K20351EN ed.2

TECHNICAL NOTE

R410A CE ISO 9001 BUREAU VERITAS Certification EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

EasyPACK
low consumption
TCAEY-THAEY
269÷2146

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

RHOSS
CREATING YOUR COMFORT

Index

EasyPACK

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

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

Rhoss presents **EasyPACK**, the new generation chillers and heat pumps from **65 to 145 kW** in air-cooled R410A, developed in line with the evolution in the HVAC market.

EasyPACK 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.

EasyPACK 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 7 dB(A)**.

EasyPACK is efficient all year round!

Thanks to the technology applied, **EasyPACK** models involve 2 scroll compressors being used, with 3 capacity steps, designed and configured so as to guarantee greater **control flexibility** and increased energy efficiency even at partial loads with **high ESEER and SCOP** values.

EasyPACK is flexible!

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

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

The new SIR function (Rhoss Integrated Sequencer) manages up to 4 connected units, ensuring precision, reliability and energy savings.

EasyPACK is environmentally friendly!

EasyPACK was designed to be more **eco-sustainable** and especially in keeping with the new regulations which increasingly restrict greenhouse gas content.

Plus, the possibility of equipping the **desuperheater or heat recovery** units for the production of hot water, makes it possible to **recover the energy** feeding out from the compressor, which would normally otherwise be released into 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 Cycle Global Warming Potential - An index which defines the global warming potential of the entire life cycle of the product. This index depends on: GWP of the refrigerant used, useful life of the product, estimated annual loss of refrigerant and end of life, amount of unit refrigerant.

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

General Features

Declared conditions of use

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.
THAETY THAESY THAEQY units are reversible packaged heat pumps on the cooling cycle with air evaporation/condensation and axial fans in 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 (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 EasyPACK" code						"MODEL" code	
T	**C**	**A**	**E**	**B** Basic	**Y**	**2**	**69÷146**
Water production unit	Cooling only	Air cooling	Scroll-type hermetic compressors	**T** High efficency	R410A refrigerant gas	Number of compressors	Approximate heating capacity (in kW)
				S Silenced			
				Q Super-silenced			

Guide to reading the code

"SERIES EasyPACK" code						"MODEL" code	
T	**H**	**A**	**E**	**T** High efficency	**Y**	**2**	**69÷146**
Water production unit	Heat pump	Air cooling	Scroll-type hermetic compressors	**S** Silenced	R410A refrigerant gas	Number of compressors	Approximate heating capacity (in kW)
				Q Super-silenced			

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 2146 ASP1

- Water production unit
- Cooling only;
- Air-cooled;
- 2 Scroll-type hermetic compressors;
- Super-silenced unit;
- R410A refrigerant fluid;
- Approximate nominal cooling capacity 146 kW;
- Installation with pump and water buffer tank.

New EasyPACK range

Low consumption chillers
energy yield, reliable and versatile

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

New R410A chillers with two scroll compressors installed on a cooling circuit to obtain up to three 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 EasyPACK 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!

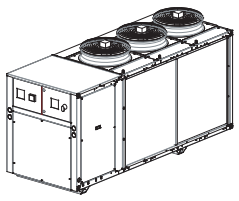
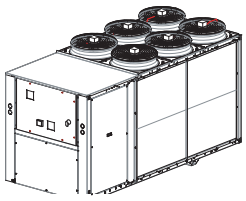
2. High precision: "Precision" Option

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 269÷2146 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

○ Scroll rotary hermetic compressors complete with internal thermal protection and resistance in the crankcase that is automatically activated when the unit stops (as long as the unit is electrically powered).
○ Duly insulated stainless steel brazed plate heat exchanger on the water circuit side (tube and shell heat exchanger - STE option).
○ Heat exchanger on air circuit side comprised of copper tubes and aluminium fins.
○ Axial electric fans with external rotor, equipped with internal thermal protection and complete with protection nets set up in single row or double row depending on the models.
○ The S-Silenced and Q-Super-silenced versions are standard and the proportional electronic device (FI10) for pressure and continuous fan rotation speed adjustment up to an outdoor air temperature of -10°C in chiller mode and up to an outdoor temperature of 40°C in heat pump mode.
○ Victaulic-type hydraulic connections.
○ Differential pressure switch to protect the unit from any interruptions in the water flow.
○ Cooling circuit built with annealed copper tube (EN 12735-1-2) complete with: cartridge dryer filter, load connections, safety pressure switch on the high pressure side with manual reset, LP and HP pressure transducer, safety valve/s, valve upstream of the filter, liquid indicator, insulation of the inlet line, thermostatic expansion valve or electronic expansion valve (accessory), cycle inversion valve and liquid receiver, non-return valve, gas separator on intake to the compressors and solenoid valve on the liquid line (for THAETY-THAESY-THAEQY).
○ Unit with protection rating IP24.
○ Control with ***AdaptiveFunction Plus*** function.
○ The unit is supplied filled with refrigerant fluid R410A.

Versions

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

In this case it is compulsory to use the pump cables contained in the unit's terminal block to manage the external pump provided by the user. Refer to the specific section on "Electrical connections" for details.

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.

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 230V-1ph+N-50Hz power supply voltage;
- auxiliary circuit power supply 230V-1ph-50Hz drawn from the main power supply;
- 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 (THAETY-THAESY-THAEQY); of the safety timers; of the circulation pump; of the system compressor and pump hour-run meter; dei cicli di sbrinamento; of the pressurised defrost cycles; electronic anti-freeze protection that is automatically activated when the unit is off; 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;
- 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 (THAETY-THAESY-THAEQY);
- user interface menu;
- automatic pump operating time balance (DP1-DP2, ASDP1-ASDP2, DPR1-DPR2 installations);
- automatic activation of standby pump in the event of an alarm (DP1-DP2, ASDP1- ASDP2, DPR1-DPR2 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:

- High-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 management logic integrated into the single units (SIR - Rhoss Integrated Sequencer) - See specific section for Explanation

○ 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 pump on recovery circuit RC100
P2 - Installation with increased head pump
PR2 - Installation with increased head pump on recovery circuit RC100
DP1 - Installation with double pump, including an automatically activated pump in stand-by.
DPR1 - Installation with double pump, including an automatically activated pump in stand-by on the recovery circuit RC100
DP2 - Installation with increased static pressure 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 on the recovery circuit RC100
ASP1 - Installation with pump and storage tank
ASDP1 - Installation with 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 (versions T,S,Q)
CAC - Compressor soundproof enclosures
INS - Compressor technical compartment soundproofing (standard in version S)
INS60 - Compressor technical compartment soundproofing with high acoustic impedance (standard in version Q)
RS - Cooling circuit intake and flow taps
DS - Desuperheater. Active in summer and winter mode for THAEY
RC100 - Heat recovery unit with 100% recovery. Active in summer and winter mode for THAEY. Refer to the specific section for the explanation.
FI10 - Modulating condensation control for continuous operation as a chiller with outdoor air temperature up to -10°C (standard in versions S-Q)
FI15 - Modulating condensation control with fans with EC motor (Brushless) for continuous operation as a chiller with outdoor air temperature up to -15°C
FIAP - Modulating condensation control with over-pressured fans with EC motor (Brushless) and useful static head according to the following table:

	Unit with a Ø630mm fan (TCAEBY-TCAETY-THAETY)
Available static head	Up to 130 Pa
Single fan absorption	Max 1.25 kW
Average increase in noise of the unit	2 dBA

SFS - Soft starter compressors
CR - Power factor correction capacitors (φ>0.94)
EEV - Electronic thermostatic valve
FDL - Forced Download Compressors. Compressor switch-off to limit the absorbed current and power (digital input)
FNR-S FNR-Q – Forced Noise Reduction. Forced noise reduction (digital input or time bands management) – Refer to the specific section for further details)
GM - Cooling circuit high and low pressure gauge
RQE - Electrical panel resistance (recommended for low outdoor air temperature)
RA - Evaporator antifreeze heater; this is used as protection against ice forming in the heat exchanger when the machine is switched off (as long as the unit is electrically powered)
RDR - Desuperheater antifreeze heater / recovery unit (DS or RC100), this is used as protection against ice forming in the heat exchanger when the machine is switched off (as long as the unit is electrically powered)
RAE1-RAR1 - 27W electric pump antifreeze heater (available with P1-P2-PR1-PR2-ASP1-ASP2 set ups); this is used as protection against ice forming in the heat exchanger when the machine is switched off (as long as the unit is electrically powered)
RAE2-RAR2 - 27W double electric pump antifreeze heater (available with DP1-DP2-DPR1-DPR2-ASDP1-ASDP2 set ups); this is used as protection against ice forming in the heat exchanger when the machine is switched off (as long as the unit is electrically powered)
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 Buffer tank anti-freeze (only with Tank&Pump - compatibly with RAS - See specific section for explanation
LDK - Refrigerant leakage detector
DSP - Double Set-point by means of digital input (incompatible with CS)
CS - Shifting set-point by means of analogue signal 4-20 mA (incompatible with DSP).
CMT - Control of minumin and maximum values of power voltage.
BT - Low temperature of produced water.
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. Energy efficiency optimisation – Refer to the specific section for further details
FTT10 - LON interface for serial dialogue with other devices (LON protocol)
RPB - Coil protection nets with work safety function (to be used as an alternative to accessory FMB)
FMB - Mechanical filters for the protection of the coils with leaf protection function (to be used as an alternative to accessory RPB).
RAP - Unit with pre-painted copper/aluminium condensation coils
BRR - Unit with copper/copper condensation coils
IMB - Protective packaging

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)
SAG - Rubber anti-vibration mounts (supplied not installed)
TQE - Electrical panel roof

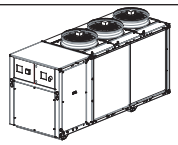
Accessories supplied separately

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 accessoryKRJ1220- 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



Model TCAEBY		**269**	**279**	**289**	**296**	**2112**
Nominal cooling capacity (*)	kW	66,0	72,5	78,0	87,0	106,0
EER		2,80	2,88	2,87	2,68	2,84
ESEER +		4,64	4,66	4,70	4,52	4,67
Nominal cooling capacity (*) (°) EN 14511:2013	kW	65,6	72,1	77,6	86,5	105,5
EER (*) (°) EN 14511:2013		2,74	2,81	2,81	2,62	2,79
ESEER EN 14511:2013		3,93	3,97	3,99	3,86	3,99
Sound pressure (***) (*)	dB(A)	50	50	50	50	52
Sound power (****) (*)	dB(A)	82	82	82	82	84
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1
Fans	n° x kW	2 x 0,69	2 x 0.69	2 x 0.69	2 x 0.69	3 x 0.69
Fan nominal air flow	m³/h	20800	20400	20100	20100	29500
Heat exchanger	Type	Plates/Shell and tube (STE accessory)				
Heat exchanger nominal flow water side (*)	m³/h	11,3	12,5	13,4	15,0	18,2
Water side heat exchanger nominal pressure drops (*)	kPa	39	47	38	46	41
Residual head P1 (*)	kPa	144	129	103	94	95
Residual head P2 (*)	kPa	203	195	177	170	174
Residual head ASP1 (*)	kPa	137	120	93	82	79
Residual head ASP2 (*)	kPa	196	187	166	157	158
Tank water content (ASP1/ASP2)	l	230	230	230	230	230
Nominal heating capacity RC100 (±)	kW	88,0	96,0	103,0	117,0	140,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,1 / 70	16,5 / 82	17,7 / 69	20,1 / 84	24,1 / 74
Nominal heating capacity DS (±)	kW	17,0	19,0	20,0	23,0	28,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,6 / 5	1,7 / 6	2,0 / 5	2,4 / 6
Amount of R410A refrigerant	Kg	12	14	17	17	21
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**
Absorbed power (*) (■)	kW	23,6	25,2	27,2	32,5	37,3
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50				
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50				
Nominal current (■)	A	39,2	41,9	45,2	54,0	62,0
Maximum current (■)	A	48,3	53,2	56,9	65,8	79,8
Starting current (■)	A	197,3	202,2	233,3	242,2	241,8
Starting current with SFS (■)	A	126,9	131,8	148,5	157,4	157,8
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**
Height (a)	mm	1700	1700	1700	1700	1700
Width (b)	mm	1210	1210	1210	1210	1210
Length (c)	mm	2650	2650	2650	2650	3250
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.
Weight	Kg	755	760	795	800	980

(*) 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.

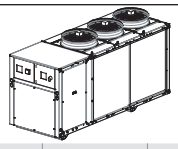
The peak current refers to the unit's most heavy duty operating conditions.

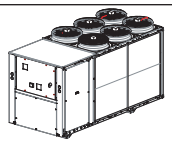
(°) Data calculated in accordance with EN 14511:2013 under nominal conditions.

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

Technical Data

Table "A": Technical Data





ModelTCAETY		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	69,5	79,5	90,5	96,5	112,5	126,0	145,0
EER		3,18	3,24	3,18	3,17	3,16	3,18	3,18
ESEER +		5,00	4,98	5,10	5,05	5,06	4,99	5,01
Nominal cooling capacity (*) (°) EN 14511:2013	kW	69,2	79,1	90,1	96,1	112	125,5	144,4
EER (*) (°) EN 14511:2013		3,12	3,18	3,12	3,11	3,1	3,12	3,12
ESEER EN 14511:2013		4,30	4,24	4,28	4,28	4,31	4,26	4,26
Sound pressure (***) (*)	dB(A)	50	51	51	51	53	54	54
Sound power (****) (*)	dB(A)	82	83	83	83	85	86	86
Sound power with FNR-S accessory (****)(*)	dB(A)	78	79	79	79	81	82	82
Sound power with FNR-Q accessory (****)(*)	dB(A)	n.d	n.d	n.d	n.d	78	79	79
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2 x 0,69	3 x 0,69	3 x 0,69	3 x 0,69	4 x 0,69	6 x 0,69	6 x 0,69
Fan nominal air flow	m³/h	21000	30000	30000	29500	39900	54700	52800
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,9	13,7	15,6	16,6	19,3	21,7	24,9
Water side heat exchanger nominal pressure drops (*)	kPa	31	32	31	34	35	35	39
Residual head P1 (*)	kPa	149	139	109	104	103	99	90
Residual head P2 (*)	kPa	211	210	185	181	183	181	174
Residual head ASP1 (*)	kPa	142	130	98	91	98	92	81
Residual head ASP2 (*)	kPa	204	202	174	169	178	174	165
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	89,0	101,0	116,0	124,0	144,0	160,0	185,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,3 / 54	17,4 / 52	19,9 / 51	21,3 / 58	24,8 / 58	27,5 / 59	31,8 / 66
Nominal heating capacity DS (±)	kW	17,0	20,0	22,0	24,0	28,0	32,0	36,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,7 / 5	1,9 / 6	2,1 / 5	2,4 / 6	2,8 / 6	3,1 / 6
Amount of R410A refrigerant	Kg	16	17	17	22	22	23	29
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power (*) (■)	kW	21,9	24,5	28,5	30,4	35,6	39,6	45,6
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Nominal current (■)	A	36,3	40,8	47,3	50,6	59,1	65,8	75,7
Maximum current (■)	A	48,3	54,8	63,4	67,4	81,4	93,2	106,2
Starting current (■)	A	197,3	203,8	239,8	243,8	243,4	269,6	332,2
Starting current with SFS (■)	A	126,9	133,4	155,0	159,0	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1700	1700	1700	1700	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.
Weight	Kg	850	865	870	905	1160	1195	1255

(*) 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.

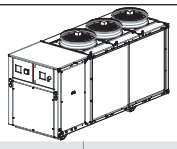
(■) Absorbed current/absorbed power value without electric pump.

The peak current refers to the unit's most heavy duty operating conditions.

