EN

TECHNICAL MANUAL

PLN P

Multipurpose heat pumps with low GWP refrigerant

50 -150 kW

A2L gas leak detection

R-454B refrigerant

Axial fan

Scroll compressor

Heating/Cooling

Total heat recovery multi-purpose unit

Multi-purpose 2 pipes system

Multi-purpose 4 pipes system

PLUS

- » R290 refrigerant (GWP=3)
- » Total heat recovery in four-pipe systems
- » Low refrigerant charge (<10 kg for circuit)
- » Production of hot water up to 78°C
- » Full load operation up to -20°C outside air temperature (water 55°C)
- » Very high seasonal efficiency values
- » Availability of silenced setups

CE

RG66029693 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 mulltipurpose heat pumps comply with directive 2014/68//EC.

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 P units are designed for heating or cooling the water to be used in air-conditioning systems for residential, commercial or industrial use.

PLN P 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.
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.

2.2 CUSTOMISED HYDRAULIC KIT

The hydronic kit is fully configurable, and as an option the pumping unit is guarantee to handle ethylene glycol and propylene glycol concentrations of up to 35% with minimum product mixture temperatures of 5 °C.

2.3 COOLING CIRCUIT

- ON/OFF 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 piping and aluminium fins with options with optional additional protective treatments, designed with circuitry optimized for operation both as an evaporator and as a condenser, and to reduce refrigerant charge.
- Dehydrating filter.
- Flow indicator with humidity indicator.
- Reverse cycle valve.
- Liquid receiver
- Liquid separator. (PLN134P, PLN154P)
- 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 P 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 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.

2.6 ELECTRONIC MICROPROCESSOR CONTROL

The electronic control enables the complete control of the PLN P unit. It can be easily accessed through a polycarbonate flap.
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
- Alarm signalling relay
- Cooling circuit solenoids
- 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. 29 for the risk assessment and the wiring diagram 16.3 p. 30.

3 CONFIGURATION OPTIONS

The range PLN P consists of 7 models with cooling capacities from 50 to 150 kW, available as multipurpose heat pump mode, charged with R290 fluid classified like 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.

» Configuration options

1	**Expansion valve**
A	Electronic valve
2	**User side water pump**
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 double inverter pump - OR (excludes inverter pump recovery side)
C	Inverter Single HP pump
D	HP double inverter pump - OR (excludes inverter pump recovery side)
3	**Water buffer tank**
0	Absent
R	Selected recovery side
S	Selected user side
4	**Recovery water pump**
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	Std single inverter pump - OR (excludes inverter pump user side)
C	Inverter Single HP pump
D	HP double inverter pump - OR (excludes inverter pump user side)
5	**Condensation/Evaporation Control**
A	With EC Fans high pressure head
C	With phase-cut (not available up to size 114)
E	With EC Fans (supplied up to size 114)
6	**Antifreezing kit**
E	Only plate exchanger (supplied user and recovery)
P	Plate exchanger and pump
S	For plate exchanger, pump, tank and expansion vassel
T	Plate exchanger, tank and expansion vassel
7	**Acoustic insulation and attenuation**
0	Absent
3	Compressor compartment acoustic insulation and sound blanket
6	Compressor compartment acoustic insulation and sound blanket + Low-noise fans
8	**Remote communication**
0	Absent
2	RS485 Board (Modbus protocol or Carel)
B	BACNET IP/pCOWeb serial board
G	BACNET IP / pCOWeb serial board + supervision software
9	**Remote control**
0	Absent
S	Remote simplified 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
C	Cataphoresis
I	Hydrophilic
P	Pre-painted fins with epoxy painting
R	Copper-copper
11	**Base vibration dampers**
0	Absent
G	Made of rubber
M	With spring
12	**Outdoor coil trace heater and unit base**
0	Absent
1	Selected
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

» Accessories

B	Outdoor finned coil heat exchanger protection grille
D	ON/OFF status of the compressors
E	Remote control for power step limits
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	Couple of probes for buffer tank temperature regulation (user and recovery)
R	Enabling 2nd set-point
T	Mains power analyzer for monitoring of power consumption
V	Set-point modification with 4-20mA signal
3	2 Deaerators for hot and cold hydraulic circuits (supplied as an accessory)
4	2 Dirt separators for hot and cold hydraulic circuits (supplied as an accessory)

4 TECHNICAL FEATURES

4.1 PLN P MULTI PURPOSE HEAT PUMPS RATED TECHNICAL DATA

» PLN P Multi purpose heat pumps rated technical data

PLN P			051	071	081	104	114	134	154
Power supply		V-ph-Hz	400-3N-50						
Cooling mode operation									
Cooling capacity	(1)(E)	kW	50,8	63,0	73,0	103	115	125	147
Total power input	(1)(E)	kW	16,9	20,9	24,9	34,8	39,0	41,3	49,6
EER	(1)(E)		2,95	2,96	2,82	2,87	2,83	3,10	2,97
Water flow	(1)	l/h	8565	10652	12114	17206	19005	22025	25369
Water pressure drop	(1)(E)	kPa	25	34	41	48	57	32	38
Available pressure head - LP pumps	(1)	kPa	161	145	129	116	103	198	180
Available pressure head - HP pumps	(1)	kPa	195	180	165	175	162	322	303
Cooling and heating mode in total heat recovery									
Cooling capacity	(2)(E)	kW	50,8	63,0	73,0	103	115	125	147
Heating capacity	(2)(E)	kW	64,9	80,2	93,7	131	146	160	188
Total power input	(2)(E)	kW	15,1	18,2	21,9	30,2	33,9	36,4	43,1
TER	(2)(E)		7,68	7,86	7,62	7,71	7,71	7,82	7,80
Available pressure head LP pumps user side		kPa	163	149	133	120	111	200	183
Available pressure head HP pumps user side		kPa	197	184	168	179	169	324	307
Available pressure head HP pump total recovery side		kPa	191	173	152	172	157	313	292
Available pressure head LP pump total recovery side		kPa	157	139	118	114	99	190	170
Heating mode operation									
Heating capacity	(3)(E)	kW	54,2	67,8	78,2	106	121	135	156
Total power input	(3)(E)	kW	16,0	20,0	23,2	31,8	35,3	39,9	46,4
COP	(3)(E)		3,39	3,39	3,36	3,33	3,42	3,38	3,36
SCOP	(4)(E)		3,86	3,75	3,72	3,94	4,03	3,84	3,97
SCOP	(5)(E)		3,10	3,05	3,06	3,25	3,36	3,16	3,30
Water flow	(3)	l/h	9401	11759	13547	18321	20907	23362	27062
Water pressure drop	(3)(E)	kPa	25	35	45	48	59	33	40
Available pressure head - LP pumps	(3)	kPa	152	132	108	102	87	179	152
Available pressure head - HP pumps	(3)	kPa	187	167	144	160	145	301	273
General data									
Rated air flow		m^3/h	17850	26350	26350	35200	34500	58000	58000
Sound power level	(6)(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
Compressors / circuits			2/2	2/2	2/2	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	(7)	kg	2,8	4,6	4,7	6,00	7,5	7,9	8,00
Refrigerant charge - circuit 2	(8)	kg	2,8	4,6	4,7	6,00	7,5	7,9	8,00
Buffer tank volume		dm^3	125	200	200	200	200	600	600
Maximum transport weight		kg	1105	1348	1348	1863	1863	2694	2694

(1) Outdoor air temperature 35°C, water temperature 12°C / 7°C (EN14511:2022)
(2) Cooling water temperature 7°C, water flow rate same as in cooling mode; Recovery water temperature 45°C, water flow rate same as in heating mode
(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) Sound power level measured according to ISO 9614
(7) 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.
(8) 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.
(E) EUROVENT certified data

5 PED CATEGORY

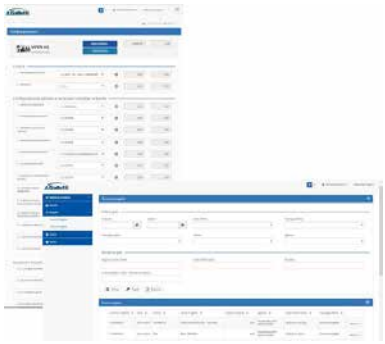
The mulltipurpose heat pumps comply with directive 2014/68//EC (PED)..

