 (mm)	C (mm)
5 - 7	2000	500	300	300
10 - 14 - 14T	2500	1000	300	300

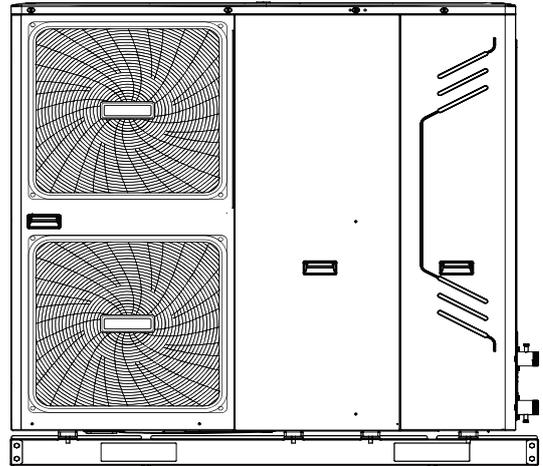
# RECEPTION AND POSITIONING

Fig.1

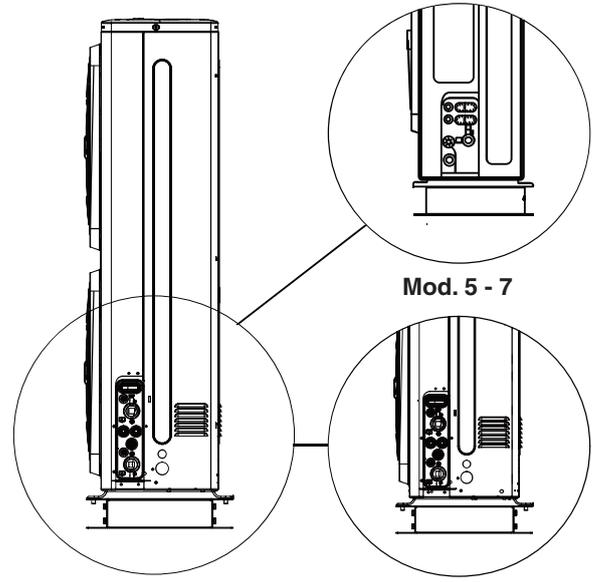
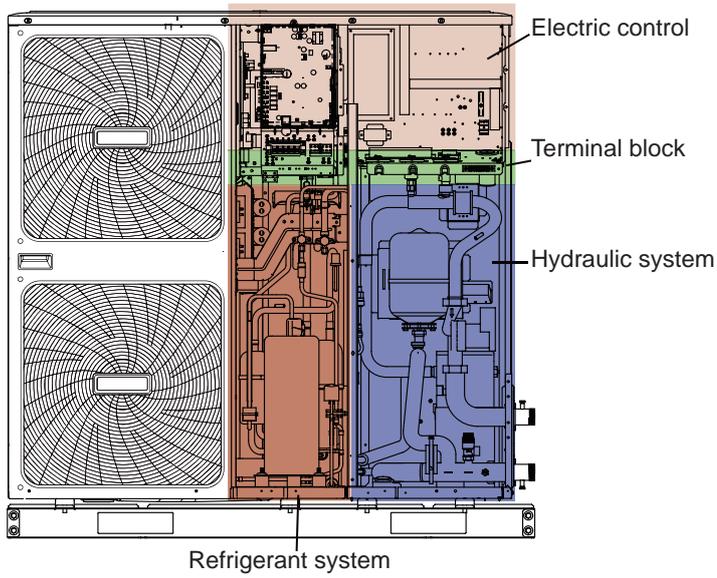


Mod. 5 - 7

Fig.2

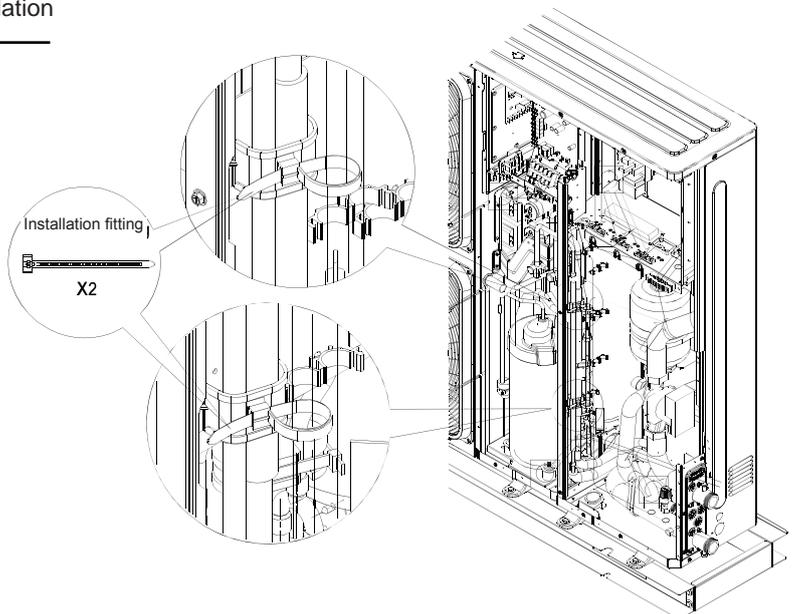
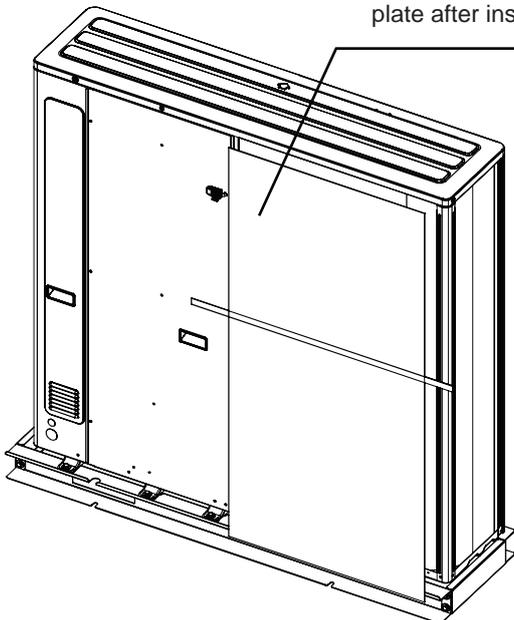


Mod. 10 - 14 - 14T



Mod. 10 - 14 - 14T

Please remove the hollow plate after installation



## RECEPTION AND POSITIONING

### Storage

The units must be stored in a dry place, sheltered from the sun, rain, sand and wind.

Comply with the storage conditions given below:

- Do not stack the units
- Maximum temperature = 60°C
- Minimum temperature = -10°C
- Humidity = 90%
- Avoid placing the units packaged with thermoretractable protection under the sun since the pressure inside the refrigerant circuits can increase up to values such as to open the safety valve.

### Packing removing

Recycle and dispose of packing material in conformity with local regulations, be extremely careful not to damage the unit.

### Inspections on arrival

As soon as the appliance is consigned, it is essential to make sure that all the ordered items have been received and that the shipment is complete. Carefully check that the equipment has not been damaged. If visible damage is discovered, immediately inform the haulage contractor and write "Collected with reserves owing to evident damage" on the consignment note.

Delivery ex works means that, as established by law, reimbursement of any damages is at the insurance company's charge.

### Before installation

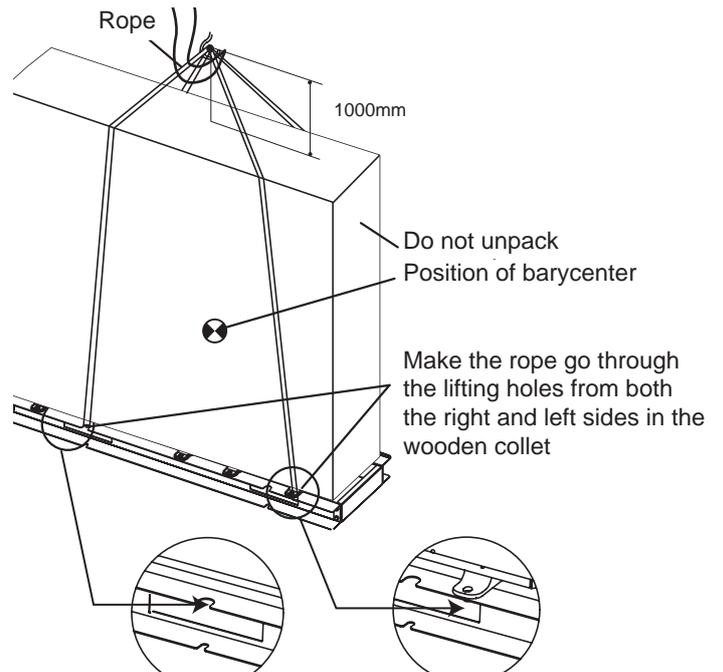
Be sure to confirm the model name and the serial number of the unit.

