UNTES®

HEATING VENTILATING AIR CONDITIONING

INSTRUCTIONS FOR USE

TCAEY- THAEY 4160÷4320 EVO

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

KP7873

English

English

CONTENTS

KEY TO SYMBOLS

SYMBOL	MEANING
	**GENERIC DANGER!** **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!** **The DANGER: LIVE COMPONENTS sign warns the operator and maintenance personnel about risks due to the presence of live voltage.**
	**DANGER: SHARP EDGES!** **The DANGER: SHARP EDGES sign warns the operator and maintenance personnel about the presence of potentially dangerous sharp edges.**
	**DANGER: HOT SURFACES!** **The DANGER: HOT SURFACES sign warns the operator and maintenance personnel about the presence of potentially dangerous hot surfaces.**
	**DANGER: MOVING PARTS!** **The DANGER: MOVING PARTS sign warns the operator and maintenance personnel about risks due to the presence of moving parts.**
	**DANGER: MOVING FANS!** **The DANGER: MOVING FANS sign warns the operator and maintenance personnel about risks due to the presence of moving fans.**
	**IMPORTANT WARNING!** **The IMPORTANT WARNING sign draws attention to actions or hazards that could damage the unit or its equipment.**
	**ENVIRONMENTAL PROTECTION!** **The ENVIRONMENTAL PROTECTION sign provides instructions for using the machine in an eco-friendly manner.**

Reference Standards

UNI EN ISO 12100	Safety of machinery - General principles of design - Risk assessment and risk reduction.
UNI EN ISO 13857	Safety of machinery - Safety distances to prevent reaching danger zones with upper and lower limbs.
UNI EN 563	Safety of machinery. Temperature of contact surfaces. Ergonomic data to establish limit values for temperatures of hot surfaces.
UNI EN 1050	Safety of machinery. Principles of risk assessment.
UNI 10893	Product technical documentation. User instructions.
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.
EN 378-2	Refrigeration systems and heat pumps – safety and environmental requirements. Design, construction, testing, installing, marking and documentation.
IEC EN 60204-1	Safety of machinery. Electrical equipment of machines. Part 1: General requirements.
IEC EN 60335-2-40	Safety of household and similar electrical appliances. Part 2: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers.
UNI EN ISO 9614	Determination of sound power levels of noise sources using sound intensity.
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.2 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 **H** Heat pump
A	Air-cooled
E	Scroll-type hermetic compressors
B	Standard
T	High temperature/efficiency
S	Silenced
Q	Supersilenced
Y	R410A refrigerant fluid

No. compressors	Cooling capacity (kW) (*)
4	160
4	180
4	200
4	230
4	260
4	290
4	320

(*) 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*).

Available installations:

Standard:
Installation without pump and without water buffer tank.

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

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

I.3 CONDITIONS OF USE

The TCAEBY-TCAETY-TCAESY-TCAEQY units are packaged air-cooled water chillers with axial fans.
The THAETY-THAESY units are packaged evaporation/air-cooled reversible heat-pumps on the refrigerant cycle with axial fans.

They are intended for use in air conditioning systems or industrial processes that require chilled water (TCAEBY-TCAETY-TCAESY-TCAEQY) or chilled and hot water (THAETY-THAESY). Not suitable for drinking water.

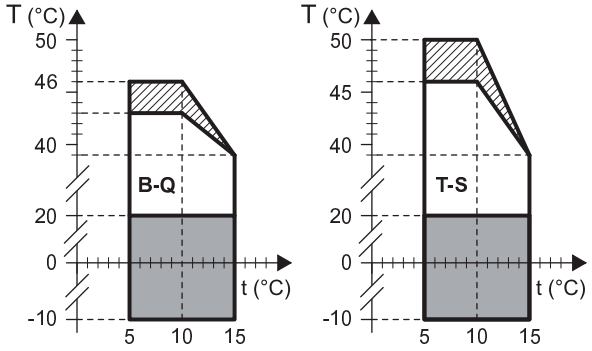
The units are designed for outdoor installation.

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

	**DANGER!** **The machine has been designed and constructed solely and exclusively to function as an air-cooled water chiller or as an air-cooled heat-pump: any other use is expressly PROHIBITED.** **The installation of the machine in an explosive environment is prohibited.**
	**DANGER!** **The machine is designed for outdoor installation. Segregate the unit if installed in areas accessible to persons under 14 years of age.**
	**IMPORTANT!** **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.**

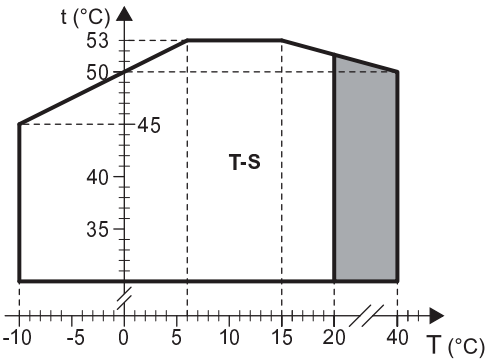
I.3.1 OPERATING LIMITS

Summer operation



In summer mode:
Maximum water inlet temperature 20°C.

Winter operation



In winter operation:
Minimum water inlet temperature 20°C.
Maximum inlet water temperature 47°C.

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

Operation with condensation control FI10 (as standard in Q and S versions)
Operation with stepped cooling capacity.

If the water inlet temperature to the condensers is lower than the permitted values, it is recommended to use a three-way modulating valve to guarantee the minimum water temperature required.
Temperature differentials permitted through the exchangers
○ Temperature differential at the evaporator ΔT = 3 ÷ 8°C (with both compressors on) for machines with "standard" installation. The maximum and minimum temperature differential for the "Pump" and "Tank&Pump" machines is linked to the pump performances, which must always be checked with the help of the graphs or using the ÜNTES Inc. selection software.
○ Minimum water pressure 0.5 Barg
○ Maximum water pressure 6 Barg.
○ Maximum water pressure on heat recovery and desuperheater 3 Barg.

Model	4160÷4320	
TCAEBY (*)	T_{max} = 43 °C (1) (2)	T_{max} = 46 °C (1) (4)
TCAETY-THAETY TCAESY-THAESY	T_{max} = 46 °C (1) (2)	T_{max} = 50 °C (1) (4)
TCAESY-THAESY	T_{max} = 40 °C (1) (3)	-
TCAEQY	T_{max} = 37 °C (1) (3)	T_{max} = 43 °C (1) (2) T_{max} = 46 °C (1) (4)

(1) Water temperature (IN/OUT) 12/7 °C.
(2) Maximum external air temperature with unit in standard operation running on full and unsilenced.
(3) Maximum external air temperature with unit in silenced mode.
(4) Maximum external air temperature with unit with shuttered cooling capacity.
(*) With the SIL accessory (silenced installation), the maximum external air temperature with the unit is silenced mode is 40°C.

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 refrigerant is estimated to contribute to the greenhouse effect is the 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 contain elements that are harmful to the ozone, such as 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 are hydrocarbons which decompose relatively rapidly into the lower atmosphere (troposphere). Decomposition by-products are highly dispersible and thus have a very low concentration. They do not affect 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 cause long-term water contamination.

- **Personal 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. The atmospheric concentration must be reduced as far as possible and maintained at this minimum level, below professional exposure limits. The vapours are 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 irritant and toxic decomposition by-products. Do not allow the liquid to come into contact with eyes or skin.

- **Procedures in case of accidental refrigerant leakage**

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 an 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 nebulised 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**

Splashes of 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, 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 PED CATEGORIES OF PRESSURE COMPONENTS

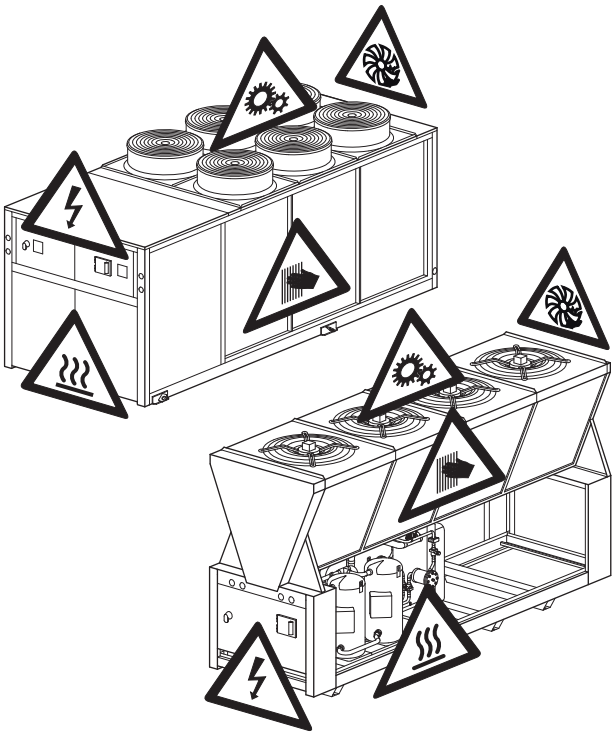
List of PED critical components (Directive 97/23/EC):

Component	PED category
Compressor	II
Safety valve	IV
High pressure switch	IV
Low pressure switch	-
Liquid receiver	II
Liquid separator	II
Finned coil	I
Evaporator	II

I.4.3 INFORMATION ON RESIDUAL RISKS AND IRREMOVABLE HAZARDS

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

If any risks remain in spite of the provisions adopted, 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 fans.

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

Indicates the presence of sharp edges in correspondence to the finned coils.

I.5 DESCRIPTION OF CONTROLS

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

I.5.1 MAIN SWITCH

Manually controlled type "b" mains power supply connection and disconnection (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 disconnect power from the pumps.

- **Automatic switch for fan protection**

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

II SECTION II: INSTALLATION AND MAINTENANCE

II.1 CONSTRUCTION FEATURES

○ Load-bearing structure and panels in galvanised and painted (RAL 9018) sheet steel; base in galvanised sheet steel.
○ The structure (with the exception of the TCAEBY version) consists of two sections:
• sound-proofed technical compartment for housing the compressors, the electrical panel and the main components in the refrigerant circuit.
• aeraulic compartment for housing the heat exchange coils, the plate heat exchangers and the motor-driven fans.
○ Hermetic, Scroll-type rotary compressors, complete with internal thermal protection and crankcase heater activated automatically when the unit stops (as long as the power supply to the unit is preserved).
○ Adequately insulated, braze-welded plate water side heat exchange in stainless steel.
○ Air side heat exchanger comprised of a coil of copper pipes and aluminium fins.
○ Motor-driven axial fans with external rotor, equipped with internal thermal protection and complete with a single row of protection grilles for version B and a double row for versions T, S and Q.
○ Proportional electronic device for the pressurised and continuous regulation of the fan rotation speed down to an external air temperature of -10°C when operating as a water chiller and up to an external air temperature of 40°C when operating as a heat pump (as standard in versions S and Q).
○ Victaulic type water connections.
○ Differential pressure switch that protects the unit from any interruptions to the water flow.
○ Double refrigerant circuit in annealed copper pipe (EN 12735-1-2) complete with: cartridge drier filter, charge connections, manual reset safety pressure switch on the high pressure side, automatic reset safety pressure switch on the low pressure side, safety valve(s), filter shut-off valves, thermostatic expansion valve, cycle inversion valve (for THAETY-THAESY), liquid receiver (for THAETY-THAESY) and non-return valves, liquid indicator, gas separator on the compressor inlet and solenoid valve on the liquid line (for THAETY-THAESY) and inlet line insulation.
○ Unit with IP24 level of protection.
○ Compatible control
○ The unit is complete with the R410A refrigerant charge.

II.1.1 VERSIONS

B – Standard chiller only version (TCAEBY).
T – High temperature/high efficiency version, with larger coil surface (TCAETY-THAETY).
S - Silenced version complete with soundproofed compressors, lower fan speed and larger coil surface (TCAESY-THAESY). The fan speed is automatically increased with the external temperature increases considerably.
Q - Supersilenced version complete with soundproofed compressors, lower fan speed and larger coil surface (TCAEQY). The fan speed is automatically increased with the external temperature increases considerably.

II.1.2 AVAILABLE INSTALLATIONS

Standard:
Installation without pump and without water buffer tank.

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

The pump assembly also comes complete with: expansion vessel, safety valve, manual bleed valve and water side pressure gauge.
In the case of an individual pump, the assembly also comes complete with an aspiration and delivery shut-off valve.
In the case of a double pump, the assembly also comes complete with a delivery non-return valve and an aspiration valve for each pump.

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

In addition to that supplied with the pump accessory, the assembly also includes:
750-l inertial water buffer tank in delivery (excluding models TCAEBY 4160-4180-4200), air bleed valve, water drain valve and electric heater connection.

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;
• control power supply 12V-1ph-50Hz drawn from the main power supply;
• general isolator, complete with door interlocking isolator;
• automatic thermal overload switch to protect the compressors and the motor-driven fans;
• protection fuse for auxiliary circuit;
• power contactor for the compressors;
• remote machine controls: remote ON/OFF, summer/winter selector;
• remote machine controls: compressor operating light, general lock light;
○ Programmable electronic board with microprocessor, controlled by the keyboard inserted in the machine.
○ This electronic board performs the following functions:
• regulation and management of the set points for unit outlet water temperature; cycle inversion (THAETY-THAESY); safety timer delays; circulating pump; compressor and system pump hour-run meter; pressurised defrost cycles; electronic anti-freeze protection which cuts in automatically when the machine is switched off; and the functions which control the operation of the individual parts making up the machine;
• complete protection of the unit, automatic emergency shutdown and display of the alarms which have been activated;
• compressor protection phase sequence monitor;
• unit protection against low or high phase power supply voltage;
• display of the programmed set-points on the display; of the water in/out temperatures on the display; of the condensation and condensation/evaporation pressures (THAETY-THAESY); of the electrical voltage values in the three phases of the electrical circuit that powers the unit; of the alarms on the display; of the chiller or heat pump function on the display (THAETY-THAESY);
• user interface menu;
• automatic pump operating time balance (DP1-DP2, ASDP1- ASDP2 installations);
• automatic activation of the pump in standby in the event of an alarm (DP1-DP2, ASDP1- ASDP2 installations);
• display of the heat recovery/desuperheater inlet water temperature (TRD accessory);
• alarm code and description;
• alarm history management (menu protected by manufacturer password).

○ The following is memorised for each alarm:
- date and time of intervention (if the KSC accessory is present);
- inlet/outlet water temperatures when the alarm intervened;
- the condensation values at the time of the alarm, if the FI10 accessory is present for versions B and T and always for versions S and Q.
- alarm delay time from the switch-on of the connected device;
- compressor status at moment of alarm;

○ Advanced functions:
- Hi-Pressure Prevent with forced cooling capacity shuttering for high external temperatures (during summer operation),
- configured for serial connection (KRS485, KFTT10, KRS232 and KUSB accessory);
- possibility to have a digital input for remote management of the double Set-point.
- possibility to have an analogue input for the scrolling set-point via a 4-20mA remote signal;
- 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;
- computer-assisted unit testing;
- self-diagnosis with continuous monitoring of the unit operating status.

○ Set-point regulation
- fixed set-point (***Precision*** options);
- scrolling set-point (***Economy*** option).

