

TECHNICAL MANUAL

PLE

Air-water Chillers and heat pumps with low-GWP refrigerant
50 - 160 kW



R-454B refrigerant



A2L gas leak
detection



Axial fan



Scroll compressor



Cooling only



Heating/Cooling

PLUS

- » Refrigerant with GWP of less than 500
- » High seasonal efficiency values
- » Electronic expansion valve
- » Tandem configuration single circuit
- » Remote connectivity with the most common protocols
- » Possibility to configure low-noise versions



Dear Customer,

Thank you for placing your trust in one of the products of Galletti S.p.a

This product is the result of our work and our commitment to design, research, and production and has been made from the finest materials, employing state-of-the-art components and production technology.

The CE marking of the product ensures its compliance with the safety requirements of the following directives: the Machinery Directive, the Electromagnetic Compatibility Directive, the Electrical Safety Directive, and the Pressure Equipment Directive. Fulfillment of the Ecodesign requirements is fully in keeping with the environmental awareness that has always guided our company.

The company certification of the Quality and Safety management system ensures that product quality is constantly checked and improved, and that the product is manufactured in full compliance with the highest standards.

By choosing our product, you have opted for Quality, Reliability, Safety, and Sustainability.

At your disposal, once again.

Galletti S.p.a

TRANSLATION BY ORIGINAL INSTRUCTIONS

The water chillers and heat pumps comply with directive 2014/68/EC (PED).

The technical and dimensional data reported in this manual may be modified in view of any product improvement.

For any information , please contact the company: info@galletti.it

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1 SERIES

The PLE range units are designed for heating and cooling the water to be used in air-conditioning or process system, for residential, commercial or industrial. The PLE range units are intended for outdoor installation (IP24 protection degree), in a position

not accessible to the public.

⚠ WARNING: Do not install the unit in environments with gas or flammable dusts.(ATEX zone)

2 CONSTRUCTIVE FEATURES

STRUCTURE

Galvanised sheet steel structure treated with a polyester powder coating (RAL9002) suitable for outdoor applications, for an attractive look and effective resistance to corrosive agents.

Fastening devices are made of non-oxidizable materials, or carbon steel that has undergone surface-passivating treatments. On request acoustic insulation can reduce the unit noise emissions

Fastening devices are made of non-oxidizable materials, or carbon steel that has undergone surface-passivating treatments.

CUSTOMISED HYDRAULIC KIT

The hydronic kit is fully configurable, and as an option the pumping unit can be requested with silicon carbide/ silicon carbide/viton seals to handle ethylene glycol and propylene glycol concentrations of up to 35% with minimum product mixture temperatures of -10 °C. With standard pumps the maximum ethylene glycol concentrations is: for frame 1: 25% and 30% for others.

COOLING CIRCUIT

- Scroll type compressors in a tandem configuration that can be sound insulated. The adopted components' efficiency, reliability, and noise emission levels represent the state of the art for scroll compressors.
- Brazed plate heat exchangers made of stainless steel and optimised for use with R454B.
- Finned block condenser with 8 mm copper piping and aluminium fins, characterised by circuits for optimize the operation both as evaporator and as condenser and to reduce refrigerant charge (PLE H).
- Microchannel condenser with low refrigerant charge (PLE C).
- Dehydrating filter.
- Flow indicator with humidity indicator.
- Cycle reversing valve (only PLE H)
- Check valve (PLE H)
- Liquid receiver (PLE H)
- High and low pressure switch
- Schrader valves for checks and/or maintenance
- Electronic expansion valve for liquid injection: available on configuration, expands a little quantity of liquid in compressors intake for reduce discharge overheating during the DHW production in cold climates.
- Electronic expansion valve: this standard feature expands the liquid refrigerant towards the plate heat exchanger during operation in chiller mode and towards coils in heat pump mode.
- Low-pressure relief valve: it limits the maximum pressure of the low-pressure circuit in order to maintain the PED category of the compressor. (Only for model 142-152)

- Liquid separator (PLE H): this configurable accessory provides greater protection to the compressors against the return of liquids, especially during cycle reversals and defrosting. It is strongly recommended on all heat pumps operating in harsh and/or variable climates and in the areas indicated by the operating range. It is always combine with liquid injection.
- PLE H): this configurable accessory provides greater protection to the compressors against the return of liquids, especially during cycle reversals and defrosting. It is strongly recommended on all heat pumps operating in harsh and/or variable climates and in the areas indicated by the operating range

REFRIGERANT WITH LOW GWP

Use of R454B refrigerant with low environmental impact. R454B is a next-generation A2L refrigerant with a GWP of only 467, one of the lowest on the market. This GWP value ensures that the PLE range complies with the gradual reduction of quotas of greenhouse refrigerants in the European market required by the F-GAS regulation, down to the stricter limits foreseen for 2030

ELECTRONIC VALVE

It is standard on the entire range and offers greater responsiveness during transients. The electronics also manage the synergistic operation of the compressors and the valve, thereby making it possible to vary overheating and maximize efficiency at partial loads.

ELECTRONIC MICROPROCESSOR CONTROL

The electronic control enables the complete control of the **PLE** unit. It can be easily accessed through a polycarbonate flap with IP65 protection rating.

By reading the outdoor air temperature, it can automatically change the setpoint to adapt it to the outdoor load conditions or keep the unit running even in the harshest winter conditions.

Main functions:

- Control of water returning from the system's temperature
- With modulating pump, control of the flow temperature to the unit or the Delta T
- Possibility of adapting the set-point to the outside load conditions or to the outside temperature
- Control of the electronic valve
- Complete alarm management, including history
- An RS485 serial port is available for monitoring
- Possibility of connecting a second remote terminal (display)
- Management of multiple units connected to a LAN network
- Devices controlled
 - Compressor

- Reverse cycle valve (PLE H)
- Alarm signalling relay
- LAN networks for controlling 6 units in parallel and managing BACNET and LON communication protocols

GAS LEAK DETECTION SYSTEM

As a standard feature, the units are equipped with leak detection sensors near the cooling circuit. The microprocessor manages the procedures for securing and shutting down the unit in case of refrigerant leakage, also making it possible to divert the power supply of the control unit that collects the information from the leak sensors on a low-voltage emergency line. This function allows the complete disconnection of the power to the unit during maintenance operations, while leaving all the safety systems enabled.

MICROCHANNELS FINNED COIL

The entire Chiller range has microchannel coils as a standard feature. The large heat exchange surface, the absence of a copper-aluminum interface, and the perfect flow of air make it possible to achieve the same performance while reducing the refrigerant charge by up to 40%, with obvious benefits from an ecological point of view. Galletti microchannel coils are made of Long Life Alloy, an aluminium alloy that offers maximum safety in urban and industrial environments.

For heat pumps there is a finned-coil exchanger with 8mm copper tubes and aluminium fins.

3 CONFIGURATION OPTIONS

The range PLE consists of 10 models with cooling capacities from 50 to 160 kW, available as cooling only and reversible heat pump mode, charged with R454B fluid classified like A2L (slightly flammable)

» Configuration options

1	Expansion valve
A	Electronic
2	Water pump and accessories
0	Absent
1	LP pump + expansion vessel
2	LP run and standby double pump + expansion vessel
3	HP pump + expansion vessel
4	HP run and standby double pump + expansion vessel
A	LP inverter pump + expansion vessel
B	LP run and standby double inverter pump + expansion vessel
C	HP inverter pump + expansion vessel
D	HP run and standby double inverter pump + expansion vessel
3	Water buffer tank
0	Absent
S	Selected
4	Partial heat recovery
0	Absent
D	Desuperheater with water pump free contact
5	Air flow modulation
A	Condensation control with high-head EC electronically controlled fans
C	Condensation control by phase-cut fans
E	Condensing control with electronic EC fans
6	Antifreezing kit
0	Absent
E	Evaporator
P	Evaporator and water pump
S	Evaporator, water pump and water buffer tank
7	Acoustic insulation and attenuation

» Accessories

A	Outdoor finned coil heat exchanger protection filters
B	Outdoor finned coil heat exchanger protection grille
C	Pair of couplings Victaulic
D	ON/OFF status of the compressors
E	Remote control for step capacity limit (advanced controller required)
F	Configurable digital alarm board (advanced controller required)
G	Soft starter
H	Power factor capacitors
I	Refrigerant sensors
L	Water pipes additional insulation
M	0-10 V signal for external user pump control (on-board pump excluded)
N	Compressor tandem/trio isolation valves
O	Night-time low-noise
Q	Temperature probe for pump shutdown on the primary circuit
R	Enabling 2nd set-point / external alarm signaling via digital input
S	Hot-wire electronic flow switch
T	Mains power analyzer for monitoring and reducing power consumption
U	Unit lifting pipes
V	Set-point modification with 4-20mA signal

NOTE: The choice of some options can make the choice of some others forbidden or make some selection (fields) mandatory. Please contact Galletti for verification.

0	Absent
3	Compressor soundproof insulations and compressor compartment acoustic insulation
8	Refrigerant pipework accessories
0	Absent
2	Operation limit extension low T air (Liquid separator in compressor intake + liquid injection)
9	Remote control / Serial communication
0	Absent
2	RS485 serial board (Carel / Modbus protocol)
B	BACNET IP / PCOWEB serial board (advanced controller required)
G	BACNET IP / PCOWEB + SUPERVISOR SOFTWARE (GWeb)
S	Remote simplified user panel
X	Remote user panel for advanced controller
10	Special coils / Protective treatments
0	Copper-aluminium (standard heat pump only)
C	Cataphoresis
E	Microchannel in Long Life Alloy (standard for chiller)
I	Hydrophilic
M	Microchannels coil with e-coating treatment
P	Pre-painted fins with epoxy painting
R	Copper-copper
11	Anti vibration shock mounts
0	Absent
G	Rubber anti vibration shock mounts
M	Spring anti vibration shock mounts
12	Outdoor coil trace heater
0	Absent
1	Selected
13	Onboard controller
1	Advanced

4 TECHNICAL FEATURES

4.1 WATER CHILLERS RATED TECHNICAL DATA PLE C

» Water chillers rated technical data PLE C

PLE			052	062	072	082	092	102	122	132	142	152
Power supply		V-ph-Hz	400 / 3+N / 50									
Cooling capacity	(1)	kW	53,0	59,0	66,0	72,0	88,0	97,0	108	122	135	145
Total power input	(1)	kW	17,4	20,1	23,0	26,3	30,2	34,3	39,9	42,2	49,0	56,1
EER	(1)		3,03	2,92	2,87	2,73	2,91	2,82	2,72	2,89	2,74	2,59
SEER	(2)		4,42	4,23	4,15	4,12	4,45	4,25	4,26	4,25	4,18	4,11
Air flow rate	(1)	m ³ /h	22600	22600	22600	22600	32200	32200	32200	42700	42700	42700
Water flow	(1)	l/h	9069	10116	11365	12318	15112	16625	18648	20981	23169	25009
Water pressure drop	(1)	kPa	22	27	27	31	33	39	35	43	44	50
Available pressure head - LP pumps	(1)	kPa	164	155	150	140	124	115	115	156	148	135
Available pressure head - HP pumps	(1)	kPa	213	204	198	188	183	173	174	177	170	157
Maximum current absorption		A	48,0	52,0	58,0	64,0	78,0	85,0	94,0	105	116	127
Start up current		A	163	170	184	224	254	304	304	308	376	376
Startup current with soft starter		A	128	133	144	174	200	239	239	243	296	296
Compressors / circuits			2/1									
no. of axial fans			4	4	4	4	6	6	6	8	8	8
Buffer tank volume		dm ³	125	125	125	125	190	190	190	295	295	295
Refrigerant charge	(3)	kg	6,60	6,70	6,90	7,00	11,5	11,8	12,5	13,0	13,5	14,0
Height		mm	1731	1731	1731	1731	1731	1731	1731	1731	1731	1731
Depth		mm	1176	1176	1176	1176	1176	1176	1176	1176	1176	1176
Length		mm	2088	2088	2088	2088	2576	2576	2576	3186	3186	3186
Sound power level	(4)	dB(A)	80	81	81	81	84	84	85	88	88	89
Sound power level, low-noise version	(4)	dB(A)	77	78	78	78	81	81	82	85	85	87
Sound pressure level	(5)	dB(A)	52	53	53	53	56	56	57	60	60	61
Weight without options		kg	462	465	469	476	590	591	642	750	808	858
Maximum transport weight		kg	520	523	529	536	682	683	733	906	962	1012

(1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2018)

(2) η efficiency values for heating and cooling are respectively calculated by the following formulas: $[\eta = SCOP / 2,5 - F(1) - F(2)]$ e $[\eta = SEER / 2,5 - F(1) - F(2)]$. For further information, please refer to the technical document "ErP 2009/125/EC DIRECTIVE" in the catalogue introducing pages, or to the EN14825:2017 regulation.

