PLN

R290 HEAT PUMPS

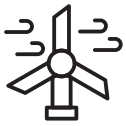
TECHNICAL DETAILS

Galletti
AIR CONDITIONING

European Green Deal: the challenge for a better future

Making Europe the world's first climate-neutral continent is one of the binding commitments of European climate legislation. In 2019, the president of the European Commission stated that the **European Green Deal** would be Europe's "man on the moon moment".
The main goal of the pact is to achieve **climate neutrality by 2050**. For this to happen, one of the goals is to decarbonize the EU energy system, with the aim of achieving net-zero greenhouse gas emissions by 2050.
The key principles include: **Prioritizing energy efficiency**, **developing an energy sector based largely on renewable resources**, **securing an affordable EU energy supply and having a fully digitalized**, **integrated and interconnected European energy market**.
One-third of the € 1.800 billion investment of the Next Generation EU recovery plan and the EU's seven-year budget will fund the European Green Deal.

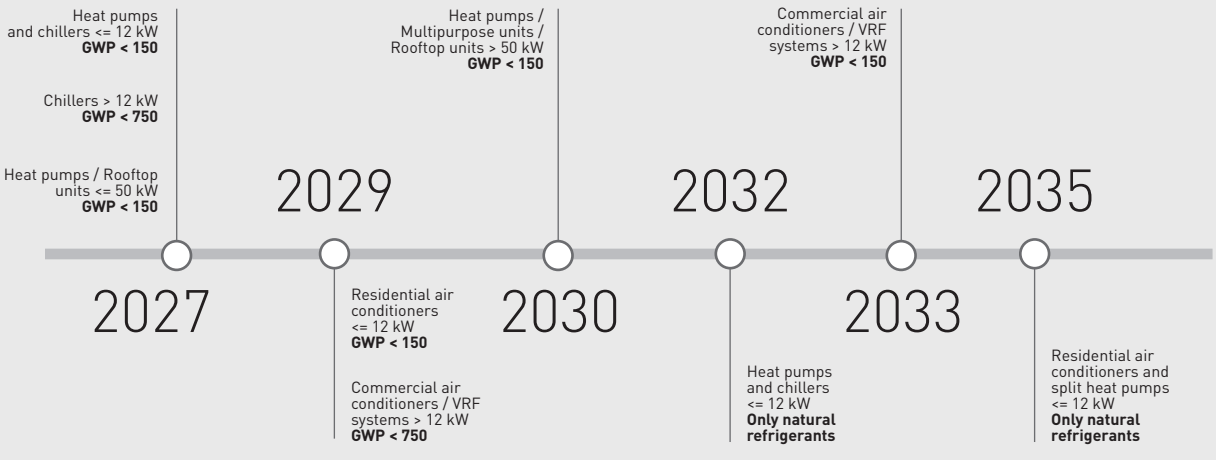
REDUCE NET GREENHOUSE GAS EMISSIONS BY AT LEAST 55% FROM 1990 LEVELS BY 2030



INCREASE THE SHARE OF RENEWABLE ENERGY IN OVERALL EU ENERGY CONSUMPTION TO 42.5% BY 2030

NET-ZERO GREENHOUSE GAS EMISSIONS BY 2050

The use of high efficiency heat pumps with low-GWP refrigerants to replace old fossil fuel heat generators is now seen as central to achieving the goals of the **Green Deal**. Therefore, on 5 April 2022, the Commission presented a proposal to revise the F-Gas Regulation 517/2014. The agreement was formalized by the European Council on 18 October 2023 and the new Regulation (EU) 2024/573 entered into force on 11 March 2024. The new regulation aims to phase out the use of climate-changing fluorinated gases by encouraging the use of natural, climate-friendly refrigerant gases.



GWP - Global Warming Potential: measures the global warming effect of greenhouse gases in relation to CO_2.

Advanced Design

An innovative approach to design, for the development of **specific solutions** for the **service** and **residential** sectors.

The decision to adopt an **Advanced Design** approach stems from the desire to anticipate market changes. This dynamic, constantly evolving process is driven by research, experience, and consultation. Solutions developed using this approach are the result of the synergy between different types of **technical expertise**, **creativity**, and a **forward-looking perspective**.

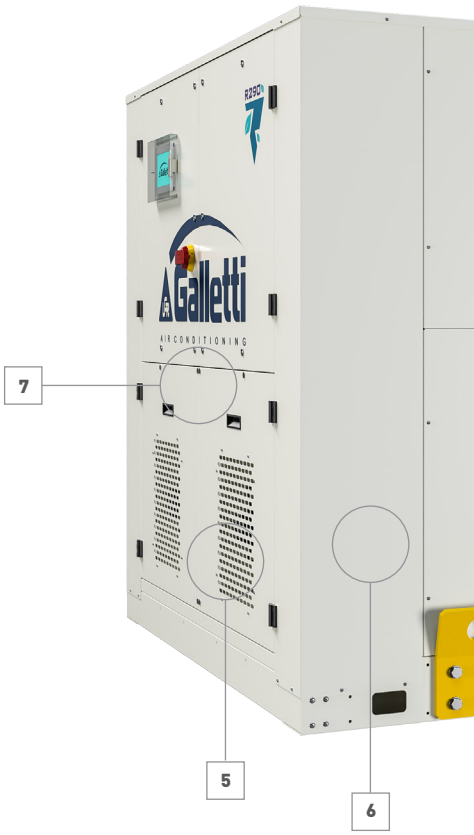
Solutions developed using this approach are also the result of a concrete commitment to greater sustainability. For us, efficiency is not just a competitive advantage; it's a responsibility to the environment. We are constantly working to enhance the energy performance of our systems by **reducing their consumption** and **direct emissions**.

