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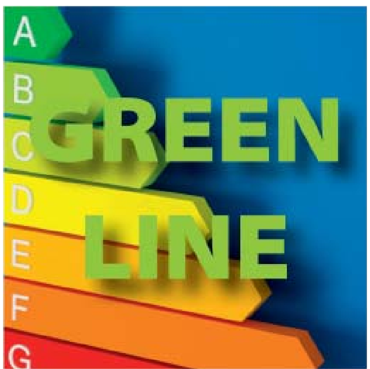
RHOSS

TCAEY-THAEY 245÷265
TXAEY 245÷265

EXP SYSTEMS
EXcellence in Polyvalent technology

Compact-Y range

Air-cooled water chillers, heat pumps and polyvalent units with axial fans. Range with hermetic Scroll type compressors and R410A ecological refrigerant.



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General characteristics

Intended conditions of use

TCAEY units are air-cooled packaged water chillers with and axial fans.
THAEY units are air-cooled packaged reversible heat-pumps on the refrigerant cycle, with axial fans.

They are intended for use in conditioning plants or industrial processes where a supply of chilled water (TCAEY) or chilled and hot water (THAEY), is required. Not suitable for drinking water.

The units are designed for outdoor installation.

The TXAEY units are air-cooled polyvalent units with full heat recovery and axial fans.

They are intended for use in air conditioning or industrial process applications where, in any season, there is the requirement for chilled water or heated water, simultaneously or independently, in systems with 2 or 4 pipes, which are not for domestic water or direct consumption.

The units are designed for outdoor installation.

The units comply with the following directives:
- Machinery directive 2006/42/EEC (MD);
- Low voltage directive 2006/95/EEC (LVD);
- Electromagnetic compatibility directive 2004/108/EEC (EMC);
- Pressure equipment directive 97/23/EEC (PED).

Guide to reading the code

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

T	C / H / X	A	E	Y	2	45÷65
Water production unit	C: Cooling only H: Heat pump X: Polyvalent unit	Air-cooled	Scroll-type hermetic compressors	R410A refrigerant fluid	No. compressors	Approximate cooling capacity (in kW)

Possible installations for TCAEY-THAEY-TXAEY 245÷265 models:

Standard:
Installation without pump and without water buffer tank.

Pump:
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.

Tank & Pump:
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 water buffer tank.
ASDP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by and water buffer tank.

Example: TCAEY 260 ASP1
- Cold water only unit;
- Air cooled;
- 2 x hermetic scroll compressors;
- R410A refrigerant fluid;
- Nominal cooling capacity of approximately 60 kW;
- With pump and water buffer tank.

New Compact-Y series

Energy-saving, reliable and versatile water chillers and heat pumps

A complete, flexible range, with three shutter steps

Four new water chillers and heat pumps, from 44 to 64 kW, in R410A with two scroll compressors of different powers installed on the same refrigerant circuit to obtain three cooling and heating capacity steps, thus allowing for greater regulation flexibility and greater efficiency when operating at partial loads compared to a chiller unit equipped with a traditional tandem. The efficiency of these units is also boosted by the innovative **AdaptiveFunction Plus** control logic, with which the range is equipped. This logic, developed by RHOSS in partnership with the University of Padua, optimises compressor activation and their operating cycles, as well as making it possible to obtain optimum comfort levels in all working conditions and the best performances in terms of energy efficiency during seasonal operation.

LOW ENERGY CONSUMPTION water chillers and heat pumps

The **AdaptiveFunction Plus** "**Economy**" function combines comfort with low energy consumption. In fact, by adjusting the set-point value, it optimises compressor operation on the basis of the actual working conditions.
It is thus possible to achieve significant seasonal energy savings compared to water chillers and heat pumps of an equivalent power with traditional control logic.

HIGH PRECISION water chillers and heat pumps

By using the **AdaptiveFunction Plus** "**Precision**" function, it is possible to achieve as little fluctuation as possible, at partial capacities, in terms of the average Set-point water temperature delivered to the users.

Guaranteed reliability, even with water in the pipes only

Thanks to the "**Virtual Tank**" function, Compact-Y units with **AdaptiveFunction Plus** can operate in systems with a low water content of down to 2 litres/kW, even without the presence of a water buffer tank, whilst still guaranteeing the reliability and good working order of the unit over time.

Estimation of the system's thermal inertia

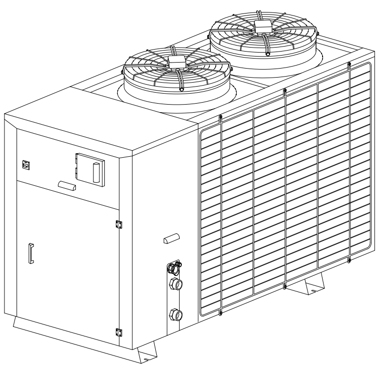
Compact-Y units with **AdaptiveFunction Plus** are able to estimate the characteristics of the thermal inertia that regulates the system dynamics. This is possible thanks to the "**ACM Autotuning**" function, which processes the information relating to the progress of the water temperatures, identifying the optimal value of the control parameters.

Continuous system autodiagnosis

The estimation function is always active and makes it possible to adapt the control parameters quickly to every change in the water circuit and thus in the system water contents.

Silent operation

Thanks to the 3 shutter steps and the condensation control, installed as standard on al units, the noise level is also reduced at partial loads. For example, during night operation, when the load is reduced but sensitivity to noise is at its peak, the control reduces the number of fan revolutions, the primary noise source in this type of unit, producing obvious benefits in terms of acoustic well-being.



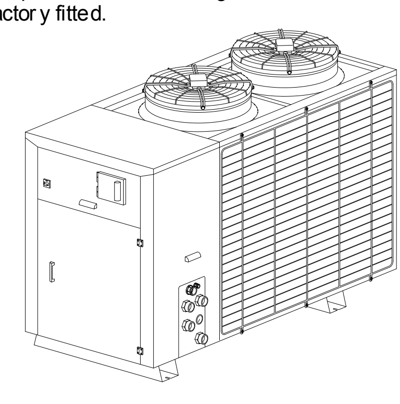
Polyvalent EXP$_{SYSTEMS}$ units in R410A for efficient energy use

Efficient energy use

EXP$_{SYSTEMS}$ is a latest generation, polyvalent eco-friendly system, designed by RHOSS to provide cooling, heating and hot water at the same time or independently, at any time of year, as well as efficient energy use. Energy savings are very high, with COP values of over 6 during the simultaneous production of chilled and hot water.
With EXP$_{SYSTEMS}$, EFFICIENCY, RELIABILITY AND VERSATILITY are guaranteed, whilst offering greater environmental protection.

Polyvalent units for light commerce applications

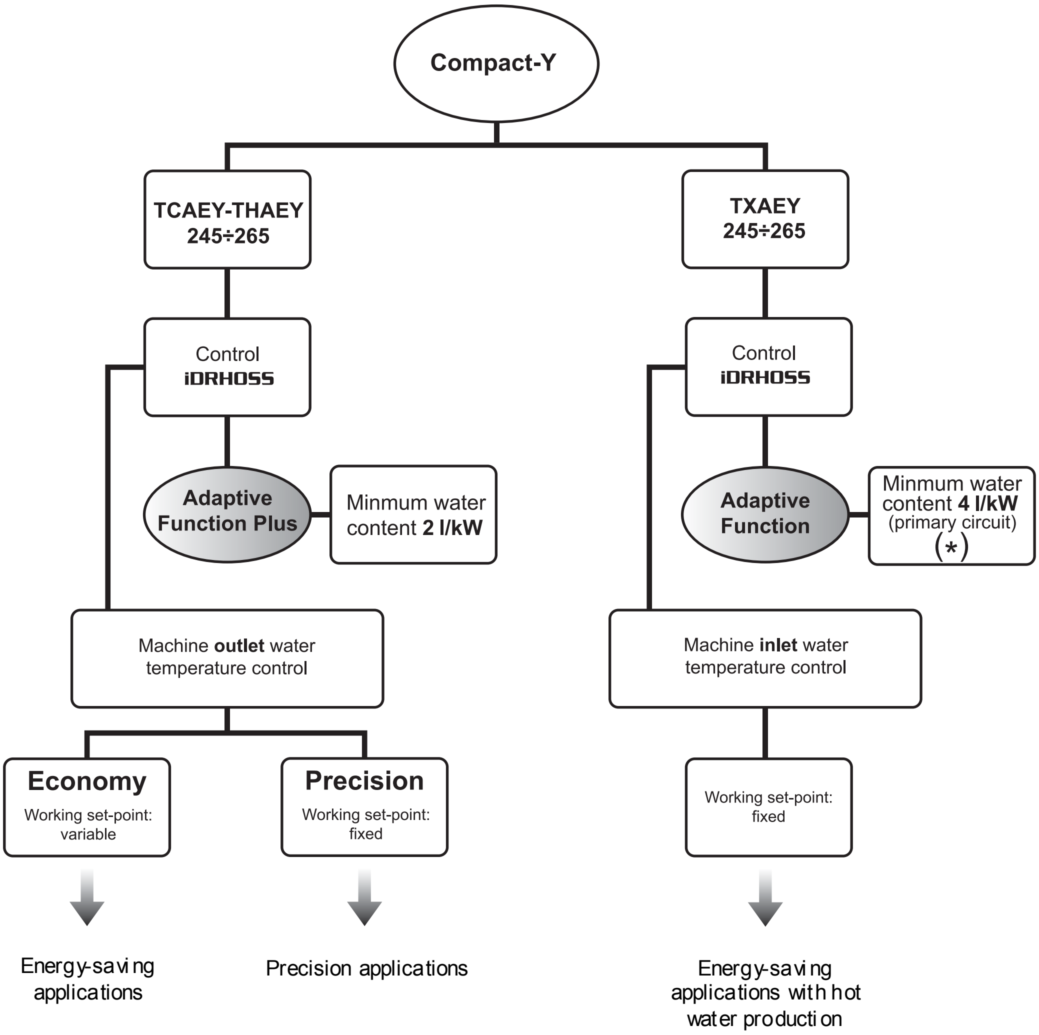
Four new units from 44 to 64 kW in R410A, able to cater for the typical demands of 2 and 4-pipe systems in a flexible fashion, so much so in fact that they can be used in existing systems without any modifications. They come complete with a wide range of accessories, which can also be supplied factory fitted.



Guide to choosing a unit

Thanks to the wide range of versions and construction options, the new Compact-Y series is able to meet a wide range of design and system requirements: systems targeted at energy saving, precision requirements for process applications or the need to be able to supply hot water too.

Below is a diagram that makes it possible to select the most suitable unit, on the basis of your requirements, and provides further information on the **AdaptiveFunction Plus** adaptive logic.



(*) for the secondary circuit refer to page 37.

AdaptiveFunction

TXAEY 245÷265

The **AdaptiveFunction** control logic makes it possible to adapt the chiller/heat pump operating parameters to the working conditions of the system in which it is installed, working partially as a water buffer tank simulator. This makes it possible to reduces the litres/kW of the system itself, guaranteeing compressor safety and the reliability of the machine over time. Approximately **4 litres/kW** are required in a system fitted with a chiller with **AdaptiveFunction** adaptive control and at least 10 litres/kW in a system fitted with a chiller without adaptive control. However, it is evident that in process applications where more accurate water temperature control is required, it is always preferable to use a water buffer tank or a greater system water content, which guarantees high system thermal inertia.

AdaptiveFunction Plus

TCAEY-THAEY 245÷265

The new adaptive regulation logic, **AdaptiveFunction Plus**, is an exclusive ***RHOSS*** patent and the result of a long partnership with the University of Padua. The various algorithm processing and development operations were implemented and tested on units in the Compact-Y range in the ***RHOSS*** S.p.A. *Research&Development* Laboratory by means of numerous test campaigns.

Objectives

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

Operating logic

In general, the actual control logics on water chillers/heat pumps do not consider the characteristics of the system in which the units are installed; they usually regulate the return water temperature and are positioned so as to ensure the operation of the chillers, giving less priority to the system requirements.
The new **AdaptiveFunction Plus** adaptive logic counters these logics with the objective of optimising the chiller operation on the basis of the system characteristics and the effective thermal load. The controller regulates the delivery water temperature and adjusts itself, as and when required, to the relative operating conditions using:

- the information contained in the return and delivery water temperature to estimate the working conditions thanks to a certain mathematical formula;
- 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

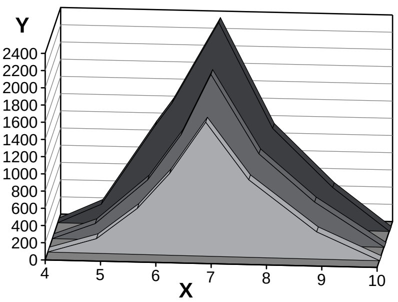
Efficiency or Precision

Thanks to the evolved control, it is possible to run the chiller on two different regulation settings to obtain the best possible performance in terms of energy efficiency and considerable seasonal savings, or high water delivery temperature precision:

1. Low consumption chiller: "Economy" option

It is well known that chillers work at full capacity for just a very small percentage of their operating time, while they work at partial capacity for most of the season. Therefore, the power they need to supply generally differs from the nominal design power, and operation at partial capacity has a noticeable effect on seasonal energy performance and consumption.
This makes it necessary to run the unit so that it is as efficient as possible at partial capacity. The controller therefore ensures that the water delivery temperature is as high as possible (when operating as a chiller) or as low as possible (when operating as a heat pump) whilst compatible with the thermal loads, meaning that it is on a sliding scale, unlike in traditional systems. This prevents energy wastage linked to the maintenance of pointlessly onerous temperature levels for the chiller, ensuring that the ratio between the power to be supplied and the energy to be used to produce it is always at an optimum level. Finally the right level of comfort is available to everyone!

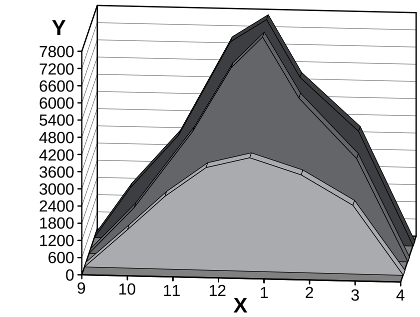
Summer season: the Compact-Y unit, with three shutter steps, offers seasonal energy savings of around 33% when compared to a mono-compressor unit, and around 18% when compared to a standard bi-compressor unit.



X Year divided into months (1 January, 2 February, etc.).
Y Energy consumption (kWh).

- Mono-compressor unit with fixed set-point.
- Bi-compressor unit, 2 shutter steps with fixed set-point.
- Bi-compressor Compact-Y unit, 3 shutter steps with scrolling set-point.

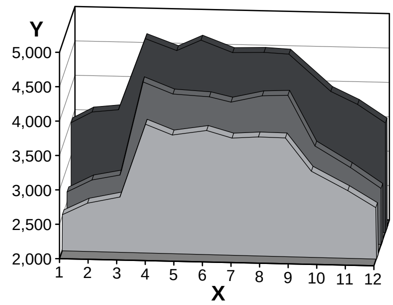
Winter season: the Compact-Y unit, with three shutter steps, offers seasonal energy savings of around 41% compared to a mono-compressor unit, and around 36% when compared to a standard bi-compressor unit. Calculations demonstrate that its seasonal consumption is equivalent to that of a **CLASS A** machine.



X Year divided into months (1 January, 2 February, etc.).
Y Energy consumption (kWh).

- Mono-compressor unit with fixed set-point.
- Bi-compressor unit, 2 shutter steps with fixed set-point.
- Bi-compressor Compact-Y unit, 3 shutter steps with scrolling set-point.

Annual: efficiency over the annual operation of the unit in heat pump mode. ***AdaptiveFunction Plus***, with the "Economy" function, enables the chiller assembly to operate energy-saving programmes whilst still providing the required level of comfort.



X Year divided into months (1 January, 2 February, etc.).
Y Energy efficiency kWh supplied / kWh absorbed.

- Bi-compressor Compact-Y unit, 3 shutter steps with scrolling set-point.
- Bi-compressor unit, 2 shutter steps with fixed set-point.
- Mono-compressor unit with fixed set-point.

Analysis conducted in an office building in Milan, comparing the operation of:

- *a mono-compressor reversible heat pump, which operates with a fixed set-point (7°C in the summer and 45°C in the winter);*
- *a reversible heat pump unit with two compressors, of equal power, operating on the same refrigerant circuit and working with a fixed set-point (7°C in the summer and 45°C in the winter);*
- *a Compact-Y unit with three shutter steps and **AdaptiveFunction Plus** logic, which operates with a scrolling set-point (range between 7 and 14°C in the summer, range between 35 and 45°C in the winter).*

The Seasonal Efficiency Index PLUS

The University of Padua has developed the seasonal efficiency index ESEER+, which takes the adaptation of the chiller set-points to different partial load conditions into account. This, therefore, characterises the seasonal behaviour of the chiller with **AdaptiveFunction Plus** compared to the more traditional ESEER index.
The ESEER+ index can therefore be used for a quick evaluation of seasonal energy consumption of units with **AdaptiveFunction Plus**, instead of more complex analyses conducted on the plant-system which are usually difficult to complete.

Simplified method for calculating energy saving with Adaptive Function Plus

The dynamic analyses used to calculate the energy consumption of chillers in a building/system are generally too elaborate to be used for a quick comparison of different refrigerant units, inasmuch as they require a range of data that is not always available.
For a quick estimate of what the energy savings could be with a unit equipped with AdaptiveFunction Plus software compared to a machine with traditional control, we suggest using a simplified method based on the following formulae:

$$E = \frac{0.54 \times N \times C}{ESEER+}$$

E	power absorbed by chiller equipped with AdaptiveFunction Plus software (kWh)
N	number of chiller operating hours
C	nominal cooling capacity of the chiller (kW)
ESEER+	average seasonal efficiency of chiller equipped with AdaptiveFunction Plus software

$$E = \frac{0.54 \times N \times C}{ESEER}$$

E	power absorbed by chiller equipped with Adaptive Function Plus software (kWh)
N	number of chiller operating hours
C	nominal cooling capacity of the chiller (kW)
ESEER	(European seasonal EER) European average seasonal energy efficiency

Therefore in two units at the same nominal cooling capacity and the same number of working hours but equipped with different controls, the higher the absorbed power the lower the seasonal efficiency. In order to simplify matters, here is an example comparing a traditional control Rhoss unit to one with Adaptive Function Plus control:

Example:

Model TCAEY 250 equipped with traditional control:
Nominal cooling capacity = 51.3 kW
N = 8 hours/day x (5 months x 30 days/month) = 1200 hours
ESEER = 4.31

$$E = \frac{0.54 \times 1200 \times 51.3}{4,31} = \mathbf{7.713\ kW/h}$$

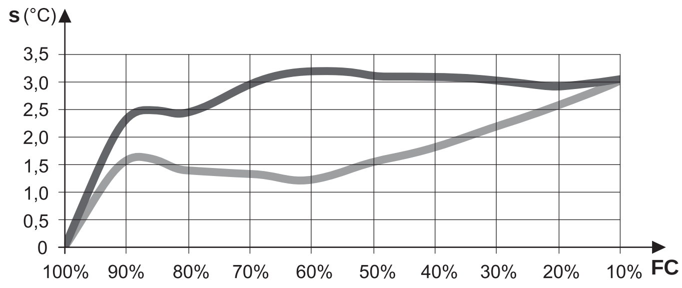
Model TCAEY 250 equipped with control software **AdaptiveFunction Plus**:
Nominal cooling capacity = 51.3 kW
N = 8 hours/day x (5 months x 30 days/month) = 1200 hours
ESEER+ = 4.98

$$E = \frac{0.54 \times 1200 \times 51.3}{4,98} = \mathbf{6.675\ kW/h}$$

The obtainable energy savings with **AdaptiveFunction Plus** is therefore **14%**.

2. High precision: "Precision" option

In this operating mode, the unit works at a fixed set-point and, thanks to the delivery water temperature control and the evolved regulation logic, at a capacity of between 50% and 100% it is possible to guarantee an average fluctuation from the water supply temperature of approximately ± 1.5°C from the set-point value compared to an average fluctuation over time of approximately ± 3°C, which is normally obtained with standard return control. The "**Precision**" option thus guarantees precision and reliability for all those applications that require a regulator that guarantees a more accurate constant water supply temperature, and where there are particular damp control requirements. However, in process applications it is always advisable to use a water buffer tank or a greater system water content to guarantee higher system thermal inertia.

