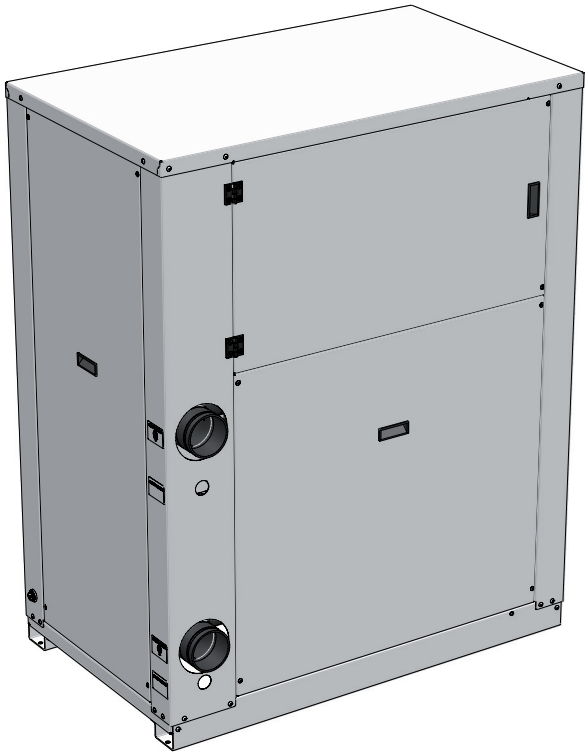
INSTALLATION, OPERATION AND MAINTENANCE MANUAL



PUMP UNIT WITH ACCESSORIES

CE

HP 2.0 series

TRANSLATION OF THE ORIGINAL INSTRUCTIONS

Language
En

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fiorini INDUSTRIES

Company with Environment - Quality integrated management system according to ISO 9001 – ISO 14001 certified by RINA

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EXTRACT OF WARRANTY TERMS AND CONDITIONS

Fiorini Industries S.r.l. guarantees the quality and correct operation of its products, in accordance with the provisions of directive 99/44/EC and national applicable legislation.
The warranty is valid if the installation instructions are followed (those issued by Fiorini Industries S.r.l., as well as those deriving from current practice).
The warranty is subject to the notification of flaws or faults. Furthermore, the warranty is valid only in the event the buyer stops using the appliance as soon as a fault is noticed.
The warranty is only valid if the appliance is serviced properly.
The warranty covers the replacement of faulty parts.
Fiorini Industries S.r.l. will not bear any costs for moving equipment on site (for example for a crane, the disassembly of pipes, etc.) to replace components such as pumps, valves etc. and this also applies to board and lodging for technicians working at the installation site.

Fiorini Industries S.r.l. has its UNI EN ISO 9001 Environment - Quality Integrated Management System certified by RINA S.p.A. (certificate no. 11436/04/SU).

A-1 SYMBOLS

The following symbols are used through this publication and/or on the unit:

	**DANGER:** draws the operator's attention to actions that can cause serious injury if they are not performed properly.
	**DO NOT:** draws the operator's attention to forbidden actions.
	**DANGER HIGH VOLTAGE:** draws the operator's attention to actions that can cause serious or fatal injury to any exposed persons if they are not performed properly.
	**DANGER HIGH TEMPERATURES:** draws the operator's attention to actions that can cause serious injuries due to the high temperature of components, if they are not performed properly.
	**IMPORTANT:** draws the operator's attention to technical information or practical recommendations for a more effective and efficient use of the unit.
	**OBLIGATION:** draws the operator's attention to mandatory actions that ensure the proper operation of the unit.

A-1.1 SAFETY LABELS

The following labels are applied to the unit. They contain important safety information:



DANGER: Applied on the front of the electrical board, it indicates that you must open the electrical board only after bringing the main switch to "0 - OFF".

A-2 GENERAL WARNINGS

Keep this manual in a dry place to avoid deterioration for at least 10 years so it can be consulted at any times. Read all the information contained in this manual carefully and thoroughly.
Pay particular attention to the instructions preceded by the “DANGER” or “DO NOT” symbols as failure to comply with them can damage the unit and/or result in damage to persons or things.
For any problems that are not covered in this manual, contact your nearest Service Centre in good time.
The manufacturer accepts no responsibility for damage due to an improper use of the unit, or the partial or superficial reading of the information in this manual.
Install the unit so that maintenance and/or repair works can be carried out with ease.
In any case, the warranty on the unit does not cover the costs of aerial ladders, scaffolding or other lifting equipment which may be required for interventions covered by warranty.

A-3 RECEIPT OF THE UNIT

The unit is supplied on a wooden pallet.

On delivery, the following documents are supplied:

- Installation, operation and maintenance manual
- EC declaration

The installation, operation and maintenance manual is an integral part of the unit; we recommend reading it from front to back and keeping it in a safe place.

Only unpack the unit prior to installation.

Once unpacked, the unit should be handled by qualified personnel using equipment with a suitable capacity (see chapter “Handling and positioning the unit”).

When handling the unit, keep it in a vertical position.

Avoid release of packaging materials to the environment, and do not leave any packaging materials within the reach of children as they are a potential source of hazard.

Dispose of those materials in accordance any local and national regulations in force.

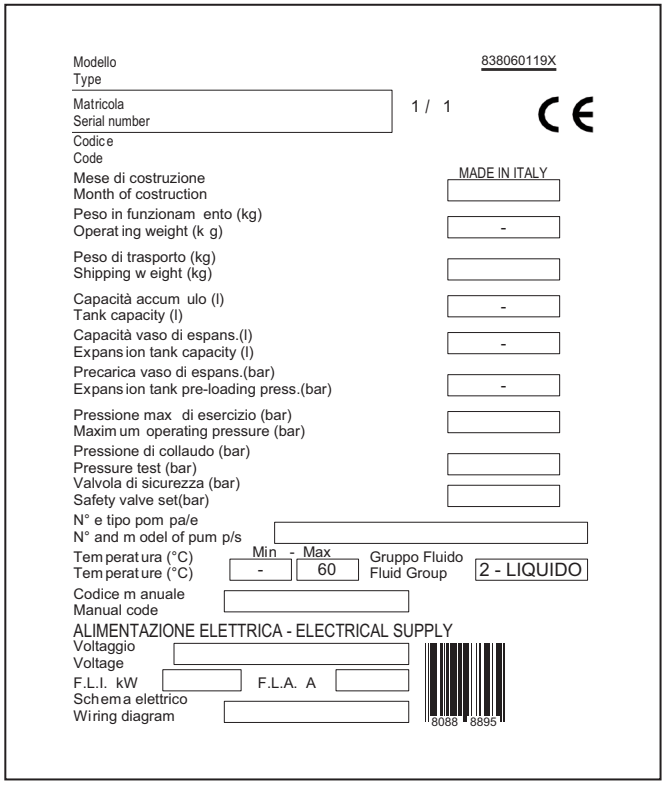
Upon receipt, check the unit to be sure it has not suffered any damage during transport or handling. Also check that all items and accessories listed in the packing list have been delivered with the unit.

A-4 IDENTIFICATION OF THE UNIT

The unit can be identified through the following:

- **Identification plate**
  The plate applied on the unit, contains specifications and performance data of the unit. If the plate is lost or illegible, you must obtain a new plate from the Manufacturer.

