Water heat exchanger for hydronic applications

When a top London restaurant opened, it needed large volumes of fresh air to ensure the optimum dining environment. ECO G units connected to the cooling coils within the air handling equipment ensured the air was introduced in the right condition in both summer and winter.

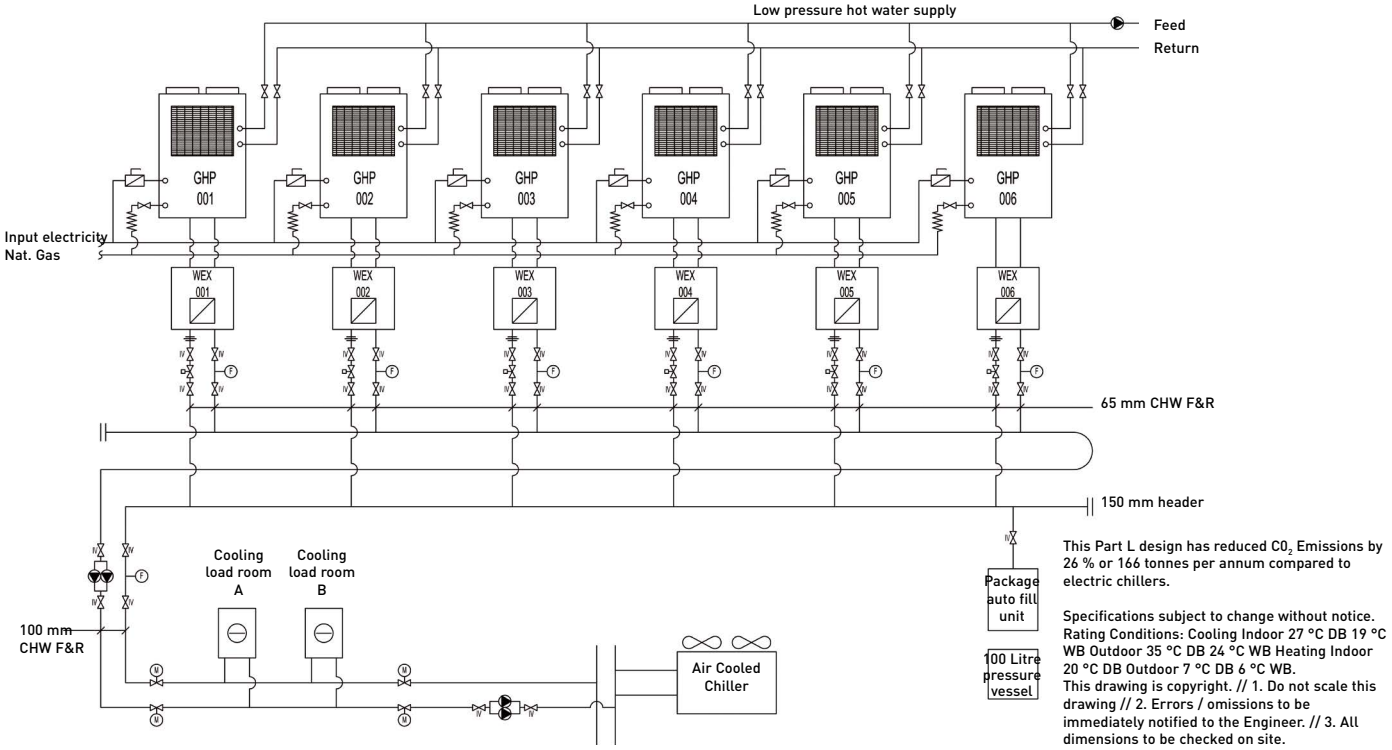
Chiller replacement. Chilled water supply to fan coils

Chiller replacement.
When some old chillers needed replacing at the end of their operational lifetime, ECO Gs with Water Heat Exchangers enabled the project to be carried out in stages whilst still utilising the existing water pipe work and fan coils. This enabled the project to be delivered on time, to a restricted budget and avoided all issues regarding refrigerant in confined spaces.

Connection to 'close control' computer equipment

Computer room applications.

When all available electrical power needed to be utilised for the IT equipment for a leading international bank, the cooling load of over 450 kW had to be powered by gas. The outdoor units were connected via Water Heat Exchangers to cooling coils inside the 'close control' units thereby maintaining a conditioned environment for temperature and humidity. By utilising the hot water function over 100 kW of hot water are supplied to the building and therefore the additional benefit of considerable CO_2 savings is ensured.



This Part L design has reduced CO_2 Emissions by 26 % or 166 tonnes per annum compared to electric chillers.

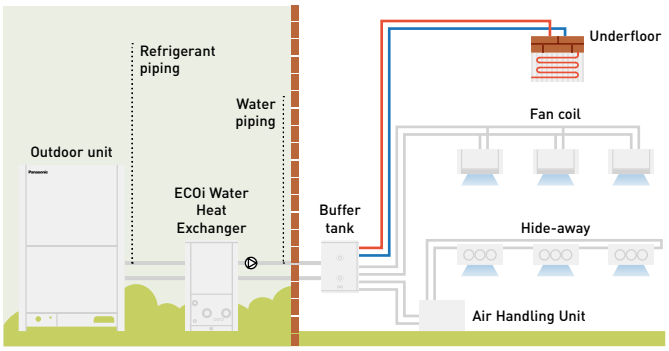
Specifications subject to change without notice. Rating Conditions: Cooling Indoor 27 °C DB 19 °C WB Outdoor 35 °C DB 24 °C WB Heating Indoor 20 °C DB Outdoor 7 °C DB 6 °C WB.
This drawing is copyright. // 1. Do not scale this drawing // 2. Errors / omissions to be immediately notified to the Engineer. // 3. All dimensions to be checked on site.

ECOi water heat exchanger

Electrical VRF with Water Heat Exchanger

· With this easy to install Water Heat Exchanger unit, you can now cover projects up to 51 kW hot water demand or 44 kW on chilled application on a efficient way and cost effective

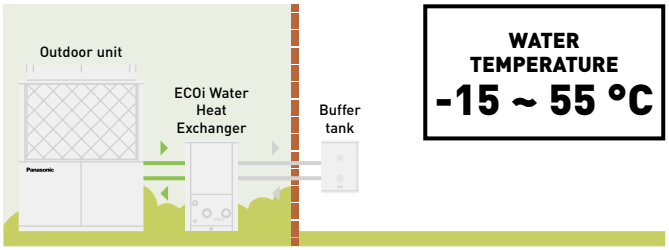
System example.



A buffer tank of minimum 280l for 28 kW and 500l for 50 kW is always needed.

Example of Hotel renewal of existing chiller and boiler system with Panasonic ECO G and Aquarea mixed solution

ECO G and Aquarea are the smart solution for renewal Chiller/Boiler applications with annual running cost savings around 13600€.



ECOi 2-Pipe with water heat exchanger for chilled and hot water production

Water heat exchanger (WHE) for hydronic applications.
WHE for ECOi system controlled by a timer remote control CZ-RTC5B.
Energy-efficient capacity control with superior external static pressure is now ready.

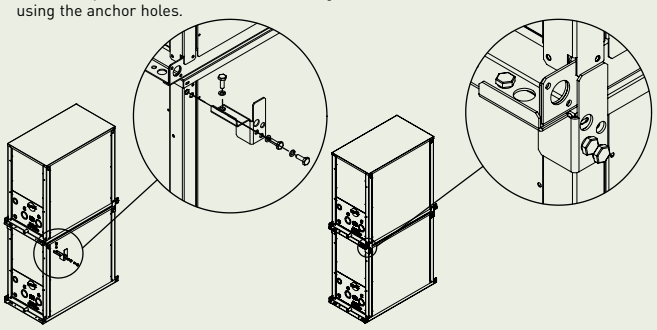
Hydrokit with A class water pump			**PAW-250WP5G1**	**PAW-500WP5G1**
Hydrokit without pump			**PAW-250W5G1**	**PAW-500W5G1**
Cooling capacity at 35 °C, water outlet 7 °C		kW	25,0	50,0
Heating capacity		kW	28,0	56,0
Heating capacity at +7 °C, heating water temperature at 45 °C		kW	28,0	56,0
COP at +7 °C with heating water temperature at 45 °C		W/W	2,97	3,10
Heating Energy Efficiency class at 35 °C [1]			**A++**	**A++**
ηsh (LOT1) [2]		**%**	**152,00**	**152,00**
Dimension	H x W x D	mm	1000 x 575 x 1110	1000 x 575 x 1110
Net weight		kg	135 (140 with pump)	155 (165 with pump)
Water pipe connector			Rp2 Female Thread (50A)	Rp2 Female Thread (50A)
Heating water flow (ΔT=5 K. 35 °C)		m^3/h	5,16	10,32
Capacity of integrated electric heater		kW	Not equipped	Not equipped
Flow switch			Equipped	Equipped
Water filter			Equipped	Equipped
Input power with A class water pump / without pump		kW	0,329 / 0,024	0,574 / 0,024
Maximum current with A class water pump / without pump		A	1,43 / 0,10	2,50 / 0,10
Outdoor unit			**U-10ME2E8**	**U-20ME2E8**
Sound pressure		dB(A)	56	60
Dimension	H x W x D	mm	1842 x 770 x 1000	1842 x 770 x 1000
Net weight		kg	210	375
Pipe diameter	Liquid pipe	Inch (mm)	3/8 (9,52)	5/8 (15,88)
	Gas pipe	Inch (mm)	7/8 (22,22)	1-1/8 (28,58)
Refrigerant (R410A) / CO_2 Eq.		kg	5,6 *Need Additional gas amount at site	9,5 *Need Additional gas amount at site
Pipe length range / Elevation difference (in/out)		m	170 / 50 (OD above) 35 (OD below)	170 / 50 (OD above) 35 (OD below)
Pipe length for nominal capacity		m	7,5	7,5
Pipe length for additional gas / Additional gas amount (R410A)		m / g/m	0 < / Refer to manual	0 < / Refer to manual
Operation range	Heat Min ~ Max	°C	-11 ~ +15 [3]	-11 ~ +15 [3]
Water outlet temperature range	Cool Min ~ Max	°C	+5 ~ +15	+5 ~ +15
	Heat Min ~ Max	°C	+35 ~ +45	+35 ~ +45

Accessories	
PAW-3WSK	Stacking kit for vertically stacking up to 3 WHE (4 pieces per Kit)

1) Unit efficiency energy level: Scale from A+++ to D. 2) Seasonal space cooling/heating energy efficiency following COMMISSION REGULATION (EU) 813/2013. 3) With accessory low temperature kit -25 ~ +15 °C. Available only as a spare part.

Performance calculation in agreement with Eurovent. Sound pressure measured at 1 m from the outdoor unit and at 1,5 m height.

Stacking kit PAW-3WSK.
It is possible to stack up to 3 units. When stacking units, always anchor the bottom unit to the ground using the anchor holes.



Availability of easy vertical stacking allows installations in a limited space (up to 3 units)*.
Stainless steel plate heat exchanger with anti-freeze protection control.
Change over between heating and cooling operation.

* Stacking kit (PAW-3WSK) is necessary.

Technical focus

Heating, cooling and DHW — A class water pump included (only in P model) — Flexible modularity from 25 kW — Better partial load vs standard chiller system — Compatible with all centralized controllers — Maximum distance between outdoor unit and WHE: 170 m — Maximum hot water outlet temperature: 45 °C — Minimum chilled water outlet temperature: 5 °C — Outdoor temperature range in heating mode: -11 °C to +15 °C (with low temperature kit -25 °C*)

* Available as a spare part.

ECO G with water heat exchanger for chilled and hot water production

Water heat exchanger (WHE) for hydronic applications.
WHE for ECO G system controlled by a timer remote control CZ-RTC5B.
Energy-efficient capacity control with superior external static pressure is now ready.

Hydrokit with A class water pump			**PAW-500WP5G1**	**PAW-710WP5G1**
Hydrokit without pump			**PAW-500W5G1**	**PAW-710W5G1**
Heating capacity		kW	60,0	80,0
Heating capacity at +7 °C, heating water temperature at 35 °C		kW	60,9	81,2
COP at +7 °C with heating water temperature at 35 °C		W/W	1,15	1,18
Heating capacity at +7 °C, heating water temperature at 45 °C		kW	60,0	80,0
COP at +7 °C with heating water temperature at 45 °C		W/W	1,02	1,04
Heating capacity at -7 °C, heating water temperature at 35 °C		kW	48,2	50,8
COP at -7 °C, heating water temperature at 35 °C		W/W	0,80	0,80
Heating capacity at -15 °C, heating water temperature at 35 °C		kW	46,3	50,0
COP at -15 °C with heating water temperature at 35 °C		W/W	0,80	0,80
Refrigeration load Pdesign		kW	48,0	—
Heating Energy Efficiency class at 35 °C [1]			**A+**	**—**
ηsh (LOT1) [2]		**%**	**130,00**	**128,00**
Cooling capacity		kW	—	—
Cooling capacity at +35 °C, outlet temperature 7 °C, inlet temperature 12 °C		kW	50,0	67,0
EER at +35 °C, outlet temperature 7 °C, inlet temperature 12 °C		W/W	0,78	0,89
Dimension	H x W x D	mm	1000 x 575 x 1110	1000 x 575 x 1110
Net weight		kg	155 (165 with pump)	160 (175 with pump)
Water pipe connector			Rp2 Female Thread (50A)	Rp2 Female Thread (50A)
Heating water flow (ΔT=5 K. 35 °C)		m³/h	10,32	13,76
Capacity of integrated electric heater		kW	Not equipped	Not equipped
Flow switch			Equipped	Equipped
Water filter			Equipped	Equipped
Input power with A class water pump / without pump		kW	0,574 / 0,024	0,824 / 0,024
Maximum current with A class water pump / without pump		A	2,50 / 0,10	3,60 / 0,10
Outdoor unit			**U-20GE3E5**	**U-30GE3E5**
Sound power	Normal / Silent	dB(A)	80 / 77	84 / 81
Dimension	H x W x D	mm	2255 x 1650 x 1000	2255 x 2026 x 1000
Net weight		kg	765	880
Pipe diameter	Liquid pipe	Inch (mm)	5/8 (15,88)	3/4 (19,05)
	Gas pipe	Inch (mm)	1-1/8 (28,58)	1-1/4 (31,75)
Pipe length / Pipe length for nominal capacity		m	7 / 170	7 / 170
Elevation difference (in/out)		m	50 (OD above) 35 (OD below)	50 (OD above) 35 (OD below)
Operation range	Heat Min ~ Max	°C	-21 ~ +24 (until outlet temperature 45)	-21 ~ +24 (until outlet temperature 45)
Water outlet temperature range	Cool Min ~ Max	°C	-15 ~ +15	-15 ~ +15
	Heat Min ~ Max	°C	+35 ~ +55	+35 ~ +55

Accessories	
PAW-3WSK	Stacking kit for vertically stacking up to 3 WHE (4 pieces per Kit)

1) Unit efficiency energy level: Scale from A+++ to D. 2) Seasonal space cooling/heating energy efficiency following COMMISSION REGULATION (EU) 813/2013.

Performance calculation in agreement with Eurovent. Sound pressure measured at 1 m from the outdoor unit and at 1,5 m height.

Availability of easy vertical stacking allows installations in a limited space (up to 3 units)*.
Stainless steel plate heat exchanger with anti-freeze protection control.
Change over between heating and cooling operation.

* Stacking kit (PAW-3WSK) is necessary.

GAS POWERED
ECO G

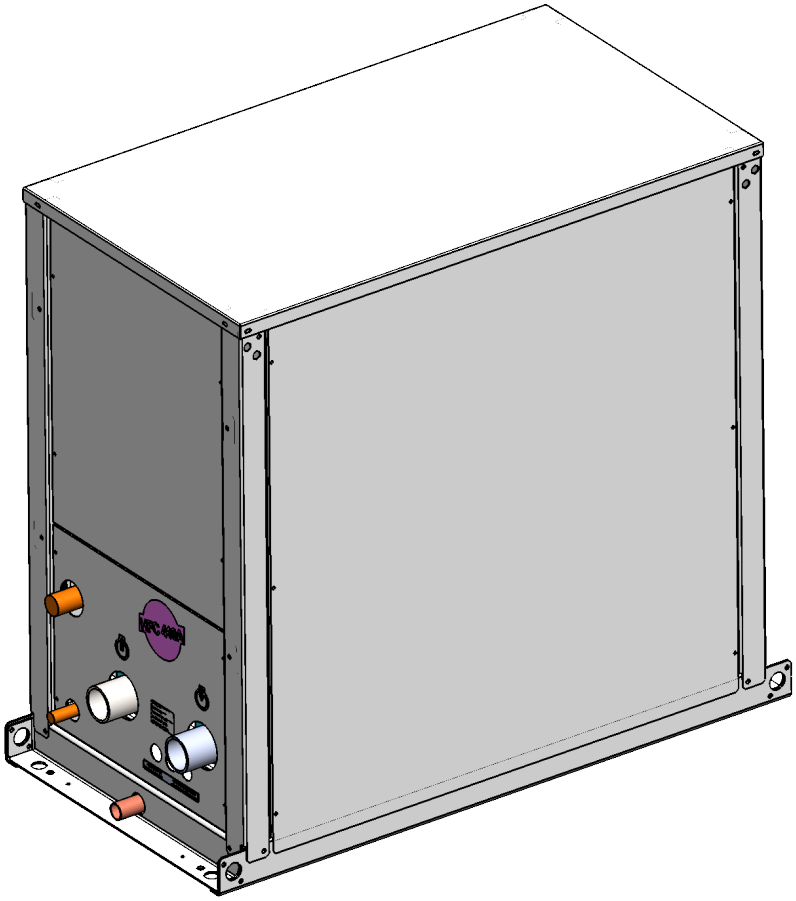
Technical focus

Heating, cooling and DHW — A class water pump included (only in P model) — No cascade installation up to 80 kW — Free DHW from waste heat of engine — Compatible with all centralized controllers — Maximum distance between outdoor unit and WHE: 170 m — Hot water outlet temperatures from 35 °C to 55 °C — Chilled water outlet temperatures from -15 °C to +15 °C — Minimum outdoor temperature in heating mode: -21 °C

Rating Conditions: Cooling Indoor 27 °C DB / 19 °C WB. Cooling Outdoor 35 °C DB / 24 °C WB. Heating Indoor 20 °C DB. Heating Outdoor 7 °C DB / 6 °C WB. (DB: Dry Bulb; WB: Wet Bulb).
Specifications subject to change without notice. For detailed information about ErP / Energy Labelling, please visit our websites www.aircon.panasonic.eu or www.ptc.panasonic.eu.

Installation and maintenance manual

WATER HEAT EXCHANGER



English

25
↓
71 kW

30
↓
80 kW

HFC 410A

PAW-250W5G1
PAW-500W5G1
PAW-710W5G1

PAW-250WP5G1
PAW-500WP5G1
PAW-710WP5G1

Part number: **373189 REV. I**
Supersedes: 373189 REV. H

CE

ISO 9001:2015 certified management system

English

Table of Contents

1 - Foreword

1.1 Introduction

Units, manufactured to state-of-the-art design and implementation standards, ensure top performance, reliability and fitness to any type of air-conditioning systems.

These units are designed for cooling water or glycoled water and for water heating and are unfit for any purposes other than those specified in this manual.

This manual includes all the information required for a proper installation of the units, as well as the relevant operating and maintenance instructions.

It is therefore recommended to read this manual carefully before installation or any operation on the machine. The unit installation and maintenance must be carried out by skilled personnel only (where possible, by one of Authorised Service Centers).

The manufacturer may not be held liable for any damage to people or property caused by improper installation, start-up and/or improper use of the unit and/or failure to implement the procedures and instructions included in this manual.

1.2 Warranty

These units are delivered complete, tested and ready for being operated. Any form of warranty will become null and void in the event that the appliance is modified without manufacturer's preliminary written authorisation.

In order for this warranty to be valid, the following conditions shall be met:

- The machine must be operated only by skilled personnel from Authorised After-Sales Service.
- Maintenance must be performed only by skilled personnel - from one of Authorised After-Sales Centers.
- Use only original spare parts.
- Carry out all the planned maintenance provided for by this manual in a timely and proper way.

Failure to comply with any of these conditions will automatically void the warranty.

1.3 An introduction to the manual

For safety reasons, it is imperative to follow the instructions given in this manual. In case of any damage caused by non-compliance with these instructions, the warranty will immediately become null and void.

Conventions used throughout the manual:

	The DANGER sign recalls your attention to a certain procedure or practice which, if not followed, may result in serious damage to people and property.
	The WARNING sign precedes those procedures that, if not followed, may result in serious damage to the appliance.
	The NOTE contain important observations.
	The USEFUL TIPS provide valuable information that optimises the efficiency of the appliance.

2 - Safety

2.1 Foreword

These units must be installed in conformity with the provisions of Machinery Directive 2006/42/EC, Electromagnetic Compability Directive 2014/30/EU, as well as with other regulations applicable in the country of installation. If these provisions are not complied with, the unit must not be operated.

