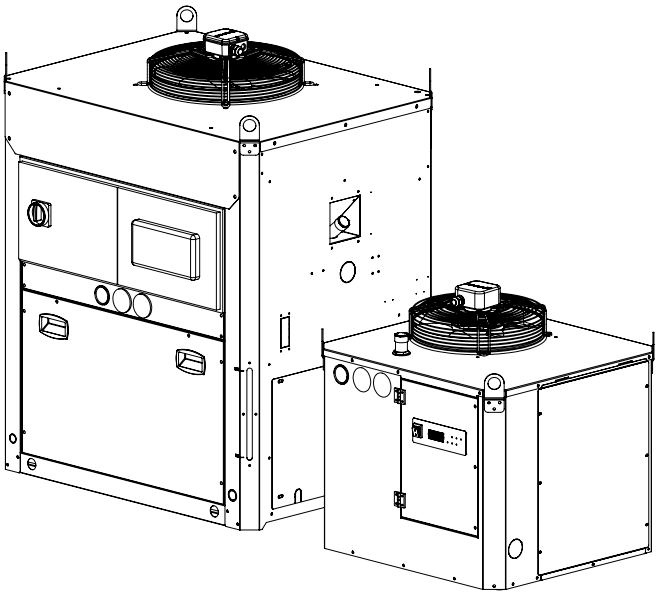
7425MUM825
Revision 0
December 2024

WATER CHILLER

Model: HPC



User and Maintenance Manual

Save These Instructions

Editions Record

Code	Revision	Edition	Note
7425MUM825	00	07/2024	

Original instructions: **ITALIAN**
EN Translation of the original instructions

Dear valued Customer,

thank you for placing your trust in our Company. Please read this manual carefully before using to improve product performance.
In order to avoid inadequate working conditions and any danger for the opeartors, it is essential to follow the guidelines meticulously as well as the current safety and accident prevention regulations of the Country where the product is used.

Each **HPC** chiller is rigorously tested before being approved for shipping.
Testing procedures check for any manufacturing defect and for a correct performance of all functions for which the product has been designed.
This manual must be retained for future reference and is an integral part of the article purchased.
Due to continuous technical development, we reserve the right to make the necessary modifications without any obligation to give advance notice.
The nameplate sticked on the equipment contains all the essential information about the product itself.

If you experience any issues or need more information, do not hesitate to contact us.

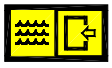
Warranty conditions:
The warranty is valid for 12 months from the machine being started-up and no longer than 14 months from the delivery date. Any part which is recognised as being faulty at source shall be repaired or supplied free of charge. This does not include transport costs, travel, room, labour and board for technicians. The warranty excludes any liability for direct or indirect damage to persons, animals and/or property that are caused by incorrect use or inadequate maintenance and is exclusively limited to manufacturing defects.
Repair under warranty is subject to compliance with the installation, use and maintenance instructions contained in the "User manual and maintenance."
The warranty is considered void if the product is modified or tampered with in any way. When making a warranty request, please supply the information available in the product identification label.

SUMMARY

1

SAFETY RULES

1.1 DEFINITIONS OF THE SYMBOLS USED

	Read this use and maintenance manual carefully before performing any repairs on the chiller.
	Warnings of a general character; risk of danger or possibility of damaging the machine, pay particular attention to the phrase following this symbol.
	Risk of electrical danger; the phrase highlights conditions that could be fatal. Follow the instructions provided meticulously.
	Risk of danger; component or system under pressure.
	Risk of danger; component or system that can reach high temperatures during operation.
	Risk of danger; it is absolutely forbidden to use water to extinguish fires near or on the chiller.
	Risk of danger; it is absolutely forbidden to operate the machine with the panel open.
	Service that can be performed by the machine's operator, if qualified (1).
	Water input connection point.
	Water output connection point.
	Dispose of each type of material in accordance with the requirements of the country of use.
NOTE	Phrases to be emphasized that do not contain safety rules.

This chiller has been carefully designed and constructed to be environmentally friendly:

- Refrigerants without CFC;
- Expanded foam insulation without CFC;
- Energy-saving techniques;
- Reduced noise;
- Recyclable chiller and its packing materials.

In order not to hinder our efforts, the user is required to obey the simple ecological warnings indicated by this symbol.

(1) These are persons with the experience, technical preparation and knowledge of standards and regulations who are qualified to perform the necessary actions and able to recognize and avoid possible dangers while handling, installing, using and maintaining the machine.

1.2 WARNINGS

Only qualified persons may use and maintain electrically-powered equipment. Before commencing maintenance operations ensure no parts of the machine are live and it cannot be re-connected to the electrical power supply.

The HPC chillers contain R513A refrigerant.
Operations on the cooling circuit must only be performed by specialist personnel with suitable equipment.

Any modifications to the machine or related operating parameters not previously verified and authorised by the Manufacturer may be hazardous and will invalidate the guarantee.

Do not use water to extinguish fires near or on the chiller.

1.3 PROPER USE OF THE CHILLER

HPC units are packaged aircooled water chillers.
They are intended for use in industrial process or air-conditioning systems requiring chilled water. Any other use is considered as incorrect.
The manufacturer is not liable for damage resulting from inappropriate use; in all cases, the user is liable for any resulting hazards.

Proper use requires conforming to the installation conditions and limits of operation (see ***sections 3.4*** and ***8***). In particular:

- Power voltage and frequency;
- Pressure, temperature of incoming water;
- Water flow rate;
- Surrounding temperature.

The chiller has been tested and completely assembled. The user must only make the connections to other systems, as described in the following chapters.

1.4 INSTRUCTIONS FOR USING THE EQUIPMENT UNDER PRESSURE CONFORMING TO PED DIRECTIVE 2014/68/EU

The proper use of equipment under pressure is an essential prerequisite for ensuring safety. To this end, the user must proceed as follows:

- Use the equipment properly within the temperature limits shown in the operating limits stated on the manufacturer's name/data plate;
- Do not solder on the exchangers or refrigerant fluid pipes;
- Do not install the equipment in insufficiently ventilated rooms, areas exposed to sources of heat or near inflammable substances;
- During operation, the equipment must not be subject to vibrations that could cause fatigue failures;
- Keep the documentation attached to the equipment (user manual, declaration of conformity, etc.) for future reference;
- The maximum working pressure stated on the manufacturer's data plate must not be exceeded. Prior to use, the user must fit safety/pressure relief devices.

2

OPERATION AND MAIN COMPONENTS

2.1 REFRIGERATING CIRCUIT

HPC chillers use a vapour-compression cycle in a refrigeration circuit that essentially consists of the following components: evaporator, compressor, condenser, lamination device (thermostatic expansion valve or capillary tube).

Evaporator: heat exchanger (co-axial or brazed-plates) to enable heat exchange between the water and the refrigerant liquid without them coming into contact with each other. The water is cooled when it passes through the evaporator.

Compressor: compresses the steam from the evaporator to send it to the condenser at a higher pressure.

Condenser: microchannel exchanger to enable heat exchange between the refrigerant and the air; it creates refrigerant gas condensation (which flows inside the microchannel) transferring the gas refrigerant condensation heat to the air (which flows externally); high pressure refrigerant liquid is thus produced.

Lamination device: reduces the pressure of the liquid refrigerant coming from the condenser, which is then sent to the evaporator. In particular, the thermostatic valve can modulate refrigerant flow such as to maintain continuous heating of the gas exiting the evaporator, during various operating conditions and therefore guaranteeing gas flow without liquid parts inside the compressor.

Thanks to these components, **the vapour-compression cycle** works as follows: the refrigerant liquid evaporates in the evaporator, chilling the water; the refrigerant vapours are then aspirated from the compressor, which compresses them and sends them to the condenser under high pressure; here, thanks to a flow of forced air from the fans, the high-pressure refrigerant gas is cooled, making it condensed and undercooled.

The flow of refrigerant liquid then passes through the lamination valve (thermostatic expansion valve), which drastically reduces its pressure: the refrigerant liquid returns to the evaporator at a reduced pressure where it again evaporates, taking heat from the water.
The refrigerant circuit also includes a **water pump**, which ensures the flow of water to be chilled by evaporation, and the **fan** which ensures the condenser is cooled.

2.2 HYDRAULIC CIRCUIT

The water circuit mainly consists of a pump, evaporator, tank, bypass calibrated between the pump discharge and the system backflow, pressure gauge on the pump discharge, and level sensor (standard).

The water flows into the evaporator first where it is cooled, then into the tank, and is then suctioned by the pump which sends it to the system (see ***P&I Diagrams section 12***).

All **HPC** units have an open circuit with a tank at atmospheric pressure.

2.3 FAN

The fan forces air through the condenser fins to remove the refrigerant gas condensation heat, therefore limiting the pressure inside the condenser.
HPC chillers are equipped with axial fans and have internal heat protection for the motor windings.

2.4 CONDENSATION CONTROL

When the ambient air temperature decreases, air flow cooling capacity increases slightly, causing a reduction in pressure inside the condenser; to limit this decrease in condensation pressure from falling below acceptable limits for good cooling circuit operation the fan stops temporarily.

2.5 WATER TEMPERATURE CONTROL

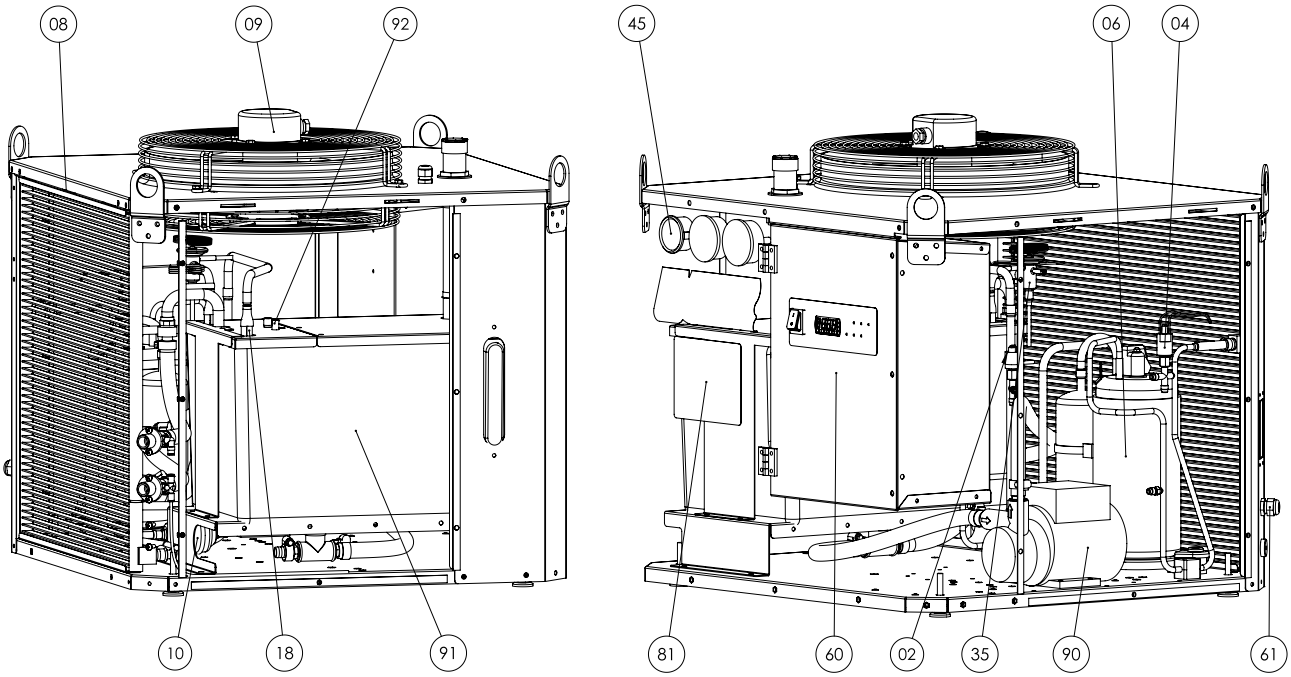
The purpose of the chiller is to maintain the temperature of the water produced within a desired interval as the load on the system varies; this is handled by an electronic controller and a temperature probe that turn the compressors on and off appropriately (see also ***sections 5.1.3*** and ***5.2.5***).

2.6 PROTECTION OF THE INTEGRITY OF THE MACHINE

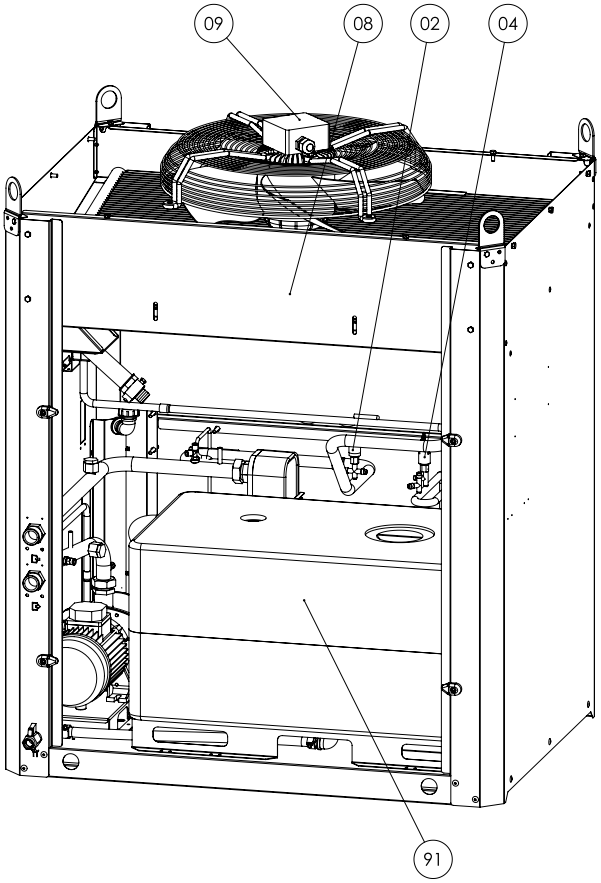
In addition to controlling the temperature, the electronic controller uses pressure switches, thermostats and timers to prevent and handle situations that could compromise the integrity of the machine (also see Chapter ***7 Safety Devices***).