II.2 ACCESSORIES

IMPORTANT!
Only use original spare parts and accessories. ÜNTES Inc. 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

P1 – Installation with pump.
P2 – Installation with increased static pressure pump.
DP1 – Installation with double pump, including an automatically activated pump in stand-by.
DP2 – Installation with increased static pressure double pump, including an automatically activated pump in stand-by.
ASP1 – Installation with pump and water buffer tank (excluding TCAEBY models 4160-4180-4200).
ASP2 – Installation with increased static pressure pump and water buffer tank (excluding TCAEBY models 4160-4180-4200).
ASDP1 – Installation with double pump, including one automatic pump in stand-by and water buffer tank (excluding TCAEBY models 4160-4180-4200).
ASDP2 – Installation with increased static pressure double pump, including one automatic pump in stand-by and water buffer tank (excluding TCAEBY models 4160-4180-4200).
FI10 – Modulated condensation control for continuous operation, as chiller down to an external temperature of -10°C (for versions B and T only).
RA - Evaporator antifreeze electric heater to prevent the risk of ice formation inside the exchanger when the machine is switched off (as long as the unit is not disconnected from the power supply)
RDR – Antifreeze electric heater for desuperheater / heat recovery (DS or RC100), to prevent the risk of ice formation inside the recovery exchanger when the machine is switched off (as long is the unit is not disconnected from the power supply).
RAS – 300W antifreeze electric heater for water buffer tank (available for ASP1-ASDP1- ASP2-ASDP2 installations); to prevent the risk of ice formation in the water buffer tank when the machine is switched off (as long as the unit is not disconnected from the power supply).
RAE 1 – 27W antifreeze electric heater for motor-driven pump (available for P1-DP1-ASP1-ASDP1 installations); to prevent the water contained in the pump from freezing when the machine is switched off (as long as the unit is not disconnected from the power supply).
RAE 2 – 27W antifreeze electric heater for double motor-driven pumps (available for P2-DP2-ASP2-ASDP2 installations); to prevent the water contained in the pumps from freezing when the machine is switched off (as long as the unit is not disconnected from the power supply).
DS – Desuperheater (excluding TCAEBY models).
RC100 – Heat recovery with 100% recovery; the accessory comes complete with condensation control FI10 (as standard in versions T, S and Q) and a differential pressure switch on the recovery exchanger. It is not active as a heat pump during operation.
TRD - Thermostat with display of the inlet water temperature at the heat recovery/desuperheater with possibility to set the activation set-point of an external regulation device if present.
GM – Refrigerant circuit high and low pressure gauges.
FTT10 – FTT10 serial interface card for connection to supervision systems (LonWorks® system compliant with Lonmark® 8090-10 protocol with chiller profile).
SS – RS485 serial interface card to create dialogue networks between cards (maximum of 200 units at a maximum distance of 1000 m) and the building automation, external supervision systems or ÜNTES Inc. supervision systems (protocols supported: proprietary protocol; Modbus® RTU).
CR - Power factor correction capacitors (cosΦ > 0.91).
EEV – Electronic thermostatic valve.
RAP - Unit with copper/pre-painted aluminium coils.
BRR - Unit with copper/copper coils.
DSP – Double set-point via digital consensus (incompatible with the CS accessory).
CS – Scrolling set point via analogue signal 4-20 mA (incompatible with the DSP accessory). On the basis of the required values, it could be necessary to install the EEV accessory too.
RPB - Coil protection networks with accident prevention function (to be used as an alternative to the FMB accessory).
FMB - Mechanical filters to protect the coils, with leaf protection function (to be used as an alternative to the RPB accessory).
BCI – Soundproofed compressor box (TCAEBY only).
SIL – Silent installation (TCAEBY only). The accessory also comprises the BCI and FI10 accessories. With the SIL accessory, cooling performance is reduced by 4%.

II.2.2 ACCESSORIES SUPPLIED LOOSE

KSAM - Spring anti-vibration mountings.
KSA - Rubber anti-vibration mountings.
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.
KTR - Remote keypad for control at a distance with rear illuminated LCD display (same functions as the one built into the machine).
KISI – CAN bus serial interface (Controller Area Network compatible with evolved hydronic system for integrated comfort management (protocol supported CanOpen®).
KRS232 – RS485/RS232 serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via RS232 serial port (RS232 cable provided).
KUSB – RS485/USB serial converter for interconnection between RS485 serial network and supervision systems with serial connection to PC via USB port (USB cable provided).
KMDM – GSM 900-1800 modem kit to be connected to the unit for the management of the parameters and any alarm signals on a remote basis. The kit consists of a GSM modem with relative RS232 card. It is necessary to purchase a SIM data card, not supplied by ÜNTES Inc.. supervision software for the installation and remote management of the units (contact ÜNTES Inc. pre-sales).

Description and fitting instructions are supplied with each accessory.

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.**

II.3.1 COMPONENTS

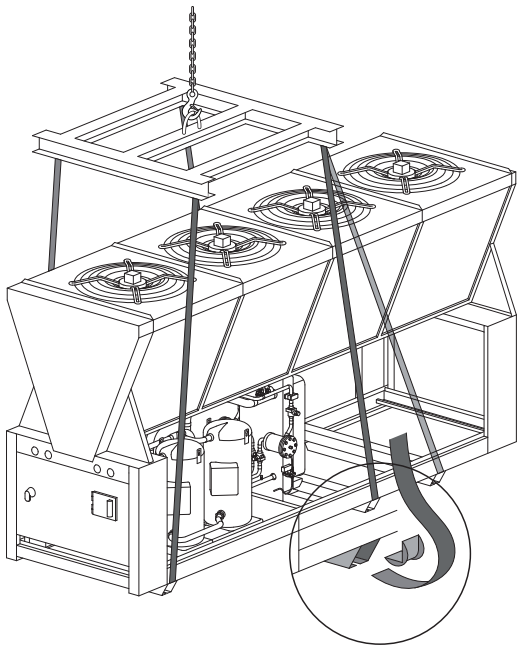
Each unit is supplied complete with:

- Instructions for use;
- Wiring diagram;
- List of authorised service centres;
- Warranty document;
- Safety valve certificates;
- Use and maintenance manual for the pumps, fans and safety valves.

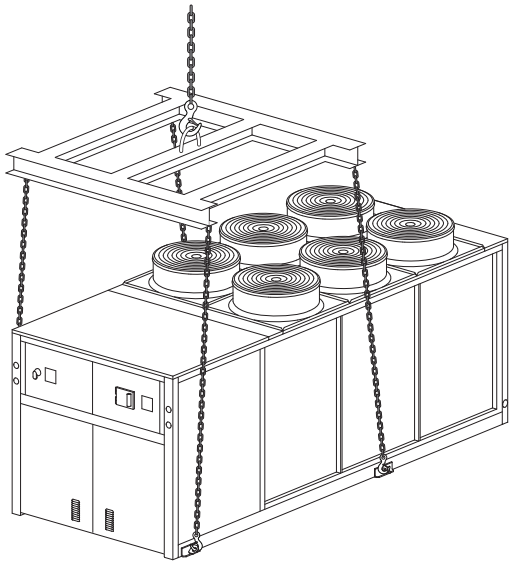
II.3.2 LIFTING AND HANDLING

	ATTENTION! **The unit is not designed to be lifted using a forklift truck.**
	DANGER! **The unit should be moved 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.**

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).
Pull the straps tight, 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.
During lifting and handling, make sure that the unit is horizontal at all times.
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.



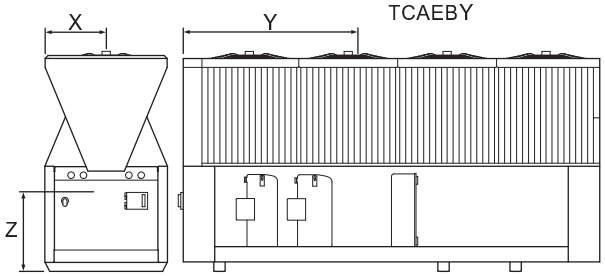
Connect the chains to the relative lifting hooks. Lift the unit by a few centimetres and, only after having checked the stability of the load, move the unit with care to the installation site. Lower the unit carefully and fix it into place. During handling be careful not to trap any parts of the body, in order to eliminate any possible risk of crushing or any other injury if the load drops or shifts suddenly.



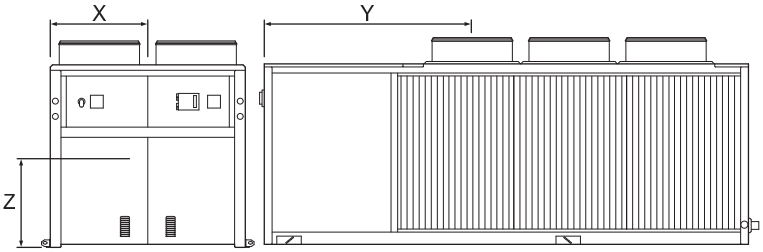
II.3.2.1 Handling Instructions

	DANGER! **The centre of gravity is off-centre and could cause sudden and hazardous movements. The centre of gravity indicated in the table 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.**

TCAEBY



TCAETY-TCAESY-TCAEQY-THAETY-THAESY



Model		Position of the centre of gravity		
		X	Y	Z
TCAEBY 4160	mm	596	1340	986
TCAEBY 4160 P1 / P2 – DP1 / DP2	mm	596	1500	923
TCAEBY 4180	mm	596	1279	905
TCAEBY 4180 P1 / P2 – DP1 / DP2	mm	595	1418	862
TCAEBY 4200	mm	595	1298	906
TCAEBY 4200 P1 / P2 – DP1 / DP2	mm	595	1469	848
TCAEBY 4230	mm	595	1523	950
TCAEBY 4230 P1 / P2 – DP1 / DP2	mm	595	1655	893
TCAEBY 4230 ASP1 / ASP2 – ASDP1 / ASDP2	mm	572	1817	865
TCAEBY 4260	mm	595	1515	940
TCAEBY 4260 P1 / P2 – DP1 / DP2	mm	595	1647	885
TCAEBY 4260 ASP1 / ASP2 – ASDP1 / ASDP2	mm	573	1808	859
TCAEBY 4290	mm	596	1823	952
TCAEBY 4290 P1 / P2 – DP1 / DP2	mm	596	1915	901
TCAEBY 4290 ASP1 / ASP2 – ASDP1 / ASDP2	mm	575	2041	877
TCAEBY 4320	mm	596	1840	963
TCAEBY 4320 P1 / P2 – DP1 / DP2	mm	596	1929	914
TCAEBY 4320 ASP1 / ASP2 – ASDP1 / ASDP2	mm	576	2051	890
TCAETY – TCAESY – TCAEQY 4160	mm	951	1529	783
TCAETY – TCAESY – TCAEQY 4160 P1 / P2 – DP1 / DP2	mm	977	1628	753
TCAETY – TCAESY – TCAEQY 4160 ASP1 / ASP2 – ASDP1 / ASDP2	mm	1001	1693	791
TCAETY – TCAESY – TCAEQY 4180	mm	952	1451	798
TCAETY – TCAESY – TCAEQY 4180 P1 / P2 – DP1 / DP2	mm	991	1614	751
TCAETY – TCAESY – TCAEQY 4180 ASP1 / ASP2 – ASDP1 / ASDP2	mm	994	1599	803
TCAETY – TCAESY – TCAEQY 4200	mm	952	1416	798
TCAETY – TCAESY – TCAEQY 4200 P1 / P2 – DP1 / DP2	mm	983	1546	764
TCAETY – TCAESY – TCAEQY 4200 ASP1 / ASP2 – ASDP1 / ASDP2	mm	1001	1603	814
TCAETY – TCAESY – TCAEQY 4230	mm	951	1706	794
TCAETY – TCAESY – TCAEQY 4230 P1 / P2 – DP1 / DP2	mm	979	1900	762
TCAETY – TCAESY – TCAEQY 4230 ASP1 / ASP2 – ASDP1 / ASDP2	mm	997	1996	809
TCAETY – TCAESY – TCAEQY 4260	mm	951	1715	819
TCAETY – TCAESY – TCAEQY 4260 P1 / P2 – DP1 / DP2	mm	978	1897	788
TCAETY – TCAESY – TCAEQY 4260 ASP1 / ASP2 – ASDP1 / ASDP2	mm	995	1987	831
TCAETY – TCAESY – TCAEQY 4290	mm	951	1690	811
TCAETY – TCAESY – TCAEQY 4290 P1 / P2 – DP1 / DP2	mm	979	1877	780
TCAETY – TCAESY – TCAEQY 4290 ASP1 / ASP2 – ASDP1 / ASDP2	mm	995	1966	824
TCAETY – TCAESY 4320	mm	951	1669	804
TCAETY – TCAESY 4320 P1 / P2 – DP1 / DP2	mm	978	1854	774
TCAETY – TCAESY 4320 ASP1 / ASP2 – ASDP1 / ASDP2	mm	994	1942	818
THAETY – THAESY 4160	mm	951	1518	779
THAETY – THAESY 4160 P1 / P2 – DP1 / DP2	mm	976	1614	751
THAETY – THAESY 4160 ASP1 / ASP2 – ASDP1 / ASDP2	mm	999	1678	787
THAETY – THAESY 4180	mm	952	1447	794
THAETY – THAESY 4180 P1 / P2 – DP1 / DP2	mm	973	1532	770
THAETY – THAESY 4180 ASP1 / ASP2 – ASDP1 / ASDP2	mm	993	1591	799
THAETY – THAESY 4200	mm	951	1713	800
THAETY – THAESY 4200 P1 / P2 – DP1 / DP2	mm	979	1902	768
THAETY – THAESY 4200 ASP1 / ASP2 – ASDP1 / ASDP2	mm	997	1995	814
THAETY – THAESY 4230	mm	951	1689	793
THAETY – THAESY 4230 P1 / P2 – DP1 / DP2	mm	979	1877	763
THAETY – THAESY 4230 ASP1 / ASP2 – ASDP1 / ASDP2	mm	996	1969	808
THAETY – THAESY 4260	mm	951	1699	817
THAETY – THAESY 4260 P1 / P2 – DP1 / DP2	mm	977	1875	787
THAETY – THAESY 4260 ASP1 / ASP2 – ASDP1 / ASDP2	mm	994	1963	828
THAETY – THAESY 4290	mm	952	1673	809
THAETY – THAESY 4290 P1 / P2 – DP1 / DP2	mm	978	1854	779
THAETY – THAESY 4290 ASP1 / ASP2 – ASDP1 / ASDP2	mm	994	1940	822
THAETY – THAESY 4320	mm	952	1652	803
THAETY – THAESY 4320 P1 / P2 – DP1 / DP2	mm	977	1831	774
THAETY – THAESY 4320 ASP1 / ASP2 – ASDP1 / ASDP2	mm	993	1917	816

II.3.3 STORAGE CONDITIONS

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

II.4 INSTALLATION INSTRUCTIONS

	**DANGER!** **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!** **The unit must be installed according to national or local rules in force at the time of installation.**
	**DANGER!** **The machine is designed for outdoor installation. Segregate the unit if installed in areas accessible to persons under 14 years of age.**
	**DANGER!** **Some internal parts of the unit may cause cuts. Use suitable personal protective equipment.**
	**DANGER!** **When the outdoor temperature is around zero, the water normally produced during the defrosting of the coils could form ice and make the flooring near the installation area slippery.**

If the unit is not secured on the anti-vibration mountings (KSA or KSAM), it must be firmly anchored to the floor once it is placed on the ground. The unit may not be installed on brackets or shelves.

