

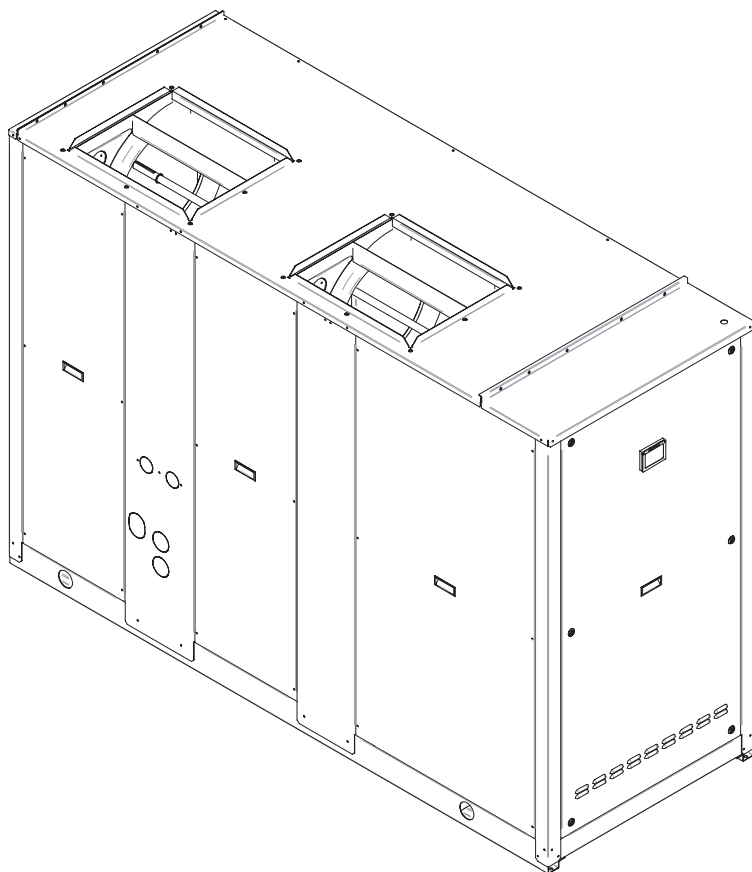


RGC

AIR COOLED WATER CHILLERS AND HEAT PUMPS
WITH CENTRIFUGAL FANS

53.5 ÷ 200 kW IN COOLING MODE

53.2 ÷ 202 kW IN HEATING MODE



FERROLÌ adheres to the
EUROVENT certification
programme.
The products concerned
appear in the products
guide to [www.eurovent-
certification.com](http://www.eurovent-
certification.com)



INSTALLATION AND OPERATION MANUAL

Dear Customer,

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



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 :

DK

“CE” OVERENSSTEMMELSESERKLÆRING

Underfegnede forsikrer under eget ansvar al den ovennævnte maskine er i overensstemmelse med vilkårene i direktiveme :

DE

“EG” KONFORMITÄT SERKLÄRUNG

Wir, die Unterzeichner dies er Erklärung, erklären unter unseren ausschließlichen Verantwortung, daß die genannte Maschine den Bestimmungen der folgenden EG-Richtlinien entspricht :

SE

FÖRSÄKRAN OM “CE” ÖVERENSSTÄMMELSE

Underfegnade försäkrar under eget ansvar alt ovannämnda maskinskinen er i overensstemmelse med vilkårene i direktivene :

FR

DECLARATION “CE” DE CONFORMITE

Nous soussignés déclarons, sous notre entière responsabilité, que la machine en objet est conforme aux prescriptions des Directives :

NO

BEKREFTELSE OM ÆCEØ OVERENSSTEMMELSE

Underfegnede forsikrer under eget ansvar al den ovennævnte maskinen er i overensstemmelse med vilkårene i direktivene :

IT

DICHIARAZIONE “CE” DI CONFORMITÀ

Noi sottoscritti dichiariamo, sotto la nostra responsabilità, che la macchina in questione è conforme alle prescrizioni delle Direttive :

FI

“CE” VAATIMUSTENMUKAISUUSVAKUUTUS

Allekirjoittaneet vakuutamme omalla vastuullamme että yllämainittu kone noudattaa ehtoja direktiiveissä :

ES

DECLARACION “CE” DE CONFORMIDAD

Quienes subscribimos la presente declaración, declaramos, bajo nuestra exclusiva responsabilidad, que la maquina en objeto respeta lo prescrito par las Directivas :

GR

ΔΗΛΩΣΗ ΣΥΜΒΑΤΟΤΗΤΑΣ “EE”

Εμετζ που υπογραφομε την παρουμεα, δηλωνουμε υπο την αποκλειστικη μας ευθυνη, οτι το μηχανημα συμμορφουται στα οα οα ορτζουν οι Οδηγιεα :

PT

DECLARAÇÃO “CE” DE CONFORMIDADE

Nós, signatários da presente, declaramos sob a nossa exclusiva responsabilidade, que a máquina em questão está em conformidade com as prescrições das Directivas :

HR

IZJAVA O “CE” SUGLASNOSTI

Mi niže potpisani izjavljujemo, pod našom odgovornošću, da ova Mašina odgovara zahtjevima iz Direktiva :

NL

“EG” CONFORMITEITSVERKLARING

Wij ondergetekenden verklaren hierbij op uitsluitend eigen verantwoording dat de bovengenoemde machine conform de voorschriften is van de Richtlijnen:

PL

DEKLARACJA ZGODNOŚCI “CE”

My niżej podpisani oświadczamy z pełną odpowiedzialnością, że niżej wymienione urządzenie w pełni odpowiada postanowieniom przyjętym w następujących Dyrektywach:

2006/42/EC
97/23/EC
2004/108/EC
2006/95/EC

Il legale rappresentante
Dante Ferrolì

TABLE OF CONTENTS

THIS MANUAL IS DIVIDED INTO SECTIONS. THEIR NAMES APPEAR IN THE HEADING OF EACH PAGE.

GENERAL SPECIFICATIONS	4	WEIGHT DURING OPERATION AND TRANSPORT	36
GENERAL SPECIFICATIONS	4	VIBRATION-DAMPER INSTALLATION	36
EUROPEAN DIRECTIVES	4	AREA OF SUPPORT	36
UNIT IDENTIFICATION PLATE	4	WEIGHT DURING OPERATION AND TRANSPORT	36
PRESENTATION OF THE UNIT	5	MOD. 50	37
IDENTIFICATION CODE OF THE UNIT	5	MOD. 60	37
DESCRIPTION OF THE COMPONENTS	6	MOD. 70	38
HYDRAULIC AND COOLING CIRCUIT COMPONENTS ..	8	MOD. 80	38
VERSION WITH DESUPERHEATER		MOD. 90	39
(AVAILABLE FOR BOTH IR UNITS AND IP UNITS)	9	MOD. 100	39
		MOD. 115	40
ACCESSORIES AND OPTIONAL EQUIPMENT	10	MOD. 130	40
MECHANICAL ACCESSORIES	10	MOD. 145	41
ELECTRICAL ACCESSORIES	12	MOD. 160	41
MECHANICAL OPTIONS	12	MOD. 180	42
ELECTRICAL OPTIONS	12	MOD. 200	42
ACCESSORIES - MODEL COMBINATIONS	13		
TECHNICAL SPECIFICATIONS AND STANDARD		RECEPTION AND POSITIONING	43
PERFORMANCES - IR COOLING UNIT ONLY	15	INSPECTIONS ON ARRIVA	43
TECHNICAL SPECIFICATIONS OF UNIT AB STANDARD		SAFETY PRESCRIPTIONS	43
UNIT / AB STANDARD UNIT + KS SILENCER KIT	15	HANDLING	43
STANDARD PERFORMANCES AB STANDARD UNIT		STORAGE	43
/ AB STANDARD UNIT + KS SILENCER KIT	16		
VERSION WITH DESUPERHEATER (VD)	18	ELECTRICAL CONNECTIONS	44
RECOVERED HEATING CAPACITY		GENERAL RULES	44
IN VERSION WITH DESUPERHEATER (VD)	18	STRUCTURE OF THE ELECTRIC PANEL	44
SPECIFIC DATA FOT BRINE VERSION (VI)	19	COMPOSITION OF THE SYSTEM	44
		ELECTRICAL CONNECTIONS	44
TECHNICAL SPECIFICATIONS AND STANDARD			
PERFORMANCES - IP HEAT PUMP UNITS	20	WET CONNECTIONS	47
TECHNICAL SPECIFICATIONS OF UNIT AB STANDARD		GENERAL RULES	47
UNIT / AB STANDARD UNIT + KS SILENCER KIT	20	HYDRAULIC LAYOUT OF THE SYSTEM	47
STANDARD PERFORMANCES IN COOLING MODE AB	21	PRECAUTIONS FOR THE WINTER	47
STANDARD UNIT / AB STANDARD UNIT + KS SILENCER KIT		BASIC DIAGRAM STANDARD UNIT VB	
STANDARD PERFORMANCES IN HEATING MODE AB		[COLD WATER CIRCUIT]	48
STANDARD UNIT / AB STANDARD UNIT + KS SILENCER KIT		AIR VENT AND WATER DRAIN	48
VERSION WITH DESUPERHEATER (VD)	23	PLUMBING CONNECTION WITH VICTAULIC COUPLINGS	
RECOVERED HEATING CAPACITY		BASIC DIAGRAM FOR UNITS WITH DESUPERHEATER	
IN VERSION WITH DESUPERHEATER (VD)	24	[HOT WATER CIRCUIT]	49
		VALVE REGULATING DIAGRAM VALVE	49
NOISE LEVELS	25	REFRIGERANT FLOW DIAGRAM BASIC VERSION	
STANDARD AB VERSION	25	IN COOLING MODE IR	51
AB VERSION + LOW NOISE KIT KS	25	REFRIGERANT FLOW DIAGRAM BASIC VERSION	
		IN HEATING MODE IP	52
OPERATING RANG	26		
OPERATING RANGE	26	ADJUSTMENT AND CONTROL	53
		CONTROL SYSTEM	53
WATER PRESSURE DROP PLATE HEAT EXCHANGER ...	27	MENU STRUCTURE	55
		INPUTS AND OUTPUTS	58
WATER PRESSURE DROP OF THE DESUPERHEATER ...	28	CONTROLLER TECHNICAL DATA	59
		ALARMS	60
WORKING HEAD OF THE		FUNCTIONS AVAILABLE FOR THE USER	62
PUMPING MODULE MP-AM AND MP-SS	29	PROBE CHARACTERISTICS	64
		SERIAL COMMUNICATION	65
WORKING HEAD OF THE		SETTING AT WORK	67
PUMPING MODULE MP-AM AP AND MP-SS AP	30	GENERAL RULES	67
MAXIMUM VOLUME OF WATER	31		
MAXIMUM WATER VOLUME OF THE SYSTEM		MAINTENACE	67
WITH HYDRONIC KIT	31	MAINTENACE	67
		VENTILATING UNIT MAINTENANCE	68
VENTILATION UNIT CALIBRATION	32		
		SAFETY AND PULLON	69
DIMENSIONAL DATA	33	GENERAL CONSIDERATIONS	69
OVERALL DIMENSIONS	33	REFRIGERANT SAFETY CARD	70
DESCRIPTION OF THE COMPONENTS	34	FIRST AID	71
POSITION OF CONDENSATE DRAIN	34		
MINIMUM OPERATIVE SPACE	34		
CONFIGURATIONS FOR CHANNEL INSTALLATION	35		

GENERAL SPECIFICATIONS

General specifications

This manual and the wiring diagram supplied with the unit must be kept in a dry place for possible future consultation. The manual provides information on installation and correct use and maintenance of the unit. **Before carrying out installation, please carefully read all the information contained in this manual, which describes the procedures necessary for correct installation and use of the unit.**

Carefully follow the instructions contained in this manual and comply with the current safety regulations. The unit must be installed in conformity with the laws in force in the country of use. Unauthorised tampering with the electrical and mechanical equipment **INVALIDATES THE WARRANTY**.

Check the electrical specifications given on the dataplate before making the electrical connections. Read the instructions given in the specific section on electrical connections.

Deactivate the equipment in case of a fault or poor operation.

If the unit requires repairs, only contact a specialised service centre recognised by the manufacturer and use original replacement parts.

The unit must be installed outside and connected to a hydronic cooling and/or heating system. Any use different from that permitted or outside the operating limits given in this manual is prohibited (unless previously agreed on with the firm).

The manufacturer declines any liability for damage or injury due to non-compliance with the information given in this manual.

European Directives

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

- Machinery directive **2006/42/EC**
- Pressurised equipment directive (PED) **97/23/EC**
- Electromagnetic compatibility directive (EMC) **2004/108/EC**
- Low voltage directive (LVD) **2006/95/EC**

Unit identification plate

The figure on the left illustrates the identification plate of the unit:

Basic versions

- A** - Trademark
- B** - Model
- C** - Serial number
- D** - Cooling Capacity
- E** - Heating Capacity

- F** - Power input in COOLING mode

- G** - Power input in HEATING mode
- H** - Reference standard
- I** - Electric power supply
- L** - Maximum current absorption
- M** - Type of refrigerant and weight of charge
- N** - Shipping weight of the unit
- O** - Sound pressure
- P** - IP Level Protection
- Q** - Maximum pressure - High Side
- R** - Maximum pressure - Low Side
- S** - PED certification authority

Special versions

- A** - Trademark
- B** - Model
- C** - Serial number
- D** - Useful cooling output (same as Standard Version of the unit)
- E** - Useful heating output
- F** - Electric power draw in the COOLING mode (same as Standard version of the unit)
- G** - Electric power draw in the HEATING mode
- H** - Reference standard
- I** - Electric power supply
- L** - Maximum electric current requirement
- M** - Type of refrigerant and weight of charge
- N** - Shipping weight of the unit
- O** - Acoustic pressure
- P** - IP Protection degree
- Q** - Maximum pressure on top side
- R** - Maximum pressure on bottom side
- S** - PED certification authority

NOTE: The identification plate of the Brine Version (VI) is filled out as shown in the diagram for the Basic Version of the unit (VB).

A											
Modello Model	B										
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Rif. norma Standard	H										
Alimentazione Power supply											
	I V / Ph / Hz										
Corrente max Max current	L A										
Refrigerante Refrigerant	M kg M										
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Grado di protezione Level protection	P										
Pressione max Max pressure	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">Lato Alta High Side</td> <td style="width: 50%; text-align: center;">Lato Bassa Low Side</td> </tr> <tr> <td style="text-align: center;">Q MPa</td> <td style="text-align: center;">R</td> </tr> </table>	Lato Alta High Side	Lato Bassa Low Side	Q MPa	R						
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GENERAL SPECIFICATIONS

Presentation of the unit

This new series of industrial chillers and heat pumps has been designed to meet the demands of global markets in the small-medium power industrial and commercial plants. Units are compact and highly configurable, built to fit different types of plants so to meet the needs of highly qualified engineers.

Units are water chillers and heat pumps air condensed with centrifugal fans suitable for outdoor and indoor installation: the structure and panels are robust, made of galvanized and painted steel; all fasteners are made of stainless steel or galvanized steel, the frame containing the electrical equipment and all the components exposed to weather have a minimum **IP54** degree of protection.

This series is composed of 12 models divided in four sizes with nominal cooling capacity from **53.5 to 200 kW** and heating capacity from **53.2 to 202 kW**.

The units product cold water from 5 to 20°C (in summer) and hot water from 30 to 53°C (in winter) and they can be equipped with continuous adjustment of centrifugal fans speed in order to allow the units to operate both with low outdoor temperature in cooling mode and with high outdoor temperature in heating mode as well as to reduce noise emissions (IMV accessory).

All the units are equipped with 2 scroll compressors arranged in pairs (tandem) on 1 circuit operating with **environmental friendly R410A** gas, brazed plate heat exchanger completely insulated and protected by water side with a differential pressure control and with an antifreeze electrical heater, coil heat exchanger made of louver aluminum fins and copper tubes, double inlet centrifugal fans with forward curved blades and transmission with belts and pulleys by a thermal protected motor, on-board electrical control panel equipped with control system to manage the main functions.

Hydronic group (MP) composed of fittings and connections is available as an accessory with 1 or 2 pumps and also with high available head pumps; the accessory Water Storage Tank (SAA) is completely insulated and available on delivery side or for primary-secondary hydraulic circuit (Victaulic connections already in place) depending on the kind of plants to serve.

A variety of other accessories are available to extend the capabilities of the units.

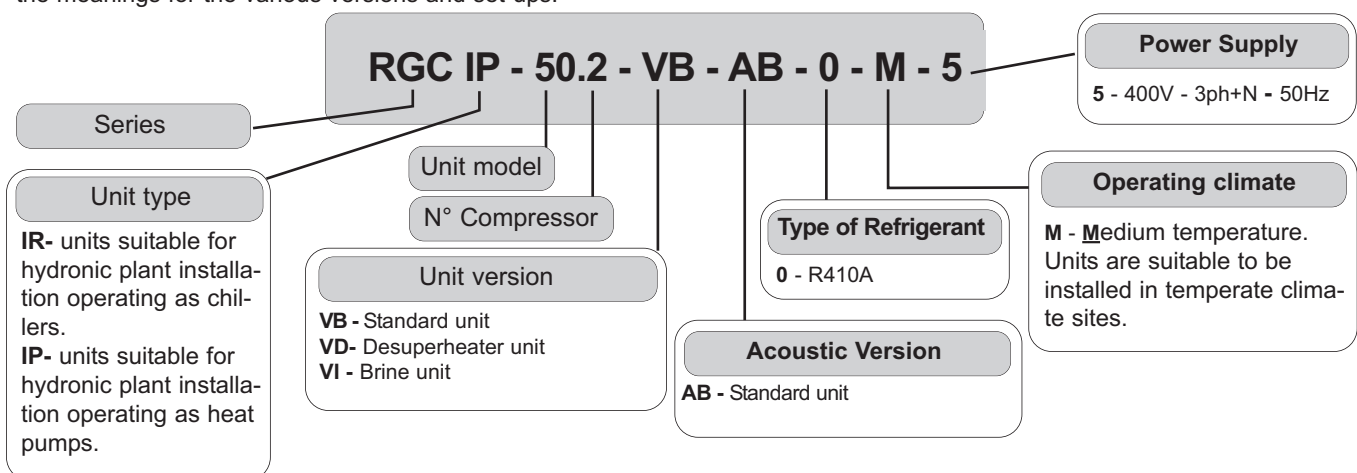
During the design of the units particular attention has been given to achieve high system efficiency, to reduce overall energy consumptions and sound levels in order to meet the increasingly restrictive laws in terms of noise. Upon request, you can choose for a Standard Unit (AB) or a Low Noise Kit (KS) which provides sound attenuation thanks to sound absorbing insulation in compressors area and sound jackets on compressors.

All units are accurately build in compliance with the existing standards and are individually tested in factory. Only electrical and hydraulic connections are required for installation.



Identification code of the unit

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



The available special versions are described below:

VB: Basic version.

VD: Version with Desuperheater (available for both IR units and IP units)

Produces cold water in the same way as the standard version plus hot water **from 40 to 70°C** at the same time. This is achieved by installing a water-refrigerant gas heat exchanger between the compressor and coils in order to recover 15 to 20% of the heating capacity that would otherwise be dispersed in the air.

VI: Version that produces water at a low temperature (BRINE) (available for IR units only)

The unit can produce cold water with brine at a temperature of **-8 to 5°C**.

GENERAL SPECIFICATIONS

Description of the components

The complete series of industrial chillers and heat pumps for use in hydronic systems includes **12 constructional sizes** ranging from **53.5 to 200 kW** in the cooling mode and **from 53.2 to 202 kW** in the heating mode.

Main components:

1. Fans. It is composed of single and/or twin dual-intake centrifugal fans with forwards blades curved, balanced both statically and dynamically in compliance with ISO 1940 class 6.3 standards. The screw conveyor, rotor and frame are made of galvanized plate, while the shaft is made of C40 steel. The fan is coupled via belt and pulley to a 4-pole, three-phase, asynchronous motor secured on a special tightener slide, with protection class IP55, insulation class F and suitable for continuous service (S1) with sufficient thermal margin in the event of overloads of limited duration. The pulley fitted on the motor has a variable diameter and, within certain limits, enables adjusting the speed of rotation of the fan in order to obtain the desired air flow rate and useful static head.

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

2a. The power section includes:

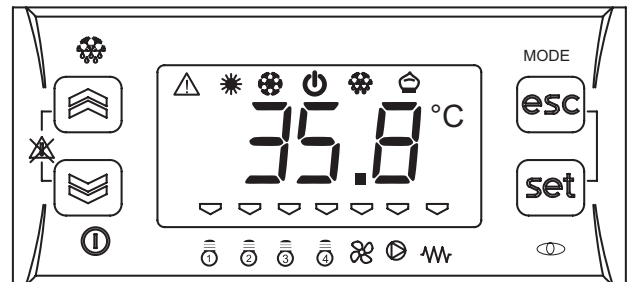
- Main door-locking circuit-breaker.
- Fuse-holder that can be isolated with protection fuse triad for each compressor.
- Fuse-holder that can be isolated with protection fuse for compressor oil heaters and antifreeze (if installed).
- Control contactor for each compressor.
- Protection fuse for the ventilation unit.
- Fan speed regulating board.
- Contactor and magnetothermic switch to protect the pump (if the Hydronic Kit accessory is installed).
- Pump contactor (if the Hydronic Kit accessory is installed).
- Phase presence and sequence monitoring device on power supply

2b. The auxiliary section includes:

- Fuses on the auxiliary transformer.
- Fuses for fans protection
- Electromagnetic noise filter
- Adjusting fan speed board
- Insulating and safety transformer to power the auxiliary circuit.

2c. The microprocessor monitoring section includes:

- User interfacing terminal with display.
- On-off key.
- Operating mode selector key.
- Compressor on-off display **LED**.
- Operational mode **LED**
- Antifreeze heaters activated indicator **LED**.
- Fans on-off display **LED**
- Pumps on-off display **LED**
- Check-control with fault code display
- Defrosting, alarm, economy, stand-by **LED**.
- **Remote ON/OFF functions** - Summer/Winter (E/I) remote selection (IP unit only).



Control system main functions: temperature control of the water produced by the unit, smart defrosting control, compressor and pump operating hour counter, timing and cycling of start-ups, input parameters by keyboard, alarms management, operating mode change (only IP unit), dynamic set-point (climatic control), "Adaptive" function for better temperature control for unit without storage tank.

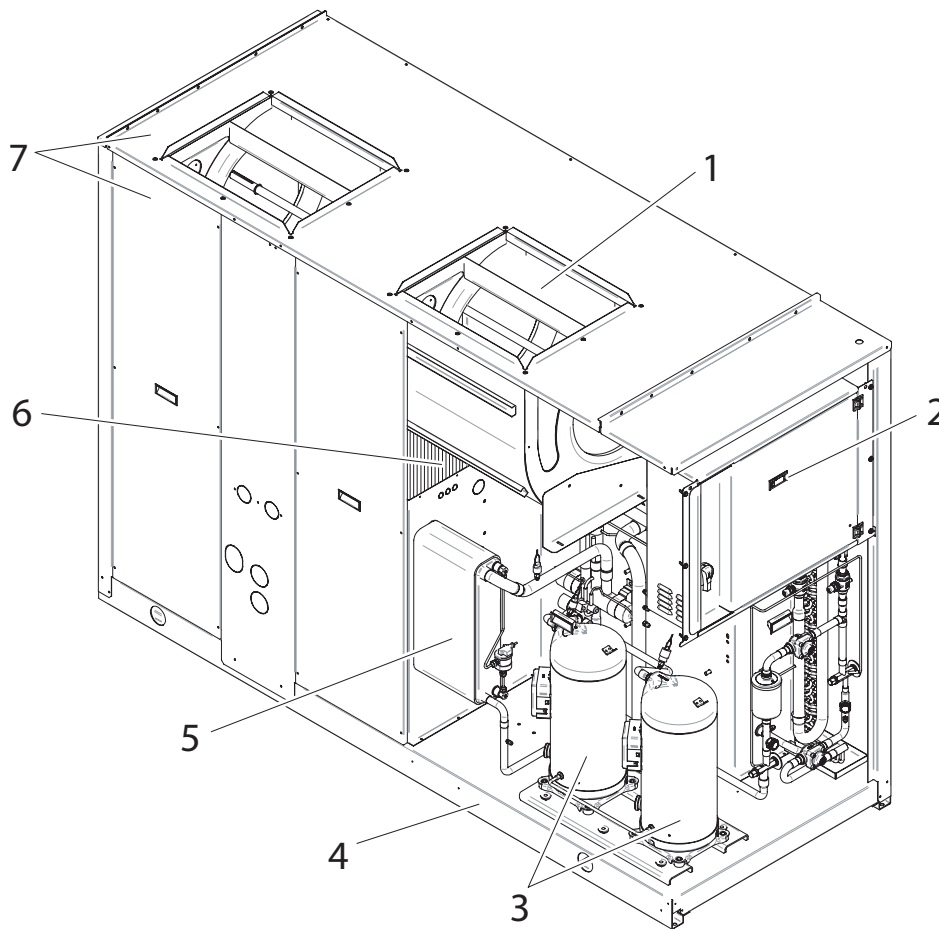
Digital input functions: low pressure, high pressure, high temperature on compressor supply, phase presence and sequence monitoring device on power supply, differential water pressure control, compressors thermal protection, fans thermal protection, pumps thermal protection (only if installed MP accessory), remote ON/OFF and remote operating mode change (only IP unit).

Digital output functions: compressor start-up, pump start-up (only with MP accessory), plate heat exchanger electrical heater, remote general alarm, 4-way valve (only IP unit).

Analogic input functions: in and out water temperature, coil temperature probe, external air temperature probe (if present).

Analogic output functions: continuous adjustment of centrifugal fans rotating speed by inverter (only if installed IMV accessory).

GENERAL SPECIFICATIONS



3. Compressors. They are the **SCROLL** type with orbiting coil equipped with built-in thermal protection and oil heater. The KS kit includes: a soundproofing jacket for the compressors and acoustic cladding for the entire compressor compartment to reduce the noise level. All units are equipped with two compressors connected in parallel (1 single cooling circuit) which can operate at the same time (**100% cooling power**) or individually (**50% of the cooling power**), thus adapting to the different thermal loads of the system supplied.

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

5. Evaporator made of brazed stainless steel plates (**AISI 316**). It is installed in a shell of heat-insulating material to prevent the formation of condensation and heat exchanges towards the outside. Standard supply also includes antifreeze heater a differential pressure switch on the water circuit to avoid the risk of freezing if the water flow is shut off for some reason.

6. Condensing coils, the aluminium finned pack type with shaped profile to increase the heat exchange coefficient and with copper pipes arranged in staggered rows. A sub-cooling section is integrated into the lower part.

7. Covering panels, made of galvanized sheet metal coated with polyurethane powder paint to ensure maximum protection against adverse weather conditions

8. One-way valves (IP unit only), allowing the coolant to pass into the appropriate exchangers, depending on the operating cycle.

4-way cycle reversal valve (IP unit only), reverses the flow direction of the coolant as the summer/winter operating mode is changed.

GENERAL SPECIFICATIONS

Hydraulic and cooling circuit components

10. Drain Pan Kit (standard for IP version). Provides a pan under the coil to drain the condensing water, fitted with 1/2" outlet connection positioned opposite the electric control panel.

11. Fluid cock. Ball type, this allows the gas flow on the fluid line to be turned on and off. Along with the cock on the compressor delivery, it allows the components of the fluid line to be subjected to extraordinary maintenance work and the compressors to be replaced if necessary (without discharging the coolant from the unit).

12. Compressor delivery cock. Ball type, allows the gas delivered to the compressors to be turned on and off.

13. Dehydrator filter. Mechanical type. Retains impurities and traces of moisture in the circuit. **Hermetic type** for models **50÷80**; **cartridge type** for models **90÷160**.

14. Fluid and humidity indicator. Signals when fluid passes through the circuit, indicating that the coolant charge is correct. The fluid indicator light also indicates the amount of moisture in the coolant by changing colour.

15. Low pressure switch (N°1 of series IR version, N°2 of series IP version). With fixed setting. It is installed on the suction pipe and blocks the compressors if the operating pressures drop below the tolerated values. Automatically resets as the pressure increases. If it activates frequently, the unit will block and can only be restarted by resetting via the user interface terminal.

16. High pressure switch (n°2). With fixed setting. Are installed on the delivery pipe and blocks the compressors if the operating pressures exceed the tolerated values. If it activates, the unit will block and can only be restarted by resetting via the user interface terminal.

17. Thermostatic valve. With external equalizer, this supplies the evaporator correctly, keeping the selected overheating degree at a steady level.

18. Water differential pressure switch. This is standard supply and is installed on the connections between the water inlet and outlet of the exchanger. It stops the unit if it activates.

19. Pressure taps: 1/4 " SAE (7/16" UNF) type with flow regulator. Allow the operating pressure of the system to be measured: compressor delivery, lamination component inlet, compressor intake.

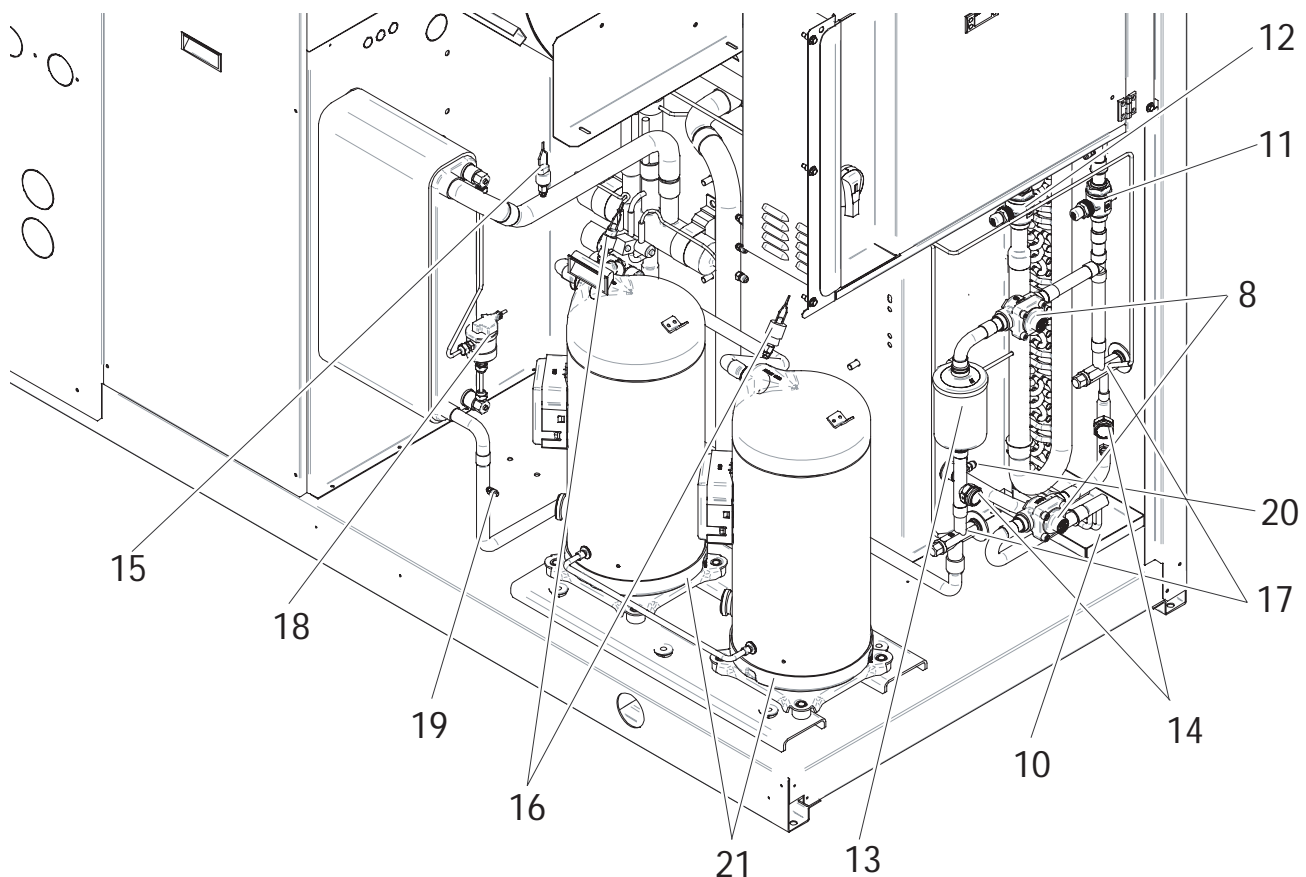
20. Pressure taps: 5/16 " SAE type with flow regulator. Allow the charge/discharge of the gas from the system, precisely from compressor outlet an expansion valve inlet.

21. Electrical heating elements to heat the compressor oil. "Belt" type. These activate when the compressor turns off and keep the temperature of the oil sufficiently high so as to prevent coolant from migrating during these pauses.

Safety valve. Installed on the delivery pipe of the compressors, this operates if extreme faults should occur in the plant.

Fluid receiver (IP unit only), this is a plenum tank that accounts for variations to the coolant charge the machine must supply as the summer/winter operating mode varies.

Fluid separator (IP unit only), on the compressor intake to protect against possible fluid back-flows.

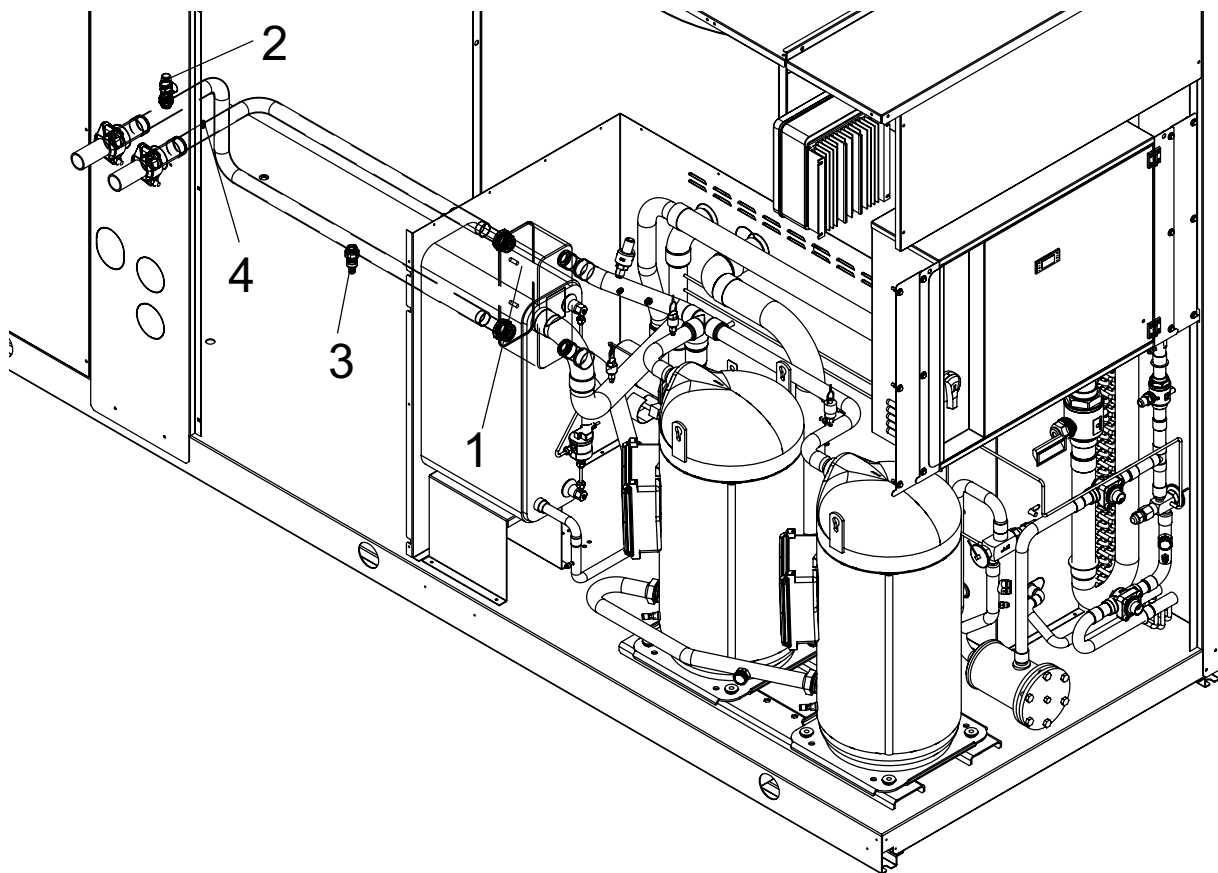


GENERAL SPECIFICATIONS

Version with Desuperheater VD (available for both IR units and IP units)

Hydraulic and chilling circuit components:

- 1. Desuperheater.** Specially designed for the specific version. Plate type, made of stainless steel (AISI 316). It is installed within a shell of thermal barrier insulating material to prevent heat exchanges towards the outside. Standard supply also includes an electric antifreeze heater to prevent the parts from freezing during the winter, when the system remains at a standstill (if not drained).
- 2. Water safety valve.** On the heat recovery inlet pipe. It acts whenever faulty service leads to an operating pressure in the plumbing system that exceeds the valve opening value (Fig.1).
- 3. Water drain cock** for emptying the exchangers and pipes of the machine dedicated to heat recovery (Fig. 1).
- 4. Air vent.** Accessed by removing the front panels. It consists of a manually operated valve installed in the highest part of the water pipes. To use in conjunction with the water drain cocks situated in the rear part of the unit, for emptying the exchangers and pipes dedicated to heat recovery.



