EN

TECHNICAL MANUAL

PLN C / H

Air chillers and heat pumps with R290 refrigerant

50-150 kW

Plate exchanger | A3 gas leak detection | R-290 Refrigerant | Axial fan | Scroll compressor | Cooling only | Heating/Cooling

PLUS

- Refrigerant with GWP of less than 3
- High seasonal efficiency values
- Electronic expansion valve
- ATEX leak gas detection sensor
- ATEX extractor fan
- Production of high temperature water

CE

RG66029465 10/25

Galletti
AIR CONDITIONING

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

1 SERIES

PLN units are designed for heating and cooling the water to be used in process air conditioning systems for residential, commercial or industrial use.
PLN units are designed for outdoor installation (guaranteed IPX4 protection, IP54 for the electrical control board), in a place not accessible to the public.

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

2 CONSTRUCTIVE FEATURES

2.1 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.
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.

2.2 CUSTOMISED HYDRAULIC KIT

The hydronic kit is fully configurable. For standard pumps, the maximum ethylene and propylen glycol content tolerated is 35% with positive water temperatures. Please contact us if higher glycol percentages are required or if it is necessary to operate with negative water temperatures.
The hydronic kit and pumping unit are designed to be used with non-industrial water within the operating range. A utility-side heat output meter (optional) is also fitted to the pumping unit.

2.3 COOLING CIRCUIT

- Scroll compressor with optional sound insulation. 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 R290.
- Finned block condenser with 8 mm copper tubing and corrugated aluminium fins, characterised by circuits designed to optimise operation as both evaporator and condenser and reduce refrigerant charge. (PLN H)
- Microchannel condenser with low refrigerant charge. (PLN C)
- Dehydrating filter.
- Flow indicator with humidity indicator.
- Cycle reversing valve (PLN H)
- Liquid receiver. (PLN H)
- Liquid separator.(PLN H)
- High pressure switch.
- Electronic expansion valve: expands the liquid refrigerant towards the plate heat exchanger during operation in chiller mode and towards coils in heat pump mode.
- Gas leak detection systems: attends when there is a R290B leak, blocking operation of the unit.

2.4 REFRIGERANT WITH LOW GWP

Use of environmentally-friendly refrigerant R290. R290 is the A3 refrigerant with a GWP of only 3, one of the lowest on the market. This GWP value ensures that the PLN range complies with the gradual reduction of quotas of greenhouse refrigerants in the European market required by the latest version of the F-GAS regulation.

2.5 ELECTRONIC VALVE

It is standard, 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.

2.6 ELECTRONIC MICROPROCESSOR CONTROL

The electronic controller enables the complete control of the PLN 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 the delivery water temperature and Delta T on system with inverter modulating pump
- 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
- Control of electrical power input

Devices controlled
- Compressor
- Reverse cycle valve
- Dual alarm signalling relays
- LAN networks for controlling 6 units in parallel

2.7 GAS LEAK DETECTION SYSTEM

The units are equipped with a leak detector sensor near the cooling circuit. The leak sensor is equipped with a microprocessor-independent control unit, which is fitted with a relay that cuts off the power supply to the normal equipment of the unit when the critical LFL threshold is exceeded. Power to the leak sensor control unit is supplied from the branch located upstream of the main switch. This function allows the complete disconnection of the ordinary unit components during maintenance operations, while leaving all the safety systems enabled (i.e. energized).
In the event of a refrigerant leak, the gas detector control unit activates an ATEX extractor fan, which is also kept energised by the same branch upstream of the main switch.
Refer to section 16 p. 38 for the risk assessment and the wiring diagram 16.2 p. 39.

3 CONFIGURATION OPTIONS

The PLN C / H range consists of 7 models with cooling capacities from 48 to 148 kW for cooling-only versions and heating capacities from 50 to 156 kW for reversible heat pump versions. All units are charged with R290, which is classified as A3 (highly flammable).
NOTE: The choice of some options can make the choice of some others forbidden or make some selection (fields) mandatory. Please contact Galletti S.p.A. for verification.

1	**Expansion valve**
A	Electronic valve
2	**Water pump and accessories**
0	Absent
1	Single standard pump
2	Double std pump - OR
3	Single HP pump
4	HP double pump - OR
A	Single inverter standard pump
B	Standard dual inverter OR pump
C	Inverter Single HP pump
D	Dual inverter HP OR pump
3	**Water buffer tank**
0	Absent
S	Selected
4	**De-superheater**
0	Absent
D	Included with pump free contact
5	**Condensation/Evaporation Control**
None	None
None	None
None	None
6	**Antifreezing kit**
E	Only cooling versions and plate exchanger (supplied)
P	Plate exchanger + pump
S	Plate exchanger + pump + tank
T	For plate exchanger and tank
7	**Esecuzione silenziata (isolamento acustico)**

8	**Water low temperature production**
0	Up to 5°C (0% of glycol)
1	Up to 0°C (15% of glycol)
2	Up to -5°C (25% of glycol) (only if the option 5 = E or A)
9	**Remote control**
0	Absent
2	RS485 Board (Modbus protocol or Carel)
B	BACNET IP/PCOWEB serial board
G	BACNET IP / PCOWEB serial board + supervision software
S	Simplified additional remote control panel
T	Touch screen control (up to 50m)
X	Additional remote control for advanced control (up to 50m)
10	**Special coils / Protective treatments**
0	Copper / aluminium (standard for H version)
C	Cataphoresis (only for H versions)
E	Microchannel in Long Life Alloy (standard for C version)
I	Hydrophilic (only H version)
M	Microchannel with E-coating (only for C version)
P	Pre-painted fins with epoxy painting (only H version)
R	Copper-copper (heat pump only)
11	**Base vibration dampers**
0	Absent
G	Made of rubber
M	With spring
12	**Outdoor coil trace heater**
0	Absent
1	Present (only H version)
13	**Control panel**
1	Advanced
2	Advanced with touch screen display
14	**Water flow control**
2	Vane-type flow switch
3	Hot-wire electronic flow switch
15	**DHW accessory only (if option 3 = 0)**
0	Absent
1	DHW 3-way valve + tank probe
2	DHW mode enabling with dry contact
3	DHW 3-way valve (supplied) + ACS from ID contact

» Accessories

B	Outdoor finned coil heat exchanger protection grille
D	ON/OFF status of the compressors (mandatory only if opt.4 = D)
E	Remote control for power step limits (accessory 2 excluded)
F	Configurable digital alarm board
G	Soft starter
H	Power factor capacitors
I	Refrigerant sensors (standard)
L	Double insulation water side (as standard for tank)
M	0-10V signal for external user pump control (only if opt 4 =0)
N	Integration system enabling contact (boiler / electric heater) plant
O	Night-time low-noise (only if opt 7 different from 6)
Q	Temperature probe for pump shutdown on the primary circuit
R	Enabling 2nd set-point
T	Mains power analyzer for monitoring of power consumption
V	Set-point modification with 4-20mA signal
Z	Flow meter for calculating power output
1	Integration system enabling contact (electric heater) DHW (only if opt 15 different from 0)
2	Smart Grid Certification (option E excluded)
3	Deaerator for hydraulic circuit (supplied as an accessory)
4	Dirt separator (supplied as an accessory)

4 TECHNICAL FEATURES

4.1 RATED TECHNICAL DATA PLN

» Rated technical data PLN C chiller

PLN C			052	072	082	104	114	134	154
Power supply		V-ph-Hz	400-3N-50						
Cooling capacity	(1)(E)	kW	50,8	65,5	77,4	106	118	138	160
Total power input	(1)(E)	kW	16,5	20,1	24,3	35,6	40,6	43,3	51,7
EER	(1)(E)		3,08	3,25	3,19	2,99	2,90	3,18	3,09
SEER	(2)(E)		4,12	4,61	4,40	4,45	4,65	5,00	4,62
Water flow	(1)	l/h	8743	11262	13322	18341	20289	23702	27456
Water pressure drop	(1)(E)	kPa	25	27	35	55	65	35	44
Available pressure head - LP pumps	(1)	kPa	158	145	129	113	102	198	178
Available pressure head - HP pumps	(1)	kPa	192	180	165	172	160	322	301
Maximum available pressure head with EC fans high pressure		Pa	25	25	25	25	25	70	70
Rated air flow		m^3/h	17000	24500	24500	33750	33750	52250	52250
Compressors / circuits			2/1	2/1	2/1	4/2	4/2	4/2	4/2
Refrigerant charge - circuit 1	(3)	kg	3,3	4,8	4,9	3,8	3,85	3,9	3,95
Refrigerant charge - circuit 2	(4)	kg	-	-	-	3,8	3,85	3,9	3,95
Sound power level	(5)(E)	dB(A)	84	85	85	85	86	87	87
Low-noise sound power reduction		dB(A)	-3	-3	-3	-3	-3	-3	-3
Super low-noise sound power reduction		dB(A)	-7	-7	-7	-5	-5	-5	-5
Height		mm	1848	1848	1848	1906	1906	1952	1952
Depth		mm	1136	1136	1176	1253	1253	2030	2030
Length		mm	2356	2356	3027	3771	3771	3821	3821
Maximum transport weight		kg	1042	1270	1270	1805	1805	2587	2589

(1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2022)
(2) η efficiency values for heating and cooling are respectively calculated by the following formulas: [η = SCOP / 2,5 - F(1) - F(2)] e [η = 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 EN14825:2022 regulation.
(3) If the two cooling circuits are unbalanced, it is the smaller circuit. Kg gas value is estimated. For the exact value refer to the plate data on the unit.
(4) If the two cooling circuits are unbalanced, it is the larger circuit. Kg gas value is estimated. For the exact value refer to the plate data on the unit.
(5) Sound power level measured according to ISO 9614
(E) EUROVENT certified data

» Heat pumps rated technical data PLN H

PLN H			052	072	082	104	114	134	154
Power supply		V-ph-Hz	400 / 3+N / 50						
Cooling capacity	(1)(E)	kW	48,6	63,4	72,0	101	111	130	148
Total power input	(1)(E)	kW	16,9	21,2	25,2	35,3	39,2	41,6	49,9
EER	(1)(E)		2,88	2,99	2,86	2,86	2,83	3,12	2,97
SEER	(2)(E)		4,02	4,32	4,11	4,28	4,50	4,90	4,55
Water flow	(1)	l/h	8355	10912	12397	17374	19097	22336	25465
Water pressure drop	(1)(E)	kPa	25	30	37	49	57	32	38
Available pressure head - LP pumps	(1)	kPa	158	144	128	116	104	199	180
Available pressure head - HP pumps	(1)	kPa	192	179	163	175	162	322	303
Heating capacity	(3)(E)	kW	54,6	68,6	79,5	106	120	132	154
Total power input	(3)(E)	kW	16,7	20,7	23,9	32,8	36,6	40,0	47,7
COP	(3)(E)		3,28	3,32	3,32	3,24	3,29	3,30	3,22
SCOP	(4)(E)		3,80	3,70	3,82	3,90	4,00	3,80	3,95
SCOP	(5)(E)		3,05	3,03	3,12	3,30	3,34	3,14	3,25
Water flow	(3)	l/h	9464	11898	13782	18364	20827	22910	26629
Water pressure drop	(3)(E)	kPa	29	33	42	49	59	32	40
Available pressure head - LP pumps	(3)	kPa	149	136	114	101	86	179	151
Available pressure head - HP pumps	(3)	kPa	183	171	149	159	144	301	272
Rated air flow		m^3/h	17850	26350	26350	35200	34500	58000	58000
Compressors / circuits			2/1	2/1	2/1	4/2	4/2	4/2	4/2
Maximum available pressure head with EC fans high pressure		Pa	25	25	25	25	25	70	70
Refrigerant charge - circuit 1	(6)	kg	5,7	8,4	8,5	6,3	7,5	7,8	7,9
Refrigerant charge - circuit 2	(7)	kg	-	-	-	6,3	7,5	7,8	7,9
Buffer tank volume		dm^3	125	200	200	200	200	600	600
Sound power level	(8)(E)	dB(A)	84	85	85	85	86	87	87
Low-noise sound power reduction		dB(A)	-3	-3	-3	-3	-3	-3	-3
Super low-noise sound power reduction		dB(A)	-7	-7	-7	-5	-5	-5	-5
Height		mm	1900	1900	1900	1900	1900	1950	1950
Depth		mm	1250	1250	1250	1250	1250	2030	2030
Length		mm	2350	3000	3000	3700	3700	3820	3820
Maximum transport weight		kg	960	1196	1206	1698	1771	2534	2624

(1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2022)
(2) η efficiency values for heating and cooling are respectively calculated by the following formulas: [η = SCOP / 2,5 - F(1) - F(2)] e [η = 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 EN14825:2022 regulation.
(3) Outdoor air temperature dry bulb 7°C / wet bulb 6°C, water temperature 40°C / 45°C (EN14511:2022)
(4) η efficiency values for heating and cooling are respectively calculated by the following formulas: [η = SCOP / 2,5 - F(1) - F(2)] e [η = 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 EN14825:2022 regulation. Low temperature conditions.
(5) η efficiency values for heating and cooling are respectively calculated by the following formulas: [η = SCOP / 2,5 - F(1) - F(2)] e [η = 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 EN14825:2022 regulation. Medium temperature conditions.
(6) If the two cooling circuits are unbalanced, it is the smaller circuit. Kg gas value is estimated. For the exact value refer to the plate data on the unit.
(7) If the two cooling circuits are unbalanced, it is the larger circuit. Kg gas value is estimated. For the exact value refer to the plate data on the unit.
(8) Sound power level measured according to ISO 9614
(E) EUROVENT certified data

5 PED CATEGORY

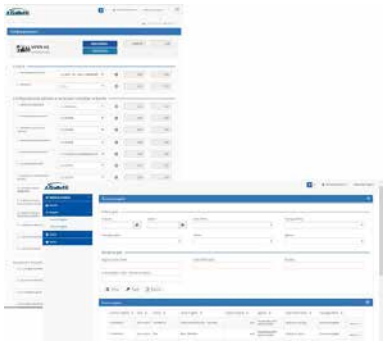
The water chillers and heat pumps comply with directive 2014/68//EC (PED).

