Hidros
THERMAL SOLUTIONS

AIR TO WATER CHILLERS

LDA

SERIES

TECHNICAL MANUAL

Incorporated in this document are the following:
- Declaration of conformity
- Technical manual

TÜVRheinland CERTIFIED
Management System
ISO 9001:2015
ISO 14001:2015
ISO 45001:2018
www.tuv.com
ID 9108638436

CE

Multiple instructions: Consult the specific part

Read and understand the instructions before undertaking any work on the unit

RETAIN FOR FUTURE REFERENCE

Declaration of conformity

We declare under our own responsibility that the below equipment complies in all parts with the CEE and EN directives.
The declaration of conformity is enclosed to the technical booklet enclosed with the unit. The unit contains fluorinated greenhouse gases.

INDEX

1. INTRODUCTION

1.1 Preliminary information

Reproduction, storage or transmission of any part of this publication in any form, without the prior written consent of the Company, is prohibited.
The unit to which these instructions refer, is designed to be used for the the purposes described and to be operated in accordance with these instructions.
The Company will not be liable for claims for damage caused to persons, animals, material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.
This document is intended to provide information only and does not form a contract with third parties.
The Company pursues a policy of constant improvement and development of its products and therefore reserves the right to change the specifications and the documentation at any time, without notice and without obligation to update existing equipment.

1.2 Aim and content of the manual

These instructions are intended to provide the information required for the selection, installation, use and maintenance of the unit.
They have been prepared in accordance with the European Union laws and with the technical standards in force at the date of issue of the instructions.
The instructions contain all the necessary information to prevent any reasonably foreseeable misuse.

1.3 How to store this manual

The manual must be kept in a suitable place with easy access for users and operators, protected from dust and damp.
The manual must always accompany the unit during the entire life cycle of the same and therefore must be transferred to any subsequent user.

1.4 Manual Update

It is recommended that the manual is updated to the latest revision available.
If updates are sent to the customer they must be added to this manual.
The latest information regarding the use of its products is available by contacting the Company.

1.5 How to use this manual

The manual is an integral part of the unit.

Users or operators must consult the manual before performing any operation and especially so when transporting, handling, installating, maintaining, or dismantling the unit in order to eliminate uncertainty and reduce risk.

In these instructions symbols have been used (described in the following paragraphs) to draw the attention of operators and users to the operations that have a higher risk and which must be performed safely.

1.6 Potential Risks

Whilst the unit has been designed to minimize any risk posed to the safety of people who will interact with it, it has not been technically possible to eliminate completely the causes of risk. It is therefore necessary to refer to the requirements and symbolism below:

LOCATION OF RISK	POTENTIAL RISK	METHOD OF INJURY	PRECAUTIONS
Thermal heat exchangers.	Small stab wounds.	Contact	Avoid any contact, use protective gloves.
Fan and fan grilles.	Cuts, eye damage, broken bones.	Insertion of sharp objects through the grid while the fans are operating.	Never put objects through the protection grilles.
Internal component: compressors and discharge pipes	Burns.	Contact	Avoid any contact, use protective gloves.
Internal component: electric cables and metallic parts	Electrocution, severe burns.	Defect in the supply cable insulation, live metallic parts.	Adequate protection of power cables, ensure correct earthing of all metal parts.
External to unit: unit enclosure	Poisoning, severe burns.	Fire due to short circuit or overheating of the supply cable external to unit.	Size cables and mains protection system in accordance with iee regulations.
Low pressure safety valve.	Poisoning, severe burns.	High evaporating pressure causing a refgrigerant discharge during maintenance.	Carefully check the evaporating pressure during the maintenance operations. Use all personal protective equipment required by the law. PPE must also protect against gas leaks from the safety valve. The outlet of these valves is directed to avoid causing damage to persons or goods.
High pressure safety valve.	Poisoning, severe burns, hearing loss.	Activation of the high pressure safety valve with the refrigerant circuit open.	If possible, do not open the refrigerant circuit valve; carefuly check the condensing pressure; use all the personal protective equipment required by law. PPE must also protect against gas leaks from the safety valve. The outlet of these valves is directed to avoid causing damage to persons or goods.
Entire unit	External fire	Fire due to natural disasters or combustions of elements nearby unit	Provide the necessary fire-fighting equipment
Entire unit	Explosion, injuries, burns, poisoning, folgoramento for natural disasters or earthquake.	Breakages, failures due to natural disasters or earthquake	Plan the necessary precautions both electrical (suitable differential magneto and electrical protection of the supply lines; greatest care during the connections of the metal parts), and mechanical (special anchors or seismic vibrations to prevent breakages or accidental falls).

1.7 General Description of Symbols Used

Safety symbols combined in accordance with ISO 3864-2:

BANNED
A black symbol inside a red circle with a red diagonal indicates an action that should not be performed.

WARNING
A black graphic symbol added to a yellow triangle with black edges indicates danger.

ACTION REQUIRED
A white symbol inserted in a blue circle indicates an action that must be done to avoid a risk.

Safety symbols combined in accordance with ISO 3864-2:

The graphic symbol “warning” is qualified with additional safety information (text or other symbols).

1.8 Safety symbols used

GENERAL RISK
Observe all signs placed next to the pictogram. The failure to follow directions may create a risk situation that may be injurious to the user.

ELECTRICAL HAZARD
Observe all signs placed next to the pictogram.
The symbol indicates components of the unit and actions described in this manual that could create an electrical hazard.

MOVING PARTS
The symbol indicates those moving parts of the unit that could create risk.

HOT SURFACES
The symbol indicates those components with high surface temperature that could create risks.

SHARP SURFACES
The symbol indicates components or parts that could cause stab wounds.

EARTH CONNECTION
The symbol identifies Earthing connection points in the unit.

READ AND UNDERSTAND THE INSTRUCTIONS
Read and understand the instructions of the machine before any operations.

RECOVER OR RECYCLE MATERIAL

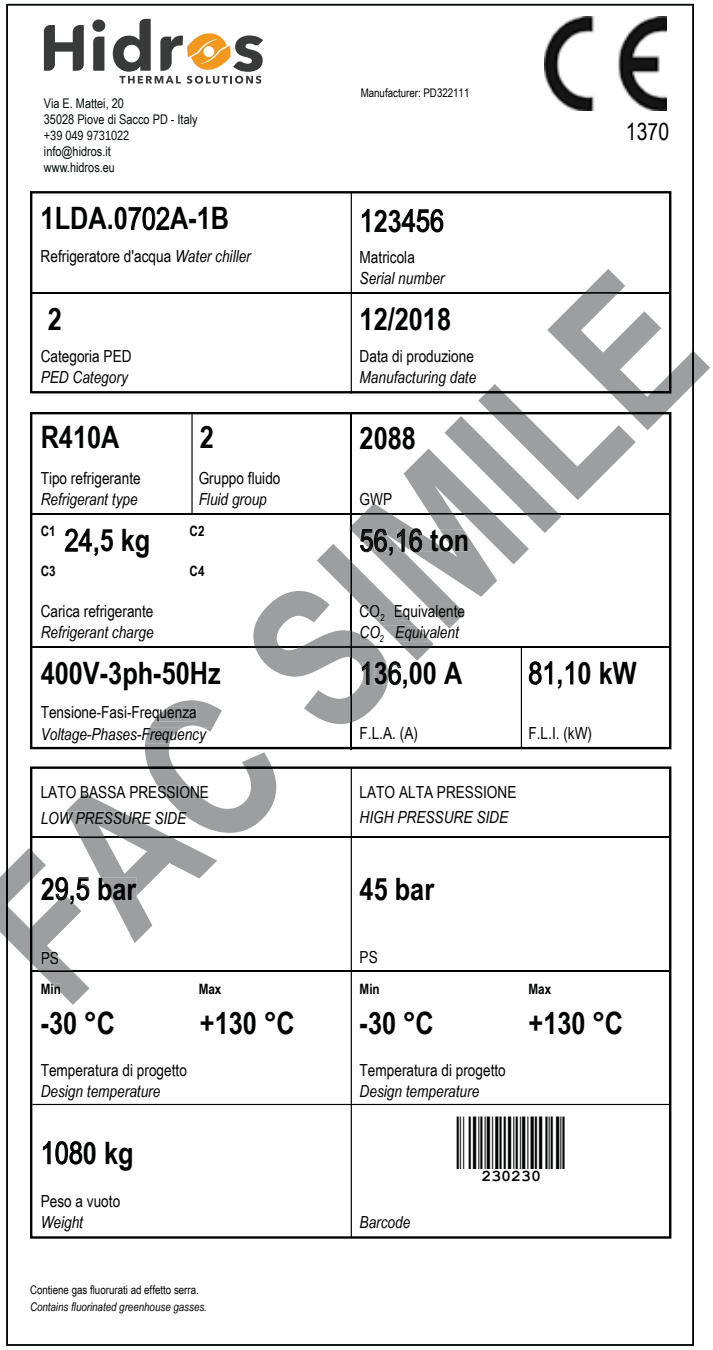
1.9 Limitations and prohibited use

The machine is designed and built exclusively for the uses described in “Limitations of use” of the technical manual.
Any other use is prohibited because it may pose a potential risk to the health of operators and users.

The unit is not suitable for operations in environments:
- excessively dusty or potentially explosive atmospheres;
- where there are vibrations;
- where there are electromagnetic fields;
- where there are aggressive atmospheres

1.10 Unit identification

Each unit has a rating plate that provides key information regarding the machine.
The rating plate may differ from the one shown below as the example is for a standard unit without accessories.
For all electrical information not provided on the label, refer to the wiring diagram.
A facsimile of the label is shown below:



The product label should never be removed from the unit.

2. SAFETY

2.1 Warning re potentially hazardous toxic substances

2.1.1 Identification of the Type of Refrigerant Fluid Used: R410A

• Difluoromethane (HFC-32) 50% by weight CAS No.: 000075-10-5
• Pentafluoroethane (HFC-125) 50% by weight CAS No.: 000354-33-6

2.1.2 Identification of the Type of Oil Used.

The lubricant used is polyester oil. Please refer to the information provided on the compressor data plate.

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

Main Ecological Information Regarding the Types of refrigerants Fluids used.

ENVIRONMENTAL PROTECTION : Read the ecological information and the following instructions carefully.

2.1.3 Persistence and degradation

The refrigerants used decompose in the lower atmosphere (troposphere) relatively quickly. The decomposed products are highly dispersible and therefore have a very low concentration. They do not influence the photochemical smog which is not among the VOC volatile organic compounds (as stipulated in the guidelines to the UNECE). The constituent refrigerants of R407C (R32, R125 and R134a), do not damage the ozone layer. These substances are regulated under the Montreal Protocol (revised 1992) and regulations EC no. 2037/200 of 29 June 2000.

2.1.4 Effects of discharges

Discharges into the atmosphere of this product does not cause a long-term contamination.

2.1.5 Exposure controls and personal protection

Wear protective clothing and gloves, protect your eyes and face

2.1.6 Professional exposure limits

R410A
HFC-32 TWA 1000 ppm
HFC-125 TWA 1000 ppm

2.2 Refrigerant handling

Users and maintenance personnel must be adequately informed about the possible risks of handling potentially toxic substances. Failure to follow such instructions can cause damage to personnel or to the unit.

2.3 Prevent inhalation of high vapor concentration

Atmospheric concentrations of refrigerant must be minimized and kept to a level that is below the occupational exposure limit. Vapor is heavier than air and can form dangerous concentrations near the ground where the ventilation rate is lower. Always ensure adequate ventilation. Avoid contact with open flames and hot surfaces as this can cause toxic and irritating decomposition products to form. Avoid contact between liquid refrigerant and the eyes or skin.

2.4 Procedures to be adopted in the event of accidental release of refrigerant

Ensure suitable personal protection (especially respiratory protection) during cleaning operations.
If deemed safe, isolate the source of the leak. If the leakage is small and if adequate ventilation is provided, allow the refrigerant to evaporate. If the loss is substantial ensure that measures are taken to adequately ventilate the area.
Contain spilled material with sand, earth or other suitable absorbent material.
Do not allow the refrigerant to enter drains, sewers or basements, as pockets of vapor can form.

2.5 Main Toxicological Information Regarding the Type of refrigerant used

2.5.1 Inhalation

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

2.5.2 Contact with skin

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

2.5.3 Contact with eyes

Splashes of liquid may cause frostbite.

2.5.4 Ingestion

While highly improbable, may produce frostbite.

2.6 First Aid Measures

Adhere scrupulously to the warnings and first aid procedures indicated below.

2.6.1 Inhalation

Move the person away from the source of exposure, keep him/her warm and let him/her rest. Administer oxygen if necessary. Attempt artificial respiration if breathing has stopped or shows sings of stopping. If the heart stops, perform external heart massage. Seek medical assistance.

2.6.2 Contact with skin

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

2.6.3 Contact with eyes

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

2.6.4 Ingestion

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

2.6.5 Further medical treatment

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

3. TECHNICAL CHARACTERISTICS

3.1 Unit description

The water chillers are efficient, low-noise products designed for medium to large applications.
They are suitable for generating chilled water at temperatures in the region of 7°C, commonly used in applications with fan coils and/or air handling units. The use of tandem scroll compressors results in high efficiencies (especially at part loads) and low noise levels, making them suitable for use in many applications.

Differing versions and a wide range of accessories, enable the optimal solution to be selected.

3.1.1 Frame

All units are made from hot-galvanised sheet steel, painted with polyurethane powder enamel and stoved at 180°C to provide maximum protection against corrosion. The frame is self-supporting with removable panels. All screws and rivets used are made from stainless steel. The standard colour of the units is RAL9018.

3.1.2 Refrigerant circuit

The refrigerant utilised is R410A. The refrigerant circuit is assembled using internationally recognised brand name components with all brazing and welding being performed in accordance with ISO 97/23. The refrigerant circuit includes: sight glass, filter drier, thermal expansion valve with external equalizer, Schrader valves for maintenance and control, pressure safety device (for compliance with PED regulations).

3.1.3 Compressors

The compressors used are a high performance scroll type. In all units the compressors are connected in tandem. This results in much higher efficiencies at part loads compared to units with independent refrigerant circuits.
The compressors are all supplied with a crankcase heater and thermal overload protection by a klixon embedded in the motor winding. They are mounted in a separate enclosure in order to be separated from the air stream thus enabling them to be maintained even if the unit is operating. Access to this enclosure is by the front panel of the unit. The crankcase heater is always powered when the compressor is in stand-by.

3.1.4 Source heat exchanger

The source heat exchanger is made from 3/8” copper pipes and 0,1mm thick aluminium fins with the tubes being mechanically expanded into the aluminium fins in order to maximise heat transfer. Furthermore, the design guarantees a low air side pressure drop thus enabling the use of low rotation speed (and hence low noise) fans.

3.1.5 Fans

The fans are direct drive axial type with aluminium aerofoil blades, are statically and dynamically balanced and are supplied complete with a safety fan guard complying with the requirements of EN 60335.
They are fixed to the unit frame via rubber anti-vibration mountings. The electric motors, in LS versions are 6 poles type rotating at approximately 900 rpm. In the XL versions the fans are 8 poles type (approx 600 rpm). The motors are fitted with integrated thermal overload protection and have a moisture protection rating of IP 54.

3.1.6 User heat exchangers

The user heat exchanger is a braze welded, plate type heat exchanger, manufactured from AISI 316 stainless steel. The use of this type of exchanger results in a massive reduction of the refrigerant charge of the unit compared to a traditional shell-in-tube type. A further advantage is a reduction in the overall dimensions of the unit.

The exchangers are factory insulated with flexible close cell material and can be fitted with an antifreeze heater (accessory). Each exchanger is fitted with a temperature sensor on the discharge water side for antifreeze protection.

3.1.7 Electric enclosure

The enclosure is manufactured in order to comply with the requirements of the electromagnetic compatibility standards CEE 73/23 and 89/336. Access to the enclosure is achieved by removing the front panel of the unit. The following components are supplied as standard on all units: main switch, a sequence relay that disables the power supply in the event that the phase sequence is incorrect (scroll compressors can be damaged if they rotate in the wrong direction), thermal overloads (protection of pumps and fans), compressor fuses, control circuit automatic breakers, compressor contactors, fan contactors and pump contactors. The terminal board has volt free contacts for remote ON-OFF and general alarm.

3.1.8 Microprocessors

All units are supplied as standard with microprocessor controls. The microprocessor controls the following functions: control of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence, alarm reset, volt free contact for remote general alarm, alarms and operation LED's. If required (available as an option), the microprocessor can be configured in order for it to connect to a site BMS system thus enabling remote control and management. The technical department can discuss and evaluate, in conjunction with the customer, solutions using MODBUS protocols.

3.1.9 Control and protection devices

All units are supplied with the following control and protection devices: Return water temperature sensor installed on the return water line from the building, antifreeze protection sensor installed on the outlet water temperature, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection and flow switch.

3.2 Other versions

3.2.1 BT Version

Low user water temperature; supplied with a specific cooling circuit allowing the unit to operate with user chilled water between +4°C and -5°C.

3.2.2 SA Version

Standard efficiency version, according to ERP2018 standard. Unit equipped with AC fans.

3.2.3 SE Version

Standard efficiency version, according to ERP2018 standard. Unit equipped with EC fans.

3.2.4 HA Version

High efficiency version, according to ERP2018 standard. Unit equipped with AC fans.

3.2.5 HE Version

High efficiency version, according to ERP2018 standard. Unit equipped with EC fans.

3.2.6 Units with integrated hydraulic kit, tank & pump (A1ZZU - A2ZZU)

The units have available, as an option, a built in hydraulic kit that includes:
Water tank in different sizes (depending on the size of the unit) factory insulated with flexible close cell material and prepared for the installation of an antifreeze kit (option) and 1 water pump (A1ZZ) or 2 pumps running+stand-by (A2ZZ), centrifugal type, suitable for chilled water operation. The pumps are directly controlled by the microprocessor.
The water tank is installed on the outlet water side in order to minimize fluctuations in the water temperature due to the compressors cycling at part load conditions.
Also provided in the hydraulic circuit are an expansion vessel, pressure relief valve and system isolating valves with fittings.

3.2.7 Units with integrated hydraulic kit, pump no tank (A1NU-A2NTU)

The units have available, as an option, a built in hydraulic kit that incorporates 1 water pump (A1NT) or 2 pumps running+stand-by (A2NT), centrifugal type, suitable for chilled water operation. The pump is directly controlled by the microprocessor.
Also provided in the hydraulic circuit are a pressure relief valve and system isolating valves with fittings.

3.3.8 Low noise version (LS)

This version includes the complete acoustic insulation of the unit (compressor + heat exchangers vanes) with compressor jackets and insulating material made with high density media and the interposition of heavy bitumen layer.

3.2.9 Extra low noise version (XL)

Units in XL version are supplied, as standard, with the latest 'Floating Frame' technology that completely isolates the compressors from the main casing, thereby eliminating vibration and noise from this source. The 'Floating Frame' is a special vibration and acoustic damping system that consists of a base plate and acoustic enclosure that houses the compressors. The base plate is separated from the supporting frame of the unit by soft steel springs that have a high damping power. Within the enclosure, the compressors are mounted on rubber shock absorbers on the floating base plate. The enclosure is manufactured from galvanized steel sandwich panels that have a micro-perforated inner skin and a core of 50 mm thick, high density (40 kg/m3) mineral wool. The entire arrangement provides a double damping system and acoustic attenuation. The compressor refrigerant pipes are connected to the refrigerant circuit through "anaconda" flexible connections. Flexible connections are also used on the water pipework within the unit. The combination of these systems results in an overall noise reduction in the region of 10-12 dB(A). Unit equipped with low rotation speed fans (approx. 600 rpm).

3.3 Accessories description

3.3.1 Rubber vibration dampers (KAVG)

To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

3.3.2 Spring vibration dampers (KAVM)

To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

3.3.3 Antifreeze heater (RAEV)

This kit, used in units without a hydraulic kit, comprises a "self-heating" electric cable that is wrapped around the user and domestic hot water exchanger (SW6 Units only) and the water circuit pipework. This device is controlled by the microprocessor.

3.3.4 Antifreeze kit (only A1 versions) (KPU-KPSU)

This kit, used on units fitted with a hydraulic kit, comprises a "self-heating" electric cable that is wrapped around the user and domestic hot water exchanger (SW6 Units only), the water circuit pipework and includes an armoured electric heater that is fitted inside the water tank. This device is controlled by the microprocessor.

3.3.5 Pressure gauges (MAML)

These enable the standing charge and the operating pressures to be monitored.

3.3.6 Condensing coil protection mesh with metallic filter (FAMM)

This protects the condensing coil from accidental damage and from weather events (hail). It also prevents leaves, paper and debris from collecting at the coil, thus reducing maintenance.

3.3.7 Electronic soft starter (DSSE)

The soft starter reduces the peak starting current down to maximum 40% of the nominal peak value. The device can only be installed in the factory.

3.3.8 Remote control panel (PCRL)

This panel can be mounted up to 50m (maximum) from the unit and replicates all of the control functions. It is connected using a twin cable of 2.5 mm2 section.

3.3.9 RS485 serial interface card modbus protocol (INSE)

This controller card enables the controller to communicate with other devices on a BMS using Modbus protocol.

3.3.10 Electronic expansion valve (VTEE)

The electronic expansion valve enables the maximum possible efficiency to be achieved by maximising the evaporator heat exchange, minimising the reaction time to load variations and optimising the superheat . It is strongly recommended for use in systems that will experience large load variations.

3.3.11 Fan speed control (DCCF)

This device allows unit operation, in cooling mode, under low ambient temperature (below 20°C), by reducing condenser air flow and obtaining in this way permissible operating parameters. This device can be used as well to reduce unit sound level emission when ambient temperature is decreasing (i.e. during night time). Fan speed control is factory pre-set. The values must never be modified.

3.3.12 Partial heat recovery (RP00)

Made by a braised plates exchanger in steel inox AISI 316, that can recover around the 20% of the thermal load to the condenser.

3.3.13 Liquid line solenoid valve (VSLI)

When the unit is in stand-by mode, it avoids the translation of the liquid freon toward the compressor.

