INSTALLATION, OPERATION AND MAINTENANCE MANUAL





BUFFER TANK FOR CHILLED WATER STORAGE

HPT • HPT V hydronic systems

TRANSLATION OF THE ORIGINAL INSTRUCTIONS

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A-1 SYMBOLS

The following symbols are used in this manual and/or on the equipment:

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

INSTALLER: Information, section, chapter of the manual the fitter should refer to.

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

DANGER: Indicates a hazardous operation which, if not properly carried out, will result in serious injury.

PROHIBITION: Indicates an action which is expressly forbidden.

DANGER, HIGH VOLTAGE: Indicates a hazardous operation which, if not properly carried out, will result in death or serious injury.

WARNING, HIGH TEMPERATURE: Indicates a hazardous operation which, if not properly carried out, could result in serious injury due to the presence of hot parts.

IMPORTANT: Indicates technical information or safety practices which it is advisable to follow to ensure efficient use of the equipment.

OBLIGATION: Indicates an action which is required to ensure proper use of the equipment.

A-1.1 SAFETY LABELS

The following safety labels are affixed to the machine to convey important safety information:



DANGER: Affixed to the front door of the electrical cabinet, it indicates the obligation to open the cabinet only when the main switch is in the “0 - OFF” position.

A-2 RECOMMENDATIONS

Keep the manual in clean and good condition for at least 10 years, for future reference.
Read and understand all the information in the manual.
Pay particular attention to the safety notices preceded by the signal word "**DANGER**" or "**PROHIBITION**" which, if not followed, can cause serious injury or damage to the equipment and/or property.
For problems not illustrated in this manual, contact your nearest service centre immediately.
The manufacturer shall not be held responsible for damage if the equipment is used in an improper way or if the instructions in this manual are not read, understood and followed.
The equipment shall be installed so that maintenance and/or repair can be carried out at all times.
The warranty on the equipment does not cover the costs of aerial ladders, scaffolding or other lifting equipment needed to replace parts under guarantee.

A-3 RECEIPT OF THE EQUIPMENT

The equipment is supplied on wooden pallets.
The following documentation is supplied with the equipment:

- installation, operation and maintenance manual
- EC declaration of conformity

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

Only unpack the equipment prior to installation.

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

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

Avoid release of packaging materials to the environment and always keep any packaging materials out of reach of children as they are a potential source of hazard.
Dispose of packaging materials in accordance any local and national regulations in force.

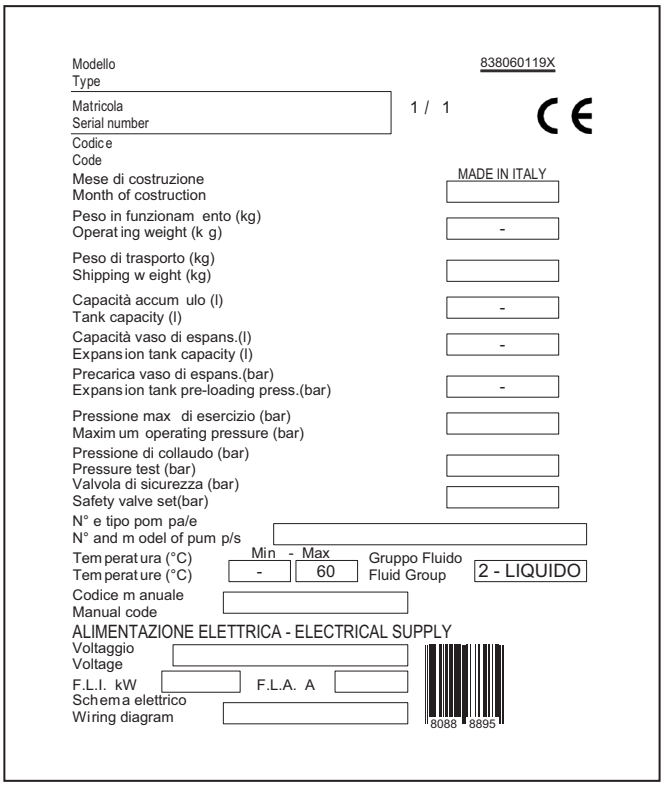
Upon receiving the goods, check the equipment to be sure it has not suffered any damage during transport or handling. Also check that the details on the shipping document correspond with the goods received.

A-4 IDENTIFICATION OF THE EQUIPMENT

The equipment can be identified through the:

- **identification plate**.
  The plate is affixed to the equipment and contains specifications and performance data. If the plate is lost or illegible, you must obtain a new plate from the Manufacturer.

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



A-5 AVAILABLE VERSIONS

For information on the available versions of the equipment, please refer to chapters A-6.4 and A-6.5 of this manual.

A-6 DESCRIPTION OF THE EQUIPMENT

A-6.1 GENERAL DESCRIPTION

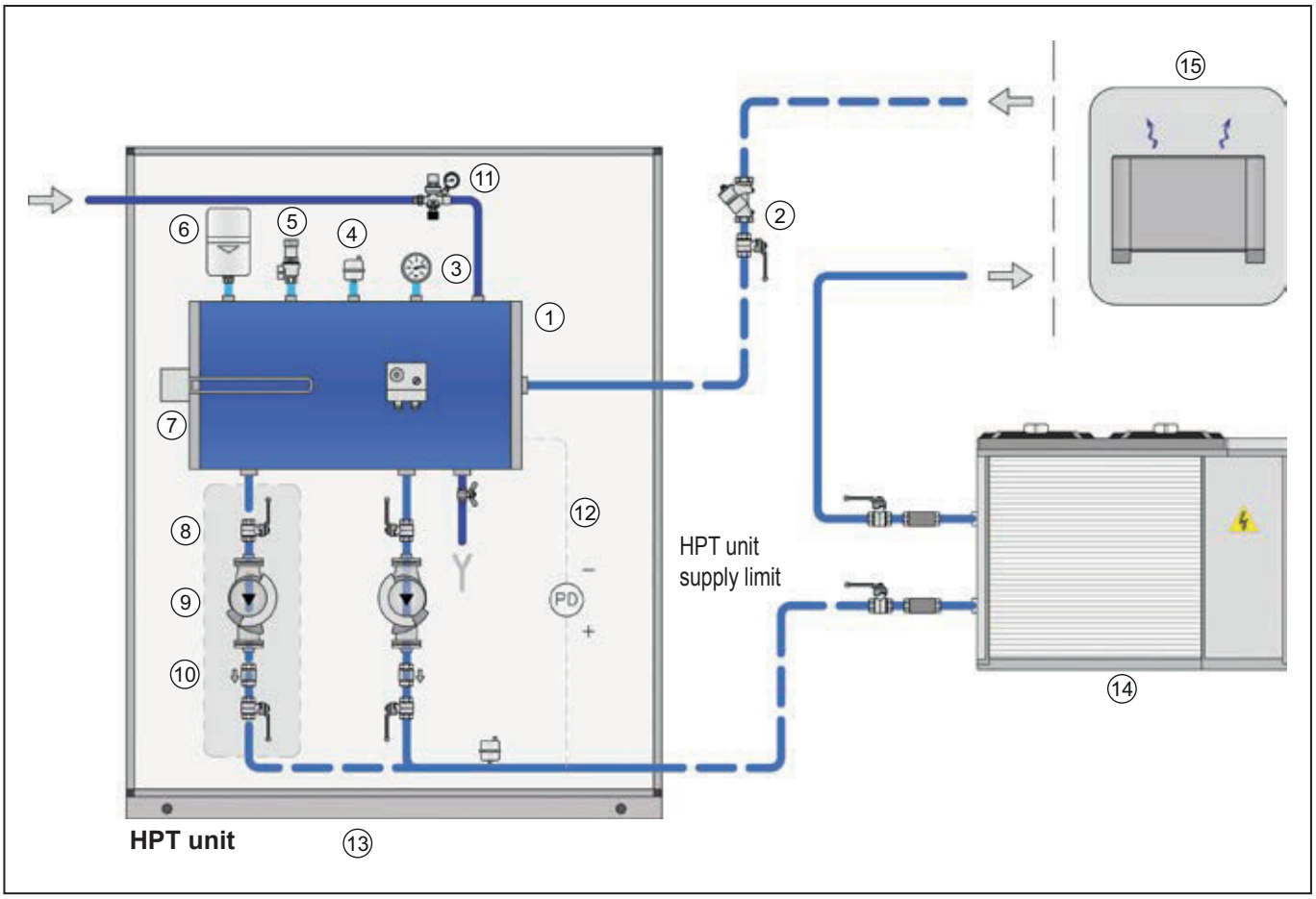
The HPT units have been specially designed to optimise the performance of conditioning and cooling systems and to cut installation times.
The units form an integrated system and incorporate all the parts needed for an efficient operation of the hydraulic circuit (or for the distribution of chilled water).
They are designed, pre-assembled and tested one by one by the manufacturer to ensure simple and fast installation and to maximise system efficiency and performance.
Kits are available with different combinations of pumps/storage tanks to meet the requirements of any type of cooling or heat pump system.
The units are manufactured with materials and finishes suitable for outdoor use and can be customised based on the specific needs of the end users.

The HPT units include:

- tank made of carbon steel and piping insulated with elastomeric material to prevent condensation;
- single or double centrifugal pump with shut off valves;
- electrical power board with pump alternation at each start-up (version with 2 pumps), reserve pump in case of pump failure (version with 2 pumps), magnetothermal protections, dry contacts for remote indication of pump operation, IP55 protection degree;
- expansion tank;
- safety valve;
- deaerator;
- pressure gauge;
  filling/drain valves;
- base and panelling of galvanised steel sheets.