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

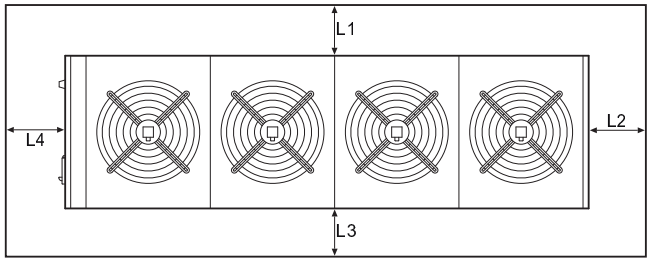
Machines designed for outdoor installation must be positioned so as to avoid any refrigerant gas leakage entering the building and posing a hazard to people's health.
If the unit is installed on terraces or building roofs, adequate safety measures must be taken in order to ensure that any gas leaks cannot 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

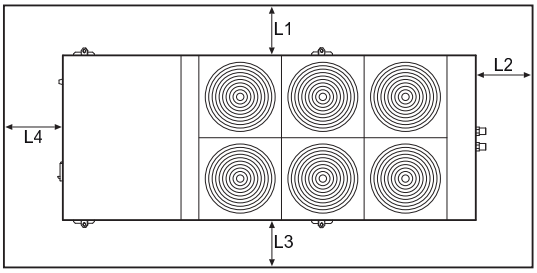
	**IMPORTANT!** **Before installing the unit, check the noise limits permissible in the place in which it will be used.**
	**IMPORTANT!** **The unit should be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.**

The unit is designed for outdoor installation. The unit should be correctly levelled and positioned on a supporting surface capable of sustaining its full weight. It must not be installed on brackets or shelves.

TCAEBY



TCAETY-TCAESY-TCAEQY-THAETY-THAESY



Model		TCAEBY	TCAETY-TCAESY-TCAEQY THAETY-THAESY
L1	mm	1500	2000
L2	mm	1500	2000
L3	mm	1500	2000
L4	mm	1500	1500

N.B.:
L2 is the minimum distance for the removal of the pump assembly and the relative water buffer tank. If the accessory is not present, the distance can be reduced. The space above the unit must be free from obstacles. If the unit is completely surrounded by walls, the distances specified are still valid, provided that at least two adjacent walls are not higher than the unit itself.
There must be a minimum gap of at least 3.5 m between the top of the unit and any obstacles above it.
If more than one unit is installed, the minimum distance between the finned coils should be at least 2 m.
However it is installed, the coil inlet air temperature (ambient air) must remain within the set limits.

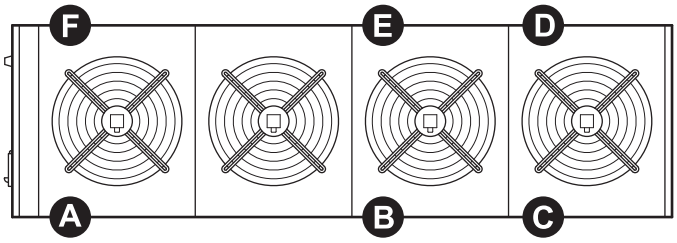
	**IMPORTANT!** **Incorrect positioning or installation of the unit may amplify noise levels and vibrations generated during operation.**

The following accessories are available to reduce noise and vibration:
KSA/KSAM - 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 elastic joints. 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.4.3 WEIGHTS

TCAEBY weights



TCAEBY model

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1090	1375	1500	1670	1725	2015	2150
Support (**)								
A	kg	265	360	388	448	466	414	437
B	kg	-	-	-	216	223	338	362
C	kg	281	327	362	170	174	255	276
D	kg	281	330	365	175	179	258	279
E	kg	-	-	-	219	225	338	362
F	kg	263	358	385	442	458	412	434

TCAEBY model with **PUMP** accessory

Weight		4160	4180	4200	4230	4260	4290	4320
q	kg	1233	1518	1709	1878	1934	2233	2365
Support (**)								
A	kg	278	372	398	449	465	424	444
B	kg	-	-	-	274	281	387	410
C	kg	340	387	457	215	220	305	328
D	kg	337	387	456	219	224	307	330
E	kg	-	-	-	277	284	387	410
F	kg	278	372	398	444	460	423	443

TCAEBY model with **TANK&PUMP** accessory

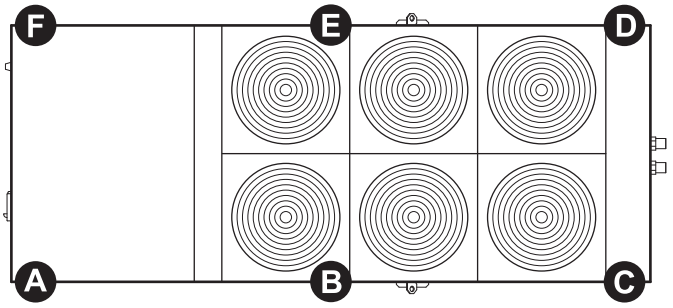
Weight		4230	4260	4290	4320
(*)	kg	1981	2033	2329	2459
(**)	kg	2749	2804	3102	3235
Support (**)					
A	kg	408	420	426	440
B	kg	516	524	574	598
C	kg	516	524	614	642
D	kg	477	484	577	605
E	kg	471	480	530	554
F	kg	361	372	381	396

(*) Weight of the unit when empty.

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

In units with the **BCI** or **SIL** accessory, add 100 kg to the total weight.

TCAETY – TCAESY – TCAEQY weights



TCAETY-TCAESY-TCAEQY

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1600	2000	2000	2200	2350	2400	2450
Support (**)								
q	kg	336	446	456	532	568	586	605
B	kg	270	336	335	366	390	398	406
C	kg	189	214	202	194	210	208	207
D	kg	197	224	215	206	222	220	220
E	kg	274	340	340	372	397	405	412
F	kg	334	440	452	530	563	583	600

TCAETY-TCAESY-TCAEQY with **PUMP** accessory

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1750	2250	2250	2400	2550	2600	2700
Support (**)								
A	kg	348	460	480	539	574	590	593
B	kg	307	400	394	418	442	452	440
C	kg	239	308	282	273	289	290	272
D	kg	232	290	272	262	279	278	305
E	kg	293	370	372	397	422	430	472
F	kg	330	422	450	511	544	560	618

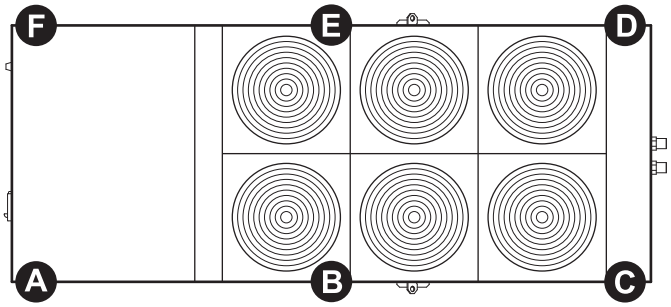
TCAETY-TCAESY-TCAEQY with **TANK&PUMP** accessory

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1834	2234	2332	2479	2627	2724	2769
(**)	kg	2600	3000	3100	3250	3400	3500	3550
Support (**)								
A	kg	456	565	587	612	646	674	692
B	kg	519	585	607	635	660	678	686
C	kg	506	532	550	570	585	594	592
D	kg	402	430	441	463	480	486	485
E	kg	392	458	471	502	527	542	550
F	kg	325	430	444	468	502	526	545

(*) Weight of the unit when empty.

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

THAETY – THAESY Weights



THAETY-THAESY

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1700	2050	2160	2250	2450	2550	2600
Support (**)								
A	kg	362	458	544	544	596	628	648
B	kg	288	344	374	374	407	423	430
C	kg	196	218	200	200	214	216	214
D	kg	204	230	122	212	227	230	228
E	kg	290	348	380	380	414	430	438
F	kg	360	452	540	540	592	623	642

THAETY-THAESY with **PUMP** accessory

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1850	2200	2450	2450	2650	2750	2800
Support (**)								
A	kg	372	470	550	550	602	634	652
B	kg	324	382	426	426	460	476	484
C	kg	248	268	280	280	294	298	295
D	kg	242	264	268	268	284	288	287
E	kg	310	368	406	406	438	454	462
F	kg	354	448	520	520	572	600	620

THAETY-THAESY with **TANK&PUMP** accessory

Weight		4160	4180	4200	4230	4260	4290	4320
(*)	kg	1934	2284	2532	2579	2727	2824	2869
(**)	kg	2700	3050	3300	3350	3500	3600	3650
Support (**)								
A	kg	480	578	622	642	676	704	724
B	kg	536	593	644	652	678	694	702
C	kg	516	535	576	574	590	596	594
D	kg	412	434	470	468	484	490	488
E	kg	408	466	510	518	542	560	566
F	kg	348	444	478	496	530	556	576

(*) Weight of the unit when empty.

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

DS - RC100 accessory weights

Weight of the DS and RC100 accessories for models: TCAETY-TCAESY-TCAEQY-THAETY-THAESY

Model		Weight of the **DS** accessory
4160	kg	100
4180	kg	100
4200	kg	120
4230	kg	120
4260	kg	120
4290	kg	120
4320	kg	120

Model		Weight of the **RC100** accessory
4160	kg	140
4180	kg	170
4200	kg	180
4230	kg	190
4260	kg	200
4290	kg	210
4320	kg	215

N.B.:
To obtain the total weight of the units with the **RC100** and **DS** accessories, at the weight of the accessory to the weight of the machine.

II.5 WATER CONNECTIONS

II.5.1 CONNECTION TO THE SYSTEM

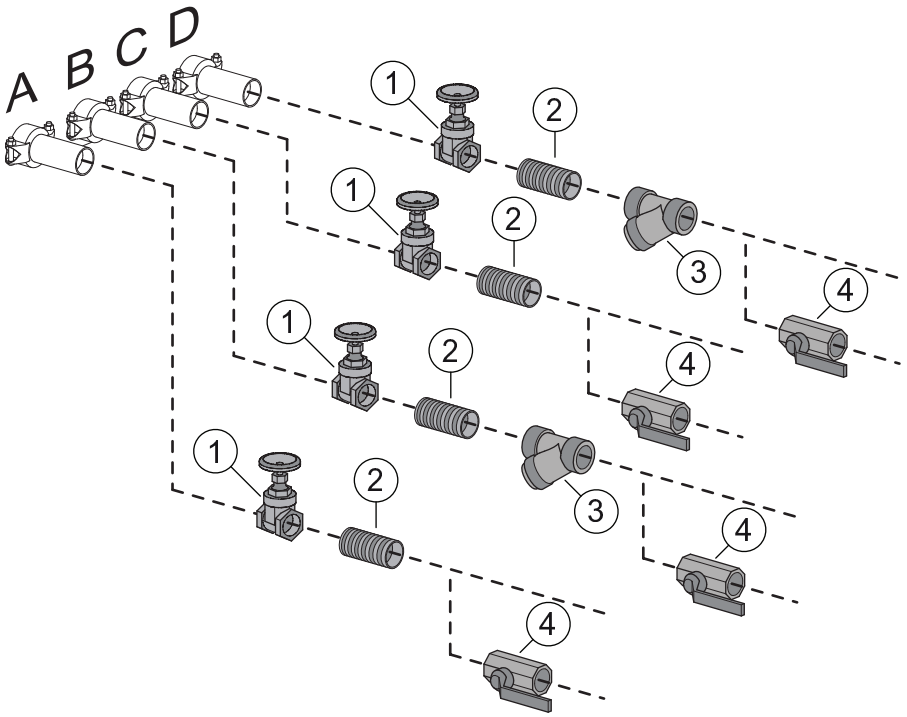
	IMPORTANT! **The layout of the water system and connection of the system to the unit must be carried out in conformity with local and national rules in force.**
	IMPORTANT! **We recommend installing isolating valves that isolate the unit from the rest of the system. Mesh filters with a square section (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 designed for outdoor installation.
○ The unit is fitted with Victaulic type water connections on the air conditioning system water inlet and outlet and on the recovery/desuperheater inlets and outlets. It is also fitted with carbon steel fittings for welding.
○ The unit must be positioned to comply with the minimum recommended clearances, bearing in mind the access to water and electrical connections.
○ The unit can be equipped with anti-vibration mountings on request (KSA).
○ Shut-off valves must be installed that isolate the unit from the rest of the system. Elastic connection joints and system/machine drain taps also need to be fitted.
○ A metal mesh filter (with a square mesh measuring no more than 0.8 mm), of a suitable size and with suitable pressure drops, must be fitted on unit return pipes.
○ The water flow through the heat-exchanger should not fall below a value corresponding to a temperature differential of 8°C (with both compressors on).
○ Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.
○ During long periods of inactivity, it is advisable to drain the water from the system.
○ It is possible to avoid draining the water by adding ethylene glycol to the water circuit (see "*Use of antifreeze solutions*").
○ The expansion tank is sized on the basis of the water content of the individual machine. Any additional expansion tank should be sized by the installer on the basis of the system. In the case of models without a pump, the pump must be installed with the pump delivery towards the machine water inlet.
○ It is advisable to install an air bleed valve.
○ Once the connections to the unit are made, check that none of the pipes leak, and bleed the air from the system.

II.5.1.1 Installing and Managing the Unit's External User Pump

The circulation pump to be installed in the main water circuit should be selected to overcome any pressure drops, at nominal rates of water flow, both in the exchanger and in the entire water system.
The operation of the user pump must be subordinated to the operation of the unit; the microprocessor controller checks the operation of the pump according to the following logic:
when the start-up command is given, the first device to start is the pump, which has priority over all the other devices. During the start-up phase, the minimum water flow differential pressure switch fitted on the unit is temporarily excluded, for a preset period, in order to avoid oscillations caused by air bubbles or turbulence in the water circuit. Once the starting phase is over, final enablement is given to the machine to start up; 60 seconds from the pump starting, the fans cut in (during this phase the antifreeze alarm is bypassed); after a further 60 seconds the compressors start up (allowing for the safety timer delay). The pump keeps on working all the time the unit is in operation, and it shuts down only at the switch-off command. After switch-off, the pump will continue to operate for a pre-set time before finally stopping, in order to disperse the residual heat in the water exchanger.

II.5.2 INSTALLATION



A Recovery exchanger water outlet
B Recovery exchanger water inlet
C Main exchanger water outlet
D Main exchanger water inlet

1 Shut-off valve
2 Anti-vibration connection
3 Mesh filter
4 Charge/drain valve

The diagram refers to models TCAETY-TCAESY-TCAEQY-THAETY-THAESY; for the TCAEBY models, check the position of the water inlet and outlet connections in the *Enclosed Documents* section.

II.5.3 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 antifreeze heater of the storage tank and the pump (RAA and RAE accessories) 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 felt to be too much trouble, 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 "**H**" shows the multipliers which allow the changes in performance of the units to be determined in proportion to the required percentage of ethylene glycol.

- The multipliers refer to the following conditions: condenser inlet water temperature 35°C; chilled water outlet temperature 7°C; temperature differential at evaporator and condenser 5°C.
- For different operating conditions, the same coefficients can be used as their variations are negligible.

○ The electric heater for the water side heat exchanger (RA accessory), the water buffer tank (RAS accessory), the motor-driven pump assembly (RAE accessory) and the desuperheater or heat recovery (RDR accessory) prevents ice formation during winter breaks (as long as the unit is not disconnected from the power supply).

Attention:
Over 20% glycol, check the pump absorption limits (in versions P1-P2, DP1-DP2, ASP1-ASP2, ASDP1-ASDP2).

