



RCA 195÷395

AIRCOOLED LIQUID CHILLERS AND HEAT PUMPS
WITH AXIAL FANS AND SCROLL COMPRESSORS

CE

Cod. 3QE47500 - Rev. 00 - 10/2021



EN

INSTALLATION, MAINTENANCE AND USER MANUAL

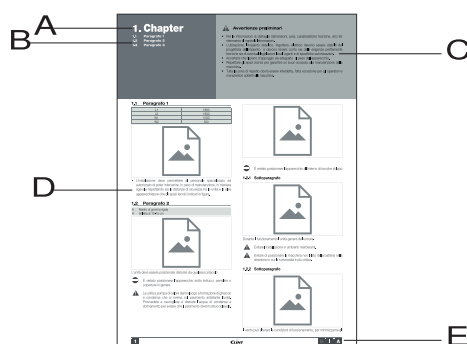
	GENERAL	4		MAINTENANCE	29
1.1	DOCUMENT INFORMATION	4	8.1	MAINTENANCE	29
1.2	RESIDUAL RISK	4	8.2	WEEKLY CHECKS	29
1.3	RANGE	5	8.3	MONTHLY CHECKS	29
1.4	ACCESSORIES	5	8.4	ANNUAL CHECKS	29
1.5	COMPLIANCE	5	8.5	WATER CIRCUIT	29
1.6	MACHINE IDENTIFICATION	5	8.6	REFRIGERANT CIRCUIT	30
1.7	CONNECTIONS OF THE ACCESSORIES	6	8.7	DECOMMISSIONING AND DISPOSING	30
1.8	INTENDED USE	6			
1.9	GENERAL PRECAUTIONS	6			
1.10	BASIC SAFETY RULES	7			
1.11	USER GUIDELINES	7			
1.12	MACHINE DESCRIPTION	7			
	SHIPMENT	8			
2.1	INSPECTION ON RECEIPT	8			
2.2	POSITION OF THE EQUIPMENT	8			
2.3	EQUIPMENT	8			
2.4	STORAGE	8			
2.5	HANDLING	8			
2.6	UNPACKING	9			
2.7	ACCESS TO INTERNAL PARTS	9			
2.8	RESTING ON THE GROUND	9			
	INSTALLATION	10			
3.1	INSTALLATION LOCATION REQUIREMENTS	10			
3.2	WORK FIELDS	10			
3.3	UNIT LOCATION	10			
3.4	VERIFYING CLEARANCES (CLEARANCE AREA)	11			
	WATER CONNECTIONS	12			
4.1	CONNECTION DIAGRAM	12			
4.2	POSITION OF CONNECTIONS	12			
4.3	HYDRAULIC DATA	12			
4.4	CONNECTION TO THE SYSTEM	13			
4.5	SYSTEM FILL-UP	14			
4.6	DESUPERHEATER CONNECTION	14			
	ELECTRICAL CONNECTIONS	15			
5.1	MACHINE CONNECTION	15			
5.2	CONNECTIONS OF THE ACCESSORIES	15			
	COMMISSIONING	16			
6.1	PRELIMINARY INSPECTIONS	16			
6.2	FIRST START-UP OR RESTART AFTER LONG INACTIVITY	16			
6.3	SHUT-DOWN	16			
6.4	FLOW RATE CALIBRATION	17			
	CONTROL PANEL	18			
7.1	USER INTERFACE	18			
7.2	SWITCH ON AND OFF	20			
7.3	SETTINGS	20			
7.4	UNIT STATUS	23			
7.5	ALARMS	25			
7.6	LOGIN	27			
7.7	SOFTWARE	28			

1. General

- 1.1 Document information
- 1.2 Residual risk
- 1.3 Range
- 1.4 Accessories
- 1.5 Compliance
- 1.6 Machine identification
- 1.7 Connections of the accessories
- 1.8 Intended use
- 1.9 General precautions
- 1.10 Basic safety rules
- 1.11 User guidelines
- 1.12 Machine description

1.1 Document information

- A Chapter
- B Sequence of paragraphs
- C Preliminary precautions
- D Operations



- The manual is divided into chapters as follows:
 - General;
 - Shipment;
 - Installation;
 - Water connections;
 - Electrical connections;
 - Commissioning;
 - Control;
 - Maintenance.
- The preliminary precautions must be read before performing any of the following operations.

This document uses the following definitions:

- Danger zones: any area inside and/or near the machine in which the presence of an exposed person constitutes a risk to his/her own health and safety.
- Exposed person: any person who is entirely or partially in a danger zone.
- Operator/Maintenance Technician: the person/s assigned to operate, adjust, service, repair or move the machine.

1.1.1 Symbols

- This publication contains the following symbols:

	Danger	Draws attention to actions that can cause serious injury if not performed correctly.
	Prohibited	Draws attention to actions that impose a prohibition.

1.2 Residual risk

Description

The description of the residual risk considers the following elements:

- the type of dangers those working around the machine are subject to;
- a description of main risks;
- who could be exposed to such risks;
- what are the main safety measures adopted to reduce the risk of injury.

The guidelines for the prevention of accidents reported below, with reference to the relative areas of residual risk, must be integrated with all the general instructions of this chapter and with the accident prevention regulations in force in the destination country of the system.

Residual risk near the machine

- Electrocutation, if the electrical connection and earthing of the machine are not carried out correctly.
- Cuts or abrasions due to the presence of sharp edges.
- Suction of substances in the installation site and subsequent dispersion in the environment.
- Projection of any object that may fall on the fan blades.
- Leakage of water (in case of a fault).
- Formation of condensation water and ice in the area in front of the machine during the heating operation of the heat pump machines.
- Micro-climate alteration (during operation).
- Noise emission (during operation). The sound pressure levels of the individual units are listed in the technical booklet.
- Oil leaks (due to a fault).
- Refrigerant gas leak (due to a fault).

Refrigerant gas is a greenhouse gas effect substance. Vapours are heavier than air and they can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid can cause freezing.

Measures to be adopted if refrigerant gas leaks

- Product type:
 - R410A

First aid measures

- General information:
 - do not administer anything to an unconscious person.

- Inhalation:
 - transfer outdoors.
 - use oxygen or artificial respiration if needed.
 - do not administer adrenaline or similar drugs.
- Contact with eyes:
 - rinse thoroughly with plenty of water for at least 15 minutes and consult a doctor.
- Contact with skin:
 - wash immediately with plenty of water
 - immediately remove all contaminated clothing

Measures in the event of accidental spillage

- Personal precautions:
 - Move all personnel to safe areas.
 - Provide adequate ventilation.
 - Use personal protective equipment.
- Environmental precautions:
 - Intercept the emission.
- Cleaning methods:
 - Use absorbent products.

Operations with removed panels

Some of the operations and/or tests described below require the removal of the panels to access inside the unit.

There may be hot surfaces (piping, compressor, etc.) or cold (compressor, intake separator, etc.), sharp edges (coil fins) or moving parts (fans) even with the machine stationary.

- ⚠ The power supply must be disconnected before removing any panel.
- ⚠ Operations that require the panels to be opened must only be carried out by qualified personnel wearing personal protective equipment.

1.3 Range

RCA	195
RCA	220
RCA	245
RCA	270
RCA	300
RCA	330
RCA	360
RCA	395

1.3.1 Available versions

RCA R AB	Cooling only
RCA P AB	Reversible Heat Pump
RCA R AX	Super silenced cooling only
RCA P AX	Super silenced reversible Heat Pump

1.4 Accessories

Factory fitted accessories

IM	Automatic circuit breakers
SL	Unit silencing
RFM	Cooling circuit shut-off valve on discharge line
RFL	Cooling circuit shut-off valve on liquid line
CT	Condensing control down to 0 °C
CC	Condensing control down to -20 °C
BT	Low water temperature kit
EC	EC Inverter fans
ECH	EC Inverter fans with high available static pressure

DS	Desuperheater
RT	Total heat recovery
TX	Coil with pre-coated fins
EW	External water connections
PS	Single circulating pump
PSI	Inverter single circulating pump
PD	Double circulating pump
PDI	Inverter double circulating pump
FE	Antifreeze heater for evaporator
SS	Soft start
IS	Modbus RTU protocol, RS485 serial interface
IST	Modbus TCP/IP protocol, Ethernet port
ISB	BACnet MSTP protocol, RS485 serial interface
ISBT	BACnet TCP/IP protocol, Ethernet port
ISL	LonWorks protocol, FTT-10 serial interface
ISS	SNMP protocol, Ethernet port
IAV	Remote set-point, 0-10 V signal
IAA	Remote set-point, 4-20 mA signal
IAS	Remote signal for second set-point activation
IDL	Demand limit from digital input

Loose accessories

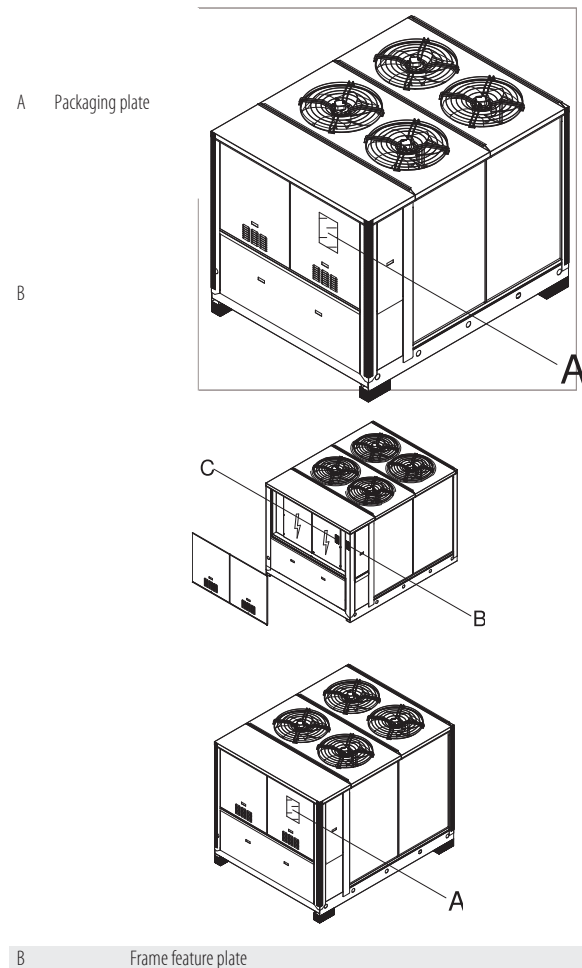
MN	High and low pressure gauges
CR	Remote control panel
RP	Coils protection metallic guards
AG	Rubber shock absorbers
AM	Spring shock absorbers

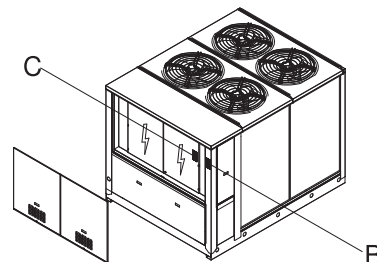
1.5 Compliance

The device complies with the following standards:

- Machinery directive 9898/37/EC - 2006/42/EC
- Electromagnetic Compatibility Directive 2004/108/EC
- Low Voltage Directive: 2006/95/EC

1.6 Machine identification





The equipment can be identified from:

- Packaging plate.
 - It shows the identification data of the equipment.
- Frame feature plate.
 - Affixed on the machine, it shows the technical and performance data of the equipment.
- Electrical board feature plate.
 - Affixed on the panel from which the electrical board is accessed, it shows the electrical data of the equipment.

If it is lost or deteriorated, request a duplicate from Technical Support.

! Tampering with, removal and deterioration of the identification plates complicate any installation, maintenance and spare part request.

1.7 Connections of the accessories

1.7.1 Circulating pump

The circulating pump must always be connected to the control unit as indicated in the wiring diagram. The pump must be started before the chiller is started and stopped after the chiller is stopped (recommended minimum delay: 60 seconds).

1.8 Intended use

This unit is designed to cool water (potentially added with inhibited ethylene glycol) that circulates in a closed circuit.

The heat pump units can cool or heat the water circuit, depending on the selected operating cycle.

The heat recovery units can act as a sub-product, heating the water that circulates in a second closed circuit.

The hot or cold air produced by the machine, may be used for air conditioning systems or industrial processes.

! Any other use of the machine is forbidden.

! Do not use flammable products near the machine.

! Do not use substances that can form explosive mixtures close to the machine.

! Do not use the machine where there are problems of environmental impact.

1.9 General precautions

- These units must be installed by a qualified company that at the end of the work provides the operator with a declaration of conformity with the regulations in force and the instructions provided by the manufacturer in this document.
- These units must comply with their intended use in line with their performance characteristics.
- Wear suitable and accident prevention clothing and equipment during installation and/or maintenance. The manufacturer declines any liability for non-compliance with safety and accident prevention regulations in force.
- All unit installation, connection, start-up and shut-down operations must only be implemented by qualified and authorised personnel.
- Comply with the laws in force in the country where the machine is installed, concerning the use and disposal of the packaging, the products used for cleaning and maintenance and for the management when the unit life cycle is complete.

- Any repairs or maintenance must be performed by the technical support of the manufacturer or by qualified personnel, in accordance with this publication.
- Preferably use original spare parts when replacing components.
- If the refrigerant should leak, ventilate the room. The liquid refrigerant produces toxic gas when exposed to a flame.
- In the case of a malfunction or spill of liquid or gas refrigerant, set the main switch to "off" and close the shut-off valves. Promptly call technical support or professional personnel. Do not intervene personally on the unit.
- If the outside temperature can drop below zero, there is a freezing hazard and the system must be drained or anti-freeze must be added.
- Based on CE Standard no. 842/2006 on certain fluorinated greenhouse gases, it is mandatory to indicate the total amount of refrigerant in the installed system. This information is present in the technical plate found in the outdoor unit.
- This unit contains fluorinated greenhouse gas covered by the Kyoto Protocol. Maintenance and disposal must be carried out only by qualified personnel.

