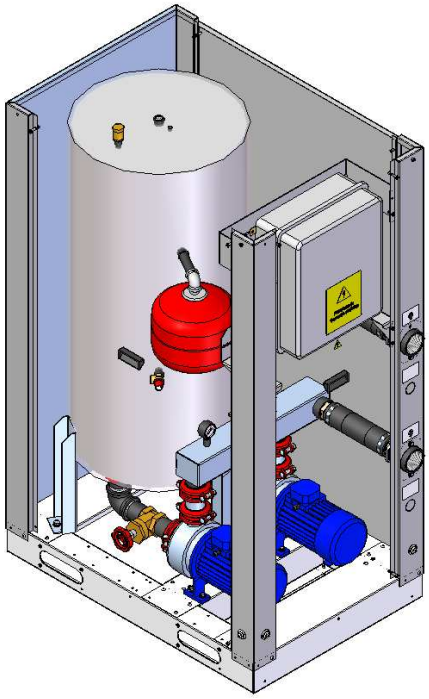
fiorini INDUSTRIES

INSTALLATION, USE AND MAINTENANCE MANUAL



INERTIAL WATER STORAGE UNIT WITH ACCESSORIES

CE

HPT Vertical Series

0926

Language
En

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A-1 SYMBOLS

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

USER: Information, paragraph, chapter of the manual the user should refer to.

INSTALLER: Information, paragraph, chapter of the manual the installer should refer to.

Technical Service: Information, paragraph, chapter of the manual the Service Centre should refer to.

DANGER: Warning relevant to operations which may cause serious injury if they are not performed properly.

DO NOT: Indicates forbidden actions.

DANGER ELECTRICAL VOLTAGE: Warning relevant to certain actions which may cause serious or mortal injury to the exposed persons if they are not performed properly.

DANGER HIGH TEMPERATURES: Warning relevant to certain actions which may cause serious injuries due to the high temperature of components, if they are not performed properly.

IMPORTANT: Emphasises technical information or practical recommendations for a more effective and efficient use of the unit.

ATTENTION: Indicates actions which are compulsory for the machine to function properly.

A-2 GENERAL WARNINGS

Keep the manual in a dry place, to avoid deterioration, for at least 10 years for future reference.
Read all the information contained in this manual carefully and thoroughly.
Pay particular attention to the instructions accompanied by the symbol "DANGER" or "DO NOT" as failure to do so could damage the unit and/or property or injure persons.
For any problems that are not covered in this manual, contact your nearest Service Centre in good time.
The manufacturer declines all responsibility for any damage caused by the improper use of the machine, and the partial or superficial reading of the information contained in this manual.
The unit must be installed so that maintenance and/or repairs can be carried out.
In any case, the guarantee on the unit does not cover the costs of aerial ladders, scaffolding or other hoist systems which may be required for interventions under guarantee.

A-3 RECEPTION OF THE PRODUCT

The unit is supplied on wood pallets.
The following are also supplied:

- Installation, use and maintenance manual
- EC declaration

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

Only remove the packing when the unit is in position for installation.

After removing the packing, the unit should be moved by qualified personnel using suitable equipment for the weight of the structure (see chapter "Handling, lifting and positioning the unit").

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

Do not throw parts of the packaging in the environment, and do not leave them within the reach of children as they are a potential source of hazard.

Dispose of the packaging in accordance with the regulations in force in the country where the machine is installed.

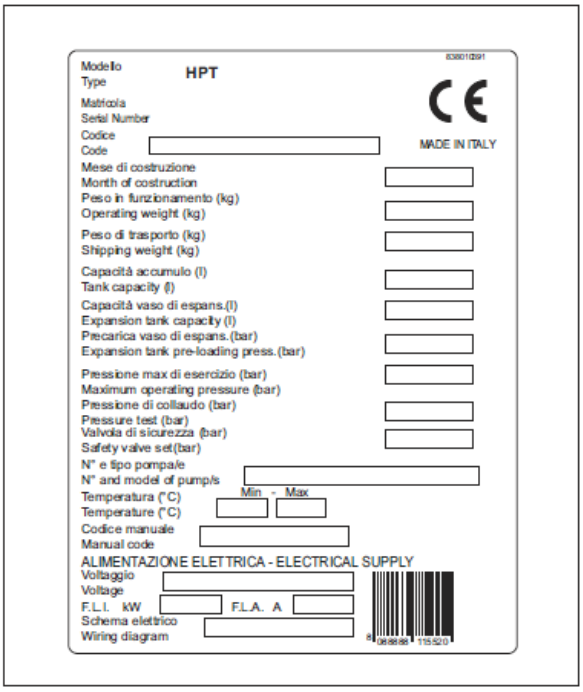
On reception of the unit, check there has been no damage during transportation and/or handling and all accessories are contained in the package.

A-4 UNIT IDENTIFICATION

The unit can be identified through the following:

- **Identification plate**
  Applied on the machine, the plate features the technical and performance data of the unit. If lost or illegible, order a copy from the Manufacturer.

The removal, deterioration or tampering with the identification plates, makes any installation, maintenance and request for spare parts difficult.

