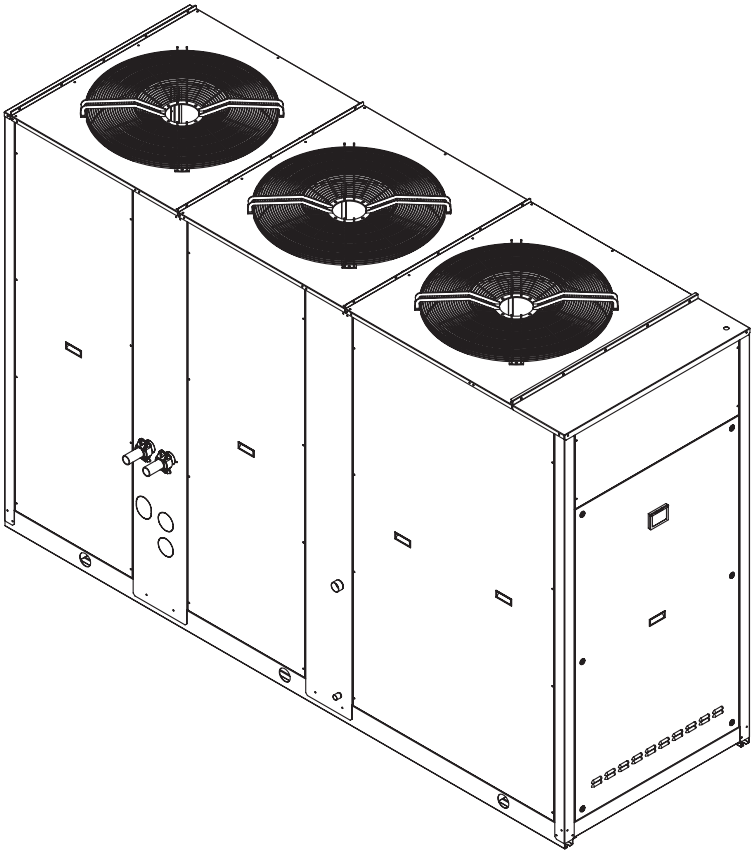
Ferroli

RGA CONDENSING UNIT

CONDENSING UNIT FOR COOLING ONLY AND HEAT PUMP
WITH AXIAL FANS

53.5 ÷ 200 kW IN COOLING MODE
53 ÷ 202 kW IN HEATING MODE



OZONE SAVED
R410A

CE

INSTALLATION AND OPERATION MANUAL

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

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

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

Il legale rappresentante
Dante Ferroli

3QE22170 rev.03

TABLE OF CONTENTS

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

GENERAL SPECIFICATIONS

General specifications

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

Carefully follow the instructions contained in this manual and comply with the current safety regulations. The unit must be installed in conformity with the laws in force in the country of use. Unauthorised tampering with the electrical and mechanical equipment **INVALIDATES THE WARRANTY**.
Check the electrical specifications given on the dataplate before making the electrical connections. Read the instructions given in the specific section on electrical connections.
Deactivate the equipment in case of a fault or poor operation.
If the unit requires repairs, only contact a specialised service centre recognised by the manufacturer and use original replacement parts.
The unit must be installed outside and connected to a hydronic cooling and/or heating system. Any use different from that permitted or outside the operating limits given in this manual is prohibited (unless previously agreed on with the firm).

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

European Directives

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

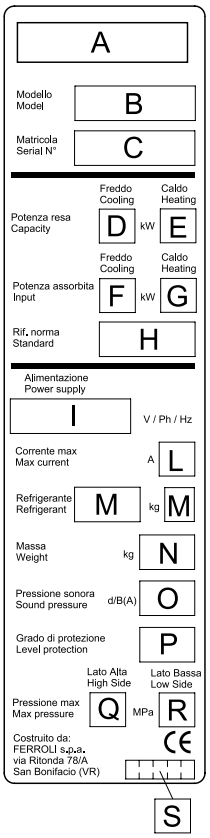
- Machinery directive **2006/42/EC**
- Pressurised equipment directive (PED) **97/23/EC**
- Electromagnetic compatibility directive (EMC) **2004/108/EC**
- Low voltage directive (LVD) **2006/95/EC**

Unit identification plate

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

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

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



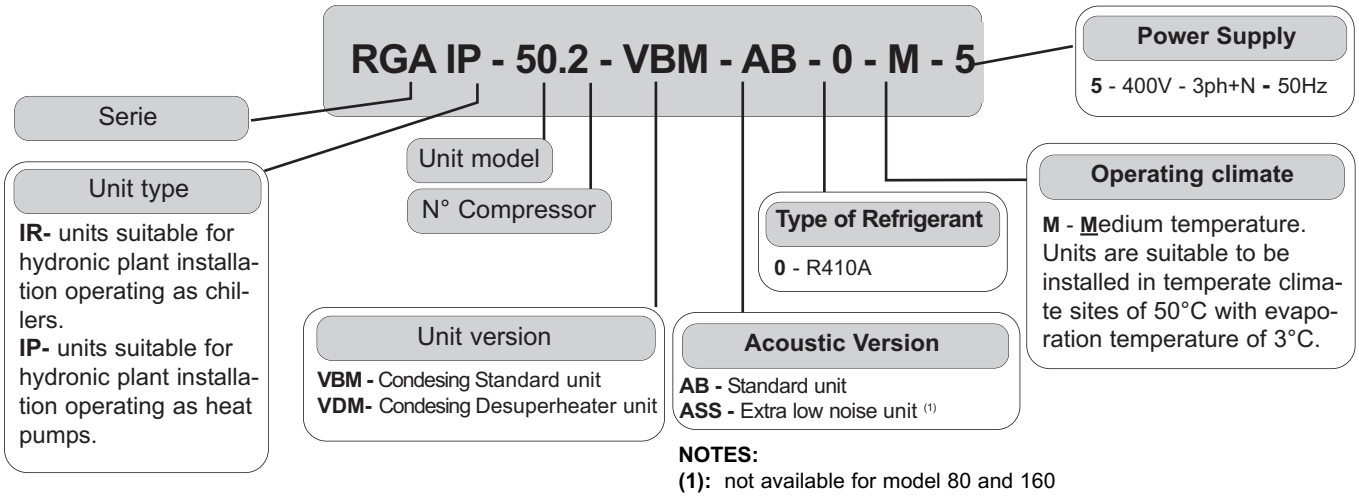
GENERAL SPECIFICATIONS

Presentation of the unit

This new series of industrial condensing unit in cooling only 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 cooling only 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 twelve models divided in four sizes with nominal cooling capacity from **50** to **200 kW** and heating capacity from **53** to **202 kW.**
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 as well as to reduce noise emissions.
All the units are equipped with 2 scroll compressors arranged in pairs (tandem) on 1 circuit operating with **environmental friendly R410A gas**, 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.
A variety of other accessories are available to extend the capabilities of the units.
During the design of the units particular attention has been given to achieve high system efficiency, to reduce overall energy consumptions and sound levels in order to meet the increasingly restrictive laws in terms of noise. Upon request, you can choose for a Standard Unit (AB) or a Low noise Kit (KS) which provides sound attenuation thanks to sound absorbing insulation in compressors area, sound jackets on compressors and reduced speed axial fans, or a Extra low noise unit (ASS), which provides in addition slower axial fans and more powerful finned coils.
All units are accurately build in compliance with the existing standards and are individually tested in factory. Only electrical and refrigeration pipes are required for installation.

Identification code of the unit

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



NOTES:
(1): not available for model 80 and 160

The available special versions are described below:
VBM : Condesing Basic version. .
VDM : Version with Condesing Desuperheater (available forboth IR units and IP units)
Produces cold water in the same way as the standard version plus hot water **from 40 to 70°C** at the same time. This is achieved by installing a water-refrigerant gas heat exchanger between the compressor and coils in order to recover 15 to 20% of the heating capacity that would otherwise be dispersed in the air.

GENERAL SPECIFICATIONS

Description of the components

The complete series of industrial chillers and heat pumps for use in hydronic and direct expansion systems includes **12 constructional sizes** rang **from 53.5 to 200 kW** in the cooling mode and **from 53 to 202 kW** in the heating mode.

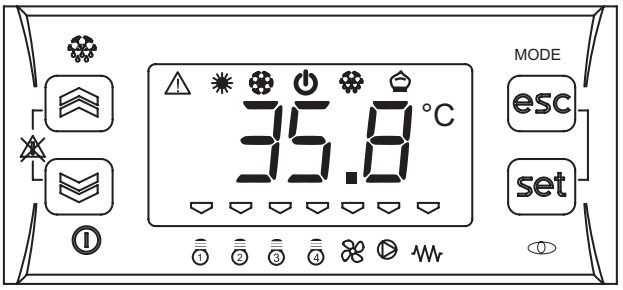
Main components:

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.** This is housed in a metal casing in which the various electrical components are positioned on one metal plate.

2a. The power section includes:
- Main door-locking circuit-breaker.
- Fuse-holder that can be isolated with protection fuse triad for each compressor.
- Fuse-holder that can be isolated with protection fuse for compressor oil heaters and antifreeze (if installed).
- Control contactor for each compressor.
- Protection fuse for the ventilation unit.
- Fan speed regulating board.
- Phase presence and sequence monitoring device on power supply

2b. The auxiliary section includes:
- Fuses on the auxiliary transformer.
- Fuses for fans protection
- Electromagnetic noise filter
- Adjusting fan speed board
- Insulating and safety transformer to power the auxiliary circuit.

2c. The microprocessor monitoring section includes:
- User interfacing terminal with display.
- On-off key.
- Operating mode selector key.
- Compressor on-off display **LED**.
- Operational mode **LED**
- Antifreeze heaters activated indicator **LED**.
- Fans on-off dislay **LED**
- Pumps on-off display **LED**
- Check-control with fault code display
- Defrosting, alarm, economy, stand-by **LED.**
- **Remote ON/OFF functions** - Summer/Winter (E/I) remote selection (IP unit only).



Control system main functions:
temperature control of the water or air produced by the unit, smart defrosting control, compressor and pump operating hour counter, timing and cycling of start-ups, input parameters by keyboard, alarms management, operating mode change (only IP unit).

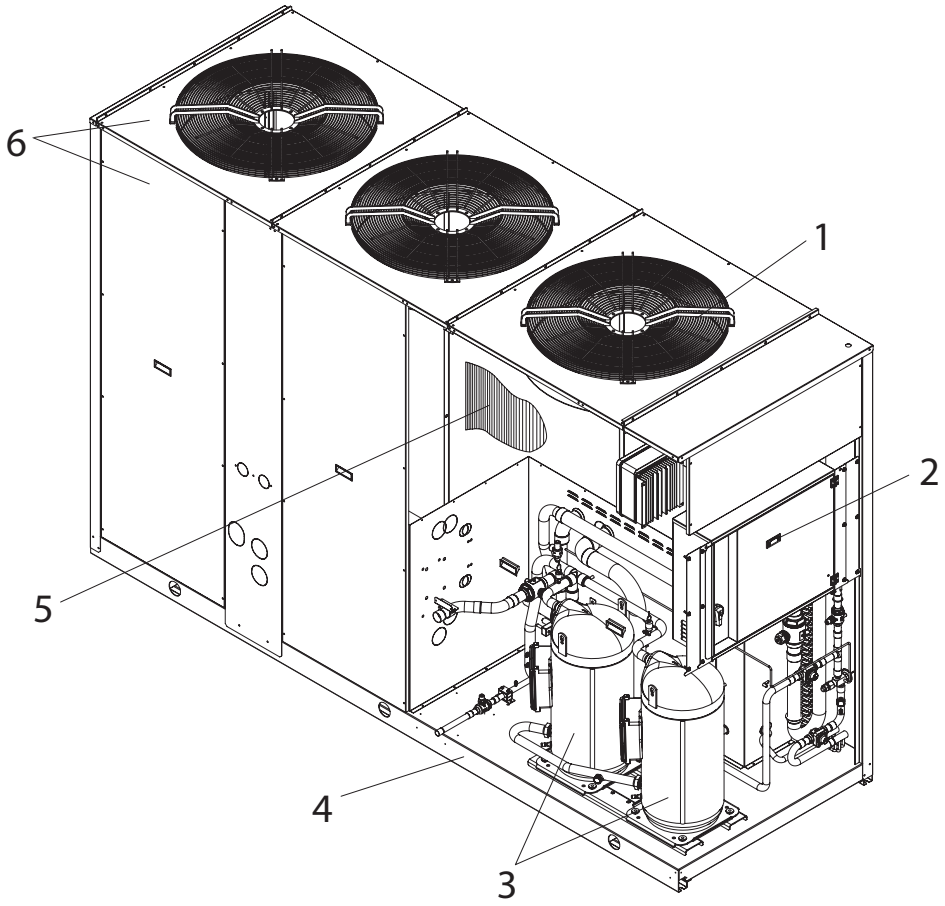
Digital input functions: low pressure, high pressure, high temperature on compressor supply, phase presence and sequence monitoring device on power supply, differential water pressure control, compressors thermal protection, fans thermal protection, remote ON/OFF and remote operating mode change (only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

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

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

Analogic output functions: continuous adjustment of axial fans rotating speed.

GENERAL SPECIFICATIONS



3. Compressors. They are the **SCROLL** type with orbiting coil equipped with built-in thermal protection and oil heater. The Extra low noise unit **ASS** 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 two compressors connected in parallel (1 single cooling circuit) which can operate at the same time (**100% cooling power**) or individually (**50% of the cooling power**), thus adapting to the different thermal loads of the system supplied.

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

5. 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.

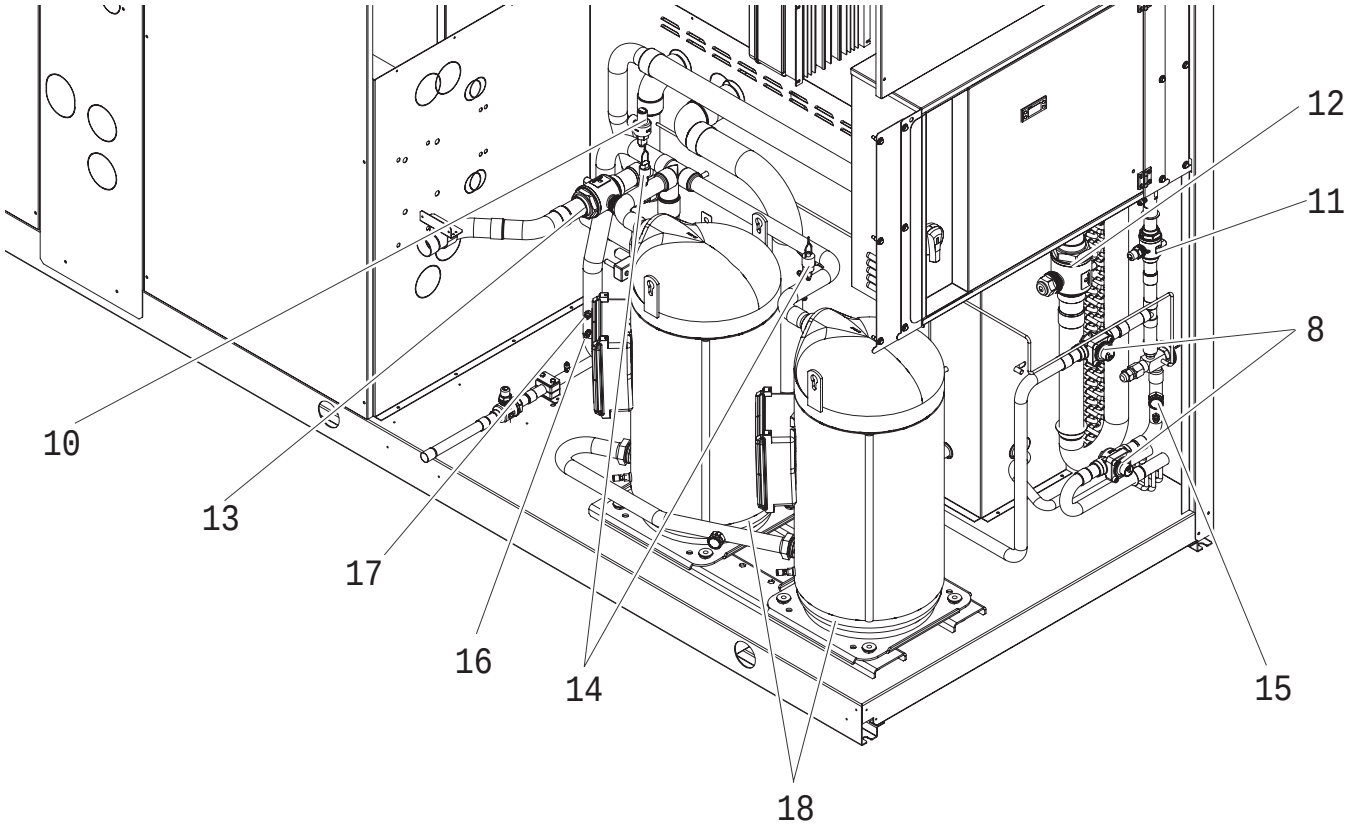
6. Covering panels, made of galvanized sheet metal coated with polyurethane powder paint to ensure maximun protection against adverse weather conditions

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

8. 4-way cycle reversal valve (IP unit only), reverses the flow direction of the coolant as the summer/winter operating mode is changed.

Hydraulic and cooling circuit components

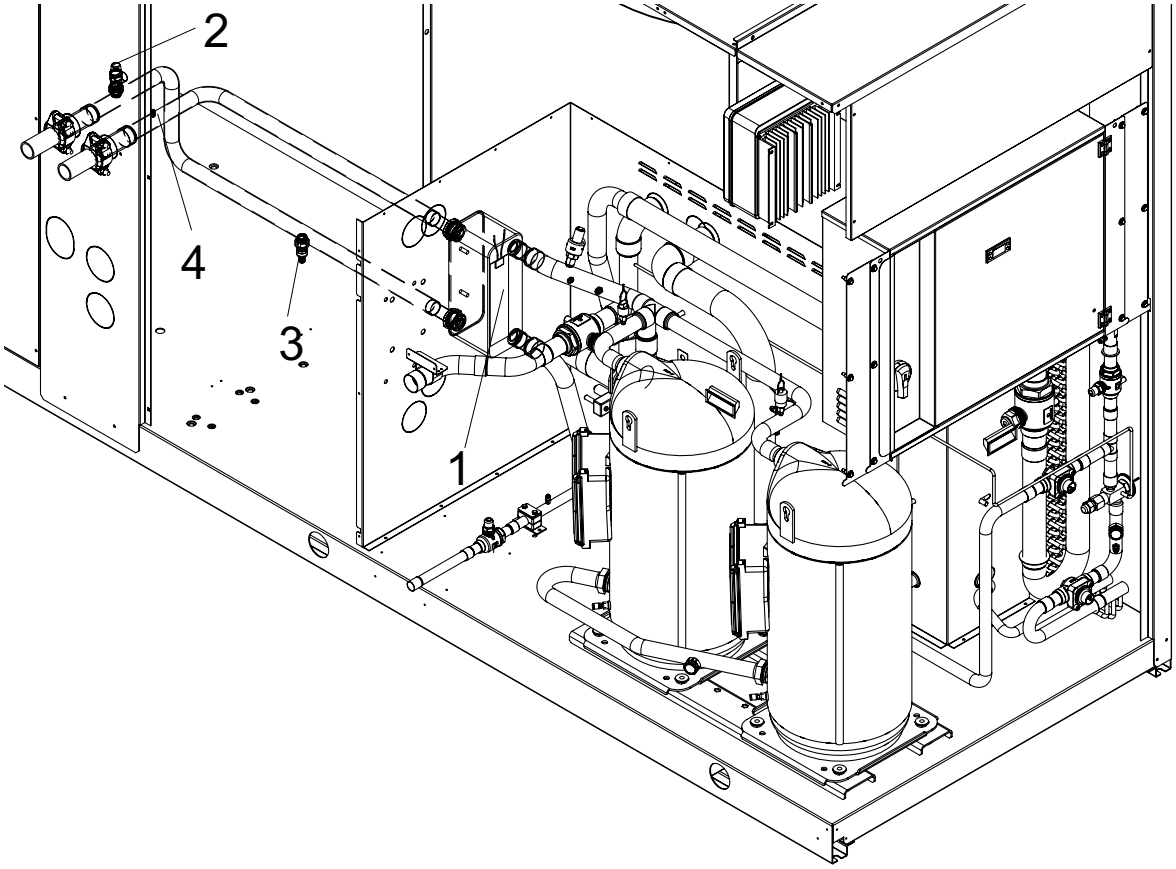
9. Safety valve. Installed on the delivery pipe of the compressors, this operates if extreme faults should occur in the plant.
10. Fluid cock. Ball type, this allows the gas flow on the fluid line to be turned on and off. Along with the cock on the compressor delivery, it allows the components of the fluid line to be subjected to extraordinary maintenance work and the compressors to be replaced if necessary (without discharging the coolant from the unit).
11. Compressor delivery cock. Ball type, allows the gas delivered to the compressors to be turned on and off.
12. Low pressure switch (N°1 of series IR version, N°2 of series IP version). With fixed setting. It is installed on the suction pipe and blocks the compressors if the operating pressures drop below the tolerated values. Automatically resets as the pressure increases. If it activates frequently, the unit will block and can only be restarted by resetting via the user interface terminal.
13. 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.
14. Thermostatic valve (only IP version). With external equalizer, this supplies the evaporator correctly, keeping the selected overheating degree at a steady level.
15. 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.
16. 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.
17. 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.



Version with Condensing Desuperheater VDM (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 stand-still (if not drained).
2. **Water safety valve.**On the heat recovery inlet pipe. It acts whenever faulty service leads to an operating pressure in the plumbing system that exceeds the valve opening value (Fig.1).
3. **Water drain cock** for emptying the exchangers and pipes of the machine dedicated to heat recovery (Fig. 1).
4. **Air vent.** Accessed by removing the front panels. It consists of a manually operated valve installed in the highest part of the water pipes. To use in conjunction with the water drain cocks situated in the rear part of the unit, for emptying the exchangers and pipes dedicated to heat recovery.



ACCESSORIES AND OPTIONAL EQUIPMENT

Mechanical options

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

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

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

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

KB- 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.

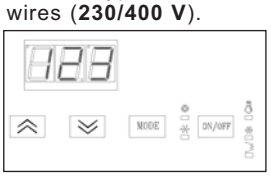
KSP - Plate heat exchanger kit (F). It consists of a plate heat exchanger, diffential pressure switch, probe well and antifreeze electrical heater.

KLQ - Liquid line kit (F). It consists of a solenoid valve with coil, dehidrator filter, Liquid and moinsture indicator, thermostatic expansion valve, one-way valve (only IP version)**.**

Electrical options

CF - Electric power supply phase presence and sequence monitoring device (F). This consists of a device installed in the electric panel that blocks the unit if one or more phases are absent or if the phase sequence is not correct: this protects the electric motor of the compressor and the hydraulic pump (if installed) against overheating and/or burnout.

CR - Remote control (F). This can be used to select all the monitoring and display functions of the control unit on the machine at a maximum distance of 100 meters away. It must be installed by using a cable with three strands or three wires in **PVC** of the **N07-VK** type with a 1mm^2 section. The transmission line must be installed in a raceway separate from any electric powering wires (**230/400 V**).



