K20343EN ed.6

TECHNICAL NOTE

R410A

CE

BUREAU VERITAS
Certification

EUROVENT
CERTIFIED
PERFORMANCE
www.eurovent-certification.com

WinPACK HE-A and SE

TCAEY-THAEY

2110÷4340

Water chillers and packaged reversible air cooled heat pumps and ecological refrigerant R410A. Series with hermetic Scroll compressors.

RHOSS
CREATING YOUR COMFORT

Index

WinPACK

HIGH EFFICIENCY AIR-COOLED WATER CHILLERS AND HEAT PUMPS IN R410A

WinPack: the concrete solution to the evolving HVAC market requirements!

Rhoss presents **WinPack**, the new generation chillers and heat pumps from **100 to 340 kW** in air-cooled R410A, developed in line with the evolution in the HVAC market.

WinPack was in fact designed to meet the new standards in **energy efficiency and load reduction of greenhouse gases**, to offer **very low noise level** solutions, to solve the problems related to the efficiency of existing systems and refitting and to allow **heat pumps** to be used even in harsh climates.

WinPack is divided into eight different construction versions ranging from high **efficiency energy class A** units (according to the Eurovent standard) right up to the super-silenced versions with **reduced noise levels by almost 10 dB(A)**.

WinPack is efficient throughout the year!

Thanks to the technology applied, **WinPack** models involve 2 or 4 scroll compressors being used, with one and two cooling circuits respectively, designed and configured so as to guarantee greater **control flexibility** and increased energy efficiency even at partial loads with **high ESEER and SCOP**.

WinPack is flexible!

All models are equipped with R410A gas: therefore, they are perfect for commercial applications, hotels and medium and large buildings requiring air conditioning that provides a perfect balance between **low consumption and maximum comfort.**

Among the several options and accessories, **WinPack** can also be equipped with an innovative pumping system which, thanks to **brushless technology** allows systems to be set up with only **variable primary flow**, thereby reducing energy costs and simplifying the system set up.

CLASS A Energy Efficiency

ADAPTIVE FUNCTION PLUS

VPF VARIABLE PRIMARY FLOW

MICROCHANNEL

BRUSHLESS EC

SILENT

ERP READY

WinPack is environmentally friendly!

WinPack has been designed to be more **eco-sustainable** and in particular in line with the new regulations that are becoming more restrictive in terms of greenhouse gas content restrictions.

In particular, the chillers involve **micro-channel heat exchangers** being used, which allow the refrigerant amount to be reduced by 30% compared to traditional technology.

Furthermore, the possibility of equipping the **desuperheater or heat recovery unit** for the production of hot water allows the **energy** available at the compressor outlet to be recovered, which would normally be dispersed in the environment.

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 Cycla 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

TCAEBY, TCAETY, TCAESY, and TCAEQY are packaged water chillers with air condensation and axial fans in basic, high efficiency, silenced and super silenced versions respectively.
THAEBY, THAETY, THAESY, and THAEQY are reversible packaged heat pumps on the cooling cycle with air evaporation/condensation and axial fans in basic, high efficiency, silenced and super silenced versions, respectively.

They are intended to be used in air conditioning or industrial process systems where chilled water (TCAEBY, TCAETY, TCAESY, TCAEQY) or chilled and hot water (THAEBY THAETY THAESY THAEQY) 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;
- Low voltage Directive 2006/95/EC;
- Electromagnetic compatibility Directive 2004/108/CE;
- Pressure equipment directive 97/23/CEE (PED).
- Restriction of the use of certain hazardous substances in electrical and electronic equipment 2011/65/EU

Guide to reading the code

"SERIES WinPACK SE" code						"MODEL" code	
T	**C**	**A**	**E**	**B**	**Y**	**2÷4**	**100÷340**
Water production unit	Cooling only **H** Heat pump	Air cooling	Scroll-type hermetic compressors	Basic **S** Silenced	R410A refrigerant gas	Number of compressors	Approximate heating capacity (in kW)

Guide to reading the code

"SERIES WinPACK HE-A" code						"MODEL" code	
T	**C**	**A**	**E**	**T**	**Y**	**2÷4**	**100÷340**
Water production unit	Cooling only **H** Heat pump	Air cooling	Scroll-type hermetic compressors	High efficency **Q** Super-silenced	R410A refrigerant gas	Number of compressors	Approximate heating capacity (in kW)

Available Installations:

Standard:
Installation without pump and without water buffer tank

Pump (main circuit):
P1 – Installation with pump.
P2 – Installation with increased static pressure pump.
DP1 – Installation with double pump, including an automatically activated pump in stand-by.
DP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by.

Pump ("RC100" recovery circuit side) when available:
PR1 – Installation with pump.
PR2 – Installation with increased static pressure pump.
DPR1 – Installation with double pump, including an automatically activated pump in stand-by.
DPR2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by.

Tank & Pump (main circuit):
ASP1 – Installation with pump and water buffer tank.
ASP2 – Installation with increased static pressure pump and water buffer tank.
ASDP1 – Installation with double pump, including an automatically activated pump in stand-by and storage.
ASDP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by and storage.

Example: TCAEQY 4270 ASP1

- Water production unit
- Cooling only;
- Air-cooled;
- 4 Scroll-type hermetic compressors;
- Super-silenced unit;
- R410A refrigerant fluid;
- Approximate nominal cooling capacity 270 kW;
- Installation with pump and water buffer tank.

New WinPACK range

Low consumption chillers
energy yield, reliable and versatile

A complete and flexible range and.... up to four capacity steps

New R410A chillers with two/for scroll compressors installed onto two cooling circuits to obtain up to four cooling and heating capacity steps that enable versatile adjustment and better performance when operating with partial loads. The efficiency of these units is also enhanced by the innovative **AdaptiveFunction Plus** control logic, 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 adaptive regulation logic **AdaptiveFunction Plus**, is an exclusive **RHOSS** S.p.a. patent that is the result of a long period of collaboration with the University of Padua. The various algorithm processing and development operations were implemented and tested on the new WinPACK range 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.**
- To achieve the best performance from a chiller and a heat pump in terms of energy efficiency with full and partial loads. ***Low consumption chillers.***

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 values and the start-up and switch-off limit values of the compressors; the optimised compressor start-up management guarantees a precision water supply to the user, 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 regulation settings in order to obtain the best possible performance in terms of energy efficiency and significant seasonal savings or high water temperature precision:

1. Low consumption chillers: "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

With this operating method, the unit works at a fixed set-point. 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.

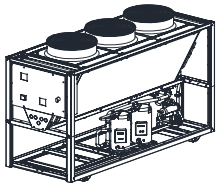
TCAEY-THAEY 2110÷4340 models

Structural features

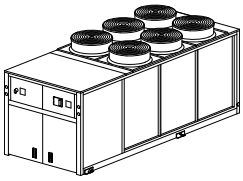
○ Load-bearing structure and panels in galvanised and RAL 9018 painted sheet metal; galvanised steel sheet metal base.
○ The structure consists of two sections:
• technical compartment that houses the compressors, electrical panel and main components of the cooling circuit;
• aeraulic circuit to house the heat exchange coils and motor-driven fans

	SIZES			
	2110÷2220	4150÷4220	4240÷4270	4310÷4340
TCAEBY-TCAESY	▽	▽	▽	■
THAEBY-THAESY	▽	■	■	■
TCAETY-TCAEQY	▽	N.D.	■	■
THAETY-THAEQY	▽	N.D.	■	■

▽ V-coiled structure



■ Vertical coiled structure



○ Hermetic, Scroll-type rotary compressors complete with internal circuit breaker protection and crankcase resistance automatically activated when the unit stops (as long as the unit is powered).
○ Adequately insulated, braze-welded plate water side heat exchanger in stainless steel (tube and shell exchanger - STE option).
○ Air side heat exchanger with MCHX micro-channel pipes or copper coil pipes and aluminium fins, as indicated in the following table:

	CIRCUIT 1		CIRCUIT 2	
	2110÷2220	4150÷4220	4240÷4270	4310÷4340
TCAEBY-TCAESY	X	X	X	●
THAEBY-THAESY	●	●	●	●
TCAETY-TCAEQY	X	N.D.	●	●
THAETY-THAEQY	●	N.D.	●	●

X MCHX micro-channel coil

● Cu-Al coil

○ External rotor axial motor-driven fans equipped with internal thermal protection and complete with a protection grille set in a single row for 2-compressor units and in a double row for 4-compressor units, (except for chiller models 4150÷4270 versions B and S).
○ The S-Silenced version has a standard proportional electronic device (FI10) for pressurised and continuous adjustment of the fan rotation speed up to outdoor air temperature of -10°C when operating as a chiller, and up to outdoor air temperature of 40°C when operating as a heat pump.
○ The Q-Super silenced version has a standard electronic proportional device (FI15) for pressurised and continuous adjustment of the fan rotation speed, up to a minimum outdoor air temperature of -15°C when operating as a chiller, and up to a maximum outdoor air temperature of 40°C when operating as a heat pump.
○ Victaulic-type hydraulic connections.
○ Differential pressure switch that protect the unit from any water flow interruptions.
○ Cooling circuits made with annealed copper pipes (EN 12735-1-2) equipped with: dryer filter cartridge, load connections, high pressure side manual reset safety pressure switch, BP and AP pressure transducer, safety valve(s), tap upstream of the filter, liquid indicator, intake line isolation, thermostatic expansion valve (versions B and S) or electronic expansion valve (versions T and Q), cycle inversion and liquid receiver valve, check valve, compressor intake gas separator and solenoid valve on the liquid line (for THAEBY-THAETY-THAESY-THAEQY).
○ Unit with IP24 protection rating.
○ Control with ***AdaptiveFunction Plus*** operation.
○ The unit is complete with a charge of R410A refrigerant.

Versions

B – Basic version (TCAEBY-THAEBY).
S – The silenced version is complete with soundproofed compressors and lower speed fans (TCAESY-THAESY). The fan speed is automatically increased when the external temperature increases significantly.
T – The high efficiency versions, with a larger condensing section (TCAETY-THAETY).
Q – Super-silenced version complete with soundproofed compressors, super low fan speed and larger condensing surface (TCAEQY-THAEQY). The fan speed is automatically increased when the external temperature increases significantly.

Available Installations

Standard:
Installation without pump and without water buffer tank

Pump (main circuit):
P1 – Installation with pump.
P2 – Installation with increased static pressure pump.
DP1 – Installation with double pump, including an automatically activated pump in stand-by.
DP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by.

Pump ("RC100" recovery circuit side):
PR1 – Installation with pump.
PR2 – Installation with increased static pressure pump.
DPR1 – Installation with double pump, including an automatically activated pump in stand-by.
DPR2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by.

In the single pump version, the unit is complete with an flow shut-off tap.
The double pump version is equipped with a non-return flow valve and intake tap for each pump.

Pump
Tank & Pump (main circuit):
ASP1 – Installation with pump and water buffer tank.
ASP2 – Installation with increased static pressure pump and water buffer tank.
ASDP1 – Installation with double pump, including an automatically activated pump in stand-by and storage.
ASDP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by and storage.
In addition to that supplied with the
Pump accessory, the unit also includes:
Inertial flow storage tank, bleed valve, water drain valve, expansion tank, safety valve, electrical resistance connection, manometer.

Electrical Control Board

○ 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.
○ Complete with:
- electrical cables prepared for 400-3ph-50Hz power supply voltage;
- auxiliary circuit power supply 230V-1ph-50Hz drawn from an internal transformer;
- power supply isolator master switch, complete with safety door locking device;
- automatic circuit breaker protection for compressors and motor-driven fans;
- auxiliary circuit protection fuse;
- compressor power contactor;
- machine remote controls: ON/OFF summer-winter switch;
- machine remote controls: compressor operation light and main lock light.

○ Programmable microprocessor electronic board handled by the keyboard inserted in the machine.
○ This electronic board performs the following functions:
- regulation and control of the unit outlet water temperature settings; of the cycle inversion (THAEBY-THAETY-THAESY-THAEQY); of the safety timers; of the system/recovery pump; of the system/recovery compressor and pump hour-run meter; of the defrost cycles; of the pressurised defrost cycles; electronic anti-freeze protection that is automatically activated when the unit is off (accessory); and of the functions that control the operations of the individual parts making up the unit;
- complete protection of the unit, possible shutdown and display of all the triggered alarms;
- compressor protection phase sequence monitor;
- unit protection against low or high phase power supply voltage (CMT accessory);
- display of the programmed set points on the display; of the water in/out temperatures on the display; of the condensation and evaporation pressures; of the electrical voltage values in the three phases of the electrical circuit that powers the unit; of the alarms on the display; of the chiller or heat pump function on the display (THAEBY-THAETY-THAESY-THAEQY);
- user interface menu;
- automatic pump operating time balance (DP1-DP2, ASDP1-ASDP2 installations);
- automatic activation of standby pump in the event of an alarm (DP1-DP2, ASDP1- ASDP2 installations);
- recovery unit/desuperheater water intake temperature;
- alarm code and description;
- alarms log management (menu protected by manufacturer password).

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

○ Advanced functions:
- Hi-Pressure Prevent function with forced cooling capacity partialisation for a high outdoor temperature (in summer mode);
- set up for serial connection (SS, FTT10, KBE, KBM, KUSB accessory);
- possibility of having a discrete input for double set-point remote management (DSP);
- possibility of having a discrete input for total recovery management (RC100), the desuperheater (DS) or for the production of domestic hot water by means of a 3-way diverter valve (VDEV). In this case, there is the possibility of using a temperature probe instead of the discrete input. (see specific section for more information);
- possibility of having an analogue input for the shifting set-point via a 4-20mA remote signal (CS);
- management of time bands and operating parameters with the possibility of daily/weekly operating programs;
- check-up and verification of the scheduled maintenance status;
- computer-assisted machine testing;
- self-diagnosis with continuous monitoring of the machine operating status;
- Master/slave control up to 4 units in parallel.

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

Accessories

Factory Fitted Accessories

P1 - Installation with pump
PR1 - Installation with a pump on the RC100 recovery circuit
P2 - Installation with increased static pressure pump
PR2 - Installation with an increased head pump on the RC100 recovery circuit
DP1 - Installation with double pump, including an automatically activated pump in stand-by.
DPR1 - Installation with a double pump, including one automatically activated in standby on the RC100 recovery circuit
DP2 - Installation with increased static pressure double pump, including an automatically activated pump in stand-by.
DPR2 - Installation with increased head double pump, including an automatically activated pump in standby on the RC100 recovery circuit
ASP1 - Installation with pump and storage tank
ASDP1 - Installation with and increased head double pump, including an automatically activated pump in standby and storage tank
ASP2 - Installation with an increased head pump and storage tank
ASDP2 - Installation with and increased head double pump, including an automatically activated pump in standby and storage tank
STE - Shell and tube evaporator
CAC - Compressor aphonic ear muffs
BCI - Compressor technical box soundproofing with high acoustic impedance (check the table)
BCI60 - Soundproofed compressor box with high acoustic impedance and unit metal sheet finish (check the table)
INS - Compressor technical compartment soundproofing (check the table)
INS60 - Compressor technical compartment soundproofing with high acoustic impedance (check the table)

WinPACK SE	**BCI-BCI60-INS-INS60 ACCESSORIES**			
	2110÷2220	**4150÷4220**	**4240÷4270**	**4310÷4340**
TCAEBY	BCI-option	BCI-option	BCI-option	INS-option
TCAESY	BCI standard	BCI standard	BCI standard	INS-option
THAEBY	BCI standard	INS option	INS option	INS-option
THAESY	BCI standard	INS standard	INS standard	INS-option

WinPACK HE-A	**BCI-BCI60-INS-INS60 ACCESSORIES**		
	2110÷2220	**4240÷4270**	**4310÷4340**
TCAETY	BCI-BCI60 option	INS-INS60 option	INS-INS60 option
TCAEQY	BCI60 standard	INS60 option	INS60 option
THAETY	BCI standard-BCI60 option	INS-INS60 option	INS-INS60 option
THAEQY	BCI60 standard	INS60 option	INS60 option

BVI - Box lower compartment closure. Available with "V" coil units. Refer to the specific section for more details.
RS - Cooling circuit intake and flow taps
DS - Desuperheater. Also active during winter operation (THAEY)
RC100 - Heat recovery unit with 100% recovery. Refer to the specific section for more details.
FI10 - Modulating condensation control for continuous operation as chiller up to -10°C of outdoor air temperature (standard versions S)

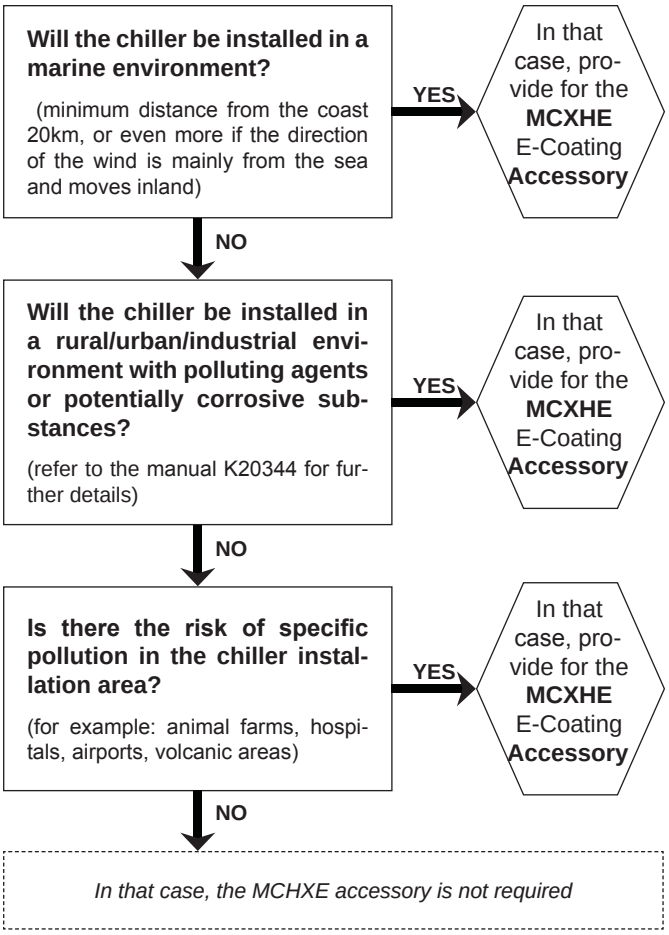
FI15 - Modulating condensation control for continuous operation as chiller up to -15°C of outdoor air temperature (standard versions Q)
FIAP - Condensing control with over-pressured fans with EC motor (Brushless) and available static head according to the following table:

	Unit with a Ø800mm fan	Unit with a Ø630mm fan (THAEBY 4150-4170)
Available static head	Up to 150 Pa	Up to 130 Pa
Single fan absorption	Max 2.8 kW	Max 1.25 kW
Average increase in noise of the unit	2 dBA	2 dBA

SFS - Soft Starter compressors
CR - Power factor correction capacitors (cosφ>0.94)
EEV - Electronic thermostatic valve (standard supplied in versions T-Q)
FDL - Forced Download Compressors. Compressor switch-off to limit the absorbed current and power (digital input) FNR – Forced Noise Reduction. Refer to the specific section for further details)
GM – Cooling circuit high and low pressure gauge
RQE - Electrical panel resistance (recommended for low air temperatures)
RA - Evaporator antifreeze resistor to prevent the risk of ice formation inside the exchanger when the machine is switched off (as long as the unit is not disconnected from the power supply).
RDR - Antifreeze electric heater for desuperheater / heat recovery (DS or RC100), to prevent the risk of ice formation inside the recovery exchanger when the machine is switched off (as long is the unit is not disconnected from the power supply)
RAE1-RAR1 - 27W antifreeze electric heater for motor-driven pump (available for P1-DP1-ASP1-ASDP1 installations); to prevent the water contained in the pump from freezing when the machine is switched off (as long as the unit is not disconnected from the power supply)
RAE2-RAR2 - Antifreeze electric heater for double motor-driven pumps (available for DP1-DP2-DPR1-DPR2-ASDP1-ASDP2 installations); to prevent the water contained in the pump from freezing when the machine is switched off (as long as the unit is not disconnected from the power supply)
RAS - 300W antifreeze electric heater for water buffer tank (available for ASP1-ASDP1- ASP2-ASDP2 installations); to prevent the risk of ice formation in the water buffer tank when the machine is switched off (as long as the unit is not disconnected from the power supply).
RIS – Integrative electrical resistances and the Antifreeze storage tank (only with Tank&Pump - incompatible with RAS) - See specific section for more information)
LDK - Refrigerant leak detector
DSP - Double set-point via digital consensus (incompatible with the CS accessory).
CS - Scrolling set point via analogue signal 4-20 mA (incompatible with the DSP accessory). The EEV accessory may have to be also installed, depending on the required values.
CMT - Control of minimum and maximum values of power voltage.
BT - Low temperature of water produced
SS - RS485 interface for serial communication with other devices (proprietary protocol; Modbus RTU protocol)
EEM – Energy Meter. Measure and display values of the electrical units - See specific section for more information
EEO - Energy Efficiency Optimizer. Optimising energy efficiency - See specific section for more information
FTT10 - LON interface for serial communication with other devices (LON protocol)
RPB -Protection coil grilles with accident-prevention function (to use as an alternative to the FMB accessory) (not available with V-coiled models).
FMB - Mechanical filters to protect the coils, with leaf protection function (to be used as an alternative to the RPB accessory).
RAP - Unit with pre-painted copper/aluminium condensation coils (available as an alternative with traditional Cu-AL coils and with heat pumps - refer to the table in "General features")
BRR - Unit with copper/copper condensation coils (available as an alternative in chillers with traditional Cu-AL coils and heat pumps - refer to the table in "General features")
DVS - Double high pressure safety valve with an exchanger valve (the valve is only on the outlet branch. In the case of options, such as DS/RC100 recovery units or tube and shell heat exchangers, please contact the Pre-Sales department for a quotation and feasibility of the additional double valves)
IMB - Protective packaging
SAG - Rubber anti-vibration mountings (supplied not installed)
SAM - Spring antivibration mountings (supplied not installed)
TQE - Electrical panel roof

MCHXE- AL/AL micro-channel coil with E-coating treatment (available in chillers with micro-channel coils - refer to table in *"General features")*

GUIDE TO THE CHOICE OF THE MCHXE ACCESSORY (Electrofin E-Coating treatment on micro-channel coils in chillers equipped with the said heat exchangers. Refer to the table "General features")



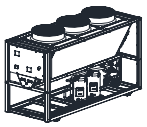
Accessories supplied separately

KTRD - Thermostat with display
KTR - Remote keypad for control at a distance with LCD display and same functions as 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
KRJ1220- Connection cables for KTR (20 m length)
KRJ1230 - Connection cables for KTR (30 m length)
KR200 - KTR remote control Kit (distance between 50 and 200m)
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)

Note: Refer to the price list or contact Rhoss S.p.A. to verify the compatibility of any accessory.

Technical Data

Table "A": Technical Data



TCAEBY SE Model (single circuit)		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Nominal cooling capacity (*)	kW	107	115	128	148	166	189	213
EER		2,86	2,85	2,85	2,86	2,86	2,85	2,85
ESEER +		4,62	4,63	4,66	4,52	4,61	4,75	4,57
Nominal cooling capacity (*) (°) EN 14511:2013	kW	106,5	114,4	127,4	147,3	165,2	188,1	212,1
EER (*) (°) EN 14511:2013		2,81	2,79	2,8	2,81	2,81	2,8	2,8
ESEER EN 14511:2013		3,91	3,94	3,96	3,85	3,93	4,00	3,87
Sound pressure (***) (*)	dB(A)	55	56	56	57	58	58	59
Sound power (****) (*)	dB(A)	87	88	88	89	90	90	91
Sound power with FNR accessory (****)(*)	dB(A)	81	82	82	83	84	84	85
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2 x1,8	2 x1,8	2 x1,8	3 x1,8	3 x1,8	3 x1,8	4 x1,8
Fan nominal air flow	m³/h	39600	39600	39600	59600	59600	59600	79200
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	18,4	19,8	22	25,4	28,5	32,5	36,6
Water side heat exchanger nominal pressure drops (*)	kPa	39	44	44	48	48	47	47
Residual head P1 (*)	kPa	93	85	80	108	99	87	68
Residual head P2 (*)	kPa	137	128	123	149	142	130	111
Residual head ASP1 (*)	kPa	90	82	76	102	92	77	56
Residual head ASP2 (*)	kPa	134	125	119	144	135	121	100
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550
Nominal heating capacity RC100 (±)	kW	140	151	168	193	217	248	279
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	24,1/67	26/76	28,9/76	33,2/82	37,3/83	42,6/82	48/81
Nominal heating capacity DS (±)	kW	28	29	33	38	43	49	55
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,4/7	2,5/8	2,8/7	3,3/8	3,7/7	4,2/9	4,7/8
Amount of R410A refrigerant	Kg	13	13	14	17	18	19	23
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Absorbed power (*) (■)	kW	37,4	40,4	44,9	51,7	58	66,3	74,7
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0
Electrical power supply	V-ph-Hz	400 – 3 – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50						
Nominal current (■)	A	62	67	75	86	96	110	124
Maximum current (■)	A	86	96	104	121	134	149	168
Starting current (■)	A	248	266	266	347	360	375	390
Starting current with SFS (■)	A	164	182	182	232	245	252	270
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350
Length (c)	mm	2650	2650	2650	3600	3600	3600	4550
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM
Weight	Kg	990	1000	1010	1160	1180	1180	1340

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2013 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Technical Data

Table "A": Technical Data

TCAEBY SE Model (double circuit)		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	147	167	190	214	230	257	301	330
EER		3,05	2,94	2,88	2,97	2,84	2,84	2,85	2,8
ESEER +		4,85	4,87	4,87	4,85	4,80	4,84	4,70	4,69
Nominal cooling capacity (*) (°) EN 14511:2013	kW	146,3	166,4	189,2	213,2	229,2	256	299,9	328,6
EER (*) (°) EN 14511:2013		2,99	2,90	2,83	2,92	2,8	2,8	2,81	2,76
ESEER EN 14511:2013		4,11	4,13	4,12	4,12	4,07	4,11	3,98	3,98
Sound pressure (***) (*)	dB(A)	57	57	57	58	60	60	60	61
Sound power (****) (*)	dB(A)	89	89	89	90	92	92	92	93
Sound power with FNR accessory (****)(*)	dB(A)	83	83	83	84	86	86	88	89
Scroll/step compressor	n°	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	n°	2	2	2	2	2	2	2	2
Fans	n° x kW	3 x1,8	3 x1,8	3 x1,8	4 x1,8	4 x1,8	4 x1,8	6 x1,8	6 x1,8
Fan nominal air flow	m³/h	57300	57300	57300	76400	79200	79200	104800	104800
Heat exchanger	Type	Plates/Shell and tube (STE accessory)							
Heat exchanger nominal flow water side (*)	m³/h	25,3	28,7	32,7	36,8	39,5	44,2	51,8	56,7
Water side heat exchanger nominal pressure drops (*)	kPa	44	30	39	40	37	44	42	49
Residual head P1 (*)	kPa	116	117	97	75	100	86	99	78
Residual head P2 (*)	kPa	157	160	141	119	141	128	155	134
Residual head ASP1 (*)	kPa	110	110	88	63	93	78	93	71
Residual head ASP2 (*)	kPa	151	153	132	107	134	119	149	127
Tank water content (ASP1/ASP2)	l	300	300	300	550	550	550	700	700
Nominal heating capacity RC100 (±)	kW	189	217	249	277	302	338	393	434
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	32,5/73	37,3/51	42,8/67	47,6/68	51,9/63	58,1/75	67,6/72	74,6/85
Nominal heating capacity DS (±)	kW	37	43	49	55	59	67	78	85
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	3,2/12	3,7/13	4,2/12	4,7/13	5,1/13	5,8/12	6,7/13	7,3/12
Amount of R410A refrigerant	Kg	16	18	18	22	26	26	50	50
Polyester oil charge	Kg	10,6	10,6	10,6	10,6	20,8	20,8	20,8	20,8
Electrical data		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Absorbed power (*) (■)	kW	48,2	56,8	66,0	72,1	81	90,5	105,6	117,9
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50							
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50							
Nominal current (■)	A	80	94	110	120	135	150	175	196
Maximum current (■)	A	104	120	136	156	192	208	242	268
Starting current (■)	A	226	269	313	333	362	370	468	494
Starting current with SFS (■)	A	168	199	228	248	278	286	366	379
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	2090	2090
Length (c)	mm	3600	3600	3600	4550	4550	4550	4800	4800
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	2" vic	2" vic
Weight	Kg	1165	1185	1190	1335	1670	1690	2400	2410

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

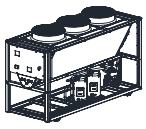
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2013 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



TCAESY SE Model (single circuit)		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Nominal cooling capacity (*)	kW	103	111	123	143	160	184	206
EER		2,77	2,72	2,7	2,76	2,75	2,7	2,74
ESEER +		4,77	4,79	4,71	4,73	4,74	4,79	4,70
Nominal cooling capacity (*) (°) EN 14511:2013	kW	102,5	110,4	122,4	142,3	159,2	183,2	205,1
EER (*) (°) EN 14511:2013		2,72	2,67	2,65	2,71	2,7	2,66	2,7
ESEER EN 14511:2013		4,03	4,04	4,02	4,01	4,01	4,03	3,96
Sound pressure (***) (*)	dB(A)	49	50	50	51	52	52	53
Sound power (****) (*)	dB(A)	81	82	82	83	84	84	85
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2x1,2	2x1,2	2x1,2	3x1,2	3x1,2	3x1,2	4x1,2
Fan nominal air flow	m³/h	31000	31000	31000	46500	46500	46500	62000
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	17,7	19,1	21,1	24,6	27,5	31,6	35,4
Water side heat exchanger nominal pressure drops (*)	kPa	37	42	41	45	46	44	45
Residual head P1 (*)	kPa	96	88	85	113	104	95	75
Residual head P2 (*)	kPa	140	132	128	154	147	138	119
Residual head ASP1 (*)	kPa	93	85	81	107	98	86	64
Residual head ASP2 (*)	kPa	137	129	124	149	140	130	108
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550
Nominal heating capacity RC100 (±)	kW	140	151	168	193	217	248	279
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	24,1/67	26/76	28,9/76	33,2/82	37,3/83	42,6/82	48/81
Nominal heating capacity DS (±)	kW	26	29	32	37	41	49	53
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,2/6	2,5/8	2,8/6	3,2/7	3,5/6	4,2/9	4,6/7
Amount of R410A refrigerant	Kg	13	13	14	17	18	19	23
Polyester oil charge	Kg	10,7	10,7	10,7	10,7	10,7	10,7	10,7
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Absorbed power (*) (■)	kW	37,2	40,8	45,6	51,8	58,2	68,1	75,2
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0
Electrical power supply	V-ph-Hz	400 – 3 – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50						
Nominal current (■)	A	62	68	76	86	97	113	125
Maximum current (■)	A	86	96	104	121	134	149	168
Starting current (■)	A	248	266	266	347	360	375	390
Starting current with SFS (■)	A	164	182	182	232	245	252	270
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350
Length (c)	mm	2650	2650	2650	3600	3600	3600	4550
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM
Weight	Kg	1110	1120	1130	1280	1300	1300	1460

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data

TCAESY SE Model (double circuit)		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	143	162	183	208	225	251	292	321
EER		2,98	2,86	2,71	2,86	2,71	2,7	2,71	2,65
ESEER +		4,98	4,97	4,85	4,95	4,83	4,83	4,81	4,75
Nominal cooling capacity (*) (°) EN 14511:2013	kW	142,3	161,4	182,3	207,2	224,2	250,1	291	319,7
EER (*) (°) EN 14511:2013		2,93	2,82	2,67	2,82	2,68	2,66	2,68	2,61
ESEER EN 14511:2013		4,25	4,23	4,10	4,19	4,11	4,11	4,06	4,02
Sound pressure (***) (*)	dB(A)	51	51	51	52	54	54	56	57
Sound power (****) (*)	dB(A)	83	83	83	84	86	86	88	89
Scroll/step compressor	n°	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	n°	2	2	2	2	2	2	2	2
Fans	n° x kW	3x1,2	3x1,2	3x1,2	4x1,2	4x1,2	4x1,2	6x1,2	6x1,2
Fan nominal air flow	m³/h	46000	46000	46000	61500	62000	62000	81600	81600
Heat exchanger	Type	Plates/Shell and tube (STE accessory)							
Heat exchanger nominal flow water side (*)	m³/h	24,6	27,9	31,5	35,8	38,7	43,2	50,2	55,2
Water side heat exchanger nominal pressure drops (*)	kPa	42	29	36	37	35	42	40	46
Residual head P1 (*)	kPa	120	121	104	83	105	92	106	88
Residual head P2 (*)	kPa	160	164	148	127	146	133	163	145
Residual head ASP1 (*)	kPa	114	114	96	72	98	84	100	82
Residual head ASP2 (*)	kPa	155	157	140	116	139	126	157	138
Tank water content (ASP1/ASP2)	l	300	300	300	550	550	550	700	700
Nominal heating capacity RC100 (±)	kW	189	217	249	277	302	338	393	434
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	32,5/73	37,3/51	42,8/67	47,6/68	51,9/63	58,1/75	67,6/72	74,6/85
Nominal heating capacity DS (±)	kW	36	41	47	53	59	65	76	84
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	3,1/13	3,5/11	4/12	4,6/11	5,1/13	5,6/11	6,5/12	7,2/11
Amount of R410A refrigerant	Kg	16	18	18	22	26	26	50	50
Polyester oil charge	Kg	10,6	10,6	10,6	10,6	20,8	20,8	20,8	20,8
Electrical data		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Absorbed power (*) (■)	kW	48,0	56,6	67,5	72,7	83	93	107,7	121,1
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50							
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50							
Nominal current (■)	A	80	94	112	121	138	154	179	201
Maximum current (■)	A	104	120	136	156	192	208	242	268
Starting current (■)	A	226	269	313	333	362	370	468	494
Starting current with SFS (■)	A	168	199	228	248	278	286	366	379
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	2090	2090
Length (c)	mm	3600	3600	3600	3600	4550	4550	4800	4800
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	1"¼ vic	2" vic	2" vic
Weight	Kg	1300	1320	1325	1470	1830	1850	2440	2450

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

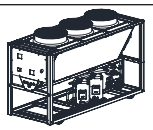
(■) Absorbed current/absorbed power value without electric pump.