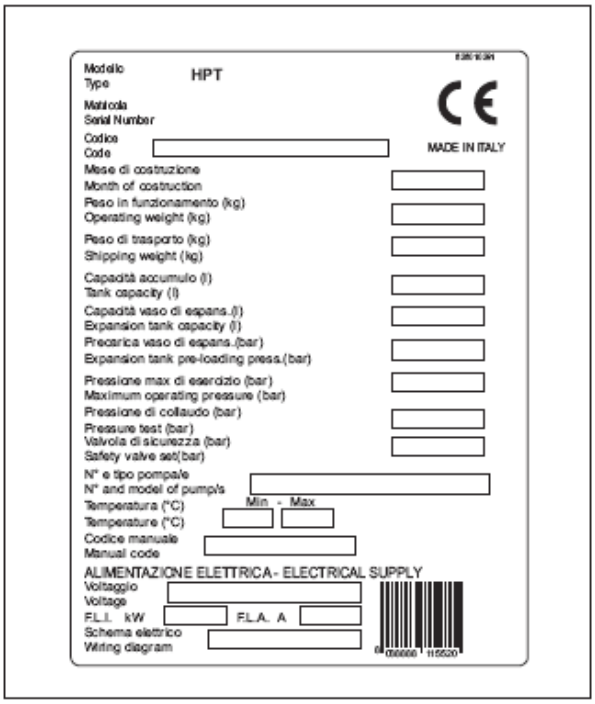


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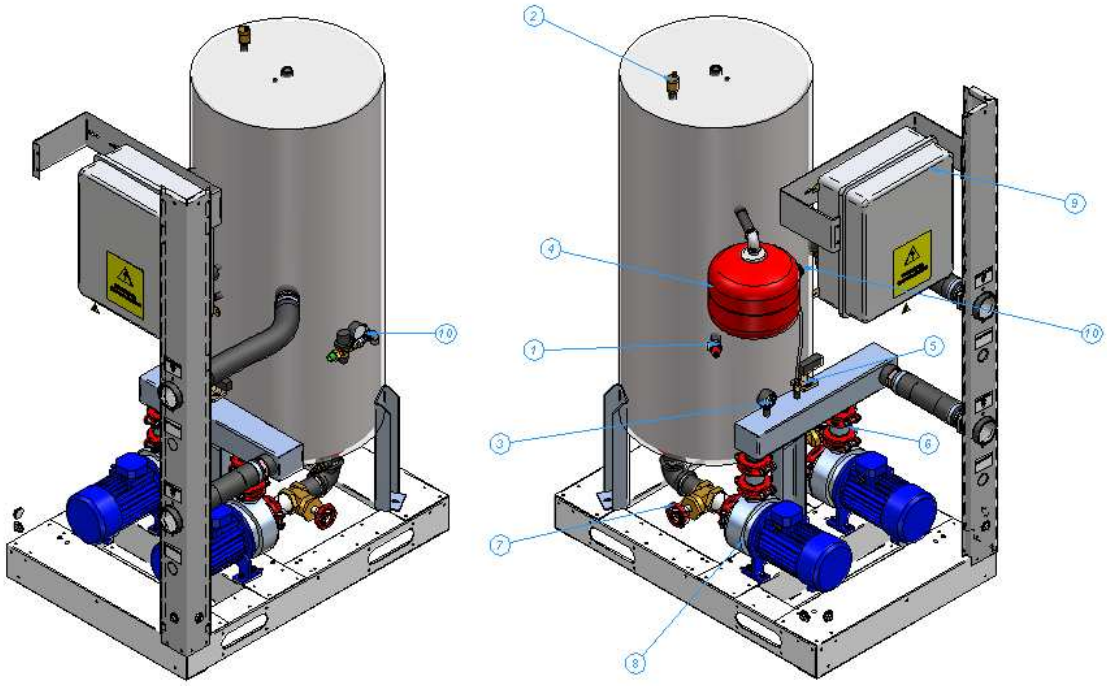


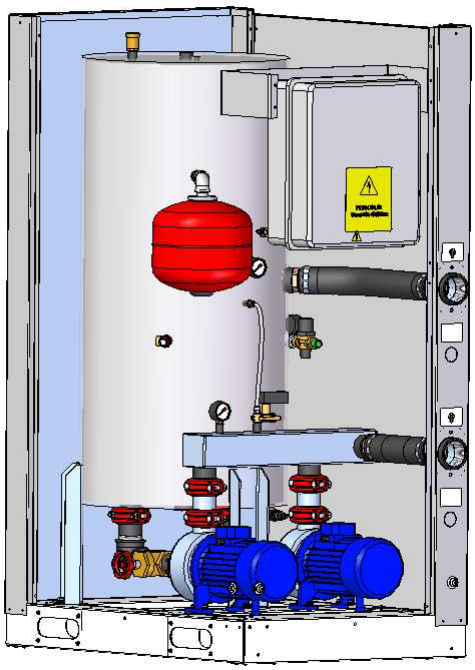
A-5 VERSIONS AVAILABLE

Water storage unit with one or two pumps:

A-6 UNIT DESCRIPTION

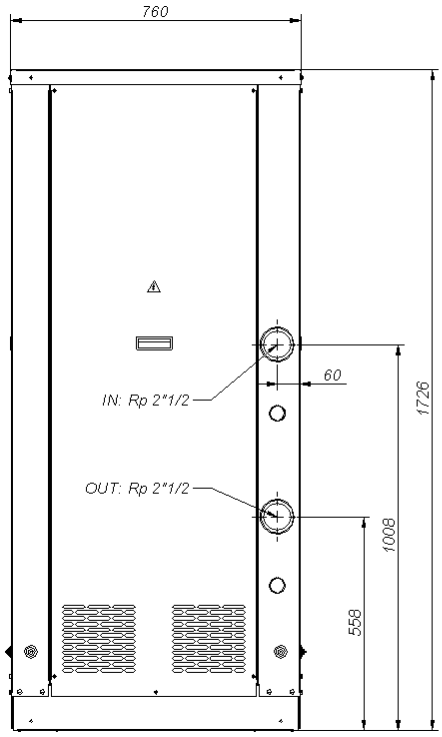
A-6.1 DESCRIPTION OF THE MAIN COMPONENTS