1.10 Basic safety rules

Using products that require electricity and water require some basic safety rules to be complied with, such as:

-  It is prohibited to operate the unit before having disconnecting it from the power supply by setting the main switch to "off".
-  It is prohibited to modify the safety devices or the settings without authorisation and instructions from the manufacturer of the unit.
-  It is prohibited to pull, detach or twist the electrical cables coming from the unit, even if it is disconnected from the power supply.
-  It is strictly prohibited to touch any moving parts, stand between them or introduce pointed objects through the grids.
-  It is prohibited to use gas and water pipes to earth the unit.
-  It is prohibited to touch the unit when barefoot or with wet or damp parts of the body.
-  It is prohibited to stand on the unit, sit down on it and/or lean any type of object against it.
-  It is prohibited to dispose of and leave the packaging material in the reach of children as it can be a potential source of danger.
-  It is prohibited for children or unassisted disabled persons to use the unit.
-  It is prohibited to introduce R410A in the atmosphere: R410A is a fluorinated greenhouse gas referred to in the Kyoto Protocol with a Global Warming Potential (GWP) of 1975.

1.11 User guidelines

- Keep this manual together with the wiring diagram in a place that is accessible by the operator.
- Take note of the unit identification data so as to provide them to the service centre when required (see the "Machine identification" paragraph).
- It is recommended to keep track of the operations carried out on the unit, so as to facilitate any troubleshooting.
- In case of a fault or malfunction:
 - verify the type of alarm to notify the service centre;
 - immediately disable the unit without resetting the alarm;
 - contact an authorised service centre;
 - request original spare parts.
- Request the installer to be trained on:
 - switching on/shut-down;
 - shutting down for long periods;
 - maintenance;
 - what to do/not to do in case of a fault.

1.12 Machine description

1.12.1 Features

Frame.

Self-supporting galvanised steel frame further protected with polyester powder painting. Easy to remove panels allow access to the inside of the unit for maintenance and repair operations.

Compressors.

Scroll with oil sight glass.

They are fitted with internal overheat protection and crankcase heater, installed on rubber shock absorbers.

Fans.

Axial fans directly coupled to a three-phase electric motor with external rotor.

A safety fan guard is fitted on the air flow outlet.

Fans with low rpm are fitted on super silenced units and therefore some models have more fans.

Condenser.

Made up of two finned coils with copper pipes and aluminium fins. Circuits are made to create two independent circuits.

Circuits are made so as to create two independent circuits.

Evaporator.

Evaporator AISI 316 stainless steel braze welded plates type with two independent circuits on the refrigerant side and one on the water side, complete with water differential pressure switch. On the Heat Pump units it is always installed an antifreeze heater.

Electrical board.

Includes: main switch with door safety interlock; fuses; overload protection for compressors and thermocontacts for fans; interface relays; electrical terminals for external connections.

Microprocessor.

For the automatic control of the unit.

It allows the continuous display of the operational status of the unit, control set and real water temperature and, in case of partial or total block of the unit, indication of security device that intervened.

Cooling versions refrigerant circuit.

Each unit includes two independent refrigerant circuits.

Made of copper pipe, it includes the following components on all models: electronic thermostatic expansion valve; filter drier; liquid and humidity indicator; high and low pressure switches (fixed setting); safety valve in 8104P ÷ 12240P models; liquid line shut-off valves in 8104P ÷ 12240P models.

Heat pump versions refrigerant circuit.

The unit in heat pump version, in addition to the components of the cooling only unit, includes for each circuit: 4-Way inversion valve; liquid separator on the suction line; liquid receiver; check valves; liquid line shut-off valves in 8104P ÷ 12240P models.

Water circuit.

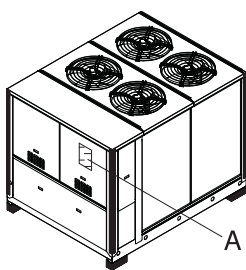
It includes: evaporator; temperature sensor; antifreeze sensor; manual air vent; water drain.

2. Shipment

- 2.1 Inspection on receipt
- 2.2 Position of the equipment
- 2.3 Equipment
- 2.4 Storage
- 2.5 Handling
- 2.6 Unpacking
- 2.7 Access to internal parts
- 2.8 Resting on the ground

2.1 Inspection on receipt

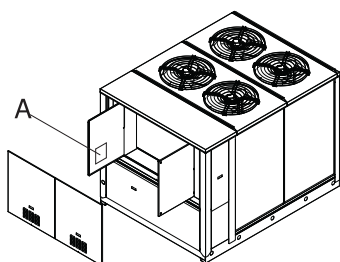
A Packaging plate



- Before accepting the delivery, check:
 - That the unit has not been damaged during transport.
 - That the delivered material is as specified on the shipping document when comparing the data with the package plate 'A'.
- In case of damage or faults:
 - Immediately take note of the damage on the shipping document and write: "Accepted with reservations for evident loss/damage during transport".
 - Submit a complaint by fax and by registered mail with return receipt to the carrier and the supplier.

2.2 Position of the equipment

A Pocket for documents



⚠ Keep the documentation in a dry place to prevent deterioration, for at least 10 years for future reference.

⚠ Any accessories that are not factory-fitted are supplied in separate packages, with a relevant instruction sheet.

2.3 Equipment

- Installation, operating and maintenance manual;
- Wiring diagram;
- Refrigerant diagram;
- Water diagram;

- List of parameters;
- Declaration of conformity;
- Technical data.

2.4 Storage

The room temperature in which the units are stored must be between $-20 / +50^{\circ}\text{C}$.

2.5 Handling

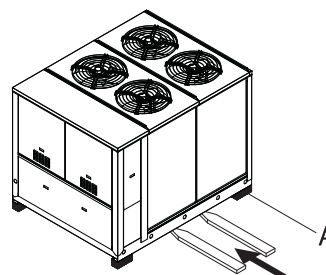
- The equipment is designed for two lifting systems according to the length of the machine.



It is prohibited to use the pipes or other components of the machine as lifting points.

2.5.1 Lifting with forks

A Support

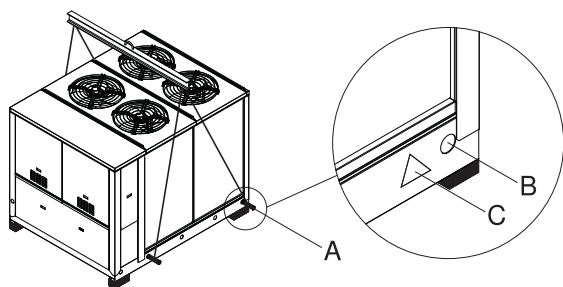


Models with a length shorter than 6700 mm

- Insert the forks from the side to avoid damaging the panels.
- Before placing the machine on the ground remove the wooden supports.

2.5.2 Lifting with a crane

A	Bar for lifting (maximum $\varnothing$ 63 mm)
B	Hole to insert the lifting bar
C	Label for holes enabled for lifting



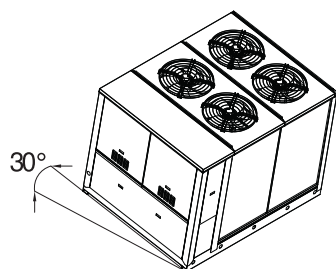
⚠ It is recommended to use a system to prevent the belts from slipping from the bars during lifting.

⚠ Place spacers and protectors in between prevent damaging the unit.

All models

- Insert the lifting bars into the arranged holes on the base and indicated by the relative labels.
- Lift the unit using suitable belts.

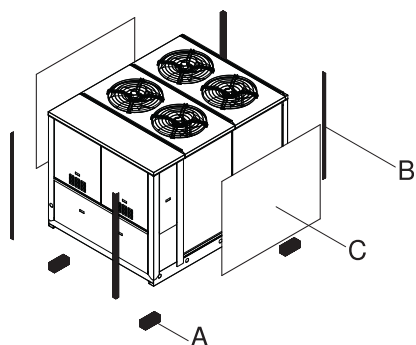
⚠ Make sure that all the equipment used for handling (belts, bars, etc.) are appropriate for the weight of the unit.



⚠ During handling it is prohibited to exceed the maximum inclination allowed, as shown in the figure.

2.6 Unpacking

A	Wooden support
B	Corner protector
C	Coil protection



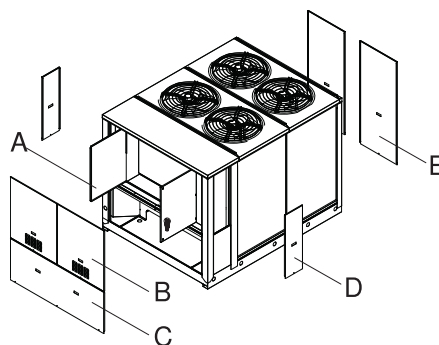
- Remove the wooden supports before resting it definitely on the ground.
- Remove the clear film that wraps the machine.
- Remove the corner protectors.
- Remove the coil protectors.

⚠ The machine is supplied without shock absorbers. Install any shock absorbers before resting the machine definitely on the ground.

⚠ Only remove the packaging when set in the place of installation.

2.7 Access to internal parts

A	Electrical board door
B	Electrical board access panel
C	Lower access panel
D	Lateral access panel
E	Rear access panel



- Unscrew the fixing screws and remove the panels.

To access the electrical board:

- Remove the panels of the electrical board.
- Set the disconnecting switch knob to Off.
- Open the doors of the electrical board.

2.8 Resting on the ground

The unit must be positioned on a perfectly horizontal surface that is able to withstand its weight. Positioning must be performed slowly and so that all support points are touching the floor.

3. Installation

- 3.1 Installation location requirements
- 3.2 Work fields
- 3.3 Unit location
- 3.4 Verifying clearances (clearance area)

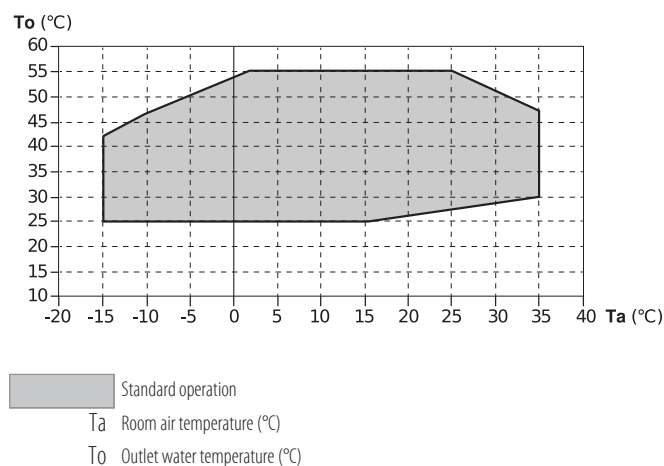
3.1 Installation location requirements

The installation place must be chosen as specified in standard EN 378-1 and the requirements of standard EN 378-3. In any case, the installation site must consider the risks associated with an accidental leak of refrigerant gas contained in the direct expansion units. Do not install the unit near flammable materials or others that could cause a fire. Provide specific fire-fighting measures.

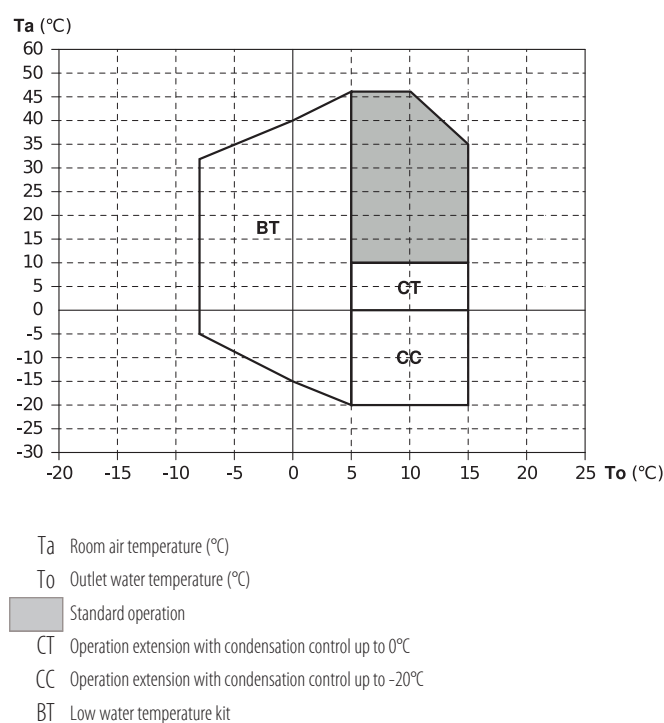
3.2 Work fields

The work fields are indicative, near the operating range limits the units may choke the cooling capacity. Check the actual capacity by using the capacity tables or the selection software.