(3) Kg gas value is estimated. For the exact value refer to the plate data on the unit.

(4) Sound power level measured according to ISO 9614

(5) Sound pressure measured at a distance of 10 m in a free field with a directivity factor of 2

4.2 HEAT PUMPS RATED TECHNICAL DATA PLE H

» Heat pumps rated technical data PLE H

PLE			052	062	072	082	092	102	122	132	142	152
Power supply		V-ph-Hz	400 / 3+N / 50									
Cooling capacity	(1)	kW	50,1	54,9	62,5	70,5	83,8	92,5	107	120	132	142
Total power input	(1)	kW	18,5	21,3	24,0	27,0	30,8	36,1	41,0	44,8	49,7	56,3
Absorbed rated current	(1)	A	34,0	38,0	42,0	46,0	56,0	62,0	69,0	78,0	86,0	95,0
EER	(1)		2,71	2,58	2,60	2,61	2,72	2,56	2,61	2,68	2,66	2,53
SEER	(2)		4,40	4,21	4,11	3,93	4,40	4,02	4,22	4,23	4,15	3,93
Heating capacity	(3)	kW	59,0	66,0	75,0	84,0	99,0	111	125	138	157	172
Total power input	(3)	kW	18,3	20,6	23,5	26,0	30,7	34,7	39,1	43,1	48,4	53,8
Absorbed rated current	(3)	A	34,0	39,0	43,0	48,0	56,0	65,0	73,0	81,0	89,0	99,0
COP	(3)		3,21	3,20	3,20	3,24	3,23	3,20	3,20	3,21	3,24	3,20
SCOP	(2)		3,61	3,66	3,77	3,90	3,61	3,61	3,84	3,73	3,79	3,73
Energy efficiency			142	144	148	153	142	142	150	146	149	146
Heating energy efficiency class	(4)		A+									
Maximum current absorption		A	48,0	52,0	58,0	64,0	78,0	85,0	94,0	105	116	127
Start up current		A	163	170	184	224	254	304	304	308	376	376
Startup current with soft starter		A	128	133	144	174	200	239	239	243	296	296
Compressors / circuits			2/1									
no. of axial fans			4	4	4	4	6	6	6	8	8	8
Air flow rate	(1)	m³/h	24400	24400	23900	23500	34900	34900	33900	46700	46700	45500
Water flow	(1)	l/h	8624	9446	10758	12140	14418	15927	18419	20699	22745	24516
Water pressure drop	(1)	kPa	21	24	25	31	28	36	34	42	38	44
Available pressure head - LP pumps	(1)	kPa	168	160	151	138	129	116	115	158	156	138
Available pressure head - HP pumps	(1)	kPa	218	210	200	186	187	175	173	179	177	160
Air flow rate	(3)	m³/h	24400	24400	24000	23500	35200	35200	34200	46700	46700	45900
Water flow	(3)	l/h	10193	11420	13026	14577	17208	19221	21658	23996	27204	29845
Water pressure drop	(3)	kPa	28	34	35	43	36	51	46	55	51	60
Available pressure head - LP pumps	(3)	kPa	160	150	138	118	119	101	96	140	136	111
Available pressure head - HP pumps	(3)	kPa	209	199	185	164	177	159	154	162	158	132
Buffer tank volume		dm³	125	125	125	125	190	190	190	295	295	295
Refrigerant charge	(5)	kg	9,50	10,0	13,0	16,1	17,5	18,0	23,0	25,0	28,3	28,6
Height		mm	1731	1731	1731	1731	1731	1731	1731	1731	1731	1731
Depth		mm	1176	1176	1176	1176	1176	1176	1176	1176	1176	1176
Length		mm	2088	2088	2088	2088	2576	2576	2576	3186	3186	3186
Sound power level	(6)	dB(A)	80	81	81	81	84	84	85	88	88	89
Sound power level, low-noise version	(6)	dB(A)	77	78	78	78	81	81	82	85	85	87
Sound pressure level	(7)	dB(A)	52	53	53	53	56	56	57	60	60	61
Weight without options		kg	502	505	517	532	646	647	711	828	906	956
Maximum transport weight		kg	560	563	577	592	739	739	801	983	1059	1109

(1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2018)

(2) η efficiency values for heating and cooling are respectively calculated by the following formulas: $[\eta = SCOP / 2,5 - F(1) - F(2)]$ e $[\eta = SEER / 2,5 - F(1) - F(2)]$. For further information, please refer to the technical document "ErP 2009/125/EC DIRECTIVE" in the catalogue introducing pages, or to the EN14825:2017 regulation.

(3) Outdoor air temperature dry bulb 7°C / wet bulb 6°C, water temperature 40°C / 45°C (EN14511:2018)

(4) Seasonal energy efficiency class for LOW TEMPERATURE room heating under AVERAGE climatic conditions [EUROPEAN REGULATION No 811/2013]

(5) Kg gas value is estimated. For the exact value refer to the plate data on the unit.

(6) Sound power level measured according to ISO 9614

(7) Sound pressure measured at a distance of 10 m in a free field with a directivity factor of 2

5 PED CATEGORY

The water chillers and heat pumps comply with directive 2014/68/EC (PED).

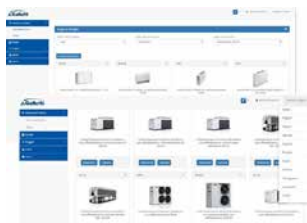
Series	Size	Notified body	PED Category	Marking
PLE	F1	0476	III	CE + PED
	F2	0476	III	CE + PED
	F3	0476	III	CE + PED

6 PERFORMANCES

Galletti has developed on its www.galletti.com web-area the new ON-LINE integrated platform for product selection, configuration and the making of the economic offer.

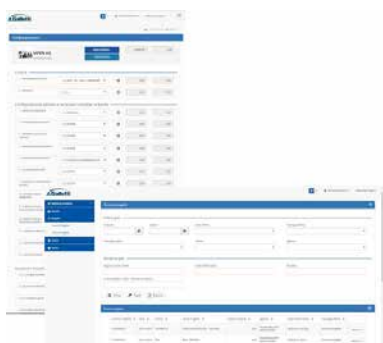
The software, whose use is easy and intuitive, allows the identification of the desired products by calculating their performances

based on real working conditions and their configuration helping the user in choosing options and accessories. It also allows to obtain a detailed report which includes performances, dimensional drawings, tender specifications and the economic offer.



Product selection:

Filters to make the identification of the requested product easier
Performance calculation and saving of results
Performance comparison between products belonging to different series



Configuration and project history

Wizard configuration of accessories and options for chillers, heat pumps and hydronic units
Creation of a project which collects all products of interest
Complete management of the stored history projects



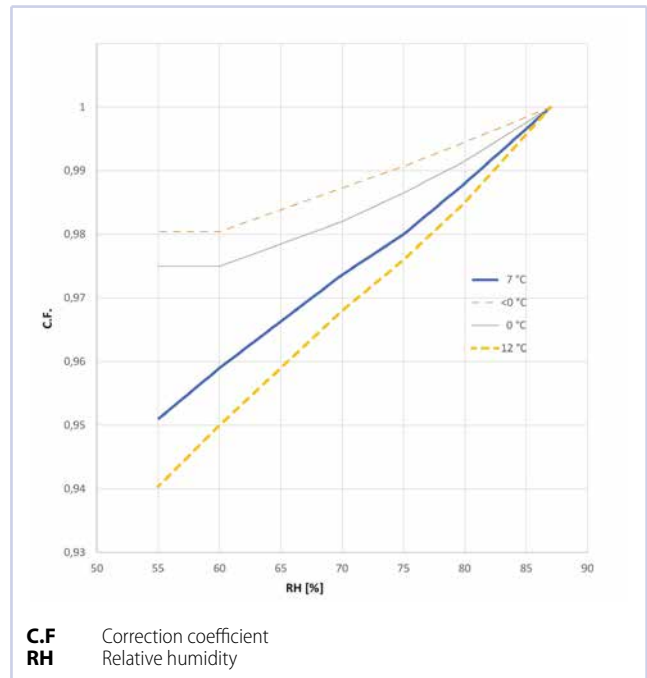
Report:

Generation of a detailed list report in pdf format
Choice of the sections to be included in the print:

- Products performances
- Dimensional drawings
- Tender specifications

6.1 CORRECTION OF THE HEATING CAPACITIES

In the heat pump operation (heating mode), the actual heating capacities of units may be lower than the values shown in the technical data table, due to the different values of the relative humidity of the external air. To obtain the actual heating capacity, multiply the capacity values by the corrective coefficients given in graphic.



7 SOUND LEVELS

» Standard sound level

Mod.	LwA (1)	125 Hz (2)	250 Hz (2)	500 Hz (2)	1000 Hz (2)	2000 Hz (2)	4000 Hz (2)	8000 Hz (2)
	dB(A)	dB	dB	dB	dB	dB	dB	dB
PLE152CS	89	84,3	90,7	81,8	80,6	74,2	67,0	66,0
PLE142CS	88	84,3	90,7	81,8	80,6	74,2	67,0	66,0
PLE132CS	88	84,3	90,7	81,8	80,6	74,2	67,0	66,0
PLE122CS	85	84,3	90,7	81,8	80,6	74,2	67,0	66,0
PLE102CS	84	84,3	90,7	81,8	80,6	74,2	67,0	66,0
PLE092CS	84	83,3	89,7	80,8	79,6	73,2	66,0	65,0
PLE082CS	81	77,7	82,5	76,5	75,9	69,0	62,7	62,1
PLE072CS	81	77,7	81,5	75,5	74,9	68,0	61,7	60,2
PLE062CS	81	77,7	81,5	75,5	74,9	68,0	61,7	60,2
PLE052CS	80	77,7	81,5	75,5	74,9	68,0	61,7	60,2

1. Total sound power level, weighted A
2. Sound power level by octave band, not weighted

7.1 ACOUSTIC INSULATION VERSIONS

PLE			052	062	072	082	092	102	122	132	142	152
Sound power level	(1)	dB(A)	80	81	81	81	84	84	85	88	88	89
Sound power level, low-noise version	(1)	dB(A)	77	78	78	78	81	81	82	85	85	87

(1) Sound power level measured according to ISO 9614

NOTE: Low noise sound power level = standard + compressor silencing housings.