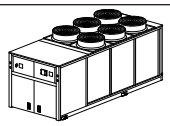
The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data





Model TCAETY HE-A		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	111	122	139	157	176	201	224	242	277	310	346
EER		3,19	3,15	3,18	3,16	3,15	3,16	3,15	3,14	3,14	3,14	3,14
ESEER +		5,02	5,09	4,96	4,98	5,04	4,89	4,95	5,10	5,06	5,00	5,03
Nominal cooling capacity (*) (°) EN 14511:2013	kW	110,5	121,5	138,4	156,4	175,4	200,3	223,2	241,3	276,3	309,1	345
EER (*) (°) EN 14511:2013		3,13	3,1	3,13	3,11	3,1	3,11	3,1	3,1	3,11	3,1	3,1
ESEER EN 14511:2013		4,28	4,32	4,13	4,22	4,28	4,18	4,21	4,30	4,28	4,25	4,23
Sound pressure (***) (*)	dB(A)	55	56	57	57	58	59	59	58	60	60	62
Sound power (****) (*)	dB(A)	87	88	89	89	90	91	91	90	92	92	94
Sound power with FNR accessory (****)(*)	dB(A)	79	79	80	80	81	82	82	83	85	85	86
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2	4/4	4/4	4/4	4/4
Circuits	n°	1	1	1	1	1	1	1	2	2	2	2
Fans	n° x kW	2 x1,8	2 x1,8	3 x1,8	3 x1,8	3 x1,8	4 x1,8	4 x1,8	4 x1,8	6 x1,8	6 x1,8	8 x1,8
Fan nominal air flow	m³/h	41600	41600	59600	59600	62000	79200	79200	78000	104800	109800	132200
Heat exchanger	Type	Plates/Shell and tube (STE accessory)										
Heat exchanger nominal flow water side (*)	m³/h	19,1	21	23,9	27	30,3	34,6	38,5	41,6	47,6	53,3	59,5
Water side heat exchanger nominal pressure drops (*)	kPa	34	32	35	34	33	35	35	28	26	34	31
Residual head P1 (*)	kPa	96	95	85	119	110	91	74	96	83	102	82
Residual head P2 (*)	kPa	140	138	128	161	153	135	117	137	126	158	136
Residual head ASP1 (*)	kPa	93	91	80	112	102	81	62	92	78	95	73
Residual head ASP2 (*)	kPa	137	134	123	155	145	125	105	133	121	151	128
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700
Nominal heating capacity RC100 (±)	kW	141	156	176	200	225	256	286	310	352	395	439
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	24,2/56	26,8/53	30,3/57	34,4/56	38,7/54	44/57	49,2/58	53,3/46	60,5/43	67,9/56	75,5/50
Nominal heating capacity DS (±)	kW	28	30	34	39	44	50	56	60	69	78	86
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,4/6	2,6/7	2,9/7	3,4/7	3,8/7	4,3/9	4,8/8	5,2/14	5,9/12	6,7/13	7,4/12
Amount of R410A refrigerant	Kg	17	17	18	19	23	25	26	50	53	58	63
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4	20,8	20,8	20,8	20,8
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Absorbed power (*) (■)	kW	34,8	38,7	43,7	49,7	55,9	63,6	71,1	77,1	88,2	98,7	110,2
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50										
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50										
Nominal current (■)	A	58	64	73	83	93	106	118	128	147	164	183
Maximum current (■)	A	86	96	108	121	134	153	168	192	208	242	268
Starting current (■)	A	248	266	270	347	360	379	390	362	378	468	502
Starting current with SFS (■)	A	164	182	186	232	245	256	270	278	294	366	387
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440	2030	2030	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350	2090	2090	2090	2090
Length (c)	mm	3600	3600	3600	3600	4550	4550	4550	4800	4800	5300	5300
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1090	1100	1110	1130	1280	1300	1320	2290	2390	2520	2640

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

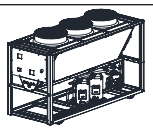
(■) Absorbed current/absorbed power value without electric pump.

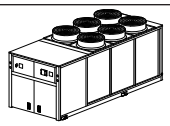
The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data





Model TCAEQY HE-A		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	101	109	127	141	156	182	200	219	252	281	319
EER		2,77	2,63	2,73	2,68	2,63	2,67	2,64	2,59	2,71	2,65	2,65
ESEER +		4,98	4,84	4,81	4,87	4,72	4,82	4,79	4,90	4,96	4,97	4,85
Nominal cooling capacity (*) (°) EN 14511:2013	kW	100,6	108,6	126,5	140,5	155,5	181,4	199,4	218,4	251,4	280,2	318,2
EER (*) (°) EN 14511:2013		2,73	2,6	2,69	2,65	2,6	2,64	2,61	2,57	2,68	2,62	2,63
ESEER EN 14511:2013		4,29	4,12	4,09	4,15	4,02	4,12	4,05	4,19	4,22	4,21	4,14
Sound pressure (***) (*)	dB(A)	47	47	48	48	49	50	50	51	53	53	54
Sound power (****) (*)	dB(A)	79	79	80	80	81	82	82	83	85	85	86
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2	4/4	4/4	4/4	4/4
Circuits	n°	1	1	1	1	1	1	1	2	2	2	2
Fans	n° x kW	2x0,6	2x0,6	3x0,6	3x0,6	3x0,6	4x0,6	4x0,6	4x0,6	6x0,6	6x0,6	8x0,6
Fan nominal air flow	m³/h	23000	23000	33000	33000	34500	44000	44000	44600	60000	62600	75600
Heat exchanger	Type	Plates/Shell and tube (STE accessory)										
Heat exchanger nominal flow water side (*)	m³/h	17,4	18,7	21,8	24,2	26,8	31,3	34,4	37,7	43,3	48,3	54,8
Water side heat exchanger nominal pressure drops (*)	kPa	28	26	29	28	27	29	29	23	23	28	26
Residual head P1 (*)	kPa	105	105	95	132	125	109	96	110	97	121	104
Residual head P2 (*)	kPa	149	149	138	173	168	152	140	150	139	178	159
Residual head ASP1 (*)	kPa	103	102	91	127	119	100	86	107	93	115	97
Residual head ASP2 (*)	kPa	147	145	134	168	161	144	130	147	135	172	153
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700
Nominal heating capacity RC100 (±)	kW	141	156	176	200	225	256	286	310	352	395	439
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	24,2/56	26,8/53	30,3/57	34,4/56	38,7/54	44/57	49,2/58	53,3/46	60,5/43	67,9/56	75,5/50
Nominal heating capacity DS (±)	kW	26	29	34	37	41	47	53	58	66	74	84
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,2/8	2,5/6	2,9/7	3,2/6	3,5/6	4/8	4,6/7	5/13	5,7/11	6,4/11	7,2/11
Amount of R410A refrigerant	Kg	17	17	18	19	23	25	26	50	53	58	63
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4	20,8	20,8	20,8	20,8
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Absorbed power (*) (■)	kW	36,5	41,4	46,5	52,6	59,3	68,2	75,8	84,6	93	106	120,4
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50										
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50										
Nominal current (■)	A	61	69	77	87	99	113	126	140	154	176	200
Maximum current (■)	A	81	91	102	115	128	144	159	183	195	229	251
Starting current (■)	A	243	261	264	341	354	370	381	353	365	455	485
Starting current with SFS (■)	A	159	177	180	226	239	247	261	269	281	353	370
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440	2030	2030	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350	2090	2090	2090	2090
Length (c)	mm	3600	3600	3600	3600	4550	4550	4550	4800	4800	5300	5300
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1250	1260	1270	1290	1440	1460	1480	2420	2520	2650	2770

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

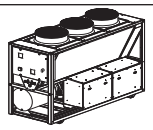
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



THAEBY SE Model (single circuit)		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Nominal cooling capacity (*)	kW	100	111	124	143	160	183	207
EER		2,71	2,71	2,7	2,73	2,7	2,7	2,7
ESEER +		4,44	4,44	4,47	4,37	4,38	4,48	4,35
Nominal cooling capacity (*) (°) EN 14511:2013	kW	99,5	110,4	123,4	142,3	159,3	182,2	206,1
EER (*) (°) EN 14511:2013		2,66	2,66	2,65	2,68	2,65	2,66	2,66
ESEER EN 14511:2013		3,76	3,78	3,80	3,73	3,74	3,78	3,69
Nominal heating capacity (**)	kW	112	123	139	158	176	197	228
COP		3,09	3,11	3,11	3,08	3,09	3,1	3,1
Nominal heating capacity (**) (°) EN 14511:2013	kW	112,6	123,7	139,7	158,8	176,9	198	229,1
COP (*) (°) EN 14511:2013		3,05	3,08	3,08	3,04	3,06	3,07	3,07
Sound pressure (***) (*)	dB(A)	53	54	54	55	56	56	57
Sound power (****) (*)	dB(A)	85	86	86	87	88	88	89
Sound power with FNR accessory (****)(*)	dB(A)	81	82	82	83	84	84	85
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2x1,8	2x1,8	2x1,8	3x1,8	3x1,8	3x1,8	4x1,8
Fan nominal air flow	m³/h	39600	38800	38800	59400	59400	58200	79200
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	17,2	19,1	21,3	24,6	27,5	31,5	35,6
Water side heat exchanger nominal pressure drops (*)	kPa	36	44	41	45	45	44	45
Residual head P1 (*)	kPa	97	85	85	113	105	94	75
Residual head P2 (*)	kPa	141	129	128	155	148	137	119
Residual head ASP1 (*)	kPa	94	82	81	108	99	85	64
Residual head ASP2 (*)	kPa	138	126	124	149	141	129	108
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550
Nominal heating capacity RC100 (±)	kW	132	147	165	189	212	244	274
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	22,7/64	25,3/78	28,4/73	32,5/79	36,5/80	42/78	47,1/80
Nominal heating capacity DS (±)	kW	26	29	33	37	42	48	53
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,2/6	2,5/8	2,8/7	3,2/7	3,6/7	4,1/8	4,6/7
Amount of R410A refrigerant	Kg	27	34	34	39	40	51	60
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Absorbed power in summer mode (*) (■)	kW	36,9	41	45,9	52,4	59,3	67,8	76,7
Absorbed power in winter mode (**) (■)	kW	36,3	39,5	44,6	51,4	56,9	63,6	73,4
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0
Electrical power supply	V-ph-Hz	400 – 3 – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50						
Summer operation nominal current (*) (■)	A	61	68	76	87	98	113	127
Maximum current (■)	A	86	96	104	121	134	149	168
Starting current (■)	A	248	266	266	347	360	375	390
Starting current with SFS (■)	A	164	182	182	232	245	252	270
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350
Length (c)	mm	2650	2650	2650	3600	3600	3600	4550
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM
Weight	Kg	1250	1310	1320	1470	1480	1565	1730

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; evaporator scaling factor equal to $0.35x10^{-4}$ m^2 K/W.

(**) In the following conditions: Evaporator inlet water temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB. With heat pumps** operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

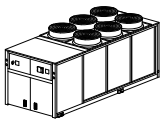
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



THAEBY SE Model (double circuit)		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	142	164	187	210	228	255	297	326
EER		2,92	2,91	2,80	2,80	2,71	2,71	2,71	2,71
ESEER +		4,84	4,92	4,56	4,63	4,64	4,50	4,58	4,59
Nominal cooling capacity (*) (°) EN 14511:2013	kW	141,3	163,4	186,2	209,1	227,1	253,9	295,9	324,7
EER (*) (°) EN 14511:2013		2,87	2,87	2,76	2,76	2,67	2,67	2,67	2,67
ESEER EN 14511:2013		4,10	4,18	3,86	3,93	3,93	3,82	3,88	3,90
Nominal heating capacity (**)	kW	152	172	197	225	248	280	318	353
COP		3,12	3,16	3,07	3,07	3,05	3,03	3,03	3,01
Nominal heating capacity (**) (°) EN 14511:2013	kW	152,7	172,6	197,8	225,9	249	281,4	319,3	354,6
COP (*) (°) EN 14511:2013		3,09	3,14	3,04	3,04	3,03	3,01	3,01	2,98
Sound pressure (***) (*)	dB(A)	54	54	56	56	58	60	60	61
Sound power (****) (*)	dB(A)	86	86	88	88	90	92	92	93
Sound power with FNR accessory (****)(*)	dB(A)	82	82	84	84	86	86	88	89
Scroll/step compressor	n°	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	n°	2	2	2	2	2	2	2	2
Fans	n° x kW	6x0,69	6x0,69	4x1,8	4x1,8	4x1,8	6x1,8	6x1,8	6x1,8
Fan nominal air flow	m³/h	55200	53500	73200	70900	80200	109600	106200	106200
Heat exchanger	Type	Plates/Shell and tube (STE accessory)							
Heat exchanger nominal flow water side (*)	m³/h	24,4	28,2	32,2	36,1	39,2	43,8	51,1	56,1
Water side heat exchanger nominal pressure drops (*)	kPa	43	33	39	42	40	49	41	48
Residual head P1 (*)	kPa	118	115	94	75	90	70	104	83
Residual head P2 (*)	kPa	158	157	138	119	131	112	160	139
Residual head ASP1 (*)	kPa	115	112	81	58	87	66	98	76
Residual head ASP2 (*)	kPa	156	155	125	102	128	107	155	132
Tank water content (ASP1/ASP2)	l	440	440	700	700	700	700	700	700
Nominal heating capacity RC100 (±)	kW	185	215	245	276	303	336	393	432
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	31,8/74	37/57	42,1/67	47,5/73	52,1/71	57,8/86	67,6/72	74,3/85
Nominal heating capacity DS (±)	kW	36	42	47	53	59	66	77	85
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	3,1/13	3,6/11	4/13	4,6/12	5,1/13	5,7/11	6,6/13	7,3/12
Amount of R410A refrigerant	Kg	38	51	40	52	59	59	79	79
Polyester oil charge	Kg	10,6	10,6	10,6	10,6	20,8	20,8	20,8	20,8
Electrical data		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Absorbed power in summer mode (*) (■)	kW	48,6	56,4	66,8	75,0	84,1	94,1	109,6	120,3
Absorbed power in winter mode (**) (■)	kW	48,7	54,4	64,2	73,3	81,2	92,3	104,9	117,2
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50							
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50							
Summer operation nominal current (*) (■)	A	81	94	111	125	140	156	182	200
Maximum current (■)	A	100	116	140	156	192	208	242	268
Starting current (■)	A	222	265	317	333	362	370	468	494
Starting current with SFS (■)	A	164	195	232	248	278	286	366	379
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2000	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	1520	1520	2090	2090	2090	2090	2090	2090
Length (c)	mm	3450	3450	3700	3700	4800	4800	4800	4800
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1450	1525	1725	1800	2375	2460	2580	2595

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; evaporator scaling factor equal to $0.35x10^{-4}$ m^2 K/W.

(**) In the following conditions: Evaporator inlet water temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

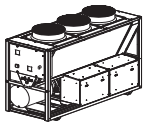
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



THAESY SE Model (single circuit)		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Nominal cooling capacity (*)	kW	98	107	118	137	153	176	200
EER		2,62	2,61	2,54	2,63	2,57	2,54	2,6
ESEER +		4,62	4,56	4,45	4,50	4,45	4,60	4,45
Nominal cooling capacity (*) (°) EN 14511:2013	kW	97,6	106,5	117,5	136,4	152,3	175,3	199,2
EER (*) (°) EN 14511:2013		2,58	2,56	2,5	2,59	2,53	2,5	2,56
ESEER EN 14511:2013		3,90	3,85	3,80	3,81	3,76	3,87	3,76
Nominal heating capacity (**)	kW	109	121	135	155	173	195	225
COP		3,13	3,16	3,13	3,17	3,14	3,12	3,16
Nominal heating capacity (**) (°) EN 14511:2013	kW	109,5	121,7	135,7	155,8	173,9	195,9	226
COP (*) (°) EN 14511:2013		3,1	3,13	3,1	3,13	3,1	3,09	3,13
Sound pressure (***) (*)	dB(A)	49	50	50	51	52	52	53
Sound power (****) (*)	dB(A)	81	82	82	83	84	84	85
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2x1,2	2x1,2	2x1,2	3x1,2	3x1,2	3x1,2	4x1,2
Fan nominal air flow	m³/h	31800	31000	31000	47700	47700	46500	63600
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	16,8	18,4	20,3	23,6	26,3	30,3	34,4
Water side heat exchanger nominal pressure drops (*)	kPa	34	41	38	42	43	41	42
Residual head P1 (*)	kPa	100	90	90	119	111	101	83
Residual head P2 (*)	kPa	144	134	133	159	153	145	127
Residual head ASP1 (*)	kPa	98	87	86	113	104	94	73
Residual head ASP2 (*)	kPa	142	130	129	154	147	137	117
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550
Nominal heating capacity RC100 (±)	kW	132	147	165	189	212	244	274
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	22,7/64	25,3/78	28,4/73	32,5/79	36,5/80	42/78	47,1/80
Nominal heating capacity DS (±)	kW	26	28	31	36	40	47	53
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,2/6	2,4/7	2,7/6	3,1/7	3,4/6	4/8	4,6/7
Amount of R410A refrigerant	Kg	27	34	34	39	40	51	60
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Absorbed power in summer mode (*) (■)	kW	37,4	41	46,5	52,1	59,5	69,3	76,9
Absorbed power in winter mode (**) (■)	kW	34,8	38,3	43,1	48,9	55,1	62,6	71,1
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0
Electrical power supply	V-ph-Hz	400 – 3 – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50						
Summer operation nominal current (*) (■)	A	62	68	77	87	99	115	128
Maximum current (■)	A	86	96	104	121	134	149	168
Starting current (■)	A	248	266	266	347	360	375	390
Starting current with SFS (■)	A	164	182	182	232	245	252	270
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350
Length (c)	mm	2650	2650	2650	3600	3600	3600	4550
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM
Weight	Kg	1250	1310	1320	1470	1480	1565	1730

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; evaporator scaling factor equal to $0.35x10^{-4}$ m^2 K/W.

(**) In the following conditions: Evaporator inlet water temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data

THAESY SE Model (double circuit)		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	137	157	181	201	221	249	287	315
EER		2,78	2,74	2,70	2,64	2,6	2,64	2,61	2,54
ESEER +		4,80	4,88	4,69	4,63	4,66	4,58	4,66	4,63
Nominal cooling capacity (*) (°) EN 14511:2013	kW	136,4	156,4	180,3	200,2	220,2	248	286	313,8
EER (*) (°) EN 14511:2013		2,73	2,70	2,66	2,60	2,57	2,6	2,58	2,51
ESEER EN 14511:2013		4,09	4,15	3,96	3,92	3,97	3,90	3,93	3,91
Nominal heating capacity (**)	kW	147	167	192	219	244	277	314	344
COP		3,13	3,14	3,12	3,12	3,12	3,08	3,09	3,06
Nominal heating capacity (**) (°) EN 14511:2013	kW	147,7	167,6	192,8	219,9	245	278,3	315,2	345,5
COP (*) (°) EN 14511:2013		3,10	3,12	3,09	3,09	3,09	3,05	3,07	3,03
Sound pressure (***) (*)	dB(A)	50	50	52	52	54	55	56	57
Sound power (****) (*)	dB(A)	82	82	84	84	86	87	88	89
Scroll/step compressor	n°	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	n°	2	2	2	2	2	2	2	2
Fans	n° x kW	6x0,48	6x0,48	4x1,2	4x1,2	4x1,2	6x1,2	6x1,2	6x1,2
Fan nominal air flow	m³/h	43000	42000	58000	56000	64600	86200	83000	83000
Heat exchanger	Type	Plates/Shell and tube (STE accessory)							
Heat exchanger nominal flow water side (*)	m³/h	23,6	27	31,1	34,6	38	42,8	49,3	54,2
Water side heat exchanger nominal pressure drops (*)	kPa	40	30	37	39	37	47	37	44
Residual head P1 (*)	kPa	123	121	101	85	96	75	112	94
Residual head P2 (*)	kPa	163	163	144	128	137	116	169	150
Residual head ASP1 (*)	kPa	121	118	88	69	93	71	107	88
Residual head ASP2 (*)	kPa	161	161	132	113	134	112	164	144
Tank water content (ASP1/ASP2)	l	440	440	700	700	700	700	700	700
Nominal heating capacity RC100 (±)	kW	185	215	245	276	303	336	393	432
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	31,8/74	37/57	42,1/67	47,5/73	52,1/71	57,8/86	67,6/72	74,3/85
Nominal heating capacity DS (±)	kW	36	41	48	53	58	66	76	82
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	3,1/13	3,5/11	4,1/13	4,6/11	5/13	5,7/11	6,5/13	7,1/11
Amount of R410A refrigerant	Kg	38	51	40	52	59	59	79	79
Polyester oil charge	Kg	10,6	10,6	10,6	10,6	20,8	20,8	20,8	20,8
Electrical data		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Absorbed power in summer mode (*) (■)	kW	49,3	57,3	67,0	76,1	85	94,3	110	124
Absorbed power in winter mode (**) (■)	kW	47,0	53,2	61,5	70,2	78,3	89,9	101,5	112,6
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50							
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50							
Summer operation nominal current (*) (■)	A	82	95	111	126	141	157	183	206
Maximum current (■)	A	100	116	140	156	192	208	242	268
Starting current (■)	A	222	265	317	333	362	370	468	494
Starting current with SFS (■)	A	164	195	232	248	278	286	366	379
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2000	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	1520	1520	2090	2090	2090	2090	2090	2090
Length (c)	mm	3450	3450	3700	3700	4800	4800	4800	4800
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1475	1550	1765	1840	2415	2500	2620	2635

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; evaporator scaling factor equal to $0.35x10^{-4}$ m^2 K/W.

(**) In the following conditions: Evaporator inlet water temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

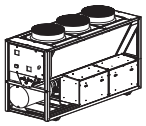
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



Model THAETY HE-A		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	102	113	127	146	162	187	210	232	264	302	335
EER		2,88	2,86	2,86	2,87	2,84	2,83	2,83	2,82	2,86	2,85	2,83
ESEER +		4,69	4,73	4,66	4,67	4,69	4,53	4,60	4,85	4,79	4,75	4,74
Nominal cooling capacity (*) (°) EN 14511:2013	kW	101,6	112,6	126,5	145,4	161,4	186,3	209,3	231,3	263,3	301,1	334,1
EER (*) (°) EN 14511:2013		2,83	2,82	2,82	2,83	2,8	2,79	2,79	2,79	2,83	2,82	2,8
ESEER EN 14511:2013		4,00	4,01	3,89	3,96	3,99	3,87	3,91	4,10	4,04	4,04	3,99
Nominal heating capacity (**)	kW	114	124	141	161	181	204	233	249	282	320	356
COP		3,25	3,25	3,24	3,25	3,26	3,25	3,24	3,22	3,22	3,22	3,22
Nominal heating capacity (**) (°) EN 14511:2013	kW	114,5	124,5	141,6	161,6	181,7	204,8	233,9	249,8	282,8	321	357
COP (*) (°) EN 14511:2013		3,22	3,22	3,21	3,22	3,23	3,22	3,21	3,2	3,2	3,2	3,2
Sound pressure (***) (*)	dB(A)	53	54	55	55	56	57	57	58	60	60	62
Sound power (****) (*)	dB(A)	85	86	87	87	88	89	89	90	92	92	94
Sound power with FNR accessory (****)(*)	dB(A)	79	79	80	80	81	82	82	83	85	85	86
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2	4/4	4/4	4/4	4/4
Circuits	n°	1	1	1	1	1	1	1	2	2	2	2
Fans	n° x kW	2x1,8	2x1,8	3x1,8	3x1,8	3x1,8	4x1,8	4x1,8	4x1,8	6x1,8	6x1,8	8x1,8
Fan nominal air flow	m³/h	41200	41200	59400	58200	62000	79200	77600	78800	106200	111000	134200
Heat exchanger	Type	Plates/Shell and tube (STE accessory)										
Heat exchanger nominal flow water side (*)	m³/h	17,5	19,4	21,8	25,1	27,9	32,2	36,1	39,9	45,4	51,9	57,6
Water side heat exchanger nominal pressure drops (*)	kPa	32	29	32	32	30	33	33	26	25	31	29
Residual head P1 (*)	kPa	100	100	90	124	117	99	83	101	90	110	91
Residual head P2 (*)	kPa	144	143	133	166	160	143	126	142	132	166	146
Residual head ASP1 (*)	kPa	97	96	86	118	110	90	71	98	85	104	83
Residual head ASP2 (*)	kPa	141	140	129	160	153	133	114	139	127	160	138
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700
Nominal heating capacity RC100 (±)	kW	133	148	165	190	212	244	275	305	343	394	436
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	22,9/55	25,5/50	28,4/55	32,7/55	36,5/52	42/57	47,3/57	52,4/45	59/43	67,8/53	75/50
Nominal heating capacity DS (±)	kW	26	29	33	38	41	47	54	60	66	76	85
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,2/5	2,5/6	2,8/7	3,3/6	3,5/6	4/8	4,6/7	5,2/14	5,7/11	6,5/12	7,3/12
Amount of R410A refrigerant	Kg	38	39	40	51	64	65	79	79	82	91	95
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4	20,8	20,8	20,8	20,8
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Absorbed power in summer mode (*) (■)	kW	35,4	39,5	44,4	50,9	57	66,1	74,2	82,3	92,3	106	118,4
Absorbed power in winter mode (**) (■)	kW	35,1	38,2	43,5	49,5	55,5	62,8	71,9	77,3	87,6	99,4	110,6
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50										
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50										
Summer operation nominal current (*) (■)	A	59	66	74	84	95	110	123	137	153	176	197
Maximum current (■)	A	86	96	108	121	134	153	168	192	208	242	268
Starting current (■)	A	248	266	270	347	360	379	390	362	378	468	502
Starting current with SFS (■)	A	164	182	186	232	245	256	270	278	294	366	387
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440	2030	2030	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350	2090	2090	2090	2090
Length (c)	mm	3600	3600	3600	3600	4450	4450	4550	4800	4800	5300	5300
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1380	1410	1420	1500	1670	1690	1780	2470	2570	2720	2840

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; fouling factor equal to 0.35x10^{-4} m^2 K/W.

(**) Under the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

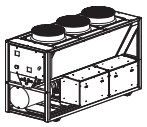
(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Table "A": Technical Data



Model THAEQY HE-A		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Nominal cooling capacity (*)	kW	92	101	119	131	145	170	188	207	239	271	303
EER		2,49	2,34	2,56	2,45	2,37	2,42	2,37	2,32	2,47	2,36	2,4
ESEER +		4,65	4,48	4,55	4,54	4,44	4,46	4,49	4,65	4,64	4,66	4,60
Nominal cooling capacity (*) (°) EN 14511:2013	kW	91,6	100,6	118,6	130,6	144,5	169,5	187,4	206,5	238,4	270,3	302,3
EER (*) (°) EN 14511:2013		2,46	2,31	2,53	2,42	2,34	2,39	2,35	2,3	2,45	2,34	2,38
ESEER EN 14511:2013		4,01	3,82	3,87	3,87	3,78	3,81	3,79	3,98	3,94	3,94	3,93
Nominal heating capacity (**)	kW	110	118	136	153	171	194	221	236	266	300	341
COP		3,31	3,32	3,3	3,28	3,29	3,26	3,29	3,14	3,13	2,97	3,1
Nominal heating capacity (**) (°) EN 14511:2013	kW	110,5	118,5	136,5	153,6	171,6	194,7	221,8	236,7	266,7	301	341,9
COP (*) (°) EN 14511:2013		3,28	3,29	3,27	3,26	3,26	3,23	3,26	3,12	3,11	2,95	3,08
Sound pressure (***) (*)	dB(A)	47	47	48	48	49	50	50	51	53	53	54
Sound power (****) (*)	dB(A)	79	79	80	80	81	82	82	83	85	85	86
Scroll/step compressor	n°	2/3	2/3	2/2	2/3	2/2	2/3	2/2	4/4	4/4	4/4	4/4
Circuits	n°	1	1	1	1	1	1	1	2	2	2	2
Fans	n° x kW	2x0,6	2x0,6	3x0,6	3x0,6	3x0,6	4x0,6	4x0,6	4x0,6	6x0,6	6x0,6	8x0,6
Fan nominal air flow	m³/h	23900	23900	33900	33200	35400	45200	44200	45000	60600	63200	77000
Heat exchanger	Type	Plates/Shell and tube (STE accessory)										
Heat exchanger nominal flow water side (*)	m³/h	15,8	17,4	20,5	22,5	24,9	29,2	32,3	35,6	41,1	46,6	52,1
Water side heat exchanger nominal pressure drops (*)	kPa	26	24	27	26	25	27	26	20	20	25	24
Residual head P1 (*)	kPa	109	109	100	137	132	116	106	117	105	130	113
Residual head P2 (*)	kPa	153	153	143	178	173	160	150	157	146	187	169
Residual head ASP1 (*)	kPa	107	106	96	133	126	108	96	114	101	125	106
Residual head ASP2 (*)	kPa	151	150	139	173	168	152	140	154	142	182	163
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700
Nominal heating capacity RC100 (±)	kW	133	148	165	190	212	244	275	305	343	394	436
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	22,9/55	25,5/50	28,4/55	32,7/55	36,5/52	42/57	47,3/57	52,4/45	59/43	67,8/53	75/50
Nominal heating capacity DS (±)	kW	24	28	32	35	40	46	51	57	65	74	81
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	2,1/5	2,4/6	2,8/7	3/5	3,4/6	4/8	4,4/6	4,9/13	5,6/11	6,4/11	7/10
Amount of R410A refrigerant	Kg	38	39	40	51	64	65	79	79	82	91	95
Polyester oil charge	Kg	10,4	10,4	10,4	10,4	10,4	10,4	10,4	20,8	20,8	20,8	20,8
Electrical data		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Absorbed power in summer mode (*) (■)	kW	37	43,2	46,5	53,5	61,2	70,3	79,3	89,2	96,8	114,8	126,3
Absorbed power in winter mode (**) (■)	kW	33,2	35,5	41,2	46,6	52	59,5	67,2	75,2	85	101	110
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,5/2,2	1,5/2,2	1,5/2,2	2,2/3,0	2,2/3,0	2,2/3,0	2,2/3,0	3,0/4,0	3,0/4,0	4,0/5,5	4,0/5,5
Electrical power supply	V-ph-Hz	400 – 3 – 50										
Auxiliary electrical power supply	V-ph-Hz	230 – 1 – 50										
Summer operation nominal current (*) (■)	A	61	72	77	89	102	117	132	148	161	191	210
Maximum current (■)	A	81	91	102	115	128	144	159	183	195	229	251
Starting current (■)	A	243	261	264	341	354	370	381	353	365	455	485
Starting current with SFS (■)	A	159	177	180	226	239	247	261	269	281	353	370
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	3,0/4,5	3,0/4,5	3,0/4,5	4,5/6,0	4,5/6,0	4,5/6,0	4,5/6,0	6,0/8,0	6,0/8,0	8,0/10,5	8,0/10,5
Dimensions		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**	**4240**	**4270**	**4310**	**4340**
Height (a)	mm	2440	2440	2440	2440	2440	2440	2440	2030	2030	2030	2030
Width (b)	mm	1350	1350	1350	1350	1350	1350	1350	2090	2090	2090	2090
Length (c)	mm	3600	3600	3600	3600	4550	4550	4550	4800	4800	5300	5300
Heat exchanger inlet/outlet connections and RC100	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3" vic	3" vic	3" vic	3" vic
DS inlet/outlet connections	Ø	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	1" GM	2" vic	2" vic	2" vic	2" vic
Weight	Kg	1420	1450	1460	1540	1710	1730	1820	2600	2700	2850	2970

(*) Under the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5 K; evaporator scaling factor equal to $0.35x10^{-4}$ m^2 K/W.