Series	Size	Notified body	PED Category	Marking
PLN P	F1	0476	III	CE + PED
	F2	0476	III	CE + PED
	F3	0476	III	CE + PED
	F4	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

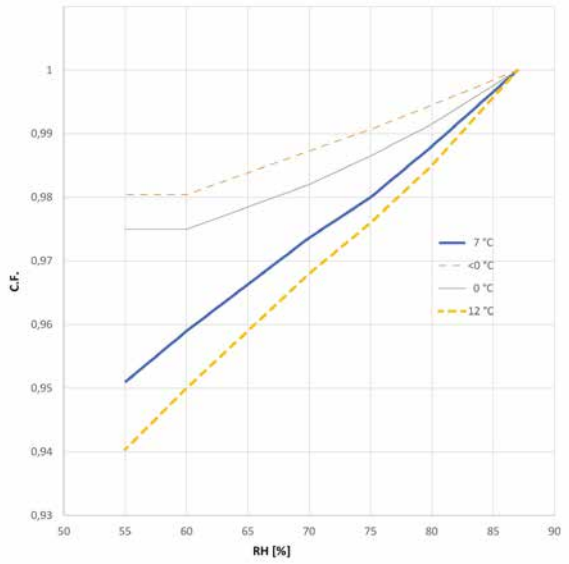


Configuration and project history
Wizard configuration of accessories and options for chillers, heat pumps and hydronic units
Creation of a project which collects all products of interest
Complete management of the storaged history projects

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			051	071	081	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			051	071	081	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			051	071	081	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 P			051	071	081	104	114	134	154
Sound power level	(1)(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

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

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

8 OPERATING LIMITS

The graphs below illustrate the operating limits of PLN P 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.

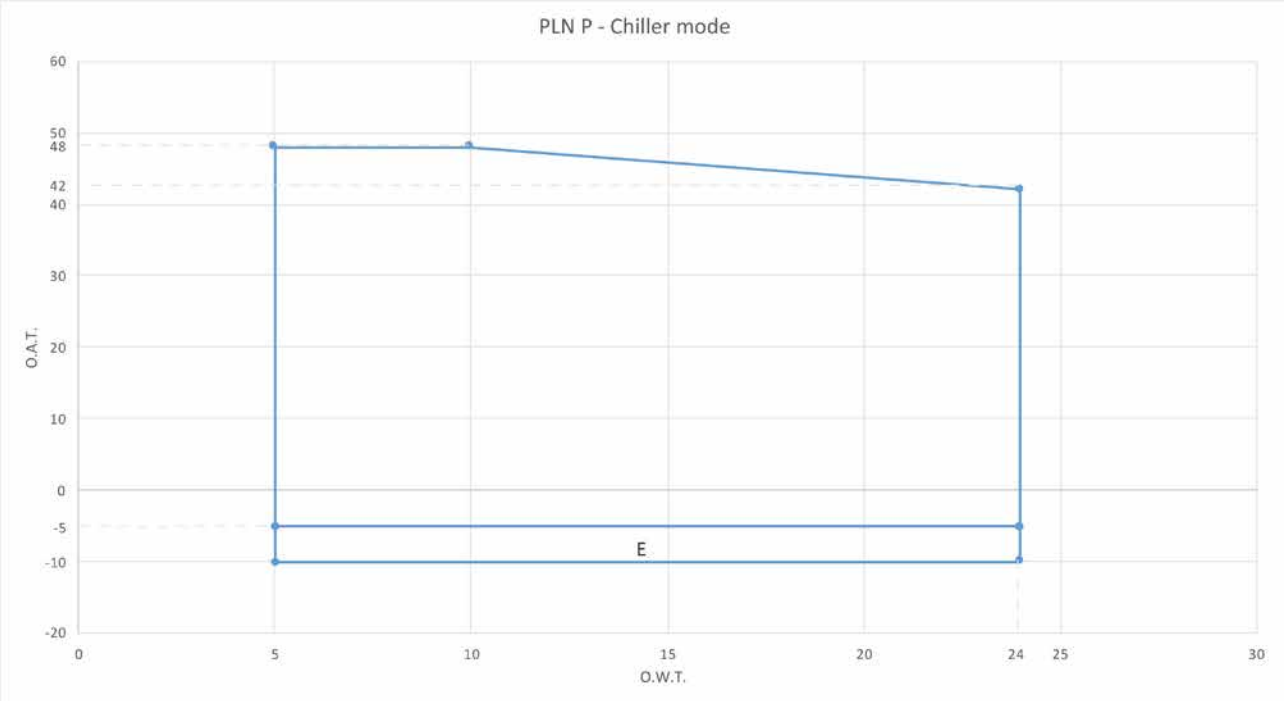
⚠ **WARNING:** contact the support area if you wish to operate with water temperature fluctuations other than 5 K at full load.

⚠ **WARNING:** except for special requests, which can be managed to order, the PLN P 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 OPERATING LIMITS IN CHILLING MODE

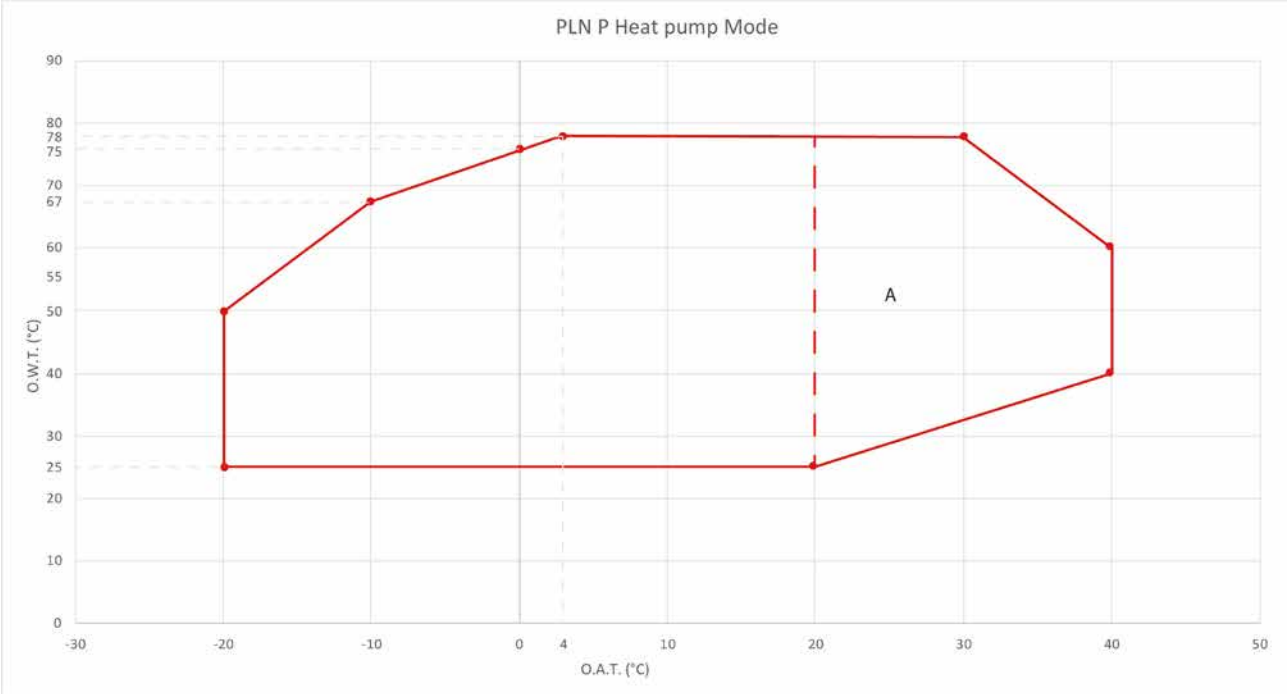
» PLN P operating range - cooling mode



O.W.T. Outlet water temperature
O.A.T. Outdoor air temperature
E Condenser control and EC fans