8 OPERATING LIMITS

The graphs below illustrate the operating limits of PLE units (in the case of continuous operation) in relation to the outlet water temperature and outdoor air temperature. The following limits are to be considered valid for water temperature fluctuations of 5 K.

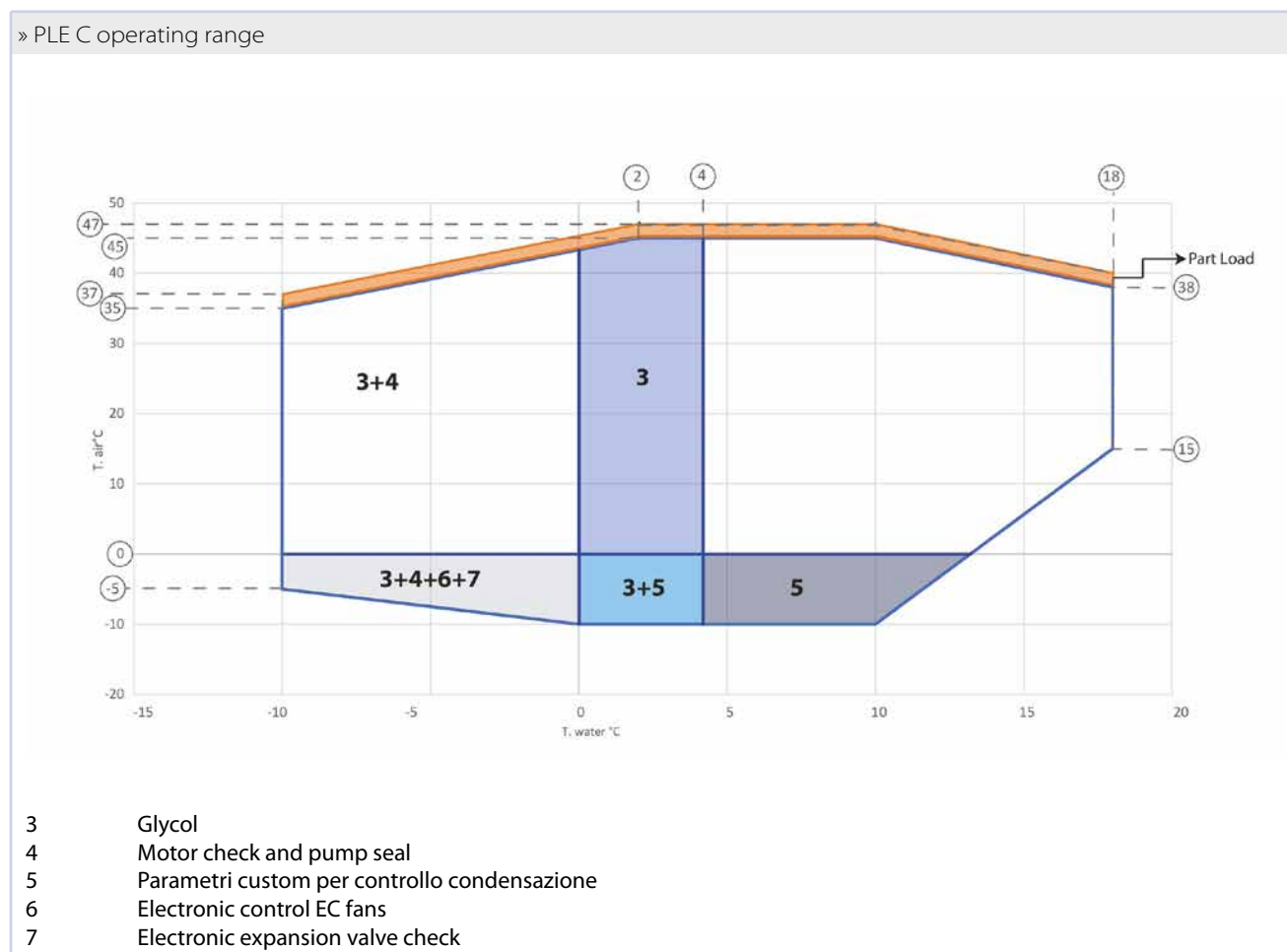
⚠ WARNING: contact the support area if you wish to operate with water temperature fluctuations other than 5 K at full load.

⚠ IMPORTANT: except for special requests, which can be managed on request, the PLE series units set the number of compressors running according to the temperature of the water entering the unit (temperature returning from the system) and not according to the outlet temperature. Therefore, the settable set point always refers to the temperature of the water entering the unit. The outlet water temperature,

to which the following operating limits refer, therefore depends on the set point/differential combination set on the return line, on the design thermal differential, and on any unit splitting conditions (refer to the controller's technical manual). Therefore, if you would like to operate continuously in the vicinity of the operating range, you should always make sure that the temperatures are in compliance with the operating limits, even under conditions of load regulation and splitting of the unit. If in doubt, contact the Galletti product support department.

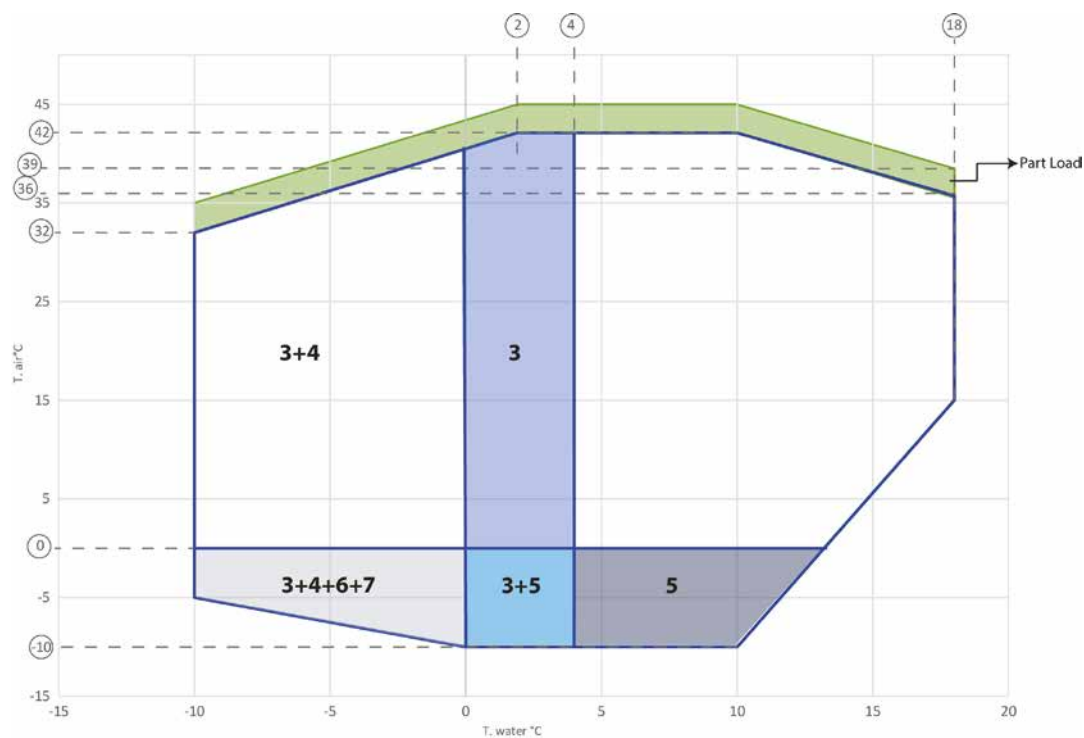
⚠ WARNING The units are designed to work with water and air temperatures falling within the range defined by the operating limits. Attempting to operate the units beyond these limits could cause irreparable damage to the units themselves.

8.1 OPERATING LIMITS IN CHILLER MODE



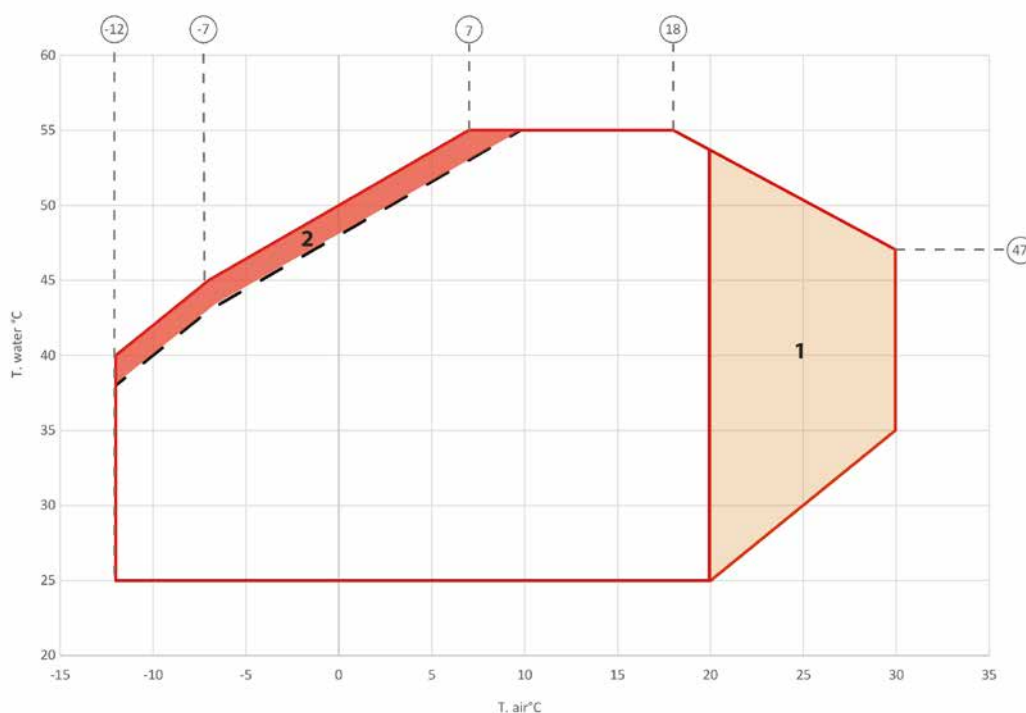
8.2 OPERATING LIMITS IN HEAT PUMP MODE

» PLE H operating range



- 3 Glycol
- 4 Motor check and pump seal
- 5 Parametri custom per controllo condensazione
- 6 Electronic control EC fans
- 7 Electronic expansion valve check

» PLE H operating range



1. Evaporation control EEV custom parameters
2. Operation limit extension (liquid injection)

8.3 THERMAL CARRYING FLUID

Pumps belonging to the PLEseries can operate with mixtures of water and ethylene glycol, with percentage indicated in the following table. On request it's possible to have pumps with a special seal in order to work with higher glycol percentage (until 35%); in this cases it must be verified the pump motor sizing so it's necessary to contact the company, as it's shown in operating

limits.

⚠ IMPORTANT: observe the minimum water temperature indicated in the operating ranges.

⚠ IMPORTANT: Never go below the water flow rates indicated in the following table so as to prevent the unit from stopping due to a flow alarm.