For this reason, we are gradually introducing **low-GWP refrigerants** in order to **significantly reduce the climatic impact** of our solutions. One example of this is **PLN**, the new line of air-water units that use a natural refrigerant. Thanks to their ability to produce high-temperature water, these units can replace fossil fuel generators while maintaining the efficiency of the existing system.

ITS EXTREMELY WIDE OPERATING RANGE AND HIGH PERFORMANCE UNDER ALL OPERATING CONDITIONS MAKE PLN THE PERFECT ANSWER TO THE NEED TO PHASE OUT THE USE OF FOSSIL FUELS FOR HEATING AND COOLING BUILDINGS.

PLN

50-160 kW CHILLER	Minimum water temperature -10°C Maximum air temperature 48°C SEER up to 5.00
54-154 kW HEAT PUMP	Maximum water temperature 75°C Minimum air temperature -20°C SCOP up to 4.00
MULTIPURPOSE UNIT WITH HEAT RECOVERY TOTAL 54-156 kW	Maximum water temperature 78°C Minimum air temperature -20° TER up to 7.86



7 **ELECTRONIC VALVE** a standard feature on the entire range to offer 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.

Chillers, heat pumps, and multipurpose units with total heat recovery using a natural refrigerant

The **perfect solution** for **your comfort** and **our environment**

1 **AXIAL FANS** with standard BLDC motor (up to size 114) housed in a special compartment with a profile designed to optimize aeraulic performance. The condensation control system continuously and automatically regulates the fan speed.

2 **FINNED COPPER-ALUMINUM COILS** (H and P versions) or with microchannel (C versions) to reduce the refrigerant content by at least 40%. This is an outstanding achievement that confirms Galletti's decision to produce Advanced Design solutions with ultra-low TEWI (Total Equivalent Warming Impact).

3 **PLATE HEAT EXCHANGER** with asymmetrical channels optimized for operation with R290. Its innovative geometry reduces the system-side pressure drop while increasing the heat exchange capacity between water and refrigerant. The P version has an additional plate heat exchanger that allows for the total recovery of condensation heat and the simultaneous production of hot and cold water.

6 **MULTI-SCROLL SOLUTIONS WITH AN IDV VALVE**
Intermediate delivery valve (IDV) technology allows the compressor to avoid losses caused by overcompression, which is typical of partial load operation, thus saving energy and improving seasonal efficiency by 3% to 10%.

5 **ATEX EXHAUST FAN** it is activated when the gas sensor detects a dangerous concentration of refrigerant in the compressor compartment. The fresh air flow removes the potentially explosive mixture that has formed inside the compartment.

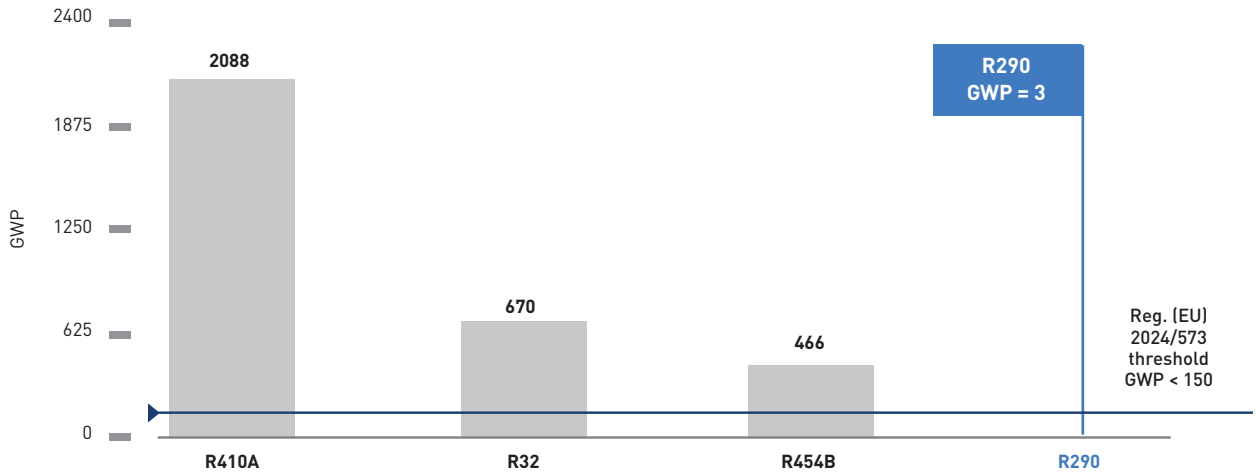
4 **ATEX REFRIGERANT LEAK SENSOR** using MPS (molecular properties spectrometry) technology to make the sensor immune to all types of contamination, thus ensuring high levels of accuracy over the lifetime of the component (15+ years).

Sustainability and efficiency: the role of propane in our solutions

Propane (R290) is a natural refrigerant with an ISO 817 classification of A3, i.e. flammable and non-toxic, and a Global Warming Potential (GWP) of only 3.

This makes it a strong contender to be one of the leading **refrigerants** for air conditioning solutions.

Firstly, it **contributes significantly less to the greenhouse effect** than synthetic refrigerants. Secondly, its physical properties make it **ideal** for meeting the design requirements associated with the increasing use of heat pumps and water chillers, allowing it to operate within unprecedentedly wide operating limits and with excellent energy performance.
Furthermore, by combining the use of an ultra-low GWP refrigerant with coils with reduced internal volume (microchannels for C versions), direct emissions in terms of tonnes of CO_2 equivalent due to the internal refrigerant charge are virtually zero.