(°) 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



Model TCAESY		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	68,0	77,0	88,0	92,5	108,5	122,5	139,5
EER		2,98	3,11	3,00	2,97	2,99	3,04	2,99
ESEER +		5,06	5,07	5,11	5,09	5,08	5,05	5,01
Nominal cooling capacity (*) (°) EN 14511:2013	kW	67,7	76,7	87,6	92,1	108	122	138,9
EER (*) (°) EN 14511:2013		2,92	3,05	2,95	2,92	2,94	2,99	2,94
ESEER EN 14511:2013		4,32	4,29	4,33	4,31	4,32	4,31	4,26
Sound pressure (***) (*)	dB(A)	46	47	47	47	49	50	50
Sound power (****) (*)	dB(A)	78	79	79	79	81	82	82
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2 x 0,48	3 x 0,48	3 x 0,48	3 x 0,48	4 x 0,48	6 x 0,48	6 x 0,48
Fan nominal air flow	m³/h	16000	23800	23800	23200	31600	42100	40300
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,7	13,2	15,1	15,9	18,7	21,1	24,0
Water side heat exchanger nominal pressure drops (*)	kPa	31	31	29	32	33	33	37
Residual head P1 (*)	kPa	149	143	112	107	106	102	94
Residual head P2 (*)	kPa	211	212	187	184	185	183	177
Residual head ASP1 (*)	kPa	142	134	101	95	101	96	86
Residual head ASP2 (*)	kPa	204	203	176	172	180	177	169
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	89,0	101,0	116,0	124,0	144,0	160,0	185,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,3 / 54	17,4 / 52	19,9 / 51	21,3 / 58	24,8 / 58	27,5 / 59	31,8 / 66
Nominal heating capacity DS (±)	kW	17,0	19,0	22,0	24,0	28,0	31,0	35,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,6 / 5	1,9 / 6	2,1 / 5	2,4 / 6	2,7 / 6	3,0 / 6
Amount of R410A refrigerant	Kg	16	17	17	22	22	23	29
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power (*) (■)	kW	22,8	24,8	29,3	31,1	36,3	40,3	46,7
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Nominal current (■)	A	37,9	41,2	48,7	51,7	60,3	66,9	77,6
Maximum current (■)	A	48,3	54,8	63,4	67,4	81,4	93,2	106,2
Starting current (■)	A	197,3	203,8	239,8	243,8	243,4	269,6	332,2
Starting current with SFS (■)	A	126,9	133,4	155,0	159,0	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1700	1700	1700	1700	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.
Weight	Kg	865	880	885	920	1180	1215	1275

(*) 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.

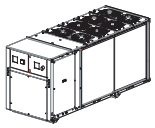
(■) Absorbed current/absorbed power value without electric pump.

The peak current refers to the unit's most heavy duty operating conditions.

(°) 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		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	65,0	71,5	85,0	90,0	101,5	117,0	131,5
EER		2,87	2,77	2,85	2,77	2,57	2,76	2,63
ESEER +		4,98	4,93	5,05	4,94	4,68	4,73	4,70
Nominal cooling capacity (*) (°) EN 14511:2013	kW	64,7	71,2	84,6	89,6	101,1	116,5	131
EER (*) (°) EN 14511:2013		2,82	2,72	2,8	2,72	2,53	2,72	2,59
ESEER EN 14511:2013		4,29	4,20	4,29	4,21	3,99	4,04	3,97
Sound pressure (***) (*)	dB(A)	42	42	43	43	46	47	47
Sound power (****) (*)	dB(A)	74	74	75	75	78	79	79
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	6 x 0,09	6 x 0,09	8 x 0,09	8 x 0,09	4 x 0,34	6 x 0,34	6 x 0,34
Fan nominal air flow	m³/h	15700	15700	19900	19400	22700	31000	30000
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,2	12,3	14,6	15,5	17,5	20,1	22,6
Water side heat exchanger nominal pressure drops (*)	kPa	30	29	30	32	29	31	33
Residual head P1 (*)	kPa	150	147	111	107	111	106	100
Residual head P2 (*)	kPa	212	214	186	184	188	186	183
Residual head ASP1 (*)	kPa	144	139	100	95	106	100	93
Residual head ASP2 (*)	kPa	205	206	175	172	184	181	176
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	89,0	101,0	116,0	124,0	144,0	160,0	185,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,3 / 54	17,4 / 52	19,9 / 51	21,3 / 58	24,8 / 58	27,5 / 59	31,8 / 66
Nominal heating capacity DS (±)	kW	17,0	19,0	22,0	24,0	27,0	31,0	34,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,6 / 5	1,9 / 6	2,1 / 5	2,3 / 6	2,7 / 6	2,9 / 6
Amount of R410A refrigerant	Kg	16	17	17	22	22	23	29
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power (*) (■)	kW	22,6	25,8	29,8	32,5	39,5	42,4	50,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Nominal current (■)	A	37,5	42,9	49,5	54,0	65,6	70,4	83,1
Maximum current (■)	A	58,3	63,2	76,2	80,2	81,4	93,2	106,2
Starting current (■)	A	207,3	212,2	252,6	256,6	243,4	269,6	332,2
Starting current with SFS (■)	A	136,9	141,8	167,8	171,8	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1520	1520	1520	1520	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	2" 1/4 Vic.	2" 1/4 Vic.	2" 1/4 Vic.
Weight	Kg	920	925	940	980	1230	1265	1320

(*) 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.

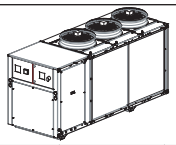
(■) Absorbed current/absorbed power value without electric pump.

The peak current refers to the unit's most heavy duty operating conditions.

(°) 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		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	67,5	77,0	87,0	94,0	108,0	122,0	140,0
EER		2,99	3,05	3,00	2,97	2,96	3,00	2,98
ESEER +		4,86	4,78	4,91	4,85	4,87	4,69	4,75
Nominal cooling capacity (*) (°) EN 14511:2013	kW	67,2	76,7	86,6	93,6	107,5	121,5	139,4
EER (*) (°) EN 14511:2013		2,94	2,99	2,95	2,92	2,91	2,95	2,93
ESEER EN 14511:2013		4,19	4,07	4,13	4,11	4,14	4,01	4,04
Nominal heating capacity (**)	kW	73,0	82,0	92,0	100,0	118,0	132,5	151,0
COP		3,39	3,40	3,34	3,32	3,35	3,28	3,26
Nominal heating capacity (**) (°) EN 14511:2013	kW	73,4	82,4	92,4	100,5	118,5	133,1	151,7
COP (*) (°) EN 14511:2013		3,35	3,36	3,31	3,28	3,31	3,25	3,23
Sound pressure (***) (*)	dB(A)	50	51	51	51	53	54	54
Sound power (****) (*)	dB(A)	82	83	83	83	85	86	86
Sound power with FNR-S accessory (****)(*)		78	79	79	79	81	82	82
Sound power with FNR-Q accessory (****)(*)		n.d	n.d	n.d	n.d	78	79	79
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2 x 0,69	3 x 0,69	3 x 0,69	3 x 0,69	4 x 0,69	6 x 0,69	6 x 0,69
Fan nominal air flow	m³/h	21100	30100	30100	29600	40100	55100	53500
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,6	13,2	15,0	16,2	18,6	21,0	24,1
Water side heat exchanger nominal pressure drops (*)	kPa	30	31	30	33	34	34	38
Residual head P1 (*)	kPa	151	142	110	106	105	101	92
Residual head P2 (*)	kPa	212	212	186	183	184	182	175
Residual head ASP1 (*)	kPa	144	133	99	93	100	94	83
Residual head ASP2 (*)	kPa	206	203	175	170	179	176	167
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	88,0	99,0	113,0	123,0	141,0	157,0	182,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,1 / 52	17 / 53	19,4 / 51	21,2 / 56	24,2 / 58	27 / 57	31,3 / 64
Nominal heating capacity DS (±)	kW	17,0	19,0	22,0	24,0	27,0	31,0	35,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,6 / 5	1,9 / 6	2,1 / 5	2,3 / 6	2,7 / 6	3,0 / 6
Amount of R410A refrigerant	Kg	27	27	28	35	34	35	44
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power in summer mode (*) (■)	kW	22,6	25,2	29,0	31,6	36,5	40,7	47,0
Absorbed power in winter mode (**) (■)	kW	21,5	24,1	27,5	30,1	35,2	40,4	46,3
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Summer operation nominal current (*) (■)	A	37,5	41,9	48,2	52,5	60,6	67,6	78,1
Maximum current (■)	A	48,3	54,8	63,4	67,4	81,4	93,2	106,2
Starting current (■)	A	197,3	203,8	239,8	243,8	243,4	269,6	332,2
Starting current with SFS (■)	A	126,9	133,4	155,0	159,0	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1700	1700	1700	1700	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.
Weight	Kg	915	930	935	980	1240	1280	1355

(*) 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 $0.35x10^{-4}$ m² 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.

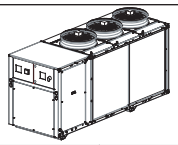
(■) Absorbed current/absorbed power value without electric pump.

The peak current refers to the unit's most heavy duty operating conditions.

(°) 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



ModelTHAESY		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	66,5	75,0	86,0	90,0	105,0	119,5	137,5
EER		2,90	2,96	2,90	2,85	2,85	2,93	2,91
ESEER +		4,97	4,86	4,94	4,87	4,96	4,79	4,90
Nominal cooling capacity (*) (°) EN 14511:2013	kW	66,2	74,7	85,7	89,6	104,6	119	136,9
EER (*) (°) EN 14511:2013		2,85	2,91	2,85	2,8	2,8	2,88	2,86
ESEER EN 14511:2013		4,24	4,11	4,18	4,13	4,21	4,09	4,17
Nominal heating capacity (**)	kW	70,5	80,0	90,0	97,5	114,5	128,5	147,0
COP		3,36	3,40	3,34	3,33	3,33	3,30	3,30
Nominal heating capacity (**) (°) EN 14511:2013	kW	70,8	80,4	90,4	98	115	129,1	147,6
COP (*) (°) EN 14511:2013		3,32	3,36	3,31	3,29	3,3	3,27	3,27
Sound pressure (***) (*)	dB(A)	46	47	47	47	49	50	50
Sound power (****) (*)	dB(A)	78	79	79	79	81	82	82
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	2 x 0,48	3 x 0,48	3 x 0,48	3 x 0,48	4 x 0,48	6 x 0,48	6 x 0,48
Fan nominal air flow	m³/h	16900	23900	23900	23400	31800	42700	41000
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,4	12,9	14,8	15,5	18,1	20,5	23,6
Water side heat exchanger nominal pressure drops (*)	kPa	28	31	27	31	31	33	36
Residual head P1 (*)	kPa	155	144	113	109	107	103	95
Residual head P2 (*)	kPa	214	212	188	185	186	184	178
Residual head ASP1 (*)	kPa	149	136	103	97	103	97	88
Residual head ASP2 (*)	kPa	208	204	178	173	181	178	171
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	88,0	99,0	113,0	123,0	141,0	157,0	182,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,1 / 52	17 / 53	19,4 / 51	21,2 / 56	24,2 / 58	27 / 57	31,3 / 64
Nominal heating capacity DS (±)	kW	17,0	19,0	22,0	24,0	27,0	31,0	35,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,6 / 5	1,9 / 6	2,1 / 5	2,3 / 6	2,7 / 6	3,0 / 6
Amount of R410A refrigerant	Kg	27	27	28	35	34	35	44
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power in summer mode (*) (■)	kW	22,9	25,3	29,7	31,6	36,8	40,8	47,3
Absorbed power in winter mode (**) (■)	kW	21,0	23,5	26,9	29,3	34,4	38,9	44,5
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Summer operation nominal current (*) (■)	A	38,0	42,0	49,3	52,5	61,1	67,8	78,6
Maximum current (■)	A	48,3	54,8	63,4	67,4	81,4	93,2	106,2
Starting current (■)	A	197,3	203,8	239,8	243,8	243,4	269,6	332,2
Starting current with SFS (■)	A	126,9	133,4	155,0	159,0	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1700	1700	1700	1700	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.
Weight	Kg	930	945	950	995	1260	1300	1375

(*) 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.

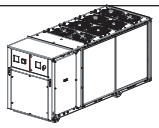
(■) Absorbed current/absorbed power value without electric pump.

The peak current refers to the unit's most heavy duty operating conditions.

(°) 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		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Nominal cooling capacity (*)	kW	64,0	70,0	83,0	87,0	99,5	112,5	129,0
EER		2,77	2,67	2,75	2,70	2,49	2,58	2,54
ESEER +		4,83	4,72	4,88	4,73	4,56	4,54	4,56
Nominal cooling capacity (*) (°) EN 14511:2013	kW	63,7	69,7	82,7	86,6	99,1	112,1	128,5
EER (*) (°) EN 14511:2013		2,72	2,63	2,71	2,66	2,46	2,54	2,51
ESEER EN 14511:2013		4,17	4,02	4,15	4,03	3,89	3,88	3,85
Nominal heating capacity (**)	kW	70,0	77,0	88,0	95,0	110,5	125,0	143,0
COP		3,35	3,33	3,30	3,29	3,24	3,26	3,25
Nominal heating capacity (**) (°) EN 14511:2013	kW	70,3	77,3	88,4	95,4	111	125,5	143,6
COP (*) (°) EN 14511:2013		3,31	3,3	3,27	3,26	3,21	3,23	3,22
Sound pressure (***) (*)	dB(A)	42	42	43	43	46	47	47
Sound power (****) (*)	dB(A)	74	74	75	75	78	79	79
Scroll/step compressor	n°	2/3	2/3	2/3	2/3	2/3	2/3	2/3
Circuits	n°	1	1	1	1	1	1	1
Fans	n° x kW	6 x 0,09	6 x 0,09	8 x 0,09	8 x 0,09	4 x 0,34	6 x 0,34	6 x 0,34
Fan nominal air flow	m³/h	15800	15800	20000	19600	22900	31400	30400
Heat exchanger	Type	Plates/Shell and tube (STE accessory)						
Heat exchanger nominal flow water side (*)	m³/h	11,0	12,0	14,3	15,0	17,1	19,3	22,2
Water side heat exchanger nominal pressure drops (*)	kPa	29	28	28	31	28	30	32
Residual head P1 (*)	kPa	152	149	112	109	112	107	102
Residual head P2 (*)	kPa	213	215	187	185	189	187	184
Residual head ASP1 (*)	kPa	146	142	102	97	108	102	95
Residual head ASP2 (*)	kPa	207	208	177	173	185	182	177
Tank water content (ASP1/ASP2)	l	230	230	230	230	440	440	440
Nominal heating capacity RC100 (±)	kW	88,0	99,0	113,0	123,0	141,0	157,0	182,0
Nominal flow rate/pressure drop RC100 (±)	m³/h/kPa	15,1 / 52	17 / 53	19,4 / 51	21,2 / 56	24,2 / 58	27 / 57	31,3 / 64
Nominal heating capacity DS (±)	kW	17,0	18,0	22,0	23,0	26,0	30,0	34,0
Nominal flow rate/pressure drop DS (±)	m³/h/kPa	1,5 / 5	1,5 / 5	1,9 / 6	2,0 / 5	2,2 / 6	2,6 / 6	2,9 / 6
Amount of R410A refrigerant	Kg	27	27	28	35	34	35	44
Polyester oil charge	Kg	5,3	5,3	5,3	5,3	7,8	7,8	7,8
Electrical data		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Absorbed power in summer mode (*) (■)	kW	23,1	26,2	30,2	32,2	40,0	43,6	50,8
Absorbed power in winter mode (**) (■)	kW	20,9	23,1	26,7	28,9	34,1	38,3	44,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	1,1 / 2,2	1,1 / 2,2	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0	1,5 / 3,0
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary electrical power supply	V-ph-Hz	230 – 1+N – 50						
Summer operation nominal current (*) (■)	A	38,4	43,5	50,2	53,5	66,4	72,4	84,4
Maximum current (■)	A	58,3	63,2	76,2	80,2	81,4	93,2	106,2
Starting current (■)	A	207,3	212,2	252,6	256,6	243,4	269,6	332,2
Starting current with SFS (■)	A	136,9	141,8	167,8	171,8	159,4	184,8	217,4
Pump absorbed current (P1/ASP1) / (P2/ASP2)	A	2,4 / 4,5	2,4 / 4,5	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3	3,2 / 6,3
Dimensions		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Height (a)	mm	1520	1520	1520	1520	2000	2000	2000
Width (b)	mm	1210	1210	1210	1210	1520	1520	1520
Length (c)	mm	3250	3250	3250	3250	3450	3450	3450
Heat exchanger inlet/outlet connections and RC100	Ø	2" Vic.	2" Vic.	2" Vic.	2" Vic.	2" 1/2 Vic.	2" 1/2 Vic.	2" 1/2 Vic.
DS inlet/outlet connections	Ø	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	1" 1/4 Vic.	2" 1/4 Vic.	2" 1/4 Vic.	2" 1/4 Vic.
Weight	Kg	985	990	1010	1050	1305	1350	1420

(*) 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 peak current refers to the unit's most heavy duty operating conditions.