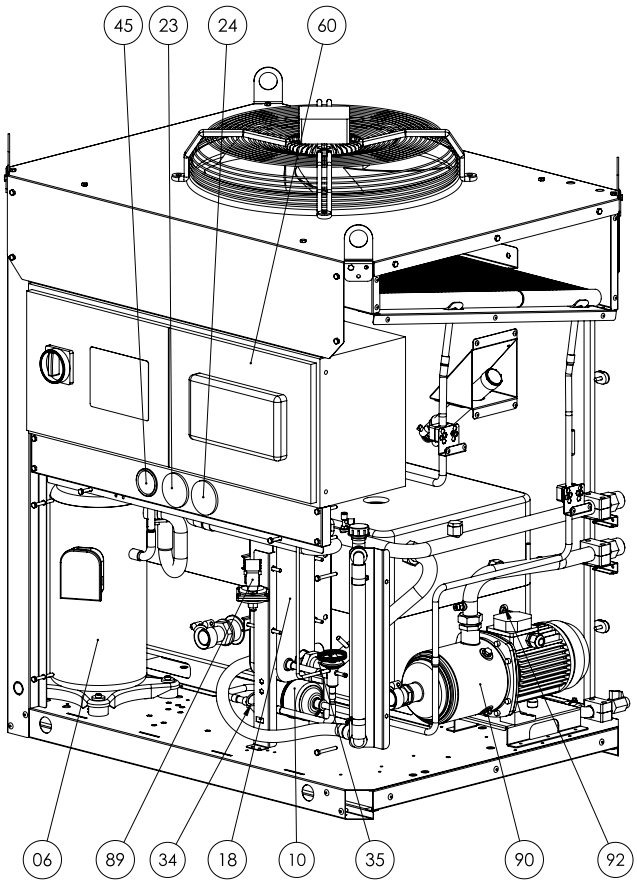
2.7 HPC UNITS: IDENTIFICATION OF THE MAIN COMPONENTS

2.7.1 HPC 002÷007 STANDARD



2.7.3 HPC 009÷025 STANDARD





Legend	
02 Low pressure switch **04** High pressure switch **06** Compressor **08** Condenser **09** Fan **10** Refrigerant filter **17** Electronic controller **18** Evaporator **22** Disconnector switch **23** High pressure manometer **24** Low pressure manometer **35** Thermostatic valve **45** Water manometer	**61** Power input **78** Flow switch **81** Refrigerant diagram **89** Differential pressure switch **90** Pump **91** Tank **93** Level indicator **94** Water filler **95** Water inlet **96** Water outlet **97** Drain **99** Pressure plug

2.8 SPARE PARTS

Spare parts list is printed on a dedicated sticker applied inside the chiller. On this sticker each spare part is identified with its ID Number and related Spare Part Number.

NOTE To order the suggested spare parts or any other part, it is necessary to quote the data reported on the identification plate.

ID N.	DESCRIZIONE	TAG P&ID*
2	LOW PRESSURE SWITCH	LPS1
4	HIGH PRESSURE SWITCH	HPS1
6	COMPRESSOR	MC1
6.1	COMPRESSOR CRANKCASE HEATER	RC1
8	CONDENSER	SC1
9	FAN	MV1
10	REFRIGERANT FILTER	FI
12	TEMPERATURE PROBE	BCOND / BWO
14	WATER STRAINER	FY
18	EVAPORATOR	SE1
23	HIGH PRESSURE GAUGE	MGH1
24	LOW PRESSURE GAUGE	MGL1
34	SIGHT GLASS	IND
35	THERMOSTATIC EXPANSION VALVE	VT
45	WATER GAUGE	MNW1
89	DIFFERENTIAL PRESSURE SWITCH	WDP
90	WATER PUMP	MP1
91	WATER TANK	TNK
92	WATER LEVEL SENSOR	LS

* see ***P&I Diagram section 12***

3

INSTALLATION

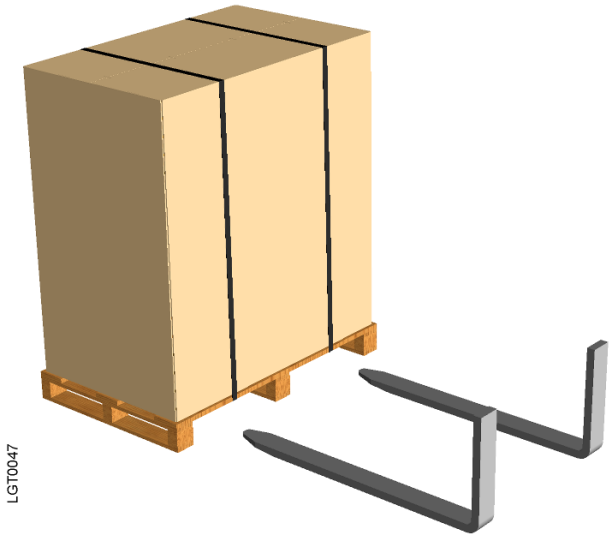
3.1 TRANSPORT

The units are packed in a cardboard box on a wooden pallet.
After checking that the packing is undamaged, position the unit near the installation site and unpack it.

Always keep the chiller vertical: turning it upside down can irreparably damage several parts of the unit.

Handle with care. Violent falls can cause irreparable damage.

The centre of the machine is approximately its centre of gravity. In any case, when handling the machine with a forklift truck or pallet jack, always check its stability before lifting.



The units are supplied without water inside them. After the first installation or use, before any subsequent transport or handling, make sure that the tank and the hydraulic circuit have been completely emptied of water. It is also necessary to ensure that no water residues remain inside the tanks.

3.2 STORAGE

Protect the machine from bad weather, even if packed.
Always keep the chiller vertical, even when in storage. Turning it upside down can irreparably damage several parts of the unit.
If not used, the chiller can be stored packed in an enclosed place, free of dust, with a minimum temperature of 1°C // 33,8°F and a maximum temperature of 50°C // 122°F and specific humidity of no higher than 90%.

The packing material is recyclable.
Dispose of each type of material in accordance with the requirements in the country of use.

The units are supplied without water inside them. In case of storage after use, make sure that the tank and the hydraulic circuit have been completely emptied of water. It is also necessary to ensure that no water residues remain inside the tanks.

3.3 PLACE OF INSTALLATION

Warning! The **HPC 002÷007** models are suitable for indoor installation only. Optionally, version IP44 is available.
All other **HPC** units can be installed indoors or outdoors.

Warning! Check that the support surface is suitable to support the weight of the unit and that it is perfectly horizontally levelled.

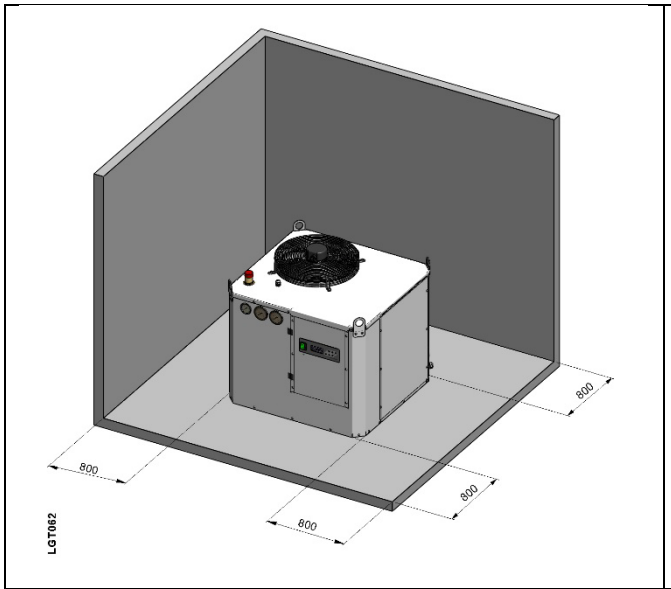
To determine the best place to install the unit, it is important to consider the following aspects:

- The dimensions and source of the water pipes;
- The location of the power supply;
- Avoid any obstacles to the flow of the fan which could cause the recirculation of air to the condenser;
- Avoid the possible reflection of sound waves: (do not install in narrow or tight spaces);
- Provide access for maintenance or repair (see paragraph ***3.3.1 Installation***);
- Average air temperature in the chosen installation area (see Section ***8 Operating limits***).

Attention! If the machine is installed outside, it could find itself at a temperature lower than 0°C//32°F, when stopped; the formation of ice could damage the evaporator. If you do not intend to drain the machine during the winter, you must add **anti-freeze to the water circuit.**

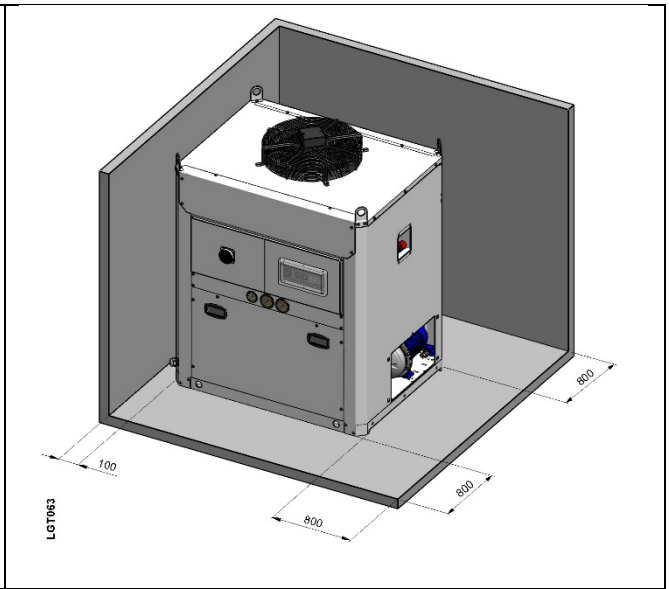
3.3.1 Installation

To ensure the good functioning of the unit and access for maintenance, you must respect the minimum installation clearances shown in the figure in this paragraph.
The exit of air from the fan must not be obstructed.
In any case, avoid all situations in which hot air can circulate between the output of the fan and the intake of the machine. Contact our office to verify feasibility in all cases where one of the preceding conditions cannot be met.



HPC 002÷007

- 800mm/31 inches on each side



HPC 009÷025

- 100mm/4 inches on left side
- 800mm/31 inches on the other sides

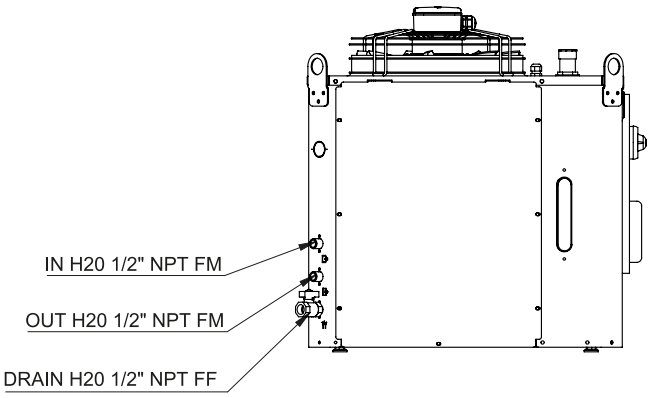
3.4 WATER CONNECTIONS

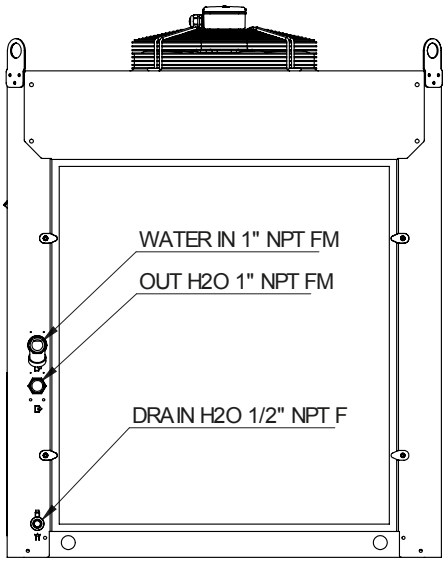
Connect the machine to the water pipes following the instructions located near its water fittings (see figures).
The installation of outlet and inlet taps on the machine is recommended, which will enable machine maintenance without emptying the entire system, and emptying of the machine only during winter downtime.

Important! Install the mechanical water strainer supplied with the unit on its input: scum and impurities can seriously damage the evaporator.

We recommend an extraordinary cleaning of the mechanical water strainer after the machine has been running for the first week (also see ***Chapter 9 Maintenance, inspections and periodic checks***).

HPC 002÷007	HPC 009÷025





Warning! No naked flames should be used during water connection operations, in the vicinity of or inside the unit.

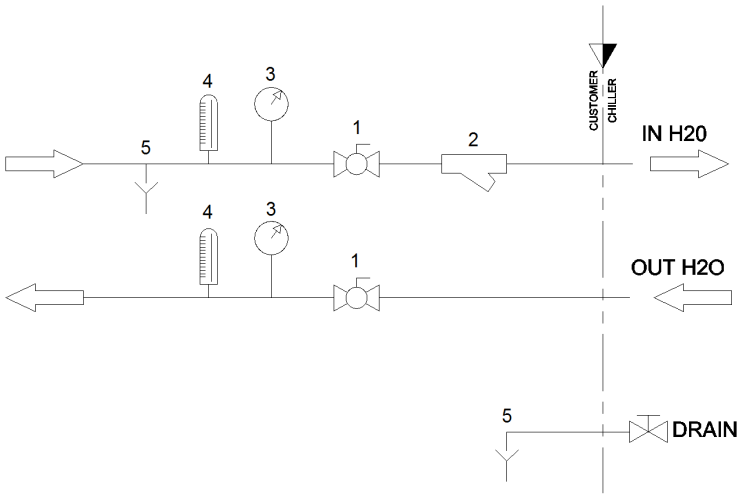
NOTE It is a good rule that the diameters of the arriving and departing pipes be not less than the water fittings.

3.4.1 Recommended water system for HPC 002÷025

HPC 002÷025 units come as standard with a mechanical water strainer, a tank at atmospheric pressure, pump and bypass; it is advisable to also provide the water circuit with:

- Machine inlet and outlet taps;
- Inlet and outlet pressure gauges and thermometers for water from the machine, to control its operation.