Defacing, damaging or removing an identification plate, makes any installation, maintenance and request for spare parts difficult.

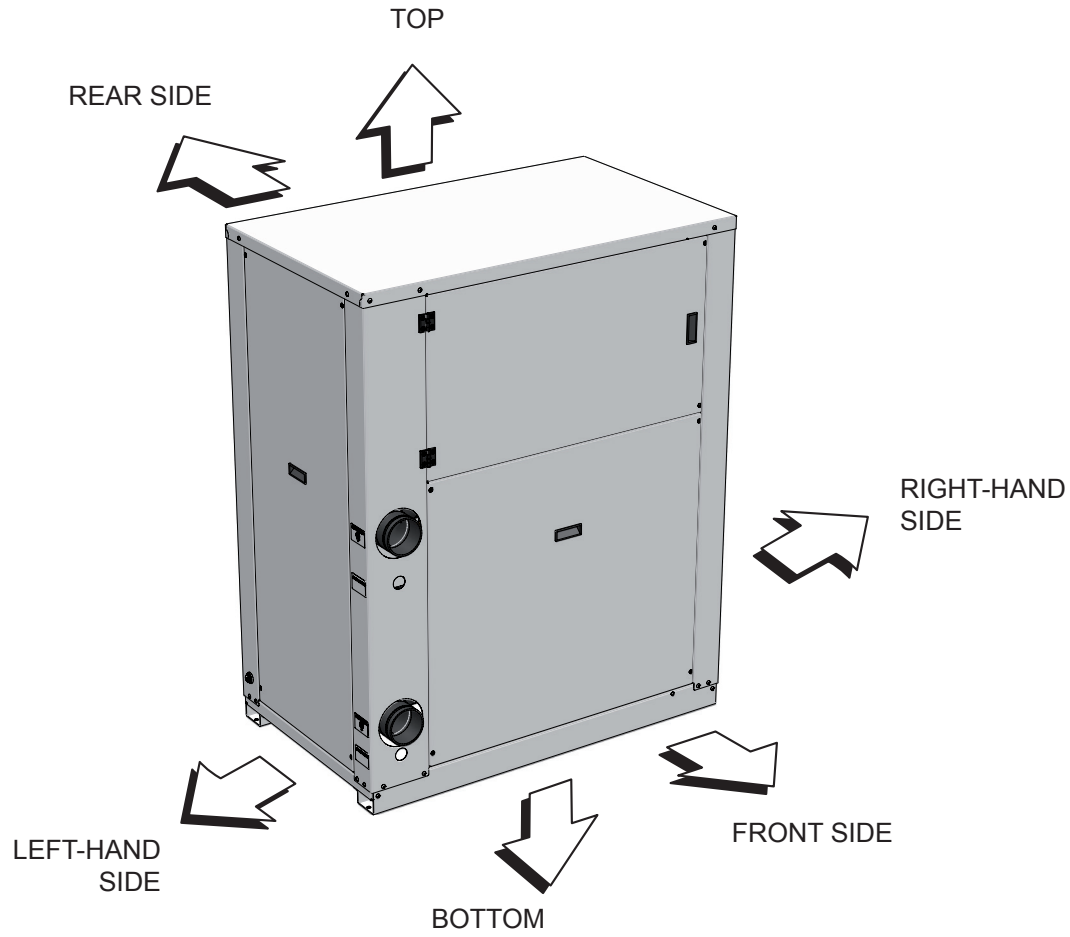


A-5 AVAILABLE VERSIONS

For the identification of the different versions manufactured, refer to section G “Drawings - Diagrams - Tables” in this manual.

A-6 POSITION

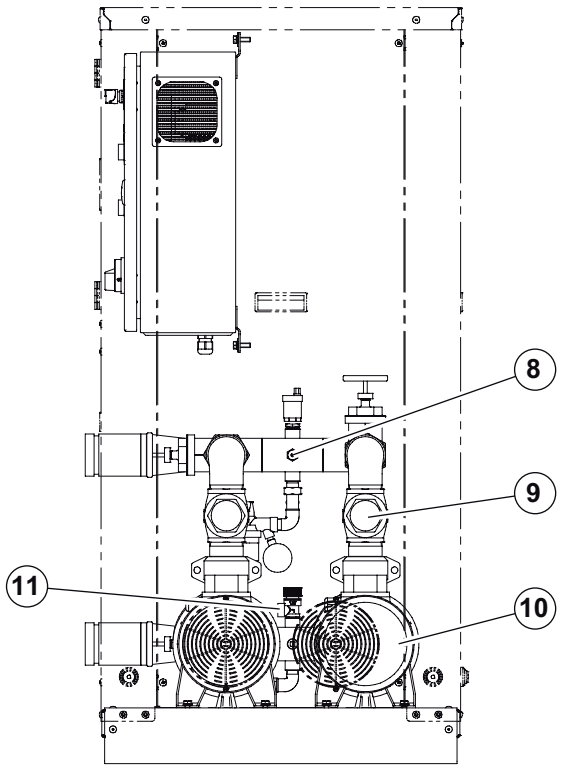
In order to make any reference in this manual to different parts clear and unmistakable, the following picture shows the main reference points of the unit.



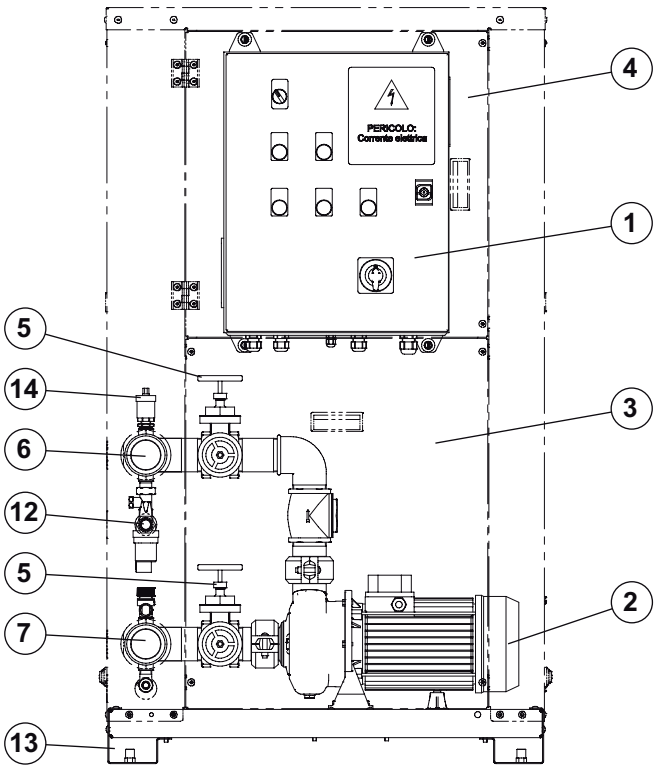
purely indicative picture

A-7 DESCRIPTION OF THE UNIT

A-7.1 LIST OF MAIN COMPONENTS



Right-hand side view



Front view

Ref.	*Description*
1	Electrical panel
2	Circulation pump (two-pump versions only)
3	Removable bolted panel
4	Hinged panel
5	Shut-off valves
6	Water outlet fitting
7	Water inlet fitting
8	Pressure transmitter (versions with inverter only)
9	Check valve (two-pump versions only)
10	Air intake grid
11	Safety valve
12	Automatic filling unit
13	Base
14	Automatic bleed valve

Upon request the following optional accessories can be supplied:

- dual pump;

- vibration-proof feet;

- sound insulating panels;

- expansion tank.