(°) 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).

$$\mathbf{IPLV} \quad \frac{\mathbf{1*EER}100\%\mathbf{+\ 42*EER}75\%\mathbf{+\ 45*EER}50\%\mathbf{+\ 12*EER}25\%}{\mathbf{100}}$$

$$\mathbf{ESEER} \quad \frac{\mathbf{3*EER}100\%\mathbf{+\ 33*EER}75\%\mathbf{+\ 41*EER}50\%\mathbf{+\ 23*EER}25\%}{\mathbf{100}}$$

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%
269	3,93	2,73	3,53	4,16	4,23
279	3,97	2,80	3,55	4,23	4,25
289	3,99	2,81	3,59	4,17	4,38
296	3,86	2,62	3,41	4,12	4,19
2112	3,99	2,78	3,61	4,19	4,34

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%
269	4,30	3,11	3,93	4,53	4,60
279	4,24	3,17	3,89	4,47	4,46
289	4,28	3,12	3,94	4,50	4,55
296	4,28	3,11	3,90	4,53	4,56
2112	4,31	3,10	3,95	4,51	4,62
2125	4,26	3,12	3,87	4,51	4,53
2146	4,26	3,12	3,95	4,45	4,52

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%
269	4,32	2,92	3,80	4,62	4,72
279	4,29	3,05	3,84	4,58	4,60
289	4,33	2,95	3,84	4,61	4,70
296	4,31	2,91	3,81	4,62	4,68
2112	4,32	2,94	3,86	4,57	4,72
2125	4,31	2,99	3,84	4,60	4,65
2146	4,26	2,94	3,83	4,50	4,62

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%
269	4,29	2,81	3,69	4,62	4,74
279	4,20	2,72	3,60	4,56	4,62
289	4,29	2,80	3,72	4,62	4,73
296	4,21	2,72	3,63	4,55	4,63
2112	3,99	2,53	3,45	4,26	4,44
2125	4,04	2,72	3,55	4,33	4,43
2146	3,97	2,59	3,47	4,24	4,40

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%
269	4,19	2,93	3,77	4,44	4,51
279	4,07	2,99	3,70	4,31	4,31
289	4,13	2,95	3,76	4,35	4,41
296	4,11	2,91	3,69	4,36	4,40
2112	4,14	2,91	3,77	4,35	4,47
2125	4,01	2,95	3,68	4,22	4,25
2146	4,04	2,92	3,73	4,22	4,30

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%
269	4,24	2,85	3,73	4,53	4,64
279	4,11	2,90	3,67	4,39	4,42
289	4,18	2,85	3,71	4,45	4,55
296	4,13	2,80	3,64	4,41	4,48
2112	4,21	2,80	3,73	4,47	4,64
2125	4,09	2,88	3,67	4,34	4,41
2146	4,17	2,86	3,74	4,41	4,54

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%
269	4,17	2,72	3,61	4,48	4,60
279	4,02	2,62	3,47	4,35	4,43
289	4,15	2,70	3,59	4,46	4,59
296	4,03	2,65	3,49	4,34	4,44
2112	3,89	2,45	3,36	4,16	4,34
2125	3,88	2,54	3,37	4,17	4,27
2146	3,85	2,50	3,36	4,11	4,27

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.

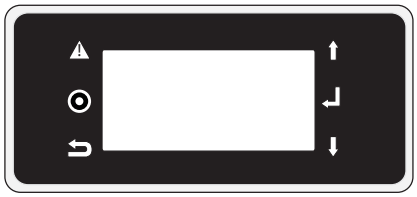
The seasonal efficiency in SEER cooling mode depends on a unique design temperature of 35°C and is indicated for 2 types of distribution:

- 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.

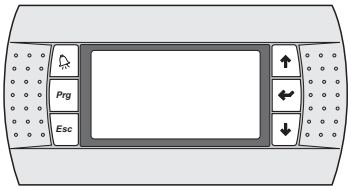
UP key
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points

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

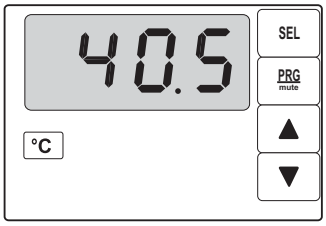
UP key: used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points

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).

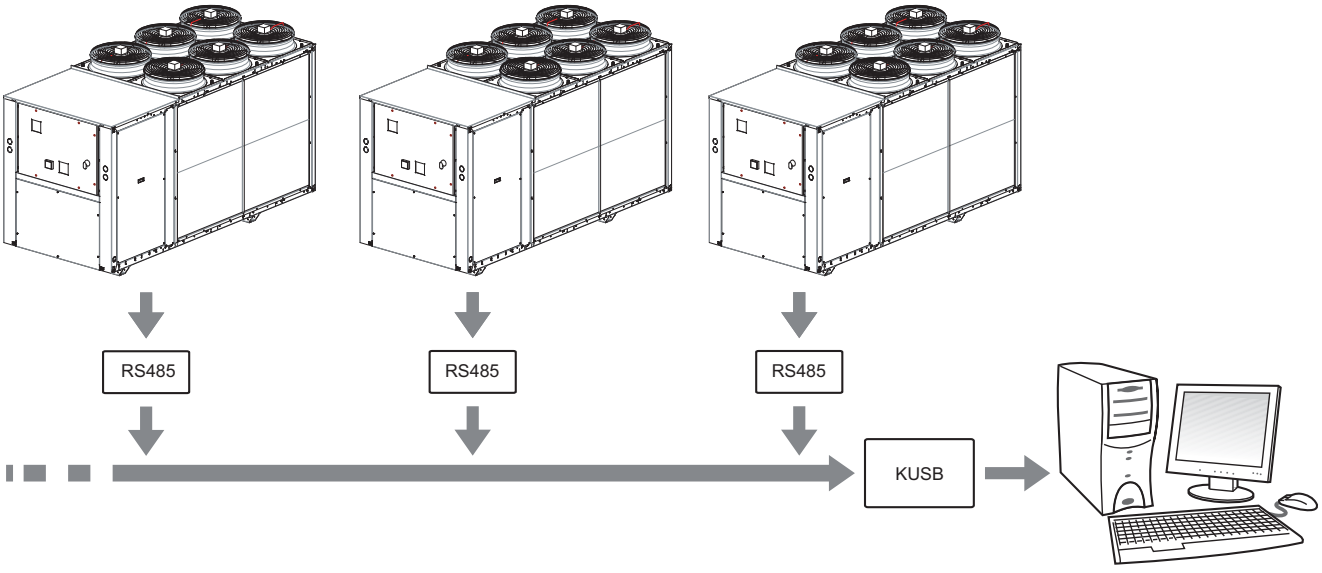
Supervision

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

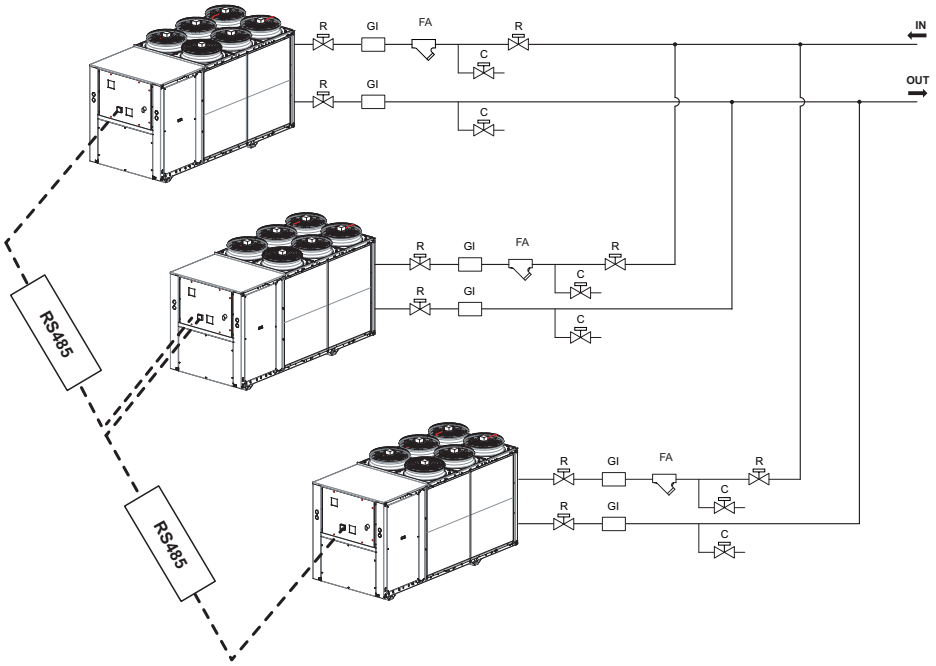
The clock card (standard in the EasyPACK units) enhances unit flexibility and efficiency, displaying the date/time and allowing machine management with daily and weekly start/stop time bands, with the possibility of changing the set points. The time bands are set and managed via the keyboard.

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.

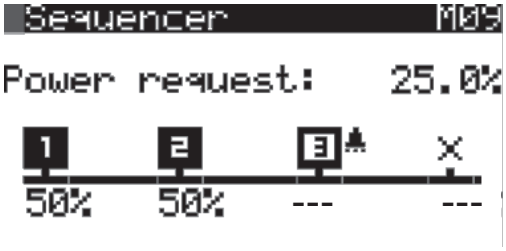
If the chillers are supplied with the **heat recovery accessory** (DS and RC100), hot water production from the dedicated heat exchanger will not be sequenced.

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.

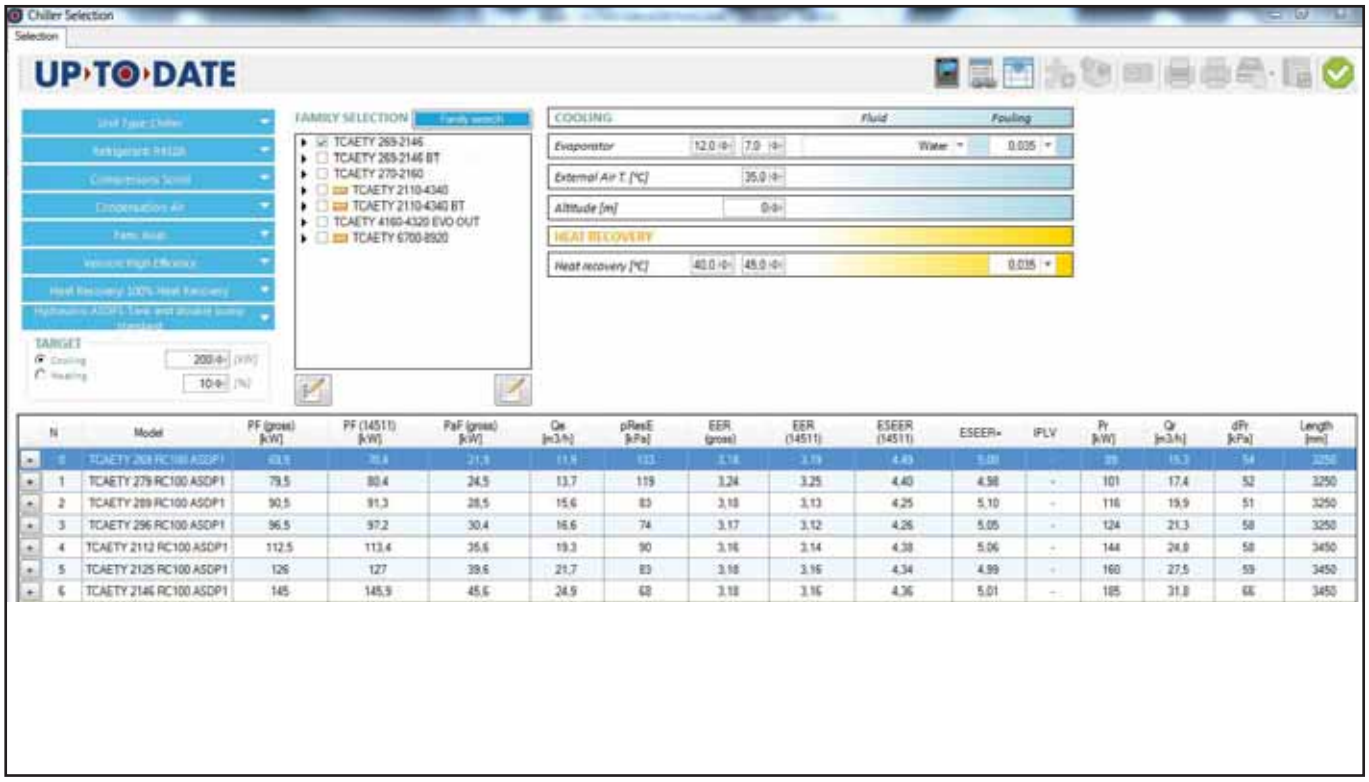
- Units 1 and 2 are on at 50%;
- Unit 3 is affected by an alarm;
- Unit 4 is disconnected from the network.

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.

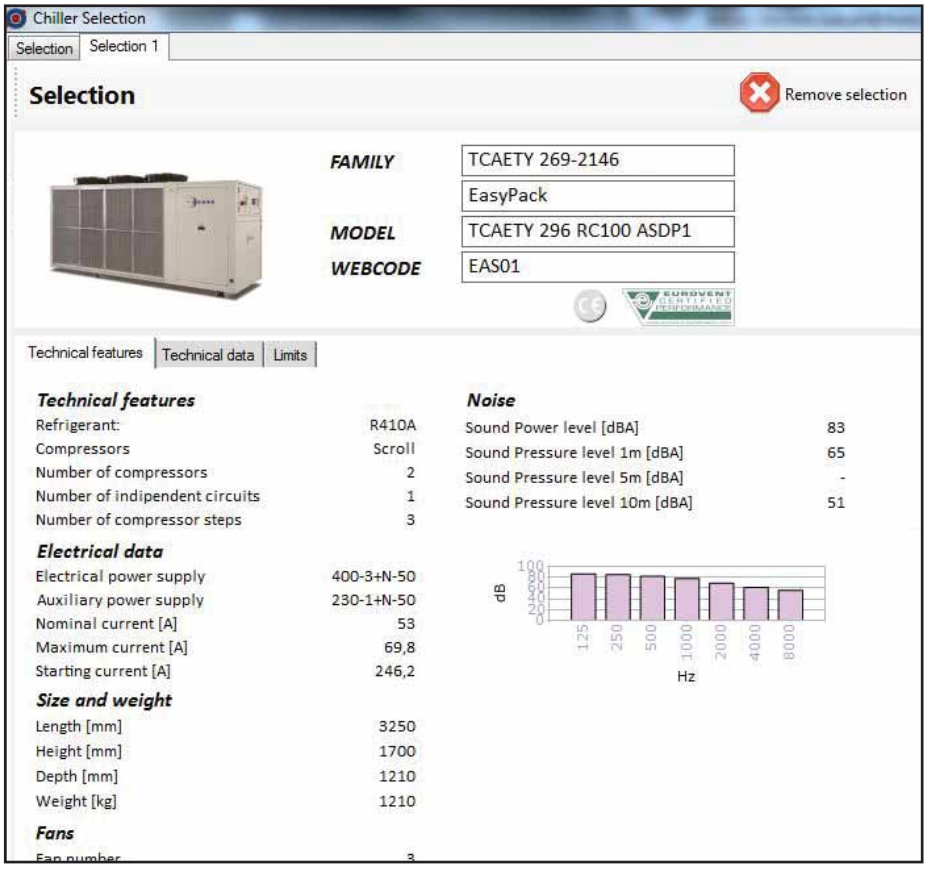
Perfomance

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 (gross) [kW]	PF (14511) [kW]	PaF (gross) [kW]	Qw [m3/h]	pResE [kPa]	EER (gross)	EER (14511)	ESEER (14511)	ESEER-	IPLV	Pr [kW]	Qr [m3/h]	dPr [kPa]	Length [mm]
0	TCAETY 269 RC100 ASDP1	69,5	70,4	21,9	11,9	103	3,16	3,19	4,49	5,00	-	89	15,3	54	3250
1	TCAETY 279 RC100 ASDP1	79,5	80,4	24,5	13,7	119	3,24	3,25	4,40	4,98	-	101	17,4	52	3250
2	TCAETY 289 RC100 ASDP1	90,5	91,3	28,5	15,6	83	3,10	3,13	4,25	5,10	-	116	19,9	51	3250
3	TCAETY 296 RC100 ASDP1	96,5	97,2	30,4	16,6	74	3,17	3,12	4,26	5,05	-	124	21,3	58	3250
4	TCAETY 2112 RC100 ASDP1	112,5	113,4	35,6	19,3	90	3,16	3,14	4,38	5,06	-	144	24,8	58	3450
5	TCAETY 2125 RC100 ASDP1	126	127	39,6	21,7	83	3,18	3,16	4,34	4,99	-	160	27,5	59	3450
6	TCAETY 2146 RC100 ASDP1	145	145,9	45,6	24,9	68	3,18	3,16	4,36	5,01	-	185	31,8	66	3450



