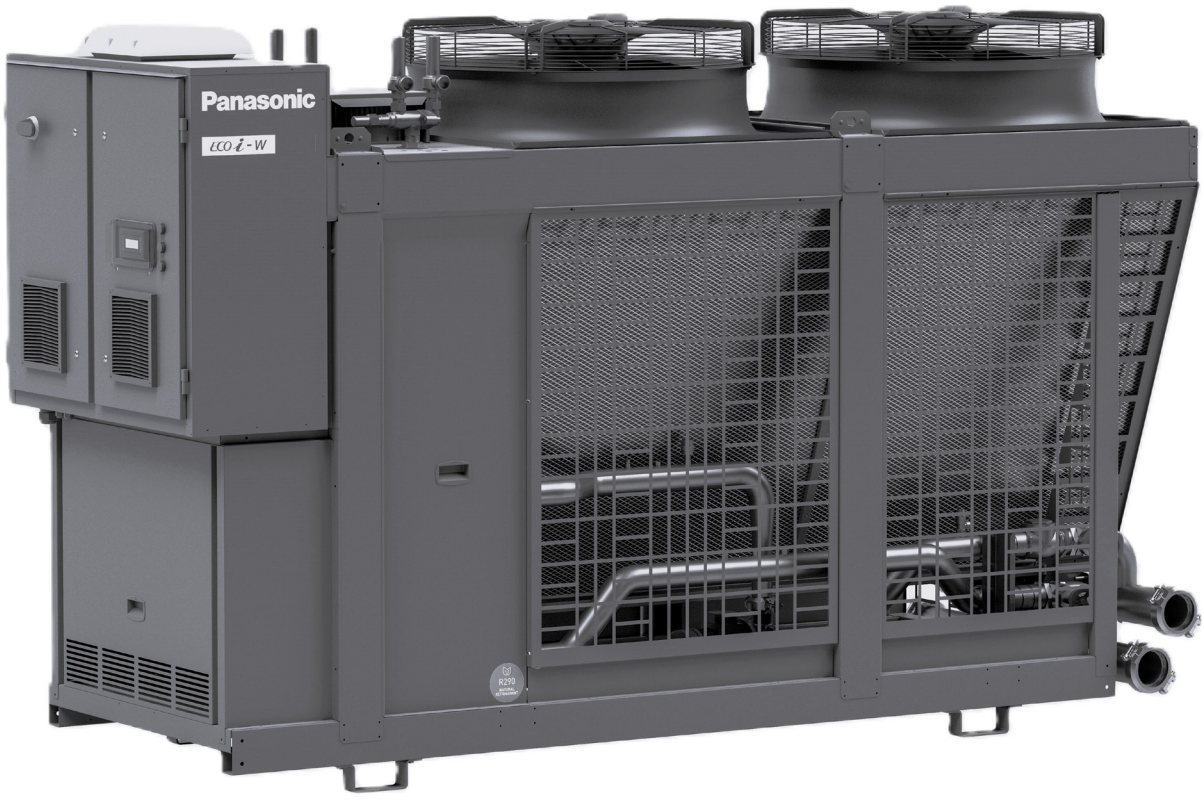
Panasonic

English
Français
Deutsch
Italiano
Español

INSTALLATION AND MAINTENANCE MANUAL

ECOi-W AQUA-G EVO 60-100

Reversible air cooled heat pumps



R290
NATURAL
REFRIGERANT

CE

Original istructions

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1. GENERAL INFORMATION

1.1 Introduction



Due to the manufacturer's policy of continuous improvement, these products are subject to change without notice. The information and images published here are not contractually binding.

SIZE	MODEL
60	P-AQAVG0060HA
80	P-AQAVG0080HA
100	P-AQAVG0100HA

The purpose of this document is to provide users with installation and maintenance instructions for the above units. It also contains instructions on commissioning the machine and recommendations on how to avoid physical injury and the risk of deterioration of the machine during operation.
Only the intervention of a qualified technician can ensure safe and durable installation, operation and maintenance of the unit.

This manual and its contents, as well as the documentation accompanying the product, are and remain the property of the manufacturer, who reserves all rights. It is forbidden to copy the document, in whole or in part, without the written permission of the manufacturer.
The content of this manual has been prepared in accordance with Annex I of the Machinery Directive 2006/42/EC and the technical standard EN ISO 20607:2019. Please note that Directive 2006/42/EC will be replaced by Regulation (EU) 2023/1230 effective January 27, 2027.

1.2 Key of pictograms



Danger or unsafe action that may result in serious personal injury or death.



Danger or unsafe action that may cause minor personal injury or damage to the product or property.



Particularly useful information for the user when reading this manual.



Information not found in this manual or in the relevant section; the note next to it specifies wheret it can be found.

1.3 Inspection upon receipt

Upon receipt of the product, carefully check the shipping documents and that the unit has not suffered any damage.

In case of transport damage, report it in detail on the delivery note and immediately send a registered letter to the carrier within 48 hours, clearly stating the problem. Forward a copy of this letter to the manufacturer or its representative.

1.4 Warranty

This unit is shipped fully assembled, factory tested and ready to be commissioned.

Any changes to the unit without the manufacturer's prior written consent will void the warranty.

If any of the below conditions are not met, the warranty is automatically voided:

- Installation must be carried out by technicians authorised by the manufacturer.
- Maintenance must be carried out by specially trained technicians.
- Only original spare parts must be used.
- All operations in this manual must be carried out within

the agreed deadlines.



Original spare parts are available in the “Spare Parts” document.



Damage caused by the non-compliance with these instructions will immediately invalidate the warranty.

1.5 Return of defective material under warranty

Material must not be returned without prior written consent of our Service Department. The return of parts deemed defective does not necessarily imply their replacement free of charge. Spare parts must be ordered at the same time as the return of the parts found to be defective, specifying the quantity, name and code in the document.

If, after careful evaluation of the returned parts, our Service Department finds them to be defective, a credit note corresponding to the amount of the ordered spare parts will be issued. All parts deemed defective must be returned ex warehouse of our distributor.

1.6 Order and spare parts service

Every order for spare parts and/or service work must be accompanied by the order confirmation number of the machine and the serial number which is indicated on the nameplate. It must also indicate the date of failure and installation.

Use the code provided by our Spare Parts Service; if not available, please provide a full description of the part required.

Only use original spare parts purchased directly from the manufacturer or from official dealers of the companies on the list of recommended spare parts.

In this way, a prolonged service life of the machine can be ensured during the entire period of operation.

English

2. SAFETY

2.1 Foreword

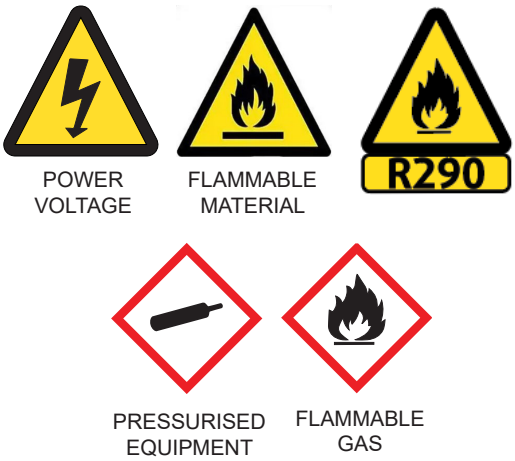
This machine is not intended for use by children or adults with reduced physical and sensory abilities or inexperienced personnel without proper training.

2.2 Definitions

- **Owner**: the legal representative of the company, organisation or natural person owning the system in which the unit has been installed; they are responsible for ensuring compliance with all the safety regulations specified in this manual, as well as with the national laws in force.
- **Installer**: legal representative of the company appointed by the owner to lay and carry out the plumbing, electrical and other connections of the unit to the system: they are responsible for the handling and correct installation of the unit, as specified in this manual and in accordance with current national regulations.
- **Operator:** a person authorised by the owner to carry out on the unit all the adjustment and control operations expressly described in this manual, which must be strictly adhered to, without exceeding the scope of the tasks entrusted to them.
- **Technician**: a person authorised directly by the manufacturer, under their full responsibility, to carry out any ordinary and extraordinary maintenance operations, as well as any adjustment, inspection, servicing and replacement of parts, that may be necessary during the product's service life.

2.3 Safety symbols

The symbols indicating the hazards associated with the use of these units are as follows.



It's recommended that the following personal protective equipment (PPE) be worn during the handling, installation and maintenance of the unit:



2.4 General safety information

These instructions are sufficient for most installation sites and maintenance conditions. If you need help and further instructions for a particular problem, please contact our sales/service centre or your certified dealer.
The manufacturer is in no way responsible for incorrect installation or maintenance, including failure to comply with the instructions in this document.

This unit must be installed by authorised personnel in accordance with wiring regulations. The power supply should be isolated and locked out before starting work on the machine.

The unit uses R290 refrigerant, included in group 1, classification A3 (slightly flammable liquid).

This equipment complies with the requirements of the following EU directives:
- 2006/42/EC (Machinery).
- 2009/125/EC (ErP).
- 2011/65/EU (RoHS).
- 2014/30/EU (EMC).
- 2014/68/EU (PED).

as well as with all applicable regulations and standards (for details, see Declaration of Conformity).

From 20 January 2027, EU Regulation 2023/1230 will replace the Machinery Directive 2006/42/EC, introducing significant updates to bring the legislation into line with new technologies.

2.5 Precautions against residual risks

Transport
- To reduce the possibility of serious injury, care must be taken when lifting or moving the unit. Do not try to move the unit without the correct lifting equipment.
- Avoid any swaying of the load during handling.
- Make sure that no bolts, screws or other fasteners are loose, even if the unit has been checked at the factory before shipment.

Installation
- Choose an installation point that is rigid and strong enough to support or hold the unit and a location that allows easy maintenance.
- Use a raised concrete platform to create a solid and level base for the unit. This prevents damage due to water and abnormal vibration.
- In an area subject to strong winds, secure the unit firmly with bolts and a metal frame. Provide a suitable wind barrier.
- In a snowy area, install the unit on a raised platform higher than the snowdrifts and provide adequate protection.
- Keep a fire extinguisher for electrical appliances near the machine.

Wiring
- Do not switch on the unit's power supply until all wiring has been connected and checked.
- Check all electrical connections. A faulty electrical connection can cause the connection points to overheat, posing a potential fire hazard.
- It is strongly recommended that you install a residual current device (RCD) to protect against both direct and alternating residual currents. Failure to do so may result in electric shock and damage, such as unit failure or insulation breakdown.
- The residual-current device and the circuit breaker must be incorporated into the wiring in accordance with current standards.
- Improper connections and inadequate grounding can lead to accidental injury or death.



Do not modify the electrical system. This can cause fire, electric shocks or injury.



Electric shocks can cause serious personal injury or death. This system may only be wired by a qualified and experienced electrician.

- Connect the unit to the ground to prevent possible risks due to insulation faults.
- Check all electrical connections and in particular the insulation; replace worn or damaged cables.
- Do not use cables with inadequate cross-sections or loose connections, not even for limited periods of time or in an emergency.

Operational precautions
- Make sure you fully understand the operating instructions before performing any operation on the control panel.
- When working on the panel, always keep the instruction manual handy.
- Only start the unit after checking that it is completely connected to the system.

- Promptly inform the technician of any alarm involving the unit.
- Do not manually reset alarms unless the cause has been identified and removed.



The unit must only be operated when the electrical box is closed.



Ensure that the electrical box is fully closed before leaving the installation site.

Maintenance

Before starting any maintenance work, proceed as follows:

- Switch off the unit from the main power supply, wait at least 10 minutes until it discharges, then open it to check or repair the electrical parts and wiring.
- Keep hands, feet and clothing away from moving parts.
- Periodically check the wiring inside the panel.
- Ensure that remote on-off controls are disabled.
- Do not touch air condenser coils without wearing protective gloves.
- Do not touch the compressor pipes, the compressor itself and any other components inside the machine before putting on protective gloves.
- Do not bend/hit pipes containing pressurised fluids.
- Weld only empty pipes; do not bring flames or other heat sources near the refrigerant pipes.
- Do not remove guards from moving elements while the unit is in operation.
- Check that the guards are correctly positioned on the moving elements before restarting the unit.
- When maintenance is complete, clean up and check that no objects of any kind have been left inside the unit.
- Contact the factory if you need to move the unit after it has been placed on site or if you want to dismantle it.



During maintenance, beware of contact with flames or heat sources; refrigerant gas leaks can cause fires or explosions.



Modified or disassembled units can cause fire, electric shocks or injury.
Any operation carried out by unauthorised personnel is prohibited and may cause serious damage to persons and property.



Do not touch the air or fans, as you could injure yourself.
Do not insert objects into the fan, you could injure yourself and damage the unit.

2.6 Other precautions

- Do not disperse refrigeration circuit fluids into the environment.
- When replacing the compressor, evaporator, coil or any other heavy element, ensure that the lifting equipment is suitable for the weight to be lifted.
- When replacing any electronic board, always use suitable devices (e.g. extractor, antistatic wrist strap, etc.).
- Inspect and clean the ATEX fan intake grilles weekly. The grilles allow refrigerant gas to be vented through the fan in the event of a refrigerant leak. Also, clean the grilles in the compressor room.
- The machine is not designed to withstand fire. If exposed to fire, it would suffer irreversible damage. Do not stand near the unit, as the safety valves could release air and refrigerant gas, which could help fuel the fire.
- Use protective ear muffs if you must work at the point of maximum sound pressure emitted during machine operation. The maximum instantaneous sound pressure value is higher than the time-weighted average value listed in the technical data in Chapter 3. The following page lists the instantaneous sound pressure data for each unit.
- Contact the manufacturer for any changes to the refrigeration system, the plumbing system or the unit's wiring diagram, as well as its control logic.
- When disposing of the product, comply with national regulations.

MAXIMUM INSTANTANEOUS PRESSURE VALUE db(A)			
EMISSION POINT (*)	AQUA-G EVO 60	AQUA-G EVO 80	AQUA-G EVO 100
	103	104	103

The maximum instantaneous sound pressure level is measured at the bottom of the left closure panel of the compressor compartment, at a distance of 10 cm from the panel's surface. (*) This value applies when the compressors are operating at maximum rotational speed and the soundproofing shell is not installed (the closure panels must still be in place, as per the factory configuration).

2.7 Unit shutdown

In the event of an emergency stop, use the dedicated isolator located on the electrical box.

When the unit is equipped with an integrated inertial tank, the isolator is positioned approximately 2 meters from the machine's mounting surface defined as the base of the unit and excluding any anti-vibration mounts. To facilitate access, a suitable metal step, not supplied with the machine, must be positioned in the immediate vicinity. In any case, provided the installation is carried out in accordance with the instructions in this manual, the isolator remains within the maximum permitted height; it is therefore necessary to check that any additional raised platforms do not cause this limit to be exceeded excessively.

2.8 Pressure equipment safety

Given that the machine is a hermetically sealed pressurized assembly, please note that:

- Only trained and qualified personnel are allowed to remove pressurised elements during maintenance.
- The pressurised pipes must not be damaged, bent or hit.



Failure to comply with these recommendations can result in serious or fatal injury.

The following table lists the characteristics of the units in accordance with PED regulation.

Gas	Fluid group	Maximum pressure (bar)	PED category	Evaluation form	Notified body code	GWP	Safety classification
R290	1	38	III	H	0062	0,02	A3

2.9 Standard EN 378

The technical standard EN 378 on highly flammable natural gases requires operators of air-conditioning equipment to comply with the following obligations:

- installation, servicing, maintenance and leak testing must be carried out by qualified personnel.
- gas must be recovered during maintenance and servicing.
- take all necessary measures to prevent gas leaks and ensure that any leaks are repaired as quickly as possible.
- carry out checks in accordance with the relevant technical standards and good safety practices.

The refrigerant R290 does not fall within the scope of the EU Regulation 2024/573 (F-Gas) as it is not a fluorinated gas; therefore, no CO_2 equivalent thresholds or mandatory intervals for leak checks apply. Such checks must be carried out in accordance with standard EN 378, the manufacturer's documentation and safety procedures, taking into account the flammable nature of the refrigerant.



The refrigerant must be handled by qualified personnel.
The unit uses R290 refrigerant, a flammable gas classified A3 (highly flammable).



According to the Pressure Equipment Directive (PED) 2014/68/EU, the unit is classified in category III.



Failure to comply with any of these obligations constitutes an offence, which may result in financial penalties. In addition, the compliance of the equipment with the F-Gas regulation must be demonstrated to the insurance company.

The installer and end user must be informed on local environmental regulations for installation, use and disposal of the equipment, in particular with regard to the collection of environmentally-hazardous substances (refrigerant, oil, antifreeze fluids, etc.).
Whatever the type of refrigerant, it must not be released into the atmosphere.

This gas is subject to strict safety regulations due to its flammability, so certain precautions must be taken to avoid accidental accumulation of refrigerant, especially when charging the unit.
Manufacturers recommend the use of extractors when charging the refrigerant.



EN 378 defines the requirements for safe concentration levels of refrigerants.



It advisable to keep a document describing all operations carried out on the refrigeration circuit.

Although R290 is an environmentally friendly refrigerant and is not classified as a direct greenhouse gas, it is still necessary to take into account the indirect emissions associated with its use.
The following formula is used to calculate the CO_2 emission generated.

Amount of greenhouse gases (kg of CO_2)
=
Refrigerant charge (kg) × GWP

2.10 Refrigerant safety data sheet

Safety data	Propane (R290)
Toxicity level	Low toxicity
Flammability level	High flammability
Contact with the skin	Skin contact with this rapidly evaporating liquid may cause frostbite. In the event of skin contact, warm the affected area with lukewarm water and seek medical attention. Remove contaminated clothing and footwear. Wash clothing before reusing it.
Contact with the eyes	Rinse your eyes with running water or an eye wash solution for at least 10 minutes. Seek medical attention immediately.
Ingestion	Not considered to be a potential route of exposure. In any case, burns may occur. Do not try to make the patient vomit. If the patient is conscious, rinse their mouth with water. Call a doctor immediately.
Inhalation	If inhaled, move the patient to a well-ventilated area and administer oxygen if necessary. Administer artificial respiration if the patient has stopped breathing or is having difficulty breathing. In the event of cardiac arrest, perform external cardiac massage. High concentrations may cause asphyxia.Call a doctor immediately.
Further medical advice	Exposure to high concentrations can be dangerous for people with heart problems, as the presence of catecholamines (adrenaline and others) in the bloodstream can lead to an increase in arrhythmia and possibly cardiac arrest.
Occupational exposure limits	Recommended short-term limits: 4000 ppm (7200 mg/m³) over a 15-minute reference period. Recommended limits: 1000 ppm (1800 mg/m³) over an 8-hour reference period.
Stability	The product is stable under normal conditions.
Conditions to avoid	• sources of ignition (sparks, open flames). • hot surfaces. • accumulation in confined spaces. • exposure to high temperatures. Heating may cause a rise in pressure, with a risk of the refrigeration pipes and components bursting and explosions.
Dangerous reactions	It may form explosive mixtures with air. It reacts violently with strong oxidisers.
General precautions	Avoid inhaling vapours and the formation of flammable atmospheres. Ensure adequate ventilation at the installation site. Prevent gas from accumulating in low-lying areas, as the refrigerant is heavier than air.
Respiratory protection	Use screens fitted with an AX-type filter. If there is any doubt about the actual concentration, wear a respirator. This must be a self-contained respirator and approved by the relevant safety authorities.

Safety data	Propane (R290)
Conditions for safe storage, including any incompatibilities	Propane (R290) must be stored using electrical equipment certified for potentially explosive atmospheres (ATEX), as it is a highly flammable gas. Containers must be kept in well-ventilated, cool, and dry environments, away from ignition sources, heat, and direct sunlight. Do not exceed a storage temperature of 50 °C. Contact with incompatible substances such as oxidizing agents and strong acids must be avoided. Containers must be protected from mechanical damage and corrosion, and periodic checks must be carried out to verify the absence of leaks. Smoking is strictly prohibited and the area must be kept free from combustible materials.
Protective equipment	Wear boots, heat-resistant safety gloves and goggles or a face shield with side protection to protect your face. Wear clothing made from waterproof material. (This prevents very cold liquids from penetrating the fabric and coming into contact with your skin)
What to do in the event of leaks or spills	In the event of a leak or accidental release, it is necessary to immediately eliminate all ignition sources and ensure adequate ventilation of the area. Gas accumulation must be avoided in low-lying or confined spaces, and any attempt to stop the leak should only be made if it can be done safely. Non-explosion-proof equipment must not be used and, where possible, the use of gas detectors to monitor concentration is recommended. Prevent the liquefied refrigerant from flowing into drains, foundations, or pits, as its vapors may create an asphyxiating atmosphere.
Disposal	Disposal should prioritize recovery and recycling of the gas, avoiding release into the environment. All operations must comply with local regulations on flammable gases and must be carried out by authorized and qualified personnel.
Fire-fighting measures	Immediately isolate the area by removing all people from the vicinity of the incident in case of fire. Do not take any action that involves personal risk or without adequate training. Contact the supplier for specialized advice. Remove containers from the fire area only if it can be done without risk, and use water spray to cool containers exposed to fire. If containers are involved in the fire, stop the flow of gas if possible and safe; otherwise, withdraw and allow the fire to burn under controlled conditions. Fight the fire from a protected position or at the maximum possible distance. Eliminate all ignition sources if it can be done safely.
Special protective equipment for fire-fighters	Firefighters must wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full facepiece operated in positive pressure mode. In case of incidents involving large quantities, it may be necessary to wear thermally insulating clothing and thick fabric or leather gloves.
Containers	Containers may explode if exposed to heat or fire; therefore, they must be cooled with water spray.

2.11 Polyester oil safety data sheet

Safety data	Polyester oil (POE)
Classification	Non-harmful.
Skin contact	May cause slight irritation. It does not require first aid measures. It is recommended to follow normal personal hygiene measures, including washing exposed skin with soap and water several times a day. We also recommend washing clothes at least once a week.
Eye contact	Wash thoroughly with a suitable solution or tap water. If easy to do, remove contact lenses.
Ingestion	Treat symptomatically. Seek medical help immediately.
Inhalation	Remove exposed person to fresh air if adverse effects are observed.
Conditions to avoid	Strong oxidising substances, caustic or acidic solutions, excessive heat. It can corrode certain types of paint or rubber.
Respiratory protection	Respiratory Protective Equipment (RPE) is not normally required where there is adequate natural or local exhaust ventilation to control exposure. Refer to the relevant EN standards for the RPE selected. Use respirator with an organic vapor cartridge if exposure limit is exceeded.
Protective clothing	Always wear protective goggles or a screen. The use of protective gloves is not compulsory, but is recommended in case of prolonged exposure to oil.
Measures in the event of an accidental leakage	It is important to wear protective clothing and, above all, goggles. Stop the source of the leak. Use absorbent substances (sand, sawdust or any other commercially available absorbent material) to reduce the leak.
Disposal	Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Since emptied containers retain product residue, follow label warnings even after container is emptied.
Fire-fighting measures	In the presence of hot liquids or flames, use dry powder, carbon dioxide or foam. Do not use water jet as an extinguisher, as this will spread the fire.
Cylinders	Cylinders exposed to fire must be cooled with water jets in the event of a fire.
Special protective equipment for fire-fighters	Wear full protective firegear including self-containing breathing apparatus operated in the positive pressure mode with full facepiece, coat, pants, gloves and boots. Recommend wearing self-contained breathing apparatus.
Fire protection equipment	In case of fire, wear a self-contained breathing apparatus.
Conditions for safe storage, including any incompatibilities	Store away from incompatible materials as strong oxidizing agents ,strong acids, oxidizing agents and strong bases.

3. PRODUCT DESCRIPTION

3.1 General data

The unit in this range is specially designed for outdoor installation and is not suitable for uses other than those intended. This heat pump unit is programmed for both water heating and for the reverse cooling function.
Do not use this unit for:

- cooling or heating fluids other than water or fluids containing a glycol concentration exceeding the values specified in this manual.
- use in environments with explosive or corrosive atmospheres, unless specifically designed for such use.
- industrial processes requiring temperatures, flow rates, or pressures outside the specified limits.



Incorrect use of the machine could prove dangerous.

The units consist of a base and a frame made of galvanised steel, with easily removable panels to allow easy access to the internal components.
All steel parts areprotected by an epoxy powder coating, which ensures high resistance to corrosion.
The units are optionally equipped with anti-vibration mount kits,accompanied by specific installation instructions for fitting to the base; these are spring-type.

All components of the control system and those required for operation are connected and tested.
The control system consists of an electronic board equipped with a human-machine interface (HMI), complete with a keyboard and display, through which it is possible to view operational functions, any alarms and operational faults.

The refrigeration circuit is pressure-tested prior to final factory testing, then drained and charged with the required quantity of R290 refrigerant.
Final testing of the unit is carried out by circulating water through the refrigerant/water heat exchanger, in order to verify the correct operation of the refrigeration circuit and compliance with operating parameters.
The hydraulic and electrical connections are designed to ensure quick installation on site.

3.2 Refrigerant circuit components

Below is an introduction to the components that characterise the standard version of the machines.

Compressors
Depending on the selected size, the units are equipped with one or two hermetic scroll compressors, mounted on anti-vibration mounts.
The configuration is as follows:

- a variable-speed compressor, equipped with an inverter, installed on 60 kW units.
- one variable-speed compressor and one fixed-speed compressor (ON/OFF) installed on 80 and 100 kW units.

Both compressors are powered by permanent magnet synchronous motors. The speed of the variable-speed compressor can be modulated using an inverter. The PeC controller, installed inside the electrical box, responds to a PID signal request from the main controller to manage both the fixed-speed ON/OFF compressor and the variable-speed compressor. The PEC also monitors and protects the refrigeration circuit and provides detailed information on the refrigerant cycle.

The compressors are cooled by the refrigerant gas they draw in and are equipped with an internal thermistor protection system against thermal and electrical overloads. The terminal box has an IP65 protection rating.

The fixed-speed (ON/OFF) compressor is equipped with an electric crankcase heater, which is necessary to maintain a minimum lubricant temperature inside the component, especially in cold weather conditions. This ensures that satisfactory lubricating properties are maintained. For the variable-speed compressor, this function is performed by a feature built into the driver that uses the motor windings to provide the thermal power needed to heat the oil.

Plate heat exchanger
The user-side reversible heat exchanger is constructed of a pack of brazed plates made of highly corrosion-resistant stainless steel. The design includes a thin outer layer of aluminum that provides oil resistance and enhanced overall protection. The unit is equipped with polyurethane thermal insulation, designed to limit heat loss and prevent condensation from forming on the external surfaces.

An antifreeze heater provides preventive protection for the heat exchanger during periods of inactivity and under the most demanding operating conditions, preventing the risk of fluid freezing and ensuring the system's reliability and continuous operation.

Finned heat exchanger

The reversible air-to-refrigerant heat exchanger consists of copper tubes arranged in staggered rows, mechanically expanded. The coil is arranged in a "V"-shape and it is positioned lenghtwise relative to the machine structure.

Liquid receiver

The liquid receiver is a container whose primary function is to store the refrigerant in its liquid state when the unit is operating in heating mode.
It allows for the management of excess or insufficient refrigerant without compromising overall efficiency.

Electronic expansion valve

It is a refrigerant flow control device installed upstream of the evaporator.
The valve opening is controlled by the Pec controller, which processes signals from the suction pressure transducer and temperature sensor in the circuit. Depending on operating conditions, the valve continuously adjusts its position to maintain the correct superheat value at the evaporator outlet.

Four way valve

The four-way valve is a device installed between the heat exchangers and the compressors. It is necessary to reverse the refrigeration cycle from cooling mode to heating mode and vice versa.
The unit's control system powers the coil located outside the valve itself. The magnetic field generated acts on a pilot valve that controls the movement of the piston inside the four-way valve. The piston's movement diverts the refrigerant flow.The water-side and air-side heat exchangers switch roles, functioning as either an evaporator or a condenser depending on the selected operating mode.

Fans

The fans are axial-flow type. They have an impeller with 5 sickle-shaped polypropylene blades and a diameter of 950 mm. They are equipped with a galvanised steel protection grid coated with black plastic.
The motor is fully enclosed, with IP55 protection rating and a protection thermostat built into the windings.

It is an electronically commutated (EC) motor, controlled via Modbus communication. Inverter tecnology allows for a floating condensing pressure in cooling mode depending on the outdoor ambient temperature and maximises the unit's efficiency in all applications.

Additional standard components

The specifications for these units also include the following:

- external service valves for measuring pressure and refrigerant charge.
- moisture level indicators.
- dehydrator filter.
- non-return valves on the discharge line.
- high and low pressure transducers for real-timemonitoring of pressure values in the circuit.
- suction temperature sensor.

Optional components

The options available for the refrigeration circuit are as follows:

- compressors jackets, designed to reduce noise during operation.
- high-head electronically controlled fans.
- a desuperhater. It is a component that is installed on the compressor's discharge line and is designed to recover heat while the unit is operating in cooling mode. Its use allows the gas to be cooled before it enters the finned coil, reducing the load on the condenser and improving heat exchange efficiency. It is a component recommended by the manufacturer. It is carefully sized based on the compressor's flow rate and power to prevent excessive pressure drops.

3.3 Hydraulic circuit components

The configuration of the hydraulic system varies between the basic and fully equipped version.
The basic version consists of the following components:

- four pressure taps distributed between the inlet and outlet lines.
- inlet and outlet water temperature probes.
- drain points and valves at the lowest points of the hydraulic lines.
- two shut-off valves.
- insulation of hydraulic lines to prevent heat loss and condensation.

The fully equipped version includes:

- variable-speed circulation pumps capable of delivering the required flow rate and head. They are available in high- and low-head versions.
- a diaphragm expansion tank fitted with a safety valve and a clearly visible drain.
- an inertial storage tank, fitted with an automatic air vent valve, a vacuum relief valve and a water drain valve. The tank is available only for 80 and 100 kW units.
- a differential pressure transducer that measures the pressure difference between the inlet and outlet water.
- water shut-off valves where a buffer tank is present

For both versions, there is a choice of water filter and deaerator, which are accessory components.

This hydraulic circuit is designed to minimise the number of bends and components that cause pressure drops, thereby keeping installation costs down and ensuring optimal system performance.



Operating the unit without a water filter may allow impurities to enter the circuit, which could damage the heat exchanger and other hydraulic components.



The hydraulic circuit is designed to guarantee a constant flow of water through the plate heat exchanger both in stable operating conditions and in situations of load variation.



The expansion vessel is sized so that it can absorb an expansion of 3% of the total volume of water contained in the system (exchanger, piping, utilities and tank, if any). It must take into account the percentage of glycol in the circuit.



It is necessary to consult and comply with all applicable local standards, regulations and instructions relating to hydraulic circuits, particularly if the fluid used is glycol water.



The warranty does not cover deterioration caused by corrosion due to electrolytic phenomena.

Deaerator

The deaerator is an accessory specifically designed to continuously remove from the hydraulic circuit the amount of propane gas that may be dissolved in the working fluid as a result of a plate heat exchanger failure. This component is a high-efficiency model, designed to remove as much propane gas as possible during the first water pass. Its use is governed by the EN 378 technical standard for commercial applications. In the exceptional event of a plate heat exchanger failure, the extent of the leak depends on several factors, such as the size of the internal crack, the refrigerant operating pressure, and the water pressure.

Although the maximum operating pressure of the refrigerant can be reached in heating mode, the most likely failure condition occurs in cooling mode due to icing, when the pressure difference between the propane gas and the working fluid is small (a few bar). Under these conditions, the volumetric flow rate of refrigerant entering the hydraulic circuit is estimated at approximately 30–60 liters per minute per unit, assuming a fracture with an average size (< 7 mm²).

It should therefore be noted that the automatic deaerator analyzed should NOT be considered a safety component for the purpose of protecting against explosion hazards, but rather an aid in reducing such risks. Its use, suitability for the specific application, and related fluid dynamic performance must be strictly evaluated and validated by the installer and the system designer, in strict compliance with applicable technical and safety regulations.

You can choose between two different models:
- a first model suitable for a single-machine installation and featuring a 2-inch hydraulic connection.
- a second model suitable for a modular installation and featuring a 4-inch hydraulic connection.

To facilitate the release of gas, the two deaerators are equipped with one and three safety valves, respectively, located on the top of the vessel.



For information regarding the technical specifications and installation of the deaerator, refer to Chapters 3 and 5 of this manual.

Modular system

The modular system can be implemented through:
- an “Ultracompact” installation, designed to optimize space utilization and facilitate installation of the units in confined spaces, but which has limited access for maintenance. A single array of up to 4 units is recommended to minimize pressure drops.
- a second “Compact” installation that ensures greater spacing between the installed units and easier access during maintenance operations. In this case as well, a single array of up to 4 units is provided.
- a third installation option, at the user's expense, which involves creating a custom layout. In this case, the system can be configured with up to 8 units. Depending on the planned layout, it may be necessary to install balancing valves.

Modularity has the advantage of ensuring uninterrupted operation in the event that one of the units is unavailable due to a malfunction or routine maintenance. For all installation configurations, the guaranteed rated power in heating mode is 800 kW.

For Compact and Ultracompact installations, each unit is supplied with factory-installed hydraulic manifolds.
For the Compact installation, a 600-mm-long interconnecting pipe for the water manifolds is provided as an accessory, supplied in a dedicated package.
The pipe connections are Victaulic-type to ensure quick installation without the need for on-site modifications.



Provide for a modular installation of units with equal power ratings in order to ensure efficient operation under partial load and a balanced load distribution among the units.



See Chapters 5 and 8 for more information on the installation and maintenance of units in a modular installation.

3.4 Domestic hot water management kit

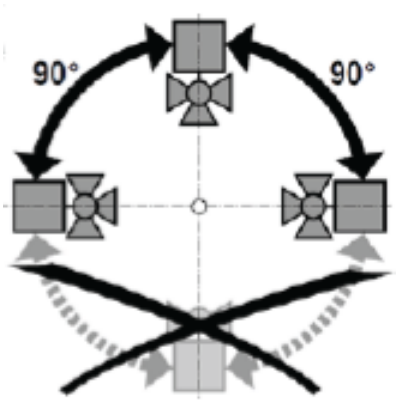
The domestic hot water management kit is supplied as an accessory and includes the following:
- a temperature probe to be positioned as needed.
- a three-way valve that, under the control of the controller, diverts the flow of hot water from the unit to the inertial tank.

The circuit board and control unit include standard functions for managing the three-way valve, the temperature sensor, the built-in heating element of the storage tank, and the storage tank itself.

To ensure hygienic conditions suitable for use by the end user, the water temperature must reach the setpoint specified for the Legionella disinfection cycle (60–65°C).
We recommend configuring the control system to run this cycle on a daily or weekly basis.

At the end of the disinfection cycle, the setpoint is automatically reset to the operating value, and the control system once again adjusts the flow via the 3-way valve to resume the production of hot water required by the system.

The three-way valve can be installed in a vertical or horizontal position. However, it is not recommended to install the valve with the head pin facing downward.



3.5 Polar version

AQUA-G EVO units are available in a special configuration known as Polar, designed for operation in conditions of low outdoor air temperature, around -25°C.
This configuration allows for an expansion of the unit's operating range and ensures operational continuity and reliability.
The Polar version retains the unit's basic structure while integrating auxiliary devices designed for specific functions:

- a heating element installed inside the electrical box to ensure a minimum internal temperature and a thermostat.
- a remote control panel that allows for remote monitoring of the machine and management of its functions, thereby preventing damage caused by low temperatures.
- a 130 W electric heater in the defrost water drain pan to prevent ice formation.

The operating limits of the Polar version can be found in section 3.12 of this manual.

3.6 Safety devices

Each unit is equipped with the following standard safety devices:

- motor overload protection for the compressor.
- motor overload protection for the fan.
- high-pressure switch with manual reset.
- a refrigerant circuit pressure relief valve located at the top of the unit. Its function is to vent the refrigerant to the outside in the event of excessive pressure within the refrigeration circuit, thereby preventing potentially hazardous conditions.
- a water safety valve, included as a component in the fully equipped version of the hydraulic circuit, designed to protect the pump in the event of excess pressure caused by hydraulic filling
- an automatic air vent valve at the highest points of the circuit.
- two non-return valves on the pumps' delivery pipe.
- a crankcase heater of the fixed-speed compressor to preheat the oil.
- a high-pressure switch on the refrigeration circuit.
- a differential pressure switch on the hydraulic circuit which, by measuring pressure drops across the plate heat exchanger, shuts down the unit in the event of water flow problems.
- an anti-freeze heater on the plate heat exchanger to prevent the risk of freezing.
- a drain pan heater.
- R290 gas safety system.
- phase relay.

The optional safety devices are as follows:

- a second pressure relief valve for the refrigerant circuit with a diverter valve.
- An electronic or mechanical flow switch that prevents the machine from operating if there is insufficient water flow in the circuit.
- a low-water pressure switch that protects the pump from cavitation should the mains pressure drop.

3.7 R290 gas safety system

The unit is fitted as standard with a safety system to ensure that the end user can operate the machine safely.

Below is a more detailed description of the components:

- a leak detector based on molecular property spectrometry fitted with two relays that indicates the level of refrigerant gas leakage.
  The thresholds indicating a leak are 10% and 20% respectively.
- an ATEX-certified extraction fan that guarantees high performance, located on the outer top side of the electrical box. It activates in the event of a leak.
- an air differential pressure switch, located inside the machine near the refrigeration circuit.
  It detects malfunctions in the exhaust fan, such as an incorrect airflow rate.
- three LEDs positioned on the outside of the electrical box, to the right of the control panel. They come in green, yellow and red. Each of them indicates that a specific condition has occurred.
- a digital contact dedicated to the customer that electrically signals the occurrence of an alarm.



See Section 7.5 for more information on how the safety system works.



The Modbus parameter list for the leak detector is available to customers on request in a separate document.

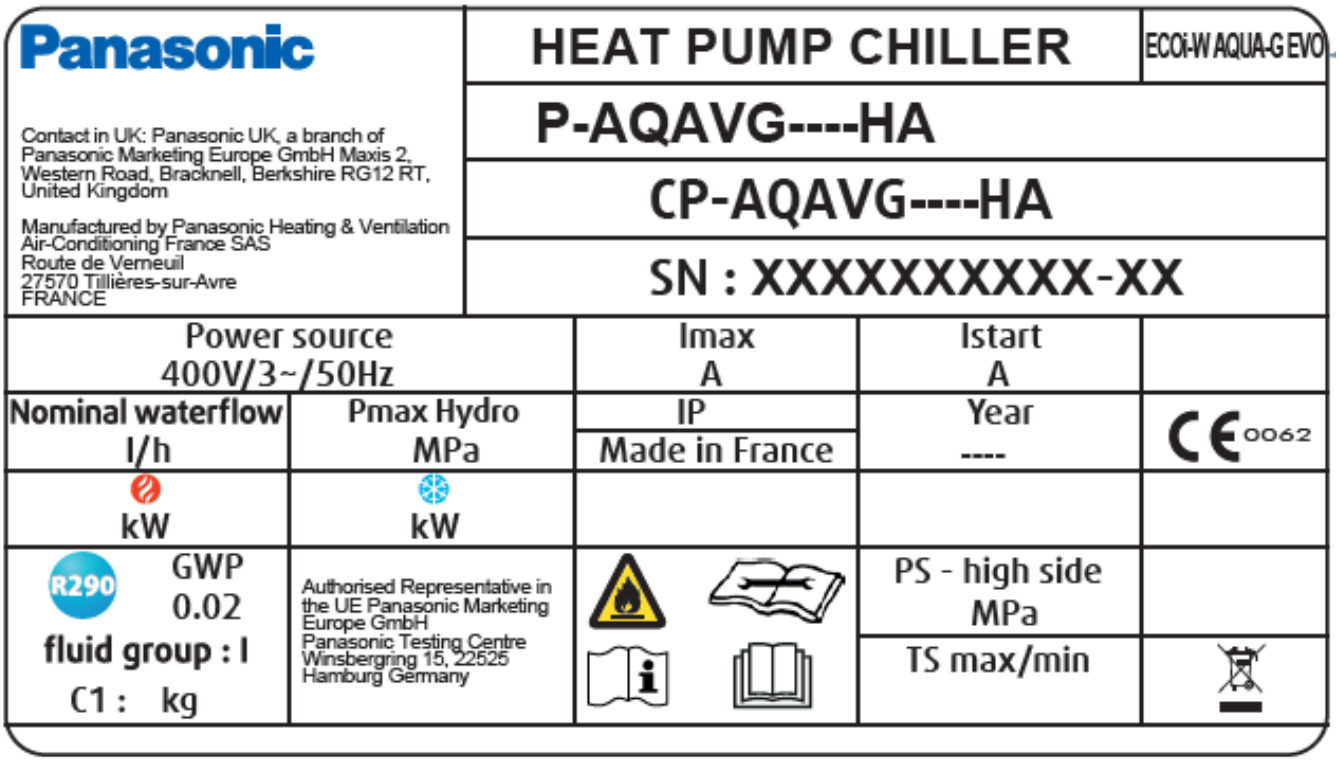


Both the fan and the detector perform a 30-second initialisation cycle when the unit is first started up and when the controller is started up, respectively. During this cycle, the “Leak detection initialisation” alarm is displayed; this will clear once all parameters are correct.
The R290 concentration detected at that moment is considered to be 0%. It is therefore essential to verify the complete absence of R290 when the unit is switched on.

3.8 Energy meter

The energy meter is an optional control device, also available as an accessory, designed to measure the electrical energy consumed by the machine. It is located inside the electrical box and measures the currents of the three phases using dedicated current transformers. It also calculates the unit’s key energy parameters.

3.9 Nameplate



- **ECOi-W AQUA-G EVO H ⟶ Model name**
- **P-AQAVG----HA ⟶ Model designation**
- **XXXXXXXXXX-XX ⟶ Serial number**

3.10 Technical data

AQUA-G EVO			60	80	100
Technical data					
Cooling (According to EN14511) A35°C W12/7 °C	Cooling capacity	kW	51,4	68,4	85,8
	Power input	kW	19,5	25,0	32,6
	EER		2,64	2,74	2,63
Seasonal energy efficiency ratio. (According to EN14825)	SEER		4,65	4,59	4,69
	$\tilde{\eta}_{sc}$	%	182,8	180,7	184,5
Cooling (According to EN14511) A35°C W23/18°C	Cooling capacity	kW	69,4	92,8	116
	Power input	kW	21,4	26,8	35,6
	Total EER		3,24	3,46	3,26
Heating (According to EN 14511) A7°C W30/35°C	Heating capacity	kW	62,2	86,8	105
	Power input	kW	14,9	20,6	25,7
	COP		4,18	4,21	4,09
Heating (According to EN 14511) A7°C W40/45°C	Heating capacity		60,9	84,1	102
	Power input		17,6	24,2	30,3
	COP		3,46	3,48	3,37
Heating (According to EN 14511) A7°C W47/55°C	Heating capacity		59,3	75,9	99,7
	Power input		20,0	26,1	36,1
	COP		2,97	2,91	2,76
Heating (According to EN 14511) A7°C W55/65°C	Heating capacity		58,1	74,0	98,7
	Power input		23,3	30,1	39,9
	COP		2,49	2,46	2,47
Low T application (According to EN14825 and EU Regulation 813/2013)	SCOP		4,21	4,27	4,38
	$\tilde{\eta}_{sh}$	%	165,4	167,8	172,4
Medium T temperature (According to EN14825 and EU Regulation 813/2013)	SCOP		3,34	3,39	3,47
	$\tilde{\eta}_{sh}$	%	130,5	132,7	135,7
High T application (According to EN14825 and EU Regulation 813/2013)	SCOP		2,97	3,02	3,09
	$\tilde{\eta}_{sh}$	%	115,9	117,7	120,4

AQUA-G EVO			60	80	100
Electrical power supply					
Power supply		V/ph/Hz	400-3-50		
Tiype of start-up			DOL (Direct On Line)		
Maximum operating current		A	113,8	103,6	116,6
Refrigerant					
Type / GWP			R290 / 0,02		
No. of refrigerant circuits			1		
Charge (*)		kg	5,40	8,50	9,90
Compressors					
Number / Type			1 / Scroll	2 / Scroll	
Capacity range			29-100	17-100	19-100
Crankcase heater (**)		W	66	55/67	66/67
Plate heat exchanger					
Number / Type			1 / Plates		
Cooling mode	Water flow rate	m³/h	8,84	11,76	14,76
	Pressure drops	kPa	25	24	29
Heating mode	Water flow rate	m³/h	10,71	14,93	18,06
	Pressure drops	kPa	37	39	43
Volume of water		l	4,6	6,1	8,1
Antifreeze heater		kW	35	35+35	35+35

(*) For precise refrigerant charge refer to the unit name plate.