(**) In the following conditions: Evaporator inlet water temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; temperature differential at condenser 5 K; fouling factor equal to 0.35x10-4 m2 K/W.

(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump

(****) Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards The noise data refers to the units without the electric pump

(±) Recovery unit heating capacity Conditions referring to the unit operating with chilled water temperature 7°C, differential temperature due to evaporation of 5 K, hot water temperature produced equivalent to 40/45°C (RC100) 50/60°C (DS). **NB.** With heat pumps operating in winter mode with DC active, the heating capacity available is decreased from the portion supplied to the desuperheater.

(■) Absorbed current/absorbed power value without electric pump.

The starting current refers to the worst conditions of the unit.

(°) Data calculated in accordance with EN 14511:2011 under nominal conditions.

The refrigerant charge values are indicative. Refer to the serial number plate.

Energy efficiency at partial loads ESEER and IPLV indexes

- 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 IPLV (Integrated Part Load Value) and ESEER indexes (European Seasonal EER) are those that estimate the average seasonal energy efficiency of the cooling unit on four load and outdoor air temperature conditions. In general, two chillers that have the same EER value can have different IPLV or ESEER values. In fact, for an air- cooled cooling unit, the average energy efficiency depends on the design choices and the temperature of the air entering the condensing coil.
- The IPLV and ESEER indexes, introduced respectively by the ARI (American Refrigeration Institute - ARI standard 550/590) and the European Community (EECCAC Energy Efficiency and Certification of Central Air Conditioners project), have the same formulation, but differ due to outdoor air temperatures (see table “C”) and for the energy weights that are assigned to the four load conditions considered for the calculation: 100%, 75%, 50% and 25% and for Tw produced (6.7°C IPLV / 7°C ESEER).

$$\text{IPLV} \quad \frac{1*EER100\% + 42*EER75\% + 45*EER50\% + 12*EER25\%}{100}$$

$$\text{ESEER} \quad \frac{3*EER100\% + 33*EER75\% + 41*EER50\% + 23*EER25\%}{100}$$

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

Table “B”: load and temperatures conditions

Load	IPLV	ESEER
100%	35,0°C	35°C
75%	26,7°C	30°C
50%	18,3°C	25°C
25%	12,8°C	20°C

Table “C”: E.E.R. - E.S.E.E.R. for TCAEBY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	3,91	2,80	3,58	4,12	4,16
2120	3,94	2,79	3,51	4,22	4,21
2140	**3,96**	2,79	3,54	4,24	4,20
2150	3,85	2,80	3,49	4,09	4,08
2170	3,93	2,81	3,53	4,21	4,17
2200	4,00	2,80	3,55	4,30	4,28
2220	3,87	2,80	3,51	4,15	4,04
4150	4,11	2,99	3,64	4,35	4,51
4170	4,13	2,90	3,60	4,39	4,61
4200	4,12	2,83	3,59	4,37	4,61
4220	4,12	2,92	3,61	4,37	4,56
4240	4,07	2,80	3,53	4,31	4,56
4270	4,11	2,79	3,52	4,38	4,63
4310	3,98	2,81	3,50	4,21	4,41
4340	3,98	2,75	3,44	4,24	4,46

Table “C”: E.E.R. - E.S.E.E.R. for TCAESY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	4,03	2,72	3,57	4,29	4,38
2120	**4,04**	2,67	3,46	4,39	4,42
2140	4,02	2,65	3,49	4,36	4,35
2150	4,01	2,71	3,48	4,33	4,36
2170	4,01	2,70	3,51	4,33	4,31
2200	4,03	2,65	3,48	4,38	4,39
2220	3,96	2,69	3,50	4,29	4,22
4150	4,25	2,93	3,67	4,53	4,74
4170	4,23	2,82	3,60	4,52	4,79
4200	4,10	2,67	3,48	4,37	4,69
4220	4,19	2,82	3,58	4,48	4,72
4240	4,11	2,67	3,47	4,39	4,73
4270	4,11	2,66	3,44	4,41	4,71
4310	4,06	2,67	3,45	4,33	4,64
4340	4,02	2,61	3,37	4,32	4,60

Table “C”: E.E.R. - E.S.E.E.R. for TCAETY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	4,28	3,13	3,98	4,49	4,51
2120	4,32	3,09	3,90	4,60	4,58
2140	4,13	3,12	3,80	4,38	4,30
2150	4,22	3,11	3,87	4,47	4,44
2170	4,28	3,10	3,87	4,57	4,52
2200	4,18	3,11	3,85	4,42	4,36
2220	4,21	3,10	3,85	4,49	4,37
4240	4,30	3,10	3,83	4,50	4,79
4270	4,28	3,10	3,77	4,51	4,74
4310	4,25	3,10	3,80	4,45	4,69
4340	4,23	3,10	3,75	4,45	4,68

Table “C”: E.E.R. - E.S.E.E.R. for TCAEQY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	4,29	2,73	3,74	4,61	4,73
2120	4,12	2,59	3,50	4,49	4,56
2140	4,09	2,69	3,55	4,43	4,43
2150	4,15	2,64	3,55	4,51	4,58
2170	4,02	2,59	3,47	4,36	4,39
2200	4,12	2,63	3,53	4,48	4,52
2220	4,05	2,61	3,50	4,40	4,39
4240	4,19	2,56	3,44	4,47	4,97
4270	4,22	2,68	3,51	4,52	4,88
4310	4,21	2,62	3,49	4,48	4,98
4340	4,14	2,62	3,44	4,44	4,81

Table “C”: E.E.R. - E.S.E.E.R. for THAEBY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	3,76	2,66	3,46	3,96	3,98
2120	3,78	2,66	3,40	4,04	4,02
2140	3,80	2,65	3,40	4,07	4,03
2150	3,73	2,68	3,40	3,95	3,93
2170	3,74	2,65	3,37	4,00	3,95
2200	3,78	2,65	3,43	4,01	3,99
2220	3,69	2,65	3,36	3,95	3,85
4150	4,10	2,86	3,57	4,37	4,56
4170	4,18	2,86	3,61	4,44	4,69
4200	3,86	2,75	3,42	4,08	4,25
4220	3,93	2,75	3,43	4,17	4,38
4240	3,93	2,67	3,40	4,15	4,45
4270	3,82	2,66	3,30	4,06	4,28
4310	3,88	2,67	3,38	4,09	4,38
4340	3,90	2,67	3,36	4,13	4,40

Table “C”: E.E.R. - E.S.E.E.R. per THAESY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	3,90	2,57	3,47	4,16	4,22
2120	3,85	2,56	3,38	4,15	4,16
2140	3,80	2,49	3,32	4,11	4,09
2150	3,81	2,58	3,38	4,09	4,10
2170	3,76	2,53	3,32	4,06	4,04
2200	3,87	2,50	3,33	4,21	4,22
2220	3,76	2,56	3,34	4,05	3,98
4150	4,09	2,73	3,49	4,38	4,62
4170	4,15	2,70	3,50	4,45	4,74
4200	3,96	2,66	3,41	4,21	4,48
4220	3,92	2,60	3,34	4,19	4,44
4240	3,97	2,56	3,36	4,22	4,59
4270	3,90	2,60	3,32	4,16	4,43
4310	3,93	2,57	3,35	4,17	4,54
4340	3,91	2,50	3,27	4,19	4,51

Table “C”: E.E.R. - E.S.E.E.R. for THAETY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	4,00	2,83	3,66	4,23	4,23
2120	4,01	2,81	3,61	4,28	4,26
2140	3,89	2,81	3,53	4,15	4,06
2150	3,96	2,82	3,58	4,22	4,19
2170	3,99	2,80	3,58	4,28	4,22
2200	3,87	2,79	3,51	4,14	4,07
2220	3,91	2,79	3,55	4,20	4,07
4240	4,10	2,79	3,55	4,32	4,66
4270	4,04	2,83	3,51	4,28	4,55
4310	4,04	2,81	3,54	4,24	4,55
4340	3,99	2,80	3,47	4,22	4,49

Table “C”: E.E.R. - E.S.E.E.R. per THAEQY

Model	E.S.E.E.R.	E.E.R. 100%	E.E.R. 75%	E.E.R. 50%	E.E.R. 25%
2110	4,01	2,45	3,43	4,35	4,46
2120	3,82	2,31	3,18	4,20	4,27
2140	3,87	2,52	3,37	4,19	4,18
2150	3,87	2,42	3,30	4,20	4,27
2170	3,78	2,34	3,23	4,12	4,14
2200	3,81	2,39	3,26	4,15	4,19
2220	3,79	2,34	3,25	4,14	4,13
4240	3,98	2,30	3,19	4,27	4,79
4270	3,94	2,45	3,27	4,23	4,60
4310	3,94	2,34	3,20	4,22	4,73
4340	3,93	2,38	3,21	4,23	4,61

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 Fancoil: 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 o più bassa Warmer (clima di Atene): 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.

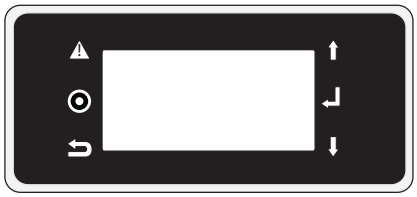
The seasonal efficiency in SEER cooling mode depends on a unique design temperature and is indicated for 2 types of distribution:

- 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)

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).



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.

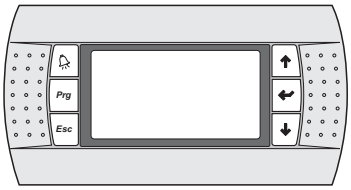
UP key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points

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

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

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

ESC key: makes it possible to switch the unit on and off

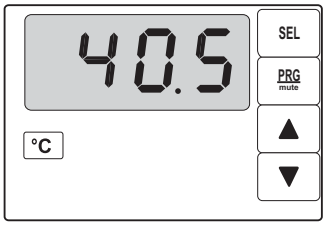
UP key: used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points

ENTER key:allows confirmation of the selected parameters

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.

KTRD - Thermostat with display



The thermostat accessory with display (KTRD) allows the water temperature read by the probe supplied to be displayed and the setting to be made.

DISPLAY:
displays the water temperature value

SEL

SEL key:
allows the set-point and activation differential to be set

PRG mute

PRG/mute key:
allows access to the parameters programming menu

▲

UP key:
allows scrolling the menu and modify the parameters

▼

DOWN key:
allows scrolling the menu and modify the parameters

Serial Connection

Serial Connection

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

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

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

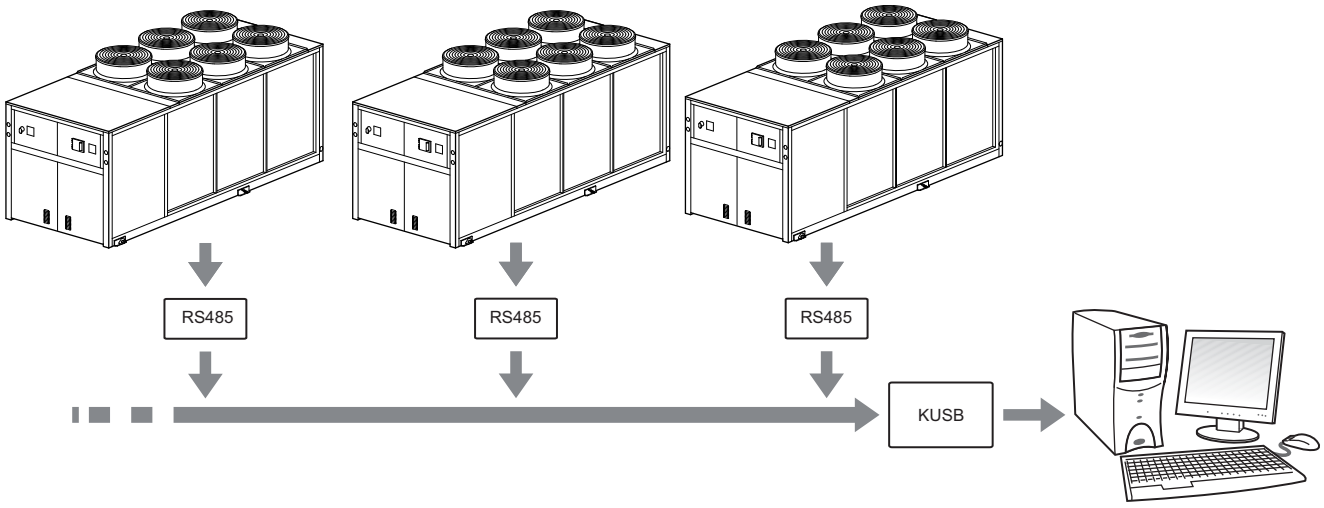
Supervision

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;

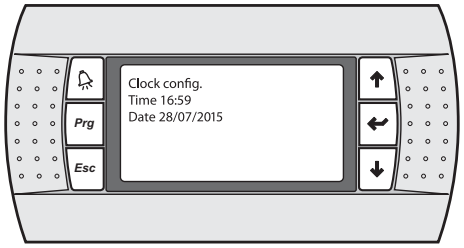
○ reading the various alarm codes which are present, and resetting them as necessary.



Clock card

The clock card (standard in the WinPACK units) 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

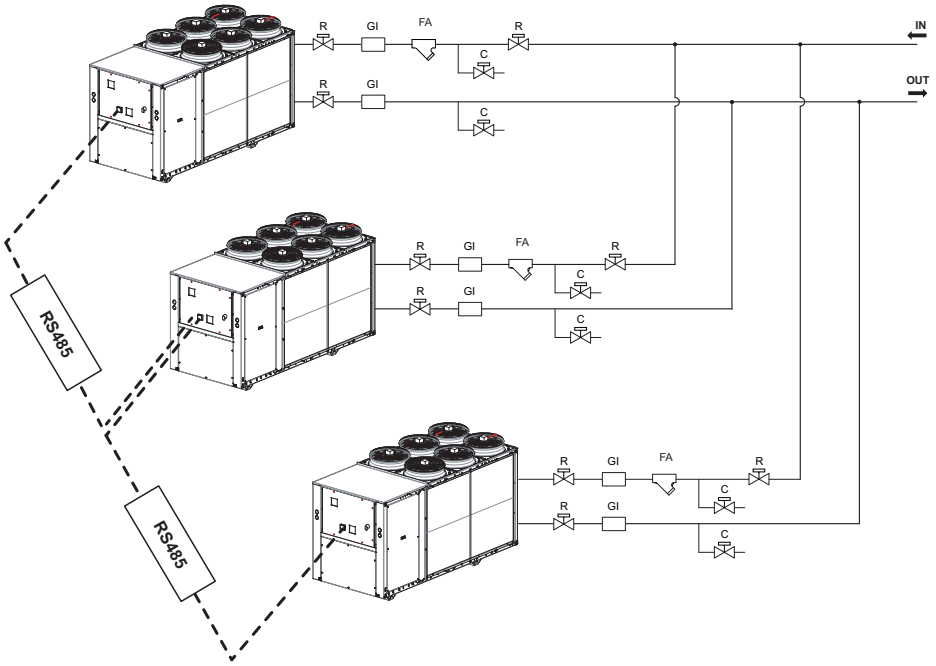


Rhoss Integrated Sequencer

A new function has been introduced in the units **making it possible to control up to 4** identical units (chillers or heat pumps), function (standard, high efficiency, silenced or super-silenced), 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

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.

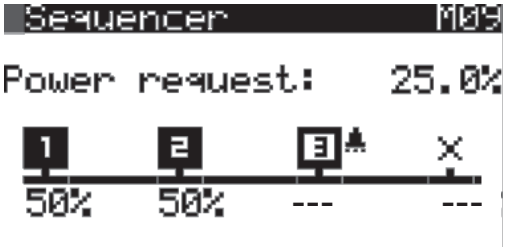
If the chillers are supplied with the **heat recovery accessory** (DS and RC100), hot water production from the dedicated heat exchanger will not be sequenced.

If the heat pumps are supplied with the **heat recovery accessory** (RC100), hot water production from the dedicated heat exchanger will be sequenced.

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.

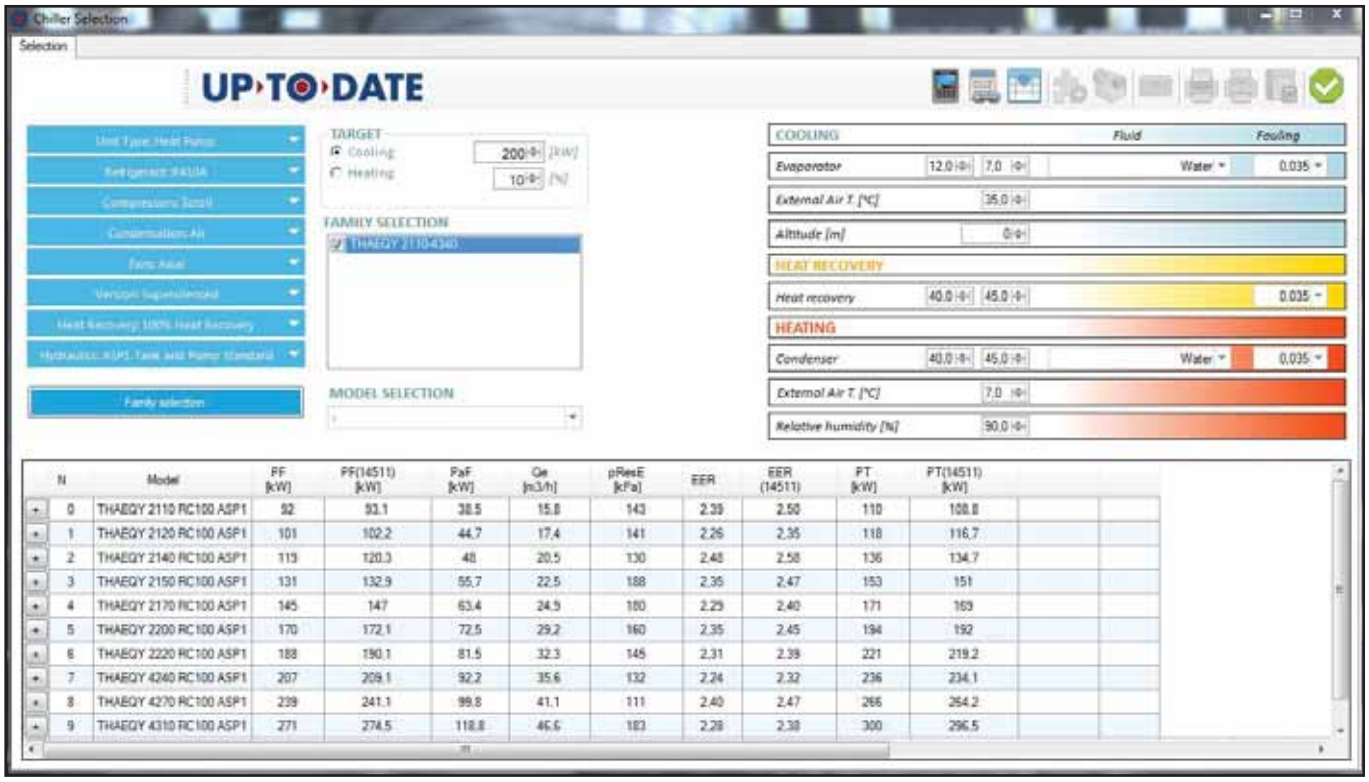
- Units 1 and 2 are on at 50%;
- Unit 3 is affected by an alarm;
- Unit 4 is disconnected from the network.

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.

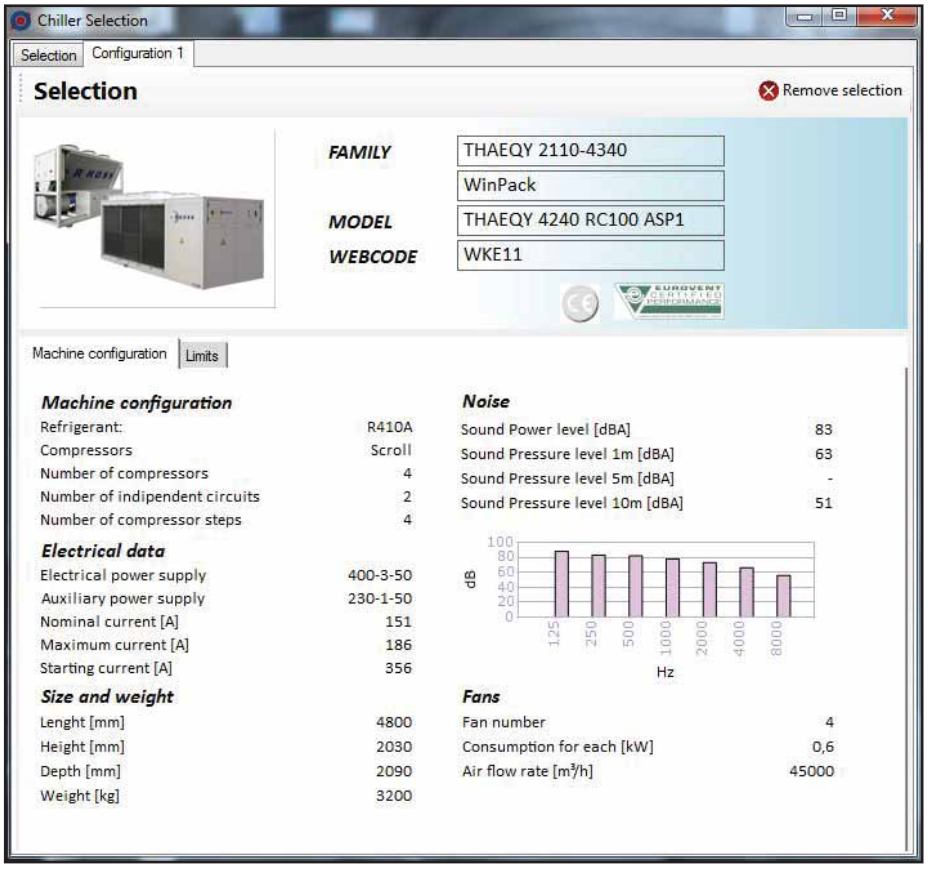
Perfomance

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

1. Unit performance data according to design conditions
   (a summary is also available in the section *"Technical Note Attachments"*);
2. Technical data of the selected unit, heat exchanger pressure drops and residual head if the unit is supplied with pumps;
3. Performance data of RC100 and DS heat recovery.



N	Model	PF [kW]	PF(14511) [kW]	PaF [kW]	Qe [m3/h]	pResE [kPa]	EER	EER (14511)	PT [kW]	PT(14511) [kW]
0	THAEQY 2110 RC100 ASP1	92	93.1	38.5	15.8	143	2.39	2.50	110	108.8
1	THAEQY 2120 RC100 ASP1	101	102.2	44.7	17.4	141	2.26	2.35	118	116.7
2	THAEQY 2140 RC100 ASP1	113	120.3	48	20.5	130	2.48	2.58	136	134.7
3	THAEQY 2150 RC100 ASP1	131	132.9	55.7	22.5	188	2.35	2.47	153	151
4	THAEQY 2170 RC100 ASP1	145	147	63.4	24.9	180	2.29	2.40	171	169
5	THAEQY 2200 RC100 ASP1	170	172.1	72.5	29.2	160	2.35	2.45	194	192
6	THAEQY 2220 RC100 ASP1	188	190.1	81.5	32.3	145	2.31	2.39	221	219.2
7	THAEQY 4240 RC100 ASP1	207	209.1	92.2	35.6	132	2.24	2.32	236	234.1
8	THAEQY 4270 RC100 ASP1	239	241.1	99.8	41.1	111	2.40	2.47	266	264.2
9	THAEQY 4310 RC100 ASP1	271	274.5	118.8	46.6	183	2.28	2.38	300	296.5



Sound power and pressure levels

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAEBY (single circuit)	**2110 (1)**	89	85	83	84	79	71	64	87	55,0	68,5
	2120 (1)	89	86	84	85	80	72	64	88	56,0	69,5
	2140 (1)	89	86	84	85	80	72	64	88	56,0	69,5
	2150 (1)	90	87	85	86	81	73	65	89	57,0	70,0
	2170 (1)	91	88	86	87	82	74	66	90	58,0	71,0
	2200 (1)	91	88	86	87	82	74	66	90	58,0	71,0
	2220 (1)	92	89	87	88	83	75	67	91	59,0	71,5

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAEBY (double circuit)	**4150 (1)**	90	87	85	86	81	73	65	89	57	70
	4170 (1)	90	87	85	86	81	73	65	89	57	70
	4200 (1)	90	87	85	86	81	73	65	89	57	70
	4220 (1)	91	88	86	87	82	74	66	90	58	70,5
	4240 (1)	93	90	88	89	84	76	68	92	60,0	72,5
	4270 (1)	93	90	88	89	84	76	68	92	60,0	72,5
	4310 (2)	93	92	91	87	82	77	70	92	60,0	72,5
	4340 (2)	94	93	92	88	83	78	71	93	61,0	73,0

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAESY (single circuit) (•)	**2110**	85	83	78	76	71	65	60	81	49,0	62,5
	2120	86	84	79	77	71	65	60	82	50,0	63,5
	2140	86	84	79	77	71	65	60	82	50,0	63,5
	2150	87	85	80	78	72	66	61	83	51,0	64,0
	2170	88	86	81	79	73	67	62	84	52,0	65,0
	2200	88	86	81	79	73	67	62	84	52,0	65,0
	2220	89	87	83	80	74	68	63	85	53,0	65,5

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAESY (double circuit) (• •)	**4150**	87	85	80	78	72	66	61	83	51	64
	4170	87	85	80	78	72	66	61	83	51	64
	4200	87	85	80	78	72	66	61	83	51	64
	4220	88	86	81	79	73	67	62	84	52	64,5
	4240	89	87	85	81	75	69	64	86	54,0	66,5
	4270	89	87	85	81	75	69	64	86	54,0	66,5
	4310	90	88	87	83	77	72	65	88	56,0	68,0
	4340	90	89	88	84	78	73	66	89	57,0	69,0

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	Sound pressure levels in dB(A).
(1)	If the BCI (Soundproof compressor box) accessory is supplied, the sound power decreases by 2 dB(A)
(2)	If the INS (Technical compartment soundproofing) accessory is supplied, the sound power decreases by 1 dB(A)

(•)	BCI Standard
(• •)	BCI60 Standard 4150÷4270 - INS Standard 4310÷4340

The CAC (Compressors aphonic ear muffs) accessory decreases the sound power by 1 dB(A).
It is only possible to install it on units equipped with the BCI-BCI60 - INS-INS60 accessory, when not already standard installed.

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. In brackets is the measurement distance in metres. It is not possible to extrapolate sound pressure values for distances less than 10 m. With outdoor air temperatures below 35°C, or in the presence of the FI10 accessory (standard in the S version), the machine decreases its noise to a value below the nominal value indicated in the table.

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
THAEBY (single circuit) (•)	**2110**	86	83	81	82	80	71	64	85	53,0	66,5
	2120	87	84	82	83	80	72	64	86	54,0	67,5
	2140	87	84	82	83	80	72	64	86	54,0	67,5
	2150	88	85	83	84	79	73	65	87	55,0	68,0
	2170	89	86	84	85	80	74	66	88	56,0	69,0
	2200	89	86	84	85	80	74	66	88	56,0	69,0
	2220	90	87	85	86	81	75	67	89	57,0	69,5

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
THAEBY (double circuit)	**4150 (2)**	89	85	85	82	76	70	63	86	54	67
	4170 (2)	89	85	85	82	76	70	63	86	54	67
	4200 (2)	89	88	87	83	78	73	65	88	56	69
	4220 (2)	89	88	87	83	78	73	65	88	56	69
	4240 (2)	91	90	89	85	80	75	67	90	58,0	70,0
	4270 (2)	93	92	91	87	82	77	70	92	60,0	72,0
	4310 (2)	93	92	91	87	82	77	70	92	60,0	72,0
	4340 (2)	94	93	92	88	83	78	71	93	61,0	73,0

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
THAESY (single circuit) (•)	**2110**	85	83	78	76	71	65	60	81	49,0	62,5
	2120	86	84	79	77	71	65	60	82	50,0	63,5
	2140	86	84	79	77	71	65	60	82	50,0	63,5
	2150	87	85	80	78	72	66	61	83	51,0	64,0
	2170	88	86	81	79	73	67	62	84	52,0	65,0
	2200	88	86	81	79	73	67	62	84	52,0	65,0
	2220	89	87	83	80	74	68	63	85	53,0	65,5

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
THAESY (double circuit) (• •)	**4150**	87	83	81	77	71	68	62	82	50	63
	4170	87	83	81	77	71	68	62	82	50	63
	4200	88	85	83	79	73	70	63	84	52	65
	4220	88	85	83	79	73	70	63	84	52	65
	4240	89	87	85	81	75	70	63	86	54,0	66,0
	4270	89	87	86	82	76	71	64	87	55,0	67,0
	4310	90	88	87	83	77	72	65	88	56,0	68,0
	4340	90	89	88	84	78	73	66	89	57,0	69,0

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	Sound pressure levels in dB(A).
(1)	If the BCI (Soundproof compressor box) accessory is supplied, the sound power decreases by 2 dB(A)
(2)	If the INS (Technical compartment soundproofing) accessory is supplied, the sound power decreases by 1 dB(A)

(•)	BCI Standard
(• •)	BCI60 Standard 4150÷4270 - INS Standard 4310÷4340

The CAC (Compressors aphonic ear muffs) accessory decreases the sound power by 1 dB(A).
It is only possible to install it on units equipped with the BCI-BCI60 - INS-INS60 accessory, when not already standard installed.

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. In brackets is the measurement distance in metres. It is not possible to extrapolate sound pressure values for distances less than 10 m. With outdoor air temperatures below 35°C, or in the presence of the FI10 accessory (standard in the S version), the machine decreases its noise to a value below the nominal value indicated in the table.