The unit must be grounded, and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit.

Failure to respect the safety measures mentioned above may result in electrocution hazard and fire in the presence of any short-circuits.

Inside the heat exchangers, the compressors and the refrigeration lines, this unit contains liquid and gaseous refrigerant under pressure. The release of this refrigerant may be dangerous and cause injuries.

The units are not designed to be operated with natural refrigerants, such as hydrocarbons. Manufacturer may not be held liable for any problems deriving from the replacement of original refrigerant or the introduction of hydrocarbons.

- The used refrigerants are included in group II (non-hazardous fluids).
- The maximum working pressure values are mentioned on the unit's data plate.
- Suitable safety devices (pressure switches and safety valves) must be installed on the refrigerant line when installing the unit.
- Dedicated guards (removable panels with tools) and danger signs indicate the presence of hot pipes or components (high surface temperature).

It is the User's responsibility to ensure that the unit is fit for the conditions of intended use and that both installation and maintenance are carried out by experienced personnel, capable of respecting all the recommendations provided by this manual.

It is important that the unit is adequately supported, as detailed in this manual. Non-compliance with these recommendations may create hazardous situations for the personnel.

The unit must rest on a base which meets the characteristics specified in this manual; a base with inadequate characteristics is likely to become a source of serious injury to the personnel.

The packaging material must not be disposed of in the surrounding environment or burnt.

2 - Safety

2.2 Definitions

OWNER: means the legal representative of the company, body or individual who owns the plant where unit has been installed; he/she has the responsibility of making sure that all the safety regulations specified in this manual are complied with, along with the national laws in force.

INSTALLER: means the legal representative of the company who has been given by the owner the job of positioning and performing the hydraulic, electric and other connections of unit to the plant: he/she is responsible for handling and properly installing the appliance, as specified in this manual and according to the national regulations in force.

OPERATOR: means a person authorised by the owner to do on unit all the regulation and control operations expressly described in this manual, that must be strictly complied with, without exceeding the scope of the tasks entrusted to him.

ENGINEER: means a person authorised directly by manufacturer or, in all EC countries, excluding Italy, under his full responsibility, by the distributor of product, to perform any routine and extraordinary maintenance operations, as well as any regulation, control, servicing operations and the replacement of pieces, as may be necessary during the life of the unit.

2.3 Access to the unit

The unit must be placed in an area which can be accessed also by OPERATORS and ENGINEERS; otherwise the unit must be surrounded by a fence at not less than 2 meters from the external surface of the machine.

OPERATORS and ENGINEERS must enter the fenced area only after wearing suitable clothing (safety shoes, gloves, helmet etc.). The INSTALLER personnel or any other visitor must always be accompanied by an OPERATOR.

For no reason shall any unauthorised personnel be left alone in contact with the unit.

2.4 General precautions

The OPERATOR must simply use the controls of the unit; he must not open any panel, other than the one providing access to the control module.

When you approach or work on the unit, follow the precautions listed below:

- do not wear loose clothing or jewellery or any other accessory that may be caught in moving parts
- wear suitable personal protective equipment (gloves, goggles etc.) when you have to work in the presence of free flames (welding operations) or with compressed air
- cut off connecting pipes, drain them in order to balance the pressure to the atmospheric value before disconnecting them, disassemble connections, filters, joints or other line items
- do not use your hands to check for any pressure drops
- use tools in a good state of repair; be sure to have understood the instructions before using them
- be sure to have removed all tools, electrical cables and any other objects before closing and starting the unit again

2.5 Precautions against residual risks

Prevention of residual risks caused by the control system

- be sure to have perfectly understood the operating instructions before carrying out any operation on the control panel
- when you have to work on the control panel, keep always the operating instructions within reach
- start the unit only after you have checked its perfect connection to the plant
- promptly inform the ENGINEER about any alarm involving the unit
- do not reset manual restoration alarms unless you have identified and removed their cause

Prevention of residual mechanical risks

- install the unit according to the instructions provided in this manual
- carry out all the periodical maintenance operations prescribed by this manual
- before opening any panelling of the machine, make sure that it is secured to it by hinges

Prevention of residual electrical risks

- connect the unit to the mains according to the instructions provided in this manual
- periodically carry out all the maintenance operations specified by this manual
- disconnect the unit from the mains by the external disconnecting switch before opening the electrical board
- check the proper grounding of the unit before start-up
- check all the electrical connections, the connecting cables, and in particular the insulation; replace worn or damaged cables

2 - Safety

- periodically check the board's internal wiring
- do not use cables having an inadequate section or flying connections, even for limited periods of time or in an emergency

Prevention of other residual risks

- make sure that the connections to the unit conform to the instructions provided in this manual and on the unit's panelling
- if you have to disassemble a piece, make sure that it has been properly mounted again before restarting the unit
- do not touch the delivery pipes from the compressor and any other piping or component inside the machine before wearing protective gloves
- keep a fire extinguisher fir for electrical appliances near the machine
- Install safety valves on the refrigeration circuits to a piping network that can channel any overflowing refrigerant outside
- remove and leak of fluid inside and outside the unit
- collect the waste liquids and dry any oil spillage
- do not store flammable liquids near the unit
- do not disperse the refrigerant and the lubricating oil into the environment
- weld only empty pipes; do not approach flames or other sources of heat to refrigerant pipes
- do not bend/hit pipes containing fluids under pressure

2.6 Precautions during maintenance operations

Maintenance operations can be carried out by authorised technicians only.

Before performing any maintenance operations:

- disconnect the unit from the mains with the external disconnecting switch
- place a warning sign "do not turn on - maintenance in progress" on the external disconnecting switch
- make sure that on-off remote controls are inhibited
- wear suitable personal protective equipment (helmet, safety gloves, goggles and shoes etc.)

To carry out any measurements or checks which require the activation of the machine:

- work with the electrical board open only for the necessary time
- close the electrical board as soon as the measurement or check has been completed

The following precautions must be always adopted:

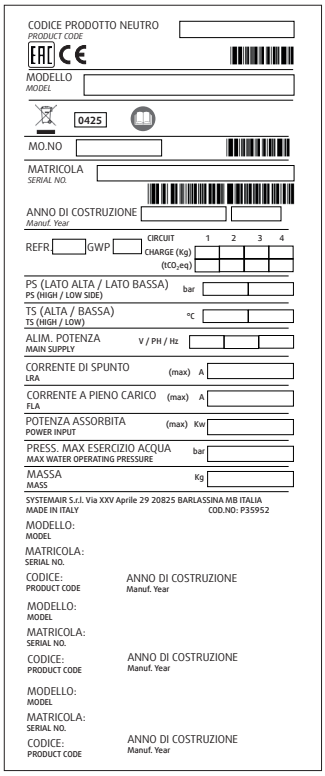
- do not scatter the fluids of the refrigeration circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace the pump, the evaporator or any other weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- contact manufacturer for any modifications to the refrigeration, hydraulic or wiring diagram of the unit, as well as to its control logics
- contact manufacturer if it is necessary to perform very difficult disassembly and assembly operations
- use only original spare parts purchased directly from manufacturer or the official retailers of the companies on the recommended spare parts list
- contact manufacturer if it is necessary to handle the unit one year after its positioning on site or if you wish to dismantle it.

2 - Safety

2.7 Safety labels

Identification of the refrigerant - Outside, on the external panel

Identification of the unit - Outside, on the external panel



Pump operation - Outside, on the external panel

LAS BOMBAS MONTADAS EN ESTA UNIDAD NO PUEDEN TRABAJAR SIN AGUA
DIE PUMPEN DIESES GERÄTES DÜRFEN NICHT OHNE WASSER BETRIEBEN WERDEN
THE PUMPS ON BOARD OF THIS UNIT CAN NOT WORK WITHOUT WATER
LES POMPES A BORD DE CETTE UNITE NE PEUVENT PAS FONCTIONNER SANS EAU
LE POMPE ABORDO DI QUESTA UNITÀ NON POSSONO FUNZIONARE SENZA ACQUA

Electrical warning - On the elecrical box panel

	ATTENZIONE ! Prima di aprire togliere tensione	ATTENTION ! Enlever l'alimentation electrique avant d'ouvrir
ACHTUNG ! Vor offnen des gehauses hauptschalter ausschalten	CAUTION ! Disconnect electrical supply before opening	ATENCION ! Cortar la corrente antes de abrir el aparato

Factory adjusted flow switch

FLUSSOSTATO REGOLATO
IN FABBRICA

FACTORY ADJUSTED
FLOW SWITCH

CONTRÔLEUR DE DÉBIT D'EAU
RACCORDÉ EN USINE

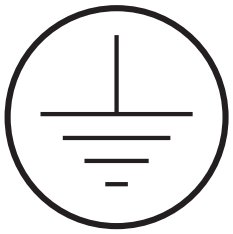
WERKSEINGESTELLTER
STRÖMUNGSWÄCHTER

INTERRUPTOR DE FLUJO
AJUSTADO EN FÁBRICA

Power supply

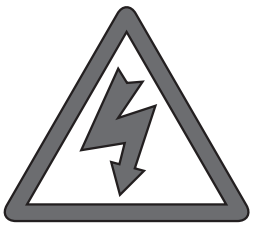
POWER SUPPLY DRAWING-IN PORT	UNIT COMMUNICATION WIRING DRAWING-IN PORT

Grounding connection on the electrical board, adjacent to the connection

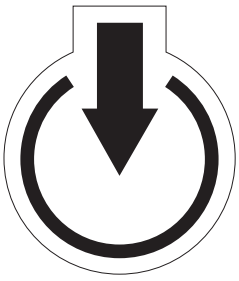


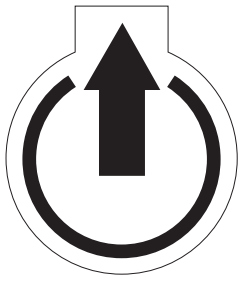
Read the instruction on the electrical board

On voltage



Fitting identification - Adjacent to fittings





2 - Safety

2.8 Safety regulations

REFRIGERANT DATA	SAFETY DATA: R410A
Toxicity	Low.
Contact with skin	If sprayed, the refrigerant is likely to cause frost burns. If absorbed by the skin, the danger is very limited; it may cause a slight irritation, and the liquid is degreasing. Unfreeze the affected skin with water. Remove the contaminated clothes with great care - in the presence of frost burns, the clothes may stick to the skin. Wash with plenty of warm water the affected skin. In the presence of symptoms such as irritation or blisters, obtain medical attention.
Contact with eyes	Vapours do not cause harmful effects. The spraying of refrigerant may cause frost burns. Wash immediately with a proper solution or with tap water for at least 10 minutes, and then obtain medical attention.
Ingestion	Very unlikely - should something happen, it will cause frost burns. Do not induce vomiting. Only if the patient is conscious, wash out mouth with water and give some 250 ml of water to drink. Then, obtain medical attention.
Inhalation	R410A: remarkable concentrations in the air may have an anaesthetic effect, up to fainting. The exposure to considerable amounts may cause irregular heartbeat, up to the sudden death of the patient. Very high concentrations may result in the risk of asphyxia, due to the reduction in the oxygen percentage in the atmosphere. Remove the patient to fresh air and keep warm and at rest. If necessary, give oxygen. In case of breathing difficulties or arrest, proceed with artificial respiration. In case of cardiac arrest, proceed with cardiac massage. Then, obtain medical attention.
Recommendations	Semiotics or support therapy is recommended. Cardiac sensitisation has been observed that, in the presence of circulating catecholamines such as adrenalin, may cause cardiac arrhythmia and accordingly, in case of exposure to high concentrations, cardiac arrest.
Prolonged exposure	R410A: a study on the effects of exposure to 50,000 ppm during the whole life of rats has identified the development of benign testicle tumour. This situation should therefore be negligible for personnel exposed to concentrations equal to or lower than professional levels.
Professional levels	R410A: Recommended threshold: 1000 ppm v/v - 8 hours TWA.
Stability	R410A: Not specified.
Conditions to avoid	Do not use in the presence of flames, burning surfaces and excess humidity.
Hazardous reactions	May react with sodium, potassium, barium and other alkaline metals. Incompatible substances: magnesium and alloys with magnesium concentrations > 2%.
Hazardous decomposition products	R410A: Halogen acids produced by thermal decomposition and hydrolysis.

2.8 Safety regulations (continued)

REFRIGERANT DATA	SAFETY DATA: R410A
General precautions	Do not inhale concentrated vapours. Their concentration in the atmosphere should not exceed the minimum preset values and should be maintained below the professional threshold. Being more weighty than the air, the vapour concentrates on the bottom, in narrow areas. Therefore, the exhaust system must work at low level.
Respiratory system protection	If you are in doubt about the concentration in the atmosphere, it is recommended to wear a respirator approved by an accident-prevention Authority, of the independent or oxygen type.
Storage	Cylinders must be stored in a dry and fresh place, free from any fire hazard, far from direct sunlight or other sources of heat, radiators etc. Keep a temperature below 50 °C.
Protective clothing	Wear overalls, protective gloves and goggles or a mask.
Accidental release measures	It is important to wear protective clothing and a respirator. Stop the source of the leak, if you can do this without danger. Negligible leaks can be left evaporating under the sun, providing that the room is well ventilated. Considerable leaks: ventilate the room. Reduce the leak with sand, earth or other absorbing substances. Make sure that the liquid does is not channelled into gutters, sewers or pits where the vapours are likely to create a stuffy atmosphere.
Disposal	The best method is recovery and recycling. If this method is not practicable, dispose according to an approved procedure, that shall ensure the absorption and neutralization of acids and toxic agents.
Fire fighting information	R410A: Not flammable in the atmosphere.
Cylinders	The cylinders, if exposed to fire, shall be cooled by water jets; otherwise, if heated, they may explode.
Protective fire fighting equipment	In case of fire, wear an independent respirator and protective clothing.

2 - Safety

2.8 Safety regulations (continued)

LUBRICANT OIL DATA	SAFETY DATA: POLYESTER OIL (POE)
Classification	Not harmful.
Contact with skin	May cause slight irritation. Does not require first aid measures. It is recommended to follow usual personal hygiene measures, including washing the exposed skin with soap and water several times a day. It is also recommended to wash your overalls at least once a week.
Contact with eyes	Wash thoroughly with a suitable solution or tap water.
Ingestion	Seek medical advice immediately.
Inhalation	Seek medical advice immediately.
Conditions to avoid	Strong oxidising substances, caustic or acid solutions, excess heat. May corrode some types of paint or rubber.
Protection of the respiratory system	Use in well ventilated rooms.
Protective clothing	Always wear protective goggles or a mask. Wearing protective gloves is not mandatory, but is recommended in case of prolonged exposure to refrigerant oil.
Accidental release measures	It is important to wear protective clothing and, especially, goggles. Stop the source of the leak. Reduce the leak with absorbing substances (sand, sawdust or any other absorbing material available on the market).
Disposal	The refrigerant oil and its waste will be disposed of in an approved incinerator, in conformity with the provisions and the local regulations applicable to oil waste.
Fire fighting information	In the presence of hot liquid or flames, use dry powder, carbon dioxide or foam. If the leak is not burning, use a water jet to remove any vapours and to protect the personnel responsible for stopping the leak.
Cylinders	The cylinders exposed to a fire will be cooled with water jets in case of fire.
Fire fighting protective equipment	In case of fire, wear an independent respirator.

3 - Transport, Handling and Storage

3.1 Inspection

The unit shall be immediately inspected upon receipt to find out any damage since it has been delivered ex works and transported at the customer's risk. It is also necessary to make sure that all the parcels specified on the delivery note have been delivered.

Any damage you may find out shall be immediately reported in writing to the carrier. Even if the damage is only on the surface, please notify our local representative too.

The manufacturer disclaims all responsibility for the shipment even if it has provided for its organisation.

3.2 Handling

WHE units are designed to be lifted from above, by means of cables and suspension holes. Use the configuration shown in the figure aside to lift the unit in a proper way.

Before handling the devices, make sure the site you have chosen for the installation can withstand its weight and support its mechanical impact.

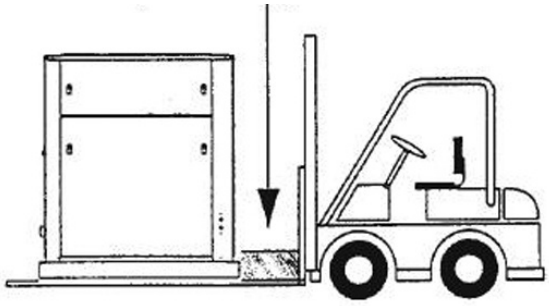
WARNING	The unit shall never be placed on rollers.

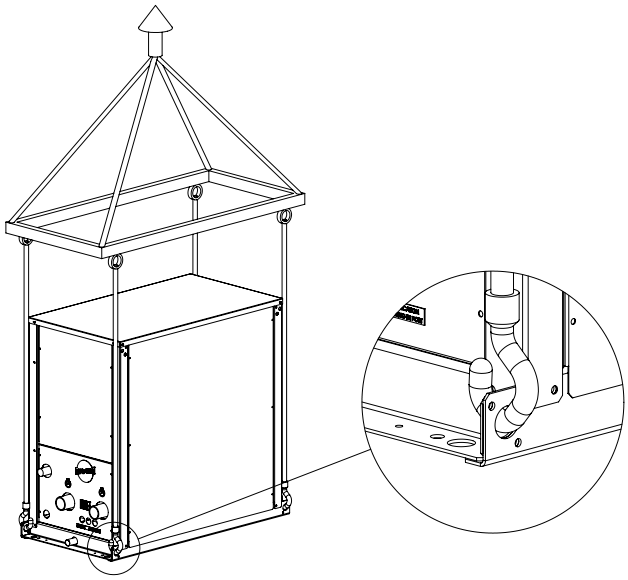
Act as follows to lift and handle the unit:

- Connect the cables to the suspension holes.
- Insert the spacer between the cables.
- Provide for hooking at the centre of gravity of the device.
- Cables shall have such a length that the angle they form with the horizon when under tension is not less than 45°.

WARNING	Do not lay the WHE unit on its side during transportation. Internal damage could result in malfunction
WARNING	Do not stock units one on top of another

Space requirements request to handling





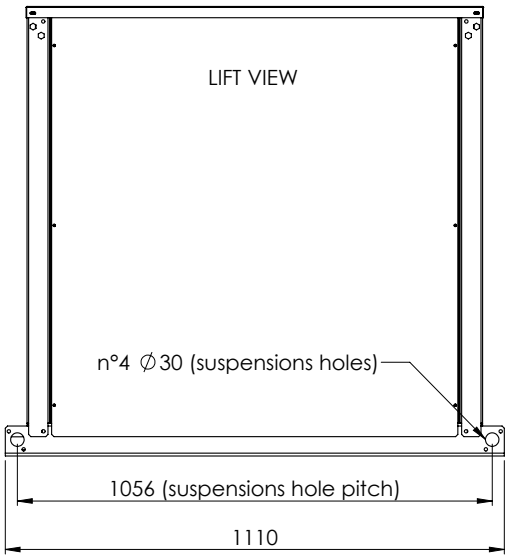
3 - Transport, Handling and Storage

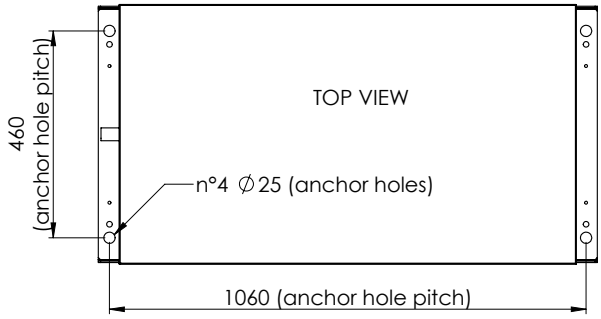
WARNING	Until the unit is ready for operation, do not remove the plastic envelope to prevent external surfaces damaging.

3.3 Anchoring

It is not essential to secure the unit to the foundations, unless in areas where there is a serious risk of earth-quake, or if the appliance is installed on the top of a steel frame.

If Anchoring is needed use the anchoring holes of figure:





3.4 Storage

If the unit is to be stored before the installation for some time, take at least the following precautions to prevent damage, corrosion and/or deterioration:

- Make sure all openings, such as for example water connections, are well plugged and sealed.
- Never store the units in a room where temperature is above 50 °C (R410A units) or where the units are directly exposed to the sunlight.
- Minimum storage temperature is -25 °C.
- Store the units in areas where minimum activity is likely to take place in order to avoid any risk of accidental damage.
- Never use steam to clean the unit.

It is also recommended to provide for visual inspections at regular intervals.

4 - Installation

4.1 Installation Site

	**Before installing the unit, make sure that the building structure and/or the supporting surface can withstand the weight of the device. The weights of the units are detailed by Chapter 8 of this manual.**
	These units have been designed to be installed on the floor, or on robust supports, and only for indoor applications. Nevertheless, installation of the unit outdoors is also possible, provided that a shelter from heavy rain is ensured.