(**) For variable speed compressor it is a function included into the frequency drive.

AQUA-G EVO			60	80	100
Fin&Tube exchanger					
Number			1	1	1
Front surface		m²	1,3	2,5	2,5
Number of rows			3	3	3
Fan					
Number			1	1	1
EC	Air flow rate	m³/h	21800	41600	41600
	Rotational speed	rpm	700	700	700
	Power input	kW	0,8	0,8	0,8
Hydraulic connections					
Type			Victaulic		
Inlet diameter		inch	2	2.1/2	
Outlet diameter		inch	2	2.1/2	
Buffer tank (Option)					
Volume		L	Not available	230	230
Dimensions					
Length		mm	2385	3385	3385
Width		mm	1116		
Height		mm	1998 + 80		

AQUA-G EVO			60	80	100
Acoustic data					
Sound power level (STD) (no pump)		dB(A)	86,5	83,0	84,5
Sound pressure level (STD) (According to ISO 3744, for parallelepiped shape) (no pump) (***)		dB(A)	54,5	51,0	52,5
Sound power level (S) (no pump)		dB(A)	81,0	80,0	80,5
Sound pressure level (S) (According to ISO 3744, for parallelepiped shape) (no pump) (***)		dB(A)	49,0	48,0	48,5
Extra Sound power level (STD) (with pump)		dB(A)	-	1	1
Extra Sound pressure level (S) (with pump)		dB(A)	0,5	2	2
Sound power level (STD) Ecodesign conditions SCOP C		dB(A)	78	80	78
Sound power level (S) Ecodesign conditions SCOP C		dB(A)	69	71	70

(***) Sound pressure levels calculated at 10 meters. Sound pressure levels refer to ISO 3744 standard, parallelepiped shape.

Deaerator efficency data



DEAERATOR (1 air vent valve)				
Indicative degassing efficiency η (%)				
	Water flowrate. Q (l/h)			
Air flowrate (nl/min)	**5000**	**10.000**	**15000**	**20000**
30	95	95	89	65
60	95	95	89	65
90	96	96	92	70

It is an accessory available for single-unit installation, featuring a 2-inch hydraulic connection.
The indicative efficiency data listed above refer to the first refrigerant pass.



DEAERATOR (3 air vent valves)				
Indicative degassing efficiency η (%)				
	Water flowrate Q (l/h)			
Air flowrate (nl/min)	**50.000 (1,5 bar)**	**50.000 (2 bar)**	**50.000 (3 bar)**	**50.000 (4 bar)**
30	91	90	91	84
90	94	93	92	92
150	95	94	98	92
200	94	94	92	91
270	85	94	93	90

It is an accessory available for modular installation, featuring a 4-inch hydraulic connection.
The indicative efficiency data listed above refer to the first refrigerant pass.

3.11 Electrical data

400 V/3/50 Hz		NO KIT HYDRO		
STD / S VERSION -EC FANS		**60**	**80**	**100**
Maximum current input (FLA)	A	114	104	117
Maximum current input (FLA) without T-CAP	A	48	81	92
Nominal current input (*)	A	28	45	52
Maximum power input	kW	34	55	60
Maximum power input without T-CAP	kW	30	46	53
Max Start-up current (LRA)	A	68	298	311
Max Start-up current (LRA) without T-CAP	A	3	275	286
Max Start-up current with Soft Starter (LRA)	A	3	226	239
Max Start-up current with Soft Starter (LRA) without T-CAP	A	3	203	214
Unit fuses (aM)	A	100	160	160
Phase Wire Sections (max flex wiring for disconnector)	mm²	50	70	70

400 V/3/50 Hz		KIT HYDRO STANDARD PRESSURE		
STD / S VERSION -EC FANS		**60**	**80**	**100**
Maximum current input (FLA)	A	70	107	120
Maximum current input (FLA) without T-CAP	A	49	84	96
Nominal current input (*)	A	30	49	55
Maximum power input	kW	35	57	61
Maximum power input without T-CAP	kW	49	84	96
Max Start-up current (LRA)	A	5	301	314
Max Start-up current (LRA) without T-CAP	A	3	275	286
Max Start-up current with Soft Starter (LRA)	A	5	229	242
Max Start-up current with Soft Starter (LRA) without T-CAP	A	3	203	214
Unit fuses (aM)	A	100	160	160
Phase Wire Sections (max flex wiring for disconnector)	mm²	50	70	70

400 V/3/50 Hz		KIT HYDRO HIGH PRESSURE		
STD / S VERSION -EC FANS		60	80	100
Maximum current input (FLA)	A	71	108	121
Maximum current input (FLA) without T-CAP	A	51	85	97
Nominal current input (*)	A	31	50	56
Maximum power input	kW	35	57	62
Maximum power input without T-CAP	kW	51	85	97
Max Start-up current (LRA)	A	6	302	315
Max Start-up current (LRA) without T-CAP	A	6	279	291
Max Start-up current with Soft Starter (LRA)	A	6	230	243
Max Start-up current with Soft Starter (LRA) without T-CAP	A	6	207	219
Unit fuses (aM)	A	100	160	160
Phase Wire Sections (max flex wiring for disconnector)	mm²	50	70	70

RANGE AND SETTINGS OF THERMAL PROTECTION / NOMINAL INTENSITY OF THE CONTACTORS					
MODELS		SIZES	60	80	100
FFVFDC-1.1	Range	A	80	63	80
FTC-1.2	Range	A	-	45	45
FTOF-1.1	Range	A	10	10	10
FFVFDWP-0.1	Range	A	10	10	10



The unit must be installed in accordance with the specifications and electrical requirements stated on the nameplate.
The limitations imposed by the software and applied to the variable-speed compressor cannot be regarded as a compliant safety measure and do not constitute a legally valid substitute for the data shown on the nameplate on the outside of the unit.
Any installation based on limitations imposed by software rather than on the data stated on the nameplate is entirely the responsibility of the installer.

3.12 Weight distribution

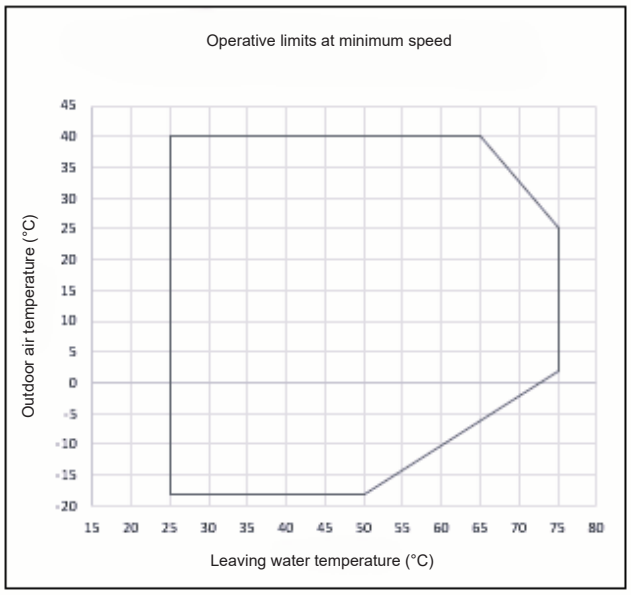
MODEL	SIZE	TYPE	VERSION	HYDROKIT	WEIGHT DISTRIBUTION			
					P1	P2	P3	P4
					kg	kg	kg	kg
AQUA-G EVO	60	H	STD	–	181	181	105	105
	60		STD	1P	195	196	112	113
	60		STD	2P	211	203	114	106
	60		S	–	183	182	106	105
	60		S	1P	197	197	112	113
	60		S	2P	213	204	114	106
	80		STD	–	292	280	153	142
	80		STD	1P	285	294	157	166
	80		STD	2P	302	301	160	159
	80		S	–	297	283	154	140
	80		S	1P	290	296	158	164
	80		S	2P	307	303	161	157
	100		STD	–	306	286	152	132
	100		STD	1P	300	300	156	156
	100		STD	2P	317	307	159	149
	100		S	–	311	288	153	130
	100		S	1P	305	302	157	154
	100		S	2P	322	309	160	147

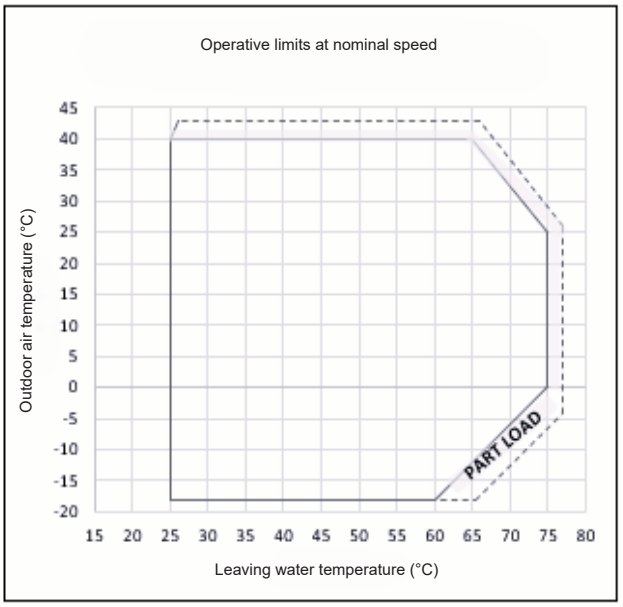
MODEL	SIZE	TYPE	VERSION	HYDROKIT	SHIPPING WEIGHT	OPERATIVE WEIGHT
					kg	kg
AQUA-G EVO	60	H	STD	-	577	577
	60		STD	1P	629	629
	60		STD	2P	647	647
	60		S	-	580	580
	60		S	1P	632	632
	60		S	2P	650	650
	80		STD	-	874	874
	80		STD	1P	924	924
	80		STD	2P	944	944
	80		S	-	880	880
	80		S	1P	930	930
	80		S	2P	950	950
	100		STD	-	885	885
	100		STD	1P	935	935
	100		STD	2P	955	955
	100		S	-	891	891
	100		S	1P	941	941
	100		S	2P	961	961

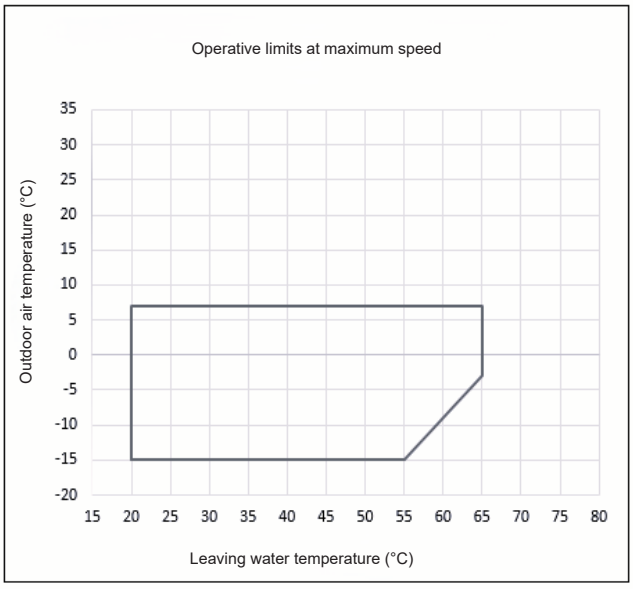
MODEL	SIZE	TYPE	VERSION	HYDROKIT	P COORDINATES		CG		
					a	b	x	y	z
					mm	mm	mm	mm	mm
AQUA-G EVO	60	H	STD	-	1041	1400	544	893	785
	60		STD	1P	1041	1400	540	878	732
	60		STD	2P	1041	1400	525	854	712
	60		S	-	1041	1400	542	888	781
	60		S	1P	1041	1400	539	875	730
	60		S	2P	1041	1400	523	850	709
	80		STD	-	1041	2000	532	1131	783
	80		STD	1P	1041	2000	547	1149	747
	80		STD	2P	1041	2000	536	1125	731
	80		S	-	1041	2000	529	1123	777
	80		S	1P	1041	2000	543	1141	742
	80		S	2P	1041	2000	532	1118	727
	100		STD	-	1041	2000	522	1099	770
	100		STD	1P	1041	2000	536	1118	736
	100		STD	2P	1041	2000	526	1095	721
	100		S	-	1041	2000	519	1092	765
	100		S	1P	1041	2000	533	1111	731
	100		S	2P	1041	2000	523	1089	717

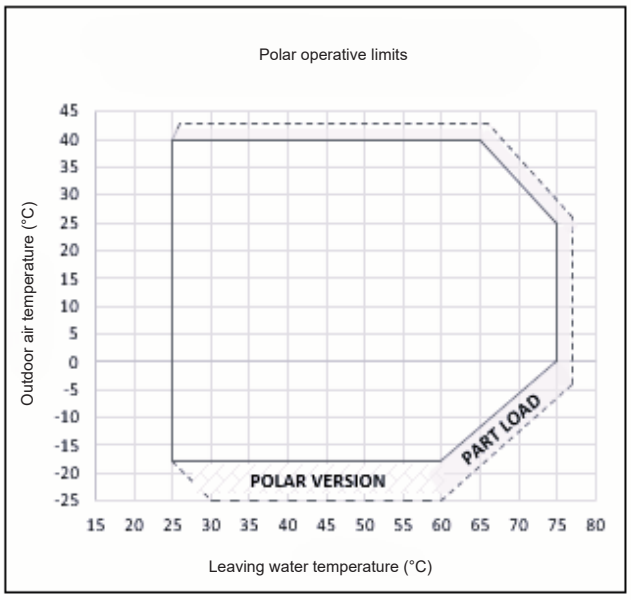
3.13 Operative limits

Heating mode

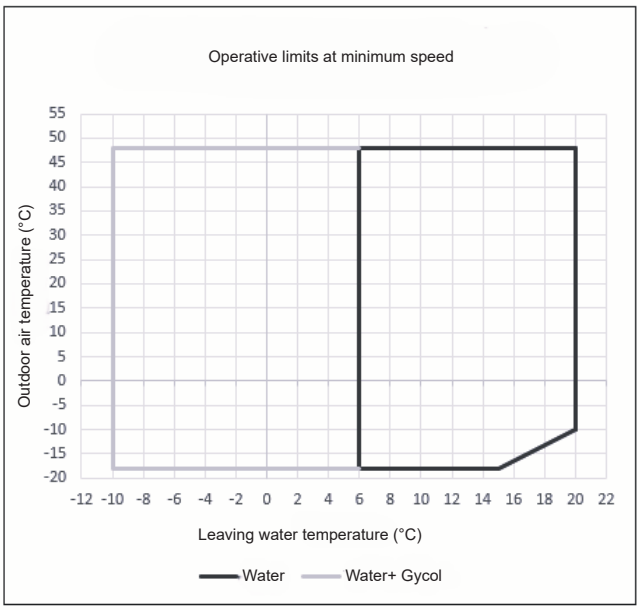


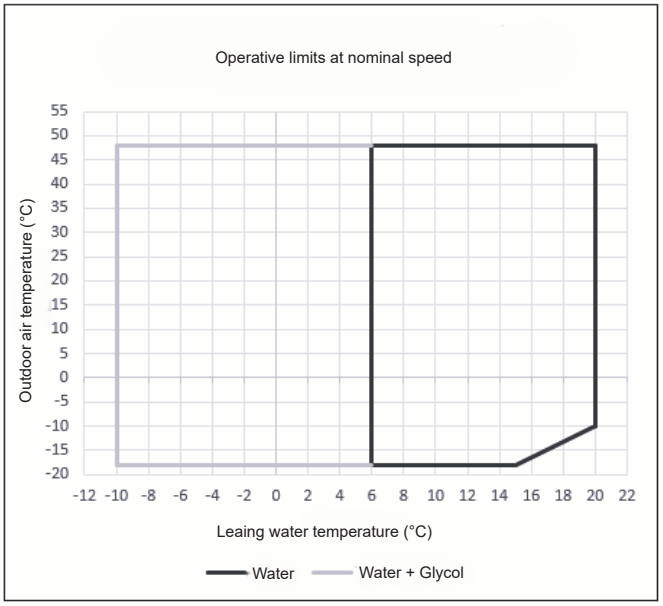




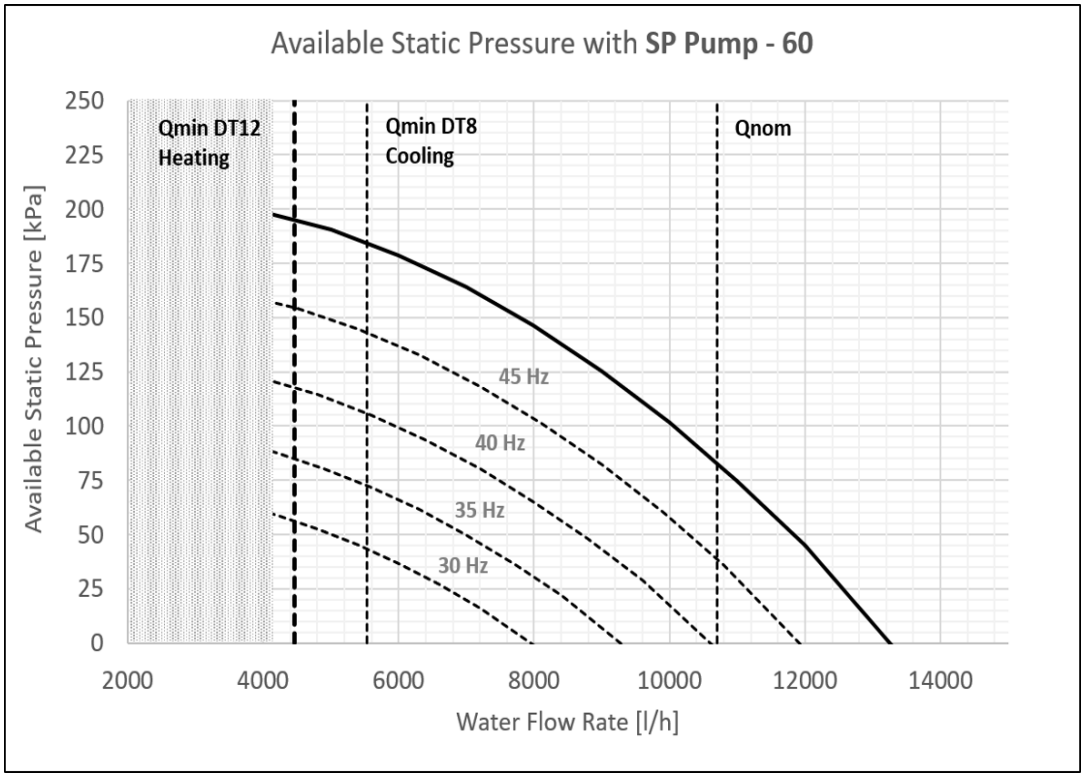


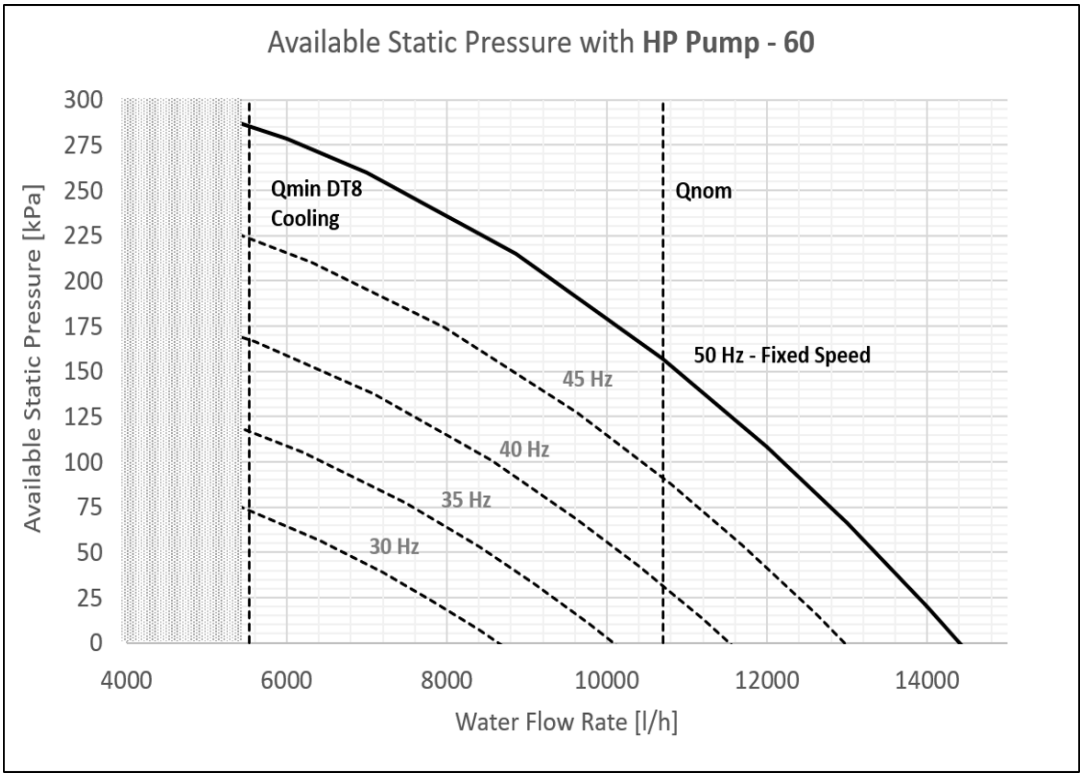
Cooling mode

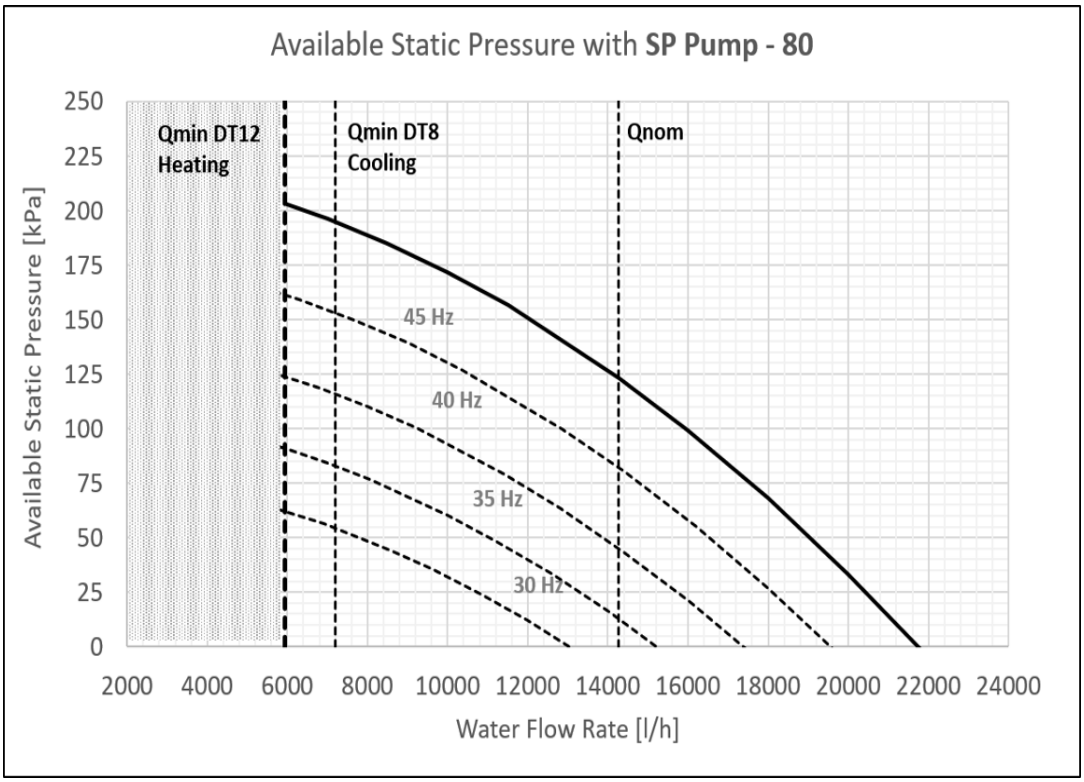


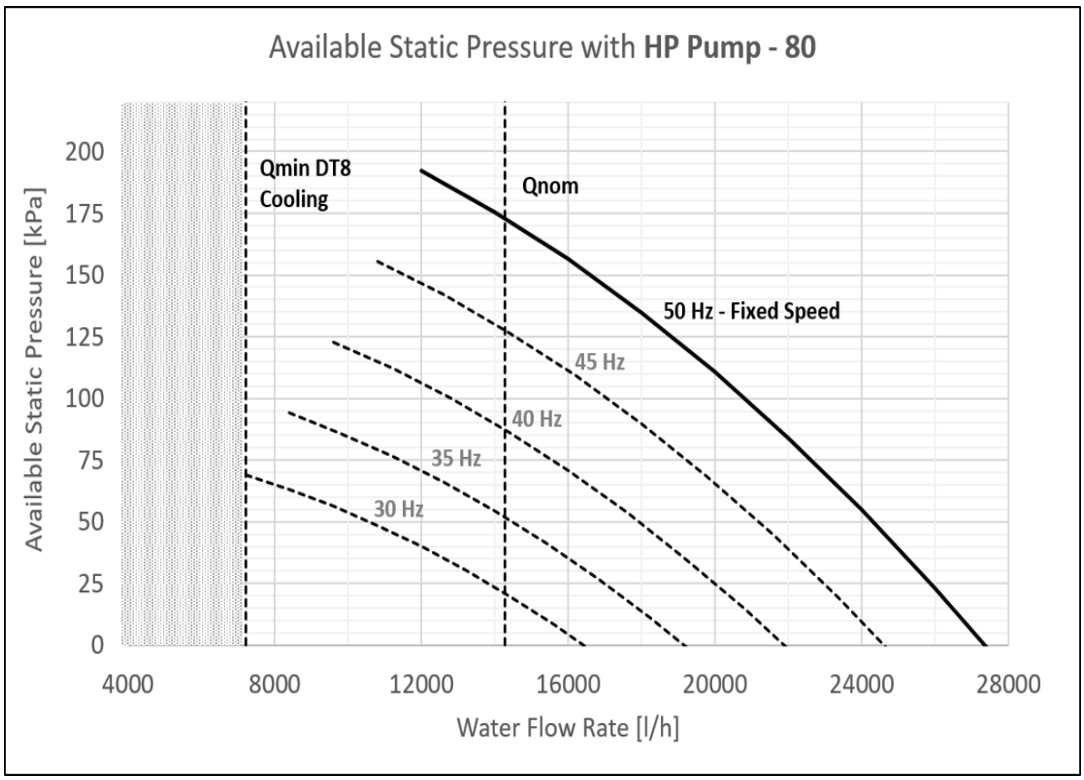


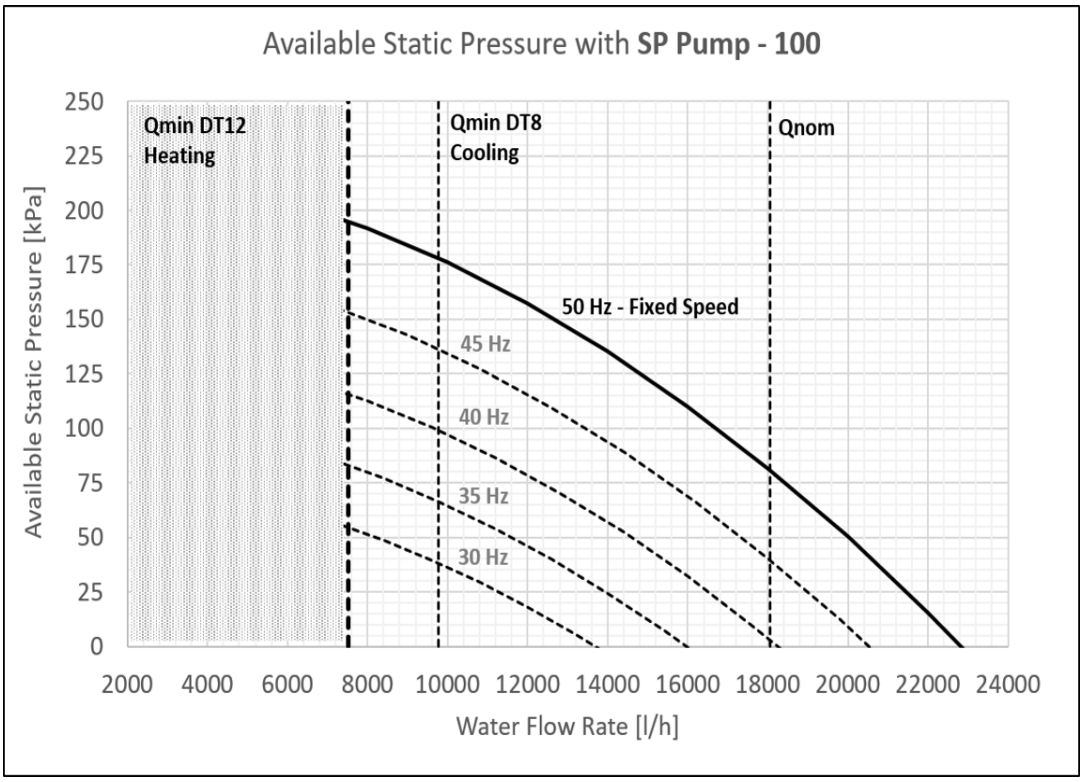
3.14 Available static pressure

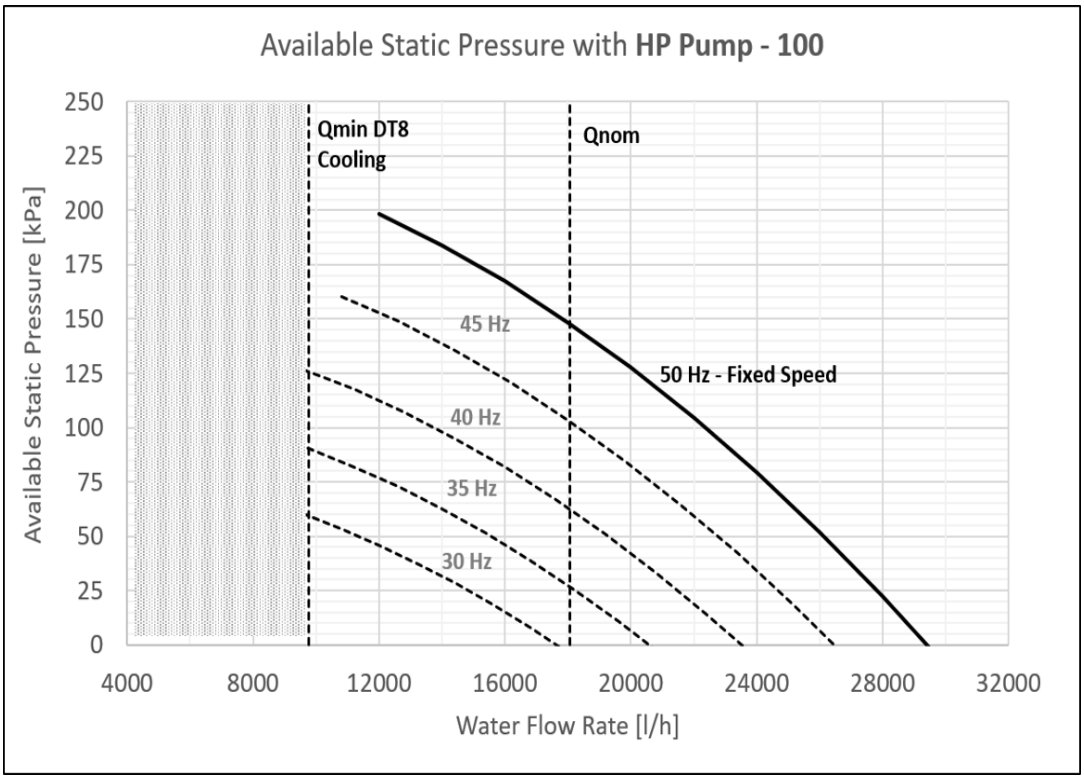




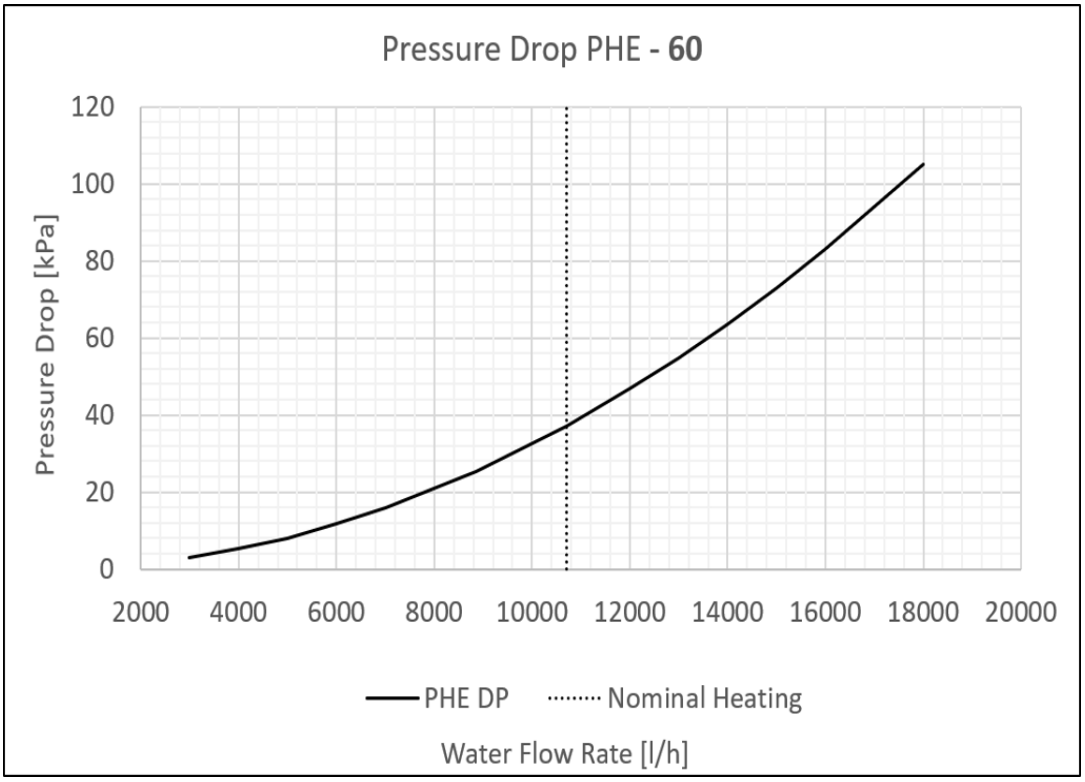

Available Static Pressure with SP Pump - 80
Available Static Pressure [kPa]
250
225
200
175
150
125
100
75
50
25
0
Qmin DT12
Heating
Qmin DT8
Cooling
Qnom
45 Hz
40 Hz
35 Hz
30 Hz
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
Water Flow Rate [l/h]

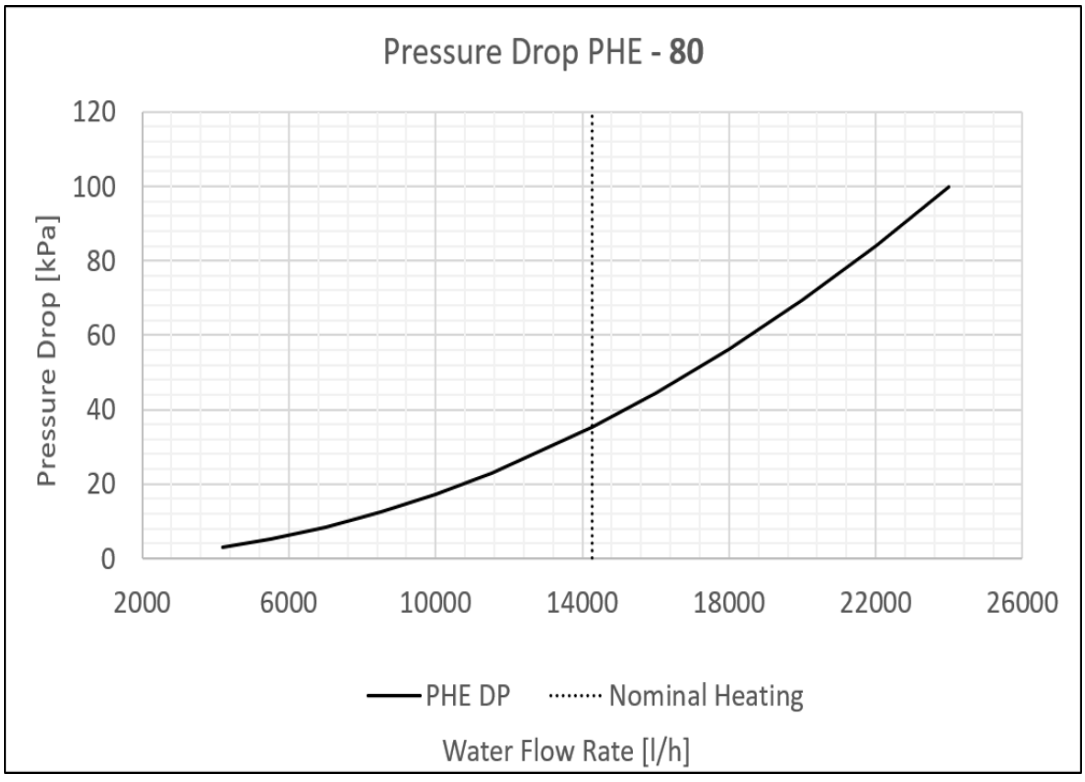

Available Static Pressure with HP Pump - 80
Available Static Pressure [kPa]
200
175
150
125
100
75
50
25
0
Qmin DT8
Cooling
Qnom
50 Hz - Fixed Speed
45 Hz
40 Hz
35 Hz
30 Hz
4000
8000
12000
16000
20000
24000
28000
Water Flow Rate [l/h]

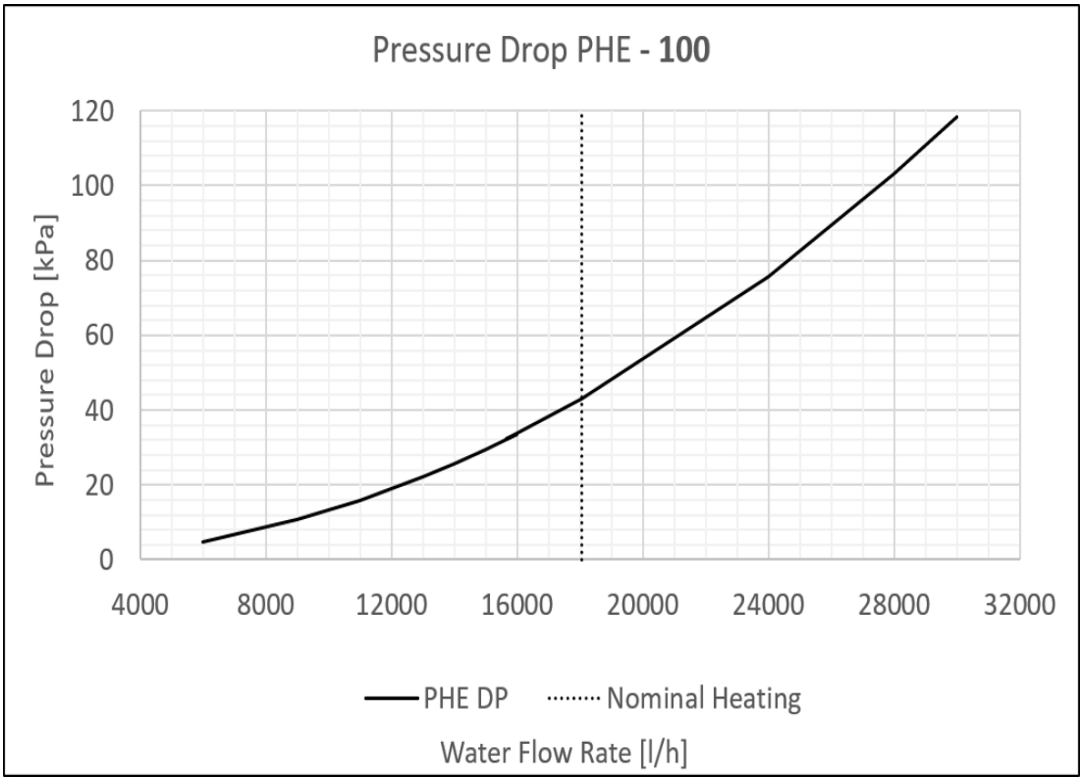

Available Static Pressure with SP Pump - 100
Qmin DT12
Heating
Qmin DT8
Cooling
Qnom
50 Hz - Fixed Speed
45 Hz
40 Hz
35 Hz
30 Hz
Available Static Pressure [kPa]
250
225
200
175
150
125
100
75
50
25
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
Water Flow Rate [l/h]


Available Static Pressure with HP Pump - 100
Qmin DT8
Cooling
Qnom
45 Hz
50 Hz - Fixed Speed
40 Hz
35 Hz
30 Hz
Available Static Pressure [kPa]
250
225
200
175
150
125
100
75
50
25
0
4000
8000
12000
16000
20000
24000
28000
32000
Water Flow Rate [l/h]