B-1 SAFETY INSTRUCTIONS

B-1.1 FOREWORD

All units have been designed, manufactured and tested to comply with the following EC Directives: **2006/42/EC** (Machinery Directive), **2014/30/UE** (Electromagnetic Compatibility Directive), **2014/35/UE** (Low Voltage Directive).
Read the instructions provided in this manual before using the unit.

The Manufacturer cannot be held responsible if - when installing the system in which the unit is incorporated - the local safety regulations in force are not abided by.

B-1.2 DEFINITIONS

- **Owner**: means the legal representative of the company, body or person owning the system in which the unit is incorporated; the owner is responsible for making sure that all the safety regulations contained in this manual and the national regulations in force are abided by.
- **Installer**: means the legal representative of the company called in by the owner to position the unit and perform hydraulic, electrical and other connections of the unit to the system; the installer is responsible for handling and properly installing the unit in accordance with the instructions in this manual and the national regulations in force.
- **Operator**: means the person authorised by the owner to perform adjustment and control operations; the operator cannot perform operations other than the ones expressly indicated in this manual.
- **Technician**: means the person authorised to carry out all the routine and extraordinary maintenance operations, as well as any adjustment, check, repair operations and part replacement which may be necessary during the lifetime of the unit.

B-1.3 INTENDED USE

These units have been designed to be installed along with heat pumps or chillers in water cooling/heating systems. Any other use not authorized by the Manufacturer is forbidden as an improper use.
The Manufacturer accepts no contractual or extra-contractual liability for injury to persons or animals or damage to things, due to wrong installation, incorrect adjustment and maintenance, improper use or the partial or superficial reading of the information contained in this manual.
In order to constantly improve the quality of its products, the Manufacturer reserves the right to make changes to the data in this manual at any time and without notice and accepts no responsibility for any inaccuracies contained herein, nor printing or transcription errors.

Read this manual carefully.
All the work must be carried out by qualified, skilled personnel, who has full knowledge of the regulations in force in the country of installation.

The warranty shall cease to have effect if:
- the unit is put into service by anyone other than skilled, authorised personnel;
- the above-mentioned indications are not observed.

The documentation supplied with the unit shall be given to the owner to be kept carefully for future maintenance or service.

On receipt of the goods by the carrier, check the packaging of the units is intact.

B-1.4 ACCESS TO THE UNIT

The installation area of the unit must be accessible to authorised **OPERATORS** and **TECHNICIANS** only.

B-1.5 GENERAL PRECAUTIONS

- The unit must be connected to an efficient grounding system and no installation and/or maintenance intervention shall be performed unless the main switch and the switch of the control system have been turned off.
- Make sure the characteristics of the main electricity supply match the data indicated on the unit's identification plate.
- The unit must only be used for the purpose for which it was designed. Any use other than that intended and specified is not binding for the manufacturer in any way.
- Stop the unit in case of faults or malfunction.
- Do not fill the unit with liquids other than water or water-based solutions with ethylene or propylene glycol in a maximum quantity of 30%. Do not exceed the maximum allowed pressure for the water circuit indicated on the identification plate.
- The **OPERATOR** must only use the unit controls and must not open any of the panels other than those necessary to gain access to the control panel.
- The **INSTALLER** must only make the connections between the system and the unit.
- Do not wear jewellery, loose clothing or any other accessories that could get caught in moving parts.
- Use suitable personal protective equipment (gloves, goggles, etc.) when flame-cutting or using compressed air.
- Always use tools in good conditions; make sure you have fully understood the instructions before using them.
- Make sure you have removed any tools, electrical cables or other loose items before closing and starting the unit.
- Do not install the unit in an explosive atmosphere.
- Do not install the unit in environments with electromagnetic fields stronger than those envisaged in Electromagnetic Compatibility Directive **2014/30/UE**.
- The unit must stand on a support surface featuring the characteristics indicated in this manual; a surface with unsuitable characteristics can expose personnel to the risk of serious accidents.
- The unit has not been designed to support loads and/or forces which might be transmitted by adjacent units, pipes and/or structures. Any external load or force transmitted to the unit can cause breakage or failure of the structure of the same, with serious hazards for the persons exposed. In these cases any form of guarantee is automatically void.

B-1.6 PRECAUTIONS AGAINST RESIDUAL RISKS

Prevention of residual risks caused by the control system

- Be sure to have fully understood the instructions before performing any operation on the control panel.
- Always keep the instruction manual on hand when operating on the control panel.
- Only start the unit after making sure it has been properly connected to the chillers, heat pumps, etc..
- Immediately report any alarm on the unit to a technician.
- Do not reset the alarms that can be reset manually without first detecting and eliminating the cause; failure to do so will make the warranty void.

Prevention of residual mechanical risks

- Install the unit according to the instructions in this manual.
- Perform all the maintenance tasks indicated in this manual on a regular basis.

Prevention of residual electrical risks

- Connect the unit to the main electricity supply following the instructions provided in this manual.
- Perform all the maintenance maintenance tasks indicated in this manual on a regular basis.
- Disconnect the unit from the main electricity supply by means of the external disconnect switch before opening the electrical board.
- Ensure that the unit has been connected to an efficient ground system before putting it into service.
- Check all electrical connections, the connecting cables and in particular the insulation condition; replace any obviously worn or damaged cables.
- Periodically check the wiring in the board.
- Check that all magneto-thermal circuit breakers are in efficient working order.
- Do not use cables with an inadequate cross-section or make temporary connections even for short periods of time or emergencies.

Prevention of various residual risks

- Make all connections to the unit following the instructions in this manual and on the panels of the unit.
- The hydraulic circuit contains toxic substances, when using antifreeze. Do not drink the liquid in the hydraulic circuit and avoid contact with skin, eyes and clothes.
- After dismantling a part, make sure it is reassembled correctly before starting the unit again.

- Keep a fire extinguisher suitable for putting out fires on electric appliances near the unit. Check the extinguisher and have the maintenance operations recommended on the instructions plate carried out as indicated.
- When working on a unit installed indoors, make sure that any drainage following the activation of safety valves does not pose any hazards.
- Eliminate any fluid leaks inside and outside the unit.
- Do not keep flammable liquids near the system.
- Do not bend or hit pipes containing fluids at pressure.

B-1.7 PRECAUTIONS TO OBSERVE DURING MAINTENANCE

Maintenance operations must be carried out by authorized technicians only.

Before performing any maintenance operation you shall:
- Switch off the unit from the main electricity supply by turning the external disconnect switch to off.
- Place a “Do not turn on - Maintenance underway” sign on the open (OFF) disconnecting switch.
- Make sure any remote ON/OFF controls are disabled.
- Use suitable personal protection equipment (helmet, insulating gloves, protective goggles, safety shoes, etc.).

If you have to make measurements or do checks with the unit running, proceed as follows:
- Operate with the electrical board open for as short a time as possible.
- Close the electrical board as soon as each single measurement has been taken or each single check has been done.
- For external units, do not perform interventions in dangerous weather conditions such as rain, snow, fog, etc.