When the unit is to be installed on the ground, provide for a antivibration mat which shall assure a uniform distribution of the weights. No special subbase is generally required.

When selecting the installation site, never forget to consider as follows:

- Provide the required space for inspection and maintenance
- If the water heat exchanger unit is installed on a high location, provide a permanent ladder or hand grips for safe access, and provide railings or hand grips around WHE unit to prevent falls
- Ensure that the installation location has adequate water drainage. A defect in the piping could cause water leaks into the surrounding property
- Drain pipes that pass indoors should be as short as possible
- Drain pipes that pass indoors must be insulated
- Make sure that drain water cannot cause trouble for surrounding properties
- Use a leveling tool to ensure that the unit is truly horizontal. Water leaks can result if the unit is not horizontally true
- If the ambient temperature in the installation site could be below 0°C, it is necessary to use a glycol mixture as thermal vector (see table at section 8.2 for more information)

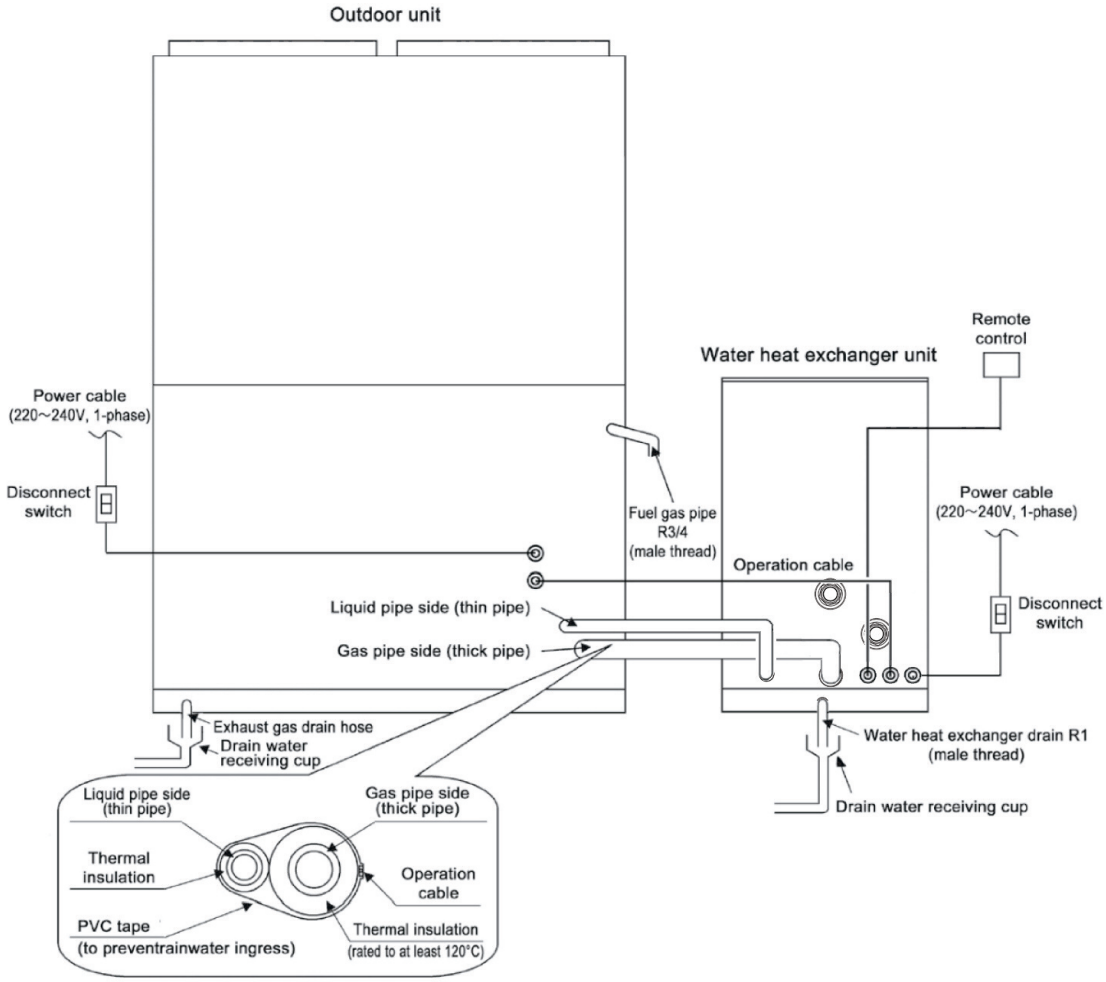
4.2 Connection to the outdoor unit

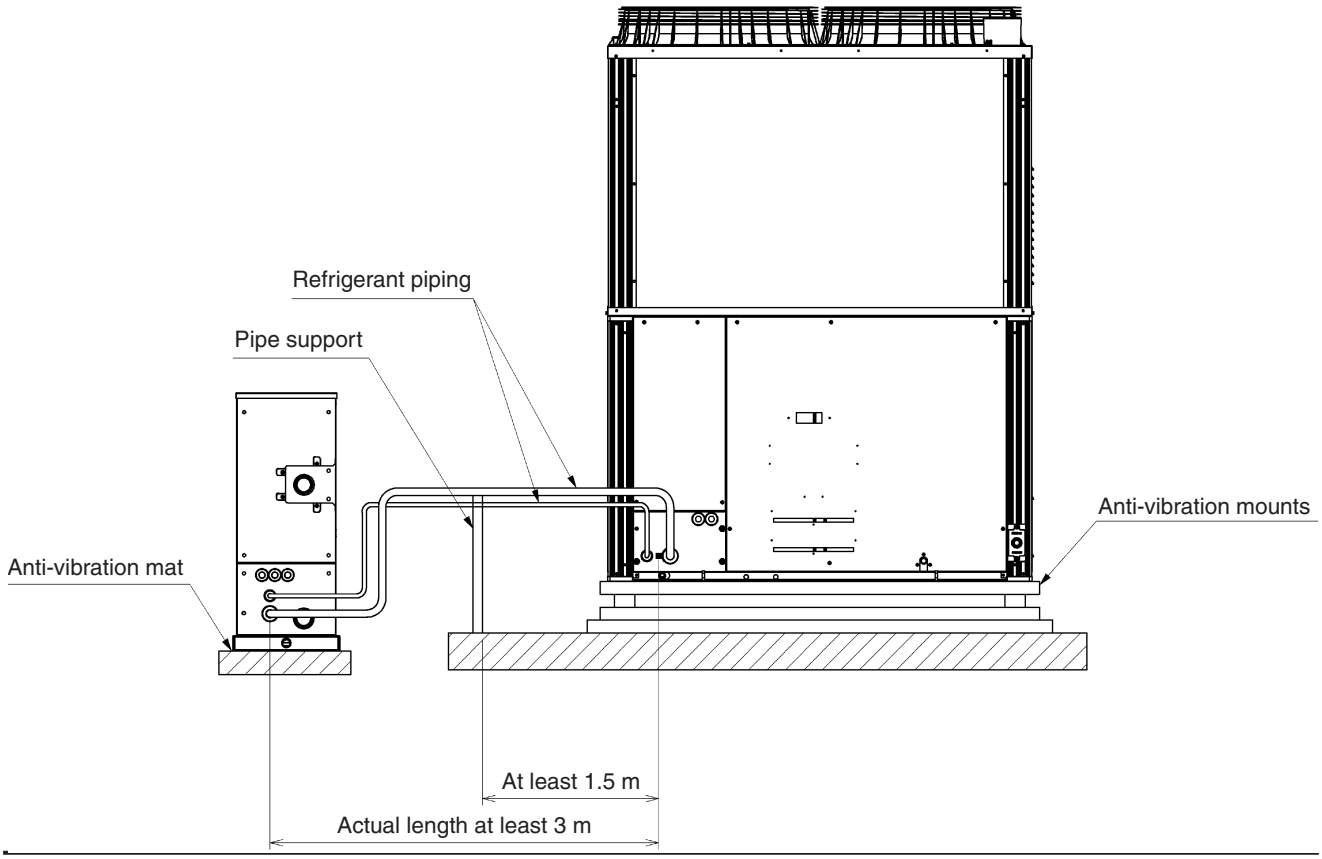
When connecting the refrigerant pipes to the outdoor unit consider to

- Ensure an actual length of refrigerant piping between the outdoor unit and the WHE of at least 3 meters
- Include bends and vertical lines in at least two places as in figure
- A siphon on the gas line at the exit of the WHE unit is recommended
- Refrigerant piping should be secured with support at least 1.5 meters from the units

See the next page figure.

4 - Installation





4 - Installation

4.3 Placing units one on an other

WARNING	It is allowed to place up to 3 units one on an other, only during operation. It is not allowed to pile units during stock.

- It is allowed to place up to 3 units one on an other, by using the appropriate accessory kit, supplied (on request) by the constructor
- Follow the instructions supplied with the kit (refer to accessory in product description)
- Always use the bolt and washer supplied together with the kit

4.4 External Water Circuit

WARNING	The external water circuit shall guarantee a constant water flow rate through the circulating refrigerant/water heat exchanger (evaporator) under steady operating conditions and in case of a load variation.

The circuit shall be composed by the following elements:

- For unit without internal pump, provide a circulation pump which can ensure the necessary flow rate and head. If the external pump has a collective fault signal, it should be connected to the provided terminal contacts. It is important to ensure the operation stop of the system in case external pump fails to operate in order to avoid a freezing of the plate heat exchanger in cooling mode or overheating in case of heating mode.
- In case of controlling the water circuit by external valves, such as automated shut off valves or 3way valves or similar, take care that the water flow can not be interrupted during WHE unit operation. Failure to do so may lead to a damage and contamination of the whole refrigerant system.
- The buffer tank content (not provided by the manufacturer), installed on the primary water circuit, shall never be lower than 10 lt/kW in terms of refrigerating capacity. This tank is intended to avoid any repetitive start of the compressor.
- A membrane expansion tank complete with a safety valve and a drain which shall be visible.
- Follow the 3 possible configurations in the figures on the next page.

NOTE	The expansion tank shall be dimensioned in such a way that it can absorb a 2% expansion of the total volume of the water in the plant (exchanger, pipelines, uses and storage tank, if available). The expansion tank shall never be insulated when the circulating fluid is not flowing through it.

A differential pressure switch is mounted as a standard. It will stop the unit whenever it senses a load loss through the heat exchanger which may result in a flow rate problem. A flow switch is mounted as a standard. It will stop the unit whenever it senses a significant loss in flow rate, which could cause freezing in the heat exchanger.

A drain valve is present as a standard on the low part of the unit
A vent valve is present as a standard on the high part of the unit

In addition it is advisable to:

- Install on/off valves on the lines at the inlet and outlet of the manifolds of the exchangers (evaporator).
- Arrange air vent valves at the high points of the water lines.
- Arrange drain points complete with plugs, cocks, etc. in the proximity of the low points of the water lines.
- Insulate the water lines to prevent the heat from blowing back into the unit.
- Provide a flow rate adjustment valve, so that the hot/cold water flow rate can be adjusted while watching the water temperature during testing. Do not touch the adjustment valve after adjusting
- The hot/cold water flow rate should be within the range shown in the technical data

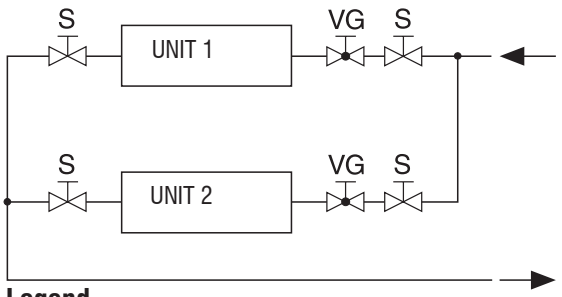
WARNING	The external water circuit must be dimensioned with the minimum bends possible, in order to reduce pressure drops and maintain the nominal flow rates reported in the technical data section. Refer to the pump available static pressure curve and unit pressure drop curve in the technical data section to a correct dimension of the water circuit

WARNING	Before filling the installation, remove any impurity, such as sand, crushed stones and welding scales, coating drops and any other material which might damage the evaporator.

It is advisable to flush with disposable water bypassing the exchanger to avoid clogging.

NOTE	The water used to fill the circuit shall be treated in such as way that the pH will have the correct value.

When two or several units are connected in parallel, to balance the load losses of the various circuits, it is recommended to execute a “reverse return” connection (see the diagram below).

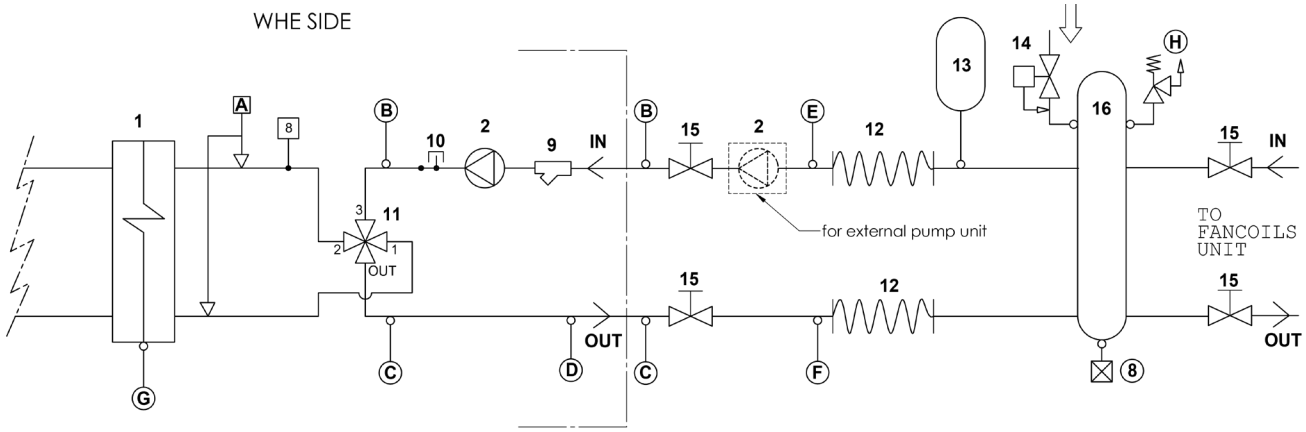


Legend

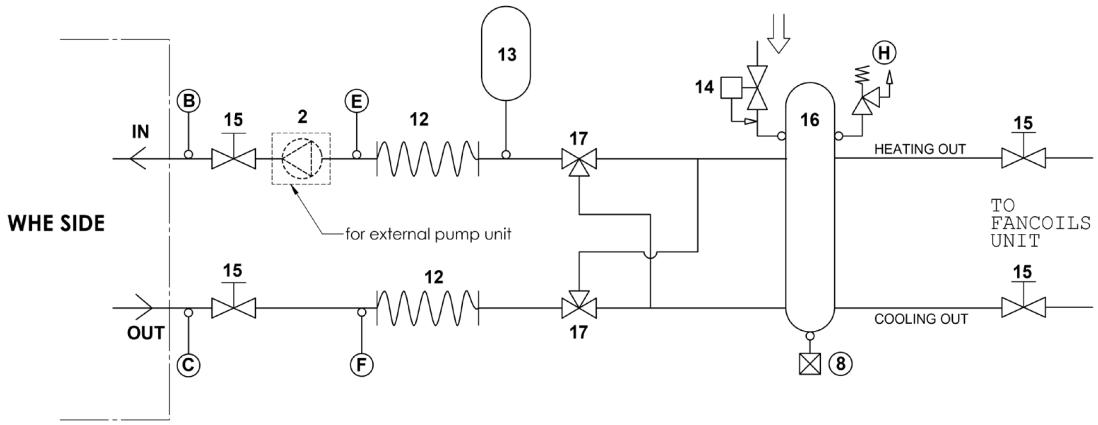
S On/Off valves
VG Balancing valves

4 - Installation

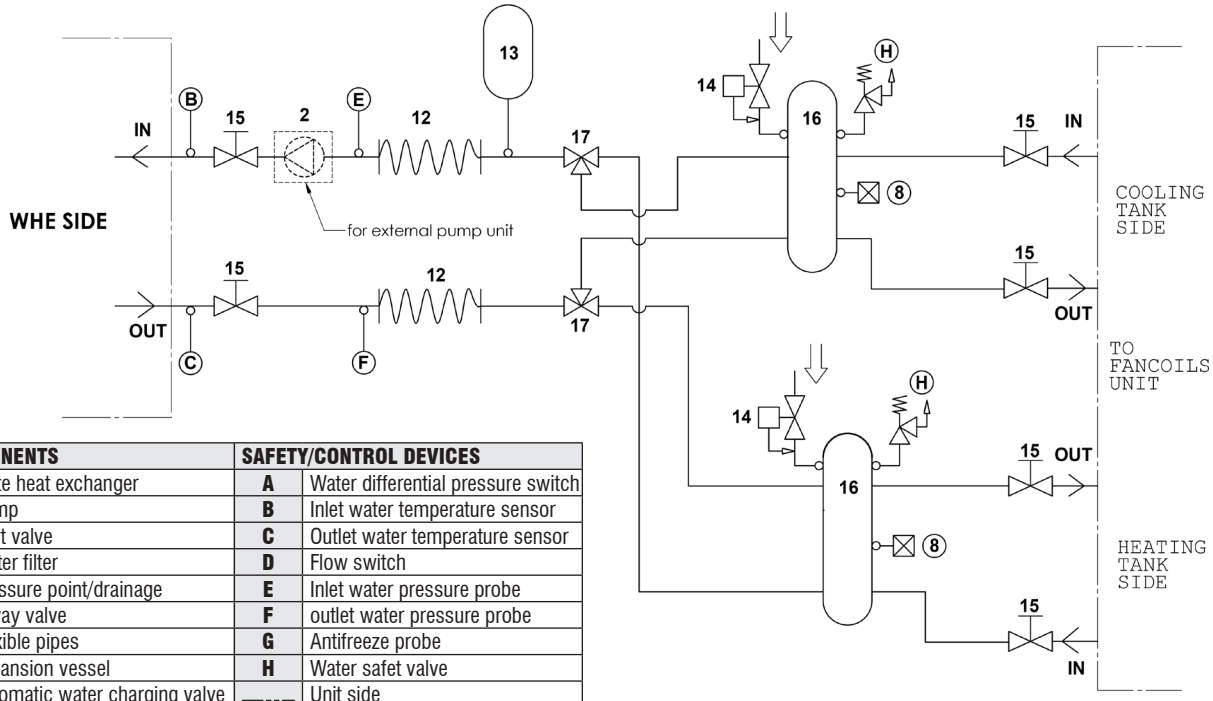
Water circuit - Basic configuration



Water circuit - One tank-3 way valve configuration



Water circuit - Two tanks-3 way valve configuration



COMPONENTS		SAFETY/CONTROL DEVICES	
1	Plate heat exchanger	A	Water differential pressure switch
2	Pump	B	Inlet water temperature sensor
8	Vent valve	C	Outlet water temperature sensor
9	Water filter	D	Flow switch
10	Pressure point/drainage	E	Inlet water pressure probe
11	4 way valve	F	outlet water pressure probe
12	Flexible pipes	G	Antifreeze probe
13	Expansion vessel	H	Water safet valve
14	Automatic water charging valve	_.._	Unit side
15	Globe valve	o	Probes
16	Buffer tank (10 l/kW)	↓	Pressure pipe connection with shrader valve
17	3 way valve		

4 - Installation

4.5 Water connections

The attachments at the water inlet and outlet shall be connected in compliance with the instructions which can be found on the labels in the proximity of the attachments.

Connect the water lines of the plants with the attachments of the unit whose diameters and positions are shown in Chapter 8.

4.6 Drainage

The drain should allow water to run out naturally, so provide a downward slope of around 1°

The WHE unit exhibits a cold internal temperature during cooling operation, which can result in condensation on the outside of the unit and elsewhere, leading to dripping that can cause indoor furnishings to wet. Always include a drain pan beneath the unit to catch condensation runoff. Also, as necessary, provide thermal insulation

RECOMMENDED WATER COMPOSITION		
PH	7,5 - 9	
Electrical conductivity	10 - 500	μS/cm
Total hardness	4,5 - 8,5	dH
Temperature	< 60	[°C]
Alkalinity (HCO_3^-)	70-300	ppm
Alkalinity / Sulphates (HCO_3^-/ SO_4^{2-})	> 1	ppm
Sulphates (SO_4^{2-})	< 70	ppm
Chlorides (Cl^-)	< 50	ppm
Free Chlorine	< 0,5	ppm
Phosphates (PO_4^{3-})	< 2	ppm
Ammonia (NH_3)	< 0,5	ppm
Ammonium Ion (NH_4^+)	< 2	ppm
Manganese Ion (Mn^{2+})	< 0,05	ppm
Free Carbon Dioxide (CO_2)	< 5	ppm
Hydrogen Sufide (H_2S)	< 0,05	ppm
Oxygen Content	< 0,1	ppm
Nitrates (NO_3^-)	< 100	ppm
Manganese (Mn)	< 0,1	ppm
Iron (Fe)	< 0,2	ppm
Aluminium (Al)	< 0,2	ppm

Caution
If the water circuit is to be drained for a time exceeding one month, the circuit must be fully charged with nitrogen to prevent any risk of corrosion by differential venting

4 - Installation

4.7 Power supply

	**Before carrying out any operations on the electrical system, make sure that the unit is deenergized.**
	**It is important that the appliance is grounded.**
	The company in charge of the installation shall conform to the standards applicable to outdoor electrical connections.