### Handling

Due to relatively large dimensions and heavy weight, the unit should only be handled using lifting tools with slings. The slings can be fitted into foreseen sleeves at the base frame that are made specifically for this purpose.

### CAUTION

- To avoid injury, do not touch the aluminum fins of the unit.
- Do not use the grips in the fan grills to avoid damage.
- The unit is top heavy! Prevent the unit from falling due to improper inclination during handling.



## RECEPTION AND POSITIONING

### Selecting the installation site

Select an installation site where the following conditions are satisfied and one that meets with your customer's approval.

- Places that are well-ventilated.
- Places where the unit does not disturb next-door neighbors.
- Safe places which can bear the unit's weight and vibration and where the unit can be installed at an even level.
- Places where there is no possibility of flammable gas or product leak.
- The equipment is not intended for use in a potentially explosive atmosphere.
- Places where servicing space can be well ensured.
- Places where the units' piping and wiring lengths come within the allowable ranges.
- Places where water leaking from the unit cannot cause damage to the location (e.g. in case of a blocked drain pipe).
- Places where rain can be avoided as much as possible.
- Do not install the unit in places often used as a work space. In case of construction work (e.g. grinding etc.) where a lot of dust is created, the unit must be covered.
- Do not place any objects or equipment on top of the unit (top plate)
- Do not climb, sit or stand on top of the unit.
- Be sure that sufficient precautions are taken in case of refrigerant leakage according to relevant local laws and regulations.



### WARNING

■ Be sure to provide for adequate measures in order to prevent that the unit be used as a shelter by small animals. Small animals making contact with electrical parts can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean.

■ When installing the unit in a place exposed to strong wind, pay special attention to the following.

Strong winds of 5 m/sec or more blowing against the unit's air outlet causes a short circuit (suction of discharge air), and this may have the following consequences:

- Deterioration of the operational capacity.
- Frequent frost acceleration in heating operation.
- Disruption of operation due to rise of high pressure.
- When a strong wind blows continuously on the front of the unit, the fan can start rotating very fast until it breaks.

Refer to the figures for installation of this unit in a place where the wind direction can be foreseen.

■ Turn the air outlet side toward the building's wall, fence or screen.

Make sure there is enough room to do the installation

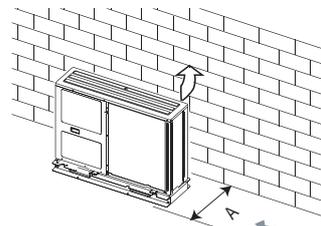
- Set the outlet side at a right angle to the direction of the wind.
- Prepare a water drainage channel around the foundation, to drain waste water from around the unit.
- If water does not easily drain from the unit, mount the unit on a foundation of concrete blocks, etc. (the height of the foundation should be about 100 mm).
- If you install the unit on a frame, please install a waterproof plate (about 100 mm) on the underside of the unit to prevent water from coming in from the low side.
- When installing the unit in a place frequently exposed to snow, pay special attention to elevate the foundation as high as possible.
- In heavy snowfall areas it is very important to select an installation site where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (if necessary construct a lateral canopy).

■ As the outdoor temperature is measured via the outdoor unit air thermistor, make sure to install the outdoor unit in the shade, or a canopy should be constructed to avoid direct sunlight, so that it is not influenced by the sun's heat, otherwise protection may be possible to the unit.

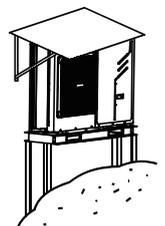
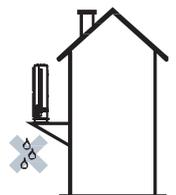
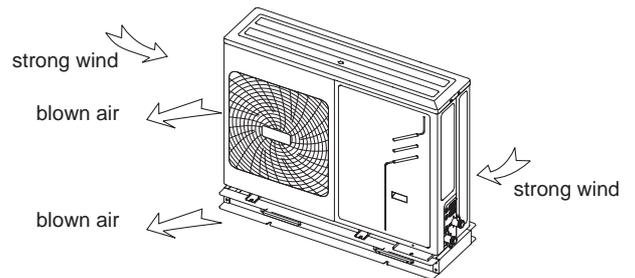
■ Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise after installation.

■ In accordance with the foundation drawing in the figure, fix the unit securely by means of the foundation bolts. (Prepare four sets each of Ø10 Expansion bolts, nuts and washers which are readily available on the market.)

■ It is best to screw in the foundation bolts until their length is 20 mm from the foundation surface.