A-6.2 INDICATIVE LAYOUTS

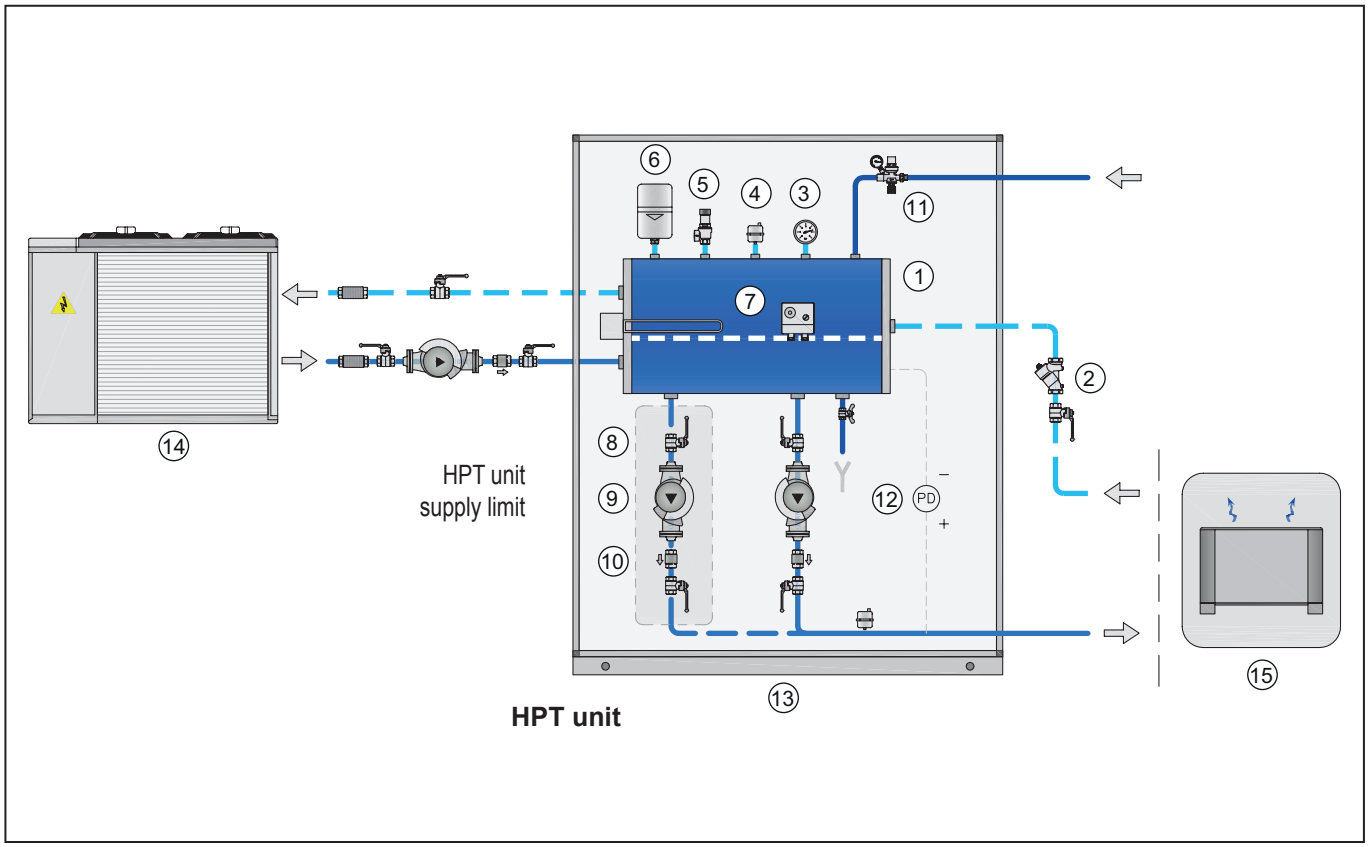
A-6.2.1 Layout 1



Hydronic kit, chiller and system connected in series; water flow rate will be constant throughout the entire plant. All the Fiorini HPT kits of the standard series are supplied in Layout 1.

Ref.	*Description*
1	Storage tank
2	Y-strainer (optional, supplied not assembled))
3	Pressure gauge
4	Deaerator
5	Safety valve
6	Expansion tank
7	Coolant heating element and thermostat kit (optional)
8	On-off valve
9	Circulator
10	Check valve (for version with 2 pumps only)
11	Automatic make-up unit
12	Differential pressure switch (optional)
13	Self-supporting metal structure suitable for installation outdoors
14	Chiller
15	System

A-6.2.2 Special execution (layout 2)

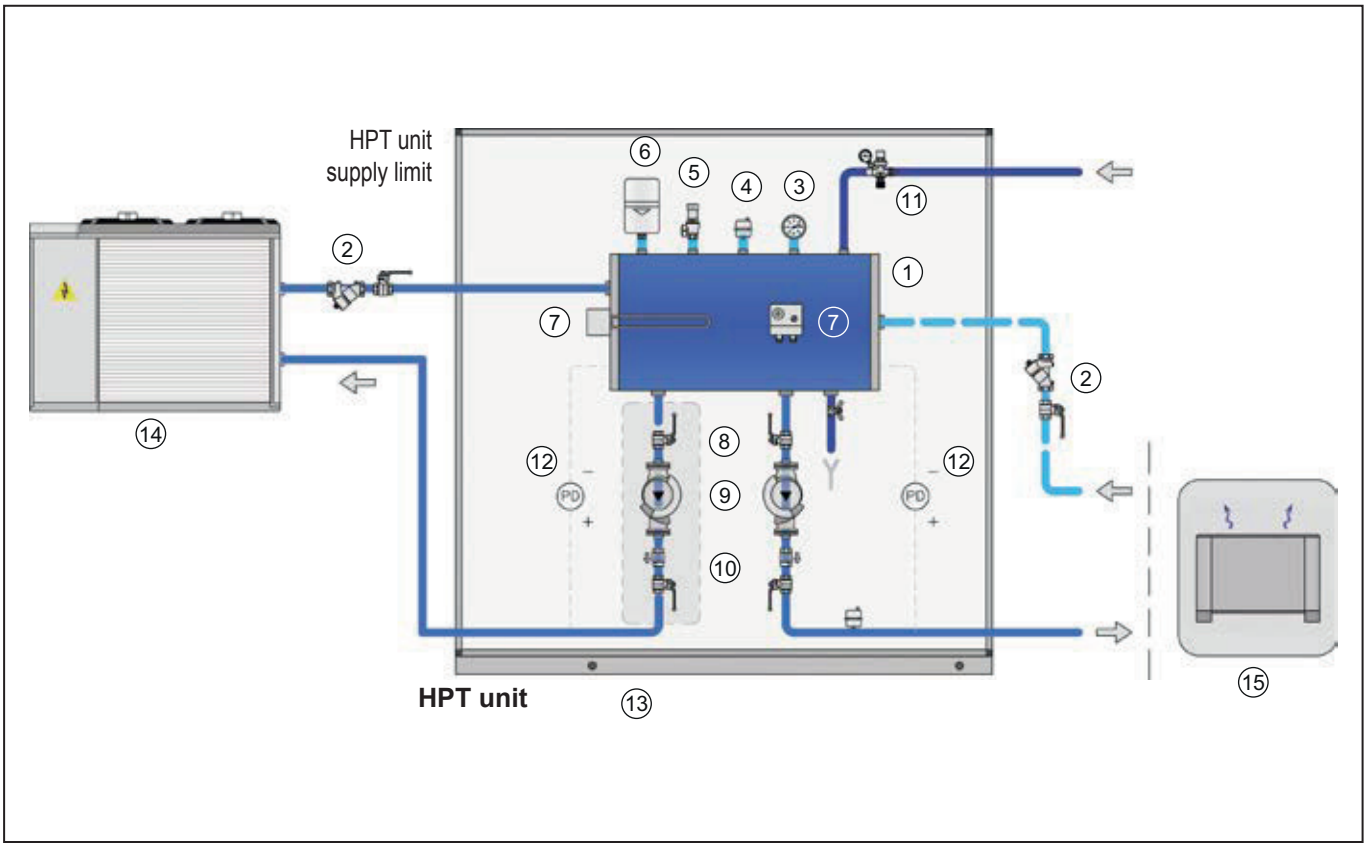


HPT unit

Hydronic kit and chiller form the primary circuit; hydronic kit and system form the secondary circuit. This results in two circuits with flow rates independent from one another. Pumping unit supplied for one of the two circuits only.

Ref.	*Description*
1	Storage tank
2	Y-strainer (optional, supplied not assembled))
3	Pressure gauge
4	Deaerator
5	Safety valve
6	Expansion tank
7	Coolant heating element and thermostat kit (optional)
8	On-off valve
9	Circulator
10	Check valve (for version with 2 pumps only)
11	Automatic make-up unit
12	Differential pressure switch (optional)
13	Self-supporting metal structure suitable for installation outdoors
14	Chiller
15	System