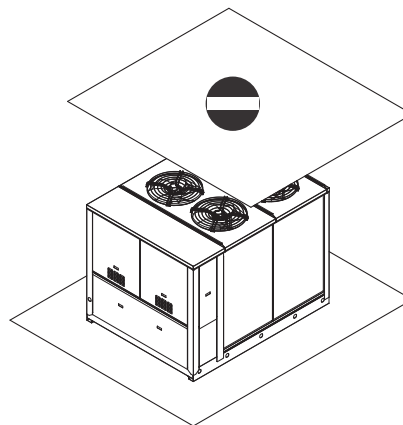
Operating mode: heating



Operating mode: cooling



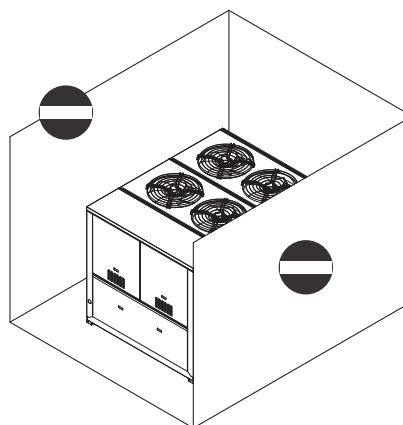
3.3 Unit location



The unit should be positioned far from any obstacle.

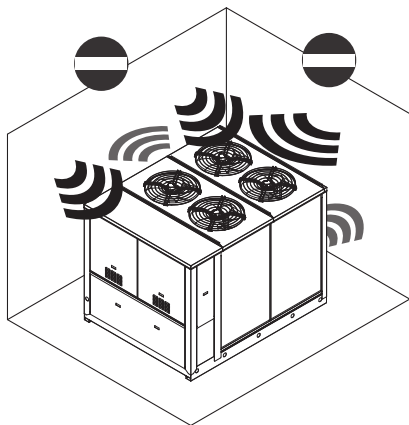
It is prohibited to place the unit under a roof, canopy or any covering in general.

! The heat pump units allow ice and condensation to form that pours on to the floor in front of the unit. Collect and drain the condensation and defrost water to prevent the floor from becoming slippery.



It is prohibited to place the unit inside basement windows.

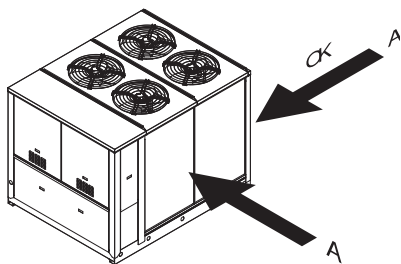
3.3.1 Noise



During operation, the unit generates noise.

- ⚠ Avoid installation in reverberant environments.
- ⚠ Avoid placing the machine with the side of the coil in the direction where the noise level is more critical.

3.3.2 Windy areas (Resting on the ground)

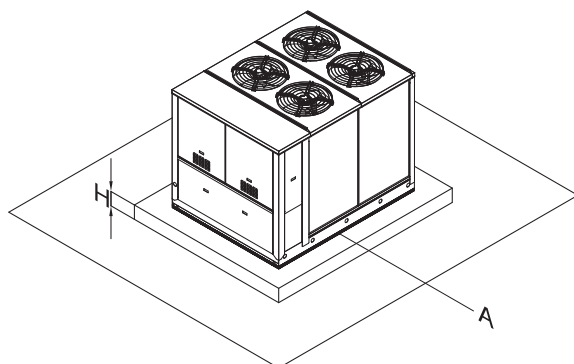


The wind may alter the operating conditions. Place the unit with the long side parallel to the prevailing wind direction in order to minimise the effects.

- ⚠ Avoid placing it with the coil perpendicular to the direction of the main wind.

3.3.3 Resting on the ground

A	Rigid rubber band
H	Slab of 10-15 cm



- Place the unit on a perfectly level support surface.
- Place a rigid rubber band between the base of the machine and the support surface.

- ⚠ Verify that the support surface withstands the weight of the unit.
- ⚠ Provide a supporting slab of proportional dimensions with the unit if resting on unstable ground.

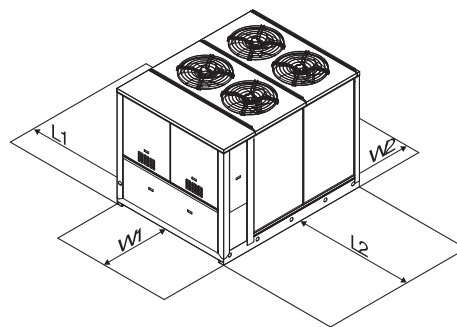
- ⚠ The slab must be horizontal and able to withstand approximately 200% of the operating weight of the machine.

- ⚠ If necessary, use shock absorbers (rubber or spring).

- ⚠ A drain for the water produced by coils defrosting must be implemented for the WP units.

3.4 Verifying clearances (clearance area)

L1	1800
L2	1800
W1	1000
W2	500



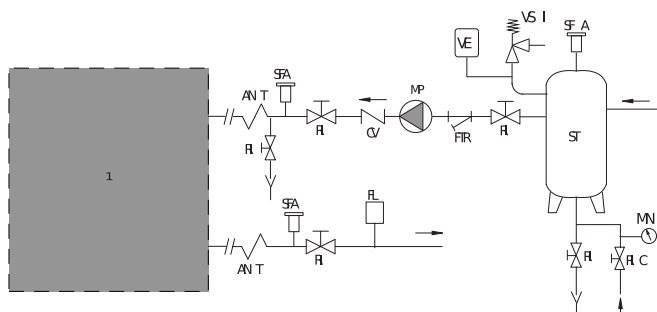
- Installation, in addition to the indicated spaces, must enable access to the authorised personnel for maintenance operations and must take into account the safety distances from any other equipment installed near the machine.

4. Water connections

- 4.1 Connection diagram
- 4.2 Position of connections
- 4.3 Hydraulic data
- 4.4 Connection to the system
- 4.5 System fill-up
- 4.6 Desuperheater connection

4.1 Connection diagram

1	Unit
ANT	Anti-vibration joint (recommended)
CV	Check valve
FL	Flow switch (mandatory)
FTR	Mesh filter (mandatory)
MN	Water gauge
MP	Circulating pump
RI	Shut-off ball valve
RIC	Automatic water filling valve
SFA	Automatic air vent (mandatory)
ST	Inertial tank
VE	Expansion vessel
VSI	Safety valve (mandatory)



⚠ Some of the components in the diagram may already be included in the unit with the hydronic kit. Those not included must be provided by the installer.

⚠ Connection pipes must have a suitable diameter and be supported so as not to impose their weight on the unit.

4.2 Position of connections

The position of the water connections and the inlet and outlet direction is indicated by the labels on the connections.

4.3 Hydraulic data

4.3.1 Water volume

The machine electronic control, to protect the electrical motor, limits hourly start up of the compressor.

This operation creates oscillations of the water temperature in the draw-off point, affecting plant efficiency.

For a correct operation, the water volume must comply with the following formula:

For cooling only version only

$$M > 9,45 \times k \times n / N \times (Q_f - q)$$

For heat pump version only

$$M > 9,45 \times k \times n / N \times (Q_t - q) + 2,37 \times (Q_t - q)$$

M = Minimum water content (l);

k = Factor that takes into account the different water temperature value between the inlet and outlet of the evaporator or condenser;

n = Partition coefficient (n=1 unit up to 4 compressors; n=2 units with more than 4 compressors);

N = N. compressors;

Q_f = Cooling capacity (kW);

Q_t = Heating capacity (kW);

q = Permanent thermal load in the system (kW), (q=0 if the value is unknown).

ΔT (K)	K
3	1
4	1
5	1
6	1.05
7	1.1
8	1.15
9	1.2
10	1.25

⚠ For the process application a 50% higher water content is recommended to stabilize the outlet temperature (1.5 x M calculated with the previous formulas).

If the water volume in the circuit (V) does not reach what is indicated, installing a new inertial storage tanks shall be required.

Storage size shall be calculated so that with its volume, added to the water quantity inside the circuit, the value indicated in the formula is reached.

4.3.2 Water features

Water features are important for the proper operation of the machine and for its lifetime. Extreme water hardness leads to the formation of limestone in exchangers reducing their performance.

The table shows some water parameters to be observed for proper operation of the machine.

Content		Concentration mg/l or ppm	Material	
			AISI 316L	Copper
pH		<6	2	2
		6-7.5	2	2
		7.5-9	1	1
		>9	1	2
Alkalinity	HCO ₃	<70	1	2
		70-300	1	1
		>300	1	2
Sulphate	SO ₄ ²⁻	<70	1	1
		70-300	1	3
		>300	1	3
Alkalinity/Sulphate	HCO ₃ -/SO ₄ ²⁻	>1	1	1
		<1	1	3
Electrical conductivity	μS/cm	<10	1	2
		10-500	1	1
		>500	1	2
Ammonium	NH ₄	<2	1	1
		2-20	1	2
		>20	1	3
Free chlorine	Cl ₂	<1	1	1
		1-5	3	1
		>5	3	3
Hydrogen Sulphide	H ₂ S	<0.05	1	1
		>0.05	1	3
Free Carbon Dioxide	CO ₂	<5	1	1
		5-20	1	2
		>20	1	3
Nitrate	NO ₃	<100	1	1
		>100	1	2
Iron	Fe	<0.2	1	1
		>0.2	1	2
Aluminium	AL	<0.2	1	1
		>0.2	1	2
Manganese	MN	<0.1	1	1
		>0.1	1	2

1 - Good corrosion resistance.

2 - If different factors of this type are present, corrosion can occur.

3 - Use not recommended.

4.3.3 Protection against freezing

If you do not wish to drain the system during periods where the machine is not used, the water may freeze, or if the system must operate with temperatures less than 5°C, ethylene glycol must be mixed with the water.

Adding glycol changes the physical characteristics of the water and the performance of the machine.

The table indicates the multiplicative factors to calculate the performance change based on the percentage of glycol used.

% G	10	20	30	40	50
Tc	-4.5	-9.5	-15.5	-21.5	-32.5
CQ	0.975	0.953	0.931	0.914	0.882
CP	0.998	0.995	0.99	0.985	0.975
CG	1.01	1.04	1.08	1.14	1.2
CP	1.05	1.13	1.21	1.26	1.32

% G = Glycol percentage

Tc = Water freezing temperature (°C)

CQ = Cooling capacity correction factor

CP = Electrical power absorbed correction factor

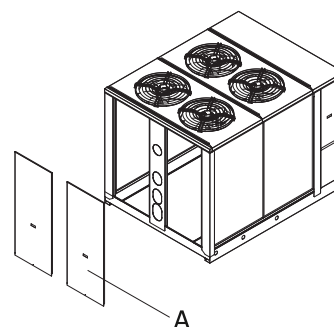
CG = Water flow correction factor

Cp = Pressure drops correction factor

4.4 Connection to the system

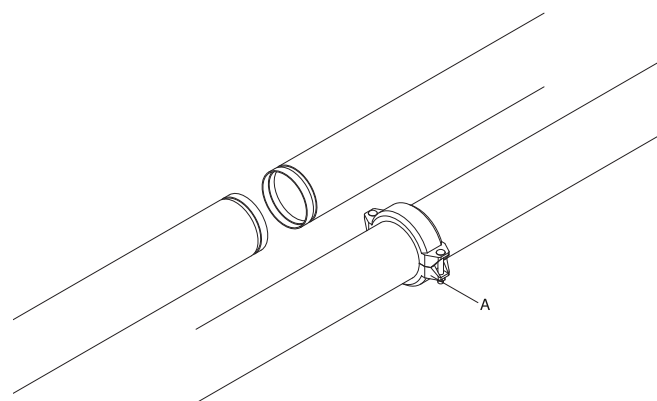
4.4.1 Models without hydronic kit

A Rear panel



In these models, the connections are positioned inside the unit.

- Remove the inspection panels.
- Remove the protection caps from the connections.
- Connect the pipes to the connections.



For threaded connections:

- Fasten by holding a part in order to tighten the other part.
- It is recommended to seal with hemp and green paste.

For Victaulic connections:

- Secure by using the appropriate coupling system (not supplied).

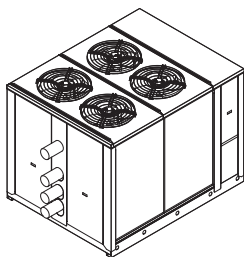


Provide shut-off valves and anti-vibration joints on the connection pipes.



During the hydraulic connection operations, never operate with free flames near or inside the unit.

4.4.2 Models with hydronic kit



In these models, the connections are positioned outside the unit.

- Remove the protection caps from the connections.
- Connect the pipes to the connections.

For threaded connections:

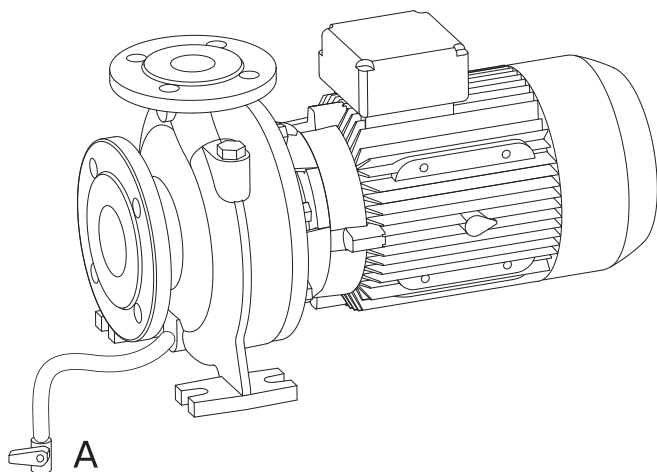
- Fasten by holding a part in order to tighten the other part.
- It is recommended to seal with hemp and green paste.

For Victaulic connections:

- Secure by using the appropriate coupling system (not supplied).