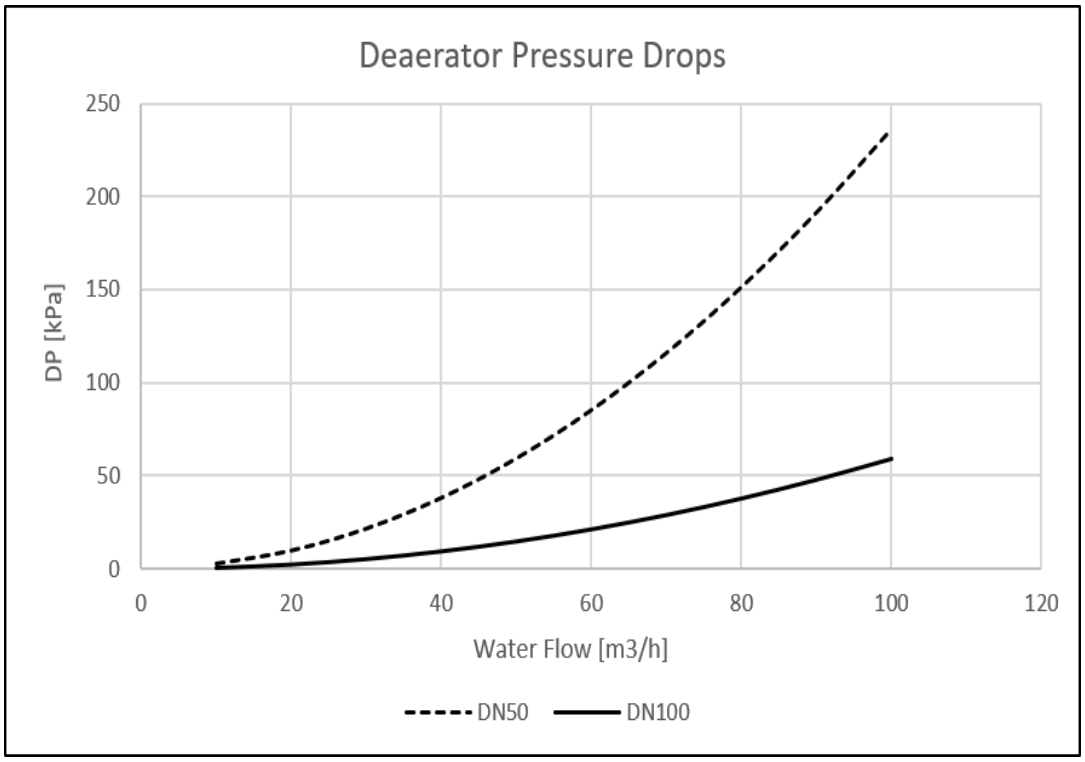
3.15 Plate heat exchanger pressure drops





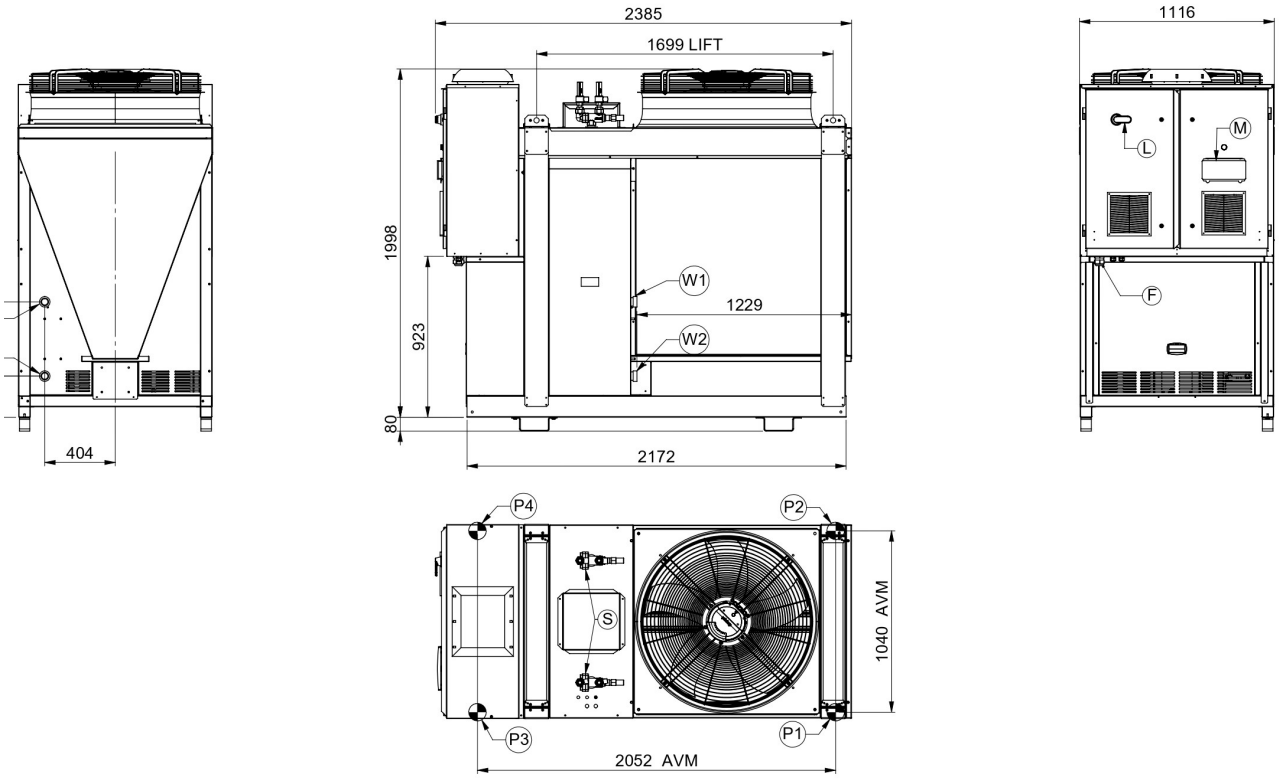

Pressure Drop PHE - 100
Pressure Drop [kPa]
120
100
80
60
40
20
0
4000
8000
12000
16000
20000
24000
28000
32000
PHE DP
Nominal Heating
Water Flow Rate [l/h]

3.16 Deaerator pressure drops



3.17 Dimensional drawings

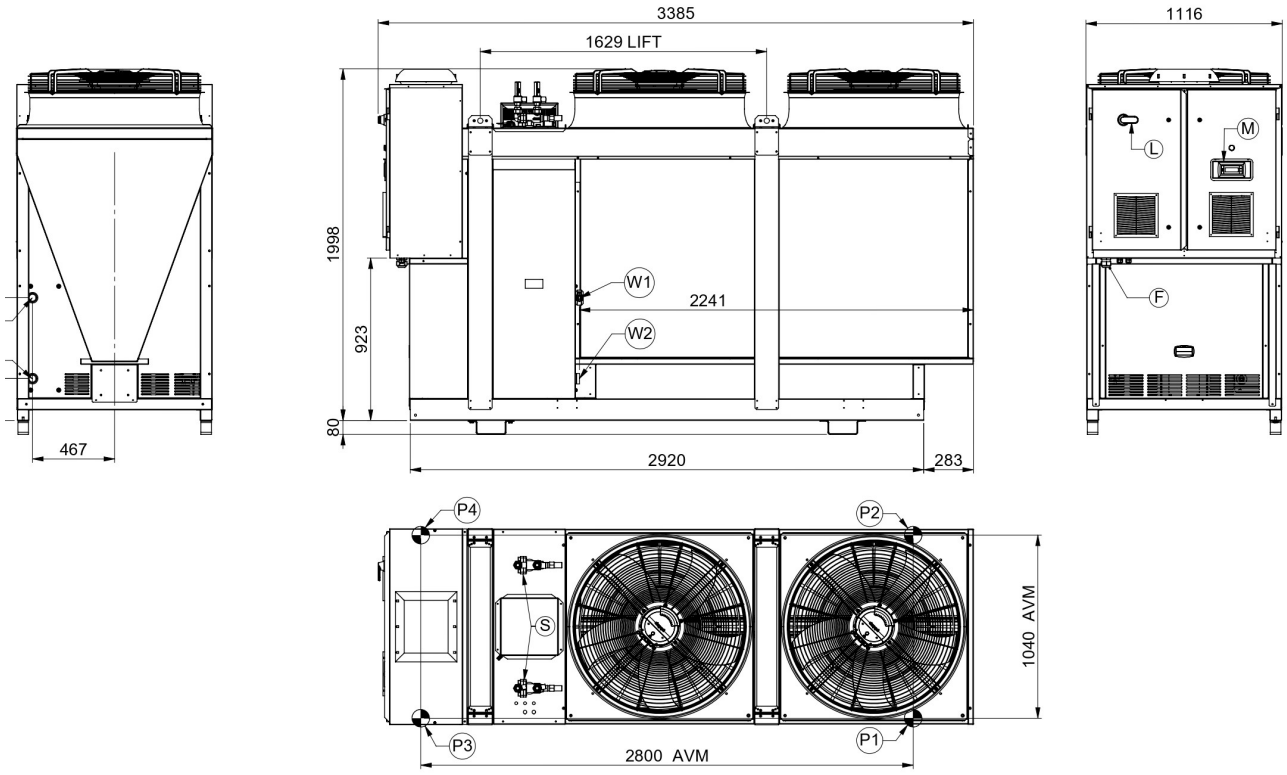
AQUA G-EVO 60



F - POWER SUPPLY
L - UNIT MAIN SWITCH
M - CONTROL SCREEN AND KEYBOARD
S - SAFETY VALVE
W1 - WATER INLET 2" VICTAULIC
W2 - WATER OUTLET 2" VICTAULIC

P1,P2,P3,P4 - LIFTING POINTS

AQUA G-EVO 80-100

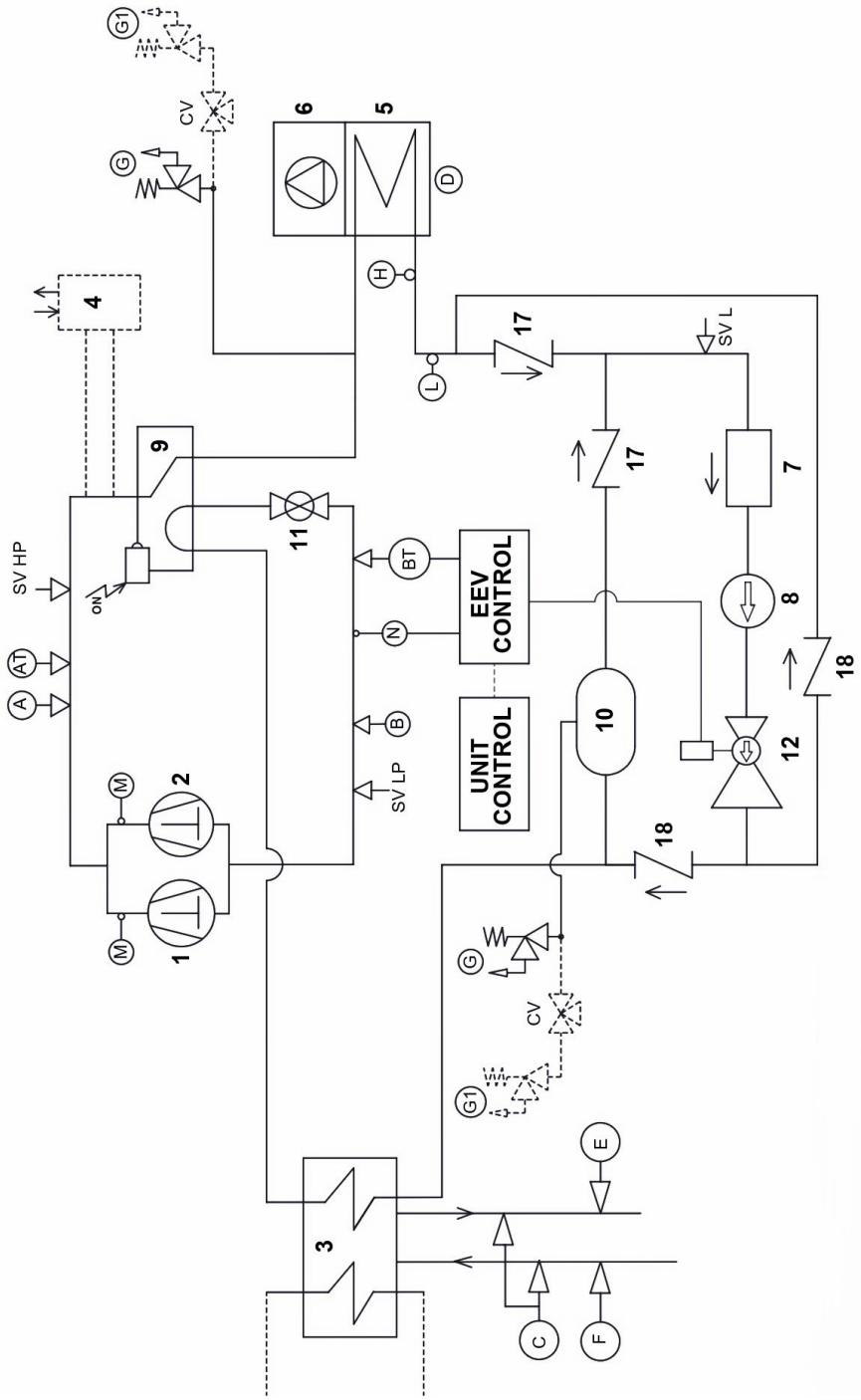


F - POWER SUPPLY
L - UNIT MAIN SWITCH
M - CONTROL SCREEN AND KEYBOARD
S - SAFETY VALVE
W1 - WATER INLET 2" VICTAULIC
W2 - WATER OUTLET 2" VICTAULIC

P1,P2,P3,P4 - LIFTING POINTS

English

3.18 Refrigeration circuit diagram



COMPONENTS

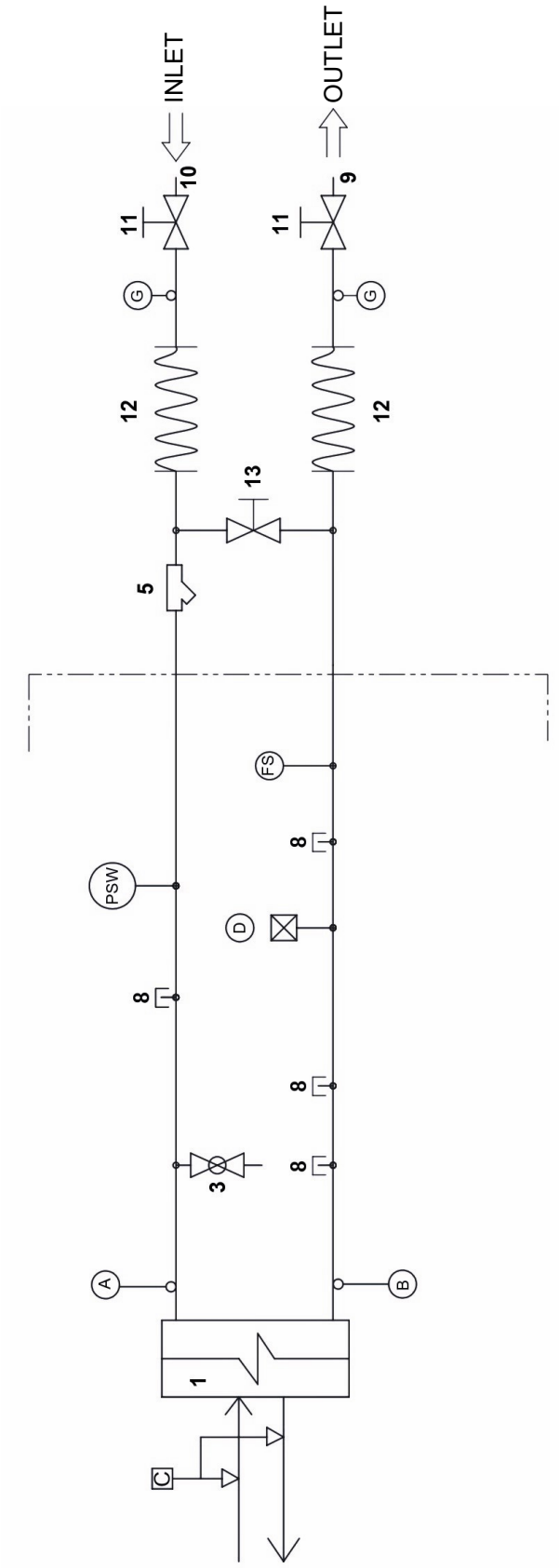
1 - SCROLL COMPRESSOR 1
2 - SCROLL COMPRESSOR 2
3 - PLATE EXCHANGER
4 - DESUPERHEATER (optional)
5 - COIL
6 - FAN
7 - FILTER
8 - SIGHT GLASS
9 - 4-WAY VALVE
10 - LIQUID RECEIVER
11 - BALL VALVE
12 - EEV
17 - CHECK VALVE LIQUID LINE
18 - CHECK VALVE EXPANSION VALVE

CONTROL DEVICES / SAFETY

A - HIGH PRESSURE SWITCH
B - LOW PRESSURE SWITCH
AT - HIGH PRESSURE TRANSDUCER
BT - LOW PRESSURE TRANSDUCER
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - AIR TEMPERATURE SENSOR
E - LEAVING WATER TEMPERATURE SENSOR
F - INLET WATER TEMPERTURE SENSOR
G - PRESSURE RELIEF VALVE
G1 - PRESSURE RELIEF VALVE (optional)
H - DEFROST TEMPERATURE SENSOR
L - LIQUID LINE PROBE
M - DISCHARGE TEMPERATURE SENSOR
N - SUCTION TEMPERATURE SENSOR
CV - CHANGE-OVER VALVE (optional)
SV - SV-PRESSUR PIPE CONNECTION WITH SHRADER VALVE 1/4"

3.19 Hydraulic circuit diagram

Standard version



COMPONENTS

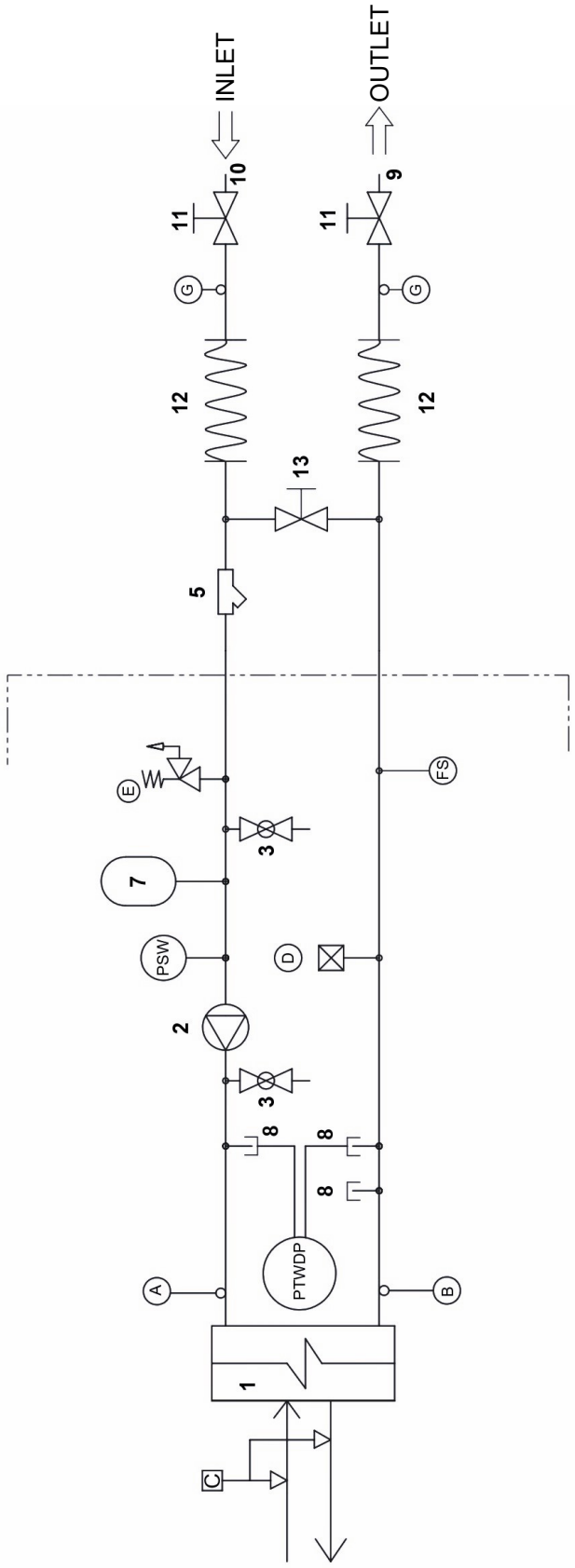
1 - PLATE HEAT EXCHANGER
5 - WATER FILTER
8 - PRESSURE POINT
9 - WATER OUTLET
10 - WATER INLET
11 - GLOBE VALVE
12 - FLEXIBLE PIPES
13 - BY-PASS VALVE

CONTROL DEVICES / SAFETY

A - INLET WATER TEMPERATURE SENSOR
B - OUTLET WATER TEMPERATURE SENSOR
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - VENT VALVE
FS - FLOW SWITCH (optional)
G - THERMOMETER
PSW - LACK OF WATER PRESSURE SWITCH (optional)

English

1 Pump version



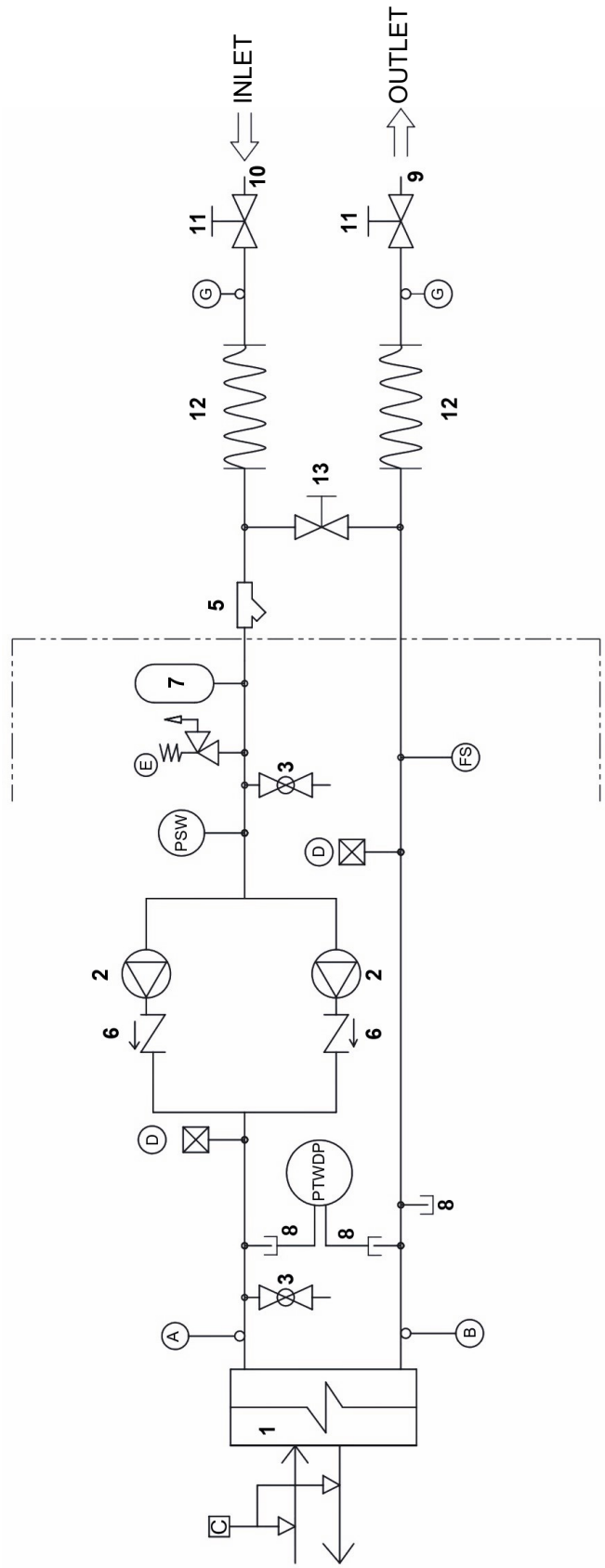
COMPONENTS

1 - PLATE HEAT EXCHANGER
2 - PUMP
3 - DRAINING VALVE
5 - WATER FILTER
7 - EXPANSION TANK
8 - PRESSURE POINT
9 - WATER OUTLET
10 - WATER INLET
11 - GLOBE VALVE
12 - FLEXIBLE PIPES
13 - BY-PASS VALVE

CONTROL DEVICES / SAFETY

A - INLET WATER TEMPERATURE SENSOR
B - OUTLET WATER TEMPERATURE SENSOR
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - VENT VALVE
E - WATER SAFETY VALVE
FS - FLOW SWITCH (optional)
G - THERMOMETER
PSW - LACK OF WATER PRESSURE SWITCH (optional)
PTWDP - DIFFERENTIAL PRESSURE TRANSDUCER (optional)

2 Pumps version



COMPONENTS

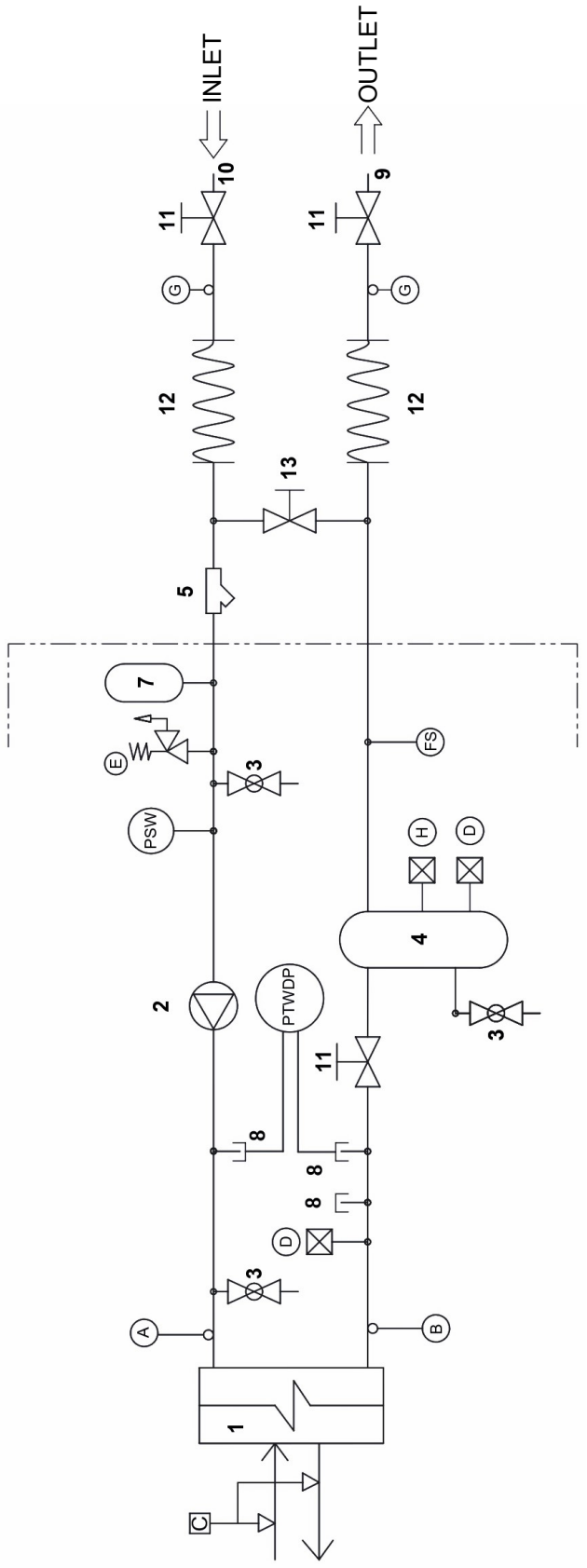
1 - PLATE HEAT EXCHANGER
2 - PUMP
3 - DRAINING VALVE
5 - WATER FILTER
6 - CHECK VALVE
7 - EXPANSION TANK
8 - PRESSURE POINT
9 - WATER OUTLET
10 - WATER INLET
11 - GLOBE VALVE
12 - FLEXIBLE PIPES
13 - BY-PASS VALVE

CONTROL DEVICES / SAFETY

A - INLET WATER TEMPERATURE SENSOR
B - OUTLET WATER TEMPERATURE SENSOR
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - VENT VALVE
E - WATER SAFETY VALVE)
FS - FLOW SWITCH (optional)
G - THERMOMETER
PSW - LACK OF WATER PRESSURE SWITCH (optional)
PTWDP - DIFFERENTIAL PRESSURE TRANSDUCER (optional)

English

1 Pump with Tank version



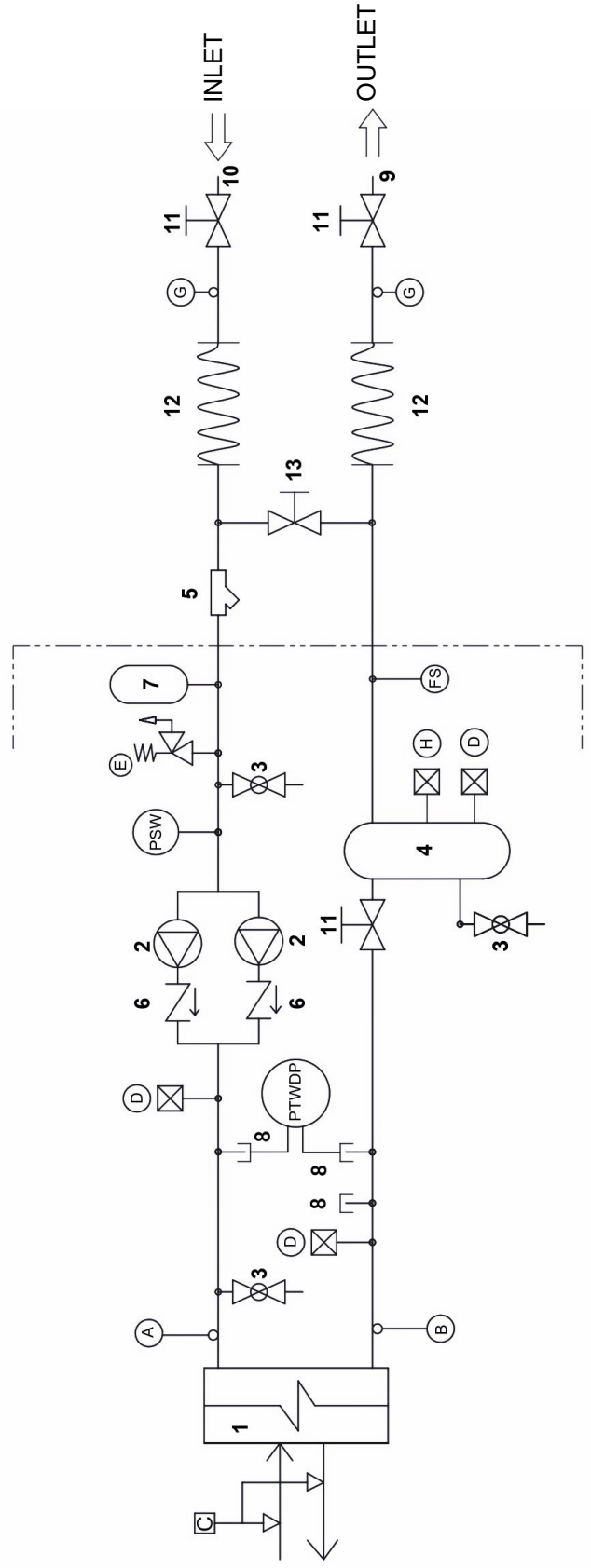
COMPONENTS

1 - PLATE HEAT EXCHANGER
2 - PUMP
3 - DRAINING VALVE
4 - BUFFER TANK
5 - WATER FILTER
7 - EXPANSION TANK
8 - PRESSURE POINT
9 - WATER OUTLET
10 - WATER INLET
11 - GLOBE VALVE
12 - FLEXIBLE PIPES
13 - BY-PASS VALVE

CONTROL DEVICES / SAFETY

A - INLET WATER TEMPERATURE SENSOR
B - OUTLET WATER TEMPERATURE SENSOR
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - VENT VALVE
E - WATER SAFETY VALVE
FS - FLOW SWITCH (optional)
G - THERMOMETER
H - SAFETY VALVE
PSW - LACK OF WATER PRESSURE SWITCH (optional)
PTWDP - DIFFERENTIAL PRESSUR TRANSDUCER (optional)

2 Pumps with Tank version



COMPONENTS

1 - PLATE HEAT EXCHANGER
2 - PUMP
3 - DRAINING VALVE
4 - BUFFER TANK
5 - WATER FILTER
6 - CHECK VALVE
7 - EXPANSION TANK
8 - PRESSURE POINT
9 - WATER OUTLET
10 - WATER INLET
11 - GLOBE VALVE
12 - FLEXIBLE PIPES
13 - BY-PASS VALVE

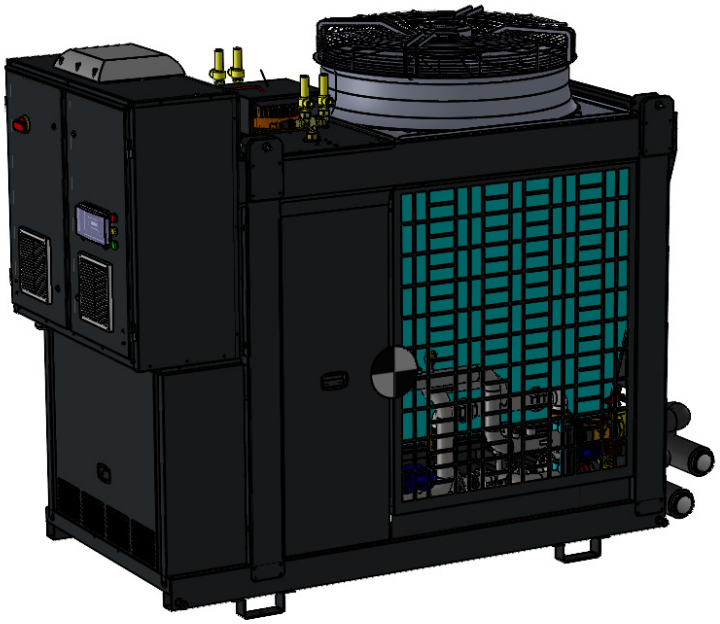
CONTROL DEVICES / SAFETY

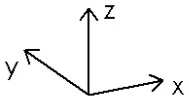
A - INLET WATER TEMPERATURE SENSOR
B - OUTLET WATER TEMPERATURE SENSOR
C - WATER DIFFERENTIAL PRESSURE SWITCH
D - VENT VALVE
E - WATER SAFETY VALVE
FS - FLOW SWITCH (optional)
G - THERMOMETER
H - SAFETY VALVE
PSW - LACK OF WATER PRESSURE SWITCH (optional)
PTWDP - DIFFERENTIAL PRESSURE TRANSDUCER (optional)

4. LIFTING, HANDLING AND STORING

4.1 Position of the centre of gravity

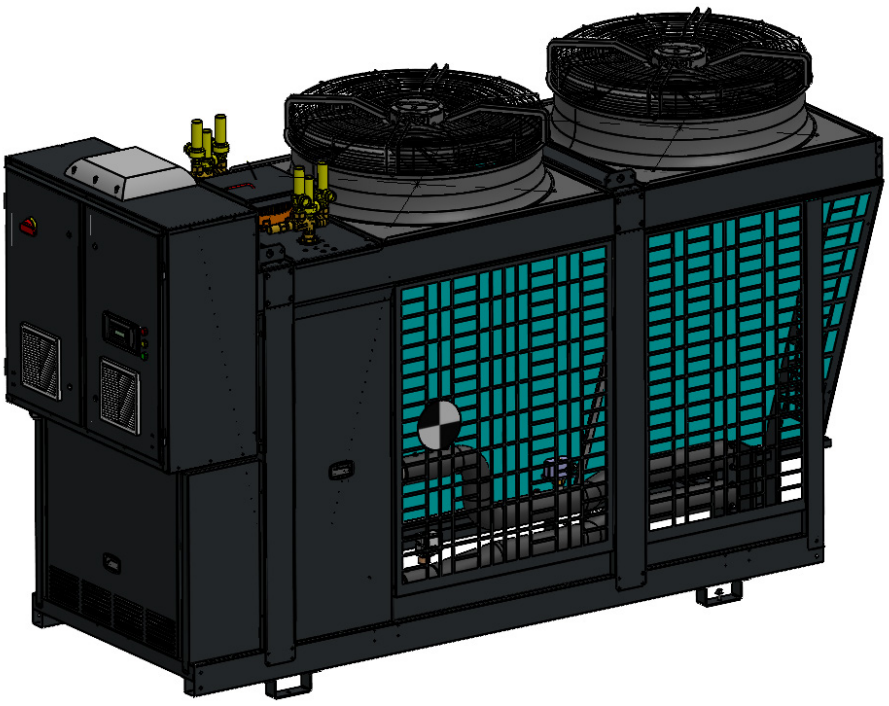
(*) For information on the coordinates of the centre of gravity, please refer to the table on page 29.

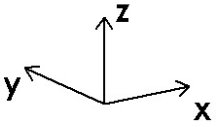




(*)AQUA-G EVO 60

(*)AQUA-G EVO 80-100





4.2 Packaging

R290 units are supplied properly packaged to ensure protection during shipping and storage.

The manifolds required for the modular installation of the hydraulic circuit are factory-assembled.
It is recommended to verify that the hydraulic piping is complete and undamaged and that the packaging remains intact until installation.



Avoid knocks, bending or damage to components, particularly pipes and connectors.



Do not remove the protective caps from the hydraulic connections until you are ready to connect them, in order to prevent contamination or the ingress of foreign objects.



Check that all identification labels are present and legible before installation.



The hydraulic interconnecting fitting, for Compact-type installation, is supplied in a separate package along with installation instructions.

It is important to note that in the event of an accidental leak of R290, the gas could accumulate inside the packaging.
Before unpacking, make sure that the area is adequately ventilated and that there are no ignition sources or open flames present.

4.3 Lifting

The unit must be lifted taking into account the position of its centre of gravity. It is essential to ensure optimal balance to allow for correct handling.
Before moving the machine, inspect it carefully for any faults, both in terms of assembly and bodywork, and carry out the necessary checks.

Lifting can be carried out in two different ways: using an overhead crane or a forklift.
In particular:

- check that the belts are in good working order.
- carry out an initial test lift to check the stability of the unit.
- during this phase, do not make any sudden movements that could cause the machine to sway.



The belts should never come into contact with the frame or the coil fin stack on the side of the unit, in order to prevent any damage.

The lifting points located on the top of the machine allow each individual unit to be lifted, even in Compact and Ultracompact installations. This must be carried out with the utmost care to avoid collisions between adjacent machines.

When lifting with a forklift, insert the forks into the designated slots at the base of the unit, ensuring they are positioned correctly and symmetrically.
The length of the forks must be appropriate for the unit's dimensions to ensure full and stable support during lifting.
The 60 kW and 80/100 kW units have total lengths of 2172 mm and 2920 mm, respectively.
Based on the weight distribution specified by the manufacturer, the ideal fork length should be:

- approximately 1800 mm for longitudinal lifting.
- approximately 1200 mm for lateral lifting.

Lifting in the longitudinal direction using a forklift ensures that the units can be removed in the event of extraordinary maintenance on machines installed in the Ultracompact configuratiom.

It is recommended not to remove the support brackets at the base of the machine, as they ensure better stability during the lifting phase.

Be careful not to damage the frame or other components of the unit when inserting or removing the forks.

The unit must be lifted with care.
To lift it slowly and smoothly, avoid twisting it or making jerky movements.

Take great care not to damage the coil fin block. If possible, place a protective shim between the trolley and the unit to prevent damage to the frame.

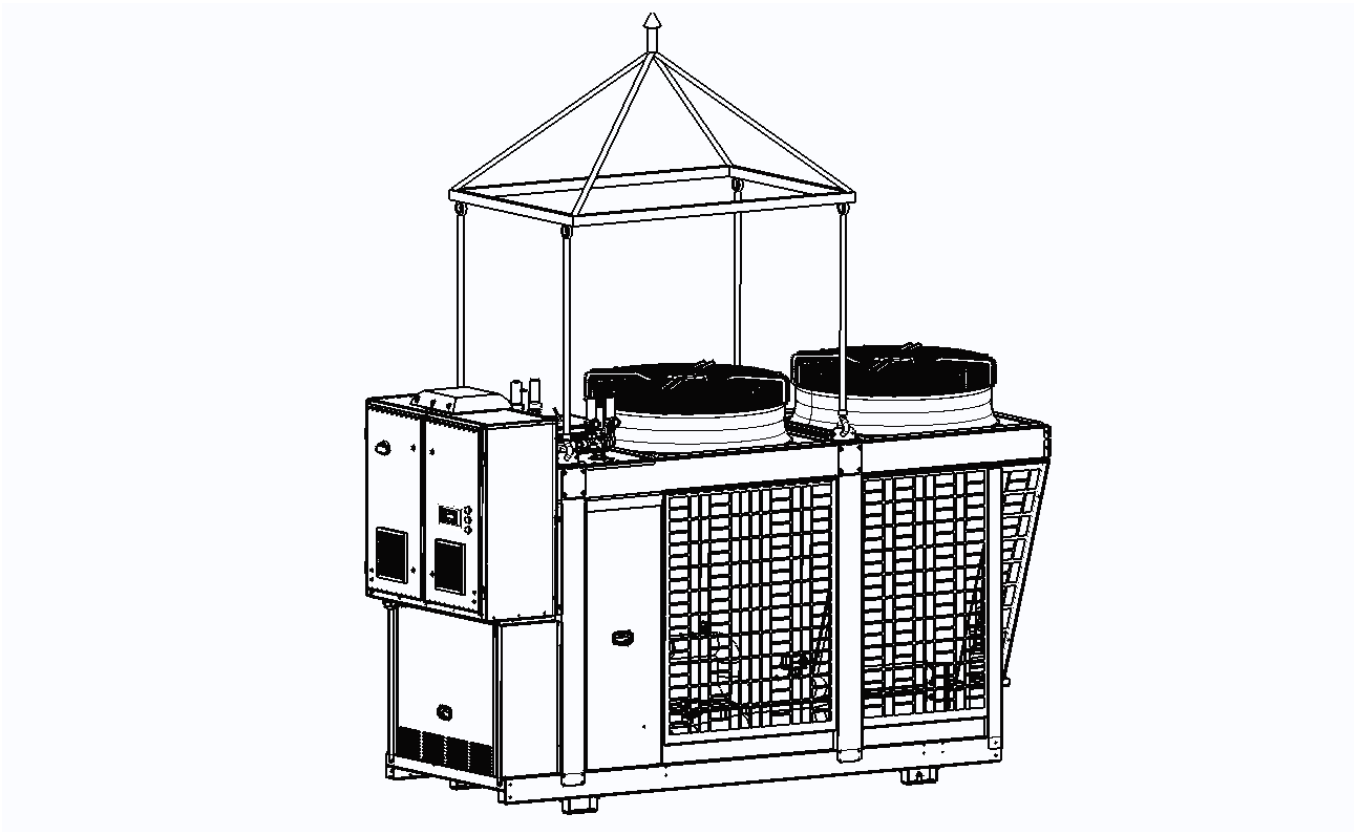
Forks that are too short may compromise stability and cause the unit to tip over. Carefully assess the length of the forks when using the extension.

Do not use lifting methods other than those described, as they may not be strong enough to support the weight of the unit.