Furthermore, the following precautions should always be taken:
- During bleeding operations be careful of any spillages of fluids at high temperatures and/or dangerous pressure.
- Always and only use original spare parts purchased directly from the Manufacturer.

B-1.8 GENERAL SAFETY RULES

Remember that the use of products supplied with electricity and water implies the observance of some fundamental safety rules:

The unit must not be used by children or disabled people without suitable assistance.

Do not touch the unit if you have bare feet or wet or damp parts of the body.

Do not perform any cleaning operation, unless you have first disconnected the power supply by turning the main circuit breaker to “OFF”.

Do not tamper with the safety or adjustment **devices** without prior authorisation and instructions of the Manufacturer.

Do not pull, disconnect, or twist the electrical cables coming out of the unit, even if power has been turned off.

Do not open the doors giving access to internal parts of the unit, unless power has been turned off.

Do not climb or sit on the unit and do not place any objects on the unit.

Do not spray water **or direct** water jets towards the unit.

Do not disperse, abandon or leave packaging materials (cardboard, staples, plastic bags, etc.) within the reach of children as they can be a potential source of danger.

Maintain safe distances between the unit and other appliances or structures to guarantee enough room to access the unit for maintenance and/or repair as indicated in this manual (see **chapter C-1.1**).

Power supply: use electrical cables of a suitable cross-section to power the unit, and ensure the input voltages match those indicated for the different units; all units must be connected to an efficient grounding system according to any local or national regulations in force.

Hydraulic connection must be made following the instructions provided in order to guarantee the unit proper functioning. Add glycol to the water circuit if the unit shall not be used for a long time, or the hydraulic circuit is not drained in winter.

Handle the unit with the greatest care to prevent any damages.

C-1 HANDLING

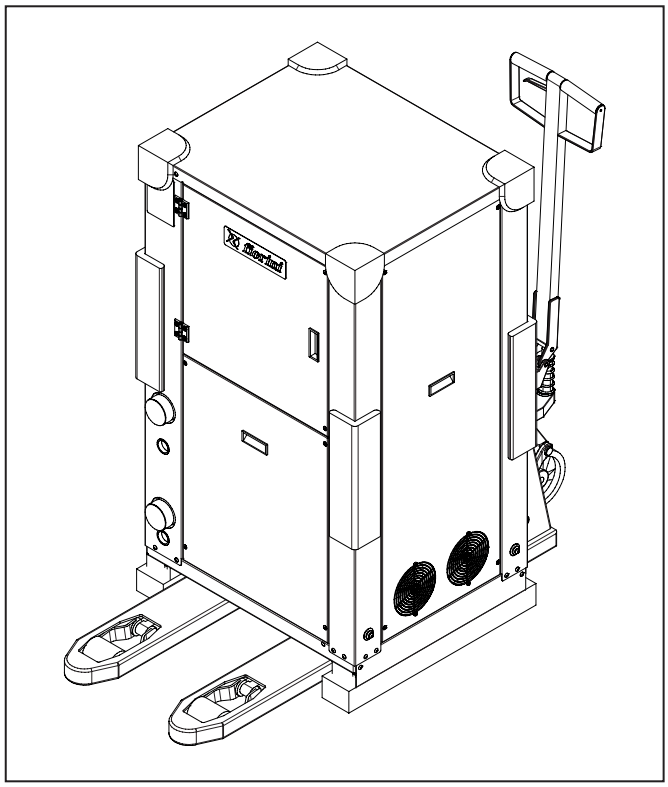
C-1.1 HANDLING AND POSITIONING THE UNIT

The units must be handled by means of a hand pallet truck. They are supplied adequately packed to prevent any damage.

Do not handle the units using means that are not adequate or in good state of repair.

Before handling, make sure that all panels are properly fixed.
Before handling the unit, verify that the surface where it will be installed on, has an adequate bearing capacity at full load.
Never move the unit on rollers and never lift it.
Do not remove the plastic cover and the protective elements that protect the unit from dirt, dust and foreign matter which may penetrate or damage the outer surfaces, until the unit is ready for use.
Place the forks of the pallet truck under the unit. Make sure they are properly centered to prevent any dangerous oscillations.
When handling the unit, be careful not to damage it.

The maximum width of the unit is 790 mm. You can easily make it pass through narrow openings (e.g. doors of dwellings).



The units of the HP series have a base with holes for antivibration supports. The unit doesn't need to be anchored to the base, unless there is a serious risk of seismic activity in the area where the unit is installed, or if the unit is installed in an overhead position and/or on a metal profile frame.
Before installing the unit, make sure the structure of the building and/or the supporting surfaces can support its weight. The relevant weights are shown in the overall dimensions drawing.
The units have been designed to be installed on the floor outdoors.
If you need to install the unit on the ground, position it on a flat surface suitable for supporting its weight.

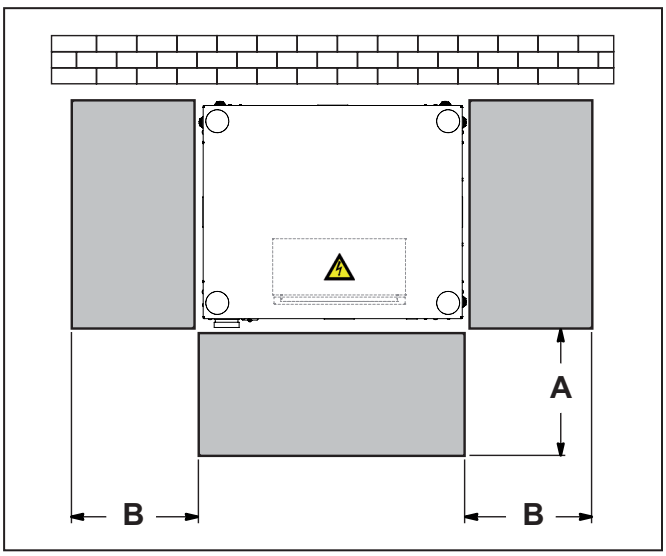
To select the installation position, take into account the following:

- Do not install the unit in areas that may be subject to floods, nor under drips, etc.
- The place of installation must ensure enough room for air circulation and for the execution of maintenance operations.

You can lean the back of the unit against a wall; however, it is advisable to leave some distance from the wall for easy repair and/or maintenance, if any.

Choose the place of installation ensuring enough room for air circulation; in particular, do not cover the air intake grids on the sides of the circulation pump/s.

Recommended free space for handling operations	
A	800 mm
B	800 mm



C-2 STORAGE BEFORE ASSEMBLY

If the unit is not installed shortly after receiving it, and you have to store it for a long time, do not remove the original packaging.
Check the ambient conditions in the place of storage: the unit, still packed, must be stored in a sheltered place, with ambient temperature between +10°C and +50°C.
Do not store in very humid places, exposed to weather (avoid any unsheltered places).
Rest the unit on a stable surface and make sure there is no risk of sudden displacement.
To ensure the packed unit is not a hazard or is not damaged, store it in a place which can be accessed by authorized personnel only.
The storage area should be preferably close to the installation area, so that only short distances have to be travelled during assembly.
Periodically check for any changes in the storage conditions.
Do not lay any boxes, cases or heavy equipment on the packed unit.