4.5 System fill-up

A Pump drainage shut-off valve



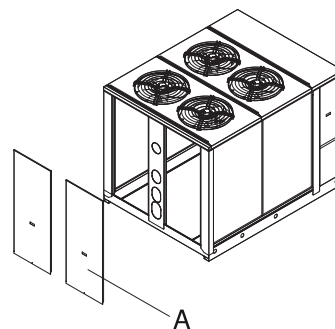
- Before performing any operation, make sure the main switch is off.
- If the hydronic kit is installed, make sure the pump drainage shut-off valve (A) is closed.
- Make sure that the drain valves are closed and the air vent valves are open.
- Open the shut-off valves of the water system.
- Start filling.
- When the water begins to leak from the vent valves, close them and bring the water pressure to the value required by the system (1 - 1.5 bar). Keep in mind that safety valve calibration is 6 bar.
- When the water pressure has stabilised (read the pressure gauges installed on the upper side), close the fill-up valve and check the tightness of the various joints.

⚠ It is advisable to periodically check the pressure in the water circuits to prevent malfunctions.

⚠ The water circuits must always be topped-up with the pumps off.

4.6 Desuperheater connection

A Rear panel



The connections are positioned inside the unit.

- Remove the inspection panels (A).
- Remove the protection caps from the connections.
- Connect the pipes to the connections.

For threaded connections:

- Fasten by holding a part in order to tighten the other part.
- It is recommended to seal with hemp and green paste.

For Victaulic connections:

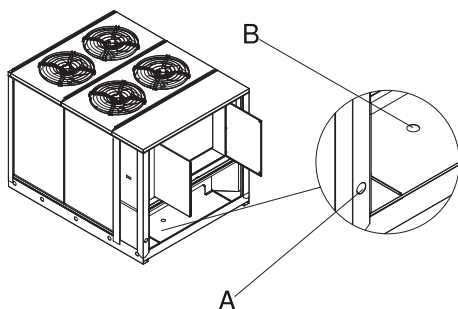
- Secure by using the appropriate coupling system (not supplied).

5. Electrical connections

- 5.1 Machine connection
- 5.2 Connections of the accessories

5.1 Machine connection

A	Pre-cut for front inlet
B	Hole for bottom inlet



The unit is provided with holes for the power cables inlet. There is a pre-cut hole on the structure and a hole on the base for any input from below.

- Remove the pre-cut.
- Insert the cables from the outside, guiding them towards the electrical board.

⚠ Avoid direct contact with non-insulated copper pipes and with the compressor.

⚠ It is forbidden to enter the device with electrical cables in positions not specifically required in this booklet.

To set up the electrical connections:

- Unscrew the fixing screws.
- Remove the external panels.
- Set the main switch to 0.
- Turn the two fixing screws 1/4 of a turn and open the board doors.
- Use the hole for the main power cable and the hole for the cables of other external connections.
- Make the connections as shown in the wiring diagram.
- Once the electrical connections are completed, secure the cables by using the cable glands, close the doors of the electrical panel and reassemble the external panels by screwing the fixing screws.

⚠ Before connecting the remote ON-OFF switch, remove the jumper from the relative clamps.

5.2 Connections of the accessories

5.2.1 Flow switch

The chiller must only operate in the presence of water flow. The flow switch (if not already present) must be connected as shown in the wiring diagram.

5.2.2 Circulating pump

The circulating pump must always be connected to the control unit as indicated in the wiring diagram. The pump must be started before the chiller is started and stopped after the chiller is stopped (recommended minimum delay: 60 seconds).

5.2.3 External consents

If you wish to enable or disable the unit remotely, connect the external consent to the contacts listed in the wiring diagram.

⚠ Avoid placing the control cables in the same duct as the power cables. Always use a suitable shielded cable.

⚠ The connection cables must have a minimum cross section of 1.5 mm².

6. Commissioning

- 6.1 Preliminary inspections
- 6.2 First start-up or restart after long inactivity
- 6.3 Shut-down
- 6.4 Flow rate calibration

6.1 Preliminary inspections

6.1.1 Electrical

- Verify that the voltage on terminals L1, L2 and L3 is that shown on the plate of the unit (tolerance allowed) $\pm 5\%$, which can be checked with a tester. If voltage changes occur frequently, please contact our technical department to choose suitable protections.
- Verify the complete tightness of the fuse holder caps.
- Verify that the crankcase heaters (if applicable) are powered correctly: to check whether the heaters are working properly, check that the bottom of the compressor is at a temperature of 10 to 15 °C higher than the ambient temperature.
- Power and check the correct direction of rotation for the three-phase version, which should be clockwise looking at the motor from the fan side. Otherwise, invert any two of the phase conductors.

6.1.2 Hydraulic

- Make sure that the water circuit has been previously cleaned: it is recommended to wash the water circuit via by-passing the unit and then check the cleanliness of the system filter.
- The machines are shipped with open vents and drains, which must be closed during installation when filling the water circuit. Labels indicate their positions.
- In models with a hydronic kit, the water drain cap of the pump has been removed, in order to drain the water contained in it and to avoid freezing problems during the winter season. The cap is inside the envelope containing all documents of the unit.
- Make sure that the hydraulic system has been bled, thereby eliminating any residual air. The operation must be performed by loading gradually and opening the venting devices set up by the installer in the upper part of the system.
- If you are using glycol water you can move the antifreeze set-point. The value must be equal to the value of the freezing temperature of the fluid plus 6K.

6.1.3 Cooling

- Make sure that the pressure gauges (when present) indicate an adequate pressure. Pressure gauges can be fitted with shut-off valves. They should only be opened when necessary and once readings are taken, they must be closed again.
- Check that there is no refrigerant leak, possibly using a leak detector.

6.2 First start-up or restart after long inactivity

6.2.1 Start-up

Activate the machine according to that described in the relative command section.

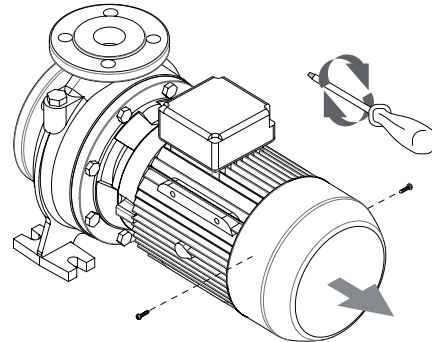
6.2.1.1 Checks during operation

- Check that the machine does not generate abnormal noise or excessive vibrations.
- After a few hours of operation verify that the crown of the liquid and humidity indicator indicates a dry circuit.
- Verify that the machine operates within the optimum working range.
- Verify that there is no excessive presence of bubbles in the liquid indicator. If there are this indicates low refrigerant.
- A few minutes after the compressors are started, during the summer mode cycle, make sure that the condensing temperature is $18 \pm 4\text{K}$ higher than the air temperature entering the condenser and that the average evaporating temperature is approximately 5K lower than the water temperature leaving the utility exchanger.
- Verify that the overheating temperature of the refrigerant is between 5 and 7K. To verify:
 - Measure the temperature with a contact thermometer placed on the intake pipe of the condenser.

- Read the temperature indicated on the pressure gauge connected to the inlet.
- The difference between these temperatures provides the overheating value.
- Verify that the subcooling temperature of the refrigerant is between 4 and 8K. To verify:
 - Measure the temperature with a contact thermometer placed on the outlet pipe from the condenser.
 - Read the temperature indicated on a pressure gauge connected to the liquid outlet of the condenser.
 - The difference between these temperatures provides the subcooling value.

! The tests referred to above can be performed using the pressure gauges supplied with the unit (accessories). Once the checks are complete, close the shut-off valves of the pressure gauges.

6.2.2 Pump release procedure



- Before starting the pump, check that the moving parts rotate freely.

To release the pump:

- Remove the fan cover from the seat of the rear motor cover.
- Use a screwdriver on the present slot on the motor shaft from the fan side.
- In case of blockage, turn the screwdriver by tapping it lightly with a hammer.
- When the operations are completed, reassemble the components in reverse order.

6.3 Shut-down

6.3.1 Temporary shut-down

Disable the machine according to that described in the relative command section.

! Do not disconnect the power supply by acting on the disconnecting switch on board the machine or the main switch of the system. If no voltage is present, the crankcase heaters and any anti-freeze heaters cannot work, thereby, posing a risk of freezing.

6.3.2 shutting down for long periods;

Not using the unit for a long period of time requires the following operations to be performed:

- Disable the unit in any mode of operation it may be, from the control panel.
- Set the remote switch to "OFF" (if present) after having turned off the unit.
- Disable the internal terminal units by setting the switch of each unit to "off".
- Set the main switch of the system to "off".
- Close the water valves.

 If, during the period of inactivity the temperature drops below zero, the system must be fully emptied or topped up with antifreeze liquid.

6.4 Flow rate calibration

Once the pump has started, verify that the fluid flow rate of the utilities is within the expected values for the unit.

To verify:

- Use pressure gauges set before and after the circulating pump to measure the pressure difference.
- Verify that the pressure difference measured is equal to the pressure drop in the system, including the heat exchanger.

To correct:

- Turn the valve installed downstream of the pump to increase or decrease the pressure difference.
- Mark the position of each valve to reposition it in the same position after closing for maintenance operations.

If there are no pressure gauges:

- Verify the temperature difference between the utility fluid input and output when the unit is operating regularly (all compressors on).
- The difference in water temperature between input and output must be between 4° and 6°C:
 - If it is below 4°C, the water flow rate is too high: slightly close the discharge valve of the pump.
 - If it is more than 6°C, verify the pressure drops in the water circuit.

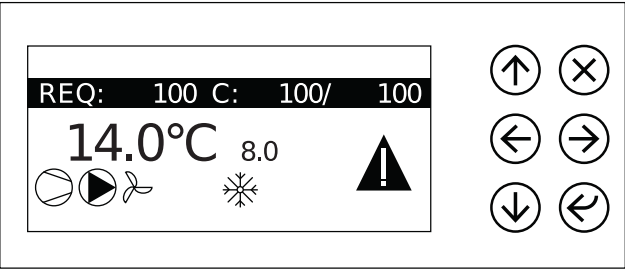
 For units equipped with two pumps, you will have to repeat the calibration for each pump.

7. Control Panel

- 7.1 User interface
- 7.2 Switch on and off
- 7.3 Settings
- 7.4 Unit Status
- 7.5 Alarms
- 7.6 Login
- 7.7 Software

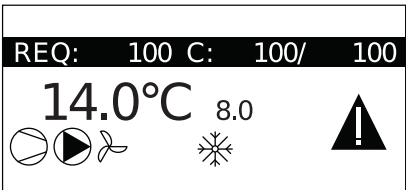
7.1 User interface

7.1.1 Control panel



The control panel enables all machine functions to be performed, to display its operation and any alarms which may be triggered.

7.1.2 Display



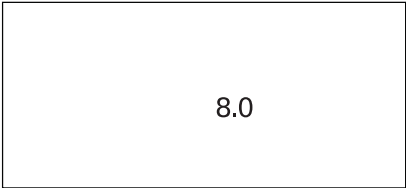
From the display of the control panel it is possible to see the sizes of the values set and machine operation may be displayed through the LEDs.

Inlet water temperature



Indicates inlet water temperature.

Set-point



Indicates the Set-Point temperature.

Alarm



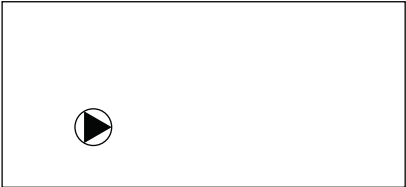
Indicates that a machine operation alarm has triggered.

Compressor



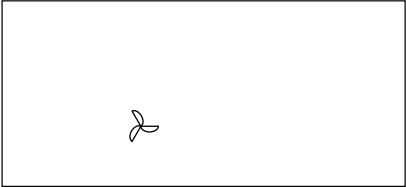
Indicates compressors operation:
- on, compressor active;
- flashing, compressor in standby;
- white filling, indicates the power percentage dedicated.

Pumps



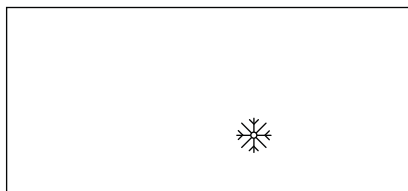
Indicate pumps operation.

Fans



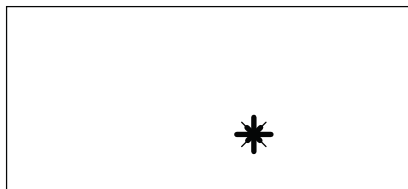
Indicates fan operation.

Cooling



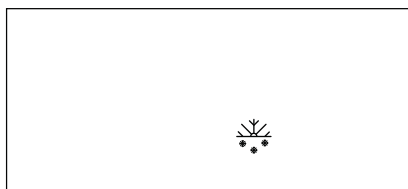
Indicates that the machine is operating in cooling mode.

Heating



Indicates that the machine is operating in heating mode.

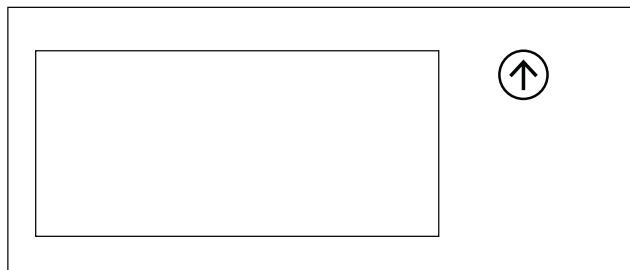
Defrosting



Indicates that the machine is operating in defrosting mode.

