

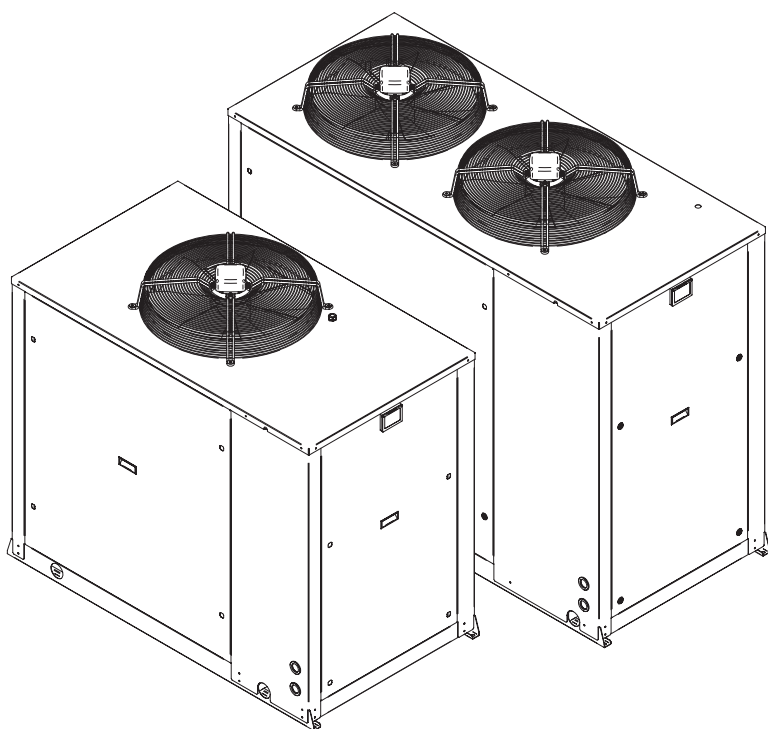


RMA

AIR COOLED WATER HEAT PUMP AND
COOLERS WITH HELICAL FANS

18.7 ÷ 49.7 kW IN COOLING MODE

20.4 ÷ 51.3 kW IN HEATING MODE



FERROLÌ adheres to the
EUROVENT certification
programme.

The products concerned
appear in the products
guide to [www.eurovent-
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INSTALLATION AND OPERATION MANUAL

Dear Customer,

Thank you for having purchased a **FERROLI** Industrial coolers. It is the result of many years experience, particular research and has been made with top quality materials and highly advanced technologies. The CE mark guaranteed that the appliances meet European Machine Directive requirements regarding safety.

The qualitative level is kept under constant surveillance. **FERROLI** products therefore offer **SAFETY, QUALITY** and **RELIABILITY**.

Due to the continuous improvements in technologies and materials, the product specification as well as performances are subject to variations without prior notice.

Thank you once again for your preference.

FERROLI S.p.A



GB	"CE" DECLARATION OF CONFORMITY We, the undersigned, hereby declare under our responsibility, that the machine in question complies with the provisions established by Directives : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC and subsequent modifications.
DE	"EG" KONFORMITÄTSERKLÄRUNG Wir, die Unterzeichner dieser Erklärung, erklären unter unserer ausschließlichen Verantwortung, daß die genannte Maschine den Bestimmungen der folgenden EG-Richtlinien entspricht : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC und anschließende Novellierungen.
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IT	DICHIARAZIONE "CE" DI CONFORMITÀ Noi sottoscritti dichiariamo, sotto la nostra responsabilità, che la macchina in questione è conforme alle prescrizioni delle Direttive : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC e successive modificazioni.
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SE	FÖRSÄKRAN OM "CE" ÖVERENSSTÄMMELSE Underfecknade försäkrar under eget ansvar alt ovannämnda maskin överensstämmer med villkoren i direktiv : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC med ändringar.
NO	BEKREFTELSE OM ÆCEØ OVERENSSTEMMELSE Underfegnede forsikrer under eget ansvar al den ovennevnte maskinen er i overensstemmelse med vilkårene i direktivene : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC med endringer.
FI	"CE" VAATIMUSTENMUKAISUUSVAKUUTUS Allekirjoittaneet vakuutamme omalla vastuullamme että yllämainittu kone noudattaa ehtoja direktiiveissä : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC muutoksin.
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Il legale rappresentante
Dante Ferrolì

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GENERAL SPECIFICATIONS

General specifications

- This manual and the wiring diagram supplied with the unit must be kept in a dry place, ready to hand for future consultation.
- This manual has been compiled to ensure that the unit is installed in the correct way and to supply comprehensive information about how to correctly use and service the appliance. **Before proceeding with the installation phase, please carefully read all the information in this manual, which describes the procedures required to correctly install and use the unit.**
- Strictly comply with the instructions in this manual and conform to the current safety standards.
- The appliance must be installed in accordance with the laws in force in the country in which the unit is installed and used.
- Unauthorized tampering with the electrical and mechanical equipment will **VOID THE WARRANTY**.
- Check the electrical specifications on the identification plate before making the electrical connections. Read the instructions in the specific section where the electrical connections are described.
- If the unit must be repaired for any reason, this must only be done by a specialized assistance center recognized by the manufacturer and using genuine spare parts.
- The manufacturer also declines all liability for any damage to persons or property deriving from failure of the information in this manual to correspond.
- **Proper uses: this series of chillers is designed to produce cold or hot water to use in systems designed for conditioning/heating purposes. The units are not suitable for the production of domestic hot water. Any use differing from this proper use or beyond the operating limits indicated in this manual is forbidden unless previously agreed with the manufacturer.**

Declaration of conformity

The company hereby declares that this machine conforms to the standards established by the following directives:

- Machine Directive **98/37 EEC**
- Low voltage Directive **73/23 EEC**
- Electromagnetic compatibility Directive **EMC 89/336 EEC**
- Directive governing pressurized equipment **97/23 EEC**

Presentation of unit

This new series of industrial refrigerators covers **6 construction sizes** with a rated refrigerating capacity of from **18.7 to 49.7 kW** and rated thermal power of from **20.4 to 51.3 kW**. It has been designed to satisfy the heating and cooling requirements of both tertiary and commercial sector installations of small-medium capacity.

These units are air/water coolers and heat pumps with helical fans suited for outdoor installation: the framework and panelling are made of painted, galvanized plate of suitable thickness, all the fixing elements are made of stainless steel and/or galvanized, the enclosure containing the electrical equipment and all the components exposed to dirt and moisture have minimum protection class **IP54**. The electric panel contains the thermal and magneto-thermal protections for the most important parts and the microprocessor controller. All the units are supplied as standard with the power supply phase sequence meter and monitor. In designing the units, special attention has been paid to the problem of noise in order to comply with increasingly strict legislation on noise pollution.

All the units have the standard outfit of 1 **SCROLL** compressor specifically designed for working with **R410A ecological refrigerant gas**. The compressor, equipped with thermal protection inside the motor and outlet overtemperature, is installed in a special compartment protected from the air flow in order to facilitate routine and special maintenance work.

The exchanger on the water-refrigerant circuit (plate type) is thermo-insulated and protected with a differential pressure switch on the water and antifreeze electric heater.

The finned coil, with a large surface area for thermal exchange, is composed of copper pipes and notched aluminium fins.

The fans are helical with crescent-shaped blades to increase efficiency and decrease noise. They are coupled directly with the single-phase motor (external rotor type) and equipped with thermal protection.

All the units permit producing cold water from **5 to 12°C** (summer operation) and hot water from **35 to 50°C** (winter operation, for IP Heat Pumps only); in addition, they are fitted as standard for summer/winter operation with low/high temperatures of the outside air thanks to a condensation/evaporation control system with continuous fan speed control.

The standard outfit can be supplemented with a vast range of accessories. Especially noteworthy:

- Silencing Kit (KS), composed of lagging on the refrigerator circuit compartment and compressor with soundproofing material that, associated with reduced fan speed, enables reducing the level of noise emitted by the unit under nominal conditions by approximately 6dB.

- Storage and Pumping Module (MAP), composed of a Pumping Module and the Water Storage Tank. The Storage Tank is always configured for storage on the delivery to the system. The Pumping Module is available with 1 pump and equipped with all the plumbing components needed for complete installation.

All the units are carefully built and tested one by one. Installation merely requires the electrical and plumbing connections.

GENERAL SPECIFICATIONS

Unit identification plate

A					
Modello Model	B				
Matricola Serial N°	C				
Potenza resa Capacity	<table border="1"> <tr> <td>Freddo Cooling</td> <td>D kW</td> <td>Caldo Heating</td> <td>E</td> </tr> </table>	Freddo Cooling	D kW	Caldo Heating	E
Freddo Cooling	D kW	Caldo Heating	E		
Potenza assorbita Input	<table border="1"> <tr> <td>Freddo Cooling</td> <td>F kW</td> <td>Caldo Heating</td> <td>G</td> </tr> </table>	Freddo Cooling	F kW	Caldo Heating	G
Freddo Cooling	F kW	Caldo Heating	G		
Rif. norma Standard	H				
Alimentazione Power supply					
I	V / Ph / Hz				
Corrente max Max current	L A				
Refrigerante Refrigerant	M kg M				
Massa Weight	kg N				
Pressione sonora Sound pressure	d(B(A)) O				
Grado di protezione Level protection	P				
Pressione max Max pressure	<table border="1"> <tr> <td>Lato Alta High Side</td> <td>Q MPa</td> <td>Lato Basso Low Side</td> <td>R</td> </tr> </table>	Lato Alta High Side	Q MPa	Lato Basso Low Side	R
Lato Alta High Side	Q MPa	Lato Basso Low Side	R		
Costruito da: FERROLI s.p.a. via Rionda 78/A San Bonifacio (VR)					
S					

The figure on the left illustrates the identification plate of the unit, applied to the outer left-hand side of the Electric Panel.

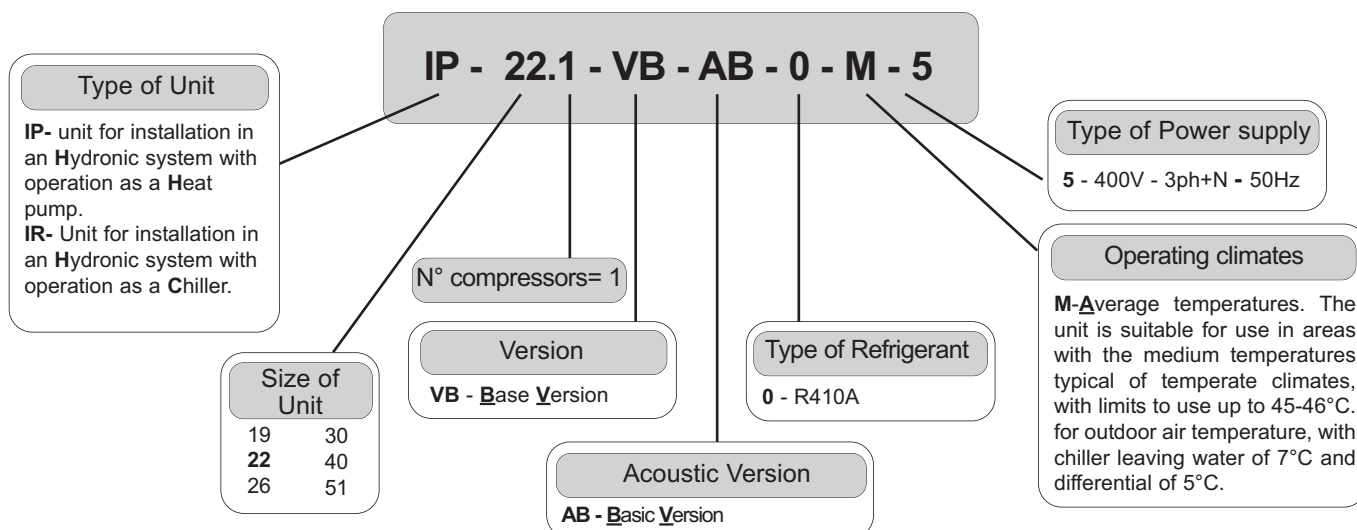
A description of the individual areas is given below:

Basic versions

- A** - Trademark
- B** - Model
- C** - Serial number
- D** - Cooling Capacity
- E** - Heating Capacity
- F** - Power input in COOLING mode
- G** - Power input in HEATING mode
- H** - Reference standard
- I** - Electric power supply
- L** - Maximum current absorption
- M** - Type of refrigerant and weight of charge
- N** - Shipping weight of the unit
- O** - Sound pressure
- P** - IP Level Protection
- Q** - Maximum pressure - High Side
- R** - Maximum pressure - Low Side
- S** - PED certification authority

Identification code of the unit

The codes that identify the units are listed below and include the sequences of letters that determine the meanings for the various versions and set-ups.



GENERAL SPECIFICATIONS

Description of the components

The technical features of the main components in the units are: (Fig. 1).

1. **The fans** are helical with crescent-shaped blades to increase efficiency and decrease noise. They are coupled directly with the single-phase motor (external rotor type). There is thermal protection in the winding against operating trouble.

2. **Electric control and monitoring panel.** This is housed in a metal casing in which the various electrical components are positioned on one metal plate.

a. The main components are:

- Main door-locking circuit-breaker.
- Power supply phase sequence meter and monitor
- Compressor protection fuses
- Compressor contactor
- Fuse to protect the resistors (casing and antifreeze)
- Insulating and safety transformer to power the auxiliary circuit

and controller board, protected by a fuse.

- Magneto-thermal protection and pump contactor (**for units with the storage and pumping module accessory, MAP**)

- Wiring board
- Fan speed control board.

b. The monitoring section includes:

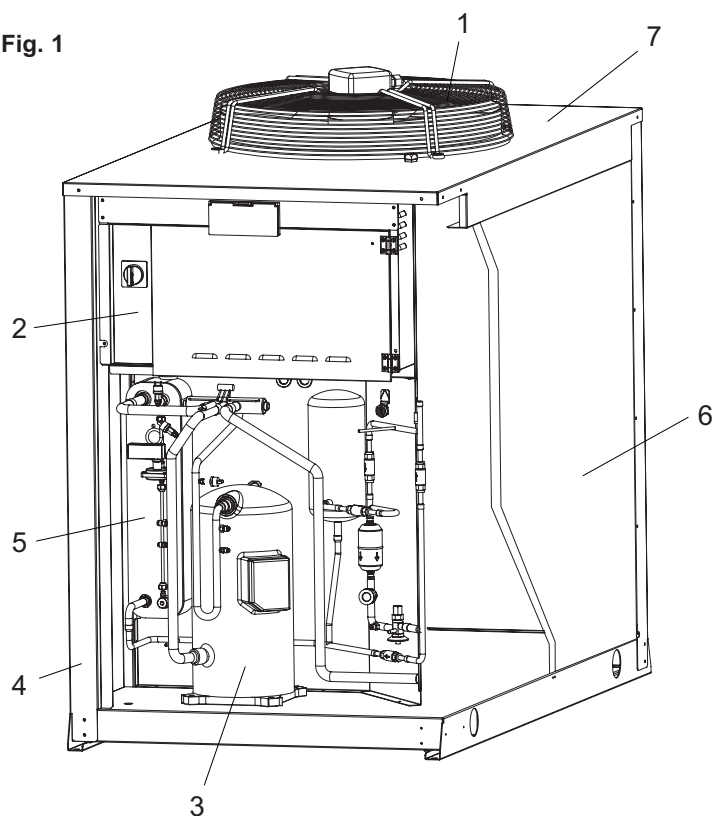
- User interface terminal with LCD
- On-off key.
- Operating mode selector key.
- Compressor on-off LED.
- Antifreeze heaters on LED.
- Defrosting request/activation LED
- Check-control with fault code display.

