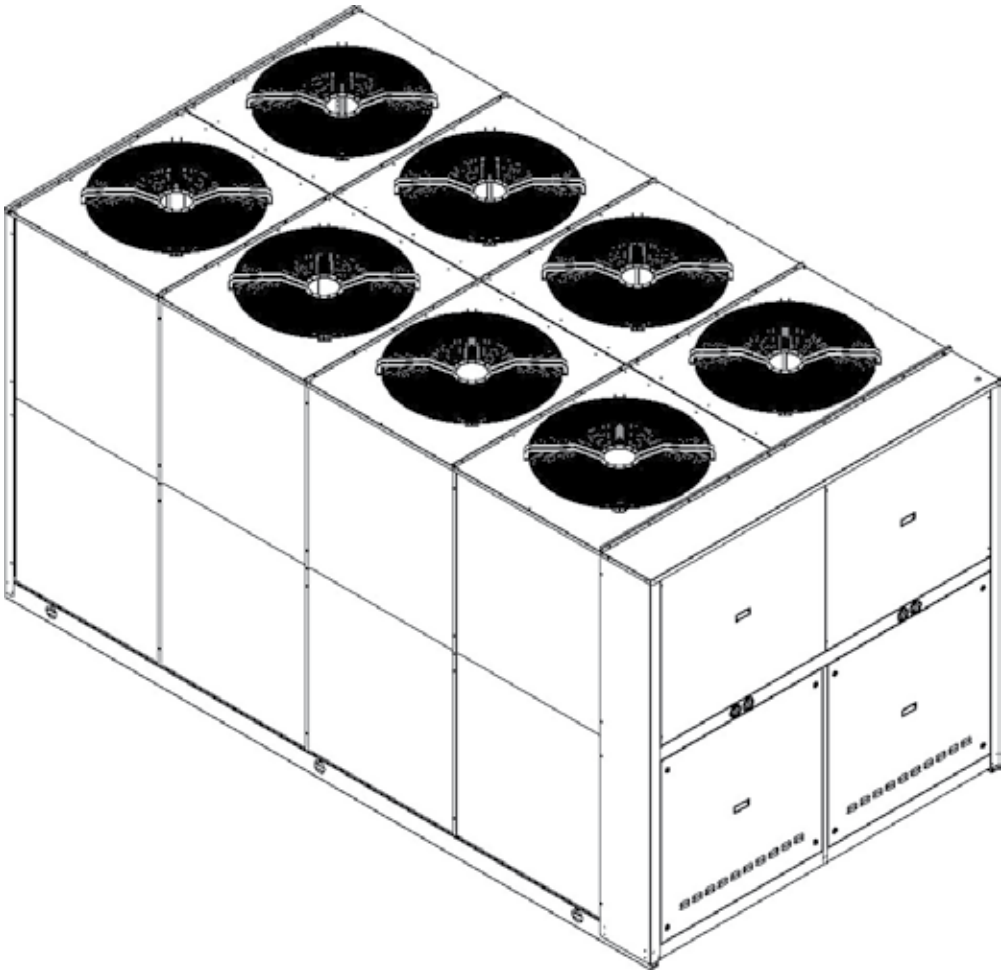
Ferroli

RLA

AIR COOLED WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS

162 ÷ 413 kW in cooling mode
168 ÷ 435 kW in heating mode



CE

INSTALLATION MANUAL

Dear Customer,
Thank you for having purchased a FERROLI Idustrial coolers. It is the result of many years experience, particular research and has been made with top quality materials and higlly advanced technologies.The CE mark guaranteed thats the appliances meets European Machine Directive requirements regarding safety.
The qualitative level is kept under constant surveillance. FERROLI products therefore offer SAFETY, QUALITY and RELIABILITY.
Due to the continuous improvements in technologies and materials, the product specification as well as performances are subject to variations without prior notice.

Thank you once again for your preference.
FERROLI S.p.A

CE

GB **"CE" DECLARATION OF CONFORMITY**
We, the undersigned, hereby declare under our responsibility, that the machine in question complies with the provisions established by Directives :

DE **"EG" KONFORMITÄTSERKLÄRUNG**
Wir, die Unterzeichner dies er Erklärung, erklären unter unseren ausschlie ßlichen Verantworfung, daß die genannte Maschine den Bestimmungen der folgenden EG-Richtlinien entspricht :

FR **DECLARATION "CE" DE CONFORMITE**
Nous soussignés déclarons, sous notre entière responsabilité, que la machine en objet est conforme aux prescriptions des Directives :

IT **DICHIARAZIONE "CE" DI CONFORMITÀ**
Noi sottoscritti dichiariamo, sotto la nostra responsabilità, che la macchina in questione è conforme alle prescrizioni delle Direttive :

ES **DECLARACION "CE" DE CONFORMIDAD**
Quienes subscribimos la presente declaracion, declaramos, baio nuestra exclusiva responsabilidad, que la maquina en objeto respeta lo prescrito par las Directivas :

PT **DECLARAÇÃO "CE" DE CONFORMIDADE**
Nós, signatários da presente, declaramos sob a nassa exclusiva responsabilidade, que a má quina em questão está em conformidade com as prescrições das Directrizes :

NL **"EG" CONFORMITEITSVERKLARING**
Wij ondergetekenden verklaren hierbij op uitsluitend eigen verantwoording dat de bovengenoemde machine conform de voorschriften is van de Richtlijnen:

DK **"CE" OVERENSSTEMMELSESERKLERING**
Underfegnede forsikrer under eget ansvar al den ovennævnte maskine er i overensstemmelse med vilkårene i direktiveme :

SE **FÖRSÄKRAN OM "CE" ÖVERENSSTÄMMELSE**
Underfecknade försäkrar under eget ansvar alt ovannämnda maskinskinen er i overensstemmelse med vilkarene i direktivene :

NO **BEKREFTELSE OM ÆCEØ OVERENSSTEMMELSE**
Underfegnede forsikrer under eget ansvar al den ovennevnte maskinen er i overensstemmelse med vilkarene i direktivene :

FI **"CE" VAATIMUSTENMUKAISUUSVAKUUTUS**
Allekirjoittaneet vakuutamme omalla vastuullamme että yllämainittu kone noudattaa ehtoja direktiiveissä :

GR **ΔΗΛΩΣΗ ΣΥΜΒΑΤΟΤΗΤΑΣ "ΕΕ"**
Εμετς που υπογραφουμε την παρουσα, δηλωνουμε υπο την αποκλειστικη μας ευθυνη, οτι το μηχανημα συμμορφουται οτα οσ α ορτζουν οι Οδηγιες :

HR **IZJAVA O "CE" SUGLASNOSTI**
Mi niže potpisani izjavljujemo, pod našom odgovornošu, da ova Mašina odgovara zahtijevima iz Direktiva :

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

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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 condensed in air with axial fans suitable for outdoor 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 seven models divided in 9 sizes with nominal cooling capacity **from 155 to 413 kW** and thermal capacity **from 168 to 435 kW.**
The units product cold water from **5 to 25°C** (in summer) and hot water from **30 to 55°C** (in winter) and as optional they are equipped with continuous adjustment of axial fans rotating 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.
All the units are equipped with 4 scroll compressors arranged in pairs (tandem) on 2 circuits 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, electronic expansion valve, coil heat exchanger made of louver aluminum fins and copper tubes, axial fans with profiled blades to contain noise and with thermal protection built-in, 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) a Low Noise Unit (AS) which provides sound attenuation thanks to sound absorbing insulation in compressors area, sound jackets on compressors, a head pressure control to reduce axial fans speed or an Extra Low Noise Unit (AX), which provides in addition slower axial fans, more powerful finned coils and activation logic of the compressors in saturation.
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.

General specifications

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

European Directives

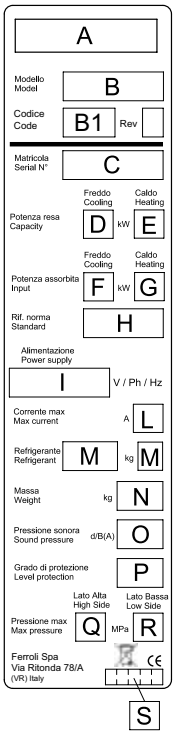
The company hereby declares that the machine in question complies with the matters prescribed by the following Directives:

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

Any other Directives have to be considered not applicable.

GENERAL SPECIFICATIONS

Identification plate of the Unit



The figure on the left depicts the identification plate of the unit, affixed to the outer left-hand side of the Electric Panel.
A description of the data is given below:

Standard versions

A - Trademark
B - Model
B1- Code
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 load current
M - Type of refrigerant and charge
N - Shipping weight of the unit
O - Sound pressure level at 1m
P - IP Level Protection
Q - Maximum pressure - High Side
R - Maximum pressure - Low Side
S - PED certification authority

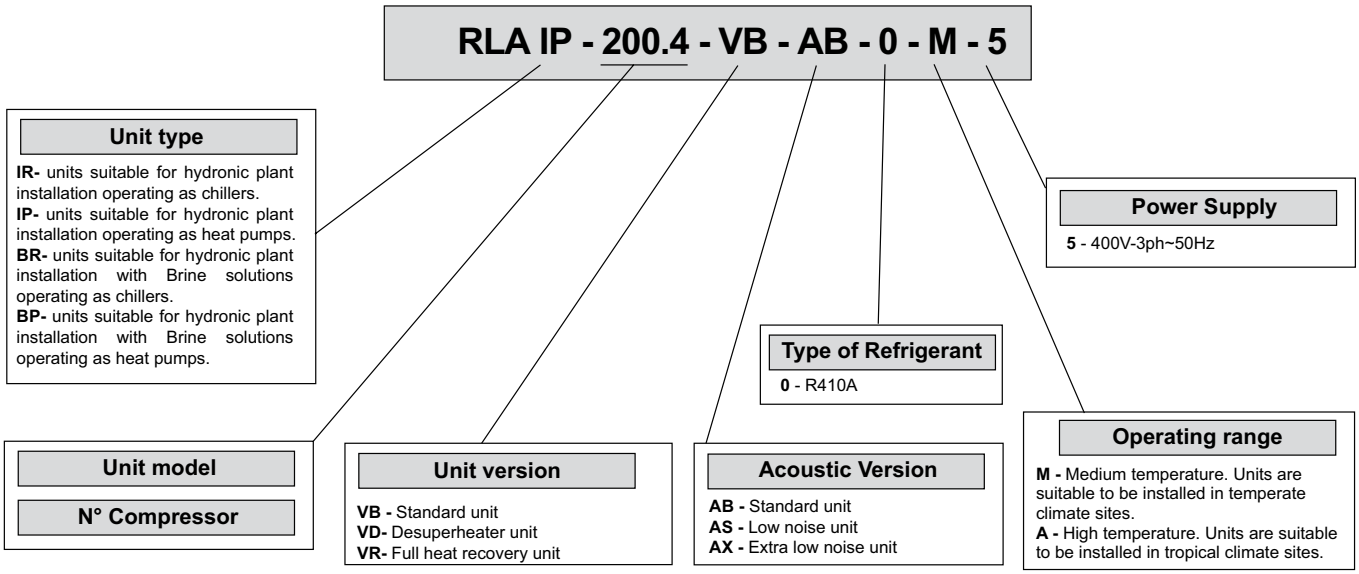
Special versions

A - Trademark
B - Model
B1- Code
C - Serial number
D - Cooling Capacity (same as Standard Version of the unit)
E - Heating Capacity
for IR unit, VD version, Recovered Heating Capacity
for IP unit, VD version, Heating Capacity / Recovered Heating Capacity
F - Power input in COOLING mode (same as Standard version of the unit)
G - Power input in HEATING mode
H - Reference standard
I - Electric power supply
L - Maximum load current
M - Type of refrigerant and charge
N - Shipping weight of the unit
O - Sound pressure level at 1m
P - IP Level Protection
Q - Maximum pressure - High Side
R - Maximum pressure - Low Side
S - PED certification authority

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

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: Standard unit.

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

Produces cold water in the same way as the standard version plus hot water from 30 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 20 to 25% of the heating capacity that would otherwise be dispersed in the air.

It helps to remind that hot water production is possible only in combination with cold-hot water production in the main heat exchanger and it is subordinated by it.

VR: Total Heat Recovery version

Produces cold water as in the standard version plus hot water at a temperature of 35 to 55°C at the same time. This is achieved thanks to a water-refrigerant gas heat exchanger that totally recovers the heating capacity that would otherwise be dispersed in the air. The total heat recovery function is enabled and disabled by means of a valve on the compressor delivery of each circuit: when the temperature of the water that enters the recuperator drops, the valve switches the hot gas flow from the condensing coils to the recovery heat exchanger. On the other hand, when the temperature of the water reaches the set-point, the valve shuts off the heat recuperator and switches the hot gas flow to the condensing coils.

It helps to remind that hot water production is possible only in combination with cold water production in the main heat exchanger and it is subordinated by it.

GENERAL SPECIFICATIONS

Description of the components

1. Fans. These are the helical type with scythe-shaped blades to increase the efficiency and reduce the noise level. The fans are directly coupled to the single-phase motor by means of an external rotor. Thermal protection against operating faults is installed inside the winding. As standard they are equipped with continuous adjustment of axial fans rotating 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.

2. Electric control and monitoring panel.

It is housed in a cabinet made of adequately thick painted sheet metal suitable for outdoor installation (protection degree IP 54). The panel comprises the following main components:

- Main door-locking circuit-breaker.
- Fuse holders with protection fuses for each compressor.
- Fuse holders with protection fuses for the antifreeze heater.
- Fuse holders and protection fuses for the fans (accessories).
- Fan control contactors.
- Insulating and safety transformer to power the auxiliaries, protected with fuses.
- Basic monitoring board with microprocessor

Control system main functions:

temperature control of the water produced by the unit, compressor and pump operating hour counter, timing and cycling of start-ups, input parameters by keyboard, alarms management, smart defrosting control and operating mode change (only IP unit), dynamic set-point (climatic control), scheduling and integrative heaters control ATC. If you installed the hydronic kit these functions are enabled: antifreeze with pump, start-up cycle after prolonged inactivity (anti-sticking), if the hydronic kit installed has 2 pumps there is a cycling between each pump to ensure an equivalent lifetime.

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 E/I (only IP unit), demand limit, double Set-point.

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), additional heating management, available digital contact on compressors running.

Analogic input functions: in and out water temperature, coil temperature probe, external air temperature probe.

Analogic output functions: continuous adjustment of axial fans rotating speed (if installed).

Moreover the controller allows:

- Alarm history (max 50m alarms managed with FIFO logic)
- Time scheduling (daily and weekly)
- Precise control of the water leaving temperature
- ATC (Advanced Temperature Control) prevention of the block of the unit: In case of critical conditions the machine does not stop but is able to regulate itself and provide the maximum power that can be generated in those conditions with the compressors working inside the admissible limits.
-Demand Limit by Digital Input and/or by Analog Input (4-20mA)
-Double Set Point by Digital Input
-Connection to BMS (supervision systems) through serial port RS 485 and MODBUS protocol

3. User interfacing terminal with display.

Control panel: composed of the instrument's front panel, equipped with an LCD display, three indicator LEDs, and one joystick buttons and three function button, it enables viewing and/or checking the operating mode and parameters, resources and complete alarm diagnostics.

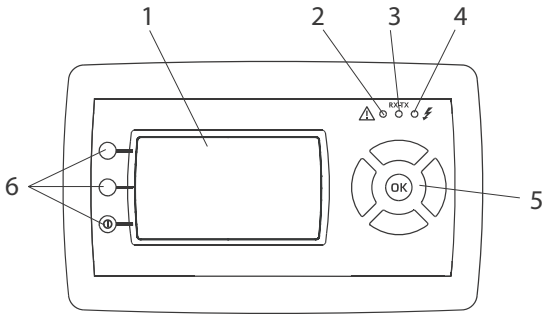
In particular, it enables:

· Managing alarm situations

· Checking the status of resources.

KEY

1.Display
2. Alarms LED
3. LED for communication between the motherboard governing the unit and the keypad
4. Power supply LED
5. Joystick Menu Button
6. Function Button

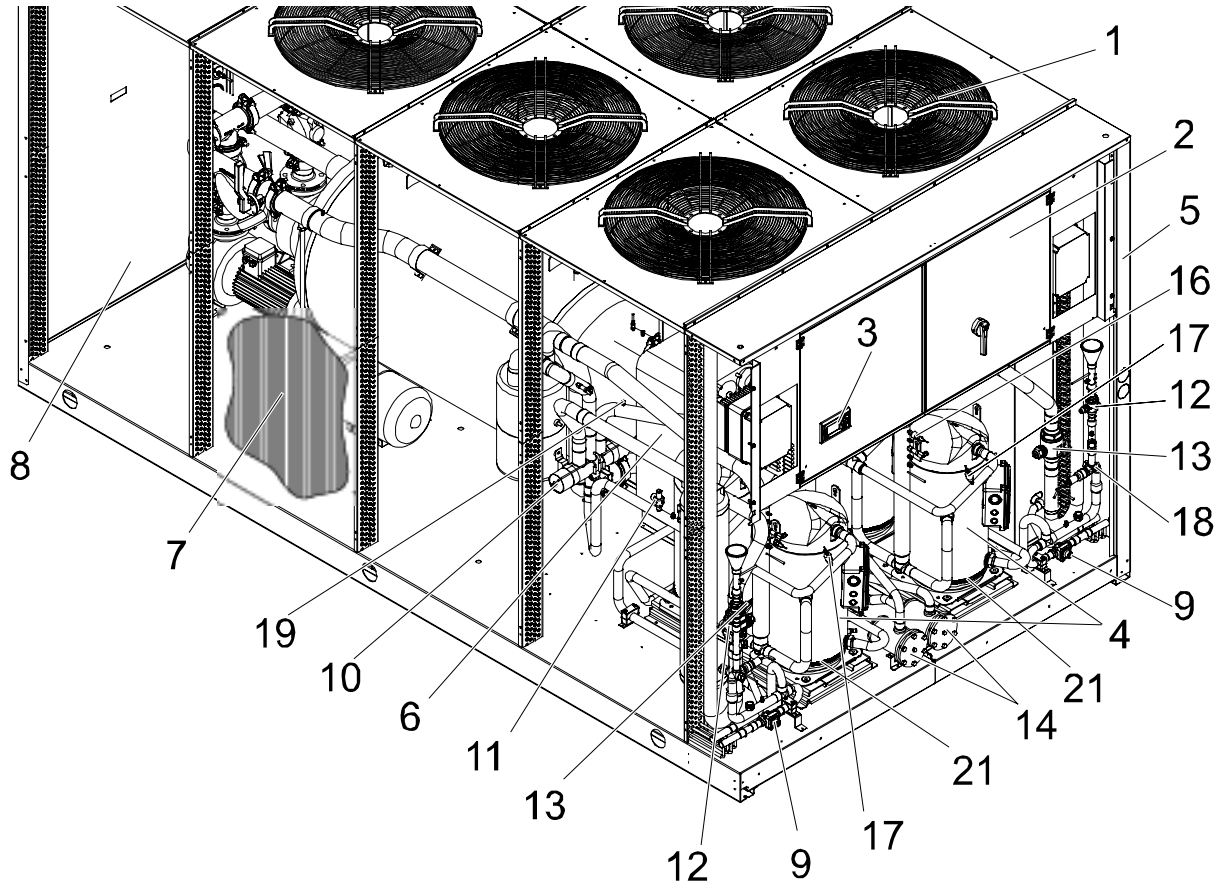


4. Compressors. They are the SCROLL type with orbiting coil equipped with built-in thermal protection and oil heater. The version unit AS and AX includes: a soundproofing jacket for the compressors, acoustic cladding for the entire compressor compartment to reduce the noise level and continuous adjustment of axial fans rotating speed. All units are equipped with four compressors connected in parallel (2 cooling circuits) which can operate at the same time (100% cooling power) or individually (75-50-25% of the cooling power), thus adapting to the different thermal loads of the system supplied.

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

6. 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.
7. 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.
8. Covering panels, made of galvanized sheet metal coated with polyurethane powder paint to ensure maximun protection against adverse weather conditions
9.One-way valves (IP unit only), allowing the coolant to pass into the appropriate exchangers, depending on the operating cycle.
10. 4-way cycle reversal valve (IP unit only), reverses the flow direction of the gas as the summer/winter operating mode is changed.

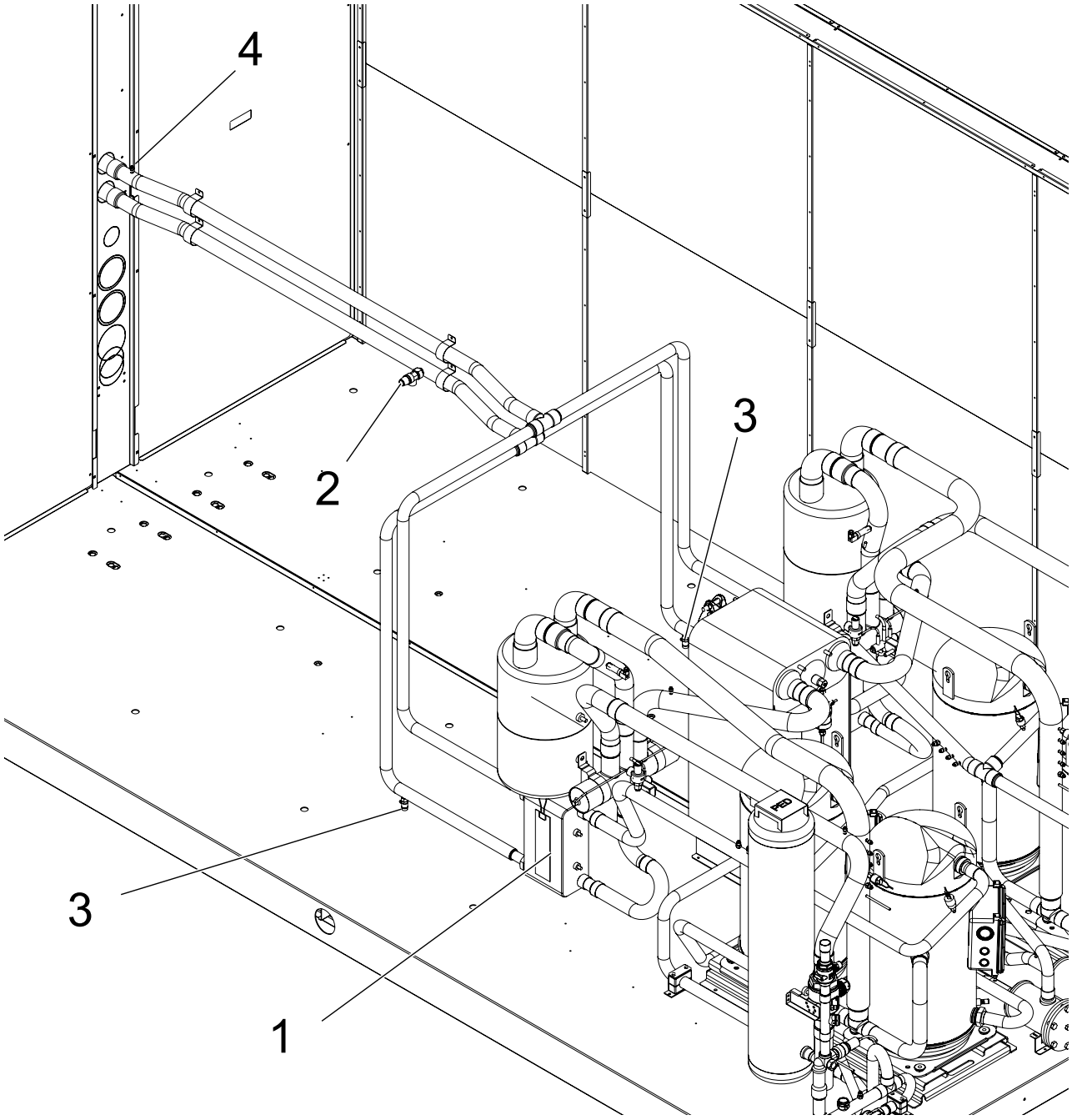
Hydraulic and cooling circuit components
11. Safety valve. Installed on the delivery pipe of the compressors, this operates if extreme faults should occur in the plant.
12. Fluid tap. Ball type, this allows the gas flow on the fluid line to be turned on and off. Along with the tap on the compressor delivery, 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): pump down.
13. Compressor delivery tap. Ball type, allows the gas delivered to the compressors to be turned on and off.
14. Dehydrator filter. Mechanical cartridge type. Retains impurities and traces of moisture in the circuit.
15. 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.
16. Low pressure switch. 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.
17. High pressure switch (n°2). With fixed setting. Are is 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.
18. Electronic expansion valve. This supplies the evaporator correctly, keeping the selected overheating degree at a steady level.
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.
- 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.
- **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.



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 accessories

NOTE: The accessories can be of the following type:
(M): only installed in the factory.
(F): supplied for installation by the customer.

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).

To ensure a continuous operation, an anti-freeze with pump function (based on a reading from the output water probe) and starting cyclic (anti-sticking) after prolonged inactivity are enabled; if the hydronic kit has 2 pumps, the second, mounted in parallel to the first, can be activated in case of failure of the first and will also include a cycling period to guarantee to each pump an equivalent operating time.

MP. Hydronic Kit.

MP : Hydronic Kit with 1 (M1P) o 2 (M2P) Pumps: (The second pump, mounted in parallel to the first, allows to have a spare pump to be activated in case of failure of the first). 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 2P STD: 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 2P HP1: 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 2P STD: 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 2P STD: 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 2P HP1: 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.).

Notes:
(A): For the working head values depending on the water flow rate, consult the Standard Working Head MP AM STD graph.
(B): For the working head values depending on the water flow rate, consult the High Working Head MP AM HP1 graph.

SAA- Water Storage tank (M). Painted steel water storage tank reduces compressor startup frequency and temperature fluctuation on water side. It is coated with thermo insulated material to avoid air condensing and losses due to heat transfer. It is available on delivery side and also for primary-secondary hydraulic circuit interface.

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.

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

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.

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

- Victaulic connection 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.

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

GP- Coil protection grid (M). Protects external surface of the finned coils.

GM- Pressure gauges kit (M). 4 pressure gauges allow visualization of high and low refrigerant gas pressure.

AVG- Rubber vibration dampers (F). Reduce vibrations transmitted to the floor by compressors and fans during normal operating conditions (until 85%).

AVM- Spring vibration dampers (F). Reduce vibrations transmitted to the floor by compressors and fans during normal operating conditions (until 90%).

ACCESSORIES AND OPTIONAL EQUIPMENT

VICTAULIC CONNECTION KIT

COMPLETE PIPE KIT

WATER STORAGE TANK PIPE KIT

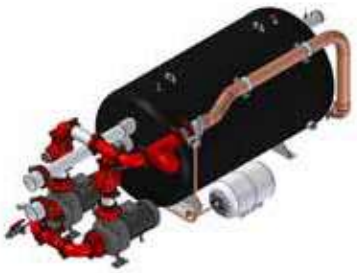
M1P AM 2P STD

M1P AM 2P HP1

M1P PS 2P STD

M2P AM 2P STD

M2P AM 2P HP1



M2P PS 2P STD

M1P SS 2P STD

M1P SS 2P HP1

M2P SS 2P STD

M2P SS 2P HP1

ACCESSORIES AND OPTIONAL EQUIPMENT

Electrical accessories

TP - Low and High pressure transducers (M). Allow the display of the suction and discharge pressures of compressors. Their presence activates an advanced defrost and condensation control logic and the ATC (Advanced Temperature Control) to prevent high pressure alarm due to high external air temperature.

RAG- Storage tank electrical heater (F). Keeps water in storage tank above freezing point to avoid risk of icing during winter stops it is activated together with plate heat exchanger electrical heater.

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.

CR- Remote control panel (F). Replies every control and visualization of the onboard control panel.

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

MTC - Magnetothermic switch (M). Magnetothermic switch on all loads place of fuses.

SS - Soft Starter (M). Soft starter on compressors allow to reduce to about a 60% nominal inrush current.

FLS - Flow switch (F). Paddle flow switch on the water circuit to avoid the risk of freezing if the water flow is shut off for some reason.

RIF - Capacitors for power factor corrections (M). Capacitors for power factor corrections increase power factor cos φ (> 0.91) and reduce power input.

CSF - Voltage monitor and sequence meter (M). The device enables control of the correct sequence of power phases and the lack of any phases.

KOP - Programmer clock (M). 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).

DCC - Head pressure control (M). (as standard for Low Noise unit AS and for eXtra Low Noise unit AX).
The device is made by 2 electrical drivers that, by means of phase cutting, control the fans speed rotation, with the scope of mantaining the condensation pressure inside the correct operating limits.

Mechanical options

Special finned heat exchangers
- Coils with copper fins
- Coils with tin-coated copper fins
- Coils with aluminium fins with acrylic, epoxy or hydrofilic coating.