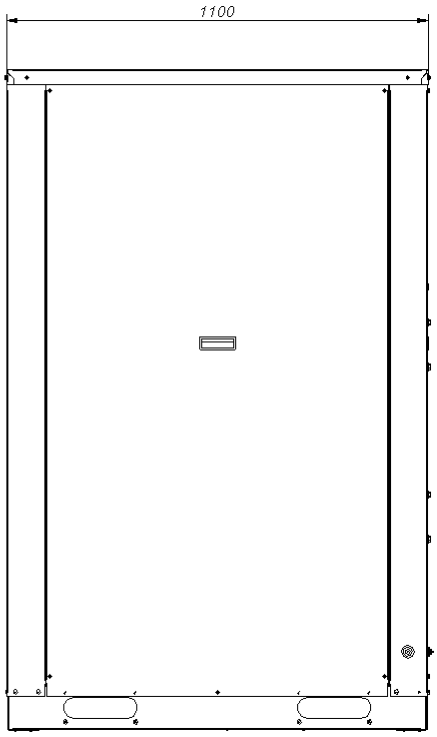




	Component
1	Safety valve
2	Automatic Air vent valve
3	Pressure gauge 1
4	Expansion tank
5	Differential pressure switch
6	Non-return valve (only for 2 pumps)
7	On/Off valves
8	Circulating pump
9	Electric Control unit
10	Make up unit
11	Pressure gauge 2

A-6.2 DIMENSIONS





A-6.3 TECHNICAL SPECIFICATIONS

Pump Groups Type

A	DWC-V 300/1.1	EBARA
B	DWC-V 300/1.5	EBARA
C	DWC-V 500/1.5	EBARA
D	DWC-V 500/2.2	EBARA
E	DWC-V 500/3.0	EBARA

B-1 SAFETY REGULATIONS

B-1.1 INTRODUCTION

All units have been designed, built and tested to be conform to the following EC Directives: **98/37/EC** (Machinery Directive), **89/336/EEC** (Electromagnetic Compatibility Directive), **2006/95/EC** (Low Voltage Directive). Read the recommendations contained in this manual before using the machine.

The Manufacturer is not responsible for the non-observance of the local safety regulations in force at the time of installation for the system in which the unit is installed.

B-1.2 DEFINITIONS

- **Owner**: Legal representative of the company, body or natural person owning the system in which the unit is installed; the owner is responsible for making sure all the safety regulations contained in this manual and the national regulations in force are respected.
- **Installer**: Legal representative of the firm called in by the owner to position the unit and make hydraulic connections, electrical connections, etc. to the system; the isntaller is responsible for the unit handling and proper installation in accordance with the instructions contained in this manual and the national regulations in force.
- **Operator**: Person authorised by the owner to perform all unit adjustment and control operations specifically indicated in this manual; the operator cannot perform operations other than the ones allowed.
- **Technician**: Person authorised to carry out all the routine and extraordinary maintenance operations, as well as any adjustments, checks, repairs and parts replacing which may be necessary during the working life of the unit.

B-1.3 ALLOWED USE

This unit has been designed to be installed with heat or chiller pumps for water cooling/heating systems. Any other application, which hasn't been specifically authorised by the manufacturer, is considered improper use and is therefore not allowed.
The Manufacturer excludes any contractual and extra-contractual responsibility for injury to persons or animals or damage to things, due to erroneous installation, incorrect adjustment and maintenance, improper use or the partial or superficial reading of the information contained in this manual.
Furthermore, in order to constantly improve the products, the Manufacturer reserves the right to modify the data at any time and without prior warning and declines all responsibility for any inaccuracy in the present document caused by misprints or errors in transcription.

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

The guarantee is void if:
- the unit is put into service by anyone other than skilled and authorised personnel.
- if 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.

Upon delivery by the carrier, check the unit packaging is intact.

B-1.4 ACCESS TO THE UNIT

The unit must be installed in an area only **OPERATORS** and **TECHNICIANS** can have access to.

B-1.5 GENERAL PRECAUTIONS

- The unit must be earthed 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 power supply network correspond to the data indicated on the machine's identification plate.
- The machine must only be used for the purpose for which it was designed. Any use other than that specified is not binding for the manufacturer in any way.
- Stop the machine in the case of fault 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% and in any case don't exceed the maximum allowed pressure for the unit's hydraulic circuit indicated on the registration number label.
- 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 modules.
- The **INSTALLER** must only make the connections between the system and the machine.
- Do not wear jewellery, loose clothing or any other accessories that could get caught in the moving parts.
- Use suitable protective equipment (gloves, goggles, etc.) when working with naked flame (welding) or 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 objects before closing the unit and starting it again.
- Do not install the machine in an explosive atmosphere.
- Do not install the machine in environments with electromagnetic fields stronger than those envisaged in Electromagnetic Compatibility Directive 89/339.
- The unit must stand on a base featuring the characteristics indicated in this manual; a base 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 involving the control system

- Make sure you 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..
- Report any alarm on the unit to a technician immediately.
- Do not reset the alarms that can be reset manually without first detecting and eliminating the cause; failure to do so will make the guarantee void.

Prevention of residual mechanical risks

- Install the unit according to the instructions indicated in this manual.
- Perform all the maintenance operations envisaged in the present manual regularly.

Prevention of residual electrical risks

- Connect the unit to the power supply network following the instructions contained in this manual.
- Perform all the maintenance operations envisaged in the present manual regularly.
- Disconnect the unit from the network by means of the external disconnecting switch before opening the electrical board.
- Check the unit has been earthed properly before putting it into service.
- Check all electrical connections, the connecting cables and in particular check the insulation condition; replace any obviously worn or damaged cables.
- Periodically check the wiring in the board.
- Check that all magnetothermal cutouts are activated.
- Do not use cables with an inadequate 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 indicated in this manual and on the panels of the unit itself.
- The hydraulic circuit contains toxic substances, when using antifreeze. Do not drink the liquid in the hydraulic circuit and avoid contact with the skin, eyes and clothes.
- When you have dismantled a part, make sure it is reassembled correctly before starting the unit again.