Contenuto di refrigerante [$tCO_{2,eq}$]	51-52	71-72	81-82	104	114	134	154
Chiller	0,0099 t	0,0144 t	0,0144 t	0,0228 t	0,0228 t	0,0234 t	0,0234 t
Heat Pump	0,0171 t	0,0252 t	0,0252 t	0,0378 t	0,0462 t	0,0468 t	0,0468 t
Polyvalent	0,0168 t	0,0276 t	0,0282 t	0,0360 t	0,0450 t	0,0450 t	0,0450 t

To ensure **maximum reliability of the unit**, the on-board microprocessor is capable of **activating automatic safety procedures** in the event of a refrigerant leak. The ATEX sensor **communicates with the unit's main controller** on the basis of two alarm thresholds: the first activates **forced ventilation** of the compressor compartment by means of an ATEX exhaust fan and the second, linked to an increased concentration of refrigerant in the cooling compartment, **automatically disconnects the unit's main power supply**, leaving only the safety components (ATEX sensor and fan) powered. The electrical control board is designed to be hermetically sealed against possible gas leaks.

Unprecedented flexibility and efficiency thanks to total heat recovery

STANDARD CHILLER
(cooling circuit)

COOLING MODE

In this mode, the unit operates like a traditional chiller. It extracts heat from the water in the system **(C1)** to cool rooms (e.g., during the summer) and releases the heat outside through the air coil. The ventilation is active to facilitate the exchange of condensation heat between the air and the refrigerant. The unit's hot circuit **(C2)**, which would typically serve a heating system, remains inactive.

STANDARD HEAT PUMP
(heating circuit)

HEATING MODE

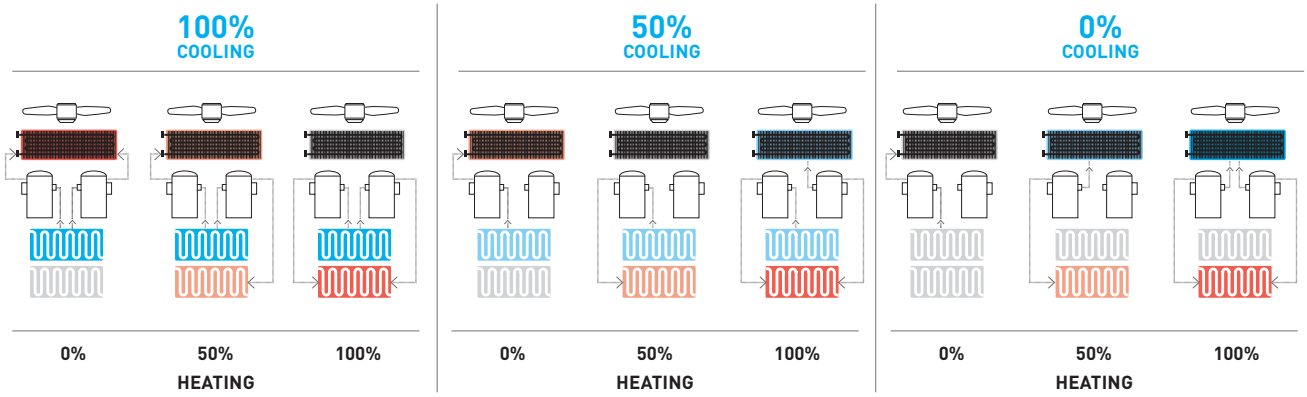
In this case, the refrigeration cycle is **reversed**, turning the unit into a heat pump. It pulls heat from the outside air and transfers it to the water in the system **(C2)**. This water is then used to **heat** the rooms. The ventilation is active while the unit's cooling circuit **(C1)** remains inactive.

TOTAL HEAT RECOVERY

TOTAL HEAT RECOVERY MODE
(SIMULTANEOUS HEATING AND COOLING)

The unit operates for two applications simultaneously: one that requires cooling **(C1)** and one that requires heating **(C2)**. Rather than releasing heat outside, as in "cooling only" mode, the unit recovers all the thermal energy produced by cooling and uses it to heat water. The ventilation is inactive, which maximizes the efficiency of the entire unit. This design is ideal for buildings with opposing and simultaneous thermal loads, such as hotels, hospitals, and wellness centers.

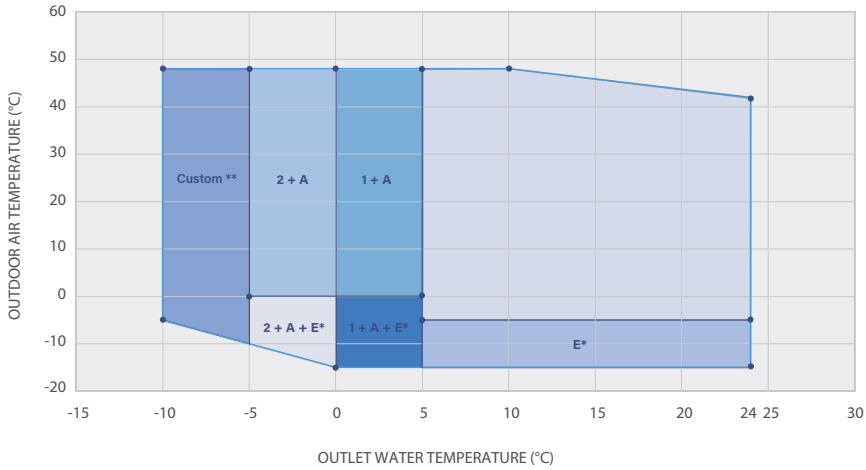
Additionally, all **PLN P** units are equipped with a **dual refrigeration circuit**. This configuration is designed to ensure **maximum operational flexibility**, even when there are **unbalanced thermal loads** between hot and cold applications. This design enables the unit to adapt dynamically to actual load conditions, ensuring efficiency and uninterrupted service, even in complex scenarios.