The control unit has the following buttons:
MODE key : used to select the operating mode
ON/OFF key : used to turn the unit ON/OFF and to reset the alarms
Mode + ON/OFF keys : used to access and quit the various menu levels
UP key: scrolls forwards through the menu items or increases the value of a parameter
Tasto DOWN: scrolls backwards through the menu items or decreases the value of a parameter.

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

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

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

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

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

CSF - Voltage monitor and sequence meter (M/F). The device enables control of the correct sequence of power phases and the lack of any phases. It also ensures that the unit works within ± 10% the rated voltage (MIN=360 V - RATED=400V - MAX=440V). It blocks the unit if the voltage is outside the limits provided for.

RIF – Power factor capacitors (M). Capacitors on compressors increase power factor up to 0.9.

SS – Soft Starter (M). Soft starters on compressors reduce a inrush current at startup.

MTC – Magneto-thermal protections on loads (M). Replace the thermal fuse protection, allowing a reset of the compressors, fans, resistors and auxiliary.

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

Mechanical options

Special finned heat exchangers

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

Electrical options

Power source voltage rating 230V-3-50Hz (ask technical department for support).

ACCESSORIES AND OPTIONAL EQUIPMENT

Accessories - Model Combinations

	MODEL / ACCESSORY CODE			M / F	50	60	70	80	90	100	115	130	145	160	180	200
Mechanical Accessories	Rubber vibration dampers		AVG12	F	•	•	•	•								
			AVG14	F					•	•	•	•	•	•		
			AVG16	F											•	•
	Gas pressure gauges		GM12	M	•	•	•	•	•	•	•	•	•	•	•	•
	Protective grilles		GP49	M	•	•	•	•								
			GP50	M					•	•						
			GP51	M							•	•	•	•		
			GP66	M											•	•
	Drain pan kit		BCN3	M	•	•	•	•								
			BCN4	M					•	•	•	•	•	•		
			BCN12	M											•	•
	Low noise kit		KS10	M	•	•	•	•								
			KS11	M					•							
			KS12	M						•						
			KS13	M							•					
			KS14	M								•	•	•		
			KS16	M											•	•
	Plate heat exchanger kit		KSP1	F	•	•										
			KSP2	F			•									
			KSP3	F				•								
			KSP4	F					•							
			KSP5	F						•						
			KSP6	F							•					
			KSP7	F								•				
			KSP8	F									•			
			KSP9	F										•		
			KSP10	F											•	
			KSP11	F												•
	Liquid line kit	IR	KLQ6	F	•	•										
			KLQ7	F			•	•								
			KLQ8	F					•	•						
			KLQ9	F							•	•				
			KLQ10	F									•	•		
			KLQ11	F											•	•
		IP	KLQ1	F	•	•										
			KLQ2	F			•	•								
			KLQ3	F					•	•						
			KLQ4	F							•	•				
			KLQ5	F									•	•		
			KLQ12	F											•	•
Mechanical Accessories	External air probe		SND3	M	•	•	•	•	•	•	•	•	•	•	•	•
	Programming clock kit		KOP1	F	•	•	•	•	•	•	•	•	•	•	•	•
	High temperature thermostat kit		TAT8	M	•	•	•	•	•	•	•	•	•	•	•	•
	Remote control kit		CR6	F	•	•	•	•	•	•	•	•	•	•	•	•
	Serial interface kit		INT2	M	•	•	•	•	•	•	•	•	•	•	•	•
			KMB1	F	•	•	•	•	•	•	•	•	•	•	•	•
	Voltage monitor and sequence meter		CSF6	M	•	•	•	•	•	•	•	•	•	•	•	•
			CSF7	F	•	•	•	•	•	•	•	•	•	•	•	•
	Soft Starter		SS1	M	•											
			SS2	M		•	•									
			SS3	M				•								
			SS4	M					•							
			SS5	M						•						
			SS6	M							•					
			SS7	M								•				
			SS8	M									•			
			SS9	M										•		
			SS10	M											•	
			SS11	M												•
	Power factor capacitors		RIF3	M	•	•										
			RIF4	M			•	•	•	•	•	•				
			RIF5	M									•			
			RIF6	M										•	•	•
	Magneto-thermal protections on loads		MTC1	M	•	•										
			MTC2	M			•	•								
			MTC3	M					•							
			MTC4	M						•						
			MTC5	M							•					
			MTC6	M								•				
			MTC7	M									•			
			MTC8	M										•		
			MTC9	M											•	
			MTC10	M												•

NOTE: (M): *factory mounted* ***(F):*** *to be installed by customer*

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Technical specifications of unit AB Standard Unit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1) (E)	53,5	58,6	68,8	78,7	91,0	102	112	126	143	158	180	200	kW
Compressors power input (1)	16,3	18,5	20,9	25,6	28,2	31,6	35,5	40,5	46,0	51,0	56,0	62,8	kW
EER	3,28	3,17	3,29	3,07	3,23	3,22	3,15	3,11	3,11	3,10	3,21	3,18	-
Total power input (1) (E)	18,1	20,3	22,7	27,4	31,8	35,2	39,1	44,1	51,4	56,4	63,2	70,0	kW
Total EER	2,96	2,89	3,03	2,87	2,86	2,89	2,86	2,86	2,78	2,80	2,85	2,86	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed (AB)	900												rpm
Total air flow rate	29050	29050	28100	27680	41460	41460	47440	47440	62190	59820	82920	79760	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38				4,72		5,90				7,41		m^2

Electrical Data

Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165	A
Total maximum power input [FLI]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101	kW
Total maximum starting current [MIC]	146	147	173	211	265	270	317	325	368	382	470	485	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Standard performances AB Standard unit

Mod. 50-100

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

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Mod. 115-200

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

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Technical specifications of unit AB Standard Unit + KS Silencer kit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1)	51,9	56,8	66,7	76,3	88,2	98,5	109	122	139	153	174	194	kW
Compressors power input (1)	17,0	19,3	21,8	26,8	29,5	33,0	37,1	42,3	48,1	53,3	58,5	65,6	kW
EER	3,04	2,94	3,05	2,85	2,99	2,98	2,93	2,89	2,88	2,87	2,98	2,95	-
Total power input (1)	18,8	21,1	23,6	28,6	33,1	36,6	40,7	45,9	53,5	58,7	65,7	72,8	kW
Total EER	2,75	2,69	2,82	2,67	2,67	2,69	2,67	2,66	2,59	2,61	2,65	2,66	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed	900												rpm
Total air flow rate	24208	24208	23417	23067	34550	34550	39533	39533	51825	49850	69100	66467	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes				/
Quantity	1				n°
Front area	3,38		4,72	5,90	7,41	m^2

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Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165	A
Total maximum power input [FLI]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101	kW
Total maximum starting current [MIC]	146	147	173	211	265	270	317	325	368	382	470	485	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Standard performances AB Standard Unit + KS Silencer kit

Mod. 50-100

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	1	59,2	11,9	55,3	13,7	52,3	15,1	49,1	16,7	45,7	18,4	42,3	20,0	38,8	21,7
	2	60,9	12,0	56,8	13,9	53,7	15,3	50,4	16,8	46,9	18,5	43,5	20,2	39,9	21,9
	3	62,7	12,2	58,5	14,0	55,3	15,4	**51,9**	**17,0**	48,3	18,7	44,7	20,4	41,1	22,1
	4	64,4	12,3	60,1	14,1	56,9	15,6	53,4	17,2	49,7	18,9	46,0	20,7	-	-
	5	66,2	12,4	61,8	14,3	58,4	15,7	54,8	17,4	51,0	19,1	47,3	20,9	-	-
	6	68,0	12,5	63,4	14,4	60,0	15,9	56,3	17,5	52,4	19,3	48,5	21,1	-	-
	7	69,7	12,7	65,1	14,6	61,5	16,1	57,7	17,7	53,7	19,5	49,8	21,3	-	-
	8	71,6	12,8	66,8	14,7	63,2	16,2	59,3	17,9	55,2	19,7	51,1	21,5	-	-
60	1	64,8	13,5	60,5	15,6	57,2	17,2	53,7	18,9	50,0	20,9	46,3	22,7	42,5	24,6
	2	66,6	13,7	62,2	15,7	58,8	17,3	55,2	19,1	51,3	21,1	47,6	23,0	43,7	24,8
	3	68,6	13,8	64,0	15,9	60,5	17,5	**56,8**	**19,3**	52,8	21,3	48,9	23,2	45,0	25,1
	4	70,5	14,0	65,8	16,1	62,2	17,7	58,4	19,5	54,3	21,5	50,3	23,4	-	-
	5	72,5	14,1	67,6	16,2	64,0	17,9	60,0	19,7	55,8	21,7	51,7	23,7	-	-
	6	74,4	14,2	69,4	16,4	65,7	18,1	61,6	19,9	57,3	21,9	53,1	23,9	-	-
	7	76,3	14,4	71,2	16,5	67,3	18,2	63,2	20,1	58,8	22,2	54,4	24,2	-	-
	8	78,4	14,5	73,1	16,7	69,2	18,4	64,9	20,3	60,4	22,4	55,9	24,4	-	-
70	1	76,1	15,3	71,1	17,6	67,2	19,4	63,1	21,4	58,7	23,6	54,3	25,7	49,9	27,8
	2	78,2	15,4	73,0	17,8	69,1	19,6	64,8	21,6	60,3	23,8	55,8	25,9	51,3	28,0
	3	80,5	15,6	75,2	17,9	71,1	19,8	**66,7**	**21,8**	62,1	24,0	57,5	26,2	52,8	28,3
	4	82,8	15,8	77,3	18,1	73,1	20,0	68,6	22,0	63,8	24,3	59,1	26,5	-	-
	5	85,1	15,9	79,4	18,3	75,1	20,2	70,5	22,3	65,6	24,5	60,7	26,8	-	-
	6	87,3	16,1	81,5	18,5	77,1	20,4	72,3	22,5	67,3	24,8	62,3	27,0	-	-
	7	89,6	16,2	83,6	18,7	79,1	20,6	74,2	22,7	69,0	25,0	63,9	27,3	-	-
	8	92,0	16,4	85,9	18,9	81,2	20,8	76,2	22,9	70,9	25,3	65,7	27,5	-	-
80	1	87,1	18,8	81,3	21,6	76,9	23,8	72,1	26,3	67,1	29,0	62,2	31,6	57,1	34,1
	2	89,5	19,0	83,5	21,8	79,0	24,1	74,1	26,5	69,0	29,2	63,9	31,9	58,7	34,5
	3	92,1	19,2	86,0	22,1	81,3	24,3	**76,3**	**26,8**	71,0	29,5	65,7	32,2	60,4	34,8
	4	94,7	19,4	88,4	22,3	83,6	24,6	78,5	27,1	73,0	29,9	67,6	32,6	-	-
	5	97,3	19,6	90,9	22,5	85,9	24,8	80,6	27,4	75,0	30,2	69,5	32,9	-	-
	6	100	19,8	93,3	22,8	88,2	25,1	82,8	27,6	77,0	30,5	71,3	33,2	-	-
	7	102	20,0	95,6	23,0	90,4	25,3	84,9	27,9	79,0	30,8	73,1	33,5	-	-
	8	105	20,2	98,2	23,2	92,9	25,6	87,2	28,2	81,1	31,1	75,1	33,9	-	-
90	1	101	20,7	94,0	23,8	88,9	26,2	83,4	28,9	77,6	31,9	71,9	34,8	66,0	37,6
	2	103	20,9	96,6	24,0	91,3	26,5	85,7	29,2	79,7	32,2	73,9	35,1	67,8	37,9
	3	106	21,1	99,4	24,3	94,0	26,8	**88,2**	**29,5**	82,1	32,5	76,0	35,4	69,8	38,3
	4	109	21,3	102	24,6	96,6	27,1	90,7	29,8	84,4	32,9	78,2	35,8	-	-
	5	113	21,6	105	24,8	99,3	27,3	93,2	30,1	86,7	33,2	80,3	36,2	-	-
	6	115	21,8	108	25,0	102	27,6	95,7	30,4	89,0	33,5	82,4	36,6	-	-
	7	118	22,0	111	25,3	105	27,9	98,1	30,7	91,3	33,9	84,5	36,9	-	-
	8	122	22,2	114	25,5	107	28,1	101	31,0	93,8	34,2	86,8	37,3	-	-
100	1	112	23,2	105	26,6	99,2	29,4	93,1	32,4	86,6	35,7	80,3	38,9	73,7	42,0
	2	116	23,4	108	26,9	102	29,6	95,7	32,7	89,0	36,0	82,5	39,3	75,8	42,4
	3	119	23,6	111	27,2	105	29,9	**98,5**	**33,0**	91,6	36,4	84,9	39,7	78,0	42,9
	4	122	23,9	114	27,5	108	30,3	101	33,4	94,2	36,8	87,3	40,1	-	-
	5	126	24,1	117	27,7	111	30,6	104	33,7	96,8	37,1	89,7	40,5	-	-
	6	129	24,3	120	28,0	114	30,9	107	34,0	99,4	37,5	92,1	40,9	-	-
	7	132	24,6	123	28,3	117	31,2	110	34,4	102	37,9	94,4	41,3	-	-
	8	136	24,8	127	28,6	120	31,5	113	34,7	105	38,2	97,0	41,7	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Mod. 115-200

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	1	124	26,0	116	30,0	110	33,0	103	36,4	95,9	40,1	88,8	43,7	81,6	47,3
	2	128	26,3	119	30,2	113	33,3	106	36,7	98,5	40,5	91,3	44,1	83,8	47,7
	3	132	26,5	123	30,5	116	33,6	**109**	**37,1**	101	40,9	93,9	44,6	86,3	48,2
	4	135	26,8	126	30,9	119	34,0	112	37,5	104	41,3	96,6	45,1	-	-
	5	139	27,1	130	31,2	123	34,4	115	37,9	107	41,8	99,2	45,5	-	-
	6	143	27,4	133	31,5	126	34,7	118	38,3	110	42,2	102	46,0	-	-
	7	146	27,6	137	31,8	129	35,0	121	38,6	113	42,6	104	46,4	-	-
	8	150	27,9	140	32,1	133	35,4	125	39,0	116	43,0	107	46,9	-	-
130	1	139	29,7	130	34,1	123	37,6	115	41,5	107	45,7	99,4	49,8	91,3	53,9
	2	143	30,0	134	34,5	126	38,0	119	41,9	110	46,2	102	50,3	93,8	54,4
	3	147	30,3	137	34,8	130	38,4	**122**	**42,3**	114	46,6	105	50,8	96,6	55,0
	4	151	30,6	141	35,2	134	38,8	125	42,8	117	47,1	108	51,4	-	-
	5	156	30,9	145	35,6	137	39,2	129	43,2	120	47,6	111	51,9	-	-
	6	160	31,2	149	35,9	141	39,6	132	43,6	123	48,1	114	52,4	-	-
	7	164	31,5	153	36,3	145	40,0	136	44,1	126	48,6	117	52,9	-	-
	8	168	31,8	157	36,6	149	40,3	139	44,5	130	49,0	120	53,5	-	-
145	1	159	33,7	148	38,8	140	42,8	131	47,2	122	52,0	113	56,7	104	61,3
	2	163	34,1	152	39,2	144	43,2	135	47,6	126	52,5	116	57,2	107	61,9
	3	168	34,4	157	39,6	148	43,6	**139**	**48,1**	129	53,0	120	57,8	110	62,5
	4	173	34,8	161	40,0	152	44,1	143	48,6	133	53,6	123	58,4	-	-
	5	177	35,1	166	40,4	157	44,6	147	49,1	137	54,1	127	59,0	-	-
	6	182	35,5	170	40,8	161	45,0	151	49,6	140	54,7	130	59,6	-	-
	7	187	35,8	174	41,2	165	45,4	155	50,1	144	55,2	133	60,2	-	-
	8	192	36,2	179	41,6	169	45,9	159	50,6	148	55,8	137	60,8	-	-
160	1	175	37,4	163	43,0	154	47,4	145	52,3	135	57,6	125	62,8	114	67,9
	2	179	37,7	168	43,4	158	47,9	149	52,8	138	58,2	128	63,4	118	68,5
	3	185	38,1	172	43,9	163	48,3	**153**	**53,3**	142	58,7	132	64,0	121	69,3
	4	190	38,6	177	44,4	168	48,9	157	53,9	146	59,4	136	64,8	-	-
	5	195	38,9	182	44,8	172	49,4	162	54,4	150	60,0	139	65,4	-	-
	6	200	39,3	187	45,3	177	49,9	166	55,0	154	60,6	143	66,1	-	-
	7	205	39,7	192	45,7	181	50,3	170	55,5	158	61,2	147	66,7	-	-
	8	211	40,1	197	46,1	186	50,8	175	56,0	163	61,8	151	67,4	-	-
180	1	199	41,0	185	47,2	175	52,0	165	57,4	153	63,2	142	68,9	130	74,5
	2	204	41,4	191	47,7	180	52,5	169	57,9	157	63,8	146	69,6	134	75,2
	3	210	41,9	196	48,2	185	53,1	**174**	**58,5**	162	64,5	150	70,3	138	76,0
	4	216	42,3	202	48,7	191	53,6	179	59,1	166	65,2	154	71,1	-	-
	5	222	42,7	207	49,2	196	54,2	184	59,7	171	65,8	158	71,8	-	-
	6	228	43,2	213	49,7	201	54,7	189	60,3	176	66,5	163	72,5	-	-
	7	234	43,6	218	50,2	206	55,3	194	60,9	180	67,2	167	73,2	-	-
	8	240	44,0	224	50,6	212	55,8	199	61,5	185	67,8	171	73,9	-	-
200	1	221	46,0	207	53,0	195	58,3	183	64,3	171	70,9	158	77,3	145	83,6
	2	228	46,5	212	53,5	201	58,9	189	64,9	175	71,6	162	78,0	149	84,4
	3	234	46,9	219	54,0	207	59,5	**194**	**65,6**	180	72,3	167	78,8	154	85,2
	4	241	47,5	225	54,6	213	60,2	199	66,3	186	73,1	172	79,7	-	-
	5	247	47,9	231	55,1	218	60,8	205	67,0	191	73,8	177	80,5	-	-
	6	254	48,4	237	55,7	224	61,4	210	67,7	196	74,6	181	81,3	-	-
	7	261	48,9	243	56,2	230	62,0	216	68,3	201	75,3	186	82,1	-	-
	8	268	49,4	250	56,8	236	62,6	222	69,0	206	76,0	191	82,9	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Technical specifications of unit ASS Extra low noise version

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1)	50,7	55,5	65,2	-	86,2	96,2	106	119	135	-	170	-	kW
Compressors power input (1)	17,6	19,9	22,5	-	30,4	34,1	38,3	43,7	49,6	-	60,4	-	kW
EER	2,88	2,78	2,89	-	2,83	2,82	2,77	2,73	2,73	-	2,82	-	-
Total power input (1)	19,4	21,7	24,3	-	32,2	37,7	41,9	47,3	55,0	-	67,6	-	kW
Total EER	2,62	2,55	2,68	-	2,68	2,55	2,53	2,52	2,46	-	2,52	-	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed	900												rpm
Total air flow rate	19367	19367	18733	-	27640	27640	31627	31627	41460	-	55280	-	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38				4,72		5,90				7,41		m^2

Electrical Data

Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165	A
Total maximum power input [FLI]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101	kW
Total maximum starting current [MIC]	146	147	173	211	265	270	317	325	368	382	470	485	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Standard performances ASS Extra low noise version

Mod. 50-100

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	1	57,9	12,3	54,0	14,2	51,1	15,7	47,9	17,3	44,6	19,0	41,3	20,7	37,9	22,4
	2	59,5	12,5	55,5	14,3	52,5	15,8	49,3	17,4	45,8	19,2	42,5	20,9	39,0	22,6
	3	61,2	12,6	57,1	14,5	54,0	16,0	**50,7**	**17,6**	47,2	19,4	43,7	21,1	40,1	22,9
	4	62,9	12,7	58,8	14,6	55,6	16,1	52,1	17,8	48,5	19,6	44,9	21,4	-	-
	5	64,7	12,9	60,4	14,8	57,1	16,3	53,6	18,0	49,8	19,8	46,2	21,6	-	-
	6	66,4	13,0	62,0	14,9	58,6	16,5	55,0	18,2	51,2	20,0	47,4	21,8	-	-
	7	68,1	13,1	63,6	15,1	60,1	16,6	56,4	18,3	52,5	20,2	48,6	22,0	-	-
	8	69,9	13,2	65,3	15,2	61,7	16,8	57,9	18,5	53,9	20,4	49,9	22,2	-	-
60	1	63,4	14,0	59,1	16,1	55,9	17,7	52,5	19,5	48,8	21,5	45,2	23,5	41,5	25,4
	2	65,1	14,1	60,8	16,2	57,5	17,9	53,9	19,7	50,2	21,7	46,5	23,7	42,7	25,6
	3	67,0	14,2	62,5	16,4	59,1	18,0	**55,5**	**19,9**	51,6	21,9	47,8	23,9	43,9	25,9
	4	68,9	14,4	64,3	16,6	60,8	18,2	57,1	20,1	53,1	22,2	49,2	24,2	-	-
	5	70,8	14,5	66,1	16,7	62,5	18,4	58,6	20,3	54,6	22,4	50,5	24,4	-	-
	6	72,7	14,7	67,8	16,9	64,1	18,6	60,2	20,5	56,0	22,6	51,9	24,7	-	-
	7	74,5	14,8	69,6	17,1	65,8	18,8	61,7	20,7	57,4	22,8	53,2	24,9	-	-
	8	76,6	15,0	71,5	17,2	67,6	19,0	63,4	20,9	59,0	23,1	54,6	25,1	-	-
70	1	74,4	15,8	69,5	18,2	65,7	20,0	61,6	22,1	57,4	24,3	53,1	26,5	48,8	28,7
	2	76,5	15,9	71,4	18,3	67,5	20,2	63,4	22,3	58,9	24,5	54,6	26,8	50,1	28,9
	3	78,7	16,1	73,5	18,5	69,5	20,4	**65,2**	**22,5**	60,7	24,8	56,2	27,0	51,6	29,2
	4	80,9	16,3	75,6	18,7	71,4	20,6	67,0	22,7	62,4	25,1	57,8	27,3	-	-
	5	83,2	16,4	77,6	18,9	73,4	20,8	68,9	23,0	64,1	25,3	59,4	27,6	-	-
	6	85,4	16,6	79,7	19,1	75,4	21,0	70,7	23,2	65,8	25,6	60,9	27,9	-	-
	7	87,6	16,8	81,7	19,3	77,3	21,3	72,5	23,4	67,5	25,8	62,5	28,2	-	-
	8	89,9	16,9	83,9	19,5	79,4	21,5	74,5	23,7	69,3	26,1	64,2	28,4	-	-
80	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	**-**	**-**	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	1	98,4	21,3	91,8	24,5	86,8	27,0	81,5	29,8	75,8	32,9	70,2	35,8	64,5	38,7
	2	101	21,5	94,4	24,8	89,3	27,3	83,8	30,1	77,9	33,2	72,2	36,2	66,3	39,1
	3	104	21,8	97,1	25,0	91,9	27,6	**86,2**	**30,4**	80,2	33,5	74,3	36,5	68,2	39,5
	4	107	22,0	100	25,3	94,5	27,9	88,6	30,7	82,5	33,9	76,4	36,9	-	-
	5	110	22,2	103	25,6	97,1	28,2	91,1	31,0	84,7	34,2	78,5	37,3	-	-
	6	113	22,4	105	25,8	100	28,4	93,5	31,4	87,0	34,6	80,6	37,7	-	-
	7	116	22,7	108	26,1	102	28,7	95,9	31,7	89,2	34,9	82,6	38,0	-	-
	8	119	22,9	111	26,3	105	29,0	98,5	32,0	91,6	35,2	84,9	38,4	-	-
100	1	110	23,9	102	27,5	96,9	30,3	91,0	33,4	84,6	36,9	78,4	40,2	72,0	43,4
	2	113	24,2	105	27,8	100	30,6	93,5	33,8	87,0	37,2	80,5	40,6	74,0	43,9
	3	116	24,4	108	28,1	103	30,9	**96,2**	**34,1**	89,5	37,6	82,9	41,0	76,1	44,3
	4	119	24,7	111	28,4	105	31,3	98,9	34,5	92,0	38,0	85,2	41,4	-	-
	5	123	24,9	115	28,7	108	31,6	102	34,8	94,6	38,4	87,6	41,8	-	-
	6	126	25,2	118	29,0	111	31,9	104	35,2	97,1	38,8	89,9	42,3	-	-
	7	129	25,4	121	29,2	114	32,2	107	35,5	100	39,1	92,2	42,7	-	-
	8	133	25,7	124	29,5	117	32,5	110	35,9	102	39,5	94,7	43,1	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Mod. 115-200