8.2 OPERATING LIMITS IN HEATING MODE

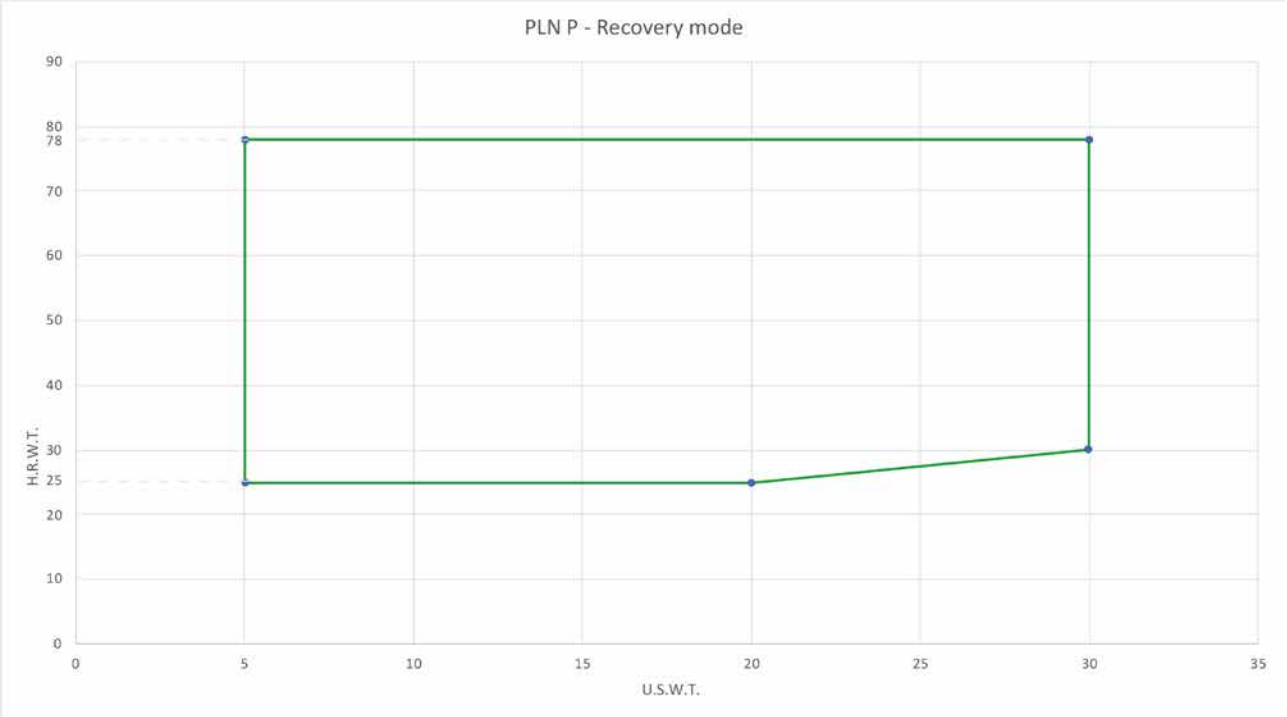
» PLN P operating range - heating mode



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

8.3 TOTAL HEAT RECOVERY PLN P OPERATING RANGE

» Total Heat Recovery PLN P operating range



H.R.W.T. Heat recovery water temperature
U.S.W.T. Water temperature - user side

8.4 THERMAL CARRYING FLUID

Pumps belonging to the PLN Pseries 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 P		051	071	081	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.

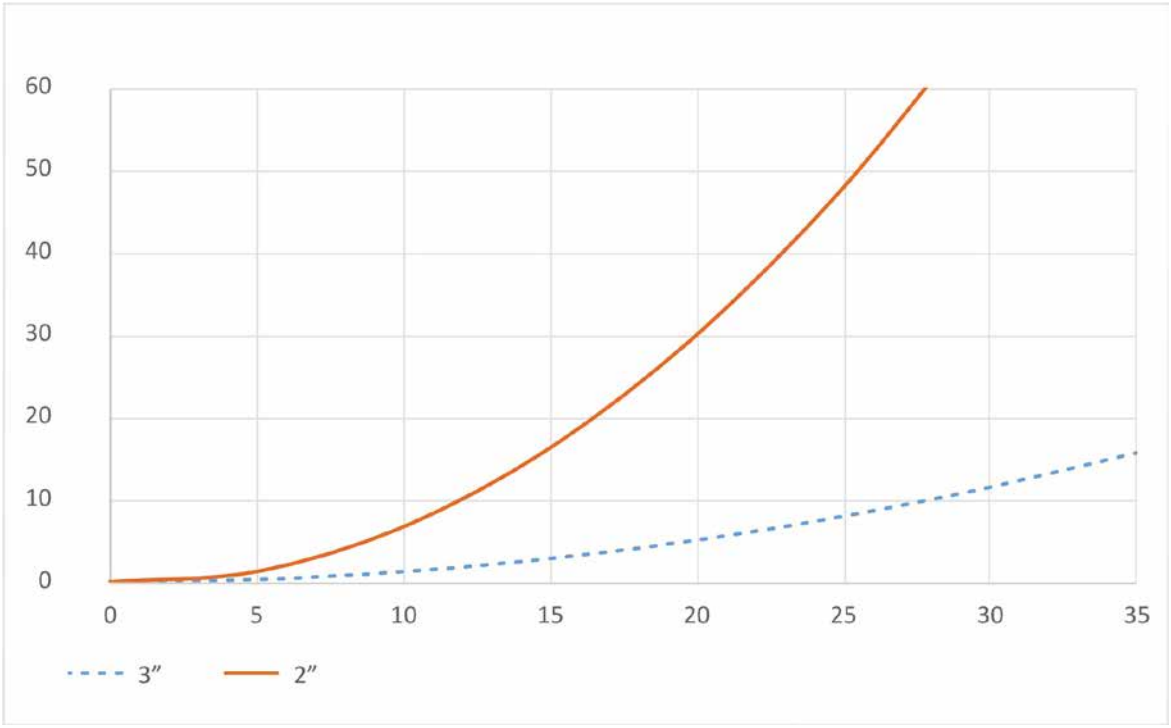
9 WATER PRESSURE DROP

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		051	071	081	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 P 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.

⚠ **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. 19).

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. 14:

— 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 onboard 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)

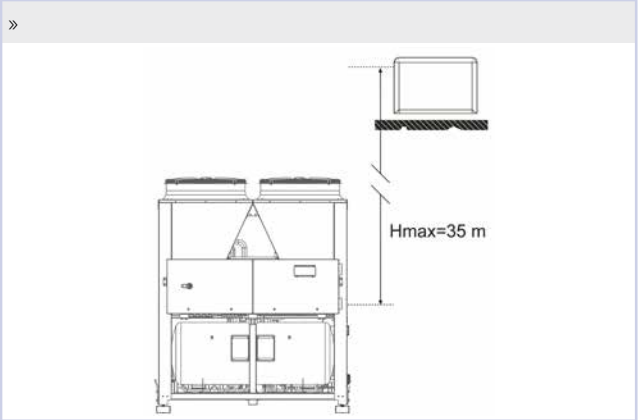
— Ammonium ions (NH4+) dissolved in water should be eliminated due to their high reactivity with copper.
— Chlorine ions (Cl-) pose a risk of holes developing due to corrosion.
— Sulfate ions (SO4--) must be eliminated because they may present a risk of corrosion.
— Limit for fluoride ions: 0.1 mg/l.
— 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.