The manufacturer may not be held liable for any damage and/or injury caused by failure to comply with these precautions.

The unit conforms to EN 60204-1.

The following connections shall be provided:

- A single-phase with neutral and grounding connection for the power supply circuit.
- The electrical distribution system shall meet the power absorbed by the appliance.
- The disconnecting and magnetothermal switches must be sized to control the starting current of the unit.
- The power supply lines and the insulation devices must be designed in such a way that every line independent.
- It is recommended to install differential switches, to prevent any damage caused by phase drops.
- Each motor is provided with an internal safety thermal device and external fuses.
- The power supply cables must be inserted into dedicated openings on the front of the unit, and the will enter the electrical board through holes drilled on the bottom of the board.

4.8 Electrical connections

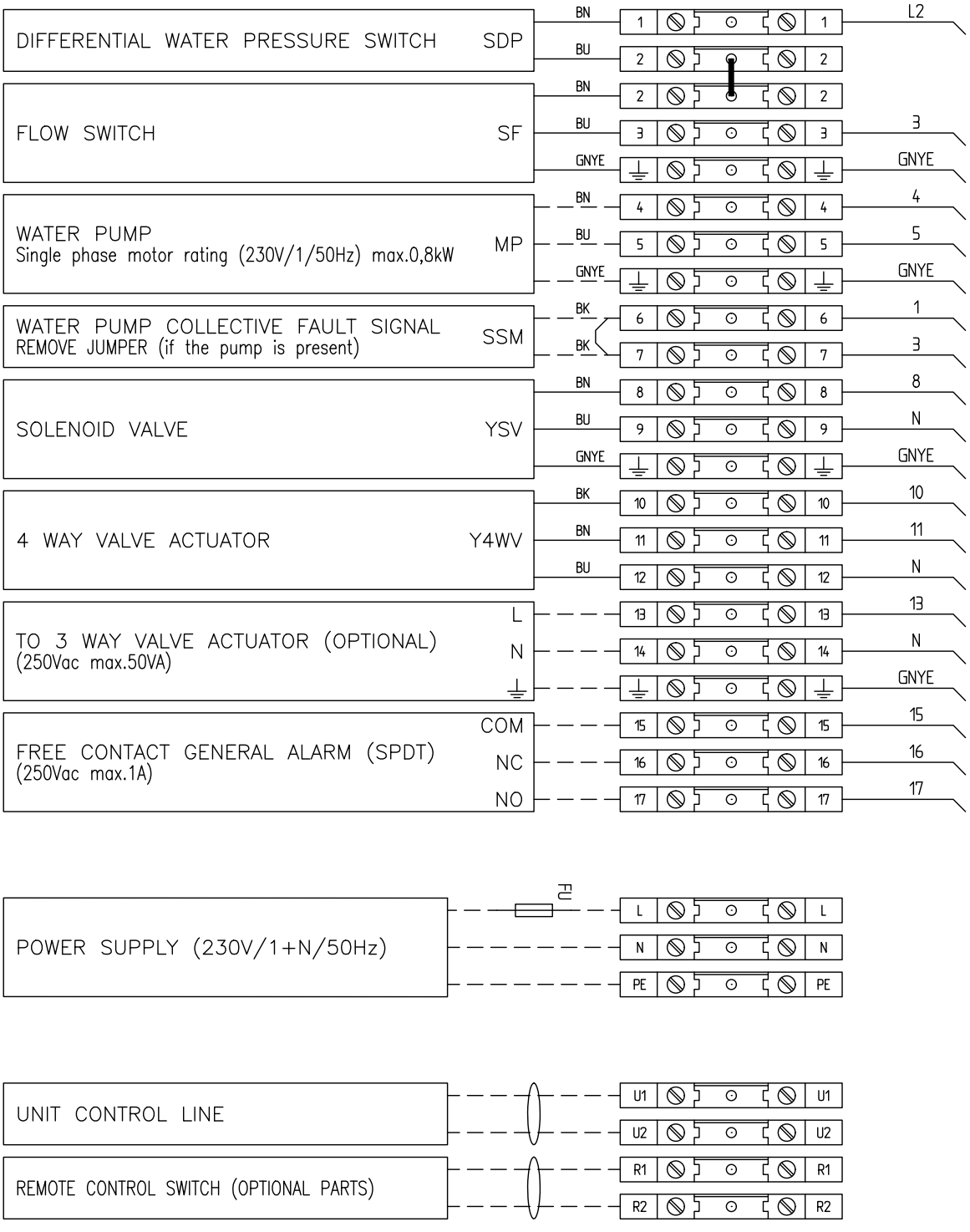
The unit must be installed on site according to the usual procedures and standards applicable in the place of installation. The unit must not be operated if its installation has not been carried out according to the instructions provided in this manual.

The power supply lines must consist of insulated copper conductors, dimensioned for the maximum absorbed current.

Connection to terminals must be performed according to the diagram of connections (User's Terminal Box) provided in this manual and according to the wiring diagram which accompanies the unit.

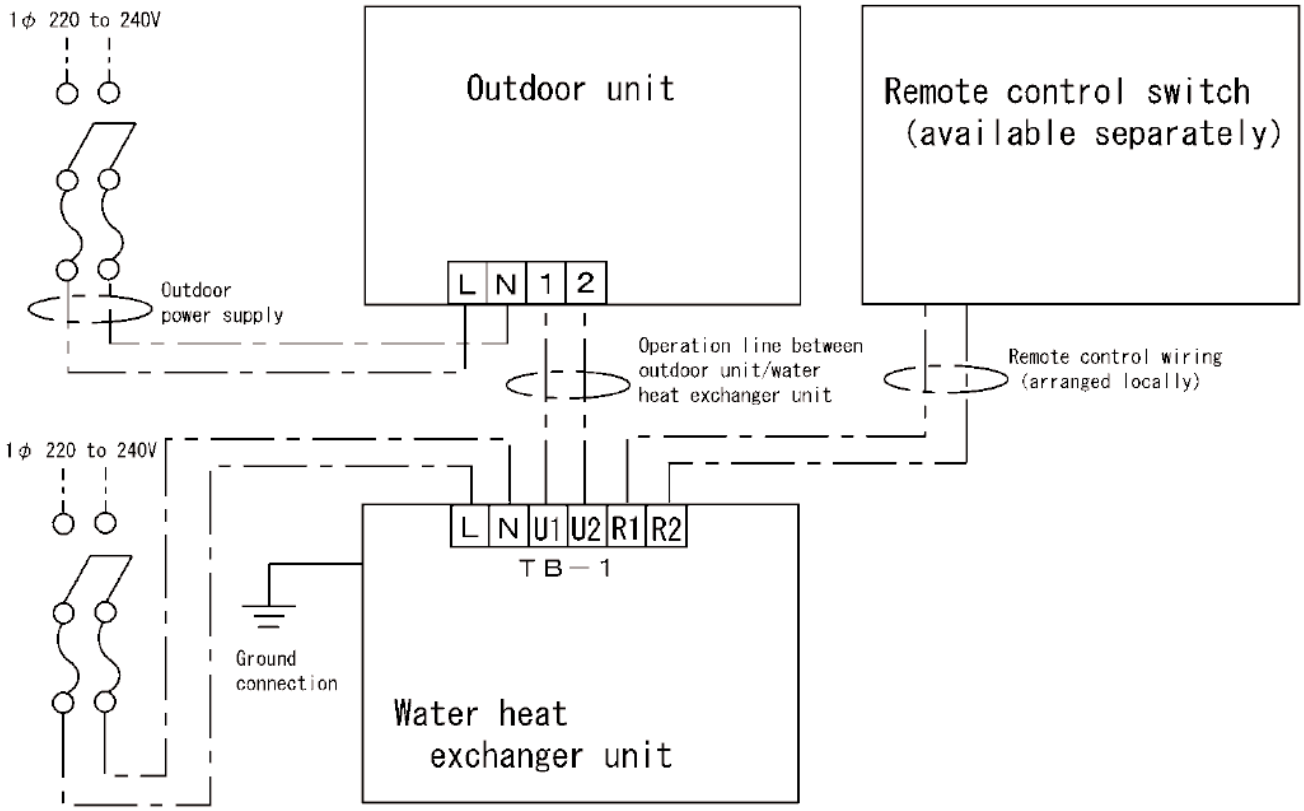
	Before connecting the power supply lines, check that the available voltage value does not exceed the range specified in the Electric Data (Chapter 8)
	An inverter is used in the unit, so use an earth leakage breaker that is compliant with the inverter. Use the clamper for cables in the outdoor unit to fix the power supply cable and the operation cable for the oudoor and WHE units, to ensure they do not come into contact with parts such as, refrigerant pipes or any other part of the refrigerant circuit
	For the operation cables (remote control cable, operation cable for the indoor and outdoor units), use signal cables that are easy to differentiate from the powe supply cable (AC220-240V). Also, do not run the power cable with the operation cables
	Keep the power supply cable and operation cables, 3 m or more away from the chiller, antenna cable, operation cable, power supply cable annd other parts of equiment such as a TV, radio, stereo, interphone, personal comuper, word processor and telephone. Noise from such equipment may have adverse affects
	For units without internal pump, an external pump is required and it must be connected to the unit. When an external pump is used, keep the error signal line separate from the power line. Use a shielded wire for the wiring of the pump error signal. This wire must not be longer than 20 meters to avoid noise superimposition
	the pump absorbtion for external pump units must not be higher than 800W

WHE - Electrical Connections



4 - Installation

WHE - Electrical Connections Outdoor



5 - Start-up

The unit must be started for the first time by personnel suitably trained by one of Authorised Service Centre. Failure to meet this requirement will immediately void the warranty.

The operations carried out by authorised personnel are limited to the start-up of the unit, and do not include any other operation on the plant, such as, for example, electrical and hydraulic connections etc.

5.1 Preliminary check

The checks listed below shall be performed before starting the unit and before the arrival of the personnel authorised.

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the main switch open.
- In case of units without internal pump, connect hte external pump power line to terminals 4 and 5, and the pump error signal line to terminals 6 and 7
- Check that the components of the external water circuit (pump, user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacturer's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles. If you use ethylene glycol as antifreeze, check that its percentage is correct (do not exceed 40% glycol percentage).
- In case of external pump, check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 12 hours.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.

5.2 Start-up

Start-up sequence:

- Turn on the Main switch.
- Check the operation of all the external equipment, and make sure that the control devices of the plant are properly calibrated.
- Start the pump and act on the knob to provide the nominal flow rate as indicated in the technical data. In order to do so, a flow meter or a differential pressure transducer across the WHE unit is needed.
- Set the desired fluid temperature on the control board.

5.3 Checking the operation

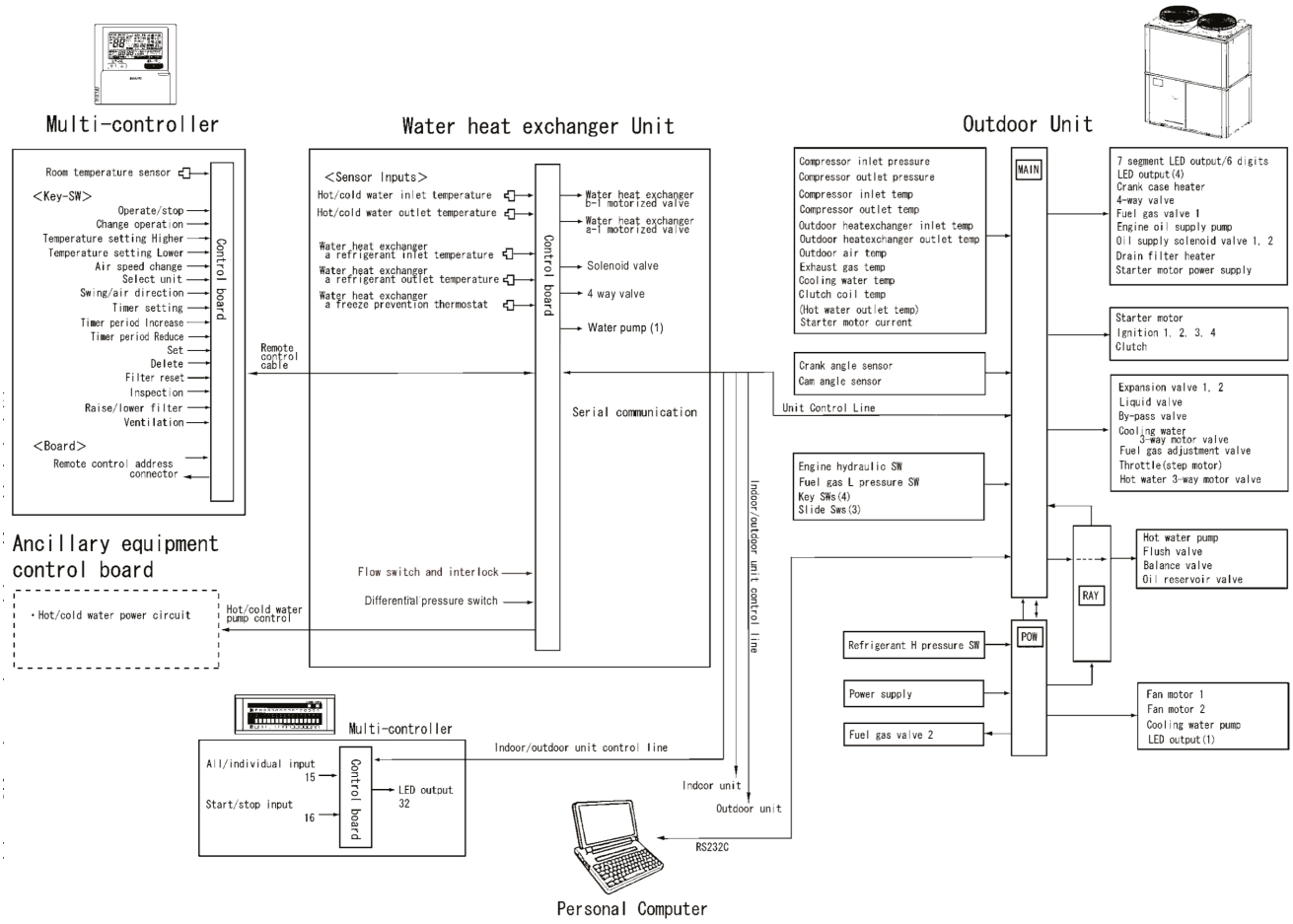
Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the evaporator, if possible.

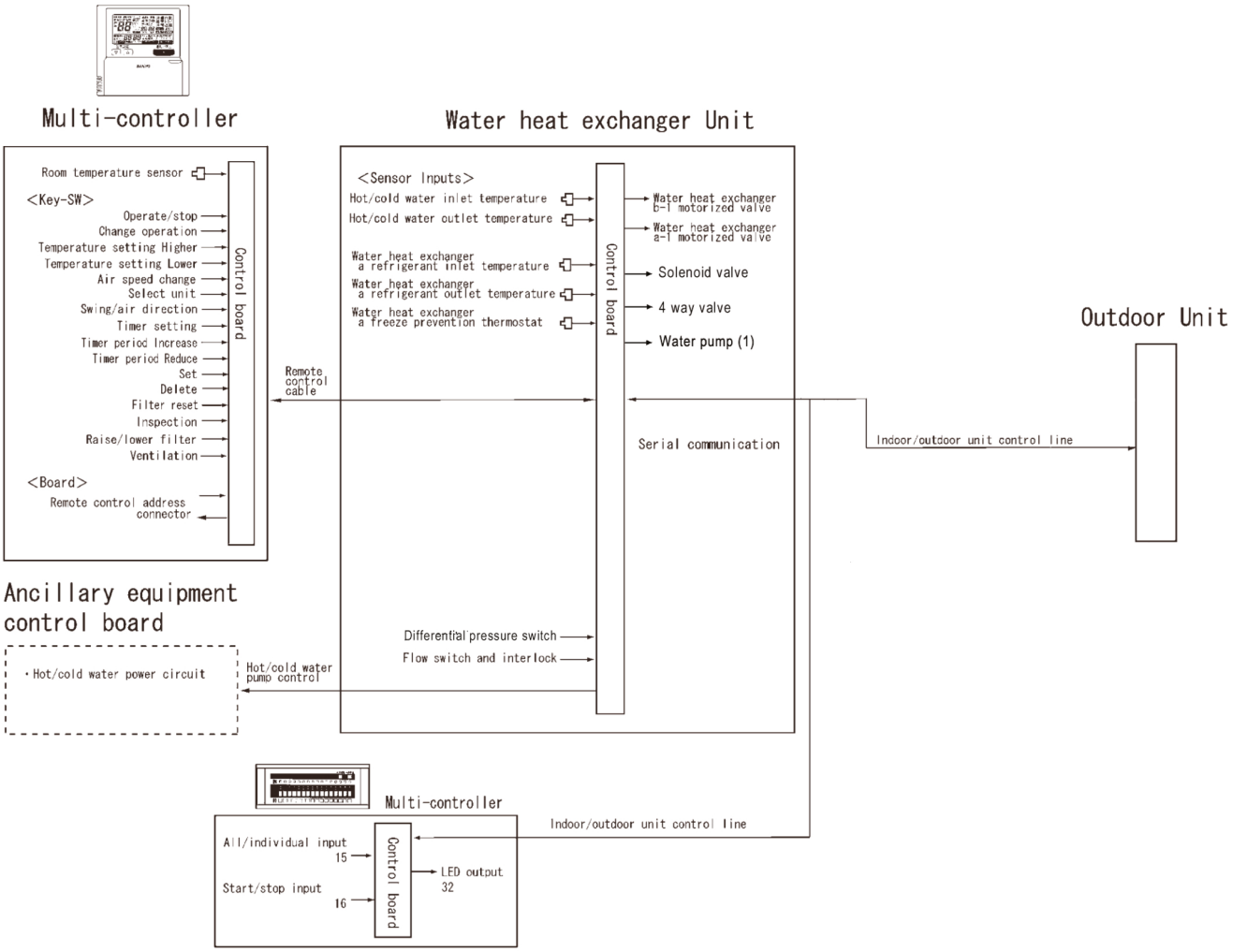
6 - Control

6.1 System block diagram

GHP+WHE Configuration

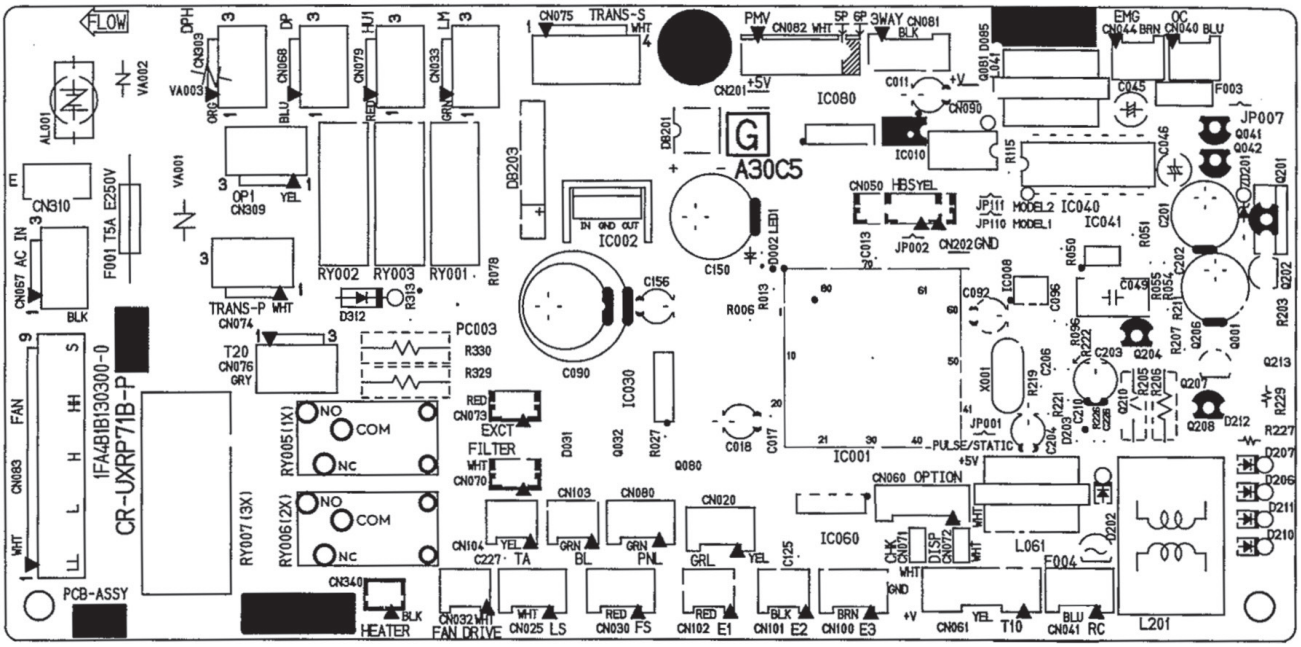


ECOi+WHE Configuration



6 - Control

6.2 Circuit Board Controls and Connettors



6.3 Fault indicators and codes

Reset method [common for 1. to 3.]: After correcting the fault, allow for automatic recovery or press the reset button

1. Sensor faults (related to the water heat exchanger unit)

1) Faulty water heat exchanger refrigerant inlet temperature sensor (primary or secondary) [F01]

• Detection method: Open (-20°Ct) or short circuit (130°C≤t)

2) Faulty water heat exchanger freeze prevention sensor (primary or secondary) [F02]

• Detection method: Open (-20°Ct) or short circuit (130°C≤t)

3) Faulty water heat exchanger refrigerant outlet temperature sensor (primary or secondary) [F03]

• Detection method: Open (-20°Ct) or short circuit (130°C≤t)

4) Faulty hot/cold water inlet temperature sensor [F10]

• Detection method: Open (-30°Ct) or short circuit (100°C≤t)

5) Faulty hot/cold water outlet temperature sensor [F11]

• Detection method: Open (-30°Ct) or short circuit (100°C≤t)

2. Serial communication faults or faulty settings (related to remote control of the water heat exchanger unit)

1) Faulty remote control reception [E01]

• Detection method: There has been no communications addressed to the device for 3 minutes

2) Remote control transmission fault [E02]

• Detection method: The device cannot read it's own transmissions for 3 minutes

3) Faulty reception from the remote control by the water heat exchanger unit [E03]

• Detection method: There has been no communications addressed to the device for 3 minutes

4) Faulty reception from the outdoor side by the water heat exchanger unit [E04]

• Detection method: There has been no communications addressed to the device for 3 minutes

5) Faulty transmission by the water heat exchanger unit to the outdoor unit [E05]

• Detection method: The device cannot read it's own transmissions for 3 minutes

6) Duplication of indoor unit address [E08]

• Detection method: Another unit has the same indoor unit address as the device

7) Faulty transmission by the water heat exchanger unit to the remote control [E13]

• Detection method: The device cannot read it's own transmissions for 3 minutes

3. Other warnings (determined by the water heat exchanger unit)

1) External device error (input signal) [P09]

• Detection method: While the WHE unit is under operation (Operation signal ON), when an open contact is detected, the operation of WHE unit and outdoor unit will be stopped and P09 displayed on the RC display. Can be reset by switching unit OFF/ON.