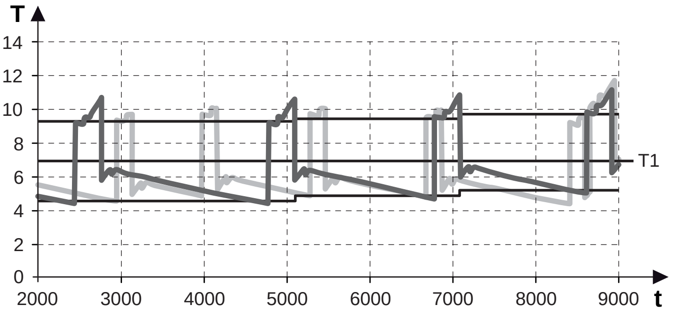


s Fluctuation
FC Load
Unit with water buffer tank, 4 litres/kW in the system and return control.
Unit with water buffer tank, 2 litres/kW in the system and delivery control with "***Precision***" **AdaptiveFunction Plus function**

The chart illustrates the fluctuations of the water temperature from the set value for the various capacities, demonstrating how a unit with delivery control and the ***AdaptiveFunction Plus*** *"****Precision****" function guarantees greater water supply temperature precision*

Virtual Tank: guaranteed reliability, even with water in the pipes only

A low water content in the system can cause the chiller units/heat pumps to be unreliable and can generate system instability and lack of performance. Thanks to the **Virtual Tank** function, this is no longer a problem. The unit can operate in systems with just **2 litres/kW** in the pipes given that the control is able to compensate for the lack of inertia specific to a water buffer tank, "muffling" the control signal, preventing the compressor from switching on and off in an untimely fashion and reducing the average fluctuation of the set-point value.



T Water temperature (°C)
t Time (s)
T1 Set-point temperature
Delivery temperature with Virtual Tank
Delivery temperature without Virtual Tank

*The chart shows the various chiller outlet temperatures considering capacity of 80%. We can observe how the temperatures of the unit with **AdaptiveFunction Plus** logic and the **Virtual Tank** function is far less varied and more stable over time, with average temperatures closer to the working set-point compared to a unit without the **Virtual Tank** function. Moreover, we can see how the unit with **AdaptiveFunction Plus** logic and the **Virtual Tank** function switches the compressor on less often over the same period of time, with obvious advantages in terms of energy consumption and system reliability.*

ACM Autotuning compressor management

AdaptiveFunction Plus enables the Compact-Y units to adapt to the system they are serving, so as to always identify the best compressor operating parameters in the different working conditions.
During the initial operating phases, the special "**Autotuning**" function enables the Compact-Y unit with **AdaptiveFunction Plus** to estimate the thermal inertia characteristics that regulate the system dynamics. The function, which is automatically activated when the unit is switched on for the first time, executes a number of set operating cycles, during which it processes the information relative to the water temperatures. It is thus possible to estimate the physical characteristics of the system and to identify the optimal value of the parameters to be used for the control.
At the end of this initial auto-estimate phase, the "**Autotuning**" function remains active, making it possible to adapt the control parameters quickly to every change in the water circuit and thus in the system water contents.

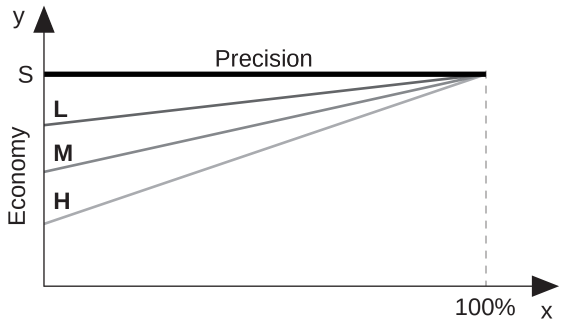
"DEFROST PLUS" evolved defrost logic

In addition to AdaptiveFunction Plus, the defrost logic is also adaptive based on variations in evaporation pressure.
Using this information, the unit controller is able to detect when there is substantial formation of ice on the coils, minimizing the number of defrost cycles in less extreme exterior temperature conditions, while in more extreme exterior temperature and humidity conditions, the controller activates defrost cycles in a timely manner, optimising their times and durations. In this way complete elimination of ice on the exchangers is guaranteed. This system guarantees marker advantages in terms of energy savings and better stability of produced water temperature, improving the comfort levels.

Set-point Compensation

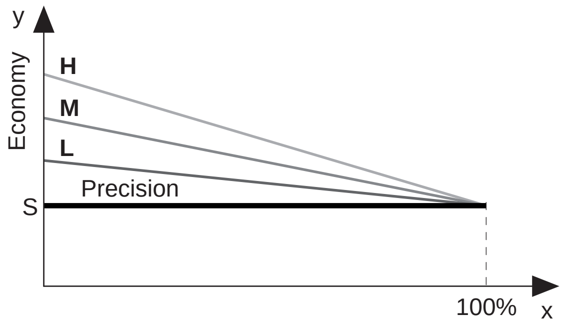
The Economy function enables the chiller assembly to operate energy-saving programmes while still providing the required level of comfort.
This function controls the maximum limit with sliding Set-point, modifying the Set-point value according to the actual system thermal load; when the load decreases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

"Economy" function in Winter mode



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

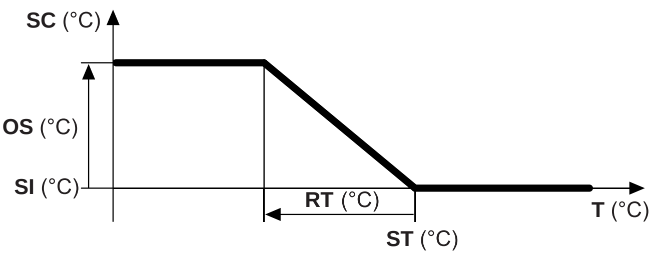
"Economy" function in Summer mode



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

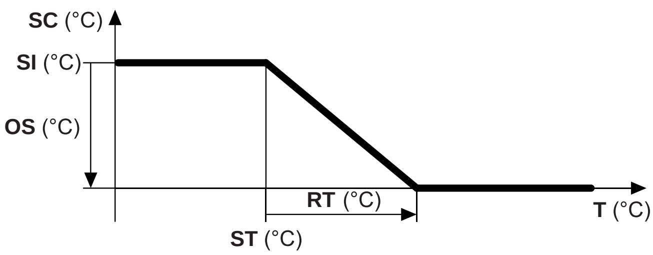
As an alternative to modification of the Set-point according to the real system load (Economy option), it is possible to compensate the set-point based on the temperature of the outdoor air by purchasing the KEAP accessory.
This function modifies the Set-point value based on the temperature of the outdoor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

Winter cycle



OS = 8°C
RT = 25°C
ST = 20°C

Summer cycle



OS = 8°C
RT = 15°C
ST = 15°C

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

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

TCAEY-THAEY 245÷265 models

Construction features

○ Load-bearing structure and panels in galvanised and painted (RAL 9018) sheet steel; base in galvanised sheet steel.
○ Hermetic, Scroll-type rotary compressors, complete with internal thermal protection and crankcase heater activated automatically when the unit stops (as long as the power supply to the unit is preserved).
○ Water side, braze welded plate heat exchanger in stainless steel, complete with antifreeze electric heater and suitably insulated.
○ Air side heat exchanger comprised of a coil of copper pipes and aluminium fins.
○ Double motor-driven, spiral fan with external rotor, fitted with internal thermal protection and complete with protection grille.
○ Proportional electronic device for the pressurised and continuous regulation of the fan rotation speed down to an external air temperature of -10°C when operating as a chiller and up to an external air temperature of 40°C when operating as a heat pump.
○ Male threaded hydraulic connections.
○ Differential pressure switch that protects the unit from any interruptions to the water flow.
○ Refrigerant circuit in annealed copper pipe (EN 12735-1-2) complete with: drier filter, charge connections, safety pressure switch on the high pressure side, pressure switch on the low pressure side, safety valve, thermostatic expansion valve, cycle inversion valve (for THAEY), liquid receiver (for THAEY) and check valves (x2 for THAEY), gas separator.
○ Unit with IP24 level of protection.
○ Compatible ***IDRHOSS*** control, with ***AdaptiveFunction Plus*** function.
○ The unit is complete with the R410A refrigerant charge.

Potential installations

Standard:
Installation without pump and without water buffer tank.

Pump:
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.

Tank & Pump:
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 water buffer tank.
ASDP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by and water buffer tank.

Electrical board

○ Electrical board accessible by opening the front panel, conforming with current IEC norms, can be opened and closed with a suitable tool.
○ Complete with:
- electrical wiring arranged for power supply 400-3ph+N-50Hz;
- auxiliary power supply 230V-1ph-50Hz drawn from the main power supply;
- general isolator, complete with door interlocking isolator;
- automatic compressor, pump and fan protection switch;
- protection fuse for auxiliary circuit;
- compressor, pump and fan power contactor;
- remote unit control.

○ Programmable electronic board with microprocessor, controlled by the keyboard inserted in the machine.
○ This electronic board performs the following functions:
- Regulation and management of the outlet water temperature set points; of the shutter steps; of cycle reversal (THAEY); of the safety timer delays; of the circulating pump; of the compressor and system pump hour-run meter; pressurised defrost cycles; of the electronic anti-freeze protection which cuts in automatically when the machine is switched off; and of the functions which control the operation of the individual parts making up the machine;
- complete protection of the unit, automatic emergency shutdown and display of the alarms which have been activated;
- compressor protection phase sequence monitor;
- unit protection against low or high phase power supply voltage;
- visual indication of the programmed set points on the display; of the inlet/outlet water temperature via the display; of the alarms via the display; and of cooling/heat-pump operating mode via LEDs (for THAEY models);
- self-diagnosis with continuous monitoring of the functioning of the unit;
- user interface menu;
- automatic pump operating time balance (DP1-DP2, ASDP1- ASDP2 installations);
- automatic activation of the pump in standby in the event of an alarm (DP1-DP2, ASDP1-ASDP2 installations);
- alarm code and description;
- alarm history management (menu rotected by manufacturer password).

○ The following is memorized for each alarm:
- date and time of intervention (if the KSC accessory is present);
- alarm code and description;
- inlet/outlet water temperatures when the alarm intervened;
- alarm delay time from the switch-on of the connected device;
- compressor status at moment of alarm;

○ Advanced functions:
- configured for serial connection (KRS485, KFTT10, KRS232 and KUSB accessory);
- possibility to have a digital input for remote management of the double set point.
- possibility to have an analogue input for the scrolling set-point via a 4-20mA remote signal (contact ***RHOSS*** S.p.A. pre-sales);
- configured for management of time bands and operation parameters with the possibility of daily/weekly operating programs (KSC accessory);
- check-up and monitoring of scheduled maintenance status;
- testing of the units assisted by computer;
- self-diagnosis with continuous monitoring of the functioning of the unit.

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

TCAEY-THAEY 245÷265 accessories

Factory fitted accessories

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.
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 water buffer tank.
ASDP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by and water buffer tank.
RAA – 300W water buffer tank antifreeze electric heater (available for Tank & Pump installations).
RAE – 27W motor-driven pump antifreeze electric heater (available for Pump and Tank & Pump installations).
RPB – Coil protection networks.
SFS – Soft-start device for reducing the start-up current during the start-up phase.
SIL – Silent installation.
DS15 – Desuperheater complete with antifreeze electric heater.
RC100 – Heat recovery unit with 100% recovery, complete with antifreeze electric heater.
GM – Refrigerant circuit high and low pressure gauges.
DSP – Double set-point via digital consensus (not compatible with the CS accessory), only for models with compatible ***iDRHOSS*** control and ***Precision*** option.
CS – Scrolling set-point via 4-20 mA analogue signal (incompatible with the DSP accessory), only for models with compatible ***iDRHOSS*** control and ***Precision*** option. Handled as a special accessory by our pre-sales office.

Accessories supplied loose

KSA – Anti-vibration supports.
KRIT – Supplementary electric heater for heat pump.
KEAP – External air temperature sensor for set-point compensation (incompatible with CS accessory).
KRPB – Coil protection networks.
KTR – Remote keypad for control at a distance with rear illuminated LCD display (same functions as the one built into the machine).
KVDEV – 3-way diverter valve for managing the production of domestic hot water.
KSC – Clock card to display date/time and to regulate the machine with daily/weekly start/stop time bands, with the possibility to change the set-points.
KRS485 – RS485 serial interface card to create dialogue networks between cards (maximum of 200 units at a maximum distance of 1,000 m) and building automation, external supervision systems or ***RHOSS*** S.p.A. supervision systems (supported protocols: proprietary protocol; Modbus® RTU).
KFTT10 – FTT10 serial interface card for connection to supervision systems (LonWorks® system compliant with Lonmark® 8090-10 protocol with chiller profile).
KISI – CAN bus serial interface (Controller Area Network compatible with evolved hydronic system ***iDRHOSS*** for integrated comfort management (protocol supported CanOpen®).
KRS232 – RS485/RS232 serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via RS232 serial port (RS232 cable provided).
KUSB – RS485/USB serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via USB port (USB cable provided).
KMDM – GSM 900-1800 modem kit to be connected to the unit for the management of the parameters and any alarm signals on a remote basis. The kit consists of a GSM modem with relative RS232 card. It is necessary to purchase a SIM data card, not supplied by ***RHOSS*** S.p.A.
KRS – ***RHOSS*** S.p.A. supervision software for unit monitoring and remote management. The kit consists of a CD-Rom and hardware key.

TXAEY 245÷265 models

Construction features
STANDARD installation

○ *RHOSS* S.p.A. patented polyvalent system. Italian
○ Load-bearing structure in galvanised and RAL 9018 painted sheet steel, coated on the inside with sound-absorbing material, divided into:
• sound-proofed technical compartment for housing the compressors, the electrical board and the main components in the refrigerant circuit.
• aeraulic compartment for housing the heat exchange coils, the motor-driven fans and the pump assembly accessory if present.
○ Hermetic, Scroll-type rotary compressors, complete with internal thermal protection and crankcase heater activated automatically when the unit stops (as long as the power supply to the unit is preserved).
○ Double motor-driven, spiral fan with external rotor, fitted with internal thermal protection and complete with protection grille.
○ Proportional electronic device for the pressurised and continuous regulation of the fan rotation speed down to an external air temperature of -10°C when operating as a chiller and up to an external air temperature of 40°C when operating as a heat pump.
○ Stainless steel plate heat exchangers on the primary and secondary water circuits, complete with closed cell polyurethane foam rubber insulation and antifreeze electric heaters.
○ Differential pressure switch on all exchangers.
○ Air side exchanger comprised of a copper pipe coil flared into aluminium fins with "corrugated" design in order to increase heat exchange efficiency.
○ Male threaded hydraulic connections.
○ Refrigerant circuit realized with annealed copper tube (EN 12735-1-2) and welded with silver alloy. Complete with 2 cycle inversion valves, charge connections, high and low pressure switch, 2 thermostatic valves for models 117-130 and 3 for models 133, 4 solenoid valves, a drier filter, 2 liquid receivers, a gas separator, a humidity indicator, 3 non-return valves and a safety valve (for models 130-133).
○ Primary and secondary water circuit made from annealed copper piping (EN 12735-1-2) and welded with silver alloy. The primary water circuit also comes complete with:
pump, safety valve (3 bar), pressure gauge, expansion tank, manual bleed valves and drainage valves.
○ Secondary water circuit made from annealed copper piping (EN 12735-1-2) and welded with silver alloy, complete with differential pressure switch.
○ Compatible *iDRHOSS* control with ***AdaptiveFunction*** on the primary circuit regulation.
○ Unit with IP24 level of protection.
○ The unit is complete with the R410A refrigerant charge.

Potential installations

Standard:
Installation without pump and without water buffer tank.

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

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

EXP electrical board characteristics

○ Electrical board accessible by opening the front panel, conforming with current IEC norms, can be opened and closed with a suitable tool.
○ Complete with:
• electrical wiring arranged for power supply 400V-3ph+N-50Hz
• auxiliary power supply 230V-1ph-50Hz drawn from the main power supply;
• general isolator, complete with door interlocking isolator;
• automatic compressor, pump and fan protection switch;
• protection fuse for auxiliary circuit;
• compressor, pump and fan power contactor;
• remote unit control.
○ Programmable electronic board with microprocessor, controlled by the keyboard inserted in the machine.
○ This electronic board performs the following functions:
• regulation and management of the set points for unit inlet water temperature; cycle inversion; safety timer delays; circulating pump; compressor and system pump hour-run meter; pressurised defrost cycles; electronic anti-freeze protection which cuts in automatically when the machine is switched off; and the functions which control the operation of the individual parts making up the machine;
• complete protection of the unit, automatic emergency shutdown and display of the alarms which have been activated;
• compressor protection phase sequence monitor;
• unit protection against low or high phase power supply voltage;
• visual indication of the programmed set points via the display; of the in/out water temperature via the display; of the alarms via the display; and of cooling/heat-pump operating mode via display;
• self-diagnosis with continuous monitoring of the functioning of the unit;
• user interface menu;
• automatic pump operating time balance (DP1-DP2, ASDP1- ASDP2 installations);
• automatic activation of the pump in standby in the event of an alarm (DP1-DP2, ASDP1-ASDP2 installations);
• alarm code and description;
• alarm history management (menu protected by manufacturer password).
○ The following is memorized for each alarm:
• date and time of intervention (if the KSC accessory is present);
• alarm code and description;
• inlet/outlet water temperatures when the alarm intervened;
• alarm delay time from the switch-on of the connected device;
• compressor status at moment of alarm;
○ Advanced functions:
• configured for serial connection (KRS485, KFTT10, KRS232 and KUSB accessory);
• possibility to have a digital input for remote management of the double set point (contact *RHOSS* S.p.A. pre-sales).
• possibility to have an analogue input for the scrolling set-point via a 4-20mA remote signal (contact *RHOSS* S.p.A. pre-sales);
• configured for management of time bands and operation parameters with the possibility of daily/weekly operating programs (KSC accessory);
• check-up and monitoring of scheduled maintenance status;
• testing of the units assisted by computer;
• self-diagnosis with continuous monitoring of the functioning of the unit;
○ ***AdaptiveFunction*** on the primary circuit regulation.

TXAEY 245÷265 accessories

Factory fitted accessories

P1 – Installation with pump on the primary circuit.
P2 – Installation with increased static pressure pump on the primary circuit.
DP1 – Installation with double pump on the primary circuit, including an automatically activated pump in stand-by.
DP2 – Installation with increased static pressure double pump on the primary circuit, including an automatically activated pump in stand-by.
ASP1 – Installation with pump on the primary circuit and water buffer tank.
ASP2 – Installation with increased static pressure pump on the primary circuit and water buffer tank.
ASDP1 – Installation with double pump on the primary circuit, including an automatically activated pump in stand-by and water buffer tank.
ASDP2 – Installation with increased static pressure double pump on the primary circuit, including an automatically activated pump in stand-by and water buffer tank.
RAA – 300W water buffer tank antifreeze electric heater (available for Tank & Pump installations).
RAE – 27W motor-driven pump antifreeze electric heater (available for Pump and Tank & Pump installations).
RPB – Coil protection networks.
SIL – Silent installation.
GM – Refrigerant circuit high and low pressure gauges.
DSP – Double set-point via digital consensus (not compatible with the CS accessory), only for models with compatible IDRHOSS control and ***Precision*** option. Handled as a special accessory by our pre-sales office.
CS – Scrolling set-point via 4-20 mA analogue signal (incompatible with the DSP accessory), only for models with compatible IDRHOSS control and ***Precision*** option. Handled as a special accessory by our pre-sales office.

Accessories supplied loose

KSA – Anti-vibration supports.
KRPB – Coil protection networks.
KTR – Remote keypad for control at a distance with rear illuminated LCD display (same functions as the one built into the machine).
KSC – Clock card to display date/time and to regulate the machine with daily/weekly start/stop time bands, with the possibility to change the set-points.
KRS485 – RS485 serial interface card to create dialogue networks between cards (maximum of 200 units at a maximum distance of 1,000) and building automation, external supervision systems or RHOSS S.p.A. supervision systems (supported protocols: proprietary protocol; Modbus® RTU).
KFTT10 – FTT10 serial interface card for connection to supervision systems (LonWorks® system compliant with Lonmark® 8090-10 protocol with chiller profile).
KISI – CAN bus serial interface (Controller Area Network compatible with evolved hydronic system IDRHOSS for integrated comfort management (protocol supported CanOpen®).
KRS232 – RS485/RS232 serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via RS232 serial port (RS232 cable provided).
KUSB – RS485/USB serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via USB port (USB cable provided).
KMDM – GSM 900-1800 modem kit to be connected to the unit for the management of the parameters and any alarm signals on a remote basis. The kit consists of a GSM modem with relative RS232 card. It is necessary to purchase a SIM data card, not supplied by RHOSS S.p.A.
KRS – RHOSS S.p.A. supervision software for unit monitoring and remote management. The kit consists of a CD-Rom and hardware key.