The main functions of the monitoring system are:

- Water temperature regulation

- Compressor operating hour count (display protected by a **PASSWORD** only accessible to assistance service staff)
- Start-up time settings
- Parameter entry via the keyboard
- Functions associated with the digital inputs
 - High and low pressure
 - Power supply phase sequence monitor
 - Compressor protection
 - Thermal protection of fans
 - Differential pressure switch on wet side
 - Remote ON/OFF command
 - Remote controlled operating mode changes (heating/cooling)
 - Pump protection
- Functions associated with the digital outputs
 - Compressor control
 - Cycle reversing valve (for heat pump only)
 - Antifreeze heating element
 - Water circulating pump control
 - General remote alarm
- Functions associated with the analog outputs
 - Condensation and evaporating pressure monitoring through infinite regulation of the fan speed
- Functions associated with the analog inputs
 - Water inlet and outlet temperature
 - Temperature of the coils

Fig. 1



GENERAL SPECIFICATIONS

3. Compressor, of the **SCROLL** type with an orbiting spiral equipped with thermal protection and oil heater. With Silencing Kit KS accessory has a soundproofing jacket and acoustic insulation around the entire compressor compartment in order to reduce the noise level. The internal protection shuts down the compressor in cases of overtemperature of the motor windings and/or delivery gas.

4. Bearing structure made of galvanized sheet metal panels coated with polyurethane powder paint to ensure good protection against adverse weather conditions.

5. Plate-type evaporator made of braze-welded stainless steel (AISI 316). It is installed within a shell of thermal barrier insulating material to prevent the formation of condensation and heat exchanges towards the outside. Standard supply also includes an antifreeze heating element and a differential pressure switch on the water supply circuit to avoid the risk of freezing if the water flow is shut off for some reason.

6. The condensating coils are the finned aluminium pack type with a notched profile to increase the coefficient of thermal exchange and they have copper pipes arranged in staggered rows. At the bottom there is a sub-cooling section.

7. The covering panels are made of galvanized plate and painted with polyurethane powders to provide good resistance to dirt and moisture.

8. The high pressure switch, with a fixed setting, is installed on the delivery pipe and shuts down the compressor if the working pressure is higher than permissible. If it trips, the unit shuts down and can only restart by resetting with the user interface terminal.

9. The low pressure switch, with a fixed setting, is installed on the suction pipe and shuts down the compressor if the working pressure is lower than permissible. It is automatically restored when the pressure increases. If it trips frequently, the unit shuts down and can only restart by resetting with the user interface terminal.

9. The low pressure switch (IP units only), with a fixed setting, is installed on the plate exchanger and shuts down the compressor if the working pressure is lower than permissible. It is automatically restored when the pressure increases. If it trips frequently, the unit shuts down and can only restart by resetting with the user interface terminal.

10. The liquid and moisture flow indicator signals the medium flowing in the circuit, indicating the correct cooling load. The fluid gauge moreover signals the moisture content of the refrigerant by changing its colour.

11. The dewatering filter, mechanical type, is used to hold back debris and any traces of moisture in the circuit.

12. The water differential pressure switch is supplied as standard and installed on the connections between the exchanger water inlet and outlet. If it trips frequently, the unit shuts down and can only restart by resetting with the user interface terminal.

13. Thermostatic valve, type with external balancer. It's job is to supply the evaporator correctly, keeping the set level of overheating constant.

For some models there are 2 thermostatic valves for cooling operation and one for heating operation.

14. Check valves (IP units only) allow the refrigerant to be forced to pass through the appropriate exchangers according to the operating cycle.

15. The 4-way cycle inversion valve (IP units only) reverses the direction of flow of refrigerant as summer/winter operation is changed over.

16. The medium receiver (IP units only) is a storage tank to limit the changes in cooling load required by the machine as summer/winter operation is changed over.

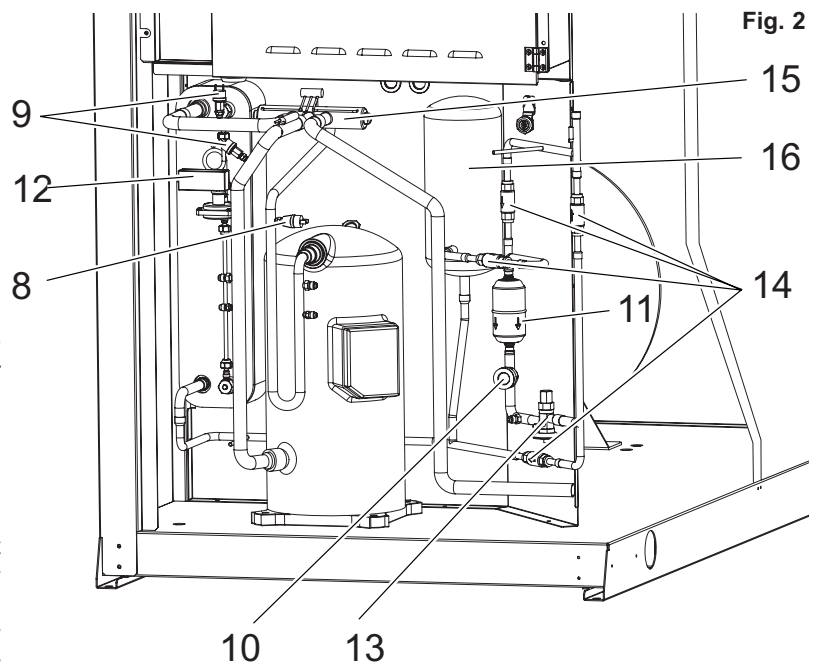


Fig. 2

ACCESSORIES AND OPTIONAL EQUIPMENT

Mechanical accessories

GM - Pressure gauges. Consisting of 2 pressure gauges that display the pressure of the refrigerant fluid on the compressor's intake and delivery.

GP - Coils protective grilles. Consisting of metal grilles that protect the coils with extended surfaces.

AVG - Rubber vibration dampers. Consisting of 4 rubber vibration dampers to fix under the unit. They reduce the mechanical vibrations generated by the compressor and fan/s during their normal operation, that are transmitted to the bearing surface of the machine. The insulation degree provided by the vibration dampers is about 90%.

KS - Silencing Kit, composed of the lagging of the refrigerating circuit compartment and the compressor with soundproofing material that, associated with reduced fan speed, enables reducing the level of noise emitted by the unit under nominal conditions by approximately 6dB.

KT - Tube Kit is composed of two steel pipes insulated with heatproofing material and enables taking the water IN / OUT connections onto the machine.

MAP - Storage and Pumping Module, composed of a Pumping Module and the Water Storage Tank.

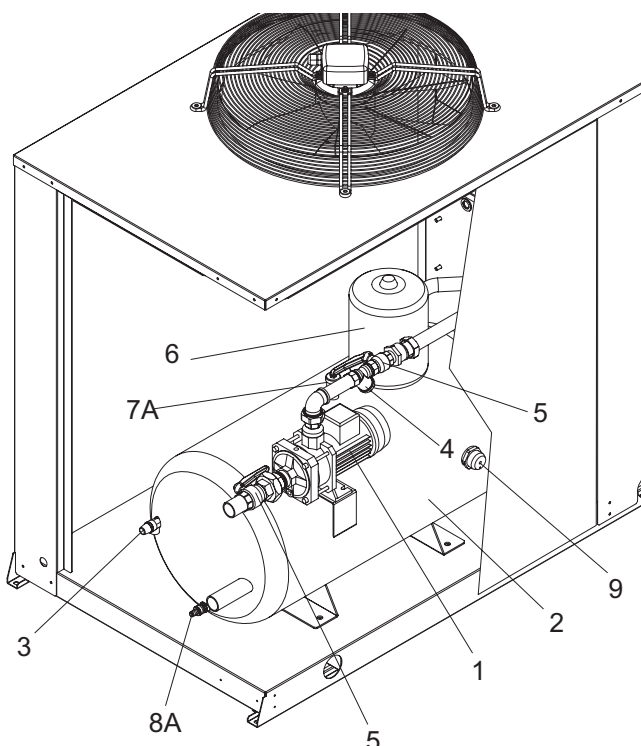
The Storage Tank is always configured for storage on the delivery to the system. The Pumping Module is available with 1 pump and equipped with all the plumbing components (water filter, expansion tank, shut-off valves, safety valve, air vent, water drain) needed for complete and easily serviceable installation. The pump draws water from the system, sends it to the plate exchanger and then to the inertial storage tank. In this configuration, under nominal operating conditions, the pump is able to supply a residual head to the circulating water that depending on the model and version goes from 72 to 126 kPa (7.2/12.6 m.w.c.).

The accessory is composed of:

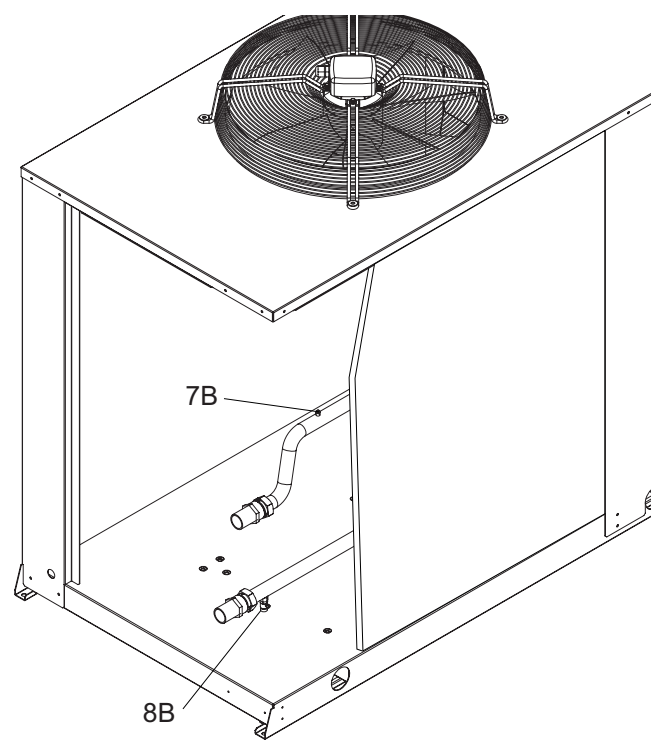
1 Hydraulic pump. Used to make the water circulate in the system. The pumps with a steel impeller have a high head and enable satisfying most plant engineering situations. The pump is protected by a motor cut-out fitted in the electric panel of the cooler. The pump is equipped with two 1/4" gas plugs to enable filling with water / venting air (top plug) and perfectly draining off pump water (bottom plug).

2 Water Storage Tank: comprehensive of antifreeze resistor connection. It is made of painted metal plate of suitable thickness, enables decreasing the number of pick-ups of the compressor and the fluctuations in the temperature of the water sent to the users. Insulated with heatproofing material to prevent condensation and heat exchange with the outside. It is always configured for storage on the delivery to the system.

MAP - Storage and Pumping Module



KT - Tube Kit



ACCESSORIES AND OPTIONAL EQUIPMENT

3 Water safety valve. Located on the back of the tank, it is able to trip in the event of any service trouble generating working pressure for the plumbing system greater than the valve opening value.

4 Water filter with metal cartridge. It can be shut off and inspected and is located on the plate exchanger inlet pipe; it prevents any machining debris (powder, shavings, etc.) that could be present in the water piping from getting into the plate exchanger.

5 On-off ball valves. They are used to shut off components such as the water filter and pump that need routine or special maintenance.

6 Expansion tank. This is a diaphragm closed expansion tank; it is used to absorb changes in volume of the water in the system due to changes in temperature.

7 Air vent. Accessible by removing the rear panel positioned on the opposite side of the unit to the electrical panel and the side panel, it is composed of 1 automatic valve (7A), located on the tank, and 2 manual valves (7B), positioned on the top of the hydraulic pipes.

8 Water drain. Shut off by a cock that can be reached by removing the upper rear panel, one is located on the bottom of the tank (8A) and a second one on the bottom pipe of the plate exchanger (8B).

9 Antifreeze heater connection. Female 1"1/4 threaded connection, fitted for inserting the tank antifreeze heater.

Electrical accessories

CR - Remote control. This can be used to select all the monitoring and display functions of the control unit on the machine at a maximum distance of 100 meters away. It must be installed by using a cable with three strands or three wires in **PVC** of the **N07-VK** type with a 1mm² section. The transmission line must be installed in a raceway separate from any electric powering wires (**230/400 V**).

The control unit has the following buttons:



MODE key : used to select the operating mode

ON/OFF key : used to turn the unit ON/OFF and to reset the alarms

Mode + ON/OFF keys : used to access and quit the various menu levels

UP key: scrolls forwards through the menu items or increases the value of a parameter

Tasto DOWN: scrolls backwards through the menu items or decreases the value of a parameter.

OP - Programmer clock. Allows the unit to be turned on and off depending on the programmed time setting (up to 14 switching actions can be programmed as required throughout the 7 days of the week).

RAG: Antifreeze heating element for the accumulation tank. Plug type. This activates in parallel with the evaporator's anti-freeze heating element and keeps the water at a temperature able to prevent ice from forming when the unit remains idle during the winter.

INT - RS485 serial interface, for communications via MODBUS protocol.

SFM - Power supply phase sequence meter and monitor.

ACCESSORIES AND OPTIONAL EQUIPMENT

Mechanical options

Special finned heat exchangers

- Coils with copper fins
- Coils with tin-coated copper fins
- Coils with aluminium fins with acrylic coating

Electrical options

Supply voltage different from standard 400V-3+N-50Hz.

By specific request, contact our Sales Office.

