EMICON
INNOVATION AS ENERGY
AN ENEX TECHNOLOGIES COMPANY

WATER TO WATER GROUND SOURCE HEAT PUMPS

WHA

SERIES

TECHNICAL MANUAL

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

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.

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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

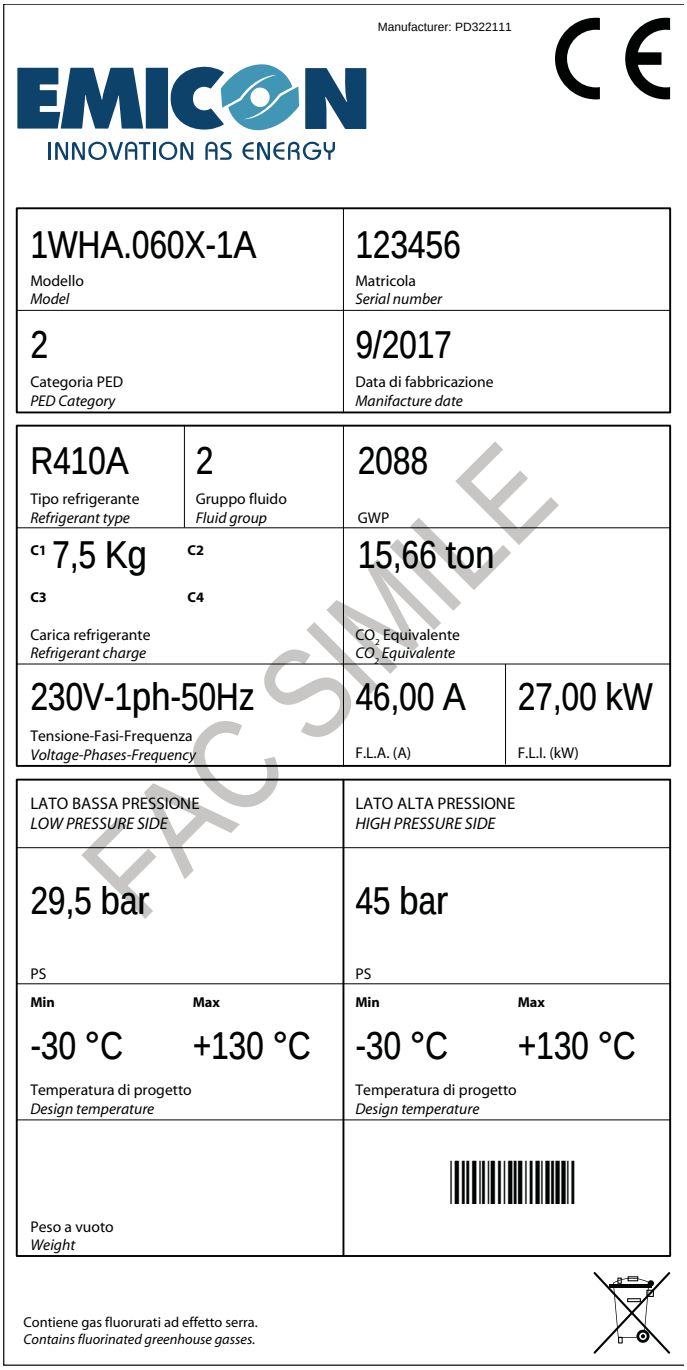
1.9 Limitations and prohibited use

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	TWA 1000 ppm
HFC125	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

These units are particularly suitable for applications that utilise well water or ground source probes. These units have been designed for use with radiant floor heating systems or those applications where it is necessary to have maximum efficiency when heating. They have been optimized on heating mode and are able to produce water up to 60°C.
These heat pumps are available in several versions. The most simple is a 2 pipe unit that can provide heating only. By fitting an external 3 port valve the unit can provide either heating or domestic hot water. There is also a 4 pipe unit that produces domestic hot water in a separate hydraulic circuit and can generate this irrespective of whether the unit is in heating or cooling mode. All the units are also available in Free Cooling (FC) versions which provide low energy cooling by simply using the cool water that is available from either the ground source probes or the well water. 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 RAL 9018.

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. Each refrigerant circuit is totally independent from the other with the result that any fault or alarm condition on one circuit does not influence the other. The refrigerant circuit includes: sight glass, filter drier, thermal expansion valve with external equalizer, Schrader valves for maintenance and control and pressure safety device (for compliance with PED regulations).

3.1.3 Compressors

The compressors used are a high performance scroll type that incorporates a special scroll design which enhances the efficiency of the refrigerant cycle when the source temperature is low. 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 thus enabling them to be maintained even if the unit is operating. Access to this enclosure is via 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

Source heat exchanger are braze-welded plates and are made of stainless steel AISI 316. From size 039 to size 162 are single-circuit, from size 190 are all double circuit cross-flow. The use of this type of exchangers greatly reduces the refrigerant charge of the unit compared to the conventional shell and tube evaporators, and increases the efficiency of the refrigerant loads. The heat exchangers are factory insulated with flexible close cell material and are protected by a temperature sensor used as antifreeze protection kit.

3.1.5 User exchangers

The user side heat exchanger is a braze welded, plate type heat exchanger, manufactured from AISI 316 stainless steel. From size 039 to size 162 they have a single water side circuit, from the size 190 they are double circuit, “cross flow” type. All units are supplied with a sub-cooler to enhance the performance of the refrigerant cycle. The user heat exchangers are factory insulated with flexible close cell material.

3.1.6 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, Summer/Winter change over (heat pumps only) and general alarm.

3.1.7 Microprocessors

All WHA 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 depart-

ment can discuss and evaluate, in conjunction with the customer, solutions using MODBUS protocols.The control also manages the anti-legionella program, the integration with other heating sources (electric heaters, boilers, solar panels etc), the operation of a three port modulating valve (for diverting to DHW or heating) and both the heating circuit pump and the domestic hot water circuit pump. 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 of the Company can discuss and evaluate, in conjunction with the customer, solutions using MODBUS protocols.

3.1.8 Control and protection devices

All units are supplied with the following control and protection devices: Return user water temperature sensor, antifreeze protection sensor installed on the user outlet water temperature, return and supply, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection, pressure transducer (used to optimize the defrost cycle and the fan speed depending on the ambient conditions), flow switch.

3.2 Other versions

3.2.1 Heating + Domestic hot water production version (SW5)

This version is able to produce domestic hot water. It is supplied with an ON/OFF 3 way valve that diverts the water flow to a circuit for hot water production. These units are not available in the reversible version (RV) and cannot produce cold water.

3.2.2 Reversible version heating/cooling (RV)

This version can be used for cooling during summer operation by using a 4 way reversing valve in the refrigerant circuit. They are also fitted with a second thermostatic valve and a liquid receiver.

3.2.3 Reversible version heating/cooling/domestic hot water (RV/SW6)

This version is fitted with an additional heat exchanger, used as a condenser, to produce domestic hot water irrespective of the operation mode of the unit. The activation of the additional heat exchanger is performed automatically by the microprocessor control when the domestic hot water temperature, measured by the sensor, is lower than the required set point. If, during the summer months, the unit is operating on cooling, this version can produce hot and cold water simultaneously. This version is equipped with return and supply domestic hot water sensors and an advanced control panel with specific software for management of the system priorities.

3.2.4 Free cooling versions (FC; FC/RV; FC/SW5; FC/RV/SW6)

These versions, in addition to the characteristics described above, can produce cold water during summer operation using the cold water available from the source ground probes. All free cooling versions are supplied with an intermediate heat exchanger and a 3 way valve that modulates the water flow to the user circuit depending on the required user cold water temperature.
During free cooling mode the compressors may be off or in operation (part load or full operation) to increase the free cooling capacity.

3.3 Accessories description

3.3.1 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.

3.3.2 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.

3.3.3 Spring vibration dumpers (KAVM)

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

3.3.4 Pressure gauges (MAML)

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

3.3.5 Electronic soft starter (DSSE)

It is used to reduce the peak current of the unit; the average reduction is 40% of the nominal peak current.

3.3.6 Remote control panel((PCRL)

It allows the remote control of all parameters of the unit.

3.3.7 RS485 serial interface card MODBUS protocol (INSE)

It is used to connect the unit to BMS systems using MODBUS protocol. In units where it is optional, it would be a kit that is supplied separately.

3.3.8 Source water 2 way modulating valve (4-20 mA; 0-10 V) (V2MO)

2-way modulating valve is factory installed in the hydraulic circuit at the source side, to optimize the consumption of well water as a function of the temperature of the available water. The valve is controlled by the microprocessor control unit by modulating signal 0-10V.
In the event of lack of power supply, the valve is normally closed.

3.3.9 Liquid line solenoid valve (VSLI)

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

3.3.10 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 Hydraulic kit with one pump without tank - user circuit (A1NTU)

It includes: 1 water pump, expansion vessel, pressure relief valve (if required by PED norms).

3.3.12 Hydraulic kit with one pump without tank - source circuit (A1NTS)

It includes: 1 water pump, expansion vessel, pressure relief valve (if required by PED norms).

3.3.13 Hydraulic kit with one pump without tank - recovery circuit (A1NTR)

It includes: 1 water pump, expansion vessel, pressure relief valve (if required by PED norms).

3.3.14 Hydraulic kit with two pumps without tank - user circuit (A2NTU)

It includes: 2 pumps running+stand-by, expansion vessel, pressure relief valve (if required by PED norms).

3.3.15 Hydraulic kit with two pumps without tank - source circuit (A2NTS)

It includes: 2 pumps running+stand-by, expansion vessel, pressure relief valve (if required by PED norms).

3.3.16 Hydraulic kit with two pumps without tank - recovery circuit (A2NTR)

It includes: 2 pumps running+stand-by, expansion vessel, pressure relief valve (if required by PED norms).

3.4 Technical data

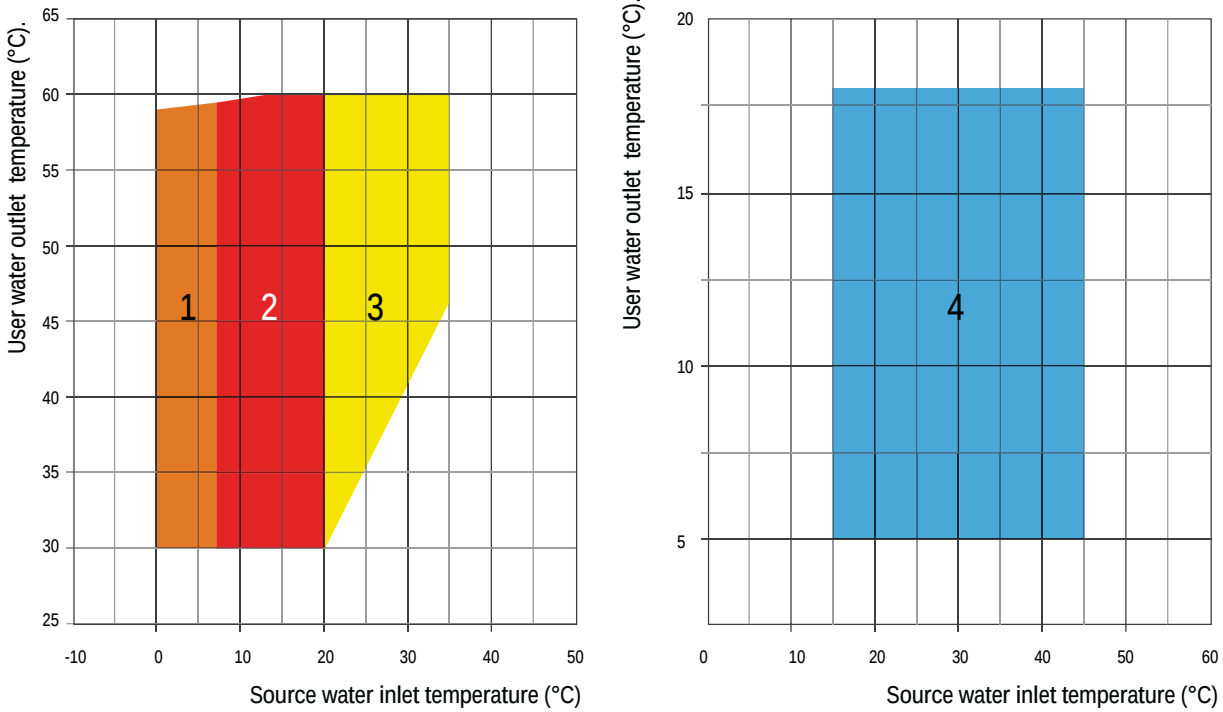
WHA		039	045	050	060	070	080	090	110	120
Heating capacity (1)	kW	51,7	59,0	71,2	80,0	92,5	105,9	120,8	136,1	152,0
Total input power (1)	kW	9,8	11,0	12,5	14,3	16,9	19,4	22,2	24,9	28,3
User water flow (1)	m^3/h	8,8	10,1	12,3	13,8	15,8	18,1	20,6	23,2	25,9
C.O.P. (1)	W/W	5,3	5,4	5,7	5,6	5,5	5,5	5,4	5,5	5,4
Heating capacity (2)	kW	38,9	44,2	53,9	60,3	69,5	79,5	89,9	100,7	112,5
Total input power (2)	kW	9,5	10,8	12,3	14,1	16,4	18,6	21,3	23,9	27,2
C.O.P. (2)	W/W	4,1	4,1	4,4	4,3	4,2	4,3	4,2	4,2	4,1
Cooling capacity (3)	kW	59,8	68,1	83,9	94,0	107,8	124,1	142,5	161,8	178,7
Total input power (3)	kW	10,3	11,3	13,1	14,9	17,4	19,6	23,0	26,4	29,8
E.E.R. (3)	W/W	5,8	6,0	6,4	6,3	6,2	6,3	6,2	6,1	6,0
Cooling capacity (4)	kW	42,9	49,0	60,3	67,4	77,5	88,9	101,3	114,3	126,9
Total input power (4)	kW	10,0	11,3	12,9	14,7	17,4	19,9	22,7	25,5	29,0
E.E.R. (4)	W/W	4,3	4,3	4,7	4,6	4,4	4,5	4,5	4,5	4,4
User water flow FC	m^3/h	7,4	8,5	10,5	11,7	13,4	15,4	17,6	19,8	22,0
Free cooling input power (5)	Kw	22,8	22,9	36,0	36,3	36,6	49,3	71,0	72,4	73,5
Max input current	A	32,0	42,0	44,0	50,0	59,0	68,0	74,0	80,0	88,5
Peak current	A	111,0	132,0	140,0	143,0	199,0	208,0	259,0	265,0	312,0
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
Compressors scroll / Circuit	n°/ n°	2/1	2/1	2/1	2/1	2/1	2/1	2/1	2/1	2/1
Capacity steps	n°	2	2	2	2	2	2	2	2	2
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088
Refrigerant charge	Kg	4,3	4,3	5,0	5,0	6,0	6,5	8,0	11,0	11,0
Equivalent CO_2 charge	t	9,0	9,0	10,4	10,4	12,5	13,6	16,7	23,0	23,0
Sound power level (6)	dB(A)	71	77	77	78	79	80	8.	85	87
Sound pressure level (7)	dB(A)	55	61	61	62	63	64	66	68	70

Performance refer to the following conditions:
(1) Heating: user water temperature 30/35°C, source water temperature 10/7°C.
(2) Heating: user water temperature 30/35°C, source water temperature 0/-3°C con 10% glycol.
(3) Cooling: user water temperature 23/18°C, source water temperature 30/35°C.
(4) Cooling: user water temperature 12/7°C, source water temperature 30/35°C.
(5) Cooling: user water temperature 10°C, source water temperature 20°C.
(6) Sound power level in accordance with ISO 3744 (LS version).
(7) Sound pressure level at 10 mt from the unit in free field conditions direction factor Q=2, calculated in accordance with ISO 3744 (LS version).

WHA		130	152	162	190	210	240	260	300	320
Heating capacity (1)	kW	169,2	195,0	222,1	243,8	271,3	306,9	342,2	390,9	439,4
Total input power (1)	kW	31,6	36,8	41,0	45,1	51,0	57,3	63,6	72,5	81,4
User water flow (1)	m^3/h	28,8	33,2	38,0	40,4	45,0	51,4	57,7	66,6	75,0
C.O.P. (1)	W/W	5,4	5,3	5,4	5,4	5,3	5,3	5,4	5,4	5,4
Heating capacity (2)	kW	125,6	140,4	159,1	177,8	196,0	222,9	249,7	283,3	316,8
Total input power (2)	kW	30,5	35,1	39,2	43,1	48,7	54,9	61,0	69,4	77,9
C.O.P. (2)	W/W	4,1	4,0	4,0	4,1	4,0	4,1	4,1	4,1	4,1
Cooling capacity (3)	kW	198,5	231,4	265,2	289,5	321,7	363,7	405,3	462,9	520,1
Total input power (3)	kW	33,1	38,9	43,7	47,0	54,2	60,5	66,8	76,5	86,2
E.E.R. (3)	W/W	6,0	5,9	6,1	6,1	5,9	6,0	6,1	6,1	6,0
Cooling capacity (4)	kW	141,2	163,6	187,4	200,0	222,3	254,3	286,7	328,1	368,5
Total input power (4)	kW	32,3	37,8	42,2	45,1	51,0	57,4	63,8	74,3	83,4
E.E.R. (4)	W/W	4,4	4,3	4,4	4,4	4,3	4,4	4,4	4,4	4,4
User water flow FC	m^3/h	24,5	28,4	32,6	34,3	38,1	43,6	49,2	56,9	64,0
Free cooling input power (5)	Kw	74,1	93,1	94,0	125,9	127,6	129,5	162,0	164,4	203,0
Max input current	A	97,0	113,9	130,8	148,0	160,0	177,0	194,0	227,8	261,6
Peak current	A	320,5	358,5	375,4	333,0	345,0	400,5	417,5	472,4	506,2
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
Compressors scroll / Circuit	n°/ n°	2/1	2/1	2/1	4/2	4/2	4/2	4/2	4/2	4/2
Capacity steps	n°	2	2	2	4	4	4	4	4	4
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Global warming potential (GWP)		2088	2088	2088	2088	2088	2088	2088	2088	2088
Refrigerant charge		15,0	15,0	15,0	16,0	16,0	19,0	19,0	30,0	30,0
Equivalent CO_2 charge		31,3	31,3	31,3	33,4	33,4	39,7	39,7	62,6	62,6
Sound power level (6)	dB(A)	88	88	88	86	88	90	91	91	91
Sound pressure level (7)	dB(A)	71	71	71	69	71	73	74	74	74

Performance refer to the following conditions:
(1) Heating: Source exchanger ambient temperature 10/7°C, user exchanger water temperature 35/30°C.
(2) Heating: Source exchanger ambient temperature 0/-3°C, user exchanger water temperature 35/30°C.
(3) Cooling: Source exchanger ambient temperature 23/18°C, user exchanger water temperature 35/30°C.
(4) Cooling: Source exchanger ambient temperature 12/7°C, user exchanger water temperature 35/30°C.
(5) FreeCooling: Source Water input temperature 10°C, User water return temperature 20°C, compressors off.
(5) Sound power level in accordance with ISO 3744 (LS Version).
(6) Sound pressure level at 1 mt from the unit in free field conditions direction factor Q=2, calculated in accordance with ISO 3744 (LS Version).

3.5 Operation limits



1 Heating with glycol

2 Heating

3 Contact the company

4 Cooling

3.5.1 User heat exchanger water flow rate

The nominal water flow rate given is referred to a Dt of 5 °C. Maximum flow rate allowed is the one that presents a Dt of 3 °C: higher values may cause too high pressure drop. The minimum water flow rate allowed is the one presenting a Dt of 8 °C. Insufficient values cause too low evaporating temperatures with the action of safety devices which would stop the unit.

3.5.2 User hot water temperature (winter operation)

Once the system is on temperature, the minimum user water temperature should not be less than 30 °C: Lower values could cause incorrect working operation of the compressor and compressor failure may occur. The maximum user outlet water temperature cannot exceed 60°C; higher values may call the action of safety devices which would stop the unit.