Electrical options

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

GENERAL TECHNICAL SPECIFICATION

General technical specifications

MODELS		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply		400-3-50									V-ph-Hz
Refrigerant type		R410A									-
Refrigeration circuits		2									N°
Compressor specifications											
Type		scroll									-
Quantity		4									N°
Oil charge CP1		3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	l
Oil charge CP2		3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	6.3	l
Oil charge CP3		3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	l
Oil charge CP4		3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	6.3	l
Load steps		0-25-50-75-100									%
Heat Exchanger											
Type		Brazed plates									-
Quantity		1									N°
Total water capacity		7.3	8.3	9.5	10.8	12.0	14.2	23.0	25.7	29.3	l
Coils specifications											
Type		Aluminum fins and copper tubes									-
Quantity		2									N°
Total area		5.54	5.54	5.54	5.54	5.54	5.54	7.41	7.41	7.41	m^2
Fan specifications											
Type		Axial									-
Quantity		4	4	4	4	6	6	6	8	8	N°
Maximum rotation speed	AB	900									rpm
	AS	750									rpm
	AX	600									rpm
Total air flow rate	AB	84350	82920	82920	79760	124380	119640	130599	165840	159520	m^3/h
	AS	70292	69100	69100	66467	103650	99700	108833	138200	132933	m^3/h
	AX	56233	55280	55280	53173	82920	79760	87066	110560	106347	m^3/h
Power input		7.2	7.2	7.2	7.2	10.8	10.8	10.8	14.4	14.4	kW
Water Storage Tank (SAA accessory)											
Water volume		325						710			l
Surge chamber volume		24									l
Safety valve setting		600									kPa
Surge chamber default pressure		150									kPa
Max. operating pressure		800									kPa

Electrical specifications

Units without pumping module

MODELS	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Total maximum load current [FLA]	141	152	163	179	204	234	263	301	330	A
Total maximum power input [FLI]	76.8	88	98.4	108	122	139	156	182	203	kW
Total maximum starting current [MIC]	284	340	352	407	432	484	514	621	650	A
Units with pumping module MP PS STD (1 or 2 pumps)										
Total maximum load current [FLA]	147	158	169	186	210	245	275	312	341	A
Total maximum power input [FLI]	80	91	102	112	126	146	163	188	210	kW
Total maximum starting current [MIC]	290	347	358	413	438	496	525	633	662	A
Units with pumping module MP AM STD and MP SS STD (1 or 2 pumps)										
Total maximum load current [FLA]	147	158	172	188	213	245	275	312	345	A
Total maximum power input [FLI]	80	91	103	113	127	146	163	188	212	kW
Total maximum starting current [MIC]	290	347	360	416	441	496	525	633	665	A
Units with pumping module MP AM HP1 and MP SS HP1 (1 or 2 pumps)										
Total maximum load current [FLA]	150	161	175	191	216	249	278	316	352	A
Total maximum power input [FLI]	82	93	105	115	129	148	165	188	216	kW
Total maximum starting current [MIC]	293	349	363	418	443	499	529	636	672	A

Data referred to standard operating condition.
(SAA): with storage tank

NOMINAL PERFORMANCES

Standard unit AB - MEDIUM TEMPERATURE PLANT

	MOD.	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	162	179	201	230	257	292	326	371	413	kW
	Compressor power input	47.7	54.0	61.9	71.1	77.4	89.7	101	112	128	kW
	Total power input	54.9	61.2	69.1	78.3	88.2	100	112	127	142	kW
	EER (E)	2.95	2.92	2.91	2.94	2.91	2.92	2.91	2.92	2.91	-
	ESEER (E)	4.13	4.09	4.07	4.11	4.08	4.09	4.08	4.09	4.07	-
	Water flow rate	7.74	8.55	9.60	11.0	12.3	14.0	15.6	17.7	19.7	l/s
	Water pressure drop (E)	55	54	62	65	67	71	59	61	62	kPa
IP	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	155	172	194	217	246	278	312	360	401	kW
	Compressor power input	47.0	53.3	60.7	69.5	76.9	88.4	100	111	125	kW
	Total power input	54.2	60.5	67.9	76.7	87.7	99.2	111	126	140	kW
	EER (E)	2.86	2.84	2.86	2.83	2.81	2.80	2.81	2.86	2.86	-
	ESEER (E)	4.00	3.98	4.00	3.96	3.93	3.92	3.94	4.00	4.01	-
	Water flow rate	7.41	8.22	9.27	10.4	11.8	13.3	14.9	17.2	19.2	l/s
	Water pressure drop (E)	50	50	58	58	62	64	54	58	59	kPa
	Heating mode A7W45 (source: air 7°C d.b. 6°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity (E)	168	189	213	238	270	305	342	391	435	kW
	Compressor power input	48.1	55.1	62.9	71.7	79.0	90.4	102	114	129	kW
	Total power input	55.3	62.3	70.1	78.9	89.8	101	113	128	143	kW
	COP (E)	3.04	3.03	3.04	3.02	3.01	3.02	3.03	3.05	3.04	-
	Water flow rate	8.03	9.03	10.2	11.4	12.9	14.6	16.3	18.7	20.8	l/s
	Water pressure drop (E)	59	60	70	69	74	77	65	68	69	kPa
	Heating mode A2W45 (source: air 2°C d.b. 1°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity	153	172	194	217	246	278	311	356	396	kW
	Compressor power input	47.4	54.3	62.0	70.6	77.8	89.0	100	112	127	kW
	Total power input	54.6	61.5	69.2	77.8	88.6	99.8	111	127	141	kW
	COP	2.80	2.80	2.80	2.79	2.78	2.79	2.80	2.80	2.81	-
	Water flow rate	7.30	8.22	9.26	10.3	11.7	13.3	14.9	17.0	18.9	l/s
	Water pressure drop	49	50	58	57	61	64	54	57	57	kPa

(E): Data declared according to **EUROVENT LCP** certification programme. The values are for units without options and accessories.

Standard unit AB - LOW TEMPERATURE PLANT

	MOD.	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	207	229	257	294	329	374	417	475	529	kW
	Compressor power input	50.6	57.2	65.6	75.4	82.0	95.1	107	119	136	kW
	Total power input	57.8	64.4	72.8	82.6	92.8	106	118	133	150	kW
	EER	3.58	3.56	3.53	3.56	3.55	3.53	3.53	3.57	3.53	-
	Water flow rate	9.91	10.9	12.3	14.1	15.7	17.9	19.9	22.7	25.3	l/s
	Water pressure drop	90	87	102	106	110	116	97	101	102	kPa
IP	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	198	220	248	278	315	356	399	461	513	kW
	Compressor power input	49.8	56.5	64.3	73.7	81.5	93.7	106	118	133	kW
	Total power input	57.0	63.7	71.5	80.9	92.3	105	117	132	147	kW
	EER	3.47	3.45	3.47	3.44	3.41	3.39	3.41	3.49	3.49	-
	Water flow rate	9.48	10.5	11.9	13.3	15.0	17.0	19.1	22.0	24.5	l/s
	Water pressure drop	82	81	95	95	100	105	89	95	96	kPa
	Heating mode A7W35 (source: air 7°C d.b. 6°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	178	200	226	252	286	323	363	414	461	kW
	Compressor power input	40.9	46.8	53.5	60.9	67.2	76.8	86.7	96.9	110	kW
	Total power input	48.1	54.0	60.7	68.1	78.0	87.6	97.5	111	124	kW
	COP	3.70	3.70	3.72	3.70	3.67	3.69	3.72	3.73	3.72	-
	Water flow rate	8.51	9.57	10.8	12.1	13.7	15.4	17.3	19.8	22.0	l/s
	Water pressure drop	66	67	79	78	84	86	73	77	77	kPa
	Heating mode A2W35 (source: air 2°C d.b. 1°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	159	179	202	225	256	289	324	370	412	kW
	Compressor power input	38.6	44.2	50.5	57.6	63.4	72.6	81.9	91.5	104	kW
	Total power input	45.8	51.4	57.7	64.8	74.2	83.4	92.7	106	118	kW
	COP	3.47	3.48	3.50	3.47	3.45	3.47	3.50	3.49	3.49	-
	Water flow rate	7.60	8.55	9.63	10.8	12.2	13.8	15.5	17.7	19.7	l/s
	Water pressure drop	53	54	62	62	66	69	59	61	62	kPa

NOMINAL PERFORMANCES

Low noise unit AS - MEDIUM TEMPERATURE PLANT

	MODELLO	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	156	172	193	221	247	280	313	356	396	kW
	Compressor power input	51.5	58.3	66.9	76.8	83.6	96.9	109	121	138	kW
	Total power input	58.7	65.5	74.1	84.0	94.4	108	120	135	152	kW
	EER (E)	2.66	2.63	2.60	2.63	2.62	2.59	2.61	2.64	2.61	-
	ESEER (E)	3.72	3.68	3.65	3.68	3.66	3.63	3.65	3.69	3.65	-
	Water flow rate	7.45	8.22	9.22	10.6	11.8	13.4	15.0	17.0	18.9	l/s
	Water pressure drop (E)	51	50	57	60	62	65	55	57	57	kPa
IP	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	149	165	186	208	236	267	300	346	385	kW
	Compressor power input	50.8	57.6	65.6	75.1	83.1	95.5	108	120	135	kW
	Total power input	58.0	64.8	72.8	82.3	93.9	106	119	134	149	kW
	EER (E)	2.57	2.55	2.55	2.53	2.51	2.52	2.52	2.58	2.58	-
	ESEER (E)	3.60	3.56	3.58	3.54	3.52	3.53	3.53	3.61	3.62	-
	Water flow rate	7.12	7.88	8.89	9.94	11.3	12.8	14.3	16.5	18.4	l/s
	Water pressure drop (E)	46	46	53	53	57	59	50	53	54	kPa
	Heating mode A7W45 (source: air 7°C d.b. 6°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity (E)	161	181	204	228	259	293	328	375	418	kW
	Compressor power input	45.7	52.3	59.8	68.1	75.1	85.9	97.0	108	123	kW
	Total power input	52.9	59.5	67.0	75.3	85.9	96.7	108	122	137	kW
	COP (E)	3.04	3.04	3.04	3.03	3.02	3.03	3.04	3.07	3.05	-
	Water flow rate	7.69	8.65	9.8	10.9	12.4	14.0	15.7	17.9	20.0	l/s
	Water pressure drop (E)	54	55	64	63	69	71	60	63	64	kPa
	Heating mode A2W45 (source: air 2°C d.b. 1°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity	147	165	186	207	236	267	298	341	380	kW
	Compressor power input	45.0	51.5	58.9	67.1	74.0	84.6	95.5	106	121	kW
	Total power input	52.2	58.7	66.1	74.3	84.8	95.4	106	121	136	kW
	COP	2.82	2.81	2.81	2.79	2.78	2.81	2.81	2.82	2.79	-
	Water flow rate	7.00	7.87	8.87	9.91	11.3	12.7	14.3	16.3	18.2	l/s
	Water pressure drop	45	46	53	52	57	58	50	52	53	kPa

(E): Data declared according to **EUROVENT LCP** certification programme. The values are for units without options and accessories.

Low noise unit AS - LOW TEMPERATURE PLANT

	MODELLO	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	200	220	247	283	316	358	401	456	507	kW
	Compressor power input	54.6	61.8	70.9	81.4	88.6	103	116	128	146	kW
	Total power input	61.8	69.0	78.1	88.6	99.4	114	126	143	161	kW
	EER	3.24	3.19	3.16	3.19	3.18	3.14	3.18	3.19	3.15	-
	Water flow rate	9.54	10.5	11.8	13.5	15.1	17.1	19.1	21.8	24.2	l/s
	Water pressure drop	83	81	94	97	102	106	89	93	94	kPa
IP	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	191	211	238	266	302	342	384	443	493	kW
	Compressor power input	53.8	61.1	69.5	79.6	88.1	101	114	127	143	kW
	Total power input	61.0	68.3	76.7	86.8	98.9	112	125	142	158	kW
	EER	3.13	3.09	3.10	3.06	3.05	3.05	3.07	3.12	3.12	-
	Water flow rate	9.11	10.1	11.4	12.7	14.4	16.3	18.3	21.2	23.5	l/s
	Water pressure drop	76	75	88	86	92	96	82	88	88	kPa
	Heating mode A7W35 (source: air 7°C d.b. 6°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	171	192	216	242	275	311	348	398	443	kW
	Compressor power input	38.8	44.5	50.8	57.9	63.8	73.0	82.5	91.8	105	kW
	Total power input	46.0	51.7	58.0	65.1	74.6	83.8	93.3	106	119	kW
	COP	3.72	3.71	3.72	3.72	3.69	3.71	3.73	3.75	3.72	-
	Water flow rate	8.15	9.17	10.3	11.5	13.1	14.8	16.6	19.0	21.2	l/s
	Water pressure drop	61	62	71	71	76	79	67	71	72	kPa
	Heating mode A2W35 (source: air 2°C d.b. 1°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	152	171	193	216	245	277	310	355	396	kW
	Compressor power input	36.7	42.0	48.0	54.7	60.3	69.0	77.9	86.7	98.7	kW
	Total power input	43.9	49.2	55.2	61.9	71.1	79.8	88.7	101	113	kW
	COP	3.46	3.48	3.50	3.49	3.45	3.47	3.49	3.51	3.50	-
	Water flow rate	7.28	8.18	9.22	10.3	11.7	13.2	14.8	17.0	18.9	l/s
	Water pressure drop	48	49	57	57	61	63	53	57	57	kPa

NOMINAL PERFORMANCES

Extra low noise unit AX - MEDIUM TEMPERATURE PLANT

	MODELLO	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	152	168	189	216	242	274	306	349	388	kW
	Compressor power input	52.9	59.9	68.7	78.9	85.9	99.6	112	124	142	kW
	Total power input	60.1	67.1	75.9	86.1	96.7	110	123	138	156	kW
	EER (E)	2.53	2.50	2.49	2.51	2.50	2.49	2.49	2.53	2.49	-
	ESEER (E)	3.54	3.51	3.49	3.51	3.50	3.49	3.48	3.54	3.48	-
	Water flow rate	7.26	8.03	9.03	10.3	11.6	13.1	14.6	16.7	18.5	l/s
	Water pressure drop (E)	48	47	55	57	60	62	52	55	55	kPa
IP	Cooling mode A35W7 (source: air 35°C d.b. / system: water in 12°C out 7°C)										
	Cooling capacity (E)	146	162	182	204	231	261	293	338	377	kW
	Compressor power input	52.2	59.2	67.4	77.1	85.4	98.1	111	123	139	kW
	Total power input	59.4	66.4	74.6	84.3	96.2	109	122	137	153	kW
	EER (E)	2.46	2.44	2.44	2.42	2.40	2.39	2.40	2.47	2.46	-
	ESEER (E)	3.44	3.42	3.42	3.39	3.36	3.35	3.36	3.45	3.45	-
	Water flow rate	6.98	7.74	8.70	9.75	11.0	12.5	14.0	16.1	18.0	l/s
	Water pressure drop (E)	44	44	51	51	54	57	48	51	52	kPa
	Heating mode A7W45 (source: air 7°C d.b. 6°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity (E)	160	180	202	226	257	290	325	371	413	kW
	Compressor power input	44.7	51.2	58.5	66.7	73.5	84.1	94.9	106	120	kW
	Total power input	51.9	58.4	65.7	73.9	84.3	94.9	106	120	134	kW
	COP (E)	3.08	3.08	3.07	3.06	3.05	3.06	3.07	3.09	3.08	-
	Water flow rate	7.64	8.60	9.65	10.8	12.3	13.9	15.5	17.7	19.7	l/s
	Water pressure drop (E)	53	54	63	62	67	70	59	61	62	kPa
	Heating mode A2W45 (source: air 2°C d.b. 1°C w.b. / system: water in 40°C out 45°C)										
	Heating capacity (E)	146	164	184	206	234	264	296	338	376	kW
	Compressor power input	44.0	50.4	57.6	65.7	72.4	82.8	93.5	104	118	kW
	Total power input	51.2	57.6	64.8	72.9	83.2	93.6	104	119	133	kW
	COP (E)	2.85	2.85	2.84	2.83	2.81	2.82	2.85	2.84	2.83	-
	Water flow rate	6.96	7.83	8.78	9.83	11.2	12.6	14.1	16.1	18.0	l/s
	Water pressure drop (E)	44	45	52	52	56	57	48	51	52	kPa

(E): Data declared according to **EUROVENT LCP** certification programme. The values are for units without options and accessories.

Extra low noise unit AX - LOW TEMPERATURE PLANT

	MODELLO	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
IR	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	195	215	242	276	310	351	392	447	497	kW
	Compressor power input	56.1	63.5	72.8	83.6	91.1	106	119	131	151	kW
	Total power input	63.3	70.7	80.0	90.8	102	116	130	146	165	kW
	EER	3.08	3.04	3.03	3.04	3.04	3.03	3.02	3.06	3.01	-
	Water flow rate	9.30	10.3	11.6	13.2	14.8	16.8	18.7	21.3	23.7	l/s
	Water pressure drop	79	78	91	93	98	102	85	89	90	kPa
IP	Cooling mode A35W18 (source: air 35°C d.b. / system: water in 23°C out 18°C)										
	Cooling capacity	187	207	233	261	296	334	375	433	483	kW
	Compressor power input	55.3	62.8	71.4	81.7	90.5	104	118	130	147	kW
	Total power input	62.5	70.0	78.6	88.9	101	115	128	145	162	kW
	EER	2.99	2.96	2.96	2.94	2.93	2.90	2.93	2.99	2.98	-
	Water flow rate	8.93	9.91	11.1	12.5	14.1	16.0	17.9	20.7	23.1	l/s
	Water pressure drop	73	72	83	83	89	93	78	84	85	kPa
	Heating mode A7W35 (source: air 7°C d.b. 6°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	170	191	214	240	272	307	345	393	438	kW
	Compressor power input	38.0	43.5	49.7	56.7	62.5	71.5	80.7	90.1	102	kW
	Total power input	45.2	50.7	56.9	63.9	73.3	82.3	91.5	105	116	kW
	COP	3.76	3.77	3.76	3.76	3.71	3.73	3.77	3.74	3.78	-
	Water flow rate	8.10	9.12	10.2	11.4	13.0	14.7	16.5	18.8	20.9	l/s
	Water pressure drop	60	61	70	69	75	78	66	69	70	kPa
	Heating mode A2W35 (source: air 2°C d.b. 1°C w.b. / system: water in 30°C out 35°C)										
	Heating capacity	151	170	191	214	243	274	308	351	391	kW
	Compressor power input	35.9	41.1	47.0	53.5	59.0	67.5	76.2	85.1	96.3	kW
	Total power input	43.1	48.3	54.2	60.7	69.8	78.3	87.0	99.5	111	kW
	COP	3.50	3.52	3.52	3.53	3.48	3.50	3.54	3.53	3.52	-
	Water flow rate	7.23	8.14	9.13	10.2	11.6	13.1	14.7	16.8	18.7	l/s
	Water pressure drop	48	49	56	56	60	62	53	55	56	kPa

STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Performance - Standard unit AB

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
160.4	5	185	33.5	173	38.5	163	42.4	153	46.8	143	51.6	132	56.2	121	60.8
	6	190	33.8	177	38.9	168	42.8	157	47.2	146	52.0	136	56.7	125	61.3
	7	196	34.1	183	39.3	173	43.3	162	47.7	151	52.6	140	57.3	128	62.0
	8	201	34.5	188	39.7	178	43.7	167	48.2	155	53.2	144	58.0	-	-
	9	207	34.9	193	40.1	182	44.2	171	48.7	159	53.7	148	58.5	-	-
	10	212	35.2	198	40.5	187	44.6	176	49.2	163	54.2	151	59.1	-	-
	11	218	35.5	203	40.9	192	45.1	180	49.7	168	54.8	155	59.7	-	-
	12	223	35.9	209	41.3	197	45.5	185	50.2	172	55.3	160	60.3	-	-
180.4	5	204	37.9	191	43.6	180	48.0	169	53.0	157	58.4	146	63.6	134	68.8
	6	210	38.2	196	44.0	185	48.5	174	53.5	162	58.9	150	64.2	138	69.4
	7	216	38.6	202	44.5	191	49.0	179	54.0	167	59.5	154	64.9	142	70.2
	8	222	39.1	207	44.9	196	49.5	184	54.6	171	60.2	159	65.6	-	-
	9	228	39.5	213	45.4	202	50.0	189	55.1	176	60.8	163	66.3	-	-
	10	234	39.8	219	45.8	207	50.5	194	55.7	181	61.4	167	66.9	-	-
	11	240	40.2	224	46.3	212	51.0	199	56.2	185	62.0	172	67.6	-	-
	12	247	40.6	230	46.7	218	51.5	205	56.8	190	62.6	176	68.2	-	-
200.4	5	229	43.4	214	50.0	203	55.1	190	60.7	177	66.9	164	72.9	150	78.9
	6	236	43.8	220	50.4	208	55.6	195	61.3	182	67.5	168	73.6	155	79.6
	7	243	44.3	227	51.0	214	56.1	201	61.9	187	68.2	173	74.4	159	80.4
	8	250	44.8	233	51.5	220	56.8	207	62.6	192	69.0	178	75.2	-	-
	9	256	45.2	239	52.0	226	57.3	212	63.2	198	69.7	183	76.0	-	-
	10	263	45.7	246	52.6	232	57.9	218	63.8	203	70.4	188	76.7	-	-
	11	270	46.1	252	53.1	238	58.5	224	64.5	208	71.1	193	77.5	-	-
	12	277	46.6	259	53.6	245	59.0	230	65.1	214	71.7	198	78.2	-	-
230.4	5	263	49.9	245	57.4	232	63.2	217	69.7	202	76.9	187	83.8	172	90.6
	6	270	50.4	252	57.9	238	63.8	223	70.4	208	77.6	193	84.6	177	91.4
	7	278	50.9	259	58.5	245	64.5	230	71.1	214	78.4	198	85.4	182	92.4
	8	286	51.4	267	59.2	252	65.2	237	71.9	220	79.2	204	86.4	-	-
	9	293	51.9	274	59.8	259	65.9	243	72.6	226	80.0	209	87.2	-	-
	10	301	52.5	281	60.4	266	66.5	249	73.3	232	80.8	215	88.1	-	-
	11	309	53.0	288	61.0	273	67.2	256	74.0	238	81.6	220	89.0	-	-
	12	317	53.5	296	61.5	280	67.8	263	74.8	245	82.4	226	89.8	-	-
260.4	5	293	54.3	274	62.5	259	68.8	243	75.9	226	83.7	209	91.2	192	98.6
	6	301	54.8	281	63.1	266	69.5	250	76.6	232	84.4	215	92.1	198	99.5
	7	310	55.4	290	63.7	274	70.2	257	77.4	239	85.3	221	93.0	203	100.6
	8	319	56.0	298	64.4	282	71.0	264	78.3	246	86.3	228	94.0	-	-
	9	328	56.6	306	65.1	289	71.7	272	79.0	253	87.1	234	95.0	-	-
	10	337	57.1	314	65.7	297	72.4	279	79.8	259	88.0	240	95.9	-	-
	11	345	57.7	322	66.4	305	73.1	286	80.6	266	88.8	246	96.9	-	-
	12	355	58.2	331	67.0	313	73.8	294	81.4	273	89.7	253	97.8	-	-
290.4	5	333	62.9	311	72.4	294	79.8	276	88.0	257	97.0	238	106	219	114
	6	343	63.5	320	73.1	302	80.5	284	88.8	264	97.9	244	107	225	115
	7	353	64.2	329	73.8	311	81.4	292	89.7	272	98.9	252	108	231	117
	8	363	64.9	338	74.7	320	82.3	300	90.7	279	100.0	259	109	-	-
	9	372	65.5	348	75.4	329	83.1	309	91.6	287	101.0	266	110	-	-
	10	382	66.2	357	76.2	338	83.9	317	92.5	295	102.0	273	111	-	-
	11	392	66.8	366	76.9	346	84.7	325	93.4	302	103	280	112	-	-
	12	403	67.5	376	77.6	356	85.6	334	94.3	310	104	288	113	-	-
330.4	5	372	70.9	347	81.5	328	89.8	308	99.0	287	109	266	119	244	129
	6	382	71.5	357	82.3	338	90.7	317	100.0	295	110	273	120	251	130
	7	394	72.3	367	83.1	347	91.6	326	101.0	303	111	281	121	258	131
	8	405	73.1	378	84.1	357	92.6	335	102.1	312	113	289	123	-	-
	9	416	73.8	388	84.9	367	93.5	344	103.1	320	114	297	124	-	-
	10	427	74.5	398	85.7	377	94.5	354	104	329	115	305	125	-	-
	11	438	75.3	409	86.6	386	95.4	363	105	337	116	312	126	-	-
	12	450	76.0	420	87.4	397	96.3	372	106	347	117	321	128	-	-
375.4	5	423	78.6	395	90.4	374	99.6	351	110	326	121	302	132	278	143
	6	435	79.3	406	91.3	384	100.6	360	111	335	122	311	133	285	144
	7	448	80.1	418	92.2	395	101.6	371	112	345	123	320	135	294	146
	8	461	81.0	430	93.2	407	102.7	382	113	355	125	329	136	-	-
	9	473	81.8	442	94.2	418	104	392	114	365	126	338	137	-	-
	10	486	82.6	453	95.1	429	105	402	116	374	127	347	139	-	-
	11	498	83.5	465	96.0	440	106	413	117	384	129	356	140	-	-
	12	512	84.3	478	97.0	452	107	424	118	394	130	365	142	-	-
420.4	5	471	89.8	440	103	416	114	390	126	363	138	336	151	309	163
	6	484	90.7	452	104	428	115	401	127	373	140	346	152	318	165
	7	499	91.6	465	105	440	116	413	128	384	141	356	154	327	166
	8	513	92.6	479	107	453	117	425	129	395	143	366	156	-	-
	9	527	93.5	492	108	465	119	436	131	406	144	376	157	-	-
	10	541	94.4	505	109	477	120	448	132	417	145	386	159	-	-
	11	555	95.4	518	110	490	121	459	133	427	147	396	160	-	-
	12	570	96.3	532	111	503	122	472	135	439	148	407	162	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Performance - Low noise unit AS

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
160.4	5	178	36.1	166	41.6	157	45.8	147	50.5	137	55.7	127	60.7	117	65.6
	6	183	36.5	171	42.0	162	46.2	152	51.0	141	56.2	131	61.3	120	66.2
	7	188	36.8	176	42.4	166	46.7	156	51.5	145	56.8	134	61.9	123	66.9
	8	194	37.3	181	42.9	171	47.2	160	52.1	149	57.4	138	62.6	-	-
	9	199	37.6	186	43.3	176	47.7	165	52.6	153	58.0	142	63.2	-	-
	10	204	38.0	191	43.7	180	48.2	169	53.1	157	58.5	146	63.8	-	-
	11	210	38.4	196	44.2	185	48.6	174	53.6	161	59.1	150	64.4	-	-
	12	215	38.7	201	44.6	190	49.1	178	54.2	166	59.7	154	65.1	-	-
180.4	5	196	40.9	183	47.1	173	51.9	163	57.2	151	63.0	140	68.7	129	74.3
	6	202	41.3	188	47.5	178	52.3	167	57.7	155	63.6	144	69.3	132	75.0
	7	208	41.7	194	48.0	183	52.9	172	58.3	160	64.3	148	70.1	136	75.7
	8	214	42.2	199	48.5	188	53.5	177	58.9	165	65.0	152	70.8	-	-
	9	219	42.6	205	49.0	194	54.0	182	59.5	169	65.6	157	71.5	-	-
	10	225	43.0	210	49.5	199	54.5	187	60.1	174	66.3	161	72.2	-	-
	11	231	43.4	216	50.0	204	55.1	191	60.7	178	66.9	165	73.0	-	-
	12	237	43.9	221	50.5	209	55.6	197	61.3	183	67.6	169	73.7	-	-
200.4	5	220	46.9	206	54.0	194	59.5	182	65.6	170	72.3	157	78.8	144	85.2
	6	226	47.4	211	54.5	200	60.1	188	66.2	174	73.0	162	79.6	148	86.0
	7	233	47.9	217	55.1	206	60.7	193	66.9	180	73.7	166	80.4	153	86.9
	8	240	48.4	224	55.7	211	61.3	198	67.6	185	74.6	171	81.3	-	-
	9	246	48.9	230	56.2	217	62.0	204	68.3	190	75.3	176	82.1	-	-
	10	253	49.4	236	56.8	223	62.6	209	69.0	195	76.0	180	82.9	-	-
	11	259	49.8	242	57.4	229	63.2	215	69.7	200	76.8	185	83.7	-	-
	12	266	50.3	249	57.9	235	63.8	221	70.3	205	77.5	190	84.5	-	-
230.4	5	252	53.9	235	62.0	223	68.3	209	75.3	194	83.0	180	90.5	165	97.9
	6	259	54.4	242	62.6	229	69.0	215	76.0	200	83.8	185	91.4	170	98.8
	7	267	54.9	249	63.2	235	69.7	221	76.8	206	84.6	190	92.3	175	99.8
	8	274	55.6	256	63.9	242	70.4	227	77.6	211	85.6	196	93.3	-	-
	9	282	56.1	263	64.6	249	71.1	234	78.4	217	86.4	201	94.2	-	-
	10	289	56.7	270	65.2	255	71.8	240	79.2	223	87.3	207	95.2	-	-
	11	297	57.2	277	65.8	262	72.5	246	80.0	229	88.2	212	96.1	-	-
	12	305	57.8	285	66.5	269	73.2	253	80.8	235	89.0	218	97.0	-	-
260.4	5	282	58.7	263	67.5	249	74.4	234	82.0	217	90.4	201	98.5	185	107
	6	290	59.2	270	68.1	256	75.1	240	82.8	223	91.2	207	99.4	190	108
	7	298	59.8	278	68.8	263	75.8	247	83.6	230	92.1	213	100.5	196	109
	8	307	60.5	286	69.6	271	76.7	254	84.5	236	93.2	219	101.6	-	-
	9	315	61.1	294	70.3	278	77.4	261	85.4	243	94.1	225	102.6	-	-
	10	323	61.7	302	71.0	285	78.2	268	86.2	249	95.0	231	103.6	-	-
	11	332	62.3	310	71.7	293	79.0	275	87.1	256	96.0	237	104.6	-	-
	12	341	62.9	318	72.4	301	79.7	282	87.9	263	96.9	243	105.6	-	-
290.4	5	320	68.0	298	78.2	282	86.2	265	95.0	246	105	228	114	210	123
	6	328	68.6	307	79.0	290	87.0	272	95.9	253	106	234	115	215	125
	7	338	69.3	316	79.8	298	87.9	280	96.9	261	107	241	116	222	126
	8	348	70.1	324	80.6	307	88.9	288	98.0	268	108	248	118	-	-
	9	357	70.8	333	81.5	315	89.7	296	99.0	275	109	255	119	-	-
	10	367	71.5	342	82.3	324	90.6	304	99.9	283	110	262	120	-	-
	11	376	72.2	351	83.1	332	91.5	311	101	290	111	268	121	-	-
	12	386	72.9	361	83.9	341	92.4	320	102	298	112	276	122	-	-
330.4	5	357	76.5	333	88.0	315	97.0	296	107	275	118	255	128	234	139
	6	367	77.2	343	88.8	324	97.9	304	108	283	119	262	130	241	140
	7	378	78.0	353	89.7	334	98.9	313	109	291	120	270	131	248	142
	8	389	78.8	363	90.7	343	100	322	110	299	121	277	132	-	-
	9	399	79.6	373	91.6	352	101	331	111	308	123	285	134	-	-
	10	410	80.4	383	92.5	362	102	340	112	316	124	293	135	-	-
	11	420	81.2	392	93.4	371	103	348	114	324	125	300	136	-	-
	12	432	82.0	403	94.4	381	104	358	115	333	126	308	138	-	-
375.4	5	406	84.9	379	97.7	359	108	337	119	313	131	290	143	266	154
	6	418	85.7	390	98.6	369	109	346	120	322	132	298	144	274	156
	7	430	86.6	401	99.6	379	110	356	121	331	133	307	145	282	157
	8	442	87.5	413	101	390	111	366	122	341	135	315	147	-	-
	9	454	88.4	424	102	401	112	376	124	350	136	324	148	-	-
	10	466	89.3	435	103	411	113	386	125	359	138	333	150	-	-
	11	478	90.2	446	104	422	114	396	126	368	139	341	151	-	-
	12	491	91.0	458	105	433	115	407	127	378	140	351	153	-	-
420.4	5	452	96.8	422	111	399	123	374	135	348	149	323	163	296	176
	6	465	97.7	434	112	410	124	385	137	358	151	332	164	305	177
	7	478	98.7	446	114	422	125	396	138	368	152	341	166	313	179
	8	492	99.8	459	115	434	127	407	140	379	154	351	168	-	-
	9	505	101	472	116	446	128	418	141	389	155	361	169	-	-
	10	519	102	484	117	458	129	430	142	400	157	370	171	-	-
	11	532	103	496	118	469	130	441	144	410	158	380	173	-	-
	12	546	104	510	119	482	132	452	145	421	160	390	174	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Performance - Extra low noise unit AX