• Correction: Please check in case of no external device connected that the jumper wire is correctly connected to terminal contacts 6 & 7. In case of external device connected (example error signal of external pump), please check if that signal is correctly connected and if the error had been triggered. by the external device.

2) Water heat exchanger unit anti-icing warning [P11]

• Detection method: While the outdoor unit is operating, freezing temperature is detected by either the anti-icing sensor, the hot/cold water inlet and outlet sensor, or the refrigerant outlet temperature sensor.

3) Interlock warning (ancillary equipment) [P23]

• Detection method: Within 30 seconds after a hot/cold water pump start command, the interlock does not turn ON, or the interlock turns OFF during a hot/cold water pump start command.

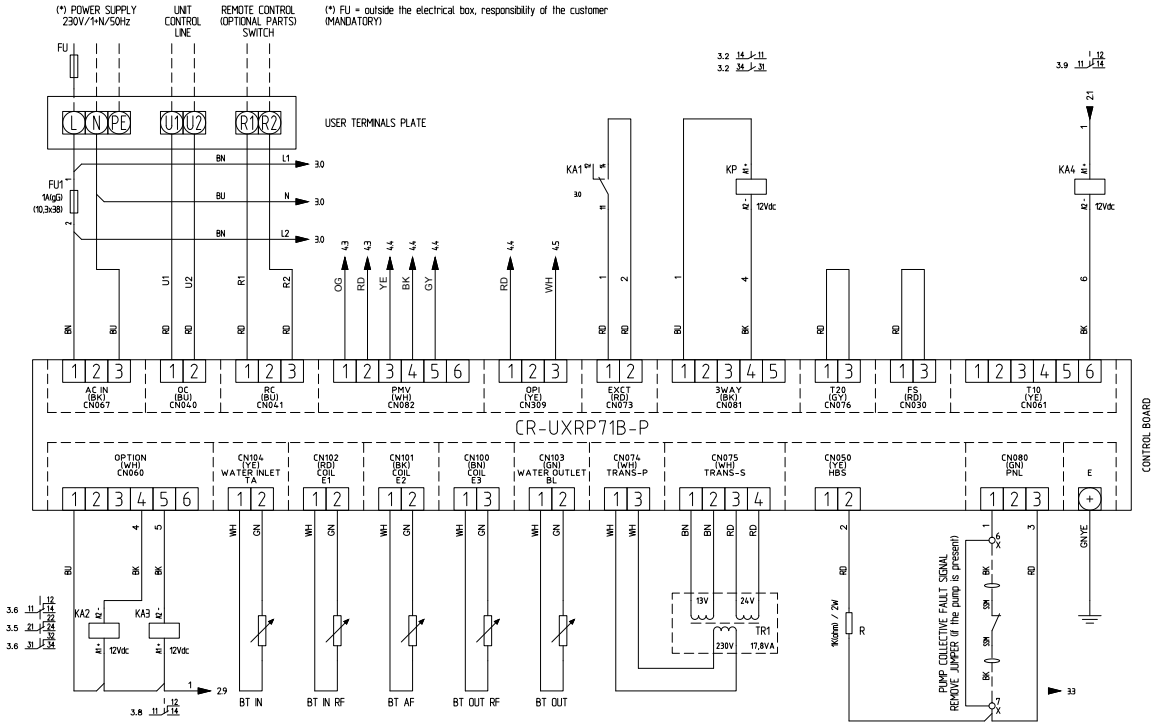
4) Non-volatile memory (EEPROM) fault [F29]

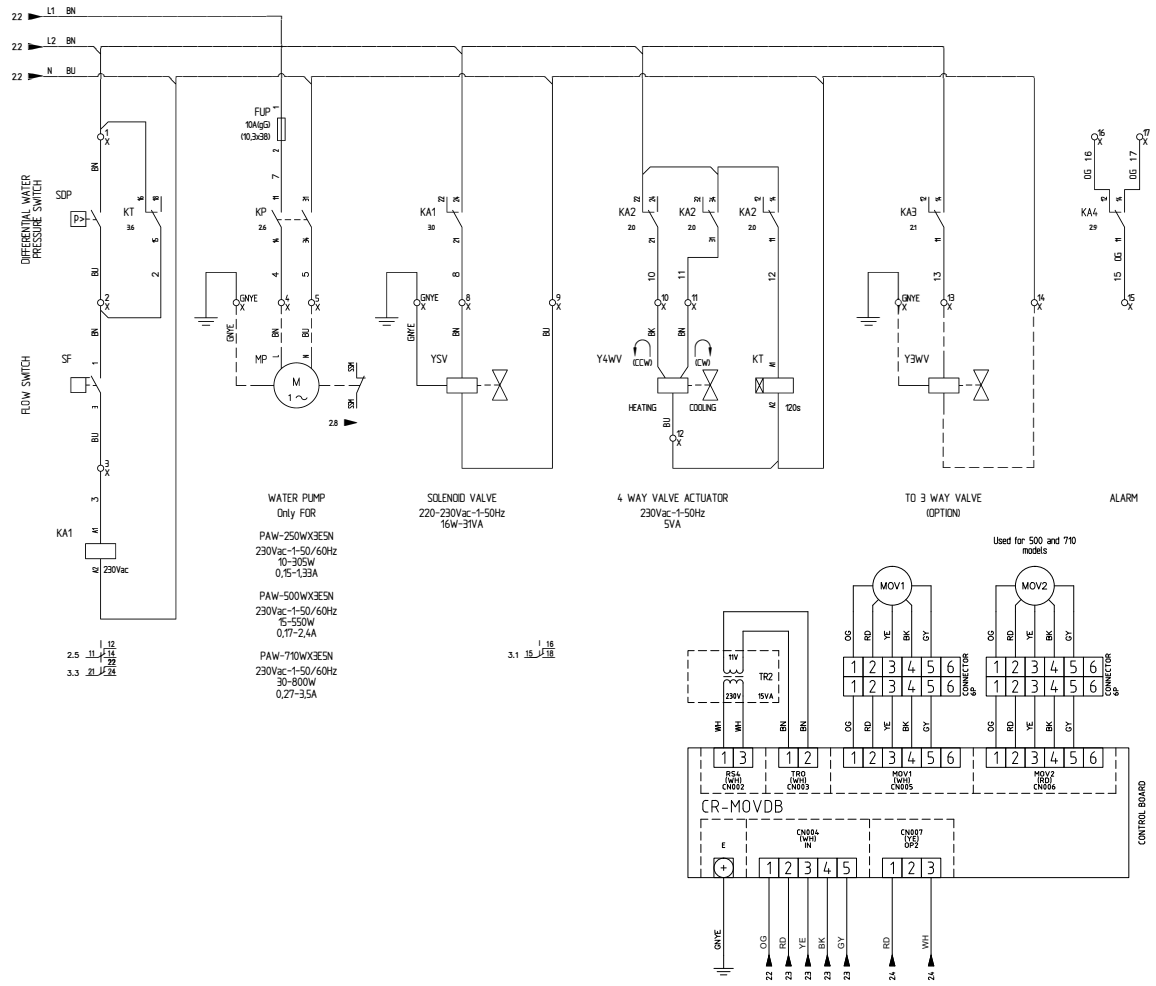
• Detection method: Inability to write normally

For electrical connections and electrical box layout, please refer to the electrical wiring diagram supplied inside the electrical box

6 - Control

6.4 WHE Wiring Diagram





7 - Product Description

7.1 General Information

The WHE units are intended to cool down and heat up the water required for air conditioning in residential and small commercial application.

The units are completely assembled in fabric. They are equipped with refrigerant and hydraulic connections, as well as the internal electrical wiring required for a rapid installation on the field.

An operation test is performed after assembly, with water flowing through the refrigerant/water exchanger in order to test the sefaty devises intervention and the proper sealing of pipes and joints, both on the hydraulic and the refrigerant circuit.

The refrigerating circuits of every unit is pressure tested before inspection

Body and Frame

The base and frame of these units are made with galvanized steel elements, assembled with stainless steel screws. All panels can be removed to ensure easy access to internal components. All galvanized steel parts are protected by epoxy powder paint.

Evaporators

Evaporators are made of stainless steel plates. They are thermally insulated by means of a thick flexible insulating mattress with closed cells. The maximum operating pressures correspond to 10 bar for the water side and to 45 bar for the refrigerant side. Antifreeze protection for the water in the exchangers is ensured by flow switch, differential pressure switch, and an antifreeze temperature sensor. The water side of these exchangers is connected by manifolds which will provide for the connection to the plant by means ofa 2" female threaded attachment.

Refrigerating Circuits

Each unit has a single refrigerating circuit equipped with electronic expansion valves, mechanical filters and a solenoid valve on the liquid line, in order to prevent liquid return to the compressor during shut down operation.

Circulating Pump

The hydraulic side is equipped (only for PAW-WP5G1 units) with a high efficiency pump with ECM technology (Electronic Commutated Motor) with an electronic device that allows the automatic adjustment of pump performance at different load conditions of the system. The device is located on the motor housing and enables the automatic adjustment, using the integrated control of the differential pressure.

The device has several control modes. As a standard, the control of the differential pressure is set as Dp-v. In this mode, the electronics changes the differential pressure set point to be maintained by the pump linearly between 1/2Hs and Hs. The setpoint Hs increases or decreases with the flow

In case of connecting an external pump (models PAW-W5G1) it is possible to connect a collective fault signal of that pump, which would cause operation stop in case of pump failure.

The pressure value to be set must be equal to the sum of the hydraulic loss of the unit (see hydraulic feature of chapter 8) and hydrostatic loss of the system, at a given flow rate (see technical data for nominal flow rate).

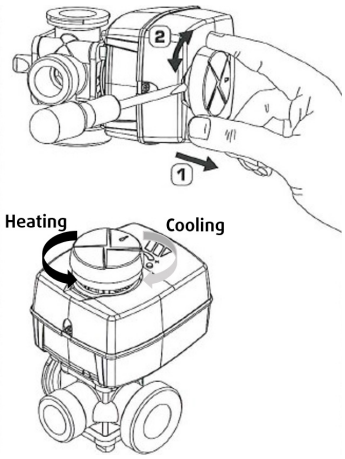
For more information about operation modes, refer to the manual of the pump.

Water 4-way valve

The hydraulic circuit is equipped with a servo-controlled 4 ways valve that allows countercurrent heat exchange in both cooling and heating mode.

The valve automatically switches to heating or cooling mode by a changeover contact activated from CN060 connector (see wiring diagram). Switching mode is performed with a 90° rotation in 120 seconds.

It is also possible to operate the valve manually. By extracting the knob by one click, the gears are unhooked and the actuator shaft can be operated by manually turning the knob. Turn it un-clockwise till the end of the run for heating mode and clockwise till the end of the run for cooling mode. In the absence of voltage, the actuator shaft maintains its position.



7 - Product Description

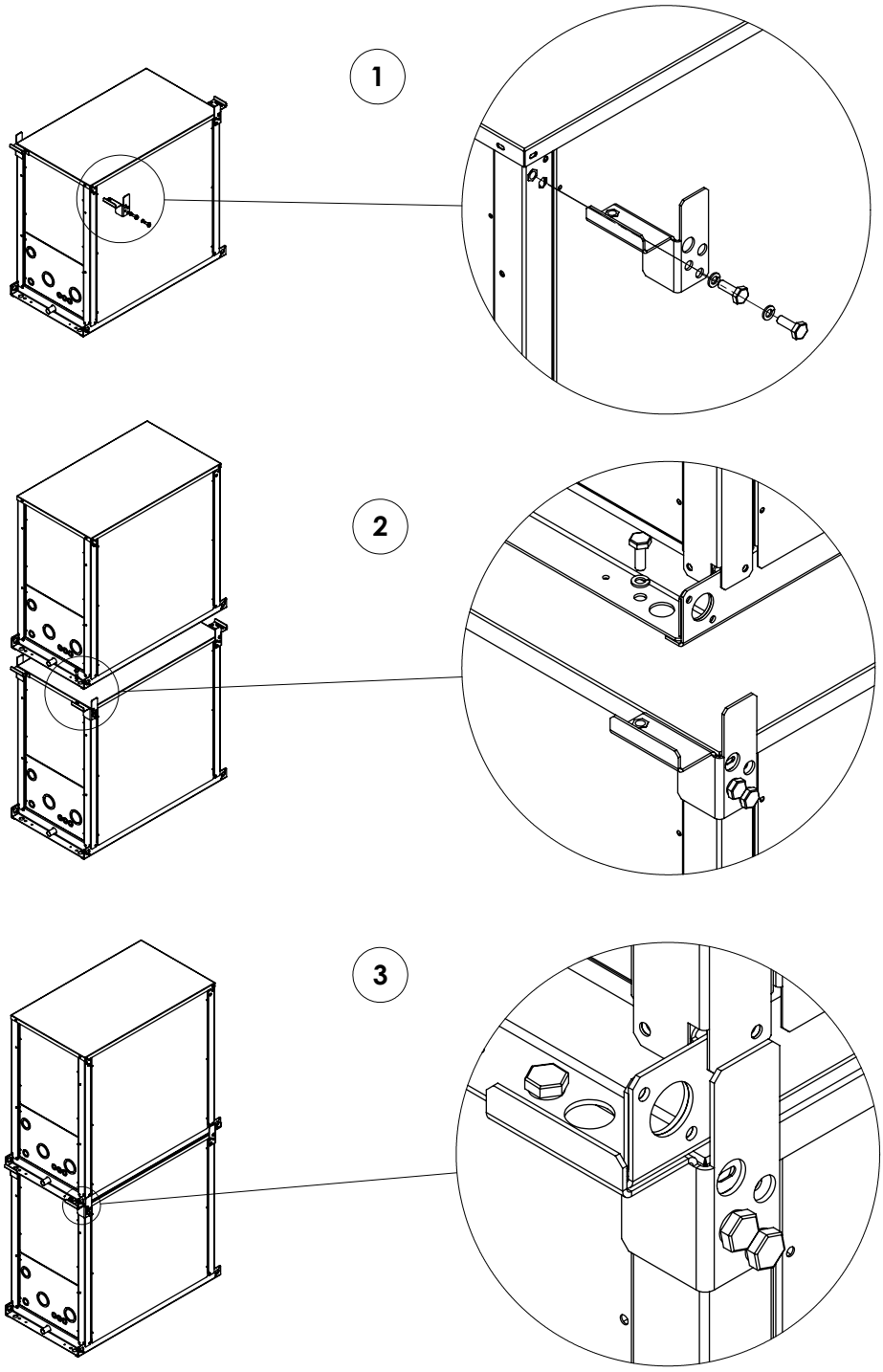
7.2 Accessories

Stacking kit - Part Code Number: PAW-3WSK

See figure below.

Follow instruction supplied together with the kit

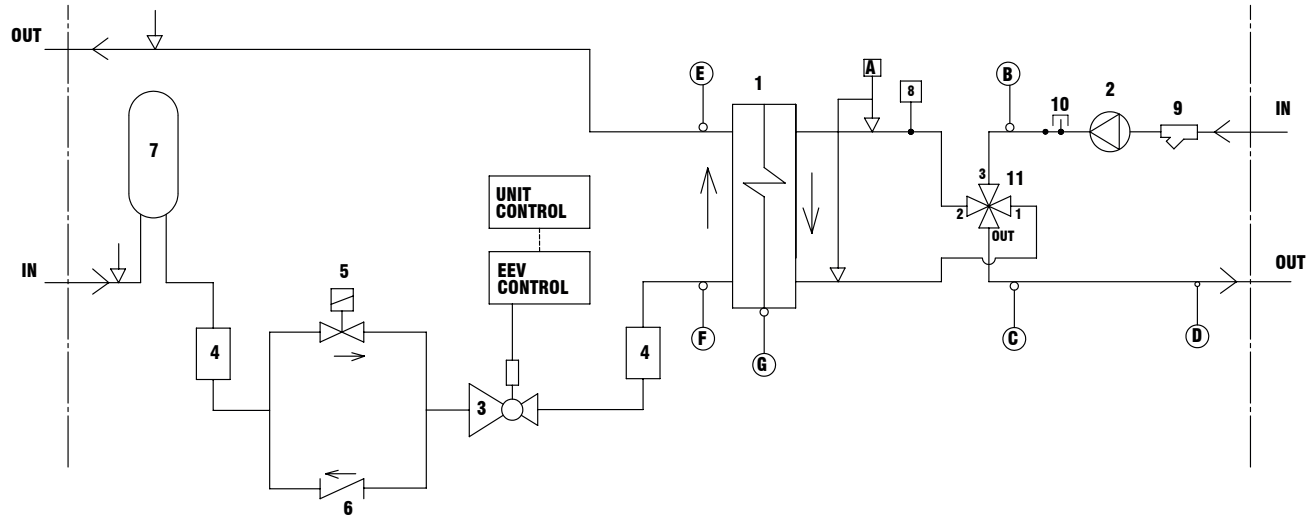
WARNING	It is possible to stack up to 3 units. When stacking units, always anchor the bottom unit to the ground using the anchor holes