Table "H"

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

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

II.5.4 HEAT RECOVERY SYSTEM

II.5.4.1 Operation

To recover the heat from the compressor and thus produce hot water, the differential pressure switch PD must give its consent to the electronic board; to achieve this result, the circulating pump P must be active and the water must circulate normally through the recovery exchanger.
The electronic board also checks the recovery unit and/or desuperheater (ST8) outlet temperature so as to guarantee maximum outlet temperature.

II.5.4.2 Installation Precautions

DANGER!
The heat recovery / desuperheater is in direct line with the compressor; the internal temperature of the recovery exchanger, if faulty, may reach 120°C at a pressure of 2 bar. This could lead to the formation of steam from overheated water.

Units fitted with a permanent recovery unit or desuperheater in series with the compressor must be used in compliance with the regulations set out by Ministerial Decree 1/12/1975 "Safety regulations for appliances containing hot pressurized fluids" and by its technical application specifications (collections R and H). This law is only valid in Italy. For installation in other countries, please abide by the local laws in force.

II.5.5 MINIMUM WATER CIRCUIT CONTENTS

In order for the units to operate properly, minimum water contents must be guaranteed in the water system. The minimum water content is determined on the basis of the unit's nominal cooling capacity (or heating capacity in the case of heat pumps) (table A *Technical Data*), multiplied by the coefficient expressed in l/kW.
If the minimum content in the system is below the minimum value indicated or calculated, it is advisable to select the TANK&PUMP accessory complete with inertial water buffer tank, and install an additional tank if necessary. However, in process applications it is always advisable to use a water buffer tank or a greater system water content to guarantee higher system thermal inertia.

The minimum circuit water content is 2 l/kW

Example:

THAETY 4320 QT = 353 kW

If the unit envisages control IDRHOSS compatible with the ***Adaptative Function Plus*** function, the minimum system content must be:

QT (kW) x 2 l/kW = 353 kW x 2 l/kW = 706 l

II.5.6 WATER DATA

	Models		4160	4180	4200	4230	4260	4290	4320
	Safety valve	barg	6	6	6	6	6	6	6
TCAEBY	Exchanger water contents	l	9	11	16	18	21	23	26
	Tank water content	l	-	-	-	750	750	750	750
TCAETY-TCAESY-TCAEQY	Exchanger water contents	l	16	16	18	21	23	26	16
	Tank water content	l	750	750	750	750	750	750	750
THAESY-THAETY	Exchanger water contents	l	16	16	18	21	23	26	31
	Tank water content	l	750	750	750	750	750	750	750

II.5.6.1 Expansion Vessel Technical Data

Installation		P1-P2-DP1-DP2						
		4160	4180	4200	4230	4260	4290	4320
Capacity	l	12	12	12	12	12	12	12
Pre-charging	barg	2	2	2	2	2	2	2
Maximum expansion vessel pressure	barg	6	6	6	6	6	6	6

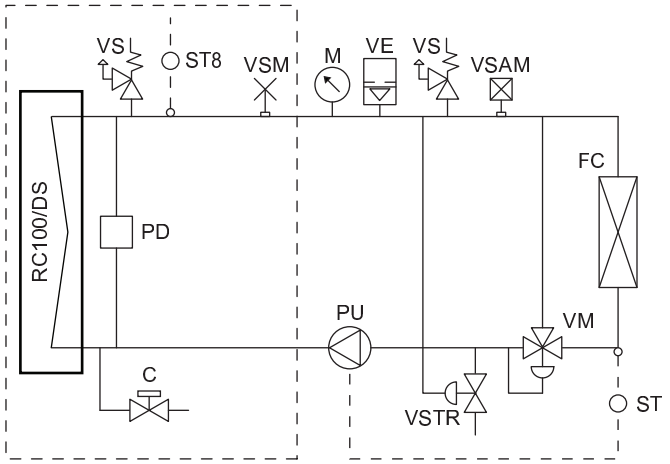
Installation		ASP1-ASP2-ASDP1-ASDP2						
		4160	4180	4200	4230	4260	4290	4320
Capacity	l	24	24	24	24	24	24	24
Pre-charging	barg	2	2	2	2	2	2	2
Maximum expansion vessel pressure	barg	6	6	6	6	6	6	6

II.5.7 INSTALLATION SUGGESTIONS

IMPORTANT!
The type of system described below could lead to lime scale forming in the water/refrigerant heat exchanger. We therefore recommend taking suitable steps to limit this phenomenon.
When operating as a heat pump, it is advisable to drain the recovery circuit.

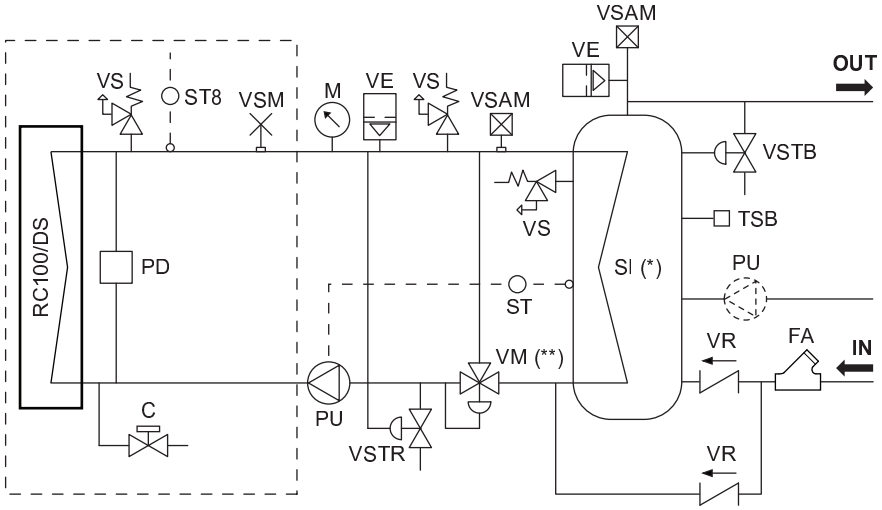
Particular attention should be paid to the system operating pressure, which should not exceed the values recorded on the plaque for the individual components and should be such as to prevent the water contained in the recovery unit from boiling.
The continuous circulation of water through the recovery unit or the desuperheater must be guaranteed by means of mixing units.

Closed circuit system (for heating for example)



RC100 – Recovery unit
DS – Desuperheater
M – Pressure gauge
VS = Safety valve
VE = Expansion vessel
VSTB – Hot water boiler heat drain valve
VSTR – Recovery heat drain valve
VSM=Manual air bleed valve
VSAM – Automatic/manual air bleed valve
TSB – Hot water boiler safety thermostat
VR = Non-return valve
VM – Three-way mixer valve
P – Circulating pump
PD – RC100/DS consensus differential pressure switch
FC – Fan coil
UT – Upon use
RI – From the water supply
ST – Temperature sensor
SI – Intermediate exchanger
ST8 – RC100/DS outlet temperature probe
VSAC = Water safety valve
C – Water charge/drain valve
ST – Temperature sensor
FA – Water filter

Open circuit system (for hot water for example)



(*): in the case of hot water for washing purposes, an intermediate exchanger (BL) should be installed for reasons of hygiene. For the same reason, it is important not to forget to periodically raise the water temperature in the tank in order to disinfect against bacteria such as Legionella Pneumophila.

(**) It is advisable to use a three-way mixer valve to guarantee the minimum recovery (RC100) or desuperheater (DS15) inlet temperature.

II.6 ELECTRICAL CONNECTIONS

	**DANGER!** **Install a general automatic switch with characteristic delayed curve, of adequate capacity and interruption power, in a protected area near the unit (the device must be able to interrupt the presumed short circuit current, whose value should be determined on the basis of the system characteristics). The minimum opening distance between the contacts should be 3 mm. Earth connection is compulsory by law and safeguards the user while the machine is in use.**
	**DANGER!** **The 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-compliant electrical connections relieve ÜNTES Inc. of all liability for damage to property and personal injury. 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 burrs.**
	**DANGER!** **Check the tightness of the screws that secure the conductors to the electrical components on the board (vibrations during handling and transport could have caused them to come loose).**
	**IMPORTANT!** **For electrical connections to the unit and the accessories, follow the wiring diagrams which are supplied with them.**

Check the voltage and network frequency, which should fall within the limit of 400-3-50 ± 6%. Check the phase unbalance: it should be under 2%.

Example:
L1-L2 = 388V, L2-L3 = 379V, L3-L1 = 377V
Measurement average = (388+379+377) / 3 = 381V
Maximum deviation from the average = 388-381 = 7V
Unbalance = (7 / 381) x 100 = 1.83 % (acceptable inasmuch as it is within the envisaged limit).

	**DANGER!** **Operation outside the limits could affect the good working order of the machine.**

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
4160	mm²	70	35	1,5
4180	mm²	70	35	1,5
4200	mm²	95	50	1,5
4230	mm²	95	50	1,5
4260	mm²	120	70	1,5
4290	mm²	150	70	1,5
4320	mm²	185	95	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 Connections Prepared by the Installer

The connections between board and switch or remote light must be made with screened cable (make sure the screening is continuous throughout the length of the 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.
Lay the cables far from power cables, cables with a different voltage and cables that emit electromagnetic disturbance.
Do not lay the cables in the vicinity of appliances that could create electromagnetic interference.

SCR Remote control selector (control with clean contact);

SEI Summer/Winter selector (control with clean contact);

LBG General lock light (230 V AC);

LFC1 Compressor 1 operating light (230 V AC);

LFC2 Compressor 2 operating light (230 V AC);

SDP Double set-point connector (DSP accessory), (control with clean contact);

CS 4÷20 mA analogue signal for setting the scrolling set-point (CS accessory).

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

	**IMPORTANT!** **When the unit is switched OFF using the remote control selector, the message *OFF by digital input* appears on the control panel display on the machine.**

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.

- **Remote summer/winter enablement on THAEY**

Connect the wires coming from the remote summer/winter selector on the **ID7** terminal present on the electronic board.
Now modify parameter **Rem. Summer/Winter**.

ATTENTION	Open contact:	heating cycle.
	Closed contact:	cooling cycle.

- **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.

- **Dual set-point management**

The DSP accessory can be used to connect a selector in order to switch between two set-points.

ATTENTION	Open contact:	Double Set-point
	Closed contact:	Set-point

II.6.1.2 Remote Management Using Accessories Supplied Loose

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.3*. 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 ÜNTES Inc., 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 located inside the technical and coil compartments. When they cut in, they cause a loud noise and violent refrigerant and oil leaks. Do not approach the safety valve cut-in pressure value. Safety valves can be ducted away in accordance with the recommendations of the valve manufacturers.**

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
High pressure safety valve	41.7 bar	-

A bleed/safety valve calibrated at 27 Barg. is provided either in the gas separator or on the suction line.

	**DANGER!** **The safety valve on the high pressure side is calibrated at 41.7 bar. It could cut in (just as the other valves of the circuit) if the calibration value is reached during the refrigerant charging operations, leading to a burst that could cause scalding.**

Configuration parameters	Standard setting
Summer working temperature set point	7°C
Winter working temperature set point (THAETY THAESY)	45°C
Antifreeze temperature set point	1.5°C
Antifreeze temperature differential	2°C
Water differential press. switch exclusion time upon start-up	120"
Water differential press. 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 STARTING UP AGAIN AFTER LONG PERIODS OUT OF USE

	**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's first start-up must be carried out by skilled technicians only, qualified to work on air conditioning and refrigerant units.**
	IMPORTANT! **A few hours before starting up the unit (at least 12), supply power to the machine in order to power the electrical heaters designed to heat up the compressor crankcase. Each time the unit starts up the crankcase heaters switch off automatically.**

	DANGER! **By removing the protection panel from the coil/fan compartment, the unit electrical supply is completely interrupted. Be careful of any possible rotation of the fan blades caused by traction or inertia.**

Once the unit installation and connection operations have been completed, the unit 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 start-up!

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 inlet/outlet direction correct? → **NO** → Correct the inlet/outlet 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**

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.

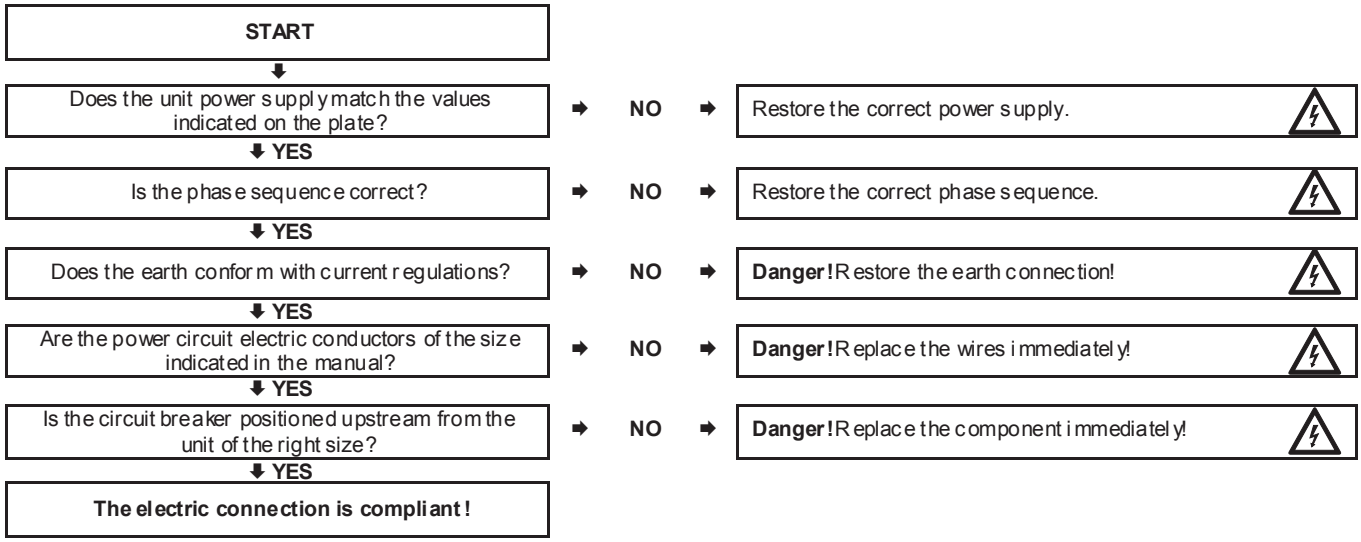
↓ **YES**

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.

