RHOSS
CLIMA EVOLUTION

# INSTRUCTIONS FOR USE

COOLMATION

## TCAEY 118÷270

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



ADAPTIVE FUNCTION PLUS

**H51300/A**

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**Español**

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CE

***Dichiarazione di conformità***

La società ***RHOSS*** **S.p.A.**
con sede ad Arquà Polesine (RO), via delle Industrie 211, dichiara, sotto la propria esclusiva responsabilità, che i prodotti della serie

**TCAEY 118÷270**

sono conformi ai requisiti essenziali di sicurezza di cui alla Direttiva Macchine 98/37/CE.

---

La macchina è inoltre conforme alle seguenti direttive:
- 2006/95/CE che abroga e sostituisce la direttiva 73/23/CEE come modificata da 93/68/CEE.
- 89/336/CEE (Compatibilità Elettromagnetica) come modificata da 93/68/CEE.

CE

***Statement of conformity***

***RHOSS*** **S.p.A.**
located in Arquà Polesine (RO), via delle Industrie 211, hereby states on its own exclusive responsibility that the products in the

**TCAEY 118÷270**

are compliant with the essential safety requirements as set forth in Machine Directive 98/37/CE.

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The machine is also compliant with the following directives:
- 2006/95/CE which voids and replaces drective73/23/CEE as modified by 93/68/CEE.
- 89/336/CEE (Electromagnetic Compatibility) as modified by 93/68/CEE.

CE

***Déclaration de conformité***

La société ***RHOSS*** **S.p.A.**
dont le siège se trouve à Arquà Polesine (RO), via delle Industrie 211, déclare, sous sa responsabilité exclusive, que les produits de la série

**TCAEY 118÷270**

sont conformes aux caractéristiques de sécurité requises par la Directive Machines 98/37/CE.

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L'appareil est par ailleurs conforme aux directives suivantes :
- 2006/95/CE qui abroge et remplace la directive 73/23/CEE comme modifiée par 93/68/CEE.
- 89/336/CEE (Compatibilité Electromagnétique) comme modifiée par 93/68/CEE.

CE

***Konformitätserklärung***

Der Hersteller ***RHOSS*** **S.p.A.**
mit Geschäftssitz in Arquà Polesine (RO), via delle Industrie 211, erklärt eigenverantwortlich, dass die Geräte der Baureihe

**TCAEY 118÷270**

den grundsätzlichen Anforderungen an die Sicherheit in Übereinstimmung mit der Maschinenrichtlinie 98/37/EG entsprechen.

---

Darüber hinaus entspricht die Maschine folgenden Richtlinien:
- 2006/95/EG, welche die Richtlinie 73/23/EWG aufhebt und ersetzt, wie mit 93/68/EWG geändert.
- 89/336/EWG (Elektromagnetische Verträglichkeit) wie mit 93/68/EWG geändert.

CE

***Declaración de conformidad***

La empresa ***RHOSS*** **S.p.A**
con sede en Arquà Polesine (RO), via delle Industrie 211, declara bajo su única responsabilidad que los productos de la serie

**TCAEY 118÷270**

Se encuentran en conformidad con los principales requisitos de seguridad indicados en la Directiva de máquinas 98/37/CE.

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La máquina, además, se encuentra en conformidad con las siguientes directivas:
- 2006/95/CE, que abroga y sustituye la directiva 73/23/CEE, según las modificaciones de 93/68/CEE.
- 89/336/CEE (Compatibilidad electromagnética) según las modificaciones de 93/68/CEE.

Codroipo, lì 22 Aprile 2008

Il direttore generale / General manager / Directeur général / Generaldirektor / Director general

Pierluigi Ceccolin

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## KEY TO SYMBOLS

| SYMBOL | MEANING |
|---|---|
|  | **GENERIC DANGER!**<br>**The GENERIC DANGER sign warns the operator and maintenance personnel about risks that may cause death, physical injury, or immediate or latent illnesses of any kind.** |
|  | **DANGER: LIVE COMPONENTS!**<br>**The DANGER: LIVE COMPONENTS sign warns the operator and maintenance personnel about risks due to the presence of live voltage.** |
|  | **DANGER: SHARP EDGES!**<br>**The DANGER: SHARP EDGES sign warns the operator and maintenance personnel about the presence of potentially dangerous sharp edges.** |
|  | **DANGER: HOT SURFACES!**<br>**The DANGER: HOT SURFACES sign warns the operator and maintenance personnel about the presence of potentially dangerous hot surfaces.** |
|  | **DANGER: MOVING PARTS!**<br>**The DANGER: MOVING PARTS sign warns the operator and maintenance personnel about risks due to the presence of moving parts.** |
|  | **IMPORTANT WARNING!**<br>**The IMPORTANT WARNING sign draws attention to actions or hazards that could damage the unit or its equipment.** |
|  | **ENVIRONMENTAL PROTECTION!**<br>**The ENVIRONMENTAL PROTECTION sign provides instructions for using the machine in an eco-friendly manner.** |

## Reference Standards

| | |
|---|---|
| **UNI EN 292** | Sicurezza del macchinario. Concetti fondamentali, principi generali di progettazione. |
| **UNI EN 294** | Sicurezza del macchinario. Distanze di sicurezza per impedire il raggiungimento di zone pericolose con gli arti superiori. |
| **UNI EN 563** | Sicurezza del macchinario. Temperature delle superfici di contatto. Dati ergonomici per stabilire i valori limiti di temperatura per superfici calde. |
| **UNI EN 1050** | Sicurezza del macchinario. Principi per la valutazione del rischio. |
| **UNI 10893** | Documentazione tecnica di prodotto. Istruzioni per l'uso. |
| **EN 13133** | Brazing. Brazer approval. |
| **EN 12797** | Brazing. Destructive tests of brazed joints. |
| **EN 378-1** | Refrigeration systems and heat pumps – safety and environmental requirements. Basic requirements, definitions, classification and selection criteria. |
| **PrEN 378-2** | Refrigeration systems and heat pumps – safety and environmental requirements. Design, construction, testing, installing, marking and documentation. |
| **CEI EN 60204-1** | Sicurezza del macchinario. Equipaggiamento elettrico delle macchine. Parte 1: Regole generali. |
| **CEI EN 60335-2-40** | Sicurezza degli apparecchi elettrici d'uso domestico e similare. Parte 2: norme particolari per le pompe di calore elettriche, per i condizionatori d'aria e per i deumidificatori. |
| **UNI EN ISO 3744** | Determinazione dei livelli di potenza sonora delle sorgenti di rumore mediante pressione sonora. Metodo tecnico progettuale in un campo essenzialmente libero su un piano riflettente. |
| **EN 50081-1:1992** | Electromagnetic compatibility – Generic emission standard Part 1: Residential, commercial and light industry. |
| **EN 61000** | Electromagnetic compatibility (EMC). |

# I SECTION I: USER

## I.1 AVAILABLE VERSIONS

The available versions belonging to this product range are listed below. After having identified the unit, you can use the following table to find out about some of the machine's features.

| | |
|---|---|
| **T** | Water production unit |
| **C** | Cooling only |
| **A** | Air-cooled |
| **E** | Scroll-type hermetic compressors |
| **Y** | R410A refrigerant fluid |

| Model | No. compressors | Cooling capacity (kW) (*) |
|---|---|---|
| **118** | **1** | **18** |
| **121** | **1** | **21** |
| **128** | **1** | **28** |
| **131** | **1** | **31** |
| **135** | **1** | **35** |
| **140** | **1** | **40** |
| **253** | **2** | **53** |
| **261** | **2** | **61** |
| **270** | **2** | **70** |

**(*)** The power value used to identify the model is approximate. For the exact value, identify the machine and consult the enclosed documents (*A1 Technical data).*

**Possible installations for TCAEY 253-261-270 models:**
**ASDP1** – Installation with double pump, including an automatically activated pump in stand-by and water buffer tank.

## I.2 ADAPTIVEFUNCTION PLUS

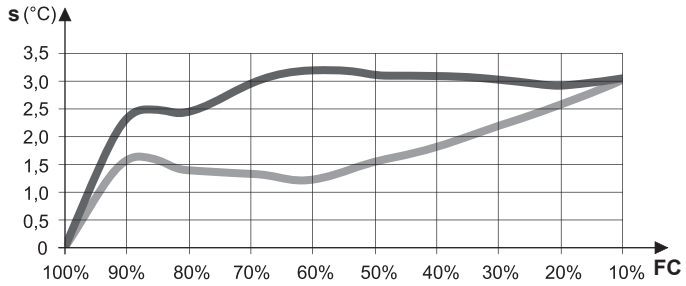
The new adaptive regulation logic, **AdaptiveFunction Plus**, is an exclusive ***RHOSS*** patent and the result of a long partnership with the University of Padua. The various algorithm processing and development operations were implemented and tested on TCAEY units in the ***RHOSS*** S.p.A. *Research&Development*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

### *Objectives*

- To guarantee optimal unit operation in the system in which it is installed and high water delivery temperature precision.

### *High precision*

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.
This 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 units with a water buffer tank to guarantee higher system thermal inertia.

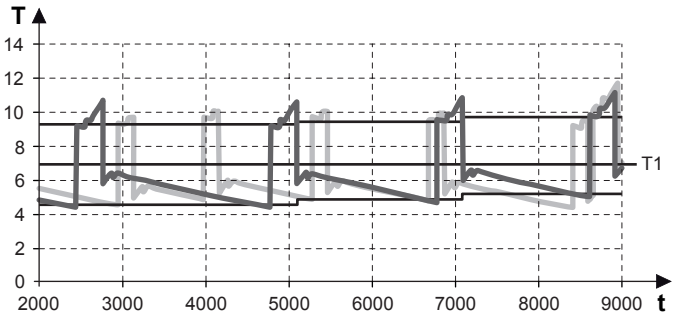



**s** Fluctuation
**FC** Load
Unit with water buffer tank, 4 litres/kW in the system and return control.
Unit with water buffer tank, 2 litres/kW in the system and control on the supply side with **AdaptiveFunction Plus**.

*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** guarantees greater water supply temperature precision.*

### *Virtual Tank: guaranteed reliability*

A low water content in the system can cause the chiller units 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. However, in process applications it is always advisable to use units with a water buffer tank to guarantee higher system thermal inertia.




**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 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.

## I.2.1 MACHINE IDENTIFICATION

The units feature a serial number plate located on the side which includes machine identification data.




## I.3 SPECIFIED CONDITIONS OF USE

TCAEY units are air-cooled packaged water chillers with pumping group, storage tank and axial fans.

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

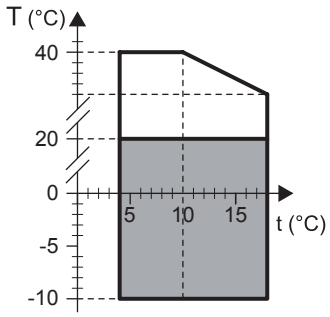
**The units are designed for indoor or outdoor installation and for atmospheric pressure hydraulic circuit.**

The units comply with the following directives:
- Machinery directive 98/37/EEC (MD);
- Low voltage directive 2006/95/EEC (LVD);
- Electromagnetic compatibility directive 89/336/EEC (EMC);
- Pressure equipment directive 97/23/EEC (PED).

| | |
|---|---|
|  | **DANGER!**<br>**The machine has been designed and constructed solely and exclusively to function as an air-cooled water chiller: any other use is expressly PROHIBITED. The installation of the machine in an explosive environment is prohibited.** |
|  | **DANGER!**<br>**Segregate the unit if installed in areas accessible to persons under 14 years of age.** |
|  | **IMPORTANT!**<br>**The unit will only function correctly if the instructions for use are scrupulously followed, if the specified clearances are complied with during installation and if the operating restrictions indicated in this manual are strictly adhered to.** |

## I.3.1 OPERATING LIMITS

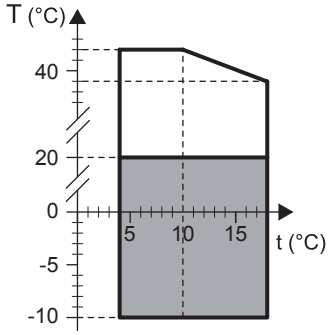
**TCAEY 118÷135 in summer mode**




Standard operation
Operation with condensation control

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

**TCAEY 140÷270 in summer 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 are permitted through the exchangers**
Normally the temperature differentials range are $\Delta T = 3 \div 8$°C.
The maximum and minimum temperature differential for the Tank&Pump machines is linked to the pump performances, which must always be checked with to help of graphs on pages 46-47.

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

**N.B.:**
We can provide units on demand to supply chilled water at less than 4°C. The tables show the correction factors to obtain the changes of the unit performance with different percentages of ethylene glycol (table "**E**").

## I.4 WARNINGS REGARDING POTENTIALLY TOXIC SUBSTANCES

**DANGER!**
**Read the ecological information and the following instructions regarding the refrigerant fluids used carefully.**

### I.4.1.1 Identification of the type of refrigerant fluid used

- Difluoromethane (HFC 32) 50% by weight

CAS No.: 000075-10-5

- Pentafluoroethane (HFC 125) 50% by weight

CAS No.: 000354-33-6

### I.4.1.2 Identification of the type of oil used

The lubricant used in the unit is polyester oil; please refer to the indications on the compressor data plate.

**DANGER!**
**For further information regarding the characteristics of the refrigerant and oil used, refer to the safety data sheets available from the refrigerant and oil manufacturers.**

### I.4.1.3 Main ecological information regarding the types of refrigerant fluids used

- **Persistence, degradation and environmental impact**

| Refrigerant | Chemical formula | GWP (over 100 years) |
|---|---|---|
| R32 | $CH_2F_2$ | 550 |
| R125 | $C_2HF_5$ | 3400 |

HFC R32 and R125 refrigerants are the single components which mixed at 50% make up R410A. They belong to the hydrofluorocarbons group and are regulated by the Kyoto protocol (1997 and subsequent revisions) being gases that contribute to the greenhouse effect. The measure of how much a given mass of greenhouse gas is estimated to contribute to global warming is GWP (Global Warming Potential). The standard measure for carbon dioxide ($CO_2$) is GWP=1.
The value of GWP assigned to each refrigerant represents the equivalent amount in kg of $CO_2$ released over a period of 100 years, in order to have the same greenhouse effect of 1kg refrigerant released over the same period of time.
The R410A mixture does not contribute to ozone depletion unlike Chlorine, therefore its ODP (Ozone Depletion Potential) is zero (ODP=0).

| Refrigerant | R410A |
|---|---|
| Components | R32/R125 |
| Composition | 50/50 |
| ODP | 0 |
| GWP (over 100 years) | 2000 |

**ENVIRONMENTAL PROTECTION!**
**The hydrofluorocarbons contained in the unit cannot be released into the atmosphere as they are gases that contribute to the greenhouse effect.**

R32 and R125 hydrocarbons which decompose rapidly into the lower atmosphere (troposphere). Decomposition by-products are highly dispersible and thus have a very low concentration. They have no influence on photochemical smog (that is, they are not classified among VOC volatile organic compounds, according to the guidelines established by the UNECE agreement).

- **Effects on effluent treatment**

Waste products released into the atmosphere do not produce long-term water contamination.

- **Individual protection/exposure control**

Use protective clothing and gloves; protect eyes and face.

- **Professional exposure limits:**

**R410A**
HFC 32 TWA 1000 ppm
HFC 125 TWA 1000 ppm

- **Handling**

**DANGER!**
**Users and maintenance personnel must be adequately informed about the risks of handling potentially toxic substances. Failure to observe the aforesaid indications may cause personal injury or damage the unit.**

Avoid inhalation of high concentrations of vapour. Atmospheric concentration must be reduced to a minimum and maintained at this minimum level, well beneath professional exposure limits. Vapour is heavier than air, and thus hazardous concentrations may form close to the floor, where overall ventilation may be poor. In this case, ensure adequate ventilation. Avoid contact with naked flames and hot surfaces, which could lead to the formation of irritating and toxic products of decomposition. Do not allow the liquid to come into contact with eyes or skin.

- **Procedure in case of accidental refrigerant escape**

Ensure adequate personal protection (using means of respiratory protection) during clean-up operations. If the conditions are sufficiently safe, isolate the source of leak.
If the amount of the spill is limited, let the material evaporate, as long as adequate ventilation can be ensured. If the spill is considerable, ventilate the area adequately.
Contain the spilt material with sand, soil, or other suitable absorbent material.
Prevent the liquid from entering drains, sewers, underground facilities or manholes, because suffocating vapours may form.

### I.4.1.4 Main toxicological information on the type of refrigerant used

- **Inhalation**

A high atmospheric concentration can cause anaesthetic effects with possible loss of consciousness. Prolonged exposure may lead to irregular heartbeat and cause sudden death.
Higher concentrations may cause asphyxia due to the reduced oxygen content in the atmosphere.

- **Contact with skin**

Splashes of nebulized liquid can produce frostbite. Probably not hazardous if absorbed through the skin. Repeated or prolonged contact may remove the skin's natural oils, with consequent dryness, cracking and dermatitis.

- **Contact with eyes**

Splashing liquid may cause frostbite.

- **Ingestion**

While highly improbable, may produce frostbite.

### I.4.1.5 First aid measures

- **Inhalation**

Move the person away from the source of exposure area, keep him/her warm and let him/her rest. Administer oxygen if necessary. Attempt artificial respiration if breathing has stopped or shows signs of stopping. In the case of cardiac arrest carry out heart massage and seek immediate medical assistance.

- **Contact with skin**

In case of contact with skin, wash immediately with lukewarm water. Thaw tissue using water. Remove contaminated clothing. Clothing may stick to the skin in case of frostbite. If irritation, swelling or blisters appear, seek medical assistance.

- **Contact with eyes**

Rinse immediately using an eyewash or clean water, keeping eyelids open, for at least ten minutes.
Seek medical assistance.

- **Ingestion**

Do not induce vomiting. If the injured person is conscious, rinse his/her mouth with water and make him/her drink 200-300 ml of water.
Seek immediate medical assistance.

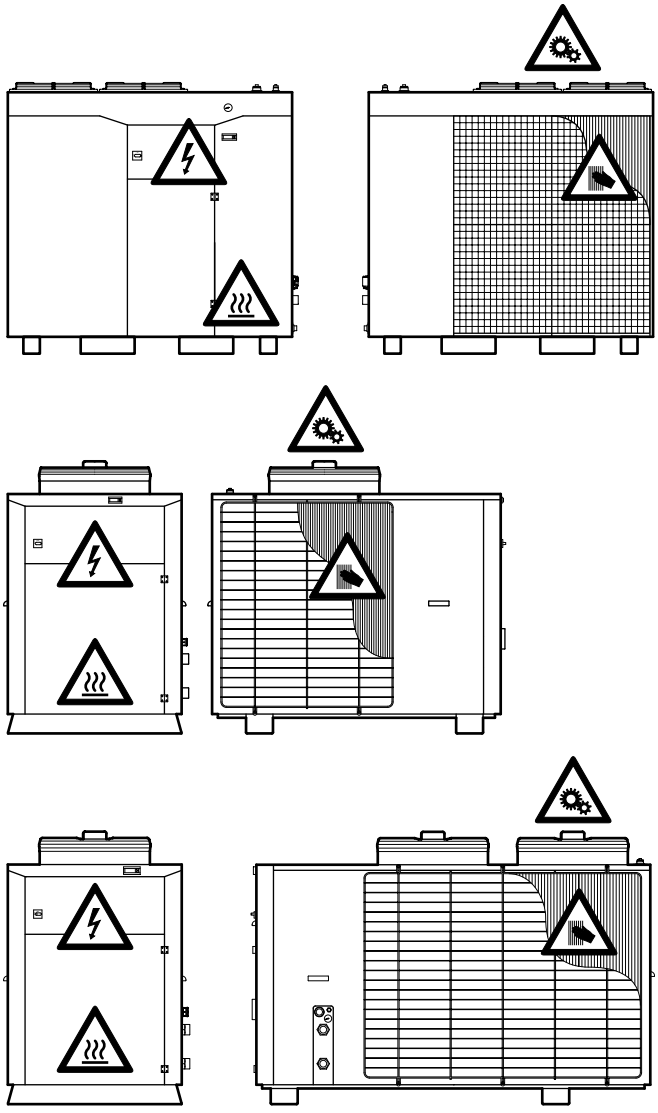
- **Further medical treatment**

Treat symptoms and carry out support therapy as indicated. Do not administer adrenaline or similar sympathomimetic drugs following exposure, due to the risk of cardiac arrhythmia.

## I.4.2 INFORMATION ON RESIDUAL RISKS AND IRREMOVABLE HAZARDS

**IMPORTANT!**
**Pay the utmost attention to the signs and symbols located on the appliance.**

If any risks remain in spite of the provisions adopted, or if there are any potential or hidden risks, these are indicated by adhesive labels attached to the machine in compliance with standard “ISO 3864”.





**Indicates the presence of live components.**



**Indicates the presence of moving parts (belts, fans).**



**Indicates the presence of hot surfaces (refrigeration circuit, compressor heads).**



**Indicates the presence of sharp edges in reference to the finned coils.**

## I.5 DESCRIPTION OF CONTROL FOR ASP1 MODELS

The controls consist of the main switch, the automatic switches and the user interface panel located on the appliance.

### I.5.1 MAIN SWITCH

Manually controlled type «b» mains power supply disconnecting switch (ref. EN 60204-1 § 5.3.2).

### I.5.2 AUTOMATIC SWITCHES

- **Automatic switch for compressor protection**

This switch allows the supply or isolation of the compressor's main power circuit.

- **Automatic switch for pump protection**

The switch makes it possible to supply and cut off power from the pumps.

- **Automatic switch for fan protection (Models 140÷270)**

The switch makes it possible to supply and cut off power from the fans.

### I.5.3 ON BOARD CONTROL PANEL






**Display:**
displays the values of all the parameters (i.e. outlet water temperature, etc.), any alarm codes.



**Power supply LED:**
indicates the presence of the power supply when the machine is switched off. If it flashes when the unit is running, it means that the compressor is stationary due to safety delays. The LED is also used as a decimal point in temperature indications.