» Minimum and maximum water flow admitted

PLE		052	062	072	082	092	102	122	132	142	152
Water flow MIN	l/h	6000	6000	6128	6912	10000	10000	10490	11785	12951	13971
Water flow MAX	l/h	15500	16500	18000	18000	27000	25500	27000	30000	35000	35000
Maximum percentage of ethylene glycol	%	25	25	25	25	30	30	30	30	30	30

PLE		052	062	072	082	092	102	122	132	142	152
ΔT min	(1)	3	3	4	4	3	4	4	4	4	4
ΔT max	(1)	7	8	8	8	7	8	8	8	8	8

(1) Return temperature 12°C for chiller mode and 40°C for heat pump mode. T_{air}=35°C chiller mode and 7(6)°C heat pump mode

NB: in partial load conditions, or low charge of the unit (example, frozen water produced in low temperature), the minimum ΔT could decrease. Make sure that the water flow is between maximum and minimum value indicated.

⚠ WARNING: working beyond the maximum water flow rate, over time could cause erosion problems of the heat exchanger with consequent deterioration of the unit's performance.

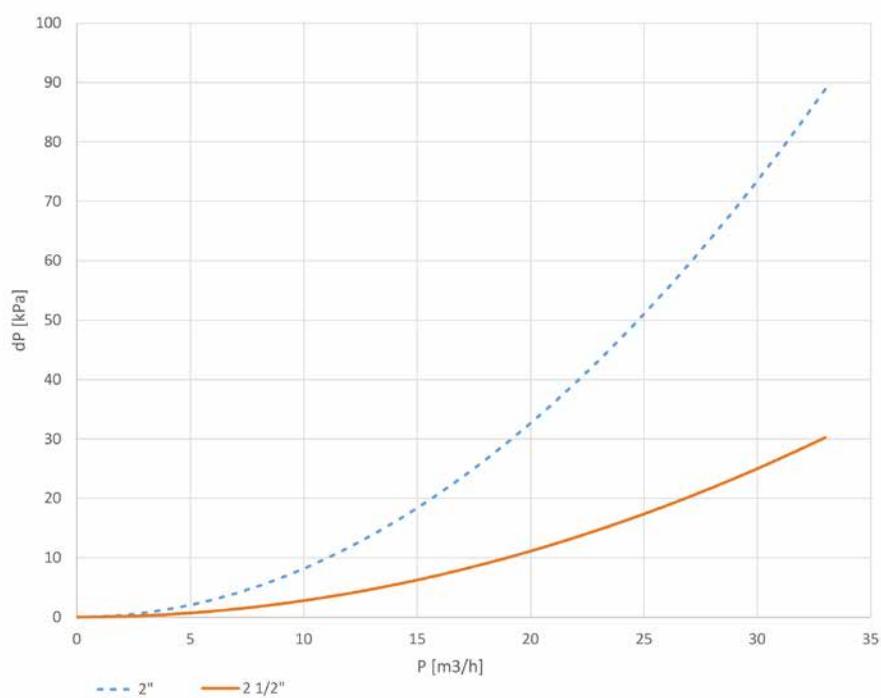
⚠ WARNING: working under the minimum flow rate instead causes the presence of the flow alarm with consequent stopping of the unit

9 WATER PRESSURE DROP

9.1 Y FILTER PRESSURE DROPS

The table below shows the pressure drops of the Y filter (Δp) as a function of the water flow rate (Q_w), assuming an average water temperature of 10 °C,

PLE		052	062	072	082	092	102	122	132	142	152
Unit connections											
Unit connections type		VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC	VICTAULIC
Filter connections											
Filter connections type		Threaded	Threaded	Threaded	Threaded	Threaded	Threaded	Threaded	Threaded	Threaded	Threaded
Filter connections diameter	"	2"	2"	2"	2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"
Kvs		35	35	35	35	35	35	35	60	60	60
Filter name		F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR65	F21NOR65	F21NOR65

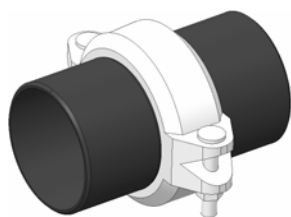


10 WATER CIRCUIT

All units in the PLE series are equipped with water flow switch (supplied with the unit), relief valve, water pressure gauge, automatic vent valve, and drainage valve.

Depending on the configuration they can then be equipped with a pumping unit (single or double pump managed in OR logic, standard or with inverter), buffer tank, expansion tank, and water-side cycle-reversing valve to have reverse-flow exchange in each operating mode. A gate valve is also available as an accessory for cutting off pump suction, so that the pump can be replaced without needing to empty the unit's entire tank.

» Victaulic connection



When you are getting ready to set up the water circuit for the evaporator you should follow the directions below and in any case make sure you comply with national or local regulations (use the diagrams included in this manual as your reference).

1. Connect the pipes to the chiller using flexible couplings to prevent the transmission of vibrations and to compensate for thermal expansions. These units are all configured for installation of the water inlet-outlet pipes outside the unit (on the rear) and these pipes are supplied as standard accessories at no extra cost for the customer.
2. Install the following components on the piping:
 - Pair of quick-connection couplings with pipe section to be welded (optional item that may be selected from the price list). They facilitate the connecting operations to the plumbing system, greatly speeding up installation
 - temperature and pressure indicators for routine maintenance and monitoring of the unit. Pressure control on the water side allows to assess the correct functioning of the expansion tank and to detect water leakage in advance.
 - sumps on inlet and outlet piping for temperature detection, for a direct view of operating temperatures. They can also be consulted on the microprocessor on board the unit.
 - cut-off valves (gate valves) to isolate the unit from the hydraulic circuit.
 - metal net filter compulsory (inlet piping) with mesh no larger than 1 mm, to protect the heat exchanger from slag or impurities inside the piping. If the machine is combined with process cycles, it is recommended to install a readily serviceable uncoupling exchanger to prevent possible operation blockages and/or breakage of the plate evaporator.
 - air vent valve placed on the higher parts of the hydraulic circuit to bleed the air. The internal pipes of the unit are fitted with small air vent valves for bleeding the unit itself: this operation should be conducted when the unit is disconnected from the power supply - make sure that the circuit is completely full of water and check again to make sure there is no air before starting the pump for the first time.
 - discharge cock and, where needed, drain tank in order to empty the system for maintenance or seasonal stops.

Drainage valve is provided on the optional water buffer tank: this operation may only be carried out when the unit is disconnected from the power supply.

⚠ WARNING Failure to use anti-freezing solutions may cause serious damage to the hydraulic/cooling circuit in general.

Requirements for the heat transfer fluid and maintenance of the system

In order to avoid problems of reliability and/or operation of the hydronic system, it is necessary to take into consideration the characteristics of the heat transfer fluid (water or mixtures of water and glycol) and the hydraulic circuit.

The use of an unsuitable fluid can cause sludge deposits, algae growth, scale build-up, or corrosion and in some cases even erosion.

⚠ IMPORTANT: Never cut off the pumping unit while the unit is turned on. This could cause irreparable damage to the pump and the unit.

The Manufacturer does not accept any responsibility for damage caused by the use of untreated water, water containing particles or debris in suspension, water that has been incorrectly treated or admixed, or salt water.

By way of example, some (non-exhaustive) advice is given below (contact a specialist and consult specific standards such as UNI 8065)

- Ammonium ions (NH_4^+) dissolved in water should be eliminated due to their high reactivity with copper.
- Chlorine ions (Cl^-) pose a risk of holes developing due to corrosion.
- Sulfate ions (SO_4^{--}) must be eliminated because they may present a risk of corrosion.
- Limit for fluoride ions: 0.1 mg/l.
- Silicon may pose a risk of corrosion. Limit: < 1 mg/l.
- Electrical conductivity: the higher the specific resistivity, the lower the tendency of corrosion. Therefore, the following limit must be observed: Electrical conductivity: < 3,500 $\mu\text{S}/\text{cm}$
- pH: neutral pH at 20 °C ($7 < \text{pH} < 8$)
- Fixed residue (at 180 °C): < 2 000 mg/kg
- Conditioners Present within the concentrations prescribed by the supplier

The water must be analysed: it is advisable to contact a qualified water treatment specialist to determine the most suitable type of treatment according to the materials used in the hydraulic system.

The installed hydraulic circuit must include all the necessary devices for water treatment: mesh filter (immediately at the inlet to the unit), additive dosing systems if necessary, any intermediate heat exchangers, vent valves at all points of possible air accumulation, air intakes, isolation valves, etc., and anything else necessary according to best practice.

⚠ CAUTION: in case of regular shut-down, if it is necessary to empty the hydraulic circuit, the system must be flushed internally with nitrogen, making sure to leave it pressurized (at a pressure approximately equal to half the maximum pressure of the hydraulic circuit) in order to avoid the entry of oxygen and to protect the parts of the system from the risk of corrosion.

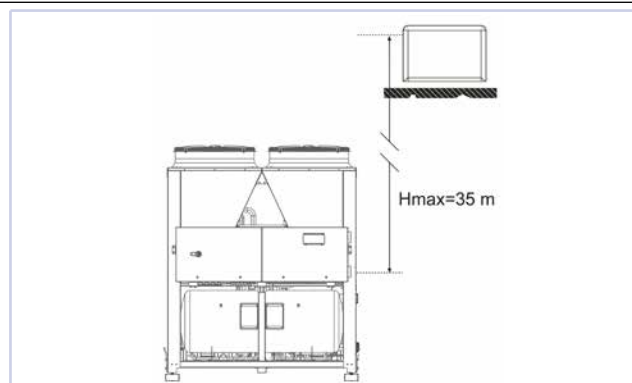
10.1 WATER CONTENT AND CHARGING OF EXPANZION TANK SYSTEM

In models without a water storage reservoir it is necessary to assure that the content of water within the system does not fall below 8 litres/kW in the case of cooling-only models and 10 litres/kW in the case of heat pump models. This level is necessary to prevent the water temperature from falling below the indoor unit enabling threshold during defrost cycles.

N.B. kW in reference to rated capacity

The expansion tank is pre-charged to a pressure of 1.5 bars, sufficient for systems with a maximum height difference (H in the figure at the side) of 13 metres.

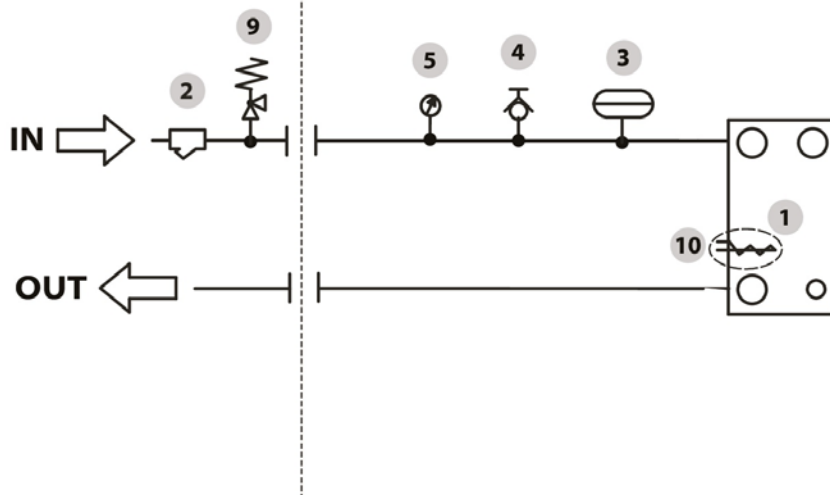
For greater height differences, refer to the table below in order to adjust the charging pressure of the expansion tank accordingly. In no case should you exceed the maximum height difference $H_{max} = 35$ m.