Do not rest the unit directly on the ground.

Do not place the packed unit near flammable materials.

Ensure and maintain the best storage conditions; in particular avoid contact with water.

If any operations which may damage the stored unit have to be performed close to it, take suitable measures: for example, in the event of welding operations, protect the unit with panels.

C-3 INSTALLATION

C-3.1 HYDRAULIC CONNECTIONS

Fill the hydraulic circuit with an antifreeze solution if the system is shut down without being emptied before winter. If necessary, drain water from the HP unit.
The connection pipes shall be adequately supported so that their weight does not put undue stress on the unit.
Furthermore:

- Install shutoff valves at the inlet and outlet.
- Install vent valves in the high points of the water lines.
- Install suitable drain points with plugs, taps, etc. in the low points of the water lines.
- Insulate water pipes to prevent heat transfer.

Before filling the system, make sure there are no foreign matters, sand, gravel, welding residues and other materials inside which could damage the system components.
When flushing the circuit we recommend cutting off the unit.
The inlet and outlet fittings of the running fluid shall be connected in compliance with the indications on those fittings.
Connect the system's water lines to the unit couplings, the diameters and positions of which are indicated in this manual.

Not obeying these installation instructions will make the warranty void.

C-3.2 EXPANSION TANK

The unit is supplied with no expansion tank, since the total volume of the plant cannot be foreseen, and thus its dimensions.
Because the expansion tank compensates for pressure changes and ensures a constant operating pressure, the client may decide to fit it and calculate the required size.

To size the expansion tank use the formula below::

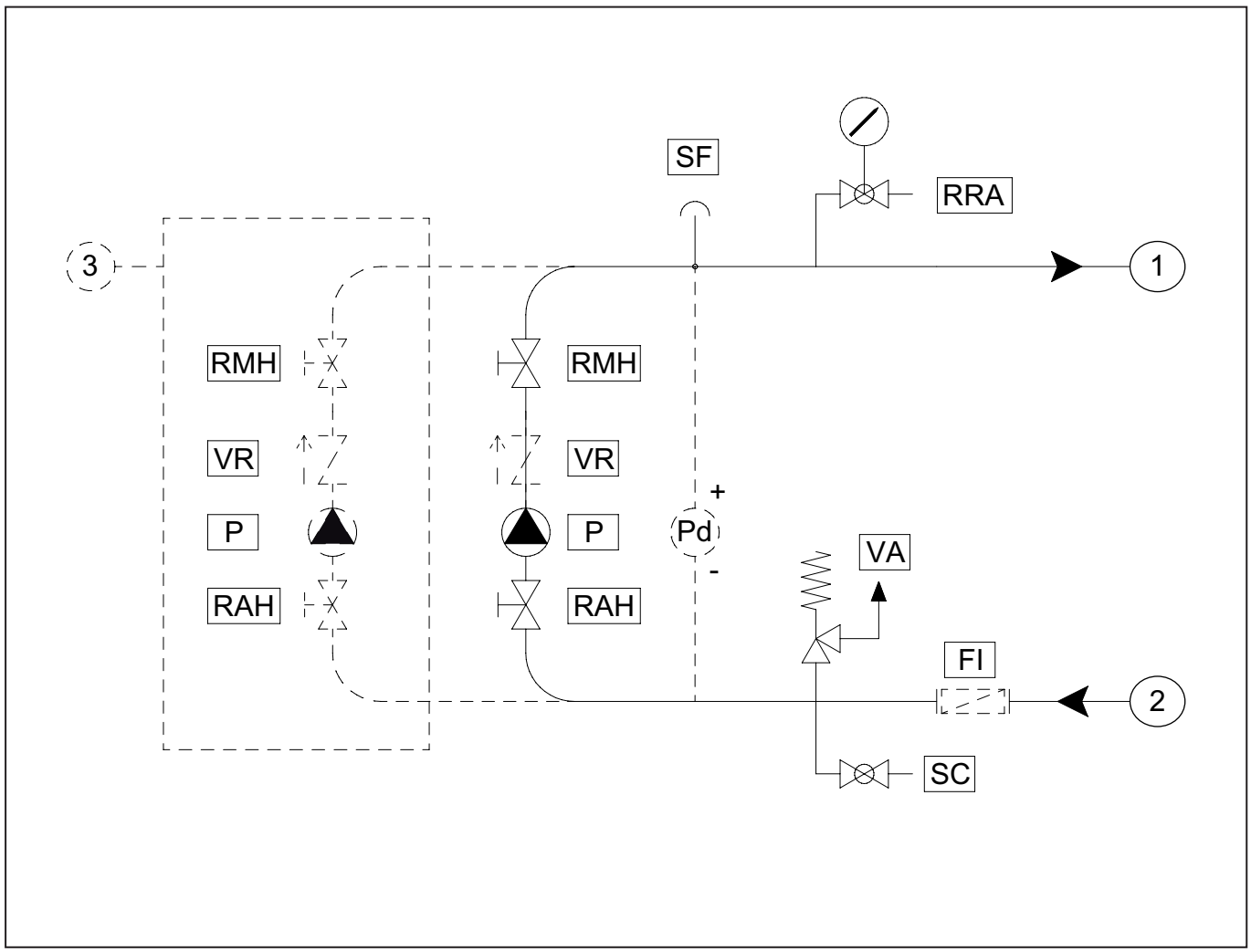
$$V = \frac{\frac{e \times C}{P_f - P_i}}{P_f}$$

Whereas:

V = expressed in liters, is the result of the calculation. For proper sizing, use an expansion tank having a capacity slightly higher than "V".
e = water expansion coefficient (see table below)
C = total volume of the plant
P_i = absolute pre-charge pressure of the expansion tank, given by the relative pre-charge pressure of the tank plus the atmospheric pressure
P_f = preset absolute pressure of the safety valve, given by the valve relative pressure plus the atmospheric pressure.

Temperature difference (ΔC)	Coefficient e
10	0.00027
20	0.00177
30	0.00435
40	0.01210
50	0.01450
55	0.01710
60	0.01980
65	0.02270
70	0.02580
75	0.02900
80	0.03240
85	0.03590
90	0.03960
100	0.04340
110	0.05150

C-3.3 HYDRAULIC CONNECTION DIAGRAM



C-3.4 HYDRAULIC CONNECTION KEY

Ref.	*Description*
FI	Mesh filter (optional)
P	Circulation pump
SC	Drain valve
SF	Bleed valve
RAH	Pump suction valve
RMH	Pump delivery valve
RRA	Automatic make-up valve
VR	Check valve (two-pump version only)
VA	Automatic safety valve
Pd	Differential pressure switch
1	Delivery to plant
2	Return from plant
3	Second pump (two-pump version only)

C-3.5 FILLING AND EMPTYING THE CIRCUIT

Should the system be shut down in winter, the water in the pipes can freeze causing irreparable damage to the unit.

There are three possible solutions to prevent icing up:

– drain water at the end of the season and fill the circuit at the beginning of the next. We recommend installing a tap for draining the unit on the outlet pipes. **In any case, a bleed valve and a drain valve are positioned on the pump impeller (possibly behind the cover of the same)**;

– run the unit with a glycol-water mix, using a percentage of glycol chosen according to the minimum outdoor temperature expected;

– use a heating element (available as an accessory). In this case the heating element must always be powered for the entire period when there is a risk of pipe icing up.