**Winter LED - ON/OFF, DOWN key:**
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.




**Summer LED MODE, UP key:**
When the green LED is on, it 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.




**Alarm LED ALARM, PRG key:**
When the red LED is 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.

The display keypad installed on the machine makes it possible to access parameters on three levels: user, technical assistance and manufacturer. The technical assistance and manufacturer levels are password protected.

## I.6 INSTRUCTIONS FOR USE

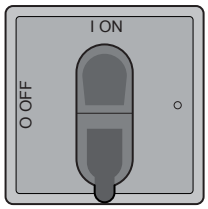
By means of the switches and the keypad the user may carry out the following operations:

- power the unit;
- start-up;
- change/select the operating mode;
- adjust summer Set-point;
- view alarms via the display;
- view the status of the principal components via LEDs or display;
- stop the unit;
- disconnect the unit from the mains power supply.

**IMPORTANT!**
**Any other operation must be carried out by qualified personnel authorised by *RHOSS* S.p.A.**

### I.6.1 UNIT POWER SUPPLY

In order to power the unit, turn the mains switch in a clockwise direction after having armed the automatic switch that protects the compressor.

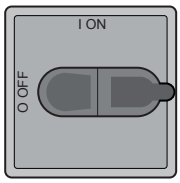





The “power supply” LED lights up.

### I.6.2 ISOLATION FROM THE ELECTRICITY NETWORK

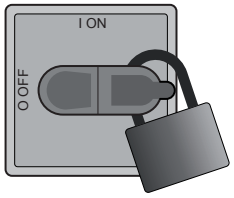
In order to electrically isolate the unit, turn the mains switch in an anticlockwise direction.






The “power supply” LED switches off.

The mains switch can be locked in order to prevent anyone accidentally powering the unit.




**IMPORTANT!**
**If the mains switch is opened, it cuts off the electricity supply to the storage tank plate exchanger heater, the storage tank antifreeze heater and of the pump and the compressor crankcase heater. The switch should only be disconnected for cleaning, maintenance or repair of the machine.**

### I.6.3 START-UP

To start up the unit, press the **ON/OFF** key for 2 seconds.







The LED corresponding to the operating mode which was active when the appliance was last switched off lights up, and the display shows the inlet water temperature.
The compressor status LED begins to flash, indicating that the compressor is in time-delay.




After a short period of time, the LED lights up to indicate compressor start-up.




### I.6.4 SHUTDOWN

In order to switch the unit off, press the **ON/OFF** key for 2 seconds or open the remote control (SCR) if present. This ensures the power supply to the plate exchanger heater and the storage tank antifreeze heater.







The compressor and active operating mode LEDs go out. The power supply LED remains lit, indicating that the unit is connected to the power supply.



## I.6.5 ADAPTIVEFUNCTION PLUS SETTING

**AdaptiveFunction Plus Economy Function**

Using the **AdaptiveFunction Plus** "**Economy**" function makes it possible to combine comfort with the need for low energy consumption. In fact, by adjusting the set-point value, it optimises compressor operation on the basis of the actual working conditions.

**AdaptiveFunction Plus Precision Function**

Using the **AdaptiveFunction Plus** "**Precision**" function makes it possible to achieve the smallest possible average fluctuation, at partial loads, from the average Set-point of the water temperature delivered to the users.

By default the unit is set in the ***AdaptiveFunction Plus*** **Precision** mode.
To set the ***AdaptiveFunction Plus*** **Economy** mode, proceed as follows:

Press the **Prg** key for 2 seconds to access it.

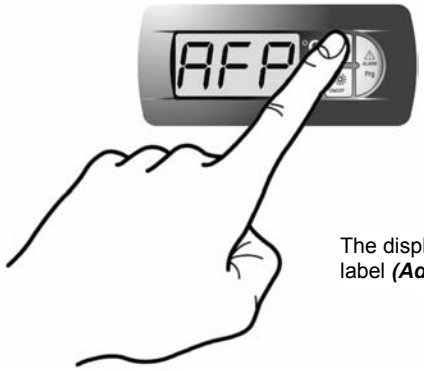






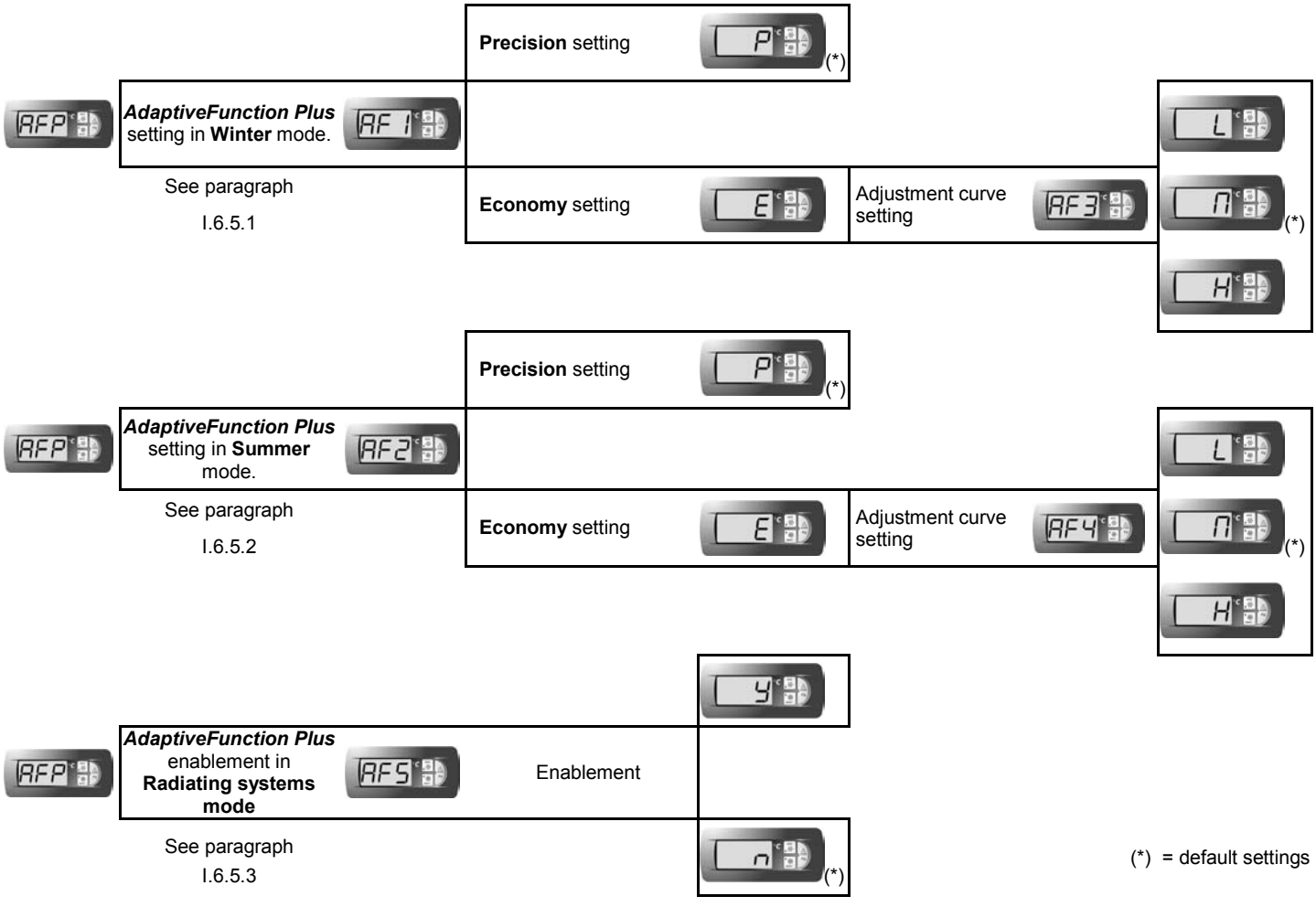
The display shows the **Coo** label (summer Set-point).

Press the **MODE** key to move onto the label that sets the ***AdaptiveFunction Plus***.




The display shows the **AFP** label ***(AdaptiveFunction Plus***).

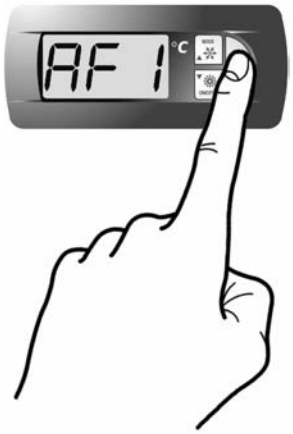
The ***AdaptiveFunction Plus*** **(AFP)** label makes it possible to set the ***AdaptiveFunction Plus*** function in **Winter** and **Summer** modes and to enable **Radiating System** management:




(*) = default settings

### I.6.5.1 AdaptiveFunction Plus Economy in Winter Mode

Press the **Prg** key to access the first screen for the selection of the **Economy** operating mode.

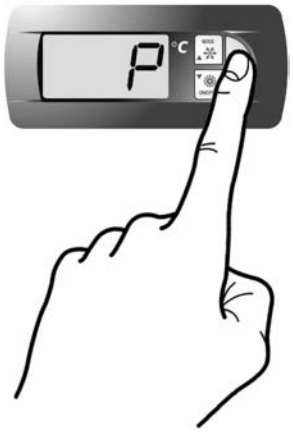






The display shows the label **AF1**.

Press the **Prg** key again to access the screen for the selection of the ***AdaptiveFunction Plus*** **Economy** in **Winter** function.







The display shows the label **P**.

Press the **MODE** key (UP) to modify the parameter from **P** to **E** thus enabling the ***AdaptiveFunction Plus*** **Economy** in **Winter** function.







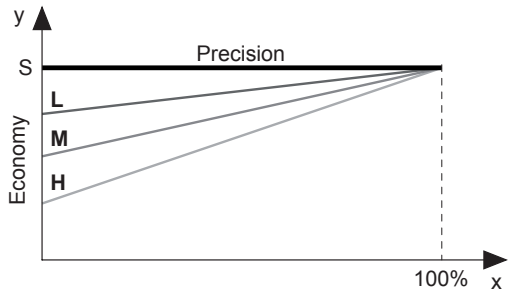
The memorised value flashes on the display for a few seconds (**E**). After this, the display will show the label **AF1**.

Press the **MODE** key to select AF3 to set one of the three Set-point adjustment curves for the **AdaptiveFunction Plus Economy** function in **Winter** mode. The three adjustment curves correspond to three different laws of variation of the Set-point based on the load, in order to modify the degree of comfort which can be attained in the room and the efficiency of the machine.

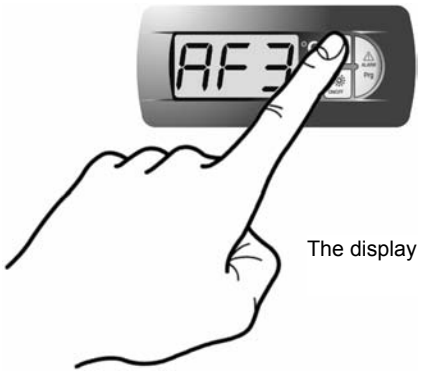
It is possible to choose one of these three adjustment curves:

| Label | Characteristics of the adjustment curve |
|---|---|
| L | Use in buildings with very unbalanced loads. Efficiency higher than the standard. |
| n | Intermediate comfort and efficiency (default). |
| H | Use in buildings with very similar loads. High efficiency. |

***AdaptiveFunction Plus*** **in Winter mode**




| | |
|---|---|
| **x** | Percentage of load (%) |
| **y** | Set-point (°C) |
| **S** | Value of Set-point set by user |
| **L** | Use in buildings with very unbalanced loads. |
| **M** | Intermediate comfort and efficiency (default). |
| **H** | Use in buildings with very similar loads. High efficiency. |

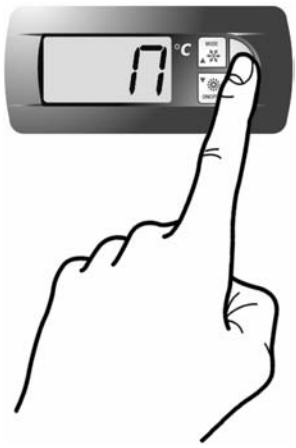






The display shows label **AF3**

Press the **Prg** key to access the modifiable value of the parameter selected.







The display will show the default value **M**.




Use the **MODE** key (UP) and **ON/OFF** (DOWN) to select the adjustment curve (**L**, **M**, **H**) in **Winter**.



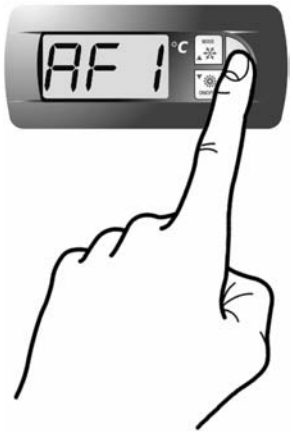




The memorised value flashes on the display for a few seconds (**L**, **M** or **H**). After this, the display will show the label **AF3**.

### I.6.5.2 AdaptiveFunction Plus Economy in Summer Mode

Press the **Prg** key to access the first screen for the selection of the **Economy** operating mode.

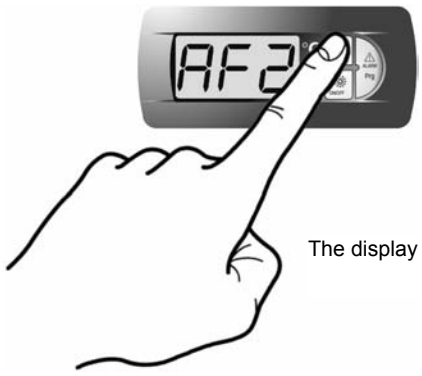






The display shows the label **AF1**.

Press the **MODE** key to access the screen for the selection of the **Economy** in **Summer** operating mode.

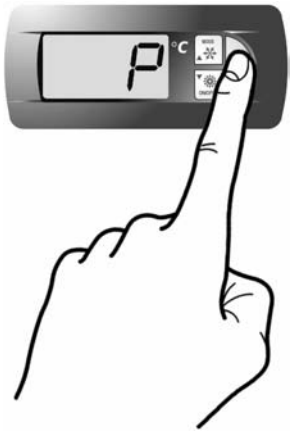






The display shows label **AF2**

Press the **Prg** key again to access the screen for the selection of the ***AdaptiveFunction Plus*** **Economy** in **Summer** function.

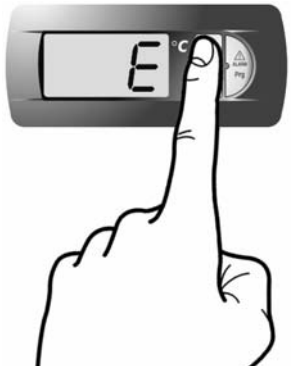






The display shows the label **P**.

Press the **MODE** key (UP) to modify the parameter from **P** to **E** thus enabling the ***AdaptiveFunction Plus*** **Economy** in **Summer** function.







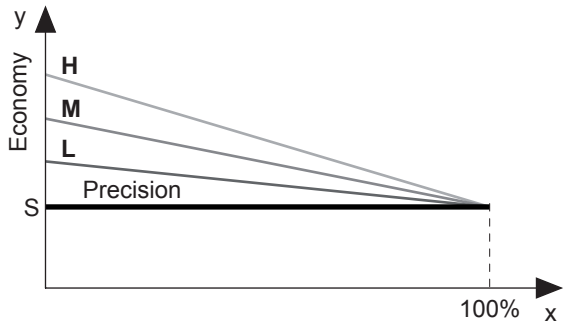
The memorised value flashes on the display for a few seconds (**E**). After this, the display will show the label **AF2**.

Press the **MODE** key to select **AF4** to set one of the three Set-point adjustment curves for the **AdaptiveFunction Plus Economy** function in **Summer** mode. The three adjustment curves correspond to three different laws of variation of the Set-point based on the load, in order to modify the degree of comfort which can be attained in the room and the efficiency of the machine.

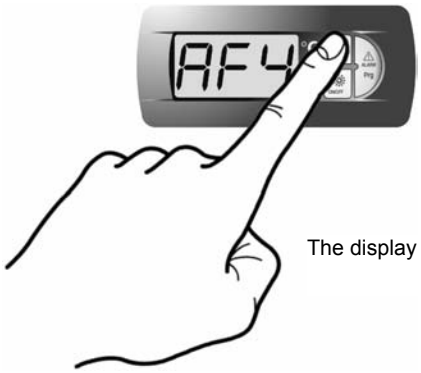
It is possible to choose one of these three adjustment curves:

| Label | Characteristics of the adjustment curve |
|---|---|
| L | Use in buildings with very unbalanced loads. Efficiency higher than the standard. |
| n | Intermediate comfort and efficiency (default). |
| H | Use in buildings with very similar loads. High efficiency. |

***AdaptiveFunction Plus*** **in Summer mode**




| | |
|---|---|
| **x** | Percentage of load (%) |
| **y** | Set-point (°C) |
| **S** | Value of Set-point set by user |
| **L** | Use in buildings with very unbalanced loads. |
| **M** | Intermediate comfort and efficiency (default). |
| **H** | Use in buildings with very similar loads. High efficiency. |

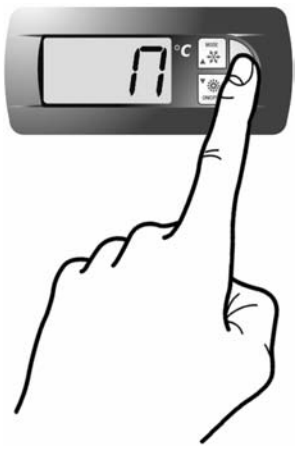






The display shows label **AF4**

Press the **Prg** key to access the modifiable value of the parameter selected.







The display will show the default value **M**.




Use the **MODE** key (UP) and **ON/OFF** (DOWN) to select the adjustment curve (**L**, **M**, **H**) in **Summer**.





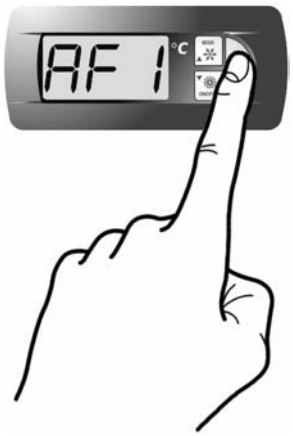


The memorised value flashes on the display for a few seconds (**L**, **M** or **H**). After this, the display will show the label **AF4**.

### I.6.5.3 AdaptiveFunction Plus Economy in Radiating Systems Mode.

In the case of a Radiating Systems installation, the machine needs to be configured as described below.

Press the **Prg** key to access the first screen for the selection of the **Economy** operating mode.

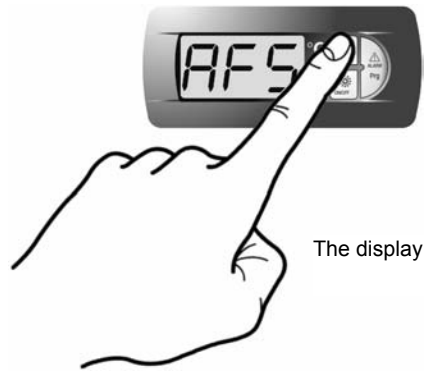






The display shows the label **AF1**.

Press the **MODE** key to access the screen for the selection of the **Radiating Systems** operating mode.







The display shows label **AF5**

Press the **Prg** key again to access the screen for the selection of ***AdaptiveFunction Plus*** enablement **for Radiating Systems**.

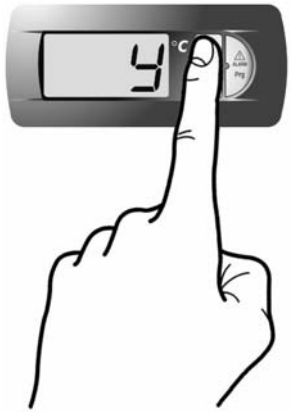






The display shows the label **n**.

Press the **MODE** key (UP) to modify the parameter from **n** to **y** thus enabling the ***AdaptiveFunction Plus*** **for Radiating Systems** function).







The memorised value flashes on the display for a few seconds (**y**). After this, the display will show the label **AF5**.

**IMPORTANT!**
**If the Radiating Systems function is enabled (y), the *AdaptiveFunction Plus* Economy in Summer function is forced into Precision operation.**

## I.6.6 KEYBOARD-ADJUSTABLE VARIABLES

The adjustment variables that can be edited from the keyboard are illustrated in the following table.

| Label | Function | Limit of adjustment | Set DEFAULT |
|---|---|---|---|
| Coo | Cooling set point | 4÷18°C | 10°C |
| CC1 | Enablement of pressure transducer (condensation control KFI) | | y |
| Coo | Set-point cooling in Economy | 5÷10°C | - |
| PSU | Password (technical service) | | |
| AF1 | Setting ***AdaptiveFunction Plus*** *Economy/Precision in* Winter | | P |
| AF2 | Setting ***AdaptiveFunction Plus*** *Economy/Precision in* Summer | | P |
| AF3 | Setting adjustment curve Economy in Winter | | M |
| AF4 | Setting adjustment curve Economy in Summer | | M |
| AF5 | Enablement ***AdaptiveFunction Plus*** Radiating Systems | | n |

## I.6.7 SETTING SUMMER SET-POINT

| | |
|---|---|
| | **IMPORTANT!**<br>**When modifying or varying the machine's operating parameters, make sure that you do not create situations that conflict with the other set parameters.** |

The user is authorised to modify the summer set-point values within the adjustment limits indicated in *Par. I.6.6*.

To set the summer set-point, proceed as follows:

Press the **Prg** key for 2 seconds to access it.







The display shows the **Coo** label (summer Set-point).

Press the **Prg** key to access the modifiable value of the parameter selected.







The display shows the summer set-point value.




The **MODE** (UP) and **ON/OFF** (DOWN) keys can be used to increase or reduce its value.

Once the desired summer set-point value has been set, simply press the **MODE** and **ON/OFF** keys simultaneously to memorize the defined value.