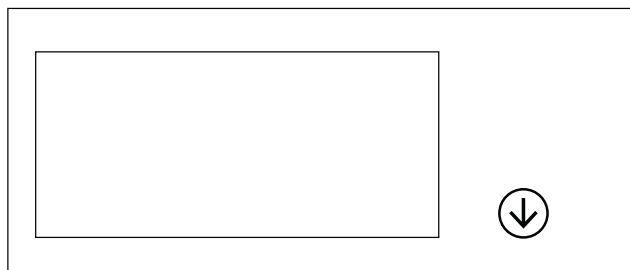
7.1.3 Function keys

UP Function



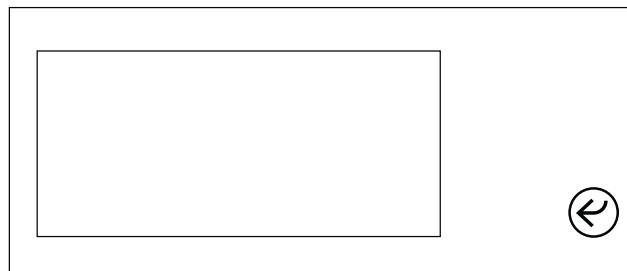
By using the UP key it is possible to move upwards between the parameters and increase a value.

DOWN Function



By using the DOWN key it is possible to move downwards between the parameters and decrease a value.

ENTER Function



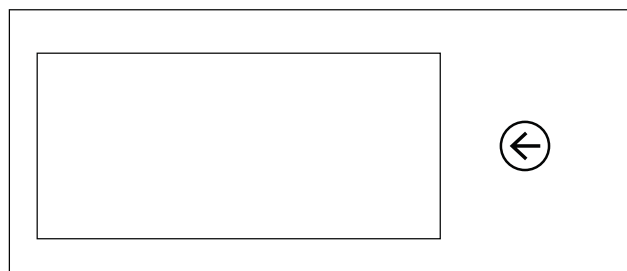
Enter a menu and save a value by using the ENTER key.

RIGHT Function



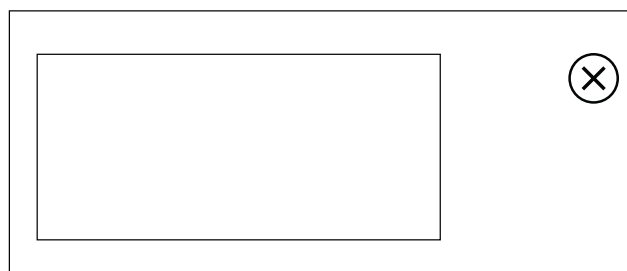
By using the RIGHT key it is possible to move to the right within the parameters.

LEFT Function



By using the LEFT key it is possible to move to the left within the parameters.

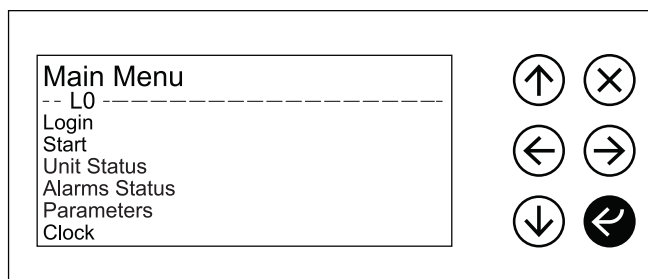
ESC Function



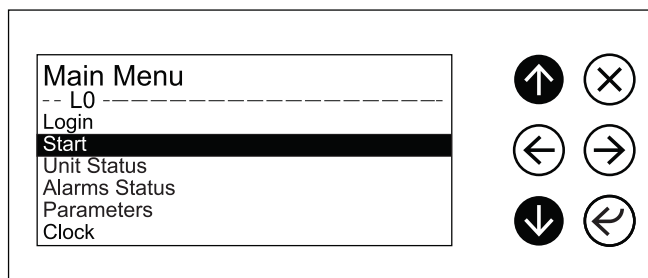
By using the ESC key it is possible to exit a menu and display an alarm that has triggered.

7.2 Switch on and off

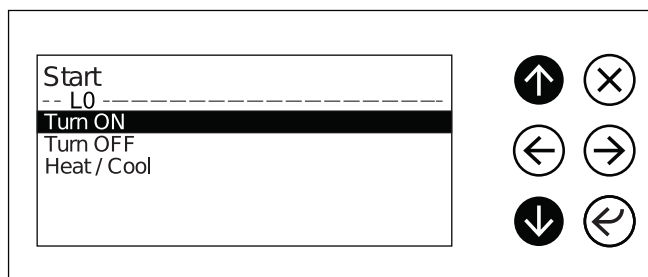
Press the ENTER key to access the main menu in order to switch the unit on or off.



Select the start-up menu.

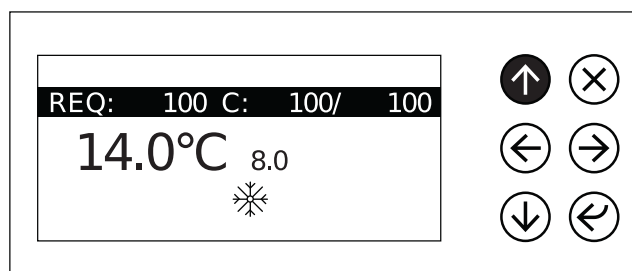


Press the ENTER key.

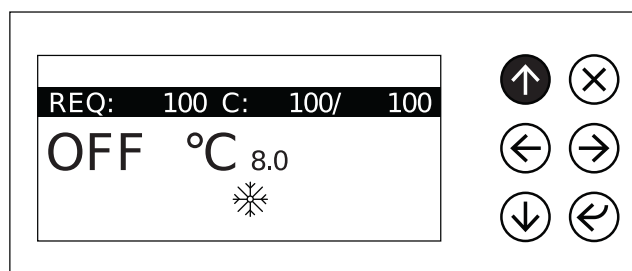


By using the UP and DOWN keys it is possible to select unit start-up and shutdown.
Press the ENTER key to confirm.

The unit can be switched on or off directly from the main screen: pushing the UP key for 5 seconds the unit switches from on to off and vice versa.



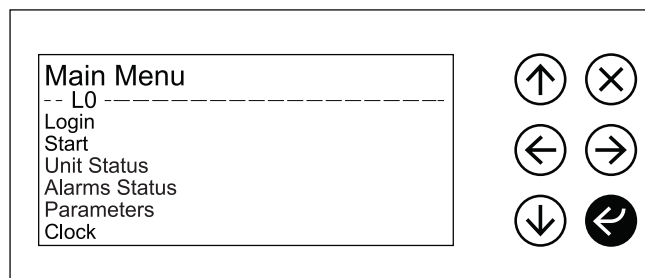
If the machine is switched off, the display will show the sign OFF.



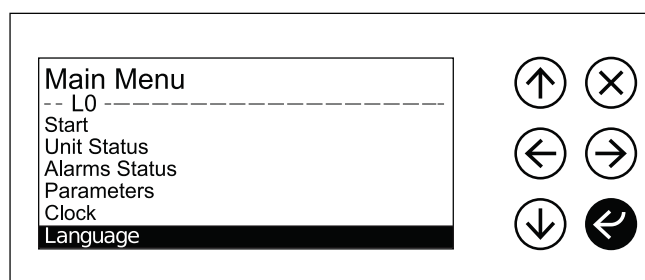
7.3 Settings

7.3.1 Language

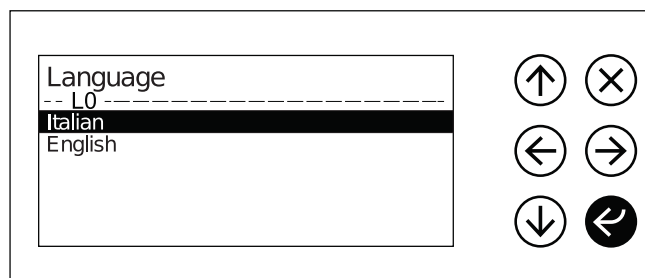
It is possible to select the software language.
Press the ENTER key to access the main menu.



Select the language menu.
Press the ENTER key.



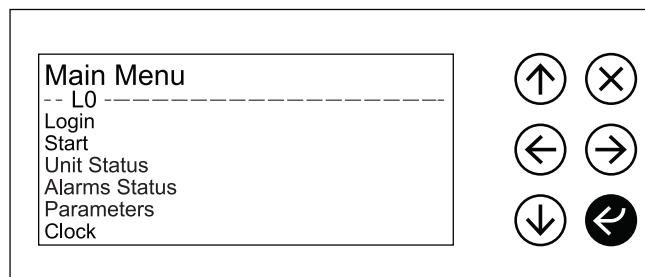
Select the desired language from those available.
Press the ENTER key to confirm.



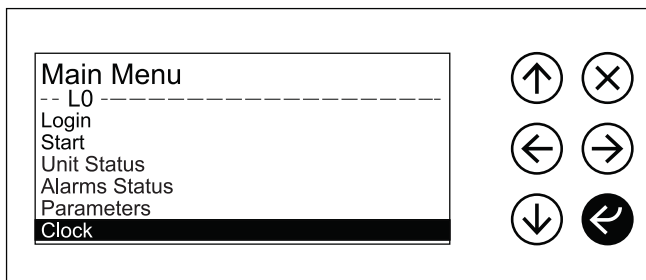
All software contents will appear translated in the language selected.

7.3.2 Date and time

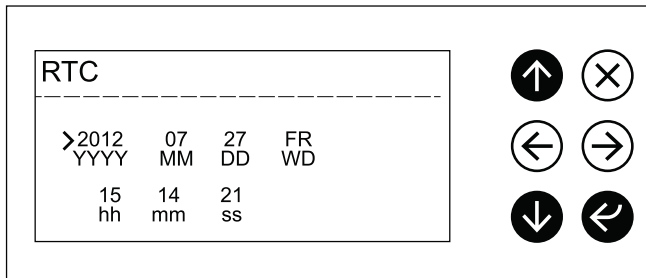
The adjustment must be made while the machine is off.
Press the ENTER key to access the main menu.



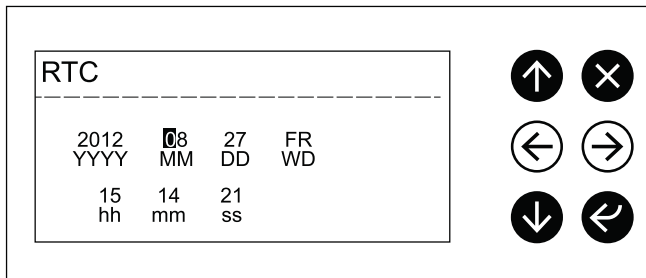
Select the clock menu.
Press the ENTER key.



Select the parameter to be changed by placing the cursor on the side.
Press the ENTER key.

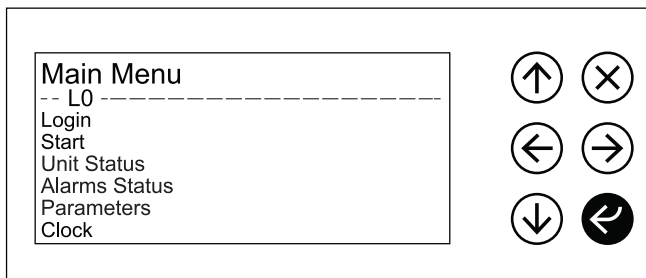


Change the value by using the arrow keys.
Press the ENTER key.
Press the ESC key to exit.

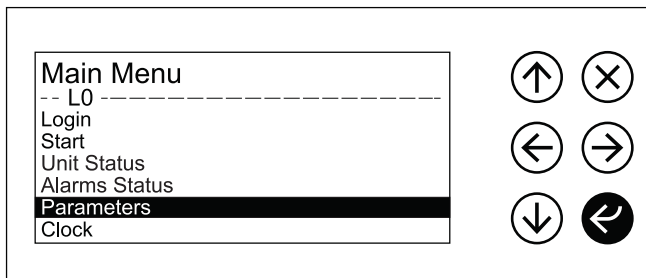


7.3.3 Unit configuration

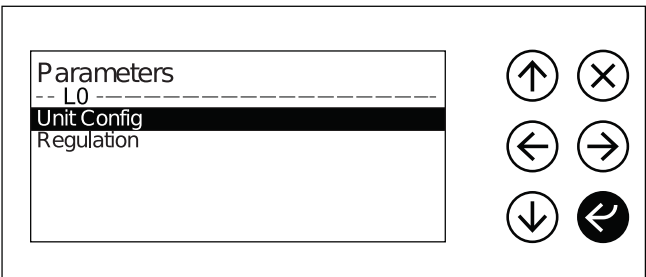
The control panel unit of measurement can be configured.
Press the ENTER key to access the main menu.



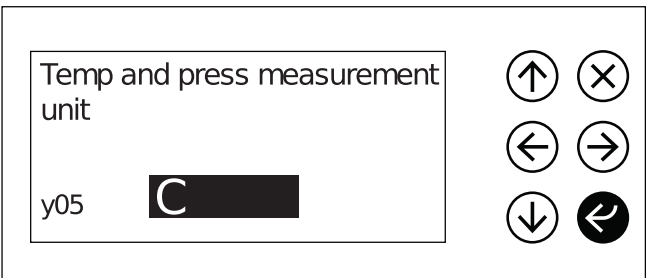
Select the parameter menu.
Press the ENTER key.



Select the unit configuration menu.
Press the ENTER key.