Technical data

Table "A": Technical data

TCAEY model		245	250	260	265
Nominal cooling capacity (*)	kW	44,2	51,3	59,2	64,0
E.E.R. (3rd step, 100%)		2,55	2,60	2,68	2,67
E.E.R. (2nd step)		3,91	3,88	4,14	4,15
E.E.R. (1st step)		4,17	4,17	4,49	4,76
E.S.E.E.R.		3,78	4,31	4,38	4,03
E.S.E.E.R.+		4,38	4,98	5,04	4,72
Sound pressure (3rd step, 100%) (**) (∆)	dB(A)	56	56	57	57
Sound power level (3rd step, 100%) (***)	dB(A)	80	80	81	81
Sound power level (2nd step) (***)	dB(A)	77	77	79	79
Sound power level (1st step) (***)	dB(A)	74	74	74	75
Scroll/step compressor	No.	2/3	2/3	2/3	2/3
Circuits	No.	1	1	1	1
Fans	No. x kW	2 x 0.78	2 x 0.78	2 x 0.78	2 x 0.78
Exchanger water contents	l	3,8	4,4	5,1	5,7
Water side exchanger nominal water flow (*)	l/h	7600	8800	10200	11000
Nominal pressure drops, water side heat exchanger (*)	kPa	32	32	33	31
Residual static pressure (P1/P2 installation) (*)	kPa	122/195	114/190	102/184	92/167
Residual static pressure (ASP1/ASP2 installation) (*)	kPa	113/186	103/179	88/169	75/150
Tank water content (ASP1/ASP2 installation)	l	150	150	150	150
R410A refrigerant charge		See serial No. plate			
Polyester oil charge		See compressor plate			

Electrical data					
Absorbed power (*) (●)	kW	17,4	19,7	22,1	24,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	0,7 / 1,5	0,7 / 1,5	0,7 / 1,5	0,7 / 1,5
Electrical power supply	V-ph-Hz	400-3+N-50			
Auxiliary power supply	V-ph-Hz	230-1-50			
Nominal current (■)	A	27,7	30,1	35,1	39,5
Maximum current (■)	A	39,3	43,9	48,6	53,4
Starting current	A	134	150	216	222
Starting current with SFS	A	93	95	135	140
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,1 / 8,6	5,1 / 8,6	5,1 / 8,6	5,1 / 8,6

Dimensions					
Width (L)	mm	2260	2260	2260	2260
Height (H)	mm	1570	1570	1570	1570
Depth (P)	mm	1000	1000	1000	1000
Water connections	Ø	2"	2"	2"	2"

(*) In the following conditions: condenser input air temperature 35°C; chilled water temperature 7°C; temperature differential at evaporator 5°C.

(**) Sound pressure level in dB(A), measured at a distance of 5 m from the unit, with a directionality factor of 2.

(***) Sound power level in dB(A) on the basis of measurements made in compliance with the UNI EN-ISO 3744 standard and Eurovent 8/1.

(∆) For machines fitted with the "SIL" accessory, the sound pressure must be corrected by -3dB(A).

(■) Current value, excluding the current absorbed by the pump.

(●) Power absorbed by the unit without motor-driven pump.

E.S.E.E.R. (European Seasonal EER) European average seasonal energy efficiency.

E.S.E.E.R. + with AdaptiveFunction Plus logic.

N.B.:
The values for available static pressure of the pumps and the pressure drops of the exchangers can be found on page 32.
The calculation of the E.E.R. and C.O.P. does not take the pump absorption into account.

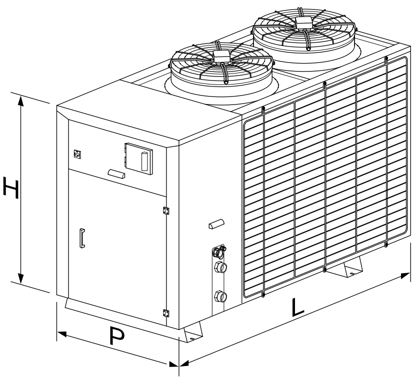


Table "A": Technical data

THAEY model		245	250	260	265
Nominal cooling capacity (*)	kW	42,6	50,6	58,2	61,9
E.E.R. (3rd step, 100%)		2,54	2,74	2,69	2,58
E.E.R. (2nd step)		3,90	4,09	4,16	4,02
E.E.R. (1st step)		4,16	4,39	4,51	4,61
E.S.E.E.R.		3,76	4,29	4,35	4,01
E.S.E.E.R.+		4,38	4,98	5,04	4,72
Nominal heating capacity (**)	kW	47,8	55,8	62,2	67,9
C.O.P.		2,89	3,00	3,04	2,91
Sound pressure (3rd step, 100%) (**) (∆)	dB(A)	56	56	57	57
Sound power level (3rd step, 100%) (***) (∆)	dB(A)	80	80	81	81
Sound power level (2nd step) (***)	dB(A)	77	77	79	79
Sound power level (1st step) (***)	dB(A)	74	74	74	75
Scroll/step compressor	No.	2/3	2/3	2/3	2/3
Circuits	No.	1	1	1	1
Fans	No. x kW	2 x 0.78	2 x 0.78	2 x 0.78	2 x 0.78
Exchanger water contents	l	3,8	4,4	5,1	5,7
Water side exchanger nominal water flow (*)	l/h	7300	8700	10000	10600
Nominal pressure drops, water side heat exchanger (*)	kPa	32	32	33	31
Nominal pressure drops, water side heat exchanger (**)	kPa	37	37	35	34
Residual static pressure (P1/P2 installation) (*)	kPa	125/198	115/191	105/186	97/172
Residual static pressure (ASP1/ASP2 installation) (*)	kPa	118/190	105/181	90/171	81/156
Tank water content (ASP1/ASP2 installation)	l	150	150	150	150
R410A refrigerant charge		See serial No. plate			
Polyester oil charge		See compressor plate			

Electrical data					
Absorbed power in summer operation (*) (●)	kW	16,8	18,5	21,6	24,0
Absorbed power in winter operation (**) (●)	kW	16,6	18,6	20,5	23,3
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	0,7 / 1,5	0,7 / 1,5	0,7 / 1,5	0,7 / 1,5
Electrical power supply	V-ph-Hz	400-3+N-50			
Auxiliary power supply	V-ph-Hz	230-1-50			
Nominal current in summer operation (*) (■)	A	25,5	30,6	36,2	39,5
Nominal current in winter operation (**) (■)	A	25,2	29,0	33,7	37,7
Maximum current (■)	A	39,3	43,9	48,6	53,4
Starting current	A	134	150	216	222
Starting current with SFS	A	93	95	135	140
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,1 / 8,6	5,1 / 8,6	5,1 / 8,6	5,1 / 8,6

Dimensions					
Width (L)	mm	2260	2260	2260	2260
Height (H)	mm	1570	1570	1570	1570
Depth (P)	mm	1000	1000	1000	1000
Water connections	Ø	2"	2"	2"	2"

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

(**) In the following conditions: evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 45°C; temperature differential at the condenser 5°C.

(***) Sound pressure level in dB(A), measured at a distance of 5 m from the unit, with a directionality factor of 2.

(∆) For machines fitted with the "SIL" accessory, the sound pressure must be corrected by -3dB(A).

(****) Sound power level in dB(A) on the basis of measurements made in compliance with the UNI EN-ISO 3744 standard and Eurovent 8/1.

(■) Current value, excluding the current absorbed by the pump.

(●) Power absorbed by the unit without motor-driven pump.

N.B.:
The values for available static pressure of the pumps and the pressure drops of the exchangers can be found on page 32.
The calculation of the E.E.R. and C.O.P. does not take the pump absorption into account.

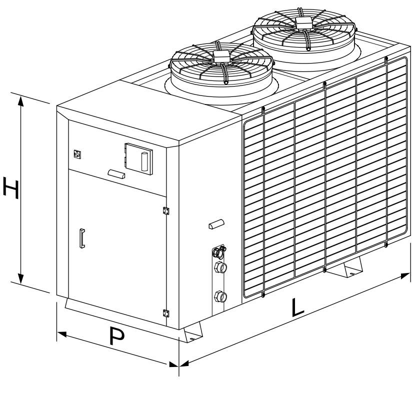


Table "A": Technical data

TXAEY model		**245**	**250**	**260**	**265**
Cooling operation in *AUTOMATIC 1* mode					
Nominal cooling capacity (*)	kW	42,6	50,6	58,2	61,9
E.E.R. (*)		2,54	2,74	2,69	2,58
E.S.E.E.R. (*)		3,76	4,29	4,35	4,01
Cooling operation with heat recoveryin *AUTOMATIC 2* mode					
Nominal cooling capacity in main heat exchanger (*)	kW	40,0	48,3	53,5	60,6
Nominal heating capacity in secondary heat exchanger (**)	kW	54,4	65,0	71,8	81,1
C.O.P. (**)		6,94	7,30	7,32	7,48
Heat pump operation in modes *SELECT 1-2* / *AUTOMATIC 3*					
Nominal heating capacity (***)	kW	47,8	55,8	62,2	67,9
C.O.P. (***)		2,89	3,00	3,04	2,91
Sound pressure (****) (Δ)	dB(A)	56	56	57	57
Sound power level (*****)	dB(A)	80	80	81	81
Scroll/step compressor	No.	2/1	2/1	2/1	2/1
Circuits	No.	1	1	1	1
Fans	No. x kW	2 x 0.78	2 x 0.78	2 x 0.78	2 x 0.78
Main exchanger nominal flow (*)	l/h	7300	8700	10000	10600
Nominal pressure drops in main exchanger (*)	kPa	32	32	33	31
Nominal pressure drops in main exchanger (***)	kPa	37	37	35	34
Water content in main exchanger	l	3,8	4,4	5,1	5,7
Residual static pressure on the main exchanger (P1/ASP1) (*)	kPa	125/118	115/105	105/90	97/81
Residual static pressure on the main exchanger (P2/ASP2) (*)	kPa	198/190	191/181	186/171	172/156
Main/secondary recovery exchanger nominal flow rate (***)	l/h	9500	11300	12500	14100
Secondary recovery exchanger pressure drops (***)	kPa	46	49	46	47
Recovery exchanger water content	l	3,8	4,4	5,1	5,7
Tank water content (ASP1/ASP2 installation)	l	150	150	150	150
R410A refrigerant charge		See serial No. plate			
Polyester oil charge		See compressor plate			

(*) In the following conditions: condenser input air temperature 35°C; chilled water temperature 7°C; main heat exchanger (evaporator) temperature differential 5°C.

(**) In the following conditions: chilled water temperature 7°C; temperature differential at main exchanger (evaporator) 5°C, secondary exchanger (recovery) hot water outlet temperature 40/45°C at nominal flow.

(***) In the following conditions: coil inlet air temperature 7°C D.B., 85% R.H.; main exchanger (condenser/evaporator) or secondary exchanger (recovery) hot water outlet temperature 40/45°C at nominal flow.

(****) Level of sound pressure in dB(A) measured at a distance of 5 m from the unit with a directionality factor of 2 (to obtain the value in open space, subtract 3 dB(A)).

(*****) Sound power level in dB(A) on the basis of measurements made in compliance with the UNI EN-ISO 3744 standard and Eurovent 8/1.

(Δ) For machines fitted with the "SIL" accessory, the sound pressure must be corrected by -3dB(A).

N.B.:
The values for available static pressure of the pumps and the pressure drops of the exchangers can be found on page 32.
The calculation of the E.E.R. and C.O.P. does not take the pump absorption into account.

Electrical data		245	250	260	265
Absorbed power in ***AUTOMATIC 1*** mode (*)(●)	kW	16,8	18,5	21,6	24,0
Absorbed power in ***AUTOMATIC 2*** mode (**)(●)	kW	13,6	15,5	17,1	19,0
Absorbed power in ***AUTOMATIC 3 / SELECT 2/ SELECT 1*** mode (***) (●)	kW	16,6	18,6	20,5	23,3
Pump absorbed power (P1/ASP1)	kW	0,7	0,7	0,7	0,7
Pump absorbed power (P2/ASP2)	kW	1,5	1,5	1,5	1,5
Electrical power supply	V-ph-Hz	400-3+N-50			
Auxiliary power supply	V-ph-Hz	230-1-50			
Nominal current (▲) (■)	A	25,5	30,6	36,2	39,5
Maximum current (■)	A	39,3	43,9	48,6	53,4
Starting current	A	134	150	216	222
Pump absorbed power (P1/ASP1)	A	5,1	5,1	5,1	5,1
Pump absorbed power (P2/ASP2)	A	8,6	8,6	8,6	8,6

Dimensions					
Width (L)	mm	2260	2260	2260	2260
Height (H)	mm	1570	1570	1570	1570
Depth (P)	mm	1000	1000	1000	1000
Water connections	Ø	2”	2”	2”	2”
Recovery system water filling connection	Ø	2”	2”	2”	2”

(*) In the following conditions: condenser input air temperature 35°C; chilled water temperature 7°C; main heat exchanger (evaporator) temperature differential 5°C.

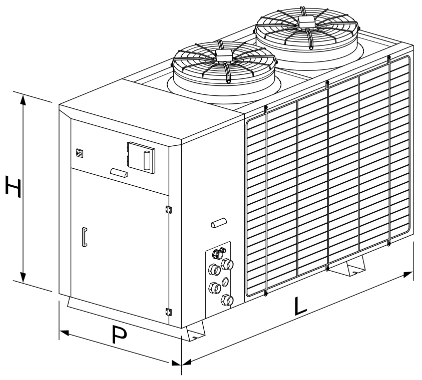
(**) In the following conditions: chilled water temperature 7°C; temperature differential at main exchanger (evaporator) 5°C, secondary exchanger (recovery) hot water outlet temperature 40/45°C at nominal flow.

(***) In the following conditions: coil inlet air temperature 7°C D.B., 85% R.H.; main exchanger (condenser/evaporator) or secondary exchanger (recovery) hot water outlet temperature 40/45°C at nominal flow.

(▲) The current value shown is the maximum from among the values measured in ***AUTOMATIC*** and ***SELECT*** mode in the respective nominal conditions.

(●) Power absorbed by the unit without motor-driven pump.

(■) Total current value, excluding the current absorbed by the pump.



Energy efficiency at partial loads - ESEER index

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

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

where EER100% EER75% EER50% EER25% represent the efficiencies of the cooling unit in the four load conditions and at the temperatures indicated in table "**B**".
The data is calculated using Eurovent methodology. The pump absorption (if present) is not taken into consideration.

Table "B": load and temperature conditions

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

○ Table "**C**" shows the E.E.R. and E.S.E.E.R. values for each model. The high values of energy efficiency at partial loads were achieved thanks to optimisation of the heat exchangers.

Table "C": E.E.R. - E.S.E.E.R. for TCAEY

Model	E.E.R.	E.S.E.E.R.
245	2,55	3,78
250	2,60	4,31
260	2,68	4,38
265	2,67	4,03

Table "C": E.E.R. - E.S.E.E.R. for THAEY – TXAEY

Model	E.E.R.	E.S.E.E.R.
245	2,54	3,76
250	2,74	4,29
260	2,69	4,35
265	2,58	4,01

TXAEY operating principle

○ The eco-friendly polyvalent system was designed by ***RHOSS*** to provide 2-pipe and 4-pipe systems with hot water from another heat exchanger (recovery) all year-round, as well as acting as a traditional reversible-cycle water chiller
○ The total heat recovery units also allow efficient energy rationalisation.
○ The system can operate in two modes, which can be selected by electronic control. These are called ***AUTOMATIC*** and ***SELECT***.
• In ***AUTOMATIC*** mode, the system allows for full recovery of the heat of condensation and/or the production of chilled water.
• In ***SELECT*** mode, it allows for the production of hot water by the secondary or main heat exchanger.

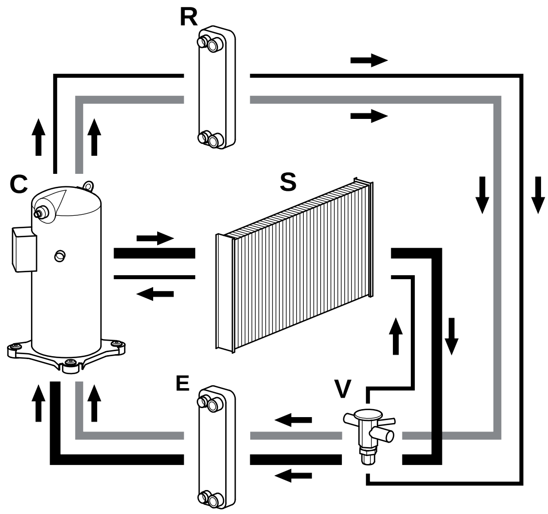
AUTOMATIC mode - multi-season

○ In this mode the system automatically manages the requests for hot or chilled water, supplying chilled water to the main exchanger and hot water to the secondary exchanger, even simultaneously.
○ Each request for hot or cold water is satisfied independently of every other request.
○ When the secondary exchanger requires hot water, the flow of gas delivered from the compressor is directed towards the recovery. If chilled water is required at the same time, the unit operates as a water chiller.
○ In ***AUTOMATIC*** mode the unit therefore has three possible automatic operating configurations:
• ***AUTOMATIC 1 (A1)*** - operation as an air-cooled water chiller for the production of chilled water.
• ***AUTOMATIC 2 (A2)*** - operation as a water chiller with total heat recovery for simultaneous production of hot and chilled water.
• ***AUTOMATIC 3 (A3)*** - operation as a heat pump for the production of hot water at the secondary exchanger (recovery).

SELECT mode - multi-season

○ In this mode, based on requests the system provides hot water to the main exchanger ***SELECT 1 (S1)*** or hot water to the secondary exchanger ***SELECT 2 (S2)***. If simultaneous requests are expected, priority of operation must be established via the electronic control.
○ If the request for hot water from the selected heat exchanger is completely satisfied, the hot gas can be completely switched over to the other heat exchanger, provided this is requested.
○ The unit is programmed in the factory to provide hot water with priority assigned to the secondary exchanger. You can however modify this setting from the electronic control panel.
○ To summarise, operation in ***SELECT*** mode offers two possible automatic configurations:
• ***SELECT 1 (S1)*** - operation as a heat pump for the production of hot water at the main exchanger.
• ***SELECT 2 (S2)*** - operation as a heat pump for the production of hot water at the main exchanger.

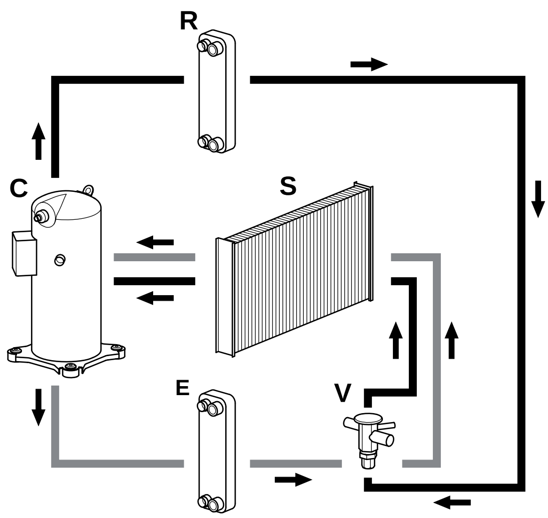
Diagram of AUTOMATIC operating mode



Production of chilled water only at the main exchanger (***A1***).
Production of chilled water at the main exchanger and hot water at the secondary exchanger (***A2***) (recovery).
Production of hot water only at the secondary exchanger (***A3***) (recovery).

S Air side condenser/evaporator.
C Compressor.
E Main exchanger (condenser/evaporator).
R Secondary exchanger (recovery).
V Lamination valve.

Diagram of SELECT operating mode



Production of hot water at the main exchanger (***S1***).
Production of hot water at the secondary exchanger (***S2***).

S Air side condenser/evaporator.
C Compressor.
E Main exchanger (condenser/evaporator).
R Secondary exchanger (recovery).
V Lamination valve.

Operating logic

○ The following tables provide examples of automatic operation of the polyvalent system in various operating modes based on the requests from the user.

○ The first table shows the operating status and the production of hot and chilled water considering the single requests.

○ The subsequent tables show the operating status and the production of hot water in the main and secondary exchangers on the basis of requests and the priority assigned to the exchangers.