ACCESSORIES AND OPTIONAL EQUIPMENT

Mechanical options

AVG - Rubber vibration dampers. Consisting of 4/6 rubber vibration dampers to fit under the unit. Reduce the extent to which the mechanical vibrations created by the compressors and fans during normal operation are transmitted to the bearing surface of the machine. The insulating degree of the vibration dampers is about 85%.

GM - Pressure gauge unit. Consisting of 2 pressure gauges that display the pressure values of the refrigerating fluid on the compressor suction and delivery sides.

GP - Protective grilles. These are metal grilles installed to protect the finned banks.

SAA - Water storage tank. Made of adequately thick painted sheet metal, this reduces the number of compressor start-ups and fluctuations in the temperature of the water conveyed to the users. It is insulated with thermal barrier material to prevent the formation of condensation and heat exchanges towards the outside.

Water storage tank. It consists of:

Water draining. On-off action by means of a cock that can be accessed by removing the rear panel, positioned on the side of the unit opposite to the electric panel.

Air vent. Accessed by removing the rear panel positioned on the side of the unit opposite to the electric panel. It consists of a manually operated valve installed on the highest part of the wet pipes.

Water safety valve, on the rear part of the tank. It acts whenever faulty service leads to an operating pressure in the hydraulic circuit that exceeds the valve opening value.

Antifreeze heater connection. 1"1/4 female threaded connection pre-engineered for installation of the antifreeze heater (RAG accessory).

KS- Low noise kit (M). Provides sound attenuation thanks to sound absorbing insulation in compressors area and sound jackets on compressors.

KB- KB- Drain Pan Kit (standard for IP version) (M). Provides a pan under the coil to drain the condensing water, fitted with 1/2" outlet connection positioned opposite the electric control panel.

KT - the following kits are available (this accessory is mandatory if the Hydronic Kit is not installed).

- **Basic pipe kit.** This accessory consists of steel pipes insulated with thermal barrier material and allows the water inlet/outlet to be connected straight inside the unit.

- **Complete pipe kit.** This accessory consists of steel pipes insulated with thermal barrier material and allows the water inlet/outlet connection to be routed to the machine.

- **Water storage tank pipe kit.** This accessory consists of steel pipes insulated with thermal barrier material and allows the water inlet/outlet connection to be routed to the machine.

NB: YOU CAN CHOOSE ONLY ONE KIT.

• **MP. Hydronic Kit (M).** Consists of:

1 On-off ball valves. Turn components such as the water filter, surge chamber and pump on and off when they require routine or extraordinary maintenance.

2 Metal gauze water filter. Can be turned on and off and inspected. It is installed on the pump delivery side. Prevents machining residues (dust, swarf, etc.) in the water pipes from entering the plate-type heat exchanger.

3 Hydraulic pump. Circulates water around the system. The pumps have a low/high head and suit the majority of installation requirements. The pumps are safeguarded by a magnetothermics installed in the chiller's electric panel.

4 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.

5 Water filling. Manual function with control positioned on the side of the unit opposite the electric panel and turned on and off by a cock that can be accessed by removing the rear panel.

6 Water pressure gauge. Connected to the water fill pipe. Displays the pressure of the water in the system.

7 Water safety valve.

8 Water outlet.

9 Air vent.

10 Antifreeze heater connection (RAG accessory).

MP. Hydronic Kit.

MP : Hydronic Kit with 1 o 2 Pumps: Besides the pumps, this accessory is equipped with all the hydraulic components (water filter, expansion tank, on-off valves, water pressure gauge, air vent, water outlet) required for complete installation and easy maintenance. Different water accumulation tank configurations are therefore available in combination with the Hydronic Kit accessory:

MP - AM: Accumulation on the Plant Delivery side (Standard)^(A): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 86 to 150 kPa (from 9 to 15 m.w.c.) for the circulating water.

MP - AM AP: Accumulation on the Plant Delivery side (High)^(B): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 198 to 255 kPa (from 20 to 25 m.w.c.) for the circulating water.

MP - PS: Accumulation pre-engineered for the primary and secondary circuit : The sole function of the pump is to circulate the water around the primary circuit: this circuit includes the accumulation tank and plate exchanger (chiller water circuit). The installer must mount the pumping section relative to the secondary circuit formed by the accumulation tank (with the pre-engineered wet connections) and the system served. No high working head version available.

MP-SS: Hydronic Kit without Water Storage Tank (Standard) ^(A). The pump draws water from the system, sends it to the plate heat exchanger and returns it to the system. During normal operating conditions, the pump in this configurations can provide a residue head from 86 to 150 kPa (from 9 to 15 m.w.c.).

MP-SS AP: Hydronic Kit without Water Storage Tank (High Working Head) ^(B). The pump draws water from the system, sends it to the plate heat exchanger and returns it to the system. During normal operating conditions, the pump in this configurations can provide a residue head from 198 to 255 kPa (from 20 to 25 m.w.c.).

(A): For the working head values depending on the water flow rate, consult the Standard Working Head MP-AM graph.

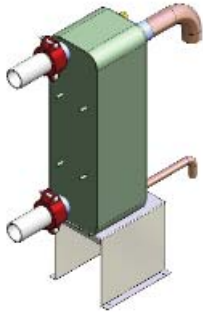
(B): For the working head values depending on the water flow rate, consult the High Working Head MP-AM graph.

NOTE: (M): Installed **(F):** To be installed by customers

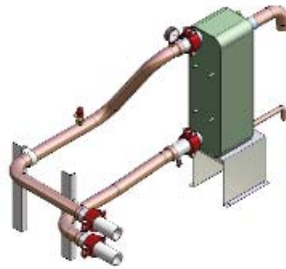
NOTE: It is essential to purchase the units with either the KT or MP accessory described previously. The choice of one automatically excludes the other.

ACCESSORIES AND OPTIONAL EQUIPMENT

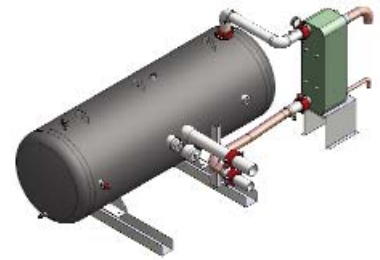
KT - BASIC PIPE KIT



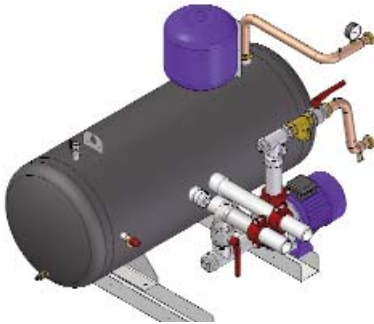
KT - COMPLETE PIPE KIT



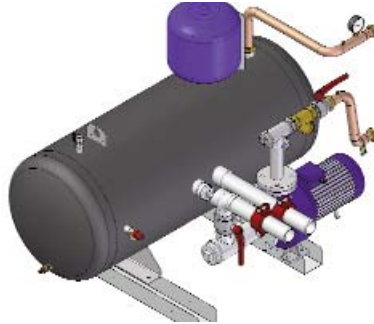
WATER STORAGE TANK PIPE KIT



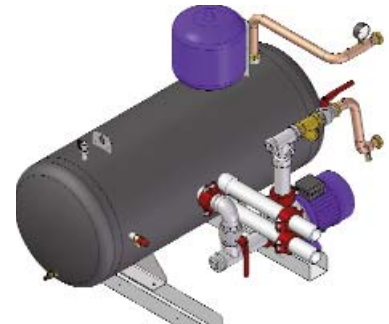
MP - 1P AM



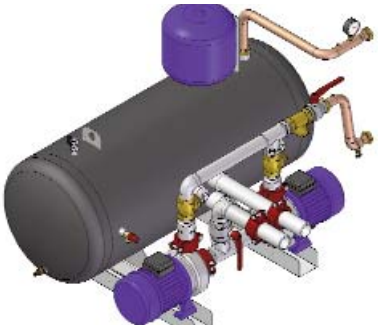
MP - 1P AM AP



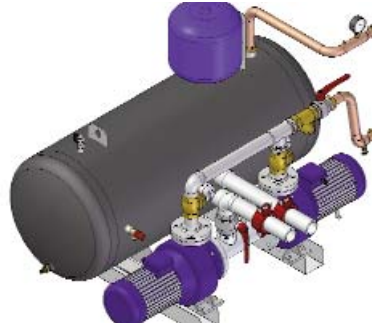
MP - 1P PS



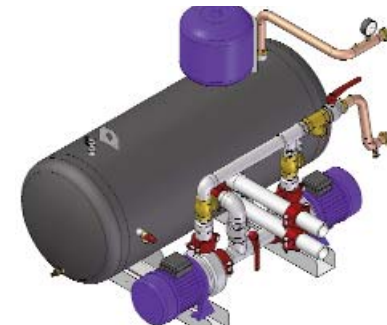
MP - 2P AM



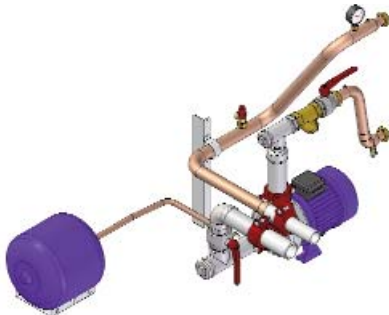
MP - 2P AM AP



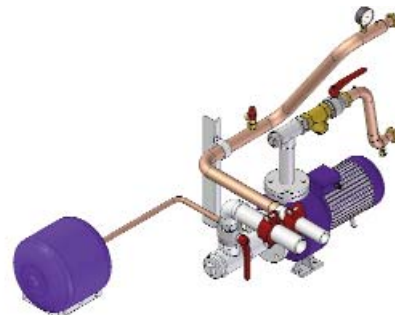
MP - 2P PS



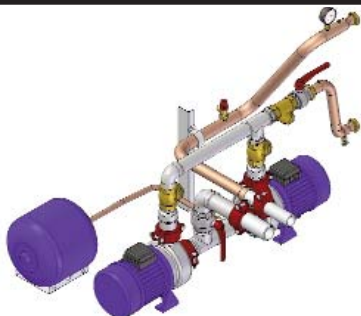
MP - 1P SS



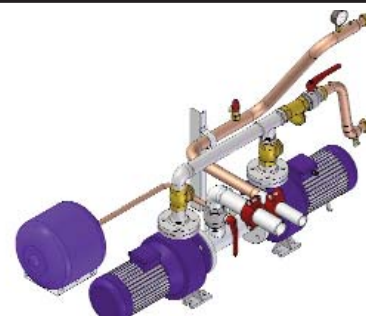
MP - 1P SS AP



MP - 2P SS



MP - 2P SS AP



ACCESSORIES AND OPTIONAL EQUIPMENT

Electrical options

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

The control unit has the following buttons:



MODE key : used to select the operating mode

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

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

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

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

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

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

TAT- High Temperature Thermostat (M). Two thermostats in series on compressors outlet pipes preserve operation not allowing temperature to rise up than a specified non adjustable value.

SND- External Air Probe (M). External air probe mounted near coil allows smart defrosting and climatic variation of setpoint

INT - Serial interface (F). Allows serial communication on RS485 by MODBUS protocol

IMV- Fan motor inverter(M). Adjusts continuously centrifugal fan speed in order to allow the units to operate both with low outdoor temperature in cooling mode and with high outdoor temperature in heating mode

NOTE: (M): Factory mounted **(F):** To be installed by customers

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

Other power source voltage rating (contact our technical department).

ACCESSORIES AND OPTIONAL EQUIPMENT

Accessories - Model Combinations

MODEL / ACCESSORY CODE			M / F	50	60	70	80	90	100	115	130	145	160	180	200	
Mechanical Accessories	Rubber vibration dampers	With Tank	AVG13	F	•	•	•	•								
			AVG15	F					•	•	•	•	•	•	•	•
		Without Tank	AVG12	F	•	•	•	•								
			AVG14	F						•	•	•	•	•	•	
			AVG16	F											•	•
	Gas pressure gauges		GM12	M	•	•	•	•	•	•	•	•	•	•	•	•
	Protective grilles		GP49	M	•	•	•	•								
			GP50	M					•	•						
			GP51	M							•	•	•	•		
			GP66	M											•	•
	Drain pan kit (1)		BCN3	M	•	•	•	•								
			BCN4	M					•	•	•	•	•	•		
			BCN12	M											•	•
	Low noise kit		KS5	M	•	•	•	•								
			KS6	M					•							
			KS7	M						•						
			KS8	M							•					
			KS9	M								•	•	•		
			KS15	M											•	•
	Basic pipe kit		KT30	M	•	•	•	•								
KT29			M					•	•	•	•	•	•	•	•	
Copmplete pipe kit		KT31	M	•	•	•	•									
		KT33	M					•	•	•	•	•	•			
		KT40	M											•	•	
Tank pipe kit		KT34	M	•	•	•	•									
		KT35	M					•	•	•	•	•	•			
		KT41	M											•	•	
Water storage tank		SAA29	M	•	•	•	•									
		SAA30	M					•	•	•	•	•	•			
		SAA39	M											•	•	

NOTE:

(M): factory mounted
(F): to be installed by customer
(1): standard for IP version

Table Continued on next page.

ACCESSORIES AND OPTIONAL EQUIPMENT

MODEL / ACCESSORY CODE				M / F	50	60	70	80	90	100	115	130	145	160	180	200			
Mechanical Accessories	Hydronic kit	With tank on delivery (Standard Head)	1 Pump	MP105	M	.	.	.	.						
				MP106	M					.	.	.	.		
				MP113	M									.	.				
				MP147	M											.	.		
			2 Pumps	MP122	M										
				MP124	M										
				MP133	M										.	.			
				MP152	M												.	.	
		With tank on delivery (High Head)	1 Pump	MP107	M										
				MP108	M					.	.								
				MP109	M										
				MP148	M												.	.	
			2 Pumps	MP125	M										
				MP126	M						.	.							
				MP127	M										
				MP153	M												.	.	
	With tank for primary - Secondary circuit	1 Pump	MP111	M	.	.	.	.							
			MP112	M					.	.	.	.			
			MP113	M									.	.					
			MP149	M												.	.		
		2 Pumps	MP128	M											
			MP129	M											
			MP130	M										.	.				
			MP154	M												.	.		
	Without tank (Standard Head)	1 Pump	MP117	M	.	.	.	.							
			MP118	M					.	.	.	.			
			MP131	M									.	.					
			MP150	M												.	.		
		2 Pumps	MP134	M											
			MP135	M											
			MP136	M										.	.				
			MP155	M												.	.		
Without tank (High Head)	1 Pump	MP119	M	.	.	.	.								
		MP120	M					.	.										
		MP121	M								.	.	.	.	
		MP151	M												.	.			
	2 Pumps	MP137	M	.	.	.	.								
		MP138	M						.	.									
		MP139	M								.	.	.	.	
		MP156	M												.	.			
Electrical Accessories	MODEL / ACCESSORY CODE			M / F	50	60	70	80	90	100	115	130	145	160	180	200			
	External air probe			SND3	M	.	.	.	.	.	.	.	.	.	.	.	.
	Programming clock kit			KOP1	F	.	.	.	.	.	.	.	.	.	.	.	.
	Storage tank electrical heater kit			RAG13	M	.	.	.	.	.	.	.	.	.	.	.	.
				RAG14	F	
	High temperature thermostat kit (2)			TAT8	M	.	.	.	.	.	.	.	.	.	.	.	.
	Remote control kit			CR6	F	.	.	.	.	.	.	.	.	.	.	.	.
	Serial interface kit			INT2	M	.	.	.	.	.	.	.	.	.	.	.	.
	Kit Inverter			VRT5	M	.	.	.	.						
				VRT6	M					.	.								
				VRT7	M								.	.					
				VRT8	M									

NOTE:

- (M): factory mounted
- (F): to be installed by customer
- (2): standard for VI version

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Technical specifications of unit AB Standard Unit / AB Standard Unit + KS Silencer kit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity ^{(1)(E)}	53,5	58,6	68,8	78,7	91,0	102	112	126	143	158	180	200	kW
Compressors power input ⁽¹⁾	16,3	18,5	20,9	25,6	28,2	31,6	35,5	40,5	46,0	51,0	56,0	62,8	kW
EER	3,28	3,17	3,29	3,07	3,23	3,22	3,15	3,11	3,11	3,10	3,21	3,18	-
Total power input ⁽¹⁾	21,8	24,0	26,4	31,1	34,4	37,8	44,5	49,5	62,5	67,5	78,0	84,8	kW
Total power input ^{(1)(E)}	17,8	20,0	22,5	27,3	30,6	34,1	37,9	42,9	53,9	59,2	66,5	73,7	kW
Total EER	3,01	2,93	3,06	2,88	2,97	2,98	2,96	2,94	2,65	2,67	2,71	2,71	-
ESEER ^(E)	4,15	4,04	4,22	3,98	4,10	4,11	4,08	4,05	3,66	3,68	3,74	3,74	-
Water flow rate ⁽¹⁾	2,56	2,80	3,29	3,76	4,35	4,85	5,35	6,02	6,83	7,55	8,60	9,56	l/s
Water pressure drops ^{(1)(E)}	42	51	48	40	40	40	40	39	39	39	58	57	kPa
Working head ^{(1)(MP)}	135	116	97	75	143	129	113	92	116	95	141	107	kPa

Compressor

Type	Scroll												/
Quantity	2												n°
Load steps	0-50-100												%
Oil charge CP1	3,25	3,25	3,25	3,25	3,25	4,7	4,7	6,8	6,8	6,3	6,3	6,3	l
Oil charge CP2	3,25	3,25	3,25	3,25	4,7	4,7	6,8	6,8	6,3	6,3	6,3	6,3	l

Heat Exchanger

Type	Brazen plates												/
Quantity	1												n°
Water volume	3,6	3,6	4,6	5,4	7,6	8,4	9,7	10,9	12,6	14,5	11,1	13,0	l

Fan

Type	Centrifugal												-	
Quantity	1			2			3			4			n°	
Total air flow rate	29050	29050	28100	27680	41460	40100	47440	47440	62190	59820	82920	79760	m³/h	
Working head NOM/MAX (3)	50 /150												rpm	
Power input	5,5			6,2			9			16,5			22	kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38			4,72			5,90			7,41			m²

Water Storage Tank (SAA accessory)

Water volume	200			400			460						l
Safety valve setting	600												kPa
Surge chamber volume	12						24						l
Surge chamber default pressure	150												kPa
Max. operating pressure	1000						800						kPa

Electrical Data

Units without pumping module

Total maximum power input [FLA]	52,7	55,3	62,8	73,1	80,6	86,1	101	109	138	152	178	193	A
Total maximum power input [FLI]	30,3	32,5	35,9	40,3	47,1	52,7	60,9	65,6	82,7	91,5	108	119	kW
Total maximum starting current [MIC]	150	151	177	215	269	275	328	336	389	403	498	513	A

Units with pumping module MP-AM and MP-PS (1 or 2 pumps)

Total maximum power input [FLA]	55,9	58,5	66,0	76,3	85,4	90,9	106	114	144	158	186	201	A
Total maximum power input [FLI]	32,1	34,3	37,7	42,1	50,0	55,6	63,8	68,5	85,9	94,7	113	124	kW
Total maximum starting current [MIC]	153	155	180	218	274	279	333	341	394	409	507	521	A

Units with pumping module MP-AM AP (1 or 2 pumps)

Total maximum power input [FLA]	58,9	61,6	69,0	79,3	86,8	92,4	109	117	146	161	189	204	A
Total maximum power input [FLI]	34,1	36,3	39,7	44,1	50,8	56,5	65,6	70,3	87,5	96,3	115	126	kW
Total maximum starting current [MIC]	156	158	183	221	275	281	336	345	397	411	509	524	A

Data referred to standard operating condition.

(1): water temperature: in 12°C - out 7°C air temperature: in 35°C d.b.

(2): water temperature: in 40°C - out 45°C air temperature: in 7°C d.b. 87% RH

(3): Adjustable changing the diameter of the motors pulley

(MP): with standard hydronic kit MP-AM and MP-SS

(SAA): with storage tank

(E): data declared according to LCP EUROVENT certification program, Total power input is corrected of external available static pressure as defined in UNI EN 14511:2008

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Standard performances AB Standard unit / AB Standard Unit + KS Silencer kit

Mod. 50-100

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	5	61,1	11,4	57,0	13,2	53,9	14,5	50,6	16,0	47,1	17,6	43,6	19,2	40,0	20,8
	6	62,8	11,5	58,6	13,3	55,4	14,6	52,0	16,1	48,4	17,8	44,8	19,4	41,1	21,0
	7	64,6	11,7	60,3	13,4	57,0	14,8	53,5	16,3	49,8	18,0	46,1	19,6	42,3	21,2
	8	66,4	11,8	62,0	13,6	58,6	14,9	55,0	16,5	51,2	18,2	47,4	19,8	-	-
	9	68,2	11,9	63,7	13,7	60,2	15,1	56,5	16,6	52,6	18,3	48,7	20,0	-	-
	10	70,1	12,0	65,4	13,8	61,8	15,2	58,0	16,8	54,0	18,5	50,0	20,2	-	-
	11	71,8	12,1	67,1	14,0	63,4	15,4	59,5	17,0	55,4	18,7	51,3	20,4	-	-
	12	73,8	12,3	68,9	14,1	65,1	15,5	61,1	17,1	56,9	18,9	52,7	20,6	-	-
60	5	66,9	13,0	62,4	14,9	59,0	16,5	55,4	18,1	51,5	20,0	47,7	21,8	43,9	23,6
	6	68,7	13,1	64,2	15,1	60,7	16,6	56,9	18,3	53,0	20,2	49,1	22,0	45,1	23,8
	7	70,7	13,2	66,0	15,2	62,4	16,8	58,6	18,5	54,5	20,4	50,5	22,2	46,4	24,0
	8	72,8	13,4	67,9	15,4	64,2	17,0	60,3	18,7	56,1	20,6	51,9	22,5	-	-
	9	74,8	13,5	69,8	15,6	66,0	17,1	61,9	18,9	57,6	20,8	53,4	22,7	-	-
	10	76,7	13,7	71,6	15,7	67,7	17,3	63,6	19,1	59,1	21,0	54,8	22,9	-	-
	11	78,7	13,8	73,5	15,9	69,5	17,5	65,2	19,3	60,7	21,2	56,2	23,2	-	-
	12	80,8	13,9	75,5	16,0	71,3	17,6	67,0	19,5	62,3	21,4	57,7	23,4	-	-
70	5	78,5	14,7	73,3	16,9	69,3	18,6	65,0	20,5	60,5	22,6	56,1	24,6	51,5	26,6
	6	80,7	14,8	75,3	17,0	71,2	18,8	66,9	20,7	62,2	22,8	57,6	24,9	52,9	26,9
	7	83,1	15,0	77,5	17,2	73,3	19,0	68,8	20,9	64,0	23,0	59,3	25,1	54,5	27,2
	8	85,4	15,1	79,7	17,4	75,4	19,2	70,7	21,1	65,8	23,3	61,0	25,4	-	-
	9	87,8	15,3	81,9	17,6	77,5	19,4	72,7	21,3	67,6	23,5	62,6	25,6	-	-
	10	90,1	15,4	84,1	17,7	79,5	19,5	74,6	21,6	69,4	23,8	64,3	25,9	-	-
	11	92,4	15,6	86,2	17,9	81,6	19,7	76,5	21,8	71,2	24,0	66,0	26,2	-	-
	12	94,9	15,7	88,6	18,1	83,8	19,9	78,6	22,0	73,1	24,2	67,7	26,4	-	-
80	5	89,8	18,0	83,9	20,7	79,3	22,8	74,4	25,1	69,2	27,7	64,1	30,2	58,9	32,6
	6	92,3	18,1	86,2	20,9	81,5	23,0	76,5	25,3	71,1	27,9	65,9	30,5	60,5	32,9
	7	95,0	18,3	88,7	21,1	83,9	23,2	78,7	25,6	73,2	28,2	67,8	30,8	62,3	33,3
	8	97,7	18,5	91,2	21,3	86,2	23,5	80,9	25,9	75,3	28,5	69,7	31,1	-	-
	9	100	18,7	93,7	21,5	88,6	23,7	83,2	26,1	77,4	28,8	71,7	31,4	-	-
	10	103	18,9	96,2	21,7	91,0	23,9	85,4	26,4	79,4	29,1	73,6	31,7	-	-
	11	106	19,1	98,7	21,9	93,3	24,2	87,5	26,7	81,5	29,4	75,4	32,0	-	-
	12	109	19,3	101	22,2	95,8	24,4	89,9	26,9	83,7	29,7	77,5	32,3	-	-
90	5	104	19,8	97,0	22,8	91,7	25,1	86,0	27,7	80,1	30,5	74,1	33,2	68,1	35,9
	6	107	20,0	100	23,0	94,2	25,3	88,4	27,9	82,3	30,8	76,2	33,5	70,0	36,3
	7	110	20,2	103	23,2	97,0	25,6	91,0	28,2	84,7	31,1	78,4	33,9	72,0	36,6
	8	113	20,4	105	23,5	100	25,9	93,6	28,5	87,1	31,4	80,6	34,3	-	-
	9	116	20,6	108	23,7	102	26,1	96,2	28,8	89,5	31,7	82,9	34,6	-	-
	10	119	20,8	111	23,9	105	26,4	98,7	29,1	91,8	32,1	85,1	34,9	-	-
	11	122	21,0	114	24,2	108	26,6	101	29,4	94,2	32,4	87,2	35,3	-	-
	12	126	21,2	117	24,4	111	26,9	104	29,7	96,7	32,7	89,6	35,6	-	-
100	5	116	22,2	109	25,5	103	28,1	96,4	31,0	89,7	34,2	83,1	37,2	76,3	40,3
	6	120	22,4	112	25,7	106	28,4	99,1	31,3	92,2	34,5	85,4	37,6	78,4	40,6
	7	123	22,6	115	26,0	109	28,7	102	31,6	94,9	34,8	87,9	38,0	80,7	41,1
	8	127	22,9	118	26,3	112	29,0	105	31,9	97,6	35,2	90,4	38,4	-	-
	9	130	23,1	121	26,6	115	29,3	108	32,3	100	35,6	92,9	38,8	-	-
	10	134	23,3	125	26,8	118	29,6	111	32,6	103	35,9	95,3	39,2	-	-
	11	137	23,5	128	27,1	121	29,8	113	32,9	106	36,3	97,8	39,5	-	-
	12	141	23,8	131	27,4	124	30,1	117	33,2	108	36,6	100	39,9	-	-

Tw= Outlet water temperature °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

The standard performances refer to a 5°C temperature difference between the water entering and leaving the plate-type heat exchanger and to operation of the unit with all fans at top speed. A $0.44 \times 10^{-4} \text{ m}^2 \text{ K/W}$ fouling factor has also been considered with the unit installed at zero meters above sea level (Pb = 1013mbar).

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Mod. 115-200

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	5	128	24,9	119	28,7	113	31,6	106	34,8	98,5	38,4	91,3	41,8	83,8	45,2
	6	131	25,1	123	28,9	116	31,9	109	35,1	101	38,7	93,8	42,2	86,1	45,7
	7	135	25,4	126	29,2	119	32,2	112	35,5	104	39,1	96,5	42,7	88,6	46,1
	8	139	25,7	130	29,5	123	32,6	115	35,9	107	39,6	99,2	43,1	-	-
	9	143	25,9	133	29,8	126	32,9	118	36,3	110	40,0	102	43,6	-	-
	10	147	26,2	137	30,1	129	33,2	121	36,6	113	40,4	105	44,0	-	-
	11	150	26,5	140	30,4	133	33,5	125	37,0	116	40,7	107	44,4	-	-
	12	154	26,7	144	30,7	136	33,9	128	37,3	119	41,1	110	44,9	-	-
130	5	144	28,4	134	32,7	127	36,0	119	39,7	111	43,8	103	47,7	94,3	51,6
	6	148	28,7	138	33,0	130	36,4	122	40,1	114	44,2	106	48,2	96,9	52,1
	7	152	29,0	142	33,3	134	36,7	126	40,5	117	44,6	109	48,7	100	52,6
	8	156	29,3	146	33,7	138	37,1	130	40,9	121	45,1	112	49,2	-	-
	9	161	29,6	150	34,0	142	37,5	133	41,4	124	45,6	115	49,7	-	-
	10	165	29,9	154	34,4	146	37,9	137	41,8	127	46,0	118	50,2	-	-
	11	169	30,2	158	34,7	149	38,3	140	42,2	130	46,5	121	50,7	-	-
	12	174	30,5	162	35,1	153	38,6	144	42,6	134	46,9	124	51,2	-	-
145	5	163	32,3	152	37,1	144	40,9	135	45,1	126	49,7	117	54,2	107	58,6
	6	168	32,6	157	37,5	148	41,3	139	45,5	129	50,2	120	54,7	110	59,2
	7	173	32,9	161	37,9	152	41,7	143	46,0	133	50,7	123	55,3	113	59,8
	8	178	33,3	166	38,3	157	42,2	147	46,5	137	51,3	127	55,9	-	-
	9	182	33,6	170	38,7	161	42,6	151	47,0	141	51,8	130	56,4	-	-
	10	187	33,9	175	39,1	165	43,0	155	47,4	144	52,3	134	57,0	-	-
	11	192	34,3	179	39,4	170	43,5	159	47,9	148	52,8	137	57,6	-	-
	12	197	34,6	184	39,8	174	43,9	163	48,4	152	53,3	141	58,1	-	-
160	5	180	35,8	168	41,2	159	45,4	149	50,0	139	55,1	129	60,1	118	65,0
	6	185	36,1	173	41,6	164	45,8	154	50,5	143	55,6	132	60,7	122	65,6
	7	191	36,5	178	42,0	168	46,3	158	51,0	147	56,2	136	61,3	125	66,3
	8	196	36,9	183	42,4	173	46,8	162	51,6	151	56,8	140	62,0	-	-
	9	202	37,3	188	42,9	178	47,2	167	52,1	155	57,4	144	62,6	-	-
	10	207	37,6	193	43,3	183	47,7	171	52,6	159	58,0	148	63,2	-	-
	11	212	38,0	198	43,7	187	48,2	176	53,1	164	58,5	151	63,8	-	-
	12	218	38,4	203	44,1	192	48,6	181	53,6	168	59,1	156	64,4	-	-
180	5	205	39,3	192	45,2	181	49,8	170	54,9	158	60,5	147	66,0	135	71,4
	6	211	39,7	197	45,6	186	50,3	175	55,4	163	61,1	151	66,6	138	72,0
	7	217	40,1	203	46,1	192	50,8	180	56,0	167	61,7	155	67,3	142	72,8
	8	223	40,5	209	46,6	197	51,4	185	56,6	172	62,4	160	68,0	-	-
	9	230	40,9	214	47,1	203	51,9	190	57,2	177	63,0	164	68,7	-	-
	10	236	41,3	220	47,5	208	52,4	195	57,8	182	63,7	168	69,4	-	-
	11	242	41,7	226	48,0	213	52,9	200	58,3	186	64,3	173	70,1	-	-
	12	248	42,1	232	48,5	219	53,4	206	58,9	191	64,9	177	70,8	-	-
200	5	228	44,1	213	50,7	202	55,9	189	61,6	176	67,9	163	74,0	150	80,0
	6	235	44,5	219	51,2	207	56,4	194	62,2	181	68,5	167	74,7	154	80,8
	7	241	44,9	225	51,7	213	57,0	200	62,8	186	69,2	172	75,5	158	81,6
	8	248	45,4	232	52,3	219	57,6	206	63,5	191	70,0	177	76,3	-	-
	9	255	45,9	238	52,8	225	58,2	211	64,1	197	70,7	182	77,1	-	-
	10	262	46,3	244	53,3	231	58,7	217	64,8	202	71,4	187	77,8	-	-
	11	269	46,8	251	53,8	237	59,3	222	65,4	207	72,1	192	78,6	-	-
	12	276	47,2	258	54,4	244	59,9	229	66,0	213	72,8	197	79,4	-	-

Tw= Outlet water temperature °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

The standard performances refer to a 5°C temperature difference between the water entering and leaving the plate-type heat exchanger and to operation of the unit with all fans at top speed. A 0.44×10^{-4} m² K/W fouling factor has also been considered with the unit installed at zero meters above sea level (Pb = 1013mbar).

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Version with Desuperheater (VD)

Recovery heat exchanger specifications

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM	
Type of recovery exchanger	PIASTRE INOX SALDOBRASATE													
Quantity	1												N°	
Max. operating pressure on wet side	600													kPa
Total water content of recovery exchangers	0,6			0,8			1,3			1,8			l	

Unit specification

Recovered heating capacity (1)	15,7	17,6	20,0	23,6	27,1	30,4	34,4	38,4	44,0	49,3	55,4	61,3	kW
Recovered water flow rate (1)	0,75	0,84	0,96	1,13	1,29	1,45	1,64	1,83	2,10	2,36	2,65	2,93	l/s
Recovered water pressure drop (1)	9	11	14	19	15	18	11	14	18	22	18	21	kPa

(1): The data refer to: Water temperature: evaporator inlet :12°C - evaporator outlet: 7°C, Outdoor air temperature 35°C.
The data refer to: Water temperature: recovery inlet :40°C - recovery outlet: 45°C.

Recovered heating capacity in Version with Desuperheater (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)					MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45			25	30	35	40	45
		kW _{tr} = RECOVERED HEATING CAPACITY [KW]							kW _{tr} = RECOVERED HEATING CAPACITY [KW]				
50	30	12,8	14,7	16,9	19,3	22,0	115	30	29,1	33,0	37,5	42,5	48,1
	35	12,9	14,8	17,0	19,4	22,1		35	28,9	32,8	37,3	42,3	47,8
	40	12,6	14,4	16,6	18,9	21,6		40	28,2	31,9	36,2	41,1	46,5
	45	11,9	13,7	15,7	17,9	20,5		45	26,7	30,3	34,4	39,0	44,1
	50	10,9	12,5	14,3	16,4	18,7		50	24,7	28,0	31,7	36,0	40,7
	55	9,5	10,9	12,5	14,3	16,3		55	21,9	24,9	28,3	32,0	36,2
	60	7,7	8,8	10,1	11,6	13,2		60	18,6	21,1	24,0	27,2	30,7
	65	5,5	6,4	7,3	8,4	9,5		65	14,6	16,6	18,8	21,4	24,2
70	3,0	3,5	4,0	4,6	5,2	70	10,0	11,4	12,9	14,6	16,5		
55	30	14,6	16,8	19,0	21,7	24,6	130	30	32,3	36,6	41,5	47,1	53,2
	35	14,6	16,8	19,0	21,7	24,6		35	32,3	36,6	41,5	47,1	53,2
	40	14,2	16,3	18,6	21,2	24,0		40	31,5	35,6	40,5	45,9	51,9
	45	13,5	15,5	17,6	20,1	22,8		45	29,8	33,8	38,4	43,5	49,2
	50	12,4	14,2	17,0	18,5	20,9		50	27,4	31,1	35,3	40,0	45,2
	55	10,9	12,5	15,0	16,3	18,4		55	24,2	27,4	31,1	35,2	39,9
	60	9,0	10,4	12,5	13,5	15,3		60	20,1	22,8	25,9	29,3	33,2
	65	6,8	7,9	9,4	10,2	11,6		65	15,2	17,3	19,6	22,2	25,1
70	4,3	4,9	5,9	6,4	7,2	70	9,6	10,8	12,3	14,0	15,8		
60	30	16,6	19,0	21,6	24,7	28,0	145	30	36,7	41,7	47,4	53,6	60,5
	35	16,6	19,0	21,6	24,7	28,0		35	36,8	41,8	47,5	53,8	60,6
	40	16,1	18,6	21,1	24,1	27,3		40	35,9	40,8	46,4	52,5	59,2
	45	15,3	17,6	20,0	22,8	25,9		45	34,1	38,7	44,0	49,8	56,2
	50	14,0	16,2	18,4	21,0	23,8		50	31,3	35,6	40,4	45,7	51,5
	55	12,4	14,2	16,2	18,5	20,9		55	27,5	31,3	35,5	40,2	45,4
	60	10,3	11,8	13,4	15,4	17,4		60	22,8	25,9	29,4	33,3	37,6
	65	7,8	8,9	10,2	11,6	13,1		65	17,1	19,5	22,1	25,0	28,2
70	4,8	5,6	6,3	7,2	8,2	70	10,5	11,9	13,5	15,3	17,3		
70	30	19,4	22,2	25,4	29,2	33,4	160	30	41,5	47,1	53,4	60,5	68,2
	35	19,4	22,3	25,5	29,3	33,6		35	41,4	47,1	53,3	60,4	68,1
	40	19,0	21,7	24,9	28,6	32,8		40	40,3	45,8	52,0	58,8	66,3
	45	18,0	20,6	23,6	27,1	31,1		45	38,3	43,5	49,3	55,8	62,9
	50	16,4	18,8	21,6	24,8	28,4		50	35,2	40,0	45,4	51,3	57,9
	55	14,4	16,5	18,9	21,7	24,8		55	31,2	35,4	40,1	45,4	51,2
	60	11,8	13,5	15,5	17,8	20,4		60	26,1	29,7	33,7	38,1	42,9
	65	8,6	9,9	11,3	13,0	14,9		65	20,1	22,8	25,9	29,3	33,0
70	5,0	5,7	6,5	7,5	8,6	70	13,1	14,8	16,8	19,0	21,5		
90	30	22,5	25,6	29,2	33,3	37,8	180	30	46,6	53,0	60,0	68,0	76,6
	35	22,6	25,7	29,3	33,4	38,0		35	46,5	52,9	59,9	67,8	76,5
	40	22,1	25,1	28,6	32,6	37,1		40	45,3	51,5	58,4	66,1	74,5
	45	20,9	23,8	27,1	30,9	35,1		45	43,0	48,9	55,4	62,7	70,7
	50	19,1	21,8	24,8	28,3	32,1		50	39,6	45,0	51,0	57,7	65,0
	55	16,7	19,1	21,7	24,7	28,1		55	35,0	39,8	45,1	51,1	57,6
	60	13,7	15,6	17,8	20,3	23,1		60	29,4	33,4	37,8	42,8	48,3
	65	10,1	11,5	13,1	14,9	17,0		65	22,6	25,7	29,1	32,9	37,1
70	5,9	6,7	7,6	8,7	9,9	70	14,7	16,7	18,9	21,4	24,1		
100	30	25,5	29,0	33,0	37,5	42,5	200	30	51,6	58,6	66,4	75,2	84,8
	35	25,3	28,8	32,8	37,3	42,2		35	51,5	58,5	66,3	75,1	84,6
	40	24,7	28,1	32,0	36,3	41,1		40	50,2	57,0	64,6	73,1	82,4
	45	23,5	26,7	30,4	34,5	39,1		45	47,6	54,1	61,3	69,4	78,2
	50	21,7	24,7	28,2	32,0	36,2		50	43,8	49,8	56,4	63,8	72,0
	55	19,5	22,1	25,2	28,6	32,4		55	38,8	44,0	49,9	56,5	63,7
	60	16,7	19,0	21,6	24,5	27,8		60	32,5	36,9	41,8	47,4	53,4
	65	13,4	15,2	17,3	19,6	22,2		65	25,0	28,4	32,2	36,4	41,1
70	9,5	10,8	12,3	14,0	15,8	70	16,2	18,5	20,9	23,7	26,7		

kW_{tr} = RECOVERED HEATING CAPACITY [KW]

Twr = Desuperheater outlet water temperature, Δtin-out= 5°C

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Specific data for Brine Version (VI)

Correction factors to apply to the basic version data

Brine percentage freezing point [°C]	20% Ethylene Glicol						
	-8						
Produced water temperature	4	2	0	-2	-4	-6	-8
Cooling capacity c.f.	0,912	0,855	0,798	0,738	0,683	-	-
Compressor power input c.f.	0,967	0,957	0,947	0,927	0,897	-	-
Water flow rate c.f.	0,984	0,899	0,821	0,750	0,685	0,620	0,561
Water pressure drop c.f.	1,289	1,071	0,890	0,740	0,615	0,490	0,390

Brine percentage freezing point [°C]	30% Ethylene Glicol						
	-14						
Produced water temperature	4	2	0	-2	-4	-6	-8
Cooling capacity c.f.	0,899	0,842	0,785	0,725	0,670	0,613	0,562
Compressor power input c.f.	0,960	0,950	0,940	0,920	0,890	0,870	0,840
Water flow rate c.f.	1,013	0,928	0,851	0,780	0,715	0,650	0,591
Water pressure drop c.f.	1,431	1,184	0,979	0,810	0,670	0,530	0,419

Brine percentage freezing point [°C]	40% Ethylene Glicol						
	-22						
Produced water temperature	4	2	0	-2	-4	-6	-8
Cooling capacity c.f.	0,884	0,827	0,770	0,710	0,655	0,598	0,547
Compressor power input c.f.	0,880	0,870	0,860	0,840	0,810	0,790	0,760
Water flow rate c.f.	1,062	0,970	0,887	0,810	0,740	0,670	0,607
Water pressure drop c.f.	1,542	1,279	1,061	0,880	0,730	0,580	0,461

A calculation example showing how the table is used is given below.