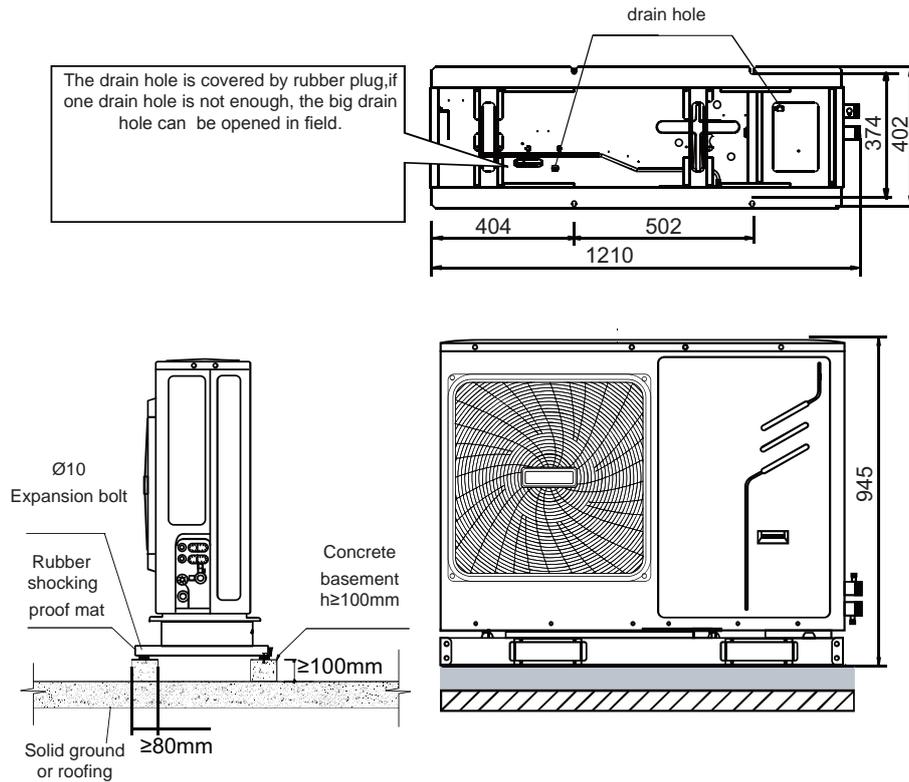


Unit	A (mm)
5 - 7	1000
10 - 14	1500

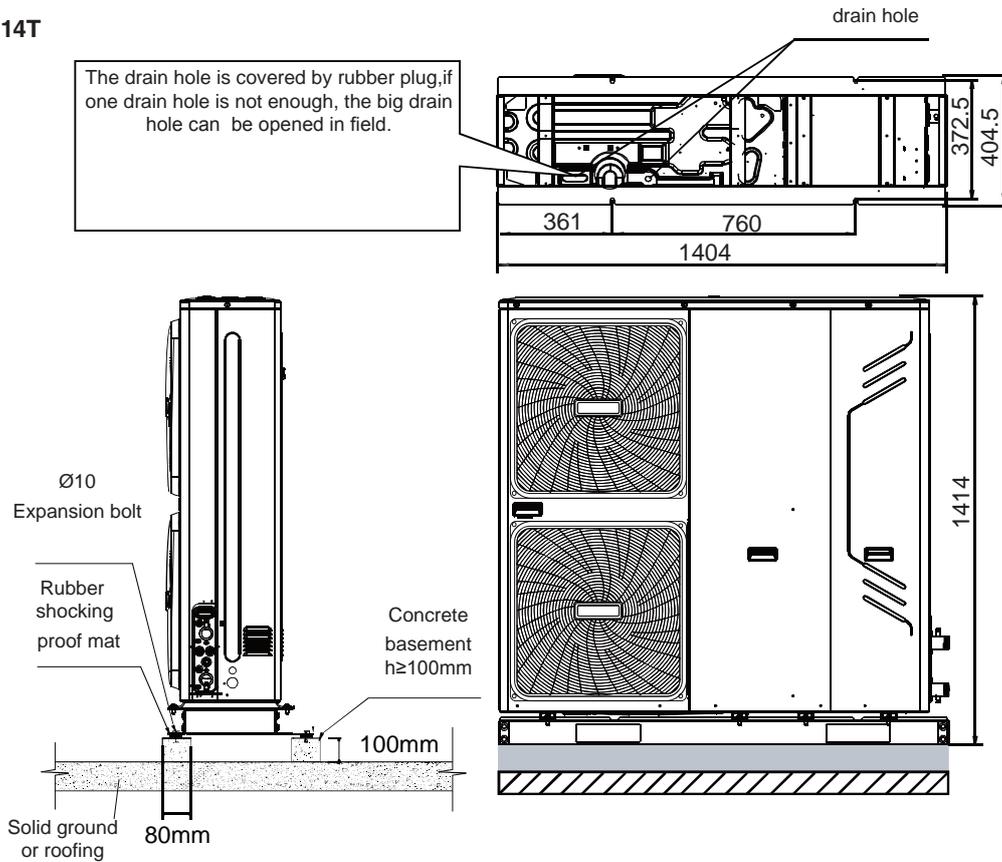


# RECEPTION AND POSITIONING

## Mod. 5 - 7



## Mod. 10 - 14 - 14T



### NOTE

If drain holes in the unit are covered by a mounting base or by floor surface, raise the unit in order to provide a free space of more than 100 mm under the unit.

# HYDRAULIC CONNECTIONS

## Tips for a successful installation

For a correct design and installation of the hydraulic plant comply the local laws governing safety matters and sound.

The following information is suggestion for a correct installation of the unit:

- Before connecting the unit to the system wash adequately the pipes using clean water, filling and emptying and cleaning the filters. Only after that proceed connecting the unit to the system; this operation is crucial to ensure proper start-up without the need to have repeated stops to clean the filter, with the possible risk of damage to heat exchangers and other components.
- Check by qualified personnel the quality of the water or of the mixture used; avoid the presence of inorganic salts, biological load (seaweeds, etc.) suspended solids, dissolved oxygen and the pH. Water with inadequate characteristics can cause a pressure drop increase due to a rapid fouling of the filter, energy efficiency decrease and corrosive symptom increase that can damage the unit.
- The pipes must have the least possible number of bends to minimize load losses and must be adequately supported in order to prevent the connections of the unit from being excessively stressed.
- Install on-off valves near components that need to be serviced to isolate them when maintenance work needs to be done and to allow them to be replaced without having to discharge the system.
- Before isolating the pipes and charging the system, carry out preliminary inspections to make sure that there are no leaks.
- Isolate all the chilled water pipes to prevent condensation from forming along the pipes themselves. Make sure that the material used is the steam barrier type, failing this, cover the insulation with an appropriate protection. Also make sure that the air venting valves can be accessed through the insulation.
- It is recommended to use flexible couplings before and after the water circulation pump and near the unit.
- Avoid that the weight of the connection pipes pushes on the hydraulic connections of the unit using approved supports.
- Always use materials that are compatible with the water used in the system and with the materials used in the unit.
- Ensure that components installed in the field piping can withstand the water pressure and temperature.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit during maintenance.
- Air vents must be provided at all high points of the system. The vents should be located at points that are easily accessible for servicing. An automatic air purge is provided inside the unit. Check that this air purge valve is not tightened too much so that automatic release of air in the water circuit remains possible.

## Water filter

It is mandatory to install at the inlet of the unit the Y-shape water filter (supplied with the unit).

## Water component for corrosion limit

To avoid corrosion problems in water exchangers make sure that the water used in the plant meets the requirements listed in the table.

pH	7.5 ÷ 9.0	-	Free Chlorine	< 0.5	ppm
SO4 --	< 100	ppm	Fe3+	< 0.5	ppm
HCO3 -/ SO4 --	>1.0		Mn++	< 0.05	ppm
Total hardness	8.0 ÷ 15.2	°F	CO2	< 50	ppm
Cl-	< 50	ppm	H2S	< 50	ppb
PO4 3-	< 2.0	ppm	Temperature	< 65	°C
NH3	< 0.5	ppm	Oxygen content	< 0.1	ppm

## Water pipework

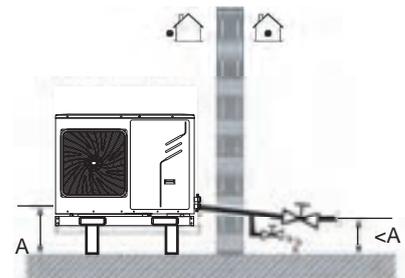
All piping lengths and distances have been taken into consideration.

### Requirements

The maximum allowed thermistor cable length is 20m. This is the maximum allowable distance between the domestic hot water tank and the unit (only for installations with a domestic hot water tank). The thermistor cable supplied with the domestic hot water tank is 10m in length. In order to optimize efficiency we recommend installing the 3-way valve and the domestic hot water tank as close as possible to the unit

## NOTE

- If the installation is equipped with a domestic hot water tank (optional), please refer to the domestic hot water tank Installation & Owner's Manual.
- If there is no glycol (anti-freeze) in the system there is a power supply or pump failure, drain the system (as shown in the figure below).



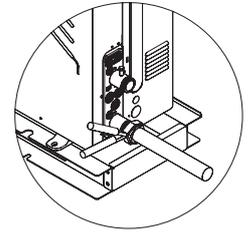
## HYDRAULIC CONNECTIONS

The unit is only to be used in a closed water system. Application in an open water circuit can lead to excessive corrosion of the water piping.

Water connections must be made in accordance with the outlook diagram delivered with the unit, with respect to the water intake and water outlet (refer to section "DIMENSIONAL AND PHYSICAL DATA").

If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs
- Cover the pipe end when inserting it through a wall so that no dust and dirt enter.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.
- When using non-brass metallic piping, make sure to insulate both materials from each other to prevent galvanic corrosion. Never use Zn-coated parts in the water circuit. Excessive corrosion of these parts may occur as copper piping is used in the unit's internal water circuit.
- Because brass is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes.



 Be careful not to deform the unit's piping by using excessive force when connecting the piping. Deforming the piping can cause the unit to malfunction.

- When using a 3-way valve in the water circuit. Preferably choose a ball type 3-way valve to guarantee full separation between the domestic hot water and floor heating water circuit.
- When using a 3-way valve or a 2-way valve in the water circuit. The recommended maximum changeover time of the valve should be less than 60 seconds.

### Protecting the water circuit against freezing

Frost can cause damage to the hydraulic system. As this unit is installed outdoors and thus the hydraulic system is exposed to freezing temperatures, care must be taken to prevent freezing of the system.

All hydraulic parts are insulated to reduce heat loss. Insulation must be present on the field piping.

The unit is already equipped with several features to prevent freezing.

- The software contains special functions using the heat pump to protect the entire system against freezing.

When the temperature of the water flow in the system drops to a certain value, the software will heat the water, either using the heat pump, the electric heating tap, or the backup heater (if backup heater box is installed).

The freeze protection function will turn off only when the temperature increases to a certain value.

In case of a power failure, the features mentioned above cannot protect the unit from freezing. Since a power failure could happen when the unit is unattended, the supplier recommends adding glycol to the water system. Refer to "Caution: Use of glycol".

Since a power failure could happen when the unit is unattended, the supplier recommends adding glycol to the water system. Refer to "Caution: Use of glycol".

Depending on the expected lowest outdoor temperature, make sure the water system is filled with a concentration of glycol as mentioned in the table below.

