



INVERTER AIR/WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS AND WALL FLOOR-STANDING REMOTE CONDENSING UNITS

USER'S AND INSTALLER'S MANUAL

Models THRON AGR2



Indoor unit Mod. TA1/xxR2



Outdoor unit TEx/xxAG

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Catalogo / Catalogue / Katalog / Catalogue MUI14110H8020-00				Serie / Series / Serie / Serie / Série INVERTER AIR/WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS AND FLOOR-STANDING REMOTE CONDENSING UNITS
Possible wasted electrical or electronic devices/products should not be located together with normal domestic waste, but disposed according to the current WEEE law in compliance with the European Directive 2012/19/UE. Please inform yourself at your local Administration or at your reseller in case the product will be replaced with a similar one.				



CE CONFORMITY DECLARATION

DICHIARAZIONE DI CONFORMITÀ CE



THE COMPANY AEFOR S.R.L. – VIA DELL'INDUSTRIA 5A – 35020 – BUGINE - PADOVA - ITALY
LA SOCIETÀ AERFOR S.R.L. – VIA DELL'INDUSTRIA 5A – 35020- BRUGINE – PADOVA - ITALY

DECLARES
DICHIARA

that the unit:
che la macchina:

Definition	Air to water reversible heat pump with remote condenser unit /
Definizione:	Pompa di calore aria-acqua reversibile con unità condensante remota
Model N°:	THRON 06 AGR2, THRON 08 AGR2, THRON 10 AGR2, THRON 12 AGR2,
N° modello:	THRON 14 AGR2, THRON 14T AGR2, THRON 16T AGR2

Serie N°:
N° di serie:

MEETS THE REQUIREMENTS OF DIRECTIVE 2006/42/CE
È CONFORME AI REQUISITI DELLA DIRETTIVA 2006/42/CE

1. The unit is in CAT. I, so it's free from the application of Directive 2014/68/UE (Reference to Art. I, paragraph 2, point f)
L'attrezzatura a pressione rientra nella CAT. I. L'unità è quindi esente dall'applicazione della normativa PED 2014/68/UE (Riferimento Art. I, paragrafo 2 punto f).
2. Harmonized standards applied to designing and manufacture : UNI EN 378-1, UNI EN378-2, UNI EN 12735-1
Norme armonizzate applicate alla progettazione ed alla costruzione : UNI EN 378-1, UNI EN378-2, UNI EN 12735-1
3. Others European Directives and harmonized standards applied to the equipment : 2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE, CEI EN 60335-2-40, CEI EN 55014-1, CEI EN 55014-2, CEI EN 61000-3-2, CEI EN 61000-3-3, CEI EN 62233
Eventuali altre Direttive Europee e norme armonizzate applicate all'attrezzatura : 2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE, CEI EN 60335-2-40, CEI EN 55014-1, CEI EN 55014-2, CEI EN 61000-3-2, CEI EN 61000-3-3, CEI EN 62233

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The THORN AGR2 manual includes all the necessary information for the better use of the equipment under safety conditions for the operator thus meeting the requirements listed in the 2006/42/CE Equipment Directive and following amendments.

Note: All the pictures in this manual are for explanation purpose only. They may be slightly different from the unit you purchased. The actual shape shall prevail.

1 AIM AND CONTENTS OF THIS MANUAL

This manual provides basic information as for the the selection, installation, operation and maintenance of the THRON AGR2 units. It is addressed to the installer and the user of the unit: it allows to operate this equipment efficiently, even if the user do not have any previous specific knowledge of it.

This manual describes the characteristics of the equipment when it was being put on the market; therefore, it may not capture later technological improvements introduced by the company as part of its constant endeavour to enhance the performance, ergonomics, safety and functionality.

The company introduces also technological improvements and is not constrained to update the manuals for previous versions of appliances that could not be compatible. So make sure to use, for the installed unit, the supplied manual.

It's recommended that, the user must follow the instructions contained in this booklet, especially those concerning the safety and routine maintenance.

1.1 HOW TO KEEP THIS MANUAL




The manual has to be always kept by the user for future references. It has to be stored in a safe place, away from the dust and moisture. It has to be accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.

The company reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. It declines also any responsibility for possible inaccuracies in the manual if due to printing or transcription errors.

The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

The company is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

1.2 GRAPHIC SYMBOLS

	<i>Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment.</i>
	<i>Indicates prohibited operations.</i>
	<i>Indicates important information that the operator has to follow in order to guarantee the correct operation of the equipment in complete safety. It indicates also general notes.</i>

2 SAFETY LAWS

The THRON AGR2 units have been designed in compliance with the following Directives and Harmonised Norms:

- 2006/42/CE, 2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE Community Directives
- UNI EN 378-1, 378-2, UNI EN 12735-1 Norms
- CEI EN 60335-2-40 Norm
- CEI EN 55014-1, CEI EN 55014-2, CEI EN 61000-3-2, CEI EN 61000-3-3, CEI EN 62233 Norms

And the following directives and regulations concerning the energy labeling and the eco-friendly products:



- Community directive 2009/125/CE and subsequent transpositions
- Community directive 2010/30/UE and subsequent transpositions
- Regulation UE No 811/2013
- Regulation UE No 813/2013

3 PERMITTED USES

- The company excludes any contractual and extracontractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.
- These units have been designed only for heating and/or cooling water. Any other use not expressly authorized by the manufacturer is considered improper and therefore not allowed.
- The location of the plant, the hydraulic and electrical circuits must be established by the planting designer and must take into account both technical requirements as well as any applicable local laws and authorized specifications.
- The execution of all works must be performed by skilled and qualified personnel and competent in the existing rules in the contry in which the appliance will be installed.



4 GENERAL SAFETY GUIDELINES

Before beginning to operate on THRON AGR2 units every user has to be perfectly knowledgeable about the functions of the equipment and its controls and has to have read and understood the information listed in this manual.

	<i>It's strictly forbidden to remove and/or tamper with any safety device.</i>
	<i>Children or unassisted disabled persons are not allowed to use the appliance.</i>
	<i>Do not touch the appliance when barefoot or parts of the body are wet or damp.</i>
	<i>Do not clean the unit when the power supply is 'ON'.</i>
	<i>Do not pull, remove or twist the electrical cables coming out from the unit, even if it is disconnected from the main power supply.</i>
	<i>Do not step with your feet on the appliance, sit down and/or place any type of object.</i>
	<i>Do not spray or pour water directly on the unit.</i>
	<i>Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc) as they may represent an environmental and life hazard.</i>
	<i>Any routine and/or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric and pneumatic power sources and after its pneumatic system has been discharged.</i>
	<i>Do not put neither your hands nor insert screwdrivers, spanners or other tools into moving parts of the equipment.</i>
	<i>The equipment supervisor and the maintenance man has to receive suitable training for the performance of their tasks in safety.</i>
	<i>Operators have to know how to use personal protective devices and have to know the accident-prevention guidelines contained in national and international laws and norms.</i>

4.1 HEALTH AND SAFETY OF WORKERS


The European Community has adopted a number of directives on workplace's health and safety, which include 89/391/CEE, 89/686/CEE, 2009/104/CE, 86/188/CEE and 77/576/CEE directives. Every employer shall implement such provisions and ensure that workers respect them:

	<i>Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations.</i>
	<i>Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the equipment</i>
	<i>The operator's workplace has to be kept clean, tidy and free from objects that may prevent free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.</i>
	<i>Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force.</i>

The unit operates with R410A refrigerant gas, which is a greenhouse gas according to the F-gas Regulation (EU) 517/2014 (mandatory in the European area). This Regulation, among the provisions, requires all operators intervening in greenhouse gas systems to be in possession of a certificate issued or recognized by the competent authority, attesting to a successful completion of an examination entitling them to carry out such work. In particular:





- Device contains up to 3kg of the total amount of refrigerant gas: Category II certificate.
- Device contains 3kg or more than 3kg of the total amount of refrigerant gas: Category I certificate.

The refrigerant R410A in gaseous form is heavier than air and tends to concentrate highly in little ventilated environments when a leak occurs. Its inhalation can cause dizziness, suffocation and can develop lethal gas if it becomes in contact with open flames or hot objects, (please see paragraph 4.4 "REFRIGERANT SAFETY DATA SHEET").

	<i>Wear appropriate Personal Protective Equipment (PPE) specifically, gloves and goggles</i>
	<i>Ensure that the workplace is well ventilated. Do not work in closed rooms or ditches with weak air circulation.</i>
	<i>Do not work on the refrigerant near open flames or near hot parts.</i>
	<i>Avoid any refrigerant leakage into the environment and pay particular attention to leakage from pipes and/or fittings after evacuating the refrigerant circuit.</i>






4.2 PERSONAL PROTECTION EQUIPMENTS

When operating and maintaining the units, please use the following personal protective equipments.

	Protective clothing: Maintenance men and operators has to wear protective clothing that complies with the basic safety requirements currently in force. In case of slippery floors, users have to wear safety shoes with non-slip soles.	
	Gloves: During maintenance or cleaning operation protection gloves have to be used	
		Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.

4.3 SAFETY SYMBOLS

The safety signs indicated on the unit which should be respected:

	General hazard.
	Electric shock hazard.
	Presence of moving organs.
	Presence of surfaces that may cause injuries.
	Presence of hot surfaces which can cause burns.

4.4 REFRIGERANT SAFETY DATA SHEET

Name:	R410A (50% Difluoromethane (R32); 50% Pentafluoroethane (R125)).
RISKS IN DICATIONS	
Major risks:	Asphyxia
Specific risks:	The rapid evaporation can cause freezing.
FIRST AID	
General informations:	Never give anything by mouth to an unconscious person.
Inhalation:	Outdoors opens transport. Use oxygen or artificial respiration if necessary. Do not give adrenaline or similar drugs
Eyes contact:	Rinse carefully with water for at least 15 minutes and consult a doctor.
Contact with skin:	Wash immediately with plenty of water. Take off immediately the contaminated clothes.
FIRE PREVENTION	
Extinguishing Media:	Whatever.
Specific risks:	Increase in pressure.
Specifics methods:	Use water spray to cool containers
MISURE IN CASO DI FUORIUSCITA ACCIDENTALE	
Personal precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use personal protective equipment.
Environmental precautions:	Evaporate.
Cleaning method:	Evaporate.
MANIPULATION AND STORAGE	
Manipulation:	
Action/technical precautions:	Provide sufficient air exchange and/or exhaust in work rooms.
Recommendations for safe use:	Do not breathe vapors or spray mist.
Storage:	Close tightly and store in a cool, dry and well ventilated place. Store in original container. Incompatible products: explosive, flammable materials, Organic peroxide
EXPOSURE CONTROL / PERSONAL PROTECTION	
Control parameters:	AEL (8-h e 12-h TWA) = 1000 ml/m ³ for each of the two components.
Respiratory protection:	For rescue and maintenance operation in storage tanks use self-contained respirator apparatus. The vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Eyes protection:	Safety glasses.
Protection of hands:	Rubber gloves.
Hygiene measures:	Do not smoke.
PHYSICAL AND CHEMICAL PROPERTIES	
Colour:	Colourless.
Odor:	Light.
Boiling point:	-52.8°C at atmospheric pressure.
Lighting point:	do not ignite.
Density:	1.08 kg/l at 25°C.
Solubility in water:	Negligible.
STABILITY AND REACTIVITY	
Stability:	No reactivity when used with the appropriate instructions.
Materials to avoid:	Highly oxidizing materials. Incompatible with magnesium, zinc, sodium, potassium and aluminum. The incompatibility is more serious if the metal is present in powder form or if the surfaces were, recently, unprotected.
Decomposition products:	These products are halogenated compounds, hydrogen fluoride, carbon oxides (CO, CO ₂), carbonyl halides.
Risks:	
TOXICOLOGICAL INFORMATION	
Acute toxicity:	(R32) LC50/ inhalation /4 hours/on rat >760 ml/l (R125) LC50/ inhalation /4 hours/on rat >3480 mg/l
Local effects:	Concentrations substantially above the TLV may cause narcotic effects.
Long term toxicity:	Inhalation of decomposed products of high concentrations may cause respiratory failure (pulmonary edema). Did not show carcinogenic, teratogenic or mutagenic effects in animal experiments.
ECOLOGICAL INFORMATION	
Global warming potential	2088
GWP (R11=1):	
Potential depletion	0
Ozone ODP (R11=1):	
Disposal considerations:	Usable with reconditioning.

5 GENERAL CHARACTERISTICS

5.1 MODELS THRON AGR2 (TA1/xxR2 + TEx/xxAG)

As standard:

- 1) Puffer for technical water of 190 liters for DHW (domestic hot water) and plant technical puffer of 40 liters, with polyurethane coating of 50 mm thick.
- 2) Circulator of the heat pump and the rapid preparer of high efficiency according to ErP directive up to values of $EEI \leq 0.21$.
- 3) Exchangers of the heat pump and of the DHW rapid producer in stainless steel AISI 304.
- 4) Integrated Y filter with impurities discharge valve.
- 5) Tap of water loading/unloading for both DHW technical side and plant side.
- 6) Automatic air vent valves mounted on the plant side and on the DHW technic side.
- 7) Double manometer 6 bar to measure the water flow/load losses.
- 8) Double expansion vessels of 8 liters, one on the plant circuit side and the other on DHW technic side.
- 9) 3 bar pressure relief valve to be connected with to a collecting system.
- 10) Flow switch for heat exchanger protection.
- 11) Flowmeter for managing the rapid production of DHW.
- 12) Single or three phase electric power supply.
- 13) Electric heater controller logic for plant side in integration and/or substitution.
- 14) Controller logic for boiler or similar source for both plant and DHW technical sides in integration and/or substitution of the heat pump (digital contact).
- 15) Integrated climatic system for plant.
- 16) Controller logic for plant remote sensor.
- 17) Integrated controller logic for double set-point of plant side.
- 18) Integrated controller logic for intelligent energy resources.
- 19) Single and three phase electric heaters of 2 kW, common to the plant and DHW technical sides (if the optional diverter valve kit is present), managed in integration and/or substitution mode. Double safety level with automatic and manual reset thermostat for protecting the system and the user (optional kit, factory-fitted mod. RExxxx).
- 20) Mixer's controller logic for plant side in both heating and cooling operations. controller logic for solar integration. Controller logic for relaunched circulator (secondary) plant side.
- 21) Boiler kit on DHW technical side: allows to connect the unit with additional energy source (boiler or others similar) to manage in integration and/or substitution of the heat pump (KCACS kit).

5.2 MODELS THRON AGR2 (TA1/xxR2 + TEx/xxAG) + ST (solar collectors predisposition)

In addition to the above indicated characteristics:

- 1) GI2 module for solar integration management logic already included. Management logic of the relaunched circulator (secondary) plant-side. Mixing management logic for plant-side for both heating and cooling.
- 2) Integration and management of solar DHW technical-side equipped with modulating High efficiency circulator according to ERP Directive with $EEI \leq 0.21$.
- 3) Flow regulator 2÷12 l/min Loading operations, washing and removal of the circulator without unloading the plant circuit.
- 4) Compact safety group with safety valve and pressure gauge.
- 5) Integrated ball valve with thermometer and check valve.
- 6) Temperature sensors DHW storage technical-side and solar collectors.
- 7) Expansion vessel not included to be installed externally.

6 TECHNICAL CHARACTERISTICS

The reversible heat pumps THRON AGR2 series are designed for residential and commercial applications, these units are extremely versatile and can operate in heat pump mode with the ability of producing hot water at a temperature of 63°C using the electric heaters for environmental heating and sanitary applications.

The new THRON AGR2 system is the ideal solution for the total home climate control. For new or already existing house if equipped with a radiant floor or fan coil as heating system, with feeding from electric power network and a renewable energy sources.

The INVERTER compressor with brushless DC motor technology, matched with electronic expansion valve, pump and variable speed blower always with brushless motor, as well as the integrated circulators, optimize the power consumption and the operation efficiency of the refrigerating components and of the entire system.

6.1 FRAME

The units are all made of hot-galvanised thick sheet metal, painted with polyurethane powder enamels at 180°C to ensure the best resistance against atmospheric agents. The frame is self-supporting with removable panels. All screws and rivets for outdoor installations are in galvanized stainless steel. The indoor units also have a self-supporting structure made of galvanized steel with removable painted panels.

6.2 REFRIGERANT CIRCUIT

The refrigerant circuit has been manufactured by means of international primary brands components and according to the UNI EN 13134 rule concerning welding procedures. The refrigerant gas used in these units is R410A. The refrigerant circuit includes: 4 way reverse cycle valve, electronic expansion valve, liquid separator, liquid receiver, valves for maintenance and control, pressure safety device (high pressure switch), pressure transducers to accurately control the evaporating and condensing pressures, filters for throttling valve to avoid its clogging, SAE valves for liquid and gas line.

6.3 COMPRESSORS

The used DC inverter compressors are twin rotary hermetic type, designed especially to be used with R410 refrigerant. The compressors are all supplied with thermal overload protection and are mounted on a rubber material acting as a shock absorbers. The compressors are mounted in a separate chamber in order to be separated from the air flow for reducing noises and are also supplied with crankcase heater which operates in order to avoid the oil dilution which may cause seizure of the compressor. The crankcase heater starts when the compressor remains off for a duration no less than 30 minutes and when the discharge temperature is under 20°C (with hysteresis of 2.0°C). When the compressor restarts, the crankcase heater will stop operation. We recommend to turn on the unit and to put it in standby mode at least 6 hours before the first startup.

The inspection of the compressor is possible through the front panel of the unit that allow the maintenance of the compressors even if the unit is working.

6.4 AIR SIDE EXCHANGERS

The air side exchangers are made up of copper pipes and aluminium fins. The diameter of the copper pipes is 9.52mm, the thickness of the aluminium fins is 0,1mm. The pipes are mechanically expanded into the aluminium fins to improve the heat exchange factor. The geometry of these condensers guarantee a low air side pressure drop and, then, the use of low rotation speed (and low noise emission) fan motors.

6.5 FANS

The fans are axial type with aluminium aerofoil blades. They are statically and dynamically balanced and supplied complete of the safety fan guard according to the CE EN 60335-2-80 rule (safety for electrical apparatus of domestic and similar use). They are mounted on the unit frame by interposition of rubber vibration dampers. The electric motors are all brushless DC type with 8 poles (about 200/1000 rpm). The motors are directly driven with an integrated thermal overload protection. The protection class of the motors is IP44.

6.6 USER HEAT EXCHANGERS

The user heat exchangers are made up of AISI 304 stainless steel braze-welded plates type. The user heat exchangers are factory insulated with flexible close cell material. Each evaporator is provided with a temperature sensor working as antifreeze protection that activates the circulator, even in the case when the unit is turned off when the condition parameters set in the controller have been occurred.

6.7 ELECTRIC BOX

The electric box is manufactured according to according current European Union laws. The accessibility to the electric board is possible after removing the side and top panels of the outdoor unit by using an appropriate tool, and by removing the ABS plastic cover for the indoor units. The protection degree is IP24. The outdoor unit terminal board is supplied with voltage free contacts for general alarm.

6.8 CONTROL SYSTEM

The THRON AGR2 units are all equipped with a microprocessor adopting an overheating control logic program through the electronic thermostatic valve managed by the pressure transducers signals and temperature sensor. The microprocessor can manage also the following functions: water temperature regulation, antifreeze protection, compressor's time setting, compressor automatic starting sequence, alarm reset, alarm management and operating LED. The control system together with the INVERTER

technology and the on board sensors continuously monitor and adapt the performance of the inverter compressor, and of the fan (2 fans as for the 14, 14T and 16T models).

6.9 MONITORING AND PROTECTION DEVICES

The internal units are all standard supplied with the following monitoring and protection devices: return water temperature sensor installed at the return water pipe line from the plant, operating and antifreeze sensor installed at the outlet pipe of the water to the plant and on water side a water flow switch is installed to protect the evaporator. The internal units are all supplied with high pressure transducer, low pressure transducer, compressor's inlet and outlet temperature sensors, compressors thermal protection device, fans thermal protection device, high pressure flow switch HP.

6.10 HYDRAULIC CIRCUIT

The THRON outdoor units are supplied with an integrated hydraulic circuit including a high efficiency ($EEL \leq 0,23$ for the sizes of V4 14, 16, 10 and 12, $EEL \leq 0,21$ for V4 06, 08) modulating BRUSHLESS circulator, suitable also for chilled water utilization and is directly managed by the controller on board the unit, Y filter Y with integrated faucet, plate heat exchanger, flow switch for protection, 3-way valve for commutation between plant side and DHW technical side, expansion vessel of 8 liters plant circuit side, expansion vessel of 8 liters plant side, the automatic air release valve and relief valve (3 bar) to be connected to the collecting system.

6.11 FAN SPEED CONTROLLER

This type of control is managed by the microprocessor and is necessary for optimizing the pressure of evaporation/condensation during summer/winter operation in order to allow proper running of the unit.