Accessories-models combinations

MODEL ACCESSORY CODE			19	22	26	30	40	51
Mechanical accessories	Rubber vibration dampers	AVG (F)	•	•	•	•		
		AVG1 (F)					•	•
	Pressure gauges	GM10 (M)	•	•	•	•	•	•
	Coils protective grilles	GP36 (M)	•	•	•	•		
		GP41 (M)					•	•
	Tube Kit	KT26 (M)(1)	•	•	•	•		
		KT27 (M)(1)					•	•
	Storage and Pumping Module	MAP1 (M)	•	•	•	•		
		MAP2 (M)					•	•
	Storage and Pumping Module High	MAP7 (M)	•	•	•	•		
		MAP8 (M)					•	•
	Silencing Kit	KS1 (M)	•					
		KS2 (M)		•	•	•		
		KS3 (M)					•	
		KS4 (M)						•
Electrical accessories	Remote control	CR (F)	•	•	•	•	•	•
	Programmer clock	OP (F)	•	•	•	•	•	•
	Antifreeze heating element for the accumulation tank	RAG6 (F)	•	•	•	•	•	•
	RS485 serial interface	INT2 (M)	•	•	•	•	•	•
	Power supply phase sequence meter and monitor	SFM (M)	•	•	•	•	•	•

NOTES:

(M): mounted in the factory

(F): supplied for installation by customer

IR R410A - GENERAL SPECIFICATIONS

Technical specifications

Model	19	22	26	30	40	51	UM
Refrigerant	R410A						
Gross cooling capacity ^{(1)(E)}	19,2	22,3	26,0	29,1	40,8	51,7	kW
Gross total power input ^(E)	7,05	7,75	8,90	10,3	13,1	17,9	kW
EER ^{(1)(E)}	2,72	2,88	2,92	2,84	3,11	2,89	W/W
Maximum pressure on wet side *	1000 / 600						kPa
Coolant charge ⁽²⁾	4,5	4,7	6,5	6,5	9,6	10,6	kg

(*) Regarding unit WITH (600 KPa) / WITHOUT (1000 KPa) Storage Tank MAP accessory

Compressor specifications

Type	SCROLL						
Quantity	1						N°
N° Throttling steps	0-100						%
Power input ⁽¹⁾	6,40	7,10	8,25	9,60	11,8	16,6	kW

Plate-type Heat Exchanger specifications

Quantity	1						N°
Water capacity	1.4	1.7	2.0	2.3	3.1	4.2	l
Maximum pressure on water side	1000						kPa
Water flow rate	0,92	1,07	1,24	1,39	1,95	2,47	l/s
Water pressure drop ^(E)	37	33	34	34	47	43	kPa

Fan specifications

Number of fans	1				2		N°
Diameter [Ø]	630						mm
Maximum speed	900						rpm
Motor input power ⁽¹⁾	650						W
Total air flow rate on cooling ⁽¹⁾	2540	2540	2440	2440	4500	4310	l/s

Specifications of coils with extended surfaces

Type	Alette in alluminio / Tubi in rame						/
Quantity	1						N°
Total frontal area	1.43			2.03			m²

Data for water storage tank and pumping module (MAP accessory)

Water capacity	140				180		l
Max. operating pressure	600						kPa
Safety valve setting	600						kPa
Surge chamber volume	8				12		l
Service charge pressure of surge chamber	150						kPa
Working head ⁽¹⁾	121	112	98	81	97	72	kPa
Pump power input	0.45				0.70		kW

Silencing Kit data (KS accessory)

Gross cooling capacity ^{(1)(E)}	18,4	21,2	24,3	27,1	38,1	47,8	kW
Gross total power input ^(E)	7,09	7,86	9,15	10,6	13,4	18,6	kW
EER ^{(1)(E)}	2,60	2,70	2,66	2,55	2,85	2,58	W/W
Compressor power input ^{(1)(E)}	6,69	7,46	8,75	10,22	12,6	17,8	kW
Water flow rate ⁽¹⁾	0,88	1,01	1,16	1,29	1,82	2,28	l/s
Water pressure drop ⁽¹⁾	34	30	30	29	41	37	kPa
Working head ⁽¹⁾	128	121	110	96	110	90	kPa

NOTES:

(1): The data refer to: Water temperature: inlet: 12°C - outlet: 7°C.
Outdoor air temperature 35°C D.B.

(2) Take as reference the coolant charge value on the Unit Identification plate.

(MAP): With Storage and Pumping Module

(E): Data certificated by EUROVENT

IP R410A - GENERAL SPECIFICATIONS

Technical specifications

Model	19	22	26	30	40	51	UM
Refrigerant	R410A						
Gross cooling capacity ^{(1)(E)}	18,7	21,9	25,6	28,2	39,1	49,7	kW
Gross heating capacity ^{(2)(E)}	20,4	23,5	27,6	29,4	41,0	51,3	kW
Gross total power input ^(E)	In cooling mode ⁽¹⁾	6,90	7,65	8,80	10,10	12,7	kW
	In heating mode ⁽²⁾	6,95	7,75	9,05	9,75	13,1	kW
EER ^{(1)(E)}	2,71	2,86	2,91	2,79	3,08	2,81	W/W
COP ^{(2)(E)}	2,94	3,03	3,05	3,02	3,13	3,05	W/W
Maximum pressure on wet side *	1000 / 600						kPa
Coolant charge ⁽³⁾	4,7	5,5	7,0	7,0	10	11	kg

(*) Regarding unit WITH (600 KPa) / WITHOUT (1000 KPa) Storage Tank MAP accessory

Compressor specifications

Type	SCROLL						
Quantity	1						N°
N° Throttling steps	0-100						%
Power input	In cooling mode ⁽¹⁾	6,25	7,00	8,15	9,45	11,4	kW
	In heating mode ⁽²⁾	6,30	7,10	8,40	9,10	11,8	kW

Plate-type Heat Exchanger specifications

Quantity	1						N°
Water capacity	1.4	1.7	2.0	2.3	3.1	4.2	l
Maximum pressure on water side	100						kPa
In cooling mode ⁽¹⁾	Water flow rate	0,89	1,05	1,22	1,35	1,87	l/s
	Water pressure drop(E)	35	32	33	32	43	kPa
In heating mode ⁽²⁾	Water flow rate	0,97	1,12	1,32	1,40	1,96	l/s
	Water pressure drop(E)	42	37	38	35	47	kPa

Fan specifications

Number of fans	1				2		N°
Diameter [Ø]	630						mm
Maximum speed	900						rpm
Maximum motor input power ^{(1) (2)}	650						W
Total air flow rate on cooling ⁽³⁾	2540	2540	2440	2440	4500	4310	l/s
Total air flow rate on heating ⁽²⁾	2430	2430	2340	2340	4310	4310	l/s

Specifications of coils with extended surfaces

Type	Alette in alluminio / Tubi in rame						/
Quantity	1						N°
Total frontal area	1.43			2.03			m²

IP R410A - GENERAL SPECIFICATIONS

Data for water storage tank and pumping module (MAP accessory)

Model		19	22	26	30	40	51	UM
Water capacity		140				180		l
Max. operating pressure		600						kPa
Safety valve setting		600						kPa
Surge chamber volume		8				12		l
Service charge pressure of surge chamber		150						kPa
Working head	In cooling mode ⁽¹⁾	126	115	101	87	105	82	kPa
	In heating mode ⁽²⁾	112	104	85	79	95	74	kPa
Pump power input		0.45				0.70		kW

Silencing Kit data (KS accessory)

Gross cooling capacity ^{(1)(E)}		18,0	20,8	23,9	26,2	36,6	46,0	kW
Gross heating capacity ^{(2)(E)}		20,4	23,5	27,6	29,4	41,0	51,3	kW
Gross total power input ^(E)	In cooling mode ⁽¹⁾	6,93	7,75	9,04	10,46	12,9	18,3	kW
	In heating mode ⁽²⁾	6,95	7,75	9,05	9,75	13,1	16,8	kW
EER ^{(1)(E)}		2,59	2,68	2,65	2,51	2,83	2,51	W/W
COP ^{(2)(E)}		2,9	3,0	3,0	3,0	3,1	3,1	W/W
Compressor power input ^(E)	In cooling mode ⁽¹⁾	6,53	7,35	8,64	10,06	12,1	17,5	kW
	In heating mode ⁽²⁾	6,3	7,1	8,4	9,1	11,8	15,5	kW
Water flow rate	In cooling mode ⁽¹⁾	0,86	0,99	1,14	1,25	1,75	2,20	l/s
	In heating mode ⁽²⁾	1,0	1,1	1,3	1,4	2,0	2,5	l/s
Water pressure drop	In cooling mode ⁽¹⁾	32	29	29	28	38	34	kPa
	In heating mode ⁽²⁾	42	37	38	35	47	43	kPa
Working head	In cooling mode ⁽¹⁾	131	124	113	102	116	98	kPa
	In heating mode ⁽²⁾	107	107	89	79	91	69	kPa

NOTES:

(1): The data refer to: Water temperature: inlet: 12°C - outlet: 7°C.
Outdoor air temperature 35°C D.B.

(2): The data refer to: Water temperature: inlet: 40°C - outlet: 45°C.
Outdoor air temperature 7°C D.B., 6°C W.B.

(3) Take as reference the coolant charge value on the Unit Identification plate.

(MAP): With Storage and Pumping Module

(E): Data certificated by **EUROVENT**

NOISE LEVELS

Noise levels of IR and IP unit Basic Version VB ^{(1)(E)}

Mod.	SWL (dB)										SPL (dBA)		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
19	89,0	81,0	80,0	76,0	72,0	67,0	62,0	52,0	90,3	78,0	61,9	51,9	46,5
22	90,0	81,5	80,5	76,5	73,0	67,0	62,0	52,0	91,2	78,5	62,4	52,4	47,0
26	90,0	82,0	81,0	77,0	73,5	67,0	64,0	52,0	91,3	79,0	62,9	52,9	47,5
30	90,0	82,0	81,0	77,0	73,5	67,0	64,0	52,0	91,3	79,0	62,9	52,9	47,5
40	92,0	84,0	83,0	78,5	76,0	69,5	65,0	54,0	93,3	81,0	64,4	54,7	49,4
51	92,0	85,0	83,5	79,0	76,0	70,5	66,0	55,0	93,5	81,5	64,9	55,2	49,9

(1): Water temperature: inlet 12°C - outlet 7°C. Outdoor temperature 35°C.

SWL = Sound power levels, with reference to 1×10^{-12} W.

The **Total** sound power level in **dB(A)** measured in compliance with **ISO 9614** standards, is certified according to the **Eurovent** certification program.

Eurovent certification **(E)** exclusively refers to the **Total** Sound Power in **dB(A)**, which is therefore the only binding acoustic specification (the values of the Octave bands in the table are indicative).

SPL = Sound pressure levels, with reference to 2×10^{-5} Pa.

The sound pressure levels are values calculated by applying the **ISO-3744 relation (Eurovent 8/1)** and refer to a distance of 1,5,10 meters away from the external surface of units operating in the open field with directivity factor 2 and the units operating in nominal conditions in the cooling mode.

Noise levels of IR and IP unit Basic Version VB + Silencing Kit accessory KS ^{(1)(E)}

Mod.	SWL (dB)										SPL (dBA)		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
19	87,0	76,0	75,0	71,5	66,5	61,0	57,0	47,0	87,7	73,0	56,9	46,9	41,5
22	87,0	76,0	75,0	71,5	66,5	61,0	57,0	47,0	87,7	73,0	56,9	46,9	41,5
26	87,0	76,0	75,5	72,0	67,0	61,0	58,0	50,0	87,8	73,5	57,4	47,4	42,0
30	87,0	76,0	75,5	72,0	67,0	61,0	58,0	50,0	87,8	73,5	57,4	47,4	42,0
40	90,0	80,0	76,5	73,5	69,5	64,0	61,0	54,0	90,7	75,5	58,9	49,2	43,9
51	90,0	80,0	77,0	74,0	70,0	65,0	62,0	54,0	90,8	76,0	59,4	49,7	44,4

(1): Water temperature: inlet 12°C - outlet 7°C. Outdoor temperature 35°C.

SWL = Sound power levels, with reference to 1×10^{-12} W.

The **Total** sound power level in **dB(A)** measured in compliance with **ISO 9614** standards, is certified according to the **Eurovent** certification program.

Eurovent certification **(E)** exclusively refers to the **Total** Sound Power in **dB(A)**, which is therefore the only binding acoustic specification (the values of the Octave bands in the table are indicative).

SPL = Sound pressure levels, with reference to 2×10^{-5} Pa.

The sound pressure levels are values calculated by applying the **ISO-3744 relation (Eurovent 8/1)** and refer to a distance of 1,5,10 meters away from the external surface of units operating in the open field with directivity factor 2 and the units operating in nominal conditions in the cooling mode.

WHEN THE APPLIANCE ARRIVES

Inspections on arrival

As soon as the unit is consigned, it is essential to make sure that all the ordered items have been received and that the dispatch is complete. Carefully check that the load has not been damaged. If visible damage is discovered, immediately inform the haulage contractor and write "**Collected with reserves owing to evident damage**" on the consignment note. Delivery at the plant means that any damages will be reimbursed by the insurance company as established by law.

Safety prescriptions

Comply with the current safety provisions in relation to the equipment used to handle the unit and the ways in which these operations are carried out.

Handling

Before moving the unit, check its weight on the data plate with the general specifications of the appliance and consult the **Main Features** section of this manual. Make sure that the unit is handled with care, that it is not jolted in any way and that none of its functional parts is damaged.

Comply with the following instructions when lifting and positioning the unit:

- **Handling with a lift truck or similar**

The unit has four wooden bases so that it can be transported in a longitudinal direction (**not sideways**). Place something suitable in between to separate the truck from the unit in order to prevent the surfaces of the bank or electric panel from being damaged if the unit has to be moved sideways (**Fig.1**). Do not allow the unit or any of its parts to drop on to the ground. Remember that the heaviest part is the one where the compressor is installed (**electric panel side**).

Fig.1

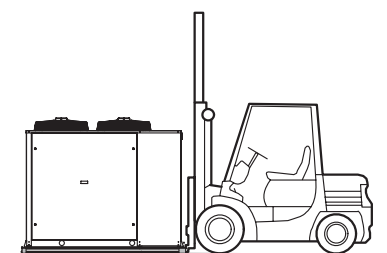


Fig.2

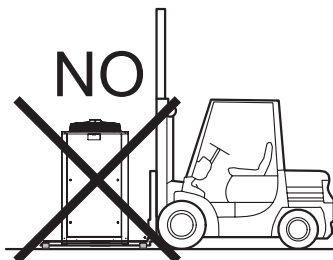
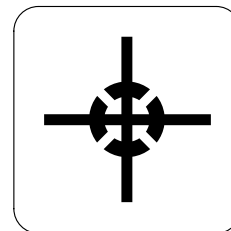
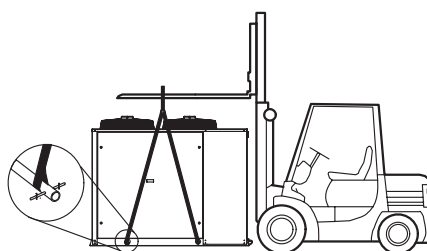
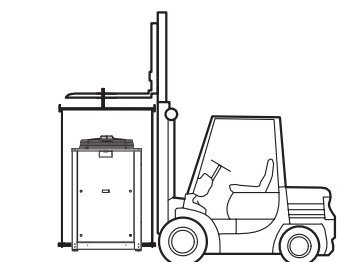


Fig.3



- **Lifting and handling with a crane or similar**

- Position metal tubes of an adequate thickness in the holes on the base of the unit in order to lift it.
- The ends of the tubes must project to an adequate extent to allow safety components to be inserted and the lifting belts to be fitted.
- Consult the tables in the **When the appliance arrives** section for the venter of gravity position.
- Use spacer bars in the top part of the unit to prevent the banks and plastic parts covering the unit from being crushed and damaged.