Height difference of system (m)	Charging pressure of expansion tank
<13	1,50
15	1,70
20	2,20
25	2,70
30	3,10

10.2 WATER CIRCUIT

» PLE (evaporator)

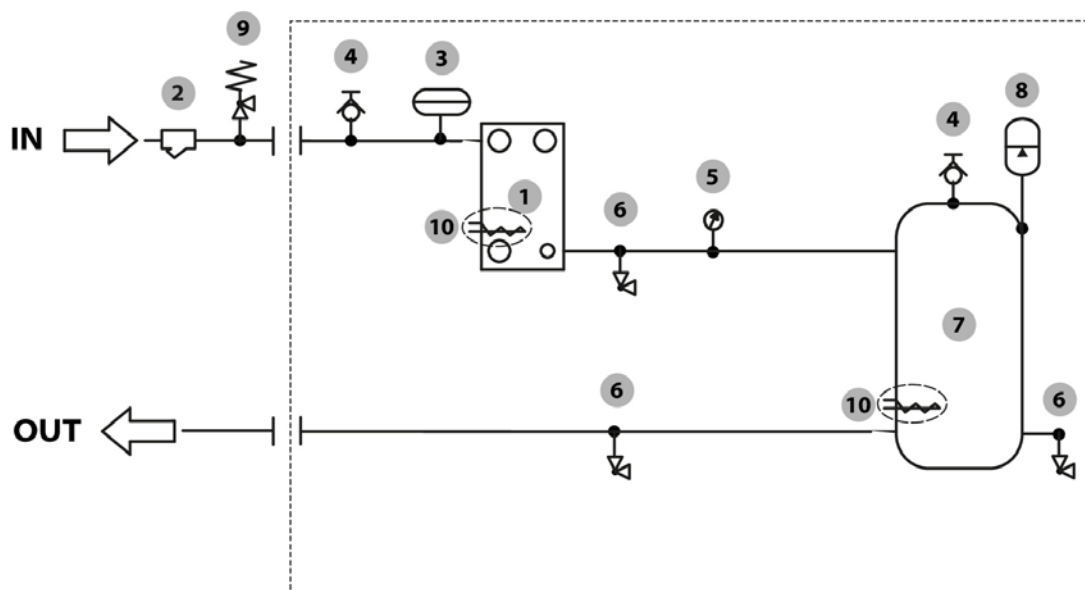


LEGEND

- 1 Evaporator
- 2 Water filter (included)
- 3 Flow switch
- 4 Air purge valve
- 5 Pressure gauge
- 6 -

- 7 -
- 8 -
- 9 Safety valve (supplied)
- 10 Antifreeze electric heating
- Internal and external borderline
- — — — — OPTIONAL

» PLE (evaporator and tank)

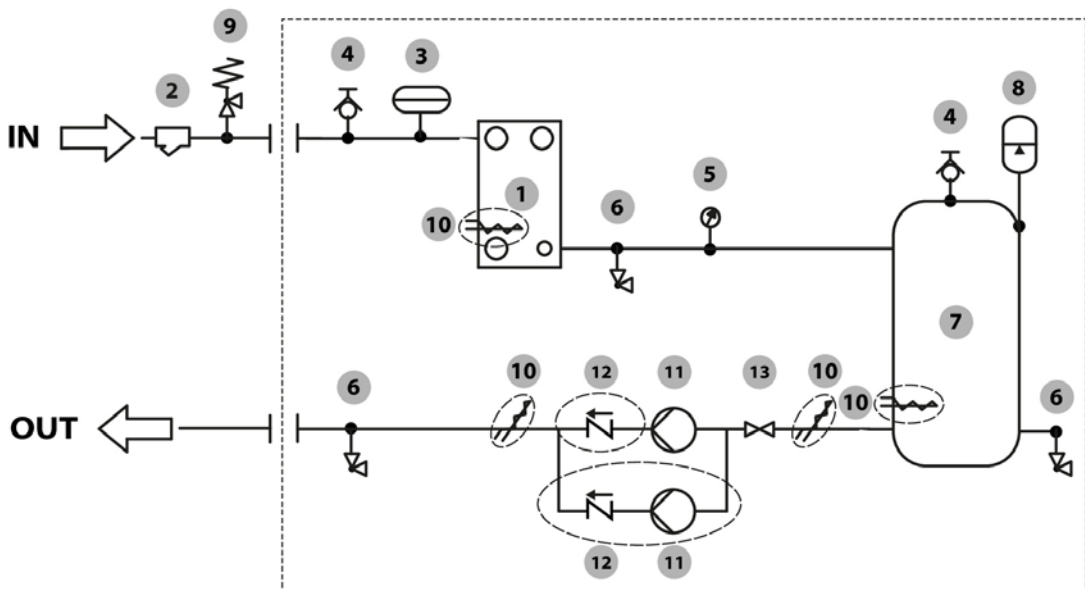


LEGEND

- 1 Evaporator
- 2 Water filter (included)
- 3 Flow switch
- 4 Air purge valve
- 5 Pressure gauge
- 6 Drain

- 7 Buffer tank
- 8 Expansion tank
- 9 Safety valve
- 10 Antifreeze electric heating
- Internal and external borderline
- OPTIONAL

» PLE (evaporator, pump and tank)

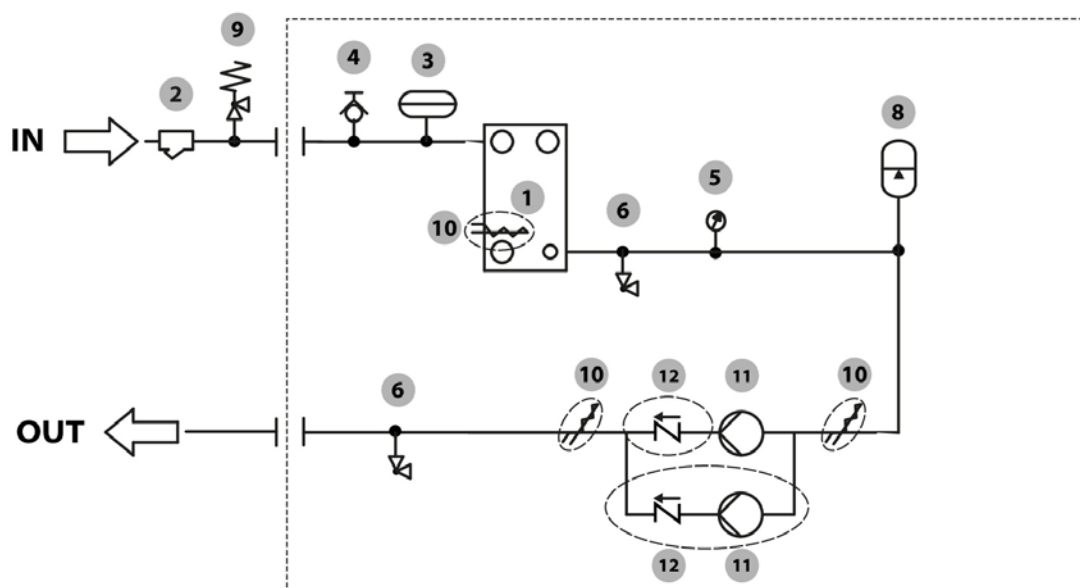


LEGEND

- 1 Evaporator
- 2 Water filter (included)
- 3 Flow switch
- 4 Air purge valve
- 5 Pressure gauge
- 6 Drain
- 7 Buffer tank

- 8 Expansion tank
- 9 Safety valve (supplied)
- 10 Antifreeze electric heating
- 11 Hydraulic pump
- 12 Clapet valve
- Internal and external borderline
- OPTIONAL

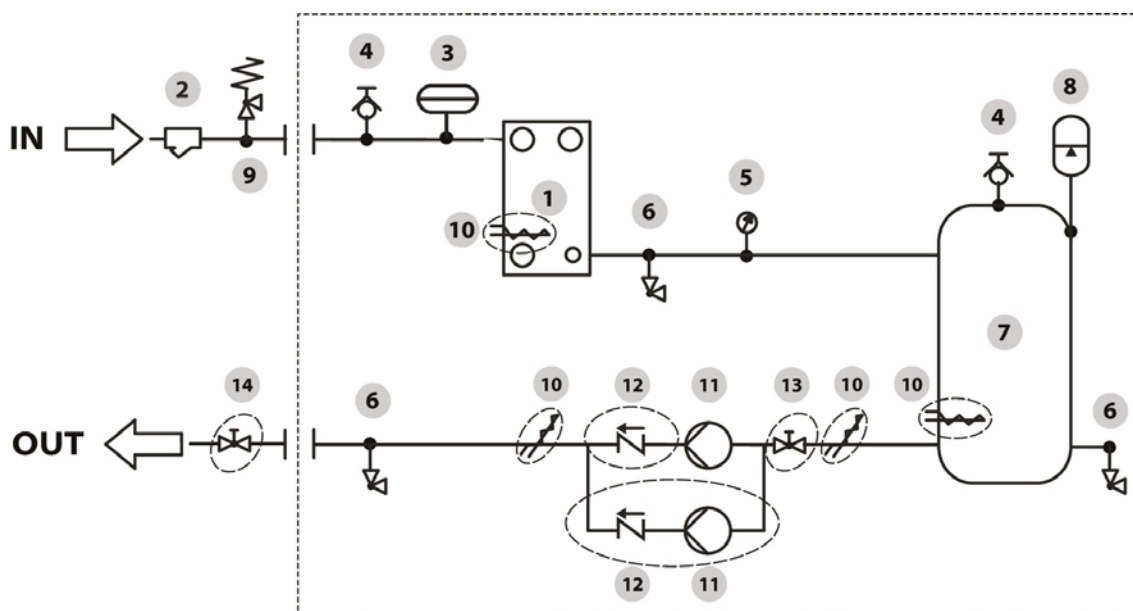
» PLE (evaporator and pump)



LEGEND

- | | | | |
|---|-------------------------|----|--|
| 1 | Evaporator | 8 | Expansion tank |
| 2 | Water filter (included) | 9 | Safety valve (supplied) |
| 3 | Flow switch | 10 | Antifreeze electric heating |
| 4 | Air purge valve | 11 | Hydraulic pump |
| 5 | Pressure gauge | 12 | Clapet valve |
| 6 | Drain | | ----- Internal and external borderline |
| 7 | - | | --- OPTIONAL |

» PLE (evaporator, tank and 2 pumps)