7 COMPOSITION OF THE UNIT

THRON AGR2 system is composed by an out door unit and by one internal module

8 INSTALLATION



WARNING: All the operation described below **MUST BE DONE BY TRAINED PEOPLE ONLY**. Before any operation on the unit, be sure that the electric power supply is disconnected.

8.1 GENERALITY

When installing or servicing the unit, it is necessary to strictly follow the rules listed in this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions. Not observing the rules reported on this manual can create dangerous situations.



After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage has to be questioned to the carrier and recorded on the Delivery Note before signing it.

The company has to be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.



WARNING: The moto-condensing units are designed for outdoors installation. The installation place should be enough away from fire risks. Therefore all the necessary measures should be adopted in order to prevent the risk of fire at the installation place. In any case the outside temperature must not exceed 46°C. Beyond this value, the unit is no longer covered by the actual regulations in the field of safety of pressure equipment.

WARNING: If they should be installed in an areas of the building subject to low temperatures (attics, basements, etc.), refer please to the precautions listed in Chapters 11 and 21).

WARNING: The unit must be installed so as to allow free movement for repair and maintenance operations. The warranty does not cover costs due to platforms or other lifting systems needed for eventual interventions.

All checks and maintenance operations must be carried out only by qualified personnel.

Before any operation on the unit, make sure that the electric supply is disconnected.



WARNING: Inside the unit, there are some moving components. Be very careful when operating in their surroundings even if the electric power supply is disconnected.



The top part and discharge pipes of the compressor operates at high temperatures. Be sure to let the unit to become cool before beginning any maintenance work.



Be especially careful when going to operate in the surrounding of the coils. The aluminum fins are very sharp and can cause serious injury.



After the maintenance operations, close the panels by fixing them with screws.

8.2 LIFTING AND HANDLING

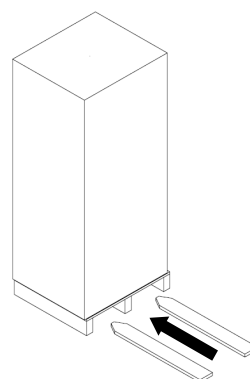
The handling must be performed by qualified personnel, properly equipped with appropriate equipments to the weight and the encumbrance of the unit, in compliance with safety regulations of accident preventing.

8.2.1 Indoor unit

- The apparatus is supplied on wooden pallets protected by carton packing box.
- Do not place anything on the top of the carton box.
 - Do not move it without pallets—you may break the plastic feet.

Packed unit handling:

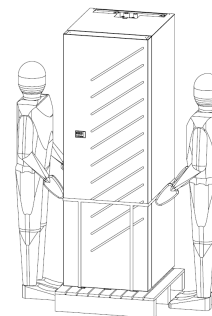
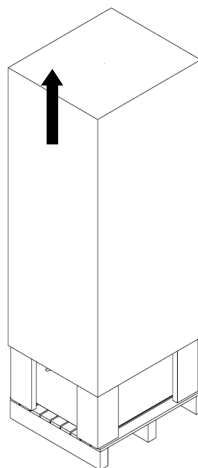
- Insert the forks from the indicated side.
- During the unloading of the unit, utmost care must be taken to avoid abrupt or violent maneuvers in order to protect the internal electronic components.
- During handling keep the unit vertically.



It is recommended to unpack the unit only with equipment positioned near the installation place, otherwise take special care not to damage the unit when handling it.

Removal of the packing box:

- Cut the strap fasteners.
- Lift the carton box upward.
- Remove the corner pieces of polystyrene foam.
- Remove the unit from the pallet using a suitable belt straps (at least two persons equipped with suitable protective equipment for the hands and feet)



The image is just for illustration



8.2.2 Outdoor unit

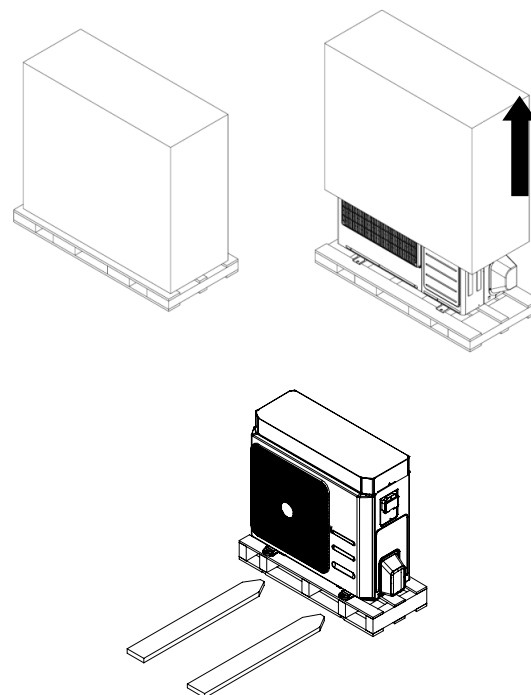
It is recommended to unpack the unit only with equipment positioned near the installation place, otherwise take special care not to damage the unit when handling it.

Removal of the packing box:

- Cut the strap fasteners.
- Remove the apparatus by lifting the packing upward.
- Remove the corner pieces of polystyrene foam.
- Remove the the unit from the pallet by unscrewing the screws that hold the feet to the pallet itself.

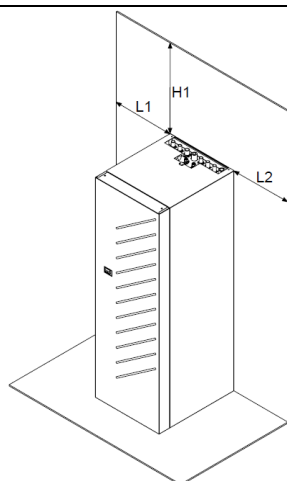
When unloading and installing the unit, it is highly recommended to avoid any sudden move in order to protect the inner components. The units can be lifted by means of a forklift or, in alternative, of belts, being sure not to damage the lateral panels and the cover. It is important to keep the unit horizontal during these operations.

Note: All the pictures in this manual are for explanation purpose only. They may be slightly different from the unit you purchased. The actual shape shall prevail.



8.3 LOCATION AND MINIMUM TECHNICAL CLEARANCES

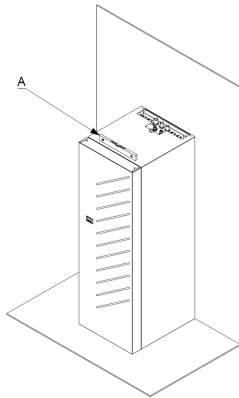
8.3.1 Indoor unit



The installation must allow authorized personnel to operate in the event of maintenance, in an easy manner respecting both the safety distances between the units and other apparatus that the technical spaces (expressed in mm) indicated in the table:

MOD.	L1*	L2*	H1
TA1/xxR2	300	300	300

(*)Recommended distances for lateral inspection in case of concealed installation. In case concealed installation, the inspection side is not required and you can keep up to 10 mm on each side.

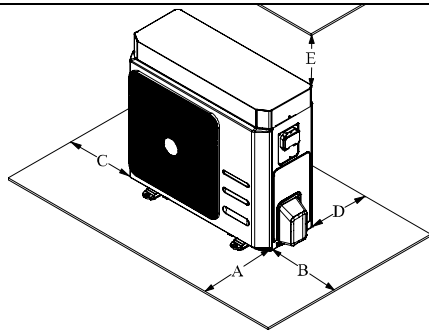


- Make sure that the equipment is installed and protected from the weather elements in a clean and dry location.
- Place the unit on the wall.
- Livellare i piedini in modo che sia perfettamente orizzontale.

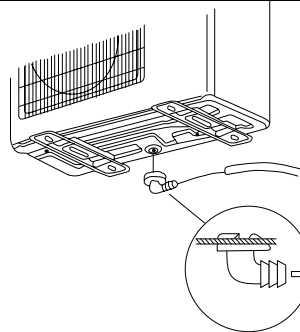
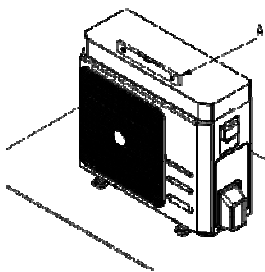
(A) Level

8.3.2 Outdoor unit

The outdoor units are all designed for external installation: any cover over the unit and location near trees (even if they partially cover the unit) is avoided in order to allow the air recirculation. It is advisable to create a proper basement, with a size similar to unit foot-print. Unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. It is also possible to install anti-vibration supports (springs or rubbers) to keep vibrations at a very low level. Absolute care has to be taken to ensure adequate air volume to the condenser. Re-circulation of discharge air has to be avoided; failure to observe this point will result in poor performance or activation of safety controls. For these reasons it is necessary to respect the following clearances (expressed in mm):



MOD.	A	B	C	D	E
TE1/06AG	1500	500	400	400	500
TE1/08AG	1500	500	400	400	500
TE1/10AG	1500	500	400	400	500
TE1/12AG	1500	500	400	400	500
TE1/14AG e TE3/14AG	1500	500	400	400	500
TE3/16AG	1500	500	400	400	500



Positioning on the floor

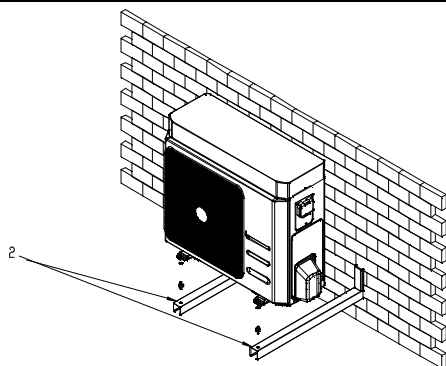
Provide lifting from the floor of the unit:

- 20 mm without conveying the condensate drain
- 90 ÷ 100 mm to allow the conveying of the condensate drain

In case of installation in areas subjected to extreme cold or heavy snow, where there is the possibility of freezing, it's recommended to provide suitable frost protection systems.

(A) Level

(1) condensate drain pipe



Suspended positioning

- In the case of suspended installation, adequate brackets must be used to support the weight of the unit and also depending also on the type of the wall to which should be fixed.
- Make sure that the section of the wall doesn't overlap to bearing elements of construction, pipelines or power lines.

(2) brackets for positioning (not supplied with the unit)





Both units must be positioned on a leveled surface, the holders used for installation must be able to support its weight.

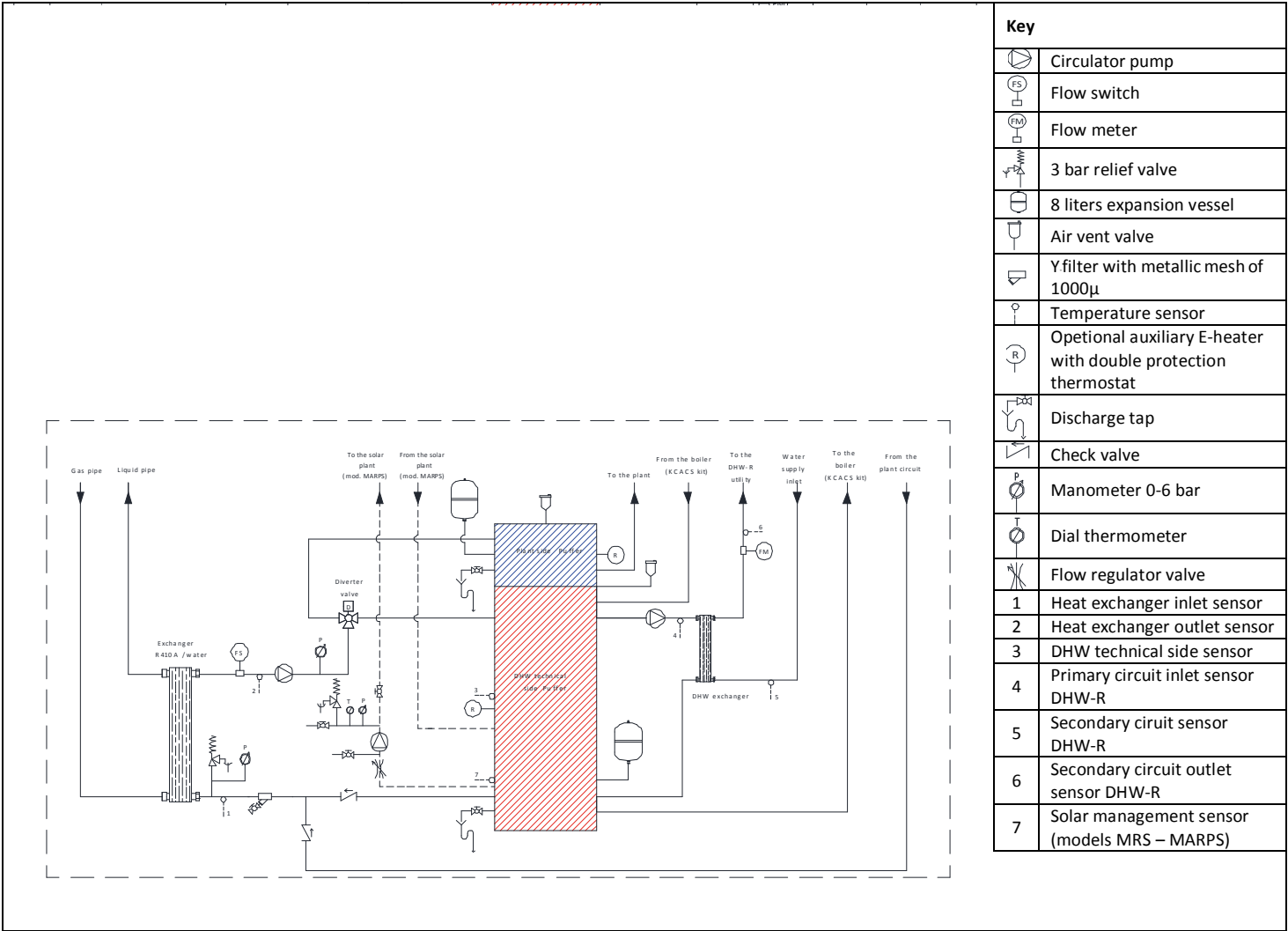
8.4 HYDRAULIC CONNECTIONS

The hydraulic connections have to be installed in accordance with national and/or local regulations; pipes can be made up of steel, galvanized steel or PVC. Pipes have to be designed depending on the nominal water flow and on the hydraulic pressure drops of the system. All pipes have to be insulated with closed-cell material of adequate thickness. It is recommended to connect the indoor unit to the piping using flexible joints. The hydraulic circuit should include the following components:

- Hole thermometers to monitor the circuit's temperature.
- Manual shut-off valves to separate the chiller from the hydraulic circuit.
- Loading group and discharge valve.
- Anti-vibration joints and supports for the piping where necessary.

	WARNING: make sure that the size of the pipes shall not exceed the maximum head loss on the plant side given in the table in the Paragraph 14.3 (see the available pressure head data).
	WARNING: connect the pipes to their attacks always by the way of key against key method.
	WARNING: The plant side expansion vessel included in the model has a limited capacity of 8 liters. The installer should verify that if the expansion vessel is adequate to the real capacity of the plant circuit, otherwise should be provide an additional expansion vessel. For the installation position of the expansion vessel (indicated as additional expansion vessel), please refer to Paragraph 8.5.
	WARNING: check that the weight of the pipes does not grave about the structure of the machine.
	WARNING: unit water return pipe should be in correspondence with the connection labelled: "TECHNIC WATER RETURN", otherwise the evaporator may freeze.
	WARNING: If the water flow switch (factory mounted) is altered or remouved, the warranty will no longer be valid. Please refer to the wiring diagram for the water flow switch electric connections.
	The metallic Y-filter must be kept clean, so make sure that it is still clean after the installation of the unit, and then check it periodically.
	The water on the loading/topping up pipe must be opportunely pre-filtered from any suspended particles and impurities through the use cartridge filter (washable, wrapped wire, etc.) of at least 100 microns.
	Check the water hardness with which you load and top up the plant circuit. With particularly hard water, in this case it is necessary to utilize a water softener. For treating water for the plant,please refer to UNI 8065.
	The heating system and safety relief valves must meet with the requirements of regulation EN 12828.

8.4.1 Hydraulic circuit



8.4.2 Connections positions

8.4.2.1 Indoor unit

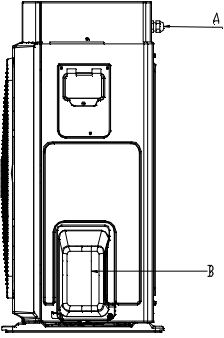
TA1/xxR2 also version ST	A. From the plant (1"")M) B. To the plant (1"")M C. Water supply inlent (3/4"")M D. The user DHW-R (3/4"")M E. Liquid line (see Paragraph 14.3) F. Gas line (see Paragraph 14.3)	
	G. To the solar plant (3/4"")M H. From the solar plant (3/4"")M	



For DHW-R user, it means the point(s) of using of domestic hot water produced by the instantaneous preparer DHW. The DHW-R means “rapid”production of the domestic hot water.

8.4.2.2 Outdoor unit

Units 06, 08, 10 and 12

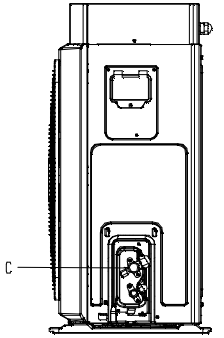


A. Power supply cover (terminal block)

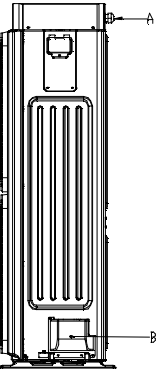
B. Gas connections cover

C. Gas connections

Model	Liquid pipe	Gas pipe
06	3/8 SAE	5/8 SAE
08	3/8 SAE	5/8 SAE
10	3/8 SAE	5/8 SAE
12	3/8 SAE	5/8 SAE



Units 14, 14T and 16T

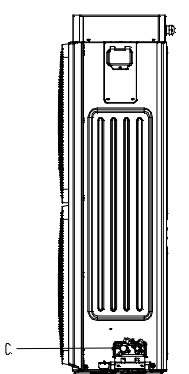


A. Power supply and signal cables
(remove the rear side cover for reaching the terminal block)

B. Gas connections cover

C. Gas connections

Models	Liquid pipe	Gas pipe
14 / 14T	3/8 SAE	5/8 SAE
16T	3/8 SAE	5/8 SAE



8.4.3 Drainage system connection


8.4.3.1 Indoor unit

The connection of a condensate drainage system is not necessary for the indoor units since all pipes and cold components are insulated with a closed-cell foam of an adequate thickness.

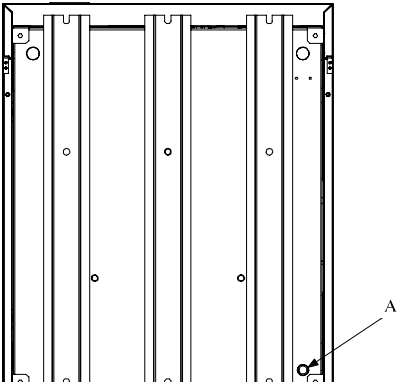
8.4.3.2 Outdoor unit

The outdoor units have been designed in a way to use their own basement as a drain pan.

- Locate the hole at the basement of the unit between the finned coil and fan, A.
- Connect to the hole the provided fitting joint, B.
- Connect a hose to the nozzle of the supplied fitting joint.
- Direct the hose into the disposal place for condensate water.
- Keep a sufficient slope to ensure the smooth flow of condensate water.



8.4.4 Installation of the relief valve discharge pipe





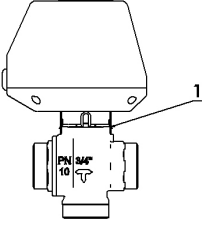
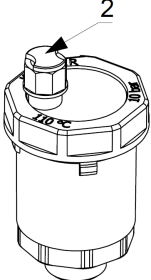
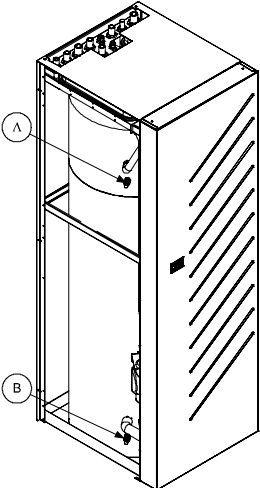
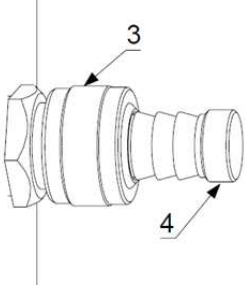
On the basis of the indoor unit there is a drain pipe in PVC, internally connected to the unit on both safety valves outlet connections of the plant side/DHW technical side and of the solar integration circuit in order to ensure the proper discharge of the water when the relief valve opens in case of overpressure.