3.4 Technical data

Cooling only version (CO)

SA/LS/CO *		242	292	402	432	492	592	702	802	902	1002	1202	1402
Cooling capacity (EN14511) (1)	kW	18,7	25,3	30,0	40,5	46,1	51,8	57,1	64,4	73,4	87,0	95,0	108,2
Total input power (EN14511) (1)	kW	6,6	9,2	10,8	14,0	16,6	19,6	20,9	22,7	27,6	31,1	36,0	40,1
EER (EN14511) (1)	W/W	2,83	2,76	2,77	2,90	2,77	2,64	2,73	2,84	2,66	2,80	2,64	2,70
SEER (2)	kWh/kWh	3,85	3,90	3,83	3,81	3,82	3,84	3,88	3,85	3,80	3,83	3,81	3,85
ηs,c (2)	%	151	153	150	149	150	151	152	151	149	150	149	151
Sound power level (3)	dB (A)	75	75	75	75	77	77	77	78	79	82	83	85
Sound pressure level (4)	dB (A)	43	43	43	43	45	45	45	46	47	50	51	53
Water tank volume	l	100	100	100	100	100	100	300	300	300	500	500	500
SE/LS/ CO *		**242**	**292**	**402**	**432**	**492**	**592**	**702**	**802**	**902**	**1002**	**1202**	**1402**
Cooling capacity (EN14511) (1)	kW	18,5	25,3	29,8	40,3	46,1	52,1	57,6	65,0	74,0	87,0	95,0	109,1
Total input power (EN14511) (1)	kW	6,6	9,2	10,8	13,8	16,4	19,5	20,7	22,5	27,4	30,6	35,6	39,7
EER (EN14511) (1)	W/W	2,82	2,76	2,77	2,93	2,80	2,68	2,78	2,89	2,70	2,84	2,67	2,75
SEER (2)	kWh/kWh	4,02	4,05	4,00	3,95	3,96	3,97	3,97	3,96	3,90	3,95	3,99	4,00
ηs,c (2)	%	158	159	157	155	155	1556	156	155	153	155	157	157
Sound power level (3)	dB (A)	73	74	74	75	77	77	77	78	79	82	83	84
Sound pressure level (4)	dB (A)	41	42	42	43	45	45	45	46	47	50	51	52
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Fans	n°	1	1	2	2	2	2	2	2	2	3	3	3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	6,5	6,5	6,5	8,5	8,5	8,5	8,5	14,5	17,0	17,0	17,0	17,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	13,57	13,57	13,57	17,74	17,74	17,74	17,74	30,27	35,49	35,49	35,49	35,49
Water tank volume	l	100	100	100	100	100	100	300	300	300	500	500	500

Cooling only version (CO)

SA/LS/CO *		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
Cooling capacity (EN14511) (1)	kW	121,7	139,1	153,0	182,3	205,3	200,4	220,2	244,6	296,6	326,6	366,7	414,0
Total input power (EN14511) (1)	kW	44,6	50,6	58,8	64,9	73,6	72,3	83,4	92,3	101,2	115,4	130,5	148,4
EER (EN14511) (1)	W/W	2,73	2,75	2,60	2,81	2,79	2,77	2,64	2,65	2,93	2,83	2,81	2,79
SEER (2)	kWh/kWh	3,83	3,91	3,90	3,90	3,81	3,80	3,80	3,80	3,81	3,80	3,82	4,10
ηs,c (2)	%	150	153	153	153	149	149	149	149	149	149	150	161
Sound power level (3)	dB (A)	86	86	86	89	90	87	89	90	90	91	92	93
Sound pressure level (4)	dB (A)	54	54	54	57	58	55	57	58	58	59	60	61
Water tank volume	l	500	500	500	500	500	500	500	500	1000	1000	1000	1000
SE/LS/CO *		**1602**	**1802**	**2002**	**2302**	**2502**	**2504**	**3004**	**3204**	**3504**	**4004**	**4504**	**5004**
Cooling capacity (EN14511) (1)	kW	122,5	140,2	154,4	183,3	207,1	201,7	221,8	246,2	297,1	327,8	370,6	417,1
Total input power (EN14511) (1)	kW	44,2	50,3	58,0	64,5	72,9	71,5	82,5	91,2	100,0	115,0	129,6	146,9
EER (EN14511) (1)	W/W	2,77	2,79	2,66	2,84	2,84	2,82	2,69	2,70	2,97	2,85	2,86	2,84
SEER (2)	kWh/kWh	3,95	4,00	4,01	4,01	4,01	3,96	3,97	3,98	4,04	4,00	4,01	4,25
ηs,c (2)	%	155	157	157	157	157	155	156	156	159	157	157	167
Sound power level (3)	dB (A)	85	85	85	89	90	87	89	90	90	91	92	93
Sound pressure level (4)	dB (A)	53	53	53	57	58	55	57	58	58	59	60	61
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Fans	n°	4	4	4	3	4	4	4	4	6	6	6	8
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	18,0	30,0	25,0	33,0	33,0	40,0	40,0	50,0	60,0	70,0	90,0	90,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	37,58	62,64	52,20	69,90	69,90	83,52	83,52	104,40	152,28	146,16	187,92	187,92
Water tank volume	l	500	500	500	500	500	500	500	500	1000	1000	1000	1000

* Units only available for the non-EU market

Performances are referred to the following conditions:

(1) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C.

(2) In accordance with (EU) 2016/2281 and relative norms part of this.

(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

Cooling only version (CO)

SA/XL/CO *		252	302	402	432	492	592	702	802	902	1002	1202	1402
Cooling capacity (EN14511) (1)	kW	18,8	25,5	29,5	39,7	44,3	50,4	55,8	63,0	71,1	85,2	92,7	105,2
Total input power (EN14511) (1)	kW	6,7	9,2	11,0	14,1	15,3	18,6	21,3	23,1	28,3	31,4	36,8	41,1
EER (EN14511) (1)	W/W	2,80	2,76	2,67	2,82	2,89	2,71	2,62	2,73	2,51	2,71	2,52	2,56
SEER (2)	kWh/kWh	3,80	3,85	3,87	3,83	3,82	3,90	3,83	3,84	3,80	3,90	3,81	3,92
ηs,c (2)	%	149	151	152	150	150	153	150	151	149	153	149	154
Sound power level (3)	dB (A)	71	71	71	71	75	75	75	76	77	80	82	83
Sound pressure level (4)	dB (A)	39	39	39	39	43	43	43	44	45	48	50	51
Water tank volume	l	100	100	100	100	100	100	300	300	300	500	500	500
SE/XL/CO		**252**	**302**	**402**	**432**	**492**	**592**	**702**	**802**	**1002**	**1202**	**1402**	**1402**
Cooling capacity (EN14511) (1)	kW	18,5	25,4	29,4	39,7	44,4	50,6	55,8	63,0	85,2	92,7	105,2	105,2
Total input power (EN14511) (1)	kW	6,5	9,1	10,4	13,9	15,0	18,3	21,1	22,9	31,3	36,8	40,9	40,9
EER (EN14511) (1)	W/W	2,84	2,81	2,82	2,87	2,96	2,77	2,64	2,75	2,72	2,52	2,57	2,57
SEER (2)	kWh/kWh	4,14	4,12	4,14	4,11	4,12	4,15	4,11	4,12	4,13	4,11	4,15	4,10
ηs,c (2)	%	163	162	163	161	162	163	162	162	162	162	163	161,0
Sound power level (3)	dB (A)	68	69	69	71	75	75	75	76	80	82	83	83
Sound pressure level (4)	dB (A)	36	37	37	39	43	43	43	44	48	50	51	51
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Fans	n°	2	2	2	2	2	2	2	2	3	3	3	3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	6,5	6,5	6,5	8,5	8,5	8,5	8,5	14,5	17,0	17,0	17,0	14,9
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	13,57	13,57	13,57	17,74	17,74	17,74	17,74	30,27	35,49	35,49	35,49	31,1
Water tank volume	l	100	100	100	100	100	100	300	300	500	500	500	

Cooling only version (CO)

SA/XL/CO *		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
Cooling capacity (EN14511) (1)	kW	118,0	135,5	148,2	175,9	198,0	193,1	210,6	232,2	286,8	314,4	355,2	395,0
Total input power (EN14511) (1)	kW	45,7	51,9	60,0	65,6	73,3	72,3	83,9	94,0	100,6	116,4	131,6	146,3
EER (EN14511) (1)	W/W	2,58	2,61	2,47	2,68	2,70	2,67	2,51	2,47	2,85	2,70	2,70	2,70
SEER (2)	kWh/kWh	3,82	3,93	3,82	3,93	3,83	3,81	3,84	3,80	3,92	3,82	3,95	3,94
ηs,c (2)	%	150	154	150	154	150	149	151	149	154	150	155	155
Sound power level (3)	dB (A)	85	85	85	87	89	85	87	88	88	88	90	91
Sound pressure level (4)	dB (A)	53	53	53	55	57	53	55	56	56	56	58	59
Water tank volume	l	500	500	500	500	500	500	500	500	1000	1000	1000	1000
SE/XL/CO		**1602**	**1802**	**2002**	**2302**	**2502**	**2504**	**3004**	**3204**	**3504**	**4004**	**4504**	**5004**
Cooling capacity (EN14511) (1)	kW	118,0	135,5	148,2	175,9	198,0	193,1	210,6	232,2	286,8	314,4	355,2	395,0
Total input power (EN14511) (1)	kW	44,9	51,5	59,8	65,6	72,8	71,5	83,2	92,5	99,9	115,2	131,6	144,2
EER (EN14511) (1)	W/W	2,63	2,63	2,48	2,68	2,72	2,70	2,53	2,51	2,87	2,73	2,70	2,74
SEER (2)	kWh/kWh	4,12	4,14	4,12	4,15	4,13	4,13	4,15	4,12	4,15	4,14	4,13	4,15
ηs,c (2)	%	162	163	162	163	162	162	163	162	163	163	162	163
Sound power level (3)	dB (A)	85	85	85	87	89	85	87	88	88	88	90	91
Sound pressure level (4)	dB (A)	53	53	53	55	57	53	55	56	56	56	58	59
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Fans	n°	4	4	4	3	4	4	4	4	6	6	6	8
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	18,0	30,0	25,0	33,0	33,0	40,0	40,0	50,0	60,0	70,0	90,0	90,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	37,58	62,64	52,20	69,90	69,90	83,52	83,52	104,40	152,28	146,16	187,92	187,92
Water tank volume	l	500	500	500	500	500	500	500	500	1000	1000	1000	1000

* Units only available for the non-EU market

Performances are referred to the following conditions:

(1) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C.

(2) In accordance with (EU) 2016/2281 and relative norms part of this.

(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

Cooling only version (CO)

HA/LS/CO		242	292	412	432	492	602	702	802	902	1002	1202	1402
Cooling capacity (EN14511) (1)	kW	19,6	26,7	32,3	42,8	46,8	55,0	61,5	68,4	82,6	93,5	104,5	121,4
Total input power (EN14511) (1)	kW	6,3	8,6	10,3	13,8	15,0	17,1	19,6	22,0	26,2	30,0	33,6	38,1
EER (EN14511) (1)	W/W	3,10	3,11	3,13	3,11	3,11	3,22	3,13	3,11	3,15	3,12	3,11	3,19
SEER (2)	kWh/kWh	4,11	4,20	4,19	4,11	4,12	4,20	4,19	4,19	4,14	4,13	4,12	4,13
ηs,c (2)	%	161	161	164	162	162	165	165	165	163	162	162	162
Sound power level (3)	dB (A)	75	75	75	75	77	77	77	78	83	84	85	87
Sound pressure level (4)	dB (A)	43	43	43	43	45	45	45	46	51	52	53	55
Water tank volume	l	100	100	100	100	100	300	300	300	300	300	300	500
HE/LS/CO		**242**	**292**	**412**	**432**	**492**	**602**	**702**	**802**	**902**	**1002**	**1202**	**1402**
Cooling capacity (EN14511) (1)	kW	19,7	26,7	32,0	42,8	46,6	55	61,6	68,6	82,6	93,8	105	121,6
Total input power (EN14511) (1)	kW	6,2	8,4	10,0	13,6	14,8	16,9	19,3	21,8	25,4	29,6	33,2	36,8
EER (EN14511) (1)	W/W	3,16	3,18	3,19	3,15	3,14	3,25	3,19	3,15	3,25	3,17	3,16	3,30
SEER (2)	kWh/kWh	4,20	4,25	4,35	4,29	4,26	4,39	4,31	4,24	4,37	4,34	4,25	4,40
ηs,c (2)	%	165	167	171	168	167	173	169	167	172	171	167	173
Sound power level (3)	dB (A)	71	73	73	75	77	77	77	78	81	84	85	86
Sound pressure level (4)	dB (A)	39	41	41	43	45	45	45	46	49	52	53	54
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Fans	n°	1	1	2	2	2	2	2	2	2	2	2	3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	6,5	6,5	6,5	10,0	8,5	8,5	14,5	14,5	19,0	19,0	20,0	28,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	13,57	13,57	13,57	20,88	17,74	17,74	30,27	30,27	39,67	39,67	41,76	58,46
Water tank volume	l	100	100	100	100	100	300	300	300	300	300	300	500

Cooling only version (CO)

HA/LS/CO		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504
Cooling capacity (EN14511) (1)	kW	133,3	151,6	168,9	195,0	214,5	208,8	242,5	266,0	301,1	340,5	390,0
Total input power (EN14511) (1)	kW	42,9	48,7	54,3	62,7	68,8	67,1	77,5	85,3	96,8	109,5	125,4
EER (EN14511) (1)	W/W	3,11	3,11	3,11	3,11	3,12	3,11	3,13	3,12	3,11	3,11	3,11
SEER (2)	kWh/kWh	4,19	4,13	4,17	4,18	4,13	4,12	4,13	4,15	4,17	4,19	4,18
ηs,c (2)	%	165	162	164	164	162	162	162	163	164	165	164
Sound power level (3)	dB (A)	88	88	88	89	91	89	90	91	91	91	93
Sound pressure level (4)	dB (A)	56	56	56	57	59	57	58	59	59	59	61
Water tank volume	l	500	500	5000	500	1000	1000	1000	1000	1000	1000	1000
HE/LS/CO		**1602**	**1802**	**2002**	**2302**	**2502**	**2504**	**3004**	**3204**	**3504**	**4004**	**4504**
Cooling capacity (EN14511) (1)	kW	133,3	152,1	169,3	195,6	215,1	210,3	246,8	267,7	303,2	345,3	390
Total input power (EN14511) (1)	kW	41,8	48,1	53,6	62,7	68,3	66,3	76,2	85,0	95,3	108,2	123,8
EER (EN14511) (1)	W/W	3,19	3,16	3,16	3,12	3,15	3,17	3,24	3,15	3,18	3,19	3,15
SEER (2)	kWh/kWh	4,42	4,41	4,31	4,40	4,28	4,25	4,36	4,32	4,41	4,28	4,43
ηs,c (2)	%	174	175	169	173	168	167	171	170	173	168	174
Sound power level (3)	dB (A)	87	88	88	89	91	88	89	90	91	91	93
Sound pressure level (4)	dB (A)	55	56	56	57	59	56	57	58	59	59	61
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Fans	n°	3	3	3	3	3	4	6	6	6	6	8
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	30,0	30,0	30,0	30,0	40,0	40,0	50,0	60,0	50,0	60,0	90,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	62,64	62,64	62,64	62,64	83,52	83,52	104,40	152,28	104,40	152,28	187,92
Water tank volume	l	500	500	5000	500	1000	1000	1000	1000	1000	1000	1000

Performances are referred to the following conditions:

(1) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C.

(2) In accordance with (EU) 2016/2281 and relative norms part of this.

(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

Cooling only version (CO)

HA/XL/CO		252	302	412	432	492	602	702	802	902	1002	1202	1402
Cooling capacity (EN14511) (1)	kW	20,5	27,0	31,9	42,6	46,1	54,0	61,2	68,1	80,7	91,2	103,2	118,8
Total input power (EN14511) (1)	kW	6,6	8,7	10,2	13,7	14,9	17,4	19,6	22,0	25,4	29,4	33,3	36,9
EER (EN14511) (1)	W/W	3,11	3,10	3,14	3,11	3,10	3,11	3,12	3,10	3,18	3,10	3,10	3,22
SEER (2)	kWh/kWh	4,14	4,11	4,15	4,13	4,11	4,16	4,15	4,15	4,16	4,17	4,16	4,20
ηs,c (2)	%	162	161	163	162	161	163	163	163	163	164	163	165
Sound power level (3)	dB (A)	70	70	70	70	72	72	72	73	75	77	78	80
Sound pressure level (4)	dB (A)	38	38	38	38	40	40	40	41	43	45	46	48
Water tank volume	l	100	100	100	100	100	300	300	300	300	300	300	500
HE/XL/CO		**252**	**302**	**412**	**432**	**492**	**602**	**702**	**802**	**902**	**1002**	**1202**	**1402**
Cooling capacity (EN14511) (1)	kW	20,5	27,0	31,4	42,6	46,1	54,0	61,2	68,1	80,7	91,2	103,2	118,8
Total input power (EN14511) (1)	kW	6,6	8,7	10,1	13,7	14,8	17,2	19,6	21,9	25,4	29,2	33,2	36,9
EER (EN14511) (1)	W/W	3,12	3,11	3,12	3,11	3,11	3,14	3,13	3,11	3,18	3,12	3,11	3,22
SEER (2)	kWh/kWh	4,35	4,32	4,44	4,25	4,30	4,35	4,30	4,25	4,40	4,43	4,30	4,50
ηs,c (2)	%	171	170	175	167	169	171	169	167	173	174	169	177
Sound power level (3)	dB (A)	64	65	68	70	72	72	72	73	75	77	78	80
Sound pressure level (4)	dB (A)	32	33	36	38	40	40	40	41	43	45	46	48
Power supply	V/Ph/Hz	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Fans	n°	2	2	2	2	2	2	2	2	2	2	2	3
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	6,5	6,5	6,5	10,0	8,5	8,5	14,5	14,5	19,0	19,0	20,0	28,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	13,57	13,57	13,57	20,88	17,74	17,74	30,27	30,27	39,67	39,67	41,76	58,46
Water tank volume	l	100	100	100	100	100	300	300	300	300	300	300	500

Cooling only version (CO)

HA/XL/CO		1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504
Cooling capacity (EN14511) (1)	kW	130,1	150,1	166,8	189,1	211,0	208,5	236,0	264,0	297,8	337,4	383,5
Total input power (EN14511) (1)	kW	42,0	48,1	53,8	60,8	67,8	67,3	75,6	84,9	95,8	108,5	123,7
EER (EN14511) (1)	W/W	3,10	3,12	3,10	3,11	3,11	3,10	3,12	3,11	3,11	3,11	3,10
SEER (2)	kWh/kWh	4,11	4,25	4,12	4,27	4,15	4,14	4,22	4,20	4,30	4,20	4,25
ηs,c (2)	%	161	167	162	168	163	163	166	165	169	165	167
Sound power level (3)	dB (A)	81	81	81	83	84	81	83	84	84	84	86
Sound pressure level (4)	dB (A)	49	49	49	51	52	49	51	52	52	52	54
Water tank volume	l	500	500	500	500	500	1000	1000	1000	1000	1000	1000
HE/XL/CO		**1602**	**1802**	**2002**	**2302**	**2502**	**2504**	**3004**	**3204**	**3504**	**4004**	**4504**
Cooling capacity (EN14511) (1)	kW	130,1	150,1	166,8	189,1	211,0	208,5	236,0	264,0	297,8	337,4	383,5
Total input power (EN14511) (1)	kW	42,0	48,1	53,6	60,8	67,8	67,3	75,6	84,9	95,4	108,5	122,9
EER (EN14511) (1)	W/W	3,10	3,12	3,11	3,11	3,11	3,10	3,12	3,11	3,12	3,11	3,12
SEER (2)	kWh/kWh	4,40	4,45	4,35	4,35	4,28	4,30	4,40	4,35	4,38	4,30	4,40
ηs,c (2)	%	173	175	171	171	168	169	173	171	172	169	173
Sound power level (3)	dB (A)	81	81	81	83	84	81	83	84	84	84	86
Sound pressure level (4)	dB (A)	49	49	49	51	52	49	51	52	52	52	54
Power supply	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Compressors / Circuits	n° / n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Fans	n°	3	3	3	3	3	4	6	6	6	6	8
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	30,0	30,0	30,0	30,0	40,0	40,0	50,0	60,0	50,0	60,0	90,0
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088	2088	2088
Equivalent CO_2 charge	t	62,64	62,64	62,64	62,64	83,52	83,52	104,40	152,28	104,40	152,28	187,92
Water tank volume	l	500	500	500	500	500	1000	1000	1000	1000	1000	1000

Performances are referred to the following conditions:

(1) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C.

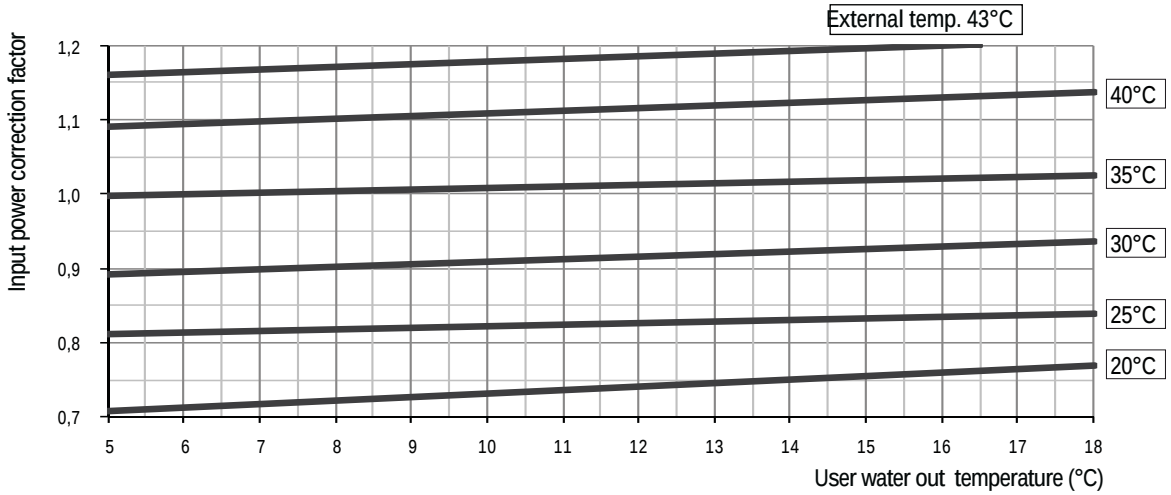
(2) In accordance with (EU) 2016/2281 and relative norms part of this.

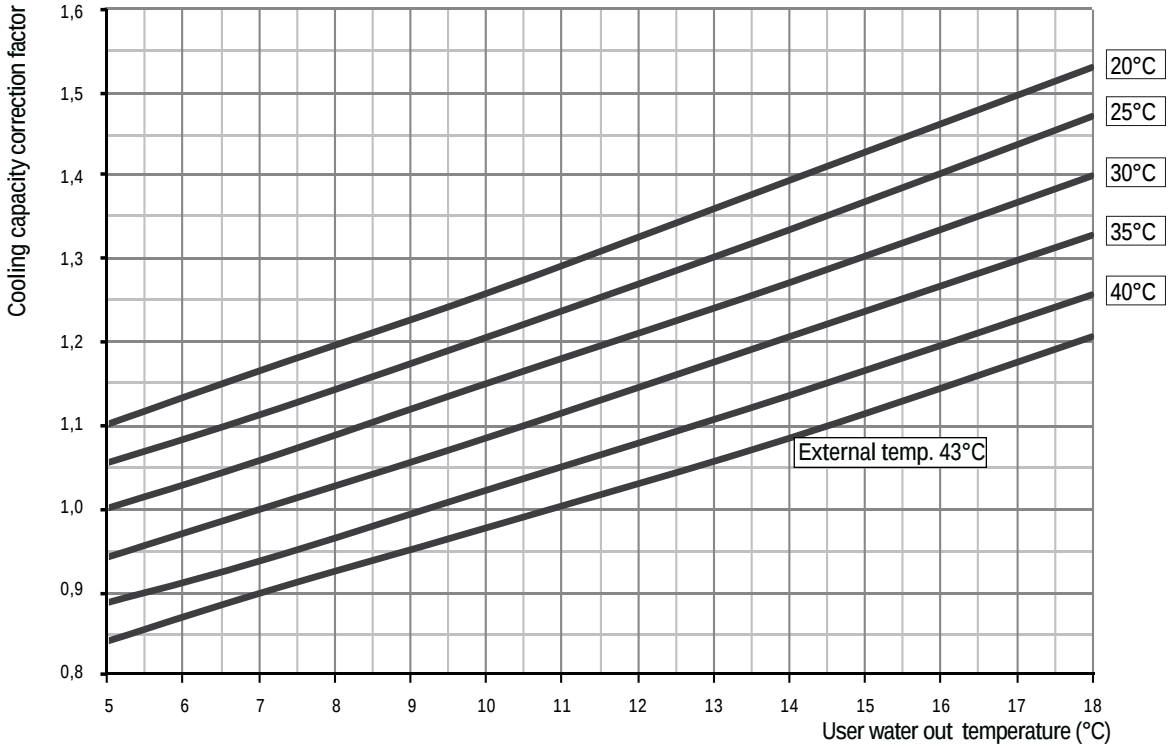
(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

The refrigerant data may change without notice. It is therefore necessary to refer always to the silver label placed on the unit.

3.4.1 Cooling capacity and compressors input power

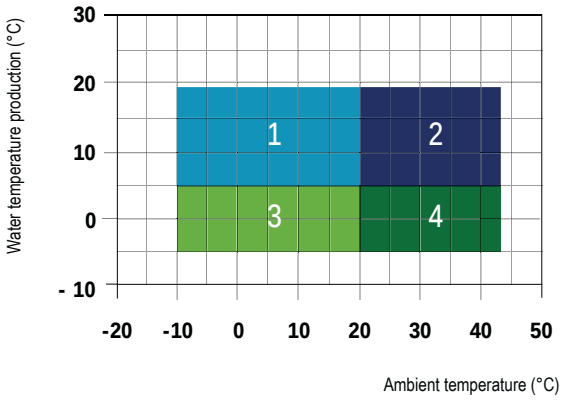




The cooling capacity of the compressor is obtained by multiplying the nominal values (PF PA), with water produced at 7 ° C, shown at page 16 and 17, for respective correction factors. For each curve, the difference between the temperature of water entering (In) and leaving (Out) the users heat exchanger is 5° C.