3.5.3 User cold water temperature (summer operation)

The minimum user outlet water temperature allowed is 5°C. To operates below this limit the unit should need some structural modifications. In this case please contact our company. The maximum user outlet water temperature 18°C.

3.5.4 Source water temperature

The minimum source water outlet temperature is, in heating mode, 7°C. To operates below this limit a glycol mixture must be used. In case of use with this glycol mixture the minimum source water outlet temperature is -5°C. The maximum source water outlet temperature is 20°C.

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.

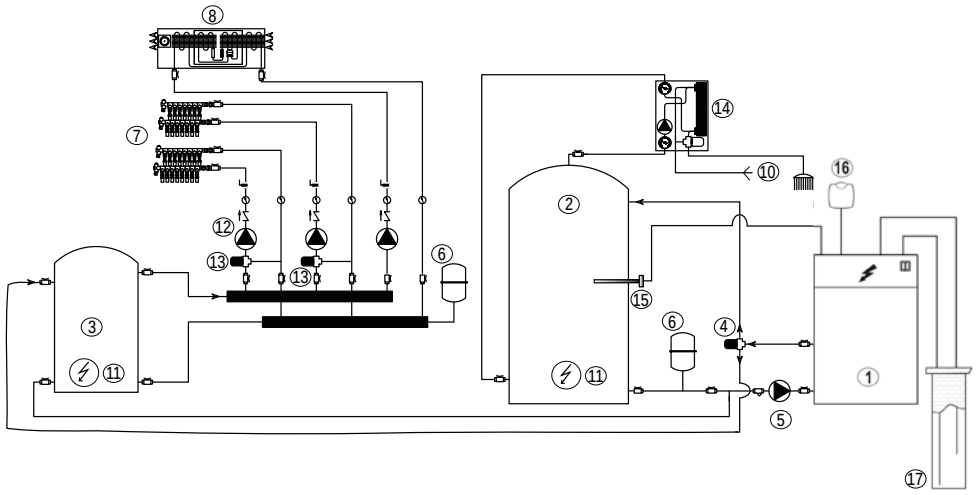
In case of operations outside of these values, please contact the company.

3.6 Domestic hot water production

The production of domestic hot water through heat pump is a sensitive issue that deserves proper consideration. There are several systems of domestic hot water production by using heat pumps, each of which brings advantages and disadvantages. It is not subject of this manual to deal with the matter in depth and in the case, please contact the company for all the appropriate solutions.
In general, we can say that there are two main solutions, in the market, concerning the domestic hot water production:

3.6.1 Solution 1

This is the standard solution for new buildings where space and general plant layout can be designed for the specific application.
It consists in the production of the domestic hot water "instantaneously", by using a instant heat exchanger (heat station), combined to a "technical water" accumulator at constant temperature. In such way we can obtain 3 main advantages:
• Domestic hot water quality . Because you are not storing the domestic hot water in a tank, it is not necessary to heat the water to higher temperatures to bacteriologically disinfect. The legionella bacteria is present only in still water.
• Energy efficient the "technical water" present in the tank, is stored at a temperature just few degrees higher than the required domestic hot water temperature and it is not necessary to increase the temperature of the tank at 63-65°C (temperature at which the legionella bacteria is killed). In this way it can be also possible to avoid the use of integration electric heaters or to keep them just in case of heat pump mal-functions or in very severe ambient conditions.
• Reduction of the fouling phenomena resulting in increased operational life of the plant.
In this case, the domestic hot water heat exchanger must be connected to a storage tank in a closed circuit. Please contact the company for the correct sizing. To connect the DHW domestic hot water cylinder it is required to install all the components mentioned in the above picture. The cylinder is fitted with a heat exchanger (copper coil or plate heat exchanger, depending on the version). The heat pump has to be connected to the volume of the storage cylinder. This is required to guarantee the correct operation of the unit, avoiding frequent start and stops of the compressors. The DHW water inlet and outlet are connected to the heat exchanger. This ensures direct heat exchange between the "technical" water stored in the cylinder and the flowing domestic hot water inside the heat exchanger. It is recommendable to control the temperature of the supplied domestic hot water by a thermostatic valve.

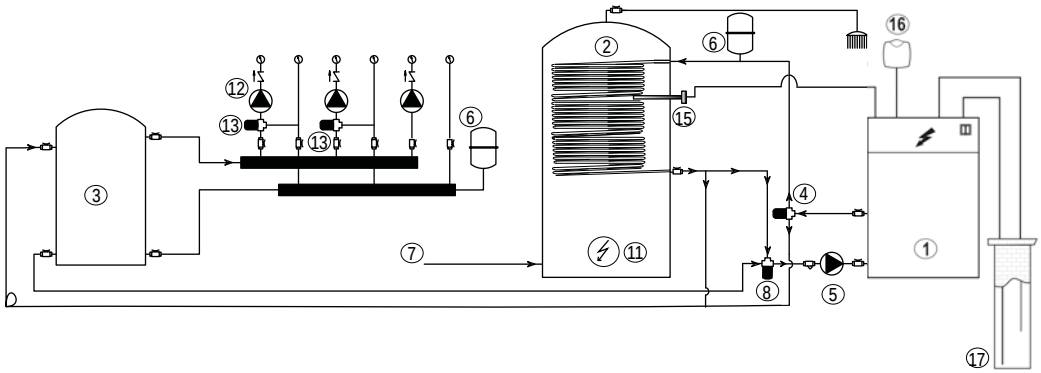


1	Heat pump	2	DHW Domestic hot water cylinder
3	Buffer storage tank	4	3 way ON/OFF valve Heating/DHW production
5	Primary circuit user water pump	6	Expansion vessel
7	Underfloor heating system	8	Dehumidifier / Cooling
9	Domestic hot water supply	10	Domestic cold water
11	Integration electric heater	12	Secondary circuit user water pumps
13	Underfloor heating modulating valves	14	Instantaneous domestic hot water producer
15	Domestic hot water sensor	16	Weather compensation sensor
17	Integrative source		

3.6.2 Solution 2

This is the solution for existing buildings or for those applications where it is not possible to remove existing plants.
It consists in the accumulation of the domestic hot water inside the existing DHW water tank (that possibly is not designed properly for the combination with the new heat pump), by using the heat exchanger already present in the DHW tank.
In such way we can not obtain many advantages, just the possibility of using the existing DHW tank.
This system can be considered a compromise between costs and efficiency and need to be set correctly in order to have enough domestic hot water at the tap. The main risk of such systems is the incorrect sizing of the heat exchanger inside the DHW tank, who implies the frequent start and stop of the heat pump and possible frequent high pressure alarms. This happens due to the fact that the heat pump dissipates a much higher thermal capacity than the maximum possible allowed by the DHW heat exchanger. The result is a heat pump is frequently in stand-by operation, possible frequent high pressure alarms, and COLD WATER in the tank.
To help the heat pump in this solution, it is necessary to install a 3 way modulating valve (8) as shown in the below drawing. The valve, depending on the water temperature measured by the return sensor installed, standard, in the LZT units, modulates the opening of the by-pass port, going to the user system, in order to use, AS MUCH AS POSSIBLE, the capacity of the existing heat exchanger. The 3 way valve (8) can be managed by the unit microprocessor.

This solution is only available in the two pipe systems. It can not be applied to units in 4 pipe systems version.



1	Heat pump	2	DHW Domestic hot water cylinder
3	Buffer storage tank	4	3 way ON/OFF valve Heating/DHW production
5	Primary circuit user water pump	6	Expansion vessel
7	Domestic cold water	8	3 way mixingt valve
9	Domestic hot water supply	11	Integration electric heater
12	Secondary circuit user water pumps	13	Underfloor heating modulating valves
15	Domestic hot water sensor	16	Weather compensation sensor
17	Integrative source		

The 3 way valve MUST have a maximum opening time period of 35 seconds. Longer opening time periods can creates malfunctioning of the system with possible high pressure alarm in the heat pump.

The standard factory set point temperature of the return sensor is 53°C.

3.7 Compressor capacity steps

NUMBER of COMPRESSORS						
Model	1	2	3	4	5	6
039	50%	50%	---	---	---	---
045	50%	50%	---	---	---	---
050	50%	50%	---	---	---	---
060	44%	56%	---	---	---	---
070	50%	50%	---	---	---	---
080	50%	50%	---	---	---	---
090	43%	57%	---	---	---	---
110	50%	50%	---	---	---	---
120	45%	55%	---	---	---	---
130	50%	50%	---	---	---	---
152	44%	56%	---	---	---	---
162	50%	50%	---	---	---	---
190	21,5%	21,5%	28,5%	28,5%	---	---
210	25%	25%	25%	25%	---	---
240	22,5%	22,5%	27,5%	27,5%	---	---
260	25%	25%	25%	25%	---	---
300	22%	22%	28%	28%	---	---
320	25%	25%	25%	25%	---	---

3.8 Correction tables

3.8.1 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.

3.8.2 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

3.8.3 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

3.9 Sound data

LOW NOISE VERSION (LS)											
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			
039	84,1	75,3	69,2	67,7	66,6	61,2	57,8	48,7	84,9	71	55
045	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	61
050	90,1	81,3	75,2	73,7	72,6	67,2	63,8	54,7	90,9	77	61
060	91,1	82,3	76,2	74,7	73,6	68,2	64,8	55,7	91,9	78	62
070	92,1	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79	63
080	93,1	84,3	78,2	76,7	75,6	70,2	66,8	57,7	93,9	80	64
090	96,1	87,3	81,2	79,7	78,6	73,2	69,8	60,7	96,9	83	66
110	98,1	89,3	83,2	81,7	80,6	75,2	71,8	62,7	98,9	85	68
120	100,1	91,3	85,2	83,7	82,6	77,2	73,8	64,7	100,9	87	70
130	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	71
152	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	71
162	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	71
190	99,1	90,3	84,2	82,7	81,6	76,2	72,8	63,7	99,9	86	69
210	101,1	92,3	86,2	84,7	83,6	78,2	74,8	65,7	101,9	88	71
240	103,1	94,3	88,2	86,7	85,6	80,2	76,8	67,7	103,9	90	73
260	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	74
300	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	74
320	104,1	95,3	89,2	87,7	86,6	81,2	77,8	68,7	104,9	91	74

Lw: Sound power level according to ISO 3744.
Lp: Sound pressure level measured at 1 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, 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.

4.5 Storage

Units should be stored under cover and ideally, should remain in their packaging. The tools that are supplied for opening the electrics box should be formally transferred to the person responsible for the plant.

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.).

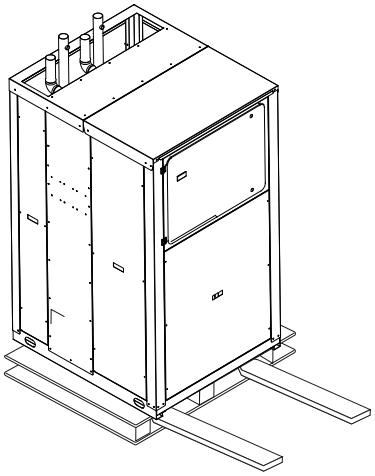
The packaging materials should be seperated and sent for disposal or possible recycling to specialist waste companies.

Prior to unpacking and installing the unit, it is prudent to read this manual, note the information provided on the labels on the unit and to take all precautions required for safe working and to avoid damage. Non compliance with the warnings can create dangerous situations.

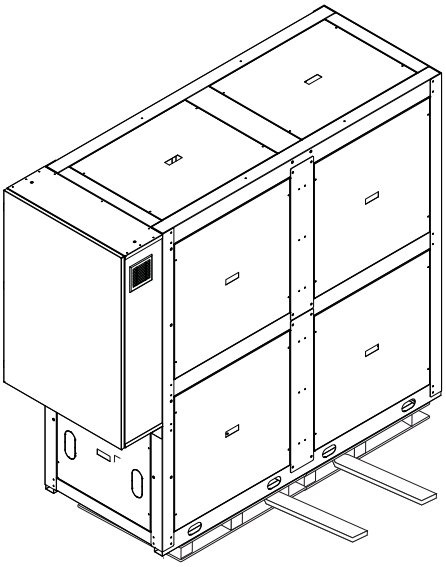
4.7 Lifting and handling

When unloading the unit, it is highly recommended to avoid any sudden move in order to protect refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, in alternative, using belts, being sure that the method of lifting does not damage the lateral panels and the cover. It is important to keep the unit horizontal at all time to avoid damages to the internal components.

039-045-050-060-070
080-090-110-120-130-145-162



190-210-240
260-300-320

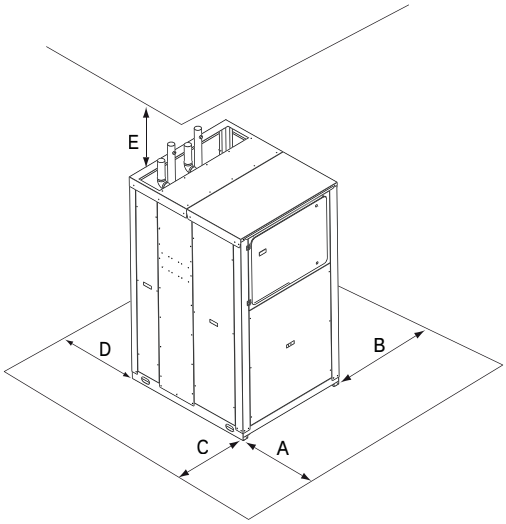


4.8 Location and minimum technical clearances

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.

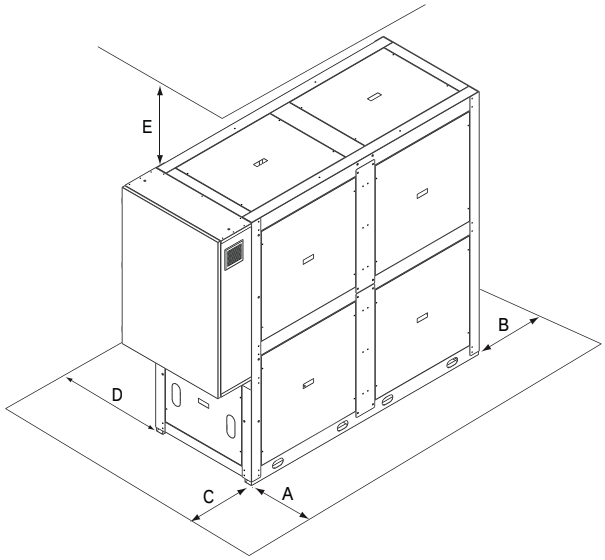
The installation site should be chosen in accordance with EN 378-1 and 378-3 standards. When choosing the installation site, all risks caused by accidental refrigerant leakage should be taken into consideration.

All models are designed and built for indoor installations, it is a good idea to create a base of support to those of the appropriate size, the units transmit to a low level of ground vibration: it is advisable to interpose between the frame base and the ground plane of vibration absorbers (spring or rubber), In this regard it is necessary to guarantee the minimum service below.



Mod.	A	B	C	D*	E
039	1000	500	600	0	500
045	1000	500	600	0	500
050	1000	500	600	0	500
060	1000	500	600	0	500
070	1000	500	600	0	500
080	1000	500	600	0	500
090	1000	500	600	0	500
110	1000	500	600	0	500
120	1000	500	600	0	500
130	1000	500	600	0	500
152	1000	500	800	0	500
162	1000	500	800	0	500

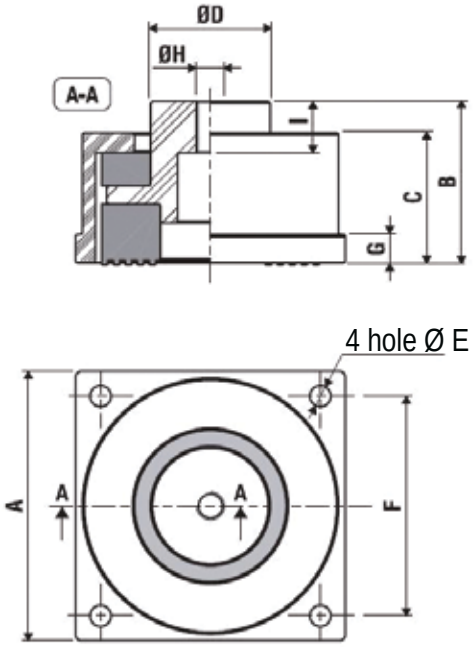
* minimum 600 mm when using hydraulic kit S1NT



Mod.	A	B	C	D	E
190	1000	500	800	1000	500
210	1000	500	800	1000	500
240	1000	500	800	1000	500
260	1000	500	800	1000	500
300	1000	500	800	1000	500
320	1000	500	800	1000	500

4.9 Installation of rubber vibration dampers (KAVG)

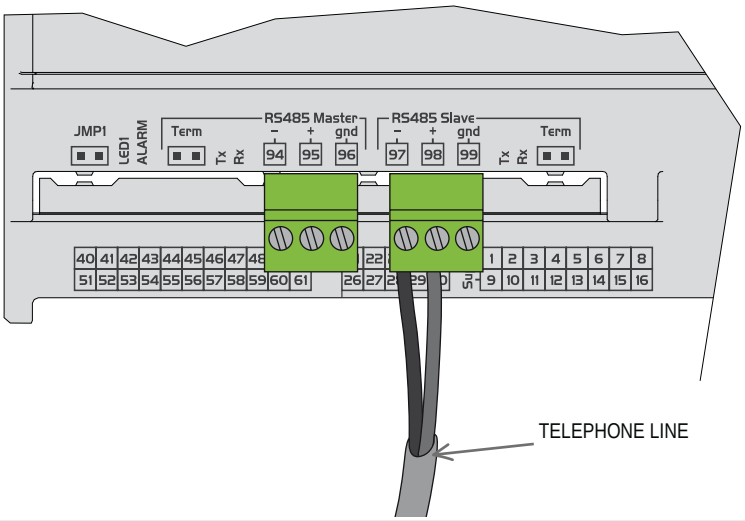
All units should be installed on vibration dampers in order to prevent the transmission of vibration to the supporting surface and reduce the noise level. Rubber vibration dampers are available as an option in the catalogue. The vibration dampers (optional) are supplied by the factory in seperate packaging.



A	B	C	D	E	F	G	H	I
80	55	44	25	6,5	67	8	M12	41

4.10 Serial interface card RS485 (INSE)

Supervision system interface (MODBUS RS485 available only)
This system allows you to remotely monitor all parameters of the unit and change their values.
It 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 mm^2.
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.



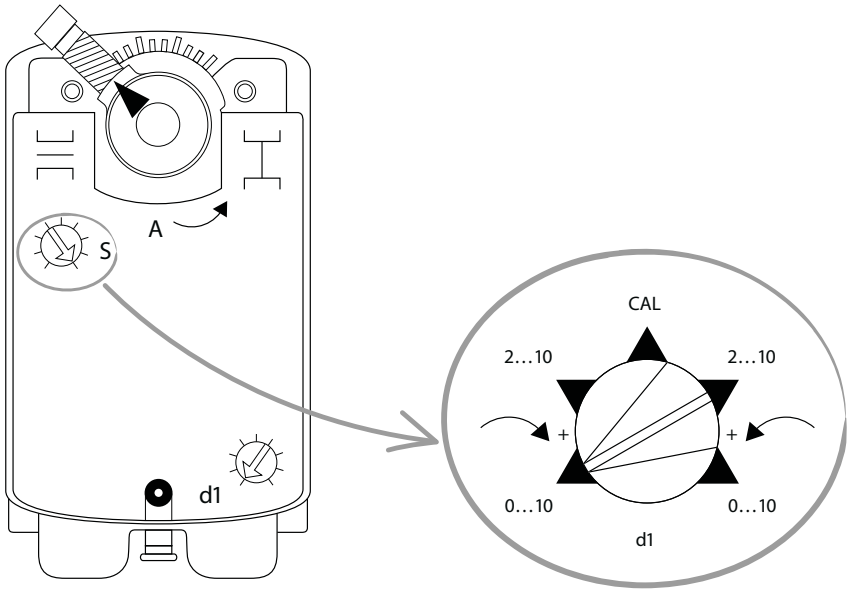
4.11 Source water pump installation

Recently there has been a continuous increase in installations (solution 1 at page 32) where the variable speed source water pump (inverter type) is used.
The company states that it is of fundamental importance the correct flow rate of water source in order to avoid problems of freezing of the source heat exchanger. In this regard it is noted that the source water pump should be exclusively dedicated to the heat pump and, preferably, the ON / OFF type.

