K20156 EN Ed.1

Electa-PI

THAITP 104-116

Reversible air-cooled heat pumps with axial fans.
Series with Inverter DC rotary hermetic compressors
and R290 eco refrigerant.

R290

EUROVENT CERTIFIED PERFORMANCE

RHOSS

NIBE GROUP MEMBER

1. RHOSS USEFUL FOR LEED

LEED certification - which stands for "Leadership in Energy and Environmental Design" - is now the most internationally established protocol for defining and assessing the environmental sustainability of buildings. It was introduced in 1998 by the US Green Building Council (USGBC) and was subsequently established internationally.

It is voluntary certification based on the consent that provides investors and all stakeholders with precise references for the design, construction and management of high performance green buildings.
LEED is a flexible system that can be applied to all types of buildings, both new and existing, and covers the entire life cycle of the building.
LEED certification is aimed at promoting a constructive transformation of the industry to achieve seven main objectives [LEED Version 4 - BD+C Guide]:

- Invert the contribution to climate change
- Improving individual health and wellbeing
- Protect and restore water resources
- Protect, improve and restore ecosystems and biodiversity
- Promote procurement cycles of sustainable and regenerative materials
- Create “green economy”
- Improving social equity, public health and quality of life

With LEED being a certification dedicated to buildings, products, technologies or building materials cannot be LEED certified but can only contribute to meeting the criteria of specific prerequisites and credits of the LEED Reference Guide and help increase the building’s score.

However, the conscious choice of certain products and technologies over others can have a significant impact on a building's total score, an impact of up to 50% of the total.
This is why the builder may have an important role in the certification process and provide concrete support to the concerned parties. The role of the manufacturer will be basically consist of two activities:

- Provide precise mapping of products and/or technologies, aimed at identifying which products can be used in a LEED project and which pre-requisite criteria and credits these products help fulfil
- Offer services and expertise that are able to simplify and facilitate a number of activities specifically required by LEED standards

RHOSS units have been analysed according to the criteria described in Version 4 of the LEED certification, published in November 2013 and currently still flanked by Version 3 of 2009, with particular attention paid to the LEED Building Design and Construction guide.

With regards to the minimum energy efficiency criteria, aimed at determining whether a particular model can be used in a LEED project, the reference standard of Version 4 is ASHRAE Standard 90.1-2010, section 6.4 - 6.8 and table 6.8.1C, which replaces ASHRAE Standard 90.1-2007 used as a reference for LEED certification Version 3. Clearly, all RHOSS models that meet the minimum efficiency criteria of Version 4 also automatically meet the criteria of Version 3.

RHOSS SpA is a member of USGBC and actively supports the awareness of the principles of the sustainable design in the world.

GLOSSARY

GWP = Global Warming Potential – An index that expresses the greenhouse effect caused by gas emission into the atmosphere. Each substance has a defined potential in relation to CO2 for which a potential of 1 has been conventionally defined.

LCGWP = Life Cycle Global Warming Potential - An index defining the global warming potential over the entire life cycle of the product. This index depends on: GWP of the refrigerant used, product lifetime, estimated annual and end-of-life refrigerant leakage, unit refrigerant charge.

LCODP = Life Cycle Ozone Depletion Potential - Index defining the stratospheric ozone depletion potential of the refrigerant used over the entire life cycle of the product. This index is equal to 0 for refrigerants of the HFC and HFO families (R134a, R410A, R32, R454B, R1234ze, R515B) and natural refrigerants.

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2. GENERAL SPECIFICATIONS

2.1. INTENDED CONDITIONS OF USE

THAITP units are reversible packaged heat pumps on the cooling circuit with evaporation/air cooled and axial fans, in the high efficiency version. They are suitable in air conditioning installations and industrial processes where chilled and heated water is required, not for human consumption.

The units are designed for outdoor installation

2.2. GUIDE TO READING THE CODE

T	Water production unit
H	Heat pump
A	Air cooled condensation
I	DC inverter hermetic rotary compressors
T	High efficiency
P	Propane refrigerant gas R290

1	Number of compressors
04-16	Approximate heating capacity (in kW)

The power value used to identify the model is approximate. For the exact value, identify the machine and consult the Technical Data.

Electrical supply

M	230V-1ph-50Hz
T	400V-3ph+N-50Hz

2.3. AVAILABLE SET-UPS

Pump PI0	Set up with an electronic circulator.

Example: THAITP 110 M PI0

- Water production unit
- Heat pump
- Air-cooled
- With hermetic rotary DC inverter compressor
- High efficiency unit
- With refrigerant fluid R290
- Nominal thermal power of approximately 10 kW
- Power supply 230V-1ph-50Hz
- Setup with PI0 pump

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3. CONSTRUCTION FEATURES

3.1. CONSTRUCTION FEATURES

o Load-bearing structure, base and panelling made of galvanised and painted sheet metal, black (Pantone black C) for the visible parts, base in galvanised and painted sheet steel.
o Inverter DC rotary hermetic compressor with variable capacity control, complete with thermal protection and crankcase heater.
o Electronic expansion valve.
o Suitably insulated brazed stainless steel plate heat exchanger on the water side, complete with antifreeze heater
o Air-side finned coil heat exchanger with copper tubes and aluminium-manganese fins with Golden Fin anti-corrosion treatment in epoxy resin and additional hydrophilic treatment.
o Condensate drip tray with ducted drainage equipped with electric heater, operating in winter mode with activation depending on outside temperature.
o Helical fan with brushless DC motors equipped with internal thermal protection and accident-prevention grilles.
o Proportional electronic device for pressure and continuous regulation of fan rotation speed.
o Male threaded hydraulic connections (1"GM for THAITP 104-114 and 1¼ "GM for THAITP 116).
o Cooling circuit, hermetically sealed, made with annealed copper tube (EN 12735- 1-2) complete with:
load connection, high and low pressure side safety pressure switch, pressure transducer on both the high and low side, gas separator, electronic thermostatic expansion valve, cycle reverse valve, liquid receiver.
o Unit with IPX4 protection rating.
o Control: microprocessor-based electronic unit, with remote touch-screen control panel, 5” colour display, 800x480 resolution, WiFi and Modbus connectivity, USB-C port, for integrated management of the heat pump and heating system, based on the various energy source usage needs.
- Management of 3-way diverter valve, electric resistance and temperature probe for the production of domestic hot water.
- Solar thermal management, with probe and solar pump.
- Rapid heating function for domestic hot water.
- Anti-legionella cycle function, with timer and electrical resistance.
- Auxiliary or supplementary heat source management.
- Secondary circuit management:
  - high temperature secondary circuit, with booster pump.
  - low temperature secondary circuit with mixing valve, probe and mixed zone pump in heating.
- On/Off valve management for shutting off part of the system, in heating or cooling mode.
- Management of water or ambient air temperature, using the air temperature probe installed in the control panel or remote ambient probe accessory (KSOA).
- Management via a room thermostat.
- Master/Slave management of up to 6 units of the same model in parallel
- Silent operation with timer.
- Weekly and daily time bands.
- Holiday mode and system antifreeze function
- Power consumption limitation function.
- View energy consumption with daily, monthly, and annual history.
- Parental control and start menu password.
- Unit activation (remote ON/OFF) and ACS mode activation from external contact (digital inputs).
- Contacts for Smart Grid and photovoltaic system integration (digital inputs).
- Additional/secondary/DHW recirculation pump contact and DHW diverter valve status (digital outputs)
- RS485 interface for serial communication with other devices (Modbus RTU protocol), present on the touch-screen control panel.
- Wi-Fi connection, present on the touch-screen control panel for management via EWPE Smart APP, downloadable from Google Play or Apple Store.

o The unit is complete with a charge of R290 refrigerant fluid.
- The unit is also complete with:
- outdoor temperature probe for set-point compensation;
- water temperature probe for domestic hot water storage (20 m – RT7).
- temperature probe for additional heat source or hydraulic separator (5.6 m – RT5).
- cable for touch-screen connection, length 8 m

Versions

- **T** High efficiency version.

PUMP set up

PI0 - Pumping unit complete with: multi-step EC circulator, degasser with safety valve (2.5 bar), automatic air vent valve, flow switch, expansion tank (5 litres), and water filter included.

Electrical panel

o Electrical panel accessible by opening the front panel, compliant with the current EN 60335-2-40 standards, consisting of non-igniting components and equipped with opening and closing using a special tool; complete with:
- wiring harnesses designed for supply voltage:
  230-1ph+N-50Hz for sizes 104-116M
  400-3ph+N-50Hz for size 116T
- numbered electrical cables.
- 230V-1ph+N-50Hz auxiliary circuit power supply from the main power supply.
- remotable machine controls and commands: remote on/off, auxiliary generator control (boiler), supplementary generator control (KRIT accessory).

o Programmable microprocessor electronic board managed by the remote touch-screen control panel; performs the following functions:

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- Adjustment and management of the machine's outlet water temperature settings; cycle reversal; safety timings; circulation pump; defrost cycles; electronic antifreeze protection with automatic activation when the machine is off; functions that regulate the intervention mode of the individual parts that make up the machine;
- Complete protection of the machine, possible shutdown and display of all the triggered alarms; total compressor and inverter protection by means of continuously monitoring the current absorbed by the compressor and operating pressures. The compressor can modulate automatically, regardless of the request if it goes out of its proper field of operation;
- Protection of the unit against low or high supply voltage on the phases;
- Multi-language display management (Italian, English, French, German, Spanish);
- Electronic expansion valve management;
- Management of compressor discharge temperature and intake and outlet pressures;
- Viewing of programmed sets via display; of in/out water temperatures via display; of alarms via display; of the refrigerator or heat pump operation using a specific icon;
- The following are stored for each alarm:
  - Alarm code and description;
  - Date and time triggered;
  - The unit it occurred in (in case of master/slave);
- Self-diagnosis with continuous monitoring of unit operation;
- User interface menu;

o Advanced functions:

- Unit pump control (primary), auxiliary pump control (back-up) or secondary pump zone 1 or DHW recirculation pump, mixed pump zone 2 control, solar pump control via dedicated contacts;
- Ability to set the unit pump status during standby;
- Provision for serial connection (on control panel);
- Possibility to manage up to two secondary circuits
  - Secondary circuit high temperature Zone 1 and low temperature Zone 2 with regulation on water temperature
  - Secondary circuit: high temperature Zone 1, with regulation on the water temperature, and low temperature Zone 2, via room thermostat, with Hot/Cold/OFF consent.
- Possibility of activating the DHW system with an external consent
- Possibility of managing an additional or auxiliary heat source (electrical resistance or boiler).
- Possibility of managing a DHW electrical resistance, a solar system, a diverter valve for DHW, a diverter valve for heating/cooling consent, a mixing valve for radiant system
- Management of time bands and operation parameters with the possibility of daily/weekly functioning programs;
- iOS and Android apps for managing the unit via smartphone and tablet.

o Check-up and verification of the scheduled maintenance status;

- Self-diagnosis with continuous monitoring of unit operation;
- Master/slave management logic integrated in the individual units;
- Smart Grid function and photovoltaic integration: the unit in the presence of a photovoltaic system maximises self-consumption and limits absorption from the grid.
- Display: daily energy consumption with COP, instantaneous heating and cooling capacity; historical consumption with average COP, total heating and cooling output, monthly and annual, in graphic format.
- Set-point regulation with variable water flow and variable water output.

3.2. SEPARATELY SUPPLIED ACCESSORIES

KAI-100	Inertial storage tank, with thermal handwheel or hydraulic circuit breaker function, for external installation under the Electa-PI unit; 33W dispersion losses, energy class A (class between F and A+).
KTAI-100	Connection pipe between Electa-PI unit and KAI tank.
KSA	Rubber anti-vibration mounts (only Electa-PI without KAI-100 accumulation).
KVDEV	3-way diverter valve control for domestic hot water production.
KRIT	Additional electrical resistance for system-side heat pump, managed by regulation
KPRU	Cable for touch-screen connection (30 m) instead of the cable supplied as standard.
KWTSM	Secondary mixed water circuit temperature probe (8 m).
KWTSS	Solar thermal temperature probe (20 m).
KPRP	Wiring for RS485 serial connection to the touch screen panel.
KSMS	Serial cable for connecting slave units (8 m), in case of master/slave management (provide one cable for each slave unit present)
KSOA	Remote air temperature probe for managing the unit on the room set-point; KCSOA connection cable required.
KCSOA	KSOA room probe connection cable (10 m).

See price list or contact Rhoss S.p.A. to check compatibility of accessories

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4. TECHNICAL DATA

THAITP Model			104 M	106 M	108 M	110 M
Cooling capacity EN 14511 [min / nom / max]	*(A35W7) (*)*	kW	2.30 / 4.50 / 4.80	2.30 / 6.10 / 6.20	3.20 / 7.50 / 7.50	3.20 / 8.90 / 8.90
EER EN 14511 [min / nom / max]	*(A35W7) (*)*		3.90 / 3.75 / 3.71	3.60 / 3.20 / 3.18	3.59 / 3.20 / 3.20	3.59 / 3.05 / 3.05
SEER EN 14825	*(AW7)*	kW	5,34	5,34	5.07	5.07
Thermal power EN 14511 [min / nom / max]	*(A7W45) (*)*	kW	2.32 / 4.50 / 5.20	2.36 / 6.10 / 6.69	4.43 / 8.20 / 8.50	4.46 / 10.00 / 10.30
COP EN 14511 [min / nom / max]	*(A7W45) (*)*		4.42 / 4.10 / 3.93	4.41 / 3.90 / 3.82	4.59 / 3.90 / 3.78	4.40 / 3.70 / 3.59
Thermal power EN 14511	*(A7W55)*	kW	4.00	6,00	7,20	8,50
COP EN 14511	*(A7W55)*	kW	3,80	3,70	3,60	3.30
SCOP EN 14825	*(AW55)*		3,87	3,87	3,87	3,87
Energy class	*(AW55)*		A+++	A+++	A+++	A+++
Cooling capacity EN 14511 [min / nom / max]	*(A35W18) (*)*	kW	2.54 / 4.50 / 5.31	2.54 / 6.20 / 6.86	3.54 / 8.30 / 8.30	3.54 / 10.00 / 10.00
EER EN 14511 [min / nom / max]	*(A35W18) (*)*		5.92 / 5.65 / 5.59	5.85 / 5.20 / 5.17	5.83 / 5.20 / 5.20	5.76 / 4.90 / 4.90
Thermal power EN 14511 [min / nom / max]	*(A7W35) (*)*	kW	2.40 / 4.50 / 5.30	2.40 / 6.20 / 6.80	4.50 / 8.40 / 8.60	4.50 / 10.00 / 10.40
COP EN 14511 [min / nom / max]	*(A7W35) (*)*		5.80 / 5.20 / 5.08	5.65 / 5.00 / 4.90	5.55 / 5.00 / 4.81	5.55 / 4.75 / 4.53
Nominal heating capacity EN 14511	*(A-7W35) (*)*	kW	4.00	5,50	7,00	8,00
COP EN 14511	*(A-7W35) (*)*		3,19	3.07	3,00	2,80
SCOP EN 14825	*(AW35)*		5,13	5,18	5,13	4,93
Energy class	*(AW35)*		A+++	A+++	A+++	A+++
Sound pressure	*(Lp - 5m)*	dB(A)	39	39	42	42
Sound power	*(Lw)*	dB(A)	65	65	68	68
Sound power EN 12102	*(Lw-pl)*	dB(A)	54	54	56	56
Compressor			Rotativo DC inverter			
Fans		n°xkW	1x0,15	1x0,15	1x0,15	1x0,15
Heat exchanger water content		l	0,8	0,8	1,0	1,0
Water side heat exchanger nominal flow	*(A35W7)*	m^3/h	774	1049	1290	1531
Useful head of circulator	*(A35W7)*	kPa	77	68	67	62
Carica refrigerante R290		kg	0,80	0,80	1,00	1,00
Total compressor oil charge		kg	0,45	0,45	0,68	0,68
Type of oil			Synthetic oil	Synthetic oil	PZ46M	PZ46M
Electrical data						
Absorbed power in summer operation	*(A35W7)*	kW	0.59 / 1.20 / 1.29	0.64 / 1.91 / 1.95	0.89 / 2.34 / 2.34	0.89 / 2.92 / 2.92
Absorbed power in winter mode	*(A7W45)*	kW	0.52 / 1.10 / 1.32	0.54 / 1.56 / 1.75	0.97 / 2.10 / 2.25	1.01 / 2.70 / 2.87
Absorbed power in summer operation	*(A35W18)*	kW	0.43 / 0.80 / 0.95	0.43 / 1.19 / 1.33	0.61 / 1.60 / 1.60	0.61 / 2.04 / 2.04
Absorbed power in winter mode	*(A7W35)*	kW	0.41 / 0.87 / 1.04	0.42 / 1.24 / 1.39	0.81 / 1.68 / 1.79	0.81 / 2.11 / 2.30
Electrical power supply		V-ph-Hz	230 – 1 – 50	230 – 1 – 50	230 – 1 – 50	230 – 1 – 50
Rate current		A	5,2	8,3	10,2	12,7
Maximum current		A	10,4	12.2	18,7	18,7
Dimensions						
Width		mm	1210	1210	1210	1210
Height		mm	880	880	880	880
Depth		mm	450	450	450	450
Water connections		Ø	1"	1"	1"	1"
Weight						
Net weight		kg	110	110	118	118
Gross weight		kg	128	128	135	135

min / nom / max Minimum / nominal / maximum

(A35W7) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; evaporator temperature differential 5 K; fouling factor of 0.

(A7W45) In the following conditions: Evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 45°C; condenser temperature differential 5 K; fouling factor of 0.

(A7W55) In the following conditions: Evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 55°C; condenser temperature differential 8 K; fouling factor of 0.

(A35W18) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 18°C; evaporator temperature differential 5 K; fouling factor of 0.

(A7W35) In the following conditions: Evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 35°C; condenser temperature differential 5 K; fouling factor of 0.

(A-7W35) In the following conditions: Evaporator inlet air temperature -7°C D.B., -8°C W.B.; hot water temperature 35°C; condenser temperature differential 5 K; fouling factor of 0.

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THAITP Model			112 M	114 M	116 M	116 T
Cooling capacity EN 14511 [min / nom / max]	*(A35W7) (*)*	kW	6.00 / 11.60 / 11.60	6.00 / 12.80 / 12.80	5.26 / 14.00 / 14.51	5.26 / 14.00 / 14.51
EER EN 14511 [min / nom / max]	*(A35W7) (*)*		3.94 / 3.15 / 3.15	3.94 / 2.95 / 2.95	3.36 / 2.85 / 2.82	3.36 / 2.85 / 2.82
SEER EN 14825	*(AW7)*	kW	4,90	4,90	4,33	4,33
Thermal power EN 14511 [min / nom / max]	*(A7W45) (*)*		6.45 / 12.00 / 12.58	6.44 / 14.00 / 14.46	6.62 / 15.50 / 16.00	6.62 / 15.50 / 16.00
COP EN 14511 [min / nom / max]	*(A7W45) (*)*	kW	4.20 / 3.80 / 3.49	4.29 / 3.70 / 3.43	4.09 / 3.75 / 3.51	4.09 / 3.75 / 3.51
Thermal power EN 14511	*(A7W55) (*)*		12,00	14,00	15,50	15,50
COP EN 14511	*(A7W55) (*)*		3.10	3,00	3,00	3,00
SCOP EN 14825	*(AW55)*		3,57	3.55	3.50	3,43
Energy class	*(AW55)*		A++	A++	A++	A++
Cooling capacity EN 14511 [min / nom / max]	*(A35W18) (*)*	kW	6.21 / 12.00 / 12.00	6.56 / 14.00 / 14.00	6.84 / 15.50 / 18.86	6.84 / 15.50 / 18.86
EER EN 14511 [min / nom / max]	*(A35W18) (*)*		5.75 / 4.60 / 4.60	5.75 / 4.30 / 4.30	5.19 / 4.40 / 4.36	5.19 / 4.40 / 4.36
Thermal power EN 14511 [min / nom / max]	*(A7W35) (*)*	kW	6.50 / 12.00 / 12.90	6.50 / 14.00 / 14.90	6.67 / 15.50 / 16.49	6.67 / 15.50 / 16.49
COP EN 14511 [min / nom / max]	*(A7W35) (*)*		5.50 / 4.95 / 4.65	5.50 / 4.70 / 4.49	5.15 / 4.70 / 4.53	5.15 / 4.70 / 4.53
Nominal heating capacity EN 14511	*(A-7W35) (*)*	kW	10,00	11,50	12,00	12,00
COP EN 14511	*(A-7W35) (*)*		2,80	2,71	2,82	2,82
SCOP EN 14825	*(AW35)*		4.75	4,73	4.75	4.70
Energy class	*(AW35)*		A+++	A+++	A+++	A+++
Sound pressure	*(Lp - 5m)*	dB(A)	44	44	41	41
Sound power	*(Lw)*	dB(A)	70	70	67	67
Sound power EN 12102	*(Lw-pl)*	dB(A)	58	58	57	57
Compressor			Rotativo DC inverter			
Fans		n°xkW	1x0,15	1x0,15	2x0,15	2x0,15
Heat exchanger water content		l	1,1	1,1	1,4	1,4
Water side heat exchanger nominal flow	*(A35W7)*	m^3/h	1995	2202	2408	2408
Useful head of circulator	*(A35W7)*	kPa	58	53	47	47
R290 refrigerant charge		kg	1,20	1,20	1,50	1,50
Total compressor oil charge		kg	0,81	0,81	0,81	0,81
Type of oil			PZ46M	PZ46M	PZ46M	PZ46M
Electrical data						
Absorbed power in summer operation	*(A35W7)*	kW	1.52 / 3.68 / 3.68	1.52 / 4.34 / 4.34	1.57 / 4.91 / 5.15	1.57 / 4.91 / 5.15
Absorbed power in winter mode	*(A7W45)*	kW	1.53 / 3.16 / 3.60	1.50 / 3.78 / 4.21	1.62 / 4.13 / 4.55	1.62 / 4.13 / 4.55
Absorbed power in summer operation	*(A35W18)*	kW	1.08 / 2.61 / 2.61	1.14 / 3.25 / 3.25	1.32 / 3.52 / 4.33	1.32 / 3.52 / 4.33
Absorbed power in winter mode	*(A7W35)*	kW	1.18 / 2.42 / 2.77	1.18 / 2.98 / 3.32	1.30 / 3.30 / 3.64	1.30 / 3.30 / 3.64
Electrical power supply		V-ph-Hz	230 – 1 – 50	230 – 1 – 50	230 – 1 – 50	400 – 3+N – 50
Rate current		A	16,0	18,9	21,3	7,1
Maximum current		A	20.7	25.7	30.0	8,5
Dimensions						
Width		mm	1210	1210	940	940
Height		mm	880	880	1615	1615
Depth		mm	450	450	460	460
Water connections		Ø	1''	1''	1¼"	1¼"''
Weight						
Net weight		kg	138	138	179	179
Gross weight		kg	155	155	197	197

(Lp - 5m)	Sound pressure level in dB(A) referred to a measurement 5m from the unit, in a free field and with directionality factor Q=2 in accordance with the UNI EN ISO 3744 standard, relating to the power level Lw.
(Lw)	Sound power level in dB(A) on the basis of the measurements made in compliance with the UNI EN ISO 9614 and Eurovent 8/1 Standards.
(Lw-pl)	Sound power level in dB(A) on the basis of the measurements made in compliance with the EN12102, UNI EN-ISO 9614 and Eurovent 8/1. Standards.
(AW7)	Low temperature space cooling (7/12°C) (Regulation (EU) 2016/2281)
(AW35)	Low temperature space heating (35/30°C) in Average climate (Regulations (EU) No. 811/2013 and No. 813/2013)
(AW55)	Medium temperature space heating (55/50°C) in Average climate (Regulations (EU) No. 811/2013 and No. 813/2013)
(*)	Data according to EN14511

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5. ENERGY EFFICIENCY

Seasonal efficiency indices according to EN 14825: SCOP and SEER

Standard EN 14825 defines the calculation method to determine the summer (SEER) and winter (SCOP) seasonal efficiency indices of heat pumps, summing the machine's performance in one value that considers the temperature variations of outdoor air, water produced, and partialisation degree of the compressor.

