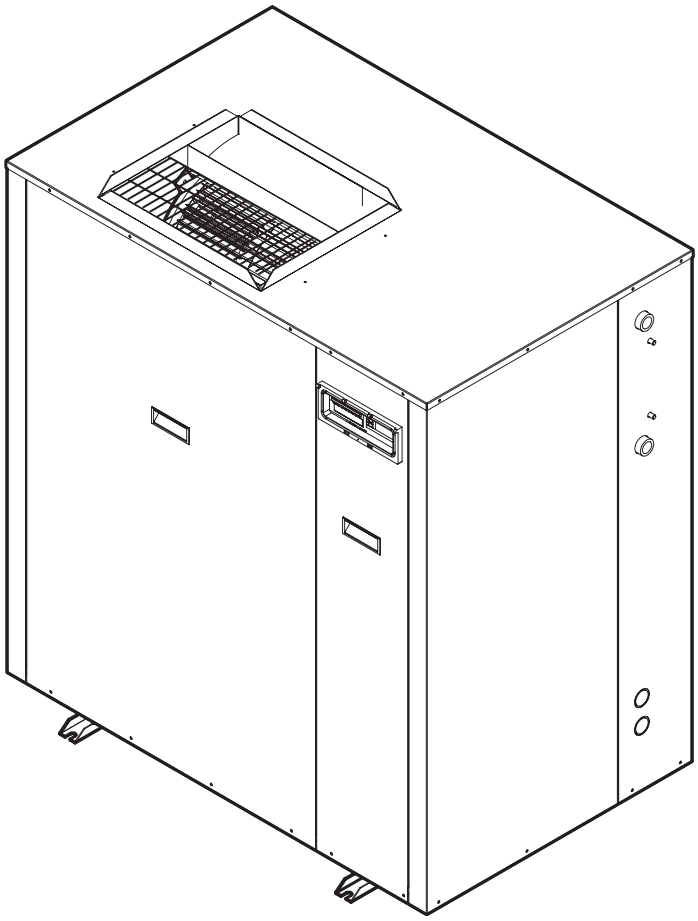
Ferroli

RPC

AIR COOLED WATER CHILLERS AND HEAT PUMPS
WITH CENTRIFUGAL FANS



CE

INSTALLATION AND OPERATION MANUAL

Dear Customer,
Thank you for having purchased a **FERROLI** Idustrial coolers. It is the result of many years experience, particular research and has been made with top quality materials and higlly advanced technologies.The CE mark guaranteed thats the appliances meets 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

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tel. +39.045.6139411
fax. +39.045.6100933
www.ferroli.it

CE

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 unseren ausschließlichen Verantworfung, 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.

FR

DECLARATION "CE" DE CONFORMITE

Nous soussignés déclarons, sous notre entière responsabilité, que la machine en objet est conforme aux prescriptions des Directives : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC el modifications suivantes.

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.

ES

DECLARACION "CE" DE CONFORMIDAD

Quienes subscribimos la presente declaracion, declaramos, baio nuestra exclusiva responsabilidad, que la maquina en objeto respeta lo prescrito par las Directivas : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC y sucesivas modificaciones.

PT

DECLARAÇÃO "CE" DE CONFORMIDADE

Nós, signatários da presente, declaramos sob a nassa exclusiva responsabilidade, que a máquina em questão está em conformidade com as prescrições das Directrizes : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC e sucessivas modificações.

NL

"EG" CONFORMITEITSVERKLARING

Wij ondergetekenden verklaren hierbij op uitsluitend eigen verantwoording dat de bovengenoemde machine conform de voorschriften is van de Richtlijnen : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC en volgende wijzigingen.

DK

"CE" OVERENSSTEMMELSESERKLERING

Underfegnede forsikrer under eget ansvar al den ovennævnte maskine er i overensstemmelse med vilkårene i direktiveme : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC med ændringer.

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 vilkarene 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.

GR

ΔΗΛΩΣΗ ΣΥΜΒΑΤΟΤΗΤΑΣ "ΕΕ"

Εμετς που υπογραφουμε την παρουσα, δηλωνουμε υπο την αποκλειστικη μας ευθυνη, οτι το μηχανημα συμμορφουται οτα οσ α ορτζουν οι Οδηγιες : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC και επακολονθες τροποποιησετς.

HR

IZJAVA O "CE" SUGLASNOSTI

Mi niže potpisani izjavljujemo, pod našom odgovornošću, da ova Mašina odgovara zahtijevima iz Direktiva : 98/37/EC , 2006/95/EC , 2004/108/EC , 97/23/EC i naknadne izmjene.

Il legale rappresentante
Dante Ferroli

TABLE OF CONTENTS

GENERAL SPECIFICATIONS

General specifications

- This manual and the wiring diagram supplied with the unit must be kept in a dry place and ready to hand for future consultation when required.
- 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.
- 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 geuine 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 to the actual machine in your possession.
- **Proper uses: this series of chillers is designed to produce cold or hot water for use in hydronic systems 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.

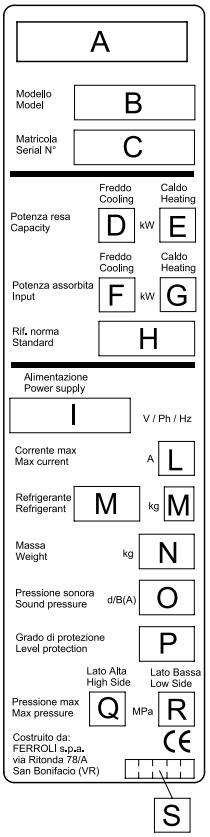
Declaration of conformity

The company hereby declares that the machine in question complies with the matters prescribed by the following Directives:

- Machine Directive **98/37 EEC**
- Low voltage Directive **73/23 EEC**
- Electromagnetic compatibility Directive **EMC 89/36 EEC**
- Directive governing pressurized vessels **97/23 EEC**Category I

CE

Unit identification plate



The figure on the left depicts the identification plate of the unit, **affixed to the outer right-hand side** (viewing the unit frontally from the Electric Panel).
A description of the data is given below:

A - Trademark
B - Model
C - Serial number
D - Cooling Capacity
E - Heating Capacity
F - Power input in the COOLING mode
G - Power input in the 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 (only if cat. >I)

GENERAL SPECIFICATIONS

Unit identification code

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.

IP - 30 - VB - AB - 7 - M - 5

Unit Type

IR: units for installation in an **H**ydronic system with operation as a **C**hiller.
IP: units for installation in an **H**ydronic system with operation as a **H**eat pump.

Model of unit

19
30
30/3
38
38/3
42
50

Version

VB - Basic **V**ersion

Refrigerant Type

7 - R407C

Acoustic Version

AB - Basic **V**ersion

Power supply Type

1: Units fit to operate with **230V-1-50Hz(1) (single-phase)** voltage.
5: Units fit to operate with **400V-3+N-50Hz(2) (threephase)** voltage.

Operating climates

M- Medium temperatures (temperate climates). These units are fit for operation up to a maximum outdoor air temperature of 46 °C with chilled water produced at a temperature of 10°C and 5°C thermal gradient.

(1): Mod. 19-30-38
(2): Mod. 30/3-38/3-42-50

Description of the components

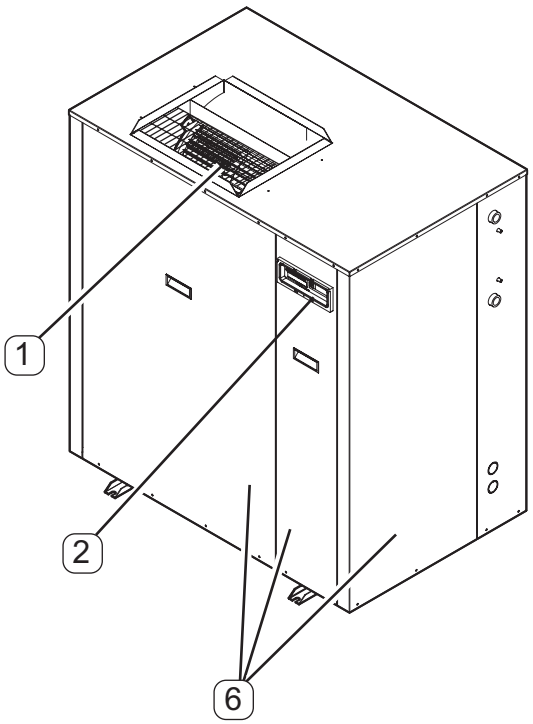
The series includes five sizes ranging from **5.9 to 14.9 kW** in the cooling mode and **from 6.5 to 15.1 kW** in the heating mode.

Main components
The technical specifications of the main components forming the units are:

1. **The ventilating unit** consists of centrifugal electric fans of the external rotor type with aluminium vanes pointing forwards. They provide the air to be ducted with an adequate residue head (max 150 Pa) with low noise levels. They are housed in a galvanized sheet metal screw and are protected by a safety net.

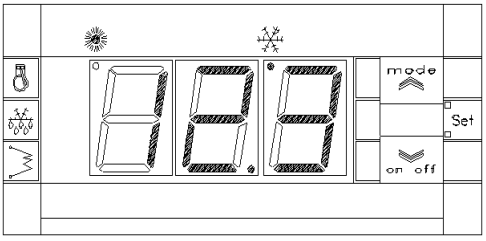
2. **Electric control and monitoring panel**. This consists of a casing made of plastic material in which the various electrical components are installed on a metal plate.

a. The main components are:
- Main Magnetothermal switch/Disconnector: disconnects the unit from the electric power supply. It can be accessed from the outside by lifting the plastic flap installed as a protection. The disconnector also safeguards the power cables and compressor motor, as well as the other standard users (e.g. fan) or accessory components (water circulator) against short-circuits or faulty operation.
- Compressor contactor: enables the compressor to operate.
- Transformer to power the auxiliary circuit and electronic controller.
- Wiring board: complete with pump relay, alarm relay and protections for the electronic controller and auxiliary circuit.



GENERAL SPECIFICATIONS

b. The monitoring section includes:
- User interface terminal with **LCD** display
- On-off key.
- Operating mode selector key.
- Compressor on-off LED.
- Antifreeze heaters “on” LED.
- Defrosting **request/activation** indicator LED (only **IP** units)
- Check-control with fault code display.



The main functions of the monitoring system are:
Temperature regulation of the water produced by the unit, operating hour counting for compressors and pump, start-up timing, parameter entry via the keyboard, alarm diagnosis.
Functions associated with the digital inputs: low and high pressure, water differential pressure switch, correct electric power phase presence-sequence (accessory) (the accessory currently acts straight on the coil of the compressor contactor and not on a digital input), remote controlled **ON/OFF** commands, remoTe controlled operating mode SWITCH-OVER (summer/winter).
Functions associated with the digital outputs: compressor control, water pump control, electric antifreeze heater, general alarm (can be remote controlled), cycle reversing valve control.
Functions associated with the analog inputs: water inlet and outlet temperatures, coil temperature.
Functions associated with the analog outputs: infinite fan speed monitoring.

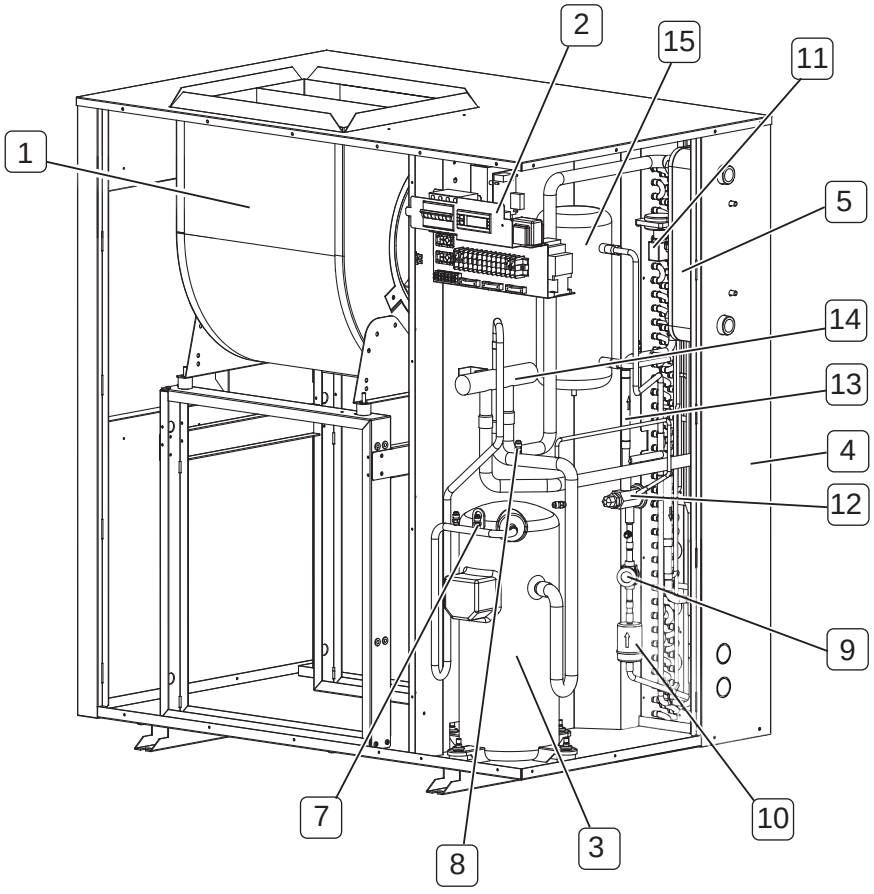
The controller can be directly accessed from outside the machine and is protected by a transparent plastic flap.

3. **Compressors** of the ROTARY or SCROLL type, protected by magnetothermic switches and equipped with internal thermal protection (IP units only are also equipped with oil heaters which evaporate any fluid in the casing and thus prevent fluid pressure surges). To prevent reverse rotation in threephase models, the electric panel can be equipped with an accessory device to monitor the correct sequence and presence of the powering phases. The compressors are fixed on rubber pads which reduce the vibrations transmitted to the structure.

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

5. **Evaporator**. This is the single-circuit plate type on the wet side with single circuit on the refrigerant side. As part of the standard supply, it is equipped with an adhesive electric antifreeze heater and a differential water pressure switch to prevent icing up if the outdoor temperature is low or there is no water flowing. It is also insulated with thermal barrier insulating material to prevent the formation of condensation and heat dispersion.

6. **Covering panels**. Made of galvanized sheet metal panels coated with polyurethane powder paint to ensure good protection against adverse weather conditions.



GENERAL SPECIFICATIONS

Chilling circuit components.

7. **High pressure switch**, with fixed setting. It is installed on the delivery pipe and blocks the compressor if the operating pressures exceed the tolerated values. If it activates, the circuit will block and can only be restarted by resetting via the electronic board display.

8. **Low pressure switch**, with fixed setting. It is installed on the suction pipe and blocks the compressor if the operating pressures drop below the tolerated values. If it activates, the unit will block and can only be restarted by resetting via the electronic board display.

9. **Fluid and humidity indicator**. Signals when fluid passes through the circuit, indicating that the refrigerant charge is correct. The fluid indicator also changes colour to show the amount of moisture in the refrigerant.

10. **Dehydrator filter** of the mechanical type. Retains impurities and traces of moisture in the circuit.

11. **Differential water pressure switch**. This is standard supply and is installed on the connections between the exchanger's water inlet and outlet. If it activates, the unit will block and can only be restarted by resetting via the user interface terminal.

12. **Thermostatic valve**, of the type with external equalizer. It's task is to supply the evaporator correctly, keeping the selected degree of superheat at a steady level.

13. **One-way valves (only IP units),** make the refrigerant obligatorily pass through the appropriate heat exchangers, depending on the operating cycle.

14. **4-way cycle reversing valves (IP units only).** Reverse the direction in which the refrigerant flows when the summer/winter operating modes change.

15. **Fluid receiver (IP units only).** This is a plenum tank that accounts for the refrigerant charge variations required by the machine as the summer/winter operating modes change.

Pressure taps: 1/4 " SAE (7/16" UNF) type with air pump. Allow the operating pressure of the system to be measured in the 3 main points: compressor delivery, inlet to the laminating component, compressor intake.

Electrical heating element to heat the compressor oil: "belt type". They activate when the compressor turns off. Their task is to keep the temperature of the oil sufficiently high so as to prevent refrigerant from migrating during these pauses **(standard supply for IP, not available for IR)**.

Antifreeze electric heating element for evaporator: adhesive type. It is installed under the layer of insulation and activates when the temperature of the water measured by the probe at the evaporator outlet drops below a preset value. It maintains the water at a temperature able to prevent ice from forming during winter periods at a standstill.

Condensing coils, of the type with serrated aluminium fins and smooth or grooved, expanded pipes.

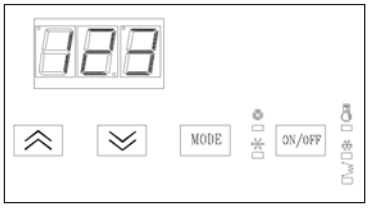
OPTIONAL EQUIPMENT AND ACCESSORIES

Mechanical accessories

GP - Protective coil grilles. Consisting of a metal grille that protects the coils with extended surfaces.
AVG - Rubber vibration dampers. Kit comprising 4 cylindrical vibration dampers made of vulcanized rubber on metal washers. They are used for mounting the units on both a base and on shelving.
They reduce the mechanical vibrations generated by the compressor and fans during their normal operation, that are then transmitted to the bearing surface of the machine.
MP - Pumping Module.
Storage module that can be coupled to the unit via a quick hydraulic connection.
The purpose of the storage and pumping module is to lower the number of compressor surges, increasing the amount of water in the system and, thus, its thermal inertia.
Refer to the “Description of the Pumping module” section for further details of the selected model.

Electrical accessories

CR - Remote Control. This device allows all the control and monitoring functions of the control unit on the machine to be controlled up to 100 meters away from the actual machine itself. Use a threepole or three-wired section cable in **PVC** type **N07-VK** with a 1mm^2 wire section for the connections. The transmission line must be routed in a dedicated duct, separate from any electric powering lines (**230/400 V**).



The remote control has the following keys:
MODE key : selects the operating mode
ON/OFF key : turns the unit ON/OFF and resets 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
DOWN key : scrolls backwards through the menu items or decreases the value of a parameter

CFS - Electric power Phase presence and sequence Monitoring device. This device is installed inside the electric panel and blocks the unit in the event of a phase failure or if the phase sequence is incorrect, indicating the error on the display. this safeguards the compressor’s electric motor.
OP - Programmer Clock. This is a device (housed in a modular casing 45 mm in width) that allows the unit to be turned on and off (without needing to be regulated) by means of the remote controlled digital on-off input on the control board of the unit. Up to 14 change-overs can be set-up over the 7 days of the week, as preferred. Take care when the line is routed, since the wires are live (230V).
RAG - Electric antifreeze heating element on the storage tank. Glow plug type; maintains the water at a temperature able to prevent ice from forming during winter standstills (Pumping Module accessory).