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAETY	**2110 (3)**	89	85	83	84	79	71	64	87	55,0	68,0
	2120 (3)	89	86	84	85	80	72	64	88	56,0	69,0
	2140 (3)	90	87	85	86	81	73	65	89	57,0	70,0
	2150 (3)	90	87	85	86	81	73	65	89	57,0	70,0
	2170 (3)	91	88	86	87	82	74	66	90	58,0	70,5
	2200 (3)	92	89	87	88	83	75	67	91	59,0	71,5
	2220 (3)	92	89	87	88	83	75	67	91	59,0	71,5
	4240 (4)	91	90	89	85	80	75	67	90	58,0	70,0
	4270 (4)	93	92	91	87	82	77	70	92	60,0	72,0
	4310 (4)	93	92	91	87	82	77	70	92	60,0	72,0
	4340 (4)	95	94	93	89	84	79	72	94	62,0	74,0

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
THAETY (•)	**2110 (5)**	86	83	81	82	80	71	64	85	53,0	66,0
	2120 (5)	87	84	82	83	80	72	64	86	54,0	67,0
	2140 (5)	88	85	83	84	79	73	65	87	55,0	68,0
	2150 (5)	88	85	83	84	79	73	65	87	55,0	68,0
	2170 (5)	89	86	84	85	80	74	66	88	56,0	68,5
	2200 (5)	90	86	84	85	80	74	66	89	57,0	69,5
	2220 (5)	90	87	85	86	81	75	67	89	57,0	69,5
	4240 (4)	91	90	89	85	80	75	67	90	58,0	70,0
	4270 (4)	93	92	91	87	82	77	70	92	60,0	72,0
	4310 (4)	93	92	91	87	82	77	70	92	60,0	72,0
	4340 (4)	95	94	93	89	84	79	72	94	62,0	74,0

Models		Sound power level in dB for octave bands								Sound pressure level in dB(A)	
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAEQY THAEQY (•••)	**2110**	83	81	77	75	68	63	58	79	47,0	60,0
	2120	83	81	77	75	68	63	58	79	47,0	60,0
	2140	84	82	78	76	69	64	59	80	48,0	61,0
	2150	84	82	78	76	69	64	59	80	48,0	61,0
	2170	86	83	79	77	69	64	59	81	49,0	61,5
	2200	87	84	81	77	70	65	59	82	50,0	62,5
	2220	87	84	81	77	70	65	59	82	50,0	62,5
	4240	88	83	82	78	73	66	56	83	51,0	63,0
	4270	89	85	84	80	75	67	57	85	53,0	65,0
	4310	89	85	84	80	75	67	57	85	53,0	65,0
	4340	89	87	85	81	75	70	63	86	54,0	66,0

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	Sound pressure levels in dB(A).
(3)	If the BCI or BCI60 accessories (Soundproof compressor box) accessories are supplied, the sound power decreases respectively by 2 dB(A) and 3 dB(A)
(4)	If the INS or INS60 (Technical compartment soundproofing) accessories are supplied, the sound power decreases respectively by 1 dB(A) and 2 dB(A)
(5)	If the BCI60 (Soundproof compressor box) accessory is supplied, the sound power decreases by 1 dB(A)

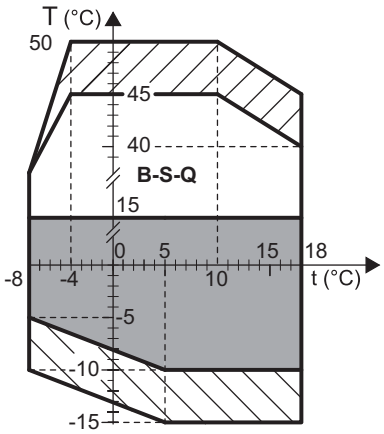
(•)	BCI Standard 2110÷2220
(••)	BCI60 Standard 2110÷2220 - INS60 Standard 4240÷4340

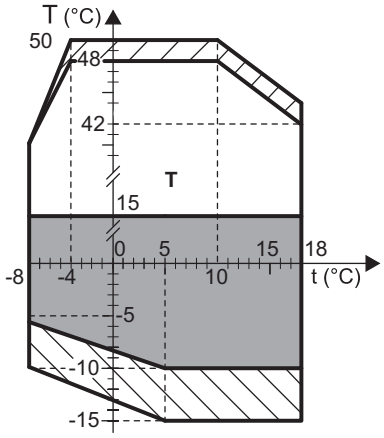
	The CAC (Compressors aphonic ear muffs) accessory decreases the sound power by 1 dB(A). It is only possible to install it on units equipped with the BCI-BCI60 - INS-INS60 accessory, when not already standard installed.

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. In brackets is the measurement distance in metres. It is not possible to extrapolate sound pressure values for distances less than 10 m. With outdoor air temperatures below 35°C, or in the presence of the FI10 accessory (standard in the S version), the machine decreases its noise to a value below the nominal value indicated in the table.

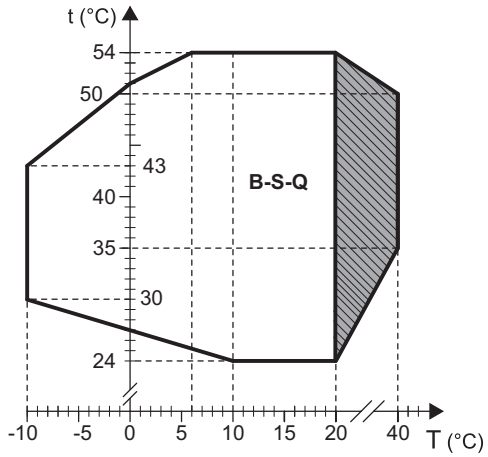
Functioning limits

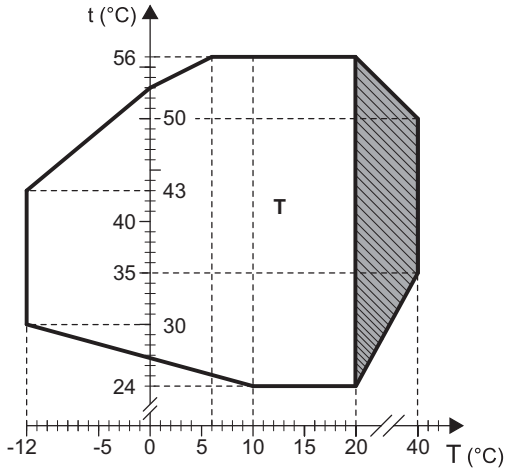
Summer mode





Winter mode





In summer mode:
Maximum water inlet temperature 23°C

- Minimum water pressure 0.5 Barg.
- Maximum water pressure: 10 Barg / 6 Barg with ASP

In winter mode:
Minimum water inlet temperature 18°C.
Maximum water inlet temperature 51°C

N.B.:
For t(°C), < 5°C (BT accessory) it is COMPULSORY to specify the unit's work temperature when ordering (inlet/outlet glycoled water evaporator) in order to enable its correct parametrisation. Condensing control FI10 or FI15, where not already carried out as standard, is also compulsory. Use antifreeze solutions: refer to "*Use of antifreeze solutions*

T (°C)	Outdoor air temperature (D.B.)
t (°C)	Temperature of the water produced
	Standard functioning.
	Summer operation with condensing control FI10 (as per standard in S version)
	Summer operation with condensing control FI15 (as per standard in Q version)
	Functioning with partialised cooling capacity
	Winter mode with FI10 or FI15 condensation control (FI10 standard in version S and FI15 standard in version Q)

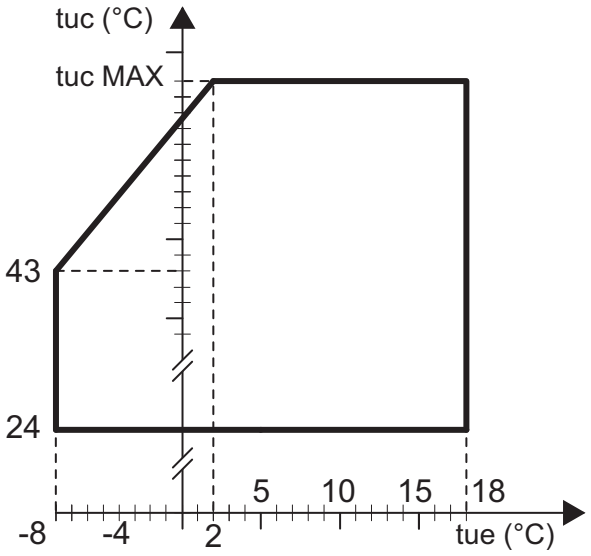
Model	2110÷4340	2110÷4340	2110÷4340	2110÷4340
Versions	**B**	**S**	**T**	**Q**
	Tmax = 45°C (1) (2)	Tmax = 42°C (1) (3)	Tmax = 48°C (1) (2)	Tmax = 40°C (1) (3)
	Tmax = 50°C (1) (4)	Tmax = 45°C (1) (2)	Tmax = 50°C (1) (4)	Tmax = 45°C (1) (2)
		Tmax = 50°C (1) (4)		Tmax = 50°C (1) (4)

(1)	Evaporator water temperature (IN/OUT) 12/7 °C
(2)	Maximum outdoor air temperature with unit in standard operation running on full
(3)	Maximum outdoor air temperature with unit in silenced mode
(4)	Maximum outdoor air temperature with unit in partialised cooling capacity

Operating limits with the Heat recovery accessory

The chiller and the heat pump can be fitted with the DS partial heat recovery accessory. In this case the operating limits are the same as those of the unit without accessory.

If the unit is fitted with the total heat recovery accessory RC100, the winter operating limit (heat pump) remains unchanged, whereas the summer operating limit is as follows when the recovery is activated:



tue (°C)	Evaporator chilled outlet water temperature.
tuc (°C)	Hot water temperature leaving the recovery unit

RC100:
- The minimum water inlet tuc temperature (°C) allowed is 20°C
- tuc MAX 54°C B-S versions
- tuc MAC 56°C T-Q versions

DS:
- Temperature of hot water produced is 50 to 70°C with a water temperature differential allowed 5 to 10 K
- The minimum water inlet tuc temperature (°C) allowed is 40°C

Note: If the inlet temperature to the recovery unit is lower than the permitted values, it is recommended to use a three-way modulating valve to guarantee the minimum water temperature required.

For tue(°C), < 5°C (accessorio BT) it is COMPULSORY to specify the unit's operating temperature when placing the order (evaporator glycol water inlet/outlet) in order to allow for its correct parametrisation. Condensing control FI10 or FI15, where not already carried out as standard, is also compulsory. Use antifreeze solutions: refer to "*Use of antifreeze solutions*"

Permitted temperature differentials through the heat exchangers

○ Evaporator temperature differential ΔT = 3 ÷ 8°C with “Standard” set-ups. However, consider the minimum and maximum flow rates reported in the tables *“Water flow rate limits”*. The maximum and minimum temperature differentials for “Pump” and “Tank&Pump” set-ups are related to the performance of the pumps, which must always be checked by means of the **RHOSS** S.p.a. selection software.

Evaporator water flow rate limits

Type of heat exchanger		Plates		Tube and shell (STE accessory)	
Version B-S		Min	Max	Min	Max
2110	m^3/h	11	33	12	27
2120	m^3/h	11	33	12	27
2140	m^3/h	11,5	37	12	27
2150	m^3/h	13	43	18	38
2170	m^3/h	14,5	48	18	38
2200	m^3/h	16	54	20	43
2220	m^3/h	18	62	20	43
4150	m^3/h	15	60	TCAEY 13 | THAEY 11	TCAEY 32 | THAEY 28
4170	m^3/h	21	60	TCAEY 19 | THAEY 15	TCAEY 48 | THAEY 38
4200	m^3/h	21	60	TCAEY 19 | THAEY 15	TCAEY 48 | THAEY 38
4220	m^3/h	24	60	TCAEY 19 | THAEY 18	TCAEY 48 | THAEY 44
4240	m^3/h	24	74	28	63
4270	m^3/h	24	74	28	63
4310	m^3/h	26	95	28	63
4340	m^3/h	26	95	36	95

Type of heat exchanger		Plates		Tube and shell (STE accessory)	
Version T-Q		Min	Max	Min	Max
2110	m^3/h	11,5	37	12	25
2120	m^3/h	13	43	12	25
2140	m^3/h	14,5	48	18	38
2150	m^3/h	16	54	18	38
2170	m^3/h	18	62	20	43
2200	m^3/h	21	63	20	43
2220	m^3/h	23	64	23	63
4240	m^3/h	26	95	28	63
4270	m^3/h	31	95	28	63
4310	m^3/h	31	95	36	95
4340	m^3/h	37	100	36	95

Recovery water flow rate limits

Type of heat exchanger		RC100	
Versions B-S		Min	Max
2110	m^3/h	11	33
2120	m^3/h	11	33
2140	m^3/h	11,5	37
2150	m^3/h	13	43
2170	m^3/h	14,5	48
2200	m^3/h	16	54
2220	m^3/h	18	62
4150	m^3/h	15	60
4170	m^3/h	21	60
4200	m^3/h	21	60
4220	m^3/h	24	60
4240	m^3/h	24	74
4270	m^3/h	24	74
4310	m^3/h	26	95
4340	m^3/h	26	95

Type of heat exchanger		RC100	
Versions T-Q		Min	Max
2110	m^3/h	11,5	37
2120	m^3/h	13	43
2140	m^3/h	14,5	48
2150	m^3/h	16	54
2170	m^3/h	18	62
2200	m^3/h	21	63
2220	m^3/h	23	64
4240	m^3/h	26	95
4270	m^3/h	31	95
4310	m^3/h	31	95
4340	m^3/h	37	100

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 The addition of 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 air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5°C.

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

◦ The resistance of the water side primary and secondary heat exchanger (RA accessory), the storage tank (RAS accessory) and the electric pump unit (RAE-RAR accessory), prevents undesired effects due to freezing during the operating breaks in winter (provided the unit remains powered).

Attention:

• Besides the 20% glycol, check the pump absorption limits (in versions P1/PR1-P2/PR2, DP1/DPR1-DP2/DPR2, ASP1-ASP2, ASDP1-ASDP2).

Table "H"

Design air temperature in °C	2	0	-3	-6	-10	-15	-20
% glycol in weight	10	15	20	25	30	35	40
Freezing temperature °C	-5	-7	-10	-13	-16	-20	-25
fc G	1.025	1.039	1.054	1.072	1.093	1.116	1.140
fc Δpw	1.085	1.128	1.191	1.255	1.319	1.383	1.468
fc QF	0.975	0.967	0.963	0.956	0.948	0.944	0.937
fc P	0.993	0.991	0.990	0.988	0.986	0.983	0.981

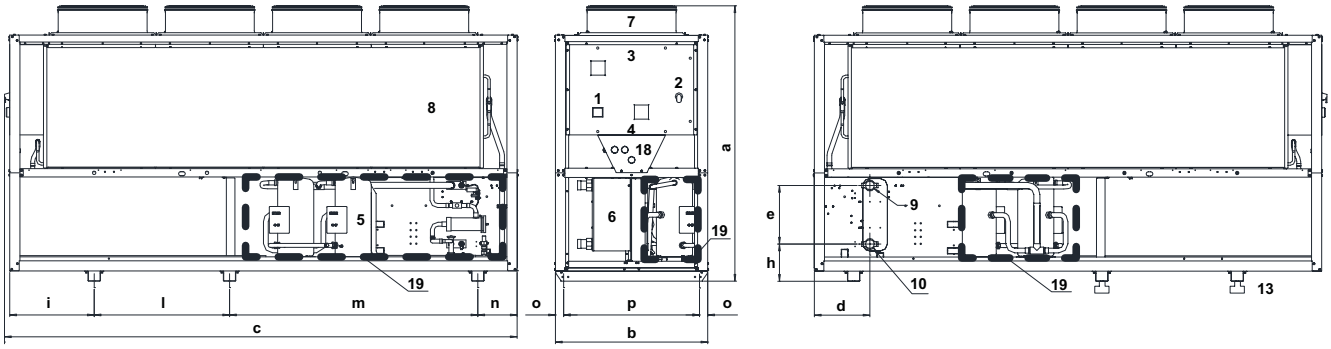
fc G	Correction factor of the glycol water flow to the evaporator
fc Δpw	Correction factor of the pressure drops in the evaporator
fc QF	Cooling capacity correction factor
fc P	Correction factor for the total absorbed electrical current

Use of anti-freeze solutions with the BT accessory

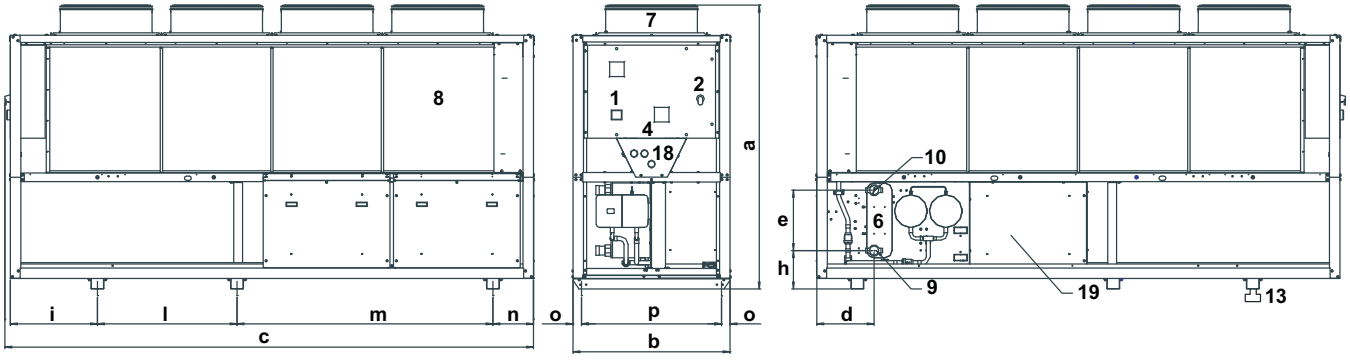
The table provides the percentage of ethylene/propylene glycol to be used in units with the BT accessory, according to the temperature of the chilled water produced. Use the RHOSS *UpToDate* Software for unit performance.

Evaporator glycol water outlet temperature	Minimum % glycol in weight	Minimum % glycol in weight
From -7,1°C a -8°C	33	34
From -6,1°C to -7°C	32	33
From -5,1°C to -6°C	30	32
From -4,1°C to -5°C	28	30
From -3,1°C to -4°C	26	28
From -2,1°C to -3°C	24	26
From -1,1°C to -2°C	22	24
From -0,1°C to -1°C	20	22
From 0,9°C a 0°C	20	20
From 1,9°C to 1°C	18	18
From 2,9°C a 2°C	15	15
From 3,9°C to 3°C	12	12
From 4,9°C to 4°C	10	10

Dimensions and volume TCAEBY - TCAESY 2150-2220 (models with a plate evaporator)



Dimensions and volume THAEBY - THAESY 2150-2220 (models with a plate evaporator)

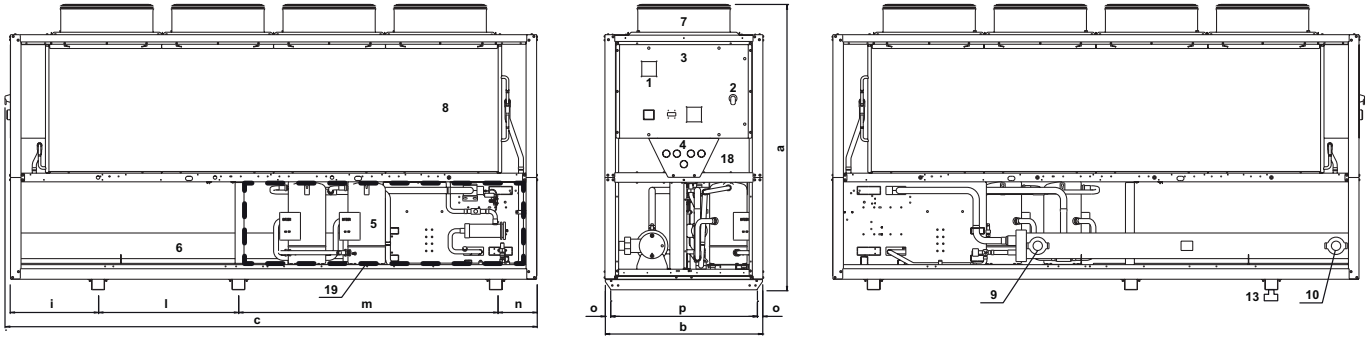


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (RPB accessory);
16. Water inlet recovery (DS-RC100 accessory);
17. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.
19. BCI accessory (standard with S versions and heat pumps)

Model		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
a (*)	mm	2440	2440	2440	2440	2440	2440	2440
b	mm	1350	1350	1350	1350	1350	1350	1350
c	mm	2650	2650	2650	3600	3600	3600	4550
d	mm	493	493	493	493	493	493	493
e	mm	519	519	519	519	519	519	519
f	mm	-	-	-	-	-	-	-
g	mm	-	-	-	-	-	-	-
h	mm	330	330	330	330	330	330	330
i	mm	399	399	399	424	424	424	349
l	mm	1800	1800	1800	2700	2700	2700	1200
m	mm	-	-	-	-	-	-	2200
n	mm	399	399	399	424	424	424	349
o	mm	73	73	73	73	73	73	73
p	mm	1204	1204	1204	1204	1204	1204	1204
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic”	2”½ vic	2”½ vic	2”½ vic	2”½ vic

(*) Attention:
With the FIAP accessory, add 70mm

Dimensions and volume TCAEBY - TCAESY THAEBY - THAESY 2150-2220 (models with tube and shell evaporator - single circuit)



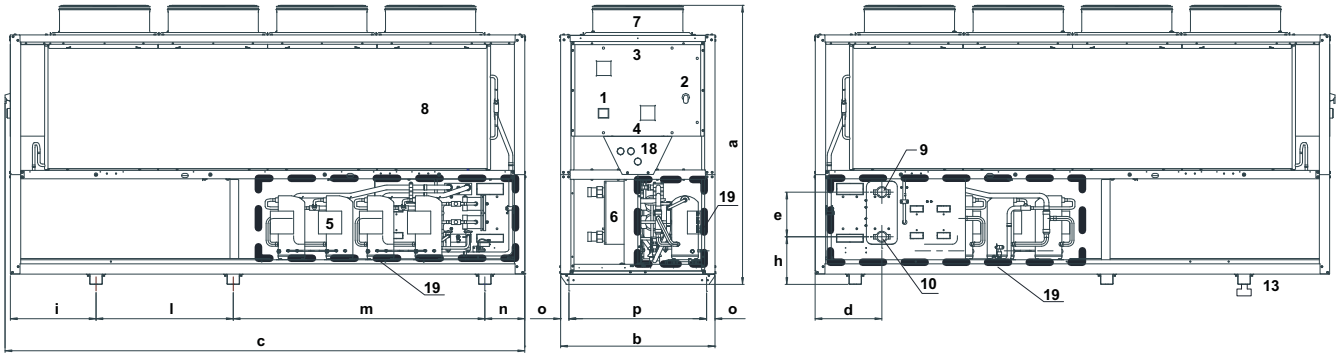
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Tube and shell evaporator (STE);
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Anti-vibration mounts (SAG/SAM accessory);
12. Power supply inlet.
13. BCI accessory (standard with S versions and heat pumps)

Model		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
a (*)	mm	2440	2440	2440	2440	2440	2440	2440
b	mm	1350	1350	1350	1350	1350	1350	1350
c	mm	2650	2650	2650	3600	3600	3600	4550
d	mm	-	-	-	-	-	-	-
e	mm	-	-	-	-	-	-	-
f	mm	-	-	-	-	-	-	-
g	mm	-	-	-	-	-	-	-
h	mm	-	-	-	-	-	-	-
i	mm	399	399	399	424	424	424	349
l	mm	1800	1800	1800	2700	2700	2700	1200
m	mm	-	-	-	-	-	-	2200
n	mm	399	399	399	424	424	424	349
o	mm	73	73	73	73	73	73	73
p	mm	1204	1204	1204	1204	1204	1204	1204
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic”	2”½ vic	2”½ vic	2”½ vic	2”½ vic

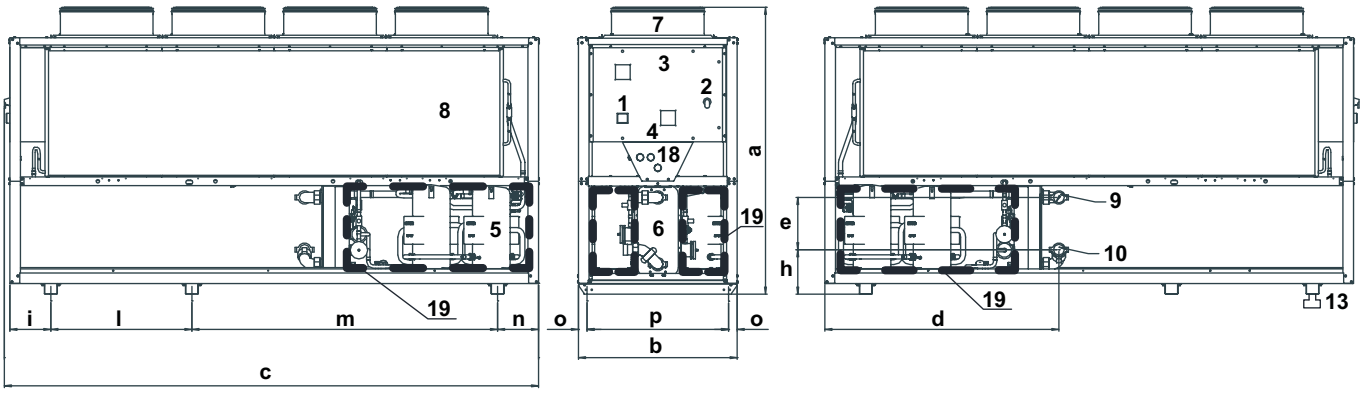
(*) Attention:
With the FIAP accessory, add 70mm

Dimensions and volume TCAEBY - TCAESY (models with a plate evaporator - double circuit)

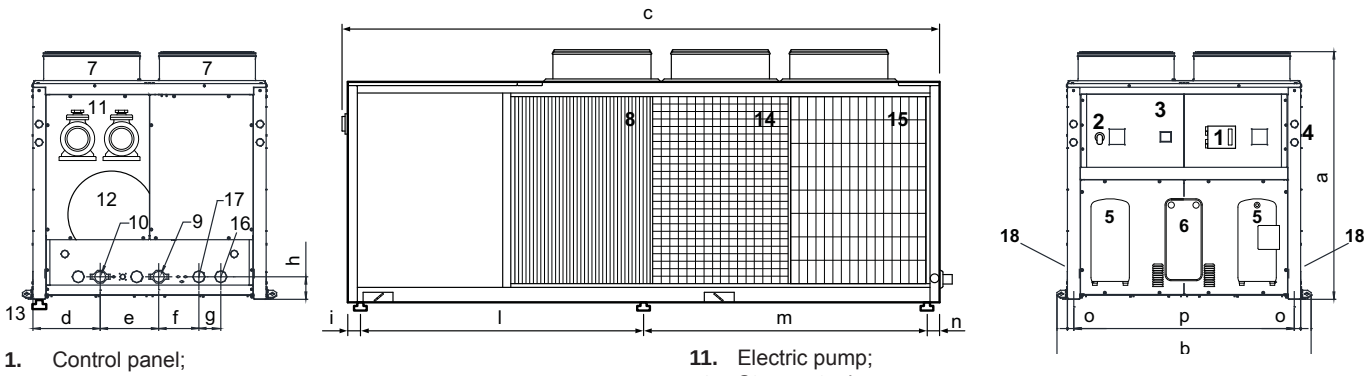
4150÷4220



4240÷4270



4310÷4340

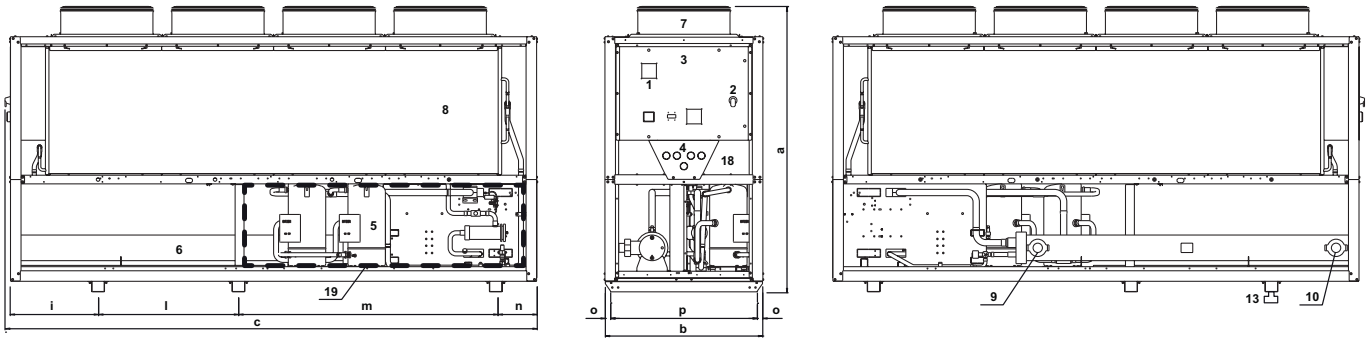


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (RPB accessory);
16. Water inlet recovery (DS-RC100 accessory);
17. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.
19. BCI accessory (standard with S versions)

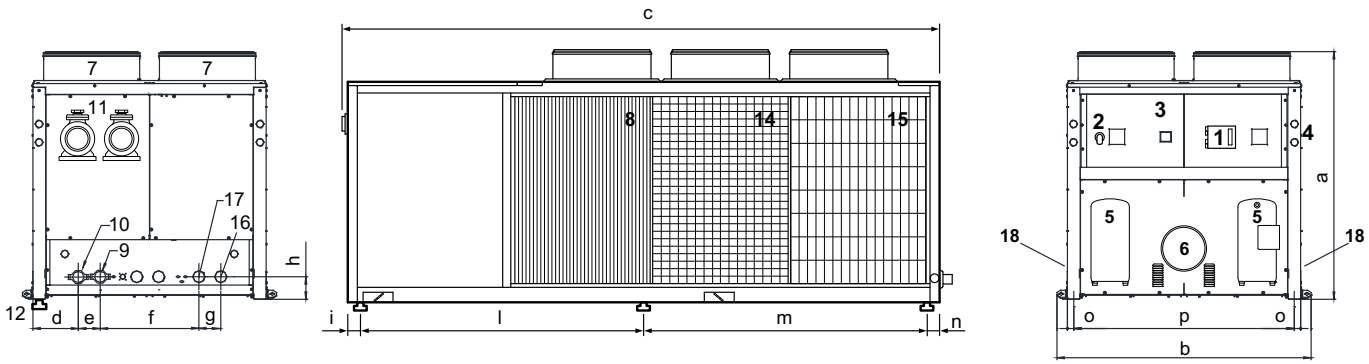
Model		4150	4170	4200	4220	4240	4270	4310	4340
a (*)	mm	2440	2440	2440	2440	2440	2440	2030	2030
b	mm	1350	1350	1350	1350	1350	1350	2090	2090
c	mm	3600	3600	3600	4550	4550	4550	4800	4800
d	mm	584	584	584	584	1991	1991	552	552
e	mm	390	390	390	390	445	445	480	480
f	mm	-	-	-	-	-	-	330	330
g	mm	-	-	-	-	-	-	180	180
h	mm	417	417	417	417	378	378	185	185
i	mm	424	424	424	749	349	349	153	153
l	mm	2700	2700	2700	1200	1200	1200	2223	2223
m	mm	-	-	-	2200	2600	2600	2223	2223
n	mm	424	424	424	349	349	349	154	154
o	mm	73	73	73	73	73	73	52	52
p	mm	1204	1204	1204	1204	1204	1204	1810	1810
Heat exchanger inlet/outlet connections	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3"vic	3"vic	3" vic	3" vic

Dimensions and volume TCAEBY - TCAESY (models with tube and shell evaporator - double circuit)

4150÷4270



4310÷4340



1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Tube and shell evaporator (STE);
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (RPB accessory);
16. Water inlet recovery (DS-RC100 accessory);
17. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.
19. BCI accessory (standard with S versions)

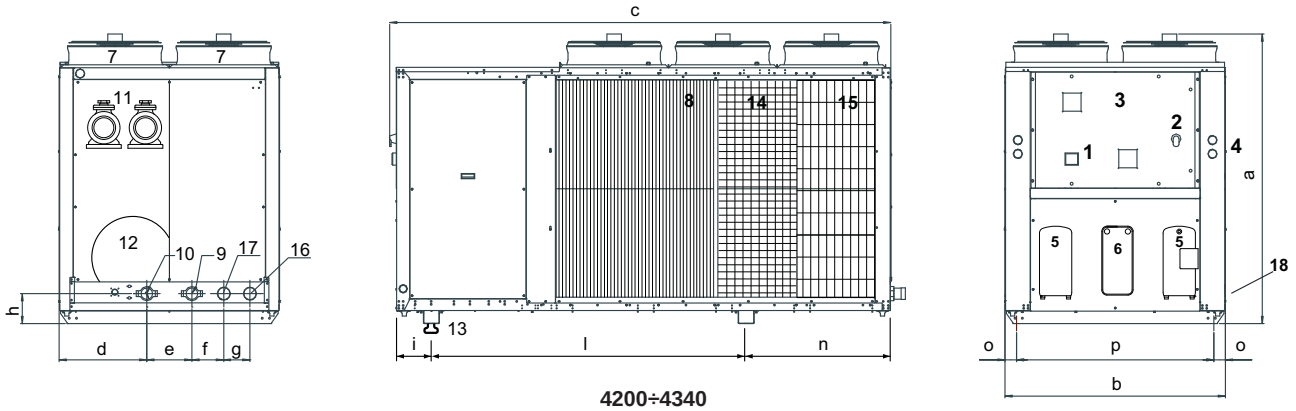
Model		4150	4170	4200	4220	4240	4270	4310	4340
a (*)	mm	2440	2440	2440	2440	2440	2440	2030	2030
b	mm	1350	1350	1350	1350	1350	1350	2090	2090
c	mm	3600	3600	3600	4550	4550	4550	4800	4800
d	mm	-	-	-	-	-	-	372	372
e	mm	-	-	-	-	-	-	180	180
f	mm	-	-	-	-	-	-	810	810
g	mm	-	-	-	-	-	-	180	180
h	mm	417	417	417	417	378	378	185	185
i	mm	424	424	424	749	349	349	153	153
l	mm	2700	2700	2700	1200	1200	1200	2223	2223
m	mm	-	-	-	2200	2600	2600	2223	2223
n	mm	424	424	424	349	349	349	154	154
o	mm	73	73	73	73	73	73	52	52
p	mm	1204	1204	1204	1204	1204	1204	1810	1810
Heat exchanger inlet/outlet connections	Ø	2"½ vic	2"½ vic	2"½ vic	2"½ vic	3"vic	3"vic	3" vic	3" vic

(*) Attention: With the FIAP accessory, add 70mm

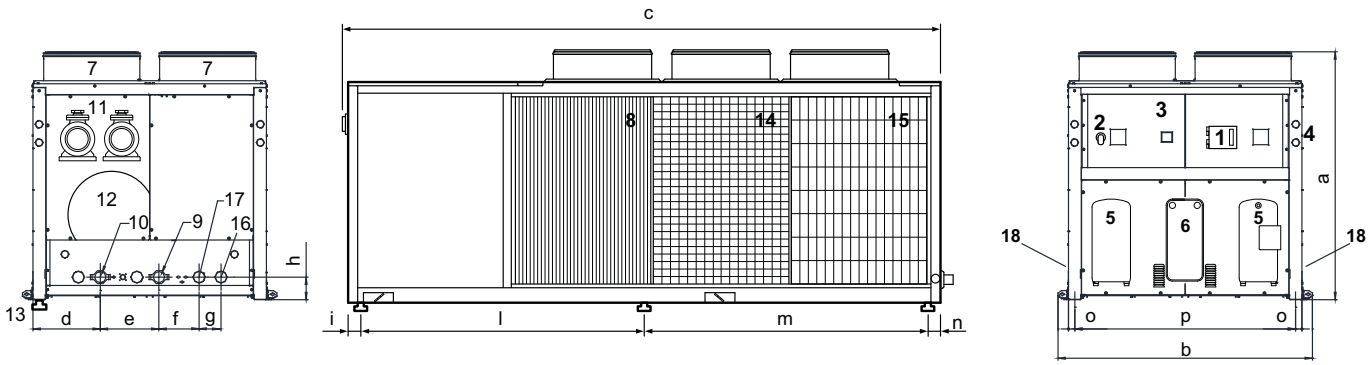
Note: Contact Rhoss S.p.A. for the sizing of the units, with V-shaped coils, fitted with STE (Shell&Tube Evaporator), Pump, Tank&Pump and heat recovery units.