The memorized Setpoint value will flash for a few seconds. The display will then show the **Coo** label if the summer Set-point value has been memorized.

To return to the initial screen, press the **MODE** and **ON/OFF** keys simultaneously.



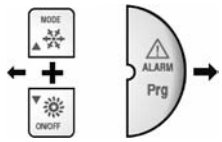


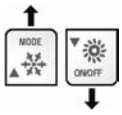


The water inlet temperature will be displayed.

## I.7 MENU NAVIGATION






By pressing the **UP** and **Down** keys simultaneously the set value is memorized.

**CC2** is accessible only if **CC1=y**

| | | | |
|---|---|---|---|
| Coo | | | Cooling Set point (°C). |
| dCo | | | Cooling double Set-point °C) |
| OCo | | CA1 | Offset shifting Set-point Set-point min (4 mA) |
| | | CA2 | Offset shifting Set-point Set-point max (20 mA) |
| Prb | | Pb1 | Inlet water temperature (°C). |
| | | Pb5 | Outlet water temperature (°C). |
| | | Pb6 | Transducer pressure (bar). |
| | | Pb7 | Phase tension L1 (V). |
| | | Pb8 | Phase tension L2 (V). |
| | | Pb9 | Phase tension L3 (V). |
| CC | | CC1 | n: Pressure transducer not enabled. |
| | | | y: Enabled pressure transducer (default). |
| | | CC2 | P: Condensation control enabled (fan proportional) (default). |
| | | | 0: Condensation control not enabled. |
| AFP | | AF1 | Enablement of ***AdaptiveFunction Plus*** in Winter mode (Precision or Economy). |
| | | AF2 | Enablement of ***AdaptiveFunction Plus*** in Summer mode (Precision or Economy). |
| | | AF5 | Enablement of ***AdaptiveFunction Plus*** in Radiating Systems mode. |
| PSU | | 0 | Enter password (technical assistance) |

## I.7.1 STATUS SIGNALLING

**Compressor time delay**



During the compressor time delay, the **power supply LED** (red) flashes.

**Remote keyboard (KTR)**



Three horizontal marks appear on the display if the remote keypad is connected to the unit.

**Remote control selector (SCR)**



If the unit is switched off by a remote command, the letters ***Scr*** appear on the display.

**Clock card (KSC)**



If the unit is switched off by a time band setting, the letters ***CLo*** appear on the display.

## I.7.2 ALARM SIGNALS

| | |
|---|---|
| | **IMPORTANT!**<br>**Malfunctions and alarms displayed by the machine should NEVER be ignored. The problem should be checked and resolved as soon as possible. If the alarm re-occurs, call technical assistance.** |

In the presence of an alarm, the alarm code is shown on the display.

In the event of a Manual reset alarm, press the **ALARM** key and check that the unit starts up again correctly.




Once the alarm has been reset, the inlet water temperature re-appears on the display.

**Table of alarms**

| | |
|---|---|
| **A** | Automatic |
| **M** | Manual |
| **A3M** | Automatic 3 times, then manual |

| Alarm | Alarm description | Reset |
|---|---|---|
| A02 | Antifreeze lockout alarm | **M** |
| A05 | Differential pressure switch alarm | **A3M** |
| A10 | Low pressure alarm | **A3M** |
| A12 | High pressure Alarm | **M** |
| A20 | Fan thermal alarm | **M** |
| A21 | Pump alarm | **M** |
| A30 | ST1 probe malfunction alarm | **A** |
| A34 | ST2 probe malfunction alarm | **A** |
| A35 | Faulty pressure transducer alarm | **A** |
| A40 | Pump maintenance signal | **A** |
| A41 | Compressor maintenance signal | **A** |
| A55 | Clock card alarm | **A** |
| A56 | Phase sequence alarm | **M** |
| A57 | Min/max voltage alarm | **A** |

## I.8 DESCRIPTION OF CONTROL FOR ASDP1 MODELS

The controls consist of the main switch, the automatic switches and the user interface panel located on the appliance.

### I.8.1 MAIN SWITCH

Manually controlled type «b» mains power supply disconnecting switch (ref. EN 60204-1 § 5.3.2).

### I.8.2 AUTOMATIC SWITCHES

- **Automatic switch for compressor protection**

This switch allows the supply or isolation of the compressor's main power circuit.

- **Automatic switch for pump protection**

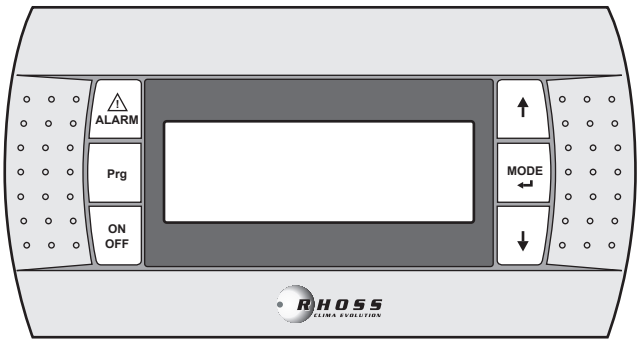
The switch makes it possible to supply and cut off power from the pumps.

- **Automatic switch for fan protection**

The switch makes it possible to supply and cut off power from the fans.

### I.8.3 ON BOARD CONTROL PANEL

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:**
used to confirm the choices.




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



## I.9 INSTRUCTIONS FOR USE

By means of the switches and the keypad the user may carry out the following operations:

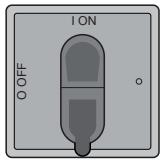
- power the unit;
- start-up;
- change/select the operating mode;
- adjust summer Set-point;
- view alarms via the display;
- stop the unit;
- disconnect the unit from the mains power supply.



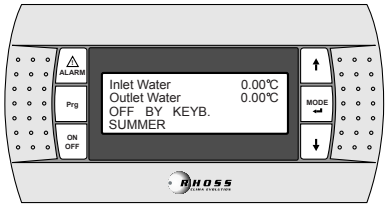
**IMPORTANT!**
**Any other operation must be carried out by qualified personnel authorised by *RHOSS* S.p.A.**

### I.9.1 UNIT POWER SUPPLY

In order to power the unit, turn the mains switch in a clockwise direction after having armed the automatic switch that protects the compressor, the pumps and the fans.



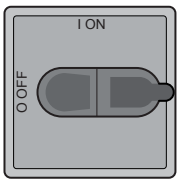

Switch on the control panel and the main screen will appear.

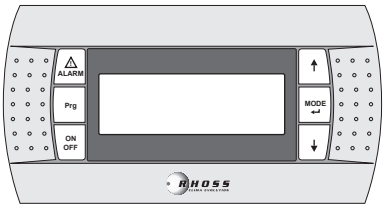



Press the **DOWN** key to display the unit status.

### I.9.2 ISOLATION FROM THE ELECTRICITY NETWORK

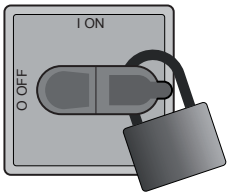
In order to electrically isolate the unit, turn the mains switch in an anticlockwise direction.




The control panel switches off.

The mains switch can be locked in order to prevent anyone accidentally powering the unit.

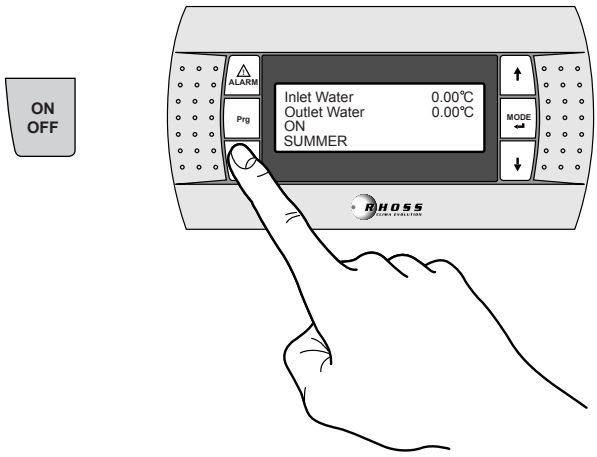





**IMPORTANT!**
**If the mains switch is opened, it cuts off the electricity supply to the storage tank plate exchanger heater, the storage tank antifreeze heater and the compressor crankcase heater. The switch should only be disconnected for cleaning, maintenance or repair of the machine.**

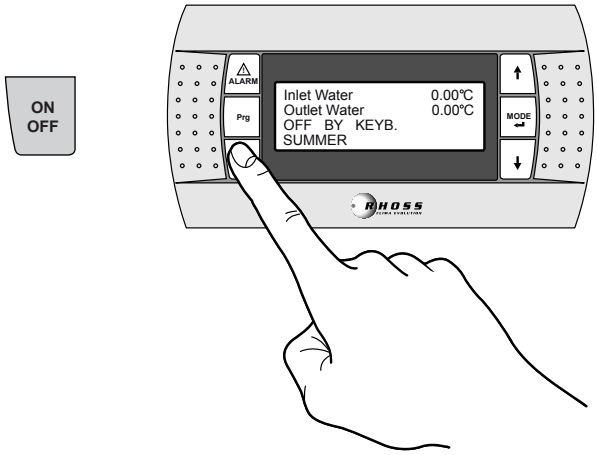
### I.9.3 START-UP

Hold the **ON/OFF** key down for 2 seconds in order to switch the unit on. The message **ON** will appear on the third line of the display.




### I.9.4 SHUTDOWN

Hold the **ON/OFF** key down for 2 seconds in order to switch the unit off. The message **OFF BY KEYB** will appear on the third line of the display.




#### I.9.4.1 Keypad-modifiable variables

The keypad-modifiable variables are as follows:

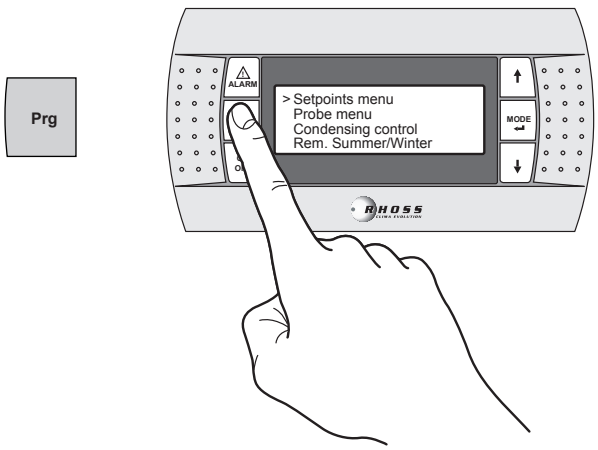
| Function | Regulation | Default value |
|---|---|---|
| Cooling set point * | 4 ÷ 18°C | 10°C |
| Password | Technical Assistance | |

***** Precision mode

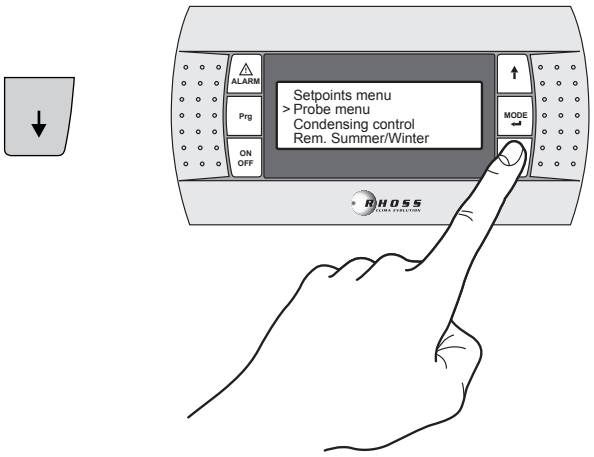
### I.9.5 MENU NAVIGATION

To access the available menus, press the **Prg** key for 3 seconds. With the **UP** and **DOWN** keys it is possible to scroll through the following menus.

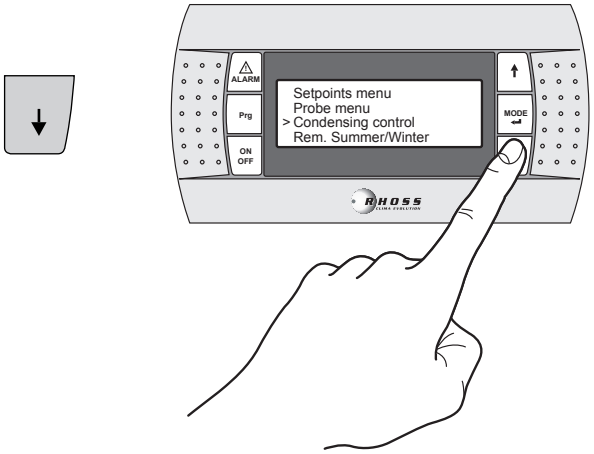
**Set-Point Menu**



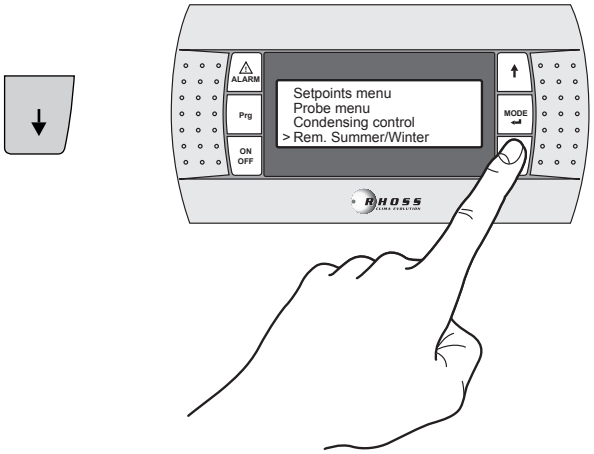

**Probe Menu**



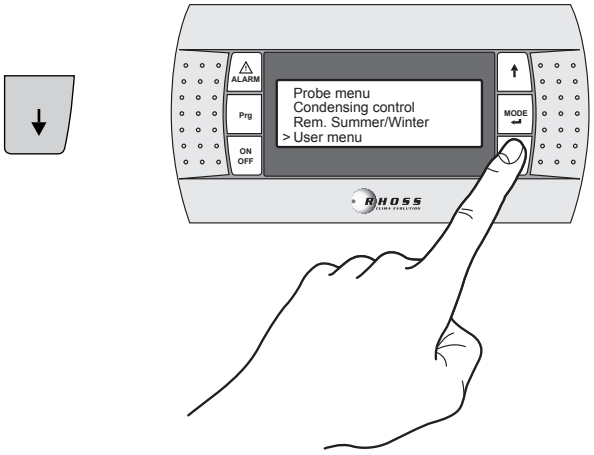

**Condensing Control Menu**



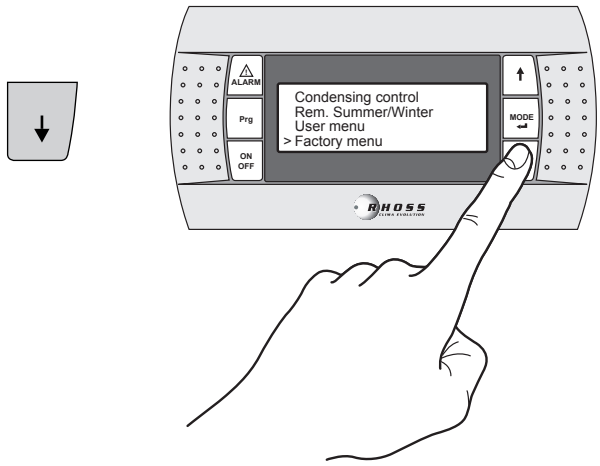

**Summer/Winter Remote Menu (not used)**



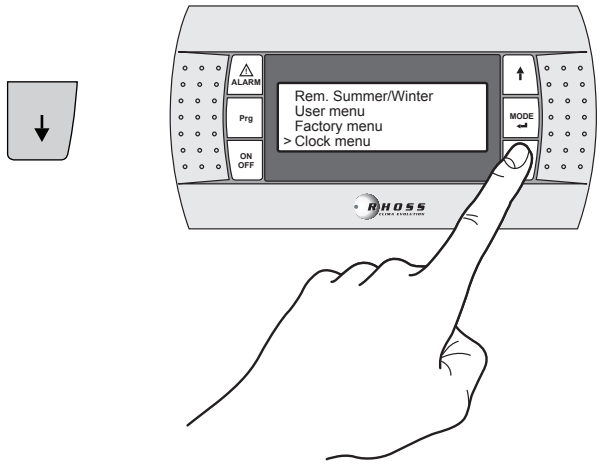

**User Menu (password protected)**



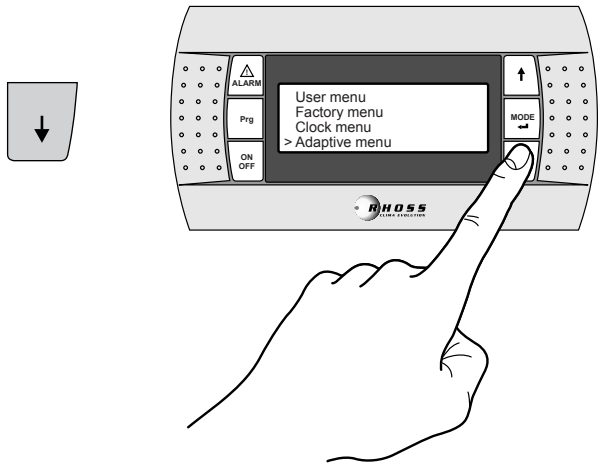
**Factory Menu (password protected)**




**Clock Menu**




**Adaptive Menu**




### I.9.5.1 Set-Point Menu

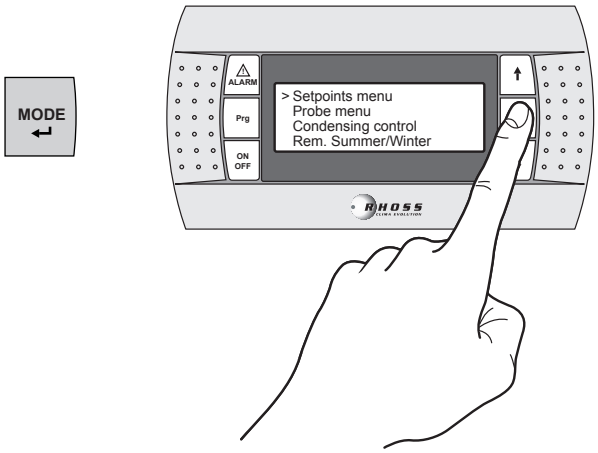
The **Set-points menu** makes it possible to set the water temperature in **Summer**.

| | |
|---|---|
| | **IMPORTANT!**<br>**When modifying or varying the machine's operating parameters, make sure that you do not create situations that conflict with the other set parameters.** |

The unit cannot operate with Set-points outside the adjustment limits.

To enter the desired menu:

- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.




Use the **UP/DOWN** keys to scroll through the following screens:

| | | |
|---|---|---|
| **Actual setp.:** | **7.0°C** | Active set-point |
| **Summer setp.:** | **7.0°C** | Summer set-point |

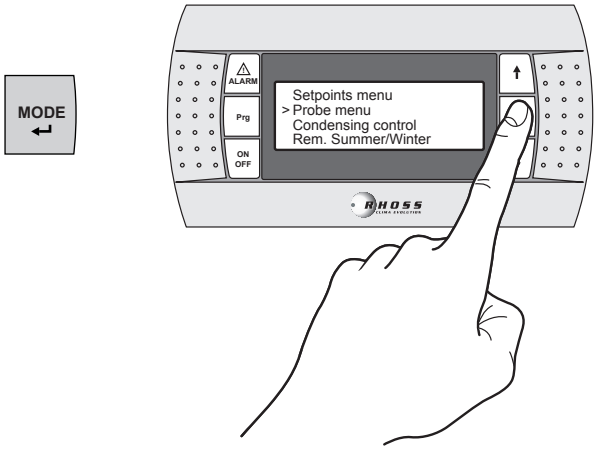
| | |
|---|---|
| MODE | Press the **Mode** key to position the cursor on the value to be modified. |
| ↑ | Press the **UP** or **DOWN** key to modify it. |
| ↓ | |
| MODE | Press the **MODE** key to confirm. |
| Prg | Press the **Prg** key for 2 seconds to exit. |

### I.9.5.2 Probe menu

The **Probe menu** makes it possible to check the status of the inputs and outputs.

To enter the desired menu:

- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.

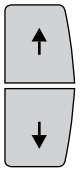


Use the **UP/DOWN** keys to scroll through the following screens:

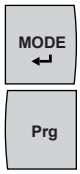
| | |
|---|---|
| **Analog inputs:**<br><br>**B1: 12.5°C**<br>**B2: – – – –°C** | Analogue inputs<br><br>IN main exchanger ST1 |
| **Analog inputs:**<br><br>**B3: – – – –°C**<br>**B4: – – – –°C** | Analogue inputs |
| **Analog inputs:**<br><br>**B5: 7.5°C**<br>**B6: 28.3 bar** | Analogue inputs<br><br>OUT main exchanger ST2<br>Condensation pressure |
| **Analog inputs:**<br>**B7: – – – –°C**<br>**B8: – – – –°C**<br>**B9: – – – –°bar** | Analogue inputs |
| **Digital inputs**<br>**1:COOC 5:CCOO 9: – – – –**<br>**Digital outputs**<br>**1:COCC 5:OOCO 9: – – – –** | Digital inputs<br><br>Digital outputs |
| **Analog outputs**<br><br>**Y1: 100 %**<br>**Y2: – – –%** | Analogue outputs<br><br>Fan speed regulation signal |
| **Supply**<br>**Voltage L1 400V**<br>**Voltage L2 400V**<br>**Voltage L3 400V** | Power supply voltage |
| **RHOSS S.p.A.**<br>**Code: FLRHSMCH2O_AI**<br>**Ver.: 1.0 22/10/07**<br>**ENGLISH** | |
| **Bios: 3.92 11/04/06**<br>**Boot: 4.03 03/07/06** | Bios version<br>Boot version |




Press the **Mode** key to position the cursor on the value to be modified.