C-4 ELECTRICAL CONNECTION

C-4.1 ELECTRICAL POWER SUPPLY

The characteristics of the main electricity supply must comply with the requirements of standard **IEC EN 60204-1** and they must be suitable for the unit's power absorption indicated in **chapter "TECHNICAL SPECIFICATIONS"** in **section A**.

The mains voltage must correspond to the nominal value +/- 10%, with a maximum offset between the phases of 2%.

Abide by any local and national regulations.

The electrical distribution system must be suitable for supplying the power absorbed by the unit.

The disconnecting switches and magneto-thermal circuit breakers must be properly sized to handle the maximum current absorbed.

As for the layout and equipment of the electrical board, refer to the unit's wiring diagram.

The power cables must pass through the relevant holes in the unit's panels and enter the electrical cabinet through the holes specifically made for this purpose at the bottom of the same.

Install a protective device - not supplied - in the power line of the electrical panel as provided for by the regulations in force.

Supply the electrical panel with power using a cable with a suitable cross-section for the power absorbed by the unit (see wiring diagram in **section G**). The control circuit in the electrical board is a branch circuit of the power circuit.

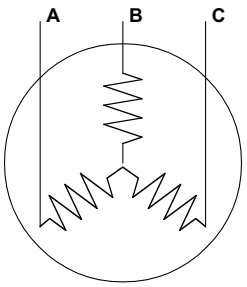
C-4.2 ELECTRICAL CONNECTIONS

Connections to terminals must be made according to the wiring diagram.
Before connecting the power lines, ensure that the voltage is within the limits indicated in the specifications of the wiring diagram.

Do not run the electric motors when the voltage offset between the phases is over 2%.
Use the following formula to check for it:

$$\text{offset \%} = \frac{\text{Max voltage offset with respect to mean value (V)}}{\text{voltage average value (V)}} \times 100$$

Example:
Nominal mains voltage 400V - 3Ph - 50Hz
AB = 409 V; BC = 398 V ; AC 396 V
average V = (409 + 398 + 396) / 3 = 401 V



$$\text{offset \%} = \frac{(409 - 401)}{401} \times 100 = 1.99$$

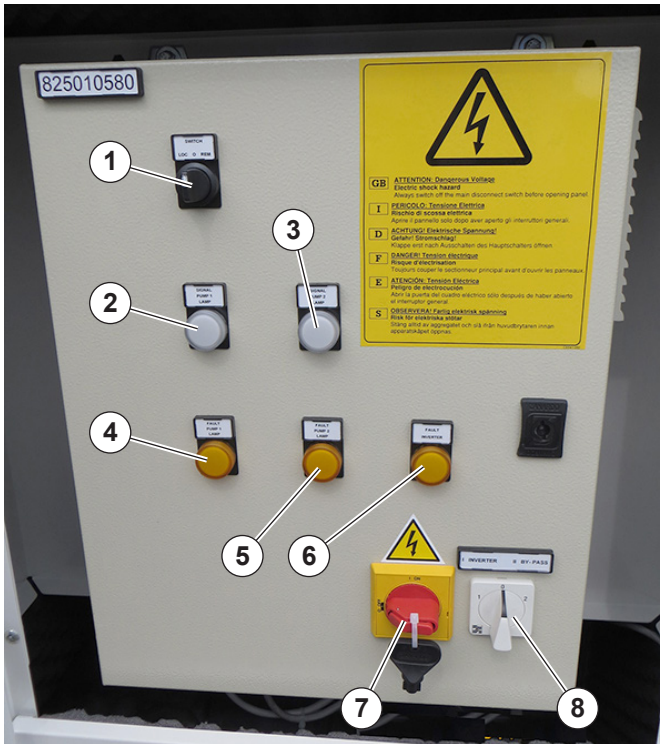
IMPORTANT: If the mains voltage has an offset of over 2%, contact the electricity company. Using the unit with a voltage offset between the phases of over 2% MAKES THE WARRANTY VOID.

Before putting the unit into service we recommend checking that the electrical systems have been installed in accordance with the Electromagnetic Compatibility Directive.

It is essential to ensure that the pumps rotate in the right direction (indicated by the arrow on the pump casing).
If this is not the case, swap two phases of the power cable over in the electrical panel.

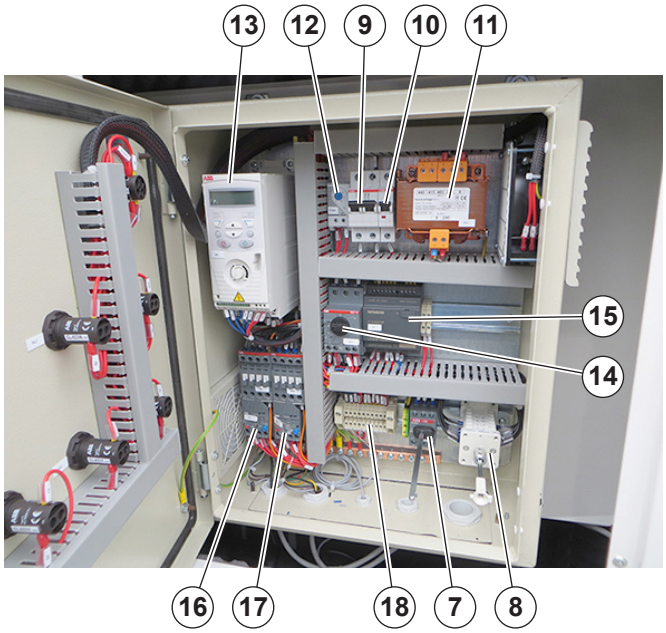
C-5 ELECTRICAL PANEL

Pos.	Description	Ref.
1	Local-remote selector	-
2	Pump 1 operation light	HL1
3	Pump 2 operation light (if any)	HL2
4	Pump 1 blocked warning light	HL3
5	Pump 2 blocked warning light (if any)	HL4
6	Inverter blocked warning light (if any)	HL5
7	Circuit breaker	QS1
8	Inverter by-pass selector (if any)	QS3
9	Aux. magneto thermal switch 400V	QF4
10	Aux. magneto thermal switch 230V	QF5
11	Aux. transformer	1TC1
12	Timer	
13	Inverter (if any)	
14	Automatic switch	
15	LOGO PLC (version with inverter only)	
16	Pump 1 contactor	KM1
17	Pump 2 contactor	KM2
18	Control/warning terminal board	X1