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
160.4	5	174	37.1	162	42.7	153	47.1	144	51.9	134	57.2	124	62.3	114	67.4
	6	178	37.5	166	43.1	157	47.5	148	52.4	137	57.7	127	62.9	117	68.0
	7	184	37.8	171	43.5	162	48.0	152	52.9	141	58.3	131	63.6	120	68.7
	8	189	38.3	176	44.0	167	48.5	156	53.5	145	59.0	135	64.3	-	-
	9	194	38.6	181	44.5	171	49.0	161	54.0	149	59.5	138	64.9	-	-
	10	199	39.0	186	44.9	176	49.5	165	54.6	153	60.1	142	65.6	-	-
	11	204	39.4	191	45.4	180	50.0	169	55.1	157	60.7	146	66.2	-	-
	12	210	39.8	196	45.8	185	50.5	174	55.6	162	61.3	150	66.8	-	-
180.4	5	192	42.0	179	48.4	169	53.3	159	58.7	148	64.7	137	70.6	126	76.3
	6	197	42.4	184	48.8	174	53.8	163	59.3	152	65.4	141	71.3	129	77.0
	7	203	42.9	189	49.3	179	54.3	168	59.9	156	66.0	145	72.0	133	77.8
	8	209	43.3	195	49.9	184	54.9	173	60.6	161	66.8	149	72.8	-	-
	9	214	43.8	200	50.4	189	55.5	178	61.2	165	67.4	153	73.5	-	-
	10	220	44.2	205	50.9	194	56.0	182	61.8	170	68.1	157	74.2	-	-
	11	226	44.6	211	51.4	199	56.6	187	62.4	174	68.8	161	75.0	-	-
	12	232	45.1	216	51.9	205	57.1	192	63.0	179	69.4	165	75.7	-	-
200.4	5	216	48.2	201	55.5	190	61.1	179	67.4	166	74.3	154	81.0	141	87.5
	6	222	48.7	207	56.0	196	61.7	184	68.0	171	75.0	158	81.7	145	88.4
	7	228	49.2	213	56.6	201	62.3	189	68.7	176	75.7	163	82.6	150	89.3
	8	235	49.7	219	57.2	207	63.0	194	69.5	181	76.6	167	83.5	-	-
	9	241	50.2	225	57.8	213	63.6	200	70.2	186	77.3	172	84.3	-	-
	10	247	50.7	231	58.3	218	64.3	205	70.9	191	78.1	177	85.1	-	-
	11	254	51.2	237	58.9	224	64.9	210	71.5	196	78.9	181	86.0	-	-
	12	261	51.7	243	59.5	230	65.5	216	72.2	201	79.6	186	86.8	-	-
230.4	5	247	55.4	230	63.7	218	70.2	204	77.4	190	85.3	176	93.0	162	101
	6	253	55.9	237	64.3	224	70.8	210	78.1	195	86.1	181	93.9	166	101
	7	261	56.5	243	65.0	230	71.6	216	78.9	201	87.0	186	94.8	171	103
	8	268	57.1	250	65.7	237	72.4	222	79.8	207	87.9	191	95.9	-	-
	9	276	57.6	257	66.3	243	73.1	228	80.6	212	88.8	197	96.8	-	-
	10	283	58.2	264	67.0	250	73.8	234	81.4	218	89.7	202	97.8	-	-
	11	290	58.8	271	67.6	256	74.5	240	82.2	224	90.6	207	98.7	-	-
	12	298	59.4	278	68.3	263	75.3	247	83.0	230	91.4	213	99.7	-	-
260.4	5	276	60.3	258	69.3	244	76.4	229	84.2	213	92.8	197	101	181	109
	6	284	60.8	265	70.0	251	77.1	235	85.0	219	93.7	203	102	186	110
	7	292	61.5	273	70.7	258	77.9	242	85.9	225	94.7	209	103	192	112
	8	300	62.1	280	71.5	265	78.8	249	86.8	232	95.7	214	104	-	-
	9	309	62.8	288	72.2	272	79.6	256	87.7	238	96.7	220	105	-	-
	10	317	63.4	296	72.9	280	80.4	262	88.6	244	97.6	226	106	-	-
	11	325	64.0	303	73.6	287	81.1	269	89.5	250	98.6	232	107	-	-
	12	334	64.6	312	74.4	295	81.9	277	90.3	257	99.6	238	109	-	-
290.4	5	313	69.9	292	80.4	276	88.6	259	97.7	241	108	223	117	205	127
	6	321	70.5	300	81.2	284	89.4	266	98.6	248	109	229	118	211	128
	7	331	71.3	309	82.0	292	90.3	274	99.6	255	110	236	120	217	129
	8	340	72.0	318	82.9	300	91.3	282	101	262	111	243	121	-	-
	9	350	72.8	326	83.7	309	92.3	290	102	269	112	249	122	-	-
	10	359	73.5	335	84.6	317	93.2	297	103	277	113	256	123	-	-
	11	368	74.2	343	85.4	325	94.1	305	104	284	114	263	125	-	-
	12	378	74.9	353	86.2	334	95.0	313	105	291	115	270	126	-	-
330.4	5	349	78.6	326	90.4	308	99.6	289	110	269	121	249	132	229	143
	6	359	79.3	335	91.3	317	101	297	111	277	122	256	133	235	144
	7	369	80.1	345	92.2	326	102	306	112	285	123	264	135	242	146
	8	380	81.0	355	93.2	335	103	315	113	293	125	271	136	-	-
	9	390	81.8	364	94.2	345	104	323	114	301	126	279	137	-	-
	10	401	82.6	374	95.1	354	105	332	116	309	127	286	139	-	-
	11	411	83.5	384	96.0	363	106	340	117	317	129	293	140	-	-
	12	422	84.3	394	97.0	373	107	350	118	325	130	301	142	-	-
375.4	5	398	87.0	372	100	352	110	330	122	307	134	284	146	261	158
	6	409	87.8	382	101	361	111	339	123	316	135	292	147	268	159
	7	421	88.7	393	102	372	112	349	124	325	137	301	149	276	161
	8	433	89.7	404	103	382	114	359	125	334	138	309	151	-	-
	9	445	90.6	416	104	393	115	369	127	343	140	318	152	-	-
	10	457	91.5	427	105	403	116	379	128	352	141	326	154	-	-
	11	469	92.4	437	106	414	117	388	129	361	142	335	155	-	-
	12	481	93.3	449	107	425	118	399	130	371	144	344	157	-	-
420.4	5	443	99.6	413	115	391	126	367	139	341	153	316	167	290	181
	6	455	101	425	116	402	127	377	141	351	155	325	169	298	183
	7	468	102	437	117	413	129	388	142	361	157	334	171	307	184
	8	482	103	450	118	425	130	399	144	371	158	344	173	-	-
	9	495	104	462	119	437	132	410	145	381	160	353	174	-	-
	10	508	105	474	121	448	133	421	146	392	161	363	176	-	-
	11	521	106	486	122	460	134	432	148	402	163	372	178	-	-
	12	535	107	500	123	472	135	443	149	412	165	382	179	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in cooling mode - Standard Unit AB

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
160.4	5	177	33.0	165	37.9	156	41.8	147	46.1	136	50.8	126	55.4	116	59.9
	6	182	33.3	170	38.3	160	42.2	151	46.5	140	51.3	130	55.9	119	60.4
	7	187	33.6	175	38.7	165	42.6	155	47.0	144	51.8	134	56.5	123	61.1
	8	192	34.0	180	39.1	170	43.1	159	47.5	148	52.4	137	57.1	-	-
	9	198	34.3	185	39.5	175	43.5	164	48.0	152	52.9	141	57.7	-	-
	10	203	34.7	189	39.9	179	44.0	168	48.5	156	53.4	145	58.2	-	-
	11	208	35.0	194	40.3	184	44.4	172	48.9	160	54.0	149	58.8	-	-
	12	214	35.4	200	40.7	189	44.8	177	49.4	165	54.5	153	59.4	-	-
180.4	5	196	37.4	183	43.0	173	47.4	163	52.3	151	57.6	140	62.8	129	67.9
	6	202	37.7	188	43.4	178	47.9	167	52.8	155	58.2	144	63.4	132	68.5
	7	208	38.1	194	43.9	183	48.3	172	53.3	160	58.7	148	64.0	136	69.3
	8	214	38.6	199	44.4	188	48.9	177	53.9	165	59.4	152	64.8	-	-
	9	219	38.9	205	44.8	194	49.4	182	54.4	169	60.0	157	65.4	-	-
	10	225	39.3	210	45.3	199	49.9	187	55.0	174	60.6	161	66.1	-	-
	11	231	39.7	216	45.7	204	50.3	191	55.5	178	61.2	165	66.7	-	-
	12	237	40.1	221	46.1	209	50.8	197	56.0	183	61.8	169	67.4	-	-
200.4	5	221	42.6	207	49.0	195	54.0	183	59.5	171	65.6	158	71.5	145	77.3
	6	228	43.0	212	49.5	201	54.5	189	60.1	175	66.2	162	72.2	149	78.1
	7	234	43.4	219	50.0	207	55.1	194	60.7	180	66.9	167	72.9	154	78.9
	8	241	43.9	225	50.5	213	55.7	199	61.4	186	67.6	172	73.7	-	-
	9	247	44.3	231	51.0	218	56.2	205	62.0	191	68.3	177	74.5	-	-
	10	254	44.8	237	51.5	224	56.8	210	62.6	196	69.0	181	75.2	-	-
	11	261	45.2	243	52.0	230	57.3	216	63.2	201	69.7	186	76.0	-	-
	12	268	45.7	250	52.5	236	57.9	222	63.8	206	70.4	191	76.7	-	-
230.4	5	248	48.8	231	56.1	219	61.8	205	68.2	191	75.1	177	81.9	162	88.6
	6	255	49.2	238	56.6	225	62.4	211	68.8	196	75.8	182	82.7	167	89.4
	7	262	49.7	245	57.2	231	63.0	217	69.5	202	76.6	187	83.5	172	90.3
	8	269	50.3	251	57.8	238	63.7	223	70.3	208	77.5	192	84.4	-	-
	9	277	50.8	258	58.4	244	64.4	229	71.0	213	78.2	198	85.3	-	-
	10	284	51.3	265	59.0	251	65.0	235	71.7	219	79.0	203	86.1	-	-
	11	291	51.8	272	59.6	257	65.6	241	72.4	225	79.8	208	87.0	-	-
	12	299	52.3	279	60.2	264	66.3	248	73.1	231	80.6	214	87.8	-	-
260.4	5	281	54.0	262	62.1	248	68.4	233	75.4	216	83.1	200	90.6	184	98.0
	6	289	54.5	269	62.7	255	69.0	239	76.1	222	83.9	206	91.5	189	98.9
	7	297	55.0	277	63.3	262	69.7	246	76.9	229	84.8	212	92.4	195	99.9
	8	305	55.6	285	64.0	270	70.5	253	77.7	235	85.7	218	93.4	-	-
	9	314	56.2	293	64.6	277	71.2	260	78.5	242	86.6	224	94.4	-	-
	10	322	56.7	301	65.3	284	71.9	267	79.3	248	87.4	230	95.3	-	-
	11	330	57.3	308	65.9	292	72.6	274	80.1	255	88.3	236	96.2	-	-
	12	339	57.9	317	66.6	300	73.3	281	80.9	262	89.1	242	97.2	-	-
290.4	5	317	62.0	296	71.4	280	78.6	263	86.7	245	95.6	226	104	208	113
	6	326	62.6	304	72.0	288	79.4	270	87.5	251	96.4	233	105	214	114
	7	336	63.2	313	72.8	296	80.2	278	88.4	259	97.4	240	106	220	115
	8	345	63.9	322	73.6	305	81.1	286	89.4	266	98.5	246	107	-	-
	9	355	64.6	331	74.3	313	81.9	294	90.3	273	99.5	253	108	-	-
	10	364	65.2	340	75.0	321	82.7	302	91.2	281	100	260	110	-	-
	11	373	65.9	348	75.8	330	83.5	309	92.1	288	101	266	111	-	-
	12	383	66.5	358	76.5	338	84.3	318	93.0	296	102	274	112	-	-
330.4	5	356	70.2	332	80.7	314	88.9	295	98.1	274	108	254	118	233	127
	6	366	70.8	342	81.5	323	89.8	303	99.0	282	109	261	119	240	129
	7	377	71.5	352	82.3	332	90.7	312	100	290	110	269	120	247	130
	8	387	72.3	362	83.2	342	91.7	321	101	299	111	276	121	-	-
	9	398	73.1	372	84.1	351	92.6	330	102	307	113	284	123	-	-
	10	409	73.8	381	84.9	361	93.5	338	103	315	114	292	124	-	-
	11	419	74.5	391	85.7	370	94.5	347	104	323	115	299	125	-	-
	12	430	75.2	402	86.6	380	95.4	356	105	332	116	307	126	-	-
375.4	5	411	77.9	384	89.6	363	98.7	340	109	317	120	293	131	269	141
	6	422	78.6	394	90.5	373	99.7	350	110	325	121	301	132	277	143
	7	435	79.4	406	91.4	384	101	360	111	335	122	310	133	285	144
	8	447	80.3	417	92.4	394	102	370	112	344	124	319	135	-	-
	9	459	81.1	429	93.3	405	103	380	113	354	125	328	136	-	-
	10	471	81.9	440	94.2	416	104	390	114	363	126	336	138	-	-
	11	483	82.7	451	95.2	427	105	400	116	373	127	345	139	-	-
	12	497	83.5	464	96.1	438	106	411	117	383	129	354	140	-	-
420.4	5	458	87.7	427	101	404	111	379	123	353	135	327	147	300	159
	6	470	88.5	439	102	415	112	390	124	363	136	336	149	308	161
	7	484	89.4	452	103	427	113	401	125	373	138	346	150	317	162
	8	498	90.4	465	104	439	115	412	126	384	139	355	152	-	-
	9	512	91.3	477	105	452	116	424	128	394	141	365	153	-	-
	10	525	92.2	490	106	463	117	435	129	405	142	375	155	-	-
	11	539	93.1	503	107	475	118	446	130	415	143	384	156	-	-
	12	553	94.0	516	108	488	119	458	131	426	145	395	158	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in heating mode - Standard Unit AB

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
160.4	30	128	34.2	147	34.4	161	34.9	171	35.1	183	35.5	196	35.9	210	36.3
	35	128	37.9	146	38.2	160	38.7	170	38.9	182	39.4	195	39.8	209	40.3
	40	127	42.2	145	42.4	159	43.0	169	43.3	181	43.8	194	44.3	208	44.8
	45	126	46.9	144	47.2	158	47.8	168	48.1	180	48.7	193	49.2	206	49.8
	50	125	52.1	143	52.4	157	53.2	167	53.5	179	54.1	191	54.7	205	55.3
180.4	30	144	39.2	165	39.5	181	40.0	192	40.2	206	40.7	221	41.2	236	41.6
	35	144	43.5	165	43.7	180	44.3	191	44.6	205	45.1	219	45.6	235	46.1
	40	143	48.3	164	48.6	179	49.3	190	49.6	204	50.2	218	50.7	233	51.3
	45	142	53.7	162	54.0	178	54.8	189	55.1	203	55.7	217	56.4	232	57.0
	50	141	59.7	161	60.1	176	60.9	188	61.3	201	62.0	215	62.7	230	63.4
200.4	30	163	44.8	186	45.0	204	45.7	217	45.9	233	46.5	249	47.0	266	47.5
	35	162	49.6	185	49.9	203	50.6	216	50.9	231	51.5	247	52.1	265	52.7
	40	161	55.2	184	55.5	202	56.3	214	56.6	230	57.3	246	57.9	263	58.6
	45	160	61.3	183	61.7	200	62.5	213	62.9	228	63.6	244	64.4	261	65.1
	50	159	68.2	182	68.6	199	69.5	212	69.9	227	70.7	243	71.5	259	72.4
230.4	30	182	51.0	208	51.4	228	52.1	242	52.4	260	53.0	278	53.6	297	54.2
	35	181	56.6	207	56.9	227	57.7	241	58.0	259	58.7	276	59.4	296	60.0
	40	180	62.9	206	63.3	225	64.1	240	64.5	257	65.3	275	66.0	294	66.8
	45	179	69.9	205	70.3	224	71.3	238	71.7	255	72.5	273	73.4	292	74.2
	50	177	77.7	203	78.2	222	79.3	236	79.7	253	80.6	271	81.6	290	82.5
260.4	30	206	56.2	236	56.6	258	57.4	275	57.7	295	58.4	315	59.0	337	59.7
	35	205	62.3	235	62.7	257	63.6	273	63.9	293	64.7	314	65.4	335	66.1
	40	204	69.3	234	69.7	256	70.7	272	71.1	292	71.9	312	72.7	334	73.6
	45	203	77.0	232	77.5	254	78.5	270	79.0	290	79.9	310	80.8	331	81.7
	50	201	85.6	231	86.1	252	87.3	268	87.8	288	88.8	307	89.9	329	90.9
290.4	30	233	64.4	267	64.7	292	65.6	310	66.0	333	66.8	356	67.5	381	68.3
	35	232	71.3	266	71.7	290	72.7	309	73.2	331	74.0	354	74.8	379	75.7
	40	230	79.3	264	79.8	289	80.9	307	81.3	329	82.3	352	83.2	377	84.2
	45	229	88.1	262	88.7	287	89.9	305	90.4	327	91.4	350	92.5	374	93.5
	50	227	98.0	260	98.6	285	99.9	303	101	325	102	347	103	372	104
330.4	30	261	72.6	299	73.1	327	74.1	348	74.5	373	75.3	399	76.2	427	77.1
	35	260	80.5	298	81.0	326	82.1	346	82.5	371	83.5	397	84.5	425	85.4
	40	258	89.5	296	90.0	324	91.2	344	91.8	369	92.8	395	93.9	422	95.0
	45	257	99.4	294	100	322	101	342	102	367	103	392	104	420	106
	50	255	111	292	111	319	113	340	113	364	115	389	116	417	117
375.4	30	299	81.2	342	81.6	374	82.8	398	83.2	427	84.2	456	85.2	488	86.1
	35	297	89.9	340	90.5	372	91.7	396	92.3	425	93.3	454	94.4	486	95.5
	40	295	100	338	101	370	102	394	103	422	104	451	105	483	106
	45	293	111	336	112	368	113	391	114	419	115	448	117	480	118
	50	291	124	334	124	365	126	388	127	416	128	445	130	476	131
420.4	30	332	91.8	381	92.4	416	93.7	443	94.2	475	95.3	508	96.4	543	97.5
	35	330	102	379	102	414	104	441	104	472	106	505	107	540	108
	40	329	113	377	114	412	115	438	116	470	117	502	119	537	120
	45	326	126	374	127	409	128	435	129	467	130	499	132	534	133
	50	324	140	371	141	406	143	432	143	463	145	495	147	530	148

Tw= Outlet water temperature °C **kWt** = Heating capacity (kW). **kWa** = Compressor power input (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} m^2 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 defrosting, strictly correlated with the humidity in the outdoor air.

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in cooling mode - Low noise Unit AS

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
160.4	5	170	35.6	159	41.0	150	45.2	141	49.8	131	54.9	121	59.9	112	64.7
	6	175	36.0	163	41.4	154	45.6	145	50.3	135	55.4	125	60.4	115	65.3
	7	180	36.3	168	41.8	159	46.1	149	50.8	139	56.0	128	61.0	118	66.0
	8	185	36.7	173	42.3	163	46.6	153	51.4	143	56.6	132	61.7	-	-
	9	190	37.1	177	42.7	168	47.1	157	51.9	146	57.2	136	62.3	-	-
	10	195	37.5	182	43.1	172	47.5	162	52.4	150	57.7	139	63.0	-	-
	11	200	37.9	187	43.6	177	48.0	166	52.9	154	58.3	143	63.6	-	-
	12	206	38.2	192	44.0	181	48.5	170	53.4	158	58.9	147	64.2	-	-
180.4	5	188	40.4	176	46.5	166	51.2	156	56.5	145	62.3	134	67.9	123	73.4
	6	194	40.8	181	46.9	171	51.7	160	57.0	149	62.8	138	68.5	127	74.1
	7	199	41.2	186	47.4	176	52.2	165	57.6	154	63.5	142	69.2	131	74.8
	8	205	41.7	191	47.9	181	52.8	170	58.2	158	64.2	146	70.0	-	-
	9	210	42.1	196	48.4	186	53.3	174	58.8	162	64.8	150	70.7	-	-
	10	216	42.5	202	48.9	191	53.9	179	59.4	167	65.5	154	71.4	-	-
	11	222	42.9	207	49.4	196	54.4	184	60.0	171	66.1	158	72.1	-	-
	12	228	43.3	212	49.9	201	54.9	189	60.6	175	66.8	162	72.8	-	-
200.4	5	212	46.0	198	53.0	187	58.3	176	64.3	164	70.9	152	77.3	139	83.6
	6	218	46.5	204	53.5	193	58.9	181	64.9	168	71.6	156	78.0	143	84.4
	7	225	46.9	210	54.0	198	59.5	186	65.6	173	72.3	160	78.8	147	85.2
	8	231	47.5	216	54.6	204	60.2	191	66.3	178	73.1	165	79.7	-	-
	9	237	47.9	221	55.1	209	60.8	197	67.0	183	73.8	169	80.5	-	-
	10	244	48.4	227	55.7	215	61.4	202	67.7	188	74.6	174	81.3	-	-
	11	250	48.9	233	56.2	220	62.0	207	68.3	193	75.3	178	82.1	-	-
	12	257	49.4	239	56.8	226	62.6	213	69.0	198	76.0	183	82.9	-	-
230.4	5	237	52.7	222	60.6	210	66.8	197	73.6	183	81.2	169	88.5	156	95.7
	6	244	53.2	228	61.2	215	67.4	202	74.3	188	81.9	174	89.3	160	96.6
	7	251	53.7	234	61.8	222	68.1	208	75.1	194	82.8	179	90.2	165	97.6
	8	258	54.3	241	62.5	228	68.9	214	75.9	199	83.7	184	91.2	-	-
	9	265	54.9	248	63.1	234	69.6	220	76.7	204	84.5	189	92.2	-	-
	10	272	55.4	254	63.8	240	70.2	226	77.5	210	85.4	194	93.1	-	-
	11	279	56.0	261	64.4	247	70.9	231	78.2	215	86.2	199	94.0	-	-
	12	287	56.5	268	65.0	253	71.6	238	79.0	221	87.0	205	94.9	-	-
260.4	5	269	58.3	251	67.1	238	73.9	223	81.5	208	89.8	192	97.9	177	106
	6	277	58.9	258	67.7	244	74.6	229	82.3	213	90.7	198	98.8	182	107
	7	285	59.5	266	68.4	251	75.4	236	83.1	220	91.6	203	99.9	187	108
	8	293	60.1	273	69.2	259	76.2	243	84.0	226	92.6	209	101	-	-
	9	301	60.7	281	69.9	266	77.0	249	84.9	232	93.5	215	102	-	-
	10	309	61.3	288	70.5	273	77.7	256	85.7	238	94.5	221	103	-	-
	11	317	61.9	296	71.2	280	78.5	263	86.5	244	95.4	226	104	-	-
	12	326	62.5	304	71.9	287	79.3	270	87.4	251	96.3	232	105	-	-
290.4	5	305	67.0	284	77.1	269	84.9	252	93.7	235	103	218	113	200	122
	6	313	67.6	292	77.8	276	85.7	259	94.5	241	104	224	114	205	123
	7	322	68.3	301	78.6	285	86.6	267	95.5	248	105	230	115	211	124
	8	331	69.1	309	79.5	293	87.6	275	96.6	255	106	237	116	-	-
	9	341	69.8	318	80.3	301	88.5	282	97.5	262	107	243	117	-	-
	10	350	70.5	326	81.1	309	89.3	290	98.5	269	109	250	118	-	-
	11	359	71.2	335	81.9	316	90.2	297	99.5	276	110	256	120	-	-
	12	368	71.9	344	82.7	325	91.1	305	100	284	111	263	121	-	-
330.4	5	342	75.8	320	87.2	302	96.1	284	106	264	117	244	127	225	138
	6	352	76.5	328	88.0	311	97.0	291	107	271	118	251	128	231	139
	7	362	77.3	338	88.9	320	98.0	300	108	279	119	259	130	237	140
	8	372	78.1	348	89.9	329	99.0	309	109	287	120	266	131	-	-
	9	383	78.9	357	90.8	338	100	317	110	295	122	273	133	-	-
	10	393	79.7	367	91.7	347	101	325	111	303	123	280	134	-	-
	11	403	80.5	376	92.6	356	102	334	112	310	124	288	135	-	-
	12	414	81.3	386	93.5	365	103	343	114	319	125	295	136	-	-
375.4	5	395	84.2	369	96.9	349	107	327	118	304	130	282	141	259	153
	6	406	85.0	379	97.8	358	108	336	119	313	131	290	143	266	154
	7	418	85.9	390	98.8	369	109	346	120	322	132	298	144	274	156
	8	430	86.8	401	99.9	379	110	356	121	331	134	307	146	-	-
	9	441	87.7	412	101	390	111	366	123	340	135	315	147	-	-
	10	453	88.5	423	102	400	112	375	124	349	136	323	149	-	-
	11	465	89.4	434	103	410	113	385	125	358	138	332	150	-	-
	12	477	90.3	446	104	421	114	395	126	368	139	341	152	-	-
420.4	5	439	94.7	410	109	388	120	364	132	339	146	314	159	288	172
	6	452	95.6	422	110	399	121	374	134	348	147	322	161	296	174
	7	465	96.6	434	111	410	122	385	135	358	149	332	162	305	175
	8	478	97.7	446	112	422	124	396	136	368	150	341	164	-	-
	9	491	98.6	458	113	434	125	407	138	379	152	351	166	-	-
	10	504	99.6	471	115	445	126	418	139	389	153	360	167	-	-
	11	517	101	483	116	456	128	428	141	398	155	369	169	-	-
	12	531	102	496	117	469	129	440	142	409	156	379	171	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in heating mode - Low noise Unit AS

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
160.4	30	123	32.5	141	32.7	154	33.2	164	33.4	176	33.8	188	34.1	201	34.5
	35	122	36.1	140	36.3	153	36.8	163	37.0	175	37.4	187	37.8	200	38.3
	40	122	40.1	139	40.3	152	40.9	162	41.1	174	41.6	186	42.1	199	42.5
	45	121	44.6	138	44.8	151	45.4	161	45.7	173	46.2	185	46.8	197	47.3
	50	120	49.5	137	49.8	150	50.5	160	50.8	171	51.4	183	52.0	196	52.6
180.4	30	138	37.2	158	37.5	173	38.0	184	38.2	198	38.6	211	39.1	226	39.5
	35	138	41.3	158	41.5	172	42.1	183	42.3	197	42.8	210	43.3	225	43.8
	40	137	45.9	157	46.2	171	46.8	182	47.1	195	47.6	209	48.1	224	48.7
	45	136	51.0	156	51.3	170	52.0	181	52.3	194	52.9	208	53.5	222	54.1
	50	135	56.7	155	57.0	169	57.8	180	58.1	193	58.8	206	59.5	220	60.2
200.4	30	156	42.6	179	42.8	195	43.4	208	43.7	223	44.2	238	44.7	255	45.2
	35	155	47.2	178	47.5	194	48.1	207	48.4	222	49.0	237	49.5	253	50.1
	40	154	52.5	177	52.8	193	53.5	205	53.8	220	54.4	236	55.1	252	55.7
	45	153	58.3	175	58.6	192	59.5	204	59.8	219	60.5	234	61.2	250	61.9
	50	152	64.8	174	65.2	190	66.1	203	66.5	217	67.3	232	68.0	248	68.8
230.4	30	174	48.5	200	48.8	218	49.4	232	49.7	249	50.3	266	50.9	285	51.5
	35	173	53.7	199	54.0	217	54.8	231	55.1	248	55.7	265	56.4	283	57.0
	40	172	59.7	197	60.1	216	60.9	230	61.3	246	62.0	263	62.7	282	63.4
	45	171	66.4	196	66.8	214	67.7	228	68.1	245	68.9	261	69.7	280	70.5
	50	170	73.8	195	74.3	213	75.3	226	75.7	243	76.6	260	77.5	278	78.3
260.4	30	198	53.5	227	53.8	248	54.5	264	54.8	283	55.5	302	56.1	323	56.7
	35	197	59.3	226	59.6	247	60.4	262	60.8	281	61.5	301	62.2	322	62.9
	40	196	65.9	224	66.3	245	67.2	261	67.6	280	68.4	299	69.1	320	69.9
	45	194	73.2	223	73.7	244	74.7	259	75.1	278	76.0	297	76.8	318	77.7
	50	193	81.4	221	81.9	242	83.0	257	83.5	276	84.5	295	85.4	315	86.4
290.4	30	224	61.2	256	61.5	280	62.4	298	62.7	320	63.5	342	64.2	366	64.9
	35	223	67.8	255	68.2	279	69.1	297	69.5	318	70.3	340	71.1	364	71.9
	40	221	75.4	254	75.8	277	76.8	295	77.3	316	78.2	338	79.1	362	80.0
	45	220	83.7	252	84.2	276	85.4	293	85.9	314	86.9	336	87.9	359	88.9
	50	218	93.1	250	93.7	274	94.9	291	95.5	312	96.6	334	97.7	357	98.8
330.4	30	250	69.1	287	69.5	314	70.4	334	70.8	358	71.7	383	72.5	410	73.3
	35	249	76.5	286	77.0	312	78.0	332	78.5	356	79.4	381	80.3	407	81.2
	40	248	85.1	284	85.6	311	86.8	330	87.3	354	88.3	379	89.3	405	90.3
	45	246	94.6	282	95.1	308	96.4	328	97.0	352	98.1	376	99.2	402	100
	50	244	105	280	106	306	107	326	108	349	109	373	110	400	112
375.4	30	286	76.9	328	77.3	359	78.4	382	78.9	409	79.8	438	80.7	468	81.6
	35	285	85.2	327	85.7	357	86.9	380	87.4	407	88.4	435	89.4	466	90.4
	40	283	94.7	325	95.3	355	96.6	378	97.2	405	98.3	433	99.4	463	101
	45	281	105	322	106	353	107	375	108	402	109	430	110	460	112
	50	279	117	320	118	350	119	372	120	399	121	427	123	457	124
420.4	30	319	87.6	366	88.1	400	89.3	426	89.8	456	90.9	488	91.9	522	92.9
	35	318	97.0	364	97.6	398	99.0	423	100	454	101	485	102	519	103
	40	316	108	362	109	396	110	421	111	451	112	483	113	516	115
	45	314	120	359	121	393	122	418	123	448	124	479	126	513	127
	50	311	133	357	134	390	136	415	137	445	138	476	140	509	141

Tw= Outlet water temperature °C **kWt** = Heating capacity (kW). **kWa** = Compressor power input (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} m^2 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 defrosting, strictly correlated with the humidity in the outdoor air.