Dimensions and volume THAEBY - THAESY (models with a plate evaporator - double circuit)

4150÷4170



4200÷4340



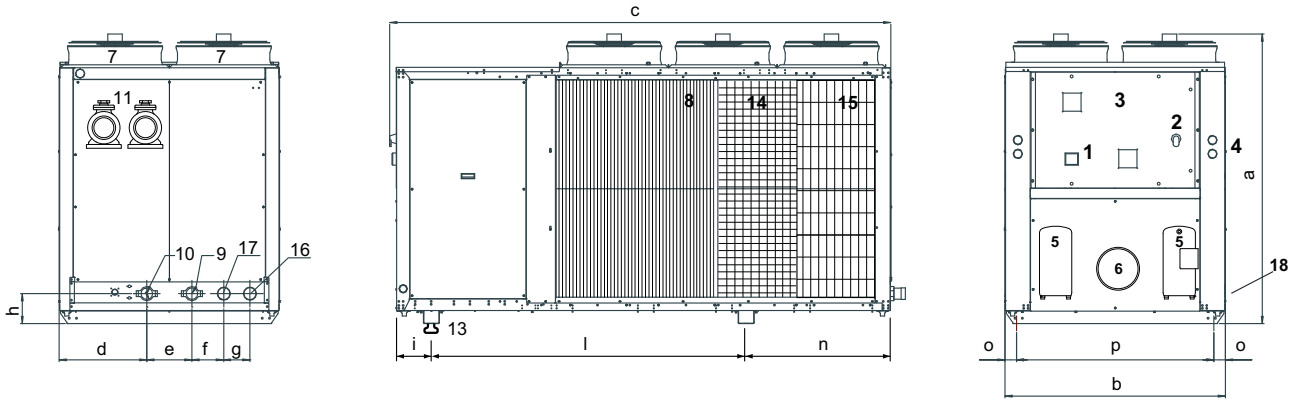
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (accessory RPB).
16. Water inlet recovery (accessory DS-RC100)
17. Exit recovery water (accessory DS-RC100)
18. Power supply inlet.

Model		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
a (*)	mm	2000	2000	2030	2030	2030	2030	2030	2030
b	mm	1520	1520	2090	2090	2090	2090	2090	2090
c	mm	3450	3450	3700	3700	4800	4800	4800	4800
d	mm	605	605	552	552	552	552	552	552
e	mm	311	311	480	480	480	480	480	480
f	mm	220	220	330	330	330	330	330	330
g	mm	180	180	180	180	180	180	180	180
h	mm	207	207	185	185	185	185	185	185
i	mm	243	243	153	153	153	153	153	153
l	mm	2170	2170	1673	1673	2223	2223	2223	2223
m	mm	-	-	1673	1673	2223	2223	2223	2223
n	mm	998	998	153	153	154	154	154	154
o	mm	80	80	52	52	52	52	52	52
p	mm	1360	1360	1810	1810	1810	1810	1810	1810
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic	2”½ vic	3”vic	3”vic	3” vic	3” vic

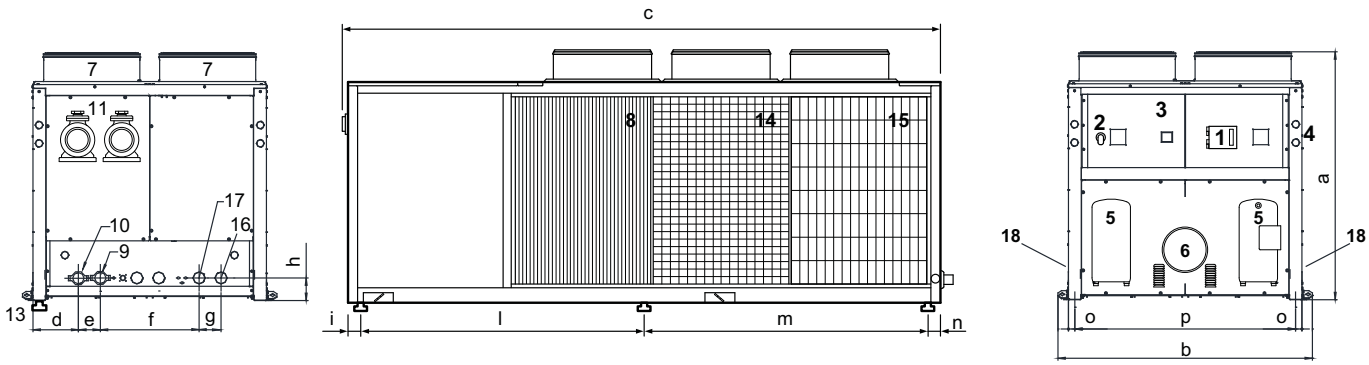
(*) Attention:
With the FIAP accessory, add 70mm

Dimensions and volume THAEBY - THAESY (models with tube and shell evaporator - double circuit)

4150÷4170



4200÷4340



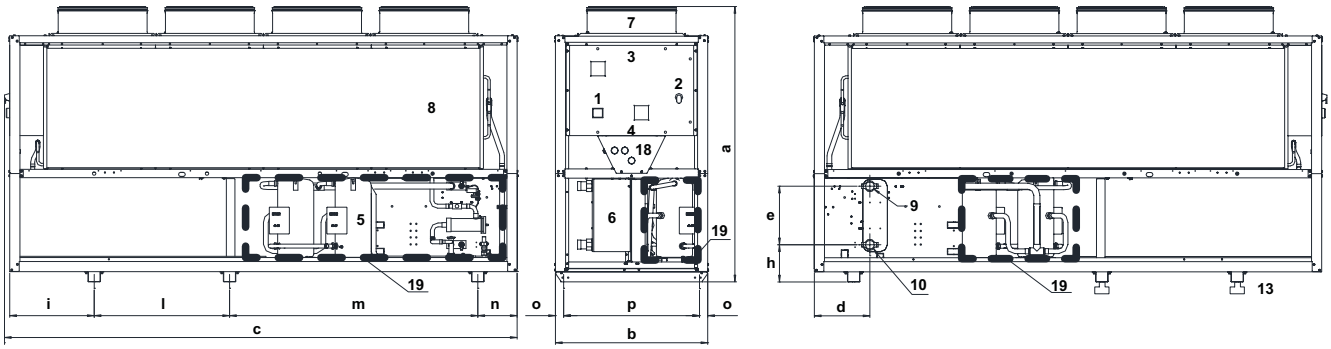
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (accessory RPB).
16. Water inlet recovery (accessory DS-RC100)
17. Exit recovery water (accessory DS-RC100)
18. Power supply inlet.

Model		**4150**	**4170**	**4200**	**4220**	**4240**	**4270**	**4310**	**4340**
a (*)	mm	2000	2000	2030	2030	2030	2030	2030	2030
b	mm	1520	1520	2090	2090	2090	2090	2090	2090
c	mm	3450	3450	3700	3700	4800	4800	4800	4800
d	mm	205	205	372	372	372	372	372	372
e	mm	200	200	180	180	180	180	180	180
f	mm	731	731	810	810	810	810	810	810
g	mm	180	180	180	180	180	180	180	180
h	mm	207	207	185	185	185	185	185	185
i	mm	243	243	153	153	153	153	153	153
l	mm	2170	2170	1673	1673	2223	2223	2223	2223
m	mm	-	-	1673	1673	2223	2223	2223	2223
n	mm	998	998	153	153	154	154	154	154
o	mm	80	80	52	52	52	52	52	52
p	mm	1360	1360	1810	1810	1810	1810	1810	1810
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic	2”½ vic	3”vic	3”vic	3” vic	3” vic

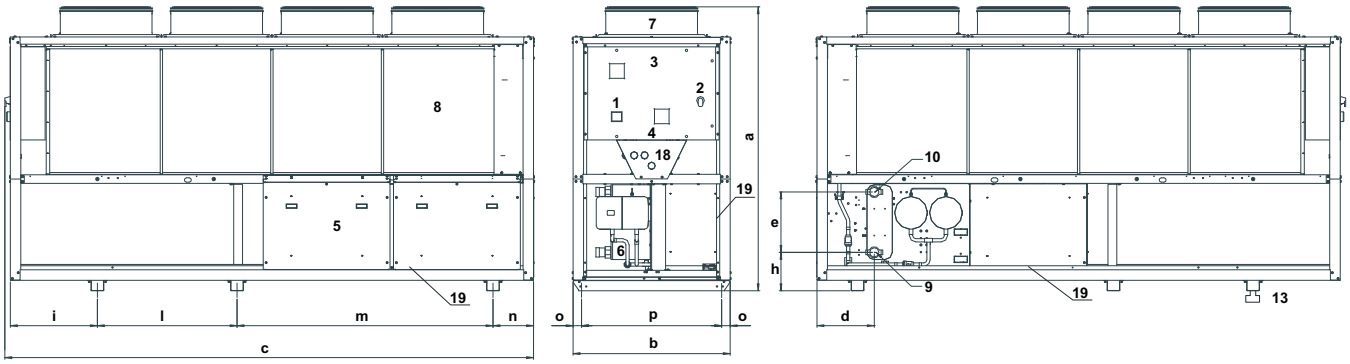
(*) Attention:
With the FIAP accessory, add 70mm

Dimensions and volume

Dimensions and volume TCAETY - TCAEQY 2150-2220 (models with a plate evaporator)



Dimensions and volume THAETY - THAEQY 2150-2220 (models with a plate evaporator)



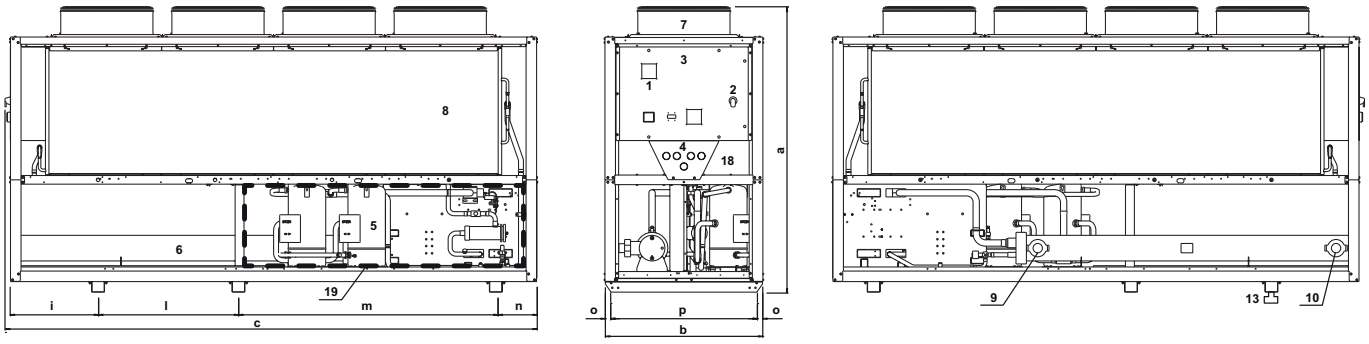
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (RPB accessory);
16. Water inlet recovery (DS-RC100 accessory);
17. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.
19. BCI accessory (default in THAETY models) and BCI60 (standard with TCAEQY-THAEQY series)

Model		2110	2120	2140	2150	2170	2200	2220
a (*)	mm	2440	2440	2440	2440	2440	2440	2440
b	mm	1350	1350	1350	1350	1350	1350	1350
c	mm	3600	3600	3600	3600	4550	4550	4550
d	mm	493	493	493	493	493	493	493
e	mm	519	519	519	519	519	519	519
f	mm	-	-	-	-	-	-	-
g	mm	-	-	-	-	-	-	-
h	mm	330	330	330	330	330	330	330
i	mm	424	424	424	424	749	749	749
l	mm	2700	2700	2700	2700	1200	1200	1200
m	mm	-	-	-	-	2200	2200	2200
n	mm	424	424	424	424	349	349	349
o	mm	73	73	73	73	73	73	73
p	mm	1204	1204	1204	1204	1204	1204	1204
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic”	2”½ vic	2”½ vic	2”½ vic	2”½ vic

(*) Attention: With the FIAP accessory, add 70mm

Note: Contact Rhoss S.p.A. for the sizing of the units, with V-shaped coils, fitted with STE (Shell&Tube Evaporator), Pump, Tank&Pump and heat recovery units.

Dimensions and volume TCAETY-TCAEQY THAETY-THAEQY 2150-2220 (models with tube and shell evaporator - single circuit)



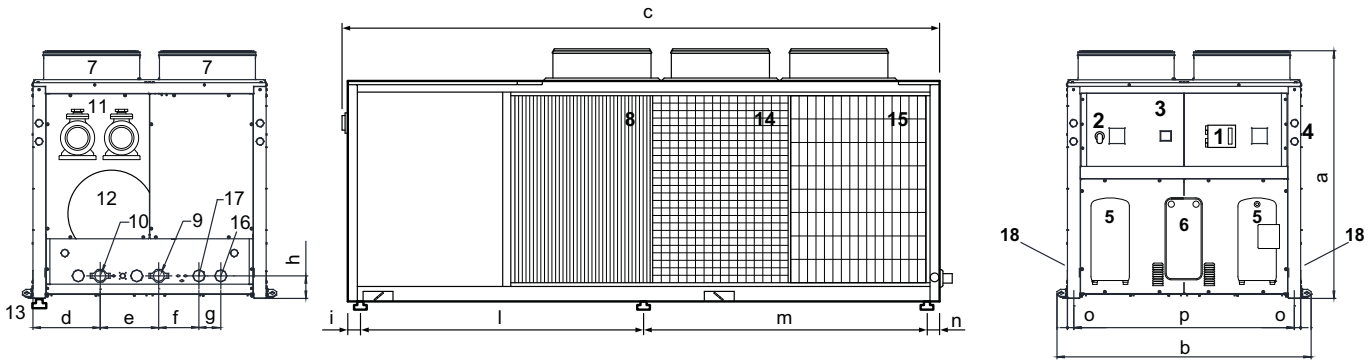
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Tube and shell evaporator (STE);
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Storage tank;
13. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.
19. BCI accessory (standard with THAETY)
BCI60 accessory (standard with TCAEQY-THAEQY)

Model		**2110**	**2120**	**2140**	**2150**	**2170**	**2200**	**2220**
a (*)	mm	2440	2440	2440	2440	2440	2440	2440
b	mm	1350	1350	1350	1350	1350	1350	1350
c	mm	3600	3600	3600	3600	4550	4550	4550
d	mm	493	493	493	493	493	493	493
e	mm	519	519	519	519	519	519	519
f	mm	-	-	-	-	-	-	-
g	mm	-	-	-	-	-	-	-
h	mm	330	330	330	330	330	330	330
i	mm	424	424	424	424	749	749	749
l	mm	2700	2700	2700	2700	1200	1200	1200
m	mm	-	-	-	-	2200	2200	2200
n	mm	424	424	424	424	349	349	349
o	mm	73	73	73	73	73	73	73
p	mm	1204	1204	1204	1204	1204	1204	1204
Heat exchanger inlet/ outlet connections	Ø	2”½ vic	2”½ vic	2”½ vic”	2”½ vic	2”½ vic	2”½ vic	2”½ vic

(*) Attention: With the FIAP accessory, add 70mm

Note: Contact Rhoss S.p.A. for the sizing of the units, with V-shaped coils, fitted with STE (Shell&Tube Evaporator), Pump, Tank&Pump and heat recovery units.

Dimensions and volume TCAETY - TCAEQY - THAETY - THAEQY 4240÷4340 (models with a plate evaporator - double circuit)

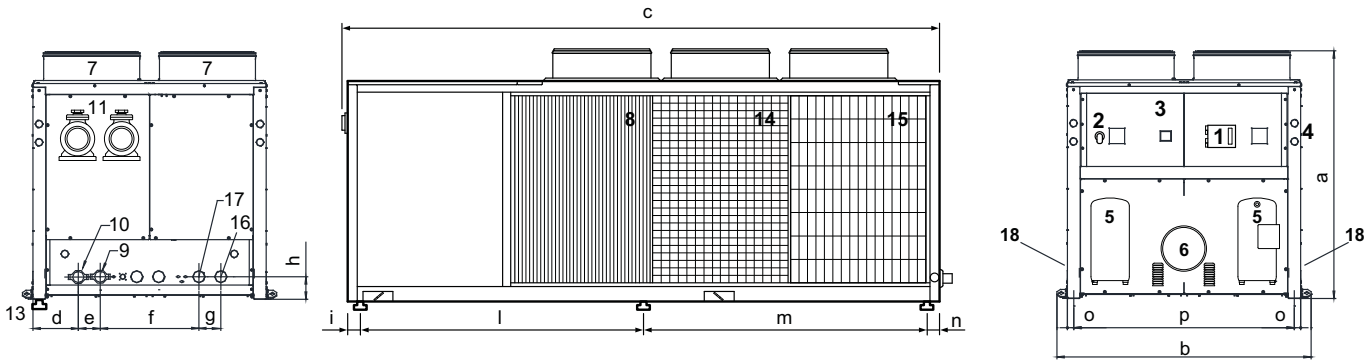


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (accessory RPB).
16. Water inlet recovery (accessory DS-RC100)
17. Exit recovery water (accessory DS-RC100)
18. Power supply inlet;

Model		4240	4270	4310	4340
a (*)	mm	2030	2030	2030	2030
b	mm	2090	2090	2090	2090
c	mm	4800	4800	5300	5300
d	mm	552	552	552	552
e	mm	480	480	481	481
f	mm	330	330	329	329
g	mm	180	180	180	180
h	mm	185	185	185	185
i	mm	153	153	154	154
l	mm	2223	2223	2473	2473
m	mm	2223	2223	2473	2473
n	mm	154	154	153	153
o	mm	52	52	52	52
p	mm	1810	1810	1810	1810
Heat exchanger inlet/ outlet connections	Ø	3” vic	3” vic	3”vic	3”vic

(*) Attention: With the FIAP accessory, add 70mm

Dimensions and volume TCAETY - TCAEQY - THAETY - THAEQY 4240÷4340 (models with tube and shell evaporator - double circuit)



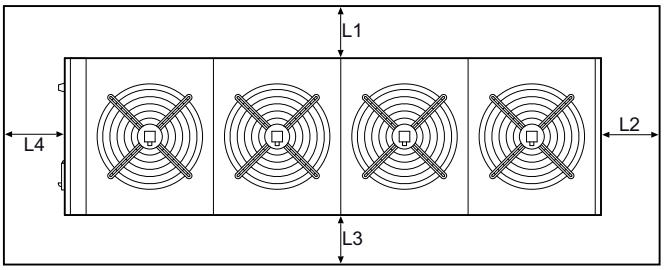
1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Tube and shell evaporator (STE);
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
13. Anti-vibration mounts (SAG/SAM accessory);
14. Metal filter (FMB accessory);
15. Coil protection mesh (RPB accessory);
16. Water inlet recovery (DS-RC100 accessory);
17. Exit recovery water (DS-RC100 accessory);
18. Power supply inlet.

Model		**4240**	**4270**	**4310**	**4340**
a (*)	mm	2030	2030	2030	2030
b	mm	2090	2090	2090	2090
c	mm	4800	4800	5300	5300
d	mm	372	372	372	372
e	mm	180	180	180	180
f	mm	810	810	810	810
g	mm	180	180	180	180
h	mm	185	185	185	185
i	mm	153	153	154	154
l	mm	2223	2223	2473	2473
m	mm	2223	2223	2473	2473
n	mm	154	154	153	153
o	mm	52	52	52	52
p	mm	1810	1810	1810	1810
Heat exchanger inlet/ outlet connections	Ø	3” vic	3” vic	3”vic	3”vic

(*) Attention: With the FIAP accessory, add 70mm

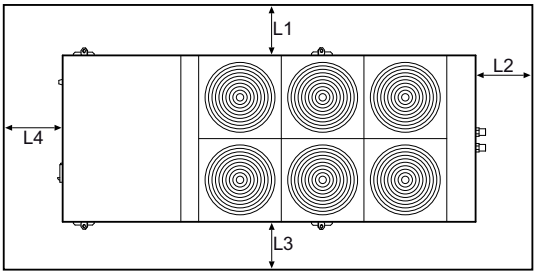
Clearance and positioning WinPACK SE and WinPACK HE-A

TCAEBY-TCAESY 2110÷2220 (single circuit)
TCAEBY-TCAESY 4150÷4270 (double circuit)
THAEBY-THAESY 2110÷2220 (single circuit)
TCAETY-TCAEQY 2110÷2220 (single circuit)
THAETY-THAEQY 2110÷2220 (single circuit)



L1	mm	1500
L2	mm	1500
L3	mm	1500
L4	mm	1500

TCAEBY-TCAESY 4310÷4340 (double circuit)
THAEBY-THAESY 4150÷4340 (double circuit)
TCAETY-TCAEQY 4240÷4340 (double circuit)
THAETY-THAEQY 4240÷4340 (double circuit)

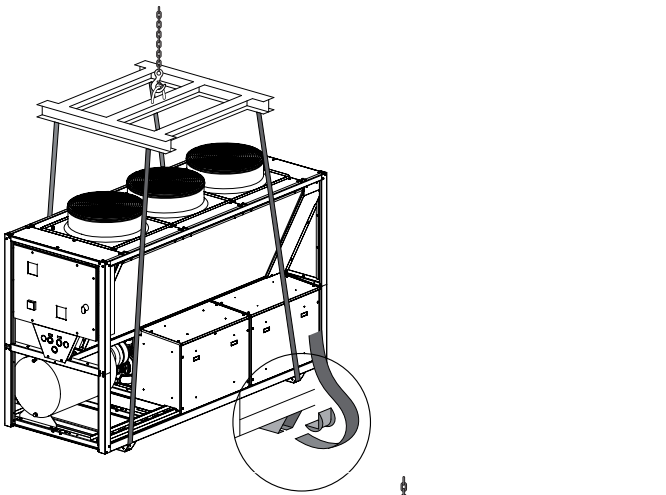


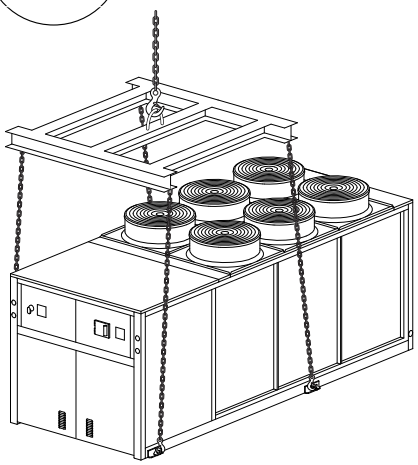
L1	mm	2000
L2	mm	2000
L3	mm	2000
L4	mm	1500

Nota bene: L2 is the minimum distance to remove the pumping unit and the relative storage tank.
If the accessory is not present, the distance can be reduced.

Handling and storage

○ 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÷50°C.
○ The position of the lifting belts must be checked according to the model and accessories installed.
○ During lifting and handling, make sure that the unit is horizontal at all times.



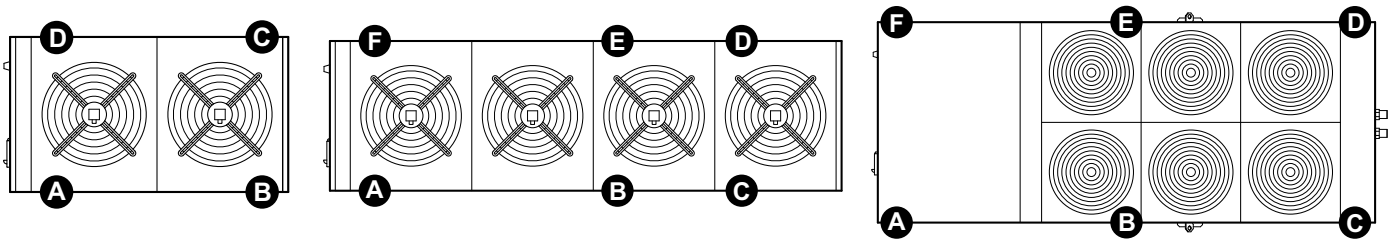


Installation and connection to the system

○ The unit is designed for outdoor installation.
○ The unit is fitted with Victaulic type hydraulic connections on the air conditioning system water inlet and outlet. It is also fitted with carbon steel fittings for welding.
○ Segregate the units if installed in areas accessible to persons under 14 years of age.
○ 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 mounts upon request (SAG/SAM).
○ Shut-off valves must be installed that isolate the unit from the rest of the system. Elastic connection joints and system/machine drain taps also need to be fitted.
○ It is mandatory to install a square metal mesh filter (longest side = 0.8 mm) of adequate size and pressure drops on the unit return pipes.
○ However it is installed, the coil inlet air temperature (ambient air) must remain within the set limits.
○ The water flow through the heat exchanger must not go below the value corresponding to a temperature differential of 8°C (with all compressors on, and must, in any case, comply with the limit values reported in the section Operation limits).
○ 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.
○ 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”).
○ The expansion tank is sized to contain the machine water only. The size of an additional expansion tank must be calculated by the installer depending on the system. In the case of models without a pump, the pump must be installed with a flow towards the machine water inlet.

N.B.:
The space above the unit must be free from obstacles. If the unit is completely surrounded by walls, the distances specified are still valid, provided that at least two adjacent walls are not higher than the unit itself.
There must be a minimum gap of at least 3.5m between the top of the unit and any obstacles above it.
If more than one unit is installed, the minimum distance between the finned coils should be at least 2 m.

Weight distribution (models with a plate evaporator)



TCAEBY-TCAESY 2110÷4270

Weight		2110	2120	2140	2150	2170	2200	2220	4150	4170	4200	4220	4240	4270
(*)	Kg	1110	1120	1130	1280	1300	1300	1460	1300	1320	1325	1470	1830	1850
Support														
A	Kg	377	405	409	390	396	392	249	401	401	402	242	96	96
B	Kg	311	300	303	401	408	409	305	432	439	442	313	286	289
C	Kg	194	174	176	270	274	277	331	272	281	283	358	535	542
D	Kg	228	241	243	219	223	222	244	195	198	198	257	527	534
E	Kg	-	-	-	-	-	-	195	-	-	-	187	284	287
F	Kg	-	-	-	-	-	-	136	-	-	-	113	101	101

TCAEBY-TCAESY 4310÷4340

Weight		4310	4340
(*)	Kg	2440	2450
Support			
A	Kg	589	593
B	Kg	409	410
C	Kg	222	221
D	Kg	230	230
E	Kg	409	411
F	Kg	580	585

TCAEBY-TCAESY 2110÷4270 with accessory **PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220	4150	4170	4200	4220	4240	4270
(*)	Kg	1250	1250	1260	1420	1430	1500	1600	1435	1455	1460	1610	2000	2000
Support														
A	Kg	404	406	409	400	403	402	246	410	410	411	239	123	121
B	Kg	327	327	330	421	424	435	314	449	457	459	322	318	317
C	Kg	235	233	236	324	326	358	354	325	335	336	381	569	570
D	Kg	284	284	286	276	277	305	289	251	254	254	303	556	558
E	Kg	-	-	-	-	-	-	233	-	-	-	224	311	311
F	Kg	-	-	-	-	-	-	164	-	-	-	140	123	122

TCAEBY-TCAESY 4310÷4340 with accessory **PUMP**

Weight		4310	4340
(*)	Kg	2685	2700
Support			
A	Kg	595	600
B	Kg	471	473
C	Kg	318	318
D	Kg	301	301
E	Kg	442	445
F	Kg	557	563

TCAEBY-TCAESY 2110÷4270 with accessory **TANK&PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220	4150	4170	4200	4220	4240	4270
(*)	Kg	1330	1350	1350	1510	1520	1600	1725	1530	1545	1550	1740	2120	2130
(**)	Kg	1630	1650	1650	1810	1820	1900	2300	1830	1845	1855	2295	2680	2680
Support (**)														
A	Kg	526	535	535	528	530	533	421	540	539	542	411	257	255
B	Kg	290	296	296	383	386	400	387	410	416	420	393	390	390
C	Kg	300	302	302	381	384	418	277	383	391	394	302	528	530
D	Kg	514	518	518	518	519	549	316	497	499	500	327	614	616
E	Kg	-	-	-	-	-	-	433	-	-	-	422	507	507
F	Kg	-	-	-	-	-	-	466	-	-	-	440	383	382

TCAEBY-TCAESY 4310÷4340 with accessory **TANK&PUMP**

Weight		4310	4340
(*)	Kg	2870	2890
(**)	Kg	3580	3590
Support (**)			
A	Kg	752	757
B	Kg	692	694
C	Kg	558	557
D	Kg	444	442
E	Kg	545	546
F	Kg	590	594

(*) Weight of the unit when empty

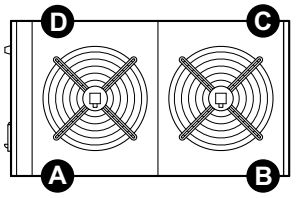
(**) Weight of the units including the water present in the tank

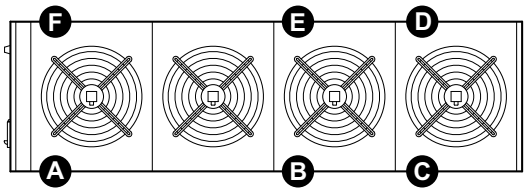
Note: The weight of the TCAEBY unit 2110÷4270 also includes the BCI accessory (standard with TCAESY models), while the weight of the TCAEBY unit 4310÷4340 includes the INS accessory (standard with TCAESY models)

Weight of the accessory BCI = 120 Kg (Mod. 2110÷2220) 135 Kg (Mod. 4150÷4220) 160 Kg (Mod. 4240-4270)

Weight of the accessory INS = 40 Kg

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).