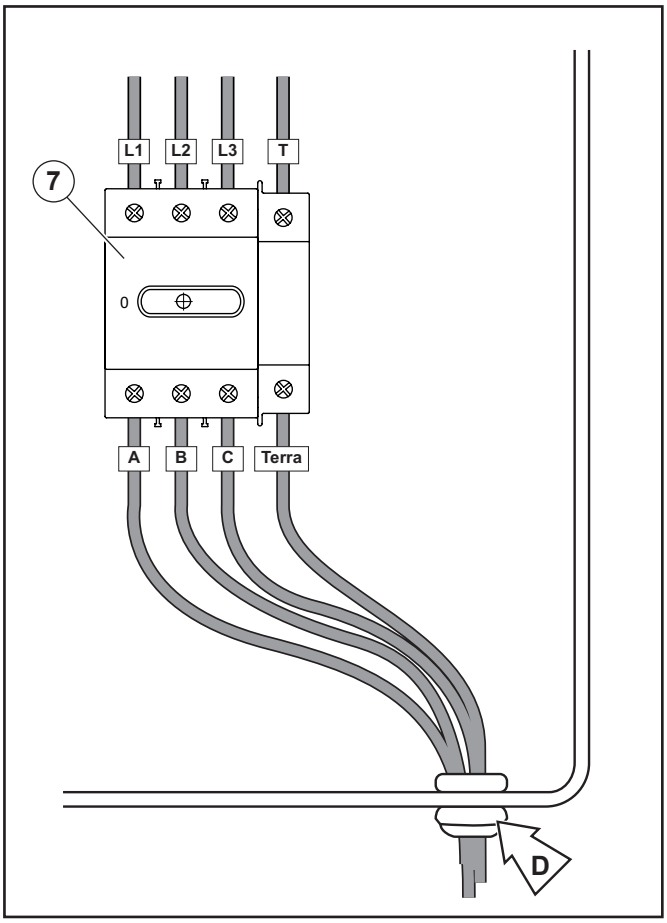


IMPORTANT
The electrical installer shall provide for the fuses on the power supply line.

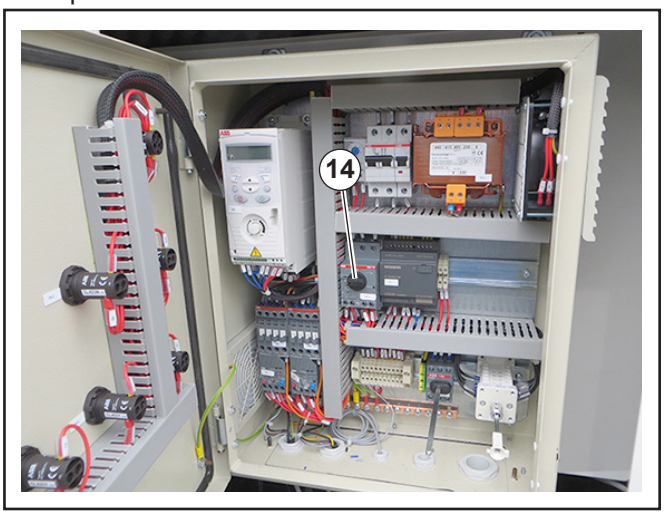
IMPORTANT
The two-pump versions are fitted with a jumper between two terminals in the terminal board ref. 18.
If the jumper is closed, upon every start-up the running pumps alternate, whereas if the jumper is open, pumps alternate every 48 hours; for further information refer to the wiring diagrams annexed herein.



The electrical panel is wired by the Manufacturer. The fitter only has to connect wires **A** (brown), **B** (grey), **C** (black) and the **EARTH** (green/yellow) to the circuit breaker switch **ref. 7**, letting the cables pass through opening **D** in the box, as shown in the figure.

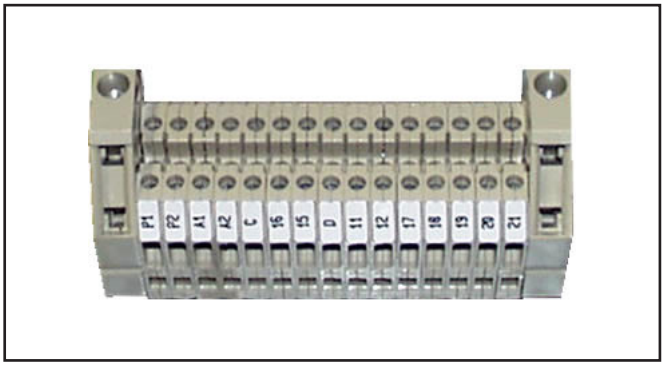


Ensure that the motors rotate in the right direction (indicated by the arrow on the same motors). If this is not the case, swap two phases of the power cable over in the electrical board.
The automatic switch (or motor protection switch) **ref. 14** has been calibrated by the Manufacturer. In the case of malfunctioning, do not tamper with any internal connection. Recalibrate the switch based on actual absorption.



C-5.1 REMOTELY CONTROLLED OPERATION

If the unit shall controlled by means of an external remote control, turn selector switch **1S1** to the **REM** position.
If a dry contact is available, use terminals $\mathbf{P_1}$ and $\mathbf{P_2}$ to connect the remote control.



Ex. Two- pump HPT 2 terminal board

C-6 INVERTER (OPTIONAL)

Every pump can be controlled by an inverter.
The inverter is an electronic device that powers the motor at variable frequency, in order to adapt the rotation speed of the motor to the needs of the unit.
The units equipped with inverter feature a 0-10 bar pressure sensor that communicates with the inverter through a 4-20 mA signal. All adjustment parameters are preset during testing by the manufacturer. The user just has to select the desired pressure set point.

To know how to select the inverter set point, refer to the inverter operation and maintenance manual annexed to the technical documentation.

D-1 START-UP

D-1.1 CHECKS PRIOR TO START-UP

The following preliminary operations must be performed before starting the unit:

- With the main disconnect switch open (OFF), check the cross-section of power cables, the earth connection, and that the terminals are tight.
- Check rotation direction and smooth operation of the pump units.
- Ensure that water flows in the right direction at both inlet and outlet, and the components of the external water circuits have been installed properly.
- Ensure that the hydraulic circuit has been filled.
- Ensure that the shutoff valves are open and the fluid can circulate.
- Ensure that air has been vented out.

D-1.2 START-UP

The start-up sequence is the following:

- Ensure that all external appliances are in efficient working order and the control devices of the system have been properly calibrated.
- Turn the main circuit breaker to the "**I**" (closed) position.
- Switch on the chiller/heat pump to cause the water pump to start and ensure the circulating flow is within the set parameters.

Before start-up, ensure that the water circuit has been filled properly and/or completely.

D-1.3 WINTER CARE

Turn the main switch to the OFF position to switch off the unit.

Before winter, drain off water or replace it with a glycol solution to prevent ice from damaging the pipes.

If the kit is equipped with optional heating element, make sure the shutoff valves of the circuit are open and the kit is supplied with power to switch on the heating element and the water pump when the unit needs to be protected from cold and freezing temperatures.

E-1 MAINTENANCE

E-1.1 INTRODUCTION

Unless otherwise stated, the following maintenance tasks can be performed by a maintenance technician specifically trained for the task.
The units have been designed to run continuously as long as they are serviced properly and used within the limits previously indicated.
Each unit must be inspected on a regular basis by qualified personnel.
If damage or failures caused by bad or neglected maintenance occur during the warranty period, the manufacturer will not be liable for any costs incurred to put the unit back into operation.

E-1.2 ORDINARY MAINTENANCE

Ordinary maintenance tasks must be carried out by a qualified technician based on the intervals below.

The units cannot be repaired by the user. If any failures are detected during daily use, do not try to fix them.