Variable	Description
Project temperature:	Europe divided into 3 climate bands: Colder (Helsinki climate): -22°C Average (Strasbourg climate): -10°C Warmer (Athens climate): 2°C
User side water temperature:	Low temperature (LT): 35°C fixed or variable according to the outdoor air temperature Intermediate temperature (IT): 45°C fixed or variable according to the outdoor air temperature Medium temperature (MT): 55°C fixed or variable according to the outdoor air temperature High temperature (HT): 65°C fixed or variable according to the outdoor air temperature
Compressor partialisation degree	The standard considers, with due coefficient corrective features, the inefficiency of partial loads with “On-Off” operation of the heat pumps.
Outdoor air temperature frequency occurrence	The number of hours of occurrence of each outdoor air temperature value expressed in degrees, during the heating season.
Bivalent T	Temperature at which pdc fulfils the load at 100% Colder (Helsinki climate): -7°C or lower Average (Strasbourg climate): 2°C or lower Warmer (Athens climate): 7°C or lower

SCOP is calculated by using the Bin Method as an average weight of efficiency (COP) of the heat pump on the frequency of occurrence of outdoor air temperature.

The seasonal efficiency in SEER cooling mode depends on a unique 35° design temperature and can be calculated for 2 types of distribution:
- Radiant panel (Water T at a fixed point equivalent to 18°C)
- Fan coil (water T at a fixed point equivalent to 7°C or variable according to the outdoor air temperature

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6. ELECTRONIC CONTROLS

Remote management via control panel

The remotely-controllable control panel with touch-screen allows you to view the operating temperature and all the process variables of the unit, and to access the settings of the work set-point and edit them.
Using a password, it is possible to gain access to the unit's management parameters (access permitted only to authorised personnel).
The remote control panel has a room temperature probe inside.
The maximum distance from the unit to the control panel is 8 m with the cable supplied, up to 30 metres with the KPRU accessory (connection to be made by the installer).

No.	Item	Description
1	Status	Status and active functions
2	Date and time	Current date (year-month-day) + time (hours:minutes).
3	Menu	Allows access to the menu page from the home page
4	Temperature set-point adjustment (-)	Allows the desired temperature to be decreased.
5	Minimum temperature	Indicates the minimum value of the selectable temperature range.
6	Temperature Cursor	Allows quick setpoint adjustment by moving the cursor.
7	Outlet water temperature	When Control Temp is set to T-flow, the instantaneous temperature of the water leaving the heat pump will be displayed and in “Heating” mode the temperature with auxiliary heater or heat source, if active.
	Ambient air temperature	When Control Temp is set to T-Environment, the room temperature measured by the remote probe RT6 will be displayed (KSOA accessory).
		When Control Temp is set to T-controller, the measured room temperature is shown on the touch control panel.
	Domestic hot water (DHW) temperature	Indicates the temperature of the water in the DHW tank when DHW mode is activated.
8	Delivery water setpoint	Indicates the output water setpoint in heating, heating+DHW, cooling and cooling+DHW modes.
	Domestic hot water (DHW) setpoint	Indicates the water setpoint in the DHW tank when the DHW mode is activated.
9	Mode	Current mode e.g. system heating
10	Maximum temperature	Indicates the maximum value of the selectable temperature range.
11	Setpoint adjustment (+)	Allows the desired temperature to be increased.
12	On/Off	Allows the unit to be switched on or off. If the icon is coloured brown then the unit is on, if coloured white it is off. In the event of an error or fault, the stop icon is displayed and the unit is automatically switched off.
13	Menu pop-up	Quick settings access Mode Quiet mode Timer
14	Outdoor temperature	Outdoor temperature measured by the outdoortemperature sensor
15	Room thermostat	The unit is managed by a third-party room thermostat, with ON/OFF control and Hot/Cold mode

11

Home page

Tapping the Menu icon takes you to the Menu >:

Menu page

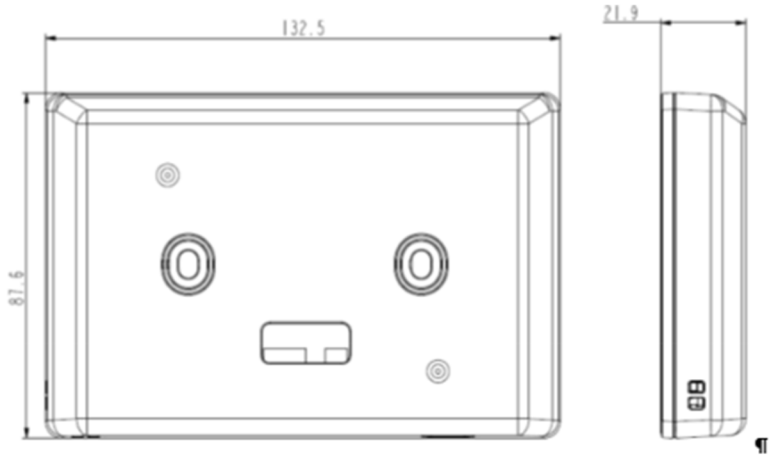
- Setting page: Settings Allows you to view the operating parameters.
- View: View Allows you to view the status of the parameters.
- General: General Allows you to view the setting parameters
- By touching the Settings icon you can access the settings pages of the functions and parameters >

Setting > Mode page

The operating modes that can be set are:

- Cool
- Heat
- DHW
- Cool+DHW
- Heat+DHW

Wall installation



Dimensions 133 x 88 x 22 cm

The control panel must be installed on the wall, inside the home, in closed and sheltered environments.
It is not built for outdoor installation.
The support is compatible with two-module recessed boxes (Bticino 502E type).

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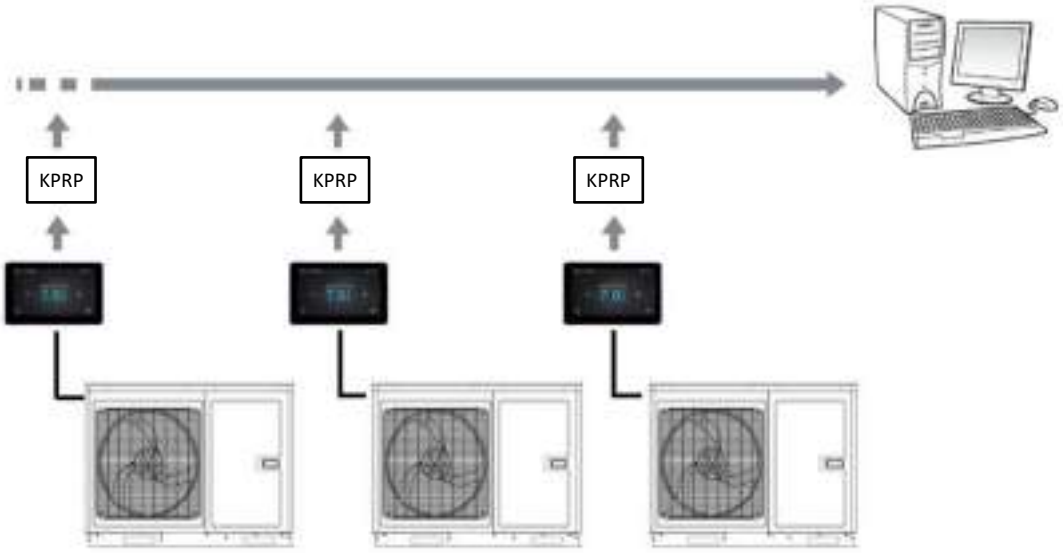
7. SERIAL CONNECTION

All units are equipped with an electronic controller for communicating with an external BMS via a serial communication line (ModBus® RTU).
The RS485 serial connection can be made via the touch-screen control panel; the KPRP accessory - Wiring for RS485 serial connection of the touch-screen panel is available.

Supervision

In general, a supervision system allows access to all unit functions, such as:

- implementing all settings that are accessible via the keyboard
- reading all process variables of the inputs and outputs, digital or analogue
- reading the various alarm codes that are present and resetting them as necessary



KPRP	Wiring for RS485 serial connection to the touch screen panel (KPRP accessory).

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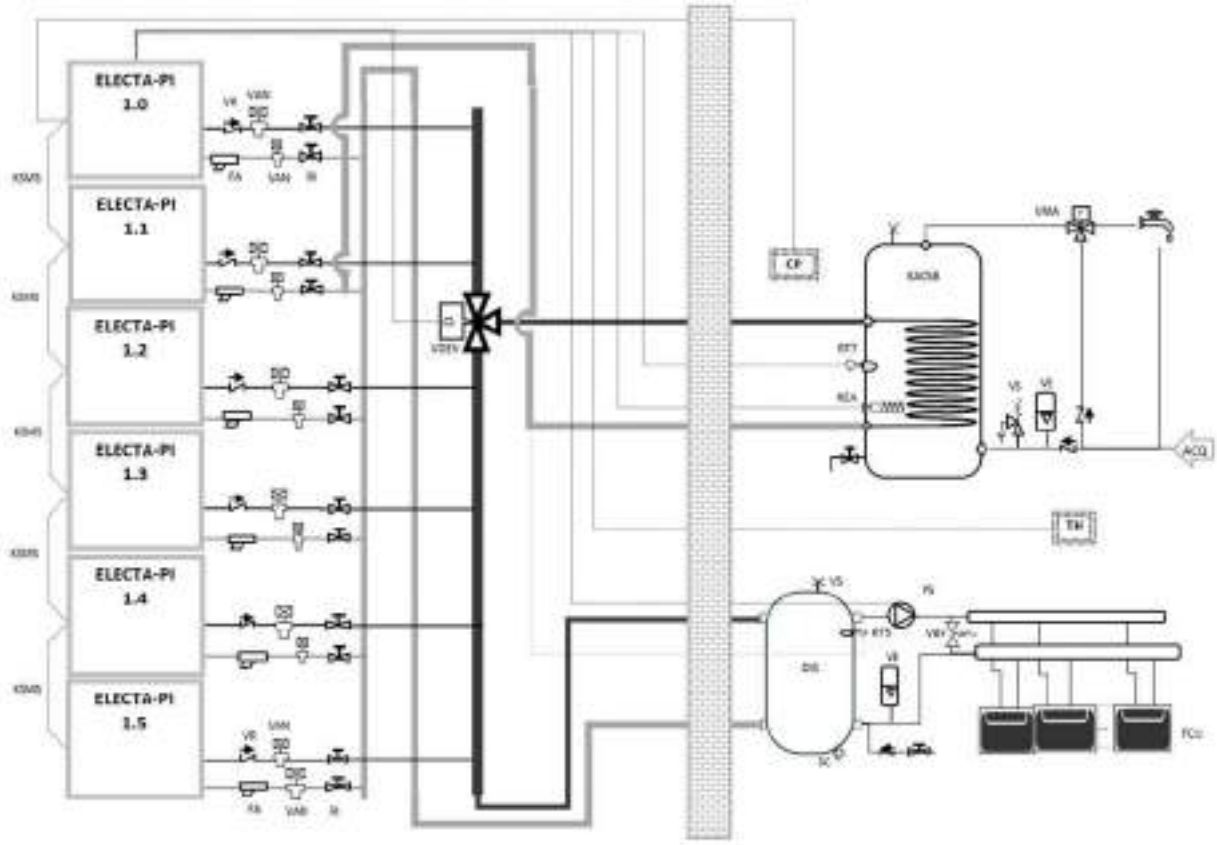
8. ADVANCED FUNCTIONS

8.1. INTEGRATED MASTER/SLAVE MANAGEMENT SEQUENCER

The units feature a function that allows you to manage up to 6 identical units (1 master + 5 slaves), through a single control panel, connected to the master unit.
The built-in Sequencer allows for the management, based on a master-slave logic, of units connected according to an hydraulic parallel design without the use of external devices or hardware.
The units can be used for cooling/heating the room and for the production of domestic hot water on the DHW circuit.
The production of hot water, DHW side, is possible from each unit and involves the use of a 3-way diverter valve, in the hydraulic circuit, located down-stream of the units intended for DHW production.
The production of domestic hot water is possible only for the units located upstream of the 3-way diverter valve.
For example, in the figure below, only units 1.0 and 1.1 can produce domestic hot water and water for heating and cooling; while units 1.2, 1.3, 1.4, 1.5 are able to produce water only for heating and cooling on the system side.
This management logic allows for an optimised distribution of the load between the units, ensuring maximum use of the heat exchanger; reduces frost formation and operating noise, with benefits in terms of efficiency and acoustic comfort.



1.0	Master unit
1.1 - 1.2 - 1.3 - 1.4 - 1.5	Slave units
VDEV	3-way diverter valve
VR	Check valve
VAN	Antifreeze valve
FA	Water filter (supplied as standard)
RI	Tap
RT5	Temperature probe for additional heat source or hydraulic separator (supplied as standard)
CP	Touch-screen control panel
KSMS	Serial cable for connecting slave units (length 8 m), in case of master/slave management (KSMS accessory).

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Nota bene
The units must be installed close to each other, the domestic hot water units must be installed one after the other, starting from the master unit.
Non-return valves must be installed in the parallels to prevent short-circuiting of the flow through the unit when the circulator is not running.
It is necessary to install the temperature probe for hydraulic circuit breaker (RT5) downstream, near the water outlet of the hydraulic divider, serving the group of units.

The unit makes available, on the electronic board on board the machine (XT6), the terminals for the serial connection between the master and slave units: a serial cable is also available for connecting slave units (KSMS accessory, length 8 m): provide a cable for each slave unit.
For master/slave management the units must be addressed with a progressive number, from 0 to 5, through the DIP switch setting on the board.
The control panel must be connected to the master unit of the group, with DIP set to 0; the number of units, DHW side, is set in the configuration parameters.
The connection of the DHW diverter valve, the DHW temperature probe and the DHW side electrical resistance must be carried out only on the master unit of the group.
The master unit has the task of controlling all slave units and evaluating, based on the system's load demand, how many and which units to turn on to satisfy it, providing operating mode and set-point.
Balancing the operating hours of the unit is another important aspect of the sequencer: the rotation of the units and compressors is guaranteed on the basis of cumulative working hours.
It is also possible to set the following system-side configuration parameters: quantity of units, optimal compressor frequency, compressor on/off delay between units; On the ACS side, it is necessary to set the quantity of units connected to the DHW system.

The various managed components (pumps, valves, probes, auxiliary or supplementary heat source) must be connected only to the master unit.
In the display, the operation of the master unit can be set and the operating information of the individual master and slave units is shown.

The master unit, managed via sequencer, can be supervised via RS485 serial network.

NOTE: the sequencer does not have compulsory start-up. Contact Rhoss Service for more information on enabling function or start-up by authorised technical personnel.

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8.2. SMART GRID FUNCTION AND PHOTOVOLTAICS

There is Smart Grid logic in the unit to minimise energy consumption when connected to the power grid and in the presence of photovoltaics.
The unit is set up for the self-consumption of photovoltaic energy through the accumulation of thermal energy via the EVU input.
The unit is also able to receive a status signal from the power grid, the SG input, in order to limit consumption from the power grid.
The Smart Grid function is activated by connecting the two inputs to the board named: EVU and SG.
Activation of the Smart Grid function must be set from the control panel.
The operating logic is as follows:

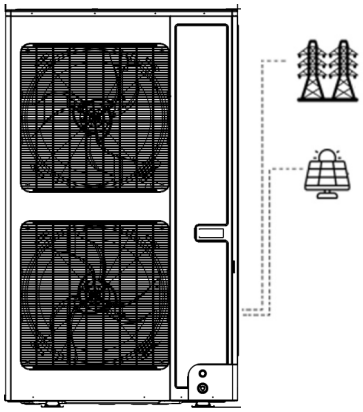
Smart grid signal	Photovoltaic signal	Command sent to unit	Unit status
0	0	Switch-off command	Off
1	0	Standard operation	On with standard set-point
0	1	Switch-on request	On with intermediate set-point
1	1	Switch-on command	On with enhanced set-point

0: open contact
1: closed contact

Based on the command sent to the unit, the following features can be achieved.

Command sent to unit	**Switch-on request**	**Switch-on command**	**Standard operation**	**Switch-off command**
Temperature set for mode	Intermediate set point	Enhanced set-point	Standard set-point	Unit off
Cooling	Cooling delivery T + Cooling delivery ΔT	T Cool Range	T-Out Cool	OFF
Set-point	13°C	10°C	18°C	OFF
Heating	Heating supply T + Heating supply ΔT	T Heat Range	T Out Heat	OFF
Set-point	50°C	55°C	45°C	OFF
DHW	DHW tank T + DHW tank ΔT	T DHW Range	T DHW tank	OFF
Set-point	55°C	60°C	50°C	OFF

By setting the configuration parameters indicated in the table, it is possible to modify the set-point, obtaining the desired set-point values for each operating mode.
The function takes into account the activation of climate compensation and the presence of electric resistances.



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9. PERFORMANCE

UP TO DATE

By means of the Rhoss Up To Date software selection, you are able to obtain:

- o Unit performance data under project conditions
- o Technical data of the selected unit, exchanger pressure drops and residual heads in case the unit is equipped with pumps
- o Heat recovery units RC100 and DS performance data

9.1. SOUND POWER AND PRESSURE LEVELS

		Sound power level per dB octave bands								Lw	Lw	Average sound pressure level dB(A)		
Models		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A) EN12102	Lp 1m	Lp 5m	Lp 10m
THAITP	**104M**	49,1	56,4	58,2	64,7	59,7	52,9	50.4	45,4	65	54	50	39	34
	106M	52,0	51,3	60,6	65.2	58,0	56,1	55,1	49,9	65	54	50	39	34
	108M	48,2	58,2	61,6	64,8	64,1	59,2	54,4	52,0	68	56	53	42	37
	110M	51,1	55.5	62,0	63,7	65,0	60,9	56,7	55,6	68	56	53	42	37
	112M	52,0	54,5	60,2	66,1	65,3	63,7	56,2	53,4	70	58	55	44	39
	114M	53,2	57.6	62,4	67,4	66,6	63,0	58,8	50,9	70	58	55	44	39
	116M	52.6	54,6	61,6	63,6	64,3	59,8	52,3	47,6	67	57	52	41	36
	116T	52.6	54,6	61,6	63,6	64,3	59,8	52,3	47,6	67	57	52	41	36

Lw	Total sound power level in dB(A) on the basis of the measurements made in compliance with the UNI EN-ISO9614 and Eurovent 8/1 Standards
Lp	Mean sound pressure levels in dB(A) according to ISO 3744

NOTE
The Eurovent certification refers to the sound power value in dB(A) and it is the only binding acoustic data. The mean sound pressure levels refer to the values calculated by the sound power for units installed in free field with a directionality factor Q = 2 according to ISO 3744. The distance, measured in metres, is provided in brackets. It is not possible to extrapolate sound pressure values for different distances. The inverter compressors reduce the noise levels of the chiller when operating with a partial load, which means for most of its service life.

Sound levels in SILENT mode

Mode	QUIET	Average sound pressure reduction dB(A)
Models		**Lp (1m)**
THAITP	**104M**	-7
THAITP	**106M**	-5
THAITP	**108M**	-7
THAITP	**110M**	-5
THAITP	**112M**	-8
THAITP	**114M**	-8
THAITP	**116M**	-4
THAITP	**116T**	-4

NOTE
The noise reduction values refer to the default configuration for silent mode. Any variations from this configuration will result in values different from those reported in the table.
The heating or cooling power supplied varies according to the working conditions and the distance from the setpoint.
In silent mode, power can be reduced by up to 40% of nominal values on average.