- Connect a rubber pipe to the drain pipe by means of hose pipe joint connector of 14 mm (not supplied)
- Secure it with pipe clamp.
- Direct the hose towards a appropriate location for unloading.
- A sufficient slope should be maintained to ensure the smooth flow.
- Do not "strangle" the pipe.
- Check for proper water drainage

(A) Hole for pressure relief valve discharge

8.4.5 Plant circuit loading

	WARNING: Check all the loading/topping up operations.
	WARNING: Before beginning the loading/topping up operation of the plant circuit, disconnect the unit for the electric power supply.
	WARNING: The loading/topping up of the plant circuit must always be done under controlled conditions of pressure (max 1,5 bar). Make sure that you have installed on the line of loading/topping up a pressure reducer and a relief valve as indicated in the Paragraph 8.5.
	WARNING: The water on the loading/topping up pipe must be suitably pre-filtered from any impurities and suspended particles. Make sure that you have installed a filter as indicated in Paragraph 8.5.
	WARNING: Before proceeding to the loading/topping up of the plant circuit, place in mid-travel the three-way valve of the indoor unit by actuating the black lever. Restore the normal position of the black lever after finishing the loading/topping up operation of the plant circuit.
	WARNING: Before beginning the loading /topping up operation, unscrew the plugs of the air vent valves Tighten the plugs after finishing the operation of loading/topping up of the plant circuit system.
	WARNING: instead of using a fixed installation of the line filling/topping up, as indicated in Paragraph 8.5, you can alternatively use the discharge valves of which is already provided with the puffer of the indoor unit. In this case, it is mandatory that the inlet water should be pre-filtered with (with at least 100 microns pre filter) and the pressure of the water entering should be controlled (max 1,5 bar).

	<p>Before starting the loading/topping up operations, the connection ring between the valve's body and its actuator must be rotated with 90° in order to unhook the two parts.</p> <p>After separating the two parts, the maneuvering shaft which previously is interposed between the two parts must be rotated by 45° counterclockwise. Thereby, the three ways of the valve can communicate between each other and consequently the plant circuit side with the DHW technical circuit side.</p> <p>To unlock the valve, after the loading operation, place the shaft in the initial position, turning it again by 45° (this time in a clockwise direction), connect the two parts (make sure at this step that the control shaft is completely inserted in the corresponding actuator casing) and fix them by turning the ring by 90° till to reach the initial locked position.</p> <p>(1) Connection ring between the valve's body and actuator</p>
	<p>During the operations of loading/topping up, the plugs of the air vent valves must be partially unscrewed to allow air to flow freely out of the valves.</p> <p>The models MP are equipped with one air vent valve, the models MPR are equipped with two air vent valves, one on the plant side, the other on the primary side of the rapid preparer of DHW-R.</p> <p>Refer to pos 2 of the Paragraph Errore. L'origine riferimento non è stata trovata. and the Paragraph 24.1.</p> <p>(2) Stopper of the air vent valve</p>
	<div data-bbox="512 1563 758 1848">  </div> <p>When it's necessary to top up the circuit of the plant or to adjust the title of glycol (in the cases described in Chapter 21), you can use the service valves. Unscrew the cap of the service valve and connect to joint connector a hose pipe of 14 mm (inner diameter) which should be connected to the water supply, then unscrew the knurled nut to load the plant circuit. At the end of the operation, retighten the knurled nut and screw the cap. At any case, it's recommended to use an external water tap for loading the plant circuit, this should be processed by the installer.</p> <p>(A) service valve of plant side puffer tank (models MARP/MARPS)</p> <p>(B) service valve of DHW technical side puffer tank</p> <p>(3) knurled nut</p> <p>(4) stopper with gasket</p>

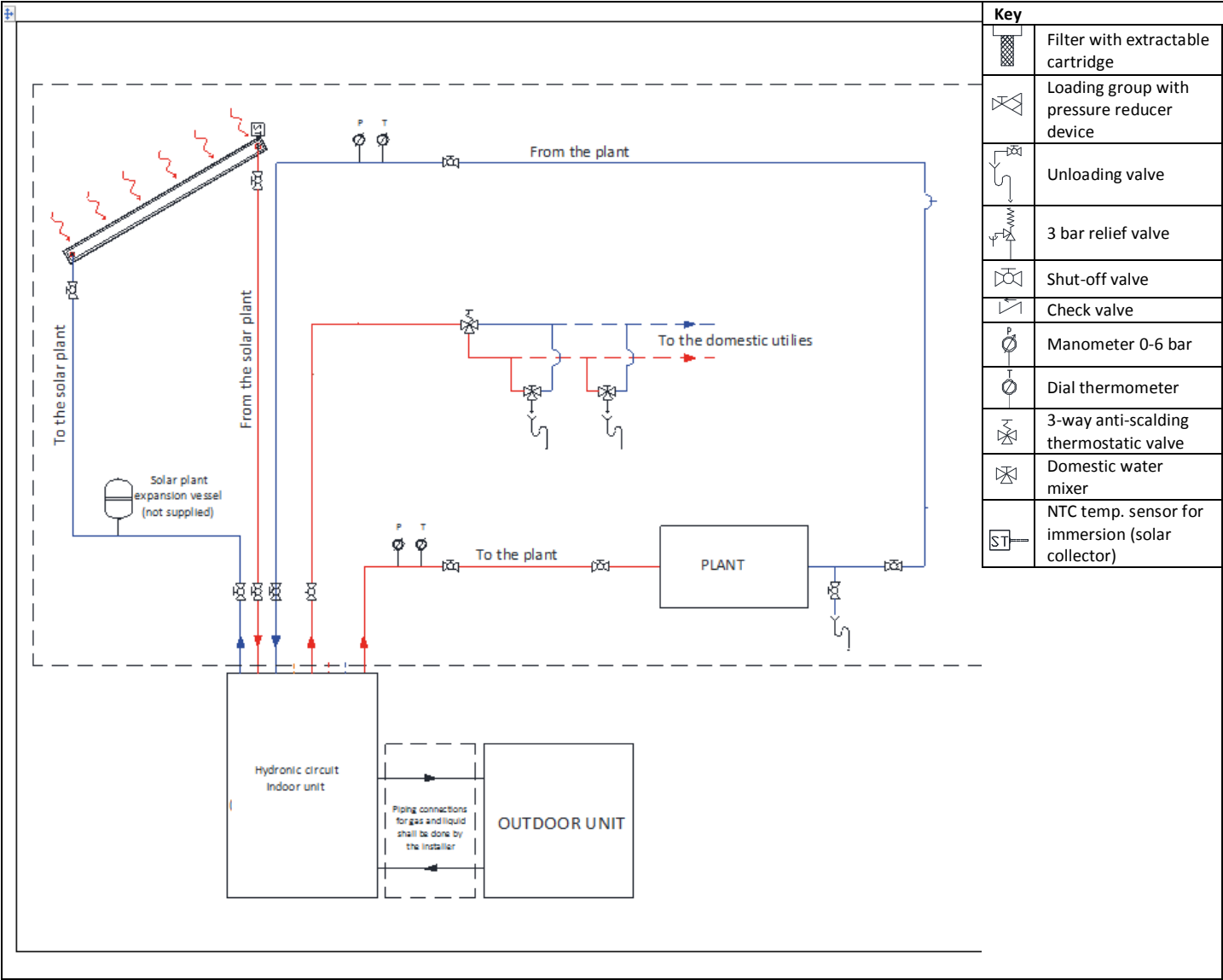
	<p>When the three-way valve is de-energized, it is turned towards the plant side position.</p> <p>If you look at front valve, the way normally open is in the left side</p>
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8.4.6 Unloading of the plant circuit

If it 's necessary to drain completely the indoor unit, connect with a pipe to the service valves. Then unscrew the cap of the service valve and connect to the hose pipe joint connector a pipe of 14 mm (inner diameter) which must be connected to the drain water, then proceed to evacuate the plant circuit by unscrewing the knurled nut. After the end of the process, close again the knurled nut and screw the cap. Refer to the previous paragraph regarding the position and the utilization mode of the valves.

8.5 INDICATIVE DIAGRAMS OF THE PLANT CIRCUIT

8.5.1 Standard schematic diagram of the plant



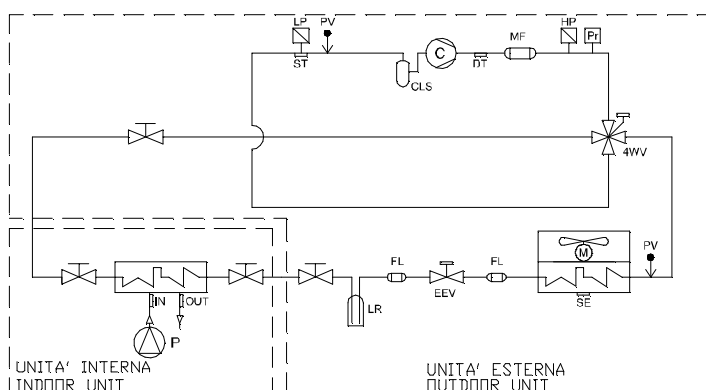
8.6 REFRIGERANT CONNECTIONS

The refrigerant connections are equipped with shut off valves on the outdoor unit and designed for flare connections.
How to make the connection:

- Place the refrigerant pipes; (place the refrigerant pipes, the number of curves should be as low as possible and avoid throttling of the pipes)
- bring together the flared ends to their connection located on the indoor and outdoor units;
- tighten the connections by using the method of "key against key";
- perform a proper evacuation of the refrigerant pipes using the taps of the moto-condensing unit (similar system to household split)
- check if the work is being done well by evaluating the rise time by mean of pressure gauge that integrated in the vacuum pump.
- release the refrigerant contained in the moto-condensing unit by opening the gas/liquid valves (see Paragraph 8.4.2.2)
- add or take out a proper amount of refrigerant as indicated in the paragraph 14.2 see note (5).
- check if there is no refrigerant leakage;
- cover the connections with insulating material.

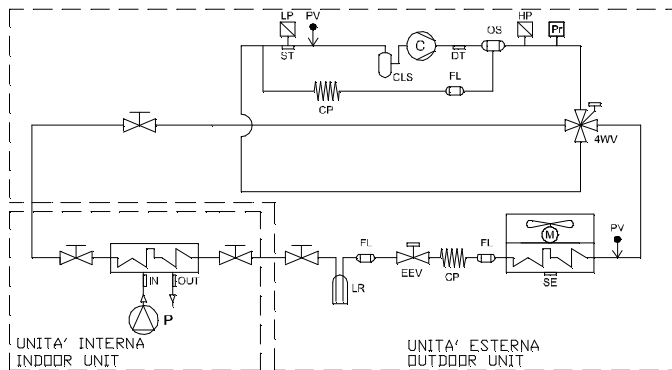
	Do not put both pipes in the same protecting sheath, in order to ensure the correct operation of the plant.
	<p>Please refer to section 14.2 for the minimum and maximum lengths, and possible differences in level.</p> <p>Do not carry out the connections by using ordinary hydraulic pipes that might contain inside themselves residues of chips, dirt, or water which can damage the components of the unit and alterate the correct operation of the equipments.</p> <p>Use only specific refrigeration copper pipes that should be provided clean and sealed at the ends.</p> <p>Use only pipes with correct dimensions of diameters, refer to the table of the technical data in the chapter 14.</p> <p>Cut the pipes with wheel pipes cutter, clutch slowly paying attention for not to crush the pipes when using the tool. Never use an ordinary hacksaw because shavings could go into the pipe and then circulate in the system which can seriously damage the components.</p> <p>After cutting the pipe, please seal immediately the opening on both ends of the roll and cut pipe.</p> <p>The equipment does not require any additional refrigerant.</p> <p>The refrigerant pipes should be straight as possible and the necessary bends must have radius more than 300mm.</p> <p>Plug the opening on the ends of the pipes before inserting them through the hole in the wall.</p> <p>The refrigerant piping and joints must be thermally insulated to prevent heat loses.</p> <p>You should avoid the introduction of non-condensable gases (air) into the circuit, otherwise, the pressure becomes high during operation with the risk of system breaking.</p>

8.6.1 Refrigerant diagram for models THRON 06 /08



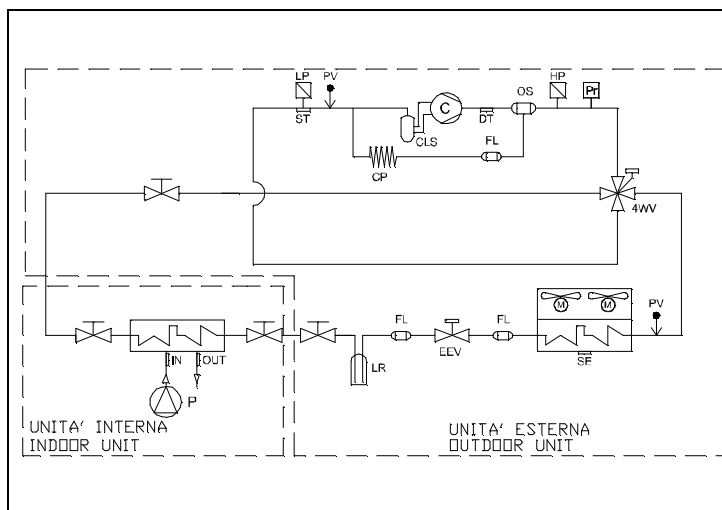
C	COMPRESSOR
CLS	COMPRESSOR LIQUID SEPARATOR
ST	COMPRESSOR INLET TEMPERATURE
DT	COMPRESSOR OUTLET TEMPERATURE
HP	HIGH PRESSURE TRANSDUCER
Pr	HIGH PRESSURE FLOW SWITCH
LP	LOW PRESSURE TRANSDUCER
LS	LIQUID SEPARATOR (only for the model 09)
4WV	VALVE FOR INVERTING CYCLE
LR	LIQUID RECEIVER
EEV	ELECTRONIC EXPANSION VALVE
FL	FILTER
M	AXIAL FAN
MF	MUFFLER SILENCER
SE	OUTDOOR AIR TEMPERATURE
P	CIRCULATOR ON BOARD UNIT
IN	WATER INLET TEMPERATURE
OUT	WATER OUTLET TEMPERATURE

8.6.2 Refrigerant diagram for models THRON 10 / 12



C	COMPRESSOR
CLS	COMPRESSOR LIQUID SEPARATOR
OS	OIL SEPARATOR
ST	COMPRESSOR INLET TEMPERATURE
DT	COMPRESSOR OUTLET TEMPERATURE
HP	HIGH PRESSURE TRANSDUCER
Pr	HIGH PRESSURE FLOW SWITCH
LP	LOW PRESSURE TRANSDUCER
4WV	VALVE FO INVERTING CYCLE
LR	LIQUID RECEIVER
EEV	ELECTRONIC EXPANSION VALVE
FL	FILTER
M	AXIAL FAN
SE	OUTDOOR AIR TEMPERATURE
P	CIRCULATOR ON BOARD UNIT
IN	WATER INLET TEMPERATURE
OUT	WATER OUTLET TEMPERATURE
CP	CAPILLARY

8.6.1 Schema frigorifero THRON 14 / 14T / 16T






C	COMPRESSOR
CLS	COMPRESSOR LIQUID SEPARATOR
OS	OIL SEPARATOR
ST	COMPRESSOR INLET TEMPERATURE
DT	COMPRESSOR OUTLET TEMPERATURE
HP	HIGH PRESSURE TRANSDUCER
Pr	HIGH PRESSURE FLOW SWITCH
LP	LOW PRESSURE TRANSDUCER
4WV	VALVE FO INVERTING CYCLE
LR	LIQUID RECEIVER
EEV	ELECTRONIC EXPANSION VALVE
FL	FILTER
M	AXIAL FAN
SE	OUTDOOR AIR TEMPERATURE
P	CIRCULATOR ON BOARD UNIT
IN	WATER INLET TEMPERATURE
OUT	WATER OUTLET TEMPERATURE
CP	CAPILLARY

8.7 ELECTRICAL CONNECTIONS

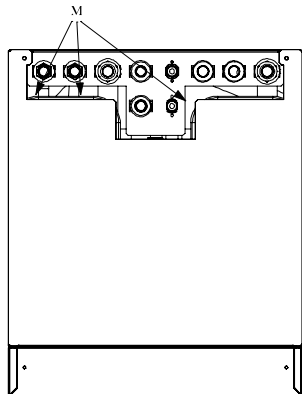
Check if the power supply meets the unit's electric nominal data (voltage, phase, frequency) reported on the label in the unit's right-side panel. Power supply wiring has to be made according to the wiring diagram enclosed with the unit and according to the national and international norms in force (provide equipments as general magnetothermic circuit breaker, differential circuit breakers for each electric single line, proper grounding for the plant, etc.). Power supply cables, the electric protection and line fuses have to be sized according to the specifications listed in the wiring diagram enclosed with the unit and in the electrical data contained in the table of the technical characteristics.



- **The supply voltage's fluctuations can not exceed $\pm 10\%$ of the nominal value. If this tolerance should not be respected, please contact our technical department.**
- **The power supply should respect the listed limits: failing this, warranty will not be valide immediately. Before any operation on the unit, be sure that the power supply is disconnected.**
- **The power supply cables must be sized properly, a minimum cross-section 6mmq.**
- **Phase, neutral and ground connections should be respected. Install upstream of each unit an adequate protection and disconnection device QF of the electric power with delayed characteristic curve, with at least 3 mm contact opening and with an adequate capacity of breaking and differential protection. The capacity of the magneto-thermic circuit breaker must conform to the electric consumption of the unit; (Consideration should be taken of any eventual auxiliary electric heater). It is recommended to use a C20 circuit breaker.**
- **A good grounding is required; the manufacturer is not responsible for damage caused in case of lack of good grounding.**
- **In case of maintenance, the unit must be disconnected from the power supply, the power cable plug must be easy for pulling it out from the power socket by the operator for having possibility to check the unit from anywhere, the plug should remain disconnected.**
- **It's required to use cables that meet the regulations in force in different countries.**

	<ul style="list-style-type: none"> • Be sure, after about 10 minutes of operation the screws on the power supply terminal block that are well fixed. • Before proceeding, the user's-installer manual supplied with the unit should be read. • All the operations described below must be carried out only by qualified personnel. • The wiring to the terminal block must be performed by qualified personnel. • Any routine and/or not-routine maintenance operation shall be carried out when the equipment has been shut down and disconnected from the electric power supply. • Do not put neither your hands nor insert screwdrivers, spanners or other tools into moving parts of the equipment. • The equipment supervisor and the maintenance man have to receive suitable training for the performance of their tasks in safety. • The access to the electric panel is limited to authorized personnel only. • Operators have to know how to use personal protective devices and have to know the accident-prevention guidelines contained in national and international laws and norms. • The operator's workplace has to be kept clean, tidy and free from objects that may prevent free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out safely the required operations. Poor or too strong lighting can cause risks. • Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force. • Not all the configurations can be simultaneously enabled and/or modified. • Other values different than those of default can ensure the proper operation of the unit, in case of doubt about the value to be set contact please our office. • The company excludes any contractual and extra contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.
	<ul style="list-style-type: none"> • It's forbidden to open the electrical board by unauthorized persons. • Do not carry out any work on the equipment under voltage. • Do not touch the equipment if you are not authorized. • Direct contact with the pipes must be avoided.
	<p><u>Requirements before performing electrical work on the control board:</u></p> <ul style="list-style-type: none"> • Turn off the unit from the control panel ("OFF" displayed) • Put the switch "QF" general differential on OFF position. • Wait for 15 seconds before getting access to the electric board. • Check the ground connection before beginning any operation. • Be sure that you are well insulated from the ground, with dry hands and feet, or by using insulating platforms and gloves. • Check that there is no foreign material near the system.

8.7.1 Indoor unit

<ul style="list-style-type: none"> • The power supply and signal cables should pass along the space between the metal sheets in the top part of the unit and use the fixing clamps for fastening. • Follow along the suggested path cable reported in the image. • Use a shielded signal cable to reduce/prevent interferences. <p>(M) Cables gateway</p>	
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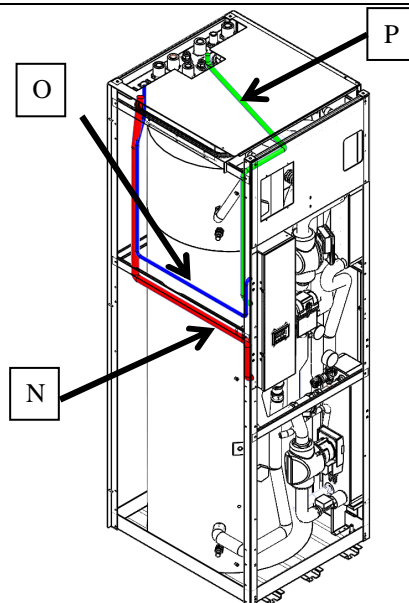
- The power supply and signal cables should pass along the space between the metal sheets in the top part of the unit and use the fixing clamps for fastening.
- Follow along the suggested path cable reported in the image.
- Use a shielded communication cable to reduce/prevent interferences.