- Keep a fire extinguisher suitable for putting out fires on electric equipment near the machine. Check it 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 doesn't cause 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 under pressure.

B-1.7 PRECAUTIONS TO OBSERVE DURING MAINTENANCE OPERATIONS

Maintenance operations must be carried out by authorized technicians only .

Before performing any maintenance operation you must:

- Disconnect the unit from the power supply network by turning the external disconnecting switch off.
- Place a sign with the words "Do not turn on - Maintenance underway" on the open (OFF) disconnecting switch.
- Make sure any remote ON/OFF controls are disabled.
- Use suitable accident prevention equipment (helmet, insulating gloves, protective goggles, safety shoes, etc.).

If you have to make measurements or do checks with the machine 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 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 under dangerous pressure.
- Always and only use original spare parts purchased directly from the Manufacturer.

B-1.8 FUNDAMENTAL SAFETY RULES

Remember that the use of products involving electrical power and water implies the observance of 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 system's main switch "OFF".

Do NOT modify the safety devices or adjust them without the prior authorisation and instructions of the Manufacturer.

Do NOT pull, disconnect, or twist the electrical cables coming out of the unit, even if they are disconnected from the electrical mains.

Do NOT open the doors giving access to the unit internal parts, unless the system has been turned OFF with the main switch.

Do NOT climb or sit on, and/or place any kind of object on the unit.

Do NOT direct sprays or jets of water directly at the unit.

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

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

Powering the unit: electrical cables of a suitable section must be used to power the unit and input voltages must correspond to those indicated; all units must be earthed as indicated in regulations in force in the countries the units are installed in.

Hydraulic connections must be made following the instructions in order to guarantee the unit proper functioning. Add glycol to the water circuit if the unit isn't used or the hydraulic circuit isn't emptied in winter.

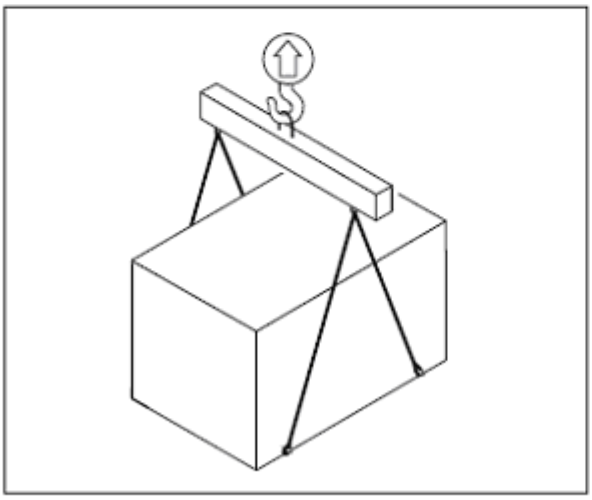
Handle the unit with the greatest care to avoid damaging it.

C-1 INSTALLATION

C-1.1 HANDLING, LIFTING AND POSITIONING THE UNIT

The units are designed to be lifted from above using eyebolts or tubular section bars inserted in the relevant holes on the machine base.
Don't lift the unit using unsuitable or inefficient means, contact a specialised firm for the job.
Don't tilt the machine to an angle of more than 15° when moving it.
Before moving the machine, make sure all panels are fixed in place.
Use spacers to prevent the lifting cables or chains from touching the unit.
Before moving the unit it is essential to make sure the position chosen for the installation can bear the fully laden weight.
Never move the unit by using rollers or lift it with a forklift truck.
To lift and move the unit follow the instructions below:

- Insert and fix the eyebolts in the holes of the frame marked specifically for this purpose.
- Connect cables to the eyebolts.
- Insert the spacer between the cables.
- Hook up at the unit's centre of gravity.
- Cables must be sufficiently long so that, once in tension, they do not form an angle of less than 45° with the horizontal line.



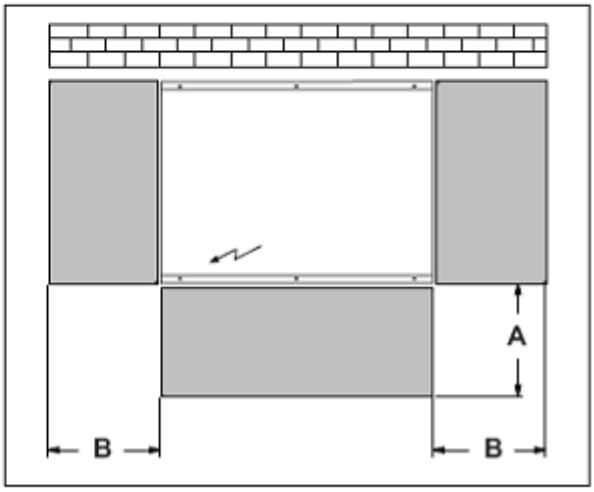
While hoisting and moving the unit take care not to damage the same. The unit sides must be protected by cardboard or plywood sheets.

Do not remove the plastic wrapping or protective elements until the machine is ready to be put into service as these prevent dirt, dust and foreign bodies from getting into the unit and damaging the external surfaces.
The HPT units 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.

These 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.
When choosing the installation position it is essential to keep the following in mind:

- The unit must not be installed in areas subject to flooding, or under drainage channels, etc.
- The place of installation must be large enough to ensure air circulation and allow maintenance operations.

The rear of the unit can be placed up against a wall but we recommend keeping a little space between the wall and the unit to make repairs and/or maintenance easier.



Dimensions of free spaces to leave for manoeuvres	
A	800 mm
B	800 mm

C-1.2 HYDRAULIC CONNECTIONS

Protect the hydraulic circuit with antifreeze if the system will be shut down without emptying the system during the winter. If necessary, drain the water in the HPT unit.
The connection pipes must be adequately supported so that their weight doesn't affect the unit.