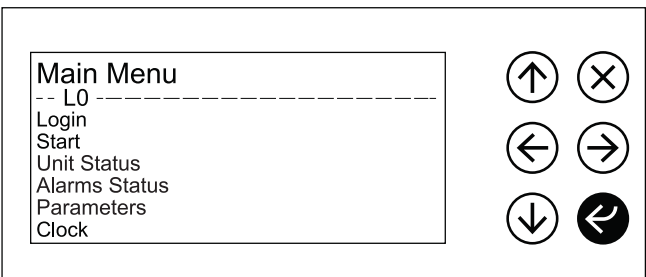


By using the UP and DOWN keys it is possible to change the unit of measurement of the control panel from Celsius to Fahrenheit.
Press the ENTER key to confirm.

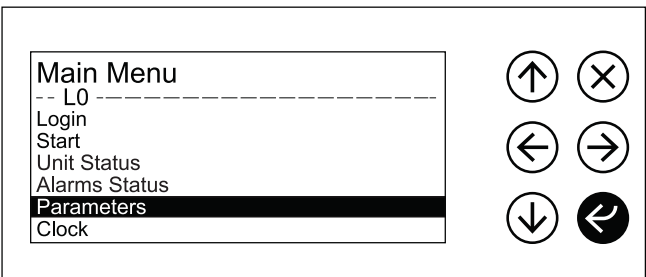


7.3.4 Set-point

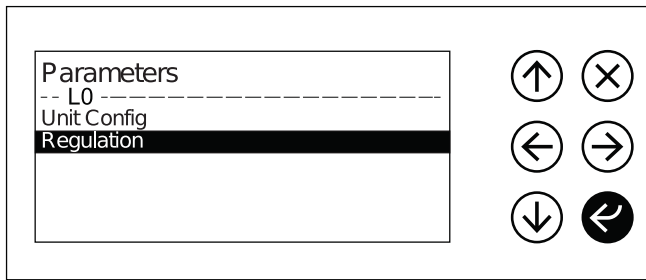
The machine inlet water temperature can be set from the control panel.
Press the ENTER key to access the main menu.



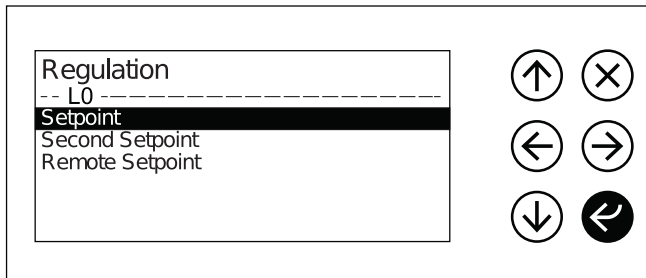
Select the parameter menu.
Press the ENTER key.



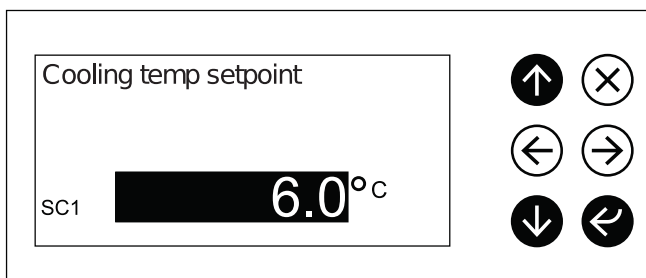
Select the adjustment menu.
Press the ENTER key.



Select the set-point menu.
Press the ENTER key.



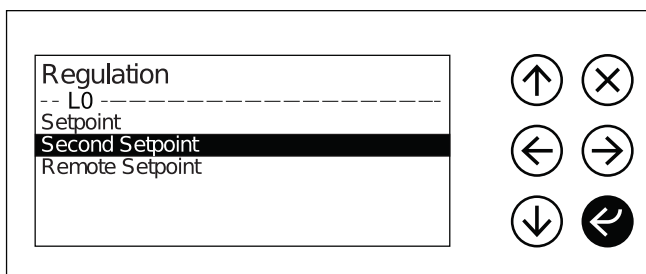
By using the UP and DOWN keys it is possible to choose between the machine set-point in the heating or cooling operating mode.
Once the set-point you wish to change has been selected, press the ENTER key and set the desired value by using the UP and DOWN keys.
Press the ENTER key to confirm.



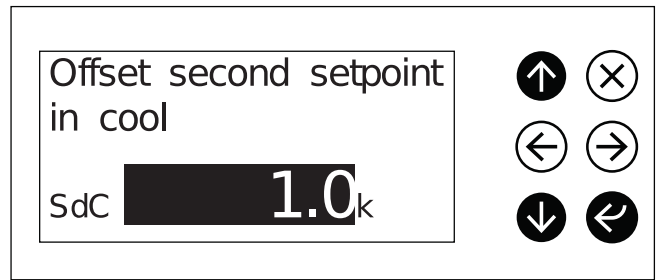
Second set-point (accessory).

The second set-point is a value expressed in Kelvin which indicates the temperature difference of the set-point obtained by its enabling.
The value can be set and then, only for units equipped with the IAS accessory (factory fitted accessory), enabled or disabled.

From the adjustment menu, select the second set-point menu and press the ENTER key.



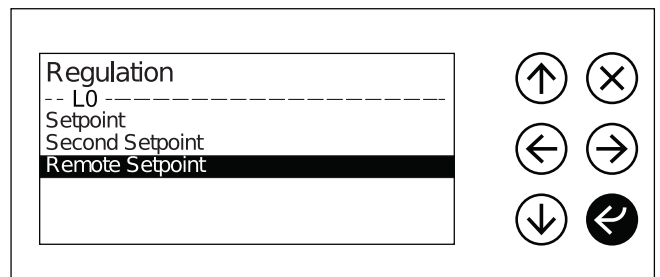
By using the UP and DOWN keys it is possible to choose between the second machine set-point in the heating or cooling operating mode.
Once the second set-point you wish to change has been selected, press the ENTER key and set the desired value by using the UP and DOWN keys.
Press the ENTER key to confirm.



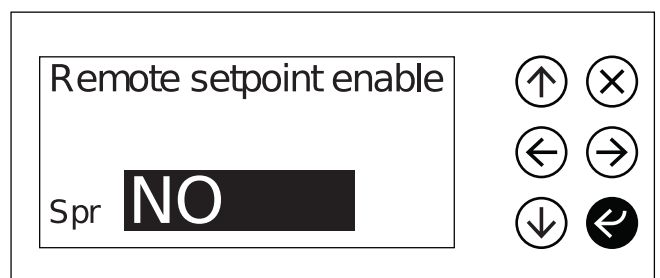
Remote set-point (accessory)

In units fitted with the IAV or IAA accessory (factory fitted accessories), the set-point can be modified by using a remote signal.
Operation can be enabled by using the remote set-point function.

From the adjustment menu, select the remote set-point menu and press the ENTER key.



Press the ENTER key.

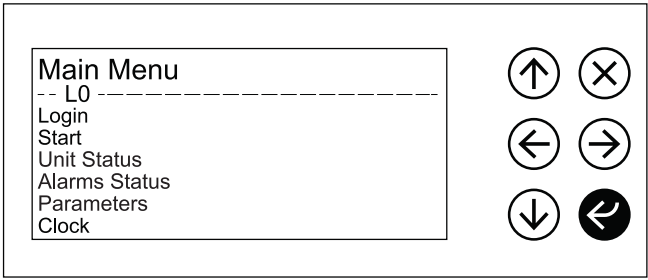


The remote set-point can be enabled or disabled by using the UP and DOWN keys.
Press the ENTER key to confirm.

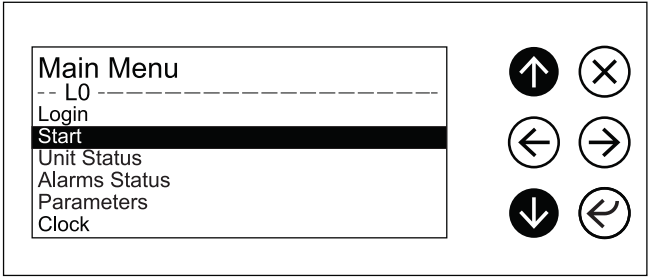


7.3.5 Operating mode change

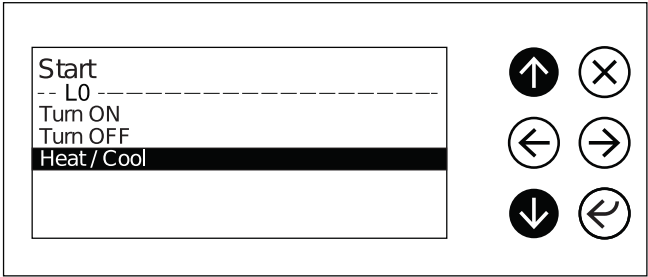
The machine operating mode can be changed from the control panel.
Press the ENTER key to access the main menu.



Select the start-up menu and press the ENTER key.

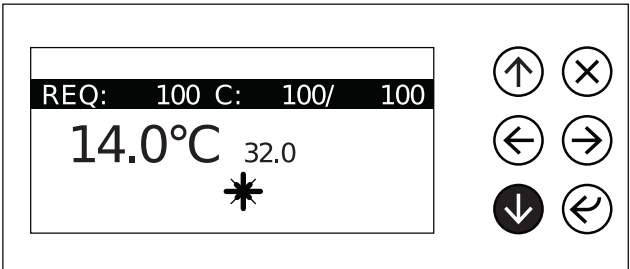


Select the Heating/Cooling menu.

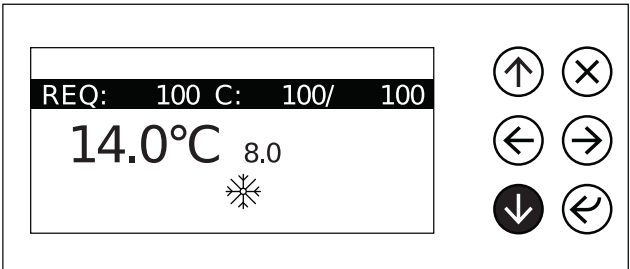


By pressing the ENTER key the unit switches from heating to cooling operation and vice versa.
The control panel will return to the main screen, displaying the icon related to the operating mode.

The unit operating mode can be changed directly from the main screen: by pushing the DOWN key for 5 seconds, the unit switches from heating to cooling operation and vice versa.

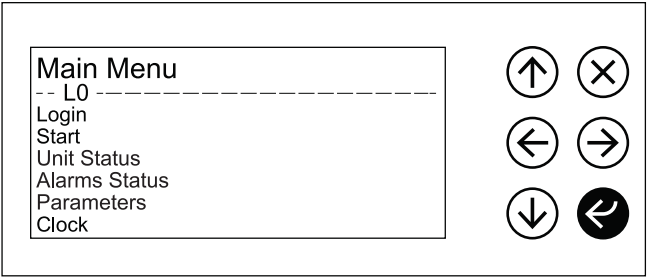


The icon relative to the operating mode in the main screen will change.

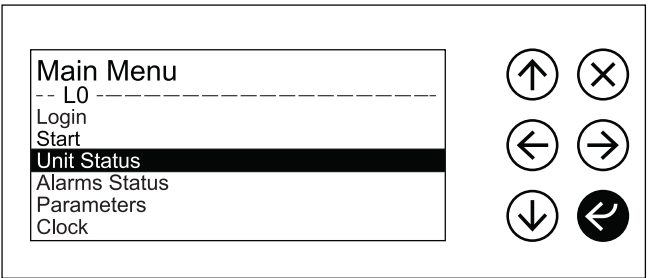


7.4 Unit Status

The unit status can be displayed.
Press the ENTER key to access the main menu.



Select the Unit Status menu.
Press the ENTER key to access the Unit Status menu.



Inputs and outputs

Select the Input/Output menu.

Unit Status
-- L0 -----
Input/Output
Expansion Valve 1
Expansion Valve 2
Compr Status
Hour Counters

↑

×

←

→

↓

↶

Press the ENTER key to access the Input/Output menu.

1
2
3
4
5
6
7
8

INPUT

15.0
10.0

23.0
23.0

0
0
0
0
0
0
0
0

OUTPUT

0
0
0
0
0
0
0
0

1
2
3
4
5
6
7
8

↑

×

←

→

↓

↶

By using the UP and DOWN keys it is possible to scroll through the inputs and outputs status list.

9
10
11
12
13
14
15
16

INPUT

0
0
0
0
0
0
0
0

OUTPUT

0
0
0
0
0
0
0
0

9
10
11
12
13
14
15
16

↑

×

←

→

↓

↶

Expansion valve 1

Select the Expansion valve 1 menu.

Unit Status
-- L0 -----
Input/Output
Expansion Valve 1
Expansion Valve 2
Compr Status
Hour Counters

↑

×

←

→

↓

↶

Press the ENTER key to display the expansion valve status.

POS: 0
S2 : 13.4 SH : 10.2
S4 : 0.0 SR : 8.0
Al : 0.0 Pe : 7.9
Te : 3.2
Alr : 0 0 0 0 0 0 0 0
Err : 0 DI : 1 SW:0

↑

×

←

→

↓

↶

Expansion valve 2

Select the Expansion valve 2 menu.

Unit Status
-- L0 -----
Input/Output
Expansion Valve 1
Expansion Valve 2
Compr Status
Hour Counters

↑

×

←

→

↓

↶

Press the ENTER key to display the expansion valve status.