(N) Power supply cables inlet

(O) Power supply cables outlet (if present)

(P) Communication cable outlet with outdoor unit (see Paragraph 8.7.3)

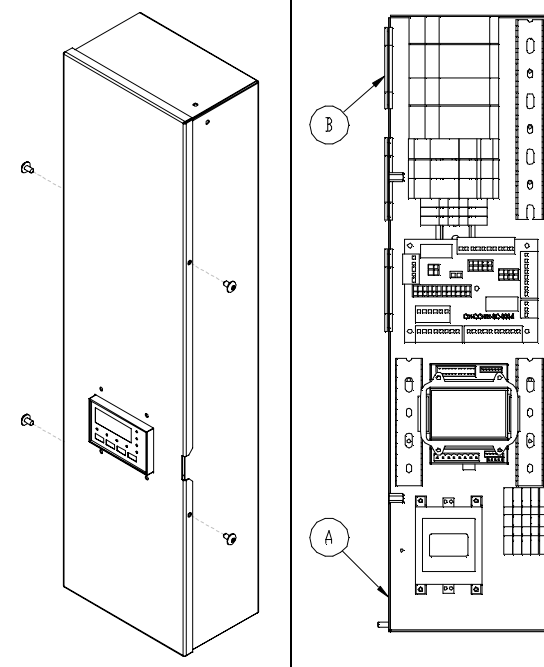
As for the connection P, the communication cable with outdoor unit, it's recommended to use a shielded twisted-pair multipolar cable 5x0.75mm² and to pass it as far as possible from the other two connections.



- Remove the mounting screws.
- Remove the cover plate of the electric box.
- Connect the cable to the terminals inside the electric box.
- Please refer to the wiring diagrams given in the manual MSE of the unit.

(A) Power cable hole

(B) Auxiliary connections



WARNING: For allowing the power supply and communication cables to cross easily, it is recommended to remove the side panels. Prepare then all the connections before any concealed installation.

Note: All the pictures in this manual are for explanation purpose only. They may be slightly different from the unit you purchased. The actual shape shall prevail.

8.7.1.1 Terminal block connections

For getting informations on the legend and location of the terminal blocks in the electric box, please see the wiring diagrams in the Chapter 26.

Power supply terminal block Single phase system 1-Ph_230Vac + N +PE			Power supply board Three-phase system 3-Ph_230Vac + N +PE		
Terminal block	Terminal	Description	Terminal block	Terminal	Description
M1	PE	Grounding conductor	M1	PE	Grounding conductor
	L	Phase conductor		L1	Phase conductor 1
	N	Neutral conductor		L2	Phase conductor 2
		L3		Phase conductor 3	
		N		Neutral conductor	

Terminal blocks	Terminals	Description
M2	L1-1	Phase conductor (230Vac)
	L1-2	Phase conductor (230Vac)
	L1-3	Phase conductor for auxiliary systems (230Vac)
	N-1	Neutral conductor
	N-2	Neutral conductor for double setpoint valve

	N-R1	Neutral conductor for electric heater
	PE	Grounding conductor
M3	12V-	Input 12Vac
	12V+	Input 12Vac
	E-	Modbus for connection with outdoor unit
	E+	
	R-	Modbus for communication with PC or Hi-T control panel accessory
	R+	
	I-	Modbus for connection with outdoor unit
	I+	
	GNDR	GND reference signals and for connection with outdoor unit
M4	ACS	DHW sensor
	SW	Double set-point digital input
	ON/OFF	Remote on/off digital input
	IMP	Plant circuit remote sensor
	D01	Phase conductor for DHW recirculation circulator
	D01N	Neutral conductor for DH recirculation circulator
	D02	Phase conductor for DHW valve (230Vac)
	D02N	Neutral conductor for DHW valve
	D03	Phase conductor for auxiliary plant system electric heater (230Vac)
	DO3N	Neutral conductor for plant system auxiliary electric heater
	DO4	Phase conductor for auxiliary DHW electric heater (230Vac)
	DO4N	Neutral conductor for auxiliary DHW electric heater
	DO5	Phase conductor for boiler enablement (230Vac)
	DO5N	Neutral conductor for boiler enablement
	NO2	Normally open changeover contact for double set-point valve (Phase 230Vac)
	NC2	Normally closed changeover contact for double set-point valve (Phase 230Vac)
*M5	KCS	Phase conductor for solar circulator (230Vac)
	KN	Neutral conductor for solar circulator
	KMO	N.A. contact for mixer valvole (230Vac)
	KMC	N.C. contact for mixer valve (230Vac)
	KDO	Relaunching circulator phase
	KDON	Phase conductor for relaunching circulator (230Vac)
	K1	Mixing valve outlet sensor
	KS1	Solar panel collector sensor
	KS2	Solar panel storage tank sensor
	K2	Water recirculation sensor
	KPWM	Digital input for ambient thermostat
	KN2	Neutral conductor for solar discharge valve
	KCS2	Phase conductor for solar discharge valve

(*) Present with mod.Gi

Terminal block Auxiliary Board – AB – Indoor unit		
Jumper	Terminal	Description
CN3	HP+	Not Used
	HP-	Not Used
	LP+	Not Used
	LP-	Not Used
	DT	DHW terminals
CN4	PWM 1 / 0-10V 1	Analog output for the signal of DHW circulator
CN5	PWM 2 / 0-10V 2	Analog output for the signal of plant system circulator
CN7	12V	See the 12V terminal
	AI10	Ratiometric 0-10V analog input
	+5V	Power supply for ratiometric
CN8	AI1	IMP terminals
	AI2	Outlet (flow) temp. sensor
	AI3	Inlet temperature sensor
	AI4	DHW secondary outlet sensor
CN9	AD1	DHW primary outlet sensor
	AD2	DHW secondary inlet sensor
	DI1	Flow switch
	DI2	ON/OFF terminals
CN10	DI3	SW terminals
	L	Single-phase 230Vac
	N	Not Used
	DO1	DO1 terminal
	DO2	DO2 terminal
	DO3	DO3 terminal
	DO4	DO4 terminal
	DO5	230Vac Phase
	DO5	DO5 terminal
	NC1	Normally closed changeover contact (230Vac Phase)
CN12	C1	230Vac Phase
	NO1	Normally Open Changeover Contact (230Vac Phase)
	I+/I-	I+/I- terminals
	GND	GND terminal
	R+/R-	R+/R- terminals
	E+/E-	E+/E- terminals
CN14	NC2	NC2 terminal
	C2	230Vac Phase
	NO2	NO2 terminal

8.7.2 Outdoor unit

The connections listed below are standard. Other connections are shown in the manual MCO (Control Manual) of the on-board control panel of the units.

- Remove the mounting screws of the cover of the power supply (see the paragraph 8.4.2.2.)
- Connect the cable to the terminals inside the electric box.
- For electrical connections please refer to the wiring connections given in the manual of wiring diagrams “MSE”.

8.7.2.1 Terminal block connections

The terminal block must be connected in compliance with the following notes (the schema is only for illustration).

Outdoor unit terminal block				
Terminal	Description			
GND	Grounding			
N1	Neutral			
L1	Phase 1			
L2	Phase 2 (only for three-phase systems)			
L3	Phase 3 (only for three-phase systems)			
NO	Power supply (230V AC) general alarm (closed if the alarm is on)			
N	Neutral			
NC	Power supply (230V AC) general alarm (closed if the alarm is off)			
I+ / I-	Modbus Slave Wiring with indoor unit			
R+ / R-	Modbus Master Wiring with indoor unit			
GNDR	GND reference signals (Modbus reference mass for connection with indoor unit)			

It's recommended to use a shielded twisted-pair multipolar cable 5x0.75mm² for connecting the I-, I+ and GNDR terminals.

8.7.3 Wiring between indoor and outdoor units

The indoor unit must be connected to the outdoor unit respecting the below table.

Indoor unit terminal block	Outdoor unit terminal block
I+	I+
I-	I-
E+	R+
E-	R-
GNDR	GNDR



WARNING: Do not confuse on the terminal block of the outdoor unit between the terminals GND (protective earth of the power supply) with GNDR (ground reference for Modbus connection).
It's recommended to use a shielded twisted-pair multipolar cable of type 5x0.75mm² for connecting the I-, I+ and GNDR terminals.
After carrying out the connection between the units, using the service password get access into the analogue inputs menu "tP" of the indoor unit control panel, check that the temperature measured by the outside temperature sensor (t17) is correct. See chapter ANALOG INPUTS in the instructions of the control manual.

8.7.4 Removal of the outdoor unit's top cover for getting access to the terminal block and electric box

The following illustration shows the procedure for removing the front-right side panel in order to reach the terminal block in the models 14 and 16.

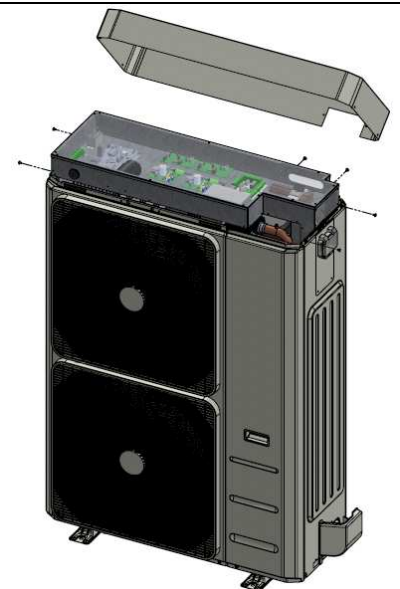
1. Remove the screws connecting the top plate. Two for each side of the unit and other two crews connecting the top plate with the hole-cable plate holder. (For the small sizes, there is only one fixing screw in the controller's lateral part of the unit)
2. Remove the screws connecting the cover plate of the electric box then proceed to connect wire to the terminal block.
3. Insert the cables PG cable glands located on the side of the unit to take them outside the unit
4. Close the electric box and the top panel of the unit with their fixing screws.



The above operations must be done after turning off the unit and disconnecting it from the power supply (by mean of an appropriate disconnecting switch which should be already mounted by the installer). Operations to be performed by qualified personnel.

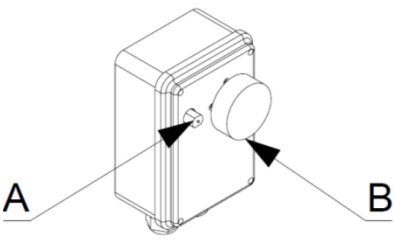
Remove the top cover without taking away the holder of hole-cable plate.

The work is completed, please fix all the removed plates then tighten all screws and washers (if expected).



To replace and secure the the front-right side panel follow the same procedure but in reverse.


8.7.5 Safety thermostats

<p>A. Manual reset thermostat:</p> <ul style="list-style-type: none"> • Opening $90 \pm 5^{\circ}\text{C}$; • Manual rest: follow the procedure in the Paragraph 23.1 to remove the front panel, unscrew the plug casing on the on thermostats box, push the red button with a suitable tool, replace the plug. 	
<p>B. Automatic reset thermostat:</p> <ul style="list-style-type: none"> • Opening $70 \pm 4^{\circ}\text{C}$; • Differential $5 \pm 3.5^{\circ}\text{C}$ <p>(WARNING: Adjustment knob of the intervention threshold of the automatic thermostat with factory setting, other values can ensure the proper operation of the unit)</p>	

9 START UP


Before start-up

- Ensure the availability of diagrams and manuals of the installed appliance.
- Check the availability of diagrams electrical and hydraulic diagrams of the plant where the appliance is connected.
- Check if the anti-vibration couplings exists on hydraulic pipes.
- Check if the shut-off valves of the hydraulic circuits are opened.
- Check that the hydraulic circuit has been loaded into required pressure and vented from air.
- Check that all the hydraulic connections are carried out correctly and that all information on the labels are respected.
- Ensure that arrangements have been provided to drain condensate.
- Ensure that power cables and all terminals are well connected.
- Check that the electrical connections have been made according to applicable regulations including grounding.
- The voltage must be specified on the nameplate of the unit.
- Ensure that the voltage is within the tolerance limits of ($\pm 10\%$).
- Check that the refrigerant connections have been made correctly and that the shut-off valves are open.
- Check that the heating elements of the compressor are powered properly.
- Ensure that there are no gas leaks.
- Before the start up, check that all shutting panels are positioned and fixed with proper screws.

	<p>WARNING: The unit must be connected to the electrical network and should be adjusted in STAND-BY mode (powered) turning on the general switch for a minimum of 12 hours before start up in order to operate the crankcase heaters of the compressor, for allowing the proper heat to the compressor crankcase (the heaters are automatically electrified when the switch is closed).The crankcase heaters turns on properly if after some minutes the temperature of crankcase's compressor is about $10^{\circ}\text{C} \div 15^{\circ}\text{C}$ higher than ambient temperature.</p>
	<p>WARNING: Never switch off the unit (for a temporary stop) by the way of the main switch, this last component should be used to disconnect the unit from the power supply only for lengthy stoppages (e.g. seasonal stoppages). Besides, failing the power supply, the crankcase's resistances are not supplied thus resulting in a possible breakdown of the compressors once the unit is switched on.</p>
	<p>WARNING: Do not modify the internal wiring of the unit otherwise the warranty will terminate immediately.</p> <p>WARNING: The summer/winter operating mode have to be selected at the beginning of the related season. Frequent and sudden changes of this operation should be avoided in order to prevent severe damages to compressors.</p>
	<p>WARNING: For the first installation and start-up of the unit, make sure that the unit is working correctly in both cooling and heating modes.</p>

10 INDICATIONS FOR THE USER

Write down the identification data of the unit for to provide them to the service center in the event of a request for assistance.

	<p>The identification label of the machine reports the technical data and performance of the equipment. In case of lost or damage identification label, ask a duplicate to a Technical Service Center.</p>
	<p>Tampering with, removal, deterioration of identification label, makes difficult anyoperation of installation, maintenance and demand for spare parts.</p>

It is advisable to keep track of the work performed on the unit, so any troubleshooting will be easy to find.

In case of failure or malfunction:

- check the type of alarm to indicate to the service center;
- contact an authorized service center;
- if required by the service center, turn off the unit immediately without resetting the alarm;
- require the use of original spare parts.


11 SHUTDOWNS FOR LONG PERIODS

The types of shutdown depends on the weather of the site where the unit is installed and on the period of the stop. The antifreeze system, if it's installed, stay on work also with the on-board control unit in "OFF" position.







If the time of stop is long and the temperature is low, we recommend you to drain the hydraulic circuits or use a mixture of water and glycol.

Discharge the hydraulic circuits and shutdown the unit following the below steps:

- Turn off the units from control panel (displayed "OFF").
- Close the water faucet (tap).
- Place the general differential QF switch in "OFF" state (if it is installed upstream of the system).

	<p><i>If the indoor unit is installed in areas of the building subject to low temperatures (attics, basements, etc.) and the temperature drops below 0°C there is serious danger of frost: provide please a mixture of water and glycol in the plant system, otherwise drain the water system and the hydraulic circuits of the heat pump.</i></p> <p><i>If it is necessary to add glycol to the hydraulic circuit of the plant, provide a T-fitting with tap downstream of the non-return valve on the charging/topping up pipe (see Paragraph 8.5), in order to adapt the glycol concentration.</i></p> <p>WARNING: even the transient operation, with water temperatures below +5°C is not guaranteed on the basis of the limits set out in Paragraph 20.4 . Before you turn the unit on after a long off period, make sure that the temperature of the mixture of water and glycol is higher than or at least equal to +5°C.</p>
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12 MAINTENANCE AND PERIODIC CHECKS

	<p>WARNING: All the operations described in this chapter HAVE TO BE CARRIED OUT BY TRAINED STAFF ONLY. Before any operation or before acceding to the inner components of the unit, be sure that the power supply is not connected. The compressor's heads and discharge piping are usually at high temperature levels. Be very careful when operating in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating near them. After servicing operations, re-install the cover panels, and fix them by means of screws.</p>
	<p>The refrigerant circuits must not be filled with refrigerant gas other than that indicated on the nameplate. The use of a different refrigerant can cause severe damage to the compressor.</p> <p>It is forbidden to use refrigerant oils other than those specified in this manual. The use of different oil can cause serious damage to the compressor.</p>
	<p>The top part and discharge pipes of the compressor operate at high temperatures. Be sure to let the unit to become cool before beginning any maintenance work.</p>
	<p>Be careful when working near the condensing coils.</p> <p>The aluminum fins are very sharp and can cause serious injuries.</p>
	<p>After the maintenance operations, close the panels fixing them with screws.</p>
	<p>Be sure that only trained and qualified personnel to perform maintenance operation and periodical inspections on the equipment. The EU Regulation 517/2014 establishes that users should assign a qualified personnel to be responsible to regularly carry out inspections of the facilities, to perform tightness test and eliminating eventual leakages within the shortest possible time. Also has to check the obligatoriness and the necessary documentation about the Regulation (EU) No 517/2014 and its subsequent amendment or repeal.</p>

It is a good rule to carry out periodic checks in order to verify the proper operation of the unit.

OPERATION	1 month	4 month	6 month
Charging of the water circuit.	x		
Presence of bubbles in the water circuit.	x		
Check the proper working of the safety and control devices (indoor and outdoor units)	x		
Check if there is a possible oil leakage from compressor (outdoor unit).	x		
Check if there is a possible water leakages from the hydraulic circuit (indoor unit).	x		
Check the proper working of the flow switches (outdoor unit).	x		
Check out if the crankcase resistances are supplied and working properly (outdoor unit).	x		
Clean the metallic filters of the hydraulic circuit.	x		
Clean the finned coil by means of compressed air (outdoor unit).	x		
Check if all the terminals on the electric board as well as on the terminals of the compressor are properly fixed. Clean from time to time the remote control switch's sliding and fixed contactors (indoor and outdoor units).		x	
Tightening of hydraulic connections.		x	
Check the tightening and the balancing of the fan blades (outdoor unit).		x	
Correct voltage.			x
Correct power absorption.			x
Check the refrigerant charge.			x
Check the operating pressure, and superheat and subcooling			x
Check of the efficiency of circulation pump.			x
Check the expansion vessel.			x
If the unit should be out of service for a long period, discharge water from the piping and from heat exchanger. This operation is necessary if, during seasonal stoppages, ambient temperature is expected to go down below the freezing point of the employed fluid.			x


12.1 ENVIRONMENTAL PROTECTION

According to the norms dealing with the use of depleting stratospheric ozone substances, it is forbidden to release refrigerants fluids in the atmosphere. They have to be collected and delivered to the seller or to proper gathering points at the end of their operating life. Refrigerant R410A is mentioned among controlled substances and for this reason it has to be subjected to the mentioned norms. **A particular care is recommended during service operations in order to reduce as much as possible any refrigerant loss.**

13 DISPOSAL

Once the unit is arrived at the end of its life cycle and needs to be removed or replaced, the following operations are recommended.

- the refrigerant has to be recuperated by trained people and sent to a proper collecting centre;
- compressors' lubricating oil has to be collected and sent to a proper collecting centre;
- the frame and the various components, if not serviceable any longer, have to be dismantled and divided according to their nature, particularly copper and aluminium, which are present in conspicuous quantity in the unit. These operations allow easy material recover and recycling process, thus reducing the environmental impact.

	<i>An incorrect decommissioning of the appliance may create serious environmental damage and endanger people's safety. Therefore, it's recommended that the unit shall be disposed only by authorized persons and technical training who has followed training courses recognized by the competent authorities.</i>
	<i>It is required to follow the same precautions described in the previous paragraphs.</i>
	<i>Pay special attention during the disposal operation of the refrigerant gas.</i>

14 TECHNICAL DATA

14.1 PERFORMANCE DATA

PERFORMANCE DATA		Units	Models THRON AGR2		
			06	08	10
Cooling	Cooling capacity (1) min/nom/max	kW	3,65 / 6,87 / 7,56*	4,65 / 8,52 / 9,12*	5,4 / 10 / 11,35*
	Input power (1)	kW	1,69	2,18	2,26
	EER (1)	W/W	4,06	3,91	4,43
	Cooling capacity (2) min/nom/max	kW	2,32 / 5,07 / 5,58*	2,95 / 6,12 / 6,73*	3,27 / 7,56 / 8,83*
	Input power (2)	kW	1,74	2,11	2,43
	EER (2)	W/W	2,91	2,90	3,11
	SEER (5)	W/W	3,59	3,61	4,63
Heating	Heating capacity (3) min/nom/max	kW	2,84 / 6,77 / 7,37*	3,56 / 8,09 / 8,90*	4,69 / 10 / 10,8*
	Input power (3)	kW	1,47	1,85	2,26
	COP (3)	W/W	4,61	4,37	4,43
	Heating capacity (4) min/nom/max	kW	2,28 / 6,27 / 6,90*	2,88 / 8,00 / 8,80*	3,9 / 9,51 / 10,3*
	Input power (4)	kW	1,83	2,40	2,74
	COP (4)	W/W	3,43	3,33	3,47
	SCOP (6)	W/W	3,92	3,91	4,24
	Energy efficiency water 35°C / 55°C	Class	A++ / A+	A++ / A+	A++ / A+

PERFORMANCE DATA		Units	Models THRON AGR2		
			12	14	16T
Cooling	Cooling capacity (1) min/nom/max	kW	5,4 / 11,9 / 13,1*	6,7 / 13,8 / 15,2*	8,70 / 15,69 / 16,30*
	Input power (1)	kW	2,65	2,93	3,20
	E.E.R. (1)	W/W	4,49	4,70	4,90
	Cooling capacity (2) min/nom/max	kW	3,27 / 8,49 / 9,6*	5,3 / 11,46 / 12,05*	6,30 / 14,64 / 16,00*
	Input power (2)	kW	2,74	3,70	4,52
	E.E.R. (2)	W/W	3,10	3,10	3,24
	SEER (5)	W/W	4,73	4,51	4,77
Heating	Heating capacity (3) min/nom/max	kW	4,69 / 12,1 / 12,7*	5,5 / 13,76 / 15,1*	7,10 / 15,21 / 15,90*
	Input power (3)	kW	2,89	3,2	3,45
	C.O.P. (3)	W/W	4,19	4,3	4,41
	Heating capacity (4) min/nom/max	kW	3,9 / 11,3 / 12,1*	5,3 / 13,55 / 14,9*	6,50 / 15,17 / 15,80*
	Input power (4)	kW	3,32	4,04	4,38
	C.O.P. (4)	W/W	3,41	3,35	3,46
	SCOP (6)	W/W	4,31	4,01	4,07
	Energy efficiency water 35°C / 55°C	Class	A++ / A+	A++ / A+	A++ / A++

Operating conditions:

- (1) Cooling: Outdoor air temperature 35°C; inlet/outlet temperature 23/18°C.
 (2) Cooling: Outdoor air temperature 35°C; inlet/outlet temperature 12/7°C.
 (3) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet temperature 30/35°C.
 (4) Heating: Outdoor air temperature 7°C DB 6°C WB.; inlet/outlet temperature 40/45°C.
 (5) Cooling: water temperature inlet/outlet 7/12°C
 (6) Riscaldamento: normal climatic condition; T_{biv}=-7°C; eater temperature inlet/outlet 30/35°C
 (*) Activation maximum Hz function

N.B. The performance data are indicative and could be subject to change. In addition, the performances declared in apex (1), (2), (3) and (4) refer to the instantaneous power according to EN 14511.

