K20129EN ed.2

TECHNICAL NOTE

Compact-I

TCAITY-THAITY 117÷128

Air-cooled water chillers and reversible heat pumps with axial fans.
Range with hermetic Scroll DC brushless Inverter compressors and R410A ecological refrigerant.

www.tpiab.com

RHOSS
CREATING YOUR COMFORT

index

New Compact-I range

Inverter compressor
Thanks to inverter technology, Compact-I units are able to modulate heating and cooling capacity continuously over time, adjusting the power supplied to system request minute-by-minute, thus ensuring high efficiency as well as partial loads.

Extremely silent
Compact-I is characterised by low sound levels that are decreased even further with partial loads. This is possible thanks to the modulating capacity of the compressor and fans, which reduce their speed according to outdoor and load conditions. Moreover, when energy requirement is minimal and the need for more silence increase, for example during night-time operation, via the FDL accessory, it is possible to limit the maximum operation frequency to a pre-established value, having remarkable advantages from an acoustic point of view.

Unit Plug&play
From a hydraulic point of view, the units are available with different fittings in order to be easily coupled to different types of systems.

Thanks to the PI0 set up with an EC brushless circulator, it is possible to manufacture **variable capacity** systems that reduce energy costs and simplify the system.

EC fans (accessory)
The FI15 accessory is also available for maximum attention to energy saving, which is assembled in brushless fan units.

Energy absorbed saving in an year, compared to standard fans, can reach up to **50%.**

Comfort at 360°C
THAITY units are able to ensure maximum performance both when heating/cooling rooms and for DHW production by means of 3-way diverter valve management.

Control from the machine also enables intelligent management of an auxiliary generator (e.g. boiler) or integration (e.g. electrical resistance) to guarantee perfect comfort throughout the year.

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 U.S. 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
- » Improve individual health and well-being
- » Protect and restore water resources
- » Protect, enhance and restore ecosystems and biodiversity
- » Promote procurement cycles of sustainable and regenerative materials
- » Create "green economy"
- » Improve social equity, public health and quality of life

Since LEED is certification dedicated to buildings, products, technologies or building materials cannot be LEED certified and can only help meet the criteria of specific pre-requisites and credits of the LEED reference guide and help the building increase its score.

However, making an informed choice of certain products and technologies other than others may have a significant impact on the total score of the building; an impact that can reach 50% of the total.

For this reason, the manufacturer may have an important role in the certification process and provide concrete support to the parties involved. 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 do these products help fulfil
- Offer services and expertise that simplify and facilitate certain activities, which are 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 definite potential in relation to CO2, which has been conventionally defined as a potential equal to 1.

LCGWP = Life Cycle Global Warming Potential - An index which defines the global warming potential of the entire life cycle of the product. This index depends on: GWP of the refrigerant used, useful life of the product, estimated annual loss of refrigerant and end of life, amount of unit refrigerant.

LCODP = Life Cycle Ozone Depletion Potential - The index which defines the potential destruction of the stratospheric ozone layer of refrigerant used throughout the life cycle of the product. This index is 0 for refrigerants of the HFC family (R134a and R410A).

General Features
Declared conditions of use

THAITY units are packaged cooling cycle reversible heat pumps with air evaporation/condensation and axial fans complete with a hydraulic pump.
TCAITY units are air cooled packaged water chillers and helical fans with axial fans.

They are suitable in air conditioning installations and industrial processes where chilled and hot water is required, not for human consumption.

The units are designed for outdoor installation.

The units comply with the following Directives:
2006/42/EC Machinery Directive (MD)
Low voltage Directive 2006/95/EC
Electromagnetic compatibility Directive 2004/108/EC
Pressure equipment directive 97/23/EEC (PED)

Guide to reading the code

"SERIES" code **"MODEL" code**

T	H Heat pump C Water chiller	A	I	T	Y	1	17÷28
Water production unit		Air cooling	Inverter scroll-type hermetic compressors	High efficency	R410A refrigerant fluid	n° compressors	Approximate cooling power (in kW)

Set-ups available for the Models TCAITY-THAITY 117÷128:

Pump:
P0 – Set up with a 3-speed electronic circulator.
PI0 – Set up with an electronic circulator with continuous speed adjustment (variable capacity of the system).
P1 – Set-up with a single pump standard head.

Tank&Pump:
ASP0 – Set up with inertial buffer tank and 3-speed electronic circulator.
ASPI0 – Set up with inertial buffer tank, electronic circulator and continuous speed regulation (variable flow rate on the system).
ASP1 – Set up with inertial buffer tank and single basic head pressure pump.

Example: THAITY 124 P0

- Hot and cold water production unit;
- Air-cooled;
- n° 1 Hermetic Inverter Scroll compressor;
- High efficiency version
- R410A refrigerant fluid
- Approximate nominal cooling capacity 24 kW.
- With a 3-speed electronic circulator.

New Compact-I range

Reliable and versatile energy consumption chillers

A complete and flexible range

New chillers and heat pumps with an R410A inverter compressor equipped with **AdaptiveFunction Plus** innovative logic control with which the range is supplied. Besides optimising compressor activation and the relative operating cycles, the control, developed by RHOSS in collaboration with the University of Padua, allows optimal comfort levels to be achieved in all load conditions and the best performance in terms of energy efficiency during seasonal operation.

AdaptiveFunction Plus

The new AdaptiveFunction Plus adaptive control logic is an exclusive RHOSS patent and the result of a long collaboration with the University of Padua. The various algorithm processing and development operations were implemented and tested on the new Compact-I units in the R&D Laboratory of **RHOSS** S.p.A. by means of numerous test campaigns.

Objectives

- To always guarantee optimal unit operation in the system in which it is installed. ***Evolved adaptive logic.***
- btaining the best performance from a chiller in terms of energy efficiency at full and partial capacities. ***Low consumption chiller.***

Operating logic

In general, the actual control logics on chillers/heat pumps do not consider the features of the system in which the units are installed; they usually control the return water temperature and there aim is to guarantee the operation of the chillers, giving less priority to the system requirements.
The new AdaptiveFunction Plus adaptive logic contrasts these logics with the objective of optimising chiller operation according to the system characteristics and the actual thermal load. The controller regulates the flow water temperature and adjusts itself according to the operating conditions using:

- the information contained in the return and flow water temperature to estimate the load conditions, thanks to a particular mathematical function;
- a special adaptive algorithm that uses this estimate to vary the start-up and switch-off threshold values and position of the compressors; optimised compressor start-up control guarantees maximum precision in the water supplied to the utility, thereby reducing the fluctuation around the Set-point value.

Main functions

Efficiency or Precision

Thanks to the advanced control, the chiller can run on two different control settings in order to obtain the best possible performance in terms of energy efficiency and therefore, significant seasonal savings or high water delivery temperature precision:

1. Low consumption chiller: “Economy” Option

It is known that chillers work at full load for only a very small percentage of their operating time and at partial load for most of the season. Therefore, the power they must supply generally differs from the nominal design power, and partial load operation significantly affects seasonal energy performance and consumption.
This makes it necessary for the unit to run as efficiently as possible with partial loads. The controller therefore ensures that the water flow temperature is as high as possible (when operating as a chiller) or as low as possible (when operating as a heat pump) whilst being compatible with the thermal loads, which means it shifts, unlike traditional systems. This prevents energy waste associated with the unnecessarily onerous chiller temperature levels being maintained, thereby guaranteeing that the ratio between the power to be supplied and the energy to be used to produce it is always optimised. The right level of comfort is finally available to everyone!

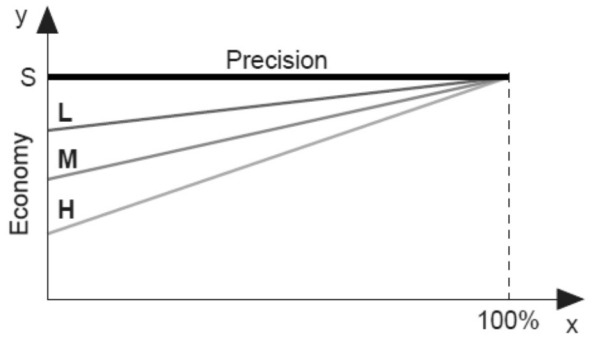
2. High precision: “Precision” Option

In this operating mode, the unit works at a fixed set-point and, thanks to the water flow temperature control and the advanced control logic, at loads ranging between 50% and 100%, it is possible to guarantee an average fluctuation from the utility water supply temperature of approximately ± 1.5°C with respect to the set-point value compared to an average fluctuation of approximately ± 3°C, which is normally obtained with standard return control.
Therefore, the “Precision” option guarantees precision and reliability in all applications that require a controller that guarantees a more accurate constant water supply temperature, and where particular humidity control is required. However, it is always recommended to use a storage tank with greater system water content in process applications to guarantee high system thermal inertia.

Set-point Compensation

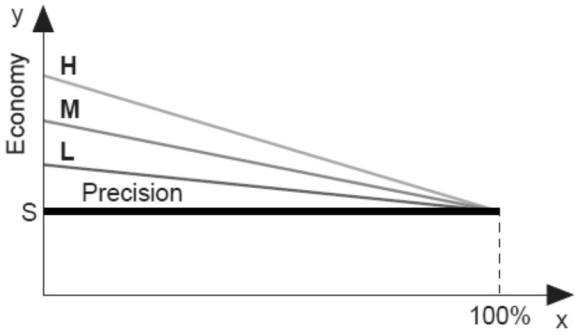
The Economy function enables the chiller assembly to operate energy-saving programmes whilst still providing the required level of comfort.
This function controls the maximum limit with sliding Set-point , modifying the Set-point value according to the actual system thermal load; when the load decreases during summer months the Set-point increases, while when the load decreases during winter months the Set-Point decreases.
This function is destined for cooling applications, and is designed to control energy consumption while always respecting the real demands of the system capacity. Within the Economy option it is possible to select one of three diverse Set-point adaptation curves depending on the type of system.

"Economy" function in Winter mode



x	Load percentage (%)
y	Set-point (°C)
S	Value of Set-point set by user
L	Use in buildings with very unbalanced loads.
M	Intermediate situation between L and H (default).
H	Use in buildings with very similar loads. High efficiency.

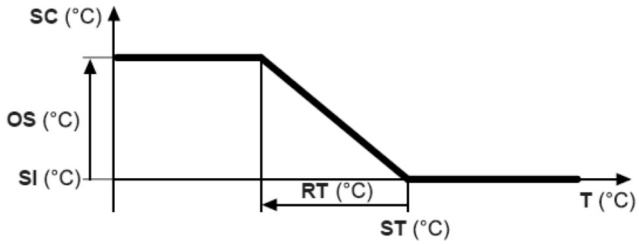
"Economy" function in Summer mode



x	Load percentage (%)
y	Set-point (°C)
S	Value of Set-point set by user
L	Use in buildings with very unbalanced loads.
M	Intermediate situation between L and H (default).
H	Use in buildings with very similar loads. High efficiency.