When glycol is added to the system, the performance of the unit will be affected. The correction factor of the unit capacity, flow rate and pressure drop of the system is listed in the table below:

### Correction factor for the use of glycol in heating mode

**ETHYLENE GLYCOL** with water produced between 30 ÷ 55 °C.

Percentage Of glycol in mass / volume	0 / 0	10 / 8,9	20 / 18,1	30 / 27,7	40 / 37,5
Freezing point [°C]	0	-3,2	-8	-14	-22
CCPT - Heating capacity	1,000	0,995	0,985	0,975	0,970
CCPA - Power input	1,000	1,010	1,015	1,020	1,030
CCQA - Water flow rate	1,000	1,038	1,062	1,091	1,127
CCDP - Water pressure drop	1,000	1,026	1,051	1,077	1,103

**PROPYLENE GLYCOL** with water produced between 30 ÷ 55°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 9,6	20 / 19,4	30 / 29,4	40 / 39,6
Freezing point [°C]	0	-3,3	-7	-13	-21
CCPT - Heating capacity	1,000	0,990	0,975	0,965	0,955
CCPA - Power input	1,000	1,010	1,020	1,030	1,040
CCQA - Water flow rate	1,000	1,018	1,032	1,053	1,082
CCDP - Water pressure drop	1,000	1,026	1,051	1,077	1,103

### Correction factor for the use of glycol in cooling mode

**ETHYLENE GLYCOL** with water produced between 5 ÷ 20 °C.

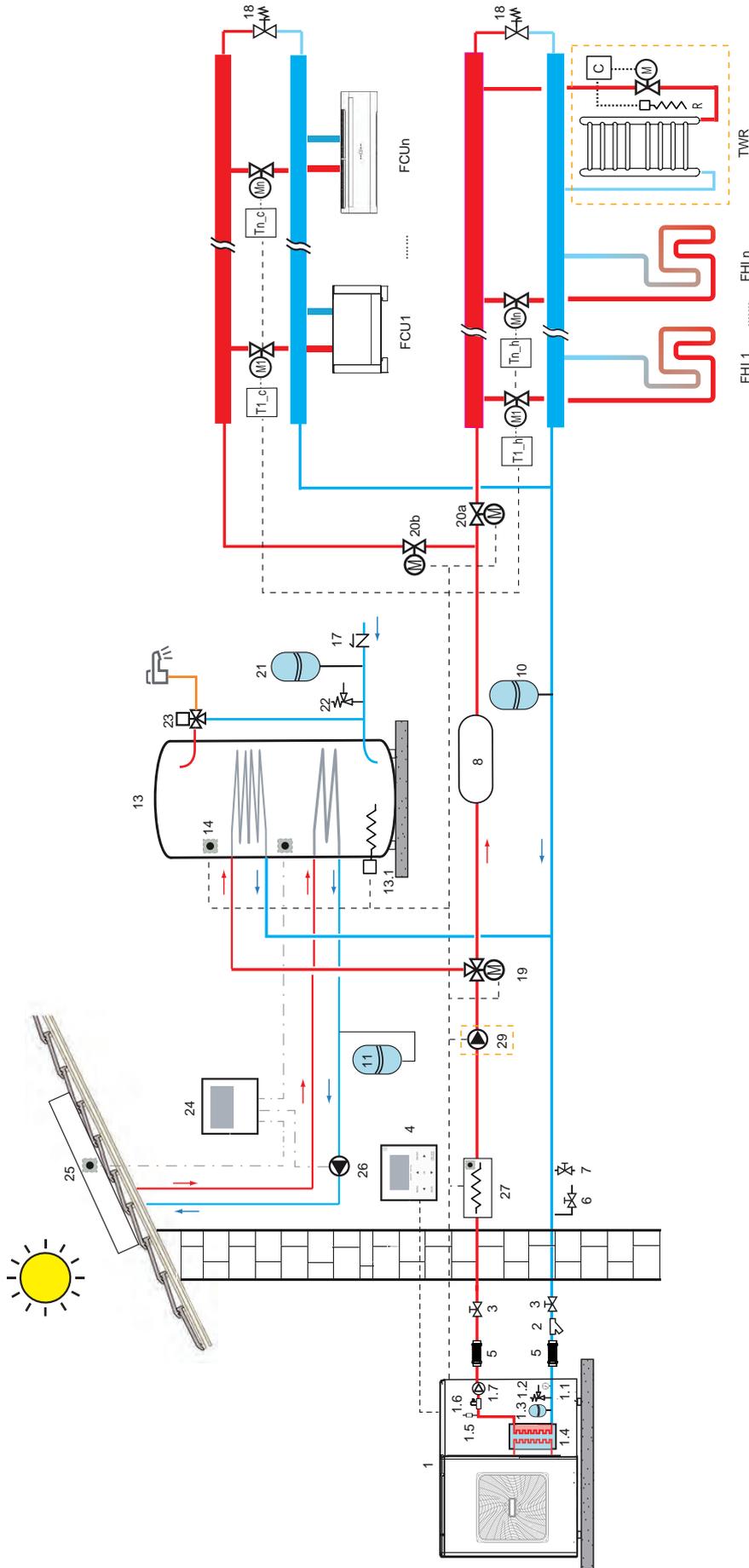
Percentage Of glycol in mass / volume	0 / 0	10 / 8,9	20 / 18,1	30 / 27,7	40 / 37,5
Freezing point [°C]	0	-3,2	-8	-14	-22
CCPF - Cooling capacity	1,00	0,99	0,98	0,97	0,95
CCPA - Power input	1,00	1,00	0,99	0,99	0,98
CCQA - Water flow rate	1,00	1,04	1,08	1,12	1,16
CCDP - Water pressure drop	1,00	1,08	1,16	1,25	1,35

**PROPYLENE GLYCOL** with water produced between 5 ÷ 20 °C.

Percentage Of glycol in mass / volume	0 / 0	10 / 9,6	20 / 19,4	30 / 29,4	40 / 39,6
Freezing point [°C]	0	-3,3	-7	-13	-21
CCPF - Cooling capacity	1,00	0,98	0,96	0,94	0,92
CCPA - Power input	1,00	0,99	0,98	0,95	0,93
CCQA - Water flow rate	1,00	1,01	1,03	1,06	1,09
CCDP - Water pressure drop	1,00	1,05	1,11	1,22	1,38

# EXAMPLE OF APPLICATION SYSTEM - cooling / heating integrated with optional electrical booster / DHW production integrated with optional solar system