In the case of using the source water pump for other purposes (irrigation, etc..) and you need a variable speed pump (inverter type) , undertakes the installation of the modulating valve V2MO. In these cases, the pump must ensure a constant pressure at the inlet of the source circuit of the heat pump of at least 3 bars, regardless of the type and number of active users.

In case of variation of the water flow to the source circuit there is a risk of freezing of the source heat exchanger. in this case the warranty expires immediately.

The activation of the modulating valve V2MO shows a selector used to vary the type of signal and the sense of rotation of the valve itself. Tampering can undermine the correct operation of the valve precluding security.



4.12 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:

Heating mode: 10/7°C Dry bulb ambient temperature 35°C water outlet temperature
Cooling mode: 30/35°C dry bulb ambient temperature 7°C water outlet temperature.

4.13 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		

4.14 User circuit minimum water content

Like any refrigerant unit also the heat pumps need a minimum water content in the user hydraulic circuit to guarantee a correct operation of the units, avoiding a high numbers of start and stop of the compressors that can reduce the working life of the unit.

Model	039	045	050	060	070	080	090	110	120
Minimum water content (l)	500	600	700	750	850	1000	1200	1350	1500
Safety valve (bar)	6	6	6	6	6	6	6	6	6

Model	130	152	162	190	210	240	260	300	320
Minimum water content (l)	1700	1900	2100	1200	1350	1500	1700	1900	2100
Safety valve (bar)	6	6	6	6	6	6	6	6	6

4.15 Installation with source open circuit (water to water heat pump)

The source water circuit of a water to water heat pump is generally an open circuit, with sampling from a well or a water reservoir.
The hydraulic source MUST include appropriate safety devices to protect the 3 major problems encountered:

- Corrosion: generated by the chemical composition of ground water;
- Clogging: caused by mud and / or suspended organic and inorganic compounds in groundwater;
- Freezing: caused by too low temperature of the fluid source.

4.16 Chemical characteristics of source water circuit

Carbonic acid dissolved	(CO_2)	< 5 mg/Kg	Gas chloride free	(Cl_2)	< 1 mg/Kg
Hydrogen peroxide sulfur	(H_2S)	< 0,05 mg/Kg	Manganese	(Mn)	< 0,1 mg/Kg*
Ammonia	(NH_3)	< 2 mg/Kg	Nitrate	(NO_3)	< 100 mg/Kg
Chloride	(Cl)	< 100 mg/Kg	Oxygen	(O_2)	< 2 mg/Kg*
Chloride free	(Cl)	< 0,5 mg/Kg	Sulphate	(SO_4^2)	< 50 mg/Kg
Electrical conductivity		>50µS/cm e <600µS/cm	**Sulfites**	(SO_3)	< 1 mg/Kg
Iron	(Fe)	< 0,2 mg/Kg*	pH Value		6,5 – 9,0

*An excess of these limits due to a blockage of mud in the source heat exchanger and piping.

Warranty does not cover any damage caused by corrosion, clogging and freezing if attributable to lack and / or incorrect installation of described safety devices

The use of groundwater generally requires approval by the municipality and / or the province. Check with local authorities.

The limit values in the table may cause clogging by mud in the pipes and the heat exchanger.

The maintenance of the quality of ground water is borne by the user and / or maintenance company.

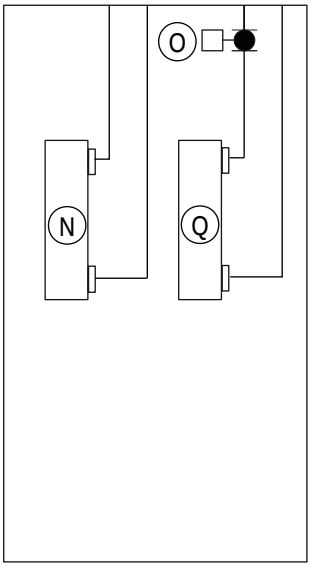
The temperature of source groundwater at the inlet of the source heat exchanger in heating mode, must not fall below 7.8 ° C to avoid freezing problems in the source circuit. The fact is average water cooling of about 3-5 ° C, resulting in temperature of the fluid outlet from the heat pump, in this case an inlet water temperature less than 7 ° C is dangerously close to the temperature of formation of ice.

The temperature of the source groundwater at the inlet of source heat exchanger in heating mode, should never exceed 25 ° C as this may activate the control devices and safety unit. For applications with temperatures above 25 ° C groundwater temperature, please contact the company.

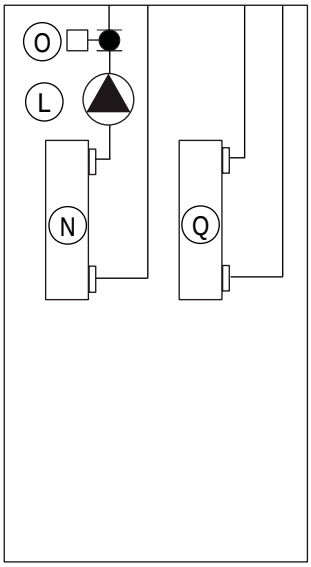
In case of installation in sites with ground water temperatures close to the above it is recommended to test for water consumption for a minimum period of 36 consecutive hours (to be made, possibly, towards the end of winter season).

4.17 Hydraulic components

WHA



WHA A1NT

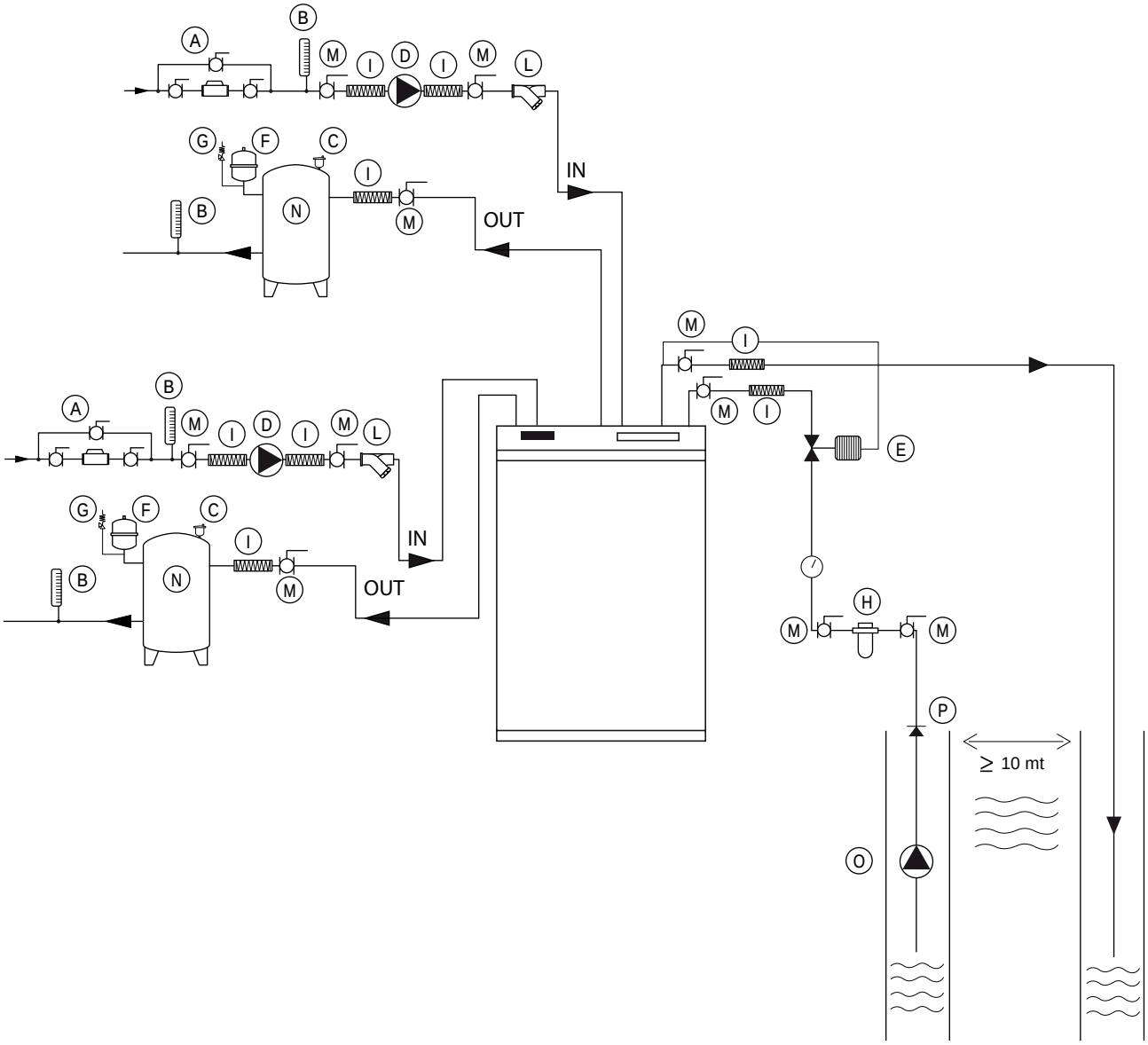


L	Water Pump	O	Flow Switch
N	User heat exchanger	Q	Source heat exchanger

The hydraulic kit includes: single centrifugal pump, suitable for hot and cooled water. The pump is directly managed by the microprocessor. In the hydraulic circuit are also present the safety valve and manual shut-off valves.

If the unit is supplied without a pump, the pump must be installed with the supply side toward the water inlet connection of the unit.

4.17.1 Solution 1

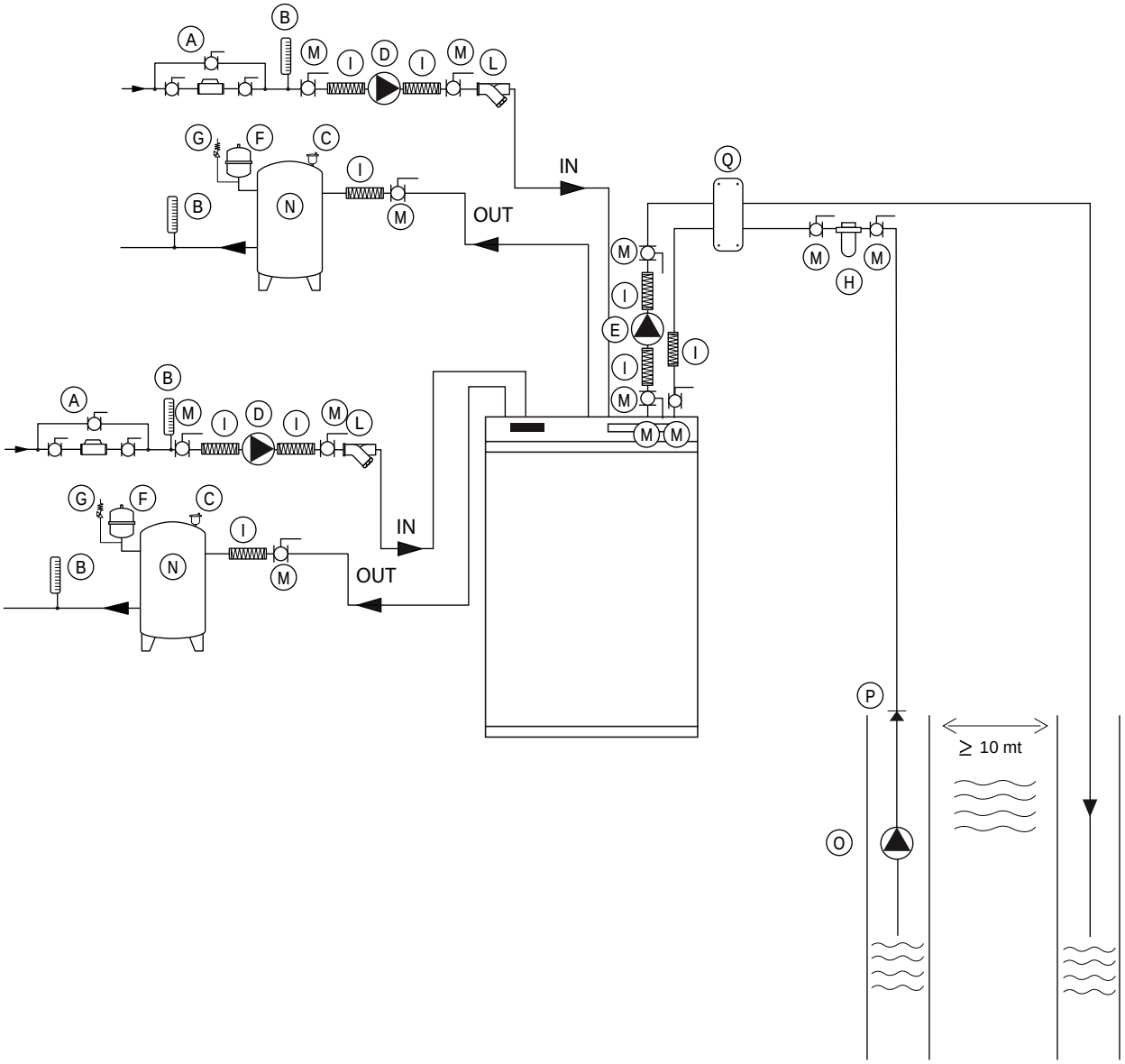


The above system is the most economical and efficient, but it can be used ONLY in cases where a water quality parameters are within the limits shown in the table. It is ALWAYS recommended to perform an accurate chemical analysis of water by a qualified technician. In the case where it is not possible to maintain control the water quality parameters listed above there has to opt for a source hydraulic circuit type 2.

A	System Filling Group	H	Source water Filter
B	Thermometer	I	Flexible Connection
C	Vent Valve	L	User water Filter
D	Circulating pump	M	Manual valve
E	Source modulating valve	N	Water tank
F	Expansion Vessel	O	Well pump
G	Safety Valve	P	Check valve

The pump (O) must be installed with the water supply side facing the unit water inlet connection.

4.17.2 Solution 2

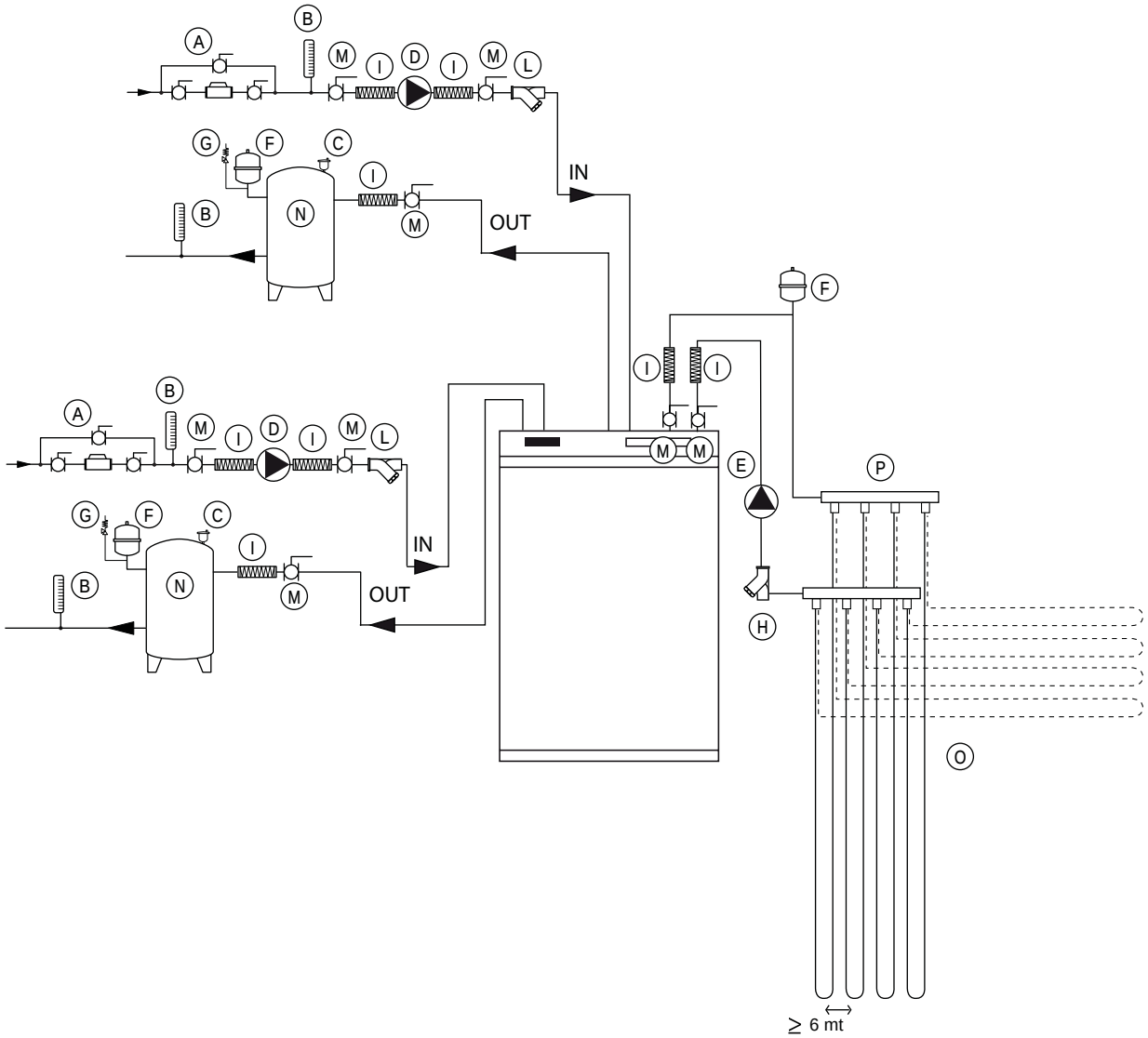


The system above is the most secure and reliable, involves the installation of an intermediate water –water plate heat exchanger which protects the source of the heat pump from clogging, corrosion and freezing.
This hydraulic circuit is strongly recommended in those installations where it is not possible to maintain control the water quality parameters listed above. The installation of the intermediate heat exchanger lead to lower performance of the unit and requires an auxiliary pump. Please contact the Company in case of need for sizing of the intermediate heat exchanger.

A	System Filling Group	I	Flexible Connection
B	Thermometer	L	User water Filter
C	Vent Valve	M	Manual valve
D	Circulating pump	N	Water tank
E	Source pump	O	Well pump
F	Expansion Vessel	P	Check valve
G	Safety Valve	Q	Medium heat exchanger
H	Source water Filter		

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

4.17.3 Solution 3



The above system refers to an application with geothermal probes vertical or horizontal. In the majority of vertical applications using PE pipes connected in parallel, placed at a distance of at least 6 meters. Normally the vertical perforations must be approved by local authorities. In case of horizontal applications will typically use PE pipes buried about 1.5 to 2 meters deep.

A	System Filling Group	H	Source water Filter
B	Thermometer	I	Flexible Connection
C	Vent Valve	L	User water Filter
D	Circulating pump	M	Manual valve
E	Source modulating valve	N	Water tank
F	Expansion Vessel	O	Geothermal probes
G	Safety Valve	P	Collector probes

The geothermal probes must be correctly sized with glycol as a function of their operating temperature. It is recommended to contact the manufacturer of the individual probes for more details.

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

4.18 Domestic hot water (dhw) hydraulic circuit

The domestic hot water (DHW) circuit also requires a minimum water content to guarantee correct operation and to avoid excessive cycling of the compressors that can reduce the working life of the unit.