The declared data stated in the apex (6) is determined according to the UNI EN 14825.

14.2 TEx/xxAG OUTDOOR UNITS

TECHNICAL DATA		Unit	Model TEx/xxAG			
			06	08	10	12
Electrical data	Power supply		230V/1/50Hz		230V/1/50Hz	
	Max. power input	kW	3,2	4,7	5,0	6,0
	Max. starting current	A	8,5	12,9	13,7	16,6
	Max. current input	A	13,6	20,4	21,6	26,1
Compressor	Type		Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter
	Number		1	1	1	1
	Refrigerant oil (type, quantity)	mL	ESTER OIL VG74,	ESTER OIL VG74,	ESTER OIL VG74,	ESTER OIL VG74,
Fan motor	Type		Motore DC Brushless			
	Number		1	1	1	1
Refrigerant	Type		R410A	R410A	R410A	R410A
	Refrigerant charge (7)	kg	2,68	2,03	3,9	3,9
	Equivalent amount of CO ₂	ton	5,6	4,2	8,1	8,1
	Pressure design (high/low)	MPa	4,2 / 2,7	4,2 / 2,7	4,2 / 2,7	4,2 / 2,7
Refrigerant piping	Liquid side connections	inch SAE	3/8"	3/8"	3/8"	3/8"
	Gas side connections	inch SAE	5/8"	5/8"	5/8"	5/8"
	Required minimum Refrigerant pipe length	m	3	3	3	3
	Max. Refrigerant pipe length	m	30	30	30	30
	Length for nominal capacity	m	5	5	5	5
	Max. length with Standard refrigerant load	m	7	7	7	7
	Additional refrigerant for every meter exceeding the standard length (10)	g/m	20	20	20	20
	Max. difference in level (9)	m	15 / 20	15 / 20	15 / 20	15 / 20
Noise	Sound power (8)	dB(A)	62,0	62,5	63,0	63,5
Dimensions and weight	Dimensions (LxDxW)	mm	925 x 785 x 380	925 x 785 x 380	1047 x 913 x 465	1047 x 913 x 465
	Packing dimensions (LxDxW) (11)	mm	995 x 944 x 415	995 x 944 x 415	1120 x 1080 x 520	1120 x 1080 x 520
	Weight in operation	kg	62	62	83,5	83,5
	Net/Gross weight	kg	62 / 70	62 / 70	83,5 / 90	83,5 / 90

TECHNICAL DATA		Unit	Model TEx/xxAG		
			14	14T	16T
Electrical data	Power supply		230V/1/50Hz		400V/3P+N+T/50Hz
	Max. power input	kW	7,5	7,5	7,9
	Max. starting current	A	20,6	6,2	6,8
	Max. current input	A	31,8	10	10,6
Compressor	Type		Twin Rotary DC Inverter		
	Number		1		1
	Refrigerant oil (type, quantity)	mL	ESTER OIL VG74, 1400		ESTER OIL VG74, 1400
Fan motor	Type		Motore DC Brushless		Motore DC Brushless
	Number		2		2
Refrigerant	Type		R410A		R410A
	Rfrigerant charge (7)	kg	4,9		5,1
	Equivalent amount of CO ₂	ton	10,2		10,6
	Pressure design (high/low)	MPa	4,2 / 2,7		4,2 / 2,7
Refrigerant piping	Liquid side connections	inch SAE	3/8"		3/8"
	Gas side connections	inch SAE	5/8"		5/8"
	Required minimum Refrigerant pipe length	m	3		3
	Max. Refrigerant pipe length	m	30		30
	Length for nominal capacity	m	5		5
	Max. length with Standard refrigerant load	m	7		7
	Additional refrigerant for every meter exceeding the standard length (10)	g/m	20		20
	Max. difference in level (9)	m	20 / 25		20 / 25
Noise	Sound power (8)	dB(A)	65,5		66,0
Dimensions and weight	Dimensions (LxDxW)	mm	1060 x 1405 x 455		1060 x 1405 x 455
	Packing dimensions (LxDxW) (11)	mm	1125 x 1581 x 515		1125 x 1581 x 515
	Weight in operation	kg	112,2		123
	Net/Gross weight	kg	112,2 / 123,2		123 / 134

Operating conditions:

(7) Refrigerant charge valid until 5m of distance between indoor and outdoor units.

(8) Sound power level Heating mode condition (3) measured value made according to UNI EN ISO 9614-2, as required for Eurovent certification.

(9) Data for: Indoor unit is up and Outdoor unit is down / Indoor unit is down and Outdoor unit is up (in this case a siphon must be created each 5 m of the piping length).

(10) Additional refrigerant for pipe dimensions coherent with the intended attacks

(11) Packaging height including pallet: specifically the height of the pallet, for V4 06/08 models is 117 mm, for V4 10/12 models is 126mm and for V4 14 / 14T / 16T models is 120mm.

N.B. The data shown are only for indication and could be subject to change, please always refer to the technical labels on board unit.

14.3 INDOOR UNITS

14.3.1 Models TA1/xxR2

TECHNICAL CHARACTERISTICS		Unit	Model TA1/xxR2			
Indoor unit coupled with a moto-condensing unit size:			06	08	10	12
Circulator	Water flow (3)	m ³ /h	1,16	1,39	1,72	2,08
	Available head pressure (3)	kPa	67,1	61,5	65	51,6
	Nominal capacity (3)	kW	0,075		0,09	
	Max. input power	kW	0,075		0,09	
	Max. input current	A	0,60		0,70	
	Energy Efficiency Index (EEI)		≤ 0,21		≤ 0,23	
Hydraulic circuit	DHW technical side paffur tank	L	190		190	
	Plant technical side puffer tank	L	40		40	
	DHW technical side expansion vessel	L	8		8	
	Plant technical side expansion vessel	L	8		8	
	Hydraulic plant flow/return connections	inch	1" M		1" M	
	Minimum additional water volume (13)	L	0	0	6	11
DHW-R circuit	Maximum supplied flow rate for DHW side	L/min	40		40	
	Minimum water flow for start-up	L/min	3		3	
	Maximum power of the primay side circulator	kW	0,045		0,045	
	Maximum input current of primary side circulator	A	0,44		0,44	
	Energy Efficiency Index (EEI) of the circulator		≤ 0,20		≤ 0,20	
	Hydraulic connections	inch	3/4" M		3/4" M	
Refrigerant circuit	Liquid side connections	inch	3/8" SAE		3/8" SAE	
	Gas side connections	inch	5/8" SAE		5/8" SAE	
Noise level	Sound power (8)	dB(A)	35		39	
Dimensions and weights	Dimensions (LxDxW)	mm	595x1830x705		595x1830x705	
	Packing dimensions (LxDxW) (13)	mm	800x1990x1000		800x1990x1000	
	Weight in operation	kg	462 / 479		463 / 480	
	Net weight	kg	202 / 217		203 / 218	
	Gross weight	kg	219 / 234		220 / 235	

TECHNICAL CHARACTERISTICS		Unit	Model TA1/xxR2	
Indoor unit coupled with a moto-condensing unit size:			14 / 14T	16T
Circulator	Water flow (3)	m ³ /h	2,37	2,62
	Available head pressure (3)	kPa	68,8	58,6
	Nominal capacity (3)	kW	0,140	0,140
	Max. input power	kW	0,140	0,140
	Max. input current	A	1,05	1,05
	Energy Efficiency Index (EEI)		≤ 0,23	≤ 0,23
Hydraulic circuit	DHW technical side paffur tank	L	190	190
	Plant technical side puffer tank	L	40	40
	DHW technical side expansion vessel	L	8	8
	Plant technical side expansion vessel	L	8	8
	Hydraulic plant flow/return connections	inch	1" M	1" M
	Minimum additional water volume (12)	L	29	48
DHW-R circuit	Maximum supplied flow rate for DHW side	L/min	40	40
	Minimum water flow for start-up	L/min	3	3
	Maximum power of the primay side circulator	kW	0,045	0,045
	Maximum input current of primary side circulator	A	0,44	0,44
	Energy Efficiency Index (EEI) of the circulator		≤ 0,20	≤ 0,20
	Hydraulic connections	inch	3/4" M	3/4" M
Refrigerant circuit	Liquid side connections	inch	3/8" SAE	3/8" SAE
	Gas side connections	inch	5/8" SAE	5/8" SAE
Noise level	Sound power (8)	dB(A)	40	40
Dimensions and weights	Dimensions (LxDxW)	mm	595x1830x705	595x1830x705
	Packing dimensions (LxDxW) (13)	mm	800x1990x1000	800x1990x1000
	Weight in operation	kg	465 / 482	465 / 482
	Net weight	kg	205 / 220	205 / 220
	Gross weight	kg	222 / 237	222 / 237

(3) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet water temperature 30/35°C.

(8) Sound power level Heating mode condition (3) measured value made according to UNI EN ISO 9614-2, as required for Eurovent certification.

(12) Calculated for a decrease of the plant water temperature with 10°C and including defrosting cycle maintained for 6 minutes. Minimum water volume to be added to the plant circuit in addition to that required for the plant side unit's hydraulic circuit.

(13) Dimensions of pallet are included.



WARNING: The minimum temperature allowed for storing the units is 5°C.

15 ELECTRIC DATA

Power supply of the unit	V/~ /Hz	230/1/50*-400/3/50**	Power supply of circulator and diverting valve (indoor unit)	V/~ /Hz	230/1/50
Outdoor unit control board circuit	V/~ /Hz	12/1/50	Outdoor fans power supply	V/~ /Hz	230/1/50
Indoor unit control board circuit	V/~ /Hz	12/1/50	Electric heaters power supply	V/~ /Hz	See the power supply of the unit

* For the single-phase indoor units and for outdoor units 06, 08, 10, 12 and 14 models.

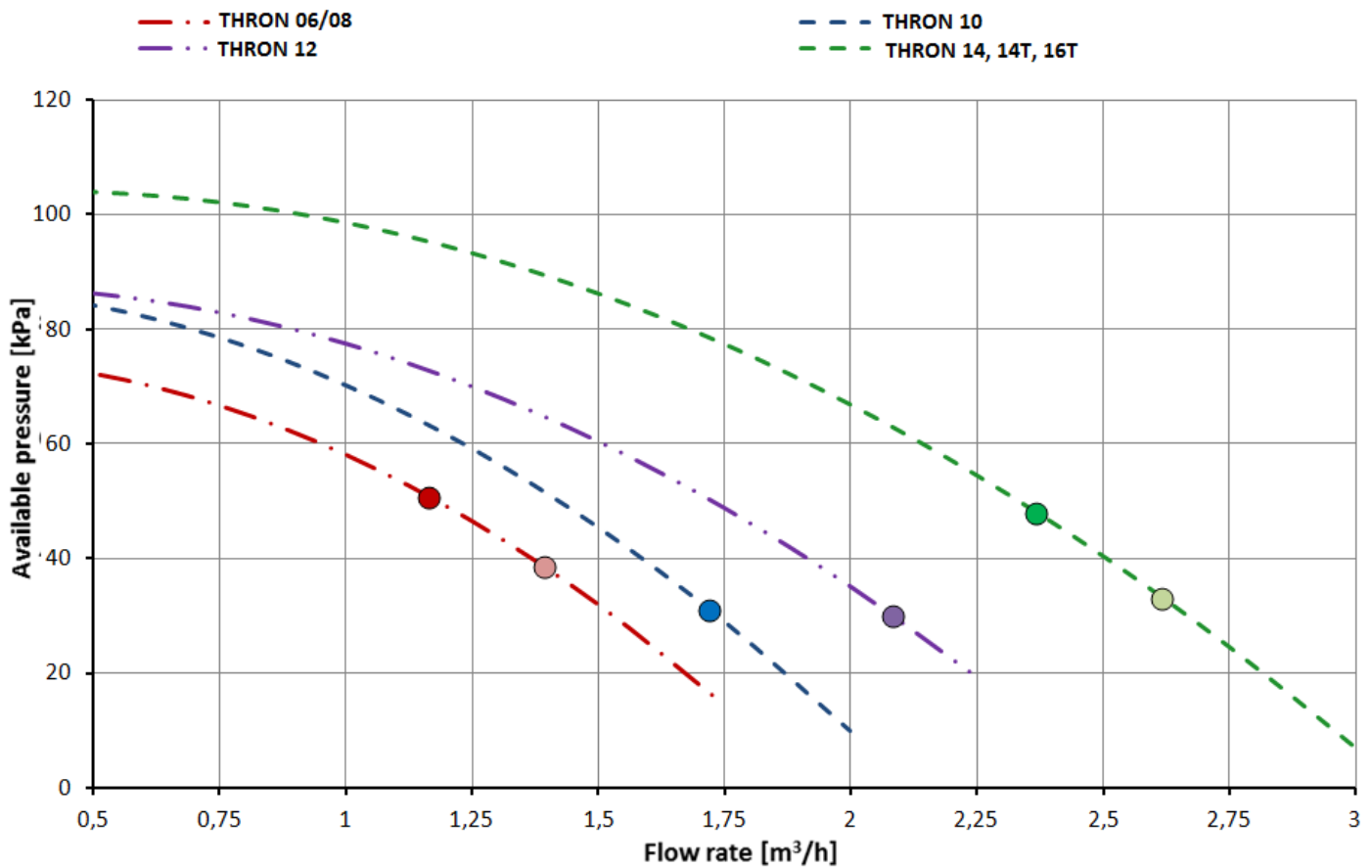
** For the three-phases indoor units and for the outdoor units 14T and 16T models.

Note: Electric data may change for updating the manual. It is therefore necessary to refer always to the technical data label stucked on the right-side panel of the unit.

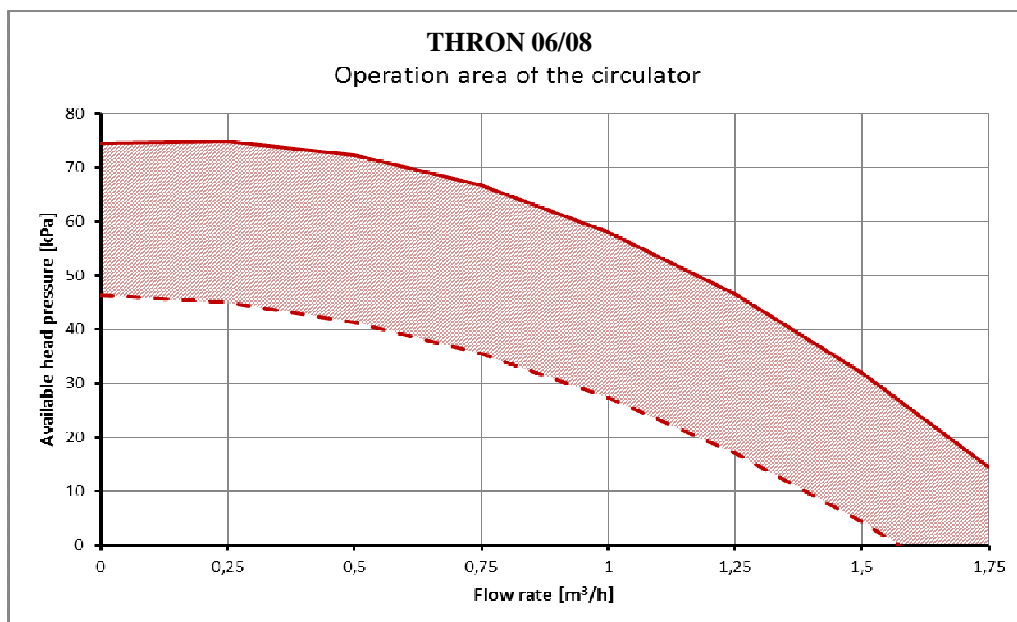
16 PLANT SIDE HYDRAULIC CIRCUIT AVAILABLE HEAD PRESSURES

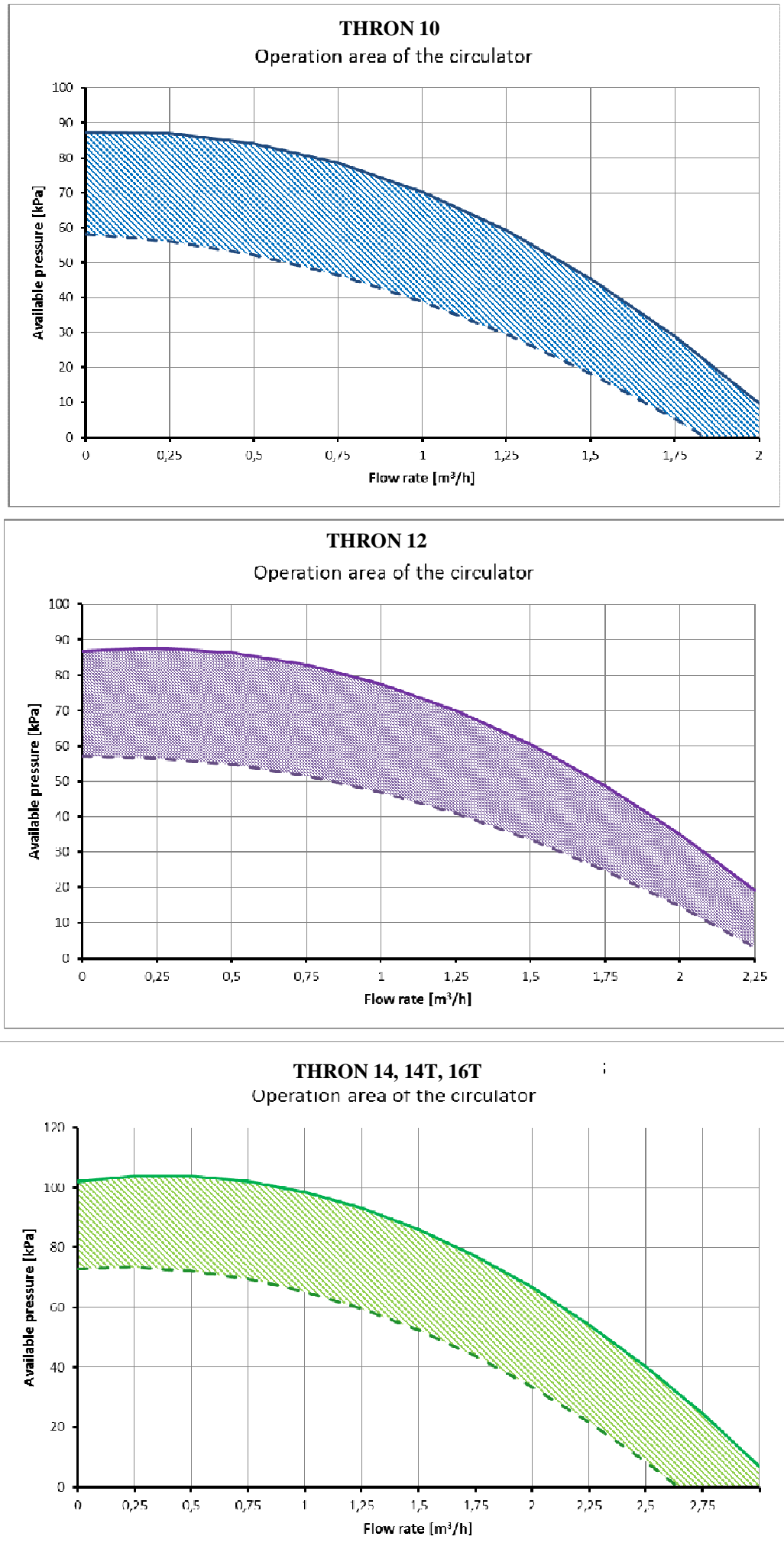
The characteristic curves corresponding to prevalence-water flow rate without head losses of the hydronic kit, which is composed of the components described in Paragraph 6.10 are shown below. The optimal operating points of the different models are shown on the following curve according to the conditions indicated in the apex 3 of the paragraph 14.3.