TXAEY operating in *AUTOMATIC* mode

Request for chilled water (*)	Request for hot water at the secondary exchanger (recovery)			
	0 %		100 %	
	Status	Operation	Status	Operation
0 %	OFF	-	ON	Recovery only (*A3*)
100 %	ON	Cooling (*A1*)	ON	Cooling + recovery (*A2*)

(*A1*) = *AUTOMATIC 1* (*A2*) = *AUTOMATIC 2* (*A3*) = *AUTOMATIC 3*

TXAEY working in *SELECT* mode with priority to the secondary exchanger (recovery)

Request for hot water (**)	Request for hot water at the secondary exchanger (recovery)			
	0 %		100 %	
	Status	Operation	Status	Operation
0 %	OFF	-	ON	Recovery only (*S2*)
100 %	ON	Heating only (*S1*)	ON	Recovery only (*S2*)

(*S1*) = *SELECT 1* (*S2*) = *SELECT 2*

TXAEY working in *SELECT* mode with priority to the main exchanger (condenser/evaporator)

Request for hot water (**)	Request for hot water at the secondary exchanger (recovery)			
	0 %		100 %	
	Status	Operation	Status	Operation
0 %	OFF	-	ON	Recovery only (*S2*)
100 %	ON	Heating only (*S1*)	ON	Heating only (*S1*)

(*S1*) = *SELECT 1* (*S2*) = *SELECT 2*

(*) Request for chilled water at the main exchanger (evaporator).
(**) Request for hot water at the main exchanger (condenser/evaporator).

The competitive advantages of the polyvalent system

○ The polyvalent system was patented by ***RHOSS*** S.p.A. to provide for the request for hot and cold water, simultaneously or independently, with a single unit. This optimizes energy consumption and makes management easier.

○ The polyvalent system is a valid alternative to traditional systems that require the use of a chiller with or heat pump, with use or addition of a boiler. The advantages derive from the use of a single unit, energy savings due to high COPs, and the lack of use of combustible products, so that it can be defined as an ecological polyvalent machine.

○ The system is a versatile fourth-generation polyvalent heat pump. As opposed to other polyvalent units, it meets the typical demands of 2-pipe and 4-pipe systems with a single unit and in a most flexible manner, so that it can even be used in existing systems with no modifications required.

○ This polyvalent unit takes it place on the market as a unit that ensures essential aspects such as EFFICIENCY, RELIABILITY AND VERSATILITY.

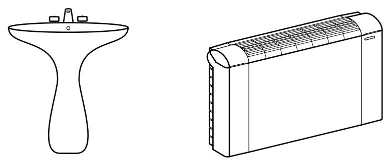
Applications of the polyvalent system

The polyvalent ecological system was designed by **RHOSS** S.p.A. to provide year-round supply of hot and cold water to 2-pipe or 4-pipe systems, either simultaneously or independently, depending on the selected operating mode, ***AUTOMATIC*** or ***SELECT***.

2-pipe-systems

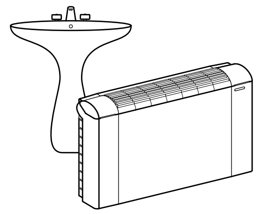
○ Air conditioning and the production of hot water in a 2-pipe system is a typical application in hotels, hospitals, gyms and hospitality structures in general.
○ In ***AUTOMATIC*** mode it is used in the summer months for cooling and the production of hot water.
○ In ***SELECT*** mode it is used in between seasons or in winter for heating or the production of hot water on the basis of the priority assigned.

Summer months *"AUTOMATIC"*



Water for domestic use Hot water — **Air conditioning** Chilled water

Winter months "*SELECT*"



Water for domestic use or air conditioning
Hot water

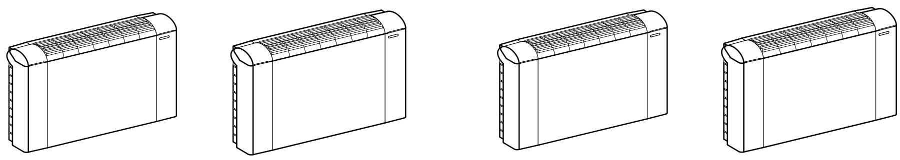
4-pipe systems

○ Increasingly frequently, modern HVAC installations require the simultaneous production of hot and chilled water. This can occur more often because of:
- the development of new types of thermal insulation for buildings;
- increase of internal loads (CED, WEB,…);
- lighting systems;
- the presence of large windows;
- the growing importance attributed to air quality, which requires the use of conditioning systems year-round.

In these kinds of application, it can be used in ***AUTOMATIC*** mode throughout the year, catering to simultaneous or separate hot and chilled water demands in a completely automatic way.

"*AUTOMATIC*" mode for the entire year

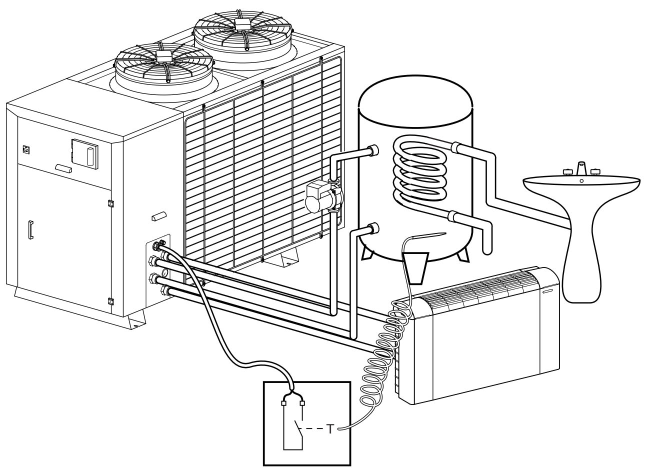
Winter Heating	**Summer** Cooling	**Spring/Autumn** Cooling and heating	

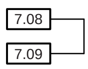


Air conditioning Hot water	**Air conditioning** Chilled water	**Air conditioning 1** Hot water	**Air conditioning 2** Chilled water

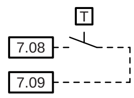
Example of water circuit

With external boiler (recovery)





Standard connection:
the recovery pump (installed by the installer) is on at all times. Recovery is activated on the basis of the temperature of return water to the boiler.



Suggested connection:
the recovery and the recovery pump (installed by the installer) are activated by the thermostat installed on the boiler.

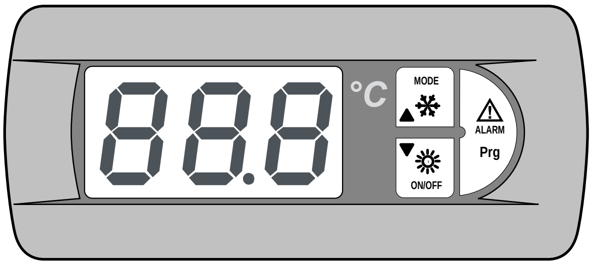
N.B.:
The maximum temperature to which the thermostat can be set, and hence the set-point of the machine, must be set on the basis of the operating limits.
Attention:
Units equipped with a recovery unit or desuperheater must be operated in compliance with the provisions in Italian Ministerial Decree 01/12/04 No.309. This law is only valid in the Italian Republic. For installation in other countries, refer to current local legislation.
Hot water for domestic use can be produced only by using an additional heat exchanger which is suited to this purpose. Refer to current local laws and regulations.

An adequate supply of water must be guaranteed to the recovery circuit in order to prevent the compressor from switching on and off frequently and poor performance due to the defrosting cycles. To calculate the correct water content, please refer to page 37.

Electronic controls for TCAEY THAEY 245÷265 models

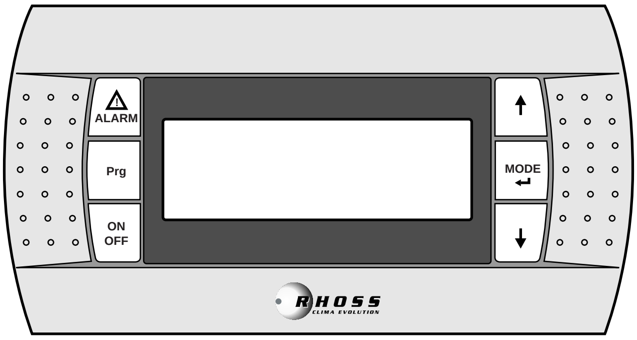
Electronic control

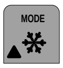
The keyboard with display makes it possible to view the working temperature and all the unit process variables, as well as providing access to setting parameters for operating set points and their modification. For purposes of technical assistance, it allows password-protected access to the unit's management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



KTR – Remote keyboard

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





SUMMER LED - MODE, UP key:
indicates that the unit is running in cooling mode. This key makes it possible to select the unit operating mode (summer or winter cycle) and also allows the user to run up through the list of parameters, the values displayed and any alarm codes.

WINTER LED - ON/OFF, DOWN key:
Indicates that the unit is running in heating mode. This key makes it possible to switch the unit on and off and also allows the user to run down through the list of parameters, the values displayed and any alarm codes.

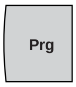
ALARM LED – Prg, ALARM key
When on, it indicates the presence of at least one alarm situation in the machine. This key makes it possible to programme the machine, display the alarm codes and reset the same.

Display
Displays all the parameters (i.e. outlet water temperature, etc.), any alarm codes and the resource statuses.

POWER SUPPLY LED
Indicates the presence of the power supply when the machine is switched off. If the regulation temperature is displayed and flashing, it means that the requested compressor is stationary due to the safety time delays.

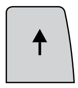
DISPLAY:
displays the numbers and the values of all the parameters (i.e. outlet water temperature etc.), any alarm codes and resource status by means of strings.

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

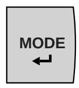


PRG key:
makes it possible to programme the machine's operating parameters.

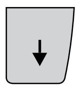
ON/OFF key:
makes it possible to switch the unit on and off.



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



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

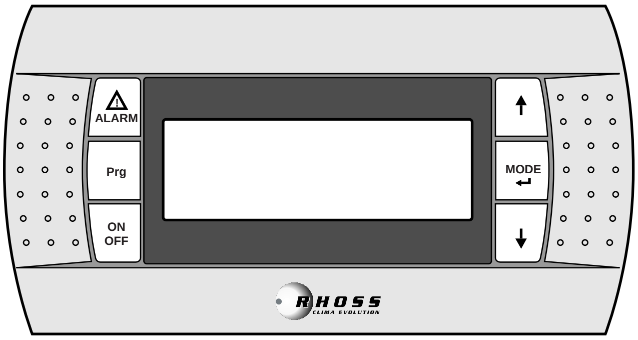


DOWN key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points.

Note:
The temporary presence of two devices, on-board machine keyboard and remote keyboard, will cause the on-board machine terminal to be disabled. Three dashes (- - -) will be displayed on the interface on the machine, indicating the presence of the remote keypad (KTR).

Electronic control for units with accessories: RC100, DS15, DP1, DP2, ASDP1, ASDP2

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 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 of the code and reset any alarms.

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

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

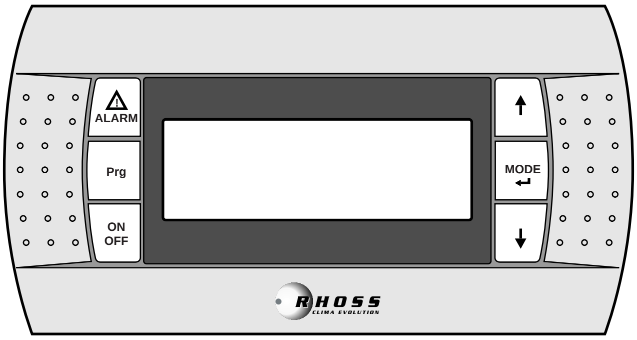
UP key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points.

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 for units with accessories: RC100, DS15, DP1, DP2, ASDP1, ASDP2

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



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 of the code and reset any alarms.

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

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

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

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

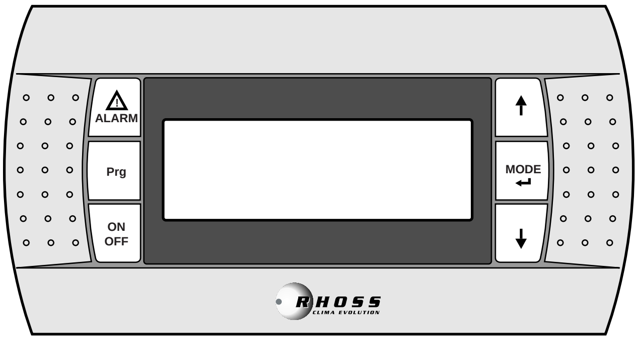
DOWN key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points.

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

Electronic control TXAEY 245÷265 models

Electronic control

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 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 of the code and reset any alarms.

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

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

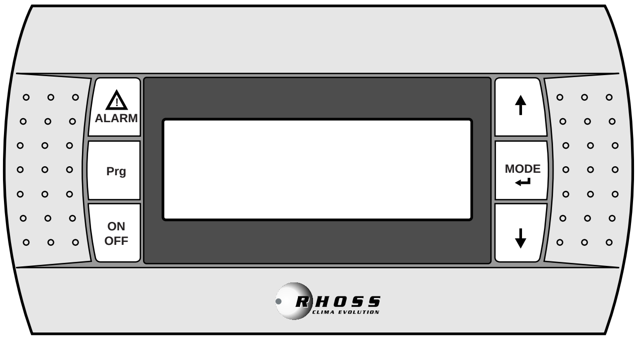
UP key:
used to scroll through the list of parameters, statuses and any alarms; makes it possible to modify set points.

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 the unit's digital and analogue process variables. It therefore possible to control all the machine functions directly in the room. It allows setting and management of time periods (if KSC accessory is included).



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 of the code and reset any alarms.

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

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

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

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

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

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

Serial connection

Serial connection

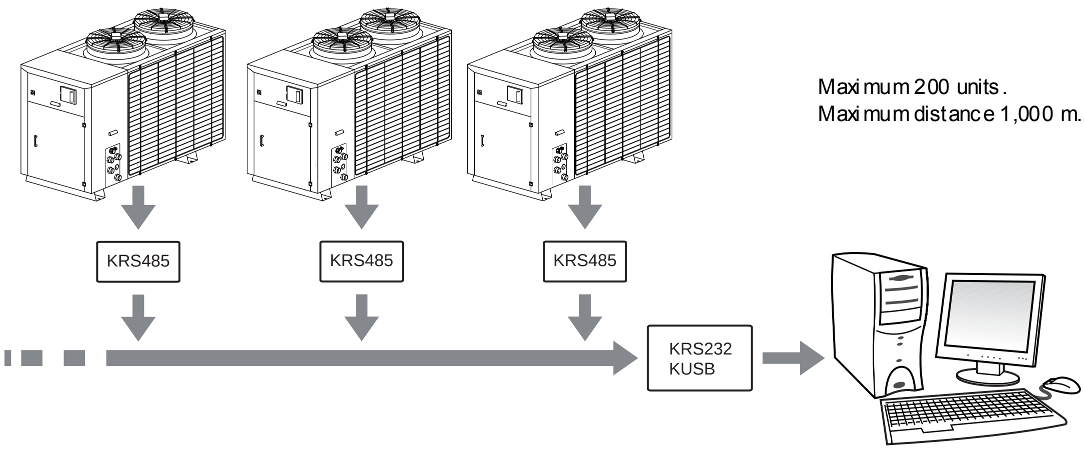
All units are equipped with electronic control that is set up to dialogue with an external BMS via a serial communication line by means of the KRS485 serial interface accessory (proprietary protocol or ModBus® RTU) and the following converters.

- **KRS232** – RS485/RS232 converter for connection to supervision systems;
- **KUSB –** RS485/USB converter for connection to supervision systems.
- The FTT10 LonWorks® compatible interface is also available.

Supervision

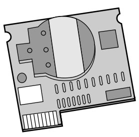
In general, a supervision system allows access to all unit functions, such as:

- 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.



KSC – Clock card

Insertion of the clock card (KSC) favours flexible and efficient use of the unit, showing the date/time and allowing management of the machine in daily or weekly start/stop time periods, with the possibility to change set-points. The time periods can be set and managed from the keyboard.



Example of display

Performance

Choice of a chiller or heat pump and use of the performance tables

○ For each model, table "**D**" provides the cooling capacity (**QF**), and the total absorbed electric power (**P**), on the basis of the evaporator outlet water temperature with constant temperature differences **ΔT** = 5°C: the value of **QT** is the value of the heating capacity available to the user in winter mode.
○ Within the operating limits, the values in table "**D**" may permit performance interpolations. However, extrapolations are not permitted.
○ Table "**H**" shows the values of the corrective coefficients to be applied to the nominal values if water with glycol is used.
○ Graph "**1**" shows the pressure drop values of the exchangers (with respect to the indicated temperature differentials).
○ Graph "**2**" indicates the useful static pressure of the pump (if present).

Example

○ Design conditions for a water-cooled chiller with installation P1:

- Requested cooling capacity = 52.3 kW;
- Temperature of water produced at evaporator = 12°C;
- Temperature differential **ΔT** at the evaporator = 5°C;
- Inlet air temperature at condenser = 30°C.

Using the values indicated in table "**D**", and supposing a temperature differential of **ΔT**=5°C at the condenser, it can be seen that model THAEY 245 meets the requirement with:
QF = 52.3 kW; **P** = 15.7 kW;

The water flow rates **G** to be sent to the exchangers are obtained using the following formulae:
G (l/h) evaporator =
(**QF**x860) ÷ **ΔT**=(52.3 x 860) ÷ 5 = 8995 (l/h);

Graph "**1**" shows the pressure drop values **Δpw** of the evaporator.
Δpw evaporator = 50 kPa;
Graph "**2**" shows the residual static pressure values **Δpr** available at the machine outlet 99 kPa.

Calculation of the flow at different Δt:

For machines with **Pump** and **Tank&Pump** installations, it is important to check the performance of the pump if the unit has to operate with **Δt** other than the nominal one at the exchanger. The calculation of the water flow at an **Δt** of other than 5°C can be achieved by applying the following formula:

G' = G x **Δt / Δt'**

With G and G' expressed in l/h and Δt and Δt' in °C.

For example, in order to establish the flow G' of the TCAEY 245 P1 unit, operating with a temperature differential at the evaporator of **Δt'** = 4°C and knowing that in nominal conditions, with **Δt** = 5°C, the flow **G** = 7600 l/h (table **A** Technical Data), we apply the formula indicated and obtain:

G' = 7600 x 5 / 4 = 9500 l/h

Using Graph "**2**" at the identified flow, the useful static pressure is equal to 90 kPa.