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in cooling mode - Extra low noise Unit AX

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
160.4	5	167	36.6	156	42.1	147	46.4	138	51.2	128	56.4	119	61.5	109	66.5
	6	171	37.0	160	42.5	151	46.9	142	51.7	132	57.0	122	62.1	112	67.1
	7	176	37.3	165	43.0	156	47.3	146	52.2	136	57.5	126	62.7	116	67.8
	8	181	37.8	169	43.4	160	47.9	150	52.8	140	58.2	129	63.4	-	-
	9	186	38.1	174	43.9	164	48.3	154	53.3	144	58.8	133	64.1	-	-
	10	191	38.5	178	44.3	169	48.8	158	53.8	147	59.3	136	64.7	-	-
	11	196	38.9	183	44.8	173	49.3	162	54.4	151	59.9	140	65.3	-	-
	12	201	39.3	188	45.2	178	49.8	167	54.9	155	60.5	144	66.0	-	-
180.4	5	185	41.5	173	47.8	163	52.7	153	58.1	143	64.0	132	69.8	121	75.4
	6	190	41.9	177	48.2	168	53.2	157	58.6	146	64.6	136	70.4	125	76.1
	7	196	42.4	183	48.7	173	53.7	162	59.2	151	65.3	140	71.1	128	76.9
	8	201	42.8	188	49.3	178	54.3	167	59.9	155	66.0	144	71.9	-	-
	9	207	43.3	193	49.8	182	54.8	171	60.5	159	66.6	148	72.6	-	-
	10	212	43.7	198	50.3	187	55.4	176	61.1	163	67.3	151	73.4	-	-
	11	218	44.1	203	50.8	192	55.9	180	61.7	168	68.0	155	74.1	-	-
	12	223	44.5	209	51.2	197	56.5	185	62.3	172	68.6	160	74.8	-	-
200.4	5	208	47.3	194	54.4	183	59.9	172	66.1	160	72.9	148	79.4	136	85.9
	6	213	47.7	199	54.9	188	60.5	177	66.7	165	73.5	152	80.2	140	86.7
	7	220	48.2	205	55.5	194	61.1	182	67.4	169	74.3	157	81.0	144	87.6
	8	226	48.8	211	56.1	199	61.8	187	68.1	174	75.1	161	81.9	-	-
	9	232	49.2	217	56.7	205	62.4	192	68.8	179	75.9	166	82.7	-	-
	10	238	49.7	222	57.2	210	63.0	197	69.5	184	76.6	170	83.5	-	-
	11	244	50.2	228	57.8	216	63.7	202	70.2	188	77.4	174	84.3	-	-
	12	251	50.7	234	58.3	222	64.3	208	70.9	193	78.1	179	85.2	-	-
230.4	5	233	54.1	217	62.2	206	68.6	193	75.6	179	83.3	166	90.9	153	98.2
	6	239	54.6	223	62.8	211	69.2	198	76.3	184	84.1	171	91.7	157	99.2
	7	246	55.2	230	63.5	217	69.9	204	77.1	190	85.0	176	92.6	161	100
	8	253	55.8	236	64.2	224	70.7	210	78.0	195	85.9	181	93.7	-	-
	9	260	56.3	243	64.8	230	71.4	216	78.7	201	86.8	186	94.6	-	-
	10	267	56.9	249	65.5	236	72.1	221	79.5	206	87.6	191	95.5	-	-
	11	274	57.4	256	66.1	242	72.8	227	80.3	211	88.5	196	96.5	-	-
	12	281	58.0	263	66.7	248	73.5	233	81.1	217	89.4	201	97.4	-	-
260.4	5	264	59.9	246	68.9	233	76.0	218	83.7	203	92.3	188	101	173	109
	6	271	60.5	253	69.6	239	76.7	224	84.5	209	93.2	193	102	178	110
	7	279	61.1	260	70.3	246	77.5	231	85.4	215	94.1	199	103	183	111
	8	287	61.8	268	71.1	253	78.3	238	86.3	221	95.2	205	104	-	-
	9	295	62.4	275	71.8	260	79.1	244	87.2	227	96.1	210	105	-	-
	10	302	63.0	282	72.5	267	79.9	251	88.1	233	97.1	216	106	-	-
	11	310	63.6	290	73.2	274	80.7	257	88.9	239	98.0	221	107	-	-
	12	319	64.3	297	73.9	281	81.5	264	89.8	246	99.0	227	108	-	-
290.4	5	298	68.8	278	79.2	263	87.3	247	96.2	230	106	213	116	195	125
	6	306	69.5	286	79.9	270	88.1	254	97.1	236	107	219	117	201	126
	7	315	70.2	294	80.8	278	89.0	261	98.1	243	108	225	118	207	127
	8	324	71.0	302	81.6	286	90.0	268	99.2	250	109	231	119	-	-
	9	333	71.7	311	82.5	294	90.9	276	100	257	110	238	120	-	-
	10	342	72.4	319	83.3	302	91.8	283	101	263	112	244	122	-	-
	11	351	73.1	327	84.1	309	92.7	290	102	270	113	250	123	-	-
	12	360	73.8	336	84.9	318	93.6	298	103	277	114	257	124	-	-
330.4	5	334	77.9	312	89.6	295	98.7	277	109	258	120	239	131	219	141
	6	344	78.6	321	90.5	303	99.7	285	110	265	121	245	132	225	143
	7	354	79.4	330	91.4	312	101	293	111	273	122	252	133	232	144
	8	364	80.3	340	92.4	321	102	301	112	280	124	260	135	-	-
	9	374	81.1	349	93.3	330	103	310	113	288	125	267	136	-	-
	10	384	81.9	358	94.2	339	104	318	114	296	126	274	138	-	-
	11	393	82.7	367	95.2	347	105	326	116	303	127	281	139	-	-
	12	404	83.5	377	96.1	357	106	335	117	311	129	288	140	-	-
375.4	5	386	86.3	360	99.3	341	109	320	121	297	133	275	145	253	157
	6	396	87.1	370	100	350	110	328	122	306	134	283	146	260	158
	7	408	88.0	381	101	360	112	338	123	314	136	291	148	268	160
	8	420	89.0	392	102	370	113	348	124	323	137	300	149	-	-
	9	431	89.9	402	103	381	114	357	126	332	138	308	151	-	-
	10	443	90.8	413	104	391	115	367	127	341	140	316	152	-	-
	11	454	91.6	424	105	401	116	376	128	350	141	324	154	-	-
	12	466	92.5	435	106	412	117	386	129	359	143	333	155	-	-
420.4	5	430	97.5	402	112	380	124	356	136	332	150	307	164	282	177
	6	442	98.4	413	113	390	125	366	138	341	152	316	165	290	179
	7	455	99.5	425	114	402	126	377	139	351	153	325	167	298	181
	8	468	101	437	116	413	127	388	141	361	155	334	169	-	-
	9	481	102	449	117	424	129	398	142	371	156	343	171	-	-
	10	494	103	461	118	436	130	409	143	380	158	352	172	-	-
	11	506	104	473	119	447	131	419	145	390	160	361	174	-	-
	12	520	105	485	120	459	133	431	146	401	161	371	176	-	-

Tw= Outlet water temperature °C **kWf** = Cooling capacity (kW). **kWa** = Compressor power input (kW)

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

STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Performances in heating mode - Extra low noise Unit AX

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
160.4	30	122	31.8	140	32.0	153	32.5	163	32.6	175	33.0	187	33.4	200	33.8
	35	122	35.3	139	35.5	152	36.0	162	36.2	174	36.6	186	37.0	199	37.4
	40	121	39.2	139	39.4	151	40.0	161	40.2	173	40.7	185	41.2	198	41.6
	45	120	43.6	138	43.8	150	44.4	160	44.7	172	45.2	183	45.7	196	46.3
	50	119	48.5	137	48.7	149	49.4	159	49.7	170	50.3	182	50.8	195	51.4
180.4	30	137	36.5	158	36.7	172	37.2	183	37.4	197	37.8	210	38.3	225	38.7
	35	137	40.4	157	40.6	171	41.2	182	41.4	196	41.9	209	42.4	224	42.9
	40	136	44.9	156	45.2	170	45.8	181	46.1	194	46.6	208	47.1	222	47.7
	45	135	49.9	155	50.2	169	50.9	180	51.2	193	51.8	206	52.4	221	53.0
	50	134	55.5	154	55.8	168	56.6	179	56.9	192	57.6	205	58.2	219	58.9
200.4	30	154	41.6	177	41.9	193	42.5	206	42.7	221	43.2	236	43.7	252	44.2
	35	153	46.2	176	46.4	192	47.1	205	47.3	219	47.9	235	48.4	251	49.0
	40	153	51.3	175	51.6	191	52.3	203	52.6	218	53.2	233	53.9	250	54.5
	45	152	57.0	174	57.4	190	58.2	202	58.5	217	59.2	232	59.9	248	60.5
	50	150	63.4	172	63.8	189	64.7	201	65.0	215	65.8	230	66.5	246	67.3
230.4	30	173	47.5	198	47.8	216	48.4	230	48.7	247	49.3	264	49.8	282	50.4
	35	172	52.6	197	52.9	215	53.7	229	54.0	245	54.6	262	55.2	281	55.8
	40	171	58.5	196	58.9	214	59.7	228	60.0	244	60.7	261	61.4	279	62.1
	45	170	65.0	194	65.4	213	66.3	226	66.7	242	67.5	259	68.2	277	69.0
	50	168	72.3	193	72.7	211	73.7	224	74.2	241	75.0	257	75.9	275	76.7
260.4	30	196	52.3	225	52.6	246	53.4	262	53.7	281	54.3	300	54.9	321	55.5
	35	195	58.0	224	58.3	245	59.1	260	59.5	279	60.2	298	60.9	319	61.5
	40	194	64.5	222	64.9	243	65.8	259	66.1	278	66.9	297	67.7	317	68.4
	45	193	71.7	221	72.1	242	73.1	257	73.5	276	74.3	295	75.2	315	76.0
	50	191	79.7	219	80.1	240	81.2	255	81.7	274	82.7	293	83.6	313	84.5
290.4	30	221	59.9	254	60.2	278	61.1	295	61.4	317	62.1	339	62.8	362	63.5
	35	220	66.4	252	66.7	276	67.7	294	68.1	315	68.8	337	69.6	360	70.4
	40	219	73.8	251	74.2	275	75.2	292	75.7	313	76.5	335	77.4	358	78.3
	45	218	82.0	249	82.5	273	83.6	290	84.1	311	85.1	333	86.0	356	87.0
	50	216	91.2	248	91.7	271	93.0	288	93.5	309	94.6	330	95.7	353	96.7
330.4	30	248	67.6	284	68.0	311	68.9	331	69.3	355	70.1	379	70.9	406	71.7
	35	247	74.9	283	75.3	309	76.4	329	76.8	353	77.7	377	78.6	404	79.5
	40	245	83.3	281	83.7	308	84.9	327	85.4	351	86.4	375	87.4	401	88.4
	45	244	92.5	279	93.1	306	94.4	325	94.9	349	96.0	373	97.1	399	98.2
	50	242	103	277	103	303	105	323	106	346	107	370	108	396	109
375.4	30	283	75.5	325	75.9	355	77.0	378	77.4	405	78.3	433	79.2	463	80.1
	35	282	83.6	323	84.1	353	85.3	376	85.8	403	86.8	431	87.8	461	88.8
	40	280	93.0	321	93.5	351	94.8	374	95.4	401	96.5	428	97.6	458	98.7
	45	278	103	319	104	349	105	371	106	398	107	425	108	455	110
	50	276	115	317	116	346	117	368	118	395	119	422	121	452	122
420.4	30	315	85.4	361	85.9	395	87.1	420	87.6	451	88.6	482	89.7	516	90.7
	35	314	94.7	360	95.2	393	96.5	418	97.1	449	98.2	480	99.4	513	100
	40	312	105	358	106	391	107	416	108	446	109	477	110	510	112
	45	310	117	355	118	388	119	413	120	443	121	474	123	507	124
	50	308	130	353	131	386	133	410	133	440	135	470	136	503	138

Tw= Outlet water temperature °C **kWt** = Heating capacity (kW). **kWa** = Compressor power input (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} m^2 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 defrosting, strictly correlated with the humidity in the outdoor air.

CORRECTION FACTOR FOR THE USE OF GLYCOL

Correction factor for the use of glycol IN HEATING MODE

ETHYLENE GLYCOL with water produced between 30÷55ºC.

Percentage Of glycol in mass / volume	0 / 0	10 / 8,9	20 / 18,1	30 / 27,7	40 / 37,5
Freezing point [°C]	0	-3.2	-8	-14	-22
Heating capacity CCPF Power input CCPA	1.000	0.995	0.985	0.975	0.970
Compressor power input CCPA	1.000	1.010	1.015	1.020	1.030
Water flow rate CCQA	1.000	1.038	1.062	1.091	1.127
Water pressure drop CCDP	1.000	1.026	1.051	1.077	1.103

PROPYLENE GLYCOL with water produced between 30÷55ºC.

Percentage Of glycol in mass / volume	0 / 0	10 / 9,6	20 / 19,4	30 / 29,4	40 / 39,6
Freezing point [°C]	0	-3.3	-7	-13	-21
Heating capacity CCPF Power input CCPA	1.000	0.990	0.975	0.965	0.955
Compressor power input CCPA	1.000	1.010	1.020	1.030	1.040
Water flow rate CCQA	1.000	1.018	1.032	1.053	1.082
Water pressure drop CCDP	1.000	1.026	1.051	1.077	1.103

Correction factor for the use of glycol IN COOLING MODE

ETHYLENE GLYCOL with water produced between 5÷20ºC.

Percentage Of glycol in mass / volume	0 / 0	10 / 8,9	20 / 18,1	30 / 27,7	40 / 37,5
Freezing point [°C]	0	-3.2	-8	-14	-22
Cooling capacity CCPF Power input CCPA	1.00	0.99	0.98	0.97	0.95
Compressor power input CCPA	1.00	1.00	0.99	0.99	0.98
Water flow rate CCQA	1.00	1.04	1.08	1.12	1.16
Water pressure drop CCDP	1.00	1.08	1.16	1.25	1.35

PROPYLENE GLYCOL with water produced between 5÷20ºC.

Percentage Of glycol in mass / volume	0 / 0	10 / 9,6	20 / 19,4	30 / 29,4	40 / 39,6
Freezing point [°C]	0	-3.3	-7	-13	-21
Cooling capacity CCPF Power input CCPA	1.00	0.98	0.96	0.94	0.92
Compressor power input CCPA	1.00	0.99	0.98	0.95	0.93
Water flow rate CCQA	1.00	1.01	1.03	1.06	1.09
Water pressure drop CCDP	1.00	1.05	1.11	1.22	1,38

GENERAL SPECIFICATIONS - BRINE UNIT BR - BP

Brine Unit BR - BP

Correction factors to apply to the Standard unit data

ETHYLENE GLYCOL

percentage of glycol in mass / volume	20 / 18.1								
freezing point [°C]	-8								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.912	0.855	0.798	0.738	0.683	-	-	-	-
Power input c.f.	0.967	0.957	0.947	0.927	0.897	-	-	-	-
Water flow rate c.f.	0.955	0.895	0.836	0.773	0.715	-	-	-	-
Water pressure drop c.f.	1.090	1.095	1.100	1.110	1.120	-	-	-	-

percentage of glycol in mass / volume	30 / 27.7								
freezing point [°C]	-14								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.899	0.842	0.785	0.725	0.670	0.613	0.562	-	-
Power input c.f.	0.960	0.950	0.940	0.920	0.890	0.870	0.840	-	-
Water flow rate c.f.	0.967	0.905	0.844	0.780	0.720	0.659	0.604	-	-
Water pressure drop c.f.	1.140	1.145	1.150	1.155	1.160	1.175	1.190	-	-

percentage of glycol in mass / volume	40 / 37.5								
freezing point [°C]	-22								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.884	0.827	0.770	0.710	0.655	0.598	0.547	0.490	0.437
Power input c.f.	0.880	0.870	0.860	0.840	0.810	0.790	0.760	0.724	0.686
Water flow rate c.f.	1.150	1.151	1.153	1.154	1.155	1.157	1.158	1.159	1.161
Water pressure drop c.f.	1.190	1.195	1.200	1.210	1.220	1.235	1.250	1.269	1.290

PROPYLENE GLYCOL

percentage of glycol in mass / volume	20 / 19.4								
freezing point [°C]	-7								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.874	0.807	0.740	0.690	0.641	-	-	-	-
Power input c.f.	0.945	0.935	0.925	0.900	0.875	-	-	-	-
Water flow rate c.f.	0.915	0.845	0.774	0.723	0.671	-	-	-	-
Water pressure drop c.f.	1.110	1.115	1.120	1.130	1.140	-	-	-	-

percentage of glycol in mass / volume	30 / 29.4								
freezing point [°C]	-13								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.869	0.799	0.729	0.680	0.630	0.583	0.536	-	-
Power input c.f.	0.935	0.923	0.910	0.888	0.865	0.838	0.810	-	-
Water flow rate c.f.	0.934	0.859	0.784	0.731	0.678	0.627	0.576	-	-
Water pressure drop c.f.	1.160	1.175	1.190	1.200	1.210	1.255	1.300	-	-

percentage of glycol in mass / volume	40 / 39.6								
freezing point [°C]	-21								
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12
Refrigerating power c.f.	0.848	0.784	0.719	0.670	0.620	0.570	0.520	0.478	0.438
Power input c.f.	0.865	0.855	0.845	0.820	0.795	0.773	0.750	0.714	0.680
Water flow rate c.f.	1.116	1.114	1.112	1.110	1.108	1.107	1.105	1.103	1.101
Water pressure drop c.f.	1.230	1.275	1.320	1.375	1.430	1.500	1.570	1.642	1.724

A calculation example showing how the table is used is given below.
Consider unit **IR 200.4** in the Basic Version with air temperature: in 35°C d.b. and water temperature out 7°C:

- Cooling capacity of the Basic Version unit (VB): Pf_{VB} = 201 kW
- Power input of the Compressors in the Basic Version unit (VB): $PassCP,_{VB}$= 61.9 kW
- Water Flow Rate of the Basic Version unit (VB): Q_{VB}= 9.60 l/s
- Water pressure drop of the Basic Version unit (VB): Dp_{VB}= 62 kPa
- **with 30% brine and -2°C temperature of the water produced**

The corresponding values for the Brine Unit are:

- Cooling capacity $Pf_{BR/BP} = Pf_{VB}$ x (**0.725**) = 146 kW
- Compressor power input $Pass_{CP,BR/BP} = Pass_{CP,VB}$ x (**0.92**)= 56.9 kW
- Water flow rate $Q_{BR/BP}= Q_{VB}$ x (**0.78**)= 7.49 l/s
- Water pressure drop $\Delta p_{BR/BP} = \Delta p_{VB}$ x (**1.155**)= 72 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 Pf_{VB} and $Pass_{CP,VB}$ reported on the tables standard performances for the requisited air temp. and with water leaving temp=7°C.
With Pf_{VB} calculate Q_{VB} and using the graph water pressure drop Basic Version you have Dp_{VB}. Then apply the corrective coefficients indicated on the tables for BR-BP.

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

GENERAL SPECIFICATIONS - VERSION WITH DESUPERHEATER (VD)
IR COOLING UNIT ONLY

Acoustic Version: AB (Standard Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	169	186	209	239	267	304	339	385	430	kW
Total power input VD (1)	46.3	52.4	60.0	69.0	75.0	87.0	98.4	109	124	kW
Power input compressor VD (1)	53.5	59.6	67.2	76.2	85.8	97.8	109	124	138	kW
EER VD (1)	3.16	3.12	3.11	3.14	3.11	3.11	3.11	3.10	3.12	-
Water flow rate VD (1)	8.06	8.89	10.0	11.4	12.8	14.5	16.2	18.4	20.5	l/s
Water pressure drop VD (1)	59	58	67	69	73	76	64	66	67	kPa
Recovered heating capacity (1)	47.2	52.2	59.1	65.7	74.3	84.2	97.8	111	125	kW
Recovered water flow rate (1)	2.26	2.49	2.82	3.14	3.55	4.02	4.67	5.30	5.97	l/s
Recovered water pressure drop (1)	5	7	8	10	13	16	16	21	25	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.**

Acoustic Version: AS (Low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	162	179	201	230	257	291	326	370	412	kW
Total power input VD (1)	50.0	56.6	64.9	74.5	81.1	94.0	106	117	134	kW
Power input compressor VD (1)	57.2	63.8	72.1	81.7	91.9	105	117	132	148	kW
EER VD (1)	2.83	2.81	2.79	2.82	2.80	2.77	2.79	2.80	2.78	-
Water flow rate VD (1)	7.75	8.55	9.59	11.0	12.3	13.9	15.6	17.7	19.7	l/s
Water pressure drop VD (1)	55	54	62	65	67	70	59	61	62	kPa
Recovered heating capacity (1)	47.2	52.2	59.1	65.7	74.3	84.2	97.8	111	125	kW
Recovered water flow rate (1)	2.26	2.49	2.82	3.14	3.55	4.02	4.67	5.30	5.97	l/s
Recovered water pressure drop (1)	5	7	8	10	13	16	16	21	25	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.**

Acoustic Version: AX (Extra low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	158	175	197	225	252	285	318	363	404	kW
Total power input VD (1)	51.3	58.1	66.6	76.5	83.3	96.6	109	120	138	kW
Power input compressor VD (1)	58.5	65.3	73.8	83.7	94.1	107	119	135	152	kW
EER VD (1)	2.70	2.68	2.67	2.69	2.68	2.66	2.67	2.69	2.66	-
Water flow rate VD (1)	7.55	8.35	9.39	10.7	12.0	13.6	15.2	17.3	19.3	l/s
Water pressure drop VD (1)	52	51	59	61	64	67	56	59	60	kPa
Recovered heating capacity (1)	47.2	52.2	59.1	65.7	74.3	84.2	97.8	111	125	kW
Recovered water flow rate (1)	2.26	2.49	2.82	3.14	3.55	4.02	4.67	5.30	5.97	l/s
Recovered water pressure drop (1)	5	7	8	10	13	16	16	21	25	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.**

GENERAL SPECIFICATIONS - VERSION WITH DESUPERHEATER (VD)
IR COOLING UNIT ONLY

Performans Version with Desuperheater (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kWtr = Recovered HEATING CAPACITY [kW]				
160.4	30	39.6	45.0	51.3	58.2	65.9
	35	39.4	44.8	51.0	57.9	65.5
	40	38.3	43.6	49.6	56.3	63.8
	45	36.4	41.4	47.2	53.6	60.7
	50	33.7	38.4	43.7	49.6	56.2
	55	30.2	34.4	39.2	44.4	50.3
	60	25.9	29.4	33.5	38.1	43.1
	65	20.7	23.6	26.9	30.5	34.5
	70	14.8	16.8	19.1	21.7	24.6
180.4	30	44.2	50.1	56.9	64.5	72.9
	35	43.9	49.8	56.6	64.1	72.5
	40	42.7	48.4	55.0	62.4	70.5
	45	40.5	46.0	52.2	59.2	67.0
	50	37.4	42.4	48.2	54.6	61.8
	55	33.3	37.8	42.9	48.6	55.0
	60	28.2	32.0	36.4	41.2	46.6
	65	22.2	25.2	28.6	32.4	36.7
	70	15.2	17.2	19.6	22.2	25.1
200.4	30	49.6	56.4	64.2	72.9	82.6
	35	49.3	56.0	63.9	72.5	82.1
	40	48.0	54.5	62.1	70.5	79.9
	45	45.6	51.9	59.1	67.1	76.0
	50	42.2	48.0	54.7	62.1	70.3
	55	37.8	43.0	49.0	55.6	63.0
	60	32.4	36.9	42.0	47.7	54.0
	65	26.0	29.5	33.6	38.2	43.2
	70	18.5	21.0	23.9	27.2	30.8
230.4	30	55.6	63.0	71.6	81.2	91.8
	35	55.3	62.7	71.2	80.7	91.3
	40	53.8	61.0	69.2	78.5	88.8
	45	51.0	57.9	65.7	74.5	84.3
	50	47.1	53.4	60.6	68.7	77.8
	55	41.9	47.5	54.0	61.2	69.2
	60	35.5	40.3	45.8	51.9	58.7
	65	27.9	31.7	36.0	40.8	46.2
	70	19.1	21.7	24.6	27.9	31.6
260.4	30	62.5	70.7	80.4	91.1	103
	35	62.5	70.7	80.4	91.1	103
	40	60.9	69.0	78.3	88.8	100
	45	57.7	65.4	74.3	84.2	95.2
	50	53.0	60.1	68.2	77.3	87.5
	55	46.8	53.0	60.2	68.2	77.1
	60	38.9	44.1	50.1	56.7	64.2
	65	29.5	33.4	38.0	43.0	48.7
	70	18.5	21.0	23.8	27.0	30.5
290.4	30	70.3	79.9	90.7	103	116
	35	70.4	80.0	90.9	103	116
	40	68.7	78.1	88.7	100	113
	45	65.2	74.1	84.2	95.3	107
	50	59.9	68.0	77.3	87.4	98.6
	55	52.7	59.9	68.0	76.9	86.8
	60	43.6	49.6	56.3	63.7	71.9
	65	32.8	37.2	42.3	47.9	54.0
	70	20.1	22.8	25.9	29.3	33.0
330.4	30	82.3	93.5	106	120	135
	35	82.2	93.3	106	120	135
	40	80.0	90.9	103	117	132
	45	75.9	86.3	97.8	111	125
	50	69.9	79.4	90.0	102	115
	55	61.8	70.3	79.6	90.1	102
	60	51.8	58.9	66.8	75.6	85.2
	65	39.9	45.3	51.3	58.1	65.5
	70	25.9	29.4	33.4	37.8	42.6
375.4	30	93.4	106	120	136	154
	35	93.2	106	120	136	153
	40	90.8	103	117	132	149
	45	86.2	97.9	111	126	142
	50	79.3	90.1	102	116	130
	55	70.2	79.7	90.4	102	115
	60	58.8	66.8	75.8	85.8	96.7
	65	45.2	51.4	58.3	65.9	74.3
	70	29.4	33.4	37.9	42.9	48.3
420.4	30	105	120	135	153	173
	35	105	119	135	153	173
	40	102	116	132	149	168
	45	97.1	110	125	141	159
	50	89.3	101	115	130	147
	55	79.0	89.8	102	115	130
	60	66.3	75.3	85.3	96.6	109
	65	50.9	57.9	65.6	74.3	83.7
	70	33.1	37.6	42.7	48.3	54.4

Twr= Recovery outlet water temperature °C - Evaporator outlet water temperature = 7°C.