LEGEND

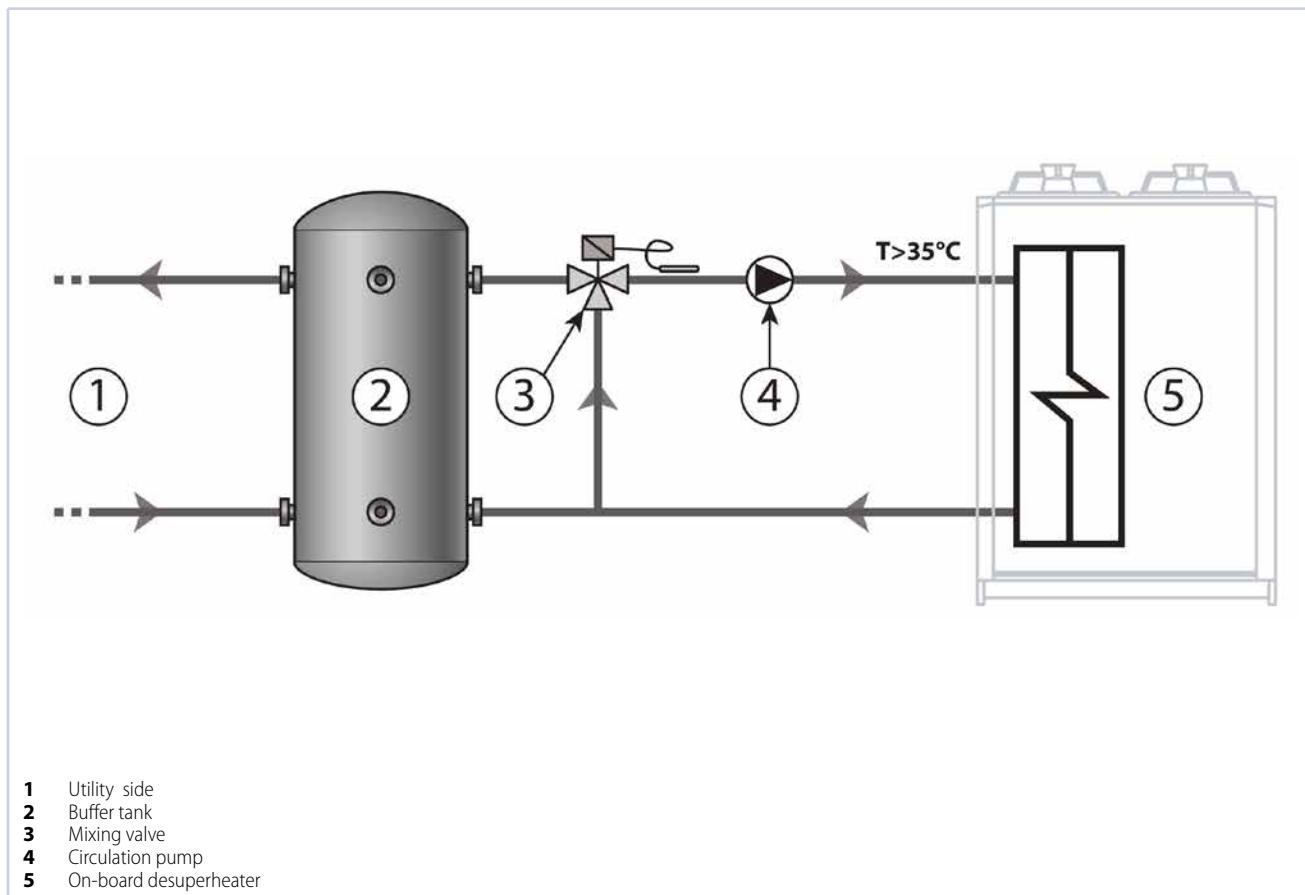
- | | | | |
|---|-------------------------|----|---|
| 1 | Evaporator | 9 | Safety valve (supplied) |
| 2 | Water filter (included) | 10 | Antifreeze electric heating |
| 3 | Flow switch | 11 | Hydraulic pump |
| 4 | Air purge valve | 12 | Clapet valve |
| 5 | Pressure gauge | 13 | Intake pump shut-off valve |
| 6 | Drain | 14 | Outlet pumps shut-off valve (NOT SUPPLIED) |
| 7 | Buffer tank | | ----- Internal and external borderline |
| 8 | Expansion tank | | --- OPTIONAL |

10.3 DE-SUPERHEATER

10.3.1 Recommended water circuit

The partial heat recovery option is provided by a braze-welded plate heat exchanger placed in series on the compressor delivery (typically in series in relation to the finned pack condenser). Its size is designed to limit pressure drops on the refrigerant side to a minimum.

All units equipped with a heat recovery kit have modulating condensation control as a standard feature. To prevent unbalances from occurring in the cooling circuit in the event of start-ups with very low water temperatures at the recuperator inlet ($<35^{\circ}\text{C}$), the recovery system water circuit should be configured as shown in the following figure. A low recuperator inlet water temperature would cause low condensation temperatures and thus an insufficient pressure differential on the expansion valve with the consequent risk of tripping the safety devices.



The bulb of the 3-way mixer valve is placed at the de-superheater exchanger inlet. By mixing the hot water produced by the recovery with colder water from the tank, it reduces the time needed for the system to reach full operating capacity to a few moments.

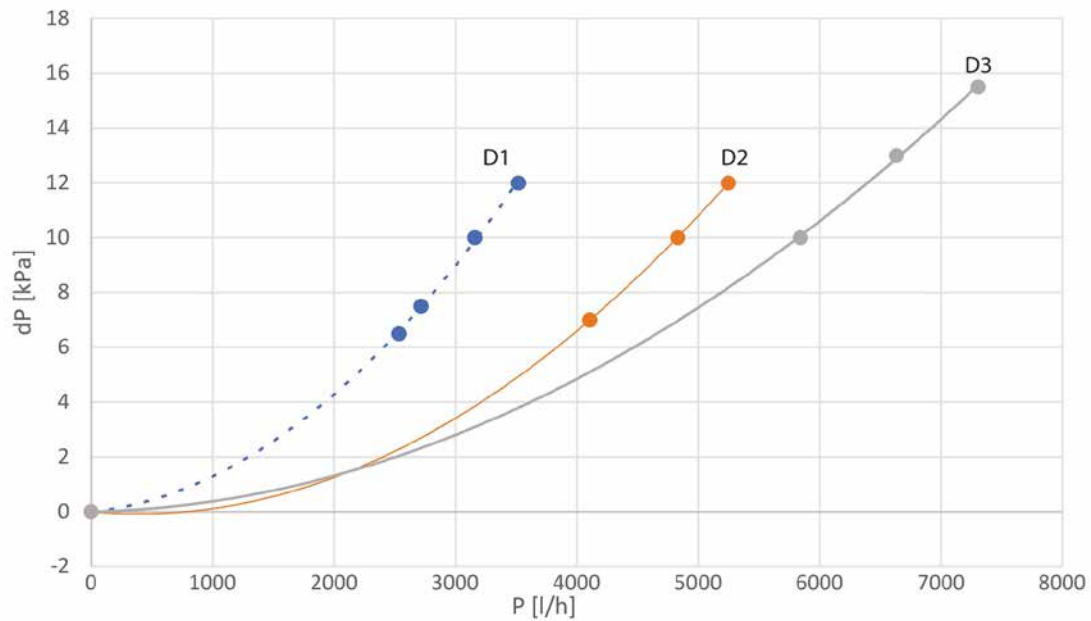
A buffer tank must be placed between the unit and the utility since the demand for hot water and its availability are not simultaneous, because it needs the compressors to be running.

Note that the heat recovery capacity is tied to the delivered cooling capacity and therefore decreases proportionately in partial load situations: this aspect should be taken into account when choosing the size of the storage tank.

The partial heat recovery option is supplied only with the de-superheater exchanger. The other components of the circuit laid out in the previous figure are not included in the supply.

10.3.2 Water pressure drop

PLE	052	062	072	082	092	102	122	132	142	152
De-superheater type	D1	D1	D1	D1	D2	D2	D2	D3	D3	D3



- D1: CBH30-20M-F
- D2: CBH30-30M-F
- D3: CBH30-38M-F
- dP[kPa]: Water pressure drop
- P[l/h]: Water flow

10.3.3 Heating capacities

» De-Superheater heating capacities

PLE			052	062	072	082	092	102	122	132	142	152
De-superheater heating capacity	(1)	kW	13	15	18	20	23	27	29	32	37	41
De-superheater water flow	(1)	l/h	2270	2597	3010	3371	3939	4610	5040	5573	6347	7000

(1) De-superheater water temperature 40 / 45°C, cooling water temperature 12 / 7°C

10.3.4 Heating capacities corrective factors

» De-Superheater heating capacities corrective factors

	Inlet water temperature / Outlet water temperature °C	
	50/55	50/60
f _{corr} Pdes	0,73	0,66
corr.f. Δp (water side)	0,53	0,44

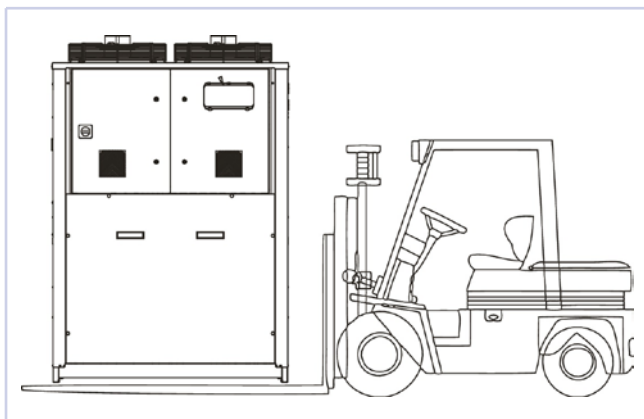
11 INSTALLATION CLEARANCE REQUIREMENTS

To guarantee the proper functioning of the unit and access for maintenance purposes, it is necessary to comply with the minimum installation clearance requirements shown in dimensional drawings.

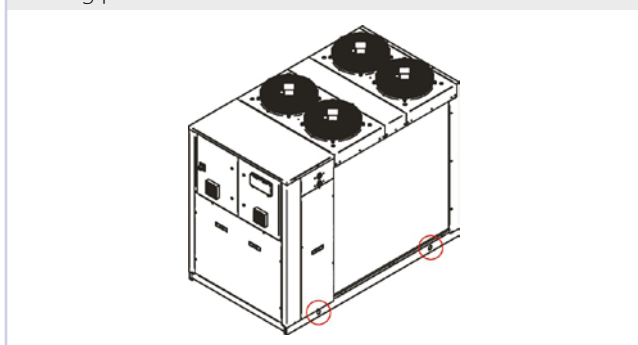
Verify that there are no obstacles in front of the fans air outlet.

- Avoid any and all situations of backflow of hot air between air outlet and inlet of the unit.
- If even only one of the above conditions is not fulfilled, please contact the manufacturer to check for feasibility.
- In the design of the PLE series, special care has been taken to minimise noise and vibrations transmitted to the ground.
- Even greater insulation may be obtained, however, by using vibration damping base supports (available as optional accessories).
- If vibration damping base supports are adopted, it is strongly recommended also to use vibration damping couplings on the water pipes.
- Whenever the unit is to be sited on unstable ground (various types of soil, gardens, etc.) it is a good idea to provide a supporting base of adequate dimensions.

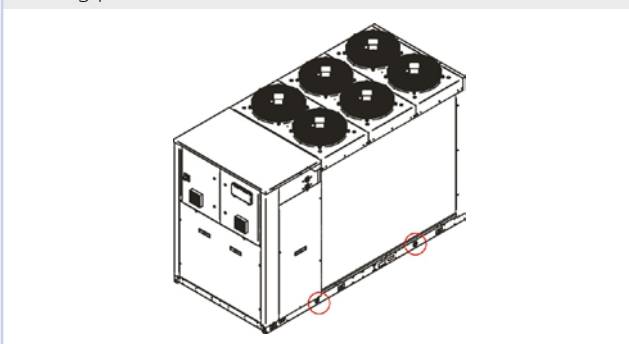
⚠ WARNING During installation adjust the vibration damping couplings in order to allow a proper slope toward the condensate drainage system, as shown on the unit.