We have designed a range with operating limits **beyond standards**

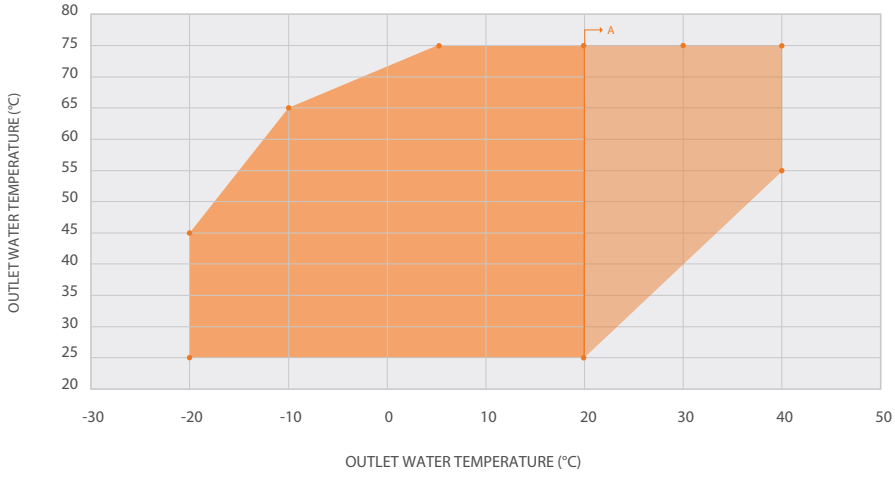
The generous sizing of the heat exchange surfaces and the choice of extremely high quality components have resulted in a **range that is not only efficient** but also highly **reliable** in all operating conditions, from the **lowest outdoor temperatures** to the **highest**. In particular, the production of hot water up to 75°C makes PLN heat pumps a viable alternative to traditional heat generators such as boilers.

COOLING MODE — PLN C / PLN H



A : glycol
E : condensing control with EC fans
1 : opt 1 water low temperature
2 : opt 2 water low temperature