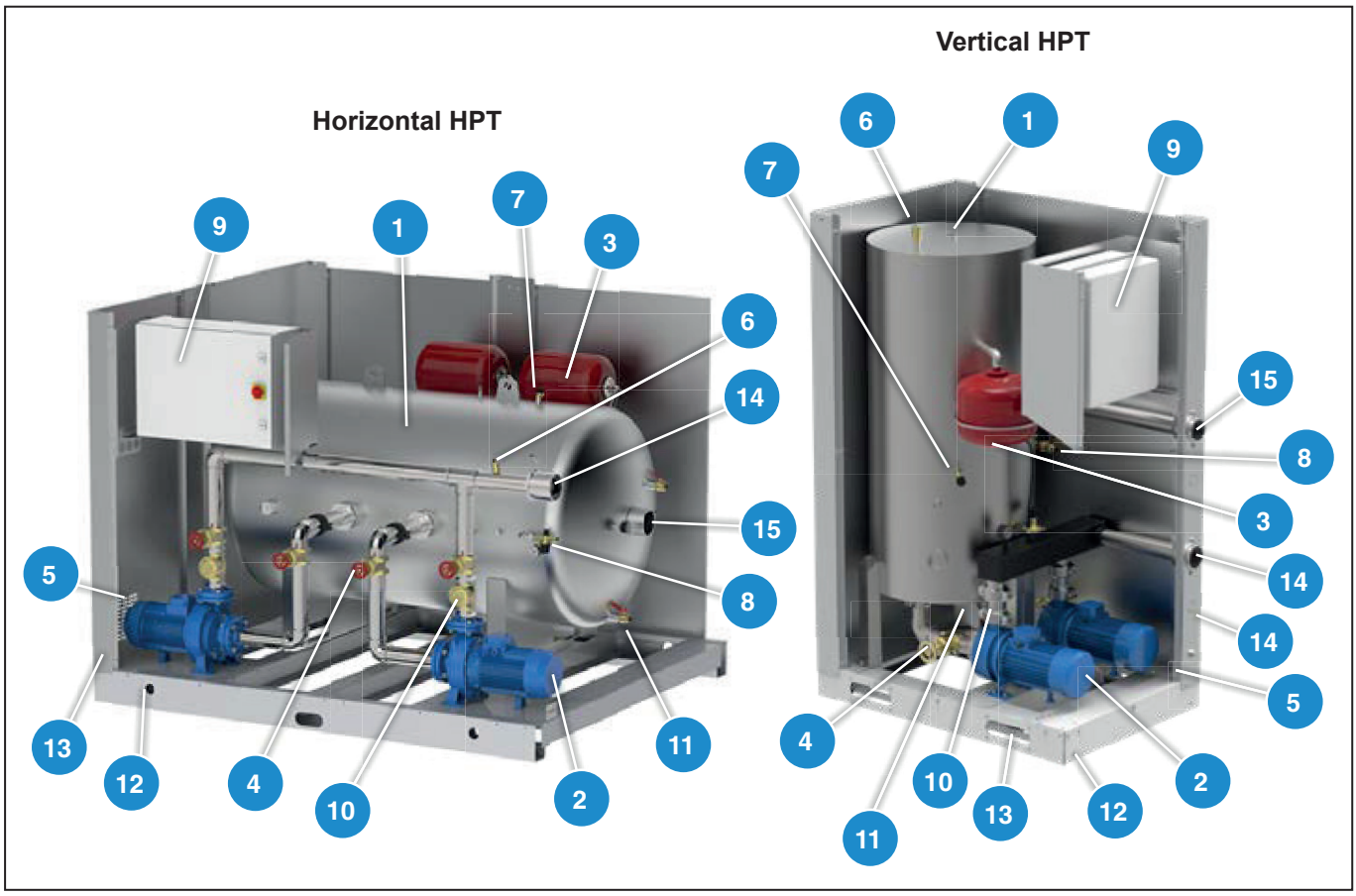
A-6.2.3 Special execution (layout 3)



Hydronic kit and chiller form the primary circuit; hydronic kit and system form the secondary independent circuit. This results in two circuits with independent flow rates. Pumping unit supplied for both circuits only.

Ref.	*Description*
1	Storage tank
2	Y-strainer (optional, supplied not assembled))
3	Pressure gauge
4	Deaerator
5	Safety valve
6	Expansion tank
7	Coolant heating element and thermostat kit (optional)
8	On-off valve
9	Circulator
10	Check valve (for version with 2 pumps only)
11	Automatic make-up unit
12	Differential pressure switch (optional)
13	Self-supporting metal structure suitable for installation outdoors
14	Chiller
15	System

A-6.3 DESCRIPTION OF THE MAIN COMPONENTS

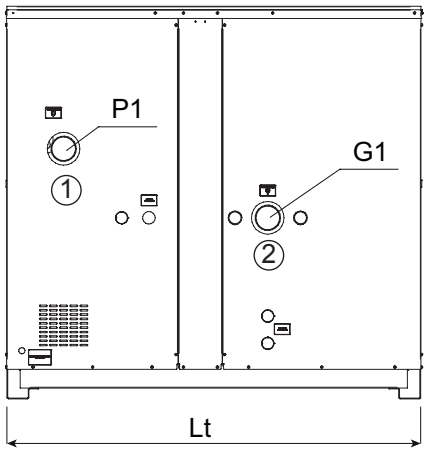


Ref.	*Description*
1	Tank
2	Circulator
3	Expansion tank
4	On-off valve
5	Automatic ventilation system
6	Air vent valve
7	Safety valve
8	Automatic make-up unit
9	Electrical cabinet
10	Check valve (version with 2 pumps only)
11	Drain valve
12	Anchor points (n. 4-6 holes M12/ø14)
13	Mains electricity input
14	Delivery to system
15	Return from system

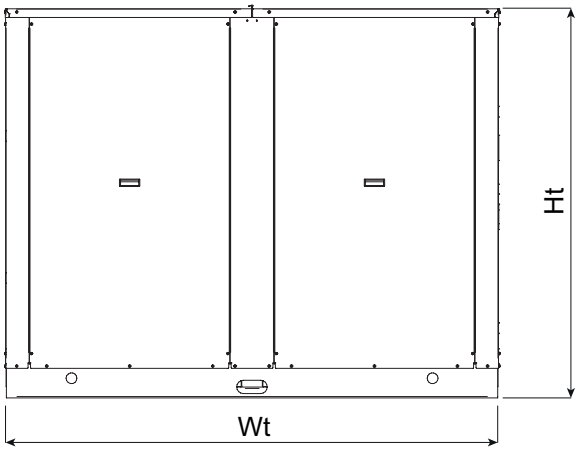
A-6.4 DIMENSIONS

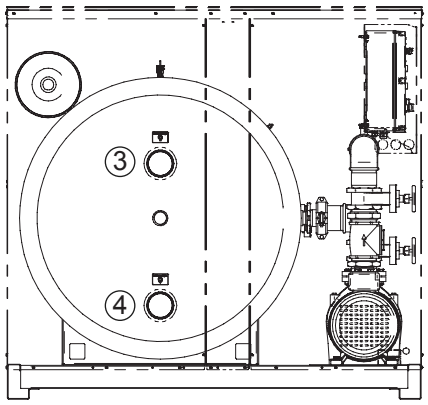
A-6.4.1 Horizontal version

View from the right (Layout 1-2)



Front view (Layout 1-2)





View from the right (Layout 2 only)

Ref.	*Description*
1	Delivery
2	Return
3	To chiller
4	From chiller

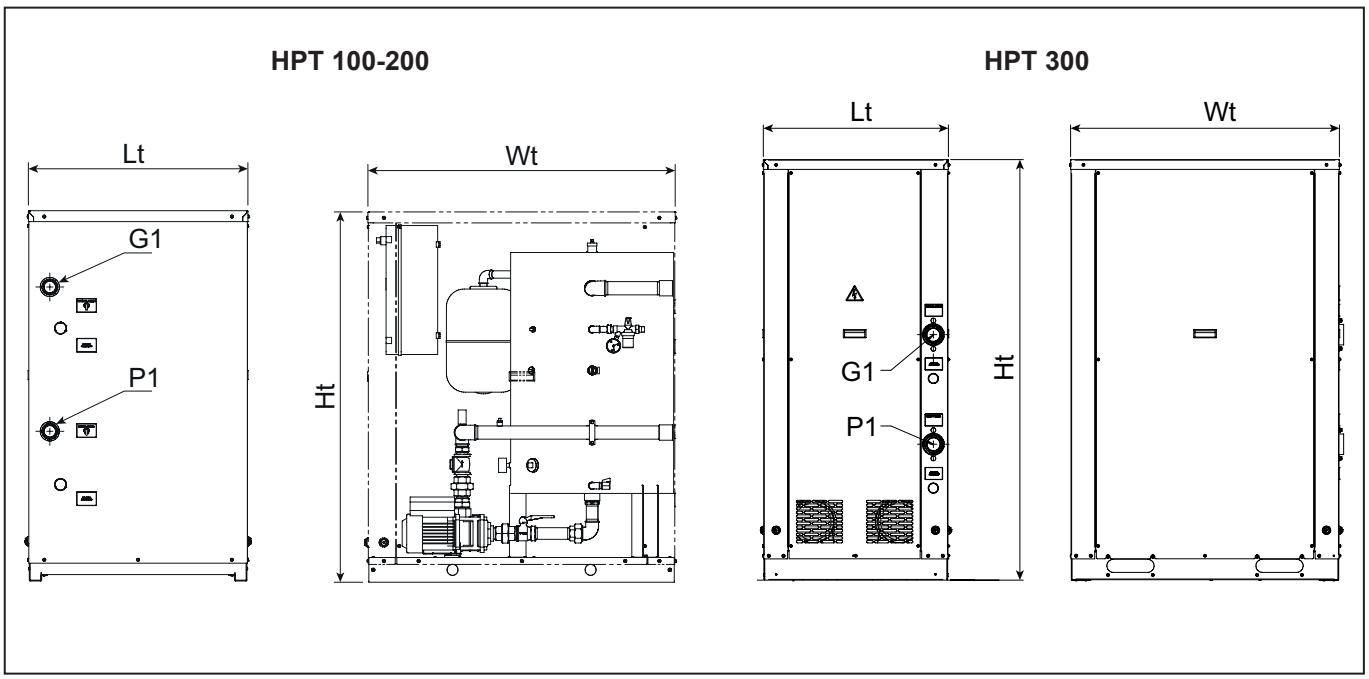
Capacity	Wt	Lt	Ht	G1	P1
(litres)	(mm)			(inches)	
300	1504	1120	1265	2”1/2	2”1/2
500	1504	1120	1265	2”1/2	2”1/2
750	2041	1200	1510	3”	3”
1000	2041	1200	1510	3”	3”
1500	2260	1902	1780	4”	4”
2500	2260	1902	1780	4”	4”

Connection legend:

G1 Inlet from system. Threaded connection.

P1 Outlet toward source of energy. Threaded connection.