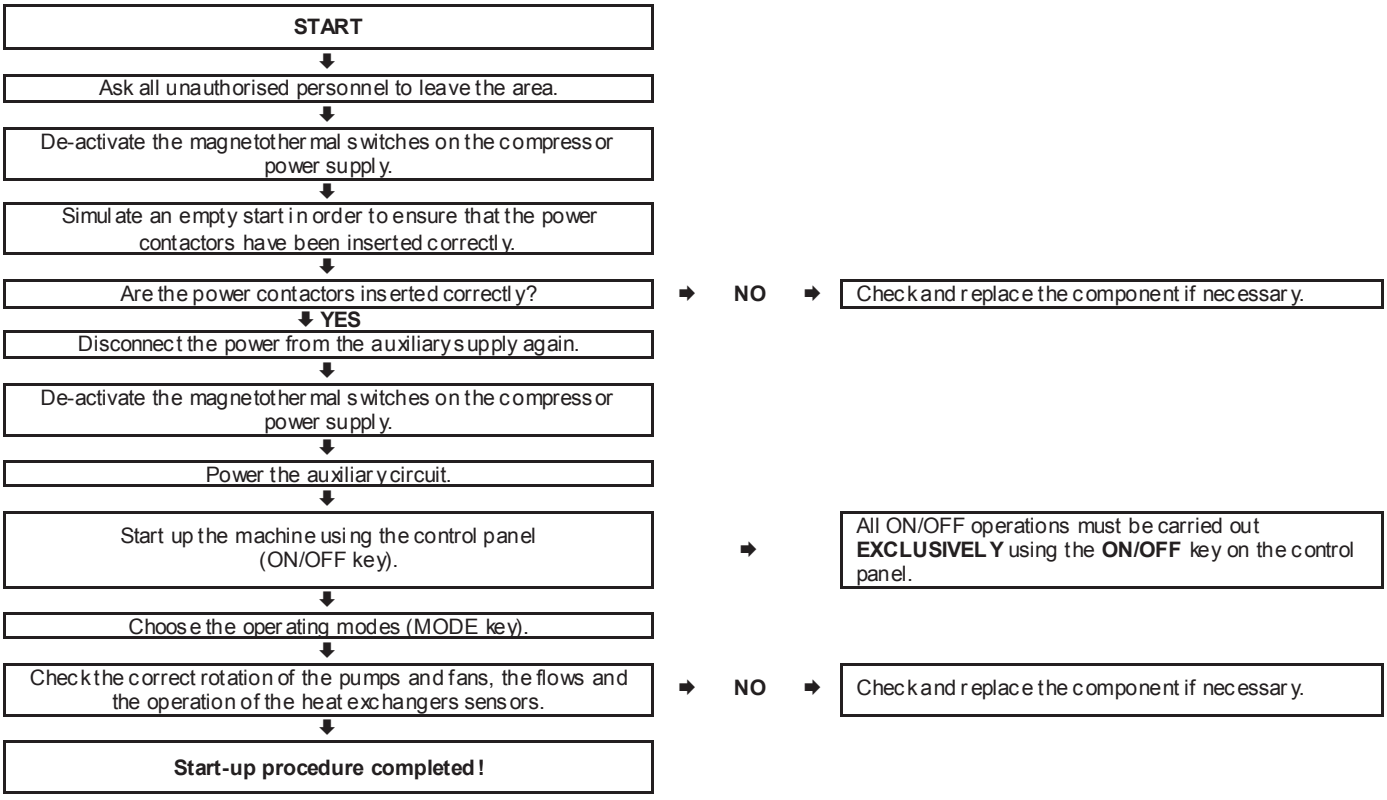
↓ **YES**

The water connections are compliant!

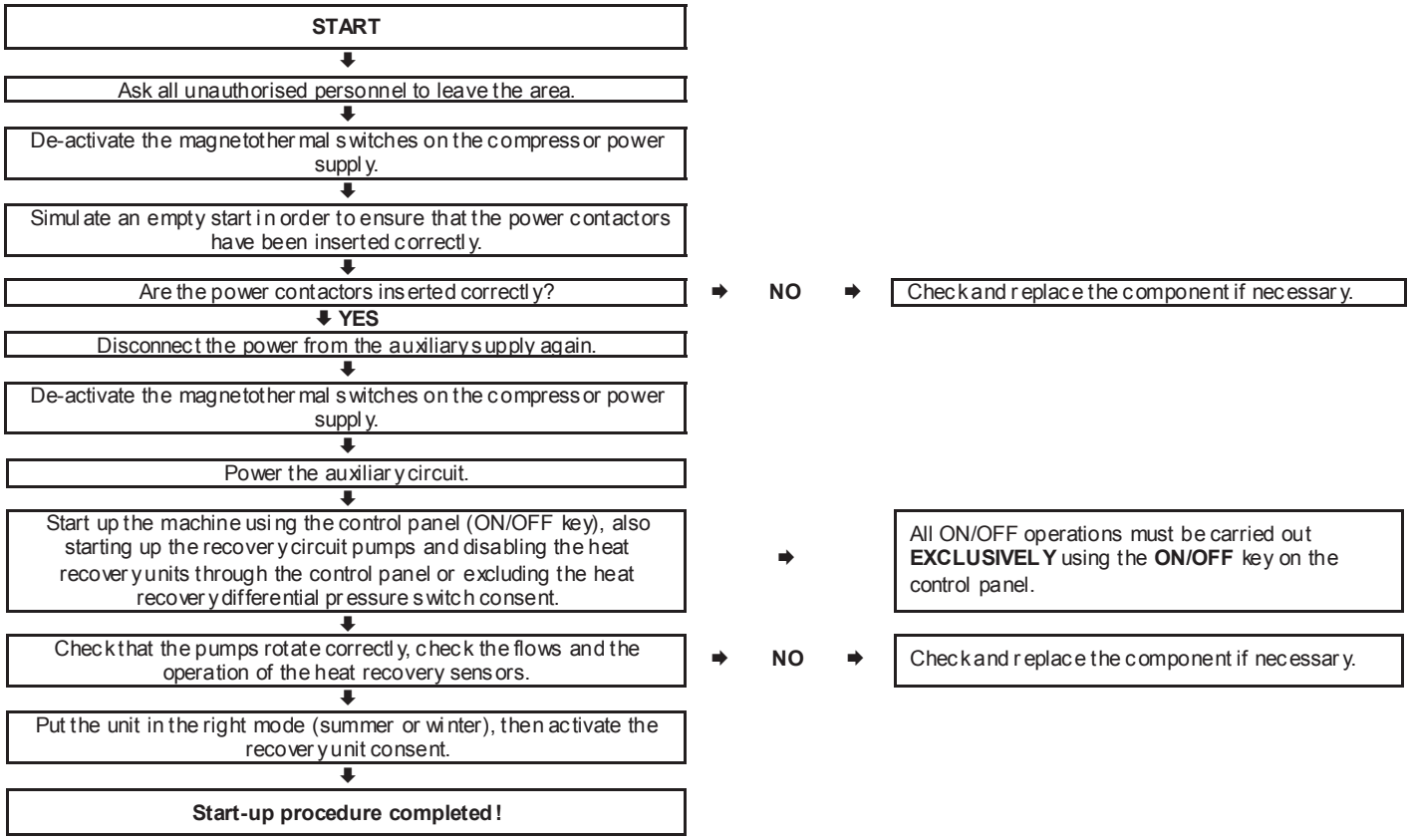
II.7.3.4 Checking the Electrical Connections



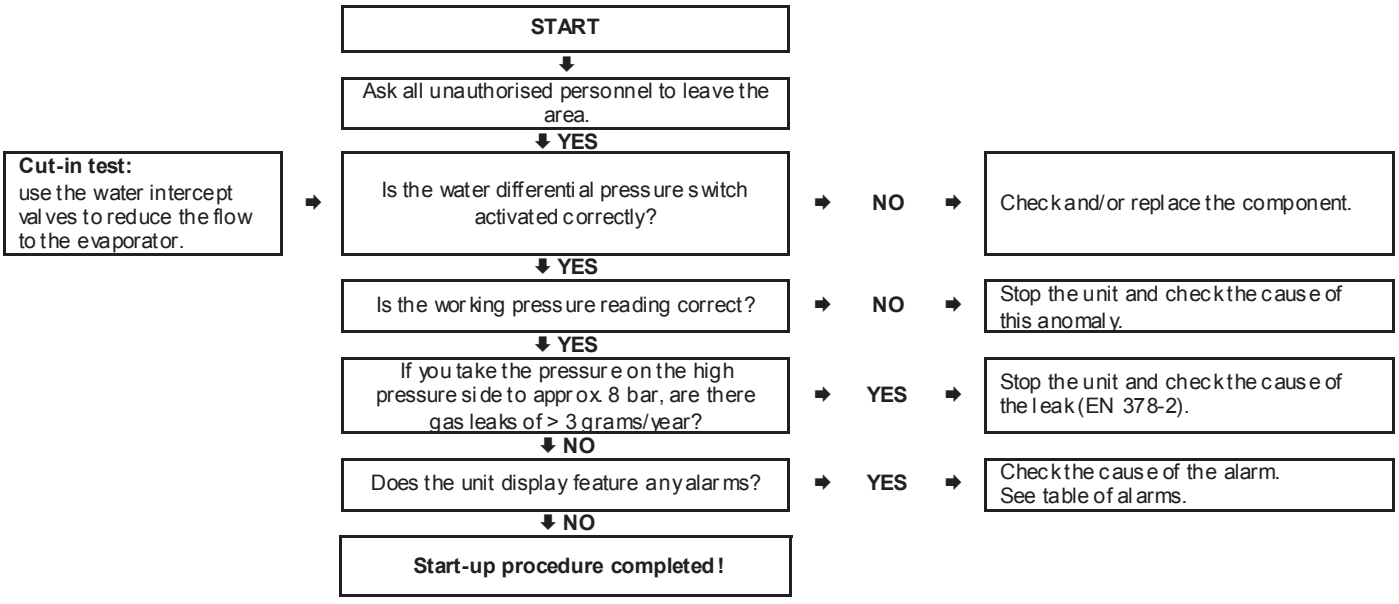
II.7.3.5 First Start-up (Standard Unit)



II.7.3.6 First Start-up (Unit with Recovery)



II.7.3.7 Checks to be Made While the Unit is Running



II.8 INSTRUCTIONS FOR FINE TUNING AND ADJUSTMENTS

II.8.1 CALIBRATION OF SAFETY AND CONTROL DEVICES

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 devices which monitor safety of the unit are the following:

- High pressure switch (PA)
- Low pressure switch (PB)
- High pressure safety valve

Safety component calibration settings

Pressure switch	Tripping	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
High pressure safety valve	41.7 bar	-

DANGER!
The safety valve on the high pressure side is calibrated at 41.7 bar. It could trip (just as the other valves of the circuit) if the calibration value is reached during the refrigerant charging operations, leading to a burst that could cause scalding.

II.8.2 FUNCTIONING OF COMPONENTS

II.8.2.1 Compressor functioning

Scroll compressors are equipped with internal circuit breaker protection. Once the circuit breaker has tripped, 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.8.2.2 Functioning of operating, antifreeze and pressure probes

The water temperature probes are inserted within a socket in contact with a conductive paste and sealed from the outside with silicon.

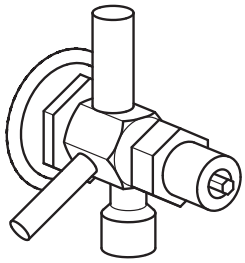
- One is placed at the entrance of the heat exchanger and measures the temperature of the return water from the system;
- the other is placed at the exit of the evaporator and acts as an operational and anti-freeze probe in units with no storage tank and only as an antifreeze probe in units with storage tank.

Always check that both wires are firmly welded to the connector and that this is properly inserted in the housing on the electronic board (see 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 triggered, this must be reset through the control panel. The unit starts up again only when the water temperature exceeds the triggering difference.

II.8.2.3 Functioning of thermostatic valve (only for heat pumps)

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.8.2.4 Functioning of electronic thermostatic valve

The electronic thermostatic expansion valve is calibrated to maintain the gas superheated by at least 6K, to avoid any liquid being sucked into the compressor. The operator is not called upon to perform calibration since the control software of the valve monitors these operations automatically.

II.8.2.5 Functioning of the PA: high pressure switch

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

II.8.2.6 Functioning of the PB: low pressure switch

After the low pressure switch has tripped, 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 MAINTENANCE

	**IMPORTANT!** **Maintenance must be carried out exclusively by skilled personnel from workshops authorised by ÜNTES Inc., qualified to work on this type of products.** **Pay attention to the danger warnings on the unit.** **Use the personal protective equipment foreseen by current laws.** **Pay the utmost attention to the indications on the appliance. Use ONLY original ÜNTES Inc. spare parts.**

	**DANGER!** **Always use the automatic master switch protecting the entire system 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 automatic master switch in the zero position.**
	**DANGER!** **Pay attention to high temperatures near the compressor heads and the supply pipes of the refrigeration circuit.**

II.9.1 ROUTINE MAINTENANCE

Control	Frequency	Notes
General cleaning and inspection of unit	Every 6 months, the unit must undergo general washing and its status must be checked.	Any points where corrosion is starting need to be touched up with protective paint.
Finned coils	Variable depending on where the unit is installed.	The coils must be kept clear from any obstructions. If needed, they must be washed with detergents and water. Brush the fins gently to keep them from being damaged. Always use the personal protective equipment foreseen by law (goggles, ear muffs, etc.).
Fans	Variable depending on where the unit is installed.	The fan grilles must be kept clear from any obstructions.
Compressor: oil check	Every 6 months	The lubricating oil level in the compressor can be checked by means of the sight-glass.
Heat exchangers	Every 12 months	Any incrustation of the heat exchangers may be detected by measuring the pressure-drop between the inlet and outlet pipes, using a differential pressure gauge.
Water filter	Every 12 months	It is mandatory to install a mesh filter on the unit's inlet water piping. This filter must be cleaned from time to time.

II.9.1.1 General cleaning and inspection of unit

Every six months, the unit should undergo a general cleaning using a moist cloth.
Every six months as well, the general conditions of the unit should be inspected. In particular, make sure there is no corrosion on the unit framework. Any corrosion detected must be treated with protective paints in order to prevent possible damage.

II.9.1.2 Cleaning finned coils

	**DANGER!** **Pay attention to the edges of the coil.**

The coils must be washed and brushed gently with water and soap.
Remove any foreign bodies from the condensing coils which may block the passage of air, such as: leaves, paper, debris, and so on;

- Replace the coils should it not be possible to clean them.

Failure to clean the coils increases pressure drops and therefore reduces overall performance of the unit in terms of its flow rate.
It is recommended to mount RPB accessories to safeguard the coils: protective coil grilles.

II.9.1.3 Cleaning fans

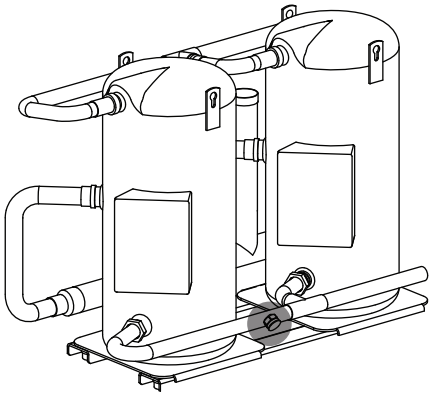
DANGER!
Pay attention to the fans. Do not remove the protective grilles for any reason whatsoever!

Check the fan grilles making sure they are not obstructed by any objects and/or filth. The latter, besides drastically reducing the overall performance of the unit, in some cases causes the fans to break.

II.9.1.4 Checking oil level in compressor

IMPORTANT!
Do not use the unit when the oil level in the compressor is low.

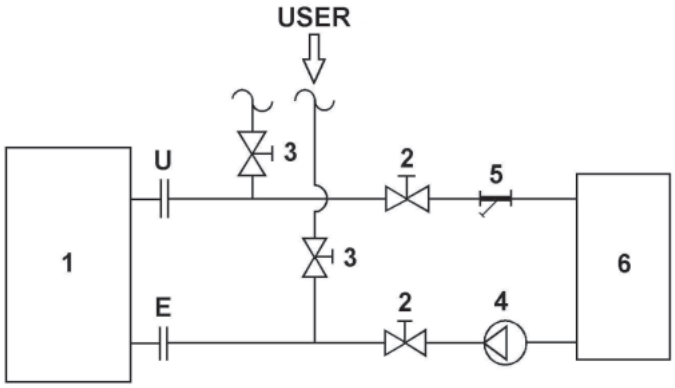
The lubricating oil level in the compressor can be checked by means of the sight-glass. The oil level in the sight-glass can be inspected while the compressor is running.
At times a small amount of oil could migrate towards the refrigeration circuit causing slight level fluctuations; they can therefore be considered normal.
Level fluctuations are also possible when capacity control is activated; in any event, the oil level must always be visible through the sight-glass.
The presence of foam when the unit starts is normal. A prolonged and excessive presence of foam during operation, on the other hand, means that the refrigerant has dissolved in the oil.