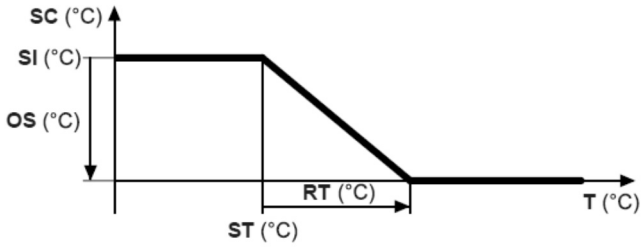
As an alternative to modification of the Set-point according to the real system load (Economy option), it is possible to compensate the set-point based on the temperature of the outdoor air by purchasing the KEAP accessory.
This function modifies the Set-point value based on the temperature of the outdoor air. Based on this value, the set-point is calculated by adding (winter cycle) or subtracting (summer cycle) an offset value to the Set-point set (see example below).
This function is activated both in winter mode as well as in summer mode. The function is activated only when a KEAP accessory is present.

Winter cycle



OS = 8°C
RT = 25°C
ST = 20°C

Summer cycle



OS = 8°C
RT = 15°C
ST = 15°C

T (°C)	Outdoor air temperature
SC (°C)	Calculated Set-point temperature
OS (°C)	Offset Set-point (calculated value)
SI (°C)	Set-point set
RT (°C)	Outdoor air temperature Set-point compensation
ST (°C)	Outdoor temperature set

It is possible to decide whether to activate the function in both functioning modes or only in one. If the Set-point compensation is enabled in relation to the outdoor temperature, the Economy option is automatically disabled.
However, it is possible to decide to enable the set-point compensation in one cycle and enable the Economy function in the other cycle.

Structural features

o Load-bearing structure and panels in galvanised and RAL 9018 painted sheet metal; galvanised steel sheet metal base.
o Hermetic scroll type rotary compressors with inverter activation to control variable capacity from 30% to 120% of the nominal capacity with peak current reduction during the start-up phase and power factor correction of the automatic user to the network. They are complete with external thermal protection and crankcase heater activated automatically when the unit stops (as long as the electrical supply to the unit is preserved).
o Adequately insulated, braze-welded plate water side heat exchange in stainless steel complete with anti-freeze heater.
o Air side heat exchanger featuring finned coil with copper pipes and aluminium fins, with hydrophilic surface treatment (THAITY). Air side heat exchanger featuring finned coil with copper pipes and aluminium fins (TCAITY).
Complete with protective grilles.
o Condensate drain tray under the coil for THAITY units only supplied with electrical heating resistance that is activated according to outdoor air.
o Electric axial fans with external rotor, supplied with internal thermal protection and complete with protection mesh.
o Proportional electronic device for pressure regulation and continuous regulation of the rotation speed of the fans.
o Male threaded hydraulic connections.
o Water heat exchanger differential pressure switch that protects the unit from any water flow interruptions.
o Outdoor air temperature probe
o Cooling circuit made with an annealed copper pipe (EN 12735-1-2) complete with: dryer filter, load connections, high pressure side pressure switch, pressure transducer on both the high and low pressure sides, electronic thermostatic expansion valve , cycle inversion valve (for THAITY only), liquid receiver (for THAITY only), gas separator and check valve.
o Unit with IP24 protection rating.
o Control with *AdaptiveFunction Plus* operation.
o The unit is complete with a charge of R410A refrigerant.
o Condensate drain tray with ductable drains and heating resistance functioning in winter mode.

Available Installations

Pump P0 – Set up with a 3-speed electronic circulator.
Pump PI0 – Set up with an electronic circulator with continuous adjustment (variable capacity of the system).
Pump P1 – Set-up with a single pump standard head.
Tank&Pump ASP0 – Pump unit with: inertial buffer tank, EC circulator with 3-speed selector, membrane expansion tank, manual air vent valve, safety valve, pressure gauge and hydraulic pipes connecting the unit to the tank.
Tank&Pump ASPI0 – Pump unit including: inertial buffer tank, EC circulator with continuous speed regulation, membrane expansion tank, manual air vent valve, safety valve, pressure gauge and hydraulic pipes connecting the unit to the tank.
Tank&Pump ASP1 – Pump unit including: inertial buffer tank, electric circulation pump, membrane expansion tank, manual air vent valve, safety valve, pressure gauge and hydraulic pipes connecting the unit to the tank.

Control

o Electrical panel can be accessed by opening the front panel, in compliance with IEC Standards in force, fitted with opening and closing via specific tool.
o Complete with:
- electrical wiring arranged for power supply 400-3ph+N-50Hz;
- auxiliary circuit power supply 230V-1ph+N-50Hz derived from main power supply;
- main power supply switch with interlocking safety door isolator;
- compressor protection fuses;
- auxiliary circuit protection fuse;
- remote unit controls: remote on/off (SCR), remote summer/winter (SEI), CGA auxiliary generator control (boiler), KRIT integrative generator control, unit forced drain (FDL), lock lamp (LBG) and compressor operation lamps (LFC).
- remote machine commands and controls.

o Programmable electronic board with microprocessor, controlled by keyboard inserted in the machine or by using the remote keyboard (KTR) controlled up to 50 metres: Use the KR200 kit for distances greater than 50 m up to 200 m.
o This electronic board performs the following functions:
- Adjustment and control of the machine water output temperature set-points; of the cycle inversion; of the safety timings; of the circulation pump; of the system pump and compressor hour-run meter; of the electronic anti-freeze protection with automatic activation if the machine is off; of the functions that regulate the intervention method of the individual parts forming the machine;
- complete protection of the unit, 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.
- Multi-language management (Italian, English, French, German) of displays;
- management of the electronic expansion valve (EEV);
- compressor discharge temperature management and inlet and flow pressures;
- display the programmed set-points via the display; the in/out water temperature via the display; the alarms via the display; the chiller or heat pump operation via Led;
- self-diagnosis with continuous monitoring of the unit functioning status.
- user interface menu;
- alarm code and description;
- alarm history management (menu protected by factory password).

o In particular, for every alarm, the following are memorised:
- date and time of intervention;
- alarm code and description;
- in/out water temperature values as soon as the alarm was triggered;
- alarm delay time from the switch-on of the connected device;
- compressor status at the time of the alarm;

o Advanced functions:
- set-up for serial connection (KRS485, KFTT10, KBE, KBM, KUSB accessory);
- possibility of having a digital input for remote management of the double set-point;
- possibility to have an analogue input for the shifting Set-point via a 4-20mA remote signal;
- configured to manage time slots and work parameters with the possibility of daily/weekly operation planning;
- check-up and monitoring of scheduled maintenance status;
- computer-assisted unit testing;
- self-diagnosis with continuous monitoring of the unit functioning status.

o Set-point regulation via the AdaptiveFunction Plus with two options:
- fixed set-point (Precision option);
- set-point sliding (Economy option).

o Compressor drive control serial connection to the programmable electronic board

Accessories TCAITY THAITY 117÷128

Factory Fitted Accessories

FDL – Forced Download Compressors function. Compressor modulation to limit the absorbed current and power (digital input). Also used as a "night mode" function to limit noise during night-time operation.
SIL – Compressor soundproofing.
FI15 – Condensate control with low consumption EC electronic fans.
RAE – Circulator or pump antifreeze(P0/PI0) resistance (P1).
RAS – Storage anti-freeze resistance.
RAP - Unit with copper/pre-painted aluminium condensation coils.
BRR - Unit with copper/copper condensation coils.
DSP – Double set-point via digital input (incompatible with the CS accessory) only with ***Precision*** setting.
CS – Shifting set point via analogue signal 4-20 mA (incompatible with the DSP accessory). Only with ***Precision*** setting.

Accessories supplied separately

KSA - Anti-vibration mountings.
KFA – Water filter.
KRIT – Supplementary electric heater for heat pump.
KVDEV – 3-way diverter valve for managing the production of domestic hot water.
KEAP – Outdoor air remote control temperature probe (instead of the outdoor air probe already on board).
KTR – Keyboard for remote control with LCD display, with identical functions to those inserted in the machine. Connection must be made with a 6-wire telephone cable (maximum distance 50 m) or with KRJ1220/KRJ1230 accessories. For greater distances up to 200 m, use an AWG 20/22 shielded cable (4 wires+shield, not supplied) and the KR200 accessory.
KRS485 - RS485 interface for serial dialogue with other devices (proprietary control; Modbus RTU protocol).
KFTT10 - LON interface for serial communication with other devices (LON protocol).
KBE – Ethernet interface for serial communication with other devices (BACnet IP protocol).
KBM – RS485 interface for serial communication with other devices (BACnet MS/TP protocol).
KUSB – RS485/USB serial converter (USB cable supplied).
KRJ1220 – Connection cable for KTR (length 20m)
KRJ1230 – Connection cable for KTR (length 30m)
KR200 - KTR accessory remote control kit for distances greater than 50m and up to 200m (AWG shielded cabled not supplied).

Technical Data

Table "A": Technical Data

TCAITY model		**117**	**124**	**128**
Fan coil application				
Cooling capacity MIN/NOM/MAX (1)	kW	8,5/16,2/17,1	12,3/24/25,6	13,1/27,2/28,3
ESEER +		5,99	5,47	5,37
Nominal cooling capacity (1) (*) EN 14511:2013	kW	16,40	24,30	27,60
EER EN 14511:2013 (1) (*)		3,14	2,98	3,12
ESEER EN 14511:2013		5,25	4,85	4,79
Application radiant				
Cooling capacity MIN/NOM/MAX (3)	kW	11,1/20,4/21,4	14,8/28,1/29,9	16,0/32,3/33,6
Nominal cooling capacity (3) (*) EN 14511:2013	kW	20,60	28,40	32,60
EER EN 14511:2013 (3)		4,11	4,08	4,10
Sound pressure (5) (∆)	dB(A)	46	48	49
Sound power (6) (∆)	dB(A)	72	74	75
Scroll compressor		Scroll regulated by inverter		
Fans	n° x kW	2x0,3	2x0,3	2x0,3
Heat exchanger water content	l	1,5	1,9	1,9
Water buffer tank content	l	110	110	110
Heat exchanger nominal flow water side (1)	l/h	2800	4100	4700
Residual head (P0/ASP0 installation) (1)	kPa	89/87	89/83	76/69
Residual head (PI0/ASPI0 installation) (1)	kPa	89/87	89/83	76/69
Residual head (P1/ASP1 installation) (1)	kPa	148/145	113/108	124/117
Amount of R410A refrigerant		See serial number plate		
Amount of Oil PVE		See compressor plate		
Electrical data				
Absorbed power in summer mode NOM (1) (●)	kW	5,20	8,20	8,90
Absorbed power in summer mode NOM (3) (●)	kW	5,10	6,90	8,00
Pump absorbed power (P0/PI0-ASP0/ASPI0)	kW	0,3	0,3	0,3
Pump absorbed power (P1/ASP1)	kW	0,6	0,6	0,6
Electrical power supply	V-ph-Hz	400-3+N-50		
Auxiliary power supply	V-ph-Hz	230-1-50		
Nominal current	A	12	15	15
Maximum current (■)	A	16,5	23,9	23,9
Pump absorbed current (P0/PI0-ASP0/ASPI0)	A	1,37	1,37	1,37
Pump absorbed current (P1/ASP1)	A	2,72	2,72	1,58
Dimensions				
Width P0/PI0/P1	mm	1522	1522	1522
Width ASP0/ASPI0/ASP1	mm	1625	1625	1625
Height P0/PI0/P1	mm	1280	1280	1280
Height ASP0/ASPI0/ASP1	mm	1590	1590	1590
Depth P0/PI0/P1	mm	600	600	600
Depth ASP0/ASPI0/ASP1	mm	600	600	600
Water connections	Ø	1 ½"	1 ½"	1 ½"

(1) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5°C.