Performance data for TCAEY-THAEY 245÷265 models

Table "D": TCAEY cooling capacity (ΔT = 5°C at the evaporator)

Model	Tue (°C)	Ta (°C)											
		20		25		30		35		39		42	
		QF	P	QF	P	QF	P	QF	P	QF	P	QF	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
245	5	49,6	12,7	47,1	14,0	44,5	15,5	41,6	17,2	39,1	18,6	37,2	19,8
	7	52,5	13,0	50,0	14,2	47,2	15,7	44,2	17,3	41,5	18,8	39,5	19,9
	10	57,1	13,3	54,4	14,6	51,3	16,0	48,1	17,6	45,2	19,1	43,2	20,2
	12	60,2	13,5	57,4	14,8	54,3	16,2	50,8	17,9	47,9	19,2	-	-
	15	65,1	13,9	62,1	15,2	58,7	16,6	55,1	18,2	52,0	19,6	-	-
	18	70,1	14,3	66,9	15,6	63,4	17,0	59,5	18,6	56,2	20,0	-	-
250	5	56,7	14,7	54,1	16,1	51,4	17,7	48,4	19,5	45,8	21,0	43,8	22,3
	7	60,0	15,0	57,4	16,4	54,5	17,9	51,3	19,7	48,6	21,2	46,5	22,5
	10	65,2	15,4	62,4	16,7	59,3	18,3	55,9	20,1	53,0	21,6	50,8	22,8
	12	69,0	15,7	65,9	17,0	62,6	18,6	59,1	20,3	56,1	21,9	-	-
	15	74,5	16,1	71,3	17,4	67,8	18,9	64,0	20,7	60,8	22,2	-	-
	18	80,3	16,5	76,9	17,8	73,2	19,3	69,2	21,1	65,7	22,6	-	-
260	5	65,6	16,5	62,6	18,1	59,2	19,8	55,7	21,8	52,7	23,5	50,3	24,9
	7	69,4	16,8	66,2	18,4	62,8	20,1	59,2	22,1	56,0	23,8	53,4	25,2
	10	75,5	17,3	72,0	18,8	68,3	20,6	64,3	22,5	60,8	24,3	58,3	25,6
	12	79,6	17,6	76,1	19,1	72,2	20,9	67,9	22,8	64,4	24,5	-	-
	15	85,9	18,1	82,1	19,6	78,0	21,3	73,5	23,3	69,8	25,0	-	-
	18	92,6	18,6	88,5	20,1	84,1	21,8	79,4	23,7	75,3	25,4	-	-
265	5	70,8	17,8	67,7	19,5	64,1	21,5	60,4	23,7	57,2	25,6	54,6	27,1
	7	75,0	18,2	71,6	19,9	68,0	21,8	64,0	24,0	60,6	25,9	58,0	27,4
	10	81,7	18,7	77,8	20,4	73,9	22,3	69,7	24,5	66,1	26,3	63,2	27,8
	12	86,0	19,0	82,3	20,7	78,0	22,6	73,6	24,8	69,8	26,7	-	-
	15	93,0	19,6	88,9	21,2	84,5	23,1	79,6	25,3	75,6	27,1	-	-
	18	100,1	20,1	95,9	21,8	91,1	23,7	86,0	25,8	81,7	27,7	-	-

Table "D": THAEY cooling capacity (ΔT = 5°C at the evaporator)

Model	Tue (°C)	Ta (°C)											
		20		25		30		35		39		42	
		QF	P	QF	P	QF	P	QF	P	QF	P	QF	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
245	5	47,9	12,5	45,5	13,7	43,0	15,2	40,2	16,8	37,7	18,2	35,9	19,4
	7	50,6	12,6	48,2	13,8	45,5	15,2	42,6	16,8	40,0	18,2	38,1	19,3
	10	54,9	12,6	52,2	13,8	49,3	15,2	46,2	16,8	43,5	18,1	41,5	19,1
	12	57,7	12,7	55,0	13,9	52,0	15,3	48,7	16,8	45,9	18,0	-	-
	15	62,2	12,8	59,3	14,0	56,1	15,3	52,7	16,7	49,7	18,0	-	-
	18	66,7	12,9	63,6	14,1	60,3	15,4	56,6	16,8	53,5	18,0	-	-
250	5	56,8	14,0	54,2	15,3	51,5	16,8	48,5	18,5	45,9	19,9	43,9	21,1
	7	59,3	14,1	56,6	15,4	53,8	16,8	50,6	18,5	48,0	19,9	45,9	21,1
	10	62,9	14,3	60,2	15,5	57,2	16,9	53,9	18,6	51,1	20,0	49,0	21,1
	12	65,5	14,4	62,6	15,6	59,4	17,0	56,1	18,6	53,2	20,0	-	-
	15	69,0	14,5	66,1	15,7	62,9	17,1	59,3	18,7	56,4	20,0	-	-
	18	72,7	14,7	69,6	15,8	66,2	17,2	62,6	18,7	59,4	20,0	-	-
260	5	65,1	16,3	62,1	17,9	58,8	19,6	55,3	21,6	52,3	23,3	50,0	24,6
	7	69,5	16,4	65,9	17,9	62,1	19,7	58,2	21,6	54,8	23,2	52,1	24,5
	10	74,3	16,5	70,6	18,1	66,7	19,8	62,4	21,6	58,8	23,2	56,0	24,5
	12	77,5	16,7	73,8	18,2	69,6	19,8	65,3	21,7	61,5	23,2	-	-
	15	82,6	16,8	78,5	18,3	74,2	19,9	69,5	21,7	65,7	23,2	-	-
	18	87,5	17,0	83,1	18,4	78,6	20,0	73,8	21,7	69,8	23,1	-	-
265	5	68,7	18,1	65,7	19,8	62,2	21,8	58,6	24,0	55,5	26,0	53,0	27,5
	7	72,6	18,2	69,3	19,9	65,8	21,8	61,9	24,0	58,7	25,9	56,1	27,4
	10	78,7	18,3	75,0	20,0	71,3	21,9	67,2	23,9	63,7	25,8	60,9	27,3
	12	82,7	18,4	79,1	20,0	75,0	21,9	70,8	23,9	67,1	25,7	-	-
	15	89,0	18,5	85,1	20,1	80,9	21,9	76,2	23,9	72,4	25,6	-	-
	18	95,4	18,6	91,4	20,1	86,8	21,9	82,0	23,8	77,9	25,5	-	-

Ta = Dry bulb external air temperature.

Tue = Evaporator outlet water temperature (ΔT inlet/outlet = 5 °C).

QF = Cooling capacity (evaporator fouling factor of 0.35 X 10^{-4} m²C/W).

P = Total absorbed electrical power (compressor and fan).

Table "D": THAEY heating capacity (ΔT = 5°C at the condenser)

Model	Ta (°C)	RH (%)	Tuc (°C) 30 QT kW	30 P kW	35 QT kW	35 P kW	40 QT kW	40 P kW	45 QT kW	45 P kW	50 QT kW	50 P kW	53 QT kW	53 P kW
245	-5	90	39,1	11,3	38,0	12,7	37,1	14,4	-	-	-	-	-	-
	0	90	44,6	11,4	43,2	12,8	42,0	14,5	41,0	16,6	-	-	-	-
	7	90	53,0	11,6	51,2	13,0	49,5	14,7	47,8	16,6	46,3	18,8	45,2	20,2
	10	90	57,0	11,7	55,1	13,1	53,1	14,7	51,3	16,6	49,3	18,8	48,1	20,2
	15	85	63,7	11,9	61,4	13,3	59,1	14,9	56,9	16,7	54,4	18,8	53,0	20,1
	20	80	71,5	12,1	68,5	13,4	65,6	15,0	62,8	16,8	59,9	18,8	-	-
250	-5	90	44,4	13,0	43,6	14,5	42,8	16,2	-	-	-	-	-	-
	0	90	50,7	13,1	49,6	14,6	48,6	16,4	47,5	18,3	-	-	-	-
	7	90	60,3	13,4	58,9	14,9	57,3	16,6	55,8	18,6	54,2	20,8	53,2	22,3
	10	90	65,1	13,6	63,4	15,0	61,6	16,7	59,9	18,7	58,0	20,9	56,8	22,4
	15	85	72,8	13,8	70,9	15,3	68,6	16,9	66,5	18,9	64,3	21,1	62,9	22,6
	20	80	81,1	14,1	78,6	15,5	76,2	17,1	73,7	19,1	71,0	21,3	-	-
260	-5	90	49,2	14,3	48,5	15,9	48,0	17,8	-	-	-	-	-	-
	0	90	55,8	14,5	54,8	16,1	54,1	18,0	53,3	20,2	-	-	-	-
	7	90	65,9	14,7	64,6	16,4	63,4	18,3	62,2	20,5	60,9	22,9	60,1	24,5
	10	90	71,0	14,9	69,4	16,5	68,0	18,4	66,4	20,6	64,9	23,1	63,9	24,6
	15	85	79,8	15,2	77,9	16,8	75,7	18,7	73,7	20,8	71,6	23,2	70,4	24,8
	20	80	89,0	15,4	86,7	17,0	84,2	18,9	81,8	21,0	79,0	23,4	-	-
265	-5	90	56,2	16,0	54,3	17,9	52,7	20,2	-	-	-	-	-	-
	0	90	64,1	16,2	62,0	18,1	59,7	20,4	57,7	23,0	-	-	-	-
	7	90	76,6	16,6	73,6	18,5	70,8	20,7	67,9	23,3	64,9	26,2	63,3	28,1
	10	90	82,6	16,8	79,3	18,7	76,0	20,9	72,9	23,4	69,4	26,3	67,5	28,2
	15	85	92,6	17,2	88,8	19,0	84,9	21,2	81,1	23,7	77,1	26,5	74,6	28,4
	20	80	103,4	17,5	98,9	19,3	94,3	21,4	89,8	23,9	85,1	26,7	-	-

Tuc = Condenser outlet water temperature (ΔT inlet/outlet = 5 °C).

Ta = Dry bulb external air temperature.

RH = Relative humidity.

QT = Heating capacity (evaporator fouling factor of 0,35 X 10^{-4} m²C/W).

P = Total absorbed electrical power (compressor and fan).

Performance data for TXAEY 245÷265 models

Table "D": TXAEY cooling capacity (ΔT = 5°C at the evaporator) – *AUTOMATIC 1*

Model	Tue (°C)	Ta (°C) 20		25		30		35		39		42	
		QF	P	QF	P	QF	P	QF	P	QF	P	QF	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
245	5	47,8	12,3	45,4	13,6	42,9	15,0	40,1	16,6	37,7	18,0	35,8	19,1
	7	50,6	12,6	48,2	13,8	45,5	15,2	42,6	16,8	40,0	18,2	38,1	19,3
	10	55,1	12,9	52,4	14,1	49,4	15,5	46,4	17,1	43,6	18,4	41,6	19,5
	12	58,0	13,1	55,3	14,3	52,3	15,7	49,0	17,3	46,2	18,6	-	-
	15	62,8	13,5	59,9	14,7	56,6	16,1	53,1	17,6	50,1	18,9	-	-
	18	67,6	13,8	64,4	15,1	61,1	16,5	57,3	18,0	54,2	19,3	-	-
250	5	55,9	13,9	53,4	15,2	50,8	16,6	47,8	18,3	45,2	19,7	43,3	20,9
	7	59,3	14,1	56,6	15,4	53,8	16,8	50,6	18,5	48,0	19,9	45,9	21,1
	10	64,4	14,5	61,5	15,7	58,5	17,2	55,2	18,8	52,3	20,3	50,1	21,4
	12	68,0	14,7	65,0	16,0	61,7	17,4	58,3	19,1	55,3	20,5	-	-
	15	73,5	15,1	70,3	16,3	66,9	17,8	63,1	19,4	60,0	20,8	-	-
	18	79,3	15,5	75,9	16,7	72,2	18,1	68,3	19,8	64,8	21,2	-	-
260	5	64,5	16,2	61,5	17,7	58,2	19,4	54,8	21,3	51,8	23,0	49,5	24,3
	7	68,2	16,4	65,1	18,0	61,7	19,7	58,2	21,6	55,0	23,3	52,5	24,6
	10	74,3	16,9	70,7	18,4	67,1	20,1	63,2	22,0	59,8	23,7	57,3	25,0
	12	78,2	17,2	74,8	18,7	70,9	20,4	66,8	22,3	63,3	24,0	-	-
	15	84,4	17,7	80,7	19,2	76,7	20,9	72,3	22,7	68,6	24,4	-	-
	18	91,0	18,2	87,0	19,6	82,7	21,3	78,0	23,2	74,0	24,8	-	-
265	5	68,6	17,8	65,5	19,5	62,0	21,5	58,4	23,7	55,3	25,6	52,9	27,1
	7	72,6	18,2	69,3	19,9	65,8	21,8	61,9	24,0	58,7	25,9	56,1	27,4
	10	79,0	18,7	75,3	20,4	71,5	22,3	67,5	24,5	63,9	26,3	61,2	27,8
	12	83,3	19,0	79,6	20,7	75,5	22,6	71,3	24,8	67,6	26,7	-	-
	15	90,0	19,6	86,1	21,2	81,8	23,1	77,0	25,3	73,2	27,1	-	-
	18	96,8	20,1	92,8	21,8	88,2	23,7	83,2	25,8	79,1	27,7	-	-

Ta = Dry bulb external air temperature.

Tue = Evaporator outlet water temperature (ΔT inlet/outlet = 5 °C).

QF = Cooling capacity (evaporator fouling factor of 0,35 X 10^{-4} m²C/W).

P = Total absorbed electrical power (compressor and fan).

Table “D”: TXAEY cooling and heating capacity with heat recovery(ΔT = 5°C at the exchangers) – *AUTOMATIC 2*

Model	Tue (°C)	Tuc (°C)																	
		30			35			40			45			50			53		
		Qf	Qt	P	Qf	Qt	P	Qf	Qt	P	Qf	Qt	P	Qf	Qt	P	Qf	Qt	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
245	5	45,7	55,5	9,9	43,2	54,3	11,1	40,5	53,1	12,6	37,4	51,8	14,3	34,2	50,5	16,3	32,1	49,6	17,5
	7	48,6	58,5	10,0	46,0	57,2	11,2	43,2	55,9	12,7	40,0	54,4	14,4	36,5	52,8	16,3	34,3	51,9	17,5
	10	53,2	63,2	10,1	50,4	61,8	11,3	47,4	60,2	12,8	44,0	58,5	14,4	40,3	56,6	16,3	37,9	55,4	17,5
	12	56,3	66,5	10,2	53,6	65,0	11,4	50,3	63,3	12,8	46,8	61,3	14,5	43,0	59,3	16,3	40,4	57,9	17,5
	15	61,3	71,6	10,3	58,3	69,9	11,5	55,0	67,9	12,9	51,3	65,8	14,6	47,1	63,4	16,4	44,4	62,0	17,6
	18	66,5	76,9	10,5	63,4	75,1	11,7	59,9	72,9	13,1	55,9	70,6	14,7	51,5	68,0	16,5	48,7	66,3	17,7
250	5	54,4	66,3	11,8	51,7	64,8	13,2	48,7	63,4	14,8	45,3	61,9	16,6	41,7	60,4	18,7	39,3	59,3	20,0
	7	57,9	69,8	11,9	55,0	68,3	13,3	51,8	66,7	14,9	48,3	65,0	16,7	44,4	63,3	18,8	42,0	62,2	20,1
	10	63,3	75,5	12,1	60,2	73,6	13,4	56,8	71,9	15,0	53,0	69,9	16,8	49,0	67,8	18,9	46,3	66,4	20,2
	12	67,1	79,3	12,2	63,8	77,4	13,5	60,3	75,4	15,1	56,4	73,3	16,9	52,1	71,1	18,9	49,3	69,5	20,3
	15	73,0	85,4	12,4	69,6	83,3	13,7	65,8	81,0	15,2	61,6	78,6	17,0	57,0	76,0	19,0	54,0	74,4	20,4
	18	79,1	91,8	12,6	75,5	89,5	13,9	71,4	86,8	15,3	67,0	84,1	17,1	62,2	81,3	19,1	59,0	79,6	20,5
260	5	60,1	73,0	13,0	57,1	71,6	14,5	53,8	70,0	16,2	50,1	68,4	18,2	46,1	66,6	20,4	43,6	65,5	21,9
	7	64,0	77,1	13,1	60,9	75,4	14,6	57,4	73,7	16,3	53,5	71,8	18,3	49,3	69,9	20,6	46,6	68,7	22,0
	10	70,0	83,4	13,3	66,6	81,4	14,8	62,9	79,3	16,5	58,7	77,3	18,5	54,3	74,9	20,7	51,3	73,5	22,2
	12	74,1	87,7	13,5	70,7	85,6	14,9	66,8	83,4	16,6	62,4	80,9	18,5	57,8	78,5	20,8	54,7	76,9	22,2
	15	80,7	94,4	13,7	76,9	92,0	15,1	72,8	89,5	16,7	68,3	86,8	18,7	63,2	84,1	20,9	59,9	82,3	22,3
	18	87,6	101,6	13,9	83,7	99,0	15,3	79,1	96,1	16,9	74,2	93,1	18,8	68,8	89,9	21,0	65,4	87,9	22,4
265	5	68,0	82,6	14,5	64,7	80,9	16,2	60,9	79,1	18,2	56,8	77,2	20,5	52,2	75,2	23,0	49,4	74,0	24,7
	7	72,5	87,2	14,7	68,9	85,3	16,3	64,9	83,2	18,3	60,6	81,1	20,6	55,8	79,0	23,1	52,7	77,6	24,7
	10	79,4	94,2	14,9	75,5	92,1	16,5	71,2	89,8	18,5	66,6	87,3	20,7	61,4	84,7	23,2	58,1	83,0	24,9
	12	84,1	99,1	15,0	80,2	96,7	16,7	75,6	94,3	18,6	70,7	91,5	20,8	65,4	88,7	23,3	61,9	86,8	24,9
	15	91,6	106,9	15,3	87,3	104,2	16,9	82,5	101,2	18,8	77,3	98,2	21,0	71,5	95,0	23,4	67,8	92,8	25,1
	18	99,2	114,8	15,6	94,8	111,9	17,1	89,8	108,7	19,0	84,2	105,2	21,1	78,1	101,7	23,6	74,0	99,4	25,2

Tue = Evaporator outlet water temperature (ΔT inlet/outlet = 5 °C).
Tuc = Condenser outlet water temperature (ΔT inlet/outlet = 5 °C).
QF = Cooling capacity (evaporator fouling factor of 0,35 X 10^{-4} m²C/W).
QT = Heating capacity (evaporator fouling factor of 0,35 X 10^{-4} m²C/W).
P = Total absorbed electrical power (compressor).

Nominal summer operating conditions *A1*
Evaporator inlet/outlet water 12°C/7°C, condenser inlet/outlet water 30°C/35°C.

Nominal winter operating conditions *S1*, *S2* and *A3*
Condenser inlet/outlet water 40°C/45°C, evaporator inlet water 10°C, water flow rate as for summer operation.

Nominal recovery conditions *A2*
Condenser inlet/outlet water 40/45°C, evaporator inlet/outlet water 12/7°C.

Table “D”: TXAEY heating capacity (ΔT = 5°C at the condenser) – *SELECT 1, SELECT 2, AUTOMATIC 3*

Model	Ta (°C)	RH (%)	Tuc (°C) 30		35		40		45		50		53	
			QT	P	QT	P	QT	P	QT	P	QT	P	QT	P
			kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
245	-5	90	37,1	11,4	36,7	12,8	36,4	14,5	-	-	-	-	-	-
	0	90	42,3	11,6	41,7	12,9	41,3	14,6	41,0	16,5	-	-	-	-
	7	90	50,2	11,8	49,4	13,1	48,6	14,7	47,8	16,6	47,1	18,6	46,6	20,0
	10	90	54,0	11,9	53,1	13,2	52,1	14,8	51,3	16,6	50,2	18,6	49,5	19,9
	15	85	60,5	12,1	59,3	13,4	58,1	14,9	56,9	16,6	55,4	18,6	54,5	19,9
	20	80	67,8	12,3	66,1	13,6	64,4	15,0	62,8	16,8	61,0	18,7	-	-
250	-5	90	43,5	13,2	43,0	14,6	42,5	16,3	-	-	-	-	-	-
	0	90	49,7	13,3	48,9	14,8	48,2	16,5	47,5	18,3	-	-	-	-
	7	90	59,1	13,6	58,1	15,1	56,9	16,7	55,8	18,6	54,6	20,7	53,8	22,1
	10	90	63,8	13,8	62,5	15,2	61,2	16,8	59,9	18,7	58,4	20,8	57,5	22,2
	15	85	71,3	14,1	69,9	15,4	68,2	17,0	66,5	18,9	64,7	21,0	63,6	22,4
	20	80	79,4	14,3	77,5	15,7	75,7	17,2	73,7	19,1	71,5	21,1	-	-
260	-5	90	48,5	14,5	47,8	16,0	47,4	17,9	-	-	-	-	-	-
	0	90	55,2	14,6	54,4	16,2	53,7	18,1	53,0	20,1	-	-	-	-
	7	90	65,6	15,0	64,5	16,5	63,3	18,4	62,2	20,5	60,9	22,8	60,2	24,3
	10	90	70,6	15,1	69,4	16,7	68,1	18,5	66,7	20,6	65,2	22,9	64,3	24,4
	15	85	78,9	15,4	77,4	16,9	75,8	18,7	74,1	20,8	72,2	23,1	71,0	24,6
	20	80	88,0	15,7	86,0	17,2	84,1	18,9	81,9	21,0	79,7	23,3	-	-
265	-5	90	52,7	16,3	52,0	18,1	51,5	20,3	-	-	-	-	-	-
	0	90	60,1	16,5	59,3	18,3	58,4	20,5	57,7	23,0	-	-	-	-
	7	90	71,8	16,9	70,5	18,7	69,2	20,9	67,9	23,3	66,4	26,0	65,6	27,8
	10	90	77,5	17,1	75,9	18,9	74,4	21,0	72,9	23,4	71,0	26,1	70,0	27,9
	15	85	86,8	17,5	85,0	19,2	83,0	21,3	81,1	23,7	78,9	26,3	77,3	28,1
	20	80	96,9	17,9	94,6	19,6	92,2	21,6	89,8	23,9	87,1	26,5	-	-

Tuc = Condenser outlet water temperature (ΔT inlet/outlet = 5 °C).

Ta = Dry bulb external air temperature.

RH = Relative humidity.

QT = Heating capacity (evaporator fouling factor of 0,35 X 10^{-4} m²C/W).

P = Total absorbed electrical power (compressor and fan).