The data shown in the graph are generic and only intend to show the development of cooling and electrical power,in accordance with changing of working conditions. For a precise definition of the data, please refer to the Product Selection Software.

3.5 Operational limits



1 Cooling mode with cond. press. contr.

2 Cooling mode without cond. press. contr.

3 Cooling mode with cond. press. contr. and glycol (Only BT versions)

4 Cooling mode without cond. press. contr. and glycol (Only BT versions)

3.5.1 User heat exchanger water flow rate

The nominal water flow rate provided, relates to a ΔT of 5°C. The maximum flow rate allowed is one that provides a ΔT of 3°C. Higher values may cause too high a pressure drop. The minimum water flow rate allowed is that which results in a ΔT of 8°C. Insufficient flow will result in evaporating temperatures that are too low leading to the operation of safety devices that will prevent unit operation.

3.5.2 User water temperature (summer operation)

The minimum user water outlet temperature is 5°C. To operate below this limit requires modification of the unit. Should this be the case, please contact the technical support team for details.
The maximum user water outlet temperature is 18°C.

3.5.3 Ambient air temperature

In cooling mode the units can operate with air temperatures from -10°C to 43°C.

If the unit is installed in particularly windy areas, it will be necessary to provide some windbreaker barriers to avoid any malfunction. We suggest to install the barriers only if the wind exceeds 2,5m/s.

The units, in their standard configuration, are not suitable for installation in saline environments.

Units are designed and manufactured to European safety and technical standards. The units have been designed exclusively for heating, cooling and domestic hot water production (D.H.W.). The units must be used for this specific purpose only. The Company will not be liable for claims for damage caused to persons, animals or material goods or property caused by improper installation, adjustment and maintenance or improper use. Any use not specified in this manual is prohibited.

In case of operations outside of these values, please contact the company.

3.6 Compressor capacity steps

	NUMBER of COMPRESSORS			
Model	1	2	3	4
242/252	50%	50%	...	...
292/302	50%	50%	...	...
402	50%	50%	...	...
412	50%	50%	...	...
432	50%	50%	...	...
492	50%	50%	...	...
592	50%	50%	...	...
602	50%	50%	...	...
702	50%	50%	...	...
802	50%	50%	...	...
902	50%	50%	...	...
1002	43%	57%	...	...
1202	50%	50%	...	...
1402	45%	55%	...	...
1602	50%	50%	...	...
1802	45%	55%	...	...
2002	50%	50%	...	...
2302	43%	57%	...	...
2502	50%	50%	...	...
2504	25%	25%	25%	25%
3004	22%	28%	22%	28%
3204	25%	25%	25%	25%
3504	22%	28%	22%	28%
4004	25%	25%	25%	25%
4504	22%	28%	22%	28%
5004	25%	25%	25%	25%

3.7 Correction tables

3.7.1 Operation with glycol

Glycol percentage	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	1.09	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 maintain the same temperature difference as that which would be obtained without glycol. The pressure drop correction factor takes into account the different flow rate obtained from the application of the flow rate correction factor.

3.7.2 Correction tables different Δt

Water temperature diff.(°C)	3	5	8
CCCP	0.99	1	1.02
IPCF	0.99	1	1.01

CCCP = Cooling capacity correction factor IPCF = Input power correction factor

3.7.3 Correction tables different Fouling factors

Fouling factor	0.00005	0.0001	0.0002
CCCP	1	0.98	0.94
IPCF	1	0.98	0.95

CCCP = Cooling capacity correction factor IPCF = Input power correction factor

3.8 Sound data

Mod.	Octave bands (Hz)								Lw	Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB			
SA / LS											
242/SA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
292/SA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
402/SA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
432/SA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
492/SA/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
592/SA/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
702/SA/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
802/SA/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
902/SA/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	47
1002/SA/LS	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	50
1202/SA/LS	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
1402/SA/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1602/SA/LS	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
1802/SA/LS	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
2002/SA/LS	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
2302/SA/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2502/SA/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
2504/SA/LS	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
3004/SA/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
3204/SA/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
3504/SA/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
4004/SA/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4504/SA/LS	105,1	96,3	90,2	88,7	87,6	82,2	78,8	69,7	105,9	92	60
5004/SA/LS	106,1	97,3	91,2	89,7	88,6	83,2	79,8	70,7	106,9	93	61
SE / LS											
242/SE/LS	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	41
292/SE/LS	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	42
402/SE/LS	87,1	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74	42
432/SE/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
492/SE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
592/SE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
702/SE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
802/SE/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
902/SE/LS	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	47
1002/SE/LS	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	50
1202/SE/LS	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
1402/SE/LS	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
1602/SE/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1802/SE/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2002/SE/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2302/SE/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2502/SE/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
2504/SE/LS	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
3004/SE/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
3204/SE/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
3504/SE/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
4004/SE/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4504/SE/LS	105,1	96,3	90,2	88,7	87,6	82,2	78,8	69,7	105,9	92	60
5004/SE/LS	106,1	97,3	91,2	89,7	88,6	83,2	79,8	70,7	106,9	93	61

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3744.

Mod.	63	125	250	500	1K	2K	4K	8K	Lw		Lp
	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
SA / XL											
252/SA/XL	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
302/SA/XL	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
402/SA/XL	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
432/SA/XL	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
492/SA/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
592/SA/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
702/SA/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
802/SA/XL	89,1	80,3	74,2	72,7	71,6	66,2	62,8	53,7	89,9	76	44
902/SA/XL	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
1002/SA/XL	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	48
1202/SA/XL	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	50
1402/SA/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
1602/SA/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1802/SA/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2002/SA/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2302/SA/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
2502/SA/XL	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2504/SA/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
3004/SA/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
3204/SA/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
3504/SA/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
4004/SA/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
4504/SA/XL	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
5004/SA/XL	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
SE / XL											
252/SE/XL	81,1	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68	36
302/SE/XL	82,1	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69	37
402/SE/XL	82,1	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69	37
432/SE/XL	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
492/SE/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
592/SE/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
702/SE/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
802/SE/XL	89,1	80,3	74,2	72,7	71,6	66,2	62,8	53,7	89,9	76	44
902/SE/XL	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
1002/SE/XL	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	48
1202/SE/XL	95,1	86,3	80,2	78,7	77,6	72,2	68,8	59,7	95,9	82	50
1402/SE/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
1602/SE/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1802/SE/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2002/SE/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
2302/SE/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
2502/SE/XL	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2504/SE/XL	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
3004/SE/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
3204/SE/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
3504/SE/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
4004/SE/XL	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
4504/SE/XL	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
5004/SE/XL	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3744.

Mod.	Octave bands (Hz)								Lw	Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB		dB(A)
242/HA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
292/HA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
412/HA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
432/HA/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
492/HA/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
602/HA/LS	20,1	11,3	5,2	3,7	2,6	-2,8	-6,2	-15,3	20,9	7	-25
702/HA/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
802/HA/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
902/HA/LS	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
1002/HA/LS	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
1202/HA/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1402/HA/LS	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
1602/HA/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
1802/HA/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
2002/HA/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
2302/HA/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2502/HA/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
2504/HA/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
3004/HA/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
3204/HA/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
3504/HA/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4004/HA/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4504/HA/LS	106,1	97,3	91,2	89,7	88,6	83,2	79,8	70,7	106,9	93	61
5004/HA/LS	107,1	98,3	92,2	90,7	89,6	84,2	80,8	71,7	107,9	94	62
HE / LS											
242/HE/LS	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	39
292/HE/LS	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	41
412/HE/LS	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	41
432/HE/LS	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
492/HE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
602/HE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
702/HE/LS	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
802/HE/LS	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
902/HE/LS	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
1002/HE/LS	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
1202/HE/LS	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	53
1402/HE/LS	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
1602/HE/LS	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
1802/HE/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
2002/HE/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
2302/HE/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
2502/HE/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
2504/HE/LS	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	56
3004/HE/LS	102,1	93,3	87,2	85,7	84,6	79,2	75,8	66,7	102,9	89	57
3204/HE/LS	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	58
3504/HE/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4004/HE/LS	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	59
4504/HE/LS	106,1	97,3	91,2	89,7	88,6	83,2	79,8	70,7	106,9	93	61
5004/HE/LS	107,1	98,3	92,2	90,7	89,6	84,2	80,8	71,7	107,9	94	62

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3744.

Mod.	63	125	250	500	1K	2K	4K	8K	Lw		Lp
	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB(A)	dB(A)
HA / XL											
252/HA/XL	83,1	74,3	68,2	66,7	65,6	60,2	56,8	47,7	83,9	70	38
302/HA/XL	83,1	74,3	68,2	66,7	65,6	60,2	56,8	47,7	83,9	70	38
412/HA/XL	83,1	74,3	68,2	66,7	65,6	60,2	56,8	47,7	83,9	70	38
432/HA/XL	83,1	74,3	68,2	66,7	65,6	60,2	56,8	47,7	83,9	70	38
492/HA/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
602/HA/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
702/HA/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
802/HA/XL	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	41
902/HA/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
1002/HA/XL	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
1202/HA/XL	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
1402/HA/XL	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	48
1602/HA/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
1802/HA/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
2002/HA/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
2302/HA/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
2502/HA/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
2504/HA/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
3004/HA/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
3204/HA/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
3504/HA/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
4004/HA/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
4504/HA/XL	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
5004/HA/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55
HE/ XL											
252/HE/XL	77,1	68,3	62,2	60,7	59,6	54,2	50,8	41,7	77,9	64	32
302/HE/XL	78,1	69,3	63,2	61,7	60,6	55,2	51,8	42,7	78,9	65	33
412/HE/XL	81,1	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68	36
432/HE/XL	83,1	74,3	68,2	66,7	65,6	60,2	56,8	47,7	83,9	70	38
492/HE/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
602/HE/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
702/HE/XL	85,1	76,3	70,2	68,7	67,6	62,2	58,8	49,7	85,9	72	40
802/HE/XL	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	41
902/HE/XL	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	43
1002/HE/XL	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	45
1202/HE/XL	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	46
1402/HE/XL	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	48
1602/HE/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
1802/HE/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
2002/HE/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
2302/HE/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
2502/HE/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
2504/HE/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
3004/HE/XL	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	51
3204/HE/XL	94,1	85,3	79,2	77,7	76,6	71,2	67,8	58,7	94,9	81	49
3504/HE/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
4004/HE/XL	97,1	88,3	82,2	80,7	79,6	74,2	70,8	61,7	97,9	84	52
4504/HE/XL	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	54
5004/HE/XL	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	55

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3744.

4. INSTALLATION

4.1 General safety guidelines and and use of symbols

Before undertaking any task the operator must be fully trained in the operation of the machines to be used and their controls. They must also have read and be fully conversant with all operating instructions.

All maintenance must be performed by TRAINED personnel and be in accordance with all national and local regulations.

The installation and maintenance of the unit must comply with the local regulations in force at the time of the installation.

Avoid contact and do not insert any objects into moving parts.

4.2 Health and safety Considerations

The workplace must be kept clean, tidy and free from objects that may prevent free movement. Appropriate lighting of the work place shall be provided to allow the operator to perform the required operations safely. Poor or too strong lighting can cause risks.

Ensure that work places are always adequately ventilated and that respirators are working, in good condition and comply fully with the requirements of the current regulations.

4.3 Personal protective equipment

When operating and maintaining the unit, use the following personal protective equipment listed below as required by law.

Protective footwear.

Eye protection.

Protective gloves.

Respiratory protection.

Hearing protection.

4.4 Inspection

When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. 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 conditions; any eventual damage must be questioned to the carrier and recorded on the Delivery Note before it is signed. The company must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.
Before accepting the unit check:

- The unit did not suffer any damage during transport;
- The delivered goods are conforming to what shown in the delivery note.

In Case of Damage

- List the damage on the delivery note
- Inform the Company of the extent of the damage within 8 days of receipt of the goods. After this time any claim will not be considered.
- A full written report is required for cases of severe damage.
- Take digital photographs.

4.5 Storage

If it is necessary to store the unit, leave it packed in a closed place. If for any reason the machine has already been unpacked, follow these instructions to prevent damage, corrosion and/or deterioration:

- Make sure that all openings are properly closed or sealed;
- Never use steam or other cleaning agents to clean the unit that could damage it;
- Remove any keys needed to access the control panel and entrust them to the site manager.

4.5.1 Shipment

The shipment must be carried out by authorised carriers and the characteristics of the vehicle used must be such as to avoid damaging the machinery transported/to be transported, neither during loading and unloading nor during transport. If the roads to be driven are irregular, the vehicle must be fitted with special suspensions or internal walls in order not to damage the unit during the shipment.

The maximum ambient temperature for storage/shipment is +45°C and the minimum is -20°C,

4.6 Unpacking

Packaging could be dangerous for the operators.

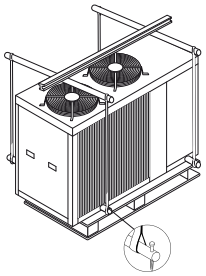
It is advisable to leave packaged units during handling and remove it before the installation.
The packaging must be removed carefully to prevent any possible damage to the machine.
The materials constituting the packaging may be different in nature (wood, cardboard, nylon, etc.).

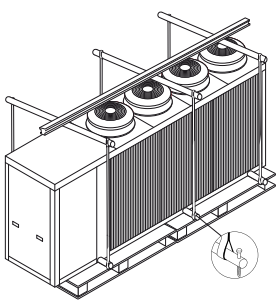
The packaging materials should be separated and sent for disposal or possible recycling to specialist waste companies.

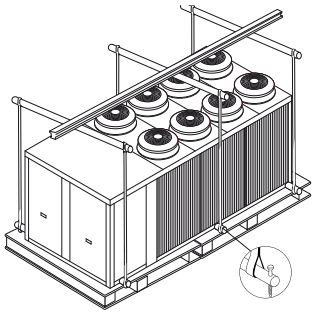
4.7 Lifting and handling

When unloading the unit, it is strongly recommended that sudden movements are avoided in order to protect the refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, alternatively, using belts. Take care that the method of lifting does not damage the side panels or the cover. It is important to keep the unit horizontal at all time to avoid damage to the internal components.

The Source heat exchangers fins are sharp. Use protection gloves.





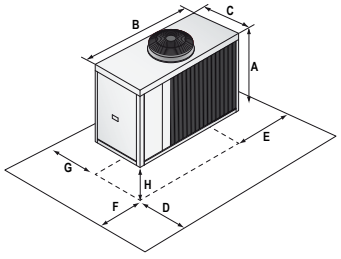


4.8 Location and minimum technical clearances

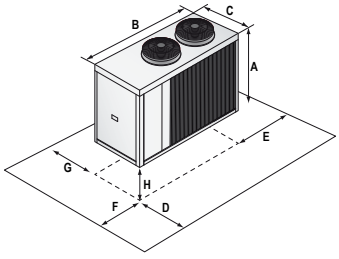
The unit has to be installed such that maintenance and repair is possible. The warranty does not cover costs for the provision of lifting apparatus, platforms or other lifting systems required to perform repairs during warranty period.

The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.

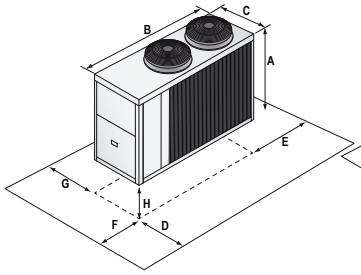
All units are designed for external installation : any overhang above the unit and location near trees, if they partially cover the unit,must be avoided in order to prevent air by-pass. It is advisable to create a proper mounting plinth, with a size similar to the unit foot-print. Unit vibration level is very low: it is advisable however, to install vibration dampers (spring or rubber) between the plinth and the unit base-frame to keep vibrations at a very low level. It is vital to ensure adequate air volume to the source fan. Re-circulation of discharge air must be avoided; failure to observe this point will result in poor performance or activation of safety controls. For these reasons it is necessary to observe the following clearances:



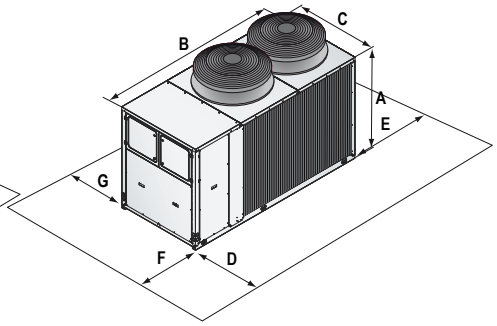
SA/SE-LS 242 - 292
HA/HE-LS 242 - 292



SA/SE-XL 252 - 302 - 402
HA/HE-XL 252 - 302



SA/SE-LS/XL 432 - 492 - 592
HA/HE-LS/XL 412 - 432 - 492

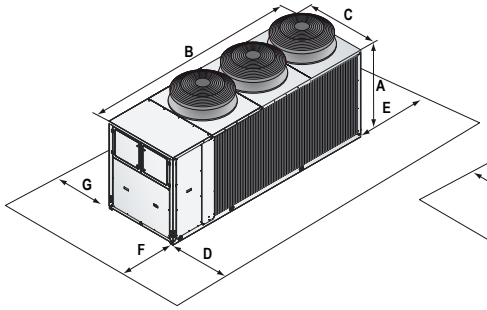


SA/SE-LS/XL 702 - 802 - 902
HA/HE-LS/XL 602 - 702 - 802 - 902 - 1002 - 1202

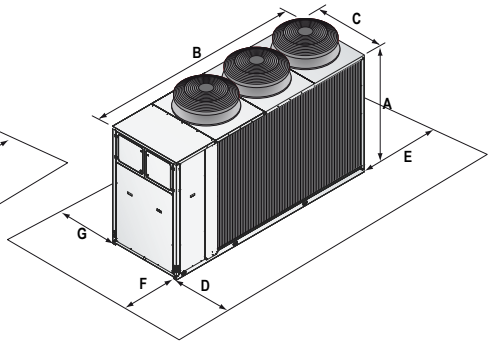
		242/252	292/302	402	412	432	492	592	602	702	802
A (mm)	**SA-SE/LS-XL**	1500	1500	1500	--	1690	1690	1690	--	1820	1820
B (mm)	**SA-SE/LS-XL**	1915	1915	1915	--	2400	2400	2400	--	2905	2905
C (mm)	**SA-SE/LS-XL**	875	875	875	--	1150	1150	1150	--	1150	1150
D (mm)	**SA-SE/LS-XL**	1000	1000	1000	--	1500	1500	1500	--	2000	2000
E (mm)	**SA-SE/LS-XL**	800	800	800	--	1000	1000	1000	--	1000	1000
F (mm)	**SA-SE/LS-XL**	800	800	800	--	1000	1000	1000	--	1000	1000
G (mm)	**SA-SE/LS-XL**	800	800	800	--	1000	1000	1000	--	1000	1000
H (mm)	**SA-SE/LS-XL**	350	350	350	--	350	350	350	--	350	350
A (mm)	**HA-HE/LS**	1500	1500	--	1690	1690	1690	--	1820	1820	1820
B (mm)	**HA-HE/LS**	1915	1915	--	2400	2400	2400	--	2905	2905	2905
C (mm)	**HA-HE/LS**	875	875	--	1150	1150	1150	--	1150	1150	1150
D (mm)	**HA-HE/LS**	1000	1000	--	1500	1500	1500	--	2000	2000	2000
E (mm)	**HA-HE/LS**	800	800	--	1000	1000	1000	--	1000	1000	1000
F (mm)	**HA-HE/LS**	800	800	--	1000	1000	1000	--	1000	1000	1000
G (mm)	**HA-HE/LS**	800	800	--	1000	1000	1000	--	1000	1000	1000
H (mm)	**HA-HE/LS**	350	350	--	350	350	350	--	350	350	350
A (mm)	**HA-HE/XL**	1500	1500	--	1690	1690	1690	--	1820	1820	1820
B (mm)	**HA-HE/XL**	1915	1915	--	2400	2400	2400	--	2905	2905	2905
C (mm)	**HA-HE/XL**	875	875	--	1150	1150	1150	--	1150	1150	1150
D (mm)	**HA-HE/XL**	1000	1000	--	1500	1500	1500	--	2000	2000	2000
E (mm)	**HA-HE/XL**	800	800	--	1000	1000	1000	--	1000	1000	1000
F (mm)	**HA-HE/XL**	800	800	--	1000	1000	1000	--	1000	1000	1000
G (mm)	**HA-HE/XL**	800	800	--	1000	1000	1000	--	1000	1000	1000
H (mm)	**HA-HE/XL**	350	350	--	350	350	350	--	350	350	350

The unit has to be installed such that maintenance and repair is possible. The warranty does not cover costs for the provision of lifting apparatus, platforms or other lifting systems required to perform repairs during warranty period.

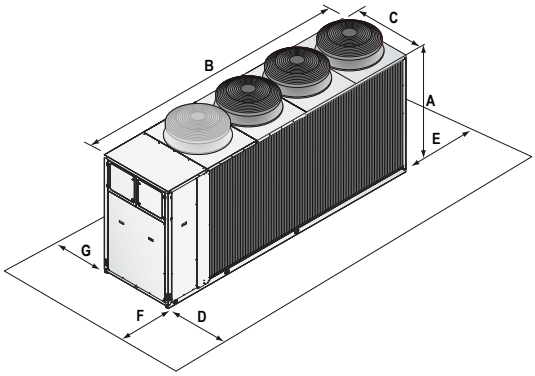
The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.



SA/SE-LS/XL 1002 - 1202 - 1402 - 1602
HA/HE-LS/XL 1402 - 1602 - 1802 - 2002



SA/SE-LS/XL 1802 - 2002
HA/HE-LS/XL 2302 - 2502

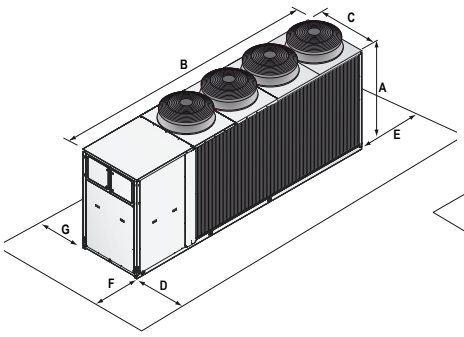


SA/SE-LS/XL 2302 - 2502

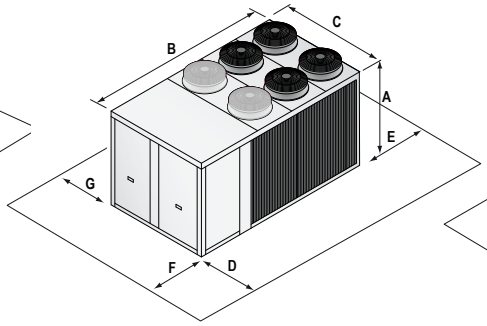
		902	1002	1202	1402	1602	1802	2002	2302
A (mm)	**SA-SE/LS-XL**	1820	1820	1820	1820	1820	2270	2270	2310
B (mm)	**SA-SE/LS-XL**	2905	3905	3905	3905	3905	3905	3905	4505
C (mm)	**SA-SE/LS-XL**	1150	1150	1150	1150	1150	1150	1150	1150
D (mm)	**SA-SE/LS-XL**	2000	2000	2000	2000	2000	2000	2000	2000
E (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	1000	1500	1500	1500
G (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	1000	1000	1000	1000
H (mm)	**SA-SE/LS-XL**	350	350	350	350	350	350	350	350
A (mm)	**HA-HE/LS**	1880	1880	1880	1880	1880	1880	1880	2270
B (mm)	**HA-HE/LS**	2905	2905	2905	3905	3905	3905	3905	3905
C (mm)	**HA-HE/LS**	1150	1150	1150	1150	1150	1150	1150	1150
D (mm)	**HA-HE/LS**	2000	2000	2000	2000	2000	2000	2000	2000
E (mm)	**HA-HE/LS**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**HA-HE/LS**	1000	1000	1000	1000	1000	1500	1500	1500
G (mm)	**HA-HE/LS**	2000	2000	2000	2000	2000	2000	2000	2000
H (mm)	**HA-HE/LS**	350	350	350	350	350	350	350	350
A (mm)	**HA-HE/XL**	1880	1880	1880	1880	1880	1880	1880	2270
B (mm)	**HA-HE/XL**	2905	2905	2905	3905	3905	3905	3905	3905
C (mm)	**HA-HE/XL**	1150	1150	1150	1150	1150	1150	1150	1150
D (mm)	**HA-HE/XL**	2000	2000	2000	2000	2000	2000	2000	2000
E (mm)	**HA-HE/XL**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**HA-HE/XL**	1000	1000	1000	1000	1000	1500	1500	1500
G (mm)	**HA-HE/XL**	2000	2000	2000	2000	2000	2000	2000	2000
H (mm)	**HA-HE/XL**	350	350	350	350	350	350	350	350

The unit has to be installed such that maintenance and repair is possible. The warranty does not cover costs for the provision of lifting apparatus, platforms or other lifting systems required to perform repairs during warranty period.