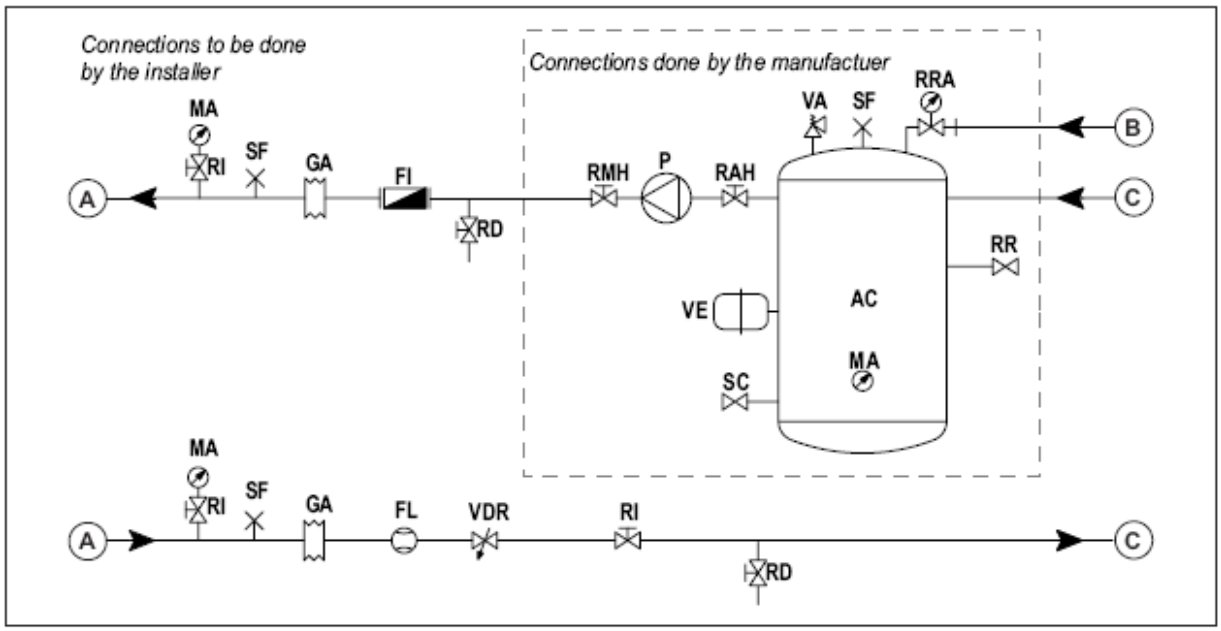
Furthermore:

- Install On/Off valves in the inlet and outlet lines.
- Envisage air vent valves in the high points of water lines.
- Envisage suitable drainage 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 bodies, 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 must be connected in compliance with the indications on the labels near the said fittings.
Connect the system's water lines to the unit couplings, the diameters and positions of which are indicated in the manual (**chapter A-6.1**).

The installation instructions above are a necessary condition for the validity of the guarantee.



Ref.	*Description*
A	Chiller
B	Make-up
C	Utilities
AC	Storage
FI	Mesh filter
FL	Water flow switch
GA	Anti-vibration coupling
MA	Pressure gauge
P	Circulation pump
SC	Storage drainage valve

Ref.	*Description*
SF	Bleed valve
RAH	Pump suction valve
RD	Drain tap
RI	On/Off valve
RMH	Pump delivery valve
RR	Make-up valve
RRA	Automatic make-up valve
VA	Safety valve
VDR	Control valve
VE	Expansion tank

C-1.3 FILLING AND EMPTYING THE SYSTEM

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

C-2 ELECTRICAL CONNECTIONS

C-2.1 ELECTRICAL POWER SUPPLY

The characteristics of the power supply network must meet **IEC EN 60204-1** standards and be suitable for the unit's power absorption indicated in the **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%.
Refer to local regulations.
The electrical distribution system must be suitable for supplying the power absorbed by the unit.
The disconnecting switches and magnetothermal cutouts must be properly sized to handle the maximum current absorbed.
As for the layout and equipment of the electrical board, refer to the unit wiring diagram.
The power cables must pass through the relevant holes in the unit panels and enter the electrical board through the holes specifically made for this purpose at the bottom of the same.
Install a protective device, not included with the supply, in the power line of the electrical board in compliance with the regulations in force.
Power the machine electrical board using a cable with a suitable section for the power absorbed by the machine (see wiring diagram - **section G**).
The command and control circuit in the electrical board is a derived circuit of the power circuit.

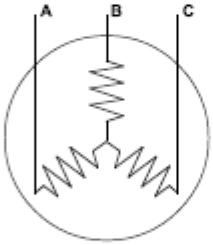
C-2.2 ELECTRICAL CONNECTIONS

Connections to terminals must be made according to the wiring diagram.
Before connecting the power lines, check that the voltage respects the limits indicated in the Electrical Data 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:

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

Example:
Nominal mains voltage 400V - 3Ph - 50Hz
AB = 409 V; BC = 398 V ; AC 396 V
mean 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 electric utility company. Using the unit with a voltage offset between the phases of over 2% MAKES THE GUARANTEE 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 make sure the pumps turn in the right direction of rotation (indicated by the arrow on the pump casing).
If this is not the case, swap two of the three phases of the power cable in the electrical board.

D-1 START-UP

D-1.1 PRELIMINARY CHECKS

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

- Check the section of the power cables, check the earth connection, and that the terminals are tight with the main disconnecting switch open (OFF).
- Check the rotation direction of pumps.
- Check the water flows in the right directions in the inlet and outlet, and that the components in the external water circuits have been installed properly.
- Check the hydraulic circuit has been filled.
- Check that the On/Off valves are open so the fluid can run.
- Check the air has been vented.