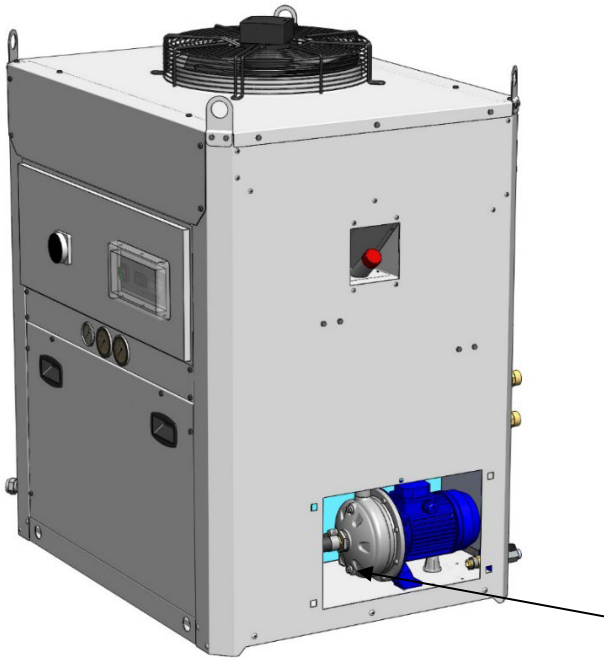
Diagram of recommended water circuit for FQBE002÷025 models



Key			
1	Tap	4	Thermometer
2	Water strainer (supplied with the unit)	5	System/unit discharge
3	Pressure gauge		

Important! During winter downtime empty the system (or just the refrigerator) to prevent damage from the cold.

Any residual water inside the pump (HPC 009÷025) must be discharged using the proper screw on the lower part of the pump (see diagram).



Pump Drain screw

3.4.2 Water quality

For unit safe and durable operation, the quality of the process water in the system must comply with the parameters in the table below. If this is not the case, it is recommended to use suitable chemicals or additives such as corrosion inhibitors, hardness stabilisers and anti-algae[1].

Total hardness	6.0…15 dH°	Cl^-	<5 mg/l - ppm
PH	7.5…9.0	Cl_2	0.5 mg/l - ppm
Conductivity	10…500 µS/cm	H_2S	<0.05 mg/l - ppm
Residual solid particles	<30 mg/l - ppm	NO_2^-	<5 mg/l - ppm
Saturation Index SI	-0.2 < 0 < 0.2	NO_3^-	<100 mg/l - ppm
HCO_3	<300 mg/l - ppm	Fe	<0.2 mg/l - ppm
SO_4^{2-}	<100 mg/l - ppm	Al	<0.2 mg/l - ppm
Aggressive free carbonic acid	<20 mg/l - ppm	Mn	<0.1 mg/l - ppm
Free chlorine	<0.5 mg/l - ppm	NH_4^+	<2 mg/l - ppm
PO_4^{3-}	<2 mg/l - ppm	Oxygen content	<0.1 mg/l - ppm
HCO_3 / SO_4	>1.0 mg/l - ppm	S^{2-}	<1 mg/l - ppm
NH_3	<0.5 mg/l - ppm		

The use of demineralised water is allowed only with the addition of anticorrosive liquids.

Any damage caused by failure to comply with the water requirements is excluded from the warranty.

[1] Please get in touch with the company for product recommendations..

3.4.3 Charging the hydraulic circuit HPC 002÷025

3.4.3.1 Preliminary operations

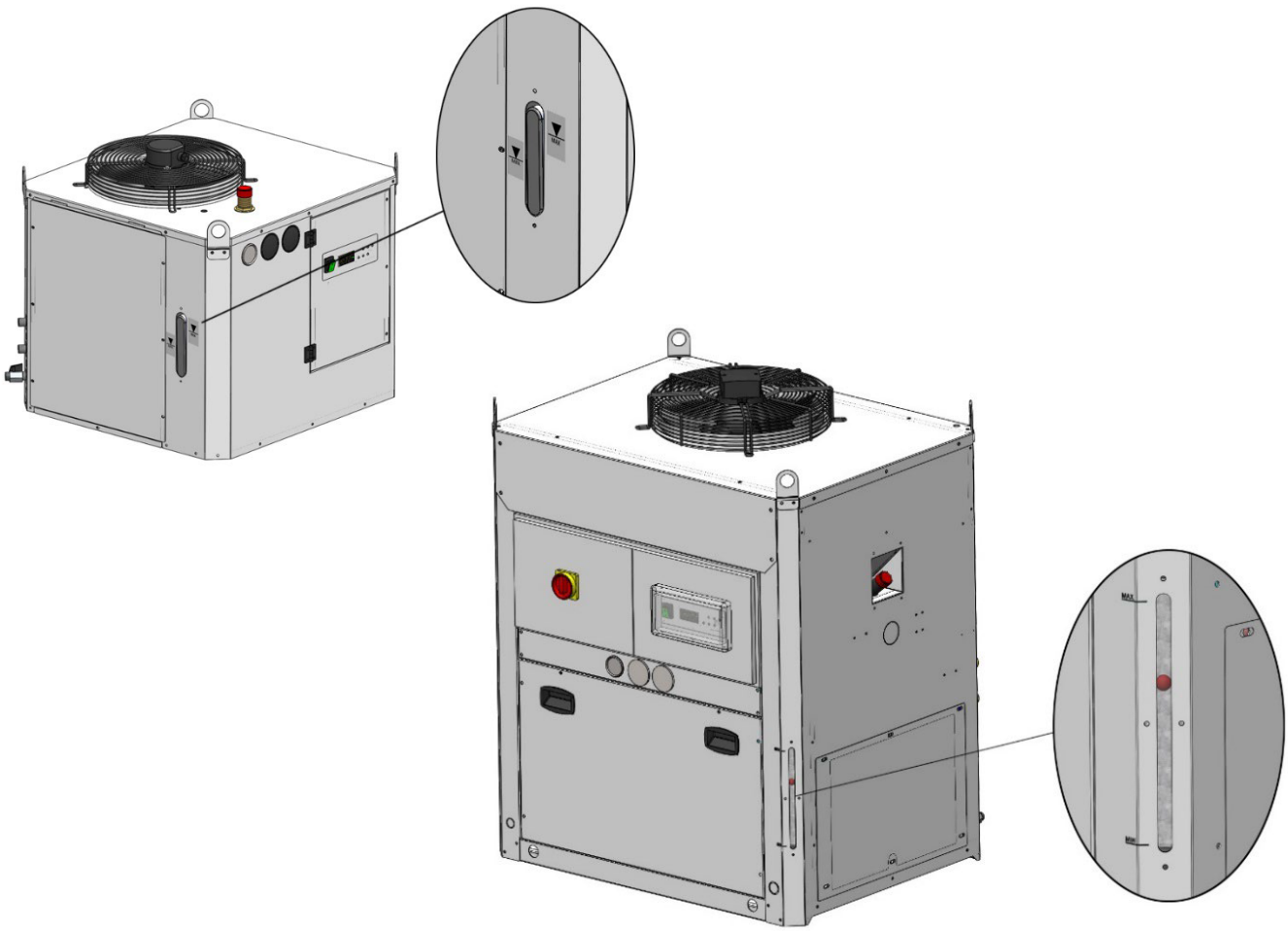
- Check that the drain taps are turned off;
- Open all the vent valves of the system;
- Open the system interception devices;

3.4.3.2 Subsequent operations based on the hydraulic circuit

<u>For hydraulic circuits with open vessel systems:</u>

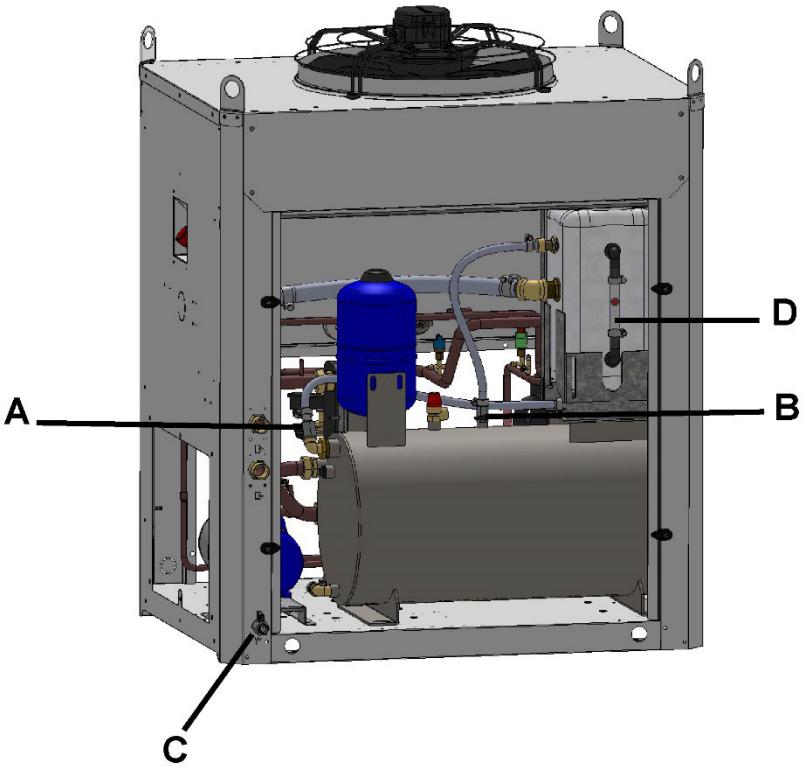
Feed the water from the filling inlet above the machine until the water reaches the required level near the transparent level indicator (see picture below). When the pump starts check the level again and top up if necessary;
Alla partenza della pompa, riverificare il livello ed eventualmente rabboccare.

Attention, when filling the tank with water, never exceed the maximum level indicated.



For hydraulic circuits with additional atmospheric tank (opt. TA)

Open the taps (**A** and **B**) for filling and venting the additional atmospheric tank.



Make sure that the drain cock (**C**) is closed.

Fill the additional tank by checking the level (**D**), the circuit will fill by gravity emptying the additional tank, continue to fill the additional tank until the level stops dropping. Start the pump by checking the level of the additional tank and fill it if necessary.

When the level of the additional tank remains constant, close the fill and vent cocks (**A** and **B**) of the same while the pump is running. (It is advisable to periodically check the filling of the circuit by opening the taps and checking if the tank level drops).

3.4.3.3 Concluding operations

- Recheck the filling of the system;
- Check for any leaks by checking the pressure gauge and inspecting the circuit.

3.4 ELECTRICAL CONNECTIONS

The machine must be connected to the electricity following the electrical diagram and conforming to the current laws and regulations in the place of installation.

- The voltage, frequency and number of phases must conform to the data shown on the machine's identification plate;
- The power supply voltage must not vary by more than ±10% from its nominal value;
- The frequency must not vary by more than ±1% from its nominal value (±2% for brief periods);
- The imbalance between power phases must be <2%;
- Upstream from the electrical panel, install a differential switch (IDn=0.03A) (main power switch) and slow-blow fuses with the specifications shown on the electrical diagram;
- Use wires of the section shown on the electrical diagram and in the following table.

Attention! Never change the internal electrical connections, as the warranty will be immediately voided.

Important! Screw the wires solidly to the terminal strip of the cut-off switch and lock the wire with a cable-gland.

Important! Make the cable entering the machine enters the cable-gland from below: this prevents rain from dripping inside the machine.

Important! The earth connection is mandatory: connect the earth wire to the terminal provided in the electrical panel. The ground wire must be longer than the other wires so that it will be the last one to be pulled if the device holding the cable loosens.

Attention! RS485 port not galvanically isolated

3.4.1 Connecting a remote on/off switch and a remote alert warning indicator

A remote ON/OFF switch can be installed using the terminal clamps on the switchboard terminal board.

NOTE For all **HPC** units (except FQBE002), any remote switch installed must be enabled on the electronic controller setting the "**L8**" parameter to value 1 (see ***par. 5.2.2***).

A remote alert warning indicator can be installed using the terminal clamps in the switchboard cabinet.

Consult the electrical diagram.

4

PRELIMINARY CHECKS AND START-UP

4.1 PRELIMINARY CHECKS AND PREPARATION FOR THE START-UP

Before starting up the unit, it is a good idea to do the following:

- Check that the water shut-off valves are open;
- Verify the regular water level in the tank;
- Check that the surrounding temperature is in the range for the machine to function (see Chapter ***8 Operating Limits***);
- Check the cut-off switch on the machine switchboard is open;
- Check that the mains voltage matches the voltage on the machine's identification plate with a tolerance of ±10%;
- Close the main power supply switch;
- Close the cut-off switch on the machine's electrical panel.

4.2 STARTUP

4.2.1 FQBE002 Startup

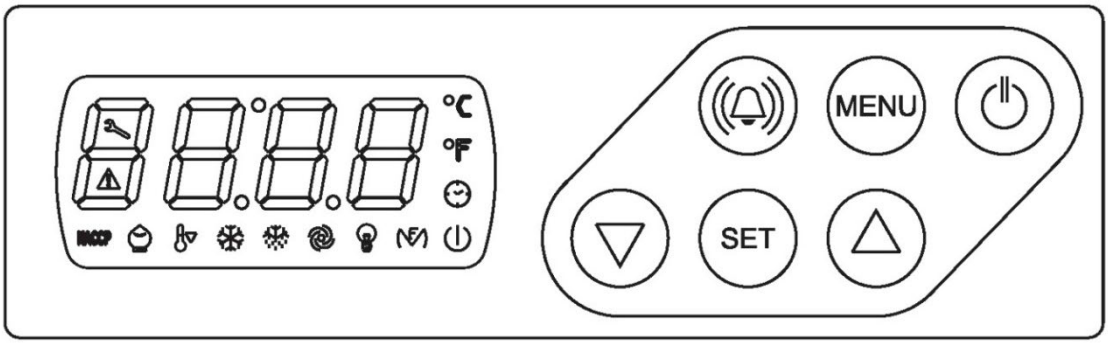
Connect the device power supply. Touch the for 4 seconds. The led will flash and turn off, the chiller will switch on.
The controller will display the temperature of the water inside the tank - if it is higher than the set value the compressor will start up.

To disable, touch the for 4 seconds. The led will flash and turn on, the chiller will switch off.