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

Power source voltage rating 230V-3-50Hz

Combinations of accessories-models

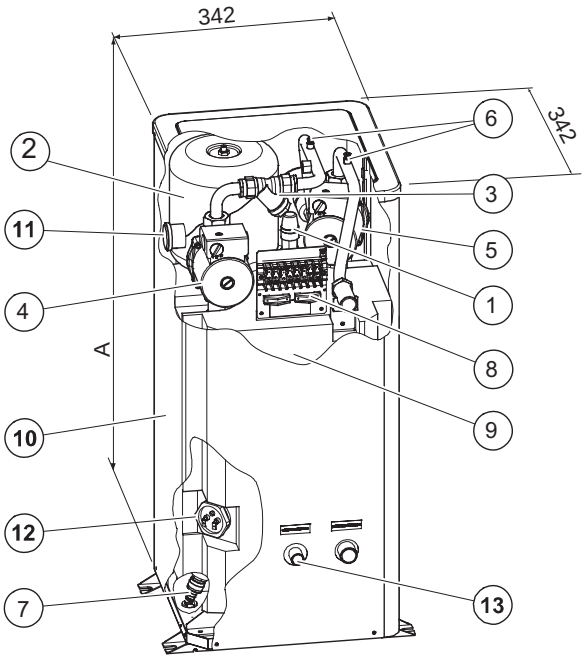
MODEL OF UNIT			CODE	19	30	30/3	38	38/3	42	50
ACCESSORIES	MECHANICAL	Protective coil grilles.	GP13	•	•					
			GP14				•		•	•
		Rubber vibration dampers	AVG6	•	•		•		•	•
	ELECTRIC	Remote Control	CR	•	•		•		•	•
		Electric power Phase presence and sequence Monitoring device	CSF(*)			•		•	•	•
		Programmer Clock	OP	•	•		•		•	•

(*):Only available for threephase models

OPTIONAL EQUIPMENT AND ACCESSORIES

Description of Pumping Module Mod. 34 - 60

The storage module can be coupled to the unit via a quick hydraulic connection.
The storage unit is equipped with :



1. **Safety valve.** With fixed setting. Activates when the pressure in the tank exceeds the preset values.
2. **Surge chamber.** This is a closed, diaphragm type chamber. It absorbs the variations in the volumes of water in the system caused by temperature variations.
3. **Mechanical gauze filter.** Can be inspected. Installed on the pump/circulator intake. Preventing machining residues (dust, swarf) in the water pipes from entering the pump or plate-type heat exchanger.
4. **Primary circulation pump.** Three-speed circulation pump that provides the chiller with the right water flow rate.
5. **Secondary circulation pump.** Three-speed circulation pump that provides the system with the right water flow rate.
6. **Air vents.** Positioned on the highest part of the module's wet pipes, it bleeds the air from the module itself when the system is filled.
7. **Drain cock.** Drains the water from the storage module to prevent it from freezing during winter periods when the system remains at a standstill (unless it is used for hot water storage), or when it is being serviced.
8. **Electric terminal board.** Reduces the number of compressor start-ups and fluctuations in the temperature of the water conveyed to the users. It is insulated with polyurethane foam to prevent the formation of condensation and heat exchanges towards the outside.
9. **Storage tank.** Insulated with a foam coating.
10. **Metal framework.** Made of galvanized sheet metal panels coated with polyurethane powder paint to ensure good protection against adverse weather conditions.
11. **Pressure gauge.** Indicates the pressure level in the storage tank.
12. **Electric antifreeze heating element connection** (Accessory). Allows the storage tank's electric antifreeze heating element to be installed.
13. **Filling fitting.**

Storage and Pumping Module Accessory

STORAGE MODEL	CODE	34			60			
MATCHABLE UNIT MODEL		19	30	30/3	38	38/3	42	50
Pumping Module	MP34	•	•					
	MP60				•		•	•

Accessory for the Storage and Pumping Module

STORAGE MODEL	CODE	34	60
Antifreeze heating element	RAG2	•	•
Flexible wet connections	KT14	•	•

OPTIONAL EQUIPMENT AND ACCESSORIES

Description of Pumping Module Mod. 30 - 55

Pumping and Storage module Mod. 30 - 55
The purpose of the storage and pumping module is to lower the number of compressor surges, increasing the amount of water in the system and, thus, its thermal inertia. Available in the Standard versions for all models and in the High Head version for models 19-30. In nominal operating conditions in the cooling mode, the Standard Version is able to provide the circulating water with 35 to 104 kPa residual head, while the High Head Version has 116 to 134 kPa residual head.

With reference to the figure alongside and depending on the model, the Storage and Pumping Module is equipped with:

1A. Multiple stage pump. With a high head, able to suit the majority of installation requirements. All pump components that come into contact with the pumped fluid are made of stainless steel.
1B. Circulation pump. Three-speed circulation pump that provides the chiller with the right water flow rate. The 3rd speed is set during the production phase: it is inadvisable to modify this speed as the operation of the Module would be impaired.

2A. Pump suction sleeve (1" GAS female) used for returning from the system**.**
2B. Returning stub pipe from the system (1" GAS male) used for returning from the system**.**

3. Pressure gauge. Indicates the pressure level in the storage tank (only for mod. 30 in the High head version and mod. 50 in the Standard version).

4. Delivery stub pipe of the system (1" GAS male).

5. Safety valve. With fixed setting. Activates when the pressure in the tank exceeds the preset values.

6. Drain cock. Drains the water from the storage module to prevent it from freezing during winter periods, if not used for hot water storage.

7. Electric antifreeze heating element connection (Accessory). Allows the storage tank's electric antifreeze heating element to be installed.

8. Storage tank. Reduces the number of compressor start-ups and fluctuations in the temperature of the water conveyed to the users. It is insulated with polyurethane foam to prevent the formation of condensation and heat exchanges towards the outside.

9A. Automatic air venting. Vents the tank when the system is filled.
9B. Air venting. Positioned on the highest part of the module's wet pipes, it bleeds the air from the module itself when the system is filled.

10. Metal gauze water filter. Can be inspected. Installed on the pump/circulator intake. Preventing machining residues (dust, swarf) in the water pipes from entering the pump or plate-type heat exchanger.

11. Surge chamber. This is a closed, diaphragm type chamber. It absorbs the variations in the volumes of water in the system caused by temperature variations.

12. Metal structure. Made of galvanized sheet metal panels coated with polyurethane powder paint to ensure good protection against adverse weather conditions.

Mod. 30 in the Standard Version

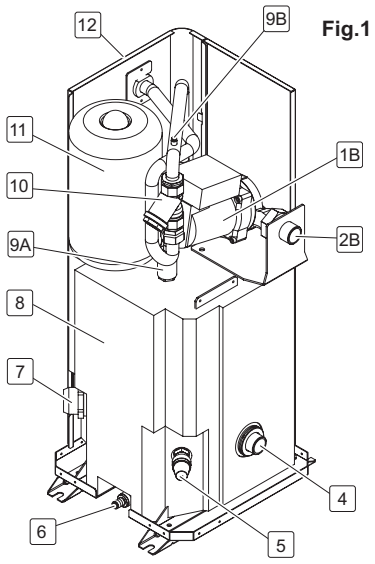


Fig.1

Mod. 30 in the High Head Version
Mod. 50 in the Standard Version

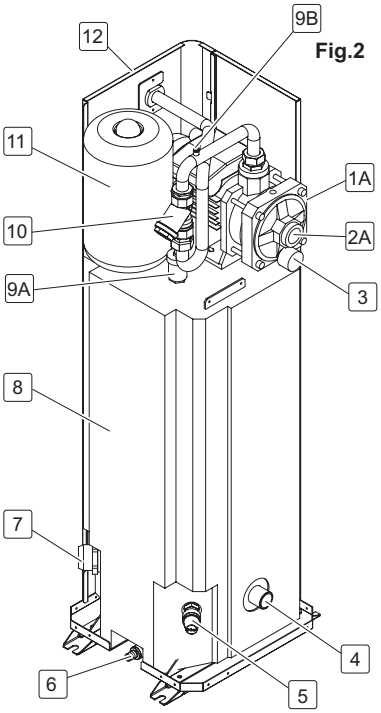


Fig.2

Storage and Pumping Module Accessory

STORAGE MODEL	CODE	30			55			
MATCHABLE UNIT MODEL		19	30	30/3	38	38/3	42	50
Standard version	SAA 8	•	•					
	SAA 12				•		•	•
High Head Version	SAA 9	•	•					

Accessory for the Storage and Pumping Module

STORAGE MODEL	CODE	30	55
Antifreeze heating element	RAG 5	•	•
Hydraulic quick couplings	AV 4	•	•
Flexible wet connections	KT14	•	•

GENERAL SPECIFICATIONS - IR UNIT FOR COOLING MODE ONLY

Common general technical specifications

The following data refer to units using **R407C refrigerant**

Model of Unit	19	30	30/3	38	38/3	42	50	MU
Compressor specifications								
Type	ROTARY	SCROLL						/
Quantity	1							N°
Exchanger data								
Type	COPPER BRAZE WELDED STAINLESS STEEL PLATES							/
Quantity	1							N°
Water capacity	0.26	0.34		0.46		0.53	0.60	l
Fan specifications								
Type	Centrifugal with vanes positioned forwards							
Quantity	1							N°
Nominal air flow rate	944	917		1667		1667	1611	l/s
Air working head	50							Pa
Maximum air head(NB)	150							Pa
Specifications of coils with extended surfaces								
Type	Copper pipes and notched aluminium fins							/
Quantity	1							N°

Basic Version of IR Unit

Model of Unit	19	30	30/3	38	38/3	42	50	MU
Power supply	230-1-50		400-3+N-50	230-1-50	400-3+N-50			V-f-Hz
Refrigerant fluid	R407C							/
Cooling capacity(1) (E)	6.2	8.4		10.6		13.0	15.2	kW
Compressor power input(1)	2.15	3.05		3.60		4.60	5.50	kW
Total power draw (1) (E)	2.78	3.70		4.86		5.88	6.75	kW
Water flow rate(1)	0.30	0.40		0.51		0.62	0.73	l/s
Water pressre drop (1) (E)	34	39		33		37	40	kPa
Working head (1)	58	52		65		60	57	kPa
Throttling	0-100							%
Unit electrical specifications								
FLA Maximum current absorption	21.6	25.6	13.1	33.6	20.1	22.6	24.6	A
FLI Maximum power draw	4.5	5.4	5.4	7.0	7.0	7.8	8.9	kW
MIC Maximum surge current	64	106	52	124	60	76	84	A
Noise levels								
Sound pressure (2)	60	62		67		67	68	dB(A)

The data refer to standard operating conditions.
(1): The data refer to Water temperature: inlet: 12°C - outlet: 7°C, Outdoor air temperature 35°C D.B.
(2): Acoustic pressure level of units operating with a channelled fan and measured in the free field one meter away from the end section of the exhausting channel.
(NB): The unit has a infinite fan speed monitoring device to allows it to adapt itself to the different ducted conditions. It permits the right unit working to a maximum air pressure drop value of 150 Pa.
(E): Data according EUROVENT certification program.

GENERAL SPECIFICATIONS - IR UNIT FOR COOLING MODE ONLY

Unit technical specifications with Storage and Pumping Module Accessory

Standard Versio accessory model	30			55				UM
Compatible Unit	19	30	30/3	38	38/3	42	50	
Water capacity	30			55				l
Water flow rate(1)	0.30	0.40		0.51		0.62	0.73	l\s
Working head (1)	44	35		104		78	48	kPa
Type of pump	CIRCOLATORE			POMPA MULTISTADIO				tipo
Maximum power input	210			450				W
Surge chamber capacity.	5							l
Service charge pressure of surge chamber	150							kPa
Safety valve setting	300							kPa

High Head Version of accessory model	30			-				UM
Compatible Unit	19	30	30/3	-	-	-	-	
Water capacity	30			-	-	-	-	l
Water flow rate(1)	0.30	0.40		-	-	-	-	l\s
Working head (1)	134	116		-	-	-	-	kPa
Type of pump	POMPA MULTISTADIO			-	-	-	-	tipo
Maximum power input	450			-	-	-	-	W
Surge chamber capacity.	5			-	-	-	-	l
Service charge pressure of surge chamber	150			-	-	-	-	kPa
Safety valve setting	300			-	-	-	-	kPa

Unit electrical specifications with Storage and Pumping Module Accessory(2)

Power supply	230-1-50		400-3+N-50	230-1-50	400-3+N-50			V/ph/Hz
Total maximum power input [FLA]	22.1	26.1	15.4	35.9	22.4	24.9	26.9	A
Total maximum power input [FLI]	6.80	7.70	5.85	7.45	7.45	8.25	9.35	kW
Total maximum surge current [MIC]	64	106	54	126	62	78	86	A

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

(2): Regarding unit operating in conjunction with the Storage and Pumping Module accessory:
- for mod. 16-19-24-30 Storage Module in the High Head version
- for mod. 38-42-50-30 Storage Module in the Standard version.

GENERAL SPECIFICATIONS - IP HEAT PUMP UNIT

Basic Version of IP Unit

Model of Unit	19	30	30/3	38	38/3	42	50	MU
Power supply	230-1-50		400-3+N-50	230-1-50	400-3+N-50			V-f-Hz
Refrigerant fluid	R407C							/
Cooling capacity (1) (E)	5.9	8.1		10.3		12.6	14.9	kW
Compressor power input (1)	2.15	2.95		3.45		4.40	5.40	kW
Total power draw (1) (E)	2.78	3.60		4.70		5.67	6.64	kW
Water flow rate (1)	0.28	0.38		0.49		0.60	0,71	l/s
Water pressre drop (1) (E)	31	35		31		35	38	kPa
Working head (1)	60	54		66		62	58	kPa
Heating capacity (2) (E)	6.5	8.9		10.7		13.4	15.1	kW
Compressor power input (2)	2.35	3.10		3.55		4.50	5.30	kW
Total power draw (2) (E)	3.02	3.79		4.87		5.84	6.60	kW
Water flow rate (2)	0.31	0.43		0.51		0.64	0.72	l/s
Water pressre drop (2) (E)	37	43		34		40	39	kPa
Working head (2)	58	51		65		60	57	kPa
Throttling	0-100							%

Unit electrical specifications

FLA Maximum current absorption	21.6	25.6	13.1	33.6	20.1	22.6	24.6	A
FLI Maximum power draw	4.5	5.4	5.4	7.0	7.0	7.8	8.9	kW
MIC Maximum surge current	64	106	52	124	60	76	84	A

Noise levels

Sound pressure (3)	60	62		67		67	68	dB(A)

The data refer to standard operating conditions.
(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., 87% humidity
(3): Acoustic pressure level of units operating with a channelled fan and measured in the free field one meter away from the end section of the exhausting channel.
(E): Data according EUROVENT certification program.

GENERAL SPECIFICATIONS - IP HEAT PUMP UNIT

Unit technical specifications with Storage and Pumping Module Accessory

Standard Version accessory model		30			55				UM
Compatible UnitUnità abbinabile		19	30	30/3	38	38/3	42	50	
Water capacity		30			55				l
Water flow rate	in cooling mode(1)	0.28	0.38		0.49		0.60	0.71	l\s
	in heating mode(2)	0.31	0.43		0.51		0.64	0.72	l\s
Working head	in cooling mode(1)	48	40		108		84	56	kPa
	in heating mode(2)	40	28		104		72	52	kPa
Type of pump		CIRCOLATORE			POMPA MULTISTADIO				tipo
Maximum power input		210			450				W
Surge chamber capacity.		5							l
Service charge pressure of surge chamber		150							kPa
Safety valve setting		300							kPa

High Head Version of accessory model		30			-				UM
Compatible Unit		19	30	30/3	-	-	-	-	
Water capacity		30			-	-	-	-	l
Water flow rate	in cooling mode(1)	0.28	0.38		-	-	-	-	l\s
	in heating mode(2)	0.31	0.43		-	-	-	-	l\s
Working head	in cooling mode(1)	140	123		-	-	-	-	kPa
	in heating mode(2)	130	105		-	-	-	-	kPa
Type of pump		POMPA MULTISTADIO			-	-	-	-	tipo
Maximum power input		450			-	-	-	-	W
Surge chamber capacity.		5			-	-	-	-	l
Service charge pressure of surge chamber		150			-	-	-	-	kPa
Safety valve setting		300			-	-	-	-	kPa

Unit electrical specifications with Storage and Pumping Module Accessory (3)

Power supply	230-1-50		400-3+N-50	230-1-50	400-3+N-50			V/ph/Hz
Total maximum power input [FLA]	22.1	26.1	15.4	35.9	22.4	24.9	26.9	A
Total maximum power input [FLI]	6.80	7.70	5.85	7.45	7.45	8.25	9.35	kW
Total maximum surge current [MIC]	64	106	54	126	62	78	86	A

(1): The data refer to: Water temperature: inlet: 12°C - outlet: 7°C. Outdoor air temperature 35°C.
(2): The data refer to: Water temperature: inlet: 40°C - outlet: 45°C. Outdoor air temperature 7°C DB, 90% humidity
(3): Regarding unit operating in conjunction with the Storage and Pumping Module accessory:
- for mod. 16-19-24-30 Storage Module in the High Head version
- for mod. 38-42-50-30 Storage Module in the Standard version.

ARRIVAL

Inspections on arrival

As soon as the appliance is consigned, it is essential to make sure that all the ordered items have been received and that the shipment is complete. Carefully check to make sure that the equipment 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 ex works means that, as established by law, reimbursement of any damages is at the insurance company's charge.

Safety regulations

Comply with the current safety regulations concerning the equipment to use when handling the unit or for the required ways of operating.

Handling

Check the weight of the appliance before proceeding with the moving and handling operations. The weight is indicated on the data plate with the general features of the appliance and in the **General Specifications** section of this manual. Make sure that the appliance is handled with care and without jolting as rough treatment could damage the functional parts of the machine. Comply with the following instructions when lifting and positioning the appliance:

- **Handling with a lift truck or similar**
  The unit is supplied on a pallet prepared for transporting in both the longitudinal and cross-wise directions. Fit a suitable separation between the truck and unit to prevent the coil surfaces from being damaged if the unit is carried in the longitudinal direction (**Fig.1**), and to the electric panel if the unit is transported in the cross-wise direction. (**Fig.2**). Prevent the unit or parts of it from falling on to the ground.