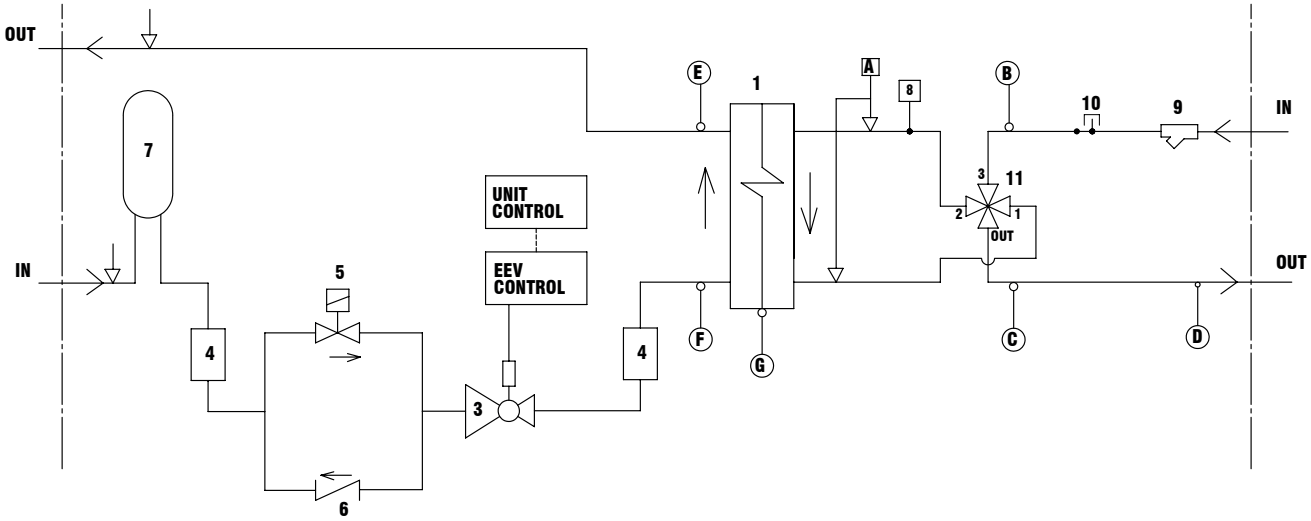
7 - Product Description

7.3 Circuit diagram

Cooling with pump



Cooling without pump



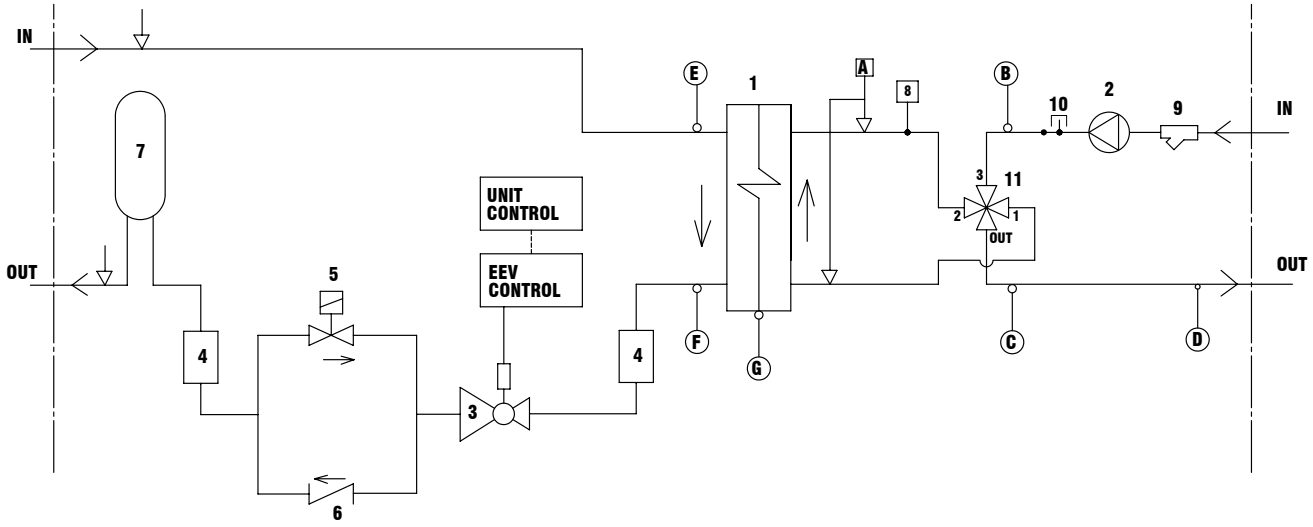
COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Electronic expansion valve
4	Strainers*
5	Solenoid valve
6	Not return valve
7	Liquid receiver
8	Vent valve
9	Water filter
10	Pressure point/drain valve
11	4 way valve

SAFETY/CONTROL DEVICES	
A	Water differential pressure switch
B	Inlet water temperature sensor
C	Outlet water temperature sensor
D	Flow switch
E	Refrigerant probe
F	Refrigerant probe
G	Antifreeze probe
—·-·—	Unit side
o	Probes
↓	Pressure pipe connection with shrader valve

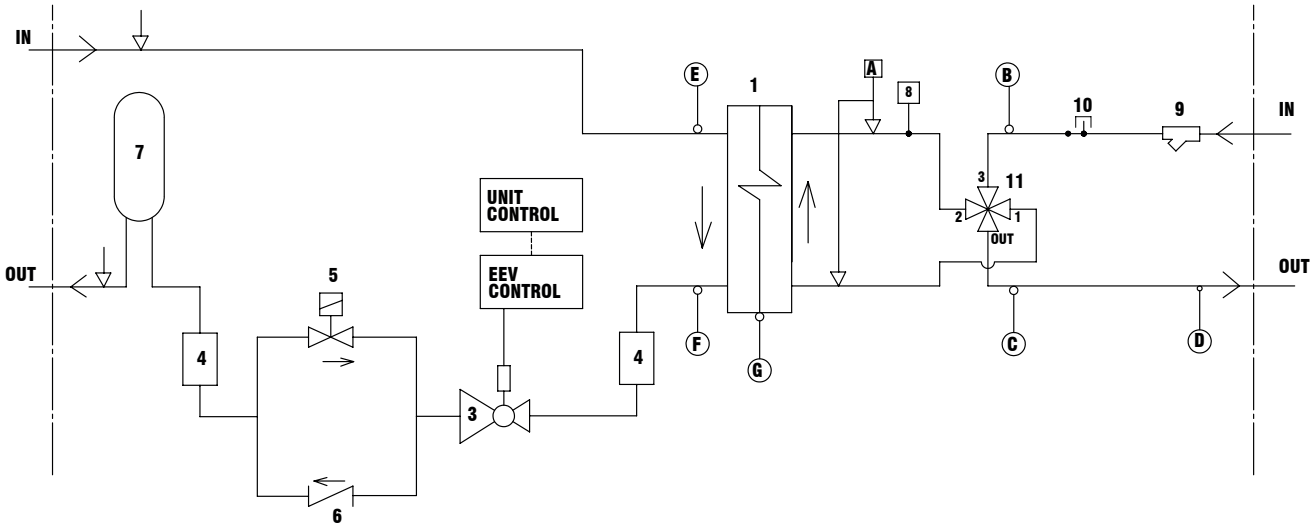
* Strainers can work in both flow directions. For Installation refer to chapter 9

7 - Product Description

Heating with pump



Heating without pump



COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Electronic expansion valve
4	Strainers*
5	Solenoid valve
6	Not return valve
7	Liquid receiver
8	Vent valve
9	Water filter
10	Pressure point/drain valve
11	4 way valve

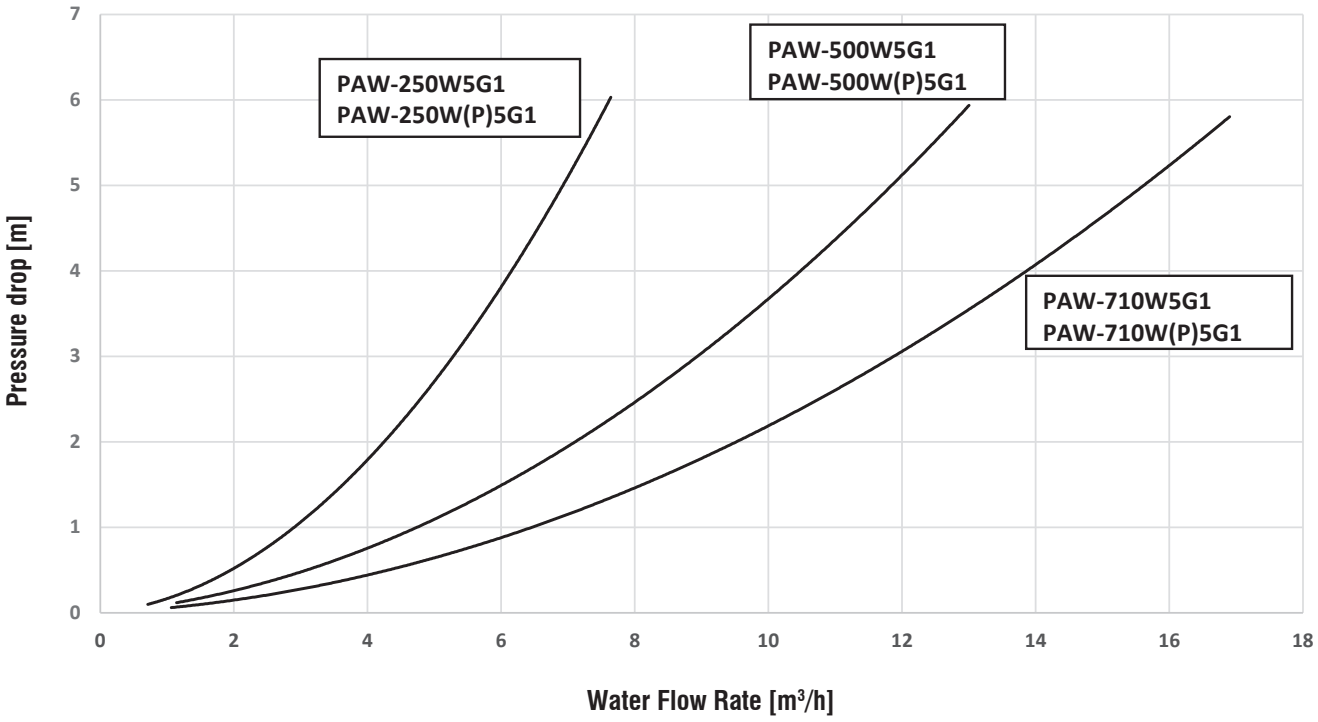
SAFETY/CONTROL DEVICES	
A	Water differential pressure switch
B	Inlet water temperature sensor
C	Outlet water temperature sensor
D	Flow switch
E	Refrigerant probe
F	Refrigerant probe
G	Antifreeze probe
_.-._	Unit side
o	Probes
↓	Pressure pipe connection with shrader valve

* Strainers can work in both flow directions. For Installation refer to chapter 9

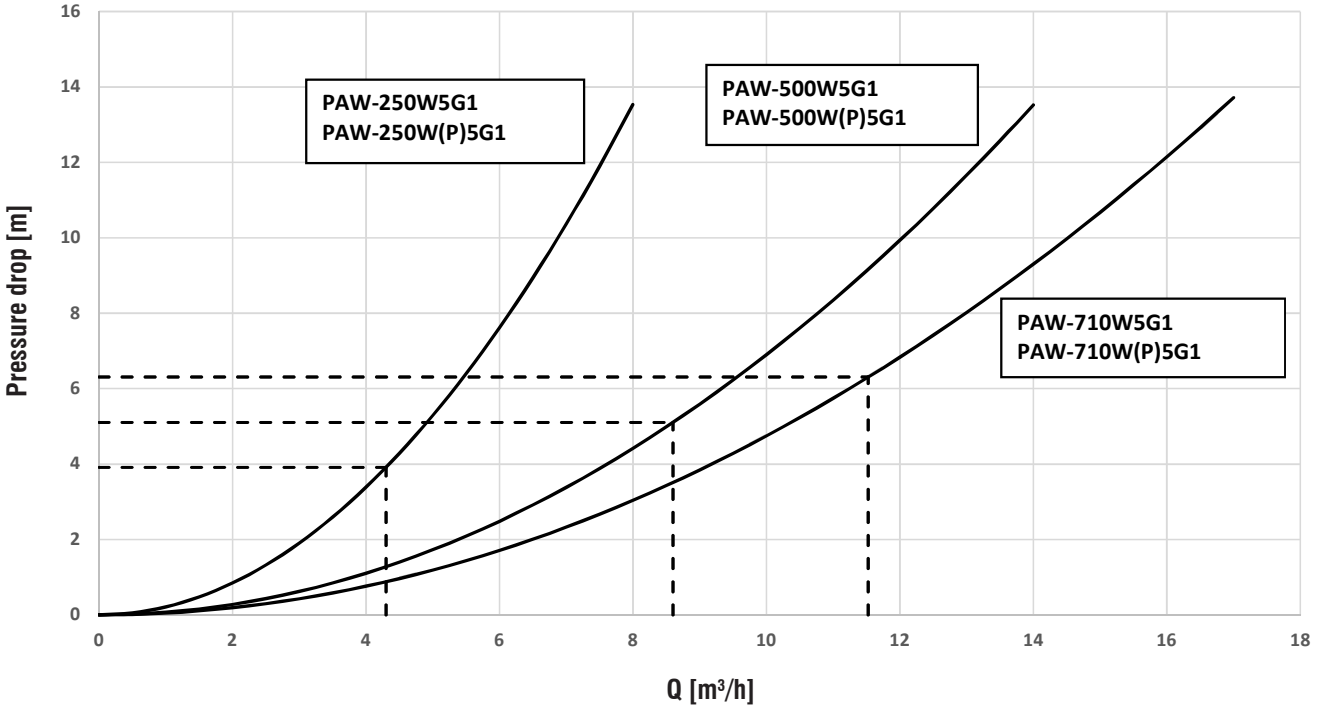
8 - Technical Data

8.1 Hydraulic features

Evaporator water pressure drop



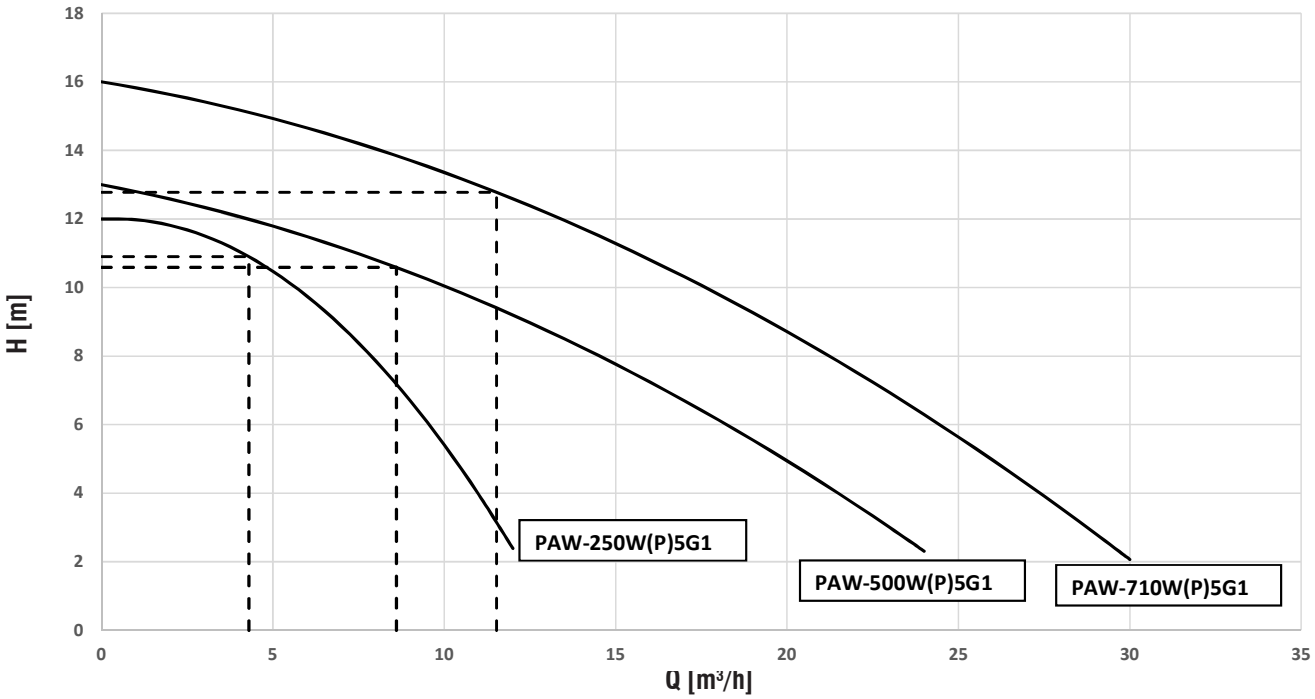
WHE Total Water Pressure Drop*



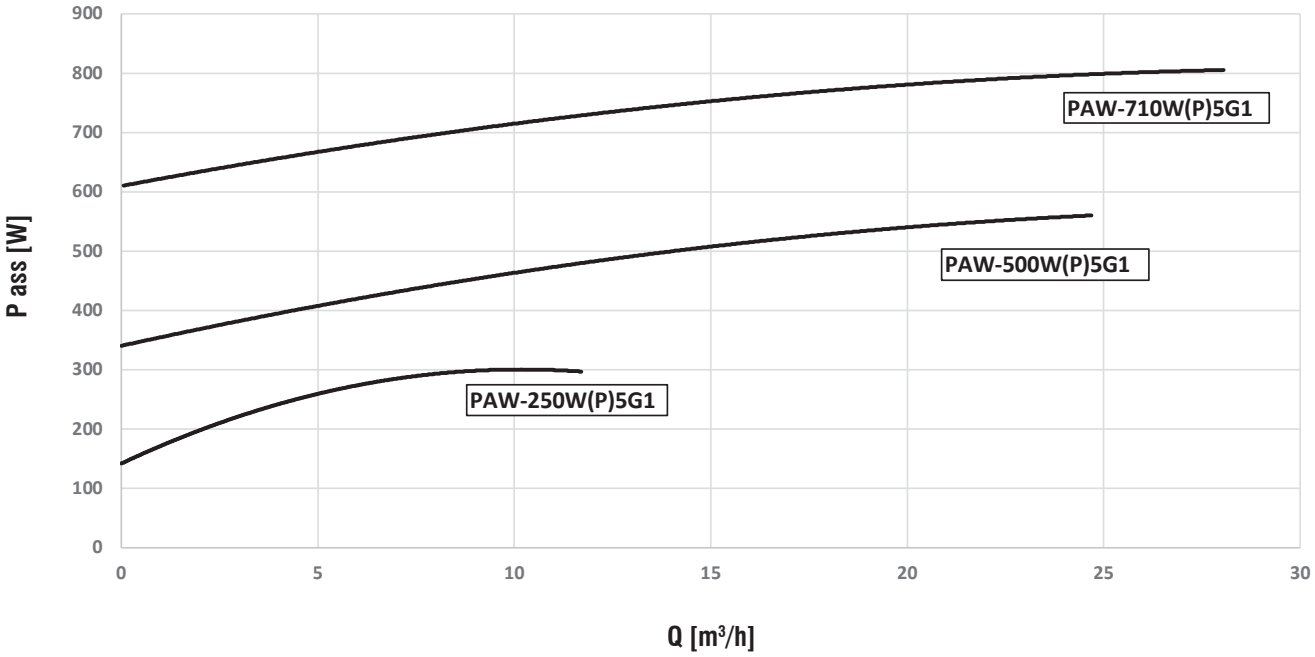
* All components and piping pressure drops inside the unit are considered in this curve

8 - Technical Data

Pump static pressure*



Pump power input*



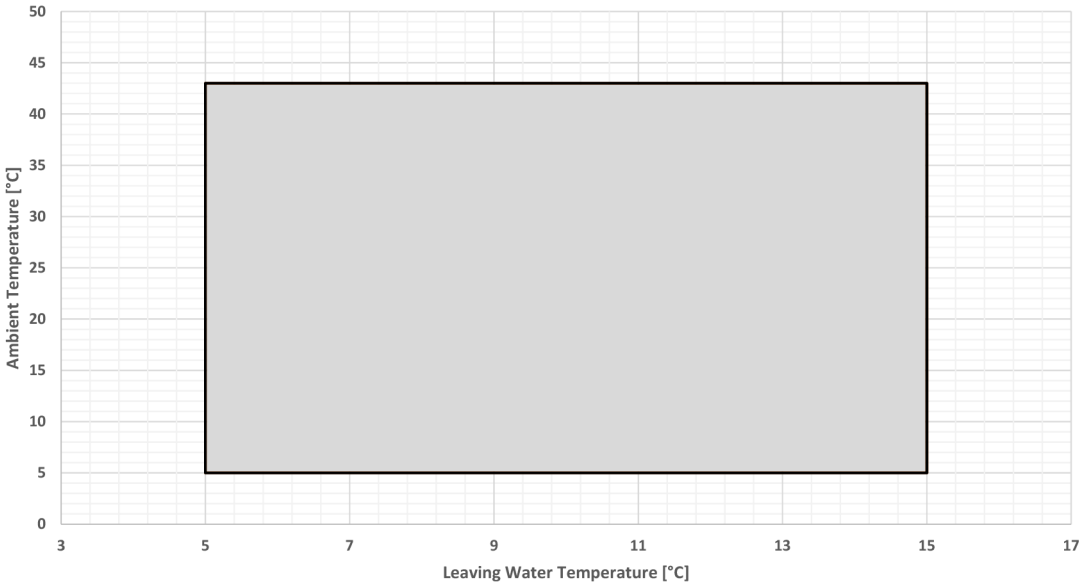
NOTE

The Available pressure head, at the exit of the WHE, is calculated by:
Available Head = Pump Static Pressure - WHE Total Pressure Drops
The external water circuit must be dimensioned accordingly

* Pump curves refer to working condition of pure water and an average temperature of 10°C