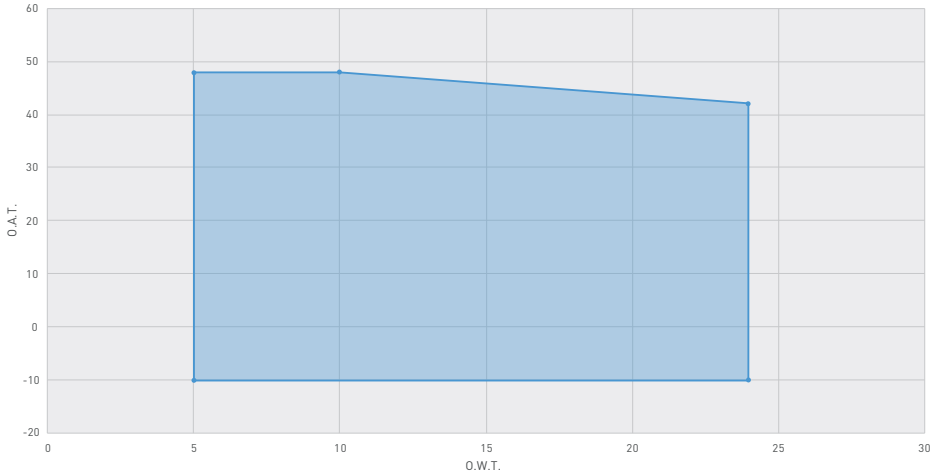
HEATING MODE — PLN H



A : evaporation control

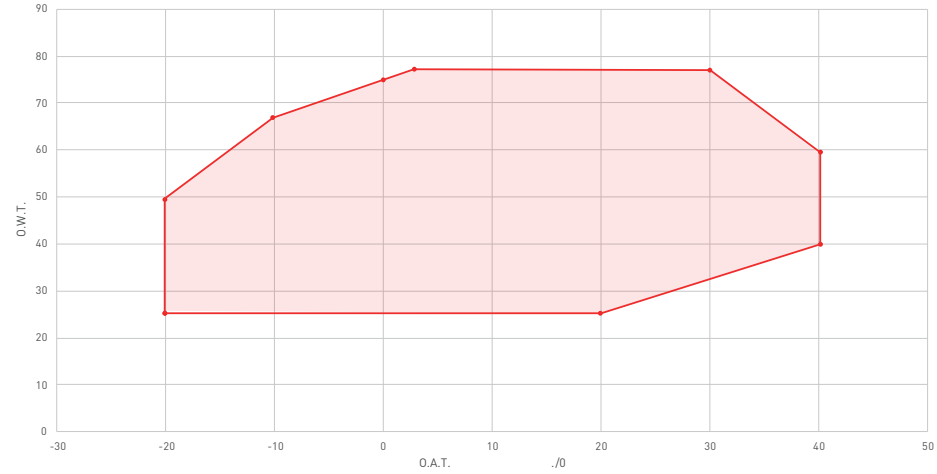
COOLING MODE

PLN P



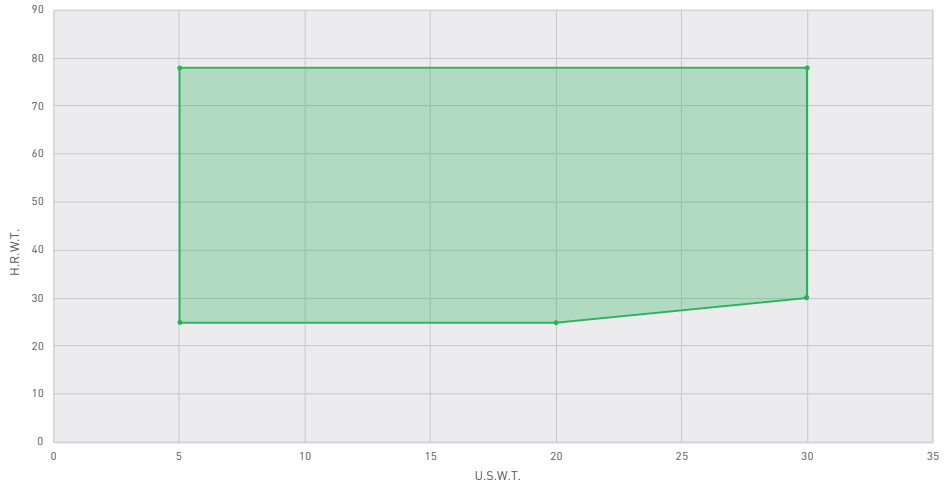
HEATING MODE

PLN P



TOTAL HEAT RECOVERY MODE

PLN P



Tailoring solutions to each application is an integral part of our DNA

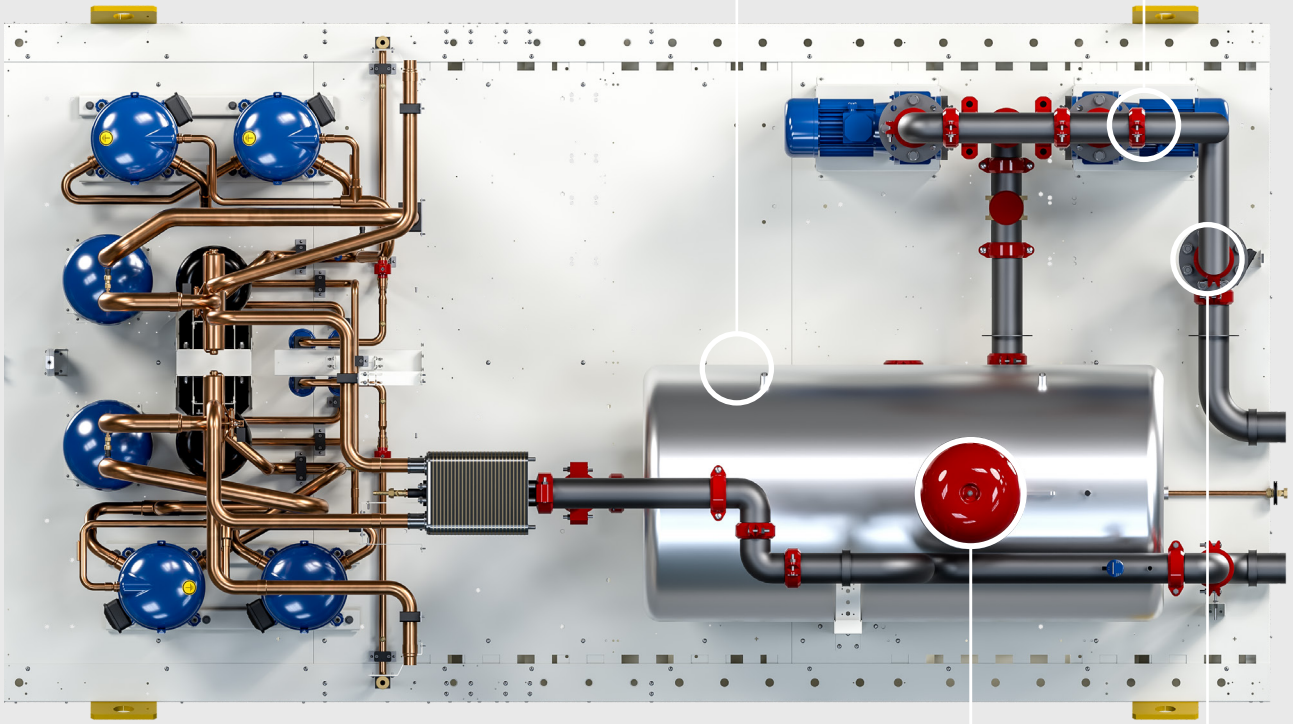
THE RANGE CONSISTS OF 7 SIZES AND IS AVAILABLE IN COOLING-ONLY, REVERSIBLE HEAT PUMP, AND TOTAL HEAT RECOVERY MULTIPURPOSE UNIT VERSIONS.

The range is also highly configurable in terms of hydraulics. There is the option to integrate on the unit up to **2 on/off or modulating pumps** for the C and H versions or up to 4 pumps (with a maximum of 2 modulating pumps) for the P version.
As a standard feature, the units are equipped with threaded hydraulic connections to the outside (up to size 114) or with Victaulic type connectors (from size 134), suitably positioned air vent valves, safety valve calibrated to 6 bar (supplied as standard), vane type flow switch or hot-wire flow switch (optional), inlet and outlet water temperature probe for load management, with antifreeze thermostat function and for variable flow management. Up to size 114, water pipes are made of copper to provide greater resistance to corrosion.

In addition to the pump kits, a water buffer tank can be installed inside the fan compartment, located on the outlet side of the water circuit and protected by a membrane expansion tank. A **flow meter** is available as an accessory for the C and H versions. It can be used with the optional mains power analyzer to continuously monitor power output and the efficiency index.
A **sludge remover** can also be supplied, capable of blocking and retaining heavy impurities present in the water circuit, which slow down when they hit a synthetic filter mesh inside the unit, allowing them to be deposited more easily. This allows the impurities to settle in the lower part of the unit, known as the collection sump, which acts as a settling chamber. A magnetic device that retains ferromagnetic impurities is also located here.