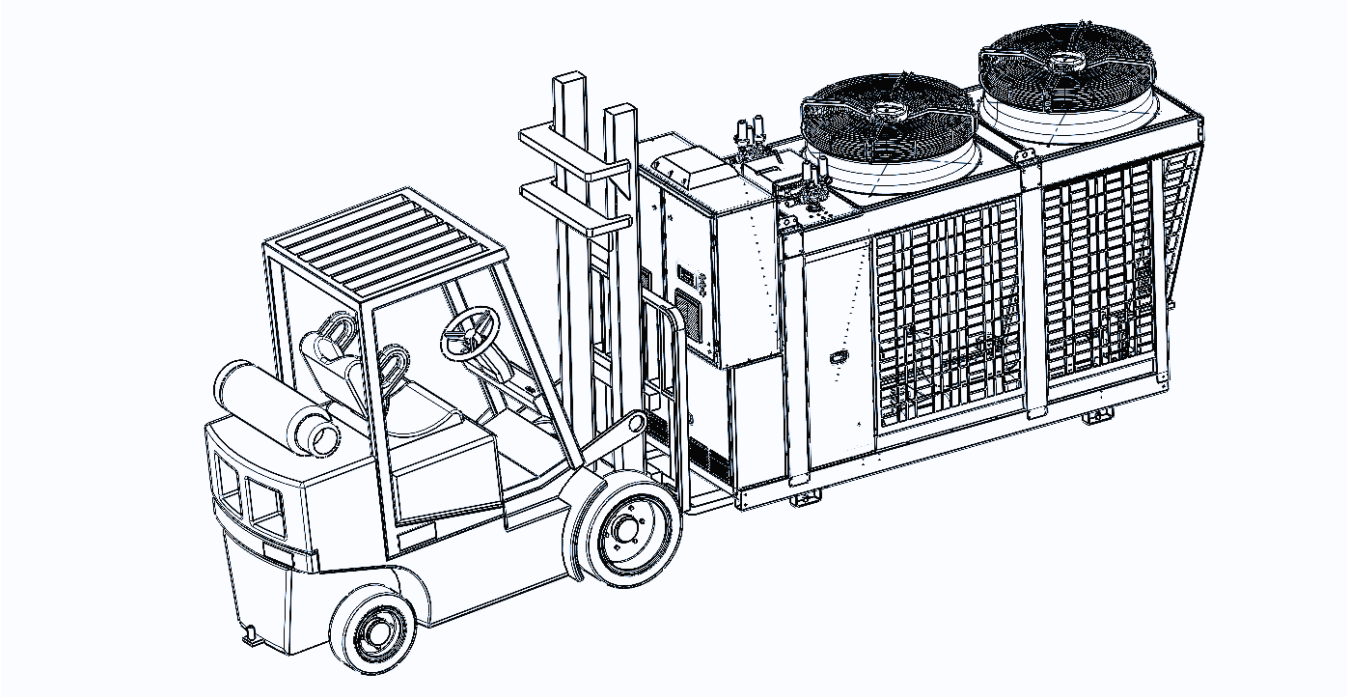
For more information on lifting and moving the units, refer to Chapter 8 of this manual

Below are images showing the two different types of lifting.

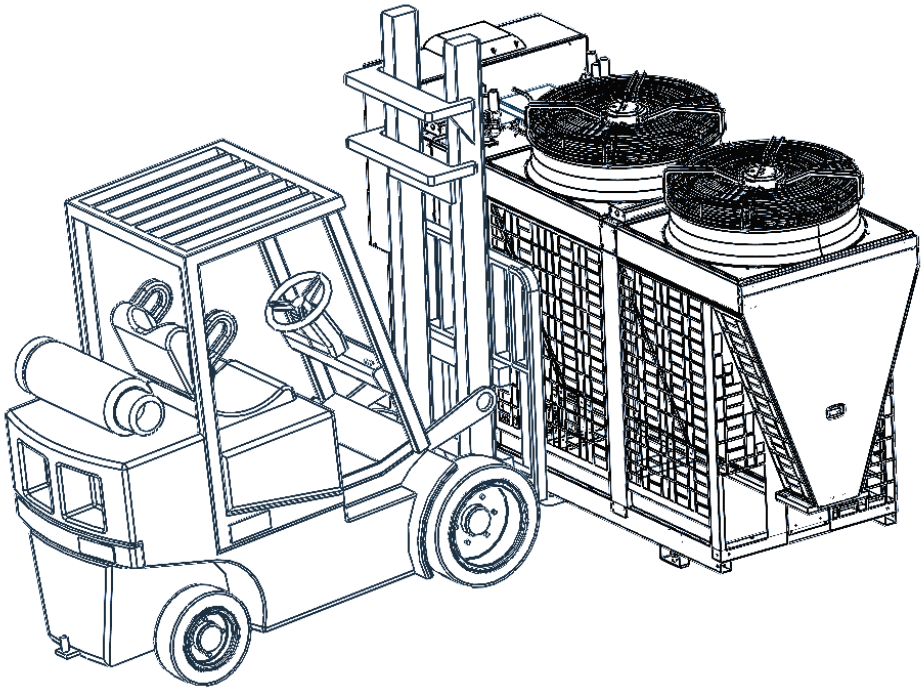
Lifting using a crane or overhead crane



Lifting in the longitudinal direction using a forklift



Lifting with a forklift and “omega” profiles



4.4 Handling

When moving the unit, particular care must be taken due to the presence of R290 refrigerant (propane), which is classified as a highly flammable fluid (A3).
In particular, please follow these recommendations:

- Avoid any sudden movements or impacts. If the refrigeration circuit is damaged, refrigerant leaks may occur.
- avoid any fluctuations.
- avoid falls.
- make sure that the chosen installation location is capable of supporting its weight.



Do not handle the product near sources of ignition or heat



Do not use handling methods other than those specified. For example, do not move the machine using unstable trolleys.

If the units are configured in a modular setup, whether in the Compact or Ultra Compact versions, it is strictly forbidden to move them once they have been installed. Any subsequent handling or maintenance operations must only be carried out after the units have been completely disconnected from the systems and safety conditions have been verified.



For information on the maintenance of these units,please refer to section 8 of this manual.



The lifting and handling phases are tested at the factory to ensure operational safety.

4.5 Loading and unloading

The machine must be loaded onto a truck or into a container using appropriate lifting equipment and by qualified personnel, in accordance with the nstructions provided in this manual.

Depending on the loading procedures, it is advisable to adopt the operational approach that best facilitates and speeds up the work.

It is recommended to load the AQUA-G EVO unit onto a truck primarily using a forklift to facilitate handling operations.
By truck:

1. Open the folding sides in advance, if the trailer has a box body, or open the side walls.
2. Lift the machine using the designated fork guides, located on the sides of the base at the “omega” profiles.
3. Keep the unit in an upright position and ensure that the work area is free of obstacles and suitable for handling operations.

Only if the loading platform is fully accessible is it permitted to perform operations using a crane or overhead crane.

If it is necessary to load one or more machines into containers, the proper procedure involves using cranes or overhead cranes assisted by a forklift.
This solution is necessary because the load capacity may be too high to allow for the use of a forklift alone, and accessing the skid could cause the unit to become unbalanced during handling operations.

Take special care in confined spaces. When loading a container, ensure that:

- handling by crane or overhead crane is performed slowly to prevent the machine from swaying.
- the forklift is aligned with the longitudinal axis of the container during the insertion phase.
- the unit is lifted in a controlled manner, maintaining stability and preventing dragging and possible structural deformation of the fork guides located at the base.

Given the volume and total weight of these units, it is recommended that the AQUA-G EVO unit be loaded only onto containers with the specific characteristics listed below:

- internal length = 12.03 m.
- internal width = 2.35 m.

- internal height = 2.70 m
- door width = 2.34 m.
- door height = 2.58 m.
- volume = 76.4 m³.

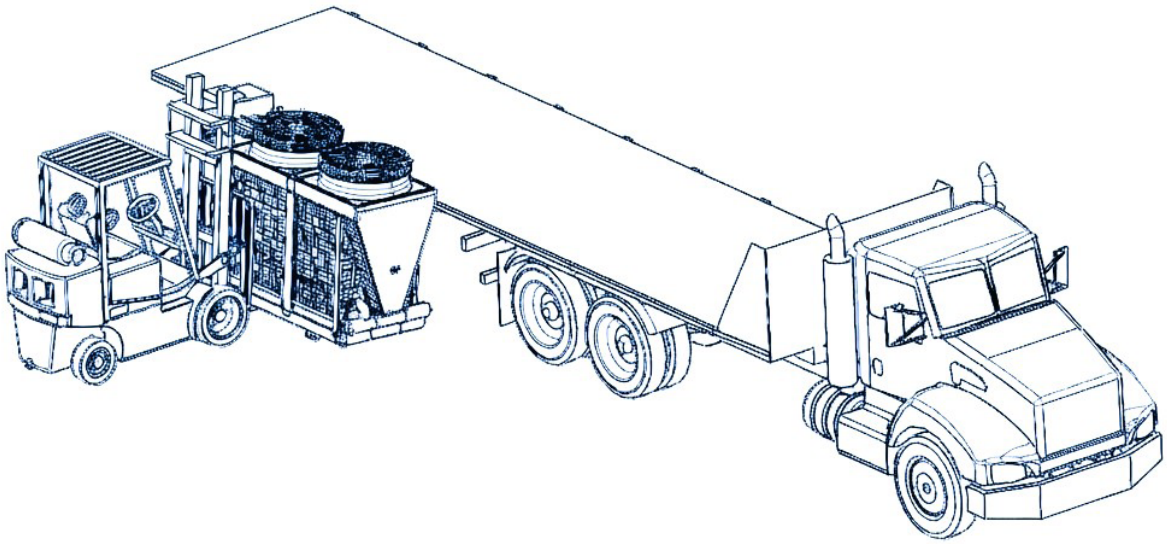


In particular, to ensure the machine remains undamaged during operations, a container kit is available as an accessory. This kit prevents the electrical box from being damaged by the forklift's structure during the loading phase.

Unloading operations must be performed in a manner similar to that used for loading, ensuring proper control and stability of the unit during lifting and positioning.
Once loading is complete and before proceeding to the securing phase, verify that the units are positioned correctly and are not in contact with other objects inside the transport vehicle.

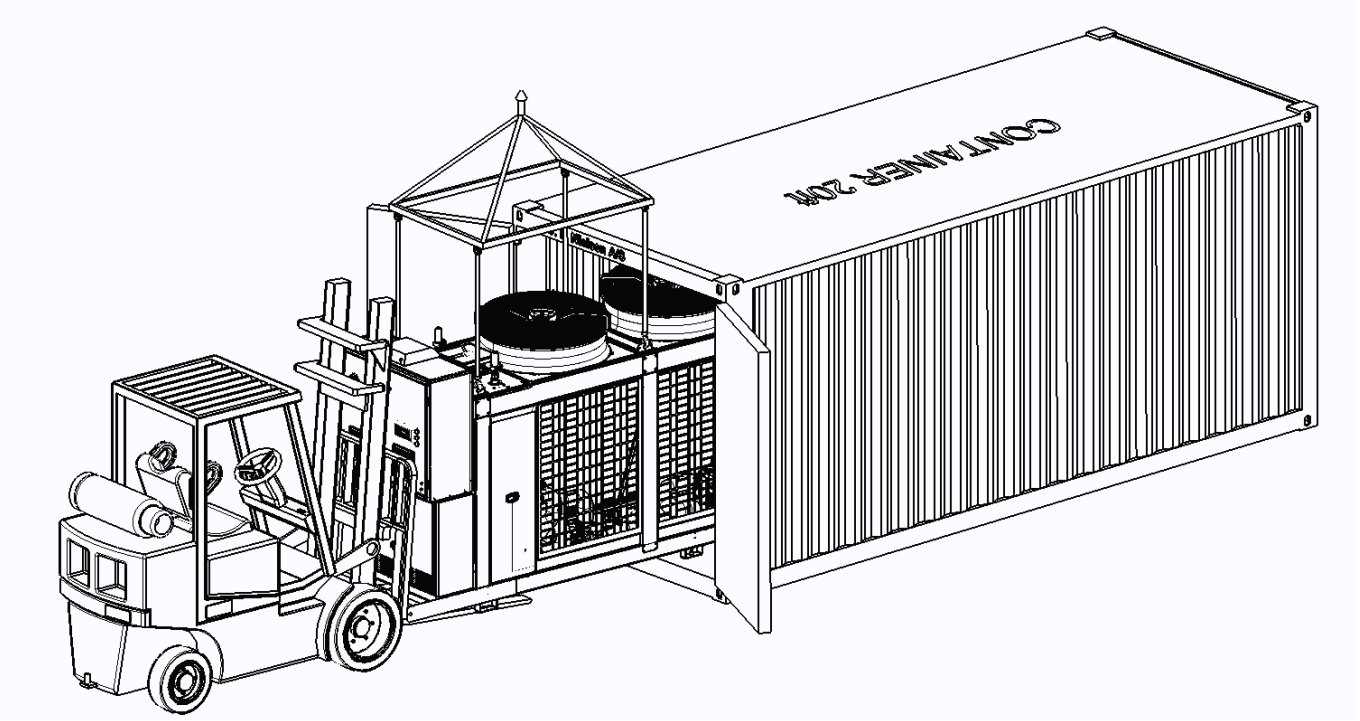
You can view images of vehicles and containers being loaded using a special kit for additional operational reference.

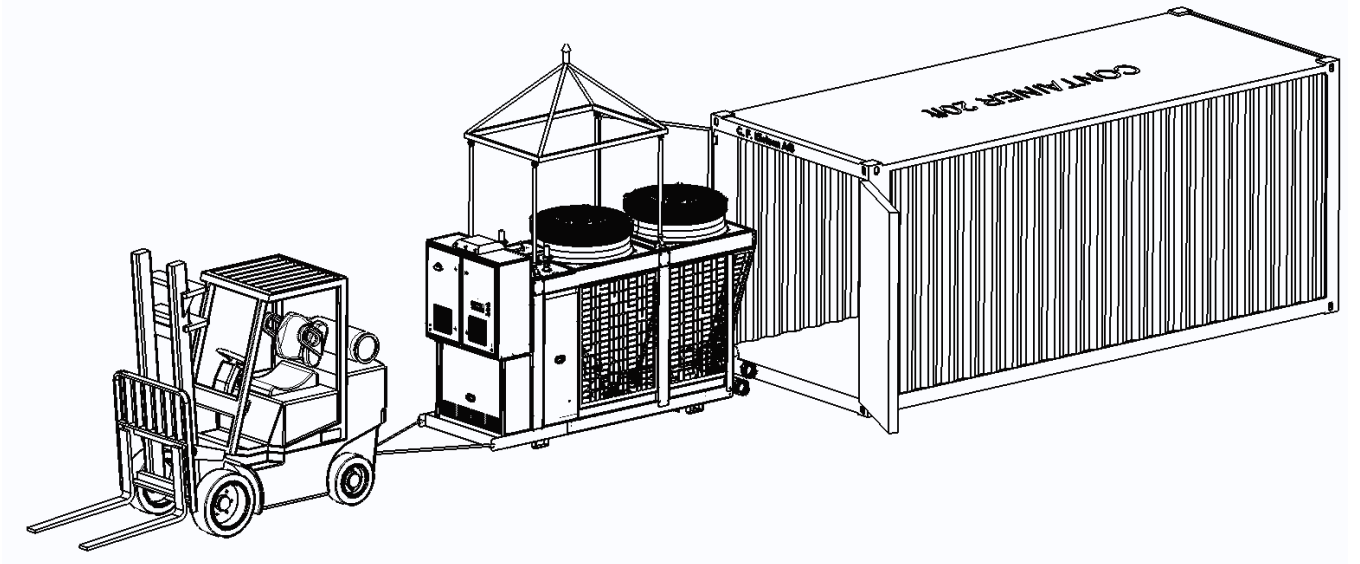
Loading the AQUA-G EVO unit onto a truck



The illustration above shows the machine being loaded onto a container. Given the compact dimensions of the AQUA-G EVO unit, it is not strictly necessary to use a crane or overhead crane. The unit's centre of gravity allows it to be easily lifted and loaded from the side using a forklift.

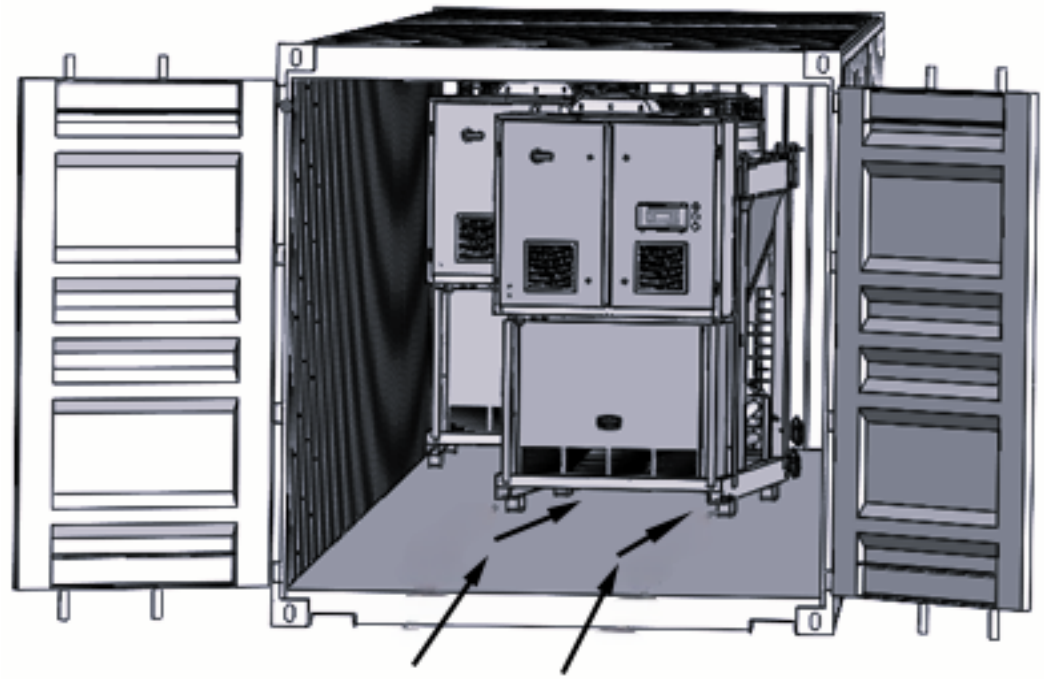
Container handling

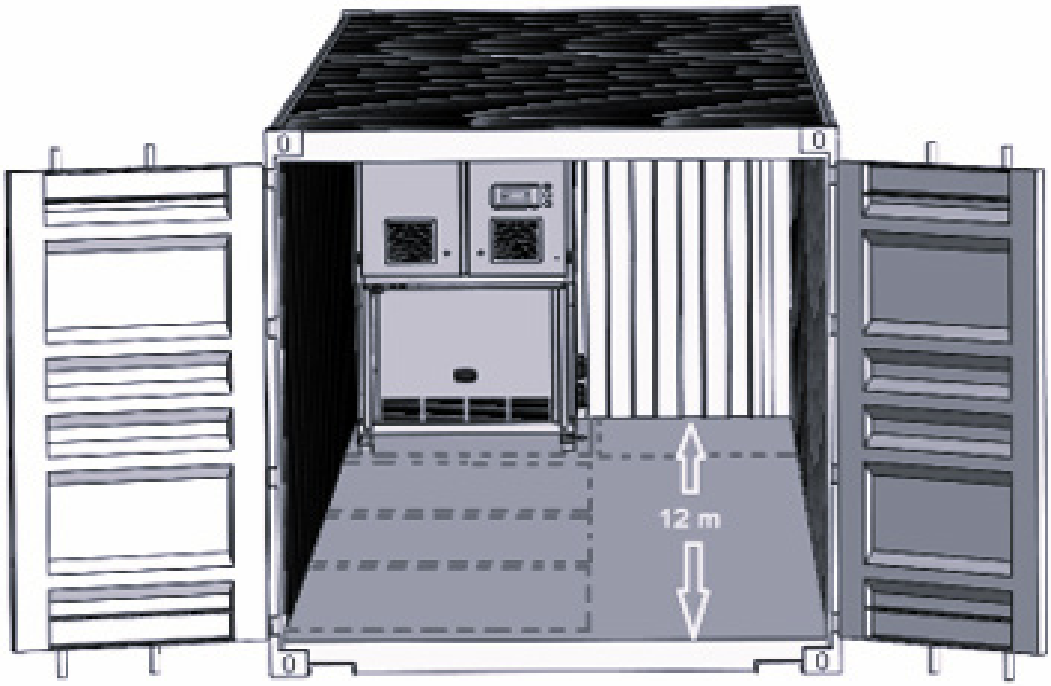




The two figures above show the loading and unloading of an AQUA-G EVO unit from a container using a dedicated kit available as an accessory.

Container





- The first image shows the proper handling of an AQUA-G EVO unit inside a container. Maintain as straight a path as possible to avoid damaging the machine's frame.
- The second image shows a view of a 60 kW unit inside the container, with the dimensions and the space available for loading additional units of the same power rating.

4.6 Anchoring and transport

During transport, the unit, hydraulic fittings, manifolds, and pre-installed connections are subject to inertial forces that can cause damage.
It is therefore necessary to install a suitable anchoring system that ensures:

- mechanical locking of the unit.
- reduction of micro-movements.
- prevention of deformation or cracks.
- protection of the joints, even in the absence of installed piping.

The unit must be secured exclusively by attaching it to the lower structural points of the frame (omega shaped base profiles), using appropriate systems such as straps, brackets, or rigid clamps.
The straps must be properly tensioned, positioned so as not to interfere with guards, grates, or sensitive components, and distributed in a way that takes into account the unit's center of gravity to ensure stability during all stages of transport.
If necessary, use one or more rigid securing systems to prevent longitudinal and transverse movement.



It is strictly prohibited to wrap straps around the machine or to use non-structural components—such as pipes, safety valves, or panels—as anchor points, in order to prevent damage to the unit.

It is recommended to place sturdy panels between units when transporting them in containers.
The limited space between units could cause damage and deformation to the machine frames if they come into contact.
Furthermore, during transport,any locking devices or container kits provided must not be removed; the unit must be kept in a stable, upright position for the entire duration of transport.
Upon arrival, check that all connections and components are intact before installation.



The upper lifting points are intended only for handling operations and must not be used for securing the load during transport.

4.7 Storage

When the unit is to be stored, take precautions to avoid damage or risk of corrosion or wear:

- plug or seal every single opening, such as plumbing fittings.
- store the unit in a well-ventilated area, away from direct sunlight and away from open flames, sparks, ignition sources, and hot surfaces.
- store carefully away from rain, snow and dust.
- store the unit in a place where there are no drastic weather variations, such as low and high temperatures. Storage limits range from a minimum of -20 C° to a maximum of 50 C°, with a maximum permissible humidity of 95% without condensation.
- store the unit in a place where handling is kept to a minimum to avoid the risk of accidental damage.
- do not wash with steam jets.
- hand over all keys allowing access to the panels and control panel to the site manager.
- carry out visual inspections at regular intervals throughout the storage period.



Failure to comply with these conditions could result in serious damage to components and gas leakages.



Failure to ensure the unit is stored correctly may cause it to fall or tip over, with serious physical consequences for operators.



Pay special attention to refrigerant leaks inside the machine's packaging and ensure there are no ignition sources during unpacking.

5. INSTALLATION

5.1 Identification of the ATEX zone

In order to accurately identify the ATEX zone associated with the installation of AQUA-G EVO machines, the manufacturer refers to the technical standard EN IEC 60079-10-1.
This standard defines the classification of areas and the extent of hazardous zones in the presence of flammable gas or vapour emissions.
The ATEX classification for this area is based on the potential formation of an explosive atmosphere following a refrigerant leak, under fault or abnormal operating conditions and not with normal operating conditions.
As the R290 refrigerant gas is heavier than air, it tends to accumulate and form layers at ground level, at a height of approximately 300 mm from the unit's base.

The directive that forms part of the definition of the ATEX zone is EU Directive 2014/34/EU.
It applies to all products that may act as a source of ignition in the presence of flammable gases, vapours, mists or dusts, including equipment, protective systems and components intended for incorporation into such equipment.
The components of the AQUA-G EVO unit are considered precisely in relation to their potential to act as ignition sources.
This directive stipulates that measures must be taken to:

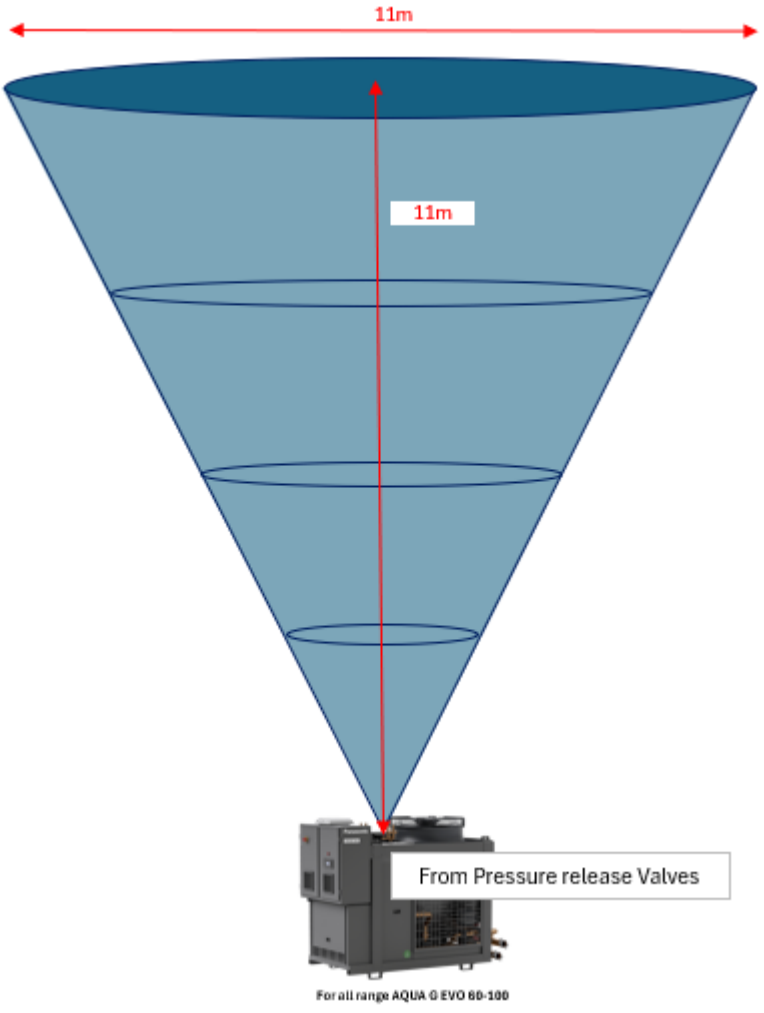
- identification of ATEX zones.
- classification of ATEX zones with a direct reference to standard EN IEC 60079-10-1.
- avoid ignition sources.

The areas identified by the manufacturer in accordance with technical standard EN IEC 60079-10-1 are shown in the diagram on the right and on pages 58 and 59.
Since these units are intended for outdoor use only and in the presence of natural ventilation, the areas surrounding the unit are classified as Zone 2, as the presence of an explosive atmosphere is considered unlikely and of short duration.
In the case of modular installations, while the area classification remains Zone 2, the reduced distance between components and the higher system density may affect the local distribution of gas in the event of a release.

The area around the machine does not necessarily have to be kept clear of obstacles. However, it is essential to ensure that:

- there are no ignition sources present.
- the gas dispersion conditions specified during the ATEX classification process are not compromised.

The image below shows the area above the equipment, defined as Zone 1—that is, an area where an explosive atmosphere may occasionally occur due to the release of gas resulting from the activation of the safety valves.



The release zone (1) is a conical volume originating at the safety valves. The discharge from the valves is such that it directs the refrigerant upwards.
The maximum extent of the discharge zone is characterised by a height of 11 m from the discharge point and a maximum diameter of 11 m.

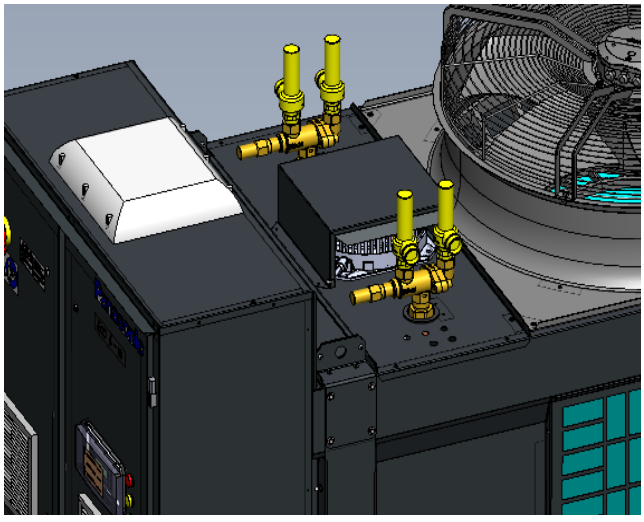
When defining the emission scenarios, Zone 0 was excluded, since the occurrence of continuous, frequent, or long-lasting gas emissions is considered to be nonexistent.

It is very important not to work near or stand near safety valves, as they may release refrigerant into the atmosphere due to back pressure within the refrigeration circuit.

5.2 Safety valves discharge

The unit is fitted with two refrigerant circuit safety valves which, in the event of overpressure, release R290 into the atmosphere. The expelled gas is released at high pressure and temperature; for this reason, it is necessary to ensure that it is vented safely and in accordance with the installation requirements.

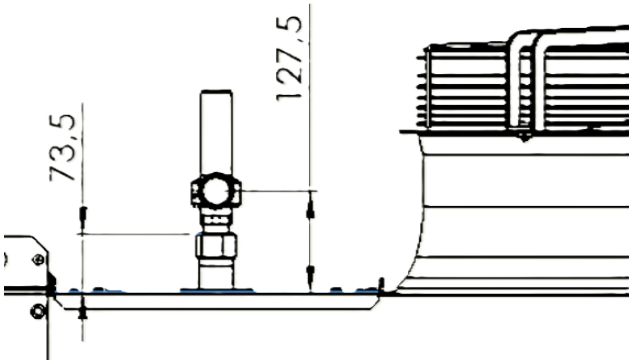
The safety valves are fitted to the top of the machine in the position shown below.

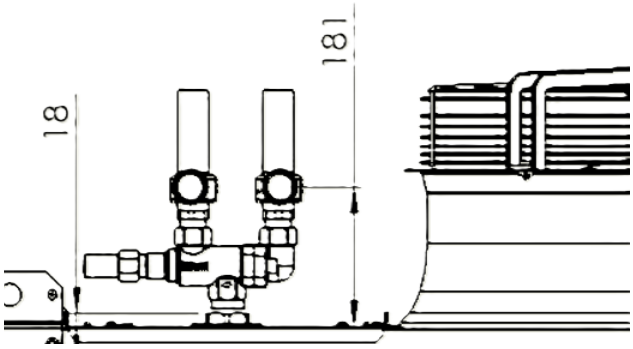


It is the responsibility of the installation technician to ensure, before switching on the machine, that the flue pipe is extended by means of a suitable extension pipe, which must be directed upwards, away from potential sources of ignition and in accordance with the installation location (flames, hot surfaces, electronic equipment, etc.), in compliance with standard EN 378-2. The outlet must be at lwast 300 mm above the valve's discharge point. The minimum internal diameter required to allow for remote connection of the safety valve must be at least 28 mm.

The outlet connections are made using male gas-type threaded fittings with the following nominal sizes:

- G 1" per AQUA-G EVO 60.
- G 1.1/4" per AQUA-G EVO 80-100.
- For each type of connection, there are two dedicated remotization kits available, as specified by the manufacturer.



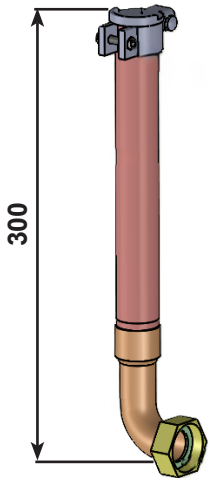


The difference in distance between the valve's discharge point and the top of the unit depending on whether there is one or two safety valves affects the final height of the installation.
La quota totale è rispettivamente di:

- 127.5 mm + 300 mm if a single safety valve is used.
- 181 mm + 300 mm when equipped with a dual

safety valve and a changeover valve.

The figure below shows the kit for the remotization of the safety valve discharge.



Be on the lookout for any refrigerant leaks from the discharge. Under no circumstances should they enter buildings located near the machine.

Installing the safety valve remotization kit on the AQUA-G EVO increases the unit's overall height, a key factor to consider when assessing technical spaces.

Below are the details regarding the heights:

- single valve configuration.

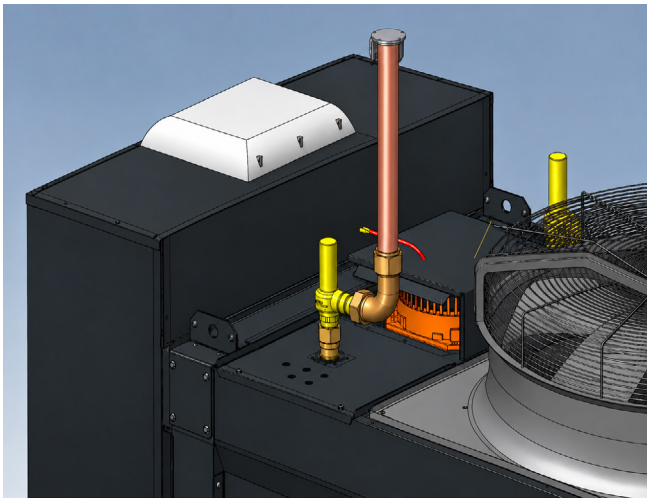
1. total height of the unit: 2167,5 mm.
2. height increase: +89.5 mm compared to the standard unit (without the kit).

- dual valve configuration.

1. total height of the unit: 2221 mm.
2. height increase: +143 mm compared to the standard unit (without the kit).

The difference in height between the dual valve version and the single valve version is 53.5 mm.

Below is a figure showing the refrigerant discharge pipe fitted to a safety valve.



5.3 Clearances

The clearance zones required for the installation of the unit are distinct from the safety zones identified through ATEX risk analysis, but may overlap to some extent in terms of the minimum distances specified. They are necessary to ensure both safety conditions by preventing the presence of potential ignition sources within the hazard zones – and the operational and accessibility requirements for maintenance work.



Please refer to Chapter 8 of this manual for full details on maintenance.

Both conditions must be met, ensuring that the available space satisfies both the requirements arising from the ATEX classification and those related to the proper operation and maintenance of the equipment.



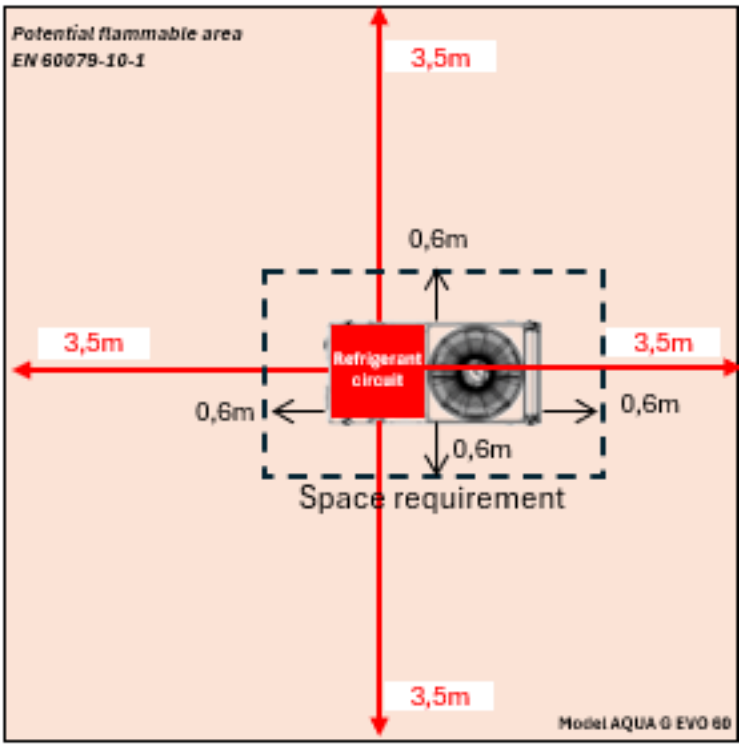
The areas must be completely free of any items that might hinder routine maintenance of the units.

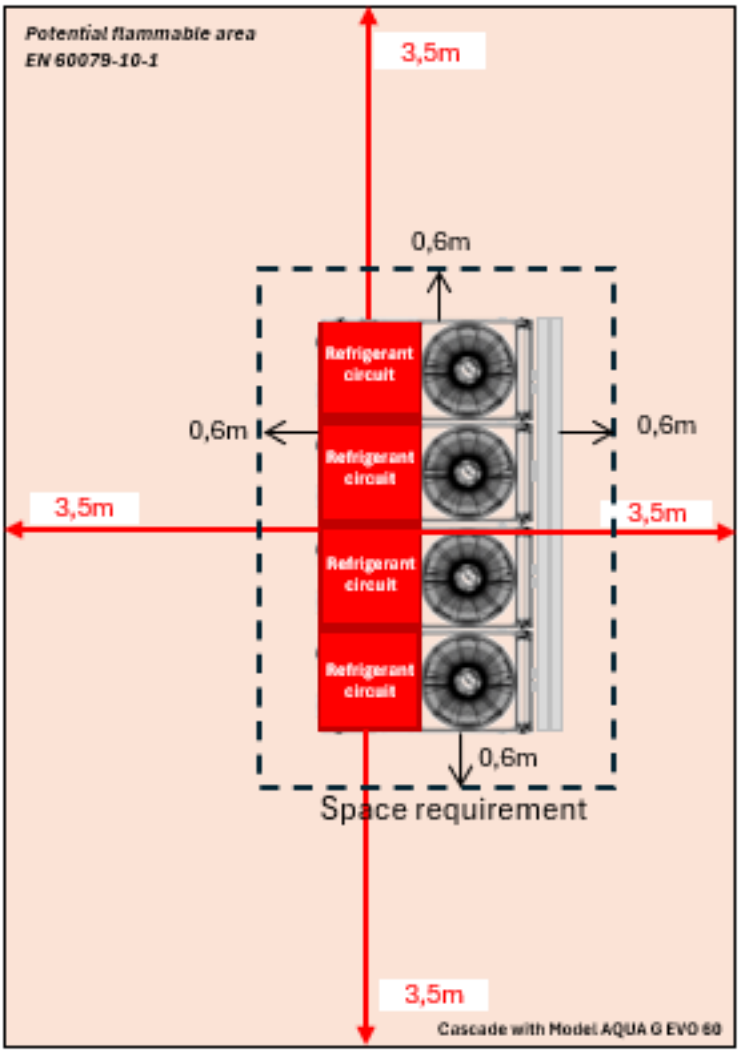


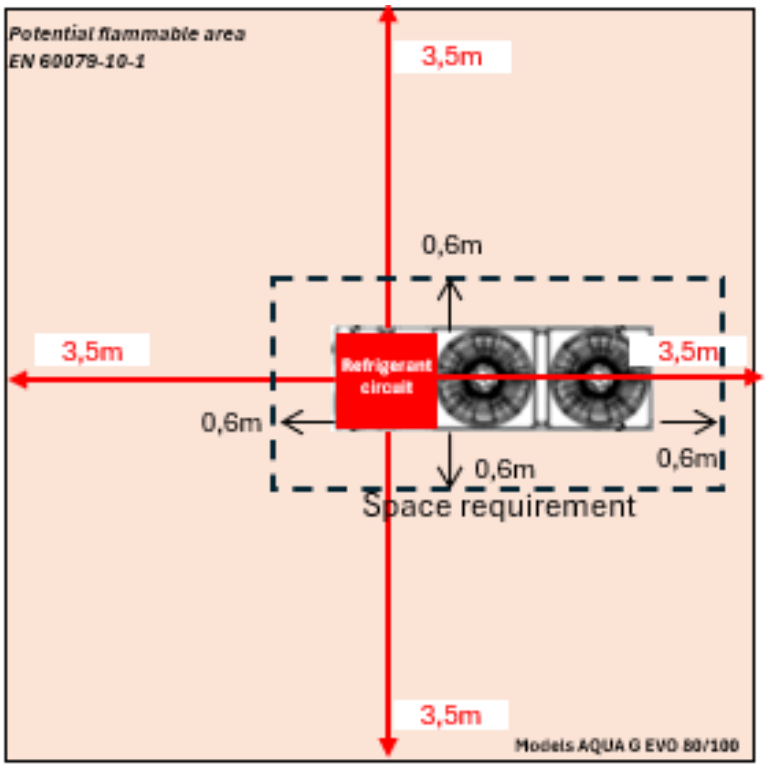
For units installed in a modular system, special care should be taken to ensure adequate ventilation and prevent localized gas buildup.

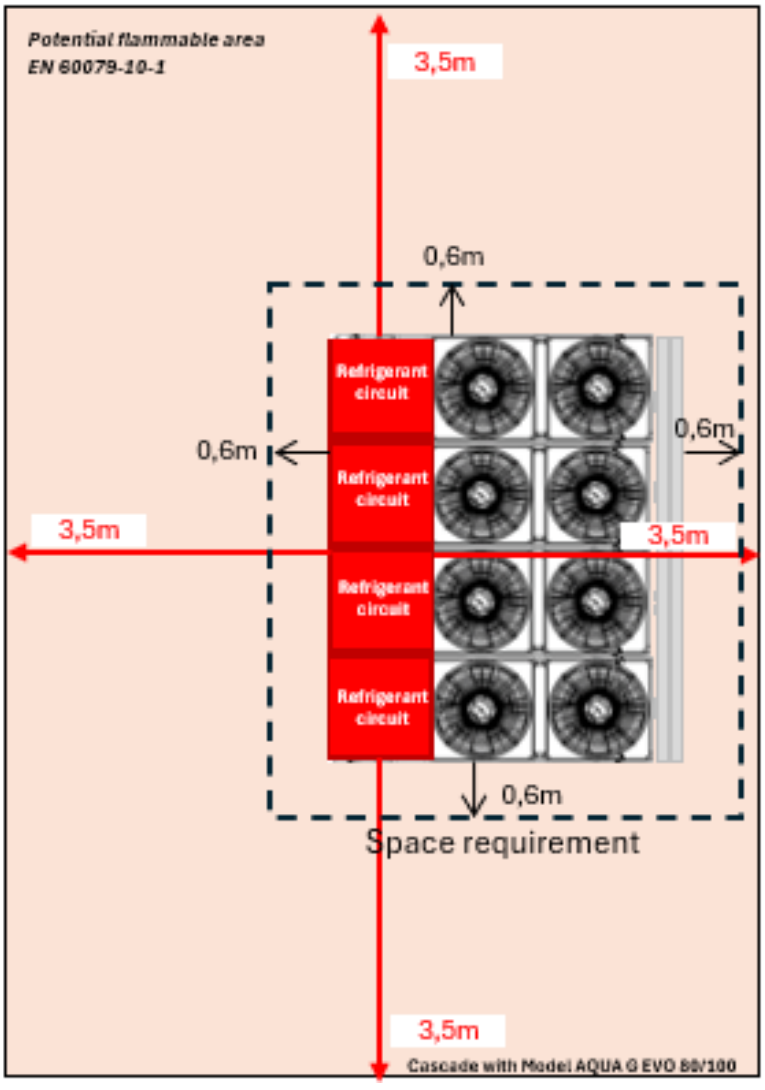
The figures on the following page show all sizes of the AQUA-G EVO unit in both single and modular installations, along with their respective potential flammable areas and the required clearance distances.

(*) The measurements indicating safety clearances and the potentially flammable area are given in meters.