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	1	121	26,9	113	30,9	107	34,1	100	37,6	93,2	41,4	86,4	45,1	79,3	48,8
	2	124	27,1	116	31,2	110	34,4	103	37,9	95,8	41,8	88,8	45,6	81,5	49,3
	3	128	27,4	119	31,5	113	34,7	**106**	**38,3**	98,6	42,2	91,3	46,0	83,9	49,8
	4	132	27,7	123	31,9	116	35,1	109	38,7	101	42,7	93,9	46,5	-	-
	5	135	28,0	126	32,2	119	35,5	112	39,1	104	43,1	96,5	47,0	-	-
	6	139	28,3	130	32,5	123	35,8	115	39,5	107	43,5	99,1	47,5	-	-
	7	142	28,5	133	32,8	126	36,2	118	39,9	110	44,0	102	47,9	-	-
	8	146	28,8	136	33,2	129	36,5	121	40,3	113	44,4	104	48,4	-	-
130	1	136	30,7	127	35,3	120	38,9	113	42,9	105	47,2	97,0	51,5	89,1	55,7
	2	140	30,9	130	35,6	123	39,2	116	43,3	108	47,7	100	52,0	91,5	56,2
	3	144	31,3	134	36,0	127	39,6	**119**	**43,7**	111	48,2	103	52,5	94,2	56,8
	4	148	31,6	138	36,4	130	40,1	122	44,2	114	48,7	105	53,1	-	-
	5	152	31,9	142	36,7	134	40,5	126	44,6	117	49,2	108	53,6	-	-
	6	156	32,2	145	37,1	138	40,9	129	45,1	120	49,7	111	54,2	-	-
	7	160	32,6	149	37,5	141	41,3	132	45,5	123	50,2	114	54,7	-	-
	8	164	32,9	153	37,8	145	41,7	136	46,0	127	50,7	117	55,2	-	-
145	1	154	34,8	144	40,0	136	44,1	128	48,6	119	53,6	110	58,4	101	63,2
	2	158	35,1	148	40,4	140	44,5	131	49,1	122	54,1	113	59,0	104	63,8
	3	163	35,5	152	40,8	144	45,0	**135**	**49,6**	126	54,7	116	59,6	107	64,4
	4	168	35,9	156	41,3	148	45,5	139	50,1	129	55,3	120	60,3	-	-
	5	172	36,2	161	41,7	152	45,9	143	50,7	133	55,8	123	60,9	-	-
	6	177	36,6	165	42,1	156	46,4	146	51,2	136	56,4	126	61,5	-	-
	7	181	37,0	169	42,5	160	46,9	150	51,7	140	56,9	129	62,1	-	-
	8	186	37,3	174	42,9	164	47,3	154	52,2	144	57,5	133	62,7	-	-
160	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	**-**	**-**	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	1	194	42,4	181	48,8	171	53,7	161	59,2	150	65,3	139	71,2	127	77,0
	2	199	42,8	186	49,2	176	54,2	165	59,8	154	65,9	142	71,8	131	77,7
	3	205	43,2	192	49,7	181	54,8	**170**	**60,4**	158	66,6	146	72,6	135	78,5
	4	211	43,7	197	50,3	186	55,4	175	61,1	163	67,3	151	73,4	-	-
	5	217	44,1	202	50,8	191	55,9	180	61,7	167	68,0	155	74,1	-	-
	6	223	44,6	208	51,3	196	56,5	184	62,3	172	68,7	159	74,9	-	-
	7	228	45,0	213	51,8	202	57,1	189	62,9	176	69,3	163	75,6	-	-
	8	235	45,4	219	52,3	207	57,6	194	63,5	181	70,0	167	76,3	-	-
200	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	**-**	**-**	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Version with Condensing Desuperheater (VDM)

Recovery heat exchanger specifications

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

Unit specification

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

NOTES:

(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.

Recovered heating capacity in Version with Condensing Desuperheater (VDM)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kWt_r = RECOVERED HEATING CAPACITY [KW]				
50	30	12,8	14,7	16,9	19,3	22,0
	35	12,9	14,8	17,0	19,4	22,1
	40	12,6	14,4	16,6	18,9	21,6
	45	11,9	13,7	**15,7**	17,9	20,5
	50	10,9	12,5	14,3	16,4	18,7
	55	9,5	10,9	12,5	14,3	16,3
	60	7,7	8,8	10,1	11,6	13,2
	65	5,5	6,4	7,3	8,4	9,5
	70	3,0	3,5	4,0	4,6	5,2
55	30	14,6	16,8	19,0	21,7	24,6
	35	14,6	16,8	19,0	21,7	24,6
	40	14,2	16,3	18,6	21,2	24,0
	45	13,5	15,5	**17,6**	20,1	22,8
	50	12,4	14,2	17,0	18,5	20,9
	55	10,9	12,5	15,0	16,3	18,4
	60	9,0	10,4	12,5	13,5	15,3
	65	6,8	7,9	9,4	10,2	11,6
	70	4,3	4,9	5,9	6,4	7,2
60	30	16,6	19,0	21,6	24,7	28,0
	35	16,6	19,0	21,6	24,7	28,0
	40	16,1	18,6	21,1	24,1	27,3
	45	15,3	17,6	**20,0**	22,8	25,9
	50	14,0	16,2	18,4	21,0	23,8
	55	12,4	14,2	16,2	18,5	20,9
	60	10,3	11,8	13,4	15,4	17,4
	65	7,8	8,9	10,2	11,6	13,1
	70	4,8	5,6	6,3	7,2	8,2
70	30	19,4	22,2	25,4	29,2	33,4
	35	19,4	22,3	25,5	29,3	33,6
	40	19,0	21,7	24,9	28,6	32,8
	45	18,0	20,6	**23,6**	27,1	31,1
	50	16,4	18,8	21,6	24,8	28,4
	55	14,4	16,5	18,9	21,7	24,8
	60	11,8	13,5	15,5	17,8	20,4
	65	8,6	9,9	11,3	13,0	14,9
	70	5,0	5,7	6,5	7,5	8,6
90	30	22,5	25,6	29,2	33,3	37,8
	35	22,6	25,7	29,3	33,4	38,0
	40	22,1	25,1	28,6	32,6	37,1
	45	20,9	23,8	**27,1**	30,9	35,1
	50	19,1	21,8	24,8	28,3	32,1
	55	16,7	19,1	21,7	24,7	28,1
	60	13,7	15,6	17,8	20,3	23,1
	65	10,1	11,5	13,1	14,9	17,0
	70	5,9	6,7	7,6	8,7	9,9
100	30	25,5	29,0	33,0	37,5	42,5
	35	25,3	28,8	32,8	37,3	42,2
	40	24,7	28,1	32,0	36,3	41,1
	45	23,5	26,7	**30,4**	34,5	39,1
	50	21,7	24,7	28,2	32,0	36,2
	55	19,5	22,1	25,2	28,6	32,4
	60	16,7	19,0	21,6	24,5	27,8
	65	13,4	15,2	17,3	19,6	22,2
	70	9,5	10,8	12,3	14,0	15,8

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

kWt_r = RECOVERED HEATING CAPACITY [KW]

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Technical specifications of unit AB Standard unit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1)	52,9	57,5	67,2	74,1	89,2	99,0	110	122	138	154	178	198	kW
Compressors power input (1)	16,2	18,4	20,7	24,7	28,0	31,4	35,4	40,0	45,8	50,5	55,0	62,5	kW
EER	3,27	3,13	3,25	3,00	3,19	3,15	3,11	3,05	3,01	3,05	3,24	3,17	-
Total power input (1)	18,0	20,2	22,5	26,5	31,6	35,0	39,0	43,6	51,2	55,9	62,2	69,7	kW
Total EER	2,94	2,85	2,99	2,80	2,82	2,83	2,82	2,80	2,70	2,75	2,86	2,84	-
Heating capacity (2)	53,2	58,0	67,7	76,2	91,4	103	113	125	143	156	184	202	kW
Compressors power input (2)	16,2	18,0	20,3	23,1	28,2	31,4	34,8	39,0	45,1	49,8	54,0	61,0	kW
COP	3,28	3,22	3,34	3,30	3,24	3,28	3,25	3,21	3,17	3,13	3,41	3,31	-
Total power input (2)	18,0	19,8	22,1	24,9	31,8	35,0	38,4	42,6	50,5	55,2	61,2	68,2	kW
Total COP	2,96	2,93	3,07	3,06	2,87	2,94	2,94	2,93	2,83	2,83	3,01	2,96	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed	900												rpm
Total air flow rate	29050	29050	28100	27680	41460	41460	47440	47440	62190	59820	82920	79760	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38				4,72		5,90				7,41		m^2

Electrical Data

Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165	A
Total maximum power input [FLI]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101	kW
Total maximum starting current [MIC]	146	147	173	211	265	270	317	325	368	382	470	485	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in cooling mode AB Standard Unit

Mod. 50-100

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

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Mod. 115-200

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

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in heating mode AB Standard Unit

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

Tc= Condensation temperature in °C (Dew point) **kWt =** heating output (kW). **kWa =** Power input of compressors (kW)

NOTE

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Technical specifications of unit AB Standard Unit + KS Silencer kit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1)	51,3	55,7	65,1	71,8	86,5	96,0	107	118	134	149	173	192	kW
Compressors power input (1)	16,9	19,2	21,6	25,8	29,3	32,8	37,0	41,8	47,9	52,8	57,5	65,3	kW
EER	3,03	2,90	3,01	2,78	2,95	2,92	2,88	2,83	2,79	2,83	3,00	2,94	-
Total power input (1)	18,7	21,0	23,4	27,6	32,9	36,4	40,6	45,4	53,3	58,2	64,7	72,5	kW
Total EER	2,74	2,65	2,78	2,60	2,63	2,63	2,63	2,60	2,51	2,57	2,67	2,65	-
Heating capacity (2)	51,6	56,2	65,6	73,9	88,6	99,8	110	121	139	151	178	196	kW
Compressors power input (2)	16,9	18,8	21,2	24,1	29,5	32,8	36,4	40,8	47,1	52,1	56,4	63,8	kW
COP	3,05	2,99	3,10	3,06	3,01	3,04	3,01	2,97	2,94	2,91	3,16	3,07	-
Total power input (2)	18,7	20,6	23,0	25,9	33,1	36,4	40,0	44,4	52,5	57,5	63,6	71,0	kW
Total COP	2,75	2,73	2,85	2,85	2,68	2,74	2,74	2,73	2,64	2,63	2,80	2,76	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed	900												rpm
Total air flow rate	24208	24208	23417	23067	34550	34550	39533	39533	51825	49850	69100	66467	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38				4,72		5,90				7,41		m^2

Electrical Data

Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165	A
Total maximum power input [FLI]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101	kW
Total maximum starting current [MIC]	146	147	173	211	265	270	317	325	368	382	470	485	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

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

Mod. 50-100

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	1	58,6	11,9	54,7	13,6	51,7	15,0	48,5	16,6	45,1	18,3	41,8	19,9	38,4	21,5
	2	60,2	12,0	56,2	13,8	53,1	15,2	49,8	16,7	46,4	18,4	43,0	20,1	39,5	21,7
	3	61,9	12,1	57,8	13,9	54,7	15,3	**51,3**	**16,9**	47,7	18,6	44,2	20,3	40,6	22,0
	4	63,7	12,2	59,4	14,1	56,2	15,5	52,8	17,1	49,1	18,8	45,5	20,5	-	-
	5	65,4	12,3	61,1	14,2	57,8	15,7	54,2	17,3	50,4	19,0	46,7	20,7	-	-
	6	67,2	12,5	62,7	14,3	59,3	15,8	55,6	17,4	51,8	19,2	48,0	20,9	-	-
	7	68,9	12,6	64,3	14,5	60,8	16,0	57,1	17,6	53,1	19,4	49,2	21,1	-	-
	8	70,8	12,7	66,1	14,6	62,5	16,1	58,6	17,8	54,5	19,6	50,5	21,4	-	-
60	1	63,6	13,5	59,3	15,5	56,1	17,1	52,7	18,8	49,0	20,8	45,4	22,6	41,7	24,5
	2	65,3	13,6	61,0	15,6	57,7	17,2	54,1	19,0	50,4	20,9	46,6	22,8	42,8	24,7
	3	67,2	13,7	62,8	15,8	59,4	17,4	**55,7**	**19,2**	51,8	21,2	48,0	23,1	44,1	24,9
	4	69,2	13,9	64,5	16,0	61,0	17,6	57,3	19,4	53,3	21,4	49,4	23,3	-	-
	5	71,1	14,0	66,3	16,1	62,7	17,8	58,9	19,6	54,8	21,6	50,7	23,6	-	-
	6	72,9	14,2	68,1	16,3	64,4	18,0	60,4	19,8	56,2	21,8	52,1	23,8	-	-
	7	74,8	14,3	69,8	16,5	66,0	18,1	62,0	20,0	57,6	22,0	53,4	24,0	-	-
	8	76,8	14,4	71,7	16,6	67,8	18,3	63,6	20,2	59,2	22,3	54,8	24,3	-	-
70	1	74,3	15,2	69,4	17,4	65,6	19,2	61,6	21,2	57,3	23,3	53,0	25,5	48,7	27,5
	2	76,4	15,3	71,3	17,6	67,4	19,4	63,3	21,4	58,9	23,6	54,5	25,7	50,1	27,8
	3	78,6	15,5	73,4	17,8	69,4	19,6	**65,1**	**21,6**	60,6	23,8	56,1	26,0	51,5	28,1
	4	80,8	15,6	75,4	18,0	71,3	19,8	66,9	21,8	62,3	24,1	57,7	26,2	-	-
	5	83,0	15,8	77,5	18,2	73,3	20,0	68,8	22,1	64,0	24,3	59,3	26,5	-	-
	6	85,2	15,9	79,6	18,3	75,2	20,2	70,6	22,3	65,7	24,6	60,8	26,8	-	-
	7	87,4	16,1	81,6	18,5	77,2	20,4	72,4	22,5	67,4	24,8	62,4	27,0	-	-
	8	89,8	16,3	83,8	18,7	79,3	20,6	74,4	22,7	69,2	25,0	64,1	27,3	-	-
80	1	82,0	18,1	76,5	20,8	72,3	22,9	67,9	25,3	63,2	27,9	58,5	30,4	53,7	32,9
	2	84,2	18,3	78,6	21,0	74,3	23,2	69,8	25,5	64,9	28,1	60,1	30,7	55,2	33,2
	3	86,7	18,5	80,9	21,2	76,5	23,4	**71,8**	**25,8**	66,8	28,4	61,9	31,0	56,8	33,5
	4	89,1	18,7	83,2	21,5	78,7	23,7	73,8	26,1	68,7	28,8	63,6	31,3	-	-
	5	91,6	18,9	85,5	21,7	80,8	23,9	75,9	26,3	70,6	29,0	65,4	31,7	-	-
	6	94,0	19,0	87,8	21,9	83,0	24,1	77,9	26,6	72,5	29,3	67,1	32,0	-	-
	7	96,4	19,2	90,0	22,1	85,1	24,4	79,9	26,9	74,3	29,6	68,8	32,3	-	-
	8	99,0	19,4	92,4	22,3	87,4	24,6	82,0	27,1	76,3	29,9	70,7	32,6	-	-
90	1	98,7	20,6	92,2	23,7	87,1	26,1	81,8	28,7	76,1	31,7	70,5	34,5	64,7	37,3
	2	101	20,8	94,7	23,9	89,6	26,3	84,0	29,0	78,2	32,0	72,4	34,9	66,5	37,7
	3	104	21,0	97,5	24,1	92,2	26,6	**86,5**	**29,3**	80,5	32,3	74,5	35,2	68,5	38,1
	4	107	21,2	100	24,4	94,8	26,9	89,0	29,6	82,8	32,7	76,7	35,6	-	-
	5	110	21,4	103	24,6	97,4	27,1	91,4	29,9	85,0	33,0	78,8	36,0	-	-
	6	113	21,6	106	24,9	100	27,4	93,8	30,2	87,3	33,3	80,9	36,3	-	-
	7	116	21,8	108	25,1	103	27,7	96,2	30,5	89,5	33,6	82,9	36,7	-	-
	8	119	22,0	111	25,4	105	27,9	98,8	30,8	92,0	34,0	85,2	37,0	-	-
100	1	110	23,0	102	26,5	96,7	29,2	90,8	32,2	84,4	35,5	78,2	38,7	71,8	41,8
	2	113	23,2	105	26,7	99,4	29,4	93,3	32,5	86,8	35,8	80,4	39,0	73,8	42,2
	3	116	23,5	108	27,0	102	29,7	**96,0**	**32,8**	89,3	36,2	82,7	39,4	76,0	42,6
	4	119	23,7	111	27,3	105	30,1	98,7	33,2	91,8	36,6	85,1	39,8	-	-
	5	122	24,0	114	27,6	108	30,4	101	33,5	94,4	36,9	87,4	40,2	-	-
	6	126	24,2	117	27,8	111	30,7	104	33,8	96,9	37,3	89,7	40,6	-	-
	7	129	24,4	120	28,1	114	31,0	107	34,2	99,4	37,7	92,0	41,0	-	-
	8	132	24,7	124	28,4	117	31,3	110	34,5	102	38,0	94,5	41,4	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Mod. 115-200

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	1	122	26,0	114	29,9	108	32,9	101	36,3	94,1	40,0	87,2	43,6	80,1	47,1
	2	126	26,2	117	30,2	111	33,2	104	36,6	96,7	40,4	89,6	44,0	82,3	47,6
	3	129	26,5	121	30,5	114	33,6	**107**	**37,0**	100	40,8	92,2	44,5	84,7	48,1
	4	133	26,8	124	30,8	117	33,9	110	37,4	102	41,2	94,8	45,0	-	-
	5	136	27,0	127	31,1	120	34,3	113	37,8	105	41,6	97,4	45,4	-	-
	6	140	27,3	131	31,4	124	34,6	116	38,2	108	42,1	100	45,9	-	-
	7	144	27,6	134	31,7	127	34,9	119	38,5	111	42,5	103	46,3	-	-
	8	148	27,8	138	32,0	130	35,3	122	38,9	114	42,9	105	46,8	-	-
130	1	135	29,3	126	33,7	119	37,2	112	41,0	104	45,2	96,1	49,3	88,3	53,3
	2	138	29,6	129	34,1	122	37,5	115	41,4	107	45,6	98,8	49,7	90,8	53,8
	3	142	29,9	133	34,4	126	37,9	**118**	**41,8**	110	46,1	102	50,2	93,4	54,3
	4	146	30,2	137	34,8	129	38,3	121	42,3	113	46,6	105	50,8	-	-
	5	151	30,5	141	35,1	133	38,7	125	42,7	116	47,0	107	51,3	-	-
	6	155	30,8	144	35,5	136	39,1	128	43,1	119	47,5	110	51,8	-	-
	7	158	31,1	148	35,8	140	39,5	131	43,5	122	48,0	113	52,3	-	-
	8	163	31,4	152	36,2	144	39,9	135	44,0	125	48,4	116	52,8	-	-
145	1	153	33,6	143	38,7	135	42,6	127	47,0	118	51,8	109	56,4	100	61,0
	2	157	33,9	147	39,0	139	43,0	130	47,4	121	52,3	112	57,0	103	61,6
	3	162	34,3	151	39,4	143	43,4	**134**	**47,9**	125	52,8	115	57,6	106	62,2
	4	166	34,6	155	39,9	147	43,9	138	48,4	128	53,4	119	58,2	-	-
	5	171	35,0	160	40,3	151	44,4	142	48,9	132	53,9	122	58,8	-	-
	6	175	35,3	164	40,7	155	44,8	145	49,4	135	54,4	125	59,4	-	-
	7	180	35,7	168	41,1	159	45,2	149	49,9	139	55,0	128	59,9	-	-
	8	185	36,0	173	41,5	163	45,7	153	50,4	142	55,5	132	60,5	-	-
160	1	170	37,0	159	42,6	150	47,0	141	51,8	131	57,1	121	62,2	112	67,3
	2	175	37,4	163	43,0	154	47,4	145	52,3	135	57,6	125	62,8	115	67,9
	3	180	37,8	168	43,5	159	47,9	**149**	**52,8**	139	58,2	128	63,4	118	68,6
	4	185	38,2	173	43,9	163	48,4	153	53,4	143	58,8	132	64,1	-	-
	5	190	38,6	177	44,4	168	48,9	157	53,9	146	59,4	136	64,8	-	-
	6	195	39,0	182	44,8	172	49,4	162	54,5	150	60,0	139	65,4	-	-
	7	200	39,3	187	45,3	177	49,9	166	55,0	154	60,6	143	66,1	-	-
	8	206	39,7	192	45,7	181	50,4	170	55,5	158	61,2	147	66,7	-	-
180	1	197	40,3	184	46,4	174	51,1	164	56,4	152	62,2	141	67,8	129	73,3
	2	203	40,7	189	46,9	179	51,6	168	56,9	156	62,7	145	68,4	133	74,0
	3	209	41,1	195	47,3	184	52,2	**173**	**57,5**	161	63,4	149	69,1	137	74,7
	4	215	41,6	200	47,9	190	52,7	178	58,1	166	64,1	153	69,9	-	-
	5	221	42,0	206	48,3	195	53,3	183	58,7	170	64,7	158	70,6	-	-
	6	227	42,4	211	48,8	200	53,8	188	59,3	175	65,4	162	71,3	-	-
	7	232	42,8	217	49,3	205	54,3	192	59,9	179	66,0	166	72,0	-	-
	8	239	43,3	223	49,8	211	54,8	198	60,5	184	66,6	170	72,7	-	-
200	1	219	45,8	205	52,7	193	58,1	182	64,0	169	70,6	156	77,0	144	83,2
	2	225	46,2	210	53,2	199	58,6	187	64,6	174	71,2	161	77,7	148	84,0
	3	232	46,7	216	53,8	205	59,2	**192**	**65,3**	179	72,0	165	78,5	152	84,8
	4	238	47,2	222	54,3	210	59,9	197	66,0	184	72,8	170	79,3	-	-
	5	245	47,7	229	54,9	216	60,5	203	66,7	189	73,5	175	80,1	-	-
	6	251	48,2	235	55,4	222	61,1	208	67,3	194	74,2	179	80,9	-	-
	7	258	48,7	241	56,0	228	61,7	214	68,0	199	75,0	184	81,7	-	-
	8	265	49,1	247	56,5	234	62,3	219	68,7	204	75,7	189	82,5	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