(3) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5°C.

(5) Sound pressure level in dB(A) referring to a 5 m distance from the unit, in directionality factor equal to 2.

(6) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards.

(■) Current drawn by the compressor and fans.

(●) Power absorbed by the compressor and fans.

(*) The data according to EN14511 refer staging P0/PI0/ASP0/ASPI0. Refer to the section "Attachments Technical Note" to the data of the establishment P1/ASP1.

(∆) With accessory SIL, the value decreases by 2dB(A).

ESEER (European Sesonal EER) European seasonal average efficiency.
ESEER+ with AdaptiveFunction Plus logic.

Table "A": Technical Data

THAITY model		117	124	128
Fan coil application				
Cooling capacity MIN/NOM/MAX (1)	kW	8,3/16/17	12/23,5/24,8	12,8/26,7/27,8
ESEER +		5,87	5,37	5,26
Nominal cooling capacity (1) (*) EN 14511:2013	kW	16,2	23,8	27,0
EER EN 14511:2013 (1) (*)		2,98	2,84	2,97
ESEER EN 14511:2013		5,15	4,75	4,70
Heating capacity MIN/NOM/MAX (2)	kW	6,8/18,0/19,1	10,1/24,6/27,2	10,7/28,8/31
Nominal heating capacity (2) (*) EN 14511:2013	kW	17,7	24,3	28,5
COP EN 14511:2013 (2) (*)		3,32	3,26	3,28
Application radiant				
Cooling capacity MIN/NOM/MAX (3)	kW	11/20,1/21,2	14,5/27,5/29,3	15,7/31,7/32,6
Nominal cooling capacity (3) (*) EN 14511:2013	kW	20,3	27,8	32,0
EER EN 14511:2013 (3)		3,90	3,87	3,89
Heating capacity MIN/NOM/MAX (4)	kW	7,5/19,1/20,1	9,7/25,3/27,9	10,2/29,4/31,6
Nominal heating capacity (4) (*) EN 14511:2013	kW	18,8	25,0	29,1
COP EN 14511:2013 (4) (*)		4,10	4,10	4,10
Sound pressure (5) (∆)	dB(A)	46	48	49
Sound power (6) (∆)	dB(A)	72	74	75
Scroll compressor		Scroll regulated by inverter		
Fans	n° x kW	2x0,3	2x0,3	2x0,3
Heat exchanger water content	l	1,5	1,9	1,9
Water buffer tank content	l	110	110	110
Heat exchanger nominal flow water side (1)	l/h	2800	4000	4600
Residual head (P0/ASP0 installation) (1)	kPa	89/87	89/84	76/69
Residual head (PI0/ASPI0 installation) (1)	kPa	89/87	89/84	76/69
Residual head (P1/ASP1 installation) (1)	kPa	148/146	116/111	126/119
Amount of R410A refrigerant		See serial number plate		
Amount of Oil PVE		See compressor plate		
Electrical data				
Absorbed power in summer mode NOM (1) (●)	kW	5,37	8,39	9,10
Absorbed power in winter mode NOM (2) (●)	kW	5,3	7,5	8,7
Absorbed power in summer mode NOM (3) (●)	kW	5,14	7,19	8,20
Absorbed power in winter mode NOM (4) (●)	kW	4,55	6,12	7,1
Pump absorbed power (P0/PI0-ASP0/ASPI0)	kW	0,3	0,3	0,3
Pump absorbed power (P1/ASP1)	kW	0,6	0,6	0,82
Electrical power supply	V-ph-Hz	400-3+N-50		
Auxiliary power supply	V-ph-Hz	230-1-50		
Nominal current	A	12	15	15
Maximum current (■)	A	16,5	23,9	23,9
Pump absorbed current (P0/PI0-ASP0/ASPI0)	A	1,37	1,37	1,37
Pump absorbed current (P1/ASP1)	A	2,72	2,72	1,58
Dimensions				
Width P0/PI0/P1	mm	1522	1522	1522
Width ASP0/ASPI0/ASP1	mm	1625	1625	1625
Height P0/PI0/P1	mm	1280	1280	1280
Height ASP0/ASPI0/ASP1	mm	1590	1590	1590
Depth P0/PI0/P1	mm	600	600	600
Depth ASP0/ASPI0/ASP1	mm	600	600	600
Water connections	Ø	1 ½"	1 ½"	1 ½"

(1) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5°C.

(2) In the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at evaporator 5°C.

(3) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 18°C; temperature differential at evaporator 5°C.

(4) In the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 35°C; temperature differential at evaporator 5°C.

(5) Sound pressure level in dB(A) referring to a 5 m distance from the unit, in directionality factor equal to 2.

(6) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards.

(■) Current drawn by the compressor and fans.

(●) Power absorbed by the compressor and fans.

(*) The data according to EN14511 refer staging P0/PI0/ASP0/ASPI0. Refer to the section "Attachments Technical Note" to the data of the establishment P1/ASP1.

(∆) With accessory SIL, the value decreases by 2dB(A).

ESEER (European Sesonal EER) European seasonal average efficiency.
ESEER+ with AdaptiveFunction Plus logic.

Energy efficiency at partial loads

ESEER Index

- The E.E.R. index represents an estimate of the energy efficiency of the cooling unit in nominal design conditions. In reality, the operating time of a chiller in nominal conditions is usually less than the operating time in partial load conditions.
- The E.S.E.E.R. index (European Seasonal E.E.R.) is an index that estimates the average seasonal energy efficiency of the cooling unit in four load and water temperature conditions. In general, two chillers that have the same EER value can have different ESEER values. In fact, for a water-cooled cooling unit, the average energy efficiency depends on the design choices and the temperature of the water entering the condensing exchanger.
- The energy index E.S.E.E.R., introduced by the EU (E.E.C.C.A.C. project - Energy Efficiency and Certification of Central Air Conditioners), is characterised by the water temperatures (see table "**B**") and by the energy weights that are assigned to the four load conditions considered in the calculation: 100%, 75%, 50% and 25%.

$$ESEER = \frac{3xEER_{100\%} + 33xEER_{75\%} + 41xEER_{50\%} + 23xEER_{25\%}}{100}$$

where EER100% EER75% EER50% EER25% represent the efficiencies of the cooling unit in the four load conditions and at the temperatures indicated in table "**B**".
The data is calculated by using the Eurovent method.

Table "B": load and temperature conditions

	Condenser air inlet temperature
Load	**E.S.E.E.R.**
100%	35°C
75%	30°C
50%	25°C
25%	20°C

New 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.

These indices are useful to calculate the system's building system energy efficiency that services the unit.

SCOP heating seasonal efficiency of an air-water heat pump in compliance with EN14825, is according to the following variables:

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:	Radiant panel: 35°C fixed or variable according to the outdoor air temperature Fan coil: 45°C fixed or variable according to the outdoor air temperature Radiators: 55°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.

SEER seasonal cooling efficiency of a water-air heat pump is also based on the aforesaid variables with a difference, compared to SCOP, that the project temperature is unique (only one reference locality was identified) and two types of distribution are indicated:

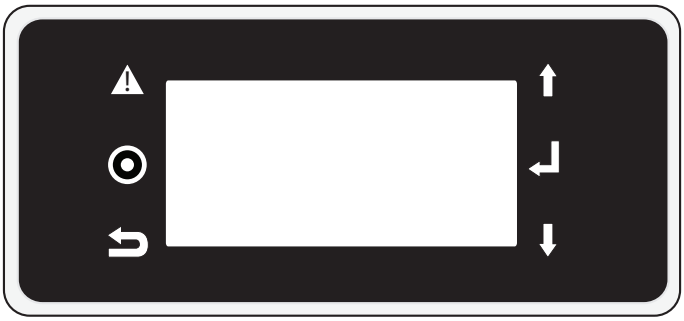
- Radiant panel (Water T at a fixed point equivalent to 18°C).
- Fan coil (water T at a fixed point equivalent to 7°C or variable according to the outdoor air temperature

The SCOP and SEER values of Compact-I units are shown in the section "*Technical Notes Attached*", which refer to applications with radiant panels and, with regard to SCOP, to Average climate. Thanks to the variation in temperature of the water produced according to the outdoor air temperature and Inverter DC technology, the values of efficiency are particularly high.

Electronic controls

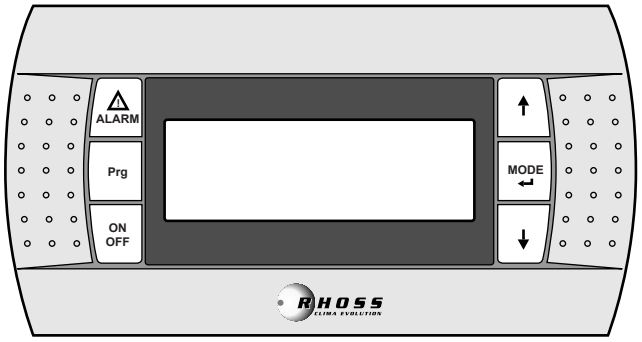
Electronic controls

The keyboard with display makes it possible to view the working temperature and all the unit process variables, as well as providing access to setting parameters for the operating set points and their modification. For purposes of technical assistance, it allows password-protected access to the unit's management parameters (access for authorised personnel only).



KTR - Remote keyboard

The remote keyboard with display (KTR) allows the remote control and display of all of the unit's digital and analogue process variables. It is therefore possible to control all the machine functions directly in the room. It allows setting and management of time periods.



DISPLAY:
displays the numbers and the values of all the parameters (i.e. outlet water temperature etc.), any alarm codes and resource status by means of strings.

ALARM key:
makes it possible to display the code and reset any alarms.

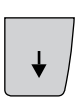
PRG key:
makes it possible to programme the machine's fundamental functioning parameters.

ON/OFF key:
makes it possible to switch the unit on and off.

UP key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points

MODE/ENTER key
makes it possible to switch from chiller to heat pump operation and vice versa.

DOWN key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points



Note:
The temporary presence of two devices, on-board machine keyboard and remote keyboard, will cause the on-board machine terminal to be disabled.