WARNING:

Before proceeding with the handling operations, read the information on the wrapping to ensure the safety of persons and property. Also be sure to:

- Handle the load with care
- Avoid stacking other objects on top of the unit

Storage

The units must be stored in a dry place sheltered from the sun, rain, sand and wind.

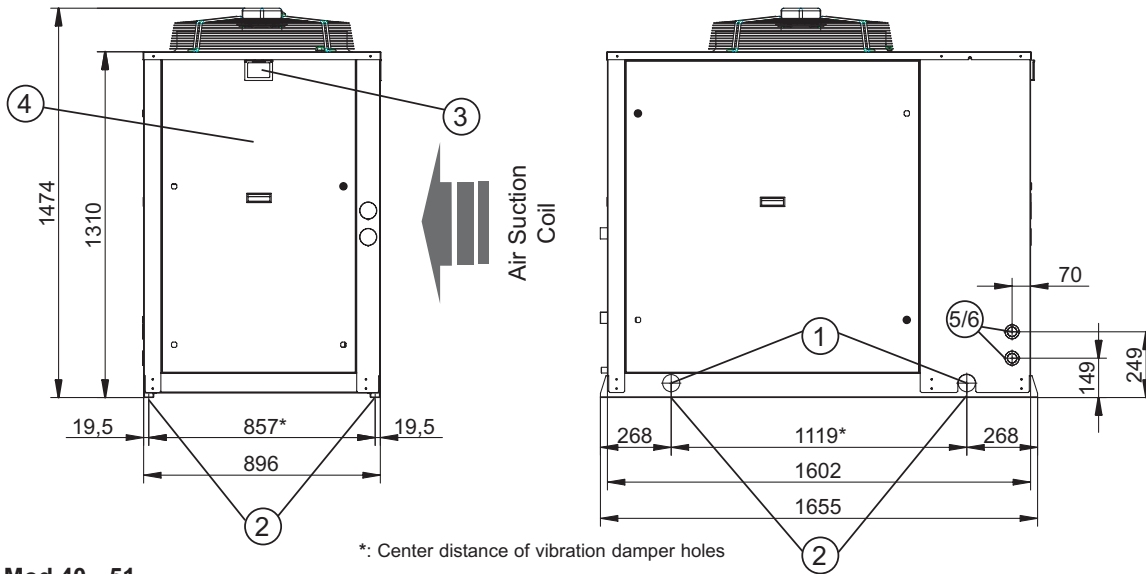
The storage conditions are:

- Do not stack the units
- Maximum temperature = **60°C**
- Minimum temperature = **-10°C**
- Humidity = **90%**

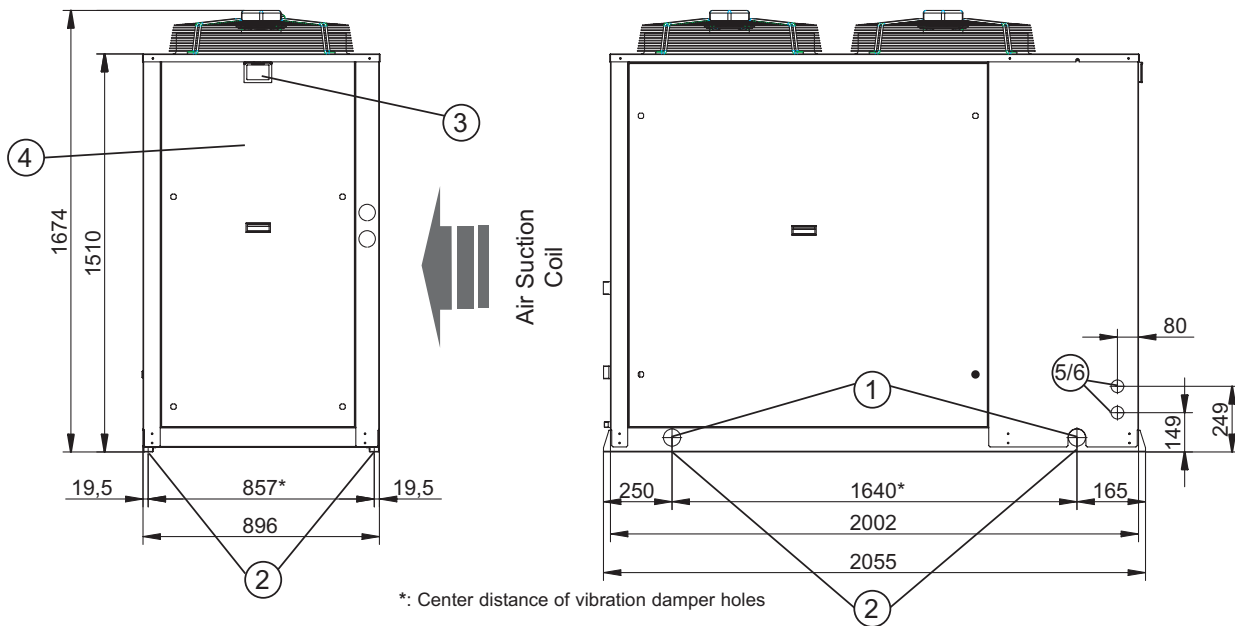
DIMENSIONAL DATA

Overall dimensions

Mod. 19 - 22 - 26 - 30



Mod.40 - 51



N.B.: Measurements given in mm.

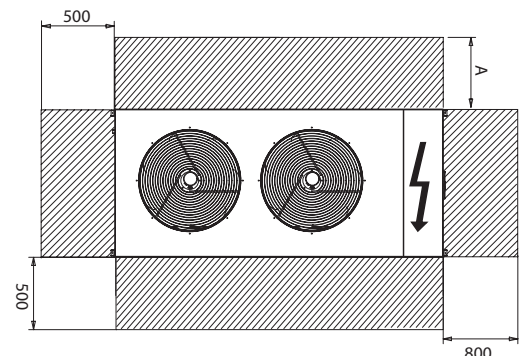
Description of the components

- | | |
|--|--|
| 1 - Lifting holes - nr.4 - Ø65 mm | 4 - Compressor compartment access panel |
| 2 - Vibration-damping fixing holes - nr.4 - Ø13 mm | 5 - Electric power supply input hole - nr.1 - Ø36 mm |
| 3 - Electric control and monitoring panel | 6 - Accessory cable inlet hole - nr.1 - Ø36 mm |

Minimum space required for operation

Refer to the figure alongside for the dimensions of the unit.
To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the figure.
The distances must be doubled if the unit is to be installed in a pit.
NOTE: Allow for a clear area of not less than 2.5 meters above unit.

The functional areas must be doubled if multiple units are installed.



Mod.	19+30	40-51
A	1100	1400

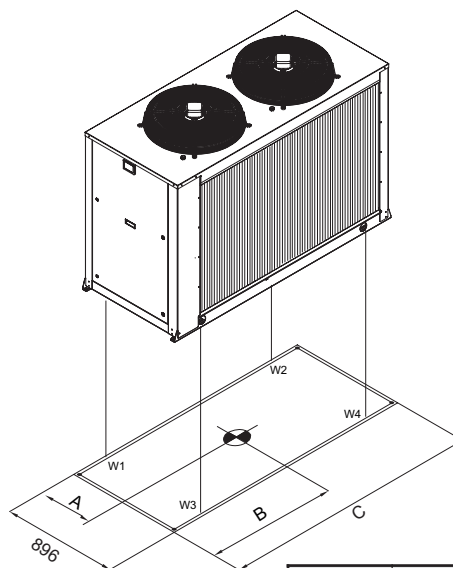
WEIGHTS AND CENTERS OF GRAVITY DURING TRASPORT AND OPERATION

Weight and center of gravity during transport

IR UNIT

Mod.	Basic Version		
	A [mm]	B [mm]	Weight [kg]
19	424	579	273
22	421	575	278
26	432	582	292
30	430	579	296
40	445	717	425
51	451	708	471

Mod.	Standard version, with Storage and Pumping Module accessory (MAP)		
	A [mm]	B [mm]	Weight [kg]
19	392	676	333
22	391	671	338
26	401	673	352
30	400	669	356
40	416	823	498
51	422	806	544



Mod.	C	UM
19-30	1602	mm
40-51	2002	mm

IP UNIT

Mod.	Basic Version		
	A [mm]	B [mm]	Weight [kg]
19	424	576	279
22	422	571	283
26	433	579	298
30	431	576	301
40	447	716	430
51	452	707	479

Mod.	Standard version, with Storage and Pumping Module accessory (MAP)		
	A [mm]	B [mm]	Weight [kg]
19	393	671	339
22	392	667	343
26	402	669	358
30	401	665	361
40	417	821	503
51	424	804	552

Weight and center of gravity during operation

Consider the following center of gravity positions of the machine and the load on the supports to correctly match the machine itself with the bearing structure (with reference to the figures on the previous pages).

IR UNIT

Mod.	Basic Version							Standard version, with Storage and Pumping Module accessory (MAP)						
	Center of gravity position during operation (mm)		Load on bearing points (kg)				total kg	Center of gravity position during operation (mm)		Load on bearing points (kg)				total kg
	A	B	W1	W2	W3	W4	Peso	A	B	W1	W2	W3	W4	Peso
19	422	578	105	40	93	36	275	367	786	152	131	104	89	475
22	419	574	108	41	95	36	279	366	781	155	131	105	89	479
26	430	581	110	43	102	39	294	374	779	157	132	111	93	494
30	428	577	113	43	103	39	298	373	775	160	133	112	93	498
40	443	715	144	73	141	71	429	385	924	211	182	157	136	686
51	447	706	160	79	159	78	476	392	905	227	187	175	144	733

IP UNIT

Mod.	Basic Version							Standard version, with Storage and Pumping Module accessory (MAP)						
	Center of gravity position during operation (mm)		Load on bearing points (kg)				total kg	Center of gravity position during operation (mm)		Load on bearing points (kg)				total kg
	A	B	W1	W2	W3	W4	Peso	A	B	W1	W2	W3	W4	Peso
19	422	575	108	41	96	36	280	368	781	154	131	106	90	480
22	420	570	111	41	97	36	285	367	777	157	131	107	89	485
26	431	578	113	43	104	40	300	375	775	160	132	113	94	500
30	428	574	115	43	105	40	303	374	771	162	133	115	94	503
40	444	714	145	73	143	72	433	387	923	212	182	159	137	690
51	449	705	162	79	163	80	483	394	902	230	188	178	145	740

Vibration-damper installation

To prevent the operating unit from transmitting vibrations to the bearing structure, vibration dampening materials should be inserted under the bearing points.

The unit can be supplied with the rubber vibration dampening accessory. This must be mounted by the installer.

ELECTRICAL CONNECTIONS

General rules

The appliance must be wired in compliance with the laws in force in the country in which it is installed. The units are supplied fully wired in the factory and pre-engineered for connection to the electricity main. The electric panel is made in compliance with the technical standards in force in the European Union.

Structure of the electric panel

All the electrical components are contained in a closed casing protected against the atmospheric agents and inspectionable by opening the front door after removing the front panel. The door for accessing the power section is locked by the mechanism. The powering flex and ground wire (PE) access the panel through the opening on the left-hand side in the lower part of the side of the unit and enter the actual panel through the lower part of the junction box.

Composition of the system

The system comprises an electromechanical part consisting of the power circuit, with disconnecting device, contactors, fuses or thermal cutouts, transformer, and another part comprising the Microprocessor control system.

NOTE: REFER TO THE WIRING DIAGRAM SUPPLIED WITH THE UNIT FOR THE LAYOUT OF THE ELECTRIC PANEL.

Electrical connections

All electrical connections must be carried out by qualified personnel in the absence of electric power. The table below gives the electrical specifications of the different constructional configurations of the units.

Compressor specifications

MODEL	19	22	26	30	40	51
Power supply [V-ph-Hz]	400 - 3 - 50					
FLA [A]	16,0	21,0	22,0	25,0	31,0	40,0
LRA [A]	95	111	118	118	198	225
FLI [kW]	9,1	10,2	12,0	13,4	16,8	22,4

Fan specifications

MODEL	19	22	26	30	40	51
Power supply [V-ph-Hz]	230 - 1 -50					
FLA [A]	3,5				7	
LRA [A]	7,5					
FLI [kW]	0,8				1,6	

Specifications of pumping module accessory MAP

MODEL	19	22	26	30	40	51
Power supply [V-ph-Hz]	400 - 3 - 50					
FLA [A]	1,73				2,10	
LRA [A]	8,00				9,40	
FLI [kW]	0,83				1,04	

Basic Version VB

MODEL	19	22	26	30	40	51
Power supply [V-ph-Hz]	400 - 3+N - 50					
FLA TOTALE [A]	19,5	24,5	25,5	28,5	38	47
FLI TOTALE [kW]	9,9	11	12,8	14,2	18,4	24
MIC TOTALE [A]	99	115	122	122	205	232

Basic Version VB + Pumping Module MAP

MODEL	19	22	26	30	40	51
Power supply [V-ph-Hz]	400 - 3+N - 50					
FLA TOTALE [A]	21,2	26,2	27,2	30,2	40,1	49,1
FLI TOTALE [kW]	10,7	11,8	13,6	15,0	19,4	25,0
MIC TOTALE [A]	100	116	123	123	207	234

NOTES:

Values valid for IP and IR units, **BASIC** and **SILENCED** versions

FLA= Power draw at maximum tolerated conditions

LRA= Surge current

FLI= Electric power draw at maximum tolerated conditions

MIC= Maximum surge current of the unit

ELECTRICAL CONNECTIONS

1) Connection to the electricity main

- **Feeder line;**

The feeder line of the machine must follow a well defined route without interruptions. Pass the line through the hole in the base of the left-hand panel of the machine. It is advisable to replace the rubber core hitch in this hole with a cable clamp so that the line is firmly fixed to the structure of the machine. Now route the line inside the compressor compartment until it reaches the hole in the bottom of the electric panel. Here again, make sure you use an adequately sized cable clamp.

Connect the conductors straight to the input terminals of the main circuit-breaker of the machine.