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

MOD.	Tc	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		-6		-2		2		6		9		12		15	
		kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa
50	35	39,4	12,0	45,2	12,1	49,4	12,3	52,5	12,3	56,3	12,5	60,2	12,6	64,4	12,8
	40	39,2	13,3	44,9	13,4	49,1	13,6	52,3	13,7	56,0	13,8	59,9	14,0	64,1	14,2
	45	39,0	14,8	44,7	14,9	48,9	15,1	52,0	15,2	55,7	15,4	59,6	15,6	63,7	15,7
	50	38,7	16,5	44,4	16,6	48,5	16,8	**51,6**	**16,9**	55,3	17,1	59,2	17,3	63,3	17,5
	55	38,4	18,3	44,1	18,4	48,2	18,7	51,2	18,8	55,0	19,0	58,8	19,2	62,9	19,4
60	35	42,9	13,4	49,2	13,5	53,8	13,6	57,2	13,7	61,4	13,9	65,6	14,0	70,2	14,2
	40	42,7	14,8	48,9	14,9	53,5	15,1	56,9	15,2	61,0	15,4	65,3	15,6	69,8	15,7
	45	42,5	16,5	48,7	16,6	53,2	16,8	56,6	16,9	60,7	17,1	64,9	17,3	69,4	17,5
	50	42,2	18,3	48,3	18,4	52,8	18,7	**56,2**	**18,8**	60,3	19,0	64,4	19,2	68,9	19,5
	55	41,9	20,4	48,0	20,5	52,5	20,8	56,2	20,9	59,9	21,1	64,0	21,4	68,5	21,6
70	35	50,1	15,1	57,4	15,2	62,8	15,4	66,8	15,5	71,6	15,7	76,6	15,8	81,9	16,0
	40	49,8	16,7	57,1	16,8	62,5	17,1	66,4	17,2	71,3	17,4	76,2	17,6	81,5	17,8
	45	49,6	18,6	56,8	18,7	62,1	19,0	66,1	19,1	70,8	19,3	75,7	19,5	81,0	19,7
	50	49,2	20,7	56,4	20,8	61,7	21,1	**65,6**	**21,2**	70,4	21,4	75,2	21,7	80,5	21,9
	55	48,9	23,0	56,0	23,1	61,3	23,4	65,1	23,6	69,9	23,8	74,7	24,1	79,9	24,4
80	35	56,4	17,2	64,7	17,3	70,7	17,5	75,2	17,6	80,7	17,8	86,3	18,0	92,3	18,2
	40	56,1	19,0	64,3	19,1	70,4	19,4	74,8	19,5	80,3	19,7	85,8	20,0	91,8	20,2
	45	55,8	21,1	64,0	21,3	70,0	21,6	74,4	21,7	79,8	21,9	85,3	22,2	91,3	22,4
	50	55,4	23,5	63,5	23,6	69,5	24,0	**73,9**	**24,1**	79,3	24,4	84,7	24,7	90,7	24,9
	55	55,1	26,1	63,1	26,3	69,0	26,6	73,4	26,8	78,7	27,1	84,1	27,4	90,0	27,7
90	35	67,7	21,0	77,5	21,1	84,8	21,4	90,2	21,5	96,7	21,8	103	22,0	111	22,3
	40	67,3	23,3	77,1	23,4	84,4	23,7	89,7	23,9	96,2	24,1	103	24,4	110	24,7
	45	66,9	25,9	76,7	26,0	83,9	26,4	89,2	26,5	95,7	26,9	102	27,2	109	27,5
	50	66,5	28,8	76,2	28,9	83,3	29,3	**88,6**	**29,5**	95,0	29,8	102	30,2	109	30,5
	55	66,0	32,0	75,6	32,2	82,7	32,6	88,0	32,8	94,4	33,2	101	33,6	108	33,9
100	35	76,2	23,4	87,3	23,5	95,5	23,8	102	24,0	109	24,2	116	24,5	125	24,8
	40	75,8	25,9	86,9	26,0	95,0	26,4	101	26,5	108	26,9	116	27,2	124	27,5
	45	75,4	28,8	86,4	28,9	94,5	29,3	100	29,5	108	29,9	115	30,2	123	30,5
	50	74,9	32,0	85,8	32,2	93,8	32,6	**99,8**	**32,8**	107	33,2	114	33,6	122	33,9
	55	74,3	35,6	85,2	35,8	93,2	36,3	99,1	36,5	106	36,9	114	37,3	122	37,7
115	35	84,0	25,9	96,3	26,1	105	26,4	112	26,6	120	26,9	128	27,2	137	27,5
	40	83,6	28,7	95,8	28,9	105	29,3	111	29,5	119	29,8	128	30,1	137	30,5
	45	83,1	31,9	95,2	32,1	104	32,6	111	32,8	119	33,1	127	33,5	136	33,9
	50	82,5	35,5	94,6	35,7	103	36,2	**110**	**36,4**	118	36,8	126	37,2	135	37,7
	55	81,9	39,5	93,9	39,7	103	40,2	109	40,5	117	40,9	125	41,4	134	41,9
130	35	92,4	29,0	106	29,2	116	29,6	123	29,8	132	30,1	141	30,5	151	30,8
	40	91,9	32,2	105	32,4	115	32,8	123	33,0	131	33,4	141	33,8	150	34,2
	45	91,4	35,8	105	36,0	115	36,5	122	36,7	131	37,1	140	37,6	149	38,0
	50	90,8	39,8	104	40,0	114	40,6	**121**	**40,8**	130	41,3	139	41,7	148	42,2
	55	90,1	44,2	103	44,5	113	45,1	120	45,4	129	45,9	138	46,4	147	46,9
145	35	106	33,5	122	33,7	133	34,2	141	34,4	152	34,8	162	35,2	174	35,6
	40	106	37,2	121	37,4	132	37,9	141	38,1	151	38,6	161	39,0	173	39,4
	45	105	41,3	120	41,6	132	42,1	140	42,4	150	42,9	160	43,4	172	43,9
	50	104	45,9	119	46,2	131	46,8	**139**	**47,1**	149	47,6	159	48,2	171	48,7
	55	104	51,1	119	51,4	130	52,1	138	52,4	148	53,0	158	53,6	169	54,2
160	35	115	37,1	132	37,3	145	37,8	154	38,0	165	38,5	176	38,9	189	39,4
	40	115	41,1	131	41,3	144	41,9	153	42,2	164	42,6	175	43,1	188	43,6
	45	114	45,7	131	46,0	143	46,6	152	46,9	163	47,4	174	48,0	187	48,5
	50	113	50,8	130	51,1	142	51,8	**151**	**52,1**	162	52,7	173	53,3	185	53,9
	55	112	56,5	129	56,8	141	57,6	150	57,9	161	58,6	172	59,3	184	59,9
180	35	136	40,2	156	40,4	170	40,9	181	41,2	194	41,7	208	42,1	222	42,6
	40	135	44,5	155	44,8	170	45,4	180	45,6	193	46,2	207	46,7	221	47,2
	45	134	49,5	154	49,8	169	50,5	179	50,7	192	51,3	206	51,9	220	52,5
	50	134	55,0	153	55,3	167	56,1	**178**	**56,4**	191	57,1	204	57,7	218	58,4
	55	133	61,1	152	61,5	166	62,3	177	62,7	190	63,4	203	64,2	217	64,9
200	35	150	45,4	172	45,7	188	46,3	200	46,6	214	47,1	229	47,7	245	48,2
	40	149	50,3	171	50,6	187	51,3	198	51,6	213	52,2	228	52,8	243	53,4
	45	148	56,0	170	56,3	186	57,1	197	57,4	212	58,1	226	58,7	242	59,4
	50	147	62,2	169	62,6	184	63,4	**196**	**63,8**	210	64,5	225	65,3	240	66,0
	55	146	69,2	167	69,6	183	70,5	195	70,9	209	71,7	223	72,6	239	73,4

Tc= Condensation temperature in °C (Dew point) **kWt =** heating output (kW). **kWa =** Power input of compressors (kW)

NOTE

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Technical specifications of unit ASS Extra low noise version

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph+N - 50 Hz												V-f-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1)	50,1	54,5	63,6	-	84,5	93,8	104	116	131	-	169	-	kW
Compressors power input (1)	17,5	19,8	22,3	-	30,2	33,8	38,2	43,1	49,4	-	59,3	-	kW
EER	2,87	2,75	2,85	-	2,80	2,77	2,73	2,68	2,65	-	2,84	-	-
Total power input (1)	19,3	21,6	24,1	-	33,8	37,4	41,8	46,7	54,8	-	66,5	-	kW
Total EER	2,60	2,52	2,64	-	2,50	2,50	2,49	2,47	2,39	-	2,54	-	-
Heating capacity (2)	50,5	55,1	64,3	-	86,8	97,9	107	119	136	-	175	-	kW
Compressors power input (2)	17,0	18,9	21,3	-	29,6	33,0	36,5	41,0	47,4	-	56,7	-	kW
COP	2,97	2,92	3,02	-	2,93	2,97	2,94	2,90	2,87	-	3,08	-	-
Total power input (2)	18,8	20,7	23,1	-	31,4	36,6	40,1	44,6	52,8	-	63,9	-	kW
Total COP	2,69	2,66	2,78	-	2,76	2,68	2,67	2,67	2,58	-	2,74	-	-

Compressor

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

Fan

Type	Axial												-
Quantity	3				2				3		4		n°
Maximum rotational speed	900												rpm
Total air flow rate	19367	19367	18733	-	27640	27640	31627	31627	41460	-	55280	-	m^3/h
Power input	1,8				3,6				5,4		7,2		kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3,38				4,72		5,90				7,41		m^2

Electrical Data

Standard Unit

Total maximum power input [FLA]	48,2	50,9	58,3	-	76,0	81,5	89,9	98,3	117	-	150	-	A
Total maximum power input [FLI]	25,5	27,7	31,1	-	43,6	49,2	53,9	58,6	69,4	-	90,8	-	kW
Total maximum starting current [MIC]	146	147	173	-	265	270	317	325	368	-	470	-	A

NOTES:
(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.
(2): Data referred to condensation temperature : 50°C (Dew point), outdoor air temperature 7°C D.B., relative humiding 87% (6°C W.B.). Superheating and subcooling 5°K.

Standard performances in cooling mode ASS Extra low noise version

Mod. 50-100

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	1	57,2	12,3	53,4	14,1	50,5	15,6	47,4	17,2	44,1	18,9	40,8	20,6	37,5	22,3
	2	58,8	12,4	54,9	14,3	51,9	15,7	48,7	17,3	45,3	19,1	41,9	20,8	38,5	22,5
	3	60,5	12,5	56,5	14,4	53,4	15,9	**50,1**	**17,5**	46,6	19,3	43,2	21,0	39,7	22,7
	4	62,2	12,7	58,1	14,6	54,9	16,0	51,5	17,7	47,9	19,5	44,4	21,3	-	-
	5	63,9	12,8	59,7	14,7	56,4	16,2	52,9	17,9	49,3	19,7	45,6	21,5	-	-
	6	65,6	12,9	61,2	14,9	57,9	16,4	54,3	18,0	50,6	19,9	46,8	21,7	-	-
	7	67,3	13,0	62,8	15,0	59,4	16,5	55,7	18,2	51,9	20,1	48,0	21,9	-	-
	8	69,1	13,2	64,5	15,1	61,0	16,7	57,2	18,4	53,3	20,3	49,3	22,1	-	-
60	1	62,2	13,9	58,1	16,0	54,9	17,6	51,5	19,4	47,9	21,4	44,4	23,3	40,8	25,2
	2	63,9	14,0	59,7	16,1	56,4	17,8	53,0	19,6	49,3	21,6	45,6	23,6	41,9	25,5
	3	65,8	14,2	61,4	16,3	58,1	18,0	**54,5**	**19,8**	50,7	21,8	47,0	23,8	43,1	25,7
	4	67,7	14,3	63,2	16,5	59,7	18,2	56,0	20,0	52,1	22,1	48,3	24,1	-	-
	5	69,5	14,5	64,9	16,6	61,4	18,3	57,6	20,2	53,6	22,3	49,6	24,3	-	-
	6	71,4	14,6	66,6	16,8	63,0	18,5	59,1	20,4	55,0	22,5	50,9	24,5	-	-
	7	73,2	14,8	68,3	17,0	64,6	18,7	60,6	20,6	56,4	22,7	52,2	24,8	-	-
	8	75,2	14,9	70,2	17,1	66,4	18,9	62,3	20,8	57,9	22,9	53,7	25,0	-	-
70	1	72,6	15,6	67,8	18,0	64,1	19,8	60,1	21,9	55,9	24,1	51,8	26,3	47,6	28,4
	2	74,6	15,8	69,6	18,2	65,9	20,0	61,8	22,1	57,5	24,3	53,3	26,5	48,9	28,7
	3	76,8	16,0	71,7	18,4	67,8	20,2	**63,6**	**22,3**	59,2	24,6	54,8	26,8	50,3	29,0
	4	79,0	16,1	73,7	18,6	69,7	20,4	65,4	22,5	60,8	24,9	56,4	27,1	-	-
	5	81,1	16,3	75,7	18,7	71,6	20,7	67,2	22,8	62,5	25,1	57,9	27,4	-	-
	6	83,3	16,5	77,7	18,9	73,5	20,9	69,0	23,0	64,2	25,3	59,4	27,6	-	-
	7	85,4	16,6	79,7	19,1	75,4	21,1	70,7	23,2	65,8	25,6	61,0	27,9	-	-
	8	87,7	16,8	81,9	19,3	77,4	21,3	72,7	23,4	67,6	25,8	62,6	28,2	-	-
80	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	1	96,5	21,2	90,0	24,4	85,1	26,9	79,9	29,6	74,3	32,6	68,8	35,6	63,2	38,5
	2	99,1	21,4	92,5	24,6	87,5	27,1	82,1	29,9	76,4	32,9	70,8	35,9	65,0	38,8
	3	102	21,6	95,2	24,9	90,0	27,4	**84,5**	**30,2**	78,6	33,3	72,8	36,3	66,9	39,2
	4	105	21,8	97,9	25,1	92,6	27,7	86,9	30,5	80,8	33,7	74,9	36,7	-	-
	5	108	22,1	101	25,4	95,1	28,0	89,3	30,8	83,1	34,0	76,9	37,1	-	-
	6	111	22,3	103	25,6	97,7	28,2	91,7	31,1	85,3	34,3	79,0	37,4	-	-
	7	113	22,5	106	25,9	100	28,5	94,0	31,5	87,5	34,7	81,0	37,8	-	-
	8	117	22,7	109	26,1	103	28,8	96,5	31,8	89,8	35,0	83,2	38,2	-	-
100	1	107	23,7	100	27,3	94,5	30,1	88,7	33,1	82,5	36,5	76,4	39,8	70,2	43,1
	2	110	23,9	103	27,5	97,1	30,3	91,1	33,5	84,8	36,9	78,5	40,2	72,1	43,5
	3	113	24,2	106	27,8	100	30,7	**93,8**	**33,8**	87,3	37,3	80,8	40,6	74,2	43,9
	4	116	24,5	109	28,1	103	31,0	96,5	34,2	89,7	37,7	83,1	41,1	-	-
	5	120	24,7	112	28,4	106	31,3	99,1	34,5	92,2	38,0	85,4	41,5	-	-
	6	123	24,9	115	28,7	108	31,6	102	34,9	94,7	38,4	87,7	41,9	-	-
	7	126	25,2	118	29,0	111	31,9	104	35,2	97,1	38,8	89,9	42,3	-	-
	8	129	25,4	121	29,3	114	32,2	107	35,5	100	39,2	92,4	42,7	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Mod. 115-200

MOD.	Te	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	1	119	26,8	111	30,8	105	34,0	98,3	37,5	91,5	41,3	84,7	45,0	77,8	48,7
	2	122	27,1	114	31,1	108	34,3	101	37,8	94,0	41,7	87,1	45,4	80,0	49,1
	3	126	27,3	117	31,4	111	34,6	**104**	**38,2**	96,8	42,1	89,6	45,9	82,3	49,6
	4	129	27,6	121	31,8	114	35,0	107	38,6	100	42,6	92,2	46,4	-	-
	5	133	27,9	124	32,1	117	35,4	110	39,0	102	43,0	94,7	46,9	-	-
	6	136	28,2	127	32,4	120	35,7	113	39,4	105	43,4	97,2	47,3	-	-
	7	140	28,5	130	32,7	123	36,1	116	39,8	108	43,8	100	47,8	-	-
	8	143	28,7	134	33,1	127	36,4	119	40,2	111	44,3	102	48,3	-	-
130	1	132	30,2	124	34,8	117	38,3	110	42,3	102	46,6	94,5	50,8	86,8	54,9
	2	136	30,5	127	35,1	120	38,7	113	42,7	105	47,0	97,1	51,3	89,2	55,4
	3	140	30,8	131	35,5	124	39,1	**116**	**43,1**	108	47,5	100	51,8	91,8	56,0
	4	144	31,2	134	35,9	127	39,5	119	43,6	111	48,0	103	52,4	-	-
	5	148	31,5	138	36,2	131	39,9	123	44,0	114	48,5	106	52,9	-	-
	6	152	31,8	142	36,6	134	40,3	126	44,4	117	49,0	108	53,4	-	-
	7	156	32,1	145	37,0	138	40,7	129	44,9	120	49,5	111	53,9	-	-
	8	160	32,4	149	37,3	141	41,1	133	45,3	123	50,0	114	54,5	-	-
145	1	150	34,7	140	39,9	132	43,9	124	48,4	115	53,4	107	58,2	98,0	62,9
	2	154	35,0	143	40,3	136	44,4	127	48,9	118	53,9	110	58,8	101	63,5
	3	158	35,3	148	40,7	140	44,8	**131**	**49,4**	122	54,4	113	59,4	104	64,2
	4	163	35,7	152	41,1	144	45,3	135	49,9	125	55,1	116	60,0	-	-
	5	167	36,1	156	41,5	148	45,8	138	50,4	129	55,6	119	60,6	-	-
	6	172	36,5	160	41,9	151	46,2	142	50,9	132	56,2	122	61,2	-	-
	7	176	36,8	164	42,4	155	46,7	146	51,4	136	56,7	126	61,8	-	-
	8	181	37,2	169	42,8	159	47,1	150	51,9	139	57,3	129	62,4	-	-
160	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	**-**	**-**	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	1	193	41,6	180	47,9	170	52,7	160	58,2	149	64,1	138	69,9	126	75,6
	2	198	42,0	185	48,3	175	53,2	164	58,7	153	64,7	142	70,5	130	76,3
	3	204	42,4	190	48,8	180	53,8	**169**	**59,3**	157	65,4	146	71,3	134	77,0
	4	210	42,9	196	49,4	185	54,4	174	60,0	162	66,1	150	72,0	-	-
	5	216	43,3	201	49,8	190	54,9	179	60,6	166	66,7	154	72,8	-	-
	6	221	43,8	207	50,3	195	55,5	183	61,2	171	67,4	158	73,5	-	-
	7	227	44,2	212	50,8	200	56,0	188	61,8	175	68,1	162	74,2	-	-
	8	233	44,6	218	51,3	206	56,6	193	62,4	180	68,7	166	74,9	-	-
200	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	**-**	**-**	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Te= evaporation temperature °C (Dew point) **kWf =** refrigerating power (kW). **kWa =** Power input of compressors (kW)

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in heating mode ASS Extra low noise version

MOD.	Tc	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		-6		-2		2		6		9		12		15	
		kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa	kWt	kWa
50	35	38,6	12,1	44,2	12,2	48,3	12,3	51,4	12,4	55,1	12,6	58,9	12,7	63,1	12,8
	40	38,4	13,4	44,0	13,5	48,1	13,7	51,1	13,8	54,9	13,9	58,6	14,1	62,7	14,2
	45	38,1	14,9	43,7	15,0	47,8	15,2	50,9	15,3	54,5	15,5	58,3	15,7	62,4	15,8
	50	37,9	16,6	43,4	16,7	47,5	16,9	**50,5**	**17,0**	54,2	17,2	57,9	17,4	61,9	17,6
	55	37,6	18,4	43,1	18,5	47,2	18,8	50,1	18,9	53,8	19,1	57,5	19,3	61,5	19,6
60	35	42,1	13,5	48,2	13,5	52,7	13,7	56,1	13,8	60,2	14,0	64,3	14,1	68,8	14,3
	40	41,9	14,9	48,0	15,0	52,5	15,2	55,8	15,3	59,8	15,5	64,0	15,6	68,5	15,8
	45	41,6	16,6	47,7	16,7	52,2	16,9	55,5	17,0	59,5	17,2	63,6	17,4	68,1	17,6
	50	41,3	18,4	47,4	18,5	51,8	18,8	**55,1**	**18,9**	59,1	19,1	63,2	19,3	67,6	19,6
	55	41,0	20,5	47,0	20,6	51,4	20,9	55,1	21,0	58,7	21,3	62,7	21,5	67,1	21,7
70	35	49,1	15,2	56,3	15,3	61,5	15,5	65,5	15,6	70,2	15,7	75,1	15,9	80,3	16,1
	40	48,8	16,8	56,0	16,9	61,2	17,1	65,1	17,2	69,8	17,4	74,7	17,6	79,9	17,8
	45	48,6	18,7	55,7	18,8	60,9	19,1	64,7	19,2	69,4	19,4	74,2	19,6	79,4	19,8
	50	48,2	20,8	55,3	20,9	60,5	21,2	**64,3**	**21,3**	69,0	21,5	73,7	21,8	78,9	22,0
	55	47,9	23,1	54,9	23,2	60,0	23,5	63,9	23,7	68,5	24,0	73,2	24,2	78,3	24,5
80	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	35	66,3	21,1	76,0	21,2	83,1	21,5	88,4	21,6	94,8	21,9	101	22,1	108	22,4
	40	65,9	23,4	75,6	23,5	82,7	23,8	87,9	24,0	94,3	24,2	101	24,5	108	24,8
	45	65,6	26,0	75,1	26,1	82,2	26,5	87,4	26,6	93,7	26,9	100	27,3	107	27,6
	50	65,1	28,9	74,6	29,0	81,6	29,4	**86,8**	**29,6**	93,1	29,9	99,5	30,3	106	30,6
	55	64,7	32,1	74,1	32,3	81,0	32,7	86,2	32,9	92,4	33,3	98,8	33,7	106	34,0
100	35	74,8	23,5	85,7	23,6	93,7	24,0	99,7	24,1	107	24,4	114	24,7	122	24,9
	40	74,4	26,0	85,2	26,2	93,2	26,6	99,1	26,7	106	27,0	114	27,3	122	27,6
	45	74,0	28,9	84,8	29,1	92,7	29,5	98,6	29,7	106	30,0	113	30,4	121	30,7
	50	73,4	32,2	84,2	32,4	92,1	32,8	**97,9**	**33,0**	105	33,4	112	33,8	120	34,1
	55	72,9	35,8	83,6	36,0	91,4	36,5	97,2	36,7	104	37,1	111	37,5	119	38,0
115	35	81,7	26,0	93,6	26,1	102	26,5	109	26,7	117	27,0	125	27,3	134	27,6
	40	81,3	28,8	93,2	29,0	102	29,4	108	29,5	116	29,9	124	30,2	133	30,6
	45	80,8	32,0	92,6	32,2	101	32,7	108	32,8	116	33,2	124	33,6	132	34,0
	50	80,3	35,6	92,0	35,8	101	36,3	**107**	**36,5**	115	36,9	123	37,3	131	37,8
	55	79,7	39,6	91,3	39,8	99,9	40,3	106	40,6	114	41,0	122	41,5	130	42,0
130	35	90,9	29,2	104	29,4	114	29,8	121	29,9	130	30,3	139	30,6	149	31,0
	40	90,4	32,3	104	32,5	113	33,0	121	33,2	129	33,6	138	33,9	148	34,3
	45	89,9	36,0	103	36,2	113	36,7	120	36,9	129	37,3	137	37,7	147	38,2
	50	89,3	40,0	102	40,2	112	40,8	**119**	**41,0**	128	41,5	136	41,9	146	42,4
	55	88,6	44,4	102	44,7	111	45,3	118	45,6	127	46,1	136	46,6	145	47,2
145	35	104	33,7	119	33,9	130	34,4	138	34,6	148	35,0	159	35,4	170	35,8
	40	103	37,4	118	37,6	130	38,1	138	38,4	148	38,8	158	39,2	169	39,7
	45	103	41,6	118	41,8	129	42,4	137	42,7	147	43,1	157	43,6	168	44,1
	50	102	46,2	117	46,5	128	47,1	**136**	**47,4**	146	47,9	156	48,5	167	49,0
	55	101	51,4	116	51,7	127	52,4	135	52,7	145	53,3	155	53,9	166	54,5
160	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	35	134	40,4	153	40,6	168	41,2	178	41,4	191	41,9	204	42,4	219	42,8
	40	133	44,7	152	45,0	167	45,6	177	45,9	190	46,4	203	46,9	217	47,5
	45	132	49,7	151	50,0	166	50,7	176	51,0	189	51,6	202	52,2	216	52,8
	50	131	55,3	150	55,6	165	56,4	**175**	**56,7**	188	57,4	201	58,0	215	58,7
	55	130	61,5	149	61,8	163	62,7	174	63,0	186	63,8	199	64,5	213	65,2
200	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Tc= Condensation temperature in °C (Dew point) **kWt =** heating output (kW). **kWa =** Power input of compressors (kW)

NOTE

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Version with Condensing Desuperheater (VDM)

Recovery heat exchanger specifications

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

Unit specification

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

NOTES:

(1): Data referred to evaporation temperature : 3°C (Dew point), outdoor air temperature 35°C D.B. superheating and subcooling 5°K.