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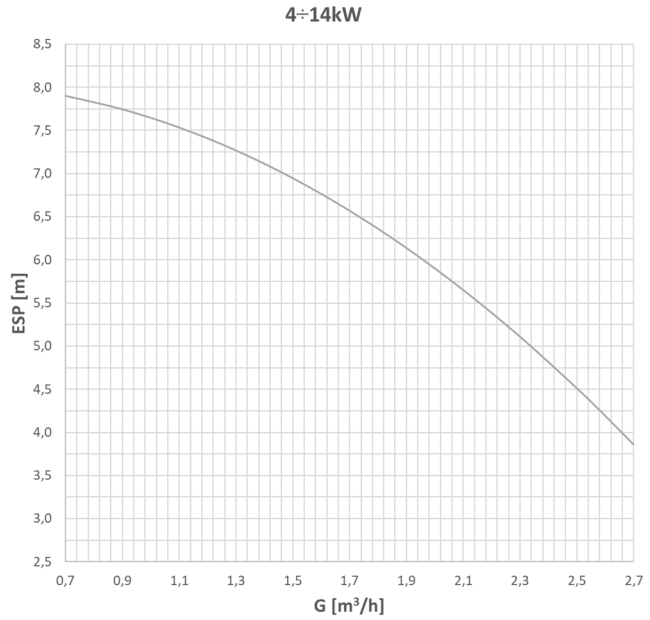
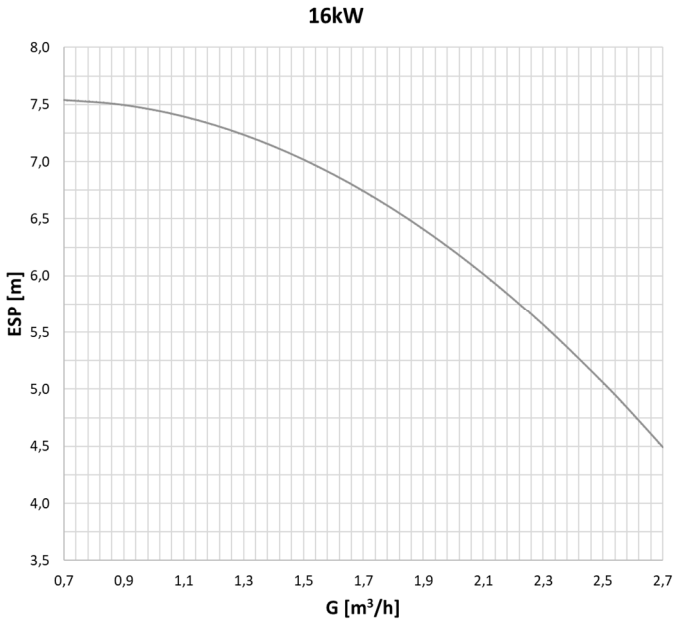
10. CIRCULATOR AVAILABLE STATIC HEAD (KPA)

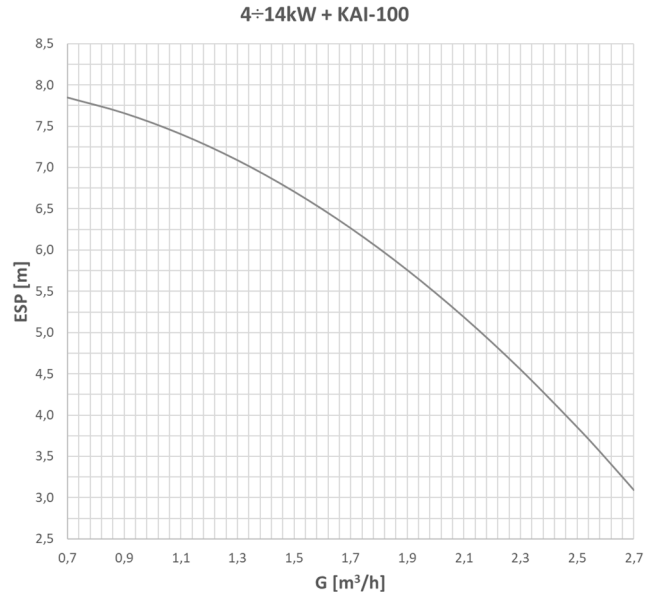
THAITP 104 - 114



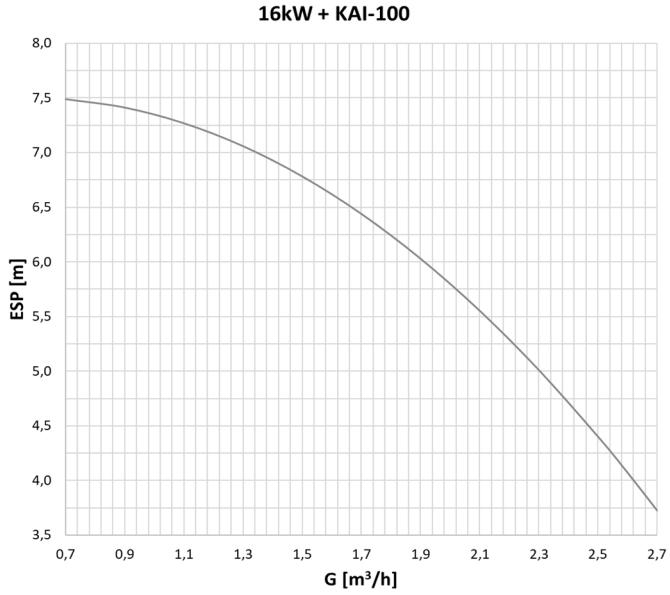
THAITP 116



THAITP 104 -114 + KAI-100



THAITP 116+KAI-100



ESP = circulator available static head
G = water flow rate

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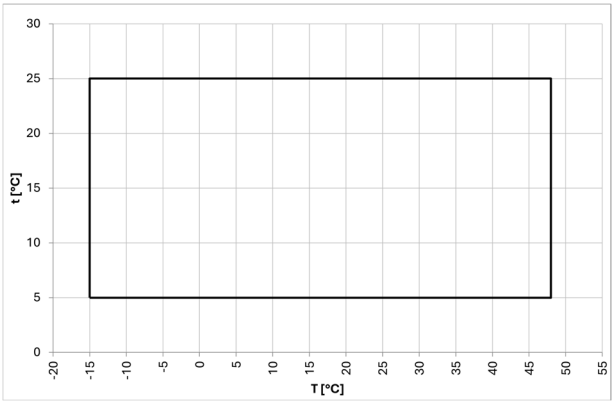
11. OPERATING LIMITS

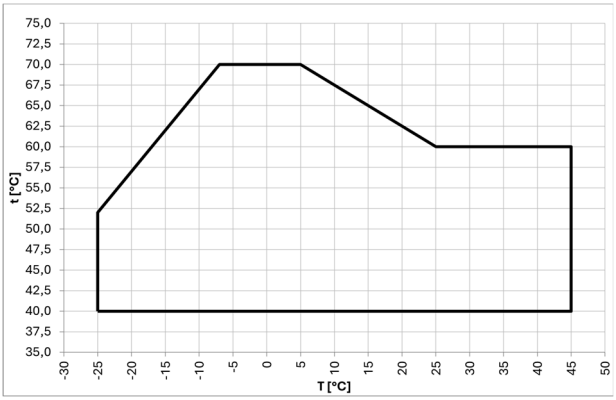
11.1. FUNCTIONING LIMITS

Winter

Summer



DHW



t(°C)	Temperature of the water produced
T(°C)	Outdoor air temperature (D.B.)

In summer mode:
- Maximum water inlet temperature 27°C.

In winter mode:
- Minimum inlet water temperature 18°C.
- Maximum water inlet temperature 78°C.
- Maximum water temperature produced with integrative electrical resistance on the system side: 80°C.

In DHW mode:
- Air temperature -25-45°C.
- DHW storage temperature from heat pump: 40°- 70°C
- Maximum DHW storage temperature with additional electric heater on DHW side: 80°C.

Thermal gradients
- Heat exchanger thermal gradient ΔT = 2 - 10°C
- DHW thermal gradient ΔT = 2 - 25°C

- Minimum water pressure 0.5 Barg.
- Maximum water pressure 2.5 Barg.

Nota bene:
In the permitted field of operation, the compressor and inverter are protected by a controller through continuous monitoring of the current absorbed by the compressor, operating pressure and output temperature. The compressor can modulate the rotation speed automatically, regardless of the set-point request if it goes out of its proper field of operation.

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11.2. TEMPERATURE DIFFERENTIALS PERMITTED THROUGH THE HEAT EXCHANGERS

Thermal gradient at the exchanger ΔT = 2 - 10°C. However, take into account the maximum/minimum flow rates shown in the “Water flow limits” tables. The maximum and minimum thermal gradient for the machines is however related to the performance of the pumps which must always be verified using the RHOSS Spa selection software

11.3. WATER FLOW LIMITS EXCHANGER

Exchanger type		**Plate**	
Model	**Water flow rate**	**Min**	**Max**
104 M	m^3/h	0,5	4,8
106 M	m^3/h	0,5	4,8
108 M	m^3/h	1,0	8,8
110 M	m^3/h	1,0	8,8
112 M	m^3/h	1.5	8,8
114 M	m^3/h	1.5	8,8
116 M	m^3/h	2,0	9,2
116 T	m^3/h	2,0	9,2

Model		**104 M**	**106 M**	**108 M**	**110 M**	**112 M**	**114 M**	**116 M**	**116 T**
Heat exchanger water content	l	0,8	0,8	1,0	1,0	1,1	1,1	1,4	1,4

11.4. ANTI-FREEZING PROTECTION

The use of antifreeze solutions (e.g. glycol) is not permitted.

The unit is equipped with antifreeze protection which is active in certain operating conditions to avoid unwanted freezing effects during downtime. The function involves the activation of the electrical resistance of the primary exchanger (below 5°C), of the circulation pump and of the compressor, below 3°C of outdoor air temperature.

To ensure frost protection, the unit must be kept electrically connected and powered.

In case it is not possible to keep the unit continuously powered, with low external temperatures below 0°C, it is recommended to insert antifreeze valves into the system or draining the system.

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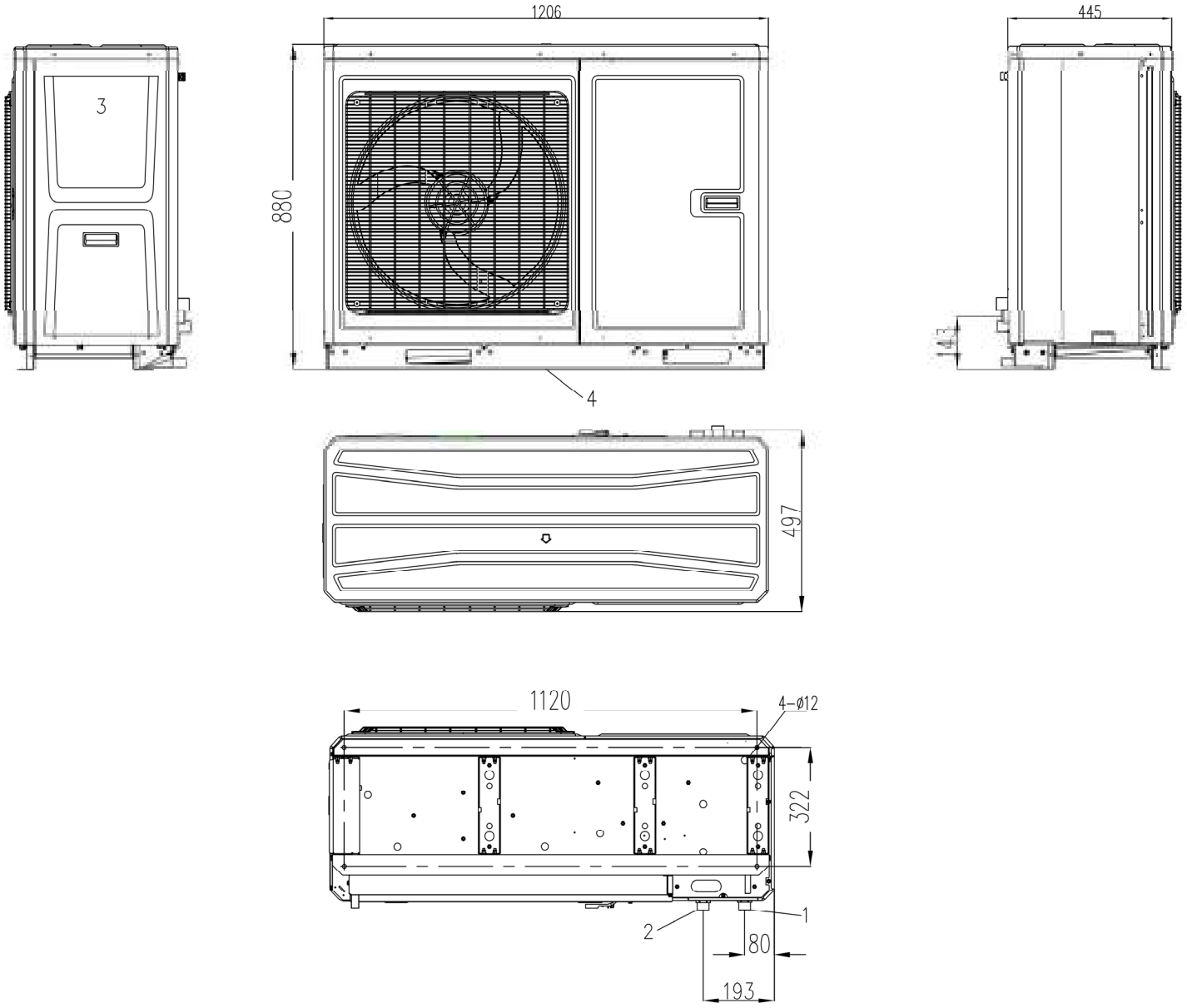
12. SIZE, OVERALL DIMENSIONS AND HYDRAULIC CONNECTIONS

THAITP 104M – 106M – 108M – 110M – 112M – 114M



1	Water inlet (1")
2	Water outlet (1")
3	Ingresso alimentazione elettrica
4	Condensation drain outlet (16mm)

Model THAITP	**104**	**106**	**108**	**110**	**112**	**114**
Net weight	110	110	118	118	138	138
Gross weight	128	128	135	135	155	155

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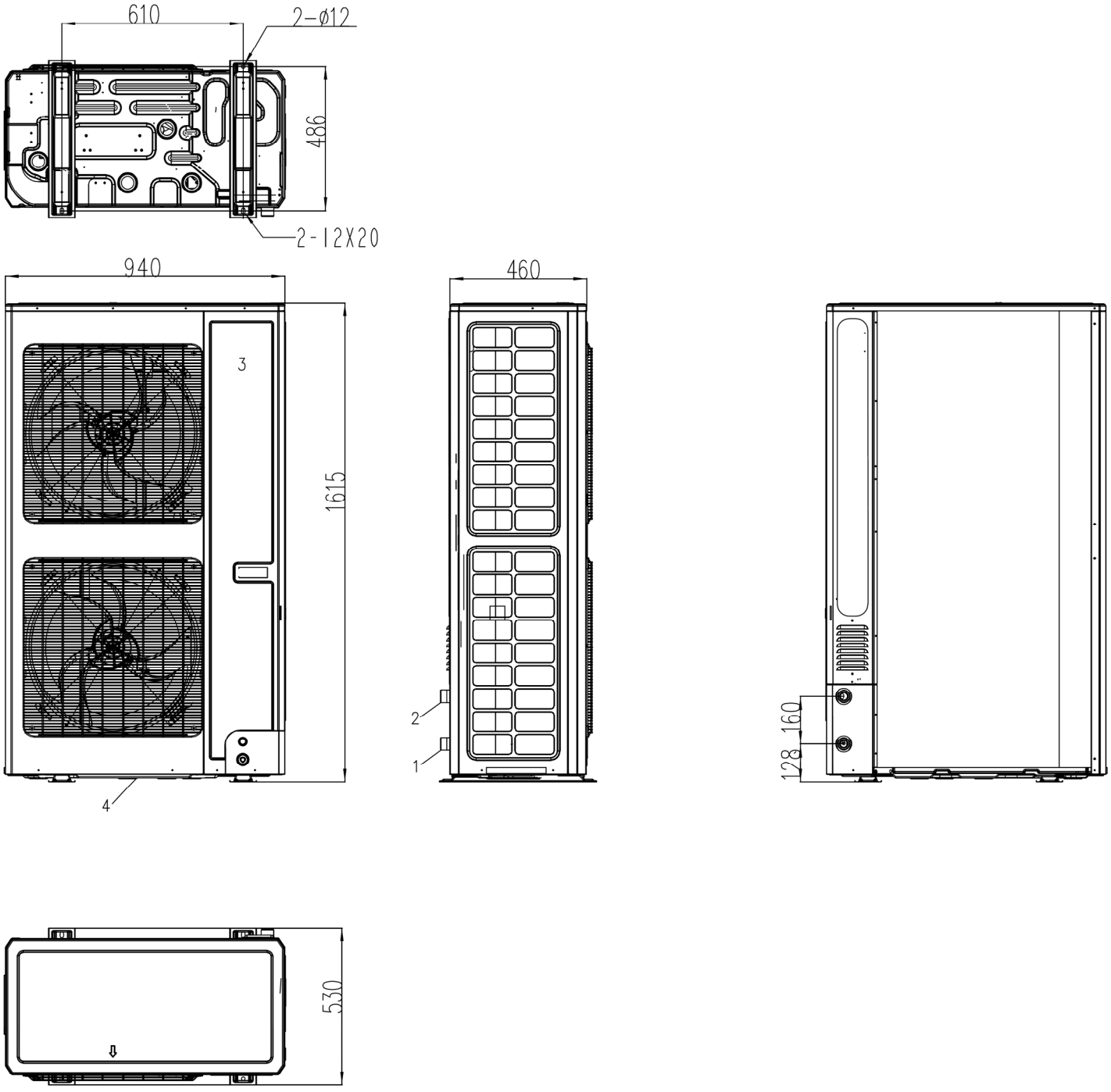
THAITP 116M – 116T



1	Water inlet (1¼ ")
2	Water outlet (1¼ ")
3	Ingresso alimentazione elettrica
4	Condensation drain outlet (16mm)

Model THAITP	116M	116T
Net weight	179	179
Gross weight	197	197

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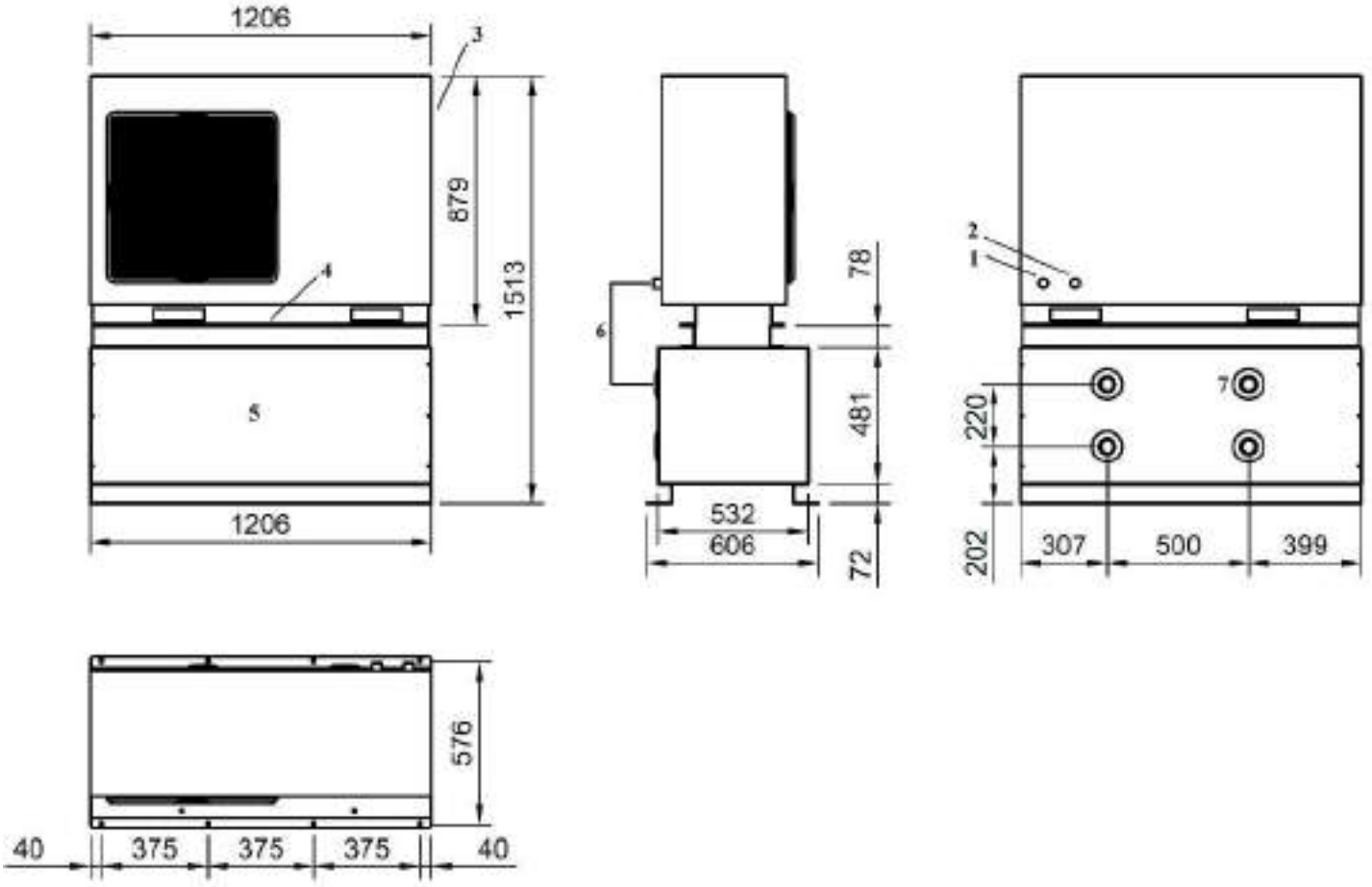
KAI-100 – Inertial storage under the unit

THAITP 104-106-108-110-112-114 + KAI-100



1	Water inlet (1")
2	Water outlet (1")
3	Ingresso alimentazione elettrica
4	Condensation drain outlet (16mm)
5	KAI-100
6	KTAI-100
7	Water connections KAI-100 (1½ ")

Model **THAITP+KAI-100**	**104**	**106**	**108**	**110**	**112**	**114**
Net weight	198	198	206	206	226	226
Gross weight	300	300	308	308	328	328

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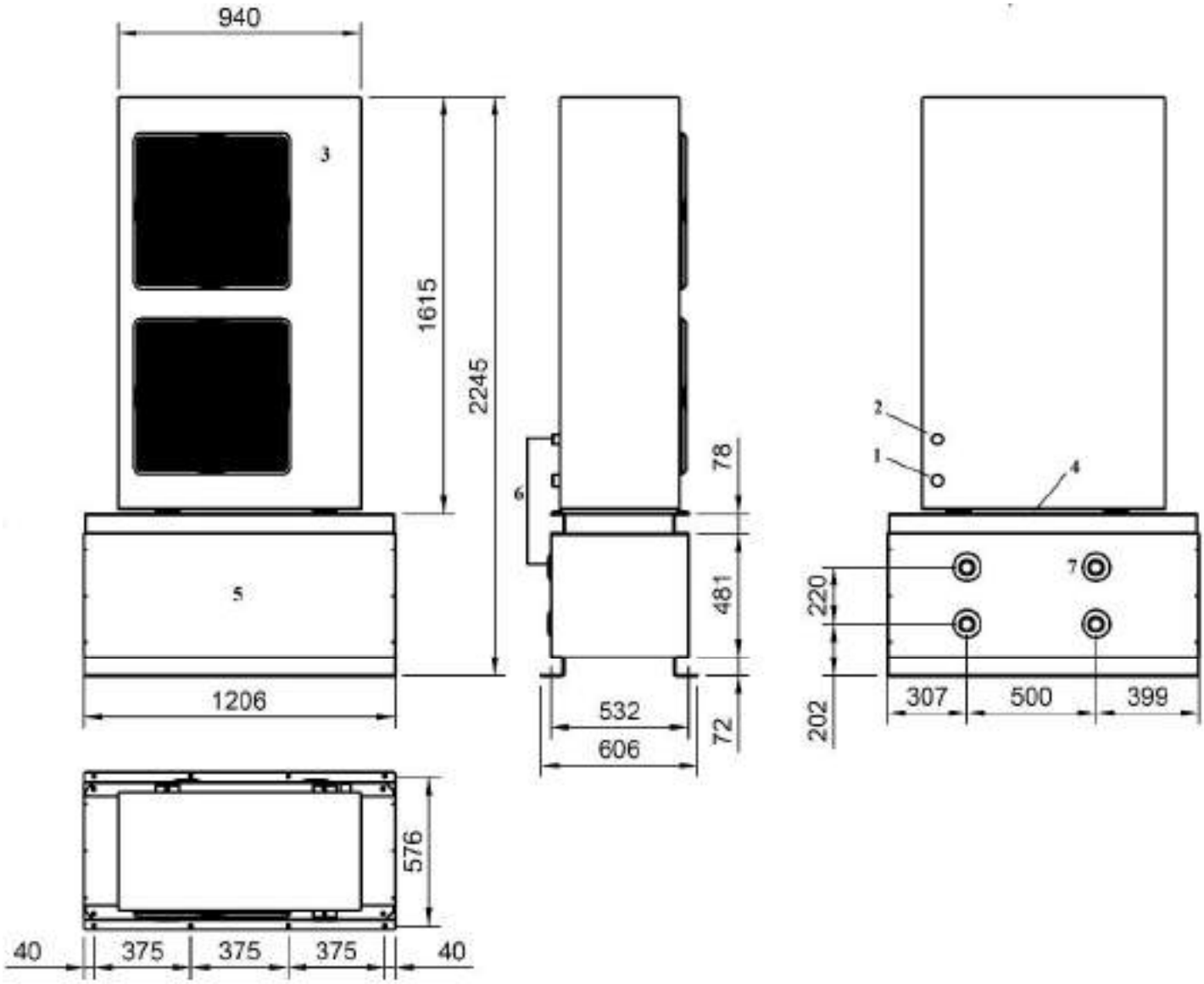
THAITP 116 + KAI 100