D-1.2 START-UP

The start-up sequence is described below:

- Make sure that all external equipment functions and the controls on the system are properly calibrated.
- Turn the electrical board on by turning the main switch to position I (closed).
- Turn the chiller/heat pump on to start the water pump and check the flow in circulation is within the parameters.

Before starting the system, make sure the water circuit has been filled properly and/or completely.

D-1.3 WINTER STOPPAGE

To stop the unit, follow the procedure below:

- Turn the main switch OFF to cut power supply.

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

E-1 MAINTENANCE

E-1.1 GENERAL INFORMATION

Unless otherwise stated, the maintenance operations described below can be performed by any maintenance technician specifically trained for the job.
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 damages or failures caused by improper maintenance occur during the period of guarantee coverage, the manufacturer will not be liable for the costs incurred to put the same back into its original functional state.

E-1.2 SCHEDULED MAINTENANCE

The maintenance checks must be carried out by a skilled person on the basis of the programme below.

Normally the units cannot be repaired by the user, who must not attempt to repair any faults that arise during daily use.

Operations	*Daily*	*Weekly*	*Monthly*	*Start of season*	*End of season*
Check the operating pressure		X			
Check the electrical absorption			X		
Check the safety valve operation				X	
Check the insulation is intact				X	
Check the terminals' screws are tight				X	
Clean the outside of the unit with soap and water				X	
Check the concentration of antifreeze in the mix (if any antifreeze mix is used)				X	X
Drain and clean the unit					X
Check the expansion tank prefill				X	

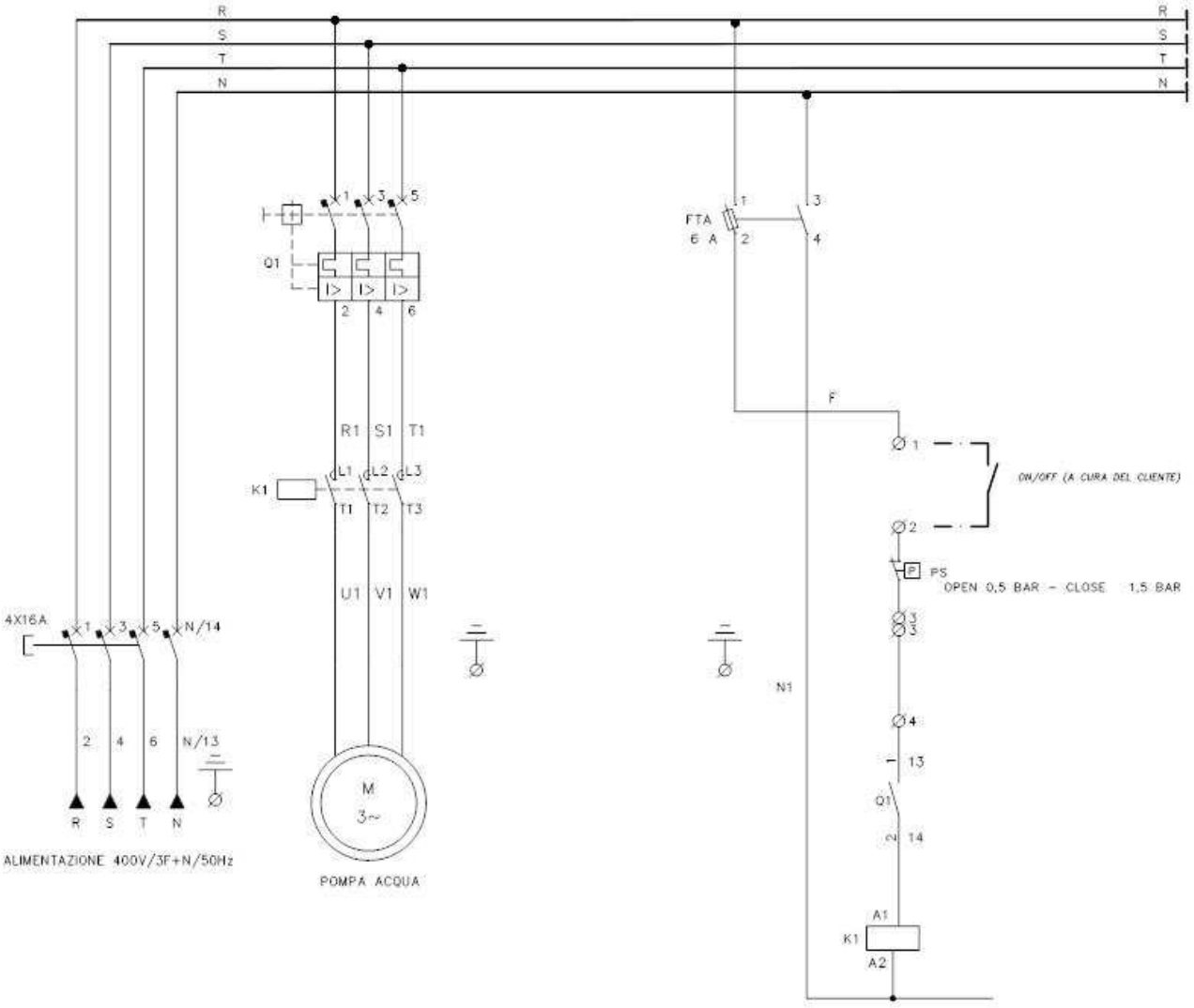
F-1 TROUBLESHOOTING

Problem	*Cause*	*Solution*	*U / I / S*
The pump does not start	1) The pump motor is damaged	1) Replace the pump	I
	2) There is no voltage	2) Check for voltage	I
	3) The pump is jammed	3) Unblock the pump	I
The pump makes a noise	1) There is air in the hydraulic circuit	1) Vent air from the circuit	U
	2) The working point is outside the operating curve	2) Adjust the calibration valve	I
	3) Inverted phase in the power supply cable	3) Invert the phase	I
Noise and vibrations	1) Contact between metal parts	1) Check for it	U
	2) Weak foundations	2) Restore them	I
	3) Loose or missing screws	3) Add or tighten the screws	U
Safety valves are triggered	1) The system's load pressure is too high	1) Release pressure	I
	2) The expansion tank is not filled	2) Fill the expansion tank	I
System low pressure	1) There are leaks in the hydraulic circuit	1) Check and eliminate the problem	U

If problems other than the ones indicated in this chapter are detected, contact either the Service Centre or the Manufacturer.