A-6.4.2 Vertical version - Layout 1



Capacity	Wt	Lt	Ht	P1	G1
(litres)	(mm)			(inches)	
100	1120	800	1350	1”1/2	1”1/2
200	1120	800	1350	1”1/2	1”1/2
300	1100	760	1726	2”1/2	2”1/2

Connection legend:
G1 Inlet from system. Threaded connection.
P1 Outlet toward source of energy. Threaded connection.

A-6.5 TECHNICAL SPECIFICATIONS

HPT	1 pump		2 pumps (1 as reserve)		F.L.I.	F.L.A. (400/3/50)	Ve
Capacity	Mod.	Weight (kg)	Mod.	Weight (kg)	(kW)	(A)	(l)
100 vertical	PT2*	171	PT2*	176	0.72	1.3	18
	PT3*	172	PT3*	176	0.72	1.3	18
200 vertical	PT2*	193	PT2*	198	0.72	1.3	18
	PT3*	194	PT3*	198	0.72	1.3	18
300 vertical	P1	231	P1	251	1.1	2.5	25
	P2	233	P2	254	1.5	3.2	25
	P3	233	P3	255	1.5	3.4	25
	P4	237	P4	262	2.2	4.8	25
	P5	239	P5	266	3	5.6	25
300 horizontal	P1	260	P1	305	1.1	2.5	25
	P2	262	P2	308	1.5	3.2	25
	P3	262	P3	309	1.5	3.4	25
	P4	266	P4	316	2.2	4.8	25
	P5	297	P5	320	3	5.6	25
500 horizontal	P1	283	P1	318	1.1	2.5	25
	P2	285	P2	321	1.5	3.2	25
	P3	285	P3	322	1.5	3.4	25
	P4	289	P4	330	2.2	4.8	25
	P5	320	P5	334	3	5.6	25
	P6	313	P6	369	3	6.1	25
750 horizontal	P6	425	P6	476	3	6.1	25
	P7	428	P7	481	4	8.7	25
	P8	442	P8	542	5.5	10.4	25
	P9	446	P9	550	7.5	13.6	25
	P10	460	P10	559	5.5	10.4	25
	P11	464	P11	568	7.5	13.6	25
	P12	477	P12	605	9.2	17.2	25
	P13	477	P13	605	11	21.3	25
1000 horizontal	P6	445	P6	531	3	6.1	25
	P7	447	P7	536	4	8.7	25
	P8	461	P8	598	5.5	10.4	25
	P9	465	P9	606	7.5	13.6	25
	P10	479	P10	615	5.5	10.4	25
	P11	484	P11	624	7.5	13.6	25
	P12	496	P12	661	9.2	17.2	25
	P13	496	P13	661	11	21.3	25

Legend:

F.L.I. Maximum absorbed power
F.L.A. Maximum absorbed current
Ve Expansion tank capacity
Pve Expansion tank precharge
Ps Maximum operating pressure
Tmin Minimum fluid temperature

Pve 1.5 bar
Ps 3 bar
Tmin -10 °C

HPT	1 pump		2 pumps (1 as reserve)		F.L.I.	F.L.A. (400/3/50)	Ve
Capacity	Mod.	Weight (kg)	Mod.	Weight (kg)	(kW)	(A)	(l)
1500 horizontal	P6	653	P6	716	3	6.1	2x25
	P7	656	P7	721	4	8.7	2x25
	P8	670	P8	783	5.5	10.4	2x25
	P9	674	P9	791	7.5	13.6	2x25
	P10	688	P10	803	5.5	10.4	2x25
	P11	692	P11	812	7.5	13.6	2x25
	P12	705	P12	846	9.2	17.2	2x25
	P13	705	P13	849	11	21.3	2x25
	P14	749	P14	939	15	27.7	2x25
	P15	739	P15	921	11	20.2	2x25
	P16	776	P16	995	15	26.6	2x25
	P17	786	P17	1015	18.5	33	2x25
	P18	795	P18	1033	22	40.4	2x25
2500 horizontal	P6	706	P6	763	3	6.1	3x25
	P7	708	P7	768	4	8.7	3x25
	P8	722	P8	830	5.5	10.4	3x25
	P9	726	P9	838	7.5	13.6	3x25
	P10	740	P10	843	5.5	10.4	3x25
	P11	745	P11	852	7.5	13.6	3x25
	P12	757	P12	889	9.2	17.2	3x25
	P13	757	P13	889	11	21.3	3x25
	P14	801	P14	980	15	27.7	3x25
	P15	791	P15	967	11	20.2	3x25
	P16	828	P16	1041	15	26.6	3x25
	P17	838	P17	1061	18.5	33	3x25
	P18	847	P18	1079	22	40.4	3x25

Legend:

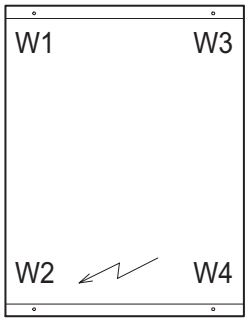
F.L.I. Maximum absorbed power
F.L.A. Maximum absorbed current
Ve Expansion tank capacity
Pve Expansion tank precharge
Ps Maximum operating pressure
Tmin Minimum fluid temperature

Pve 1.5 bar
Ps 3 bar
Tmin -10 °C

A-6.6 MASS DISTRIBUTION

A-6.6.1 Vertical versions

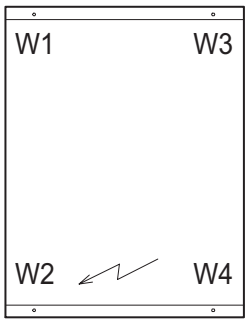
View of the unit from above



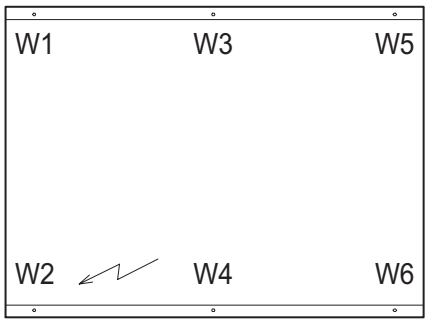
		1 pump				2 pumps (1 as reserve)			
Pump model	**Storage tank capacity (l)**	**W1 (kg)**	**W2 (kg)**	**W3 (kg)**	**W4 (kg)**	**W1 (kg)**	**W2 (kg)**	**W3 (kg)**	**W4 (kg)**
PT2	100	31	70	52	120	31	71	53	123
	200	44	101	75	175	44	103	76	177
PT3	100	31	70	52	121	31	71	53	123
	200	44	101	76	175	45	102	76	177
P1	300	191	100	160	82	138	138	138	138
P2	300	194	100	160	82	138	138	138	138
P3	300	193	100	160	81	140	140	138	138
P4	300	194	101	161	83	141	141	141	141
P5	300	196	101	162	83	143	143	141	141

A-6.6.2 Horizontal versions

View of the unit from above up to P6 500



View of the unit from above from P6 750



		1 pump						2 pumps (1 as reserve)					
Pump model	**Storage tank capacity (l)**	**W1 (kg)**	**W2 (kg)**	**W3 (kg)**	**W4 (kg)**	**W5 (kg)**	**W6 (kg)**	**W2 (kg)**	**W3 (kg)**	**W4 (kg)**	**W5 (kg)**	**W6 (kg)**	**W4 (kg)**
P1	300	166	108	173	115	-	-	174	128	175	129	-	-
	500	239	146	246	154	-	-	245	165	245	165	-	-
P2	300	167	108	174	115	-	-	175	129	176	130	-	-
	500	239	147	247	154	-	-	246	166	246	166	-	-
P3	300	167	108	174	115	-	-	175	129	176	130	-	-
	500	239	147	247	154	-	-	246	166	246	166	-	-
P4	300	168	109	175	116	-	-	177	131	178	132	-	-
	500	240	147	248	155	-	-	248	168	248	168	-	-
P5	300	177	115	184	122	-	-	178	132	179	133	-	-
	500	250	153	258	161	-	-	250	168	250	168	-	-
P6	500	248	152	256	160	-	-	260	175	260	175	-	-
	750	248	132	254	138	261	145	255	158	253	156	251	155
	1000	314	156	320	163	326	169	325	190	323	188	321	186
	1500	394	311	400	318	408	326	402	341	400	399	399	338
	2500	593	463	600	469	606	477	602	473	610	479	616	486
P7	750	249	132	255	139	262	145	256	159	254	157	252	156
	1000	314	157	320	163	327	169	326	191	324	189	322	187
	1500	394	311	401	319	408	326	403	342	401	339	400	338
	2500	593	464	601	470	607	477	603	474	611	480	617	487
P8	750	243	136	253	145	263	156	254	178	254	178	254	178
	1000	307	160	318	170	328	181	327	209	326	207	325	206
	1500	386	320	395	330	404	338	398	366	397	365	396	364
	2500	595	466	603	472	609	480	606	511	603	508	600	505
P9	750	244	136	253	146	264	156	255	179	255	179	255	179
	1000	308	160	318	171	329	181	329	210	328	209	327	207
	1500	387	321	395	330	405	339	399	368	398	367	397	366
	2500	596	467	603	473	610	480	607	513	604	509	601	506