Series	Size	Notified body	PED Category	Marking
PLN C / H	F1; F2; 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

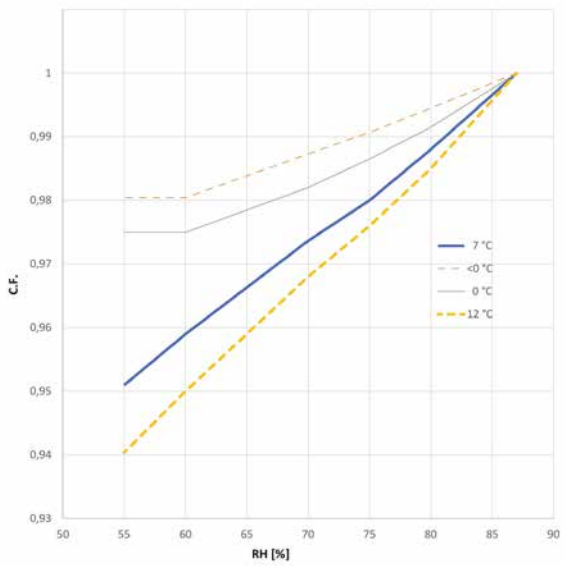


Configuration and project history
Wizard configuration of accessories and options for chillers, heat pumps and hydronic units
Creation of a project which collects all products of interest
Complete management of the storaged history projects

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.
For a more precise selection, refer to the online selection software or the Galletti S.p.A.'s Support area.



C.F Correction coefficient
RH Relative humidity

7 SOUND LEVELS

» Standard sound level

PLN			052	072	082	104	114	134	154
LwA	(1)	dB(A)	84	85	85	85	86	86	86
50 Hz	(2)	dB	102	103	103	100	101	103	103
63 Hz	(2)	dB	96,0	97,0	97,0	93,0	94,0	98,0	98,0
80 Hz	(2)	dB	90	91	91	92	93	94	94
100 Hz	(2)	dB	84	85	85	89	90	90	90
125 Hz	(2)	dB	78,0	79,0	79,0	78,0	79,0	82,0	82,0
160 Hz	(2)	dB	88	89	89	84	85	82	82
200 Hz	(2)	dB	77	78	78	78	79	82	82
250 Hz	(2)	dB	79,0	80,0	80,0	81,0	82,0	81,0	81,0
315 Hz	(2)	dB	76	77	77	75	76	80	80
400 Hz	(2)	dB	71	72	72	78	79	79	79
630 Hz	(2)	dB	75	76	76	77	78	79	79
1000 Hz	(2)	dB	76,0	77,0	77,0	78,0	79,0	77,0	77,0
1250 Hz	(2)	dB	76	77	77	77	78	76	76
1600 Hz	(2)	dB	73	74	74	74	75	75	75
2000 Hz	(2)	dB	70,0	71,0	71,0	71,0	72,0	74,0	74,0
2500 Hz	(2)	dB	70	71	71	70	71	71	71
4000 Hz	(2)	dB	65,0	66,0	66,0	65,0	66,0	65,0	65,0
5000 Hz	(2)	dB	60	61	61	66	67	62	62
6300 Hz	(2)	dB	58	59	59	59	60	60	60

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

» Sound power level, low-noise version

PLN			052	072	082	104	114	134	154
LwA	(1)	dB(A)	81	82	82	82	83	83	83
50 Hz	(2)	dB	99,0	100	100	97,0	97,0	100	100
63 Hz	(2)	dB	93,0	94,0	94,0	91,0	91,0	95,0	95,0
80 Hz	(2)	dB	87	88	88	89	89	91	91
100 Hz	(2)	dB	81	82	82	86	86	87	87
125 Hz	(2)	dB	75,0	76,0	76,0	75,0	75,0	79,0	79,0
160 Hz	(2)	dB	85	86	86	81	81	79	79
200 Hz	(2)	dB	75	76	76	75	75	79	79
250 Hz	(2)	dB	76,0	77,0	77,0	78,0	78,0	78,0	78,0
315 Hz	(2)	dB	73	74	74	71	71	77	77
400 Hz	(2)	dB	69	70	70	75	75	76	76
630 Hz	(2)	dB	72	73	73	74	74	76	76
800 Hz	(2)	dB	69	70	70	73	73	75	75
1000 Hz	(2)	dB	73,0	74,0	74,0	75,0	75,0	74,0	74,0
1250 Hz	(2)	dB	73	74	74	74	74	73	73
1600 Hz	(2)	dB	70	71	71	71	71	72	72
2000 Hz	(2)	dB	67,0	68,0	68,0	68,0	68,0	70,0	70,0
2500 Hz	(2)	dB	67	68	68	67	67	68	68
3150 Hz	(2)	dB	65	66	66	65	65	64	64
4000 Hz	(2)	dB	62,0	63,0	63,0	63,0	63,0	62,0	62,0
5000 Hz	(2)	dB	57	58	58	65	65	59	59
6300 Hz	(2)	dB	55	56	56	56	56	57	57

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

» Super low-noise version noise levels

PLN			052	072	082	104	114	134	154
LwA	(1)	dB(A)	77	78	78	80	81	81	81
50 Hz	(2)	dB	95,0	96,0	96,0	92,0	92,0	97,0	97,0
63 Hz	(2)	dB	89,0	90,0	90,0	85,0	85,0	91,0	91,0
80 Hz	(2)	dB	83	84	84	84	84	88	88
100 Hz	(2)	dB	77	78	78	82	82	85	85
125 Hz	(2)	dB	71,0	72,0	72,0	70,0	70,0	76,0	76,0
160 Hz	(2)	dB	81	82	82	77	77	77	77
200 Hz	(2)	dB	70	71	71	71	71	77	77
250 Hz	(2)	dB	72,0	73,0	73,0	74,0	74,0	76,0	76,0
315 Hz	(2)	dB	69	70	70	68	68	75	75
400 Hz	(2)	dB	64	65	65	71	71	74	74
630 Hz	(2)	dB	68	69	69	70	70	74	74
800 Hz	(2)	dB	65	66	66	68	68	73	73
1000 Hz	(2)	dB	69,0	70,0	70,0	71,0	71,0	72,0	72,0
1250 Hz	(2)	dB	69	70	70	70	70	71	71
1600 Hz	(2)	dB	66	67	67	67	67	70	70
2000 Hz	(2)	dB	63,0	64,0	64,0	64,0	64,0	69,0	69,0
2500 Hz	(2)	dB	63	64	64	63	63	66	66
3150 Hz	(2)	dB	61	62	62	61	61	62	62
4000 Hz	(2)	dB	58,0	59,0	59,0	58,0	58,0	60,0	60,0
5000 Hz	(2)	dB	53	54	54	59	59	57	57
6300 Hz	(2)	dB	51	52	52	52	52	55	55

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

7.1 ACOUSTIC INSULATION VERSIONS

PLN			052	072	082	104	114	134	154
Sound power level	(1)(E)	dB(A)	84	85	85	85	86	86	86
Low-noise sound power reduction		dB(A)	-3	-3	-3	-3	-3	-3	-3
Super low-noise sound power reduction		dB(A)	-7	-7	-7	-5	-5	-5	-5

(1) Sound power level measured according to ISO 9614
(E) EUROVENT certified data

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

☞ **NOTE:** Super low-noise sound power level = standard + compressor soundproofing covers + slowed fans

8 OPERATING LIMITS

The graphs below illustrate the operating limits of PLN 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.

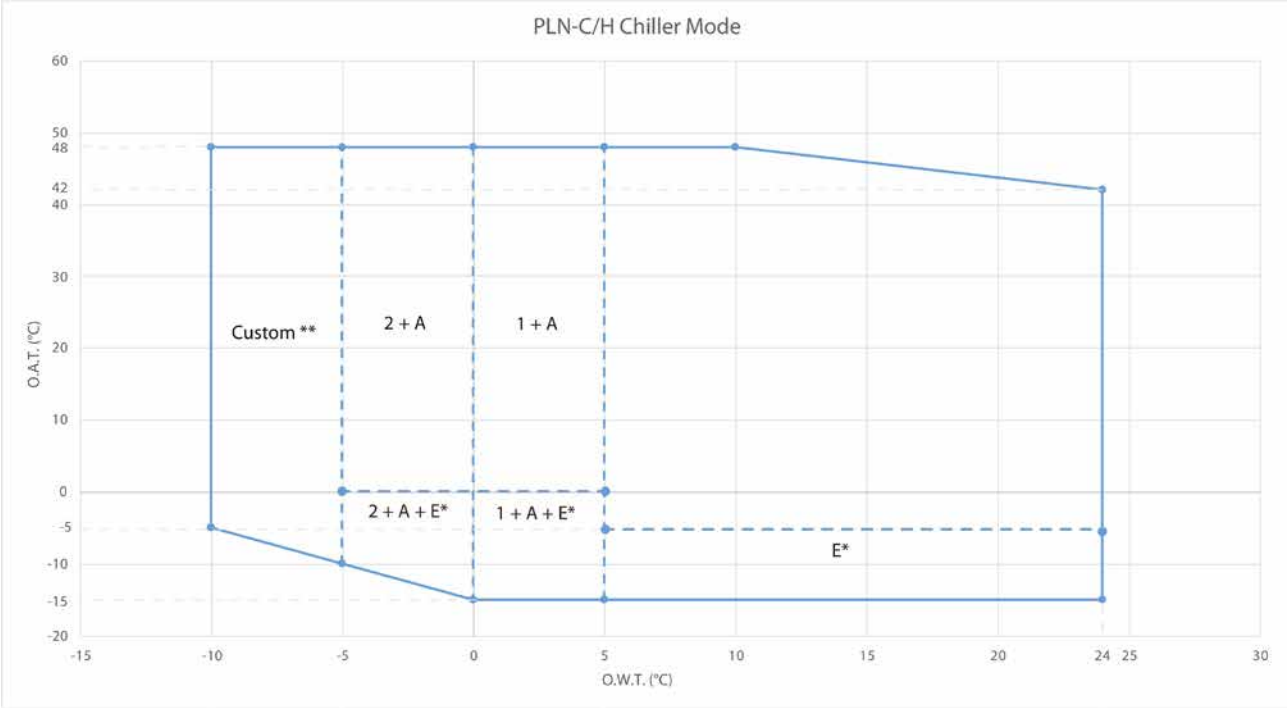
⚠ **WARNING:** contact the support area if you wish to operate with water temperature fluctuations other than 5 K at full load.

⚠ **WARNING:** except for special requests, which can be managed to order, the PLN series units set the number of compressors running according to the temperature of the water outlet the unit (temperature supply from the system) and not according to the inlet temperature. Therefore, the settable set point always refers to the temperature of the water outlet the unit.

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

8.1 PLN C AND H OPERATING LIMITS IN COOLING MODE

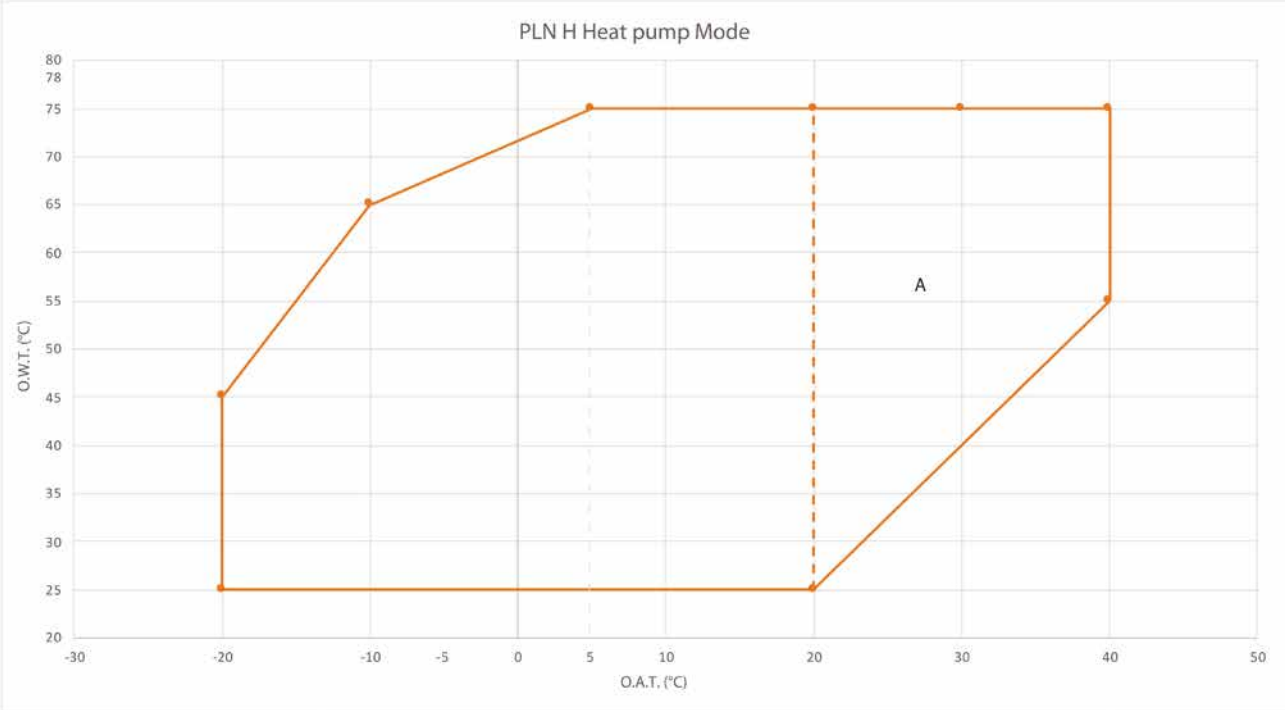
» 8.1 PLN C and H operating range - cooling mode



A Glycol
E Condenser control and EC fans
(*) standard up to size 114 included
contact the company for the development of the application
1 low temperature option
2 low temperature option
O.W.T. Outlet water temperature
O.A.T. Outdoor air temperature

8.2 PLN H OPERATING LIMITS IN HEATING MODE

» 8.2 PLN H operating range - heating mode



O.W.T. Outlet water temperature
O.A.T. Outdoor air temperature
A Evaporator control with EC fans

8.3 THERMAL CARRYING FLUID

Pumps belonging to the PLN C / Hseries can work with mixtures of water and up to 35% ethylene or propylene glycol.