Press the **UP** or **DOWN** key to modify it.

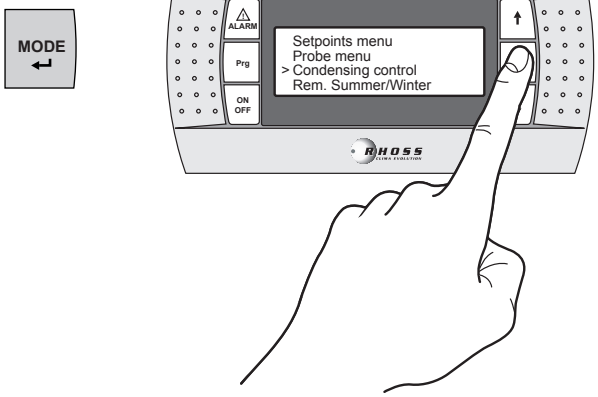



Press the **MODE** key to confirm.




Press the **Prg** key for 2 seconds to exit.

### I.9.5.3 Condensing menu control

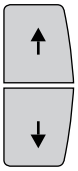



Use the **UP/DOWN** keys to scroll through the following screens:

| | |
|---|---|
| **Enable press. probe**<br>**Circuit 1 Y**<br>**Circuit 1 –**<br>**Fan type Propor.** | Enable Condensation Control (default)<br><br>Fan control type (default) |




Press the **Mode** key to position the cursor on the value to be modified.



Press the **UP** or **DOWN** key to modify it.

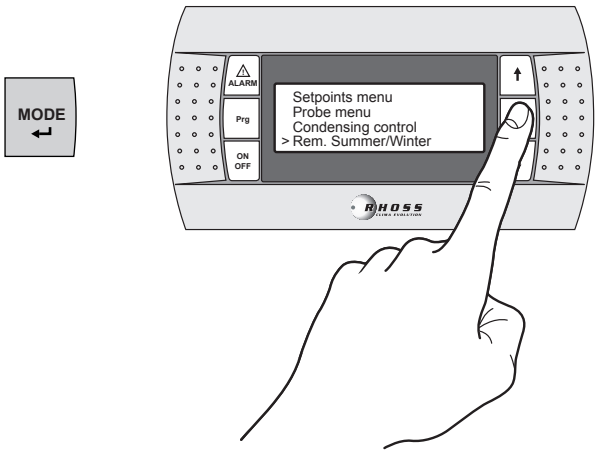



Press the **MODE** key to confirm.




Press the **Prg** key for 2 seconds to exit.

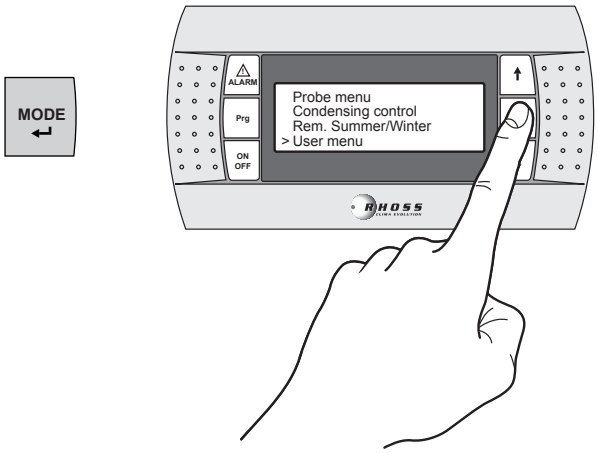
### I.9.5.4 Remote Summer/Winter Menu (not used)



### I.9.5.5 User Menu

**IMPORTANT!**
**Access to this menu is password-protected.**

To enter the desired menu:
- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.



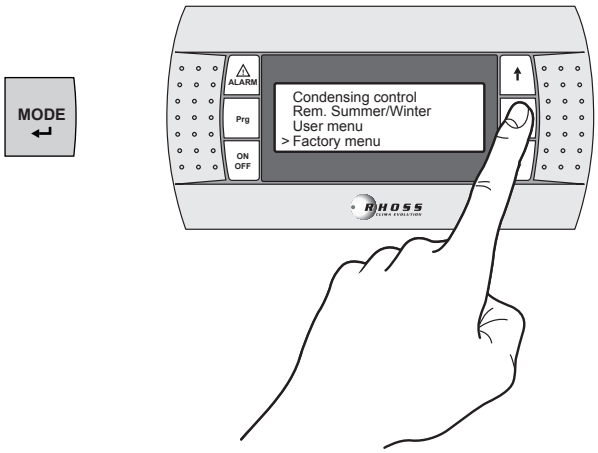

Use the **UP/DOWN** keys to scroll through the following screens:

| | |
|---|---|
| **Insert Maintenance Password** **0000** | Enter password |
| | Press the **UP** or **DOWN** key to modify it. |
| MODE | Press the **Prg** key to confirm. |

### I.9.5.6 Factory menu

**IMPORTANT!**
**Access to this menu is password-protected.**

To enter the desired menu:
- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.



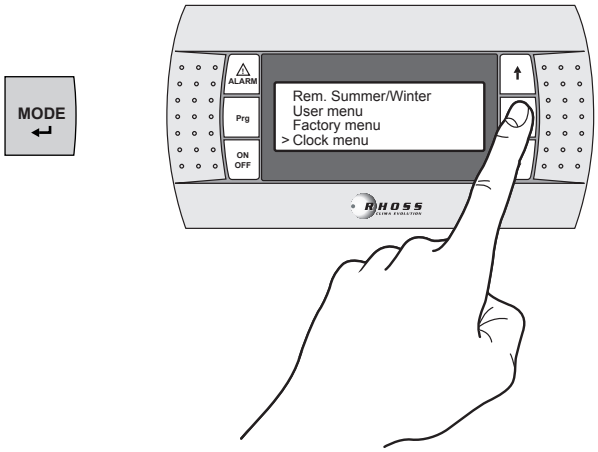

Use the **UP/DOWN** keys to scroll through the following screens:

| | |
|---|---|
| **Insert manufacturer password** **0000** | Enter password |
| | Press the **UP** or **DOWN** key to modify it. |
| MODE | Press the **Prg** key to confirm. |

### I.9.5.7 Clock menu

The **Clock menu** makes it possible to enable Clock Card operation (KSC accessory), to set the date and time and to set the operating time bands.

To enter the desired menu:
- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.




Use the **UP/DOWN** keys to scroll through the following screens:

| | |
|---|---|
| **Enable 32K clock Board N** | Enable clock card operation |
| **Clock config.**<br>**Time 16:59**<br>**Date Thu – 01/01/04** | Clock card setting<br>Time<br>Date |
| **Setpoint time zone 1**<br>**Enable: N Start - - : - -**<br>**Summer set: – – – –°C**<br>**Winter set: – – – –°C** | Time band 1 set-point<br>Enablement<br>Summer set-point<br>Winter set-point (Not used) |
| **Setpoint time zone 2**<br>**Enable: N Start - - : - -**<br>**Summer set: – – – –°C**<br>**Winter set: – – – –°C** | Time band 2 set-point<br>Enablement<br>Summer set-point<br>Winter set-point (Not used) |
| **Setpoint time zone 3**<br>**Enable: N Start - - : - -**<br>**Summer set: – – – –°C**<br>**Winter set: – – – –°C** | Time band 3 set-point<br>Enablement<br>Summer set-point<br>Winter set-point (Not used) |

| | |
|---|---|
| **Set-point time zone 4** | Time band 4 set-point |
| **Enable: N  Start --:--** | Enablement |
| **Summer set: ----°C** | Summer set-point |
| **Winter set: ----°C** | Winter set-point (Not used) |

| | |
|---|---|
| **ON/OFF time zone:** | Band on/off. |
| **Switch ON --:--** | Start-up |
| **Switch OFF --:--** | Switch off |
| **From --- to ---** | From to |

MODE — Press the **Mode** key to position the cursor on the value to be modified.

↑ ↓ — Press the **UP** or **DOWN** key to modify it.

MODE — Press the **MODE** key to confirm.

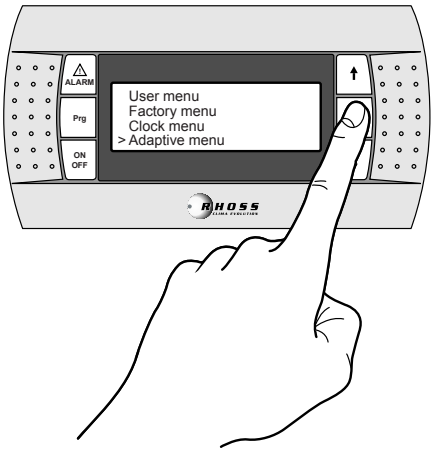
Prg — Press the **Prg** key for 2 seconds to exit.

### I.9.5.8 Adaptive Menu

The **Adaptive menu** makes it possible to enable **Adaptivefunction Plus** and to modify its operating mode.

To enter the desired menu:
- select the menu using the **UP**-**DOWN** keys;
- Press the **Mode** key to access it.

MODE




It is possible to choose between 2 operating modes of **AdaptiveFunction Plus** (see *Par. I.2*):

- **Precision (default)**
- **Economy**

By selecting the **Economy** mode the summer Set-point can be defined by choosing a min and max value.

| | |
|---|---|
| **Summer temperature Setpoint economy** | Summer set-point in economy mode |
| **MIN 07.0 °C** | Minimum |
| **MAX 10.0 °C** | Maximum |

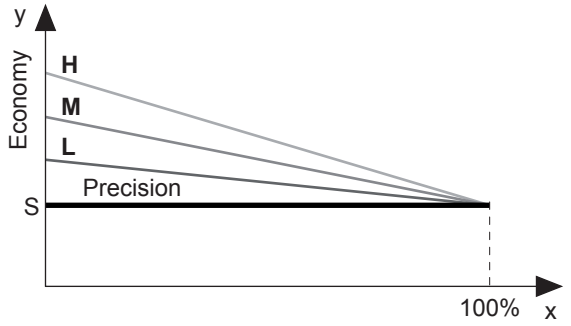
With the **Economy** function it is possible to select one of the three adjustment curves for AdaptiveFunction Plus in **Summer** mode. The three adjustment curves correspond to three different laws of variation of the Set-point based on the load, in order to modify the degree of comfort which can be attained in the room and the efficiency of the machine.

| | |
|---|---|
| **Select efficiency Winter: HIGH** | Efficiency in winter mode (not used) |
| **Select efficiency Summer: HIGH** | Efficiency in summer mode (default) |

It is possible to choose one of these three adjustment curves:

| Label | Characteristics of the adjustment curve |
|---|---|
| **LOW** | Use in buildings with very unbalanced loads. Efficiency higher than the standard. |
| **MED** | Intermediate comfort and efficiency. |
| **HIGH** | Use in buildings with very similar loads. High efficiency (default). |

***AdaptiveFunction Plus* in Summer mode**




**x** Percentage of load (%)
**y** Set-point (°C)
**S** Value of Set-point set by user
**L** Use in buildings with very unbalanced loads. Efficiency higher than the standard.
**M** Intermediate comfort and efficiency.
**H** Use in buildings with very similar loads. High efficiency (default).

MODE — Press the **Mode** key to position the cursor on the value to be modified.

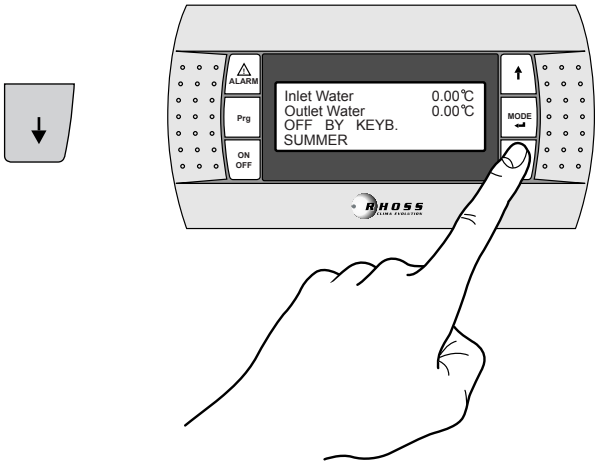
↑ ↓ — Press the **UP** or **DOWN** key to modify it.

MODE — Press the **MODE** key to confirm.

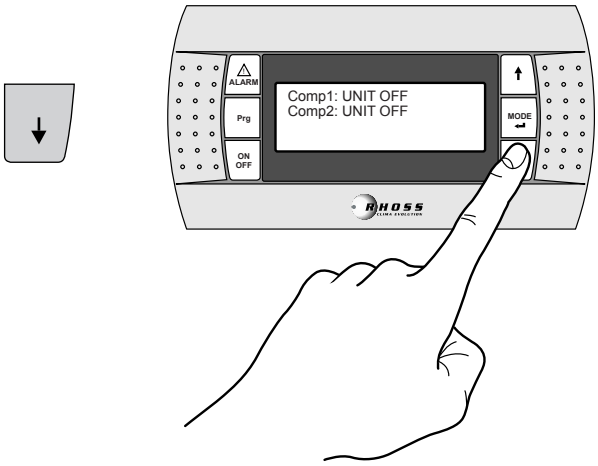
Prg — Press the **Prg** key for 2 seconds to exit.

## I.9.6 UNIT STATUS

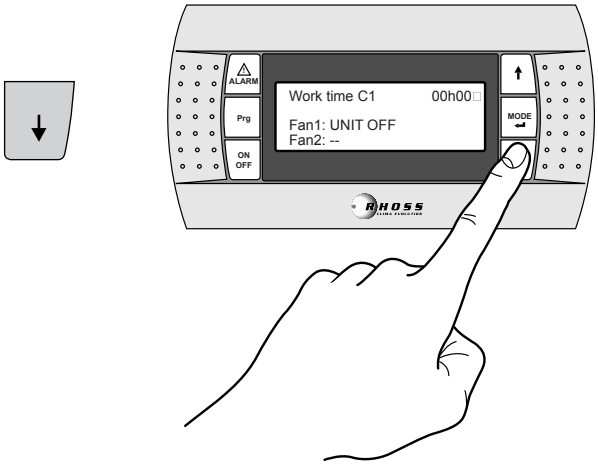
Press the **DOWN** key on the main screen to view the unit status.



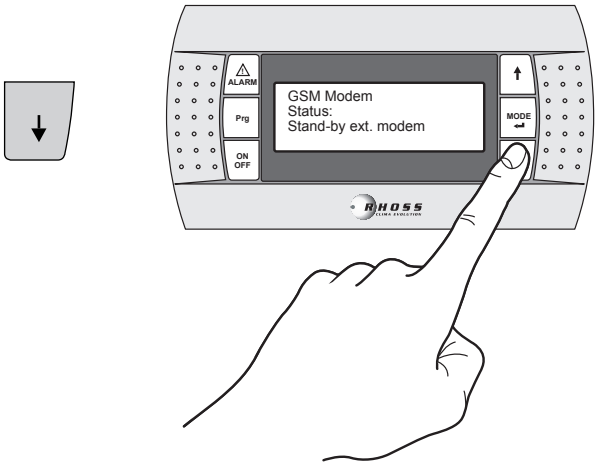

| Water temperature | |
|---|---|
| **Inlet Water** | Inlet water temperature |
| **Outlet Water** | Outlet water temperature |
| **Unit status** | |
| **ON** | Unit on |
| **OFF BY THE KEYB** | Unit switched off by keyboard |
| **Operating mode** | |
| **SUMMER** | Summer operation |



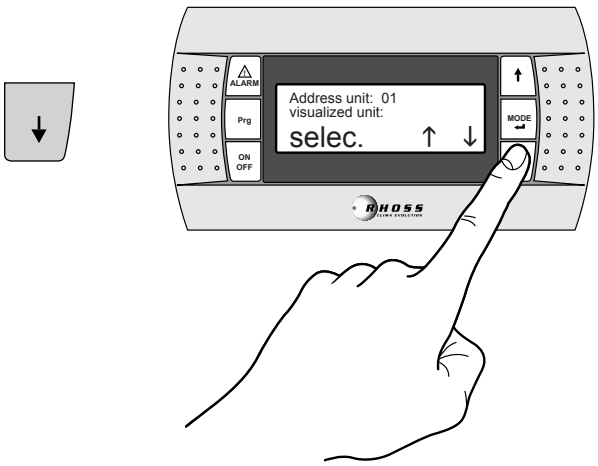

| Compressor status | |
|---|---|
| **UNIT OFF** | Compressor off/unit off |
| **OFF BY TIMING** | Compressor time delay |
| **TIME FROM PUMP** | Pump pre-circulation time delay |
| **ON** | Compressor on |




| Compressor operating time | |
|---|---|
| **Work time C1** | Operating time circuit 1 |
| **Fan operating time** | |
| **Fan 1** | Fan operating status |
| **Fan 2** | Unused |




| GSM modem status | |
|---|---|
| **Stand-by ext. modem** | |
| **Start Initialization** | Modem initialisation |
| **Search net GSM** | Search net |
| **Stand-by Modem** | Modem in stand-by |
| **Alarm modem** | Modem alarm |
| **Mistake Initializ.** | Initialisation interrupted |
| **Enable PIN** | |
| **Not find net. GSM** | No network |
| **OverFlow sms** | |
| **Send sms...** | Send message |
| **Connection...** | Connection |
| **Calling...** | Call |

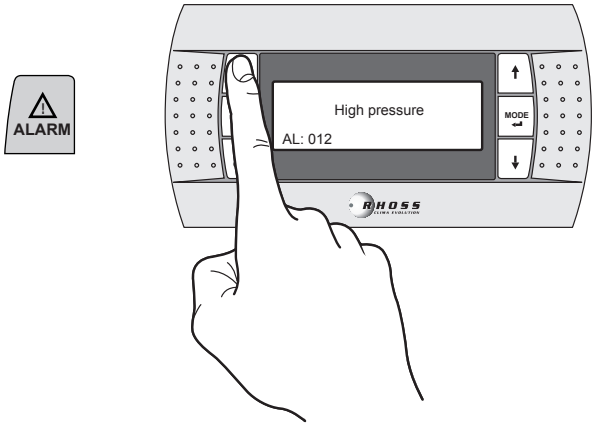



This screen is dedicated to the system **IDRHOSS**.

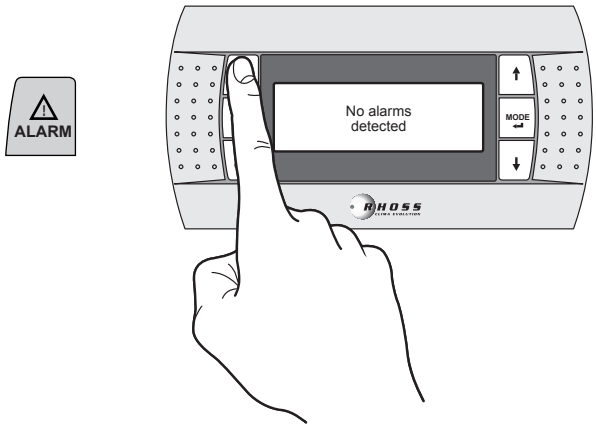
## I.9.7 ALARM SIGNALS

**IMPORTANT!**
**Malfunctions and alarms displayed by the machine should NEVER be ignored. The problem should be checked and resolved as soon as possible. If the alarm re-occurs, call technical assistance.**

If the unit's electronic board detects any malfunctions, the **ALARM** key will light up on the control panel and the alarm code in question will appear on the display, with reference to the following table.




If the alarm is a type **A** alarm, it will be automatically reset. If the alarm is a type **M** alarm, you will need to press the **ALARM** key for 3 seconds to reset it. If the alarm is a type **A3M** alarm, it will be automatically reset 3 times and will then need to be manually reset.




| Alarm | Alarm description | | Reset |
|---|---|---|---|
| **AL: 002** | Antifreeze lockout alarm | Indicates that probe ST2 has detected a lower temperature than the set antifreeze Set-point. | **M** |
| **AL: 005** | Differential pressure switch alarm | Indicates that the differential pressure switch between the system input and output water has been activated. | **A3M** |
| **AL: 010** | Low pressure alarm | Indicates that the low pressure switch has been activated. | **A3M** |
| **AL: 012** | High pressure Alarm | Indicates that the high pressure switch has been activated. | **M** |
| **AL: 020** | Fan thermal alarm | Indicates that the thermal protection inside the fan's electric motor has been activated. | **M** |
| **AL: 021** | Alarm pump 1 | Indicates that following the AL: 005 alarm the pump may be faulty. | **A3M** |
| **AL:022** | Alarm pump 2 | Indicates that following the AL: 005 alarm the pump may be faulty. | **A3M** |
| **AL: 030** | ST1 probe malfunction alarm (B1) | Indicates that either the probe is faulty or has detached from connector B1. Check whether it's working and replace if necessary. | **A** |
| **AL:034** | ST2 probe malfunction alarm (B5) | Indicates that either the probe is faulty or has detached from connector B5. Check whether it's working and replace if necessary. | **A** |
| **AL:035** | Faulty pressure transducer alarm | Indicates that either the pressure transducer is faulty or has detached from connector B6. Check whether it's working and replace if necessary. | **A** |
| **AL: 040** | Maintenance pump 1 | This alarm does not indicate a malfunction but only signals that the number of working hours of the pump has exceeded the set value. The unit continues to operate as normal. | **A** |
| **AL: 041** | Maintenance compressor 1 | This alarm does not indicate a malfunction but only signals that the number of working hours of the compressor has exceeded the set value. The unit continues to operate as normal. | **A** |
| **AL: 042** | Maintenance compressor 2 | This alarm does not indicate a malfunction but only signals that the number of working hours of the compressor has exceeded the set value. The unit continues to operate as normal. | **A** |
| **AL:046** | Maintenance pump 2 | This alarm does not indicate a malfunction but only signals that the number of working hours of the pump has exceeded the set value. The unit continues to operate as normal. | **A** |
| **AL: 055** | Clock card alarm | Indicates that the clock card (accessory) is faulty: cut off and resume the unit's power. If the alarm persists, contact an authorised service centre and the clock card will be replaced. | **A** |
| **AL: 056** | Phase sequence alarm | Indicates that the L1-L2-L3 phase sequence to the mains switch is incorrect. Cut the unit off, adjust the sequence and resume power. | **M** |
| **AL: 057** | Min/max voltage alarm | | **A** |

**A** Automatic reset
**M** Manual reset
**A3M** Automatic 3 times, then manual

# II SECTION II: INSTALLATION AND MAINTENANCE

## II.1 UNIT DESCRIPTION

### II.1.1 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 (on models 135-270) activated automatically when the unit stops (as long as the power supply to the unit is preserved).

| Model | Compressor/Steps | Circuits |
|---|---|---|
| **118** | 1/1 | 1 |
| **121** | 1/1 | 1 |
| **128** | 1/1 | 1 |
| **131** | 1/1 | 1 |
| **135** | 1/1 | 1 |
| **140** | 1/1 | 1 |
| **253** | 2/3 | 1 |
| **261** | 2/3 | 1 |
| **270** | 2/3 | 1 |

○ Water side brazed 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 complete with mesh filters.
○ Double motor-driven (only one for model 140), 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.
○ Refrigerant circuit in annealed copper pipe (EN 12735-1-2) complete with: drier filter, charge connections, liquid moisture sight glass, manual reset safety pressure switch on the high pressure side, automatic pressure switch on the low pressure side, high-pressure ductable safety valve (on models 135-270), thermostatic expansion valve, check valves and gas separator (on models 253-270).
○ Male-threaded hydraulic connections.
○ Differential pressure switch that protects the unit from any interruptions to the water flow.
○ Unit complete with tank, water filling, air vent, level indicator, by-pass valve, pressure gauge, drain valve, manual bleed valves, 300W water buffer tank antifreeze electric heater and pump.
○ Unit with adequate level of protection for external installation.
○ Microprocessor electronic control, with ***AdaptiveFunction Plus*** function.
○ The unit is complete with the R410A refrigerant charge.