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

Recovered heating capacity in Version with Condensing Desuperheater (VDM)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kWt_r= RECOVERED HEATING CAPACITY [KW]				
50	30	12,4	14,2	16,3	18,6	21,2
	35	12,4	14,2	16,4	18,7	21,3
	40	12,2	13,9	16,0	18,3	20,8
	45	11,5	13,2	**15,2**	17,4	19,8
	50	10,6	12,1	13,9	15,9	18,1
	55	9,3	10,6	12,2	14,0	15,9
	60	7,6	8,8	10,1	11,5	13,1
	65	5,7	6,5	7,5	8,5	9,7
	70	3,3	3,8	4,4	5,0	5,7
55	30	13,9	15,9	18,2	20,8	23,6
	35	14,0	16,0	18,3	20,9	23,8
	40	13,7	15,7	17,9	20,4	23,2
	45	13,0	14,9	**17,0**	19,4	22,1
	50	11,9	13,7	16,4	17,8	20,2
	55	10,4	12,0	14,4	15,6	17,7
	60	8,6	9,9	11,9	12,9	14,6
	65	6,4	7,3	8,8	9,5	10,8
	70	3,8	4,3	5,2	5,6	6,4
60	30	15,9	18,2	20,8	23,7	27,0
	35	15,9	18,3	20,9	23,9	27,1
	40	15,6	17,9	20,4	23,3	26,5
	45	14,8	17,0	**19,4**	22,2	25,2
	50	13,6	15,6	17,8	20,3	23,1
	55	11,9	13,7	15,6	17,8	20,3
	60	9,8	11,3	12,9	14,7	16,7
	65	7,3	8,3	9,5	10,9	12,4
	70	4,3	4,9	5,6	6,4	7,3
70	30	18,7	21,5	24,6	28,2	32,0
	35	18,8	21,6	24,7	28,3	32,2
	40	18,3	21,1	24,2	27,6	31,4
	45	17,4	20,0	**22,9**	26,2	29,8
	50	15,9	18,3	21,0	24,0	27,3
	55	13,9	16,0	18,4	21,0	23,9
	60	11,4	13,2	15,1	17,2	19,6
	65	8,4	9,7	11,1	12,7	14,5
	70	4,9	5,7	6,5	7,4	8,4
90	30	21,7	24,8	28,2	32,3	36,7
	35	21,8	24,9	28,3	32,4	36,8
	40	21,2	24,3	27,6	31,6	36,0
	45	20,1	23,0	**26,2**	30,0	34,1
	50	18,4	21,1	24,0	27,4	31,2
	55	16,1	18,5	21,0	24,0	27,3
	60	13,2	15,2	17,2	19,7	22,4
	65	9,8	11,2	12,7	14,5	16,5
	70	5,7	6,5	7,4	8,5	9,6
100	30	24,4	27,8	31,5	35,8	40,5
	35	24,5	27,9	31,6	35,9	40,6
	40	23,9	27,2	30,8	35,0	39,6
	45	22,6	25,7	**29,2**	33,2	37,5
	50	20,7	23,5	26,7	30,3	34,3
	55	18,1	20,6	23,3	26,5	30,0
	60	14,8	16,8	19,1	21,7	24,5
	65	10,8	12,3	14,0	15,9	18,0
	70	6,2	7,0	8,0	9,1	10,3

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

kWt_r = RECOVERED HEATING CAPACITY [KW]

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

NOISE LEVELS

The noise levels refer to units operating in the nominal conditions (water temperature: inlet: 12°C - outlet: 7°C, Outdoor air temperature 35°C), due to a change of external air temperature noise levels may change to ensure proper functioning of the unit within operating range.
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 $2x10^{-12}$ W.
The **Total** sound power level in **dB(A)** measured in compliance with **ISO 9614** standards, is certified according to the **Eurovent** certification program.
Eurovent certification **(E)** exclusively refers to the **Total** Sound Power in **db(A)**, which is therefore the only binding acoustic specification (the values of the Octave bands in the table are indicative).
SPL = Sound pressure levels, with reference to $2x10^{-5}$ 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 and the units operating in nominal conditions in the cooling mode.

AB Standard version

Mod.	SWL (dB) (E)										SPL (dBA)		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
50	94,2	91,9	89,4	85,3	81,0	74,6	67,0	58,6	97	87	69	60	55
60	94,2	91,9	89,4	85,3	81,0	74,6	67,0	58,6	97	87	69	60	55
70	94,2	91,9	89,4	85,3	81,0	74,6	67,0	58,6	97	87	69	60	55
80	94,2	91,9	89,4	85,3	81,0	74,6	67,0	58,6	97	87	69	60	55
90	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	70	61	56
100	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	70	61	56
115	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	70	61	56
130	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	70	61	56
145	96,1	92,2	91,3	89,2	86,1	81,0	74,4	66,9	99	91	72	64	59
160	96,1	92,2	91,3	89,2	86,1	81,0	74,4	66,9	99	91	72	64	59
180	96,4	94,1	92,6	90,0	87,2	81,8	75,2	66,8	100	92	73	65	60
200	96,4	94,1	92,6	90,0	87,2	81,8	75,2	66,8	100	92	73	65	60

AB Standard version + Low noise Kit KS

Mod.	SWL (dB) (E)										SPL (dBA)		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
50	91,2	88,9	86,4	82,3	78,0	71,6	64,0	55,6	94	84	66	57	52
60	91,2	88,9	86,4	82,3	78,0	71,6	64,0	55,6	94	84	66	57	52
70	91,2	88,9	86,4	82,3	78,0	71,6	64,0	55,6	94	84	66	57	52
80	91,2	88,9	86,4	82,3	78,0	71,6	64,0	55,6	94	84	66	57	52
90	92,2	89,9	87,4	83,3	79,0	72,6	65,0	56,6	95	85	67	58	53
100	92,2	89,9	87,4	83,3	79,0	72,6	65,0	56,6	95	85	67	58	53
115	92,2	89,9	87,4	83,3	79,0	72,6	65,0	56,6	95	85	67	58	53
130	92,2	89,9	87,4	83,3	79,0	72,6	65,0	56,6	95	85	67	58	53
145	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	69	61	56
160	92,4	90,1	88,6	86,0	83,2	77,8	71,2	62,8	96	88	69	61	56
180	95,4	93,0	90,8	86,3	83,4	79,8	71,3	62,0	99	89	70	62	57
200	95,4	93,0	90,8	86,3	83,4	79,8	71,3	62,0	99	89	70	62	57

AB Standard version + Low noise Kit KS

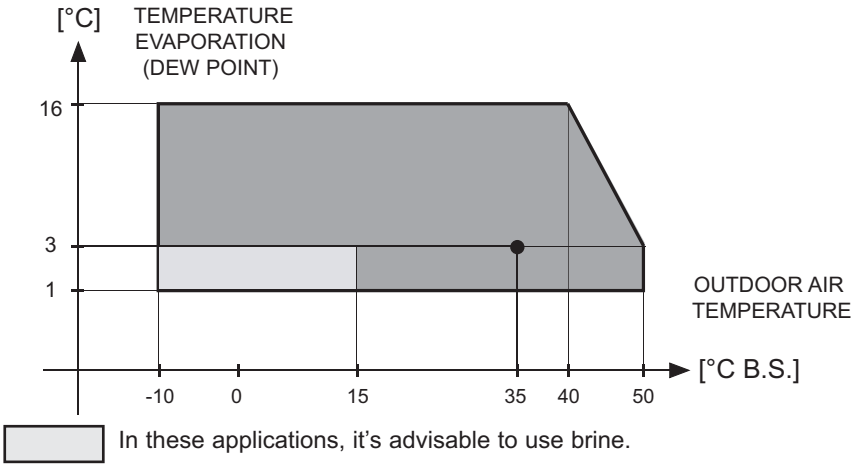
Mod.	SWL (dB) (E)										SPL (dBA)		
	Octave bands (Hz)								Total				
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	1m	5m	10m
50	84,4	87,3	83,6	78,8	75,3	68,8	60,2	51,3	91	81	63	54	49
60	84,4	87,3	83,6	78,8	75,3	68,8	60,2	51,3	91	81	63	54	49
70	84,4	87,3	83,6	78,8	75,3	68,8	60,2	51,3	91	81	63	54	49
80	-	-	-	-	-	-	-	-	-	-	-	-	-
90	85,4	88,3	84,6	79,8	76,3	69,8	61,2	52,3	92	82	64	55	50
100	85,4	88,3	84,6	79,8	76,3	69,8	61,2	52,3	92	82	64	55	50
115	85,4	88,3	84,6	79,8	76,3	69,8	61,2	52,3	92	82	64	55	50
130	85,4	88,3	84,6	79,8	76,3	69,8	61,2	52,3	92	82	64	55	50
145	92,2	89,9	87,4	83,3	79,0	72,6	65,0	56,6	95	85	66	58	53
160	-	-	-	-	-	-	-	-	-	-	-	-	-
180	92,4	90,0	87,8	83,3	80,4	76,8	68,3	59,0	96	86	67	59	54
200	-	-	-	-	-	-	-	-	-	-	-	-	-

OPERATING RANGE

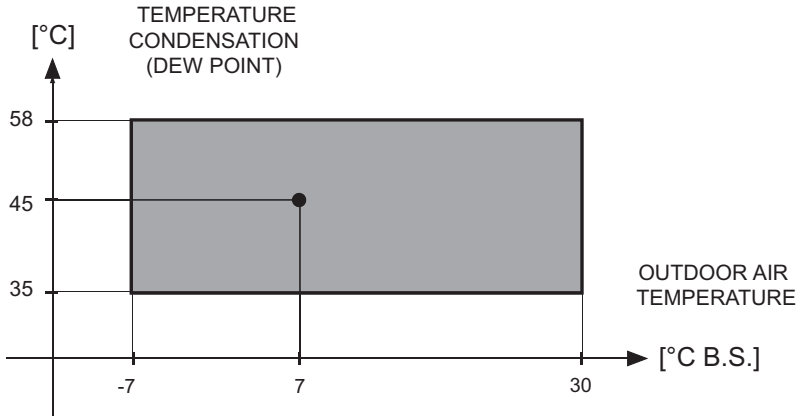
Operating range

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

COOLING MODE

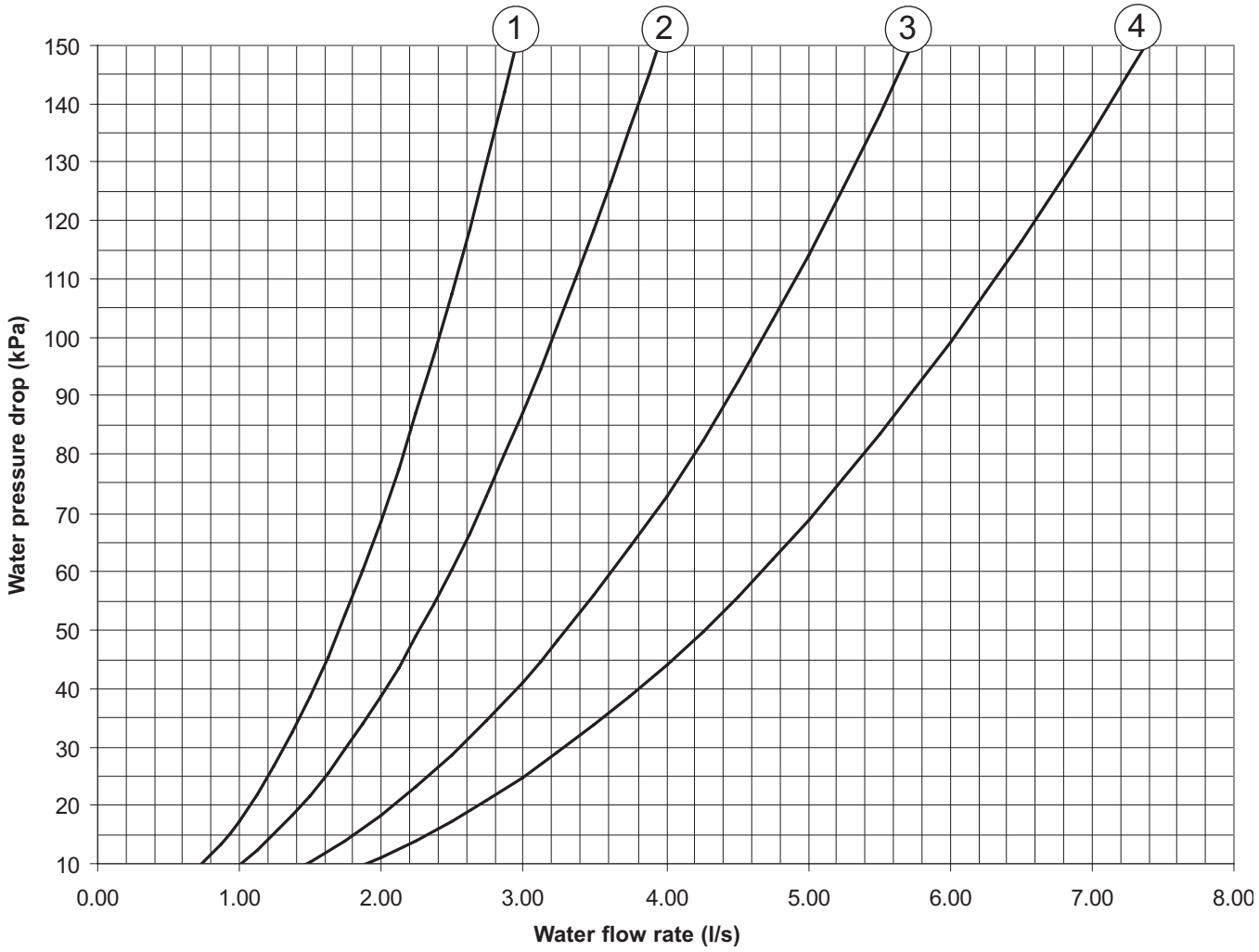


HEATING MODE



WATER PRESSURE DROP OF THE DESUPERHEATER

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



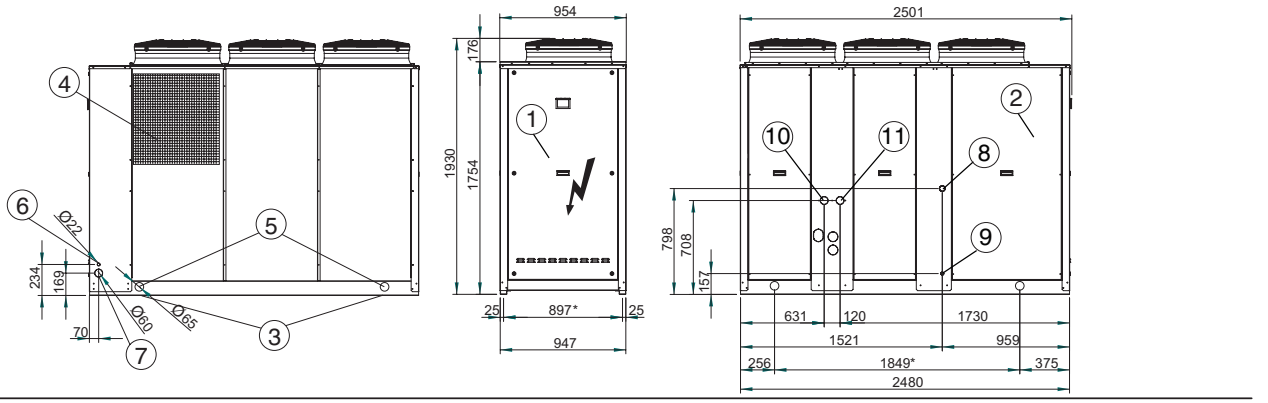
Limits to operation

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

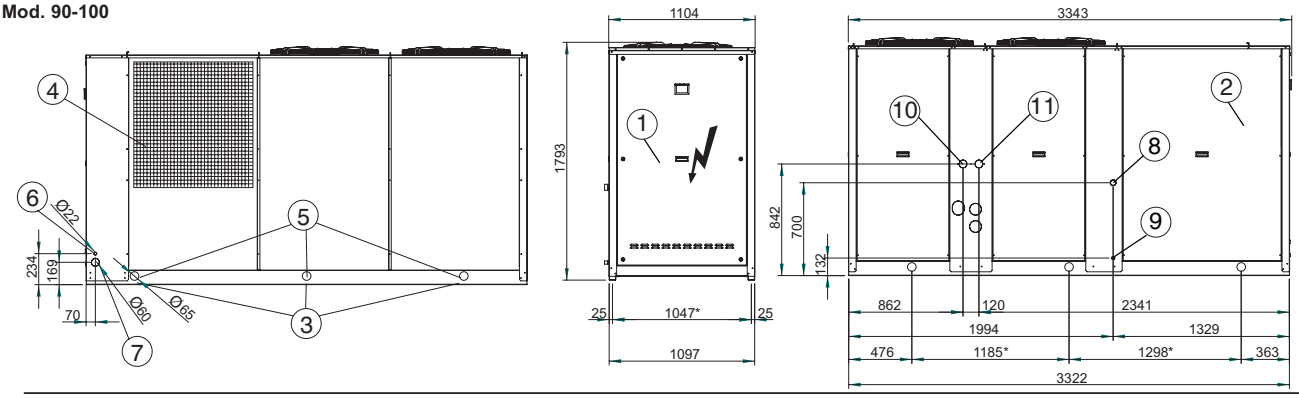
DIMENSIONAL DATA

Overall dimensions

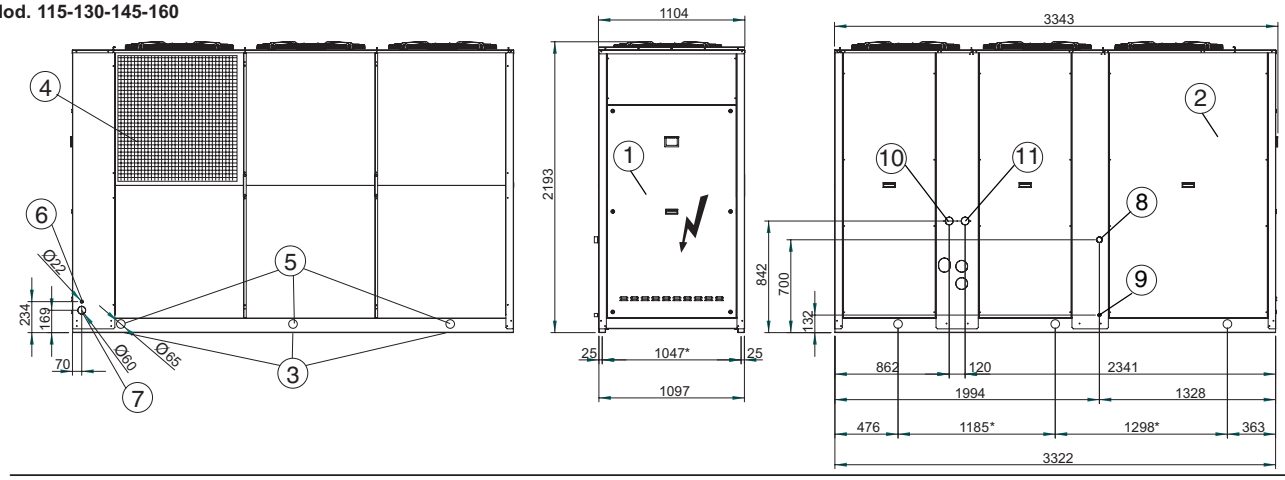
Mod. 50-60-70-80



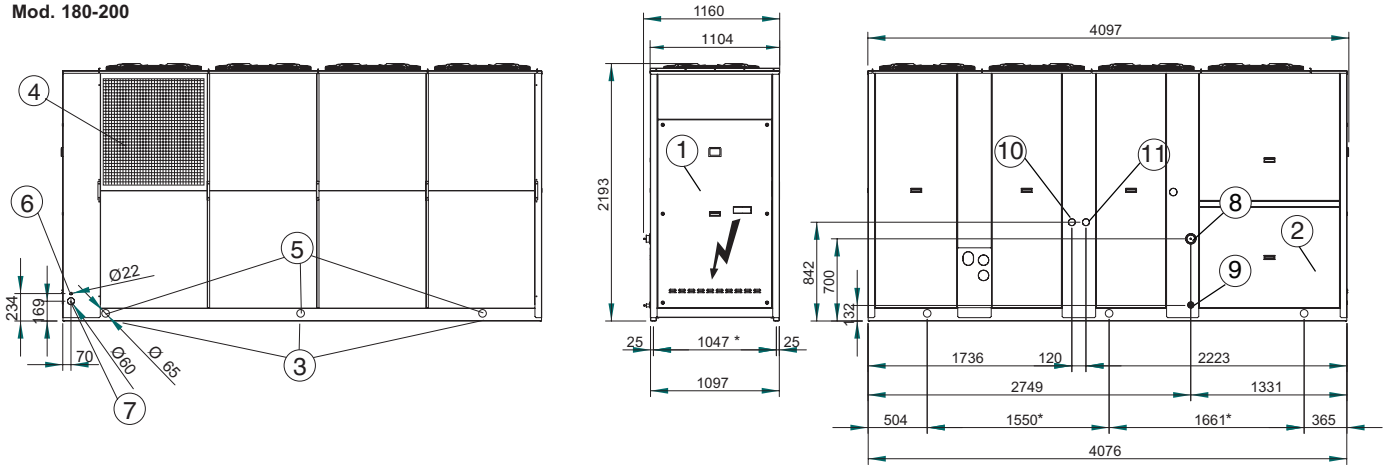
Mod. 90-100



Mod. 115-130-145-160



Mod. 180-200



DIMENSIONAL DATA

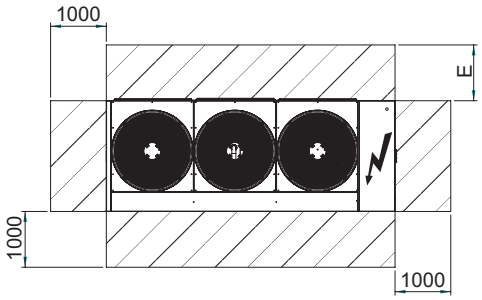
Description of the components

1 - Access panel to electric panel's power section
2 - Access panel to compressor compartment
3 - Vibration damper fixing holes (4 pcs)
4 - Coil protection grilles (accessory)
5 - 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 - GAS inlet pipe
9 - LIQUID outlet pipe
10 - Water inlet for Condensing Desuperheater (only VDM version)
11 - Water outlet for Condensing Desuperheater (only VDM version)
*: Center distance of vibration damper holes