⚠ **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 PLN C

PLN C		052	072	082	104	114	134	154
Water flow MAX	l/h	45000	45000	45000	55000	55000	60000	60000
Water flow MIN	l/h	5230	6750	8050	10730	12390	14010	16230

» Minimum and maximum water flow admitted PLN H

PLN H		052	072	082	104	114	134	154
Water flow MIN	l/h	4170	5330	6120	8640	9800	10920	12460
Water flow MAX	l/h	45000	45000	45000	55000	55000	60000	60000

☞ **WARNING:** The values indicated refer to the correct operation of the heat exchanger. Flow rates below the minimum threshold may result in a reduction of thermal exchange efficiency, potential freezing of the heat exchanger in the absence of adequate glycol concentration, and, in general, activation of the lockout alarm due to insufficient water flow. Flow rates above the maximum threshold may instead cause erosion phenomena on the plates. These values shall be considered as absolute operating limits and therefore apply only to units not equipped with onboard pumps. In the presence of onboard pumps, the limits must be redefined to take into account the minimum and maximum flow constraints of the pumping group. In such cases, please contact Galletti S.p.A. for a detailed verification of the operating point.

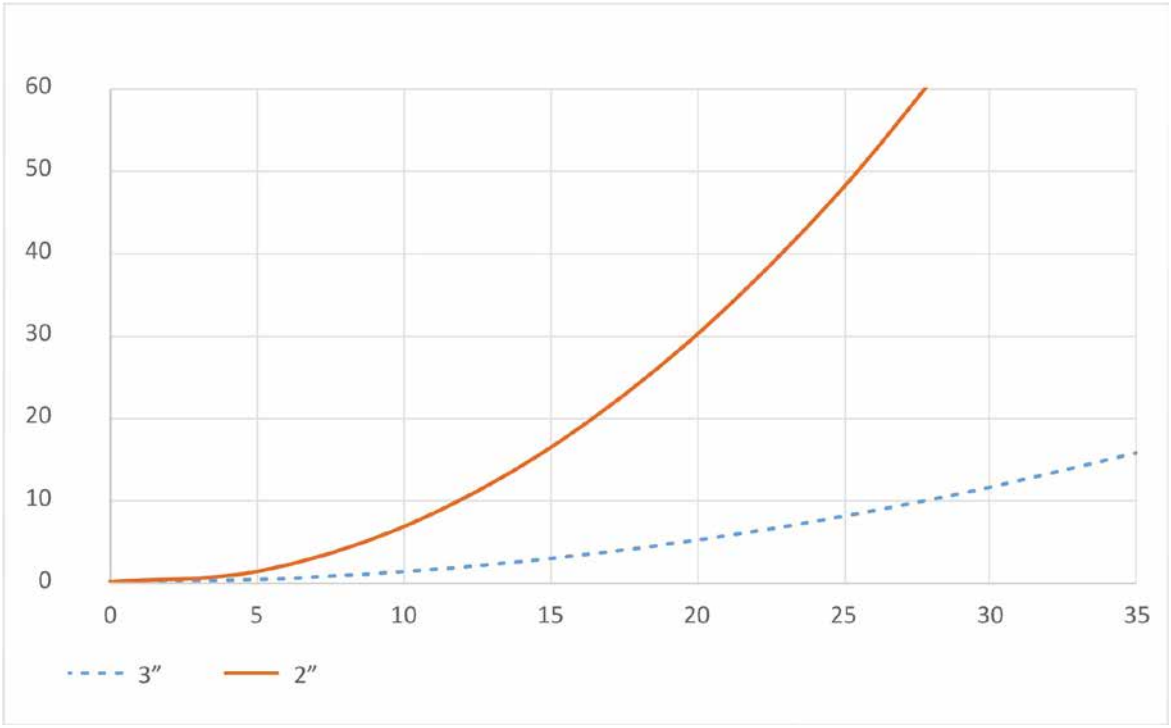
9 WATER PRESSURE DROP

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 (Qw), assuming an average water temperature of 10 °C,

PLN		052	072	082	104	114	134	154
Unit connections								
Unit connections type		Threaded	Threaded	Threaded	Threaded	Threaded	Victaulic	Victaulic
Unit connections diameter	"	2	2	2	2	2	3	3
Filter connections								
Filter connections type		Threaded	Threaded	Threaded	Threaded	Threaded	Threaded	Threaded
Filter connections diameter	"	2	2	2	2	2	3	3
Filter name		F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR50	F21NOR80	F21NOR80

»



10 WATER CIRCUIT

PLN C / H units are equipped with a flow switch or water differential pressure switch, safety valve (supplied as standard), water pressure gauge, manual air vent valve, sludge remover (configurable) and deaerator (mandatory and configurable). See table below:

» Water circuit design constraints

	Installation mandatory	Installation recommended	Configurable component (*)	Component always supplied as standard (*)
Safety valve	Yes	No	No	Yes
Deaerator	Yes	No	Yes	No
Dirt separator for the water system (supplide loose)	No	Yes	Yes	No
Y-shaped filter	Yes	No	No	Yes
3-way valve	No	-	Yes	No

(*) Installation is the responsibility of the customer

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. A gate valve is also available as standard for cutting off pump suction, so that the pump can be replaced without needing to empty the unit's entire tank.
A heat meter is available on the configurator to monitor the power output and COP (in combination with the mains power analyser, available as an option).

⚠ **WARNING:** The water safety valve, air vent valves and the deaerator (in general all the components that connect the water circuit to the outside), must have the same installation characteristics as the unit (see section 11 p. 28).

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. It is recommended to install the following components on the water pipes, subject to the constraints indicated in Table 10.1 p. 16:

— 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 the inlet and outlet pipes for temperature measurements through direct viewing of the operating temperatures. They can, however, be checked by means of the on-board microprocessor.
— Regulating valves (gate valves) for isolating the unit from the water circuit.
— Mandatory metal mesh filter (inlet pipes), supplied as standard, with a mesh size not to exceed 1 mm, to protect the heat exchanger from scale or impurities present in the pipes. If the unit is combined with process cycles, it is recommended to install a decoupling exchanger, accessible for inspection, to avoid possible blockage of operation 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.
— Water safety valve: supplied as standard, to be installed near the unit outlet pipe (if the deaerator is configured, the valve is already installed on the deaerator).
— Compulsory water deaerator (high efficiency) (is recommend the one available on the configurator): to be installed near the unit outlet pipe, protected from the weather and/or sources of obstruction.
— Water sludge remover: if configured to be installed near the unit inlet pipe.

⚠ **WARNING** Failure to use anti-freezing solutions may cause seriousdamage 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 (NH4+) 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 (SO4--) 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 µS/cm
— pH: neutral pH at 20 °C (7 < pH < 8)
— Fixed residue (at 180 °C): < 2 000 mg/kg
— Conditioners Present within the concentrations prescribed by the supplier

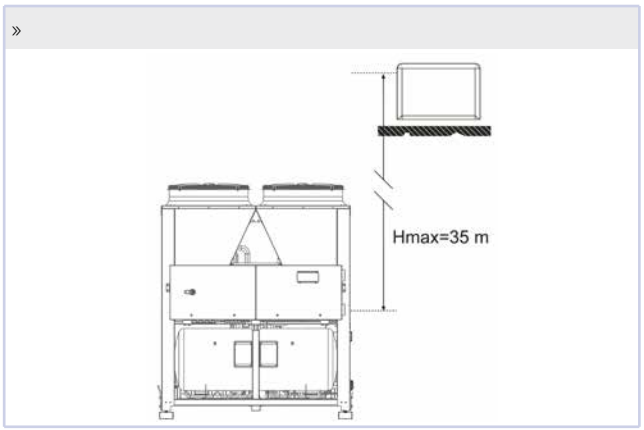
The water must be analysed: it is advisable to contact a qualified water treatment specialist to determine the most suitable type of treatment according to the materials used in the hydraulic system.
The installed water circuit must include all the necessary devices for water treatment: mesh filter (immediately at the inlet to the unit), additive dosing systems if necessary, any intermediate heat exchangers, air vent valves at all points of possible air accumulation, air intakes, isolation valves, etc., and anything else necessary according to best practice as well as the safety devices indicated above.

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.

WARNING: The water safety valve, air vent valves and the deaerator (in general all the components that connect the water circuit to the outside), must have the same installation characteristics as the unit (see section 11 p. 28).

10.1 FILLING THE 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 Hmax = 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 RECOMMENDED WATER CIRCUIT

WARNING: When making hydraulic connections, make sure that there are no open flames near or inside the unit.

In addition to the constraints indicated in Table 10.1 p. 16, the water circuit should have:
— valves for regulating (VI) the unit on the water pipes, immediately upstream and downstream from the unit itself, to be used in the event maintenance work is required;
— a mechanical filter (FM) on the inlet pipe to the unit, near the unit itself;
— a mechanical filter (FM) and a check valve (VNR), on the supply line before the filling tap inside the unit;
— deaerator protected at the top and located close to the unit on the delivery line, preferably at the highest point of the system, ensuring the same positioning standards as the unit itself;
— water safety valve to be installed near the unit outlet pipe (if not already included in the deaerator) which guarantees the same positioning standards as the unit itself;

— safety valve conveyor pipe (VS), which, if the valve is opened, directs the water jet to areas where it cannot damage people or property (Important!);
— anti-vibration joints (GA) on the pipes to prevent vibration transmission to the system.

Important! It is advisable to ensure that the pipes connected upstream and downstream from the unit are not smaller in diameter than the unit's hydraulic connections. Ensure that the pipe connected to the safety valve and to the deaerator does not lead into manholes or storm drains and that there are no accumulation points or components that could be a source of ignition within the safety zone (see section 11 p. 28).

Important! During the winter period, the water circuit (or only the chiller) must be drained to prevent damage due to freezing. Alternatively, the circuit can be filled with a mixture of water and glycol; the percentage of glycol required depends on the lowest expected temperature (see table):

Percentage by weight of ethylene glycol (%)	Mixture freezing temperature (°C)
0	0
10	-3
20	-8
30	-15
40	-25

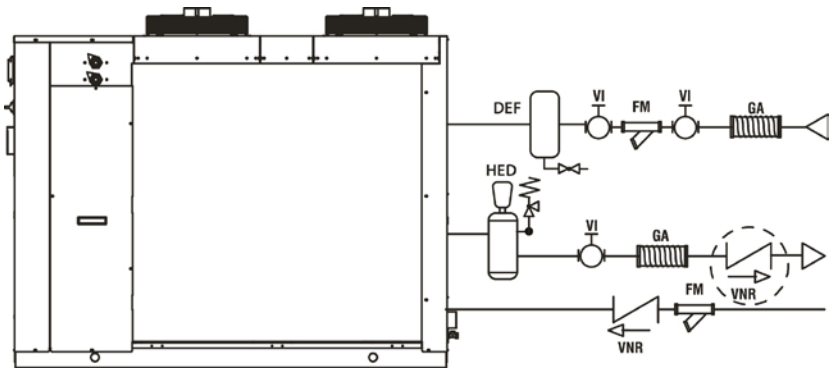
☞ **NOTE:** The percentage shown in the upper table are indicative. Always refer to your glycol supplier for the right freezing temperatures.

☞ **NOTE:** For choice of gycol percentage to use, in case of low temperature water produced, is recommended keeping a edge of 5K on outlet water temperature in order to consider any temperature fluctuations inside theheat exchanger. Example: water temperature produced: -10°C, minimum water temperature during the fluctuations: -10-5=-15°C, recommended ethylene glycol percentage: >30%.

Important! If a different type of antifreeze is to be used, please contact the manufacturer.

Failure to install filters and vibration dampers may cause problems of clogging, breakages and noise, for which the manufacturer may not be held liable.