Fig.1

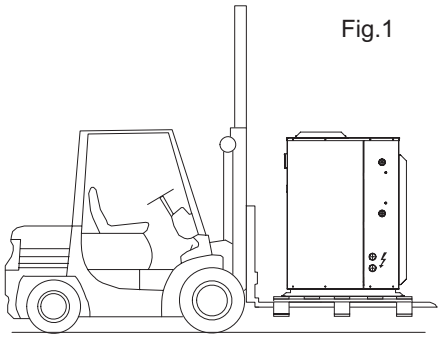


Fig.2

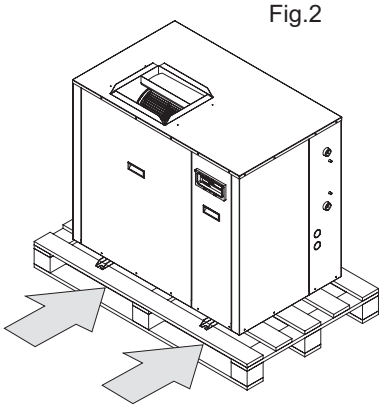


Fig.3

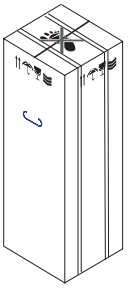
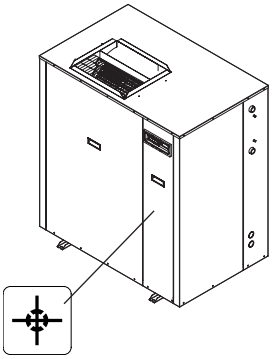


Fig.4



Remember that the heaviest part is the one where the compressor is installed (electric panel side), which also corresponds to the unit's center of gravity position.

Storage Module	30	55	UM
Transport weight	39	54	kg

WARNING:

To safeguard persons and property, read the information on the packing that covers the unit before handling. Also make sure to:

- Handle the machine with care
- Do not stack other objects on top of the unit

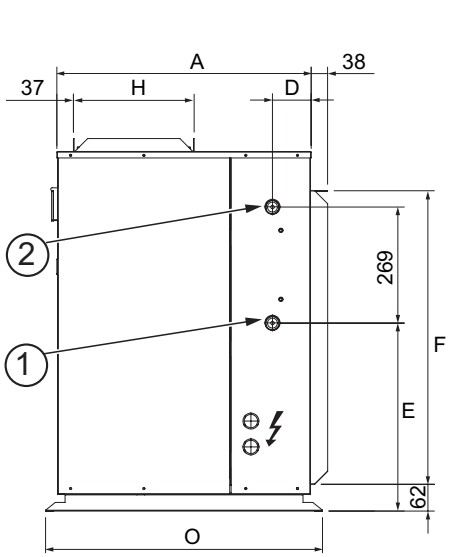
Storage

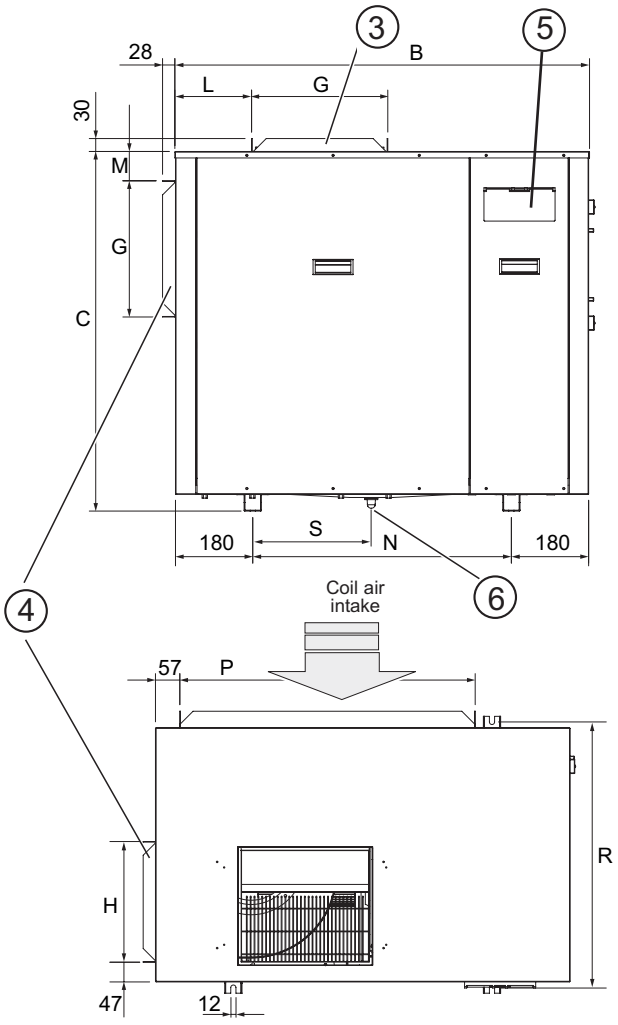
The units must be stored in a dry place, sheltered from the sun, rain, sand and wind.
Comply with the storage conditions given below:

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

OVERALL DIMENSIONS

Overall dimensions Unit





Description of the components:

1- WATER DRAIN (1” ISO-G MALE)
2- WATER INLET (1” ISO-G MALE)
3- Opening for vertical ducting (standard)
4- Opening for side ducting
5- Electric panel side
6- Water drain outlet ϕ = 18mm

Unit	19-30	38-42-50	UM
A	590	666	mm
B	962	1051	mm
C	834	1145	mm
D	90	128	mm
E	436	787	mm
F	681	981	mm
G	349	407	mm

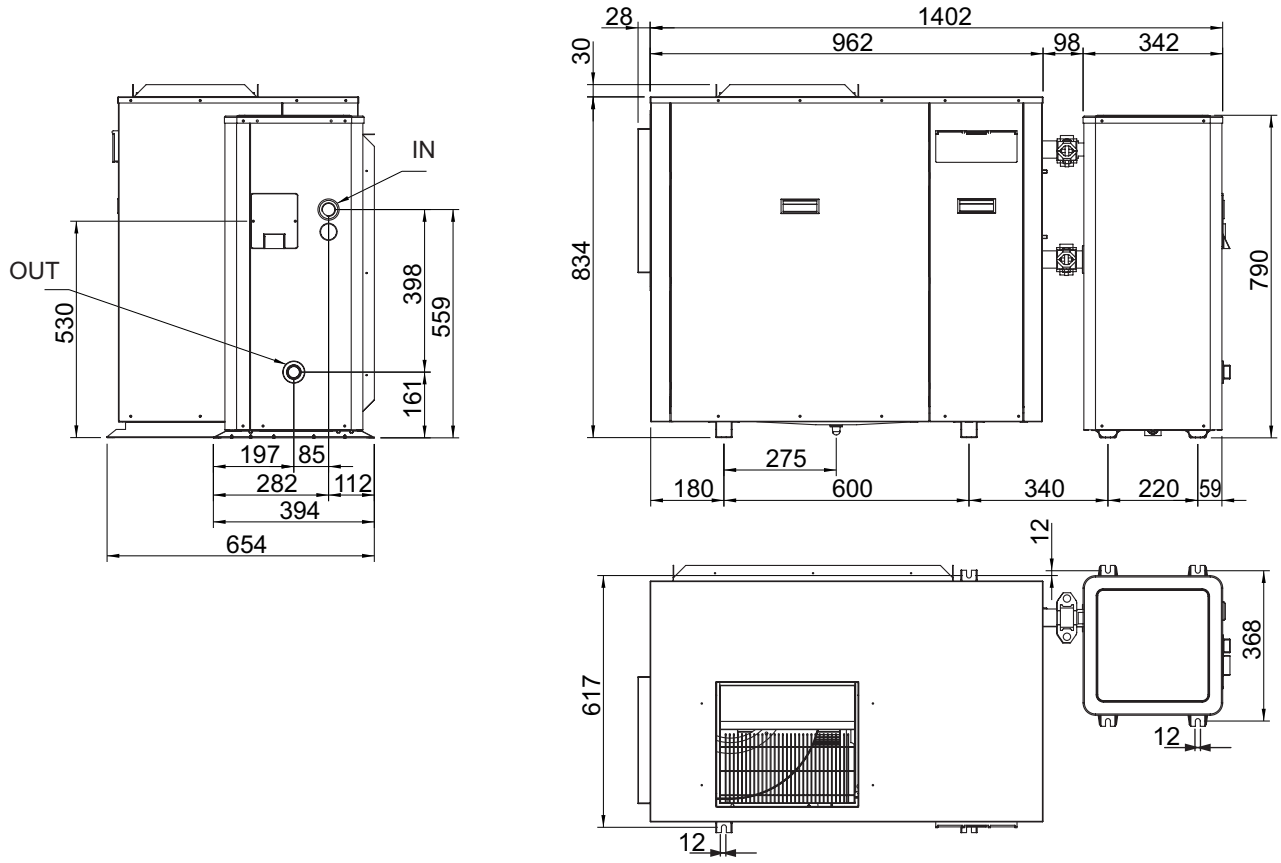
Unit	19-30	38-42-50	UM
H	307	351	mm
L	162	194	mm
M	80	181	mm
N	600	688	mm
O	642	718	mm
P	685	774	mm
R	617	692	mm
S	275	262	mm

Vibration damper installation

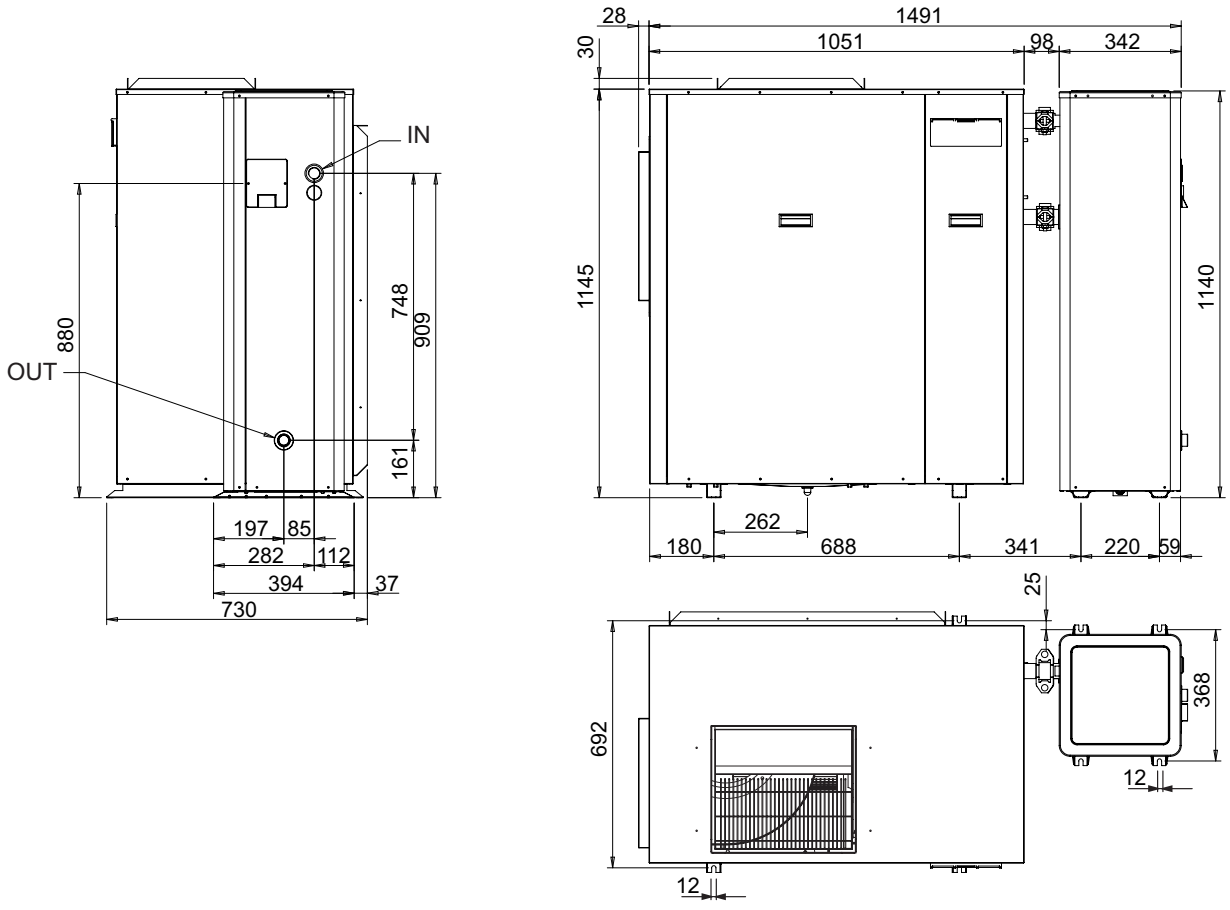
Remember to install vibration dampening material, depending on the bearing structure. This material should be placed under the bearing points of the unit. The unit can be supplied with the rubber or spring type vibration damper accessory. This accessory must be assembled at the installer’s charge.

OVERALL DIMENSIONS

Overall dimensions Unit Mod. 19-30 + Storage and Pumping Module Accessory Mod. 30



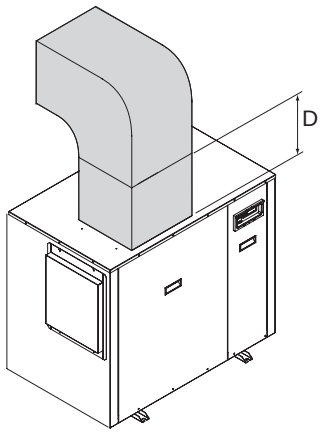
Overall dimensions Unit Mod. Mod. 38-42-50 + Storage and Pumping Module Accessory Mod. 55



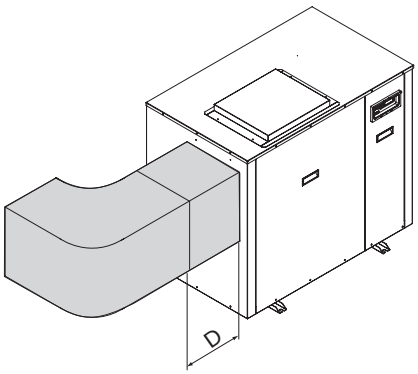
OVERALL DIMENSIONS

Possible installation configurations

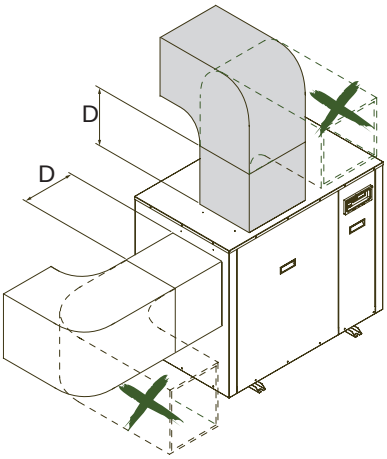
Configuration with duct for VERTICAL delivery air exhaust



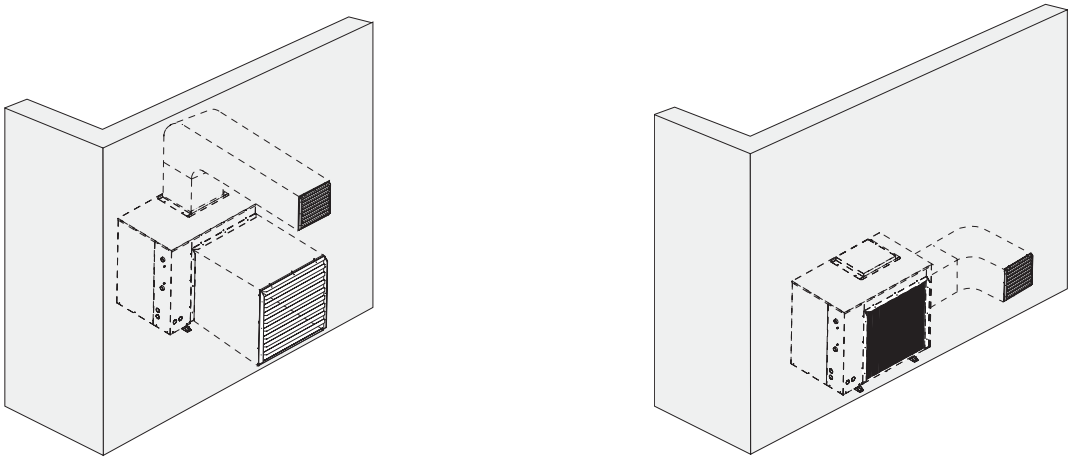
Configuration with duct for HORIZONTAL delivery air exhaust



Correct position for Delivery duct



Configuration with duct for delivery air exhaust and duct for outdoor air intake



Minimum space required for operation

To correctly install the unit, comply with the measurements for the free area that must be left around the machine to allow air to circulate correctly and to facilitate future maintenance work. Comply with the distances given in the table:

Model	19	30	38	42	50

Vacant space [mm]		
A(1)	700	1000
B	500	
C	**UNIT WITH DELIVERY EXHAUST DUCT** Dimension **C**, the space required for ducting the delivery, must be able to guarantee a straight section of duct (dimension **D**), as indicated in the figure. **UNIT WITHOUT DELIVERY EXHAUST DUCT** Allow for an uncluttered area of not less than 2.5 meters.	
D	750	900

(1) Dimension **A** is valid for applications without outdoor air intake duct.
The functional areas must be doubled if multiple units are installed.
Consider double values for the functional areas if the unit is installed in a pit.
NOTE:
If you install the unit outside without duct for the vertical delivery air exhourst, it is necessary to make a vertical duct, as shown in fig. 2, to avoid the rain water to enter in the unit and damage it.

NOTE: Consult the **"Weights and centers of gravity during operation"** section for how the loads are distributed over the supports.

Fig.1

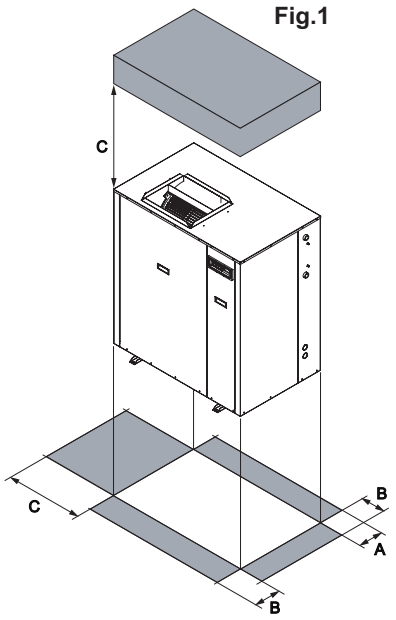
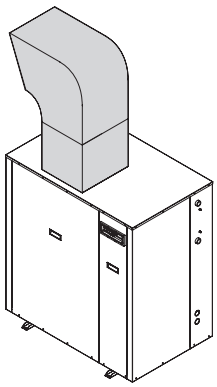


Fig.2



CONFIGURATION WITH DELIVERY AIR EXHAUSTING CHANNEL AT THE SIDE

Fan position changed from vertical delivery to horizontal delivery

The air type Heat pumps and Chillers with centrifugal fans are suitable for indoor installation; thus the air drawn in by the coils must be exhausted outdoors through channels.
In the standard configuration, the unit is pre-engineered for Vertical air channelling. In this case, the fan is positioned with the air outlet port pointing upwards: Vertical Channelling (fig.1)
If necessary, the fan's air delivery can be at the side of the unit: in this case, the air can be channelled at the side (fig.2), but the position of the fan must be changed as explained in the "How to re-position the Fan" instructions given below.