Mod.	50-60-70-80	90-100-115-130-145-160-180-200	UM
8	35	54	mm
9	22	22	
10	1 1/4"	1 1/4"	"VIC
11			

Minimum space required for operation

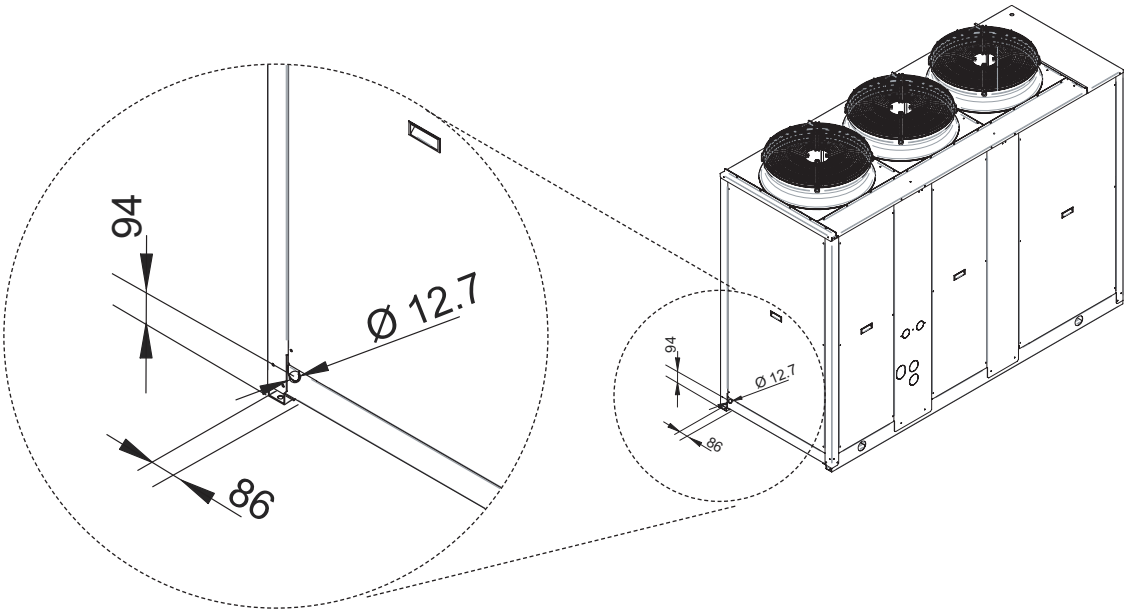
To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the figure.
This will ensure good air circulation, allow the unit to operate correctly and facilitate future maintenance work.
The distances must be doubled if the unit is to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



Modello	50-80	90-100	115-200
E [mm]	1600		2000

Position of condensate drain

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



WEIGHT DURING OPERATION AND TRANSPORT

Vibration-damper installation

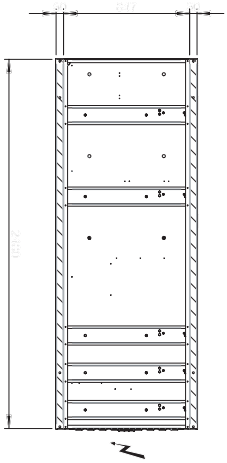
To prevent the operating unit from transmitting vibrations to the bearing structure, vibration dampening materials should be inserted under the bearing points.
The unit can be supplied with the rubber or spring vibration dampening accessory. This must be mounted by the installer.

Weight during operation and transport

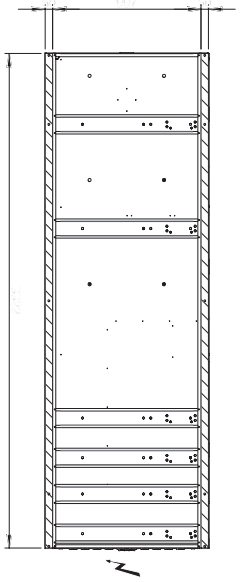
To correctly install the unit, comply with the measurements for the free area that must be left around the machine, as shown in the drawing.

AREA OF SUPPORT

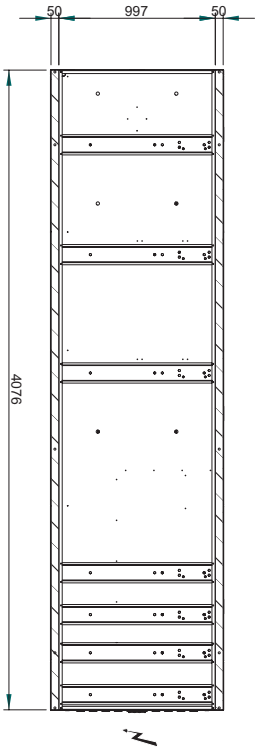
Mod. 50-60-70-80



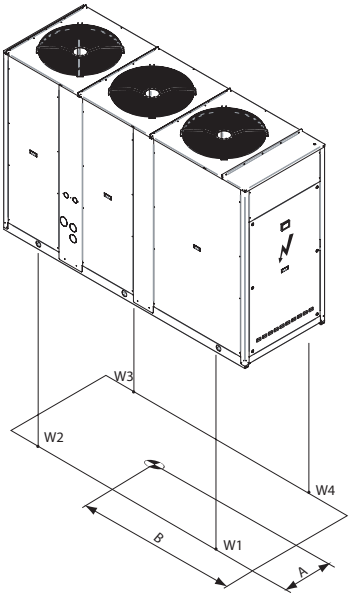
Mod. 90-100-115-130-145-160



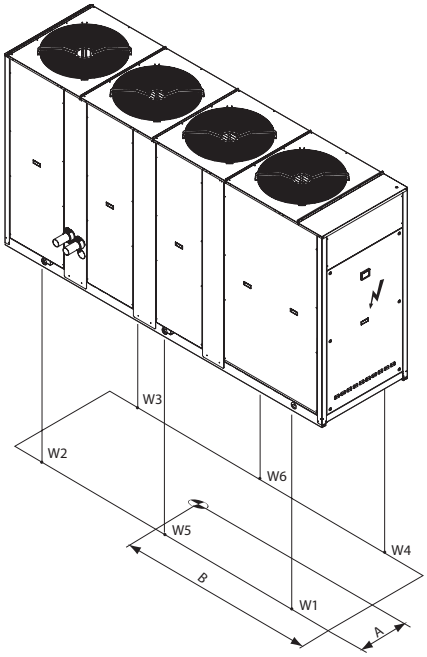
Mod. 180-200



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



Mod. 180-200



WEIGHT DURING OPERATION AND TRANSPORT

AB - Standard unit / AB - Standard unit + KS Low Noise Kit

AB - Standard unit / AB - Standard unit + KS Low Noise Kit

Version / Mod.	VBM (Condensing Standard unit)										VDM (Condensing Desuperheater unit)									
	Operation							Transport			Operation							Transport		
	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
IP - Heating mode																				
50	414	861	261	93	72	200	627	416	861	623	411	873	266	98	74	201	639	413	871	635
60	414	861	262	93	71	201	627	416	860	624	410	872	267	98	74	201	639	412	871	635
70	422	866	273	99	78	217	668	424	865	663	418	876	278	103	81	217	680	421	875	675
80	427	871	280	103	83	227	693	430	871	688	424	881	284	107	86	228	705	427	880	699
90	476	1182	358	176	133	271	939	478	1180	932	472	1193	364	183	136	271	953	475	1190	945
100	457	1133	413	186	131	291	1020	460	1130	1012	454	1143	418	192	133	291	1034	457	1140	1025
115	471	1151	445	207	154	331	1136	474	1149	1126	468	1161	451	214	157	331	1153	471	1158	1142
130	466	1140	463	211	153	337	1164	469	1138	1153	463	1150	470	218	156	337	1181	466	1147	1169
145	465	1130	490	219	159	355	1222	468	1128	1210	462	1140	496	226	162	355	1240	465	1137	1226
160	476	1139	499	227	172	377	1275	480	1137	1260	473	1148	505	234	175	378	1292	477	1145	1276
180	471	1368	484	329	245	360	1418	474	1368	1407	469	1374	490	337	248	361	1435	471	1373	1422
200	483	1378	487	337	262	378	1464	486	1378	1451	480	1384	493	344	265	379	1481	483	1383	1466
IR - Cooling mode																				
50	402	879	251	94	68	182	595	404	878	591	398	890	256	99	70	182	607	400	889	603
60	401	878	252	94	68	182	595	403	878	592	397	890	256	99	70	182	607	400	888	603
70	411	884	262	99	75	198	635	414	883	630	407	894	267	104	77	198	647	410	893	642
80	417	888	269	103	80	209	661	419	887	656	413	898	274	108	82	209	673	416	897	667
90	465	1201	346	176	128	250	900	467	1199	893	461	1212	351	183	130	251	915	464	1210	906
100	447	1148	401	185	125	270	981	449	1146	973	444	1159	406	192	128	270	995	446	1157	986
115	461	1166	432	206	147	308	1093	463	1164	1083	457	1176	438	213	150	308	1110	460	1173	1099
130	455	1154	450	210	147	314	1121	458	1152	1110	452	1164	456	217	150	314	1138	455	1162	1126
145	453	1143	477	219	151	330	1177	457	1141	1163	451	1153	483	226	154	331	1194	455	1150	1178
160	466	1152	484	225	164	352	1225	470	1150	1211	463	1162	490	233	167	353	1242	467	1159	1227
180	463	1389	467	329	236	335	1367	465	1389	1356	460	1395	473	337	239	336	1385	463	1394	1372
200	475	1399	470	336	253	354	1413	477	1399	1400	472	1404	476	344	256	355	1431	475	1404	1416

ASS - Extra Low noise Version

ASS - Extra Low noise Version

Version / Mod.	VBM (Condensing Standard unit)										VDM (Condensing Desuperheater unit)									
	Operation							Transport			Operation							Transport		
	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.	A	B	W1	W2	W3	W4	TOT.	A	B	TOT.
IP - Heating mode																				
50	430	877	259	97	80	214	649	432	877	646	426	888	264	101	82	214	662	429	887	657
60	430	877	260	97	80	214	650	432	876	646	426	887	265	101	82	214	662	428	886	658
70	432	876	272	101	84	226	684	434	875	679	428	886	277	106	86	226	696	431	885	691
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	491	1196	354	179	143	284	960	494	1194	952	487	1206	359	185	146	284	974	490	1204	966
100	472	1146	408	188	140	304	1040	475	1144	1032	469	1156	414	194	143	304	1055	471	1154	1046
115	489	1166	439	210	167	349	1165	492	1165	1155	485	1176	445	217	170	349	1182	488	1174	1171
130	483	1155	457	214	166	355	1193	486	1153	1182	480	1165	463	221	170	356	1210	483	1162	1198
145	481	1145	484	222	172	373	1251	485	1143	1238	478	1155	490	229	175	374	1268	482	1152	1254
160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	485	1386	478	335	263	375	1451	488	1386	1440	483	1391	484	342	266	376	1468	485	1391	1455
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IR - Cooling mode																				
50	419	895	249	97	76	195	617	421	895	614	415	906	254	102	79	195	630	417	905	625
60	419	894	249	97	76	195	618	421	894	614	415	905	254	102	78	195	630	417	904	626
70	422	894	261	102	81	207	651	424	894	646	418	904	266	107	83	207	663	421	903	658
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	481	1215	342	178	138	263	921	484	1213	913	477	1226	347	185	140	263	935	480	1223	927
100	462	1162	396	188	134	283	1002	465	1160	993	459	1173	401	194	137	284	1016	461	1170	1007
115	479	1181	426	209	160	326	1121	482	1180	1112	476	1191	432	216	163	326	1138	479	1189	1127
130	473	1170	444	214	160	332	1149	476	1168	1138	470	1180	450	221	163	333	1166	473	1177	1154
145	471	1159	470	222	164	349	1206	475	1156	1191	468	1168	477	229	168	349	1223	472	1165	1207
160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	477	1407	461	335	254	351	1400	480	1407	1389	474	1412	467	342	257	351	1418	477	1412	1405
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

RECEPTION AND POSITIONING

Inspections on arrival

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

Safety prescriptions

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

Handling

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

• Handling with a lift truck or similar

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

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

Fig.1

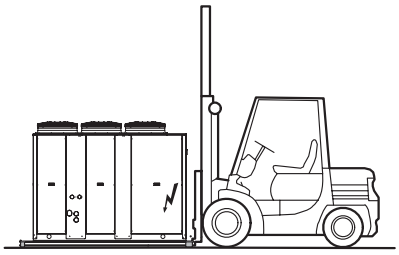


Fig.2

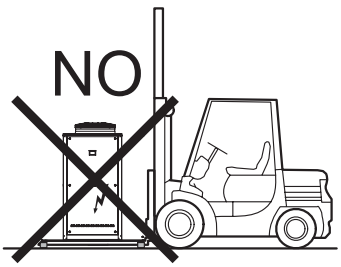
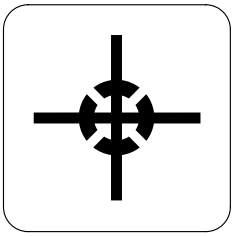
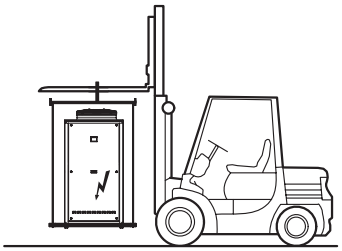


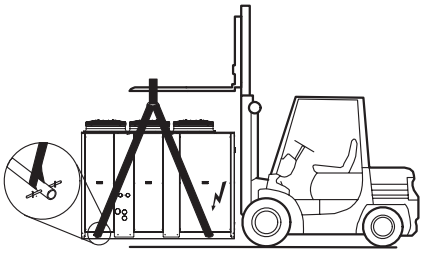
Fig.3



• Lifting and handling with a crane or similar

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





WARNING:
Before proceeding with the handling operations, read the information on the wrapping to ensure the safety of persons and property. Also be sure to:
• Handle the load with care
• Avoid stacking other objects on top of the unit

Storage

The units must be stored in a dry place sheltered from the run, rain, sand and wind.
The storage conditions are:
• Do not stack the units
• Maximum temperature = **60°C**
• Minimum temperature = **-10°C**
• Humidity = **90%**

ELECTRICAL CONNECTIONS

General rules

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

Structure of the electric panel

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

Composition of the system

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

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

ELECTRICAL CONNECTIONS

Electrical connections

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

Compressor specifications

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

Single Fan specifications

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	230 - 1 - 50				400 - 3 - 50							
FLA [A]	2,3				4,3							
LRA [A]	4,4				15,0							
FLI [kW]	0,5				2,0							

Summary specifications Fans

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	230 - 1 - 50				400 - 3 - 50							
FLA [A]	6,8				8,6				12,9		18,2	
LRA [A]	13,2				30,0				45,0		60,0	
FLI [kW]	1,6				4,0				6,0		8,0	

NOTES:
Values valid for **IP** and **IR** units, **BASIC** and **SILENCED** versions
FLA= Power draw at maximum tolerated conditions
LRA= Surge current
FLI= Electric power draw at maximum tolerated conditions

Summary tables (total values):

Unit

MOD.	50	60	70	80	90	100	115	130	145	160	180	200
Power supply [V-ph-Hz]	400 - 3 +N - 50											
FLA TOTALE [A]	48,2	50,9	58,3	68,6	76,0	81,5	89,9	98,3	117	131	150	165
FLI TOTALE [kW]	25,5	27,7	31,1	35,5	43,6	49,2	53,9	58,6	69,4	78,2	90,8	101
MIC TOTALE [A]	146	147	173	211	265	270	317	325	368	382	470	485

NOTES:
FLA= Power draw at maximum tolerated conditions
FLI= Surge current
MIC= Maximum surge current of the unit
Values relative to a **400V-3N~50Hz** power supply voltage rating

ELECTRICAL CONNECTIONS

1) Connection to the electricity main

• Feeder line;
The feeder line of the machine must follow a well defined route without interruptions. Run the line through the precut hole at the bottom of the right panel on the machine. It is advisable to use a cable gland, to secure the line to the machine structure. Now route the line inside the compressor compartment until it reaches the hole in the bottom of the electric panel. Here again, make sure you use an adequately sized cable clamp.
Connect the conductors straight to the input terminals of the main circuit-breaker of the machine.
• Powering system;
The power cables of the feeder line of the machine must come from a symmetric threephase voltage system complete with neutral conductor and separate protection conductor.

V= 400V ± 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.
• Neutral conductor:
The neutral conductor in the feeder line must be connected to the neutral conductor identified by the letter "**N**" corresponding to the fourth pole of the main panel circuit-breaker.

2) Electric panel

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

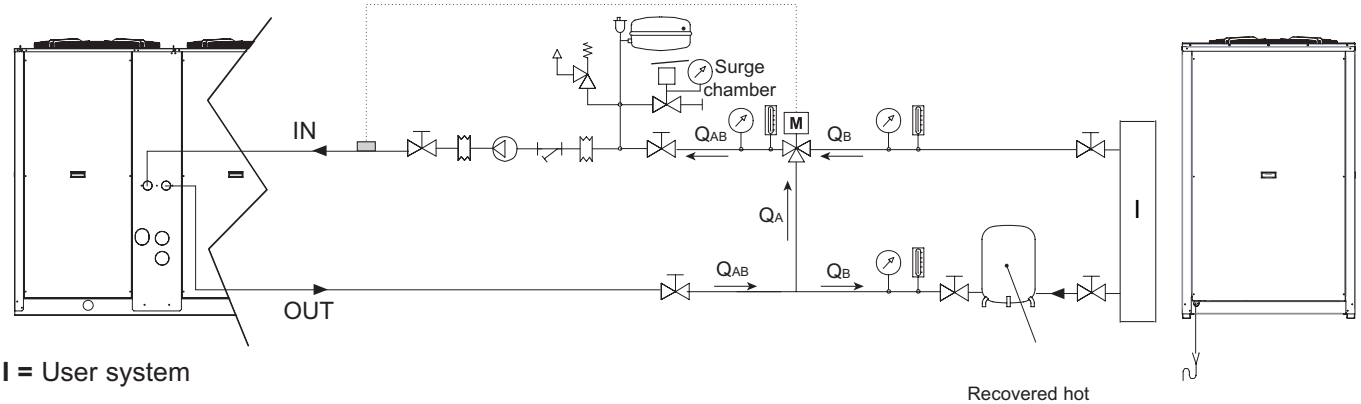
3) Reference standards
• The provisions established by the following Directives have been complied with to ensure the safety of the electrical products placed on the European Union market:
- Low Voltage Directive **2006/95 EEC** which also includes the following harmonized standards:
CEI EN 60335-1 and **60335-2-40**.
Classification:**CEI EN 60204-1**. Safety of machinery. Electrical equipment of machines. Part 1:
General rules.
- Directive **2004/108/EEC** concerning "**Electromagnetic compatibility**".

WET CONNECTIONS

Basic diagram for units with Heat Recovery [HOT WATER CIRCUIT]

The basic diagram given is valid for all the Special Versions VDM

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



I = User system

Recovered hot water tank

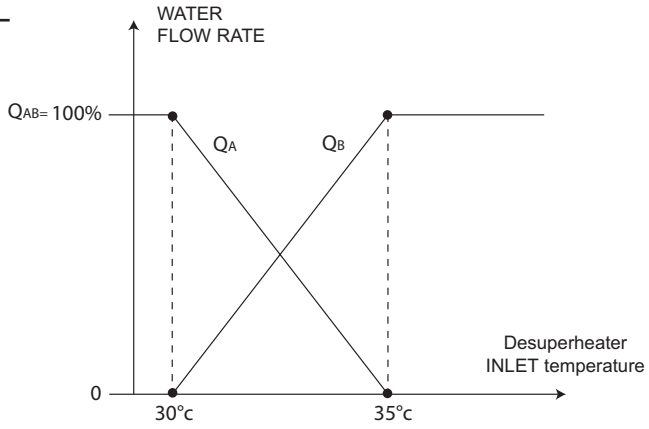
Pressure gauge	Pump	Coupling	Venting valve
Thermometer	Filter	Water filling unit	Safety valve
On-off and/or water flow regulating valve	Monitoring electronics (governor)	Three-way driven valve	Recovery water flow inlet probe

Air vent and water drain

On the plumbing circuit feeding the desuperheater there is an air vent valve and 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.