» Recommended water circuit

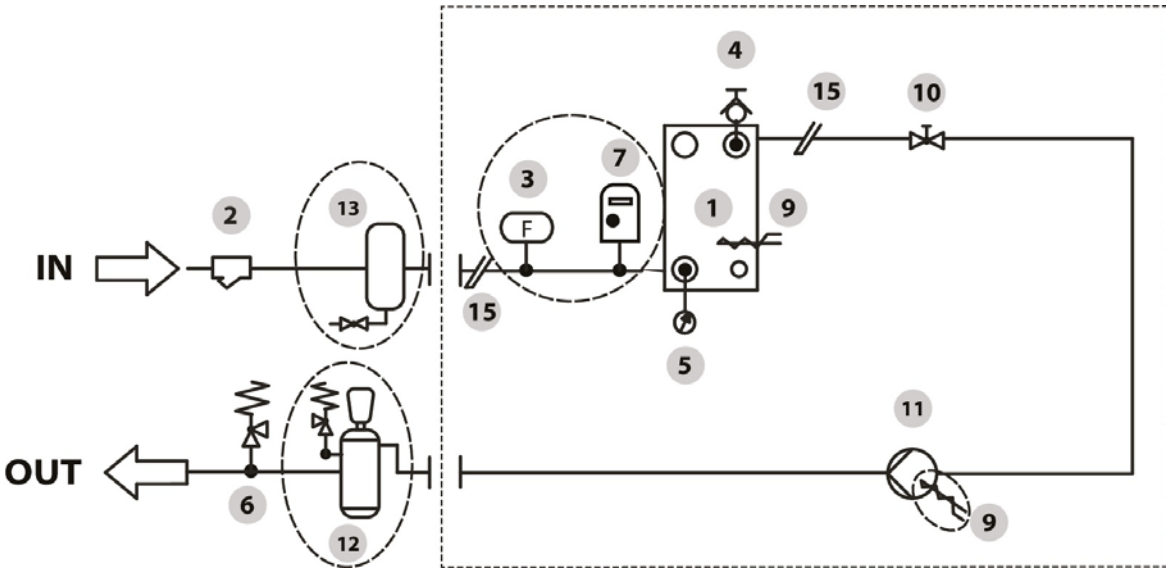


LEGEND

VI	Shut-off valve (not supplied)
GA	Vibration-damping coupling (not supplied)
FM	Mechanical filter (MANDATORY)
VNR	Check valve (not supplied)
HED	High efficiency deaerator
DEF	Sludge remover
- - - -	Check valve (not supplied), mandatory for LAN unit

10.3 WATER CIRCUIT

» PLN (evaporator and pump)

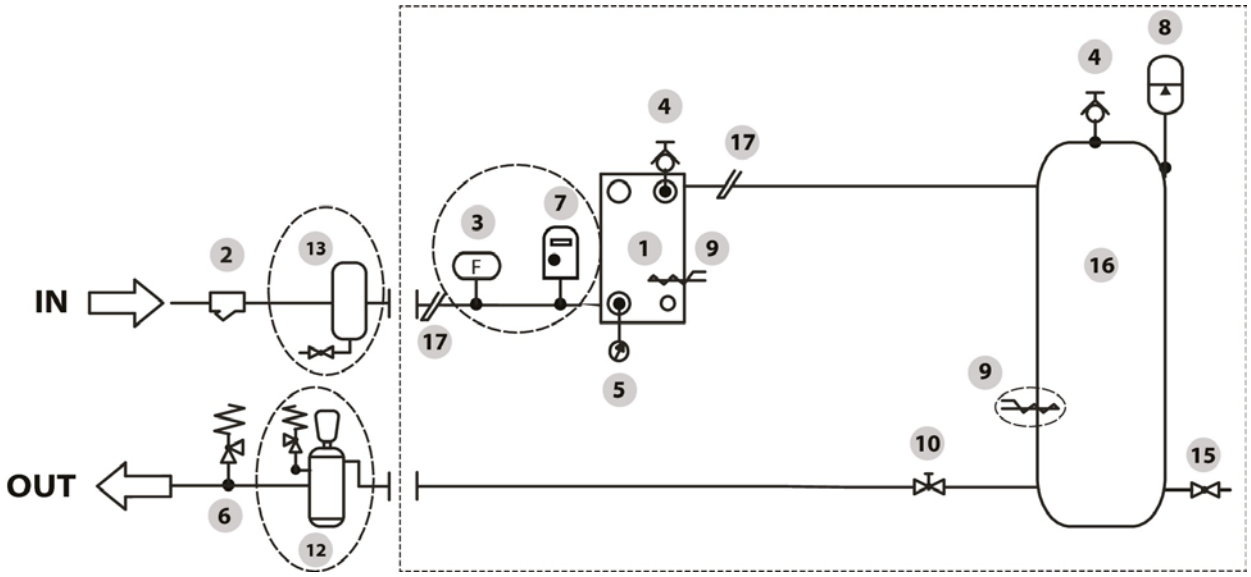


LEGEND

1 Evaporator
2 Water filter (included)
3 Flow switch
4 Air purge valve
5 Pressure gauge
6 Safety valve (supplied)
7 Heating capacity meter
8 -
9 Antifreeze electric heating
10 Cut-off valve
11 Hydraulic pump
12 Deaerator
13 Dirt separator for the water system (supplide loose)
14 -
15 Probe holder

------ Internal and external borderline
_ _ _ _ Optional

» PLN (evaporator and tank)

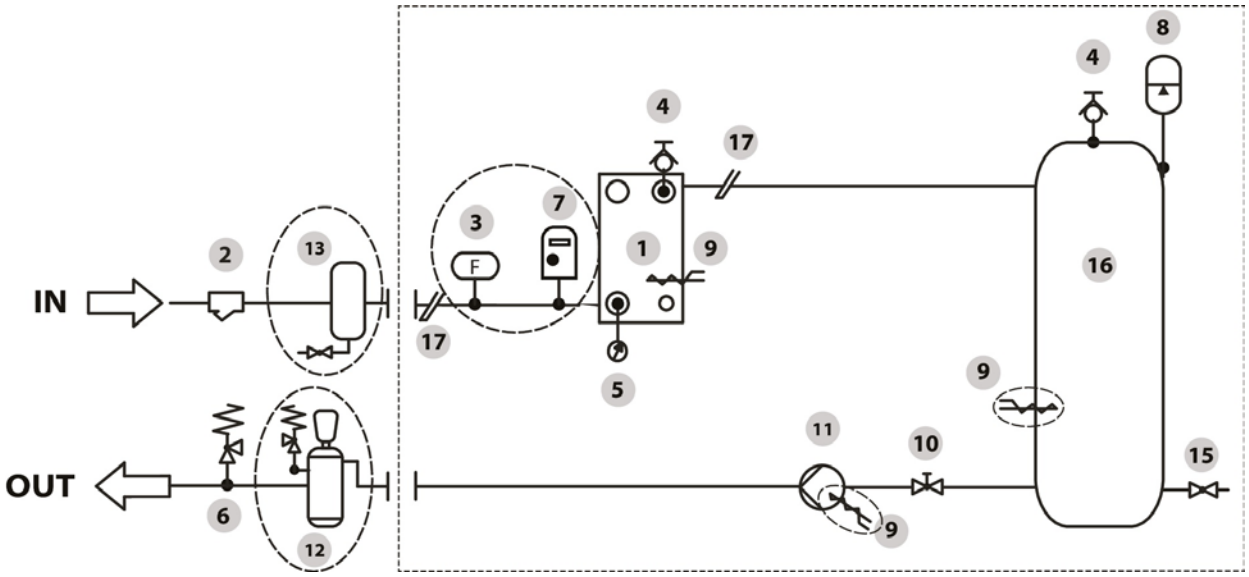


LEGEND

1 Evaporator
2 Water filter (included)
3 Flow switch
4 Air purge valve
5 Pressure gauge
6 Safety valve (supplied)
7 Heating capacity meter
8 Expansion tank
9 Antifreeze electric heating
10 Cut-off valve
11 -
12 Deaerator
13 Dirt separator for the water system (supplide loose)
14 -
15 Tank drain valve
16 Tank
17 Probe holder

------ Internal and external borderline
_ _ _ _ Optional

» PLN (evaporator, tank and pump)

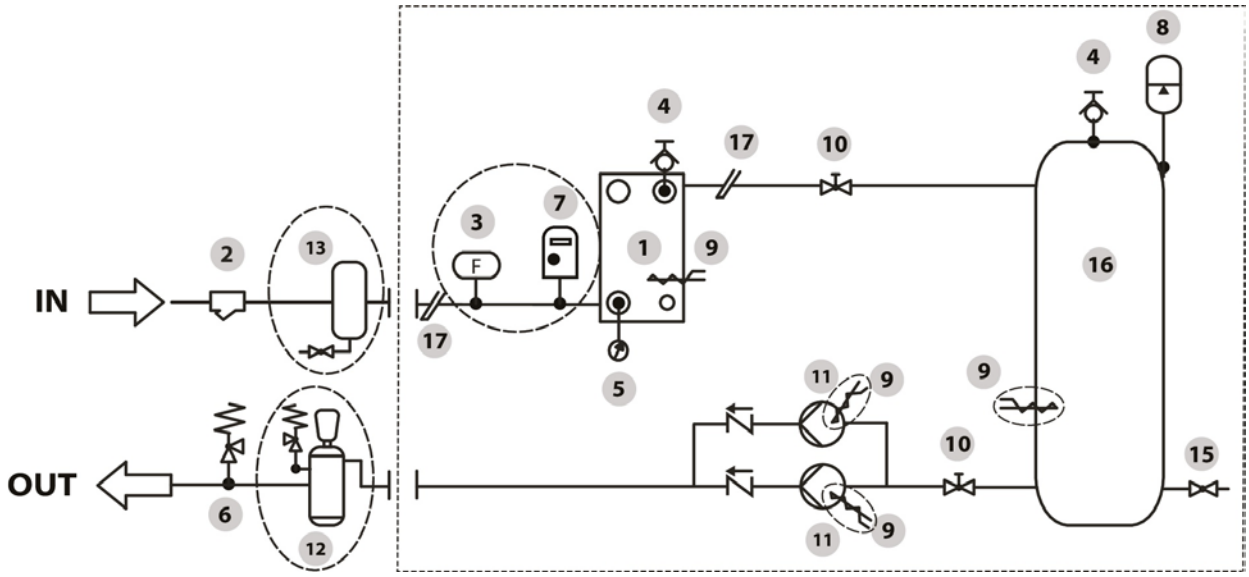


LEGEND

1 Evaporator
2 Water filter (included)
3 Flow switch
4 Air purge valve
5 Pressure gauge
6 Safety valve (supplied)
7 Heating capacity meter
8 Expansion tank
9 Antifreeze electric heating
10 Cut-off valve
11 Hydraulic pump
12 Deaerator
13 Dirt separator for the water system (supplide loose)
14 -
15 Drain
16 Tank
17 Probe holder

------ Internal and external borderline
_ _ _ _ Optional

» PLN (evaporator, tank and 2 pumps)



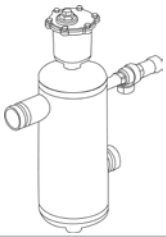
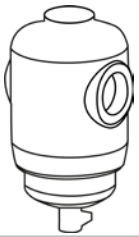
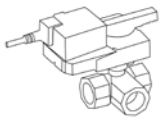
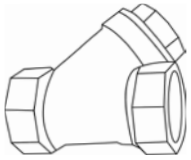
LEGEND

1 Evaporator
2 Water filter (included)
3 Flow switch
4 Air purge valve
5 Pressure gauge
6 Safety valve (supplied)
7 Heating capacity meter
8 Expansion tank
9 Antifreeze electric heating
10 Cut-off valve
11 Hydraulic pump
12 Deaerator
13 Dirt separator for the water system (supplide loose)
14 -
15 Drain
16 Tank
17 Probe holder

------ Internal and external borderline
_ _ _ _ Optional

10.4 MAIN WATER CIRCUIT DEVICES

1. Deaerator with safety valve
2. Dirt separator for the water system (supplide loose)
3. 3-way valve
4. Y-shaped filter
5. Safety valve

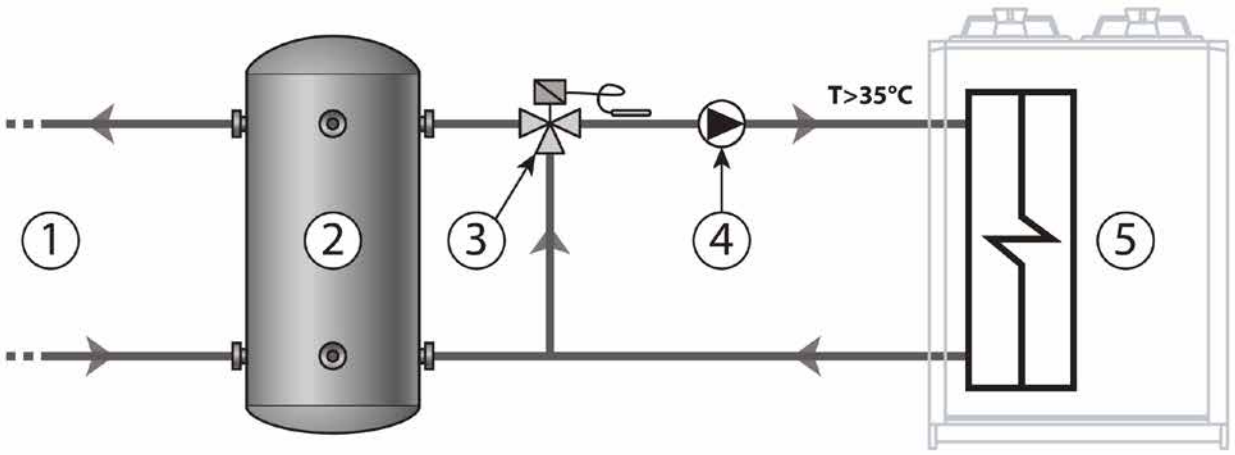
Deaerator with safety valve	Insulated sludge remover	Uninsulated sludge remover	3-way valve	Y-shaped filter	Safety valve
					
The unit must be installed vertically and adequately protected from weather and cold temperatures by means of insulation and obstructions of various kinds. Use the connections provided. Refer to the hydraulic diagrams for positioning the device.	The unit must be installed vertically and adequately protected from cold temperatures by means of insulation. Use the connections provided. Refer to the hydraulic diagrams for positioning the device . Regularly drain the accumulated sludge from the bottom of the sludge remover using the special connection at the bottom. (Use only if liquid temperature is positive)		Protect the actuator from the weather in accordance with the manufacturer's instructions.	Refer to the hydraulic diagrams for positioning the device.	Install on the delivery branch if you decide not to configure the deaerator, but to purchase it separately from a third party (not recommended).

10.5 DE-SUPERHEATER

10.5.1 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°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.