Sound power and pressure levels

Models		Sound power level in dB for octave bands									Sound pressure level in dB(A)	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAEBY	**269 (1)**	85	85	84	81	77	68	60	55	82	50,0	64,0
	279 (1)	85	85	84	81	77	68	60	55	82	50,0	64,0
	289 (1)	85	85	84	81	77	68	60	55	82	50,0	64,0
	296 (1)	85	85	84	81	77	68	60	55	82	50,0	64,0
	2112 (1)	87	87	86	83	79	70	62	57	84	52,0	66,0

Models		Sound power level in dB for octave bands									Sound pressure level in dB(A)	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAETY THAETY	**269 (1)(2)**	85	85	84	81	77	68	60	55	82	50,0	65,0
	279 (1)(2)	86	86	85	82	78	69	61	56	83	51,0	65,0
	289 (1)(2)	86	86	85	82	78	69	61	56	83	51,0	65,0
	296 (1)(2)	86	86	85	82	78	69	61	56	83	51,0	65,0
	2112 (1)(2)	88	88	87	84	80	71	63	58	85	53,0	66,0
	2125 (1)(2)	89	89	88	85	81	72	64	59	86	54,0	67,0
	2146 (1)(2)	89	89	88	85	81	72	64	59	86	54,0	67,0

Models		Sound power level in dB for octave bands									Sound pressure level in dB(A)	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAESY THAESY (•)	**269 (3)**	80	80	79	76	74	67	58	50	78	46,0	60,0
	279 (3)	81	81	80	77	75	68	59	51	79	47,0	61,0
	289 (3)	81	81	80	77	75	68	59	51	79	47,0	61,0
	296 (3)	81	81	80	77	75	68	59	51	79	47,0	61,0
	2112 (3)	83	83	82	79	77	70	61	53	81	49,0	62,0
	2125 (3)	84	84	83	80	78	71	62	54	82	50,0	63,0
	2146 (3)	84	84	83	80	78	71	62	54	82	50,0	63,0

Models		Sound power level in dB for octave bands									Sound pressure level in dB(A)	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp 10m	Lp 1m
TCAEQY THAEQY (• •)	**269**	77	77	75	72	70	63	54	49	74	42,0	56,0
	279	77	77	75	72	70	63	54	49	74	42,0	56,0
	289	78	78	76	73	71	64	55	49	75	43,0	57,0
	296	78	78	76	73	71	64	55	49	75	43,0	57,0
	2112	80	80	79	76	74	67	60	52	78	46,0	59,0
	2125	81	81	80	77	75	68	61	53	79	47,0	60,0
	2145	81	81	80	77	75	68	61	53	79	47,0	60,0

(1)	If the INS (Technical compartment soundproofing) accessory is supplied, the sound power decreases by 1 dB(A) Standard in version S
(2)	If the INS60 (increased soundproofing in the technical compartment) accessory is supplied, the sound power decreases by 2 dB(A). Standard in version Q
(3)	If the INS60 (increased soundproofing in the technical compartment) accessory is supplied, the sound power decreases by 1 dB(A). Standard in version Q

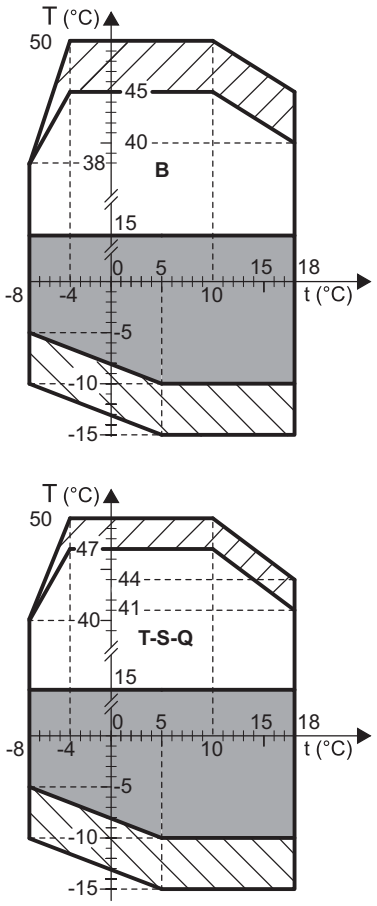
(•)	INS Standard
(• •)	INS60 Standard

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 INS-INS60 accessory, when not already standard installed.

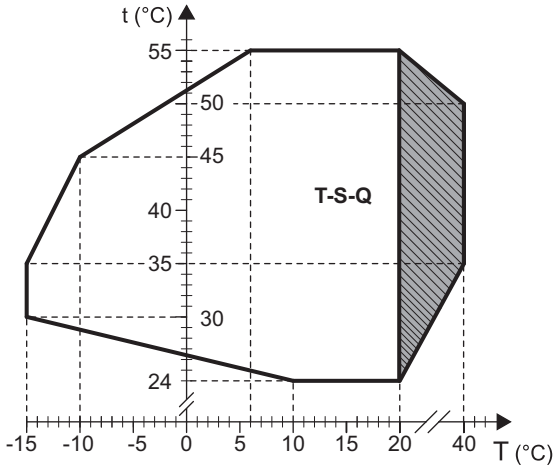
Note: The Eurovent certification refers to the sound power value in dB(A) and it is the only binding acoustic data. The sound pressure levels refer to values calculated from the sound power for units installed in free field with directionality factor Q=2. In brackets is the measurement distance in metres. 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 (standard in S-Q versions) and FI15 accessories, the machine decreases its noise to a value below the nominal value indicated in the table.

Functioning limits

Summer mode



Winter mode



In winter mode:
Minimum water inlet temperature 20°C.
Maximum water inlet temperature 50°C

In summer mode:
Maximum water inlet temperature 23°C

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

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-Q version)
	Functioning with condensing control FI15
	Functioning with partialised cooling capacity
	Winter mode with FI10 or FI15 condensation control (FI10 standard in S and Q version)

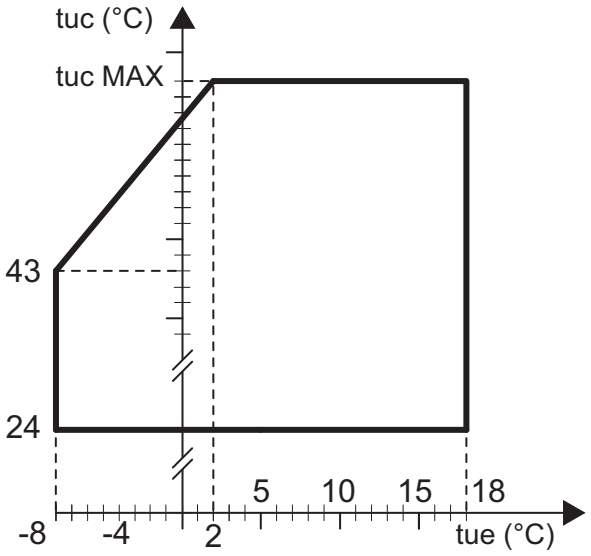
Model	269÷2112	269÷2146	269÷2146	269÷296	2112÷2146
Versions	**B**	**T**	**S**	**Q**	
	Tmax = 45°C (1) (2)	Tmax = 47°C (1) (2)	Tmax = 44°C (1) (3)	Tmax = 40°C (1) (3)	Tmax = 40°C (1) (3)
	Tmax = 50°C (1) (4)	Tmax = 50°C (1) (4)	Tmax = 47°C (1) (2)	Tmax = 43°C (1) (2)	Tmax = 47°C (1) (2)
			Tmax = 50°C (1) (4)	Tmax = 46°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 55

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*"

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

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

CHILLER

Type of heat exchanger		Plates	
B version		**Min**	**Max**
269	m^3/h	7,0	21,5
279	m^3/h	7,0	21,5
289	m^3/h	8,5	24,5
296	m^3/h	8,5	24,5
2112	m^3/h	10,5	28,5

Type of heat exchanger		Plates		Tube and shell (STE accessory)	
T-S-Q version		**Min**	**Max**	**Min**	**Max**
269	m^3/h	8,5	24,5	5,9	14,9
279	m^3/h	9,0	26,0	6,6	16,6
289	m^3/h	10,5	28,5	7,4	18,6
296	m^3/h	10,5	28,5	8,4	21,3
2112	m^3/h	12,0	32,5	9,3	23,5
2125	m^3/h	13,0	36,0	9,3	23,5
2146	m^3/h	15,0	42,0	10,0	25,2

PDC

Type of heat exchanger		Plates		Tube and shell (STE accessory)	
T-S-Q version		**Min**	**Max**	**Min**	**Max**
269	m^3/h	8,5	24,5	5,9	14,9
279	m^3/h	9,0	26,0	6,6	16,6
289	m^3/h	10,5	28,5	7,4	18,6
296	m^3/h	10,5	28,5	8,4	21,3
2112	m^3/h	12,0	32,5	11,2	28,3
2125	m^3/h	13,0	36,0	11,2	28,3
2146	m^3/h	15,0	42,0	10,0	25,2

Recovery water flow rate limits

Type of heat exchanger		RC100	
B versions		**Min**	**Max**
269	m^3/h	7,0	21,5
279	m^3/h	7,0	21,5
289	m^3/h	8,5	24,5
296	m^3/h	8,5	24,5
2112	m^3/h	10,5	28,5

Type of heat exchanger		RC100	
T-S-Q versions		**Min**	**Max**
269	m^3/h	8,5	24,5
279	m^3/h	9,0	26,0
289	m^3/h	10,5	28,5
296	m^3/h	10,5	28,5
2112	m^3/h	12,0	32,5
2125	m^3/h	13,0	36,0
2146	m^3/h	15,0	42,0

RC100:
- Hot water temperature produced 30÷54°C for versions **B** / 30÷55°C for versions **T-S-Q**;
- The minimum inlet water temperature allowed is equivalent to 20°C.

DS:
- Hot water temperature produced 50÷70°C with 5÷10 K allowed water temperature differential;
  The minimum water inlet temperature allowed is equivalent to 40°C.

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

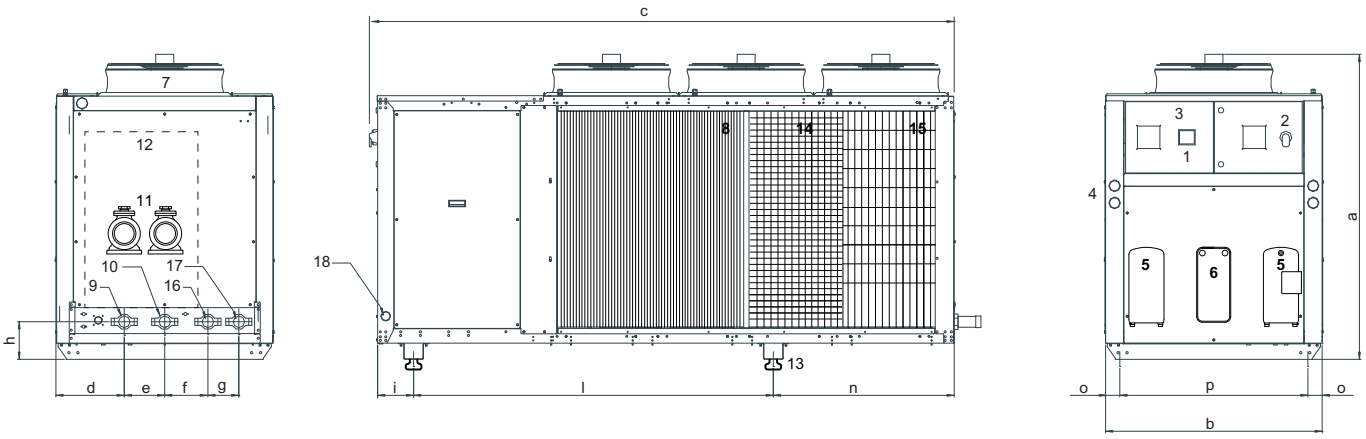
fc G	Correction factor of the glycol water flow to the evaporator
fc Δpw	Correction factor of the pressure drops in the evaporator
fc QF	Cooling capacity correction factor
fc P	Correction factor for the total absorbed electrical current

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 296÷2112 (models with a plate evaporator)

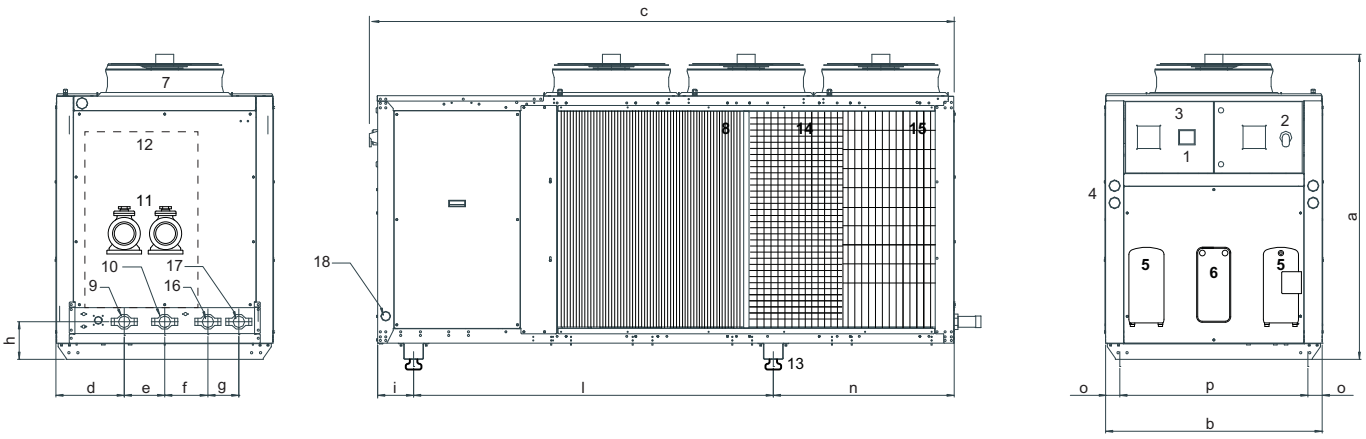


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG 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.

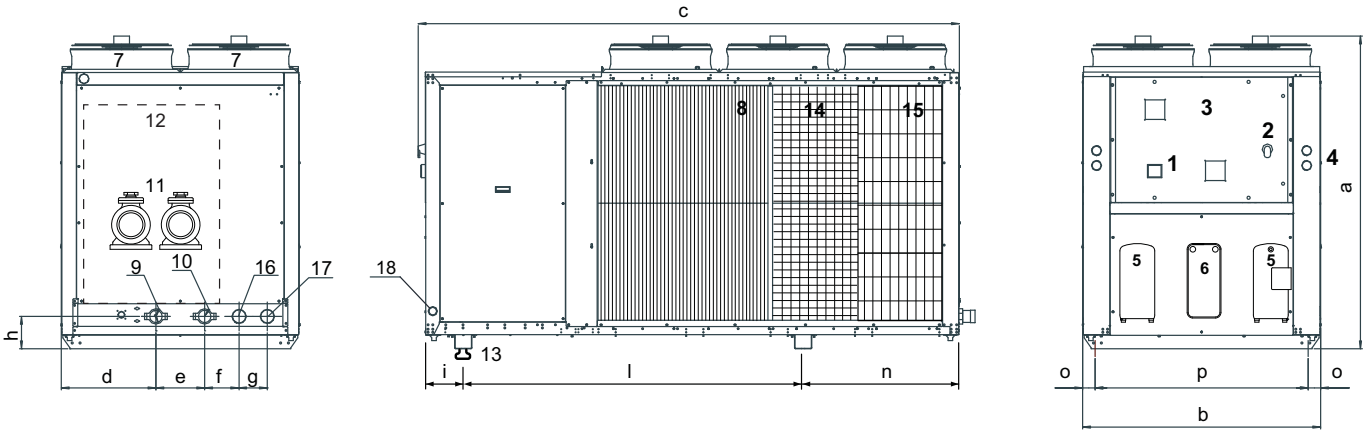
Model		**269**	**279**	**289**	**296**	**2112**
a (*)	mm	1700	1700	1700	1700	1700
b	mm	1210	1210	1210	1210	1210
c	mm	2650	2650	2650	2650	3250
d	mm	380	380	380	380	380
e	mm	225	225	225	225	225
f	mm	234	234	234	234	234
g	mm	172	172	172	172	172
h	mm	209	209	209	209	209
i	mm	200	200	200	200	200
l	mm	1640	1640	1640	1640	2000
n	mm	764	764	764	764	1006
o	mm	80	80	80	80	80
p	mm	1050	1050	1050	1050	1050
Heat exchanger inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” Vic.
DS inlet/outlet connections	Ø	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.
RC100 inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” Vic.