### II.1.2 POTENTIAL INSTALLATIONS

**ASDP1** – Installation with double pump, including an automatically activated pump in stand-by and water buffer tank (on models 253-270).

### II.1.3 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 door interlocking isolator;
- automatic compressor and pump protection switches;
- automatic fan protection switch only for the models 140÷270;
- protection fuse for auxiliary circuit;
- compressor and pump power contactors;
- fan power contactor only for the models 140÷270;
- 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 safety timer delays; of the circulating pump; of the compressor and system pump hour-run meter; 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;
- self-diagnosis with continuous monitoring of the functioning of the unit;
- user interface menu;
- automatic pump operating time balance (ASDP1 installations);
- automatic activation of the pump in standby in the event of an alarm (ASDP1 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 varying the 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*** option);
- shifting set-point (***Economy*** option, not usable for process cooling applications).

## II.2 SPARE PARTS AND ACCESSORIES

**IMPORTANT!**
**Only use original spare parts and accessories. *RHOSS* S.p.A. shall not be held liable for damage caused by tampering or work carried out by unauthorised personnel or malfunctions caused by the use of non-original spare parts or accessories.**

### II.2.1 FACTORY FITTED ACCESSORIES

**ASDP1** – Installation with double pump, including an automatically activated pump in stand-by and water buffer tank (only for 253-270 models).

### II.2.2 ACCESSORIES SUPPLIED LOOSE

**KSA** – Anti-vibration supports.
**KRCC**– Compressor crankcase heater for models 118-131.
**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 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).
**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.

## II.3 TRANSPORT - HANDLING - STORAGE

**DANGER!**
**The unit must be transported and handled by skilled personnel trained to carry out this type of work.**

**IMPORTANT!**
**Be careful to avoid damage by accidental collision.**

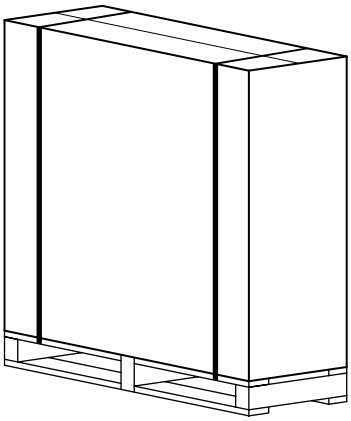
○ Movement of the unit should be performed with care, in order to avoid damage to the external structure and to the internal mechanical and electrical components.
○ For proper movement refer to the instructions in the use and maintenance manual.
○ The unit may only be handled and/or lifted using the attachments provided on the base.
○ Move the unit with the packaging intact to the installation position using a fork-lift truck or pallet-truck.
○ Bearing in mind that the centre of gravity is off-centre could give rise to sudden and dangerous movements.

### II.3.1 PACKAGING, COMPONENTS

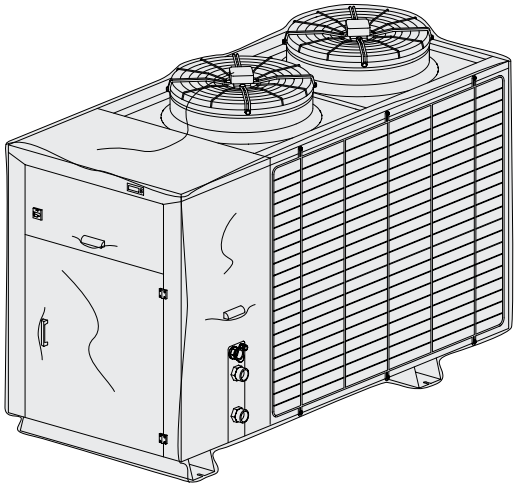
**DANGER!**
**Do not open or tamper with the packaging before installation. Do not leave the packaging within reach of children.**

**ENVIRONMENTAL PROTECTION**
**Dispose of the packaging materials in compliance with the national or local legislation in force in your country.**

**The TCAEY 118÷135 models are supplied:**
- in cardboard packaging.
- protected above by a polystyrene;
- fixed to a pallet by 4 screws;
- tied down by two straps;



**The TCAEY-THAEY 140÷270 models are supplied:**
- covered with nylon shrink-wrap.



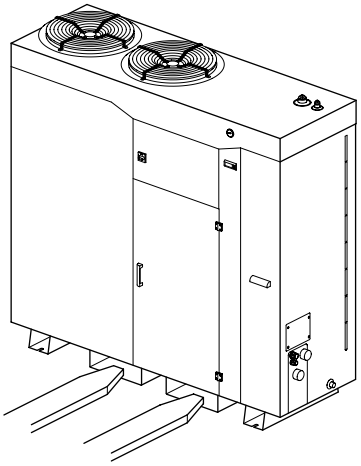
**Each unit is supplied complete with:**
- Instructions for use;
- Wiring diagram;
- List of authorised service centres;
- Warranty document;
- Use and maintenance manual for the pumps, fans and safety valves.

## II.3.2 LIFTING AND HANDLING

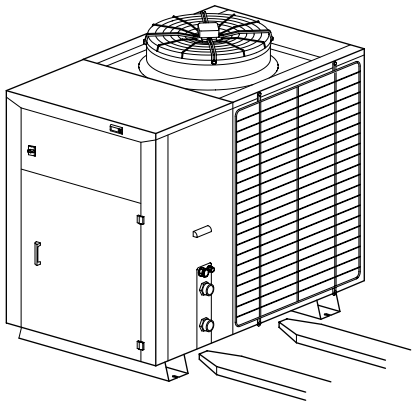
**DANGER!**
**Movement of the unit should be performed with care, in order to avoid damage to the external structure and to the internal mechanical and electrical components.**
**Also make sure that there are no obstacles or people blocking the route, to avoid the danger of collision or crushing. Make sure that there is no possibility of the lifting-gear overturning.**

Use a fork-lift or pallet truck to move the machine with its packaging intact to the final installation position.
Pass the straps through the slots on the base of the unit, having first checked their suitability (their strength and the state of wear and tear). Take the strain on the slings, checking that they remain properly attached to the lifting-hook; lift the unit a few centimetres, then, only after checking the stability of the load, carefully carry the unit to the installation site. Lower the unit carefully and fix it into place. During handling be careful not to trap any parts of the body, in order to eliminate any possible risk of crushing or any other injury if the load drops or shifts suddenly.

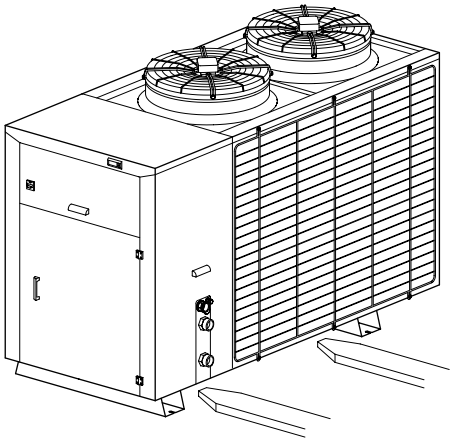
**Models 118÷135**



**Model 140**



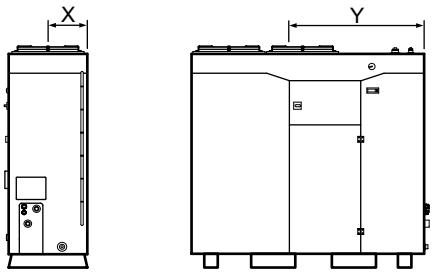
**Models 253÷270**



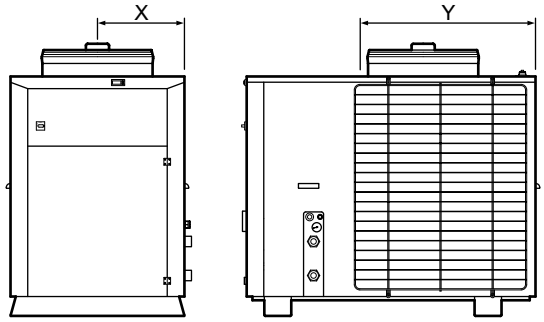
### II.3.2.1 Handling instructions

**DANGER!**
**The centre of gravity is off-centre and could cause sudden and hazardous movements. The centre of gravity indicated in the table and highlighted on the unit by the appropriate symbol is approximate. Therefore the unit must be handled carefully so as to avoid damage to the external structure and to the internal mechanical and electrical components.**

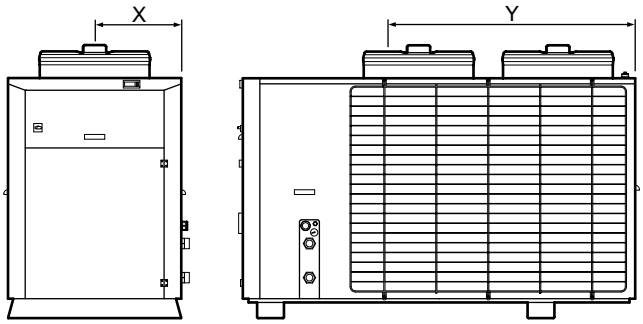
**Models 118÷135**




**Model 140**




**Models 253÷270**




| Model | | X | Y |
|---|---|---|---|
| **TCAEY 118** | mm | 250 | 600 |
| **TCAEY 121** | mm | 250 | 600 |
| **TCAEY 128** | mm | 250 | 650 |
| **TCAEY 131** | mm | 250 | 650 |
| **TCAEY 135** | mm | 300 | 800 |
| **TCAEY 140** | mm | 500 | 900 |
| **TCAEY 253** | mm | 500 | 1400 |
| **TCAEY 261** | mm | 500 | 1400 |
| **TCAEY 270** | mm | 500 | 1400 |

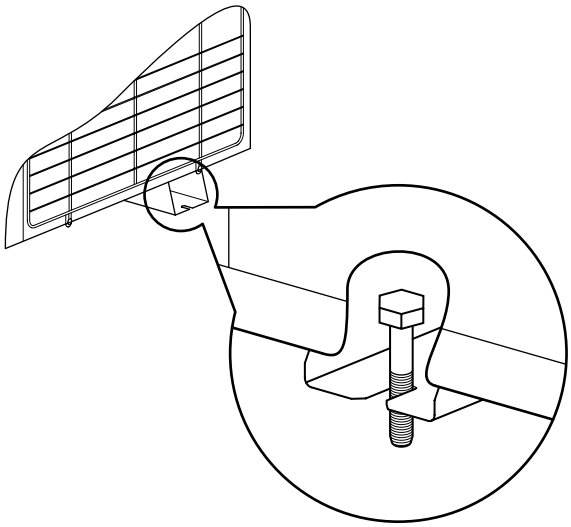
## II.3.3 STORAGE CONDITIONS

- The units cannot be stacked.
- The temperature limits for storage are -9°÷45°C.

## II.4 INSTALLATION INSTRUCTIONS

| | |
|---|---|
| | **DANGER!**<br>**Installation must only be carried out by skilled technicians, qualified to work on air conditioning and cooling systems. Incorrect installation could cause the unit to run badly, with a consequent noticeable deterioration in performance.** |
| | **DANGER!**<br>**The unit must be installed according to national or local rules in force at the time of installation.** |
| | **DANGER!**<br>**Segregate the unit if installed in areas accessible to persons under 14 years of age.** |
| | **DANGER!**<br>**Some internal parts of the unit may cause cuts. Use suitable personal protection gear.** |

If the unit is not fixed to anti-vibration supports (KSA), once it has been set on the ground, it must be solidly bolted down to the floor using M12 metric threaded bolts. Slots are provided in the base for this purpose.



### II.4.1 INSTALLATION SITE REQUIREMENTS

The installation site should be chosen in accordance with that set out in the EN 378-1 standard and in keeping with the requirements of the EN 378-3 standard. When selecting the installation site, risks posed by accidental refrigerant leakage from the unit should also be taken into consideration.

#### II.4.1.1 Outdoor installation

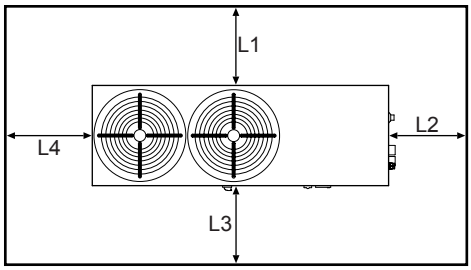
Machines designed for outdoor installation must be positioned so as to avoid any refrigerant gas leakage entering the building and posing a hazard to people's health.
If the unit is installed on terraces or building roofs, adequate safety measures must be taken in order to ensure that any gas leaks cannot enter the building through ventilation systems, doors or similar openings.
In the event that the unit is installed inside a walled-in structure (usually for aesthetic reasons), these structures must be suitably ventilated in order to prevent the formation of dangerous concentrations of refrigerant gas.

### II.4.2 CLEARANCE SPACES, POSITIONING

| | |
|---|---|
| | **IMPORTANT!**<br>**Before installing the unit, check the noise limits permissible in the place in which it will be used.** |
| | **IMPORTANT!**<br>**The unit should be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.** |

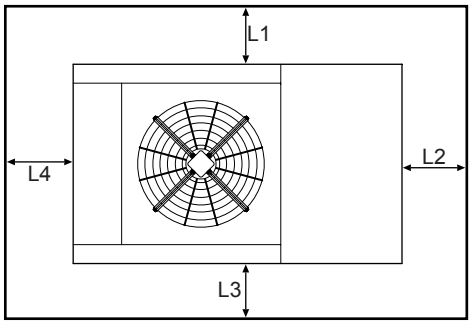
The unit is designed for outdoor installation. The unit should be installed to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections. The unit should be correctly levelled and positioned on a supporting surface capable of sustaining its full weight. It must not be installed on brackets or shelves.

**Models 118÷135**



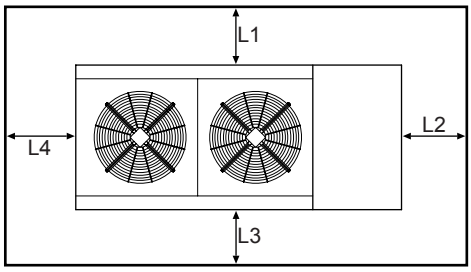

| Model | | 118 | 121 | 128 | 131 | 135 |
|---|---|---|---|---|---|---|
| **L1** | mm | 800 | 800 | 800 | 800 | 800 |
| **L2** | mm | 1000 | 1000 | 1000 | 1000 | 1000 |
| **L3** | mm | 800 | 800 | 800 | 800 | 800 |
| **L4** | mm | 800 | 800 | 800 | 800 | 800 |

**Model 140**




| Model | | 140 |
|---|---|---|
| **L1** | mm | 800 |
| **L2** | mm | 1000 |
| **L3** | mm | 800 |
| **L4** | mm | 800 |

**Models 253÷270**




| Model | | 253 | 261 | 270 |
|---|---|---|---|---|
| **L1** | mm | 800 | 800 | 800 |
| **L2** | mm | 1000 | 1000 | 1000 |
| **L3** | mm | 800 | 800 | 800 |
| **L4** | mm | 800 | 800 | 800 |

| | |
|---|---|
| | **IMPORTANT!**<br>**Incorrect positioning or installation of the unit may amplify noise levels and vibrations generated during operation.** |

The following accessories are available to reduce noise and vibration:
**KSA** - Anti-vibration mountings.
When installing the unit, bear the following in mind:

- non-soundproofed reflecting walls near the unit may increase the total sound pressure level reading near the appliance by as much as 3 dB(A) for every surface;
- install suitable anti-vibration mountings under the unit to avoid transmitting vibrations to the building structure;
- make all water connections using flexible connections. Pipes must be firmly supported by solid structures. If the pipes are routed through walls or panels, insulate with elastic sleeves. If, after installation and start-up of the unit, structural vibrations are observed in the building which provoke such strong resonance that noise is generated in other parts of the building, consult a qualified acoustic technician for a complete analysis of the problem.

## II.5 WATER CONNECTIONS

### II.5.1 CONNECTION TO THE SYSTEM

| | |
|---|---|
| | **IMPORTANT!**<br>**The layout of the water system and connection of the system to the unit must be carried out in conformity with local and national rules in force.** |
| | **IMPORTANT!**<br>**We recommend installing isolating valves that isolate the unit from the rest of the system. Mesh filters with a square section (longest side = 0.8 mm), of a suitable size and pressure drop for the system, must be installed. Clean the filter from time to time.** |

○ 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 flexible connection joints.
○ It is advisable to install regulation valves to outlet connection of the unit.
○ To protect the chiller from debris we recommend the installation of a water filter to the inlet (square mesh filter of no greater than 0,8 mm). Any damage caused by ingress of debris would not be covered under warranty.
○ 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”).
○ Before starting the units, remove air vent plugs and fill with water/glycol using water filling point.
○ High level air vents should be installed in the pipe work and opened when the units is working.

#### II.5.1.1 Tank&Pump installation

○ The units are designed for atmospheric pressure hydraulic circuit.
○ Unit complete with tank, water filling, air vent, level indicator, by-pass valve, pressure gauge, drain valve, manual bleed valves, 300W water buffer tank antifreeze electric heater and pump.

#### II.5.1.2 Water treatment/corrosion Protection

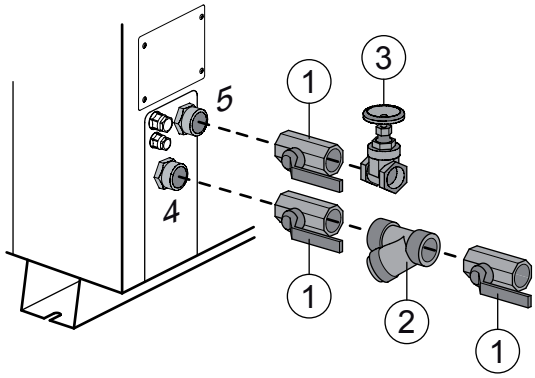
Every chilled water system containing either water or a water/glycol mix must be treated to minimize the harmful effects of corrosion, scale, sludge and microbiological fouling. The chosen process may comprise either pre-treatment or chemical techniques. You must therefore contact a water treatment specialist detailing the system materials employed, system volume and a description of the process to ascertain the optimum requirements. The materials within the chiller unit are:

- Tank- mild steel
- Pump- stainless steel, with washer rubber;
- Plate- Braze exchanger: cooper/stainlees steel;
- Pipework- Copper, Brass, rubber hoses and mild steel fitting;
- Pipework Washer: rubber.

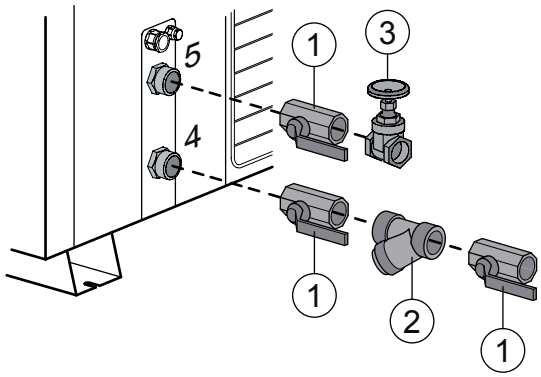
| | |
|---|---|
| | **IMPORTANT!**<br>**Failure to curry out correct water treatment may result in fouling or failure of components or critical areas of the chiller and associated plant. Such failures will not be covered under warranty.** |

### II.5.2 RECOMMENDED INSTALLATION

**Models 118÷135**




**Models 140÷270**

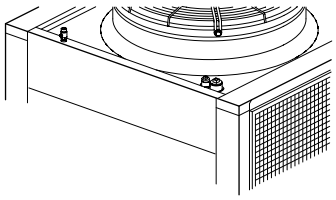



**1** Isolation valve
**2** Water filter
**3** Regulation valve
**4** Water inlet main exchanger
**5** Water outlet main exchanger

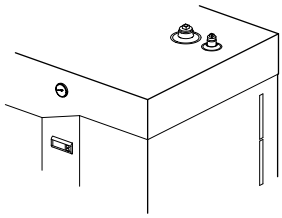
### II.5.3 CHILLER FILLING WITH WATER OR ANTIFREEZE MIXTURE

○ Open air vents within the chiller and the pipe-work system.
○ Open water fill point plug and air vents plug located on the top of the chillers.