Operation	*Daily*	*Weekly*	*Monthly*	*Start of season*	*End of season*
Check the operating pressure		X			
Check electric absorption			X		
Check the safety valve operation				X	
Check that insulation is intact				X	
Check that the terminal screws are tight				X	
Clean the outer surface of the unit with soapy water				X	
Check the amount of antifreeze in the mix (if any)				X	X
Drain and clean the unit					X
Check pre-charge in the expansion tank (if equipped)				X	

E-1.3 MAINTENANCE TO THE INVERTER (IF EQUIPPED)

The table below indicates the ordinary maintenance recommended by the inverter manufacturer.

Operation	*Yearly*	*Every 3 years*	*Every 6 years*
Check for any dust and corrosion. Check the temperature.	X		
Replace the cooling fan		X	
Check the safety valve operation			X

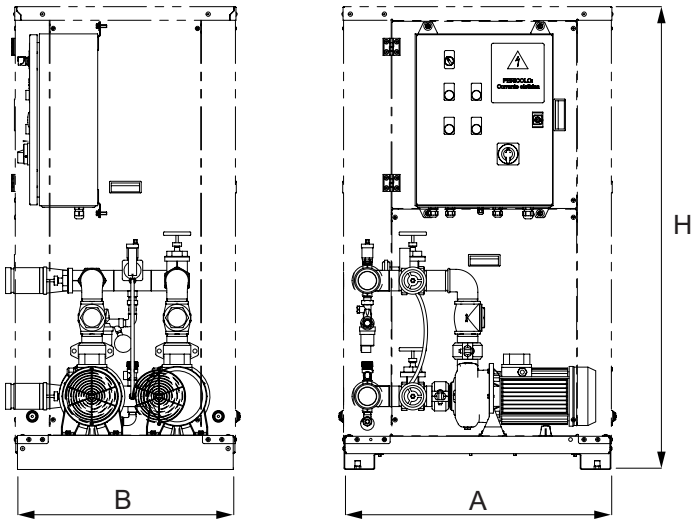
For further information about the intervention methods to be applied, refer to the inverter operation and maintenance annexed to the technical documentation.

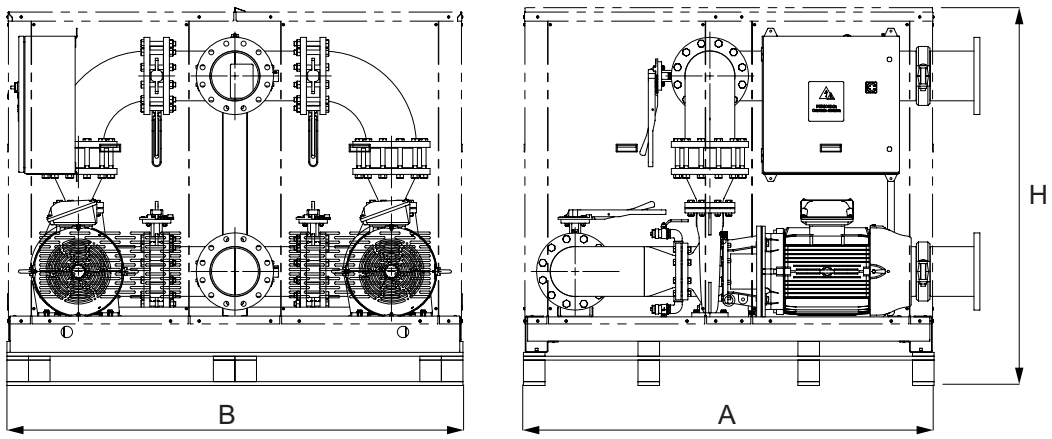
F-1 PROBLEMS AND SOLUTIONS

Problem	*Cause*	*Solution*
The pump does not start	1) Pump motor damaged 2) No power supply 3) Pump jammed	1) Replace the pump 2) Check for voltage 3) Free the pump
The pump makes a noise	1) Air in the hydraulic circuit 2) Operating point outside the operating curve 3) Power cord connected in reverse-phase	1) Bleed 2) Adjust the calibration valve 3) Swap two phases of the power cord
Noise and vibrations	1) Contact between metal parts 2) Weak foundations 3) Loose or missing screws	1) Inspect 2) Restore them 3) Install or tighten the screws
Safety valves are triggered	1) Plant load pressure too high 2) Expansion tank not filled	1) Release pressure 2) Fill the expansion tank
System low pressure	1) Leaks in the hydraulic circuit	1) Find and fix problem

If other problems are found, contact your nearest service centre or the manufacturer.

G-1 DIMENSIONS AND WEIGHTS





Single Pump

Size	Pump model	Unit dimensions		
		A	B	H
		(mm)		
1	PM2N PM3N P1N P2N P3N P4N P5N	650	790	1360
2	P6N P7N P8N P9N P10N P11N P12N P13N P14N P15N P16N P17N P18N	1116	790	1360
3	P19N P20N P21N	2000	1800	1500

Double Pump

Size	Pump model	Unit dimensions		
		A	B	H
		(mm)		
1	PM2R PM3R P1R P2R P3R P4R P5R	650	790	1360
2	P6R P7R P8R P9R P10R P11R	1116	790	1360
3	P12R P13R P14R P15R P16R P17R P18R	1280	760	1600
4	P19R P20R P21R	2000	1800	1500

G-1.1 TECHNICAL SPECIFICATIONS

Pump model	Fitting diameter	Wsb 1	Wsb 2	F.L.I.	F.L.A. (400/3/50)	F.L.A. (230/1/50)	Ve	Pve	Ps	Tmin
		(kg)	(kg)	(kW)	(A)	(A)	(l)	(bar)	(bar)	(°C)
PM3	1”1/2			0,45		3,2	12			
PM3	1”1/2			0,45		3,2	12			
P1	2”1/2	89	118	1,1	2,5		12			
P2	2”1/2	90	119	1,5	3,2		12			
P3	2”1/2	91	121	1,5	3,4		12			
P4	2”1/2	93	125	2,2	4,8		12			
P5	2”1/2	96	131	3	5,6		12			
P6	3”	153	220	3	6,1		25			
P7	3”			4	8,7		25			
P8	3”	178	275	5,5	10,4		25			
P9	3”			7,5	13,6		25			
P10	3”	186	296	5,5	10,4		25			
P11	3”	190	304	7,5	13,6		25	1,5	3	-10
P12	3”			9,2	17,2		25			
P13	4”	224	398	11	21,3		25			
P14	4”	248	447	15	27,7		25			
P15	4”			11	20,2		25			
P16	4”	258	483	15	26,6		25			
P17	4”	270	504	18,5	33		25			
P18	4”	284	532	22	40,4		25			
P19	DN 200 UNI PN 16			18,5	33		50			
P20	DN 200 UNI PN 16			30	53,5		50			
P21	DN 200 UNI PN 16			37	65,6		50			

Key:

Wsb1 HP 1 pump transported weight
Wsb2 HP 2 pump transported weight
F.L.I. Maximum power absorption
F.L.A. Maximum current absorbed
Ve Expansion tank capacity
Pve Expansion tank pre-charge
Ps Maximum working pressure
Tmin Minimum fluid temperature

G-2 WIRING DIAGRAMS

The wiring diagrams related to a specific unit are annexed to the technical documentation of the unit.

NOTES



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