Fig.1

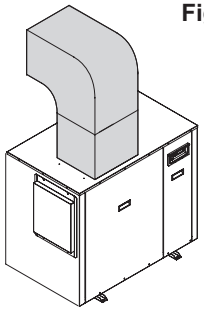
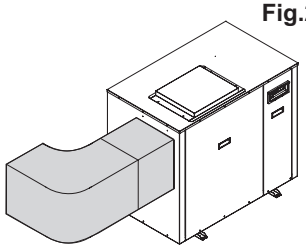


Fig.2



HOW TO RE-POSITION THE FAN FOR MODELS 19-30
1) Disconnect the machine from the electric power source.
2) Remove the upper cover from the machine (fig. 3-1) by removing the screws with a cross-head screwdriver.
3) Remove the inspection panels from the electric compartment (fig.3-2), the ventilation compartment (fig.3-3) and then remove the side panel (fig.3-5) by removing the screws with a cross-head screwdriver.
Before re-positioning the Fan, release the power cable from the clamps that fix it to the structure of the unit.
4) Electrically disconnect the cable terminals from the terminal board on the fan motor to move the fan freely and with ease.
5) Now disassemble the fan from the 4 rubber vibration dampers on which it stands (fig.5-1),
6) After having freed the fan from its housing, disassemble the fan's bearing brackets (fig.5-2), remove them from their position, then position both as shown in fig.4 and fix them in place with the previously removed screws.
The structure of the fan-bearing frame (fig.5-3) must now be modified to allow it to house the fan itself:
7) Release the frame (fig.5-3) fixed to the base by removing the 4 screws.
7a) Remove the 4 horizontal crosspieces connected to the four sides of the frame: 2 short crosspieces (fig.5-4) and 2 long ones (fig.5-5). The 2 short crosspieces (fig.5-4) are no longer required.
7b) Keep sufficient space between the two vertical parts of the frame to be able to insert the two longer crosspieces and fix them to the structure (fig.6-1).
This will make the frame wider and allow it to house the fan with air delivery at the side (fig.7).
8) Re-position the fan-bearing frame obtained in this way on the base, on a level with the 4 outermost fixing holes already made in the base itself (fig.6-2).
9) Fix the frame to the base on a level with these holes, using the previously removed screws.
10) Unscrew the 4 vibration dampers from their initial position (fig.5-1) and then screw them into the outermost holes in the frame (in fig. 6, the vibration dampers are shown in their correct seats).
11) Place the fan on the newly positioned vibration dampers: the fan will now have been correctly positioned for air delivery at the side (fig. 7).
12) Remove the closing plate from the side panel of the machine (fig.3-4)
Remake the fan's original electrical connections and remember to fix the power cable to the structure of the unit with clamps (not supplied) before fitting the previously removed panels back in place.
NOTE: Make sure that the fan's port has been correctly positioned on a perfect level with the hole in the side panel.
13) Now re-position the inspection panels of the electrical compartment (fig.3-2), the ventilation compartment (fig.3-3) and the side panel (fig.3-5), and close the opening in the upper cover with the plate (fig.3-4) previously removed from the side panel.
14) Power the machine again.

Fig.3

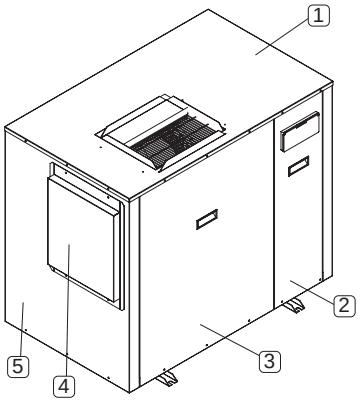


Fig.4

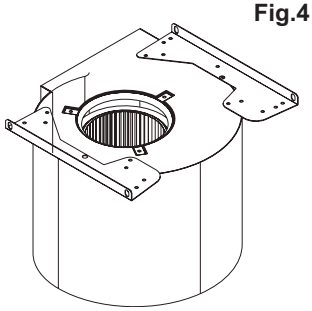


Fig.5

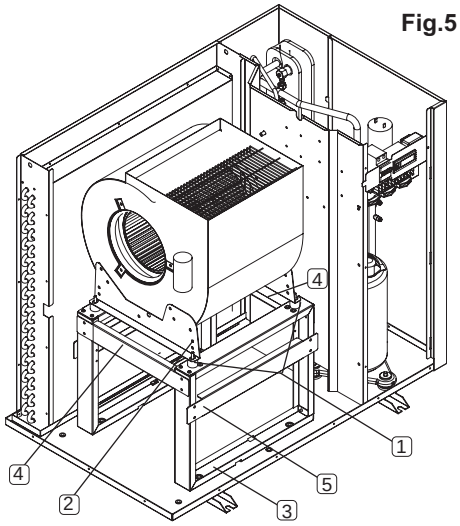


Fig.6

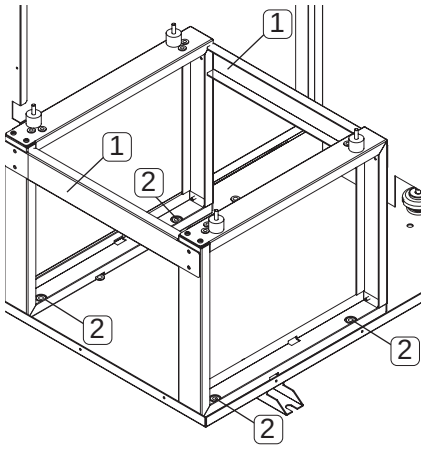
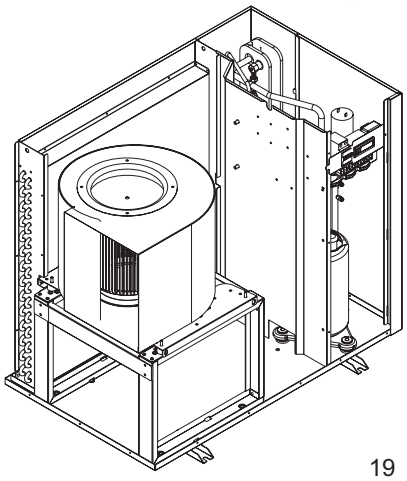


Fig.7



CONFIGURATION WITH DELIVERY AIR EXHAUSTING CHANNEL AT THE SIDE

HOW TO RE-POSITION THE FAN FOR MODELS 38-42-50

1) Disconnect the machine from the electric power source.
2) Remove the upper cover from the machine (fig. 3-1) by removing the screws with a crosshead screwdriver.
3) Remove the inspection panels from the electric compartment (fig.3-2), the ventilation compartment (fig.3-3) and then remove the side panel (fig.3-5) by removing the screws with a cross-head screwdriver.
Before re-positioning the Fan, release the power cable from the clamps that fix it to the structure of the unit.
4) Electrically disconnect the cable terminals from the terminal board on the fan motor to move the fan freely and with ease.
5) Now disassemble the fan from the 4 rubber vibration dampers on which it stands (fig.5-1),
6) After having freed the fan from its housing, disassemble the fan's bearing brackets (fig.5-2), remove them from their position, then position both as shown in fig.4 and fix them in place with the previously removed screws.

The structure of the fan-bearing frame (fig.5-3) must now be modified to allow it to house the fan itself:
7) Release the frame (fig.5-3) fixed to the base by removing the 4 screws.
7a) Remove the 4 horizontal crosspieces connected to the four sides of the frame: 2 short crosspieces (fig.5-4) and 2 long ones (fig.5-5). The 2 short crosspieces (fig.5-4) are no longer required.
8) Turn the 2 parts of the frame through 90° so that they rest on their longer side (fig.6).
9) Keep sufficient space between the two vertical parts of the frame to be able to insert the two longer crosspieces and fix them to the structure (fig.6-1).
This will make the frame wider and allow it to house the fan with air delivery at the side (fig.7).
10) Re-position the fan-bearing frame obtained in this way on the base, on a level with the 4 outermost fixing holes already made in the base itself (fig.6-2).
11) Fix the frame to the base on a level with these holes, using the previously removed screws.
12) Unscrew the 4 vibration dampers from their initial position (fig.5-1) and then screw them into the outermost holes in the frame (in fig. 6, the vibration dampers are shown in their correct seats).
13) Place the fan on the newly positioned vibration dampers: the fan will now have been correctly positioned for air delivery at the side (fig. 7).
14) Remove the closing plate from the side panel of the machine (fig.3-4)

Remake the fan's original electrical connections and remember to fix the power cable to the structure of the unit with clamps (not supplied) before fitting the previously removed panels back in place.

NOTE: Make sure that the fan's port has been correctly positioned on a perfect level with the hole in the side panel.
15) Now re-position the inspection panels of the electrical compartment (fig.3-2), the ventilation compartment (fig.3-3) and the side panel (fig.3-5), and close the opening in the upper cover with the plate (fig.3-4) previously removed from the side panel.
16) Power the machine again.

Fig.3

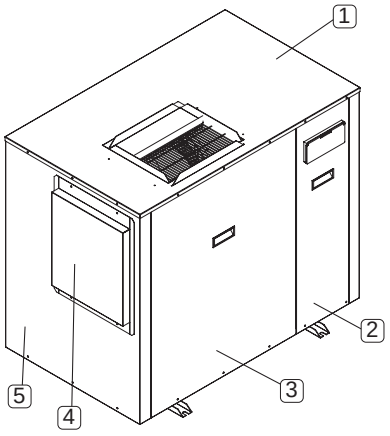


Fig.4

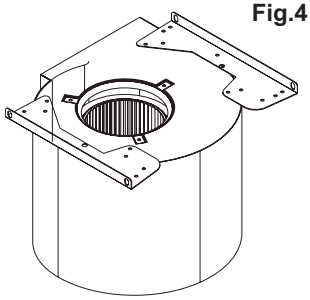


Fig.5

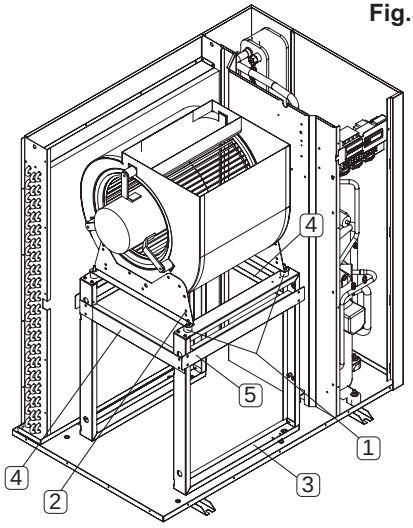


Fig.6

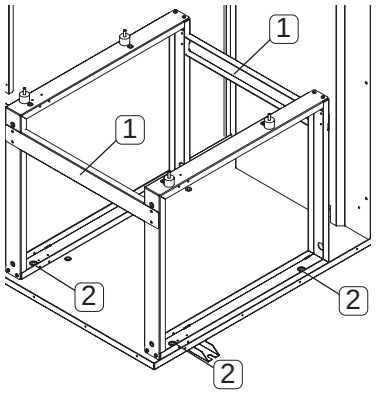
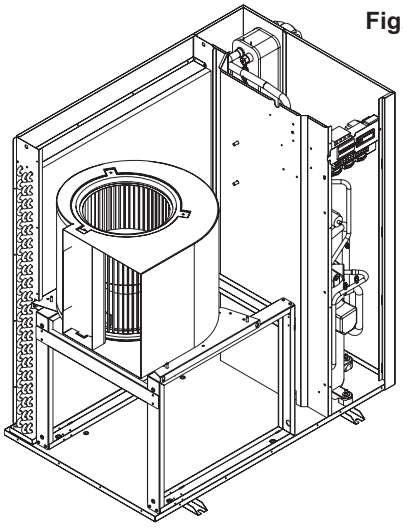


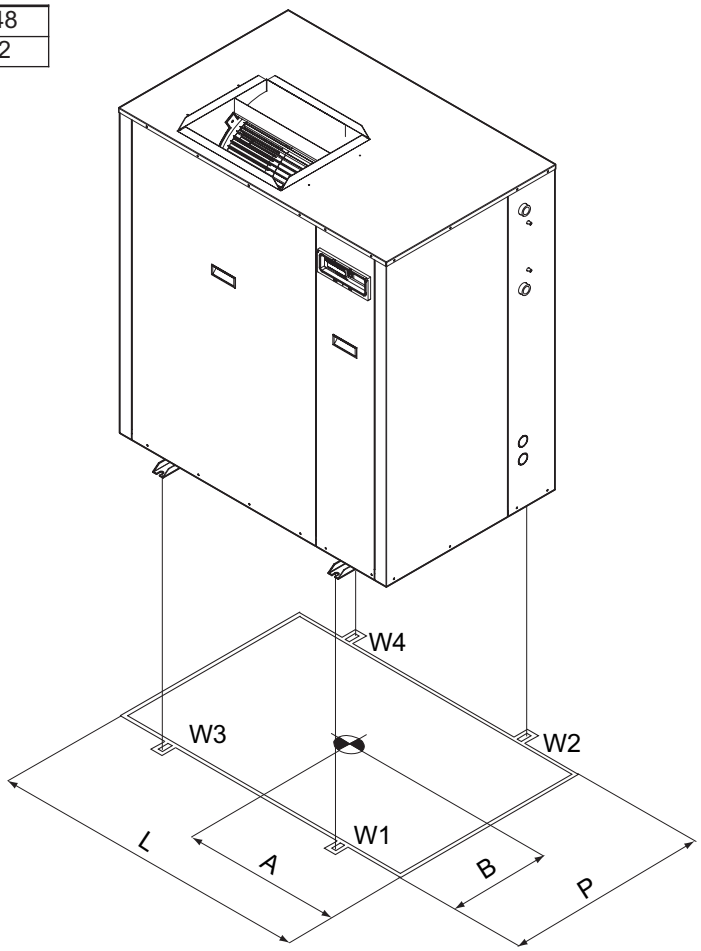
Fig.7



WEIGHTS AND CENTERS OF GRAVITY ON ARRIVAL AND DURING OPERATION

Center of gravity position

Model	19 - 30	38 - 50
L [mm]	960	1048
P [mm]	617	692



Weight distribution and center of gravity position

Consider the following center of gravity position values and load on the bearing surfaces to correctly match the machine to the bearing structure, with reference to the figure:

IP Version

Unit	VS AB 7 M5						
	Center of gravity position [mm]		Load on bearing points [kg]				total kg
	A	B	W1	W2	W3	W4	Weight
19	415	275	33	29	21	19	**103**
30	420	285	39	37	26	25	**127**
38	435	298	46	47	34	35	**162**
42	440	315	55	50	34	30	**169**
50	430	300	62	51	35	29	**178**

IR Version

Unit	VS AB 7 M5						
	Center of gravity position [mm]		Load on bearing points [kg]				total kg
	A	B	W1	W2	W3	W4	Weight
19	412	275	30	27	19	17	**93**
30	416	285	36	34	23	22	**114**
38	428	298	42	43	30	31	**146**
42	435	315	50	45	30	27	**152**
50	425	300	56	47	31	26	**160**

ELECTRICAL CONNECTIONS

The appliance must be wired in compliance with the laws in force in the country where it is installed, at the time installation takes place. The units are supplied after having been fully wired in the factory and are pre-engineered for connection to the mains source.

The electric panel is built in compliance with the technical standards in force in the European Union.

Electric panel structure.

All the electrical components are housed inside the unit and can be accessed by removing the metal front panel.

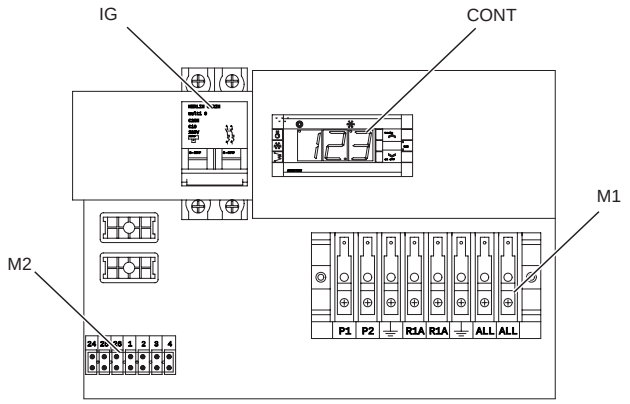
Composition of the electrical equipment.

The electrical equipment comprises an electromechanical part formed by the power circuit, comprising the disconnector, the contactors, the fuse protections, the transformer and by a second circuit formed by the Microprocessor monitoring system.

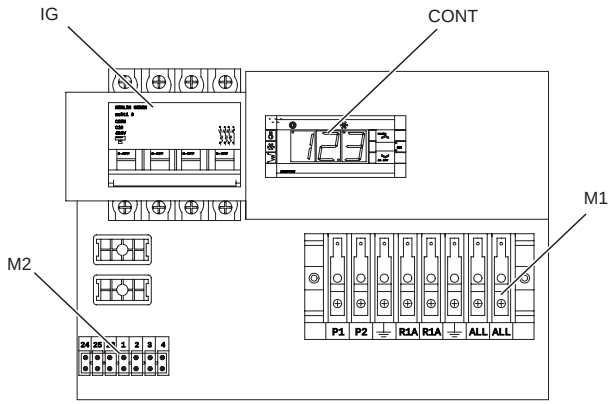
Location of the electrical components.

The following diagram shows the locations of the electrical components in the machine, with the identification codes given in the wiring diagram of the standard electric panels.

Mod. 19 - 30 - 38



Mod. 30/3 - 38/3 - 42 - 50



The next table gives a description of the codes and components on the machine.

CODE	COMPONENT
CONT	Controller
IG	Main disconnector
M1	Unit's power input terminal board and output to auxiliary loads
M2	Terminal board for analog inputs

Electric panel

The electric panel can only be accessed by removing the front panel. The microcontroller and main circuit-breaker between the powering terminal and electrical system of the unit can be accessed through a door in the same panel. This main switch can be used to stop the unit in emergency situations or for servicing purposes. Remember that the powering terminal board and main circuit-breaker are live, unless they are disconnected by automatic switch **IL** installed prior to the unit.

ELECTRICAL CONNECTIONS

Additional connections to make in the installation site
The electric panel is fitted with additional terminal boards for use if accessories controlled directly by the controller must be installed.
The following table lists the codes and meanings of the various terminals, along with their respective functions and characteristics:

Terminal code	Function	Specifications	Notes
P1 / P2	Pump command	Voltage **230V** Maximum current **3.0 A**	
ALL / ALL	Remote alarm output	Voltage **230V** Maximum current **0.5 A**	Normally open contact. Contact made with machine in alarm status
R1A / R1A	Storage antifreeze heating element	Voltage **230V** Maximum current **1.0 A**	
1 / 2	Digital input for function change **summer / winter**	Clean contact	**TO ACTIVATE BY MEANS OF PARAMETER** Contact made= **summer mode** Contact broken= **winter mode**
3 / 4	Digital input for remote **ON/OFF** command	Clean contact	Contact made= **powering** Contact broken= **switch off**
24 / 25 / 26	Connection to remote control		The remote control is supplied as an accessory

-Remote On/Off CONNECTION
Remove the jumper of terminals 3-4 for the REMOTE ON/OFF command and connect the required electrical contact.