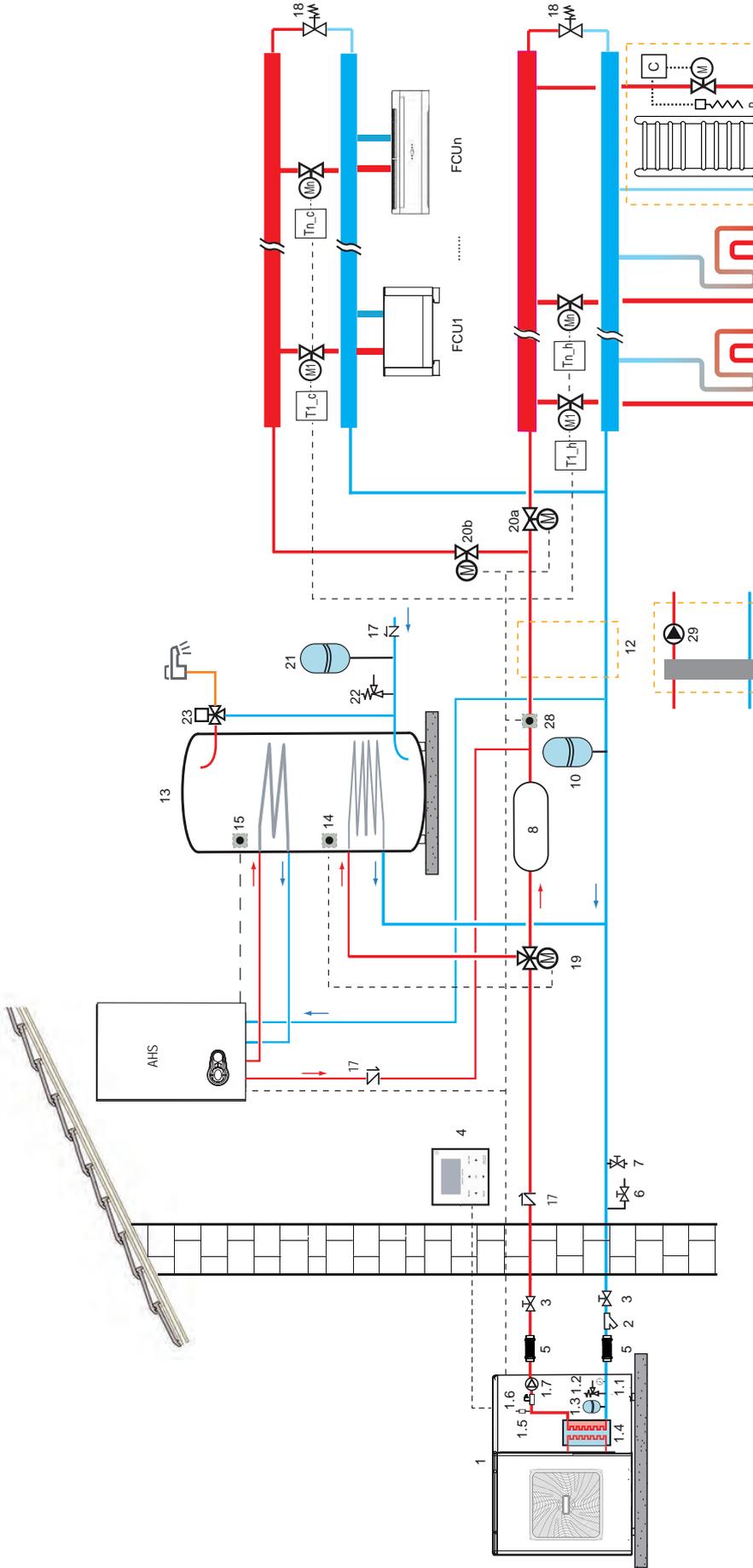
## HYDRAULIC CONNECTIONS



### LEGEND

- 1 Heat pump
- 1.1 Manometer
- 1.2 Water safety valve
- 1.3 Expansion Vessel
- 1.4 Plate Heat Exchanger (complete with antifreeze electric heater)
- 1.5 Air Purge Valve
- 1.6 Flow Switch
- 1.7 Pump inside the unit (P<sub>i</sub>)
- 2 Y-shape water filter (supplied, mounting by the installer)
- 3 Shut-off valve (not supplied)
- 4 Wired remote control
- 5 Flexible joint (not supplied)
- 6 Drain Valve (not supplied)
- 7 Fill Valve (not supplied)
- 8 Buffer Tank (available as accessory); required if you use air terminals for cooling or if the system water content (excluding the content of the unit) is less than 20 liters
- 10 Expansion Vessel (not supplied)
- 13 DHW boiler (not supplied). Minimum surface of the coil for heat pump (1,4 m<sup>2</sup> for mod. 5-7, 1,7 m<sup>2</sup> for mod. 10-14-14T)
- 13.1 Electrical Heater DHW boiler (not supplied)
- 14 Temperature probe T5 (supplied, mounting by the installer)
- 17 Check-valve (not supplied)
- 18 Bypass valve (not supplied)
- 19 3-way valve SV1 (not supplied)
- 20a 2-way valve (not supplied), controlled by SV2 with denied logic
- 20b 2-way valve (not supplied), controlled by SV2 with denied logic
- 21 DHW Expansion Vessel (not supplied)
- 22 DHW safety valve (not supplied)
- 23 Thermostatic mixing valve(not supplied)
- 24 Solar system control box (not supplied)
- 25 Solar panel (not supplied)
- 26 Solar system pump (not supplied)
- 27 Electrical Booster (available as accessory)
- 28 Temperature probe T1B (available as accessory)
- 29 External pump (P<sub>o</sub>), (not supplied), to evaluate possible need for installation according to the plant water pressure drop.
- T1 - Tn Room thermostat (not supplied)
- FCU 1...n Air terminal: it can be used only for cooling with radiant floor heating or cooling and heating without radiant floor.
- FHL 1...n only heating radiant floor with n areas
- TWR Towel water radiator for bath integration: if connected to the heating system it MUST be integrated with electrical heater (R) activated by the control (C) that at the same time closes the valve (M); if not connected to the system, the heating is granted only by the electrical heater (R) activated via the control (C)
- AHS Additional boiler for heating and DHW integration (with disinfect function)
  - - - - electrical connections to the heat pump
  - . . . . electrical connections to the solar system control box
  - ..... connection to the boiler of the DHW boiler water probe (not supplied)

# HYDRAULIC CONNECTIONS



**LEGEND**

- 1 Heat pump
- 1.1 Manometer
- 1.2 Water safety valve
- 1.3 Expansion Vessel
- 1.4 Plate Heat Exchanger (complete with antifreeze electric heater)
- 1.5 Air Purge Valve
- 1.6 Flow Switch
- 2 Y-shape water filter (supplied, mounting by the installer)
- 3 Shut-off valve (not supplied)
- 4 Wired remote control
- 5 Flexible joint (not supplied)
- 6 Drain Valve (not supplied)
- 7 Fill Valve (not supplied)
- 8 Buffer Tank (available as accessory): required if you use air terminals for cooling or if the system water content (excluding the content of the unit) is less than 20 liters
- 9 External pump (P\_o) (not supplied), to evaluate possible need for installation according to the plant water pressure drop.
- 10 Expansion Vessel (not supplied)
- 11 DHW boiler (not supplied), Minimum surface of the coil for heat pump (1,4 m² for mod. 5-7, 1,7 m² for mod. 10-14-14T)
- 12 Electrical Heater DHW boiler (not supplied)
- 13 DHW Expansion Vessel (not supplied)
- 14 DHW safety valve (not supplied)
- 15 Thermostatic mixing valve(not supplied)
- 16 Solar system control box (not supplied)
- 17 Check-valve (not supplied)
- 18 Bypass valve (not supplied)
- 19 3-way valve SV1 (not supplied)
- 20a 2-way valve (not supplied), controlled by SV2 with denied logic
- 20b 2-way valve (not supplied)
- 21 DHW Expansion Vessel (not supplied)
- 22 DHW safety valve (not supplied)
- 23 Thermostatic mixing valve(not supplied)
- 24 Solar system control box (not supplied)
- 25 Solar panel (not supplied)
- 26 Solar system pump (not supplied)
- 27 Electrical Booster (available as accessory)
- 28 Temperature probe T1B (available as accessory)
- 29 External pump (P\_o) (not supplied), to evaluate possible need for installation according to the plant water pressure drop.
- T1 - Tn Room thermostat (not supplied)
- FCU 1..n Air terminal: it can be used only for cooling with radiant floor heating or cooling and heating without radiant floor.
- FHL 1..n only heating radiant floor with n areas
- TWR Towel water radiator for bath integration: if connected to the heating system it MUST be integrated with electrical heater (R) activated by the control (C) that at the same time closes the valve (M); if not connected to the system, the heating is granted only by the electrical heater (R) activated via the control (C)
- AHS Additional boiler for heating and DHW integration (with disinfect function)
  - - - - electrical connections to the heat pump
  - - - - electrical connections to the solar system control box
  - ..... connection to the boiler of the DHW boiler water probe (not supplied)

## HYDRAULIC CONNECTIONS

Water may enter into the flow switch and cannot be drained out and may freeze when the temperature is low enough. The flow switch should be removed and dried, then can be reinstalled in the unit.



### NOTE

- Counterclockwise rotation, remove the flow switch.
- Drying the flow switch completely.



### WARNING

ETHYLENE GLYCOL IS TOXIC



### CAUTION

#### Use of glycol

- Glycol use for installations with a domestic hot water tank:
  - Only propylene glycol having a toxicity rating or class of 1, as listed in "Clinical Toxicology of Commercial Products, 5th edition" may be used.
- If there is too much pressure when using glycol, connect the safety valve to a drain pan to recover the glycol.
- Uninhibited glycol will turn acidic under the influence of oxygen. This process is accelerated by presence of copper and at higher temperatures. The acidic uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system.