POS: 0
S2 : 13.4 SH : 10.2
S4 : 0.0 SR : 8.0
Al : 0.0 Pe : 7.9
Te : 3.2
Alr : 0 0 0 0 0 0 0 0
Err : 0 DI : 1 SW:0

↑

×

←

→

↓

↶

Compressor status

Select the compressor Status menu.

Unit Status
-- L0 -----
Input/Output
Expansion Valve 1
Expansion Valve 2
Compr Status
Hour Counters

↑

×

←

→

↓

↶

Press the ENTER key to display the compressors status.

COMPRESSORS
C1 C2
C01: OFF C01: OFF
C02: OFF C02: OFF
C03: OFF C03: OFF
C04: OFF C04: OFF

↑

×

←

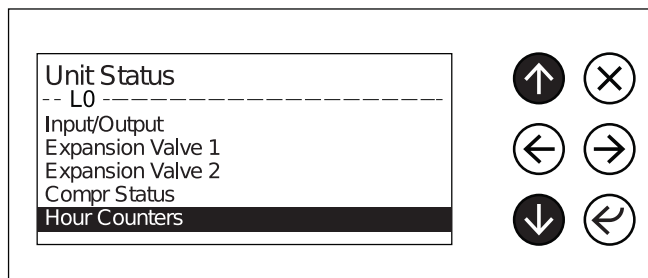
→

↓

↶

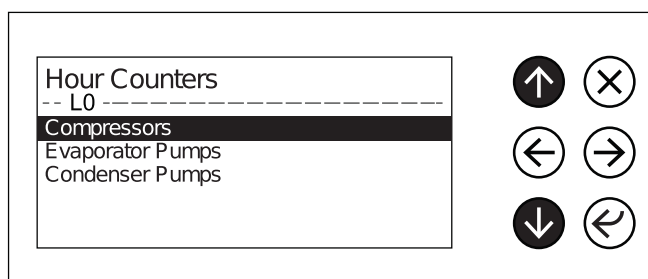
Counter

Select the Counter menu.

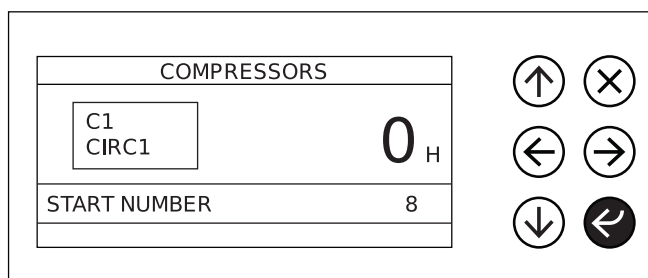


Press the ENTER key to display the counters status.

Select the compressors menu.

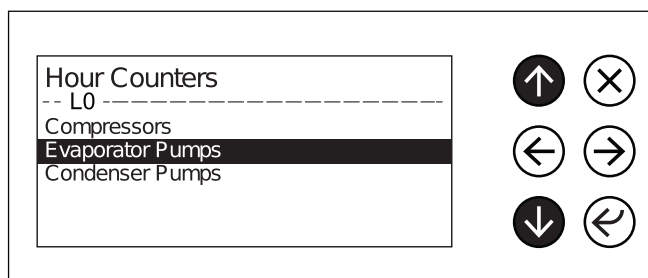


Press the ENTER key to display the compressor counter.

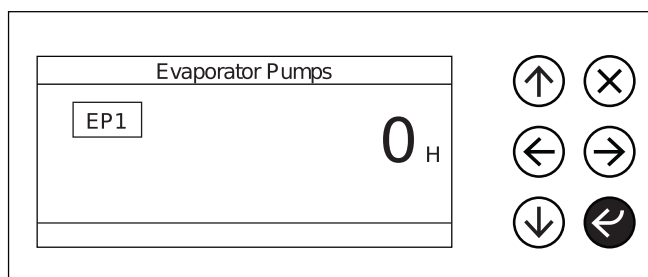


Press the ESC key to return to the main menu.

Select the evaporator pump menu.

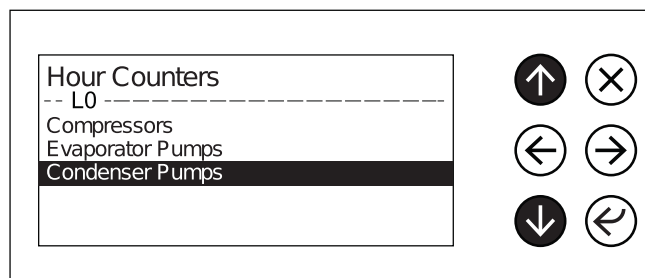


Press the ENTER key to display the evaporator pump counter.

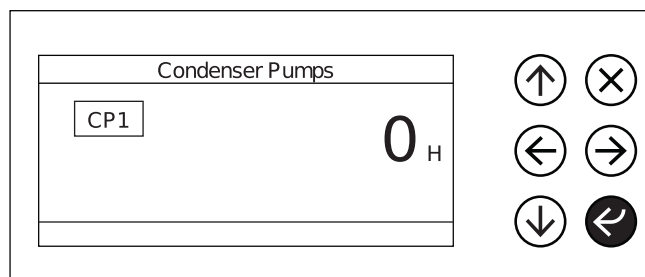


Press the ESC key to return to the main menu.

Select the condenser pump menu.



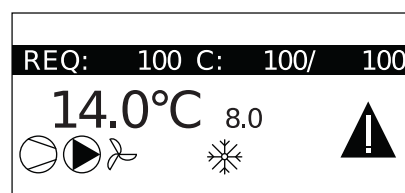
Press the ENTER key to display the condenser pump counter.



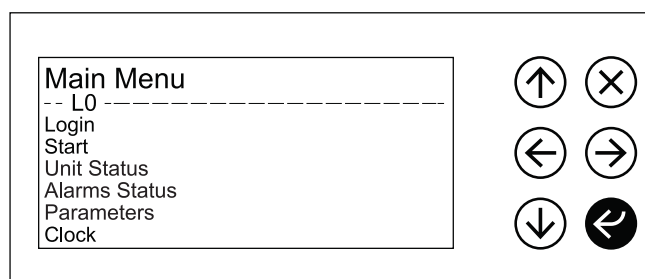
7.5 Alarms

7.5.1 Alarm presence

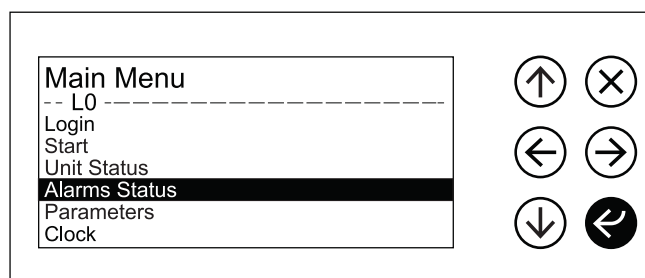
In case of machine malfunction, the ALARM symbol appears on the display.



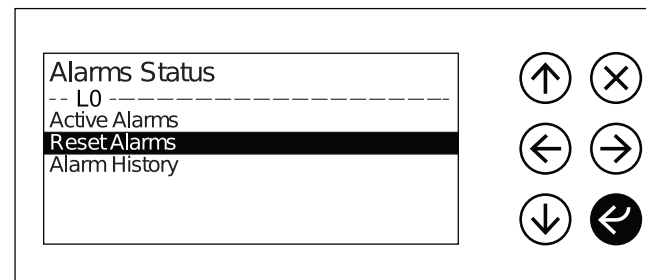
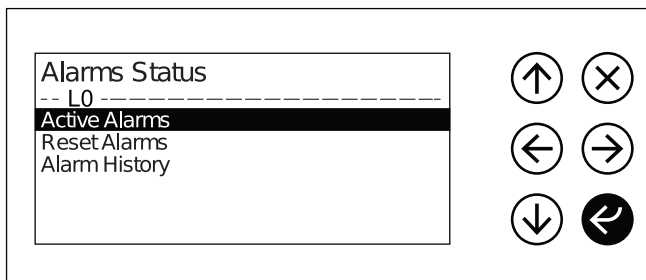
Press the ENTER key to access the main menu.



Select the ALARMS Status menu.

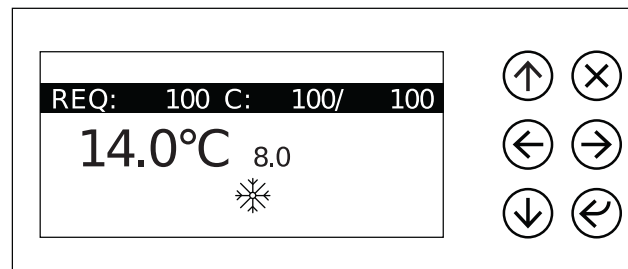
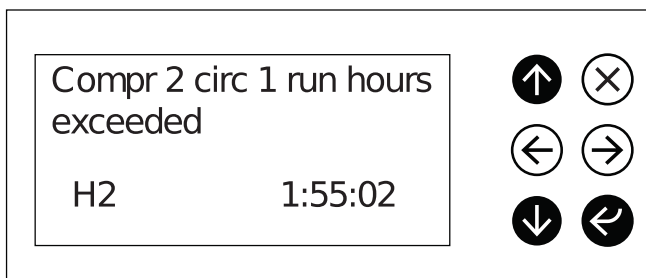


Press the ENTER key to access the ALARMS menu.



Press the ENTER key to display the active alarms.

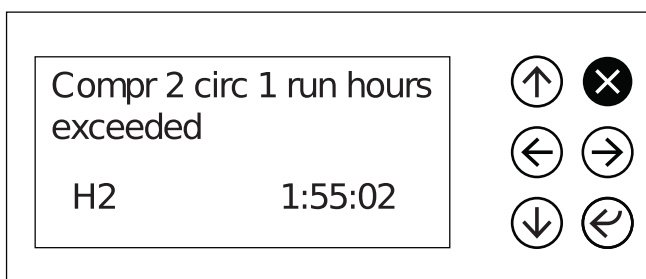
Pressing the ENTER key resets the alarms and the control panel goes back to the main screen. If the alarms are reset correctly, the alarm icon is no longer present.



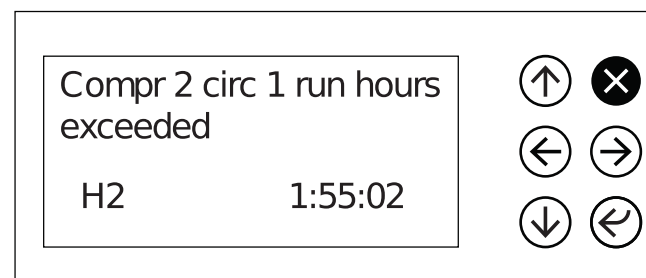
If multiple alarms have triggered, you can scroll through the list by using the UP and DOWN keys.

It is also possible to access the list of alarms triggered from the main screen by pressing the ESC key.

! Some alarms require a reset directly on the device, therefore reset the device before performing the reset on the control panel.



It is also possible to reset an alarm directly from the main screen. From the main screen, press the ESC key to display the alarm triggered.

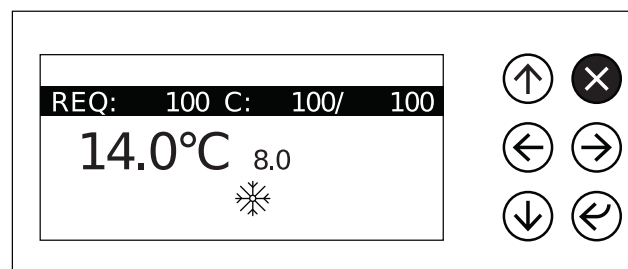
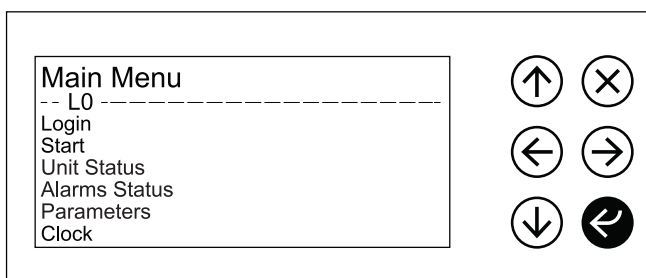


7.5.2 Alarms reset

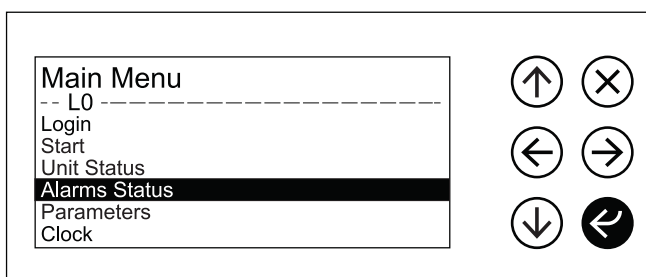
Some alarms can be reset directly from the control panel.

Press the ENTER key to access the main menu.

Press and hold the ESC key for 5 seconds, the control panel goes back to the main screen. If the alarms are reset correctly, the alarm icon is no longer present.



Select the ALARMS Status menu.

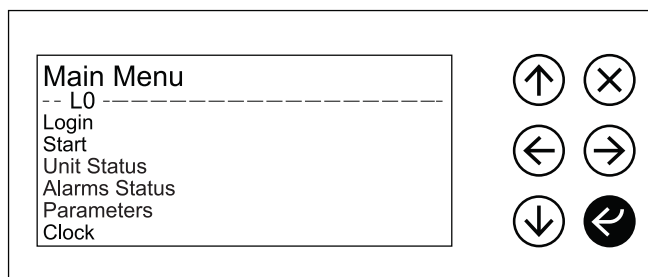


Press the ENTER key to access the ALARMS menu and select the Alarms Reset menu.