The minimum domestic hot water circuit content required is:

Model	039	045	050	060	070	080	090	110	120	130
Minimum water content (l)	500	600	700	750	850	1000	1200	1350	1500	1700
Safety valve (bar)	6	6	6	6	6	6	6	6	6	6

Model	152	162	190	210	240	260	300	320	380	430	500
Minimum water content (l)	1900	2100	1200	1350	1500	1700	1900	2100	1500	2000	2100
Safety valve (bar)	6	6	6	6	6	6	6	6	6	6	6

Il contenuto acqua minimo del circuito acqua calda sanitaria sopra riportato in tabella indica solamente il minimo contenuto d'acqua richiesto dal sistema per garantire il corretto funzionamento dell'unità in termini di corretto numero di avviamenti e fermate dei compressori e di minimo tempo di funzionamento permesso per ogni ciclo. **Il valore sopra riportato non garantisce la disponibilità di un adeguato flusso di acqua calda sanitaria** all'utenza e la sua corretta temperatura nel lungo periodo; questo valore infatti, DEVE essere stabilito a seconda del sistema impiegato per produrre l'acqua calda domestica e calcolato in funzione delle esigenze dell'utenza. Vi preghiamo di contattare l'azienda per ulteriori informazioni su questo argomento.

4.19 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.

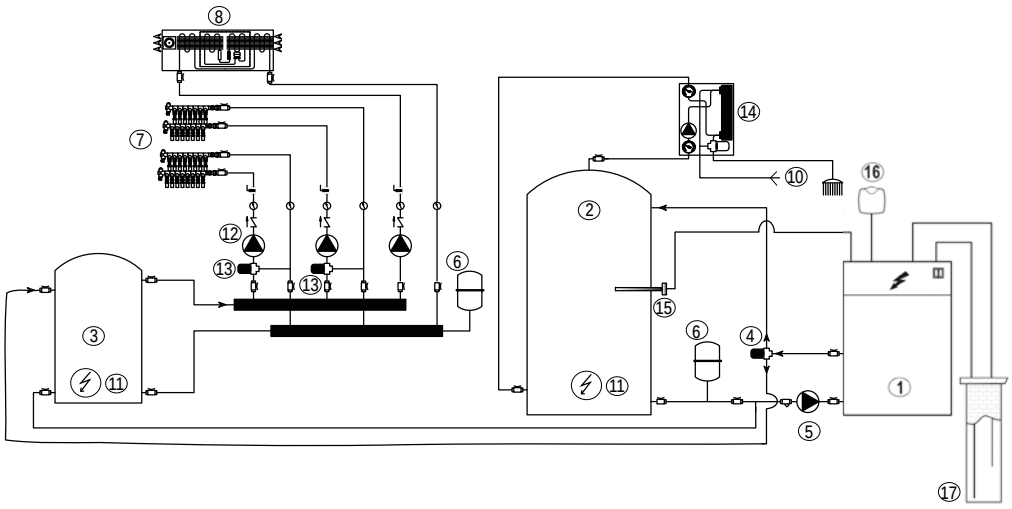
4.20 Emptying the installation

• 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.

4.21 Typical installations

4.21.1 Combined heating / Cooling / Domestic hot water production – 2 pipe system



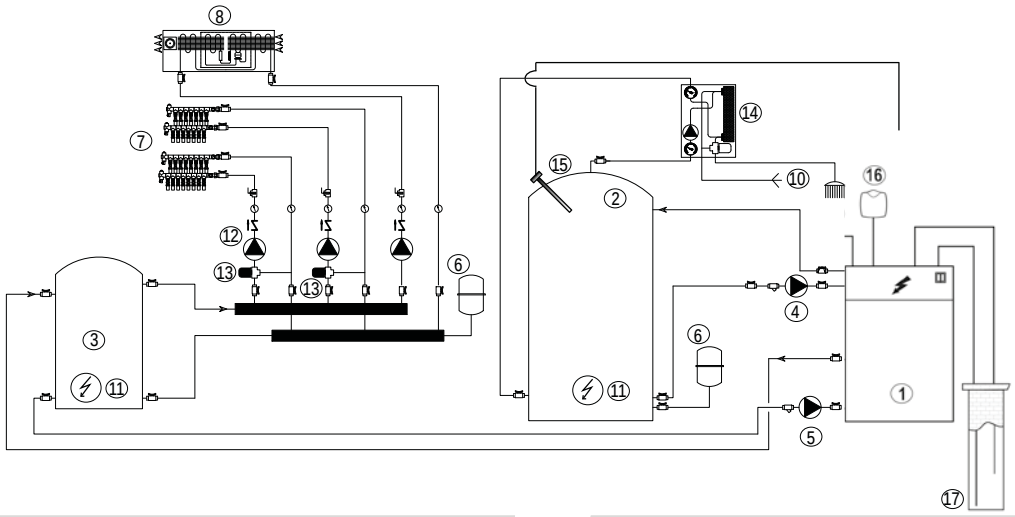
1	Heat pump	2	DHW Domestic hot water cylinder
3	Buffer storage tank	4	3 way ON/OFF valve Heating/DHW production
5	Primary circuit user water pump	6	Expansion vessel
7	Underfloor heating system	8	Dehumidifier / Cooling
9	Domestic hot water supply	10	Domestic cold water
11	Integration electric heater	12	Secondary circuit user water pumps
13	Underfloor heating modulating valves	14	Instantaneous domestic hot water producer
15	Domestic hot water sensor	16	Weather compensation sensor
17	Integrative source		

The above system combines heating at low temperatures with domestic hot water production at higher temperature using an instantaneous heat exchanger. When heating, the hot water produced by the heat pump is supplied to the floor heating at low temperatures e.g. 35°C. Domestic hot water production however, always has priority; it is activated by the domestic hot water sensor (15) which switches the position of the 3 way valve (4) and the set point of the unit e.g. 60°C. In cooling mode the system will produce cold water (by activation of the reversing valve). If domestic hot water is required, the unit stops the production of cold water, switches the reversing valve to heating, changes the position of the 3 way valve (4) and changes to the DHW set point. The heat pump heats up the DHW cylinder (2) and, when the temperature measured by the DHW sensor (15) reaches set point, it returns to operation in cooling mode. All units are supplied with a weather compensation sensor (16) that enables compensation of the hot water set point in winter mode with respect to the variation of ambient temperature.

The **plant components supplied by the company are:**

	STANDARD		OPTIONS		NOT AVAILABLE
1	Heat pump	2	Domestic hot water cylinder	6	Expansion vessel
15	Domestic hot water sensor	3	Buffer storage tank	7	Underfloor heating system
16	Weather compensation sensor	4	3 way ON/OFF valve	12	Secondary circuit user water pumps
		5	Primary circuit user water pump	13	Underfloor heating modulating valve
		8	Dehumidifier/Cooling		
		11	Integration electric heater		
		14	Domestic hot water producer		

4.21.2 Combined heating / Cooling / Domestic hot water production – 4 pipe system



1	Heat pump (SW6 Version)	2	DHW Domestic hot water cylinder
3	Buffer storage tank	4	DHW primary circuit water pump
5	Primary circuit user water pump	6	Expansion vessel
7	Underfloor heating system	8	Dehumidifier / Cooling
9	Domestic hot water supply	10	Domestic cold water
11	Integration electric heater	12	Secondary circuit user water pumps
13	Underfloor heating modulating valves	14	Instantaneous domestic hot water producer
15	Domestic hot water sensor	16	Weather compensation sensor
17	Integrative source		

This system enables the production of hot water for heating, domestic hot water and cold water by using a 4 pipe system. The SW6 versions have 4 water connections: 2 connections are for the domestic hot water circuit (DHW) and the other 2 with the heating/cooling system. Hot water production always has priority and it is controlled by the DHW sensor (15) which activates the domestic hot water pump (4).
In heating mode, activation of the DHW water pump(4) temporarily stops the supply of hot water to the underfloor heating system. This is restored when the DHW cylinder has reached the set point temperature (measured by the sensor 15).
In cooling mode, the SW6 unit will generate cold water (by activation of the reversing valve installed in the unit) and, if required, domestic hot water . The unit, in this operating mode, can produce cold water and domestic hot water at the same time. Effectively, domestic hot water in cooling mode is produced by heat recovery and is consequently, FREE OF CHARGE.
When the temperature measured by the DHW sensor (15) reaches set point, the pump (4) is stopped and the unit only produces cold water.

The plant components supplied by the company are:

	STANDARD		OPTIONS		NOT AVAILABLE
1	Heat pump (SW6 version)	2	Domestic hot water cylinder	6	Expansion vessel
15	Domestic hot water sensor	3	Buffer storage tank	7	Underfloor heating system
16	Weather compensation sensor	4	DHW primary circuit pump	12	Secondary circuit user water pumps
		5	Primary circuit user water pump	13	Underfloor heating modulating valve
		8	Dehumidifier/Cooling		
		11	Integration electric heater		
		14	Domestic hot water producer		

4.22 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.

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.

4.23 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.

Model		039	045	050	060	070	080	090	110	120
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
Line section	mm^2	10	16	16	16	25	25	35	50	50
PE section	mm^2	10	16	16	16	16	16	25	25	25

Model		130	152	162	190	210	240	260	300	320
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
Line section	mm^2	70	70	95	120	120	150	150	185	240
PE section	mm^2	35	35	50	70	70	95	95	95	120

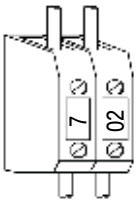
Electric data may change for updating without notice. It is therefore necessary to refer always to the wiring diagram present in the units.

4.24 Electric connections

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.

4.24.1 Remote wiring connections (compulsory)

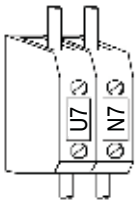
All terminals referred to in the explanations below are present on the terminal board inside the electrical box, all electric connections mentioned below and have to be made by the installer, on site.



USER CIRCUIT WATER INLET SENSOR (BTI)

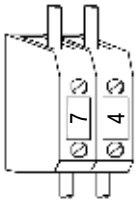
It is used to measure the return water temperature from the user circuit. The sensor is always supplied loose in a plastic bag and has to be connected to terminals 7 and 2.

As standard working mode, the user pump will be switched off during stand-by periods (Compressors in Off). The sensor must be placed in an appropriate position in order to measure the temperature of the secondary circuit. The incorrect positioning of the user water sensor can have negative influence in 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 available with 6 mt. cable length. In case the length of the cable is not enough it is recommended to increase the length by only using cable diameter 0,5 mm2 to a maximum distance of 50meters.



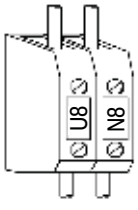
USER CIRCUIT WATER PUMP

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.



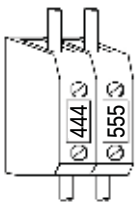
DOMESTIC HOT WATER SENSOR (BTS)

It is used to measure the return water temperature from the domestic hot water circuit. The sensor must be placed in the socket provided in the DHW (Domestic hot water) cylinder, in an appropriate position, in order to measure the correct temperature of the domestic hot water. The incorrect positioning of the domestic hot water sensor can have negative influence in the correct operation of the heat pump. The sensor is supplied loose with the unit (it is present inside the electric box) and it is available with 6 mt. cable length. It has to be connected to the terminal 7 and 4. In case the length of the cable is not enough it is recommended to increase the length by only using cable diameter 0,5 mm2 to a maximum distance of 50meters.



DOMESTIC HOT WATER CIRCUIT PUMP

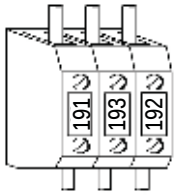
To be connected across terminals U8 and N8; maximum input current 1A. In standard configuration, the microprocessor control of the unit switches off the user water pump when the set point has reached or if the unit is in standby. This strategy provides a substantial reduction of energy use.



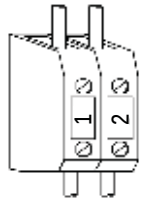
WEATHER COMPENSATED SENSOR (BTE)

This is used to measure the ambient temperature enabling weather compensation modulation of the user set point with respect to the ambient conditions. It is connected to terminals 444 and 555.

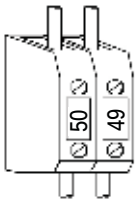
4.24.2 Remote wiring connections (optional)



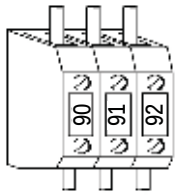
3 WAY ON/OFF VALVE(Only required on 2 pipes systems versions); Not required on / SW6 versions)
The 3 way valve is used with 2 pipe systems to produce domestic hot water; the valve is activated by the Domestic hot water sensor (BTS) and diverts the hot water either to the domestic hot water cylinder or to the user circuit. The valve is connected across terminals 191/193/192.



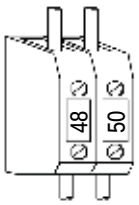
REMOTE ON / OFF
To switch the unit on or off remotely, the cable jumper connected across terminals 1 and 2 must be replaced with a switch.
Contact closed, unit ON,
Contact open, unit OFF.



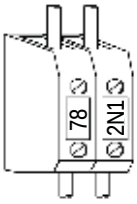
REMOTE SUMMER / WINTER CHANGE OVER
To remotely switch the unit from heating to cooling, the cable jumper connected across terminals 50 and 49 must be replaced with a switch.
Contact closed, unit in Winter mode,
Contact open, unit Summer mode.



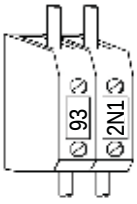
REMOTE GENERAL ALARM
For remote display of a general alarm, connect the visual or audible device between terminals 90-91-92.
Contacts 90/91 NC (Normally closed)
Contacts 91/92 NO (Normally opened)



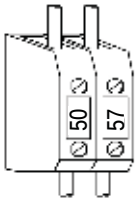
DOMESTIC HOT WATER CIRCUIT FLOW SWITCH (SW6 versions only)
If a flow switch is required on the domestic hot water circuit , it must be connected across terminals 48 and 50. The unit is factory fitted with a jumper that has to be removed before installing the flow switch.



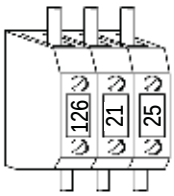
USER CIRCUIT ELECTRIC INTEGRATION HEATERS
If user circuit integration heaters are required, the coil of the contactor that is used to switch them must be connected across terminals 78 and 2N1.



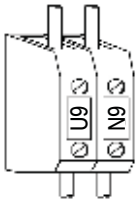
DOMESTIC HOT WATER ELECTRIC INTEGRATION HEATERS
If domestic hot water circuit integration heaters are required, the coil of the contactor that is used to switch them must be connected across terminals 93 and 2N1.



PRIORITY SELECTOR
If a priority selector switch is to be fitted, a voltage free switch has to be connected to terminals 50 and 57. The selector operates as follows:
Closed contact: Domestic hot water only;
Opened contact: Domestic hot water / Heating (and / or cooling);
The unit is supplied with noting connected to terminals (Open contact).

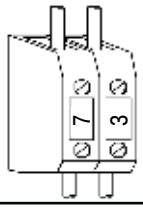


SOURCE WATER 2 WAY MODULATING VALVE (4-20mA; 0-10V) (VM2O)
126-21 ± 24 W (supply)
25 Modulation signal
2-way modulating valve is factory installed in the hydraulic circuit at the source side, to optimize the consumption of well water as a function of the temperature of the available water. The valve is controlled by the microprocessor control unit by modulating signal 0-10V.
In the event of lack of power supply, the valve is normally closed.

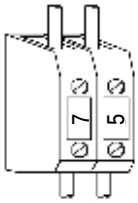


PUMP SOURCE
Must be connected to terminals U9 and N9, with maximum current of 3A. In standard configuration, the unit microprocessor control turns off the user water pump when set point is reached. This solution allows a significant reduction in electrical power consumption when the set point is reached or the unit is in standby.

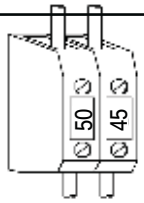
4.24.3 Factory fitted wiring connections



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; it is connected to the terminals 7 and 3.



DOMESTIC HOT WATER OUTLET SENSOR (BTU)
This is used to measure the domestic hot water outlet temperature; it is also used as maximum temperature sensor to protect the refrigerant circuit of the unit from excessive temperatures in case of low water flow rates. The sensor is connected to terminals 7 and 5.



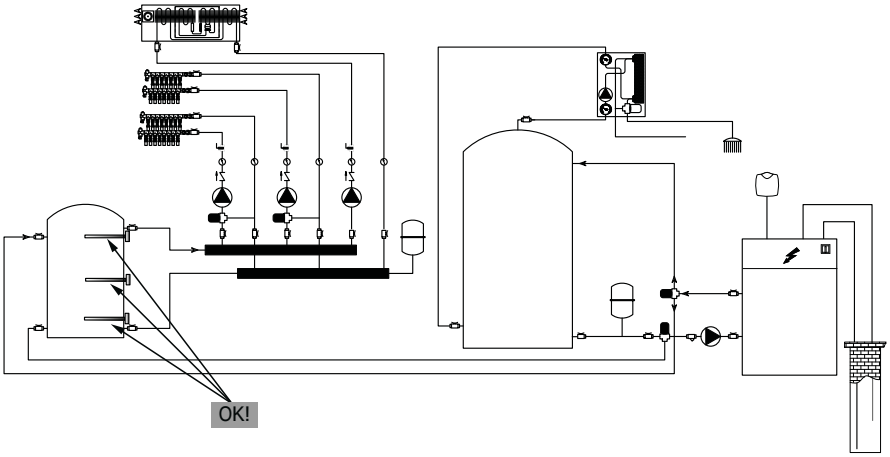
USER CIRCUIT FLOW SWITCH (SFW1)
This is used to protect the unit if there is a low water flow rate in the user circuit. It is factory fitted across terminals 50 and 45.

4.25 Positioning of the user circuit water inlet sensor (BTI)

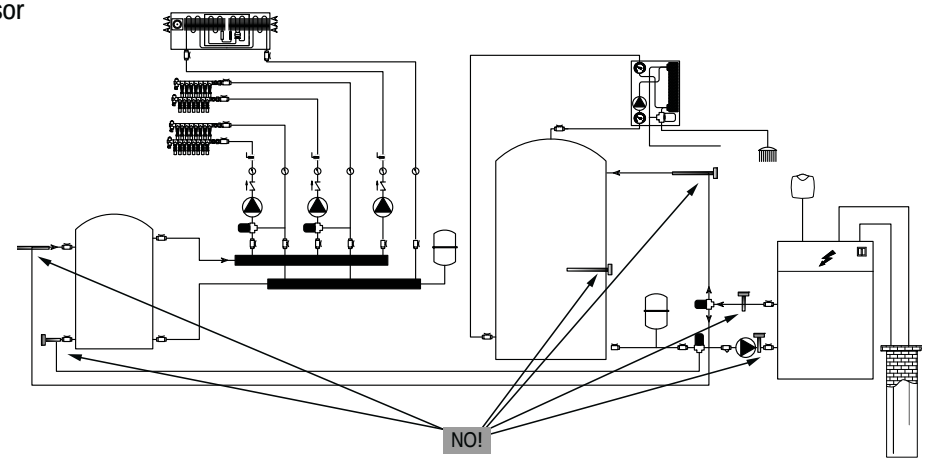
The correct positioning of the BTI sensor is extremely important to guarantee the correct operation of the heat pump. The BTI sensor is used to cycle the unit to maintain the user water temperature at set point. The BTI sensor is also used to activate the user water pump and to stop it when the user water temperature set point is reached. The BTI sensor MUST be positioned in order to measure the water temperature of the secondary circuit.

To guarantee the correct measurement of the temperature insert the probe in the sensor pocket of the buffer tank.