10.1 WATER CONTENT AND CHARGING OF EXPANZION TANK SYSTEM

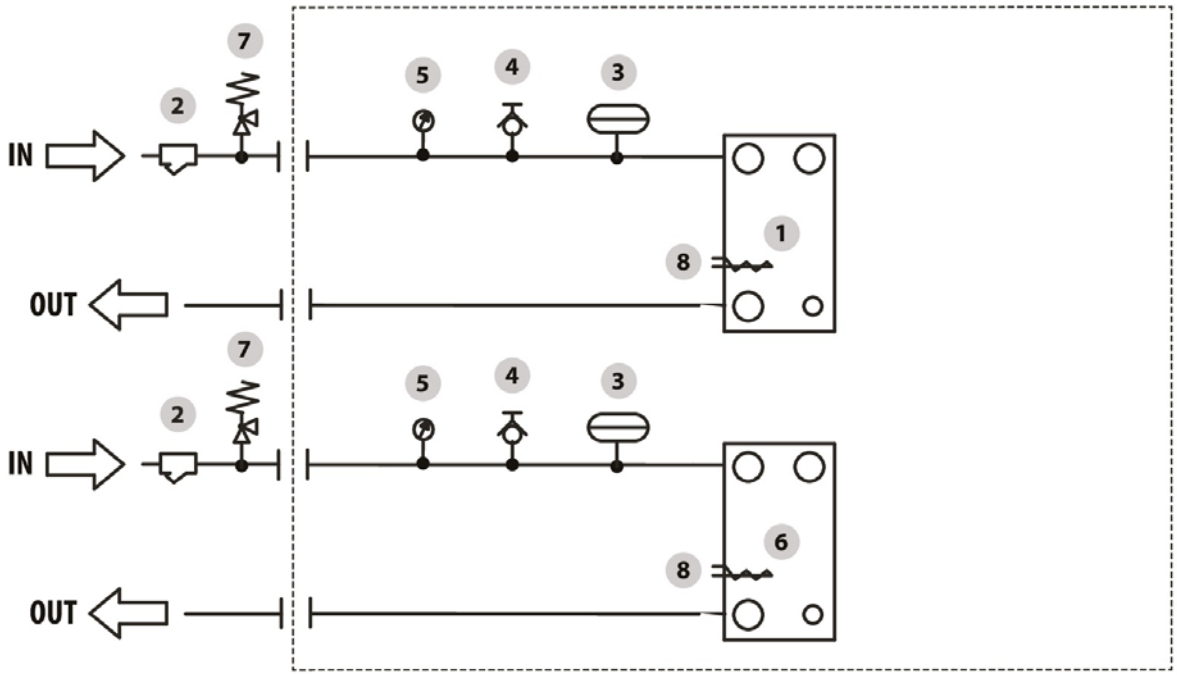
In models without a water storage reservoir it is necessary to assure that the content of water within the system does not fall below 10 litres/kW. This level is necessary to prevent the water temperature from falling below the indoor unit enabling threshold during defrost cycles.
N.B. kW in reference 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 WATER CIRCUIT

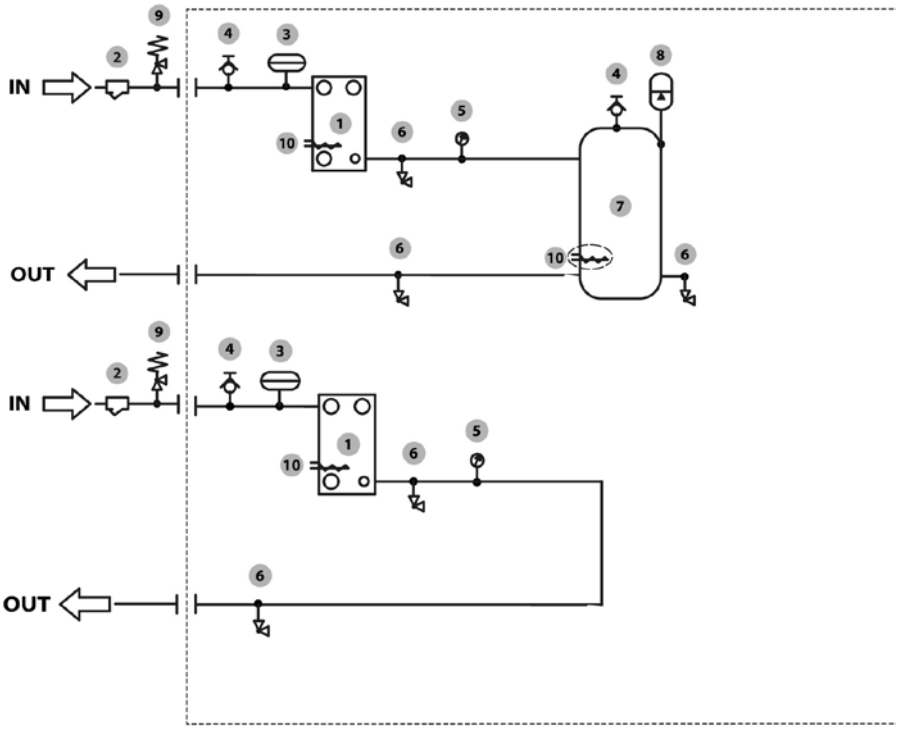
» PLN P (evaporator)



LEGEND

1 User side plate exchanger
2 Water filter (included)
3 Flow switch
4 Air purge valve
5 Pressure gauge
6 Totally recovery side plate exchanger
7 Safety valve (supplied)
8 Antifreeze electric heating
------ Internal and external borderline

» PLN P (evaporator and tank)

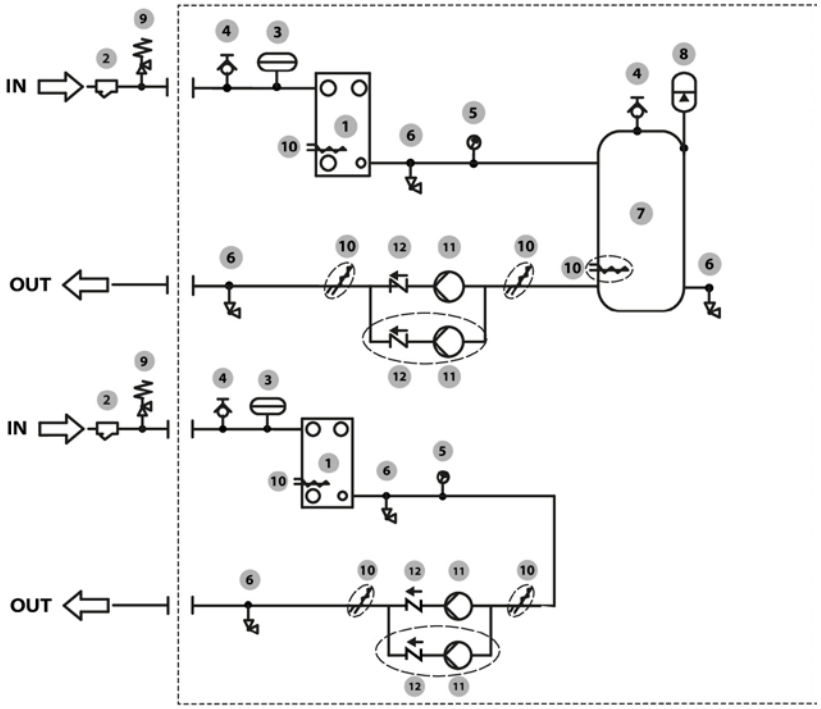


LEGEND

1 Plate exchanger
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
- - - - - - Internal and external borderline
— — — OPTIONAL

Check the configurator for all the available hydraulic configurations.
NOTE: If configurated the double pump with inverter on one of the two hydraulic circuits, the pump configuration with inverter on the second hydraulic circuit is not permitted.

» PLN P (evaporator and single/double and std/HP pump and tank)



LEGEND

1 Plate exchanger
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

Check the configurator for all the available hydraulic configurations.
NOTE: If configurated the double pump with inverter on one of the two hydraulic circuits, the pump configuration with inverter on the second hydraulic circuit is not permitted.

11 INSTALLATION SITE FEATURES

The units of the PLN P 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.