- **Powering system;**

The power cables of the feeder line of the machine must come from a symmetric threephase voltage system complete with neutral conductor and separate protection conductor.

$$V = 400V \pm 10\%$$
$$f = 50 \text{ Hz}$$

- **Protection on supply side;**

An automatic switch must be installed on the supply side of the side in order to protect against any overcurrents and indirect contacts that could occur when the machine is operating.

It is advisable to install an automatic current limiter switch in order to limit the effective short-circuit current in the connecting point of the machine. This allows a protection device with a lower breaking capacity than that required in the connection point to be sized like the main circuit-breaker of the machine.

The line and switch must be coordinated in compliance with the current laws governing electrical safety matters, regarding the type of installation and environmental conditions in which the machine must operate.

- **Protection conductor** (ground wire);

The protection conductor from the feeder line must be connected straight to the ground screw identified by code "**PE**", which ensures the equipotential connection of all metal grounding points and structural parts of the machine.

- **Neutral conductor:**

The neutral conductor in the feeder line must be connected to the neutral conductor identified by the letter "**N**" corresponding to the fourth pole of the main panel circuit-breaker.

2) Electric panel

- **Protection degree:**

The electrical panel casing is made from sheet metal and has IP54 protection rating at the doors directly accessible from the outside. The other parts of the casing guarantee a protection degree that is at least equivalent to **IP22**, as established by the current laws in force: this has been achieved since the panel has further protection against the penetration of solid foreign bodies and atmospheric agents thanks to the machine structure in which it is housed.

- **Starting and stopping function:**

The red handle on the panel door directly acts on the main circuit-breaker. The handle also acts as a door lock since it ensures that the machine is only powered when the door is shut. The stopping function carried out by the main circuit-breaker is classified as type "0" since the machine is stopped by immediately cutting off the power supply.

3) Reference standards

- The provisions established by the following Directives have been complied with to ensure the safety of the electrical products placed on the European Union market:

- Low Voltage Directive **73/23/EEC** which also includes the following harmonized standards:

CEI EN 60335-1 and **60335-2-40**.

Classification: **CEI EN 60204-1**. Safety of machinery. Electrical equipment of machines. Part 1:

General rules.

- Directive **89/336/EEC** and **92/31/EEC** concerning "**Electromagnetic compatibility**".

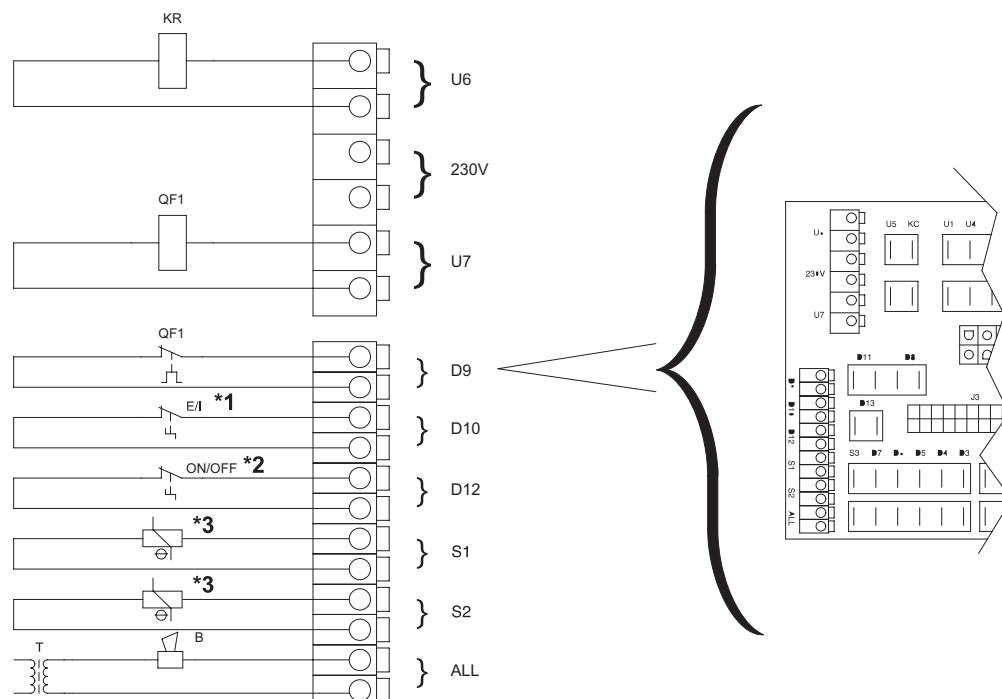
ELECTRICAL CONNECTIONS

4-A) Connections to make in the installation site

Wiring diagram (detail of wiring diagram supplied with the machine).

Description of the individual components to connect in the installation site.

WIRING BOARD TERMINAL BOARD



CODE	DESCRIPTION	CODE	DESCRIPTION
U6	230V output - Anti-freeze function	ALL	Digital output for alarm signalling Max 24V - 0.5A
230 V	230V output - 10VA max (OP-Programmer Clock power supply)	KR	Anti-freeze heating element relay
U7	230V output - Water pump	QF1	Pump control
D9	Digital input for pump protection	QF1	Pump safety
D10	Digital input for remote summer/winter *1	E/I	Remote summer/winter selector
D12	Digital input for remote ON/OFF *2	ON/OFF	Remote ON/OFF selector
S1	Analogue input for water inlet probe *3	T	Alarm signalling circuit transformer
S2	Analogue input for water outlet probe *3	B	Alarm signalling device

Note:

*1: SUMMER / WINTER SELECTOR (IP version only)

Installation:

a) Disconnect the machine from the mains power supply.

b) Remove the jumper between terminals **D10** and connect the selector.

c) Change the value of parameter **H27** to 1 (parameter **H27** belongs to the family of **CNF** configuration parameters - consult the "**Menu structure**" part of the "**Monitoring system**" section in order to change the setting).

Operation: (see table to side)

Closed contact = "**cool**" mode

Open contact = "**heat**" mode

NOTE: After the Summer/Winter selector has been enabled by changing the **H27** parameter, it will be no longer possible to change season with the "mode" key of the controller on the machine.

NB: Max. recommended length 100 m.

*2: remote ON/OFF command controllable from Programmer Clock accessory (OP) Installation:

a) Disconnect the machine from the mains power supply.

b) Remove the jumper between the terminals **D12** and connect the user ON-OFF selector.

Operation:

Closed contact = unit on (**ON**)

Open contact = unit off (**OFF**)

NB: Max. recommended length 100 m.

*3: COMPONENTS ALREADY INSTALLED STANDARD IN THE UNITS

Controller status	Contact	
	Closed	Open
OFF	OFF	OFF
Stand-by	Stand-by	E00
Cool	Cool ❄️	E00
Heat	Heat 🔥	E00

WET CONNECTIONS

General rules

A mesh filter (hole $\varnothing \leq 500 \mu\text{m}$) must be installed on the unit's water inlet otherwise warranty is immediately forfeited for units with either the pipe kit. The filter performs the function of blocking any foreign matter in the system's plumbing circuit (shavings, machining debris, etc.). This prevents the plate exchanger water pipes from clogging then possibly freezing (and therefore bursting). This filter is included in the unit equipped with the pumping module accessory (MAP).

Comply with the local laws governing safety matters in order to correctly design the hydraulic circuit. The following information gives suggestions on how to correctly install the unit.

1) Standard supply.

- Standard supply includes a differential pressure switch situated between the water inlet and outlet of the plate exchanger to avoid freezing if the water flow stops for any reason.

Activation is calibrated for a **80 mbar $\pm 5 \Delta p$** , while resetting occurs with a **Δp of 105 mbar ± 5** .

The differential pressure switch opens the contact and shuts down the unit when the water delivery decreases and $\Delta p \leq 80 \text{ mbar} \pm 5$.

The differential pressure switch closes and therefore the unit can restart when the water delivery increases and $\Delta p \geq 105 \text{ mbar} \pm 5$.

- The unit comes standard with an antifreeze heater located between the evaporator shell and the exchanger insulation, controlled by the unit's electronic controller.

2) With pumping module accessory.

- Besides the standard accessories, the unit is equipped with all the hydraulic components, as specified in the "Options and accessories" section.

Hydraulic layout of the system

General suggestions

- The pipes must have the least possible number of bends to minimize load losses and must be adequately supported in order to prevent the connections of the unit from being excessively stressed.
- Install on-off valves near components that need to be serviced to isolate them when maintenance work needs to be done and to allow them to be replaced without having to discharge the system.
- Before isolating the pipes and charging the system, carry out preliminary inspections to make sure that there are no leaks.
- Isolate all the chilled water pipes to prevent condensation from forming along the pipes themselves. Make sure that the material used is the steam barrier type, failing this, cover the insulation with an appropriate protection. Also make sure that the air venting valves can be accessed through the insulation.
- Do not forget to install or at least allow for the installation of pressure and temperature reading instruments on the inlet and outlet parts of the hydraulic circuit. These instruments will allow you to monitor the operation of the system.
- The circuit can be kept under pressure by means of an expansion tank (with which the unit is equipped if the pumping module accessory is installed) and a pressure reducer. A plant filling unit can also be used in order to automatically charge the system and keep it at the desired pressure if it drops below a certain pressure value. Install manual or automatic valves in the highest point of the system to eliminate air from the circuit.

Fit manual or automatic valves at the highest point in the circuit in order to vent air from the circuit.

- Depending on the chosen accessory, there may be male threaded connections
- If anti-vibration mounts are installed under the unit, it is recommended to use flexible couplings before and after the water circulation pump and near the unit.
- Install a cock on the outlet of the unit in order to regulate the water flow.

Precautions for the Winter

The water could freeze and damage the exchanger of the unit and other parts of the system during the winter period, if the system was to remain at a standstill. This problem can be obviated in 3 different ways:

1. Drain the system completely, taking care to drain the plate exchanger (in order to drain the unit's plumbing system completely, open the water drain ball valves and the air vent valves).
2. Operate with glycol water taking account, depending on the % of glycol, of the factor of correction of the refrigerating capacity, power input, water flow rate and losses of head (see table on following page)
3. If it is certain that the unit will always be powered throughout the winter, the unit is able to protect itself from freezing, down to a temperature of -20°C : this is possible thanks to an antifreeze electric heating element installed on the plate exchanger and intelligent control of the water pump that must be governed by the microprocessor board (see the "Electric Connections" section)

If the unit is fitted with a Storage tank, solution no. 3 requires installing the tank antifreeze heating element accessor

WET CONNECTIONS

Correction factor for use of ethylene glycol

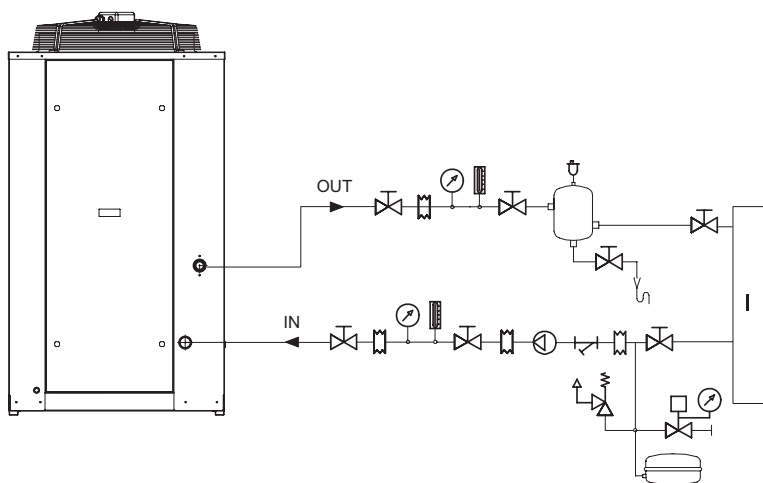
% of glycol in weight	0	10%	20%	30%	40%
Freezing temperature	0	-3.9	-8.9	-15.6	-23.4
Refrigerating power multiplier	1	0.99	0.98	0.97	0.95
Power draw multiplier	1	1	0.99	0.99	0.98
Water flow rate multiplier	1	1.04	1.08	1.12	1.16
Load loss multiplier	1	1.08	1.16	1.25	1.35

3) Basic diagram

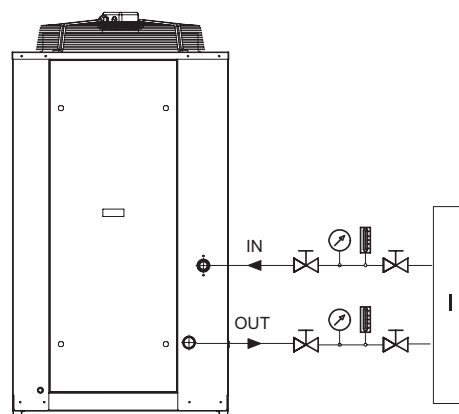
The following figures represent connections to the evaporator circuit.

IMPORTANT: There must be a constant flow of water to the exchanger.

Basic Version (VB)



VB+pumping module accessory (MAP)



I = User system



Pressure gauge



Pump



Breather valve



Coupling



Thermometer



Filter



Safety valve



Water filling unit



On-off and/or
water flow rate
regulating valve



Tank

Air vent and water drain

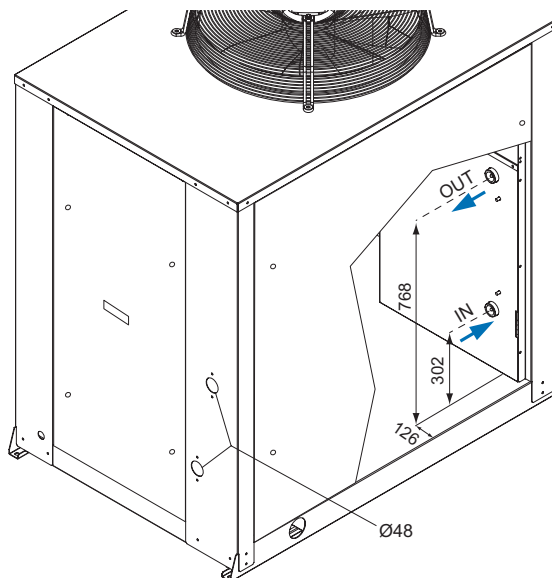
The installer must provide for fitting a suitable number of manual or automatic valves in the highest part of plumbing circuit that supplies the unit (in particular if not equipped with the pipe Kit accessory) for venting any air present. In the same way, he must install a water drain valve in order, when necessary, to drain the unit's plate exchanger completely especially during the winter in order to prevent freezing that would seriously jeopardize the operation of the unit.

For units with the pipe kit there is an air vent valve on the top pipe and a water drain valve on the bottom pipe. See "Accessories and options" section.