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

Dimensions and volume TCAETY - TCAESY - THAETY - THAESY 269÷296 (models with a plate evaporator)



Dimensions and volume TCAETY - TCAESY - THAETY - THAESY 2112÷2146 (models with a plate evaporator)

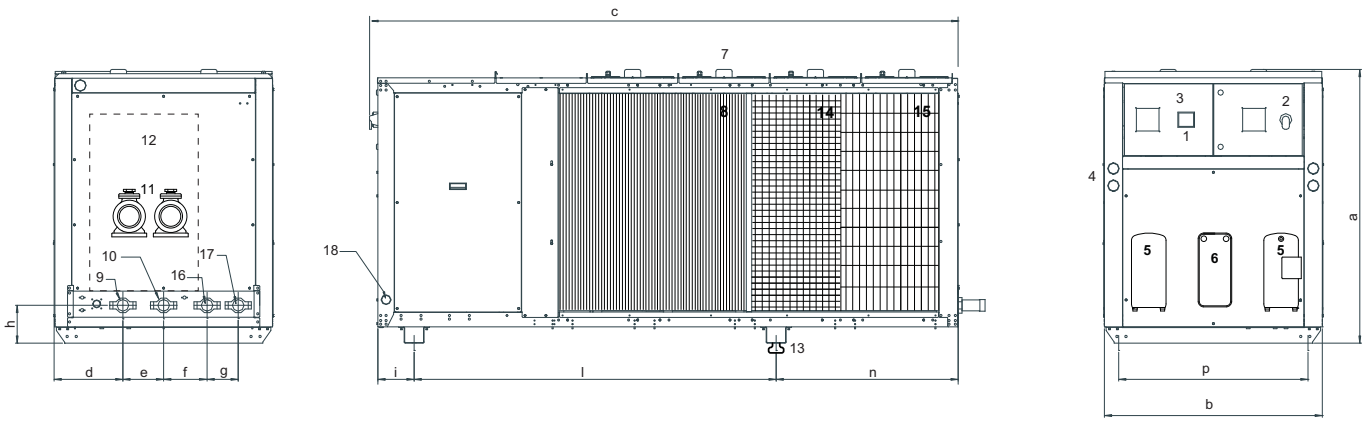


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG 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.

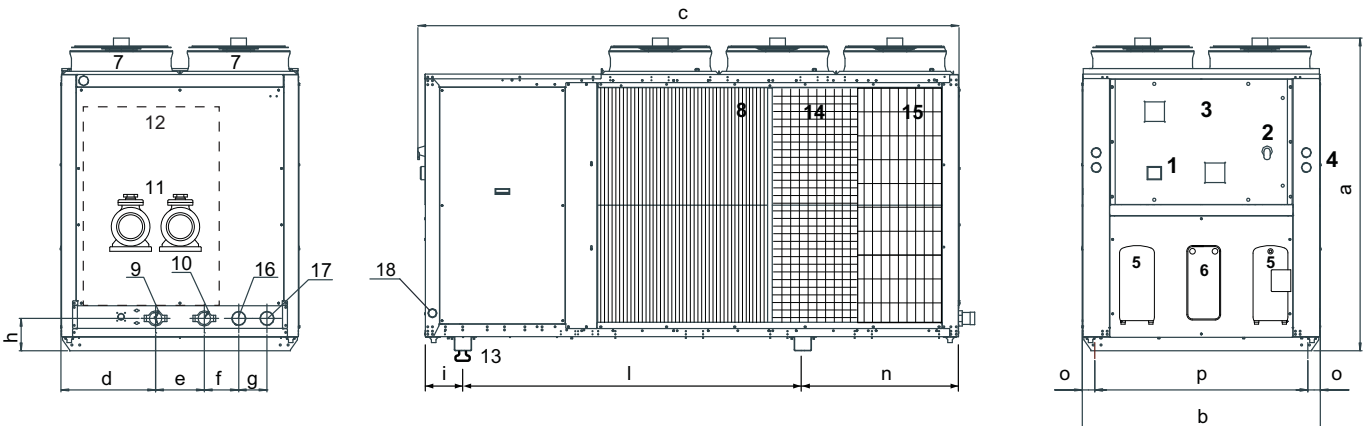
Model		269	279	289	296	2112	2125	2146
a (*)	mm	1700	1700	1700	1700	2000	2000	2000
b	mm	1210	1210	1210	1210	1520	1520	1520
c	mm	3250	3250	3250	3250	3450	3450	3450
d	mm	380	380	380	380	605	605	605
e	mm	225	225	225	225	311	311	311
f	mm	234	234	234	234	219	219	219
g	mm	172	172	172	172	180	180	180
h	mm	209	209	209	209	207	207	207
i	mm	200	200	200	200	242	242	242
l	mm	2000	2000	2000	2000	2170	2170	2170
n	mm	1006	1006	1006	1006	999	999	999
o	mm	80	80	80	80	80	80	80
p	mm	1050	1050	1050	1050	1360	1360	1360
Heat exchanger inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” 1/2 Vic.	2” 1/2 Vic.	2” 1/2 Vic.
DS inlet/outlet connections	Ø	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.
RC100 inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” 1/2 Vic.	2” 1/2 Vic.	2” 1/2 Vic.

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

Dimensions and volume TCAEQY - THAEQY 269÷296 (models with a plate evaporator)



Dimensions and volume TCAEQY - THAEQY 2112÷2146 (models with a plate evaporator)

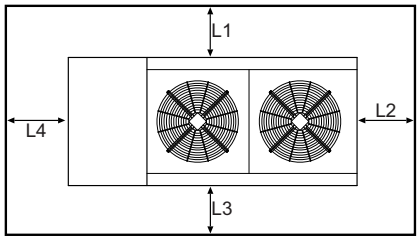


1. Control panel;
2. Isolator;
3. Electrical Control Board;
4. Cooling circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main heat exchanger water inlet;
10. Main heat exchanger water outlet;
11. Electric pump;
12. Storage tank;
13. Anti-vibration mounts (SAG 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		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
a	mm	1520	1520	1520	1520	2000	2000	2000
b	mm	1210	1210	1210	1210	1520	1520	1520
c	mm	3250	3250	3250	3250	3450	3450	3450
d	mm	380	380	380	380	605	605	605
e	mm	225	225	225	225	311	311	311
f	mm	234	234	234	234	219	219	219
g	mm	172	172	172	172	180	180	180
h	mm	209	209	209	209	207	207	207
i	mm	200	200	200	200	242	242	242
l	mm	2000	2000	2000	2000	2170	2170	2170
n	mm	1006	1006	1006	1006	999	999	999
o	mm	80	80	80	80	80	80	80
p	mm	1050	1050	1050	1050	1360	1360	1360
Heat exchanger inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” 1/2 Vic.	2” 1/2 Vic.	2” 1/2 Vic.
DS inlet/outlet connections	Ø	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.	1” 1/4 Vic.
RC100 inlet/outlet connections	Ø	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” Vic.	2” Vic.

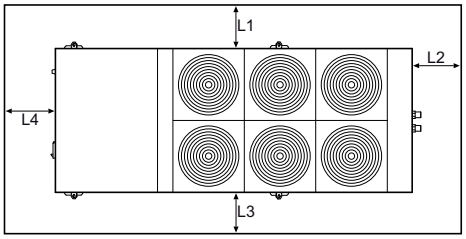
Clearance and positioning

TCAEBY 269÷2112
TCAETY-THAETY 269÷296
TCAESY-THAESY 269÷296



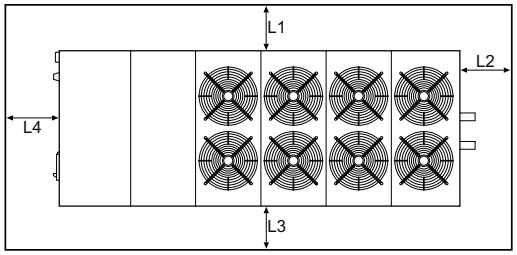
L1	mm	1500
L2	mm	2000
L3	mm	1500
L4	mm	1000

TCAETY-THAETY 2112÷2146
TCAESY-THAESY 2112÷2146
TCAEQY-THAEQY 2112÷2146



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

TCAEQY-THAEQY 269÷296

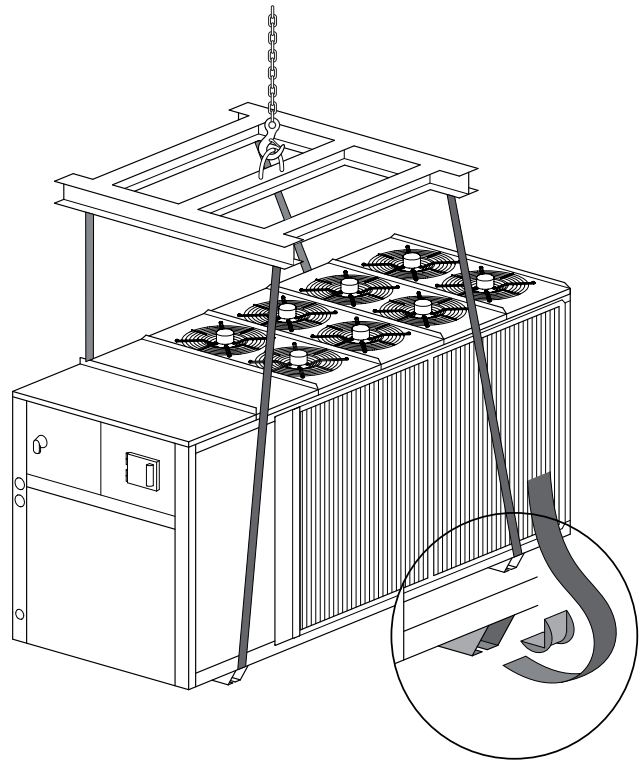


L1	mm	1500
L2	mm	2000
L3	mm	1500
L4	mm	1000

Note: L2 is the minimum distance for the removal of the pumping unit and the relative tank or tuba and shell.
If the accessory is not installed, 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.

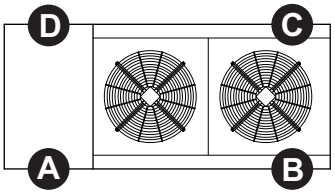


Installation and connection to the system

○ 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).
○ 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 269÷2112

Weight		269	279	289	296	2112
(*)	Kg	770	775	810	815	995
Support						
A	Kg	216	217	222	223	272
B	Kg	174	175	187	189	240
C	Kg	170	171	184	185	227
D	Kg	211	212	217	219	257

TCAEBY 269÷2112 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		269	279	289	296	2112
(*)	Kg	1140	1145	1190	1205	1395
Support						
A	Kg	226	227	235	238	280
B	Kg	331	333	347	351	413
C	Kg	347	348	362	366	418
D	Kg	236	237	246	249	283

TCAEBY 269÷2112 with accessory **TANK&PUMP ASDP2**

Weight		269	279	289	296	2112
(*)	Kg	1015	1020	1065	1070	1250
(**)	Kg	1245	1250	1295	1300	1480
Support (**)						
A	Kg	277	278	280	281	317
B	Kg	379	380	402	404	470
C	Kg	340	342	361	363	414
D	Kg	249	250	251	252	279

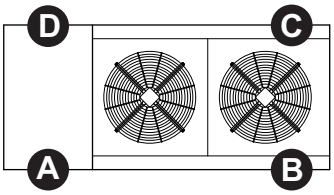
(*) Weight of the unit when empty

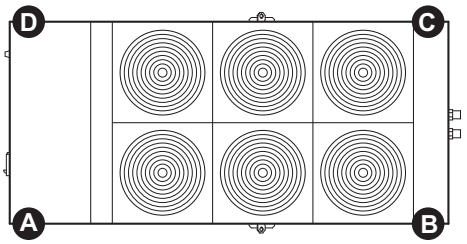
(**) Weight of the units including the water present in the tank

Note: In TCAEBY units the weight includes the INS accessory

Weight of the accessory INS = 15 Kg

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





TCAETY-TCAESY 269÷296

Weight		269	279	289	296
(*)	Kg	865	880	885	920
Support					
A	Kg	223	222	226	228
B	Kg	208	217	215	230
C	Kg	209	218	217	232
D	Kg	224	223	227	230

TCAETY-TCAESY 2112÷2146

Weight		2112	2125	2146
(*)	Kg	1180	1215	1275
Support				
A	Kg	336	341	350
B	Kg	264	276	298
C	Kg	255	268	288
D	Kg	325	330	338

TCAETY-TCAESY 269÷296 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		269	279	289	296
(*)	Kg	1235	1250	1275	1320
Support					
A	Kg	232	233	233	238
B	Kg	366	373	383	402
C	Kg	391	396	409	428
D	Kg	247	248	249	253

TCAETY-TCAESY 2112÷2146 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		2112	2125	2146
(*)	Kg	1585	1620	1685
Support				
A	Kg	338	343	353
B	Kg	416	429	453
C	Kg	458	471	494
D	Kg	372	376	385

TCAETY-TCAESY 269÷296 with accessory **TANK&PUMP ASDP2**

Weight		269	279	289	296
(*)	Kg	1110	1125	1145	1180
(**)	Kg	1340	1355	1375	1410
Support (**)					
A	Kg	267	268	269	270
B	Kg	430	437	447	463
C	Kg	397	403	412	428
D	Kg	246	247	248	249

TCAETY-TCAESY 2112÷2146 with accessory **TANK&PUMP ASDP2**

Weight		2112	2125	2146
(*)	Kg	1720	1755	1820
(**)	Kg	2160	2195	2260
Support (**)				
A	Kg	440	444	453
B	Kg	622	635	661
C	Kg	643	657	680
D	Kg	455	459	466

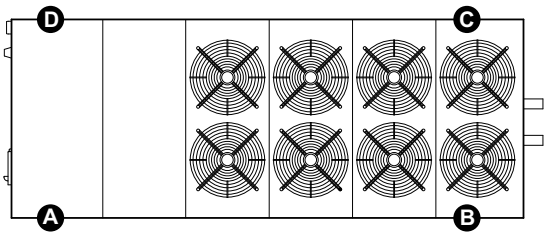
(*) Weight of the unit when empty

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

Note: In TCAETY units the weight includes the INS accessory which is standard in the TCAESY units

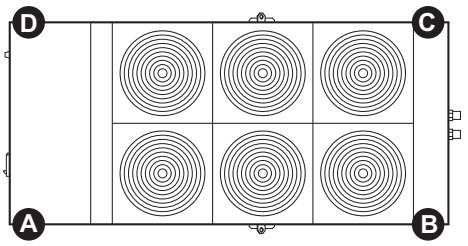
Weight of the accessory INS = 15 Kg (mod. 269÷296) - 20 Kg (mod. 2112÷2146)

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



TCAEQY 269÷296

Weight		269	279	289	296
(*)	Kg	920	925	940	980
Support					
A	Kg	241	244	241	245
B	Kg	218	218	228	244
C	Kg	219	219	229	245
D	Kg	242	245	242	246



TCAEQY 2112÷2146

Weight		2112	2125	2146
(*)	Kg	1230	1265	1320
Support				
A	Kg	356	361	369
B	Kg	269	281	302
C	Kg	260	273	292
D	Kg	344	350	357

TCAEQY 269÷296 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		269	279	289	296
(*)	Kg	1230	1295	1330	1380
Support					
A	Kg	239	253	249	254
B	Kg	359	376	395	416
C	Kg	380	398	420	440
D	Kg	253	268	265	269

TCAEQY 2112÷2146 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		2112	2125	2146
(*)	Kg	1635	1670	1730
Support				
A	Kg	358	363	372
B	Kg	421	434	456
C	Kg	462	475	496
D	Kg	393	397	405

TCAEQY 269÷296 with accessory **TANK&PUMP ASDP2**

Weight		269	279	289	296
(*)	Kg	1165	1170	1200	1240
(**)	Kg	1395	1400	1430	1470
Support (**)					
A	Kg	287	290	285	287
B	Kg	437	437	457	476
C	Kg	405	405	424	441
D	Kg	266	268	264	266