II.9.1.5 Inspecting and washing heat exchangers

DANGER!
The acids used for washing the heat exchangers are toxic. Use suitable personal protective equipment.

The plate and shell and tube heat exchangers are not subject to a particular risk of getting dirty in nominal conditions of use. The working temperatures of the unit, the speed of the water in the pipes/cabinet and the suitable finish of the heat exchanging surface reduce fouling of the exchangers to a minimum. Any incrustation of the exchanger may be detected by measuring the pressure-drop between the inlet and outlet pipes, using a differential pressure gauge, and comparing the results with the pressure-drop specified in the tables in the annex. Any sludge that may form in the water circuit or any silt that cannot be trapped by the filter, as well as extremely hard water conditions or high concentrations of any antifreeze solution used, may clog the exchangers and undermine their heat exchanging efficiency. In this case, it is necessary to wash the heat exchanger with suitable chemical detergents. If necessary, provide already existing systems with adequate charge and discharge connections or by proceeding as illustrated in the figure. Use a tank containing weak acid: 5% phosphoric acid, or if the exchangers have to be cleaned often: 5% oxalic acid. The liquid detergent must circulate around the exchanger at a flow rate at least 1.5 times higher than the rated working flow rate. The first detergent cycle cleans up the worst of the dirt. After the first cycle, carry out another cycle with clean detergent to complete the operation.
Before starting up the system again, rinse abundantly with water to get rid of any traces of acid and bleed any air from the system; if necessary start up the service pump.



1. Unit;
2. Auxiliary cock;
3. Interception shutter;
4. Wash pump;
5. Filter;
6. Acid tank.

II.9.2 SPECIAL MAINTENANCE

These are all those repairs or replacements which allow the unit to keep on working in standard conditions. The spare parts must be identical to the previous ones. Namely, they must have equivalent performance, dimensions etc. according to the specifications provided by the manufacturer.

Control	Frequency	Notes
Electrical system	Every 6 months	Besides checking the various electrical devices, the electrical insulation of all the cables and their correct tightening on the terminal boards must be verified, paying special attention to the earth connections.
Check power consumption of the unit	Every 6 months	
Check contactors on the electric panel	Every 6 months	To be performed exclusively by skilled personnel from workshops authorised by ÜNTES Inc, qualified to work on this type of products.
Fans	Every 6 months	Make sure the motors and fan blades are clean and that there are no abnormal vibrations.
Electric motor of fans	Every 6 months	The motor must be kept clean with no traces of dust, filth, oil or other impurities. These could cause it to overheat due to low heat dissipation. The bearings are usually watertight with permanent lubrication and sized in order to last approximately 20,000 hours in standard operational and environmental conditions.
Checking gas charge and humidity in circuit (with unit running at full capacity)	Every 6 months	
Make sure there are no gas leaks	Every 6 months	
Check the functioning of the maximum and minimum pressure switches	Every 6 months	To be performed exclusively by skilled personnel from workshops authorised by ÜNTES Inc., qualified to work on this type of products.
Bleeding air from the chilled water system	Every 6 months	
Drain the water system (if necessary)	Every 12 months	The unit must be drained if it remains idle during winter. In alternative, a glycol mixture can be used according to the information provided in this manual.

II.9.2.1 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 oil and refrigerant shown on the serial no. plate. The refrigerant must be piped from a cylinder in the liquid phase, so as not to alter its composition (R32/R125).
At the end of the recharge operation, repeat the unit start-up procedure and monitor the unit functioning conditions for at least 24 hours.
If, for particular reasons, i.e. in the event of a refrigerant leak, you prefer simply to top-up the refrigerant, bear in mind that there may be a slight drop in unit performance. 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.9.2.2 Restoring compressor oil level

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 should be clearly visible through the sight-glass 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 ÜNTES service centre.

II.9.3 REPAIRING AND REPLACING COMPONENTS

- 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.
- After maintenance has been performed on the unit, the liquid-humidity indicator (LUE) must be under control. After at least 12 hours of running, the refrigeration circuit of the unit must be perfectly "dry", with the LUE green, Otherwise, the filter needs to be replaced.

II.9.3.1 Replacing the drier filters

To replace the drier filters, 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.9.3.2 Instructions on how to drain the cooling circuit

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

II.9.3.3 Eliminating humidity from the circuit

If during the operation of the machine there is evidence of humidity in the refrigerant circuits, 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.10 DISMANTLING THE UNIT

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.

The unit should only be dismantled by a firm authorised for the disposal of scrap machinery/products.
The unit as a whole is composed of materials considered as secondary raw materials and the following conditions must be observed:

- the compressor oil must be removed. It must be recovered and delivered to a body authorised to collect waste oil;
- refrigerant gas should not be discharged into the atmosphere. It should instead be recovered by means of type-approved devices, stored in suitable cylinders and delivered to a company authorised for the collection;
- the filter-drier and electronic components are considered special waste, and must be delivered to a body authorised to collect such items;
- the foamed polyurethane rubber insulation material of the water exchangers must be removed and processed as urban waste.

II.11 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
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/heating with user system set point correct:	check and if necessary wait for cooling/heating) request.
Working set point too high in cooling mode (too low in heating or heat recovery 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 least 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 (in cooling mode):	check fans, check clearances around unit and possible coil obstructions.
Excessive ambient temperature:	check unit operating limits.
Insufficient water circulation on the plate exchanger (in heating or heat recovery mode):	check and adjust if necessary.
High water temperature (in heating or heat recovery mode)	check unit operating limits.
Air in the water system (in heating or heat recovery mode):	bleed the water system.
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. 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 too low in cooling mode (too high in heating or heat recovery mode):	check setting and reset.
Poor ventilation to the coils (in cooling mode):	check fans, check clearances around unit and possible coil obstructions.
Insufficient water circulation on the plate exchanger (in heating or heat recovery mode):	check and adjust as necessary.
Presence of air in the chilled/hot water system and/or heat recovery 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. 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 - THE 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 NOMINAL CONDITIONS	
Insufficient cooling air flow to the coils (in cooling mode):	check operation of fans, check clearances around unit and possible coil obstructions.
Insufficient water circulation in the heat exchanger (in heating or heat recovery mode):	check and adjust as necessary.
Presence of air in the water system (in heating or heat recovery mode):	bleed the system.
Excessive refrigerant charge:	drain the excess.
11 - LOW DELIVERY PRESSURE IN NOMINAL CONDITIONS	
Insufficient refrigerant charge.	1 identify and eliminate any leaks; 2 restore correct charge.
Presence of air in the water system (in cooling mode):	bleed the system.
Insufficient water flow to the evaporator (in cooling mode):	check water system and adjust as necessary.
Mechanical problems in the compressor:	overhaul compressor.
Excessive thermal load (in heating or heat recovery mode):	check system sizing, leaks and insulation.
Irregular working of fan speed regulator (in cooling mode):	check setting and adjust if necessary.
12 - HIGH INTAKE PRESSURE IN NOMINAL CONDITIONS	
Excessive thermal load (in cooling mode):	check system sizing, leaks and insulation.
High ambient temperature (in heating or heat recovery mode):	check unit operating limits.
Irregular operation of the expansion valve:	check operation, clean nozzle, adjust superheating, replace if necessary.
Mechanical problems in the compressor:	overhaul compressor.
Irregular working of fan speed regulator (in heating or heat recovery mode):	check setting and adjust if necessary.
13 - LOW INTAKE PRESSURE IN NOMINAL CONDITIONS	
Insufficient refrigerant charge:	1 restore correct charge. 2 identify and eliminate any leaks;
Heat exchanger damaged (in cooling mode):	1 check. 2 replace
Finned coil dirty (in heating or heat recovery mode):	1 check. 2 carry out cleaning procedure.
Irregular operation of the expansion valve:	1 check operation. 2 clean the nozzle. 3 adjust superheating. 4 replace expansion valve if necessary.
Insufficient evaporation coil ventilation (in heating or recovery mode):	1 check. 2 check clearances around unit and possible coil obstructions.
Presence of air in the water system (in cooling mode):	bleed the system.
Insufficient water flow (in cooling mode):	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 2 check pressure transducer
15 - THE UNIT DOES NOT CARRY OUT DEFROSTING (COILS ICED) in winter mode	
4-way valve damaged:	check and replace if necessary.
Pressure transducer faulty:	check and replace if necessary.

A1 TECHNICAL DATA

TCAEBY model		4160	4180	4200	4230	4260	4290	4320
Nominal cooling capacity (*)	kW	158,0	177,0	200,0	228,0	255,0	293,0	325,0
EER		2,67	2,61	2,62	2,63	2,62	2,61	2,62
ESEER		3,84	3,81	3,85	3,86	3,85	3,84	3,89
ESEER +		4,41	4,36	4,41	4,43	4,46	4,46	4,50
Sound pressure (***) (*)	dB(A)	58	60	60	62	62	63	63
Sound power level (****) (*)	dB(A)	90	92	92	94	94	95	95
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2	2
Fans	No. x kW	3 x 2,00	3 x 2,00	3 x 2,00	4 x 2,00	4 x 2,00	5 x 2,00	5 x 2,00
Fan nominal air flow	m³/h	57200	57200	56000	77000	77000	96000	93000
Water side heat exchanger water content	l	9	11	16	18	21	23	26
Water side heat exchanger nominal water flow (*)	m³/h	26,1	29,2	32,8	37,6	41,9	48,4	54,0
Water side heat exchanger nominal pressure drops (*)	kPa	62	58	57	61	58	63	64
Residual static pressure P1 (*)	kPa	116	100	137	117	101	130	95
Residual static pressure P2 (*)	kPa	174	156	213	190	171	211	179
Residual static pressure ASP1 (*)	kPa	-	-	-	109	92	119	81
Residual static pressure ASP2 (*)	kPa	-	-	-	182	162	199	164
Tank water content (ASP1/ASP2)	l	-	-	-	750	750	750	750
R410A refrigerant charge		See serial No. plate						
Polyester oil charge		See compressor plate						
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Absorbed power (*) (●)	kW	59,2	67,9	76,3	86,7	97,4	112,1	124,1
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5	5,5/7,5
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary power supply	V-ph-Hz	230 – 1+N – 50						
Control power supply	V-ph-Hz	24 – 1 – 50						
Nominal current (■)	A	107,0	119,0	129,0	145,0	163,0	183,0	203,0
Maximum current (■)	A	128,0	139,0	150,0	170,0	186,0	217,0	244,0
Start-up current (■)	A	297,0	329,0	340,0	399,0	416,0	471,0	498,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Height (a)	mm	2135	2135	2135	2135	2135	2135	2135
Width (b)	mm	1190	1190	1190	1190	1190	1190	1190
Length (c)	mm	3130	3130	3130	4090	4090	5050	5050
Heat exchanger inlet/outlet connections (Victaulic)	Ø	2"½	2"½	3"	3"	3"	3"	3"

(*) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at the evaporator 5 K; fouling factor equal to 0.35×10^{-4} m² K/W.

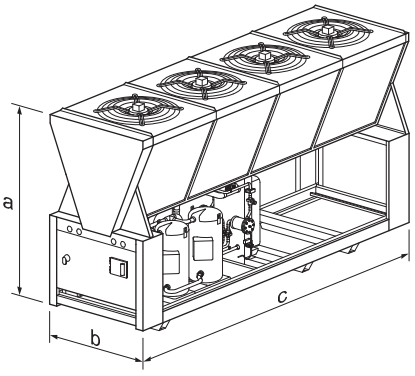
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

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

N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
If the SIL accessory is present, the cooling capacity is reduced by 4%; the sound power level is reduced by 6 dB(A).
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



TCAETY model		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Nominal cooling capacity (*)	kW	166,0	189,0	210,0	234,0	266,0	303,0	337,0
EER		2,97	2,90	2,87	2,86	2,89	2,86	2,80
ESEER		4,29	4,24	4,17	4,17	4,23	4,20	4,15
ESEER +		4,94	4,87	4,79	4,79	4,91	4,88	4,81
Sound pressure (***) (*)	dB(A)	54	59	59	60	61	61	61
Sound power level (****) (*)	dB(A)	86	91	91	92	93	93	93
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2	2
Fans	No. x kW	6 x 0,69	4 x 2,00	4 x 2,00	4 x 2,00	6 x 2,00	6 x 2,00	6 x 2,00
Fan nominal air flow	m³/h	54300	73600	73600	80800	11400	11000	11000
Water side heat exchanger water content	l	16	16	18	21	23	26	31
Water side exchanger nominal water flow (*)	m³/h	27,5	31,2	34,5	38,6	44,1	50,3	55,8
Water side heat exchanger nominal pressure drops (*)	kPa	40	52	52	51	54	56	53
Residual static pressure P1 (*)	kPa	128	90	133	116	89	116	79
Residual static pressure P2 (*)	kPa	185	145	208	188	157	198	163
Residual static pressure ASP1 (*)	kPa	123	83	125	106	75	99	58
Residual static pressure ASP2 (*)	kPa	180	138	200	178	143	180	142
Tank water content (ASP1/ASP2)	l	750	750	750	750	750	750	750
R410A refrigerant charge		See serial No. plate						
Polyester oil charge		See compressor plate						
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Absorbed power (*) (●)	kW	55,9	65,1	73,2	81,8	92,2	105,9	120,5
Pump absorbed power (P1/ASP1(/ (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5	5,5/7,5
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary power supply	V-ph-Hz	230 – 1+N – 50						
Control power supply	V-ph-Hz	24 – 1 – 50						
Nominal current (■)	A	101,0	117,0	128,0	144,0	163,0	181,0	204,0
Maximum current (■)	A	123,0	143,0	154,0	170,0	194,0	221,0	248,0
Start-up current (■)	A	292,0	333,0	344,0	399,0	424,0	475,0	502,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Height (a)	mm	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	2090	2090	2090	2090	2090	2090	2090
Length (c)	mm	3700	3700	3700	4800	4800	4800	4800
Exchanger inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"
DS/RC100 inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"

(*) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at the evaporator 5 K; fouling factor equal to 0.35×10^{-4} m² K/W.