1	Water inlet (1¼ ")
2	Water outlet (1¼ ")
3	Ingresso alimentazione elettrica
4	Condensation drain outlet (16mm)
5	KAI-100
6	KTAI-100
7	Water connections KAI-100 (1½ ")

Model **THAITP+KAI-100**	**116M**	**116T**
Net weight	267	267
Gross weight	369	369

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13. INSTALLATION

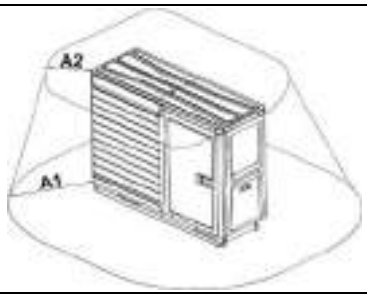
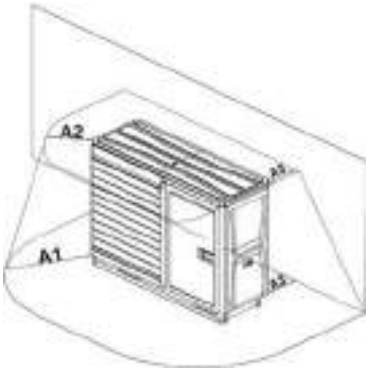
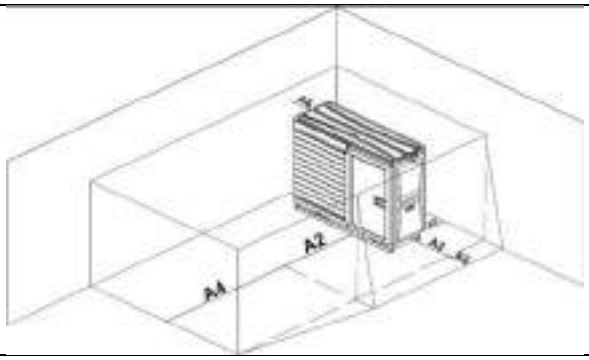
13.1. INSTALLATION

- The unit is designed for outdoor installation.
- Fence off the unit if it is installed in areas accessible to persons under 14 years of age.
- The unit is equipped with a high-efficiency automatic degasser that stops air and gas in the secondary fluid, ensuring that they cannot accumulate inside occupied rooms, compatible with the creation of an indirect system. In the event of a refrigerant leak in the secondary fluid, complete evacuation of the gas leak may not occur within the first pass through the degasser.
- The unit must be positioned respecting the minimum recommended technical safety and functional spaces, taking into account accessibility to water and electrical connections.
- Check that the recommended minimum technical and safety spaces (see section "Clearances positioning" of this document) remain free of obstacles, taking into account also materials that may naturally accumulate there as a result of atmospheric events (e.g. branches, leaves, snow, sand, ...).
- The unit can be equipped with anti-vibration mountings on request (KSA).
- It is mandatory to fit a metal mesh filter of adequate size and pressure drop on the unit's return pipes.
- The water flow rate through the exchanger must not fall below the value corresponding to a temperature difference of 10°C (with all compressors on) and in any case must respect the limit values reported in the “Water flow limits” section.
- During long periods of inactivity, it is advisable to drain the water from the system.
- Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.
- When designing the system, it is necessary to take into account possible stresses resulting from natural events (strong wind gusts, seismic events, precipitation even of a snowy nature, flooding, etc.). It is the installer's responsibility to design and protect hydraulic circuits using safety valves which must be located in an area away from possible sources of ignition.

13.2. CLEARANCES AND POSITIONING

Safety clearances

When choosing and analysing the installation location of the units, in order to ensure safety in the event of any refrigerant leaks, it is mandatory to observe the following safety clearances, based on the installation situation corresponding to one of the cases listed below:

	1. Installation in **well-ventilated area**, in a place where there are no obstructions to the free natural circulation of air. Example in the figure: open field installation.
	2. Installation in **ventilated area**, in a place where the free natural circulation of air is obstructed on no more than one side. Example: installation close to a wall.
	3. Installation in **area with reduced ventilation**, in a place where the free natural circulation of air is obstructed on no more than two sides. Example: installation close to two walls.

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Area “a”	**A1**	mm	1000
	A2	mm	500
	A3	mm	300
	A4	mm	2000
	A5	mm	250
	A6	mm	200

Check these distances also in accordance with any local regulations in force if more restrictive.

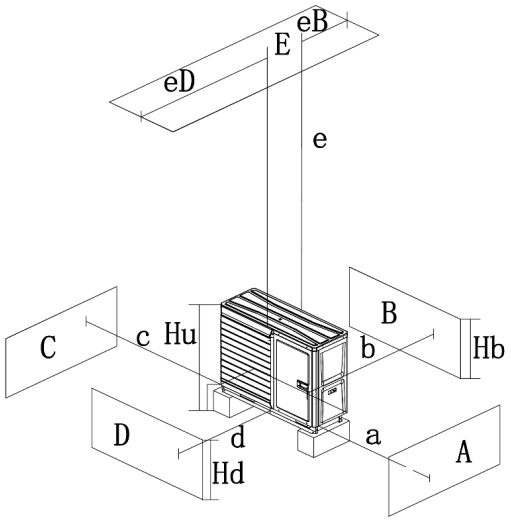
For the requirements regarding safety area "a", please refer to the chapter "Installation location requirements" of this document.

Functional spaces

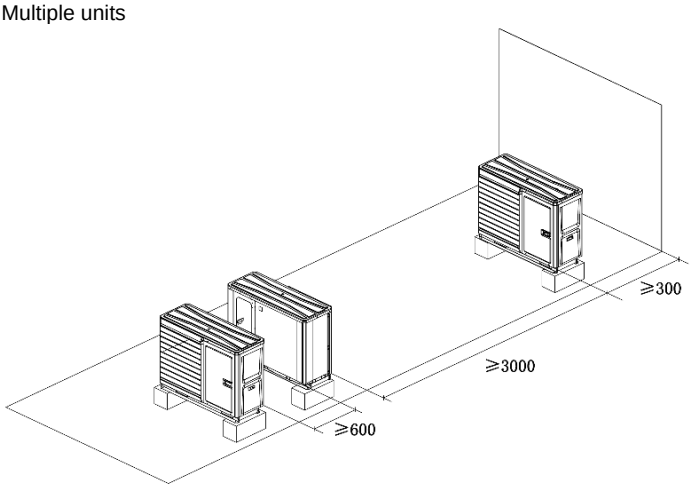
The minimum functional space allowed is shown in the images below: in case of installation of a single unit or multiple units, observe the following minimum distances from the obstacles indicated in the figure

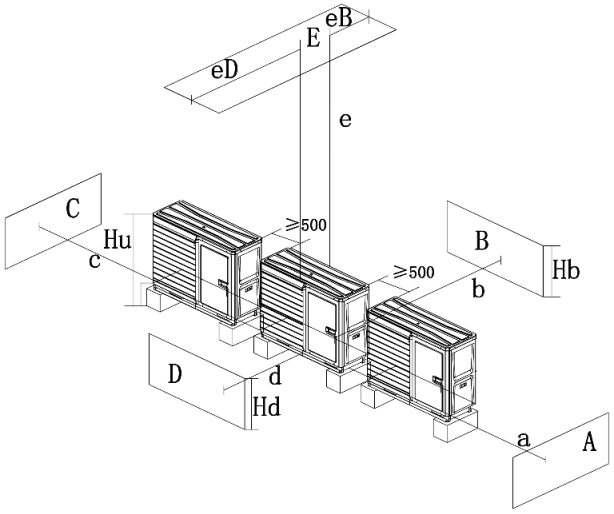
A **C**	Side obstacles (walls/baffle panels)
B	Rear suction-side obstacle (wall/baffle panel)
D	Delivery-side frontal obstruction (wall/baffle panel)
E	Obstructions on the upper side (roof)
a **b** **c** **d** **e**	Minimum clearances between units and obstacles A,B,C,D,E
eB	Maximum permissible distance between unit and obstacle E (in the direction of obstacle B)
eD	Maximum permissible distance between unit and obstacle E (in the direction of obstacle D)
Hu	Height of the unit including any base
Hb **Hd**	Heights of obstacles B and D

Single unit



Multiple units





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Minimum permissible distances:

A,B,C,D,E	B	A,B,C	B,E	A,B,C,E	D	D,E	A,C	B,D		B,D,E			A,C,D,E
Hb Hd Hu	-	-	-	-	-	-	-	(Hb or Hd) ≤Hu	(Hb & Hd) >Hu	(Hb or Hd) ≤ Hu Hb>Hd	Hb<Hd	(Hb & Hd) >Hu	-
a [mm]		≥500		≥500			≥500		X			X	≥500
b [mm]	≥300	≥300	≥300	≥300				≥300	X	≥300	≥300	X	
c(1) [mm]		≥100		≥150			≥100		X			X	≥150
c(2) [mm]		≥500		≥500			≥500		X			X	≥500
d [mm]					≥500	≥500		≥500	X	≥1000	≥1000	X	≥500
e [mm]			≥1000	≥1000		≥1000			X	≥1000	≥1000	X	≥1000
eD [mm]						≤500			X		≤500	X	≤500
eB [mm]			≤500	≤500					X	≤500		X	

Key:
c(1) Single unit
c(2) Multiple units
X Installation not permitted
or or
& together

Nota bene

The installation must comply with the requirements of the EN 378 standard. When installing the unit, bear the following in mind:
- non-acoustically insulated reflecting walls in the vicinity of the unit can cause an increase in the total sound pressure level, measured at a measuring point near the unit, of 3 dB(A) for each surface present;
- install suitable anti-vibration mounts under the unit to avoid transmitting vibrations to the building structure;
- on top of buildings, solid floor frames can be provided which support the unit and transmit its weight to the support elements of the building;
- make all water connections using elastic joints. Pipes must be firmly supported by solid structures. When crossing walls or partitions, insulate pipes with elastic sleeves.

If, after installation and start-up of the unit, structural vibrations are observed in the building which provoke such strong resonance that noise is generated in other parts of the building, consult a qualified acoustic technician for a complete analysis of the problem.

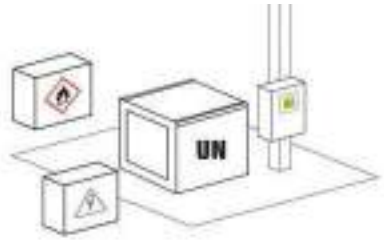
13.3. INSTALLATION SITE REQUIREMENTS

The installation site must be chosen according to the provisions of Standard EN 378-1 and the requirements of Standard EN 378-3. The installation site must nonetheless consider the risks posed by an accidental leakage of the refrigerant fluid inside the unit.

The machines are intended to be installed in a class III location and with access category "a" (i.e. "general access") according to EN 378-1.
The machines are intended to be used exclusively outdoors (open air as defined in Chapter 4.2 of EN 378-3) and in a site with no obstacles to ventilation (minimum ground air speed greater than 0.15 m/s according to EN 60079-10-1; condition intended with machine off and without other ventilation systems).

The following installation requirements generally ensure compliance with the minimum requirements of EN378-3:

- Minimum distance A (in accordance with the safety area "a" as per paragraph “Clearances and positioning”) from any ignition source; only electrical or non-electrical equipment certified as Ex according to Directive 2014/34/EU in category 3G for zone 2 for gas IIA -T2 is permitted in this area;



- To ensure that any gas leaks cannot accumulate in closed spaces or rooms, a minimum distance A must also be provided, always in accordance with safety area “a”, from openings in which dispersed gas could stagnate, such as: ventilation systems, vents or ventilation ducts, entrance doors or windows, manholes, drains, drainage channels, gutters, culverts, hatches, stairs, openings to the ground (sewers), crawl spaces, pipe penetrations, conduits or similar if not protected against the accumulation of flammable mixtures.
  Check this distance also in accordance with any local regulations in force if more restrictive;

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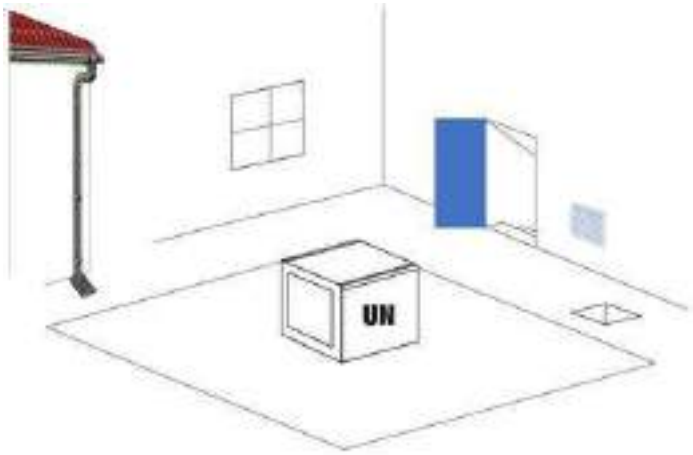

It is prohibited to:

- install the unit indoors;
- install the unit inside structures or artifacts that limit its natural ventilation: if a structure is to be provided for aesthetic or acoustic reasons, it must be adequately ventilated so as to prevent the formation of dangerous concentrations of refrigerant gas and produced with non-combustible material;
- install below ground level or in underground, basement or crawl spaces;
- install in Ex zones or areas subject to fire hazards (paper mills, deposits of fuel or flammable material, tyres, photovoltaic plants, thermal power stations;

Installation conditions other than those described are only possible after a risk analysis according to EN378-3 by the installer (system designer and manager).

13.4. INSTALLATION INSTRUCTIONS FOR UNITS WITH R290 GAS

The units contain R290 gas classified A3 according to EN 378-1 and transport is regulated by ADR UN 3358.

Identification of the type of refrigerant fluid use

o Propane (R290) CAS No.: 000074-98-6

Main ecological information regarding the types of refrigerant fluids used

- **Persistence, degradation and environmental impact**

Refrigerant	Chemical formula	GWP (over 100 years)
R290	C3H8	0,02

In accordance with ISO 817, R290 is classified as A3, as per ASHRAE Standard 34-1997. The lower flammability limit LFL (38 g/m3), flame propagation rate (0.7 m/s) and combustion heat (50 MJ/kg) place R290 among the A3 fluids, flammable refrigerants. The refrigerant also features a low minimum ignition energy (MIE=0.25 mJ) and a self-ignition temperature of 470°C.

Refrigerant	R290
Safety classification (ISO 817)	A3
PED fluid group	1
ODP	0
GWP (AR6 - over 100 years)	0,02
Component	R290

The unit must be installed following local regulations and standards (and in any case in compliance with standard EN 378-3).

In the event of a breakdown, the unit's exchangers (evaporator/recovery units) could release refrigerant into the hydraulic circuits. For this purpose, the unit is equipped with an automatic deaerator and a safety valve on the water outlet pipe.

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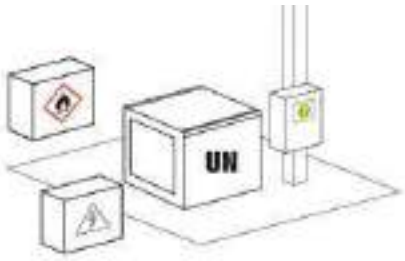
13.5. HANDLING AND STORAGE

Storage conditions

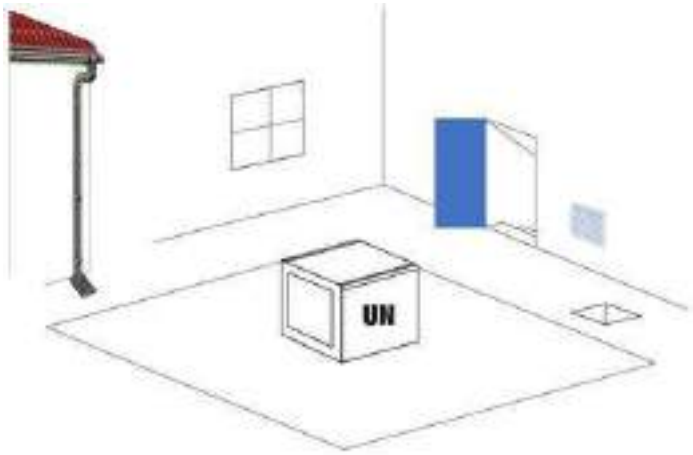
ATTENTION! Use extreme caution when approaching stored units. Periodically check the areas surrounding the unit with a suitable portable gas detector (of suitable sensitivity in accordance with current regulations such as EN 378-4 or local ones if more restrictive) to ensure that there are no refrigerant leaks.

The units cannot be stacked. Storage temperature limits are -20-50°C. Store in a non-condensing environment with relative humidity between 30-90%. If close to coastal areas, take appropriate protective measures.

The units must be stored only outdoors and respecting the minimum distance A (compliant with the safety area "a" as per the paragraph "Clearances and positioning") from any potential source of ignition, flames and heat sources; only electrical or non-electrical equipment certified as Ex according to Directive 2014/34/EU in category 3G for zone 2 for gas IIA -T2 is permitted in this area.



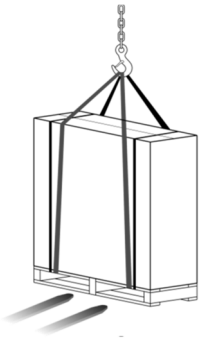
Furthermore, always in compliance with safety area “a”, they must be stored away from openings where dispersed gas could stagnate such as: ventilation systems, vents or ventilation ducts, entrance doors or windows, manholes, drains, drainage channels, gutters, culverts, hatches, stairs, openings to the ground (sewers), crawl spaces, pipe penetrations, conduits or similar if not protected against the accumulation of flammable mixtures.



Refer to local regulations regarding the maximum amount of units that can be stored (e.g. but not limited to fire prevention requirements).
For the maximum limit of transportable units, comply with the indications of the ADR agreement (SMI): please note that for refrigeration units containing flammable gases up to 12 kg gas charge, the ADR transport exemption applies (up to a total load of 333 kg gas charge)

Handling

- o The unit must be handled with care, in order to prevent damaging the external structure and the internal mechanical and electrical components.
- o Do not stack units.
- o The position of the lifting straps must be checked according to the model and the accessories installed.
- o When lifting and handling, make sure that the base of the unit always remains horizontal.
- o Be careful not to damage/block the condensate drain outlets.



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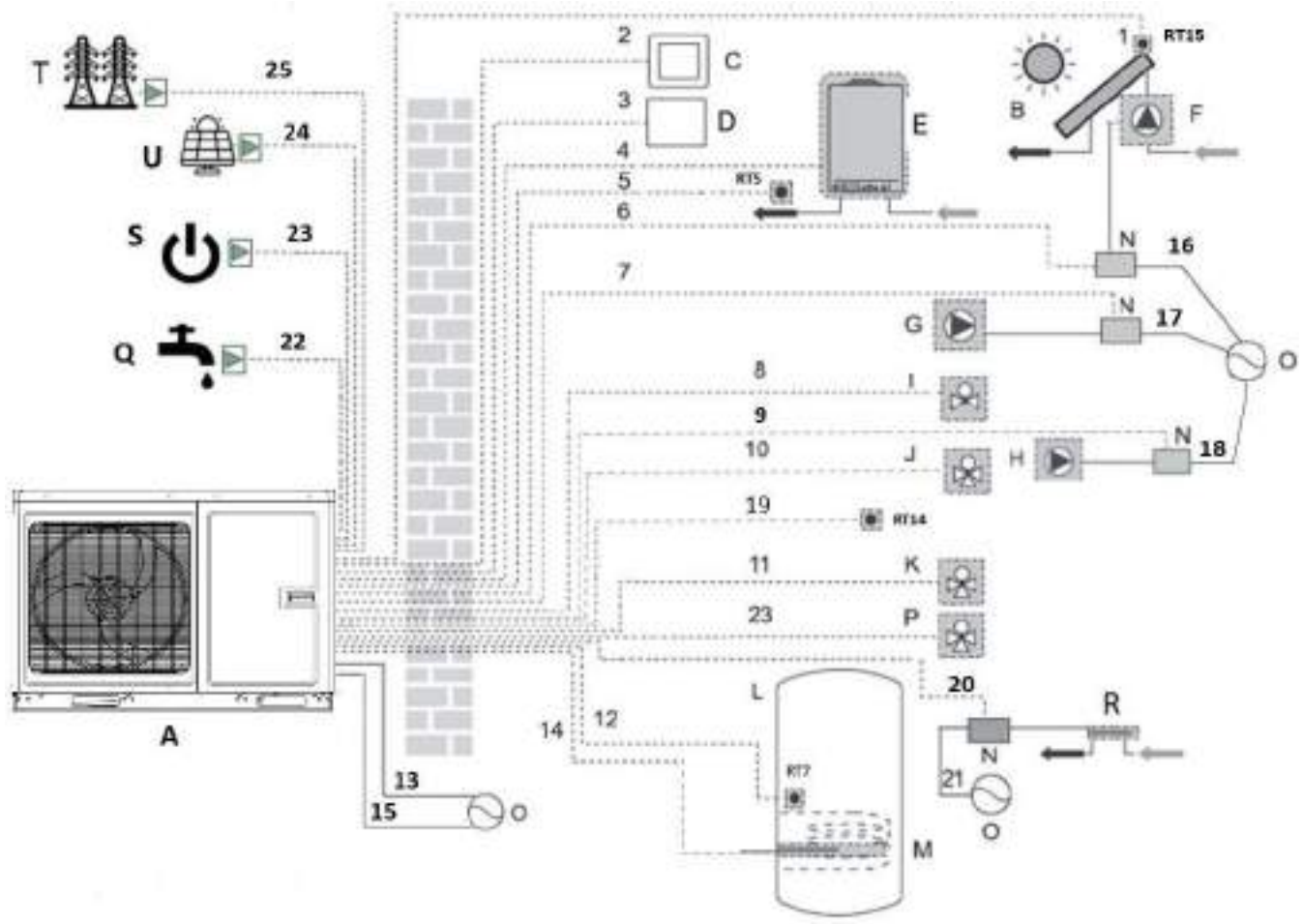
14. CONNECTION TO THE SYSTEM

14.1. FUNCTIONAL DIAGRAM



Managed units and components:

A	Heat pump unit	**N**	Power contactor
B	Thermal solar panels	**O**	Electrical supply
C	Control panel (supplied)	**P**	Heating/cooling consent valve
D	Room thermostat	**Q**	DHW call (digital input)
E	Additional heat source	**R**	Integrative electrical resistance system (KRIT accessory)
F	Solar pump	**S**	Remote ON/OFF (digital input)
G	Mixing pump zone 2	**T**	Smart Grid (digital input)
H	Secondary pump zone 1 (*)	**U**	Photovoltaic (digital input)
I	Heating/cooling consent valve	**RT15**	Thermal solar water temperature sensor KWTSS accessory (20 m - supplied separately)
J	3-way mixing valve zone 2	**RT14**	Mixed water temperature sensor zone 2 KWTSM accessory (8 m - supplied separately)
K	3-way valve for domestic hot water tank (KVDEV accessory)	**RT5**	Water temperature sensor additional heat source or hydraulic circuit breaker
L	Domestic hot water storage (KACS accessory)	**RT7**	Domestic hot water temperature sensor DHW
M	DHW storage resistance (*)		

(+) Pump can be configured alternatively as an auxiliary pump (back-up) or DHW recirculation pump.
(*) Standard for KACS boilers (single-phase only)

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Electrical connections:

1		KWTSS accessory solar probe cable (20 m - supplied separately)	**14**	(X)	Connection cable for DHW storage electrical resistance
2		Touch control panel cable (8 m - standard) or KPRU accessory (30 m - supplied separately)	**15**	(X)	Unit power supply
3	(X)	Room thermostat cable	**16**	(X)	Solar pump power supply
4	(X)	Control cable for additional heat generator (boiler)	**17**	(X)	Zone 2 mixing pump power supply
5		RT5 probe cable for additional heat generator (boiler) / system electric resistance or hydraulic circuit breaker (5.6 m - standard)	**18**	(X)	Secondary pump power supply zone 1 (+)
6	(X)	Solar pump control cable	**19**		KWTSM accessory zone 2 mixed water probe cable (8 m - supplied separately)
7	(X)	Zone 2 mixing pump control cable	**20**	(X)	Electrical system resistance control cable
8	(X)	Heating/cooling consent valve control cable	**21**	(X)	Power supply for the electrical resistance of the system
9	(X)	Zone 1 pump control cable	**22**	(X)	DHW call control cable
10	(X)	Zone 2 3-way mixing valve control cable	**23**	(X)	Remote ON/OFF control cable
11	(X)	3-way valve control cable for DHW storage	**24**	(X)	Smart Grid Cable
12		RT7 DHW storage probe cable (20 m - standard)	**25**	(X)	Photovoltaic cable
13	(X)	Power supply for the electric resistance of the DHW storage tank			

(X) Not supplied, to be provided by the installer.