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

GENERAL SPECIFICATIONS - VERSION WITH DESUPERHEATER (VD)
IP HEAT PUMP UNIT

Acoustic Version: AB (Standard Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	161	179	202	226	256	289	324	374	417	kW
Power input compressor VD (1)	45.6	51.7	58.9	67.4	74.6	85.7	97.0	108	121	kW
Total power input VD (1)	52.8	58.9	66.1	74.6	85.4	96.5	108	122	136	kW
EER VD (1)	3.05	3.04	3.06	3.03	3.00	2.99	3.00	3.07	3.07	-
Water flow rate VD (1)	7.70	8.55	9.64	10.8	12.2	13.8	15.5	17.9	19.9	l/s
Water pressure drop VD (1)	54	54	63	62	66	69	59	63	63	kPa
Recovered heating capacity (1)	44.8	51.6	58.1	65.6	73.3	84.0	94.7	108	121	kW
Recovered water flow rate (1)	2.14	2.47	2.78	3.13	3.50	4.01	4.52	5.16	5.78	l/s
Recovered water pressure drop (1)	5	6	8	10	13	16	15	19	24	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.

Acoustic Version: AS (Low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	155	172	193	216	245	278	312	360	400	kW
Power input compressor VD (1)	49.3	55.9	63.6	72.8	80.6	92.6	105	116	131	kW
Total power input VD (1)	56.5	63.1	70.8	80.0	91.4	103	116	131	145	kW
EER VD (1)	2.74	2.73	2.73	2.70	2.68	2.70	2.69	2.75	2.76	-
Water flow rate VD (1)	7.40	8.20	9.24	10.3	11.7	13.3	14.9	17.2	19.1	l/s
Water pressure drop VD (1)	50	50	58	57	61	64	54	58	58	kPa
Recovered heating capacity (1)	44.8	51.6	58.1	65.6	73.3	84.0	94.7	108	121	kW
Recovered water flow rate (1)	2.14	2.47	2.78	3.13	3.50	4.01	4.52	5.16	5.78	l/s
Recovered water pressure drop (1)	5	6	8	10	13	16	15	19	24	kPa

(1): Dati riferiti a: Temperatura acqua: ingresso evaporatore :**12°C** - uscita evaporatore: **7°C,** Temperatura aria esterna **35°C.**
Dati riferiti a: Temperatura acqua: ingresso recupero:**40°C** - uscita recupero: **45°C.**

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

Acoustic Version: AX (Extra low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	l
Unit specification										
Cooling capacity VD(1)	152	168	189	212	240	271	305	352	392	kW
Power input compressor VD (1)	50.6	57.4	65.4	74.8	82.8	95.2	108	119	135	kW
Total power input VD (1)	57.8	64.6	72.6	82.0	93.6	106	118	134	149	kW
EER VD (1)	2.63	2.60	2.60	2.59	2.56	2.56	2.58	2.63	2.63	-
Water flow rate VD (1)	7.25	8.05	9.04	10.1	11.5	13.0	14.6	16.8	18.7	l/s
Water pressure drop VD (1)	48	48	55	55	59	61	52	55	56	kPa
Recovered heating capacity (1)	44.8	51.6	58.1	65.6	73.3	84.0	94.7	108	121	kW
Recovered water flow rate (1)	2.14	2.47	2.78	3.13	3.50	4.01	4.52	5.16	5.78	l/s
Recovered water pressure drop (1)	5	6	8	10	13	16	15	19	24	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.

GENERAL SPECIFICATIONS - VERSION WITH DESUPERHEATER (VD)
IP HEAT PUMP UNIT

Performans Version with Desuperheater (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kWtr = Recovered HEATING CAPACITY [kW]				
160.4	30	37.6	42.7	48.7	55.3	62.6
	35	37.4	42.5	48.4	54.9	62.2
	40	36.4	41.3	47.1	53.5	60.5
	45	34.6	39.3	44.8	50.9	57.6
	50	32.0	36.4	41.5	47.1	53.3
	55	28.7	32.6	37.2	42.2	47.8
	60	24.6	27.9	31.8	36.1	40.9
	65	19.7	22.4	25.5	28.9	32.8
	70	14.0	15.9	18.2	20.6	23.3
180.4	30	43.7	49.5	56.2	63.7	72.1
	35	43.4	49.2	55.9	63.4	71.7
	40	42.2	47.9	54.4	61.6	69.7
	45	40.1	45.5	51.6	58.5	66.2
	50	37.0	41.9	47.6	54.0	61.1
	55	32.9	37.3	42.4	48.1	54.4
	60	27.9	31.7	35.9	40.7	46.1
	65	21.9	24.9	28.3	32.0	36.2
	70	15.0	17.0	19.4	21.9	24.8
200.4	30	48.7	55.4	63.1	71.7	81.2
	35	48.4	55.1	62.8	71.2	80.7
	40	47.1	53.6	61.1	69.3	78.5
	45	44.8	51.0	58.1	65.9	74.7
	50	41.5	47.2	53.8	61.1	69.2
	55	37.2	42.3	48.2	54.7	62.0
	60	31.9	36.2	41.3	46.9	53.1
	65	25.5	29.0	33.1	37.5	42.5
	70	18.2	20.7	23.5	26.7	30.3
230.4	30	55.5	63.0	71.5	81.0	91.7
	35	55.2	62.6	71.1	80.6	91.2
	40	53.7	60.9	69.1	78.4	88.7
	45	51.0	57.8	65.6	74.4	84.1
	50	47.0	53.3	60.5	68.6	77.6
	55	41.9	47.5	53.9	61.1	69.1
	60	35.5	40.2	45.7	51.8	58.6
	65	27.9	31.6	35.9	40.7	46.1
	70	19.1	21.7	24.6	27.9	31.6
260.4	30	63.2	71.6	81.3	92.1	104
	35	61.6	69.8	79.3	89.8	102
	40	60.1	68.0	77.3	87.6	99.1
	45	57.0	64.5	73.3	83.1	94.0
	50	52.3	59.3	67.3	76.3	86.3
	55	46.1	52.3	59.4	67.3	76.1
	60	38.4	43.5	49.4	56.0	63.3
	65	29.1	33.0	37.4	42.4	48.0
	70	18.3	20.7	23.5	26.6	30.1
290.4	30	71.8	81.6	92.7	105	118
	35	70.3	79.8	90.7	103	116
	40	68.6	77.9	88.5	100	113
	45	65.1	73.9	84.0	95.0	107
	50	59.7	67.9	77.1	87.2	98.4
	55	52.5	59.7	67.8	76.7	86.6
	60	43.5	49.5	56.2	63.6	71.7
	65	32.7	37.1	42.2	47.7	53.9
	70	20.0	22.7	25.8	29.2	33.0
330.4	30	81.0	92.1	104	118	133
	35	79.5	90.4	102	116	131
	40	77.5	88.1	100	113	127
	45	73.5	83.5	94.7	107	121
	50	67.7	76.9	87.1	98.6	111
	55	59.9	68.0	77.1	87.3	98.4
	60	50.2	57.0	64.6	73.2	82.5
	65	38.6	43.9	49.7	56.3	63.4
	70	25.1	28.5	32.3	36.6	41.2
375.4	30	92.4	105	119	135	152
	35	90.7	103	117	132	149
	40	88.4	100	114	129	145
	45	83.9	95.3	108	122	138
	50	77.2	87.7	99.4	112	127
	55	68.3	77.6	88.0	100	112
	60	57.2	65.0	73.7	83.4	94.1
	65	44.0	50.0	56.7	64.2	72.3
	70	28.6	32.5	36.9	41.7	47.0
420.4	30	104	118	133	151	170
	35	102	115	131	148	167
	40	99.0	113	128	144	163
	45	94.0	107	121	137	154
	50	86.4	98.2	111	126	142
	55	76.5	86.9	98.5	112	126
	60	64.1	72.9	82.6	93.5	105
	65	49.3	56.0	63.5	71.9	81.0
	70	32.1	36.4	41.3	46.7	52.7

Twr= Recovery outlet water temperature °C - Evaporator outlet water temperature = 7°C.

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

GENERAL SPECIFICATIONS - FULL HEAT RECOVERY UNIT (VR)
IP HEAT PUMP UNIT

Acoustic Version: AB (Basic Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	17.6	19.2	21.6	24.8	27.2	30.4	34.4	38.4	43.2	l
Unit specification										
Cooling capacity VR(1)	165	183	205	234	262	298	333	378	421	kW
Total power input VR (1)	47.7	54.0	61.9	71.1	77.4	89.7	101	112	128	kW
EER VR (1)	3.46	3.39	3.31	3.29	3.39	3.32	3.28	3.36	3.30	-
Water flow rate VR (1)	8.06	8.89	10.0	11.4	12.8	14.5	16.2	18.4	20.5	l/s
Water pressure drop VR (1)	59	58	67	69	73	76	64	66	67	kPa
Recovered heating capacity (1)	200	222	251	287	319	364	408	461	516	kW
Recovered water flow rate (1)	9.57	10.6	12.0	13.7	15.3	17.4	19.5	22.0	24.7	l/s
Recovered water pressure drop (1)	40	38	40	40	42	43	43	44	45	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.**

Acoustic Version: AS (Low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	17.6	19.2	21.6	24.8	27.2	30.4	34.4	38.4	43.2	l
Unit specification										
Cooling capacity VR(1)	165	183	205	234	262	298	333	378	421	kW
Total power input VR (1)	47.7	54.0	61.9	71.1	77.4	89.7	101	112	128	kW
EER VR (1)	3.46	3.39	3.31	3.29	3.39	3.32	3.28	3.36	3.30	-
Water flow rate VR (1)	8.06	8.89	10.0	11.4	12.8	14.5	16.2	18.4	20.5	l/s
Water pressure drop VR (1)	59	58	67	69	73	76	64	66	67	kPa
Recovered heating capacity (1)	200	222	251	287	319	364	408	461	516	kW
Recovered water flow rate (1)	9.57	10.6	12.0	13.7	15.3	17.4	19.5	22.0	24.7	l/s
Recovered water pressure drop (1)	40	38	40	40	42	43	43	44	45	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.**

Acoustic Version: AX (Extra Low noise Unit)

Recovery heat exchanger specifications

MODEL	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Type of recovery exchanger	Brazed plates									-
Quantity	1									N°
Max. operating pressure on wet side	600									kPa
Total water content of recovery exchangers	17.6	19.2	21.6	24.8	27.2	30.4	34.4	38.4	43.2	l
Unit specification										
Cooling capacity VR(1)	165	183	205	234	262	298	333	378	421	kW
Total power input VR (1)	47.7	54.0	61.9	71.1	77.4	89.7	101	112	128	kW
EER VR (1)	3.46	3.39	3.31	3.29	3.39	3.32	3.28	3.36	3.30	-
Water flow rate VR (1)	8.06	8.89	10.0	11.4	12.8	14.5	16.2	18.4	20.5	l/s
Water pressure drop VR (1)	59	58	67	69	73	76	64	66	67	kPa
Recovered heating capacity (1)	200	222	251	287	319	364	408	461	516	kW
Recovered water flow rate (1)	9.57	10.6	12.0	13.7	15.3	17.4	19.5	22.0	24.7	l/s
Recovered water pressure drop (1)	40	38	40	40	42	43	43	44	45	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.**

GENERAL SPECIFICATIONS - FULL HEAT RECOVERY UNIT (VR)
IP HEAT PUMP UNIT

Full Heat recovery unit performans (VR)

MOD.	TWE	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		35	40	45	50	55
		kWtr = Recovered HEATING CAPACITY [kW]				
160.4	5	202	196	191	185	189
	6	207	201	195	189	193
	7	212	206	**200**	194	197
	8	217	211	205	199	202
	9	223	216	210	203	207
	10	228	221	215	208	211
	11	233	226	219	212	216
	12	239	232	225	217	221
180.4	5	224	218	212	206	210
	6	229	223	217	211	214
	7	235	229	**222**	216	220
	8	241	235	228	221	225
	9	247	240	233	226	230
	10	253	246	239	231	235
	11	259	251	244	236	240
	12	265	257	249	241	246
200.4	5	252	246	239	232	237
	6	258	252	245	238	242
	7	265	258	**251**	243	248
	8	272	265	257	249	254
	9	278	271	263	255	260
	10	285	277	269	261	265
	11	291	283	275	266	271
	12	299	290	281	272	277
230.4	5	289	282	274	266	271
	6	296	288	280	272	277
	7	304	296	**287**	279	284
	8	311	303	294	285	291
	9	319	310	301	292	297
	10	326	317	308	299	304
	11	334	325	315	305	310
	12	342	332	322	312	317
260.4	5	321	313	304	295	301
	6	329	320	311	302	308
	7	338	329	**319**	309	315
	8	346	337	327	317	323
	9	355	345	335	324	330
	10	363	353	342	331	337
	11	371	361	350	339	345
	12	380	369	358	346	352
290.4	5	366	357	347	337	344
	6	375	366	356	345	352
	7	385	375	**364**	353	360
	8	395	384	373	362	368
	9	404	393	382	370	377
	10	414	402	391	378	385
	11	423	412	399	387	393
	12	433	421	409	395	402
330.4	5	410	399	389	378	385
	6	420	409	398	386	393
	7	430	419	**408**	395	403
	8	441	430	417	405	412
	9	452	440	427	414	422
	10	463	450	437	423	431
	11	473	460	447	432	440
	12	485	471	457	442	450
375.4	5	464	452	440	427	435
	6	475	463	450	436	445
	7	488	475	**461**	447	455
	8	500	486	472	458	466
	9	512	498	483	468	477
	10	524	510	494	479	487
	11	536	521	505	489	498
	12	549	534	517	500	509
420.4	5	519	506	492	478	488
	6	532	518	504	489	498
	7	545	531	**516**	501	510
	8	559	544	529	513	522
	9	573	557	541	525	534
	10	586	570	554	536	546
	11	600	583	566	548	558
	12	614	597	579	560	570

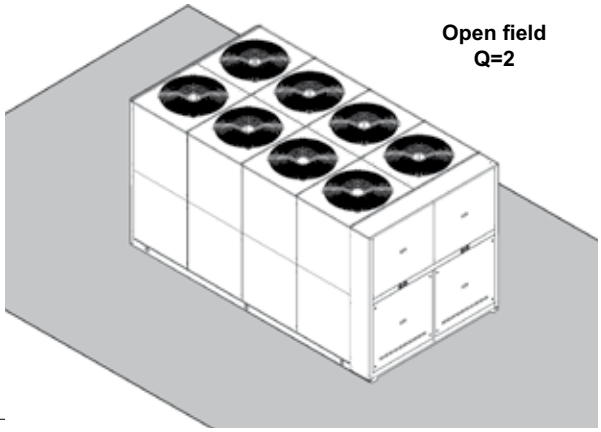
Twe= Evaporator outlet water temperature °C **Twr=** Recovery outlet water temperature °C

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

NOISE LEVELS

The noise levels refer to units operating in the nominal conditions (water temperature: inlet: 12°C - outlet: 7°C, Outdoor air temperature: inlet: 30°C - outlet: 35°C). 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 $1x10^{-12}$ W.
The Total sound power level in **dB(A)** measured in compliance with **ISO 9614** standards, is certified according to the **Eurovent** certification program and it is the only mandatory value (the values of octave band in the table are indicative).
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 $2x10^{-5}$ 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 (Q=2) and the units operating in nominal conditions in the cooling mode.



Standard Unit AB

MOD.	SWL (dB)										SPL [dB(A)]		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)(E)	1 m	5 m	10 m
160.4	96.1	92.2	91.3	89.2	86.1	81.0	74.4	66.9	**99**	**91**	72	64	59
180.4	96.4	94.1	92.6	90.0	87.2	81.8	75.2	66.8	**100**	**92**	73	65	60
200.4	96.4	94.1	92.6	90.0	87.2	81.8	75.2	66.8	**100**	**92**	73	65	60
230.4	96.4	94.1	92.6	90.0	87.2	81.8	75.2	66.8	**100**	**92**	73	65	60
260.4	98.1	94.2	93.3	91.2	88.1	83.0	76.4	68.9	**101**	**93**	74	66	61
290.4	98.4	96.2	93.8	91.4	88.9	85.9	78.1	68.6	**102**	**94**	75	67	62
330.4	98.4	96.2	93.8	91.4	88.9	85.9	78.1	68.6	**102**	**94**	74	67	62
375.4	99.2	95.5	95.4	93.0	90.2	85.5	80.1	72.0	**103**	**95**	75	68	63
420.4	99.2	95.5	95.4	93.0	90.2	85.5	80.1	72.0	**103**	**95**	75	68	63

Low noise unit AS

MOD.	SWL (dB)										SPL [dB(A)]		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)(E)	1 m	5 m	10 m
160.4	91.4	89.0	86.8	82.3	79.4	75.8	67.3	58.0	**95**	**85**	66	58	53
180.4	92.4	90.0	87.8	83.3	80.4	76.8	68.3	59.0	**96**	**86**	67	59	54
200.4	92.4	90.0	87.8	83.3	80.4	76.8	68.3	59.0	**96**	**86**	67	59	54
230.4	92.4	90.0	87.8	83.3	80.4	76.8	68.3	59.0	**96**	**86**	67	59	54
260.4	94.2	91.9	89.4	85.3	81.0	74.6	67.0	58.6	**97**	**87**	68	60	55
290.4	92.4	90.1	88.6	86.0	83.3	77.8	71.2	62.8	**96**	**88**	69	61	56
330.4	92.4	90.1	88.6	86.0	83.3	77.8	71.2	62.8	**96**	**88**	68	61	56
375.4	95.4	93.0	90.8	86.3	83.4	79.8	71.3	62.0	**99**	**89**	69	62	57
420.4	95.4	93.0	90.8	86.3	83.4	79.8	71.3	62.0	**99**	**89**	69	62	57

Extra low moise unit AX

MOD.	SWL (dB)										SPL [dB(A)]		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)(E)	1 m	5 m	10 m
160.4	85.4	88.3	84.6	79.8	76.3	69.8	61.2	52.3	**92**	**82**	63	55	50
180.4	89.4	87.0	84.8	80.3	77.4	73.8	65.3	56.0	**93**	**83**	64	56	51
200.4	89.4	87.0	84.8	80.3	77.4	73.8	65.3	56.0	**93**	**83**	64	56	51
230.4	89.4	87.0	84.8	80.3	77.4	73.8	65.3	56.0	**93**	**83**	64	56	51
260.4	90.4	88.0	85.8	81.3	78.4	74.8	66.3	57.0	**94**	**84**	65	57	52
290.4	91.4	89.0	86.8	82.3	79.4	75.8	67.3	58.0	**95**	**85**	66	58	53
330.4	91.4	89.0	86.8	82.3	79.4	75.8	67.3	58.0	**95**	**85**	65	58	53
375.4	92.4	90.0	87.8	83.3	80.4	76.8	68.3	59.0	**96**	**86**	66	59	54
420.4	92.4	90.0	87.8	83.3	80.4	76.8	68.3	59.0	**96**	**86**	66	59	54

(E): Data declared according to **EUROVENT LCP** certification programme. The values are for units without options and accessories.

OPERATING RANGE

Operating range

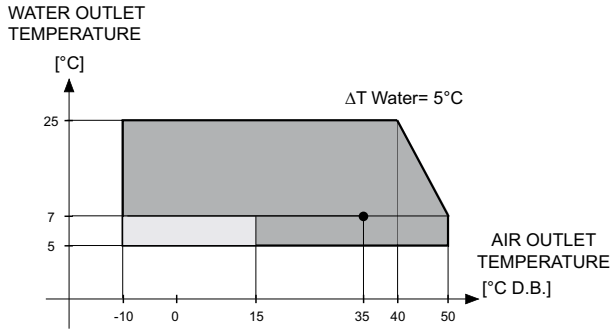
The table below lists the operating ranges within which correct operation of the units is guaranteed, depending on the Version and Operating Mode available for each type of unit.
Remember that in Heat Pump units, heat recovery only takes place during operation in the cooling mode.

Operating range of Standard unit

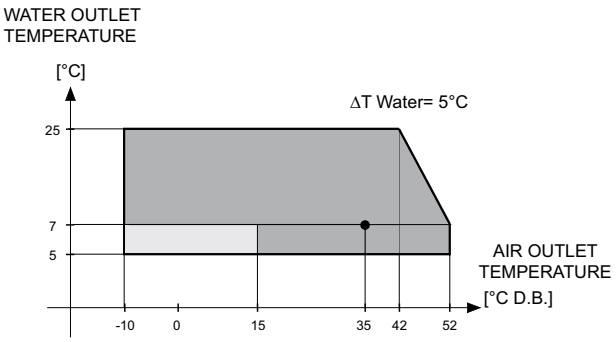
Thermal gradient of the water*		Limit value
Minimum	°C	3
Maximum	°C	8

IN COOLING MODE

UNIT MEDIUM TEMPERATURE - 0 M 5

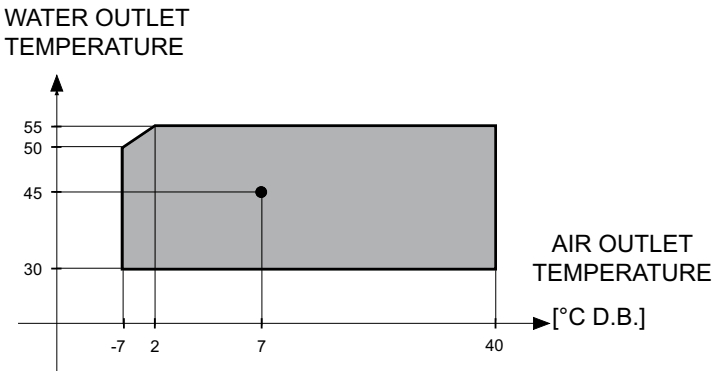


UNIT HIGH TEMPERATURE - 0 A 5

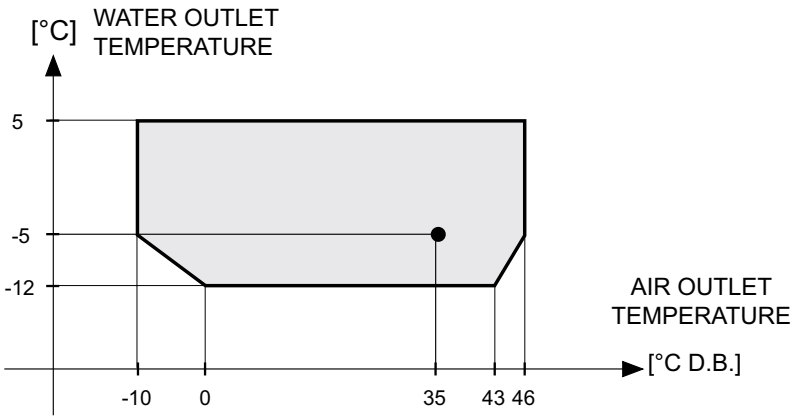


With accessory Head pressure control (brine is recommended)

IN HEATING MODE

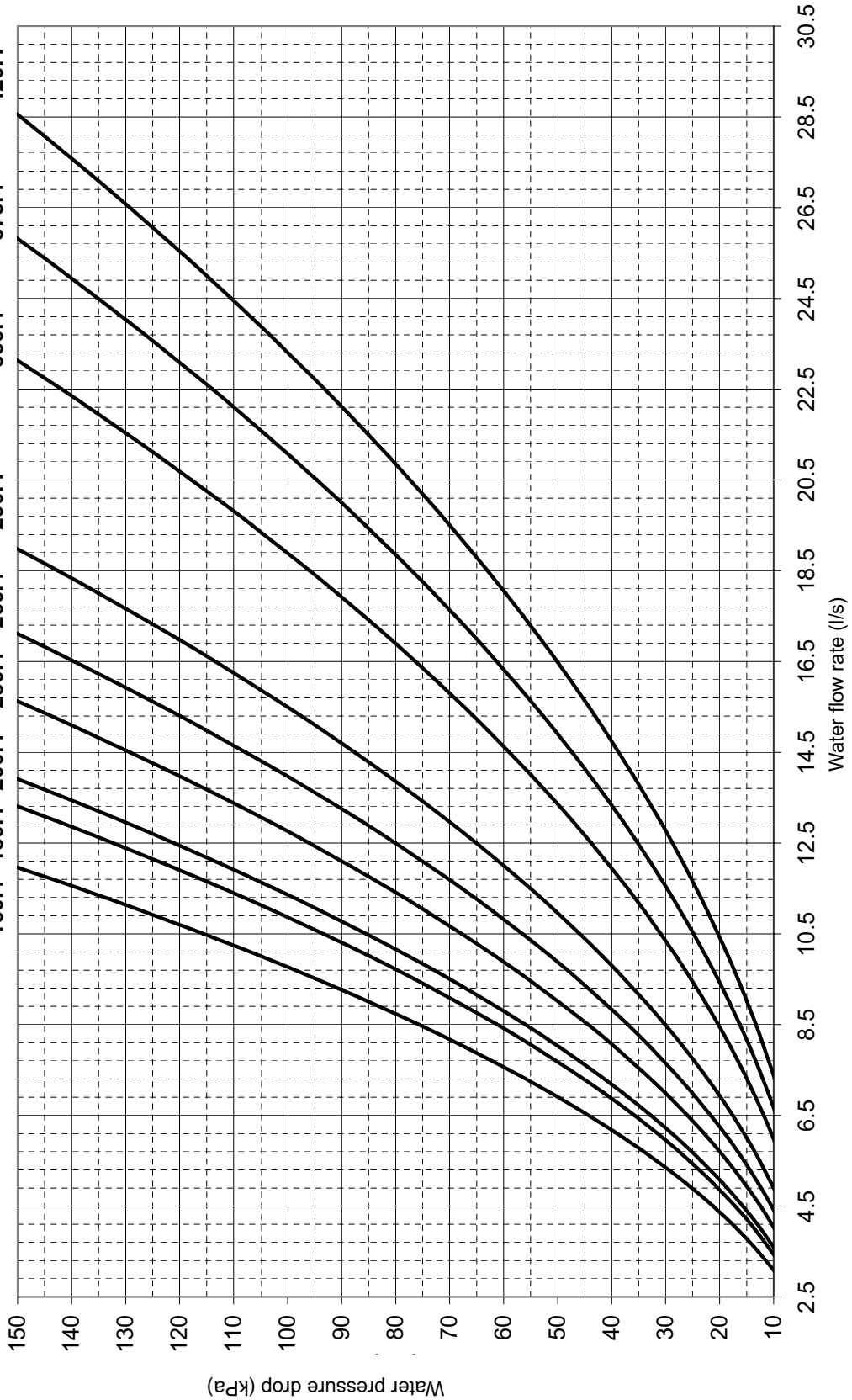


BRINE UNIT BR - BP - IN COOLING MODE



WATER PRESSURE DROP EVAPORATOR

The graph below illustrates for the evaporator 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.

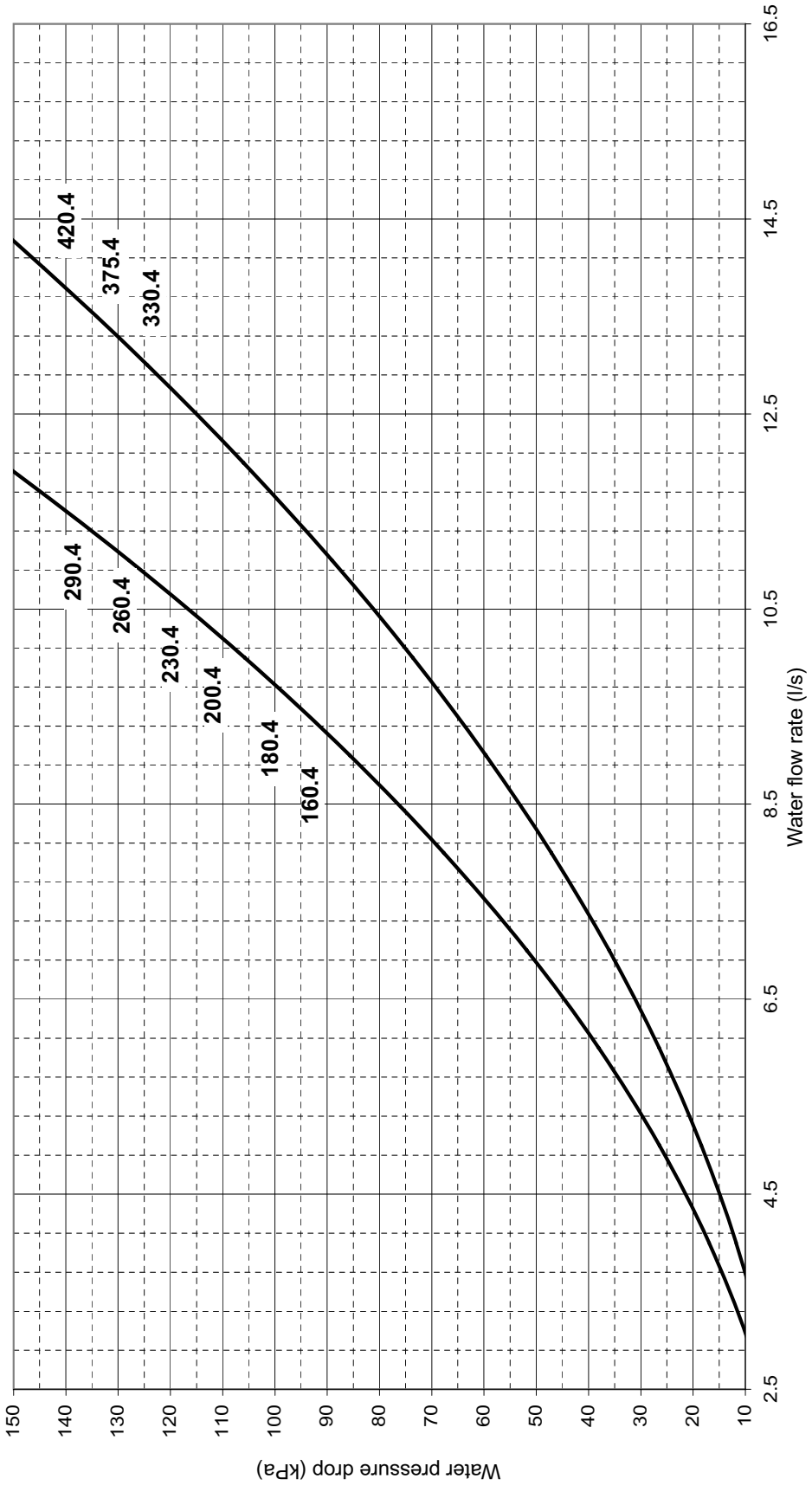


Operating range

Unit size		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM	NOTES
Lower limit value	Q	3.09	3.44	3.59	4.03	4.42	4.90	5.97	6.67	7.37	l/s	**Q**= Water flow rate **ΔP**= Water pressure drop
	Δp	10									kPa	
Upper limit value	Q	12.0	13.3	13.9	15.6	17.1	19.0	23.1	25.8	28.6	l/s	
	Δp	150									kPa	

WATER PRESSURE DROP DESUPERHEATER

The graph below illustratesfor the desupherheater exchanger 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.