Buffer tank with **thicker insulation** (> 19 mm) for high temperature water storage

Up to 2 pumps ON/OFF or inverter low- or high-head



Expansion tank to protect the buffer tank

Flow meter for **calculating power output and COP** (in conjunction with the mains power analyzer)

The electronic controller enables the **complete control** of the unit. It can be easily accessed through a polycarbonate flap with IP65 protection rating. This control allows the **recording of operating parameters** and their storage in the memory as well as the ability to download them via a control link.

The following functions are also available:

- **Algorithm** for modulating water flow to the primary and optimization of partial load operation.
- **Management** of the hourly/weekly scheduling.
- **Adjustment of the operating mode** depending on the status of 2 voltage-free contacts available to the grid operator or external PLC (Smart Grid certification).
- **Possibility of managing** an external 3-way valve for DHW production.
- **Possibility of activating** a back-up system via a dedicated digital output.
- **Possibility of activating** anti-legionnaire's disease cycles.
- **Cascade logic control** of up to 6 units for extending installed power.

For applications where low noise is a key design consideration, the compressor can be fitted with a **sound-insulating cover** that can reduce component noise by 11 dB(A). In addition, thanks to the advanced control that comes as standard, it is possible to activate the "**Night-time Low Noise**" mode, which allows the fan speed to be reduced to achieve the **lowest possible noise levels**.

CHILLER VERSION | PLN C			52	72	82	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)	W/W	3,08	3,25	3,19	2,99	2,90	3,18	3,09
SEER	(2)(E)	Wh/Wh	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
Pressure drop, water side	(1)(E)	kPa	25	27	35	55	65	35	44
Available head, low-head OR pump	(1)	kPa	158	145	129	113	102	198	178
Available head, high-head OR pump	(1)	kPa	192	180	165	172	160	322	301
Maximum absorbed current (FLA)		A	67	77	84	129	137	152	157
No. of compressors / circuits			2/1	2/1	2/1	4/2	4/2	4/2	4/2
Tank capacity		l	125	200	200	200	200	600	600
Sound power level, basic configuration	(8)(E)	dB(A)	84	85	85	85	86	87	87
Sound power level, low-noise configuration	(8)	dB(A)	81	82	82	82	83	84	84
Sound power level, super low-noise configuration	(8)	dB(A)	77	78	78	80	81	81	82
Weight without options		kg	740	865	865	1400	1400	1700	1700

HEAT PUMP VERSION - PLN H			52	72	82	104	114	134	154
Power supply		V-ph-Hz	400 - 3N - 50						
Cooling capacity	(1)(E)	kW	48,6	63,4	72	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)	W/W	2,88	2,99	2,86	2,86	2,83	3,12	2,97
SEER	(2)(E)	Wh/Wh	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
Pressure drop, water side	(1)(E)	kPa	25	30	37	49	57	32	38
Available head, low-head OR pump	(1)	kPa	158	144	128	116	104	199	180
Available head, high-head OR pump	(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)	W/W	3,28	3,32	3,32	3,24	3,29	3,03	3,22
SCOP low temperature	(4)(E)	Wh/Wh	3,80	3,70	3,82	3,90	4,00	3,80	3,95
Seasonal Heating Efficiency Class	(5)		A+	A+	A+	A++	A++	A+	A++
SCOP average temperature	(6)(E)	Wh/Wh	3,05	3,03	3,12	3,30	3,34	3,14	3,25
Low temperature energy efficiency class	(7)		A+	A+	A+	A++	A++	A+	A++
Water flow	(3)	l/h	9464	11898	13782	18364	20827	22910	26629
Pressure drop, water side	(3)(E)	kPa	29	33	42	49	59	32	40
Maximum absorbed current (FLA)		A	67	77	84	129	137	152	157
No. of compressors / circuits			2/1	2/1	2/1	4/2	4/2	4/2	4/2
Tank capacity		l	125	200	200	200	200	600	600
Sound power level, basic configuration	(8)(E)	dB(A)	84	85	85	85	86	87	87
Sound power level, low-noise configuration	(8)	dB(A)	81	82	82	82	83	84	84
Sound power level, super low-noise configuration	(8)	dB(A)	77	78	78	80	81	81	82
Weight without options		kg	655	790	800	1290	1360	1640	1730

(1) Outdoor air temperature 35°C, water temperature 12°C/7°C (EN14511:2022).

(2) Chilled 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 (EN14511:2022).

(3) Outdoor air temperature 7°C dry bulb and 6°C wet bulb, water temperature 40°C/45°C (EN14511:2022).

(4) The efficiency values in heating and cooling modes are calculated using the following formulas, respectively: [n=SCOP/2.5-F(1)-F(2)] and [n=SEER/2.5-F(1)-F(2)]. For further information, please refer to the "ErP DIRECTIVE 2009/125/EC" technical information found in the introductory pages of the catalogue or to Standard EN14825:2022. Low-temperature conditions.

(5) Seasonal energy efficiency class of space heating at LOW TEMPERATURE under AVERAGE weather conditions [REGULATION (EU) No. 811/2013. The energy efficiency class of this product is in the range A+++ to D].

(6) The efficiency values in heating and cooling modes are calculated using the following formulas, respectively: [n=SCOP/2.5-F(1)-F(2)] and [n=SEER/2.5-F(1)-F(2)]. For further information, please refer to the "ErP DIRECTIVE 2009/125/EC" technical information found in the introductory pages of the catalogue or to Standard EN14825:2022. Average temperature conditions.

(7) Seasonal energy efficiency class of space heating at MEDIUM TEMPERATURE under AVERAGE weather conditions [REGULATION (EU) No. 811/2013. The energy efficiency class of this product is in the range A+++ to D].