-REMOTE SUMMER/WINTER connection
Remove the jumper of terminals 1-2 for the REMOTE SUMMER/WINTER command and connect the required electrical contact.
The parameter for enabling the instrument on the machine and/or the remote control is (par. H27), while for the ON/OFF and S/W remote controls it is (par. H27=1)

Proceed in the following way to access parameter H27 and make the required configuration:
1. Press the ON/OFF key and keep it depressed until the instrument comes on.
2. Press the MODE and ON/OFF keys at the same time for one second. The word **Set** will appear.
3. Repeatedly press the MODE key until **Par** appears.
4. Press the MODE and ON/OFF keys at the same time and keep them depressed for at least one second until **Cnf** appears.
5. Press the MODE and ON/OFF keys at the same time and keep them depressed for at least one second until H01 appears.
6. Using the MODE key, select parameter H27 and configure it as needed.
7. After having modified the parameter, repeatedly press MODE and ON/OFF until the initial mask returns.
Turn the unit off and on again with the main switch so as to reset the controller.
The machine is now ready to operate.

Wiring diagrams
The general wiring diaframs of the units are given on the following pages. These diagrams show the connections required for powering the machine, activation of any supplementary loads (**pump**, **electric heating element** and the **alarm indicator**), connection with the available digital inputs (**ON/OFF**, change of season **summer/winter** and connection with the **remote control panel**).
All the connections must be made in compliance with the GENERAL REGULATIONS listed above.

Electrical connections

ALL THE ELECTRICAL CONNECTIONS MUST BE MADE BY QUALIFIED PERSONNEL IN THE ABSENCE OF ELECTRIC POWER. CONSULT THE "GENERAL SPECIFICATIONS" SECTION FOR THE ELECTRICAL SPECIFICATIONS OF THE UNITS.

A- UNIT
- Electric power line
The machine's power line should be routed in compliance with the current standards governing the classification of the places in which the actual machines are installed. The machine's power line should follow a precise route so that it is as short as possible and unbroken. Proceed in the following way in order to carry out this operation:
-open the front panel of the unit.

-Route the powering line inside the unit (Fig. 1-A) through one of the holes in its structure (Fig. 1-B).
-Route the line into the compressor compartment until it reaches the main switch (Fig. 1-2). Remove the protective cover to access the switch (Fig. 1-1).
-Connect the conductors straight to the switch.
-Fix the power cable in place with a clamp (Fig. 1-3).
-Fix the protection conductor (ground wire) to the grounding block (Fig. 1-4).

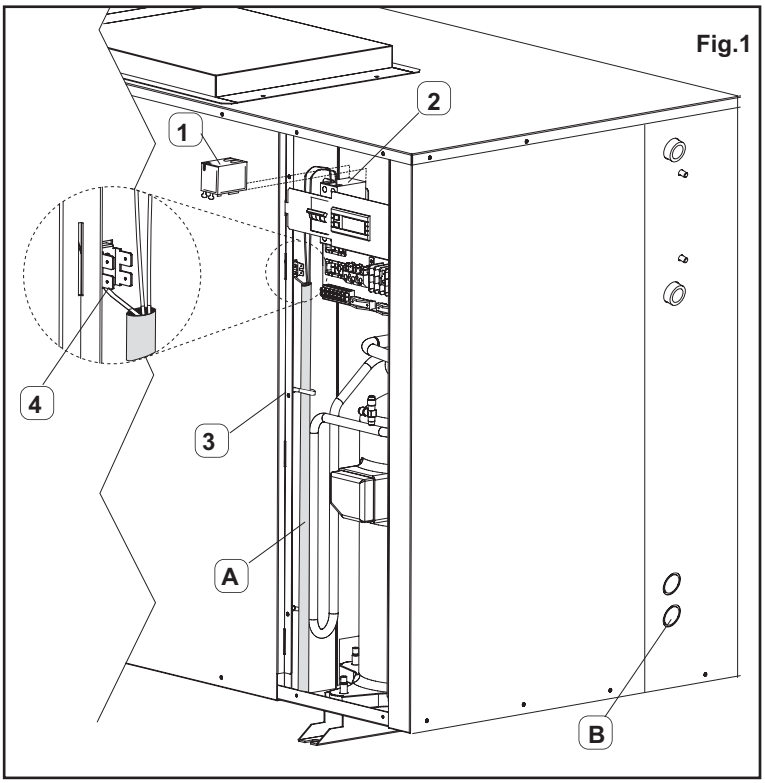


Fig.1

- Powering system

Single-phase units must be powered with 3 conductors (phase-neutral-ground).
Threephase units must be powered with 5 conductors (phase 1-phase 2-phase 3-neutral-ground).
The power cables of the machine's power supply line must therefore be off-taken from a threephase symmetric system equipped with neutral conductor and separate protection conductor.

- Protection on the supply side

An automatic switch must be installed on the supply side of the above mentioned line in order to protect against any overcurrents and indirect contacts which could occur as the machine operates.
It is advisable to install an automatic limiter switch with at least the minimum specifications given in the table.
Connections between the line and switch must be made in compliance with the current laws governing electrical safety matters, regarding the type of installation and environmental conditions in which the machine is installed.

- Protection conductor (ground wire)

The protection conductor from the electricity main must be connected straight to the ground screw, able to guarantee the equipotential connection of all metal grounding points and structural parts of the machine (Fig. 1-4).

- Neutral conductor

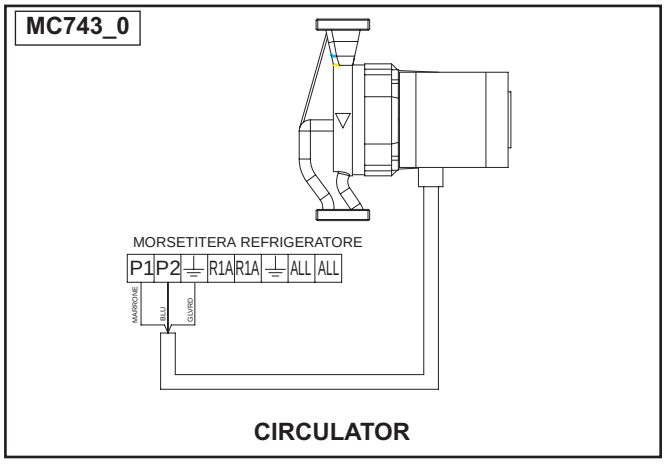
The neutral conductor that forms the line must be connected to the neutral terminal marked "**N**", corresponding to the fourth pin of the panel's main disconnector.

NOTE: If the power cable has been damaged, stop the machine if it is operating, and have the flex immediately replaced by an authorized electrician.

B-STORAGE AND PUMPING MODULE

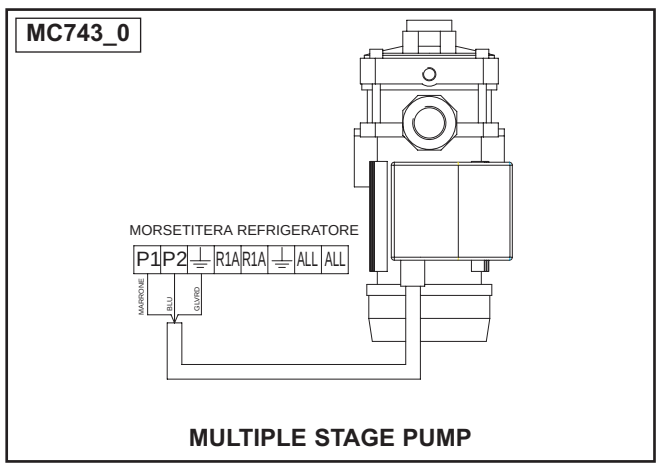
Depending on the model, the Storage and Pumping Module can be equipped with either a circulator or multiple-stage pump, both complete with power cable.
All the electrical components in the Module (circulator/pump and electric antifreeze heating element if installed) must be connected straight to the terminal board in the relative unit.
Proceed in the following way to make the connections:
-Route the pump cable through the partition on the connection side of the chiller using the core hitches that pass through this latter.
-Access the chiller through one of the core hitches in the connection side, connect the pump cable to the terminal board and fix it in place with the cable clamp on the electric panel.
-Make the connections as shown in the following diagrams.

Mod. 30 in the Standard Version



CIRCULATOR

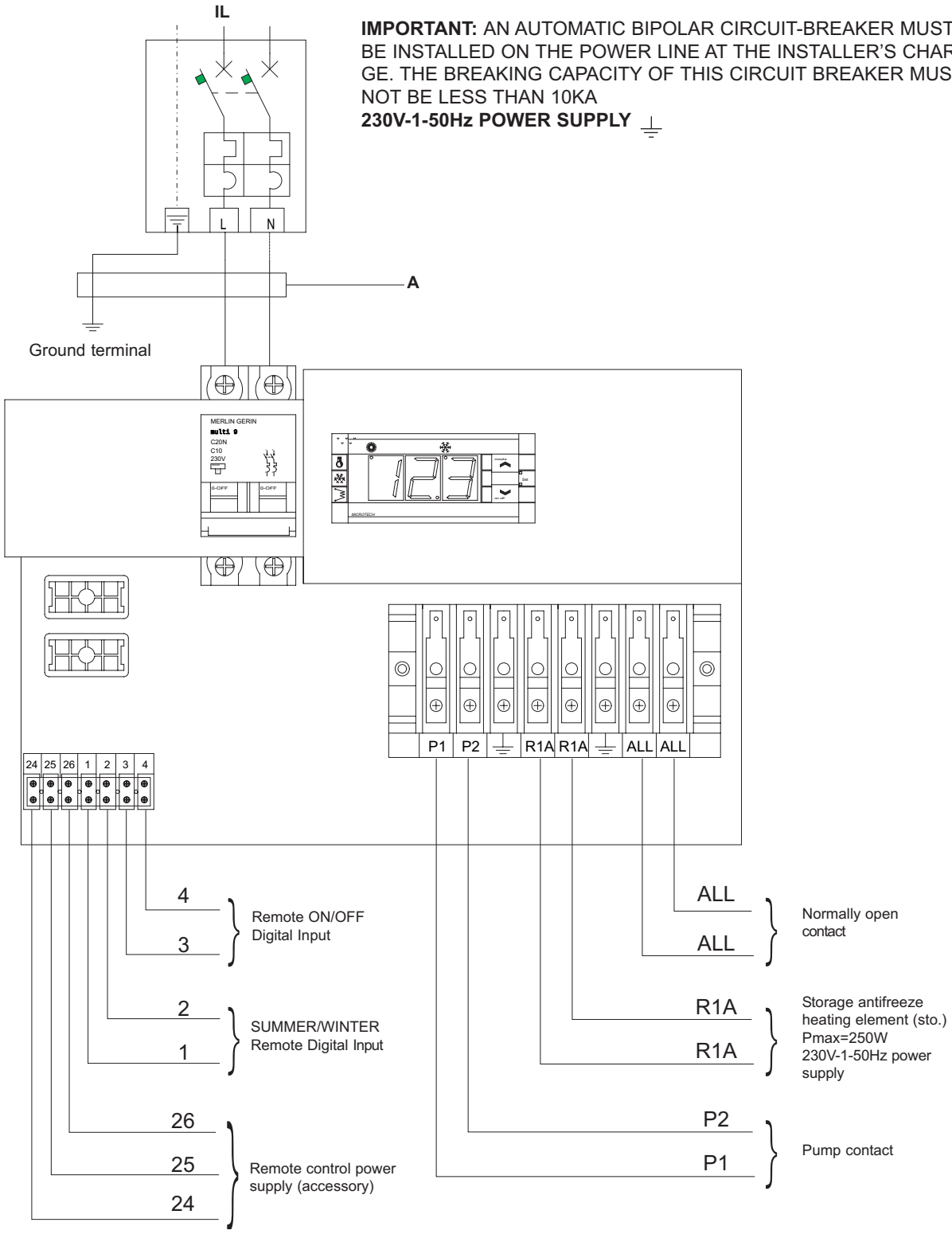
Mod. 30 High head and mod. 55 Standard Version



MULTIPLE STAGE PUMP

ELECTRICAL CONNECTIONS

Wiring diagrams for models 19 - 30 - 38 SINGLE-PHASE UNIT



IMPORTANT: AN AUTOMATIC BIPOLAR CIRCUIT-BREAKER MUST BE INSTALLED ON THE POWER LINE AT THE INSTALLER'S CHARGE. THE BREAKING CAPACITY OF THIS CIRCUIT BREAKER MUST NOT BE LESS THAN 10KA

230V-1-50Hz POWER SUPPLY ⏚

MC722_0

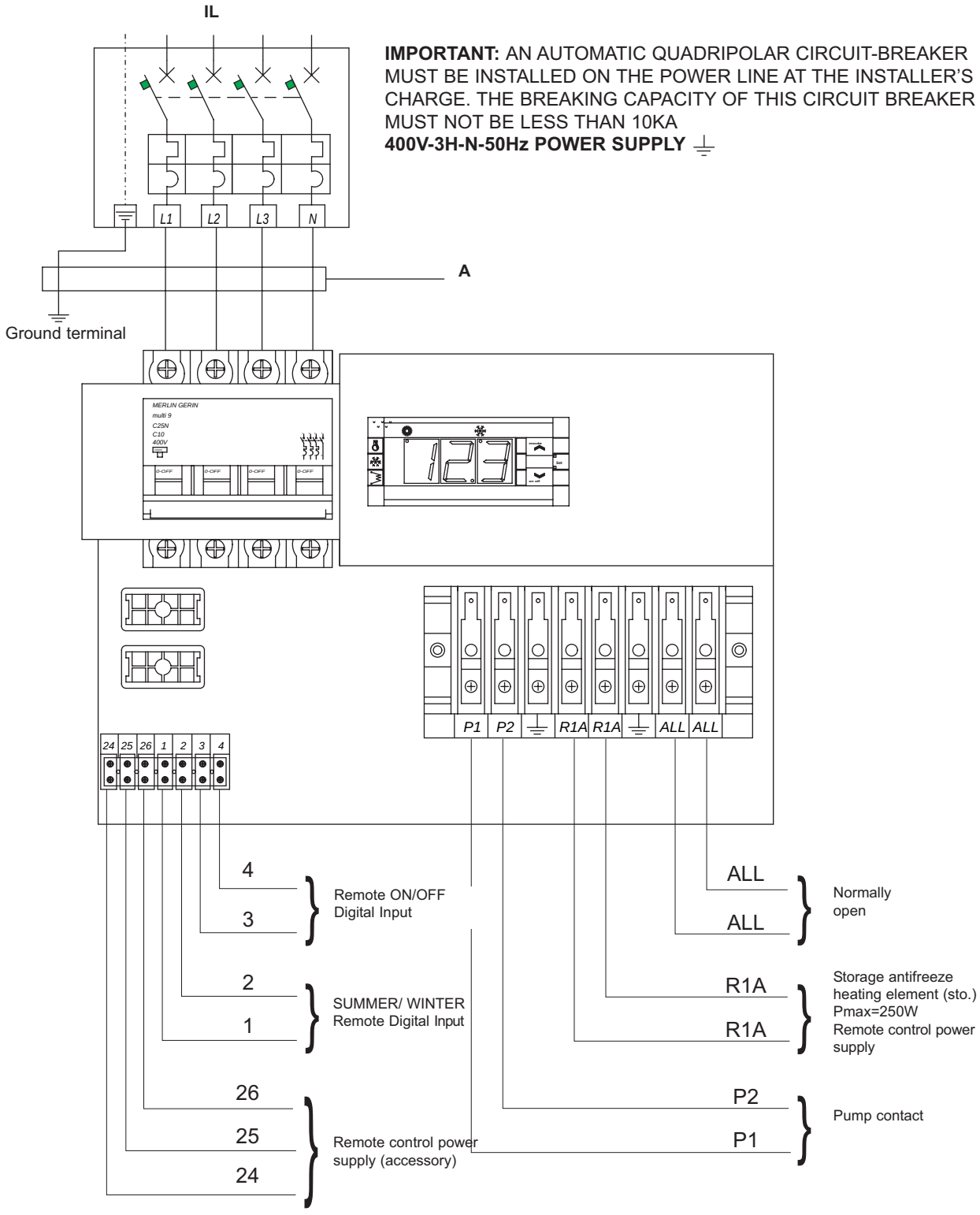
Note:
The electric cable used for installing Storage and Pumping Module mod. 30 and 55 in the Standard and High Head Versions, is supplied with the Pumping Module.

Model		19	30	38	MU
Power supply Type		230/1/50			V/Ph/Hz
Automatic switch IL(1)		C60N 25A	C60N 32A	C60N 40A	/
Cable section^2	A	4	6	10	mm^2

(1): For lengths less than 20 meters.
(2): With reference to flexible cable with polychloroprene sheathing type **H05RN-F**.
NOTE: The section of the cables must be checked and sized to suit the real conditions of use. Automatic switch at installer's charge.

ELECTRICAL CONNECTIONS

Wiring diagrams for models 30/3 - 38/3 - 42 - 50 THREEPHASE UNIT



IMPORTANT: AN AUTOMATIC QUADRIPOLAR CIRCUIT-BREAKER MUST BE INSTALLED ON THE POWER LINE AT THE INSTALLER'S CHARGE. THE BREAKING CAPACITY OF THIS CIRCUIT BREAKER MUST NOT BE LESS THAN 10KA

400V-3H-N-50Hz POWER SUPPLY ⏚

MC722_0

Note:
The electric cable used for installing Storage and Pumping Module mod. 30 and 55 in the Standard and High Head Versions, is supplied with the Pumping Module.

Model		30/3	38/3	42	50	MU
Power supply Type		400/3+N/50				V/Ph/Hz
Automatic switch IL(1)		C60N 20A	C60N 25A	C60N 25A	C60N 32A	/
Cable section²	A	2.5	4	4	6	mm²

(1): For lengths less than 20 meters.
(2): With reference to flexible cable with polychloroprene sheathing type **H05RN-F**.
NOTE: The section of the cables must be checked and sized to suit the real conditions of use. Automatic switch at installer's charge.

WET CONNECTIONS

General rules

Comply with the local safety laws in order to plan the hydraulic circuit in the correct way. A mesh filter (**hole Ø ≥ 500 µm**) must be installed on the inlet to the plate type exchanger for versions of the units without the storage Kit, so as to keep out any impurities. Failure to do this will void the warranty.

The following indications are merely suggestions about how to install the unit correctly.

1) **Standard supply.**

- Standard supply includes a differential pressure switch situated between the plate type exchanger's water inlet and outlet to prevent faults caused by freezing in the absence of water. The activation setting is for a **Δp of 80 mbar ±5**, while resetting occurs with a **Δp of 105 mbar ±5**.
- The heat pump units are supplied with an antifreeze heating element fitted to the evaporator and controlled straight by the monitoring board on the machine. For units that operate in the cooling mode only, it is advisable to drain off the system during winter periods at a standstill.