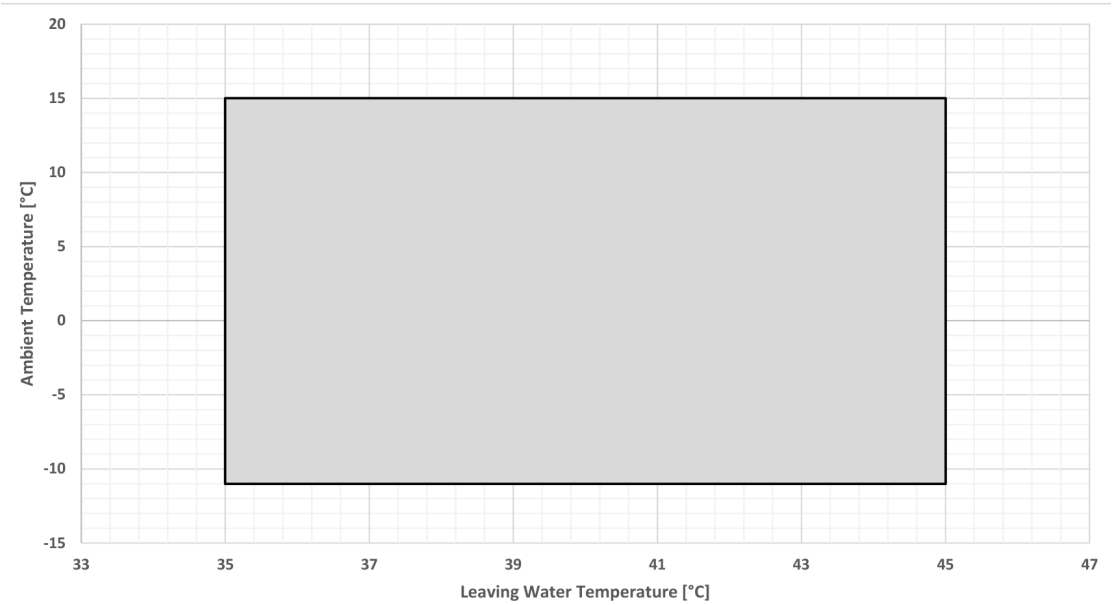
8.2 Envelope

Envelope WHE + ECOi outdoor unit - Cooling mode



For WHE+ECOi, If LWT needs to be below 5°C, contact the manufacturer

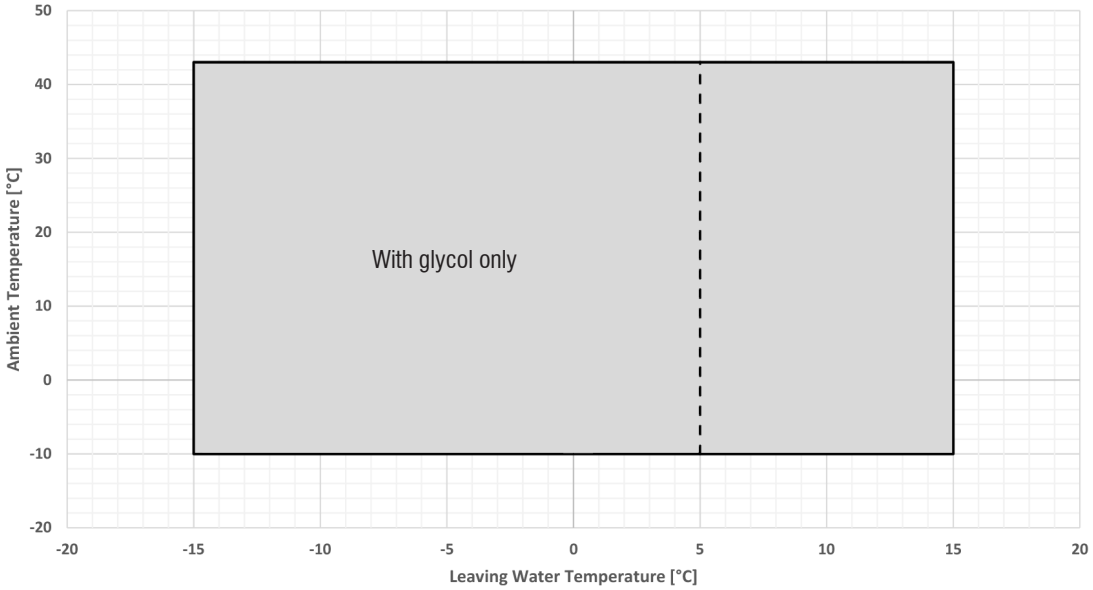
Envelope WHE + ECOi outdoor unit - Heating mode



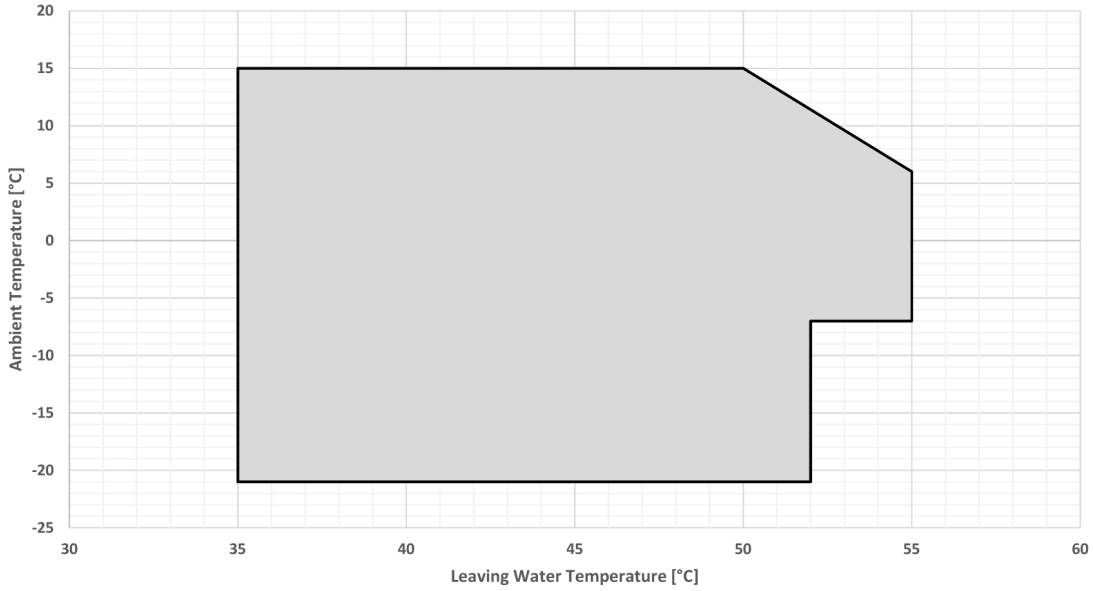
WARNING	Use glycol solution up to 40% if leaving water temperature is below 5°C
WARNING	If units is working with glycol consider the next table for functional correction factors
WARNING	If unit works with water without glycol, the minimum evaporating temperature allowed on the refrigerant side is -2°C Lower evaporating temperature could cause freezing in the plate heat exchanger

8 - Technical Data

Envelope WHE + GHP outdoor unit - Cooling mode



Envelope WHE + GHP outdoor unit - Heating mode



CORRECTION FACTORS FOR ETHYLENE GLYCOL SOLUTION						
ETHYLENE GLYCOL CONCENTRATION	%	**0**	**10**	**20**	**30**	**40**
Freezing Point	°C	0	-3,63	-8,93	-15,74	-24,79
Refrigeration Power Correction		1,0	0,990	0,980	0,970	0,960
Absorbed Power Correction		1,0	0,996	0,992	0,988	0,984
Flow Rate Correction		1,0	1,033	1,049	1,072	1,102
Pressure Drop Correction		1,0	1,109	1,209	1,336	1,505

8 - Technical Data

8.3 Physical data

WHE Units

PAW		250	500	710	250P	500P	710P
Power supply	V/ph/Hz	230V/1+N/50Hz					
Number of refrigerant circuits		1	1	1	1	1	1
REFRIGERANT							
Type		R410A					
CAPACITY*							
Nominal Cooling Capacity[1]	kW	25	50	67	25	50	67
Nominal Heating Capacity[2]	kW	30	60	80	30	60	80
EVAPORATOR							
Type		Plate					
Number		1	1	1	1	1	1
Water flow rate (cooling ΔT 5K)	m^3/h	4,3	8,6	11,5	4,3	8,6	11,5
Water flow rate (heating ΔT 5K)	m^3/h	5,2	10,3	13,8	5,2	10,3	13,8
Minimum flow rate	m^3/h	3,1	6.2	8.3	3,1	6,2	8,3
Maximum flow rate	m^3/h	7,1	14,3	19,2	7,1	14,3	19,2
Pressure drop	kPa	Refer to Hydraulic features					
HYDRAULIC CONNECTIONS (EVAPORATOR)							
Type		Threaded female (Rp2)					
Inlet diameter	inch	2”	2”	2”	2”	2”	2”
Outlet diameter	inch	2”	2”	2”	2”	2”	2”
WEIGHT							
Shipping weight	kg	135	155	160	140	165	175
Operating weight	kg	155	180	190	160	190	210
DIMENSIONS							
Length	mm	1110	1110	1110	1110	1110	1110
Width	mm	575	575	575	575	575	575
Height	mm	1000	1000	1000	1000	1000	1000

*Capacity is valid for the following combinations: PAW-250 + 10HP outdoor unit, PAW-500 + 20HP outdoor unit, PAW-710 + 30HP outdoor unit
[1] Cooling capacity is referred to a refrigerant liquid temperature of 45°C and a brine temperature of 12/7 °C
[2] Heating capacity is referred to a refrigerant discharge temperature of 80°C and a brine temperature of 30/35 °C

WHE refrigerant lines and connections to the outdoor unit

PAW	Max Allowable pipe length [m]	Max Allowable higth difference between indoor and outdoor unit [m]	Liquid line connections [inch]	Suction line connection [inch]	Additional Refrigerant R410A [kg/m]
250	200 (Equivalent length)	50 if outdoor unit is higher 35 if outdoor unit is lower	1/2	7/8	0,13
500			3/4	1-3/8	0,26
710			3/4	1-3/8	0,26

Regardless of sizes, at least 0,5 kg of R410A must be added for each WHE unit

8 - Technical Data

8.4 Electrical data

PAW		250	500	710	250P	500P	710P
Rated voltage	V/ph/Hz	230V/1+N/50Hz					
Max. absorbed power	kW	0,024	0,024	0,024	0,329	0,574	0,824
Max. current FLA	A	0,1	0,1	0.1	1,43	2,5	3,6
External fuses	A	10	10	10	10	10	10
Max. cable section	mm^2	2,5	2,5	2,5	2,5	2,5	2,5

Pump electrical data

PAW		250	500	710	250P	500P	710P
Nominal power	kW	-	-	-	0,2	0,45	0,65
Max. running current	A	-	-	-	1,33	2,4	3,5

Flow switch calibration flow rate

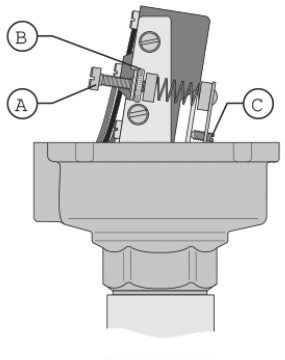
PAW		250	500	710	250P	500P	710P
Flow rate of intervention	m^3/h	2,5	5,5	7,5	2,5	5,5	7,5

The flow switch is preset in fabric. However, in case it must be changed or re-calibrated, carefully follow the instruction on the right.

For the unit safety, water flow switch is preset in factory at the minimum water flow allowed as per table. This value must not be reduced on field. Lower flow rates are not allowed, since they could cause heat exchanger freezing with serious damages to the unit.

In case the water flow switch trips, before resetting the devise manually, check and solve the cause: manufacturer is not responsible of any damage due to repeated manual resets.

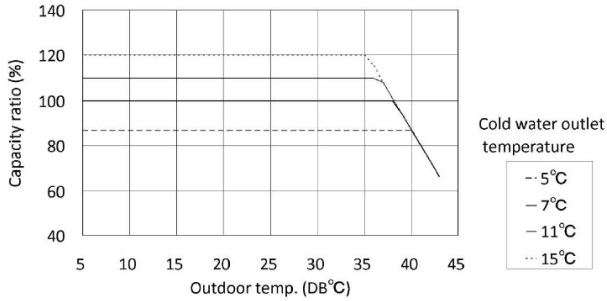
The minimum and maximum operating flow rates are given in the table above. Adjustments should be carried out as follows: turn the calibration screw (A) in a clockwise direction for the contacts to close at higher flow rate values or in a counterclockwise direction for lower flow rate values. When the adjustment has been made lock the screw (A) with the locking ring nut (B). Avoid all contact with the presetting screw (C). An incorrect setting would seriously impair the operation of the switch.

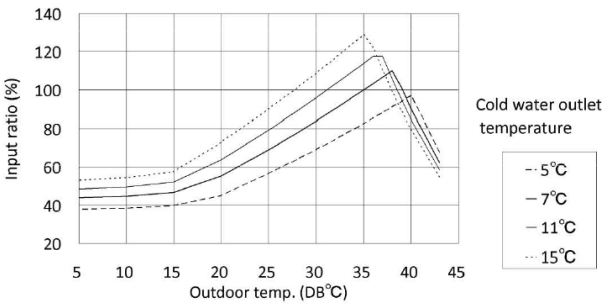


8.5 Power characteristics for ECOi+WHE configuration

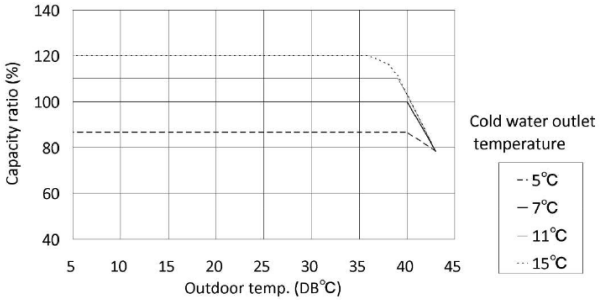
Cooling mode

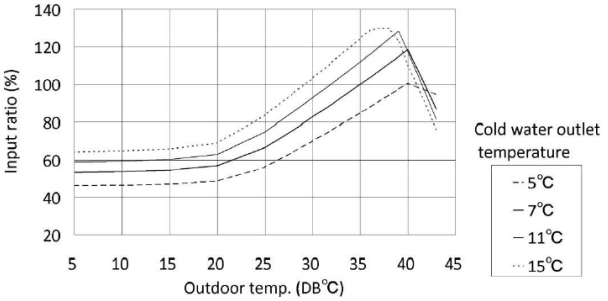
U-10ME1E81 + PAW-250W(P)5G1





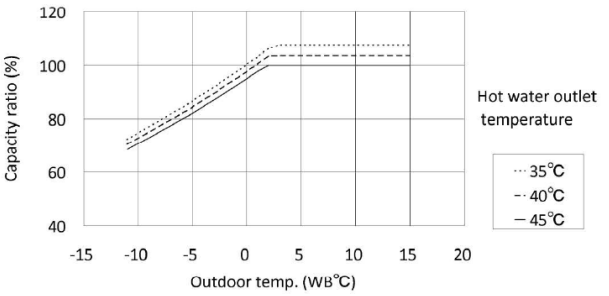
U-20ME1E81 + PAW-500W(P)5G1

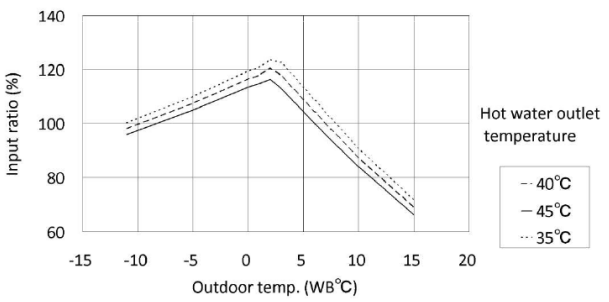




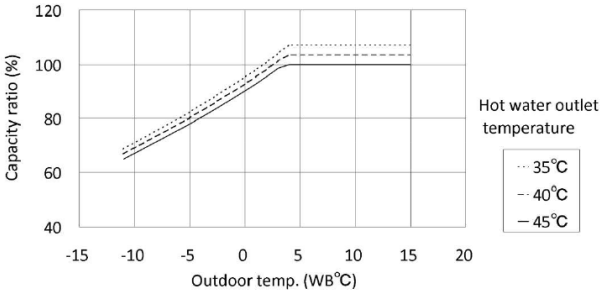
Heating mode

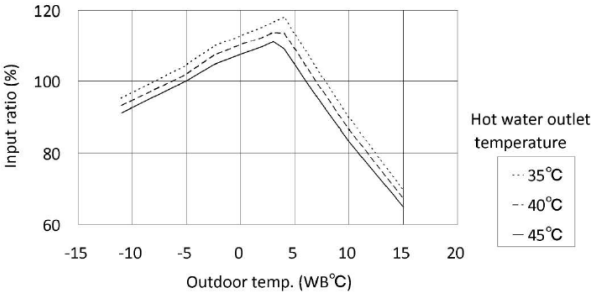
U-10ME1E81 + PAW-250W(P)5G1





U-20ME1E81 + PAW-500W(P)5G1





NOTE:
For the performances of PAW 250, 500 and 710 in combination with GHP refer to the corresponding data tables in the technical data book supplied with the GHP

8 - Technical Data

8.6 Performance Specifications

Outdoor model name U-10ME2E8
Indoor model name PAW-250W(P)5G1

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
"Rated heat output Same with design load for heating"	"Prated (Pdesign)"	19	kW	"Seasonal space heating energy efficiency"	η	152	%
"Declared capacity for heating for part load at indoor temperature 20℃ and outdoor temperature Tj"				**"Declared COP or PER for part load at indoor temperature 20℃ and outdoor temperature Tj"**			
Tj = -7℃	Pdh	16,64	kW	Tj = -7℃	"COPd or PERd"	2,60	- or %
Tj = +2℃	Pdh	10,21	kW	Tj = +2℃	"COPd or PERd"	3,90	- or %
Tj = +7℃	Pdh	6,62	kW	Tj = +7℃	"COPd or PERd"	4,50	- or %
Tj = +12℃	Pdh	6,06	kW	Tj = +12℃	"COPd or PERd"	6,14	- or %
Tj = bivalent temperature	Pdh	18,90	kW	Tj = bivalent temperature	"COPd or PERd"	2,17	- or %
"Tj = operation limit temperature"	Pdh	12.50	kW	"Tj = operation limit temperature"	"COPd or PERd"	1,71	- or %
"Tj = -15℃ (if TOL is < -20 ℃)"	Pdh	-	kW	"Tj = -15℃ (if TOL is < -20 ℃)"	"COPd or PERd"	-	- or %
Bivalent temperature	Tbiv	-10	℃	Operation Limit temperature	TOL	-20	℃
Degradation co-efficient	Cdh	0,9	-	-			
Power consumption in modes other than active mode				-			
Off mode	POFF	0,043	kW				
Thermostat off mode	PTO	0,043	kW				
Standby mode	PSB	0,043	kW				
Crankcase heater mode	PCK	0,043	kW				
Other Items				**Other Items**			
Sound power level (outdoor)	LWA	45 / 77	dB	Rated air flow rate, outdoors	-	13.440	m^3/h
Emission of Nox	Nox	-	mg/kWh				
Annual (electrical) energy consumption	QHE	10.071	kWh				

8 - Technical Data

Outdoor model name U-20ME2E8
Indoor model name PAW-500W(P)5G1

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
"Rated heat output Same with design load for heating"	"Prated (Pdesign)"	36	kW	"Seasonal space heating energy efficiency"	η	152	%
"Declared capacity for heating for part load at indoor temperature 20℃ and outdoor temperature Tj"				**"Declared COP or PER for part load at indoor temperature 20℃ and outdoor temperature Tj"**			
Tj = -7℃	Pdh	32,00	kW	Tj = -7℃	"COPd or PERd"	2,26	- or %
Tj = +2℃	Pdh	19,64	kW	Tj = +2℃	"COPd or PERd"	4,18	- or %
Tj = +7℃	Pdh	12,73	kW	Tj = +7℃	"COPd or PERd"	4,30	- or %
Tj = +12℃	Pdh	6,10	kW	Tj = +12℃	"COPd or PERd"	6,72	- or %
Tj = bivalent temperature	Pdh	36,36	kW	Tj = bivalent temperature	"COPd or PERd"	1,62	- or %
"Tj = operation limit temperature"	Pdh	25,11	kW	"Tj = operation limit temperature"	"COPd or PERd"	1,46	- or %
"Tj = -15℃ (if TOL is < -20 ℃)"	Pdh	-	kW	"Tj = -15℃ (if TOL is < -20 ℃)"	"COPd or PERd"	-	- or %
Bivalent temperature	Tbiv	-10	℃	Operation Limit temperature	TOL	-20	℃
Degradation co-efficient	Cdh	0,9	-	-			
Power consumption in modes other than active mode				-			
Off mode	POFF	0,107	kW				
Thermostat off mode	PTO	0,107	kW				
Standby mode	PSB	0,107	kW				
Crankcase heater mode	PCK	0,107	kW				
Other Items				**Other Items**			
Sound power level (outdoor)	LWA	45 / 81	dB	Rated air flow rate, outdoors	-	24.300	m^3/h
Emission of Nox	Nox	-	mg/kWh				
Annual (electrical) energy consumption	QHE	19.360	kWh				