4.2.2 HPC 003÷007 Startup

On closing the cut-off switch the electronic controller will light the led .
To proceed with startup:

- Turn on the unit by pressing key on the electronic controller for more than 2 seconds;



- Check pump startup (light);
- The display will show the temperature detected by the temperature probe; if it is higher than the set value the compressor will start up.

Attention! At start-up after couple of days, you must adjust date and time (see paragraph ***5.2.7 Setting the date and time – HPC 003÷025***).

Turn off the unit by holding the key on the electronic controller for more than 1 second; the led will light to signal the status of OFF. The electronic controller will first switch off the compressor then shortly after the pump.

Attention! It is important not to turn off the unit using the main power switch or cut-off switch on the machine switchboard because this would not provide for the delayed power-off of the pump regarding the power-off of the compressors, with the risk of damaging the evaporator; in addition, it would prevent the functioning of the heating element in the compressor housing.

Attention! Check the correct direction of rotation of the pump and fan.

4.2.3 HPC 009÷025 Startup

On closing the cut-off switch the electronic controller will light the led .
To proceed with startup:

- Turn on the unit by pressing key on the electronic controller for more than 2 seconds;
- Check the alert symbol does not appear on the electronic controller; if it does appear press key to see which type of alert has been flagged.

Attention! On first starting up an alert could occur in relation to an error sequence in the R/S/T phases, shown by the code **HPLP**. This safety system safeguards the compressor from the possibility of turning in the wrong direction.
Note: the phase sequence relay located inside the electrical panel must have both LEDS lit to confirm the correct phase sequence.

Should this occur close the main power switch upstream of the machine, and invert two phases between them immediately downstream of the main switch itself.

Attention! Do not interfere with cabling downstream of the unit switchboard cut-off switch at any time, as doing so could compromise the correct sequence of other devices, such as the pump or fans.

Repeat operations from the beginning.

- Check the pump has started (light); possibly by checking the pressure of the water upstream and downstream of the machine on the previously installed pressure gauges;
- Wait for the electronic controller to verify continuity of water flow via the signal of the differential pressure switch; if the differential pressure switch intervenes (alarm code **FL**), vent the system, check the shut-off valves are open and pump operation (see ***par. 5.2.12*** for alarm's rearm);
- The display will show the temperature detected by the probe; if it is higher than the set value the compressor will start up.

Attention! At start-up after couple of days, you must adjust date and time (see paragraph ***5.2.7 Setting the date and time – HPC 003÷025***).

Turn off the unit by holding the key on the electronic controller for more than 1 second; the led will light to signal the status of OFF. The electronic controller will first switch off the compressor then shortly after the pump.

Attention! It is important not to turn off the unit using the main power switch or cut-off switch on the machine switchboard as this could cause a delayed switch-off of the pump with respect to the compressor, which could damage the evaporator.

4.3 START-UP UNDER CRITICAL CONDITIONS

The consequence of starting up under critical conditions could be the intervention of the high-pressure pressure switch (to rearm the high-pressure pressure switch, see paragraph ***7.2 Rearming the high-pressure pressure switch***).

To overcome this problem, you will have to reduce the thermal load on the machine by shutting off some of the uses or, if this is not possible, by reducing the flow of water into the evaporator: partially close the output tap from the chiller and restart the machine.

Operate the chiller under these conditions until the water temperature gradually returns within operating limits; then, you can turn on the tap completely.

5

ELECTRONIC CONTROLLER

5.1 HPC002 ELECTRONIC CONTROLLER

The **HPC 002** electronic controller:

- Displays the temperature of the water exiting the water chiller;
- Enables the required temperature of the chilled water to be set (set point);
- Enables compressor activation and deactivation (standby);
- Controls on/off compressor operation depending on the temperature of the water measured with the set point and upper differential (3°C//3K//5,4°F);
- Guarantees minimum compressor on/off times to maintain its integrity;
- Signals any faults in the temperature probe.

5.1.1 Main functions of the electronic controller buttons and meanings of the icons – HPC002

Button	Function
	On/off button Exit procedure
SET	Setting setpoint Access the menu
	Down key
	Up key

Display/Led	Function
	Indicates the state of compressor: On: compressor ON Off: compressor OFF Flashing: setting setpoint mode or compressor protection
	Indicates the state of the fans: On: fan ON Off: fan OFF Flashing: fan stopping
AUX	Auxliary led
	Energy saving on
°C	°Celsius unit
°F	°Fahrenheit unit
	Indicates the state of the chiller: On: chiller OFF Off: chiller ON

The display shows alarms like in the following table.

Sign	Description	Type of rearm
Pr1	Water outlet temperature probe failure	Automatic
Pr2	Condensing temperature probe failure	Automatic
AL	Minimum temperature AI1 probe - Antifreeze	Automatic
AH	Maximum temperature AI1 probe	Automatic
COH	Superheated condenser	Automatic
CSd	Blocked condenser	Automatic

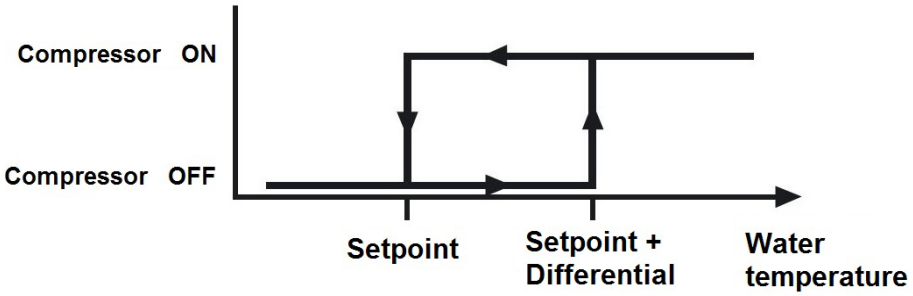
5.1.2 Turning on and off – HPC002

Connect the device power supply. Touch the for 4 seconds. The led will flash and turn off, the chiller will switch on.

To disable, touch the for 4 seconds. The led will flash and turn on, the chiller will switch off.

5.1.3 Controlling water temperature – HPC002

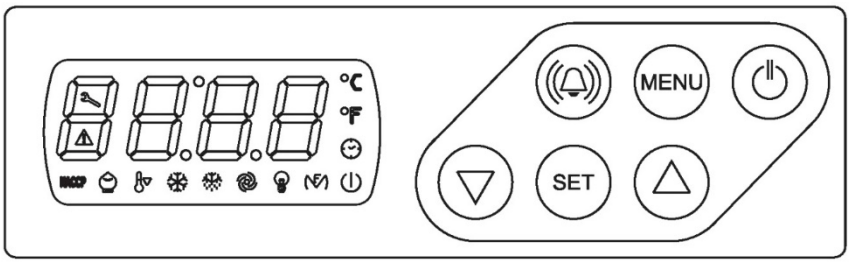
The FQBE002's electronic controller regulates the outlet water temperature on the basis of a set point value and an upper differential of 3°C//3K//5,4°F according to the following diagram:



5.1.4 Changing the set point – FQBE002

Touch the SET : the flashing led indicates that the setpoint can be changed. Use and keys within 15 seconds to change the temperature setpoint. Touch SET key or do not operate for 15 seconds to confirm the value. Otherwise, touch key, but any changes will not be saved. The led will switch off and the device will exit the procedure.

5.2 HPC 003÷025 ELECTRONIC CONTROLLER



The electronic controller has a 4 number display, 14 integrated signaling leds and 6 function buttons. It manages:

- Compressor operation to ensure temperature control of the chilled water;
- Pump operation;
- Fan operation;
- Alarms.

5.2.1 Main functions of the electronic controller buttons and meanings of the icons – HPC 003÷025

The following tables resume all the buttons and icons display on the electronic controller.

Button	Function
	Alarm menù
MENU	Access the menù
	On/Off (pressed for more than 1 second) Returns to the previous menu level (pressed once)
	Down key
SET	Setting setpoint Confirms value entered for a parameter Alarm reset (pressed for 2 seconds)
	Up key

Display/Led	Function
	Water temperature and other contents available in the menù
	°Celsius unit
	°Fahrenheit unit
	Indicates the date, hour and clock alarm
	Indicates that the machine is off
	Indicates the state of the pump: On: pump ON Off: pump OFF Slow flashing: with compressor off, the pump verifies the state of the water temperature Fast flashing: pump about to turn off
	Not used
	Indicates the state of the fan: On: fan ON Off: fan OFF
	Not used
	Indicates the state of the compressor: On: compressor ON

	Off: compressor OFF Slow flashing: compressor about to turn on Fast flashing: compressor about to turn off
	Indicates the setpoint setting (flashing)
	Energy saving on
HACCP	Not used
	Indicates the presence of one or more active alarms
	Indicates the request of maintenance

5.2.2 Turning on and off – HPC 003÷025

Attention! At start-up after couple of days, you must adjust date and time (see paragraph ***5.2.7 Setting the date and time – HPC 003÷025***).

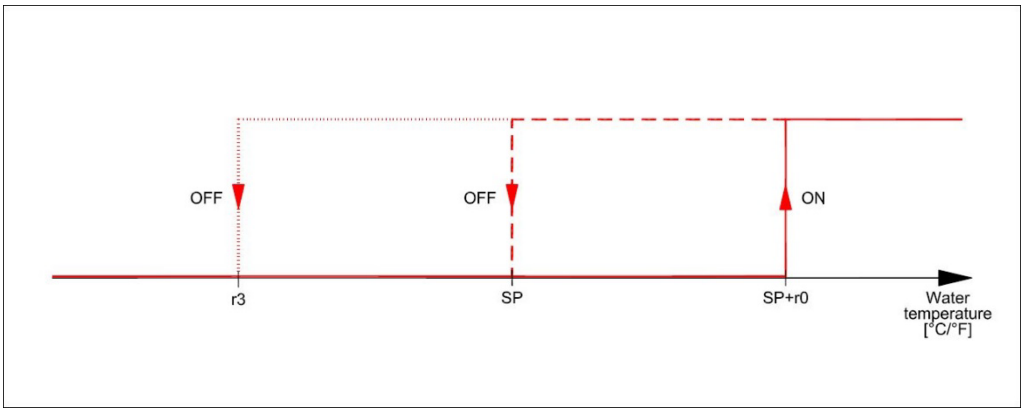
Turn on the unit by pressing key on the electronic controller for more than 2 seconds. The display will show the temperature detected by the probe.

Turn off the unit by pressing key on the electronic controller for more than 2 seconds. The led will light to signal the status of OFF.
The electronic controller can be turn on/off using the keypad or by remote operation, the choice of this modes is done via "**L8**" parameter (refers to par. ***5.2.8 Parameters changing – HPC 003÷025***).

If "**L8**" = 0, the chiller can be switched on/off only with key.
If "**L8**" = 1, the chiller can be switched on/off only through the digital input available on the terminals in the electric board (refers to par. ***3.5.2 Connecting a remote on/off switch***).
The choice of one mode excludes the other mode.

5.2.3 Controlling water temperature – HPC 003÷025

The FQBE003÷025's electronic controller regulates the water temperature with a proportional logic.
This type of control is based on setpoint value "**SP**" and on a temperature differential **"r0"** above it: the compressor is switched off when water temperature go under the set point "**SP**". Due to a low thermal load and/or a low water flow rate, set point could be reached when compressor has not yet reached the minimum ON time ("**C3**" parameter). In this case, water temperature can decrease under the set point. If minimum value ("**r3**" parameter) is reached, the compressor will be switched off apart from its protection times.



The two temperature probes act as follow:

- **AI2** takes the outlet water temperature (evaporator exit → antifreeze function);

- **AI1** takes the condensing temperature (fan regulation).

5.2.4 Changing the set point – HPC 003÷025

- Press SET key; the living set point value will be shown and the yellow icon will flash.
- Use ▽ and △ keys to set desiserd value and press SET key to confirm.

Attention! The new value will be saved afer 15 seconds, even if the SET key has't been pressed.

NOTE The setpoint value can be changed also when the keyboard is locked.

5.2.5 Quick menu – HPC 003÷025

At the unit switches on, the display will show the outlet water temperature, but quickly it is possible to access to the following parameters.

- Press MENU key one time to access to the quick menu;
- Using △ and ▽ keys it is possible to access to the following parameters:

Parameter	Function/Value
Pb2	Temperature of AI1 probe
bU	Buzzer activation/disactivation
rtC	Setting time and date (see par. 5.2.7)
PH	Pump operating time
CH	Compressor operating time

- Press SET key for see the set or the current value of the selected parameter;
- Press SET key for return to the quick menu;
- Press MENU key for exit.

5.2.6 Lock and unlock the keyboard – HPC 003÷025

To lock the keyboard press at the same time ⏻ and ▽ keys for 2 seconds. The display will show text **"Loc"** for one second to confirm the keyboard locking.
When the keyboard is locked, if you press any keys, text **"Loc"** will appear.
When the keyboard is locked, it's not allow to:

- Turn on and turn off the chiller from the controller;
- Show the temperature of AI2 probe;
- Show information about alarms;
- Show compressor working hours;
- Show pump working hours.

When the keyboard is locked, the changing setpoint is allowed pressing SET key and after △ and ▽ keys.

For unlock the keyboard press at the same time ⏻ and ▽ keys for 2 seconds. The display will show text **"UnL"** for one second, to confirm the keyboard unlocking.

5.2.7 Setting the date and time – HPC 003÷025

- Push the button MENU;
- Use △ and ▽ in order to see **"rtC"**;
- Push the button SET, the led 🕒 flashes, the display will show "yy", followed by the last two digits of the year. (i.e. "yy15"). Use △ and ▽ to modify the value;
- Push the button SET to continue to the month's adjustment; then the display shows "MM", followed by the last two digits of the month. (i.e. "MM08"). Use △ and ▽ to modify the value;
- Push the button SET to continue to the day's adjustment; then the display shows "dd", followed by the last two digits of the day. (i.e. "dd04"). Use △ and ▽ to modify the value;
- Push the button SET to continue to the time's adjustment; then the display shows "hh", followed by the last two digits of the time in hours, considered in the 24h format. (i.e. "hh15"). Use △ and ▽ to modify the value;
- Push the button SET to continue to the minute's adjustment; then the display shows "nn", followed by the last two digits of the minutes. (i.e. "nn19"). Use △ and ▽ to modify the value;
- Push the button SET to return to the main menu.