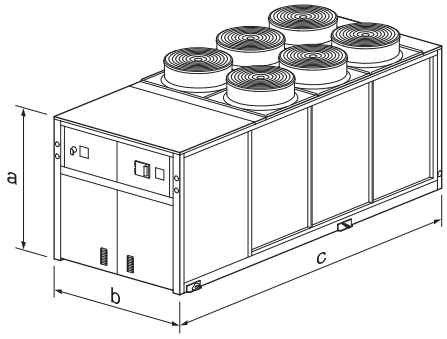
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

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

N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



TCAESY model		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Nominal cooling capacity (*)	kW	159,0	184,0	200,0	224,0	256,0	292,0	321,0
EER		2,84	2,80	2,71	2,71	2,86	2,71	2,65
ESEER		4,10	4,09	3,94	3,94	4,17	3,96	3,92
ESEER +		4,72	4,70	4,52	4,52	4,84	4,61	4,55
Sound pressure (***) (*)	dB(A)	51	54	54	55	57	57	57
Sound power level (****) (*)	dB(A)	83	86	86	87	89	89	89
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2	2
Fans	No. x kW	6 x 0,48	4 x 1,25	4 x 1,25	4 x 1,25	6 x 1,25	6 x 1,25	6 x 1,25
Fan nominal air flow	m³/h	42000	56800	56800	63600	90000	85400	85400
Water side heat exchanger water content	l	16	16	18	21	23	26	31
Water side heat exchanger nominal water flow (*)	m³/h	26,3	30,4	32,9	36,9	42,2	48,2	53,0
Water side heat exchanger nominal pressure drops (*)	kPa	37	49	48	47	51	52	48
Residual static pressure P1 (*)	kPa	138	99	143	127	100	132	104
Residual static pressure P2 (*)	kPa	196	154	219	200	169	213	187
Residual static pressure ASP1 (*)	kPa	133	92	135	117	87	116	84
Residual static pressure ASP2 (*)	kPa	191	148	212	191	157	197	167
Tank water content (ASP1/ASP2)	l	750	750	750	750	750	750	750
R410A refrigerant charge		See serial No. plate						
Polyester oil charge		See compressor plate						
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Absorbed power (*) (●)	kW	55,9	65,7	73,9	82,8	89,6	107,8	121,3
Pump absorbed power (P1/ASP1(/ (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5	5,5/7,5
Electrical power supply	V-ph-Hz	400 – 3+N – 50						
Auxiliary power supply	V-ph-Hz	230 – 1+N – 50						
Control power supply	V-ph-Hz	24 – 1 – 50						
Nominal current (■)	A	103,0	114,0	126,0	142,0	157,0	177,0	203,0
Maximum current (■)	A	123,0	143,0	154,0	170,0	194,0	221,0	248,0
Start-up current (■)	A	292,0	333,0	344,0	399,0	424,0	475,0	502,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Height (a)	mm	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	2090	2090	2090	2090	2090	2090	2090
Length (c)	mm	3700	3700	3700	4800	4800	4800	4800
Exchanger inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"
DS/RC100 inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"

(*) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at the evaporator 5 K; fouling factor equal to 0.35×10^{-4} m² K/W.

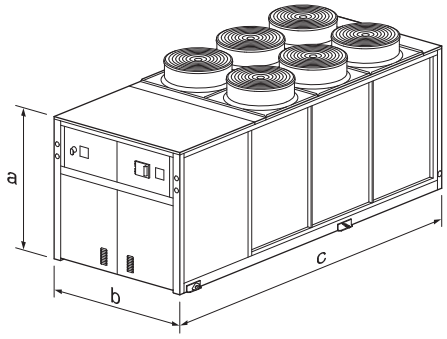
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

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

N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



TCAEQY model		4160	4180	4200	4230	4260	4290
Nominal cooling capacity (*)	kW	145,0	173,0	190,0	222,0	239,0	272,0
EER		2,35	2,58	2,36	2,58	2,46	2,36
ESEER		3,39	3,75	3,45	3,75	3,60	3,45
ESEER +		3,90	4,30	3,96	4,30	4,17	4,01
Sound pressure (***) (*)	dB(A)	48	51	51	52	53	53
Sound power level (****) (*)	dB(A)	80	83	83	84	85	85
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2
Fans	No. x kW	6 x 0,34	6 x 0,48	6 x 0,48	8 x 0,48	8 x 0,48	8 x 0,48
Fan nominal air flow	m³/h	30600	42000	42000	60800	60800	58000
Water side heat exchanger water content	l	16	16	18	21	23	26
Water side exchanger nominal water flow (*)	m³/h	23,7	28,1	31,1	36,2	39,1	44,4
Water side heat exchanger nominal pressure drops (*)	kPa	32	44	42	46	44	44
Residual static pressure P1 (*)	kPa	156	116	155	129	119	161
Residual static pressure P2 (*)	kPa	216	173	232	203	191	240
Residual static pressure ASP1 (*)	kPa	152	111	148	120	109	147
Residual static pressure ASP2 (*)	kPa	212	167	225	194	180	226
Tank water content (ASP1/ASP2)	l	750	750	750	750	750	750
R410A refrigerant charge				See serial No. plate			
Polyester oil charge				See compressor plate			
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**
Absorbed power (*) (●)	kW	61,7	67,0	80,5	86,2	97,1	115,2
Pump absorbed power (P1/ASP1) / (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5
Electrical power supply	V-ph-Hz			400 – 3+N – 50			
Auxiliary power supply	V-ph-Hz			230 – 1+N – 50			
Control power supply	V-ph-Hz			24 – 1 – 50			
Nominal current (■)	A	109,0	116,0	130,0	141,0	160,0	185,0
Maximum current (■)	A	123,0	134,0	145,0	164,0	180,0	207,0
Start-up current (■)	A	292,0	325,0	336,0	393,0	410,0	461,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**
Height (a)	mm	2000	2000	2000	2000	2000	2000
Width (b)	mm	2090	2090	2090	2090	2090	2090
Length (c)	mm	3700	3700	3700	4800	4800	4800
Exchanger inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"
DS/RC100 inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"

(*) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at the evaporator 5 K; fouling factor equal to 0.35×10^{-4} m² K/W.

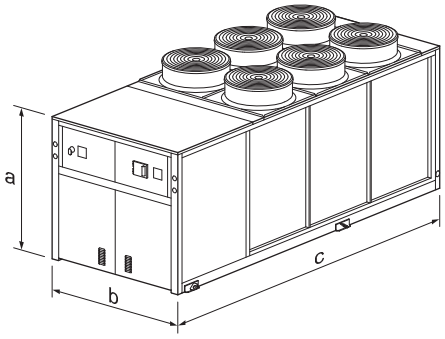
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

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

N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



THAETY model		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Nominal cooling capacity (*)	kW	163,0	186,0	207,0	231,0	264,0	301,0	334,0
EER		2,91	2,84	2,82	2,81	2,84	2,83,	2,83
ESEER		4,16	4,11	4,04	4,04	4,10	4,07	4,03
ESEER +		4,79	4,72	4,64	4,64	4,76	4,73	4,67
Nominal heating capacity (**)	kW	171,0	196,0	227,0	248,0	281,0	318,0	353,0
C.O.P.		3,14	3,00	3,08	3,04	3,04	3,01	3,01
Sound pressure (***) (*)	dB(A)	54	59	59	60	61	61	61
Sound power level (****) (*)	dB(A)	86	91	91	92	93	93	93
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2	2
Fans	No. x kW	6 x 0,69	4 x 2,00	4 x 2,00	4 x 2,00	6 x 2,00	6 x 2,00	6 x 2,00
Fan nominal air flow	m³/h	54300	73600	80800	80800	11400	11000	11000
Water side heat exchanger water content	l	16	16	18	21	23	26	31
Water side exchanger nominal water flow (*)	m³/h	27,1	30,7	33,8	38,1	43,4	49,6	54,9
Nom. pressure drops, water side heat exchanger (*)	kPa	39	50	50	49	52	54	51
Nom. pressure drops, water side heat exchanger (**)		47	59	67	63	65	67	64
Residual static pressure P1 (*)	kPa	132	95	135	120	92	121	85
Residual static pressure P2 (*)	kPa	189	151	210	193	160	202	169
Residual static pressure ASP1 (*)	kPa	127	89	127	110	79	103	64
Residual static pressure ASP2 (*)	kPa	184	144	202	183	147	185	148
Tank water content (ASP1/ASP2)	l	750	750	750	750	750	750	750
R410A refrigerant charge					See serial No. plate			
Polyester oil charge					See compressor plate			
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Absorbed power in summer operation (*) (●)	kW	56,1	65,4	73,3	82,3	93,0	106,4	118,2
Absorbed power in winter operation (**) (●)	kW	54,5	65,3	73,7	81,5	92,4	105,7	117,4
Pump absorbed power (P1/ASP1(/ (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5	5,5/7,5
Electrical power supply	V-ph-Hz				400 – 3+N – 50			
Auxiliary power supply	V-ph-Hz				230 – 1+N – 50			
Control power supply	V-ph-Hz				24 – 1 – 50			
Nominal current in summer operation (*) (■)	A	101,0	11,70	127,0	144,0	163,0	181,0	204,0
Maximum current (■)	A	123,0	143,00	154,0	170,0	194,0	221,0	248,0
Start-up current (■)	A	292,0	333,0	344,0	399,0	424,0	475,0	502,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Height (a)	mm	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	2090	2090	2090	2090	2090	2090	2090
Length (c)	mm	3700	3700	4800	4800	4800	4800	4800
Exchanger inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"
DS/RC100 inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"

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

(**) In the following conditions: Evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 45°C; temperature differential at condenser 5°C; fouling factor equal to $0.35x10^{-4}$ m^2 K/W.

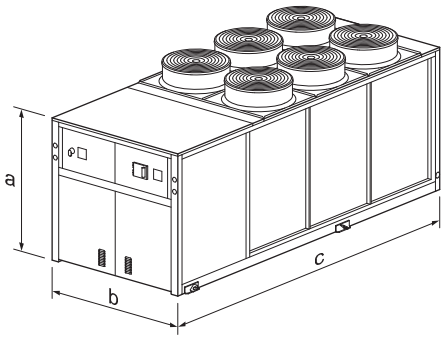
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

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

N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



THAESY model		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Nominal cooling capacity (*)	kW	157,0	181,0	200,0	220,0	255,0	288,0	317,0
EER (1st step)		2,77	2,74	2,70	2,64	2,73	2,66	2,65
ESEER		3,97	3,97	3,82	3,82	4,04	3,84	3,81
ESEER +		4,57	4,56	4,38	4,38	4,69	4,46	4,41
Nominal heating capacity (**)	kW	167,0	191,0	221,0	240,0	274,0	312,0	344,0
C.O.P.		3,13	3,01	3,12	3,07	3,08	3,10	3,06
Sound pressure (***) (*)	dB(A)	51	54	54	55	57	57	57
Sound power level (****) (*)	dB(A)	83	86	86	87	89	89	89
Scroll/step compressor	No.	4/4	4/4	4/4	4/4	4/4	4/4	4/4
Circuits	No.	2	2	2	2	2	2	2
Fans	No. x kW	6 x 0,48	4 x 1,25	4 x 1,25	4 x 1,25	6 x 1,25	6 x 1,25	6 x 1,25
Fan nominal air flow	m³/h	42000	56800	56800	63600	90000	85400	85400
Water side heat exchanger water content	l	16	16	18	21	23	26	31
Water side exchanger nominal water flow (*)	m³/h	25,9	29,9	32,4	36,4	41,5	47,5	52,2
Nom. pressure drops, water side heat exchanger (*)	kPa	36	47	47	46	49	51	46
Nom. pressure drops, water side heat exchanger (**)		44	56	62	60	62	64	61
Residual static pressure P1 (*)	kPa	141	104	142	131	102	138	110
Residual static pressure P2 (*)	kPa	199	160	218	204	172	218	193
Residual static pressure ASP1 (*)	kPa	136	98	134	121	90	122	91
Residual static pressure ASP2 (*)	kPa	194	154	211	195	160	202	174
Tank water content (ASP1/ASP2)	l	750	750	750	750	750	750	750
R410A refrigerant charge					See serial No. plate			
Polyester oil charge					See compressor plate			
Electrical data		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Absorbed power in summer operation (*) (●)	kW	56,6	66,0	84,1	83,2	93,5	108,3	119,4
Absorbed power in winter operation (**) (●)	kW	53,4	63,4	70,8	78,3	89,0	100,8	112,4
Pump absorbed power (P1/ASP1(/ (P2/ASP2)	kW	2,2/3,0	2,2/3,0	4,0/5,5	4,0/5,5	4,0/5,5	5,5/7,5	5,5/7,5
Electrical power supply	V-ph-Hz				400 – 3+N – 50			
Auxiliary power supply	V-ph-Hz				230 – 1+N – 50			
Control power supply	V-ph-Hz				24 – 1 – 50			
Nominal current in summer operation (*) (■)	A	103,0	114,0	124,0	142,0	157,0	177,0	203,0
Maximum current (■)	A	123,0	143,	154,0	170,0	194,0	221,0	248,0
Starting current	A	292,0	333,0	344,0	399,0	424,0	475,0	502,0
Pump absorbed power (P1/ASP1) / (P2/ASP2)	A	5,0/6,0	5,0/6,0	8,0/11,0	8,0/11,0	8,0/11,0	11,0/15,0	11,0/15,0
Dimensions		**4160**	**4180**	**4200**	**4230**	**4260**	**4290**	**4320**
Height (a)	mm	2000	2030	2030	2030	2030	2030	2030
Width (b)	mm	2090	2090	2090	2090	2090	2090	2090
Length (c)	mm	3700	3700	4800	4800	4800	4800	4800
Exchanger inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"
DS/RC100 inlet/outlet connections	Ø	2"½	2"½	3"	3"	3"	3"	3"

(*) In the following conditions: condenser inlet air temperature 35°C; chilled water temperature 7°C; temperature differential at the evaporator 5 K; fouling factor equal to 0.35×10^{-4} m² K/W.

(**) In the following conditions: Evaporator inlet air temperature 7°C D.B., 6°C W.B.; hot water temperature 45°C; temperature differential at condenser 5°C; fouling factor equal to 0.35×10^{-4} m² K/W.

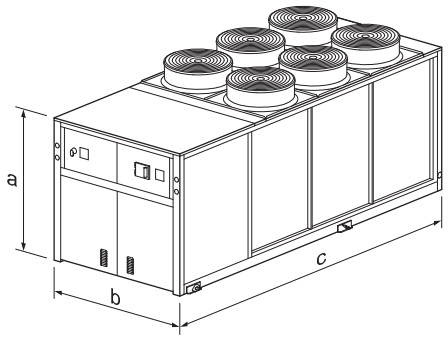
(***) Sound pressure level in dB(A) referring to a 10 m distance from the unit, in free field and directionality factor equal to Q=2. The noise data refers to the units without the electric pump.

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

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

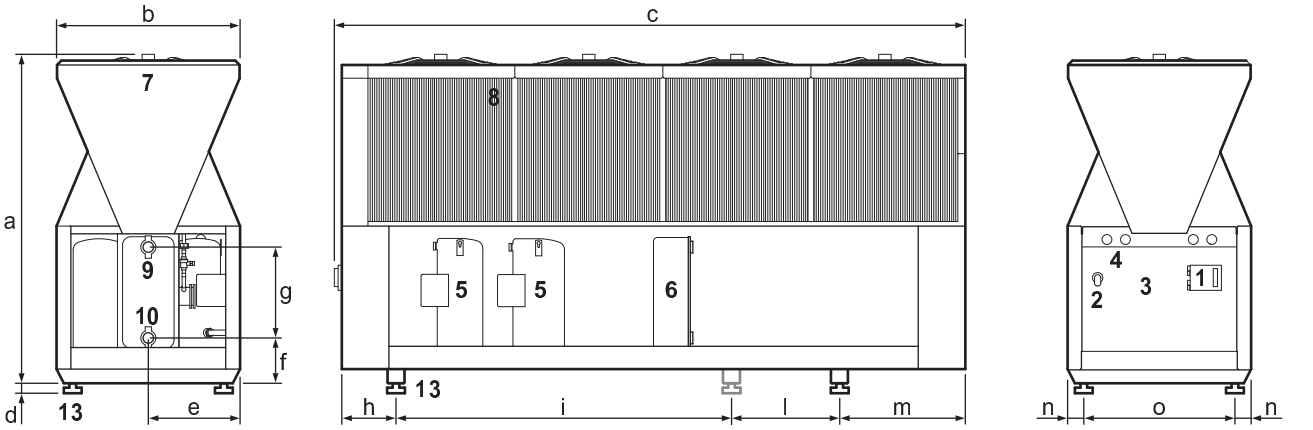
(●) Power absorbed by the unit without motor-driven pump.