The plant must be designed so as to ensure the nominal water flow rate corresponding to the operating points indicated below.

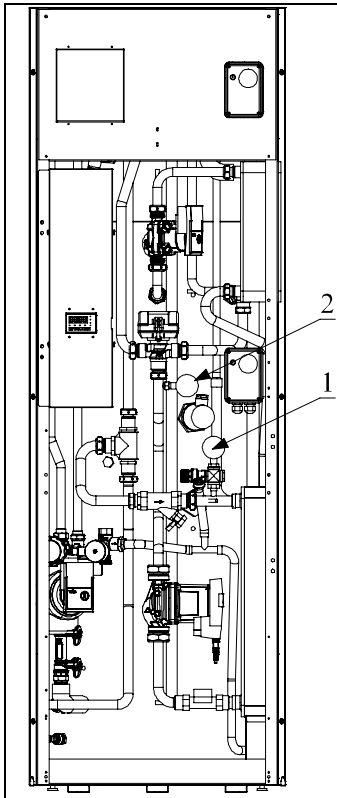


Here also the range of the available head pressures that the unit can provide during the circulator modulation period.





17 READING OF THE INDOOR UNIT MANOMETERS



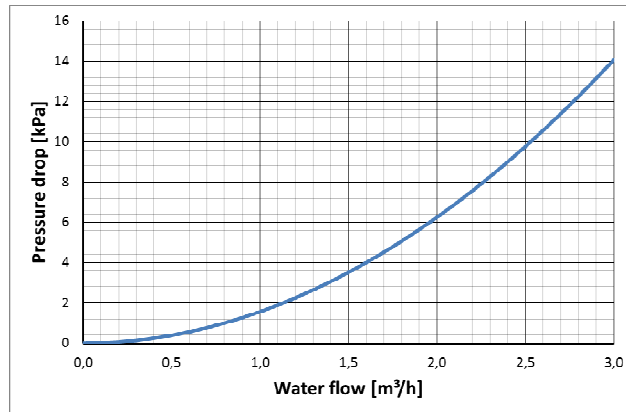
Each indoor unit is equipped with two manometers.

The difference between the manometers (1 and 2) reading can be used as approximate value for verifying the water flow rate/pressure head when the unit works on the plant.

To the difference of manometers value you should subtract the pressure drop of the 3-way valve for getting an approximate value of the available pressure head of the plant.

The characteristic curve corresponding to the Head pressure versus Water flow rate of the three-way diverter valve, whose values should be deducted at the manometric readings for verifying with sufficient accuracy the available static pressure of the plant system at the nominal operating points marked in the curves of Chapter 16.

It is recommended for safety to remove an additional 5% from the obtained values.



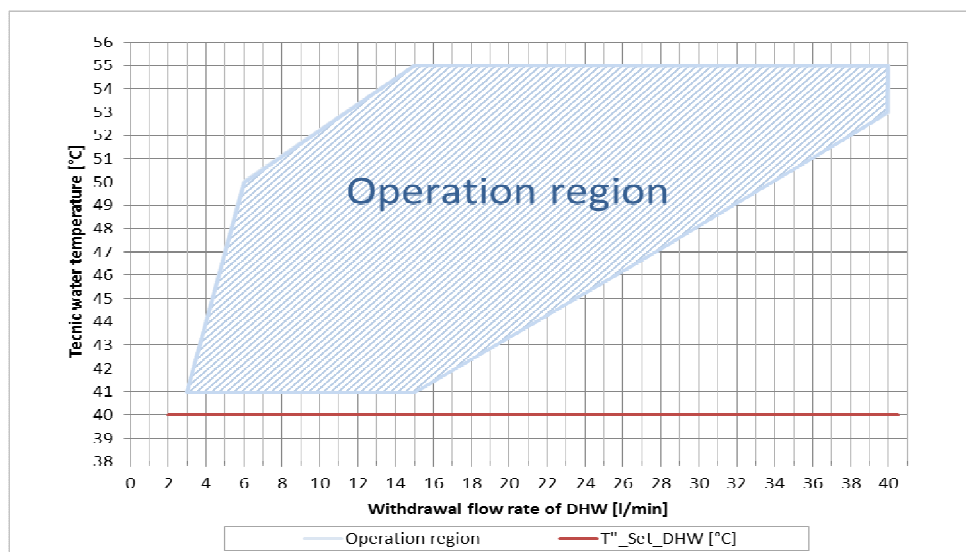
18 DHW INSTANTANEOUS PREPARER

Here below are indicated the operating regions of the instantaneous DHW preparer versus the temperature of the primary circuit (DHW temperature of technic side) and the water flow rate of the secondary circuit (DHW withdrawal rate), for different values of the set temperature of domestic hot water (T''_{Set_DHW}).

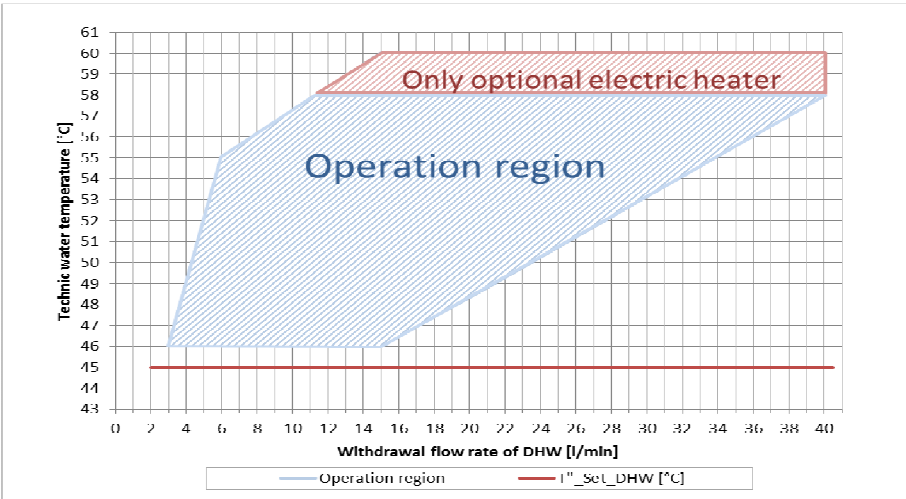
The region of operation corresponding to the alone optional electric heater is indicated with red dashed lines.

	WARNING: It is necessary to install on the DHW line between the instantaneous preparer and the mixers of domestic hot water, of an anti-scald thermostatic valve calibrated at 45°C. Otherwise there is a serious risk of burning and severe scalding.
	WARNING: Make sure that there are no air bubbles in the water supply inlet, otherwise the flow meter will not work properly. Therefore a relief valve or an air vent should be installed on the mains water inlet pipe.
	WARNING: The minimum water flow rate of the secondary circuit (water supply) required for the system startup is 3 liters/min. The maximum water flow rate of the secondary circuit should not exceed 40 liters/min, the system goes wrong over this value.

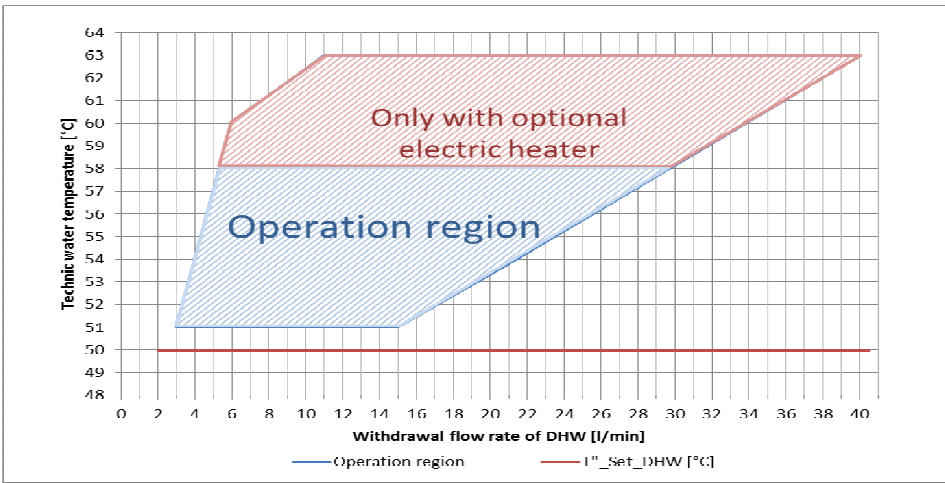
$T''_{Set_DHW}=40^{\circ}\text{C}$



T''_Set_DHW=45°C



T''_Set_DHW=50°C



19 SOLAR GROUP (MODELS ST)

WARNING: It is recommended after doing the filling/topping up/washin to replace the supplied hose connector with the respective plugs. This can minimize the risk of water dripping and boiling glycol. Keep the supplied hose connectors for future operations of topping up and cleaning.

WARNING: The Solar plant design should be performed by a qualified personnel in the field of thermotechnical engineering. Read carefully the paragraph 19.5 for the correct setting of the water flow rate.

WARNING: The expansion vessel that is not supplied. Provide an expansion vessel with adequate volume for the plant system (should be selected by a qualified thermotechnical personnel).

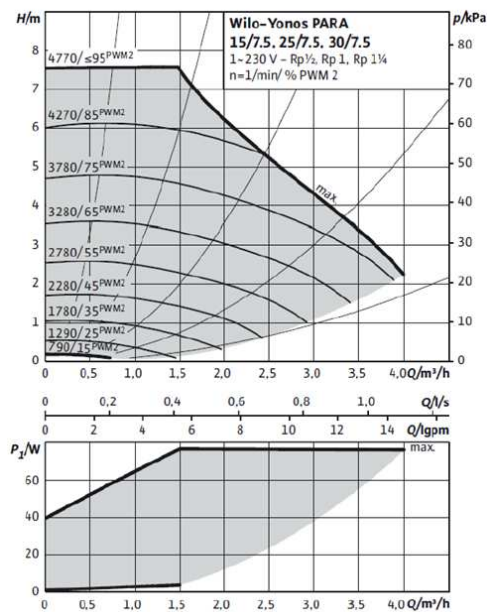
WARNING: As for the temperature sensor of the collector side that is not supplied, please refer to MCO manual control for necessary specifications.

The units include the kit for managing the solar energy source composed of the inlet (return from the plant circuit) and outlet pipes and group for forced circulation with high efficiency circulator consisting of: safety group, manometer, integrated check and ball valves and a flow regulator (2 ÷ 12 L/min). This group allows the filling/washing/maintenance of the circulator without necessity of evacuating the plant circuit, through the closing of the outlet side ball valve.

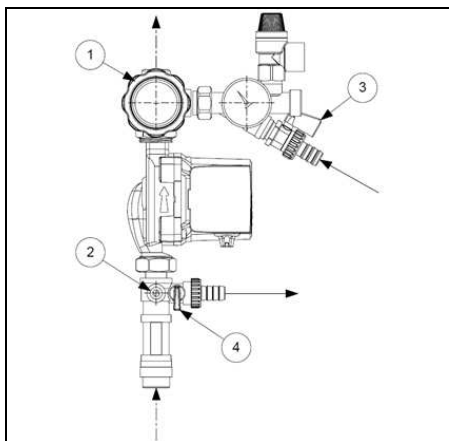
Main components of the Solar Group:

- 1) Thermometer
- 2) Knob
- 3) Outlet ball valve with check valve
- 4) 6 bar relief valve
- 5) 0-10 bar manometer
- 6) Water tap ½" for cahrging/unloading/washing
- 7) Circulator
- 8) Flow controller with graduated scale
- 9) Calibration pin for flow controller

19.1 CIRCULATOR CURVES

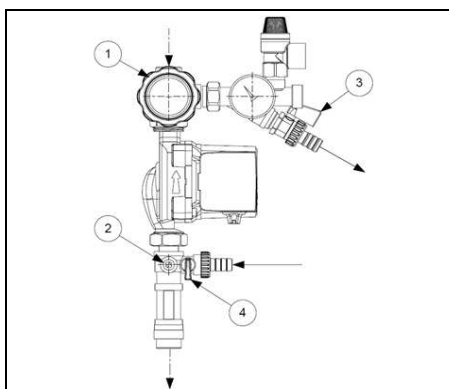


19.2 LOADING OF THE PLANT CIRCUIT



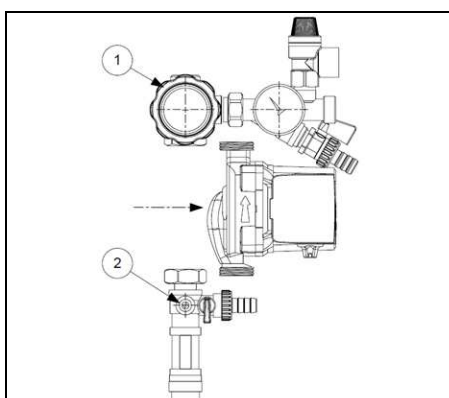
- Close the ball valve of the outlet side (1) by rotating the knob 90 degrees clockwise and close the flow regulator valve (2) (horizontal calibration pin).
- Connect the needed pipes to the supplied hose pipe joint connectors 14 mm that are installed near the safety group and the cflow regulator. Open the valves (3 and 4).
- Introduce the thermal carrier fluid from the valve of the safety group (3) and use the second (4) to evacuate the residual air.
- When the sufficient time has elapsed for the total evacuation of the air from the circuit, close the water flow regulator valve (4) and then to the safety group (3).
- Open again the ball valve and reset the flow regulator valve on the desired flow rate as described in Paragraph 19.5.

19.3 WASHING OF THE PLANT



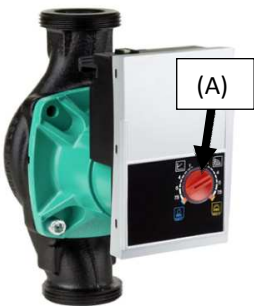
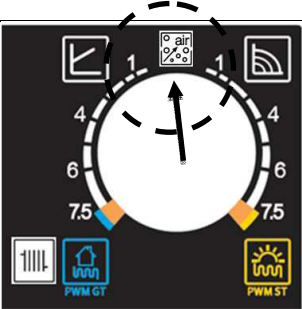
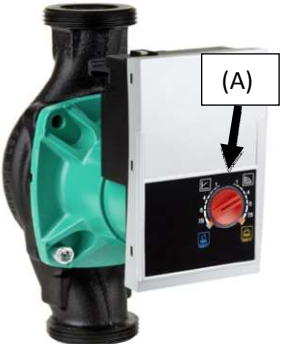
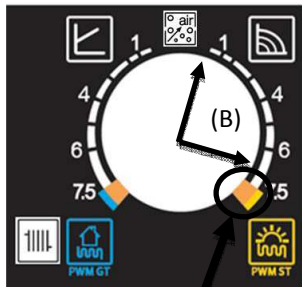
- Close the ball valve of the outlet side (1) by rotating the knob 90 degrees clockwise and close the flow regulator valve (2) (horizontal calibration pin).
- Connect the needed pipes to the supplied hose pipe joint connectors 14 mm that are installed near the safety group and the flow regulator. Open the valves (3 and 4).
- Introducing the fluid from the valve located near the flow regulator (4) and use the second (3) for the collecting the fluid that is used for wathing the plant circuit.
- When the sufficient time has elapsed for washing the plant circuit, close at first the the safety group (3).and then the water flow regulator valve (4).
- Open again the ball valve and reset the flow regulator valve on the desired flow rate as described in Paragraph 19.5.

19.4 MAINTENANCE OF THE CIRCULATOR PUMP



For removing and/or working on the circulator pump you don't don't need to evacuate necessarily need to evacuate the plant circuit, just stop the fluid to flow from both upstream and downstream sides by closing the ball valve (1) (by rotating the knob clockwise) and closing the flow regulator valve (2) (horizontal calibration pin).

19.5 REGULATION OF THE FLOW RATE OF HEAT TRANSFER FLUID IN THE PANELS

		<p>IMPORTANT: Before any regulation, it is necessary to vent air from the system.</p> <p>To do that, place the circular controller (A) at the indicated position (in correspondence with the word "air"). This position will improve the circulation of the heat transfer fluid.</p> <p>Open the air vent valve mounted on the plant circuit (not supplied) and wait for the complete discharge of air.</p>
		<p>Place the calibration valve of the solar group in the full open position (pivot in vertical position).</p> <p>If the system has been properly installed and in right conditions, the regulator will activate the circulator (cold tank and solar collectors at right temperature conditions).</p> <p>Make the flow rate to be equal through the regulator of the pump (A). You will have to choose the correct position in the solar side, between 1 and 7.5 (B), avoiding carefully the maximum area (C) which is indicated in yellow/orange color.</p> <p>Read the flow rate desired through the graduated scale of the flow regulator.</p>


19.6 TECHNICAL CHARACTERISTICS

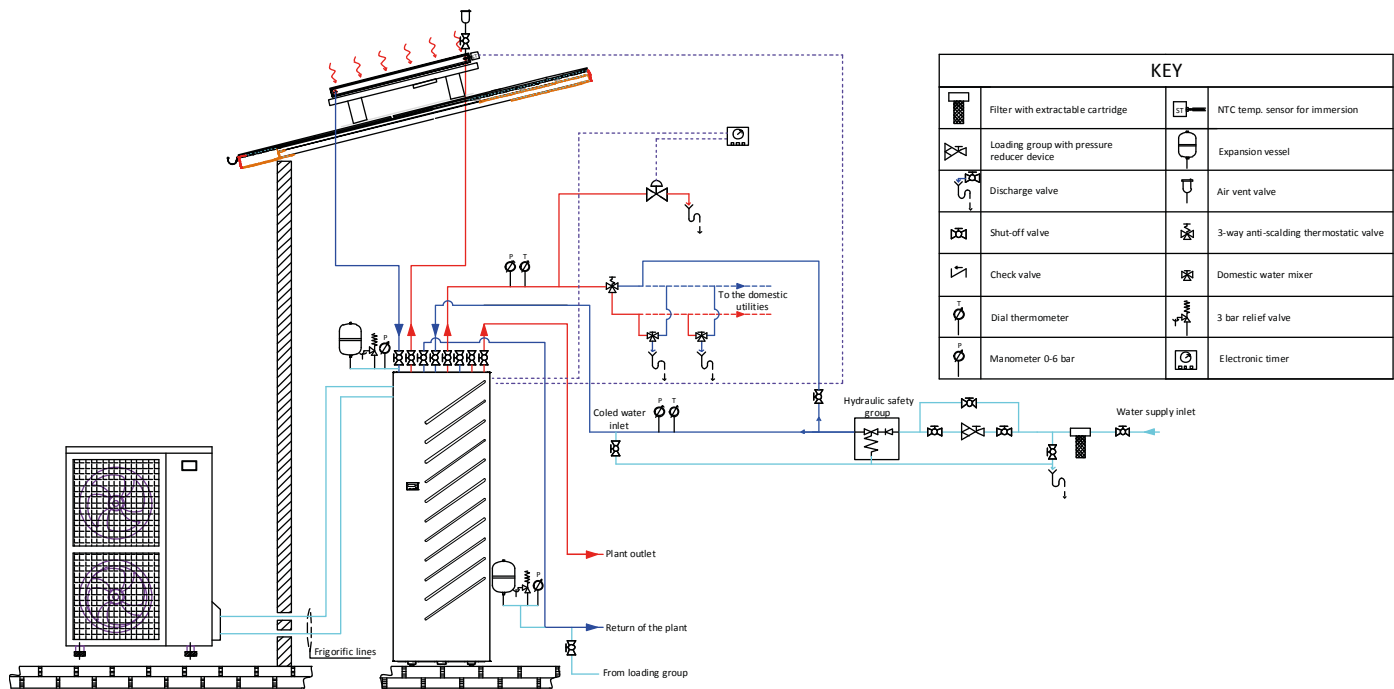
TECHNICAL CHARACTERISTICS		Unit	Model	
			THRON AGR2 ST	
Solar circuit	Maximum water flow	m³/h	0,7	
	Maximum pressure of solar circuit	bar	6	
	Maximum temperature	°C	120	
	Maximum solar surface	m²	20 for PLAN collector	15 for under vaccum
	Solar exchange coil surface	m²	0,7	
	Maximum head of the pump	kPa	74	
	Maximum power of the pump	W	75	
	Maximum absorbed current of the	A	0,60	
Energy Efficiency Index (EEI) pump			≤ 0,21	

19.7 INTEGRATED SECURITY SYSTEMS IN THE CONTROL

Integrated safety logics are included into the control software for protecting the collectors, the sanitary accumulator and the circulator.