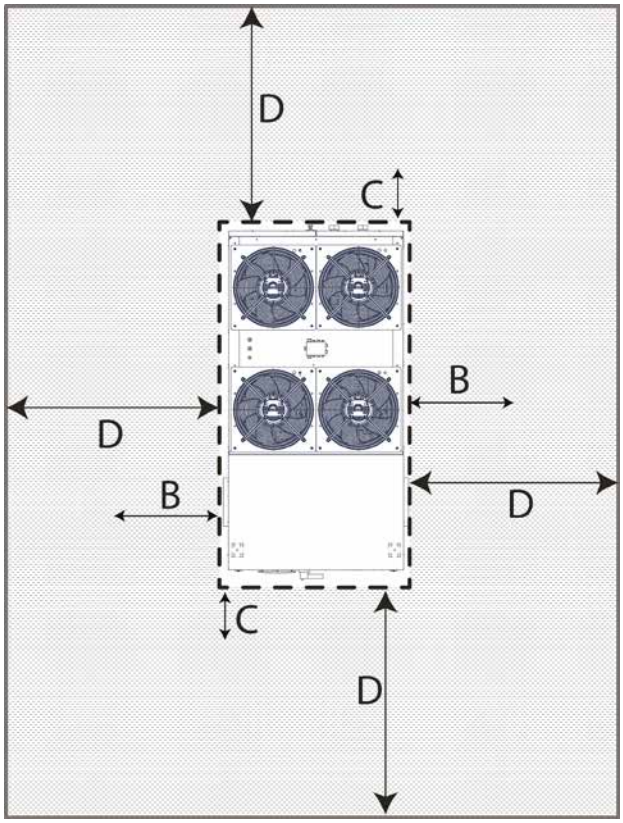
⚠ **WARNING:** The above list is only indicative of the most common conditions that may occur if installation is incorrect. The list is not exhaustive. For more information on this list, see Annex K of EN 378-2 (which refers to EN 1127).

⚠ **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 P - Distance value 'D': safety zone assigned to each unit.

Model	D (m)
PLN051P	3
PLN071P	3,5
PLN081P	3,5
PLN104P	3
PLN114P	3,5
PLN134P	3,5
PLN154P	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.

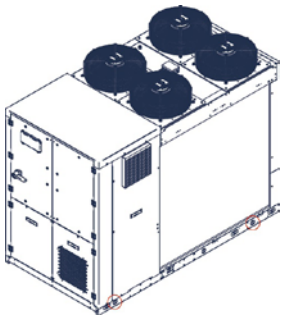
12 INSTALLATION CLEARANCE REQUIREMENTS

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.

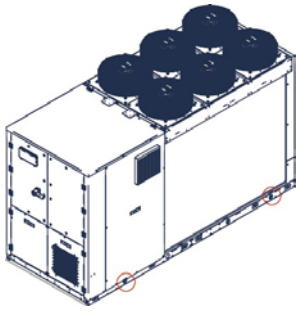
- Avoid any and all situations of backflow of hot air between air outlet and inlet of the unit.
- If even only one of the above conditions is not fulfilled, please contact the manufacturer to check for feasibility.
- In the design of the PLN P series, special care has been taken to minimise noise and 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 make sure it is installed in a perfectly level position.

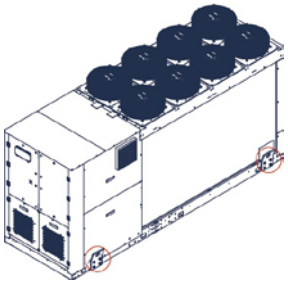
» PLN P 051



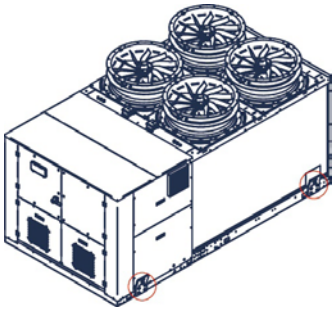
» PLN P 071-081



» PLN P 104-114



» PLN P 134-154



13 SITING AND DAMPERS

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

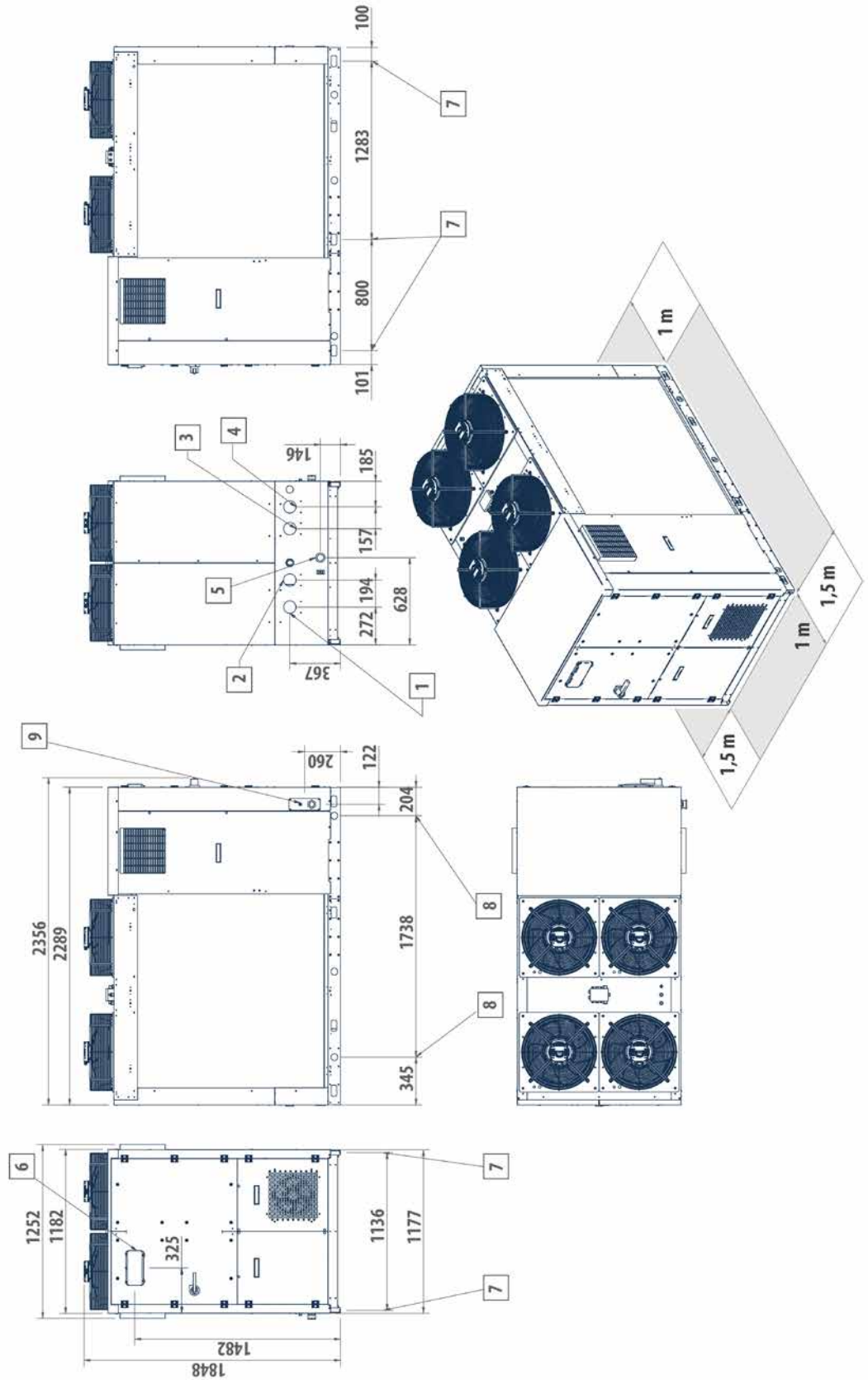
— Size and origin of water pipes;
— Location of the power supply;
— Solidity of the supporting surface;
— Avoid obstacles to the outflow of air from the fan which could cause back suction (see section on 12 p. 21);
— Direction of prevalent winds: (position the unit so as to prevent prevalent winds from 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 12 p. 21).