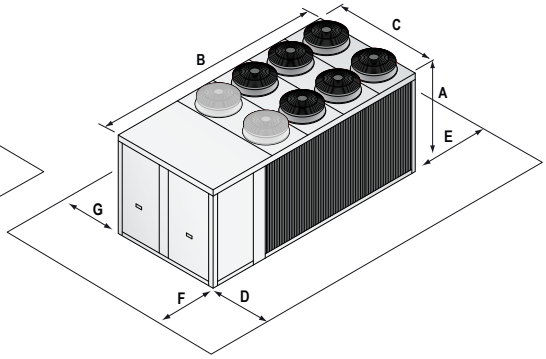
The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.



SA/SE-LS/XL 2504 - 3004 - 3204



SA/SE-LS/XL 3504 - 4004
HA/HE-LS/XL 2504 - 3004 - 3204 - 3504

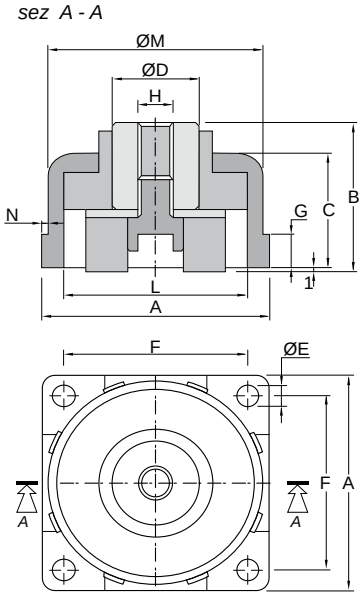


SA/SE-LS/XL 4504 - 5004
HA/HE-LS/XL 4004 - 4504 - 5004

		2502	2504	3004	3204	3504	4004	4504	5004
A (mm)	**SA-SE/LS-XL**	2310	2310	2310	2310	2350	2350	2380	2380
B (mm)	**SA-SE/LS-XL**	4505	5300	5300	5300	4205	4205	4810	4810
C (mm)	**SA-SE/LS-XL**	1150	1150	1150	1150	2210	2210	2210	2210
D (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	2000	2000	2000	2000
E (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**SA-SE/LS-XL**	1500	1500	1500	1500	1500	1500	1500	1500
G (mm)	**SA-SE/LS-XL**	1000	1000	1000	1000	2000	2000	2000	2000
H (mm)	**SA-SE/LS-XL**	350	350	350	350	350	350	350	350
A (mm)	**HA-HE/LS**	2270	2350	2350	2350	2350	2380	2380	2380
B (mm)	**HA-HE/LS**	3905	4205	4205	4205	4205	4805	4810	4810
C (mm)	**HA-HE/LS**	1150	2210	2210	2210	2210	2210	2210	2210
D (mm)	**HA-HE/LS**	2000	2000	2000	2000	2000	2000	2000	2000
E (mm)	**HA-HE/LS**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**HA-HE/LS**	1500	1500	1500	1500	1500	1500	1500	1500
G (mm)	**HA-HE/LS**	2000	2000	2000	2000	2000	2000	2000	2000
H (mm)	**HA-HE/LS**	350	350	350	350	350	350	350	350
A (mm)	**HA-HE/XL**	2270	2350	2350	2350	2350	2380	2380	2380
B (mm)	**HA-HE/XL**	3905	4205	4205	4205	4205	4805	4810	4810
C (mm)	**HA-HE/XL**	1150	2210	2210	2210	2210	2210	2210	2210
D (mm)	**HA-HE/XL**	2000	2000	2000	2000	2000	2000	2000	2000
E (mm)	**HA-HE/XL**	1000	1000	1000	1000	1000	1000	1000	1000
F (mm)	**HA-HE/XL**	1500	1500	1500	1500	1500	1500	1500	1500
G (mm)	**HA-HE/XL**	2000	2000	2000	2000	2000	2000	2000	2000
H (mm)	**HA-HE/XL**	350	350	350	350	350	350	350	350

4.9 Installation of rubber vibration dampers (KAVG)

All units should be installed on vibration dampers in order to prevent the transmission of vibration to the supporting surface and reduce the noise level. Rubber vibration dampers are available as an option in the catalogue. The vibration dampers (optional) are supplied by the factory in seperate packaging.

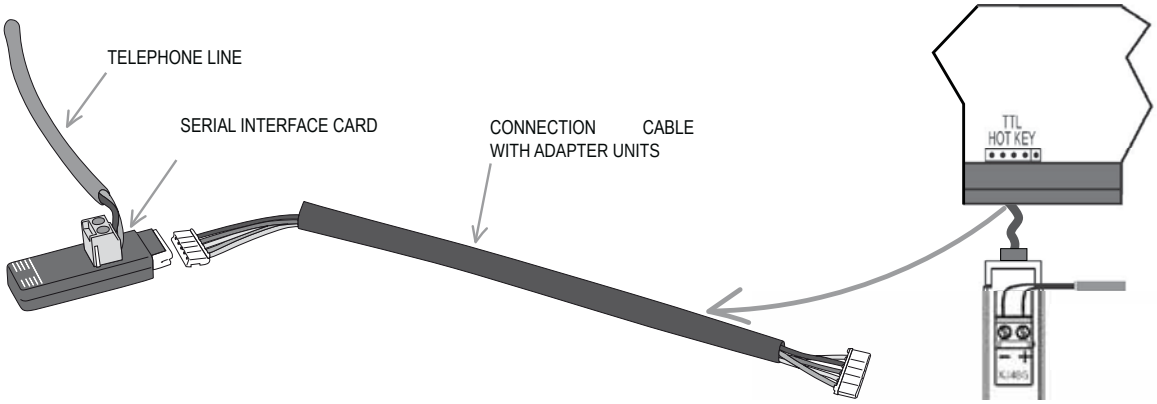


Mod.	A	B	C	D	E	F	G	H	L	M	N
242÷302	88 mm	52 mm	41 mm	25 mm	11 mm	67 mm	10 mm	M12	65 mm	74,5 mm	5,5 mm
402÷602	88 mm	52 mm	41 mm	25 mm	11 mm	67 mm	10 mm	M12	65 mm	74,5 mm	5,5 mm
702÷2002	88 mm	52 mm	41 mm	25 mm	11 mm	67 mm	10 mm	M12	65 mm	74,5 mm	5,5 mm
2504÷5004	145 mm	79 mm	65 mm	35 mm	12,5 mm	110 mm	12 mm	M16	118 mm	129 mm	8 mm

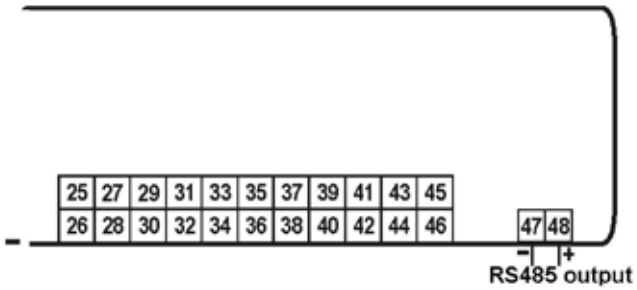
4.10 Serial interface card RS485 (INSE)

Supervision system interface serial board (MODBUS RS485 available only)
The installation of the card will allow the unit to be plugged in and connected to a system with MODBUS protocol. This system allows you to remotely monitor all parameters of the unit and change their values.
The serial interface board is normally fitted at the factory, where it is provided separately is necessary to respect the polarity of the wiring as shown in the diagram. Any reversal of polarity will result in the non-functioning unit. The supervision connectivity cable must be telephone one type 2x0, 25 mm2.
The unit is configured at the factory with serial address 1. In case of using the MODBUS system, you can request the list of variables by contacting the assistance.

4.10.1 Modd. 252 ÷ 2502



4.10.2 Modd. 2504 ÷ 5004



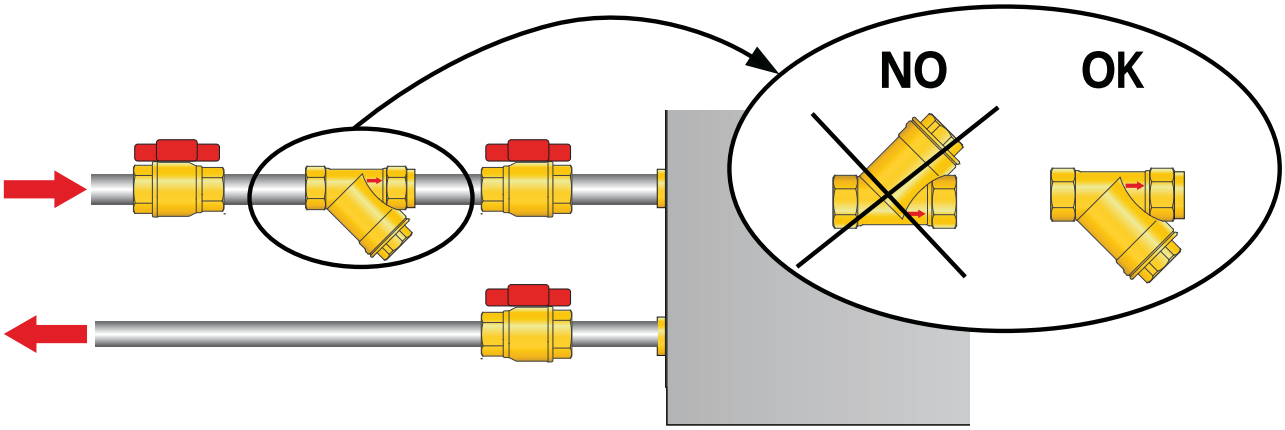
4.11 Hydraulic connections

The water pipe-work must be installed in accordance with national and local regulation and can be made from copper, steel, galvanized steel or PVC. The Pipework must be designed to cater for the nominal water flow and the hydraulic pressure drops of the system, a maximum pressure drop of 300 Pa/m run being typical. All pipes must be insulated with closed-cell material of adequate thickness. The hydraulic piping should includes:

- Pockets for temperature sensor to measure the temperature in the system.
- Flexible joints, to isolate the unit from the rest of the system
- Temperature and pressure gauges for maintenance and servicing operations.
- Shut-off manual valves to isolate the unit from the hydraulic circuit.
- Metallic filters to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.

System return water must be fitted to the connection labelled: ”USER WATER IN” as incorrect connection can damage the heat exchanger by freezing.

It is compulsory to install on the USER WATER IN connection, a water strainer with a mesh not larger than 1 mm. Fitting this filter is COMPULSORY and the warranty will be invalidated if it is removed. The filter must be kept clean and checked periodically.



All units are factory supplied with a flow switch; the flow switch MUST BE FITTED in the pipework connection labelled “USER WATER OUT”. If the flow switch is altered, removed, or the water filter omitted on the unit, the warranty will be invalidated.

The water flow through the heat exchangers of the unit should not be fall below Δt 8°C measured at the following conditions:

Cooling mode: 35°C dry bulb ambient temperature 7°C water outlet temperature

4.12 Chemical characteristics of the water

The system is to be filled with clean water and vented after a full flushing operation has been performed; the water should have the following characteristics :

PH	6-8	Total Hardness	Lower Than 50 ppm
Electric conductibility	Lower Than 200 mV/cm (25°C)	Sulphur ion	None
Chlorine ions	Lower Than 50 ppm	Ammonia ion	None
Sulphuric acid ions	Lower Than 50 ppm	Silicon ion	Lower Than 30 ppm
Total Iron	Lower Than 0.3 ppm		

4.13 User circuit minimum water content

Air-to-water chillers require a minimum water content in the user hydraulic circuit to guarantee correct operation and to avoid excessive cycling of the compressors that can reduce the working life of the unit.

Model	242	252	292	302	402	412	432	492	592	602	702	802	902	1002
Minimum water content (l)	200	200	200	200	200	300	300	350	400	400	400	500	550	650
Safety valve (bar)	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Tank water content (solo versioni A1) (l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Model	1202	1402	1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
Minimum water content (l)	700	800	900	1000	1200	1400	1500	750	850	1100	1200	1200	1400	1500
Safety valve (bar)	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Tank water content (solo versioni A1) (l)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

4.14 Expansion tank technical data

The expansion vessel supplied with the units (Version A and ANTU only) is sized for the water content of the unit only. Any additional expansion vessel should be sized by the installer depending on the layout of the system.

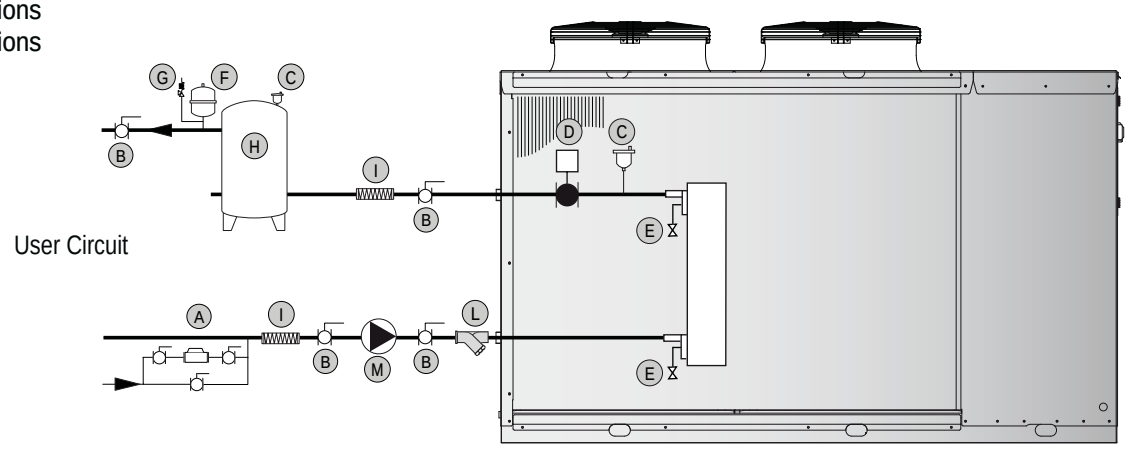
Model	242	252	292	302	402	412	432	492	592	602	702	802	902	1002
Capacity (l)	8	8	8	8	8	8	8	8	8	8	18	18	18	18
Pre-charging (bar)	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Maximum expansion tank pressure (bar)	8	8	8	8	8	8	8	8	8	8	8	8	8	8

Model	1202	1402	1602	1802	2002	2302	2502	2504	3004	3204	3504	4004	4504	5004
Capacity (l)	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Pre-charging (bar)	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Maximum expansion tank pressure (bar)	8	8	8	8	8	8	8	8	8	8	8	8	8	8

4.15 Hydraulic components

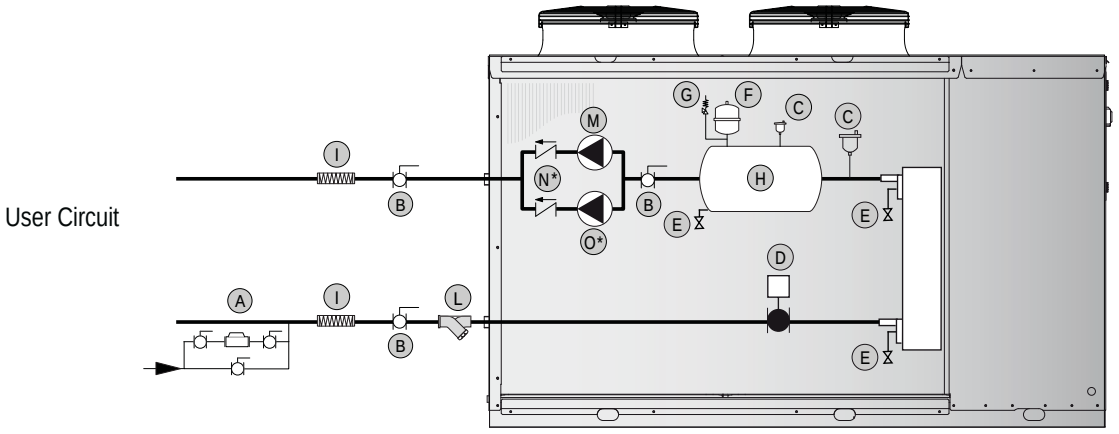
4.15.1 Standard Versions

Standard Versions

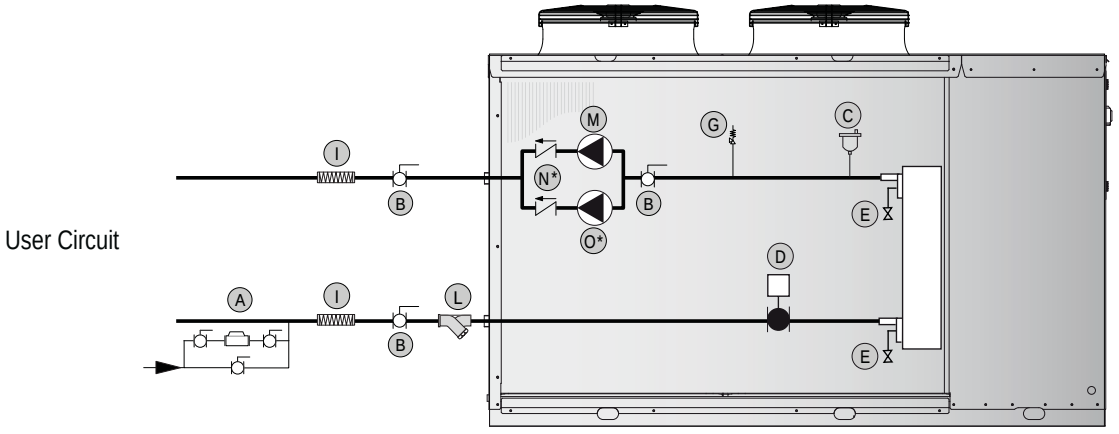


The water pump must be installed with the supply side toward the water inlet connection of the unit.

4.15.2 A1ZZU - A2ZZU



4.15.3 A1NTU - A2NTU



A	System Filling Group	H	User water tank
B	Shut-off Valve	I	Flexible Connection
C	Vent Valve	L	Water Strainer
D	Flow Switch	M	Water Pump
E	Drainage valve	N*	One way valve
F	Expansion Vessel	O*	Water Pump
G	Safety Valve		

Legend:
*Available for A2NTU – A2NTR – A2ZZU versions only; not available for A1NTU – A1NTR – A1ZZU)

Components shown inside the units are factory fitted.
Components shown outside of the units must be present in the system to guarantee the correct operation. The installation of those components is charged to the installer.

4.16 Filling the hydraulic circuit

• Before filling, check that the system drain valve is closed.
• Open all pipework, heat pump and terminal unit air vents.
• Open the shut off valves.
• Begin filling, slowly opening the water valve in the filling group outside the unit.
• When water begins to leak out of the terminal unit air vents, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bar.

The installation should be filled to a pressure of between 1 and 2 bars. It is recommended that this operation be repeated after the unit has been operating for a number of hours (due to the presence of air bubbles in the system). The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up. If frequent top-ups are required, check all connections for leaks.

4.17 Emptying the installation

• Before emptying, place the mains switch in the “Off” position.
• Make sure the filling group valve is closed.
• Open the drainage valve outside the unit and all the installation and terminal air vent valves.

If the fluid in the circuit contains anti-freeze, it MUST not be allowed to run away to drain. It must be collected for possible re-cycling or for correct disposal.

4.18 Electric connections: preliminary safety information

The electric panel is located inside the unit at the top of the technical compartment where the various components of the refrigerant circuit are also to be found. To access the electrical board, remove the front panel of the unit:

Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force.

Make sure the power supply upstream of the unit is (blocked with a switch). Check that the main switch handle is padlocked and it is applied on the handle a visible sign of warning not to operate.

It must be verified that electric supply is corresponding to the unit electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit.

Power cable and line protection must be sized according to the specification reported on the form of the wiring diagram enclosed with the unit.

The cable section must be commensurate with the calibration of the system-side protection and must take into account all the factors that may influence (temperature, type of insulation, length, etc.).

Power supply must respect the reported tolerances and limits: If those tolerances should not be respected, the warranty will be invalidated.

Flow switches must be connected following the indication reported in the wiring diagram. Never bridge flow switches connections in the terminal board. Guarantee will be invalidated if connections are altered or not properly made.

Make all connections to ground provided by law and legislation.

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

The power line and the unit external safety devices must be sized in order to ensure the correct voltage at the maximum operating conditions of the unit reported in the wiring diagram of the unit.

FROST PROTECTION
If opened, the main switch cuts the power off to any electric heater and antifreeze device supplied with the unit, including the compressor crankcase heaters. The main switch should only be disconnected for cleaning, maintenance or unit reparation.

4.19 Electric data

The electrical data reported below refer to the standard unit without accessories.
In all other cases refer to the data reported in the attached electrical wiring diagrams.

The line voltage fluctuations can not be more than ±10% of the nominal value, while the voltage unbalance between one phase and another can not exceed 1%, according to EN60204. If those tolerances should not be respected, please contact our Company.

4.19.1 Electric data LS model

Model LS		242	292	402	412	432	492	592	602
Power supply	V/~/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	230/1/50	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm^2	10	16	16	16	16	25	25	25
PE section	mm^2	6	10	10	10	10	16	16	16

Model LS		702	802	902	1002	1202	1402	1602	1802	2002
Power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm^2	35	35	50	70	70	70	95	120	120
PE section	mm^2	25	25	25	35	35	35	50	70	70

Model LS		2302	2502	2504	3004	3204	3504	4004	4504	5004
Power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm^2	150	150	185	185	185	240	240	2x150	2x240
PE section	mm^2	70	70	90	90	90	120	120	150	240

Electric data may change for updating without notice. It is therefore necessary to refer always to the wiring diagram present in the units.

4.19.2 Electric data XL model

Model XL		252	302	402	412	432	492	592	602
Power supply	V/~/Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm²	10	16	16	16	16	25	25	25
PE section	mm²	6	10	10	10	10	16	16	16

Model XL		702	802	902	1002	1202	1402	1602	1802	2002
Power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm²	35	35	50	70	70	70	95	120	120
PE section	mm²	25	25	25	35	35	35	50	70	70

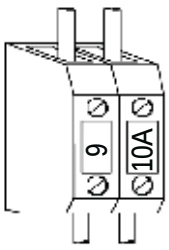
Model XL		2302	2502	2504	3004	3204	3504	4004	4504	5004
Power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Control board	V/~/Hz	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V	24 V
Auxiliary circuit	V/~/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Fans power supply	V/~/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Line section	mm²	150	150	185	185	185	240	240	2x150	2x240
PE section	mm²	70	70	90	90	90	120	120	150	240

Electric data may change for updating without notice. It is therefore necessary to refer always to the wiring diagram present in the units.

4.20 Electric connections

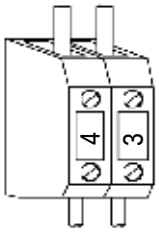
4.20.1 Remote wiring connections

All terminals referred to in the explanations below will be found on the terminal board inside the electrical box. All electric connections mentioned below have to be made by the installer, on site.

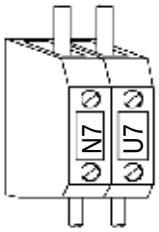


USER CIRCUIT FLOW SWITCH (SFW1)

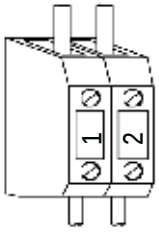
This is used to protect the unit if there is a low water flow rate in the user circuit. It is factory fitted.