THAEBY-THAESY 2110÷2220

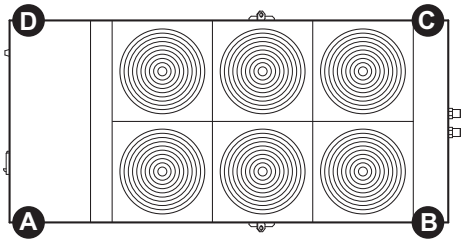
Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1250	1310	1320	1470	1480	1565	1730
Support								
A	Kg	427	443	446	425	427	445	275
B	Kg	346	366	369	470	473	498	353
C	Kg	216	231	233	330	333	357	401
D	Kg	261	271	272	245	247	265	308
E	Kg	-	-	-	-	-	-	237
F	Kg	-	-	-	-	-	-	157

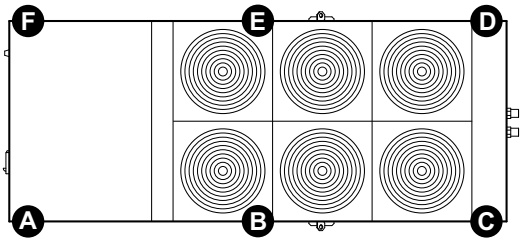
THAEBY-THAESY 2110÷2220 with the **PUMP accessory**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1380	1450	1450	1600	1620	1700	1870
Support								
A	Kg	427	445	445	432	436	453	270
B	Kg	373	396	396	485	492	516	361
C	Kg	276	294	294	382	388	411	424
D	Kg	304	316	316	301	304	320	355
E	Kg	-	-	-	-	-	-	275
F	Kg	-	-	-	-	-	-	184

THAEBY-THAESY 2110÷2220 with the **TANK&PUMP accessory**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1465	1530	1540	1700	1710	1800	2000
(**)	Kg	1770	1830	1840	2000	2010	2100	2560
Support (**)								
A	Kg	553	568	572	563	565	586	444
B	Kg	338	357	361	448	453	478	432
C	Kg	342	357	359	441	444	469	342
D	Kg	537	547	549	547	547	567	378
E	Kg	-	-	-	-	-	-	475
F	Kg	-	-	-	-	-	-	488





THAEBY-THAESY 4240÷4340

Weight		4150	4170	4200	4220	4240	4270	4310	4340
(*)	Kg	1475	1550	1765	1840	2415	2500	2620	2635
Support									
A	Kg	399	411	403	415	601	606	635	635
B	Kg	326	352	296	310	403	419	439	442
C	Kg	340	366	180	193	203	226	236	241
D	Kg	410	421	189	202	212	234	245	250
E	Kg	-	-	299	312	404	419	439	442
F	Kg	-	-	397	409	591	596	626	625

THAEBY-THAESY 4240÷4340 with the **PUMP accessory**

Weight		4150	4170	4200	4220	4240	4270	4310	4340
(*)	Kg	1605	1680	1905	1980	2630	2700	2870	2880
Support									
A	Kg	404	416	410	421	609	609	642	640
B	Kg	405	431	333	346	456	469	502	504
C	Kg	399	424	235	248	284	305	334	339
D	Kg	397	409	227	240	272	294	317	322
E	Kg	-	-	316	329	433	447	473	475
F	Kg	-	-	385	396	576	577	603	600

THAEBY-THAESY 4240÷4340 with the **TANK&PUMP accessory**

Weight		4150	4170	4200	4220	4240	4270	4310	4340
(*)	Kg	1760	1835	2085	2165	2810	2890	3055	3070
(**)	Kg	2205	2280	2795	2870	3520	3600	3760	3780
Support (**)									
A	Kg	492	503	516	527	765	774	798	805
B	Kg	709	730	554	567	676	691	723	726
C	Kg	611	637	518	531	523	539	573	574
D	Kg	398	410	409	423	414	430	459	459
E	Kg	-	-	421	434	535	549	574	577
F	Kg	-	-	377	388	607	616	633	639

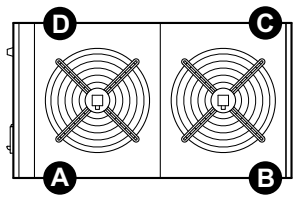
(*) Weight of the unit when empty

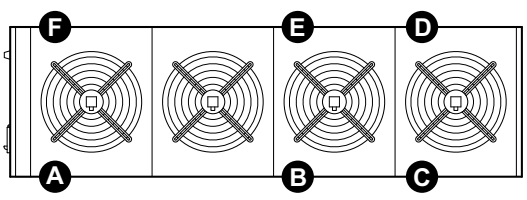
(**) Weight of the units including the water present in the tank

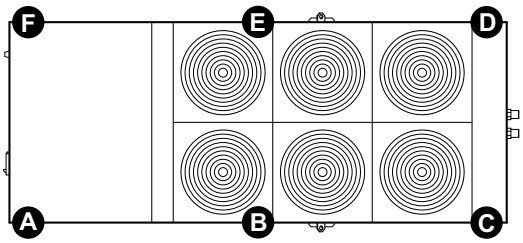
Note: The THAEBY-THAESY 2110÷2220 unit has a standard BCI accessory, while the weight of the THAEBY 4150÷4340 includes the INS accessory (standard with THAESY models)

Weight of the accessory INS = 25 Kg (Mod. 4150-4170) 40 Kg (Mod. 4200÷4340)

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).







TCAETY 2110÷2220

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1090	1100	1110	1130	1280	1300	1320
Support								
A	Kg	340	343	345	348	225	226	227
B	Kg	348	353	357	365	270	274	277
C	Kg	223	226	229	235	294	301	307
D	Kg	179	179	180	182	210	216	222
E	Kg	-	-	-	-	164	166	170
F	Kg	-	-	-	-	117	117	118

TCAETY 4240÷4340

Weight		4240	4270	4310	4340
(*)	Kg	2290	2390	2520	2640
Support					
A	Kg	569	585	618	641
B	Kg	368	386	408	428
C	Kg	206	222	233	249
D	Kg	216	232	242	258
E	Kg	370	388	409	430
F	Kg	561	577	610	633

TCAETY 2110÷2220 with accessory **PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1220	1240	1240	1260	1420	1440	1460
Support								
A	Kg	348	354	353	356	223	223	224
B	Kg	366	373	374	381	279	282	285
C	Kg	275	280	280	287	317	324	330
D	Kg	231	233	233	235	255	262	268
E	Kg	-	-	-	-	201	204	208
F	Kg	-	-	-	-	144	145	146

TCAETY 4240÷4340 with accessory **PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2490	2590	2770	2880
Support					
A	Kg	573	590	623	644
B	Kg	419	437	471	490
C	Kg	285	301	331	346
D	Kg	274	290	315	330
E	Kg	397	414	444	463
F	Kg	542	557	587	607

TCAETY 2110÷2220 with accessory **TANK&PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1310	1330	1330	1350	1550	1570	1590
(**)	Kg	1610	1630	1635	1660	2110	2120	2140
Support (**)								
A	Kg	477	482	482	487	394	394	394
B	Kg	328	336	338	346	350	352	354
C	Kg	332	337	339	347	239	244	249
D	Kg	473	475	475	480	282	285	292
E	Kg	-	-	-	-	400	401	405
F	Kg	-	-	-	-	445	444	446

TCAETY 4240÷4340 with accessory **TANK&PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2680	2780	2950	3060
(**)	Kg	3390	3480	3660	3770
Support (**)					
A	Kg	740	753	767	788
B	Kg	640	656	693	711
C	Kg	517	532	579	595
D	Kg	410	425	467	483
E	Kg	500	516	547	566
F	Kg	583	597	606	627

(*) Weight of the unit when empty

(**) Weight of the units including the water present in the tank

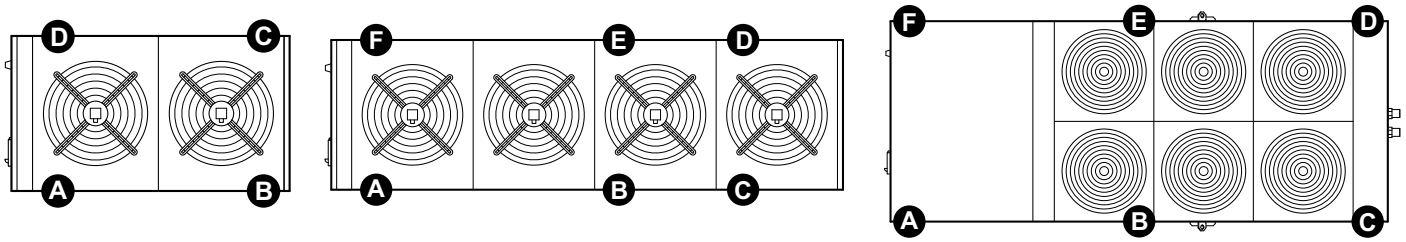
Weight of the accessory BCI = 120 Kg

Weight of the accessory BCI60 = 160 Kg

Weight of the accessory INS = 40 Kg

Weight of the accessory INS60 = 130 Kg

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).



TCAEQY 2110÷2220

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1250	1260	1270	1290	1440	1460	1480
Support								
A	Kg	380	383	385	388	245	246	247
B	Kg	388	393	397	405	300	304	307
C	Kg	263	266	269	275	324	331	337
D	Kg	219	219	220	222	240	246	252
E	Kg	-	-	-	-	194	196	200
F	Kg	-	-	-	-	137	137	138

TCAEQY 4240÷4340

Weight		4240	4270	4310	4340
(*)	Kg	2420	2520	2650	2770
Support					
A	Kg	599	615	648	671
B	Kg	403	421	443	463
C	Kg	206	222	233	249
D	Kg	216	232	242	258
E	Kg	405	423	444	465
F	Kg	591	607	640	663

TCAEQY 2110÷2220 with accessory **PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1380	1400	1400	1420	1580	1600	1620
Support								
A	Kg	388	394	393	396	243	243	244
B	Kg	406	413	414	421	309	312	315
C	Kg	315	320	320	327	347	354	360
D	Kg	271	273	273	275	285	292	298
E	Kg	-	-	-	-	231	234	238
F	Kg	-	-	-	-	164	165	166

TCAEQY 4240÷4340 with accessory **PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2620	2720	2900	3010
Support					
A	Kg	603	620	653	674
B	Kg	454	472	506	525
C	Kg	285	301	331	346
D	Kg	274	290	315	330
E	Kg	432	449	479	498
F	Kg	572	587	617	637

TCAEQY 2110÷2220 with accessory **TANK&PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1470	1490	1490	1510	1710	1730	1750
(**)	Kg	1770	1790	1795	1820	2270	2280	2300
Support (**)								
A	Kg	517	522	522	527	414	414	414
B	Kg	368	376	378	386	380	382	384
C	Kg	372	377	379	387	269	274	279
D	Kg	513	515	515	520	312	315	322
E	Kg	-	-	-	-	430	431	435
F	Kg	-	-	-	-	465	464	466

TCAEQY 4240÷4340 with accessory **TANK&PUMP**

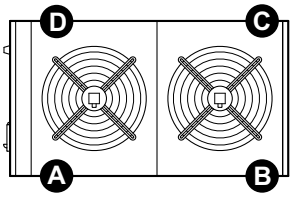
Weight		4240	4270	4310	4340
(*)	Kg	2810	2910	3080	3190
(**)	Kg	3520	3610	3790	3900
Support (**)					
A	Kg	770	783	797	818
B	Kg	675	691	728	746
C	Kg	517	532	579	595
D	Kg	410	425	467	483
E	Kg	535	551	582	601
F	Kg	613	627	636	657

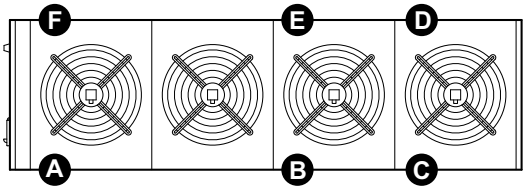
(*) Weight of the unit when empty

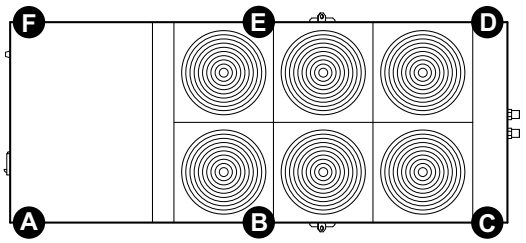
(**) Weight of the units including the water present in the tank

Note: The TCAEQY 2110÷2220 unit has a standard BCI60 accessory, while the TCAEQY 4240÷4340 unit has a standard INS60 accessory.

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).







THAETY 2110÷2220

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1380	1410	1420	1500	1670	1690	1780
Support								
A	Kg	400	407	410	428	273	211	284
B	Kg	445	451	454	477	338	292	357
C	Kg	310	316	319	341	383	363	408
D	Kg	225	236	237	254	293	349	318
E	Kg	-	-	-	-	225	276	244
F	Kg	-	-	-	-	158	199	169

THAETY 4240÷4340

Weight		4240	4270	4310	4340
(*)	Kg	2470	2570	2720	2840
Support					
A	Kg	616	632	672	695
B	Kg	399	416	441	462
C	Kg	220	237	247	263
D	Kg	230	246	256	272
E	Kg	400	417	442	463
F	Kg	606	622	662	685

THAETY 2110÷2220 with accessory **PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1520	1550	1560	1640	1810	1830	1920
Support								
A	Kg	412	417	419	437	268	268	279
B	Kg	458	471	475	496	346	350	364
C	Kg	361	371	374	396	406	414	431
D	Kg	289	290	292	311	340	347	366
E	Kg	-	-	-	-	264	266	283
F	Kg	-	-	-	-	186	185	198

THAETY 4240÷4340 with accessory **PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2670	2770	2970	3080
Support					
A	Kg	620	636	676	697
B	Kg	450	467	505	523
C	Kg	300	316	346	360
D	Kg	288	305	330	345
E	Kg	427	444	476	496
F	Kg	586	602	638	659

THAETY 2110÷2220 with accessory **TANK&PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1610	1520	1525	1610	1820	1840	1940
(**)	Kg	1910	1940	1945	2030	2510	2520	2610
Support (**)								
A	Kg	541	547	548	567	443	442	453
B	Kg	418	432	435	457	418	420	435
C	Kg	417	428	429	452	326	332	349
D	Kg	533	534	534	554	365	371	388
E	Kg	-	-	-	-	466	466	482
F	Kg	-	-	-	-	492	489	502

THAETY 4240÷4340 with accessory **TANK&PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2870	2970	3150	3270
(**)	Kg	3570	3670	3860	3970
Support (**)					
A	Kg	786	801	820	841
B	Kg	671	688	726	745
C	Kg	533	549	596	610
D	Kg	425	442	483	498
E	Kg	529	547	580	599
F	Kg	626	643	656	678

(*) Weight of the unit when empty

(**) Weight of the units including the water present in the tank

Note: In the THAETY 2110÷2220 units the BCI accessory is standards

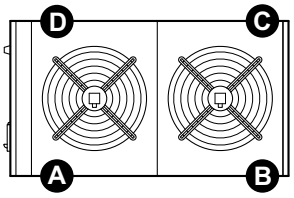
Weight of the accessory BCI = 120 Kg

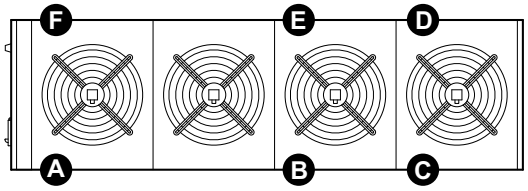
Weight of the accessory BCI60 = 160 Kg

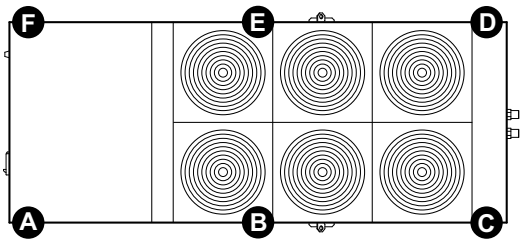
Weight of the accessory INS = 40 Kg

Weight of the accessory INS60 = 130 Kg

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).







THAEQY 2110÷2220

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1420	1450	1460	1540	1710	1730	1820
Support								
A	Kg	410	417	420	438	273	211	284
B	Kg	455	461	464	487	348	302	367
C	Kg	320	326	329	351	393	373	418
D	Kg	235	246	247	264	303	359	328
E	Kg	-	-	-	-	235	286	254
F	Kg	-	-	-	-	158	199	169

THAEQY 4240÷4340

Weight		4240	4270	4310	4340
(*)	Kg	2600	2700	2850	2970
Support					
A	Kg	646	662	702	725
B	Kg	434	451	476	497
C	Kg	220	237	247	263
D	Kg	230	246	256	272
E	Kg	435	452	477	498
F	Kg	636	652	692	715

THAEQY 2110÷2220 with accessory **PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1560	1590	1600	1680	1850	1870	1960
Support								
A	Kg	422	427	429	447	268	268	279
B	Kg	468	481	485	506	356	360	374
C	Kg	371	381	384	406	416	424	441
D	Kg	299	300	302	321	350	357	376
E	Kg	-	-	-	-	274	276	293
F	Kg	-	-	-	-	186	185	198

THAEQY 4240÷4340 with accessory **PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	2800	2900	3100	3210
Support					
A	Kg	650	666	706	727
B	Kg	485	502	540	558
C	Kg	300	316	346	360
D	Kg	288	305	330	345
E	Kg	462	479	511	531
F	Kg	616	632	668	689

THAEQY 2110÷2220 with accessory **TANK&PUMP**

Weight		2110	2120	2140	2150	2170	2200	2220
(*)	Kg	1650	1680	1685	1770	1980	2000	2100
(**)	Kg	1950	1980	1985	2070	2550	2560	2650
Support (**)								
A	Kg	551	557	558	577	443	442	453
B	Kg	428	442	445	467	428	430	445
C	Kg	427	438	439	462	336	342	359
D	Kg	543	544	544	564	375	381	398
E	Kg	-	-	-	-	476	476	492
F	Kg	-	-	-	-	492	489	502

THAEQY 4240÷4340 with accessory **TANK&PUMP**

Weight		4240	4270	4310	4340
(*)	Kg	3000	3100	3280	3400
(**)	Kg	3700	3800	3990	4100
Support (**)					
A	Kg	816	831	850	871
B	Kg	706	723	761	780
C	Kg	533	549	596	610
D	Kg	425	442	483	498
E	Kg	564	582	615	634
F	Kg	656	673	686	708

(*) Weight of the unit when empty

(**) Weight of the units including the water present in the tank

Note: The THAEQY 2110÷2220 unit has a standard BCI60 accessory, while the THAEQY 4240÷4340 unit has a standard INS60 accessory.

Note: Contact Rhoss S.p.A. for the weights of the units with the STE accessory (Shell&Tube Evaporator).

Accessories weights DS - RC100

Model		Weight of the accessory **DS**
2110	Kg	30
2120	Kg	30
2140	Kg	30
2150	Kg	30
2170	Kg	30
2200	Kg	30
2220	Kg	30
4150	Kg	60
4170	Kg	60
4200	Kg	60
4220	Kg	60
4240	Kg	60
4270	Kg	60
4310	Kg	60
4340	Kg	60

Model		Weight of the accessory **RC100**
2110	Kg	120
2120	Kg	120
2140	Kg	120
2150	Kg	120
2170	Kg	120
2200	Kg	120
2220	Kg	120
4150	Kg	200
4170	Kg	200
4200	Kg	200
4220	Kg	200
4240	Kg	200
4270	Kg	200
4310	Kg	200
4340	Kg	200

Nota bene:
To obtain the total weight of the units with the **RC100** or **DS,** accessories, add the weight of the accessory to the weight of the machine.

Weight of the accessory BVI

Model		TCAEY B-S	THAEY B-S	TCAEY T-Q	THAEY T-Q
2110	Kg	80	80	90	90
2120	Kg	80	80	90	90
2140	Kg	80	80	90	90
2150	Kg	90	90	90	90
2170	Kg	90	90	120	120
2200	Kg	90	90	120	120
2220	Kg	120	120	120	120
4150	Kg	90	90	-	-
4170	Kg	90	90	-	-
4200	Kg	90	90	-	-
4220	Kg	120	120	-	-
4240	Kg	150	150	-	-
4270	Kg	150	150	-	-
4310	Kg	-	-	-	-
4340	Kg	-	-	-	-

Water connections

Minimum hydraulic circuit contents

For proper unit operation, a minimum amount of water must be ensured in the hydraulic system. The minimum water content is determined on the basis of the unit's nominal cooling capacity (or heating capacity in the case of heat pumps) (table A *Technical Data*), multiplied by the coefficient expressed in l/kW.

If the minimum content in the system is below the minimum value indicated or calculated, it is advisable to select the TANK&PUMP accessory complete with inertial storage tank, and install an additional tank if necessary. However, it is always recommended to use a storage tank with greater system water content in process applications to guarantee high system thermal inertia.

TCAEY B-S and THAEY B-S models (single circuit)		2110	2120	2140	2150	2170	2200	2220
Hydraulic technical data								
Expansion tank capacity	l	12	12	12	12	12	12	24
Expansion tank pre-load	barg	2	2	2	2	2	2	2
Expansion vessel maximum pressure	barg	10	10	10	10	10	10	10
safety valve	barg	6	6	6	6	6	6	6
Water contents TCAEY B-S								
Plate heat exchangers	l	7	7	8	9	10	11,5	13,5
Tube and shell heat exchangers (STE accessory)	l	36	36	36	50	50	51	51
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550
Water contents THAEY B-S								
Plate heat exchangers	l	7	7	8	9	10	11,5	13,5
Tube and shell heat exchangers (STE accessory)	l	61	61	61	63	63	94	94
Tank water content (ASP1/ASP2)	l	300	300	300	300	300	300	550

TCAEY B-S and THAEY B-S models (double circuit)		4150	4170	4200	4220	4240	4270	4310	4340
Hydraulic technical data									
Expansion tank capacity	l	12	12	TCAEY 12 THAEY 24	24	24	24	24	24
Expansion tank pre-load	barg	2	2	2	2	2	2	2	2
Expansion vessel maximum pressure	barg	10	10	10	10	10	10	10	10
safety valve	barg	6	6	6	6	6	6	6	6
Water contents TCAEY B-S									
Plate heat exchangers	l	8,5	12,5	12,5	14	20,5	20,5	26,5	26,5
Tube and shell heat exchangers (STE accessory)	l	55	68,0	68,0	68,0	70	70	70	88
Tank water content (ASP1/ASP2)	l	300	300	300	550	550	550	700	700
Water contents THAEY B-S									
Plate heat exchangers	l	8,5	12,5	12,5	14	20,5	20,5	26,5	26,5
Tube and shell heat exchangers (STE accessory)	l	45	73	73	72	117	117	117	143
Tank water content (ASP1/ASP2)	l	450	450	700	700	700	700	700	700

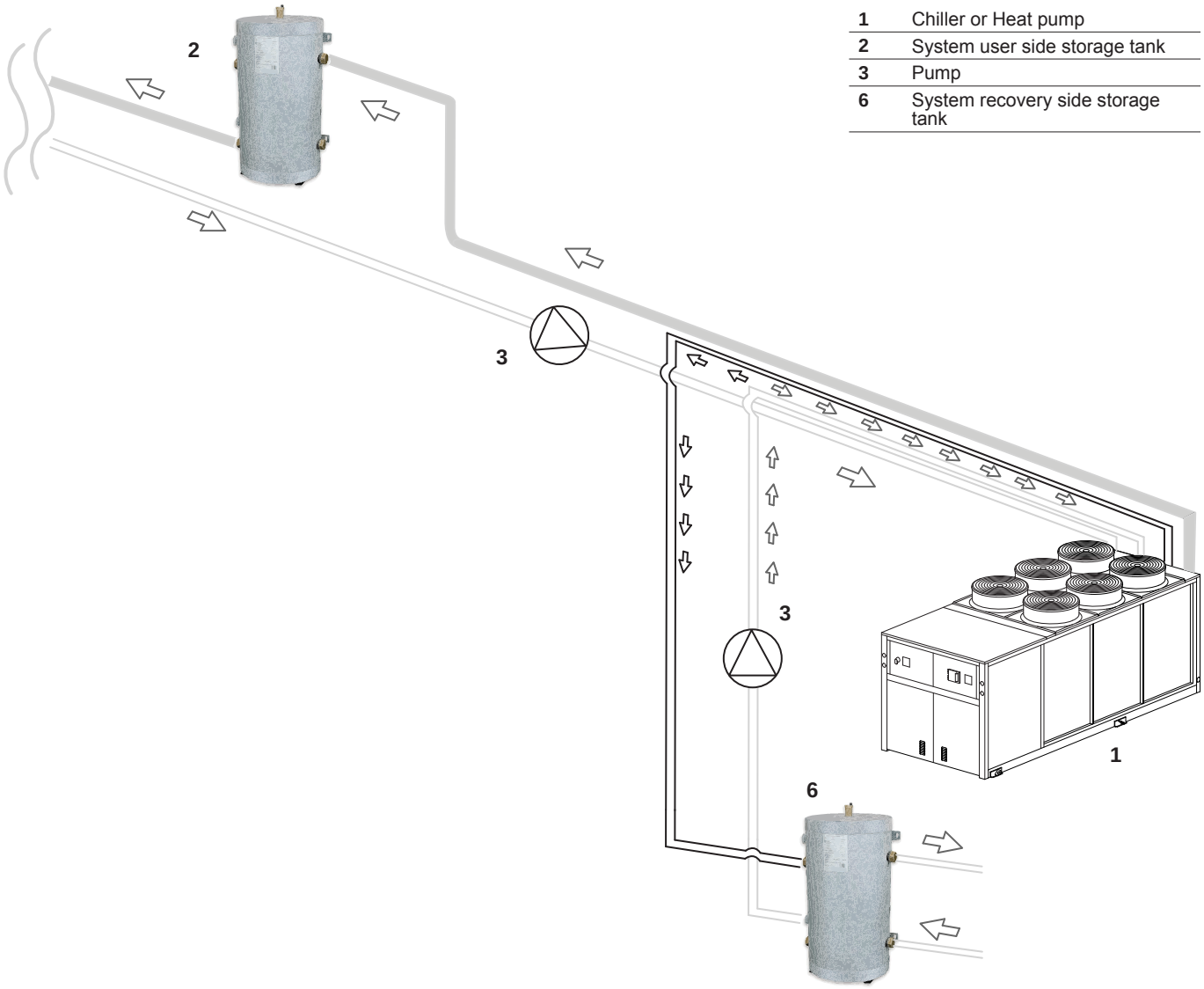
Model TCAEY T-Q and THAEY T-Q		2110	2120	2140	2150	2170	2200	2220	4240	4270	4310	4340
Hydraulic technical data												
Expansion tank capacity	l	12	12	12	12	24	24	24	24	24	24	24
Expansion tank pre-load	barg	2	2	2	2	2	2	2	2	2	2	2
Expansion vessel maximum pressure	barg	10	10	10	10	10	10	10	10	10	10	10
safety valve	barg	6	6	6	6	6	6	6	6	6	6	6
Water contents TCAEY T-Q												
Plate heat exchangers	l	8	9	10	11,5	13,5	15	17,5	26,5	32	32	39
Tube and shell heat exchangers (STE accessory)	l	41	41	50	50	51	51	70	70	70	88	88
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700
Water contents THAEY T-Q												
Plate heat exchangers	l	8	9	10	11,5	13,5	15	17,5	26,5	32	32	39
Tube and shell heat exchangers (STE accessory)	l	58	58	63	63	94	94	117	117	117	143	143
Tank water content (ASP1/ASP2)	l	300	300	300	300	550	550	550	700	700	700	700

Applications for partial (DS) and total (RC100) recovery and DHW production

Overview
Condensation heat in a chiller is usually disposed of in the air; it can be recovered intelligently by means of heat recovery, which may be partial (DS) or total (RC100). With summer operation, a reduced value equivalent to the desuperheating of gas is recovered in the first phase, while the second phase recovers all the condensation heat that would otherwise be lost.

In the case of a reversible heat pump, partial recovery (DS) and total recovery (RC100) can also run in winter mode. In the former case, the partial recovery (DS) deducts a rate from the heat production in the main heat exchanger, whereas, in the latter case of total recovery, the heat production is an alternative to that of the main heat exchanger.

Below is indicative information. The provided diagrams are not complete and are used only to provide guidelines that allow a better use of the unit.



1	Chiller or Heat pump
2	System user side storage tank
3	Pump
6	System recovery side storage tank

1. Chiller or heat pump set-up with DS or RC100

Chiller

With this type of system, the main hydraulic circuit of the chiller is connected to the user and produces cold water for air conditioning. The unit can be set-up as a pump or pump and storage tank as alternative to the traditional solution seen installed in the system. The desuperheater (DS), with which the machine can be supplied, will be connected by means of a technical water storage tank and external pump for DHW or to the system to produce hot water for the post-heating coils of the CTA or other applications. RC100 total recovery, as an alternative to DS, can be used in the same applications, however, the amount of heat produced is significantly higher and, at the same time, the heat level of the water produced is lower.

Heat pump with partial recovery (DS) - 2-Pipe+DHW system

Should the unit be a reversible heat pump, summer operation is the same as the aforementioned situation of the chiller. Instead, with winter operation, the user has DHW produced from the heat pump. If the unit is equipped with a DS desuperheater, this can be also active in winter mode. However, in this case, this value is deducted from the portion of heat from the hot water produced from the main heat exchanger.

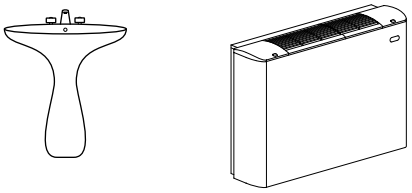
Heat pump with total recovery (RC100) - 2-Pipe+DHW system

If the unit is a reversible heat pump fitted with total recovery (RC100), the behaviour is identical to a Polyvalent 2-pipe unit with specific application in 2-pipe+DHW systems. If the system has 4-pipes, refer to the ranges of the EXP polyvalent units.
The air conditioning and the production of domestic hot water in a 2-pipe system is a typical application in hotels, hospitals, gyms and hospitality structures in general.

The 2-pipe+DHW systems provide summer mode with the production of chilled water and/or simultaneous or separate production of hot water from the heat recovery unit. In winter, however, the demand is for hot water production from the main heat exchanger and alternatively (assigning appropriate priority) from the recovery exchanger.

The unit can run in two modes:
- **AUTOMATIC**: the system allows total recovery of the condensation heat and/or the production of chilled water (summer season)
- **SELECT**: this allows the production of hot water to the recovery heat exchanger or from the main one (winter season)

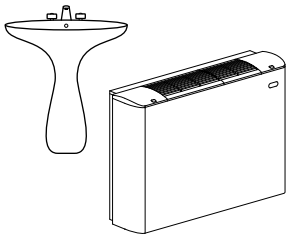
Summer season “AUTOMATIC”



Domestic
Hot water

Air Conditioning
Cold water

Winter season “SELECT”



Domestic or Air Conditioning
Hot water

Competitive advantages

The heat pump unit with total recovery, defined as 2-pipe Polyvalent, fulfils the simultaneous or separate request for hot and cold water with one single unit, thereby optimising energy consumption and simplifying management in the 2-pipe+DHW systems.
- Its natural application and as a valid alternative in all conventional systems that require a chiller or heat pump with the use or integration of a boiler.
- The advantages are due to a single unit being used, the economic saving due to the high COP (operating with heat recovery in summer mode), the non-use of combustible products that are harmful to the ozone so as to be defined as an ecological polyvalent unit.
- Fourth generation polyvalent versatile heat pump, which unlike other polyvalent units meets the typical demand in 2-pipe systems with a single unit and in a completely flexible way.
- It is therefore offered on the market as the unit that guarantees fundamental aspects such as EFFICIENCY, RELIABILITY AND VERSATILITY.

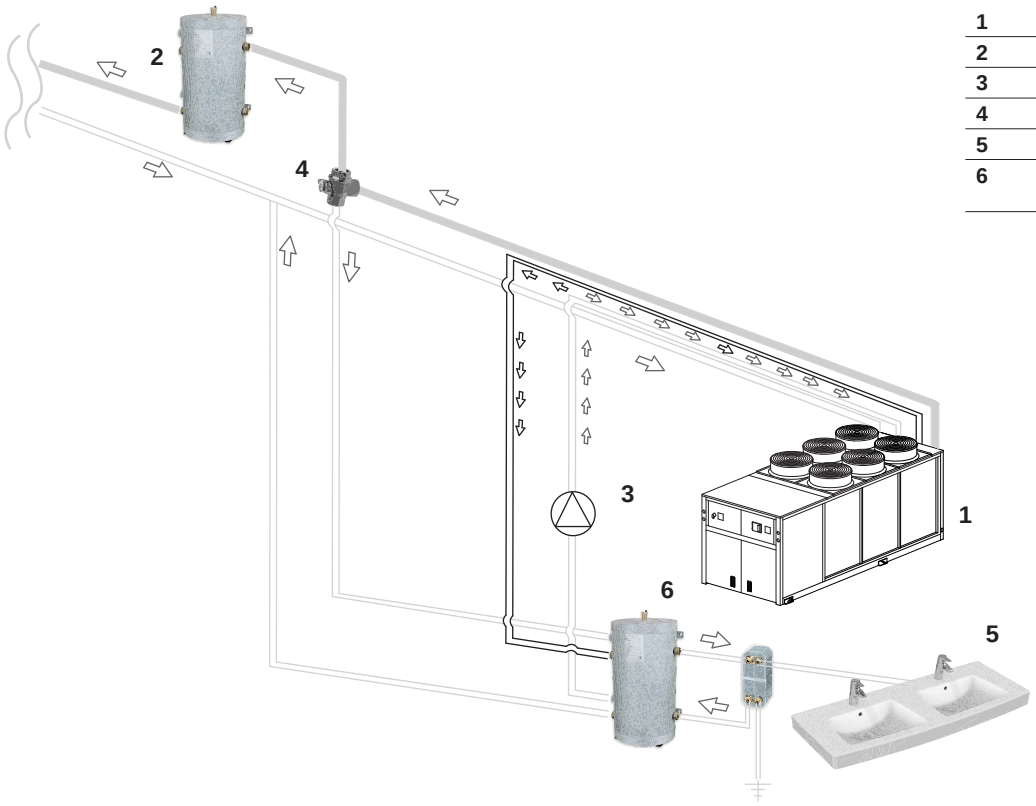
1.1 Activation and deactivation of DS and RC100

The units (HEAT PUMPS) set up with total recovery RC100 can activate the thermal recovery by means of a set-point that can be set from a keyboard on the machine or via external digital input (e.g. the KTRD accessory).