Consider unit **IR 160.2** in the Basic Version with:

- Cooling capacity of the Basic Version unit (VB): $P_{f_{VB}} = 158 \text{ kW}$
- Power input of the Compressors in the Basic Version unit (VB): $P_{ass_{CP,VB}} = 53.2 \text{ kW}$
- Water Flow Rate of the Basic Version unit (VB): $Q_{VB} = 7.55 \text{ l/s}$
- Water pressure drop of the Basic Version unit (VB): $\Delta p_{VB} = 39 \text{ kPa}$
- with 30% brine and -2°C temperature of the water produced

The corresponding values for the Brine Version are:

- Cooling capacity $P_{f_{VI}} = P_{f_{VB}} \times (0.725) = 115 \text{ kW}$
- Compressor power input $P_{ass_{CP,VI}} = P_{ass_{CP,VB}} \times (0.92) = 48.9 \text{ kW}$
- Water flow rate $Q_{VI} = Q_{VB} \times (0.78) = 5.89 \text{ l/s}$
- Water pressure drop $\Delta p_{VI} = \Delta p_{VB} \times (0.81) = 32 \text{ kPa}$

If you need to calculate the performances of the unit with outdoor air temp. different than 35°C, you have to use the values for $P_{f_{VB}}$ and $P_{ass_{CP,VB}}$ reported on the tables standard performances for the requisited air temp. and with water leaving temp=7°C.

With $P_{f_{VB}}$ calculate Q_{VB} and using the graph water pressure drop Basic Version you have Δp_{VB} . Then apply the corrective coefficients indicated on the tables for VI.

In case of other type of antifreezing fluid please contact our sales office.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Technical specifications of unit AB Standard Unit / AB Standard Unit + KS Silencer kit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity ^{(1)(E)}	52,9	57,5	67,2	74,1	89,2	99,0	110	122	138	154	178	198	kW
Compressors power input ⁽¹⁾	16,2	18,4	20,7	24,7	28,0	31,4	35,4	40,0	45,8	50,5	55,0	62,5	kW
EER	3,27	3,13	3,25	3,00	3,19	3,15	3,11	3,05	3,01	3,05	3,24	3,17	-
Total power input ⁽¹⁾	21,7	23,9	26,2	30,2	34,2	37,6	44,4	49,0	62,3	67,0	77,0	84,5	kW
Total power input ^{(1)(E)}	17,7	19,9	22,3	26,4	28,4	32,0	37,8	42,4	53,7	58,7	65,5	73,4	kW
Total EER	2,99	2,89	3,01	2,81	3,14	3,09	2,91	2,88	2,57	2,62	2,72	2,70	-
ESEER ^(E)	4,12	3,99	4,16	3,87	4,33	4,27	4,02	3,97	3,55	3,62	3,75	3,72	-
Water flow rate ⁽¹⁾	2,53	2,75	3,21	3,54	4,26	4,73	5,26	5,83	6,59	7,36	8,50	9,46	l/s
Water pressure drops ^{(1)(E)}	41	49	46	35	38	38	39	37	36	37	57	56	kPa
Working head ^{(1)(MP)}	138	120	102	85	149	136	117	98	125	100	144	109	kPa
Heating capacity ^{(2)(E)}	53,2	58,0	67,7	76,2	91,4	103	113	125	143	156	184	202	kW
Compressors power input ⁽²⁾	16,2	18,0	20,3	23,1	28,2	31,4	34,8	39,0	45,1	49,8	54,0	61,0	kW
COP	3,28	3,22	3,34	3,30	3,24	3,28	3,25	3,21	3,17	3,13	3,41	3,31	-
Total power input ⁽²⁾	21,7	23,5	25,8	28,6	34,4	37,6	43,8	48,0	61,6	66,3	76,0	83,0	kW
Total power input ^{(2)(E)}	17,7	19,5	21,9	24,8	28,6	32,0	37,2	41,4	53,0	58,0	64,5	71,9	kW
Total COP	3,01	2,97	3,09	3,07	3,20	3,22	3,04	3,02	2,70	2,69	2,85	2,81	-
Water flow rate ⁽²⁾	2,54	2,77	3,23	3,64	4,37	4,92	5,40	5,97	6,83	7,45	8,79	9,65	l/s
Water pressure drops ^{(2)(E)}	41	50	46	37	40	41	41	38	39	38	61	58	kPa
Working head ^{(2)(MP)}	137	119	101	80	142	125	111	94	116	98	135	105	kPa

Compressor

Type	Scroll												/
Quantity	2												n°
Load steps	0-50-100												%
Oil charge CP1	3,25	3,25	3,25	3,25	3,25	4,7	4,7	6,8	6,8	6,3	6,3	6,3	l
Oil charge CP2	3,25	3,25	3,25	3,25	4,7	4,7	6,8	6,8	6,3	6,3	6,3	6,3	l

Heat Exchanger

Type	Brazen plates												/
Quantity	1												n°
Water volume	3,6	3,6	4,6	5,4	7,6	8,4	9,7	10,9	12,6	14,5	11,1	13,0	l

Fan

Type	Centrifugal												-	
Quantity	1			2			3			4			n°	
Total air flow rate	29050	29050	28100	27680	41460	40100	47440	47440	62190	59820	82920	79760	m³/h	
Working head NOM/MAX (3)	50 / 150												rpm	
Power input	5,5			6,2			9			16,5			22	kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38			4,72			5,90			7,41			m²

Water Storage Tank (SAA accessory)

Water volume	200			400			460						l
Safety valve setting	600												kPa
Surge chamber volume	12			24									l
Surge chamber default pressure	150												kPa
Max. operating pressure	1000			800									kPa

Electrical Data

Units without pumping module

Total maximum power input [FLA]	52,7	55,3	62,8	73,1	80,6	86,1	101	109	138	152	178	193	A
Total maximum power input [FLI]	30,3	32,5	35,9	40,3	47,1	52,7	60,9	65,6	82,7	91,5	108	119	kW
Total maximum starting current [MIC]	150	151	177	215	269	275	328	336	389	403	498	513	A

Units with pumping module MP-AM and MP-PS (1 or 2 pumps)

Total maximum power input [FLA]	55,9	58,5	66,0	76,3	85,4	90,9	106	114	144	158	186	201	A
Total maximum power input [FLI]	32,1	34,3	37,7	42,1	50,0	55,6	63,8	68,5	85,9	94,7	113	124	kW
Total maximum starting current [MIC]	153	155	180	218	274	279	333	341	394	409	507	521	A

Units with pumping module MP-AM AP (1 or 2 pumps)

Total maximum power input [FLA]	58,9	61,6	69,0	79,3	86,8	92,4	109	117	146	161	189	204	A
Total maximum power input [FLI]	34,1	36,3	39,7	44,1	50,8	56,5	65,6	70,3	87,5	96,3	115	126	kW
Total maximum starting current [MIC]	156	158	183	221	275	281	336	345	397	411	509	524	A

Data referred to standard operating condition.

(1): water temperature: in 12°C - out 7°C air temperature: in 35°C d.b.

(2): water temperature: in 40°C - out 45°C air temperature: in 7°C d.b. 87% RH

(3): Adjustable changing the diameter of the motors pulley

(MP): with standard hydronic kit MP-AM and MP-SS

(SAA): with storage tank

(E): data declared according to LCP EUROVENT certification program, Total power input is corrected of external available static pressure as defined in UNI EN 14511:2008

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in cooling mode AB Standard Unit / AB Standard Unit + KS Silencer kit

Mod. 50-100

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	5	60,4	11,4	56,4	13,1	53,3	14,4	50,0	15,9	46,5	17,5	43,1	19,1	39,6	20,6
	6	62,1	11,5	57,9	13,2	54,8	14,5	51,4	16,0	47,8	17,7	44,3	19,3	40,7	20,8
	7	63,9	11,6	59,6	13,3	56,4	14,7	52,9	16,2	49,2	17,9	45,6	19,5	41,9	21,0
	8	65,7	11,7	61,3	13,5	58,0	14,9	54,4	16,4	50,6	18,1	46,9	19,7	-	-
	9	67,5	11,8	63,0	13,6	59,6	15,0	55,9	16,5	52,0	18,2	48,2	19,9	-	-
	10	69,3	12,0	64,7	13,8	61,1	15,2	57,4	16,7	53,4	18,4	49,4	20,1	-	-
	11	71,0	12,1	66,3	13,9	62,7	15,3	58,8	16,9	54,8	18,6	50,7	20,3	-	-
	12	73,0	12,2	68,1	14,0	64,4	15,5	60,4	17,0	56,2	18,8	52,1	20,5	-	-
60	5	65,6	12,9	61,3	14,9	57,9	16,4	54,4	18,0	50,6	19,9	46,8	21,7	43,0	23,4
	6	67,5	13,0	63,0	15,0	59,5	16,5	55,9	18,2	52,0	20,1	48,1	21,9	44,2	23,7
	7	69,4	13,2	64,8	15,1	61,3	16,7	57,5	18,4	53,5	20,3	49,5	22,1	45,5	23,9
	8	71,4	13,3	66,6	15,3	63,0	16,9	59,1	18,6	55,0	20,5	51,0	22,4	-	-
	9	73,4	13,4	68,5	15,5	64,7	17,0	60,8	18,8	56,5	20,7	52,4	22,6	-	-
	10	75,3	13,6	70,3	15,6	66,5	17,2	62,4	19,0	58,0	20,9	53,7	22,8	-	-
	11	77,2	13,7	72,1	15,8	68,2	17,4	64,0	19,2	59,5	21,1	55,1	23,0	-	-
	12	79,3	13,8	74,0	15,9	70,0	17,5	65,7	19,3	61,1	21,3	56,6	23,3	-	-
70	5	76,7	14,5	71,6	16,7	67,7	18,4	63,5	20,3	59,1	22,4	54,8	24,4	50,3	26,4
	6	78,8	14,7	73,6	16,9	69,6	18,6	65,3	20,5	60,8	22,6	56,3	24,6	51,7	26,6
	7	81,1	14,8	75,7	17,0	71,6	18,8	67,2	20,7	62,5	22,8	57,9	24,9	53,2	26,9
	8	83,4	15,0	77,9	17,2	73,6	19,0	69,1	20,9	64,3	23,1	59,5	25,1	-	-
	9	85,7	15,1	80,0	17,4	75,7	19,2	71,0	21,1	66,1	23,3	61,2	25,4	-	-
	10	88,0	15,3	82,1	17,6	77,7	19,4	72,9	21,3	67,8	23,5	62,8	25,7	-	-
	11	90,2	15,4	84,2	17,7	79,7	19,6	74,8	21,6	69,6	23,8	64,4	25,9	-	-
	12	92,7	15,6	86,5	17,9	81,8	19,7	76,8	21,8	71,4	24,0	66,2	26,2	-	-
80	5	84,6	17,3	79,0	19,9	74,7	22,0	70,1	24,2	65,2	26,7	60,4	29,1	55,5	31,5
	6	86,9	17,5	81,1	20,1	76,7	22,2	72,0	24,4	67,0	26,9	62,0	29,4	57,0	31,8
	7	89,5	17,7	83,5	20,3	79,0	22,4	74,1	24,7	68,9	27,2	63,9	29,7	58,7	32,1
	8	92,0	17,9	85,9	20,6	81,2	22,7	76,2	25,0	70,9	27,5	65,7	30,0	-	-
	9	94,5	18,0	88,2	20,8	83,4	22,9	78,3	25,2	72,8	27,8	67,5	30,3	-	-
	10	97,0	18,2	90,6	21,0	85,6	23,1	80,4	25,5	74,8	28,1	69,3	30,6	-	-
	11	100	18,4	92,9	21,2	87,8	23,3	82,4	25,7	76,7	28,4	71,0	30,9	-	-
	12	102	18,6	95,4	21,4	90,2	23,6	84,7	26,0	78,8	28,6	73,0	31,2	-	-
90	5	102	19,6	95,0	22,6	89,9	24,9	84,3	27,5	78,5	30,3	72,7	33,0	66,8	35,7
	6	105	19,8	97,7	22,8	92,4	25,1	86,7	27,7	80,6	30,5	74,7	33,3	68,6	36,0
	7	108	20,0	101	23,0	95,1	25,4	89,2	28,0	83,0	30,9	76,9	33,6	70,6	36,4
	8	111	20,3	103	23,3	97,7	25,7	91,7	28,3	85,3	31,2	79,0	34,0	-	-
	9	114	20,5	106	23,5	100	25,9	94,3	28,6	87,7	31,5	81,2	34,4	-	-
	10	117	20,7	109	23,8	103	26,2	96,8	28,9	90,0	31,8	83,4	34,7	-	-
	11	120	20,9	112	24,0	106	26,4	99,2	29,2	92,3	32,1	85,5	35,0	-	-
	12	123	21,1	115	24,2	109	26,7	102	29,4	94,8	32,5	87,8	35,4	-	-
100	5	113	22,0	105	25,3	100	27,9	93,6	30,8	87,1	33,9	80,7	37,0	74,1	40,0
	6	116	22,2	108	25,6	103	28,2	96,2	31,1	89,5	34,3	82,9	37,3	76,1	40,4
	7	120	22,5	112	25,8	105	28,5	99,0	31,4	92,1	34,6	85,3	37,7	78,4	40,8
	8	123	22,7	115	26,1	108	28,8	102	31,7	94,7	35,0	87,7	38,1	-	-
	9	126	22,9	118	26,4	111	29,1	105	32,1	97,3	35,3	90,1	38,5	-	-
	10	130	23,2	121	26,7	114	29,4	107	32,4	100	35,7	92,5	38,9	-	-
	11	133	23,4	124	26,9	117	29,7	110	32,7	102	36,0	94,9	39,3	-	-
	12	137	23,6	127	27,2	121	29,9	113	33,0	105	36,4	97,5	39,7	-	-

Tw= Outlet water temperature in °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

The standard performances refer to a 5°C temperature difference between the water entering and leaving the plate-type heat exchanger and to operation of the unit with all the fans to top speed. A 0.44 x 10⁻⁴ m² K/W fouling factor has also been considered with the unit installed at zero meters above sea level (Pb = 1013mbar).

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Mod. 115-200

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	5	126	24,8	117	28,6	111	31,5	104	34,7	96,8	38,3	89,6	41,7	82,3	45,1
	6	129	25,1	120	28,8	114	31,8	107	35,0	99,4	38,6	92,1	42,1	84,6	45,5
	7	133	25,3	124	29,1	117	32,1	110	35,4	102	39,0	94,8	42,5	87,1	46,0
	8	137	25,6	127	29,5	121	32,5	113	35,8	105	39,4	97,5	43,0	-	-
	9	140	25,9	131	29,8	124	32,8	116	36,1	108	39,8	100	43,4	-	-
	10	144	26,1	134	30,1	127	33,1	119	36,5	111	40,2	103	43,9	-	-
	11	148	26,4	138	30,3	130	33,4	122	36,9	114	40,6	105	44,3	-	-
	12	152	26,6	142	30,6	134	33,8	126	37,2	117	41,0	108	44,7	-	-
130	5	139	28,1	130	32,3	123	35,6	115	39,2	107	43,2	99,4	47,1	91,3	51,0
	6	143	28,3	134	32,6	126	35,9	119	39,6	110	43,6	102	47,6	93,8	51,4
	7	147	28,6	137	32,9	130	36,3	122	40,0	114	44,1	105	48,1	96,6	52,0
	8	151	28,9	141	33,3	134	36,7	125	40,4	117	44,6	108	48,6	-	-
	9	156	29,2	145	33,6	137	37,0	129	40,8	120	45,0	111	49,1	-	-
	10	160	29,5	149	34,0	141	37,4	132	41,3	123	45,5	114	49,6	-	-
	11	164	29,8	153	34,3	145	37,8	136	41,7	126	45,9	117	50,1	-	-
	12	168	30,1	157	34,6	149	38,2	139	42,1	130	46,4	120	50,5	-	-
145	5	158	32,1	147	37,0	139	40,7	130	44,9	121	49,5	112	54,0	103	58,4
	6	162	32,4	151	37,3	143	41,1	134	45,3	125	50,0	116	54,5	106	58,9
	7	167	32,8	156	37,7	147	41,5	138	45,8	128	50,5	119	55,0	109	59,5
	8	171	33,1	160	38,1	151	42,0	142	46,3	132	51,0	122	55,6	-	-
	9	176	33,5	164	38,5	155	42,4	146	46,8	136	51,6	126	56,2	-	-
	10	181	33,8	169	38,9	160	42,8	150	47,2	139	52,1	129	56,8	-	-
	11	185	34,1	173	39,3	164	43,3	154	47,7	143	52,6	132	57,3	-	-
	12	190	34,5	178	39,6	168	43,7	158	48,2	147	53,1	136	57,9	-	-
160	5	176	35,4	164	40,8	155	44,9	146	49,5	135	54,6	125	59,5	115	64,3
	6	181	35,8	169	41,2	159	45,3	150	50,0	139	55,1	129	60,1	118	64,9
	7	186	36,1	174	41,6	164	45,8	154	50,5	143	55,7	133	60,7	122	65,6
	8	191	36,5	178	42,0	169	46,3	158	51,1	147	56,3	136	61,4	-	-
	9	196	36,9	183	42,5	173	46,8	163	51,6	151	56,8	140	62,0	-	-
	10	202	37,3	188	42,9	178	47,2	167	52,1	155	57,4	144	62,6	-	-
	11	207	37,6	193	43,3	183	47,7	171	52,6	159	58,0	148	63,2	-	-
	12	212	38,0	198	43,7	188	48,2	176	53,1	164	58,5	152	63,8	-	-
180	5	203	38,6	190	44,4	179	48,9	168	53,9	157	59,4	145	64,8	133	70,1
	6	209	39,0	195	44,8	184	49,4	173	54,4	161	60,0	149	65,4	137	70,7
	7	215	39,4	201	45,3	190	49,9	178	55,0	166	60,6	153	66,1	141	71,5
	8	221	39,8	206	45,8	195	50,4	183	55,6	170	61,3	158	66,8	-	-
	9	227	40,2	212	46,2	200	50,9	188	56,2	175	61,9	162	67,5	-	-
	10	233	40,6	218	46,7	206	51,4	193	56,7	180	62,5	166	68,2	-	-
	11	239	41,0	223	47,2	211	52,0	198	57,3	184	63,1	171	68,8	-	-
	12	246	41,4	229	47,6	217	52,5	203	57,8	189	63,7	175	69,5	-	-
200	5	226	43,9	211	50,5	199	55,6	187	61,3	174	67,6	161	73,7	148	79,6
	6	232	44,3	217	50,9	205	56,1	192	61,9	179	68,2	166	74,3	152	80,4
	7	239	44,7	223	51,5	211	56,7	198	62,5	184	68,9	171	75,1	157	81,2
	8	246	45,2	229	52,0	217	57,3	204	63,2	189	69,6	175	75,9	-	-
	9	253	45,7	236	52,5	223	57,9	209	63,8	195	70,3	180	76,7	-	-
	10	259	46,1	242	53,1	229	58,5	215	64,5	200	71,0	185	77,5	-	-
	11	266	46,6	248	53,6	235	59,0	220	65,1	205	71,7	190	78,2	-	-
	12	273	47,0	255	54,1	241	59,6	226	65,7	210	72,4	195	79,0	-	-

Tw= Outlet water temperature in °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

The standard performances refer to a 5°C temperature difference between the water entering and leaving the plate-type heat exchanger and to operation of the unit with all the fans to top speed. A $0.44 \times 10^{-4} \text{ m}^2 \text{ kW}$ fouling factor has also been considered with the unit installed at zero meters above sea level (Pb = 1013mbar).

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in heating mode AB Standard Unit / AB Standard Unit + KS Silencer kit

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		-6		-2		2		6		9		12		15	
		kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa
50	30	40,6	11,5	46,6	11,6	50,9	11,8	54,2	11,8	58,1	12,0	62,1	12,1	66,4	12,2
	35	40,4	12,8	46,3	12,9	50,7	13,0	53,9	13,1	57,8	13,3	61,8	13,4	66,1	13,6
	40	40,2	14,2	46,1	14,3	50,4	14,5	53,6	14,6	57,5	14,7	61,4	14,9	65,7	15,1
	45	39,9	15,8	45,7	15,9	50,0	16,1	53,2	16,2	57,1	16,4	61,0	16,6	65,3	16,8
	50	39,6	17,6	45,4	17,7	49,7	17,9	52,8	18,0	56,7	18,2	60,6	18,4	64,8	18,6
60	30	44,3	12,8	50,8	12,9	55,5	13,1	59,0	13,1	63,3	13,3	67,7	13,4	72,4	13,6
	35	44,1	14,2	50,5	14,3	55,2	14,5	58,7	14,6	63,0	14,7	67,4	14,9	72,1	15,1
	40	43,8	15,8	50,2	15,9	54,9	16,1	58,4	16,2	62,6	16,4	67,0	16,6	71,6	16,8
	45	43,5	17,5	49,9	17,7	54,5	17,9	58,0	18,0	62,2	18,2	66,5	18,4	71,1	18,6
	50	43,2	19,5	49,5	19,6	54,2	19,9	58,0	20,0	61,8	20,2	66,0	20,5	70,7	20,7
70	30	51,7	14,5	59,2	14,5	64,8	14,7	68,9	14,8	73,9	15,0	79,0	15,2	84,5	15,3
	35	51,4	16,0	58,9	16,1	64,5	16,3	68,6	16,4	73,5	16,6	78,6	16,8	84,1	17,0
	40	51,1	17,8	58,6	17,9	64,1	18,2	68,2	18,3	73,1	18,5	78,2	18,7	83,6	18,9
	45	50,8	19,8	58,2	19,9	63,7	20,2	67,7	20,3	72,6	20,5	77,6	20,8	83,0	21,0
	50	50,4	22,0	57,8	22,1	63,2	22,4	67,2	22,6	72,1	22,8	77,1	23,1	82,5	23,4
80	30	58,2	16,4	66,7	16,5	72,9	16,8	77,6	16,9	83,2	17,1	88,9	17,3	95,2	17,5
	35	57,9	18,2	66,3	18,3	72,6	18,6	77,2	18,7	82,8	18,9	88,5	19,1	94,7	19,3
	40	57,6	20,3	66,0	20,4	72,1	20,7	76,7	20,8	82,3	21,0	88,0	21,3	94,1	21,5
	45	57,2	22,5	65,5	22,7	71,7	23,0	76,2	23,1	81,7	23,4	87,4	23,6	93,5	23,9
	50	56,8	25,0	65,1	25,2	71,2	25,5	75,7	25,7	81,2	26,0	86,8	26,3	92,8	26,6
90	30	69,8	20,1	80,0	20,2	87,5	20,5	93,0	20,6	99,8	20,8	107	21,1	114	21,3
	35	69,4	22,2	79,6	22,4	87,0	22,7	92,6	22,8	99,3	23,1	106	23,3	114	23,6
	40	69,0	24,7	79,1	24,9	86,5	25,2	92,0	25,4	98,7	25,7	106	26,0	113	26,3
	45	68,6	27,5	78,6	27,7	85,9	28,0	91,4	28,2	98,0	28,5	105	28,9	112	29,2
	50	68,1	30,6	78,0	30,7	85,3	31,2	90,8	31,4	97,3	31,7	104	32,1	111	32,4
100	30	78,7	22,4	90,1	22,5	98,6	22,8	105	22,9	112	23,2	120	23,5	129	23,7
	35	78,3	24,8	89,7	24,9	98,1	25,3	104	25,4	112	25,7	120	26,0	128	26,3
	40	77,8	27,5	89,2	27,7	97,5	28,1	104	28,3	111	28,6	119	28,9	127	29,2
	45	77,3	30,6	88,6	30,8	96,8	31,2	103	31,4	110	31,8	118	32,1	126	32,5
	50	76,7	34,0	87,9	34,2	96,2	34,7	102	34,9	110	35,3	117	35,7	125	36,1
115	30	86,3	24,8	98,9	24,9	108	25,3	115	25,4	123	25,7	132	26,0	141	26,3
	35	85,8	27,5	98,4	27,6	108	28,0	114	28,2	123	28,5	131	28,8	140	29,1
	40	85,4	30,5	97,8	30,7	107	31,1	114	31,3	122	31,7	130	32,0	140	32,4
	45	84,8	33,9	97,1	34,1	106	34,6	113	34,8	121	35,2	130	35,6	139	36,0
	50	84,2	37,7	96,5	37,9	106	38,5	112	38,7	120	39,1	129	39,6	138	40,0
130	30	95,5	27,8	109	27,9	120	28,3	127	28,5	136	28,8	146	29,1	156	29,5
	35	95,0	30,8	109	31,0	119	31,4	127	31,6	136	31,9	145	32,3	155	32,7
	40	94,4	34,2	108	34,4	118	34,9	126	35,1	135	35,5	144	35,9	154	36,3
	45	93,8	38,0	107	38,2	118	38,8	125	39,0	134	39,5	143	39,9	153	40,4
	50	93,1	42,3	107	42,5	117	43,1	124	43,4	133	43,9	142	44,4	152	44,9
145	30	109	32,1	125	32,3	137	32,7	146	32,9	156	33,3	167	33,7	179	34,1
	35	109	35,6	125	35,8	136	36,3	145	36,5	155	36,9	166	37,3	178	37,8
	40	108	39,6	124	39,8	135	40,3	144	40,6	154	41,1	165	41,5	177	42,0
	45	107	44,0	123	44,2	134	44,8	143	45,1	153	45,6	164	46,1	175	46,7
	50	107	48,9	122	49,2	134	49,9	142	50,1	152	50,7	163	51,3	174	51,9
160	30	119	35,5	137	35,7	149	36,2	159	36,4	170	36,8	182	37,2	195	37,6
	35	119	39,3	136	39,5	149	40,1	158	40,3	169	40,8	181	41,2	194	41,7
	40	118	43,7	135	43,9	148	44,6	157	44,8	168	45,3	180	45,8	193	46,4
	45	117	48,6	134	48,8	147	49,5	156	49,8	167	50,4	179	51,0	191	51,5
	50	116	54,0	133	54,3	146	55,0	155	55,4	166	56,0	178	56,6	190	57,3
180	30	141	38,4	161	38,7	176	39,2	187	39,4	201	39,9	215	40,3	230	40,8
	35	140	42,6	160	42,9	175	43,4	186	43,7	200	44,2	214	44,7	229	45,2
	40	139	47,4	159	47,7	174	48,3	185	48,6	199	49,2	212	49,7	227	50,3
	45	138	52,6	158	53,0	173	53,7	184	54,0	197	54,6	211	55,2	226	55,9
	50	137	58,5	157	58,9	172	59,7	183	60,0	196	60,7	210	61,4	224	62,1
200	30	154	43,4	177	43,7	193	44,3	206	44,5	221	45,1	236	45,6	252	46,1
	35	153	48,1	176	48,4	192	49,1	205	49,4	219	49,9	235	50,5	251	51,1
	40	153	53,5	175	53,8	191	54,6	203	54,9	218	55,5	233	56,2	250	56,8
	45	152	59,5	174	59,8	190	60,6	202	61,0	217	61,7	232	62,4	248	63,1
	50	150	66,1	172	66,5	189	67,4	201	67,8	215	68,6	230	69,4	246	70,2

Tw= Outlet water temperature in °C

kWt = heating output (kW).

kWa = Power input of compressors (kW)

The standard performances refer to a 5°C temperature difference between the water entering and leaving the plate-type heat exchanger, outdoor air with 87% relative humidity and to operation of the unit with all the fans to top speed. A 0.44 x 10⁻⁴ m² K/W fouling factor has also been considered with the unit installed at zero meters above sea level (Pb = 1013mbar).

NOTE

For air temperatures of less than 7°C, the heating capacity is declared without considering the effect of the thawing cycles, strictly correlated with the humidity in the outdoor air.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Version with Desuperheater (VD)

Recovery heat exchanger specifications

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Type of recovery exchanger	PIASTRE INOX SALDOBRASATE												
Quantity	1												
Max. operating pressure on wet side	600												
Total water content of recovery exchangers	0,6			0,8			1,3			1,8			l

Unit specification

Recovered heating capacity (1)	15,2	17,0	19,4	22,9	26,2	29,2	33,2	37,1	42,4	47,5	52,4	58,1	kW
Recovered water flow rate (1)	0,73	0,81	0,93	1,10	1,25	1,39	1,58	1,77	2,03	2,27	2,50	2,78	l/s
Recovered water pressure drop (1)	8	10	13	18	14	17	10	13	17	20	16	19	kPa

(1): The data refer to: Water temperature: evaporator inlet :12°C - evaporator outlet: 7°C, Outdoor air temperature 35°C.
The data refer to: Water temperature: recovery inlet :40°C - recovery outlet: 45°C.



NOTE : THE HEATING CAPACITY RECOVERED BY THE DESUPERHEATER EXCLUSIVELY REFERS TO UNITS OPERATING IN THE COOLING MODE.

Recovered heating capacity in Version with Desuperheater (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)					MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45			25	30	35	40	45
		kW _{tr} = RECOVERED HEATING CAPACITY [KW]							kW _{tr} = RECOVERED HEATING CAPACITY [KW]				
50	30	12,4	14,2	16,3	18,6	21,2	115	30	27,8	31,6	35,9	40,6	45,8
	35	12,4	14,2	16,4	18,7	21,3		35	27,8	31,6	35,9	40,6	45,8
	40	12,2	13,9	16,0	18,3	20,8		40	27,1	30,8	35,0	39,6	44,7
	45	11,5	13,2	15,2	17,4	19,8		45	25,7	29,3	33,2	37,6	42,5
	50	10,6	12,1	13,9	15,9	18,1		50	23,7	26,9	30,5	34,6	39,1
	55	9,3	10,6	12,2	14,0	15,9		55	20,9	23,8	27,0	30,6	34,5
	60	7,6	8,8	10,1	11,5	13,1		60	17,5	19,9	22,6	25,6	28,9
	65	5,7	6,5	7,5	8,5	9,7		65	13,4	15,2	17,3	19,6	22,1
55	30	13,9	15,9	18,2	20,8	23,6	130	30	31,2	35,3	40,1	45,4	51,4
	35	14,0	16,0	18,3	20,9	23,8		35	31,2	35,3	40,1	45,4	51,4
	40	13,7	15,7	17,9	20,4	23,2		40	30,4	34,5	39,1	44,3	50,1
	45	13,0	14,9	17,0	19,4	22,1		45	28,9	32,7	37,1	42,0	47,5
	50	11,9	13,7	16,4	17,8	20,2		50	26,5	30,0	34,1	38,6	43,7
	55	10,4	12,0	14,4	15,6	17,7		55	23,4	26,5	30,1	34,1	38,5
	60	8,6	9,9	11,9	12,9	14,6		60	19,5	22,1	25,1	28,4	32,1
	65	6,4	7,3	8,8	9,5	10,8		65	14,8	16,8	19,1	21,6	24,4
60	30	15,9	18,2	20,8	23,7	27,0	145	30	35,7	40,6	46,0	52,1	58,8
	35	15,9	18,3	20,9	23,9	27,1		35	35,7	40,5	45,9	52,0	58,7
	40	15,6	17,9	20,4	23,3	26,5		40	34,7	39,5	44,7	50,6	57,2
	45	14,8	17,0	19,4	22,2	25,2		45	33,0	37,4	42,4	48,1	54,3
	50	13,6	15,6	17,8	20,3	23,1		50	30,3	34,5	39,0	44,2	49,9
	55	11,9	13,7	15,6	17,8	20,3		55	26,9	30,5	34,6	39,2	44,2
	60	9,8	11,3	12,9	14,7	16,7		60	22,5	25,6	29,0	32,9	37,1
	65	7,3	8,3	9,5	10,9	12,4		65	17,4	19,7	22,3	25,3	28,6
70	30	18,7	21,5	24,6	28,2	32,0	160	30	39,8	45,2	51,2	58,0	65,5
	35	18,8	21,6	24,7	28,3	32,2		35	39,9	45,3	51,4	58,2	65,7
	40	18,3	21,1	24,2	27,6	31,4		40	39,0	44,3	50,1	56,8	64,2
	45	17,4	20,0	22,9	26,2	29,8		45	36,9	41,9	47,5	53,8	60,8
	50	15,9	18,3	21,0	24,0	27,3		50	33,8	38,3	43,4	49,2	55,6
	55	13,9	16,0	18,4	21,0	23,9		55	29,5	33,5	38,0	43,0	48,6
	60	11,4	13,2	15,1	17,2	19,6		60	24,2	27,4	31,1	35,2	39,7
	65	8,4	9,7	11,1	12,7	14,5		65	17,7	20,1	22,8	25,8	29,1
90	30	21,7	24,8	28,2	32,3	36,7	180	30	43,9	49,8	56,5	64,0	72,2
	35	21,8	24,9	28,3	32,4	36,8		35	44,1	50,0	56,7	64,2	72,5
	40	21,2	24,3	27,6	31,6	36,0		40	43,0	48,8	55,3	62,7	70,8
	45	20,1	23,0	26,2	30,0	34,1		45	40,7	46,3	52,4	59,4	67,0
	50	18,4	21,1	24,0	27,4	31,2		50	37,3	42,3	47,9	54,3	61,3
	55	16,1	18,5	21,0	24,0	27,3		55	32,6	37,0	41,9	47,5	53,6
	60	13,2	15,2	17,2	19,7	22,4		60	26,6	30,3	34,3	38,8	43,8
	65	9,8	11,2	12,7	14,5	16,5		65	19,5	22,2	25,1	28,5	32,1
100	30	24,4	27,8	31,5	35,8	40,5	200	30	48,7	55,3	62,6	70,9	80,1
	35	24,5	27,9	31,6	35,9	40,6		35	48,8	55,5	62,8	71,2	80,4
	40	23,9	27,2	30,8	35,0	39,6		40	47,7	54,1	61,3	69,5	78,5
	45	22,6	25,7	29,2	33,2	37,5		45	45,2	51,3	58,1	65,8	74,3
	50	20,7	23,5	26,7	30,3	34,3		50	41,3	46,9	53,1	60,2	68,0
	55	18,1	20,6	23,3	26,5	30,0		55	36,1	41,0	46,4	52,6	59,4
	60	14,8	16,8	19,1	21,7	24,5		60	29,5	33,5	38,0	43,1	48,6
	65	10,8	12,3	14,0	15,9	18,0		65	21,6	24,6	27,8	31,5	35,6
70	6,2	7,0	8,0	9,1	10,3	70	12,4	14,1	15,9	18,1	20,4		

kW_{tr} = RECOVERED HEATING CAPACITY [KW]

Twr = Desuperheater outlet water temperature, Δtin-out= 5°C

NOISE LEVELS

The noise levels refer to units operating in the nominal conditions (water temperature: inlet: 12°C - outlet: 7°C, Outdoor air temperature 35°C), units with accessory IMV may have lower noise levels.