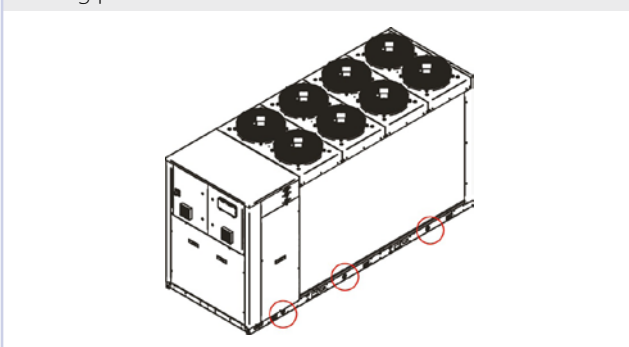
» Lifting points frame 1



» Lifting points frame 2



» Lifting points frame 3



12 SITING AND DAMPERS

It is important to bear in mind the following aspects when choosing the best site for installing the unit:

- Size and origin of water pipes;
- Location of the power supply;
- Solidity of the supporting surface;
- Avoid obstacles to the outflow of air from the fan which could cause back suction (see section on p. 21);
- Direction of prevalent winds: (position the unit so as to prevent prevalent winds from interfering with the fan air flow). Prevalent winds opposing the fan air flow will result in a maximum air temperature below the value indicated in the operating limits;
- Avoid the possible reverberation of sound waves; do not install the unit in narrow or cramped spaces;
- Ensure adequate accessibility for maintenance or repairs (see section on p. 21).

This appliance is not intended to be used by children or

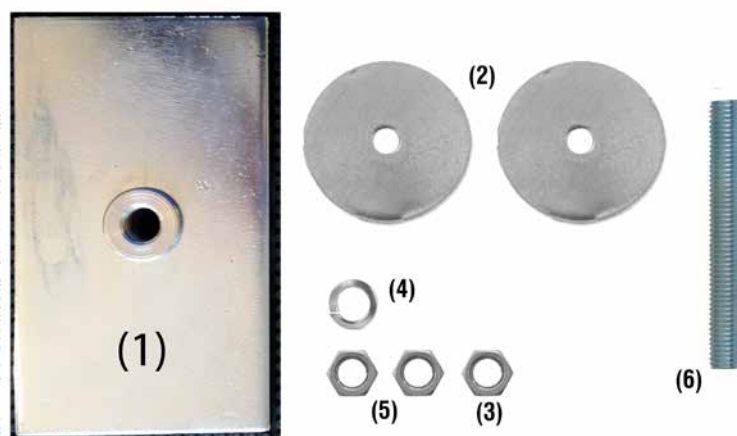
persons with physical, sensorial or mental problems, inexperienced or unprepared, without supervision. Be careful that children do not approach the appliance.

When installing the vibration dampers follow the instructions below:

1. Screw the jack (6) into the vibration damper with jack support plate (1) all the way;
2. Screw the bolt (5) until the jack (6) is locked in place on the vibration damper (1);
3. Screw the bolt (3) and insert one of the two disks (2) into the jack (6);
4. Insert the jack (6) into the hole on the unit base;
5. Adjust the height by turning the bolt (3);
6. Insert the second disk (2) into the jack (6) until it makes contact with the base;
7. Tighten the vibration damper with the split washer (4) and the bolt (5) to the unit base.

PLE	DAMPERS
F1	4
F2	6
F3	6

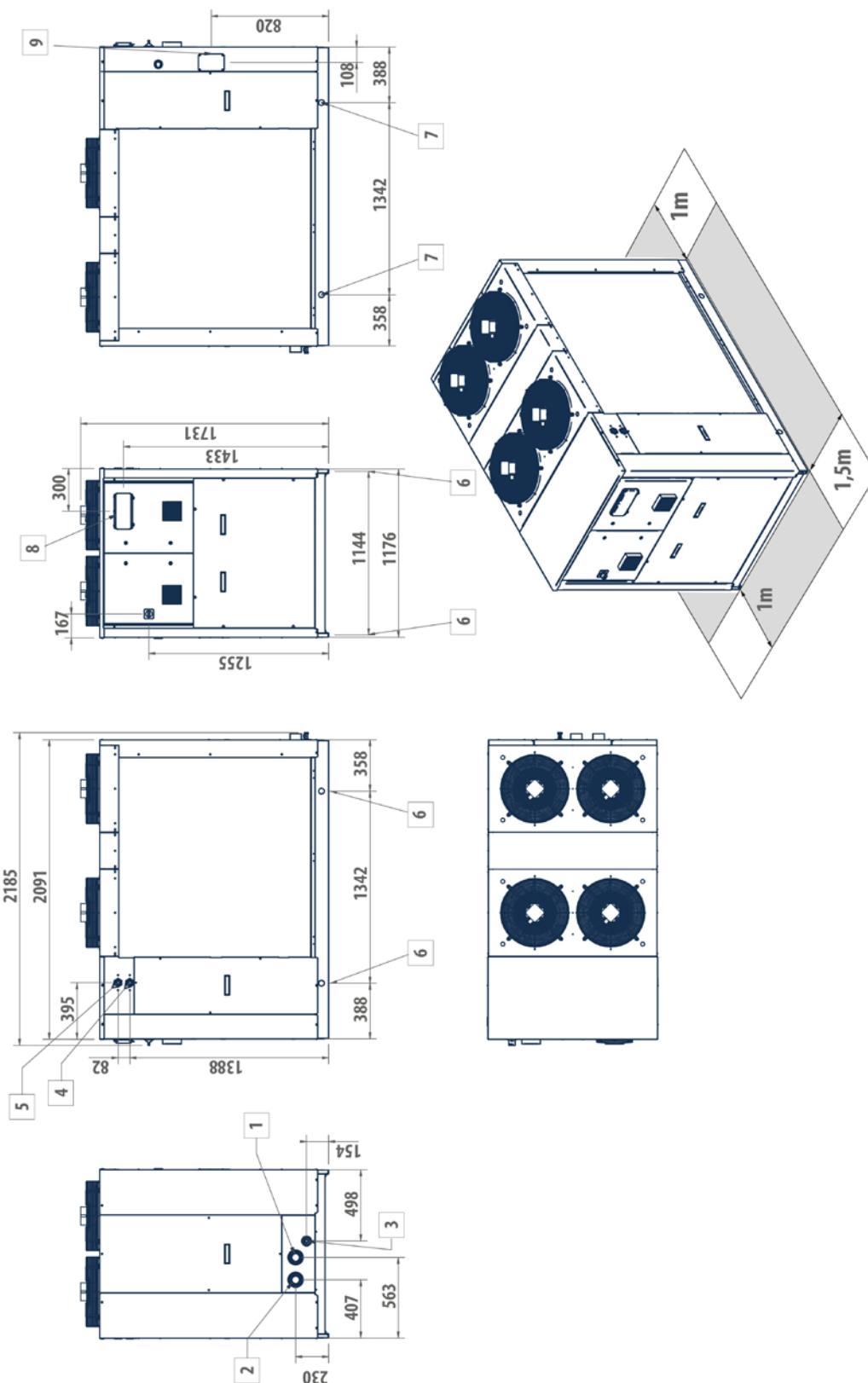
» Dampers components



See the vibration dampers mounting instructions (code RG66013698).

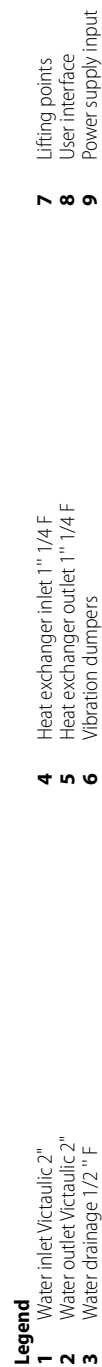
13 DIMENSIONS

» PLE 052-082

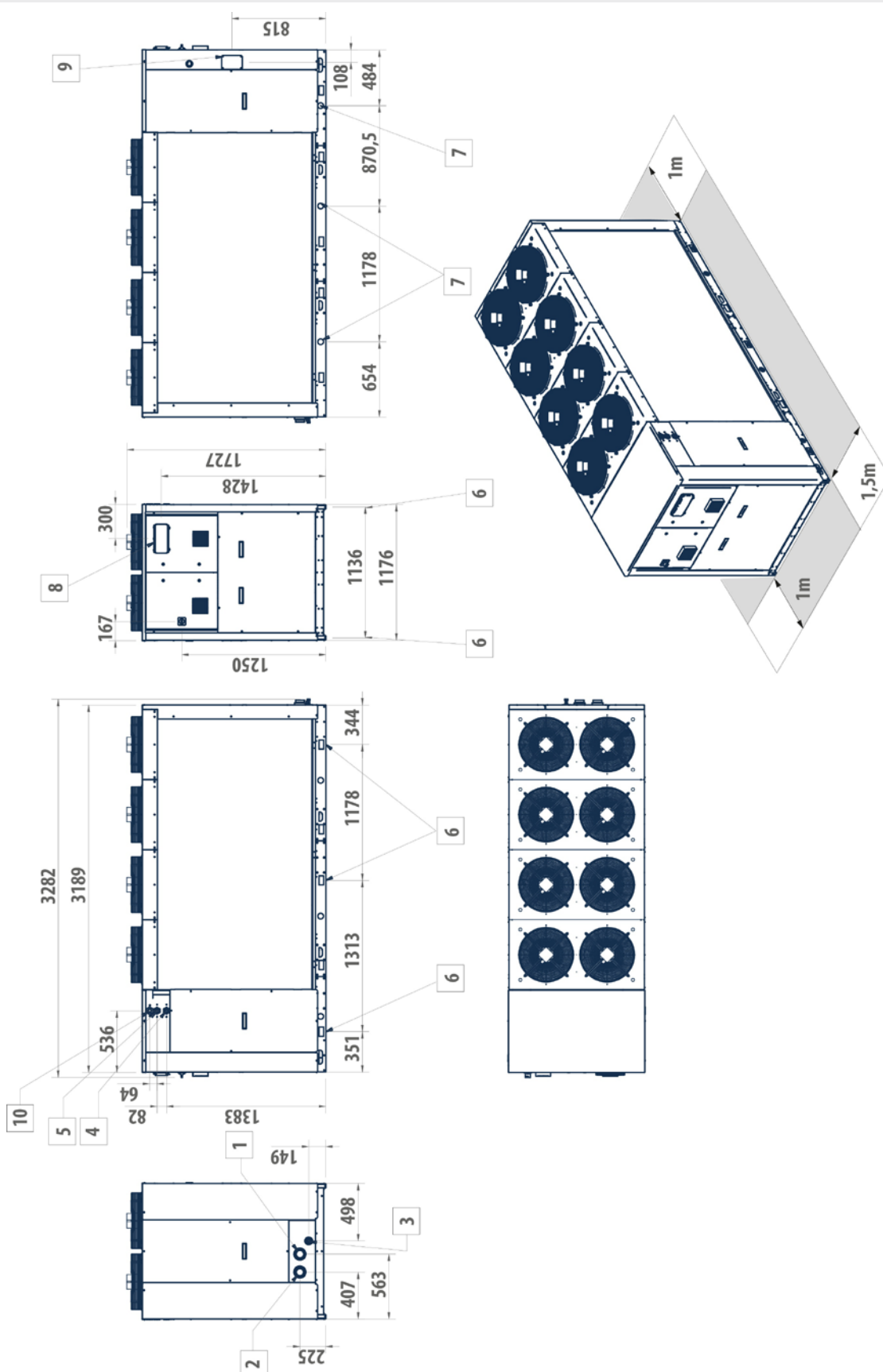


Legend

- 1 Water inlet Victaulic 2"
- 2 Water outlet Victaulic 2"
- 3 Water drainage 1/2" F
- 4 Heat exchanger inlet 1" 1/4 F
- 5 Heat exchanger outlet 1" 1/4 F
- 6 Vibration dampers
- 7 Lifting points
- 8 User interface
- 9 Power supply input