2) **Storage unit accessory**

- The storage kit (supplied as an accessory) comes with all the hydraulic components required to correctly operate the unit.

General suggestions for the hydraulic circuit

- Pipes must be sized with the least possible number of curves to minimize the loss of head. They must also be adequately supported to prevent the exchanger connections from being excessively stressed.
- Install on-off valves near components that need servicing so that they can be isolated when maintenance work is required and allow replacements to be made without the system having to be emptied.
- Before isolating the pipes and filling the system, first check to make sure that there are no leaks anywhere.
- Insulate the refrigerated water pipes to prevent condensation from forming along their length. 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 valve is accessible through the insulation.
- Also remember to install or at least prepare for the installation of instruments for reading the pressure and temperature values in the hydraulic circuit, both on the inlet and outlet sides of the unit. These instruments will allow the operation of the system to be monitored.

Installation without the storage kit

- The circuit must be kept pressurized by using a surge chamber in combination with a safety valve and pressure reducer. A filling unit, that automatically charges and maintains the required pressure below a certain value, can be used to fill the system. Install manual or automatic valves in the highest point of the circuit, to eliminate the air from this latter.
- Instal a gauze filter (**hole Ø ≤ 500 µm**) to retain foreign bodies.
- The units are supplied with female connections, as shown in the table. It is advisable to include expansion joints so as to limit the extent to which vibrations from the unit are transmitted to the bearing structures.
- If vibration dampers are fitted under the unit, it is also advisable to use flexible couplings that eliminate vibrations before and after the water circulation pump and near the actual unit itself.

If the storage module is installed

- Install a cock on the outlet of the storage module so as to regulate the water that flows to the system. Remember that the circulation pump that acts on the user circuit is equipped with a three-speed motor, thus the flow rate/head characteristics can also be adapted by modifying the speed of the circulation pump.

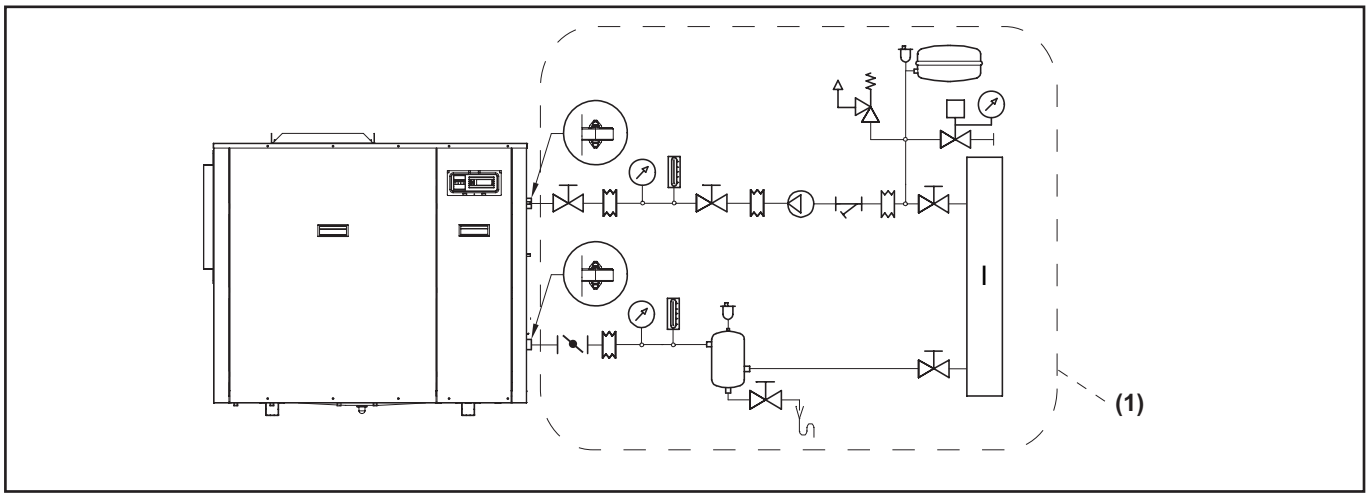
The hydraulic circuit can be completely drained through the lower cock of the storage unit.

WET CONNECTIONS

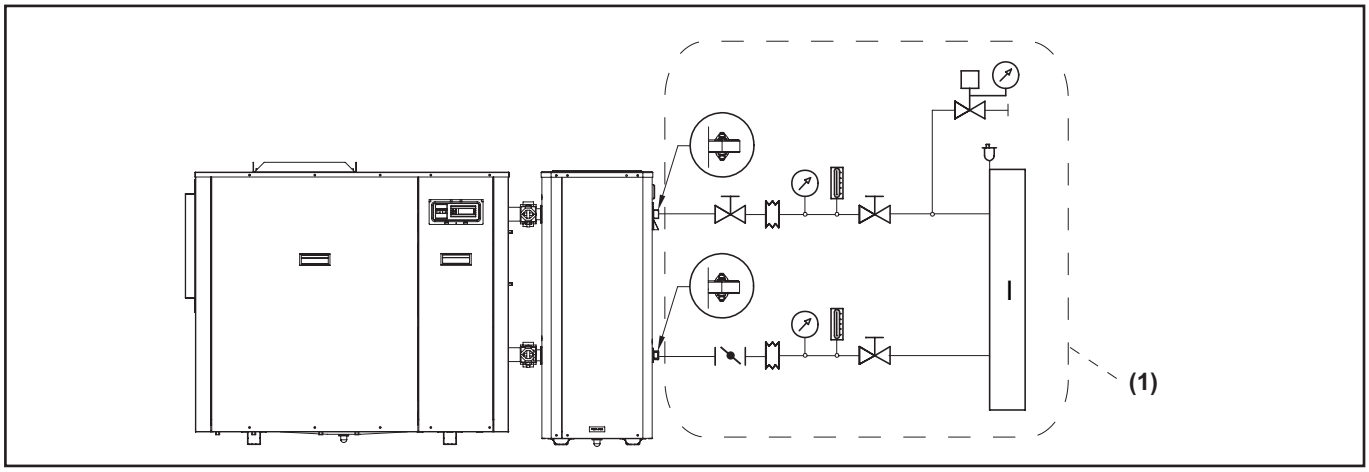
Hydraulic circuit diagram of the system

Connection layout
The figures below illustrate connections to the water supply circuit of the unit.
IMPORTANT: The exchanger must be supplied with a constant flow of water.

Version without Pumping Module



Version with Pumping Module



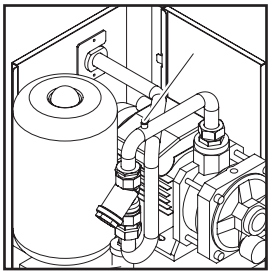
(1): components to be assembled by the installer

Pressure gauge	Filter	Safety valve
Thermometer	Coupling	Flow rate regulating valve
On-off valve	Vent valve	Storage tank
Surge chamber		

NOTE:
Unit in conjunction with the Pumping Module:
Pumping Modules mod. 30 in the High head version and mod. 55 in the Standard Version come already equipped a "PRESSURE GAUGE" to check the pressure level in the storage tank.
Installation of a pressure gauge in the wet connection of the system's return pipe is advisable and recommended for model 30 in the Standard Version.

WET CONNECTIONS

Fig.1



Charging the system and Air venting with the Storage and Pumping Module Mod. 30-55

Remember that the tank has a safety valve with a 300 kPa setting.

To make the system easier and quicker to fill, open the air vent (1) under the cover of the unit using a screwdriver.
Start the pump so as to eliminate all the air from the system.

Precautions to prevent ice from forming during winter periods at a standstill

If the system remains at a standstill during winter, the water could freeze and damage the unit's exchanger and other components.
There are three possible solutions to prevent this from happening:

- **completely drain the system**, making sure that the exchanger is completely emptied.
  If the unit is operating in conjunction with the Storage and Pumping Module, remember to also drain the tank using the fitting with which it is supplied.

Remember to open the air vent to ensure that all the water completely drains out.

- **use brine:** in this case,, the performances of the unit must be corrected, depending on the **% of brine**, and taking into account the respective correction factors for the cooling capacity, power input, water flow rate and loss of pressure (**see following table**). The real volume of the system must also be calculated, taking into account the correction factors of the system's volume as indicated in the "Maximum Volume of water" Section.

- **use the antifreeze heating element** built into the plate-type heat exchanger as part of the standard supply: use of this heating element prevents the heat exchanger from freezing and cracking.
  If the unit operates in conjunction with the Storage and Pumping Module, ice can be prevented from forming inside the Storage tank by installing the "**electric antifreeze heating element**") handled by the controller of the unit with the same operating logic as the antifreeze heating element in the plate-type heat exchanger.

Refer to the instructions supplied with this heating element when it is installed.
NOTE: <u>If this latter solution is used (use of the antifreeze heating elements) make sure that electricity is supplied continuously throughout the entire period at which the unit remains at a standstill.</u>

NOTE:
the electric heating elements supplied do not protect the hydraulic pipes used to connect to the system.

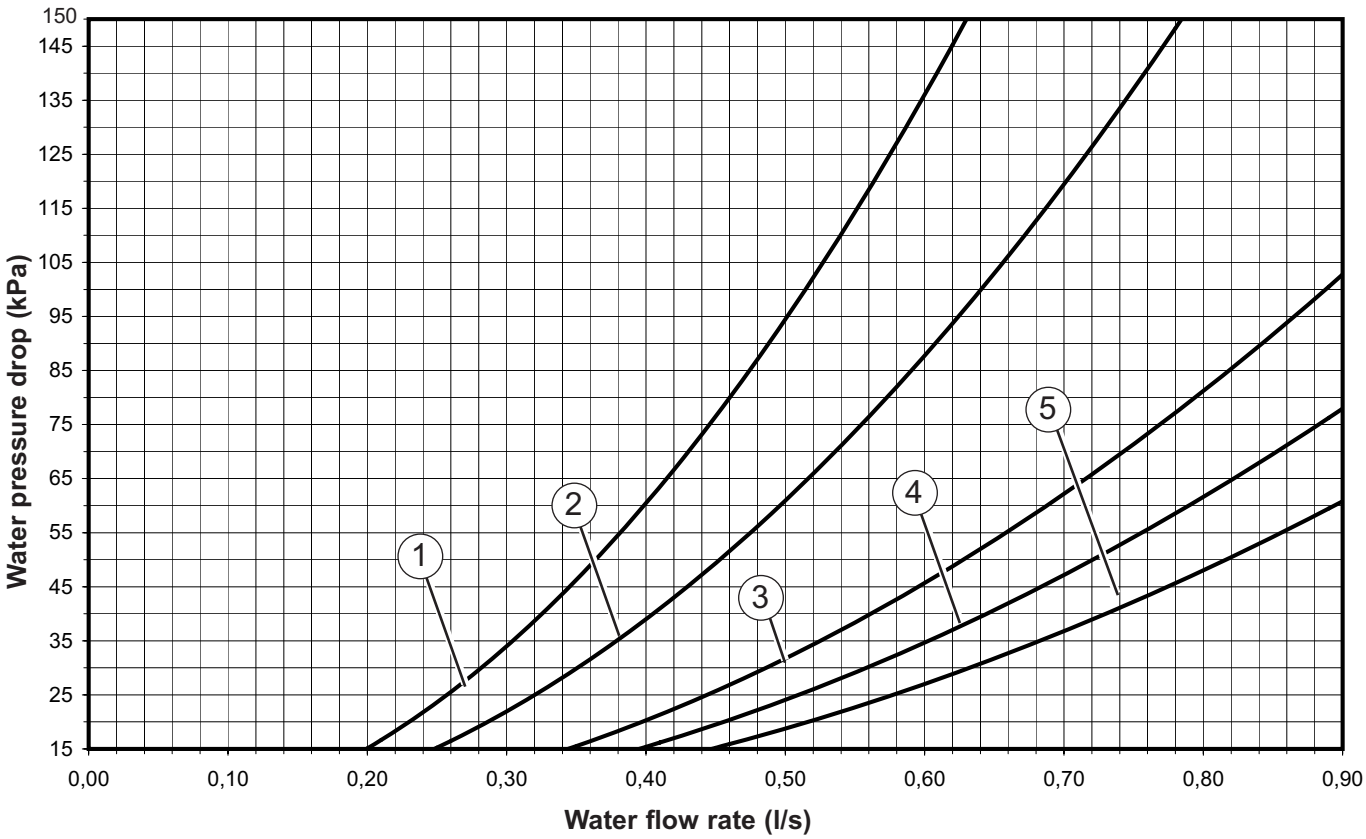
Correction factor when brine is used:

% of brine in weight	0%	10%	20%	30%	40%
Freezing temperature	0	-3.9	-8.9	-15.6	-23.4
Cooling capacity multiplier	1	0.99	0.98	0.97	0.95
Power input multiplier	1	1	0.99	0.99	0.98
Water flow rate multiplier	1	1.04	1.08	1.12	1.16
Water pressure drop multiplier	1	1.08	1.16	1.25	1.35

NOTE:
Never use more than 40% of brine in Multiple stage pump versions of units operating in conjunction with the Storage and Pumping Module.

WATER PRESSURE DROP

The graph below illustrates the loss of head 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 table.



Limits to use of the plate-type heat exchanger

The loss of head values refer to a 10°C average water temperature.

Unit Size		19	30	38	42	50	NOTES	
Graph reference		**1**	**2**	**3**	**4**	**5**		**Q**=Water flow rate
Lower limit value	**Q**	0.20	0.25	0.35	0.40	0.45	l/s	**Δp**=Water pressure drop
	Δp	15					kPa	
Upper limit value	**Q**	0.63	0.79	0.90			l/s	
	Δp	150		102	77	60	kPa	
Maximum operating pressure on wet side		1000					kPa	

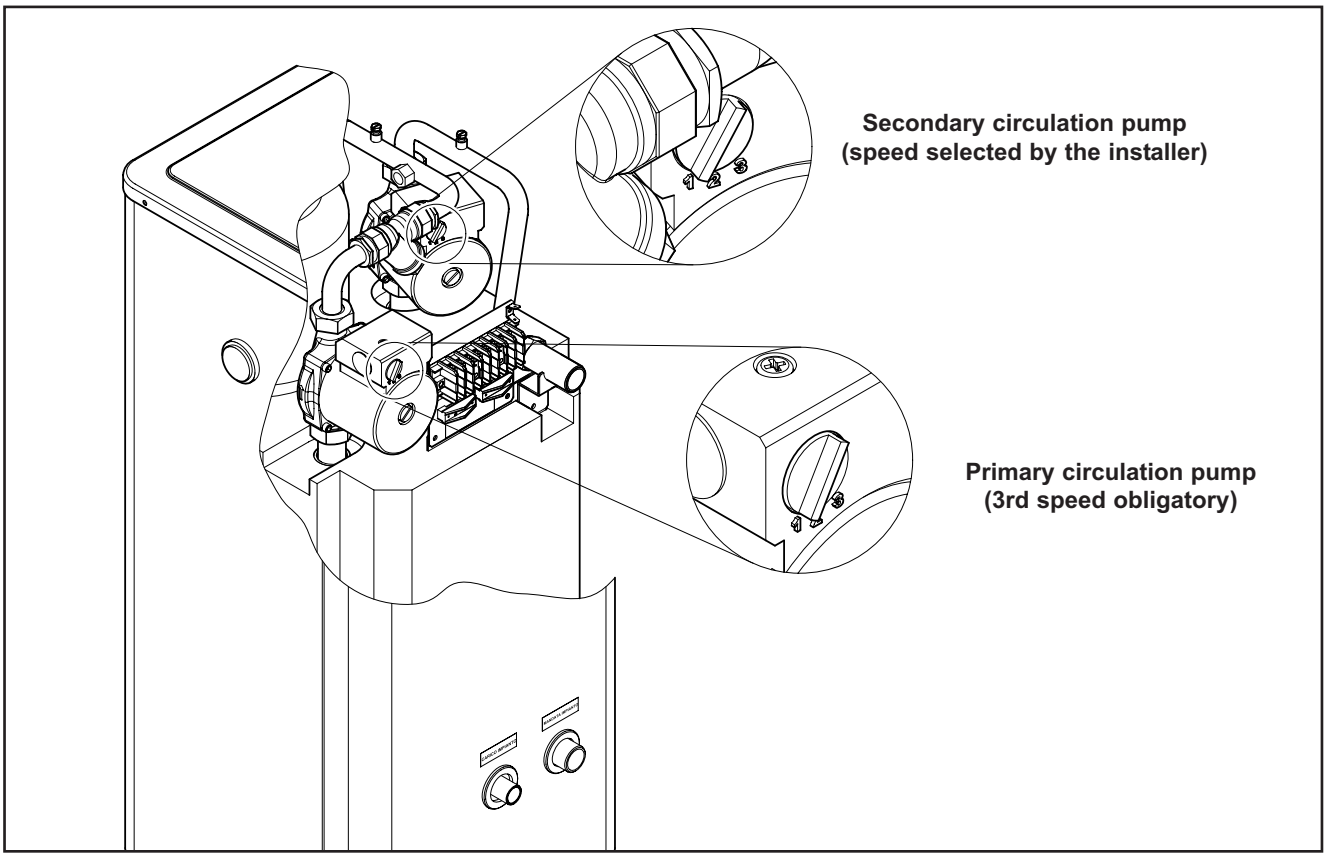
USE OF THE PUMPING MODULE MOD. 34 - 60

Primary circuit in the unit

If Storage and Pumping Module mod.34 or mod.60 are used, the water flow rate supplied to the unit is provided by the primary circulation pump. This must be left with the factory setting at top speed. Water is circulated around the system by a secondary circulation pump with three speeds that can be selected during the installation phase to suit the requirements of the actual system itself.
Consult the installation manual supplied with the Storage and Pumping Module for further information about the flow rate, head and power input values of the circulation pumps installed.
Modify the speed selectors of the circulation pumps as shown in the figure if different flow rates are required.

NOTE: The maximum operating pressure of the Storage Module is 300 kPa

IMPORTANT:
Make sure that the third speed has been selected for the circulation pump before starting.
To change the speed setting of the secondary circulation pump, open the cover of the storage kit and change the selector setting as shown in the figure.