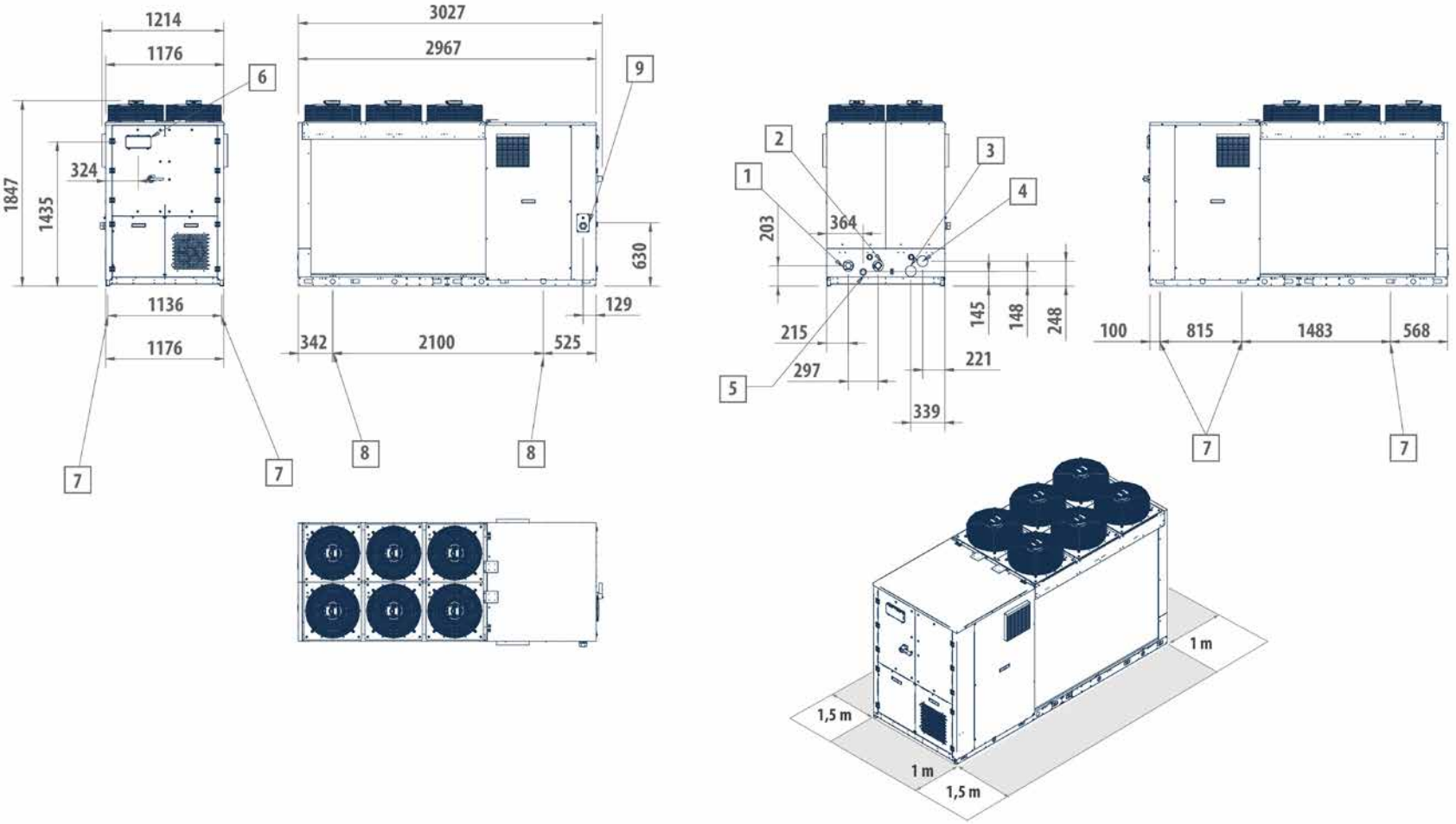
For installation and anti-vibration characteristics (optional), refer to manual RG66013698 supplied.