Potential flammable area
EN 60079-10-1
3,5m
0,6m
3,5m
Refrigerant circuit
3,5m
0,6m
0,6m
0,6m
Space requirement
3,5m
Model AQUA G EVO 60


Potential flammable area
EN 60079-10-1
3,5m
0,6m
Refrigerant circuit
Refrigerant circuit
Refrigerant circuit
Refrigerant circuit
0,6m
0,6m
3,5m
3,5m
0,6m
Space requirement
3,5m
Cascade with Model AQUA G EVO 60


Potential flammable area
EN 60079-10-1
3,5m
0,6m
3,5m
Refrigerant circuit
3,5m
0,6m
0,6m
0,6m
Space requirement
3,5m
Models AQUA G EVO 80/100


Potential flammable area
EN 60079-10-1
3,5m
0,6m
Refrigerant circuit
Refrigerant circuit
Refrigerant circuit
Refrigerant circuit
0,6m
0,6m
3,5m
3,5m
0,6m
Space requirement
3,5m
Cascade with Model AQUA G EVO 80/100

5.4 Positioning the unit

This unit is designed exclusively for outdoor installation and is not certified for use in potentially explosive atmospheres.
The area must be sufficiently clear to allow air to circulate freely through the system and, at the same time, to ensure access to the machine for maintenance work.
In accordance with EN 378-1 §5.1, the dimensions of this unit are classified in access category 'b' and fall within location class III.

It is recommended that the unit be installed on:

- a metal base that ensures both optimal weight distribution.
- optional anti-vibration mounts supplied by the manufacturer, to minimise the transmission of vibrations. These components are strongly recommended if the unit is to be installed on the roof of residential premises, where the noise caused by operation may be particularly disruptive. Simply placing the unit on a support base does not guarantee a reduction in noise levels.



In the event of a coolant leak, the liquid must under no circumstances be allowed to enter ventilation ducts, the building or the drainage system.



The machine base must be positioned as shown in the manual. If the unit is not supported correctly, there is a risk of personal injury or damage to property.

Also take the following factors into account:

- avoid installing the unit downwind of sources of greasy air (such as kitchen hood exhaust vents), as these contaminants can settle on the heat exchanger surfaces, promoting the buildup of impurities and quickly compromising its efficiency.
- do not install the unit in areas prone to heavy snowfall.
- do not install the machine in locations with extreme environmental conditions that could cause significant erosion of the finned heat exchanger.
- if the machine is equipped with an inertial tank (optional), note that the unit's ground clearance is 400 mm, including the fork guide height.

The tank is located below the finned heat exchangers.



The unit is not designed to bear weights or stresses from adjacent equipment, piping or structures. Any external weight or stress on the unit's structure could cause malfunctions or damage, which could prove dangerous to personnel and property. In this case, the warranty will be void.



The equipment is not designed to resist fire. Consequently, the installation site must comply with the applicable fire regulations.



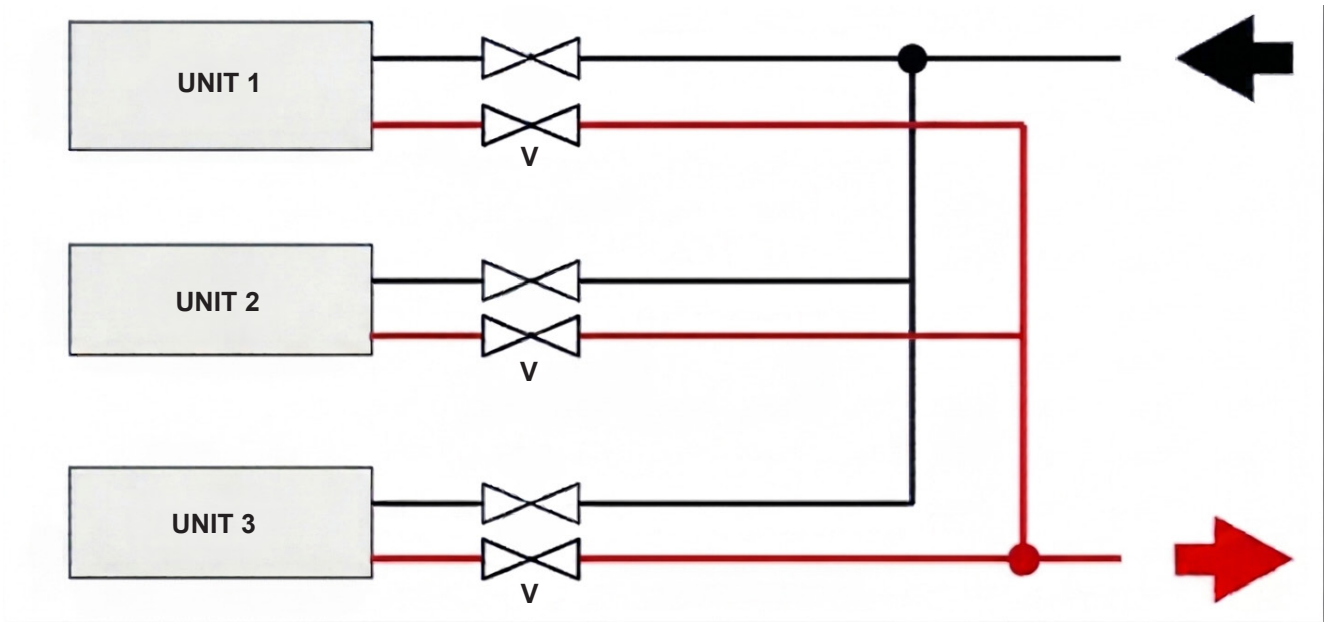
The equipment is not designed to withstand violent natural phenomena such as earthquakes, storms, etc.

In the case of a modular installation consisting of more than 4 units or where the distance between the machines exceeds 600 mm, two additional installation options are available at the end user's expense:

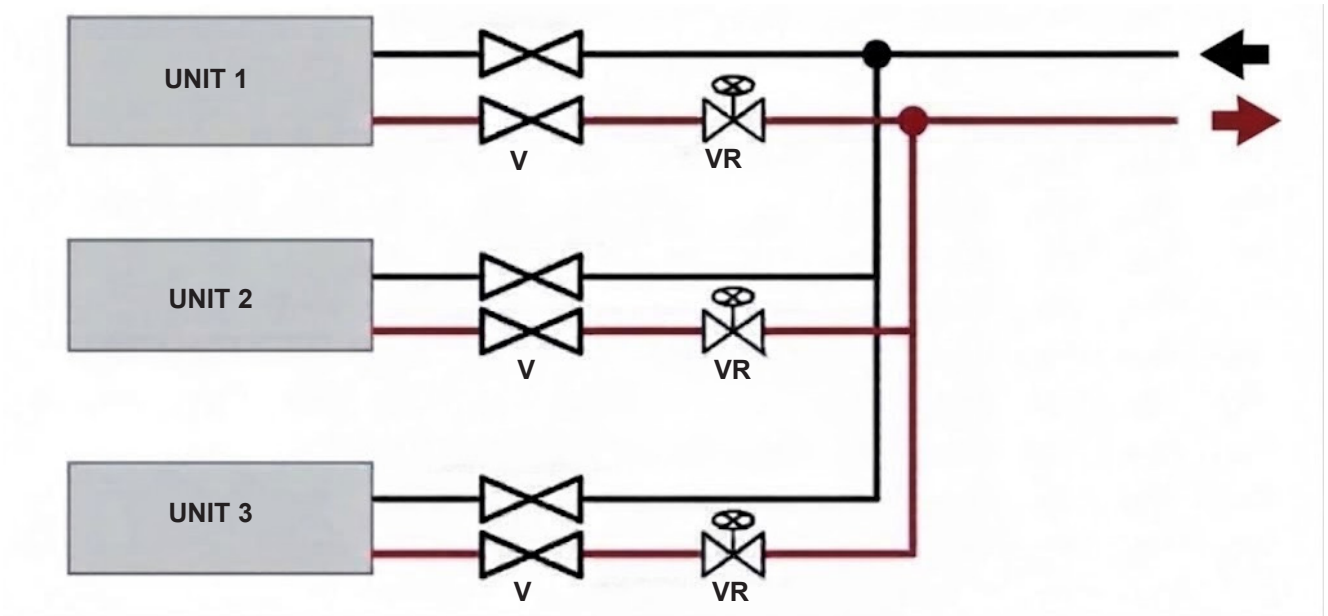
- a solution that involves connecting the units in modular system in reverse order according to the Tichelmann hydraulic scheme to equalize the pressure drops in the circuits and promote a balanced distribution of flow rates.
- A solution that involves the use of balancing valves within the hydraulic circuit. This type of integration is possible given the greater amount of physical space available along the piping line.

The following diagrams represent, respectively:

- a reverse-flow solution based on the Tichelmann design.
- a solution that includes balancing valves along the return line.

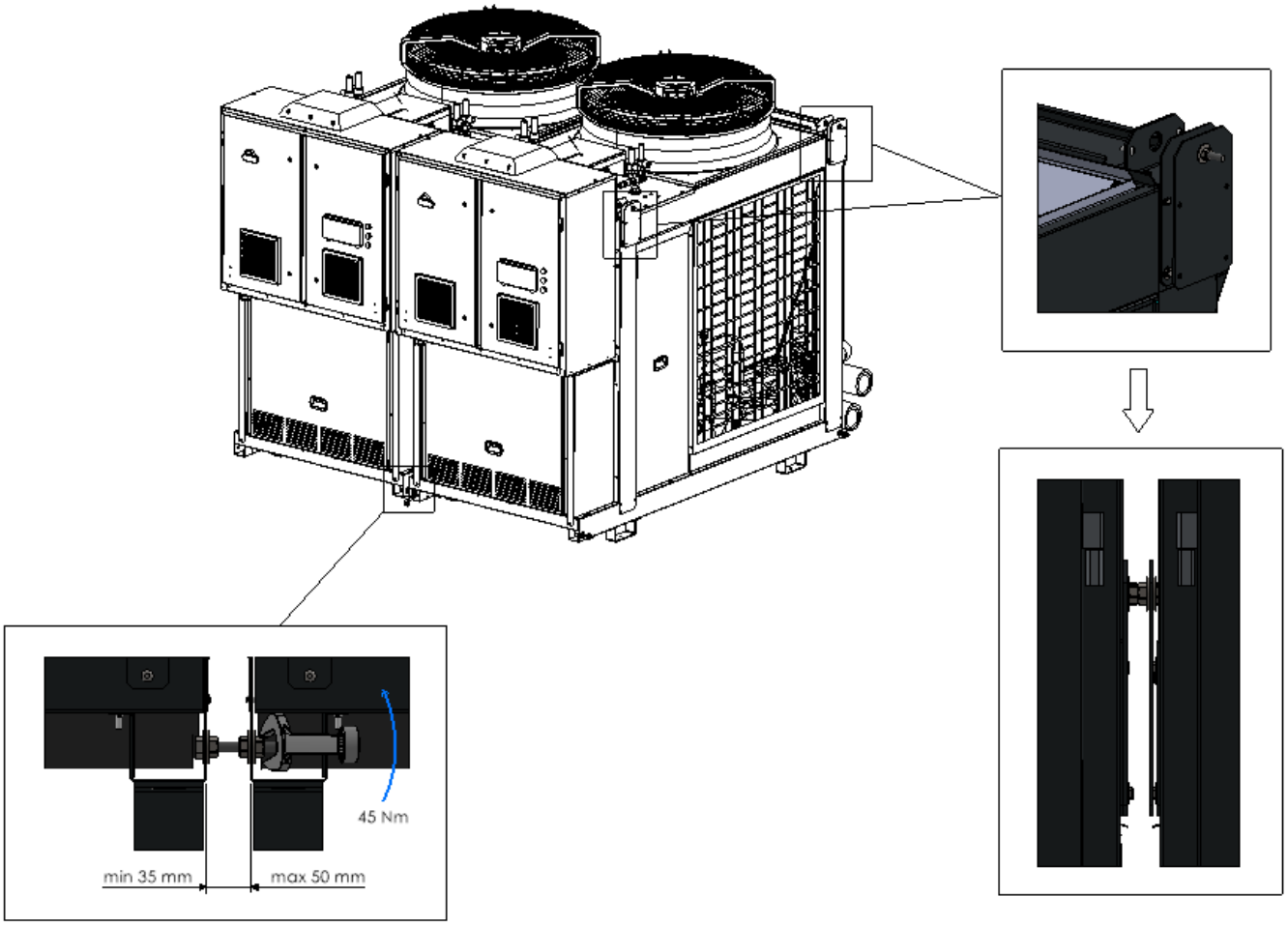


V : Shut-off valve



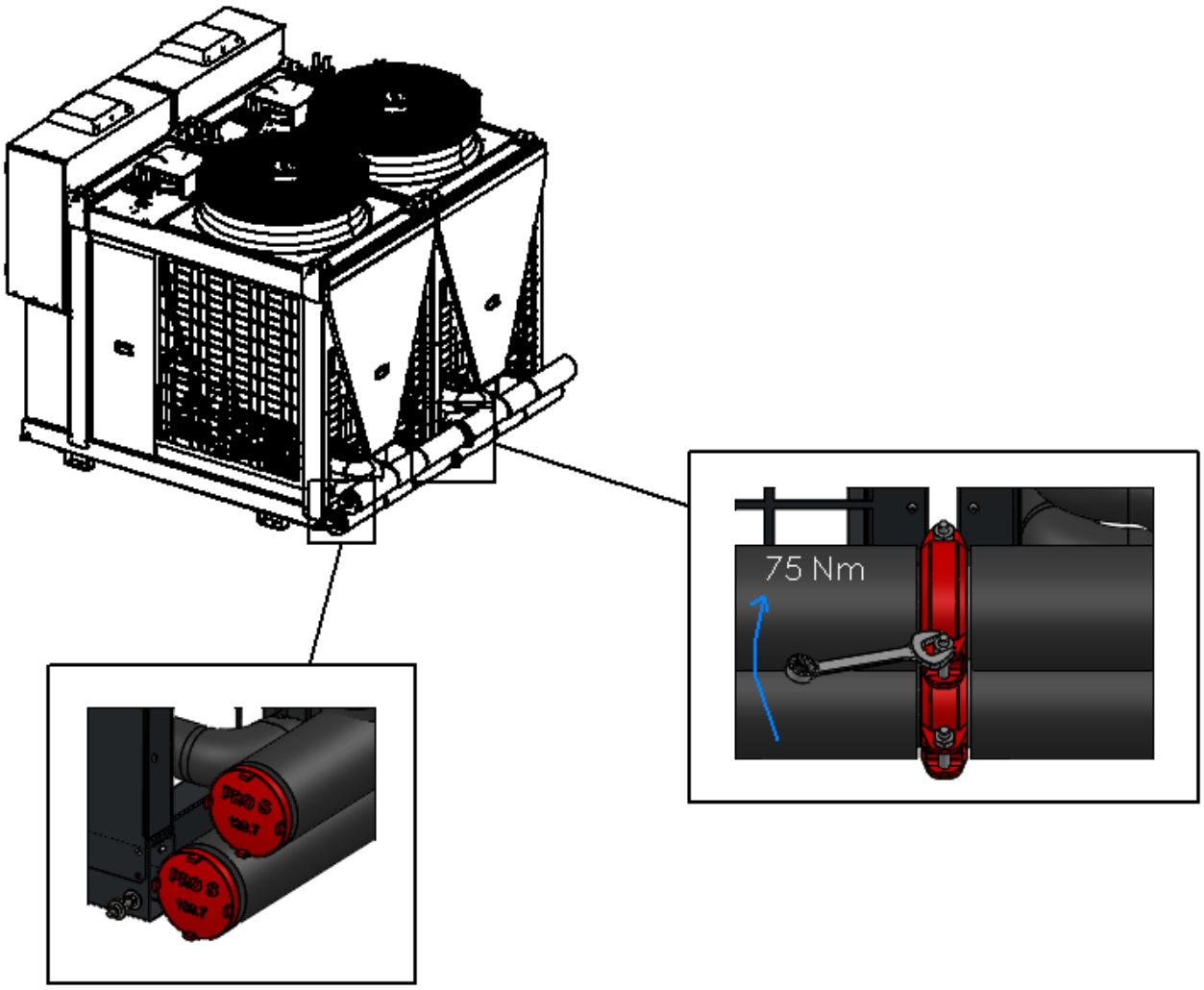
V : Shut-off valve
VR: Balancing valve

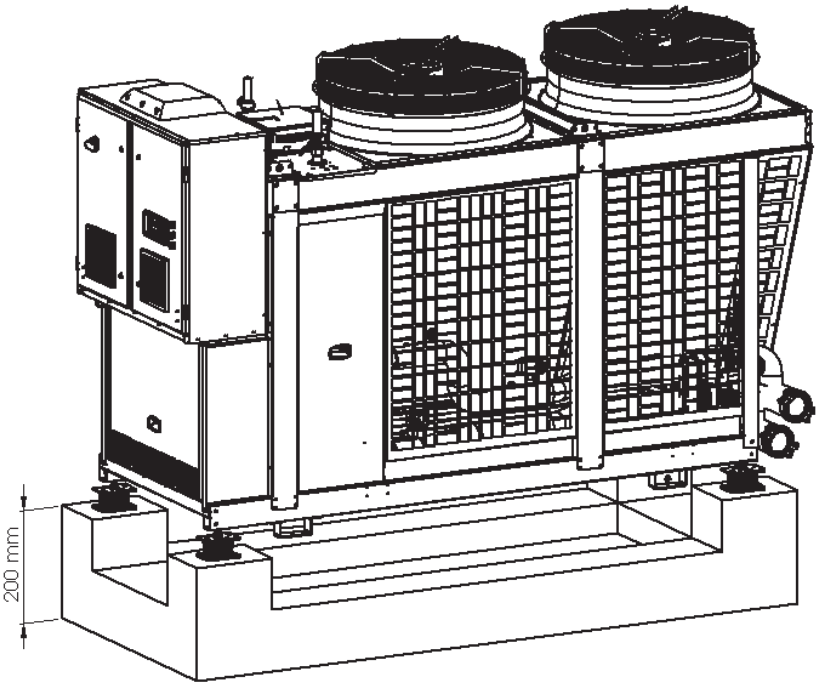
Connection of units in a modular installation

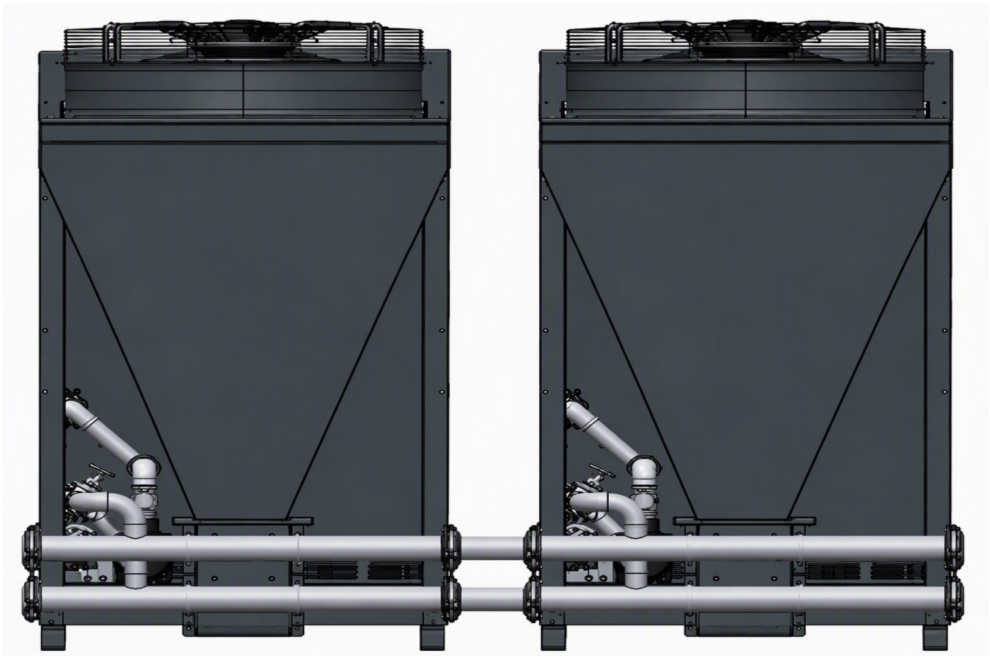


Two or more units in the Ultracompact modular system are coupled by adjusting the M10 bolts located on the lower couplings. To ensure that the Victaulic couplings on the hydraulic circuit manifolds can be properly connected, the distance between them must be between 35 mm and 50 mm, as shown in the image above.

Apply a torque of 45 N·m to both bolts.
After completing the alignment, connect the upper couplings using the dedicated plate and tighten the M10 bolts to the same torque value.


75 Nm


200 mm



In the two figures on the previous page:

- Ultracompact installation that provides for plug-and-play connection of the dedicated collectors via a Victaulic-type connection. Insert the M10 bolts supplied with the kit into the designated clamping tab and tighten to a torque of approximately 75 N·m.
- AQUA-G EVO unit mounted on a support base. To ensure better airflow to the finned heat exchangers, it is recommended to arrange the units in a modular configuration raised at least 200 mm off the ground using appropriate bases or supports (excluding omega brackets).

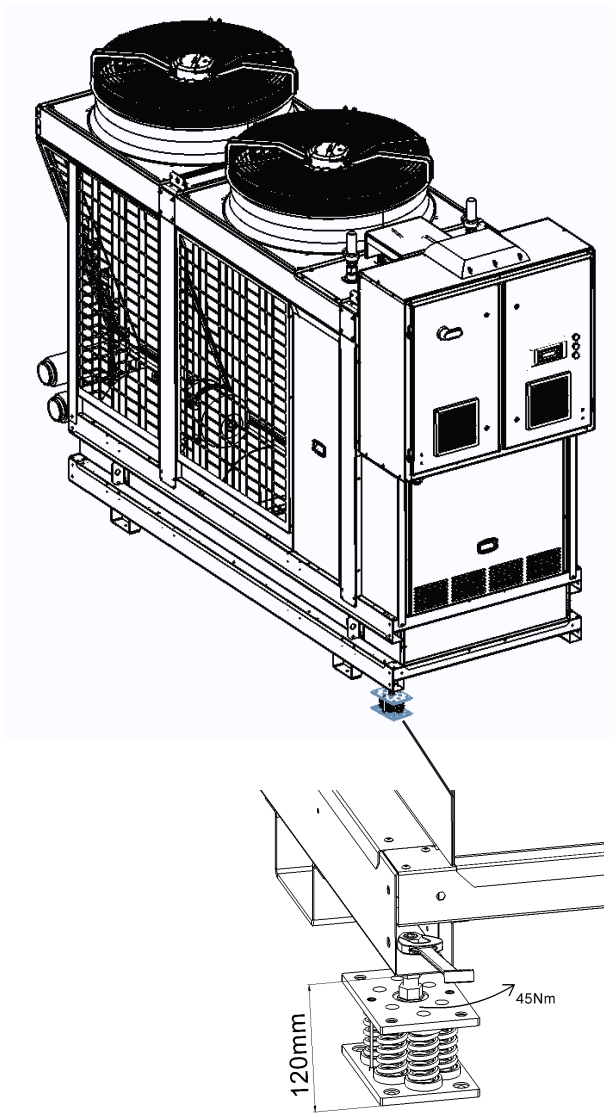
  The short distance between the units naturally limits the airflow to the heat exchanger. It is therefore preferable to choose this type of installation if the site does not offer enough space for a greater distance between the units.

The figure above shows a Compact-type modular installation: it involves connecting the dedicated manifolds using a special 600-mm-long interconnecting pipe.

The manufacturer designs the piping to ensure that the system achieves its rated performance without causing efficiency losses or significant reductions in output.

It is preferable to choose this type of installation if the site offers enough space for a greater distance between the units, thereby ensuring proper airflow to the heat exchangers and facilitating maintenance.

AVM kit



The figure on the left shows the position of the vibration-damping mount installed on the tank's support base, along with the corresponding tightening torque (45 N·m). The vibration-damping mount kit comes complete with assembly instructions to facilitate proper installation.
When tightening the bolts, maintain a height of 120 mm between the vibration-damping mount and the support surface.
This adjustment ensures a residual distance of 10 mm between the mount and the machine's omega bracket, guaranteeing the correct deflection of the vibration-damping mount, which must not exceed 20 mm.

The configuration with a storage tank increases the unit's overall height by approximately 400 mm compared to the version without this component, further increasing the machine's ground clearance. Provide a raised platform to facilitate quick access to the machine's circuit breaker if necessary.
The tank is not included in modular installations, as the system's total water volume is already sufficient to ensure proper thermal inertia.

Use only the vibration-damping pads supplied with the unit to prevent increased noise and improper weight distribution.

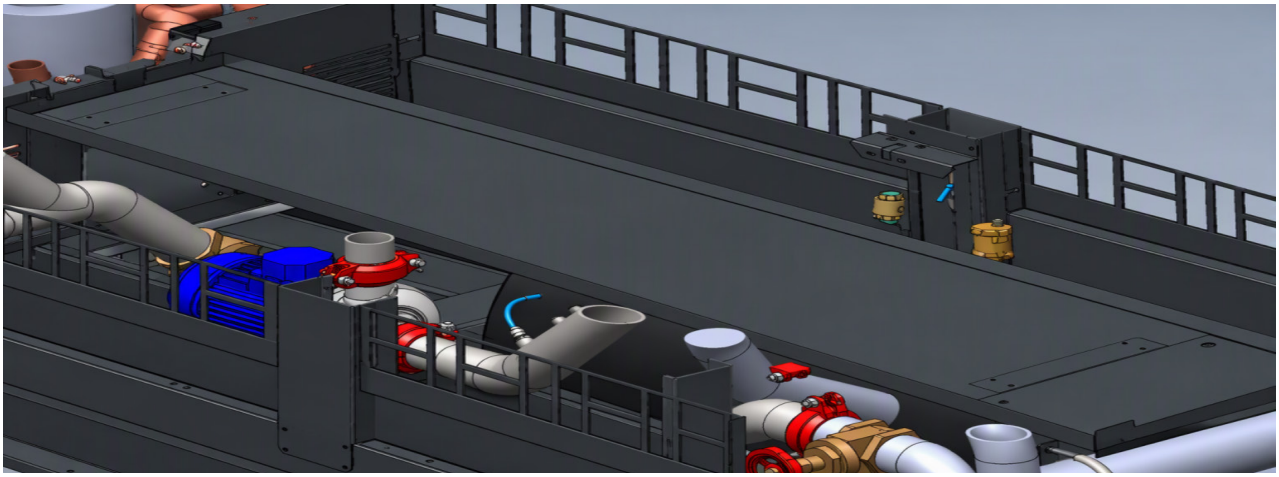
Defrost management

Under operating conditions during the winter season, the water produced during defrost cycles may freeze inside the drain pan located beneath the coils before being drained through appropriate drainage connections.
The lower the outdoor air temperature, the faster this process occurs.
Freezing can cause the unit to shut down or even be damaged.

To prevent the water from freezing, a 130 W electric heater is fitted inside the drain pans.
In addition, when the outside air temperature is -10°C, the customer may wish to consider installing the following components recommended by the manufacturer:

- pipes, thermally insulated with suitable material, with a minimum thickness of 19 mm.
- pipes routed to a safe area, at basement level, where there is no risk of ice puddles causing harm to people or the unit.
- a heating cable inside each drain pipe to prevent the water inside the pipes from freezing.
  The minimum heating power is 30 W per linear metre of pipe.

A heating cable is a component that is recommended for installation to prevent water from freezing in conditions of high relative humidity and sub-zero air temperatures.



The image above shows a cross-section of an AQUA-G EVO unit. The drain pan is positioned beneath the finned heat exchanger to collect the water from the defrost cycle.
The connection between the drain pan and the drain pipe must be made using a non-threaded fitting attached to the bottom of the pan. The pipe must have a minimum internal diameter of 20 mm and be installed in such a way as to ensure the free flow of water, preventing water from pooling and freezing.

5.5 Reduction of noise emissions

To ensure compliance with noise emission limits, the equipment is fitted with quiet fans and soundproof panels; however, it is advisable to take further precautions:

- do not install the unit in confined spaces where noise might be reflected by the walls or where air expelled by the fans could cause short circuits on the refrigerant/air heat exchangers.
- ensure that all electrical connections and duct fittings on the units are flexible to prevent the transmission of vibrations.
- position the unit using the anti-vibration mounts supplied if these are required as an optional extra.
- if installing on the ground floor, do not connect the base supporting the unit to the building structure in order to prevent the transmission of structural noise.



Wear the necessary personal protective equipment (PPE) if the user intends to work on the unit for an extended period of time.

5.6 Electrical circuit connections



Power supply lines must consist of insulated copper conductors sized for the maximum current drawn.



Before carrying out any work on the unit, disconnect the power supply and ensure that there is no risk of accidental start-up. also check that the alarm warning cables are disconnected.

The electrical installation must be carried out by a qualified electrician, in accordance with local electrical regulations and the wiring diagram for the specific model of the unit.



The wiring diagram is not included in this manual; it is a separate document supplied with the machine.

A three-phase, earthed power supply must be provided. For three-phase systems, ensure that the phase imbalance does not exceed 2%. To carry out this check, measure the differences between the voltage of each pair of phases and their average value during operation. If the imbalance is unacceptable, contact your energy supplier to resolve the issue.



Supplying power to the unit via a circuit with a phase imbalance exceeding the permissible limit will result in the immediate cancellation of the warranty.



It is recommended that residual current devices be installed to prevent any damage caused by phase failure.

The installer is responsible for properly sizing the power cables, which must ensure an appropriate voltage at the unit's terminals, both during startup and during full-load operation. Check the connections to the terminals against the wiring diagram.

The power cable must be selected according to the following criteria:

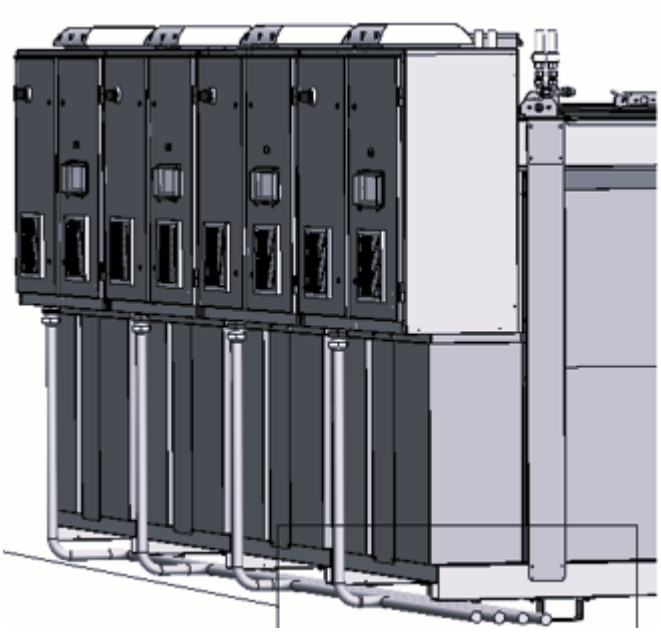
- length of the power cables.
- maximum current draw of the unit during operation.
- maximum starting current of the unit.
- method of installing the power cables.

The power supply lines and isolation devices are designed so that each line is independent.
The power cables must be inserted into the appropriate openings on the front of the unit and routed through the holes in the bottom of the electrical box.
They must be routed to the isolator via cable glands (not supplied) or a protective conduit for electrical cables, in order to ensure a proper seal.

Besides, a short-circuit protection is provided by aM-type fuses and a circuit breaker with high breaking capacity in the electrical box.



The unit must not be used if it has not been installed in accordance with the instructions provided in this manual.



In modular installations, it is recommended that the omega bracket be retained, as it can be used as a spacer to ensure optimal positioning of the electrical earth connections.

The electrical connections for optional components and equivalents owned by the user are set out below, both for the initial installation and in the event of replacement due to fault or damage, as well as the configurations required for the implementation of certain functions.

General alarm

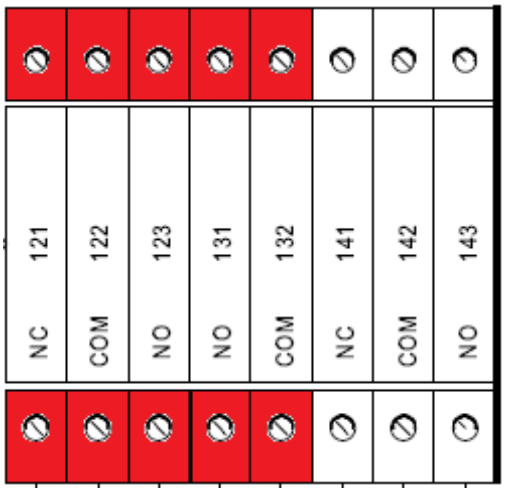
The unit's control system features a dedicated alarm signal, available via a dry contact:

- normally closed when connected to terminals 121 and 122 on terminal block Y2.
- normally open when connected to terminals 122 and 123 on terminal block Y2

Before performing any work, ensure the unit is electrically safe by disconnecting the main power supply.

Voltage check

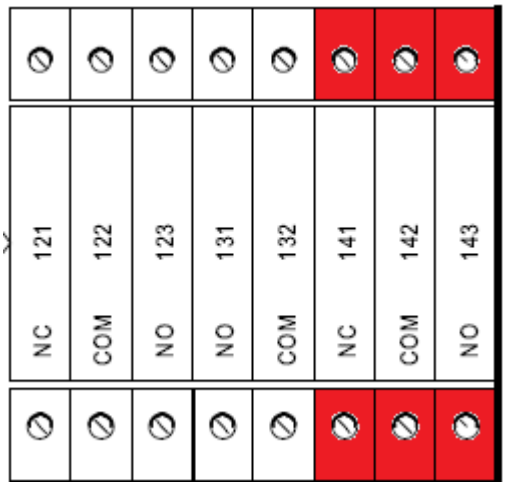
You can remotely check for the presence of voltage inside the unit using a normally open (NO) dry contact. The contact is available between terminals 131 (NO) and 132 (COM) on terminal block Y2 of the electrical box. If the contact closes, it indicates the presence of voltage inside the machine.



Gas leak detector

It is possible to remotely trigger an alarm indicating Level 2 detected by the gas detector. The alarm is available via a dry contact:

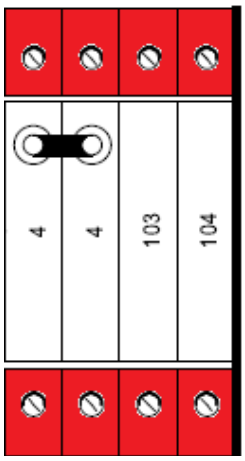
- normally closed between terminals 141 and 142 of terminal block Y2 in the electrical box.
- normally open between terminals 143 and 142 of terminal block Y2 in the electrical box.



External Pump Connections

Connect the relays for Pump No. 1 and Pump No.2 present, respectively to:

- terminal NO3 of terminal block M32 on the uPC3M controller and to terminals 4 and 103 of terminal block Y3 in the electrical box.
- terminal NO6 of terminal block M32 on the uPC3M and to terminals 4 and 104 of terminal block Y3 on the electrical box.

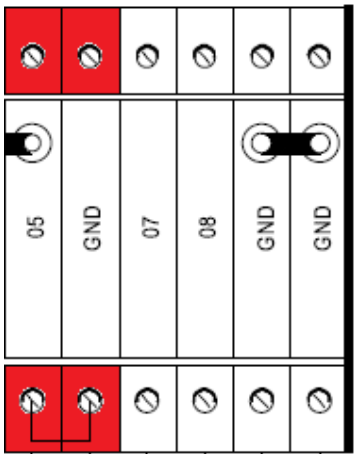


Remove the jumper between the terminals before making the necessary connections.

Flow switch - Pressure switch

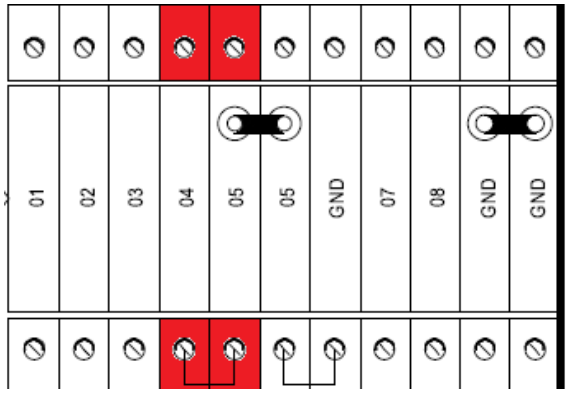
The flow switch and pressure switch are optional components maneged by a digital signal.

In the case of standard units not fitted with a manufacturer-supplied pump, the low-water pressure switch (PSW-0.1) must be installed on the suction pipe of the external pump. It must be connected to terminals 05 and GND on terminal block Y1 in the electrical box.

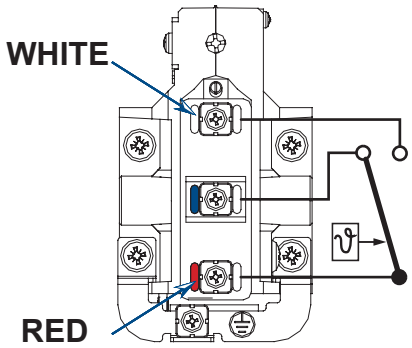


The flow switch (FS-0.1) must be connected by routing the white and red wires to terminals 04 and 05, respectively, on terminal block Y1 of the electrical box.

The unit's control system incorporates a hydraulic circuit safety system that uses dry, normally open contacts.



Remove the jumper between the terminals before making the necessary connections.



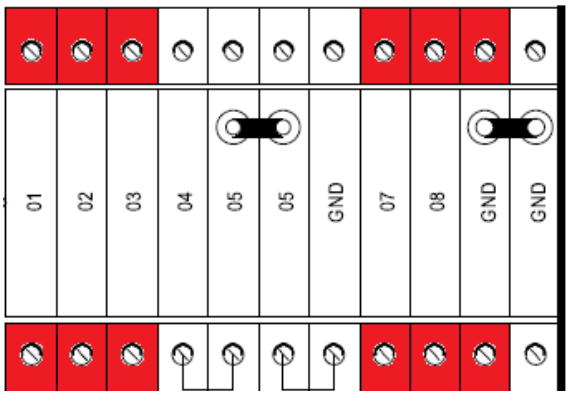
Remote controls

The ECOi-W AQUA-G EVO is equipped with five remote control functions via dry contacts:

- REMOTE ON/OFF function to be connected to terminals 01 and 03 of terminal block Y1 in the electrical box.
- REMOTE COOL/HEAT function to be connected to terminals 02 and 03 of terminal block Y1 in the electrical box.
- REMOTE DOUBLE SETPOINT function selection via the SDN contact, to be connected to terminals 08 and GND of terminal block Y1.
- REMOTE REDUCE MODE function selection via the SLS contact, to be connected to terminals 07

and GND on terminal block Y1 of the electrical box.

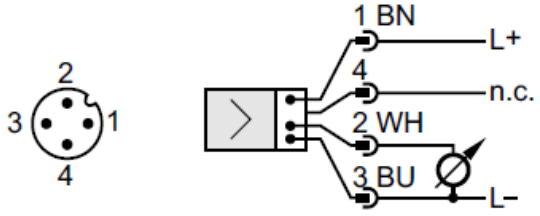
- SG (Smart Grid) signal, to be connected to terminals DI6 and GND of terminal block M46 of the uPC3M controller.
- EVU (Smart Grid) signal to be connected to terminals DI7 and GND of terminal block M46 on the uPC3M controller.



Remove the jumper between the terminals before making the necessary connections.

Electronic Flow Switch - Flow Meter

The electronic flow switch and the flow meter are optional components controlled by a 4–20 mA analog signal; they can be installed at a later date following the purchase of the machine. Before making the electrical connections, install one of the two components on one of the pressure points brazed on the water outlet pipe leading to the system.

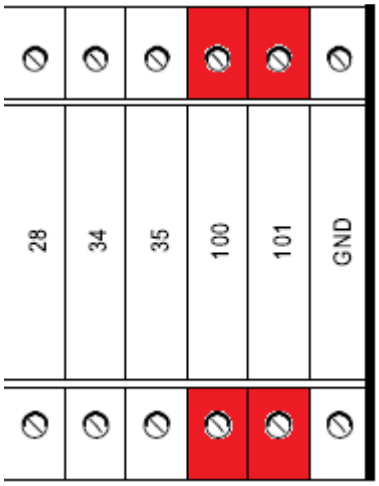


Colours of the wires in the female connectors:

- 1 = BN (brown), 3 = BU (blue), 2 = WH (white).
- n c = not connected.

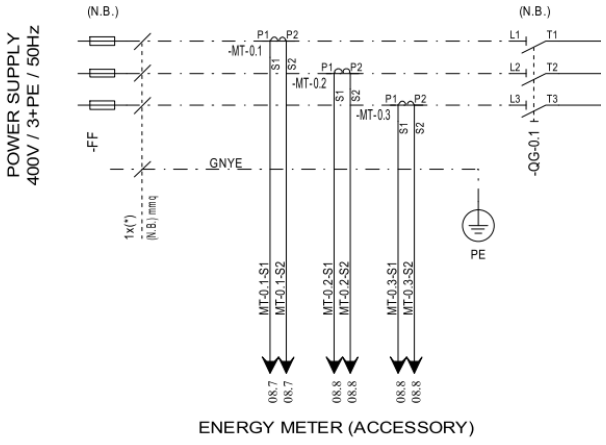
The cables must be connected as follows:

- for both components, connect the brown cable to terminal 100 of terminal block X1 in the electrical box.
- for both components, connect the blue cable to the GND terminal of terminal block M62 on the uPC3M controller and to terminal 101 of terminal block X1 in the electrical box.
- connect the white wire from the flow switch to terminal B5 on terminal block M62 of the uPC3M controller, or the white wire from the flow meter to terminal B10 on terminal block M29 of the uPC3M controller.