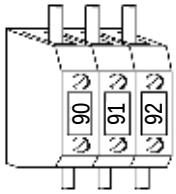
USER CIRCUIT WATER INLET SENSOR (BTI)
It is used to measure the return water temperature from the user circuit.
The standard working mode has the user pump switched off during stand-by periods (Compressors Off). The sensor must be placed in an appropriate position in order to measure the temperature of the secondary circuit. Incorrect positioning of the user water sensor can adversley affect the operation of the heat pump. The remote sensor is supplied loose with the unit (it is present inside the electric box) and it is supplied with a 3 mt. cable length. If this is too short, it is possible to increase the length by using cable of diameter 0.5 mm^2 up to a maximum distance of 50 meters.



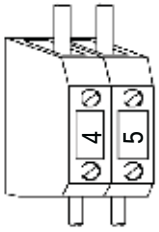
USER CIRCUIT WATER PUMP
If the pump is factory supplied and fitted (A version) it will already be connected otherwise, connect to terminals U7 and N7; maximum input current 3A. In standard configuration, the unit microprocessor controller switches off the user water pump when the set point is reached or if the unit is in standby. This strategy is suitable if the unit is heating a buffer store from which a secondary circuit is taken and provides a substantial reduction of energy use.



REMOTE ON / OFF
To switch the unit on or off remotely, the cable jumper connected across terminals 1 and 2 must be replaced with a switch.
Contact closed, unit ON,
Contact open, unit OFF.



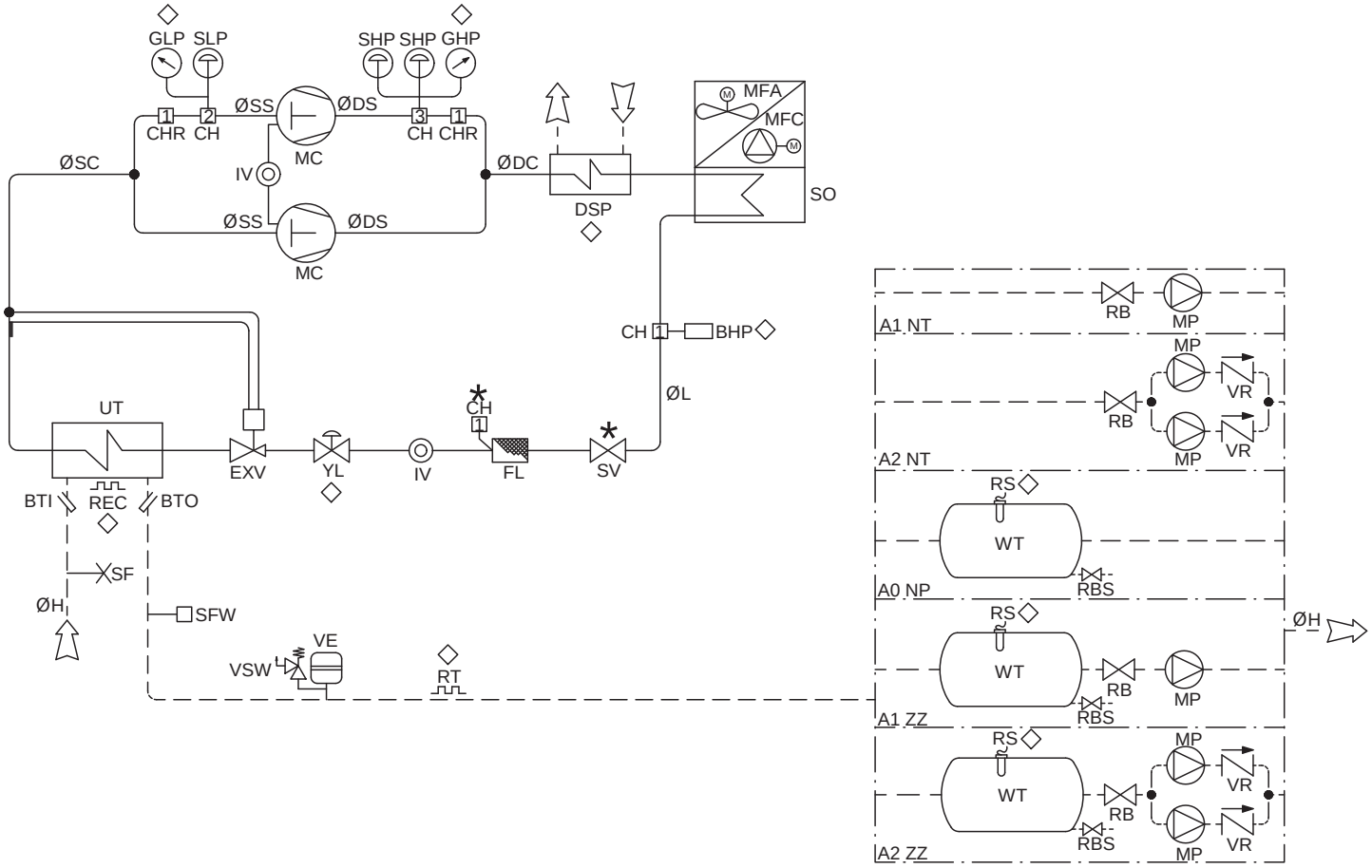
REMOTE GENERAL ALARM
For remote display of a general alarm, connect the visual or audible device between terminals 90-91-92.
Contacts 90/91 NC (Normally closed)
Contacts 91/92 NO (Normally opened)



USER CIRCUIT WATER OUTLET SENSOR (BTO)
This is used to measure the outlet user temperature; it is also used as antifreeze protection in cooling mode.

The numbering of the terminals may change without notice. For their connection is mandatory to refer to the wiring diagram supplied along with the unit.

4.21 Refrigerant circuit layout



A0NP	Water tank without pumps	MP	Pump
A1NT	One pump without water tank	RB	Shut off valve
A1ZZ	One pump with water tank	RBS	Discharge valve
A2NT	Two pumps without water tank	REC	Exchangers heating
A2ZZ	Two pump with water tank	RS	Tank resistance
BHP	High pressure transducer	RT	Pipes resistance
BTI	User water input probe	SF	Water vent
BTO	User water output probe	SFW	Water flow switch
CH	Charging plug 1/4 sae	SHP	High pressure pressostat
CHR	Charging plug 5/16 sae	SLP	Low-high pressure switch
DSP	Desuperheater	SO	Source side
EXV	Termostatic valve	SV	Shut off valve
FL	Liquid line filter	UT	User side
GHP	High pressure gauge	VE	Expansion vessel
GLP	Low pressure gauge	VR	Check nvalve
IV	Moisture indicator sight glass	VSW	Water safety valve
MC	Compressor	WT	Water tank
MFA	Axial fan	YL	Liquid solenoid valve
MFC	Centrifugal fan		

5. UNIT START UP

5.1 Preliminary checks

Before starting the unit the checks detailed in this manual of the electric supply and connections, the hydraulic system and the refrigerant circuit, should be performed.

Start-up operations must be performed in accordance with the instructions detailed in the previous paragraphs.

If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

5.1.1 Before start-up

Damage can occur during shipment or installation. It is recommended that a detailed check is made, before the installation of the unit, for possible refrigerant leakages caused by breakage of capillaries, pressure switch connections, tampering of the refrigerant pipework, vibration during transport or general abuse suffered by the unit.

- Verify that the unit is installed in a workmanlike manner and in accordance with the guidelines in this manual.
- Check that all power cables are properly connected and all terminals are correctly fixed.
- The operating voltage between phases R S T is the one shown on the unit labels.
- Check that the unit is connected to the system earth.
- Check that there is no refrigerant leakage.
- Check for oil stains, sign of a possible leak.
- Check that the refrigerant circuit shows the correct standing pressure on the pressure gauges (if present) otherwise use external ones.
- Check that the Shrader port caps are the correct type and are tightly closed.
- Check that crankcase heaters are powered correctly (if present).
- Check that all water connections are properly installed and all indications on unit labels are observed.
- The system must be flushed, filled and vented in order to eliminate any air.
- Check that the water temperatures are within the operation limits reported in the manual.
- Before start up check that all panels are replaced in the proper position and locked with fastening screws.

Do not modify internal wiring of the unit as this will immediately invalidate the warranty.

Crankcase heaters must be powered at least 12 hours before start up (pre-heating period) To do this, isolate the compressor(s), fans and pump(s) in the electrics box and then switch on the main isolator (heaters are automatically supplied when the main switch is closed). The crankcase heaters are working properly if, after several minutes, the compressor crankcase temperature is about 10÷15°C higher than ambient temperature.

During the 12 hours pre-heating period it is also important to check that the label OFF is shown on the display or that the unit is on stand-by mode. If there is an accidental start-up before the 12 hours pre-heating period has elapsed, the compressors could be seriously damaged and therefore the warranty will immediately terminate .

5.1.2 Safety device setting

Device		Set-point	Differential	Reset
Control thermostat (Cooling mode)	°C	12	2	-----
Anti-freeze thermostat	°C	4	4	MANUAL
High pressure switch	Bar	30	7	Automatic for 3 times (than manual)
Low pressure switch	Bar	0.7	1.5	
Water safety valve (Present in A versions only)	Bar	6	--	Automatic

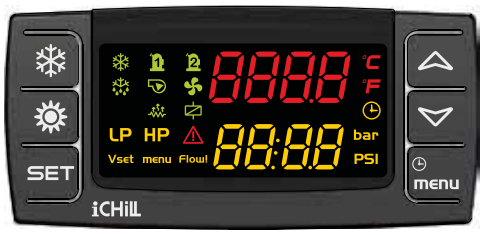
5.1.3 Controls during unit operation

- Check the rotation of the fans . If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- Check that user water inlet temperature is close to the set point of the control thermostat.
- For “A” version units (units with pumps and storage tank) if the pump is noisy, slowly close discharge shut-off valve until the noise is reduced to normal levels. This can occur when the system pressure drop substantially lower than the pump available pressure.

5.1.4 Refrigerant charge checking

- After several hours of operation, check that the sight glass has a green colour core: if the core is yellow moisture is present in the circuit. In this event it is necessary for dehydration of the circuit to take place. This must be performed by qualified people only. Check that there are no continuous vapour bubbles present at the sight glass . This would indicate a shortage of refrigerant. A few vapour bubbles are acceptable.
- Several minutes after start up and operating in cooling mode, check that condensing temperature is approximately 15 °C higher than the ambient air temperature.
- On cooling mode, check that the evaporation temperature is about 5 °C lower than the user water outlet temperature.
- On cooling mode check that the refrigerant superheat on the user heat exchanger is about 5-7 °C
- On cooling mode check that the refrigerant sub-cooling on the source heat exchanger is about 5-7 °C.

5.2 Description of the control panel (Modd. 242 ÷ 2502)



5.2.1 Display icons

The instrument display is divided into three zones:
Left zone: the display shows the icons.
Top right zone: the display shows the inlet water temperature.
Bottom right zone: The display shows the temperature of water utilities in output or, in the version with condensation control, the pressure of evaporation / condensation.

Icon	Meaning	Icon	Meaning
°C	Celsius degrees		Electric heaters activated
bar	Bar		User water pump
1	Compressor 1	Flow!	Water flow alarm
2	Compressor 2		External fan
⚠	General Alarm		

5.2.2 Key function

menu	M makes it possible to enter the functions menu
SET	SET makes it possible to display or modify the set points . Selects a parameter or confirms a value in programming mode.
	In standard mode allows the display of the different temperatures 1 click: Bottom line displays Pb1: User inlet water temperature 2 clicks: Bottom line displays Pb2: User outlet water temperature 3 clicks: Bottom line displays Pb3: refrigerant pressure (high pressure in cooling, low pressure in heating mode) 4 clicks: Bottom line displays Pb4: Finned coil temperature (not used) In programming mode it allows the user to scroll through the parameter codes or to increase values.
	In standard mode it allows the display of the different temperatures in the opposite way to the above arrow. In programming mode it allows the user to scroll through the parameter codes or to decrease values.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in chiller mode. Each time this function is activated, the green led positioned just above the button will be switched ON.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in heating mode. Each time this function is activated, the green led positioned just above the button will be switched ON. (Not used)

5.3 Remote control panel (Modd. 242 ÷ 2502)

5.3.1 Display icons

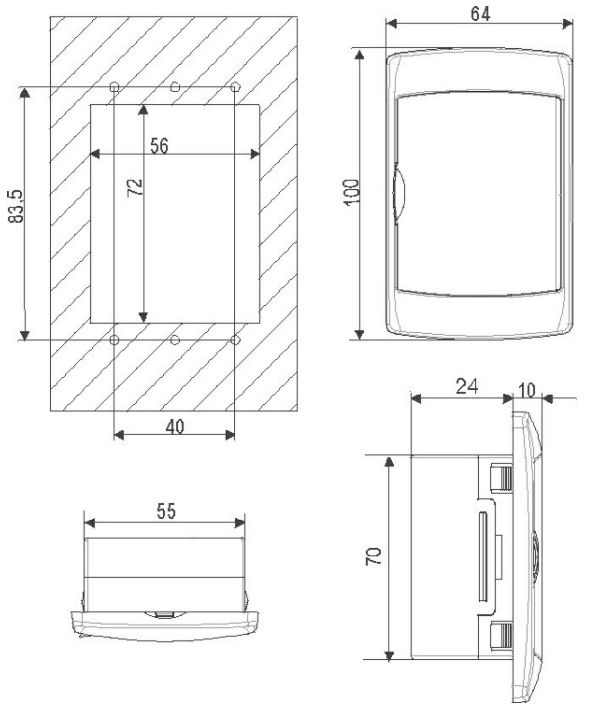
Icon	Meaning	Icon	Meaning
°C	Celsius degrees		Electric heaters activated
bar	Bar		User water pump
1	Compressor 1	Flow!	Water flow alarm
2	Compressor 2		External fan
⚠	General Alarm		

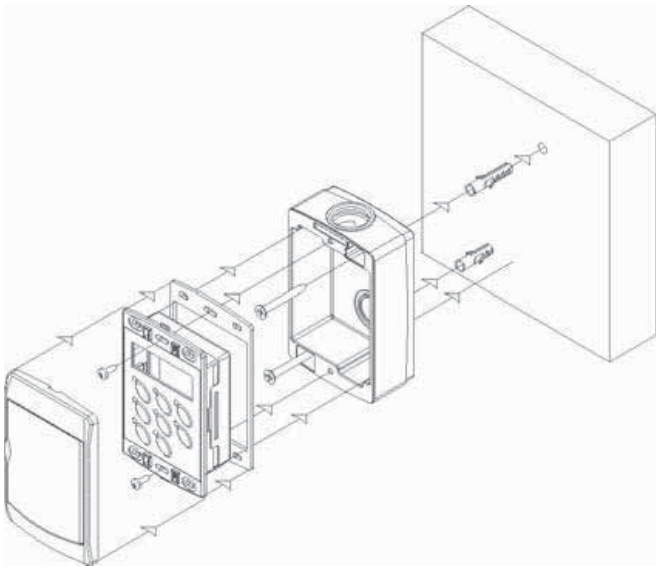
5.3.2 Key function

menu	M makes it possible to enter the functions menu
SET	SET makes it possible to display or modify the set points . Selects a parameter or confirms a value in programming mode.
	In standard mode allows the display of the different temperatures 1 click: Bottom line displays Pb1: User inlet water temperature 2 clicks: Bottom line displays Pb2: User outlet water temperature 3 clicks: Bottom line displays Pb3: refrigerant pressure (high pressure in cooling, low pressure in heating mode) 4 clicks: Bottom line displays Pb4: Finned coil temperature (not used) In programming mode it allows the user to scroll through the parameter codes or to increase values.
	In standard mode it allows the display of the different temperatures in the opposite way to the above arrow. In programming mode it allows the user to scroll through the parameter codes or to decrease values.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in chiller mode. Each time this function is activated, the green led positioned just above the button will be switched ON.
	If press ed down for 5 seconds, it makes it possible to switch the unit on or off in heating mode. Each time this function is activated, the green led positioned just above the button will be switched ON. (Not used)

5.3.3 Installation

The remote control panel is mounted on a panel with 72x56 mm cut-out, fixed with screw.
To obtain IP65 protection for the panel, use the rubber gasket RGW-V (optional). For wall mounting use the V-KIT plastic adapter as illustrated in the picture.



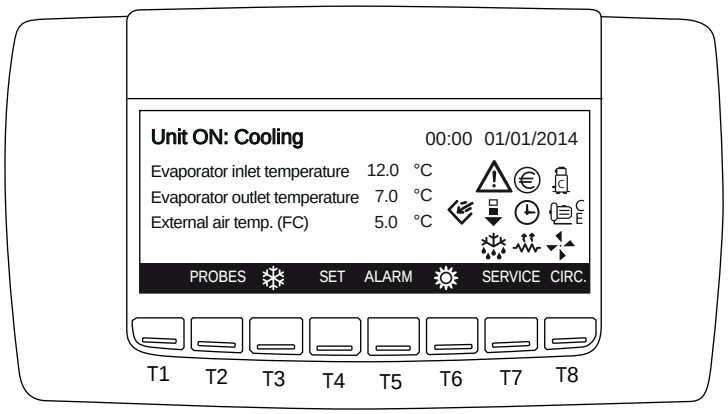


Electric data can be updated without notice. It is therefore necessary to always refer to the wiring diagram provided in the unit.

If there is damage to the remote control or there is a faulty connection, failure of communication will be indicated in the display with the message “noL” (no link).

5.4 Position of the control panel (Modd. 2504 ÷ 5004)

5.5 Description of the control panel (Modd. 2504 ÷ 5004)



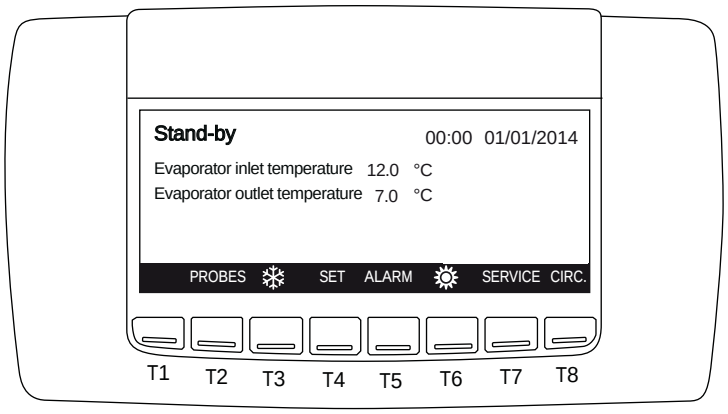
5.5.1 Display icons

Icon	Meaning	Icon	Meaning
	Number of compressors in operation.		Indicates that the electric heaters are active.
	Water pump		Economy or ON/OFF by timetable.
	Indicates that the fans are working.		Free cooling is active (not available).
	Indicates that an alarm is active.		Domestic hot water (not available).
	Economy function		Indicates that the defrost is active.
	Unloading function (not available).		

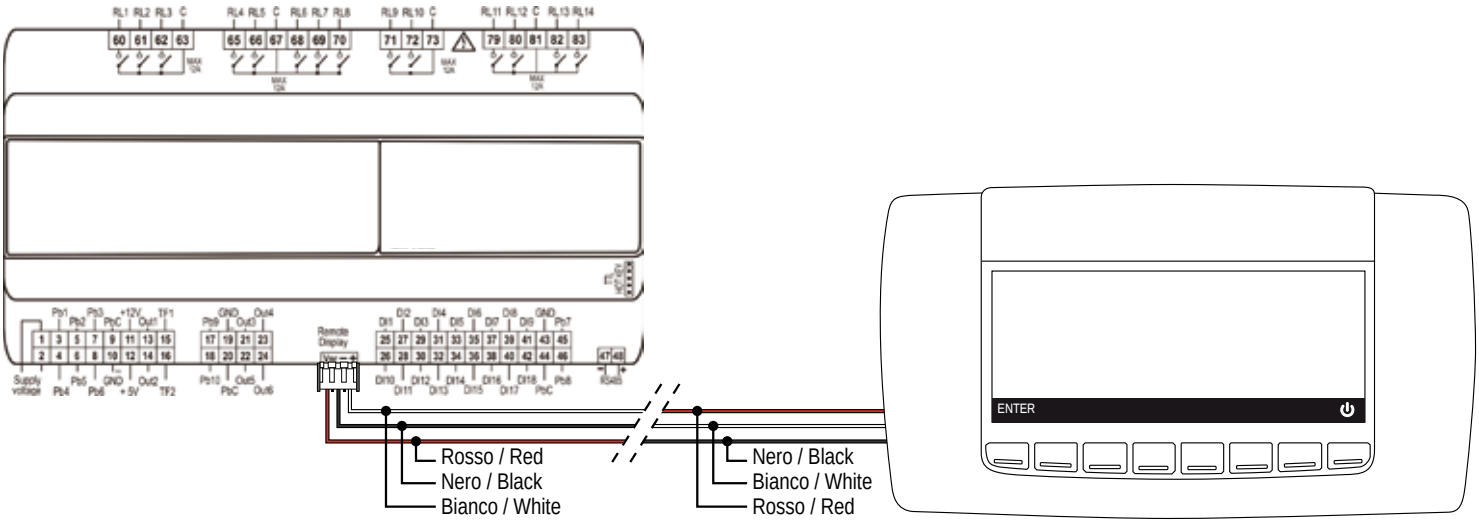
5.5.2 Key function

T2:	PROBES	Allows to read the value of the probes configured
T3:	❄	Allows to switch on the unit in cooling mode
T4:	SET	Allows to read and modify the set point
T5:	ALARM	Allows to read and reset the alarms
T6:	☼	Allows to switch on the unit in heating mode
T7:	SERVICE	Allows to enter the SERVICE menù
T8:	CIRC	Allows to read the main information of the circuits (compressor status, water pump status, pressure probe value,…)

When the unit is turned on, the display will be as follows:



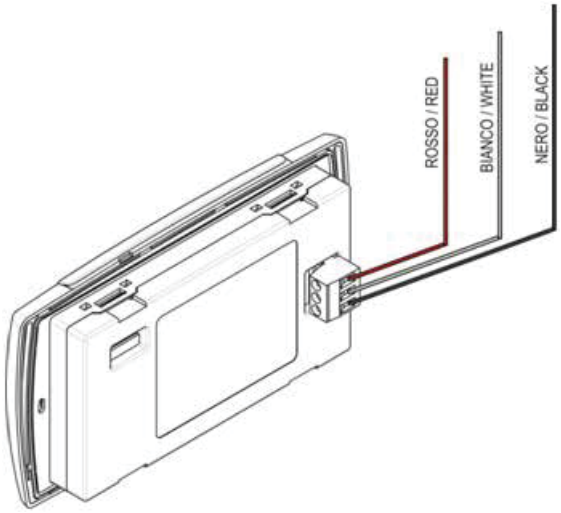
5.6 Remote keyboard connection (Modd. 2504 ÷ 5004)



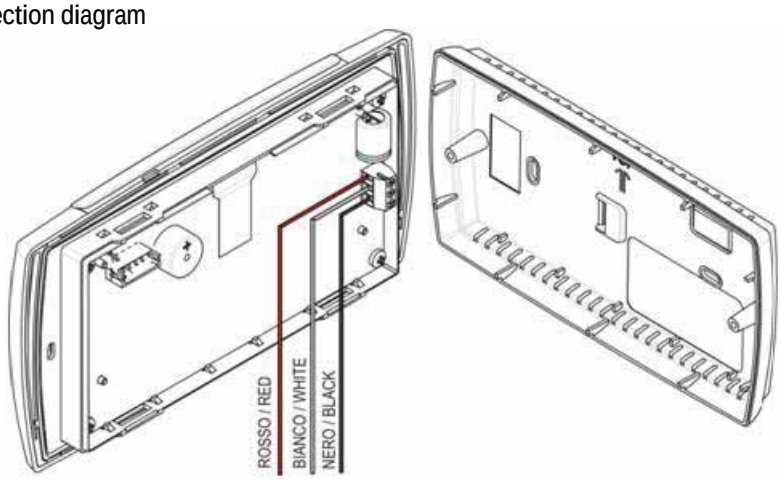
Special care must be taken when connecting the keyboard to the remote control, to avoid irreparable damage to the controller or/and keyboard

- In case of power supply failure (wire black or red), the keyboard doesn't work.
- In case of comunication problems, the display shows "noL" message.