The acoustic pressure levels are measured 1/ 5 / 10 meters away from the outer surface of the unit operating in the free field and resting on a reflecting surface (directional factor of 2).

SWL = Sound power levels, with reference to 2×10^{-12} W.

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

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

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

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

Standard AB version

Mod.	SWL (dB) (E)									SPL (dBA)			
	Octave bands (Hz)								Total		1m	5m	10m
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)			
50	83,3	82,0	82,4	84,4	82,5	83,4	80,9	75,5	91	89	71	62	57
60	83,3	82,0	82,4	84,4	82,5	83,4	80,9	75,5	91	89	71	62	57
70	83,3	82,0	82,4	84,4	82,5	83,4	80,9	75,5	91	89	71	62	57
80	83,3	82,0	82,4	84,4	82,5	83,4	80,9	75,5	91	89	71	62	57
90	85,8	84,2	83,9	85,9	84,5	85,4	84,0	80,0	94	91	73	65	59
100	85,8	84,2	83,9	85,9	84,5	85,4	84,0	80,0	94	91	73	65	59
115	94,6	91,1	90,4	92,1	89,8	90,1	88,9	84,5	100	96	78	69	64
130	94,6	91,1	90,4	92,1	89,8	90,1	88,9	84,5	100	96	78	69	64
145	95,2	91,7	91,0	92,7	90,4	90,7	89,5	85,1	101	97	79	70	65
160	95,2	91,7	91,0	92,7	90,4	90,7	89,5	85,1	101	97	79	70	65
180	101,8	98,2	96,8	95,7	93,3	89,8	83,6	85,5	105	98	79	71	66
200	101,8	98,2	96,8	95,7	93,3	89,8	83,6	85,5	105	98	79	71	66

AB version + Low noise Kit KS

Mod.	SWL (dB) (E)									SPL (dBA)			
	Octave bands (Hz)								Total		1m	5m	10m
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)			
50	80,2	78,9	79,3	81,3	79,4	80,3	77,8	72,4	88	86	68	59	54
60	80,2	78,9	79,3	81,3	79,4	80,3	77,8	72,4	88	86	68	59	54
70	80,2	78,9	79,3	81,3	79,4	80,3	77,8	72,4	88	86	68	59	54
80	80,2	78,9	79,3	81,3	79,4	80,3	77,8	72,4	88	86	68	59	54
90	82,8	81,2	80,9	82,9	81,5	82,4	81,0	77,0	91	88	70	62	56
100	82,8	81,2	80,9	82,9	81,5	82,4	81,0	77,0	91	88	70	62	56
115	91,6	88,1	87,4	89,1	86,8	87,1	85,9	81,5	97	93	75	66	61
130	91,6	88,1	87,4	89,1	86,8	87,1	85,9	81,5	97	93	75	66	61
145	92,2	88,7	88,0	89,7	87,4	87,7	86,5	82,1	98	94	76	67	62
160	92,2	88,7	88,0	89,7	87,4	87,7	86,5	82,1	98	94	76	67	62
180	98,8	95,2	93,8	92,7	90,3	86,8	80,6	82,5	102	95	76	68	63
200	98,8	95,2	93,8	92,7	90,3	86,8	80,6	82,5	102	95	76	68	63

OPERATING RANGE

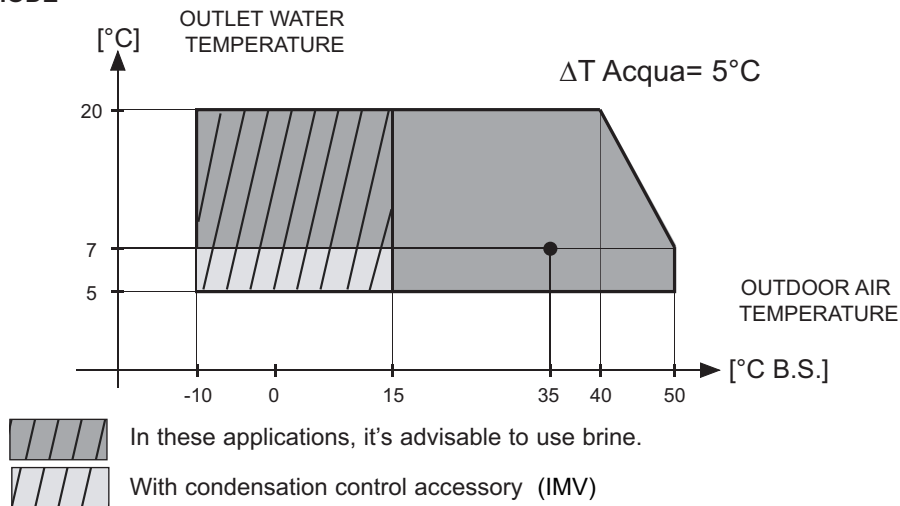
Operating range

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

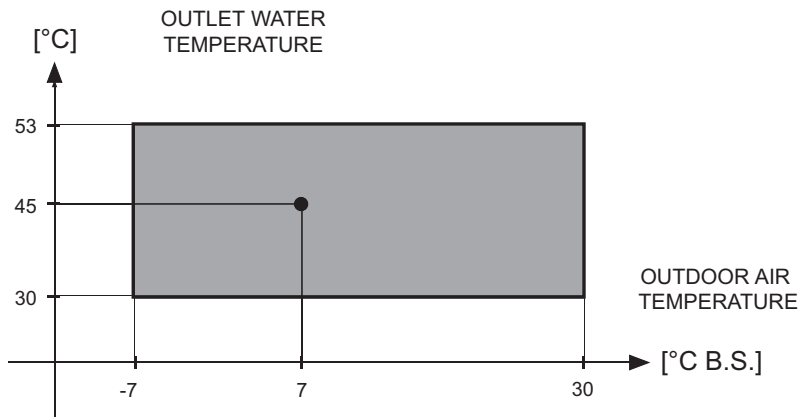
Thermal Water Head		Limit value
Minimum	°C	3
Maximum	°C	8

Note: Make sure the water flow is within the minimum and maximum pressure drop as reported "water pressure drop plate heat exchanger".

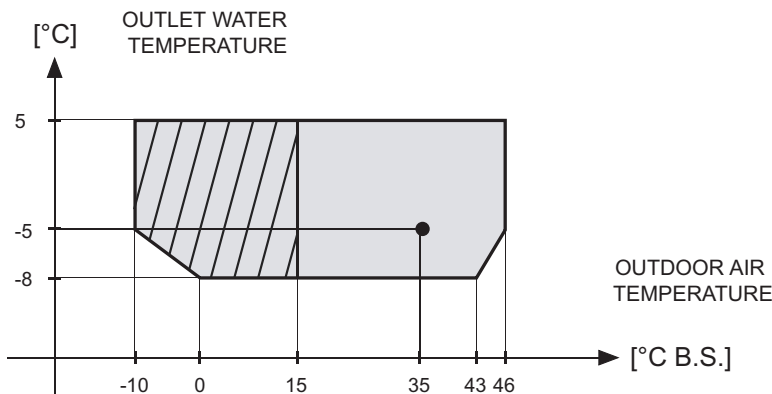
COOLING MODE



HEATING MODE



COOLING MODE BRINE VERSION (VI)

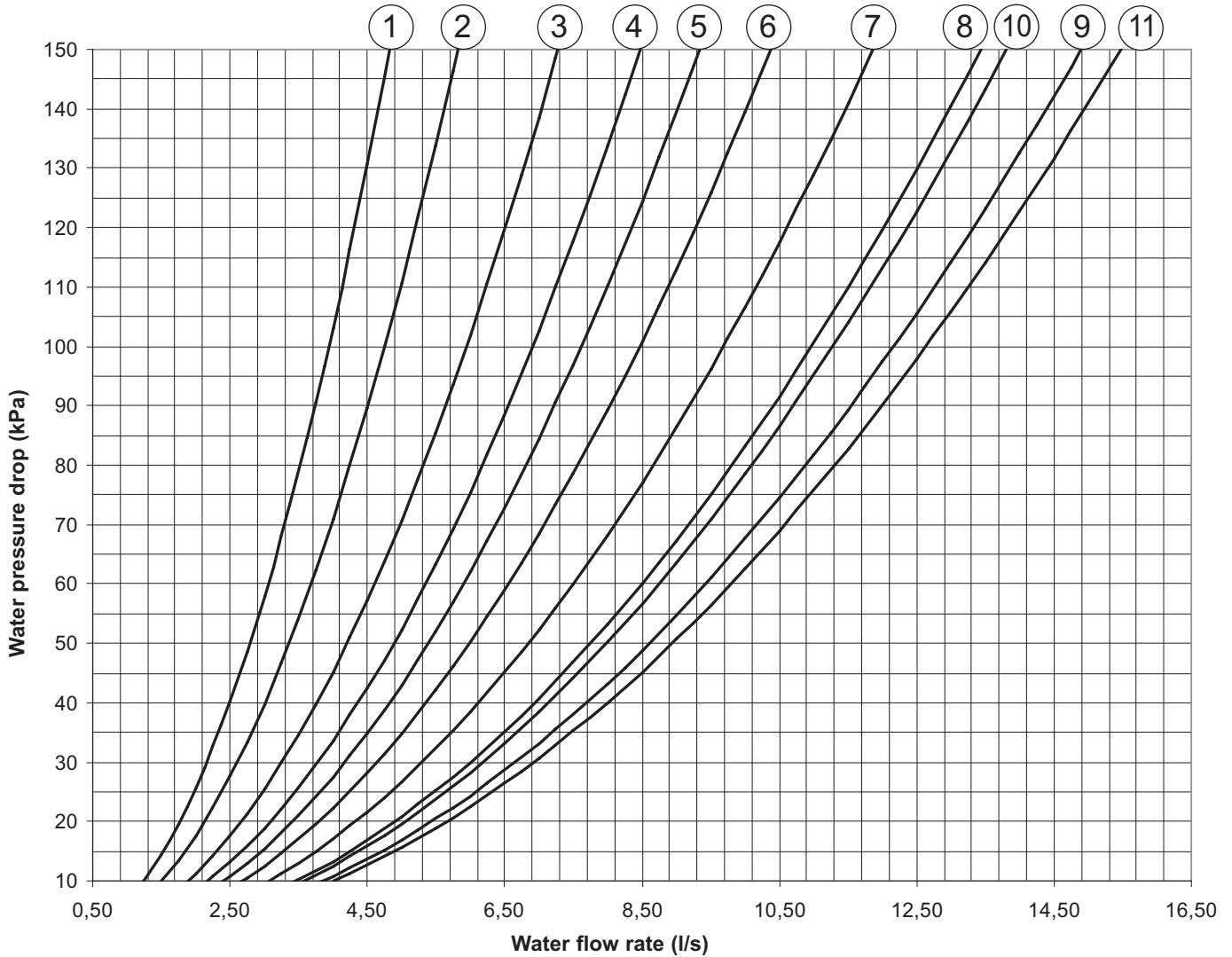


Use water glicol as specified in the paragraph "Specification data for Brine Version (VI)".

With condensation control accessory (IMV)

WATER PRESSURE DROP PLATE HEAT EXCHANGER

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

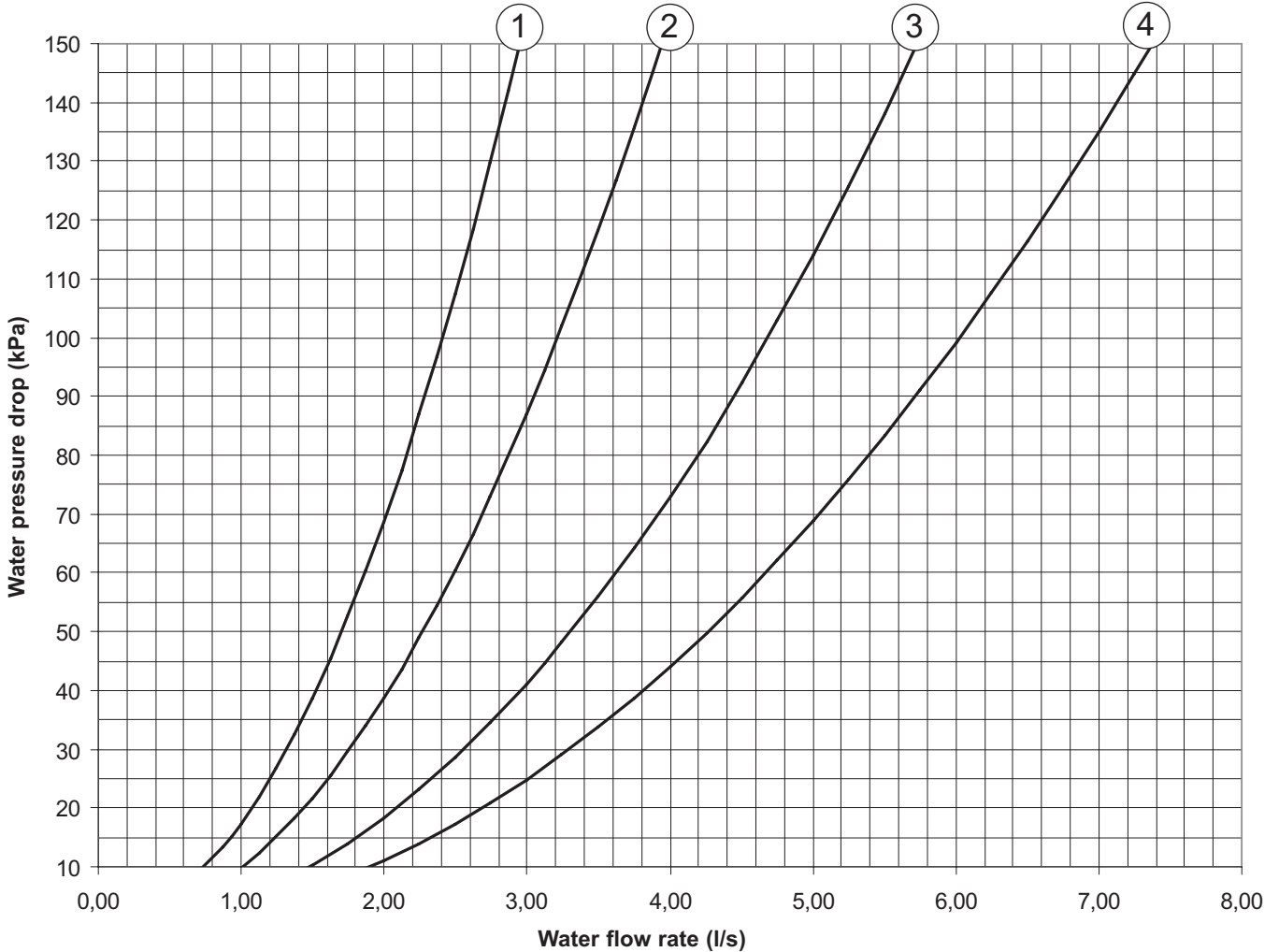


Operation limit

Unit Size		50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference		1	2	3	4	5	6	7	8	9	10	11			Q =Water flow rate Δp =Water pressure drop
Lower limit value	Q	1,2	1,5	1,9	2,2	2,4	2,7	3,1	3,5	3,8	3,6	4,0	l/s		
	Δp	10											kPa		
Upper limit value	Q	4,8	5,8	7,3	8,5	9,3	10,4	11,9	13,4	14,9	13,8	15,5	l/s		
	Δp	150											kPa		
Max. operating pressure on wet side		600											kPa		

WATER PRESSURE DROP OF THE DESUPERHEATER

The graph below illustrates the water pressure drop values in **kPa** depending on the flow rate in **liters/second**, for the Special Versions with Desuperheater (VD) in both the units that operate in the Cooling mode only (IR) and in Heat Pump units (IP). The operating range is delimited by the minimum and maximum values given in the next table.

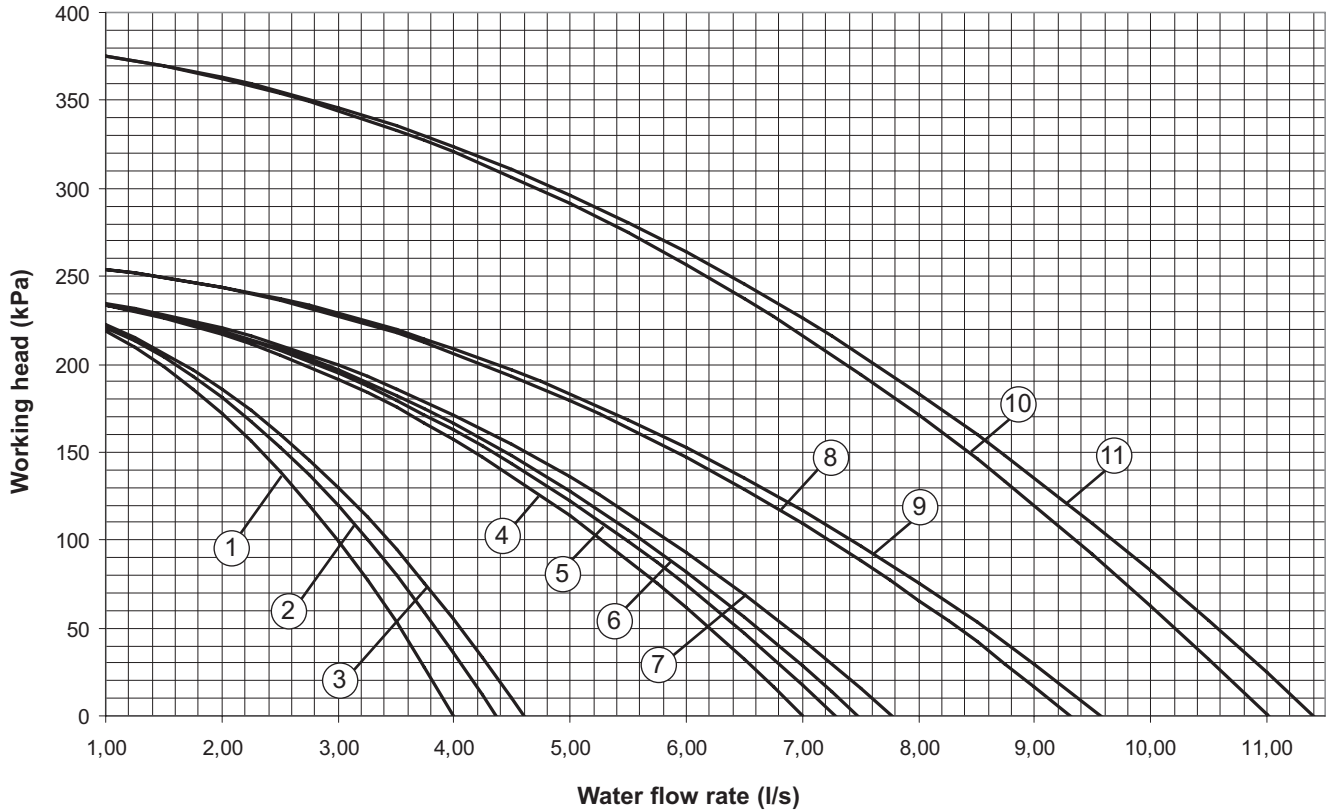


Limits to operation

Unit Size		50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference		1			2			3			4				Q=Water flow rate Δp=Water pressure drop
Lower limit value	Q	0,8			1,0			1,5			1,9		l/s		
	Δp	10											kPa		
Upper limit value	Q	3,0			3,9			5,7			7,4		l/s		
	Δp	150											kPa		

WORKING HEAD OF THE PUMPING MODULE MP-AM AND MP-SS

The following graph gives the head values (**kPa**) depending on the water flow rate (**liters/second**). The operating range is delimited by the minimum and maximum values given in the next table.
Working head is the one on the wet module outlet minus all the load losses of the unit.

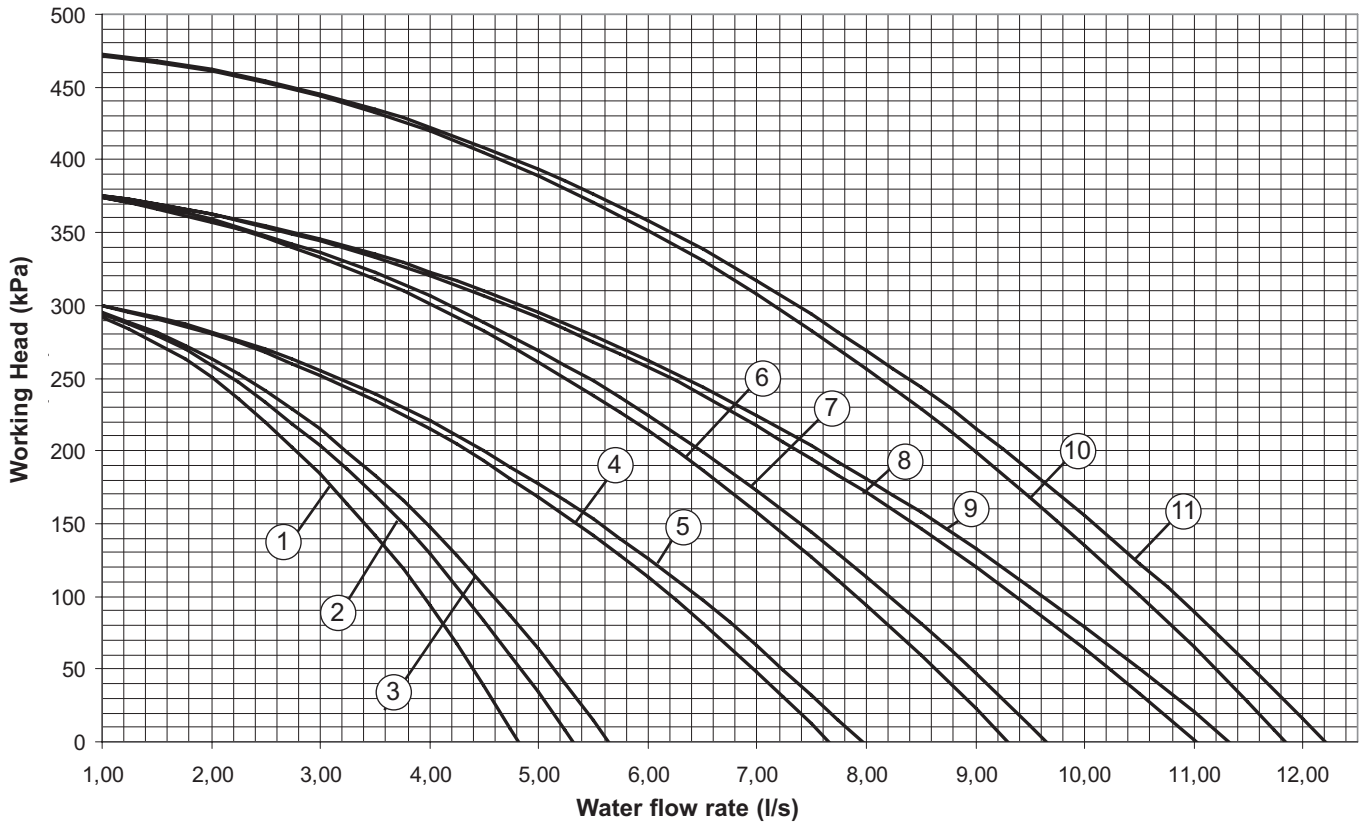


Operation limit

Unit Size	50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference	1		2	3	4	5	6	7	8	9	10	11		Q=Water flow rate
Lower limit value	Q	1,25	1,50	1,88	2,19	2,41	2,68	3,06	3,47	3,85	3,57	4,00	l/s	
Upper limit value		4,00	4,36	4,61	6,71	7,00	7,29	7,48	9,32	9,58	11,00	11,40	l/s	
Max. operating pressure on wet side	600												kPa	

HIGH WORKING HEAD OF THE PUMPING MODULE MP-AM AP AND MP-SS AP

The following graph gives the head values (**kPa**) depending on the water flow rate (**liters/second**). The operating range is delimited by the minimum and maximum values given in the next table.
Working head is the one on the wet module outlet minus all the load losses of the unit.



Operation limit

Unit Size	50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference	1		2	3	4	5	6	7	8	9	10	11		Q=Water flow rate
Lower limit value	1,25		1,50	1,88	2,19	2,41	2,68	3,06	3,47	3,85	3,57	4,00	l/s	
Upper limit value	4,82		5,31	5,65	7,67	7,96	9,29	9,65	11,03	11,32	11,85	12,21	l/s	
Max. operating pressure on wet side	600											kPa		

MAXIMUM VOLUME OF WATER

Maximum volume of water in the system with wet module

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

Maximum setting value 600 kPa.

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

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

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

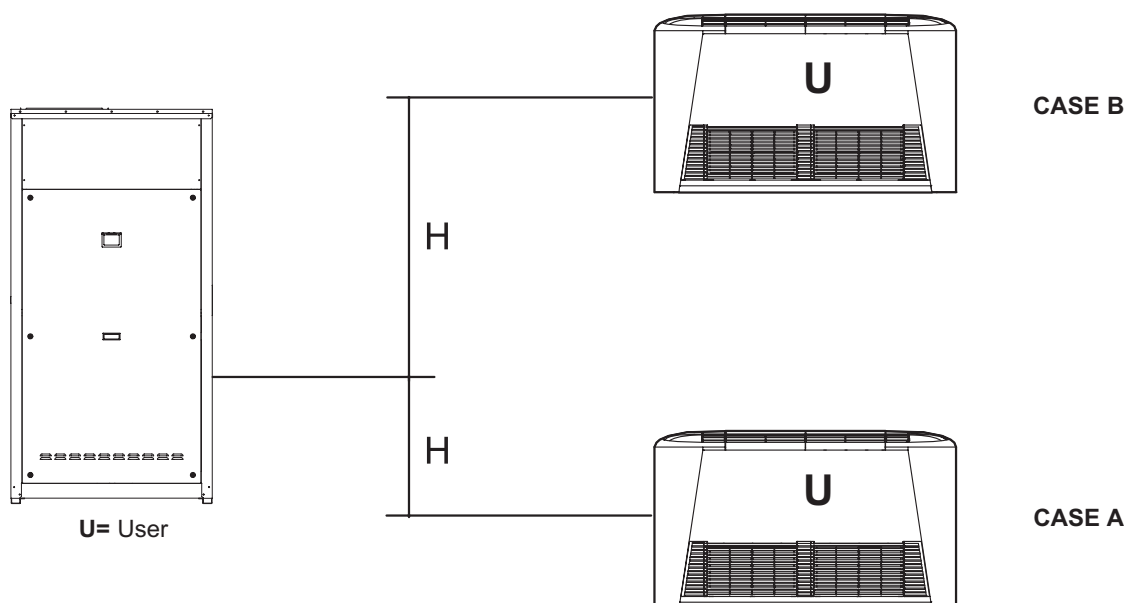
Tab.1

Model		50-60-70-80	90-100-110-115-130-145-160-180-200			
Surge chamber volume (liters)		12	24			
Thermal expansion of water (10-40°C)		0.0074				
Thermal expansion of water (10-60°C)		0.0167				
H (meters)		Surge chamber pressure (kPa)	Maximum total volume of water supply system (liters)			
			IR	IP	IR	IP
Case A	H < 0	150 (standard)	1043	461	2085	921
	0 < H < 12.25	150 (standard)	1043	461	2085	921
Case B	15	177	980	435	1960	870
	20	226	866	384	1732	768
	25	275	753	334	1505	667
	30	324	640	283	1279	566

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

Corrective factors per total maximum volume of the system with brine

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



VENTILATION UNIT CALIBRATION

The units are equipped as standard with a motor-fan assembly, the various STANDARD components of which are detailed in the table.

Model	Q.tà	Motor Model	Motor RATED Power	VARIABLE Motor Pulley	Fan Model	Fan FIXED Pulley	Belt Model
50-80	1	MAA 112MS4 B3	5,5 kW	VAR 187 A1	AT 18-18 G2L	SPA 355/1	SPA 1882
90-100	1	MAA 112 M4 B3	4 kW	VAR 187 A1	AT 18-18 G2L	SPA 355/1	SPA 1882
	1	MAA 100 LA4 B3	2,2 kW	VAR 187 A1	AT 18-18 S	SPA 355/1	SPA 1882
115-130	3	MAA 100 LB4 B3	3 kW	VAR 177 A1	AT 18-18 S	SPA 355/1	SPA 1882
145-160	3	MAA 112MS4 B3	5,5 kW	VAR 187 A1	AT 18-18 S	SPA 355/1	SPA 1882
180-200	4	MAA 112MS4 B3	5,5 kW	VAR 187 A1	AT 18-18 S	SPA 355/1	SPA 1882

For further constructive details see the MAINTENANCE section.

The pulleys installed on the motor shaft have a VARIABLE diameter.
The variation of the diameter involves:

Opening of the Pulley	Diameter	Fan speed	Applications
pulley fully closed (turning in a clockwise direction)	max	max	need a high head
which require low or no head (free mouth)	min	min	need a low or no head (free mouth)

The factory setting of the motor pulleys is fixed to obtain a residual static head of about 100 Pa.

Residual static head	Model	50-80	90-100	115-130	145-200	
100 Pa	motor current input [A]	11,2	8,3	4,9	6,5	11,2
	Motor power input [kW]	6,4	4,8	2,7	3,7	6,4
	Fan revs [rpm]	760	755	750	710	760
	MOTOR PULLEY OPENING FULLY OPEN - 2 TURN					

If the total static load given by the sum of the losses due to the air intake and discharge channels is appreciably different from 100 Pa there may be:

Channels load loss (PCC)	Number of fan revolutions	Malfunction	Motor pulley setting ^{(1) (2) (3)}
LOW(<50 Pa) or FREE MOUTH application (0 Pa) HIGH(>150Pa)	Increase	possible overload of the electric motor	If the absorption of the electric motor is lower than the allowed maximum (see ELECTRIC DATA section) it is not necessary to change the motor pulley setting. If the absorption is higher, set the pulley FREE MOUTH (0 Pa) FULLY OPEN 50Pa <PCC<100Pa CLOSED -3 TURNS
HIGH(>150Pa)	Decrease	Poor air flow can cause blockages of the unit: in cold mode for high pressure, in hot mode for low pressure	For 100Pa<PCC<150Pa CLOSED -1 TURN For 150Pa<PCC<200Pa FULLY CLOSED

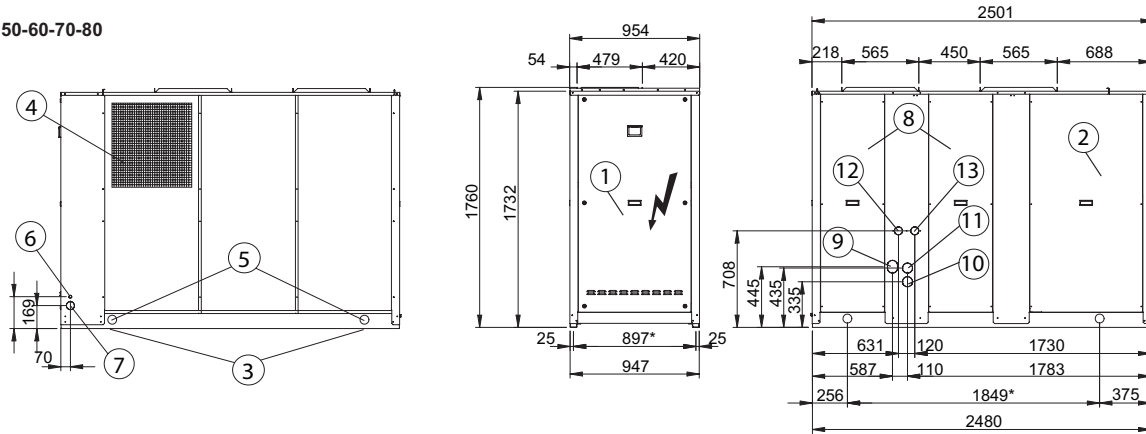
NOTES:

- (1) calibration must always be carried out by first completely closing the pulley (maximum diameter) and then opening it the number of turns indicated in this column depending on the desired head.
- (2) As the pulley diameter varies it is necessary to shift the motor along the vertical slides so as to obtain the correct tension of the transmission belt which when working must be taut and be correctly positioned in the pulley races to avoid abnormal air which could cause it to break. (see section on "Maintenance")
- (3) Once it has been calibrated, always check that the motor electric input is within the maximum admissible values (see section on electrical data)

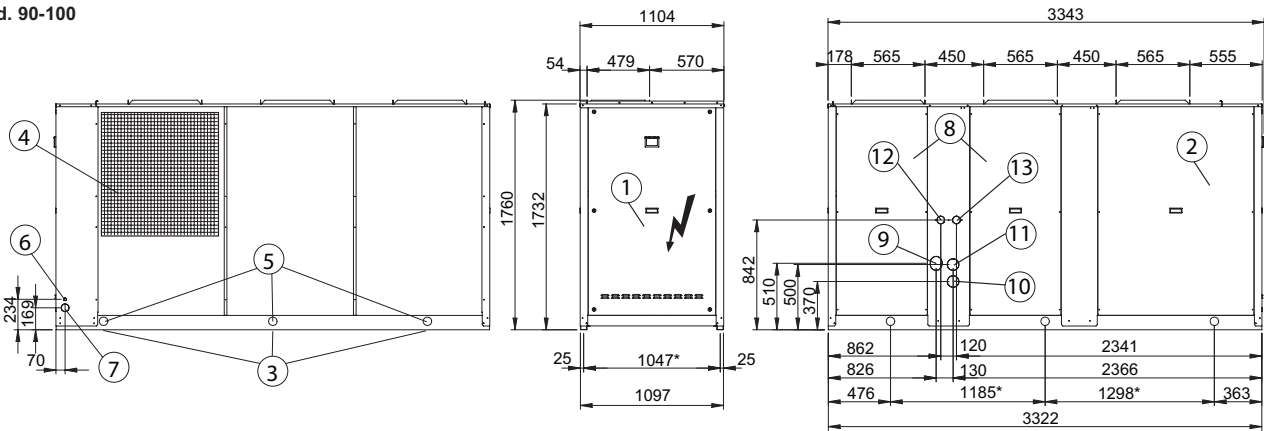
DIMENSIONAL DATA

Overall dimensions

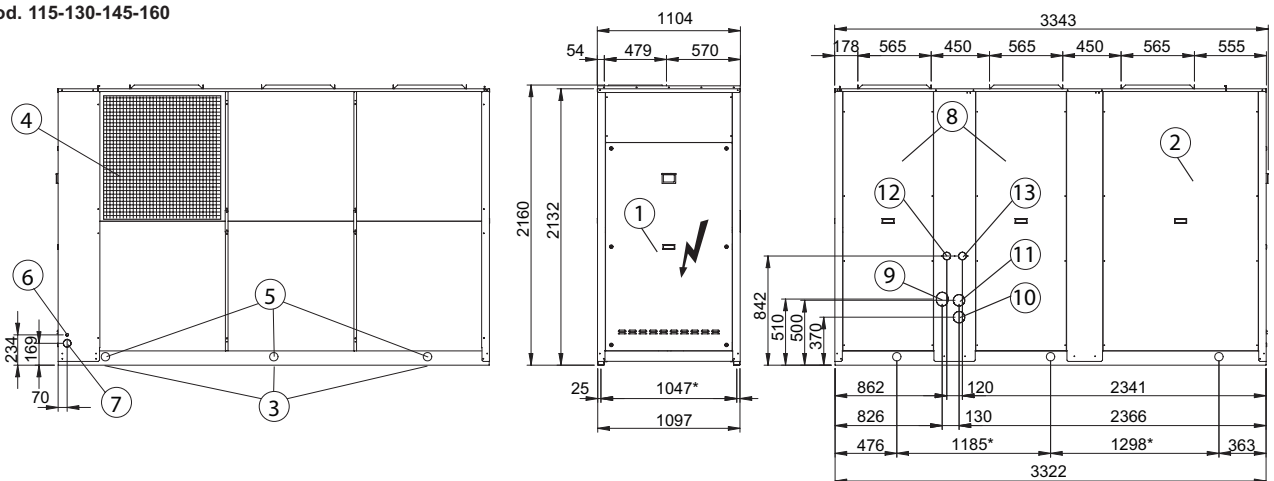
Mod. 50-60-70-80



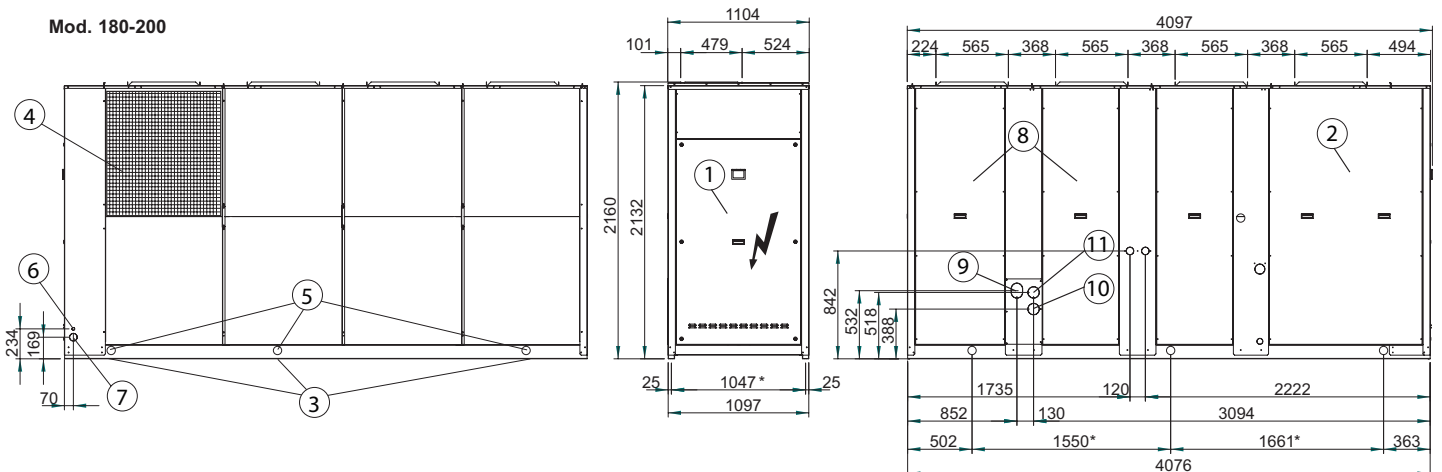
Mod. 90-100



Mod. 115-130-145-160



Mod. 180-200



DIMENSIONAL DATA

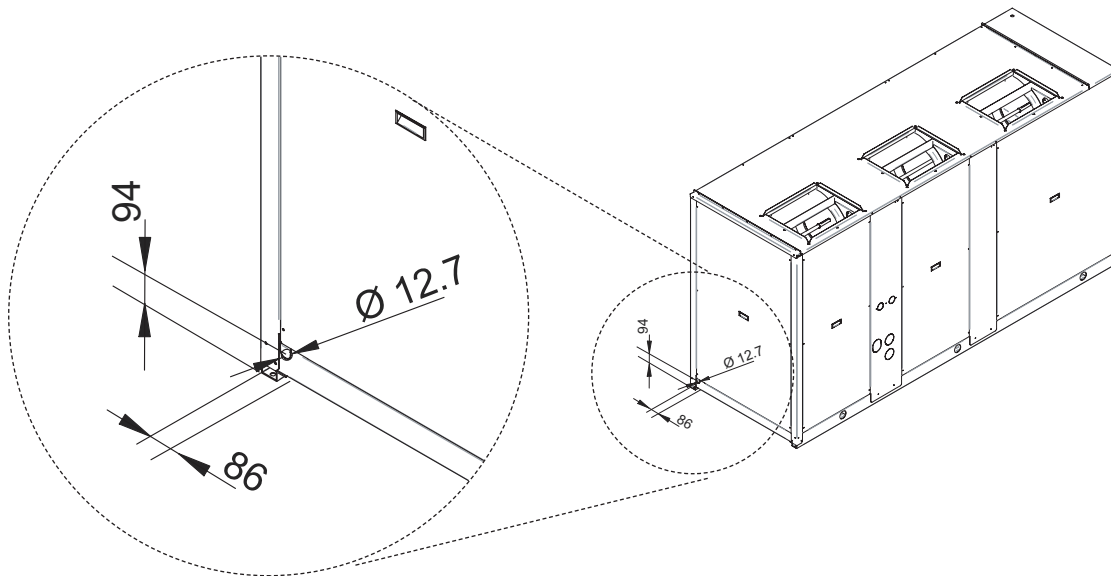
Description of the components

- 1 - Access panel to electric panel's power section
 - 2 - Access panel to compressor compartment
 - 3 - Vibration damper fixing holes (4 pcs)
 - 4 - Coil protection grilles (accessory)
 - 5 - \varnothing 65 mm lifting holes
 - 6 - \varnothing 22 mm input hole for accessory cables
 - 7 - \varnothing 60 mm hole for electric power supply input
 - 8 - Access panel to pump compartment
 - 9 - Water inlet for MP-AM and MP-SS
 - 10 - Water inlet for KT and MP-PS
 - 11 - Water outlet
 - 12 - Water inlet for Desuperheater (only VD version)
 - 13 - Water outlet for Desuperheater (only VD version)
- *: Center distance of vibration damper holes
Note (1): Basic pipe kit do not allow external connections.