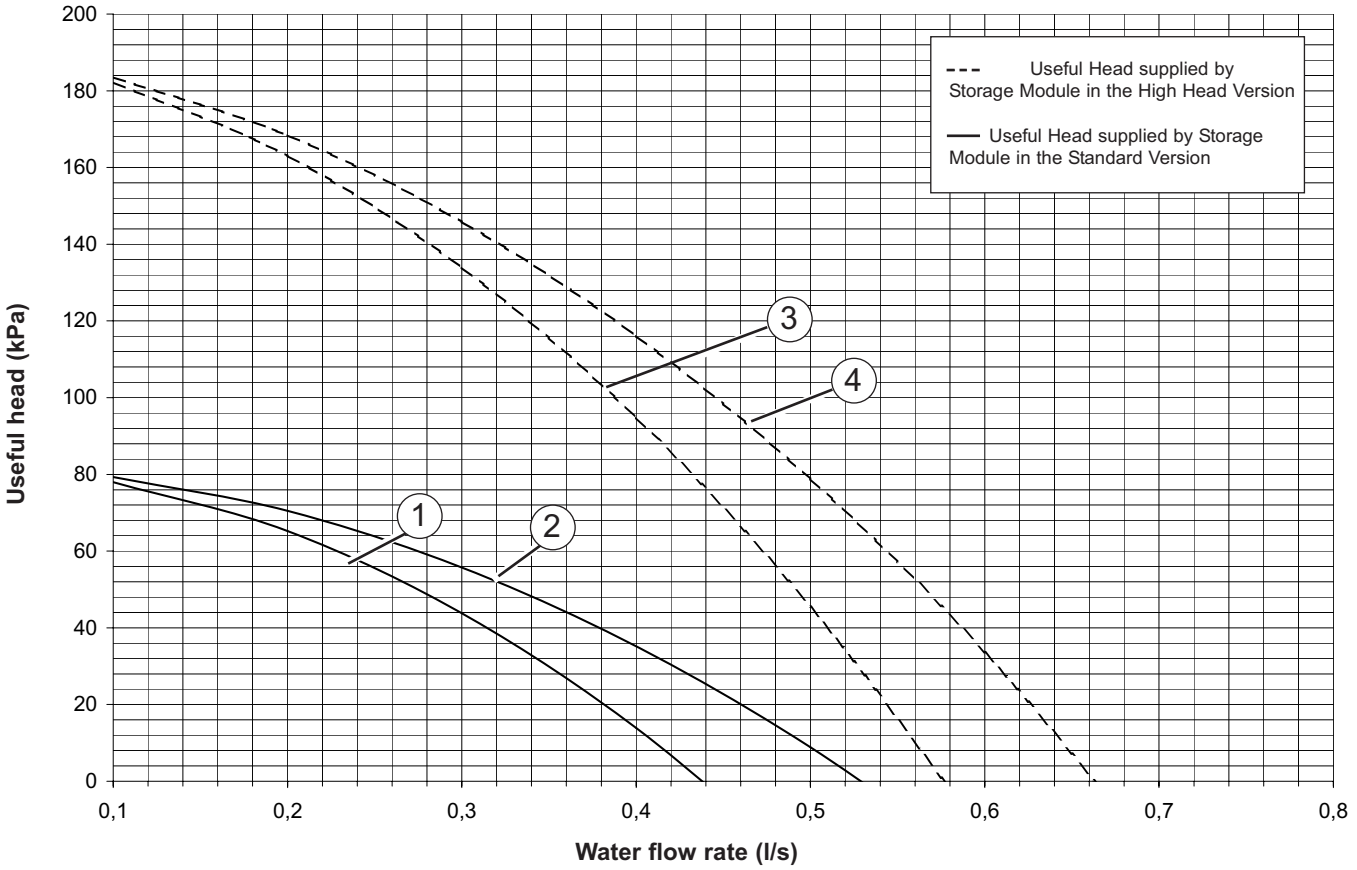


WORKING HEAD WITH STORAGE AND PUMPING MODULE Mod. 30

Units 19-30 with Storage and Pumping Module Mod. 30

The graph below illustrates the useful head values (**kPa**) depending on the water flow rate in (**liters/second**): the Standard or High Head Pumping Module can be used with each of models 19-30.
The operating range is delimited by the minimum and maximum values given in the next table.
Useful head is the one at the outlet of the Storage and Pumping Module minus all the loss of pressure values of the wet components of the unit and Storage and Pumping Module.

Head of Standard and High Head Versions mod. 19 - 30



Limits to operation (Standard Head)

Unit size		19	30	UM	NOTES
Graph reference		1	2	/	**Q=**Water flow rate
Lower limit value	**Q**	0.20	0.25	l\s	
Upper limit value		0.44	0.53	l\s	

Limits to operation (High Head)

Unit size		19	30	UM	NOTES
Graph reference		3	4	/	**Q=**Water flow rate
Lower limit value	**Q**	0.20	0.25	l\s	
Upper limit value		0.58	0.66	l\s	

Unit matches with Storage and Pumping Module Accessory

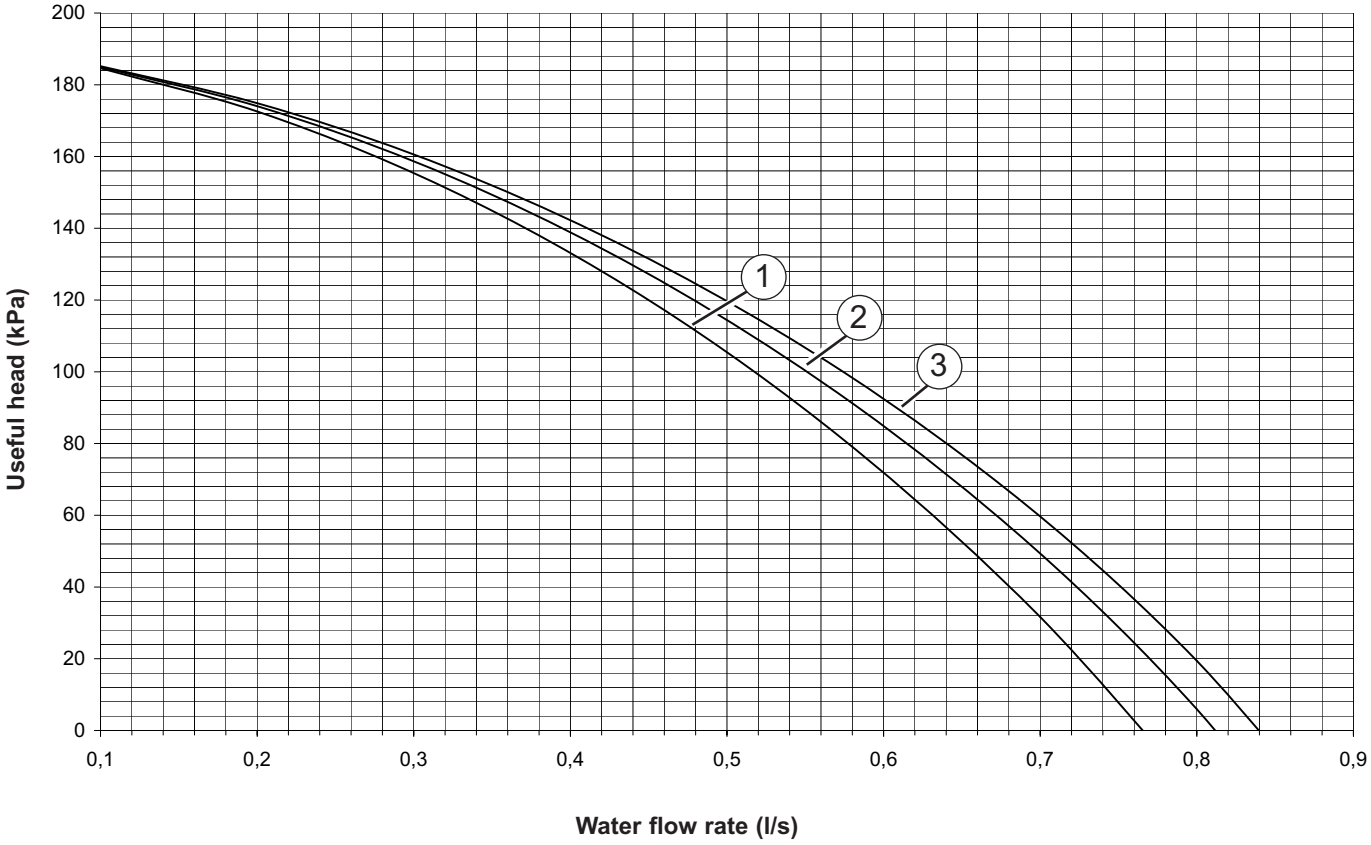
MODEL OF UNIT	19 - 30
Storage and Pumping Module model	30
STANDARD VERSION	SAA8
HIGH HEAD VERSION	SAA9

WORKING HEAD WITH STORAGE AND PUMPING MODULE Mod. 55

Units 38-42-50 with Storage and Pumping Module Mod. 55

The graph below illustrates the useful head values (**kPa**) depending on the water flow rate in (**liters/second**).
The operating range is delimited by the minimum and maximum values given in the next table.
Useful head is the one at the outlet of the Storage and Pumping Module in the Standard Version minus all the loss of pressure values of the wet components of the unit and Storage and Pumping Module.

Standard version head mod. 38 - 42 - 50



Limits to operation Standard Head

Unit size		38	42	50	UM	NOTES
Graph reference		1	2	3	/	**Q=**Water flow rate
Lower limit value	Q	0.35	0.40	0.45	l\s	
Upper limit value		0.76	0.81	0.84	l\s	

Unit matches with Storage and Pumping Module Accessory

MODEL OF UNIT	38 - 42 - 50
Storage and Pumping Module model	55
STANDARD VERSION	SAA12

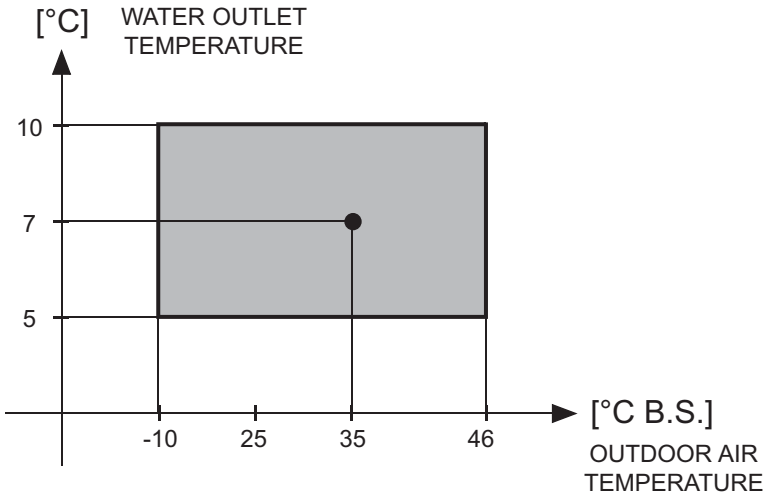
OPERATING RANGE

Operating limits

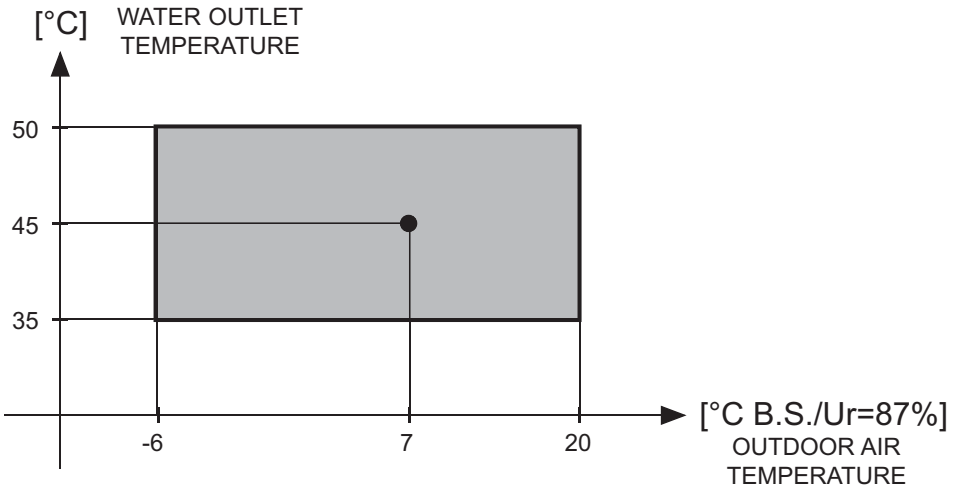
The graphs below give the operating ranges within which correct operation of the units is guaranteed.
Use of the units in conditions differing from those indicated will void the warranty with which the product is supplied.

Entity		Limit value in the cooling mode	Limit value in the heating mode
Minimum thermal gradient of the water	°C	3	3
Maximum thermal gradient of water	°C	7	7

IN COOLING MODE (units IR / IP)



IN HEATING MODE (IP units)



NOTE:
Never use more than 40% of brine in Multiple stage pump versions of units operating in conjunction with the Storage and Pumping Module.

Maximum operating pressure on wet side

Unit size	19	30	30/3	38	38/3	42	50	UM
Maximum operating pressure on wet side	1000							kPa

Pumping & Storage module	30	55	UM
Maximum operating pressure on wet side	300		kPa

MAXIMUM VOLUME OF WATER

Maximum volume of water in the system

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 Pumping 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 **300 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:

Surge chamber service charge= [H/10.2+0.3] x100 = [kPa]

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

Units with Storage and Pumping Module Mod. 34 - 60

Model of unit			**19 - 30 - 30/3**		**38 - 38/3 - 42 - 50**	
Storage and Pumping Module volume (liters)			**34**		**60**	
Surge chamber volume (liters)			3		5	
Thermal expansion of water (10-40°C)(IR)			0.0074			
Thermal expansion of water (10-60°C)(IP)			0.0167			
H (meters)		Surge chamber expansion (kPa)	Maximum total volume of water supply system (liters)			
			IR	**IP**	**IR**	**IP**
Case A	H <0	150 (standard)	150	67	250	112
Case B	0 ≤ H < 12.25	150 (standard)	150	67	250	112
	12.25 ≤ H < 15	180	120	54	200	90
	15 ≤ H < 20	230	70	31	117	52
	20 ≤ H ≤ 25	280	20	9	33	15

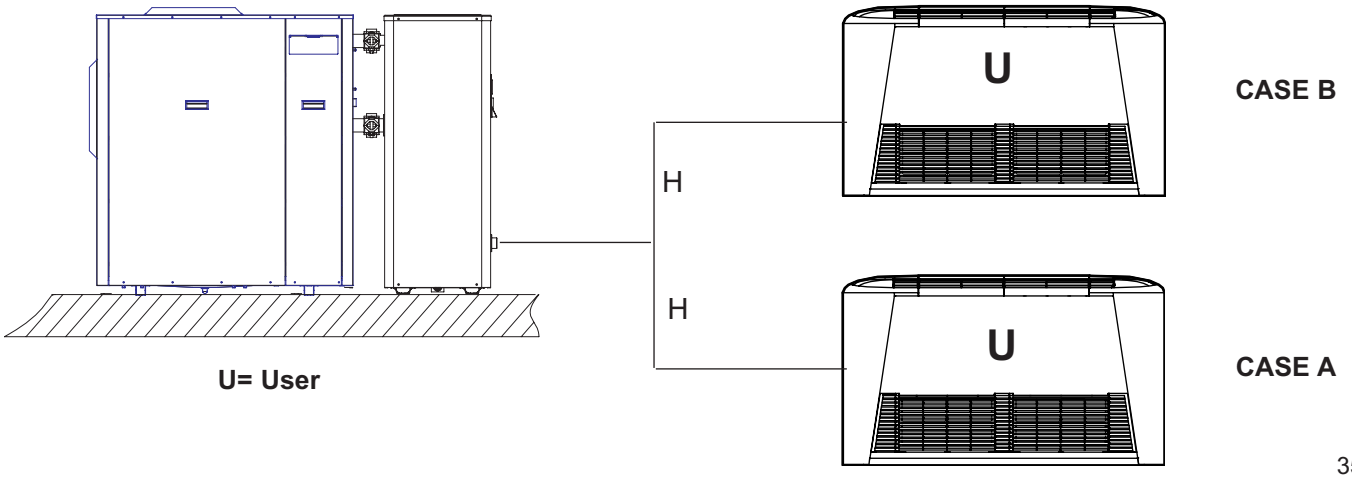
Units with Storage and Pumping Module Mod. 30 - 55

Model of unit		**19 - 30 - 30/3**	**38 - 38/3 - 42 - 50**
Storage and Pumping Module volume (liters)		**30**	**55**
Surge chamber volume (liters)		5	
Thermal expansion of water (10-40°C)(IR)		0.0074	
Thermal expansion of water (10-60°C)(IP)		0.0167	
H (meters)	Surge chamber pressure (kPa)	Maximum total volume of water supply system (liters)	
		IR	**IP**
Case A	H <0	150 (standard)	250	112
Case B	0 ≤ H < 12.25	150 (standard)	250	112
	12.25 ≤ H < 15	**180**	200	90
	15 ≤ H < 20	**230**	117	52
	20 ≤ H ≤ 25	**280**	33	15

NOTE : If the unit operates with brine, the real volume of the system must be calculated by taking into account the correction factors of the system's volume as indicated in the table below.

Correction factors per total maximum volume of the system with brine

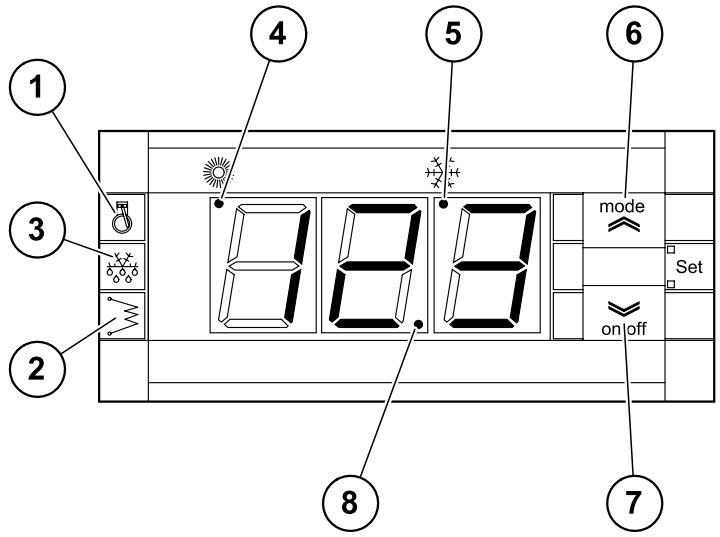
% of brine	**0%**	**10%**	**20%**	**30%**	**40%**
in cooling mode	1.000	0.738	0.693	0.652	0.615
in heating mode	1.000	0.855	0.811	0.769	0.731



MONITORING SYSTEM

User Interface

The control system, which consists of a regulator with push button panel and display, is installed on the front part of the unit and can be accessed by opening a flap. All the users and various monitoring instruments are connected to it by means of an interface board.
This particular controller is very versatile and simply to use. Specially designed to control single-circuit heat pumps and chillers, it can be programmed and, thus, customized, by means of a menu of parameters. Various peripheral devices can be connected to it so as to implement functions that it cannot handle alone.



KEY

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

STATUS

The controller has three **LEDs** on the left-hand side of the interface, that display the status functions of the machine:
1: Compressor Led
2: LED for the defrosting function (function available in heat pump units).
3: Electric antifreeze heater LED.