5.6.1 Panel mounting connection diagram



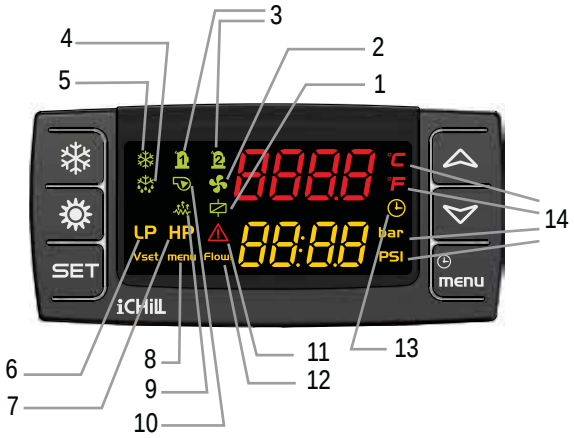
5.6.2 Wall mounting connection diagram



6. USE (Modd. 242 ÷ 2502)

6.1 Switch the unit on (Modd. 242 ÷ 2502)

In order to power the unit, turn the main switch to the ON position. The display shows the User inlet water temperature.



Legend

1	Icon on if the open collector outlet is active.	8	Function menu active.
2	Icon ON (acceso): if the fans are running.	9	Integrative user circuit heaters activated.
3	Icon On if the compressor is turned on; Icon blinking if the compressor is in the ignition timing.	10	Icon on if at least one of the 2 water pumps (pump evaporator or pump condensator) is on.
4	Icon blinking: Defrost cycle timeout activated; Led ON: Defrost cycle activated.	11	Icon blinking on alarm.
5	Icon ON: Unit in cooling mode.	12	Icon blinking if the digital input of the flow switch is active (both pump ON and pump OFF).
6	Icon blinking if low pressure alarm is active.	13	Icon on when the bottom display show current time, the hours of operation of the loads, etc.
7	Icon blinking if high pressure alarm is active.	14	Icon on when the display show a temperature or a pression.

6.1.1 Cooling mode

To start the unit in heating mode, press the  key. The snowflake icon is on. If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature.

6.2 Stop (Modd. 242 ÷ 2502)

6.2.1 Cooling mode

To stop the unit in cooling mode, press the key. The LED switches off. The unit goes into stand-by mode.

6.3 Stand-by (Modd. 242 ÷ 2502)

When the unit is switched off from the keyboard or the remote panel, it goes into standby mode. In this mode, the microprocessor control displays the sensor readings and is also able to manage alarm situations. The only visible signal on the display is the green led of circuit1 and the water temperatures. If the unit is switched off from remote ON/OFF the label OFF is displayed.

If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

6.4 How to change the set points (Modd. 242 ÷ 2502)

When modifying or varying the machine's operating parameters, make sure that you do not create situations that conflict with the other set parameters.

The complete display of the 2 set points (heating, cooling) is ONLY available when the unit is in stand-by mode. It is suggested to put the unit in stand by when modifying set points. If the unit is not in stand-by, the only editable parameters are the ones related to the operation mode of the unit (eg. In heating mode it is only possible to change the heating and set points, in cooling mode it is only possible to change the cooling and set points.)

Select the required set point using the Press the SET key . The label appears at the bottom of the display:
SEtC Cooling set point.

To set the required set-points press again the SET for 3 seconds.

The current value flashes at the top and can be modified using the , keys we can modify the parameter.

Then press the SET key to memorise the parameter and exit.

All set points are intended as return temperature from the plant. For example: if hot water at 45°C is required and the Δt is 5°C, than the set point will be 40°C. If the Δt is 8°C, then the set point has to be set at 37°C. If, for example, cold water is required at 15°C and the Δt is 5°C, then the set point will be 20°C. If the Δt is 8°C, then the set point has to be set at 23°C.

6.4.1 Adjustable parameters

The adjustable set points that can be modified by the end user are:

Label	Function	Adjustment limit	Default value
SEt C	Cooling set-point	10÷23°C	12°C
PAS	Password	(Contact the company)	

The units are supplied with a very sophisticated control system with many other parameters that are not adjustable by the end user; these parameters are protected by a manufacturer password.

6.5 Parameters list (Modd. 242 ÷ 2502)

By pressing the menu key the user has the possibility to display many parameters.

Scroll the list of the parameters using the , keys, then press the SET key to display the required one. In this menu it is only possible to display the parameters, it is not possible to change any value. The parameter list is:

Display	List	Symbol	Meaning
ALrM	Alarm List	ALrM	See following paragraph
ALOG	Alarm history	ALOG	See following paragraph
HouR	Main components working hours	C1HR	Working hours compressor 1
		C2HR	Working hours compressor 2 (only models with 2 compressors)
		PFHR	Working hours user water pump
		PCHR	Working hours domestic hot water pump
DEF	(Not used)	dF1	Countdown (in seconds) to the next defrost cycle; the countdown is active if the defrost led is blinking. In case the defrost led is off the defrost cycle is not required. During the defrost cycle the defrost led is ON.

6.6 Acoustic signal silencing (Modd. 242 ÷ 2502)

Pressing and releasing one of the keys; the buzzer is switched off, even if the alarm condition remains in place.

6.7 Alarm reset (Modd. 242 ÷ 2502)

Press the menu key (the menu AlrM appears at the bottom right of the display). Press the SET key to display the alarm event. In case of multiple alarms use the using the , keys, to scroll through the list of the active alarms.

There are two types of alarms:

Reset alarms:
RST label appears on the upper part of the display. In this case press the SET key to reset.

Non reset alarms:
nO label appears on the upper part of the display. In this case the alarm is permanent; contact technical support.

6.8 Display alarm history (Modd. 242 ÷ 2502)

Press the menu key, then the , keys, to scroll through the menus, when ALOG label appears in the bottom part of the display, press SET. To scroll the list of alarms use the , keys.

7. USE (Modd. 2504 ÷ 5004)

7.1 Switch the unit on (Modd. 2504 ÷ 5004)

Unit switch-on and switch-off can take place:
• From the keyboard
• From digital input configured as remote ON/OFF

7.1.1 Switch the unit on from the keyboard

Cooling mode

To start the unit in the cooling mode, press the ❄ key. The icon ❄ appears on the display.
If requested, the compressor safety delay countdown starts and the compressor icon flashes. The water pump will be activated after few seconds, and then, once the compressor countdown has finished, the compressor starts and the icon remains on. The display shows the user water inlet temperature and Domestic hot water inlet temperature.

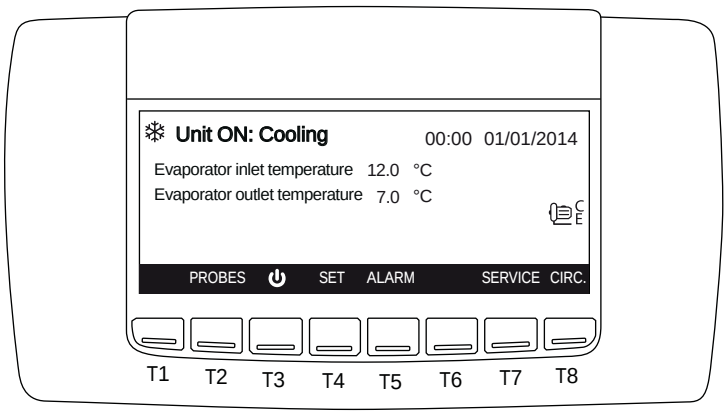
In stand-by mode, the controller gives the possibility to:
• display the set values
• manage alarms, theyr display and reports.

If it is required to switch the unit on and off, never do this using the main isolator: this should only be used to disconnect the unit from the power supply when the unit is to be permanently off. Isolation will result in no supply for the crankcase heater and on start up the compressor could be seriously damaged.

7.1.2 Heating and cooling mode

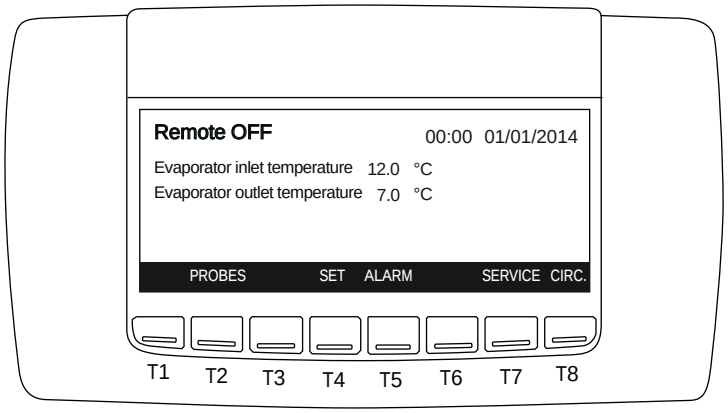
The display shows the typical visualization during the unit working in:

COOLING MODE



7.1.3 Switch the unit on from from digital input

If the unit is switch off by remote digital input, the display shows:

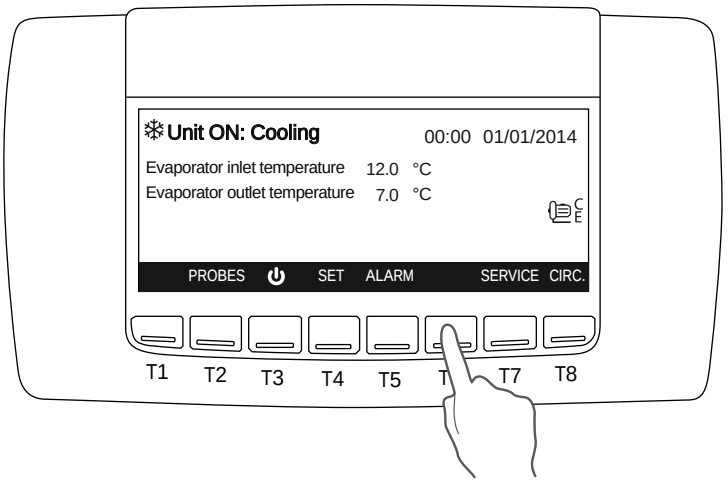


When the digital input is not active, the unit is in OFF mode

- The remote input has the priority with respect to the keyboard
- The unit can only be switched-on and off if the remote input is activated

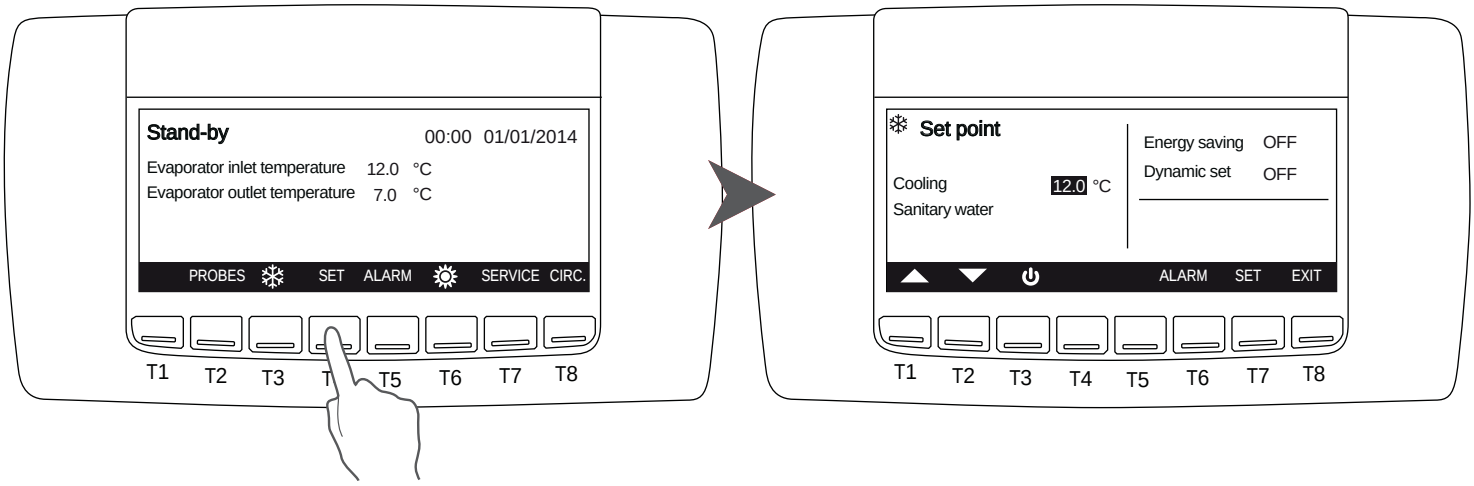
7.2 Stop (Modd. 2504 ÷ 5004)

To switch the unit off press the key ⏻ .



7.3 Set point (Modd. 2504 ÷ 5004)

To change the set-point from the main screen, press SET .



To modify the values, move the cursor with ▲; press SET to select, the value starts blinking, change the data pressing ▲ and ▼. Once the required value is reached, press again SET to confirm.
The cursor will automatically position itself on the next value, to modify it, repeat the operation just described.
In this screen it is also possible to verify (but not modify) whether the energy saving mode and dynamic set are active.

Press EXIT to go back to the main menu.

All set points refer to the return temperature from the plant. In case hot water at 45°C is requested and the Δt is 5°C, then the set point must be set at 40°C. In case the Δt is 8°C, then the set point must be set at 37°C. In case cold water is requested, for example at 15°C and the Δt is 5°C, then the set point must be set at 20°C. If the Δt is 8°C, then the set point must be set at 23°C.

7.3.1 Adjustable parameters

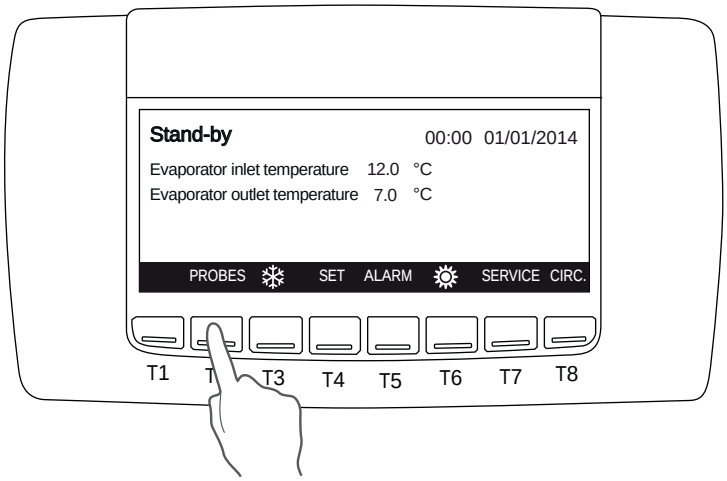
The adjustable set point that can be modified by the end user are:

Function	Adjustment limit	Default value
Cooling set-point	10÷25°C	23°C
Password	(Contact the company)	

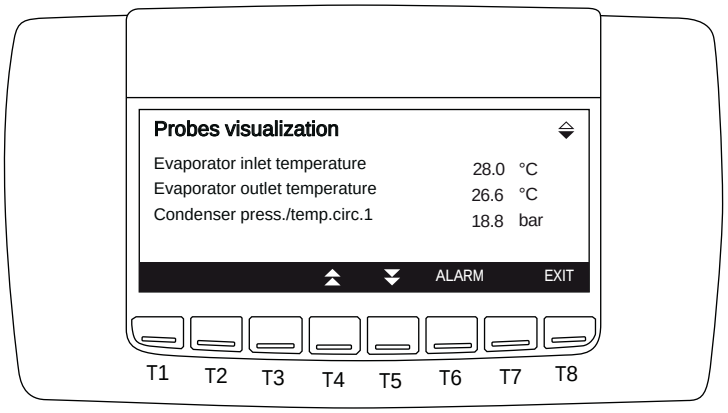
The units are supplied with a very sophisticated control system with many other parameters that are not adjustable by the end user; these parameters are protected by a manufacturer password.

7.4 PROBES key (Modd. 2504 ÷ 5004)

To view all the parameters measured by the sensors of the unit press PROBES ;



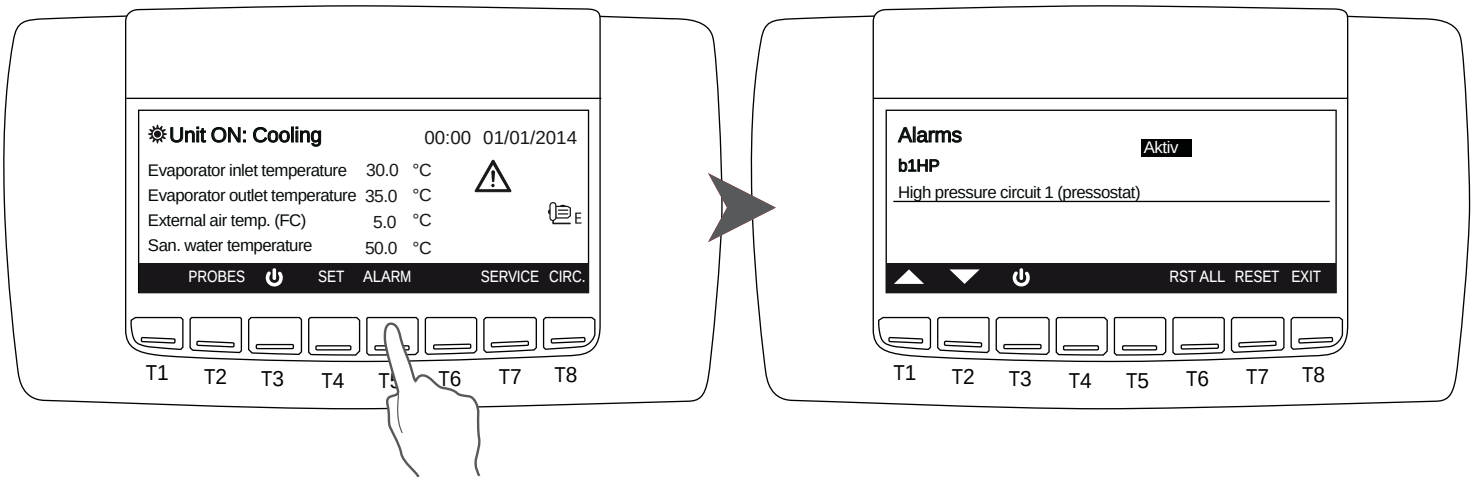
By pressing the key, all relevant values of the circuit will be displayed



Press EXIT to go back to the main menu.

7.5 ALARM key (Modd. 2504 ÷ 5004)

When the alarm occurs, the display shows the icon ⚠ blinking.
Press ALARM key to read the alarm status:



The alarm status can be:

• **Reset:** the alarm is not active and it is possible to reset it. Press ▲ and ▼ keys to select the alarm to select it and press RESET key to reset the alarm.
• Password: in this case the alarm is no longer active, but you need a password to reset it (please contact the Company).
• Active: the alarm is still active and it is not possible to reset it.

In case more resettable alarms are present, it's possible to reset all of them at once pressing RST ALL key.
In any case, even if all the alarms are reset, they remain present in the alarm history (par. 6.7.7).

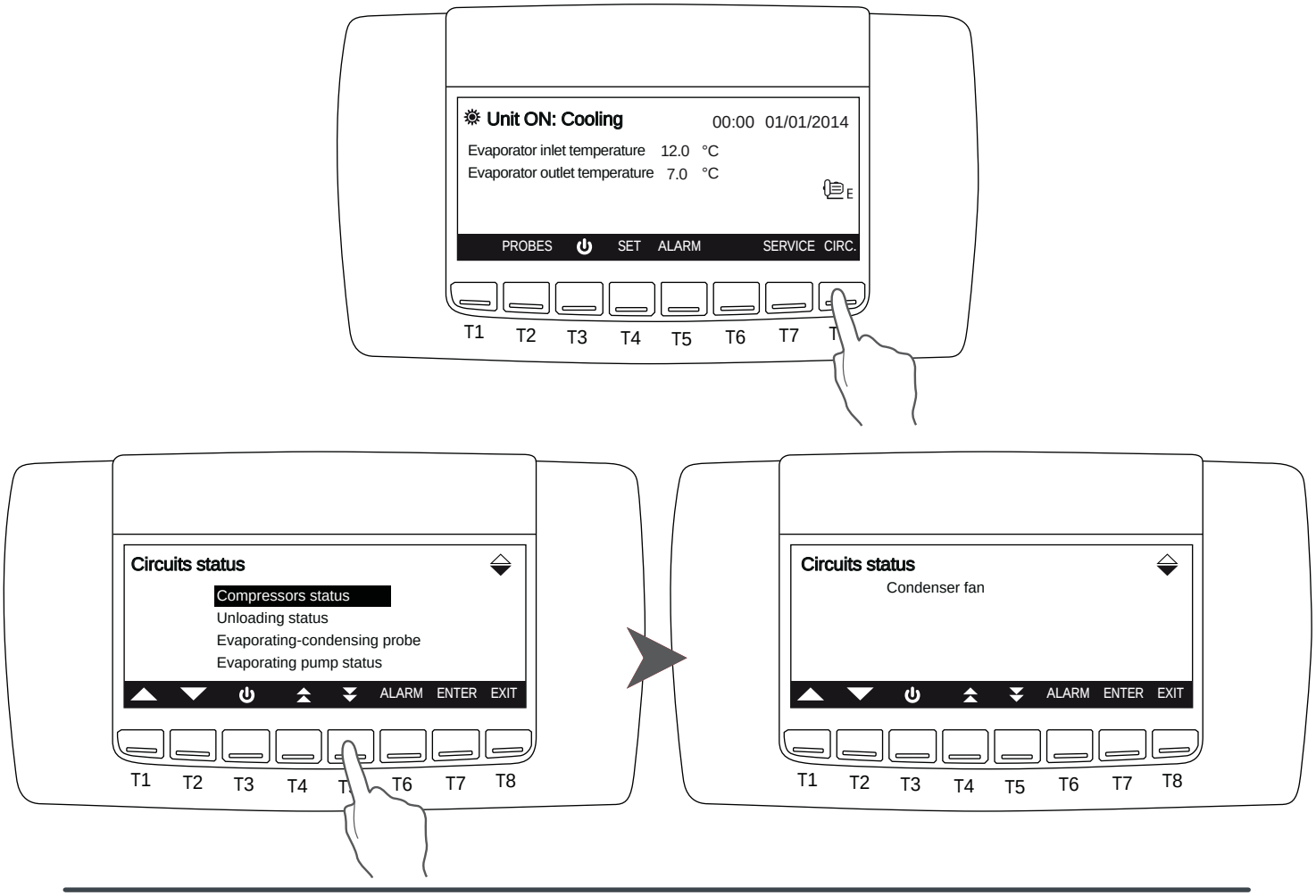
7.6 CIRC key (Modd. 2504 ÷ 5004)

Pressing CIRC can view the different parameters of the unit:

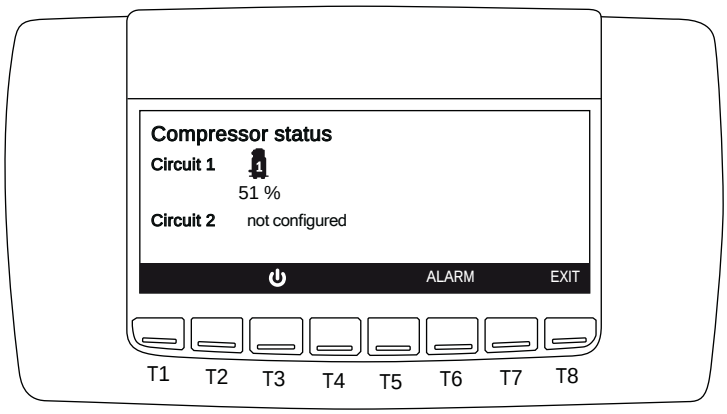
Pressing ▲▲ and ▼▼ you move from one screen to another while with ▲ and ▼ you scroll through the menu items. Press ENTER key to view the values.