8 - Technical Data

Outdoor model name **U-20GE3E5**
Indoor model name **PAW-500W(P)5G1**

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
"Rated heat output Same with design load for heating"	"Prated (Pdesign)"	48	kW	"Seasonal space heating energy efficiency"	η	130	%
"Declared capacity for heating for part load at indoor temperature 20℃ and outdoor temperature Tj"				**"Declared COP or PER for part load at indoor temperature 20℃ and outdoor temperature Tj"**			
Tj = -7℃	Pdh	42,46	kW	Tj = -7℃	"COPd or PERd"	80,1	%
Tj = +2℃	Pdh	25,85	kW	Tj = +2℃	"COPd or PERd"	123,3	%
Tj = +7℃	Pdh	16,62	kW	Tj = +7℃	"COPd or PERd"	170,8	%
Tj = +12℃	Pdh	10,37	kW	Tj = +12℃	"COPd or PERd"	171,8	%
Tj = bivalent temperature	Pdh	48,00	kW	Tj = bivalent temperature	"COPd or PERd"	80,2	%
"Tj = operation limit temperature"	Pdh	44,12	kW	"Tj = operation limit temperature"	"COPd or PERd"	78,8	%
"Tj = -15℃ (if TOL is < -20 ℃)"	Pdh	-	kW	"Tj = -15℃ (if TOL is < -20 ℃)"	"COPd or PERd"	-	%
Bivalent temperature	Tbiv	-10	℃	Operation Limit temperature	TOL	-20	℃
Degradation co-efficient	Cdh	0,9	-	-			
Power consumption in modes other than active mode				-			
Off mode	POFF	0	kW				
Thermostat off mode	PTO	0,049	kW				
Standby mode	PSB	0,049	kW				
Crankcase heater mode	PCK	0,03	kW				
Other Items				**Other Items**			
Sound power level (outdoor)	LWA	45 / 80	dB	Rated air flow rate, outdoors	-	25.200	m^3/h
Emission of Nox	Nox	136	mg/kWh				
Annual (primary) energy consumption	QHE	50.825	kWh				

8 - Technical Data

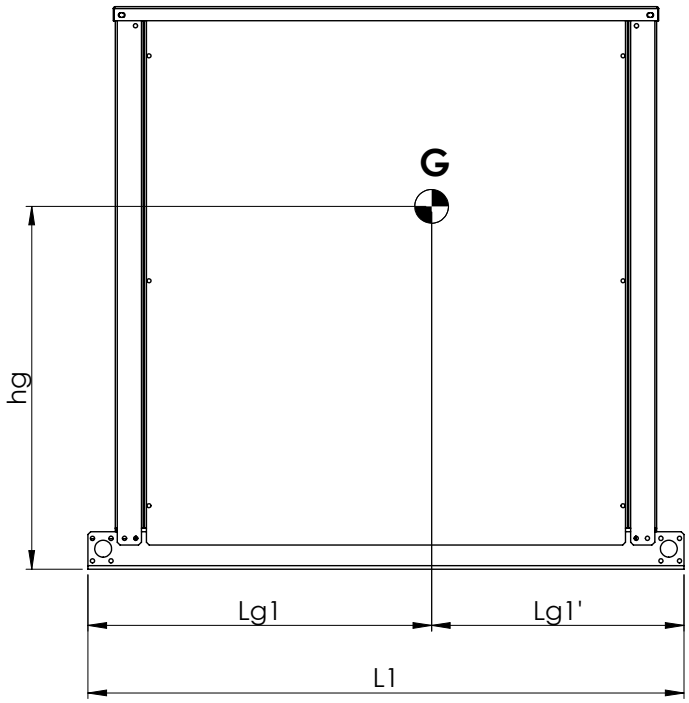
Outdoor model name U-30GE3E5
Indoor model name PAW-710W(P)5G1

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
"Rated heat output Same with design load for heating"	"Prated (Pdesign)"	50	kW	"Seasonal space heating energy efficiency"	η	128	%
"Declared capacity for heating for part load at indoor temperature 20℃ and outdoor temperature Tj"				**"Declared COP or PER for part load at indoor temperature 20℃ and outdoor temperature Tj"**			
Tj = -7℃	Pdh	44,23	kW	Tj = -7℃	"COPd or PERd"	80,1	%
Tj = +2℃	Pdh	26,92	kW	Tj = +2℃	"COPd or PERd"	122,7	%
Tj = +7℃	Pdh	17,31	kW	Tj = +7℃	"COPd or PERd"	163,1	%
Tj = +12℃	Pdh	11,02	kW	Tj = +12℃	"COPd or PERd"	168,0	%
Tj = bivalent temperature	Pdh	50,00	kW	Tj = bivalent temperature	"COPd or PERd"	80,6	%
"Tj = operation limit temperature"	Pdh	49,45	kW	"Tj = operation limit temperature"	"COPd or PERd"	82,0	%
"Tj = -15℃ (if TOL is < -20 ℃)"	Pdh	-	kW	"Tj = -15℃ (if TOL is < -20 ℃)"	"COPd or PERd"	-	%
Bivalent temperature	Tbiv	-10	℃	Operation Limit temperature	TOL	-20	℃
Degradation co-efficient	Cdh	0,9	-	-			
Power consumption in modes other than active mode				-			
Off mode	POFF	0	kW				
Thermostat off mode	PTO	0,049	kW				
Standby mode	PSB	0,049	kW				
Crankcase heater mode	PCK	0,03	kW				
Other Items				**Other Items**			
Sound power level (outdoor)	LWA	45 / 84	dB	Rated air flow rate, outdoors	-	27.600	m^3/h
Emission of Nox	Nox	212	mg/kWh				
Annual (primary) energy consumption	QHE	53.777	kWh				

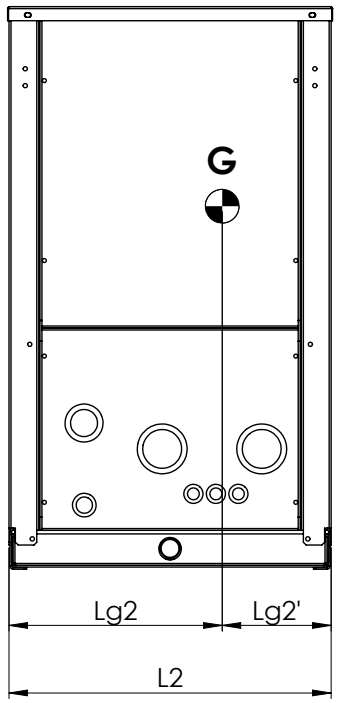
8 - Technical Data

8.7 Position of center of gravity

LEFT VIEW

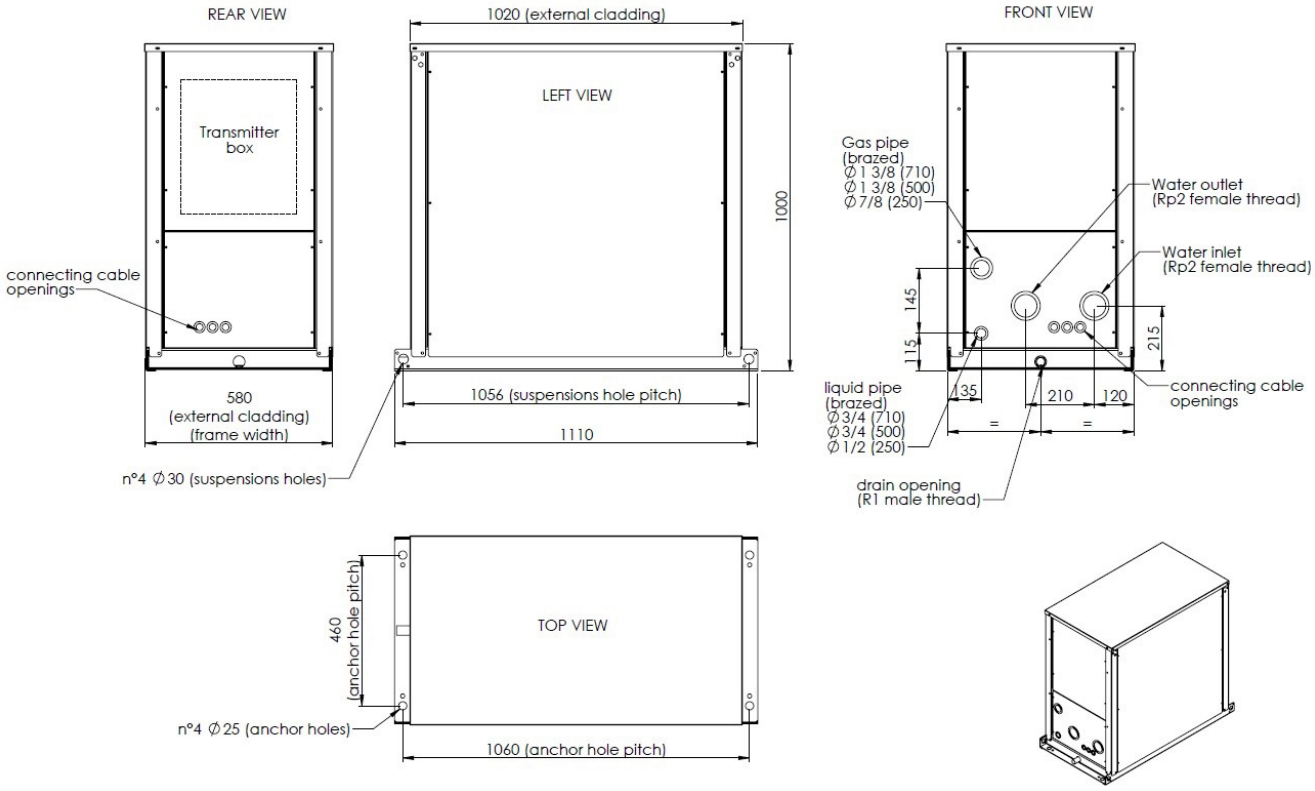


FRONT VIEW



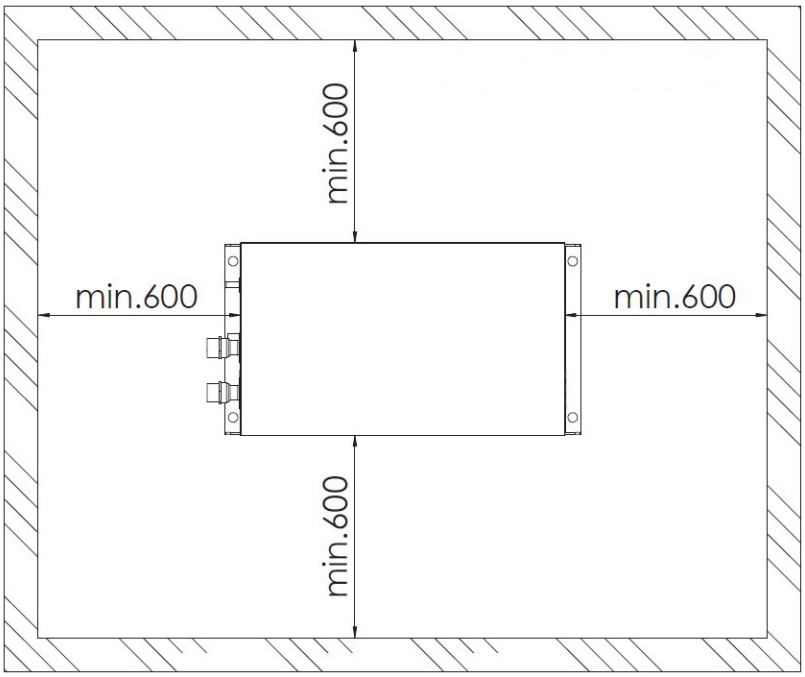
Outdoor unit type	Overall Dimension [mm]		Position of center of gravity [mm]					Operating weight [kg]
	L1	L2	Lg1	Lg1'	Lg2	Lg2'	hg	
PAW-250WP5G1	1110	575	547	563	299	276	512	160
PAW-250W5G1			543	567	294	281	523	155
PAW-500WP5G1	1110	575	564	546	313	262	505	190
PAW-500W5G1			557	553	305	270	527	180
PAW-710WP5G1	1110	575	571	539	322	253	497	210
PAW-710W5G1			561	549	309	266	529	190

8.8 Dimensional Drawings - WHE



8 - Technical Data

8.9 Space Requirements (mm)



9 - Maintenance

Carefully read the "Safety" section of this manual before carrying out any maintenance operations.

Do not discharge the refrigerant into the atmosphere while the refrigeration circuits are being drained. Use appropriate recovery equipment.

When the recovered refrigerant cannot be re-used, return it to the manufacturer.

Unless otherwise specified, the operations described below may be carried out only by a trained maintenance operator.

9.1 General requirements

Units have been designed for continuous operation, providing that they are subjected to regular maintenance, within the limits specified in this manual. Each unit must be serviced according to the programme by the User/Customer, and must be inspected at regular intervals by the personnel of one authorised Service Centers.

It is the responsibility of the User to meet these maintenance requirements and/or to enter into an agreement with one of authorised Service Centers, so as to properly safeguard the operation of the appliance.

During the warranty period, in case of damage or failures caused by improper maintenance, manufacturer will not refund the costs incurred to repair the appliance in its original state.

9.2 Planned maintenance

Maintenance inspections must be carried out according to the program below, by a qualified person.

As a general rule, units cannot be repaired directly by the user, who shall not try to service or repair any failures or anomalies identified during daily inspections. If you are in doubt, please contact authorised Service Centre.

Operations	Daily	Weekly	Monthly	Beginning of season	End of season
Check the temperature of the leaving fluid	●				
Check the pressure drops in the heat exchanger		●			
Check for electric absorption		●			
Check that there are no gas bubbles in the liquid line		●			
Check the insulation of the heat exchanger				●	
Check that terminals are tightened				●	
Check that the terminals' screws are tightened				●	
Clean the exterior of the unit with water and soap				●	
Check the operation of the flow switches				●	
Check the operation of the solenoid valve				●	●

9 - Maintenance

9.3 Electronic Expansion Valve

The circuit of the unit is equipped with a electronic expansion valve.

Procedure to check for overheating:

– Measure the suction pressure with a pressure gauge connected to the service valve on the suction side.

– From the pressure gauge's temperature scale, measure the saturated suction temperature (Tsa) which corresponds to the pressure value.

– Using a contact pressure gauge affixed to the outlet fitting of the gas of the evaporator, measure the actual temperature (Tse).

Overheating calculation (S):

S = Tse - Tsa

Overheating is regulated through the electronic expansion valve.

9.4 Evaporator

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 8) or measure the temperature of the liquid leaving and entering the heat exchanger, and compare it to the evaporation temperature.

To obtain an effective heat exchange, the difference between the temperature of the leaving water and the saturated evaporating temperature must be in the 1 - 4 °C range. A greater difference would indicate a low efficiency of the heat exchanger (i.e. the heat exchanger is dirty).

In this case, the heat exchanger must be subjected to chemical cleaning, an operation that shall be carried out by authorised engineers.

For other maintenance operations (extraordinary overhauling, replacement of the heat exchanger etc.), contact an authorised Service Centre.

9.5 Components substitution

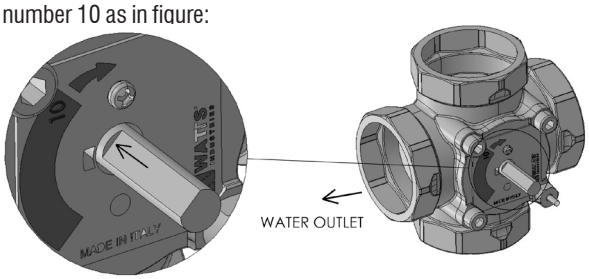
Water 4 Way Valve

In case the water 4 way valve needs to be changed, be sure to install the new one as follows:

– Put the front side of the valve in correspondence of the left view of the unit

– Put the connection with the symbol ▲ at the outlet pipe connection

– Put the shaft with the tapering in the position which indicate the number 10 as in figure:



– Mount the actuator in such a way that the arrow of the knob will be in the middle position when clicking it inside the casing

For more information, refer to the manual of the 4 way valve

Water Flow Switch

In case flow switch must be changed be sure to install the new one as follows and calibrate it as described in chapter 8.

NOTE	Use the 2-1/2" paddle for unit size 250 and screw the flow switch leaving 3 threads out of the socket Use the 2" paddle for unit size 500 and 710 and completely screw the flow switch Always assure that the flow switch is oriented with the arrow in the direction of the flow

Differential Pressure Switch

In case the differential pressure switch need to be changed, put the new one with the positive sign (+) at the capillar connected to the upper port of the heat exchanger

Refrigerant Strainers

In case refrigerant strainers must be changed, install the new one always in protection of the electronic expansion valve (the arrow on the filter must be in the direction of the EEV)

NOTE	The strainers can work in both flow directions

10 - Spare Parts

10.1 Spare part list

The table below shows the list of spare parts recommended during the first two years of operation.

Component	Number
Liquid Reciever	1
Refrigerant Filter	2
Solenoid Valve	1
Check Valve	1
Electronic Expansion Valve	2
Refrigerant Thermistor	2
Water Thermistor	3
Plate Heat Exchanger	1
Water Filter	1
Flow Switch	1
Differential Pressure Switch	1
Vent Valve	1
Circulation Pump	1
Water Four Way Valve	1
Drain Ball Valve	1
Power Transformer Main TR1	1
Power Transformer Valve TR2	1
Fuse 1A	1
Fuse 10A	1
Power Relay KP	1
Power Relay KA1	1
Power Relay KA2	1
Power Relay KA3	1
Power Relay KA4	1
Electronical main board	1
Electronical valve board	1
Electronic Timer	1

11 - Dismantling, Demolition and Scrapping

	**During the draining of the refrigeration circuits, do not let the refrigerant overflow in the surrounding atmosphere.** **The circuit must be drained using suitable recovery equipment.**

For the disposal, contact the competent authority for information.

Unless otherwise specified, the maintenance operations listed below may be carried out by any trained maintenance operator.

11.1 Generalities

Open each line that supplies the unit, including the ones of control circuits. Make sure that all disconnecting switches are secured in the off position. The power cables can be disconnected and disassembled. Refer to Chapter 4 for the position of connection points.

Remove all the refrigerant from the refrigeration circuits of the unit and store it in suitable containers, using a recovery unit. If its characteristics have remained the same, the refrigerant can be used again. Contact the competent authority to obtain information about disposal. In **NO** event shall the refrigerant be discharged into the atmosphere. The oil in each refrigeration circuit must be drained and collected into a suitable container; then it shall be disposes of in conformity with local regulations that apply to the disposal of waste lubricants. Any oil spillage must be recovered and disposed of in like manner.

Isolate the unit's heat exchangers from the external hydraulic circuits and drain the heat exchange sections of the plant.

	**If no shutoff valves have been provided, it may be necessary to drain the whole plant.** **If a glycoled solution or a similar fluid has been used in the hydraulic circuits, or if chemical additives have been added to the circulating water, the circulating fluid MUST be drained in a proper way.** **For NO reason shall a circuit containing glycoled water or a similar solution be discharged directly into the drains or surface waters.**

After draining operations, the piping of the hydraulic networks can be disconnected and disassembled.

Once they have been disconnected as specified, the packaged units can be disassembled in a single piece. First of all, disassemble the anchoring screws and then lift the unit from the position of installation, and hook it to the lifting points provided, using suitable lifting equipment.

To this end, refer to Chapter 4 for the installation of these appliances, to Chapter 8 for their weights and Chapter 3 for handling.

The units that, once disconnected, cannot be removed in a single piece, must be dismantled on site; in this case, be very careful with the weight and handling of every single component.

It is always advisable to dismantle the units following the installation steps, but in reverse.

	**Some residues of oil, glycoled water or similar solutions may remain in certain parts of the unit. These residues must be recovered and disposed of according to the procedures specified above.**

It is very important to ensure that, while a component of the unit is being removed, all the others are properly supported.

	**Use only lifting means of adequate capacity.**

Once disassembled, the components of the unit can be disposed of in conformity with current regulations.

11.2 RAEE Directive (only UE)

- The RAEE Directive requires that the disposal and recycling of electrical and electronic equipment must be handled through a special collection, in appropriate centers, separate from that used for the disposal of mixed urban waste.
- The user has the obligation not to dispose of the equipment at the end of the useful life as municipal waste, but to send it to a special collection center.
- The units covered by the RAEE Directive are marked with the symbol shown above.
- The potential effects on the environment and human health are detailed in this manual.

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