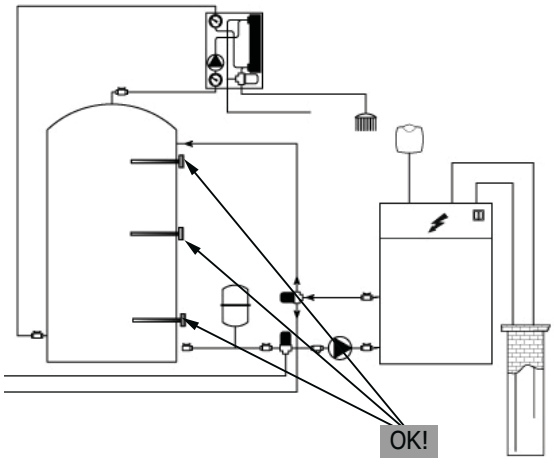
Correct positioning of the BTI sensor



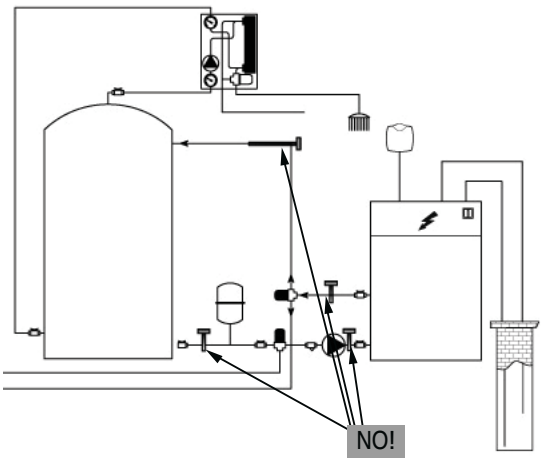
Incorrect positioning of the BTS sensor



4.26 Positioning of the domestic hot water circuit sensor (BTS)

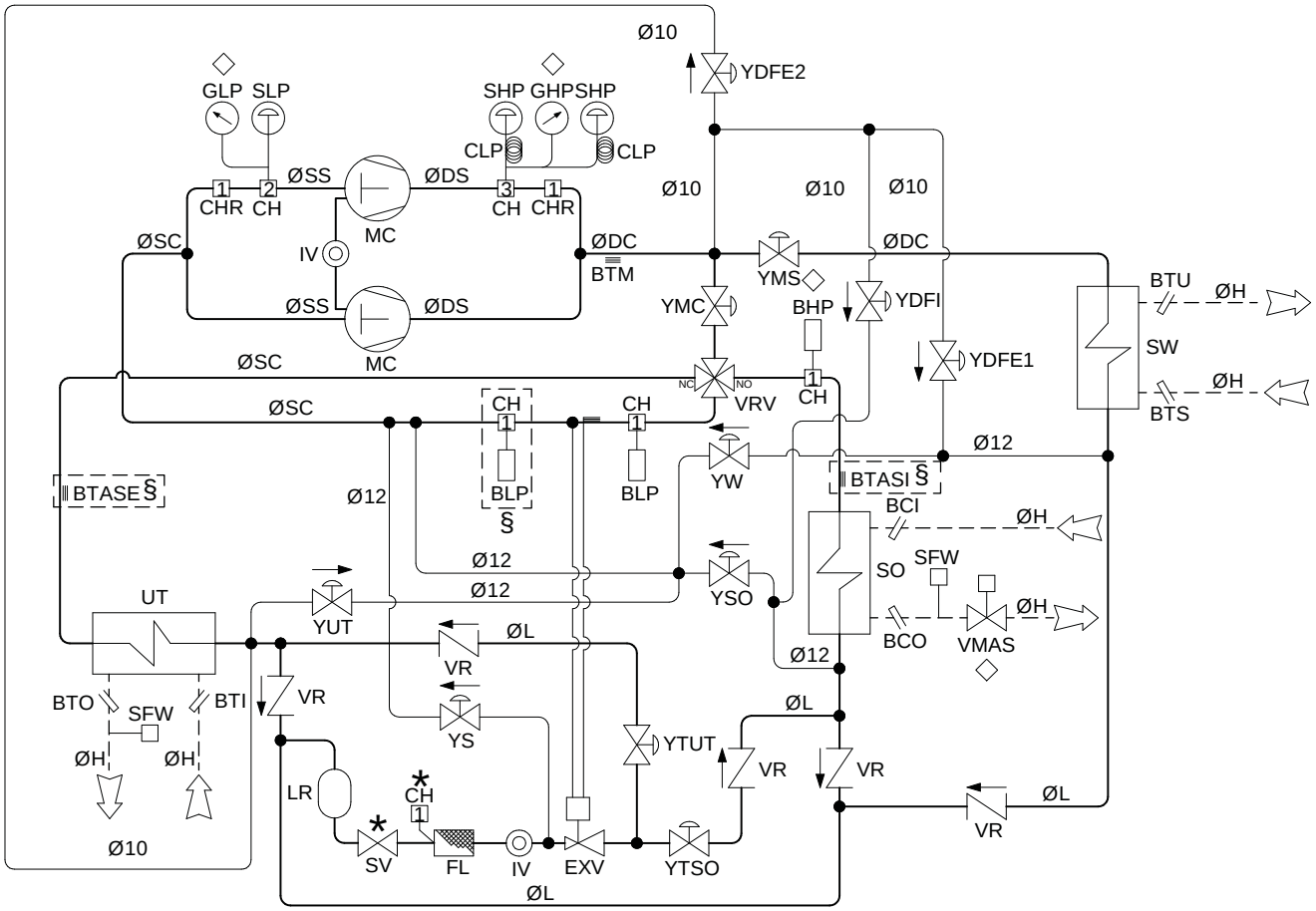


Correct positioning of the BTS sensor



Incorrect positioning of the BTS sensor

4.27 Refrigerant circuit layout



BCI	Source water input probe	LR	Liquid receiver
BCO	Source water output probe	MC	Compressor
BHP	High pressure transducer	SFW	Water flow switch
BLP	Low pressure transducer	SHP	High pressure pressostat
BTASE	Suction temperature probe	SLP	Low-high pressure switch
BTASI	Suction temperature probe	SO	Source side
BTI	User water input probe	SV	Shut off valve
BTM	Discharge temperature probe	SW	Sanitary side
BTO	User water output probe	UT	User side
BTS	Sanitary water input probe	VMAS	Source water modulating valve
BTU	Sanitary water output probe	VR	Check nvalve
CH	Charging plug 1/4 sae (r407)	VRV	Reverse cycle valve
CHR	Charging plug 5/16 sae (r410)	YMC	Chiller solenoid valve
CLP	Expansion capillary tube	YMS	Sanitary solenoid valve
EXV	Termostatic valve	YS	Injection solenoid valve
FL	Liquid line filter	YSO	Source recovery solenoid valve
GHP	High pressure gauge	YTSO	Source termostatic valve solenoid valve
GLP	Low pressure gauge	YTUT	User termostatic valve solenoid valve
IV	Moisture indicator sight glass	YW	Sanitary recovery solenoid valve

The cooling circuit principle diagram is purely indicative.

5. UNIT START UP

5.1 Preliminary checks

Before starting the unit the checks detailed in this manual of the electric supply and connections (par. 4.20), the hydraulic system (par. 4.11) and the refrigerant circuit (par. 5.1.4), 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 (Heating mode)	°C	30	2	-----
Control thermostat (Domestic hot water)	°C	45	2	-----
Control thermostat (Cooling mode)	°C	23	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

If the unit is required for heating/cooling only (without domestic hot water production) the internal parameter of the microprocessor FS1 has to be modified from 2 to 1 in order to avoid configuration alarms. Please contact the company for support.

5.1.3 Controls during unit operation

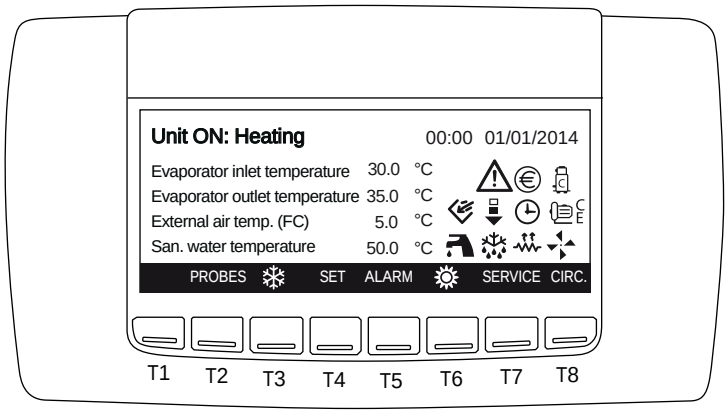
- Check the rotation of the fans . If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- Check that user water inlet temperature is close to the set point of the control thermostat.
- For “A” version units (units with pumps) 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 Position of the control panel

5.3 Description of the control panel



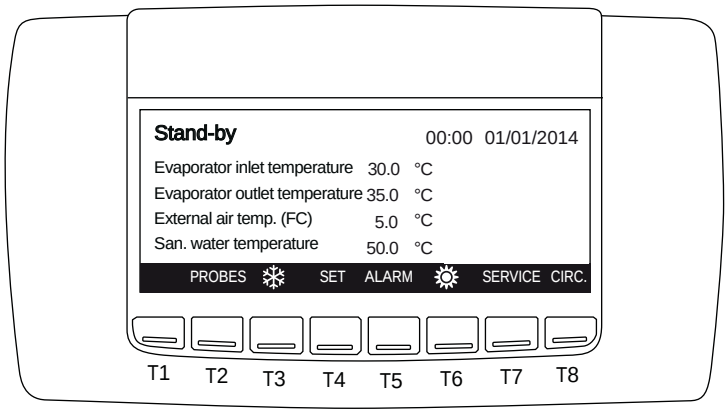
5.3.1 Display icons

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.
	Economy function		Indicates that the defrost is active.
	Unloading function (not available).	CH	Only cooling mode (chiller)
HP	Heat pump mode	HW	Domestico hot water mode

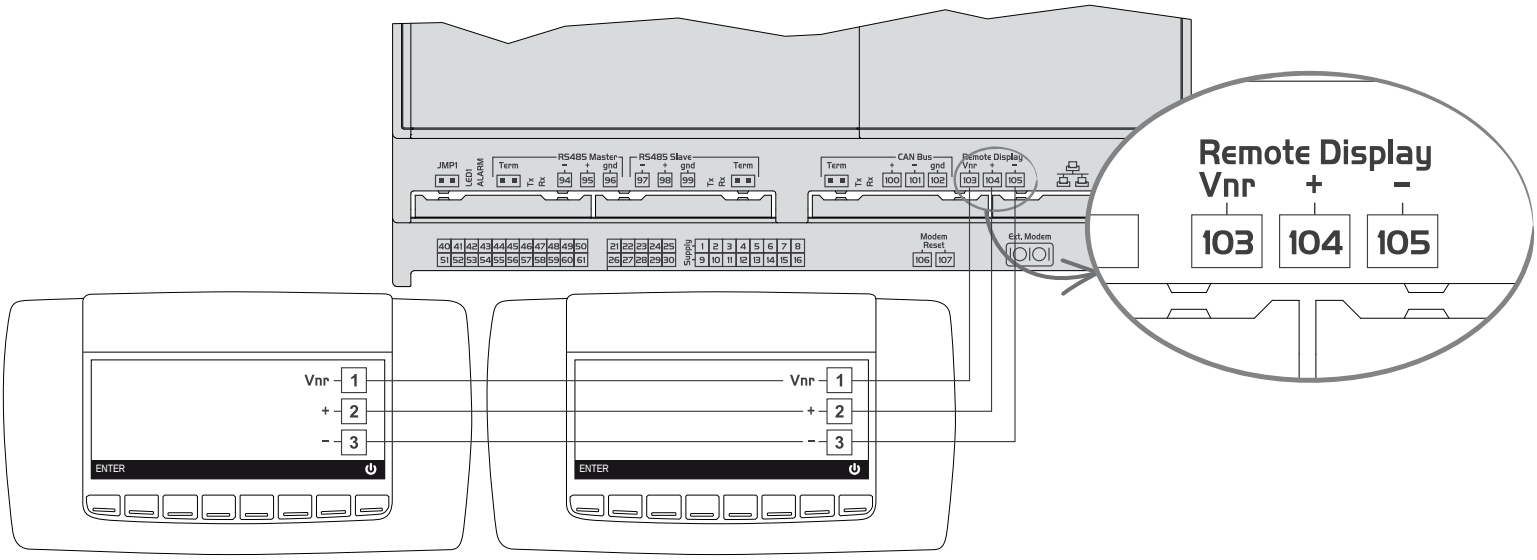
5.3.2 Key function

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:



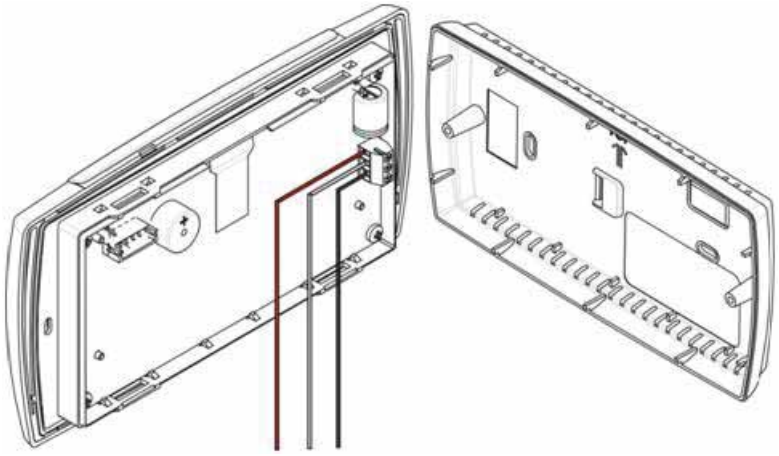
5.4 Remote keyboard connection



The remote control panel can be remotely up to a maximum distance of 50 meters from the unit.
In case the supply bipolarity is not respected, the remote control and the programmable control iPro.CHILL can be seriously damaged.

- In case of power supply failure, the keyboard doesn't work.
- In case of comunication problems, the display shows "noL" message.

5.4.1 Wall mounting connection diagram



6. USE

6.1 Switch the unit on

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

6.1.1 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.

Heating mode

To start the unit in heating 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.

Domestic hot water mode

At the first start up, the unit microprocessor control checks the domestic hot water inlet temperature measured by the sensor BTS (this has priority over the other parameters) and, if the measured temperature is lower than the domestic hot water set point , it will activate the domestic hot water mode automatically. If the unit is required to operate in heating and the domestic hot water temperature is higher than the set point (there is no requirement for domestic hot water) the microprocessor control will activate the unit in heating mode. If the unit is required to operate in cooling and domestic hot water mode the microprocessor control will activate both functions at the same time. If domestic hot water is not required, the microprocessor control will activate cooling mode only.

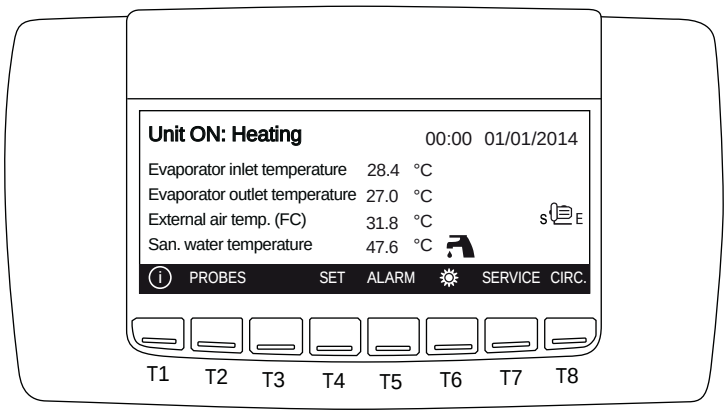
In stand-by mode, the controller gives the possibility to:
• display the set values
• manage alarms, theyr display and reports.

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.

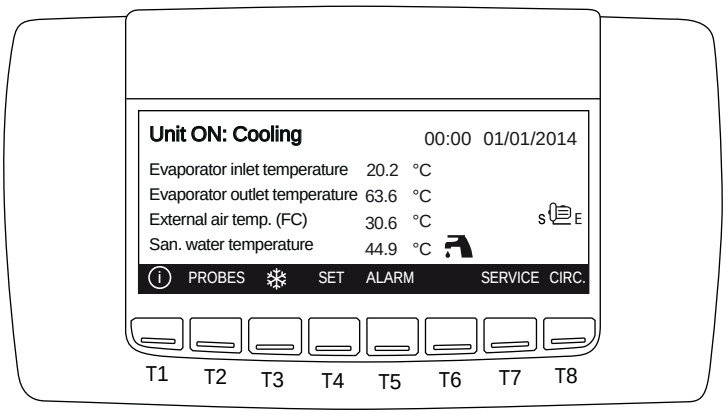
6.1.2 Heating and cooling mode

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

HEATING MODE (HP)

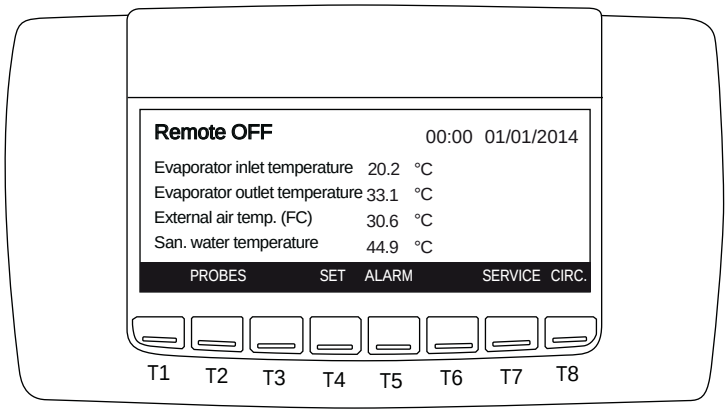


COOLING MODE (CH)



6.1.3 Switch the unit on from from digital input

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

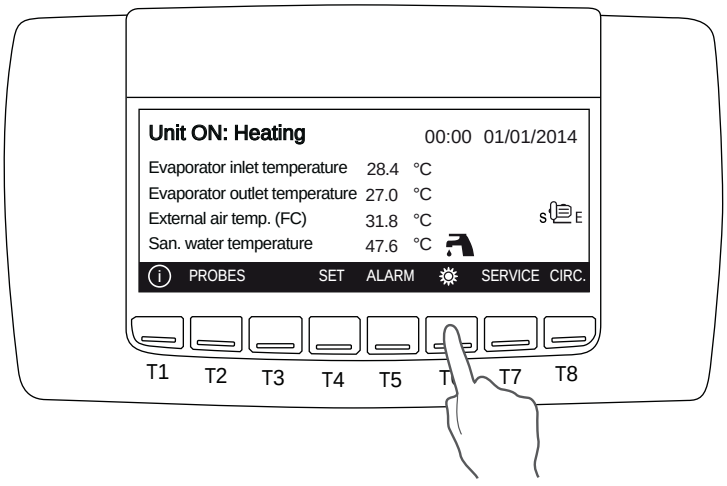


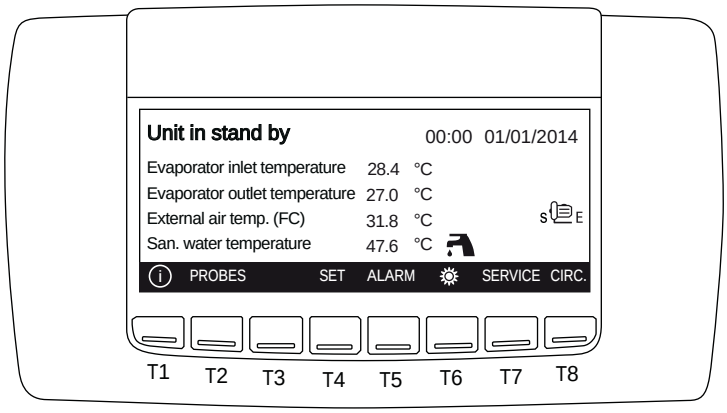
When the digital input is not active, the unit is in OFF mode

- 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

6.2 Stop

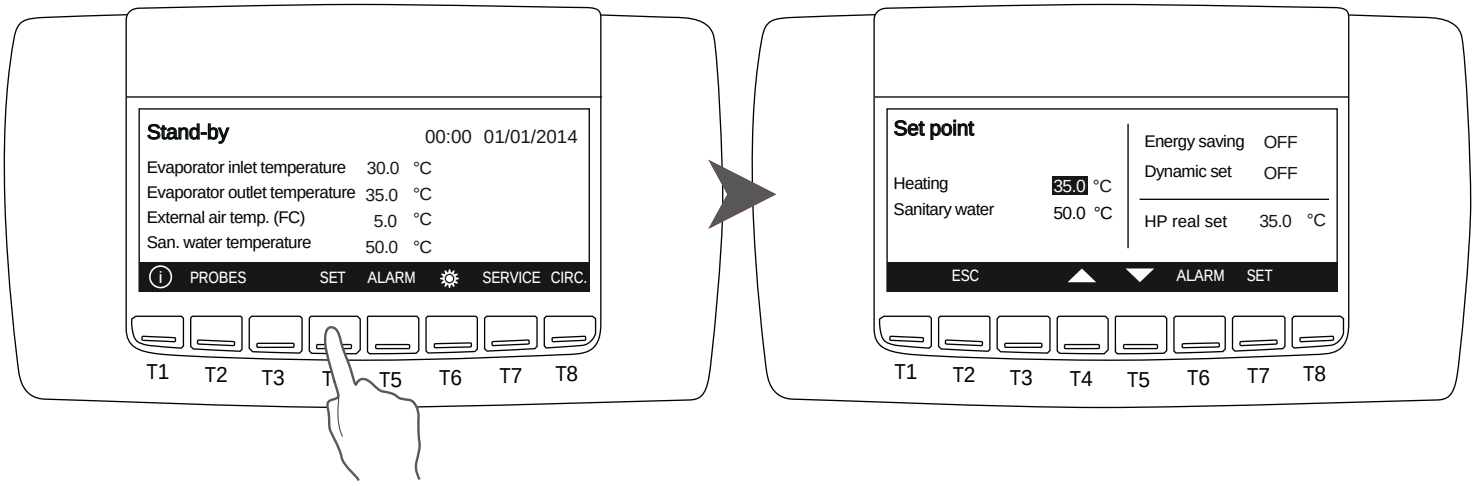
To switch the unit off press the key ⏻ .