		1 pump						2 pumps (1 as reserve)					
Pump model	Storage tank capacity (l)	W1 (kg)	W2 (kg)	W3 (kg)	W4 (kg)	W5 (kg)	W6 (kg)	W2 (kg)	W3 (kg)	W4 (kg)	W5 (kg)	W6 (kg)	W4 (kg)
P10	750	247	138	256	147	267	158	257	180	257	180	257	180
	1000	311	162	321	173	332	183	331	211	330	210	329	209
	1500	389	323	398	332	407	341	401	370	400	369	399	368
	2500	599	469	606	475	612	482	608	513	605	510	602	507
P11	750	248	138	257	148	268	158	259	182	259	182	259	182
	1000	312	163	323	173	333	184	333	212	331	211	330	210
	1500	390	323	399	333	408	341	403	371	402	370	401	369
	2500	600	470	607	476	613	483	610	515	607	512	604	508
P12	750	250	139	260	149	271	160	266	187	266	187	266	187
	1000	314	164	325	175	336	185	340	217	339	216	338	215
	1500	392	325	401	335	411	343	409	377	407	376	406	374
	2500	602	471	609	478	615	485	617	520	613	517	610	514
P13	750	249	141	259	151	269	161	264	189	264	189	264	189
	1000	306	167	319	180	333	194	331	227	330	225	328	223
	1500	382	330	394	342	407	354	396	390	395	389	394	388
	2500	591	475	601	485	612	496	603	533	600	530	597	527
P14	1500	386	336	401	350	414	365	408	408	407	407	406	406
	2500	589	486	601	498	613	516	605	563	602	560	599	555
P15	1500	384	335	399	348	413	363	405	405	404	404	403	403
	2500	588	485	599	497	611	514	603	561	600	557	596	553
P16	1500	391	340	405	354	419	369	417	417	416	416	415	415
	2500	594	490	606	503	618	520	615	573	612	569	609	565
P17	1500	392	342	407	356	421	371	421	421	420	420	419	419
	2500	596	492	607	504	620	522	619	576	616	573	612	569
P18	1500	394	344	408	357	422	372	424	424	423	423	422	422
	2500	597	493	609	506	621	524	622	579	619	576	615	572

B-1 SAFETY RECOMMENDATIONS

B-1.1 INTRODUCTION

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

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, entity 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 authorised by the Manufacturer shall be considered not permitted.
The Manufacturer declines any contractual and extra-contractual liability for injury to persons or animals or damage to property, due to wrong installation, incorrect adjustment and maintenance, improper use or the partial or superficial reading of the information contained in this manual.
The Manufacturer reserves the right to make any changes and improvements to its products at any time and without prior notice in its ongoing policy of improving quality, therefore this publication may also be subject to changes. The Manufacturer shall not be held liable for printing or transcription errors, omissions, or other inaccuracies in the information contained in this manual.

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 and must be kept carefully for future maintenance or service.

Upon receiving the goods, that the packaging is perfectly intact.

B-1.4 ACCESS TO THE EQUIPMENT

The unit must be installed in an area which is accessible to authorised **OPERATORS** and **TECHNICIANS** only.

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 mains 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 can 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/EU**.
- 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 equipment, 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.

Tanks are not designed to withstand internal pressures below the atmospheric pressure; for this reason, the maximum allowed negative pressure inside standard tanks is 0 bar.

B-1.6 PRECAUTIONS AGAINST RESIDUAL RISKS

Prevention of residual risks caused by 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 chillers, heat pumps etc.
- Report any alarm on the unit to a technician immediately.
- Do not reset alarms that can be reset manually without first detecting and eliminating the cause; failure to do so will render the warranty null and void.

Prevention of mechanical residual risks

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

Prevention of residual electrical risks

- Connect the unit to the main power supply following the instructions in this manual.
- Perform all the maintenance operations set out in this manual.
- Disconnect the unit from the main power supply by means of the external circuit breaker before opening the electrical panel.
- Check the unit has been properly earthed before putting it into service.
- Check all electrical connections, 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 cutouts are activated.
- Do not use cables with an inadequate cross-section and do not 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.
- The antifreeze added to the hydraulic circuit is harmful to human health. Do not drink the liquid in the hydraulic circuit and avoid contact with 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 electrical appliances near the unit. 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 carrying pressurised fluids.

B-1.7 PRECAUTIONS DURING MAINTENANCE

Maintenance operations must be carried out by authorised technicians only.

Before performing any maintenance operation you must:
- Disconnect the unit from the main power supply by turning the external circuit breaker to off.
- Place a sign with the words "Do not turn on - Maintenance underway" on the open (OFF) circuit breaker.
- Make sure any remote ON/OFF controls are disabled.
- Use suitable accident prevention equipment (hard hat, 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 panel 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 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 RECOMMENDATIONS

Bear in mind that appliances operating with electricity and water implies the observance of fundamental safety rules:

Do not allow children or persons with reduced capabilities **to use the unit** unless they have been given supevision.

Do not touch the unit with bare feet or wet or damp parts of your body.

Do NOT clean the unit if it is not disconnected from the main power supply.

Do NOT modify safety or adjustment **devices** without prior authorisation and instructions from the Manufacturer.

Do NOT pull, disconnect, or allow the electrical cables coming out of the unit to become twisted, even if they are disconnected.

Do NOT open the doors giving access to internal parts of the unit if the system has not been switched off at the power source.

Do NOT climb or sit on, and/or place anything on the unit.

Do NOT spray or aim water jets of water onto the unit.

Do NOT abandon or leave packaging materials like cardboard, staples and plastic bags within the reach of children as they are 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 **para. 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 avoid any damage.

C-1 INSTALLATION

C-1.1 STORAGE BEFORE INSTALLATION

If the equipment has to be stored for an extended period before installation, keep it in the original packaging.
Check the conditions of the storage environment. The packed equipment shall be stored in a covered place with a temperature between +10°C and +50°C.
Avoid humid environments and direct exposure to the elements (do not store outdoors).
Store the packed items on a flat, stable surface and ensure there are no risks of unexpected movements.
To prevent the equipment becoming a danger or being damaged, it must be stored in an area which is accessible to authorised personnel only.
It is advisable to store the equipment in close proximity to where it will be installed, so minimal handling is required when installing.
Check regularly that the storage conditions do not change.
Do not rest boxes or heavy equipment on the packed unit.

Do not store the units directly on the ground.

Do not store the packed equipment near flammable material.

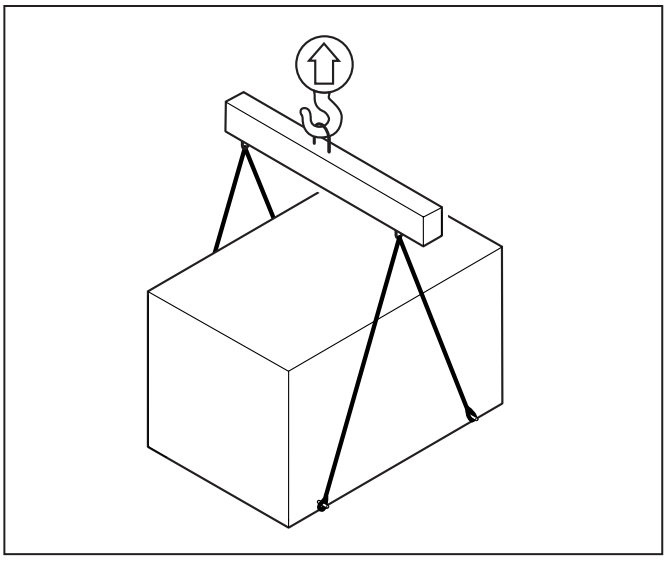
Ensure adequate storage conditions and avoid contact with water at all times.

Take appropriate measures if operations have to be carried out near the stored equipment that can damage its packaging. If for instance welding shall be carried out, protect the stored equipment with some panels.

C-1.2 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.
Do not lift the unit using unsuitable or inefficient equipment. Contact companies specialised in this field to do the job.
Do not tilt the machine to an angle of more than 15° during handling.
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 handling the unit, make sure the site chosen for its installation can bear its fully laden weight.
Never move the unit by using rollers or a forklift truck.
To lift and handle the unit follow the instructions below:

- Insert and fix the eyebolts in the holes of the frame marked specifically for this purpose.
- Attach the lifting 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.

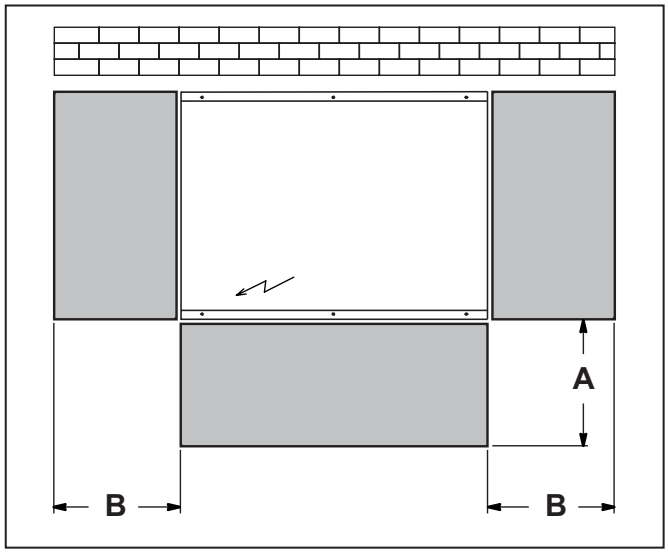


During lifting and handling, take care not to damage the unit. The unit sides must be protected by cardboard or plywood sheets.

Do not remove the plastic wrapping or protective elements until the unit is ready to be put into service as these prevent dirt, dust and foreign bodies from getting into the unit or damaging its external surfaces.
The HPT units have a base with holes for antivibration supports. The unit does not 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 drawings (chapter A-6.2).
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 that can bear 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.