**Models 140÷270**



**Models 118÷135**



○ Manually fill the chiller using fill point at the top of the chiller.
○ When water is dispersed through air vents close them.
○ Fill chiller until water level is at top off fill point pipe.
○ Briefly switch on/off and check rotation of pump as indicated by arrow on pump body. If incorrect change the phase of the incoming mains supply as appropriate.
○ When rotation is know to be correct, switch pump back on and fill remainder of pipe-work, maintaining water level within chiller.
○ Close air vents on pipe-work when water is dispersed through them.
○ Check for leak and rectify as necessary.
○ Refill chiller to full and close fill point.

## II.5.4 PROTECTING THE UNIT FROM FROST

**IMPORTANT!**
**If the mains switch is opened, it cuts off the electricity supply to the storage tank plate exchanger heater, the storage tank antifreeze heater and of the pump and the compressor crankcase heater. The switch should only be disconnected for cleaning, maintenance or repair of the machine.**

When the unit is running, the control board protects the water-side heat exchanger from freezing by making the antifreeze alarm cut in, stopping the machine if the temperature of the sensor fitted on the heat exchanger reaches the set point value.

**IMPORTANT!**
**When the unit is out of service, drain all the water contents from the circuit.**

If the draining operation is not feasible, ethylene glycol may be mixed with the water in suitable proportions in order to guarantee protection from freezing.

**IMPORTANT!**
**Mixing the water with glycol modifies the performance of the unit.**

○ 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 "**E**" 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: chilled water outlet temperature 7°C; temperature differential at evaporator 5°C.
- For different operating conditions, the same coefficients can be used as their variations are negligible.

**Table "E"**

| % 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

## II.5.5 MINIMUM CONTENTS OF WATER CIRCUIT

In order to keep the units in good working order, depending on the chosen control, 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.

**The minimum water content in the system is 2 l/kW**

**Example:** TCAEY 135 Qf = 34,7 kW
The minimum system content must be:
Qf (kW) x 2 l/kW = 34,7 l/kW x 2 kW = 69,4 l.

**IMPORTANT!**
**A system volume less than 2 l/kW would result in a larger fluctuation in temperature and can reduce the compressor life.**

## II.5.6 WATER DATA

| Model | | Water content | |
|---|---|---|---|
| | | Exchanger | Tank ASP1 |
| **118** | l | 1,33 | 42 |
| **121** | l | 1,33 | 42 |
| **128** | l | 1,90 | 51 |
| **131** | l | 2,20 | 51 |
| **135** | l | 2,60 | 55 |
| **140** | l | 3,20 | 80 |
| **253** | l | 3,80 | 150 |
| **261** | l | 4,40 | 150 |
| **270** | l | 5,10 | 150 |

## II.6 ELECTRICAL CONNECTIONS

**DANGER!**
**Always install a general automatic switch in a protected area near the appliance with a characteristic delayed curve, sufficient capacity and breaking power. There should be a minimum distance of 3 mm between the contacts.**
**Earth connection is compulsory by law and safeguards the user while the machine is in use.**

**DANGER!**
**Electrical connection of the unit must be carried out by personnel skilled in the matter and in compliance with the regulations in effect in the country where the unit is installed. Non-conforming electrical connection relieves *RHOSS* S.p.a. from all responsibility for damage to persons and property.**
**In making the electrical connections to the board, cables must be routed so that they do not touch the hot parts of the machine (compressor, flow pipe and liquid line). Protect the wires from any foam.**

**IMPORTANT!**
**For electrical connections to the unit and the accessories, follow the wiring diagrams which are supplied with them.**

The safety door interlock automatically prevents electric power being fed to the unit if the cover panel over the electrical panel is opened.

After opening the front panel of the unit, feed the supply cables through the appropriate cable clamps in the external panelling and then through the ducts at the base of the electric board.
The electrical power supplied by the single-phase or three-phase line, must be taken to the main isolator switch.
The supply cable must be of the flexible type, with PVC sheathing of no lighter than H05RN-F: for the section, refer to the table below or the wiring diagram.

| Model | | Line section | PE section | Remote control section |
|---|---|---|---|---|
| **118** | mm² | 4 | 4 | 1,5 |
| **121** | mm² | 4 | 4 | 1,5 |
| **128** | mm² | 6 | 6 | 1,5 |
| **131** | mm² | 6 | 6 | 1,5 |
| **135** | mm² | 10 | 10 | 1,5 |
| **140** | mm² | 10 | 10 | 1,5 |
| **253** | mm² | 10 | 10 | 1,5 |
| **261** | mm² | 16 | 16 | 1,5 |
| **270** | mm² | 16 | 16 | 1,5 |

The earth conductor must be longer than the other conductors in order to ensure that in the event of the cable clamping device becoming slack, it will be the last to come under strain.

### II.6.1.1 Remote management through connection preparation by the installer

The connections between board and switch or remote light must be made with screened cable consisting of 2 twisted 0,5 mm² wires and the screening. The screening must be connected to the earth screw on the panel (on one side only). The maximum permitted distance is 30 m.

**SCR** Remote control selector (control with clean contact);

**LBG** General lockout light (230 Vac);

**LFC1** Compressor operating light 1 (230 Vac);

**LFC2** Compressor operating light 2 (230 Vac);

- **Remote ON/OFF enablement (SCR)**



**IMPORTANT!**
**When the unit is switched OFF by means of the remote control selector, the wording *Scr.* will appear on the on board control panel display.**

Remove the **ID8** terminal bridge on the electronic board and connect the wires coming from the remote control ON/OFF selector (selector to be installed by the installer).

| | | |
|---|---|---|
| **ATTENTION** | Open contact: | the unit is OFF. |
| | Closed contact: | the unit is ON. |

- **LBG – LCF1 – LCF2 remote control**

To remotely control the two signals, connect the two lamps according to the instructions provided in the wiring diagram supplied with the machine.

### II.6.1.2 Remote management using accessories supplied separately

It is possible to remote control the entire machine by linking a second keyboard to the one built into the machine (KTR accessory).
To select the remote control system, consult paragraph *II.2*. The use and installation of the remote control systems are described in the *Instruction Sheets* provided with the same.

## II.7 START-UP INSTRUCTIONS



**IMPORTANT!**
**Machine commissioning or the first start up (where provided for) must be carried out by skilled personnel from workshops authorised by *RHOSS* S.p.A., qualified to work on this type of products.**



**IMPORTANT!**
**The use and maintenance manuals for the pumps, fans and safety valves are enclosed with this manual and should be read throughout.**



**DANGER!**
**Before starting up, make sure that the installation and electrical connections conform with the instructions in the wiring diagram. Also make sure that there are no unauthorised persons in the vicinity of the machine during the above operations.**



**DANGER!**
**The units are equipped with safety valves positioned inside the technical compartment. When they cut in, they cause a loud noise and violent refrigerant and oil leaks. Do not approach the safety valve cut-in pressure.**

### II.7.1 CONFIGURATION

**Safety component calibration settings**

| Pressure switch | Cut-in | Reset |
|---|---|---|
| high pressure | 40,2 bar | 28.1 bar - Manual |
| low pressure | 2 bar | 3.3 bar – Automatic |
| water differential | 80 mbar | 105 mbar - Automatic |
| Safety valve | 41,7 bar | - |



**DANGER!**
**The safety valve is calibrated to 41,7 bar. It could cut in if the calibration valve is reached during the refrigerant charging operations, causing a burst that could cause scalding.**

| Configuration parameters | Standard setting |
|---|---|
| Summer working temperature set point | 10°C |
| Working temperature differential | 2°C |
| Antifreeze temperature set point | 3°C |
| Antifreeze temperature differential | 2°C |
| Water differential pressure switch time upon start-up | 120" |
| Water differential pressure switch exclusion time upon start-up | 15" |
| Circulation pump switch off time delay | 15" |
| Minimum time between two consecutive compressor start-ups | 360" |

The units are tested in the factory, where they are also calibrated and the default parameter settings are put in. These guarantee that the appliances run correctly in rated working conditions. The machine configuration is carried out in the factory and should never be altered.



**IMPORTANT!**
**If a unit is used for the production of chilled water, check the adjustment of the thermostatic valve.**

### II.7.2 UNIT START-UP AND STARTUP AFTER PROLONGED SHUTDOWN



**DANGER!**
**Always use the switch to isolate the unit from the mains before carrying out any maintenance work, even if it is for inspection purposes only. Make sure that no one accidentally supplies power to the machine, lock the mains switch in the OFF position.**

Before starting the unit, perform the following checks:
○ The electricity power supply must comply with the specifications on the data plate and/or the wiring diagram and it must fall within the following limits:
- Variation of the power supply frequency: ±2 Hz.
- variation of the power supply voltage: ±10% of the nominal voltage;
- imbalance between the supply phases: <2%.

○ the electrical power supply system must be able to supply adequate current and be suitably sized to handle the load;
○ open the electric panel and make sure the terminals of the power supply and of the contactors are tight (they may have come loose during transport, which could lead to malfunctions);
Electrical connections must be made in compliance with the local installation standards in force in the place where the unit is installed, and with the instructions in the wiring diagram provided with the unit.

## II.7.3 START-UP PROCEDURE

**IMPORTANT!**
**The unit must be started up for the first time by skilled technicians only, qualified to work on conditioning and refrigerant units.**

Once the unit installation and connection operations have been completed, it can be started up for the first time.
For a correct first start-up of the unit carefully follow the diagrams provided in the following paragraphs.

### II.7.3.1 General unit conditions

**START**

Have the technical clearance distances indicated in the manual been respected? → **NO** → Restore the indicated technical spaces.

↓ **YES**

Are the finned coils free from obstructions? → **NO** → Clean the finned coils.

↓ **YES**

Are the fan grilles free from obstructions? → **NO** → Remove the obstructions.

↓ **YES**

Is the unit damaged due to transport/installation? → **YES** → **Danger!** Do not start the unit! Restore the unit!

↓ **NO**

**The general conditions of the unit are compliant!**

### II.7.3.2 Checking the compressor oil level

**START**

Is the oil level sufficient? → **NO** → Top up as necessary

↓ **YES**

Was pre-heating activated at least 24 hours before start-up? → **NO** → Activate pre-heating and wait 24 hours.

↓ **YES**

**The compressor is ready for startup!**

### II.7.3.3 Checking the water connections

**START**

Have the water connections been made to a professional standard? → **NO** → Bring the connections up to standard.

↓ **YES**

Is the water input/output direction correct? → **NO** → Correct the input/output direction.

↓ **YES**

Are the circuits full of water and have the pipes been bled of any air residue? → **NO** → Fill the circuits and/or bleed the air.

↓ **YES**

Is the air vent open? → **NO** → Open air vent

↓ **YES**

Does the water flow conform to what is stated in the user manual? → **NO** → Correct the water flow.

↓ **YES**

Do the pumps turn in the right direction? → **NO** → Correct the rotation direction.

↓ **YES**

Are the flow meters (if installed) active and correctly connected? → **NO** → Repair or replace the component.

↓ **YES**

Are the water filters placed upstream from the heat exchanger and recovery unit in good working order and correctly installed? → **NO** → Repair or replace the component.

↓ **YES**

**The water connections are compliant!**

### II.7.3.4 Checking the electrical connections

**START**

Does the unit power supply match the values indicated on the plaque? → **NO** → Restore the correct power supply.

**YES**

Is the phase sequence correct? → **NO** → Restore the correct phase sequence.

**YES**

Does the earth conform with current regulations? → **NO** → **Danger!** Restore the earth connection!

YES

Are the power circuit electric conductors of the size indicated in the manual? → **NO** → **Danger!** Replace the wires immediately!

**YES**

Is the circuit breaker positioned upstream from the unit of the right size? → **NO** → **Danger!** Replace the component immediately!

**YES**

**The electric connection is compliant!**

### II.7.3.5 First start-up (Standard Unit)

**START**

Ask all unauthorised personnel to leave the area.

De-activate the magneto-thermal switches on the compressor power supply.

Simulate an empty start in order to ensure that the power contactors have been inserted correctly.

Are the power contactors inserted correctly? → **NO** → Check and replace the component if necessary.

**YES**

Disconnect the power from the auxiliary supply again.

Activate the magneto-thermal switches on the compressor power supply.

Power the auxiliary circuit.

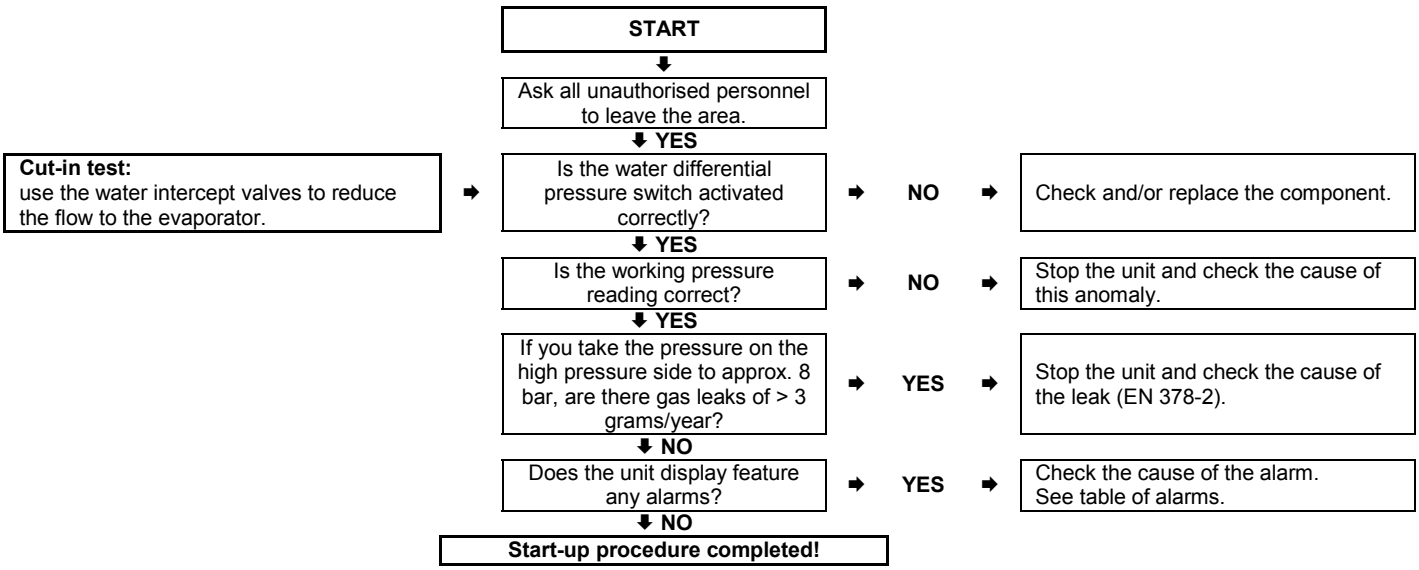
Start up the machine using the control panel (ON/OFF key). → All ON/OFF operations must be carried out **EXCLUSIVELY** using the **ON/OFF** key on the control panel.

Choose the operating modes (MODE key).

Check the correct rotation of the pumps and fans, the flows and the operation of the heat exchangers sensors. → **NO** → Check and replace the component if necessary.

**Start-up procedure completed!**

### II.7.3.6 Checks to be made while the machine is running



## II.7.4 TABLE OF ALARMS

The display on the control panel displays the alarms, with reference to the following table. Alarms are reset by pressing the ALARM key on the control panel once the cause has been identified and eliminated.

| Type of alarm | Possible cause | Cut-in |
|---|---|---|
| **A02 Antifreeze alarm** | Set-point set too low | Check set-point and reset |
| | Insufficient water flow | Check and adjust if necessary |
| **A05 Alarm for water differential pressure switch on condenser/evaporator** | Insufficient water flow | Restore the correct water flow |
| | Presence of air in the water system | Bleed |
| | Isolation valves closed | Open valves |
| | The circulating pump (if present) does not run | See Troubleshooting section |
| | Water circuit filter obstructed | Check and clean if necessary |
| **A10 Low pressure alarm** | | Indicates that the low pressure switch has been activated: the alarm is reset manually from the keyboard.<br>Note: the alarm will be automatically reset 3 times in the region of an hour and will then need to be reset manually. When this alarm is triggered the AL:021 and AL:022 signals are activated simultaneously. If the alarm persists refer to Troubleshooting section. |
| **A12 High pressure switch alarm** | | Indicates that the high pressure switch has been activated: reset the pressure switch manually by firmly pressing the button on the pressure switch itself. Then reset the alarm manually from the keyboard. If the alarm persists refer to Troubleshooting section. |
| **A20 Fan thermal protection activation alarm** | Short-circuited fan | Check and replace the fan if necessary |
| **A21 Alarm pump 1**<br>**A22 Alarm pump 2** | | Indicates that following the AL: 005 alarm the pump may be faulty. The alarm is reset manually from the keyboard.<br>Note: the alarm will be automatically reset 3 times in the region of an hour and will then need to be reset manually. |
| **AL30 Inlet water temperature sensor alarm (ST1)** | Faulty sensor | Replace the sensor |
| | Sensor detached from connector B1 | Insert terminal into connector B1 |
| **AL34 Temperature sensor alarm: evaporator outlet water (ST2)** | Faulty sensor | Replace the sensor |
| | Sensor detached from connector B5 | Insert terminal into connector B5 |
| **A35 Pressure transducer alarm** | Transducer faulty | Replace the transducer |
| | Transducer detached from connector B6 | Insert transducer into connector B6 |
| **A40 Pump 1 maintenance signal** | | This alarm does not indicate a malfunction but only signals that the number of working hours of the pump has exceeded the set value. The unit continues to operate as normal.<br>Contact an authorised service centre for maintenance intervention.<br>Press the ALARM key to deactivate the signal. |
| **A41 Compressor 1 maintenance signal**<br>**A42 Compressor 2 maintenance signal** | | This alarm does not indicate a malfunction but only signals that the number of working hours of the compressor has exceeded the set value. The unit continues to operate as normal.<br>Contact an authorised service centre for maintenance intervention.<br>Press the ALARM key to deactivate the signal. |
| **A55 Clock card alarm** | | Indicates that the clock card (accessory) is faulty: cut off and resume the unit's power. If the alarm persists, contact an authorised service centre and the clock card will be replaced. The alarms are reset automatically. |
| **A56 Phase sequence alarm** | | Indicates that L1-L2-L3 phase sequence all'interruttore generale is incorrect.<br>Cut the unit off, adjust the sequence and resume power. The alarms are reset automatically. |
| **A57 Min/max voltage alarm** | | Indicates that the general power supply voltage (in volt) is outside the set range. Check power line. The alarms are reset automatically. |

### II.7.5 END-OF-DAY AND PROLONGED SHUTDOWN

The unit can be shut down at the end of the day by pressing the ON/OFF key situated on the user interface panel. In this way power is maintained to the compressor crankcase electric heaters and any antifreeze devices.

**IMPORTANT!**
**Failure to use the unit during the winter period may cause the water contained in the system to freeze.**

When the machine is out of use for long periods of time, it is necessary to disconnect it from the mains by opening the mains switch.
All the water contained in the circuit must be drained in good time.
During installation, consider mixing the water in the circuit with the correct proportion of ethylene glycol to guarantee protection against freezing (see *Protecting the unit from frost*).

## II.8 MAINTENANCE INSTRUCTIONS

**DANGER!**
**Maintenance operations, even if for inspection purposes only, must be carried out by skilled technicians, qualified for working on air conditioning and refrigerant products. Use suitable personal protection (gloves, eye protection etc).**

**DANGER!**
**Do not introduce pointed objects through the air inlet or outlet grilles.**

**DANGER!**
**Always use the mains switch to isolate the unit from the mains before carrying out any maintenance work on the unit, even if it is for inspection purposes only. Make sure that no one accidentally supplies power to the machine, lock the mains switch in the OFF position.**

**DANGER!**
**In the case of cooling or fan circuit component breakage or a drop in the refrigerant fluid charge, the upper part of the compressor casing and the discharge line may reach temperatures as high as 180°C for brief periods of time.**

In order to guarantee that the unit runs regularly and efficiently, it is necessary to schedule an overall inspection at regular intervals to prevent malfunctions which could damage the main machine components.

#### II.8.1.1 Ordinary maintenance to be carried out by the system maintenance technician

| Component/part | Frequency of maintenance | Replacement frequency |
|---|---|---|
| Heat exchange coil | Variable depending on where the unit is installed | Non-applicable |
| Whole unit | 6 months | Non-applicable |

#### II.8.1.2 Ordinary maintenance to be performed by qualified personnel

| Component/part | Frequency of maintenance | Replacement frequency |
|---|---|---|
| Electrical system | 6 months | Non-applicable |
| Check earthing connection | 6 months | Non-applicable |
| Check power consumption | 6 months | Non-applicable |
| Check refrigerant fluid charge | 12 months | Non-applicable |
| Check absence of refrigerant leakage | 6 months | Non-applicable |
| Bleed any air from the water system | 6 months | Non-applicable |
| Water system draining | 12 months | Non-applicable |
| Pump | 5000 hours | Non-applicable |
| Compressor | 3000 hours | Non-applicable |

### II.8.2 ORDINARY MAINTENANCE

#### II.8.2.1 Inspection - Cleaning of finned coils

The following operations should be carried out while the unit is switched off and taking care not to damage the fins during cleaning:

- remove any foreign bodies from the condensing coils which may block the passage of air, such as: leaves, paper, debris, and so on;
- clean off the dust with a jet of compressed air;
- wash and brush, gently, with water and gentle brushing;
- dry with a jet of compressed air.

#### II.8.2.2 Inspection of the whole unit

Clean the unit thoroughly and check the status of the machine. Any points where corrosion is starting need to be touched up with protective paint.

#### II.8.2.3 Inspection of the electric circuit

- **Check earthing system**: with the unit switched off and disconnected from the power supply check the status of the earthing system.
- **Check and inspect electrical connections**: with the unit switched off and disconnected from the power supply check the status and seal of the wiring to the terminals.
- **Check power consumption**: using a clip-on meter assess the power consumption value and compare the reading with the values shown in the table on Technical data.