Rif.	KT BASIC		KT COMPLETE		KT WATER STORAGE TANK		MP-AM		MP-AM AP		MP-SS		MP-SS AP		MP-PS		VD	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
50	(1)	(1)	10	11	10	11	9	11	9	11	9	11	9	11	10	11	12	13
60	2"M		1 1/2"		1 1/2"	2"	2"		2"		2"	1 1/2"	2"	1 1/2"	2"		1 1/4"	
70	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
80	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
90	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
100	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
115	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
130	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
145	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
160	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
180	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	
200	2 1/2"M		2"		2"	2 1/2"	2 1/2"		2 1/2"		2 1/2"	2"	2 1/2"	2"	2 1/2"		1 1/4"	

Position of condensate drain

The condensate tray (if present) must have a suitable drain trap to prevent spilling of water during operation.



Minimum operative space

If it is intended to install the unit outdoors without the channel for expelling delivery air, a length of channel must nevertheless be provided as shown in Fig. 2 to ensure that rainwater cannot get into the unit and endanger its correct operation, is positioned in a hole, allow double values for the functional spaces. In the case of operation of multiple units, the functional spaces must be doubled.

Fig.1

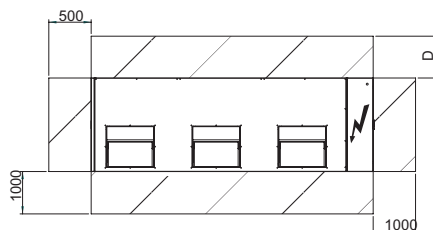
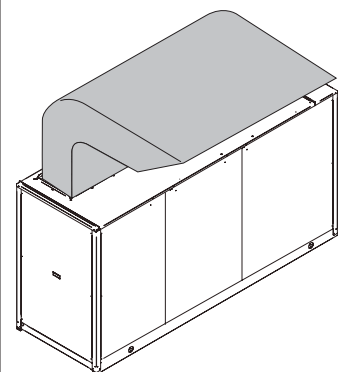


Fig.2



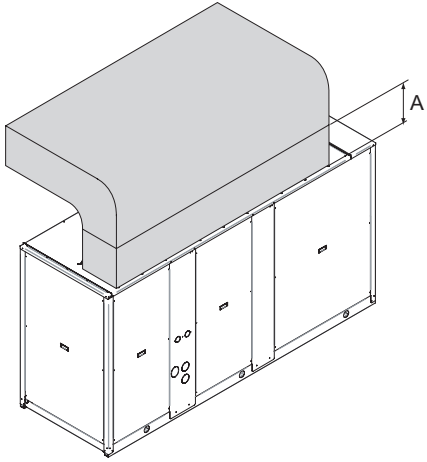
N.B. For the distribution of loads on the supports, see the section "Weights and centres of gravity in operation".

Modello	50-80	90-100	115-200
D [mm]	800		1000

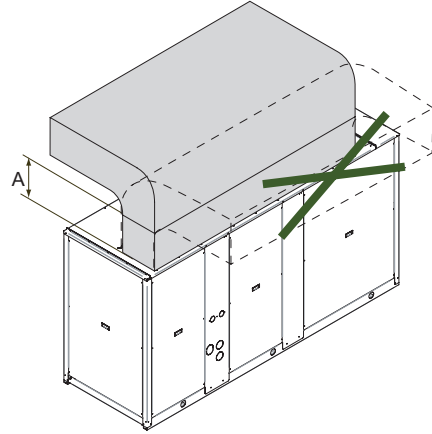
DIMENSIONAL DATA

Configurations for channel installation

Configuration with channel for expelling the delivery air



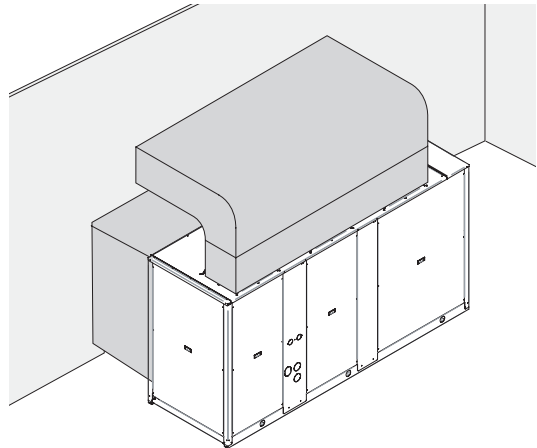
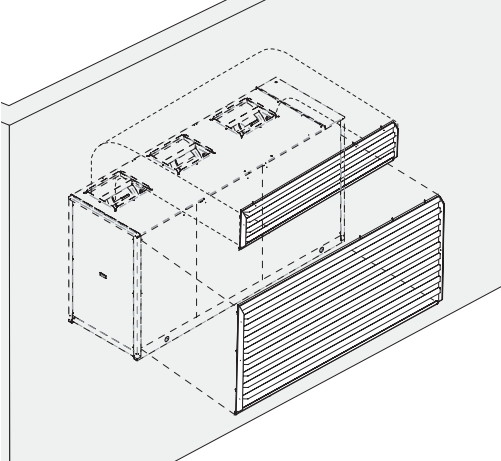
Correct direction for delivery channel



Mod.	50-60-70-80	90-100	115-130-145-160-180-200
A	1500	1750	2000

It is recommended to use a straight piece of pipe with length A in order to make the best use of the fan, favouring the recovery of dynamic pressure.

Configuration with channel for expelling the delivery air and channel for taking in outside air

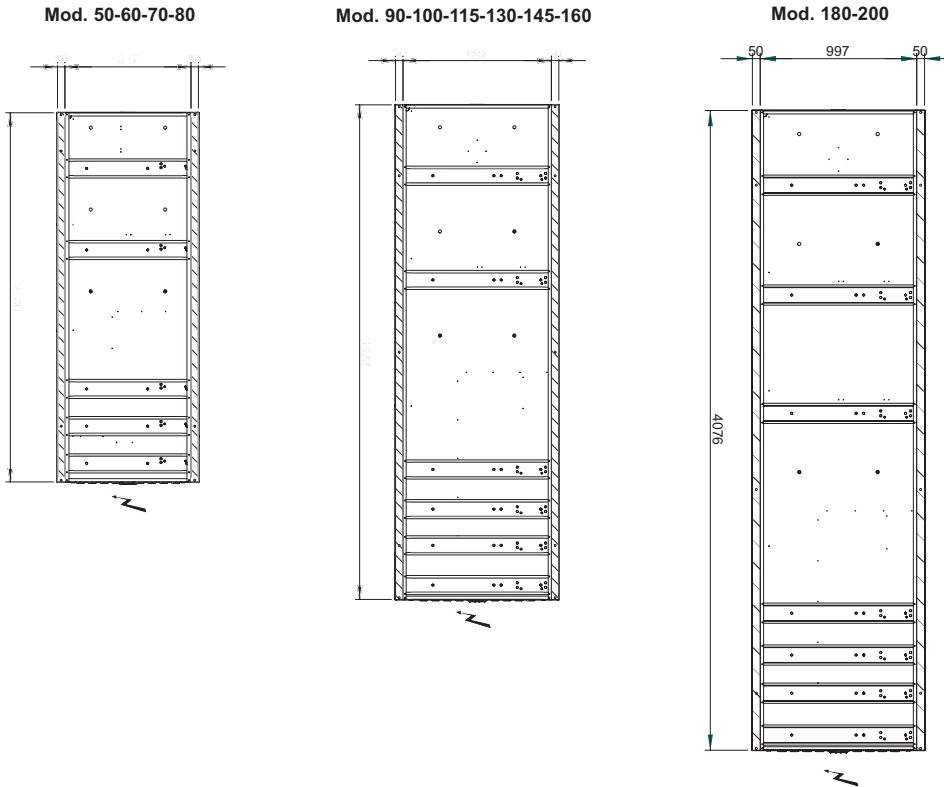


WEIGHT DURING OPERATION AND TRANSPORT

Vibration-damper installation

To prevent the operating unit from transmitting vibrations to the bearing structure, vibration dampening materials should be inserted under the bearing points.
 The unit can be supplied with the rubber or spring vibration dampening accessory. This must be mounted by the installer.

Area of support

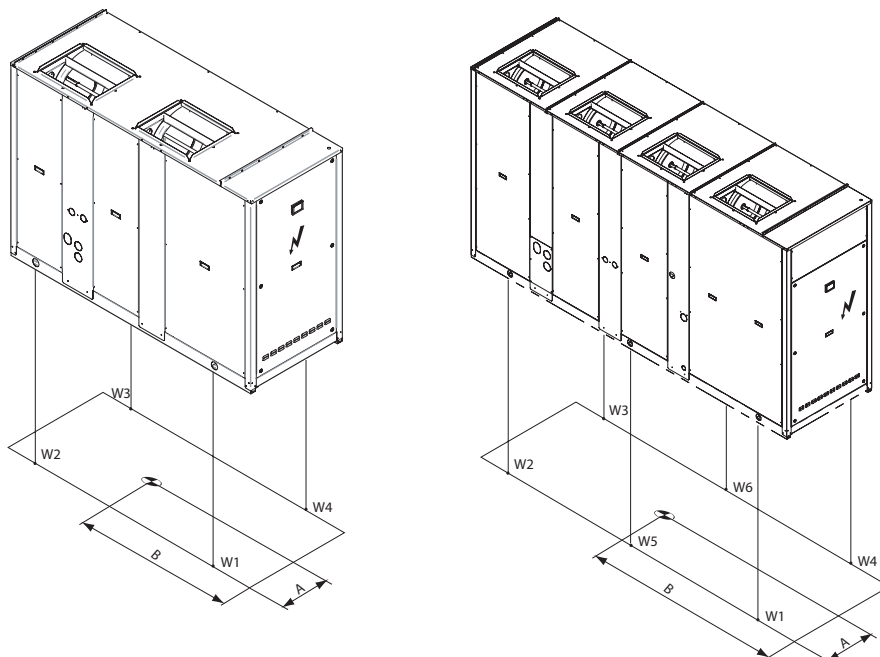


Weight during operation and transport

To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the drawing.

Mod. 50-60-70-80-90-100-115-130-145-160

Mod. 180-200



WEIGHT DURING OPERATION AND TRANSPORT - MOD. 50

Unit type		IP - Heating mode																				
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)											
		Operation			Transport			Operation			Transport											
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	
WITHOUT WATER STORAGE TANK	CHILLER	394	975	278	134	93	194	698	395	975	695	391	983	282	138	95	194	710	392	983	706	
	CHILLER + KIT TB COMPLETO	390	986	282	139	95	193	709	392	984	704	387	993	287	144	97	193	721	389	992	716	
	CHILLER + KIT TB BASE	391	977	282	136	94	194	705	393	977	700	388	985	286	141	96	194	717	390	984	712	
	CHILLER + KIT MDP 2P SS	374	1059	297	174	111	189	772	378	1049	759	371	1065	302	179	113	190	784	375	1055	770	
	CHILLER + KIT MDP 2P SS AP	359	1115	313	209	124	185	830	364	1100	810	356	1119	317	214	125	186	843	362	1104	821	
	CHILLER + KIT MDP 1P SS	378	1021	295	158	103	191	748	381	1016	738	375	1028	300	163	105	192	760	379	1022	749	
WITH WATER STORAGE TANK	CHILLER + KIT MDP 1P SS AP	372	1045	304	173	109	192	778	376	1037	764	370	1051	308	178	111	193	790	374	1043	775	
	CHILLER + KIT TB CON SERB.	427	1219	294	247	200	239	980	402	1056	769	424	1222	299	252	202	239	993	400	1061	780	
	CHILLER + KIT 2P AM	413	1254	311	281	214	237	1043	389	1105	823	411	1256	315	287	216	237	1055	387	1109	835	
	CHILLER + KIT 2P AM AP	399	1286	326	316	226	233	1102	376	1148	874	397	1288	330	322	228	234	1114	373	1152	885	
	CHILLER + KIT 1P AM	419	1234	306	265	208	240	1019	395	1078	802	417	1236	310	271	210	240	1031	393	1084	814	
	CHILLER + KIT 1P AM AP	412	1243	317	280	212	240	1049	388	1093	828	409	1245	321	285	214	241	1061	385	1098	840	
WITHOUT WATER STORAGE TANK	CHILLER + KIT 2P P/S	413	1255	311	282	215	237	1045	389	1106	825	410	1257	315	288	217	238	1057	386	1110	836	
	CHILLER + KIT 1P P/S	419	1234	307	266	208	240	1021	395	1080	804	416	1237	311	271	210	241	1033	392	1085	815	
	Unit type		IR - Cooling mode																			
	WITHOUT WATER STORAGE TANK	CHILLER	381	996	267	135	89	176	666	383	996	663	378	1004	271	140	91	176	678	380	1004	674
		CHILLER + KIT TB COMPLETO	377	1007	271	141	91	175	677	379	1006	672	374	1015	275	146	93	176	689	376	1013	684
		CHILLER + KIT TB BASE	378	998	270	137	89	176	673	380	998	668	375	1006	275	142	91	176	685	377	1005	680
CHILLER + KIT MDP 2P SS		362	1081	286	176	106	172	740	366	1071	727	360	1087	290	182	108	173	752	363	1077	738	
CHILLER + KIT MDP 2P SS AP		347	1138	301	211	118	168	798	352	1123	778	345	1142	305	217	120	169	811	350	1127	789	
CHILLER + KIT MDP 1P SS		366	1043	284	160	98	174	716	369	1037	706	363	1049	288	165	100	174	728	367	1044	717	
WITH WATER STORAGE TANK	CHILLER + KIT MDP 1P SS AP	360	1067	292	175	104	175	746	364	1059	732	358	1073	297	180	106	175	758	362	1065	743	
	CHILLER + KIT TB CON SERB.	419	1242	282	249	195	221	948	392	1078	737	416	1245	287	255	197	222	961	389	1084	748	
	CHILLER + KIT 2P AM	405	1277	298	284	209	220	1011	378	1128	791	403	1279	303	289	211	220	1023	376	1132	803	
	CHILLER + KIT 2P AM AP	392	1308	313	319	221	217	1070	365	1172	842	390	1310	317	325	222	217	1082	363	1175	853	
	CHILLER + KIT 1P AM	411	1256	294	268	203	223	987	385	1101	770	409	1259	298	273	204	223	999	382	1106	782	
	CHILLER + KIT 1P AM AP	404	1265	305	283	207	223	1017	377	1115	796	402	1267	309	288	208	224	1029	375	1120	808	
WITHOUT WATER STORAGE TANK	CHILLER + KIT 2P P/S	405	1277	299	285	209	220	1013	378	1129	793	403	1279	303	290	211	221	1025	376	1133	804	
	CHILLER + KIT 1P P/S	411	1257	295	269	203	223	989	384	1102	772	409	1259	299	274	205	223	1001	382	1107	783	

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 60

Unit type		IP - Heating mode																				
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)											
		Operation			Transport			Operation			Transport											
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	
WITHOUT WATER STORAGE TANK	CHILLER	393	975	278	134	93	194	699	395	975	695	390	983	283	138	95	194	711	392	982	707	
	CHILLER + KIT TB COMPLETO	389	985	282	139	95	193	710	391	984	705	386	993	287	144	97	194	722	388	991	716	
	CHILLER + KIT TB BASE	390	976	282	136	93	194	705	392	976	701	387	984	287	141	95	194	717	390	983	712	
	CHILLER + KIT MDP 2P SS	374	1058	298	174	111	189	773	378	1048	759	371	1064	302	179	113	190	785	375	1054	771	
	CHILLER + KIT MDP 2P SS AP	358	1114	313	209	123	185	831	364	1099	810	356	1119	318	214	125	186	843	361	1104	822	
	CHILLER + KIT MDP 1P SS	378	1020	296	158	103	192	748	381	1015	738	375	1027	300	164	105	192	760	379	1022	750	
WITH WATER STORAGE TANK	CHILLER + KIT MDP 1P SS AP	372	1044	304	173	109	192	778	376	1036	764	370	1050	309	178	111	193	790	374	1042	776	
	CHILLER + KIT TB CON SERB.	426	1219	295	247	200	239	981	402	1055	769	424	1221	299	253	202	239	993	399	1061	781	
	CHILLER + KIT 2P AM	413	1253	311	282	214	237	1044	389	1104	824	410	1256	315	287	216	238	1056	386	1109	835	
	CHILLER + KIT 2P AM AP	399	1285	326	316	226	233	1102	375	1148	874	397	1287	330	322	228	234	1114	373	1152	886	
	CHILLER + KIT 1P AM	419	1233	307	265	208	240	1019	395	1078	803	416	1236	311	271	209	241	1032	392	1083	814	
	CHILLER + KIT 1P AM AP	411	1242	317	280	212	240	1049	387	1092	829	409	1244	322	285	214	241	1062	385	1097	840	
WITHOUT WATER STORAGE TANK	CHILLER + KIT 2P P/S	412	1254	312	282	215	237	1046	389	1105	825	410	1256	316	288	216	238	1058	386	1110	837	
	CHILLER + KIT 1P P/S	418	1234	307	266	208	240	1021	395	1079	804	416	1236	311	272	210	241	1033	392	1084	816	
	Unit type		IR - Cooling mode																			
	WITHOUT WATER STORAGE TANK	CHILLER	381	996	267	135	89	176	667	383	996	663	378	1004	272	140	91	176	679	380	1003	675
		CHILLER + KIT TB COMPLETO	377	1006	271	141	91	175	678	379	1005	673	374	1014	276	146	93	176	690	376	1012	684
		CHILLER + KIT TB BASE	378	997	271	137	89	176	673	380	997	669	375	1005	276	142	91	176	685	377	1005	680
CHILLER + KIT MDP 2P SS		362	1080	286	176	106	172	741	365	1071	727	359	1086	290	182	108	173	753	363	1077	739	
CHILLER + KIT MDP 2P SS AP		347	1137	301	211	118	168	799	352	1122	778	345	1142	306	217	120	169	811	350	1127	790	
CHILLER + KIT MDP 1P SS		366	1042	284	160	98	174	716	369	1037	706	363	1049	289	165	100	174	728	366	1043	718	
WITH WATER STORAGE TANK	CHILLER + KIT MDP 1P SS AP	360	1066	293	175	104	175	746	364	1058	732	358	1072	297	180	106	175	758	362	1064	744	
	CHILLER + KIT TB CON SERB.	419	1242	283	250	195	221	949	391	1077	737	416	1244	287	255	197	222	961	389	1083	749	
	CHILLER + KIT 2P AM	405	1276	299	284	209	220	1012	378	1127	792	403	1278	303	289	211	221	1024	376	1132	803	
	CHILLER + KIT 2P AM AP	392	1308	314	319	221	217	1070	365	1171	842	390	1309	318	325	222	218	1082	363	1175	854	
	CHILLER + KIT 1P AM	411	1256	294	268	203	223	987	384	1100	771	409	1258	299	273	204	223	1000	382	1105	782	
	CHILLER + KIT 1P AM AP	404	1264	305	283	207	223	1017	377	1115	797	401	1266	309	288	208	224	1030	374	1119	808	
WITHOUT WATER STORAGE TANK	CHILLER + KIT 2P P/S	405	1277	299	285	209	220	1014	378	1128	793	403	1279	304	290	211	221	1026	376	1133	805	
	CHILLER + KIT 1P P/S	411	1256	295	269	203	223	989	384	1101	772	408	1259	299	274	205	224	1001	381	1106	784	

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 70

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation			Transport			Operation			Transport										
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	402	973	290	139	100	210	739	404	973	735	399	981	295	144	103	211	751	401	980	746
	CHILLER + KIT TB COMPLETO	398	983	294	144	102	209	750	400	981	744	395	990	299	149	105	210	762	397	988	756
	CHILLER + KIT TB BASE	399	974	294	141	101	210	746	401	974	741	396	982	299	146	103	211	758	398	981	752
	CHILLER + KIT MDP 2P SS	382	1052	310	179	119	205	813	386	1043	799	380	1058	315	184	121	206	825	384	1049	810
	CHILLER + KIT MDP 2P SS AP	367	1106	326	213	131	201	871	373	1092	850	365	1111	330	218	133	202	884	370	1096	861
	CHILLER + KIT MDP 1P SS	387	1016	308	163	110	208	789	390	1011	778	384	1023	312	168	112	208	801	388	1018	789
	CHILLER + KIT MDP 1P SS AP	381	1039	317	177	117	208	819	385	1031	804	378	1045	321	183	119	209	831	383	1037	815
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	431	1208	307	252	208	254	1022	410	1049	809	429	1210	312	257	210	255	1034	407	1055	820
	CHILLER + KIT 2P AM	418	1242	324	286	223	252	1084	397	1097	863	415	1244	328	291	224	253	1096	394	1101	875
	CHILLER + KIT 2P AM AP	404	1273	339	320	235	249	1143	383	1139	914	402	1275	343	326	236	249	1155	381	1143	926
	CHILLER + KIT 1P AM	424	1222	319	270	216	255	1060	403	1071	842	421	1224	324	275	218	256	1072	400	1076	854
	CHILLER + KIT 1P AM AP	416	1231	330	284	220	255	1090	395	1086	868	414	1233	334	290	222	256	1102	393	1090	880
	CHILLER + KIT 2P P/S	417	1242	324	287	223	252	1086	396	1098	865	415	1245	329	292	225	253	1098	394	1102	876
	CHILLER + KIT 1P P/S	423	1223	320	271	216	255	1062	402	1072	844	421	1225	324	276	218	256	1074	400	1078	855
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	391	994	278	140	97	192	706	393	994	702	388	1002	283	145	99	192	718	390	1001	713
	CHILLER + KIT TB COMPLETO	387	1004	282	145	98	191	717	390	1003	711	384	1011	287	150	100	191	729	387	1010	723
	CHILLER + KIT TB BASE	388	995	282	142	97	192	713	391	995	708	385	1003	287	147	99	192	725	388	1003	719
	CHILLER + KIT MDP 2P SS	372	1075	297	181	114	188	780	376	1066	766	369	1080	302	186	116	188	792	373	1071	777
	CHILLER + KIT MDP 2P SS AP	357	1129	313	216	126	184	838	362	1115	817	355	1134	317	221	128	184	851	360	1119	828
	CHILLER + KIT MDP 1P SS	376	1038	295	165	106	190	756	380	1033	745	373	1045	300	170	108	190	768	377	1039	756
	CHILLER + KIT MDP 1P SS AP	370	1061	304	179	112	190	786	374	1053	771	368	1067	309	184	114	191	798	372	1059	782
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	424	1231	295	254	204	236	989	400	1072	776	422	1233	299	259	205	237	1001	398	1077	787
	CHILLER + KIT 2P AM	411	1264	311	288	218	235	1051	387	1120	830	409	1266	315	293	219	236	1063	385	1124	842
	CHILLER + KIT 2P AM AP	398	1295	326	323	229	231	1110	374	1162	881	396	1297	330	328	231	232	1122	372	1166	893
	CHILLER + KIT 1P AM	417	1244	306	272	211	238	1027	393	1094	809	415	1247	311	277	213	239	1039	391	1099	821
	CHILLER + KIT 1P AM AP	410	1253	317	287	215	238	1057	386	1108	835	407	1255	321	292	217	239	1069	384	1113	847
	CHILLER + KIT 2P P/S	411	1265	311	289	218	235	1053	387	1121	832	408	1267	316	294	220	236	1065	385	1125	843
	CHILLER + KIT 1P P/S	417	1245	307	273	211	238	1029	393	1095	811	414	1248	311	278	213	239	1041	390	1100	822

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 80

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation			Transport			Operation			Transport										
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	407	974	296	142	106	220	765	410	975	759	404	982	301	147	108	221	777	407	982	771
	CHILLER + KIT TB COMPLETO	403	984	301	148	108	219	775	406	983	769	400	991	305	153	110	220	787	403	990	780
	CHILLER + KIT TB BASE	405	976	300	145	106	220	771	407	976	765	402	983	305	149	108	221	783	404	983	776
	CHILLER + KIT MDP 2P SS	388	1051	317	182	124	215	838	392	1042	823	385	1057	321	188	126	216	850	390	1048	835
	CHILLER + KIT MDP 2P SS AP	373	1104	333	216	137	211	897	379	1090	874	371	1108	337	222	139	211	909	376	1094	886
	CHILLER + KIT MDP 1P SS	392	1017	314	167	116	218	814	396	1012	802	389	1023	319	172	118	218	826	394	1018	814
	CHILLER + KIT MDP 1P SS AP	386	1039	323	181	122	218	844	391	1031	828	384	1044	328	186	124	219	856	388	1037	840
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	434	1203	314	255	214	264	1047	415	1049	833	432	1206	319	260	216	264	1059	412	1054	844
	CHILLER + KIT 2P AM	421	1237	331	289	228	262	1110	402	1095	888	419	1239	335	294	230	262	1122	399	1099	899
	CHILLER + KIT 2P AM AP	408	1268	346	323	241	258	1168	389	1136	938	406	1269	351	328	242	259	1180	386	1140	950
	CHILLER + KIT 1P AM	427	1217	326	273	222	265	1085	408	1070	866	425	1220	330	278	223	266	1097	405	1075	878
	CHILLER + KIT 1P AM AP	420	1226	337	287	226	265	1115	400	1084	893	418	1228	341	293	228	266	1127	398	1089	904
	CHILLER + KIT 2P P/S	421	1237	331	290	229	262	1111	401	1096	889	419	1240	336	295	231	262	1123	399	1100	901
	CHILLER + KIT 1P P/S	427	1218	327	274	222	265	1087	407	1071	868	424	1220	331	279	224	266	1099	405	1076	880
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	397	994	286	144	102	202	732	399	994	727	394	1001	290	149	104	202	745	396	1001	739
	CHILLER + KIT TB COMPLETO	393	1003	290	149	103	201	743	395	1002	736	390	1010	294	154	106	202	755	393	1009	748
	CHILLER + KIT TB BASE	394	995	289	146	102	202	739	396	995	733	391	1002	294	151	104	202	751	394	1002	744
	CHILLER + KIT MDP 2P SS	377	1072	305	184	119	197	806	382	1063	791	375	1077	309	190	121	198	818	379	1068	803
	CHILLER + KIT MDP 2P SS AP	362	1125	321	219	132	193	865	368	1111	842	360	1129	325	224	134	194	877	366	1115	853
	CHILLER + KIT MDP 1P SS	381	1036	303	169	111	200	782	385	1031	770	379	1043	307	174	113	200	794	383	1038	782
	CHILLER + KIT MDP 1P SS AP	376	1058	312	183	117	200	812	380	1051	796	373	1064	316	188	119	201	824	378	1057	808
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	427	1224	302	257	209	246	1015	405	1069	801	425	1227	307	262	211	247	1027	403	1075	812
	CHILLER + KIT 2P AM	414	1258	319	291	223	244	1077	392	1116	855	412	1260	323	296	225	245	1090	390	1120	867
	CHILLER + KIT 2P AM AP	401	1288	334	326	235	241	1136	379	1157	906	399	1290	338	331	237	242	1148	377	1161	918
	CHILLER + KIT 1P AM	420	1238	314	275	217	247	1053	398	1091	834	418	1240	319	280	218	248	1065	396	1095	872
	CHILLER + KIT 1P AM AP	413	1246	325	290	221	248	1083	391	1104	860	411	1249	329	295	223	248	1095	389	1109	872
	CHILLER + KIT 2P P/S	414	1258	319	292	224	244	1079	392	1117	857	412	1260	324	297	225	245	1091	390	1121	868
	CHILLER + KIT 1P P/S	420	1239	315	276	217	247	1055	398	1092	836	418	1241	319	281	219	248	1067	395	1097	847

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 90

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation							Transport		Operation					Transport					
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	444	1267	403	231	154	269	1057	446	1266	1050	441	1276	408	237	156	269	1071	443	1274	1063
	CHILLER + KIT TB COMPLETO	440	1280	409	240	157	268	1074	442	1278	1064	437	1289	414	246	160	268	1088	440	1285	1077
	CHILLER + KIT TB BASE	443	1268	404	232	154	269	1059	446	1266	1051	440	1276	409	238	157	269	1073	443	1275	1065
	CHILLER + KIT MDP 2P SS	421	1387	430	301	184	262	1176	426	1372	1153	419	1393	434	308	186	262	1190	424	1379	1167
	CHILLER + KIT MDP 2P SS AP	412	1429	440	331	194	258	1223	418	1410	1194	410	1435	445	337	196	259	1237	416	1416	1207
	CHILLER + KIT MDP 1P SS	429	1340	423	275	173	266	1137	433	1330	1119	427	1347	428	281	175	267	1152	431	1337	1133
	CHILLER + KIT MDP 1P SS AP	424	1356	431	287	177	266	1161	429	1345	1140	422	1362	436	294	179	266	1176	426	1351	1154
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	491	1626	419	433	347	336	1535	455	1367	1154	489	1628	423	440	350	337	1549	452	1373	1167
	CHILLER + KIT 2P AM	475	1676	440	494	372	332	1638	439	1443	1244	473	1678	445	500	375	333	1652	437	1448	1257
	CHILLER + KIT 2P AM AP	467	1698	450	523	382	329	1684	431	1475	1283	465	1700	454	530	385	330	1698	429	1480	1297
	CHILLER + KIT 1P AM	482	1649	434	466	362	337	1598	447	1405	1209	480	1651	439	473	364	337	1613	444	1411	1223
	CHILLER + KIT 1P AM AP	478	1656	441	479	366	337	1623	442	1417	1230	476	1658	446	486	368	337	1637	440	1422	1244
	CHILLER + KIT 2P P/S	475	1676	440	494	373	332	1640	439	1443	1245	473	1678	445	501	375	333	1654	437	1448	1258
	CHILLER + KIT 1P P/S	482	1650	434	467	362	337	1601	446	1406	1211	480	1652	439	474	364	337	1615	444	1412	1224
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	433	1287	390	231	148	249	1018	435	1286	1011	430	1296	395	238	150	249	1033	432	1294	1024
	CHILLER + KIT TB COMPLETO	429	1301	396	240	151	248	1035	431	1298	1025	426	1309	401	247	153	249	1049	429	1306	1039
	CHILLER + KIT TB BASE	432	1288	391	232	148	249	1020	435	1287	1012	430	1297	396	239	150	249	1034	432	1295	1026
	CHILLER + KIT MDP 2P SS	411	1409	416	303	177	242	1137	415	1395	1114	409	1416	420	309	179	243	1152	413	1401	1128
	CHILLER + KIT MDP 2P SS AP	402	1452	426	332	187	239	1184	407	1433	1155	400	1457	430	339	189	240	1198	405	1439	1168
	CHILLER + KIT MDP 1P SS	419	1361	410	276	166	247	1098	422	1352	1080	416	1368	415	282	168	248	1113	420	1359	1094
	CHILLER + KIT MDP 1P SS AP	414	1377	417	288	170	246	1122	418	1366	1101	411	1384	422	295	173	247	1137	416	1373	1115
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	485	1649	405	435	340	317	1496	445	1389	1115	482	1651	409	441	342	318	1511	443	1395	1129
	CHILLER + KIT 2P AM	469	1699	426	495	365	313	1599	430	1466	1205	467	1701	430	502	367	314	1614	428	1470	1218
	CHILLER + KIT 2P AM AP	461	1721	435	525	375	311	1645	422	1498	1245	459	1722	440	532	377	311	1659	420	1503	1258
	CHILLER + KIT 1P AM	476	1672	420	468	354	318	1560	437	1427	1170	474	1674	424	474	356	319	1574	435	1433	1184
	CHILLER + KIT 1P AM AP	472	1678	427	481	358	318	1584	433	1439	1191	470	1680	432	488	360	319	1598	430	1445	1205
	CHILLER + KIT 2P P/S	469	1699	426	496	365	314	1601	430	1466	1206	467	1701	430	503	367	314	1615	428	1471	1219
	CHILLER + KIT 1P P/S	476	1672	420	469	355	318	1562	437	1429	1172	474	1675	425	476	357	319	1576	435	1434	1185