Serial Connection

Serial Connection

All units are equipped with an electronic controller for communicating with an external BMS via a serial communication line by means of the RS485 serial interface accessory (proprietary protocol or - ModBus® RTU) and the following converter:

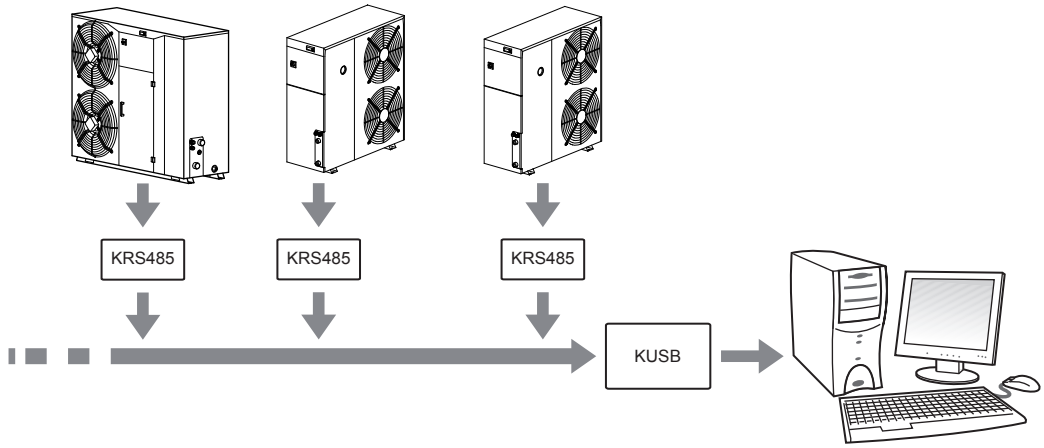
- **KUSB –** RS485/USB serial converter;

Also available are FTT10 accessory (LON protocol), KBE accessory, Ethernet interface - KBM accessory - RS485 interface (BACnet MS/TP protocol).

Supervision

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

- making all settings which are accessible through the keyboard;
- reading all process variables of the inputs and outputs, whether digital or analogue
- reading the various alarm codes which are present, and resetting them as necessary.



Clock card

The clock board, assembled by default, enhances unit flexibility and efficiency, displaying the date/time and allowing machine management with daily and weekly start/stop time bands, with the possibility of changing the set-points. The time bands are set and managed via the keyboard.

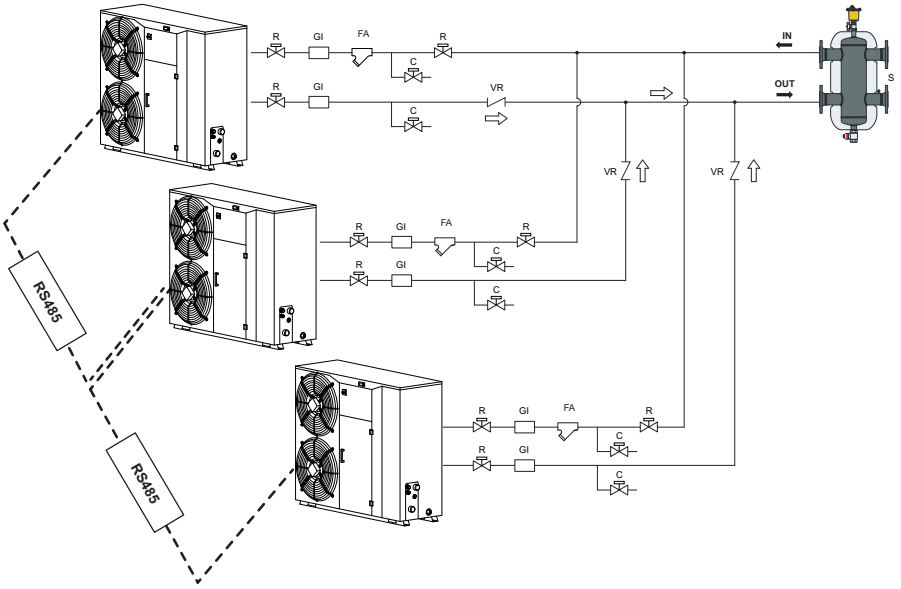
Example of display

Performances

The performance data to the different conditions and working frequencies are available in the "***Attachments Technical Note***".
Also in this section are also made available performance data in accordance with the UNI EN 14511: 2013 useful to calculate the efficiency indexes seasonal.

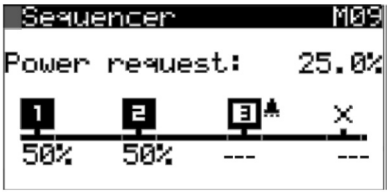
Rhoss Integrated Sequencer

A new function has been introduced in the units **making it possible to control up to 4** identical units (chillers or heat pumps) size and accessories. This operating mode allows the management logic to maintain the maximum precision in satisfying the system load.
The Rhoss Integrated Sequencer (SIR) offers **control through master-slave** logic of the units connected in hydraulic parallel without the use of external devices or hardware other than serial card RS485 (accessory).



PU Pump
RI Shut-off tap
GI Antivibration connection
FA Mesh filter
C Supply/drain tap
S Breaker
VR Check Valve

Identified as the MASTER unit of the group, the other units are addressed as SLAVES.
The **MASTER** unit has the task of controlling all of the **SLAVE** units and assessing, based on the system's load demand, how many and which units to be turned on to fulfil it.
If there is a failure on the network, the SLAVE units can be programmed to continue operation based on the last outputs received from the MASTER, or switch off while waiting for the connection to come back or, also, switch on and work independently.
The mode is defined when the sequencer is switched on.
Each unit controls its own pump (PUMP or TANK&PUMP accessory) which is only switched on if the unit requires at least one compressor to be switched on. If, on the other hand, the system load is such that it does not require any compressor to be switched on, the unit pump remains active nonetheless, ready to start up to monitor the unit's regulating temperature.
If the units are acquired without PUMP or TANK&PUMP accessory, the user can install external pumps (individually for each unit or for the group of machines); in this case the units manage the pump or the installed pumps through a signal.
It is possible **to choose the water temperature control mode**, through global regulation on the return or delivery to the group.
It is not necessary to install additional probes on the shared sections of the pipes in the system because the sequencer is in charge of assessing the system load based on the average of the values of the probes of the machines that are active at that time.
Balancing the operating hours of the group is another important aspect of the SIR sequencer. Unit and compressor rotation is guaranteed based on the accumulated hours of operation.
The sequencer is able to assess the **type of alarm**, using the units based on the respective percentages of availability, without blocking the entire unit if, for example, only one compressor is affected by an alarm.
If the units are supplied with **the FDL accessory**, there is the possibility of limiting the delivered power as a global percentage of the group. The algorithm dynamically determines how many machines need to be switched on and at what percentage, without limiting all of the machines at the same power in a fixed manner, and therefore only using some of them.
The integrated Rhoss sequencer (SIR) does not require sequenced DHW management (domestic hot water) in the presence of the 3-way diverter valve.
On the screen of the individual unit, the respective **operating information is displayed** and on the MASTER it is also possible to view a mimic panel that summarises the operating status of the connected units.
The unit group, controlled by SIR sequencer, can not be supervised.



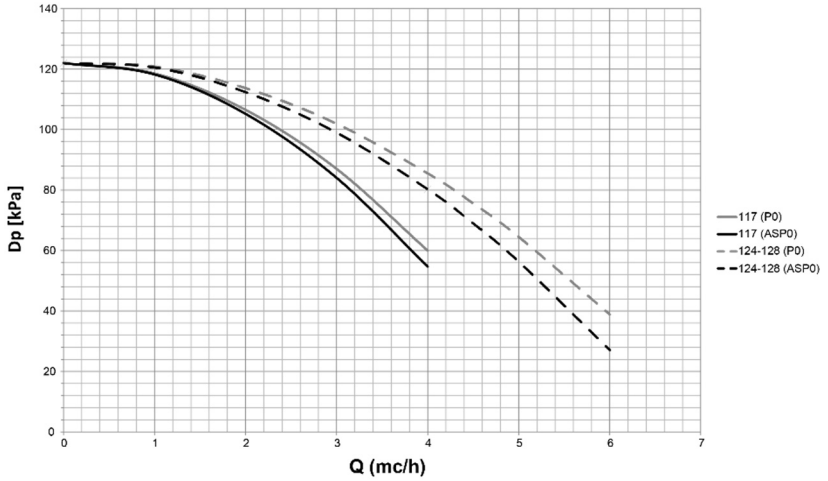
Example: the system requires a total amount of 25% of the group's cooling capacity.

- Units 1 and 2 are on at 50%;
- Unit 3 is affected by an alarm;
- Unit 4 is disconnected from the network.

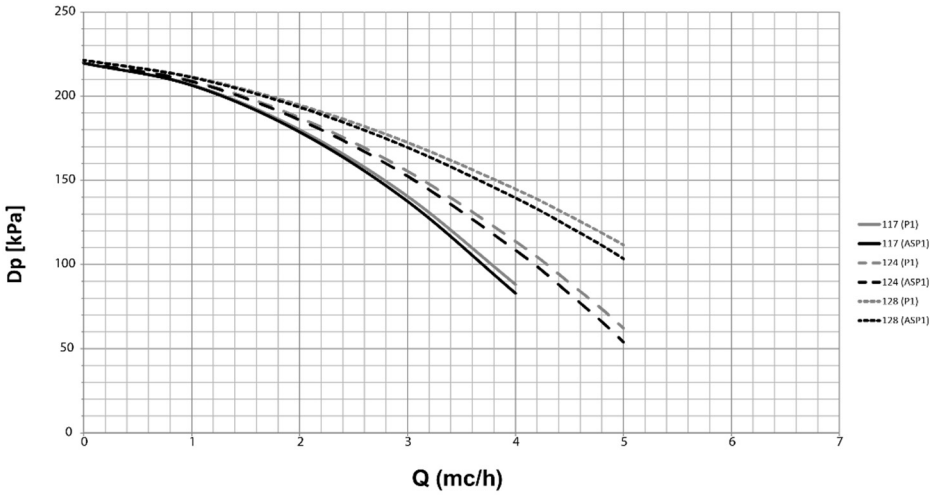
NOTE: compulsory start-up is not required for the SIR sequencer. Contact Rhoss Service for more information on how to enable the function or for start-ups followed by authorised technical staff.

Residual head and pressure drops TCAITY THAITY

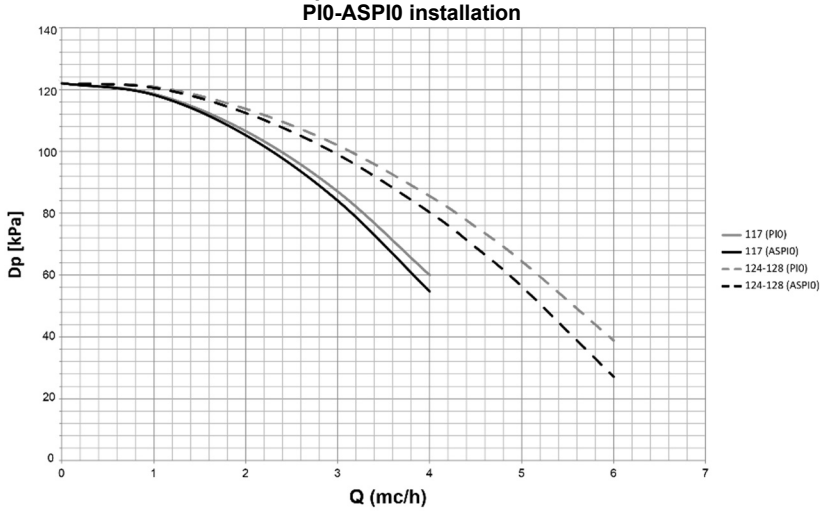
Residual head pressure TCAITY THAITY 117÷128
P0-ASP0 installation



Residual head pressure TCAITY THAITY 117÷128
P1-ASP1 installation



Residual head pressure TCAITY THAITY 117÷128
PI0-ASPI0 installation



ΔPr = Residual head
G = Water flow rate

Calculating the residual head
The residual head pressure values can be obtained from graphs "**2**" and "**3**" based on t he measured flow rates.