Recommended free space for maintenance	
A	800 mm
B	800 mm

C-1.3 HYDRAULIC CONNECTION

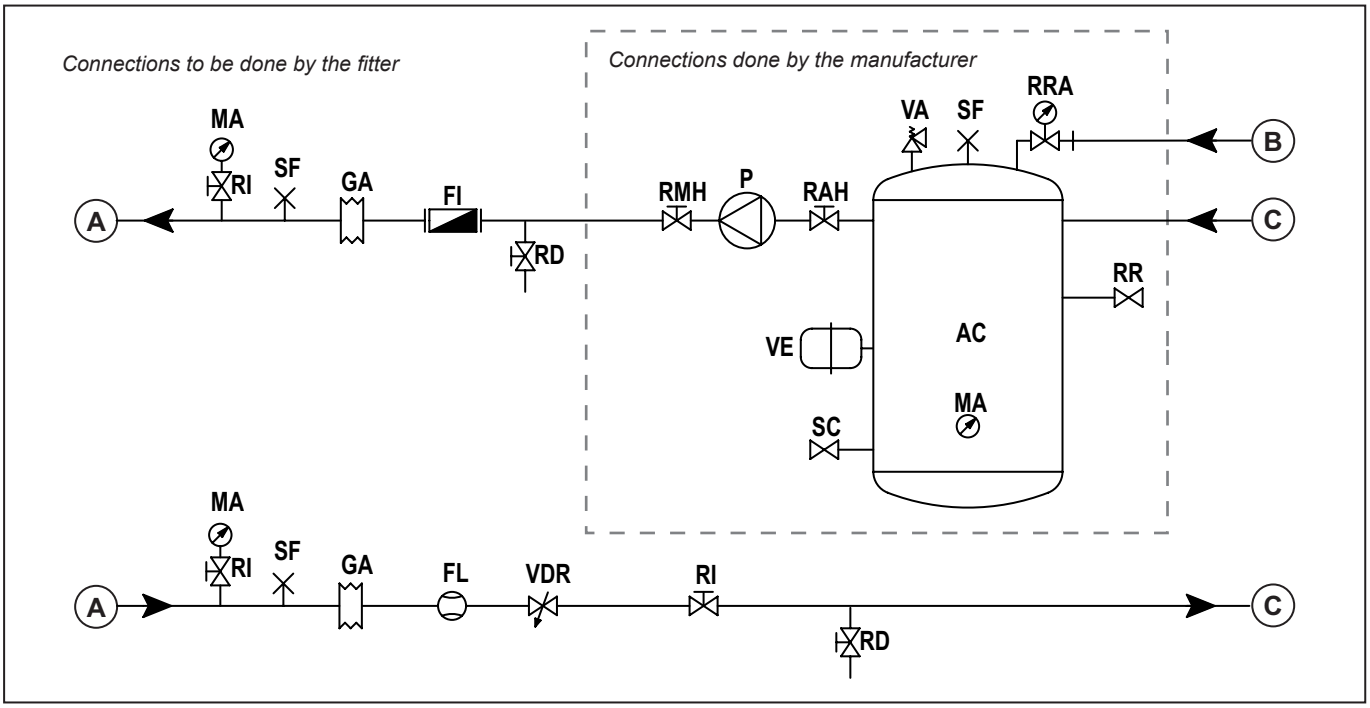
Protect the hydraulic circuit with antifreeze if the system will be shut down without emptying the system during the winter. If necessary, drain the water in the HPT unit. The connection pipes must be adequately supported so that they do not rest on the unit.

Furthermore:

- Install shut-off valves in the inlet and outlet lines.
- Provide air vent valves at the highest points of hydraulic lines.
- Provide suitable drainage points with plugs, taps, etc. at the lowest points of the hydraulic lines.
- Insulate hydraulic lines 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.

The installation instructions above are a necessary condition to keep the warranty valid.



Ref.	Description
A	Chiller
B	Make-up
C	Utilities
AC	Storage
FI	Mesh filter
FL	Flow switch
GA	Anti-vibration coupling
MA	Pressure gauge
P	Circulation pump
SC	Storage tank drain 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

Diagram showing water storage on return

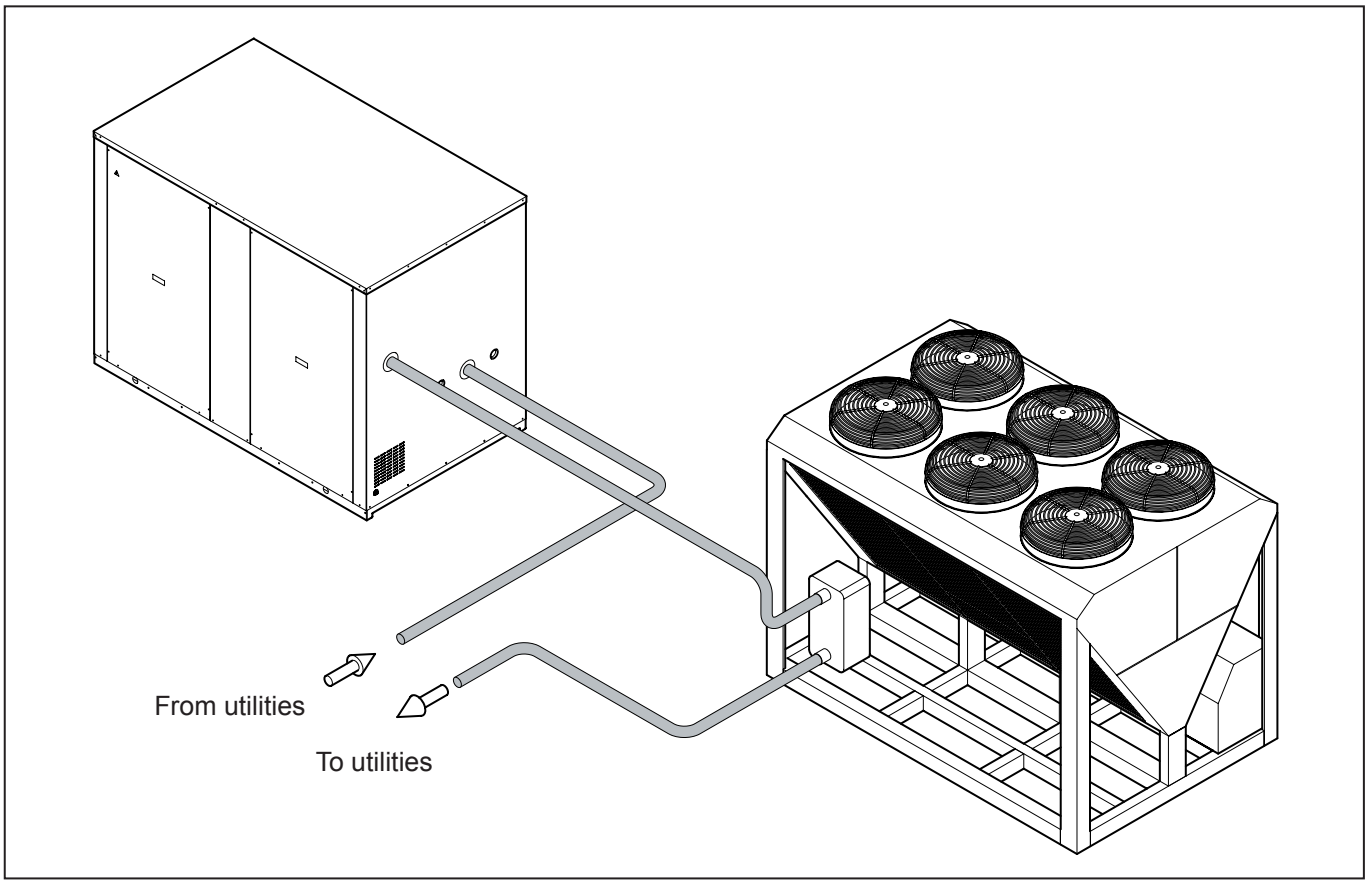
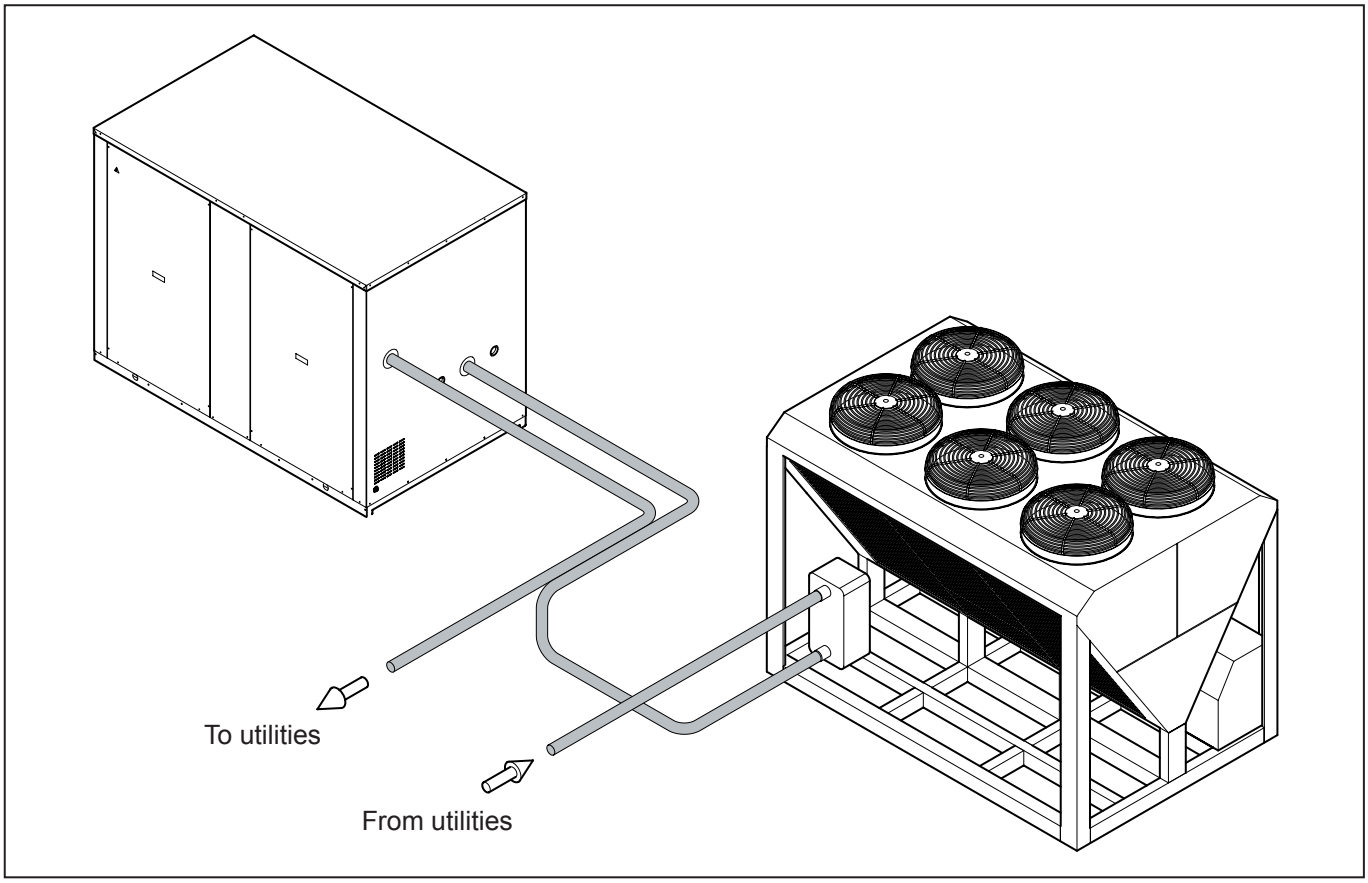


Diagram showing water storage on delivery



C-1.4 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.