RC100 and DS15 accessories: performances and pressure drops

Table "G": Performances and pressure drops of the RC100 and DS15 accessories (preliminary data)

TCAEY-THAEY MODEL		245			250		
RC100 - 100% recovery							
Water inlet/outlet temperature	°C	35/40 (**)	40/45 (*)	45/50 (**)	35/40 (**)	40/45 (*)	45/50 (**)
Nominal heating capacity (•)	kW	55,9	54,4	52,8	66,7	65,0	63,3
Recovery nominal flow	l/h	9700	9500	9400	11600	11300	11200
Recovery nominal pressure drops	kPa	48	46	45	51	49	48
Recovery water content	l	3,8	3,8	3,8	4,4	4,4	4,4
Recovery water connections	Ø		2"			2"	
DS15 - Desuperheater							
Water inlet/outlet temperature	°C	50/60 (***)	60/70 (***)	-	50/60 (***)	60/70 (***)	-
Nominal heating capacity (•)	kW	12,2	8,4	-	14,1	9,7	-
Desuperheater nominal water flow	l/h	1100	700	-	1200	900	-
Desuperheater nominal pressure drops	kPa	5,0	3,0	-	6,0	3,0	-
Desuperheater water content.	l	0,55	0,55	-	0,55	0,55	-
Desuperheater water connections	Ø		2"			2"	

TCAEY-THAEY MODEL		260			265		
RC100 - 100% recovery							
Water inlet/outlet temperature	°C	35/40 (**)	40/45 (*)	45/50 (**)	35/40 (**)	40/45 (*)	45/50 (**)
Nominal heating capacity (•)	kW	73,7	71,8	69,9	83,2	81,1	79,0
Recovery nominal flow	l/h	12800	12500	12400	14500	14100	14000
Recovery nominal pressure drops	kPa	48	46	45	49	47	46
Recovery water content	l	5,1	5,1	5,1	5,7	5,7	5,7
Recovery water connections	Ø		2"			2"	
DS15 - Desuperheater							
Water inlet/outlet temperature	°C	50/60 (***)	60/70 (***)	-	50/60 (***)	60/70 (***)	-
Nominal heating capacity (•)	kW	16,3	11,4	-	17,0	11,9	-
Desuperheater nominal water flow	l/h	1400	1000	-	1500	1100	-
Desuperheater nominal pressure drops	kPa	6,0	3,0	-	6,0	3,0	-
Desuperheater water content.	l	0,7	0,7	-	0,7	0,7	-
Desuperheater water connections	Ø		2"			2"	

(•) Heating capacity with recovery and desuperheater fouling factor equivalent to $0,35x10^{-4}$ m² K/W.

(*) Conditions refer to the unit with standard calibration, chilled water temperature of 7°C and temperature difference at the evaporator of 5K.

(**) Conditions refer to the unit with suitable calibration (expressly requested when the order is made), chilled water temperature of 7°C and temperature difference at the evaporator of 5K.

(***) Conditions refer to the unit with chilled water temperature of 7°C and temperature difference at the evaporator of 5K.

Operating limits:

RC100:

- hot water temperature of 35-50°C with permitted water temperature differential of 4÷6K;
- the minimum permitted water inlet temperature is 30°C.

DS15:

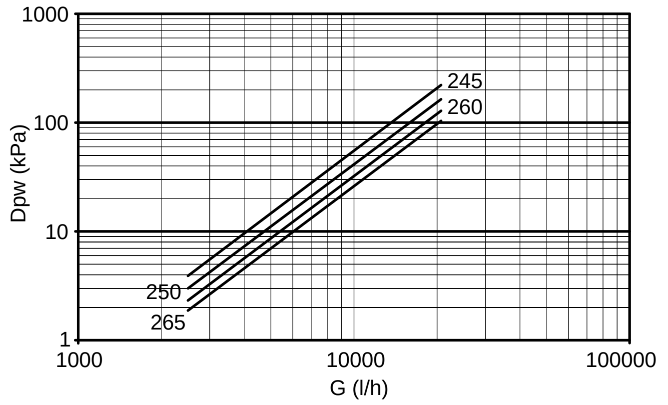
- hot water temperature of 50÷70°C with permitted water temperature differential of 5÷10K;
- the minimum permitted water inlet temperature is 40°C.

Attention

Units fitted with a permanent recovery unit or desuperheater in series with the compressor must be used in compliance with the regulations set out by Ministerial Decree 1/12/1975 "Safety regulations for appliances containing hot pressurized fluids" and by its technical application specifications (collections R and H). This law is only valid in the Italian Republic. In the event of installation in other countries, please keep to the local laws in force.
Hot water for domestic use can be produced only with the use of an additional heat exchanger which is suited to the purpose. Refer to current laws and standards in the place of installation.

TCAEY-THAEY-TXAEY pressure drops and residual static pressure

Graph "1": pressure drops, exchangers TCAEY-THAEY-TXAEY 245÷265



Δpw (kPa) = nominal pressure drop at the exchanger in question (table on *Technical data*):
G (l/h) = water flow rate at the exchanger in question;

Calculation of pressure drops

○ The water flow rate at the exchanger is calculated according to the following formula:

○ G = (Q x 860) : ΔT

- Where:

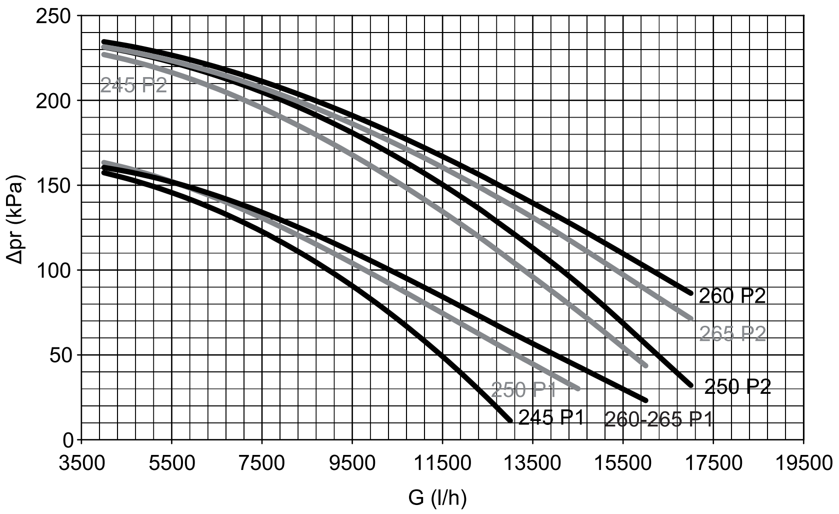
G (l/h) = water flow rate at the exchanger;
Q (kW) = exchanged power, which may be QF (for the evaporator) or QT (for the condenser), depending on the exchanger in question;
ΔT (°C) = temperature differential;

○ The pressure drops can be obtained from the ***RHOSS*** selection software and can be read on the graph to the side, or can be calculated using the following rough formula:

$$\Delta pw = \Delta pw_{nom} \times (G : G_{nom})^2$$

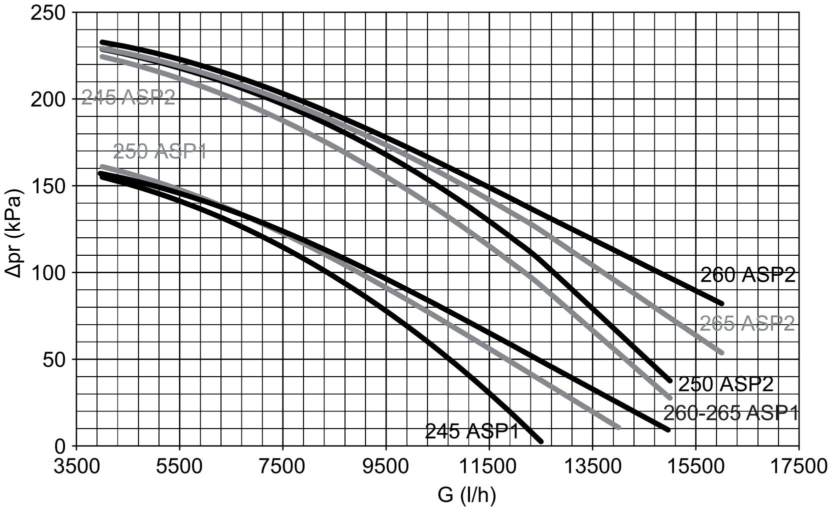
N.B.:
For all machines, refer in any case to admissible operating limits and thermal differences (ΔT).

Graph "2": residual static pressure TCAEY-THAEY-TXAEY 245÷265 installation P1-P2



Δpr = Residual static pressure
G = Water flow rate

Graph "2": residual static pressure TCAEY-THAEY-TXAEY 245÷265 installation ASP1-ASP2

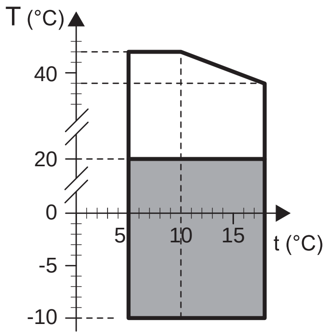


Δpr = Residual static pressure
G = Water flow rate

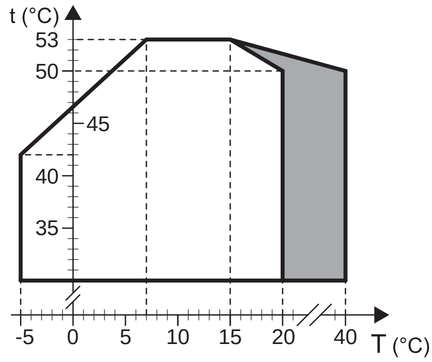
Calculation of residual static pressure
The residual static pressure values can be obtained from graph "**2**" based on measured flow rates.

Operating limits for TCAEY-THAEY models

TCAEY-THAEY 245÷265 in summer mode



THAEY 245÷265 in winter mode



Standard operation

Operation with condensation control

T (°C) = Air temperature (B.S.).
t (°C) = Water temperature

In summer mode:
Maximum inlet water temperature 25°C

Temperature differentials permitted through the exchangers

○ Temperature differential at the evaporator ΔT = 3 ÷ 8°C for machines with "Standard" installation. The maximum and minimum temperature differential for the “Pump” and “Tank&Pump” machines is linked to the pump performances, which must always be checked with the help of the graphs on page 33 or using the ***RHOSS*** selection software.

○ Minimum water pressure 0,5 Barg
○ Maximum water pressure 3 Barg.

N.B.:
For evaporator outlet water of a temperature below 5°C, please contact the ***RHOSS*** S.p.A. *pre-sales service* before ordering.

Standard operation

Operation with condensation control

T (°C) = Air temperature (B.S.).
t (°C) = Water temperature

In winter operation:
Maximum inlet water temperature 47°C

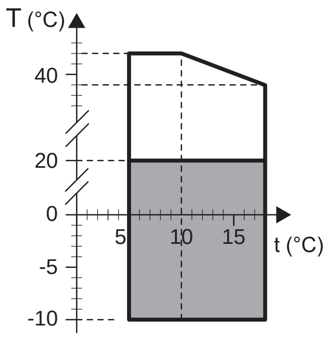
Temperature differentials permitted through the exchangers

○ Temperature differential at the evaporator ΔT = 3 ÷ 8°C for machines with "Standard" installation. The maximum and minimum temperature differential for the “Pump” and “Tank&Pump” machines is linked to the pump performances, which must always be checked with the help of the graphs on page 33 or using the ***RHOSS*** selection software.

○ Minimum water pressure 0,5 Barg
○ Maximum water pressure 3 Barg.

Operating limits for TXAEY models

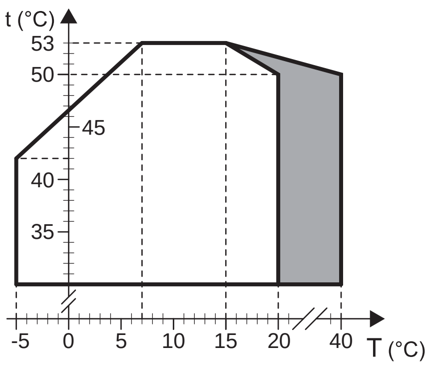
Operation as chiller
(*AUTOMATIC 1* mode)



T (°C) = Air temperature (B.S.).
t (°C) = Water temperature

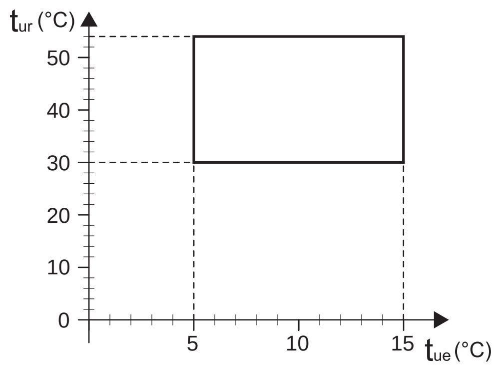
Maximum inlet water temperature 25°C

Operation as heat pump
(*SELECT 1/2 - AUTOMATIC 3* mode)



T (°C) = Air temperature (B.S.).
t (°C) = Water temperature

Operation as chiller
with heat recovery (*AUTOMATIC 2* mode)



$\mathbf{t_{ue}}$ (°C) = Main exchanger (evaporator) outlet chilled water temperature.
$\mathbf{t_{ur}}$ (°C) = Secondary exchanger (recovery) outlet heated water temperature.

Standard operation

Operation with condensation control

Temperature differentials permitted through the exchangers

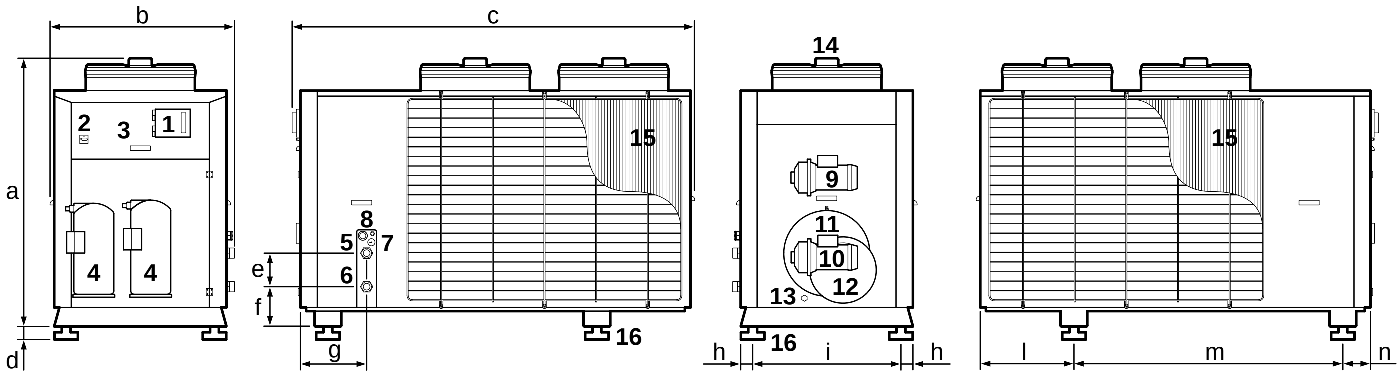
○ Temperature differential at the evaporator ΔT = 3 ÷ 8°C for machines with "Standard" installation. The maximum and minimum temperature differential for the “Pump” and “Tank&Pump” machines is linked to the pump performances, which must always be checked with the help of the graphs on page 33 or using the ***RHOSS*** selection software.

○ Minimum water pressure 0,5 Barg
○ Maximum water pressure 3 Barg.

N.B.:
For evaporator outlet water of a temperature below 4°C, please contact the ***RHOSS*** S.p.A. *pre-sales service* before ordering.

Dimensions and footprints

TCAEY - THAEY installation dimensions and footprints



Model		a	b	c	d	e	f	g	h	i	l	m	n
245	mm	1565	1070	2315	75	195	233	385	28	942	544	1562	160
250	mm	1565	1070	2315	75	195	233	385	28	942	544	1562	160
260	mm	1565	1070	2315	75	195	233	385	28	942	544	1562	160
265	mm	1565	1070	2315	75	195	233	385	28	942	544	1562	160

1. Control panel;
2. Isolator;
3. Electrical board;
4. Compressor;
5. Water inlet;
6. Water outlet;
7. Pressure gauge
8. Power supply inlet;
9. Pump housing (ASDP1/ASDP2 installation);
10. Pump housing (P1/P2 – ASP1/ASP2 installations);
11. Water buffer tank (ASP1/ASP2 – ASDP1/ASDP2 installations);
12. Expansion tank;
13. System water drain;
14. Fan;
15. Finned coil;
16. Anti-vibration support (KSA accessory).

Installation

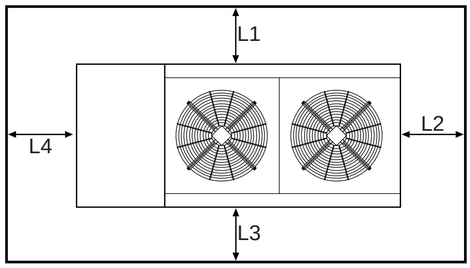
○ The unit is designed for outdoor installation.
○ The unit is equipped with male threaded water connections.
○ The unit must be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.
○ The unit can be equipped with anti-vibration mountings on request (KSA).
○ We recommend installing isolating valves that isolate the unit from the rest of the system.
○ It is essential to fit a metal mesh filter (square mesh of no greater than 0.8 mm) on the unit return piping.
○ The unit may not be installed on brackets or shelves.
○ Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.

Weights

Model		245	250	260	265
TCAEY	kg	560	595	615	655
THAEY	kg	580	615	635	675
TCAEY P1-P2	kg	580	615	635	675
THAEY P1-P2	kg	600	635	655	695
TCAEY DP1-DP2	kg	595	610	630	670
THAEY DP1-DP2	kg	615	630	650	690
TCAEY ASP1-ASP2	kg	625	640	660	700
THAEY ASP1-ASP2	kg	645	660	680	720
TCAEY ASDP1-ASDP2	kg	665	680	700	740
THAEY ASDP1-ASDP2	kg	685	700	720	760
DS15	kg	20	20	20	20
RC100	kg	60	70	75	80

The weights refer to packaged units without water

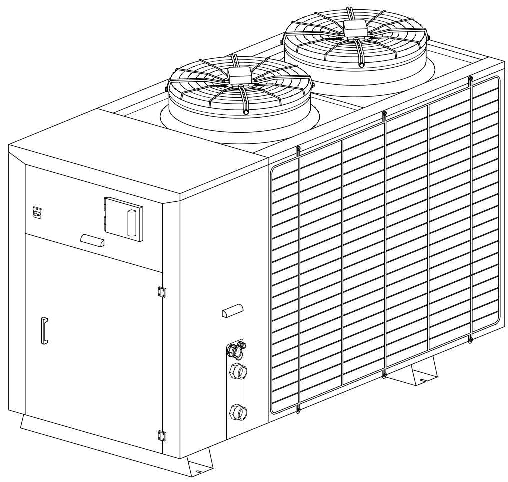
Clearances and positioning



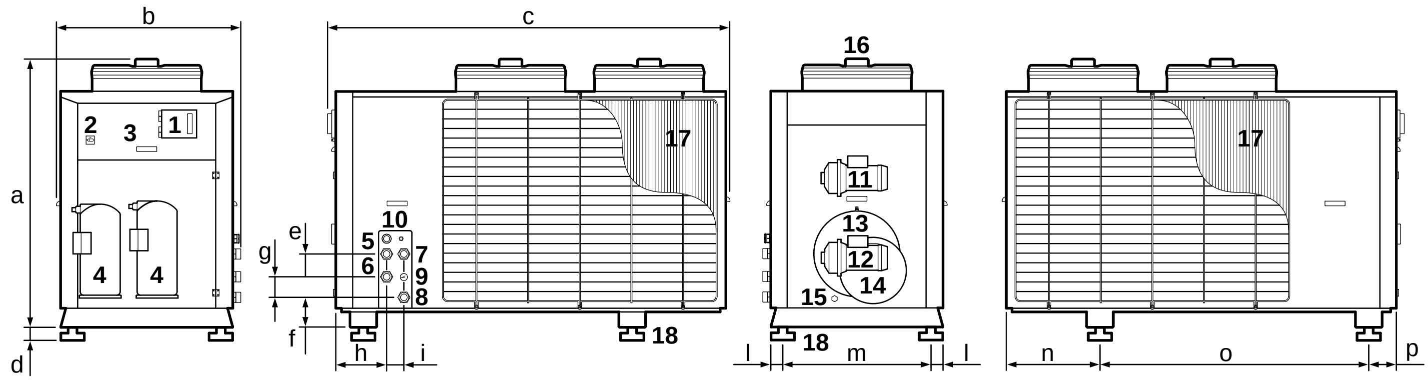
Model		245	250	260	265
L1	mm	800	800	800	800
L2	mm	800	800	800	800
L3	mm	1000	1000	1000	1000
L4	mm	800	800	800	800

Movement

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



TXAEY 245÷265 installation dimensions and footprints



Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
245	mm	1565	1070	2315	75	150	184	115	300	100	28	942	544	1562	160
250	mm	1565	1070	2315	75	150	184	115	300	100	28	942	544	1562	160
260	mm	1565	1070	2315	75	150	184	115	300	100	28	942	544	1562	160
265	mm	1565	1070	2315	75	150	184	115	300	100	28	942	544	1562	160

1. Control panel;
2. Isolator;
3. Electrical board;
4. Compressor;
5. Recovery water inlet;
6. Recovery water outlet;
7. Main exchanger water inlet;
8. Main exchanger water outlet;
9. Pressure gauge
10. Power supply inlet;
11. Pump housing (ASDP1/ASDP2 installation);
12. Pump housing (P1/P2 – ASP1/ASP2 installations);
13. Water buffer tank (ASP1/ASP2 – ASDP1/ASDP2 installations);
14. Expansion tank;
15. System water drain;
16. Fan;
17. Finned coil;
18. Antivibration support.