»



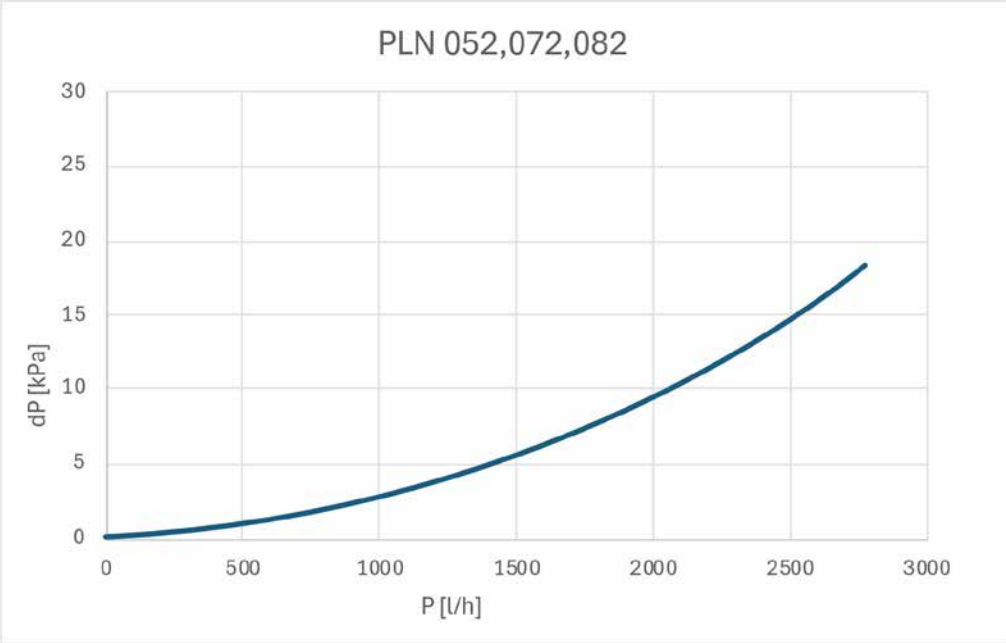
1 Utility side
2 Buffer tank
3 Mixing valve
4 Circulation pump
5 On-board desuperheater

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.

10.5.2 Water pressure drop

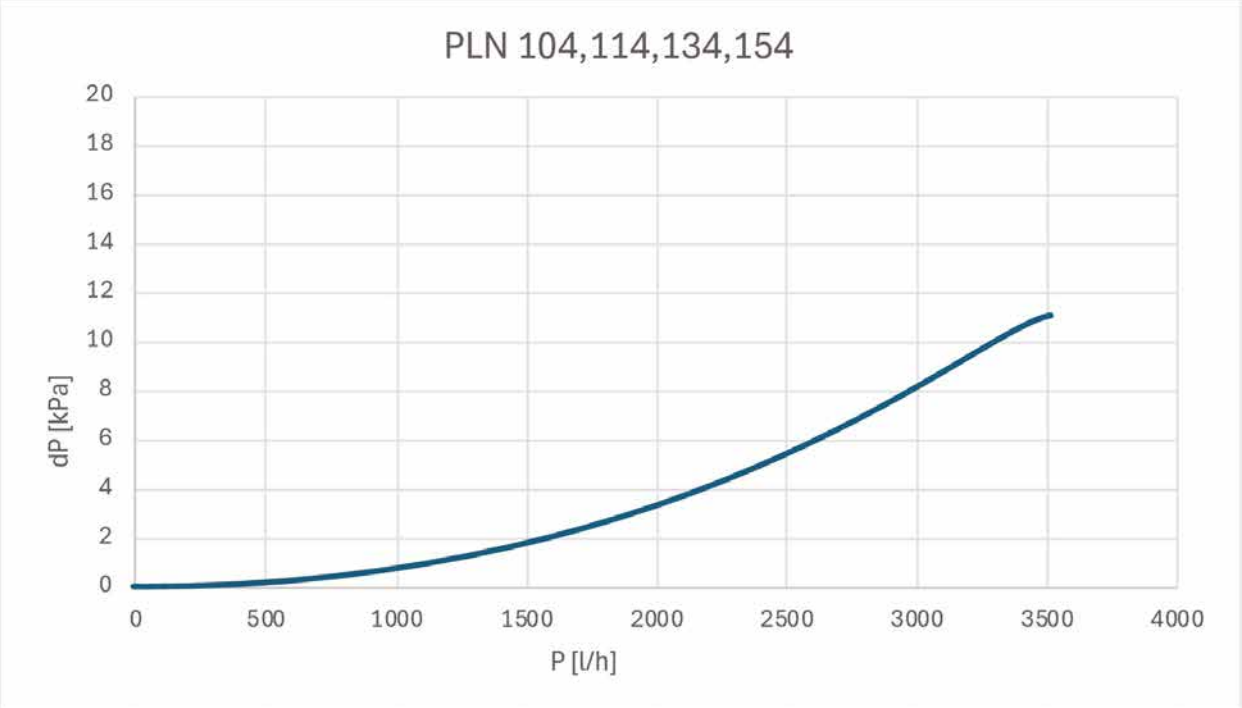
PLN	052	072	082	104	114	134	154
De-superheater type	B3-026 18H						

» PLN 052-072-082



- dP[kPa]: Water pressure drop
- P[l/h]: Water flow

» PLN 104-114-134-154



- dP[kPa]: Water pressure drop
- P[l/h]: Water flow

10.5.3 Heating capacities

» De-Superheather heating capacities

PLN			052	072	082	104	114	134	154
De-superheater heating capacity	(1)	kW	7,40	8,50	10,8	16,4	17,5	18,1	20,5
De-superheater water flow	(1)	l/h	1273	1462	1858	2821	3010	3113	3526

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

10.5.4 Heating capacities corrective factors

» De-Superheather heating capacities corrective factors

Tair/Twater	40/45	50/55	55/65
25	0,66	Y	Y
30	0,88	0,48	0,37
35	1,00	0,65	0,50
40	1,27	0,89	0,70
45	X	1,15	0,78

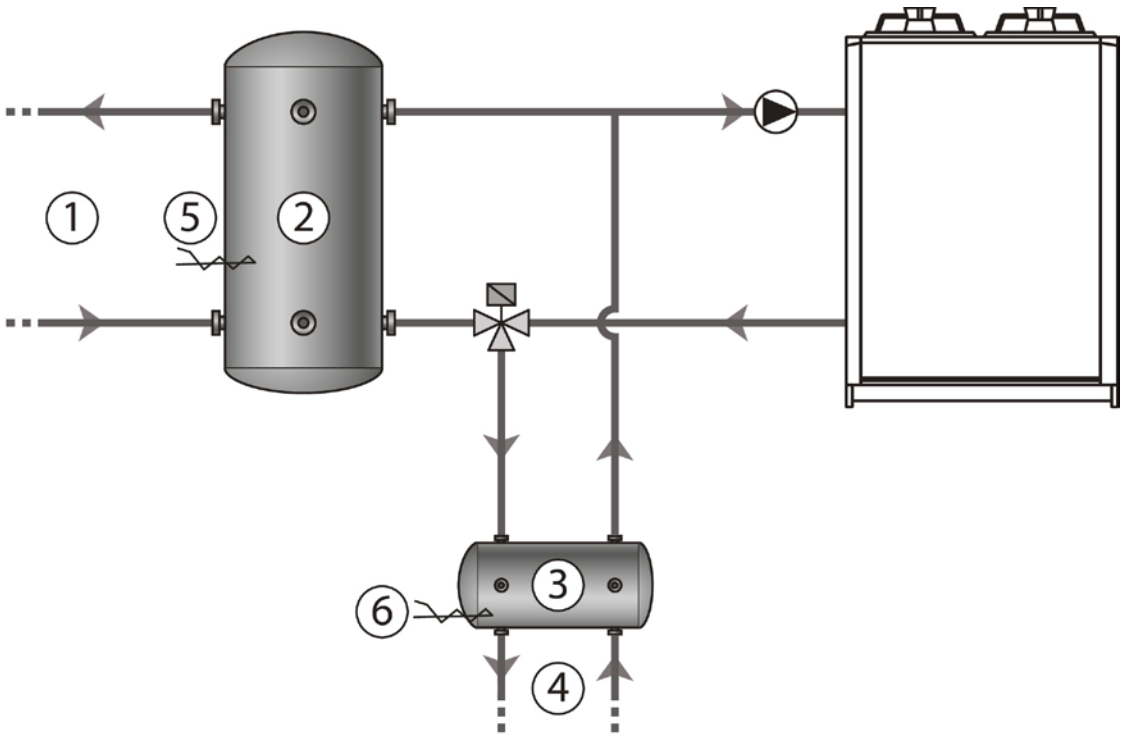
WARNING: Operation within the "X" boxes is not allowed, nor is operation outside the desuperheater outlet water temperature range of 45°C–65°C. Failure to comply with this requirement may cause gas condensation inside the desuperheater, potentially resulting in damage to the unit.

WARNING: Operation within the "Y" boxes is allowed, but the recoverable power is less than 5% of the unit's nominal cooling capacity. If operation outside these ranges is required, please contact Galletti S.p.A. for customized solutions.

10.6 SYSTEM DIAGRAM WITH DHW 3-WAY VALVE

If the DHW 3-way valve option is chosen, the positioning and number of supplementary heating elements must be decided.
The following diagram shows the correct and most complete installation in the case of a 3-way valve configuration on the water side.
The presence of the 3-way valve also makes it possible to control the supplementary heating elements (if present) to compensate for low air temperatures that may prevent the set-point from being reached.
In the case of dual-utility units of the reversible type (heat pumps with DHW 3-way valve or 2-pipe multi-purpose units), it is possible to configure where the function is to be performed, choosing between utility only (UT1), DHW recovery (UT2) or both (UT1 and UT2), depending on the variant configured.

— UT1 if VARIANT "N" is configured
— UT2 if VARIANT "1" is configured

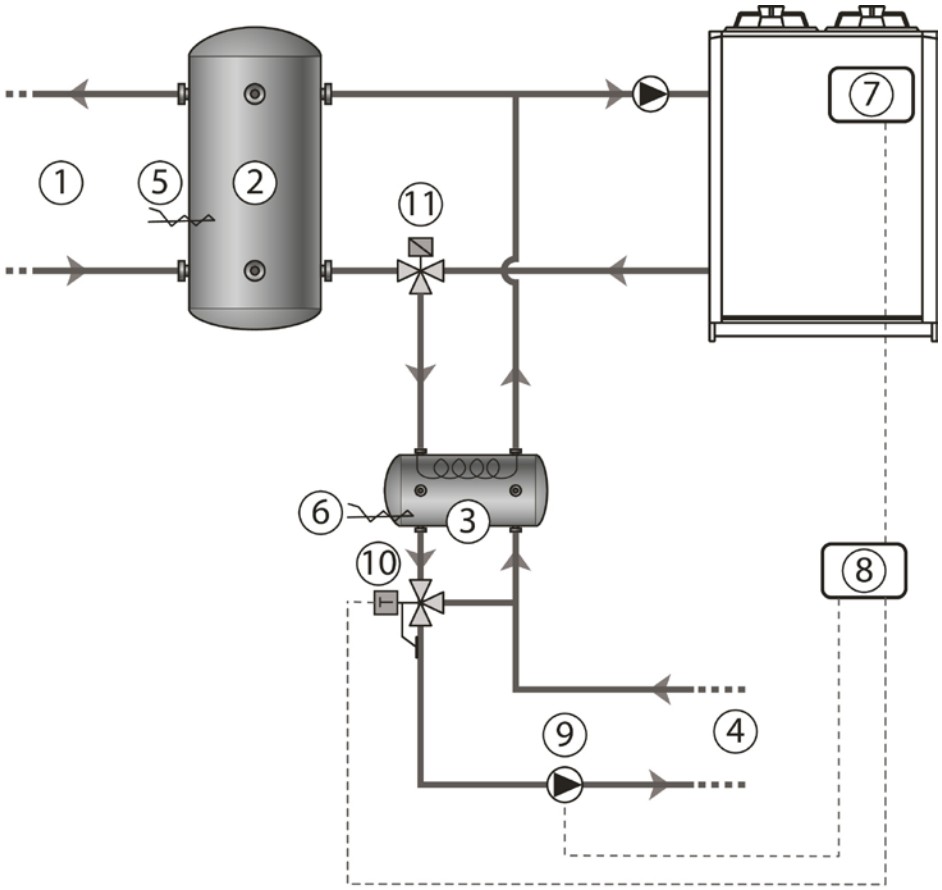


1 Main utility side (UT1)
2 Main utility buffer tank (UT1)
3 DHW buffer tank (UT2)
4 DHW side (UT2)
5 Main utility supplementary heating element (UT1)
6 DHW supplementary heating element (UT2)

The software can manage the enabling signal of a maximum of 2 supplementary heating elements.

10.7 HYDRAULIC DIAGRAM WITH ANTI-LEGIONELLA

On the PLN range, anti-legionella control can be used if option 1 field 15 is configured.
In order to use the anti-legionella cycle correctly, the following recommended procedure must be followed:



1 Main utility side (UT1)
2 Main utility buffer tank (UT1)
3 DHW buffer tank (UT2)
4 DHW side (UT2)
5 Main utility supplementary heating element (UT1)
6 DHW supplementary heating element (UT2)
7 Unit electrical control board
8 Utility electrical control board
9 DHW recirculation pump
10 DHW thermostatic mixing valve (hybrid mixer with digital controller recommended)
11 DHW 3-way valve

The cycle is activated by default every 24 hours (can be set minimum every 24 hours, maximum 72 hours). It is advisable to keep the frequency the same as the factory setting, i.e. 24 hours, by bringing the water into the tank at a temperature of 65°C for a period of 30 minutes.
The installer must also use the digital output available on the controller to manage the activation of the DHW recirculation pump and at the same time bypass the thermostatic mixing valve so that all the hot water from the tank can enter the system to eliminate any bacterial load that may be present.

⚠ **WARNING:** The system designer must bear in mind that following the above indications may result in the supply of water at a temperature that could cause minor burns and must therefore take steps to limit the risk.