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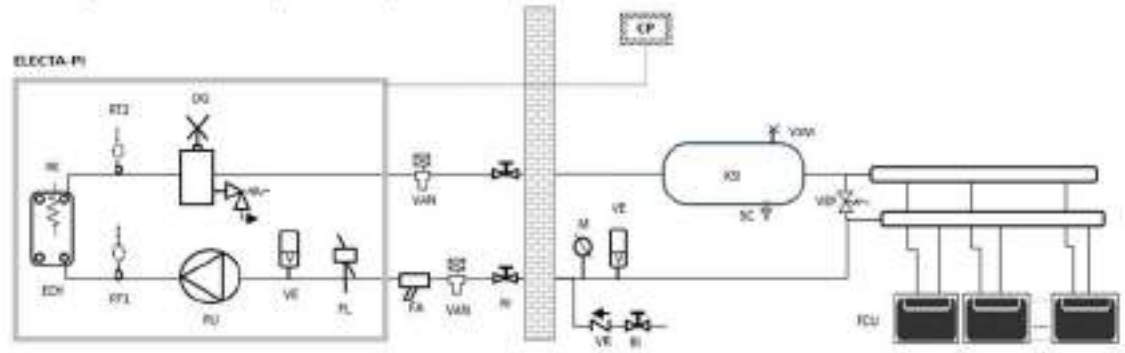
14.2. EXAMPLES OF INSTALLATION

HEATING / COOLING - PRIMARY AND SECONDARY CIRCUIT

1. Example 1: heating and cooling system

1.a. Primary circuit

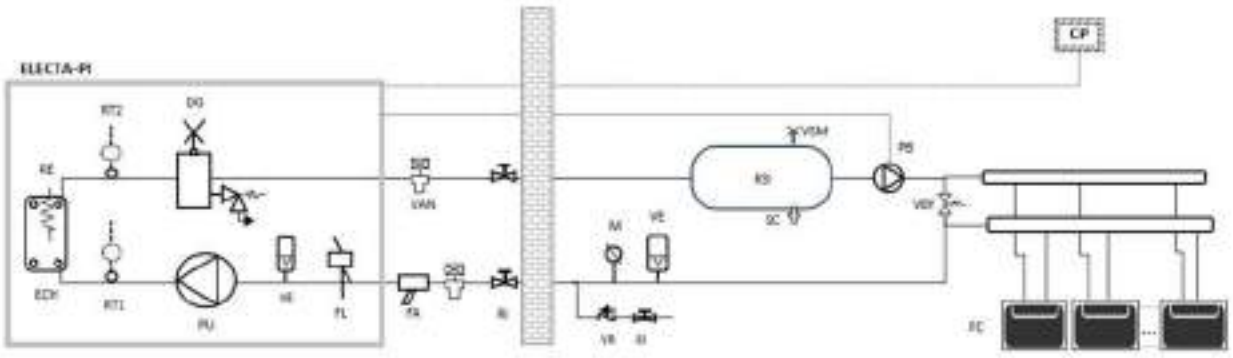
Regulation on delivery water temperature



FC = Fan coil units for cooling / heating
CP = Remotable touch screen control panel with air probe

1.b. Primary circuit with auxiliary pump

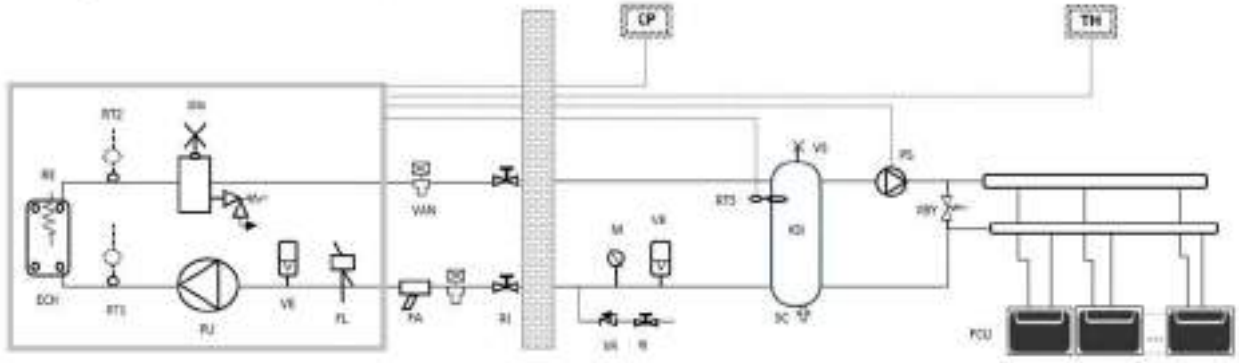
Regulation of the ambient air temperature with control panel



FC = Fan coil units for cooling / heating
CP = Remote touch screen control panel with air probe (or alternatively KSOA accessory room probe)

1.c. Primary and secondary circuit

Regulation of the flow water temperature + Room thermostat



FC = Fan coil units for cooling / heating
CP = Touch-screen control panel
TH = Room thermostat with consent Mode Hot/Cold+OFF

Nota bene:

- Antifreeze valves (VAN) are necessary in the event that the outdoor temperature may fall below 0°C, in order to prevent the risk of frost in the pipes in the event of a power failure. Install antifreeze valves at the lowest points of the pipes.
- The by-pass valve (VBY) must be installed in the manifold to ensure sufficient water flow to the unit.

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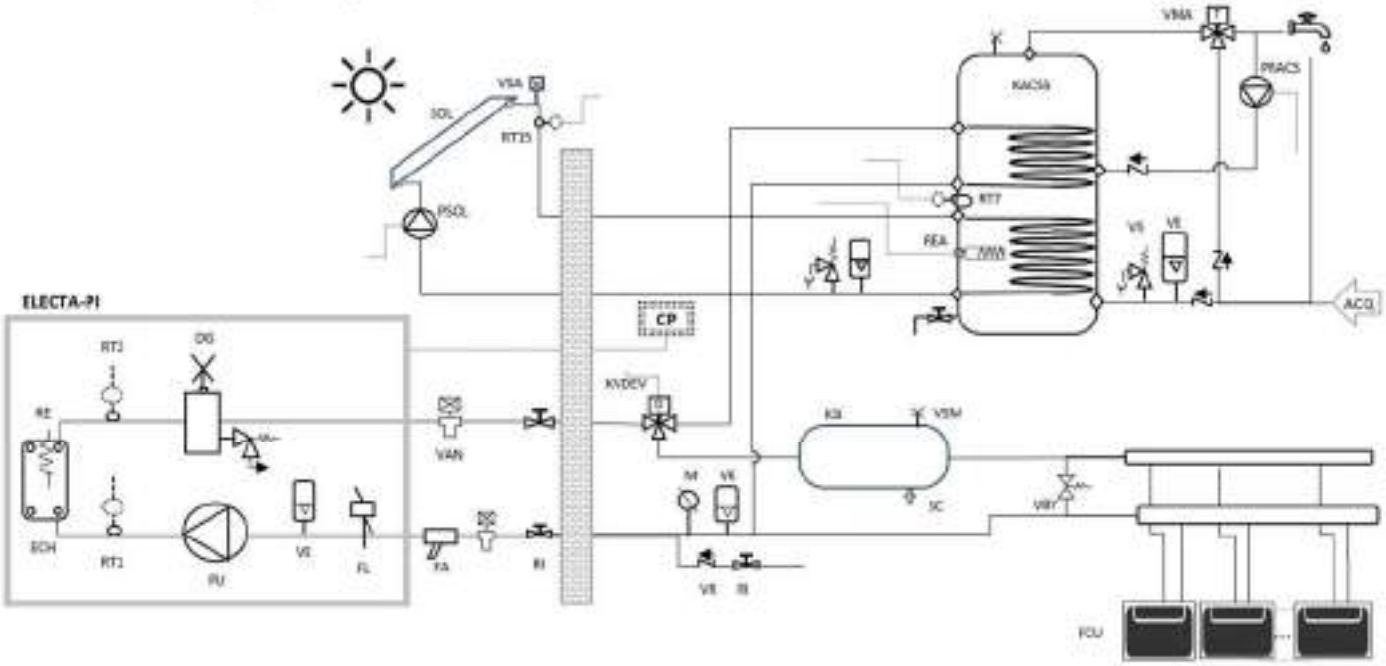
HEATING / COOLING + DHW

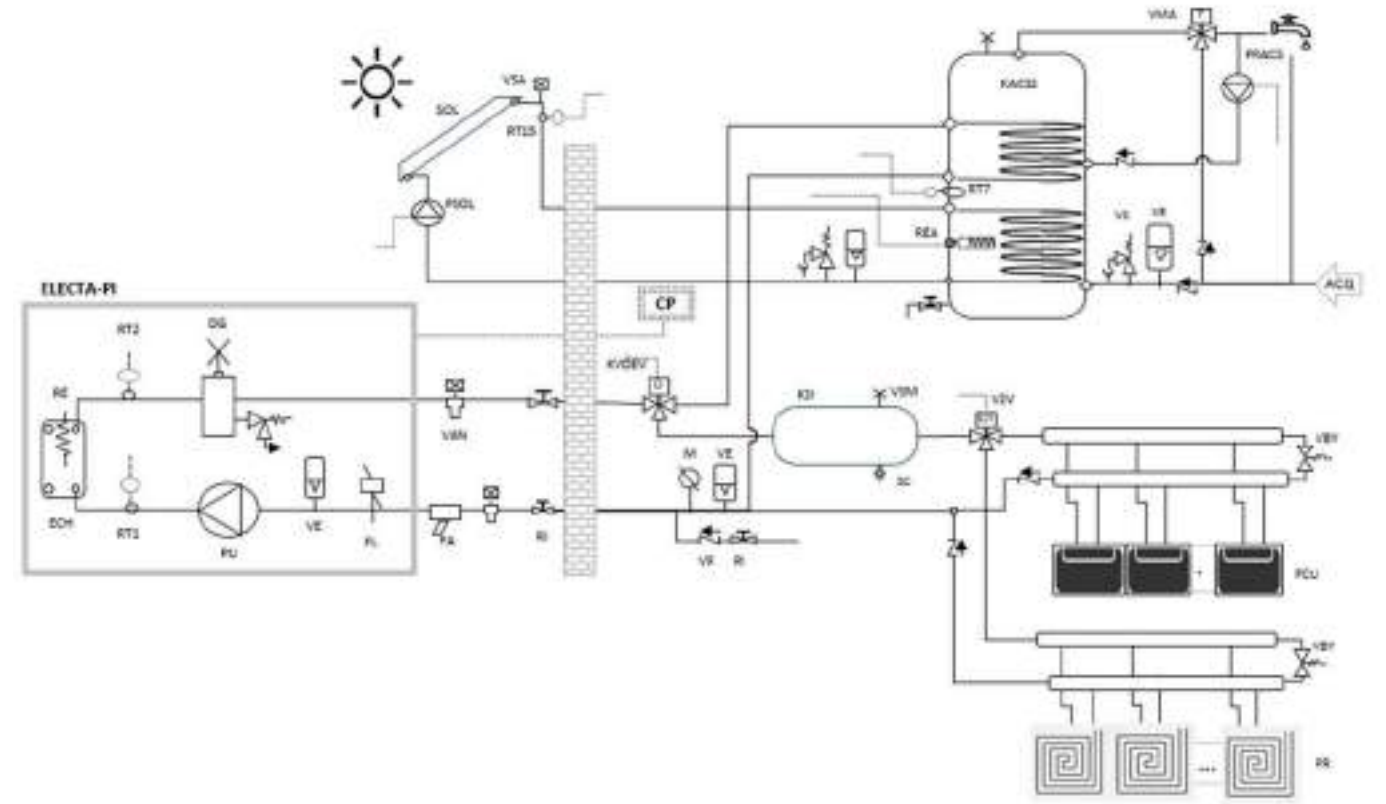
2. Example 2: heating and cooling + domestic hot water (DHW) + solar thermal system

2.a. Primary circuit
Fan coils for cooling / heating



FC = Fan coil units for cooling / heating

2.b. Primary circuit
Fan coils for cooling / Radiant panels for heating



FC = Fan coils for cooling
PR = Radiant panels for heating

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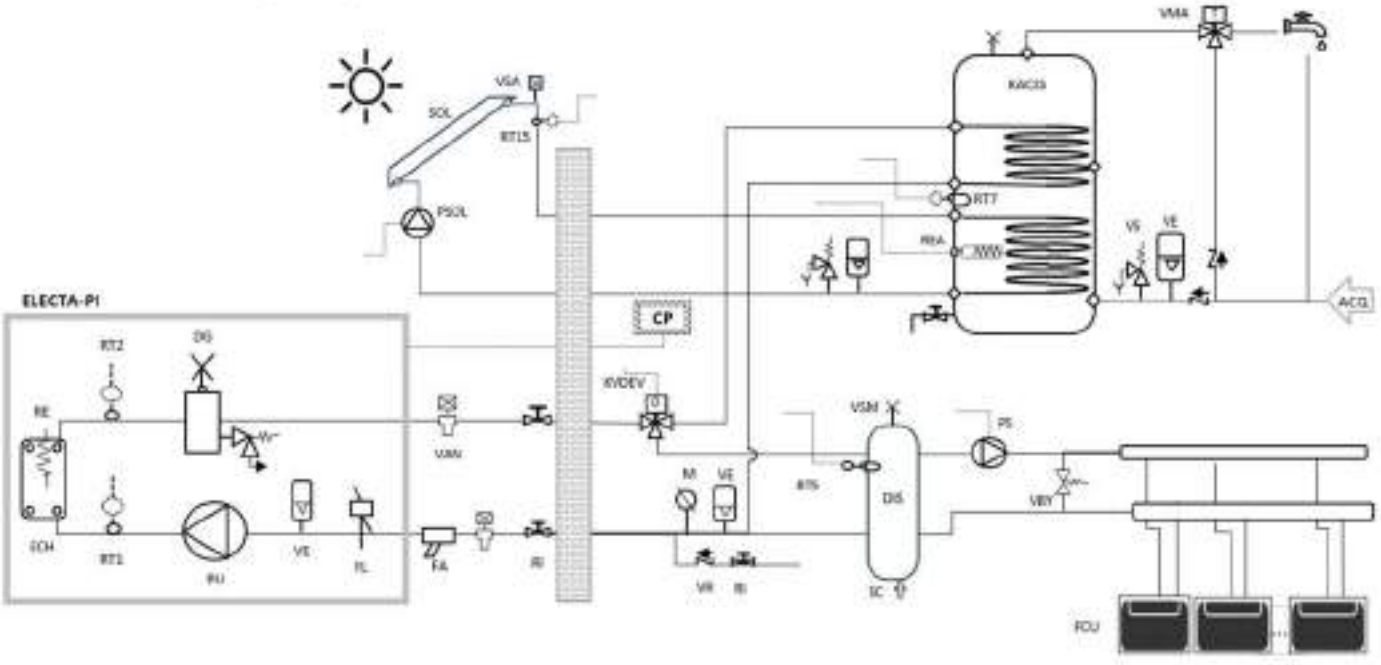
2.c. Primary and secondary circuit
Fan coils for cooling / heating



FC = Fan coil units for cooling / heating

Nota bene:

- Antifreeze valves (VAN) are necessary in the event that the ambient temperature may fall below 0°C, in order to prevent the risk of frost in the pipes in the event of a power failure. Install antifreeze valves at the lowest points of the pipes.
- The by-pass valve (VBY) must be installed in the manifold to ensure sufficient water flow to the unit.

** A hydraulic unit with a shut-off valve, inspectable non-return valve, auxiliary expansion tank and safety valve set at 7 bar must necessarily be installed at the inlet to the domestic hot water unit. The safety unit must be protected against frost.

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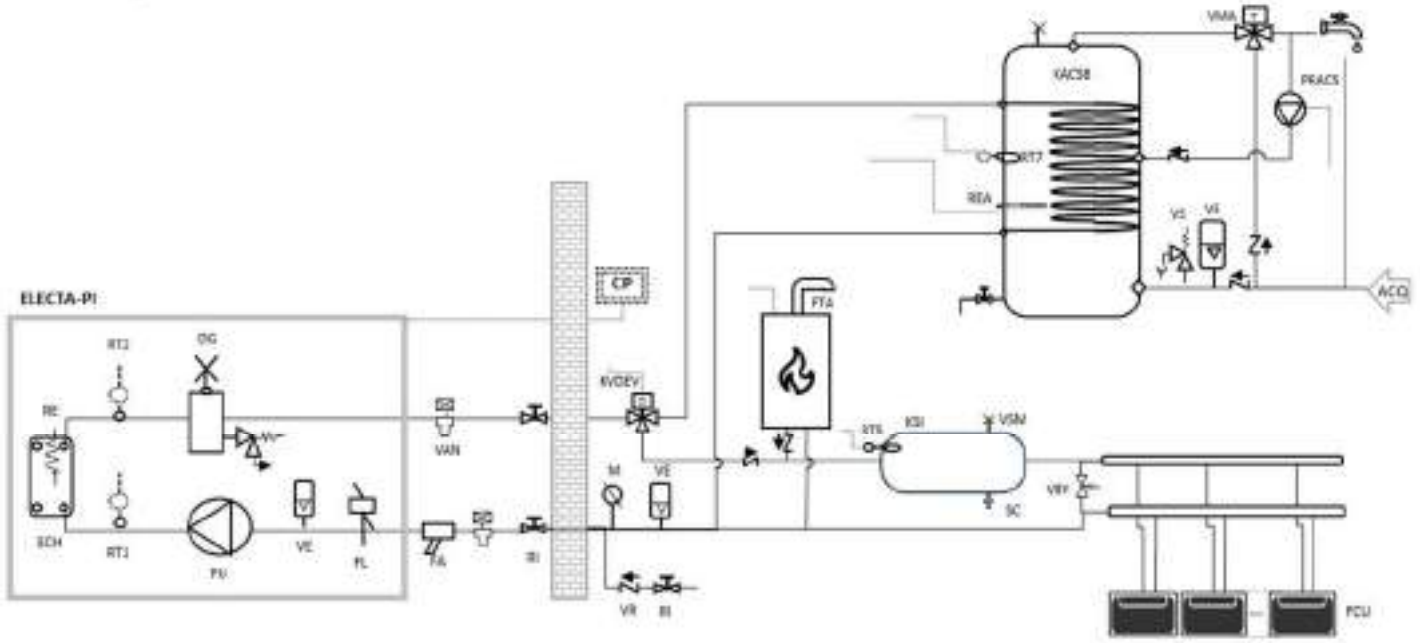
HEATING + DHW + THERMAL SOURCE

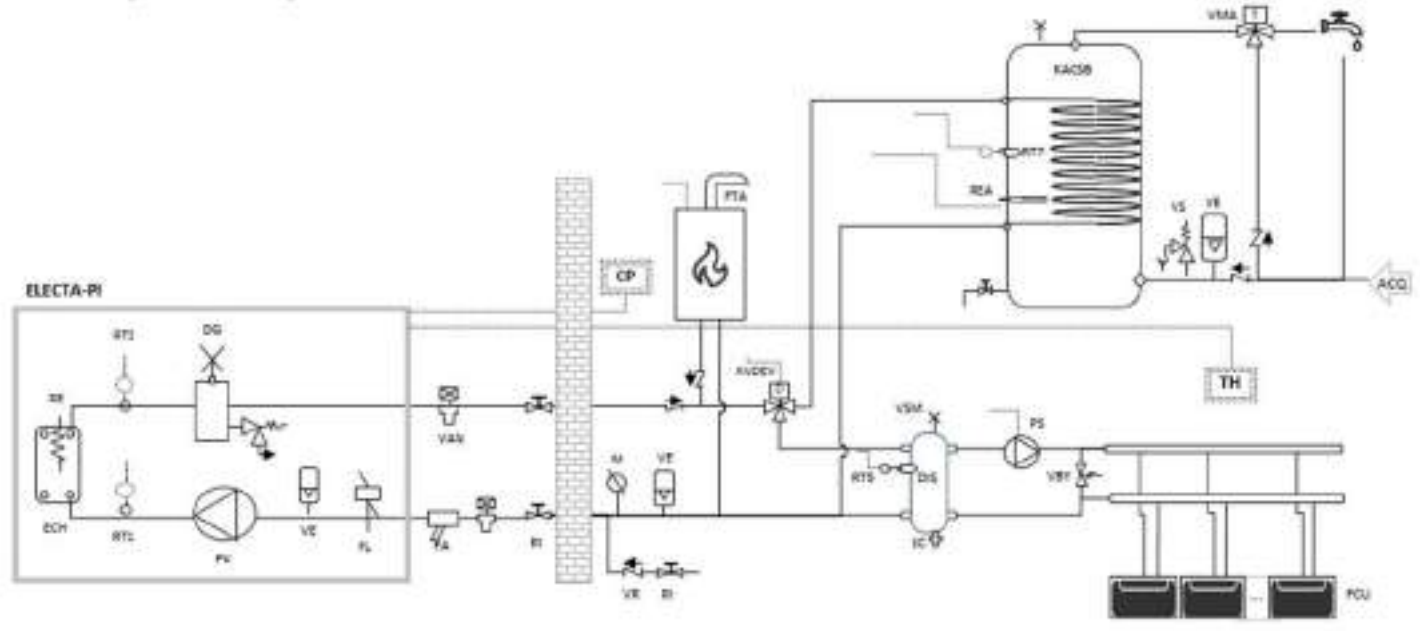
3. Example 3: heating system + domestic hot water (DHW) + auxiliary or supplementary heat source.