(8) Measured in accordance with ISO 9614.

(E) EUROVENT certified data.

The entire range is Eurovent-certified for the "Liquid Chilling Packages and Hydronic Heat Pumps (Chillers & Heat Pumps)" program

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

MULTIPURPOSE UNIT VERSION - PLN P			51	71	81	104	114	134	154
Power supply		V-ph-Hz	400 - 3N - 50						
COOLING MODE									
Cooling capacity	(1)(E)	kW	49,8	61,9	70,4	100	110	128	147
Total power input	(1)(E)	kW	16,9	20,9	24,9	34,8	39,0	41,3	49,6
EER	(1)(E)	W/W	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
Pressure drop, water side	(1)(E)	kPa	25	34	41	48	57	32	38
Available head, low-head OR pump	(1)	kPa	161	145	129	116	103	198	180
Available head, high-head OR pump	(1)	kPa	195	180	165	175	162	322	303
COOLING AND HEATING IN TOTAL HEAT RECOVERY MODE									
Cooling capacity	(2)(E)	kW	50,8	63	73	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)	W/W	7,68	7,86	7,62	7,71	7,71	7,82	7,80
HEATING MODE									
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)	W/W	3,39	3,39	3,36	3,33	3,42	3,38	3,36
SCOP low temperature	(4)(E)	Wh/Wh	3,86	3,75	3,72	3,94	4,03	3,84	3,97
Seasonal Heating Efficiency Class	(5)		A++	A+	A+	A++	A++	A++	A++
SCOP average temperature	(6)(E)	Wh/Wh	3,1	3,05	3,06	3,25	3,36	3,16	3,3
Low temperature energy efficiency class	(7)		A+	A+	A+	A++	A++	A+	A++
Water flow	(3)	l/h	9400	11761	13546	18317	20907	23365	27062
Pressure drop, water side	(3)(E)	kPa	25	35	45	48	59	33	40
Maximum absorbed current (FLA)		A	67	77	84	129	137	152	157
No. of compressors / circuits			2/2	2/2	2/2	4/2	4/2	4/2	4/2
Tank capacity		l	125	200	200	200	200	600	600
Sound power level, basic configuration	(8)(E)	dB(A)	84	85	85	85	86	87	87
Sound power level, low-noise configuration	(8)	dB(A)	81	82	82	82	83	84	84
Sound power level, super low-noise configuration	(8)	dB(A)	77	78	78	80	81	81	82
Weight without options		kg	800	940	940	1450	1460	1800	1800

(1) Outdoor air temperature 35°C, water temperature 12°C/7°C (EN14511:2022).

(2) Chilled 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 (EN14511:2022).

(3) Outdoor air temperature 7°C dry bulb and 6°C wet bulb, water temperature 40°C/45°C (EN14511:2022).

(4) The efficiency values in heating and cooling modes are calculated using the following formulas, respectively: [n=SCOP/2.5-F(1)-F(2)] and [n=SEER/2.5-F(1)-F(2)]. For further information, please refer to the "ErP DIRECTIVE 2009/125/EC" technical information found in the introductory pages of the catalogue or to Standard EN14825:2022. Low-temperature conditions.

(5) Seasonal energy efficiency class of space heating at LOW TEMPERATURE under AVERAGE weather conditions [REGULATION (EU) No. 811/2013. The energy efficiency class of this product is in the range A+++ to D].

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(7) Seasonal energy efficiency class of space heating at MEDIUM TEMPERATURE under AVERAGE weather conditions [REGULATION (EU) No. 811/2013. The energy efficiency class of this product is in the range A+++ to D].

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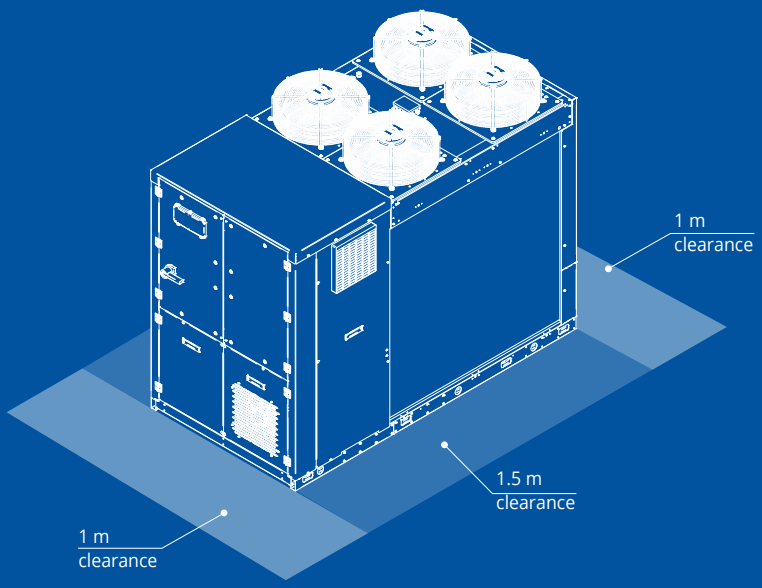
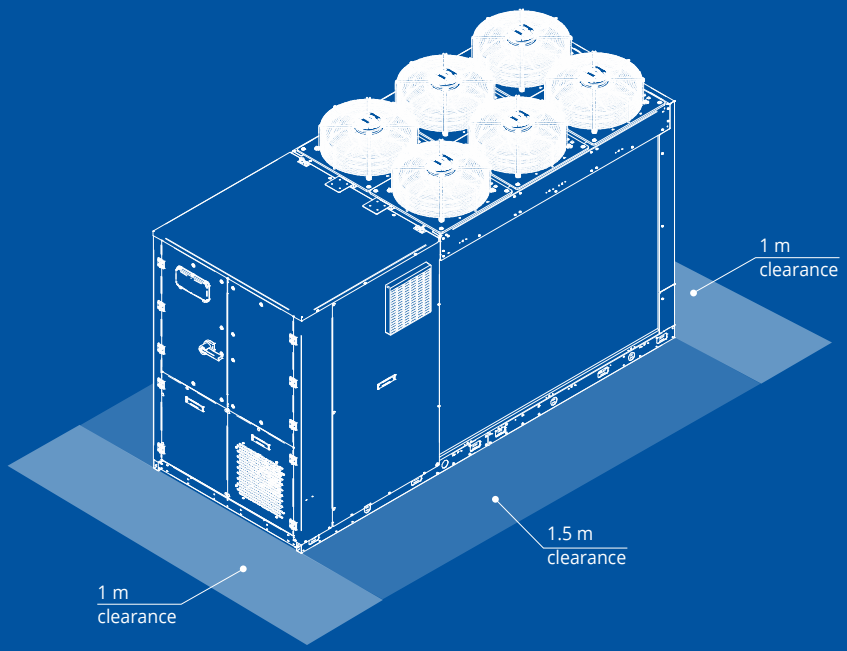
(E) EUROVENT certified data.