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 100

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation							Transport		Operation					Transport					
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	430	1217	458	240	151	289	1138	432	1215	1130	427	1225	463	246	154	289	1152	430	1223	1143
	CHILLER + KIT TB COMPLETO	426	1230	464	249	154	288	1154	429	1227	1144	424	1238	469	255	157	288	1169	426	1235	1157
	CHILLER + KIT TB BASE	429	1217	459	241	151	289	1140	431	1216	1131	427	1226	464	247	154	289	1154	429	1224	1145
	CHILLER + KIT MDP 2P SS	410	1334	484	311	181	282	1257	414	1319	1233	408	1340	489	317	183	282	1271	412	1325	1247
	CHILLER + KIT MDP 2P SS AP	402	1375	494	340	191	278	1304	407	1356	1274	400	1381	499	347	194	279	1318	405	1362	1287
	CHILLER + KIT MDP 1P SS	417	1288	478	284	170	286	1218	421	1278	1199	415	1295	483	290	172	287	1232	419	1285	1213
	CHILLER + KIT MDP 1P SS AP	413	1304	486	296	174	286	1242	417	1292	1220	411	1311	491	303	177	286	1256	415	1299	1234
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	479	1572	470	446	341	359	1616	441	1314	1234	477	1575	474	453	343	360	1630	439	1320	1247
	CHILLER + KIT 2P AM	464	1623	491	506	366	355	1719	428	1389	1324	463	1626	496	513	368	356	1733	426	1394	1337
	CHILLER + KIT 2P AM AP	457	1646	501	535	376	352	1765	421	1421	1363	455	1648	506	542	378	353	1779	419	1426	1377
	CHILLER + KIT 1P AM	471	1596	485	479	355	360	1679	434	1352	1289	469	1599	490	485	358	361	1694	432	1358	1303
	CHILLER + KIT 1P AM AP	467	1604	492	492	359	360	1703	430	1364	1310	465	1606	497	499	362	360	1718	428	1370	1324
	CHILLER + KIT 2P P/S	464	1624	492	507	367	355	1720	428	1389	1325	462	1626	496	514	369	356	1735	426	1395	1338
	CHILLER + KIT 1P P/S	471	1597	486	480	356	360	1681	434	1353	1291	469	1600	490	487	358	361	1696	432	1359	1304
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	419	1234	445	240	145	269	1099	421	1232	1091	417	1242	450	247	148	269	1113	419	1241	1104
	CHILLER + KIT TB COMPLETO	415	1247	450	249	148	268	1116	418	1244	1105	413	1256	455	256	151	268	1130	416	1252	1119
	CHILLER + KIT TB BASE	419	1235	446	241	145	269	1101	421	1233	1092	416	1243	451	248	148	269	1115	419	1241	1106
	CHILLER + KIT MDP 2P SS	400	1353	470	312	174	262	1218	404	1338	1194	398	1359	475	318	176	263	1232	402	1344	1208
	CHILLER + KIT MDP 2P SS AP	392	1395	480	341	184	259	1265	397	1376	1235	390	1401	485	348	186	260	1279	395	1382	1248
	CHILLER + KIT MDP 1P SS	407	1306	464	285	163	267	1179	410	1297	1160	405	1314	469	291	166	267	1193	408	1304	1174
	CHILLER + KIT MDP 1P SS AP	402	1322	472	297	168	266	1203	406	1311	1181	400	1329	477	304	170	267	1217	404	1318	1195
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	473	1593	456	447	334	340	1577	432	1333	1195	470	1596	460	454	336	341	1591	430	1339	1209
	CHILLER + KIT 2P AM	458	1644	477	508	359	337	1680	419	1409	1285	456	1646	481	515	361	337	1694	417	1414	1298
	CHILLER + KIT 2P AM AP	451	1666	486	537	369	334	1726	411	1441	1325	449	1668	491	544	371	334	1740	410	1446	1338
	CHILLER + KIT 1P AM	465	1617	471	480	348	341	1640	425	1371	1250	463	1619	475	487	350	342	1655	423	1377	1264
	CHILLER + KIT 1P AM AP	461	1624	478	493	352	341	1665	421	1384	1271	459	1626	483	500	354	342	1679	419	1389	1285
	CHILLER + KIT 2P P/S	458	1644	477	509	359	337	1681	418	1409	1286	456	1646	482	515	361	337	1696	417	1414	1299
	CHILLER + KIT 1P P/S	465	1618	471	481	349	341	1642	425	1373	1252	463	1620	476	488	351	342	1657	423	1378	1265

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 115

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation			Transport			Operation			Transport										
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	436	1252	519	290	187	336	1332	438	1251	1322	434	1260	525	297	190	336	1349	436	1258	1338
	CHILLER + KIT TB COMPLETO	433	1263	525	298	190	335	1348	436	1261	1336	431	1270	531	306	193	336	1365	433	1268	1352
	CHILLER + KIT TB BASE	436	1253	520	290	187	336	1333	438	1252	1324	433	1260	526	298	190	336	1351	436	1259	1339
	CHILLER + KIT MDP 2P SS	419	1351	545	360	217	328	1451	423	1339	1425	417	1356	551	368	220	329	1468	421	1344	1441
	CHILLER + KIT MDP 2P SS AP	409	1396	558	398	231	324	1511	414	1379	1478	407	1401	564	405	233	325	1528	412	1384	1494
	CHILLER + KIT MDP 1P SS	425	1312	539	333	206	333	1412	428	1304	1392	423	1318	545	341	209	334	1429	426	1310	1407
	CHILLER + KIT MDP 1P SS AP	420	1328	549	349	211	333	1442	424	1319	1418	418	1334	555	357	214	333	1460	422	1324	1434
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	478	1560	531	495	378	406	1810	446	1334	1426	476	1563	537	502	380	407	1827	444	1339	1442
	CHILLER + KIT 2P AM	465	1607	553	555	403	402	1913	434	1398	1516	464	1609	559	563	406	403	1930	432	1403	1532
	CHILLER + KIT 2P AM AP	457	1633	566	593	416	397	1972	426	1434	1568	455	1635	571	600	419	399	1989	424	1438	1583
	CHILLER + KIT 1P AM	471	1582	547	528	392	406	1873	440	1367	1481	469	1585	553	535	395	408	1890	438	1372	1497
	CHILLER + KIT 1P AM AP	467	1591	556	544	397	406	1904	435	1379	1508	465	1593	562	552	400	407	1921	433	1384	1524
	CHILLER + KIT 2P P/S	465	1607	553	556	403	402	1914	434	1399	1517	463	1609	559	563	406	403	1931	432	1403	1533
	CHILLER + KIT 1P P/S	471	1583	547	529	393	406	1875	440	1368	1483	469	1585	553	536	395	408	1892	437	1373	1499
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	426	1268	505	290	180	313	1288	428	1268	1278	424	1276	511	297	183	314	1305	426	1275	1294
	CHILLER + KIT TB COMPLETO	423	1279	511	299	183	313	1305	425	1277	1293	420	1287	517	306	186	314	1322	423	1284	1309
	CHILLER + KIT TB BASE	425	1269	506	291	180	313	1290	428	1268	1280	423	1276	512	298	183	314	1307	426	1275	1296
	CHILLER + KIT MDP 2P SS	409	1369	531	361	209	307	1407	413	1356	1382	407	1374	536	369	211	308	1424	411	1362	1398
	CHILLER + KIT MDP 2P SS AP	399	1415	543	399	222	303	1467	404	1398	1434	398	1419	549	407	225	304	1485	403	1403	1450
	CHILLER + KIT MDP 1P SS	415	1329	525	334	198	311	1368	418	1321	1348	413	1335	531	341	201	312	1385	416	1327	1364
	CHILLER + KIT MDP 1P SS AP	410	1345	535	350	204	311	1399	414	1336	1375	408	1351	541	358	206	312	1416	412	1342	1391
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	472	1580	516	496	369	384	1766	437	1351	1383	470	1582	522	504	372	386	1783	435	1357	1399
	CHILLER + KIT 2P AM	459	1626	538	557	394	381	1869	425	1417	1472	457	1628	543	564	397	382	1886	423	1421	1488
	CHILLER + KIT 2P AM AP	451	1653	550	595	407	377	1929	417	1453	1524	449	1654	556	602	410	378	1946	415	1457	1540
	CHILLER + KIT 1P AM	465	1602	532	529	384	385	1830	431	1384	1438	463	1604	537	537	386	387	1847	429	1389	1454
	CHILLER + KIT 1P AM AP	460	1610	541	546	388	385	1860	426	1397	1465	458	1612	547	553	391	386	1877	424	1402	1481
	CHILLER + KIT 2P P/S	459	1626	538	557	394	381	1871	425	1417	1474	457	1628	544	565	397	382	1888	423	1422	1490
	CHILLER + KIT 1P P/S	465	1602	532	530	384	385	1832	430	1386	1440	463	1604	538	538	387	387	1849	428	1390	1456

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 130

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation			Transport			Operation			Transport										
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	432	1241	537	294	187	342	1360	434	1240	1349	430	1248	543	301	190	342	1377	432	1247	1365
	CHILLER + KIT TB COMPLETO	429	1252	543	302	190	341	1376	432	1249	1363	427	1259	549	310	193	342	1393	430	1256	1379
	CHILLER + KIT TB BASE	432	1242	538	295	187	342	1361	434	1240	1350	429	1249	544	302	190	343	1379	432	1247	1366
	CHILLER + KIT MDP 2P SS	415	1339	563	364	216	334	1479	419	1326	1452	413	1344	569	372	219	335	1496	417	1332	1468
	CHILLER + KIT MDP 2P SS AP	406	1384	576	402	230	330	1539	411	1367	1505	404	1389	582	410	233	331	1556	409	1372	1520
	CHILLER + KIT MDP 1P SS	421	1300	557	338	206	339	1440	425	1292	1418	419	1306	563	345	208	340	1457	423	1298	1434
	CHILLER + KIT MDP 1P SS AP	416	1316	567	354	211	339	1470	420	1307	1445	414	1322	573	361	214	340	1488	419	1312	1461
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	475	1547	548	500	376	413	1838	442	1322	1453	473	1550	554	508	379	414	1855	440	1327	1469
	CHILLER + KIT 2P AM	462	1594	570	560	402	409	1941	431	1386	1543	460	1596	576	568	404	410	1958	429	1390	1559
	CHILLER + KIT 2P AM AP	454	1620	583	598	415	404	2000	423	1422	1594	452	1622	589	606	417	406	2017	421	1426	1610
	CHILLER + KIT 1P AM	468	1570	564	533	391	413	1901	436	1354	1508	466	1572	570	540	393	415	1918	434	1359	1524
	CHILLER + KIT 1P AM AP	463	1578	574	549	396	413	1932	432	1367	1535	462	1580	579	557	398	414	1949	430	1372	1551
	CHILLER + KIT 2P P/S	462	1594	570	561	402	409	1942	430	1386	1544	460	1596	576	569	404	410	1959	429	1391	1560
	CHILLER + KIT 1P P/S	468	1570	564	534	391	413	1903	436	1355	1510	466	1573	570	542	394	415	1920	434	1360	1526
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	422	1256	523	294	179	319	1316	424	1255	1305	420	1264	529	301	182	320	1333	422	1262	1321
	CHILLER + KIT TB COMPLETO	419	1267	529	303	183	319	1333	421	1265	1320	417	1274	535	310	185	320	1350	419	1272	1336
	CHILLER + KIT TB BASE	421	1257	524	295	180	319	1318	424	1256	1307	419	1264	530	302	183	320	1335	422	1263	1323
	CHILLER + KIT MDP 2P SS	405	1356	549	365	208	313	1435	409	1343	1409	403	1361	555	373	211	314	1452	408	1349	1425
	CHILLER + KIT MDP 2P SS AP	396	1401	562	404	222	309	1495	401	1384	1461	395	1406	567	411	224	310	1513	400	1389	1477
	CHILLER + KIT MDP 1P SS	411	1316	543	338	198	317	1396	415	1308	1375	409	1323	549	346	201	318	1413	413	1314	1391
	CHILLER + KIT MDP 1P SS AP	406	1333	553	354	203	317	1427	410	1323	1402	405	1339	559	362	206	318	1444	409	1329	1418
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	468	1566	533	501	368	391	1794	433	1339	1410	466	1569	539	509	370	393	1811	431	1344	1426
	CHILLER + KIT 2P AM	456	1613	555	562	393	388	1897	421	1403	1499	454	1615	561	570	395	389	1914	420	1408	1515
	CHILLER + KIT 2P AM AP	447	1639	567	600	406	384	1957	414	1440	1551	446	1641	573	608	408	385	1974	412	1444	1567
	CHILLER + KIT 1P AM	462	1588	549	534	382	392	1858	427	1371	1465	460	1590	554	542	385	394	1875	425	1376	1481
	CHILLER + KIT 1P AM AP	457	1596	558	551	387	392	1888	423	1384	1492	455	1598	564	559	389	393	1905	421	1389	1507
	CHILLER + KIT 2P P/S	456	1613	555	563	393	388	1899	421	1404	1500	454	1615	561	570	396	389	1916	420	1408	1516
	CHILLER + KIT 1P P/S	461	1589	549	535	383	392	1860	427	1373	1467	459	1591	555	543	385	394	1877	425	1378	1482

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 145

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)											VD (Desuperheater unit)								
		Operation							Transport				Operation					Transport			
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	428	1246	555	306	192	348	1401	431	1245	1388	426	1253	561	314	195	349	1418	429	1251	1404
	CHILLER + KIT TB COMPLETO	425	1256	560	315	195	347	1418	428	1254	1403	423	1263	567	322	198	348	1435	426	1260	1419
	CHILLER + KIT TB BASE	428	1246	556	307	192	348	1403	431	1245	1390	426	1254	562	314	195	349	1420	429	1252	1406
	CHILLER + KIT MDP 2P SS	412	1340	581	377	221	341	1520	417	1329	1492	410	1346	587	384	224	342	1537	415	1334	1508
	CHILLER + KIT MDP 2P SS AP	404	1384	594	415	235	336	1580	409	1368	1544	402	1389	600	422	238	337	1597	407	1373	1560
	CHILLER + KIT MDP 1P SS	418	1303	575	350	211	346	1481	422	1295	1458	416	1309	581	358	213	347	1498	420	1301	1474
	CHILLER + KIT MDP 1P SS AP	413	1319	585	366	216	345	1512	418	1309	1485	412	1325	591	374	219	346	1529	416	1315	1501
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	471	1544	566	513	381	420	1879	439	1324	1493	469	1547	571	521	383	421	1896	437	1329	1509
	CHILLER + KIT 2P AM	459	1590	587	573	406	416	1982	428	1386	1582	457	1592	593	581	408	417	1999	426	1391	1598
	CHILLER + KIT 2P AM AP	451	1616	600	611	419	411	2042	420	1421	1634	449	1618	606	619	422	413	2059	418	1425	1650
	CHILLER + KIT 1P AM	465	1566	581	546	395	420	1942	433	1356	1548	463	1568	587	554	398	421	1960	431	1361	1564
	CHILLER + KIT 1P AM AP	460	1574	591	562	400	420	1973	429	1368	1575	458	1576	596	570	403	421	1990	427	1373	1591
	CHILLER + KIT 2P P/S	459	1590	587	574	406	416	1983	428	1387	1584	457	1592	593	582	409	417	2001	426	1391	1600
	CHILLER + KIT 1P P/S	464	1567	581	547	396	420	1944	433	1357	1550	462	1569	587	555	398	421	1962	431	1362	1566
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	417	1261	541	306	184	324	1356	420	1260	1341	415	1268	547	314	187	325	1373	418	1267	1357
	CHILLER + KIT TB COMPLETO	415	1272	546	315	187	324	1372	418	1269	1356	412	1278	552	323	190	325	1389	416	1276	1371
	CHILLER + KIT TB BASE	417	1262	542	307	184	324	1358	420	1260	1343	415	1269	548	315	187	325	1375	418	1267	1359
	CHILLER + KIT MDP 2P SS	402	1357	566	378	212	318	1475	406	1345	1445	400	1363	572	386	215	319	1492	405	1351	1461
	CHILLER + KIT MDP 2P SS AP	393	1402	579	416	226	314	1535	398	1385	1497	392	1406	585	424	228	315	1552	397	1390	1513
	CHILLER + KIT MDP 1P SS	408	1319	560	351	202	323	1436	412	1311	1411	406	1325	566	358	205	324	1453	410	1317	1427
	CHILLER + KIT MDP 1P SS AP	403	1335	570	367	207	322	1467	407	1326	1438	401	1341	576	374	210	323	1484	406	1331	1454
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	464	1563	550	515	371	397	1834	429	1341	1446	462	1565	556	522	374	398	1851	427	1346	1461
	CHILLER + KIT 2P AM	452	1609	572	575	396	394	1937	418	1404	1535	450	1611	577	583	399	395	1954	417	1408	1551
	CHILLER + KIT 2P AM AP	444	1635	584	613	409	390	1996	411	1439	1587	442	1637	590	621	412	391	2013	409	1443	1603
	CHILLER + KIT 1P AM	458	1585	566	548	386	398	1897	424	1373	1501	456	1587	571	555	388	399	1914	422	1378	1517
	CHILLER + KIT 1P AM AP	453	1592	575	564	390	398	1928	419	1385	1527	451	1595	581	572	393	399	1945	418	1390	1543
	CHILLER + KIT 2P P/S	452	1609	572	576	396	394	1938	418	1404	1536	450	1611	578	584	399	395	1955	416	1409	1552
	CHILLER + KIT 1P P/S	457	1585	566	549	386	398	1899	424	1374	1502	456	1587	572	556	389	399	1916	422	1379	1518

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 160

Unit type		IP - Heating mode																			
		VB (Standard unit) - VI (Brine unit)											VD (Desuperheater unit)								
		Operation							Transport				Operation					Transport			
Version		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	440	1249	564	313	205	370	1453	443	1248	1439	438	1256	570	320	208	371	1470	441	1255	1455
	CHILLER + KIT TB COMPLETO	437	1259	570	322	209	369	1470	440	1257	1453	435	1266	576	329	212	370	1487	438	1263	1469
	CHILLER + KIT TB BASE	439	1250	565	314	206	370	1455	442	1249	1440	437	1257	571	321	209	371	1472	440	1255	1456
	CHILLER + KIT MDP 2P SS	423	1341	591	384	235	362	1572	428	1329	1542	421	1346	597	391	238	364	1589	426	1334	1558
	CHILLER + KIT MDP 2P SS AP	414	1383	604	421	249	358	1632	420	1367	1595	413	1388	610	429	252	359	1650	418	1372	1610
	CHILLER + KIT MDP 1P SS	429	1304	584	357	224	368	1533	433	1297	1508	427	1310	590	364	227	369	1550	432	1302	1524
	CHILLER + KIT MDP 1P SS AP	424	1320	595	373	230	367	1564	429	1311	1535	423	1325	601	380	233	368	1581	427	1316	1551
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	478	1539	577	519	396	440	1931	449	1325	1543	476	1541	582	526	399	441	1948	448	1330	1559
	CHILLER + KIT 2P AM	466	1584	598	579	421	436	2034	438	1385	1633	464	1586	604	586	424	437	2051	436	1389	1649
	CHILLER + KIT 2P AM AP	458	1609	611	616	435	431	2094	430	1419	1684	457	1611	617	624	437	433	2111	429	1423	1700
	CHILLER + KIT 1P AM	472	1560	592	551	410	441	1994	444	1355	1598	470	1563	598	559	413	442	2012	442	1360	1614
	CHILLER + KIT 1P AM AP	467	1568	602	568	415	440	2025	439	1367	1625	466	1570	608	575	418	442	2042	438	1372	1641
	CHILLER + KIT 2P P/S	466	1584	599	579	422	436	2036	438	1386	1634	464	1586	604	587	424	437	2053	436	1390	1650
	CHILLER + KIT 1P P/S	472	1561	593	552	411	441	1997	443	1356	1600	470	1563	598	560	414	442	2014	442	1361	1616
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	430	1265	549	313	197	345	1404	433	1264	1389	427	1272	555	320	200	346	1421	431	1270	1405
	CHILLER + KIT TB COMPLETO	427	1275	554	322	200	345	1420	430	1273	1404	424	1282	560	329	203	346	1438	428	1279	1420
	CHILLER + KIT TB BASE	429	1265	549	314	197	346	1406	432	1264	1391	427	1272	556	321	200	346	1423	430	1271	1407
	CHILLER + KIT MDP 2P SS	413	1358	574	384	226	339	1523	418	1346	1493	412	1363	580	391	229	340	1540	416	1351	1509
	CHILLER + KIT MDP 2P SS AP	405	1401	587	422	240	334	1583	410	1385	1545	403	1405	593	429	243	335	1600	408	1389	1561
	CHILLER + KIT MDP 1P SS	419	1321	568	357	216	343	1484	423	1313	1459	417	1327	574	364	218	344	1501	422	1319	1475
	CHILLER + KIT MDP 1P SS AP	415	1336	578	373	221	343	1515	419	1327	1486	413	1342	584	380	224	344	1532	417	1332	1502
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	472	1558	560	519	386	417	1882	440	1342	1494	470	1560	566	527	389	418	1899	438	1347	1510
	CHILLER + KIT 2P AM	460	1603	581	580	411	413	1985	429	1403	1583	458	1605	587	587	414	414	2002	427	1407	1599
	CHILLER + KIT 2P AM AP	452	1629	594	617	425	409	2044	421	1437	1635	450	1630	600	625	427	410	2062	420	1441	1651
	CHILLER + KIT 1P AM	465	1579	575	552	401	417	1945	434	1373	1549	463	1581	581	560	403	419	1962	433	1377	1565
	CHILLER + KIT 1P AM AP	461	1587	585	569	406	417	1976	430	1385	1576	459	1589	591	576	408	418	1993	428	1389	1592
	CHILLER + KIT 2P P/S	460	1603	582	580	412	413	1986	429	1403	1585	458	1605	587	588	414	414	2003	427	1408	1601
	CHILLER + KIT 1P P/S	465	1580	576	553	401	417	1947	434	1374	1551	463	1582	581	561	404	419	1964	432	1378	1567

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 180

Unit type		IP - Heating mode																			
Version		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation						Transport			Operation						Transport				
		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	430	1515	531	459	289	335	1614	432	1515	1600	428	1518	537	467	292	336	1631	430	1519	1615
	CHILLER + KIT TB COMPLETO	427	1529	535	474	295	333	1637	429	1528	1620	425	1532	541	481	297	334	1654	428	1531	1635
	CHILLER + KIT TB BASE	429	1515	532	460	290	335	1616	432	1516	1601	428	1518	538	468	292	336	1633	430	1519	1617
	CHILLER + KIT MDP 2P SS	406	1691	536	615	352	306	1810	411	1672	1770	404	1692	541	623	354	308	1827	409	1673	1785
	CHILLER + KIT MDP 2P SS AP	402	1718	536	644	362	301	1843	407	1697	1799	401	1719	541	652	364	303	1860	406	1698	1814
	CHILLER + KIT MDP 1P SS	415	1612	541	548	326	322	1737	419	1602	1707	414	1615	547	556	328	323	1754	418	1604	1722
	CHILLER + KIT MDP 1P SS AP	413	1622	544	559	330	320	1753	417	1611	1721	412	1624	550	567	332	322	1770	416	1613	1736
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	483	1864	493	754	587	384	2218	444	1617	1741	482	1864	498	762	590	386	2235	442	1619	1756
	CHILLER + KIT 2P AM	464	1961	494	893	646	357	2390	426	1743	1890	463	1961	499	901	648	359	2407	425	1744	1905
	CHILLER + KIT 2P AM AP	461	1979	494	921	656	352	2423	423	1765	1919	459	1978	499	929	658	354	2440	421	1766	1934
	CHILLER + KIT 1P AM	473	1911	499	826	619	373	2317	435	1680	1827	472	1911	504	834	621	375	2334	433	1682	1842
	CHILLER + KIT 1P AM AP	471	1917	501	839	623	372	2335	433	1689	1843	469	1917	507	847	625	374	2353	431	1690	1858
	CHILLER + KIT 2P P/S	464	1963	494	895	647	357	2393	426	1745	1893	463	1962	499	903	649	359	2410	425	1746	1908
	CHILLER + KIT 1P P/S	473	1913	499	829	620	373	2321	435	1682	1830	471	1912	504	837	622	375	2338	433	1684	1845
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	421	1538	513	460	280	311	1564	423	1539	1549	419	1541	518	468	282	313	1581	421	1542	1565
	CHILLER + KIT TB COMPLETO	418	1552	517	475	285	310	1587	420	1551	1569	416	1555	523	483	287	311	1604	419	1554	1585
	CHILLER + KIT TB BASE	420	1538	513	461	280	311	1566	423	1539	1551	418	1541	519	469	282	313	1583	421	1542	1567
	CHILLER + KIT MDP 2P SS	397	1716	516	618	341	285	1759	402	1698	1719	396	1717	522	626	343	286	1776	401	1699	1735
	CHILLER + KIT MDP 2P SS AP	393	1744	516	646	351	280	1793	398	1723	1748	392	1745	521	654	353	281	1810	397	1724	1764
	CHILLER + KIT MDP 1P SS	406	1637	522	550	315	299	1687	410	1626	1656	405	1639	528	558	318	301	1704	409	1628	1672
	CHILLER + KIT MDP 1P SS AP	404	1646	525	561	319	298	1703	408	1635	1670	403	1648	530	569	321	299	1720	407	1637	1686
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	478	1889	474	756	577	362	2168	436	1642	1690	476	1889	479	764	579	363	2185	435	1643	1706
	CHILLER + KIT 2P AM	459	1986	474	895	634	336	2339	419	1769	1839	458	1985	479	903	636	337	2356	417	1770	1855
	CHILLER + KIT 2P AM AP	455	2004	474	923	644	331	2373	415	1792	1868	454	2003	479	932	646	332	2390	414	1792	1884
	CHILLER + KIT 1P AM	468	1936	479	829	608	351	2267	427	1705	1776	466	1935	485	837	610	353	2284	425	1707	1792
	CHILLER + KIT 1P AM AP	466	1942	482	842	612	350	2285	425	1714	1792	464	1941	487	850	614	352	2302	423	1715	1808
	CHILLER + KIT 2P P/S	459	1988	474	898	635	335	2343	418	1771	1842	457	1987	479	906	637	337	2360	417	1772	1858
	CHILLER + KIT 1P P/S	468	1938	479	831	609	351	2270	427	1708	1779	466	1937	485	839	611	353	2287	425	1709	1795

WEIGHT DURING OPERATION AND TRANSPORT - MOD. 200

Unit type		IP - Heating mode																			
Version		VB (Standard unit) - VI (Brine unit)									VD (Desuperheater unit)										
		Operation						Transport			Operation						Transport				
		A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
WITHOUT WATER STORAGE TANK	CHILLER	441	1519	534	465	307	352	1658	444	1520	1644	439	1523	540	473	309	353	1675	442	1523	1659
	CHILLER + KIT TB COMPLETO	438	1533	538	480	312	351	1681	441	1532	1664	436	1536	544	487	315	352	1698	439	1535	1679
	CHILLER + KIT TB BASE	441	1519	535	466	307	352	1660	443	1520	1645	439	1523	541	474	310	353	1677	441	1523	1661
	CHILLER + KIT MDP 2P SS	417	1691	540	620	371	323	1854	422	1672	1814	415	1692	545	628	373	324	1871	420	1674	1829
	CHILLER + KIT MDP 2P SS AP	413	1718	540	648	381	317	1887	418	1697	1843	411	1719	546	656	383	319	1904	416	1698	1858
	CHILLER + KIT MDP 1P SS	426	1614	545	554	344	339	1781	430	1604	1751	425	1616	551	561	346	340	1798	429	1606	1766
	CHILLER + KIT MDP 1P SS AP	424	1624	547	565	348	337	1797	428	1613	1765	422	1626	553	572	350	338	1814	427	1615	1780
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	491	1861	498	758	607	399	2262	454	1619	1785	489	1861	504	766	609	401	2279	453	1621	1800
	CHILLER + KIT 2P AM	472	1957	500	896	666	372	2434	436	1742	1934	470	1956	505	904	668	373	2451	435	1743	1949
	CHILLER + KIT 2P AM AP	468	1974	500	924	677	366	2467	433	1764	1963	466	1973	506	932	679	368	2484	431	1764	1978
	CHILLER + KIT 1P AM	480	1907	504	830	639	388	2361	445	1681	1871	479	1907	510	838	641	390	2378	443	1682	1886
	CHILLER + KIT 1P AM AP	478	1913	507	843	643	387	2379	443	1689	1887	477	1913	512	851	645	389	2397	441	1691	1902
	CHILLER + KIT 2P P/S	471	1958	500	898	667	371	2437	436	1744	1937	470	1957	505	906	669	373	2454	434	1745	1952
	CHILLER + KIT 1P P/S	480	1909	505	832	640	388	2365	444	1683	1874	478	1908	510	840	642	390	2382	443	1684	1889
Unit type		IR - Cooling mode																			
WITHOUT WATER STORAGE TANK	CHILLER	433	1542	516	466	297	329	1608	435	1543	1593	431	1545	522	474	300	330	1625	433	1546	1609
	CHILLER + KIT TB COMPLETO	429	1556	520	481	303	327	1631	432	1555	1613	428	1559	526	488	305	329	1648	430	1558	1629
	CHILLER + KIT TB BASE	432	1542	517	467	297	329	1610	435	1543	1595	430	1545	522	475	300	330	1627	433	1546	1611
	CHILLER + KIT MDP 2P SS	408	1716	520	623	360	301	1803	413	1697	1763	407	1717	526	630	362	302	1820	412	1699	1779
	CHILLER + KIT MDP 2P SS AP	404	1743	520	651	370	296	1837	410	1722	1792	403	1744	526	659	372	297	1854	408	1723	1808
	CHILLER + KIT MDP 1P SS	418	1638	526	555	334	316	1731	422	1628	1700	416	1640	532	563	336	317	1748	420	1630	1716
	CHILLER + KIT MDP 1P SS AP	416	1648	529	566	337	315	1747	420	1637	1714	414	1649	534	574	340	316	1764	418	1638	1730
WITH WATER STORAGE TANK	CHILLER + KIT TB CON SERB.	486	1885	479	759	597	377	2212	447	1643	1734	484	1885	485	767	599	378	2229	445	1645	1750
	CHILLER + KIT 2P AM	467	1981	480	898	655	350	2383	429	1767	1883	465	1980	485	906	657	352	2400	427	1768	1899
	CHILLER + KIT 2P AM AP	463	1998	480	926	665	345	2417	425	1789	1912	461	1997	486	934	667	347	2434	424	1790	1928
	CHILLER + KIT 1P AM	475	1931	485	832	628	366	2311	437	1705	1820	474	1931	490	840	630	368	2328	436	1706	1836
	CHILLER + KIT 1P AM AP	473	1937	487	845	632	365	2329	435	1714	1836	472	1937	493	853	634	366	2346	434	1715	1852
	CHILLER + KIT 2P P/S	466	1983	480	901	656	350	2387	429	1769	1886	465	1981	485	909	658	351	2404	427	1770	1902
	CHILLER + KIT 1P P/S	475	1933	485	834	629	366	2314	437	1707	1823	473	1932	491	842	631	367	2331	435	1708	1839

RECEPTION AND POSITIONING

Inspections on arrival

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

Safety prescriptions

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

Handling

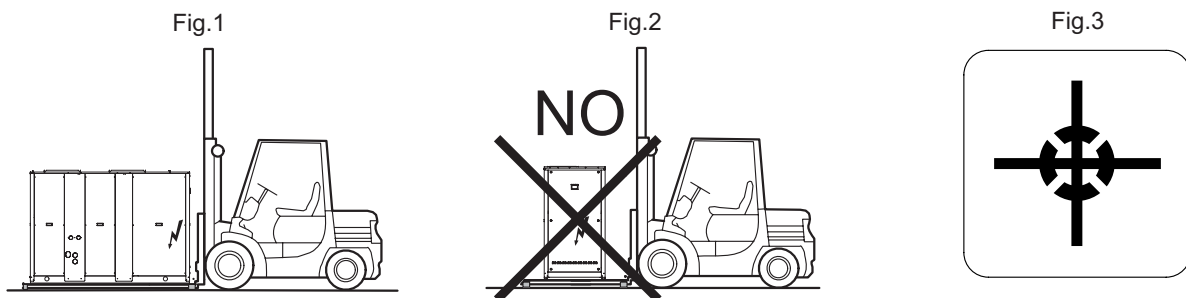
Before moving the unit, check its weight on the data plate with the general specifications of the appliance and consult the **Main Features** section of this manual. Make sure that the unit is handled with care, that it is not jolted in any way and that none of its functional parts is damaged.

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

• Handling with a lift truck or similar

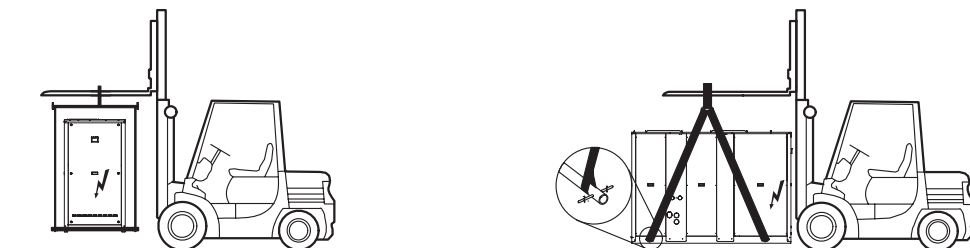
The unit has four wooden bases so that it can be transported in a longitudinal direction (**not sideways**). Place something suitable in between to separate the truck from the unit in order to prevent the surfaces of the bank or electric panel from being damaged if the unit has to be moved sideways (**Fig.1**).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

Refer to the data plates (**Part.3 Fig.1**) that identify the center of gravity position, applied to the **4 sides** of the base.



• Lifting and handling with a crane or similar

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



WARNING:

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

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

Storage

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

The storage conditions are:

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

ELECTRICAL CONNECTIONS

General rules

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

Structure of the electric panel

All the electrical components are housed in an enclosed casing protected against adverse weather conditions. They can be inspected through the screen-printed front door. The door is locked by the door locking mechanism of the main circuit-breaker. The powering flex and ground wire (**PE**) access the panel through the opening on the left-hand side in the lower part of the side of the unit and enter the actual panel through the lower part of the junction box.

Composition of the system

The system consists of an electromechanical part formed by the power circuit (which includes the circuit-breaker, the contactors, fuse protections and transformer) and a second part formed by the microprocessor monitoring system.

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

Electrical connections

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

Compressor specifications

MOD.		50	60	70	80	90	100	115	130	145	160	180	200
Power supply	V-ph-Hz	400 - 3 - 50											
FLA [A]	CP1	20,4	22,6	25,6	31,0	31,0	37,0	37,0	45,0	45,0	60,0	60,0	82,0
	CP2	20,4	22,6	25,6	31,0	37,0	37,0	45,0	45,0	60,0	60,0	82,0	82,0
LRA [A]	CP1	118	118	140	173	173	225	225	272	272	310	310	394
	CP2	118	118	140	173	225	225	272	272	310	310	394	394
FLI [kW]	CP1	11,8	13,2	14,7	17,0	17,0	22,6	22,6	27,3	27,3	36,1	36,1	46,7
	CP2	11,8	13,2	14,7	17,0	22,6	22,6	27,3	27,3	36,1	36,1	46,7	46,7

Single Fan specifications

MOD.		50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]		400 - 3 - 50											
FLA [A]		11,3			4,9 / 8,3			6,5			11,3		
LRA [A]		79,1			26,95 / 58,1			37,1			79,1		
FLI [kW]		6,4			2,71 / 4,8			3,7			6,4		

Summary specifications Fans

MOD.		50	60	70	80	90	100	115	130	145	160	180	200		
Power supply [V-ph-Hz]		400 - 3 - 50													
FLA [A]		11,3			13,2			19,5			33,9			45,2	
LRA [A]		79,1			85,1			111			237			316	
FLI [kW]		6,4			7,5			11,0			19,3			25,7	

Specifications of pumping module accessory MP-AM and MP-PS

MOD.		50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]		400 - 3 - 50											
FLA [A]		3,2	3,2	3,2	3,2	4,8	4,8	4,8	4,8	5,6	5,6	8,1	8,1
LRA [A]		20,6	20,6	20,6	20,6	37,3	37,3	37,3	37,3	57,6	57,6	63,9	63,9
FLI [kW]		1,8	1,8	1,8	1,8	2,9	2,9	2,9	2,9	3,3	3,3	4,8	4,8

ELECTRICAL CONNECTIONS

Specifications of pumping module accessory MP-AM High

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	400 - 3 - 50											
FLA [A]	6,2	6,2	6,2	6,2	6,2	6,2	8,1	8,1	8,1	8,1	11,0	11,0
LRA [A]	42,3	42,3	42,3	42,3	42,3	42,3	63,9	63,9	63,9	63,9	84,8	84,8
FLI [kW]	3,8	3,8	3,8	3,8	3,8	3,8	4,8	4,8	4,8	4,8	6,5	6,5

NOTES:

Values valid for IP and IR units, **BASIC** and **SILENCED** versions, **WITH** or **WITHOUT** water tank

FLA= Full load current at maximum tolerated conditions

LRA= Locked rotor current

FLI= Full load power input at maximum tolerated conditions

MIC= Maximum instantaneous current of the unit

Values relative to a 400V~3+N~50Hz power supply voltage rating

Summary tables (total values):

Version without Pumping Module

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	400 - 3 +N - 50											
FLA TOTALE [A]	52,7	55,3	62,8	73,1	80,6	86,1	101	109	138	152	178	193
FLI TOTALE [kW]	30,3	32,5	35,9	40,3	47,1	52,7	60,9	65,6	82,7	91,5	108	119
MIC TOTALE [A]	150	151	177	215	269	275	328	336	389	403	498	513

Version with Pumping Module MP-AM and MP-PS

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	400 - 3 +N - 50											
FLA TOTALE [A]	55,9	58,5	66,0	76,3	85,4	90,9	106	114	144	158	186	201
FLI TOTALE [kW]	32,1	34,3	37,7	42,1	50,0	55,6	63,8	68,5	85,9	94,7	113	124
MIC TOTALE [A]	153	155	180	218	274	279	333	341	394	409	507	521

Version with Pumping Module MP-AM High

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	400 - 3 +N - 50											
FLA TOTALE [A]	58,9	61,6	69,0	79,3	86,8	92,4	109	117	146	161	189	204
FLI TOTALE [kW]	34,1	36,3	39,7	44,1	50,8	56,5	65,6	70,3	87,5	96,3	115	126
MIC TOTALE [A]	156	158	183	221	275	281	336	345	397	411	509	524

ELECTRICAL CONNECTIONS

1) Connection to the electricity main

- **Feeder line;**

The feeder line of the machine must follow a well defined route without interruptions. Run the line through the pre-cut hole at the bottom of the right panel on the machine. It is advisable to use a cable gland, to secure the line to the machine structure. Now route the line inside the compressor compartment until it reaches the hole in the bottom of the electric panel. Here again, make sure you use an adequately sized cable clamp, **use a high temperature cable or sheath, not place the cable or sheath on the compressors.**

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

- **Powering system;**

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

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

- **Protection on supply side;**

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

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

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

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

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

- **Neutral conductor:**

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

2) Electric panel

- **Protection degree:**

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

- **Starting and stopping function:**

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

- **Emergency function:**

The handle also acts as an emergency stop since it can be directly accessed from outside and is also evident owing to its red colour.