The units (CHILLERS) set up with DS desuperheater or total recovery RC100 and units (HEAT PUMPS) with DS desuperheater can activate the thermal recovery by means of an external digital input (e.g. the KTRD accessory).

Moreover, the criterion to stop the thermal recovery can be established from the panel:
- for digital contact: if the consensus is interrupted, the thermal recovery stops as well. This mode meets the requirement to carry out a temperature control system of the storage tank connected to the recovery;
- for maximum return temperature: the said limit is set from the panel on the machine or from the remote keyboard (KTR accessory). The recovery keeps operating until the return temperature is lower than the configured set point. This mode is suitable for maximising the use of the thermal recovery.

2. Set-up of a 3-way heat pump (VEDEV) and domestic hot water production (DHW) and possibly a desuperheater (DS) at the same time



1	Heat pump
2	System user side storage tank
3	Pump
4	3-way valve (VDEV)
5	User-DHW
6	System recovery side storage tank

With this type of system, the main circuit of the heat pump produces DHW (winter season) or DCW (summer season) for the user. The unit can be set-up as a pump or pump and storage tank as alternative to the traditional solution seen installed in the system. For the production of DHW by using the heat pump, use a technical water storage tank, which cannot be used directly for human consumption, and combine it to a DHW producer/intermediate heat exchanger.

Should a 3-way valve system (VDEV) be envisaged , it can manage production of hot water to the DHW circuit in both the summer and winter seasons. In fact, the valve enables water flow deviation from the system to the technical water storage tank for the system to produce DHW for domestic use.

The desuperheater, with which the machine can be fitted, must be connected to the same technical water storage tank for the DHW production system , and is able to keep the heat storage tank level high. This way, the system allows maximum service continuity to the DHW and system, regardless of the operation mode (summer or winter).

2.1 Priority management and domestic hot water DHW request (3-way switch-over valve VDEV and activation of any DS)

How to manage the DHW request:

- by means of the discrete input: the request is assigned by a thermostat (e.g. via a KTRD accessory). 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's 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.

Type of probe:

description	type of probe	features	β (25/85)
NTC150	NTC HT150	50kΩ@25°C	3977 (±1%)
NTC	NTC	10kΩ@25°C	3435 (±1%)

FNR accessory - Forced Noise Reduction

The FNR accessory allows a variable acoustic layout of the unit, managing the silence in chiller mode according to the specific user needs. The accessory is available for TCAEBY-TCAETY chillers and for THAEBY-THAETY reversible heat pumps, adequately fitted with some accessories described in the table below.

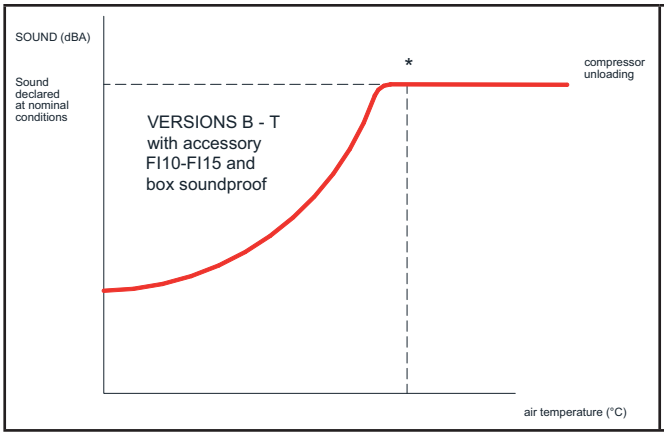
WinPACK SE range of heat pumps and chillers	Mandatory ACCESSORY	Mandatory ACCESSORY for soundproofing compressors	Mandatory ACCESSORY to adjust the fan speed
TCAEBY 2110÷4270	FNR	BCI	FI10 or FI15
TCAEBY 4310÷4340	FNR	INS	FI10 or FI15
THAEBY 2110÷2220	FNR	-	FI10 or FI15
THAEBY 4150÷4340	FNR	INS	FI10 or FI15

WinPACK HE-A range of heat pumps and chillers	Mandatory ACCESSORY	Mandatory ACCESSORY for soundproofing compressors	Mandatory ACCESSORY to adjust the fan speed
TCAETY 2110÷2220	FNR	BCI60	FI15
TCAETY 4240÷4340	FNR	INS60	FI15
THAETY 2110÷2220	FNR	BCI60	FI15
THAETY 4240÷4340	FNR	INS60	FI15

The silence of the unit is managed according to 3 modes that can be selected by actuating the control panel on the machine, using digital inputs and/or programming time bands.

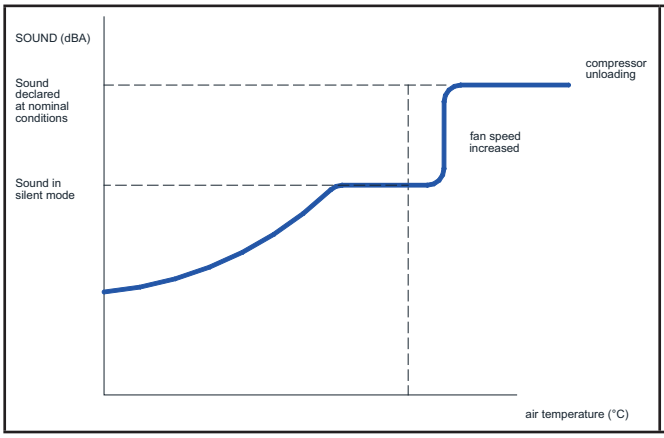
	Digital inputs	
	FNR1	**FNR2**
Mode 1	OPEN CONTACT	OPEN CONTACT
Mode 2	CLOSED CONTACT	OPEN CONTACT
Mode 3	CLOSED CONTACT	CLOSED CONTACT

1. Unit operation with standard logic (B-T version) but with better "soundproofing"



(*) Performance and noise declared at the nominal operating conditions (water in/out 12/7°C and air temperature 35°C)

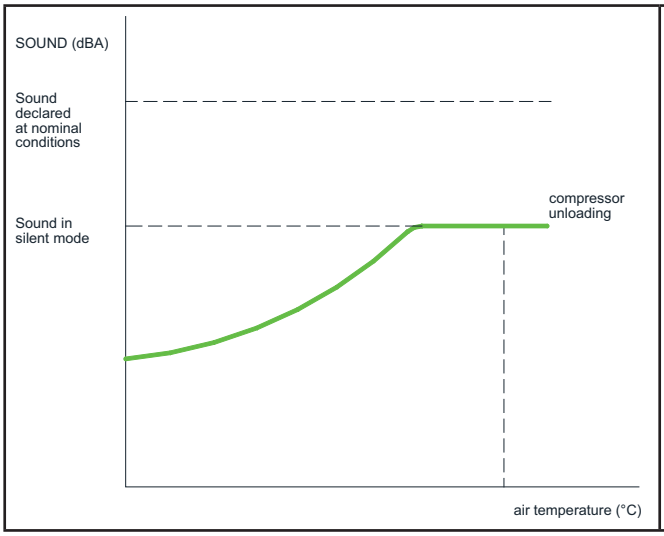
2. Request to reduce noise at certain times of the day, night, etc. maintaining the "guaranteed supplied power" priority



The TCAEBY-THAEBY units work in silence with performance and operating limits of TCAESY-THAESY, respectively. For outdoor air temperatures exceeding the operating limits (refer to the section of the operating limits for more details), the units lose silence and guarantee the functions of the respective TCAEBY-THAEBY

Units TCAETY-THAETY work in super-silenced mode with the performance and operating limits of the respective TCAEQY-THAEQY. For outdoor air temperatures exceeding the operating limits (refer to the section of the operating limits for more details), the units lose silence and guarantee the functions of the respective TCAETY-THAETY.

3. Request to reduce noise at certain times of the day, night, etc. maintaining the "guaranteed max noise" priority



Units TCAEBY-THAEBY work in the silenced mode with the performance and operating limits (refer to the section of the operating limits for more details) of the respective TCAESY-THAESY, guaranteeing silence throughout their working range

Units TCAETY-THAETY work in the super-silenced mode with the performance and operating limits (refer to the section of the operating limits for more details) of the respective TCAEQY-THAEQY, guaranteeing silence throughout their working range

EEM accessory - Energy Meter

The EEM accessory allows certain unit features, such as those below, to be measured and displayed:

- Power supply voltage and instantaneous current consumption of the unit
- Instantaneous electric power consumed by the unit
- Instantaneous power factor of the unit
- Electricity consumption (kWh)

If the unit is connected via a serial network to a BMS or external supervisory system, the trends of the measured parameters can be stored and the operating status of the unit itself checked.

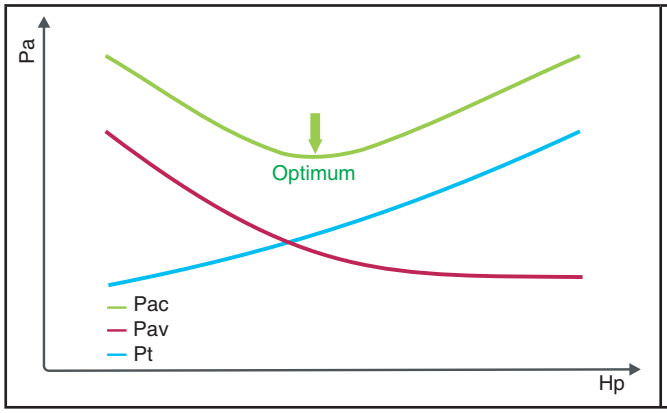
FDL accessory - Forced download compressors

The FDL accessory (forced reduction of the power consumed by the unit) allows power consumption to be restricted according to the utility requirements. The user can set the desired percentage on a special mask. The function, which can be set from the unit display, can be enabled via a digital signal, using time bands or as an input in the case of a serial connection with an external BMS via Modbus.

In the presence of the EEM accessory, which allows the power consumed to be instantaneously measured, a specific maximum consumed power value can be set and any utility requirement complied with.

EEO accessory – Energy Efficiency Optimizer

The EEO accessory allows the unit efficiency to be optimised by acting on the electrical absorption, thereby minimising consumption. The EEO accessory identifies the optimal point that minimises the total absorbed power (compressors+fans) of the unit by actuating the fan rotation speed. It is particularly effective in the partial load operation, a situation which arises for most of the useful life of the chiller. The energy efficiency index ESEER therefore, increases up to 5%.



Pac - Compressor consumed power

Pav - Fan consumed power

Pt - Total power consumed

Pa - Consumed power

Hp - Condensation pressure

The EEO accessory is available for chillers and heat pumps fitted with the condensation control accessory, with the EEM accessory (energy efficiency meter) and EEV (electronic expansion valve) according to the following table:

WinPACK SE range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAEBY 2110÷4340 **THAEBY 2110÷4340**	EEO	EEM	EEV	FI10 or FI15

WinPACK SE range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAESY 2110÷4340 **THAESY 2110÷4340**	EEO	EEM	EEV	-

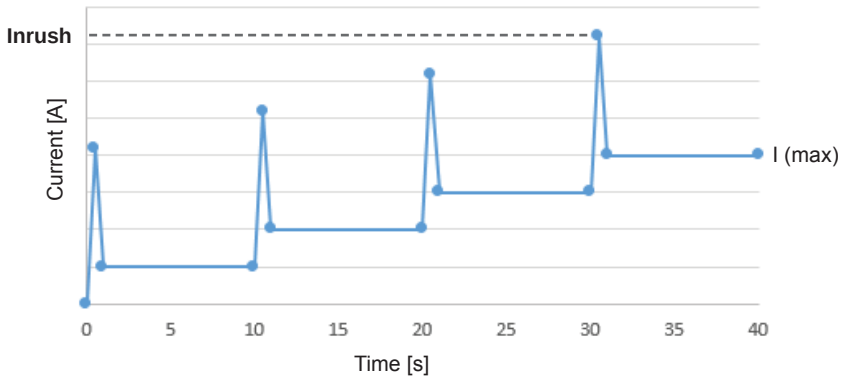
WinPACK HE-A range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAETY 2110÷4340 **THAETY 2110÷4340**	EEO	EEM	-	FI10 or FI15

WinPACK HE-A range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAEQY 2110÷4340 **THAEQY 2110÷4340**	EEO	EEM	-	-

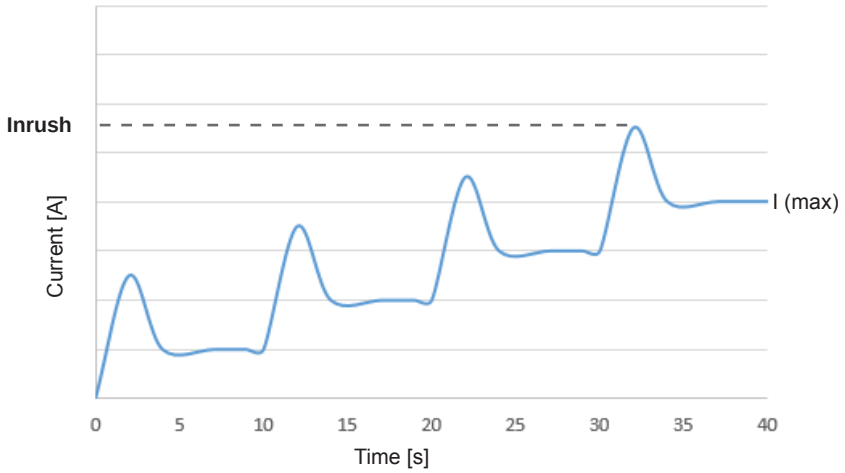
SFS accessory - Soft starter

The SFS accessory allows the peak inrush current to be reduced, thereby obtaining a gentle and gradual start-up with significant benefits for the mechanical wear of the electric motor.
The following is a qualitative drawing as an example of a unit with 4 compressors fitted with and without the SFS accessory.
The inrush current values with the SFS accessory are indicated in tables “A” Technical data.

Inrush current - without SFS



Starting current with SFS



RIS accessory - Additional storage tank resistances

The RIS accessory consists of adequately sized integrative resistances applied in the storage tank and an antifreeze resistance.

The control logic, implemented by Rhoss, involves the activation of the resistances by means of an outdoor air temperature value and according to the hot water set-point set in two STEPS described below in the table.

Primarily, if the air T is between -5 and -1°C, the first step is initiated, whereas, if the air T is between -1 and -10°C, the second step is initiated. The resistances continue to work until the set hot water set-point is reached or if the defrost function is activated (to guarantee environmental comfort).

Note: the user is responsible for the supply to the electric resistances, by means of electrical wiring in the Electrical panel (IP55) outside the resistances.

WinPACK SE range	**THAEBY-THAESY**	
SIZE	**STEP 1**	**STEP 2**
2120-2120-2140	12 Kw	36 Kw
2150-2170-2200	24 Kw	48 Kw
2220	24 Kw	54 Kw
4150-4170	N.D.	N.D.
4200-4220	24 Kw	54 Kw
4240-4270-4310-4340	30 Kw	60 Kw

WinPACK HE-A range	**THAETY-THAEQY**	
SIZE	**STEP 1**	**STEP 2**
2120-2120-2140	12 Kw	36 Kw
2150	24 Kw	48 Kw
2170-2200-2220	24 Kw	54 Kw
4240-4270-4310-4340	30 Kw	60 Kw

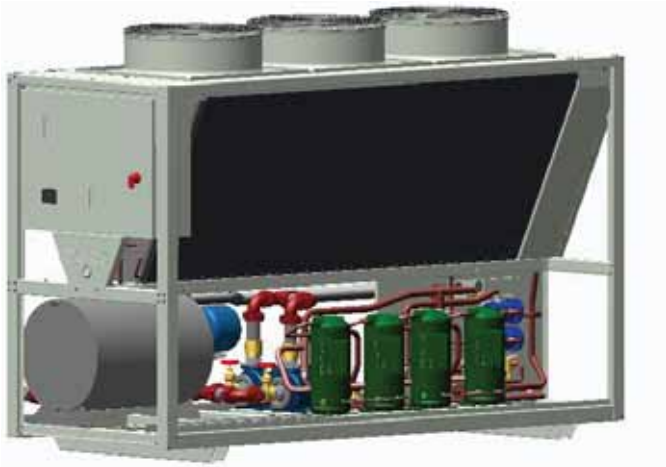
FOCUS Accessory BCI-BCI60-BVI

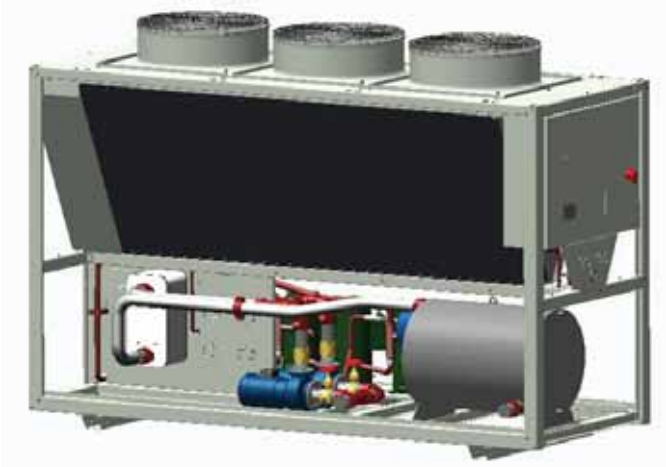
The BCI or BCI60 accessory - Soundproof box compressor, which has the function of closing and soundproofing compressors with units that have a "V" coil structure. The General Features section gives examples of when the accessory is available and when it is a standard supply in the unit.

The BVI accessory – Box Lower Compartment closure, whose main function is to close the compartment regarding hydronic equipment (pumps and pumps with a tank) in units with a "V" coil.

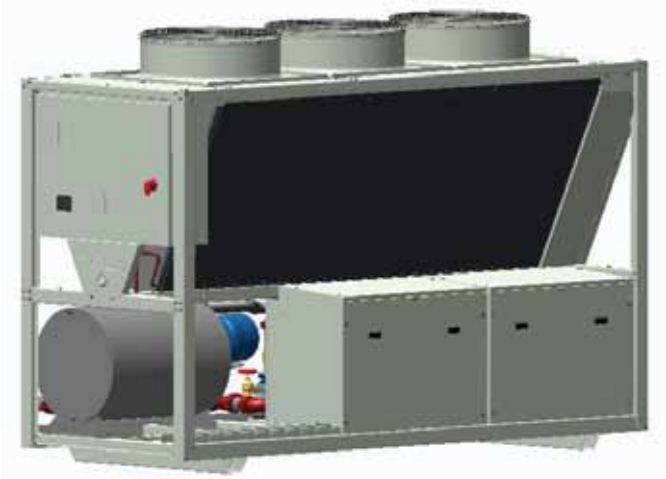
The drawings below explain how the accessories are used with a TCAEBY 4150 unit.

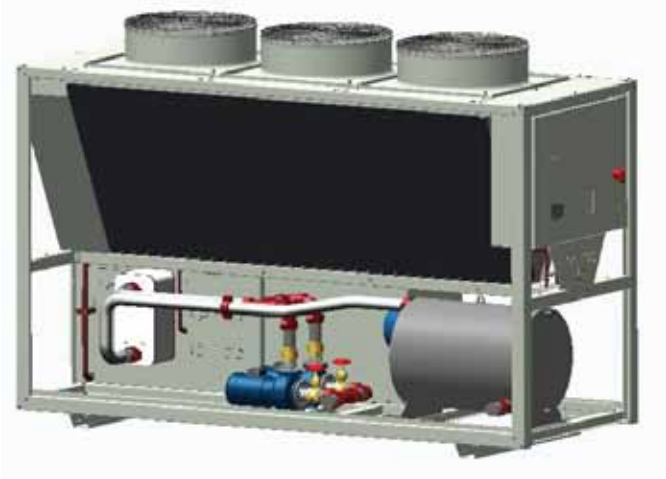
TCAEBY 4150 + Accessory ASDP1



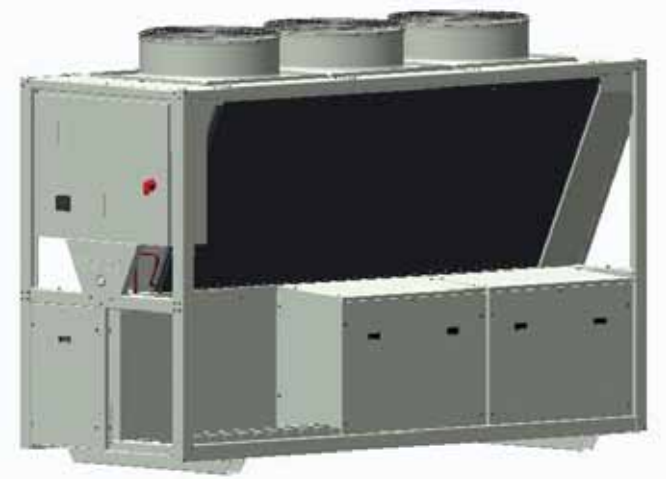


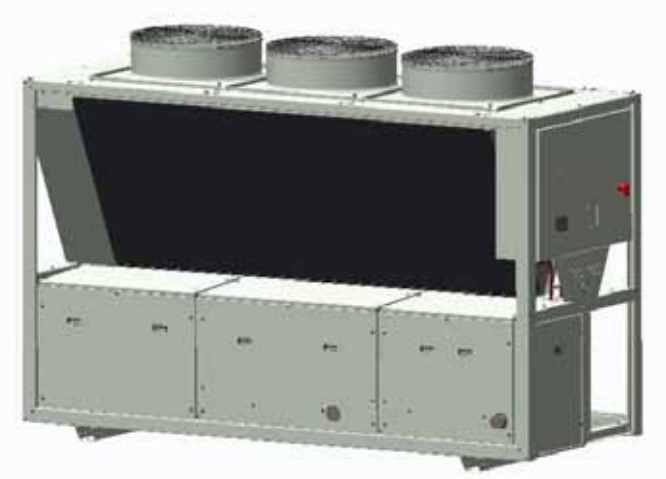
TCAEBY 4150 + Accessory ASDP1+ Accessory BCI





TCAEBY 4150 + Accessory ASDP1+ Accessory BCI + Accessory BVI





VPF accessory – Variable primary Flow

The energy used for the cooling unit to work is an important component in the system costs, and reducing the unit consumption, especially with partial load, is sometimes compromised by the pump unit operating constantly. The higher the absorption of the pumps used to maintain the proper flow of water in the pipes the more this effect is noticed.

A solution that compensates for the problem of the energy absorbed by the pump units is using pumps driven by inverter technology, able to modulate the flow rate G and reduce power consumption. This is how the systems with constant primary flow and secondary decoupled variable flow exist.

The introduction of the VPF system simplifies the systems, using a single primary variable flow circuit, in which inverter controlled pumps are installed as the only pumps in the system; this solution generates complications related to the calibration, sizing of the venting section and system setting, which burden the client and indirectly could affect the reliability of the machine.

The solution proposed by Rhoss combines the simplification of the VPF system, the reliability of the system solution with primary-**secondary variable flow** circuits and the additional energy and cost savings derived from managing **the primary with variable flow** where energy saving depends on the variation in flow rate ΔPa=f(ΔG).

The content of water in the primary circuit is very important since it stabilises system operation, the water temperature to the system and reliability of the cooling unit over time (recommended minimum content of 5L/kw).

The cooling circuit is equipped with pumps on the primary side with inverter adjustment and the option to manage the inverter pumps from the system side.

In addition to significant energy savings, the solution with VPF technology by RHOSS also allows the design of the system's hydraulic circuit to be simplified and the operating costs to be decreased.

The Rhoss solution offered for variable flow systems is innovative for several reasons:

1. Stable flow rate modulation required by the system with guaranteed reliability for the chiller installed (even with system flow rate oscillation). The flow rate can be modulated up to 20% by using pumps with an EC-type of motor.

2. Simplified design of the solutions to be applied to the terminals (balancing the number of 3-way and 2-way valves with adequate sizing of the venting section)

3. Maximising the efficiency of the cooling unit in each operating condition for the flow rate to be modulated on the system side following the route of the load, as well as on the primary side, thereby minimising the pumping energy required for it to operate correctly.

4. Possibility of simplified and reliable management of several units in parallel (the known problems related to flow variations in traditional VPF systems when the cooling units are connected/switched off are avoided)

Below is a basic diagram of the VPF solution by RHOSS being used in the case of a single chiller

P/DP= single or double pump controlled by a variable frequency inverter (pumps installed and controlled by Rhoss with a 0-10V signal)

PI/DPI= single or double pump, controlled by a variable frequency inverter to service the system. Adjustment is carried out by means of flow modulation and is supplied by the user (with separate supply) and in this case, Rhoss is in charge of management via the analogue signal 0-10V.

TANK= tank outside the machine

V2=2-way adjustment valve

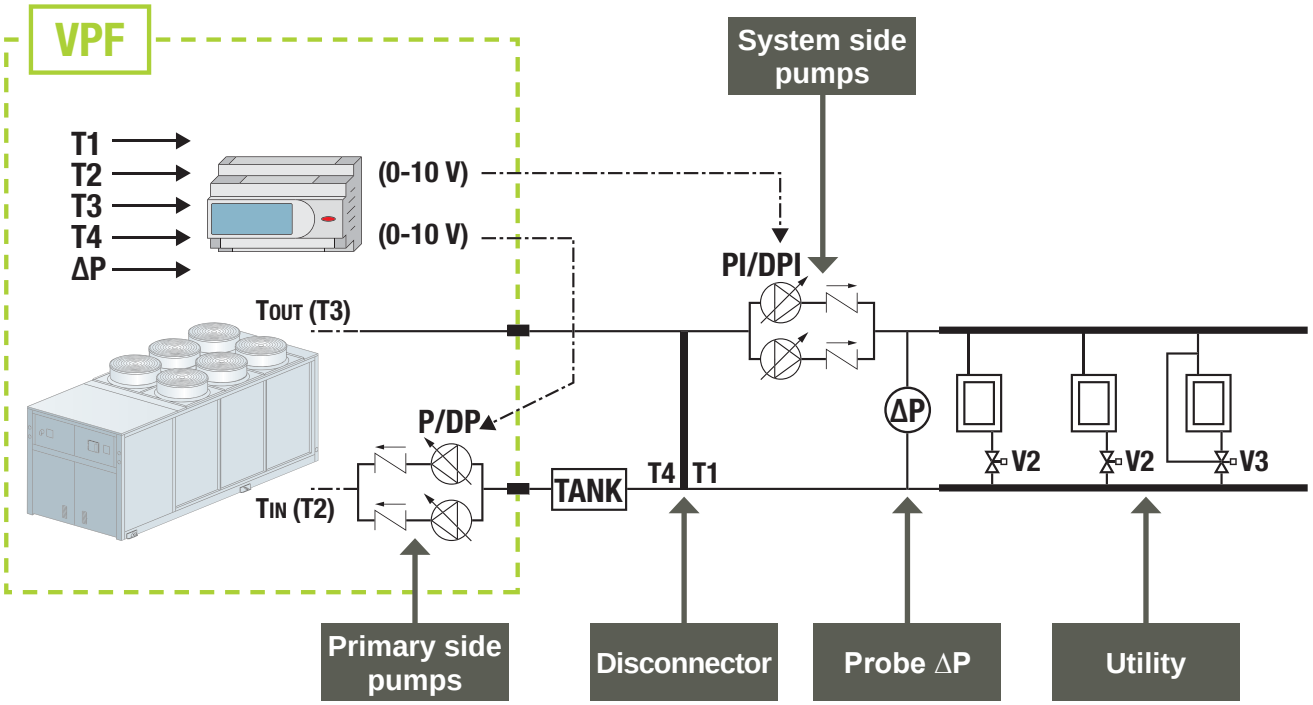
V3=3-way adjustment valve

∆**P=** differential pressure transducer

NOTES on the installation:

1. If a cooling unit with VPF technology is installed, an external tank must be installed to guarantee minimum water content of 5 l/kw on the primary side. At least 20% of the flow must be guaranteed on the system side by installing a minimum number of terminals fitted with 3-way valves V3
   The probe to determine the ΔP pressure differential is a standard supply. The installer can set the probe remotely in the most appropriate point in the system.
2. The probe to determine the ΔP pressure differential is a standard supply. The installer can set the probe remotely in the most appropriate point in the system.
3. Probes T1 and T4 are supplied and must be installed on the return side of the system, as shown in the figure: T1 before the hydraulic disconnector and T4 after.