6.3 Set point

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 ESC 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.

6.3.1 Adjustable parameters

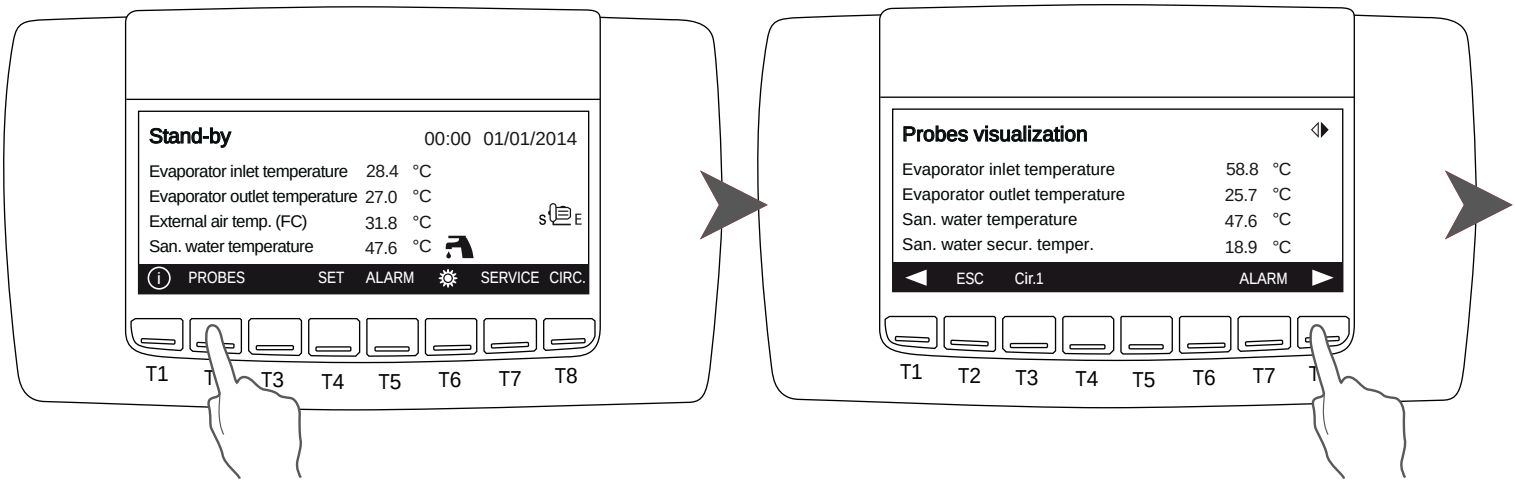
The adjustable set point that can be modified by the end user are:

Function	Adjustment limit	Default value
Heating set-point	10÷55°C	35°C
Domestic hot water set-point	20÷55°C	50°C
Cooling set-point	10÷25°C	23°C
Set point compensation	0÷15°C	10°C
Password	(Contact the company)	

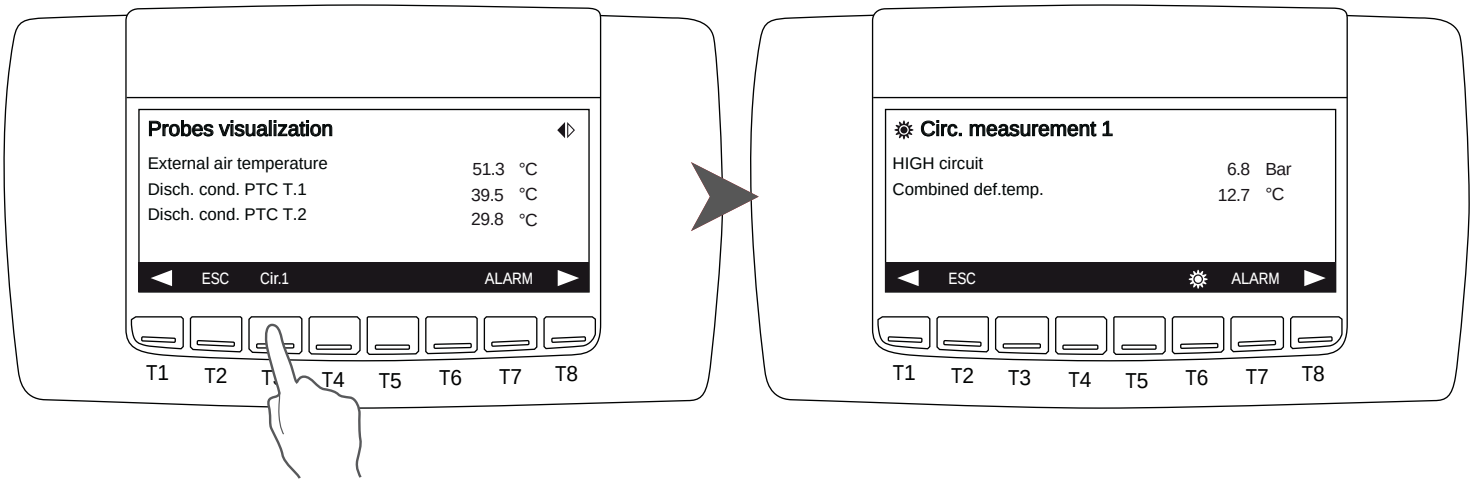
The units are supplied with a very sophisticated control system with many other parameters that are not adjustable by the end user; these parameters are protected by a manufacturer password.

6.4 PROBES key

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



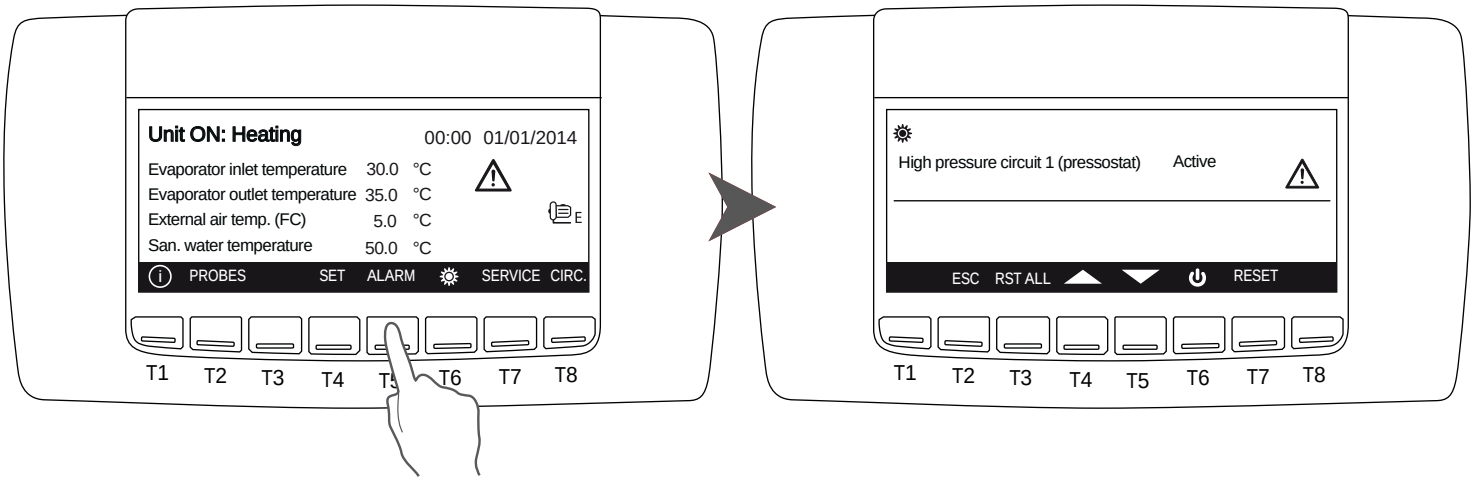
By pressing the key, all relevant values of the circuit will be displayed



Press ESC to go back to the main menu.

6.5 ALARM key

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).

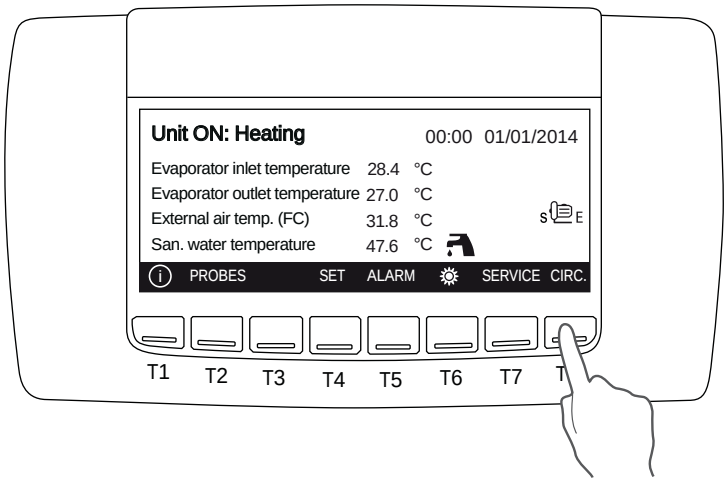
6.6 CIRC key

Pressing CIRC can view the different parameters of the unit:

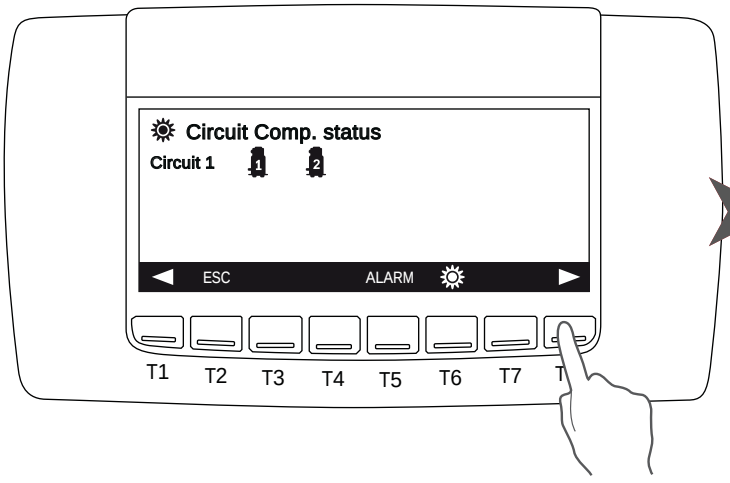
Pressing ◄ and ► you move from one screen to another.

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

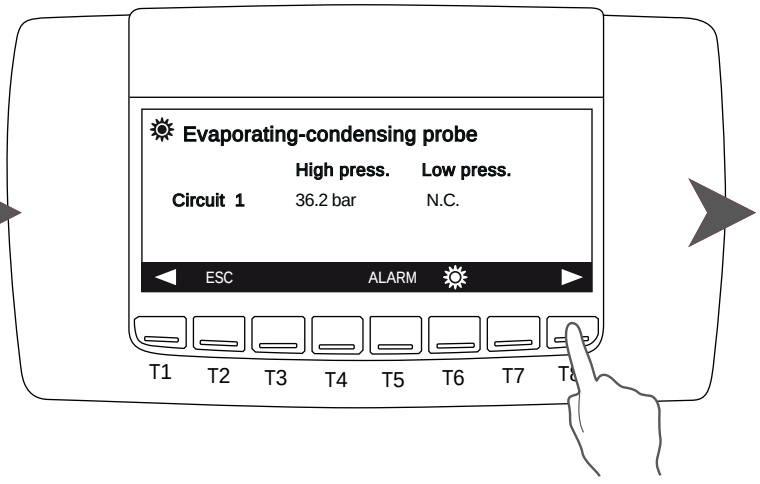
In case of use of compressors in part-loading (typically screw compressors) an icon appears to the right of the compressor showing the level of step control.
In case of use of On/Off compressors (Scroll) no icon appear to the right of the compressor.



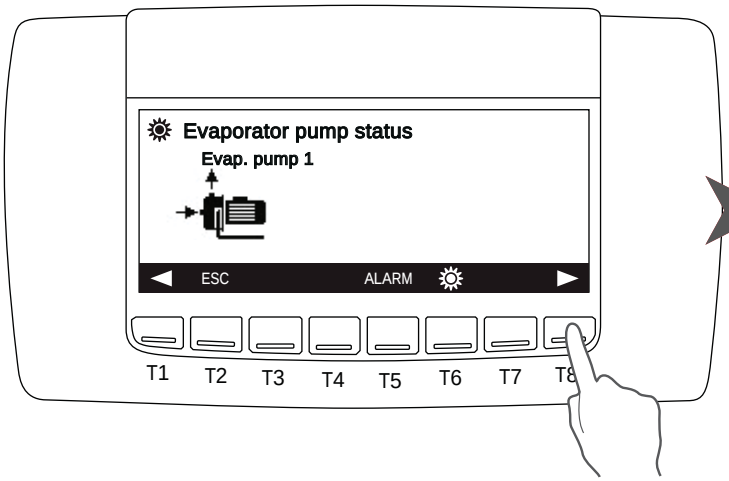
Compressor status



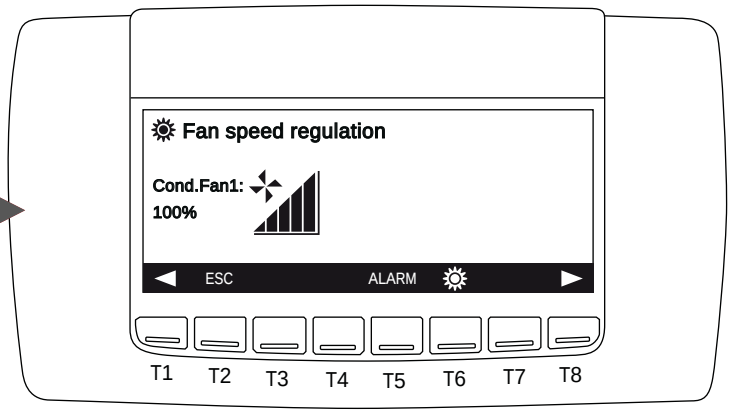
Evaporating-condensing probe



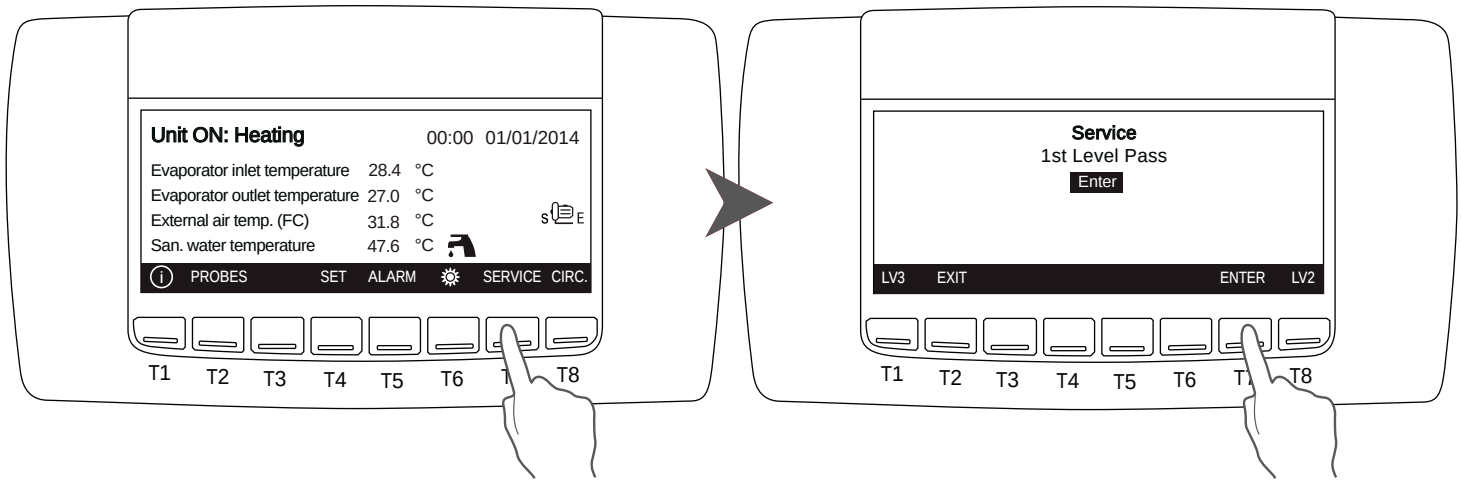
Evaporator pump status



Fan speed regulation

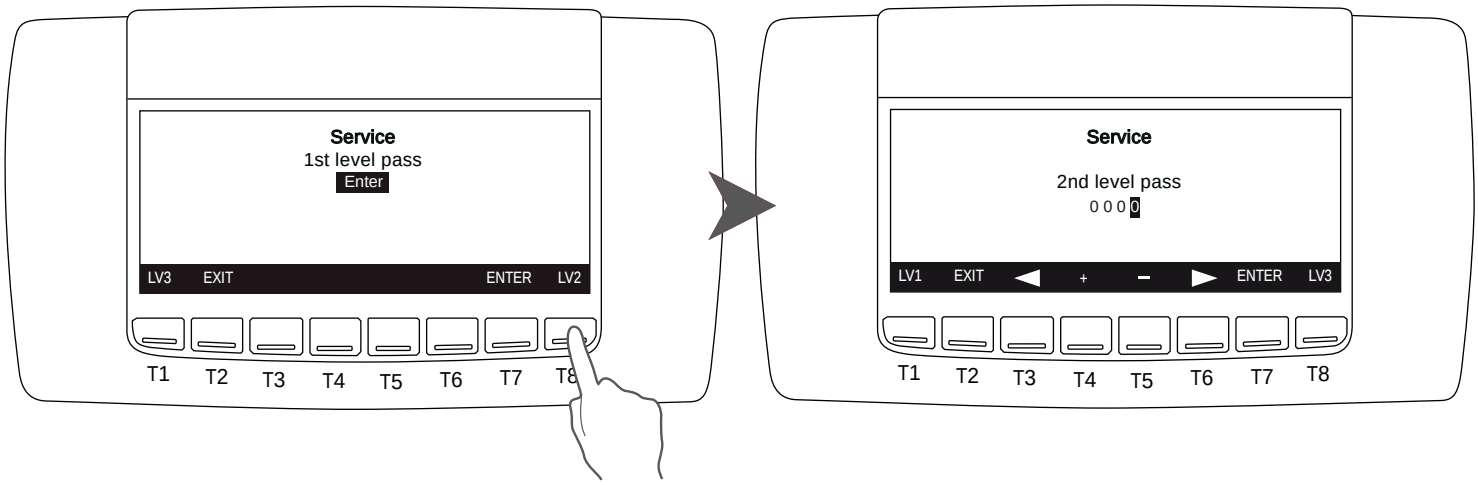


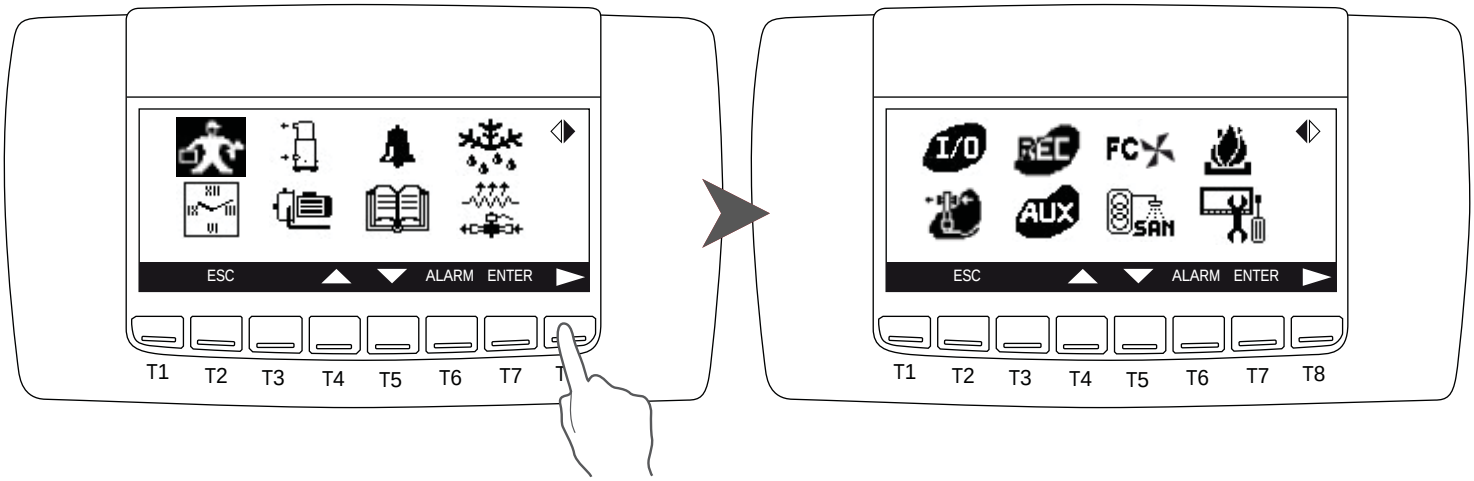
6.7 SERVICE key



To enter service menu select SERVICE.