To see the specific logics, please refer to the control manual. Refer also to the system diagram shown below.

	<p>WARNING: If the system tends to result oversized, in extreme cases, the provided protection to discharge the domestic hot water in the water supply network.</p>
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20 OPERATION LIMITS

20.1 Evaporator water flow rate

The nominal water flow rate is referred to a temperature differential of $\Delta T=5^{\circ}\text{C}$ between inlet and outlet of the evaporator. The allowed maximum flow rate is corresponding to $\Delta T=3^{\circ}\text{C}$; higher values may cause too high pressure drops. The allowed minimum water flow rate is the one corresponding to $\Delta T=8^{\circ}\text{C}$. Insufficient water flow may in fact cause too low evaporating temperatures with the intervention of safety devices for stopping the operation of the unit and, in some particular cases, the water can freeze in the evaporator coil causing the refrigeration circuit to break down or causes the increasing of the condensing pressure with the shutdown risk of the appliance and the compressor could be damaged.

We enclosed below a most accurate table showing the minimum water flow that should be ensured for the plate heat exchanger in order to have the proper operation of unit as a function of the model (note: the water flow switch is used for preventing the freezing sensor from failure in the case of insufficient water flow but it does not ensure the minimum flow rate required in order the unit can work properly).

Model	THRON AGR2					
	06	08	10	12	14	16T
Required minimum water flow rate [m^3/h]	0,71	0,86	1,08	1,30	1,48	1,64
Required maximum water flow rate [m^3/h]	1,88	2,30	2,87	3,47	3,95	4,37

As a first approach, and in the absence of other detection systems, the proper water flow for getting the best performance from your unit can be found at maximum speed of the circulator, using the pressure gauges for controlling the pressure difference between the return and the delivery water on the outside water connections of the unit and make sure that such value is equal or less than the available head pressure indicated on the curve shown in chapter 16 for the respective models and if it's necessary you change the settings (for the related circulator) that are reported in the manual MCO.

20.2 Chilled water production (summer operation)

The allowed minimum temperature at the evaporator's outlet is 5°C ; for more lower temperatures, the unit should undergo some necessities structural modifications and different setting parameters of the controller with micro-processor. In this case contact our company for the feasibility study and evaluation of changes to be made according to your requests. The maximum temperature that can be maintained at the outlet of the evaporator is 25°C . In any case, the maximum electrical input occurs for the heat pump operating mode at a water outlet temperature of 55°C and with outdoor temperature of -10°C .

20.3 Hot water production (winter operation)

Once the system is working at the right temperature, the inlet hot water temperature should not to be lower than 25°C ; the lowest values that are not related to transitional or start-up stages may cause incorrect working operation to the system with the possible breakdown of the compressor. The maximum outlet water temperature should not exceed 58°C . At this temperature, the power consumption and the performances in terms of C.O.P. are enhanced when the outdoor temperature is higher than 5°C , even if the unit is still able to work up to the limit reported in the envelope.

For higher temperatures than those pointed out, especially if have a concomitant with the reduction of the water flow rate, it may cause abnormalities to the normal operating of the unit, or the safety devices act in critical cases.

20.4 Ambient air temperature

The units are designed and manufactured to operate, in summer operation, with the condensate control, with outdoor air temperatures ranging between -10°C and 46°C. While operating as a heat pump, the admitted outdoor air temperatures range changes from -20°C to 40°C depending on the water outlet temperature as indicated in the below table.

Operation limits

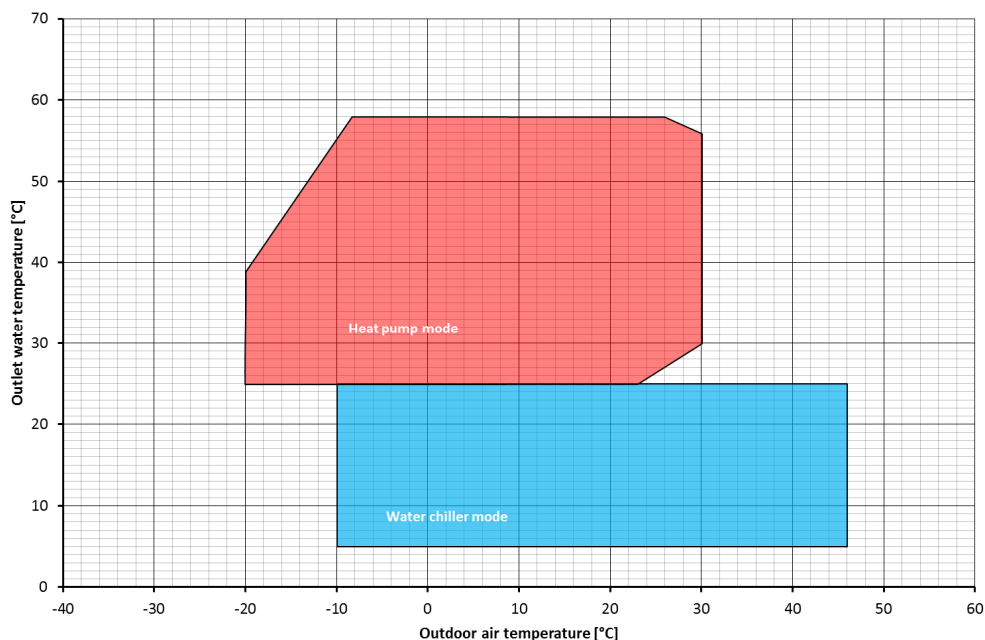
Water chiller mode		
Ambient temperature	Minimum -10°C	Maximum +46°C
Water outlet temperature	Minimum +5°C	Maximum +25°C
Heat pump mode		
Ambient temperature	Minimum -20°C	Maximum +30°C
Water outelt temperature	Minimum +25°C	Maximum +58°C*/+63°C**
Heat pump mode for sanitary hot water		
Ambient temperature with maximum water temp. 38°C	Minimum -20°C	Maximum +40°C
Ambient temperature with maximum water temp. 55°C	Minimum -15°C	Maximum +35°C
Water outelt temperature	Minimum +20°C	Maximum +58°C*/63°C**

(*) The setting of the unit is 57°C, the value of the maximum temperature takes into account the hysteresis of 1°C present on the parameter.

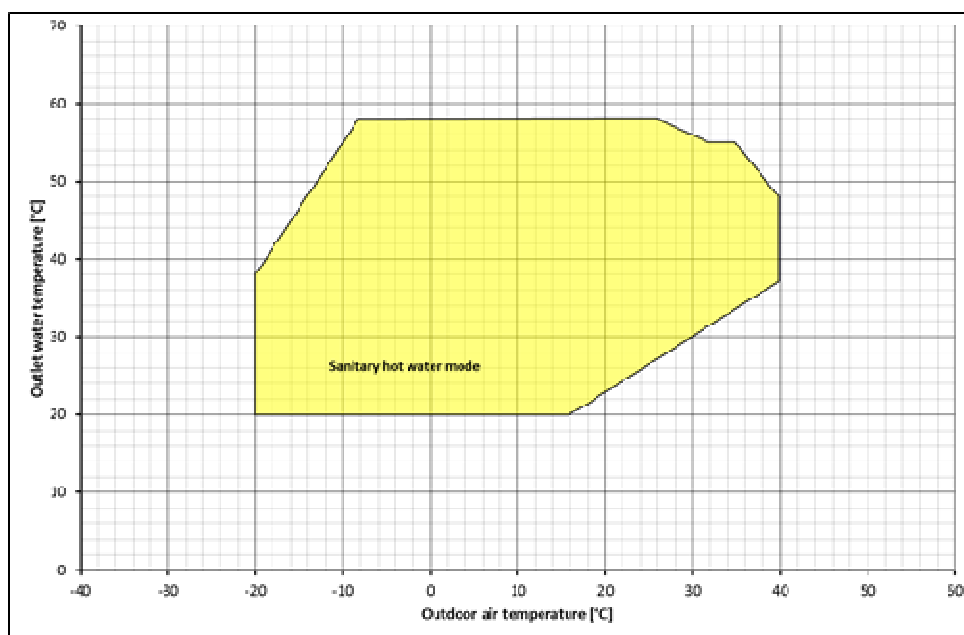
(**) With a supplementary electric heater (optional)

Herein below are reported the graphics operating limits during the air conditioning and domestic hot water production modes.

CHILLER/HEAT PUMP MODE



DOMESTIC HOT WATER MODE



21 CORRECTION FACTORS FOR OPERAZIONI WITH GLYCOL

The following correction factors are to be used only if the indoor unit is installed in any internal area of the building subject to low temperatures and with the judgment of adding a certain quantity of glycol for protecting the hydraulic circuit.

Glycol %	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10	-3,2	0,985	1	1,02	1,08
20	-7,8	0,98	0,99	1,05	1,12
30	-14,1	0,97	0,98	1,10	1,22
40	-22,3	0,965	0,97	1,14	1,25
50	-33,8	0,955	0,965	1,2	1,33

CCF: Capacity correction factor.

IPCF: Input power correction factor.

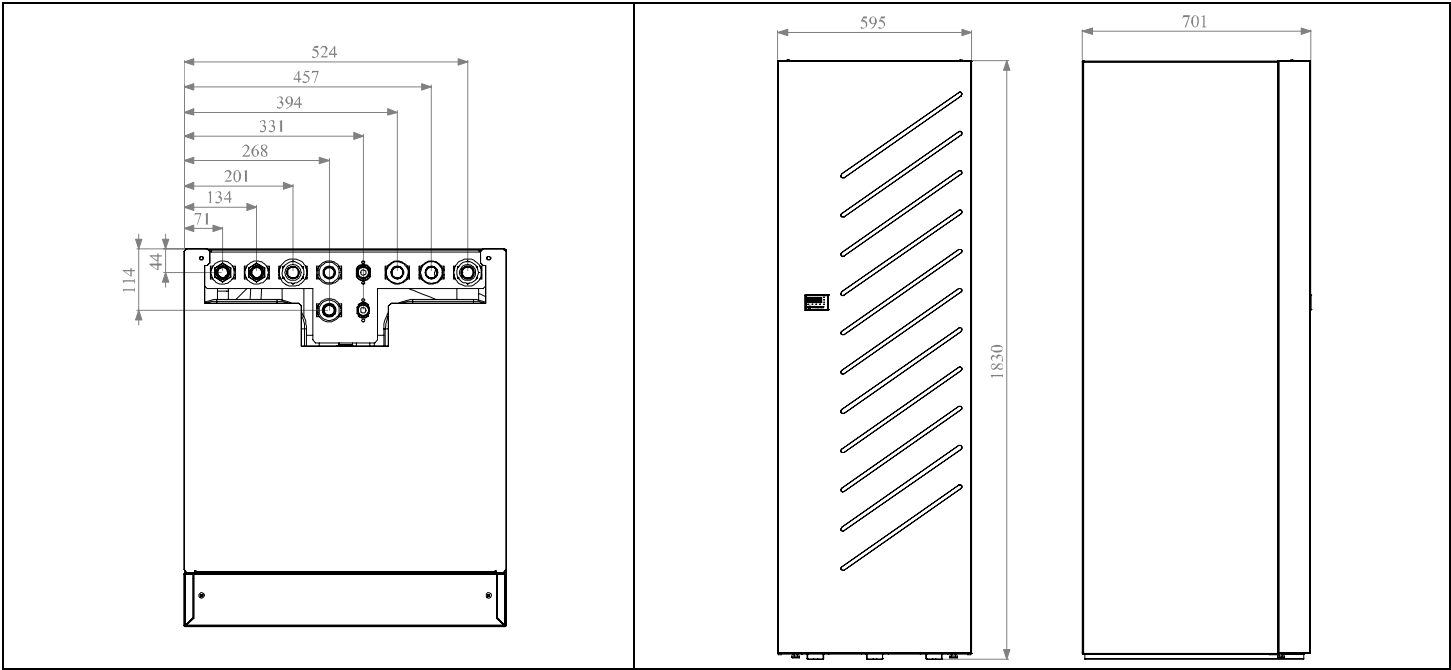
WFCF: Water flow correction factor.

PDCF: Pressure drops correction factor.

The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to get the same temperature's difference that would be obtained without glycol. The pressure drop's correction factor takes into account the different water flow rate obtained from the application of the water flow rate correction factor.

22 DIMENSIONS

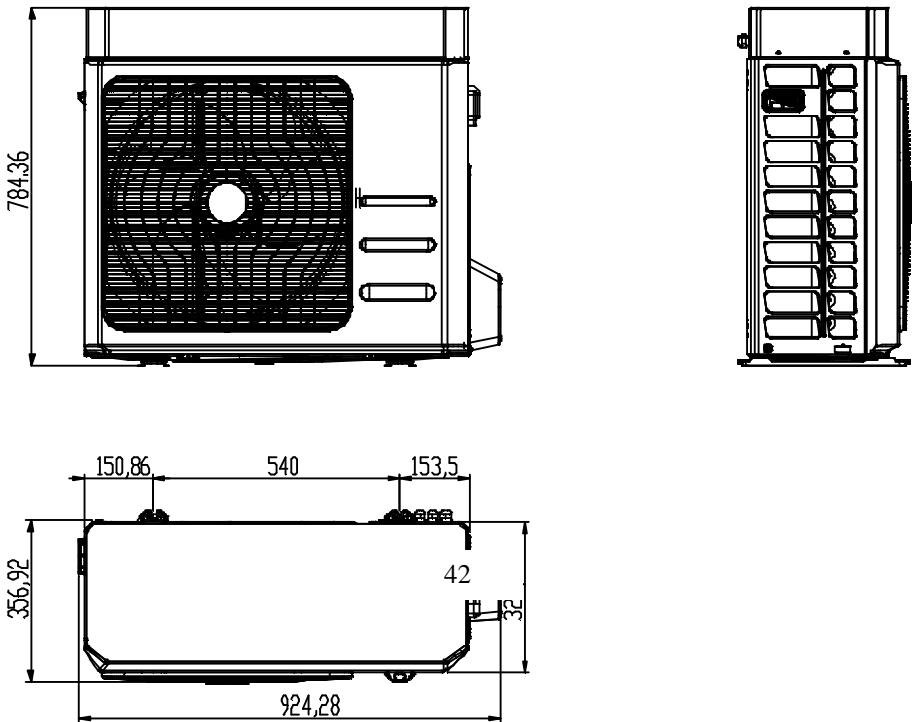
22.1 INDOOR UNITS



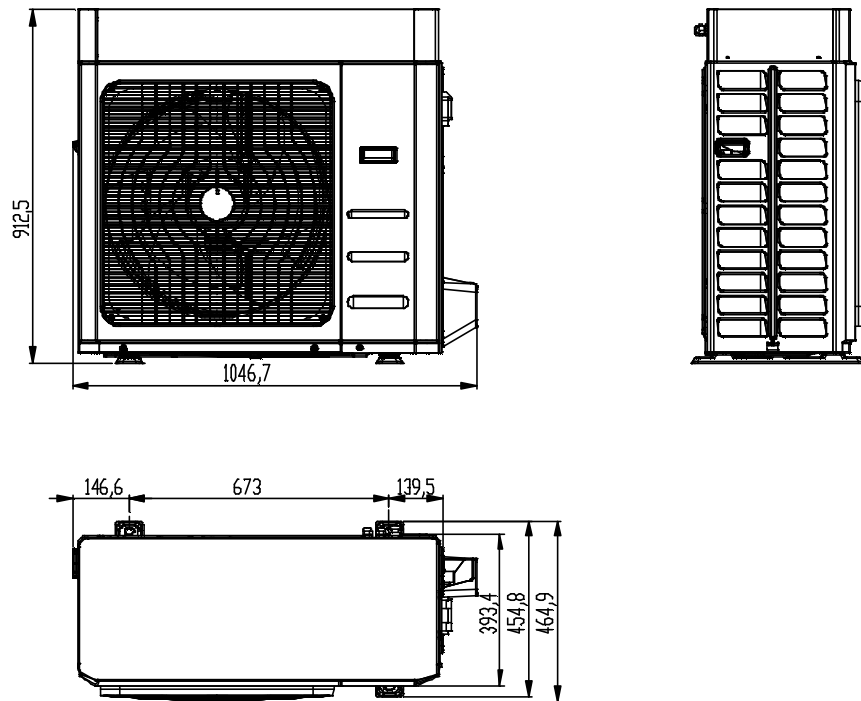
WARNING. The indicated height excludes adjustable feet which will add till 20mm.

22.2 OUTDOOR UNITS

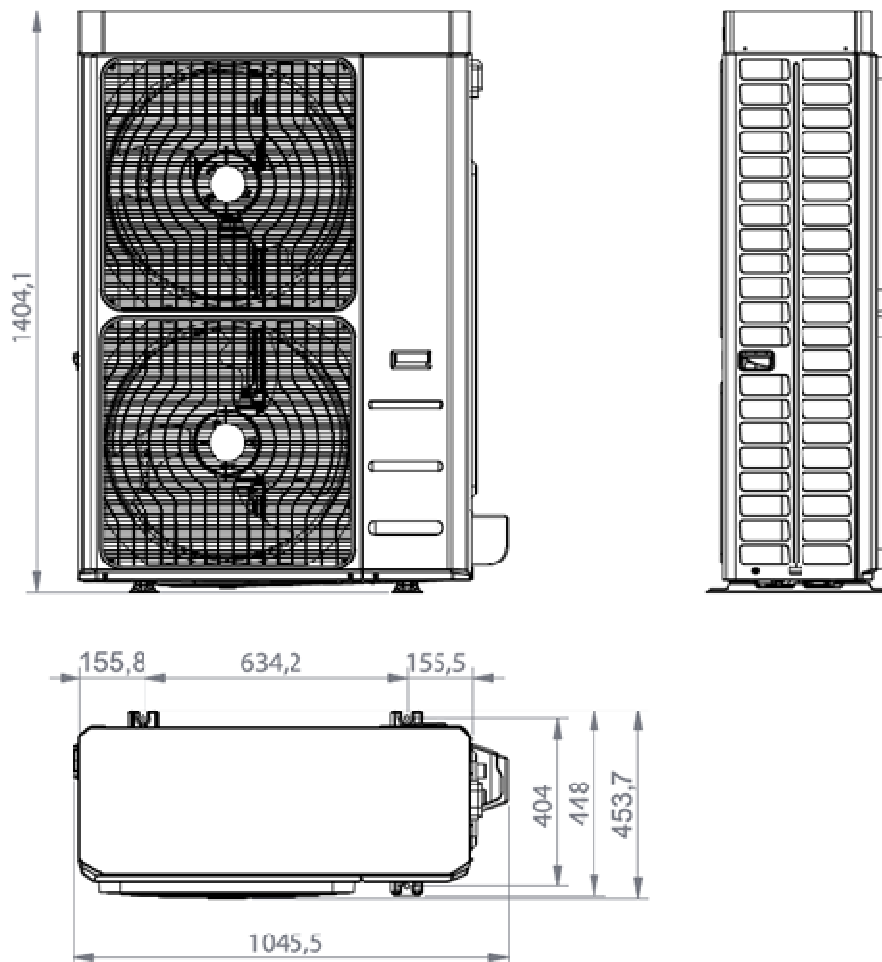
22.2.1 MOD. TE1/06AG, TE1/08AG



22.2.2 MOD. TE1/10AG, TE1/12AG

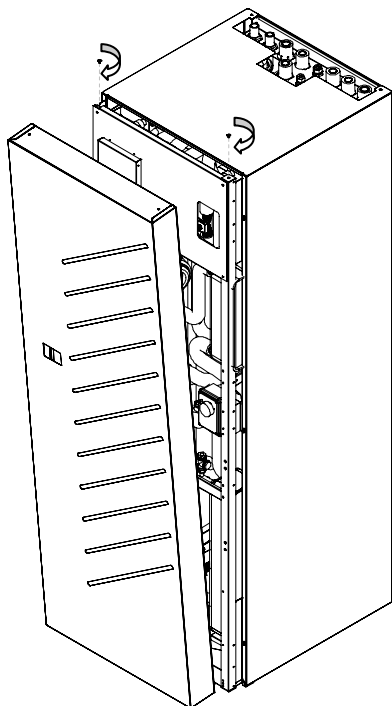


22.2.3 MOD. TE1/14AG, TE3/14AG, TE3/16AG



23 ACCESS PROCEDURE TO INTERNAL PARTS

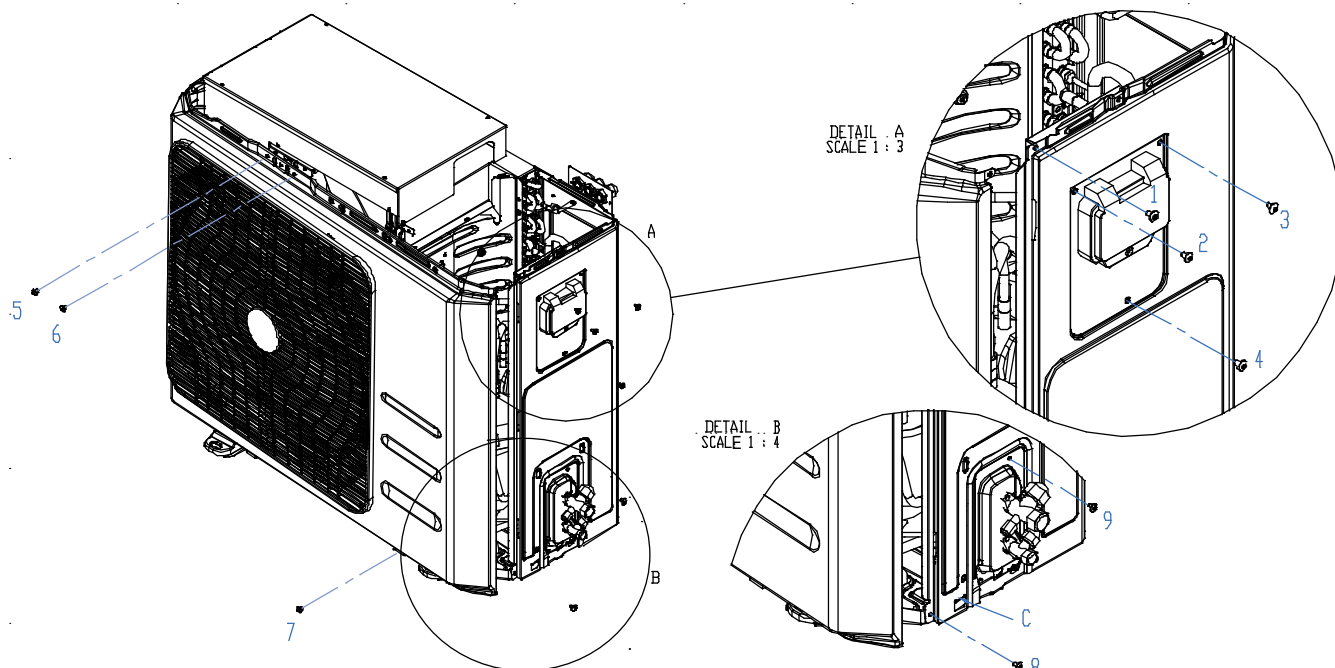
23.1 INDOOR UNIT



- 1) Remove the two fixing screws in the top part of the unit.
- 2) Remove the front panel paying attention to the locking system: to remove the front panel, it is sufficient to lift it with 10mm and to pull it in front side turning it slightly towards you.
- 3) The same procedure should be repeated on the opposite way for repositioning the front panel.