There are three possible solutions to prevent icing up:

– empty the unit at the end of the season and fill it at the beginning of the next. We recommend installing a tap for draining the unit on the outlet pipes. **In any case a drain sleeve is provided at the lowest point of the tank along with two valves, a bleed valve and a drain valve, 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 forecast;
– use a heating element in the water storage tank (available as an accessory). In this case the heating element must always be powered for the entire period when there is a risk of the system icing up.

C-1.5 MAXIMUM WATER CONTENT IN THE SYSTEM AND SIZE OF THE EXPANSION TANK

Table 1 shows the maximum water content of the hydraulic system in litres, compatible with the capacity of the expansion tank supplied with all HPT models and with the triggering value of the safety valve (3 bar for all models).
Should the real water content of the hydraulic system, including the storage tank, be higher than the one indicated in the table at operating conditions, another expansion tank of a suitable size with reference to the additional volume must be installed. Table 1 shows the system's maximum content values for operating with a water-glycol mix. The said values are obtained by multiplying the reference value in Table 1 by the correction factor in Table 2.

	Hydraulic height H	**m**	**15**	**10**
	Precarica dal vaso di espansione	**bar**	**1.80**	**1.50**
HPT 100	Max water content in the system (1)	l	708	885
	Max water content in the system (2)	l	453	567
HPT 200	Max water content in the system (1)	l	708	885
	Max water content in the system (2)	l	453	567
HPT 300	Max water content in the system (1)	l	984	1230
	Max water content in the system (2)	l	630	788
HPT 500	Max water content in the system (1)	l	984	1230
	Max water content in the system (2)	l	630	788
HPT 750	Max water content in the system (1)	l	984	1230
	Max water content in the system (2)	l	630	788
HPT 1000	Max water content in the system (1)	l	984	1230
	Max water content in the system (2)	l	630	788
HPT 1500	Max water content in the system (1)	l	1964	2461
	Max water content in the system (2)	l	1261	1576
HPT 2500	Max water content in the system (1)	l	2953	3691
	Max water content in the system (2)	l	1891	2363

Tab. 1

Operating conditions of reference:

(1) Cooling:
Min water temperature = 4 °C
Max water temperature = 40 °C

(2) Heating (heat pump):
Min water temperature = 4 °C
Max water temperature = 50 °C

Glycol mixture	Water temperature °C		Correction factor	Reference value
	max.	min.		
10%	40	-2	0.507	(1)
10%	50	-2	0.686	(2)
20%	40	-4	0.434	(1)
20%	50	-4	0.604	(2)
30%	40	-6	0.393	(1)
30%	50	-6	0.555	(2)

Tab. 2

EXPANSION TANK PRECHARGE PRESSURE

The standard pecharge pressure of the expansion tank is 1.5 bar for all models.
This value cannot however be used for any type of system. In fact it varies on the basis of the system's height H.
The formula to calculate the expansion tank precharge pressure is the following:

P = (H /10.2)+0.3

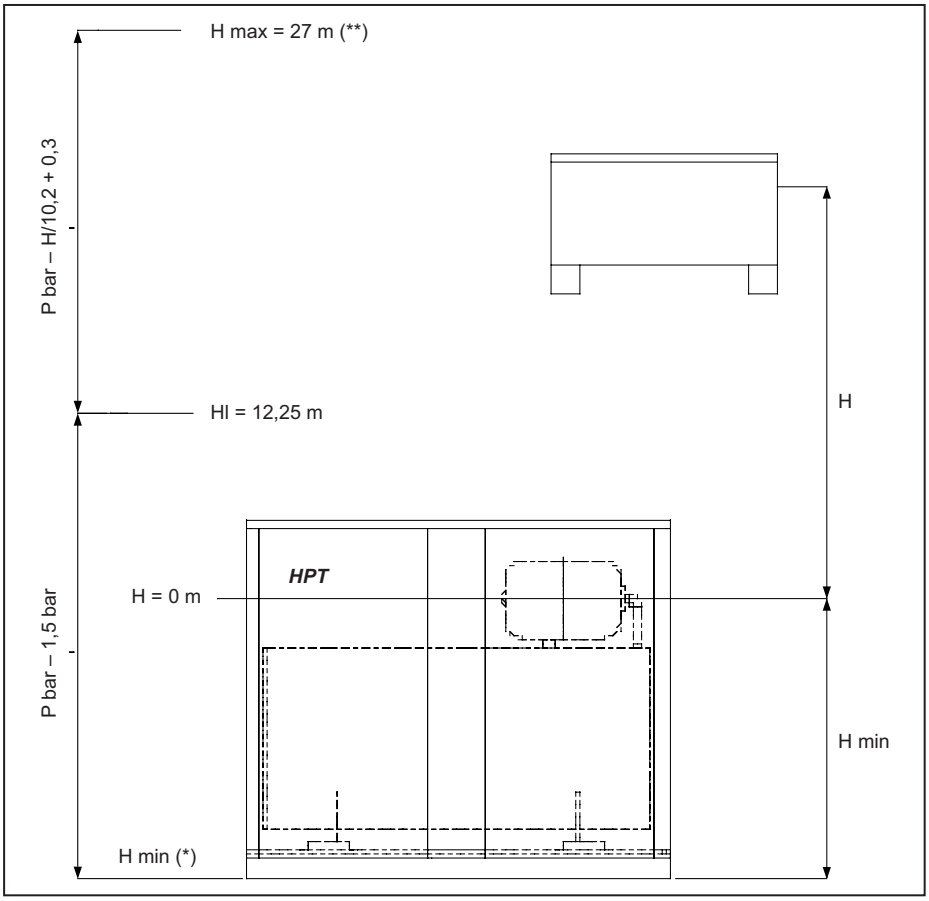
Whereas:
H: system height in metres
P: expansion tank precharge pressure in bar

If the result of the calculation is lower than the standard value, do not change the expansion tank precharge. This means that for each system where H is lower than 12.25 m, the expansion tank precharge pressure must be 1.5 bar. The operator must simply control such value.

EXAMPLE:
if the system height H is equal to 15.3 m, the precharge pressure will be:

P = (15.3/10.2)+0.3= 1.8 bar

H: system height
Hmax: max system height
Hl: height below which the expansion tank precharge pressure is equal to standard



* check that the system's lowest point can tolerate the system pressure.

** check that the height of the system's highest point is not over H max= 27 m.

C-2 ELECTRICAL CONNECTION

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 unit.
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 cross-section for the power absorbed by the unit (see wiring diagram - **section G**).
The command and control circuit in the electrical board is a derived circuit of the power circuit.

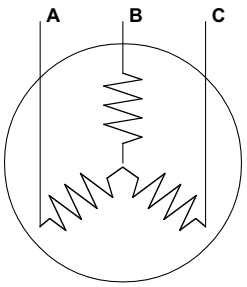
C-2.2 ELECTRICAL CONNECTION

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



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

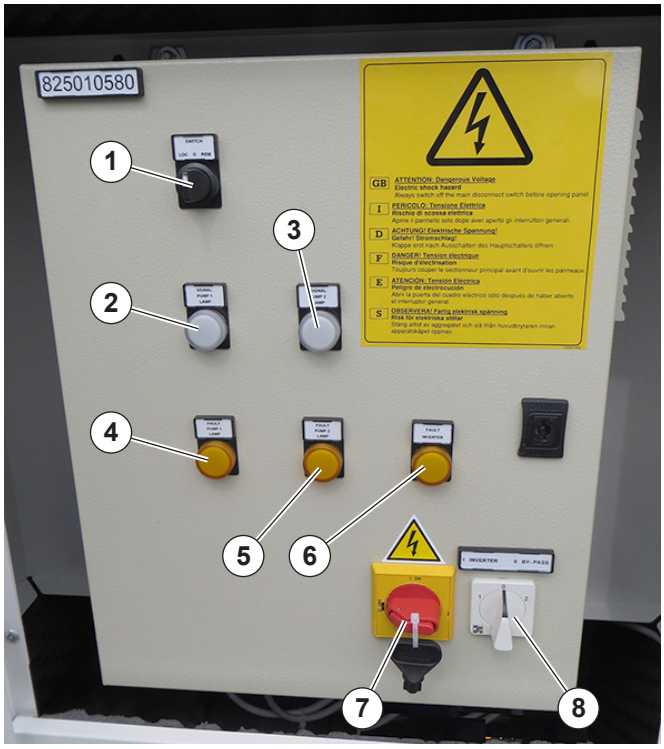
IMPORTANT: If the mains voltage has an offset of over 2%, contact the electric utility company. If the unit is used with a voltage offset between the phases of over 2%, THE WARRANTY SHALL CEASE TO HAVE EFFECT.