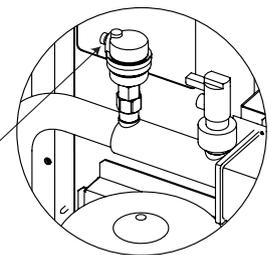
#### It is of extreme importance:

- That the water treatment is correctly executed by a qualified water specialist.
- That a glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.
- That in case of an installation with a domestic hot water tank, only the use of propylene glycol is allowed. In other installations the use of ethylene glycol is fine.
- That no automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates that can foul or plug the system;
- That galvanized piping is not used in glycol systems since it may lead to the precipitation of certain elements in the glycol's corrosion inhibitor;
- To ensure that the glycol is compatible with the materials used in the system.
- Be aware of the hygroscopic property of glycol. It absorbs moisture from the environment.
- Leaving the cap off the glycol container causes the concentration of water to increase. The glycol concentration is then lower and the water could freeze.
- Preventive actions must be taken to ensure minimal exposure of the glycol to air.

#### Filling with water

1. Connect the water supply to the fill valve and open the valve.
2. Make sure the automatic air purge valve is open (at least 2 turns).
3. Fill with water until the manometer indicates a pressure of approximately 2.0 bar. Remove air in the circuit as much as possible using the air purge valves. Air present in the water circuit might cause malfunctioning of the backup heater.

Do not fasten the black plastic cover on the vent valve at the topside of the unit when the system is running. Open air purge valve, turn anticlockwise at least 2 full turns to release air from the system.



### NOTE

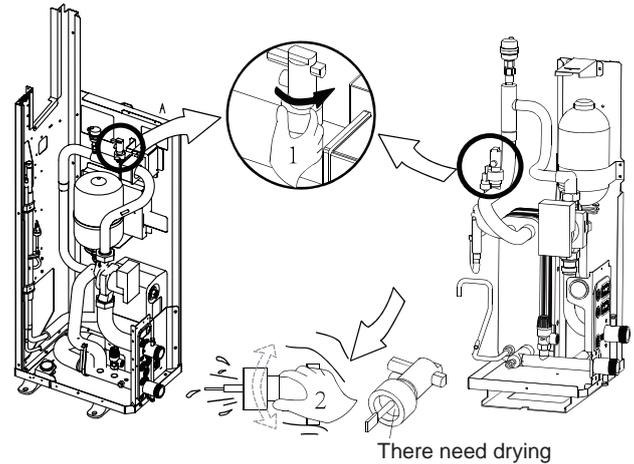
During filling, it might not be possible to remove all air in the system. Remaining air will be removed through the automatic air purge valves during the first operating hours of the system. Topping up the water afterwards might be required.

- The water pressure indicated on the manometer will vary depending on the water temperature (higher pressure at higher water temperature). However, at all times water pressure should remain above 0.3 bar to avoid air entering the circuit.
- The unit might drain-off too much water through the pressure relief valve.
- Water quality must be according to "Safe Drinking water Act "

#### Piping insulation

The complete water circuit including all piping, must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter. The thickness of the sealing materials must be at least 13 mm with  $\lambda = 0.039 \text{ W/mK}$  in order to prevent freezing on the outside water piping.

If the temperature is higher than 30°C and the humidity is higher than RH 80%, then the thickness of the sealing materials should be at least 20 mm in order to avoid condensation on the surface of the seal.



# HYDRAULIC CONNECTIONS

## Checking the maximum water volume and expansion vessel precharge

Before filling the water system, it is advisable to consider the type of installation in question, i.e. check the difference in level between the wet module and user. The following table gives the maximum water content of the water supply system in liters, depending on the capacity of the standard expansion vessel supplied and the pressure at which it should be charged. The expansion vessel setting must be regulated to suit the maximum positive difference in level of the user.

$$\text{Expansion vessel precharge} = [H/10.2 + 0.3] \times 100 = [\text{kPa}]$$

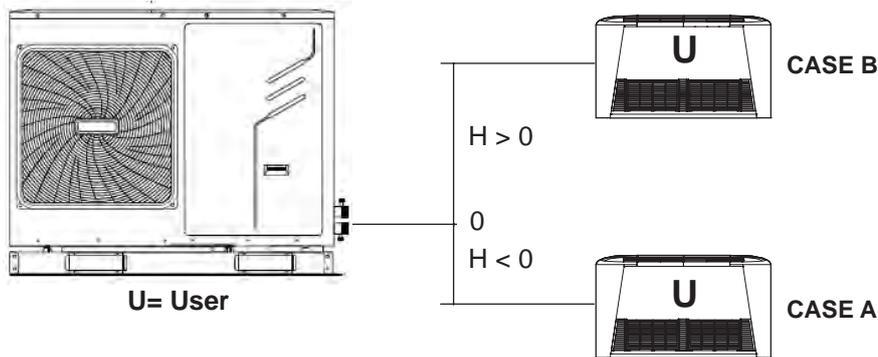
**NOTE.** if  $H < 0$  make sure that the user's lowest point is able to withstand the global pressure.

Tab.1

			H [m]			
			7	12	15	20
expansion vessel precharge as function of H [bar]						
Mod.	Exp. tank vol [l]	Twater max [°C]	1	1,5	1,8	2,3
5 - 7	2	40	133	<b>100</b>	80	47
	2	60	60	<b>45</b>	36	21
10 - 14	5	40	333	<b>250</b>	200	117
	5	60	150	<b>112</b>	90	52

**NB** standard precharge of expansion tank = 1.5 bar

If H is <0 meters, ie the unit is installed at a higher level to the highest point of the system served (eg on the roof) you can use the expansion tank with the factory setting, or reduce it up to minimum 1 bar increase the volume of water plant operated Ciol unit vessel.



**NOTE:** If the unit operates with glycol, calculate the real volume of the system by taking into account the corrective factors for the volume of the system given in the table below.

### Corrective factors per total maximum volume of the system with glycol.

% of brine	0%	10%	20%	30%	40%
Cooling Mode	1,000	0,738	0,693	0,652	0,615
Heating Mode	1,000	0,855	0,811	0,769	0,731

## Checking the minimum water volume

Check that the total water volume in the installation, excluding the internal water volume of the unit, is at least 20L.

**NOTE**

- In most applications this minimum water volume will be satisfactory.
- In critical processes or in rooms with a high heat load though, extra water might be required.
- When circulation in each space heating loop is controlled by remotely controlled valves, it is important that this minimum water volume is kept even if all the valves are closed.

## Maximum water pressure and temperature

- The maximum water pressure = 3 bar.
- The maximum water temperature is 70°C according to safety device setting.

## ELECTRICAL CONNECTIONS



### WARNING

- A main switch or other means of disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with relevant local laws and regulations.
- Switch off the power supply before making any connections.
- Use only copper wires.
- Never squeeze bundled cables and make sure they do not come in contact with the piping and sharp edges. Make sure no external pressure is applied to the terminal connections.
- All field wiring and components must be installed by a licensed electrician and must comply with relevant local laws and regulations.
- The field wiring must be carried out in accordance with the wiring diagram supplied with the unit and the instructions given below.
- Be sure to use a dedicated power supply. Never use a power supply shared by another appliance.
- Be sure to establish a ground. Do not ground the unit to a utility pipe, surge protector, or telephone ground. Incomplete grounding may cause electrical shock.
- Be sure to install a ground fault circuit interrupter (30 mA). Failure to do so may cause electrical shock.
- Be sure to install the required fuses or circuit breakers.

### Precautions on electrical wiring work

- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in figure so that it does not come in contact with the piping, particularly on the high-pressure side.
- Make sure no external pressure is applied to the terminal connectors.
- When installing the ground fault circuit interrupter make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the ground fault circuit interrupter.