3) Reference standards

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

- Low Voltage Directive **2006/95 EEC** which also includes the following harmonized standards:

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

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

- Directive **2004/108/EEC** concerning "**Electromagnetic compatibility**".

WET CONNECTIONS

General rules

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

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

1) Standard supply.

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

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

2) With pumping module accessory.

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

Hydraulic layout of the system

General suggestions

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

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

- Depending on the chosen accessory, there may be male threaded connections or Victaulic-type joints for hooking up to the unit. The joints allow the pipes to expand due to changes in temperature and in addition the elastomer gasket and the specified play help insulate and absorb noise and vibration.

- If anti-vibration mounts are installed under the unit, it is recommended to use flexible couplings before and after the water circulation pump and near the unit.

- Install a cock on the outlet of the unit in order to regulate the water flow.

Precautions for the Winter

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

1. Drain the system completely, taking care to drain the plate exchanger (in order to drain the unit's plumbing system completely, open the water drain ball valves and the air vent valves).
2. Operate with glycol water taking account, depending on the % of glycol, of the factor of correction of the refrigerating capacity, power input, water flow rate and losses of head (see table on following page)
3. If it is certain that the unit will always be powered throughout the winter, the unit is able to protect itself from freezing, down to a temperature of -20°C : this is possible thanks to an antifreeze electric heating element installed on the plate exchanger and intelligent control of the water pump that must be governed by the microprocessor board (see the "Electric Connections" section). If the unit is fitted with a Storage tank, solution no. 3 requires installing the tank antifreeze heating element accessor

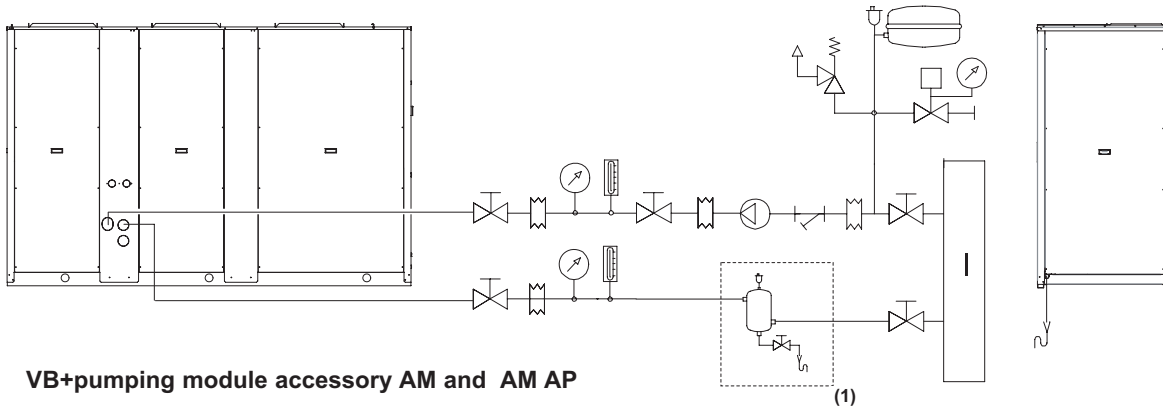
WET CONNECTIONS

Basic diagram Standard Unit VB [COLD WATER CIRCUIT]

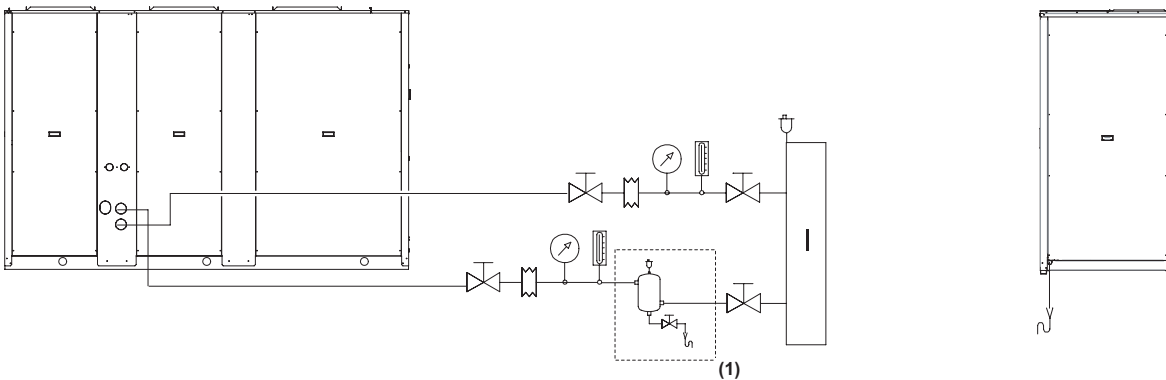
The following figures represent connections to the evaporator circuit.

IMPORTANT: There must be a constant flow of water to the exchanger. With accessory primary-secondary pumping module MP-PS is mandatory to install a water filter in the secondary circuit immediately before of the water tank.

VB+pumping module accessory PS














VB+pumping module accessory AM and AM AP



(1): Component not required if the unit is equipped with the "Water storage tank" accessory. Installation of this accessory is recommended if the unit is without it.

I = User system

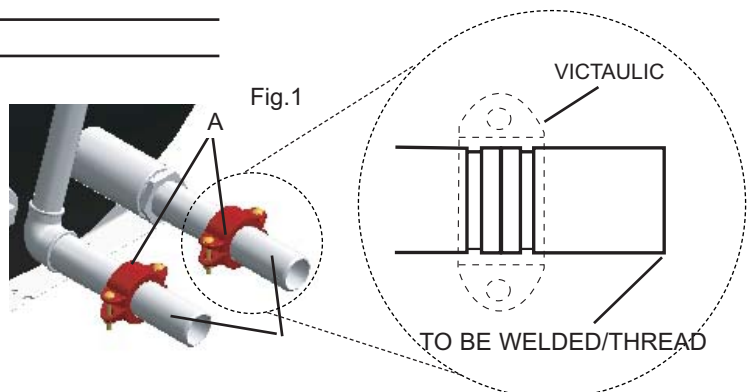
 Pressure gauge	 Pump	 Breather valve	 Coupling
 Thermometer	 Filter	 Safety valve	 Water filling unit
 On-off and/or water flow rate regulating valve		 Tank(1)	 Siphon

Air vent and water drain

On the plumbing circuit feeding the unit, especially when equipped with the standard pipe kit, the installer must fit an appropriate number of valves (manual or automatic) at the top of the circuit in order to vent any air in the plumbing system. In the same way, he must install a water drain valve in order, when necessary, to drain the unit's plate exchanger completely (especially during the winter in order to prevent freezing that would seriously jeopardize the operation of the unit). For units with the complete pipe kit there is an air vent valve on the top pipe (water inlet) and a water drain valve on the bottom pipe (water outlet). See "Accessories and options" section.

Plumbing connection with Victaulic couplings

It is composed of two Victaulic type quick couplers (Fig. 1-A) comprehensive of union (Fig. 1-B) and seal not installed (supplied with the unit). The unions are supplied to be welded on the end. Here we give the instructions to follow for installing the quick couplers.

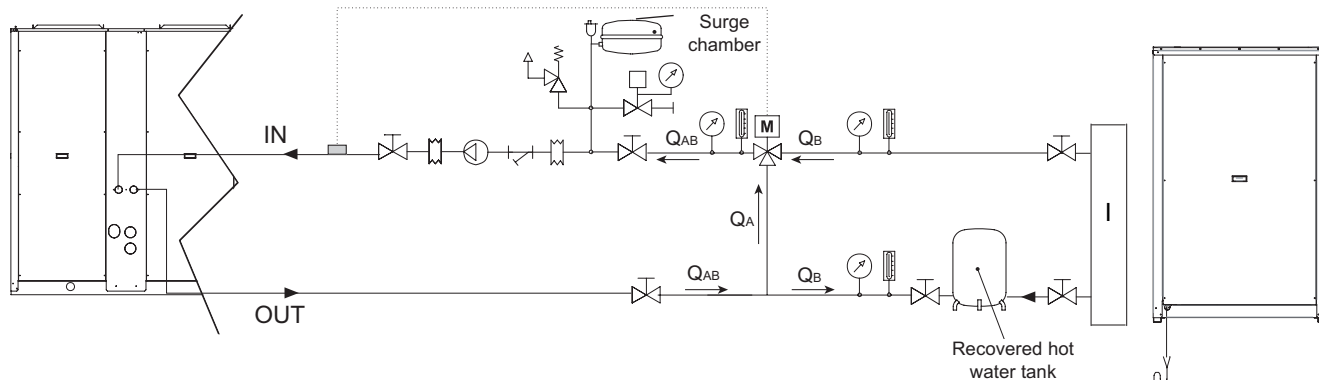


WET CONNECTIONS













Basic diagram for units with Desuperheater [HOT WATER CIRCUIT]

The basic diagram given is valid for VD version

The figure below shows the basic diagram of the portion of the system with the heat exchanger used for recovering partially heating power that would otherwise be disposed of in the air.



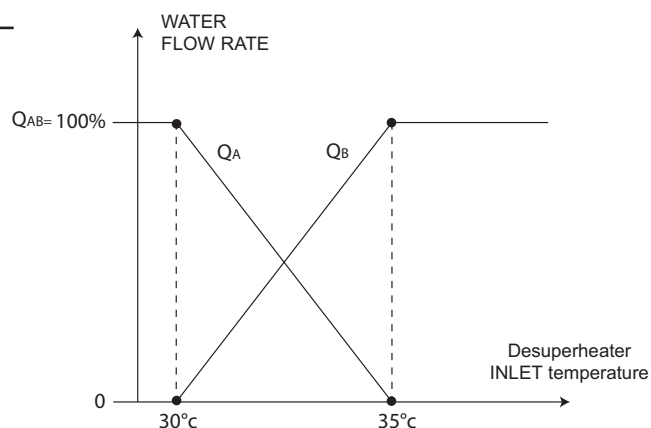
I = User system

- | | | | |
|---|--|--|---|
|  Pressure gauge |  Pump |  Coupling |  Venting valve |
|  Thermometer |  Filter |  Water filling unit |  Safety valve |
|  On-off and/or water flow regulating valve |  Three-way driven valve |  Desuperheater water flow inlet probe | |
|  Monitoring electronics (governor) | | | |

Valve regulating diagram Three-way driven valve

To prevent problems from occurring when the machine is started with very cold water, you are strongly advised to install a mixer valve as shown in the diagram.

The valve must be regulated to suit the temperature at which the water flows into the desuperheater (see diagram): the graph on the right shows the type of adjustment to use.



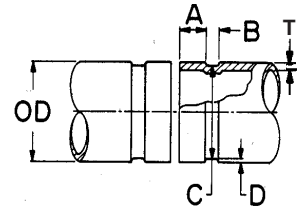
WET CONNECTIONS

ISO-G	DN(mm)	EXTERNAL DIAMETER OD(mm)	A	B	O	D	T
1"	25	33.7	15.875	7.137	30.226	1.600	1.651
1 1/4"	32	42.4	15.875	7.137	38.989	1.600	1.651
1 1/2"	40	48.3	15.875	7.137	45.085	1.600	1.651
2"	50	60.3	15.875	8.738	57.150	1.600	1.651
2 1/2"	65	76.1	15.875	8.738	72.260	1.981	2.108
3"	80	88.9	15.875	8.738	84.938	1.981	2.108
4"	100	114.3	15.875	8.738	110.084	2.108	2.108
5"	125	139.7	15.875	8.738	135.500	2.134	2.769
6"	150	168.3	15.875	8.738	163.957	2.159	2.769
8"	200	219.1	19.050	11.913	214.401	2.337	2.769

1) Pipe groove inspections

Check the depth and diameter of the grooves and their distance from the pipe ends. Make sure that the work has been carried out with care and that the end surface of the pipes is smooth and not ovalized.

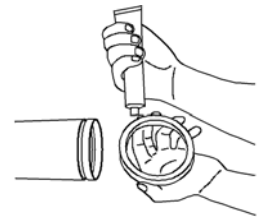
Make sure that there are no notches, burrs or other imperfections that could impair the tightness. Groove dimensions in mm **A=16-B=8-C=57.2-D=1.6**



2) Checking the seal and relative lubrication

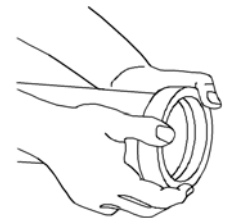
Make sure that the type of seal used is compatible with the nature and temperature of the fluid. Signal green **EPDM** seals are used.

Apply a film of grease to the seal: on the back, on the side flanks and on the inner lips that contact the pipe. Work in conditions of the utmost cleanliness as particles of dirt could damage the seal. Always and only use synthetic grease. Greasing makes it easier to fit the seal on the pipe and improves the tightness. It also allows the seal to slide within the connection, avoiding tensions and projections near the bolts.



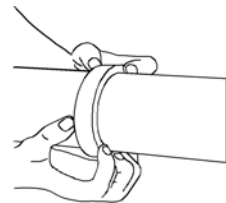
3) How to fit the seal

Fully insert the seal into the end of a pipe. Make sure that the seal lips adhere to the pipe itself.



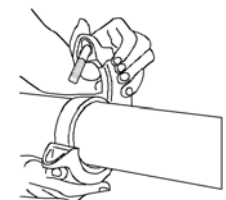
4) Alignment

Align the pipes and move their ends near to each other. Now push the seal, centering it on the two pipe ends. The seal must remain inside the grooves.



5) Joint assembly

Remove one bolt and loosen (without removing) the other one. Seat part of the body of the joint at the bottom, between the pipe ends, inserting and edges of the grooves. Now seat the other part of the body of the joint at the top, on the two ends, and close the joint. Make sure that the parts of the body of the joint touch each other.

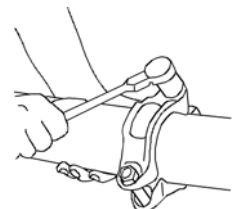


6) Nut torquing

Fit the previously removed bolt back in place and tighten both nuts by hand. Now torque them with the relative wrench, tightening them alternately a few turns.

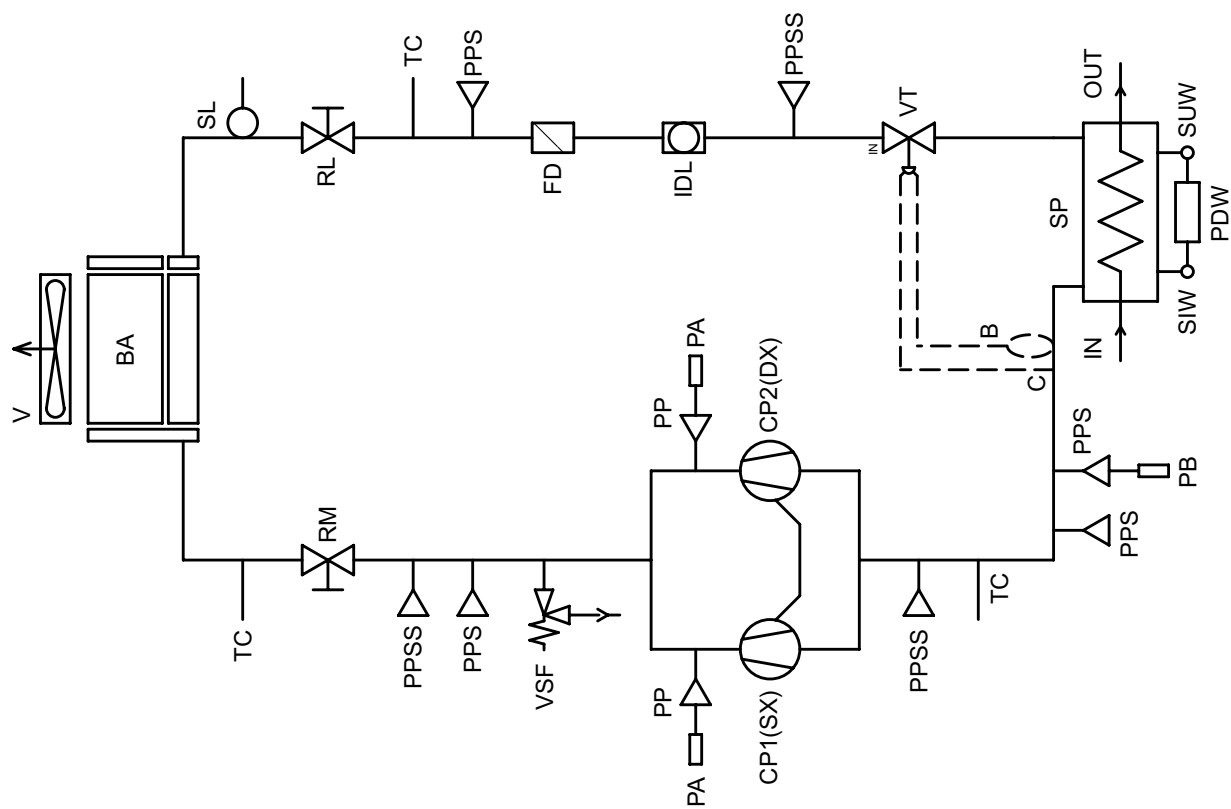
WARNING:

If one nut is fully tightened at a time, the seal could slip between the jaws of the opposite side of the joint.



WET CONNECTIONS

Refrigerant flow diagram basic version in cooling mode IR

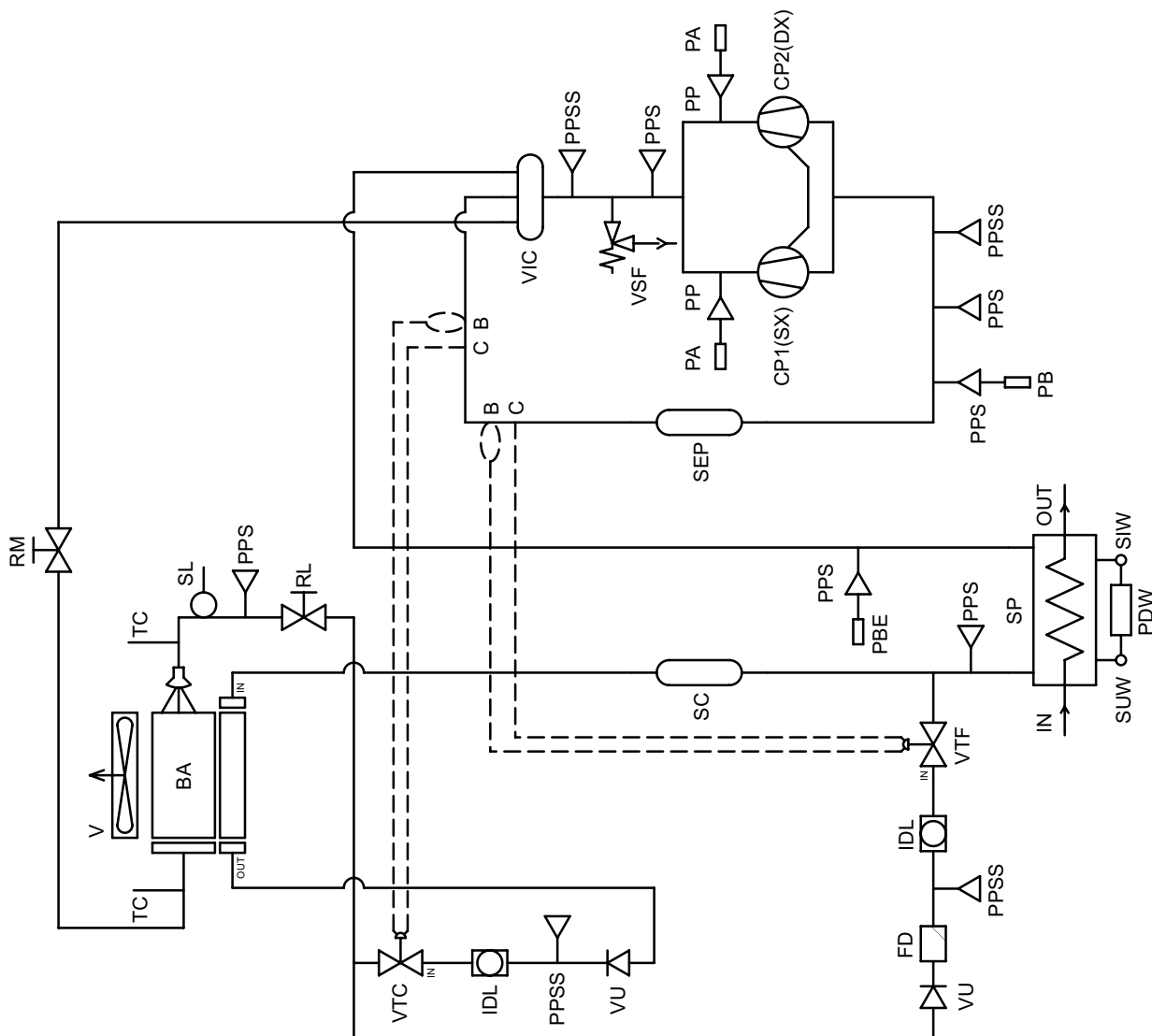


	Descrizione	Description
BA	BATTERIA A LETTATA	FIN AND TUBE COIL
CP	COMPRESSORE	COMPRESSOR
FD	FILTRO DEIDRATORE	FILTER DRIER
IDL	INDICATORE LIQUIDO E UMIDITA'	LIQUID AND MOISTURE INDICATOR
PA	PRESSOSTATO DI ALTA	HIGH PRESSURE SWITCH
PB	PRESSOSTATO DI BASSA	LOW PRESSURE SWITCH
PDW	PRESSOSTATO DIFFERENZIALE ACQUA	WATER PRESSURE SWITCH
PP	PRESA DI PRESSIONE 1/4" SAE SENZA SPILLO	PRESSURE SOCKET 1/4" SAE W/OUT CORE
PPS	PRESA DI PRESSIONE 1/4" SAE CON SPILLO	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESADI PRESSIONE 5/16" SAE CON SPILLO	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	RUBINETTO DEL LIQUIDO	LIQUID BALL VALVE
RM	RUBINETTO DI MANDATA	COMPRESSOR OUTLET BALL VALVE
SIW	SONDA INGRESSO ACQUA	WATER INLET PROBE
SL	SONDA DEL LIQUIDO	LIQUID PROBE
SP	SCAMBIATORE A PIASTRE	PLATE HEAT EXCHANGER
SUW	SONDA USCITA ACQUA	WATER OUTLET PROBE
TC	TRONCHETTO DI CARICA	CHARGING TUBE
V	VENTILATORE	FAN
VSF	VALVOLA DI SICUREZZA CIRCUITO FRIGO	SAFETY VALVE
VT	VALVOLA TERMOSTATICA	EXPANSION VALVE

WET CONNECTIONS

Refrigerant flow diagram basic version in heating mode IP

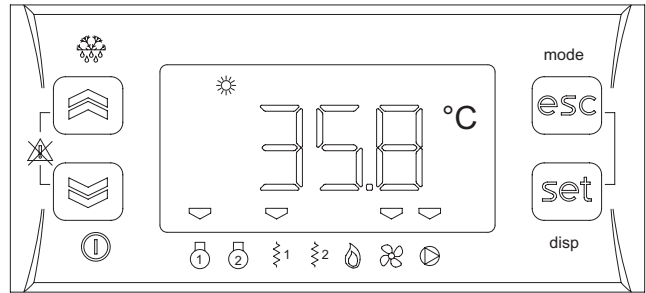
	Descrizione	Description
BA	BATTERIA ALLETATA	FIN AND TUBE COIL
CP	COMPRESSORE	COMPRESSOR
FD	FILTRO DEIDRATORE	FILTER DRIER
IDL	INDICATORE LIQUIDO E UMIDITA'	LIQUID AND MOISTURE INDICATOR
PA	PRESSOSTATO DI ALTA	HIGH PRESSURE SWITCH
PB	PRESSOSTATO DI BASSA	LOW PRESSURE SWITCH
PBE	PRESSOSTATO DI BASSA EVAPORATORE	EVAPORATOR LOW PRESSURE SWITCH
PDW	PRESSOSTATO DIFFERENZIALE ACQUA	WATER PRESSURE SWITCH
PP	PRESA DI PRESSIONE 1/4" SAE SENZA SPILLO	PRESSURE SOCKET 1/4" SAE WITHOUT CORE
PPS	PRESA DI PRESSIONE 1/4" SAE CON SPILLO	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESA DI PRESSIONE 5/16" SAE CON SPILLO	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	RUBINETTO DEL LIQUIDO	LIQUID BALL VALVE
RM	RUBINETTO DI MANDATA	COMPRESSOR OUTLET BALL VALVE
SC	RICEVITORE DI LIQUIDO	LIQUID RECEIVER
SEP	SEPARATORE DI LIQUIDO	LIQUID SEPARATOR
SIW	SONDA INGRESSO ACQUA	WATER INLET PROBE
SL	SONDA DEL LIQUIDO	LIQUID PROBE
SP	SCAMBIAITORE A PIASTRE	PLATE HEAT EXCHANGER
SUW	SONDA USCITA ACQUA	WATER OUTLET PROBE
TC	FRONCHETTO DI CARICA	CHARGING TUBE
V	VENTILATORE	FAN
VIC	VALVOLA INVERSIONE CICLO	REVERSING CYCLE VALVE
VSF	VALVOLA DI SICUREZZA	SAFETY VALVE
VTC	VALVOLA TERMOSTATICA "RAMO" CALDO	HEAT PUMP EXPANSION VALVE
VTF	VALVOLA TERMOSTATICA "RAMO" FREDDO	COOLING EXPANSION VALVE
VU	VALVOLA UNIDIREZIONALE	CHECK VALVE



ADJUSTMENT AND CONTROL






Control system






The unit is managed by a **microprocessor controller** to which all the loads and control devices are connected by means of a terminal block. The user interface comprises a display and four buttons with which it is possible to show and possibly modify all the unit's operation parameters. The interface, located in the front part of the unit and accessible from the outside, is protected by a transparent plastic door. A remote control having all the same functions as the interface fitted on the unit is available as an accessory.



Every button provides for :

- a **direct function** : indicated on the button itself and obtained by pressing the button
- an **associated function** : indicated on the front of the instrument at the corresponding button and obtained by prolonged pressing (3 seconds) of the button
- a **combined function** : obtained by pressing 2 buttons at the same time

Button		Direct function	Associated function	
	UP	Increase value of selected parameter Scroll menu up		Manual defrost
	DOWN	Decrease value of selected parameter Scroll menu down	-	-
	ESC	Go to menu higher level without saving the modification	mode	Access the "Operation mode" menu
	SET	Go to menu higher level and save the modification Go to menu lower level Access the "Status" menu	disp	Changing the display value
	ALL	Alarm deactivation	-	-

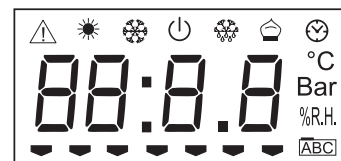
Button	Combined function		
 + 	UP + DOWN		Manual reset
 + 	ESC + SET		Access the "Programming" menu

ADJUSTMENT AND CONTROL

Display

The following are shown in normal display :

- adjustment temperature, or unit outlet water temperature (in degrees Celsius with decimal point)
- alarm code, if at least one is activated (in case of several alarms the code of the first according to the Table of Alarms is displayed)



In menu mode the display depends on its position (see menu structure).

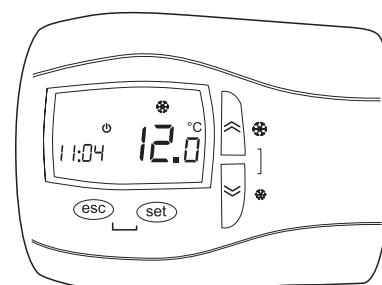
	Icon	Description	Colour	On fixed	On flashing
Operation status and modes		Alarm	Red	Alarm in progress	Alarm deactivated
		Heating	Green	Heating mode from keyboard	Heating mode from remote
		Cooling	Green	Cooling mode from keyboard	Cooling mode from remote
		Standby	Green	Standby from keyboard	Standby from remote
		Defrost	Green	Defrost in progress	-
		Economy	Green	not used	-
Unit of measure		Clock	Red	Time display format 24.00	Time setting format 24.00
	°C	Centigrade degrees	Red	Unit of measure of selected parameter	-
	Bar	Bar	Red	not used	-
	%R.H.	Relative humidity	Red	not used	-
		Menu	Red	Menu browsing	-
Users		Compressor 1	Amber	User activated	Safety timing
		Compressor 2	Amber	User activated	Safety timing
		not used	-	-	-
		not used	-	-	-
		Antifreeze heater Supplementary heating element 1st step	Amber	User activated	Safety timing
		Fans	Amber	User activated	Safety timing
		Pumps	Amber	User activated	Safety timing

Remote control

Suitable for wall mounting, it has all the functions of the standard interface fitted on the unit.

The buttons, functions associated with the buttons and the display indications are the same as those provided for the standard interface.

All configuration and control operations are further facilitated by the double display which allows the name and value of the selected parameter to be shown at the same time.








Refer to the enclosed manual for the installation and connection procedures and operating instructions.


ADJUSTMENT AND CONTROL

Menu structure




The control system provides for three menus with tree structure.

Menu	Access procedure	Submenu	Parameters	Available functions
Operation mode	Press (prolonged)  (ESC button associated function)	SEtBY	-	Change operation mode
		HEAt		
		COOL		
UP button	Press  (UP button direct function)	-	-	Value increases, the next label
DOWN button	Press  (DOWN button direct function)	-	-	Value decreases, the next label
Main view (disp)	Press (prolonged)  (SET button direct function)	A i	A iL 1	Display input AI1
			A iL 2	Display input AI2
			A iL 3	Display input AI3
			A iL 4	Display input AI4 (se abilitato)
			A iL 5	Display input AI5 (se abilitato)
		rEtC	-	Visualizzazione orologio
		SEtP	-	Visualizzazione set-point impostato
SEtr	-	Visualizzazione set-point reale		
Status	Press  (SET button direct function)	A i	A iL 1	Display input AI1
			A iL 2	Display input AI2
			A iL 3	Display input AI3
			A iL 4	Display input AI4
			A iL 5	Display input AI5
		d i	d iL 1	Display input DI1
			d iL 2	Display input DI2
			d iL 3	Display input DI3
			d iL 4	Display input DI4
			d iL 5	Display input DI5
			d iL 6	Display input DI6
		AO	ECL 1	-
			AO L 1	Display output AO1
			AO L 2	Display output AO2
			AO L 3	Display output AO3
			AO L 4	Display output AO4
		dO	AO L 5	Display output AO5
			dO L 1	Display output DO1
			dO L 2	Display output DO2
			dO L 3	Display output DO3
			dO L 4	Display output DO4
			dO L 5	Display output DO5
		CL	dO L 6	Display output DO6
			HOUr	Adjusting clock : hour
			dAtE	Adjusting clock : data
			YEAr	Adjusting clock : year
			HEAt	Viewing and setting set-point: heating
			COOL	Viewing and setting set-point: cooling
			HEAt	Display set-point real: heating
			COOL	Display set-point real: cooling
CP0 1	Viewing compressor 1 operating hours			
	CP0 2	Viewing compressor 2 operating hours		
	PUD 1	Viewing hours operating pump 1		
	PUD 2	Viewing hours operating pump 2		

ADJUSTMENT AND CONTROL

Menu	Access procedure	Submenu	Parameters	Available functions	
Programming	Press ESC + SET at the same time  (combined function buttons ESC + SET)	PRr	CL20	Offset probe SIW (ST1) - input AI1	
			CL21	Offset probe SIW (ST2) - input AI2	
			CL22	Offset probe SIW (ST3) - input AI3	
			CL23	STAE offset probe (S1) - input AI4	
			CL24	Input Offset AI5 (S2)	
			CF01	Selection Protocol COM1 (TTL)	
			CF20	Protocol controller address Eliwell	
			CF21	Family Controller Protocol Eliwell	
			CF30	Address Controller Modbus Protocol	
			CF31	Baud rate serial output	
			CF32	Protocol Modbus Parity	
			U1	U110	Selecting main view
			U1	U111	Selecting main display remote terminal
			tr10		Set point in cooling
			tr11		Minimum set point in cooling
			tr12		Maximum set point in cooling
			tr13		Hysteresis in cooling
			tr15		Differential set point in cooling
			tr20		Set point in heating
			tr21		Minimum set point in heating
			tr22		Maximum set point in heating
			tr23		Hysteresis in heating
			tr25		Differential set point in heating
			P101		Interval of inactivity pump anti-lock
			P103		Minimum time to pump up anti-lock
			P150		Approval with antifreeze pump
			P151		Set-point with antifreeze pump
			P152		With hysteresis antifreeze pump
			H120		Enabling integrative resistance
			H110		Set-point electrical resistance with antifreeze
			H115		Hysteresis antifreeze with electrical resistance
			H122		Differential resistance integrative
			H125		Hysteresis resistance integrative
			H126		2nd step differential resistance integrative
			dF11		Set-point start counting defrost
			dF13		Cumulative counting time defrost
			dF30		Enabling dynamic defrost
			dS00		Enabling climate
			dS01		Proportional band (cooling)

ADJUSTMENT AND CONTROL

Menu	Access procedure	Submenu		Parameters	Available functions
				d502	Proportional band (heating)
				d503	Differential maximum (cooling)
				d504	Differential maximum (heating)
				d505	Set start-point adjustment (cooling)
				d506	Set-point adjustment starting (heating)
		RL	RL51	Set-point alarm antifreeze	
			RL52	Antifreeze alarm hysteresis	
		FnC	dEF	Manual defrost	
			tA	Silence alarms	
			St	OFF	Change in OFF state
				On	Change in status ON
			EC	UL	Upload program parameters
				dL	Download the program parameters
				Fr	Format Multi Function Key
			EUr	Reset historical alarms, long press button 	
PASS	-	Enter password (111)			
EU	-	Viewing historical alarms			
Alarm silence	Pressure contemporary buttons  (combined function UP+DOWN button)	-	-	-	Manual
Manual defrost	Long press button  (UP button function associated)	-	-	-	Enable manual defrost

Press SET to go from one level to that below. Press ESC to go to higher level.

Press the UP and DOWN buttons respectively to scroll the menu up and down inside the same level.

Press the UP and DOWN buttons to modify the value of the selected parameter. Press SET to confirm the modification. Press ESC to not confirm the modification.

ADJUSTMENT AND CONTROL

Inputs and outputs

To monitor the unit, the controller has the following inputs and outputs :

- Analogue inputs : 4
- Digital inputs : 5
- Analogue outputs : 1
- Digital outputs : 6

DESCRIPTION			CHARACTERISTICS
Analogue inputs			
AI1	SIW	water inlet probe	NTC temperature sensor (-30°C ÷ 90°C)
AI2	SUW	water outlet probe	NTC temperature sensor (-30°C ÷ 90°C)
AI3	SL	liquid probe	NTC temperature sensor (-30°C ÷ 90°C)
AI4	STAE / IN CF1	outside air probe / remote ON/OFF - S/W.-demand limit-economy	NTC temperature sensor (-30°C ÷ 90°C) / DIG IN
AI5	IN CF2	see AI5 on "digital inputs"	configured as digital input

- Input AI4 is factory-set as not enabled. Its configuration for specific use must be carried out at the time of installation according to the needs of the moment, modifying the configuration by parameter.

- Input AI5 is factory-set as neutral and its configuration for specific use must be carried out at the time of installation according to the needs of the moment, modifying the configuration by parameter.

Modification and parameter configuration operations must only be carried out by an authorised service centre or by competent personnel.

Digital inputs			
DI1	TC1*	Thermal switch compressor 1 – thermostated delivery 1 –high pressure switch	Digital input with voltage-free contact
DI2	TC2*	Thermal switch compressor 2 –thermostated delivery 2 – high pressure switch	Digital input with voltage-free contact
DI3	PB +SEQ + TV + TINV	Low pressure switch + sequence meter + fan thermal switch + inverter thermal switch	Digital input with voltage-free contact
DI4	TP1	Thermal switch pump 1	Digital input with voltage-free contact
DI5	TP2	Thermal switch pump 2	Digital input with voltage-free contact
DI6	P.diff.	Differential pressure switch	Digital input with voltage-free contact
AI5-IN DIG	Multiconf.	remote ON/OFF - S/W.-demand limit-economy	Analogue input configured as digital

*refer to section alarms. ER10-ER11 for more details

Note for input ID5 thermal switch pump 2.

If only one pump is used and only one thermal switch is required, ID5 can be used as an additional multiconf. input for Remote ON/OFF - S/W.-demand limit-economy.

In this way it is possible to have both the

- remote ON/OFF, and
- S/W - demand limit – economy
- External probe

ID5 is factory-configured as pump 2 thermal switch. To modify the configuration, refer to the section "configurable inputs setting".