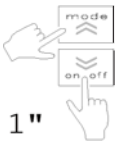
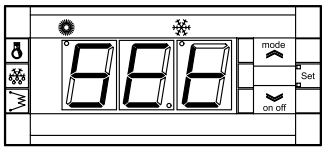
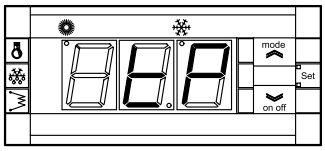
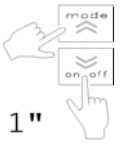
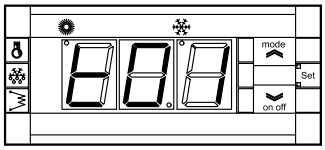
Description of LED statuses

LED	STATUS	MEANING
COMPRESSOR	ON	Compressor activated
	OFF	Compressor off
	FLASHING	Waiting to start for safety time count
ELECTRIC ANTI-FREEZE HEATER	ON	Heater activated
	OFF	Heater off
DEFROSTING	ON	Defrosting on
	OFF	Defrosting off
	FLASHING	Waiting for timed defrosting procedure

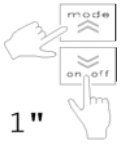
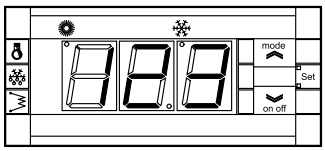
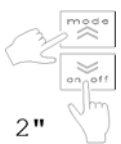
MONITORING SYSTEM

Probe reading

During normal operation, either the operating temperature (or the temperature read by the probe on the exchanger inlet) appears on the display in degrees centrigrade (**the temperature can be displayed in °F by modifying the value of parameter H52 from value Ø to value 1**) or the alarm code appears, if at least one is activated.
The temperatures read by the other probes can be displayed by means of a few simple operations. The procedure is described below:

	KEYS TO PRESS	DESCRIPTION	DISPLAY
1		Keep the mode and on/off keys depressed at the same time for 1 second. The word **SET** will appear on the display.	
2		Press the on/off key repeatedly until the letters **tP** appear on the display.	
3		Keep the mode and on/off keys depressed at the same time for 1 second. The message **t01** will appear on the display, identifying the water inlet probe.	
4		The mode key can be used to select the probe whose value must be known. The codes that identify the probes in the unit are listed in the table below.	

PROBE CODE	DESCRIPTION
t01	Temperature of water flowing into the exchanger
t02	Temperature of water flowing out of the exchanger
t03	Temperature of the coils
t04	Not used

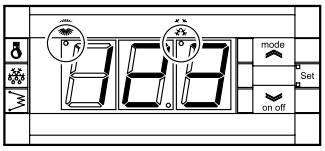
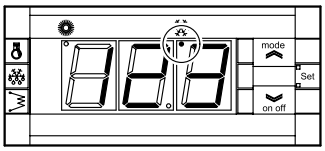
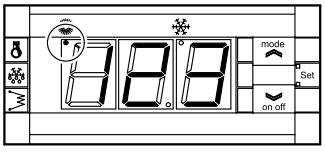
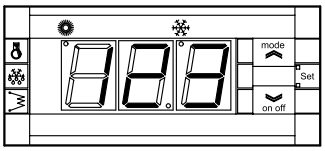
5		Keep the mode and on/off keys depressed for 1 second at the same time to display the value of the probe concerned.	
6		Keep the mode and on/off keys depressed for 2 seconds at the same time to quit the newly acquired reading. To see the values of the other probes, repeat the sequence described in points 4 and 5, otherwise keep the mode and on/off keys depressed for 2 seconds at the same time to return to the tP message. Repeat this last operation several times to quit the menu.	

MONITORING SYSTEM

CONTROL SYSTEM

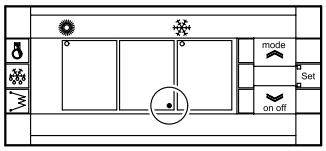
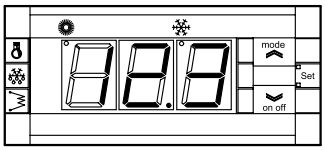
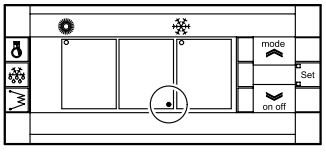
The monitoring functions allow the user to enter the operating parameters of the unit.
Operating modes

1. Operating mode keys (MODE)

	DESCRIPTION	DISPLAY
1	When the unit is at a standstill, in the "**waiting to start**" status (stand-by), **LEDs 4 and 5** will be off. The temperature of the water detected by the probe on the evaporator inlet will appear on the display.	
2	Press the **mode** key for **1 second** to turn on the unit in the **"cool"** 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** units only). **LED 4** will light up on the display.	
4	Press the **mode** key again for **1 second** to set the unit back to the "**stand-by**" status.	

2. Turning the unit ON/OFF

The ON-OFF key carries out two distinct functions: if pressed for **1 second**, it acts as an "**alarm reset**". If depressed for **2 seconds**, it turns the controller "**on-off**".

	DESCRIPTION	DISPLAY
1	Only **LED 8** will be on when the unit is off.	
2	Press the on/off key for **2 seconds** to power the controller. The temperature of the water detected by the probe on the evaporator inlet will appear on the display.	
3	Press the on/off key for **2 seconds** to turn the controlled off again.	

3. MODE + ON/OFF keys

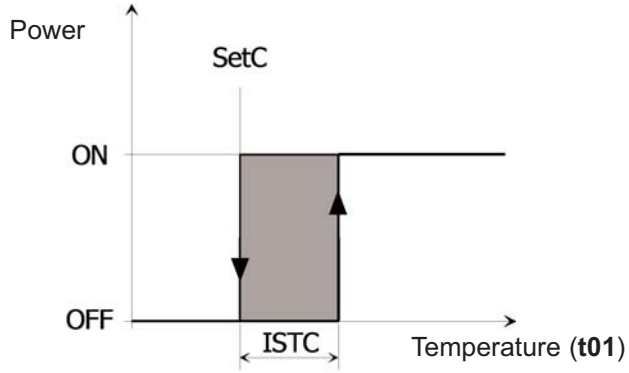
They allow you to access the menu structure and sub-levels if depressed for 1 second, or to quit by working through them in reverse if depressed for **2 seconds**.
When the **mode + on/off** keys are pressed for the first time, the status identifying **LEDs** start to flash to indicate the programming phase.

- Keep the **on/off** and **mode** keys depressed at the same time for **1 second** to switch to a lower display menu.
- Keep the **on/off** and **mode** keys depressed at the same time for **2 seconds** to switch to a higher display menu.

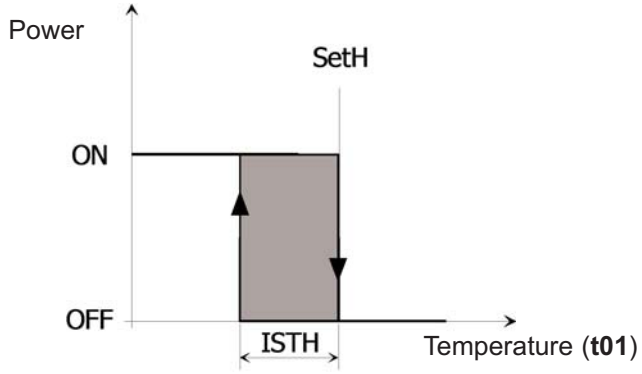
4. How to select the operating Set-point

The thermoregulator maintains the temperature of the water at the plate type heat exchanger inlet as near as possible to the value programmed as SET POINT. The type of regulation made by the controller is the **ON-OFF** type. Once the ideal operating point has been established (**SET-POINT**), the action carried out by the machine will be to switch off the compressor once that value has been reached and to power it again, once the **SET-POINT** has been reached, plus a hysteresis value preset in the factory and which can only be modified by a qualified technician.

COOL thermoregulator



HEAT thermoregulator

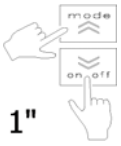
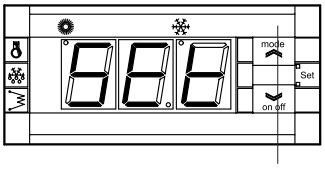
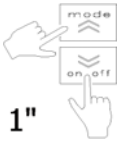
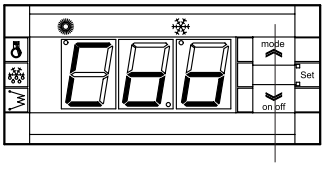
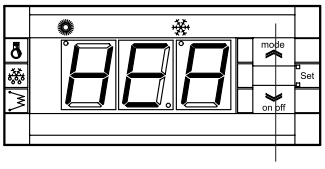
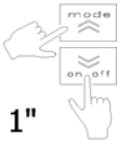
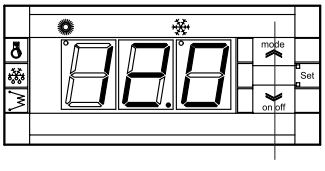
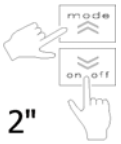


SetC =Set-point for operating in the cooling mode **(Parameter** that can be selected by the User)

ISTC= Cooling thermoregulator hysteresis **(Parameter C03** can only be modified by the Technical Assistance staff, not by the User)

SetH =Set-point for operating in the heating mode **(Parameter** that can be selected by the User)

ISTH= Heating thermoregulator hysteresis **(Parameter C04** can only be modified by the Technical Assistance staff, not by the User)

	KEYS TO PRESS	DESCRIPTION	DISPLAY
1		Keep the mode and **on/off** keys depressed at the same time for 1 second. The word **SET** will appear on the display.	
2		Keep the mode and **on/off** keys depressed at the same time for 1 second again. The word **Coo** (meaning "**Cool**") will appear on the display.	
		In heat pump units, the word **Hea** (meaning "**Heat**") will appear when the on/off key is pressed.	
3		Keep the mode and **on/off** keys depressed at the same time for 1 second. The selected set value will appear on the display	
4		Press the mode key to increase the selected set value, while the value decreases when the **on/off** key is pressed.	
5		Keep the mode and **on/off** keys depressed at the same time for 2 seconds to switch to the previous menu.	

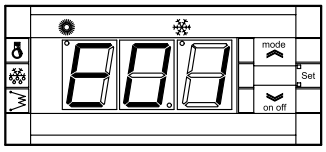
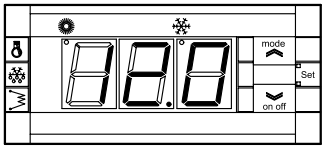
MONITORING SYSTEM

ALARMS

If faults occur during normal operation, the controller stops the machine and displays the code of the alarm in question. After the alarm has been checked and its cause eliminated, the controller can be reset by pressing the **on/off** key.

1. How to reset the alarms

The screen-print graph gives the meaning, with cyclic rotation, assumed by pressing the **on/off** key. As described previously, the key carries out two separate functions. If pressed for **1 second**, it acts as an "**alarm reset**". If depressed for **2 seconds**, it turns the controller "**on-off**".

	DESCRIPTION	DISPLAY
1	If there is an operating fault, the controller will warn the user by flashing the activated alarm code.	
2	Press the *on/off* key for 1 second to reset the controller and return to the normal operating mode.	

2. Alarm codes

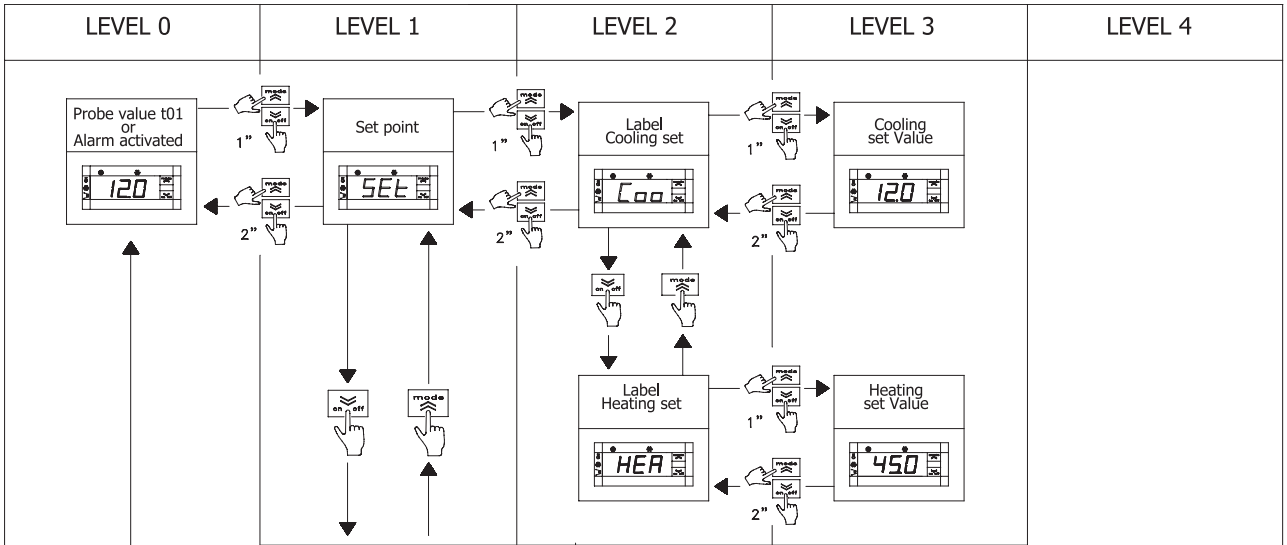
The diagram below gives the alarm codes, the relative international identifying symbol and a description of the type of alarm involved. Two of the alarm codes handle several types of fault, i.e. they have several meanings. All the other alarms have only one meaning. Pay particular attention to code **E00**, since this is not an alarm that denotes a machine fault, but one that indicates that the remote on/off switch has been activated or the off status of the unit controlled by the programmer clock (accessory).

ALARM CODE		
E00	Machine stand-by via remote control	
E01	Activation of the maximum pressure switch	
E02	Activation of the minimum pressure switch	
E05	Antifreeze safety procedure activation	
E06	Exchanger water outlet temperature probe faulty	
E07	Coil probe faulty	
E41	Activation of water differential pressure switch on plate type heat exchanger	
E40	Exchanger water inlet temperature probe faulty	
E04	Phase sequencer alarm*	

(*): Only for unit **THREE-PHASE** unit, and **ONLY** if the phase sequencer device is installed.

3. Menu structure

The menu in the system features a tree structure based on four different levels.
The values that the controller shows on the display during the normal operating mode are identified in **level 0**, i.e. the thermoregulation temperature (temperature detected by probe "**t01**" on the exchanger inlet) or an alarm code.
The menu where the seven labels are displayed (titles) is accessed in **livello 1**.
The menus in **level 2** and, successively, in **level 3**, contain a sub-menu or the values in the open menu item.
Lastly, **level 4** contains parameter menu values only.
The diagram below illustrates the structure of the menu with all the parameters that form it.



Analog inputs	Code	Description of input	Rear value
tP	t01	H2O inlet probe	120
	t02	H2O outlet probe	70
	t03	Condensation probe	500
Alarms		**Activated alarm codes**	
Err	E01	See errors table	
Digital inputs	**Code**	**Description of input**	**Status if input**
Id	i01	High pressure switch	0
	i02	Low pressure switch	0
	i03	Compressor safeties	0
	i04	Water side safeties	0
	i05	Fan thermic	0

Parameters	Code	Description of input	Parameter index	Parameter value
PAr	CnF	Configuration par.	from H01 to H47	45
	CP	Compressor par.	from C01 to C04	180
	FAn	Fan par.	from F01 to F24	1
	ALL	Alarms par.	from A01 to A22	5
	PUP	Pump par.	from P01 to P03	1
	Fro	Antifreeze par.	from r01 to r 14	0
	dFr	Defrosting par.	from d01 to d07	0

Password	Password value	
PSS	254	Enter password

Hour counter	Code	Description of parameter	Number of hour
OHr	OHC	Compressor hour	45
	OHP	Pump hour	50

SETTING AT WORK

General Rules

To validate the **contractual warranty**, the machine must 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 wet 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 inspections 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 intervals.

DESCRIPTION	WEEKLY	MONTHLY	EVERY SIX MONTHS
Visual inspection of the unit			•
Inspection of hydraulic circuit		•	
Inspection of electrical system		•	
Inspection of condensing system		•	
Inspection and adjustment of op. 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 ones 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 hydraulic circuit
Visually check to make sure that there are no leaks from the hydraulic circuit. If the pumping module accessory is installed, it is advisable to check to make sure that the water filter is clean.
• Inspection of 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 system
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 coils
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 fan's air flow rate and, thus, the performances of the unit itself. The following operations may be required:
- Remove all impurities (such as paper scraps, leaves, 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 surface of the coils, remembering to direct the jet in a vertical direction to prevent the fins from being damaged.
- "Comb" the coils 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 gives rise to noise and abnormal vibrations.
• Reading and adjustment of the operating parameters
This can only be done if the optional "Pressure gauge kit" is available (accessory supplied on request).

SAFETY AND POLLUTION

General considerations

The machine has been designed with a view to reducing the risks to persons and 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 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 actual Manufacturer.

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 about how to neutralize them.

Part in question	Residue hazard	Mode	Precautions
Compressor and delivery pipe	Burns	Contact with the pipes and/or compressor	Avoid contact by wearing protective gloves
Delivery pipes and coils	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 pull 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 coils	Cuts	Normally	Wear protective gloves
Electric fans	Cuts	Contact with the skin	Do not push the hands or objects through the fan protector of fans

c. Pollution

The machine contains **R22** or **R407C** refrigerant and lubricating oil. 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 refrigerant used

The cooling circuit of the machine is filled with **R22** or **R407C** refrigerant 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)

R22

Dangerous component.....LTEL limit
ppm

R22 - Mono Chlorodifluoromethane $CHClF_2$.....1000

R407C

Ternary mixture of R-32 (23%), R-125 (25%) and R134a (52%)

Dangerous component.....LTEL limit
ppm

R-32 - Difluoromethane CH_2F_2.....1000

R-125 - Pentafluoroethane CH_2F_3.....1000

R-134a- 1,1,1,2 - Tetrafluoroethane $CH_2F\ CF_3$.....1000

SAFETY AND POLLUTION

Handling
• Do not inhale refrigerant gas vapours.
• Concentrations of refrigerant 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 refrigerant 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.
• If the case of an extensive leak, pour sand, soil or other absorbent materials over and around it to prevent it from spreading, and adequately ventilate the area.
• Prevent refrigerant from infiltrating into sewers, basements, etc., since this could create a toxic atmosphere.
• Do everything necessary to prevent refrigerant 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.
For further information about the characteristics of the refrigerant, consult the technical briefs that can be obtained from manufacturers of refrigerant products.

NOTE

NOTE

Ferroli

Cod. 3QE18333

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