Valve regulating diagram valve

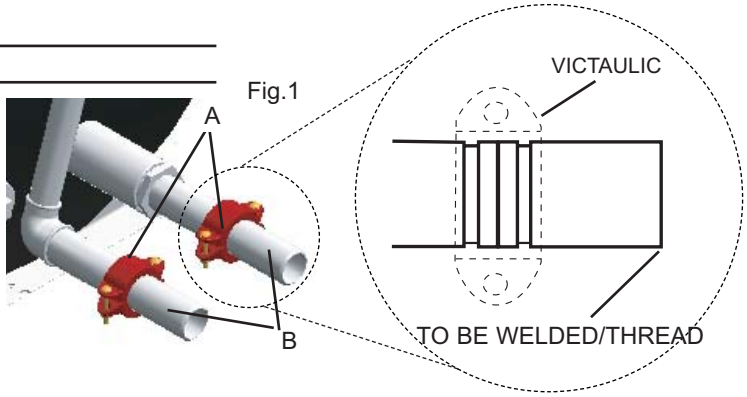
To prevent problems from occurring when the machine is started with very cold water, you are strongly advised to install a mixer valve as shown in the diagram.
The valve must be regulated to suit the temperature at which the water flows into the desuperheater (see diagram): the graph on the right shows the type of adjustment to use.



Plumbing connection with Victaulic couplings

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

Fig.1



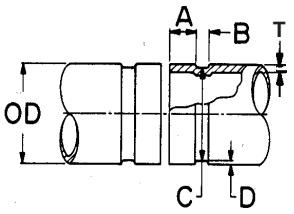
WET CONNECTIONS

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

1) Pipe groove inspections

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

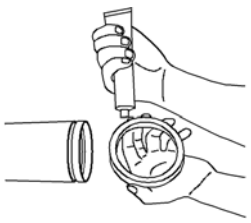
Make sure that there are no notches, burrs or other imperfections that could impair the tightness. Groove dimensions in mm **A**=16-**B**=8-**C**=57.2-**D**=1.6



2) Checking the seal and relative lubrication

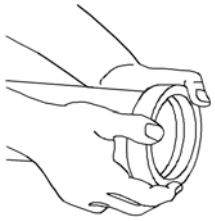
Make sure that the type of seal used is compatible with the nature and temperature of the fluid. Signal green **EPDM** seals are used.

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



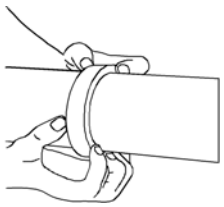
3) How to fit the seal

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



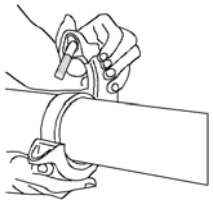
4) Alignment

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



5) Joint assembly

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

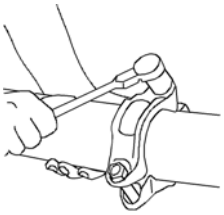


6) Nut torquing

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

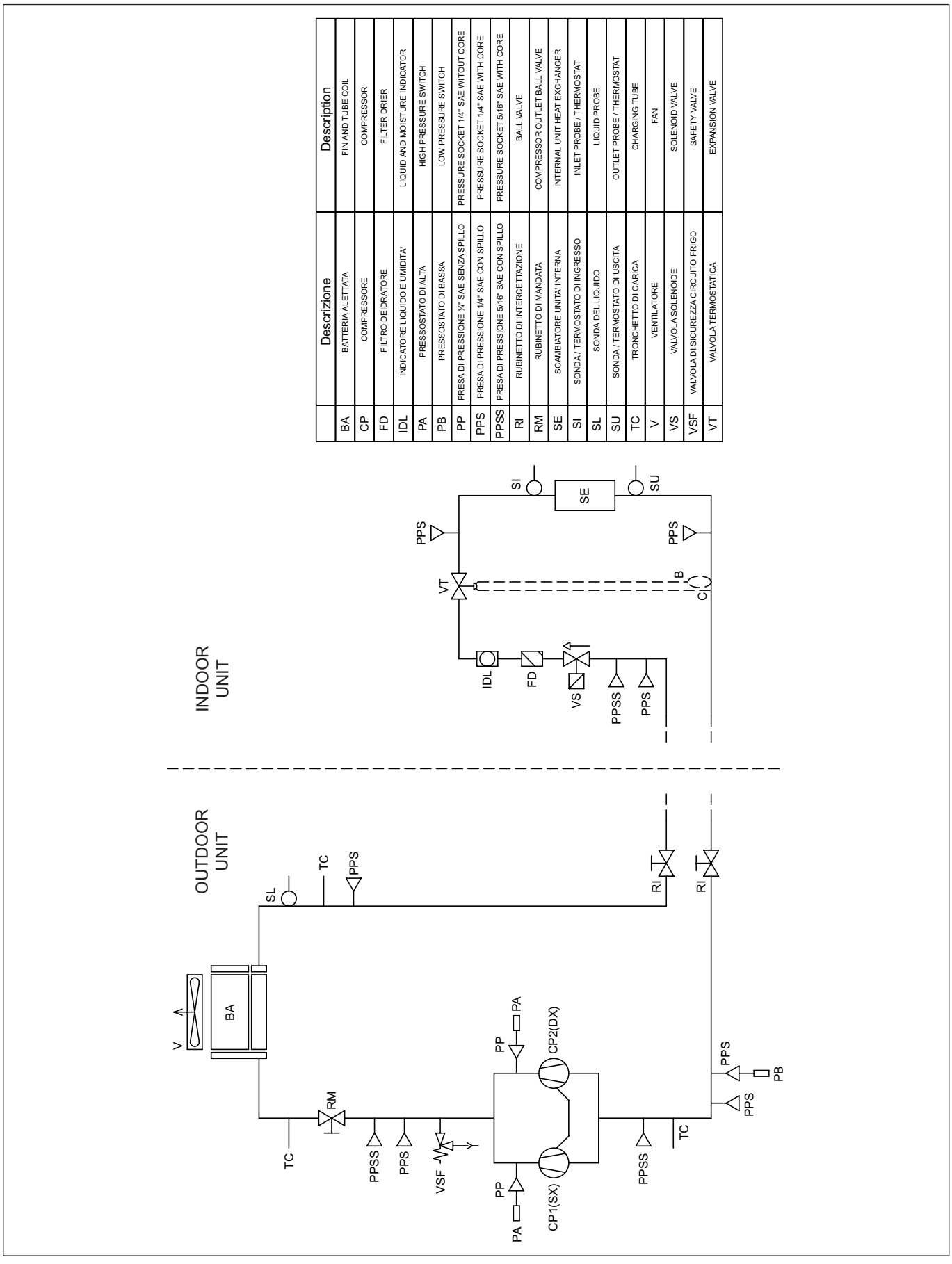
WARNING:

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



WET CONNECTIONS

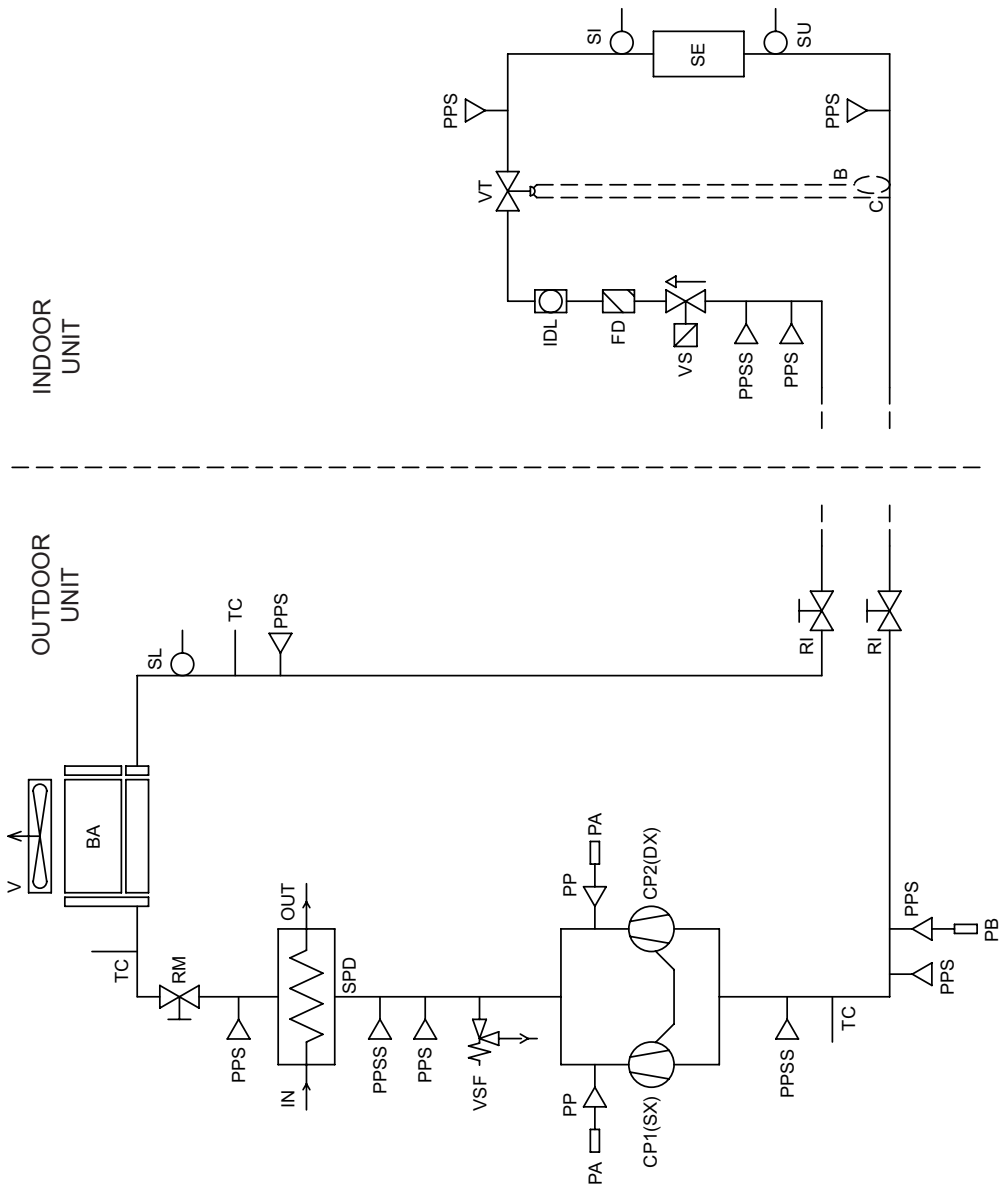
Refrigerant flow diagram condensing basic version VBM in cooling mode IR



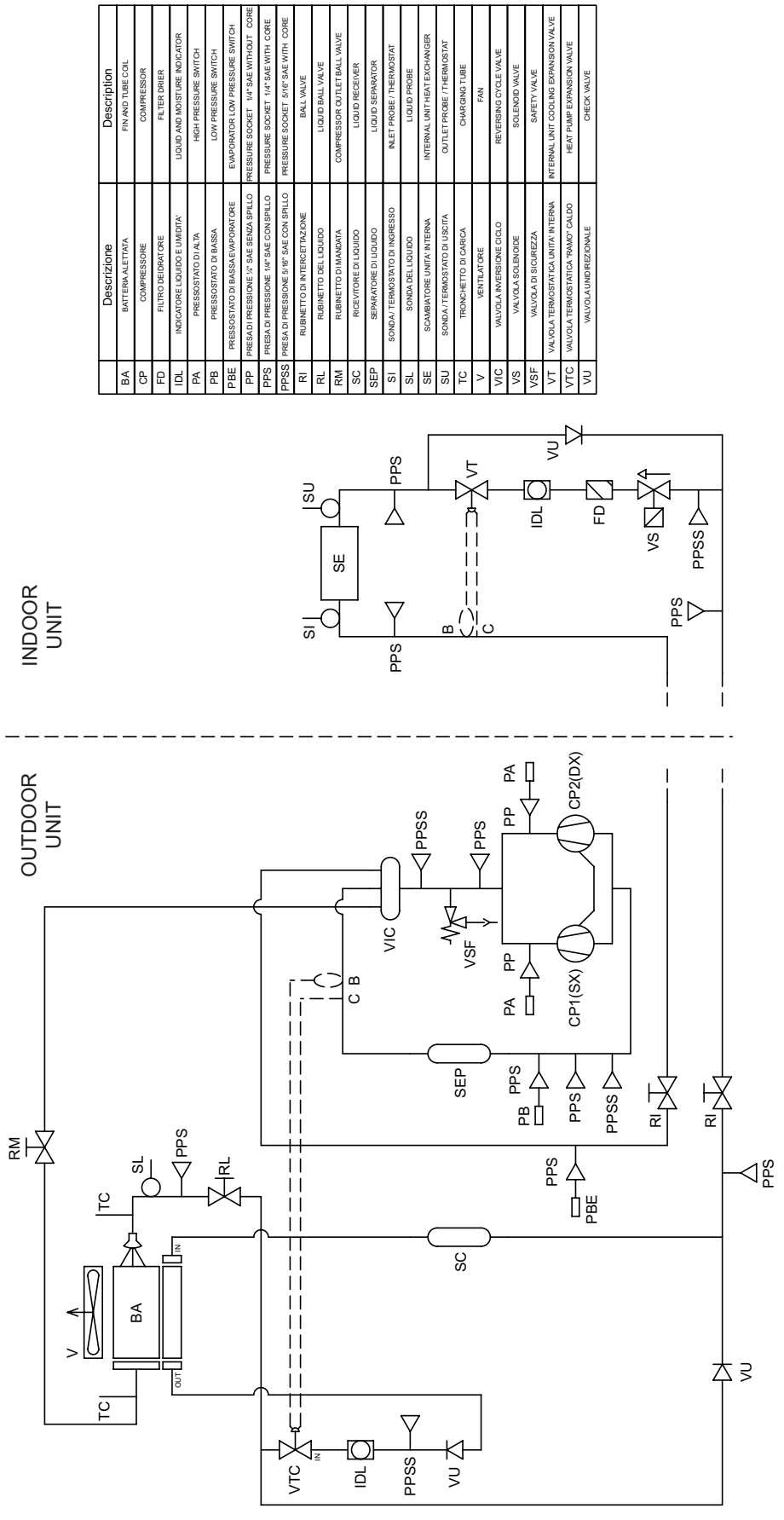
	Descrizione	Description
BA	BATTERIA ALETTATA	FIN AND TUBE COIL
CP	COMPRESSORE	COMPRESSOR
FD	FILTRO DEIDRATORE	FILTER DRIER
IDL	INDICATORE LIQUIDO E UMIDITA'	LIQUID AND MOISTURE INDICATOR
PA	PRESSOSTATO DI ALTA	HIGH PRESSURE SWITCH
PB	PRESSOSTATO DI BASSA	LOW PRESSURE SWITCH
PP	PRESA DI PRESSIONE 1/4" SAE SENZA SPILLO	PRESSURE SOCKET 1/4" SAE WITOUT CORE
PPS	PRESA DI PRESSIONE 1/4" SAE CON SPILLO	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESA DI PRESSIONE 5/16" SAE CON SPILLO	PRESSURE SOCKET 5/16" SAE WITH CORE
RI	RUBINETTO DI INTERCETTAZIONE	BALL VALVE
RM	RUBINETTO DI MANDATA	COMPRESSOR OUTLET BALL VALVE
SE	SCAMBIATORE UNITA' INTERNA	INTERNAL UNIT HEAT EXCHANGER
SI	SONDA / TERMOSTATO DI INGRESSO	INLET PROBE / THERMOSTAT
SL	SONDA DEL LIQUIDO	LIQUID PROBE
SU	SONDA / TERMOSTATO DI USCITA	OUTLET PROBE / THERMOSTAT
TC	TRONCHETTO DI CARICA	CHARGING TUBE
V	VENTILATORE	FAN
VS	VALVOLA SOLENOIDE	SOLENOID VALVE
VSF	VALVOLA DI SICUREZZA CIRCUITO FRIGO	SAFETY VALVE
VT	VALVOLA TERMOSTATICA	EXPANSION VALVE

Refrigerant flow diagram condensing basic version VBM in heating mode IP

	Descrizione	Description
BA	BATTERIA ALETTATA	FIN AND TUBE COIL
CP	COMPRESSORE	COMPRESSOR
FD	FILTRO DEIDRATORE	FILTER DRIER
IDL	INDICATORE LIQUIDO E UMIDITA'	LIQUID AND MOISTURE INDICATOR
PA	PRESSOSTATO DI ALTA	HIGH PRESSURE SWITCH
PB	PRESSOSTATO DI BASSA	LOW PRESSURE SWITCH
PP	PRESA DI PRESSIONE ¼" SAE SENZA SPILLO	PRESSURE SOCKET 1/4" SAE WITOUT CORE
PPS	PRESA DI PRESSIONE 1/4" SAE CON SPILLO	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESA DI PRESSIONE 5/16" SAE CON SPILLO	PRESSURE SOCKET 5/16" SAE WITH CORE
RI	RUBINETTO DI INTERCETTAZIONE	BALL VALVE
RM	RUBINETTO DI MANDATA	COMPRESSOR OUTLET BALL VALVE
SE	SCAMBIATORE UNITA' INTERNA	INTERNAL UNIT HEAT EXCHANGER
SI	SONDA / TERMOSTATO DI INGRESSO	INLET PROBE / THERMOSTAT
SL	SONDA DEL LIQUIDO	LIQUID PROBE
SPD	SCAMB. A PIASTRE DESURRISC.ALDATORE	DESUPERHEATER HEAT EXCHANGER
SU	SONDA / TERMOSTATO DI USCITA	OUTLET PROBE / THERMOSTAT
TC	TRONCHETTO DI CARICA	CHARGING TUBE
V	VENTILATORE	FAN
VS	VALVOLA SOLENOIDE	SOLENOID VALVE
VSF	VALVOLA DI SICUREZZA	SAFETY VALVE
VT	VALVOLA TERMOSTATICA	EXPANSION VALVE



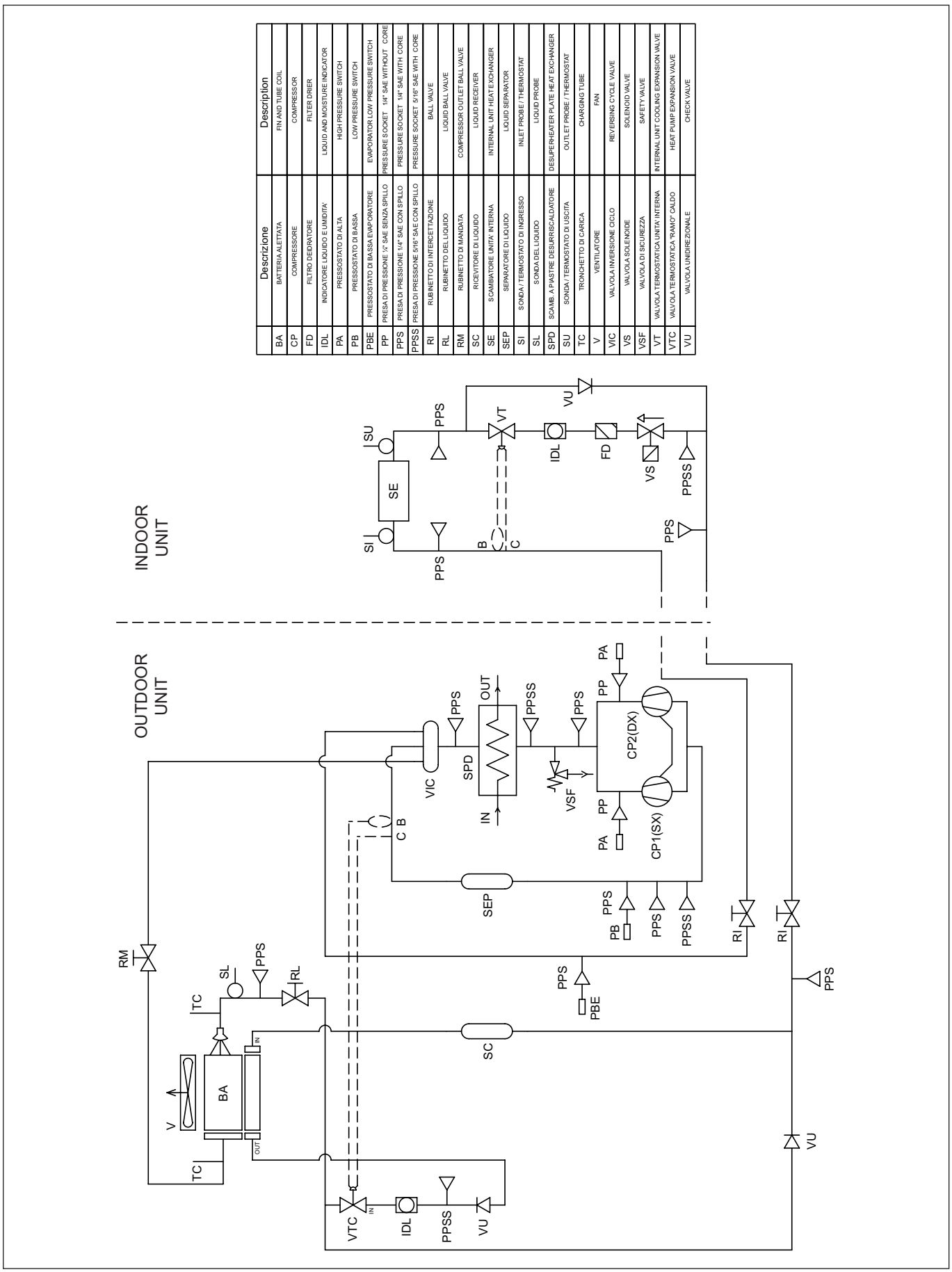
Refrigerant flow diagram condensing desuperheater version VDM in Cooling mode IR



	Descrizione	Description
BA	BATTERIA ALETTATA	FIN AND TUBE COIL
CP	COMPRESSORE	COMPRESSOR
FD	FILTRO DEIDRATORE	FILTER DRIER
IDL	INDICATORE LIQUIDO E UMIDITA'	LIQUID AND MOISTURE INDICATOR
PA	PRESSOSTATO DI ALTA	HIGH PRESSURE SWITCH
PB	PRESSOSTATO DI BASSA	LOW PRESSURE SWITCH
PBE	PRESSOSTATO DI BASSA EVAPORATORE	EVAPORATOR LOW PRESSURE SWITCH
PP	PRESA DI PRESSIONE 1/4" SAE SENZA SPILLO	PRESSURE SOCKET 1/4" SAE WITHOUT CORE
PPS	PRESA DI PRESSIONE 1/4" SAE CON SPILLO	PRESSURE SOCKET 1/4" SAE WITH CORE
PPSS	PRESA DI PRESSIONE 5/16" SAE CON SPILLO	PRESSURE SOCKET 5/16" SAE WITH CORE
RI	RUBINETTO DI INTERCETTAZIONE	BALL VALVE
RL	RUBINETTO DEL LIQUIDO	LIQUID BALL VALVE
RM	RUBINETTO DI MANDATA	COMPRESSOR OUTLET BALL VALVE
SC	RICEVITORE DI LIQUIDO	LIQUID RECEIVER
SEP	SEPARATORE DI LIQUIDO	LIQUID SEPARATOR
SI	SONDA / TERMOSTATO DI INGRESSO	INLET PROBE / THERMOSTAT
SL	SONDA DEL LIQUIDO	LIQUID PROBE
SE	SCAMBIATORE UNITA' INTERNA	INTERNAL UNIT HEAT EXCHANGER
SU	SONDA / TERMOSTATO DI USCITA	OUTLET PROBE / THERMOSTAT
TC	TRONCHETTO DI CARICA	CHARGING TUBE
V	VENTILATORE	FAN
VIC	VALVOLA INVERSIONE CICLO	REVERSING CYCLE VALVE
VS	VALVOLA SOLENOIDE	SOLENOID VALVE
VSF	VALVOLA DI SICUREZZA	SAFETY VALVE
VT	VALVOLA TERMOSTATICA UNITA' INTERNA	INTERNAL UNIT COOLING EXPANSION VALVE
VTC	VALVOLA TERMOSTATICA "RAMO" CALDO	HEAT PUMP EXPANSION VALVE
VU	VALVOLA UNIDIREZIONALE	CHECK VALVE