5.2.8 Parameters changing – HPC 003÷025

The electronic control can be personalized to adapt at different use of the chiller, through parameters setting, using a password.

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[2];
- Press SET key. Appear the first parameter;
- Press △ and ▽ keys for scroll down the list;
- Press SET key for see the current value of the selected parameter;
- Press △ and ▽ keys to change the value;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

[2] Contact our company

5.2.9 Changing the type of restart after a power failure – HPC 003÷025

In the case of a power failure, the chiller can behave in three different ways when power is restored:

- Stay off;
- Start;
- Return to the same condition it was in when the power failed.

To select one of these options, proceed as follows:

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[3];
- Press SET key. Appear the first parameter;
- Press △ and ▽ keys for scroll down the list until reach **"r7"** parameter;
- Press SET key to set the parameter;
- Press △ and ▽ keys to change the value:
  a) 0 when the power returns, the machine will stay off;
  b) 1 when the power returns, the machine will start;
  c) 2 when the power returns, the machine will work in the same way as before the power failed;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

Attention! If remote control is active (**L8**=1), the parameter **r7** must be set as 2.

5.2.10 Displaying the firmware release version of the electronic controller – HPC 003÷025

It is possible to display the software release version only in start up phase.
Follow this instructions:

- Connect the device power supply;
- While the display is flashing, press and hold ▽ key;
- On the display will appear 3 values sequentially:
  - The first value is the firmware's number;
  - The second value is the firmware's relese;
  - The third value is a not used parameter.

[3] Contact our company

5.2.11 Alarms – HPC 003÷025

An alarm is displaying with its code and the led ⚠ lights up.
There are 3 type of rearm:

- **Manual rearm:** these alarms must be reset, this can only be done when the alarm condition no longer exists; at that point the unit is enabled to run;
- **Automatic rearm:** the alarm is automatically deactivated as soon as the alarm condition ceases and the machine restarts by itself;
- **Semi-automatic rearm:** semi-automatic alarms behave like automatic alarms; but if the same semiautomatic alarm occurs 5 times in 60 minutes, that alarm becomes a manual one; therefore to restart the machine, you will have to remove the cause of the alarm and reset it.

5.2.12 Displaying alarm – HPC 003÷025

The led ⚠ indicates the presence of an alarm. Alternately the display shows the occurred alarm code (or the most important alarm code, if there are many) and the water temperature value.
In case of multiple alarms intervention, it is possible to display the alarm history in this way:

- Press key;
- Use and key to display active alarms;
- Press key to return to main menu.

The last 20 active alarms are saved; further new alarms will overwrite the oldest ones.

Abbreviation	Description	Rearm type	Effect on compressor	Effect on pump	Effect on fan
FL	Water flow alarm / Tank water level Insufficient	Manual	OFF	OFF	OFF
HPLP (HL)**	For HPC 003÷007 High/Low pressure	Manual	OFF	NO ACTION	NO ACTION
	For HPC 009÷025 High pressure Compressor protection Pump protection Fan protection Incorrect R-S-T phase sequence	Manual	OFF	OFF	OFF
	For HPC 009÷025 Low Pressure	Manual	OFF	OFF	NO ACTION
Pr1	AI2 regulation probe failure	Automatic	OFF	NO ACTION	OFF
Pr2	AI1 probe failure	Automatic	OFF	NO ACTION	OFF
AL	AI2 probe (if P3=1) / AI1 probe (if P3=2) minimum temperature	Semi-Auto	OFF	ON	OFF
AH	AI2 probe maximum temperature	Semi-Auto	OFF	NO ACTION	OFF
COH	Overheated condenser	Semi-Auto	NO ACTION	NO ACTION	NO ACTION
CSd	Blocked condenser	Manual	OFF	NO ACTION	OFF

* Pump's effect in case of FL alarm is a programmable parameter : **Lb**=0 OFF, **Lb** =1 ON, **Lb** =2 NO ACTION
** in the alarm log, **HPLP** can appear with the abbreviation **HL**.

5.2.13 Resetting alarm – HPC 003÷025

To reset an alarm, the condition that caused it must no longer exist. For example, if the low-pressure switch has occurred, the alarm can only be reset when the pressure has risen beyond the reset value (see paragraph ***7.1 Calibration of the safety devices and type of rearm***).

Proceed at manual rearm in this way:

- Press key;
- Use and key to selct the alarm to reset (a manual rearm's alarm lights up and leds);
- Press key will appear code **"dEL"**;
- Press for 1 second key to cancel the memory;
- Press key for return to upper level menu.

5.2.14 Displaying and resetting alarm history – HPC 003÷025

Make sure that the keyboards is not locked and that no procedure is in progress.

- Press key;
- Use and keys to select **"LS"** lebel;
- Press key to exit the procedure or key to acces the alarm history;
- Il display visualizzerà l'indicazione dell'allarme più recente nella seguente forma **"1.AL"**
- Use and keys to select desired alarm;
- Press to return to **"LS"** lebel or press key.
  The display will show in sequence the information in the following form:
  StA (StArt), by15, bM03, bd17,bh14, bn20, Sto (Stop), Ey15, EM03, Ed17, Eh14, En45 they provide information about the date, starting and ending time alarm;
- If the alarm is still active, the display will show for 1 second:
  StA (StArt), by15, bM03, bd17,bh14, bn20;
- Press key to exit.

To reset alarm history:

- Press key for 4 seconds;
- The display will show **"PA"** text;
- Press key;
- Use key to insert the password[4];
- Press key. The first parameter appears;
- Press and key to scroll down the list until **"rLS"** parameter is reached;
- Press key and use key to set **"149"** value;
- Press key, the display will flash "----" for 4 seconds after the device will exit the procedure;
- Press key to return at main screen.

[4] Contact our company

NOTE It is recommended to clear the alarm history when you change the parameters.

6

ALTERNATIVE METHODS OF TEMPERATURE REGULATION

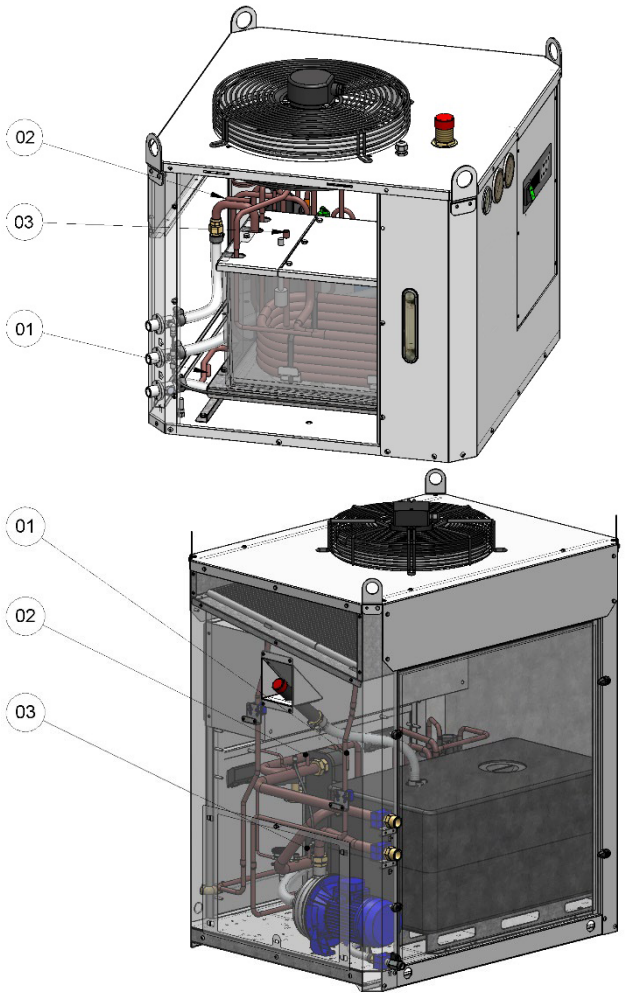
The electronic controller can regulate water temperature with two type of control logic, different from standard factory, to better adapt the operation of the chiller to the needs of the plant.

Attention! Modify the type of regulation only if necessary and, in any case, please contact our company.

	Factory setting	L mode	H mode
Regulation probe	Outlet water	Inlet water	Outlet water
Control logic	Proportional	Proportional	Neutral zone
Condensing control	Able	Disable (fan on if compressor is on)	Able
AI1 probe function	Condensing control (fan regulation)	Antifreeze	Condensing control (fan regulation)
AI2 probe function	Water temperature control + Antifreeze	Water temperature control	Water temperature control + Antifreeze

The L mode allows the machine to deal with better continuity of operation even with frequent load changes or with lower heat load than the power of the machine.
The H mode grants a better control of the water temperature, it suits to systems with regular load and relatively large water content.

6.1 TEMPERATURE PROBES POSITION



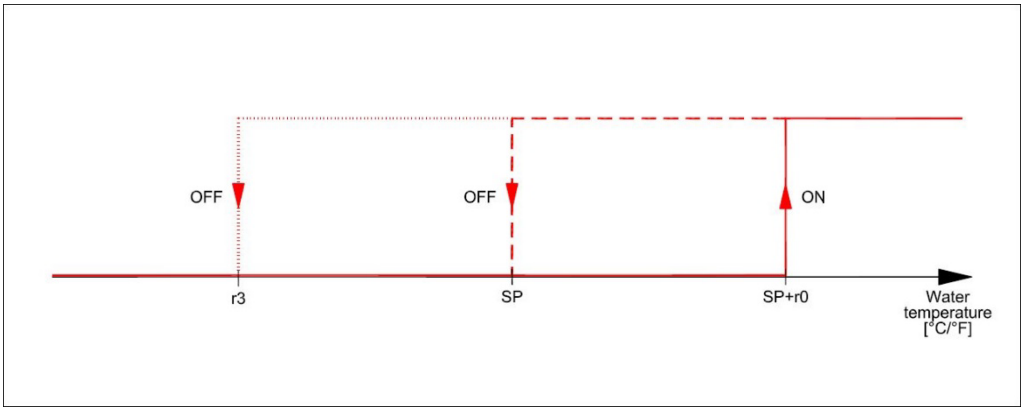
HPC 002÷007	
1	Condenser refrigerant outlet pipe well
2	Evaporator water inlet pipe well
3	Evaporator water outlet pipe well

HPC 009÷025	
1	Condenser refrigerant outlet pipe well
2	Evaporator water inlet pipe well
3	Evaporator water outlet pipe well

6.2 L REGULATION MODE – PROPORTIONAL LOGIC & INLET WATER PROBE

6.2.1 Proportional control: how it works

This type of control is based on setpoint value "**SP**" and on a temperature differential **"r0"** above it: the compressor is switched off when water temperature go under the set point "**SP**". Due to a low thermal load and/or a low water flow rate, set point could be reached when compressor has not yet reached the minimum ON time ("**C3**" parameter). In this case, water temperature can decreases under the set point.
If minimum value ("**r3**" parameter) is reached, the compressor will be switched off apart from its protection times.



When the chiller is setting with L mode, the two temperature probes act as follow:

- **AI1** takes the outlet water temperature (evaporator exit → antifreeze function)
- **AI2** takes the inlet water temperature (evaporator entrance);

6.2.2 Setting L regulation mode

If the unit is controlled by the water inlet control probe, keep in mind that parameter **"r6"** is already set at the factory to the correct value.

The setting verification methods are:

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[5];
- Press SET key. The first parameter appears;
- Press △ and ▽ keys to scroll down the list until **"r6"** parameter is reached**;**
- Press SET key to set the parameter;
- Press △ and ▽ keys to change the value: choose 0 for proportional control;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

[5] Contact our company

After, you must set the temperature probe **AI1** working mode, as antifreeze function (its standard setting is for condensing control):

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[6];
- Press SET key. The first parameter appears;
- Press △ and ▽ keys for scroll down the list until **"P3"** parameter is reached;
- Press SET key to set the parameter;
- Press △ and ▽ keys for scroll down the options until **"2"** is reached;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

6.2.3 Positioning temperature probes

- Remove **AI2** temperature regulation probe from evaporator water outlet pipe (n.3 figure par.6.1) and position it on well on the evaporator water inlet pipe (n.2 figure par.6.1);
- Remove **AI1** probe from condenser refrigerant outlet pipe (n.1 figure par.6.1)and position it on well on the evaporator water outlet pipe. **AI1** will work as antifreeze probe (n.3 figure par.6.1).

Set a setpoint temperature compatible with inlet water temperature from the plant (3÷6°C//5÷10°F more than the desired outlet water temperature).

On A regulation mode, the condensing control is disable and the condenser's fan will work simultaneously to compressor. The minimum working ambient temperature of the chiller is 15°C//59°F when "L regulation mode" is set.

[6] Contact our company

6.2.4 Recommended setting for operating with low water temperature for L regulation mode

If it was not anticipated that the chiller unit offered was to produce water at temperatures close to 0°C//32°F, or below, you should contact our company.

To achieve temperatures that are negative, or near 0°C//32°F, it is necessary to use anti-freeze (ethylene glycol) in percentages that depend on the desired temperature; it is also necessary to change the calibration of the anti-freeze thermostat.

Attention! Verify the minimum working temperature for each model (see chapter ***8 Operating limits***). The working limits differ depending on the model.

For operating with low water temperature (under 5°C//41°F), it is recommended to set the electronic controller parameters like in the following table.