Installation

○ The unit is designed for outdoor installation.
○ The unit is equipped with male threaded water connections.
○ The unit must be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.
○ The unit can be equipped with anti-vibration mountings on request (KSA).
○ We recommend installing isolating valves that isolate the unit from the rest of the system.
○ It is essential to fit a metal mesh filter (square mesh of no greater than 0.8 mm) on the unit return piping.
○ The unit may not be installed on brackets or shelves.
○ Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.

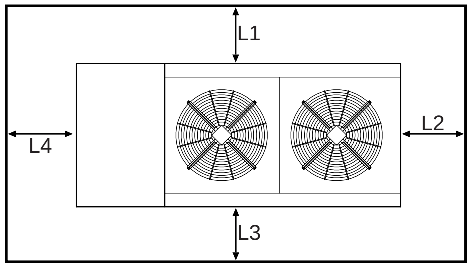
Weights

Model		245	250	260	265
TXAEY	kg	640	680	700	735
TXAEY P1-P2	kg	660	700	720	750
TXAEY DP1-DP2	kg	675	715	735	765
TXAEY ASP1-ASP2	kg	705	745	765	795
TXAEY ASDP1-ASDP2	kg	735	775	795	825

The weights refer to packaged units without water

The weight of the full unit is obtained by adding to the weight of the tank water contents, indicated in table "A".

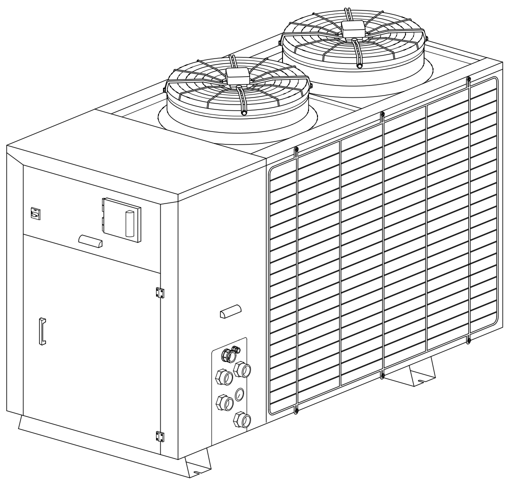
Clearances and positioning



Model		245	250	260	265
L1	mm	800	800	800	800
L2	mm	800	800	800	800
L3	mm	1000	1000	1000	1000
L4	mm	800	800	800	800

Movement

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



Water connections

Connection to the system

○ The unit is equipped with threaded male water connections and a manual air bleed valve positioned inside and outside the shell.
○ It is advisable to install intercept valves that isolate the unit from the rest of the system. It is also advisable to install elastic connection joints.
○ It is essential to fit a metal mesh filter (square mesh of no greater than 0.8 mm) on the unit return piping.
○ The water flow through the heat-exchanger should not fall below a value corresponding to a temperature differential of 8°C.
○ During long periods of inactivity, it is advisable to drain the water from the system.
○ It is possible to avoid draining the water by adding ethylene glycol to the water circuit (see "*Use of antifreeze solutions*").
○ The expansion tank is sized on the basis of the water content of the individual machine. Any additional expansion tank should be sized by the installer on the basis of the system.

Pump installation

○ The units are equipped with a circulating pump, expansion tank and safety valve.

Tank & Pump installation

○ The units are equipped with an inertial water buffer tank, circulating pump, expansion tank, drain cock and safety valve.

Minimum water circuit content TCAEY-THAEY

In order to keep the units in good working order, minimum water contents in the water system must be ensured. The minimum water content is established on the basis of the unit's nominal cooling capacity (table A *Technical Date*), multiplied by the coefficient expressed in l/kW.

Range	Adjustment type	Control	Specific capacity
TCAEY THAEY 245÷265	*AdaptiveFunction Plus*	iDRHOSS	2 l/kW

Example: THAEY 245
The reference capacity to be taken into consideration when calculating the water content on the primary side, is the cooling capacity in design conditions. If, for example, it coincides with the nominal conditions (Qf=42,6 kW), a minimum volume of water must be guaranteed, calculated as follows:

Qf (kW) x 2 l/kW = 42,6 kW x 2 l/kW = 85,2 l

For design conditions that differ from the nominal conditions, the power data must be found using Tables "D". When doing the calculation, we recommend always referring to the maximum envisaged power.

Minimum water circuit content TXAEY

To ensure the good working order of the **EXP**SYSTEMS multipurpose systems, the correct water volumes must be guaranteed in the primary and secondary circuits in relation to the type of system in which the unit will be installed.

4-pipe systems

The following specific capacities are considered for this type of system.

Range	Adjustment type	Control	Specific capacity
TXAEY 245÷265 Primary circuit	*AdaptiveFunction*	iDRHOSS	4 l/kW
TXAEY 245÷265 Secondary circuit	*Proportional*		10 l/kW

Example: TXAEY 245
The reference capacity to be taken into consideration when calculating the water content on the primary circuit, is the cooling capacity in design conditions during ***AUTOMATIC 1*** operation.
Supposing that the design condition is the nominal condition (Qf=42,6 kW), a certain volume of water must be guaranteed in the primary circuit, calculated as follows:

Qf (kW) x 4 (l/kW) = 42,6 kW x 4 (l/kW) = 170,4 l

The calculation of the minimum water content in the secondary circuit must refer to the heating capacity obtained from the design conditions during ***AUTOMATIC 2*** operation. Supposing that the design condition coincides with the nominal capacity (Qt=54,4 kW), the minimum capacity of the secondary circuit should be:

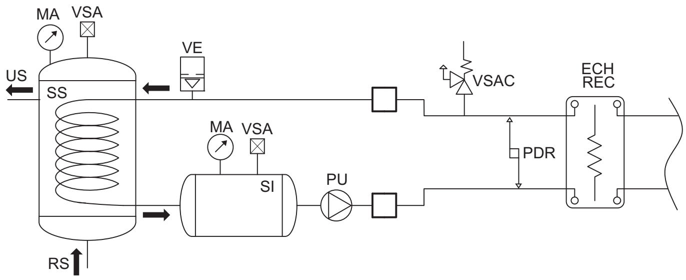
Qt (kW) x 10 (l/kW) = 54,4 kW x 10 (l/kW) = 544 l

For design conditions that differ from the nominal conditions, the power data must be found using Tables "D". When doing the calculation, we recommend always referring to the maximum envisaged power.

2-pipe system and hot water buffer tank

In this type of system, the machine is connected to the primary water circuit with the main exchanger, while the secondary exchanger is connected to the circuit for heating the hot water, as illustrated in the figure on page 20.

To calculate the minimum water content on the primary side, refer to the previous case relative to the 4-pipe system.
To calculate the minimum water content on the secondary side connected to the hot water tank, the following must be taken into account. The hot water temperature may be influenced, especially in the winter, by the machine's natural defrosting cycles. In fact, during the defrosting phase, the machine operates with an inverted cycle, transferring a cooling capacity to the water that inevitably cools it down. The change in hot water temperature may affect performance if the water content in the secondary exchanger water circuit is insufficient.
The figure provides a general illustration of the secondary circuit, which highlights the circuit's user side boiler **SS** and the inertial water buffer tank **SI**.



Key:
ECH REC: recovery exchanger
PDR: recovery differential pressure switch
PU: secondary circuit user pump
VE: expansion vessel
VSAC: water safety valve
VSA: automatic bleed valve
MA: pressure gauge
SI: secondary circuit inertial tank
SS: hot water tank
RS: hot water restoration
US: hot water user

Having assigned the permitted change in temperature, it is possible to calculate the minimum specific capacity.
The following table gives the minimum specific capacity values in l/kW for the secondary circuit, on the basis of the hot water temperature change. It is therefore possible to calculate the capacity of the tank **SI**, once the installed power is known.

Hot water temperature change dtu	K	4	5	6	7	8
Specific capacity	l/kW	22	18	15	13	12

Application example
A system with a maximum installed recovering heating capacity of $Qt_{installed}$=*50 kW*. A maximum permitted hot water change of dt_u=*5K.*
The secondary circuit capacity is calculated as follows:

$Qt_{installed}$ (kW) x 18 l/kW = 50 kW x 18 l/kW = 900 l

The secondary circuit water content must be at least 900 l. Overlooking the water content in the pipes, the case in question requires a tank **SI** (see figure) with a capacity of at least 900 l. In practice, we recommend never exceeding *dtu=6K* and always considering the maximum foreseeable power.

Water data

Model		245	250	260	265
Safety valve	barg	3	3	3	3
Exchanger water contents	l	3,8	4,4	5,1	5,7
Tank water content ASP1	l	150	150	150	150
Tank water content ASP2	l	150	150	150	150

Expansion tank technical data

Model		245	250	260	265
Capacity	l	14	14	14	14
Pre-charging	barg	1	1	1	1
Maximum expansion tank pressure	barg	3	3	3	3

Use of anti-freeze 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 operating conditions from those shown below.

○ Table "**H**" shows the multipliers which allow the changes in performance of the units to be determined in proportion to the required percentage of ethylene glycol.

- The multipliers refer to the following conditions: condenser inlet water temperature 30°C; chilled water outlet temperature 7°C; temperature differential at evaporator and condenser 5°C.
- For different operating conditions, the same coefficients can be used as their variations are negligible.

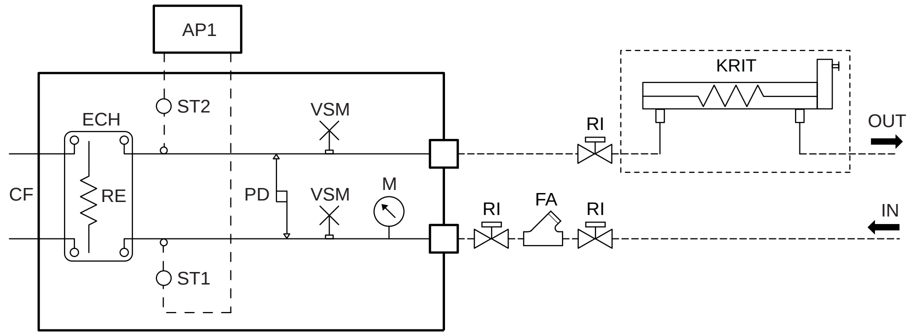
Table "H"

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

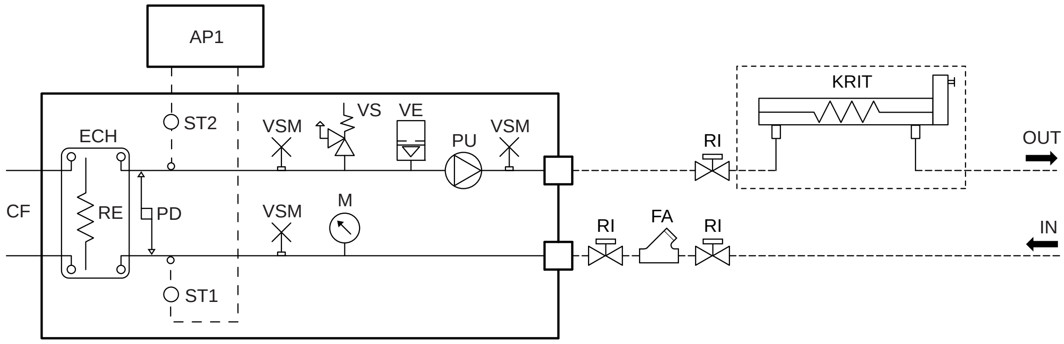
fc QF = Cooling capacity correction factor.
fc P= Correction factor for the absorbed electrical current.
fc Δpw= Correction factor of the pressure drops in the evaporator
fc G = Correction factor of the glycol water flow to the evaporator.

Water circuits in TCAEY-THAEY models

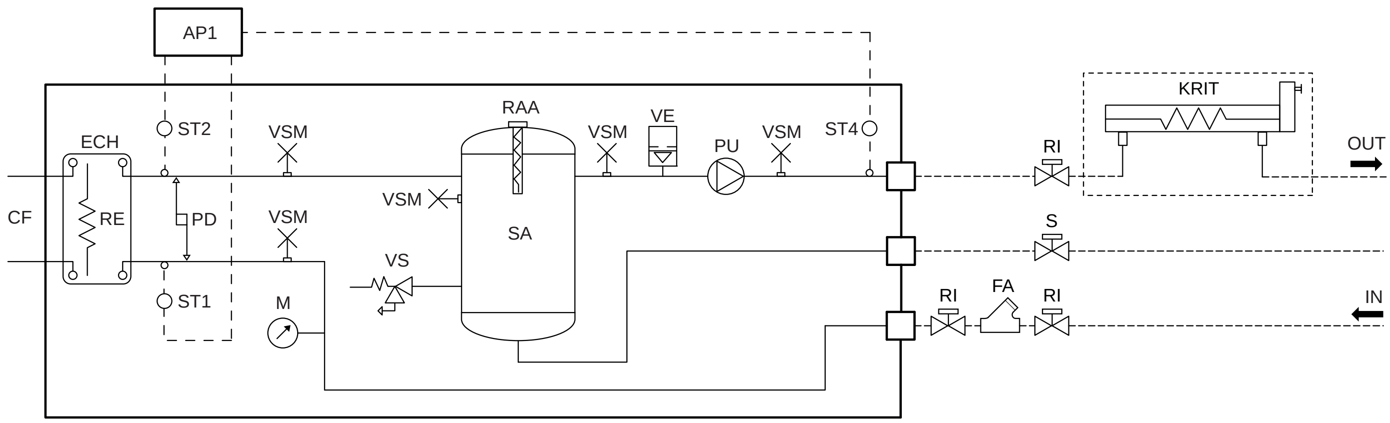
Water circuit in TCAEY-THAEY 245÷265 models, Standard installation



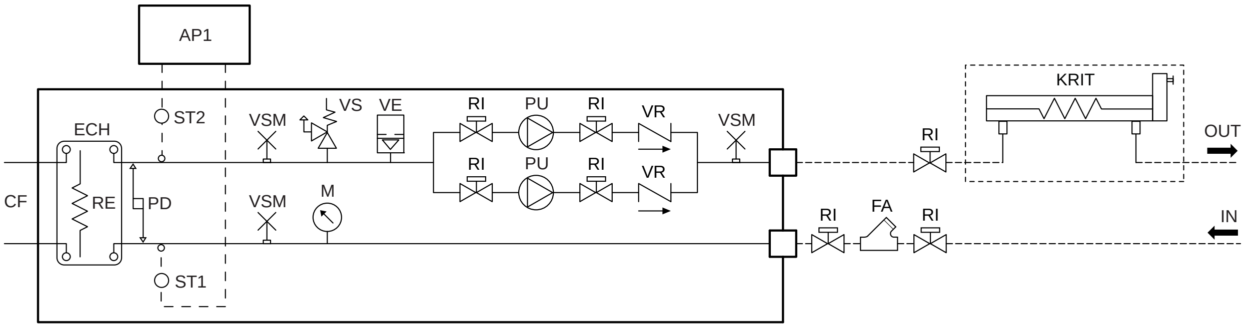
Water circuit in TCAEY-THAEY 245÷265 models, P1 – P2 installation



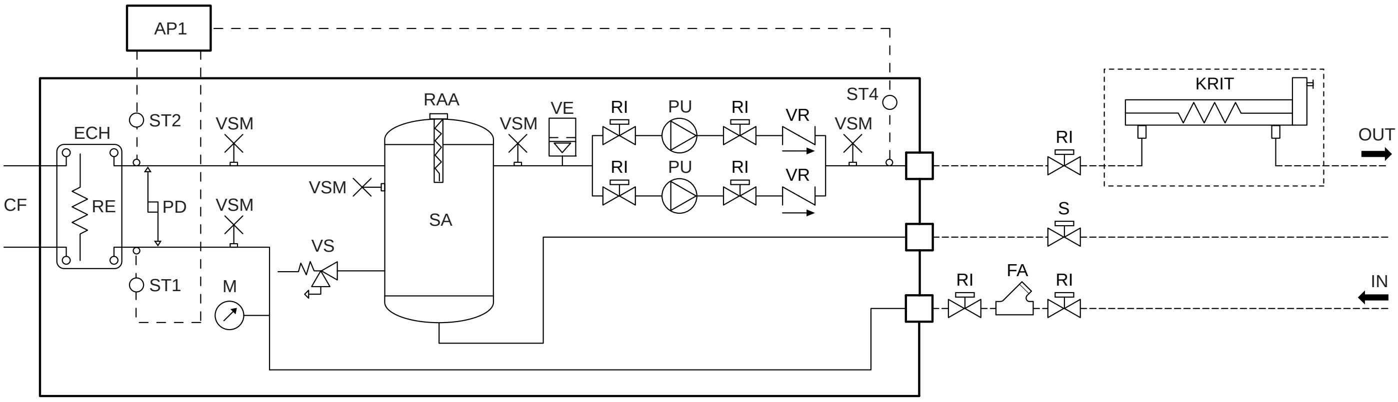
Water circuit in TCAEY-THAEY 245÷265 models, ASP1 – ASP2 installation



Water circuit in TCAEY-THAEY 245÷265 models, DP1 – DP2 installation



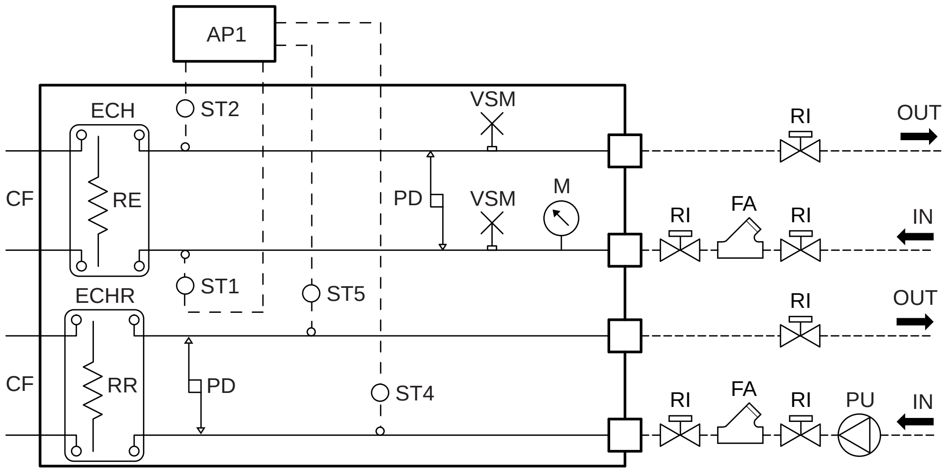
Water circuit in TCAEY-THAEY 245÷265 models, ASDP1 – ASDP2 installation