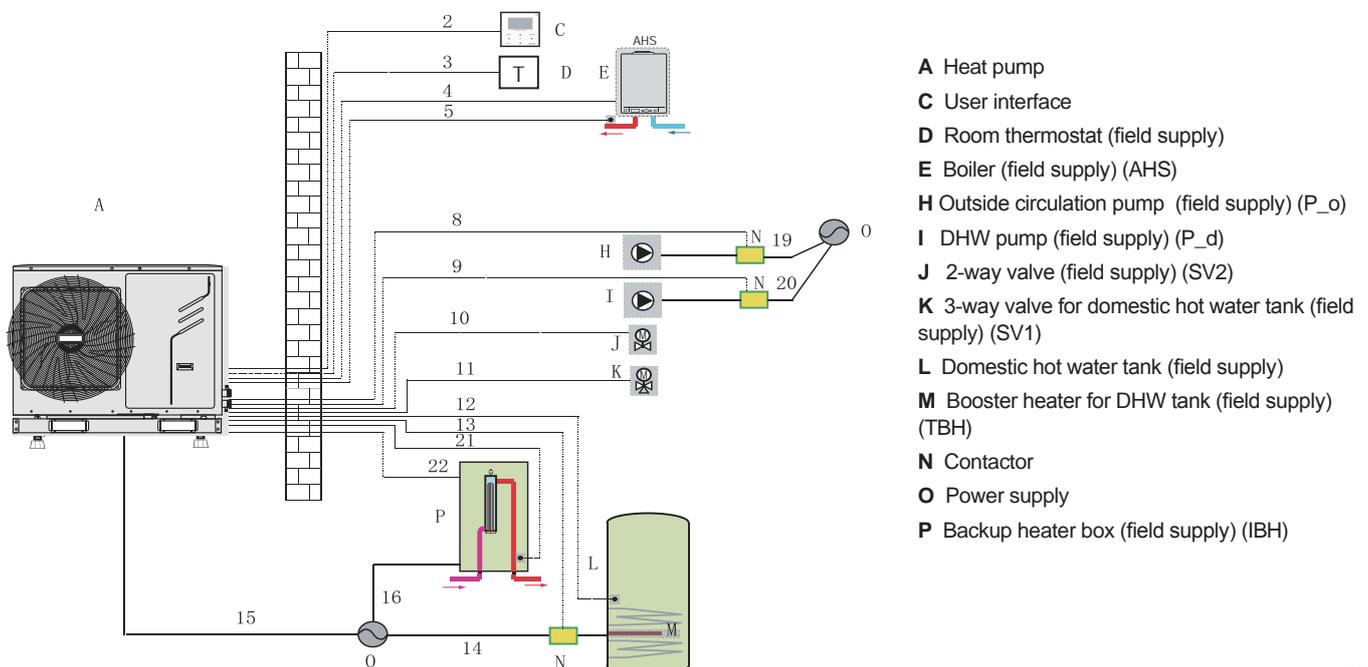
### NOTE

The ground fault circuit interrupter must be a high- speed type breaker of 30 mA (<0.1 s).

- This unit is equipped with an inverter. Installing a power factor corrector not only will reduce the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high- frequency waves. Never install a power factor corrector as it could lead to an accident.

### Overview

The illustration below gives an overview of the required field wiring between several parts of the installation.



- A Heat pump
- C User interface
- D Room thermostat (field supply)
- E Boiler (field supply) (AHS)
- H Outside circulation pump (field supply) (P\_o)
- I DHW pump (field supply) (P\_d)
- J 2-way valve (field supply) (SV2)
- K 3-way valve for domestic hot water tank (field supply) (SV1)
- L Domestic hot water tank (field supply)
- M Booster heater for DHW tank (field supply) (TBH)
- N Contactor
- O Power supply
- P Backup heater box (field supply) (IBH)

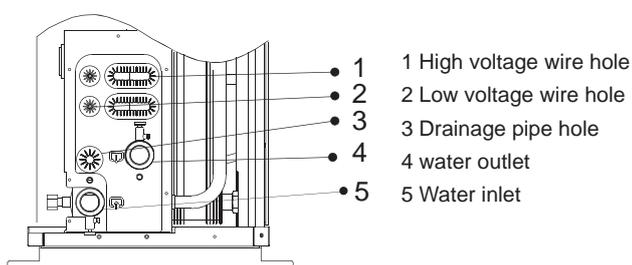
## ELECTRICAL CONNECTIONS

Item	Description	AC / DC	Required number of conductor	Maximum running current
2	User interface	AC	5	200mA
3	Room thermostat cable	AC	2 or 3	200mA
4	Boiler control cable (AHS) (dry contact)	/	2	200mA
5	Temperature probe cable for T1B	DC	2	-
8	Outside circulation pump (P_o)	AC	2	200mA
9	DHW pump control cable (P_d)	AC	2	200mA
10	2-way valve control cable (SV2)	AC	2	200mA
11	3-way valve control cable (SV1)	AC	2 or 3	200mA
12	Temperature probe cable for T5	DC	2	-
13	DHW tank booster heater control cable (TBH)	AC	2	200mA
14	Power supply cable for booster heater (TBH)	AC	2	200mA
15	Power supply cable for unit	AC	2+PE (1-phase) 3+PE N+ (3-phase)	Ref. to electrical data
16	Power supply cable for backup heater (IBH)	AC	2+PE (IBH 1-phase)	Ref. to electrical data
19	Power supply cable for outside circulation pump (P_o)	AC	2	200mA
20	Power supply cable for DHW pump (P_d)	AC	2	200mA
21	Temperature probe cable for T1 (only if IBH is installed)	AC	2	200mA
22	Backup heater control cable (IBH)	AC	2	200mA

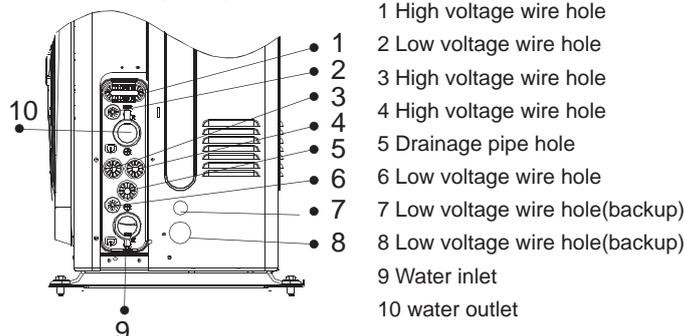
**NOTE:**

- Minimum cable section AWG18 (0.75 mm<sup>2</sup>)
- Please use H07RN-F for the power wire, all the cable are connect to high voltage except for thermistor cable and cable for user interface.
- Equipment must be grounded. All high-voltage external loads, if it is metal or a grounded port, must be grounded.
- All external loads current is needed less than 1.5A, if the loads current is greater than 1.5A, Single external load current is needed less than 0.2A, if the single load current is greater than 0.2A, the load must be controlled through AC contactor.

**MOD. 5 - 7**



**MOD. 10 - 14 - 14T**



- Most field wiring on the unit is to be made on the terminal block inside the switch box. To gain access to the terminal block, remove the switch box service panel.

**⚠ WARNING**

Switch off all power including the unit power supply and backup heater and domestic hot water tank power supply (if applicable) before removing the switch box service panel.

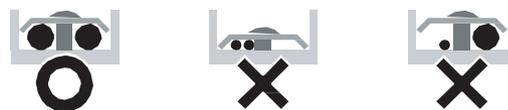
- Fix all cables using cable ties.
- A dedicated power circuit is required for the backup heater.
- Installations equipped with a domestic hot water tank (optional) require a dedicated power circuit for the booster heater. Please refer to the domestic hot water tank Installation & Owner's Manual. *Secure the wiring in the order shown below.*
- Lay out the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely (see figure).
- Follow the electric wiring diagram supplied with the unit.

**Precautions on wiring of power supply**

- Use a round crimp-style terminal for connection to the power supply terminal board. In case it cannot be used due to unavoidable reasons, be sure to observe the following instructions.

- Do not connect different diameter wires to the same power supply terminal. (Loose connections may cause overheating.)

- Use the correct screwdriver to tighten the terminal screws. Small screwdrivers can damage the screw head and prevent appropriate tightening.



# ELECTRICAL CONNECTIONS

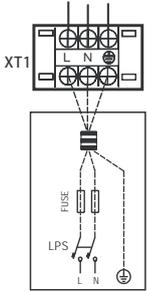
## Connections to the terminals of the unit

### Procedure

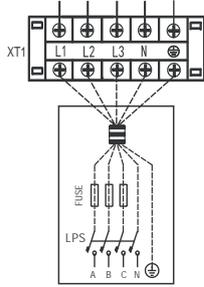
1. Connect the cable to the appropriate terminals as shown on the diagram.
2. Fix the cable with cable ties to the cable tie mountings to ensure stress relief.