Outlet water temperature [°C] Outlet water temperature [°F]		**Unit**	**5 [41]**	**7 [44,6]**
SP	Setpoint*	°C [°F]	10 [50]	12 [53,6]
r0	Cooling temperature differential	°C [°F]	2 [3,6]	2 [3,6]
r1	Setpoint minimum limit	°C [°F]	8 [46,4]	10 [50]
r3	Minimum temperature compressor OFF	°C [°F]	+8 [46,4]	+10 [50]
A1	Ice alarm setpoint	°C [°F]	0 [32]	4 [39,2]

* Recommended choice

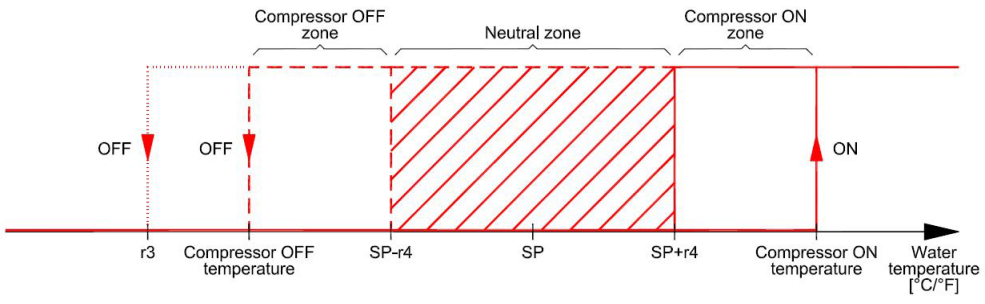
6.3 H REGULATION MODE – NEUTRAL ZONE LOGIC & OUTLET WATER PROBE

6.3.1 Neutral zone control: how it works

Neutral zone control is a variable reaction time regulation; it is often adopted when it's desired regulate the evaporator water outlet temperature.

Using "**r4**" parameter is defined the semi-width of neutral zone. In this zone, no regulation action is done. Outside the neutral zone, compressor is switched on/off with a delay as "**r5**".

The temperature reached at the start up or the shutdown of compressor after the "**r5**" time, depends on the thermal load and the water temperature. In the same way for proportional control, set point could be reached when compressor has not yet reached the minimum ON time ("**C3**" parameter). In this case, water temperature decreases until the compressor minimum ON time pass or when "**r3**" parameter is reached. In this case, the compressor will be switched off apart from its protection times.



When the chiller is setting with H regulation mode, the two temperature probes act as follow:

- **AI1** takes the condensing temperature (fan regulation).
- **AI2** takes the outlet water temperature (evaporator exit), regulation and antifreeze alarm;

6.3.2 Setting H regulation mode

At first, it is necessary to setting the proportional logic as follow:

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[7];
- Press SET key. The first parameter appears;
- Press △ and ▽ keys for scroll down the list until **"r6"** parameter is reached**;**
- Press SET key to set the parameter;
- Press △ and ▽ keys to change the value: choose 1 for neutral zone control;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

After, if necessary, set **AI1** working mode as condensing control (fan regulation):

- Press MENU key for 4 seconds;
- The display will show **"PA"** text;
- Press SET key;
- Use ▽ key to insert the password[8];
- Press SET key. The first parameter appears;
- Press △ and ▽ keys for scroll down the list until **"P3"** parameter is reached;
- Press SET key to set the parameter;
- Press △ and ▽ keys for scroll down the options until **"1"** is reached;
- Press SET key to confirm the new value and return to parameters menu or wait for 15 seconds without touch the keyboard;
- Press ⏻ key to exit from parameters menu or wait for 60 seconds without touching the keyboard.

6.3.3 Positioning temperature probes

The probes position for H regulation mode is the factory setting, that is:

- **AI1** probe on condenser refrigerant outlet pipe (n.1 figure par.6.1).
- **AI2** regulation probe on evaporator water outlet pipe (n.3 figure par.6.1);

[7] Contact our company
[8] Contact our company

7

SAFETY DEVICES

HPC chillers have a series of safety devices that limit the machine's temperature and pressure values to ensure that it operates within the expected limits and to avoid dangerous situations.Here is a list of dangerous situations, including the relative safety device and its location.

Dangerous situation	Safety device	Location	HPC 002	HPC 003÷007	HPC 009÷025
High condensation pressure	High-pressure switch	Compressor output pipe	✓	✓	✓
Low evaporation pressure	Low-pressure switch	Compressor intake pipe	✓	✓	✓
Low water flow-capacity	Water differential pressure switch	Plate evaporator	n.a.	Opt.	✓
Low water temperature	Anti-freeze thermostat	Water exit from the evaporator	✓	✓	✓
Frequent compressor start-ups	Anti-circulation timer	Electronic controller	✓	✓	✓
Low water level in the tank	Water-level sensor	Tank	✓	✓	✓

Legend: n.a. not available – Opt.: optional

When they reach their calibration value, most of the security devices trigger an alarm managed by the electronic controller.

For some safety devices, once the cause of the alarm times out, the machine resumes operation automatically as soon as the reset value is reached. Others must be manually reset to restart the machine (also see paragraph 5.2.14).
The following paragraph lists the characteristics of each safety device.

7.1 CALIBRATION OF THE SAFETY DEVICES AND REARM TYPE

Safety device	Intervention value	Reset value	Type of rearm	HPC 002	HPC 003÷007	HPC 009÷025
High-pressure switch	21.8 barg//316 psi	16 barg//232 psi	Manual	✓	✓	✓
Low-pressure gauge	1.7 barg//24 psi	2.7 barg//39 psi	Manual	✓	✓	✓
Water differential pressure switch	85mbar//1,23psi	105mbar//1,53psi	Manual	n.d.	Opt.	✓
Anti-freeze thermostat	4°C//39,2°F	8°C//46,4°F	Semiautom.	✓	✓	✓
Water-level sensor	--	--	Semiautom.	✓	✓	✓
Anti-circulation timer*	5 min.	--	--	✓	✓	✓

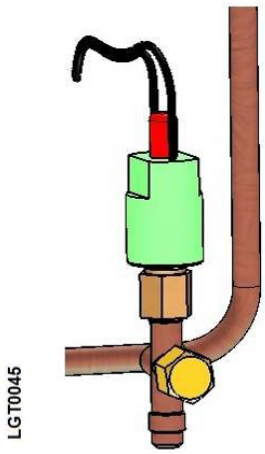
* This is a function of the electronic controller that prevents the same compressor from stopping and starting too frequently: at least 5 minutes must elapse between one compressor's power up and the next.

7.2 REARMING THE HIGH-PRESSURE SWITCH

The intervention of the high-pressure pressure switch is the only case in which, in addition to manually rearming the electronic controller, it is also necessary to reset the pressure switch itself.
The high-pressure pressure switch is located in the compressor compartment on the uninsulated copper pipe that goes from the compressors to the condensation coil; there is a manual-reset button on top of it.

Warning! The upper part of the compressor casing and discharge pipe are at a high temperature. Be especially careful when working in their vicinity.

This can only be rearmed when the pressure in the circuit has fallen below the reset value (see table ***Calibration of the safety devices and type of rearm*** in paragraph 7.1).



High pressure switch

For this reason, when dealing with an intervention of the high-pressure switch, it is necessary to:

A) Identify the cause of the rise in pressure (fan not working, condensation coil dirty or obstructed, obstacles to the flow of exiting air, operating temperature outside operating limits, etc. (also see Chapter ***10 Troubleshooting***) and remove the cause, if possible;
B) Wait until the high-pressure manometer falls below the reset value (see the table, ***Calibration of the safety devices and type of rearm*** in ***paragraph 7.1***);
C) Rearm the pressure switch by pressing the red button: if you do not hear a click, it is not rearmed;
D) Then rearm the electronic controller (see paragraph ***5.2.14 Resetting alarm – HPC 003÷025***).

Attention! The high-pressure gauge stops the compressor while it keeps the condenser fan running to lower the pressure in the condenser.

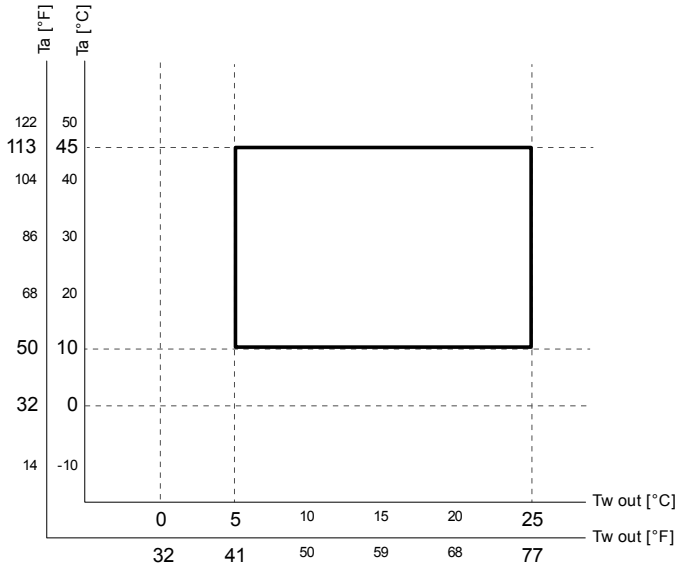
8

OPERATING LIMITS

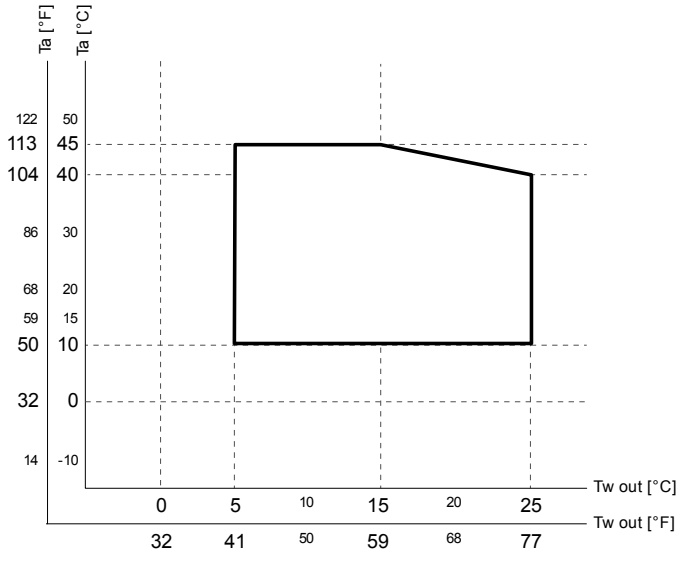
8.1 OPERATING TEMPERATURES

The various units in the **QBE** line guarantee several operating limits depending on the model and accessories provided. The graphs show the limits for continuous operation of the **QBE** units, in relation to the temperature of the water exiting the machine (Tw out) and the temperature of the external air (Ta).

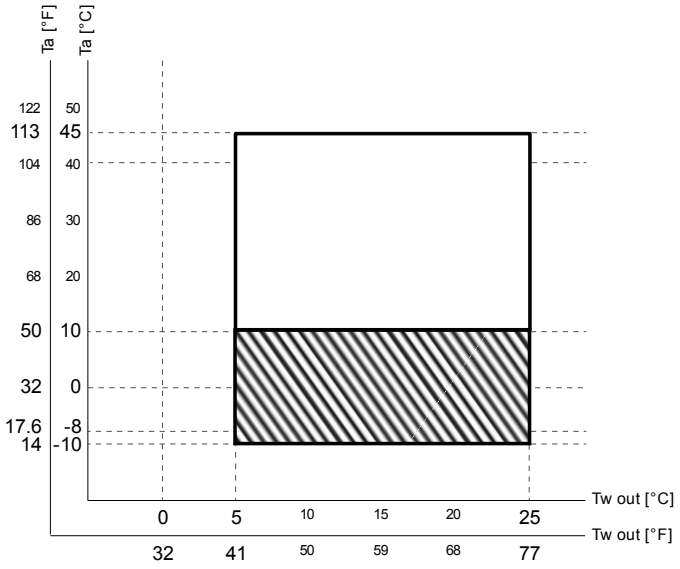
FQBE002÷007 – 60 Hz



HPC 005÷007 3 PH – 60 Hz



HPC 009÷025 – 60Hz



Legend

Mandatory continuous fan(s) speed control - electronic fan(s) (CE)

Warning! Without the crankcase heating resistor (RC) and a condensation control (CE) the minimum working ambient temperature is +10°C // +50°F.

Warning! If the unit is equipped with RC option (crankcase heating resistor) make sure that the unit is powered at least 24H before every start-up, in order to ensure that compressor lubricant is heated.

Warning! In order not to reduce the condenser performances, the wind baffle kit (FWB) must be removed when the ambient temperature is > = + 10 ° C // +50°F

8.2 MINIMUM WATER FLOW RATE

Operation with water flow rates lower than minimum limits could cause the anti-freeze thermostat to intervention and make it difficult to regulate water temperature.

Model HPC	Unit	002-003	004	005	006	007	009	012	014	020	025
Minimum water flow rate	[l/h]	200	300	350	450	500	600	1000	1000	1200	1200

9

MAINTENANCE, INSPECTIONS AND PERIODIC CHECKS

To keep the machine running properly and providing the guaranteed performance required, it is necessary to make some periodic checks.

Operation	Frequency	Execution
Check that the temperature of the water produced is in the required interval	Daily	User
Check tank water level using level indicator	Daily	
Check for the presence of any alarm signals	Daily	
Check the functioning of the fans	Monthly	
Check for any dirt on the exchanger plates inside (only HPC 009÷025) (see ***paragraph 9.1***)	Yearly (1)	
Check that the temperature of the air is compatible with the operating limits of the machine	Monthly	
Clean the air filters (only HPC 009÷025)	Monthly(1)	
Clean the condensing coil with a jet of compressed air	Annual (1)	Specialized personnel
Clean the water filter	Monthly(2)	
Check that the refrigerant liquid sight glass is clear or, at most, with a few bubbles (check with the compressor running – only HPC 009÷025)	Every 6 months	
Check that the subcooling and superheating values are, respectively between 3÷5K//5,4÷9°F and 5÷7K//9÷12,6°F	Every 6 months	
Check for traces of oil on the pipes of the refrigerant circuit (symptom of refrigerant leaks)	Every 6 months	
Carry out the correct maintenance of the fluid loaded in the system (see ***par.10.2***)	Yearly	
Check the tightness of the electrical terminals both inside the electrical panel and on the terminal strips of the compressors	Yearly	
Check the contacts of the contactors; if they show signs of deterioration, replace them	Yearly	
Check that the current absorbed by the machine is within the values on the identification plate	Every 6 months	
If the unit will not be used for a long time, drain the water from the plumbings and the machine to avoid the formation of ice during the winter	Extraordinary	

(1) It may be necessary to carry this out more frequently in the case of particularly dirty environments.
(2) We recommend an extraordinary cleaning of the strainer after the machine has been operating for the first week.