— If the unit is disconnected, the anti-legionella cycle function is not available and there is a real risk of bacterial proliferation in the DHW tank.
— If the unit is switched OFF for more than 24 hours, it will start an anti-legionella cycle the next time it is switched on.
— When the unit is in standby mode because the setpoint has been reached, it activates the anti-legionella cycle normally and when required by the controller.

11 INSTALLATION SITE FEATURES

The units of the PLN range are designed for outdoor installation, in a context where the natural dilution of the refrigerant that could escape as the result of a leak guarantees a degree of safety. Each installation site must provide a safe area around the unit with the following characteristics.
Inside the safety zone there must be no:

- Possible accumulations (manholes, storm drains or recesses) or pathways through which the refrigerant can flow into a building or to an accumulation point or other dangerous access points (fresh air inlets for air conditioning or ventilation systems).
- Sources of ignition (open flames, electric motors, sparking sources, boiler drain pipes);
- Electronic devices (cell phones, radios, PCs, tablets);
- Electrical components without AtEx certification for Group IIA gas according to IEC 60079-15;
- Surfaces whose temperature can exceed the auto-ignition temperature of propane (450°C) minus 100 K;
- Large non-conductive surfaces (polymer panels, tarpaulins) that can accumulate static electricity.

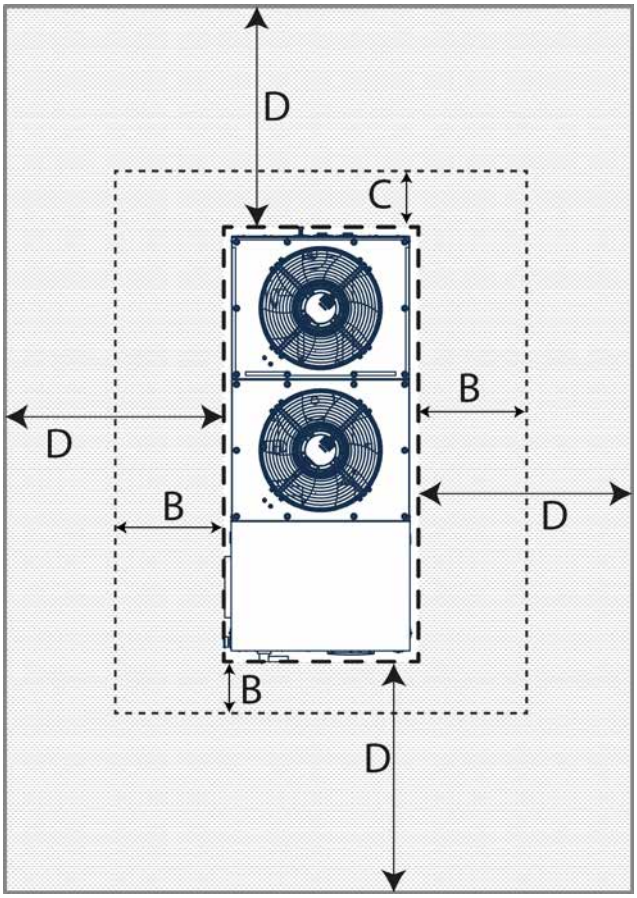
⚠ **WARNING:** The above list is only indicative of the most common conditions that may occur if installation is incorrect. The list is not exhaustive. For more information on this list, see Annex K of EN 378-2 (which refers to EN 1127).

⚠ **WARNING:** If it is not possible to comply with EN 378-2 and EN 378-3, a specific risk analysis must be carried out to identify countermeasures to eliminate the risk of fire/explosion in the event of a refrigerant leak.

⚠ **WARNING:** It is important to remember that the devices for venting air from the water circuit (safety valves, automatic/manual deaerators and sludge removers, air vent valves) must also follow the same positioning principles as the unit. It is therefore recommended that they be installed close to the unit in order to optimise and centralise the danger zone. In any case, the above components must be installed outside the occupied zone in accordance with UNI EN 378-1.

The safety zone defined above is equal to the area formed by the projection of the unit itself on the supporting surface plus the area formed by offsetting the perimeter of the unit by a distance "D" which varies depending on the refrigerant charge contained in the unit.

» Safety zone



B Area required for maintenance operations 1.5 m
C Area required for maintenance operations 1 m
D Safety zone (see table)

» PLN C - Distance value 'D': safety zone assigned to each unit

Model	D (m)
PLN052C	2,5
PLN072C	3
PLN082C	3
PLN104C	2,5
PLN114C	2,5
PLN134C	2,5
PLN154C	2,5

» PLN P - Distance value 'D': safety zone assigned to each unit

Model	D (m)
PLN052H	3
PLN072H	3,5
PLN082H	3,5
PLN104H	3
PLN114H	3,5
PLN134H	3,5
PLN154H	3,5

⚠ **WARNING:** In any case, the requirements listed above not be understood as a derogation from carrying out a risk analysis and detailed design pursuant to the requirements of standard EN378 (or other local regulations in force, in relation to machine rooms for units containing A3 fluids). Avoid installing the units in locations that could be dangerous during placement, start-up, operation, and maintenance operations, such as areas without adequate protection against falls, areas with obstacles that create a danger of tripping or falling, and areas with buffer spaces that are not compliant with the documentation.

12 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 obstacoles 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.
- In the design of the unit, 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.
- If even only one of the above conditions is not fulfilled, please contact the manufacturer to check for feasibility.

⚠ **WARNING** During installation adjust the vibration damping couplings in order to make sure it is installed in a perfectly level position.

12.1 CONDENSATE DISCHARGE FROM UNIT

During normal operation of the unit as a heat pump, condensate is produced due to the dehumidification of the air in contact with the finned block heat exchanger.
In order to hold the condensate that the unit normally produces during operation in winter mode (and during defrosting), it is advisable to prepare a technical tank below the base of the unit, with sufficient capacity to collect and discharge the water produced. The adoption of a drip tray may be mandatory (check the local legislation in force) in case of the use of glycol or additives such as ethylene glycol that cannot be released into the environment in case of possible leakage of the circuit. The installer is responsible for the construction of such a drip tray.
It is necessary to consider the drip tray installation as a hypothetical area of refrigerant accumulation and stagnation in the event of a leak. Therefore, a specific risk analysis must be carried out.

13 SITING AND DAMPERS

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

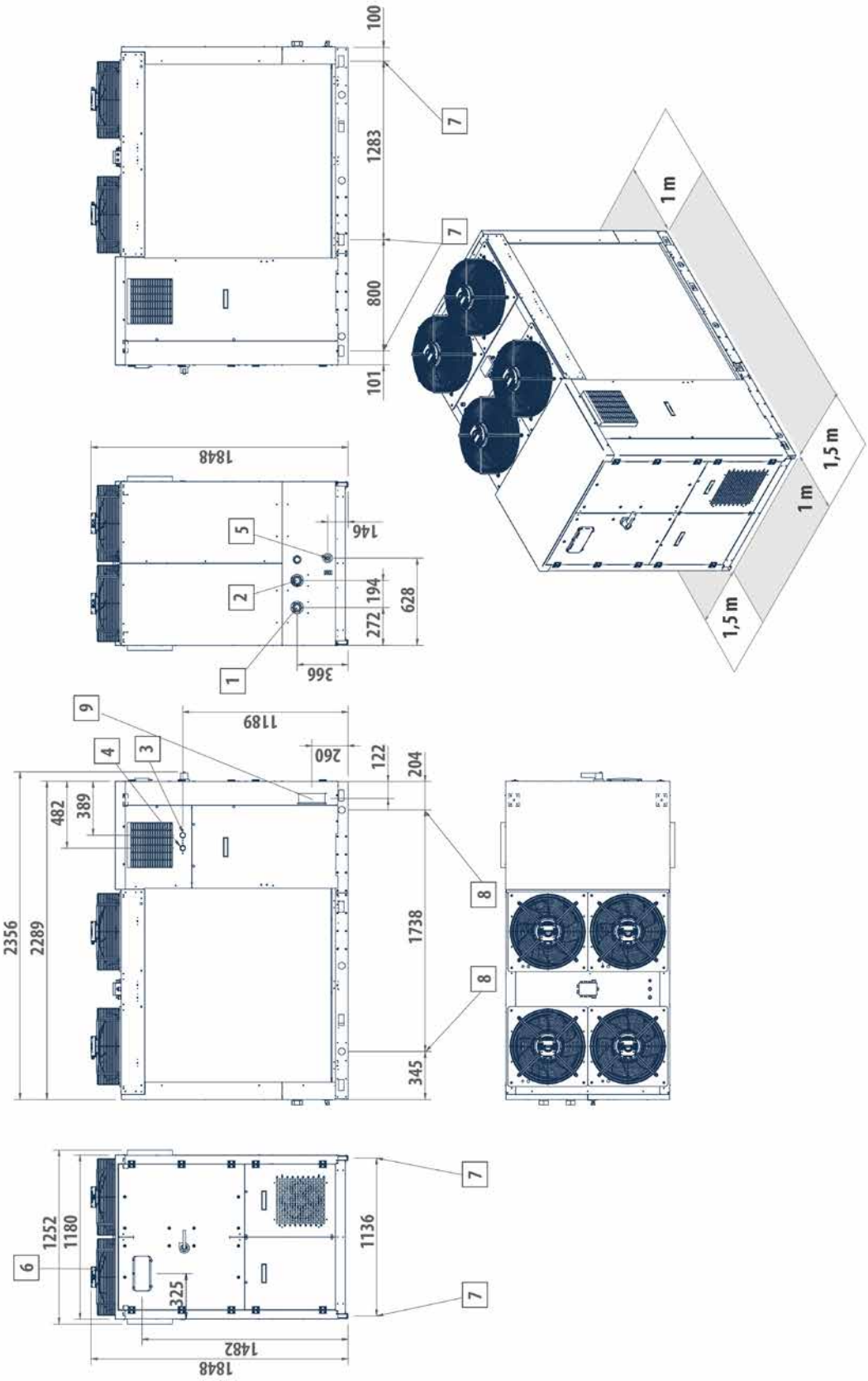
- Size and origin of water pipes;
- Location of the power supply;
- Solidity of the supporting surface;
- Avoid obstacles to the outflow of air from the fan which could cause back suction (see section on 14 p. 31);
- Direction of prevalent winds: (position the unit so as to prevent prevalent winds from 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 14 p. 31).

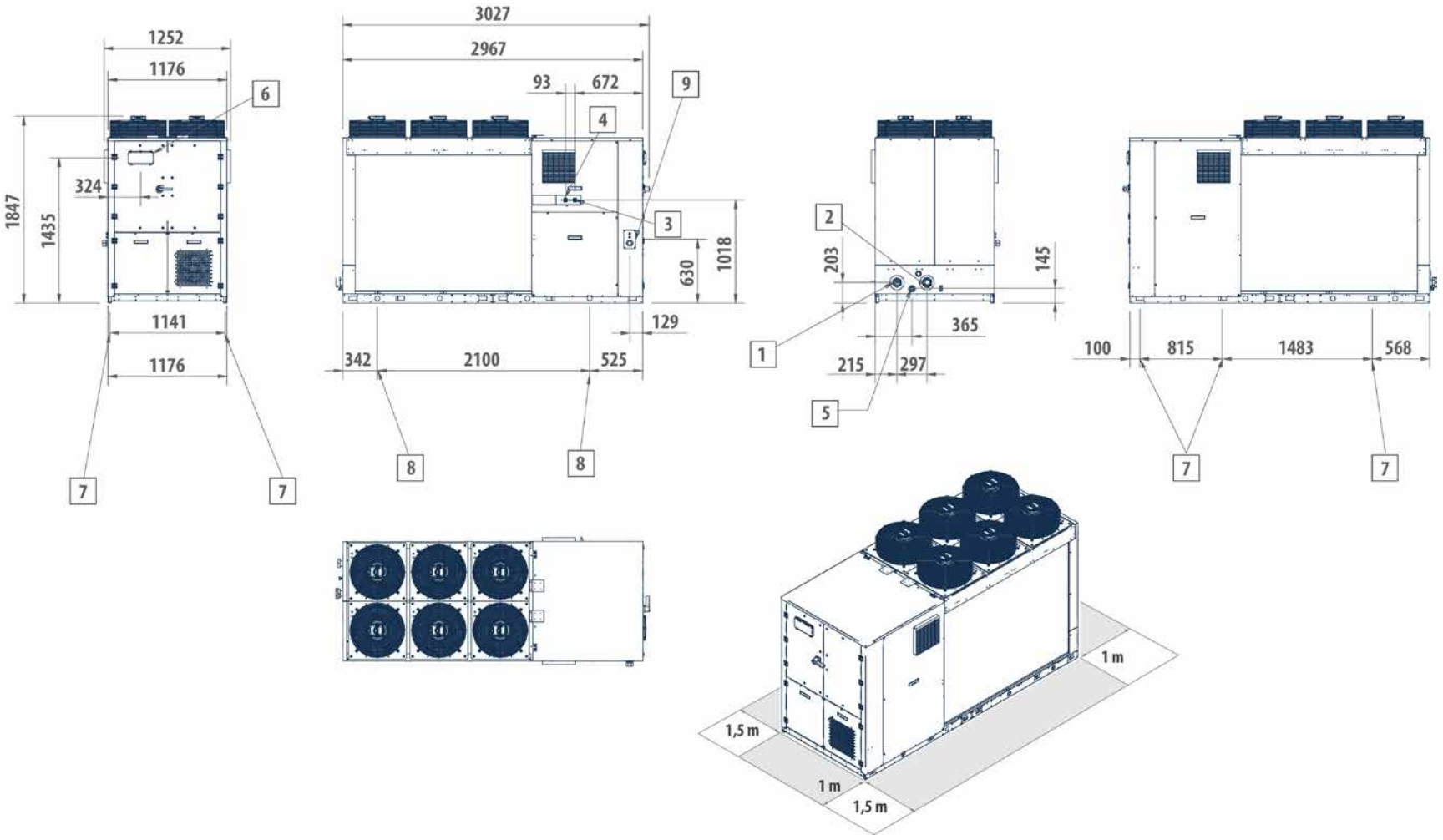
For installation and anti-vibration characteristics (optional), refer to manual RG66013698 supplied.