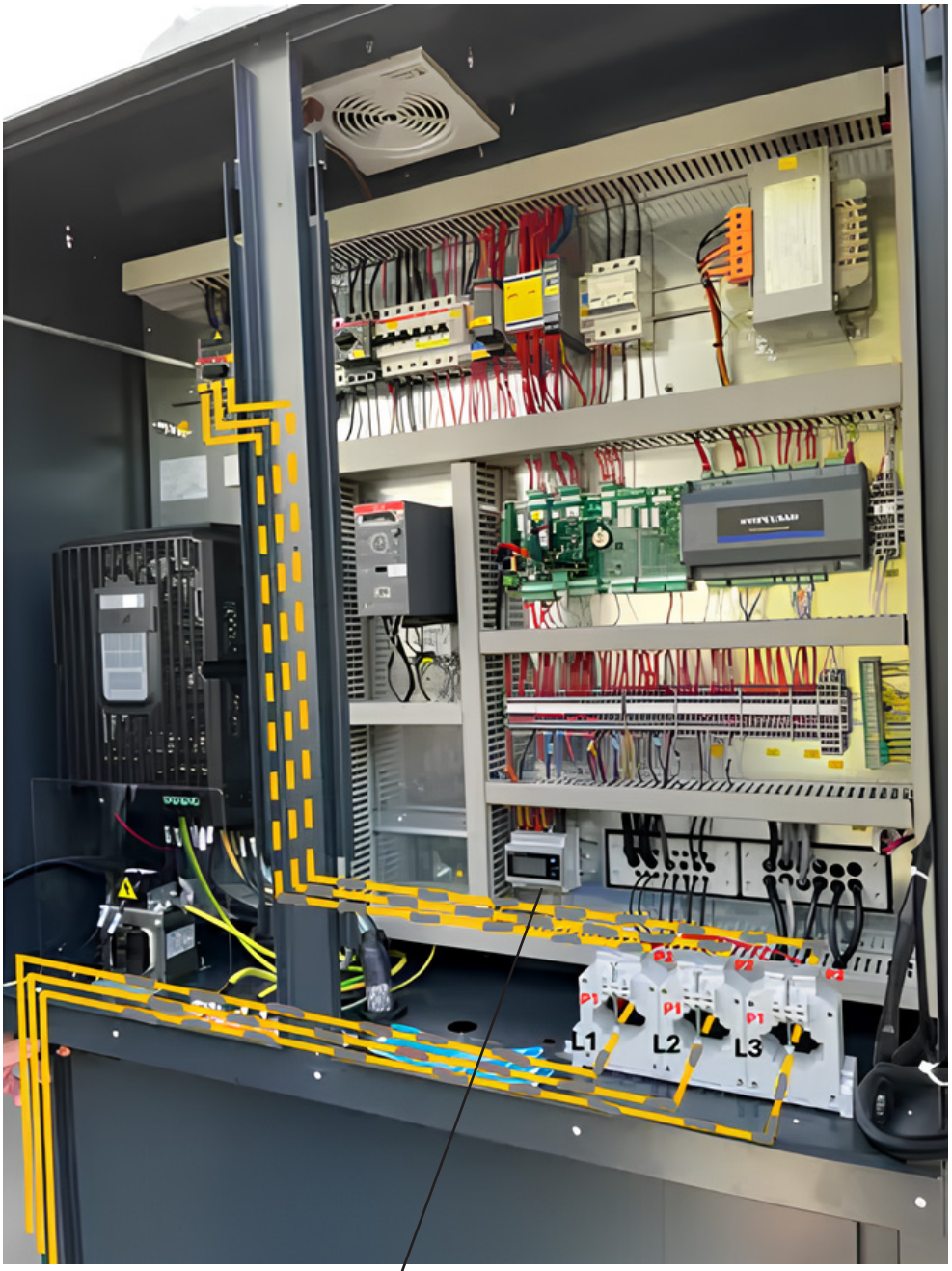


Energy meter

When installing this component, refer to the wiring diagram, particularly regarding the wiring direction of the current transformers. The input and output are labeled P1 and P2, respectively.



ENERGY METER (ACCESSORY)



The image above shows what the installation of the energy meter looks like when performed at the factory.
Specifically:

- the complete line represents the path of the three phases of the power supply entering the electrical box. Cables must be equipped with a protective sheath.
- the dashed line indicates the approximate route of the additional conductors needed to connect the energy meter. It is the installer's responsibility to provide an additional conductor (without an outer sheath) for each phase. The conductors are not included with the Energy Meter option. The approximate length required is 2.30 m, including a 15% allowance to account for bends in the required wiring.

Dynamic setpoint

The setpoint values set by the user may vary depending on the ambient temperature. An ambient temperature sensor, which comes standard on the machine, can be one of two types and must be connected as follows:

- an NTC probe dedicated to measuring the ambient temperature, to be connected to terminals B4 and GND on terminal block M62 of the uPC3M controller.
- a 0-10 V potentiometric sensor, to be connected to terminals B4, GND, and the +VDC terminal of the M62 terminal block on the uPC3M controller.

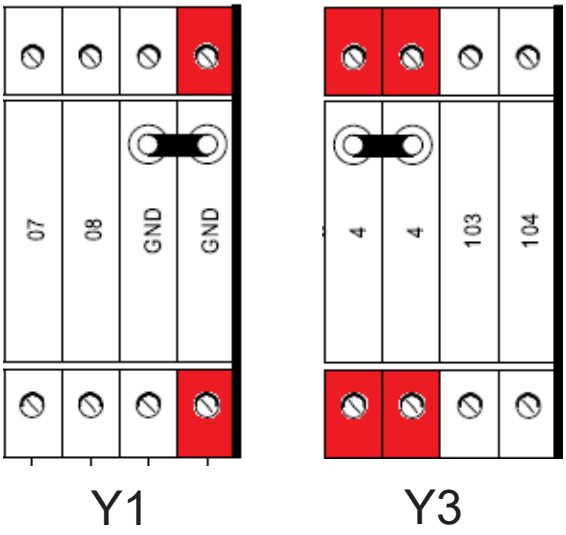
Domestic hot water

Come riportato nel paragrafo 3.4 di questo manuale, la produzione di acqua calda sanitaria si ottiene tramite l'integrazione dei seguenti componenti:

- an external intertial tank, not included with the machine.
- a temperature probe.
- a 3-way valve.
- an electric heater.

1. Connect the auxiliary relay for the storage tank to terminal NO4 on the M33 terminal block of the uPC3M controller and to terminal 4 on the Y3 terminal block of the electrical box.
2. For tank alarm management, the unit's controller is notified of a fault via a dry contact (normally open). Connect terminal DI4 of the M46 terminal block on the uPC3M controller to terminal GND of the Y1 terminal block in the electrical box.
3. Connect the NTC temperature sensor to terminals B6 and GND of the M62 terminal block on the uPC3M controller.
4. Connect the 3-way valve to terminal NO8 on terminal block M77 of the uPC3M controller and to terminal 4 on terminal block Y3 of the electrical box.
5. Connect the auxiliary relay for the electric heater to terminal NO9 on terminal block M67 of the uPC3M controller and to terminal 4 on terminal block Y3 of the electrical box.

The electric heater needed to supplement hot water production and the external water heater are not included in the domestic hot water kit.



Remove the jumper between the terminals before making the necessary connections.

Communication

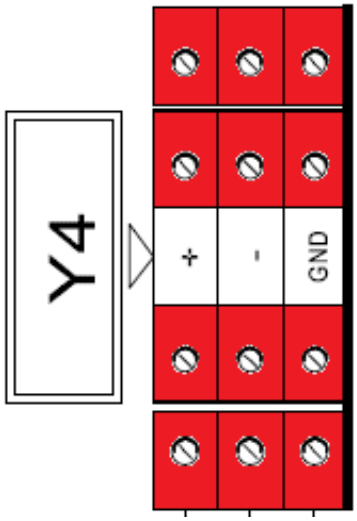
The unit is equipped with four different communication protocols for the user and one for the Leader-Follower system:

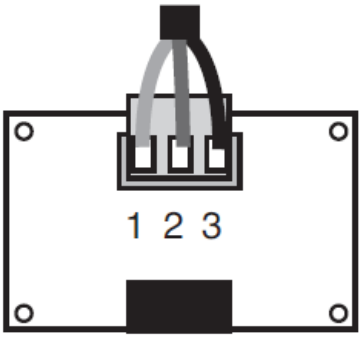
- Modbus RTU.
- Modbus TCP/IP.
- BACnet MS/TP.
- BACnet IP.
- pLAN.

Modbus TCP/IP or BACnet IP communication takes place via an RJ45 socket and an Ethernet cable connected directly to the controller.

Modbus RTU or BACnet MS/TP communication takes place by connecting the terminals via the +, - and GND connections on terminal block Y4 in the electrical box.

The Modbus connection must not run through the same cable ducts as the power cables, as any induced voltage could cause a communication failure.





BMS CARD:

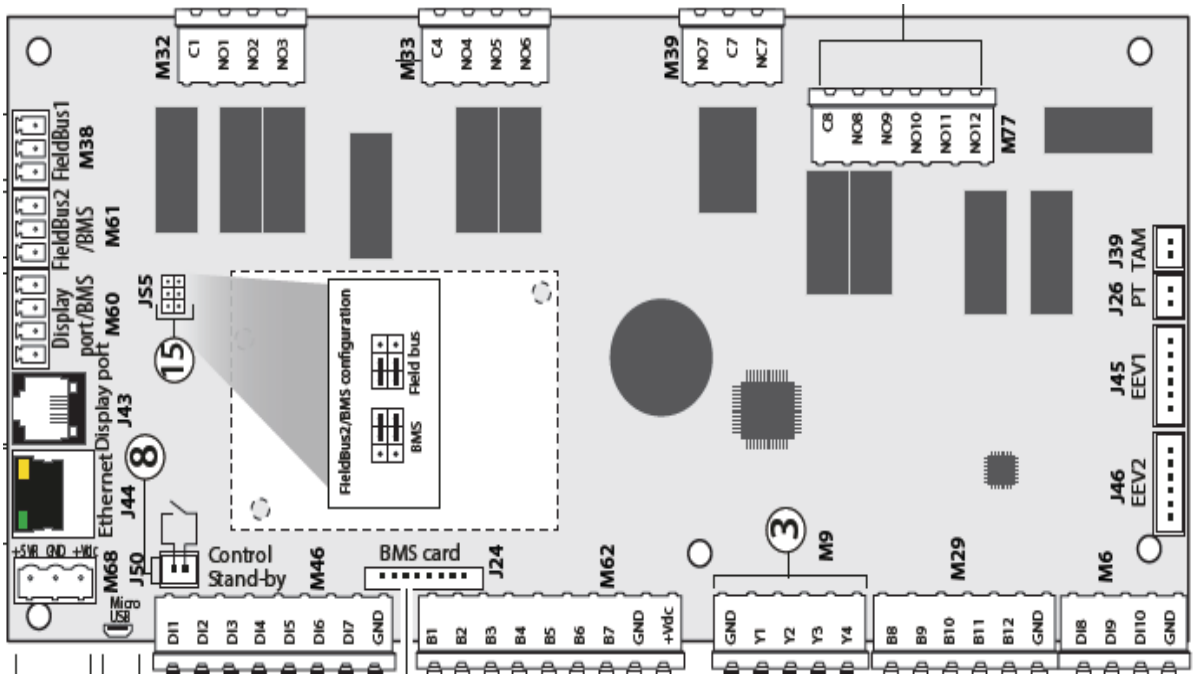
1 = GND
2 = +
3 = -

Modbus RTU communication enables remote monitoring of information from the installed units. The output cables from the +, -, and GND connections on the BMS board mounted on the uPC3M controller are connected at the factory to the corresponding ports on terminal block Y4 of the electrical box.
Connect the desired monitoring method to the terminals on port Y4 of the electrical box.

pLAN communication takes place via:

- port J43 and a telephone-type cable connected to the control screen for displaying the parameters coming from the controller.
- display unit/BMS. Connecting the controllers of multiple units allows the parameters of each machine to be displayed on a shared screen.
  This feature is independent of the Leader-Follower network with which it can be integrated.

The Leader-Follower network is managed primarily through Modbus RTU communication. Information from the Follower units is shared with the Leader unit via the connection between the Fieldbus2 / BMS ports on the subordinate unit controllers and the port on the main unit.



uPC3 MEDIUM CONTROLLER

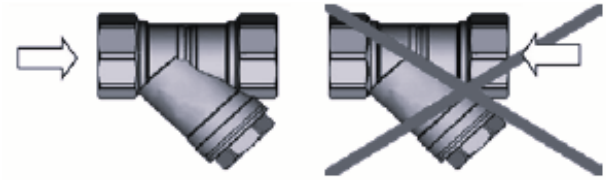
5.7 Protection against water impurities

In the absence of an appropriately sized water filter (mesh size of 800 µm), the machine's operation could be disrupted by a decrease in the water flow rate entering the heat exchanger. The unit would in fact clog up in a few moments with serious damage to the plate heat exchanger.

To avoid any risk of penetration of foreign bodies and to maintain machine performance, it is mandatory to install a water filter at the machine inlet.

The manufacturer's warranty does not apply if the filter supplied with the machine has not been installed.

Do not use any kind of filter other than the one supplied with the unit.



The filter is used correctly when water flows through it according to the direction shown in the picture.
Do not mount upside down or vertical to as shown.

5.8 Water quality

Before filling the system with the necessary water, it is recommended to check that:

- Any contamination, such as welding residues, has been removed.
- The unit is not connected to a network with open circuits, resulting in a deterioration of oxygenation quality, or to an aquifer with untreated water.
- The hydraulic network system installed includes all the necessary elements for water treatment: filters, additives, intermediate exchangers, bleed valves, vents, shut-off valves, etc., according to the results of the analysis.

The use of improperly treated or untreated water can cause scaling, erosion, corrosion or algae or sludge deposits in the exchangers. It is recommended to seek the services of a qualified water treatment technician to determine the treatment to be applied, if any.

Check that the water quality meets specifications after careful analysis.

The manufacturer cannot be held liable for damage caused by the use of untreated or incorrectly treated water.

Apply the following water quality recommendations:

- Low presence of ammonium ions NH_4^+ in the water, very harmful to copper (<10mg/l).
- Low presence of chloride ions Cl^-, with risk of perforation due to pitting corrosion of copper. (<10mg/l).
- Low presence of Fe_2^+ and Fe_3^+ ions. In case of dissolved oxygen, this indicates the presence of corrosion of steel parts, which can lead to corrosion of copper parts under Fe deposits, especially in the case of multi-tubular exchangers. Fe < 5mg/l.
- Absence of fluoride ions (< 0.1 mg/l).
- low presence of dissolved silica, an acidic element of water that can cause corrosion (< 1 mg/l).
- Water hardness between 4.5 dH and 8.5 dH in order to favour fewer lime deposits and limit copper corrosion. Over time, excessively high hardness values can lead to clogged pipes.
- Complete alkalinity title (CAT), i.e. presence of carbonate and bicarbonate ions in the water, < 100 mg/l.
- Avoid any abrupt changes in water oxygenation conditions. It is harmful both to de-oxygenate the water by bubbling inert gas through it and to over-oxygenate it by bubbling pure oxygen through it. Disturbances of oxygenation conditions cause a destabilisation of the copper hydroxides and a salting of the particles.
- Resistivity - electrical conductivity: the higher the resistivity, the more the corrosion rate will tend to decrease. Values above 3000 ohm/cm are desirable. A neutral environment favours maximum

resistivity values. For electrical conductivity, values around 10-500 µS/cm are recommended.
- Neutral pH value at 20 °C (7<pH<9).

If the hydraulic circuit is to be empty for more than one month, it must be charged with nitrogen in order to avoid any risk of corrosion.

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 ions (NH_4^+)	< 2	ppm
Manganese ions (Mn^{2+})	< 0.05	ppm
Carbon Dioxide (CO_2)	< 5	ppm
Hydrogen sulphide (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

5.9 Frost protection

If the unit is exposed to temperatures below 0 °C or produces cold water at temperatures between 5 °C and -15 °C, the hydraulic circuit must be protected against frost. The use of a water-glycol solution is the only effective method to prevent this annoying situation.
The solution must be concentrated enough to ensure adequate protection. Take precautions when using non-inert MEG (monoethylene glycol) or MPG (monopropylene glycol) antifreeze solutions.
This type of solution can cause corrosion in the presence of oxygen.

The percentage of glycol in the hydraulic circuit of the system must be indicated in the regulator during commissioning and must not exceed 40%. An incorrect value can cause deterioration of the pump seals and malfunctioning of the unit.

Ethylene glycol is toxic to the environment. Moreover, it is not suitable for heating with domestic hot water production by simple exchange.

Setting the concentration parameter changes the safety and alarm activation limits.

Emptying the water circuit is not a recommended protection against frost for the following reasons:
- Oxidation of the pipes with consequent reduction of the machine's service life.
- Residual water at the bottom of the plate heat exchanger, which can freeze at low temperatures.

5.10 Hydraulic circuit filling

The hydraulic circuit diagram is available for consultation in section 3.18 of this manual.

The hydraulic circuit must be filled and drained by qualified personnel using the devices provided by the installer.

Flush all water pipes thoroughly before final connection to the unit.

It is important to ensure that the water pressure from the water mains is sufficient to fill the system.
Once the installation is complete, after cleaning and flushing the network, the hydraulic circuit can be filled in accordance with current professional standards until the operating pressure, which must be between 0.5 bar and 3 bar, is reached.

If there is a pump and a safety valve on the inlet line of the hydraulic circuit, install a pipe at the outlet of the

safety valve to ensure that water is drained outside the machine. The valve, set to a pressure of 3.0 bar, protects the pump from excessive pressure caused by filling.

To ensure optimal operation of the unit, it is essential to properly size the hydraulic connections between the machine and the system.

The control and safety devices can only function properly if there is a sufficient volume of water for this purpose.
The minimum volume of water required for the machine to operate depends on several factors, including the operating point which determines the ratio of air and water temperature and the operating time of the compressors.

However, for optimal operation of the unit, consider the following:

- a value of 7 l/kW for comfort applications.
- a value of 13 l/kW per process application in the case of a single-unit installation. In the case of a modular installation, use the following formula: Qmin = ((Qmin for a single unit) × N units)/2.

For heat pump units, the correct water volume is essential to ensure there is a sufficient energy reserve to guarantee that defrost cycles are completed within the scheduled timeframes.

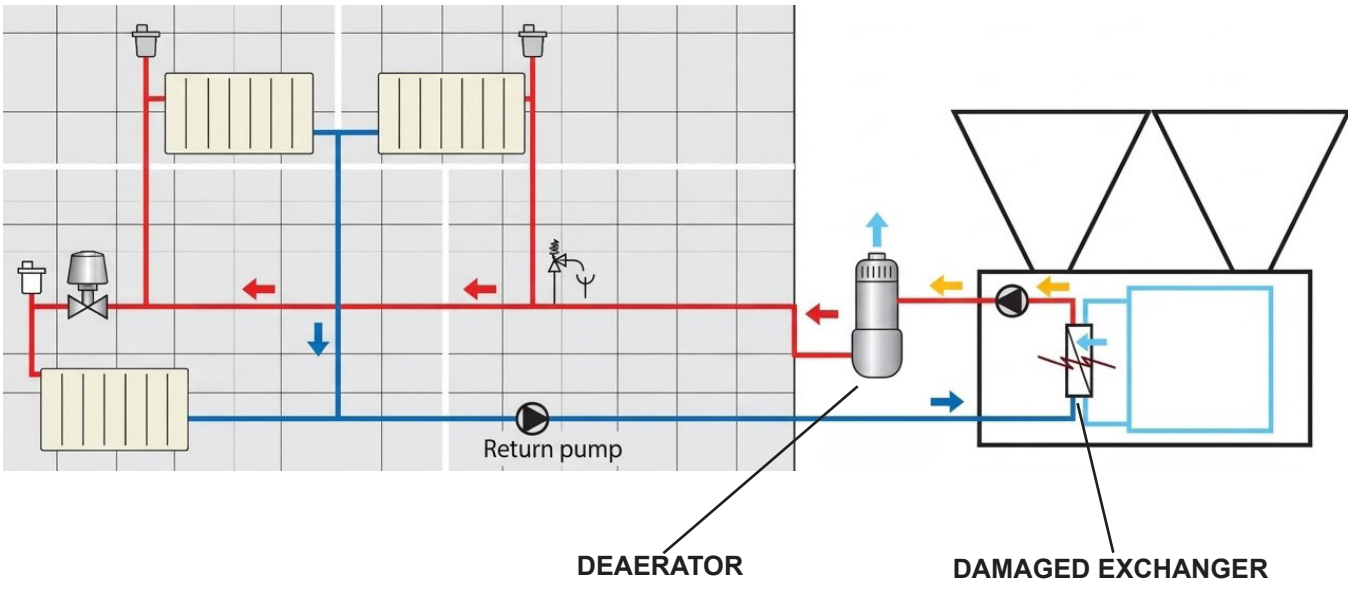
5.11 Deaerator installation

The deaerator is an accessory which must be installed in a suitable position to facilitate the removal of a significant amount of gas during the first water flow cycle, preferably at the highest points of the hydraulic circuit, such as downstream of the plate heat exchanger. The installer must bear in mind that this device is not capable of completely releasing all the refrigerant during the first water flow and that a small percentage may remain within the hydraulic circuit.
Given its size, installation must be carried out externally to the unit.

The component is supplied complete with suitable welded metal pipes, made of painted carbon steel. The installer must provide suitable mounting brackets to ensure that the deaerator is not supported only by the hydraulic pipework. Any vibrations or bending of the pipework could result in damage to the pipework itself. The installer must also verify that the amount of gas released complies with the safety requirements of the installation site.

The efficiency of the deaerator is significantly reduced in the presence of a water-glycol mixture; under such conditions, degassing performance cannot be guaranteed. Therefore, when using glycol, one should not rely on the deaerator's ability to remove any R290 refrigerant that may be present in the circuit as a result of a leak.

The hydraulic diagram shown below illustrates an example of a connection between the AQUA-G EVO unit and a room air-conditioning system with fan-coil terminal units.



6. COMMISSIONING

Safety precautions must always be taken during start-up and maintenance. Only qualified personnel trained in handling refrigeration systems (according to EN 13313) and flammable fluids (certified and in possession of the relevant training certificate) may perform this work.

The start-up form must be filled in and sent to the manufacturer as a prerequisite for the application of the warranty.

6.1 Preliminary checks

It is important to carry out some checks on the machine to ensure that it is operating under the best conditions. The following list of checks is not exhaustive, but constitutes a minimum basis for reference.

The following checks must be carried out before starting up the unit:

1. Check that the installed machine, including optional components, corresponds to the order received.
2. Ensure that the shipping packaging has been completely removed.
3. Check that there is no debris or cardboard inside the unit.
4. Check that the unit is clean and free of installation material.
5. Check for loose or missing bolts or screws.
6. Ensure that all fan panels and guards are in place and securely fastened.
7. Check that the clearance around the unit is maintained to ensure proper airflow to the external heat exchanger and to allow access for maintenance work.
8. Ensure that the working area is properly ventilated.
9. Verify that there are no ignition sources within the ATEX zone outside the machine.
10. Check that fire-fighting equipment is available nearby.
11. Check that there is no possibility of expelled air being recycled through the fans due to wind exposure.
12. Check that the unit is level and that condensate drains freely from the unit.
13. In harsh climatic conditions (such as sub-zero temperatures, snow, high humidity), ensure that the machine is raised 100 mm above the ground.
14. Remove the USB stick containing the installation and maintenance manual from the electrical box before starting any operations.

6.2 Electrical circuit checks

1. Check that the electrical system complies with the unit's wiring diagram and current local electrical regulations.
2. Check that the supply voltage corresponds to that indicated on the wiring diagram.
3. Check the cross-section of the power and grounding cables; ensure that the terminals are tightened and check the alignment of the contactors, with the main switch open.
4. Ensure that appropriately sized fuses or circuit breakers have been installed in the main electrical box.
5. Check that the gas leak detector is properly connected to the electrical box.
6. Check the tightening of the wires on the components and that all terminals are correctly connected.
7. Ensure that no cables are in contact with pipes and/or edges.
8. Check the grounding of the machine.
9. Connect the contacts of the external flow switch and the thermal relay of a pump or other devices (if fitted) to the corresponding terminals shown in the wiring diagram.
10. Switch on the main disconnecting switch. The phases will settle automatically due to the presence of the inverter.

The wiring diagram is not included in this manual; it is a separate document supplied with the machine.

6.3 Refrigeration circuit checks

1. Check that the fluid warning light is green, indicating the absence of humidity in the circuit.
2. Check that the high/low pressure gauges measure similar values and that the saturation temperature corresponding to the measured pressure is close to room temperature.
3. Check the compressor oil level (use the humidity indicator, if present, located at the base of the component); the optimum condition is a level of about 3/4 of the indicator, if the level is less than 50%, add oil.
4. Completely open all service valves.
5. If possible, carry out a leak test of the refrigerant circuit with a leak detector.



For more information on when to top up the oil, see section 8.2.



The refrigeration circuit is equipped with a manual shut-off valve between the plate heat exchanger and the compressor; this valve is open and must not be closed under any circumstances during operation.

6.4 Hydraulic circuit checks

1. Check that the components of the external water circuit (pump, user equipment, filters and tank, if any) have been correctly installed according to the manufacturer's recommendations and that the inlet and outlet water connections are correct.
2. Check that the water quality is in accordance with the specifications, as stated in section 5.8.
3. Check the presence and position of shut-off valves to isolate the unit during maintenance periods.
4. Open all service valves completely before use.
5. Check the presence of the water filter upstream of the unit, its direction and position (mesh ≤ 800 µm).
6. Check that the hydraulic circuit is filled correctly and that the fluid flows freely without signs of leakage or air bubbles.
7. Ensure that the fluid used is of good quality, clean and properly filtered. When using glycol-based antifreeze, check that the concentration level is correct (do not exceed 40% glycol in solution).
8. Check that the pump seals are not seized. The motor shaft should rotate freely when turned by hand. If necessary, unlock it using a tool.
9. Check the direction of rotation of the pump, if present, and let the water circulate for at least 12 hours. Clean the water filter at the pump suction.
10. Adjust the water flow rate to meet specifications.

6.5 Start-up

1. Power up the machine by closing the main isolator switch and ensure that the crankcase heater has been running for at least 12 hours before starting the compressors.
2. Check the functioning of all external equipment and that the control devices in the system are properly calibrated.
3. Check the status of the unit from the HMI controller (display) and make sure the parameters are correct.
4. Check that the electronic expansion valve is in the fully closed position in stand-by mode.
5. Set the heating or cooling mode.
6. Set the temperature setpoint.

Select the water temperature profile on the controller according to the table below.

Temperature profile	Temperature limit	Glycol needed
Low temp.	-10 < LWT < +6	Si
HVAC	+6 < LWT < +20	No

Once the preliminary operations have been carried out, check that the pump and hydraulic circuit are working properly before switching on the compressors.

7. Set the control parameter to “ON” (main control screen) to start the unit.
8. Start the pump and ensure that the water flow is as required.



It is dangerous to leave the unit running with insufficient water flow; this could cause irreparable damage to components and the plate heat exchanger. If the unit operates with insufficient flow, its performance will not be optimal.

9. Check the direction of rotation of the pump.
10. Adjust the water flow so that the flow rate is within the specified range.
11. Check the current drawn by the pump.
12. If present, the flow switch is factory-set to the minimum permissible flow. At start-up, after the unit has been running for at least 20 minutes, physically inspect the water filters and, if necessary, clean the water filter cartridges.
13. Switch off the unit after performing the pump check.
14. Set a suitable setpoint for compressor start-up and/or close compressor fuses or circuit breakers.
15. Restart the machine.
16. Check the correct direction of rotation of the compressors. Scroll compressors cannot compress the refrigerant when they rotate in the reverse direction. In order to ensure that the rotation takes place in the correct direction, it is sufficient to check that, immediately after starting the compressor, there is a drop in pressure on the low side and a rise in pressure on the high side. Furthermore, the reverse rotation of a scroll compressor results in a significant increase in the noise level of the unit accompanied by a drastic limitation in current consumption compared to normal values.
17. After about 15 minutes of operation, check that no bubbles have formed through the humidity indicator placed on the liquid line.



The presence of bubbles may indicate that part of the refrigerant charge has escaped in one or more areas. It is essential to eliminate such leaks before proceeding.

18. Repeat the start-up procedure after eliminating the leaks.

6.6 Operation checklist

The next step after start-up is to verify operation through the following steps:

1. Check for the absence of abnormal noises or vibrations.
2. Check that the refrigeration circuit is watertight during operation. The result to be achieved is max. 3 g/year of leaks.
3. Check the current absorption at compressor start-up and stabilised operation.
4. Check the current consumption of the fan.
5. Measure the intensities at the compressor, fan and pump terminals.
6. Check that the condensation and evaporation temperatures during high and low pressure operation measured by the refrigerant pressure gauges are within a certain range (on units not equipped with HP/LP refrigerant pressure gauges, connect a pressure gauge to the Schrader valves on the refrigeration circuit).
   The temperature ranges to be checked are given in the table on the next page.
7. Check the flow temperature, which should never exceed 120 °C during the cooling cycle.
8. Check that the overheating is 6 K ± 2 K.
9. Check that the liquid sub-cooling is 5 K ± 2 K.
10. Check the leaving and return water temperature. It is recommended to keep the water temperature difference (heat exchanger inlet/outlet) between 7 °C and 12 °C.
11. Check the pressures at the inlet and outlet of the plate heat exchanger.
12. Adjust the water flow rate according to the desired ΔT.
13. Determine the water flow rate using a flow meter or the pressure drops of the plate heat exchanger.
14. Check the temperature of the refrigeration and hydraulic circuit after 20 minutes of stabilisation using the control display.

	Cooling mode	Heating mode
High pressure side	About 11-15 °C above the temperature of the air entering the condenser.	Approximately 2-4 °C above the temperature of the water leaving the plate heat exchanger.
Low pressure side	Approx. 2-4 °C below the chilled leaving water temperature.	About 11-15 °C below the air entering the finned coils.

15. Let the fluid circulate for at least 12 hours, then clean the water filter at the pump inlet.

6.7 Other checks during operation

Flow switch

To ensure the unit operates correctly, a flow switch (either mechanical or electronic) may be fitted as an optional extra; this prevents the machine from operating if the water flow is insufficient.
If an external flow switch is used, it must be fitted on the water delivery side leading to the user's system..

Frost protection

An electrical heater is factory-fitted directly in contact with the water heat exchanger and is activated by the control logic when the leaving water temperature falls below a preset limit.
This limit varies, by default, depending on the fluid being cooled; for water applications it has a positive value, while for glycol applications it is 0 °C or less.

In addition to the electrical heater, with a deviation from the previous limit, there is also a frost alarm activated by the controller that immediately stops the compressor of the unit, so as to prevent the water temperature from dropping below freezing point.
If the circulation fluid used is water, it is mandatory before the start of the cold season to prevent
its possible freezing.
This can be done by draining the water circuit, if the unit is not in use, or by keeping the pump running and not switching off the machine, so that the control can activate all frost protections when necessary.

Defrost checks

Heat pump units are equipped with an integrated defrost control system that prevents excessive ice buildup on the air/refrigerant heat exchanger during heating operation.
This system, set by default within the control unit, constantly monitors the difference between the heat exchanger temperature and the outdoor air temperature or the low evaporation temperature of the circuit to determine when to activate the defrost logic; once activated by the unit's control, the four-way valve temporarily reverses the refrigeration cycle, diverting the hot gas from the compressor toward the finned coil. The finned coil, acting as a condenser, heats up until it melts the ice that has accumulated on its surface.

7. CONTROL

7.1 Introduction

This chapter contains useful instructions to enable the user to view the machine's operating values in real time.

7.2 Key features

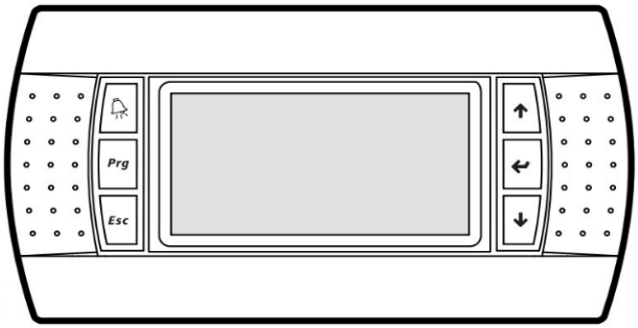
The unit is equipped with an electronic system for parameter adjustment. This system also handles the control and alarm management functions.

It can be activated as follows:
- HMI (human-machine interface).
- DI ON/OFF (digital input).
- BMS (Bacnet, Modbus).
- Leader/Follower
- Scheduler (planning)

The BMS allows you to remotely connect to the machine using the following communication protocols:
- Modbus RTU
- Modbus IP
- Bacnet MSTP
- Bacnet IP.

The BMS variable list is available on customer request.

7.3 Control panel



The control panel consists of a backlit LCD screen with integrated keyboard.

The terminal allows you to perform the following operations:
- modify main parameters.
- view detected alarms.
- read values.

The image below shows the buttons on the keyboard and their function.

Buttons			
	ALARM		UP
Prg	PRG		ENTER
Esc	EXIT		DOWN

- ALARM indicates the presence of an active alarm in the unit, the button LED flashes red.
- PRG allows access to the main menu from the home page.
- EXIT allows you to return to the previous screen by pressing the button once.
  It allows you to return to the main screen by holding down the same button for a longer time.
- UP allows you to scroll up the screens or to increase an editable parameter.
- ENTER allows access to the selected menu or to set the desired value on the variables.
- DOWN allows you to scroll down the screens or to decrease an editable parameter.

7.4 Leader/Follower

The Leader/Follower feature manages the units.
The Leader unit measures the water temperature in the collector using sensors and controls the activation of the Follower units to adjust the system's output and maintain the setpoint selected by the customer.

Based on this value, the Leader, which communicates with the Follower units via Modbus, sends a run signal to the subordinate units.
The activation of units configured as Followers is determined in proportion to the required power demand.

7.5 R290 gas safety system logic

The following describes the conditions resulting from the operating logic of the safety system.

1st condition: normal operation

1. regular monitoring of the operation of components relating to refrigerant gas safety.
2. regular performance of the detector diagnostic test and activation of the extraction fan. Air flow in progress and pressure difference detected by the air differential pressure switch.
3. the green LED on the control panel indicates to the user that the procedure has been successfully completed and that there are no leaks or malfunctions in the safety components.

2nd condition: low leak alarm

1. detection of refrigerant leaks.
2. activation of the extraction fan.
3. the yellow LED on the control panel lights up.
4. The unit continues to operate and is ready to perform an automatic reset.

The loss in the circuit is minor, at around 10%. The user is notified via Modbus as well as through the indicator LED.

3rd condition: component issue

1. carrying out the monitoring procedure as in the first condition.
2. activation of the user's dedicated digital contact.
3. the red LED lights up, indicating that a component is malfunctioning.
4. alarm delayed by 30 min if the error is caused by environmental conditions. In any other failure cases, the unit stops and alarm is displayed with manual reset waiting for component replacement.

4th condition: high leak alarm (Gas presence)

1. detection of refrigerant gas leaks, as in the second condition.
2. activation of the extraction fan.
3. activation of the user's dedicated digital safety contact.
4. electromechanical shutdown of the machine by cutting off the power supply and deactivating the control screen.
   The extraction fan continues to run to ensure that gas is removed from the machine.
5. the yellow and red LEDs on the control panel light up simultaneously. A 20% refrigerant leak has been detected in the unit, a level that poses a potential hazard.

5th condition: high leak alarm (No more gas presence)

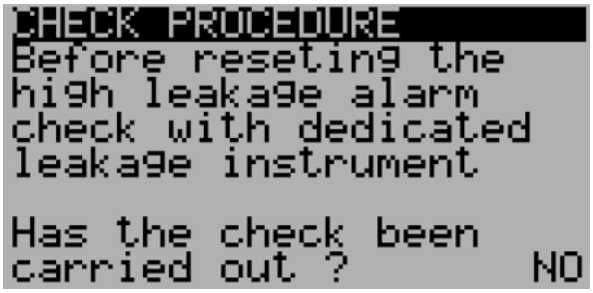
1. no more detection of refrigerant leaks.
2. the extraction fan is not working anymore and the unit still remains off.
3. activaction of the user's dedicated safety contact.
4. the display is now active after all gas has been dissipated. The green and red LEDs light up to indicate this condition.
5. The power supply is full present but the unit requires a manual reset to return to normal operating conditions.
6. Before performing the reset, the software procedure requires that leak tests be conducted using a manual leak detector to ensure a second level of safety.
   Once this has been done, please follow the steps below.
7. Enter the service password to log in with the necessary permissions.



8. Select H. Safety on the Main Menu.

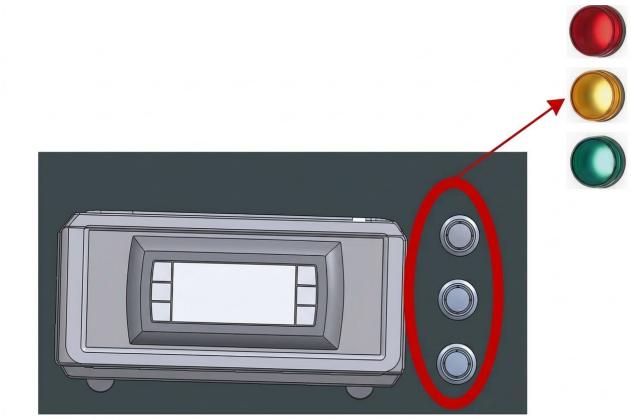


9. Check the HL Alarm Reset box to access to Check Procedure screen.



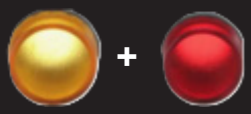
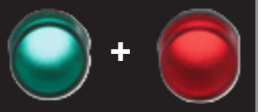


10. By selecting “Yes,” you inform the machine's control system that the leak test was performed using a dedicated instrument. After that, only the Green LED remains ON to indicate that the dangerous situation has passed.
11. Proceed by performing a manual reset.



The LEDs on the electrical box are visible next to the control panel. Each one indicates a different operating condition. The colours are listed in order of severity, reflecting the condition that arises.

Refer to the summary table below to view the operating conditions of the safety system. The complete table can be found in the Annex at the end of this document and on the unit's electrical box. It is located above the LEDS that indicate the operating conditions.

ALARM LED					
CONDITION	**NORMAL OPERATION**	**LOW LEAK ALARM**	**COMPONENT ISSUE**	**HIGH LEAK ALARM** *(Gas presence)*	**HIGH LEAK ALARM** *(No more gas presence)*
EXTRACTION FAN	**OFF**	**ON**	**OFF**	**ON**	**OFF**
UNIT	**ON**	**ON OR OFF FREEZED IN CURRENT STATUS**	**OFF AFTER 30 MIN** *(if humidity or temperature out of range issue)* **OFF** *(in the other cases)*	**OFF**	**OFF**
REMOTE STATUS	**BMS / DI OFF**	**BMS / DI OFF**	**BMS / DI ON**	**DI ON**	**BMS / DI ON**
ELECTRICAL SUPPLY	**FULL PRESENT**	**FULL PRESENT**	**FULL PRESENT**	**ONLY ON LEAK DETECTOR AND FAN**	**FULL PRESENT**
RESET	**-**	**AUTO**	**MANUAL AFTER 30 MIN** *(if humidity or temperature out of range issue)* **MANUAL** *(in the other cases)*	**WAIT UNTIL GAS HAS DISSIPATED**	**MANUAL**

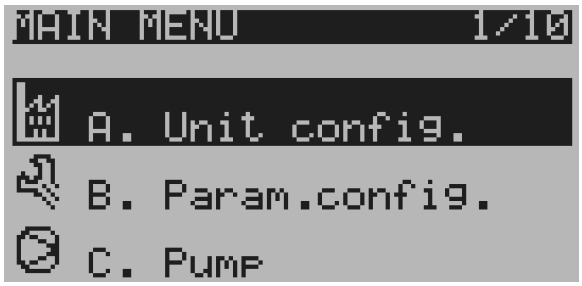
7.6 Main menu

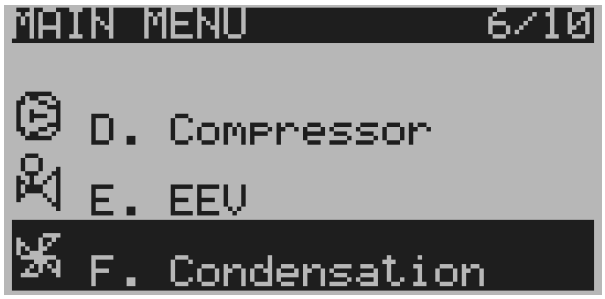


1. Press the PRG button on the left side of the screen to select the main menu from the home page.



2. Enter the password to access the main menu.
3. Set the password 9999 by editing the digits one at a time, then confirm by pressing the ENTER button to access the user level.







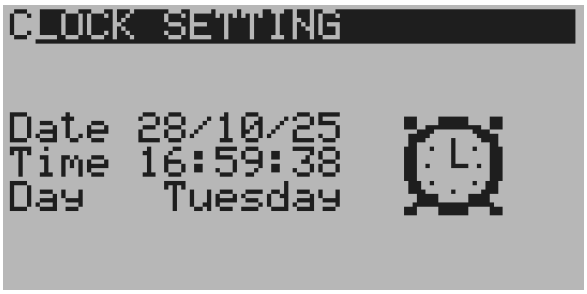
4. Press the DOWN button to scroll through all submenus. User access allows you to view them all but prevents access reserved for other operators.



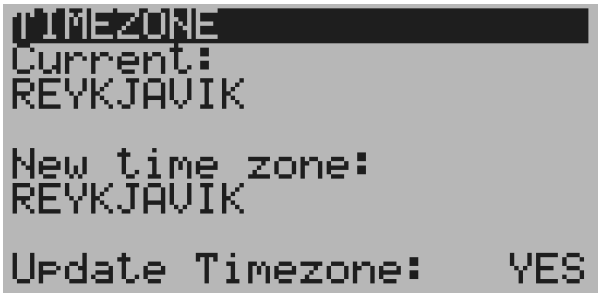
5. Select G. Setting by pressing the ENTER button to display the user submenu.



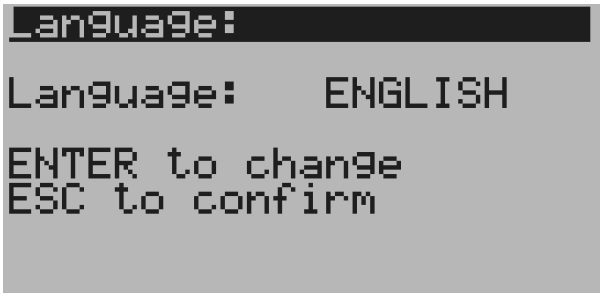
6. Press the ENTER button to access the Date/ Time page. The date and time can be set, thus automatically updating the day of the week.



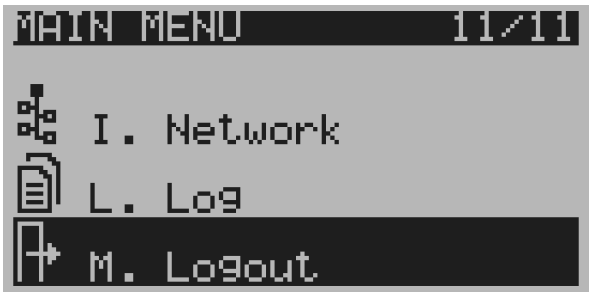
7. Scroll UP or DOWN to change date and time.

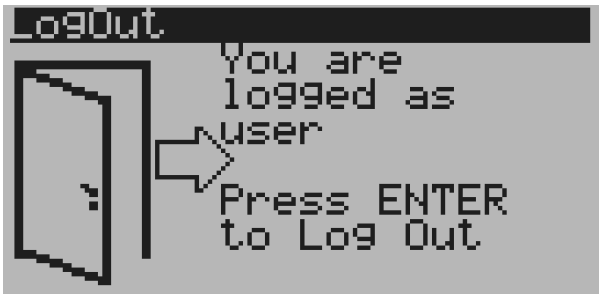


8. Set “new time zone” to have actual time values according to world time zones. To update the current time zone, select YES on the dedicated line and press ENTER to confirm.



9. Press the EXIT button to return to the Option menu screen.
10. Select Language under Date/Time to set the language.

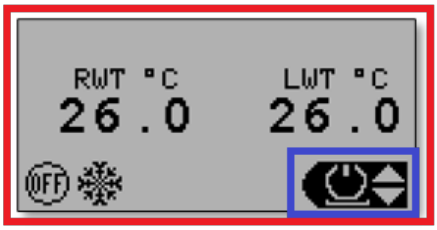




11. Press EXIT and return to the previous screen.
12. Select L. Logout and press ENTER if you wish to log out as a user or press the PRG button within 15 minutes after the first login to return directly to the main menu.