### Power supply connection

Door 1: compressor compartment and electrical parts: XT1



**MOD. 5 - 7 - 10 - 14**  
**1-PHASE**



**MOD. 14T**  
**3-PHASE**

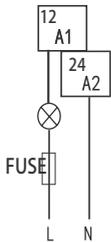
MOD.	5 - 7	10 - 14	14T
Maximum overcurrent protector(MOP)	25A	40A	20A
Wiring size	4mm <sup>2</sup>	6mm <sup>2</sup>	4mm <sup>2</sup>

### Connection for other components

Electrical parts of the hydraulic compartment: The XT7 contains terminals for remote alarm, 2-way valve, 3-way valve, pump, booster heater and external heating source.

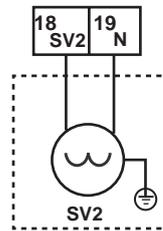
The parts wiring is illustrated below:

#### Remote alarm



Voltage	Passive signal port (dry contact)
Maximum running current	0.5A
Wiring size	0.75mm <sup>2</sup>

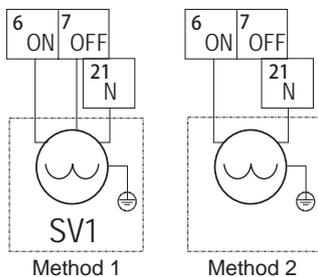
#### 2-way valve (SV2)



Voltage	220-240VAC
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

**NOTE:** Use only a normal closed valve or use the command to activate a relay with denied logic

#### 3-way valve (SV1)



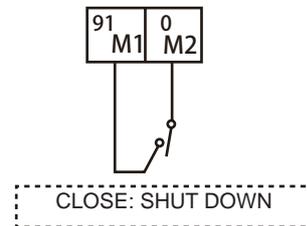
Method 1

Method 2

Voltage	220-240VAC
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

#### Remote shutdown

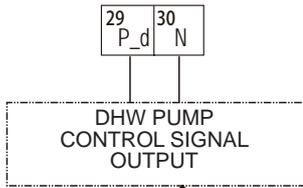
SWITCH SIGNAL INPUT



**NOTE:** when this digital input is closed the unit and the remote controller are locked. To unlock there is necessary to open the digital input.

# ELECTRICAL CONNECTIONS

## DHW pump (P\_d)

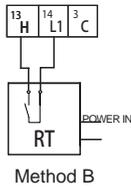


**NOTE**  
For 5/7 kW unit, the terminal number is 37 and 38.

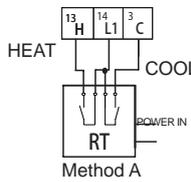
<b>Voltage</b>	<b>220-240VAC</b>
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

## Room thermostat (ON/OFF - HEAT/COOL by digital input)

### External ON/OFF (thermostat)



### External COOL/HEAT

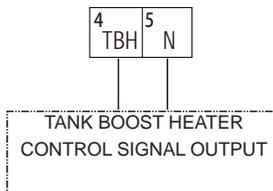


<b>Voltage</b>	<b>220-240VAC</b>
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

Method	ON/OFF	HEAT / COOL	Digital input effect	Remote controller	Setup*
A		√	The operation mode is defined by the digital input. The unit will be ON in COOL mode when L1-C is closed. The unit will be on in HEAT mode when H-L1 is closed. If both digital input are closed the unit will be ON in COOL mode.	The user can only set the target water flow temp.	<div style="border: 1px solid gray; padding: 2px;">                     6 ROOM THERMOSTAT                      ROOM THERMOSTAT <input checked="" type="checkbox"/> YES <input type="checkbox"/> NON                      MODE SETTING <input checked="" type="checkbox"/> YES <input type="checkbox"/> NON                      DUAL ROOM THERMOSTAT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NON                      ⏏ SCROLL                 </div>
B	√		The unit will be ON when the digital input is closed. The unit will operate in the mode defined by the controller.	The user can set the operation mode and the target water flow temp.	<div style="border: 1px solid gray; padding: 2px;">                     6 ROOM THERMOSTAT                      ROOM THERMOSTAT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NON                      MODE SETTING <input type="checkbox"/> YES <input checked="" type="checkbox"/> NON                      DUAL ROOM THERMOSTAT <input type="checkbox"/> YES <input checked="" type="checkbox"/> NON                      ⏏ SCROLL                 </div>

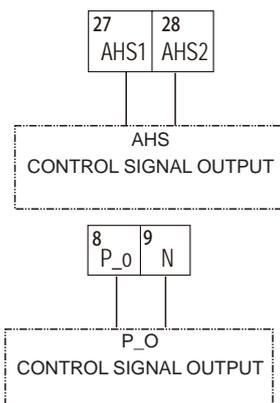
**Nota**  
For more details refer to paragraph " ROOM THERMOSTAT (ON/OFF - HEAT/COOL by digital input)" in the section "SET UP OF THE SYSTEM".

## Booster heater of the DHW tank (TBH)



<b>Voltage</b>	<b>220-240VAC</b>
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

## Boiler (AHS) and outside circulation pump (P\_o)



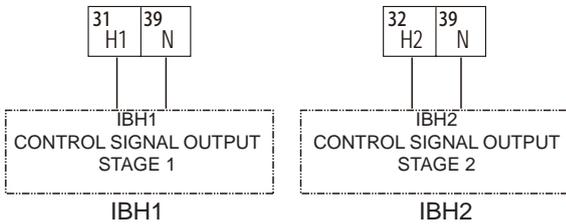
For 5/7 kW unit, the terminal number is 25 and 26.

<b>Voltage</b>	<b>220-240VAC</b>
Maximum running current	0.2A
Wiring size	0.75mm <sup>2</sup>

<b>Voltage</b>	<b>220-240VAC</b>
Maximum running current	100mA
Wiring size	0.75mm <sup>2</sup>

# ELECTRICAL CONNECTIONS

## Electrical booster



The unit can manage an electrical booster (as backup heater) with 2 stages (for example 2 electrical heater 1.5 kW). Connect to IBH1 the stage 1, to IBH2 the stage 2. If the booster has only one stage connect it to IBH1.

## Safety thermal switch of the electrical booster

Connect to these terminals the safety thermal switch of the electrical booster IBH

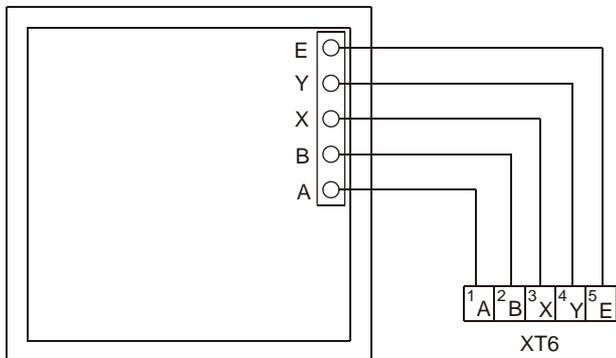


It must be connected to thermal protector!

If these 2 terminals are closed, it is possible to power the 2 relays of the hydronic board that manage IBH1 and IBH2. So, if these 2 terminals are open (for example if the thermal protector is open for overtemperature), IBH1 and IBH2 can not work. If the booster is not equipped with thermal switch output (alarm), these two terminals must be bridged.

## User interface

### COMMUNICATION

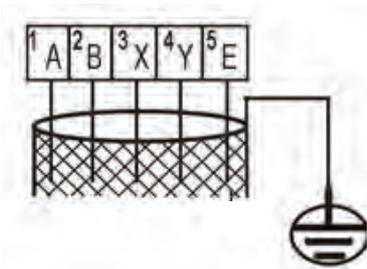


### NOTE

This equipment supports MODBUS RTU communication protocol.

Wire type	5 wire shielded cable
Wire section	AWG18-AWG16(0.75~1.25mm <sup>2</sup> )
Maximum wire length	50m

As described above, during wiring, port A in the unit terminal XT6 corresponds to port A in the user interface. Port B corresponds to port B. Port X corresponds to port X. Port Y corresponds to port Y, and port E corresponds to port E..



Procedure:

1. Remove the rear part of the user interface.
2. Connect the cable to the appropriate terminals as shown in the picture
3. Reattach the rear part of the user interface

“PLEASE USE SHIELDED WIRE AND EARTH THE WIRE.”