State of the compressors; the display shows compressors present in each circuit and the activation status of each one.
Color black: compressor running
Color white: compressor on standby

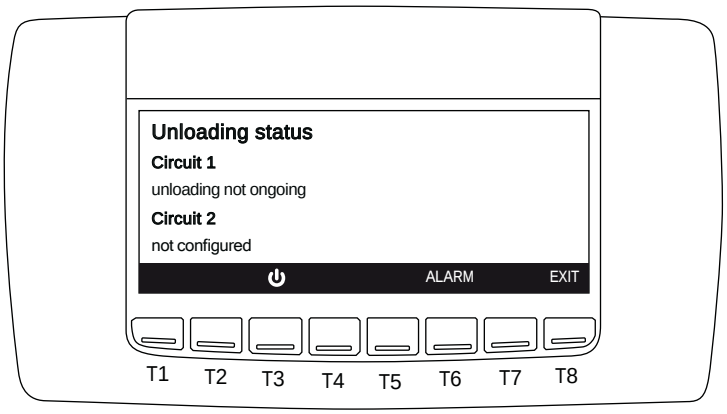
In case of use of compressors in part-loading (typically screw compressors) an icon appears to the right of the compressor showing the level of step control.
In case of use of On/Off compressors (Scroll) no icon appear to the right of the compressor.



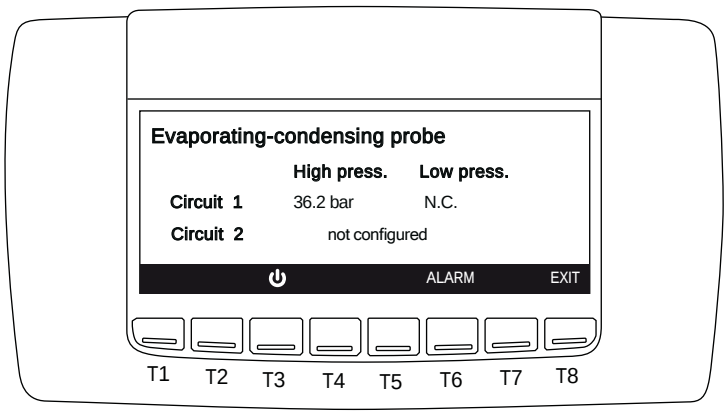
Compressor status



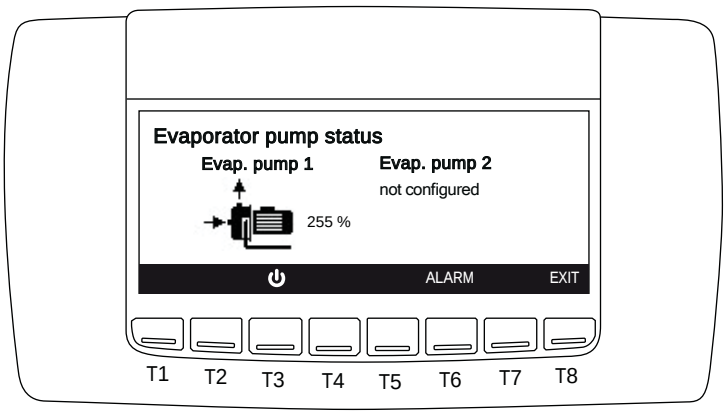
Unloading status



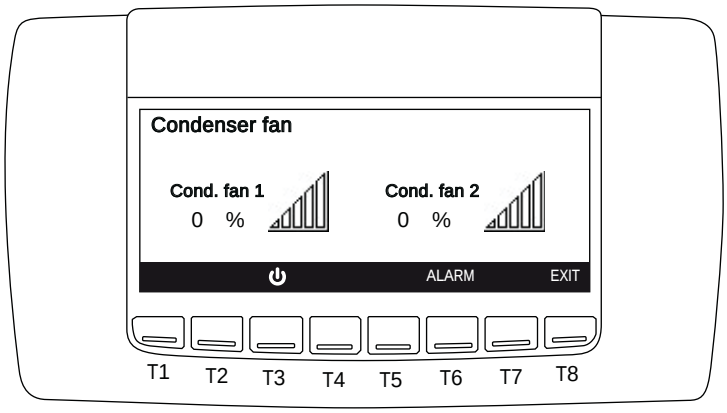
Condensing probe



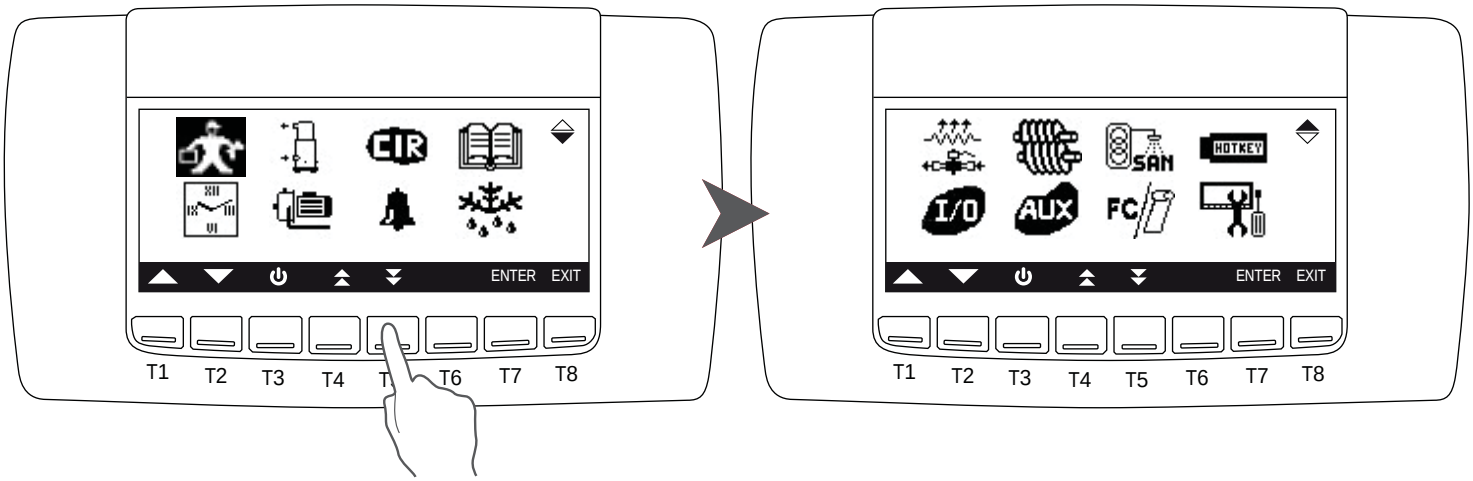
Evaporator pump status



Condenser fan



7.7 SERVICE key (Modd. 2504 ÷ 5004)



Press the SERVICE key to access the following menus:

	Setting parameters (for service only)		Electrical heater and pump down valve status
	Time and date setting	I/O	I/O status (Inputs and Outputs)
	Compressors status		Screw compressor information (Not configured)
	Pumps	AUX	Auxiliary outputs
CIR	Circuit maintenance	SAN	Domestic hot water (Not configured)
	Display of alarms	FC	Free cooling and Solar panel visualization (if available)
	Alarm history	HOTKEY	Upload and download parameter map with Hot Key
	Defrost (if available)		Control panel

Press ▲▲ key to display all the menu available.

To modify and set the parameters move the cursor using the ▲ and ▼ ,press ENTER, to select the required menu, and then SET to select the desired value.

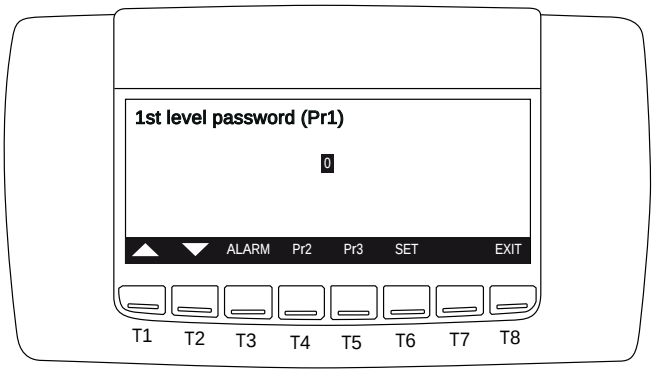
Change the parameters by pressing the ▲ and ▼ , and then press SET again to confirm.

Press the EXIT key to return to the main menu.

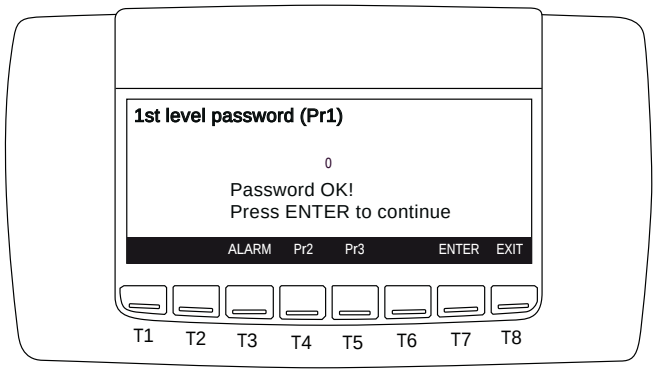
7.7.1 Service parameters setting

To enter service menu select  moving between the icons with ▲ and ▼ keys and press ENTER.

The system prompts you to enter the password to access to different levels of security.



The first level allow to modify some parameters as for example heating and cooling set points and dynamic set points. Press SET key, with ▲ modify the password to 1 then press SET again to confirm.
The display show:

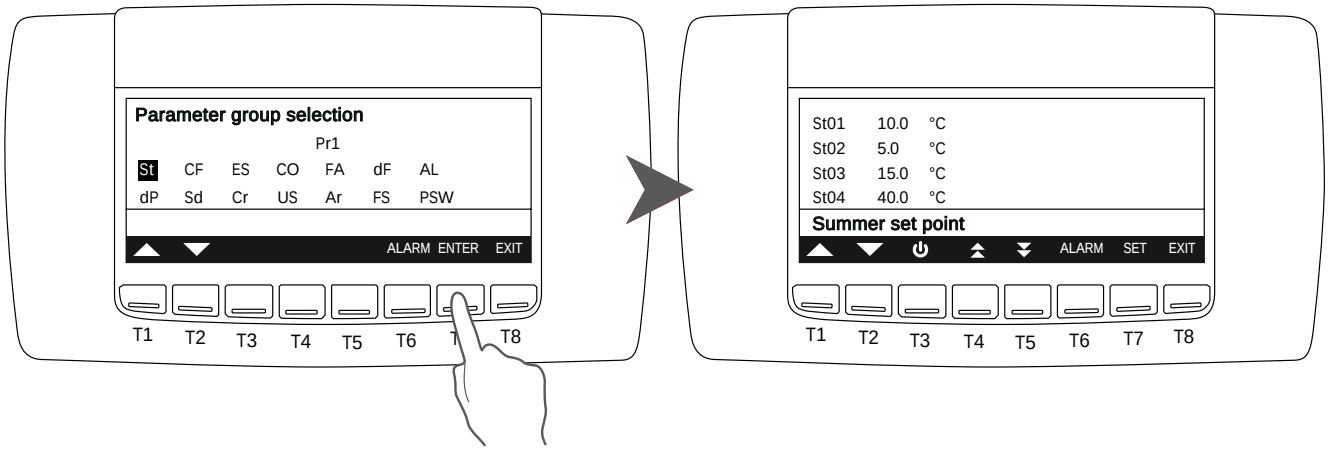


Press ▲ and ▼ to scroll through different groups of parameters. With password level 1 you could only change the Set Point (St), dynamic Set point (Sd), and parameters of sanitary circuit (FS); the unit must be switched on. Press ENTER to enter in the group of parameters. Other parameters can only be modified by service with a dedicated password. Other parameters could be modified by service people only with a dedicated password.

Parameters list:

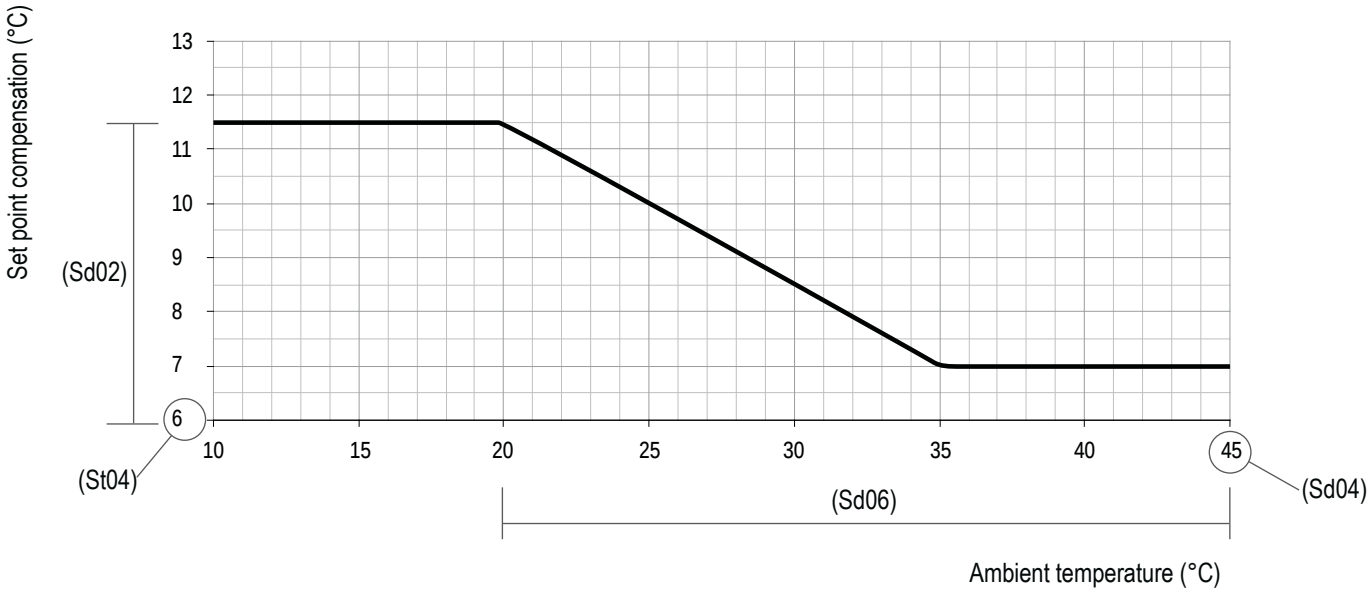
Code	Meaning	Code	Meaning
St	Set point	US	Auxiliary output
dP	Main visualization	FA	Fan
CF	Configuration	Ar	Antifreeze
Sd	Dynamic set	AL	Alarms
ES	Energy saving		
Cr	Compressor racks		
CO	Compressor		

To modify the value of the parameter: press ▲ or ▼ to select the parameter to modify then press SET the value start to blinking, press ▲ and ▼ to modify, than press SET again to confirm.
The values available in the group of parameters “Set point” (St) are: summer set point (St01), winter set point (St04), summer regolation band (St07) and winter regolation band (St08).



Weather compensated function

This function makes it possible to activate the weather compensation sensor in order to optimize the efficiency of the unit. Automatically it modifies the set-point value with respect to external air temperature: a calculation is performed on the set-point to provide a revised value of set point for higher ambient conditions (see example given below). This function makes it possible to save energy and to operate the unit in severe ambient conditions.



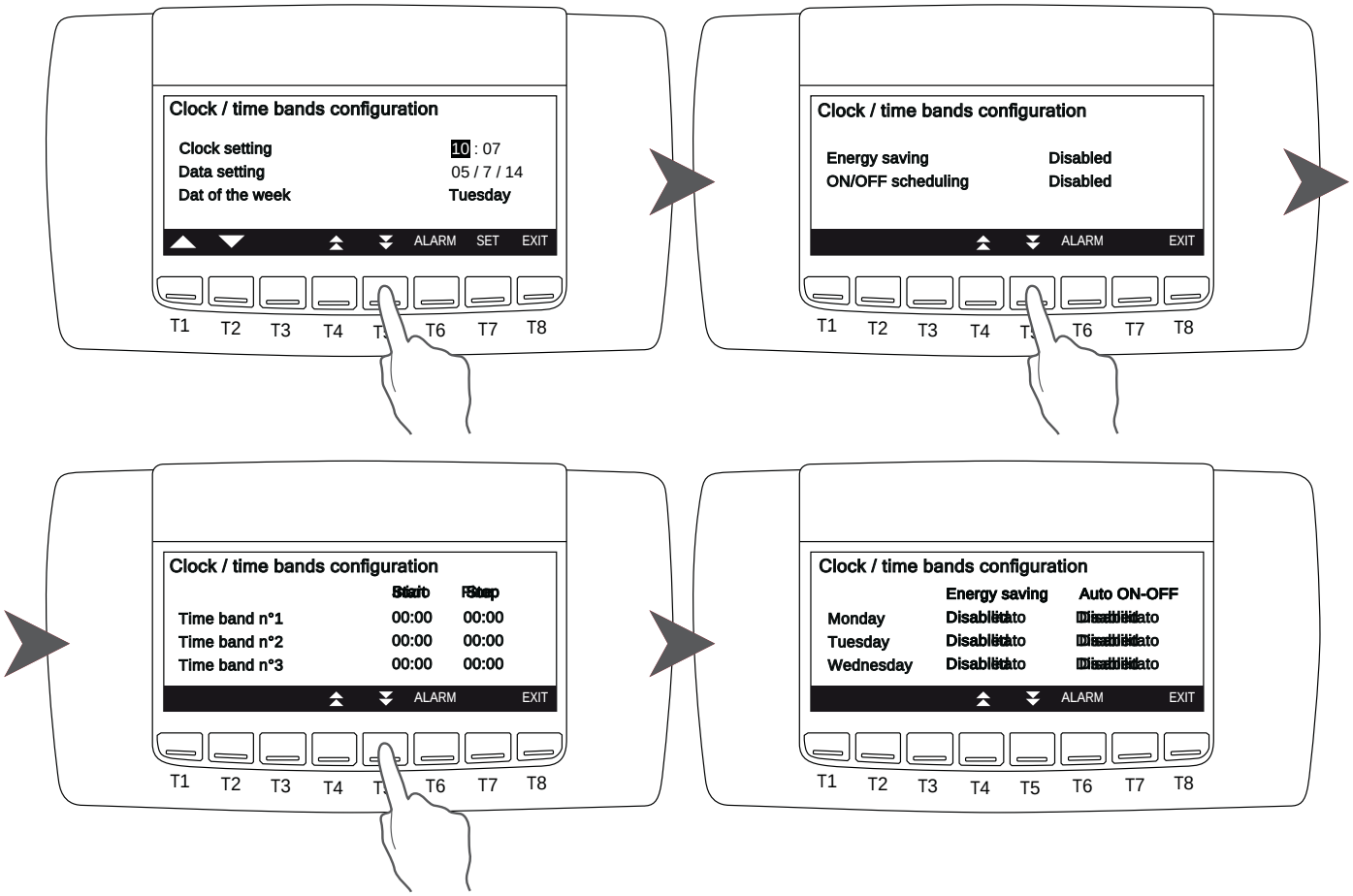
All units are factory set with the weather compensated function not activated.

7.7.2 Setting date and time

To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.

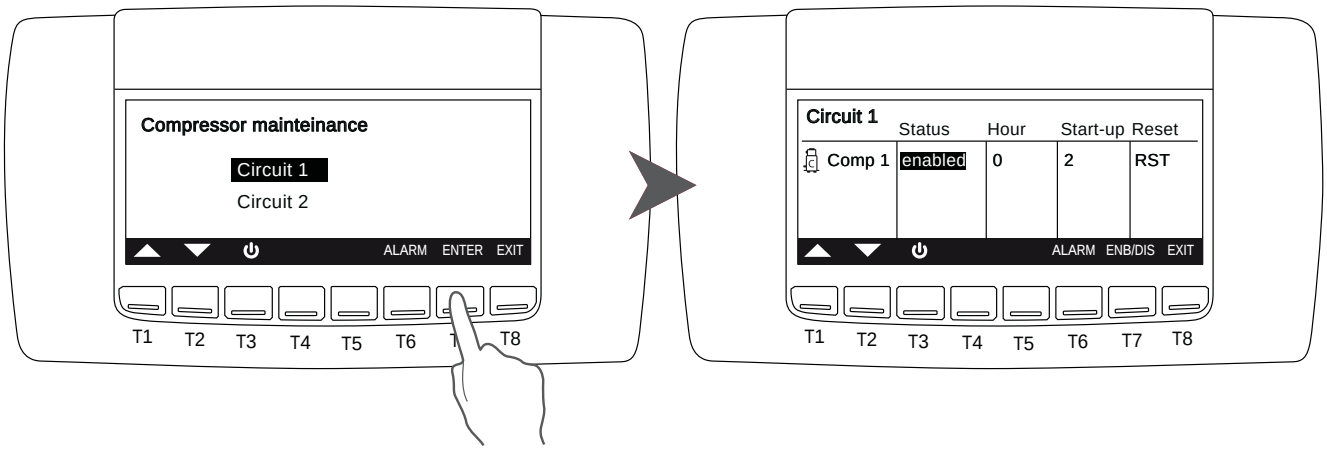
Press ▲ and ▼ to select the value you want to edit than press SET. The selected parameter will start blinking, press ▲ and ▼ to set the value and than press SET to confirm.

Pressing ⏬ it is possible to read the information about the Energy saving, ON/OFF scheduling and time bands. To modify the hour of the time band and to enable the function is necessary to insert the password, in case you do not have a password, you can only view the different parameters..



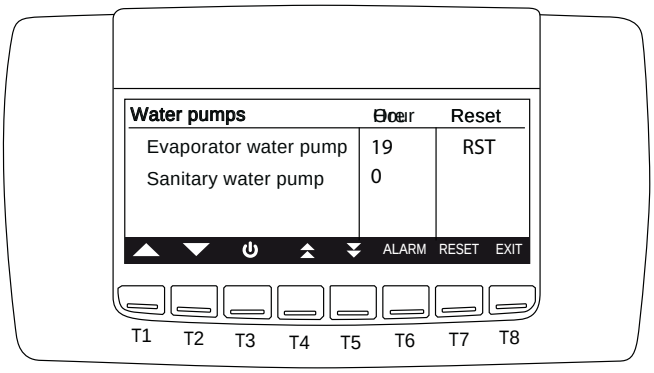
7.7.3 Compressor maintenance

To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to display the compressors working hour and the number of activations. Select the circuit with the keys ▲ and ▼ than press ENTER to display the parameters. The disabling function of the compressors ENB/DIS is only possible by service people.



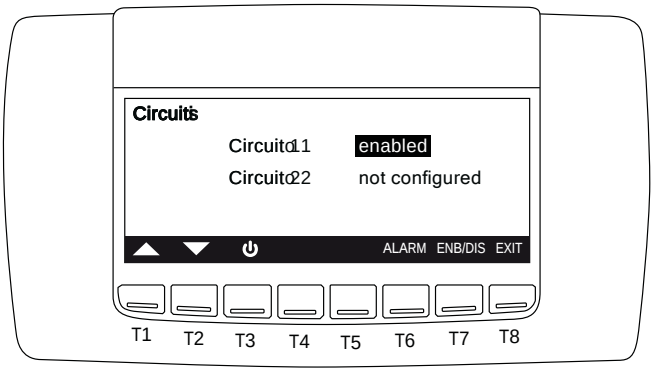
7.7.4 Water pumps

To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to display the working hours of water pumps. The function RESET is only possible by service people.



7.7.5 Circuit maintenance

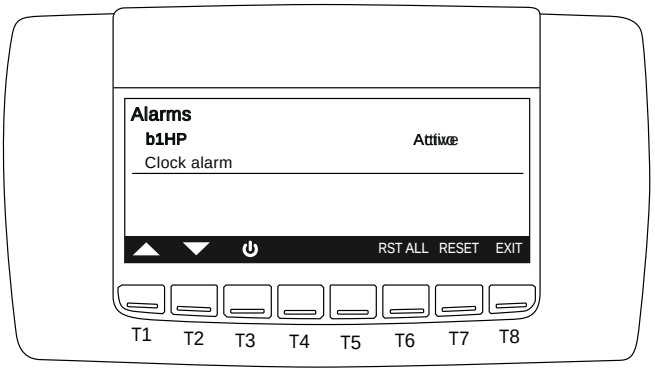
To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to display the status of the circuits. The function ENB/DIS is only possible by service people.