» PLE 132-162

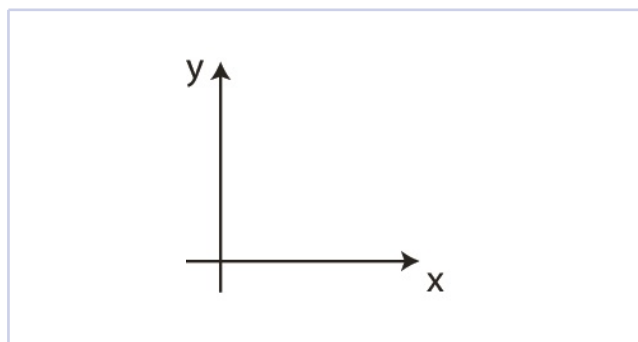


Legend

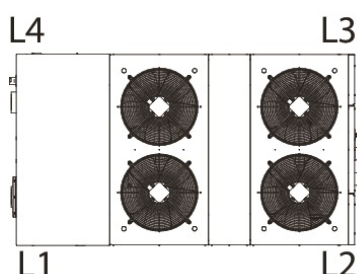
- | | | | |
|---|-------------------------------|----|--------------------------------|
| 1 | Water inlet Victaulic 2" 1/2 | 5 | Heat exchanger outlet 1" 1/4 F |
| 2 | Water outlet Victaulic 2" 1/2 | 6 | Vibration dampers |
| 3 | Water drainage 1/2" F | 7 | Lifting points |
| 4 | Heat exchanger inlet 1" 1/4 F | 8 | User interface |
| 9 | Power supply input | 10 | Outlet safety valve 1" 1/4 NPT |

14 WEIGHTS

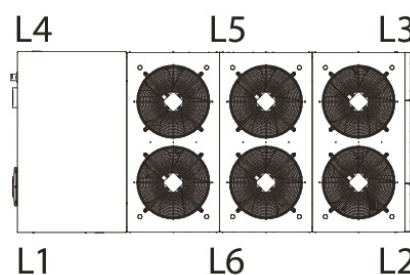
This drawing shows the points of the machine for which weights have been calculated, with respect to the basic chiller and heat pump model. The weights are shown in the tables below.



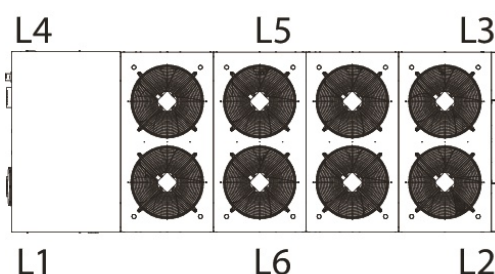
» PLE F1



» PLE F2



» PLE F3



» Lifting center of gravity for transporting unit C version without hydraulic options

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1275	1279	1282	1288	1502	1502	1547	2035	2085	2130
Yb	mm	585	585	585	585	586	586	586	586	586	586

» Lifting center of gravity for transporting unit H version without hydraulic options

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1270	1273	1274	1278	1492	1492	1527	2034	2071	2111
Yb	mm	576	576	576	577	577	577	578	574	575	576

» Lifting center of gravity for transporting unit C version with pump

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1260	1264	1267	1274	1468	1468	1514	2001	2052	2097
Yb	mm	603	603	602	602	603	603	602	601	600	600

» Lifting center of gravity for transporting unit H version with pump

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1256	1259	1261	1265	1462	1462	1498	2003	2041	2083
Yb	mm	592	592	592	592	593	593	593	588	588	588

» Lifting center of gravity for transporting unit C version with pump and tank

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1232	1235	1239	1245	1373	1373	1421	1876	1927	1973
Yb	mm	601	601	601	601	601	601	600	599	599	598

» Lifting center of gravity for transporting unit H version with pump + full tank

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
Xb	mm	1230	1233	1236	1240	1374	1374	1414	1888	1930	1971
Yb	mm	592	592	592	592	593	593	592	588	588	588

Important note: the weights of the hydronic modules must be added to the standard weights of the respective basic model (cooling only and heat pump).

All weights stated below include the refrigerant charge as well as the water contained in the circuit (very important when assessing the most suitable bearing surface for the unit especially in the presence of a tank).

To get an approximate estimate of the unit's weight when empty, subtract the weight (in kg) of the water contained in the tank. In other cases the water content is negligible for these purposes.

» Operating weight C version without hydraulic options

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	154	155	158	161	166	167	188	207	233	258
L2	kg	78	78	78	78	61	61	61	79	79	79
L3	kg	78	78	78	78	61	61	61	79	79	79
L4	kg	151	153	155	158	164	164	186	205	231	256
L5	kg	-	-	-	-	69	69	73	90	93	93
L6	kg	-	-	-	-	69	69	73	90	93	93
Total	kg	462	465	469	476	590	591	642	750	808	858

» Operating weight H version without hydraulic options

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	169	171	175	180	182	183	207	233	262	287
L2	kg	87	87	89	91	67	67	69	87	90	90
L3	kg	85	85	87	88	67	67	69	87	90	90
L4	kg	161	162	167	172	175	175	199	220	250	275
L5	kg	-	-	-	-	75	75	81	97	103	103
L6	kg	-	-	-	-	80	80	86	105	111	111
Total	kg	502	505	517	532	646	647	711	828	906	956

» C - 1 pump version weight distribution

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	154	155	158	161	166	167	188	207	233	258
L2	kg	78	78	78	78	61	61	61	79	79	79
L3	kg	89	89	89	89	73	73	73	94	94	94
L4	kg	156	157	159	163	164	164	186	205	231	256
L5	kg	-	-	-	-	75	75	78	96	99	99
L6	kg	-	-	-	-	69	69	73	90	93	93
Total	kg	476	480	484	490	608	609	660	771	828	878

» H - 1 pump version weight distribution

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	169	171	175	180	182	183	207	233	262	287
L2	kg	87	87	89	91	67	67	69	87	90	90
L3	kg	95	95	97	99	79	79	81	101	104	104
L4	kg	165	167	171	177	175	175	199	220	250	275
L5	kg	-	-	-	-	81	81	86	103	109	109
L6	kg	-	-	-	-	80	80	86	105	111	111
Total	kg	517	520	532	546	664	665	728	848	926	976

» C - 1 pump version weight distribution with full inertial tank

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	187	189	191	194	166	167	188	207	233	258
L2	kg	129	129	129	129	114	114	114	169	169	169
L3	kg	139	139	139	139	126	127	127	183	183	183
L4	kg	189	191	193	196	164	164	186	205	231	256
L5	kg	-	-	-	-	154	155	158	231	233	233
L6	kg	-	-	-	-	149	149	153	225	227	227
Total	kg	645	648	652	659	874	875	927	1220	1277	1327

» Operating weight H version with pump and full buffer tank

Frame		1				2			3		
PLE		052	062	072	082	092	102	122	132	142	152
L1	kg	203	204	209	214	182	183	207	233	262	287
L2	kg	138	138	140	141	120	120	122	176	180	180
L3	kg	146	146	147	149	133	133	135	191	194	194
L4	kg	199	200	205	210	175	175	199	220	250	275
L5	kg	-	-	-	-	161	161	166	238	244	244
L6	kg	-	-	-	-	160	160	166	240	246	246
Total	kg	685	688	700	715	931	931	995	1297	1375	1425

15 ELECTRICAL DATA

» PLE Electrical data

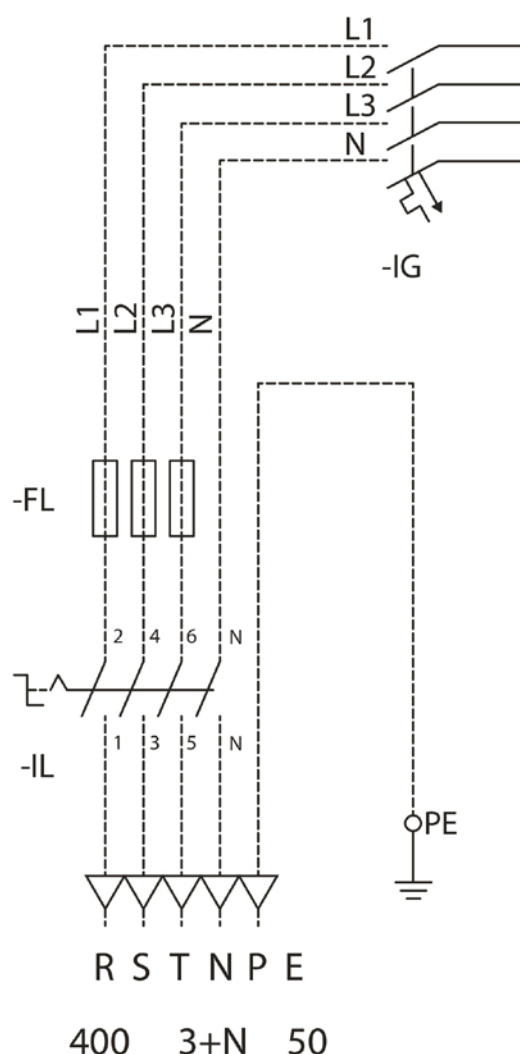
PLE			052	062	072	082	092	102	122	132	142	152
Maximum current absorption		A	48,0	52,0	58,0	64,0	78,0	85,0	94,0	105	116	127
Maximum power input		kW	26,5	29,5	33,5	37,5	45,0	52,0	58,0	66,7	71,7	76,7
Start up current		A	163	170	184	224	254	304	304	308	376	376
Startup current with soft starter		A	128	133	144	174	200	239	239	243	296	296
Power supply		V-ph-Hz	400 / 3+N / 50									
Auxiliary power supply		V-ph-Hz	230 - 1 - 50									
External power supply sensor			24VAC									
Cross-section area of power cables	(1)	mm ²	16,0	16,0	25,0	25,0	25,0	25,0	25,0	35,0	35,0	35,0
Safety fuse F		A	63	63	80	80	100	100	100	125	125	160
Circuit breaker IL		A	63	63	80	80	100	100	100	125	125	160

(1) The shown section is to be considered as the minimum recommended section. The cables must be chosen in compliance with CEI - UNEI 35024/1. standard.

- The maximum input power is the mains power that must be available in order for the unit to work.
- The maximum current absorption refers to the current that will trigger the internal safety devices of the unit. It is the

maximum current allowed in the unit. This value may never be exceeded; it must be used as a reference for determining the size of the power supply line and the related safety devices (refer to the wiring diagram supplied with the units).

» Main electrical connection of units





Galletti S.p.A Organization has a Management System Certified by Kiwa Cermet Italia S.p.A, according to the UNI EN ISO 9001:2015, UNI EN ISO 14001:2015 and UNI ISO 45001:2018 standards.

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