3.a. System side boiler
Primary circuit



FC = Fan coil units for cooling / heating
FTA (AHS) = auxiliary heat source (boiler)

3.b. Boiler on system side and DHW side
Primary and secondary circuit



FC = Fan coil units for cooling / heating
TH = Room thermostat with consent Mode Hot/Cold+OFF+DHW call
FTA (AHS) = auxiliary heat source (boiler)

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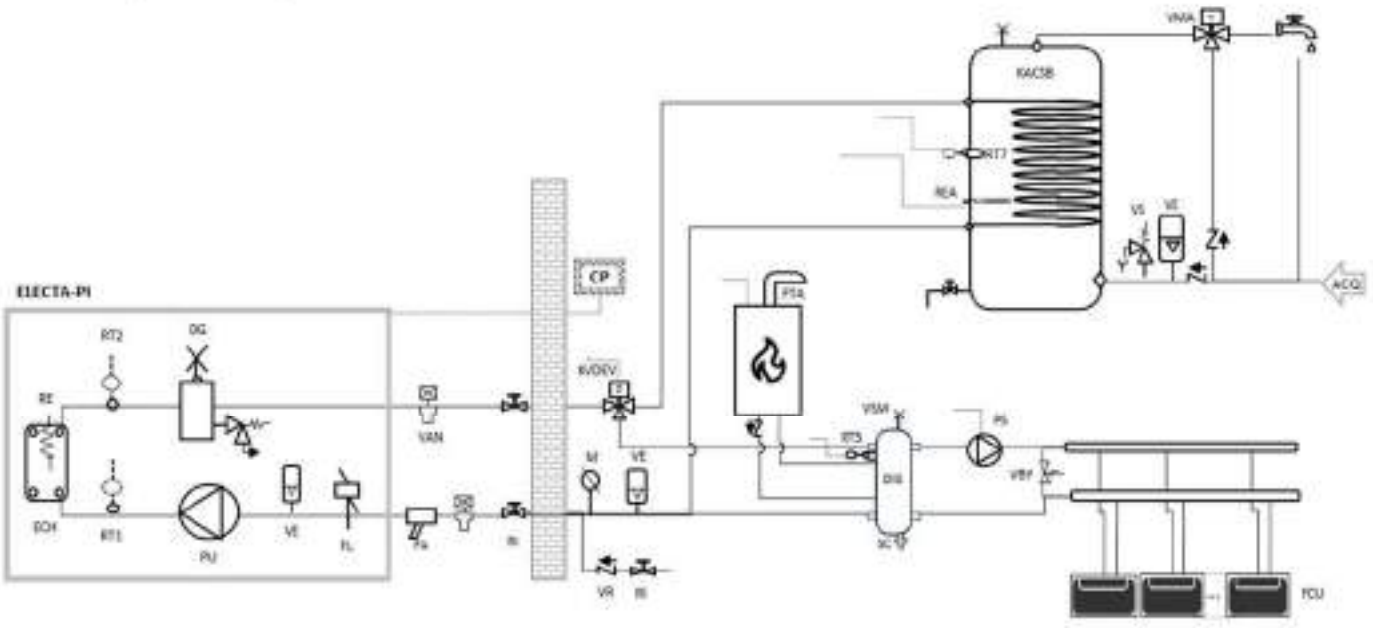
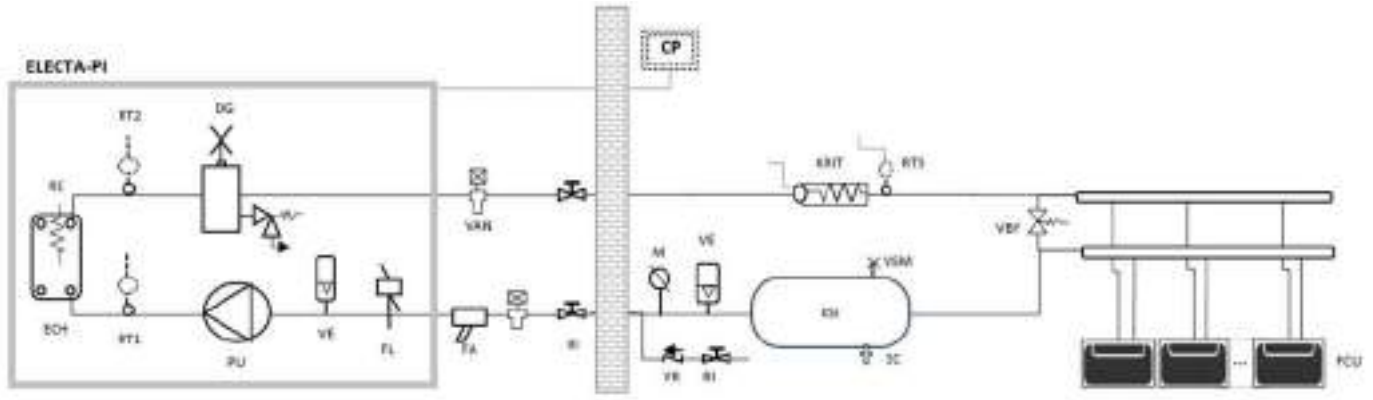
3.c. System side boiler
Primary and secondary circuit



FC = Fan coil units for cooling / heating
FTA (AHS) = Integrative thermal source (boiler)

3.d. System side electrical heater
Primary circuit



FC = Fan coil units for cooling / heating
KRIT = Auxiliary or integrative heat source (electric resistance – KRIT accessory)

Nota bene:

- Antifreeze valves (VAN) are necessary in the event that the outdoor temperature may fall below 0°C, in order to prevent the risk of frost in the pipes in the event of a power failure. Install antifreeze valves at the lowest points of the pipes.
- The by-pass valve (VBY) must be installed in the manifold to ensure sufficient water flow to the unit.

** A hydraulic unit with a shut-off valve, inspectable non-return valve, auxiliary expansion tank and safety valve set at 7 bar must necessarily be installed at the inlet to the domestic hot water unit. The safety unit must be protected against frost.

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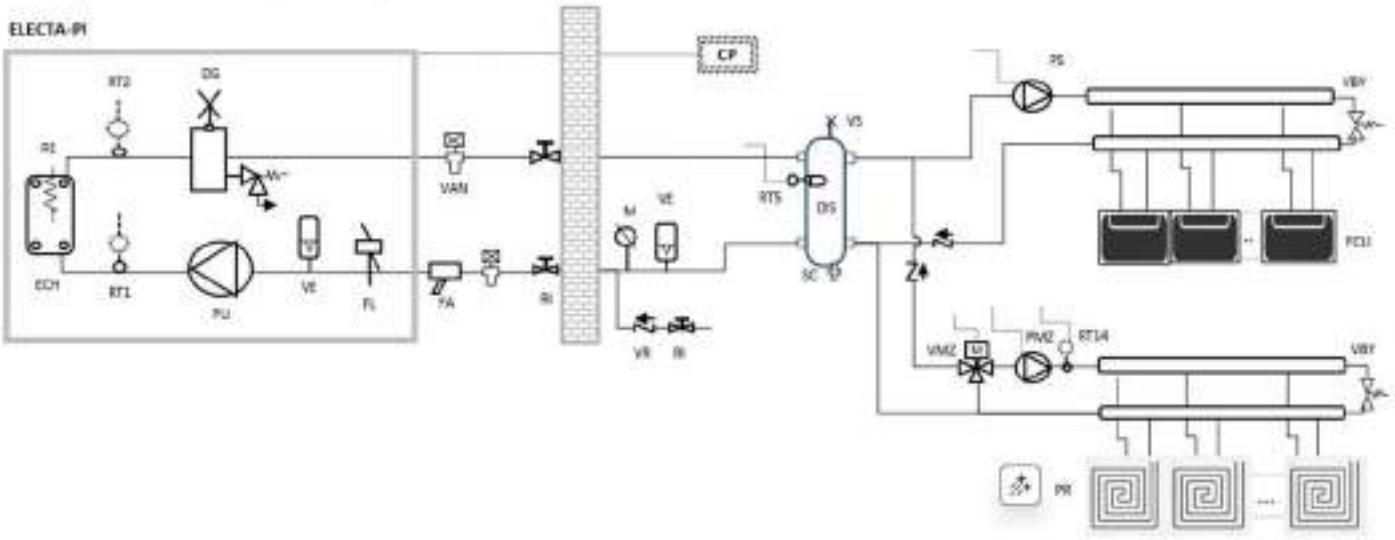
HEATING / COOLING – PRIMARY CIRCUIT + 2 SECONDARY CIRCUITS

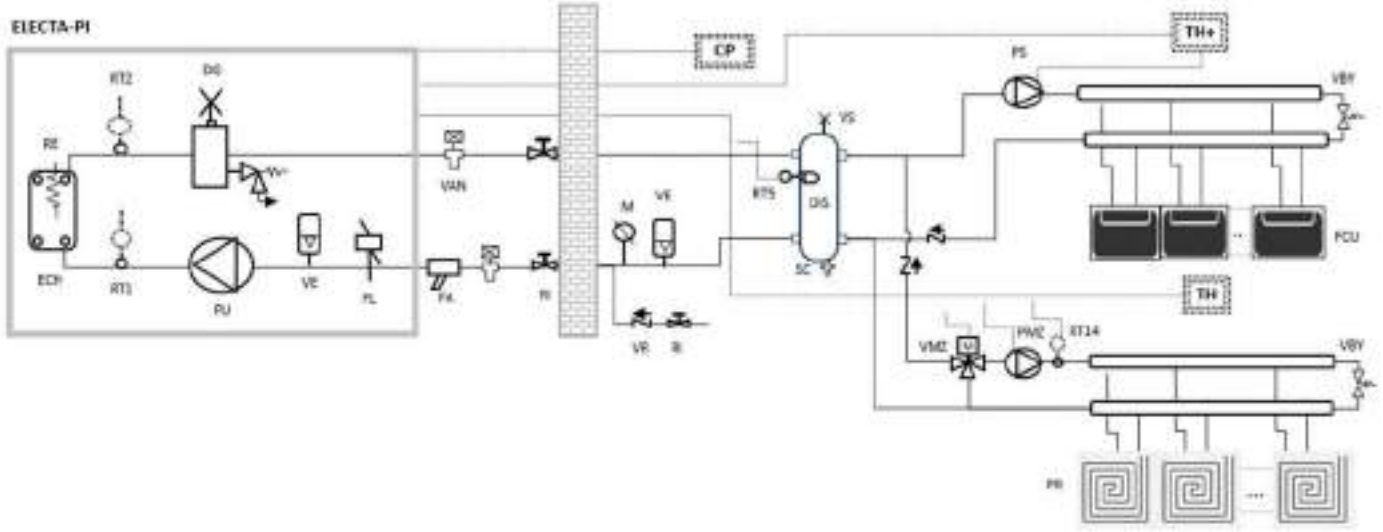
4. Example 4: heating and cooling system

4.a. Primary circuit and two secondary circuits, high and low temperature
Fan coils for cooling / heating + Radiant panels for heating only
Regulation on delivery water temperature



FC = Fan coil units for cooling / heating
PR = Radiant panels for heating only

4.b. Primary circuit and two secondary circuits, high and low temperature
Fan coils for cooling / heating + Radiant panels for heating only
Regulation of the supply water temperature + Room thermostats



FC = Fan coil units for cooling / heating
PR = Radiant panels for heating only
TH = Room thermostat with Hot/Cold+OFF mode consent, low temperature zone
TH+ = Room thermostat with ON/OFF consent for high temperature zone pump

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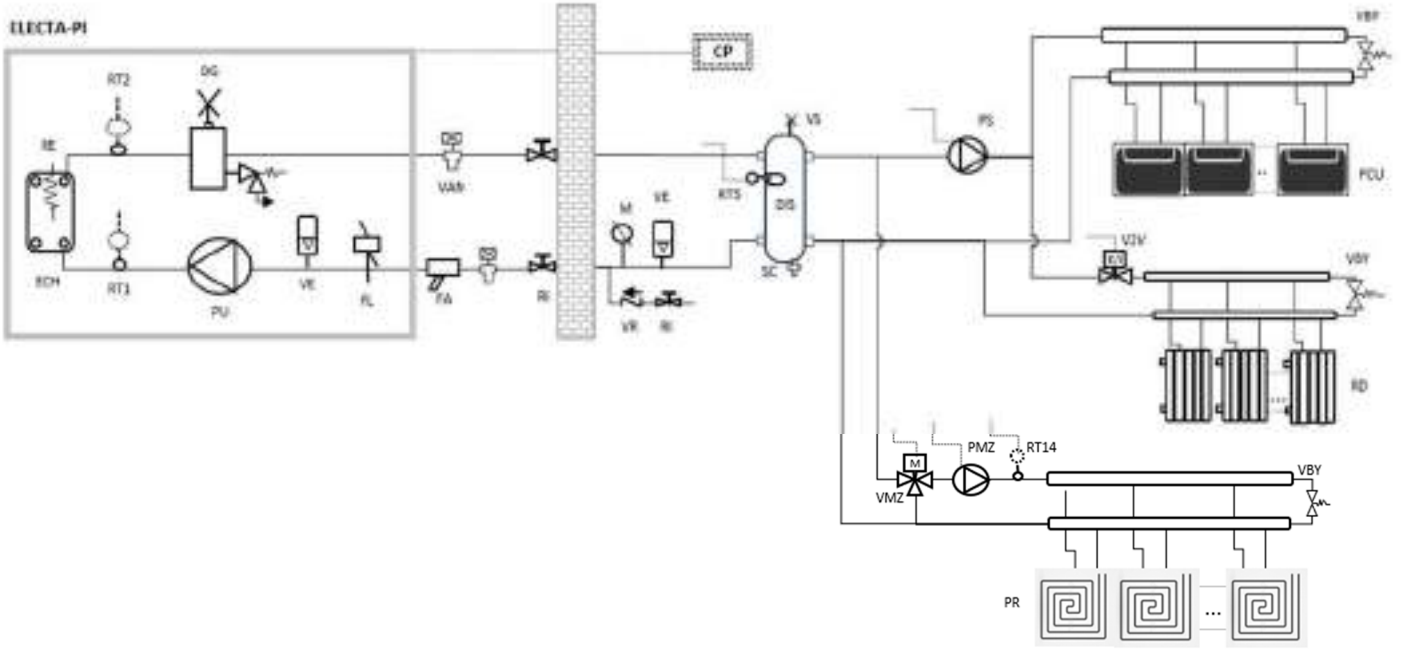
4.c. Primary circuit and two secondary circuits, high and low temperature
Fan coils for cooling / heating + Radiant panels for heating only + Radiators
Regulation on delivery water temperature



FC = Fan coil units for cooling / heating
PR = Radiant panels for heating only
RD = Radiators

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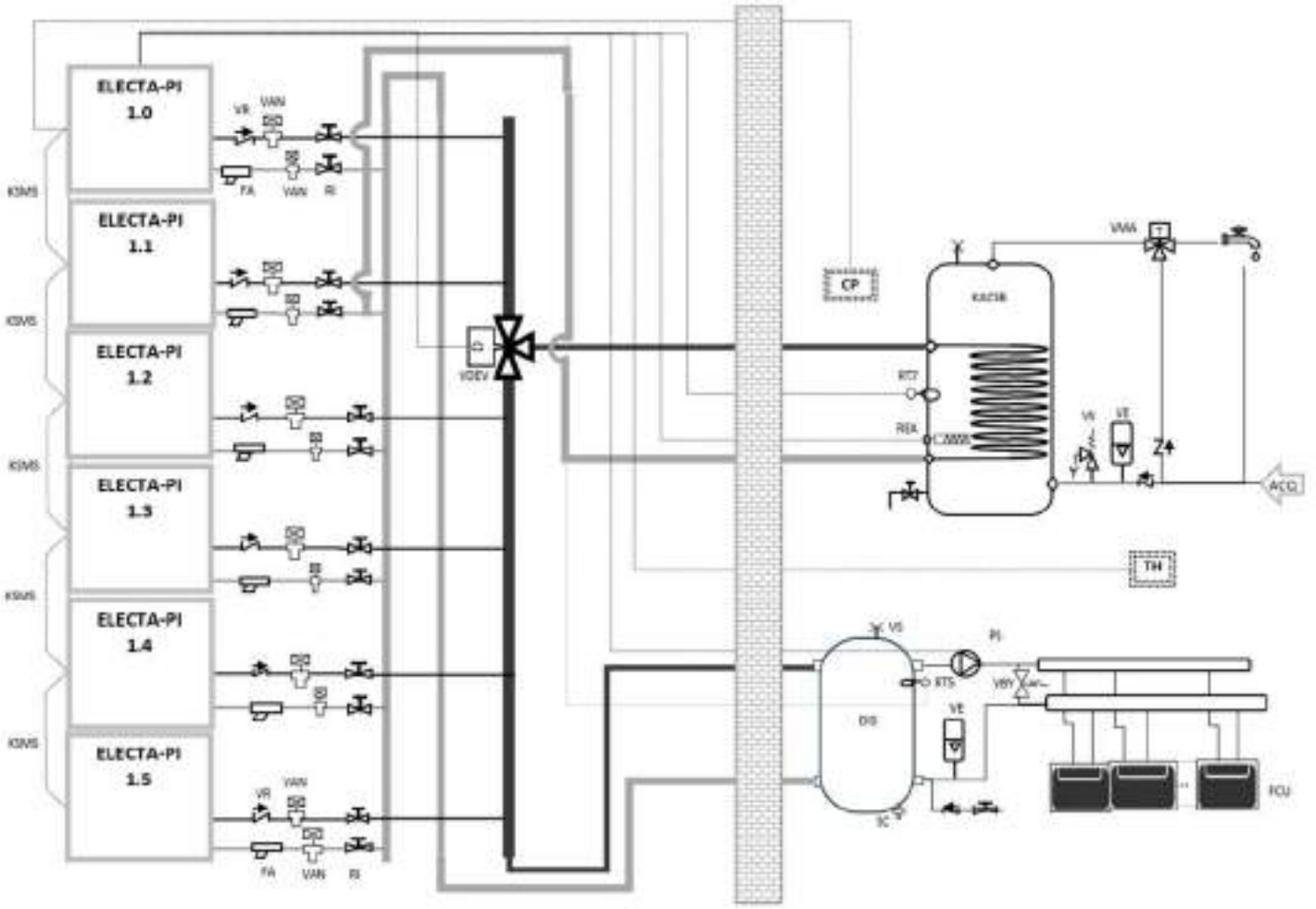
HEATING / COOLING + DHW + MASTER/SLAVE

5. Example 5: system for heating and cooling + domestic hot water (DHW) + Master/Slave management

5.a. Primary circuit and secondary circuit



FC = Fan coil units for cooling / heating
TH = Room thermostat with consent Mode Hot/Cold+OFF+DHW call

Nota bene:

- Antifreeze valves (VAN) are necessary in the event that the outdoor temperature may fall below 0°C, in order to prevent the risk of frost in the pipes in the event of a power failure. Install antifreeze valves at the lowest points of the pipes.
- The by-pass valve (VBY) must be installed in the manifold to ensure sufficient water flow to the unit.
- The DHW storage tank (KACS) must be equipped with an internal electric resistance

* The use of an automatic filling group is not recommended.
** A hydraulic unit with a shut-off valve, inspectable non-return valve, auxiliary expansion tank and safety valve set at 7 bar must necessarily be installed at the inlet to the domestic hot water unit. The safety unit must be protected against frost.

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KEY

Component	Item	Supply
AQ	Aqueduct	
CP	Remotable touch screen control panel with air probe	Standard
DG	Degasser with safety valve	Standard
DIS	Hydraulic separator	KSI accessory (supplied separately)
ECH	Plate evaporator	Standard
FA	Water-side Y filter	Included in supply, installation by installer
FCU	Fan coils	Not supplied
FL	Flow switch	Standard
FTA	Auxiliary heat source (Boiler)	Not supplied
KACS	Domestic hot water storage tank	KACSB accessory (supplied separately)
KACSS	Double coil domestic hot water storage tank	KACSS accessory (supplied separately)
KRIT	Supplementary heat source (electric heater)	KRIT accessory (supplied separately)
KSI	Buffer tank/thermal handwheel	KSI accessory (supplied separately)
KVDEV	3-way diverter valve DHW/system side	KVDEV accessory (supplied separately)
KSMS	Serial cable for connecting slave units	KSMS accessory (supplied separately)
M	Pressure gauge	Not supplied
PB	Backup pump	Not supplied
PMZ	Mixed (zone) pump	Not supplied
PR	Radiant panels	Not supplied
PS	Secondary pump	Not supplied
PSOL	Solar thermal pump	Not supplied
PU	Circulation pump	Standard
RD	Radiators	Not supplied
RE	Evaporator antifreeze heater	Standard
REA	Electric heater for domestic hot water tank	Standard with KACS/KACSS (supplied separately)
RI	Tap	Not supplied
RT1	Primary inlet temperature probe	Standard
RT14	Secondary mixed water circuit temperature probe	KWTSM accessory (supplied separately)
RT15	Solar thermal temperature probe	KWTSS accessory (supplied separately)
RT2	Primary outlet temperature probe	Standard
RT5	Temperature probe for additional heat source or hydraulic separator	Standard
RT7	Domestic hot water temperature probe	Standard
SC	Water drain	Not supplied
SOL	Solar thermal system	Not supplied
TH	Room thermostat with Hot/Cold/OFF mode	Not supplied
TH+	Pump ON/OFF room thermostat	Not supplied
VAN	Antifreeze valve	Not supplied
VBY	By-pass valve	Not supplied
VDEV	3-way diverter valve DHW/system side	Not supplied
VE	Expansion tank	Standard (5 litres)
VMA	Thermostatic mixing valve	Not supplied
VMZ	3-way mixing valve (0-10Vdc)	Not supplied
VR	Check valve	Not supplied
VS	Safety valve	Not supplied
VSA	Automatic air vent valve	Not supplied
VSM	Manual air vent valve	Not supplied

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15. WATER CONNECTIONS

15.1. CONNECTION TO THE SYSTEM

The unit is also complete with:

PUMP set up

- PI0 - Pumping unit complete with: EC multi-step circulator, degasser with safety valve (2.5 bar), flow switch, expansion vessel (5 litres), and water filter supplied.

The unit is equipped with 1"GM male thread hydraulic connections for models 106-114 and 1¼" GM for model 116.
It is necessary to install shut-off valves that isolate the unit from the rest of the system and elastic connection joints, as well as system/machine drain taps.
It is mandatory to fit the supplied water filter on the unit's return piping.
The rate of the water that flows through the heat exchanger must not drop below the value corresponding to a temperature differential of 10°C (the minimum and maximum flow rates must still be complied with – see "Water flow rate limits").
During long periods of inactivity, it is advisable to drain the water from the system:
Water drainage can be avoided by adding antifreeze valves to the hydraulic circuit.