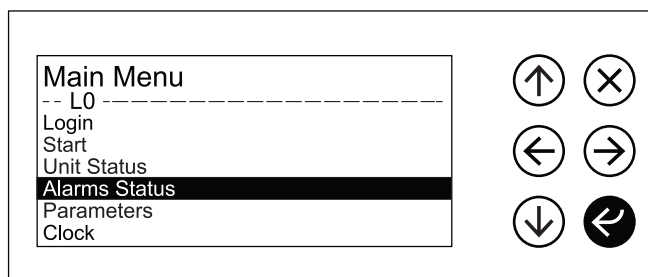
7.5.3 Alarms history

It is possible to display the alarms history triggered on the machine.

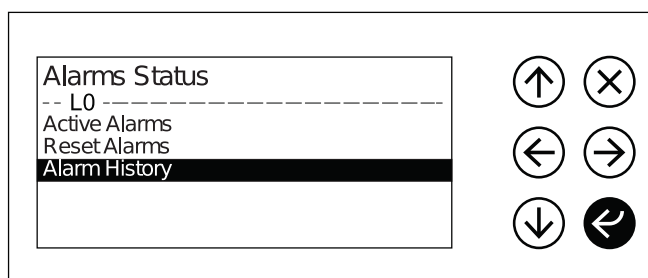
Press the ENTER key to access the main menu.



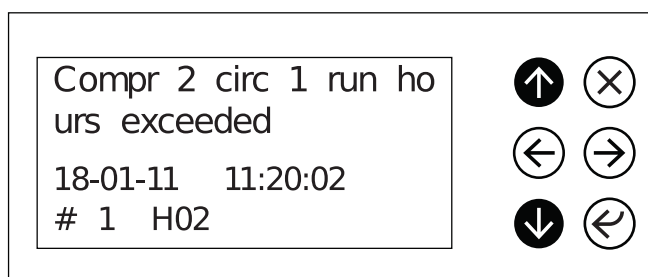
Select the ALARMS Status menu.



Press the ENTER key to access the ALARM menu and select the Alarms History menu.



Press the ENTER key to display the alarms triggered history.

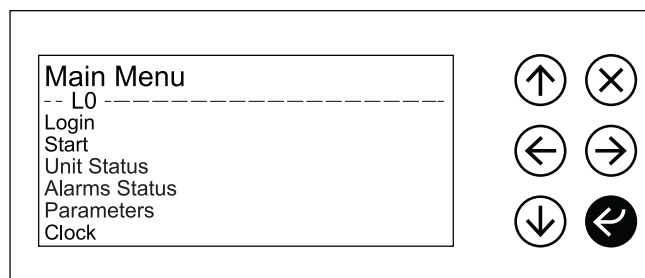


By using the UP and DOWN keys it is possible to display the list of alarms triggered with relative date and time of the event.

7.6 Login

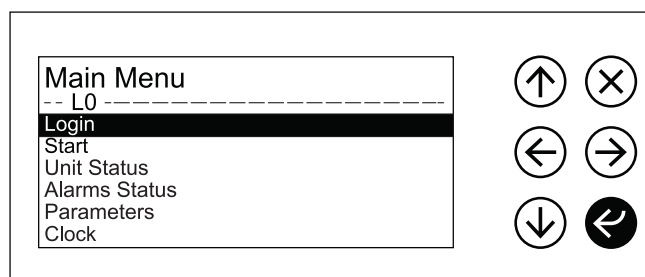
To access the advanced functions of the control panel it is required to access the password protected menus.

Press the ENTER key to access the main menu.



Select the login menu.

Press the ENTER key.



By using the UP and DOWN keys it is possible to edit the highlighted password value.
Press the ENTER key to confirm.



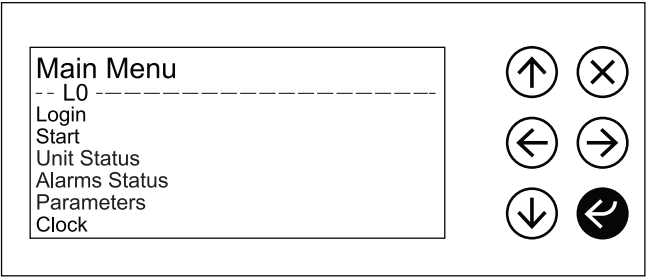
Edit all fields by entering the password.



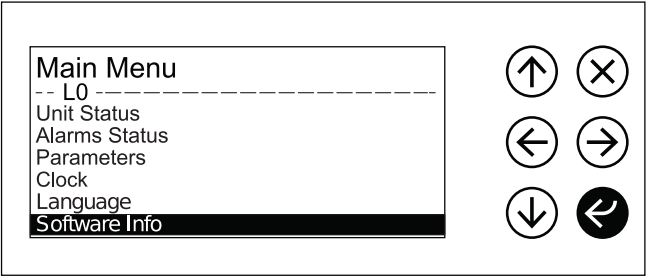
The advanced functions menus can be accessed by entering the password.

7.7 Software

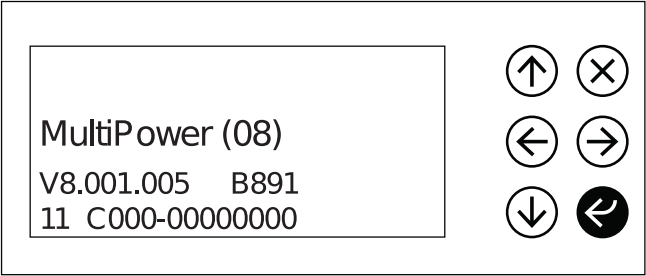
It is possible to obtain information on the software installed on your machine.
Press the ENTER key to access the main menu.



Select the Software Info menu.
Press the ENTER key.



From this screen it is possible to read the data regarding the software version installed.



8. Maintenance

- 8.1 Maintenance
- 8.2 Weekly checks
- 8.3 Monthly checks
- 8.4 Annual checks
- 8.5 Water circuit
- 8.6 Refrigerant circuit
- 8.7 Decommissioning and disposing

8.1 Maintenance

Regular maintenance is essential to maintain the efficiency of the unit in terms of operation and energy.

The maintenance schedule that the Service or the Refrigerator Technician must observe with regular frequency, involves the following operations and checks.

8.2 Weekly checks

Regular maintenance is essential to maintain the efficiency of the unit in terms of operation and energy.

The maintenance schedule that the Service or the Refrigerator Technician must observe with regular frequency, involves the following operations and checks.

8.2.1 Routine maintenance

The routine maintenance operations are the cleaning and control of machine components or parts that may compromise its operation, safety or efficiency.

These operations must be performed by qualified personnel and enabled to work on this type of products.

All maintenance operations must be performed with the machine off and electrically isolated, paying particular attention to the safety instructions and laws in force in the country of operation.

The machine can be restarted after completing the routine maintenance operations, checking its proper operation.

8.2.2 Extraordinary maintenance

The extraordinary maintenance operations are the replacement and the repair of machine components or parts that compromise its operation, safety or efficiency.

These operations must be performed by qualified personnel and enabled to work on this type of products.

All maintenance operations must be performed with the machine off and electrically isolated, paying particular attention to the safety instructions and laws in force in the country of operation.

After completing the repair and replacement operations, the machine can be restarted following the first start-up instructions, verifying its proper operation.

8.3 Monthly checks

- Verify the tightness of the terminals inside the electrical board and in the terminal board of the compressors. Check the mobile and fixed contacts of the remote switches and replace them if deteriorated.
- Verify the complete tightness of the fuse holder caps.
- Verify the proper refrigerant charge in the circuit through the liquid and humidity indicator.
- Check that the compressor is not leaking oil.
- Verify that the fan of the electrical board (if applicable) works properly.
- Verify that there are no abnormal vibrations of the compressor.
- Verify that the power consumption of the compressor falls within the plate limits.
- Verify that the temperatures and pressures of the compressor fall within those indicated for proper operation.
- Check that the water circuit does not leak water.
- Vent the hydraulic system.
- Check any compressors crankcase heaters.
- Clean the metal filters in the hydraulic pipes.
- Clean the finned coil (and the relative metal filters, if applicable), using a jet of compressed air, aimed in the opposite direction of the air flow. If the filters are particularly clogged, use a water jet.

- Verify that the noise emission of the machine is regular.
- Check that any antifreeze heaters are working properly.
- Verify that the following safety devices work properly:
 - High pressure switch;
 - Low pressure switch;
 - Compressor protection module;
 - Water flow switch;
 - Defrost sensor;
 - Check the correct reading of the temperature and pressure sensor.
- Check the following operating factors:
 - Subcooling and superheating of the refrigerant;
 - No bubbles on the liquid indicator;
 - Refrigerant leaks near the joints;
 - Proper closure of the solenoid valve (if applicable);
 - The temperature difference of the liquid used for utilities between inlet and outlet.

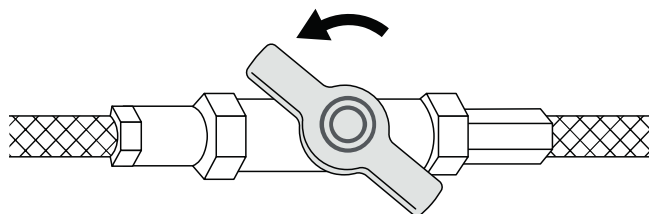
8.4 Annual checks

- Proceed with the verification of the fastening, balancing and general conditions of the fans.
- Verify the colour of the liquid and humidity indicator; if the colour indicates a wet circuit, the filter must be replaced.
- Check the condition of the paint: any scratches should be touched up to prevent corrosion.
- Verify the cleanliness of the heat exchanger on the air side.
- Verify the cleanliness of the metal guard filter on water circuit.

8.5 Water circuit

8.5.1 Water circuit load

- Before starting to load, set the main switch of the system to "off".
- Open the rear inspection panel of the chiller.
- Verify that the drain cocks of the chiller and the system are closed.
- Open all the vent valves of the chiller, the system and the relative terminals.



- Open the shut-off devices of the system.
- Start filling by slowly opening the system water fill-up valve outside the unit.
- When water begins to leak from the air vents, close them and continue filling until the expected system pressure value is reached.

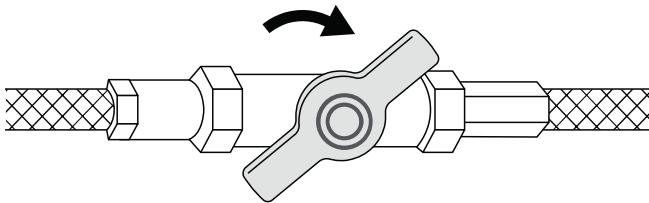
⚠ Verify the hydraulic tightness of the joints.

! It is advisable to repeat this operation after the unit has been operating for a few hours and regularly check the system pressure. Top-ups must be carried out with the machine off (pump OFF).

! The system must be filled to a pressure range between 1 and 2 bar.

8.5.2 Draining of the water circuit

- Before starting to load, set the main switch of the system to "off".
- Open the rear inspection panel of the chiller.
- Verify that the drain cocks of the chiller and the system are closed.
- Open all the vent valves of the chiller, the system and the relative terminals.



- Before starting to load, set the main switch of the system to "off".
- Before starting to empty, set the main switch of the system to "off".
- Open the rear inspection panel of the chiller.
- Verify that the system water load/top-up valve is closed.

! If the system is supplemented with antifreeze liquids, this should not be drained freely because of pollution. It must be collected and possibly reused.

8.5.3 Exchanger cleaning

The material not trapped by the filters, the water hardness or the high concentration of low freezing point solutions may dirty the water exchangers, reducing the efficiency of the heat exchange.

By using a differential pressure gauge it is possible to check the pressure loss between exchanger inlet and outlet.

If, from an inspection, it is found that the pressure values compromise regular operation or reduce machine efficiency, cleaning the exchanger will be required.

The exchangers must be cleaned with the machine off and by personnel authorised and trained for this type of operation.

The exchangers must be cleaned by using the specific pressure sockets and with specific detergents. At the end of the cleaning operation the exchangers must be appropriately rinsed to prevent detergent from circulating in the system.

At the end of the operation the water system must be reloaded and vented before restarting.

8.6 Refrigerant circuit

8.6.1 Cooling circuit repair

! These operations should be carried out only by qualified personnel, using standard techniques typical of cooling systems that use halogen fluids such as refrigerants.

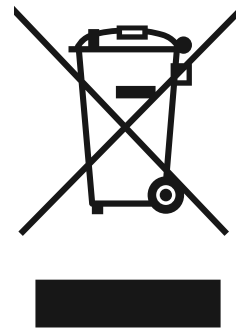
8.6.2 Refrigerant top up

They should be carried out only after having identified and repaired the leaking points.

 No more than two top ups are permitted. If an additional top-up is required, the cooling circuit must be emptied completely and filled with virgin refrigerant.

8.7 Decommissioning and disposing

This product falls within the field of application of Directive 2012/19/EU on the management of waste electric and electronic equipment (WEEE).



! These types of products may contain substances that are potentially harmful to human health and the environment and cannot be disposed of as household waste.

When the machine needs to be replaced or dismantled it must be disposed of according to local regulations on sorted waste, otherwise you must contact your local dealer for information on free pick-up.



FERROLI S.p.A.
Via Ritonda 78/a
37047 San Bonifacio - Verona - ITALY
www.ferroli.com

Made in Italy