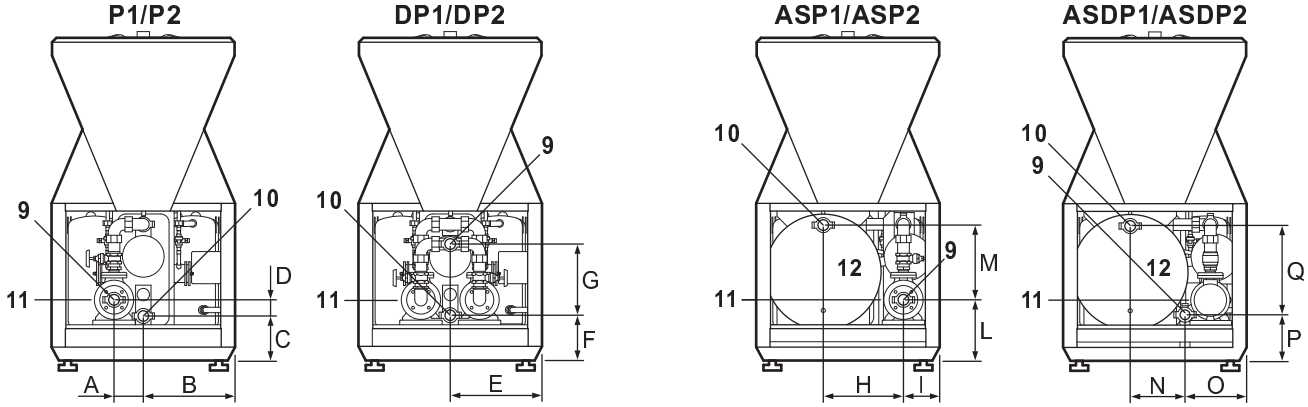
N.B.:
The calculation of the EER and C.O.P. does not take the pump absorption into account.
With an external air temperature of under 35°C in the presence of the FI10 accessory (as standard in versions S and Q), the machine noise levels fall to below the nominal value indicated in the table.



A2 DIMENSIONS AND FOOTPRINTS

TCAEBY





1. Control panel;
2. Isolator;
3. Electrical board;
4. Refrigerant circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Main exchanger water inlet;
10. Main exchanger water outlet;
11. Motor-driven pump;
12. Water buffer tank;
13. Anti-vibration support (KSA/KSAM accessory).

TCAEBY

Model		a	b	c	d	e	f	g	h	i	l	m	n	o
4160	mm	2135	1190	3130	80÷150	595	435	455	350	2075	-	655	72	1046
4180	mm	2135	1190	3130	80÷150	595	435	455	350	2075	-	655	72	1046
4200	mm	2135	1190	3130	80÷150	595	295	590	350	2075	-	655	72	1046
4230	mm	2135	1190	4090	80÷150	595	295	590	350	2175	700	815	72	1046
4260	mm	2135	1190	4090	80÷150	595	295	590	350	2175	700	815	72	1046
4290	mm	2135	1190	5050	80÷150	595	295	590	350	1725	1795	1130	72	1046
4320	mm	2135	1190	5050	80÷150	595	295	590	350	1725	1795	1130	72	1046

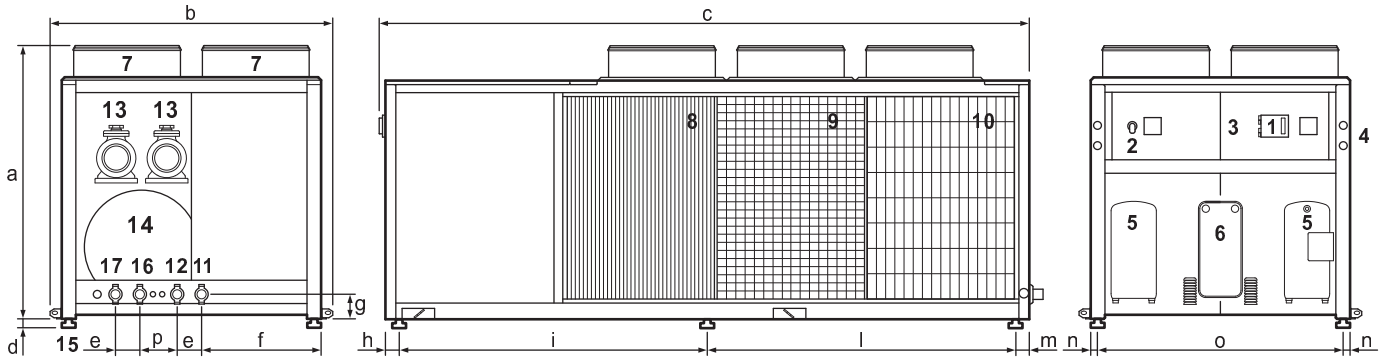
Model		4160	4180	4200	4230	4260	4290	4320
Exchanger inlet/outlet connections	Ø	2 ½"	2 ½"	3"	3"	3"	3"	3"

TCAEBY

Model		A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q
4160	mm	190	595	355	80	595	435	280	-	-	-	-	-	-	-	-
4180	mm	190	595	355	80	595	435	280	-	-	-	-	-	-	-	-
4200	mm	190	595	295	90	595	295	455	-	-	-	-	-	-	-	-
4230	mm	190	595	295	90	595	295	455	520	235	385	490	350	400	290	585
4260	mm	190	595	295	90	595	295	455	520	235	385	480	350	400	290	585
4290	mm	190	595	295	80	595	295	440	520	235	375	500	350	400	290	585
4320	mm	190	595	295	80	595	295	440	520	235	375	500	350	400	290	585

Model		4160	4180	4200	4230	4260	4290	4320
Exchanger inlet/outlet connections	Ø	2 ½"	2 ½"	3"	3"	3"	3"	3"

TCAETY-TCAESY-TCAEQY-THAETY-THAESY



1. Control panel;
2. Isolator;
3. Electrical board;
4. Refrigerant circuit pressure gauges (GM accessory);
5. Compressor;
6. Evaporator;
7. Fan;
8. Finned coil;
9. Metal filter (FMB accessory);
10. Coil protection mesh (RPB accessory);
11. Main exchanger water inlet;
12. Main exchanger water outlet;
13. Motor-driven pump;
14. Water buffer tank;
15. Anti-vibration support (KSA/KSAM accessory);
16. Recovery water inlet (DS – RC100 accessory);
17. Recovery water inlet (DS – RC100 accessory);

TCAETY-TCAESY

Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
4160	mm	2000	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4180	mm	2030	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4200	mm	2030	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4230	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4260	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4290	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4320	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300

TCAEQY

Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
4160	mm	2000	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4180	mm	2000	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4200	mm	2000	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4230	mm	2000	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4260	mm	2000	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4290	mm	2000	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300

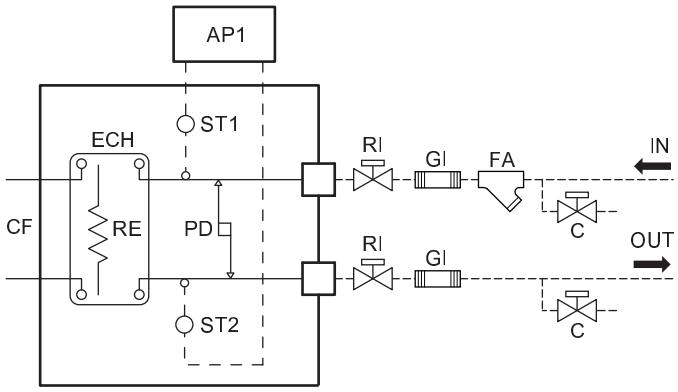
THAETY-THAESY

Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
4160	mm	2000	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4180	mm	2030	2090	3700	80÷150	180	880	185	150	1670	1670	150	50	1815	300
4200	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4230	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4260	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4290	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300
4320	mm	2030	2090	4800	80÷150	180	880	185	150	2220	2220	150	50	1815	300

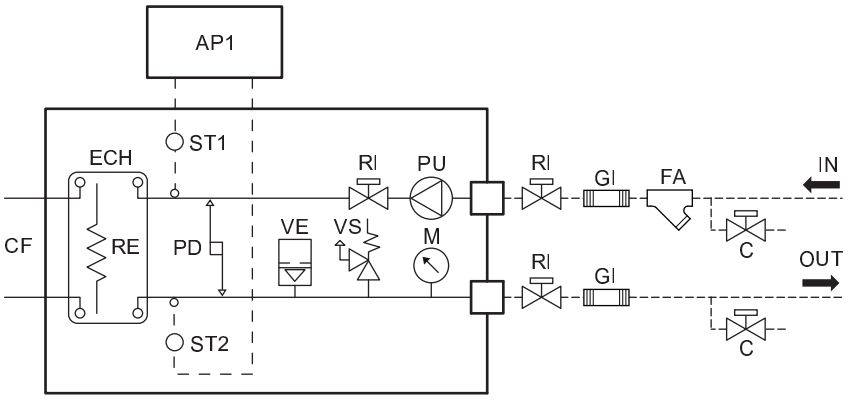
Model		4160	4180	4200	4230	4260	4290	4320
Exchanger inlet/outlet connections	Ø	2 ½"	2 ½"	3"	3"	3"	3"	3"
DS – RC100 inlet/outlet connections	Ø	2 ½"	2 ½"	3"	3"	3"	3"	3"

A3 WATER CIRCUIT

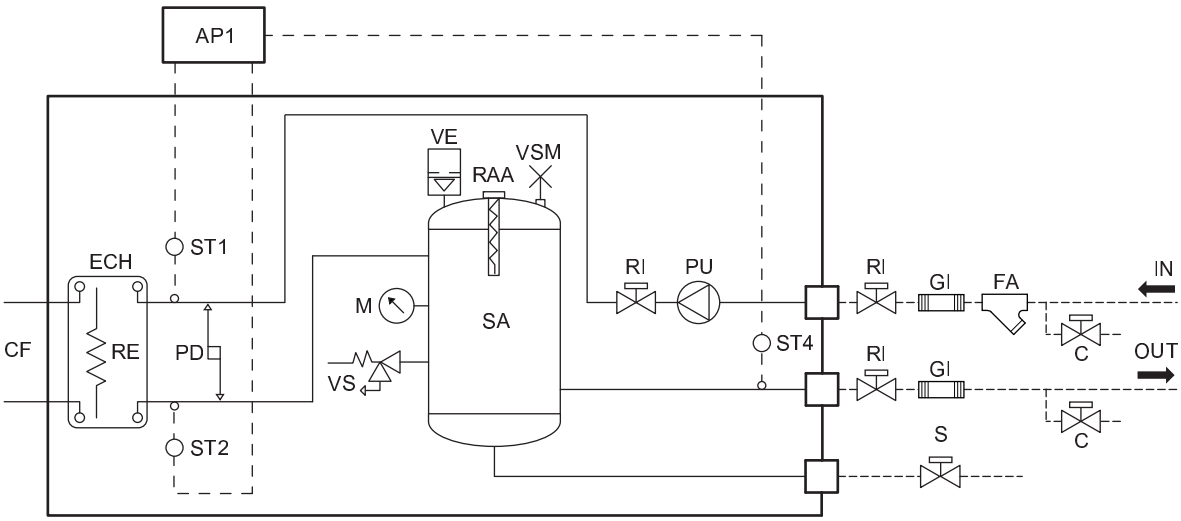
Standard



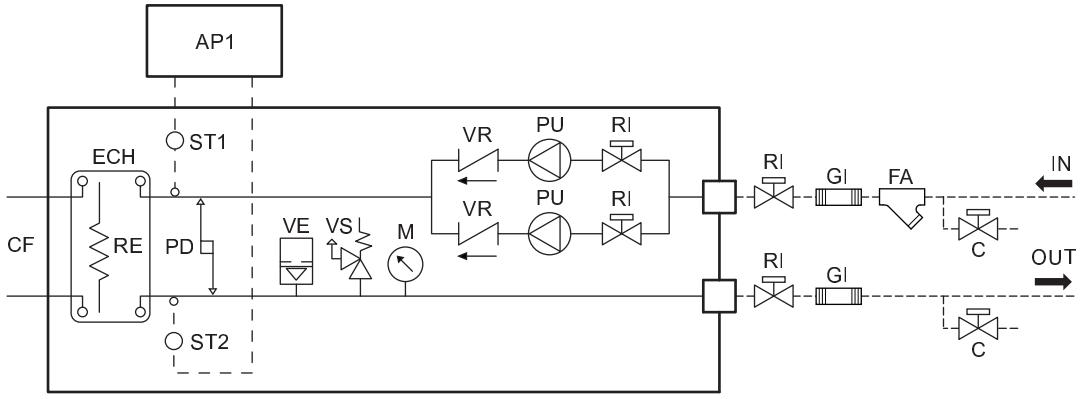
P1 – P2



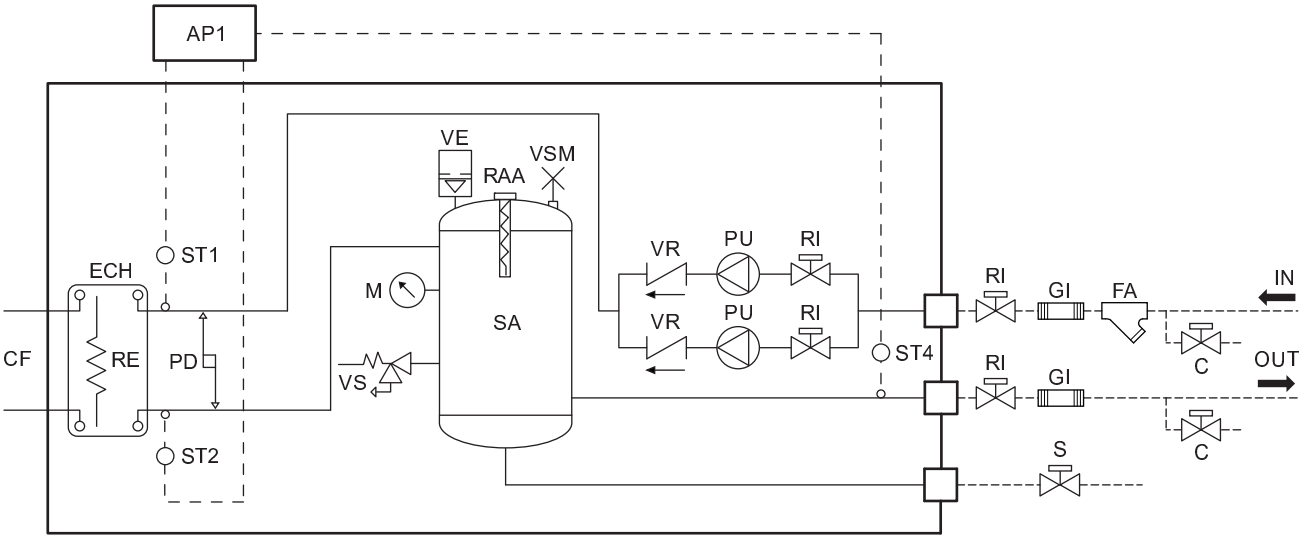
ASP1 – ASP2



DP1 – D P2



ASDP1 – ASDP2



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

NOTE

NOTE

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