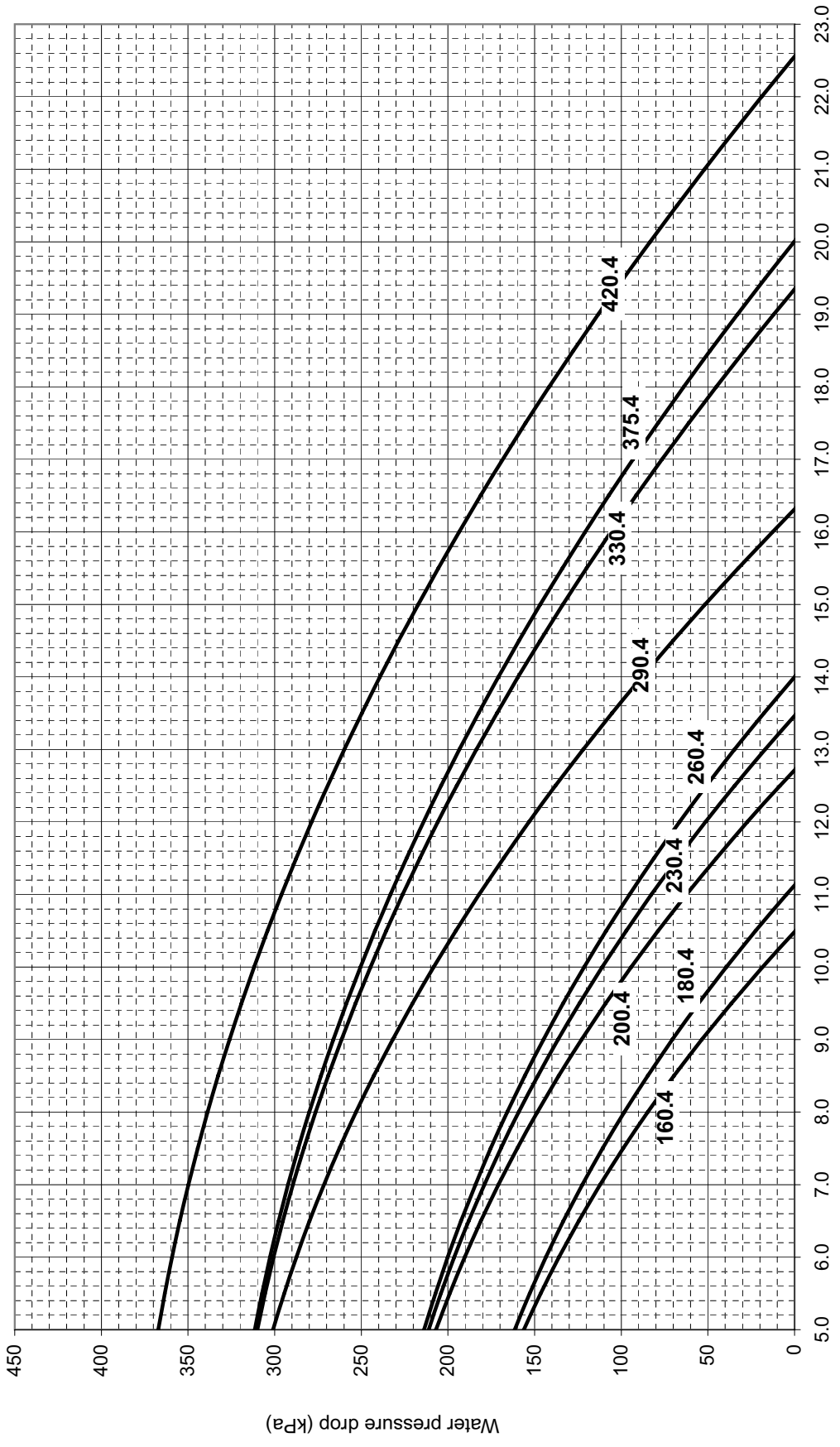


Operating range

Unit size		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM	NOTES
Lower limit value	Q	3.08						3.69			l/s	**Q**= Water flow rate Δ**P**= Water pressure drop
	Δp	10									kPa	
Upper limit value	Q	11.9						14.3			l/s	
	Δp	150									kPa	

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

The graph below illustrates for the evaporator 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.

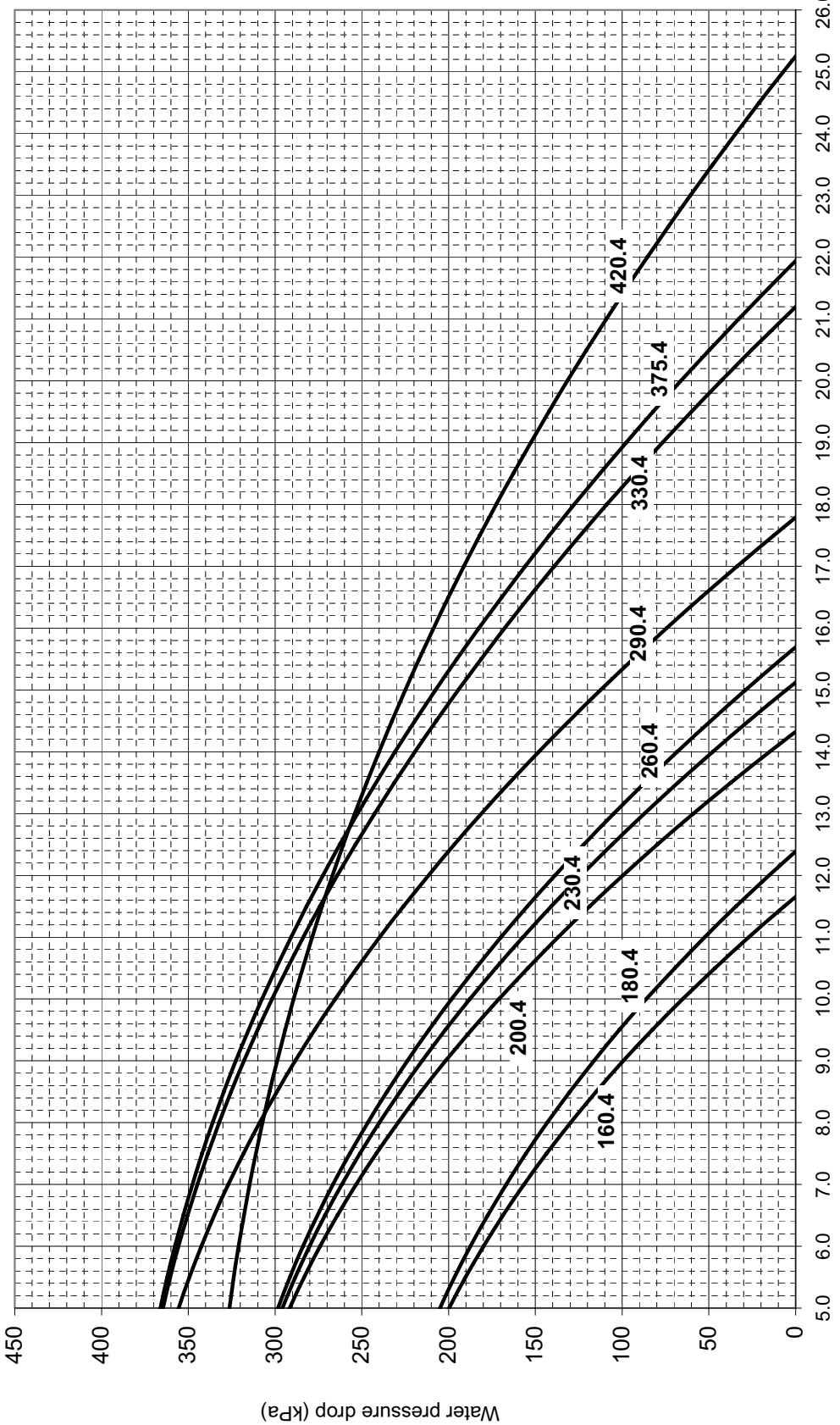


Operating range

Unit size		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM	NOTE
Lower limit value	Q	3.09	3.44	3.59	4.03	4.42	4.90	5.97	6.67	7.37	l/s	**Q**= Water flow rate
Upper limit value	Q	10.5	11.1	12.7	13.5	14.0	16.3	19.4	20.0	22.6	l/s	

HIGH WORKING HEAD OF THE PUMPING MODULE MP AM HP1 AND MP SS HP1

The graph below illustrates for the evaporator 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.



Operating range

Unit size		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM	NOTE
Lower limit value	**Q**	3.09	3.44	3.59	4.03	4.42	4.90	5.97	6.67	7.37	l/s	**Q**= Water flow rate
Upper limit value	**Q**	11.7	12.4	14.3	15.1	15.7	17.8	21.2	21.9	25.3	kPa	

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
1) 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. 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.1-2).
Refer to the data plates (**Fig.5)** that identify the center of gravity position, applied to the 4 sides of the base.

Fig. 1

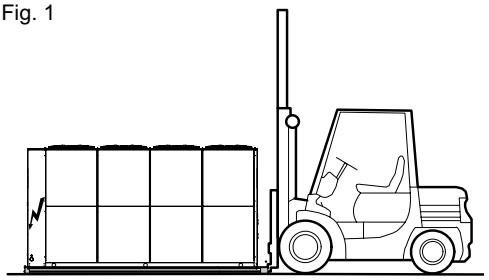
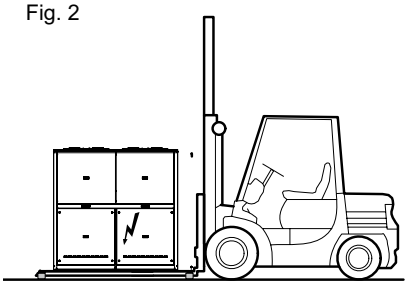
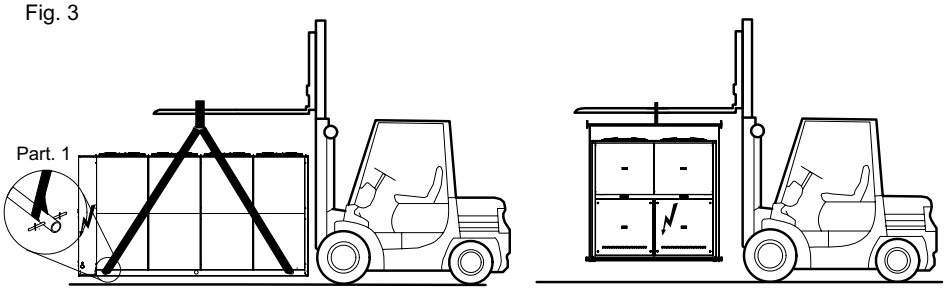


Fig. 2



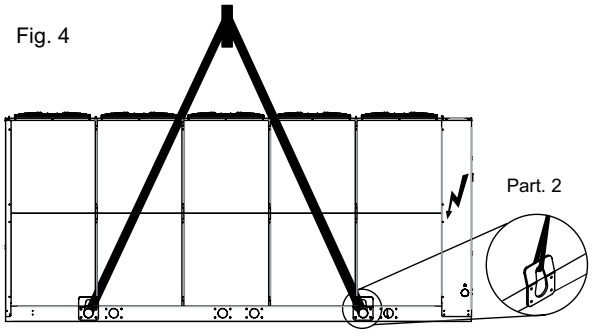
2) Position metal pipes (Part 1 Fig.3) of adequate thickness in the holes in the base of the unit for lifting.
• The end portions of the pipes must stand out by an adequate extent to permit inserting the safety devices and housing the belts for lifting.
• Use spacer bars in the top of the unit to prevent crushing and damaging the batteries and the parts intended to cover the assembly.

Fig. 3



• Handling and lifting with a crane or similar
Using the brackets (Part 2 Fig.4) located by the lifting holes (refer to the "Dimensional data" section).
• Consult the WEIGHTS AND CENTERS OF GRAVITY DURING TRASPORT AND OPERATION section for the center of gravity position.
NOTE: To correctly lift the machine, the belts used must be longer than 3.5 meters.

Fig. 4



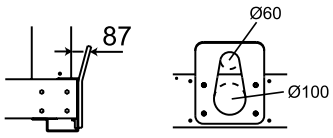


Fig. 5

Refer to the data plates (Fig.5) that identify the center of gravity position, applied to the 4 sides of the base.

ATTENZIONE:
Prendere visione delle informazioni riportate sull'imballo dell'unità, al fine di garantire la sicurezza a persone e cose, prima di effettuarne la movimentazione.
Raccomandiamo inoltre di:
• Movimentare con cura
• Non sovrapporre all'unità altri oggetti

Stoccaggio

Le unità devono essere tenute in luogo asciutto al riparo da raggi solari, pioggia, sabbia o vento.
Le condizioni di stoccaggio sono:
• Non sovrapporre le unità
• Temperatura massima = 60°C
• Temperatura minima = -10°C
• Umidità = 90%

DIMENSIONAL DATA

Overall dimensions

Mod. 160.4 ÷ 290.4

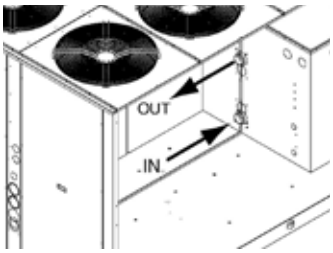
Mod. 330.4 ÷ 420.4

Description of the components

1 - Access panel to electric panel's power section
2 - Access panel to compressor compartment
3 - Vibration damper fixing holes (6 pcs)
4 - Coil protection grilles (accessory)
5 - ø 65 mm lifting holes
6 - ø 22 mm input hole for accessory cables
7- ø 60 mm hole for electric power supply input
8 - Access panel to pump compartment

9-10-11 Water inlet for MP AM HP1 and MP SS HP1
Water inlet for MP AM STD and MP SS STD
Water inlet for KT and KT + SAA
12 - Water inlet for MP PS STD
13 - Water outlet
14 - Water inlet for Desuperheater (only VD version)
15 - Water outlet for Desuperheater (only VD version)
*** :** Center distance of vibration damper holes

VICTAULIC CONNECTION KIT

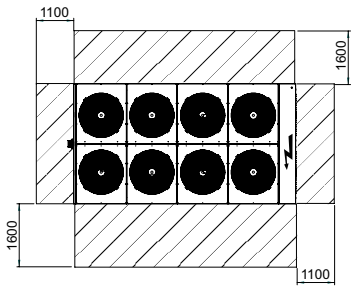


-	VICTAULIC CONNECTION KIT		PIPES KIT COMPLETE PIPES KIT WITH TANK MP AM HP1 MP SS HP1				MP AM STD MP SS STD				MP PS STD				VD			
	IN	OUT	IN		OUT		IN		OUT		IN		OUT		IN		OUT	
Mod.	Ø	Ø	Ø	Rif.	Ø	Rif.	Ø	Rif.	Ø	Rif.	Ø	Rif.	Ø	Rif.	Ø	Rif.	Ø	Rif.
160	3"	3"	3"	10	3"	13	3"	9	3"	13	3"	12	3"	13	1 ½"	14	1 ½"	15
180																		
200																		
230																		
260																		
290								10										
330	4"	4"	4"	11	4"		4"	11	4"		4"		4"					
375																		
420																		

Ø	DN	Tipo
1 ½"	DN40	Victaulic
2 ½"	DN65	Victaulic
3"	DN80	Victaulic
4"	DN100	Victaulic

Minimum space required for operation

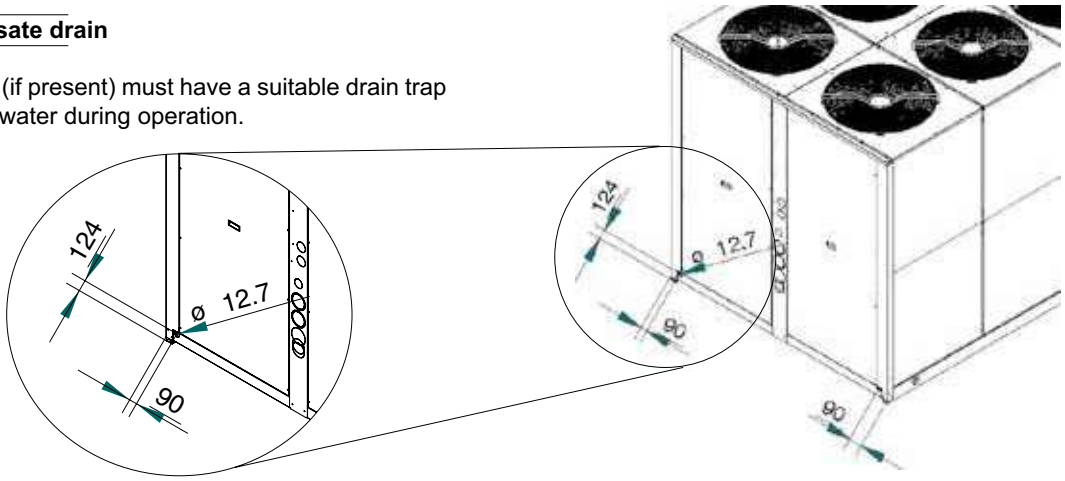
To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the figure.
This will ensure good air circulation, allow the unit to operate correctly and facilitate future maintenance work.
The distances must be doubled if the unit is to be installed in a pit.
NOTE. Allow for an uncluttered area of not less than 2.5 meters above the unit.



DIMENSIONAL DATA

Position of condensate drain

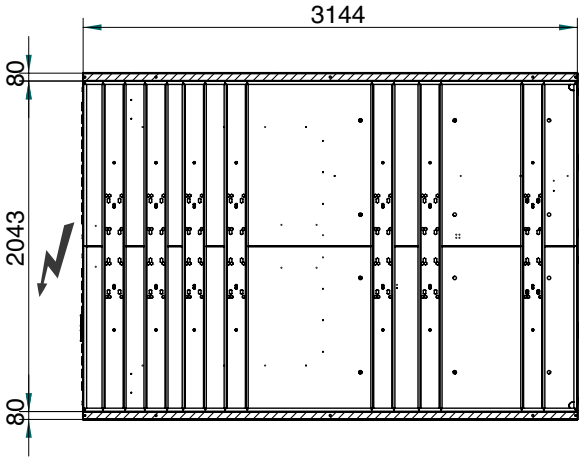
The condensate tray (if present) must have a suitable drain trap to prevent spilling of water during operation.

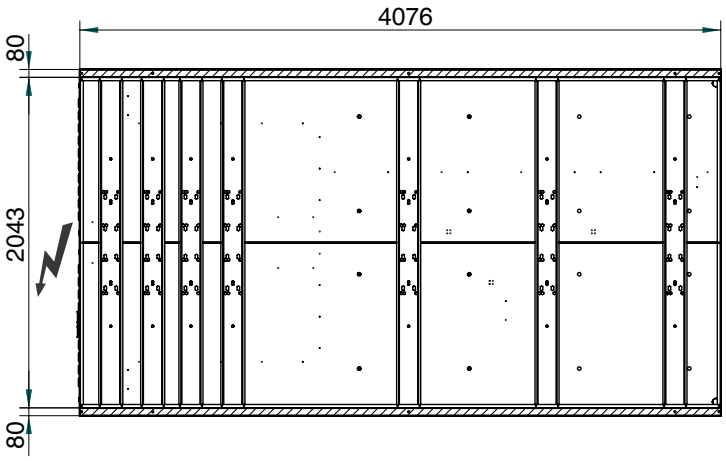


Vibration-damper installation

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.

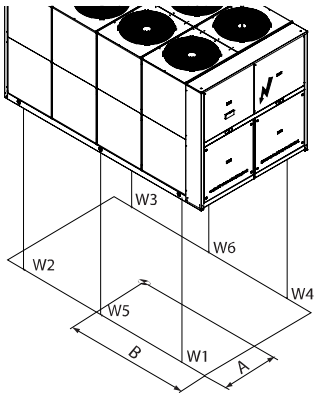
Area of support





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.



Weight during transport

UNIT **WITHOUT** WATER STORAGE TANK

Unit WITHOUT Hydronic Kit

IR Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1106	1170	1575	1106	1185	1635
180	1106	1160	1755	1106	1175	1815
200	1106	1150	1935	1106	1165	1999
230	1106	1128	2141	1106	1128	2165
260	1106	1103	2162	1106	1118	2225
290	1106	1119	2230	1106	1119	2250
330	1108	1387	2386	1108	1405	2459
375	1108	1359	2496	1108	1377	2569
420	1108	1370	2612	1108	1370	2638

IP Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1105	1175	1670	1105	1190	1733
180	1105	1165	1860	1105	1180	1924
200	1105	1155	2051	1105	1170	2119
230	1105	1133	2269	1105	1133	2295
260	1105	1108	2292	1105	1123	2359
290	1105	1124	2364	1105	1124	2385
330	1107	1376	2529	1107	1394	2607
375	1107	1348	2646	1107	1366	2723
420	1107	1359	2769	1107	1359	2796

Unit WITH Hydronic Kit

IR Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1100	1334	1825	1100	1349	1890
180	1100	1324	2005	1100	1339	2070
200	1100	1314	2185	1100	1329	2254
230	1100	1292	2391	1100	1292	2420
260	1100	1267	2412	1100	1282	2480
290	1100	1283	2480	1100	1283	2505
330	1100	1588	2649	1100	1606	2725
375	1100	1560	2759	1100	1578	2835
420	1100	1571	2875	1100	1571	2904

IP Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1099	1324	1935	1099	1339	2003
180	1099	1314	2125	1099	1329	2194
200	1099	1304	2316	1099	1319	2389
230	1099	1282	2534	1099	1282	2565
260	1099	1257	2557	1099	1272	2629
290	1099	1273	2629	1099	1273	2655
330	1099	1577	2808	1099	1595	2888
375	1099	1549	2925	1099	1567	3005
420	1099	1560	3048	1099	1560	3078

UNIT **WITH** WATER STORAGE TANK

Unit WITHOUT Hydronic Kit

IR Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1106	1218	1674	1106	1231	1738
180	1106	1208	1854	1106	1221	1918
200	1106	1198	2034	1106	1211	2102
230	1106	1183	2168	1106	1183	2268
260	1106	1148	2262	1106	1162	2328
290	1106	1163	2330	1106	1163	2353
330	1108	1459	2542	1108	1475	2617
375	1108	1430	2652	1108	1445	2727
420	1108	1438	2768	1108	1438	2796

IP Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1105	1208	1758	1105	1221	1825
180	1105	1198	1947	1105	1211	2014
200	1105	1188	2136	1105	1201	2207
230	1105	1173	2276	1105	1173	2382
260	1105	1138	2375	1105	1152	2445
290	1105	1153	2447	1105	1153	2471
330	1107	1448	2669	1107	1464	2748
375	1107	1419	2785	1107	1434	2863
420	1107	1427	2906	1107	1427	2935

Unit WITH Hydronic Kit

IR Version

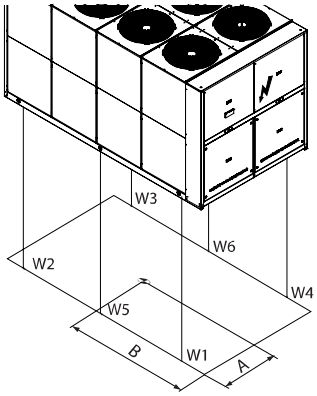
Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1100	1370	1923	1100	1383	1990
180	1100	1360	2103	1100	1373	2170
200	1100	1350	2283	1100	1363	2354
230	1100	1335	2417	1100	1335	2520
260	1100	1300	2511	1100	1314	2580
290	1100	1315	2579	1100	1315	2605
330	1100	1637	2818	1100	1653	2895
375	1100	1608	2928	1100	1623	3005
420	1100	1616	3044	1100	1616	3074

IP Version

Acustic version	AB-AS			AX		
Mod.	Center of gravity position [mm]		Weight [Kg]	Center of gravity position [mm]		Weight [Kg]
	A	B		A	B	
160	1099	1360	2019	1099	1373	2089
180	1099	1350	2208	1099	1363	2278
200	1099	1340	2397	1099	1353	2471
230	1099	1325	2538	1099	1325	2646
260	1099	1290	2637	1099	1304	2709
290	1099	1305	2708	1099	1305	2735
330	1099	1626	2959	1099	1642	3040
375	1099	1597	3074	1099	1612	3156
420	1099	1605	3196	1099	1605	3228

NOTA: For Desuperheater versions the total weight increases of 4%. For Heat recovery versions the total weight increases of 10%.

WEIGHT DURING OPERATION AND TRANSPORT



Weight during operation

UNIT **WITHOUT** WATER STORAGE TANK

IR Version

Unit WITHOUT Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1106	1170	429	91.3	93.3	430	273	275	1591	1106	1185	445	94.8	96.8	446	283	285	1651
180	1106	1160	478	102	104	479	304	306	1773	1106	1175	494	105	108	496	314	316	1833
200	1106	1150	527	112	115	528	335	337	1954	1106	1165	544	116	118	546	346	349	2019
230	1106	1128	583	124	127	585	371	373	2162	1106	1128	590	126	128	591	375	378	2187
260	1106	1103	589	125	128	591	374	377	2184	1106	1118	606	129	132	608	385	388	2247
290	1106	1119	607	129	132	609	386	389	2252	1106	1119	613	130	133	615	390	392	2273
330	1108	1387	672	124	127	676	404	407	2410	1108	1405	693	128	131	697	416	419	2484
375	1108	1359	703	130	133	707	422	426	2521	1108	1377	724	133	137	728	434	438	2595
420	1108	1370	736	136	139	740	442	445	2638	1108	1370	743	137	141	748	446	450	2664

Unit WITH Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1100	1334	445	167	165	443	317	315	1852	1100	1349	461	173	171	459	328	326	1918
180	1100	1324	489	184	182	487	348	346	2035	1100	1339	505	190	187	503	359	357	2101
200	1100	1314	533	200	198	531	379	377	2218	1100	1329	549	207	204	548	391	389	2288
230	1100	1292	583	219	217	581	415	412	2427	1100	1292	590	222	219	588	420	417	2456
260	1100	1267	588	221	218	586	419	416	2448	1100	1282	604	227	225	603	430	428	2517
290	1100	1283	604	227	225	603	430	428	2517	1100	1283	610	230	227	609	435	432	2542
330	1100	1588	673	223	221	670	452	450	2689	1100	1606	692	230	227	689	465	463	2766
375	1100	1560	700	233	230	698	471	469	2800	1100	1578	720	239	236	717	483	482	2877
420	1100	1571	730	242	240	727	490	489	2918	1100	1571	737	245	242	734	495	493	2947

UNIT **WITH** WATER STORAGE TANK

IR Version

Unit WITHOUT Hydronic Kit

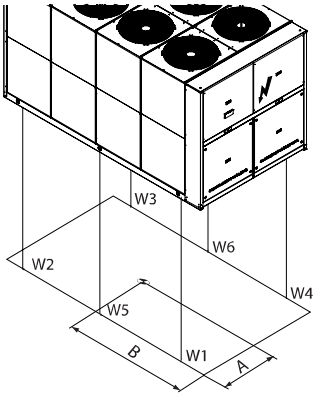
Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1106	1366	485	177	179	488	342	345	2016	1106	1372	501	183	185	503	353	356	2081
180	1106	1345	529	193	195	532	373	376	2198	1106	1352	545	198	201	547	384	387	2262
200	1106	1326	573	209	211	575	404	407	2379	1106	1334	589	215	217	592	416	419	2448
230	1106	1306	606	221	223	608	427	430	2515	1106	1301	630	229	232	633	444	448	2616
260	1106	1271	628	229	232	631	443	447	2610	1106	1280	645	235	238	647	454	458	2677
290	1106	1281	645	235	238	648	455	458	2678	1106	1280	651	237	240	653	459	462	2702
330	1107	1693	775	308	314	781	547	552	3277	1107	1701	793	315	322	799	559	565	3353
375	1107	1663	802	319	325	807	565	571	3389	1107	1670	820	326	332	825	578	583	3464
420	1107	1661	829	330	336	835	585	591	3506	1107	1660	836	332	339	842	589	595	3534

Unit WITH Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1101	1479	491	263	262	491	385	385	2277	1101	1487	506	271	270	505	397	396	2345
180	1101	1463	531	284	283	530	416	416	2460	1101	1471	545	292	291	544	428	427	2527
200	1101	1447	570	306	304	569	447	446	2642	1101	1456	586	314	312	585	459	458	2714
230	1101	1429	599	321	319	598	470	469	2778	1101	1425	622	333	332	621	488	487	2883
260	1101	1395	620	332	330	619	486	485	2874	1101	1405	635	340	338	634	498	497	2943
290	1101	1406	635	340	338	634	498	497	2943	1101	1405	641	343	341	640	503	502	2969
330	1101	1817	779	411	409	777	598	596	3570	1101	1826	796	420	418	794	612	610	3649
375	1101	1788	803	424	422	801	617	615	3682	1101	1797	820	433	431	818	630	628	3761
420	1101	1789	829	437	435	827	637	635	3800	1101	1788	836	441	439	834	642	640	3831

NOTA: For Desuperheater versions the total weight increases of 4%. For Heat recovery versions the total weight increases of 10%.