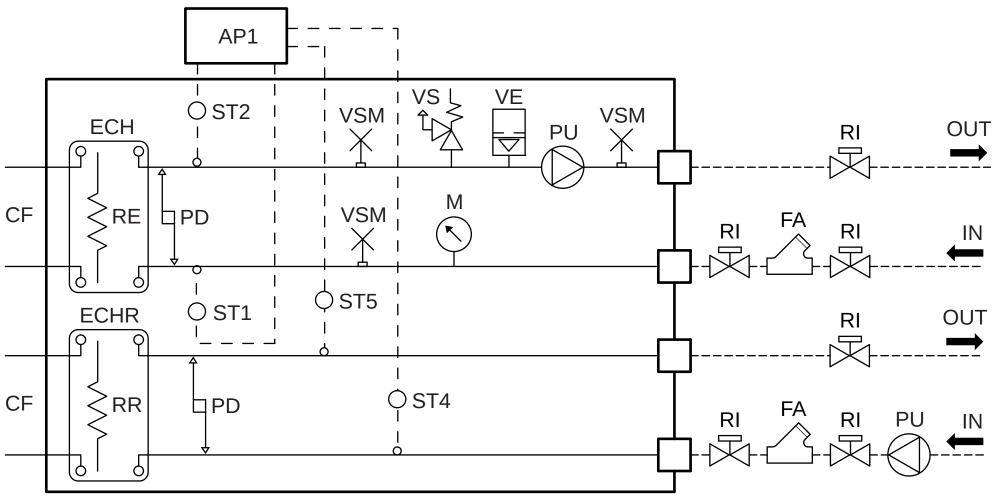
CF	Refrigerant circuit
ECH	Plate evaporator
RE	Evaporator antifreeze electric heater
PD	Water differential pressure switch
VSM	Manual bleed valve
VS	Safety valve
AP1	Electronic control
ST1	Primary inlet temperature gauge
ST2	Primary outlet temperature gauge - working and antifreeze for Standard and Pump installations - antifreeze for Tank & Pump installations
ST4	Water buffer tank outlet temperature gauge (working)
VE	Expansion tank
RAA	Water buffer tank electric heater (accessory)
FA	Mesh filter (installed by the installer)
SA	Water buffer tank
KRIT	Supplementary electric heater (accessory)
M	Pressure gauge
PU	Pump
S	Water drain
RI	Intercept cock
VR	Check valve
- - - -	Connections to be made by the installer

Water circuits in TXAEY models

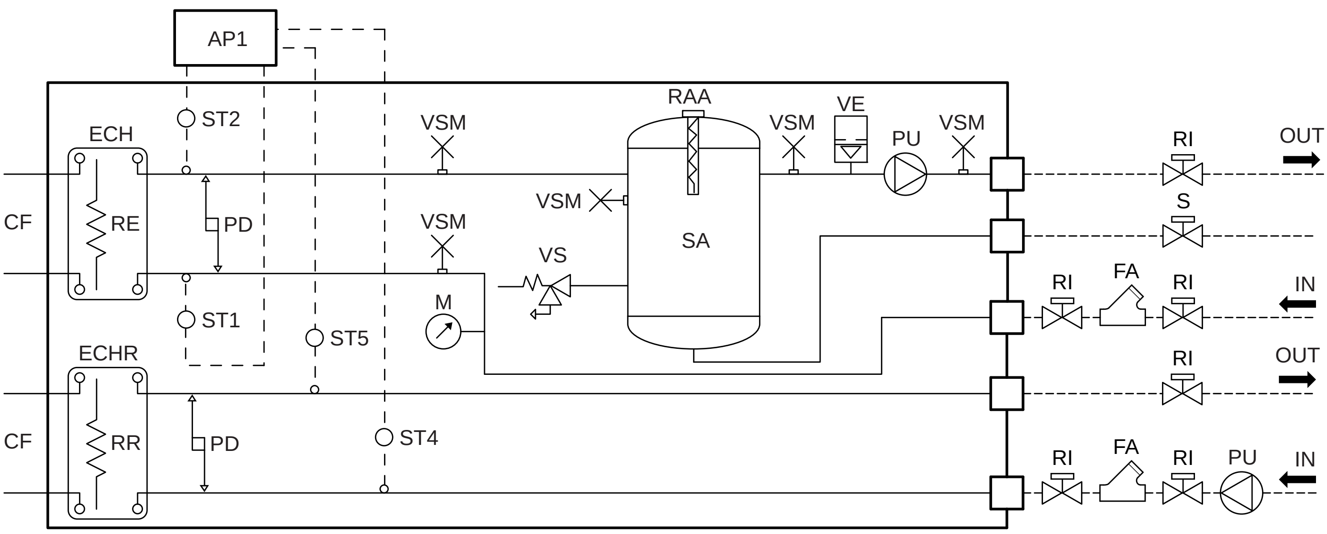
Water circuit in TXAEY 245÷265 models, Standard installation



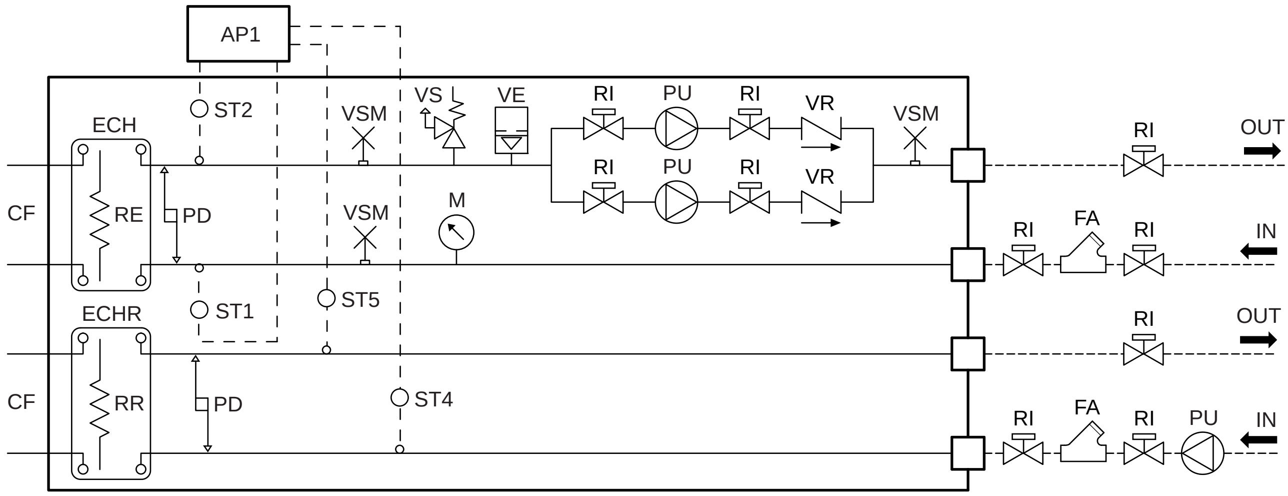
Water circuit in TXAEY 245÷265 models, P1-P2 installation



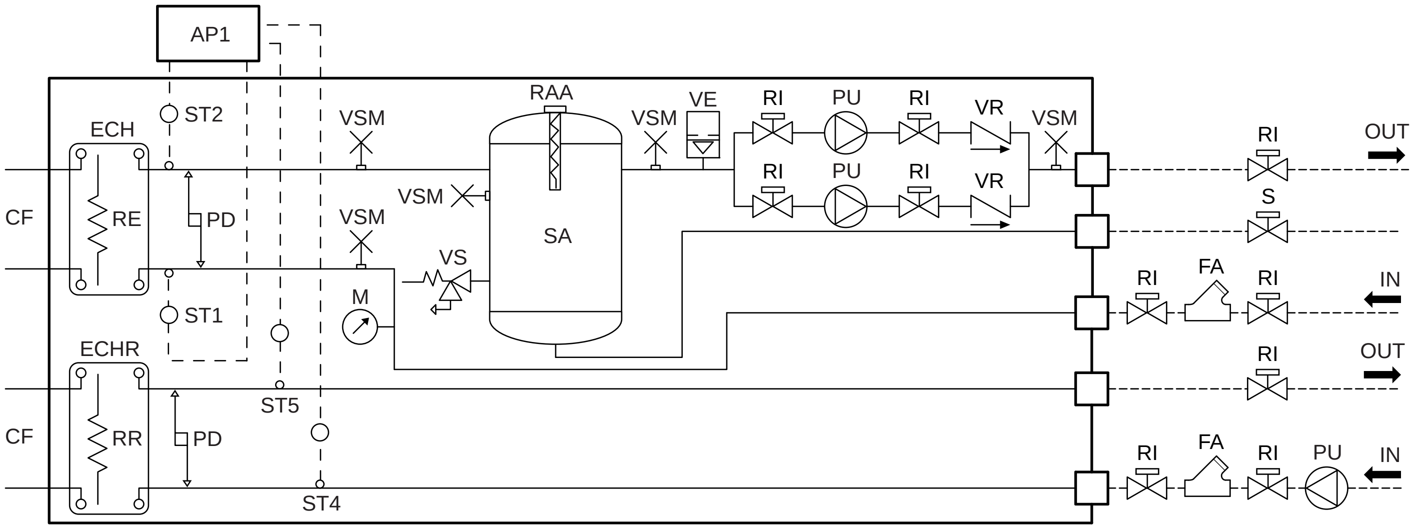
Water circuit in TXAEY 245÷265 models, ASP1-ASP2 installation



Water circuit in TXAEY 245÷265 models, DP1-DP2 installation



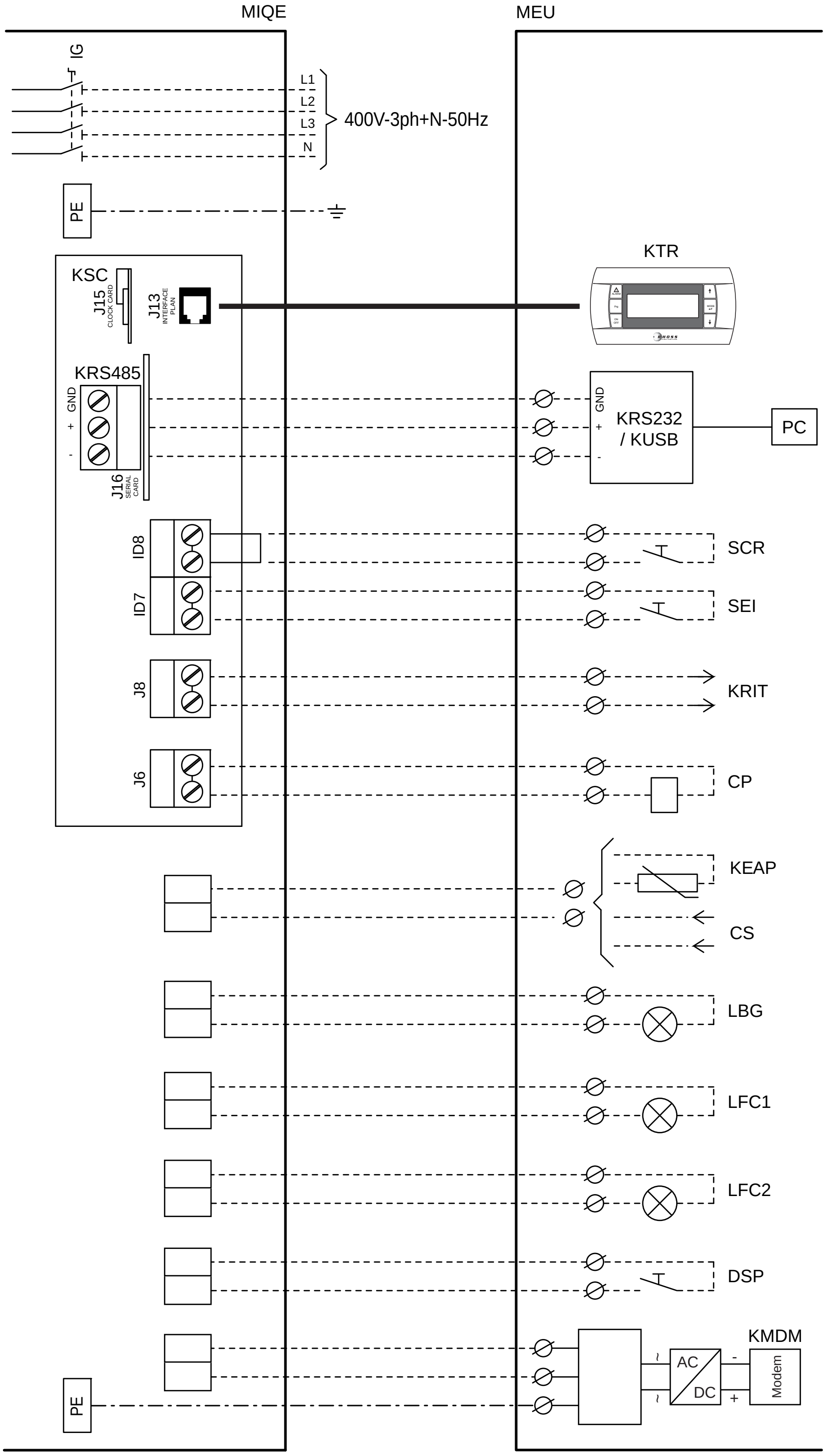
Water circuit in TXAEY 245÷265 models, ASDP1-ASDP2 installation



- **CF** Refrigerant circuit
- **ECH** Plate evaporator
- **ECHR** Plate recovery unit
- **RE** Evaporator antifreeze electric heater
- **RR** Recovery antifreeze electric heater
- **PD** Water differential pressure switch
- **AP1** Electronic control
- **ST1** Primary inlet temperature gauge (working)
- **ST2** Primary outlet temperature gauge (antifreeze)
- **ST4** Recovery inlet temperature gauge
- **ST5** Recovery outlet temperature gauge
- **VE** Expansion tank
- **VSM** Manual bleed valve
- **VS** Safety valve
- **RAA** Water buffer tank electric heater (accessory)
- **FA** Mesh filter (installed by the installer)
- **SA** Water buffer tank
- **M** Pressure gauge
- **PU** Pump
- **S** Water drain
- **RI** Intercept cock
- **VR** Check valve
- **- - - -** Connections to be made by the installer

TCAEY-THAEY electrical connections

MIQE Electrical board internal terminal board;
IG General isolator;
L Line;
N Neutral;
PE Earth terminal;
KSC Clock card (accessory);
KRS485 RS485 serial interface (accessory);
J13 6-way telephone connector (RJ12);
J15 Connector for KSC accessory installation;
J16 Connector for KRS485, KFTT10 and KISI accessory installation;
MEU External user terminal board;
KTR Remote keyboard (accessory);
KRS232 RS485/RS232 converter (accessory);
KUSB RS485/USB converter (accessory);
PC Personal computer;
SCR Remote control selector (control with clean contact);
SEI Summer/Winter selector (control with clean contact);
LBG General lock light (230 Vac, maximum load 0,5A AC1);
LFC1 Compressor 1 operating light (230 Vac, maximum load 0,5A AC1);
LFC2 Compressor 2 operating light (230 Vac, maximum load 0,5A AC1);
KRIT KRIT Command (supplementary electric heater for heat pump) (230 Vac, maximum load 0,5 A AC1).
CP Pump control for Standard installation (consensus at voltage 230 Vac, maximum load 2 A AC1);
KEAP External air sensor for compensation of Set-point.
CS Scrolling set-point by means of the 4-20 mA analogue signal (incompatible with the DSP accessory). Needs to be handled as a special accessory by our pre-sales office;
DSP Double set-point by means of digital consensus (incompatible with the CS accessory);
- - - - Connection to be made by the installer;
___ 6 wire telephone cable (maximum distance 50 m, for greater distances contact ***RHOSS*** S.p.A. customer service).

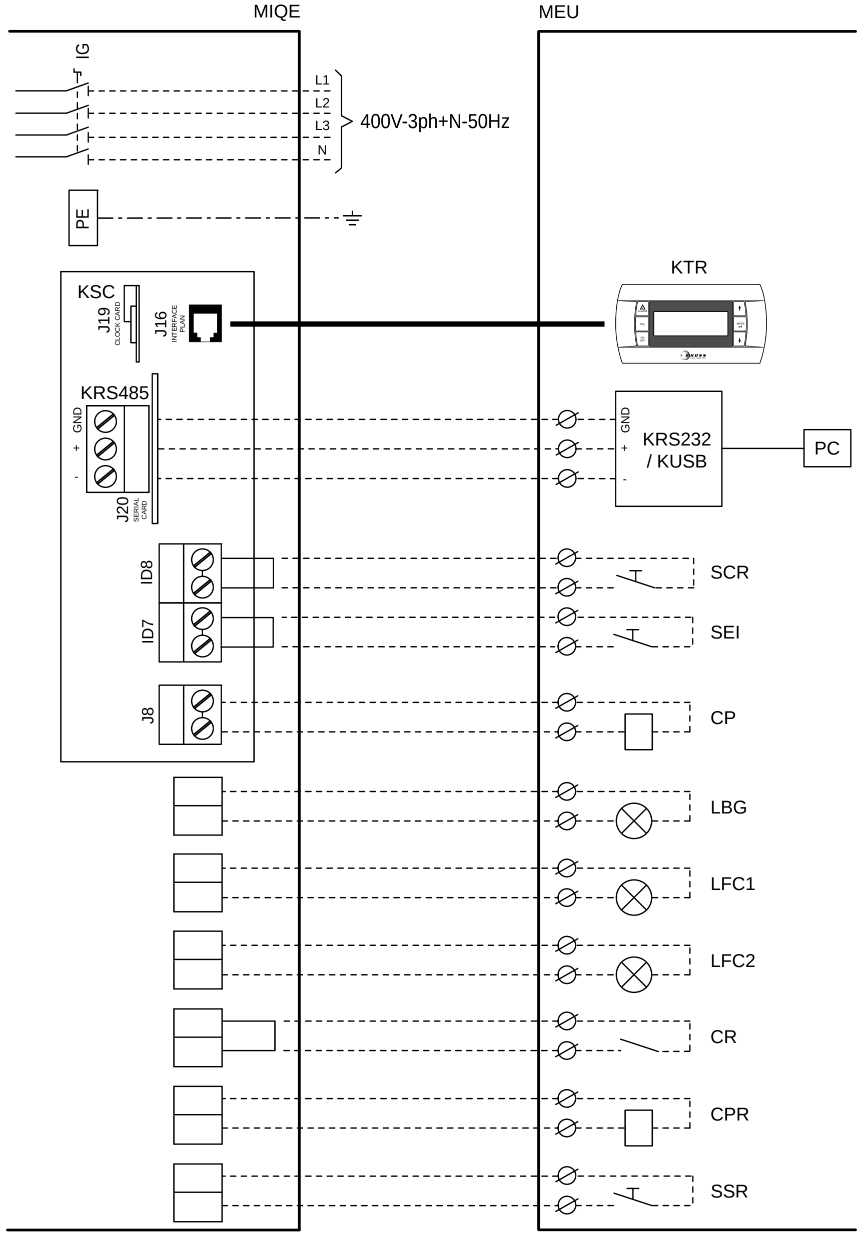


○ The electrical panel can be accessed through the front panel of the unit.
○ Connections must be made by skilled personnel in compliance with current standards and with the diagrams provided with the machine.
○ Always install a general isolator in a protected area near the appliance with a delayed characteristic curve of a suitable capacity and breaking capacity. Make sure the general isolator includes a 3mm minimum opening distance between contacts.
○ Earth connection is compulsory by law and safeguards the user while the machine is in use.

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

Cable section		**245**	**250**	**260**	**265**
Line section	mm²	10	16	16	16
PE section	mm²	10	16	16	16
Remote control section	mm²	1,5	1,5	1,5	1,5

Electric connections in TXAEY models



MIQE	Electrical board internal terminal board;
IG	General isolator;
L1	Line 1;
L2	Line 2;
L3	Line 3;
N	Neutral;
PE	Earth terminal;
KSC	Clock card (accessory);
KRS485	RS485 serial interface (accessory);
J16	6-way telephone connector (RJ12);
J19	Connector for KSC accessory installation;
J20	Connector for KRS485, KFTT10 and KISI accessory installation;
MEU	External user terminal board;
KTR	Remote keypad (accessory);
KRS232	RS485/RS232 converter (accessory);
KUSB	RS485/USB converter (accessory);
PC	Personal computer;
SCR	Remote control selector (control with clean contact);
SEI	Summer/winter selector (control with clean contact);
CP	Pump control for Standard installation (consent at voltage of 230 V AC, maximum charge 2A AC1)
LBG	General lock light (230 Vac, maximum load 0,5A AC 1);
LFC1	Compressor 1 operating light (230 Vac, maximum load 0,5A AC1);
LFC2	Compressor 2 operating light (230 Vac, maximum load 0,5A AC1);
CR	Recovery consent (control with clean contact);
CPR	Recovery pump control (consent at voltage of 230 V AC, maximum charge 2A AC 1)
SSR	Recovery only selector (control with clean contact);
- - - -	Connection to be made by the installer;
___	6 wire telephone cable (maximum distance 50 m, for greater distances contact ***RHOSS*** S.p.A. customer service).

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Line section	mm²	10	16	16	16
PE section	mm²	10	16	16	16
Remote control section	mm²	1,5	1,5	1,5	1,5

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TCAEY-THAEY 245÷265
TXAEY 245÷265
Compact-Y range

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