PLN P	DAMPERS
F1	6
F2	6
F3	8
F4	6

14 DIMENSIONS

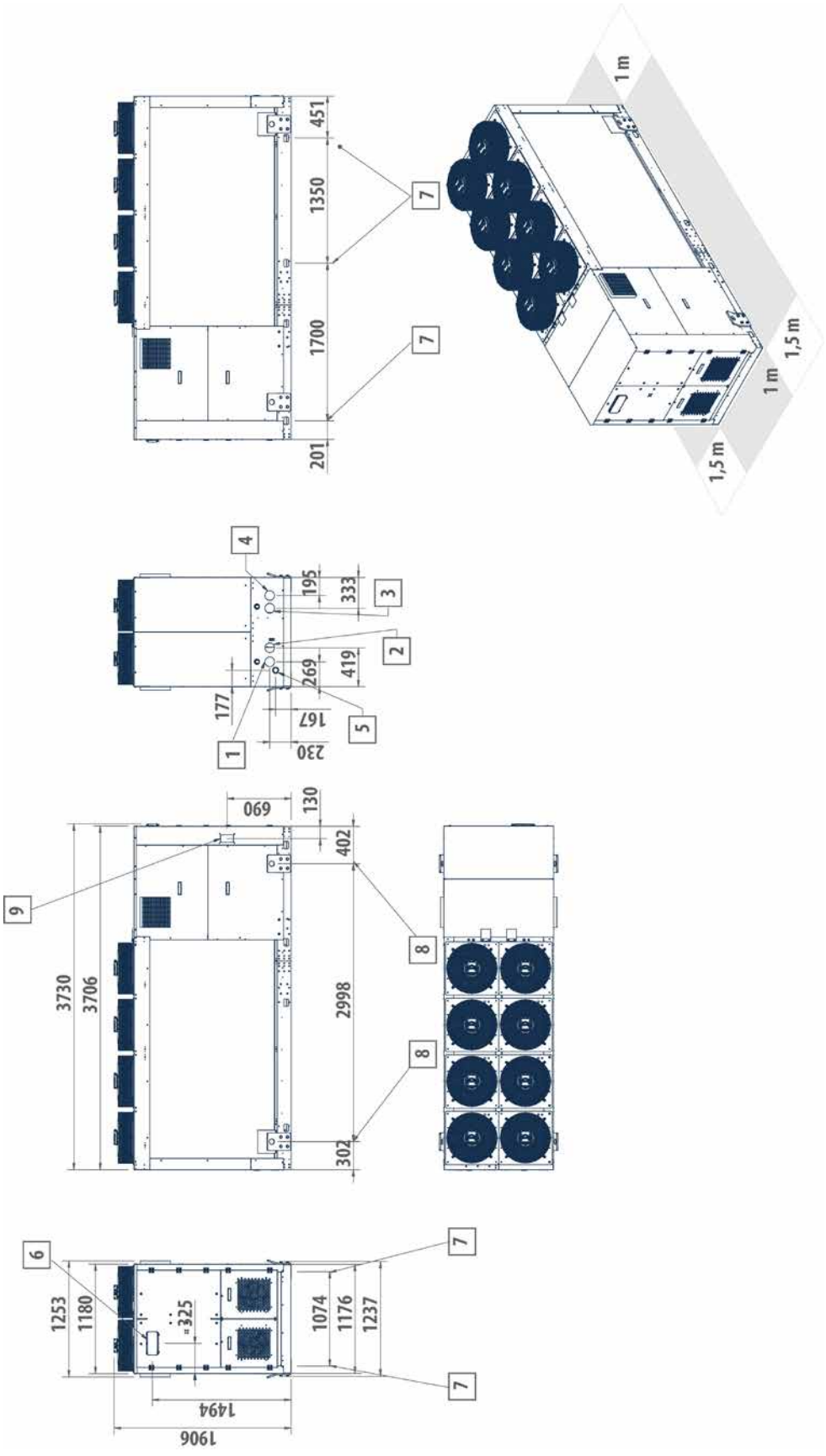
» PLN P 051





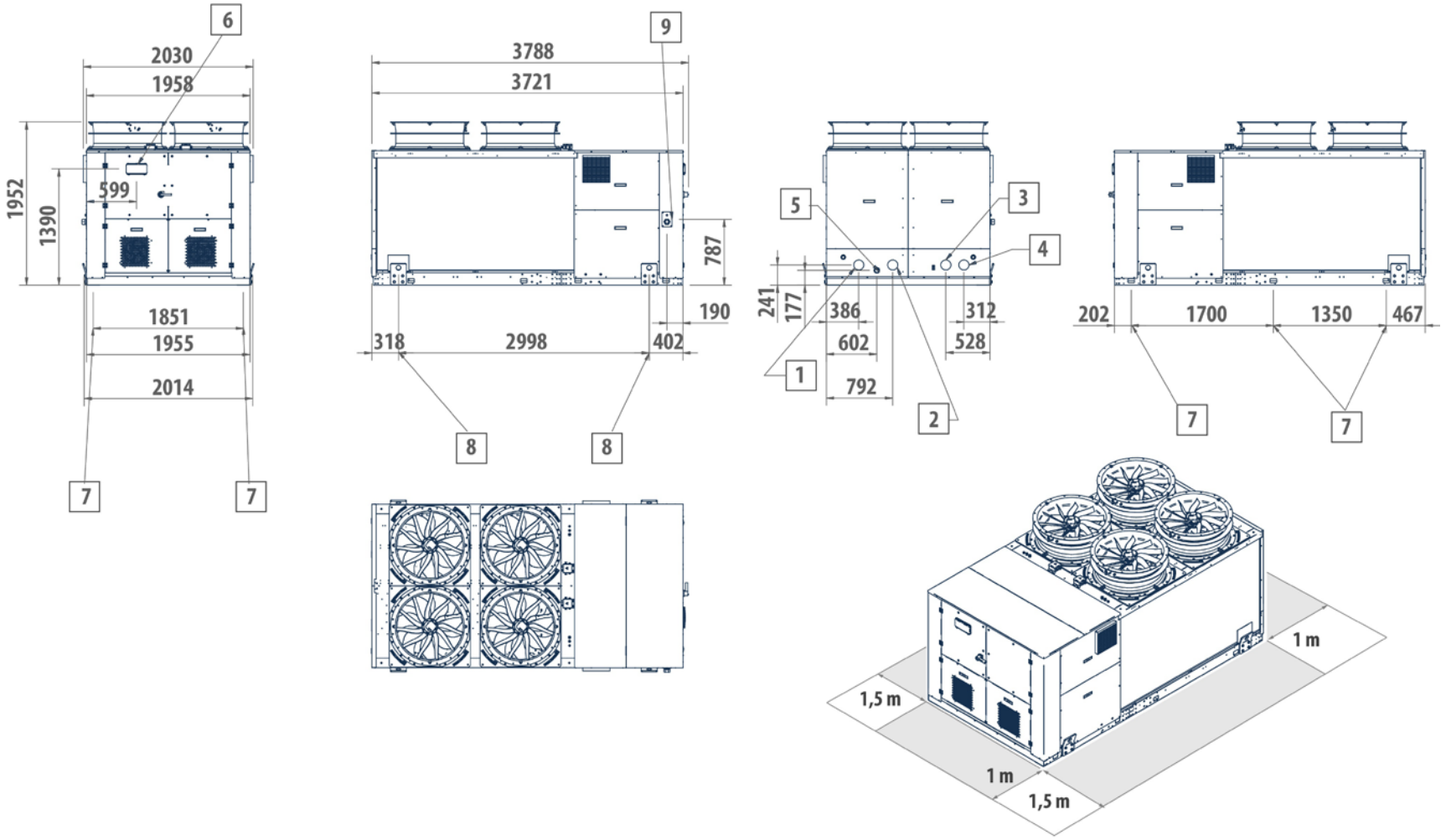
Legend

1 Water inlet on user side 2" 1/2 F
2 Water outlet user 2" 1/2 F
3 Heat recovery hot water inlet 2" 1/2 F
4 Recovery hot water outlet recovery 2" 1/2 F
5 Water drainage tank 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 Heat recovery hot water inlet 2" 1/2 F
4 Recovery hot water outlet recovery 2" 1/2 F
5 Water drainage tank 1/2 " F
6 User interface
7 Vibration dampers
8 Lifting points
9 Power supply input

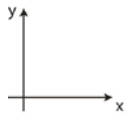


Legend

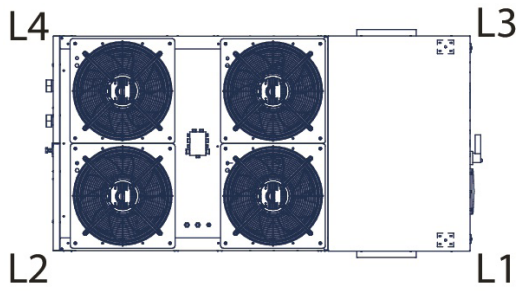
1 Water inlet on user side 3" VIC
2 Water outlet user 3" VIC
3 Heat recovery hot water inlet 3" VIC
4 Recovery hot water outlet recovery 3" VIC
5 Water drainage tank 1/2 " F
6 User interface
7 Vibration dampers
8 Lifting points
9 Power supply input

15 WEIGHTS

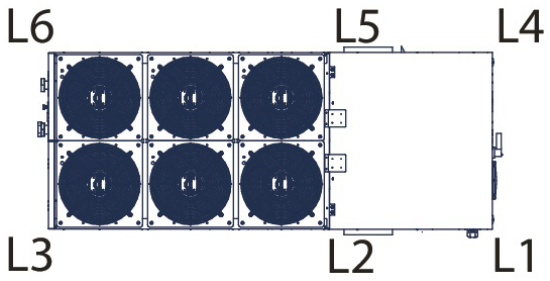
Follow the directions below for lifting center of gravity and installation of units:



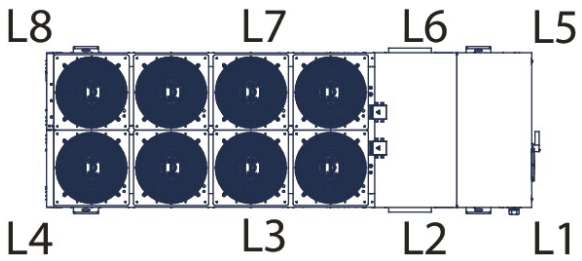
» PLN F1



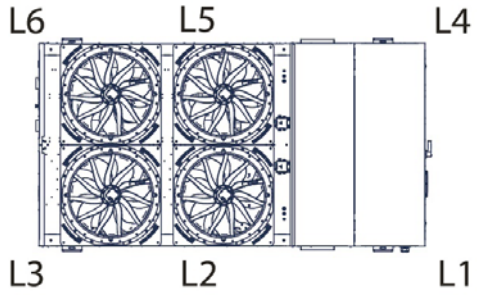
» PLN F2



» PLN F3



» PLN F4



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

Frame		1	2		3		4	
PLN P		051	071	081	104	114	134	154
Xb	mm	593	596	596	319	319	985	985
Yb	mm	980	1357	1357	1272	1265	1721	1723

» Lifting center of gravity for transporting unit version with 1 pump and full tank

Frame		1	2		3		4	
PLN P		051	071	081	104	114	134	154
Xb	mm	593	628	628	633	633	1108	1108
Yb	mm	980	1374	1374	1661	1656	1901	1901

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 version without hydraulic options

Frame		1	2		3		4	
PLN P		051	071	081	104	114	134	154
L1	kg	236	115	115	176	179	323	323
L2	kg	159	146	146	179	181	300	300
L3	kg	241	202	202	181	182	282	282
L4	kg	164	120	120	184	184	320	319
L5	kg	-	151	151	178	181	297	297
L6	kg	-	207	207	181	183	278	279
L7	kg	-	-	-	183	184	-	-
L8	kg	-	-	-	186	186	-	-
Total	kg	800	940	940	1450	1460	1800	1800