#### II.8.2.4 Inspection of the refrigerant circuit

- **Check refrigerant charge**: With the unit switched off, fit one pressure gauge on the pressure connection on the outlet side and another one on the pressure connection on the inlet side. Start up the unit and check both pressure readings once they have stabilised.
- **Check there are no refrigerant leaks**: With the unit switched off, check the refrigerant circuit using a suitable leak detector taking extra care in the connection points and close to the charge connections.
- **Compressor inspection:** every 3000 working hours of the compressor, the electronic board shows an alarm while the unit continues to operate. This is a warning that the compressor requires inspection. With the unit switched off check the status of the connections, the electrical wiring and the rubber anti-vibration mountings. With the unit switched on check that there are no abnormal vibrations or noise levels in the compressors that require special maintenance.

### II.8.2.5 Inspection of the water circuit

- **Check the water differential pressure switch**: with the unit running normally, slowly close the isolating valve on the unit water inlet pipe. When this check is performed, if the isolating valve is completely closed without the differential pressure switch cutting in, switch off the unit immediately by pressing the ON/OFF key on the control panel and replace the component.
- **Bleeding air from the chilled water system**: by using the bleed valves situated both inside and outside the unit bleed the air trapped inside the water circuit. Always check pressure of the water system and pressurize with top-up water if necessary.
- **Draining the water system**: with the unit switched off the system can be completely drained through the appropriate supply and drain pipe situated on the lowest part of the unit. Make sure that the plate exchanger is completely drained by using all the valves situated on the water pipes inside the unit.
- **Pump inspection:** every 5000 working hours of the pump, the electronic board shows an alarm while the unit continues to operate. This is a warning that the pump requires inspection. The inspection consists of the external cleaning of the pump and a check of its overall conditions.
- **Clean water filter:** is compulsory that a mash filter is installed on the inlet water pipe of the unit. This filter must be cleaned during the regular maintenance.

## II.8.3 SPECIAL MAINTENANCE

### II.8.3.1 Instructions on the repair and replacement of components

Follow the instructions below to replace a component of the unit's refrigerant circuit:

- Always refer to the wiring diagrams enclosed with the appliance when replacing electrically powered components. Always take care to clearly label each wire before disconnecting, in order to avoid making mistakes later when re-connecting.
- When the machine is started up again, always go through the recommended start-up procedure.

### II.8.3.2 Instructions on how to drain the refrigerant circuit

In order to drain the refrigerant circuit completely by means of homologated devices drain the refrigerant from both the high and low-pressure sides and in the liquid line. Use the charge connections in every section of the refrigerant circuit. In order to drain the refrigerant fluid completely all the circuit lines must be drained. The fluid should not be discharged into the atmosphere, as it causes pollution. It must be stored in suitable cylinders and delivered to a company authorised for the collection.

### II.8.3.3 Eliminating circuit humidity

If during the operation of the machine there is evidence of humidity in the refrigerant circuit, it is essential to drain the circuit completely of refrigerant and eliminate the cause of the problem. To eliminate all the humidity the operator must dry out the circuit by evacuating it to 70 Pa, and then proceed to recharge it with the gas charge indicated in the plate located on the unit.

### II.8.3.4 Replacing the filter drier

To replace the filter drier, drain and eliminate humidity from the refrigerant circuit by also draining the fluid dissolved in oil.
Once the filter has been replaced, evacuate the circuit again to eliminate any traces of non-condensable gases which may have entered the system during replacement. It is advisable to check that there are no gas leaks before restarting the machine for normal working.

### II.8.3.5 Top-up / replacement of refrigerant charge

The units are factory-tested with the gas charge necessary for correct operation. The amount of gas inside each circuit is shown on the serial no. plate.
In cases where the R410A charge needs to be restored, drain and evacuate the circuit by eliminating any traces of non-condensable gases with humidity. After any maintenance operations on the refrigerant circuit and before restoring the gas charge, wash the system thoroughly.
Then restore the exact amount of new refrigerant shown on the serial no. plate. The refrigerant piped from a cylinder in the liquid phase, so as not to alter its composition (R32/R125).
Once this operation has been completed repeat the start-up procedure of the unit and monitor its working conditions for at least 24 hours.
In case of particular conditions - for example in the event of a drop in the level of refrigerant - when it is advisable to opt for a topping-up of the fluid, a slight degradation of the unit performance will have to be taken into account. In all cases the topping-up must be carried out in the low pressure section of the machine before the evaporator, using the appropriate pressure sockets. Make sure that the refrigerant is introduced only in the liquid phase.

### II.8.3.6 Check and restore the compressor's oil charge

With the unit switched off, the oil level in the compressors must partially cover the sight-glass on the level matching tube. The level is not always constant as it depends on the ambient temperature and the percentage of refrigerant in oil.
With the unit on and in nominal conditions the oil level must be clearly visible through the sight-glass on the level matching tube and must be flat without any ripples.
An additional topping-up of the oil can be carried out after pumping-out the compressors, using the pressure connection on the compressor inlet. For information on the amount and type of oil refer to the label on the compressor or contact a ***RHOSS*** service centre.

### II.8.3.7 Compressor operation

Scroll compressors are equipped with internal thermal protection. Once the thermal protection has been activated, normal operation is automatically resumed when the windings temperature drops below the pre-set safety value (this can take from a few minutes to several hours).

### II.8.3.8 Operation of working, antifreeze and pressure probes

Temperature probes **ST1** and **ST2** are inserted within a socket in contact with a conductive paste and sealed from the outside with silicon.

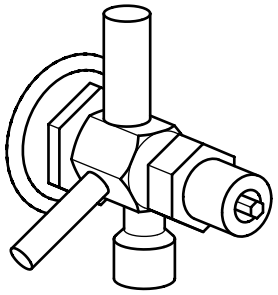
- Probe **ST1** is placed at the entrance of the heat exchanger and measures the temperature of the return water from the system.
- Probe **ST2** is placed at the exit of the evaporator and acts as an operational and antifreeze probe in units with no water buffer tank and only as an antifreeze probe in units with water buffer tank.

Always check that both the wires are firmly welded to the connector and that this is properly inserted in the housing on the electronic board (see the electrical wiring diagram provided). In order to check the efficiency of the probe use a precision thermometer immersed with the probe in a container full of water at a certain temperature after having removed the probe from the socket taking care to avoid damaging it in the process. The probe must be carefully repositioned by placing some conductive paste in the socket, inserting the probe and re-sealing the external part with silicon to avoid unscrewing. If the antifreeze alarm is activated this must be reset through the control panel. The unit starts up again only when the water temperature exceeds the triggering difference.
The pressure probe (BP1) is screwed onto a connection situated on the high pressure pipe. Check that the connectors on the board and on the probe are inserted. Check efficiency of the probe by comparing the display reading with the reading of the pressure indicated by a gauge connected to the high pressure pipe.

### II.8.3.9 Operation of thermostatic valve (VTE)

The thermostatic expansion valve is calibrated to maintain the gas superheated by at least 6°C, to avoid any liquid being sucked into the compressor.
If the superheating setting needs to be changed, adjust the valve as follows:

- turn in an anticlockwise direction to reduce superheating;
- turn in a clockwise direction to increase superheating.



Remove the screw cap on the side of the valve and then turn the adjustment screw using a screwdriver. By increasing or decreasing the amount of refrigerant, the superheating temperature value is either decreased or increased. The temperature and pressure inside the evaporator remains more or less the same, regardless of changes to the thermal load.
After any adjustments to the valve it is advisable to allow a few minutes to elapse to give the system the chance to re-stabilise.

### II.8.3.10 Operation of high pressure switch (PA)

After the high pressure switch has been activated, it needs to be reset manually by firmly pressing the black button on the pressure switch itself. Then reset the alarm at the control panel. Refer to the Troubleshooting section to identify the problem and carry out the necessary maintenance.

### II.8.3.11 Operation of low pressure switch (PB)

After the low pressure switch has been activated, the alarm must be reset at the control panel; the pressure switch is reset automatically, but only when the suction pressure reaches the set differential value. Refer to the Troubleshooting section to identify the problem and carry out the necessary maintenance.

## II.9 DISMANTLING THE UNIT - DISPOSAL OF HARMFUL COMPONENTS/SUBSTANCES

**ENVIRONMENTAL PROTECTION**
**Dispose of the packaging materials in compliance with the national or local legislation in force in your country. Do not leave the packaging within reach of children.**

It is advisable that the dismantling of the unit is performed by a company authorised to collect obsolete products and machinery.
The unit as a whole is composed of materials which can be treated as SRM (secondary raw materials) and the following conditions must be observed:

- the oil contained in the compressor must be removed. It must be recovered and consigned to an authorised waste oil collection firm;
- refrigerant gas may not be discharged into the atmosphere. It should instead be recovered by means of homologated devices, stored in suitable cylinders and delivered to a company authorised for the collection;
- the filter drier and electronic components are to be considered special waste and as such they must be delivered to a company authorised for the collection;
- The expanded polyurethane insulation to the water exchangers must be removed and processed as urban-type waste.

## II.10 CHECK-LIST

| Problem | Recommended action |
|---|---|
| **1 – THE CIRCULATION PUMP DOES NOT START (IF CONNECTED): water differential pressure switch alarm** | |
| Lack of voltage to the pump unit: | check electrical connections. |
| No signal from control board. | check, call in authorised service engineer. |
| Pump blocked: | check and clear as necessary. |
| Pump motor malfunction. | repair or replace pump. |
| Working set-point reached | check |
| Mash water filter is dirty (fixed by installer) | clean the filter |
| **2 - THE COMPRESSOR DOES NOT START** | |
| Microprocessor board alarm: | identify alarm and take appropriate action. |
| Absence of voltage, isolator switch open: | close isolator switch. |
| Automatic overload switches activated: | reset the switches; check unit on start-up. |
| No request for cooling with user system Set-point correct: | check and if necessary wait for cooling) request. |
| Working set-point set too high in cooling mode: | check and if necessary readjust set-point. |
| Defective contactors: | replace contactor. |
| Compressor electric motor failure: | check for short circuit. |
| Head of the compressor very hot, internal thermal protection activated | Wait an hour at leat for cooling |
| **3 –THE COMPRESSOR DOES NOT START BUT YOU CAN HEAR A BUZZING NOISE** | |
| Incorrect power supply voltage: | check voltage, investigate causes. |
| Defective contactors: | replace contactor. |
| Mechanical problems in the compressor: | replace compressor |
| **4 – THE COMPRESSOR RUNS INTERMITTENTLY: low pressure switch alarm** | |
| Faulty low pressure switch: | check operation of pressure switch. |
| Insufficient refrigerant charge. | 1 identify and eliminate any leaks; 2 restore correct charge. |
| Refrigerant line filter clogged (appears frosted): | replace filter. |
| Irregular operation of the expansion valve: | check calibration, adjust superheating, replace if necessary. |

| | |
|---|---|
| **5 – THE COMPRESSOR STOPS: high pressure switch alarm** | |
| Faulty high pressure switch: | check operation of pressure switch. |
| Insufficient cooling air in coils: | check fans, check clearances around unit and possible coil obstructions. |
| Excessive ambient temperature: | check unit operating limits. |
| Excessive refrigerant charge. | drain the excess. |
| **6 – EXCESSIVE COMPRESSOR NOISE - EXCESSIVE VIBRATIONS** | |
| Compressor is pumping liquid, excessive increase in refrigerant fluid in crankcase. | 1 check operation of the expansion valve. 2 adjust superheating.<br>3 replace the expansion valve if necessary. |
| Mechanical problems in the compressor: | overhaul compressor. |
| Unit running at the limit of specified conditions of use. | check capacities according to stated limits. |
| **7 - COMPRESSOR RUNS CONTINUOUSLY** | |
| Excessive thermal load. | check the system dimensioning, leaks and insulation of the rooms concerned. |
| Working set-point set too low: | check setting and reset. |
| Poor ventilation to the coils: | check fans, check clearances around unit and possible coil obstructions. |
| Poor water circulation on the plate exchanger: | check and adjust as necessary. |
| Presence of air in the chilled water system | bleed the system. |
| Insufficient refrigerant charge. | 1 identify and eliminate any leaks; 2 restore correct charge. |
| Refrigerant line filter clogged (appears frosted): | replace filter. |
| Control board faulty: | check by substitution. |
| Irregular operation of the expansion valve: | check calibration, adjust, replace if necessary. |
| Irregular working of the contactors: | check operation. |
| **8 - INSUFFICIENT OIL LEVEL** | |
| Leak in the refrigerant circuit: | 1 check, identify and eliminate leak.<br>2 restore the correct charge of refrigerant and oil. |
| The crankcase heater is off: | check and replace if necessary. |
| Unit running under irregular conditions compared to the operating limits: | check unit dimensioning. |
| **9 - CRANKCASE HEATER DOES NOT WORK (WITH COMPRESSOR OFF)** | |
| Lack of electrical power supply: | check connections |
| The crankcase heater is off: | check and replace if necessary. |
| **10 - HIGH DELIVERY PRESSURE IN RATED CONDITIONS** | |
| Insufficient cooling air flow to the coils (in cooling mode): | check operation of fans, check clearances around unit and possible coil obstructions. |
| Excessive refrigerant charge: | drain the excess. |
| **11 - LOW DELIVERY PRESSURE IN RATED CONDITIONS** | |
| Insufficient refrigerant charge. | 1 identify and eliminate any leaks;<br>2 restore correct charge. |
| Presence of air in the water system: | bleed the system. |
| Insufficient water flow to the evaporator: | check water system and adjust as necessary. |
| Mechanical problems in the compressor: | overhaul compressor. |
| Irregular working of fan speed regulator: | check setting and adjust if necessary. |
| **12 - HIGH INTAKE PRESSURE IN RATED CONDITIONS** | |
| Excessive thermal load (in cooling mode): | check system sizing, leaks and insulation. |
| Irregular operation of the expansion valve: | check operation, clean nozzle, adjust superheating, replace if necessary. |
| Mechanical problems in the compressor: | overhaul compressor. |
| **13 - LOW INTAKE PRESSURE IN RATED CONDITIONS** | |
| Insufficient refrigerant charge: | 1 restore correct charge. 2 identify and eliminate any leaks; |
| Heat exchanger damaged: | 1 check. 2 replace |
| Irregular operation of the expansion valve: | 1 check operation. 2 clean the nozzle.<br>3 adjust superheating. 4 replace expansion valve if necessary. |
| Mash water filter is dirty (fixed by installer) | clean the filter |
| Presence of air in the water system: | bleed the system. |
| Insufficient water flow: | check and adjust if necessary. |
| **14 - ONE OF THE FANS DOES NOT WORK OR STARTS AND STOPS** | |
| Switch or contactor faulty, break in the auxiliary circuit: | check and replace if necessary. |
| Thermal protection activated: | check for short-circuits, replace the motor. |
| Non-functioning condensation control: | 1 check card operation and replace if necessary<br>2 check pressure transducer |

## A1 TECHNICAL DATA

| TCAEY model | | 118 | 121 | 128 | 131 | 135 |
|---|---|---|---|---|---|---|
| Cooling capacity (15/10°C) (*) | kW | 18,6 | 21,0 | 27,7 | 29,3 | 34,7 |
| E.E.R. (*) (▲) | | 3,9 | 3,7 | 3,9 | 3,7 | 3,3 |
| Cooling capacity (12/7°C) (**) | kW | 15,4 | 17,4 | 22,7 | 24,3 | 29,1 |
| E.E.R. (**) (▲) | | 2,76 | 2,67 | 2,76 | 2,62 | 2,50 |
| E.S.E.E.R. | | 3,15 | 3,11 | 3,44 | 3,09 | 2,89 |
| Sound pressure (+) | dB(A) | 50,0 | 50,0 | 50,5 | 50,5 | 55,0 |
| Sound power level (++) | dB(A) | 78,0 | 78,0 | 78,5 | 78,5 | 83,0 |
| Scroll/step compressor | No. | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| Circuits | No. | 1 | 1 | 1 | 1 | 1 |
| Fans | No. x kW | 2 x 0,13 | 2 x 0,13 | 2 x 0,13 | 2 x 0,13 | 2 x 0,16 |
| Exchanger water contents | l | 1,33 | 1,33 | 1,9 | 2,2 | 2,6 |
| Water side exchanger nominal water flow (*) | l/h | 3200 | 3600 | 4800 | 5000 | 6000 |
| Water side exchanger nominal water flow (**) | l/h | 2647 | 2994 | 3897 | 4175 | 4998 |
| Nominal pressure drops, water side heat exchanger (*) | kPa | 47,5 | 59,7 | 53,0 | 44,0 | 46,6 |
| Available lead pressure (*) | kPa | 420 | 390 | 336 | 335 | 271 |
| Tank water content | l | 42 | 42 | 51 | 51 | 55 |
| R410A refrigerant charge | | See serial No. plate | | | | |
| Polyester oil charge | | See compressor plate | | | | |

| Electrical data | | | | | | |
|---|---|---|---|---|---|---|
| Absorbed power (*) (●) | kW | 4,84 | 5,64 | 7,14 | 7,94 | 10,5 |
| Absorbed power (**) (●) | kW | 5,58 | 6,51 | 8,2 | 9,28 | 11,90 |
| Pump absorbed power | kW | 1,2 | 1,2 | 1,2 | 1,2 | 1,2 |
| Electrical power supply | V-ph-Hz | 400-3+N-50 | | | | |
| Auxiliary power supply | V-ph-Hz | 230-1-50 | | | | |
| Nominal current (■) | A | 16,1 | 17,3 | 20,8 | 22,7 | 28,1 |
| Maximum current (■) | A | 19,1 | 20,0 | 22,0 | 24,7 | 30,5 |
| Starting current | A | 82,0 | 108,0 | 118,0 | 125,0 | 137,5 |
| Pump absorbed current | A | 5,4 | 5,4 | 5,4 | 5,4 | 5,4 |

| Dimensions | | | | | | |
|---|---|---|---|---|---|---|
| Height (a) | mm | 1305 | 1305 | 1505 | 1505 | 1740 |
| Width (b) | mm | 510 | 510 | 510 | 510 | 610 |
| Depth (c) | mm | 1525 | 1525 | 1525 | 1525 | 1825 |
| Water connections | Ø | 1/½" | 1/½" | 1/½" | 1/½" | 1/½" |

**(*)** In the following conditions: condenser input air temperature 27°C; chilled water temperature 10°C; temperature differential at evaporator 5°C.

**(**)** 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 10 m from the unit, with a directionality factor of 2.

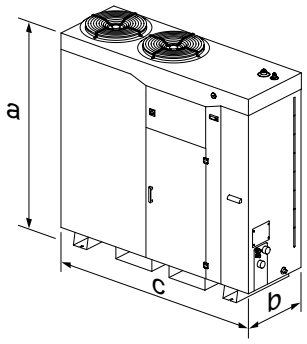
**(++)** Sound power level in dB(A) on the basis of measurements made in compliance with the UNI EN-ISO 3744 standard and Eurovent 8/1.

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

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

(▲)The calculation of the E.E.R. does not take the pump absorption into account.

**N.B.:**
The values for available static pressure of the pumps and the pressure drops of the exchangers can be found on pages 46-47.



| TCAEY model | | 140 | 253 | 261 | 270 |
|---|---|---|---|---|---|
| Cooling capacity (*) | kW | 40,5 | 53,2 | 61,1 | 70,5 |
| E.E.R. (3rd step, 100%) (*) (▲) | | 3,4 | 3,5 | 3,5 | 3,6 |
| Cooling capacity (**) | kW | 34,0 | 44,2 | 51,3 | 59,2 |
| E.E.R. (3rd step, 100%) (**) (▲) | | 2,56 | 2,55 | 2,60 | 2,68 |
| E.E.R. (2nd step) (**) (▲) | | - | 3,91 | 3,88 | 4,14 |
| E.E.R. (1st step) (**) (▲) | | - | 4,17 | 4,17 | 4,49 |
| E.S.E.E.R. | | 2,85 | 3,78 | 4,31 | 4,38 |
| Sound pressure (+) | dB(A) | 52,1 | 54,0 | 54,0 | 54,5 |
| Sound power level (++) | dB(A) | 80,1 | 82,0 | 82,0 | 82,5 |
| Scroll/step compressor | No. | 1/1 | 2/3 | 2/3 | 2/3 |
| Circuits | No. | 1 | 1 | 1 | 1 |
| Fans | No. x kW | 1x0,61 | 2x0,78 | 2x0,78 | 2x0,78 |
| Exchanger water contents | l | 3,2 | 3,8 | 4,4 | 5,1 |
| Water side exchanger nominal water flow (*) | l/h | 7000 | 9200 | 10500 | 12100 |
| Water side exchanger nominal water flow (**) | l/h | 5800 | 7600 | 8800 | 10200 |
| Nominal pressure drops, water side heat exchanger (*) | kPa | 43,5 | 46,8 | 45,0 | 46,2 |
| Available lead pressure (*) | kPa | 520 | 480 | 450 | 425 |
| Tank water content | l | 80 | 150 | 150 | 150 |
| R410A refrigerant charge | | | See serial No. plate | | |
| Polyester oil charge | | | See compressor plate | | |

| Electrical data | | | | | |
|---|---|---|---|---|---|
| Absorbed power (**) (●) | kW | 11,7 | 15 | 17,3 | 19,4 |
| Absorbed power (**) (●) | kW | 13,3 | 17,4 | 19,7 | 22,1 |
| Pump absorbed power | kW | 3,1 | 3,1 | 3,1 | 3,1 |
| Electrical power supply | V-ph-Hz | | 400-3+N-50 | | |
| Auxiliary power supply | V-ph-Hz | | 230-1-50 | | |
| Nominal current (■) | A | 25,0 | 33,1 | 38,1 | 42,5 |
| Maximum current (■) | A | 28,0 | 46,9 | 51,6 | 56,4 |
| Starting current | A | 203,0 | 137,0 | 153,0 | 219,0 |
| Pump absorbed current | A | 5,3 | 5,3 | 5,3 | 5,3 |

| Dimensions | | | | | |
|---|---|---|---|---|---|
| Height (a) | mm | 1570 | 1570 | 1570 | 1570 |
| Depth (b) | mm | 1070 | 1070 | 1070 | 1070 |
| Width (c) | mm | 1710 | 2315 | 2315 | 2315 |
| Water connections | Ø | 2” | 2” | 2” | 2” |

**(*)** In the following conditions: condenser input air temperature 27°C; chilled water temperature 10°C; temperature differential at evaporator 5°C.