WEIGHT DURING OPERATION AND TRANSPORT



UNIT **WITHOUT** WATER STORAGE TANK

IP Version

Unit WITHOUT Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1105	1175	454	96.6	98.7	455	288	291	1683	1105	1190	471	100	102	472	299	302	1747
180	1105	1165	505	108	110	507	321	324	1875	1105	1180	523	111	114	524	332	335	1939
200	1105	1155	557	119	121	559	354	357	2068	1105	1170	576	123	125	578	366	369	2136
230	1105	1133	617	131	134	619	392	395	2288	1105	1133	623	133	136	625	396	399	2313
260	1105	1108	623	133	135	625	396	399	2310	1105	1123	641	136	139	643	407	410	2377
290	1105	1124	642	137	140	644	408	411	2383	1105	1124	648	138	141	650	412	415	2404
330	1107	1376	711	131	135	715	427	430	2549	1107	1394	732	135	139	737	440	444	2627
375	1107	1348	744	137	141	748	447	450	2667	1107	1366	765	141	145	770	460	464	2745
420	1107	1359	778	144	148	783	467	471	2791	1107	1359	786	145	149	791	472	476	2819

Unit WITH Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1099	1324	471	177	175	469	335	333	1960	1099	1339	487	183	181	486	347	345	2029
180	1099	1314	517	194	192	515	368	366	2153	1099	1329	534	201	198	532	380	378	2223
200	1099	1304	563	212	209	562	401	399	2346	1099	1319	581	219	216	579	414	411	2420
230	1099	1282	616	232	229	615	439	436	2567	1099	1282	624	235	232	622	444	441	2598
260	1099	1257	622	234	231	620	443	440	2590	1099	1272	640	241	238	638	455	452	2663
290	1099	1273	640	241	238	638	455	452	2663	1099	1273	646	243	240	644	460	457	2690
330	1099	1577	711	236	234	709	478	476	2844	1099	1595	732	243	240	729	492	490	2926
375	1099	1549	741	246	243	738	498	496	2963	1099	1567	761	253	250	759	512	510	3044
420	1099	1560	772	256	253	769	519	517	3087	1099	1560	780	259	256	777	524	522	3118

UNIT **WITH** WATER STORAGE TANK

IP Version

Unit WITHOUT Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1105	1351	505	184	186	507	356	359	2097	1105	1358	521	190	192	524	367	371	2165
180	1105	1331	551	201	203	553	388	391	2287	1105	1338	567	207	209	570	400	403	2355
200	1105	1312	597	217	220	599	421	424	2478	1105	1320	614	224	226	617	433	436	2550
230	1105	1292	631	230	233	634	445	448	2620	1105	1287	656	239	242	659	463	467	2726
260	1105	1257	655	238	241	658	462	465	2719	1105	1266	671	245	248	674	473	477	2789
290	1105	1267	672	245	248	675	474	478	2791	1105	1266	678	247	250	681	478	482	2816
330	1107	1676	804	320	326	810	567	573	3400	1107	1683	823	327	334	829	580	586	3479
375	1107	1645	832	331	337	838	587	592	3517	1107	1652	851	338	345	857	600	606	3596
420	1107	1644	861	342	349	867	607	613	3640	1107	1642	868	345	352	874	612	618	3669

Unit WITH Hydronic Kit

Acustic version	AB-AS									AX							
Mod.	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]	Center of gravity position [mm]		Load on bearing points [Kg]						Weight [Kg]
	A	B	W1	W2	W3	W4	W5	W6		A	B	W1	W2	W3	W4	W5	W6	
160	1100	1466	511	274	273	511	401	400	2370	1100	1474	527	282	281	526	413	412	2441
180	1100	1450	553	296	295	552	434	433	2562	1100	1458	568	304	303	567	446	445	2633
200	1100	1434	594	318	317	593	466	465	2753	1100	1443	610	327	325	609	479	478	2829
230	1100	1416	625	335	333	624	490	489	2896	1100	1413	648	347	346	647	509	508	3005
260	1100	1382	646	346	345	645	507	506	2996	1100	1392	662	355	353	661	519	518	3069
290	1100	1393	662	355	353	661	519	518	3068	1100	1392	668	358	356	667	524	523	3096
330	1100	1801	808	427	425	807	621	619	3707	1100	1810	827	436	434	825	635	633	3790
375	1100	1772	834	440	438	832	641	639	3824	1100	1781	852	450	448	850	655	653	3907
420	1100	1773	861	454	452	859	662	660	3948	1100	1772	868	458	456	866	667	665	3980

NOTA: For Desuperheater versions the total weight increases of 4%. For Heat recovery versions the total weight increases of 10%.

HYDRAULIC CONNECTIONS

General rules

A mesh filter (hole Ø ≤ 500 µm) must be installed on the unit's water inlet otherwise warranty is immediately forfeited. 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).

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.

• The unit comes as standard with a differential pressure switch located between the entrance and exit of water exchanger to prevent freezing problems in case of lack of water flow.

The intervention is calibrated to a ΔP of 80 ± 5 mbar, while the reset occurs with a ΔP of 105 ± 5 mbar.

The differential pressure switch contact opens and stop the unit when you reduce the water flow and so $\Delta P \leq 80$ mbar ± 5.

The differential pressure switch closes and then the unit can restart when the water flow increases and so $\Delta p \geq 105$ mbar ± 5.

• The unit comes standard with an antifreeze heater placed between the evaporator and its insulation controlled by the electronic controller unit.

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 values 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 tap 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)

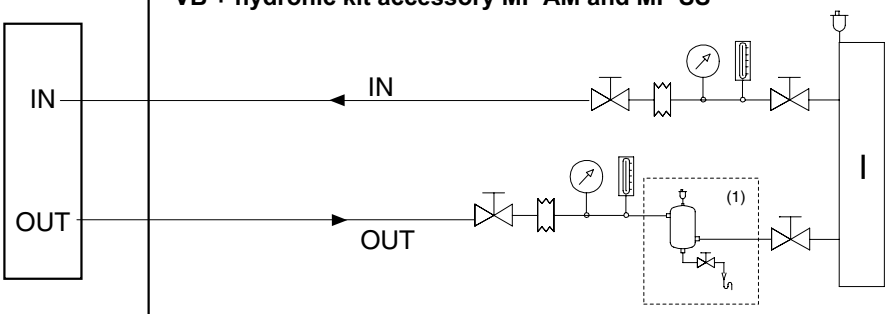
3. If it is certain that the unit will always be powered throughout the winter, the unit is able to protect itself from freezing, down to a temperature of -20°C: this is possible thanks to an antifreeze electric heating element installed on the plate exchanger and intelligent control of the water pump 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.

HYDRAULIC CONNECTIONS

Basic diagram Standard Unit VB [COLD WATER CIRCUIT]

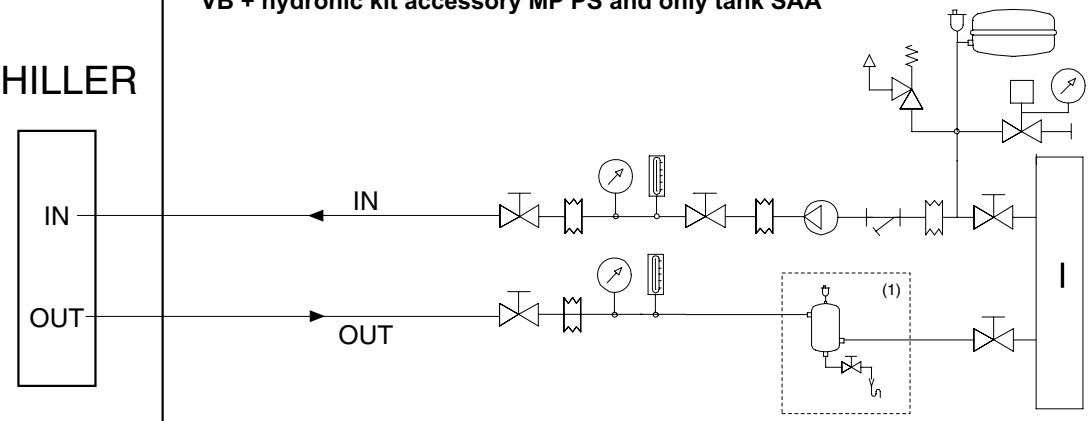
The following figures represent connections to the evaporator circuit.
IMPORTANT: There must be a constant flow of water to the exchanger. With accessory primary-secondary pumping module MP SS STD is mandatory to install a water filter in the secondary circuit immediately before of the water tank.

VB + hydronic kit accessory MP AM and MP SS



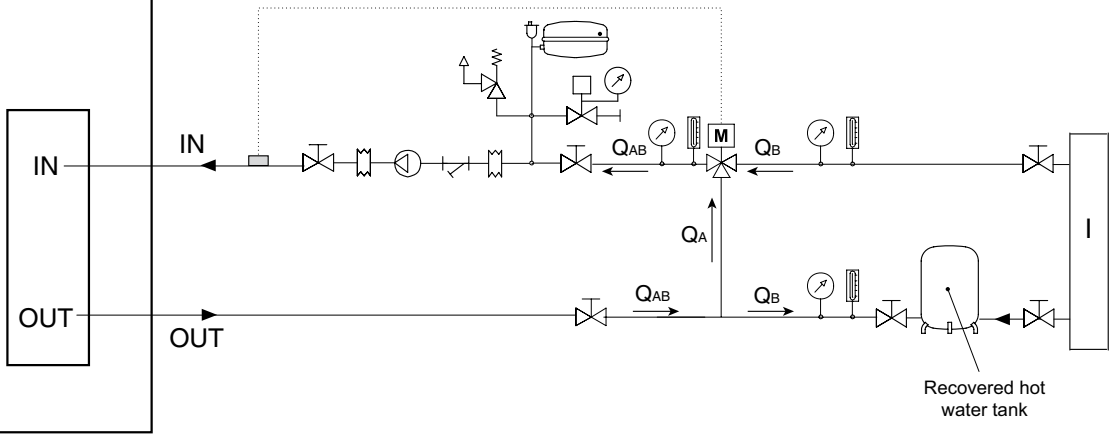
VB + hydronic kit accessory MP PS and only tank SAA

CHILLER



Basic diagram for units with Desuperheater [HOT WATER CIRCUIT]

The basic diagram given is valid for VD-VR 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.



(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
- Thermometer
- On-off and/or water flow rate regulating valve
- Monitoring electronics (governor)
- Pump
- Filter
- Tank
- Expansion tank
- Air vent valve
- Safety valve
- Coupling
- Water filling unit
- Three-way driven valve
- Recovery water flow inlet probe

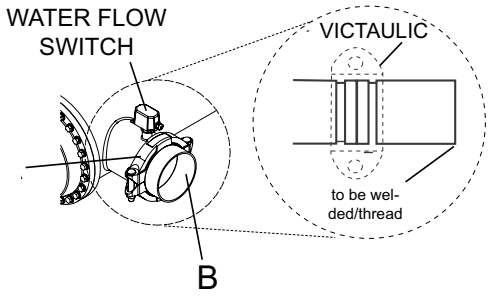
HYDRAULIC CONNECTIONS

Air vent and water drain

On the plumbing circuit feeding the unit, especially when equipped with the Victaulic connection 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.

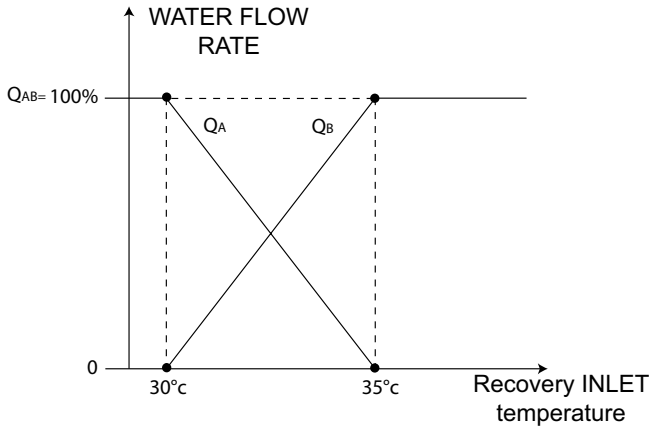
Plumbing connection with Victaulic couplings and Water flow switch

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.



Valve regulating diagram 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.

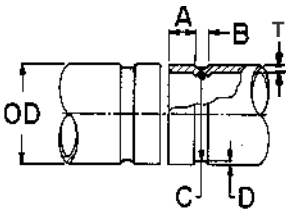


HYDRAULIC CONNECTIONS

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
11/4”	32	42.4	15.875	7.137	38.989	1.600	1.651
11/2”	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
21/2”	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

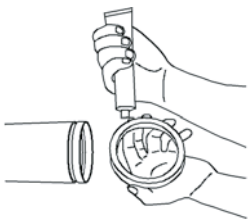
Check the depth and diameter of the grooves and their distance from the pipe ends. Make sure that the work has been carried out with care and that the end surface of the pipes is smooth and not ovalized. Make sure that there are no notches, burrs or other imperfections that could impair the tightness. 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.

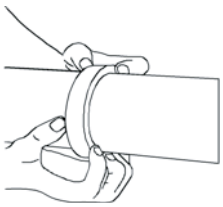


3) How to fit the seal

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

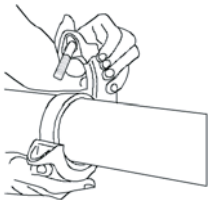
4) Alignment

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 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.

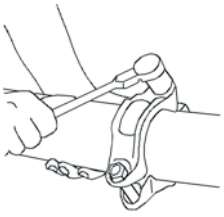


6) Nut torquing

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.



ELECTRICAL CONNECTIONS

General rules

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

Structure of the electric panel

All the electrical components are contained in a closed casing protected against the atmospheric agents and inspectionable by opening the front door after removing the front panel. The door for accessing the power section is locked by the mechanism.
Access for the supply cables and earth cable (PE) is permitted through the opening on the botton of the electric panel.

Composition of the system

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

NOTES: Refer to the wiring diagram supplied with the unit for the layout of the electric panel.

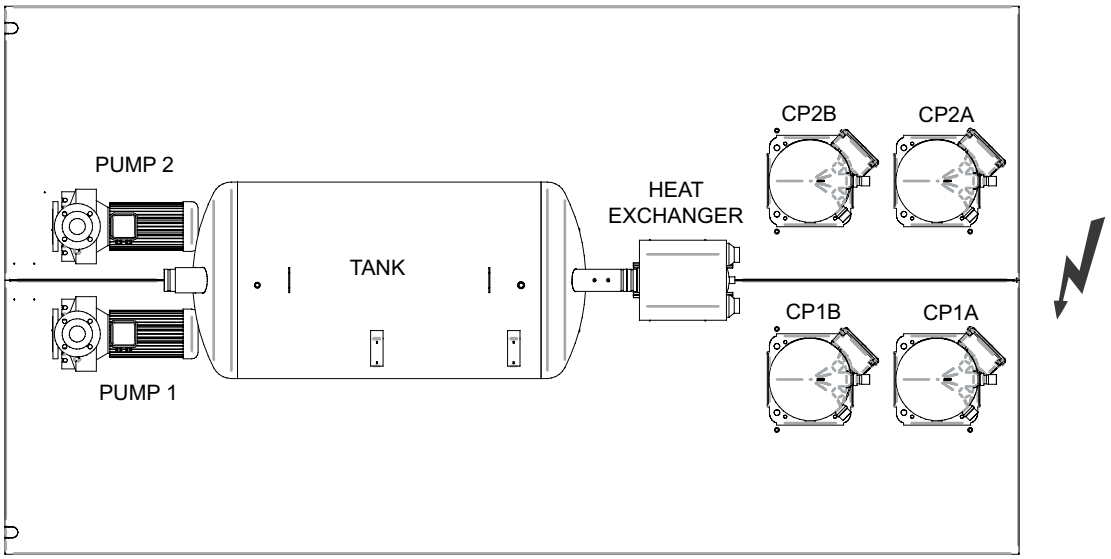
Electrical connections

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 specification

UNIT		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply		400 - 3 - 50									V-ph-Hz
FLA	CP1A	30.9	30.9	36.4	36.4	44.6	44.6	59.3	59.3	73.8	A
	CP1B	30.9	36.4	36.4	44.6	44.6	59.3	59.3	73.8	73.8	
	CP2A	30.9	30.9	36.4	36.4	44.6	44.6	59.3	59.3	73.8	
	CP2B	30.9	36.4	36.4	44.6	44.6	59.3	59.3	73.8	73.8	
LRA	CP1A	174	174	225	225	272	272	310	310	394	A
	CP1B	174	225	225	272	272	310	310	394	394	
	CP2A	174	174	225	225	272	272	310	310	394	
	CP2B	174	225	225	272	272	310	310	394	394	
FLI	CP1A	17.2	17.2	22.6	22.6	27.6	27.6	36.1	36.1	46.7	kW
	CP1B	17.2	22.6	22.6	27.6	27.6	36.1	36.1	46.7	46.7	
	CP2A	17.2	17.2	22.6	22.6	27.6	27.6	36.1	36.1	46.7	
	CP2B	17.2	22.6	22.6	27.6	27.6	36.1	36.1	46.7	46.7	

Unit layout



ELECTRICAL CONNECTIONS

Single Fan specifications

UNIT		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply		400 - 3 - 50									V-ph-Hz
FLA	AB	4.3									A
FLI	AB	15.0									kW
MIC	AB	2.0									A

Summary Fan specifications

UNIT		160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply		400 - 3 - 50									V-ph-Hz
FLA	AB	17.2				25.8			34.4		A
LRA	AB	60.0				90.0			120		A
FLI	AB	8.0				12.0			16.0		kW

Specifications of pumping module accessory MP PS STD

UNIT	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply	400 - 3 - 50									V-ph-Hz
FLA	6.2	6.2	6.2	6.2	6.2	11.8	11.8	11.8	11.8	A
LRA	56.0	56.0	56.0	56.0	56.0	95.0	95.0	95.0	95	A
FLI	3.6	3.6	3.6	3.6	3.6	6.7	6.7	6.7	6.7	kW

Specifications of pumping module accessory MP AM STD and MP SS STD

UNIT	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply	400 - 3 - 50									V-ph-Hz
FLA	6.2	6.2	8.9	8.9	8.9	11.8	11.8	11.8	15.0	A
LRA	56.0	56.0	71.0	71.0	71.0	95.0	95.0	95.0	124	A
FLI	3.6	3.6	4.9	4.9	4.9	6.7	6.7	6.7	8.8	kW

Specifications of pumping module accessory High working head MP AM HP1 and MP SS HP1

UNIT	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Power supply	400 - 3 - 50									V-ph-Hz
FLA	8.9	8.9	11.8	11.8	11.8	15.0	15.0	15.0	22.0	A
LRA	71.0	71.0	95.0	95.0	95.0	124	124	124	169	A
FLI	4.9	4.9	6.7	6.7	6.7	8.8	8.8	8.8	13.5	kW

NOTES:
Values valid for **IP** and **IR** units, **STANDARD** and **EXTRA LOW NOISE** unit, **WITH** or **WITHOUT** hydronic kit.
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~3~50Hz** power supply voltage rating

Summary tables (total values):

Units without pumping module

UNIT	160.4	180.4	200.4	230.4	260.4	290.4	330.4	375.4	420.4	UM
Total maximum load current [FLA]	141	152	163	179	204	234	263	301	330	A
Total maximum power input [FLI]	76.8	88	98.4	108	122	139	156	182	203	kW
Total maximum starting current [MIC]	284	340	352	407	432	484	514	621	650	A
Units with pumping module MP PS STD (1 or 2 pumps)										
Total maximum load current [FLA]	147	158	169	186	210	245	275	312	341	A
Total maximum power input [FLI]	80	91	102	112	126	146	163	188	210	kW
Total maximum starting current [MIC]	290	347	358	413	438	496	525	633	662	A
Units with pumping module MP AM STD and MP SS STD (1 or 2 pumps)										
Total maximum load current [FLA]	147	158	172	188	213	245	275	312	345	A
Total maximum power input [FLI]	80	91	103	113	127	146	163	188	212	kW
Total maximum starting current [MIC]	290	347	360	416	441	496	525	633	665	A
Units with pumping module MP AM HP1 and MP SS HP1 (1 or 2 pumps)										
Total maximum load current [FLA]	150	161	175	191	216	249	278	316	352	A
Total maximum power input [FLI]	82	93	105	115	129	148	165	188	216	kW
Total maximum starting current [MIC]	293	349	363	418	443	499	529	636	672	A

ELECTRICAL CONNECTIONS

1) Connection to the electricity main

• Power supply line;
The machine's power supply line must be laid by following a clearly defined route in order to make it as correct as possible any without any breaks. Pass the line through the opening on the button of the electrical panel. Secure the line integral with the structure of the machine. Then continue inside the panel and connect the conductors directly to the input terminals of the main disconnecting device of the machine.
• Power supply system;
The power cables of the machine's supply line must be taken from a system of symmetrical three-phase voltages and of a separate protection conductor.

V= 400V ± 10%
f= 50 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.

2) Electric panel

• Protection degree:
The electric panel casing is made from sheet metal and has IP54 protection rating at the doors directly accessible from the outside. The other parts of the casing guarantee a protection degree that is at least equivalent to **IP22**, as established by the current laws in force: this has been achieved since the panel has further protection against the penetration of solid foreign bodies and atmospheric agents thanks to the machine structure in which it is housed.
• Starting and stopping function:
The red handle on the panel door directly acts on the main circuit-breaker. The handle also acts as a door lock since it ensures that the machine is only powered when the door is shut. The stopping function carried out by the main circuit-breaker is classified as type "0" since the machine is stopped by immediately cutting off the power supply.

3) Reference standards

• The provisions established by the following Directives have been complied with to ensure the safety of the electrical products placed on the European Union market:
- Low Voltage Directive **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".**

4) User connection

On the electric panel are available the terminal connection for:
a) control of a pump group with 1 or 2 pumps and relative safety devices (relay 230V-2A)
b) clear contact input for remote ON/OFF of the unit
The following additional connections are present on Heat recovery versions:
c) general alarm relay (SPDT NO/NC 230V-2A)
d) recovery circulating pump control and relative safety devices (relay 230V-2A)
e) remote input for enabling of recovery mode

For more details refer to the wiring diagram of the unit.

R410A PROTECTION DEVICES

Protection devices HIGH PRESSURE

The unit is protected against risk of overpressure by means of 5 levels protection chain.

Each compressor and so each circuit is equipped with:
1) ATC (Cooling Capacity Control)
2) high pressure transducer connected to electronic controller (if installed)
3) high pressure automatic switch connected to electronic controller
4) high pressure manual switch connected to compressor contactor command and to electronic controller
5) high pressure safety valve

Protection devices technical data

LEVEL	1	2	3	4	5
Device	ATC (Cooling Capacity Control)	High pressure transducer	High pressure automatic switch	High pressure manual switch	High pressure safety valve
Trip out (barg)	-	40.5	41.0	43.0	45.0
Trip in (barg)	-		29.5	31.0	41.0
connected to	electronic controller	electronic controller	electronic controller	compressor contactor command	Discharge the refrigerant to atmosphere to reduce the system pressure
effect	Controls the cooling capacity shutting down compressors	stop the compressor and the fans	stop the compressor and the fans	stop the compressor	Discharge the refrigerant to atmosphere to reduce the system pressure
reset *	Automatic	YES by keyboard after the solution of the problem that generates the alarm	YES by keyboard if the high pressure switch has trip-in and after the solution of the problem that generates the alarm	Reset the button present on the manual pressure switch	Not necessary

*: For more details refers to section monitoring basic system.

Protection devices LOW PRESSURE

LEVEL	1	2
Device	Low pressure transducer	Low pressure automatic switch
Trip out (barg)	2 bar	2 bar
Trip in (barg)	4 bar	4 bar
connected to	electronic controller	electronic controller
effect	stop the compressor.	stop the compressor.
reset *	YES by keyboard after the solution of the problem that generates the alarm	YES by keyboard if the low pressure switch has trip-in and after the solution of the problem that generates the alarm

Protection devices DISCHARGE TEMPERATURE (if installed)

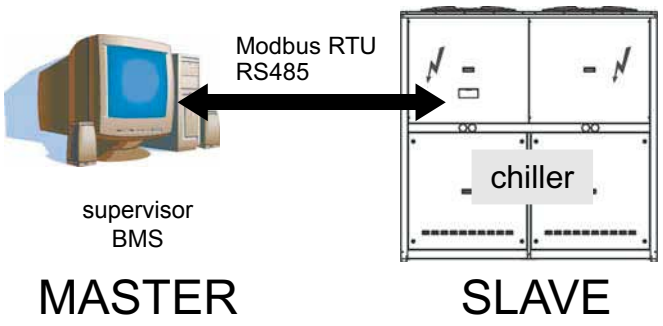
LEVEL	2
Device	Discharge Temperature
Trip out	135°C
Trip in	120°C
connected to	electronic controller
effect	stop the compressor.
reset *	YES by keyboard after the solution of the problem that generates the alarm

*: For more details refers to section monitoring basic system.

SERIAL INTERFACE: RS485 MODBUS® RTU

Through the accessory interface RS485 MODBUS ® RTU control system is able to communicate with the outside world. The outside world means a master device, usually a supervisory system or a BMS (Building Management System), designed by the customer.

CAUTION :
The use of serial communication must be made by qualified personnel.
The company assumes no responsibility for any damage to the machine due to misuse of the serial interface.



Communication with the machine is with MODBUS ® RTU on RS485 serial network.