7.7 User menu

Main page

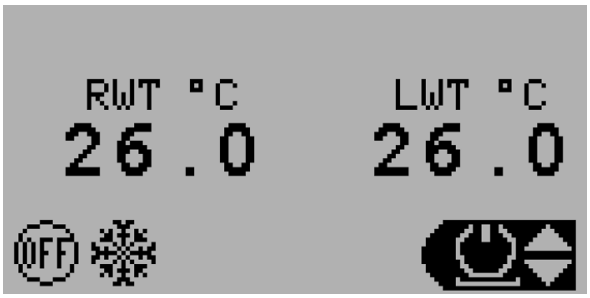


User menu

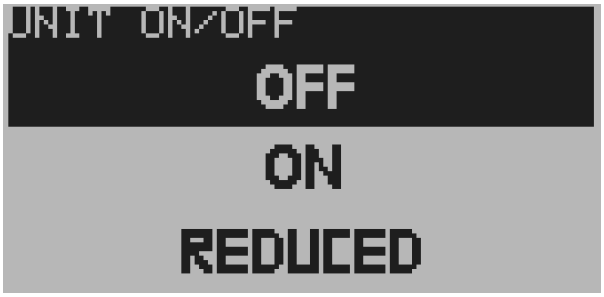
The user menu has dedicated functions for simplified customer use.
The user menu is selectable via a specific icon from the main menu and allows you to view:

- ON/OFF mode.
- Heating/cooling operation mode.
- Temperature setpoint.
- Info.

ON/OFF/Reduced mode



1. Use the UP or DOWN button from the main screen until the ON/OFF icon is selected and press ENTER.



2. Select ON, OFF or Reduced mode.

If you wish to activate Reduced operating mode, please contact Customer Service. Only a service technician is authorized to select the modes and parameters listed below.

The machine features four reduced operating modes:

- Eco. The setpoint is shifted from the default value in order to allow the machine to save energy during operation.
- Night. If the unit is in cooling mode, the fan speed is limited to reduce the noise level of the machine.
- Demand. Mode that limits the load of the machine by decreasing the working power of the compressor.
- Hysteresis. It changes the hysteresis value of the compressor restart. The unit start again to calculate the request only if temperature goes above / below setpoint +/- hysteresis.

Reduced Mode is an operating function that allows to reduce the unit functionalities by setting proper SW parameters. This mode is particularly suitable to reduce the unit acoustic level, expecially during periods when low noise operation is prioritized over maximum unit capacity (typically cooling mode in nighttime operation, and the summer period). The settings listed below are intended to achieve a unit sound power level of approximately 75 dB(A) without hydro pump installed, by reducing the fans rotation speed and the inverter compressor rotation speed

The actual sound level at the installation site may differ from the declared value due to installation-specific conditions, including the presence of reflecting surfaces, enclosed spaces, structural vibration transmission, ductwork configuration, installation accessories, operating conditions and environmental factors that may affect sound propagation and acoustic performance.

When operating in this mode, the unit's cooling/heating capacity will be reduced as indicated below.
The reduction in compressor and fan speeds may also result in a narrower operating envelope, therefore, the use of Reduced Mode is intended only when the unit is operating with an adequate margin from its operating limits.

Proper unit operation shall be verified on site under the actual installation and operating conditions.
The acoustic values indicated in the table are applicable only to units equipped with the Low Noise configuration.
Setting SW parameters:

- night mode activated.
- demand mode activated.
- fan limitation as reported in the table.
- load limitation as report in the table.

The Reduced mode is not designed to provide a significant reduction in noise on units supplied with the Standard acoustic configuration.

For further details, please refer also to the Control Manual.

The values listed below, which indicate the reduction in the operating capacity of fans and compressors, can be adjusted from the control panel only after selecting the Night and Demand modes.

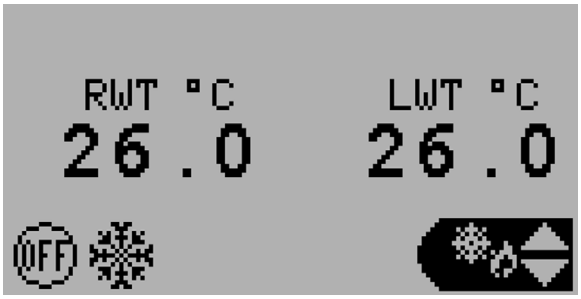
Nominal Mode						
Unit	Fan			VSD Compressor		
	RPM	%	SW Parameter	RPM	%	SW Parameter
60	700	100	Fan limitation C1/C2	4400	100	Load limitation
80	700	100		3600	100	
100	700	100		4000	100	

Reduced Mode					
Unit	Fan		VSD Compressor		Capacity Reduction
	RPM	%	RPM	%	%
60	550	79	3480	79	- 20
80	550	79	3000	83	-15
100	550	79	3000	75	- 25



It is recommended that you change the Reduced Mode settings only if you are familiar with their effects on the unit's operation. Changing one setting necessarily requires adjusting the others as well.

Heating/cooling mode



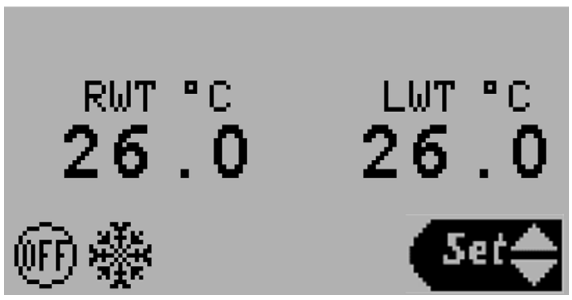


1. Use the UP or DOWN button from the main page until the COOLING/HEATING icon is selected and press ENTER.
2. Select cooling or heating depending on the type of operation desired.

Setpoint

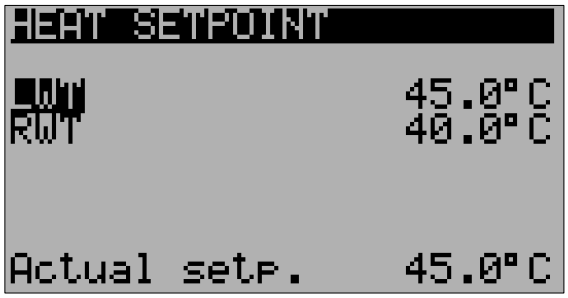
Variable Name	Default value(*)	Min. value(*)	Max. value(*) ΔT standard	Max. value(*) ΔT = 12
Leaving water temperature during cooling	7°C	depends on the water-glycol profile	20°C	20°C
Return water temperature during cooling	12°C	depends on the water-glycol profile	27°C	27°C
Leaving water temperature during heating	45°C	25°C	75°C	75°C
Return water temperature during heating	40°C	22°C	68°C	63°C

(*)The default values in the table correspond to the values available at the first machine start-up after installation. The min. and max. values are the limits not to be exceeded during setting.





1. Use the UP or DOWN button from the main screen until the SETPOINT icon is selected and press ENTER.
2. Set LWT (leaving water temperature) and RWT (return water temperature).
   This can be done whether the machine is working in cooling or heating mode.

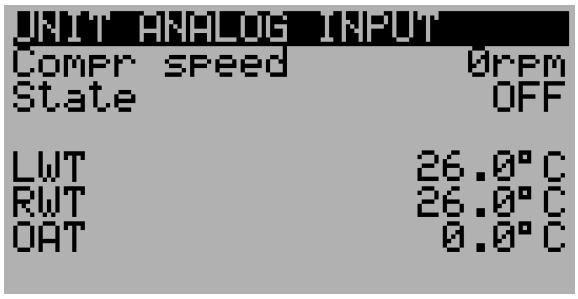


3. Water temperature control is based on the current setpoint value.

Info

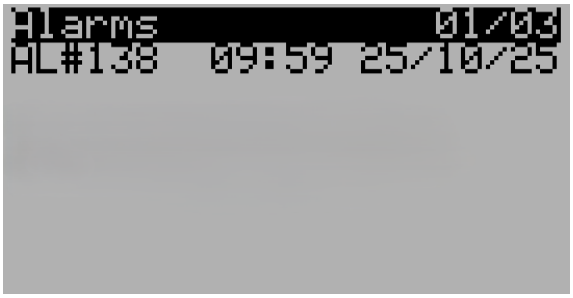


1. Use the UP or DOWN button from the main page until the INFO icon is selected and press ENTER.



2. Use the UP or DOWN button to scroll through the screens and display all unit operating variables.

7.8 Alarms



The activation of all alarms that can be displayed on the panel is signalled by a flashing red LED light on the dedicated button.

The alarm output dedicated to the customer is shown in the wiring diagram.

1. When the ALARM button is pressed, the ALARMS menu is accessed with active alarm.
2. Press the UP or DOWN buttons to scroll through the list of alarms present at that moment.

7.9 Resetting the alarms

Alarms can be reset in manual or automatic mode:

- In manual mode, the alarm must be reset after the conditions that caused it have been fixed. Press the ALARM button for at least 3 seconds to clear the alarm.
  If the cause of the alarm is still present, the reset has no effect and the alarm signal remains. Functions associated with the alarm are not activated again until the alarm is reset.
- In automatic mode, when the alarm condition is fixed, the alarm is automatically reset.
  The functions associated with the alarm are reactivated as soon as the alarm condition ends.



When the alarm condition is over, the displayed screen will read “NO ALARMS”.



Press the ENTER button and select the "Data logger" item from the alarm menu to display the full history of errors occurred during unit operation.

7.10 Alarm list

Alarm code	Alarm text	Reset	Circuit status	Unit status	Notes
0	Error in the number of retain memory writings	Manual	ON	ON	Controller internal issue.
1	Error in retain memory writings	Manual	ON	ON	Controller internal issue.
2	Water Flow Switch	Auto/ Manual	OFF	OFF	Water shortage detection.
3	Antifreeze	Auto/ Manual	OFF	OFF	Detection of too cold outlet water, risk of freezing.
4	High delta RWT/LWT	Auto	OFF	ON	High difference between Returning and Leaving temperature.
5	Wrong trend RWT/LWT	Auto	OFF	ON	The leaving temperature is greater than returning with the unit working in cooling mode, or the leaving temperature is lower than returning with the unit working in heating mode.
6	Returning water temperature probe	Auto	OFF	OFF	Returning water temperature probe disconnected or broken.
7	Leaving water temperature probe	Auto	OFF	OFF	Leaving water temperature probe disconnected or broken.
8	Phase monitor alarm	Auto	OFF	OFF	Phase monitor detects error on the power lines.
9	Condensing pressure transducer circuit 1	Auto	OFF	ON	Condensing pressure transducer disconnected or broken.
11	External air temperature probe	Auto	OFF	OFF	External air temperature probe disconnected or broken.
12	Discharge temperature probe circuit 1	Auto	OFF	ON	Discharge temperature probe disconnected or broken.
14	High discharge temperature circuit 1	Auto	OFF	ON	Compressor running out of envelope
15	Low discharge pressure circuit 1	Auto	OFF	OFF	Compressor running out of envelope.

Alarm code	Alarm text	Reset	Circuit status	Unit status	Notes
16	High suction pressure circuit 1	Auto	OFF	ON	Compressor running out of envelope.
17	Low suction pressure circuit 1	Auto	OFF	ON	Compressor running out of envelope.
19	High ratio pressure circuit 1	Auto	OFF	ON	Compressor running out of envelope.
20	Low ratio circuit 1	Auto	OFF	ON	Compressor running out of envelope.
21	Low delta pressure circuit 1	Auto	OFF	ON	Compressor running out of envelope.
22	High discharge pressure circuit 1	Auto	OFF	ON	Compressor running out of envelope.
76	Overload compressor 1 circuit 1	Auto	ON	ON	Compressor switch open.
77	High pressure switch circuit 1	Manual	OFF	ON	Detection of condensation pressure too high.
93	Maintenance hours compr 1 circuit 1	Manual	ON	ON	Compressor no. 1 circuit 1 running time exceeded.
104	Overload compressor 2 circuit 1	Auto	ON	ON	Compressor switch open.
136	Leaving water temperature probe Leader	Auto	ON	ON	Leader leaving water temperature probe disconnected or faulty.
137	Returning water temperature probe Leader	Auto	ON	ON	Leader return water temperature probe disconnected or faulty.
138	Coil circuit 1 temperature probe	Auto	OFF	ON	Coil temperature probe disconnected or faulty.
143	Overload supply pump 1	Auto/ Manual	OFF	OFF	Thermal security switch for water pump.
168	Inverter pump General error	Auto	OFF	OFF	Pump inverter faulty.
169	Inverter pump Offline	Auto	OFF	OFF	Pump inverter is disconnected from the controller.
172	Remote SetP error	Auto	ON	ON	Error on input signal used for remote setpoint option.

Alarm code	Alarm text	Reset	Circuit status	Unit status	Notes
179	Evaporating pressure transducer circuit 1	Auto	OFF	ON	Evaporating pressure transducer disconnected or faulty.
181	Suction temperature probe circuit 1	Auto	OFF	ON	Suction temperature probe disconnected or broken.
185	Defrost circuit 1 finished by time	Auto	ON	ON	Defrosting ended because it took too long.
187	Defrost circuit 1 finished by LWT	Auto	ON	ON	Defrost has finished because LWT value was too low.
189	Energy meter offline	Auto	ON	ON	Energy meter component no longer communicating with the controller.
190	Safety low Tevap circ 1	Auto	OFF	ON	Evaporation temperature too low.
192	Leak detection offline	Auto	OFF	OFF	Check leak detector Modbus connection.
193	Leak detection Initialization	Auto	OFF	OFF	Wait the initialization to finish.
194	Leak detection HL reached	Manual	OFF	OFF	Leak detector measure reaches High Level of gas concentration.
195	Leak detection internal issue	Manual	OFF	OFF	Leak detector has an internal issue.
196	Leak detection sensor maintenance	Manual	ON	ON	Calibration date has passed, proceed to detector maintenance then reset the alarm to add 1 year on the calibration date.
197	Leak detection fan initialization fault	Auto	OFF	OFF	Leak detector fan didn't start during the initialization phase.
198	Leak detection fan fault	Auto	OFF	OFF	Leak detector fan is in error.
199	Leak detection fan 24h routine fault	Auto	OFF	OFF	Leak detector fan didn't start during the 24h routine.
200	Leak detection continuous fan fault	Auto	OFF	OFF	Leak detector continuous fan is in error.

Alarm code	Alarm text	Reset	Circuit status	Unit status	Notes
201	Leak detection LL reached unit ON	Auto	ON	ON	Leak detector measure reach Low Level of gas concentration while unit is running.
202	Leak detection LL reached unit OFF	Auto	OFF	OFF	Leak detector measures reach Low Level of gas concentration while unit is not running.
203	Leak detection Fan check	Auto	ON	ON	Leak detector is running the 24h fan routine.
204	PeC Offline	Auto	OFF	OFF	PeC controller is no more communicating with uPC3.
205	PeC Software error 1	Auto	OFF	OFF	PeC controller is in Software error n°1.
206	PeC Software error 2	Auto	OFF	OFF	PeC controller is in Software error n°2.
207	PeC Hardware error 1	Auto	OFF	OFF	PeC controller is in Hardware error n°1.
208	PeC Hardware error 2	Auto	OFF	OFF	PeC controller is in Hardware error n°2.
209	PeC Drive error 1	Auto	OFF	OFF	Inverter driver is in error n°1.
210	PeC Drive error 2	Auto	OFF	OFF	Inverter driver is in error n°2.
211	PeC - Drive error 3	Auto	OFF	OFF	Inverter driver is in error n°3.
212	PeC - Drive error 4	Auto	OFF	OFF	Inverter driver is in error n°4
213	Modbus Fan 1 Offline	Auto	OFF	OFF	Modbus fan n°1 is no more communicating with uPC3.
214	Modbus Fan 1 Error	Auto	OFF	OFF	Modbus fan n°1 is in error.
215	Modbus Fan 2 Offline	Auto	OFF	OFF	Modbus fan n°2 is no more communicating with uPC3.
216	Modbus Fan 2 Error	Auto	OFF	OFF	Modbus fan n°2 is in error.
217	DHW Temperature probe	Auto	ON	ON	Temperature probe for domestic hot water is in error.
218	DHW too long	Auto	ON	ON	Domestic hot water setpoint temperature not reached.

Alarm code	Alarm text	Reset	Circuit status	Unit status	Notes
219	Antilegionella not done	Auto	ON	ON	Anti-legionella cycle has not been proceeded correctly.
220	DHW EH or Boiler fault	Auto	ON	ON	Auxiliary heater from DHW is in error.
221	Digital Flow Switch transducer	Auto	ON	ON	Digital flow switch transducer disconnected or faulty.
222	Flow meter Fault	Auto	ON	ON	Flow meter transducer disconnected or faulty.
223	Water delta pressure transducer	Auto	ON	ON	Differential Water pressure transducer disconnected or faulty.
224	Pump n°2 Overload	Auto/ Manual	ON	ON	Thermal security switch for water pump n°2.
225	Leader offline	Auto	ON	ON	Network Leader is offline, the behaviour can be switched to OFF inside the parameters.
226	Follower 1 offline	Auto	ON	ON	Unit Follower n°1 disconnected from Leader unit.
227	Follower 2 offline	Auto	ON	ON	Unit Follower n°2 disconnected from Leader unit.
228	Follower 3 offline	Auto	ON	ON	Unit Follower n°3 disconnected from Leader unit.
229	Follower 4 offline	Auto	ON	ON	Unit Follower n°4 disconnected from Leader unit.
230	Follower 5 offline	Auto	ON	ON	Unit Follower n°5 disconnected from Leader unit.
231	Follower 6 offline	Auto	ON	ON	Unit Follower n°6 disconnected from Leader unit.
232	Follower 7 offline	Auto	ON	ON	Unit Follower n°7 disconnected from Leader unit.
233	Follower 8 offline	Auto	ON	ON	Unit Follower n° disconnected from Leader unit.

8 MAINTENANCE

8.1 General requirements



Please read the safety section of this manual carefully before carrying out any maintenance work.

The units are designed to operate smoothly as long as they are constantly maintained, respecting the limits and deadlines specified in this manual. Each machine must be maintained, according to schedule, by the user/ customer and regularly inspected by personnel from an authorised service centre.

It is the user's responsibility to meet these maintenance requirements and/or to enter into an agreement with an authorised service centre in order to protect adequately the operation of the machine.
Only qualified personnel are authorized to access and work on the components to perform maintenance.

If damage or failure occurs during the warranty period due to improper maintenance, the factory will not be liable for the necessary costs of restoring the unit to its original condition.

The provisions of this section apply only to standard units; depending on the requirements of the order, other documentation may be added for any modifications or additional accessories.

Maintenance in accordance with this document will ensure a long service life of the machine.
This will guarantee the following characteristics:

- better cooling performance.
- low electricity consumption.
- prevention of accidental breakage of components.
- prevention of major, late and expensive interventions.
- environmental protection.

The following precautions should be observed before working on the unit:

- be sure not to operate the equipment under adverse weather conditions, such as snowfall or heavy rain.
- check that there are no ignition sources in the working area.
- do not operate the equipment under conditions of poor visibility or excessive lighting. This could lead to incorrect maintenance procedures and expose the operator to hazardous situations.
- ensure that the working area is properly ventilated.
- check that fire-fighting devices are available nearby.
- check that the concentration of R290 in the atmosphere of the affected area is constantly monitored so that those involved can be warned in the event of a potentially dangerous situation.
- check that all power sources have been cut off.
- perform operations with the electrical box closed for as short a time as possible.
- as inverter units, EC fans and/or power factor condensers are installed in the machine, wait between 5 and15 minutes after switching off the unit before carrying out any work on the electrical system.



Only a qualified electrician is authorized to perform work on an open switchboard.



Do not clean the unit using high-pressure steam jets. This could cause water to seep into the electrical components and damage the coil fins.

8.2 Scheduled maintenance table

Tasks per component	Actions	Maintenance interval				
		Weekly	1 Month	3 Months	6 Months	12 Months
FRAME						
Check for contamination, damage and/or corrosion.	If necessary, clean and repair.					●
Clean the outside of the unit with soap and water				●		
Check for the presence of water (condensation, leaks, etc.).	Clean and search for the cause, then repair.				●	
Check the condition of the thermal insulation.	Replace if necessary.					●
Check the condition of the vibration-damping inserts.	Replace if necessary.					●
Check the condition of the door seal.	Replace if necessary.		●			
Check the condition of the ventilation grilles of the compressor casing.	Clean, if necessary.				●	
Check the condition of the ventilation grilles on the front of the unit.	Clean, if necessary.	●				
Check the condition of the ATEX extraction fan.	Clean, if necessary.	●				
Check the condition of the markings.	Replace if necessary.					●
REFRIGERATION CIRCUIT						
Check the liquid line for gas bubbles.					●	
Check that there is no moisture in the refrigerant fluid.					●	
Check the oil level of the compressors.					●	
Check that the ducts or capillary tubes do not rub or vibrate.				●		
Check that the compressors do not emit abnormal noises or vibrations.			●			
Measure operating pressures and temperatures.	Check whether they are higher or lower than those recorded at equipment start-up.	●				
Check the tightness of the fixing screws of the compressors.						●
Coil check.	Clean, if necessary.			●		
Check filter drier for clogging	Replace if necessary.				●	
Check the operation of the high and low pressure switch.	Replace if necessary.			●		
Check that there is no refrigerant leakage (visually + hydrocarbon sensor).	Immediately carry out the repair and check after 1 month.					●

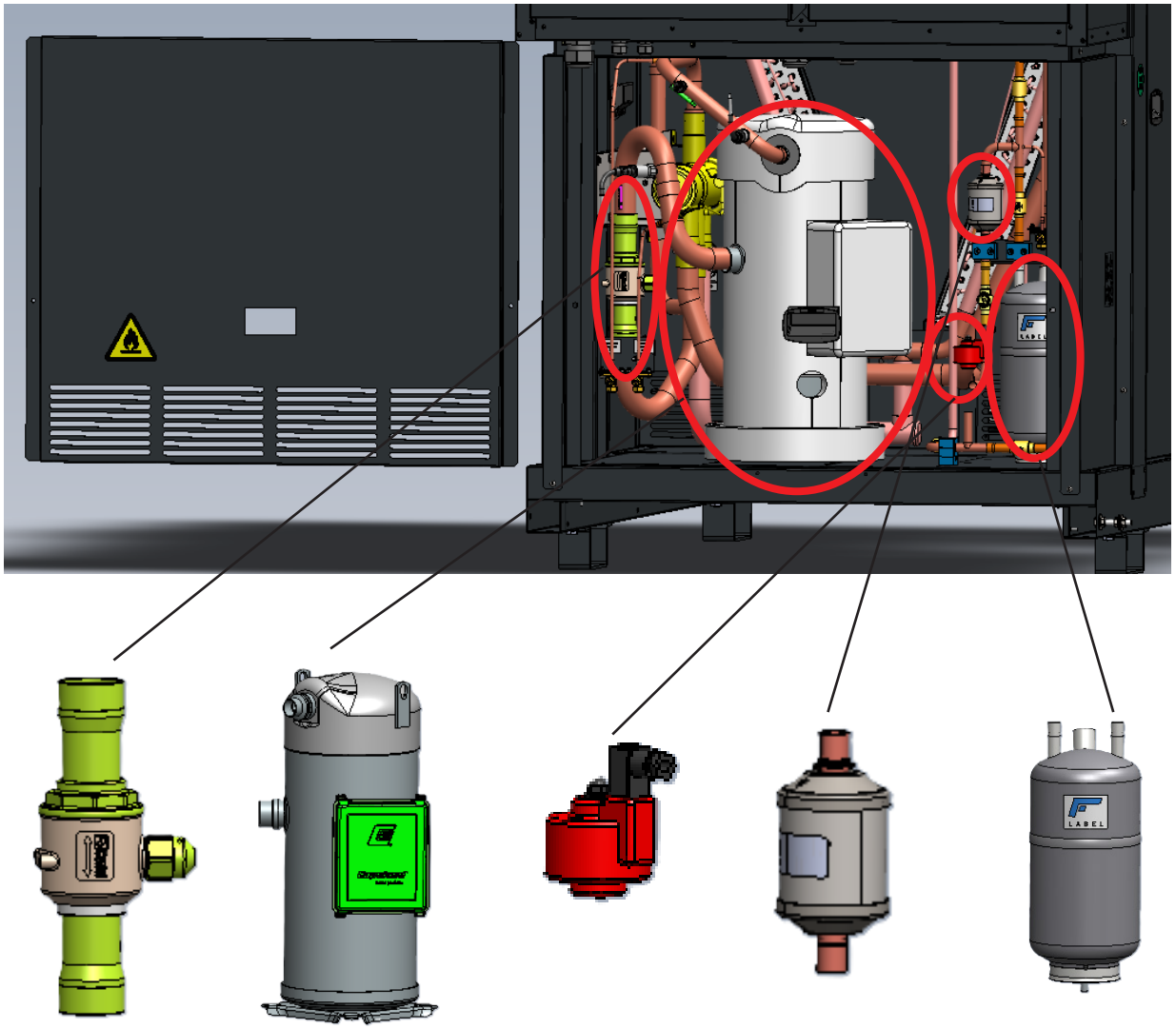
Tasks per component	Actions	Maintenance interval				
		Weekly	1 Month	3 Months	6 Months	12 Months
Check the cycle reversing valve.						•
Check the condition of the vibration-damping inserts.	Replace if necessary.					•
Check and monitor the thickness of the pipes and main components (spare fluid cylinder).	If necessary, replace.					•
Check the operation of the expansion valve.				•		
Check the safety valve body and seal for damage. Check the date of manufacture and, if necessary, replace it in accordance with current national regulations. Check that the drain connection is not obstructed by foreign bodies, rust or ice.	Replace if necessary. If necessary, clean and repair.				•	
HYDRAULIC CIRCUIT						
Record the water temperatures at the inlet and outlet of the plate heat exchanger.		•				
Check the condition of the exchanger in terms of corrosion and operation.	Clean and repair.					•
Check pressure drops in the heat exchanger.			•			
Check the pressure value of the hydraulic circuit.			•			
Check the insulation of the heat exchanger.					•	
Release air and check vents.			•			
Open the isolation valves.			•			

Tasks per component	Actions	Maintenance interval				
		Weekly	1 Month	3 Months	6 Months	12 Months
Check frost protection devices (glycol-based water, thermostat, etc.).	Repair and replace if necessary. When air temperatures become wintry, the water inside the heat exchanger can freeze. To avoid this problem, drain the unused plate heat exchanger completely or protect it by pouring an antifreeze solution into the hydraulic circuit or other devices. The manufacturer accepts no liability for damage to the plate heat exchanger caused by freezing water.		•			
Check the water pump.	If the unit has not been used for a long time, turn the pump shaft manually and check that it turns freely. Replace the pump casing after 15,000 hours of operation with antifreeze or 25,000 hours of operation with water.			•		
Check the operation of the flow switch (if any).				•		
Check the condition of the thermal insulation of pipes.	Repair or replace if necessary.				•	
Check that the hydraulic circuit is correctly filled.					•	
Check the operation of the water shortage pressure switch.						•
Check that the water filter is clean.	Clean.				•	
Check the condition of the expansion vessel (check for excessive corrosion or gas pressure drop).	Replace if necessary.					•
Water quality (sampling + water analysis).						•
Check for ice formation.						•
Check the condition of the function. Check for damage and corrosion.	Clean and repair.					•

Tasks per component	Actions	Maintenance interval				
		Weekly	1 Month	3 Months	6 Months	12 Months
Check the setting of the pipe connections and fastenings.	If necessary, adjust and repair.					•
Measure the temperatures of the water entering and leaving the heat exchanger.					•	
ELECTRICAL CIRCUIT						
Check the power consumption.				•		
Check electrical voltage applied to the unit, which must remain stable within the tolerance limits specified on the nameplates.					•	
Check that the main power cable does not show any signs of damage that could compromise its insulation.	Replace if necessary.					•
Carry out a visual inspection of the contacts.	Replace if necessary.					•
Check the tightening of all electrical connections of the machine.	Tighten if necessary.					•
Check the thermal insulation of the motor windings.						•
Check the thermal protection relays of the motors.	Replace if necessary.					•
Clean the electronic unit of the compressed air to eliminate any accumulations of dust or other dirt.						•
Check the grounding of the metal structure.	Repair, if necessary.					•
Check the switches of the remote control.						•
Check the rated current and the condition of the fuses.						•
FAN						
Check the noise.	Resolve the problem or, if necessary, replace.			•		
Check that the fan is properly secured.	Tighten if necessary.				•	
Check the vanes to ensure the balancing.	Clean, if necessary.				•	

Tasks per component	Actions	Maintenance interval				
		Weekly	1 Month	3 Months	6 Months	12 Months
Check the conditions of the fans motors.					•	
Check for contamination, corrosion or damage.	Clean, if necessary.					•
ADJUSTMENT						
Check the conditions of the alarms.	After verification, mute them.		•			
Check the preset values.					•	
Check the operation of all probes.				•		
Check the gas detection module.					•	

8.3 Work on unit front side



Maintenance work does not necessarily require the individual unit to be removed from the modular installation, as the operator can easily access the refrigeration circuit compartment and the electrical box from the front of the machine.

In the image above, you can see how removing the front panel in an UltraCompact installation allows for:

- access to the front compressor and the main components.
- access to refrigeration lines for inspection, maintenance and leak testing.

Whenever work is performed on the circuit, drain the contents of the unit using a recovery station suitable for refrigerant gas.

Opening the refrigeration circuit requires, once it is resealed, creating a vacuum, checking the circuit for leaks, and recharging the refrigerant.

Any brazing work on the refrigeration circuit must be performed using a constant flow of nitrogen.

Never use the compressor as a vacuum pump to drain the system.

In order to carry out work on the refrigeration circuit, it is advisable to follow the instructions set out below:

1. remove the side panel located next to the liquid receiver.
2. connect the necessary equipment to the service valve located above the receiver (recovery unit, vacuum pump and nitrogen cylinder) to the machine's service valves.
3. drain the refrigeration circuit until a residual pressure of 0.3 bar absolute is achieved.
4. flush the circuit by injecting dry nitrogen.
5. evacuate the circuit to a pressure of 0.3 mbar absolute.
6. re-inject nitrogen.
7. check that there is no refrigerant using a suitable detector.
8. release the nitrogen from the circuit until atmospheric pressure is reached.
9. proceed to open the circuit.



When opening the refrigeration system, it is important to pay special attention to any residual oil in the system.
This oil may contain dissolved refrigerant and could be flammable.



Below are the sections on the maintenance of refrigeration system components.

8.4 Work on the humidity/fluid indicator

The indicator is used to inspect the flow of refrigerant and its humidity level.

Inside the indicator is a colour cartridge. By comparing the colour of the cartridge with the scale on the indicator ring, the moisture content of the refrigerant can be calculated.

If the humidity is too high, replace the filter cartridge, run the machine for a day and then check the percentage again.
When the moisture content is within the set limits, no further action is required. If, however, the moisture content continues to be too high, replace the filter drier again, start the unit and run it for another day.

8.5 Work on the filter drier

The refrigeration circuit is equipped with a filter drier.

Clogging of the filter is evidenced by the presence of bubbles detectable through the moisture indicator, or by an imbalance between the temperature measured downstream and the temperature measured upstream of the filter drier. If you notice that, even after cleaning the cartridge, bubbles remain, it means that there are one or more refrigerant leaks in the unit, which must then be identified and repaired.

If the moisture content is within the set limits, no intervention is necessary. If it continues to be too high, replace the filter drier again, start the unit and run it for another day.

8.6 Refrigerant charge



Under no circumstances should you introduce the refrigerant via the high-pressure side of the circuit. Take great care to charge the circuit correctly.



All refrigerant recovery and recharging operations must be carried out by a qualified technician using equipment suitable for the unit, in accordance with the regulations in force at the site. Any reckless intervention may result in the uncontrolled release of gas into the atmosphere, fires and explosions.

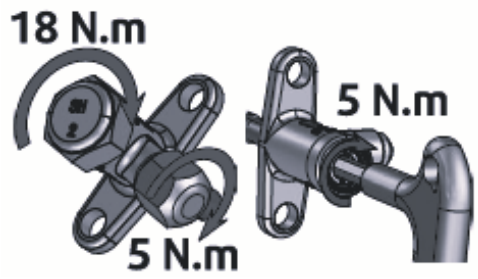
To begin the procedure, connect a vacuum pump to one of the service valves, either LP or HP.
Create a vacuum in the refrigeration circuit until a pressure of 0.3 mbar is reached.

Inject refrigerant to break the vacuum, then charge the circuit to the full required charge in liquid form.
It is recommended that refrigerant be introduced only in liquid form via the low-pressure service valve, should the service port have been relocated with the valve.
If the charge is insufficient, the unit's efficiency will be lower than expected. In the worst-case scenario, the LP (low-pressure) transducer could shut down the machine.

If there is too much charge, the condensing pressure will increase and the HP (high pressure) pressure switch may activate, causing the machine to stop and also affecting consumption.

Only feed into the circuit the amount of refrigerant R290 stated on the nameplate. After this operation, close and tighten the LP and HP service valves to the following torque values:

- valve tightening torque: 5 Nm.
- cap tightening torque: 18 Nm or 5 Nm



Perform a leak test of the refrigeration circuit after charging it. The desired result is 3 g/year.
It is recommended to perform periodic inspections in order to detect and promptly address any refrigerant leaks.
Then check that there is no moisture by checking that the colour of the indicator through the moisture indicator is green.
Operate the unit in cooling mode to determine whether the unit charge is correct controlling the sub-cooling.

Charging of the refrigeration circuit must be carried out after discharge for maintenance purposes (leakage, compressor replacement, etc.).

8.7 Work on the compressors

The compressor is supplied with the required lubricating oil charge. Under normal operating conditions, this charge will be sufficient for the entire life of the unit, provided that the efficiency of the refrigeration circuit is optimal and has not been overhauled.

The oil used for this type of machine is light and transparent. It retains its colour over a long period of operation.

Since a correctly designed and installed refrigeration system will run smoothly, compressor oil does not require changing, even after a long period of operation.

If the oil has blackened, it means that it has been exposed to impurities within the refrigerant circuit or excessive temperatures on the discharge side of the compressor, which inevitably leads to subsequent degradation. Blackening of the oil or degradation of its qualities can also be caused by moisture in the system. Change the oil when it changes colour or when it is degraded.

The compressors use polyester oil. When carrying out maintenance on the compressor, or if it is necessary to open the refrigeration circuit at any point, remember that this type of oil is highly hygroscopic and it is therefore recommended not to leave it exposed to air for long periods.

For any maintenance operation that requires topping up or changing oil, it is mandatory to use oil of the type indicated on the compressor nameplate and to strictly adhere to the indicated volume.

Should used oil accidentally spill out of the compressor, do not throw it away as it contains refrigerant in solution The used oil must then be delivered to an authorised disposal centre.

Particular attention must be paid to the maintenance of the drive that enables the inverter unit operation.

Follow these recommendations to ensure optimal and consistent operation of the drive at all times:

- store the drive correctly to prevent mechanical damage.
- the cover and the protective bag inside the cover must be opened carefully. Do not use sharp objects to open these elements.
- do not use chemicals or solvents to clean the drive.
- do not drop any mechanical tools on the drive.
- frequently check that the cooling slots, fans and heat sink are free of dust to ensure efficient cooling.

Unless otherwise specified, the operations described

above may only be carried out by a qualified service technician.



If the compressor needs to be replaced (following a mechanical failure or if it has burnt out), contact one of the authorised service centres.

8.8 Work on the EEV

The unit circuit has an electronic expansion valve.

The following procedure is used to check overheating:

1. Measure the suction pressure using the pressure gauge connected to the service valve on the suction side, if present.
2. Using the temperature scale of the pressure gauge, measure the saturated temperature, which corresponds to the pressure value.
3. Using a pressure gauge attached to the gas outlet connection of the evaporator, measure the actual temperature.

Overheating is adjusted by intervening on the driver.

If the expansion valve cannot be adjusted, it is most likely faulty and will have to be replaced.
Replacement must be carried out by one of the authorised service centres.

8.9 Modular installation unit

If the necessary operations cannot be performed due to the space occupied by the Ultracompact units, the affected machine must be removed from the assembly. Specifically, removing the machine allows the following operations to be performed efficiently:

- replacement of fans.
- maintenance on refrigeration circuit components that are not accessible from the front, unless the right and left side panels are first removed.
- access to safety valves that would otherwise be difficul to reach.



Before operating or moving any unit, be sure to disconnect all necessary mechanical, hydraulic and electrical connections.



Exercise extreme caution before performing any work on defective plumbing. Any excess pressure or temperature can be dangerous to the operator.

Movements of units installed on the ground floor can be performed using a forklift, whereas for rooftop installations, alternative lifting equipment must be used, as there may not be sufficient space for maneuvering.
Ensure that:

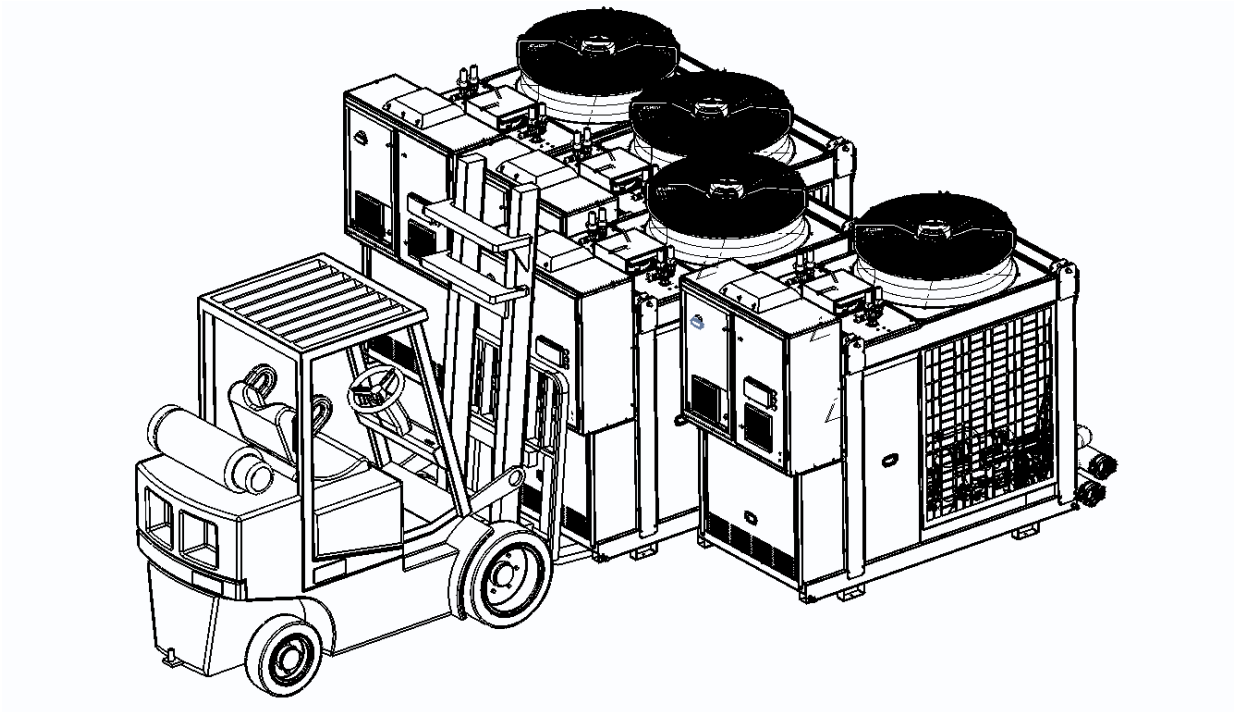
- lifting and handling are performed longitudinally using a forklift with fork length equal to or greater than 1800 mm.
  This ensures stability when performing controlled maneuvers.
- the machine rests on an auxiliary beam in the case of partial removal from the unit group.
- the forklift must be moved away from the machine once the extraction process is complete in order to avoid hazardous situations and obstructions during maintenance.

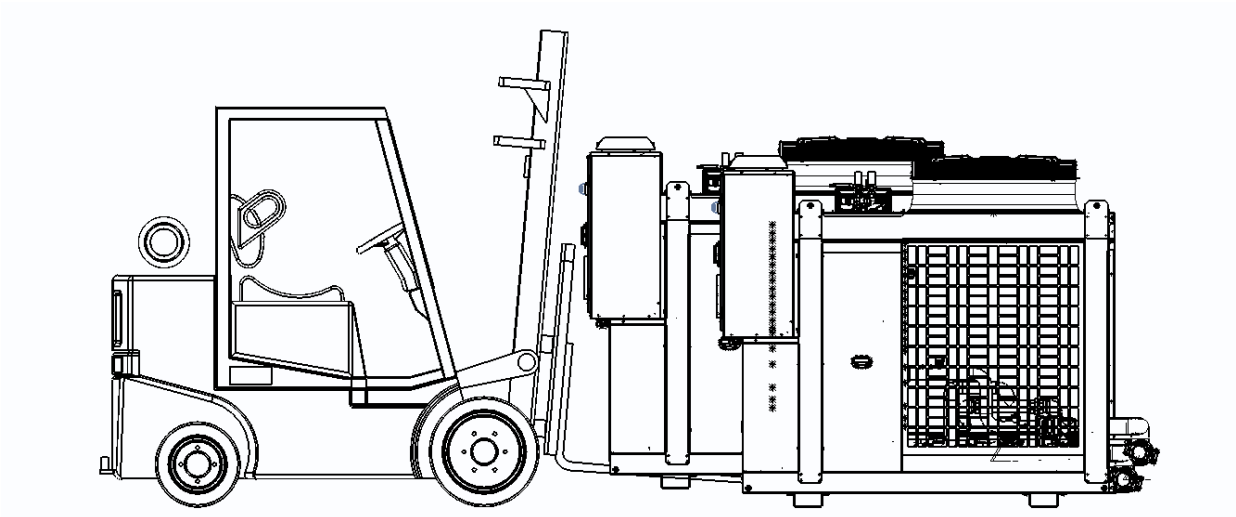
When lifting with a crane or overhead crane, use the four lifting points located on the top of the unit.
During lifting, avoid sudden movements that could cause lateral swaying and consequently damage the frames of adjacent units.
It is therefore recommended to use suitable lifting systems (e.g., slings or lifting beams) to ensure even load distribution and controlled, safe handling.