The system prompts you to enter the password to access to different levels of security; press ENTER to enter the first level or press LV2 and LV3 keys to enter in the other levels.





Press the SERVICE key to access the following menus:

	Setting parameters (for service only)		Expansion Valve
	Time and date setting	I/O	I/O status (Inputs and Outputs)
	Compressors status	REC	Recovery (Not available)
	Pumps	AUX	Auxiliary outputs
	Display of alarms	FC	Free cooling (Not available)
	Alarm history	SAN	Domestic hot water (if available)
	Defrost (if available)		Auxiliary heating (if available)
	Electrical heater and pump down valve status		Control panel

Press ► key to display all the menu available.
Move between the available menu using the ▲ and ▼ keys, press ENTER to select the required menu.
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.

6.7.1 Service parameters setting

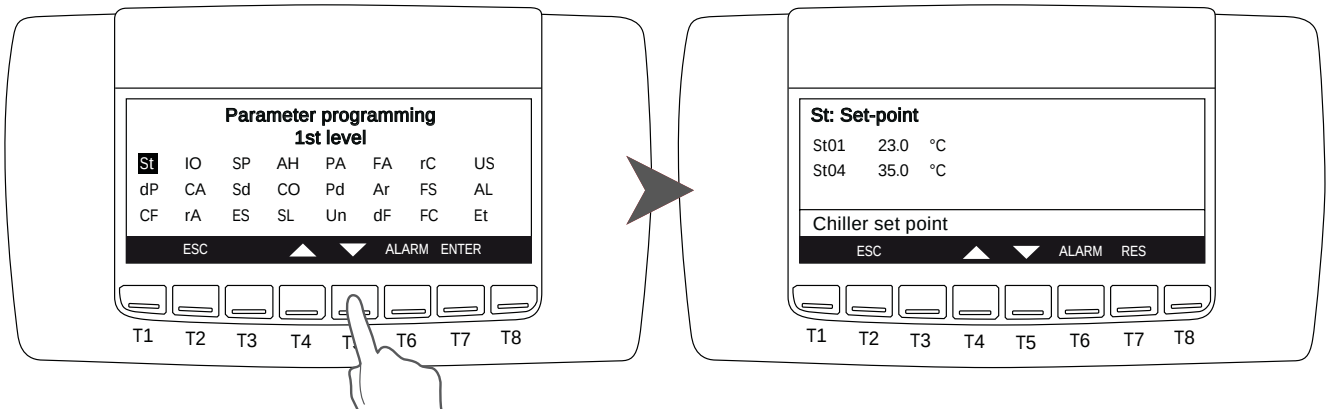
To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.

With password level 1 you could only change the Set Point (St), Serial address (SP), dynamic Set point (Sd), Energy saving (ES) and parameters of sanitary circuit (FS); the unit must be switched on. Press ENTER to enter in the group of parameters. Other parameters can be modified by pressing LV2 e LV3 keys by service people only with a dedicated password.

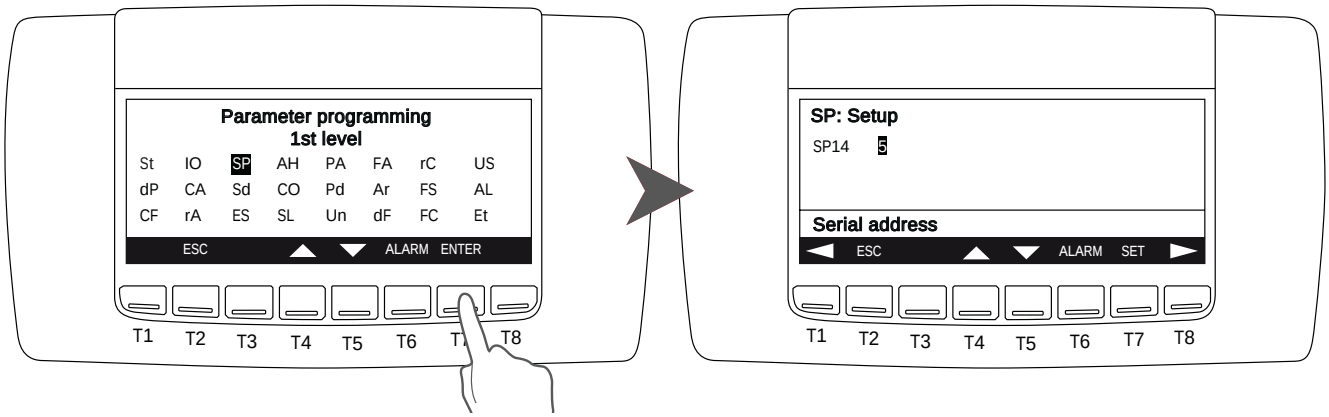
Parameters list:

Code	Meaning	Code	Meaning
ST	Temperature control parameters	FA	Ventilation parameters
DP	Variables to be shown on the keyboard	Ar	Anti-freeze heaters parameters
CF	Configuration parameters	dF	Defrost parameters
SP	Parameters for machine set up	rC	Heat recovery parameters
Sd	Dynamic set-point parameters	FS	Production of domestic hot water parameters
ES	Energy saving and automatic timed switch-on/off parameters	FC	Free-cooling function parameters
AH	Auxiliary heating parameters	US	Auxiliary output parameters
CO	Compressor parameters	AL	Alarm parameters
SL	Stepless compressor parameters	Et	Parameters for the management of the electronic expansion valve
PA	Evaporator/condenser water pump parameters	IO	Inputs/outputs configuration parameters
Pd	Pump down function parameters	CA	Analog input calibration parameters
Un	Unloading function parameters	RA	Analog input range parameters

The values available in the group of parameters “Set point” (St) are: summer set point (St01) and winter set point (St04).

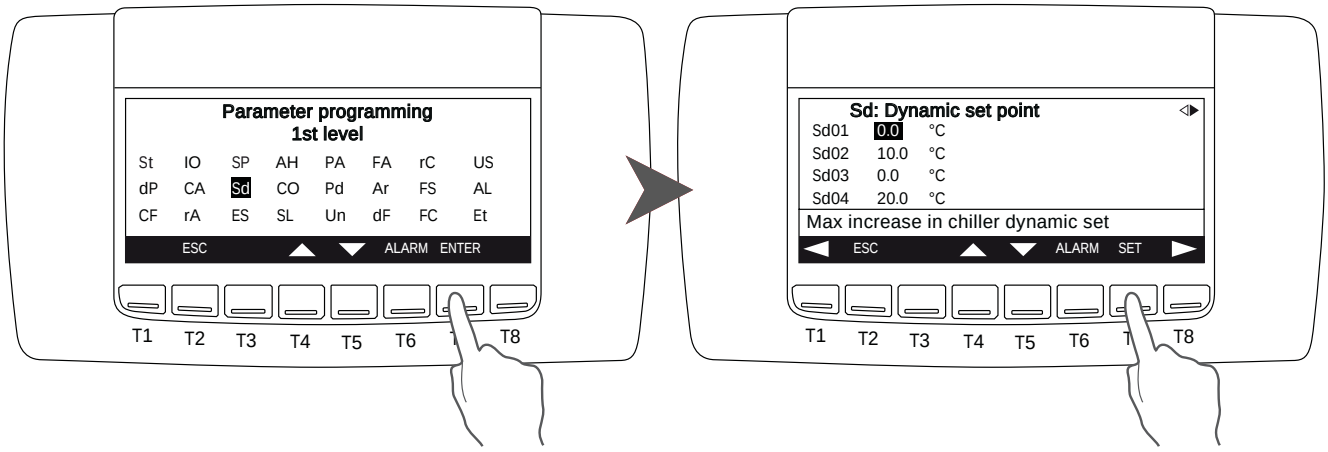


Setup parameters (SP): make possible to modify the serial address.



To modify the value of the parameter press SET key, the value start to blinking, press ▲ and ▼ to modify, than press SET again to confirm.

The values available in the group of parameters “Dynamic set point” (Sd) are: dynamic set point: summer offset (Sd01), dynamic set point: winter offset (Sd02), dynamic set point: summer outside temp. (Sd03), dynamic set point: winter outside temp. (Sd04), dynamic set point: summer differential temp. (Sd05) and dynamic set point: winter differential temp.(Sd06).
For more informations about the parameters see par. 6.3.1 and 6.3.2.

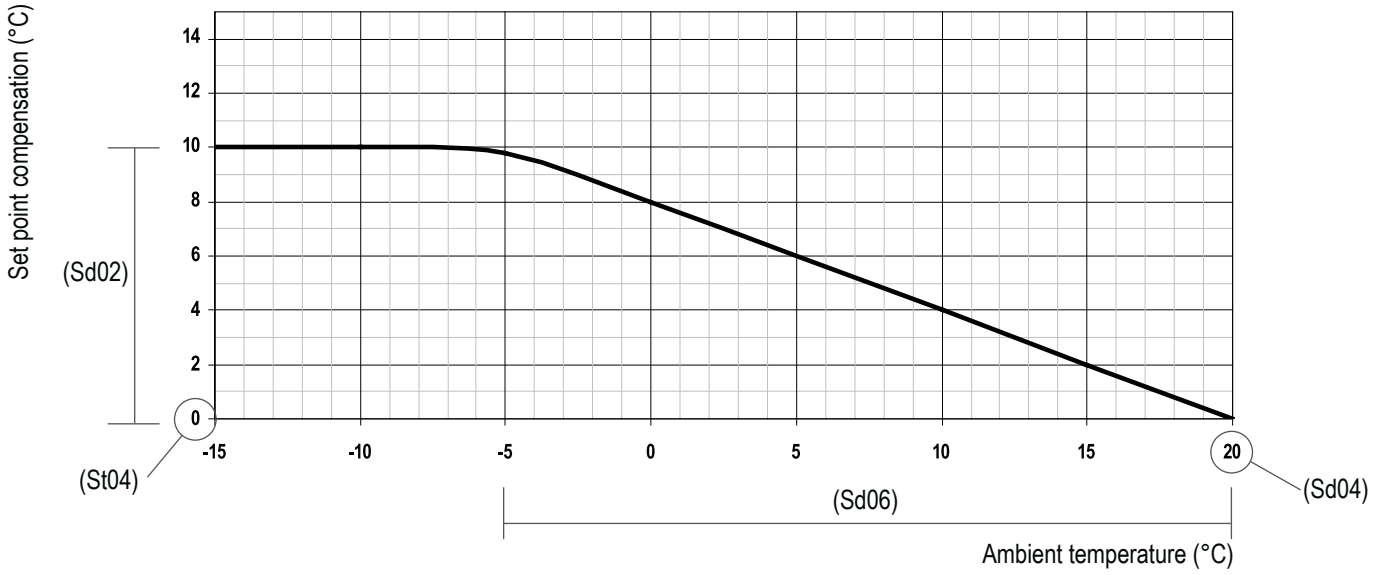


Press ▲ and ▼ keys to select the parameter.

To modify the value of the parameter press SET key, the value start to blinking, press ▲ and ▼ keys to modify, than press SET again to confirm.

Weather compensated function

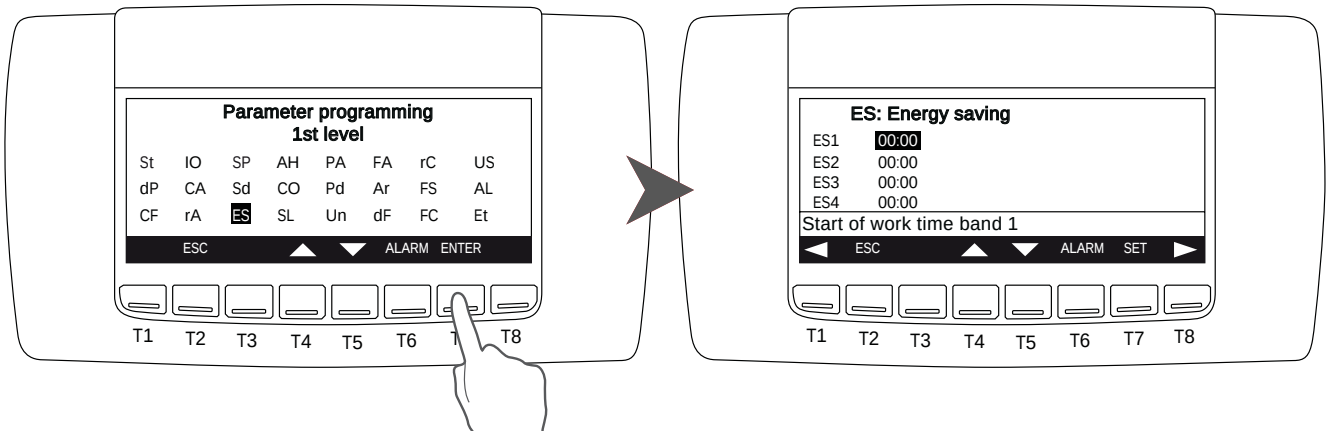
This function makes it possible to activate the weather compensation sensor in order to optimize the efficiency of the unit. Automatically it modifies the set-point value with respect to external air temperature: a calculation is performed on the set-point to provide a revised value of set point for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



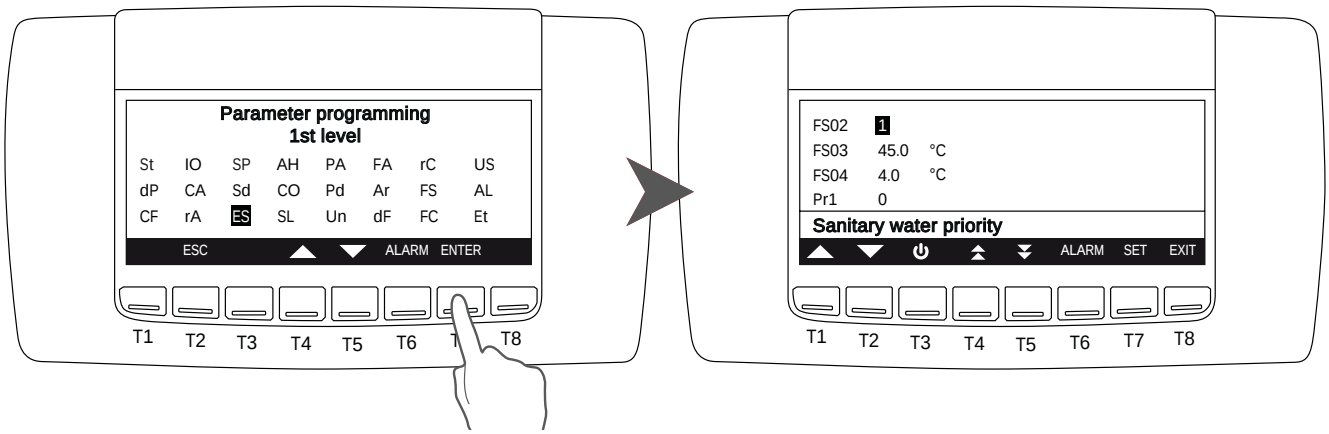
All units are factory set with the weather compensated function activated. The slope starts at +20°C with a differential of 10°C.

With the energy saving mode activated, if the SET key is pressed twice the bottom of the display shows the SEtTR (weather compensated set point) label that is the specific set point calculated by the microprocessor control for the measured ambient temperature condition.

Energy saving (ES)



The values available in the group of parameters “Sanitary circuit” (FS) are: Sanitary water priority (FS02), Sanitary water set point (FS03), Sanitary water proportional band (FS04) .