Attention! Before carrying out any maintenance on the unit or accessing internal parts, make sure you have cut-off the electricity.

Attention! The upper part of the compressor housing and the output pipe are hot. Be especially careful when working near them.

9.1 CLEANING THE PLATE EXCHANGER

The plate exchangers' mobility in the **FQBE009÷025** range creates a self-cleaning effect.
Dirt on the heat exchange surfaces is considerably reduced compared to traditional heat exchangers.
This means that the plate heat exchanger can remain in operation for longer between cleaning.
It is advisable to **check for hydraulic pressure drops at least once a year**, comparing the previously recorded with the current value, to establish if the plate needs cleaning.

Recommendations for plate cleaning:

- Use high head centrifugal pumps with a maximum fluid temperature of 50°C // 122 °F;
- To remove biological material, grease, oil and other organic deposits from heat exchangers and connected equipment, use a strong caustic soda-based alkaline cleaning solution.

The cleaning liquid must comply with environmental regulations and be readily biodegradable. It must ensure that plates, gaskets or adhesives are undamaged. It can be used in combination with other additives to reduce foaming during the cleaning process.

The recommended basic concentration is one part cleaning solution to nine parts water. Start by adding water first and then the cleaner.

The pH level should never be less than 12 during the cleaning process. Add more cleaner to increase the pH level.

This cleaning procedure is only for the heat exchanger. The pump and the other fluid circuit components are not compatible with the cleaning solution.

Estimated time for cleaning: 2 - 6 hours, depending on the deposits in the heat exchanger, size of the heat exchanger, cleaning temperature and cleaning liquid concentration.

9.2 MAINTENANCE OF THE FLUID LOADED IN THE SYSTEM

For water circuits with open cup systems:
it is advisable to **annually replace the fluid** loaded in the system and restore the parameters shown in the table in paragraphs ***3.4.2 Water quality***.

10

TROUBLESHOOTING

Alarm and fault	Cause	Solution	Carried out by
Electronic controller off	The main differential switch contacts are open	Close the contacts	User 
Electronic controller off	The cut-off switch on the unit's electrical panel is open	Close the contacts	User 
Electronic controller off	Tripping of the main differential switch	Check for any current leakage inside the machine	Specialised personnel 
FL *Water flow alarm / Tank water level Insufficient*	Insufficient tank water level	Fill the tank up to the maximum level **(if there is glycol, pay attention to the correct concentration)**	User
FL *Water flow alarm / Tank water level Insufficient*	No water flow Machine taps are closed	Open the taps	User
FL *Water flow alarm / Tank water level Insufficient*	No water flow	Check pump operation, bleed air from system	User
FL *Water flow alarm / Tank water level Insufficient*	No water flow Water circulation pump blocked or defective	Unlock or replace the pump	Specialised personnel 
FL *Water flow alarm / Tank water level Insufficient*	No water flow Circulation pump not working	Check the voltage at the coil of the remote switch or relay of the pump and the continuity of the coil.	Specialised personnel 
AL *Low water temperature*	The evaporator outlet temperature is below the alarm limit. The chiller has been stationary and exposed to low ambient temperatures	Restore a water temperature compatible with the alarm setting by leaving the pump running, reset the alarm.	User
AL *Low water temperature*	Low water flow to evaporator	Check the water filter is clean and the correct pump rotation direction	User
AL *Low water temperature*	Possible incorrect reading of evaporator water outlet probe	Check correct probe reading and replace if necessary	Specialised personnel 
AL *Low water temperature*	Compressor does not stop and compressor LED off on controller	The remote switch coil is not powered, replace remote switch.	Specialised personnel 
AH *High water temperature*	Water temperature above 35°C // 95°F.	System thermal load is higher than chiller capacity or operating conditions are out of limits. Restore correct operating conditions, partially empty the tank, add fresh water to lower the circuit temperature and restart the chiller	User
AH *High water temperature*	The chiller was switched off because of excessively high ambient temperatures.	Partially empty the tank and add fresh water to lower the circuit temperature and restart the chiller	User
AH *High water temperature*	Possible incorrect reading of evaporator water outlet probe	Check the correct reading of the probe and replace if necessary	User 

Alarm and fault	Cause	Solution	Carried out by
HPLP *Cumulative alarm*	**High-pressure switch triggered** Condenser obstructed or insufficient air flow-capacity	Remove dirt from the condenser and any obstructions to air/water flow (clean condenser filter if present). Wait for the pressure to drop below the reset value (see table paragraph 6.1), then reset the high-pressure switch by pressing the button above it (see figure paragraph 6.2).	User
HPLP *Cumulative alarm*	**High-pressure switch triggered** The unit operated outside its operating limits (such as air too hot)	If possible, restore conditions that are compatible with the operating limits. Rearm the pressure switch (paragraph 6.1).	User
HPLP *Cumulative alarm*	**High-pressure switch triggered** Condenser fans not working	Check the cause of the fan blockage. Reset the pressure switch	Specialised personnel
HPLP *Cumulative alarm*	**High-pressure switch triggered** Possible malfunction of safety pressure switch	Check the correct pressure switch settings, replace pressure switch if necessary.	Specialised personnel
HPLP *Cumulative alarm*	**Low-pressure switch triggered** Filter drier blocked	Check and replace	Specialised personnel
HPLP *Cumulative alarm*	**Low-pressure switch triggered** Thermostatic valve blocked	Replace valve	Specialised personnel
HPLP *Cumulative alarm*	**Low-pressure switch triggered** Low water flow rate	Clean water filter. Check the correct pump rotation direction. Check that the taps on the circuit are open	User
HPLP *Cumulative alarm*	**Low-pressure switch triggered** Refrigerant gas leak	Check the chiller circuit with a leak detector. Repair any ruptures and recharge the circuit.	Specialised personnel
HPLP *Cumulative alarm*	**Low-pressure switch triggered** The unit operated outside its operating limits (e.g. condensing air or chilled water too cold)	If possible, restore conditions that are compatible with the operating limits.	User
HPLP *Cumulative alarm*	**Low-pressure switch triggered** Possible malfunction of safety pressure switch	Check the correct pressure switch settings, replace pressure switch if necessary.	Specialised personnel
HPLP *Cumulative alarm*	**Compressor internal thermal protection triggered** (if present, check compressor model)	Wait for cooling: Check that the compressor is operating under nominal conditions. Check if there is sufficient refrigerant in the circuit	Specialised personnel
HPLP *Cumulative alarm*	**Compressor thermal-magnetic protection is open**	Check for short circuits in the compressor motor windings. Check for possible input overcurrent due to low voltage, the supply voltage and operating conditions.	Specialised personnel
HPLP *Cumulative alarm*	**Fan thermal-magnetic protection is open**	Check for short circuits in the fan motor windings. Check for possible input overcurrent due to low voltage, the supply voltage and operating conditions.	Specialised personnel
HPLP *Cumulative alarm*	**Fan internal thermal protection contact is open**	Check that the fans rotate freely and there are no obstructions to rotation. **With ECBlue fans, check the LED flashing on the fans' electrical box (refer to fan manual)** If necessary Call Service	User
HPLP *Cumulative alarm*	**Pump thermal-magnetic protection is open** Excessive water flow rate; pump inlet current is too high	Reduce the water flow rate by partially closing the pump delivery tap. Reset pump thermal-magnetic protection	User

Alarm and fault	Cause	Solution	Carried out by
HPLP *Cumulative alarm*	**Pump thermal-magnetic protection is open** Short circuit or overcurrent	Check for short circuits in the pump motor windings. Check for input overcurrent due to low voltage; check supply voltage.	Specialised personnel 
HPLP *Cumulative alarm*	**Pump thermal-magnetic protection is open** Mechanically blocked pump	Move the motor fan manually to unblock the pump, replace pump if necessary	Specialised personnel 
HPLP *Cumulative alarm*	**Triggering of phase sequence relay**	Reverse the two phases upstream from the cut-off switch of the unit's electrical panel. Check phase presence	Specialised personnel 
Pr1 *AI2 temperature probe failure*	AI2 temperature probe defective	Check the contacts and replace the probe if necessary	Specialised personnel 
Pr2 *AI1 temperature probe failure*	AI1 temperature probe defective	Check the contacts and replace the probe if necessary	Specialised personnel 
The compressor icon is on but the compressor does not work	Compressor remote switch or relay is off	Check the voltage at the coil of the compressor remote switch or relay and the continuity of the coil. Replace remote switch if necessary	Specialised personnel 
Fan icon off. Normal condensation pressure	Very low outside air temperature and consequent condensation control triggering	The machine can work anyway	
The compressor icon is on but the fan does not work	No voltage output from the fan-speed regulator	Check the voltage output from the regulator and replace fan, if necessary	Specialised personnel 
The compressor icon is on but the fan does not work	Electrical connections of the fan are loose	Check and tighten	Specialised personnel 
The fan icon is on but the fans do not work	Fan fuse blown	Check for short circuits in the fan motor windings. Check the rolling resistance of the fan bearings.	Specialised personnel 
Bubbles in the flow indicator, even with overcooling values above 5 K	Air or non-condensable gases inside the refrigerant circuit	Drain the circuit, create vacuum and recharge	Specialised personnel 
High overheating, low overcooling and high discharge compressor temperature. Traces of oil on the refrigerant circuit.	No refrigerant	Check the chiller circuit with a leak detector. Repair any ruptures and recharge the circuit.	Specialised personnel 
Water temperature is too high	Excessive thermal load	Reduce the thermal load. Reduce inlet water temperature and/or water flow rate by partially closing the unit's outlet tap.	User
COH Condenser overheated (only if AI1 probe configured as condensation probe)	Temperature read by the condenser probe exceeds 65°C // 149 °F Dirty condenser or ambient air too high	Clean the condenser with compressed air or cleaning agent. Ventilate the area to prevent hot air recirculation	User
CSd Condenser blocked (only if AI1 probe configured as condensation probe)	Temperature read by the condenser probe exceeds 75°C // 167 °F Dirty condenser or ambient air too high	Clean the condenser with compressed air or cleaning agent. Ventilate the area to prevent hot air recirculation	User

11

DISMANTLING THE CHILLER

If the chiller is being dismantled, you must separate it into parts of homogeneous material.
The following table lists the main materials of the various components of the machine.

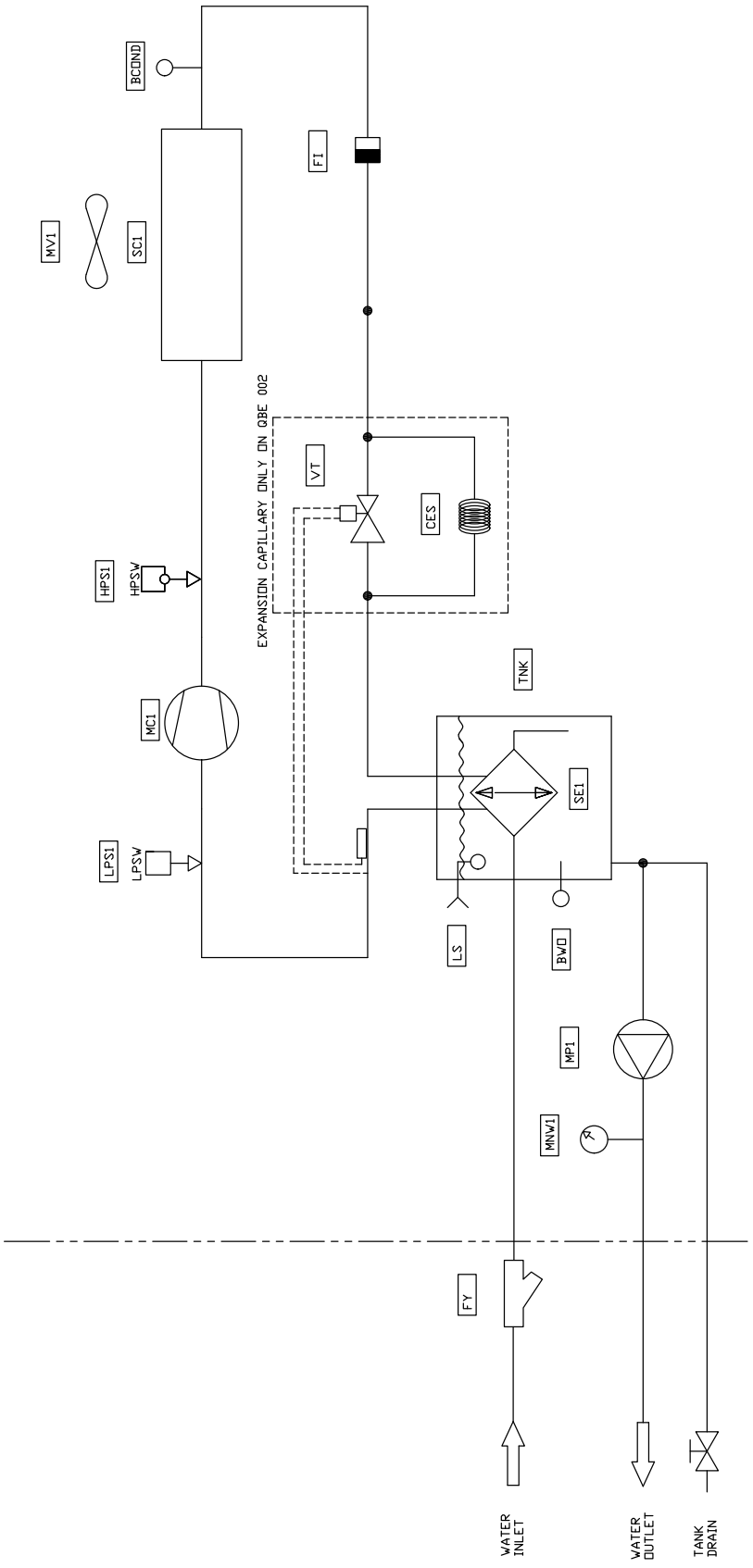
Part	Material
Refrigerant fluid	R513A, Oil
Panelling and supports	Carbon steel, epoxy paint SS Option: Stainless steel
Chiller compressor	Steel, Copper, Aluminium, Oil
Plate exchanger (evaporator FQBE009÷025)	Steel, Copper
Coaxial exchanger (evaporator FQBE002÷007)	Copper
Condenser	Aluminium, Carbon Steel
Pipes	Copper
Fan	Aluminium, Copper, Steel
Valves	Steel, Bronze
Insulation	Synthetic rubber without CFC, EPS, Polyurethane
Pump	Steel, Copper
Tank	ABS, PVC
Electrical wires	Copper, PVC
Electrical parts	PVC, Copper, Bronze

We recommend that you follow current safety norms for the disposal of each single material.
The refrigerant contains particles of lubrication oil from the chiller compressor.