PLN	N° DAMPERS
F1	6
F2	6
F3	6
F4	6

14 DIMENSIONS

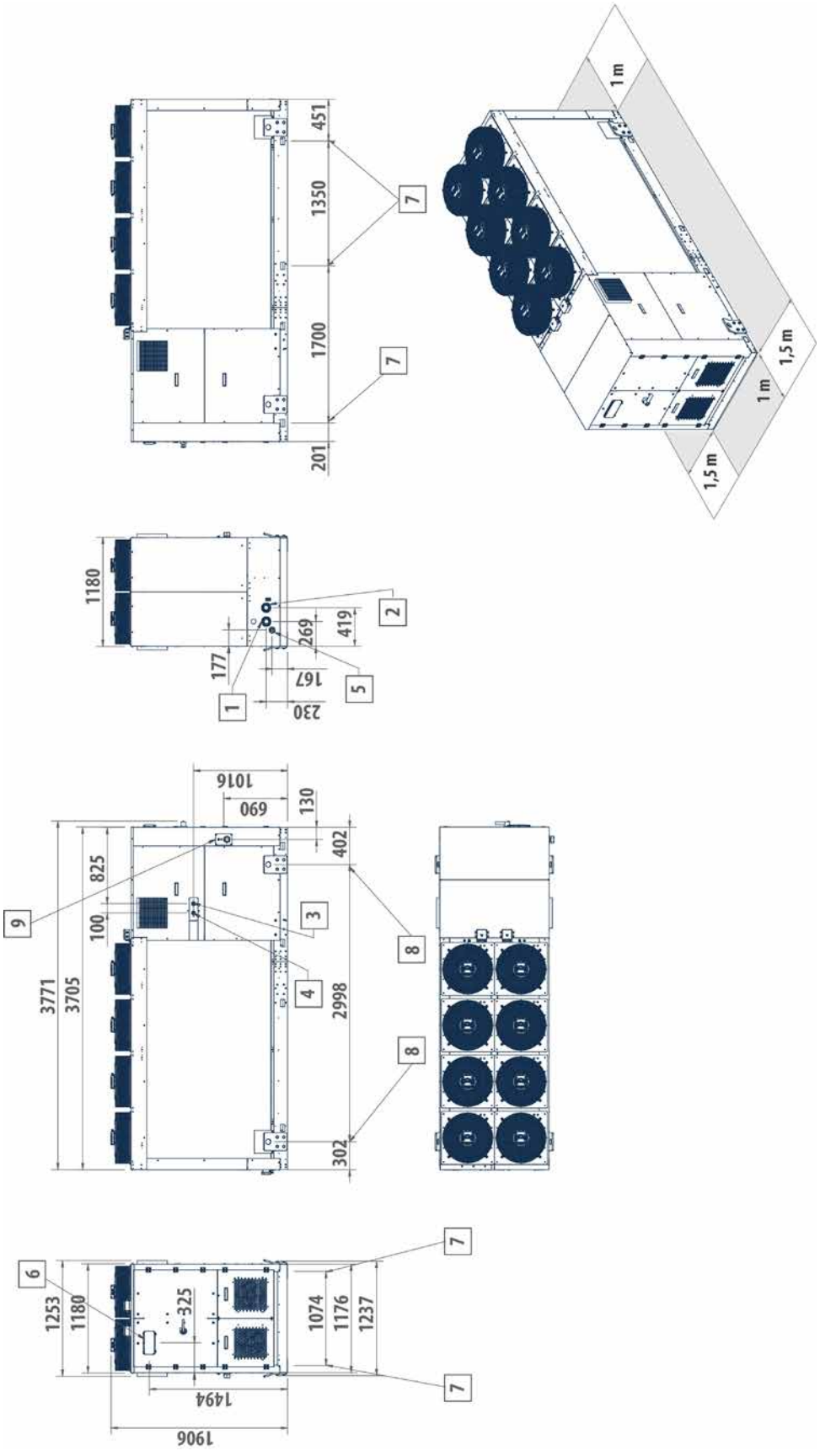
» PLN 052





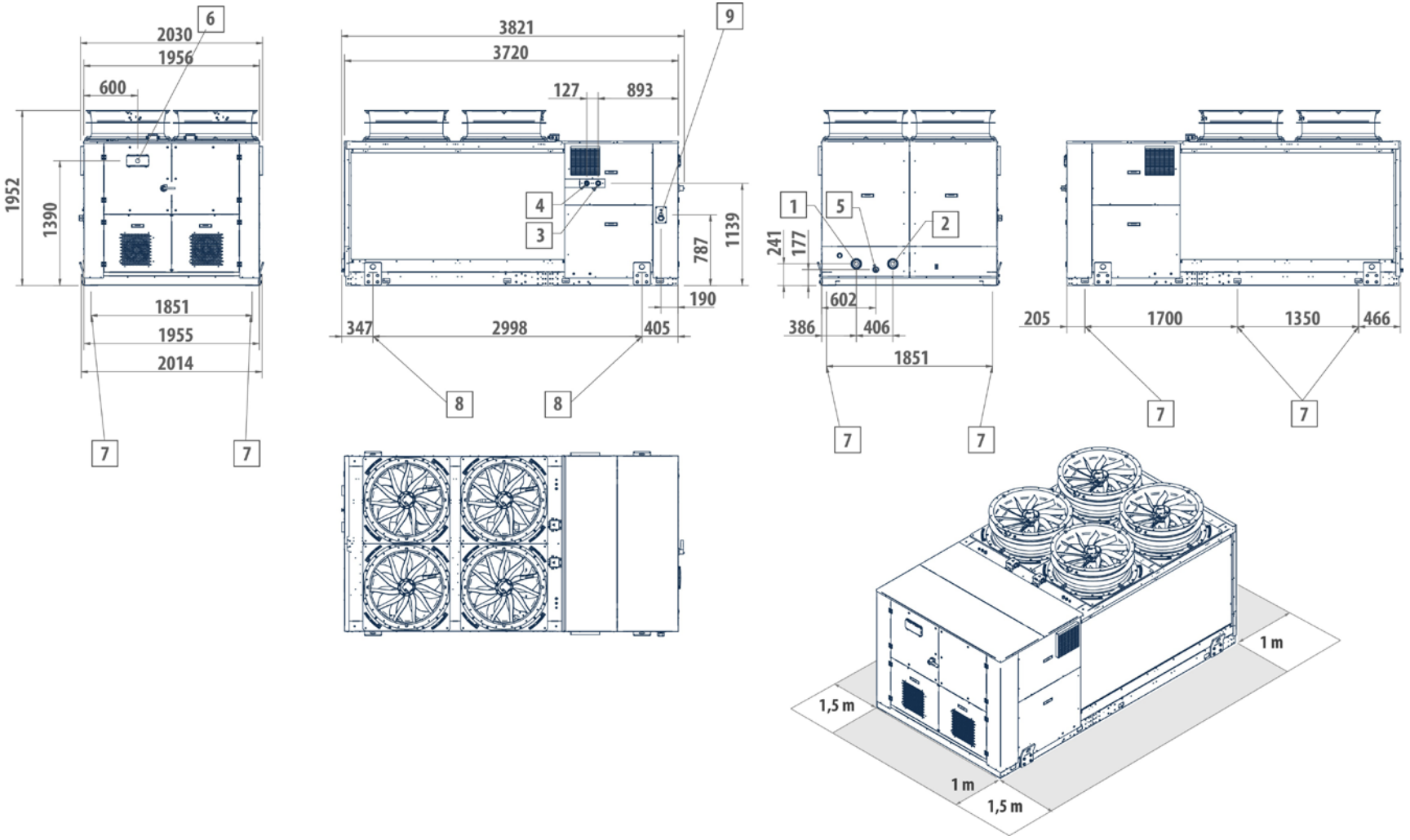
Legend

1 Water inlet on user side 2" 1/2 F
2 Water outlet user 2" 1/2 F
3 Desuperheater water inlet 1" F
4 De-superheater water outlet 1" F
5 Water drainage 1/2" F
6 User interface
7 Vibration dampers
8 Lifting points
9 Power supply input



Legend

1 Water inlet on user side 2" 1/2 F
2 Water outlet user 2" 1/2 F
3 Desuperheater water inlet 1" F
4 De-superheater water outlet 1" F
5 Water drainage 1/2" F
6 User interface
7 Vibration dampers
8 Lifting points
9 Power supply input

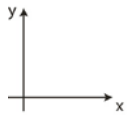


Legend

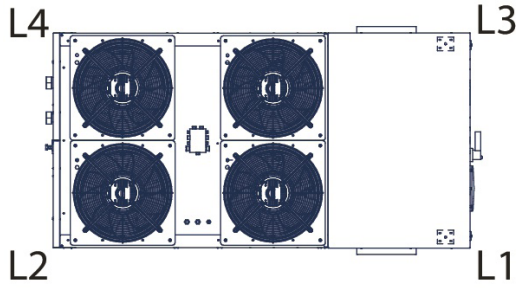
1 Water inlet on user side 3'' VIC
2 Water outlet user 3" VIC
3 Desuperheater water inlet 1'' 1/2 F
4 De-superheater water outlet 1'' 1/2 F
5 Water drainage 1/2" F
6 User interface
7 Vibration dampers
8 Lifting points
9 Power supply input

15 WEIGHTS

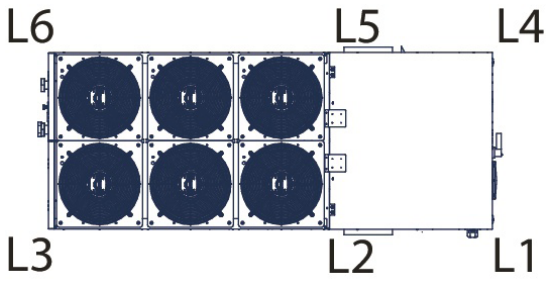
This drawing shows the points of the machine for which weights have been calculated, with respect to the basic chiller and heat pump model. The weights are shown in the tables below.



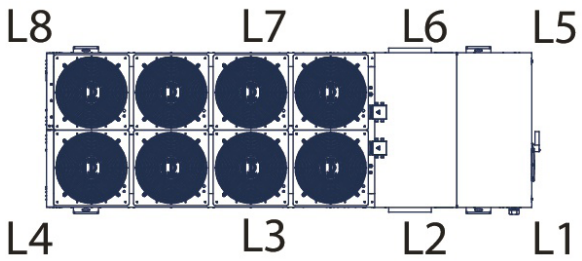
» PLN F1



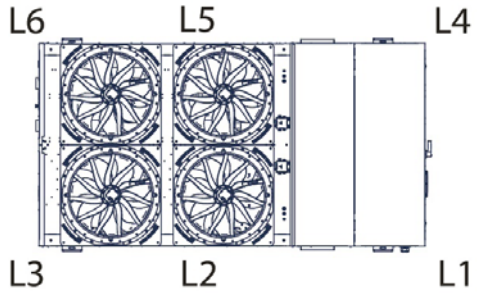
» PLN F2



» PLN F3



» PLN F4



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

Frame		1	2		3		4	
PLN C		052	072	082	104	114	134	154
Xb	mm	629	572	572	332	329	1027	1027
Yb	mm	1288	1485	1485	1350	1328	1819	1819

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

Frame		1	2		3		4	
PLN H		052	072	082	104	114	134	154
Xb	mm	621	633	631	331	327	1034	1026
Yb	mm	977	1377	1376	1295	1217	1723	1741

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

Frame		1	2		3		4	
PLN C		052	072	082	104	114	134	154
Xb	mm	656	613	613	653	648	1141	1141
Yb	mm	1183	1465	1465	1740	1720	1976	1975

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

Frame		1	2		3		4	
PLN H		052	072	082	104	114	134	154
Xb	mm	653	657	656	655	649	1148	1138
Yb	mm	955	1391	1390	1695	1630	1914	1919

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		4	
PLN C		052	072	082	104	114	134	154
L1	kg	139	91	91	143	150	264	264
L2	kg	204	136	136	160	163	273	273
L3	kg	166	218	218	170	171	279	279
L4	kg	231	83	83	192	188	287	287
L5	kg	-	128	128	160	164	295	295
L6	kg	-	210	210	177	177	302	302
L7	kg	-	-	-	188	185	-	-
L8	kg	-	-	-	210	202	-	-
Total	kg	740	865	865	1400	1400	1700	1700

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

Frame		1	2		3		4	
PLN C		052	072	082	104	114	134	154
L1	kg	212	120	120	178	185	278	279
L2	kg	237	182	182	195	199	364	365
L3	kg	274	294	294	206	207	432	432
L4	kg	299	140	140	228	224	417	418
L5	kg	-	201	201	220	224	503	504
L6	kg	-	313	313	238	237	571	571
L7	kg	-	-	-	248	245	-	-
L8	kg	-	-	-	271	263	-	-
Total	kg	1022	1250	1250	1785	1785	2567	2569

» Operating weight H version without hydraulic options

Frame		1	2		3		4	
PLN H		052	072	082	104	114	134	154
L1	kg	186	85	87	142	168	280	292
L2	kg	122	113	115	150	165	259	276
L3	kg	206	165	167	155	163	243	263
L4	kg	141	106	107	165	158	305	314
L5	kg	-	135	136	158	182	285	298
L6	kg	-	186	188	167	178	268	286
L7	kg	-	-	-	172	176	-	-
L8	kg	-	-	-	182	171	-	-
Total	kg	655	790	800	1290	1360	1640	1730

» Operating weight H version with pump and full buffer tank

Frame		1	2		3		4	
PLN H		052	072	082	104	114	134	154
L1	kg	260	115	117	178	205	296	309
L2	kg	156	160	162	186	201	352	369
L3	kg	314	241	243	191	199	396	416
L4	kg	210	163	164	201	194	438	447
L5	kg	-	208	209	219	243	494	508
L6	kg	-	289	291	227	239	538	555
L7	kg	-	-	-	232	237	-	-
L8	kg	-	-	-	243	232	-	-
Total	kg	940	1176	1186	1678	1751	2514	2604

16 ELECTRICAL DATA

» Electrical data PLN C/H

PLN		052	072	082	104	114	134	154
Power supply	V-ph-Hz	400 / 3+N / 50						
Auxiliary power supply	V-ph-Hz	230-1-50						
Maximum current absorption	A	67,0	77,0	84,0	129	137	152	157
Start up current	A	187	240	247	249	264	315	320
Startup current with soft starter	A	143	181	188	205	217	256	261
Safety fuse F	A	80	100	100	160	160	160	160
Circuit breaker IL	A	80	100	100	160	160	160	160
Power supply cable type		5G16	5G25	5G25	3x(1x70)+N35+PE35	3x(1x70)+N35+PE35	3x(1x70)+N35+PE35	3x(1x70)+N35+PE35
Fuses type		aM						

- 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).