Condensation drain tray and condensate drain
The units are complete with a condensation collection tray equipped with an electric heating element, which operates in winter mode with activation based on the outdoor temperature.
The condensation tray has drainage points for the evacuation of condensation water.
It is necessary to channel the chosen drainage point, using the supplied fittings.
When the outdoor temperature is around zero, the water normally produced during defrosting of the coils could form ice and make the flooring near the installation area slippery.
We recommend diverting using an inclined pipe, minimising the number of curves and pressure drops to facilitate draining.
Make sure the units are placed away from openings where gas could stagnate, see "installation" paragraph

EC circulator

- The units are equipped with an electric pump with continuous speed regulation, for variable flow systems.
- For the correct operation of the unit, a by-pass must be provided in the hydraulic circuit that allows the circulation of the minimum flow rate without interrupting the flow to the evaporator, in all operating conditions and especially during start-up and shutdown transients.
- The minimum flow rate value is shown in the "Hydraulic data" section.

With the continuously variable speed electric pump, it is also possible to effectively manage cold system start-up by modulating the speed, allowing operating temperatures to be reached more quickly.

Hydraulic data

Model		**104**	**106**	**108**	**110**	**112**	**114**	**116**
Water content unit		6,8	6,8	7.0	7.0	7,1	7,1	7.4
Safety valve calibration of channelled water	barg	2,5						

15.2. MINIMUM HYDRAULIC CIRCUIT CONTENTS

To ensure the unit works correctly, the system needs a minimum volume of water.
The minimum water content is determined on the basis of the unit's cooling or heating capacity (for heat pumps) in the design of the unit, multiplied by the coefficient expressed in 5 l/kW (*).
If the water content of the system is below the minimum value calculated, install an additional tank.
However, remember that a high water content in the system always goes to the advantage of comfort in the room, as it ensures a high thermal inertia of the system
* For air-condensed heat pumps, also pay attention to the temperature difference generated during the natural defrosting cycles:

DT tank and/or DHW (by defrost effect)	K	15	12	10	8	7	6
Specific capacity	litres/kW	5	6	7	9	10	12

15.3. EXPANSION TANK

The units are equipped with an expansion tank, mounted on board.

THAITP Model		**104 - 116**
Expansion tank capacity	l	5
Expansion tank pre-load	barg	1.5
Expansion tank maximum pressure	barg	3

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Expansion tank adjustment
To ensure effective regulation, it may be necessary to adjust the pre-charge pressure of the expansion tank, based on the water content as indicated in the table:

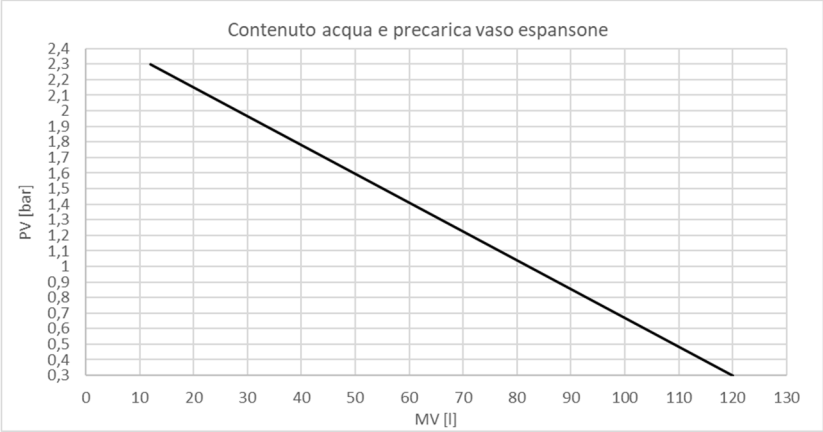
Difference in installation height H [m]	Water content [l]	
	≤ 56 litres	> 56 litres
H ≤ 12	• Re-charging is not required	• Reduce the vessel precharge according to the PV formula. • Check that the water volume is within the indicated range.
H > 12	• Increase the tank precharge according to the PV formula. • Check that the water volume is within the indicated range.	• The expansion tank is too small, add an additional tank • Adjust the tank pre-charge according to the PV formula.

where:
H = the difference in height between the installation site of the unit and the highest point of the hydraulic system.
The installation height difference is equal to 0 if the unit is located at the highest point of the system.

PV = expansion tank precharge pressure, gas side
The formula for calculating the pre-charge is as follows:

$$PV = \frac{H}{10} + 0{,}3\ [bar]$$

Check that the water content is always lower than the maximum water content that can be handled with the expansion tank supplied.



MV	Maximum total volume of the water (l)
PV	Pre-charge of the expansion tank (bar)

If the total volume of water corresponding to the pre-charge value found exceeds the limits in the figure, then the expansion tank is not suitable.
In this case, size and install an additional expansion tank suitable for the water content of the plant.

15.4. PRODUCTION OF DHW

To produce domestic hot water using a heat pump, it is necessary to use a domestic hot water storage tank, complete with an electric resistance.
The figure shows an example:

Boilers for domestic hot water **KACS**
The following boilers are available for combination with Electa-PI

- **KACSB** - Boiler with coil for domestic hot water production from heat pump and integrated electric resistance (2 kW for model 200 / 3 KW for models 300-500 - V 230-1-50)
- **KACSS** - Double coil boiler for domestic hot water production from heat pump and solar panels, with additional electric resistance (3 KW - V 230-1-50)

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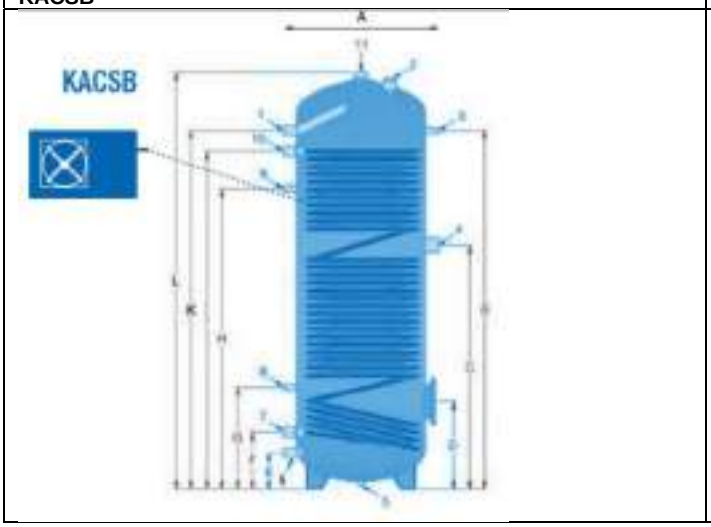
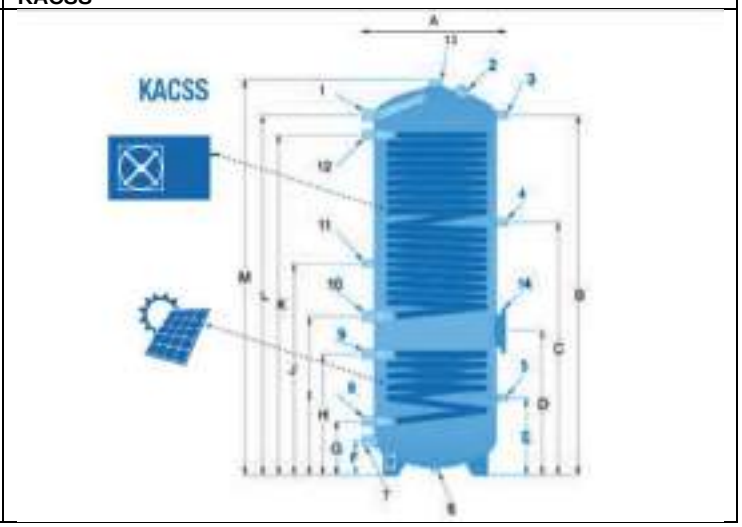
Construction features
Boiler with carbon steel coil, complete with anode protection, internal food-grade inorganic vitrified finish treatment according to DIN 4753-3 and UNI 10025. External insulation made of rigid injected polyurethane, 50 mm thick.
Single-phase copper immersion electrical resistance (IP 65) with internal adjustable thermostat and temperature limiter.

KACSB	KACSS
	

KACSB		A	B	C	D	E	F	G	H	I	J	K	L	M
200	mm	600	995	735	320	140	220	370	835	990		1070	1215	
300	mm	600	1390	945	340	140	220	395	1165	1310		1390	1615	
500	mm	750	1425	970	370	185	265	425	1170	1325		1415	1705	
KACSS		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
300	mm	600	1470	1035	590	315	140	220	495	650	865	1390	1470	1615
500	mm	750	1500	1045	625	320	185	275	525	700	950	1395	1500	1705

Storage tank matching guide

Electa-pi THAITP	KACSB 200	KACSB 300	KACSB 500	KACSS 300	KACSS 500
104	✓	✓	✓	✓	✓
106	✓	✓	✓	✓	✓
108	✓	✓	✓	✓	✓
110		✓	✓	✓	✓
112		✓	✓	✓	✓
114		✓	✓	✓	✓
116			✓		✓

DHW side operation
The activation of the production of domestic hot water is managed by a temperature probe in the storage tank (supplied as standard):
- water temperature probe for domestic hot water storage (length 20 m – RT7).

The RT7 probe must be inserted into the domestic hot water tank and connected directly to the machine's circuit board.
It is important to position the probe carefully and respect the maximum permitted distance.
From the touch-screen panel it is possible to set the desired DHW set point (40÷80°C) and the relative activation differential.
DHW tank electrical resistance
The machine manages the electrical resistance in the DHW storage tank (KACS), according to two operating logics:
Logic 1: the ACS side electric resistance and the unit's compressor cannot operate simultaneously
- When the maximum DHW storage temperature is reached by the heat pump, the DHW resistance is activated up to the domestic hot water set-point and the heat pump stops.

Logic 2: the DHW side electric resistance and the unit's compressor cannot operate simultaneously.
- When the maximum DHW storage temperature is reached by the heat pump, the DHW heating element is activated up to the domestic hot water set point and the heat pump diverts to the system side.

Rapid DHW
The rapid DHW function activates the electric resistance on the domestic side, to heat the water more quickly.
DHW recirculation pump
It is possible to manage a DHW recirculation pump as an alternative to the zone 1 secondary pump or the auxiliary pump (back-up).

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15.5. ADDITIONAL HEAT SOURCE AND AUXILIARY GENERATOR

From the machine card it is possible to manage an additional heat source (electric resistance) or an auxiliary heat source (boiler).
The management of an additional heat source must be enabled and configured, refer to the control panel manual.

Electrical resistance thermal source (KRIT accessory)

By supplementary heat source we mean an electrical resistance on the system side. which works simultaneously or as an alternative to the heat pump in winter mode.
If the 3-way valve for domestic hot water production KVDEV is present, the heater must be positioned downstream of the valve on the system side.
Install the optional temperature probe supplied (length 5.6 m – RT5), downstream of the electrical resistance or in the circuit breaker if present.

The temperature set-point in Heating must be between +20~80°C.

By controlling the unit, it can be switched on and off based on the outside air temperature:
o external activation temperature of the electric resistance Electric Res T: -20~18°C (-15°C)

There are different operating logics available for managing the electrical resistance:
Logic 1: the resistance activates below the activation temperature, as an alternative to the compressor
Logic 2: the resistance activates below the activation temperature, together with the compressor
Logic 3: the resistance activates below the activation temperature, as an alternative to the compressor, based on a settable delay, only in the presence of multi-step resistances (not supplied).
It is always advisable to carefully evaluate the available electrical power before installing additional electrical resistances.

Auxiliary generator heat source (boiler)

An auxiliary generator is a heat generator that operates simultaneously or as an alternative to the heat pump, typically a boiler.

Install the optional temperature probe supplied (length 5.6 m – RT5), downstream of the auxiliary generator or in the circuit breaker if present.
The DHW temperature set-point must be between +40~70°C.
The temperature set-point in Heating must be between +20~80°C.
Maximum water temperature for the heat source: 60°C

Using the unit control, it is possible to activate or deactivate the auxiliary generator based on the outdoor air temperature:
o outdoor temperature for activating the auxiliary generator: -20~18°C (-20°C)
Different operating logics are available for managing the auxiliary generator.

Logic 1: in Heating+DHW mode, below the activation temperature, only the auxiliary generator for heating on the system side is activated, as well as the electric resistance on the DHW side
Logic 2: in Heating+DHW mode, below the activation temperature, only the auxiliary generator is activated for heating on the system side or domestic hot water side, with settable DHW/system priority.
Logic 3 in Heating+DHW mode in a settable temperature range, the auxiliary generator activates together with the heat pump

The auxiliary generator can be switched on: for an outdoor activation temperature set point, in the event of an error condition or in the event of failure to start the heat pump, activating Emergency Mode.

15.6. SOLAR THERMAL SYSTEM

It is possible to manage a solar thermal system (not supplied).
The unit manages the solar pump and the solar thermal water temperature sensor.
Provide KWTSS accessory - Temperature probe for solar thermal system (length 20 m – RT15) for hot water production.
It is possible to activate the solar pump based on a settable temperature differential.

15.7. AUXILIARY PUMP

It is possible to manage the auxiliary pump (back-up) on the primary
The unit manages an additional circulation pump on the primary circuit (not supplied), with the same operating status as the on-board pump, to increase the useful head on the system side

The auxiliary pump (back-up) excludes the possibility of managing the secondary pump of zone 1 or the DHW recirculation pump

15.8. HIGH TEMPERATURE SECONDARY CIRCUIT

It is possible to manage a high temperature secondary circuit (zone 1), with circulation pump (booster).
The unit manages the circulation pump on the high temperature secondary circuit.
Provide temperature probe for additional heat source or hydraulic circuit breaker (length 5.6 m – RT5). On the circuit breaker

The secondary pump in zone 1 excludes the possibility of managing the auxiliary pump (back-up) or the DHW recirculation pump

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15.9. LOW TEMPERATURE SECONDARY CIRCUIT

It is possible to manage a low temperature secondary circuit (zone 2), with a mixing unit (not supplied) that regulates the flow temperature of the water for applications with radiant panels, in heating.
The unit manages the circulation pump, the mixing valve with a 0-10 Vdc proportional signal, based on the water temperature set-point, which can be set for the zone, and the mixed water temperature sensor of the low-temperature secondary circuit.
Provide accessory KWTSM - Mixed water secondary circuit temperature probe (length 8 m – RT14).

16. INFORMATION ON THE ACCESSORIES

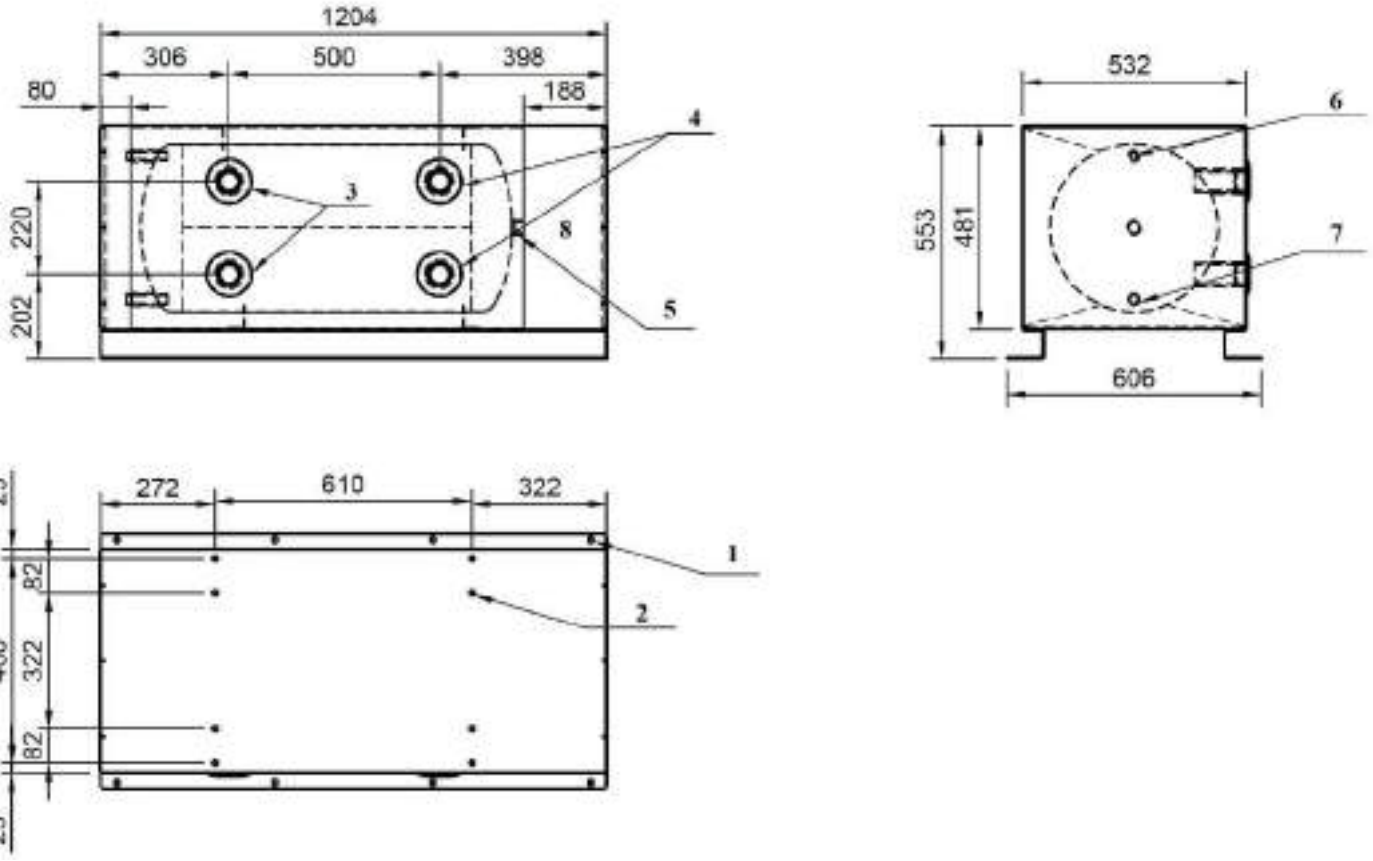
16.1. KAI-100 ACCESSORY - INERTIAL TANK UNDER THE UNIT

KAI-100 - Inertial storage tank, with thermal flywheel or hydraulic circuit breaker function, for external installation under the Electa-PI unit.
KTAI-100 - Connection pipe between Electa-PI unit and KAI-100 tank.

Technical features
KAI-100
- S235JR carbon steel tank with external anti-rust paint treatment;
- High density rigid polyurethane insulation (42 kg/m^3) with a minimum thickness of 40mm;
- External finish in Z200 galvanized sheet metal and painted in matt rippled RAL9005.

KTAI-100
- Black, heat-resistant EPDM rubber hose with connecting fittings.

Dimensions



No.	Description
1	8 holes ∅10x15mm for ground anchoring
2	8 holes ∅9mm for heat pump fastening
3	Water connections G 1½''
4	Water connections G 1½''
5	Connection G ¾" for any additional expansion tank (not supplied)
6	Air vent G 3/8"
7	Drain G ½"
8	Useful compartment for the concealed installation of a 6 or 8 litre flat expansion tank (not supplied, to be provided by the installer)

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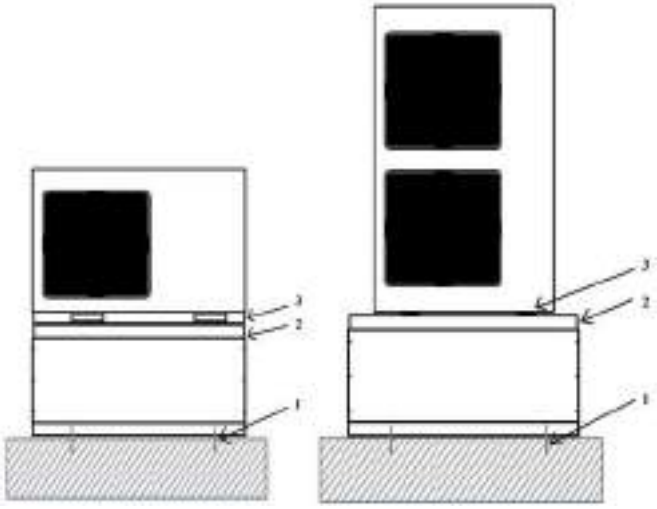
Technical Data

Description	KAI - 100	
Capacity	102	litres
Width	1204	mm
Height	624	mm
Depth	606	mm
Max operating P	6	bar
Operating T	-10°-80°C	°C
Therm disp.	0.73	W/K
Weight	88	kg

Parameters directive 2009/125/EC, EU Reg. 2017-1369-EN 12897				
ACCESSORY	**CAPACITY (L)**	**DISPERSION (W)**	**SPECIFIC DISPERSION (W/K)**	**ENERGY CLASS**
KAI - 100	102	33	0.73	A

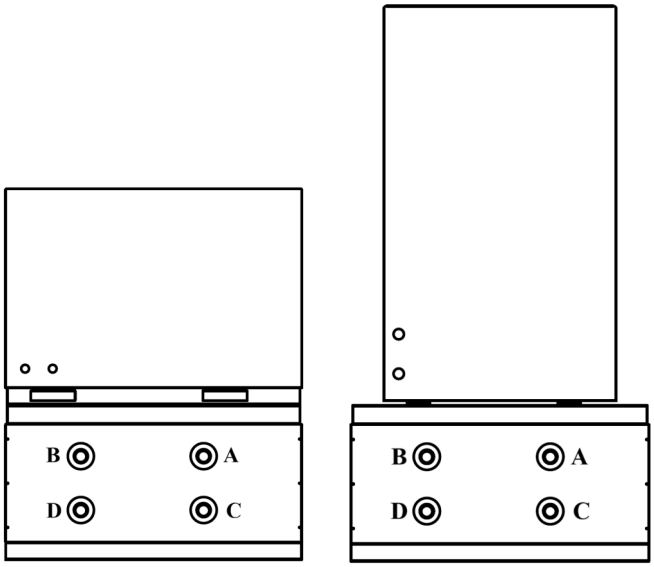
Assembly

Front view



1→ MANDATORY fixing of the KAI-100 storage tank to the base or support frame using the screws supplied;
2→ MANDATORY fixing of the brackets to the storage tank using the screws provided;
3→ Positioning and fixing the Electa-PI unit to the pre-assembled brackets on the storage tank.