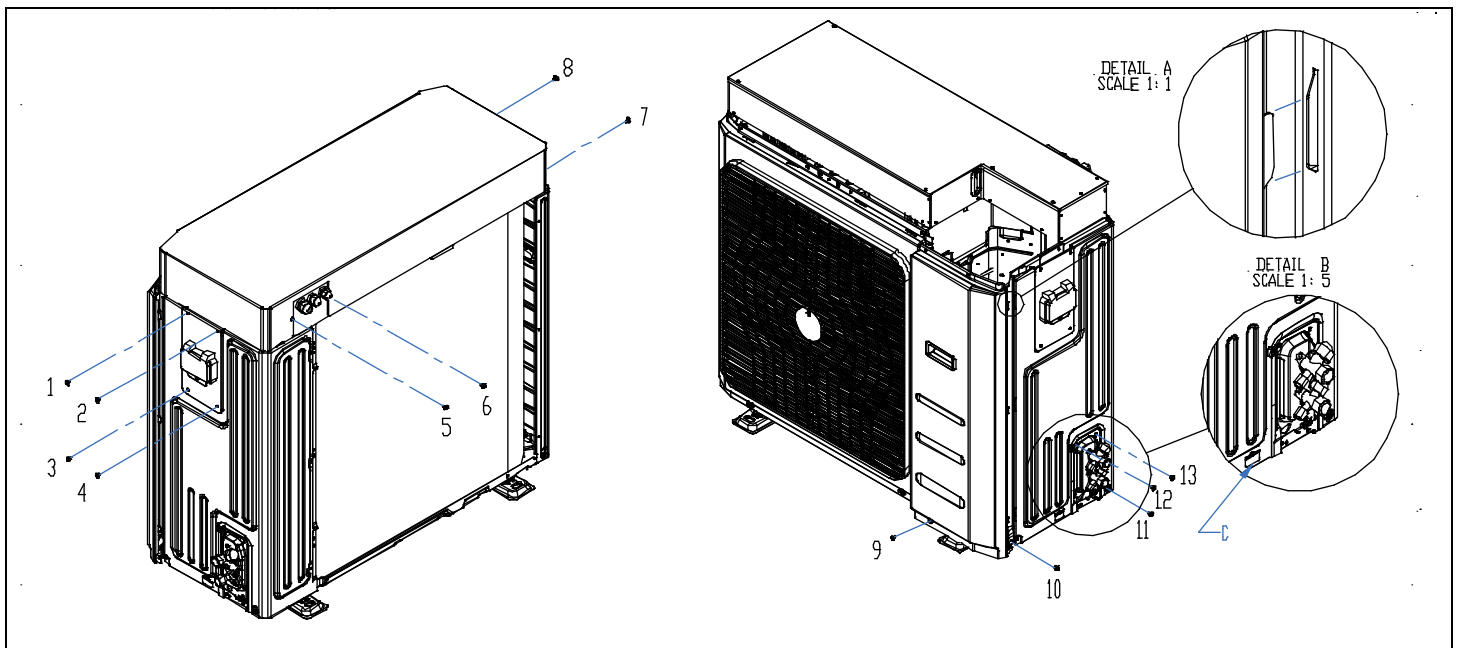
23.2 OUTDOOR UNIT

23.2.1 Mod. TE1/06AG, TE1/08AG



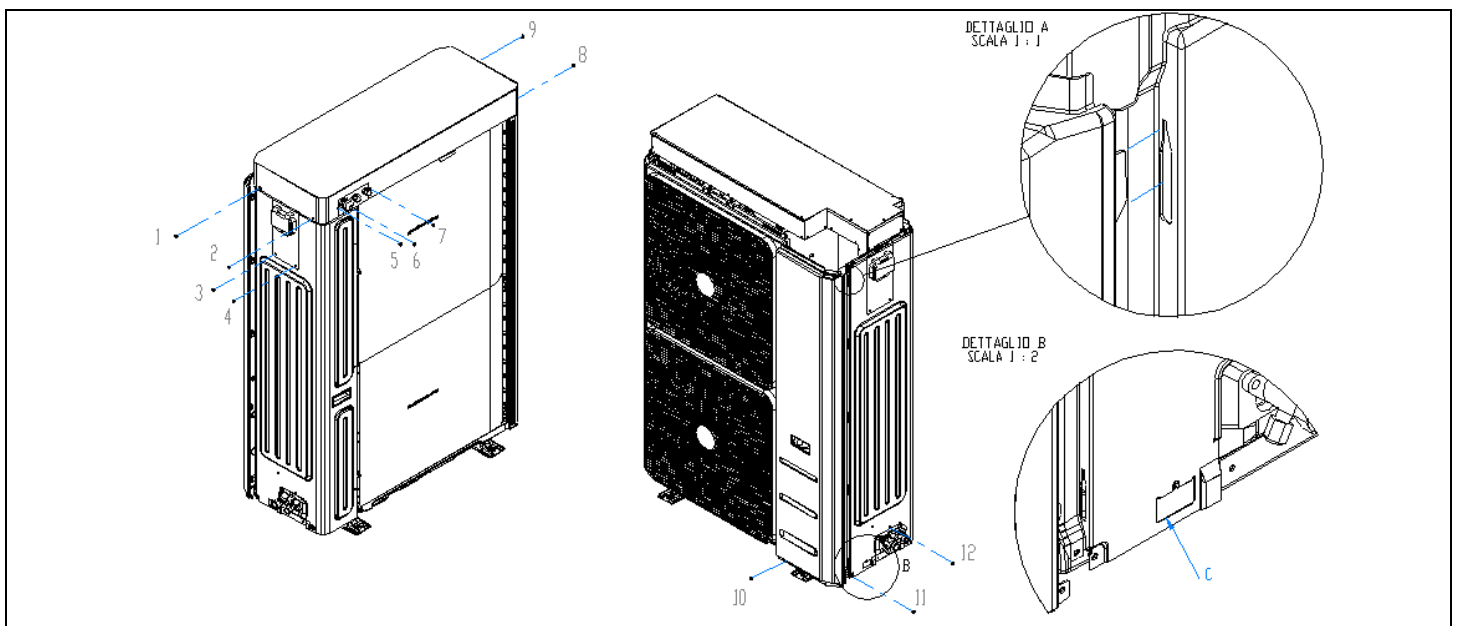
- 1) Remove the top cover
- 2) Twist off the screws (number 2; 3; 4) of the user interface cover plate and the screw (1) from the side panel for separating the side panel from the front panel (Detail A).
- 3) Sequentially, twist off the screws (number 5; 6; 7) in order to move shift slightly the front panel and gain access to the screw (number 8) visible in detail B.
- 4) Twist off the screws (number 8; 9 visible in detail B) and those positioned on the battery side of the unit. To remove the side panel, pull it up (in order to free the tab of the base coupling which is indicated as C in detail B) and remove it.

23.2.2 Mod. TE1/10AG, TE1/12AG



- 1) Remove the cover twisting off the screws (number 1; 2; 3; 4; 5; 6; 7; 8).
- 2) Twist off the screws (number 9; 10) of the front panel and then push the panel downward to remove the interlocking tab (Detail A); pull the panel forward to remove it.
- 3) Twist off the screws (number 11; 12; 13) and those places on the battery side of the unit. To remove the side panel, pull the panel forward to remove it (in order to loose the hooking tab on the basement indicated as C in the detail B) and remove it.

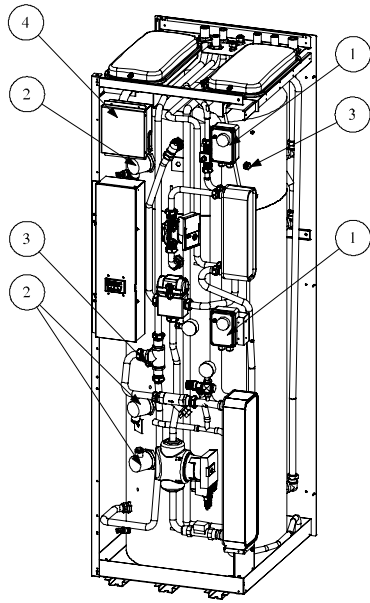
23.2.3 Mod. TE1/14AG, TE3/14AG, TE3/16AG



- 1) Remove the cover twisting off the screws (number 1; 2; 3; 4; 5; 6; 7; 8; 9).
- 2) Twist off the screws (number 10; 11) of the front panel and then push the panel downward to remove the interlocking tab (Detail A); pull the panel forward to remove it.
- 3) Twist off the screw number 12 and those placed of the battery side of the unit. To remove the side panel, pull it upward (in order to loose the hooking tab on the basement indicated as C in the detail B) and remove it.

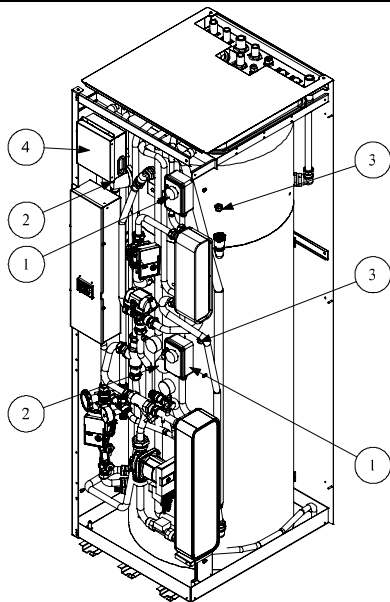
24 COMPONENTS OF INDOOR AND OUTDOOR UNITS

24.1 Indoor unit models TA1/xxR2 E e TA1/xxR2 + STxx



MODEL TA1/xxR2

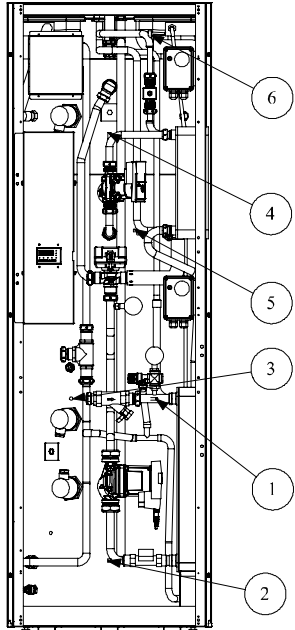
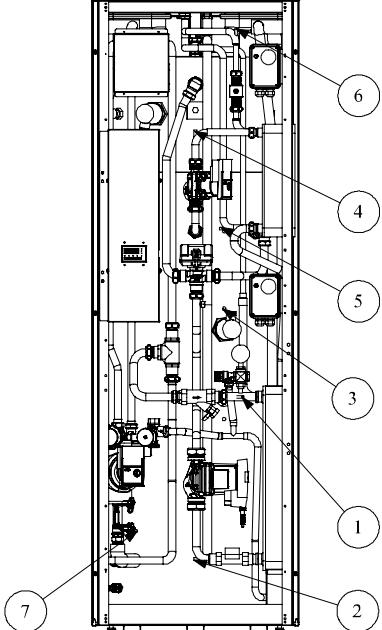
- 1) Safety thermostats boxes
- 2) Electric heaters
- 3) Wells thermostat sensors
- 4) Additional electric board



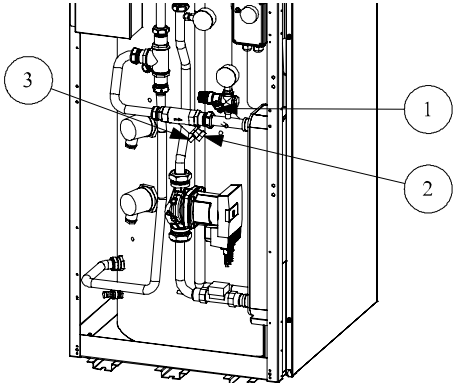
The model TA1/xxR2 + STxx

- 1) Relief thermostats boxes
- 2) Electric heaters (One only for DHW side and one for plant side)
- 3) Wells thermostat sensors
- 4) Additional electric board

24.2 Indoor unit temperature sensor

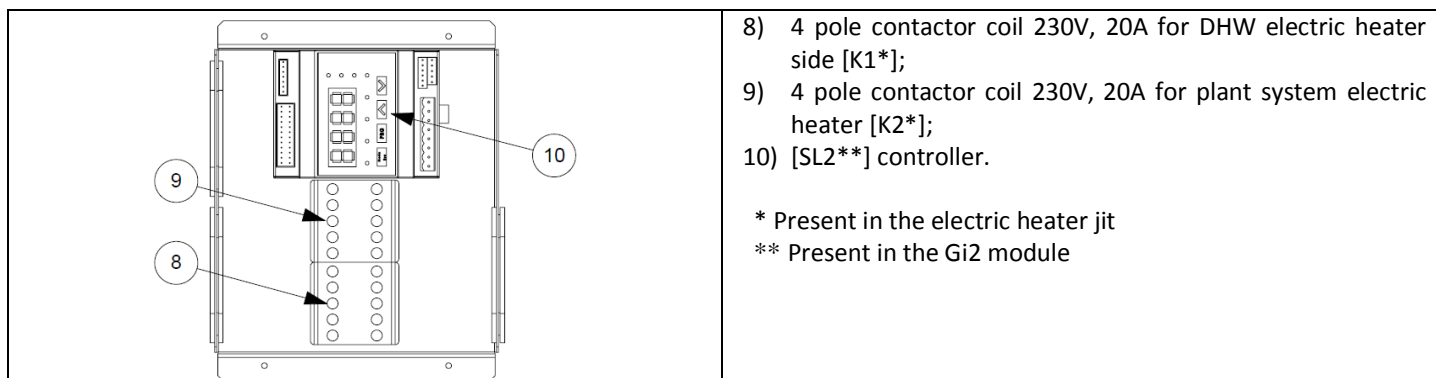
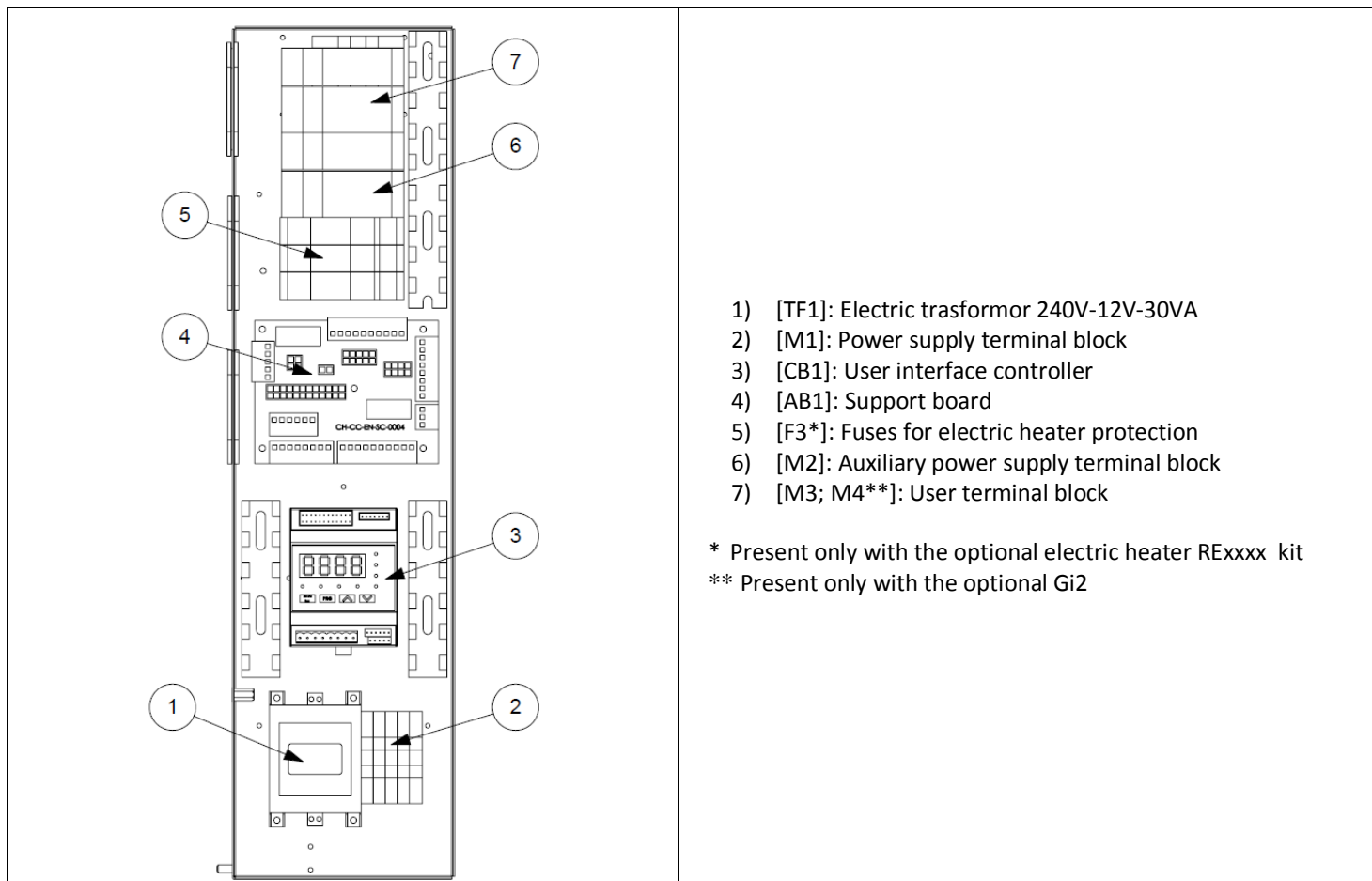
Model TA1/xxR2	Model TA1/xxR2 + STxx	Position of temperature sensor
		<ul style="list-style-type: none">1) Heat exchanger inlet2) Heat exchanger outlet3) DHW technical side4) DHW-R primary circuit inlet5) DHW-R secondary circuit inlet6) DHW-R secondary outlet7) Solar coil

25 FILTER CLEANING

	<ul style="list-style-type: none">1) Remove the discharge pipe from the fitting of the relief valve (1)2) Connect the outlet of the Y filter (it necessary to tighten an additional hose connector not supplied)3) Open the faucet and drain the dirty water with impurities (3).4) Close the faucet5) Connect the discharge pipe of the relief valve.
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26 WIRING DIAGRAMS

26.1 INDOOR UNIT ELECTRIC BOX LAYOUT



27 CONTROL LOGICS

For the control logic, please see the supplied control manual of the unit.