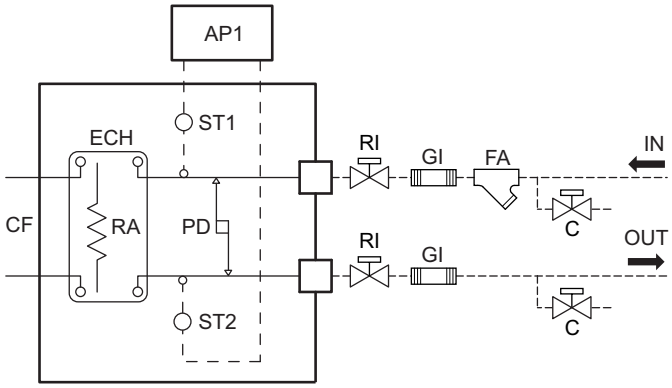
Rhoss VPF Solution (Variable Primary Flow)



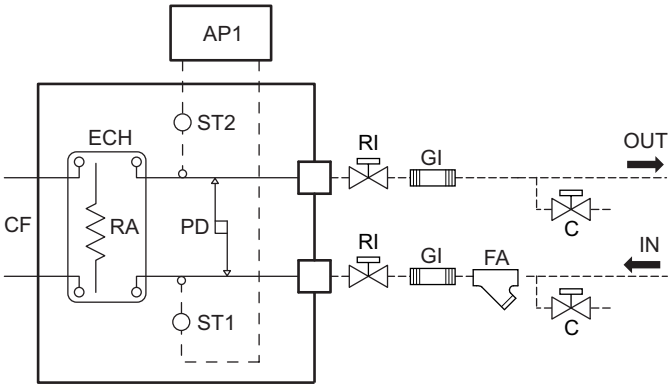
Water circuits

Hydraulic circuit Standard set-up (main heat exchanger)

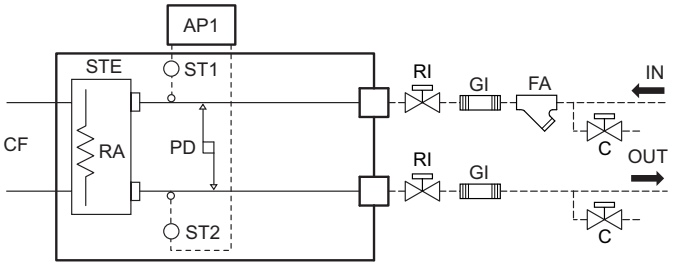
VERSION with plate heat exchanger
TCAEBY-TCAESY 2110-2220 (single circuit)
TCAEBY-TCAESY 4150-4340 (double circuit)
THAEBY-THAESY 4150-4220 (double circuit)
TCAETY-TCAEQY 2110÷4340



VERSION with plate heat exchanger
THAEBY-THAESY 2110-2220 (single circuit)
THAEBY-THAESY 4240-4340 (double circuit)
THAETY-THAEQY 2110÷4340

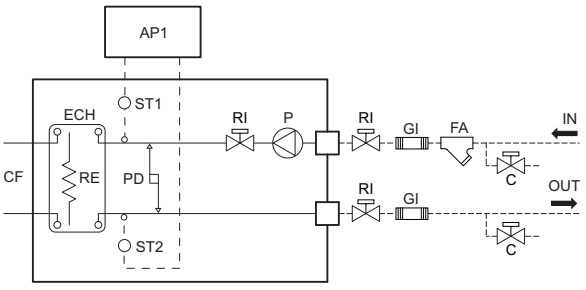


VERSION with STE tube and shell heat exchanger

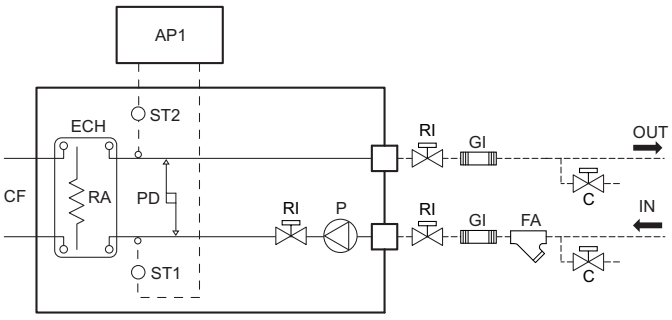


P1 – P2 set-up hydraulic circuit (main heat exchanger)

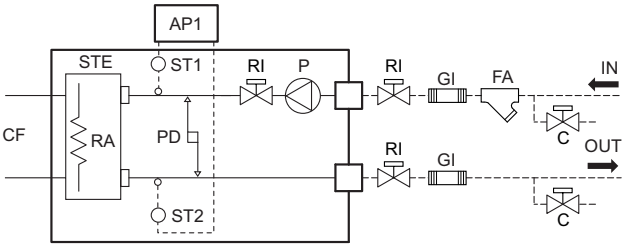
VERSION with plate heat exchanger
TCAEBY-TCAESY 2110-2220 (single circuit)
TCAEBY-TCAESY 4150-4340 (double circuit)
THAEBY-THAESY 4150-4220 (double circuit)
TCAETY-TCAEQY 2110÷4340



VERSION with plate heat exchanger
THAEBY-THAESY 2110-2220 (single circuit)
THAEBY-THAESY 4240-4340 (double circuit)
THAETY-THAEQY 2110÷4340

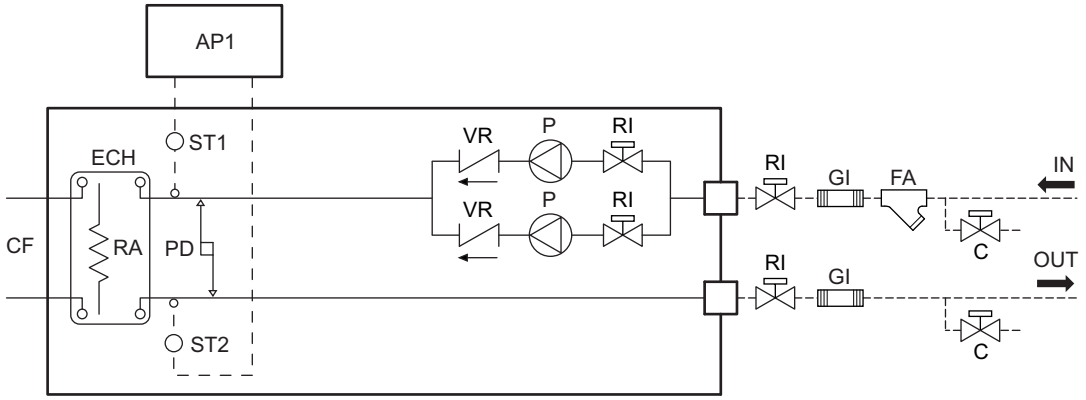


VERSION with STE tube and shell heat exchanger



DP1 – DP2 set-up hydraulic circuit (main heat exchanger)

VERSION with plate heat exchanger
TCAEBY-TCAESY 2110-2220 (single circuit)
TCAEBY-TCAESY 4150-4340 (double circuit)
THAEBY-THAESY 4150-4220 (double circuit)
TCAETY-TCAEQY 2110÷4340



VERSION with plate heat exchanger
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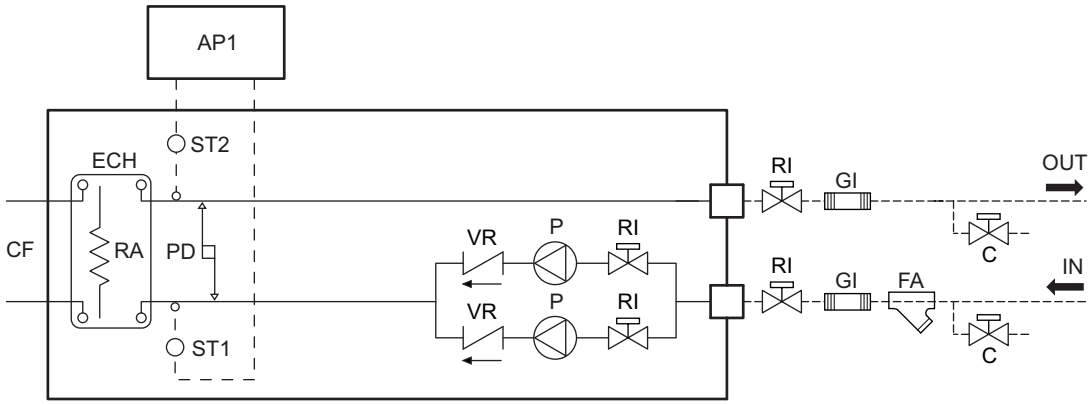
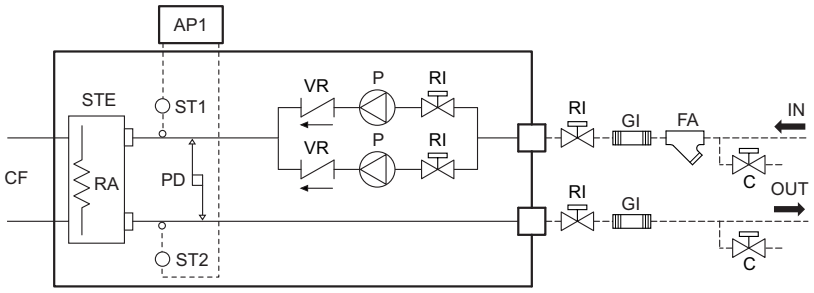
THAEBY-THAESY 4240-4340 (double circuit)
THAETY-THAEQY 2110÷4340

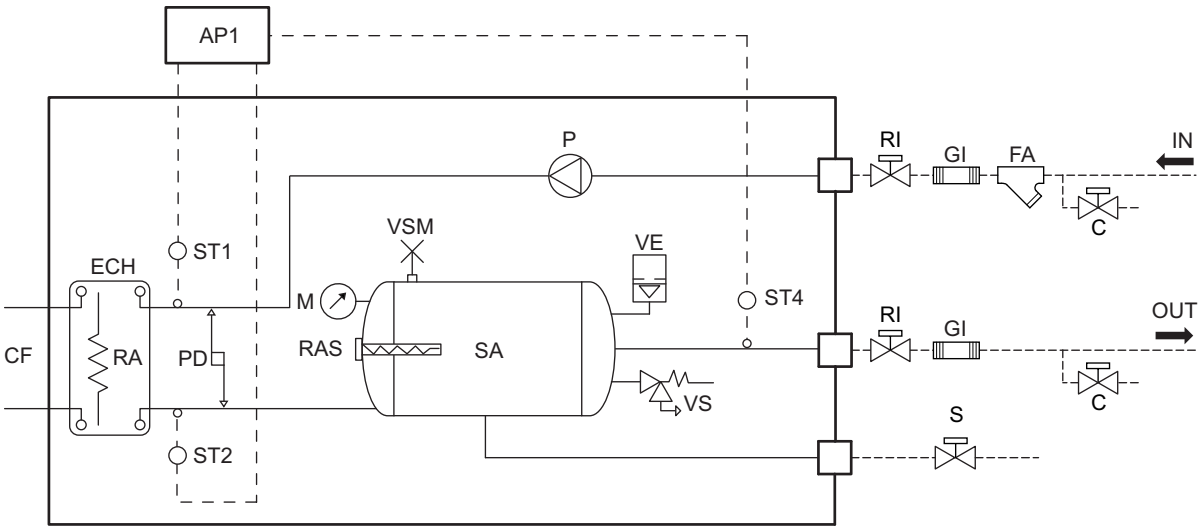


VERSION with STE tube and shell heat exchanger

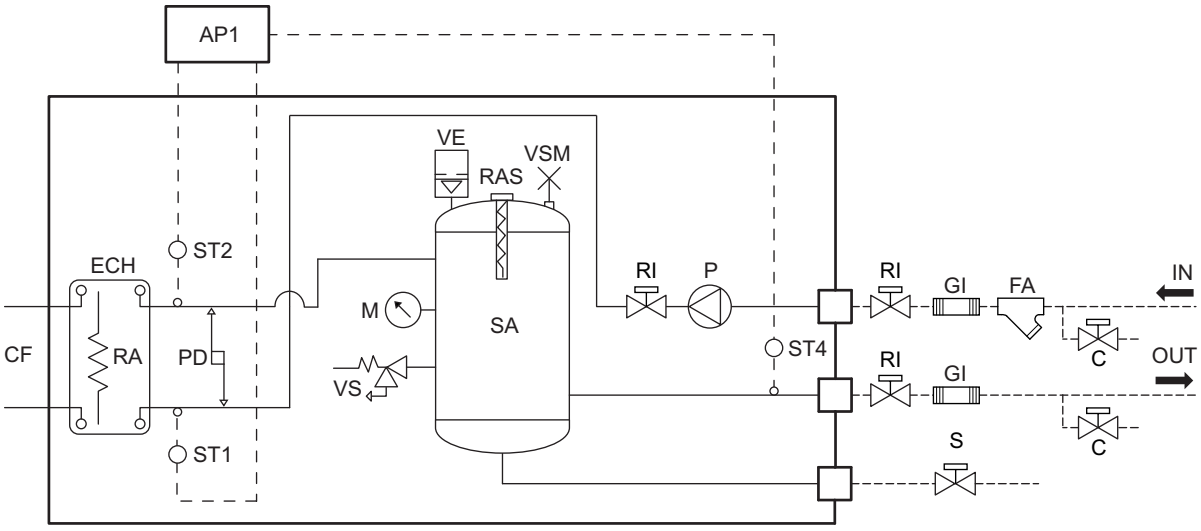


ASP1 - ASP2 set-up hydraulic circuit (main heat exchanger)

VERSION with plate heat exchanger
TCAEBY-TCAESY 2110-2220 (single circuit)
TCAEBY-TCAESY 4150-4340 (double circuit)
THAEBY-THAESY 4150-4220 (double circuit)
TCAETY-TCAEQY 2110÷4340

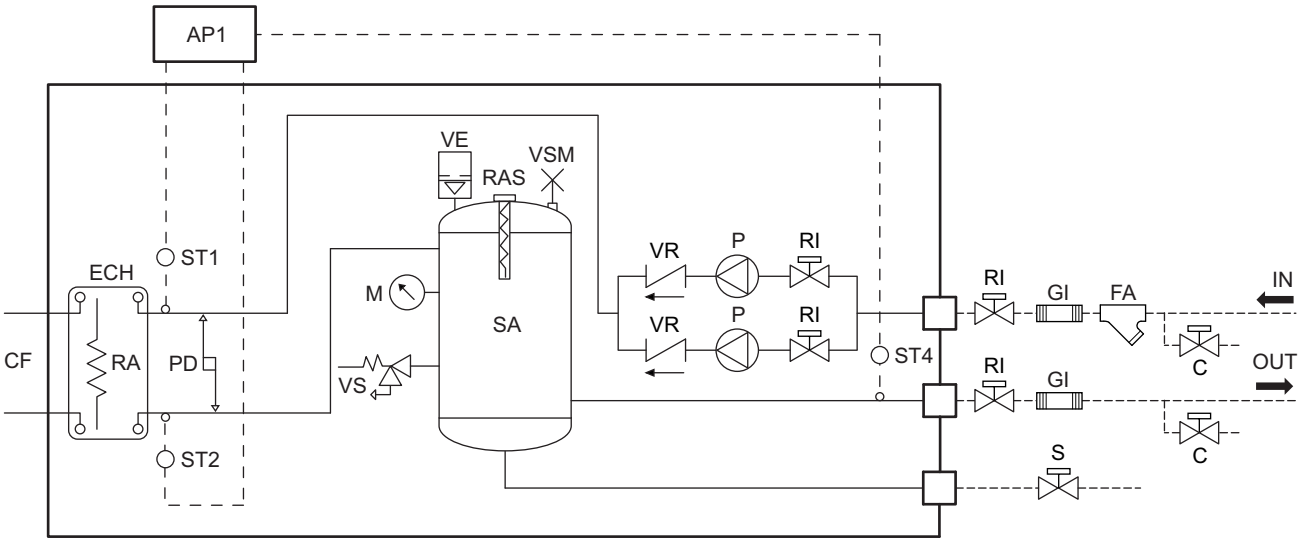


VERSION with plate heat exchanger
THAEBY-THAESY 2110-2220 (single circuit)
THAEBY-THAESY 4240-4340 (double circuit)
THAETY-THAEQY 2110÷4340



ASDP1 – ASDP2 set-up hydraulic circuit (main heat exchanger)

VERSION with plate heat exchanger
TCAEBY-TCAESY 2110-2220 (single circuit)
TCAEBY-TCAESY 4150-4340 (double circuit)
THAEBY-THAESY 4150-4220 (double circuit)
TCAETY-TCAEQY 2110÷4340



VERSION with plate heat exchanger
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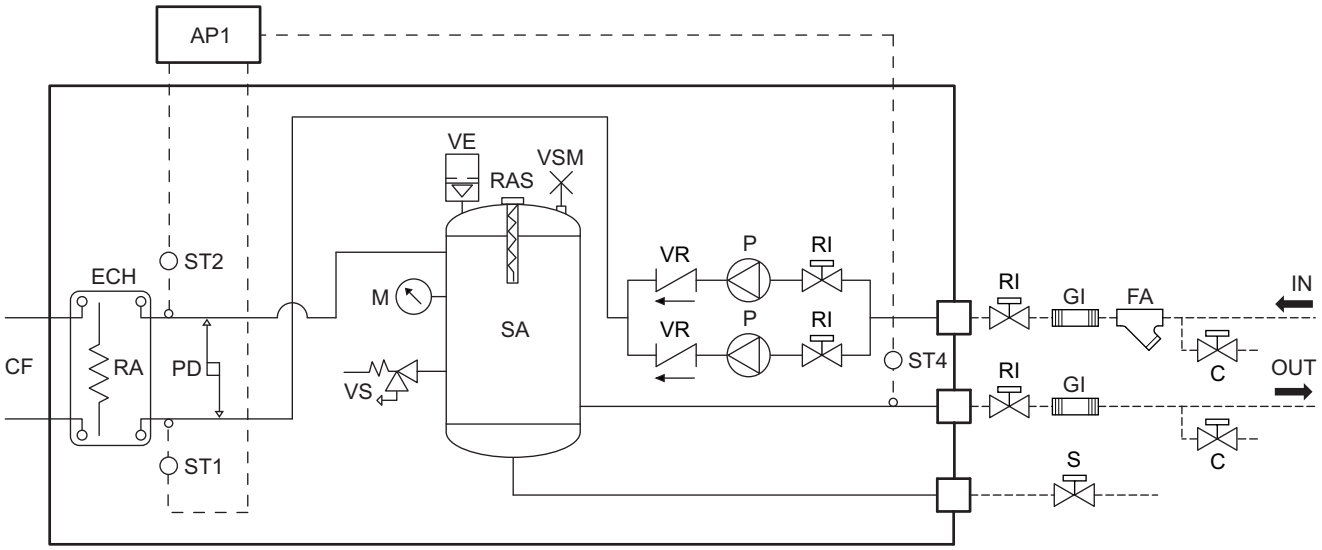
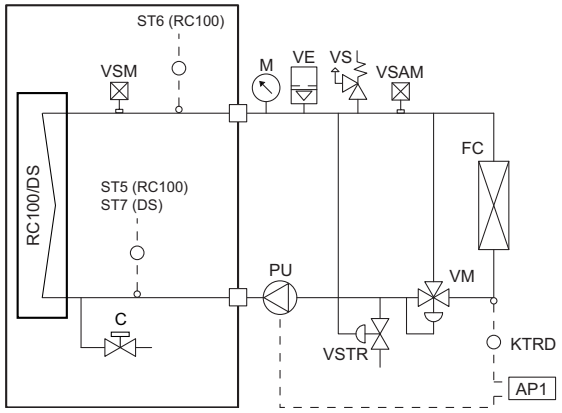


CF	Refrigerant circuit
ECH	Plate evaporator
RA	Heat exchanger/anti-freeze resistance
PD	Water differential pressure switch
VSM	Manual bleed valve
VS	safety valve
AP1	Electronic controls
ST1	Primary inlet temperature probe
ST2	Primary outlet temperature probe - work and antifreeze for Standard and Pump set-ups - antifreeze for Tank & Pump set-ups
ST4	Storage tank outlet temperature probe (work) (with RIS accessory only)
ST8	Secondary outlet temperature probe (recovery)

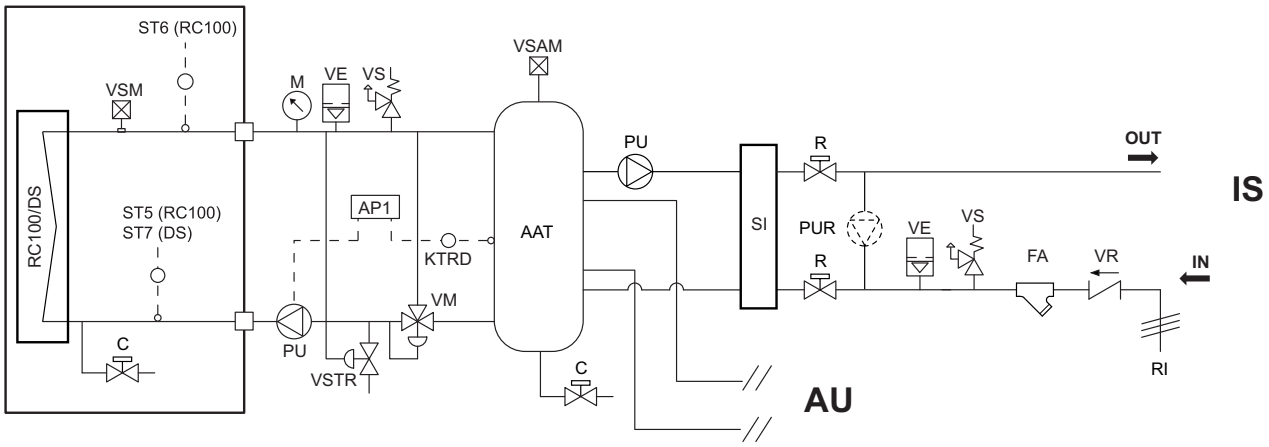
VE	Expansion vessel
RAS	Storage tank resistance (accessory)
FA	Mesh filter (set up by the installer)
SA	Storage tank
STE	Tube and shell exchanger (accessory)
M	Manometer
P	Pump
VR	Check Valve
S	Water drain
C	Supply/drain tap
RI	Shut-off tap
GI	Antivibration connection
- - - -	Connections by installer

SYSTEM SUGGESTION OF THE UNIT WITH ACCESSORY RC100/DS AND DHW PRODUCTION MANAGEMENT

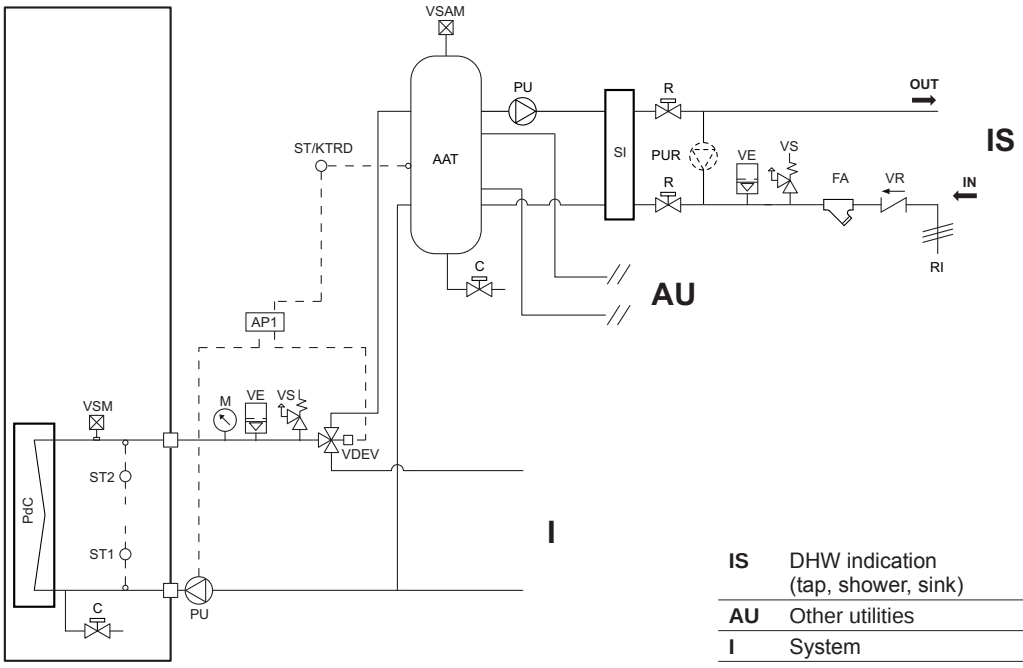
Closed circuit system (for heating, for example)



Open circuit system (for hot water, for example)

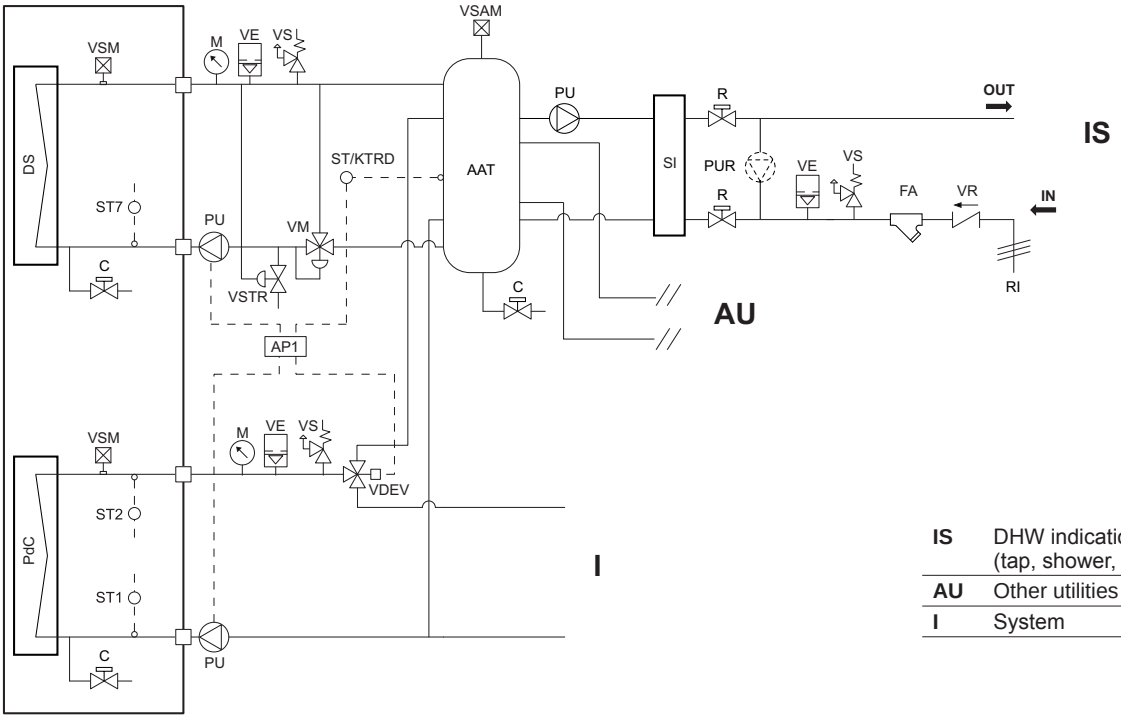


Open circuit system and simultaneous presence of 3-way diverter valve VDEV (for example for domestic hot water)



IS	DHW indication (tap, shower, sink)
AU	Other utilities
I	System

Open circuit system and simultaneous presence of 3-way diverter valve VDEV and DS desuperheater (for example for domestic hot water)



IS	DHW indication (tap, shower, sink)
AU	Other utilities
I	System

PdC	Reversible heat pump unit
RC100	Full recovery unit
DS	Desuperheater
M	Manometer
VS	safety valve
VE	Expansion vessel
VSTR	Recovery heat drain valve
VMS	Manual air bleed valve
VSAM	Automatic/manual air bleed valve
AP1	Unit board
VR	Check Valve
VM	3-way mixing valve
PU	Circulation pump
VDEV	3-way diverter valve
R	Cock
PUR	Recirculation loop circulation pump
FC	Fan coil/utility

UT	For use
RI	From the water mains
ST	Temperature probe
YES	Intermediate heat exchanger
ST8	RC100/DS inlet temperature probe
AAT	Technical water storage tank
C	Water drain/charge cock
ST	Temperature probe
KTRD	Thermostat with display (accessory)
FA	Water filter
ST1	Main heat exchanger inlet temperature probe
ST2	Main heat exchanger outlet temperature probe
ST5	RC100 inlet temperature probe
ST6	RC100 outlet temperature probe
ST7	DS inlet temperature probe

NOTA BENE: for the unit to operate properly, activation of the DC/RC100 recovery pump must be controlled by means of a specific discrete output provided in the board on the unit.

The RC100 secondary/recovery heat exchanger side pumps can be supplied as an accessory (PR1-PR2-DPR1-DPR2).

The minimum temperature of the water input to the recovery unit RC100 is equal to 20°C.
The minimum temperature of the water input to the recovery unit DS is equal to 40°C.

2-pipe system and domestic hot water tank on the secondary/recovery heat exchanger

In this type of system, the machine is connected to the primary water circuit with the main heat exchanger, whereas the secondary heat exchanger is connected to the circuit intended to heat the domestic hot water, as shown in the diagram below, as an example.

The following must be noted in order to calculate the minimum water content on the secondary side connected with the domestic hot water storage tank. The temperature of the domestic hot water can be affected by the natural defrost cycles of the machine, especially in winter. In fact, the machine runs with an inverted cycle during the defrost phase, thereby transferring a cooling capacity to the water that inevitably cools it. The fluctuation in temperature of the domestic water can cause performance deficiencies if the water circuit content of the secondary exchanger is insufficient.

The minimum specific capacity can be determined once the temperature fluctuation allowed is assigned.
The table below contains the minimum specific capacity values in l/kW pertaining to the secondary circuit, according to the temperature fluctuation of the DHW production. Therefore, the capacity of the **AAT** tank can be calculated, provided the installed power is known.

DHW temperature fluctuation dtu	**K**	4	5	6	7	8
Specific capacity	**l/kW**	22	18	15	13	12

Assuming that only one circuit at a time can defrost, the l/kW are: 11, 9, 7.5, 6.5, 6.

Application example

A system in which the maximum recovery heating capacity installed is equivalent to Qt installed=180 kW. A maximum temperature fluctuation of the domestic hot water equivalent to dtu=5K is permitted.
The secondary circuit content is thus determined:

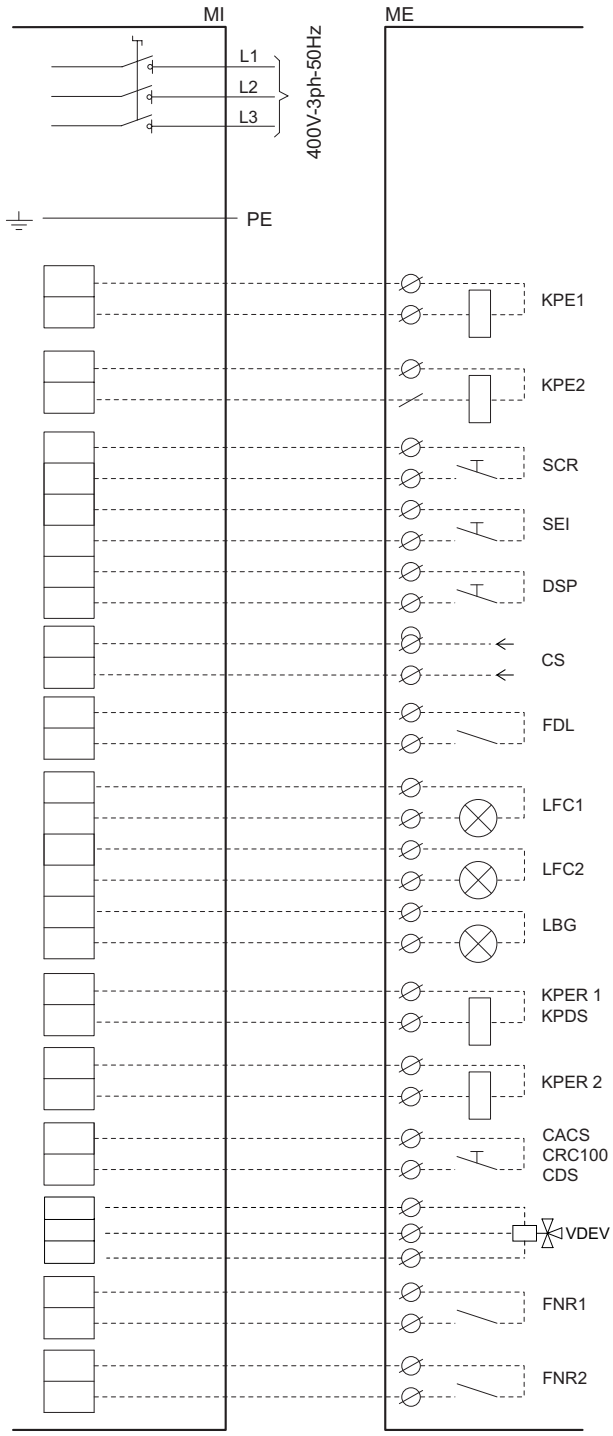
$QT_{installed}$ (kW) x 18 l/kW = 180 kW x 18 l/kW = 3240 l

The content of water in the secondary circuit must be below 3240 L. If the pipe water content is neglected, an **AAT** tank with a capacity of 3240 L is required for the example in question. In practical cases, it is recommended to never exceed dtu=6K, and always consider the maximum power expected.

Electrical connections

L	Line
PE	Earth connection
MI	Internal terminal board
ME	External terminal board
KPE1	Evaporator pump 1 wiring (consensus at voltage 230 Vac)
KPE2	Evaporator pump 2 wiring (consensus at voltage 230 Vac)
SEI	Summer/winter selector (control with potential free contact)
SCR	Remote control selector (control with clean contact)
DSP	Double set-point connector (DSP accessory) (control with clean contact)
CS	Shifting Set-point (CS accessory) (signal 4÷20 mA)
FDL	Forced download compressors (FDL accessory) (control with clean contact)
LFC1	Compressor 1 functioning light / circuit 1 (consent at 230 Vac)
LFC2	Compressor 2 functioning light / circuit 2 (consent at 230 Vac)
LBG	Machine general lock light (consensus in voltage 230 Vac)
VDEV	DHW deviator valve control (voltage consent 230 Vac, maximum load 0.5A AC1)
CACS CRC100 CDS	Domestic hot water diverter valve consent (control with potential free contact or temperature probe) or RC100/ DS consent
KPER1 KPDS	Recovery unit pump 1 control/desuperheater pump control (consent at 230 Vac)
KPER2	Recovery unit pump 2 control (consent at 230 Vac)
FNR	Forced Noise Reduction 1-2
- - -	Connection by installer

- 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 main automatic switch or fuses with adequate capacity and blackout power in a protected area or near the machine.



ATTENTION!
The following diagrams only show the connections to be made by the installer.
For electrical connections to the unit and the accessories, follow the wiring diagrams which are supplied with them.

Models		Line Section	PE section	Commands and controls section
2110	mm²	1 x 25	1 x 16	1,5
2120	mm²	1 x 35	1 x 16	1,5
2140	mm²	1 x 35	1 x 16	1,5
2150	mm²	1 x 50	1 x 25	1,5
2170	mm²	1 x 50	1 x 25	1,5
2200	mm²	1 x 70	1 x 35	1,5
2220	mm²	1 x 70	1 x 35	1,5
4150	mm²	1 x 50	1 x 25	1,5
4170	mm²	1 x 50	1 x 25	1,5
4200	mm²	1 x 70	1 x 35	1,5
4220	mm²	1 x 70	1 x 35	1,5
4240	mm²	1 x 95	1 x 50	1,5
4270	mm²	1 x 95	1 x 50	1,5
4310	mm²	1 x 120	1 x 70	1,5
4340	mm²	1 x 120	1 x 70	1,5

(*) Cable type FG7

K20343EN ed.6 - 11.16

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