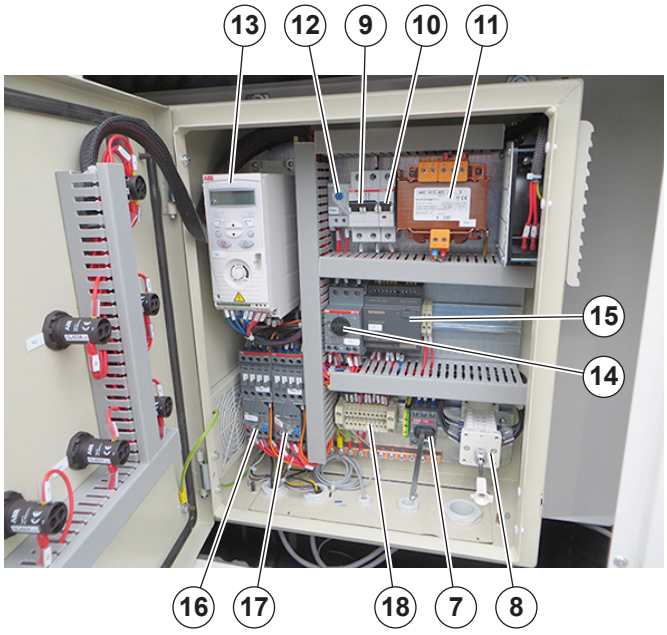
Before putting the unit into service we recommend checking that the electrical systems have been installed in accordance with the Electromagnetic Compatibility Directive.

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.

C-3 ELECTRICAL BOARD

Pos.	Description	Ref.
1	Local-remote switch	-
2	Pump 1 ON indicator	HL1
3	Pump 2 ON indicator (if any)	HL2
4	Pump 1 fault indicator	HL3
5	Pump 2 fault indicator (if any)	HL4
6	Inverter fault indicator (if any)	HL5
7	Circuit breaker with lock	QS1
8	Bypass - inverter selector (if any)	QS3
9	400V aux. magnetothermal switch	QF4
10	230V aux. magnetothermal switch	QF5
11	Auxiliary transformer	1TC1
12	Timer	
13	Inverter (if any)	
14	Automatic switch	
15	PLC LOGO (only for version with inverter)	
16	Pump 1 contactor	KM1
17	Pump 2 contactor	KM2
18	Command/signal terminal board	X1

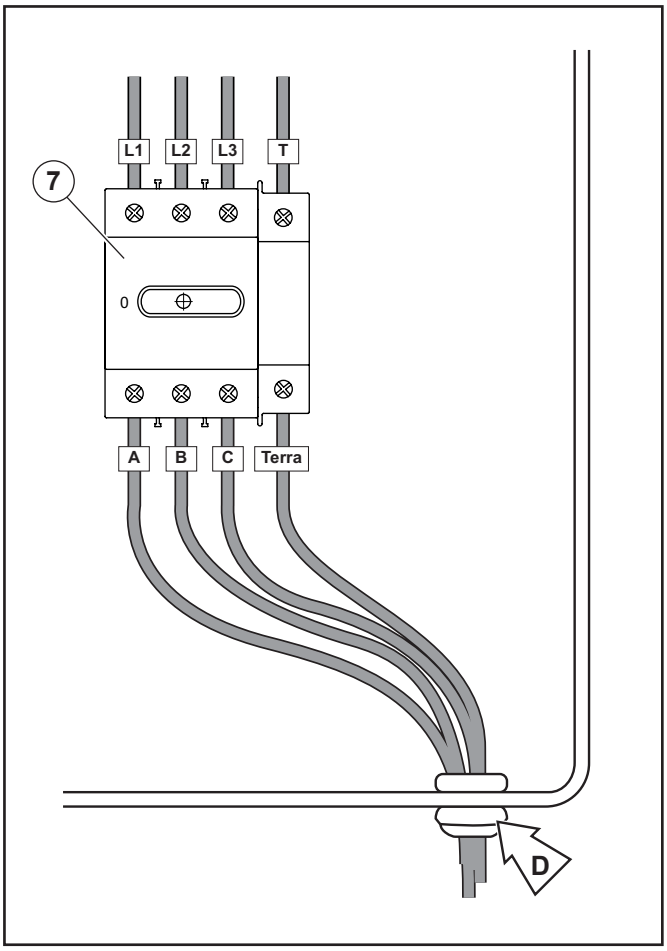




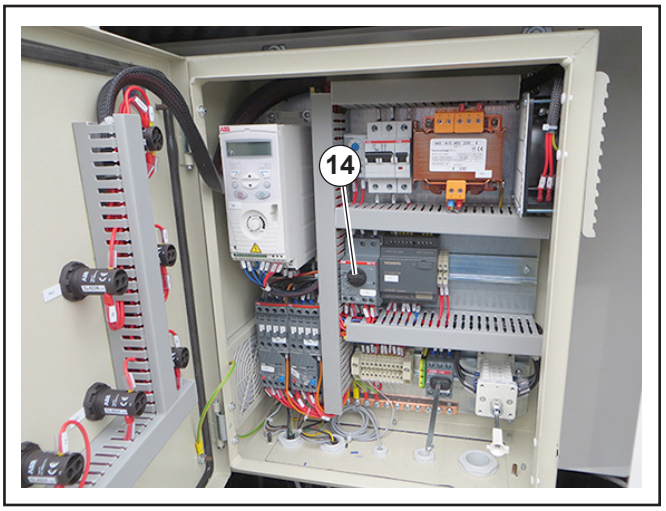
IMPORTANT
The fuses in the power supply line shall be installed by the fitter.

IMPORTANT
In the versions with two pumps, a jumper is fitted between two terminals of the terminal board pos. 18. When the jumper is closed, operation of the two pumps is automatically alternated. When the jumper is open, pump operation alternates every 48 hours. For further details, refer to the wiring diagrams attached.

The electrical board is pre-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 **ref. 7**, passing them through opening **D** in the box, as shown in the figure.

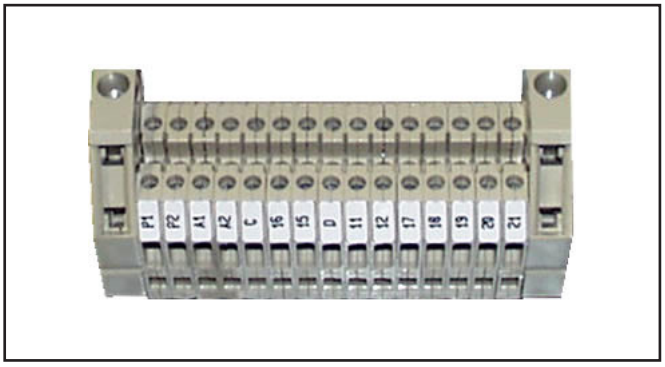


Check the correct direction of rotation of the motors (shown by an arrow on the motor). If they turn in the opposite direction, swap the phases.
The automatic switch (or cutout) **pos. 14** is adjusted by the manufacturer. In the case of malfunction, do not tamper with any internal connections: reset the switch according to real absorption.



C-5.1 REMOTE CONTROL OPERATION

If the unit is controlled by an external remote control, turn selector switch **1S1** to the **REM** position.
Connect the remote control using terminals P_1 and P_2 if there is a no-voltage contact.



Example: HPT terminal board for 2 pumps

C-6 INVERTER (OPTIONAL)

Each pump can be controlled by an inverter.
The inverter is an electronic device that adjusts the frequency and voltage that is supplied to the motor based on the demand of the machine.
The units equipped with inverter are also equipped with a 0-10 bar pressure sensor which communicates with the inverter via a 4-20 mA signal.
All adjustment parameters are set during testing by the manufacturer. The user shall only select the required pressure setpoint.

For information on how to select the inverter setpoint, please refer to the inverter use and maintenance instructions supplied with the technical documentation.

D-1 START-UP

D-1.1 PRE-OPERATIONAL 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 circuit breaker open (OFF).
- Check the rotation direction of pumps.
- Check that water flows in the right directions at the inlet and outlet, and the components in the external hydraulic circuits have been installed properly.
- Check that the hydraulic circuit has been filled.
- Check that the shut-off valves are open so the fluid can run.
- Check that air has been vented.

D-1.2 START-UP

The start-up sequence is described below:

- Make sure that any external equipment is in efficient working order and the controls on the system are properly adjusted.
- Turn the electrical board on by turning the circuit breaker to the **"I"** (closed) position.
- 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 hydraulic circuit has been filled properly and/or completely.

D-1.3 WINTER STOPPAGE

To stop the unit, follow the procedure below:

- Turn the circuit breaker to the **OFF** position 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.

If the kit has an optional antifreeze heating element, make sure the shut-off valves of the circuit are open and the kit is powered so the antifreeze heating element and the water pump will be supplied with power if the external temperature reaches the value the antfreeze protection has been set to.

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 regularly by qualified personnel.
If damages or failures caused by improper maintenance occur during the warranty period, the manufacturer will not be liable for the costs incurred to put the unit 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 screws of the terminals are tight				X	
Clean the outside of the unit with soap and water				X	
Check the concentration of antifreeze in the mixture (if an antifreeze mixture is used)				X	X
Drain and clean the unit					X
Check the expansion tank precharge pressure				X	

E-1.3 SERVICING THE INVERTER (IF FITTED)

The following table indicates the routine maintenance jobs recommended by the inverter manufacturer.

Operations	*Every year*	*Every 3 years*	*Every 6 years*
Check the temperature and inspect for dust and corrosion	X		
Replace the cooling fan		X	
Check the efficiency of the safety valve			X

For information on how to carry out maintenance, refer to the inverter use and maintenance manual supplied with the technical documentation.

F-1 PROBLEMS - CAUSES - SOLUTIONS

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

The wiring diagrams of the different models are supplied along with the purchased unit.



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