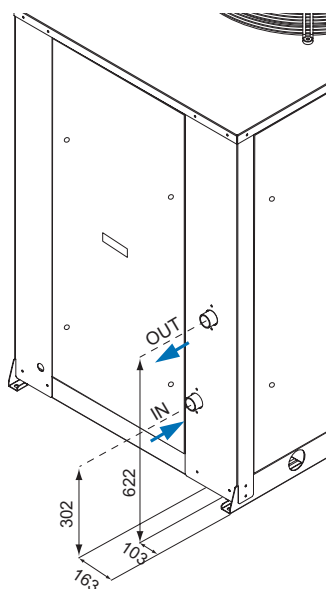
WET CONNECTIONS

Position of wet connections

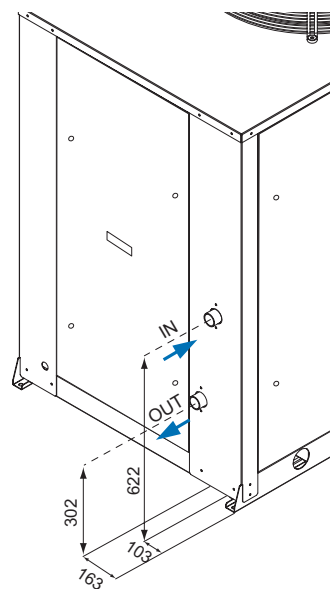
Standard Version unit (VB)



**Standard Version unit (VB)
+ Tube Kit (KT)**



**Standard Version unit (VB)
+ Storage and Pumping
Module (MAP)**



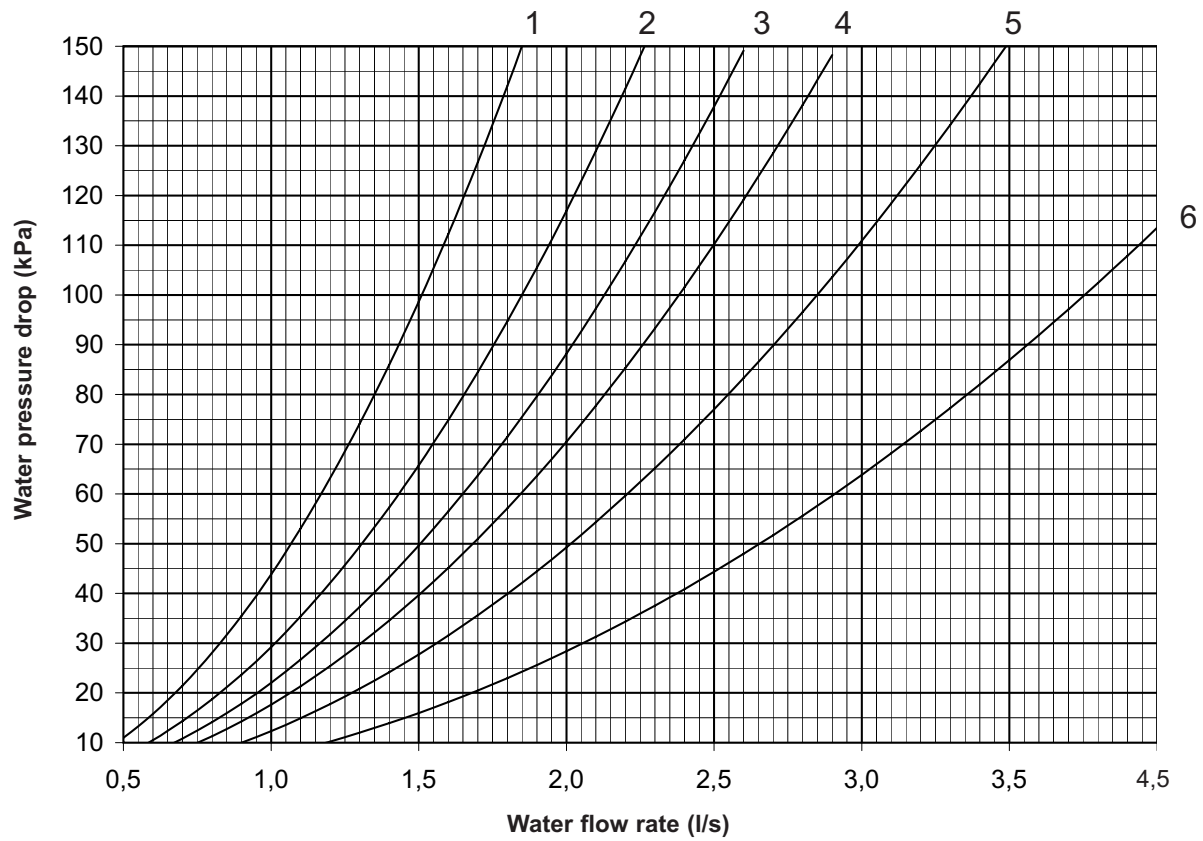
N.B.: Measurements given in mm.

Version	Standard Version unit (VB)		Standard Version unit (VB) + Tube Kit (KT)		Standard Version unit (VB) + Storage and Pumping Module (MAP)	
Mod.	19 ÷ 30	40 - 51	19 ÷ 30	40 - 51	19 ÷ 30	40 - 51
IN / OUT	1" 1/4 M	1" 1/4 M	1" 1/4 M	1" 1/2 M	1" 1/4 M	1" 1/2 M

WATER PRESSURE DROP

Water pressure drop

The graph below illustrates the water pressure drop values in **kPa** depending on the flow rate in **liters/second**. The operating range is delimited by the minimum and maximum values given in the next graph.

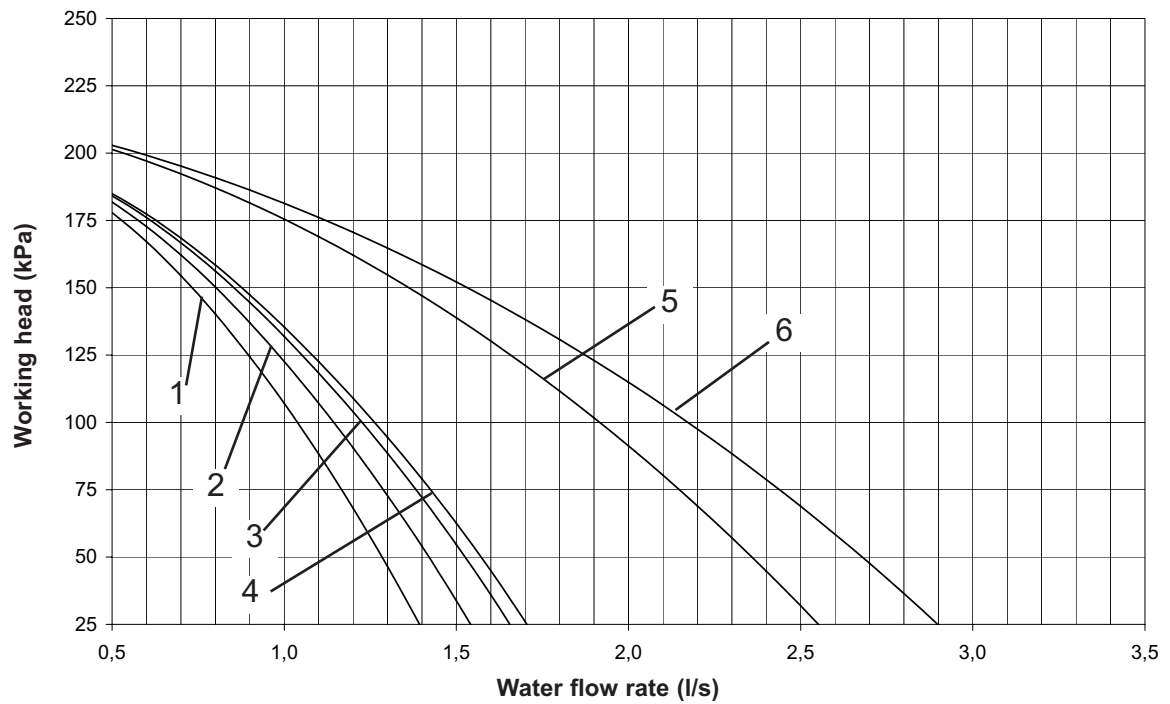


WORKING HEAD

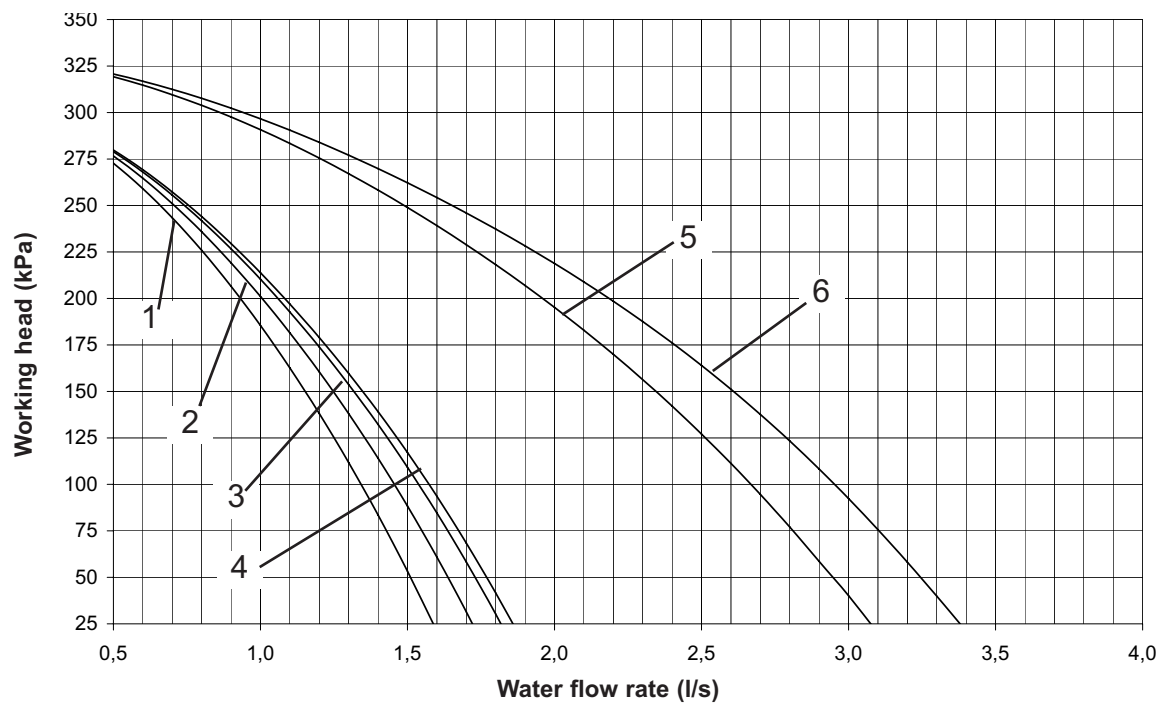
Working head Standard

The following graph gives the head values (**kPa**) depending on the water flow rate (**liters/second**). The operating range is delimited by the minimum and maximum values given in the next graph.

Working head is the one on the wet module outlet minus all the water pressure drop of the unit.



Working head High



MAXIMUM VOLUME OF WATER

Maximum volume of water in the system with wet module

Before filling the water system, it is advisable to consider the type of installation in question, i.e. check the difference in level between the wet module and user. The following table gives the maximum water content of the water supply system in liters, depending on the capacity of the standard surge chamber supplied and the pressure at which it should be charged. The surge chamber setting must be regulated to suit the maximum positive difference in level of the user.

Maximum setting value 600 kPa.

With a positive H of more than 12.25 meters, calculate the surge chamber's service charge value in kPa using the formula below:

$$\text{Surge chamber service charge} = [H/10.2 + 0.3] \times 100 = [\text{kPa}]$$

NOTE: In case A, make sure that the user's lowest point is able to withstand the global pressure.

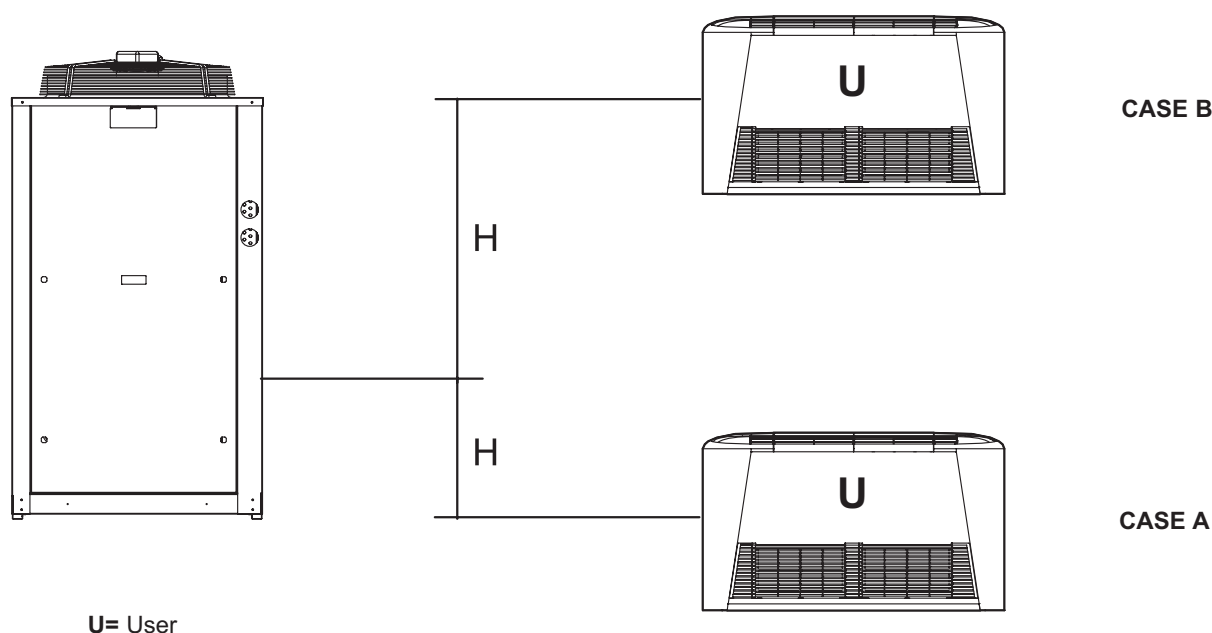
Tab.1

Model			19 - 22 - 26 - 30		40 - 51	
Surge chamber volume (liters)			8		12	
Thermal expansion of water (10-40°C)			0.0074			
Thermal expansion of water (10-60°C)			0.0167			
H (meters)		Surge chamber pressure (kPa)	Maximum total volume of water supply system (liters)			
			IR	IP	IR	IP
Case A	H <0	150 (standard)	695	308	1043	462
Case B	0 < H < 12.25	150 (standard)	695	308	1043	462
	20	226	577	256	866	384
	25	275	502	222	753	333
	30	324	426	189	639	284

NOTE: If the unit operates with brine, calculate the real volume of the system by taking into account the corrective factors for the volume of the system given in the table below.