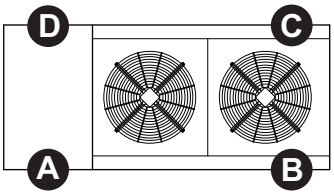
TCAEQY 2112÷2146 with accessory **TANK&PUMP ASDP2**

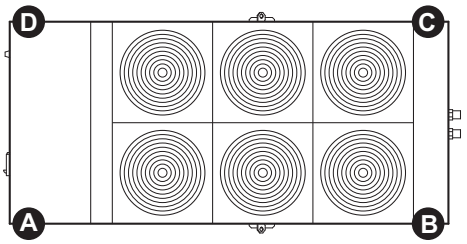
Weight		2112	2125	2146
(*)	Kg	1770	1805	1865
(**)	Kg	2210	2245	2305
Support (**)				
A	Kg	463	467	474
B	Kg	625	638	662
C	Kg	645	658	681
D	Kg	477	482	488

(*) Weight of the unit when empty

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

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





THAETY-THAESY 269÷296

Weight		269	279	289	296
(*)	Kg	930	945	950	995
Support					
A	Kg	244	246	247	251
B	Kg	231	238	238	257
C	Kg	221	227	228	246
D	Kg	233	235	237	241

THAETY-THAESY 2112÷2146

Weight		2112	2125	2146
(*)	Kg	1260	1300	1375
Support				
A	Kg	360	368	380
B	Kg	289	303	329
C	Kg	272	284	309
D	Kg	339	345	357

THAETY-THAESY 269÷296 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		269	279	289	296
(*)	Kg	1300	1315	1340	1395
Support					
A	Kg	251	252	253	263
B	Kg	392	398	409	431
C	Kg	401	407	418	435
D	Kg	257	258	259	265

THAETY-THAESY 2112÷2146 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		2112	2125	2146
(*)	Kg	1665	1705	1785
Support				
A	Kg	361	369	382
B	Kg	443	457	485
C	Kg	475	486	514
D	Kg	387	393	404

THAETY-THAESY 269÷296 with accessory **TANK&PUMP ASDP2**

Weight		269	279	289	296
(*)	Kg	1175	1190	1210	1255
(**)	Kg	1405	1420	1440	1485
Support (**)					
A	Kg	233	288	289	291
B	Kg	459	462	473	494
C	Kg	473	412	420	440
D	Kg	240	257	257	260

THAETY-THAESY 2112÷2146 with accessory **TANK&PUMP ASDP2**

Weight		2112	2125	2146
(*)	Kg	1800	1840	1920
(**)	Kg	2240	2280	2360
Support (**)				
A	Kg	464	472	503
B	Kg	651	664	650
C	Kg	657	669	681
D	Kg	468	475	526

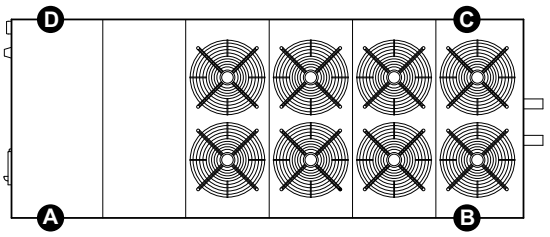
(*) Weight of the unit when empty

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

Note: In THAETY units the weight includes the INS accessory which is standard in the THAESY units

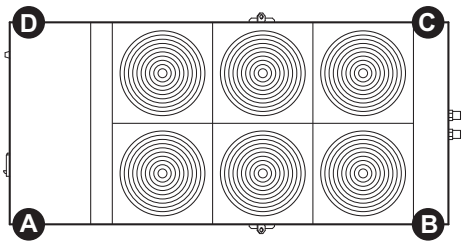
Weight of the accessory INS = 15 Kg (mod. 269÷296) - 20 Kg (mod. 2112÷2146)

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



THAEQY 269÷296

Weight		269	279	289	296
(*)	Kg	985	990	1010	1050
Support					
A	Kg	262	256	263	266
B	Kg	242	250	252	270
C	Kg	231	239	242	259
D	Kg	250	245	252	255



THAEQY 2112÷2146

Weight		2112	2125	2146
(*)	Kg	1305	1350	1420
Support				
A	Kg	379	389	399
B	Kg	292	308	333
C	Kg	276	289	313
D	Kg	358	365	375

THAEQY 269÷296 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		269	279	289	296
(*)	Kg	1355	1360	1400	1450
Support					
A	Kg	270	261	270	274
B	Kg	401	411	422	444
C	Kg	409	421	432	452
D	Kg	275	267	276	280

THAEQY 2112÷2146 with accessory **PUMP DP2** and **PUMP DPR2**

Weight		2112	2125	2146
(*)	Kg	1710	1755	1830
Support				
A	Kg	380	389	401
B	Kg	447	462	489
C	Kg	477	491	516
D	Kg	406	413	424

THAEQY 269÷296 with accessory **TANK&PUMP ASDP2**

Weight		269	279	289	296
(*)	Kg	1230	1235	1270	1310
(**)	Kg	1460	1465	1500	1540
Support (**)					
A	Kg	252	297	307	308
B	Kg	468	477	485	505
C	Kg	481	425	434	452
D	Kg	259	265	275	276

THAEQY 2112÷2146 with accessory **TANK&PUMP ASDP2**

Weight		2112	2125	2146
(*)	Kg	1845	1890	1965
(**)	Kg	2285	2330	2405
Support (**)				
A	Kg	486	494	505
B	Kg	651	667	697
C	Kg	658	672	698
D	Kg	491	497	506

(*) Weight of the unit when empty

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

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

Accessories weights TCAEBY

Model		269	279	289	296	2112
Accessory						
DS	Kg	35	35	35	40	40
RC100	Kg	60	60	60	70	70
INS	Kg	15	15	15	15	15
RPB	Kg	20	20	20	20	25
FMB	Kg	25	25	25	25	30
P1	Kg	70	70	70	70	75
P2	Kg	75	75	80	80	85
DP1	Kg	135	135	140	140	145
DP2	Kg	150	150	160	160	160
PR1	Kg	75	75	75	75	80
PR2	Kg	80	80	85	85	90
DPR1	Kg	145	145	150	150	150
DPR2	Kg	160	160	160	160	170
ASP1	Kg	175	175	180	180	175
ASP2	Kg	180	180	190	190	185
ASDP1	Kg	230	230	235	235	235
ASDP2	Kg	245	245	255	255	255

Accessories weights TCAETY-TCAESY-TCAEQY THAETY-THAESY-THAEQY

Model		269	279	289	296	2112	2125	2146
Accessory								
DS	Kg	35	35	35	40	40	40	45
RC100	Kg	60	60	60	70	70	70	75
INS	Kg	15	15	15	15	20	20	20
INS 60	Kg	50	50	50	50	65	65	65
RPB	Kg	25	25	25	25	30	30	30
FMB	Kg	30	30	30	30	35	35	35
P1	Kg	75	75	75	75	80	80	80
P2	Kg	80	80	85	85	90	90	90
DP1	Kg	140	140	145	145	145	145	145
DP2	Kg	150	150	160	160	165	165	165
PR1	Kg	80	80	80	80	85	85	85
PR2	Kg	85	85	90	90	95	95	95
DPR1	Kg	145	145	150	150	150	150	150
DPR2	Kg	160	160	170	170	170	170	170
ASP1	Kg	170	170	175	175	220	220	220
ASP2	Kg	180	180	185	185	230	230	230
ASDP1	Kg	230	230	235	235	280	280	280
ASDP2	Kg	245	245	260	260	300	300	300

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.

Model TCAEBY		**269**	**279**	**289**	**296**	**2112**
Hydraulic technical data						
Expansion tank capacity	l	12	12	12	12	12
Expansion tank pre-load	barg	2	2	2	2	2
Expansion vessel maximum pressure	barg	10	10	10	10	10
Safety valve	barg	6	6	6	6	6
Water contents TCAEBY						
Plate heat exchangers	l	4,8	4,8	5,8	5,8	7,8
Tank water content (ASP/ASDP)	l	230	230	230	230	230

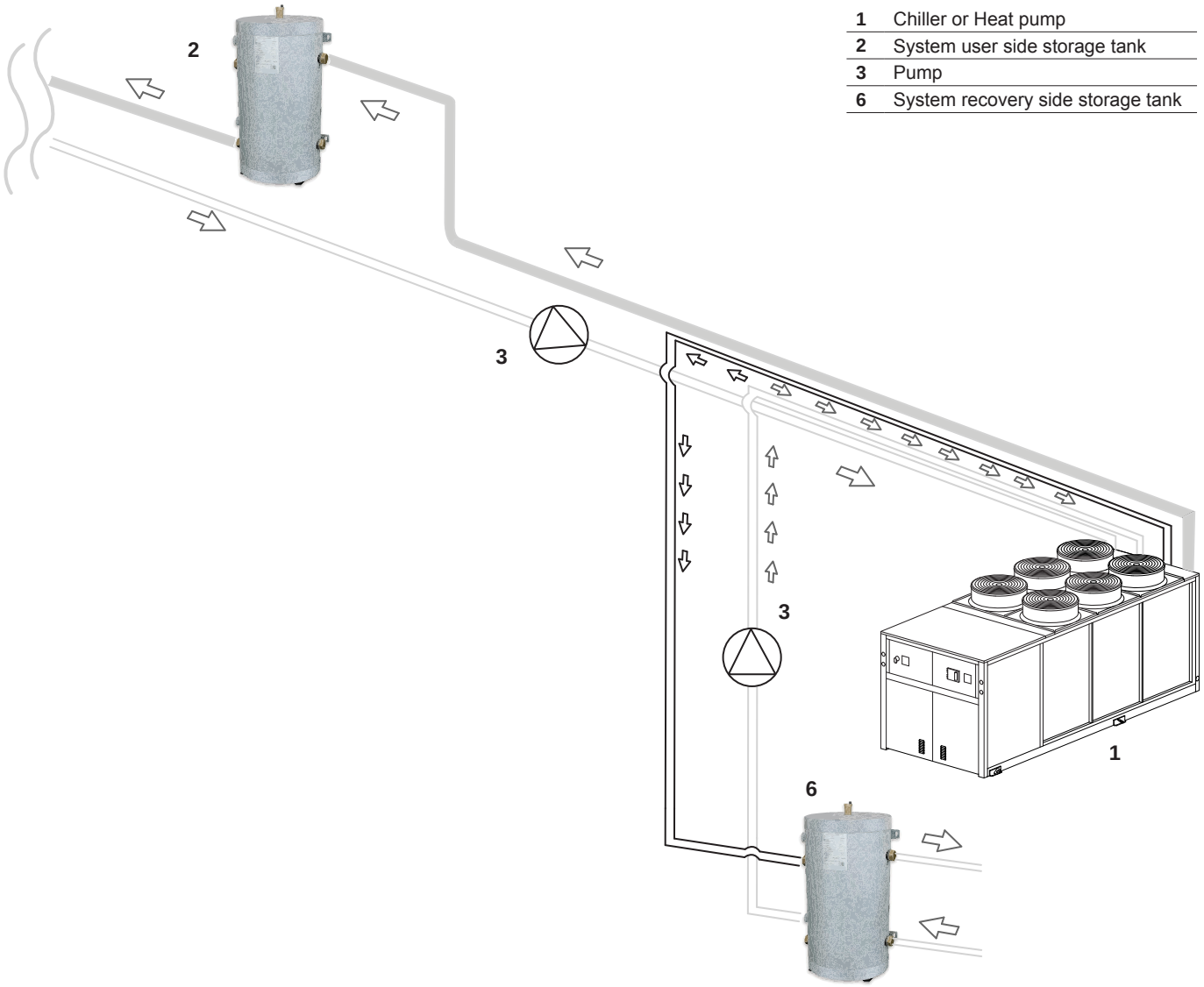
Model TCAEY T-S-Q and THAEY T-S-Q		**269**	**279**	**289**	**296**	**2112**	**2125**	**2146**
Hydraulic technical data								
Expansion tank capacity	l	12	12	12	12	12	12	12
Expansion tank pre-load	barg	2	2	2	2	2	2	2
Expansion vessel maximum pressure	barg	10	10	10	10	10	10	10
Safety valve	barg	6	6	6	6	6	6	6
Water contents TCAEY T-S-Q and THAEY T-S-Q								
Plate heat exchangers	l	5,8	6,6	7,8	7,8	8,8	10	11
Tube and shell heat exchangers (STE accessory) TCAEY	l	40	38	38	36	35	35	59
Tube and shell heat exchangers (STE accessory) THAEY	l	40	38	38	36	64	64	59
Tank water content (ASP/ASDP)	l	230	230	230	230	440	440	440

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.

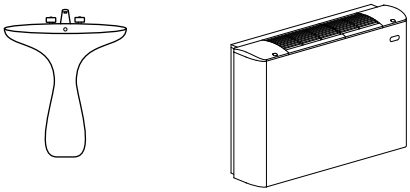
Heat pump with total recovery (RC100) - 2-Pipe+DHW system

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)

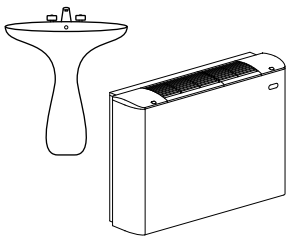
Summer season “AUTOMATIC”



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.

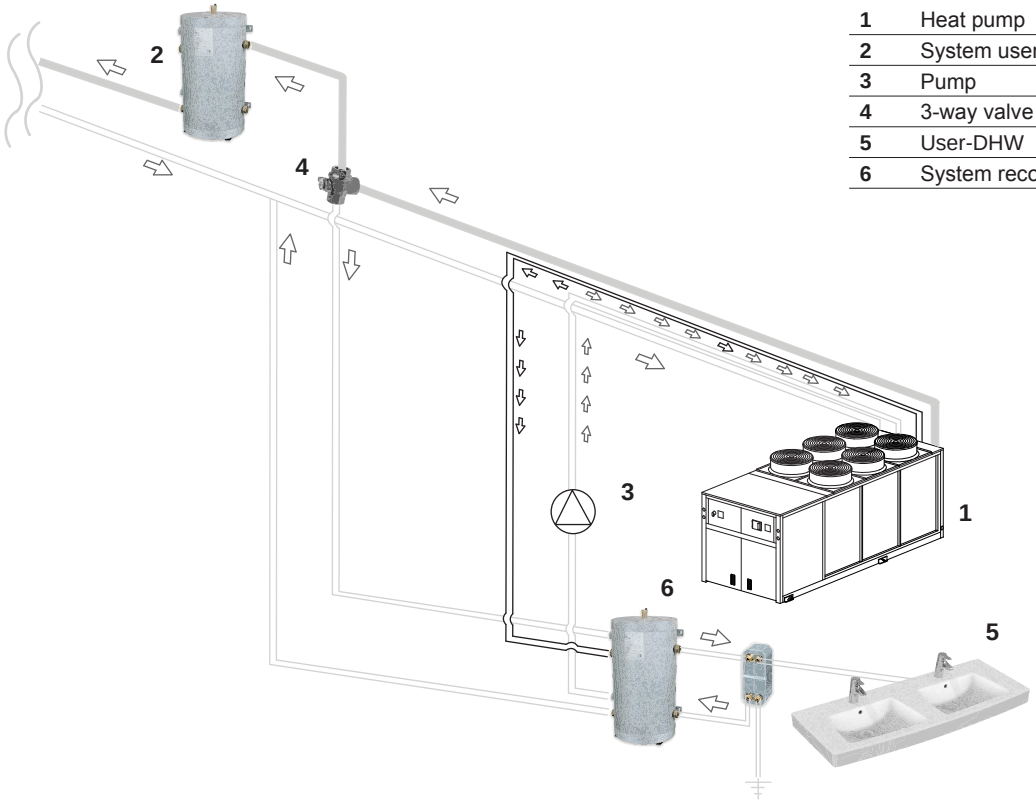
1.1 Activation and deactivation of DS and RC100

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) - Not supplied
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

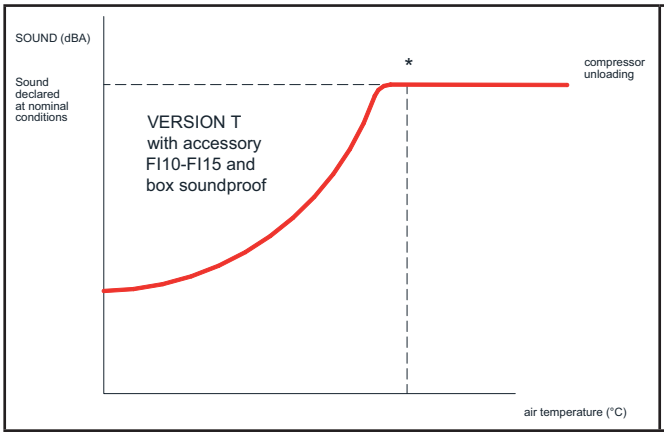
The FNR-S and FNR-Q accessories allows a variable acoustic layout of the unit, managing the silence in chiller mode according to the specific user needs. The accessory is available for TCAETY chillers and for THAETY reversible heat pumps, adequately fitted with some accessories described in the table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

EasyPACK range of heat pumps and chillers	Mandatory ACCESSORY	Mandatory ACCESSORY for soundproofing compressors	Mandatory ACCESSORY to adjust the fan speed
TCAETY-THAETY 269÷2146	FNR-S	INS	FI10 or FI15
TCAETY-THAETY 2112÷2146	FNR-Q	INS60	FI10 or 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.