The lifting systems mentioned above are not supplied by the manufacturer

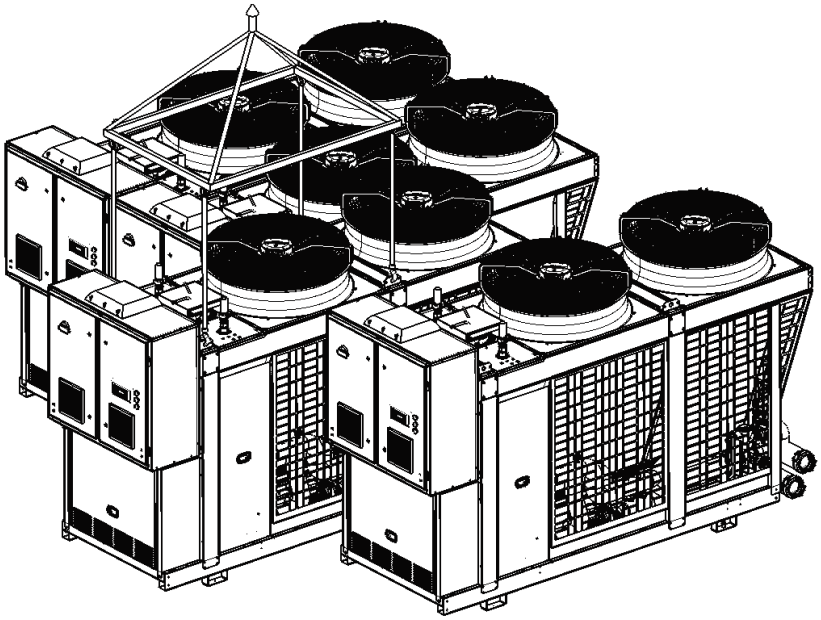
Removing a unit from a modular installation

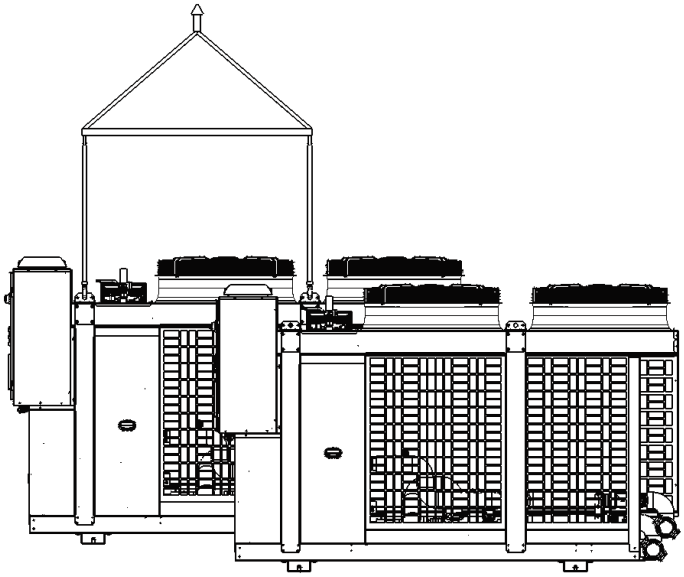




To remove an AQUA-G EVO 60 kW unit from an Ultracompact modular installation using a forklift, approach the machine carefully and ensure that the forklift does not knock against the electrical control panel. Lift the unit, taking care to ensure the stability of the machine being lifted and, at the same time, that of any adjacent machines.

As regards removing the unit from a Compact-type installation, the process is made easier by the greater distance between the machines (600 mm).

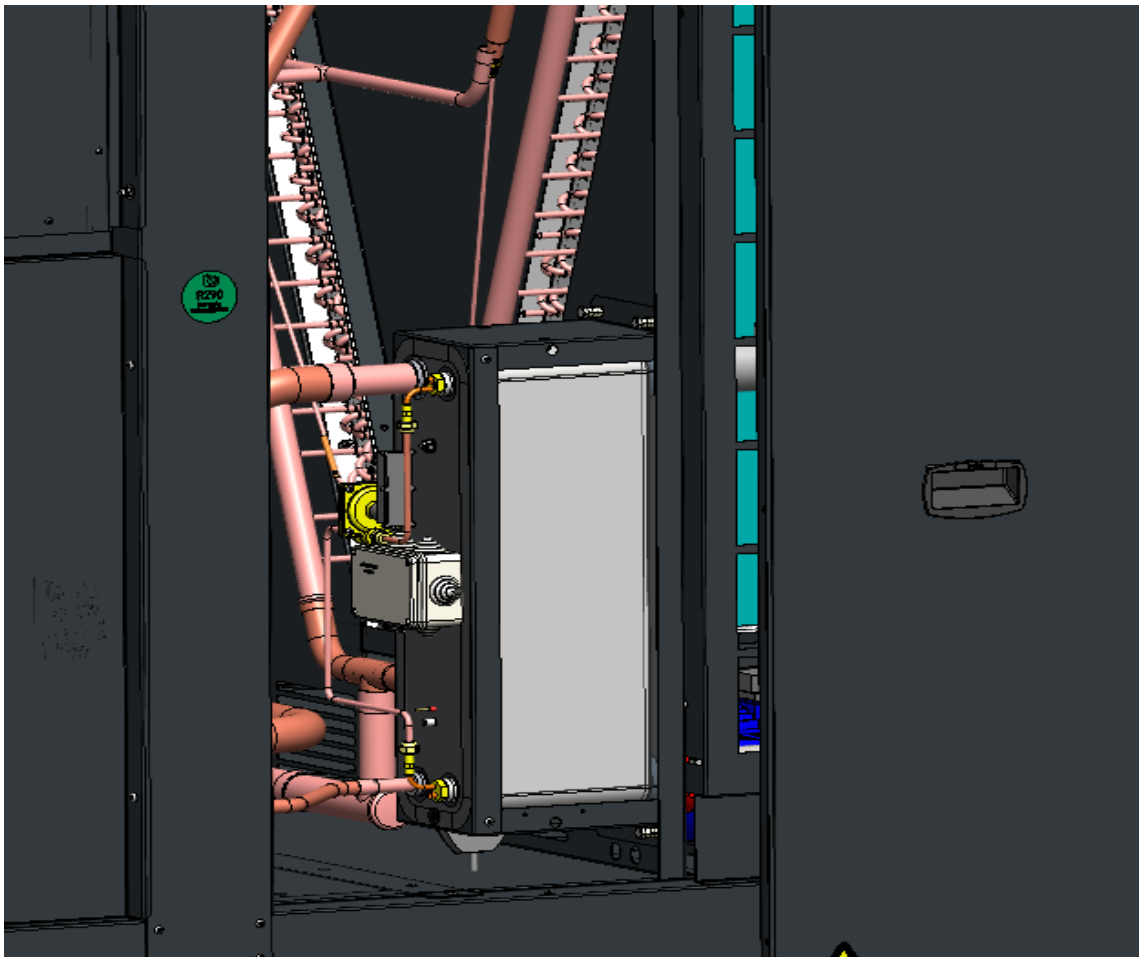




To remove an AQUA-G EVO unit from an Ultracompact modular installation using a crane or overhead crane, carefully lower the slings to the top of the machine, taking care to ensure that the hooks do not strike the structure itself or the safety valves. Insert a shackle between the lifting point and the hook and carry out the operation, ensuring the machine remains stable whilst also taking care not to damage any adjacent machines.

As regards removing the unit from a Compact-type installation, the process is made easier by the greater distance between the machines (600 mm).

8.10 Work on the plate heat exchanger



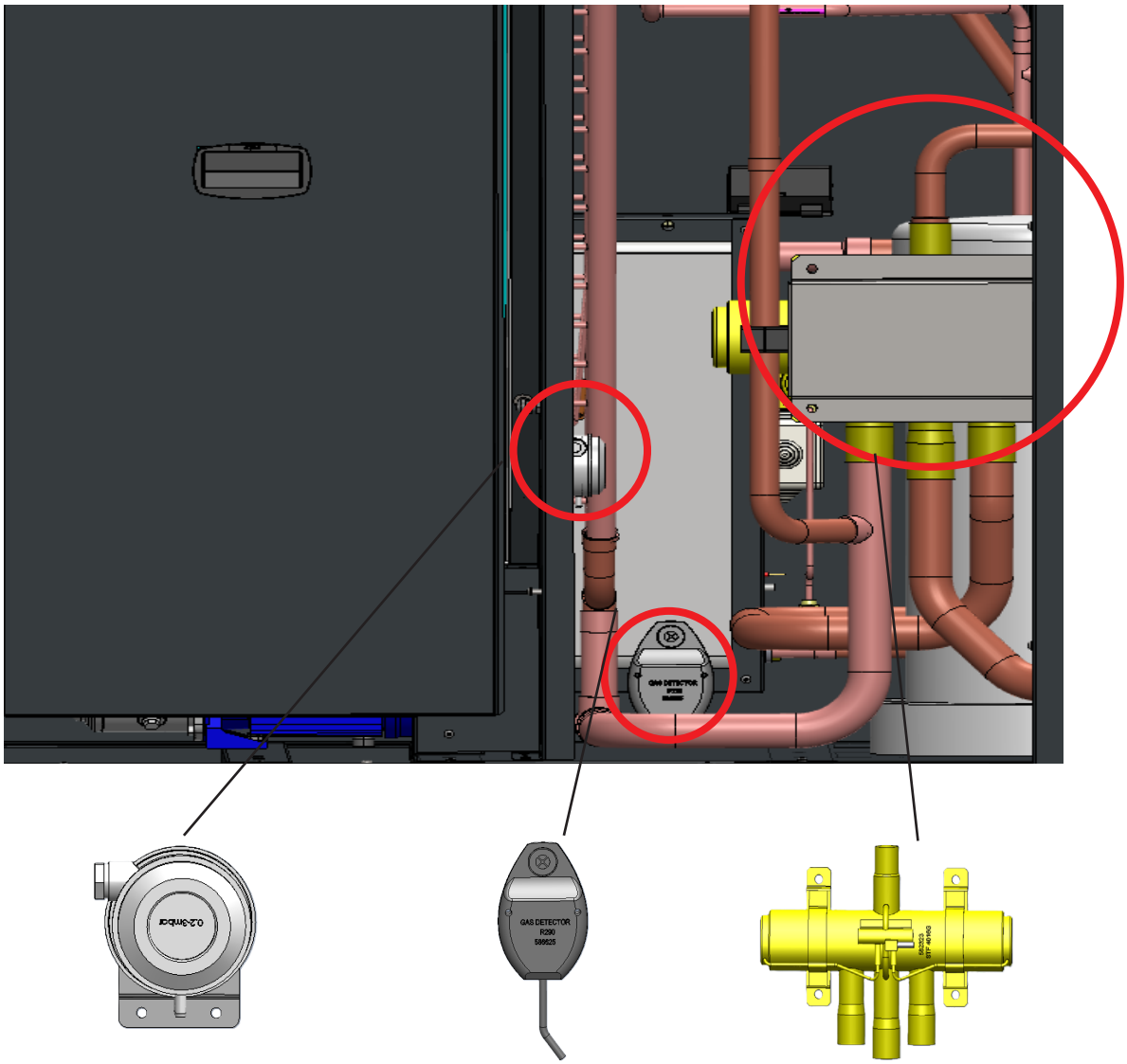
The image above shows a cross-section of the refrigeration circuit after the right side panel has been removed.
Check regularly that the water side of the heat exchanger is well cleaned. To do this, measure the pressure drop on the water side or measure the temperature of the liquid at the outlet and inlet of the heat exchanger and compare it with the evaporation temperature.

In this case, the heat exchanger will have to be chemically cleaned. This operation must be carried out by authorised technicians. For cleaning, use a non-corrosive solvent to remove the
limestone deposits. The equipment to be used for external water circulation, the quantity of solvent and the safety measures to be taken must be approved by the company supplying the cleaning products or by the company carrying out these operations. A procedure to be performed in conjunction with the cleaning of the entire hydraulic system.

For other maintenance work (exceptional overhaul, exchanger replacement, etc.) please contact one of the authorised service centres.

The manufacturer accepts no liability for damage to the plate heat exchanger caused by the water inside it freezing (low winter temperatures or initial water temperature below 5 °C in cooling mode).

8.11 Work on the safety system and four-way valve



The image above shows a cross-section of the refrigeration circuit after the left side panel has been removed.

This procedure should be performed when it is necessary to check the operation of the four-way valve, the air differential pressure switch, and the R290 gas leak detector. The machine must be removed from the modular system if this type of installation is planned.

Perform work on:

- air differential pressure switch, which detects the presence of airflow generated by the exhaust fan in the event of abnormal operation of the exhaust fan.
- leak detector in case of a sensor failure alarm sounds or the indicator LED on the control panel lights up. The red indicator light signals a component malfunction.

The four-way valve, which is essential for reversing the refrigeration cycle, does not require any special maintenance.

However, it is recommended that you check the condition of the solenoid coil at each maintenance interval, as it may become damaged during operation.

This procedure must be performed with the system under pressure. Any work on the valve body, however, requires that the system be drained.

8.12 Work on the finned exchanger



The fins have sharp edges and can cause injuries. Avoid touching them.

The structure of the finned heat exchanger consists of copper tubes and aluminium fins. To ensure the best possible operation, it is essential to keep its surface as clean as possible and to check that there are no deposits of foreign objects (leaves, insects, slag, etc.). If the coil is dirty, the electrical power absorbed increases. In addition, the maximum pressure alarm could activate and lead to a shutdown of the unit.
In case of leakage due to damage or shock, the heat exchanger must be repaired by an authorised service centre.
The heat exchanger must be cleaned with a low-pressure compressed air jet directed parallel to the aluminium fins and in the opposite direction to the air circulation.
You can also use a vacuum cleaner to clean the coil, or a product specifically for aluminium-copper coils. Rinse with water.



Take care not to damage the aluminium fins when cleaning.
Never use pressurised water without a wide diffuser. Concentrated or rotating jets of water are strictly forbidden.



Do not use hot water or steam as they may cause an increase in pressure.

8.13 Work on the fans

The fans, located above the finned heat exchanger, are driven by electric motors with permanently lubricated bearings, which are maintenance-free for their entire service life.

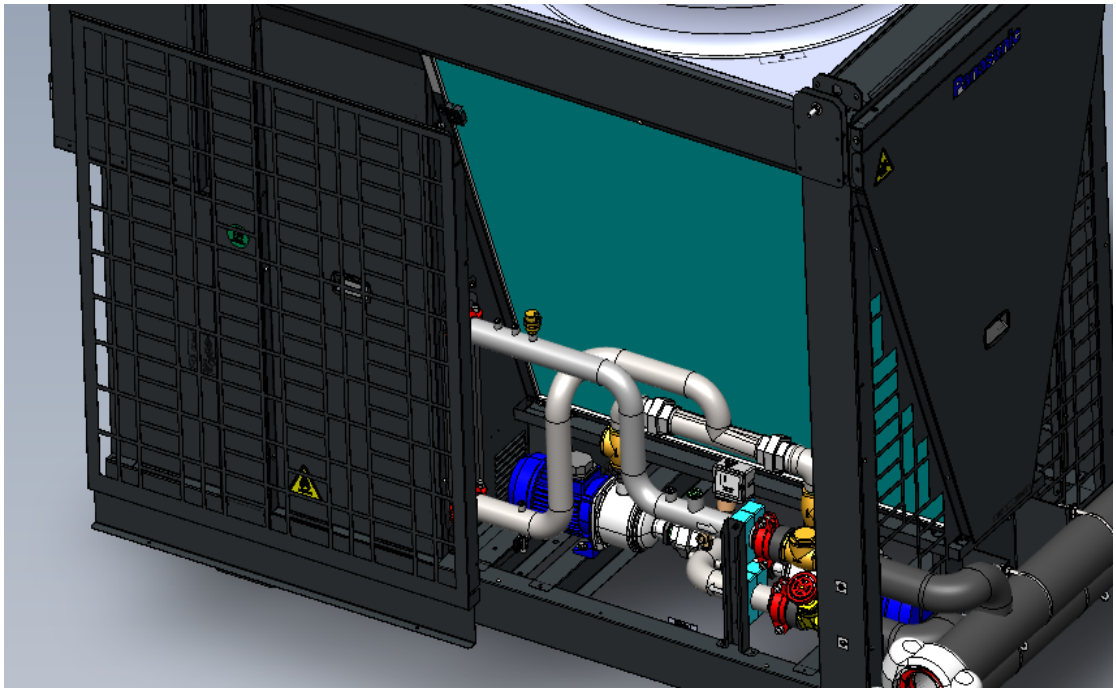
Check that the fan is running; it should not be at a standstill when the machine is running.

8.14 Work on the hydraulic circuit

In cold weather conditions, following a general shutdown of the system or a malfunction of the control system, there is a risk that the water in the hydraulic circuit may freeze.
To avoid problems, and if the hydraulic circuit is not protected by glycol or heated, it is recommended that unused circuits be completely drained and pressurised with nitrogen, protected by adding winter protection such as an antifreeze solution, or by taking other measures.

The concentration of the antifreeze solution must be checked regularly and carefully before each winter season.
At the component level, it may be necessary to inspect the water pump and the tank, if they are included as optional components.

8.15 Work on the water pump



To carry out work on the pump, follow these steps:

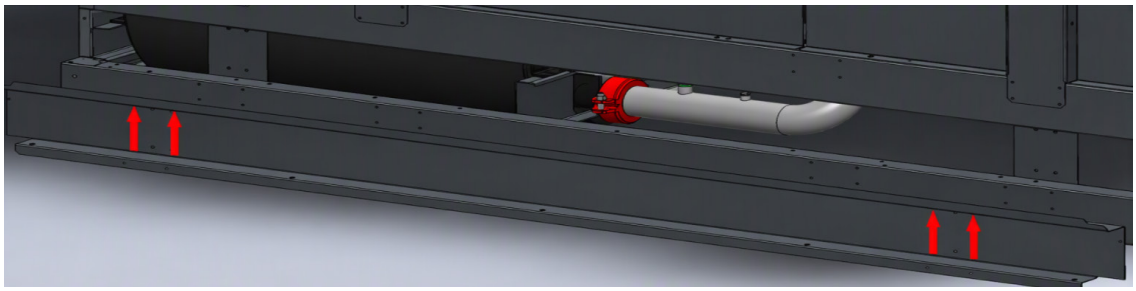
1. shut down the unit.
2. open the isolator switch.
3. disconnect all necessary electrical connections.
4. close the shut-off valves on the water supply and return lines.
5. remove the protective grille near the pump.
6. open the drain valves and drain the system.
7. check that there is no fluid and that there is no pressure in the entire circuit.
8. inspect flanges, mechanical seals and fittings to identify any leaks.
9. in the event of leaks, disconnect the Victalic couplings. Check the condition of the gakets and ensure the bolts are tightened correctly.
   Replace any faulty components if necessary.
10. check that the pump is not blocked by sludge or other debris caused by disuse or poor water quality.
    If blocked, clean the impeller and other components.
11. check that the impeller is rotating correctly again.

If the impeller is damaged or the pump no longer delivers the required flow rate, please contact one of the authorised service centres to have it replaced.

8.16 Work on the buffer tank

The tank is available as an option only for 80 and 100 kW units.
It is positioned longitudinally relative to the machine's structure and is located beneath the finned heat exchangers. It is precisely this arrangement that makes invasive maintenance operations difficult once the machine is installed.

Maintenance of the inertial tank is required should the specified operating conditions cease to be met, such as the correct effective volume of the circuit, the quality of the fluid and the integrity of the component, which could have a negative impact on the performance and operational stability of the system.



Steps to be carried out:

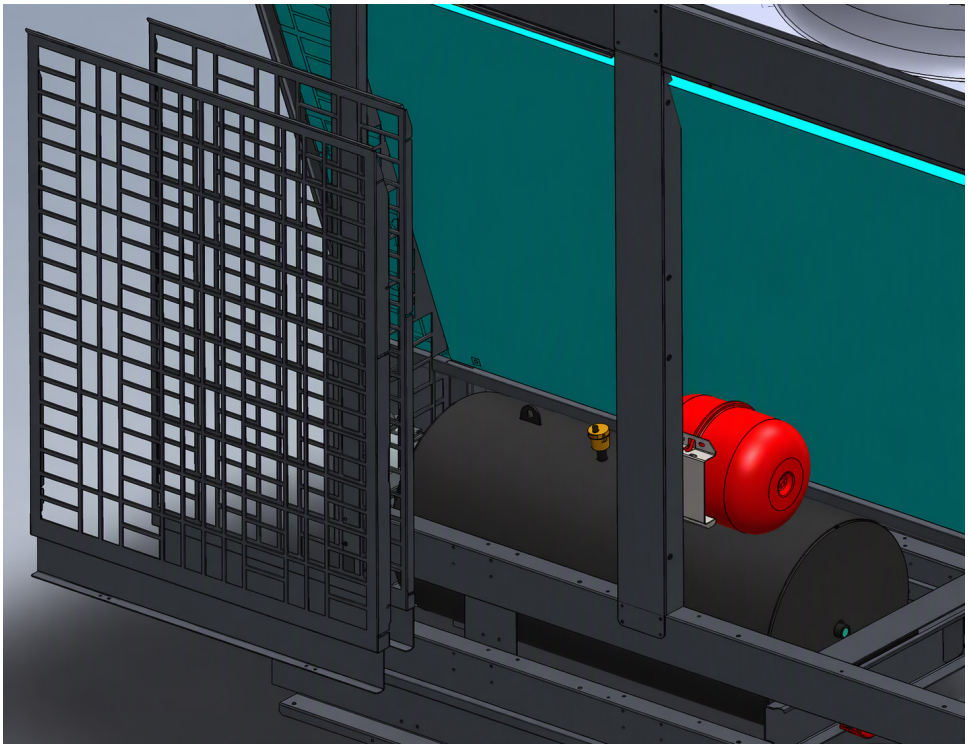
1. remove the left-hand side metal sheet at the base of the unit by removing all the necessary screws. The arrows in the figure show the positions of the hexagon-head screws.
2. check that there are no leaks at the Victaulic connection on the inlet side of the tank.
3. if there are any leaks, disconnect the joints. Check the condition of the seals and ensure the bolts are tightened correctly. Replace any faulty components if necessary.
4. check for any sediment in the drained fluid. If any contamination is found, flush the entire hydraulic circuit and the expansion tank using a suitable cleaning solution.
5. refit the metal sheet that was previously removed.
6. check that there are no leaks including at the Victaulic coupling on the outlet side of the tank, by removing the right-hand side metal sheet.



Before replacing any component, switch off the unit, disconnect the power supply, close the shut-off valves on the relevant circuit and fully release any residual pressure.



The water quality data recommended by the manufacturer are set out in section 5.8 of this manual.



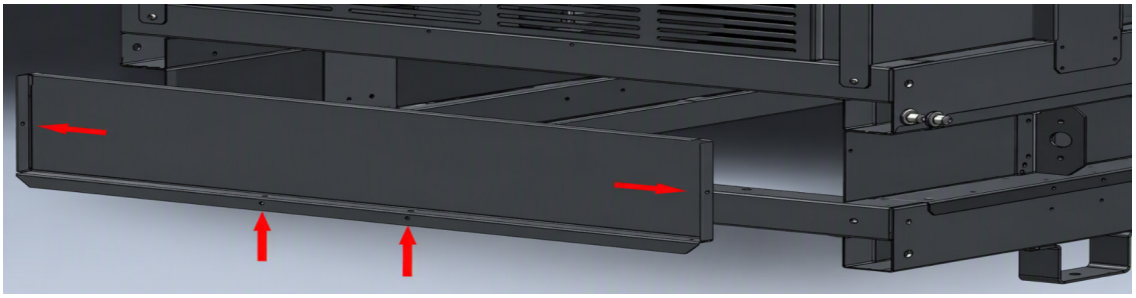
Before proceeding with any flushing of the entire circuit, it is necessary to remove the protective grilles from the tank and verify the integrity of the component's structure.

If the tank shows no signs of damage or leaks, proceed as follows:

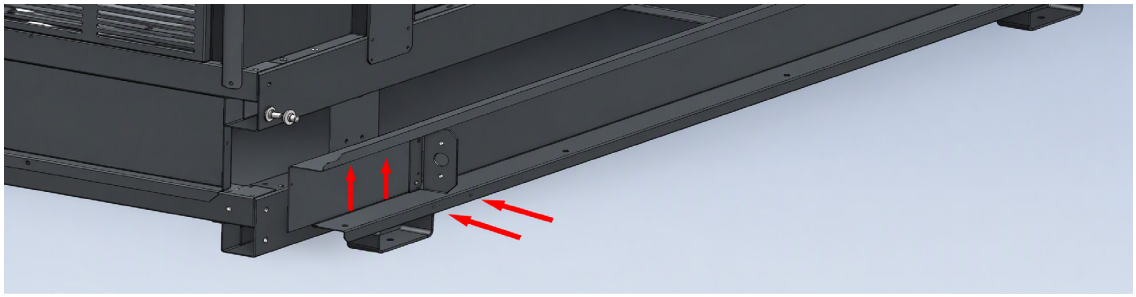
1. check the remaining water or water/glycol level after draining the unit. Open the drain valves located on the tank itself.
2. if the system is intact but shows signs of algae or corrosion, consider flushing the internal circuit using biocides and specific detergents to remove biological contaminants, deposits, and corrosion, thereby restoring optimal operating conditions.
3. Fill the circuit with the flushing solution.
   During the filling process, you must remove any air from the circuit using the bleed valves located at the highest points of the circuit.
4. turn on the pump while the machine is off to ensure circulation within the circuit.
5. let the cleaning solution sit for the time specified by the detergent manufacturer, and then drain the hydraulic system again through all available drain points.
6. circulate the water through the system to flush the entire circuit. Drain the system and circulate the water again.
7. thoroughly bleed the air from the system,and check the operating pressure.
8. turn on the unit and, if necessary, change the values previously set via the control panel.

In the event of leaks from the tank shell, structural welds, or other pressurized parts, the component must be replaced by qualified personnel or an authorized Service center.
Advanced corrosion, structural deformations,or any other condition that compromisest he integrity and safety of the vessel.

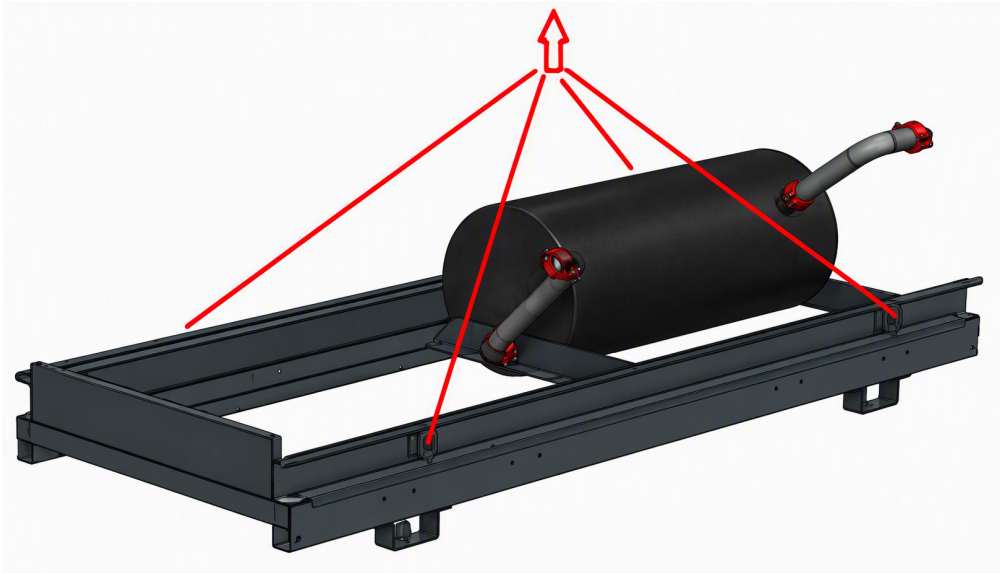
To proceed with the replacement, the unit must be detached from the support structure of the tank on which it rests.



1. Remove the front panel located at the base of the machine; the arrows in the illustration show where the screws are located.
2. Move the forklift closer and insert the forks lengthwise to ensure a solid support base.



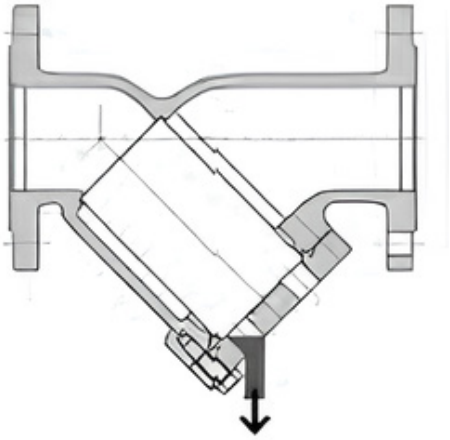
3. Remove the side panels located at the base of the unit; the arrows in the illustration show where the screws are located. Repeat this procedure on the opposite end of the base.
4. Lift the unit and move it so that it is separated from its base.
5. Replace the side panels on the base.



6. Move the base using the specific lifting points for straps shown in the image above.
7. Otherwise, lift it using the omega brackets used during the previous phase of the unit's installation.
8. Work on the component once you have identified a work area free of potential obstacles.

8.17 Work on the water filter

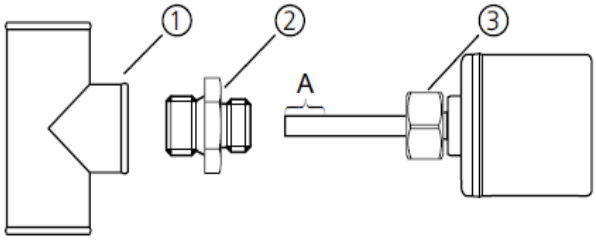
Before any maintenance work on the water filter, make sure that the water pressure inside the hydraulic circuit is reduced almost to atmospheric pressure and that the water temperature is not too high or too low to cause personal injury.
To reduce the internal pressure, after closing the valves upstream and downstream of the filter, act on the service valve located on the filter, as shown in the figure.
The same procedure applies to any other operation on the hydraulic circuit.



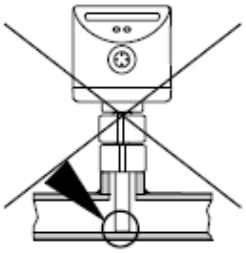
8.18 Replacement of the electronic flow switch

If fitted, the electronic flow switch installed in the unit is factory-set to the correct safety threshold, corresponding to a specific speed. For this reason, it must not be recalibrated during replacement operations.
If this component needs to be replaced, follow the procedure below:

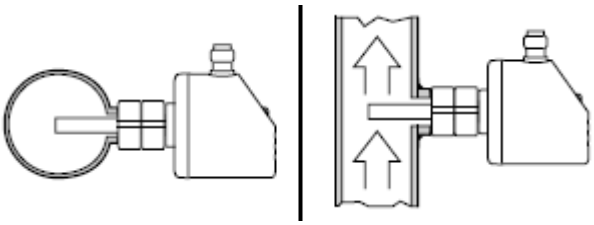
1. disconnect the power supply.
2. identify the wiring of the flow switch.
3. disconnect the power/connection cables.
4. insulate the cables that have just been disconnected.
5. close the shut-off valves on the hydraulic circuit (if any).
6. remove the existing flow switch.
7. install the new flow switch in accordance with the following recommendations:



- lubricate the thread on the fitting (1), the adapter (2) and the nut (3). Use a suitable adapter.
- fit the flow switch onto the adapter and tighten the nut. The required tightening torque is 25 Nm.
  Ensure that the component is oriented as previously specified.



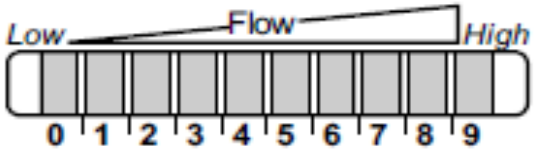
- check that the probe is inserted to a depth of at least 12 mm and ensure that the probe does not touch the inside wall of the pipe.
  This would result in the flow being read incorrectly.



- if the fitting is installed on a pipe laid horizontally or vertically, ensure that the direction of water flow is correct.

8. ensure a proper water seal by using Teflon or gaskets.
9. reconnect the electrical cables in accordance with the wiring diagram or refer to section 5.5 of this manual.
10. open the shut-off valves, if present, and fill the hydraulic circuit.
11. bleed any air from the circuit.

12. switch the power supply back on.
13. switch on the unit's or external pump to ensure the required nominal flow rate.



The flow switch is designed to measure a maximum flow velocity of 100 cm/s, corresponding to value No. 9 on the LED display.
The LED bar increases or decreases in brightness depending on the speed of the passing flow.
The flow switch transmits the speed to the control system via an analog output and a 0–20 mA signal.
The safety threshold for this device is set to 11 mA.
This signal value corresponds to an operating condition equivalent to a ΔT of 12 °C.

14. check that there are no alarms after the unit has been switched on. If the component is not connected or fitted correctly, the 'Digital Flow Switch Transducer" alarm will appear on the control screen and the corresponding indicator light will flash.

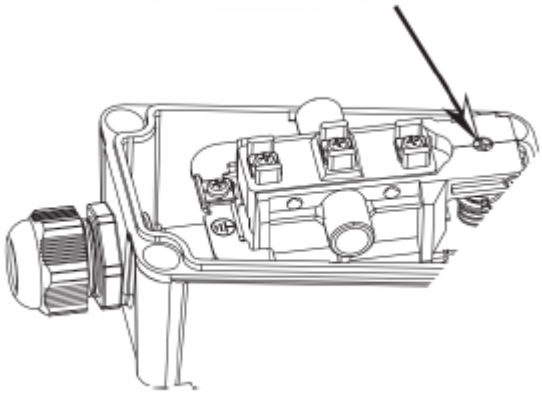
Please refer to sections 7.9 and 7.10 of this manual for information on alarm management.

8.19 Replacement and calibration of the flow switch

If fitted, the mechanical water flow switch installed in the unit is factory set to the correct flow rate. For this reason, it must not be opened and recalibrated.
Only in case of replacement with a new one, the following calibration procedure must be followed:

1. Disconnect the power supply.
2. Remove the flow switch cover.
3. Disconnect the two cables from the flow switch.
4. Isolate the disconnected cables.
5. Remove the old flow switch and replace it with the new one.
6. The paddle of the old switch can be reused. Otherwise, select the paddle of the new set with the same length.
7. Check the movement of the paddle. After completing the installation, it is necessary to check that the paddle moves freely within the tube.
8. Insert the multimeter in place of the cables. Select Ω on the multimeter.
9. Reconnect the power supply, switch on the water pump and set the nominal flow rate.
10. Turn the adjusting screw fully anticlockwise.

ADJUSTING SCREW



11. Check that the multimeter indicates continuity (sound).
12 Reduce the water flow rate until the flow switch is triggered and do the necessary checks.
13. Slowly turn the screw clockwise until the multimeter indicates the absence of continuity by interrupting the sound.
14. Return to rated capacity and check that the contact is closed.
15. Disconnect the power supply again, reconnect the cables and close the cover. The red/white contact opens in the event of a lack of flow.

9 TROUBLESHOOTING AND REPAIR

The table below lists the unit's malfunctions, their causes and corrective actions. For other types of faults, request technical assistance from one of the authorised service centres.

Problem	Possible cause	Solution
Unit runs continuously but without cooling	Insufficient fluid quantity	Add refrigerant.
	Clogged filter drier	Replace the filter drier.
Excessive noise	Vibrating pipe	Secure the pipe better.
		Check the pipe holding devices.
	Noisy compressor	Check the condition of the valves.
		The bearings are stuck, replace the compressor.
		Check the tightness of the compressor fixing nuts.
	Hissing sound emitted by the expansion valve	Recharge.
		Check the filter drier.
Compressor not working	Interrupted electrical circuit	Check the electrical circuit and check for grounding and short circuits. Check circuit breakers.
	High pressure switch activated	Reset the pressure switch via the panel and restart the unit. Identify and eliminate the causes of this activation.
	The control circuit fuse has blown.	Check the control circuit and check for grounding and short circuits. Replace fuses.
	Connectivity problem	Check the tightness of all electrical connection terminals.
	Activation of electrical circuit thermal cut-outs	Check the operation of control and safety devices. Identify and eliminate the cause of activation.
	Incorrect wiring	Check the wiring of control and safety devices.
	Mains voltage too low	Check the voltage line. Eliminate any problems caused by the system. If the problem is due to the power supply network, inform the power company.
	Compressor motor short-circuit	Check the continuity of the motor winding.
	Compressor blocked	Replace the compressor.
Shutdown of a circuit following activation of the low-pressure switch	Presence of leakage	Identify and repair the leak.
	Insufficient charge	Add refrigerant.
	Pressure switch malfunction	Replace the pressure switch.

Problem	Possible cause	Solution
Shutdown of a circuit following activation of the high-pressure switch	Malfunctioning of the high-pressure switch	Check the function of the pressure switch, and replace it if necessary.
	Substances with gases that can condensate in the circuit	Bleed the circuit and recharge.
	Heat exchanger fan failure	Check wiring and motors. Repair and replace if necessary.
	The valve on the discharge line is partially closed	Open the valve and replace if defective.
Liquid line too hot	Insufficient charge	Locate and eliminate the causes of the decrease in charge and add refrigerant.
Freezing of the liquid line	The filter drier is clogged	Replace the cartridge or filter.
	Line valve partially closed	Check that the valve is open.
Ice on the line	Incorrect overheating calibration	Increase overheating.
		Check the charge.
Low oil level in the compressor	One or more gas or oil leaks in the circuit.	Identify and repair leaks.
	Mechanical compressor failure.	Request assistance from one of the service centres.
Fan not working	Electrical circuit problems	Check the connections.
	Internal thermal fuse activated	Contact an authorised service centre.
Reduced cooling and heating performance	Compressor malfunction	Contact an authorised service centre.
	Dirt in the water circuit of the plate heat exchanger	Chemical cleaning of the water circuit of the heat exchanger.
	Finned heat exchanger coil	Clean the coil.
	Insufficient refrigerant quantity	Add refrigerant.
Electric heater of finned heat exchanger not working	No power supply	Check the main switch and auxiliary fuses.
	Opening of the heater circuit	Check the heater and replace it if necessary.

Problem	Possible cause	Solution
Lack of control/ poor control of water temperature	Wrong thermostat adjustment	Check the temperature setting on the control panel.
	Incorrect temperature differential from inlet to outlet of plate heat exchanger	Check the water flow rate and quantity of the liquid in the water circuit.
	Malfunctioning of the electronic control system	Contact an authorised service centre.
Insufficient water circulation	Air in the circuit	Purge the air from the safety valve.
	Build-ups or impurities in the plate heat exchanger	Flush the exchanger using a reverse flow.
Unit not functioning, alarm activated	Water circulation defect	Check the pump.
	Flow controller not working	Check the flow controller.

10 DECOMMISSIONING, RECYCLING AND SCRAPPING

10.1 General data

Units must be disposed of in accordance with local regulations.

For information on disposal, contact the competent authority.

Unless otherwise stated, the operations described below can be carried out by any specially trained maintenance technician:

1. Open every line supplying the unit, including those of the control circuits.
2. Ensure that all switches are set to the off position.
3. Disconnect and remove the power cables.
4. Remove all refrigerant contained in the machine's refrigeration circuits and store it in suitable containers using a recovery unit. If the characteristics remain intact, the refrigerant can be reused. Contact the competent authority for information on disposal.
5. Do not, under any circumstances, release quantities of refrigerant into the atmosphere.
6. The oil contained in each refrigeration circuit must be drained and collected in a suitable container and disposed of in accordance with local regulations governing the disposal of used lubricants. Any spillage must be recovered and disposed of in the same way.



Do not dispose of used compressor oil in the environment, as it contains dissolved refrigerant.

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



If no shut-off valves are provided, it may be necessary to drain the entire system.



If a glycol solution has been used in the hydraulic circuits or if chemical additives have been added to the circulating water, the fluid must be disposed of in an appropriate way, not in the sewage system or on the surface.

8. After draining, the hydraulic circuit piping can be disconnected and removed.
9. After being disassembled, the machine can usually be moved entirely. First, the anchor screws must be unscrewed and then the unit must be lifted from its installed position, hooking it to the lifting points provided in the unit and using suitable lifting equipment.
10. Units which, after being disconnected, cannot be removed entirely, must be dismantled on site, paying particular attention to the weight and handling of each of their components.



It is particularly important to ensure that while one component of the unit is removed, all others are safely supported so as not to be damaged.



Only use lifting equipment of adequate capacity. Once removed, the unit's components can be disposed of in accordance with current regulations.

11. Residues of oil, glycol water or similar solutions may remain in some parts of the unit. These residues must be recovered and disposed of according to specific procedures.



For further information on the recovery, reuse and disposal of refrigeration systems, see EN 378-4, section 6.

10.2 WEEE Directive

The WEEE Directive, which stands for “Waste Electrical and Electronic Equipment,” applies only within the EU. It requires that the disposal and recycling of this equipment be carried out through a dedicated collection system, separate from the one used for mixed municipal waste.
Users are required to contact and deliver them to appropriate collection centers.

For more information on the collection and recycling of used products and batteries, please contact your local municipal administration, waste disposal service or the retailer where you purchased the items. Improper disposal of this waste may result in sanctions, in accordance with national legislation.



Units covered by the WEEE directive are marked with this symbol. These symbols on products, packaging and/or accompanying documents indicate that used electrical and electronic products and batteries must not be disposed of with general household waste.



This symbol may be used in combination with a chemical symbol. In this case, it complies with the requirements of the directive for the concerned chemical.

By correctly disposing of these products and batteries, you help save valuable resources and prevent potential negative effects on human health and the environment that might otherwise result from improper waste treatment.

ANNEX
ALLEGATO
ANNEXE
ANEXO
ANLAGE

TABLE OF CONTENTS

1. R290 SAFETY SYSTEM STICKER II

1. R290 SAFETY SYSTEM STICKER

LED STATUS					
READ THE MANUAL LEGGERE IL MANUALE LIRE LE MANUEL LEA EL MANUEL LESEN SIE DAS HANDBUCH					
CONDITION CONDIZIONE CONDITION CONDICIÓN ZUSTAND	Normal Operation Funzionamento Normale Fonctionnement normal Funcionamiento normal Normalbetrieb	Low leak alarm Allarme bassa perdita Alarme de fuite faible Alarma de fuga leve Leckagealarm niedrig	Component Issue Problema del componente Problème de composant Fallo en un componente Leckagealarm niedrig	High Leak Alarm (gas presence) Allarme alta perdita (presenza gas) Alarme de fuite importante (présence de gaz) Alarma de fuga importante (presencia de gas) Leckagealarm niedrig (Leckagealarm niedrig)  **DANGER PERICOLO DANGER PELIGRO GEFARH**	*High Leak Alarm (no more gas presence)* *Allarme alta perdita (assenza gas)* *Alarme de fuite importante (absence de gaz)* *Alarma de fuga importante (ya no hay presencia de gas)* *High Leak Alarm (no more gas presence)*
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UNIT RESET RIARMO DELLA MACCHINA RÉARMEMENT DE LA MACHINE REINICIAR LA MÁQUINA GERÄTE-RESET	Not required Non rischiesto Non sollicité No es necesario Nicht angefordert	Automatic Automatico Automatique Automático Nicht angefordert	Manual or manual after 30 min * Manuale o manuale dopo 30min * Manuel ou manuel aprè 30min * Manual o manual en 30 min * Manuell oder nach 30min *	User terminal Y2 / ID on Morsettiera utente Y2 / ID attivo Bornier utilisateur Y2 / ID actif Terminal de usuario Y2 / ID activo Enutzerklemmleiste Y2 / ID aktiv	Manual, after check with leak detector Manuale, dopo controllo con rilevatore di perdite Manuel, après contrôle avec détecteur de fuites Manual, después de la comprobación con detector de fugas Manuell, nach Prüfung mit Lecksuchgerät 

*◦For humidity or temperature out of limits ◦per umidità o temperatura fuori limite ◦pour humidité ou température hors limites◦por humedad o temperatura fuera de límites ◦bei Feuchtigkeits- oder Temperaturgrenzwertüberschreitung.

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