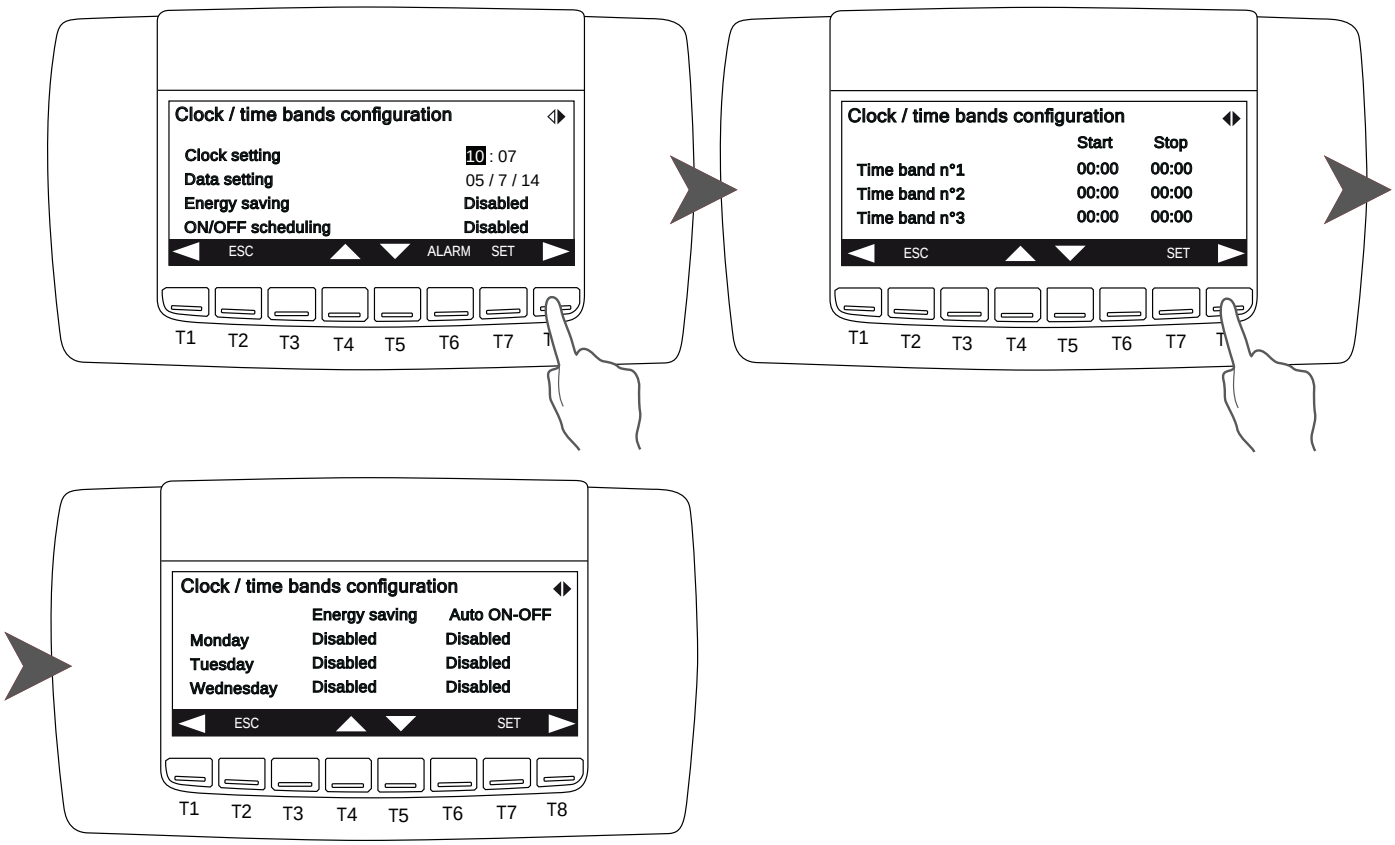


6.7.2 Setting date and time

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

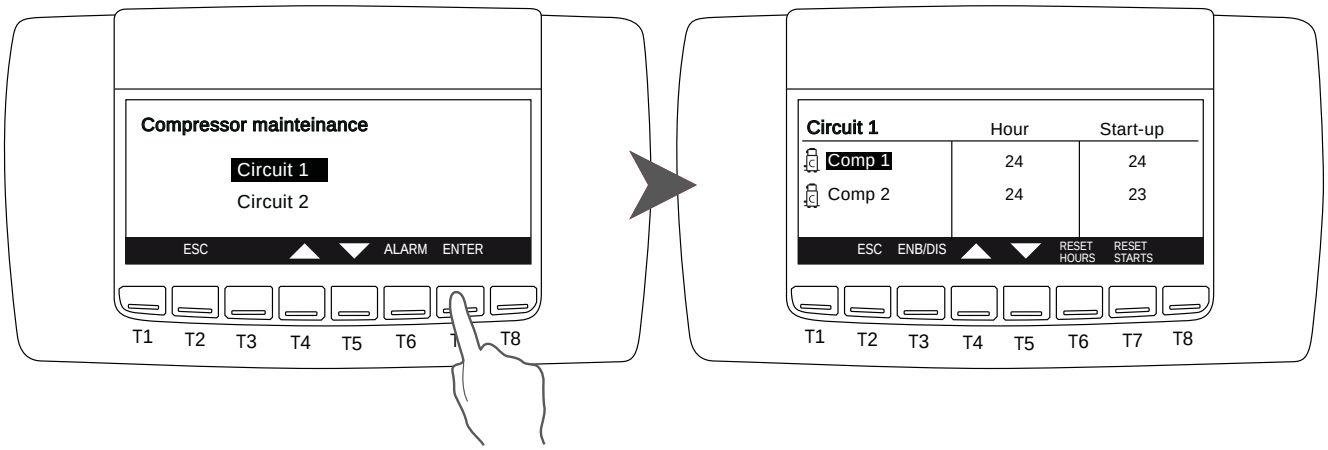
Press ▲ and ▼ to select the value you want to edit than press SET. The selected parameter will start blinking, press ▲ and ▼ to set the value and than press SET to confirm.

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..



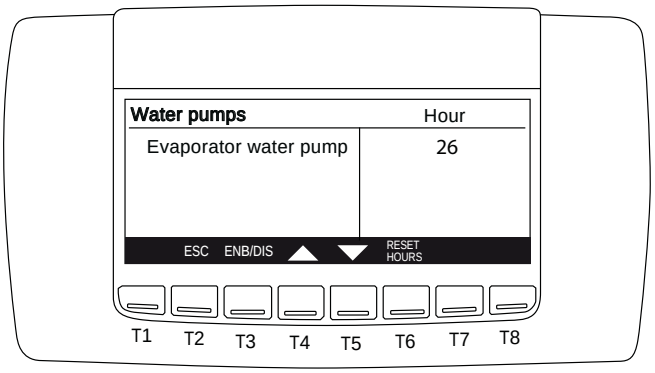
6.7.3 Compressor maintenance

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 and the reset functions RESET HOURS, RESET STARTS are only possible by service people.



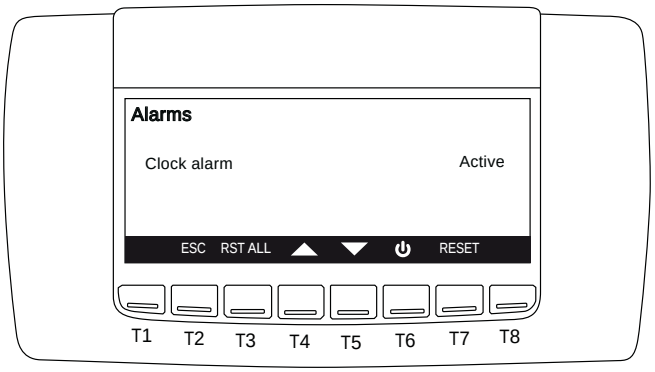
6.7.4 Water pumps

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 HOURS is only possible by service people.



6.7.6 Alarms

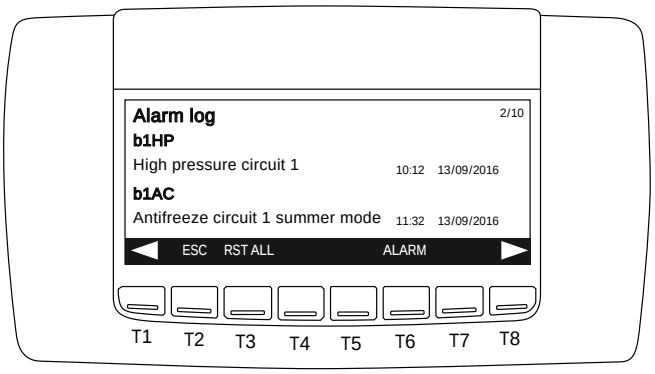
To enter this menu select  moving between the icons with the keys ▲ and ▼ and press ENTER.



6.7.7 Alarm log

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

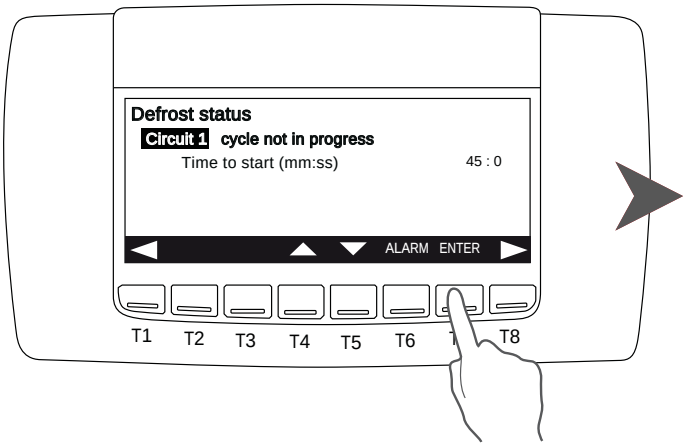
Pressing ◄ and ► it is possible to read the last 99 alarms. The function of reset of all alarms RST ALL is only possible by service people.



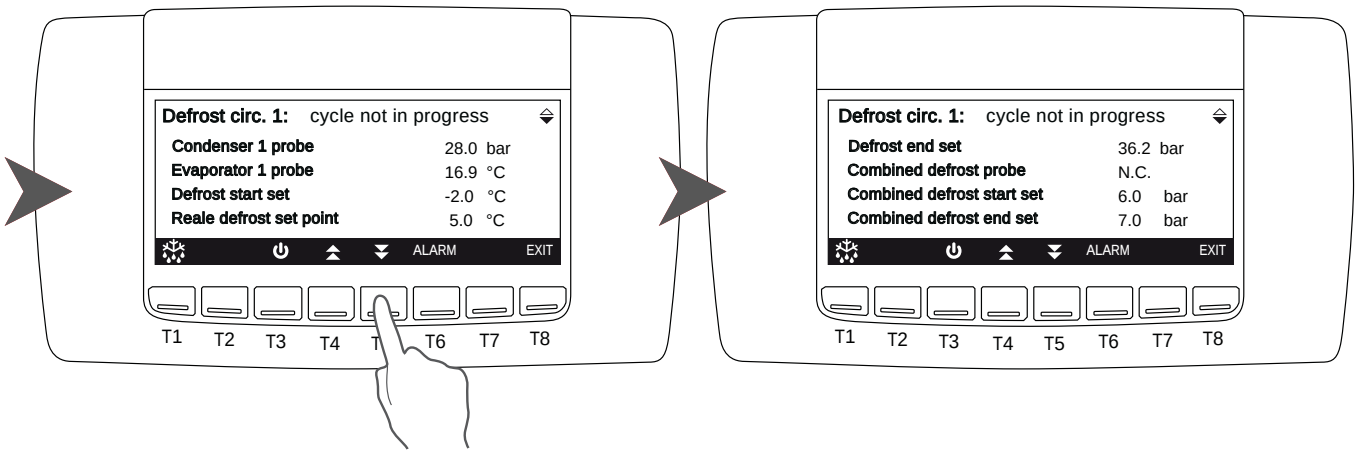
6.7.8 Defrost

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

For each circuit it is possible to read the status of the defrost and, after selecting the circuit, pressing the ENTER key it is possible to display some parameters relating to the defrosting of the circuit (values related to the probes and to the set points).

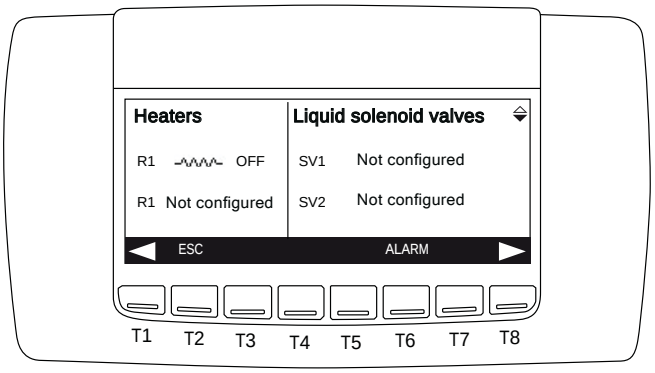


Press ◄ and ► to display all the available parameters.



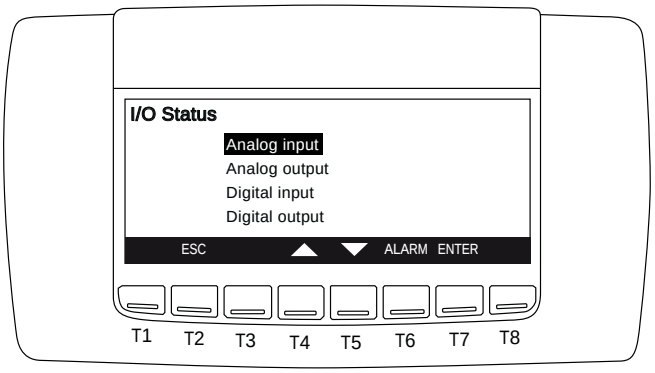
6.7.9 Eletrical heater

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.



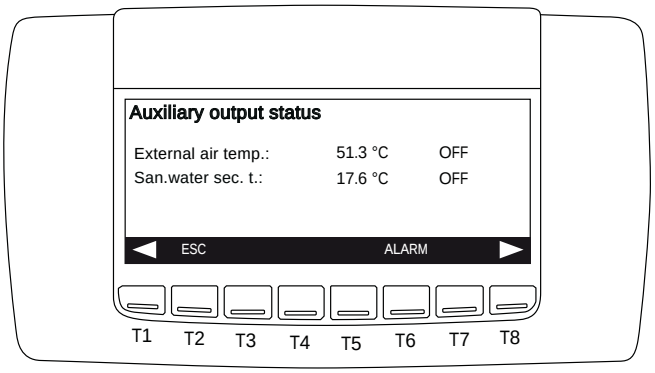
6.7.10 I/O Status (Input/Output)

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.



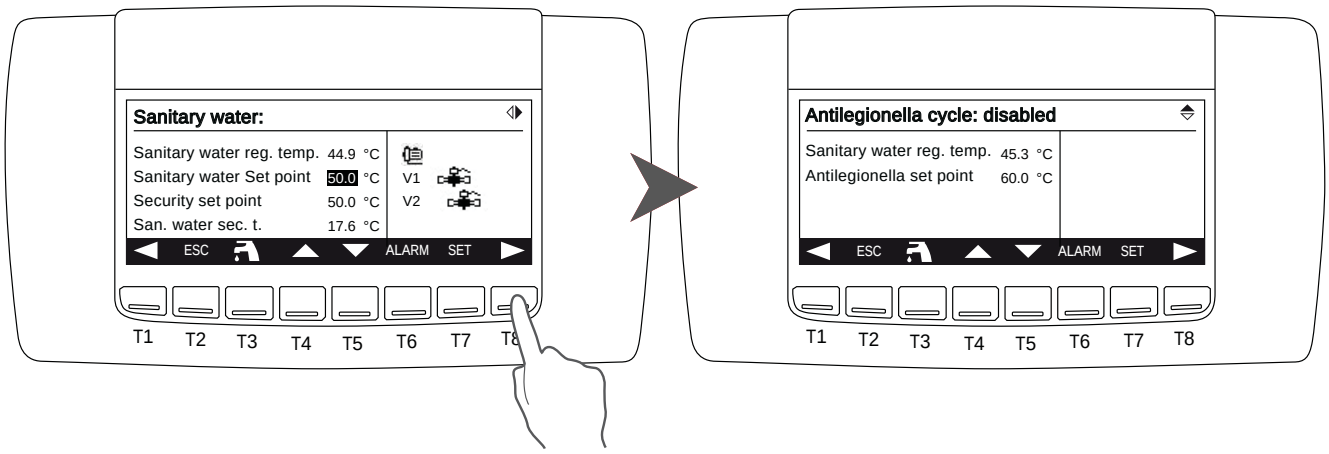
6.7.12 Auxiliary output

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.



6.7.13 Sanitary water

To enter this menu select SAN moving between the icons with the keys ▲ and ▼ and press ENTER.
It is possible to read informations of the sanitary water regulation. Press SET key to modify the values.



6.8 Acoustic signal silencing

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

7. MAINTENANCE OF THE UNIT

7.1 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.

7.2 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.

7.3 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.

7.4 Periodical and 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.

7.4.1 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		

7.4.2 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.

(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.

7.4.3 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 oil level in the compressors using the oil fill level indicator			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.

7.5 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 R407C, 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.

8. DECOMMISSIONING

8.1 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.

8.2 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.

The refrigerant circuit of the unit contains lubricant oil that binds the disposal mode of components .

8.3 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.

9. DIAGNOSIS AND TROUBLESHOOTING

9.1 Fault finding

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.

Unit alarms				
Code	Visualization	Alarm Description	Cause	Solution
ACF1... ...ACF19	Conf AL1…Conf AL19	Configuration alarm	Wrong configuration of microprocessor control system.	Contact the company.
AEFL	Plant side flow AL	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.
ACFL	Source side flow AL	Allarme flussostato acqua sorgente (solo per unità acqua/acqua)	Presence of air or dirtiness in the source hydraulic system. (Only water/water units)	Bleed carefully the spurce hydraulic system or check and clean the water strainer.
AEUn	Unload notify (evap.)	Compressor unloading alarm (only units with more than 1 compressor)	User water temperature is too high.	Wait until the user water temperature is lower.
AHFL	Sanitary water flow AL	Domestic hot 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.
AP1...AP10	Pb AL1 ... Pb AL10	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.
AP11...AP20	Pb1 AL e1 …Pb7 AL e1	Alarm expansion probe 1 (if used)		
AP21...AP27	Pb1 AL e2 …Pb7 AL e2	Alarm expansion probe 2 (if used)		
AtC1	Cond.pump 1 overl	Condenser n° 1 water pump overload alarm (only water/water units)	Pump overload.	Check the hydraulic circuit
AtC1	Cond.pump 2 overl	Condenser support n° 2 water pump overload alarm (if used) (only water/water units)	Pump overload.	Check the hydraulic circuit
AtE1	Evaporator water pump 1 overload	Evaporator pump thermal alarm1	Pump overload.	Check the hydraulic circuit
AtE2	Evaporator water pump 2 overload	Evaporator pump thermal alarm2 (if present)	Pump overload.	Check the hydraulic circuit
AEht	Hi temp.evap.water inlet	Evaporator water inlet high temperature	Evaporator water inlet high temperature alarm	Wait until the user water temperature drops.

AEM1	E1 discon	Expansion alarm	The expansion is used and lose communication with the expansion card.	Check the serial address of the expansion.
AEM2	E2 discon	Expansion alarm		
AFFC	Antif AL FC	Anti-freeze alarm in free-cooling (if present)	Presence of air or dirtiness in the free cooling hydraulic system.	Contact the service department.
Atrb	Boiler overl AL	Boiler electrical heaters overloading alarm.	Digital input Thermal heaters active.	Contact the service department.
APS	Phases sequ AL	Phases sequence alarm.	Digital input Phase sequence relay active.	Check the connections of the main switch.
AFr	Power supply freq.AL	Power supply frequency alarm.	Power supply frequency is different from that configured.	Contact the service department.
ALc1	Generic AL1	Generic alarm 1	--	Contact the service department.
ALc2	Generic AL2	Generic alarm 2	--	Contact the service department.
Probe fault	Probe fault	Wiring alarm	Wrong electrical connections. Probe defective.	Check the electrical connections from the probe to the terminal board; if they are correct, contact the service to replace the probe.

Circuit alarms				
Code	Visualization	Alarm Description	Cause	Solution
B(n)HP	Hi press circ(n)	Circuit high pressure pressure switch(n)	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.
b(n)AC	Antif/lo temp.C(n) (DI - CH) Antif/lo temp.C(n) (AI - CH)	Anti-freeze alarm circuit (n) (cooling mode)	Too low water temperature	Check user temperature set point; Check user water flow.
b(n)AH	Antif/lo temp.C(n) (DI - HP) Antif/lo temp.C1 (AI - HP)	Anti-freeze alarm circuit (n) (heating mode)	Too low water temperature	Check user temperature stet point.
b(n)dF	dF AL circ(n)	Wrong defrost circuit (n) (maximum time admitted)	Defrost time too long; Outside temperature outside the working limits; Refrigerant charge leakage.	Restore normal working conditions; Find leakage and repair.
b(n)hP	Hi press circ(n)	High pressure transducer alarm circuit (n)	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.
B(n)LP	Low press circ(n)	Low pressure switch circuit (n)	Refrigerant charge leakage.	Find leakage and repair.
b(n)lP	Low press circ(n)	Low pressure transducer alarm circuit (n)	Refrigerant charge leakage.	Find leakage and repair.
b(n)tF	Cond.fan overl circ(n)	Allarme termica ventilatore sorgente	Corrente assorbita al di fuori dei limiti operativi.	Controllare il corretto funzionamento del ventilatore sorgente e se necessario sostituirlo.
b(n)Cu	Unload high t/p circ(n)	Warning high pressure circuit (n)	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.	Contact the service department.

La lettera (n) identifica il circuito interessato

Compressors alarms				
Code	Visualization	Alarm Description	Cause	Solution
C(n)tr	C(n) overl	Compressor (n) overload	Compressor (n) input current outside operation limits.	Replace the compressor.
C(n)oP	AL oil C (n)	Compressor (n) pressure switch/oil float	Maintainence required.	Contact the service department.
C(n)dt	Hi Disch temp.C(n)	Compressor (n) high discharge temperature	Service required.	Contact the service department.

La lettera (n) identifica il compressore interessato

Other alarms			
Visualization	Alarm Description	Cause	Solution
Termostatic expansion valves AL!	The expantion circuit stops (Only with electronic expantion valve).	Faults to the cooling circuit.	Contact the service department.
Flowmeter transd.	Wrong reading of flowmeter transducer.	Fault of the transducer and/or hydraulic circuit.	Check the electrical connections, if correct call the service to replace the sensor.

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