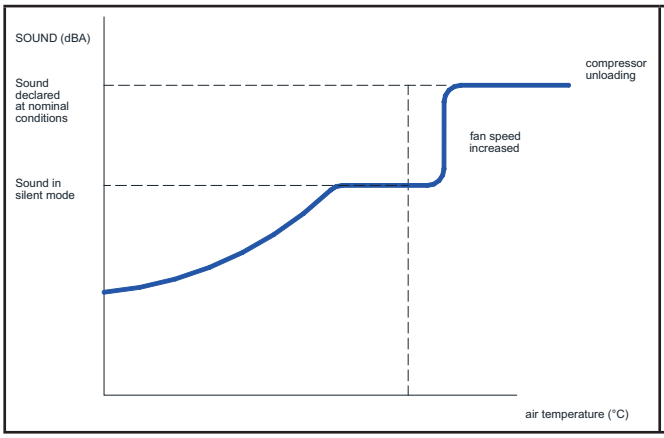
	Digital inputs	
	FNR1	**FNR2**
Mode 1	OPEN CONTACT	OPEN CONTACT
Mode 2	CLOSED CONTACT	OPEN CONTACT
Mode 3	CLOSED CONTACT	CLOSED CONTACT

1. Unit operation with standard logic (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)

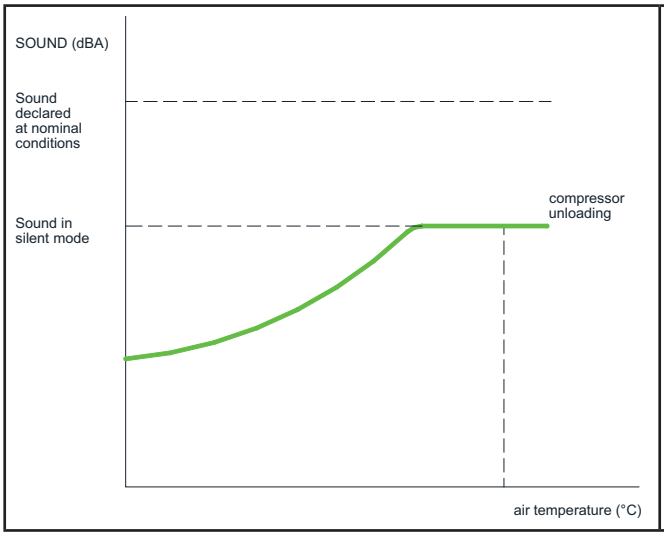
2. Request to reduce noise at certain times of the day, night, etc. maintaining the "guaranteed supplied power" priority



The TCAETY-THAETY units with FNR-S accessory 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 TCAETY-THAETY

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



The TCAETY-THAETY units with FNR-S accessory 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

TCAETY-THAETY units with FNR-Q accessory 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.

Attention: in order to use the EEM accessory, the unit must be powered with 400V-**3ph + N** - 50Hz

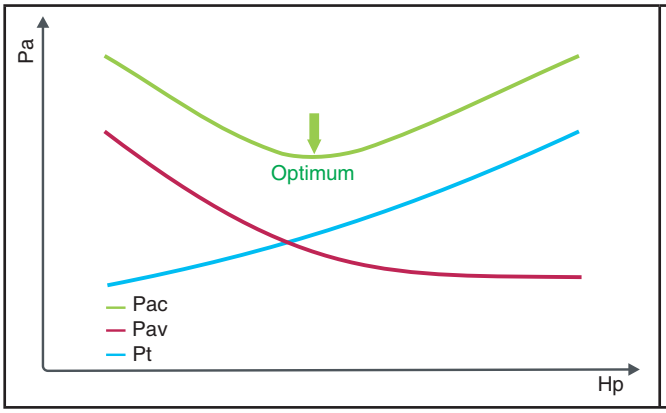
FDL accessory - Forced download compressors

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:

EasyPACK range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAEBY 269÷2112	EEO	EEM	EEV	FI10 or FI15

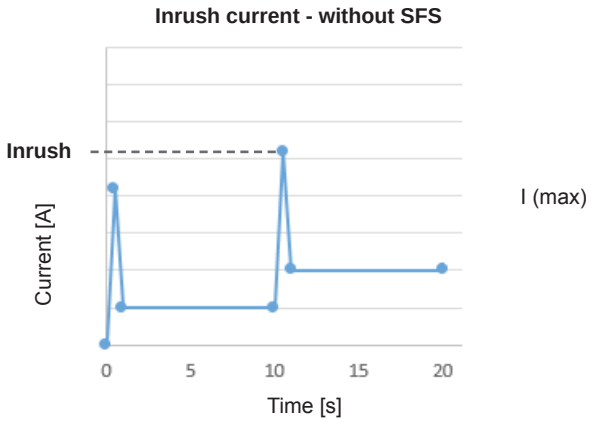
EasyPACK range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAETY 269÷2146 **THAETY 269÷2146**	EEO	EEM	EEV	FI10 or FI15

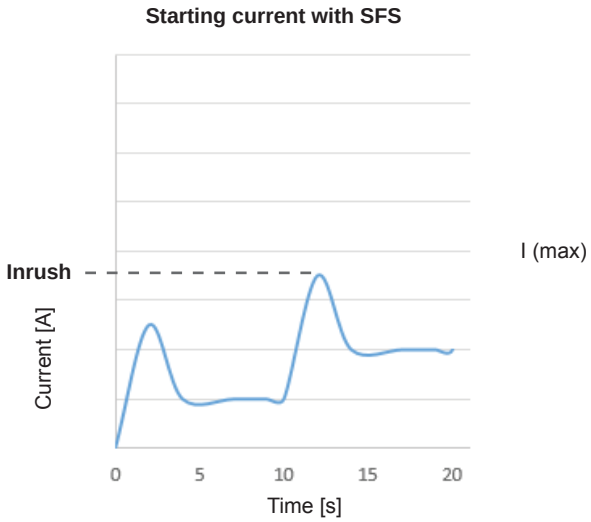
EasyPACK range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAESY 269÷2146 **THAESY 269÷2146**	EEO	EEM	EEV	-

EasyPACK range of heat pumps and chillers	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory	ACCESSORY Mandatory
TCAEQY 269÷2146 **THAEQY 269÷2146**	EEO	EEM	EEV	-

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.





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.

EasyPACK range		THAETY-THAESY-THAEQY	
SIZE		**STEP 1**	**STEP 2**
269	KW	6	18
279	KW	6	18
289	KW	6	24
296	KW	6	24
2112	KW	7	28
2125	KW	7	28
2146	KW	7	28

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 system calibration operations.

3. 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)

4. 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.

5. 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

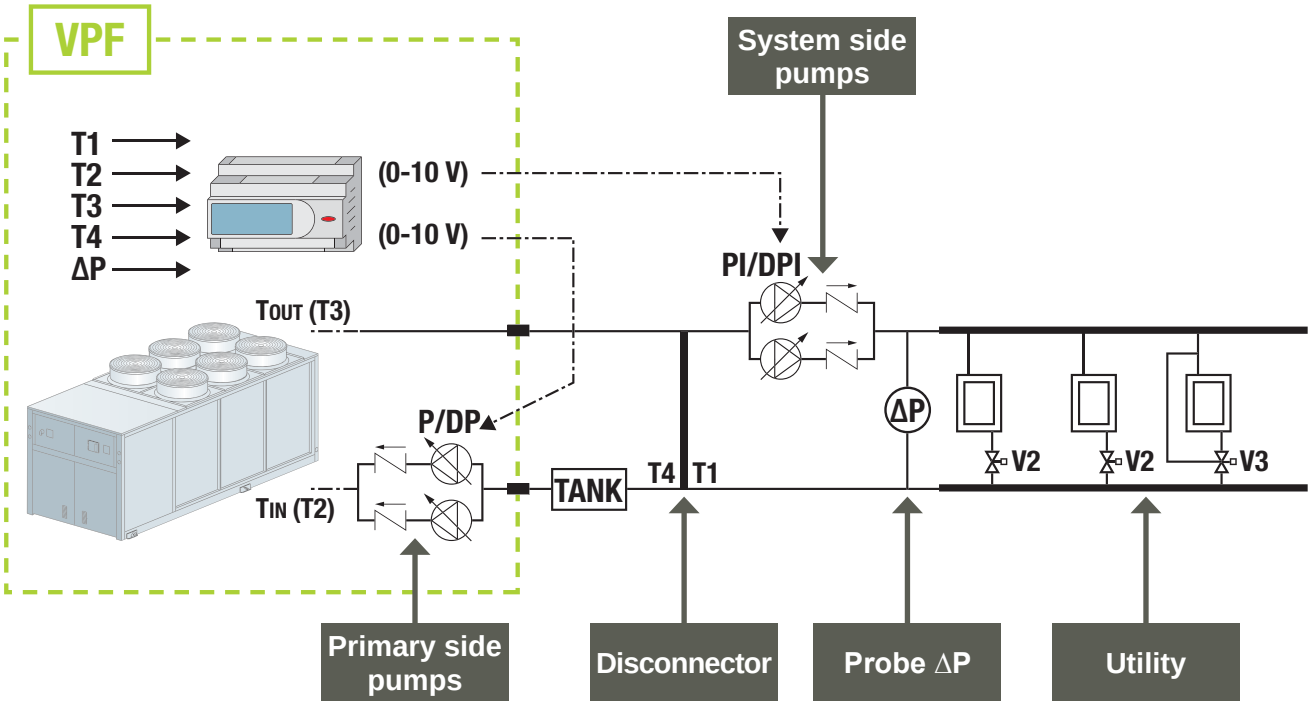
V3=3-way adjustment valve

∆**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.
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)

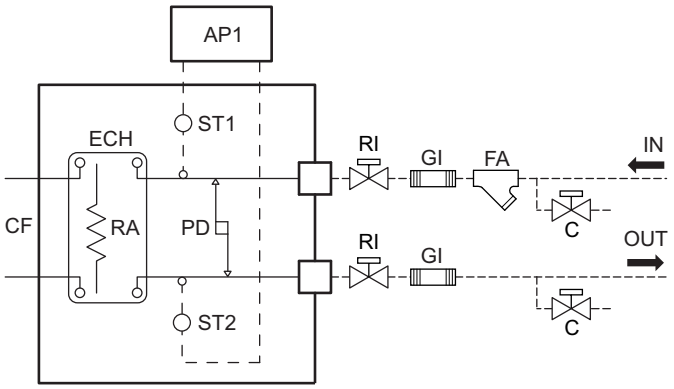


Water circuits

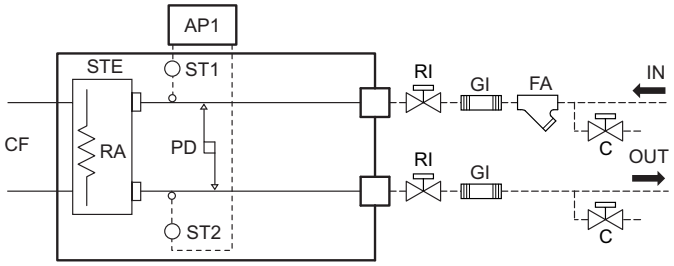
Hydraulic circuit Standard set-up

VERSION with plate heat exchanger

TCAEY-THAEY



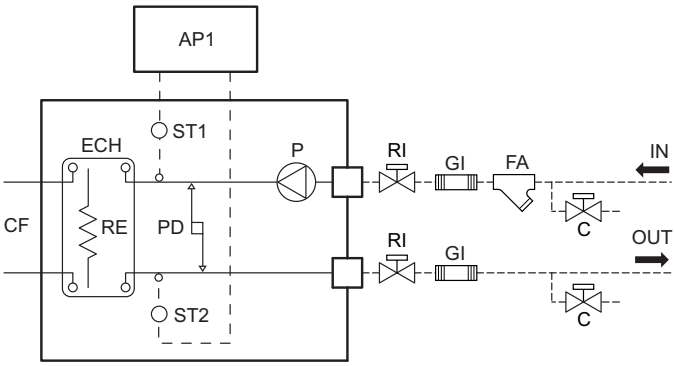
VERSION with STE tube and shell heat exchanger



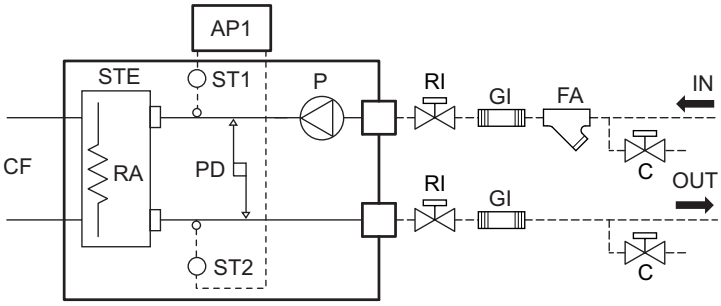
P1 – P2 set-up hydraulic circuit

VERSION with plate heat exchanger

TCAEY-THAEY



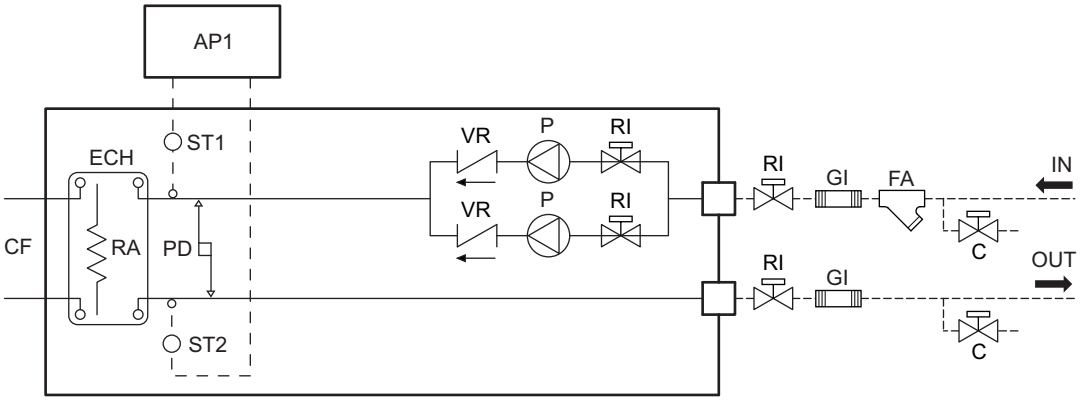
VERSION with STE tube and shell heat exchanger