» 1 pump version weight distribution with full inertial tank

Frame		1	2		3		4	
PLN P		051	071	081	104	114	134	154
L1	kg	310	145	145	214	217	339	340
L2	kg	193	192	192	216	218	393	393
L3	kg	349	278	278	218	219	434	435
L4	kg	232	177	177	220	220	452	453
L5	kg	-	224	224	241	244	506	506
L6	kg	-	310	310	243	245	548	548
L7	kg	-	-	-	244	245	-	-
L8	kg	-	-	-	247	247	-	-
Total	kg	1085	1328	1328	1843	1854	2674	2677

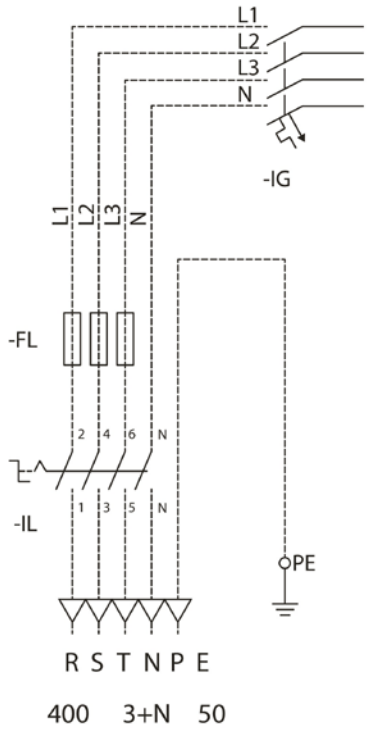
16 ELECTRICAL DATA

» Electrical data PLN P

PLN		051	071	081	104	114	134	154
Power supply	V-ph-Hz	400-3N-50						
Auxiliary power supply	V-ph-Hz	230-1-50						
Start up current	A	187	240	247	249	264	315	320
Startup current with soft starter	A	143	181	188	205	217	256	261
Maximum current absorption	A	67,0	77,0	84,0	129	137	152	157
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).

» Main electrical connection of 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.

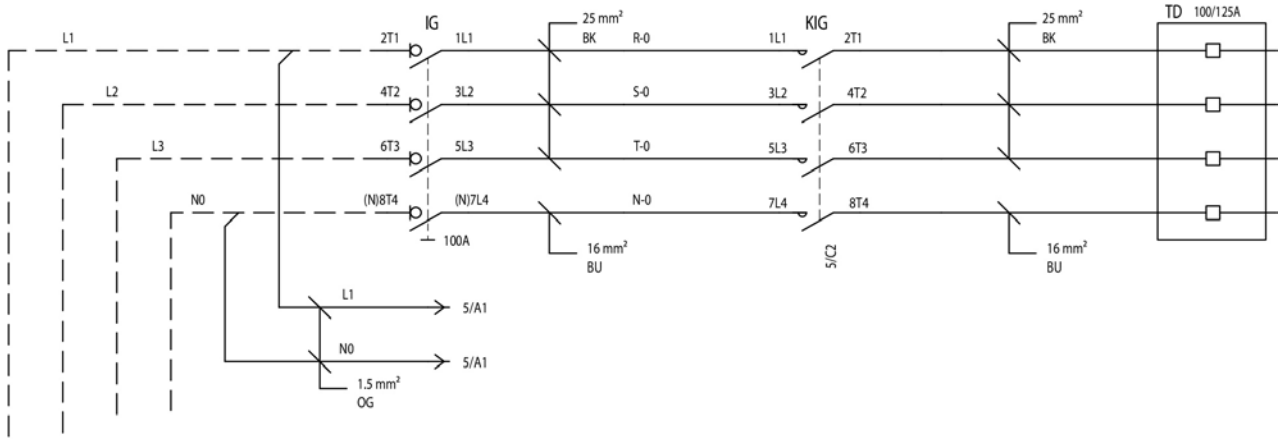
⚠ **IMPORTANT:** Before performing any work on electrical parts, make sure the power supply is disconnected. In particular, the electrical control board of the unit has a part of the circuit that is live even when the door is open and the main switch is off, protected by a Plexiglas barrier and identified 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

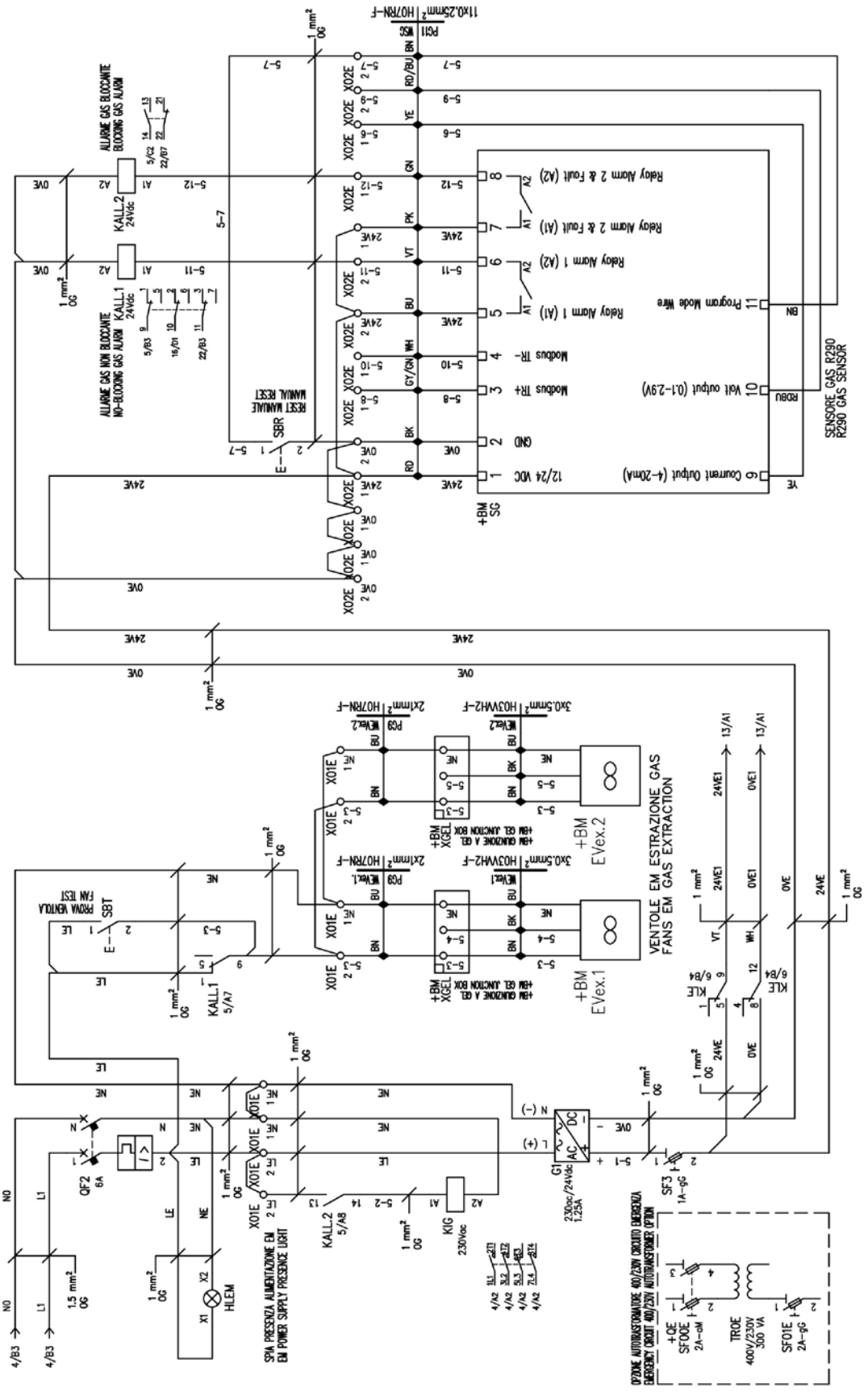
to use a thermomagnetic circuit breaker in accordance with standard EN/IEC60898-1 (contact gap of at least 3 mm), with adequate breaking capacity and differential protection in accordance with the tables in section 16 Electrical data.
For the unit power supply line use FG16(O)R16-type HEPR cables with 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 P 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 P 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



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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