**(**)** 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 10 m from the unit, with a directionality factor of 2.

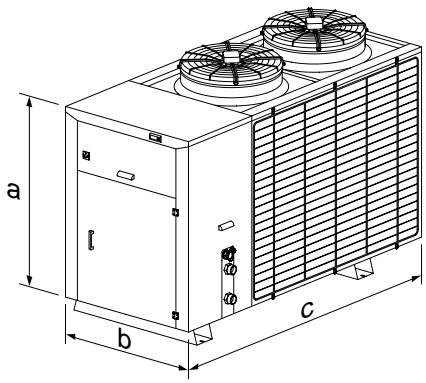
**(++)** Sound power level in dB(A) on the basis of measurements made in compliance with the UNI EN-ISO 3744 standard and Eurovent 8/1.

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

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

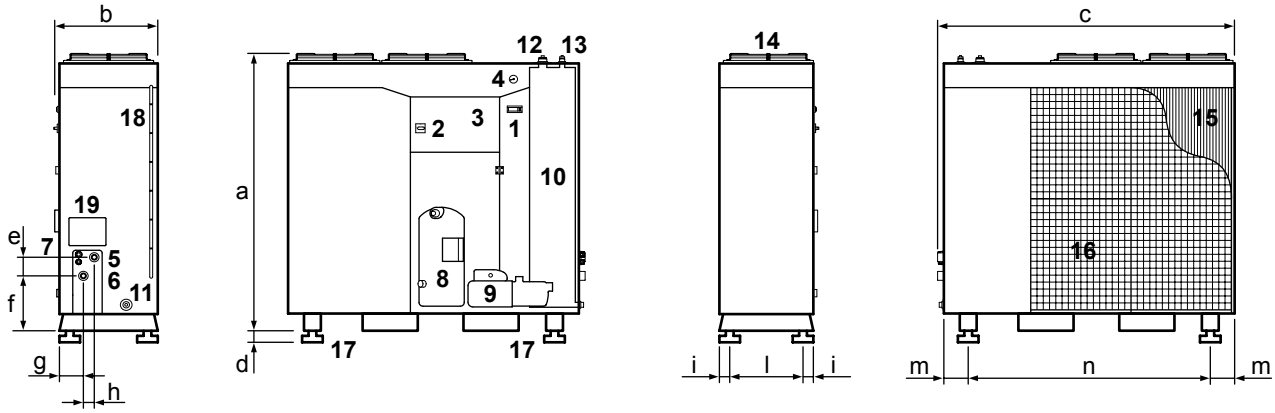
**(▲)** The calculation of the E.E.R. does not take the pump absorption into account.

**N.B.:**
The values for available static pressure of the pumps and the pressure drops of the exchangers can be found on pages 46-47.



## A2 DIMENSIONS AND FOOTPRINTS

**Models 118-121-128-131-135**




| Model | | a | b | c | d | e | f | g | h | i | l | m | n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **118** | mm | 1305 | 510 | 1525 | 60 | 94 | 312 | 120 | 57 | 29 | 444 | 166 | 1158 |
| **121** | mm | 1305 | 510 | 1525 | 60 | 94 | 312 | 120 | 57 | 29 | 444 | 166 | 1158 |
| **128** | mm | 1505 | 510 | 1525 | 60 | 94 | 312 | 120 | 57 | 29 | 444 | 166 | 1158 |
| **131** | mm | 1505 | 510 | 1525 | 60 | 94 | 312 | 120 | 57 | 29 | 444 | 166 | 1158 |
| **135** | mm | 1740 | 610 | 1825 | 60 | 94 | 312 | 120 | 57 | 29 | 544 | 180 | 1428 |

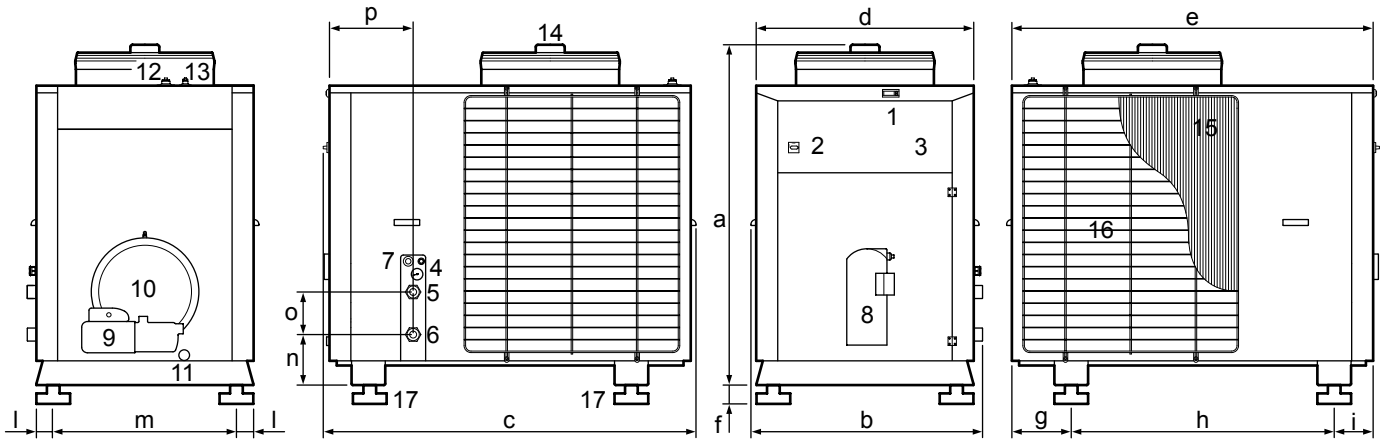
**1.** Control panel;
**2.** Isolator;
**3.** Electrical board;
**4.** Pressure gauge;
**5.** Water outlet;
**6.** Water inlet;
**7.** Power supply inlet;
**8.** Compressor;
**9.** Pump;
**10.** Water buffer tank;
**11.** Water buffer tank drain;
**12.** Water filling;
**13.** Air vent;
**14.** Fan;
**15.** Finned coil;
**16.** Protection mesh;
**17.** Anti-vibration support (KSA accessory);
**18.** Level indicator;
**19.** By-pass valve regulation door.

**Weights**

| Model | | 118 | 121 | 128 | 131 | 135 |
|---|---|---|---|---|---|---|
| **TCAEY ASP1** | kg | 230 | 240 | 290 | 300 | 390 |

The weights refer to packaged units without water.

**Model 140**




| Model | | a | b | c | d | e | f | g | h | i | l | m | n | o | p |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **140** | mm | 1570 | 1070 | 1710 | 1000 | 1660 | 75 | 273 | 1210 | 179 | 30 | 942 | 232 | 196 | 385 |

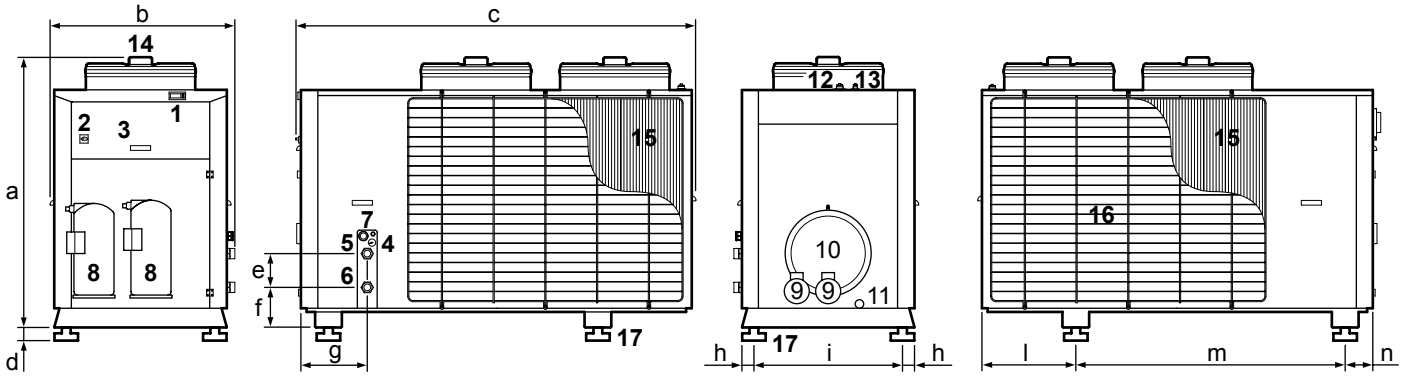
**1.** Control panel;
**2.** Isolator;
**3.** Electrical board;
**4.** Pressure gauge;
**5.** Water outlet;
**6.** Water inlet;
**7.** Power supply inlet;
**8.** Compressor;
**9.** Pump;
**10.** Water buffer tank;
**11.** Water buffer tank drain;
**12.** Water filling;
**13.** Air vent;
**14.** Fan;
**15.** Finned coil;
**16.** Protection mesh;
**17.** Anti-vibration support (KSA accessory).

**Weights**

| Model | | 140 |
|---|---|---|
| **TCAEY ASP1** | kg | 470 |

The weights refer to packaged units without water.

**Models 253-261-270**




| Model | | a | b | c | d | e | f | g | h | i | l | m | n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **253** | mm | 1570 | 1070 | 2315 | 75 | 195 | 233 | 385 | 28 | 942 | 544 | 1562 | 160 |
| **261** | mm | 1570 | 1070 | 2315 | 75 | 195 | 233 | 385 | 28 | 942 | 544 | 1562 | 160 |
| **270** | mm | 1570 | 1070 | 2315 | 75 | 195 | 233 | 385 | 28 | 942 | 544 | 1562 | 160 |

**1.** Control panel;
**2.** Isolator;
**3.** Electrical board;
**4.** Pressure gauge;
**5.** Water outlet;
**6.** Water inlet;
**7.** Power supply inlet;
**8.** Compressor;
**9.** Pump;
**10.** Water buffer tank;
**11.** Water buffer tank drain;
**12.** Water filling;
**13.** Air vent;
**14.** Fan;
**15.** Finned coil;
**16.** Protection mesh;
**17.** Anti-vibration support (KSA accessory).

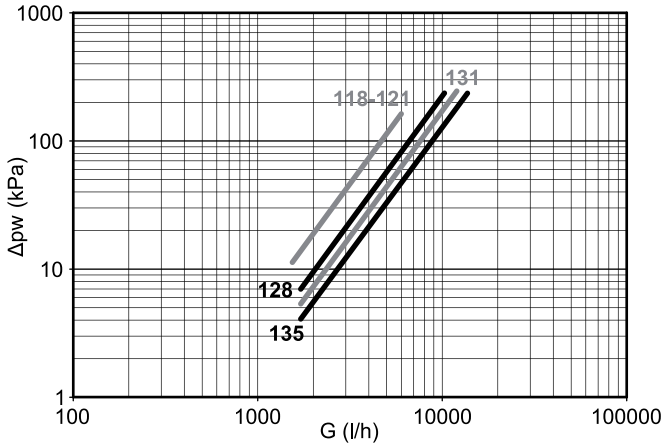
**Weights**

| Model | | 253 | 261 | 270 |
|---|---|---|---|---|
| **TCAEY ASP1** | kg | 645 | 660 | 680 |
| **TCAEY ASDP1** | kg | 695 | 710 | 730 |

The weights refer to packaged units without water.

## A3 PRESSURE DROPS

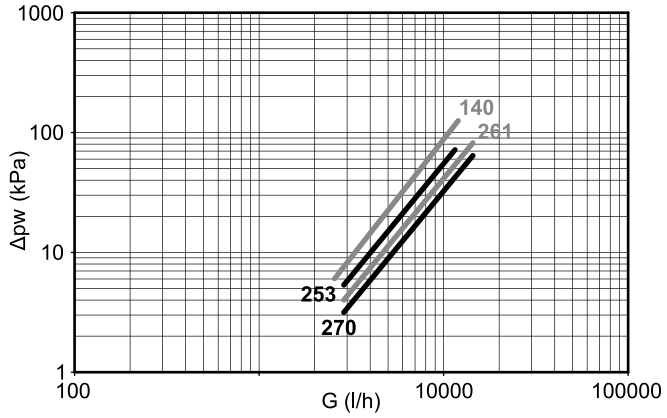
**Graph "1": pressure drops, exchangers for Models 118÷135**




**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;

**Graph "1": pressure drops, exchangers for Models 140÷270**




**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 read on the graph to the side, or can be calculated using the following rough formula:

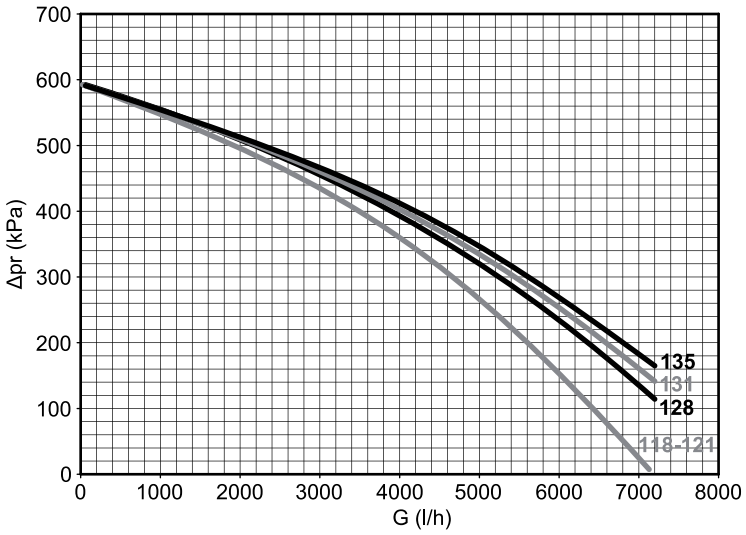
$$\Delta pw = \Delta pw_{nom} \times (G : G_{nom})^2$$

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

## A4 RESIDUAL STATIC PRESSURE

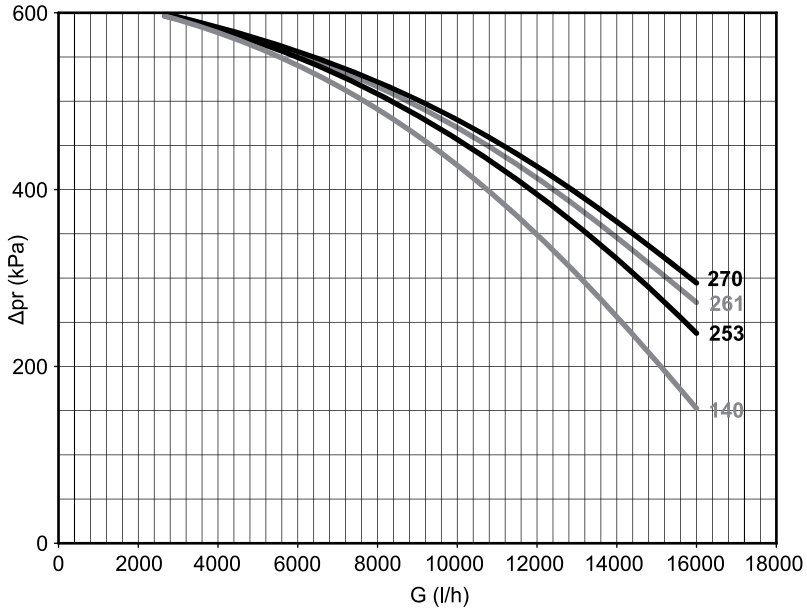
The pump water flow should be set up by using regulation valve installed to the chiller inlet/outlet (fixed by the installer).
If the pump water flow is less than the amount stated, then the valve should be opened to increased the water flow (decreased pressure). If the pump water flow is less than the amount stated, then the valves should be closed to decreased the water flow (increased pressure).
The pump water flow can be varied further if required by opening the bypass valve within the chiller.
During the regulation the evaporator temperature differentials must remain between max an min values (Δt=3-8°C).
Damage can be caused to the pump if it operates outside of its design parameters and this would not be covered under warranty.

**Graph "2": residual static pressure for Models 118÷135**




**Δpr** = Residual static pressure
**G** = Water flow rate

**Graph "2": residual static pressure for Models 140÷270**

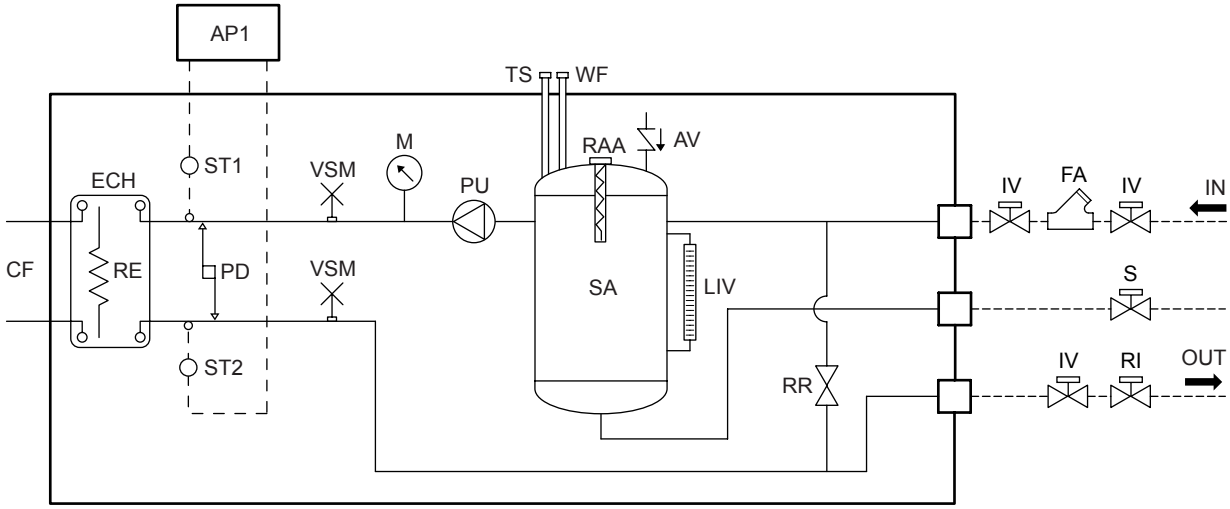



**Δpr** = Residual static pressure
**G** = Water flow rate

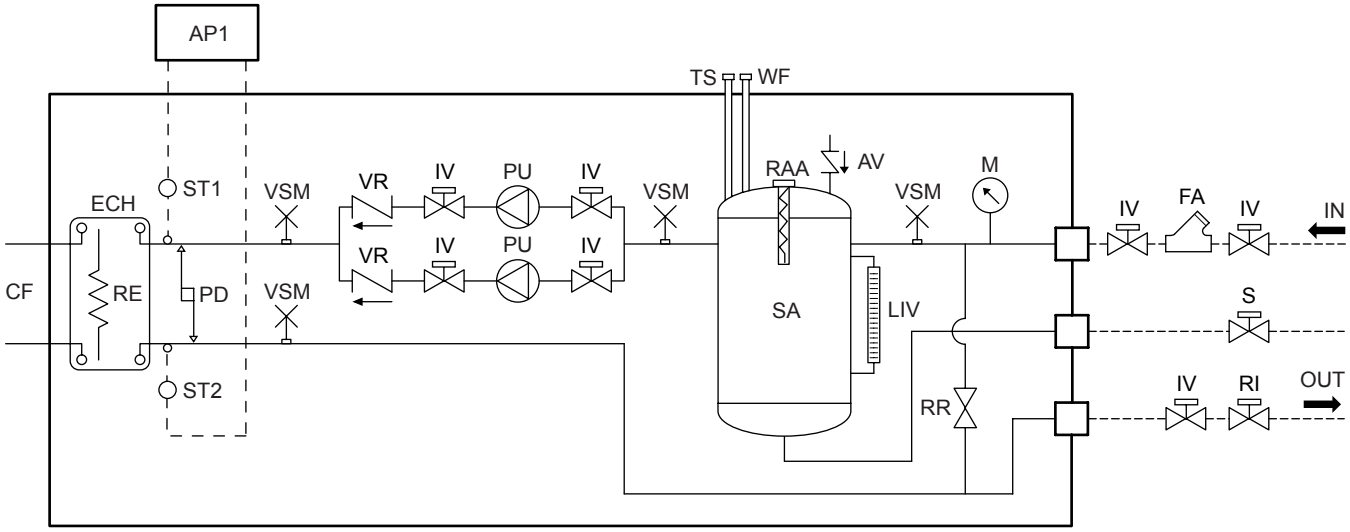
**Calculation of residual static pressure**
The residual static pressure values can be obtained from graph "**2**" based on measured flow rates.

## A5 WATER CIRCUIT

**TCAEY 118÷270 models, ASP1 installation**




**TCAEY 253÷270 models, ASDP1 installation**




**AV** No return valve (for models 140-270)
**CF** Refrigerant circuit
**ECH** Plate evaporator
**RE** Evaporator antifreeze electric heater
**PD** Water differential pressure switch
**VSM** Manual bleed valve
**AP1** Electronic control
**ST1** Primary inlet temperature gauge
**ST2** Primary outlet temperature gauge
- antifreeze for Tank & Pump installations and working
**RAA** Water buffer tank electric heater
**FA** Mesh filter (installed by the installer)
**SA** Water buffer tank
**M** Pressure gauge
**PU** Pump
**S** Water drain
**RI** Regulation valve
**IV** Isolation valve
**VR** Check valve
**WF** Water filling point
**LIV** Level indicator
**RR** By-pass regulation valve
**TS** Air vent
**- - - -** Connections to be made by the installer

# NOTE

# NOTE

# NOTE



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