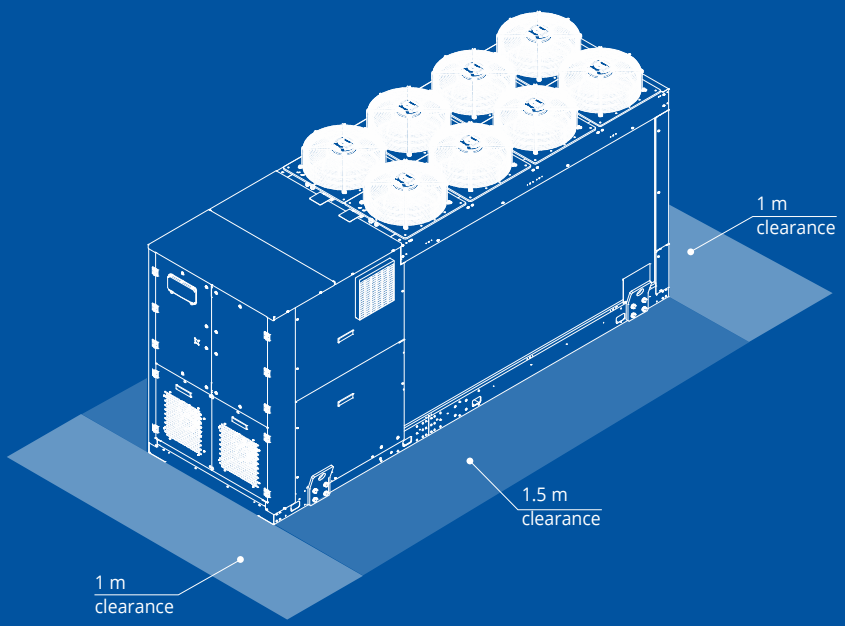
The entire range is Eurovent-certified for the "Liquid Chilling Packages and Hydronic Heat Pumps (Chillers & Heat Pumps)" program



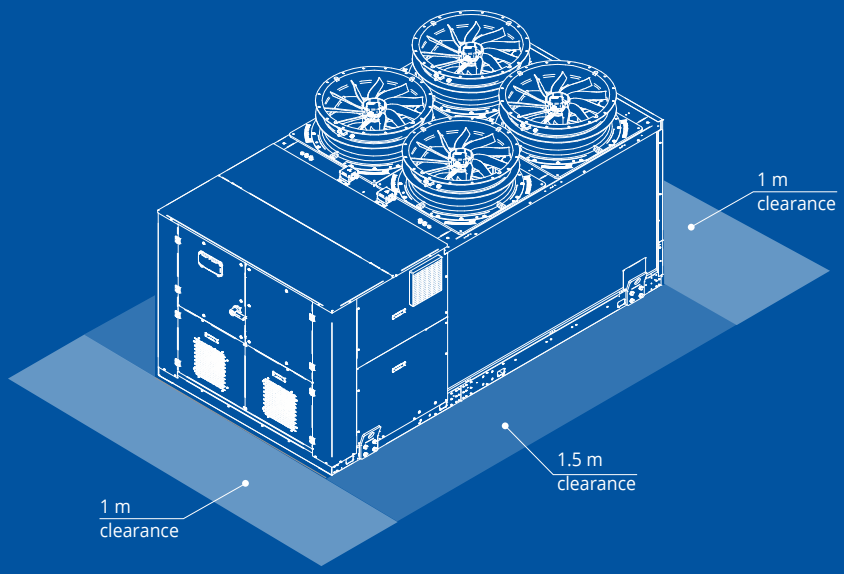
PLN 51	52	
Water inlet ø 2" F		
Water outlet ø 2" F		
D	1252 mm	
L	2356 mm	
H	1848 mm	



PLN 71	72	81	82	
Water inlet ø 2 1/2" F				
Water outlet ø 2 1/2" F				
D	1252 mm			
L	3027 mm			
H	1848 mm			



PLN 104 | 114	
Water inlet ø 2 1/2" F	
Water outlet ø 2 1/2" F	
D	1252 mm
L	3771 mm
H	1906 mm



PLN 134 | 154	
Water inlet ø 3" Victaulic	
Water outlet ø 3" Victaulic	
D	2014 mm
L	3821 mm
H	1952 mm

GABPBX252T

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