G-1 WIRING DIAGRAMS

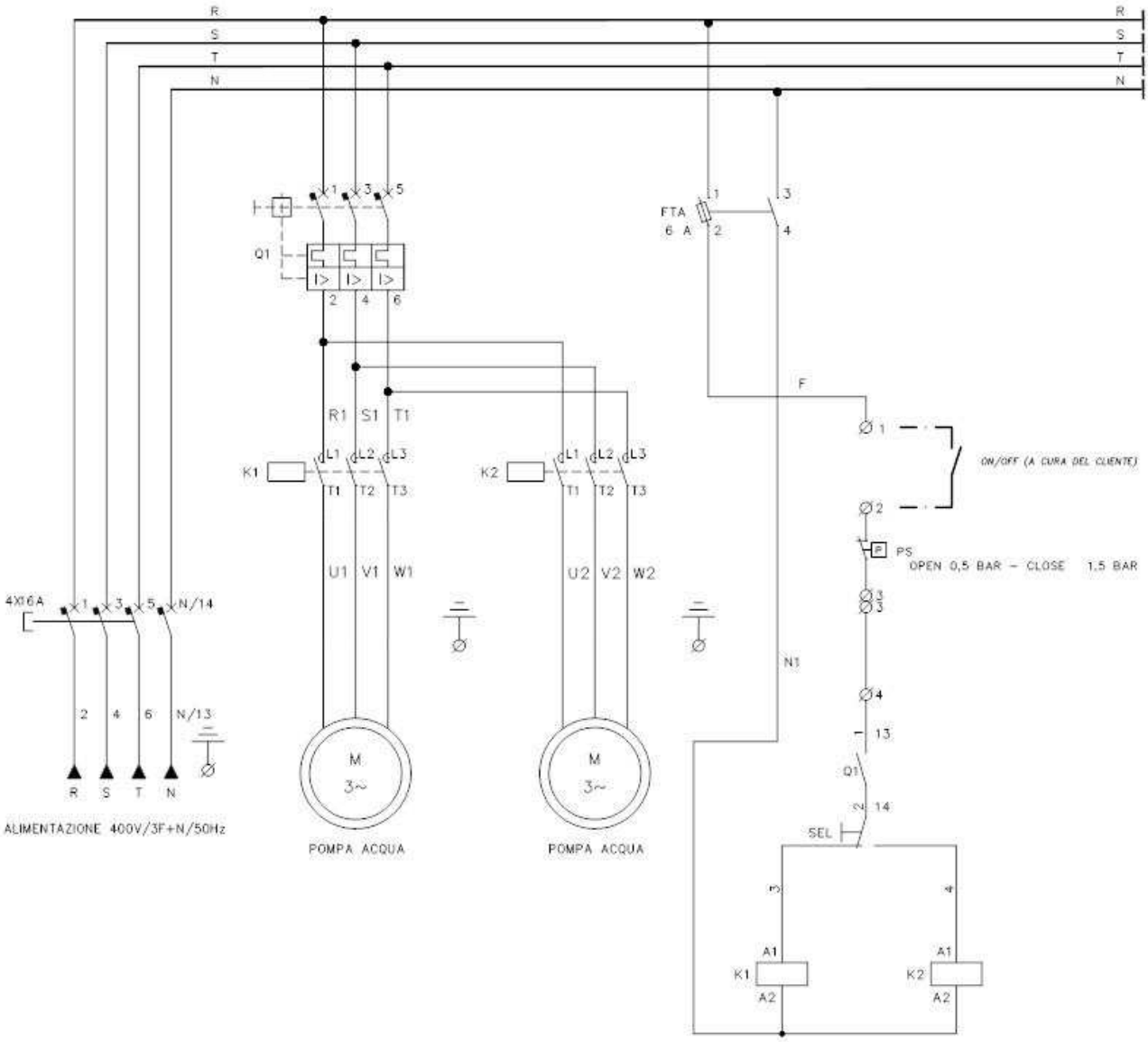
G-1.1 WIRING DIAGRAM FOR UNIT WITH SINGLE PUMP (400V/3Ph/50Hz)



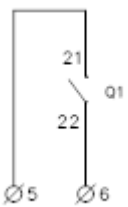


	LEGENDE	
Q	INTERRUTTORE GENERALE HAUPSHALTER MAIN SWITCH	
Q1	INTERRUTTORE AUTOMATICO PROTEZIONE POMPA MOTORSCHUTZSHALTER WASSER PUMPE AUTOMATIC SWITCH FOR PUMP PROTECTION	
K1–K2	CONTATTORE POMPA WASSER PUMPEN SCHUTZ WATER CHILLED PUMP CONTACTORS	
FTA	FUSIBILE PROTEZIONE AUSILIARI SICHERUNGSTRENNER AUXILIARI FUSE PROTECTION	
PS	PRESSOSTATO DI SICUREZZA IMPIANTO VUOTO TROCKENLAUFSCHUTZ LOW WATER SAFETY PRESSURE SWITCH	
PSH	PRESSOSTATO DI SICUREZZA ALTA PRESSIONE WASSER ALARM PRESSOSTAT HIGH WATER SAFETY PRESSURE SWITCH	