Sound power and pressure levels

MODEL TCAITY/THAITY	Sound power level in dB for octave bands							Lw	Lp
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
117	77	75	68	66	63	57	50	**72**	**46**
124	78	77	70	67	65	59	51	**74**	**48**
128	79	78	71	68	66	60	52	**75**	**49**

Lw: Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards.
Lp: Sound pressure level in dB(A) referring to the distance of 5m from the unit, with a directionality factor equal to 2.

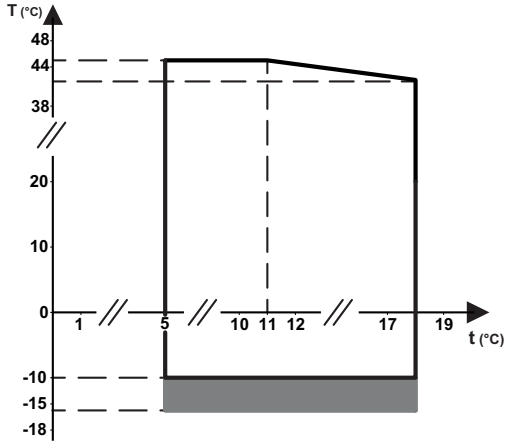
Note: The Eurovent certification refers to the sound power value in dB(A) and it is the only binding acoustic data. The sound pressure levels refer to values calculated from the sound power for units installed in free field with directionality factor Q=2. It is not possible to extrapolate sound pressure values for distances less than 10 m. With outdoor air temperatures below 35°C, the machine decreases its noise to a value below the nominal value indicated in the table.

SIL accessory: With the SIL accessory, sound pressure must be corrected by 2dBA.

FDL accessory: It is possible to use the FDL - Forced Download Compressors with "night mode" to reduce noise during night-time operation, by limiting compressor operation to its maximum frequency value.

Functioning limits Models TCAITY THAITY 117÷128

TCAITY THAITY 117÷128



T (°C) = Air temperature (B.S.).
t (°C) = Temperature of the water produced.

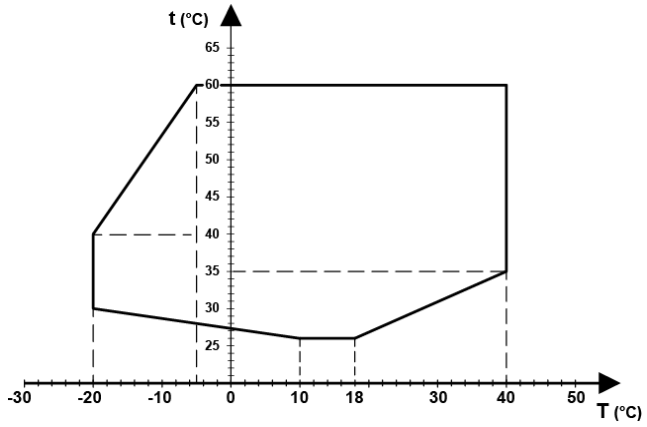
Standard functioning
FI15 functioning

In summer mode:
Maximum water inlet temperature 25°C.

Permitted temperature differentials through the heat exchangers
- Temperature differential on the evaporator ΔT = 4 ÷ 8°C.

- Minimun water pressure 0,5 Barg.
- Maximum water pressure 6 Barg.

THAITY 117÷128



T (°C) = Air temperature (B.S.).
t (°C) = Temperature of the water produced.

In winter mode:
Maximum water inlet temperature 55°C

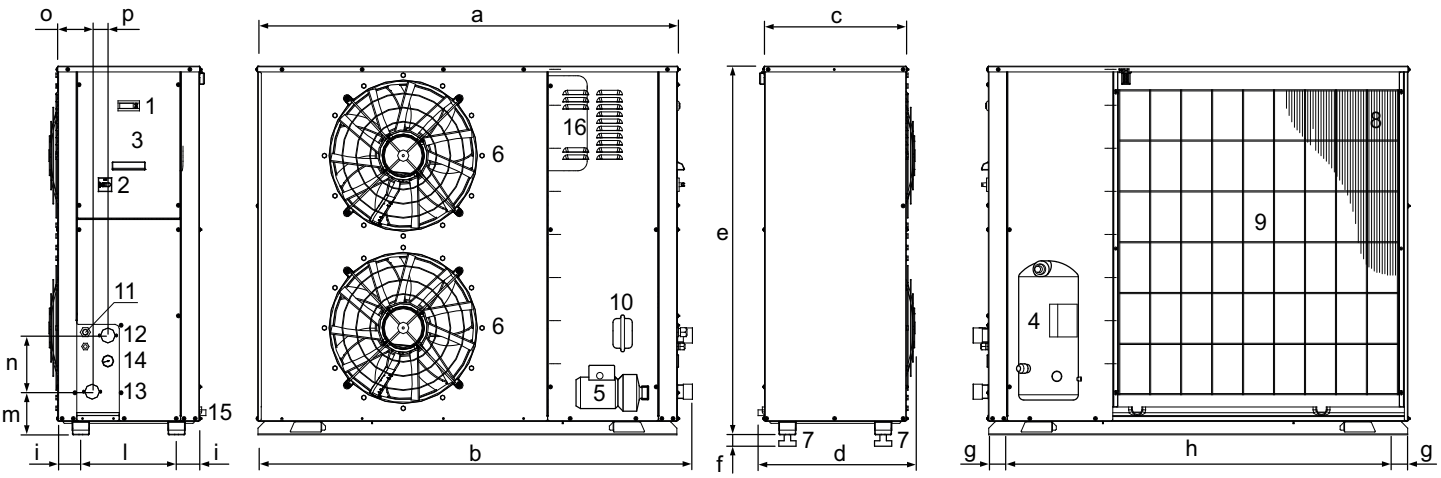
Permitted temperature differentials through the heat exchangers
- Temperature gradient on the condenser ΔT = 4 ÷ 8°C

- Minimun water pressure 0,5 Barg.
- Maximum water pressure 6 Barg.

In the permitted field of operation, the compressor and inverter are protected by a controller by means of 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.

Dimensions and volume

Dimensions and volume TCAITY THAITY 117÷128 installation P0/PI0/P1



Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
117÷128	mm	1493	1522	506	600	1284	60	20	1448	81	340	178	168	116	62

1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Compressor;
5. Pump;
6. Fan;
7. Anti-vibration support (accessory KSA);
8. Coil;
9. Protection network;
10. Expansion vessel;
11. Power supply inlet;
12. Water outlet;
13. Water inlet;
14. Manometer;
15. Condensate drain;
16. Inverter.

Installation

- The unit is designed for outdoor installation.
- The unit is equipped with male threaded water connections.
- The unit should be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.
- The unit can be equipped with anti-vibration mountings on request (KSA).
- We recommend installing shut-off valves that isolate the unit from the rest of the system.
- It is mandatory to install a square metal mesh filter (longest side = 0.8 mm) on the unit return pipes.
- The unit cannot be installed on brackets or shelving.
- Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.

Weights

Model		117	124	128
TCAITY P0/PI0	Kg	225	225	245
TCAITY P1	Kg	230	230	250
THAITY P0/PI0	Kg	240	250	260
THAITY P1	Kg	245	255	265

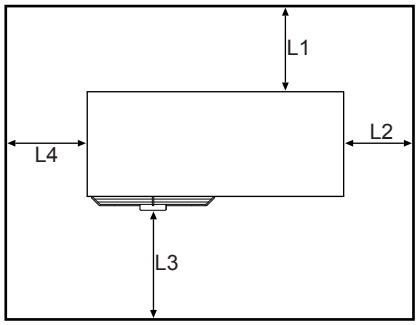
The weights refer to packed units without water.

KEAP accessory - remote controlled outdoor air probe

For correct shifting temperature adjustment of water coming out of the heat pump, it is important that the air temperature has a significant value and is not influenced by the incorrect position of the sensor/unit. The unit is equipped with an outdoor air temperature sensor located next to the fin-packed heat exchanger.
If the unit is installed facing the sun and outdoor air temperature reading is therefore altered, it is possible to connect the KEAP remote control outdoor air probe accessory. This requires the following operation:

- purchase the KEAP accessory
- disconnect the outdoor air probe from the board and connect the remote control sensor to the same clamps, following the relative instructions on the instruction sheet.

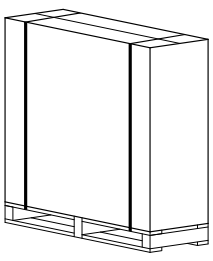
Clearance and positioning



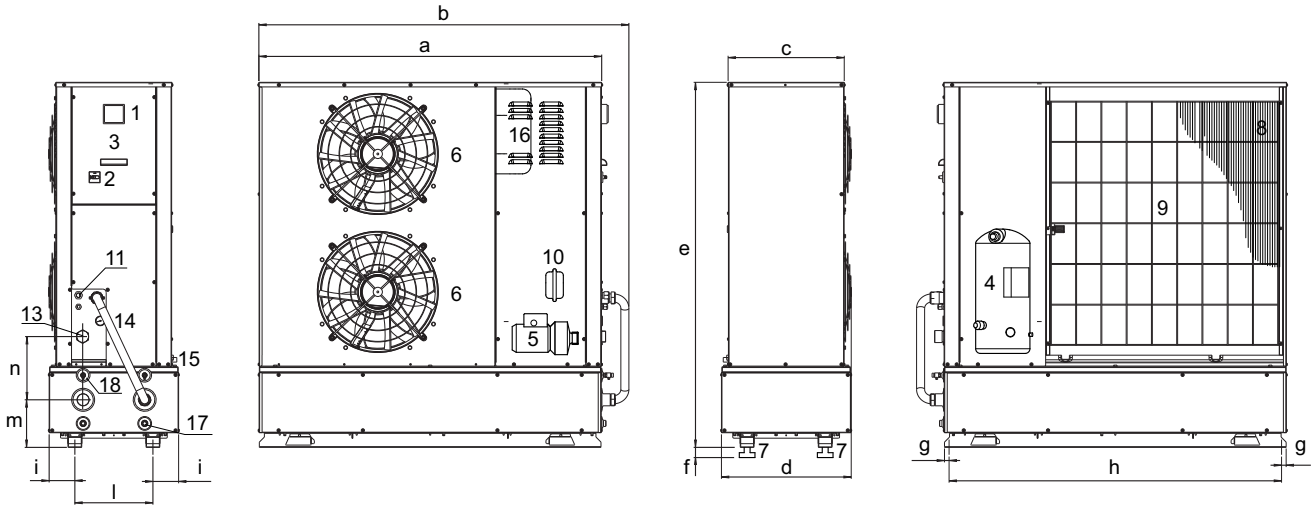
Model		117	124	128
L1	mm	300	300	300
L2	mm	600	600	600
L3	mm	With an open outlet		
L4	mm	300	300	300

Handling

- Movement of the unit must be performed with care, in order to avoid damage to the external structure and to the internal mechanical and electrical components.
- Do not stack units.
- The temperature limits for storage are -9÷45°C.