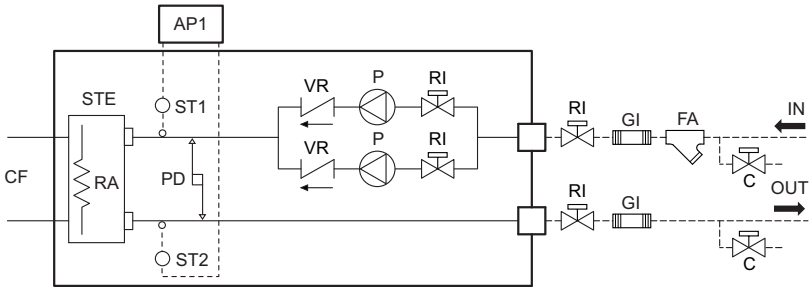
DP1 – DP2 set-up hydraulic circuit

VERSION with plate heat exchanger

TCAEY-THAEY



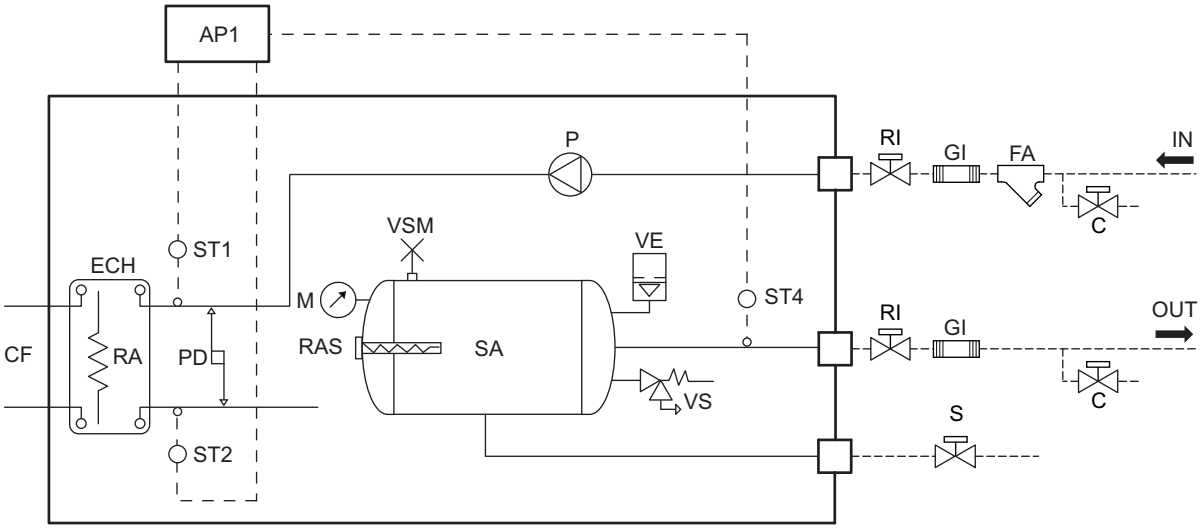
VERSION with STE tube and shell heat exchanger



ASP1 - ASP2 set-up hydraulic circuit

VERSION with plate heat exchanger

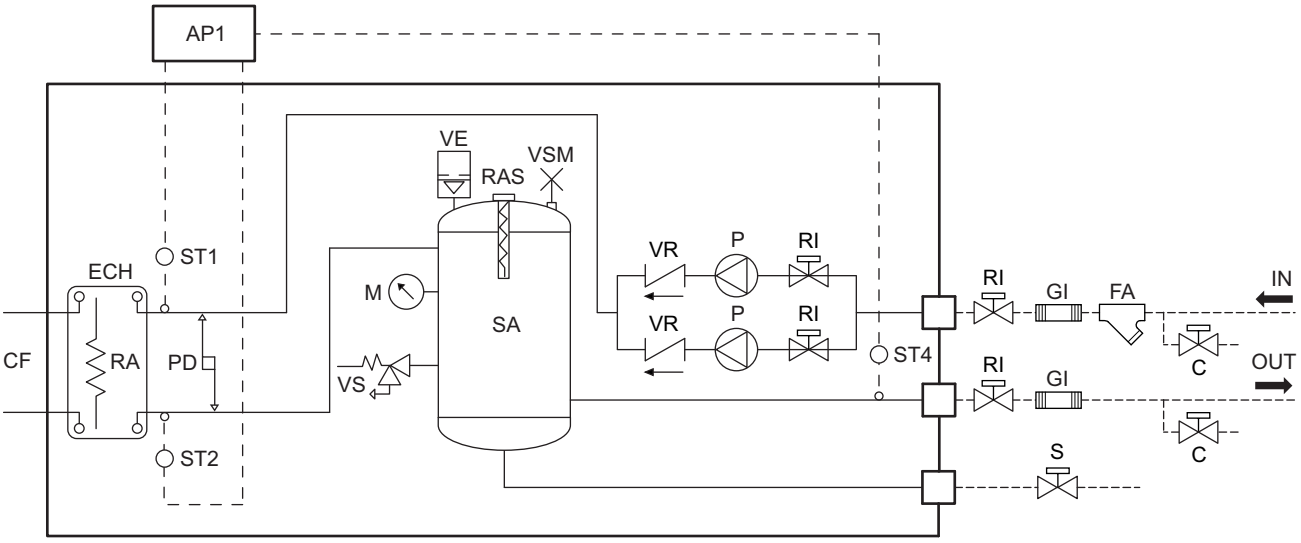
TCAEY-THAEY



ASDP1 – ASDP2 set-up hydraulic circuit

VERSION with plate heat exchanger

TCAEY-THAEY

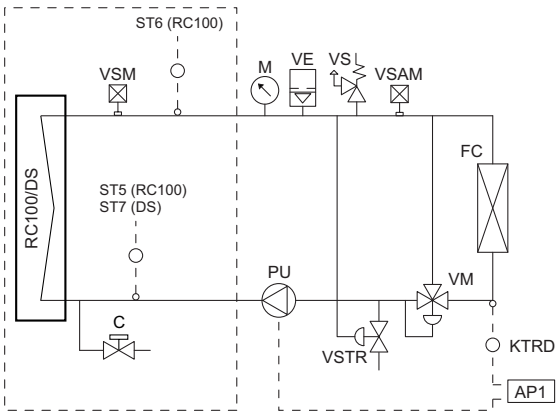


CF	Refrigerant circuit
ECH	Plate evaporator
RA	Heat exchanger/anti-freeze resistance
PD	Water differential pressure switch
VSM	Manual bleed valve
VS	safety valve
AP1	Electronic controls
ST1	Primary inlet temperature probe
ST2	Primary outlet temperature probe - work and antifreeze for Standard and Pump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

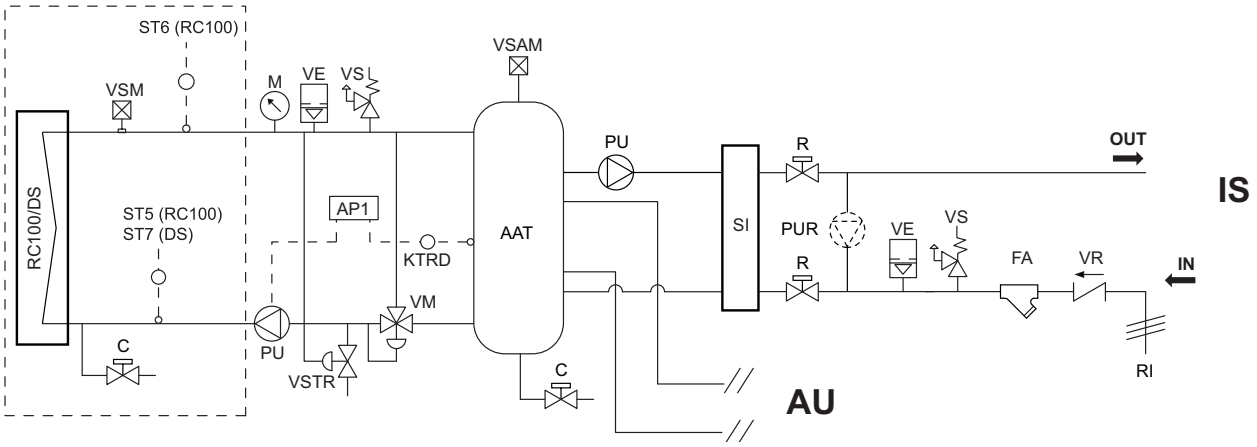
VE	Expansion vessel
RAS	Storage tank resistance (accessory)
FA	Mesh filter (set up by the installer)
SA	Storage tank
STE	Tube and shell exchanger (accessory)
M	Manometer
P	Pump
VR	Check Valve
S	Water drain
C	Supply/drain tap
RI	Shut-off tap
GI	Antivibration connection
- - - -	Connections by installer

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

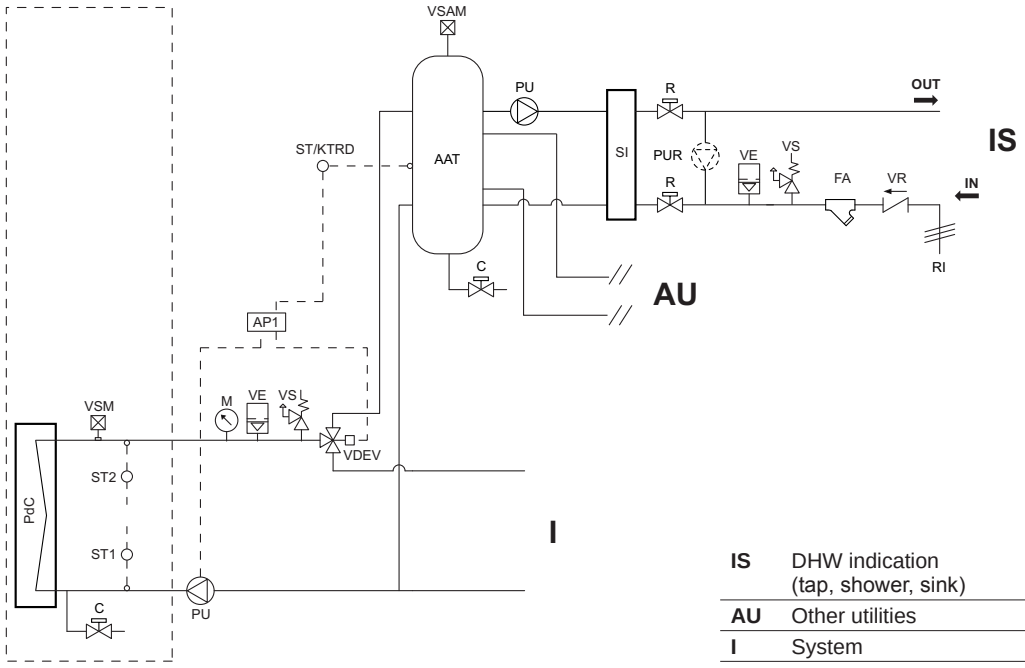
Closed circuit system (for heating, for example)



Open circuit system (for hot water, for example)

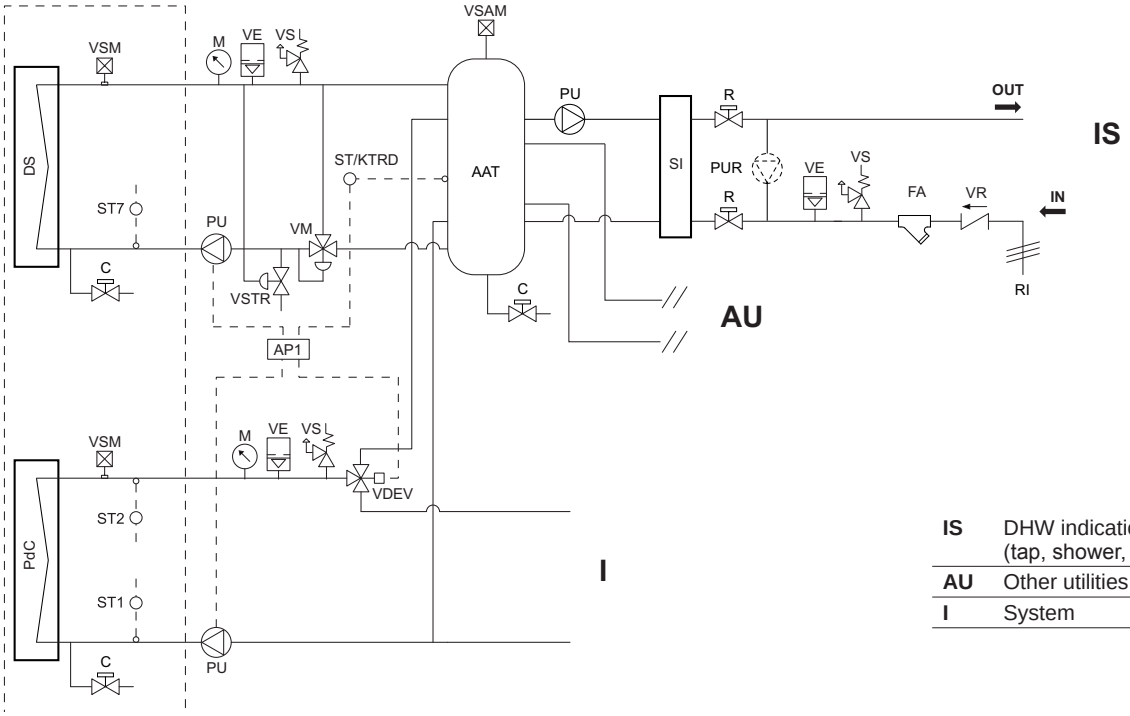


Open circuit system and simultaneous presence of 3-way diverter valve VDEV (for example for domestic hot water)



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	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
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	Sonda temperatura ingresso RC100
ST6	Sonda temperatura uscita RC100
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

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

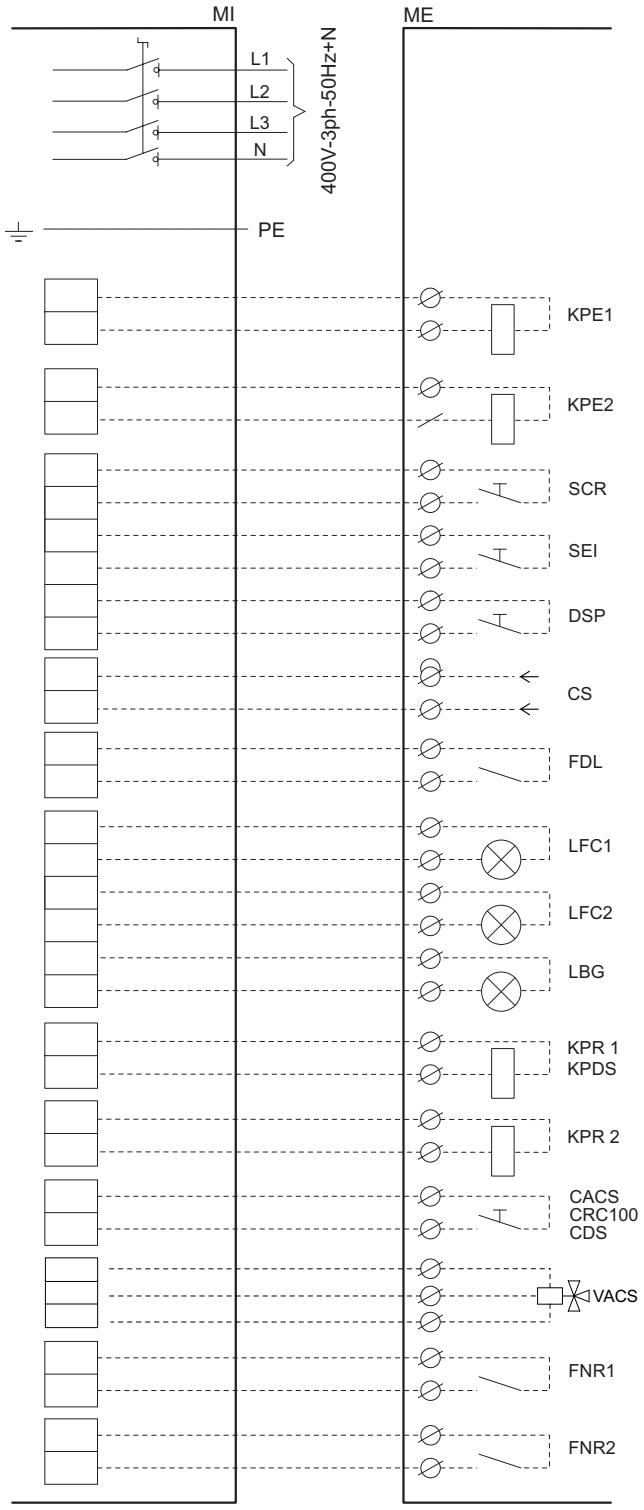
The content of water in the secondary circuit must be below 3240 L. If the pipe water content is neglected, an **AAT** tank with a capacity of 3240 L is required for the example in question. In practical cases, it is recommended to never exceed dtu=6K, and always consider the maximum power expected.

Electrical connections

L	Line
N	Neutral
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 (consent at 230 Vac)
LFC2	Compressor 2 functioning light (consent at 230 Vac)
LBG	Machine general lock light (consensus in voltage 230 Vac)
VACS	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
KPR1 KPDS	Recovery unit pump 1 control/desuperheater pump control (consent at 230 Vac)
KPR2	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
269	mm²	1 x 16	1 x 16	1,5
279	mm²	1 x 16	1 x 16	1,5
289	mm²	1 x 16	1 x 16	1,5
296	mm²	1 x 25	1 x 16	1,5
2112	mm²	1 x 25	1 x 16	1,5
2125	mm²	1 x 35	1 x 16	1,5
2146	mm²	1 x 50	1 x 25	1,5

K20351EN ed.2 - 02.17

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