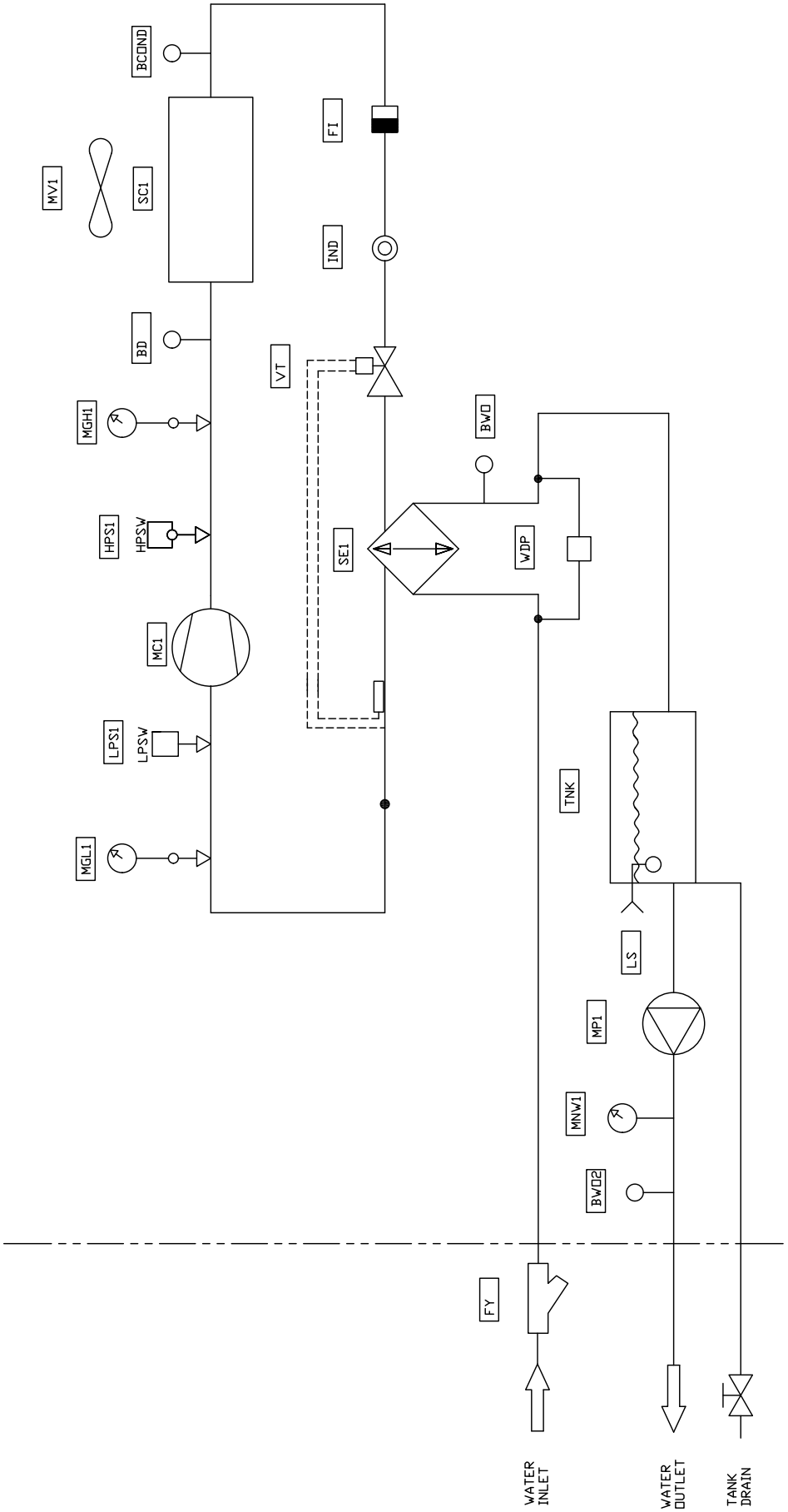
Dispose of refrigerant properly. Remove it from the chiller with suitable tools and deliver it to authorized collection centres that will treat it and make it reusable.

P&I DIAGRAMS

HPC 002÷007



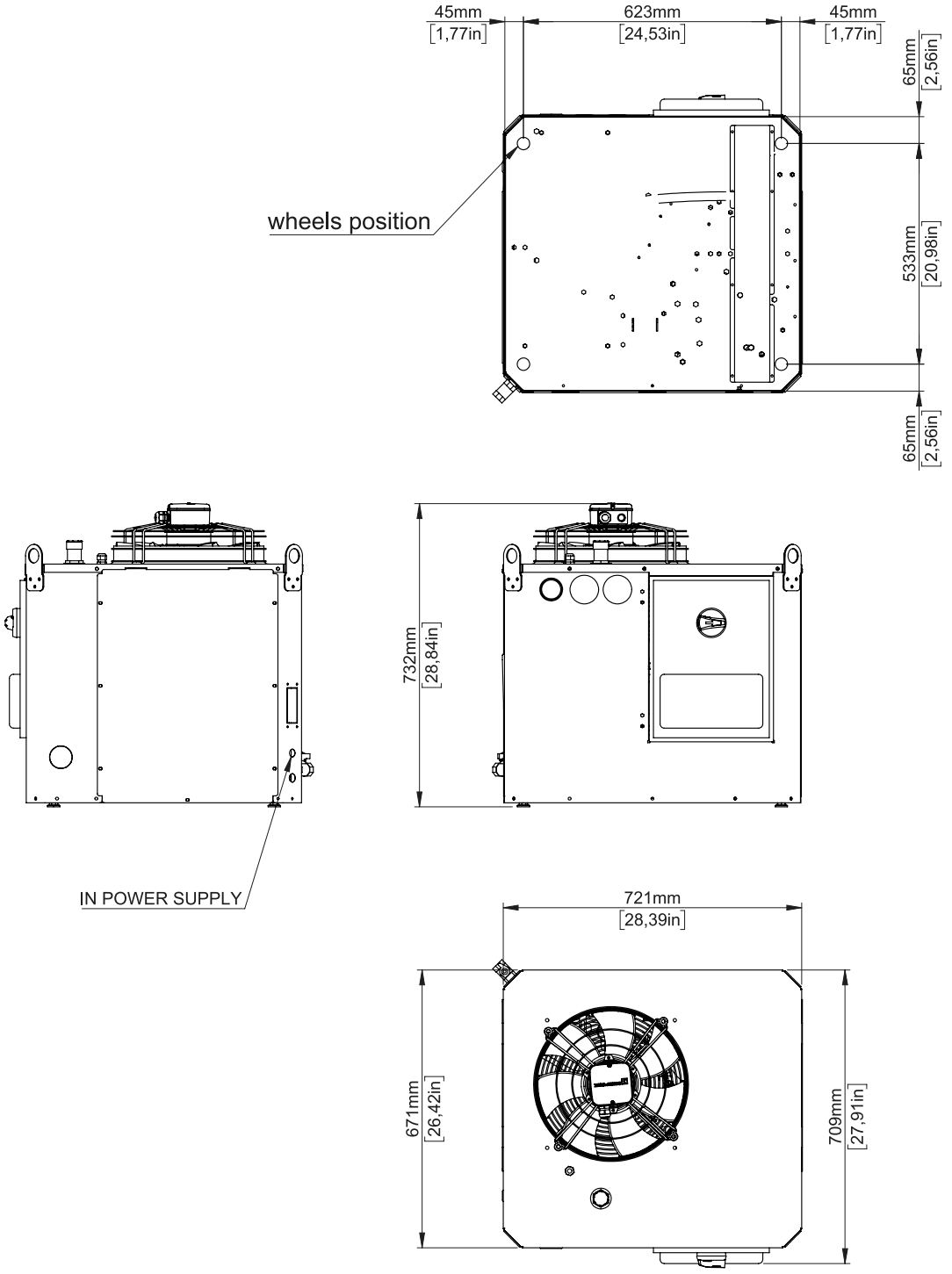
HPC 009÷025


BCOND
FI
MV1
SC1
IND
BD
VT
MGH1
BWO
HPS1
HPSW
SE1
WDP
MC1
LPS1
LPSW
TNK
MGL1
LS
MP1
MNW1
BWO2
FY
WATER INLET
WATER OUTLET
TANK DRAIN

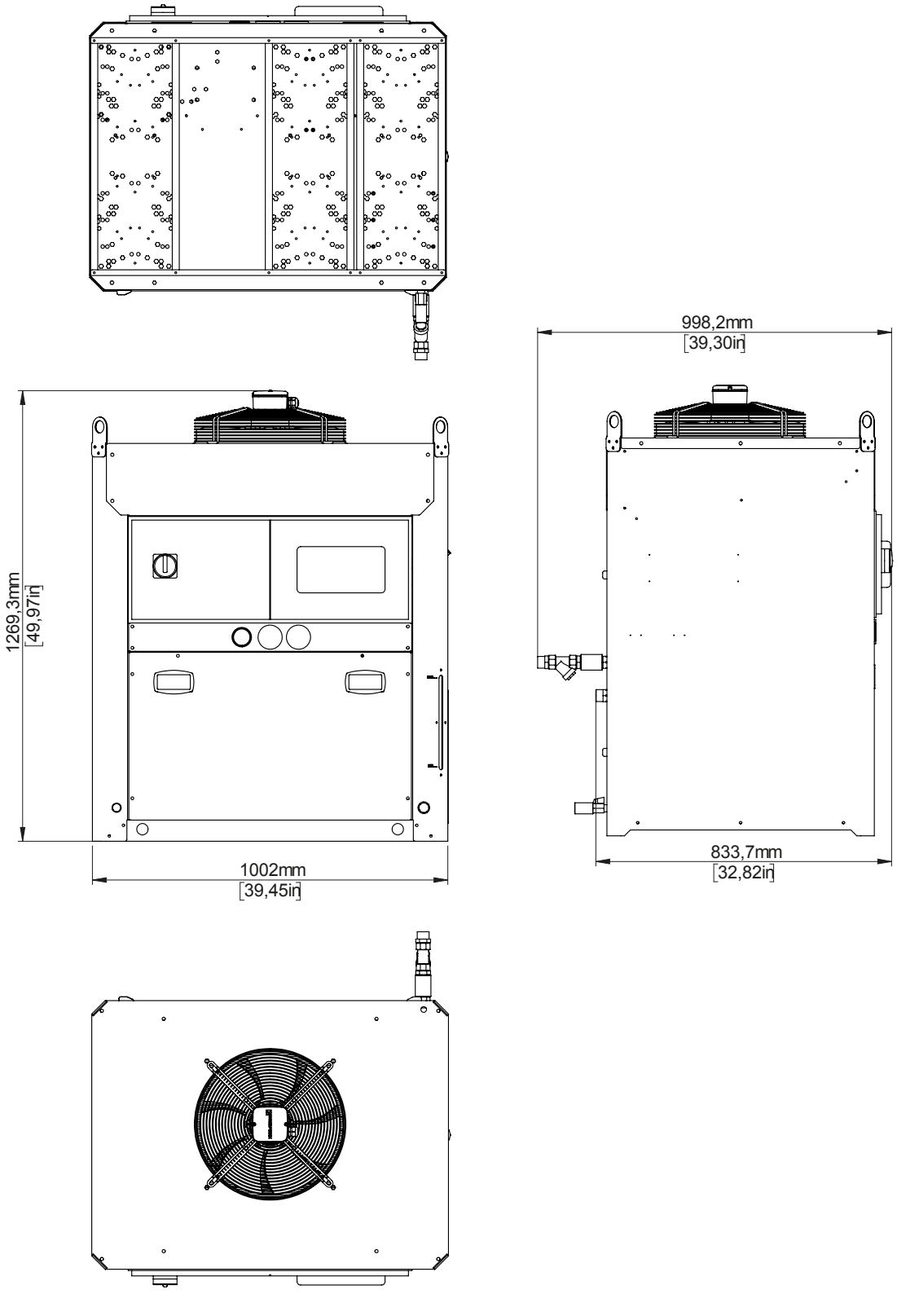
TAG P&ID*	DESCRIZIONE
LPS1	LOW PRESSURE SWITCH
HPS1	HIGH PRESSURE SWITCH
MC1	COMPRESSOR
RC1	COMPRESSOR CRANKCASE HEATER
SC1	CONDENSER
MV1	FAN
FI	REFRIGERANT FILTER
BCOND / BWO / BD	TEMPERATURE PROBE
FY	WATER STRAINER
SE1	EVAPORATOR
MGH1	HIGH PRESSURE GAUGE
MGL1	LOW PRESSURE GAUGE
IND	SIGHT GLASS
VT	THERMOSTATIC EXPANSION VALVE
MNW1	WATER GAUGE
WDP	DIFFERENTIAL PRESSURE SWITCH
MP1	WATER PUMP
TNK	WATER TANK
LS	WATER LEVEL SENSOR
CES	CAPILLARY TUBE

DIMENSIONAL DRAWINGS & MASSES

HPC 002÷007



HPC 009÷025



Model	Masses			
	Standard		*Maximum*	
	kg	*lb*	*kg*	*lb*
HPC 002	67	147.74	68	149.94
HPC 003	68	149.94	83	183.02
HPC 004	68	149.94	83	183.02
HPC 005	73	160.97	88	194.04
HPC 006	73	160.97	88	194.04
HPC 007	81	178.61	96	211.68
HPC 005 3PH	86	189.63	100	220.50
HPC 006 3PH	86	189.63	100	220.50
HPC 007 3PH	90	198.45	104	229.32
HPC 009	168	370.44	198	436.59
HPC 012	169	372.65	199	438.80
HPC 014	181	399.11	205	452.03
HPC 020	187	412.34	211	465.26
HPC 025	187	412.34	211	465.26