Dimensions and volume TCAITY THAITY 117÷128 installation ASP0/ASPI0/ASP1



Model		a	b	c	d	e	f	g	h	i	l	m	n
117÷128	mm	1493	1611	506	565	1588	60	20	1448	112	340	207	275

1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Compressor;
5. Pump;
6. Fan;
7. Anti-vibration support (accessory KSA);
8. Coil;
9. Protection network;
10. Expansion vessel;
11. Power supply inlet;
12. Water outlet;
13. Water inlet;
14. Manometer;
15. Condensate drain;
16. Inverter.
17. Storage drain;
18. Tank drain.

Installation

- The unit is designed for outdoor installation.
- The unit is equipped with male threaded water connections.
- The unit should be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.
- The unit can be equipped with anti-vibration mountings on request (KSA).
- We recommend installing shut-off valves that isolate the unit from the rest of the system.
- It is mandatory to install a square metal mesh filter (longest side = 0.8 mm) on the unit return pipes.
- The unit cannot be installed on brackets or shelving.
- Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.

Weights

Model		117	124	128
TCAITY ASP0/ASPI0	kg	425	425	445
TCAITY ASP1	kg	430	430	450
THAITY ASP0/ASPI0	kg	440	450	460
THAITY ASP1	kg	445	455	465

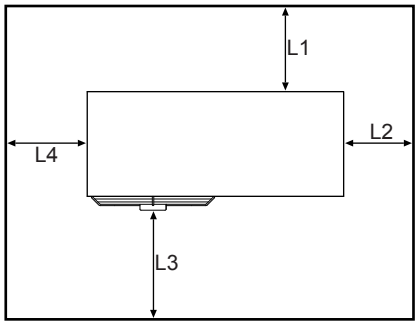
The weights refer to packed units without water.

KEAP accessory - remote controlled outdoor air probe

For correct shifting temperature adjustment of water coming out of the heat pump, it is important that the air temperature has a significant value and is not influenced by the incorrect position of the sensor/unit. The unit is equipped with an outdoor air temperature sensor located next to the fin-packed heat exchanger.
If the unit is installed facing the sun and outdoor air temperature reading is therefore altered, it is possible to connect the KEAP remote control outdoor air probe accessory. This requires the following operation:

- purchase the KEAP accessory
- disconnect the outdoor air probe from the board and connect the remote control sensor to the same clamps, following the relative instructions on the instruction sheet.

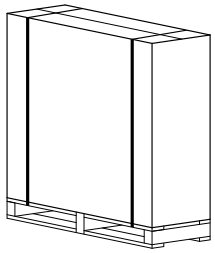
Clearance and positioning



Model		117	124	128
L1	mm	300	300	300
L2	mm	600	600	600
L3	mm	With an open outlet		
L4	mm	300	300	300

Handling

- Movement of the unit must be performed with care, in order to avoid damage to the external structure and to the internal mechanical and electrical components.
- Do not stack units.
- The temperature limits for storage are -9÷45°C.



Water connections

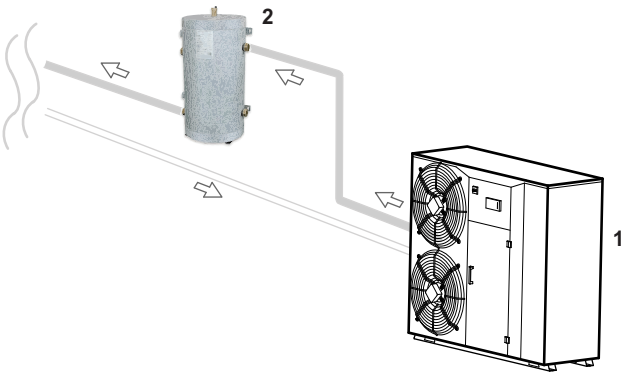
Connection to the system

- The unit is equipped with male threaded hydraulic connections and manual air vent valve placed inside the cabinet complete with expansion vessel, safety valve and drain cocks.
- It is advisable to install cut-off valves that isolate the unit from the rest of the system and elastic connection joints.
- It is mandatory to install a square metal mesh filter (longest side = 0.8 mm) on the unit return pipes.
- The rate of the water that flows through the heat exchanger must not drop below the value corresponding to a temperature differential of 8°C.
- During long periods of inactivity, it is advisable to drain the water from the system.
- It is possible to avoid draining the water by adding ethylene glycol to the water circuit (see “Use of antifreeze solutions”).

Condensation drain tray
THAITY models are complete with a condensate drain tray and heating electrical resistance that prevents ice from developing under the coil in cases of harsh temperatures. Electrical resistance is regulated according to the outdoor temperature. The condensate drain tray has two draining points to ease water evacuation. You must channel condensate draining. When the outdoor temperature is around zero, the water normally produced during the coil defrosting could form ice and make the flooring near the unit installation area slippery.
We recommend diverting using an inclined pipe, minimising the number of curves and pressure drops to facilitate draining.

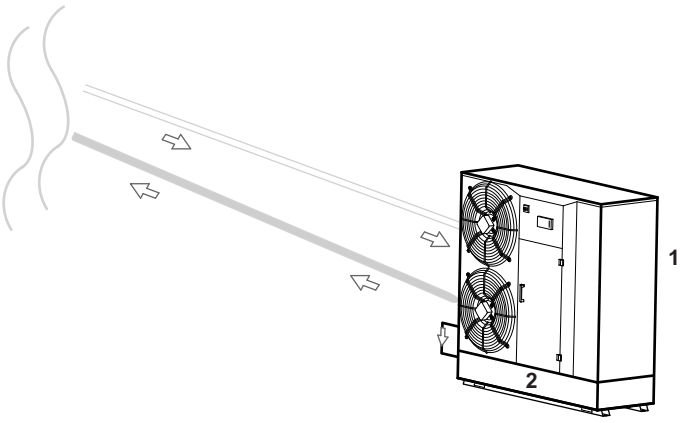
Hydraulic set ups

System configuration for P0/PI0/P1 set up



1. Compact-I
2. Inertial storage tank (If necessary)

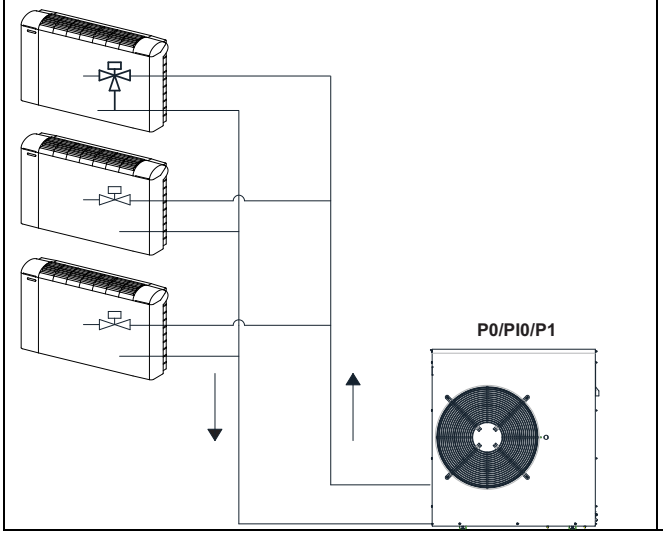
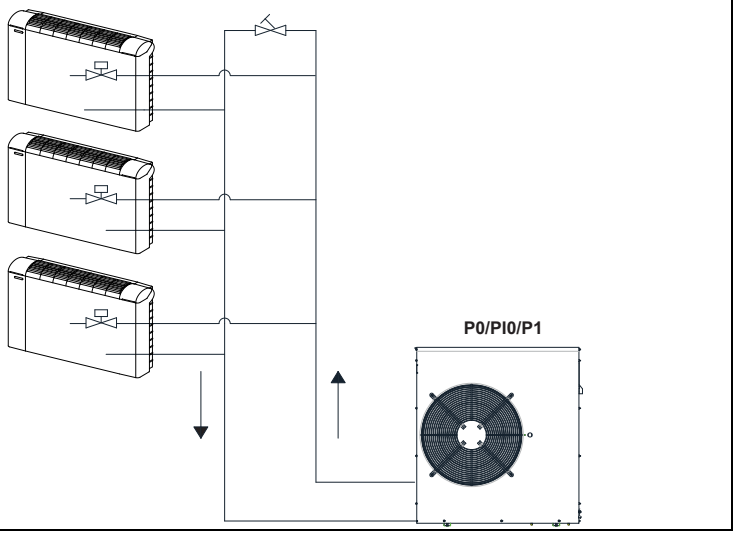
System configuration for ASP0/ASPI0/ASP1 set up



1. Compact-I
2. Inertial storage tank
3. Hydraulic connection pipes

PUMP installation P0/ASP0
- The units are equipped with a 3-speed electronic circulator, which can be selected from the selectors on board. The maximum speed it set by default.

PUMP installation PI0/ASPI0
- The units are equipped with an electronic circulator with continuous speed regulation **for variable flow rate systems**. The units is complete with a sensor to measure the pressure difference between the system's flow and return pressure. During the installation phase, the unit must be set by following the simple procedure. With the system completely open so that the water flow rate reaches each area, read the differential pressure value on the control panel. The value is the set-point that is to be assigned to the differential pressure to control. In the case of system partialisation with the terminals or areas closed, the pressure differential value is kept constant by decreasing the flow rate.
- For proper operation of the unit with this type of system set-up, you must comply with the basic rule, meaning that there must always be a circuit branch that enables circulation of water (guarantee the minimum water flow $\Delta T=8$). This can be obtained with a type of board like the one indicated in the figure, meaning with one of the terminals equipped with a 3-way valve whilst all the remaining ones can be equipped with a 2-way shut-off valve. Alternatively, there can be a bypass located in a certain point of the hydraulic circuit. It is recommended to place the bypass or 3-way valve as far away as possible from the unit. The bypass has the function to enable circulation of the minimum flow rate, especially during starting and switch-off transients of the unit without interrupting flow to the evaporator.
- With the circulator operating with continuous regulation, it is also possible to start-up a cold system by modulating the speed and enabling it to reach the operating temperature more rapidly.

Example with a 3-way valve	Example with Bypass
	

P1/ASP1 pump set up

- The units are fitted with single speed circulation pump.

Minimum content of hydraulic circuit

A minimum amount of water must be fed into the system to ensure the unit works correctly. The minimum amount of water is determined based on the cooling or heating capacity (for heat pumps/EXPs) in the project for the units, multiplied by the coefficient expressed in 3 l/kW (*).If the water content in the system is less than the minimum calculated value, it is necessary to install an additional tank. In any case, please bear in mind that a high water content in the system is always to the benefit of the comfort in the room, as it ensures high thermal inertia in the system.