Corrective factors per total maximum volume of the system with brine

% of brine	0%	10%	20%	30%	40%
Cooling Mode	1.000	0.738	0.693	0.652	0.615
Heating Mode	1.000	0.855	0.811	0.769	0.731



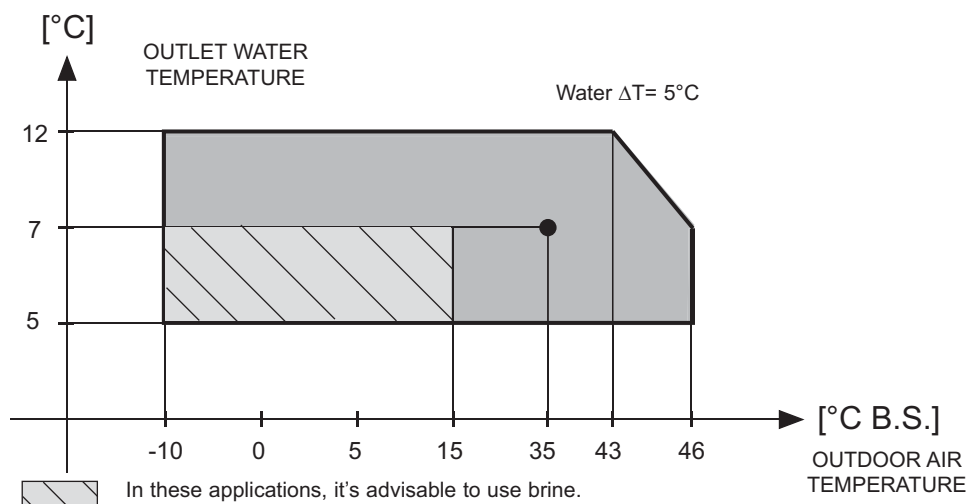
OPERATING RANGE

Operating range

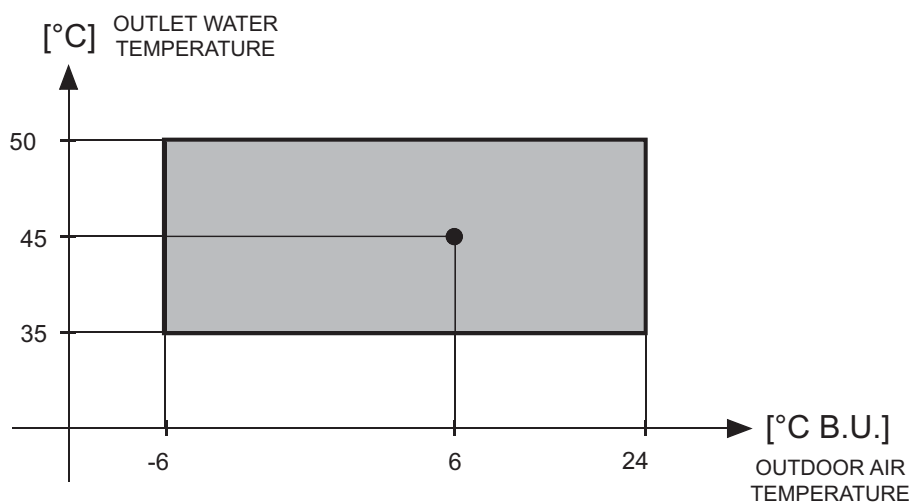
The graphs below give the operating ranges within which correct operation of the units is guaranteed.
The use of the units in conditions differing from those indicated will void the warranty with which the product is supplied.
In the following table, there are the thermal water head limit values of the unit.

Thermal Water Head		Limit value
Minimun	°C	3
Maximus	°C	8

COOLING MODE



HEATING MODE



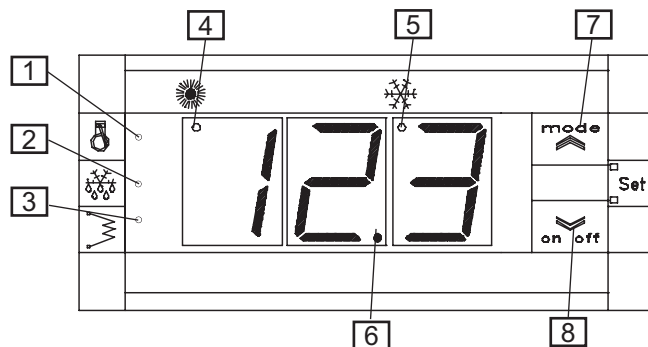
MONITORING SYSTEM

User interface

The controller installed is a highly versatile and easy-to-use instrument. Specially designed to monitor single-circuit heat pumps and chillers, it can be programmed and thus personalized by means of a parameter menu. Various peripherals can be connected to it in order to implement functions that it is unable to handle on its own.

KEY

1. Compressor Led
2. Defrosting Led
3. Antifreeze electric heater Led
4. "HEAT" mode Led
5. "COOL" mode Led
6. Unit off Led / Decimal point Led
7. Tasto **MODE - SCROLL UP**
8. **ON-OFF - SCROLL DOWN** key



1. STATUS

The controller has four **LEDs** on the left side of the interface, that display the status functions of the machine:

- Compressor LED.
- LED for the defrosting function (function available for heat pump units).
- Antifreeze electric heater LED.

MONITORING SYSTEM

1

Compressors LEDs COMPRESSOR



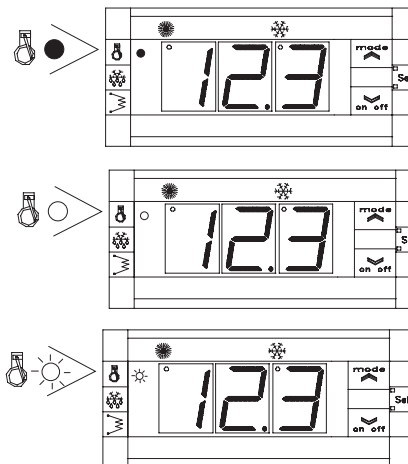
LED STATUS

ON: Compressor on

OFF: Compressor off

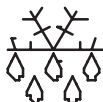
FLASHING: Waiting to start for time counting function

DISPLAY



2

Defrosting LED (version IP only) DEFROSTING



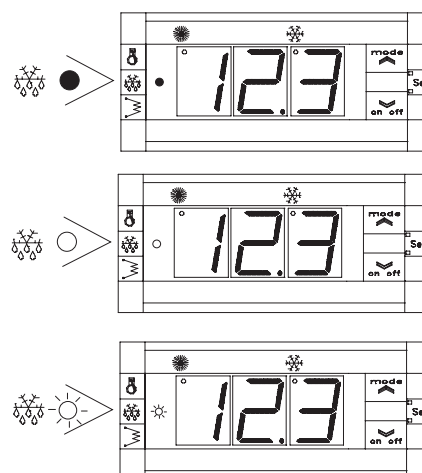
LED STATUS

ON: Defrosting function on

OFF: Defrosting function off

FLASHING: Waiting to start timed defrosting procedure

DISPLAY



3

Antifreeze electric heater LED HEATING ELEMENT

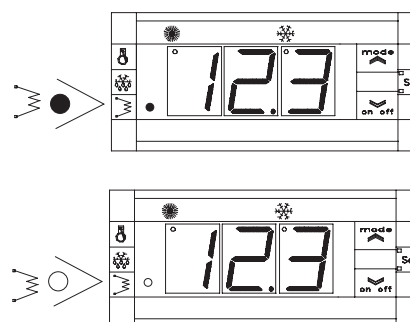


LED STATUS

ON: Heater on

OFF: Heater off

DISPLAY



MONITORING SYSTEM

Probe reading

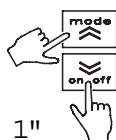
The temperature setting (i.e. the temperature read by the probe on the exchanger inlet) expressed in degrees Centigrade (**the temperature can be displayed in °F by changing the value of the HS2 parameter from 0 to 1**) or the alarm code if at least one alarm is activated, are shown on the display during normal machine operation. The temperatures read by the other probes can be displayed by means of a few simple operations as described below:

KEYS TO PRESS

DESCRIPTION

DISPLAY

1



Press the mode and on/off keys at the same time for 1 second. The word **SET** will appear on the display.



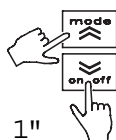
2



Repeatedly press the on/off key until the letters **tP** appear.



3



Press the mode and on/off keys at the same time for 1 second and the display will show code **t01** which identified the water inlet probe.



4

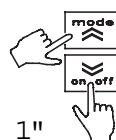


Use the mode key to select the probe whose value must be known.

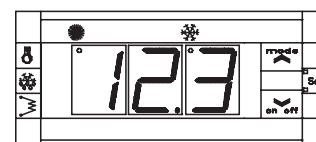
The following table lists the codes that identify the probes installed in the unit.

PROBE CODE	DESCRIPTION
t01	Exchanger inlet water temperature
t02	Exchanger outlet water temperature
t03	Bank temperature
t04	Not used

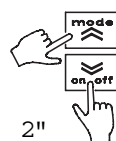
5



Press the mode and on/off keys for 1 second to display the value of the probe in question.



6



To quit the newly acquired reading, press the mode and on/off keys for 2 seconds. To know the values of the other probes, repeat the sequence up to points 4 and 5, otherwise press the mode and on/off keys at the same time for 2 seconds to return to the message tP. Repeat this operation several times to quit the menu.

MONITORING SYSTEM

2. MONITORING

The monitoring functions allow the operating parameters of the unit to be selected.

Operating modes

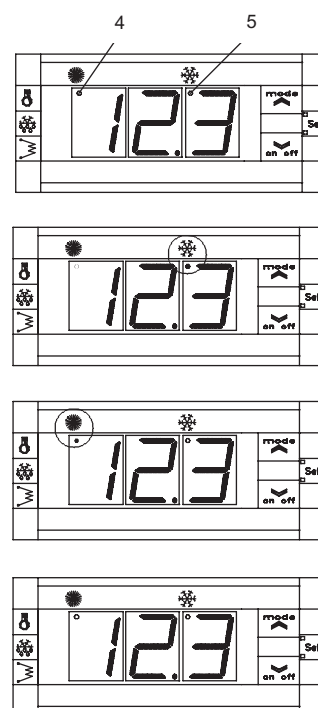
1. Operating mode key (MODE)

The screen-printed design illustrates, with cyclic rotation, the operating mode to which the machine sets each time the key is pressed.

DESCRIPTION

- 1 When the unit is at a standstill and **"waiting to start"** (stand-by status), LEDs **[4]** and **[5]** will be off.
The temperature of the water read by the probe on the evaporator inlet will appear on the display.
- 2 Press the **mode** key for **1 second** to turn the unit on in cold mode. Led **[5]** will light up on the display.
- 3 Press the **mode** key for **1 second** to switch from the **"Cool"** mode to the **"Heat"** mode (IP unit only). Led **[4]** will light up on the display.
- 4 Press the **mode** key again for **1 second** and the unit will set to the **"waiting to start"** status again.

DISPLAY

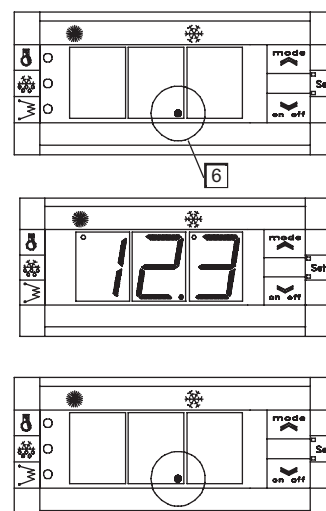


2. ON/OFF modes

The key carries out two separate functions: if pressed for **1 second**, it acts as "alarm reset"; if pressed for **2 seconds**, it turns the controller "on/off".

DISPLAY

- 1 When the unit is off, only LED **[6]** will be lit on the display.
- 2 Press the on/off key for **2 seconds** to turn on the controller. The temperature of the water read by the probe on the evaporator inlet will appear on the display.
- 3 Press the on/off key again for **2 seconds** to turn the controller off again.

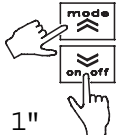
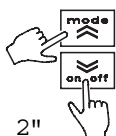


MONITORING SYSTEM

3. MODE + ON/OFF keys

These keys allow you to access the menu mode and subsequent levels if pressed for 1 second or to quit in reverse if pressed for **2 seconds**.

When the mode + on/off keys are pressed for the first time, the **LEDs** that identify the status begin to flash to indicate that the instrument is in the programming phase.

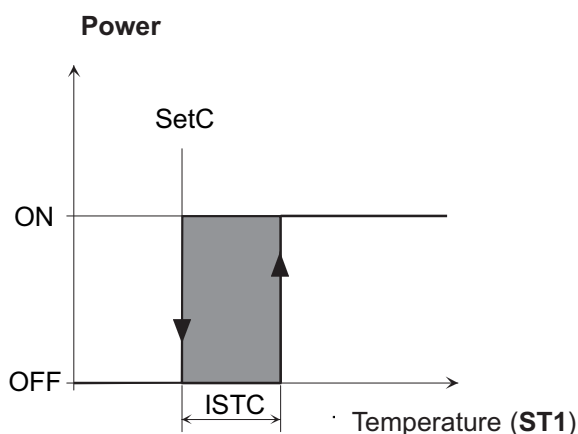
		DESCRIPTION
1	 1"	Press the on/off and mode keys for 1 second to move down one level in the display menu.
2	 2"	Press the on/off and mode keys for 2 seconds to move up one level in the display menu.

A few examples of how these keys are used together to move within the menus, are given further on in the **Status** chapter and in the next section - **How to enter the operating Set-Point**.

4. How to enter the operating Set-Point

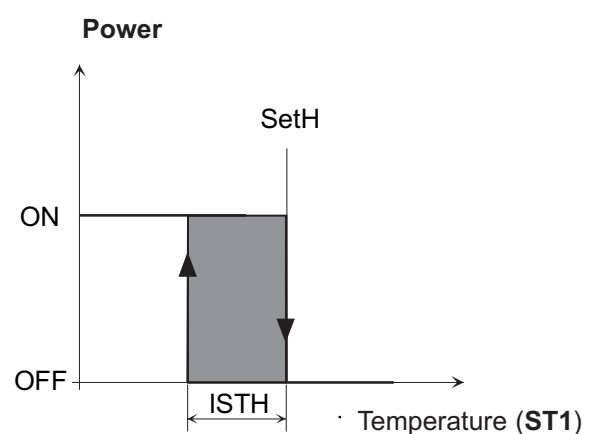
The purpose of the thermoregulator is to keep the temperature of the water at the plate exchanger inlet as near as possible to the value selected as **SET-POINT**. The type of regulation made by the controller is the **ON - OFF** type. Once the ideal operating parameter has been established (**SET-POINT**), the machine will turn off the compressor when this value is reached and turn it on again at the **SET-POINT** value plus a hysteresis value preset in the factory and which can only be modified by a qualified technician.