7.7.6 Alarms

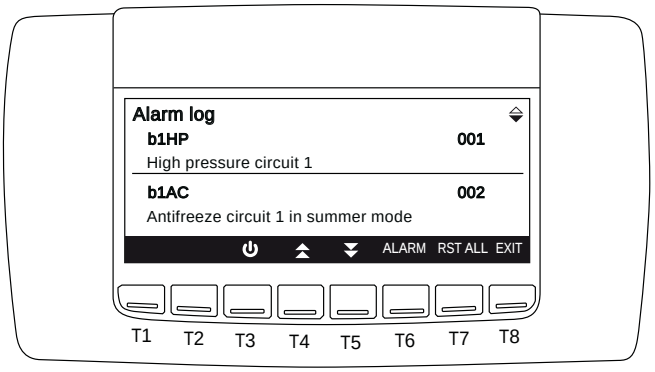
To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.

For the management of alarms see par. 6.5.

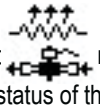


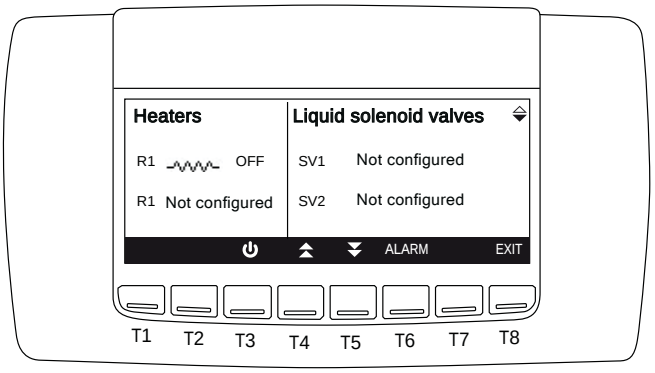
7.7.7 Alarm log

To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.
Pressing ⏫ and ⏬ it is possible to read the last 99 alarms. The function of reset of all alarms RST ALL is only possible by service people.



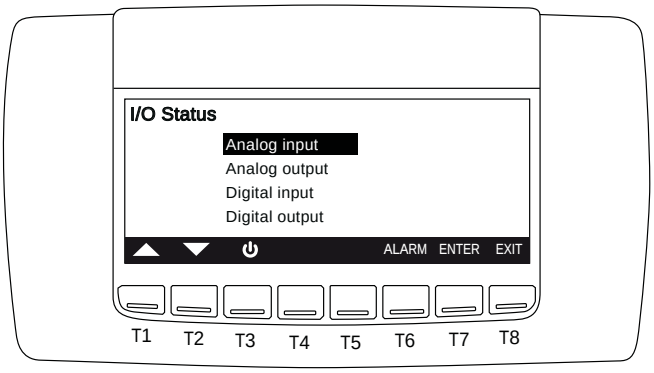
7.7.8 Eletrical heater

To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to read the status of the electrical heaters.



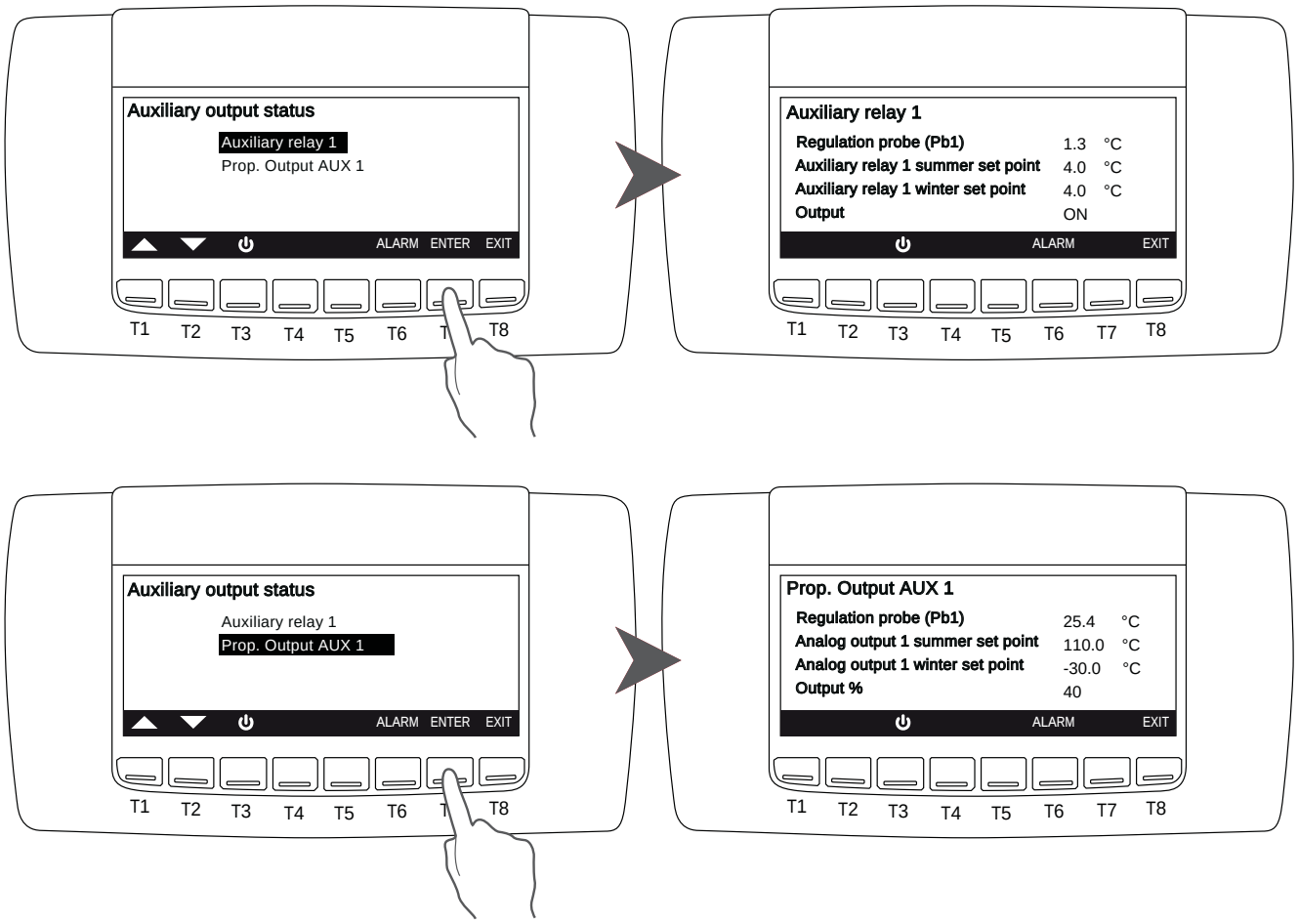
7.7.9 I/O Status (Input/Output)

To enter this menu select I/O moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to display: probes status, analog input and output, digital input and output.



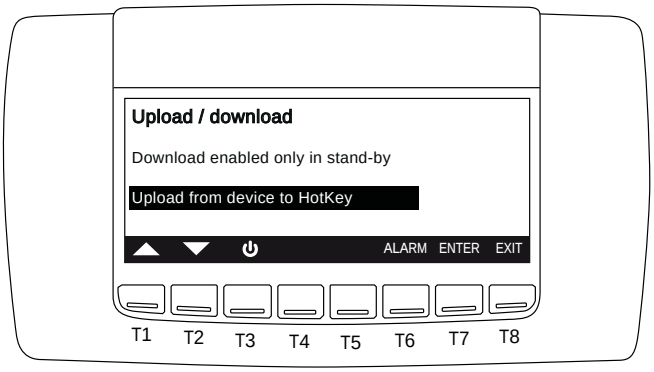
7.7.10 Auxiliary output

To enter this menu select AUX moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to read informations about auxiliary outputs.



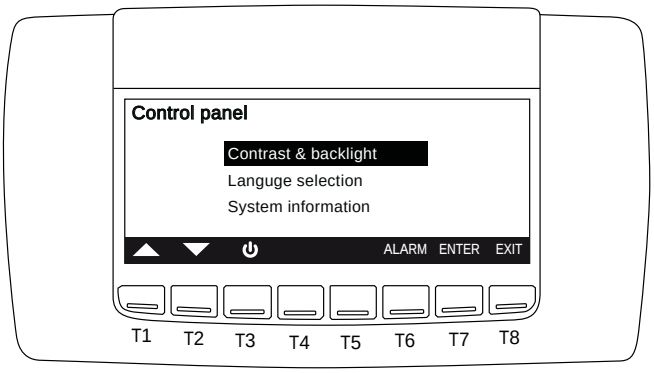
7.7.11 Upload / download

To enter this menu select HOTKEY moving between the icons with the keys ▲ and ▼ and press ENTER.
This function is allowed only to the service.



7.7.12 Control panel

To enter this menu select moving between the icons with the keys ▲ and ▼ and press ENTER.



7.8 Acoustic signal silencing

Pressing and releasing one of the keys; the buzzer is switched off, even if the alarm condition remains in place.

8. MAINTENANCE OF THE UNIT

8.1 General warnings

Starting from 01/01/2016 the new European Regulation 517_2014, “Obligations concerning the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pumps”, became effective. This unit is subject to the following regulatory obligations, which have to be fulfilled by all operators:
(a) Keeping the equipment records
(b) Correct installation, maintenance and repair of equipment
(c) Leakage control
(d) Refrigerant recovery and disposal management
(e) Presentation to the Ministry of the Environment of the annual declaration concerning the atmospheric emissions of fluorinated greenhouse gases.

Maintenance can:

- Keep the equipment operating efficiently
- Prevent failures
- Increase the equipment life

It is advisable to maintain a record book for the unit which details all operations performed on the unit as this will facilitate troubleshooting.

Maintenance must be performed in compliance with all requirements of the previous paragraphs.

Use personal protective equipment required by regulations as compressor casings and discharge pipes are at high temperatures. Coil fins are sharp and present a cutting hazard.

If the unit is not to be used during the winter period, the water contained in the pipes may freeze and cause serious damage. In this event, fully drain the water from the pipes, checking that all parts of the circuit are empty including any internal or external traps and siphons.

If it is necessary to replace a component of the machine, both for ordinary and extraordinary maintenance, this component must have the same or higher characteristics than those present. The same or higher performances or thicknesses are meant for the characteristics, which do not compromise the safety, the use, the handling, the storage, the pressures and the temperatures of use of the machine provided by the manufacturer.

The taps in the machine must always be in open position before starting. If it is necessary to disconnect the refrigeration circuit by closing the taps, it is necessary to take precautions to prevent the unit from starting up, even accidentally, and to indicate that the taps have been properly closed with special signs, both on the tap and in the electrical panel. In any case, the taps must remain closed as less as possible.

8.2 Drive access

Access to the unit once installed, should only be possible to authorized operators and technicians. The owner of the equipment is the company legal representative, entity or person owns the property where the machine is installed.
They are fully responsible for all safety rules given in this manual and regulations. If it is not possible to prevent access to the machine by outsiders, a fenced area around the machine at least 1.5 meters away from external surfaces in which operators and technicians only can operate, must be provided.

8.3 Scheduled maintenance

The owner must make sure that the unit is periodically inspected, also on-site, adequately maintained, according to the type, size, age and use of the system, and to the indications contained in the Manual.
Servicing during the unit's operating lifetime and, in particular, scheduled leak detection, on-site inspections and check-ups of safety equipment, must be carried out as provided by local laws and regulations in force.

If leak detection instruments are installed on the system, they must be inspected at least once a year, to make sure that they work properly.

During its operating life, the unit shall be inspected and verified in accordance with applicable local laws and regulations. In particular, when there are no stricter specifications, the indications given in the following table (see EN 378-4, Annex D) must be followed, with reference to the situations described.

CASE	Visual Inspection	Pressure Test	Search for leaks
A	X	X	X
B	X	X	X
C	X		X
D	X		X

A	Inspection after an intervention with possible effects on the mechanical strength or after use change or in case the machine has not being working for more than two years. Replace all the components which are not suitable any more. Do not carry out checks at a higher pressure than the one indicated in the project.
B	Inspection after a repair, or significant adjustment of the system, or its components. The check may be limited to the interested parts, but if a leakage of refrigerant is detected, a leakage search must be carried out on the entire system.
C	Inspection after installation in a different position than the original one. Refer to point A when mechanical strength could have been affected by the change.
D	Leak search, following a well-founded suspicion of refrigerant leakage. It is recommended examined the system for leakage, either directly (use of leak detection systems) or indirectly (deduction of leakage based on analysis of operating parameters), focusing on the parts most prone to leakage (e.g. joints).

If a defect is detected that compromises the reliable operation of the unit, the unit cannot be re-started until it has been repaired.

8.4 Periodical and first start-up checks

The start-up operations should be performed in compliance with all requirements of the previous paragraphs.

All of the operations described in this chapter MUST BE PERFORMED BY TRAINED PERSONNEL ONLY. Before commencing service work on the unit ensure that the electric supply is disconnected. The top case and discharge line of compressor are usually at high temperature. Care must be taken when working in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Care must be taken when working in their surroundings. After servicing, replace the cover panels, fixing them with locking screws.

8.4.1 Electrical system and adjustment

Action to be performed	Frequency					
	Monthly	Every 2 months	Every 6 months	Every year	Every 5 years	As necessary
Check that the unit works properly and that there are no active warnings	X					
Visually inspect the unit	X					
Check noise and vibration level of the unit				X		
Check operation of safety features and of interblocks				X		
Check the unit's performance				X		
Check the current draws of the different parts (compressors, fans, pumps, etc.)				X		
Check the supply voltage of the unit			X			
Check tightness of cables in their clamps			X			
Check the integrity of the insulating coating of power cables				X		
Check the conditions and functioning of the counters				X		
Check functioning of the microprocessor and of the display			X			
Clean the electrical and electronic components of any dust				X		
Check functioning and calibration of probes and transducers				X		

8.4.2 Condensing coils and fans

Action to be performed	Frequency					
	Monthly	Every 2 months	Every 6 months	Every year	Every 5 years	As necessary
Visually inspect the coil	X					
Clean finned coils (1)			X			
Check the water flow and/or any leaks	X					
Check that the flow switch is working properly			X			
Clean the metal filter on the water line (3)			X			
Check noise and vibration level of the fans				X		
Check the supply voltage of the fans			X			
Check the fans' electrical connections				X		
Check functioning and calibration of the fans' speed adjustment system (if present)				X		
Check 4-way valve operation (if present)				X		
Check air presence in the hydraulic circuit	X					
Check color of moisture indicator on liquid line				X		
Check for freon leaks (2)						X

(1) If the unit is installed in strongly windy areas, near coasts or deserts or in areas subjects to wind and/or sand storms, or near airports, industries or in places with high levels of air pollution in general inspect the unit more frequently (every three months or more) to check the real condition of the surface protection. follow the instructions given in the paragraph "Cleaning the microchannel condensing coils".

(2) In order to carry out operations on the refrigerant, it is necessary to observe the European Regulation 517_2014, "Obligations regarding the containment, use, recovery and destruction of fluorinated greenhouse gases used in stationary refrigeration, air conditioning and heat pump equipment".

(3) It can be carried out with a higher frequency (also weekly) depending on the Δt.

8.4.3 Compressors

Action to be performed	Frequency					
	Monthly	Every 2 months	Every 6 months	Every year	Every 5 years	As necessary
Visually inspect compressors				X		
Check noise and vibration level of the compressors				X		
Check the supply voltage of the compressors			X			
Check the compressors' electrical connections				X		
Check the oil level in the compressors by checking the oil level light.			X			
Check that the crankcase heaters are powered and working properly				X		
Check the conditions of the compressors' power cables and their tightness in the clamps			X			

Daily and monthly works may be carried out directly by the Owner of the system. All other works must be performed by authorised and trained personnel.

Any kind of cleaning whatsoever is forbidden before disconnecting the device from power supply by turning the master switch to the OFF position. It is forbidden to touch the device while barefooted or with wet or damp body parts.

Works on the cooling line must be carried out by qualified and trained technicians, as provided by local laws and regulations in force.

Before the start-up it is necessary to carry out all the operations described in the previous tables and make the necessary checks provided by the pre-start control module (valid for the italian market) to be requested to the service.

8.5 Refrigerant circuit repair

If the refrigerant circuit is to be emptied, all the refrigerant must be recovered using the correct equipment.

For leak detection, the system should be charged with nitrogen using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any leakage is detected using a bubble leak finder. If bubbles appear discharge the nitrogen from the circuit before brazing using the proper alloys.

Never use oxygen instead of nitrogen: explosions may occur.

Site assembled refrigerant circuits must be assembled and maintained carefully, in order to prevent malfunctions.

Therefore:

- Avoid oil replenishment with products that are different from that specified and that are pre-loaded into the compressor.
- In the event of a gas leakage on machines using refrigerant R410A, even if it is only a partial leak, do not top up. The entire charge must be recovered, the leak repaired and a new refigerant charge weighed in to the circuit.
- When replacing any part of the refrigerant circuit, do not leave it exposed for more than 15 minutes.
- It is important when replacing a compressor that the task be completed within the time specified above after removing the rubber sealing caps.
- When replacing the compressor following a burn out, it is advisable to wash the cooling system with appropriate products including a filter for acid.
- When under vacuum do not switch on the compressor.

9. DECOMMISSIONING

9.1 Disconnect the unit

All decommissioning operations must be performed by authorized personnel in accordance with the national legislation in force in the country where the unit is located.

- Avoid spills or leaks into the environment.
- Before disconnecting the machine please recover:
  - the refrigerant gas;
  - Glycol mixture in the hydraulic circuit;
  - the compressor lubricating oil.

Before decommissioning the machine can be stored outdoors, providing that it has the electrical box, refrigerant circuit and hydraulic circuit intact and closed.

9.2 Disposal, recovery and recycling

The frame and components, if unusable, should be taken apart and sorted by type, especially copper and aluminum that are present in large quantities in the machine.
All materials must be recovered or disposed in accordance with national regulations.

9.3 RAEE Directive (only UE)

The crossed-out bin symbol on the label indicates that the product complies with regulations on waste electrical and electronic equipment.
The abandonment of the equipment in the environment or its illegal disposal is punishable by law.

This product is included in the application of Directive 2012/19/EU on the management of waste electrical and electronic equipment (WEEE).
The unit should not be treated with household waste as it is made of different materials that can be recycled at the appropriate facilities. Inform through the municipal authority about the location of the ecological platforms that can receive the product for disposal and its subsequent proper recycling.
The product is not potentially dangerous for human health and the environment, as it does not contain dangerous substances as per Directive 2011/65/EU (RoHS), but if abandoned in the environment it has a negative impact on the ecosystem.
Read the instructions carefully before using the unit for the first time. It is recommended not to use the product for any purpose other than that for which it was designed, as there is a risk of electric shock if used improperly.

10. DIAGNOSIS AND TROUBLESHOOTING (Modd. 242 ÷ 2502)

10.1 Fault finding (Modd. 242 ÷ 2502)

All units are checked and tested at the factory before shipment, however, during operation an anomaly or failure can occur.

BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT.

Code	Alarm Description	Cause	Solution
P1	Alarm Sensor PB1	Wrong electrical connections. Sensor defect.	Check the electrical connection of the sensor to theterminal board, if correct call the service to replace the sensor.
P2	Alarm Sensor PB2		
P3	Alarm Sensor PB3		
P4	Alarm Sensor PB4		
A01	High pressure switch alarm.	In heating mode: Insufficient user circuit water flow; In cooling mode: Insufficient air flow to the source fan.	Restore the correct water flow in the user circuit. Restore the correct air flow to the source fan.
A02	Low pressure switch alarm.	Refrigerant charge leakage.	Find leakage and repair.
A05	High pressure alarm.	Trasducer defect.	Replace the faulty transducer.
A06	Low pressure alarm.	Refrigerant charge leakage.	Find leakage and repair.
A07	Anti-freeze alarm from analog input.	Too low water temperature.	Check user temperature set point. Check user water flow.
A08	Source heat exchanger flow switch alarm. (air/water water/water unit)	Presence of air or dirtiness in the user hydraulic system.	Bleed carefully the user hydraulic system or check and clean the water service.
A09	Compressor 1 overload.	Compressor input current putside operation limits.	Contact the company.
A10	Compressor 2 overload.		
A11	Overload source fan alarm.	Fan input current outside operation limits.	Check the proper operation of the source fan and, in case, replace it.
A12	Error alarm in defrosting.	Defrost time too long. Outside temperature outside the working limits. Refrigerant chearge leakage.	Check defrost set point. Restore normal working conditions. Find leakage and repair.
EE	EEPROM Alarm	Severe hardware damage in the microprocessor control system.	Switch the unit OFF and, after few seconds switch the unit ON; if the alarm appears again contact the service.

11. DIAGNOSIS AND TROUBLESHOOTING (Modd. 2504 ÷ 5004)

11.1 Fault finding (Modd. 2504 ÷ 5004)

All units are checked and tested at the factory before shipment, however, during operation an anomaly or failure can occur.

BE SURE TO RESET AN ALARM ONLY AFTER YOU HAVE REMOVED THE CAUSE OF THE FAULT; REPEATED RESET MAY RESULT IN IRREVOCABLE DAMAGE TO THE UNIT.

Code	Alarm Description	Cause	Solution
ACF1	Configuration alarm	Wrong configuration of microprocessor control system.	Contact the company.
ACF2	Configuration alarm		
ACF3	Configuration alarm		
ACF4	Configuration alarm		
ACF5	Configuration alarm		
ACF6	Configuration alarm		
ACF7	Configuration alarm		
ACF8	Configuration alarm		
ACF9	Configuration alarm		
AEE	Eeprom alarm	Severe hardware damage in the microprocessor control system.	Switch OFF the unit and, after few second switch ON the unit; if the alarm appears again contact the service.
AEFL	User water flow switch alarm	Presence of air or dirtiness in the user hydraulic system.	Bleed carefully the user hydraulic system or check and clean the water strainer.
AEUn	Compressor unloading alarm (only units with 2 compressors)	User water temperature is too high.	Wait until the user water temperature is lower.
AP1	Alarm user inlet water temperature sensor	Wrong electrical connection, Sensor defect.	Check the electrical connection of the sensor to the terminal board, if correct call the service to replace the sensor.
AP2	Alarm user outlet water temperature sensor		
AP3	Alarm pressure transducer		
AP8	Not used		
AP9	Not used		
AtE1	Evaporator water pump 1 overload		
AtE2	Evaporator water pump 2 overload		

Code	Alarm Description	Cause	Solution
B1 HP	High pressure switch circuit 1	In heating mode: Insufficient user circuit water flow; Insufficient domestic hot water circuit water flow. In cooling mode: Insufficient air flow at the source fan; Insufficient domestic hot water circuit water flow.	Restore the correct user circuit water flow. Restore the correct domestic hot water circuit water flow. Restore the correct air flow to spurce fan. Restore the correct domestic hot water circuit water flow.
b1AC	Anti-freeze alarm circuit 1 (cooling mode)	Too low water temperature	Check user temperature set point; Check user water flow.
b1hP	High pressure transducer alarm circuit 1	Transducer defect	Replace the faulty transducer.
B1LP	Low pressure switch circuit 1	Refrigerant charge leakage.	Find leakage and repair.
b1lP	Low pressure transducer alarm circuit 1	Transducer defect	Replace the faulty transducer.
b1tF	Overload source fan alarm	Fan input current outside operation limits.	Check the proper operation of the source fan and, in case replace it.
C1tr	Compressor 1 overload	Compressor 1 input current outside operation limits.	Replace the compressor.
C2tr	Compressor 2 overload	Compressor 1 input current outside operation limits.	Replace the compressor.

HIDROS Srl
Sede legale: Via A. Volta, 49 ▪ cap 47014 ▪ Meldola (FC)
Sede operativa: Via E.Mattei, 20 ▪ cap 35028 ▪ Piove di Sacco (Pd) Italy
Tel. +39 049 9731022 ▪ Fax +39 049 5806928
Info@hidros.it ▪ www.hidros.it

P.IVA e C.F 04297230403 ▪ R.E.A. FO 337725