Rear view



A, B, C, D → G 1½" water connections

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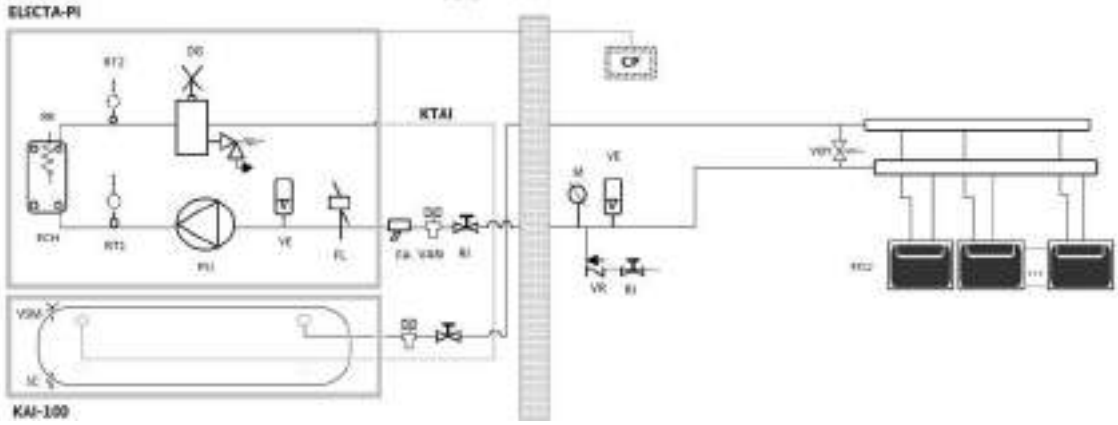
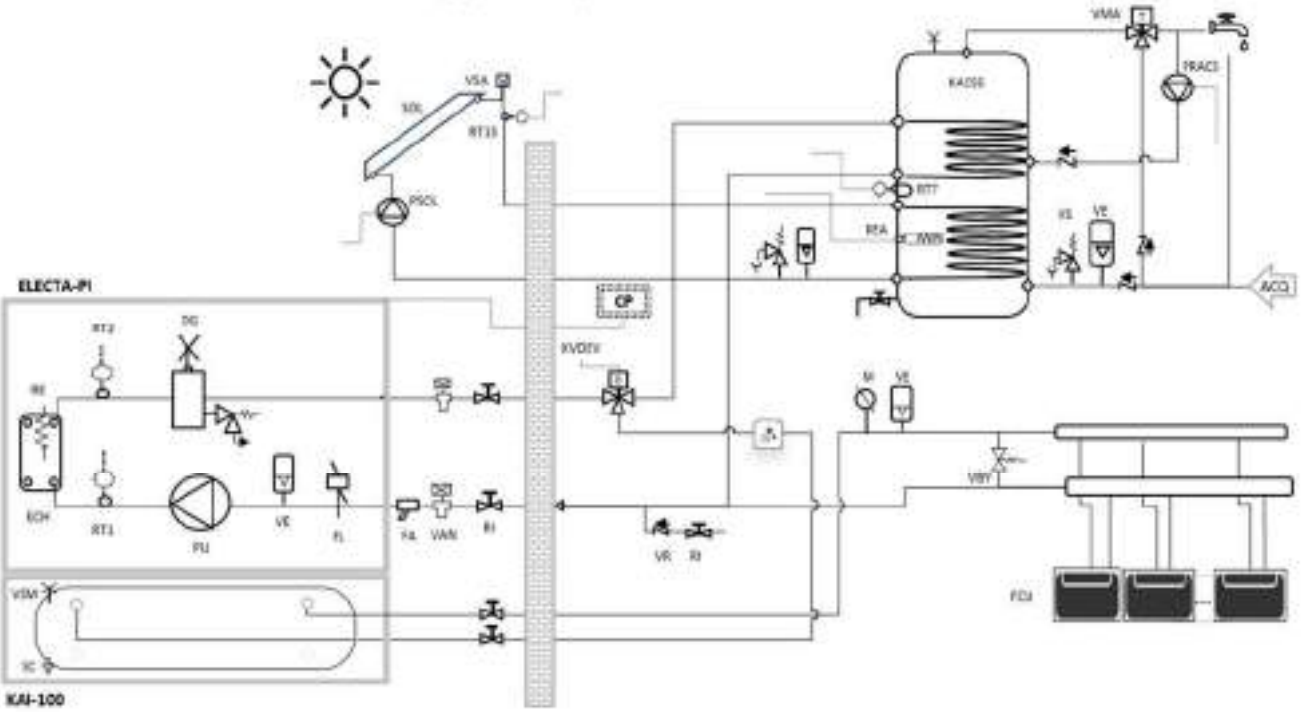
Water connections

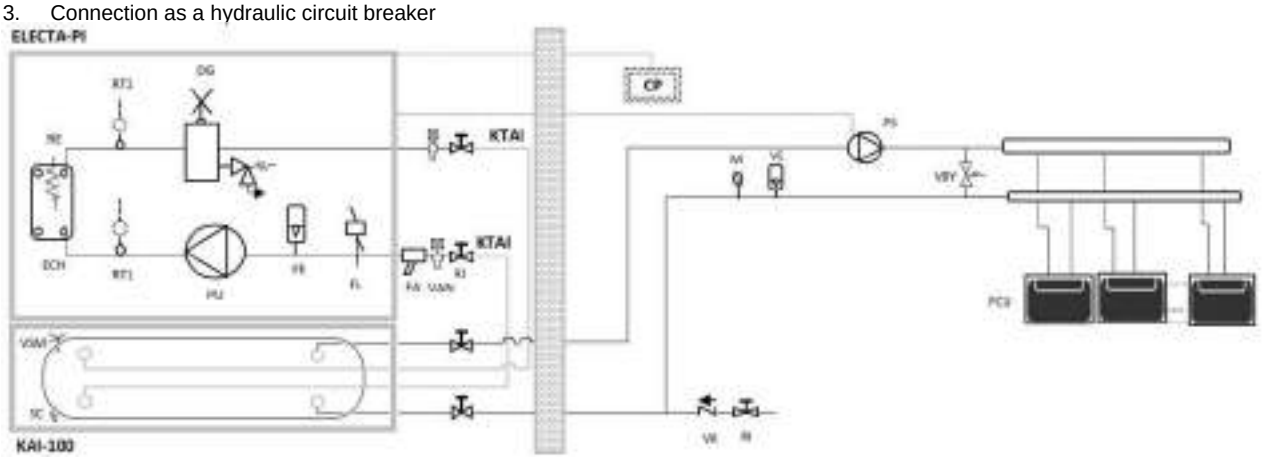
1. Connection as a thermal handwheel on supply



2. Connection as a thermal handwheel on supply with 3-way diverter valve for DHW



3. Connection as a hydraulic circuit breaker



KAI-100 - Inertial storage tank, with thermal handwheel or hydraulic circuit breaker function, for external installation under the Electa-PI unit (accessory supplied separately).
KTAI-100 - Connection pipe between Electa-PI unit and KAI-100 tank (accessory supplied separately).

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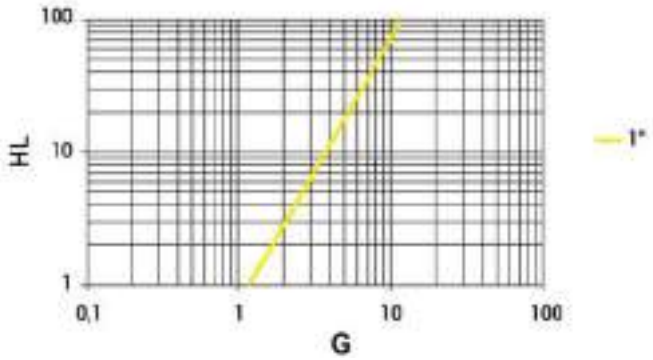
16.2. KVDEV ACCESSORY - 3-WAY DIVERTER VALVE FOR DHW

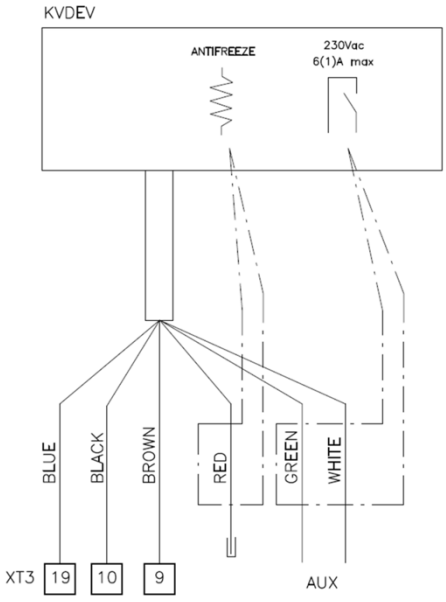
The KVDEV kit can be installed for managing the domestic hot water production. The 3-way valve allows deviating the water flow from the system to the technical water tank for the production of domestic hot water.
The accessory must be mounted the closest possible to the heat pumps, in order to prevent a transfer of chilled water inside the domestic hot water storage, during the passage between heat pump chiller operation to produce domestic hot water.
The KVDEV accessory is supplied with the three-point actuator (SPDT) and is set-up for 230V 50Hz power supply.
The valve is 3-way with 1¼" male threaded connection.

Valve body technical characteristics and servomotor technical data
The diverter valve with a brass body, chrome-plated brass ball, PTFE seat ring, EPDM gasket.
Maximum differential pressure: 500 kPa
Working pressures: PN16 for water at 90°C, PN20 for chilled water.
Flow temperature limits: water 0-90°C, with glycol -10-90°C.
Kv: 42 m3/h
Three-point actuator (SPDT).
Ball manoeuvre time: 60 s.
The passage of fluid is always guaranteed during the manoeuvre. The actuator is contained in a sealed box fixed to the valve body via screws.
Rated supply voltage 230 V/50Hz Absorbed power 6 VA.
Isolation class II
Maximum torque: 18 Nm (230V) Auxiliary contact: 6 A 230V (on-off)
IP65 protection rating



G	Water flow rate (l/sec)
HL	Pressure drop (kPa)

Electrical connection



BLUE	Neutral
BROWN	Opening phase B-AB (system
BLACK	Opening phase B-A (DHW tank)
GREEN/WHITE	Microswitch closed with blue-black, open with blue-brown
RED	Anti-condensation resistance (always active if connected to the line)

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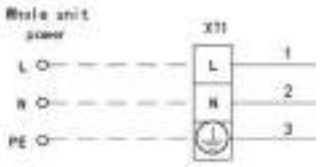
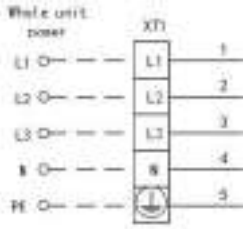
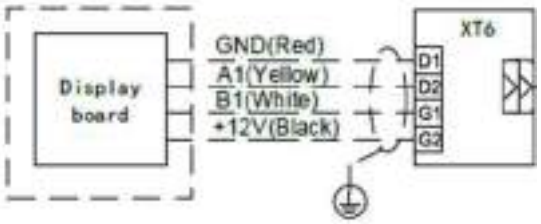
17. ELECTRICAL CONNECTIONS

17.1. ELECTRICAL SUPPLY

THAITP: 104 M – 106 M – 108 M – 110 M – 112 M – 114 M – 116 M	THAITP 116 T
V-ph-Hz: 230-1-50	V-ph-Hz: 400-3+N-50
	

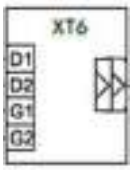
17.2. TOUCH-SCREEN CONTROL PANEL



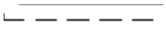
Display board = Touch-screen control panel

Cable for connecting the touch-screen control panel, length 8 m supplied,

The KPRU - Touch-screen connection cable (30 m) accessory is available as an alternative to the cable supplied as standard.



XT6 = connection terminal block



Connection set up by installer

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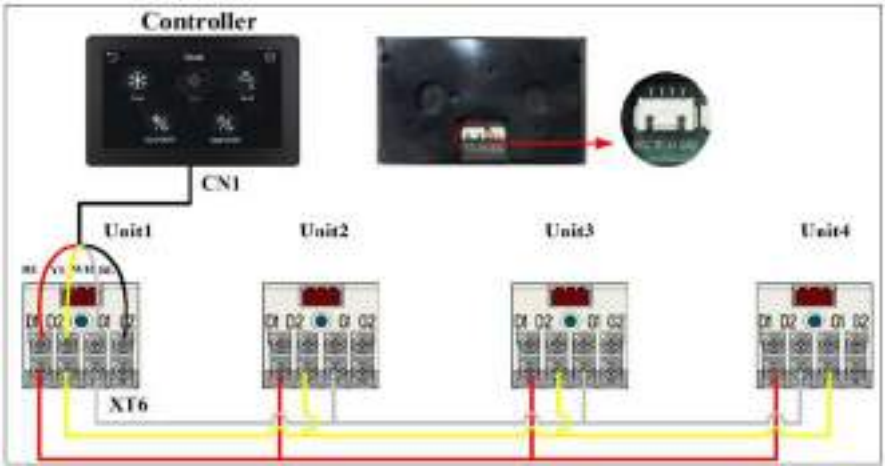
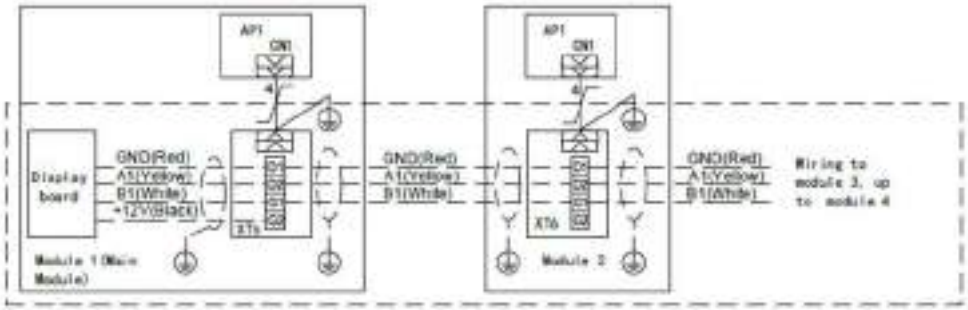
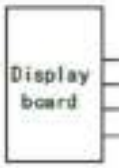
17.3. MASTER/SLAVE CONNECTION





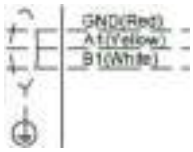


Display board = Touch-screen control panel

Cable for connecting the touch-screen control panel, supplied with the kit, length 8 m

The KPRU - Touch-screen connection cable (30 m) accessory is available as an alternative to the cable supplied as standard.

XT6 = connection terminal block



KSMS - Serial cable for connecting slave units (8 m), in case of master/slave management (provide one cable for each slave unit present)

Connection set up by installer

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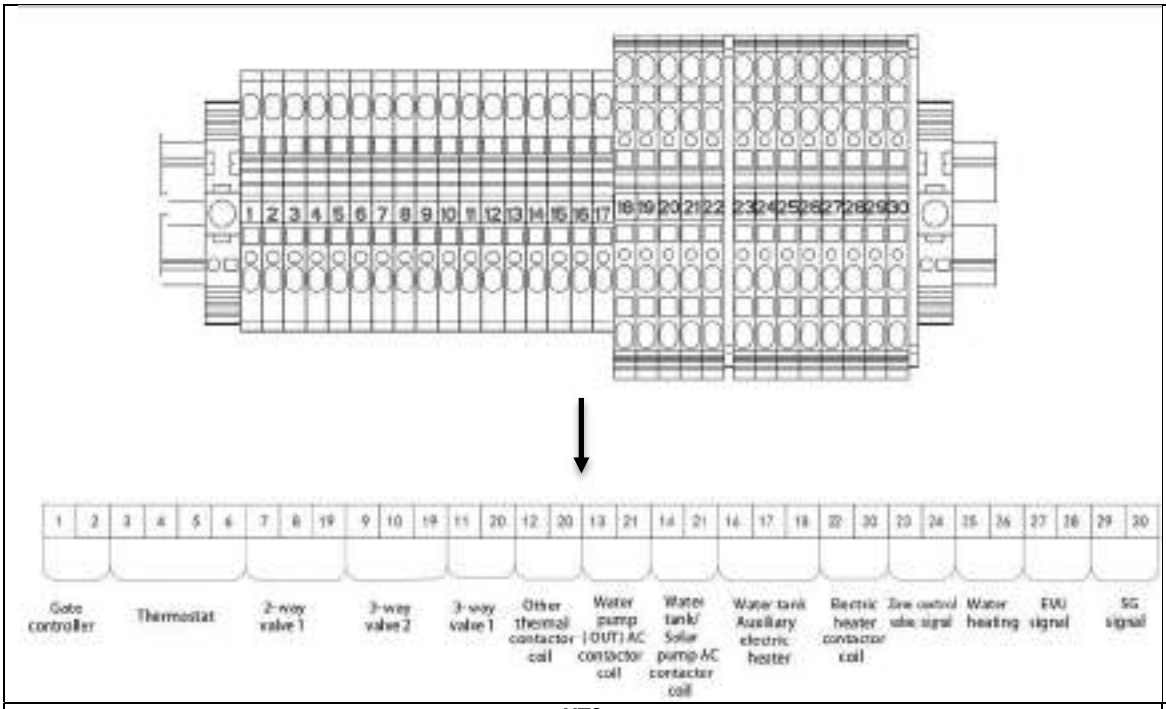
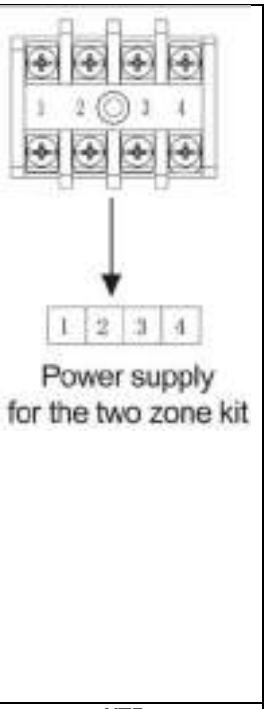
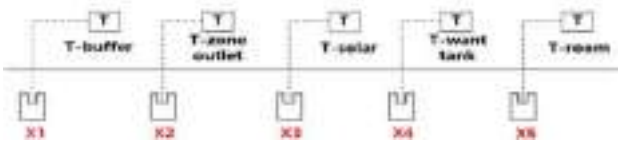
17.4. CONNECTION TERMINAL BLOCK





XT3 | **XT5**

Board	Terminal	Description
XT3	1-2	Contatto On/Off remoto unità (230Vac)
	3-4-5-6	Termostato ambiente esterno
	7-8-19	2-way on/off valve (230Vac) for cooling/heating
	9-10-19	3-way on/off diverter valve for DHW water (230Vac)
	11-20	3-way DHW diverter valve status contact (230Vac)
	12-20	Auxiliary heat source control Boiler (230Vac)
	13-21	Pump output configurable as auxiliary pump (back-up) or secondary pump zone 1 or DHW recirculation pump (230Vac)
	14-21	Solar pump contact (230Vac)
	16-17-18	DHW tank electric resistance power supply
	22-20	Control of the integrative electric resistance on the system side (230Vac)
	23-24	0-10Vdc mixing valve for low temperature secondary circuit, zone 2
	25-26	Ingresso digitale chiamata ACS (contatto pulito)
	27-28	Smart grid signal
	29-30	Photovoltaic signal
XT5	1-2	Mixing valve power supply for low temperature secondary circuit zone 2 (230Vac)
	3-4	Low temperature secondary circuit pump contact zone 2 (230Vac)



Reference	Supply	Description
X1	Standard	Temperature probe for additional heat source or RT5 hydraulic separator
X2	KWTSM Accessory	Secondary mixed water circuit temperature probe RT14
X3	KWTSS Accessory	Solar thermal temperature probe RT15
X4	Standard	Domestic hot water temperature probe RT7
X5	Standard	Remote air temperature probe for managing the unit on the room set-point RT6

- The electrical panel is accessible from the front panel of the unit.
- Connections must be made in compliance with current standards and with the diagrams provided with the machine.
- Machine earthing is legally compulsory.
- Always install a general circuit breaker or fuses with adequate capacity and breaking capacity in a protected area or near the machine.

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ATTENTION!
The diagrams only show the connections to be carried out by the installer.
For the electrical connections of the unit and accessories, refer to the relative wiring diagram.

THAITP		Line Section	PE size	Commands and controls section
104 M	mm2	2,5	2,5	1.5
106 M	mm2	2,5	2,5	1.5
108 M	mm2	4,0	4,0	1.5
110 M	mm2	4,0	4,0	1.5
112 M	mm2	6,0	6,0	1.5
114 M	mm2	6,0	6,0	1.5
116 M	mm2	6,0	6,0	1.5
116 T	mm2	2,5	2,5	1.5

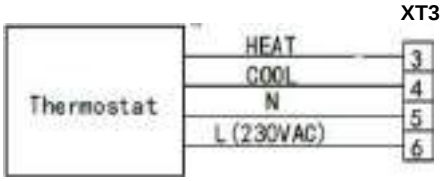
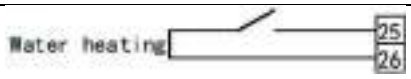
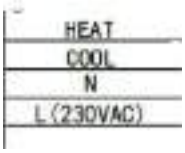
(*) The power supply gauges indicated are indicative. It is the installer's responsibility to appropriately size the power supply line switch - including the earth wire - based on: line length, distribution system, cable type, installation type, maximum power consumption of the unit

17.5. REMOTE THERMOSTAT AND DHW CALL

The unit can be activated by an external room thermostat (not supplied)
- The external thermostat manages the ON/OFF of the unit and the Cooling / Heating / Cooling + DHW / Heating + DHW mode, with configurable priority logics

o
It is possible to activate the production of domestic hot water - DHW mode - by an external consent with a selector (not supplied)
- In the presence of an external thermostat and a domestic hot water call, it is possible to manage the ON/OFF and the Cooling/Heating/DHW/Cooling+DHW/Heating+DHW mode.

The external thermostat can be connected to the high temperature zone 1,
In case of 2 secondary circuits with low temperature secondary, the thermostat can only be connected to Zone 2.

Room thermostat	**DHW call**
	
 Third party thermostat not supplied  Connection set up by installer **XT3** XT3 = connection terminal block 	

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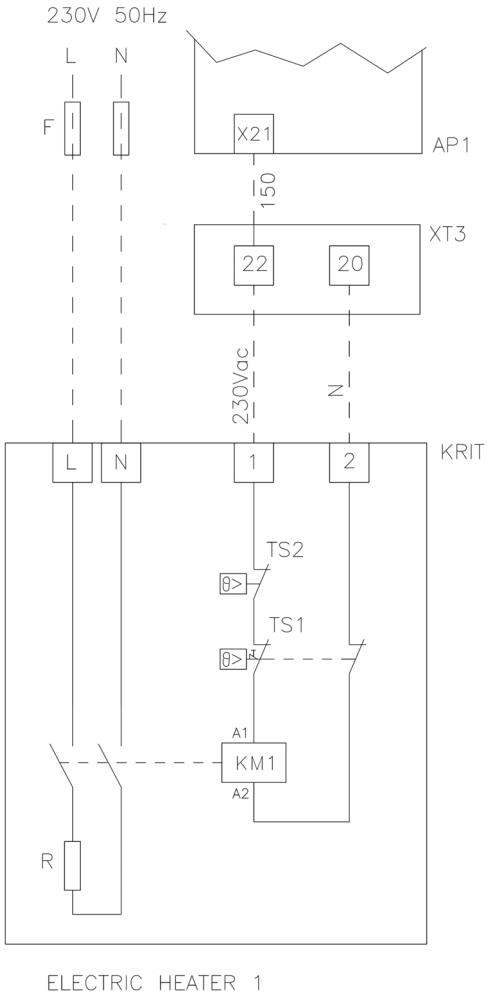
17.6. ELECTRICAL RESISTANCE ON SYSTEM SIDE - KRIT ACCESSORY



ELECTRIC HEATER 1

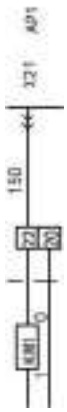
AP1 main board

- Connection X21 to 22 to be set up by the installer

XT3 terminal block

- Connection 22 -20 to KRIT resistance to be carried out by the installer

Electrical resistance on system side KRIT accessory



connection diagram
X21 on AP1 and 22 on XT3

Connection set up by installer

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New air

for the future.

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