COOL thermoregulator



SetC = Set-Point for operation in cooling mode
ISTC = Cooling thermoregulator hysteresis

HEAT thermoregulator

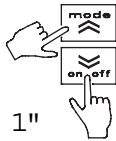


SetH = Set-Point for operation in heating mode
ISTH = Heating thermoregulator hysteresis

MONITORING SYSTEM

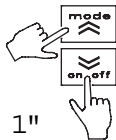
KEYS TO PRESS

1



1"

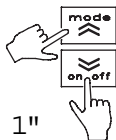
2



1"

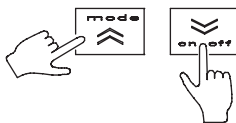


3

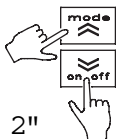


1"

4



5



2"

DESCRIPTION

Press the mode and on/off keys at the same time for 1 second. The word **SET** will appear on the display.

Press the mode and on/off keys at the same time for 1 second. The message **Coo** (meaning "Cool") will appear on the display.

In units with heat pump, press the on/off key to switch to the **Hea** mode (meaning "Heat").

Press the mode and on/off keys at the same time again for 1 second and the selected set-point value will appear on the display.

Press the mode key to increase the value of the selected set-point or the on/off key to decrease the value.

Press the mode and on/off keys together again for 2 seconds to recall the previous menu.

DISPLAY



3. ALARMS

If faults occur during normal machine operation, the controller will stop the machine and display the code of the alarm relative to the activated safety device. After having checked the alarm and eliminated its cause, the user can reset the controlled by pressing the *on/off* key.

1. How to reset the alarms

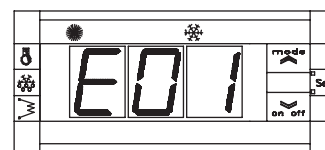
As previously described, the key carries out two separate functions. If pressed for 1 second, it resets the alarms. If pressed for 2 seconds it turns the controller on and off.

MONITORING SYSTEM

DESCRIPTION

- 1 If a fault occurs, the controller will signal the activated alarm code by means of a flashing message on the display.
- 2 Press the *on/off* key for 1 second to reset the controller and allow the unit to operate normally again.

DISPLAY



2. Alarm codes

The following diagram illustrates the alarm codes, the relative international symbol that identifies it and a description of the type of alarm. Two alarm codes are multiple, i.e. they have several meanings. All other alarms have only one meaning. Pay particular attention if code **E00** appears since it does not denote faulty machine operation but that the remote on/off switch or the off switch of the unit controlled by the programmer clock (optional accessory) have been activated.

E00



Machine stand-by status via remote control

E01



Maximum pressure switch activation

E01



The compressor circuit breaker trips

E01



Activation of the electric power line phase presence and sequence monitoring device (if installed)

E01



Activation of the compressor delivery pipe temperature probe (if installed)

E02



Minimum pressure switch activation

E04



Condensation fan circuit breaker trips

E05



Activation of the anti-freezing safety procedure

E06



Temperature probe on the exchanger water outlet faulty

E07



Bank probe faulty

E40



Temperature probe on the exchanger water inlet faulty

E41



Water pump circuit breaker trips (if installed)

E41



Activation of water differential on plate exchanger

MONITORING SYSTEM

3. Menu structure

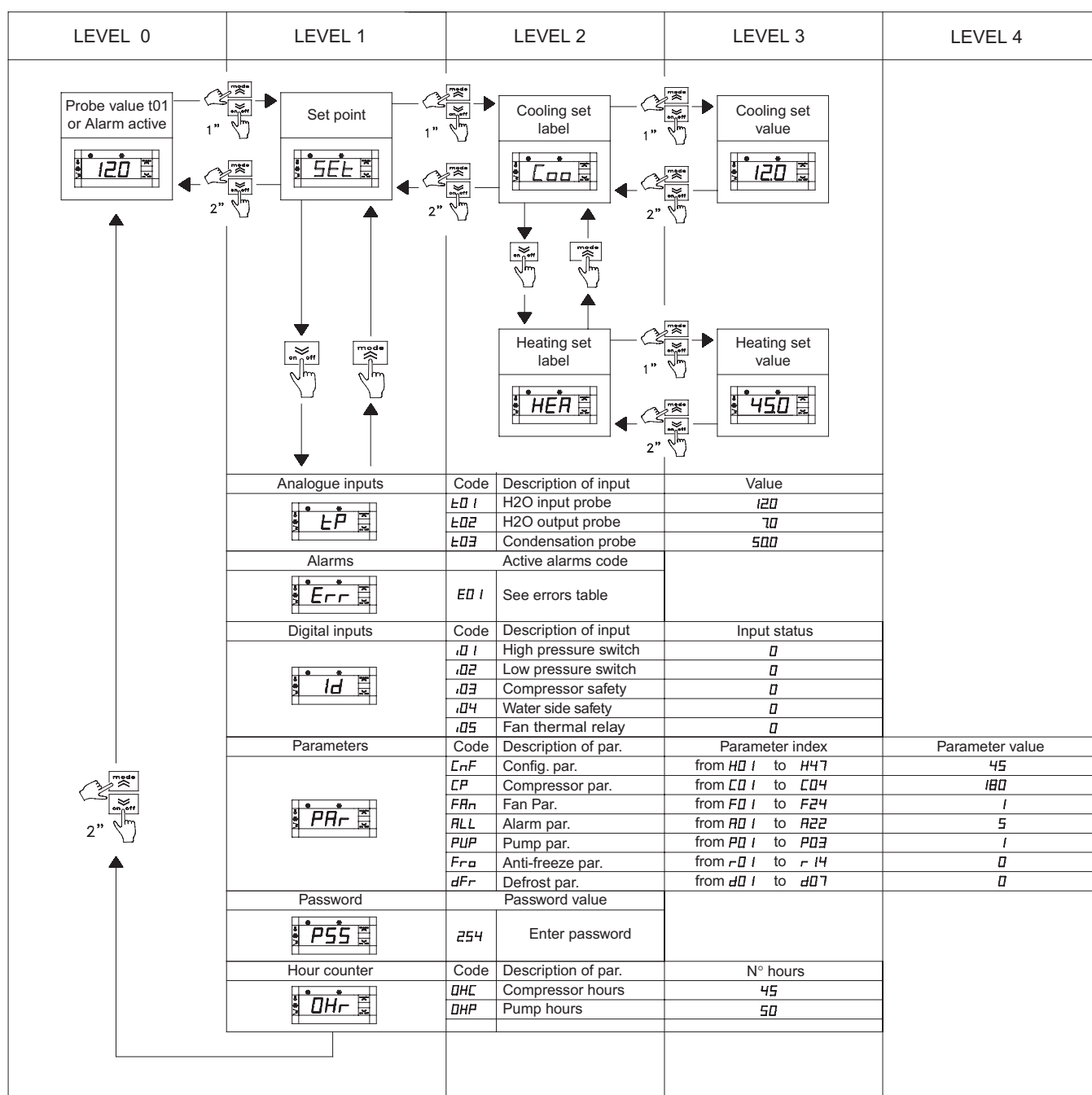
The menu in the monitoring system has a tree structure based on four different levels.

Level 0 includes the values the controller displays during normal operation, i.e. the thermoregulation temperature (temperature detected by probe "t01" on the exchanger inlet) or an alarm code.

The menu where the seven labels (titles) are displayed can be accessed by moving up to **level 1**.

At **level 2** and, subsequently, **level 3**, each menu opens by presenting a submenu or the values in the open menu item.

Lastly, **level 4** just gives the values of the parameters menu.



NOTE:The values in the menu diagram are purely indicative.

SETTING AT WORK

General Rules

To validate the **contractual warranty**, the machine must only be set at work by technicians from **an authorized assistance center**. Before they are called, check to make sure that all parts of the installation have been completed, the unit levelled, the plumbing connections made with the relative air vent and the electrical connections made.

MAINTENANCE

General rules

Maintenance is of extreme importance if the plant is to operate in a regular way and give fade-free service. Have extraordinary maintenance work done by qualified and authorized personnel. Comply with the safety precautions given in the relative section of this manual and take all the necessary precautions.

The following information is only a guide for the end user.

Routine maintenance

The inspections described below to which the unit must be subjected do not require specific technical know-how. They merely include a few simple checks involving certain parts of the unit.

Call an authorized assistance center if actual maintenance work is required.

The table below gives a recommended list of inspections which should be carried out at the indicated frequencies.

DESCRIPTION	WEEKLY	MONTHLY	EVERY SIX MONTHS
Visual inspection of the structure of the unit			•
Inspection of the hydraulic circuit		•	
Inspection of the electrical system		•	
Inspection of the condensing section		•	
Reading and recording of operating parameters	•		

• Visual inspection of the structure of the unit

When checking the condition of the parts that form the structure of the unit, pay particular attention to the parts liable to rust. If traces of rust are noted, they must be treated with rust-inhibitor paint in order to eliminate or reduce the problem. Check to make sure that the external panels of the unit are well fixed.

Bad fixing gives rise to noise and abnormal vibrations.

• Inspection of the hydraulic circuit

Check visually to make sure that there are no leaks in the hydraulic circuit. If the pumping module accessory is installed, it is advisable to make sure that the water filter is clean.

• Inspection of the electrical system

Make sure that the power cable that connects the unit to the distribution panel is not torn, cracked or damaged in a way that could impair its insulation.

• Inspection of the condensing section

WARNING: The finned pack exchanger has fins made of aluminium or some other thin material, thus even accidental contact could cause cuts. Comply with the instructions in the relative section.

• Condensing bank

In view of the function of this component, it is very important for the surface of the exchanger to be as free as possible from clogging caused by items that could reduce the air flow rate of the fan and, thus, the performances of the unit itself. The following operations may be required:

- Remove all impurities (such as paper scraps, leaves, etc., etc.) that could be clogging the surface of the bank either by hand or using a brush (comply with the above mentioned safety prescriptions).

- If the dirt has deposited on the fins and is difficult to remove by hand, use a jet of compressed air or pressurized water on the aluminium bank surface, remembering to direct the jet in a vertical direction to prevent the fins from being damaged.

- "Comb" the bank with the relative tool, using the appropriate comb spacing for the fins if some parts of them are bent or squashed.

• Helical electric fans

Visually inspect these parts to make sure that the electric fans are well fixed to the bearing grille and that this latter is fixed to the structure of the unit. Bad fixing leads to noise and abnormal vibrations.

• Reading and recording the operating parameters

This can only be done if the optional "pressure gauge kit" is available.

SAFETY AND POLLUTION

General considerations

The machine has been designed to reduce risks to persons and to the environment in which it is installed, to the minimum. To eliminate residue hazards, it is therefore advisable to become as familiar as possible with the machine in order to avoid accidents that could cause injuries to persons and/or damage to the property.

a. Access to the unit

Only qualified persons who are familiar with this type of machine and who are equipped with the necessary safety protections (footwear, gloves, helmet, etc.) may be allowed to access the machine. Moreover, in order to operate, these persons must have been authorized by the owner of the machine and be recognized by the Manufacturer itself.

b. Elements of risk

The machine has been designed and built so as not to create any condition of risk. However, residue hazards are impossible to eliminate during the planning phase and are therefore listed in the following table along with the instructions on how to neutralize them.

Part in question	Residue hazard	Mode	Precautions
Compressor and delivery pipe	Burns	Contact with the pipes and/or the compressor	Avoid contact by wearing protective gloves
Delivery pipes and bank	Explosion	Excessive pressure	Turn off the machine, check the high pressure switch and safety valve, the fans and condenser
Pipes in general	Ice burns	Leaking coolant	Do not exercise tension on the pipes
Electrical cables, metal parts	Electrocution, serious burns	Defective cable insulation, live metal parts	Adequate electrical protection; correctly ground the unit
Heat exchange bank	Cuts	Contact	Wear protective gloves
Electric fans	Cuts	Contact with the skin	Do not push the hands or objects through the fan grille

c. Pollution

The machine contains **R410A** coolant and lubricating oil. Thus, if the unit is scrapped, these fluids must be recovered and disposed of in accordance with the laws in force in the country where the machine is installed. **The machine must not be abandoned when scrapped.**

General recommendations about the coolant used

The cooling circuit of the machine is filled with **R410A** cooling gas. If it escapes, this gas will damage the atmospheric ozone. When no longer required for use, the machine must therefore be consigned to an authorized disposal center. Indications about the characteristics of this gas and how to act if it should accidentally escape are given below.

Danger indication

- Low toxicity.
- Inhalation of the gas for long periods can have anaesthetic effects.
- Prolonged exposure can alter the heart rate and cause death.
- The product can cause ice burns on the eyes and/or skin.

Limits to long-term professional exposure (LTEL)

R410A

Binary mixture of R-32 (50%) and R-125 (50%)

Dangerous component.....LTEL limit

	ppm
Difluoromethane CF ₂ H ₂	1000
Pentafluoroethane CF ₃ CHF ₂	1000

SAFETY AND POLLUTION

Handling

- Do not inhale coolant gas vapours.
- Concentrations of coolant gas vapours must be reduced to below the professional exposure limit.
- Ensure efficient ventilation near to the ground since the vapours are heavier than air.
- Prevent the coolant from coming into contact with naked flames and hot surfaces since irritating and toxic compounds can form. Do not smoke.
- Avoid contact with the eyes and skin.

Precautions to take if gas accidentally escapes

- Take adequate personal precautions (for the eyes, skin and respiratory tracts) when disposing of escaped gas.
- Isolate the leak source if the conditions are sufficiently safe.
- If the leak is small, allow it to evaporate while ensuring adequate ventilation.
- In the case of an extensive leak, pour sand, soil or other absorbent material over and around it to prevent it from spreading, and adequately ventilate the area.
- Prevent coolant from infiltrating into sewers, basements, etc., since this could create a toxic atmosphere.
- Do everything necessary to prevent coolant from dispersing into the environment.

First aid

- Move the victim away from the toxic source, keep him warm and allow him to rest.
- Administer oxygen if necessary.
- Proceed with artificial respiration if necessary.
- Give heart massage in the case of heart failure.
- Immediately seek medical help.

Contact with the skin:

- Immediately thaw the affected parts under running lukewarm water.
- Remove contaminated clothing (garments may stick to the skin in the case of ice burns) if they have not adhered to the skin.
- Seek medical assistance if necessary.

Contact with the eyes:

- Immediately rinse the eyes with physiologic eyewash or clean water for at least 10 minutes with the eyelids pulled open.
- Seek medical assistance if necessary.

Swallowing:

- Do not make the victim vomit. If the victim is conscious, have him rinse his mouth out with clean water and then drink 200-300 ml of water.
- Immediately seek medical help.
- Do not administer adrenaline or sympathomimetic drugs after exposure owing to the risk of cardiac arrhythmia.

Consult the technical safety briefs available from coolant manufacturers for further information about the characteristics of the cooling fluid.



Cod. 3QE22291



Ferroli spa - 37047 San Bonifacio (Verona) Italy - Via Ritonda 78/A
tel. +39.045.6139411 - fax +39.045.6100933 - www.ferroli.it