G-1.2 WIRING DIAGRAM FOR UNIT WITH TWO PUMPS (400V/3Ph/50Hz)

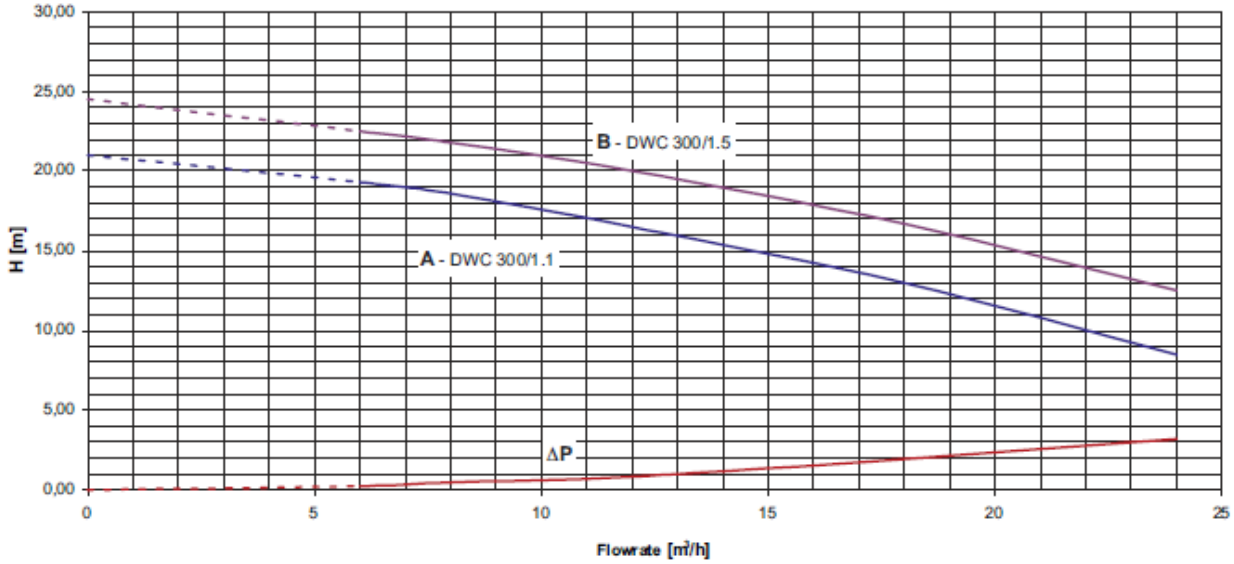


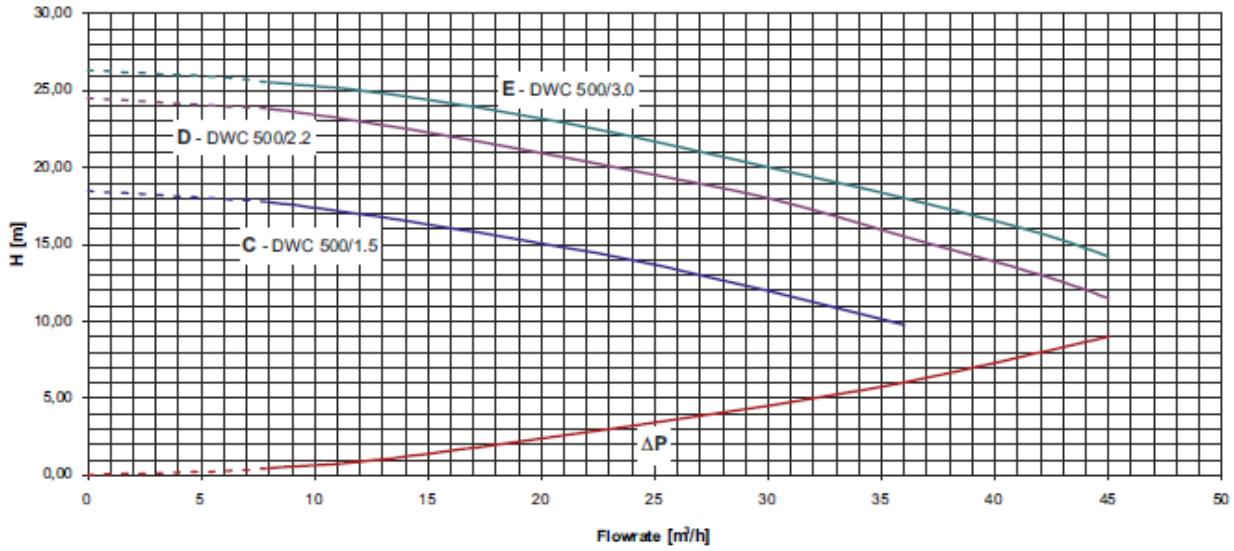
LEGENDE		
Q	INTERRUTTORE GENERALE HAUPSHALTER MAIN SWITCH	
Q1	INTERRUTTORE AUTOMATICO PROTEZIONE POMPA MOTORSCHUTZSHALTER WASSER PUMPE AUTOMATIC SWITCH FOR PUMP PROTECTION	
K1–K2	CONTATTORE POMPA WASSER PUMPEN SCHUTZ WATER CHILLED PUMP CONTACTORS	
FTA	FUSIBILE PROTEZIONE AUSILIARI SICHERUNGSTRENNER AUXILIARI FUSE PROTECTION	
PS	PRESSOSTATO DI SICUREZZA IMPIANTO VUOTO TROCKENLAUFSCHUTZ LOW WATER SAFETY PRESSURE SWITCH	
PSH	PRESSOSTATO DI SICUREZZA ALTA PRESSIONE WASSER ALARM PRESSOSTAT HIGH WATER SAFETY PRESSURE SWITCH	



G-3 DISCHARGE HEAD AND CHARGE LOSS CURVES

HPT 300






fiorini
INDUSTRIES