***** For air-cooled heat pumps/EXPs pay special attention to the temperature deviation generated during natural thawing cycles:

Tank and/or DHW DT (for thawing effect)	K	20	15	12	10	8	7	6
Specific capacity	l/kW	3.5	5	6	7	9	10	12

Production of domestic how water DHW

- The machine control is able to manage a 3-way diverter valve (KVDEV accessory) to produce DHW. The diverter valve must be installed on the flow line (before the tank) in order to deviate the water flow from the system to the DHW side. Priority between DHW and system can be set directly from the control panel

How to manage the DHW request:

- by means of the digital input: the request is assigned by a thermostat assembled by the installer. When the thermostat closes, the unit understands that there is a DHW request and, once the conditions have been verified, the procedure is activated to meet the DHW requirements;
- by means of a temperature probe in the storage tank: a temperature probe is placed inside the storage tank, which is directly connected to the unit board. The required set point can be configured from the panel together with the relative activation differential. In this case, the probe must be accurately positioned and the maximum distance allowed respected due to the type of probes used.

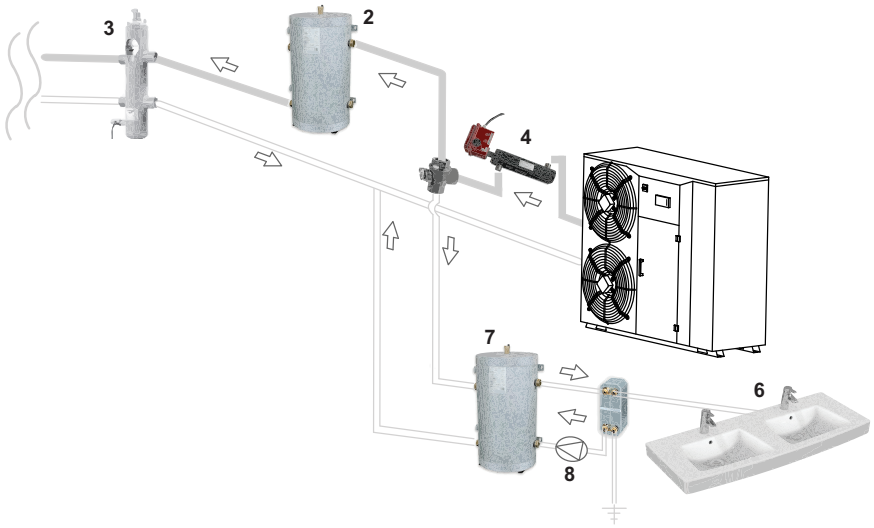
description	type of probe	features	β (25/85)
NTC150	NTC OT150	50kΩ@25°C	3977 (±1%)
NTC	NTC	10kΩ@25°C	3435 (±1%)

Management of an integrative source and auxiliary generator

The integrative heat source (electric heater) or an auxiliary thermal source (boiler) can be managed from the unit board.

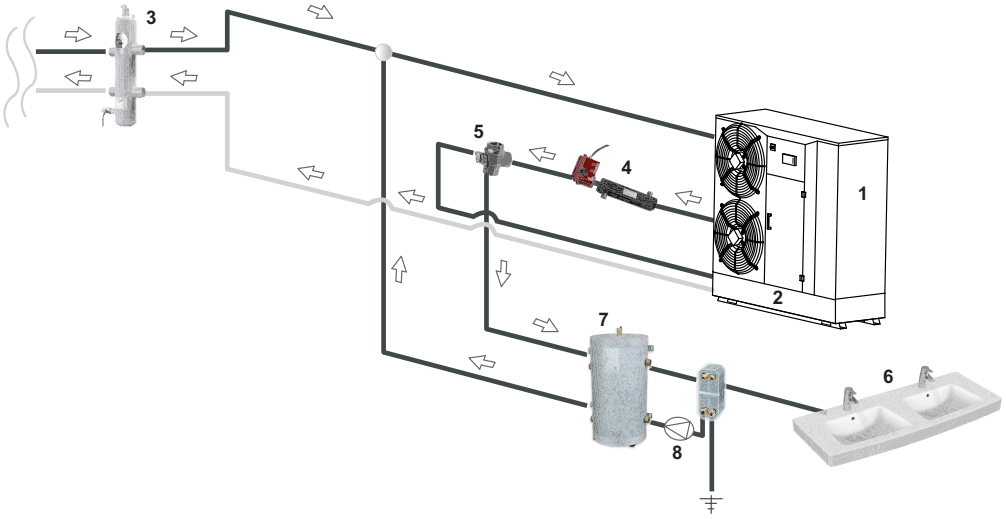
Integrative thermal source (KRIT accessory)
An integrative thermal source is an electric resistance that runs together with the THAITY heat pump in winter mode. By means of the unit's control, it is possible to control start-up and switch-off according to the different variables: outdoor air temperature, delay in reaching the set-point set due to a high thermal load.
Resistance is always activated during the defrost cycle and when DHW production is requested.
When there is a 3-way valve for KVDEV DHW production, the electrical resistance must be placed upstream of the valve, as illustrated in the figure.
The valve must be installed near the heat pump
The pipes between the heat pump and the valve must be as short as possible
It is always recommended to accurately check the electrical power available when integrative electrical resistances are installed.

System configuration for P0/PI0/P1 set up



1. Compact-I
2. Inertial storage tank
3. Hydraulic circuit breaker
4. Electric heater
5. 3-way valve (ooptional)
6. Domestic
7. Technical water storage tank
8. Pump

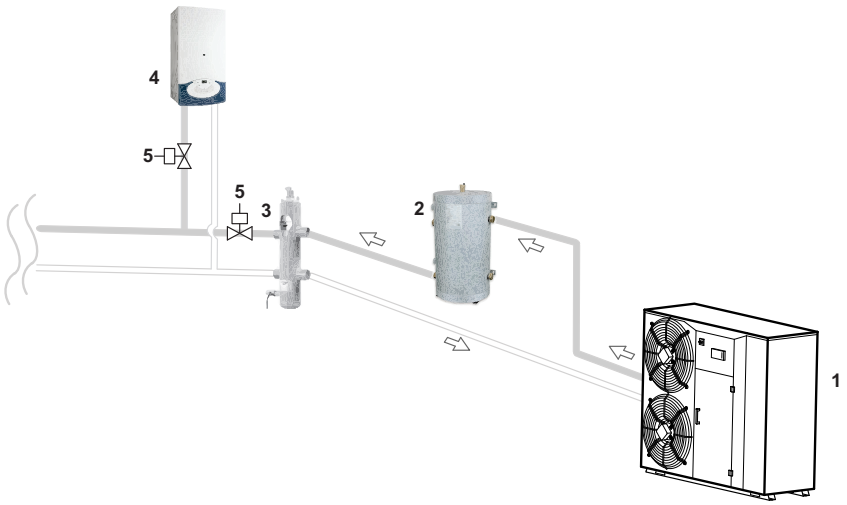
System configuration for ASP0/ASPI0/ASP1 set up



1. Compact-I
2. Inertial storage tank
3. Hydraulic circuit breaker
4. Electric heater
5. 3-way valve (ooptional)
6. Domestic
7. Technical water storage tank
8. Pump

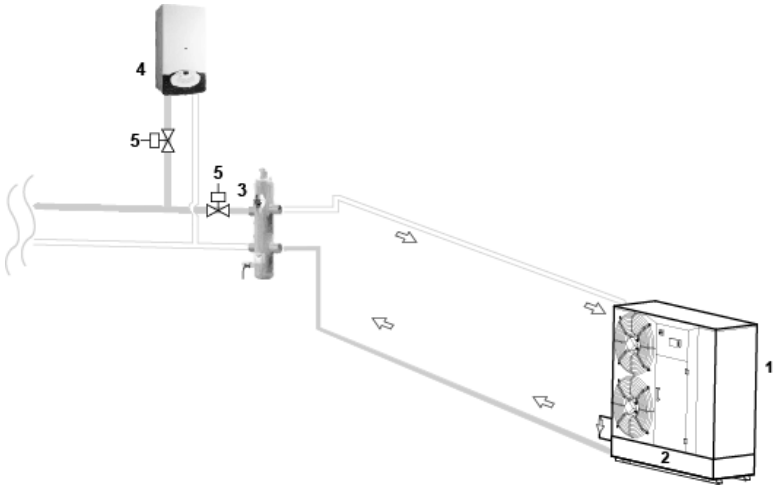
Auxiliary thermal source
An auxiliary generator is a heat generator that runs alternatively to the heat pump; typically, it is a boiler. When the alternative generator is activated, the heat pump and all its auxiliaries are off, even if powered. The auxiliary generator can be enabled only for heating the systems.
Operation of the auxiliary source
The auxiliary generator can be activated according to three modes:
- manually;
- for an outdoor temperature set point;
- for a convenience criterion based on the costs of electricity and fuel (methane and butane)
- for heat Pump malfunction.

System configuration for P0/PI0/P1 set up



1. Compact-I
2. Inertial storage tank
3. Hydraulic circuit breaker
4. Boiler
5. Shut-off components not managed

System configuration for ASP0/ASPI0/ASP1 set up



1. Compact-I
2. Inertial storage tank
3. Hydraulic circuit breaker
4. Boiler
5. Shut-off components not managed

Hydraulic data

Model		**117**	**124**	**128**
Safety valve calibration of channelled water.	barg	6	6	6
Heat exchanger water content	l	1,9	2,2	2,2
Expansion tank capacity	l	0,5	0,5	0,5
Expansion tank pre-load	barg	1	1	1
Expansion tank maximum pressure	barg	10	10	10
Minimum flow rate (intervention of the differential pressure of the water)	l/h	1450	1450	1450
Tank litres	l	110	110	110

The expansion tank on the machine has limited capacity to protect the hydraulic circuit inside the machine. It is the installer's duty to size and install an expansion tank that is suitable for the system.

Use of antifreeze solutions

The use of ethylene glycol is recommended if you do not wish to drain the water from the hydraulic system during the winter stoppage, or if the unit has to supply chilled water at temperatures lower than 5°C Mixing with glycol changes the physical properties of the water and consequently the performance of the unit. The proper percentage of glycol to be added to the system can be obtained from the most demanding functioning conditions from those shown below.
Table “H” shows the multipliers which allow the changes in performance of the units to be determined in proportion to the required percentage of ethylene glycol.
The multipliers refer to the following conditions: condenser inlet water temperature 30°C; refrigerated water temperature 7°C; temperature differential at evaporator and condenser 5°C.

For different functioning conditions, the same coefficients can be used as their variations are negligible.