RS485 settings of the chiller

Serial communication with the chiller is only possible if you installed accessory: interface RS485 MODBUS ® RTU.
The default parameters of MODBUS ®-RTU are:

Serial address of chiller	1
Protocol	MODBUS®-RTU
Baud rate	9600 b/s
Parity	EVEN

MODBUS ® Address Table: Machine Level

Parameter/Description	Def	Min	Max	U.M.	Type (*)	Decimal Position	Modbus	Modbus HEX	R/W	Notes/Meaning
Chiller on/off					D		340	0154	R/W	
Chiller mode		0	3		I	0	1520	05F0	R	0 = standby 1 = cooling 2 = hot 3 = shut down
Chiller capacity		0	100	%	I	0	1524	05F4	R	
Evaporator water inlet temperature		-50.0	150.0	°C	A	1	1522	05F2	R	
Evaporator water outlet temperature		-50.0	150.0	°C	A	1	1523	05F3	R	
Setpoint 1 chiller mode	7.0	5.0 -8.0 (**)	20.0	°C	A	1	624	0270	R/W	(**) for brine unit
Band 1 chiller mode	1.0	0.5	5.0	°C	A	1	628	0274	R/W	
Setpoint 2 chiller mode	7.0	5.0 -8.0 (**)	20.0	°C	A	1	635	027B	R/W	(**) for brine unit
Band 2 chiller mode	1.0	0.5	5.0	°C	A	1	638	027E	R/W	
Setpoint 1 heatpump mode	45.0	30.0	55.0	°C	A	1	656	0290	R/W	
Band 1 heatpump mode	1.0	0.5	3.0	°C	A	1	660	0294	R/W	
Setpoint 2 heatpump mode	45.0	30.0	55.0	°C	A	1	667	029B	R/W	
Band 2 heatpump mode	1.0	0.5	3.0	°C	A	1	670	029E	R/W	
Current setpoint		-50.0	150.0	°C	A	1	1518	05EE	R	
ALARM Chiller general	0	0	2		I	0	1519	05EF	R	0 = not active 1 = active 2 = resettable
ALARM Plant high temperature	0	0	2		I	0	1245	04DD	R	
ALARM Plant low temperature	0	0	2		I	0	1246	04DE	R	
ALARM Evaporator freezing	0	0	3		I	0	1290	050A	R	0 = not active 1 = automatic 2 = resettable 3 = active
ALARM Evaporator water flow	0	0	3		I	0	1292	050C	R	
ALARM Phase sequence	0	0	3		I	0	1371	055B	R	
ERROR water inlet probe	0	0	1		I	0	1335	0537	R	0 = active 1 = not active
ERROR water outlet probe	0	0	1		I	0	1315	0523	R	
ERROR external air probe	0	0	1		I	0	1375	055F	R	

(*) Type of variable/parameter: **A= Analog; D = Digital; I = Integer**

SERIAL INTERFACE: RS485 MODBUS® RTU

MODBUS ® Address Table: Pumps Level

Parameter/Description	Def	Min	Max	U.M.	Type (*)	Decimal Position	Modbus	Modbus HEX	R/W	Notes/Meaning
Pump A evaporator status		0	1		D	0	1525	05F5	R	0 = off 1 = on
Pump B evaporator status		0	1		D	0	1526	05F6	R	
Enabling pump A evaporator	1	0	1		D	0	1127	0467	R/W	0 = not enabled 1 = enabled
Enabling pump B evaporator	1	0	1		D	0	1128	0468	R/W	
DAY of use pump A evaporator		0	32000		I	0	1152	0480	R	
DAY of use pump B evaporator		0	32000		I	0	1153	0481	R	
HOUR of use pump A evaporator		0	24	h	I	0	1154	0482	R	
HOUR of use pump B evaporator		0	24	h	I	0	1155	0483	R	
ALARM Evaporator pump A unavailable	0	0	2		I	0	1294	050E	R	0 = not active 1 = active 2 = resettable
ALARM Evaporator pump B unavailable	0	0	2		I	0	1295	050F	R	
ALARM Evaporator pump A thermal	0	0	2		I	0	1296	0510	R	
ALARM Evaporator pump B thermal	0	0	2		I	0	1297	0511	R	

(*) Type of variable/parameter: **A= Analog; D = Digital; I = Integer**

Address Table MODBUS ®: Circuits Level

Parameter/Description	Def	Min	Max	U.M.	Type (*)	Decimal Position	Modbus	Modbus HEX	R/W	Notes/Meaning
Circuit 1 status		0	4		I	0	1551	060F	R	0 = on 1 = alarm 2 = not used 3 = not used 4 = defrost
Circuit 2 status		0	4		I	0	1552	0610	R	
Circuit 1 capacity		0	100	%	I	0	1543	0607	R	
Circuit 2 capacity		0	100	%	I	0	1544	0608	R	
Circuit 1 liquid temperature		-50.0	150.0	°C	A	1	1575	0627	R	
Circuit 2 liquid temperature		-50.0	150.0	°C	A	1	1576	0628	R	
Circuit 1 low pressure		-1.0	-30.0	bar	A	1	2332	091C	R	Only if installed pressure transducer
Circuit 2 low pressure		-1.0	-30.0	bar	A	1	2333	091D	R	
Circuit 1 high pressure		-1.0	-50.0	bar	A	1	1559	0617	R	
Circuit 2 high pressure		-1.0	-50.0	bar	A	1	1560	0618	R	
ALARM Circuit 1 low pressure	0	0	3		I	0	1270	04F6	R	0 = not active 1 = automatic 2 = resettable 3 = active
ALARM Circuit 2 low pressure	0	0	3		I	0	1271	04F7	R	
ALARM Circuit 1 high pressure	0	0	2		I	0	1262	04EE	R	0 = not active 1 = active 2 = resettable
ALARM Circuit 2 high pressure	0	0	2		I	0	1263	04EF	R	
ALARM Circuit 1 electronic expansion valve	0	0	2		I	0	1258	04EA	R	
ALARM Circuit 2 electronic expansion valve	0	0	2		I	0	1259	04EB	R	
ERROR Circuit 1 liquid probe	0	0	1		I	0	1339	053B	R	0 = active 1 = not active
ERROR Circuit 2 ERROR liquid probe	0	0	1		I	0	1340	053C	R	
ERROR Circuit 1 low pressure transducer	0	0	1		I	0	1363	0553	R	0 = active 1 = not active Only if installed pressure transducer
ERROR Circuit 2 low pressure transducer	0	0	1		I	0	1364	0554	R	
ERROR Circuit 1 high pressure transducer	0	0	1		I	0	1327	052F	R	
ERROR Circuit 2 high pressure transducer	0	0	1		I	0	1328	0530	R	

(*) Type of variable/parameter: **A= Analog; D = Digital; I = Integer**

SERIAL INTERFACE: RS485 MODBUS® RTU

MODBUS ® Address Table: Fans Level

Parameter/Description	Def	Min	Max	U.M.	Type (*)	Decimal Position	Modbus	Modbus HEX	R/W	Notes/Meaning
Circuit 1 fans power		0	100	%	I	0	1567	061F	R	0
Circuit 2 fans power		0	100	%	I	0	1568	0620	R	0
ALARM Circuit 1 fans thermal	0	0	2		I	0	1286	0506	R	0 = not active 1 = active 2 = resettable
ALARM Circuit 2 fans thermal	0	0	2		I	0	1287	0507	R	

(*) Type of variable/parameter: **A= Analog; D = Digital; I = Integer**

Address Table MODBUS ®: Compressor Level

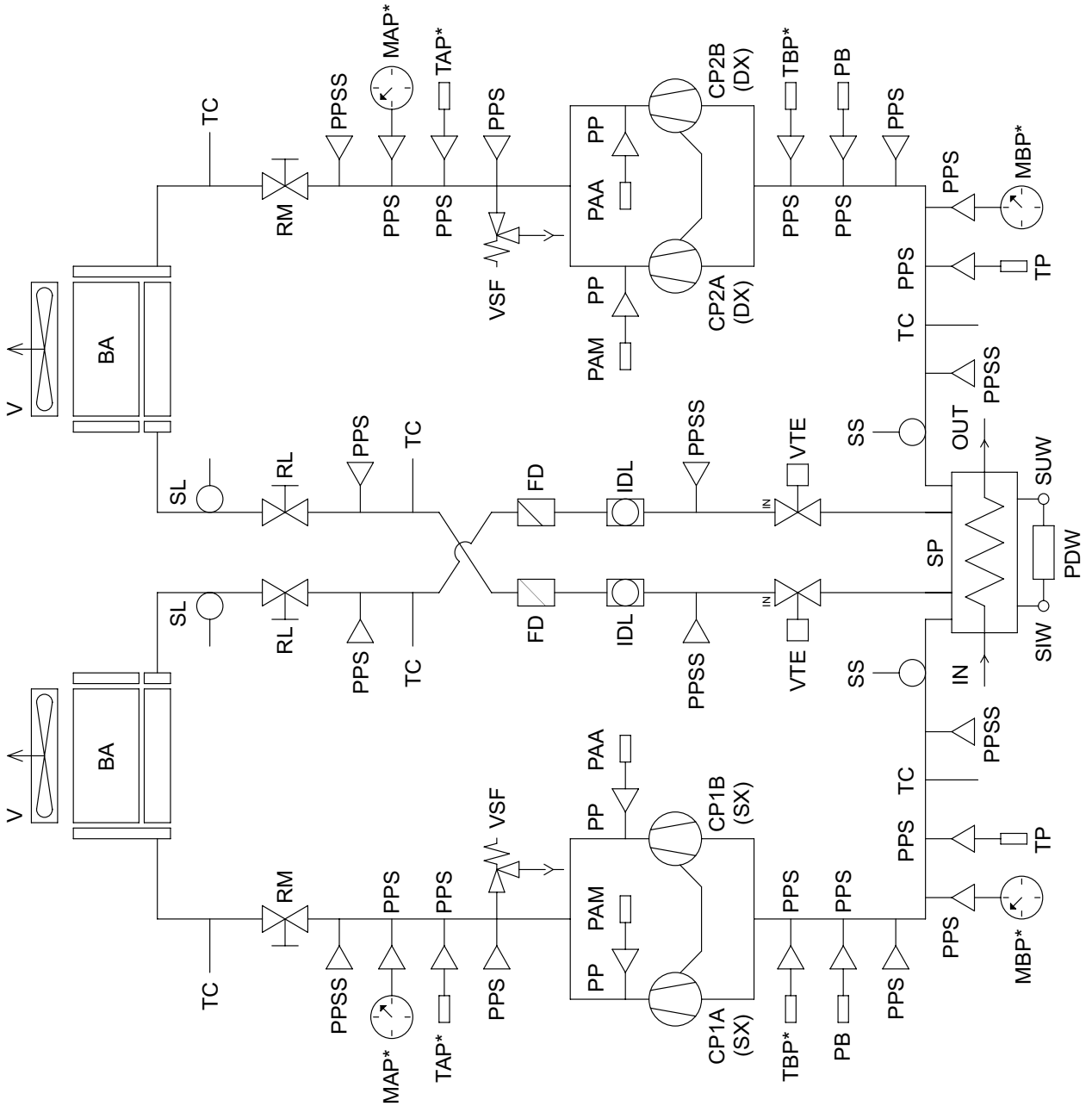
Parameter/Description	Def	Min	Max	U.M.	Type (*)	Decimal Position	Modbus	Modbus HEX	R/W	Notes/Meaning
Compressor 1A enable	1	0	1		D	0	800	0320	R/W	0 = not enabled 1 = enabled
Compressor 1B enable	1	0	1		D	0	801	0321	R/W	
Compressor 2A enable	1	0	1		D	0	803	0323	R/W	
Compressor 2B enable	1	0	1		D	0	804	0324	R/W	
Compressor 1A status		0	9		I	0	1527	05F7	R	0 = off 1..5 = not used 6 = on 7 = alarm 8 = not usable 9 = waiting
Compressor 1B status		0	9		I	0	1528	05F8	R	
Compressor 2A status		0	9		I	0	1530	05FA	R	
Compressor 2B status		0	9		I	0	1531	05FB	R	
Compressor 1A capacity		0	100	%	I	0	2370	0942	R	0 = off 100 = on
Compressor 1B capacity		0	100	%	I	0	2371	0943	R	
Compressor 2A capacity		0	100	%	I	0	2373	0945	R	
Compressor 2B capacity		0	100	%	I	0	2374	0946	R	
DAY of use compressor 1A		0	32000		I	0	816	0330	R	
DAY of use compressor 1B		0	32000		I	0	817	0331	R	
DAY of use compressor 2A		0	32000		I	0	819	0333	R	
DAY of use compressor 2B		0	32000		I	0	1014	03F6	R	
HOUR of use compressor 1A		0	24	h	I	0	820	0334	R	
HOUR of use compressor 1B		0	24	h	I	0	821	0335	R	
HOUR of use compressor 2A		0	24	h	I	0	823	0337	R	
HOUR of use compressor 2B		0	24	h	I	0	1018	03FA	R	
Compressor 1A thermal alarm	0	0	2		I	0	1278	04FE	R	0 = not active 1 = active 2 = resettable
Compressor 1B thermal alarm	0	0	2		I	0	1279	04FF	R	
Compressor 2A thermal alarm	0	0	2		I	0	1281	0501	R	
Compressor 2B thermal alarm	0	0	2		I	0	1282	0502	R	

(*) Type of variable/parameter: **A= Analog; D = Digital; I = Integer**

REFRIGERANT FLOW DIAGRAM - STANDARD UNIT VB

Refrigerant flow diagram in cooling mode IR

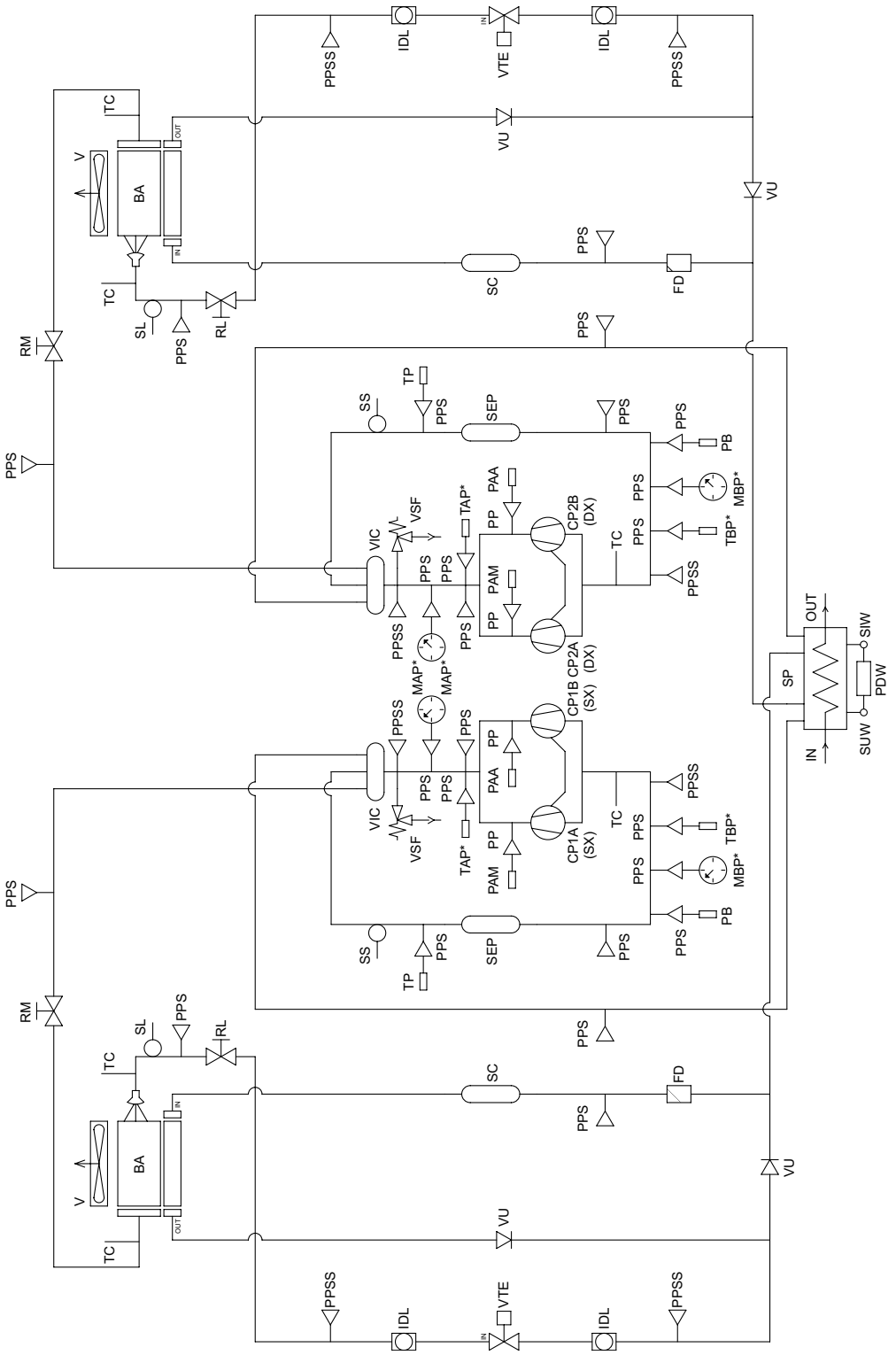
	Description
BA	FIN AND TUBE COIL
CP	COMPRESSOR
FD	FILTER DRIER
IDL	LIQUID AND MOISTURE INDICATOR
MAP	HIGH PRESSURE GAUGE
MBP	LOW PRESSURE GAUGE
PAA	AUTO RESET HIGH PRESSURE SWITCH
PAM	MANUAL RESET HIGH PRESSURE SWITCH
PB	AUTO RESET LOW PRESSURE SWITCH
PDW	WATER PRESSURE SWITCH
PP	PRESSURE SOCKET 1/4" SAE WITOUT CORE
PPS	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	LIQUID BALL VALVE
RM	COMPRESSOR OUTLET BALL VALVE
SIW	WATER INLET PROBE
SL	LIQUID PROBE
SP	PLATE HEAT EXCHANGER
SS	SUPERHEATING PROBE
SUW	WATER OUTLET PROBE
TAP	HIGH PRESSURE TRANSDUCER
TBP	LOW PRESSURE TRANSDUCER
TC	CHARGING TUBE
TP	PRESSURE TRANSDUCER
V	FAN
VSF	SAFETY VALVE
VTE	ELECTRONIC THERMOSTATIC EXPANSION VALVE



REFRIGERANT FLOW DIAGRAM - STANDARD UNIT VB

Refrigerant flow diagram in heating mode IP

	Description
BA	FIN AND TUBE COIL
CP	COMPRESSOR
FD	FILTER DRIER
IDL	LIQUID AND MOISTURE INDICATOR
MAP	HIGH PRESSURE GAUGE
MBP	LOW PRESSURE GAUGE
PAA	AUTO RESET HIGH PRESSURE SWITCH
PAM	MANUAL RESET HIGH PRESSURE SWITCH
PB	AUTO RESET LOW PRESSURE SWITCH
PDW	WATER PRESSURE SWITCH
PP	PRESSURE SOCKET 1/4" SAE WITHOUT CORE
PPS	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	LIQUID BALL VALVE
RM	COMPRESSOR OUTLET BALL VALVE
SC	LIQUID RECEIVER
SEP	LIQUID SEPARATOR
SIW	WATER INLET PROBE
SL	LIQUID PROBE
SP	PLATE HEAT EXCHANGER
SS	SUPERHEATING PROBE
SUW	WATER OUTLET PROBE
TAP	HIGH PRESSURE TRANSDUCER
TBP	LOW PRESSURE TRANSDUCER
TC	CHARGING TUBE
TP	PRESSURE TRANSDUCER
V	FAN
VIC	REVERSING CYCLE VALVE
VSF	SAFETY VALVE
VTE	ELECTRONIC THERMOSTATIC EXPANSION VALVE
VU	CHECK VALVE

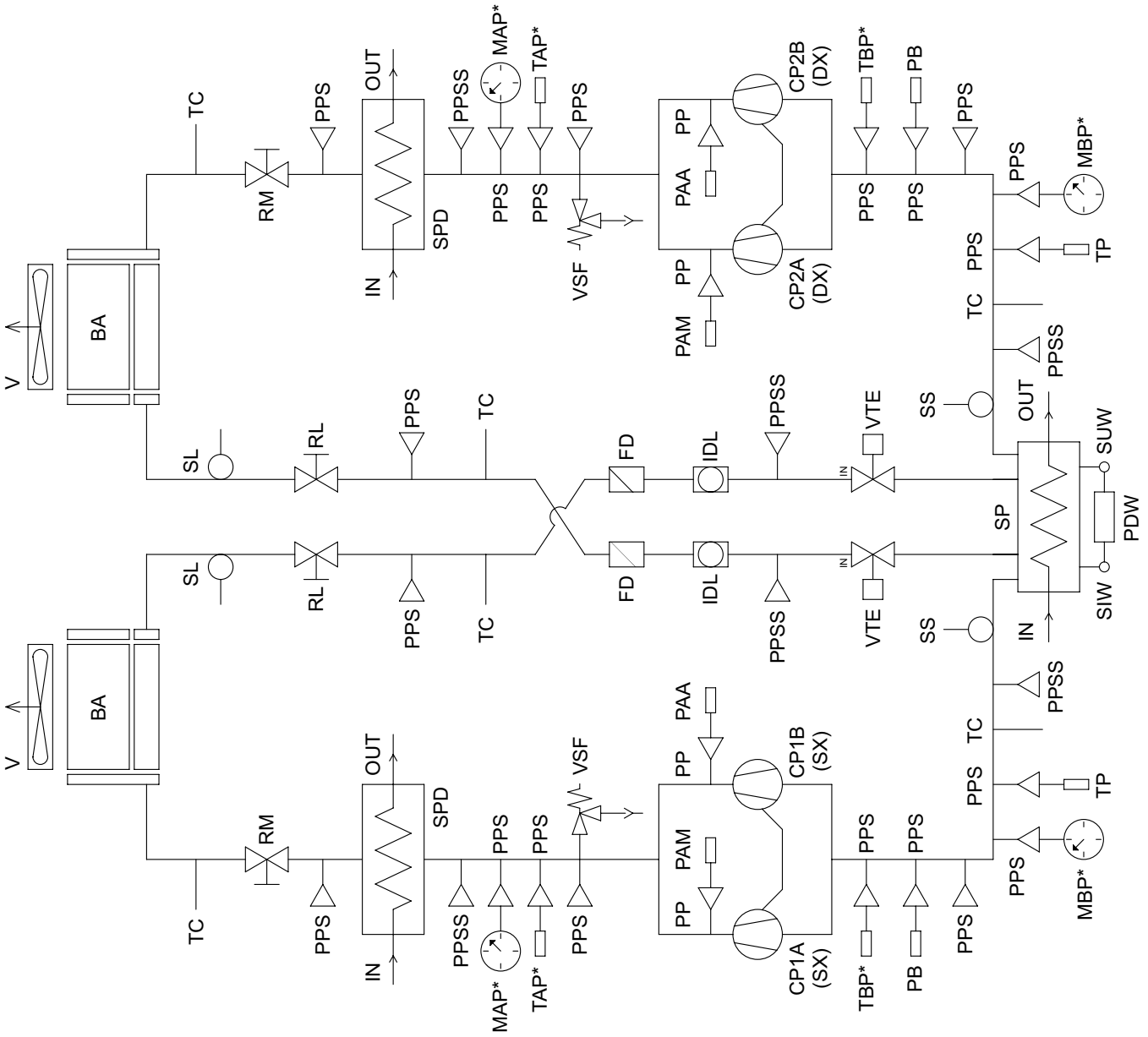


REFRIGERANT FLOW DIAGRAM - VERSION WITH DESUPERHEATERS VD

Refrigerant flow diagram in cooling mode IR

	Description
BA	FIN AND TUBE COIL
CP	COMPRESSOR
FD	FILTER DRIER
IDL	LIQUID AND MOISTURE INDICATOR
MAP	HIGH PRESSURE GAUGE
MBP	LOW PRESSURE GAUGE
PAA	AUTO RESET HIGH PRESSURE SWITCH
PAM	MANUAL RESET HIGH PRESSURE SWITCH
PB	AUTO RESET LOW PRESSURE SWITCH
PDW	WATER PRESSURE SWITCH
PP	PRESSURE SOCKET 1/4" SAE WITOUT CORE
PPS	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	LIQUID BALL VALVE
RM	COMPRESSOR OUTLET BALL VALVE
SIW	WATER INLET PROBE
SL	LIQUID PROBE
SP	PLATE HEAT EXCHANGER
SPD	DESUPERHEATER PLATE HEAT EXCHANGER
SS	SUPERHEATING PROBE
SUW	WATER OUTLET PROBE
TAP	HIGH PRESSURE TRANSDUCER
TBP	LOW PRESSURE TRANSDUCER
TC	CHARGING TUBE
TP	PRESSURE TRANSDUCER
V	FAN
VSF	SAFETY VALVE
VTE	ELECTRONIC THERMOSTATIC EXPANSION VALVE

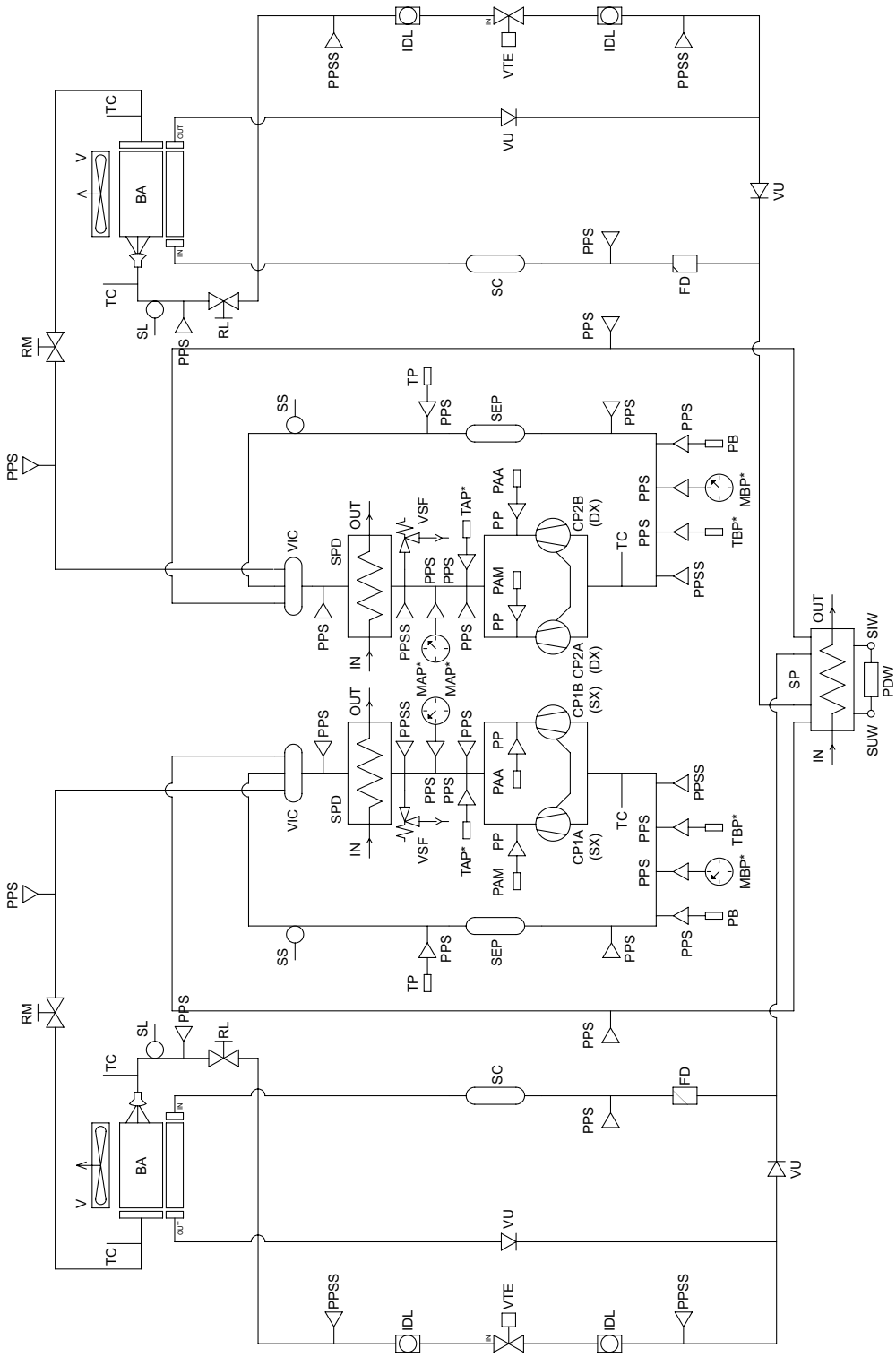
* : OPTIONAL



REFRIGERANT FLOW DIAGRAM - VERSION WITH DESUPERHEATERS VD

Refrigerant flow diagram in heating mode IP

	Description
BA	FIN AND TUBE COIL
CP	COMPRESSOR
FD	FILTER DRIER
IDL	LIQUID AND MOISTURE INDICATOR
MAP	HIGH PRESSURE GAUGE
MBP	LOW PRESSURE GAUGE
PAA	AUTO RESET HIGH PRESSURE SWITCH
PAM	MANUAL RESET HIGH PRESSURE SWITCH
PB	AUTO RESET LOW PRESSURE SWITCH
PDW	WATER PRESSURE SWITCH
PP	PRESSURE SOCKET 1/4" SAE WITHOUT CORE
PPS	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESSURE SOCKET 5/16" SAE WITH CORE
RL	LIQUID BALL VALVE
RM	COMPRESSOR OUTLET BALL VALVE
SC	LIQUID RECEIVER
SEP	LIQUID SEPARATOR
SIW	WATER INLET PROBE
SL	LIQUID PROBE
SP	PLATE HEAT EXCHANGER
SPD	DESUPERHEATER PLATE HEAT EXCHANGER
SS	SUPERHEATING PROBE
SUW	WATER OUTLET PROBE
TAP	HIGH PRESSURE TRANSDUCER
TBP	LOW PRESSURE TRANSDUCER
TC	CHARGING TUBE
TP	PRESSURE TRANSDUCER
V	FAN
VIC	REVERSING CYCLE VALVE
VSF	SAFETY VALVE
VTE	ELECTRONIC THERMOSTATIC EXPANSION VALVE
VU	CHECK VALVE



* : OPTIONAL

START-UP

General Rules

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

MAINTENANCE

General Rules

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

Routine maintenance

The inspections described below, to which the unit must be subjected, do not require specific technical know-how.
They merely include a few simple inspections involving certain parts of the unit.
Call an authorized assistance center if actual maintenance work is required.
The table below gives a recommended list of inspections which should be carried out at the indicated intervals.

DESCRIPTION	WEEKLY	MONTHLY	EVERY SIX MONTHS
Visual inspection of the unit			•
Inspection of hydraulic circuit		•	
Inspection of electrical system		•	
Inspection of condensing system		•	
Inspection and adjustment of operat. parameters	•		

• Visual inspection of the structure of the unit
When checking the condition of the parts that form the structure of the unit, pay particular attention to the parts liable to rust.
If traces of rust are noted, they must be treated with rust-inhibitor paint in order to eliminate or reduce the problem.
Check to make sure that the external panels of the unit are well fixed.
Bad fixing gives rise to noise and abnormal vibrations.
• Inspection of hydraulic circuit
Check visually to make sure that there are no leaks in the hydraulic circuit. If the pumping module accessory is installed, it is advisable to make sure that the water filter is clean.
• Inspection of electrical system
Make sure that the power cable that connects the unit to the distribution panel is not torn, cracked or damaged in a way that could impair its insulation.
• Inspection of the condensing system
WARNING: The finned pack exchanger has fins made of aluminium or some other thin material, thus even accidental contact could cause cuts. Comply with the instructions in the relative section.
• Condensing coils
In view of the function of this component, it is very important for the surface of the exchanger to be as free as possible from clogging caused by items that could reduce the fan's air flow rate and, thus, the performances of the unit itself.
The following operations may be required:
- Remove all impurities (such as paper scraps, leaves, etc.) that could be clogging the surface of the bank either by hand or using a brush (comply with the above mentioned safety prescriptions).
- If the dirt has deposited on the fins and is difficult to remove by hand, use a jet of compressed air or pressurized water on the aluminium surface of the coils, remembering to direct the jet in a vertical direction to prevent the fins from being damaged.
- "Comb" the coils with the relative tool, using the appropriate comb spacing for the fins if some parts of them are bent or squashed.
• Helical electric fans
Visually inspect these parts to make sure that the electric fans are well fixed to the bearing grille and that this latter is fixed to the structure of the unit. Bad fixing gives rise to noise and abnormal vibrations.
• Reading and adjustment of the operating parameters
This control can be done using the pressure gauges (if installed) of the refrigerant circuits and using the pressure and temperature gauges (if installed) of the hydraulic circuits of the unit (evaporator + heat recovery - if present)

MAINTENANCE

General considerations

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

a. Access to the unit

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

b. Elements of risk

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

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

c. Pollution

The unit contains refrigerant gas and lubricating oil. When scrapping the unit these fluids must be recovered and disposed of in compliance with the regulations in force in the country where it is installed. The unit must not be abandoned during the scrapping stage.

SAFETY AND POLLUTION

General recommendations about the R410A refrigerant used

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	

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 halocarbides; HGWP (R-11 = 1) = 0.84 Potential impoverishment of the ozone; ODP (R-11 = 1) = 0

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.
CEFIC Groupcard	20g39 - A
Other information for transport	Avoid transport on vehicles where the loading zone is not separate from the cab. Make sure the driver is informed about the potential risk of the load and knows what to do in case of accident or emergency. 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.

First aid

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

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

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

Swallowing:
• Do not make the victim vomit. If the victim is conscious, have him rinse his mouth out with clean water and then drink 200, 300 ml of water.
• Immediately seek medical help.
• Do not administer adrenaline or sympathomimetic drugs after exposure owing to the risk of cardiac arrhythmia.
For further information about the characteristics of the refrigerant, consult the technical briefs that can be obtained from manufacturers of refrigerant products.

NOTE

NOTE

NOTE

Ferroli

COD. 3QE27642

GRUPPO FERROLI

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