All operations must be performed by qualified service personnel in accordance with current laws and regulations. For any electrical work on the unit, refer to the electric diagrams supplied with the unit. It is recommended to make sure that:

— The characteristics of the mains power supply are adequate for the electrical inputs specified in the table of electrical data.
— Check that the mains electricity supply is compatible with the specifications (voltage, number of phases, frequency) shown on the unit rating plate.
— The supply voltage must not vary by more than ±5% from the rated value. Electrical connections must be made in accordance with the wiring diagram provided with the unit and current regulations.

⚠ **IMPORTANT:** Before performing any work on electrical parts, make sure the power supply is disconnected. In particular, the electrical control board of the unit has a part of the circuit that is live even when the door is open and the main switch is off, protected by a Plexiglas barrier and identified by special adhesive labels with the warning "Warning: circuits are live even if the door is open". In the event of maintenance of the section concerned, it is the responsibility of the maintenance technician to disconnect the power supply line upstream of the customer's electrical control board and to affix special safety signs to prevent accidental energising, bearing in mind that when the line is disconnected, no safety devices are active.

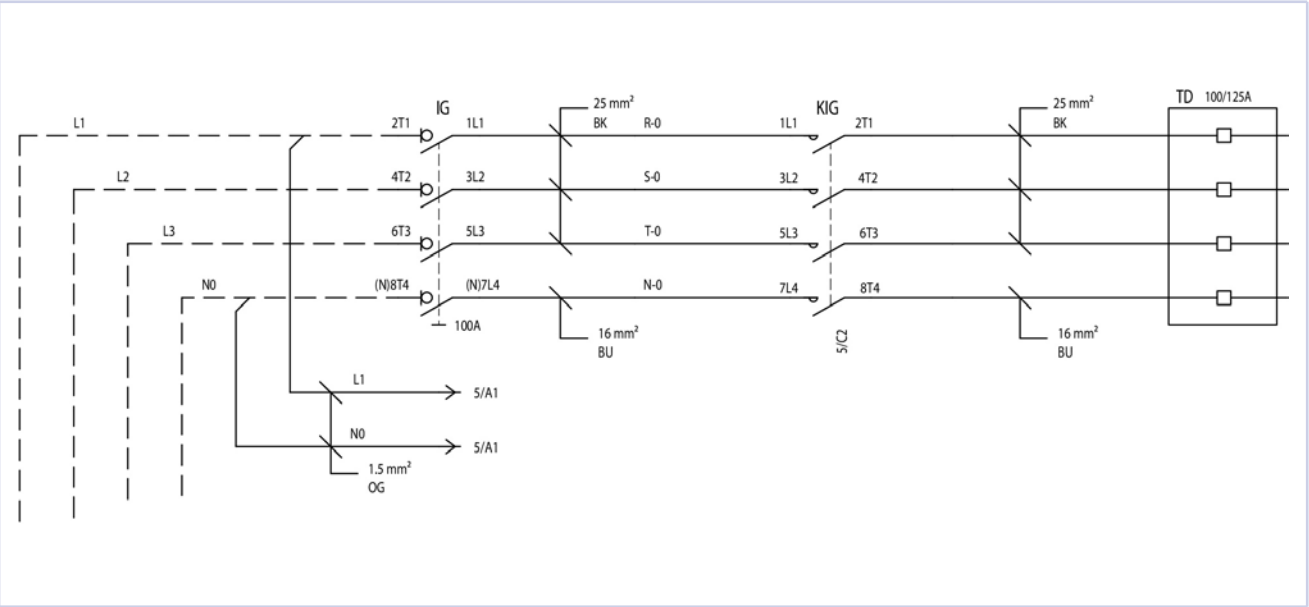
⚠ **WARNING:** do not attempt to modify the internal electrical connections; this will void the warranty.

In the customer's electrical control board, it is mandatory to use a thermomagnetic circuit breaker in accordance with standard EN/IEC60898-1 (contact gap of at least 3 mm), with adequate breaking capacity and differential protection in accordance with the tables in section 16 Electrical data.
For the unit power supply line use FG16(O)R16-type HEPR cables with the cross-section indicated in the tables in section 16 Electrical data. Use cable ducts and conduits suitable for outdoor installation to route the cables.
Tighten the wires firmly to the terminal board and secure the wires with cable glands.

An earth connection is mandatory: connect the earthing wire to the terminal provided on the electric control board (see the electric control board layout supplied with the unit), marked ⏚.
If you wish to include:
— A remote on/off switch,
— A remote switch for changing over between the cooling and heating mode.

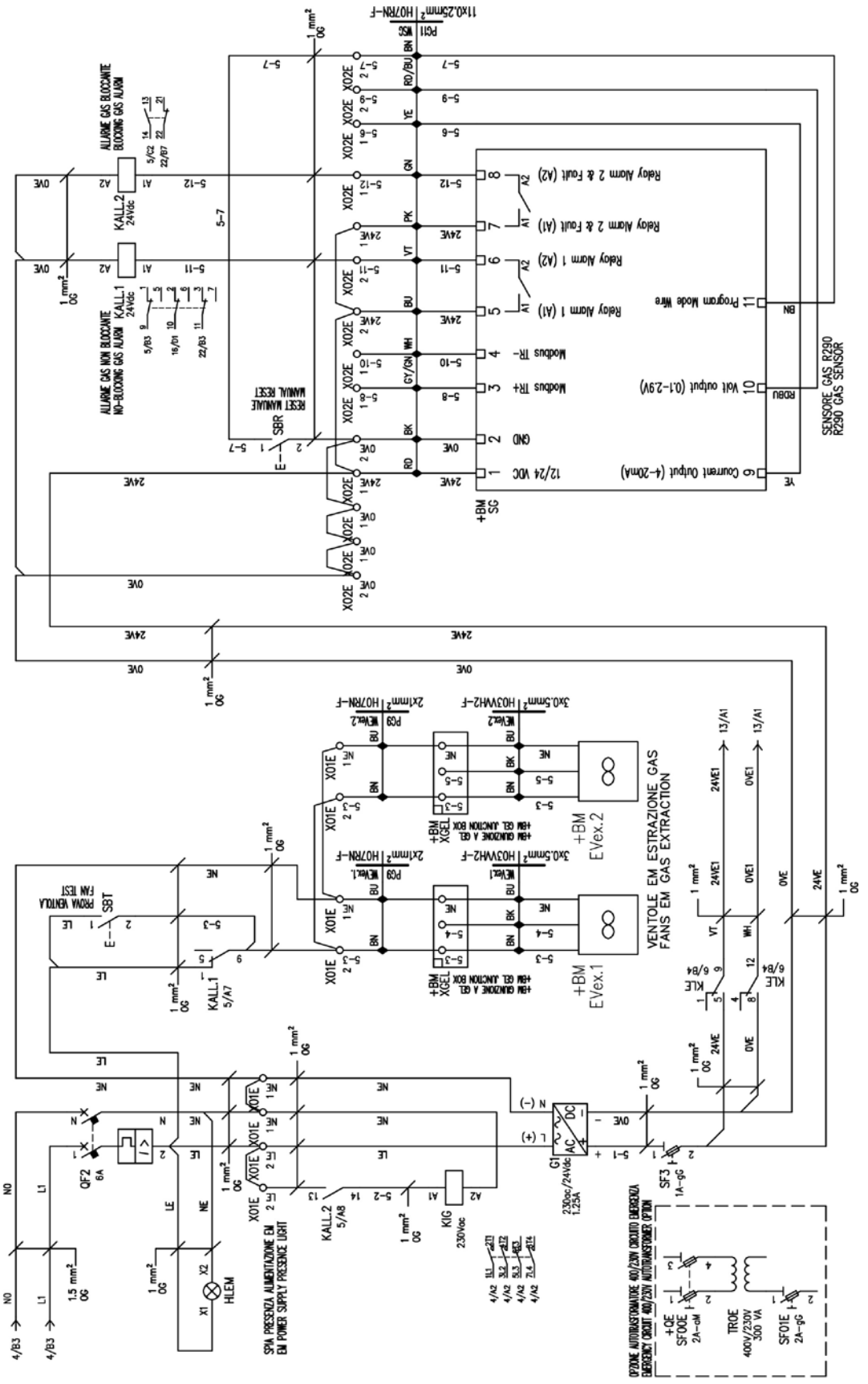
It is a good idea to do so at this stage of the installation procedure, by connecting the switches or PCDS remote control (accessory) to the electric control board terminals as directed in section 16 Electrical data and using the unit wiring diagram as your reference.
The PLN units are equipped with a control board with a special section protected by a Plexiglas barrier and identified by special adhesive labels with the warning "live even if the door is open", even if the main switch of the control board is in the OFF position and the door is open.
The wiring of the power supply to the unit's control board is the responsibility of the installer. The branch circuit upstream of the main switch ensures that the propane gas detector control unit and the ATEX extractor fan control unit are always supplied with power, so that they remain operational even when the unit's control board is switched off. In this manner it is always possible to check whether or not there is a gas leak.
The electrical control board of the PLN units is provided with a 3F+N or only 3F normal power supply to supply power to the electrical equipment for normal operation of the unit. Inside it,

and in front of the main switch (which cuts off the power to all ordinary electrical equipment downstream when the electrical control board is switched off), there is a single-phase branch that cannot be disconnected (unless a circuit breaker is installed) to supply power to all the safety devices (extractor fan and leak detector sensor).



The electrical control board of the units is physically separated from the technical compartment containing the refrigerant circuit, except for the passage of cables, which is achieved by means of standard cable glands.
This precaution has been taken to avoid an open passage between the technical compartment containing the piping and the live electrical control board in the event of a refrigerant leak.

» Sensor wiring diagram



17 SG READY CERTIFICATION

All units in the range can be configured for smart grid integration/interface. Two 24V AC digital inputs are used to manage 4 different operating logics in accordance with the SG Ready (Smart Heat Pumps) regulation issued by the Federal Heat Pump Association (BWP).

The activation/deactivation of the two digital inputs, hereafter referred to as SG1 and SG2, (also indicated on the unit's wiring diagram and in the MIUM supplied as standard) results in the following 4 different modes of unit behaviour:

Mod.	SG1	SG2	Name	Description
F1	1	0	LOCK	When the unit receives this combination of digital inputs (1,0) (whose external signal remains active for at least 10 minutes according to the SG Ready guidelines), the unit is forced into a forced OFF state. This state must not last longer than 2 hours. The forced BLOCK state remains active for at least 10 minutes after it is activated. Activation of this mode must not exceed 3 activations per day.
F2	0	0	FREE	In this mode (0,0) the unit is free and no restrictions apply.
F3	0	1	RECOMMENDED INCREASE	Upon activation of the combination (0,1) (whose signal remains active for at least 10 minutes according to the SG ready guidelines), several actions can be performed depending on the initial state of the unit: • If the unit is in the OFF state, it will remain in the OFF state. • When the unit is in standby, it is switched ON and the set-point value is increased in order to produce hotter water according to the operating mode, i.e. to increase the load and thus the power input from the mains. • When the unit is already ON, it will remain ON and the set-point value will be increased in order to produce hotter water according to the operating mode, i.e. to increase the load and thus the power input from the mains. The RECOMMENDED INCREASE state remains active for at least 10 minutes after it is activated. The user is free to return the unit to the OFF state. Therefore, this mode is not mandatory.
F4	1	1	POWER ON MANDATORY	Upon activation of the combination (1,1) (whose signal remains active for at least 10 minutes according to the SG ready guidelines), several actions can be performed depending on the initial state of the unit: • When the unit is in the OFF state, it is placed in forced ON and the set-point value is increased in order to produce hotter water according to the operating mode, i.e. to increase the load and thus the power input from the mains. • When the unit is in standby, it is switched ON and the set-point value is increased in order to produce hotter water according to the operating mode, i.e. to increase the load and thus the power input from the mains. • When the unit is already ON, it will remain ON and the set-point value will be increased in order to produce hotter water according to the operating mode, i.e. to increase the load and thus the power input from the mains. In this mode it is also possible to control supplementary heating elements (where present) to further increase the power demand. These heating elements will remain active until the set-point increased by the current function is reached. In the case of dual-utility units of the reversible type (heat pumps with DHW 3-way valve or 2-pipe multi-purpose units), it is possible to configure where the function is to be performed, choosing between utility only (UT1), DHW recovery (UT2) or both (UT1 and UT2), depending on the variant configured. UT1 if VARIANT „N" is configured UT2 if VARIANT „1" is configured The MANDATORY POWER ON state remains active for at least 10 minutes after it is activated. In this case, the user is not free to return the unit to standby or to reduce the load. This mode is mandatory and can only be avoided if the unit is in a maintenance or emergency condition or is simply disconnected from the mains.

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

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