Table "H"

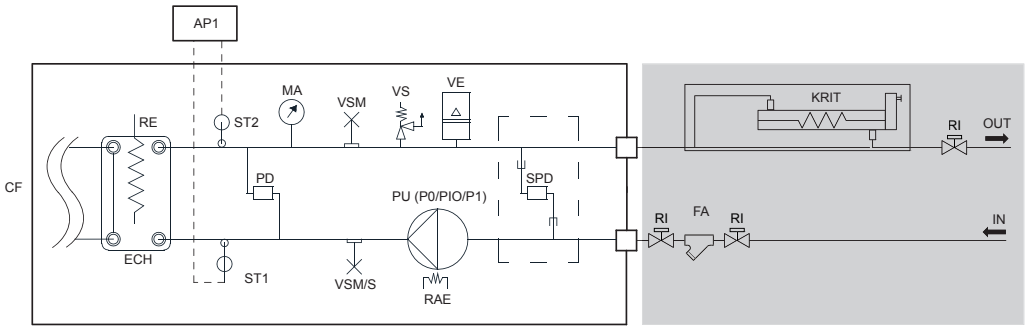
Glycol in weight	**10 %**	**15 %**	**20 %**	**25 %**	**30 %**
Freezing temperature °C	-5	-7	-10	-13	-16
fc QF	0,991	0,987	0,982	0,978	0,974
fc P	0,996	0,995	0,993	0,991	0,989
fc Δpw	1,053	1,105	1,184	1,237	1,316
fc G	1,008	1,028	1,051	1,074	1,100

fc QF = Cooling capacity correction factor.
fc P = Correction factor for the absorbed electrical current.
fc Δpw = Correction factor of the pressure drops in the evaporator.
fc G = Correction factor of the glycol water flow to the evaporator.

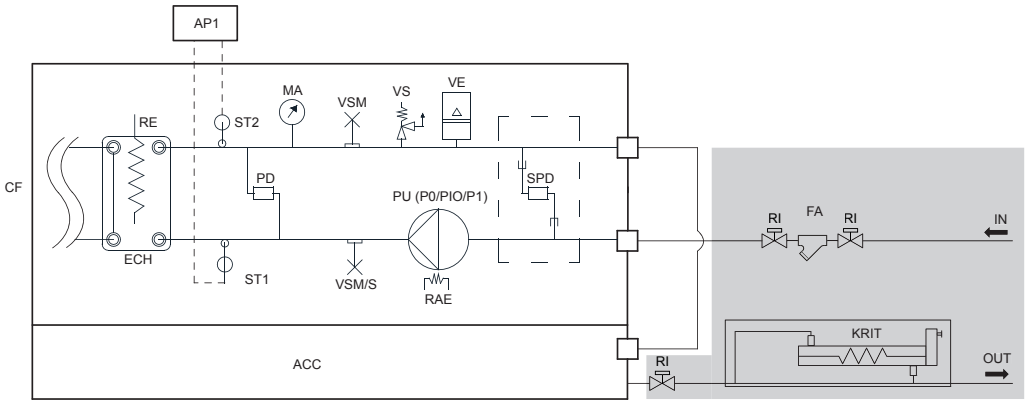
Water circuits

Hydraulic circuits

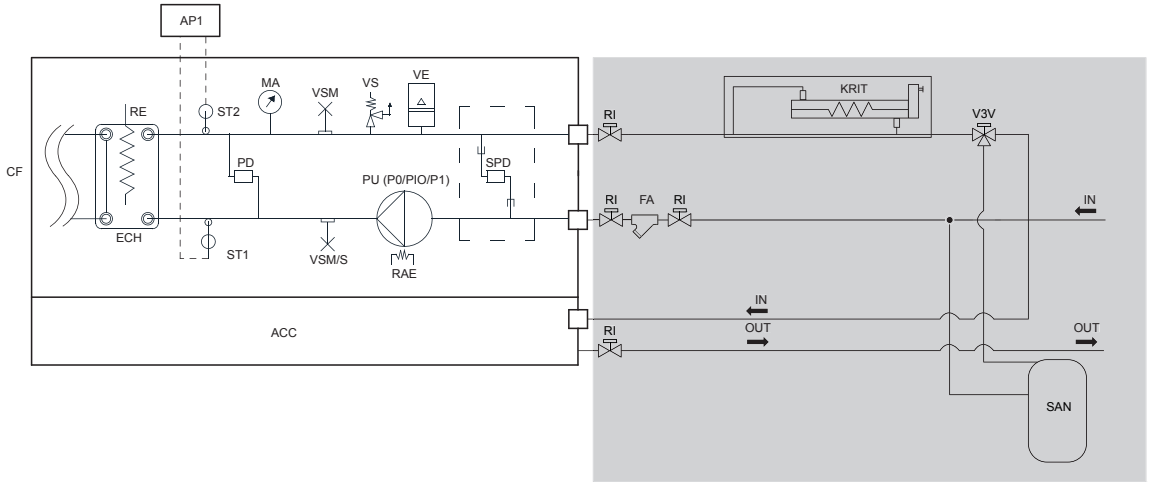
P0/PI0/P1



ASP0/ASPI0/ASP1



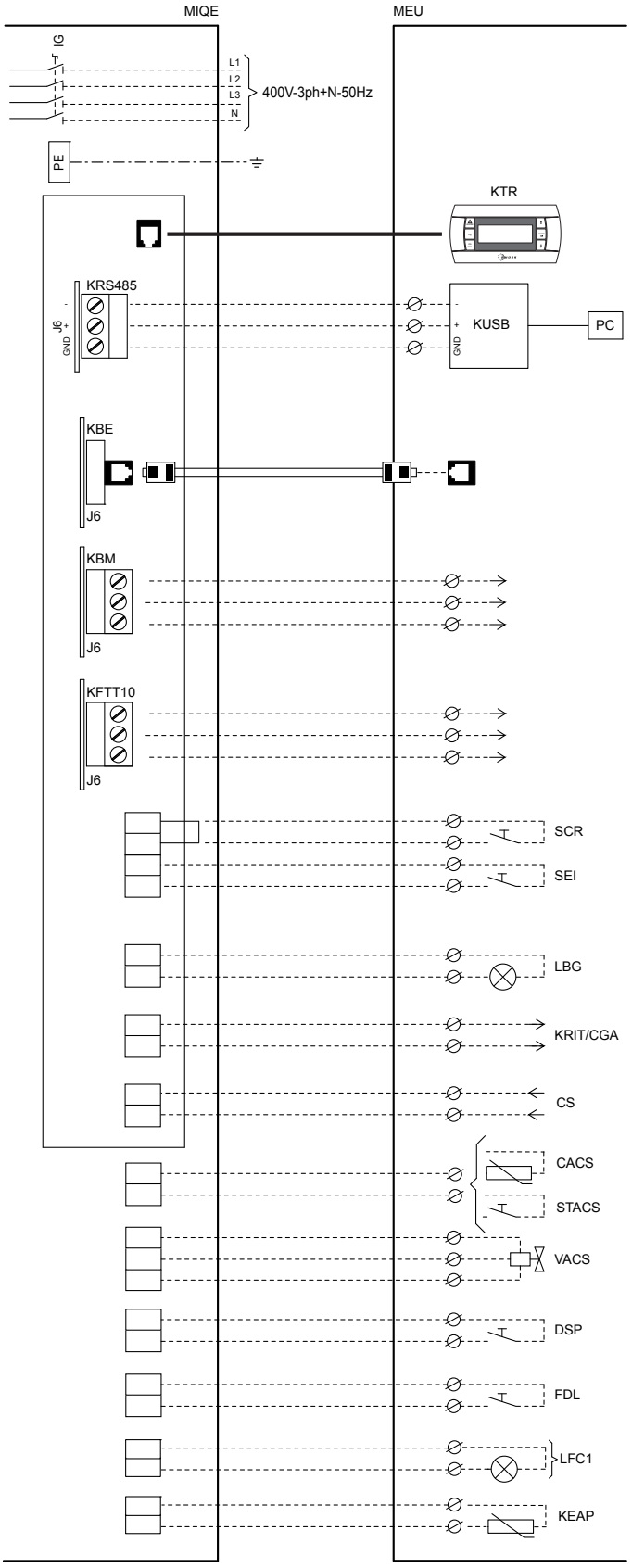
ASP0/ASPI0/ASP1+V3V



CF	Refrigerant circuit
ECH	Plate evaporator
RE	Evaporator anti-freeze resistance
PD	Water differential pressure switch
VSM	Manual bleed valve
VS	Safety valve
V3V	3-way valve
AP1	Electronic controls
ST1	Primary inlet temperature probe
ST2	Primary outlet temperature probe work and anti-freeze
SPD	Differential pressure sensor (only for PI0 set up)
VE	Expansion vessel
FA	Mesh filter (accessory)
RAE	Circulator or pump antifreeze(P0/PI0) resistance (P1) (accessory)
KRIT	Integrative electrical resistance (accessory)
M	Manometer
PU	Pump
S	Water drain
RI	Shut-off tap
▬	Connections by installer
- - - -	With construction PI0

Electrical connections

TCAITY-THAITY 117÷128
Power supply 400V – 3ph+N – 50Hz



MIQE Electrical panel internal terminal board
MEU User external terminal board
L1 Line 1;
L2 Line 2;
L3 Line 3;
N Neutral;
PE Earth terminal;
IG Manoeuvre isolator switch
KRS485 RS485 serial interface (accessory);
KUSB RS485/USB converter (accessory);
KFTT10 LONWORKS serial interface (accessory) (**)
KBE Bacnet Ethernet interface (accessory) (**)
KBM Bacnet MS/TP Ethernet interface (accessory) (**)
J6 Connector to insert the KRS485, KFTT10, KBM, KBE accessories;
KTR Remote keyboard (accessory);
PC Personal computer;
SCR Remote control selector (control with clean contact)
SEI Summer/winter selector (control with potential free contact)
LBG Machine general lock light (230 Vac)
KRIT KRIT control (additional electric resistance for heat pump) (230 Vac, maximum load 0.5 A AC1).
KEAP Outdoor air sensor for Set-point compensation (as an alternative to that already present on the machine).
CS 4-20 mA analogue signal for shifting Set-point (incompatible with the DSP accessory). This must also be handled as a special feature by our Pre-Sales Department;
CACS VACS consent (control with potential-free contact);
DSP Double set-point via digital consensus (incompatible with the CS/CACS accessory)
VACS 3-way diverter valve for managing the production of domestic hot water (KVDEV) (230 Vac, maximum load 0,5A AC1);
CGA Auxiliary generator control (consensus in voltage 230 Vac, maximum load 0,5A AC1)
STACS Domestic hot water temperature probe (not supplied, set up by the installer); an alternative to domestic hot water consensus (CACS)
FDL Forced download compressors (FDL accessory)(control with clean contact)
LFC Compressor functioning light(consensus in voltage 230 Vac, maximum load 0,5A AC1)
- - - - Connection by installer
___ 6-wire telephone cable (maximum distance 50m, for greater distances use the accessory KR200 and shielded cable)

○ 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.
○ Always install a general automatic switch in a protected area near the machine, which has a characteristic delayed curve, sufficient capacity and breaking power. There must be a minimum distance of 3 mm between the contacts.
○ If a differential switch is to be installed, be aware that it must be of type B (suitable for protecting against leakage currents with a continuous component)
○ Earth connection is compulsory by law to ensure user safety while the machine is in use.

ATTENTION!
The diagrams only show the connections to be carried out by the installer.

Cable section		**117**	**124**	**128**
Line Section	mm²	6	10	10
PE section	mm²	6	10	10
Sectioncontrolsand remote controls	mm²	1,5	1,5	1,5

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