ADJUSTMENT AND CONTROL

DESCRIPTION			CHARACTERISTICS
ANALOGUE OUTPUTS			
AO1	VE	Fans	pwm signal for control of single-phase fans in phase cut
AO4	VE	Fans	signal 0-10V for control centrifugal fans by inverter
DIGITAL OUTPUTS			
DO1	CP1	Compressor 1	2A resistive relays
DO2	CP2	Compressor 2	2A resistive relays
DO3	VIC	Reverse cycle valve	2A resistive relays
DO4	RSC-RAG-RE1	Antifreeze resistance – support 1st step	2A resistive relays
DO5	ALL	Alarm relay	Open collector - 12Vdc max 35mA
DO6	RE2	Resistance support 2nd step	2A resistive relays
AO2	P1	Relay pump 1 (using 12Vdc external relay)	Open collector - 10Vdc max 20mA
AO3	P2	Relay pump 2 (using 12Vdc external relay)	Open collector - 10Vdc max 20mA
Note: AO2 is analogue output configured as digital			

Controller technical data

Description	Typical	Minimum	Maximum
Power supply voltage	12.0 V~	10.8 V~	13.2 V~
Power supply frequency	50 Hz / 60 Hz	-	-
Power	6 VA	-	-
Insulation class	2	-	-
Protection rating	Frontal IP0	-	-
Ambient operating temperature	25 °C	-10 °C	60 °C
Ambient operating humidity (non-condensing)	30 %	10 %	90 %
Ambient storage temperature	25 °C	-20 °C	85 °C
Ambient storage humidity (non-condensing)	30 %	10 %	90 %

ADJUSTMENT AND CONTROL

Alarms

Alarm activation and reset

The controller can perform a complete diagnosis of the unit, detecting all operation faults and signalling a number of alarms.

Activation of an alarm involves :

- blocking of users concerned
- signalling of alarm code on the display (in case of simultaneous alarms the one with the lowest index is displayed whereas the complete list of active alarms can be shown by accessing the "Status \ *RL*") menu
- recording of event in the alarms history

Alarms that can damage the unit or system require **manual resetting** or an action by the operator to reset the controller (pressing the UP and DOWN buttons at the same time). It is advisable to carefully check the cause of the alarm and make sure the problem is eliminated before restarting the unit. In any case the unit restarts only if the cause of the alarm has ended.

Less critical alarms are **automatic reset**. As soon as the cause is eliminated the unit starts working again and the alarm code disappears from the display. Some of these alarms become manual reset if the number events per hour exceeds a fixed limit.

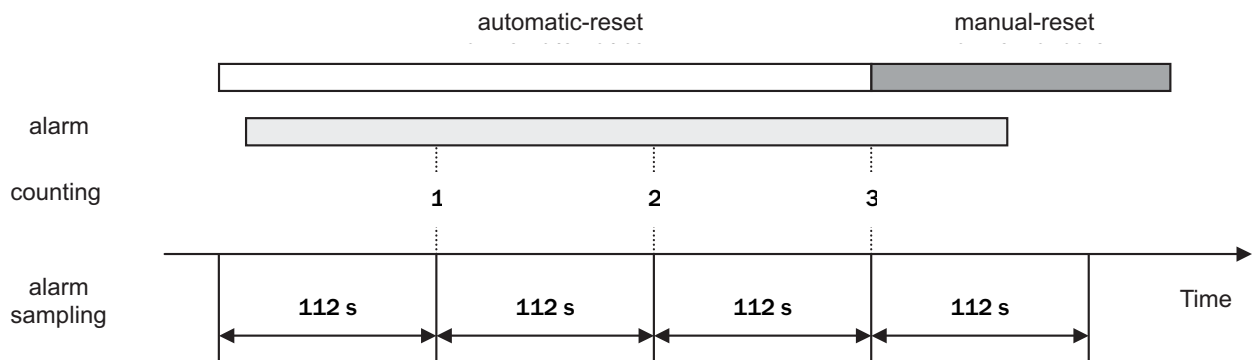
Press any button to **deactivate the alarm** : alarm signalling disappears from the display, the alarm LED starts flashing and the Alarm digital output is disabled. This operation does not affect the alarm in progress.

Number of events per hour

The counting of events per hour is provided for some alarms : if the number of events reaches a fixed limit in the last hour, the alarm goes from automatic to manual reset.

Sampling of alarms occurs every 112 seconds. If an alarm is activated several times in a sampling period (112 seconds) it is counted only once.

Example. If an number of events per hour equal to 3 is set, it must have a duration of between $2 \cdot 112$ seconds and $3 \cdot 112$ seconds so that the alarm goes from automatic to manual reset.



Alarms history

The controller enables the recording of alarms occurring during unit operation (up to a max. of 99 events). The following are memorised for each event :

- alarm code
- input time
- input date
- output time
- output date
- type of alarm (automatic or manual reset)

This information can be shown by accessing the "Programming \ *EL*" menu.

When the number of events memorised is more than 99, alarm *E-99* is generated and the subsequent events are memorised overwriting the oldest alarms.

The alarms history can be cancelled by means of the *E_{UR}* function available inside the "Programming \ *FN*" menu.

ADJUSTMENT AND CONTROL

Table of alarms

Code	Alarm	Type of alarm	input	COMPRESSORS	EXCHANGER FANS (WITH LOSS)	PRIMARY CIRCUIT PUMPS	EXCHANGER RESISTANCES PRIMARY	AUXILIARY OUTPUT
<i>Er05</i>	Low pressure -sequence meter + fans thermal switch - inverter thermal switch	A/M ⁽²⁾	ID3	OFF	OFF			
<i>Er10*</i>	Compressor 1 thermal protection	M	ID1	OFF comp.1				
<i>Er11*</i>	Compressor 2 thermal protection							
	High pressure	M	ID2	OFF comp.2				
<i>Er20</i>	Primary circuit water differential pressure switch	A/M	ID6	OFF		OFF if manual-reset	OFF	
<i>Er21</i>	Primary circuit pump 1 thermal protection	M	ID4	OFF	OFF	OFF p.1	OFF	
<i>Er22</i>	Primary circuit pump 2 thermal protection	M	ID5	OFF	OFF	OFF p.2	OFF	
<i>Er30</i>	Primary circuit antifreeze	M	AI2	OFF				
<i>Er45</i>	Clock fault error	A						
<i>Er46</i>	Clock to be set error	A						
<i>Er47</i>	Remote keyboard communication error	A						
<i>Er60</i>	Primary exchanger inlet water temperature probe fault	A	AI1	OFF	OFF	OFF	OFF	OFF
<i>Er61</i>	Primary exchanger outlet water temperature probe fault	A	AI2	OFF	OFF	OFF	OFF	OFF
<i>Er62</i>	Liquid temperature probe	A	AI3					
<i>Er68</i>	External air temperature probe fault	A	AI4					
<i>Er80</i>	Configuration error	A		OFF	OFF	OFF	OFF	OFF
<i>Er90</i>	Recordings for alarms history exceeded signalling	M						

Notes:

(1) A = automatic reset, M = manual reset

(2) Only when the alarm becomes manual reset

***Er05* Low pressure – Sequence meter**

The alarm becomes manual reset when the number of events per hour is more than 3.

The alarm is bypassed for 120 seconds from activation of the compressor or the reverse cycle valve.

***Er20* Differential pressure switch**

The alarm is activated if the associated digital input remains activated for at least 5 seconds and automatically resets if the digital input remains not activated for at least 3 seconds. The alarm becomes manual reset if the digital input remains activated for more than 10 seconds.

The alarm is bypassed for 30 seconds from pump activation.

***Er30* Antifreeze**

The alarm is bypassed for 3 minutes from switching on of the unit (in heating mode only).

***Er62* Liquid probe fault**

When the alarm is activated the fans work with on-off logic by compressor request. The defrost input and output are managed according to compressor operation time.

***Er68* Outside air probe fault**

When the alarm is activated, climate adjustment in heating and dynamic defrost are unavailable.

***Er90* Maximum number of recordings in alarms history exceeded**

Indicates that the alarms history buffer is full. Every new alarm will be memorised, cancelling the oldest alarm.

ADJUSTMENT AND CONTROL

Functions available for the user

Unit lighting : ON-OFF

When the unit is powered it may be in STAND BY status (the display shows the message *StdBY*) or ON status. It is possible to switch between ON and STAND BY by pressing (prolonged) the DOWN button.

When the unit is STAND BY all the users are disabled and the antifreeze function is not activated.

Operation mode selection

When the unit is ON, one of the operation modes can be selected by accessing the "Operation mode" menu.

- Cooling *Cool*
- Heating *Heat*
- STANDBY *StdBY*

Remote ON/OFF

This function allows remote selection of the STANDBY mode. If the input is activated (contact open) the controller is in STANDBY mode and the operation mode cannot be modified from keyboard.

The function is available if one of the configurable inputs is configured for this, contact closed = unit ON (display *SIW*), contact open = OFF (display *StdBY*).

Remote Cooling-Heating

This function allows remote selection of Cooling or Heating mode. If the input is activated (contact open) the unit is in heating mode. If the input is not activated (contact closed) the unit is in cooling mode. The operation mode cannot be modified from the keyboard (but STANDBY mode can be selected).

To enable this function, follow the indications in the section "configurable inputs setting".

Set point

The set point value in cooling (*Cool*) and heating (*Heat*) can be set by accessing the "Status \ *SP*" menu. The purpose of the controller is to keep the water temperature at the unit inlet as close as possible to the set value, by activating the compressor according to an on-off logic.

Operation in heat pump mode

For all units in heat pump version the parameter *tr01* enables operation in heat pump mode when it assumes value 1. It is possible to set an outside air temperature value (parameter *HP01*) below which operation in heat pump mode is blocked (the supplementary electrical heating elements remain activated in any case, if present).

Antifreeze

The plate-type exchanger is protected by activation of an electrical heating element and activation of the antifreeze alarm, occurring in sequence when the exchanger outlet water temperature reaches dangerous values. The storage tank is protected by the antifreeze heater (accessory) activated in parallel with the plate-type exchanger heating element.

When the outside air temperature approaches 0°C, if the unit is not working, the pump is activated in any case to prevent excessive cooling of the water in the pipes.

Supplementary electrical heating elements

The parameter *H02* enables operation of the electrical elements supplementing the heat pump when it assumes value 1. The heating elements are activated according to a two-step logic depending on the unit inlet water temperature. When present, the heating elements also carry out a storage tank antifreeze function.

Climate adjustment

In heating, the parameter *d500* allows enabling of climate adjustment when it assumes value 1. The heating set point is adjusted according to the outside air temperature (if the external probe is installed).

To configure this function, follow the indications in the section "configurable inputs setting".

Dynamic defrost

The activation limit is modified in a dynamic way according to the outside air temperature (if the external probe is installed).

Power limitation.

With this function, the unit can be forced to operate at 50% maximum power, from a digital output, thus reducing energy consumption.

To enable this function, proceed as indicated in the section "configurable inputs setting".

Economy function

This function allows the set point to be varied by a certain value from a digital input.

In cooling mode the set point is increased by the value set on *tr15* (e.g. going from 9.5°C to 14.5 °C).

In heating mode the set point is decreased by the value set on *tr25* (e.g. going from 42°C to 36°C)

To enable this function, proceed as indicated in the section "configurable inputs setting".

Serial communication

The device is configured for communicating on a serial line using the MODBUS protocol. When connecting the device it must be assigned an address univocally identifying it among all the devices connected to the same serial line ("*Modbus individual address*"). This address must be between 1 and 247 and is configurable by means of the parameter *CF30* (see section on serial communication).

Recording hours of operation

The controller can record the hours of compressor and pump operation. Access the "Status \ *hr*" menu to show the values. The hours are reset by pressing (prolonged) the SET button, while the hours of operation are displayed.

Power failure

In case of a power failure, when the power is restored the controller will go to the status prior to the power failure. The procedure is cancelled if a defrost is in progress. All timing in progress is cancelled and reinitialised.

Clock

The controller has an internal clock for memorising the date and time of each alarm occurring during unit operation (see "Alarms history"). The clock can be set by accessing the "Status \ *CL*" menu.

ADJUSTMENT AND CONTROL

Configurable inputs setting

The configurable inputs are AI4, AI5 and DI5.

For configuration, access the parameters CL and select the required function according to the following tables.

I/O	Sigla	digital/analogic input	Configurati on	Polarity	Offset (range) / Status
AI4	S1	Not configured	CL03 = 0 CL33 = 0 CL53 = 0	----	----
		External probe sensor (provided with accessory SND3)	CL03 = 2 CL33 = 9 CL53 = 0	NTC probe	CL23 (-12,0... +12,0 [°C]) CL i3 = Start value scale AiL4 [°C] CL i2 = Full scale value AiL4 [°C]
		External probe air as analog input 4-20 mA	CL03 = 3 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL i3 = Start value scale AiL4 [°C] CL i2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-10 V	CL03 = 4 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL i3 = Start value scale AiL4 [°C] CL i2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-5 V	CL03 = 5 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL i3 = Start value scale AiL4 [°C] CL i2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-1 V	CL03 = 6 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL i3 = Start value scale AiL4 [°C] CL i2 = Full scale value AiL4 [°C]
		ON/STBY remote (digital input)	CL03 = 1 CL33 = 0 CL53 = -1	input active open contact	open contact = STAND-BY
		Summer / Winter remote (digital input)	CL03 = 1 CL33 = 0 CL53 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50% (digital input)	CL03 = 1 CL33 = 0 CL53 = +21	input active close contact	close contact = Demand Limit 50%
		Economy (digital input)	CL03 = 1 CL33 = 0 CL53 = +22	input active close contact	close contact = economy
AI5	S2	Not configured	CL04 = 0 CL34 = 0 CL54 = 0	----	----
		External probe sensor (analogic input)	CL04 = 2 CL34 = 9 CL54 = 0	NTC probe	CL24 (-12,0... +12,0 [°C])
		ON/STBY remoto (digital input)	CL04 = 1 CL34 = 0 CL54 = -1	input active open contact	open contact = STAND-BY
		Summer / Winter remote (digital input)	CL04 = 1 CL34 = 0 CL54 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50% (digital input)	CL04 = 1 CL34 = 0 CL54 = +21	input active close contact	close contact = Demand Limit 50%
		Economy (analogic input)	CL04 = 1 CL34 = 0 CL54 = +22	input active close contact	close contact = economy
DI5	QF2.2	Not configured	CL44 = 0	----	----
		thermal pump 2	CL44 = -48	input active open contact	open contact = thermal pump 2
		ON/STBY remote	CL44 = -1	input active open contact	open contact = STAND-BY
		Summer / Winter remote	CL44 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50%	CL44 = +21	input active close contact	close contact = Demand Limit 50%
		Economy	CL44 = +22	input active close contact	close contact = economy

If present the module of pumping two pumps can not get that DI5 must be configured CL44 = -48

The outdoor air sensor (optional SND3) is factory installed on input AI4; if it were necessary to can install it on input AI4 or AI5, as specified above. The input AI4 can also accept an input signal current (4-20mA) or voltage (0-10V ,0-5V ,0-1V) from a probe external air by the user.

ADJUSTMENT AND CONTROL

Probe characteristics

NTC10K-25°C type temperature probes are used.

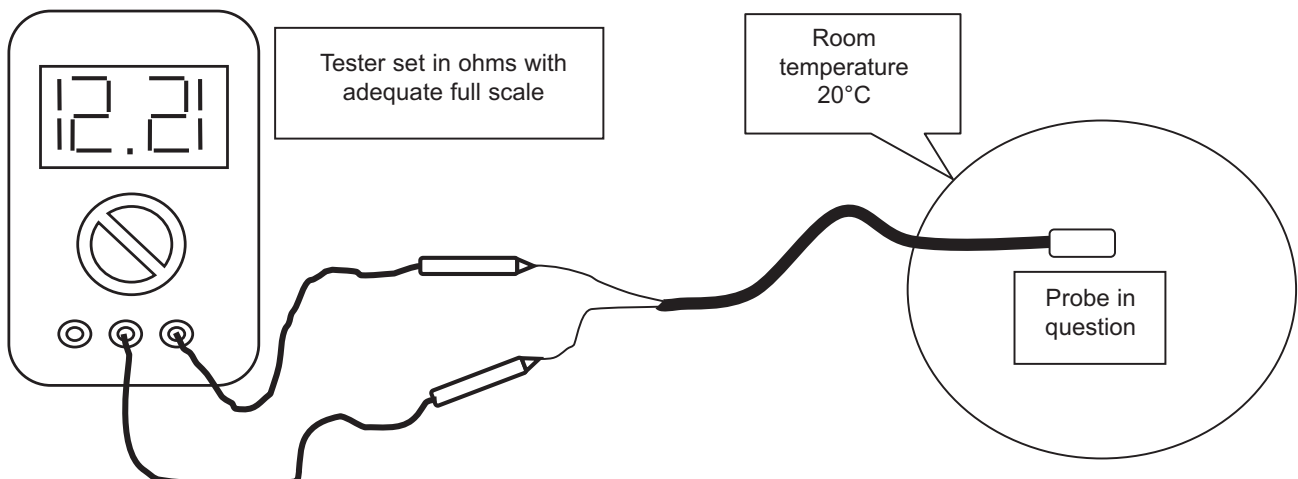
When the probe bulb is at a temperature of 25°C the electrical resistance measurable at the probe ends with a multimeter is approx. 10 kΩ. The thermistor of these probes has a negative temperature coefficient: the electrical resistance value decreases as the temperature increases.

To find out if a temperature probe is faulty or disconnected, check the correspondence between the resistance value in kΩ and the bulb temperature in °C according to the following table.

Temperature [°C]	Resistance [kΩ]	Temperature [°C]	Resistance [kΩ]	Temperature [°C]	Resistance [kΩ]
0	25.7950	20	12.2110	40	5.7805
1	24.8483	21	11.7628	41	5.5683
2	23.9363	22	11.3311	42	5.3640
3	23.0578	23	10.9152	43	5.1671
4	22.2115	24	10.5146	44	4.9774
5	21.3963	25	10.1287	45	4.7948
6	20.6110	26	9.7569	46	4.6188
7	19.8546	27	9.3988	47	4.4493
8	19.1259	28	9.0539	48	4.2860
9	18.4239	29	8.7216	49	4.1287
10	17.7477	30	8.4015	50	3.9771
11	17.0963	31	8.0931	51	3.8312
12	16.4689	32	7.7961	52	3.6906
13	15.8644	33	7.5100	53	3.5551
14	15.2822	34	7.2343	54	3.4246
15	14.7213	35	6.9688	55	3.2989
16	14.1810	36	6.7131	56	3.1779
17	13.6605	37	6.4667	57	3.0612
18	13.1592	38	6.2293	58	2.9489
19	12.6762	39	6.0007	59	2.8406

For a reliable check it is not necessary to control each single value, but just several sample values. If the instrument gives an infinite resistance, this means the probe is disconnected.

Example. With a temperature of 20°C on the probe, the ohmmeter display will indicate approx. 12.21 kΩ



ADJUSTMENT AND CONTROL

Serial communication

The unit can communicate on serial line using the **Modbus** communication protocol with **RTU** coding.

The unit can be connected to an RS485 network by means of the serial interface supplied as an accessory, and respond to requests from any master device connected to the network.

Serial line settings

The serial line must be set as follows :

- baud rate : **9600**
- data bits : **8**
- stop bits : **1**
- parity : **even**

All the devices connected to the same serial line **MUST** use the same settings.

Device address

To communicate correctly, each device connected to the serial network must have an univocal address ("*Modbus individual address*") of between 1 and 247. This address can be set by modifying the parameter [F63].

Modbus commands

The Modbus commands implemented by the controller are :

- parameter reading **3** (*Hex 03 : Read Holding Registers*)
- parameter writing **16** (*Hex 10 : Write Multiple Registers*)

Table of addresses

All the available resources are stored in the controller as WORD (2 byte) and therefore require the reading or writing of an entire Modbus register. According to the Modbus protocol, to identify a register of address X the address X-1 must appear in the message.

Some registers contain more than one piece of information : in this case the bits representing the resource value are identified by means of the number of bits used ("Bit number") and by the least significant bit ("Lsb"). In the writing operation for these registers it is necessary to read the current register value, modify the bits representing the resource concerned and rewrite the entire register.

Example.

Bit number =	4	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Lsb =	7	0	1	1	0	1	0	0	1	1	1	0	1	1	0	1	0
Resource value =	3																

The resources can be read only (R), write only (W) or read and write (RW).

To interpret the value written in the register it is necessary to consider the value of CPL, EXP and UM :

CPL : if the register represents a number with sign (CPL = Y) carry out the following conversion :

0	=	register value	<	32767	:	resource value = register value
32768	=	register value	<	65535	:	resource value = register value – 65536

EXP : indicates the exponent of the power of 10 to be multiplied by the register value to obtain the resource value.

EXP	Multiplier	
-2	10^{-2}	0.01
-1	10^{-1}	0.1
0	10^0	1
1	10^1	10
2	10^2	100

MU : indicates the unit of measure of the resource

IMPORTANT. DO NOT modify any parameter not indicated in the tables provided or indicated as a read only parameter (R), otherwise the warranty will be cancelled.

ADJUSTMENT AND CONTROL

Label	Description	RW	Register address		Bit number	Lsb	CPL	EXP	UM
			Dec	Hex					
TR10	Set point temperature controller in Cool	RW	17062	H12A6	16	0	Y	-1	°C
TR20	Set point temperature controller in Heat	RW	17074	H12B2	16	0	Y	-1	°C
-	Hours of operation compressor 1	R	857	H0359	16	0	N	0	hours
-	Hours of operation compressor 2	R	859	H035B	16	0	N	0	hours
-	Hours of operation pump 1	R	865	H0361	16	0	N	0	hours
-	Hours of operation pump 2	R	867	H0363	16	0	N	0	hours
-	Analogue input AIL1	R	412	H019C	16	0	Y	-1	°C
-	Analogue input AIL2	R	414	H019E	16	0	Y	-1	°C
-	Analogue input AIL3	R	416	H01A0	16	0	Y	-1	°C/Bar
-	Analogue/digital input AIL4	R	418	H01A2	16	0	Y	-1	°C/Bar
-	Analogue/digital input AIL5	R	420	H01A4	16	0	Y	-1	°C
-	Device in COOL	R	33028,4	H0104	1	4	N	0	num
-	Device in COOL (from digital input)	R	33028,5	H0104	1	5	N	0	num
-	Device in HEAT	R	33028,6	H0104	1	6	N	0	num
-	Device in HEAT (from digital input)	R	33028,7	H0104	1	7	N	0	num
-	Device in STAND BY	R	33028	H0104	1	2	N	0	-
-	Device in STAND BY (from digital input)	R	33028	H0104	1	3	N	0	-
COOL	Select COOL Mode	W	33450,3	H02AA	1	3	N	0	num
HEAT	Select HEAT Mode	W	33450,4	H02AA	1	4	N	0	num
STBY	Select STAND BY Mode	W	33450,5	H02AA	1	5	N	0	num
Er00	General alarm	R	33104	H0150	1	0	N	0	flag
Er05	Alarm: low pressure - sequence meter - fan thermal switch	R	33104,5	H0150	1	5	N	0	flag
Er10	Alarm: compressor 1 thermal protection – thermostatted delivery 1 – High pressure	R	33105,2	H0151	1	2	N	0	flag
Er11	Alarm: compressor 2 thermal protection – thermostatted delivery 2 - High pressure	R	33105,3	H0151	1	3	N	0	flag
Er20	Alarm: primary circuit flow switch	R	33106,4	H0152	1	4	N	0	flag
Er21	Alarm: primary circuit pump 1 thermal protection	R	33106,5	H0152	1	5	N	0	flag
Er22	Alarm: primary circuit pump 2 thermal protection	R	33106,6	H0152	1	6	N	0	flag
Er30	Alarm: primary circuit antifreeze	R	33107,6	H0153	1	6	N	0	flag
Er45	Alarm: clock fault	R	33109,5	H0155	1	5	N	0	flag
Er46	Alarm: time loss	R	33109,6	H0155	1	6	N	0	flag
Er47	Alarm: no communication with remote keyboard	R	33109,7	H0155	1	7	N	0	flag
Er60	Alarm: water temperature probe or inlet air primary exchanger fault	R	33111,4	H0157	1	4	N	0	flag
Er61	Alarm: water temperature probe or outlet air primary exchanger fault	R	33111,5	H0157	1	5	N	0	flag
Er62	Alarm: temperature probe exchanger (with loss) fault	R	33111,6	H0157	1	6	N	0	flag
Er68	Alarm: external temperature probe fault	R	33112,4	H0158	1	4	N	0	flag
Er90	Signalling alarms history full	R	33115,2	H015B	1	2	N	0	flag

* If several operation modes are enabled by mistake:

- OFF has priority over STAND BY, HEATING, COOLING
- STAND BY has priority over HEATING, COOLING
- HEATING has priority over COOLING

SETTING AT WORK

General Rules

To validate the **contractual warranty**, the machine must only be set at work by technicians from **an authorized assistance center**. Before they are called, check to make sure that all parts of the installation have been completed, the unit levelled, the plumbing connections made with the relative air vent and the electrical connections made. **Power on the unit at least 12 hours before the start.**

MAINTENANCE

Maintenance

IMPORTANT. MAKE SURE THE POWER TO UNIT IS DISCONNECTED BEFORE CARRYING OUT ANY CLEANING OR MAINTENANCE OPERATION. ALL ROUTINE AND EXTRAORDINARY MAINTENANCE OPERATIONS MUST BE CARRIED OUT BY SPECIALISED AND AUTHORISED PERSONNEL, IN ORDER TO ENSURE COMPLIANCE WITH THE CURRENT SAFETY REGULATIONS.

This section is extremely important for efficient operation of the unit over time. A few operations carried out periodically can avoid the need to call specialised personnel. The operations to be carried out do not require particular technical knowledge and consist of simple checks of the unit's components.

Contact an authorised service centre if maintenance is required.

Structure

To prevent the creation of anomalous vibrations and noise, make sure the various steel parts are secured together and that the inspection panels are properly fixed to the unit.

In case of oxidation, treat with paints suitable for eliminating or reducing the phenomenon in the parts of the unit affected.

Fans

Before every seasonal start-up, check the fixing of the fans and respective grilles to the unit's structure. Check any unbalance in the axial fan, indicated by anomalous vibrations and noise.

Finned coils

Accidental contact with the exchanger fins can cause small cuts. Use special gloves to carry out the operations described below. The exchangers must be able to ensure maximum heat exchange, therefore their surfaces must always be free of any dirt and dust deposited on them due to the action of the fans. Using a brush, remove all the impurities deposited on the surface of the coil. Clean the aluminium surface of the coil with a compressed air jet, making sure to aim the jet with the direction of fins so as to avoid damage. If the aluminium fins are damaged, "comb" the coil with a special tool until the damage is completely eliminated.

Finned coil condensate drain

In winter operation, the finned coil defrost stage occurs periodically through reversal of the refrigeration cycle. During this stage make sure the dripping of water from the finned pack has regular downflow and that the drain union on the base of the unit is not clogged. If the downflow is not correct, with particularly rigid temperatures a layer of ice could form over the base, compromising the unit's operation.

Plumbing system

Visually check that there are no leaks in the plumbing circuit and that it is pressurised. Make sure there is no air in the circuit (by operating the air vents). Make sure the filters in the unit (VP and VA versions) and in the system are clean.

Electrical system

Make sure there are no cuts, cracks or alterations able to compromise the insulation of the power cable connecting the unit to the distribution board. Contact an authorised service centre if maintenance is required. Carefully check the fixing of all the electrical connects after an initial period of operation following first start-up, and at every seasonal start-up or stop.

MAINTENANCE

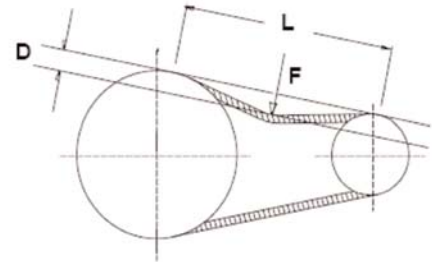
Ventilating unit maintenance

Transmission

To satisfy most installation needs the double suction centrifugal fans installed on the unit are coupled to electric motors with a transmission system composed of a belt, electric motor, fixed fan pulley and variable motor pulley. All the components, sized so as to be reliable and ensure low maintenance, must however be checked at regular intervals so as to avoid requiring undesirable special maintenance.

Belts

Check the alignment of the belts with the motor and fan pulleys. For pulleys with a variable diameter, always use as a point of reference the centre of the race and not the edge of the pulleys. To correct the alignment, slacken the bolts that fix the feet of the motor and move them along the slots of the slide until alignment is achieved. Only if you reach the end of the slots, shift the slide too along the fixing supports. Check that the belt is not raised and that it does not touch the bottom of the pulley races; if there are two belts, ensure that they are of the same length. Check that the belt tension is correct. Insufficient tension causes slipping with consequent overheating and a notable reduction of the working life. On the contrary an excessive tension subjects the belt to forces higher than those allowed, with consequent reduction of its working life, excessive load on the supports and reduction of the working hours of the bearings. The belt tension may be varied by turning the worm screw on the slide, on which the electric motor is fitted, with a box spanner or wrench.



If you do not have specific instruments for measuring the belt tension, you can follow the approximate method described below. Measure the free length L , for each belt.

Using a torque wrench, half-way along L apply a perpendicular force F sufficient to cause a deflection D of 1.5 mm for each 100 mm of the length L .

Check that the applied force F is about 35÷40 N (3.5 ÷ 4 kg)

- L = pulley centre distance [mm]
 - F = force [N]
 - D = elastic shift [mm]
- $$D = L \times 0,015$$

Pulleys

Avoid the conditions listed below which could lead to premature deterioration of the pulleys (both fixed and variable).

- lack of alignment, lack of parallelism, breakages, high wear and lack of eccentricity
- dust, grease, dirt and also a high humidity rate which would cause the formation of condensate. These substances build up between the surfaces of the belt and those of the pulleys, leading the system to work in abnormal conditions.

For pulleys with one race, slacken the retaining screws of the mobile disc and turn it on its threaded hub, checking with the belt that the desired primitive diameter is obtained. Lightly oil the thread if there is difficulty in turning. Tighten the screws evenly, check the transmission alignment, refit the belt and tighten it correctly.

Periodically check the state of wear of the races. The working life of the pulleys depends mainly on the correct performance of the operations of aligning the transmission and tightening the belts. After a certain period of operation a degree of wear will be found such as to alter the geometric characteristics of the races (generally more evident in the pulley with a smaller diameter) and a parallel reduction in the duration of the belts. In this case you must change the most worn pulley or the whole transmission.

Electric motor

Periodic cleaning of the electric motor ensures a longer working life as it increases the possibility for the casing to lose the heat that is produced. The slots for the passage of the cooling air must always be kept free to let the air through. The inspection and maintenance intervals depend on the actual operating and environmental conditions .

SAFETY AND POLLUTION

General considerations

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

a. Access to the unit

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

b. Elements of risk

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

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

c. Pollution

The machine contains **r410a** coolant and lubricating oil. Thus, if the unit is scrapped, these fluids must be recovered and disposed of in accordance with the laws in force in the country where the machine is installed. **The machine must not be abandoned when scrapped.**

SAFETY AND POLLUTION

Refrigerant safety card

1 SUPPLIER COMPANY AND PRODUCT IDENTIFICATION

Card No. FRIG 8
Product R-410A
Supplier company identification RIVOIRA SpA

2 COMPOSITION / INFORMATION ON INGREDIENTS

Substance / Preparation Preparation
Components / Impurities Contains the following components :
Difluoromethane (R32) 50 % in weight
Pentafluoroethane (R125) 50 % in weight
EEC No. Non-applicable for mixtures
Trade-name /

3 IDENTIFICATION OF HAZARDS

Identification of hazards Liquefied gas.
The vapours are heavier than air and can cause suffocation, reducing the oxygen available for breathing.
Rapid evaporation of the fluid can cause freezing.
Can cause cardiac arrhythmia.

4 FIRST-AID MEASURES

Inhalation Do not administer anything if the person has fainted.
Take the person outdoors. Use oxygen or artificial respiration if necessary.
Do not administer adrenaline or similar substances.
Contact with eyes Rinse thoroughly with plenty of water for at least 15 minutes and see a doctor.
Contact with skin Wash immediately with plenty of water. Immediately remove all contaminated garments.
Swallowing Risk unlikely.

5 FIRE-PREVENTION MEASURES

Specific hazards Increase in pressure.
Dangerous fumes Halogen acids, traces of carbonyl halides.
Fire-extinguishing means usable All the known fire-extinguishing means can be used.
Specific methods Cool the containers/tanks with water sprays.
Special protection equipment Use self-contained breathing apparatus in confined spaces.

6 MEASURES AGAINST ACCIDENTAL SPILLING OF THE PRODUCT

Personal protection Evacuate personnel to safe areas. Provide for adequate ventilation. Use personal protection equipment.
Protection for the environment It evaporates.
Product removal methods It evaporates.

7 HANDLING AND STORAGE

Handling and storage Ensure an adequate air change and/or extraction in the workplaces. Only use well-ventilated rooms.
Do not breathe vapours or aerosols. Carefully close the containers and keep them in a cool, dry and well-ventilated place. Keep in the original containers.
Incompatible products Explosives, flammable materials, organic peroxides.

8 CONTROL OF EXPOSURE / PERSONAL PROTECTION

Personal protection Ensure adequate ventilation, especially in closed areas.
Control parameters Difluoromethane (R32): Recommended exposure limits: AEL (8h and 12h TWA) = 1000 ml/m³
Pentafluoroethane (R125): Recommended exposure limits: AEL (8h and 12h TWA) = 1000 ml/m³
Respiratory tract protection For rescue and for maintenance works in tanks, use self-contained breathing apparatus. The vapours are heavier than air and can cause suffocation, reducing the oxygen available for breathing.
Eye protection Total protection glasses.
Hand protection Rubber gloves.
Hygiene measures Do not smoke.

9 CHEMICAL-PHYSICAL PROPERTIES

Relative density, gas (air=1) Heavier than air.
Solubility in water (mg/l) Not known, but deemed very low.
Appearance Colourless liquefied gas.
Odour Similar to ether.
Fire point Does not ignite.

10 STABILITY AND REACTIVITY

Stability and reactivity No decomposition if used according to the special instructions.
Materials to be avoided Alkali metals, alkali-earth metals, granulated metal salts, Al, Zn, Be, etc. in powder.
Hazardous products of decomposition Halogen acids, traces of carbonyl halides.

11 TOXICOLOGICAL INFORMATION

Local effects Concentrations substantially above the value TLV (1000 ppm) can cause narcotic effects. Inhalation of highly concentrated products of decomposition can cause respiratory insufficiency (pulmonary oedema).
Long-term toxicity No carcinogenic, teratogenic or mutagenic effects have been recorded in experiments on animals.
Specific effects Rapid evaporation of the fluid can cause freezing. Can cause cardiac arrhythmia.

12 ECOLOGICAL INFORMATION

Effects linked to ecotoxicity Pentafluoroethane (R125)
Potential global warming with halocarbons; HGWP (R-11 = 1) = 0.84
Potential impoverishment of the ozone; ODP (R-11 = 1) = 0

SAFETY AND POLLUTION

13 CONSIDERATIONS ON DISPOSAL

General

Do not dispose of where accumulation can be hazardous.
Usable with reconditioning.
The depressurised containers must be returned to the supplier.
Contact the supplier if instructions for use are deemed necessary.

14 INFORMATION FOR TRANSPORT

Designation for transport

LIQUEFIED GAS N.A.S.
(DIFLUOROMETHANE, PENTAFLUOROETHANE)

UN No.

3163

Class/Div

2.2

ADR /RID No.

2, 2nd A

ADR/RID hazard no.

20

ADR label

Label 2 : non-toxic non-flammable gas.

CEPIC Groupcard

20g39 - A

Other information for transport

Avoid transport on vehicles where the loading zone is not separate from the cab.

accident or emergency.

Make sure the driver is informed about the potential risk of the load and knows what to do in case of

ge;

Before starting transport, make sure the load is properly secured and :
make sure the valve of the container is closed and does not leak;
make sure the blind cap of the valve (when provided) is correctly fitted;
make sure the cap (when provided) is correctly fitted and that there is an adequate ventilation passage;
ensure compliance with the current provisions.

15 INFORMATION ON REGULATIONS

The product must not be labelled according to Directive 1999/45/EC.

Comply with the regulations given below, and the relevant applicable updates and amendments.

Circulars no. 46/79 and 61/81 of the Ministry of Labour : Risks related to the use of products containing aromatic amines

Leg. Decree no. 133/92 : Regulations on the discharge of hazardous substances in waters

Leg. Decree no. 277/91 : Protection of workers against noise, lead and asbestos

Law 256/74, Decree 28/1/92, Leg. Decree no. 52 dated 3/2/97, Decree dated 28/4/97 as amended : Classification, packing and labelling of hazardous substances and preparations

Decree no. 175/88, as amended : Activities with significant accident risks (Seveso Law)

Decree no. 203/88 : Emissions into the atmosphere

Decree no. 303/56 : Work hygiene

Decree no. 547/55 : Regulations on accident prevention

Leg. Decree no.152 dated 11/5/99 : Protection of waters

16 OTHER INFORMATION

Recommended uses

Refrigerant

Can cause suffocation in high concentration.

Keep in a well-ventilated place.

Do not breathe the gas.

The risk of suffocation is often underestimated and must be clearly explained during the training of operators.

Ensure compliance with all the national and regional regulations.

Before using this product in any new process or trial, an in-depth study on safety and compatibility of the product with the materials must be carried out.

The above information is based on our current know-how and describes the product according to the safety requirements. It does not however represent a guarantee and assurance of the qualities in a legal sense. Each person responds personally for compliance with such regulations.

The information contained in this document is to be deemed valid at the time of printing. The company declines any liability for damage caused by use of the product in incorrect applications and/or conditions different from those provided for.

First aid

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

Contact with the skin:

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

Contact with the eyes:

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

Swallowing:

- Do not make the victim vomit. If the victim is conscious, have him rinse his mouth out with clean water and then drink 200-300 ml of water.
- Immediately seek medical help.

Do not administer adrenaline or sympathomimetic drugs after exposure owing to the risk of cardiac arrhythmia.

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



Cod. 3QE25071



**GRUPPO
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