WET CONNECTIONS

Refrigerant flow diagram condensing desuperheater version VDM in heating mode IP



REFRIGERANT CONNECTIONS

Refrigerant connections

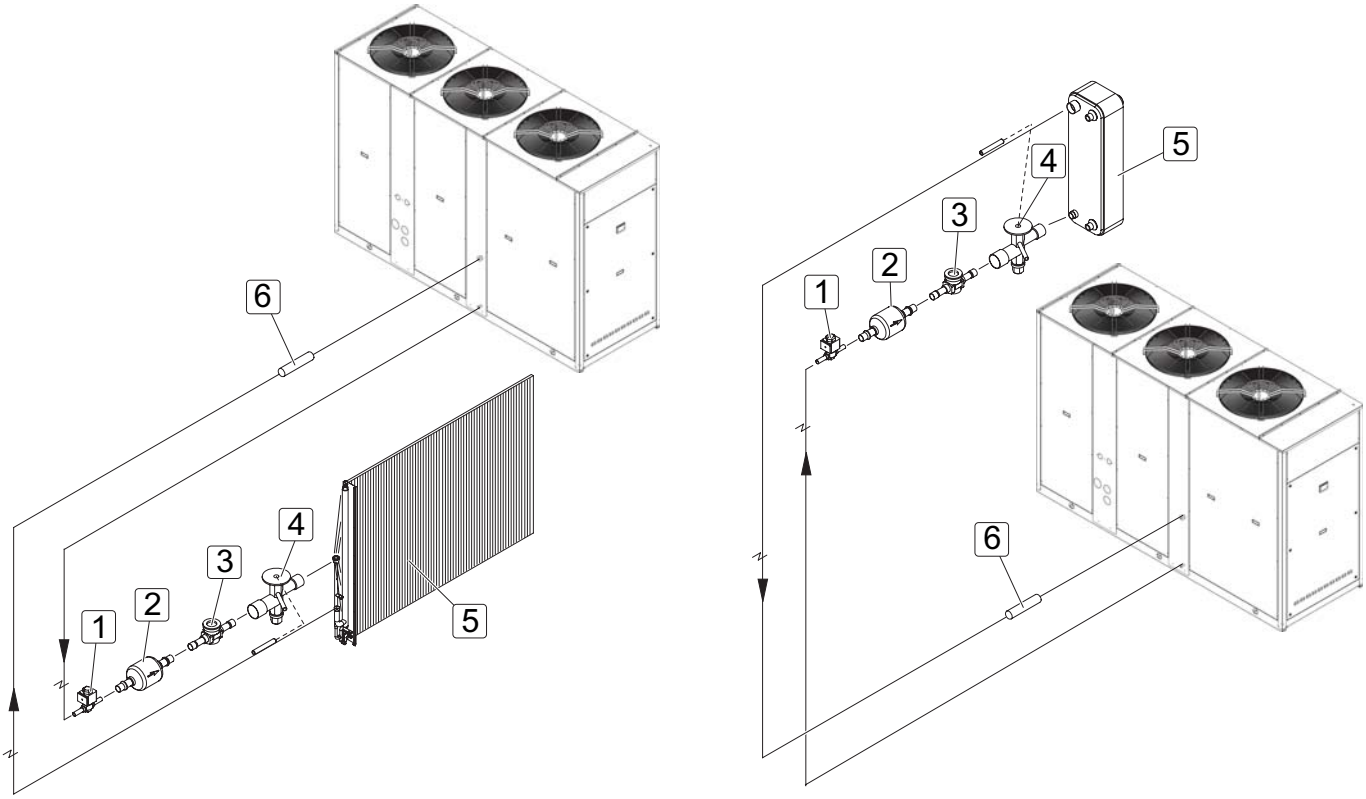
To ensure that the system operates correctly, first make sure that the connection pipes have been properly sized.
In particular, the connection pipes must guarantee the following conditions:

1. They must make sure that sufficient refrigerant reaches the evaporator.
2. The pipes must be prevented from becoming sources of high and excessive losses of head.
3. The pipes must make sure that oil flows back to the compressor in a uniform way so as to ensure that the compressor itself is correctly lubricated.
4. They must prevent fluid refrigerant from flowing into the compressor.

It is therefore advisable to comply with the following instructions:

- install the unit as near to the evaporator as possible so as to reduce the loss of head and prevent the unit from becoming inefficient.
- Size the fluid line for a 0.5°C saturation temperature differential value (it is current practice to express water pressure drop as differential value of the saturation temperature.
- Size the gas line for a 1°C saturation temperature differential value.
- Prevent the circuit from being polluted by particles of impurities and moisture as far as possible by installing a filter to ensure that it remains clean, dry and unclogged.

The reference diagrams for installing the Refrigerant pipes are given below for IR version.



Legend
1 Solenoid valves
2 Filter
3. Fluid telltale
4 Thermostatic valve
5 Coils:
Direct expansion Coils and a plate type Heat Exchanger have been shown. The type of Exchanger to use is left to the discretion of the actual installer.
6. Vibration damping connection

REFRIGERANT CONNECTIONS

WARNING: UNIT CHARGED WITH R410A REFRIGERANT

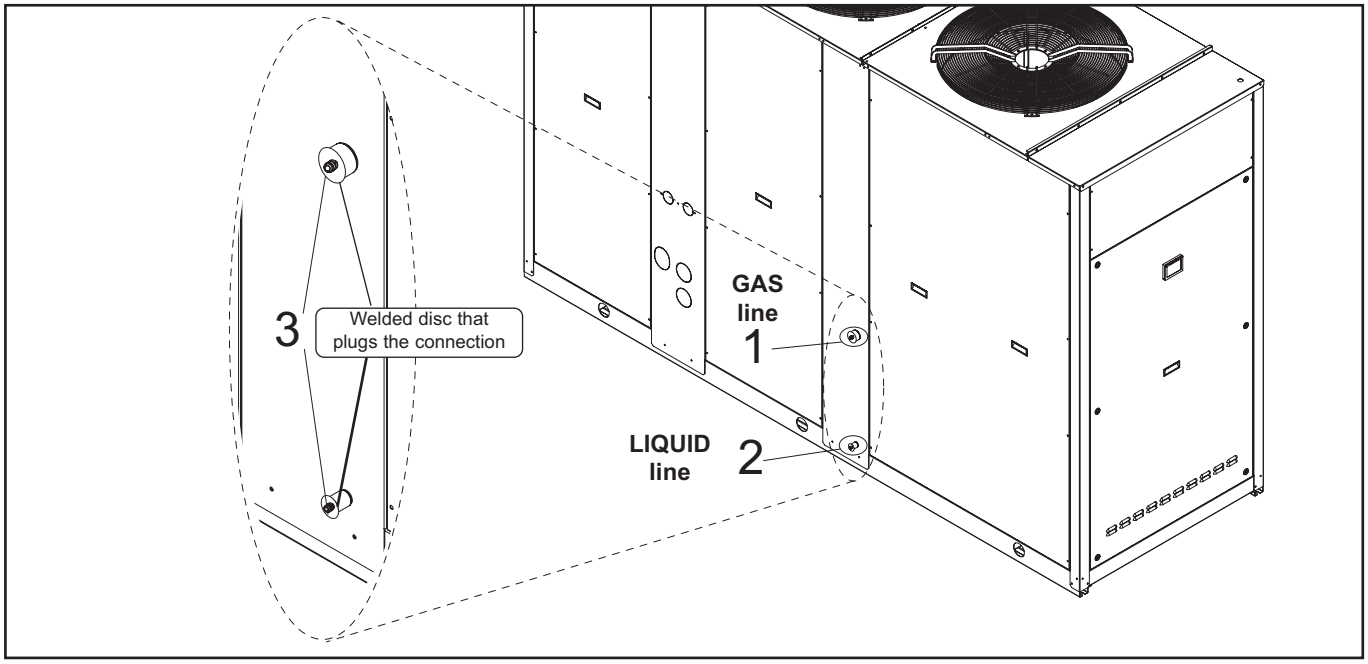
The refrigerating connections for the liquid and gas lines are on the right-hand side of the unit.

The photos below illustrate the connections and their positions

1- Gas connecting line
2- Liquid connecting line
3- ¼" SAE pin pressure tap

Ball valve for the liquid line (inside the unit)

Ball valve for the gas line (inside the unit)



Both the Liquid connection and the Gas connection are equipped with a closed Ball valve. Moreover, both connections are plugged by a section of welded pipe.

Proceed as described below to install the unit and make the Liquid and Gas line connections:

1- Remove the welded pipe that closes the liquid connection and the welded pipe that closes the gas connection.
NOTE: each pipe section is charged with Nitrogen, which can be emptied by means of the pressure tap (3).

2- Weld the liquid and gas connections to the evaporator system

3- Carry out the vacuum operation for the connections

4- Open the Ball valves

5- Check the operating parameters. A Superheating value of 5°C and a Sub-cooling value of 5°C should be obtained.
To obtain these values, modify the refrigerant charge value as shown in the table below and use the thermostatic valve if necessary.

Mod.	Gas connection				Liquid connection			
	External diameter thickness [mm]		Refrigerant fluid R410A [g/m]		External diameter thickness [mm]		Refrigerant fluid R410A [g/m]	
	IP	IR	IP	IR	IP	IR	IP	IR
50	35x1,5	42x1,5	26	39	22x1	22x1	298	298
60	35x1,5	42x1,5	26	39	22x1	22x1	298	298
70	35x1,5	42x1,5	26	39	22x1	22x1	298	298
80	35x1,5	42x1,5	26	39	22x1	22x1	298	298
90	42x1.5	54x2	39	64	22x1	28x1	298	504
100	42x1.5	54x2	39	64	22x1	28x1	298	504
115	42x1.5	54x2	39	64	22x1	28x1	298	504
130	42x1.5	54x2	39	64	22x1	28x1	298	504
145	42x1.5	54x2	39	64	22x1	28x1	298	504
160	42x1.5	54x2	39	64	22x1	28x1	298	504
180	54x2	54x2	64	64	22x1	28x1	298	504
200	54x2	54x2	64	64	22x1	28x1	298	504

ADJUSTMENT AND CONTROL

Parameter settings for the various configurations

Appropriate configuration parameters must be entered, depending on the type of exchanger chosen for application to the condensing unit.
The following exchangers can be used:
-water exchanger
-direct expansion exchanger

The following configurations can be obtained if the water exchanger is chosen:
-solution A with regulation via digital inputs - with 2 thermostats and antifreeze alarm probe
-solution B with regulation via water inlet and outlet with temperature probe

The following configurations can be obtained if the direct expansion exchanger is chosen:
-solution A with regulation via digital inputs - with 2 thermostats and antifreeze alarm probe
-solution B with regulation via air inlet and coil temperature with temperature probe

The different configurations available are described in detail below.

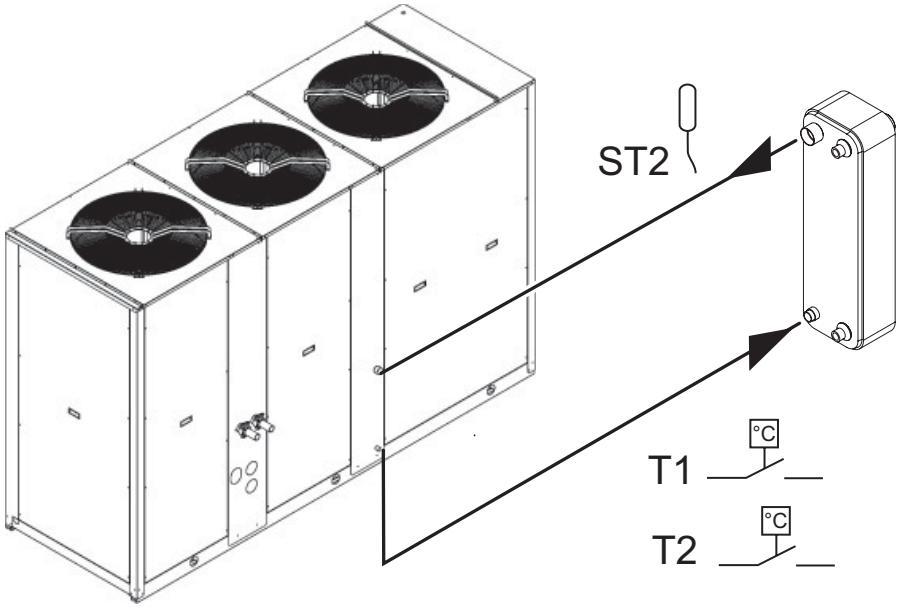
Condensing unit in conjunction with a water exchanger

Install a water flow switch or differential pressure switch and connect to terminal board as shown in wiring diagram.

SOLUTION A with regulation via digital inputs - with 2 thermostats and antifreeze alarm probe

For Condensing units IR Cooling Mode only

The parameters required for this configuration are given in the table below:

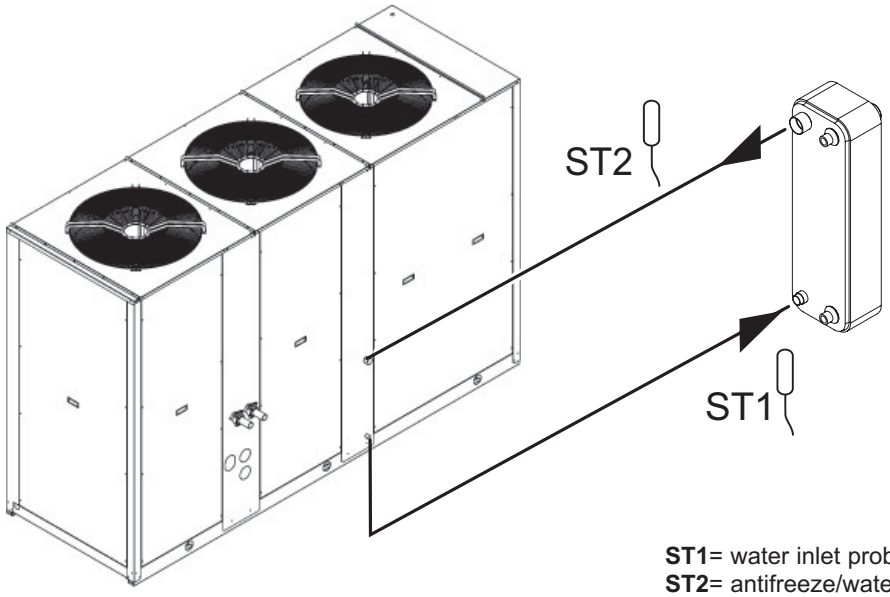


T1 = inlet water thermostat 1° step
T2= inlet water thermostat 2° step
ST2= outlet water probe/antifreeze alarm probe

Param.	IN	CODE	Descriptions
CL00=1 CL30=0 CL50=+4	AI1	T1	1° step thermostat
CL03=1 CL33=0 CL53=+5	AI4	T2	2° step thermostat
CL01=2 CL31=2 CL51=0	AI2	ST2	Antifreeze probe

SOLUTION B with regulation via water inlet and outlet with temperature probe

For Condensing units IR Cooling Mode only and IP Heat Pump units



ST1= water inlet probe
ST2= antifreeze/water outlet probe

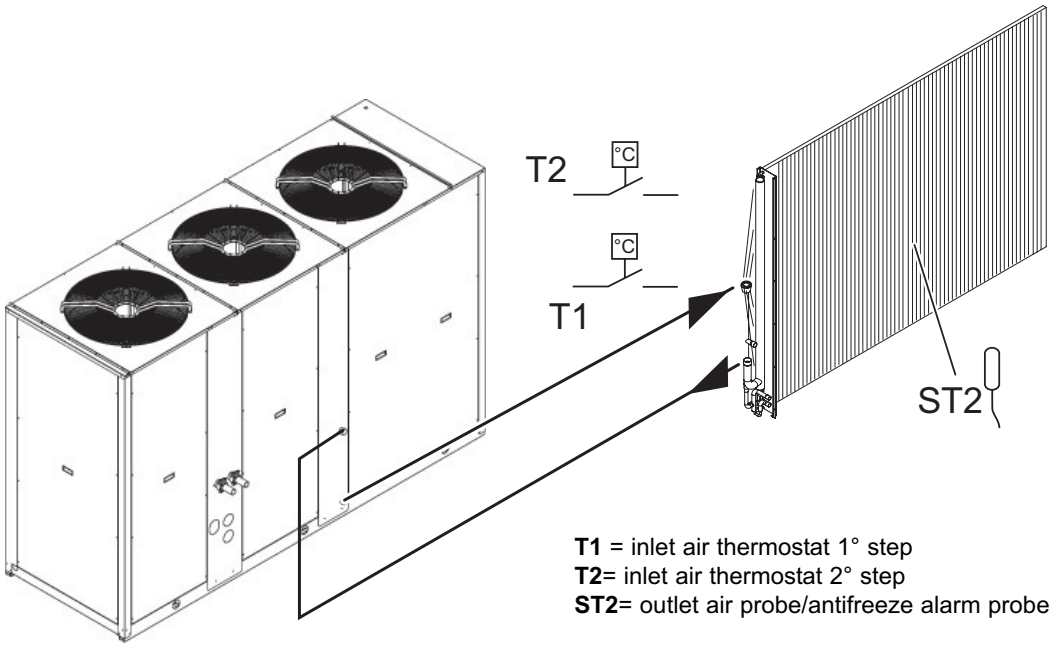
The parameters required for this configuration are given in the table below:

Param.	IN	Code	Descriptions
CL00=2 CL30=1 CL50=0	AI1	ST1	Water inlet probe
	AI4		Configurable input (see paragraph “Configurable input”)
CL01=2 CL31=2 CL51=0	AI2	ST2	Antifreeze probe

Condensing unit in conjunction with a direct expansion exchanger

SOLUTION A with regulation via digital inputs - with 2 thermostats i and antifreeze alarm probe

Per unità Motocondensanti Solo Freddo IR



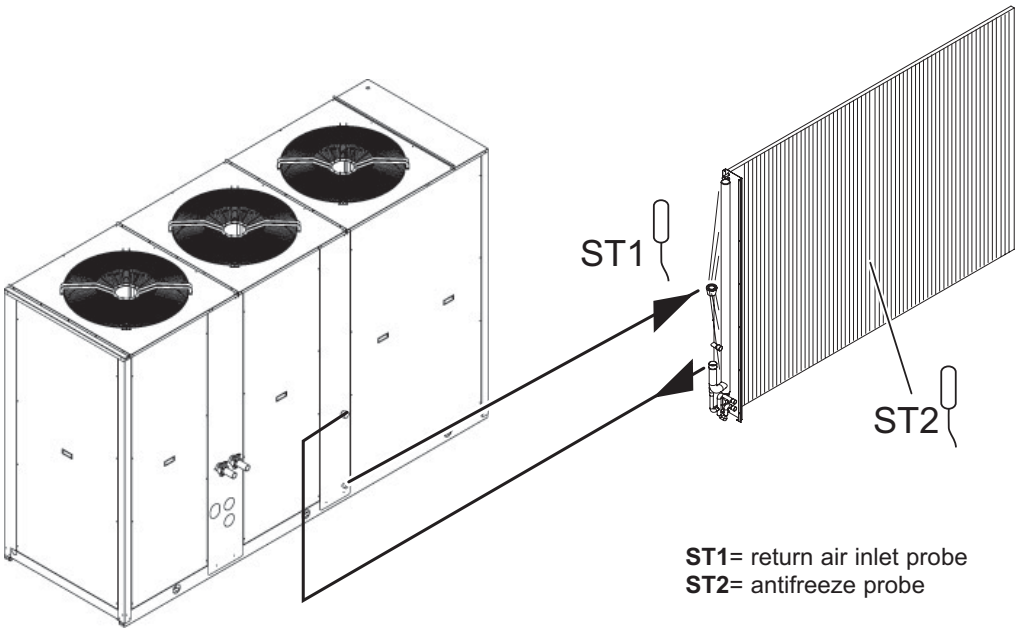
T1 = inlet air thermostat 1° step
T2= inlet air thermostat 2° step
ST2= outlet air probe/antifreeze alarm probe

The parameters required for this configuration are given in the table below:

Param.	IN	Code	Descriptions
CL00=1 CL30=0 CL50=+4	AI1	T1	1° step thermostat
CL03=1 CL33=0 CL53=+5	AI4	T2	2° step thermostat
CL01=2 CL31=2 CL51=0	AI2	ST2	Antifreeze probe

SOLUTION B with regulation via air inlet and coil temperature with temperature probe

For Condensing units IR Cooling Mode only and IP Heat Pump units



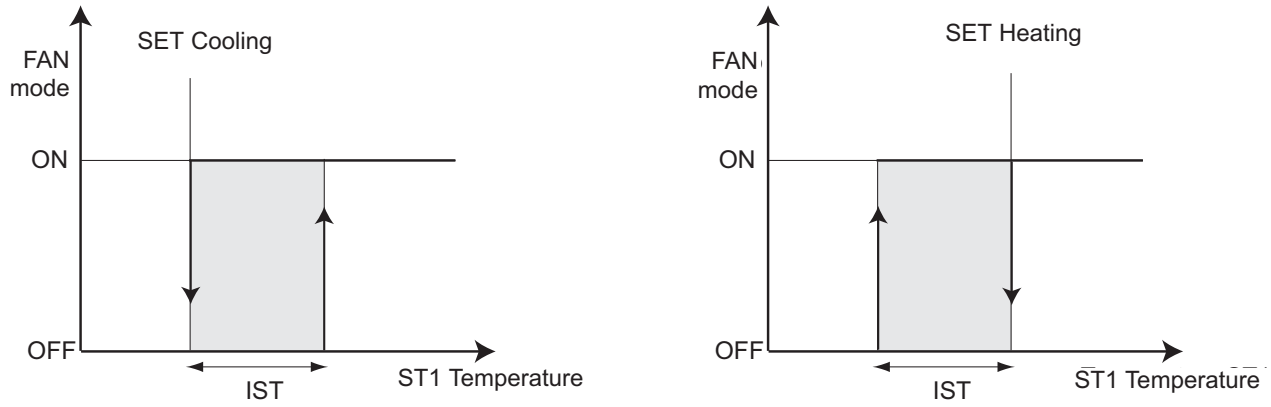
ST1= return air inlet probe
ST2= antifreeze probe

The parameters required for this configuration are given in the table below:

Param.	IN	Code	Descriptions
CL00=2 CL30=1 CL50=0	AI1	ST1	Air inlet probe
	AI4		Configurable input (see paragraph “Configurable input”)
CL01=2 CL31=2 CL51=0	AI2	ST2	Antifreeze probe

Thermostated fan operating mode

In the thermostated operating mode, the fans are turned on and off according to a set-point and a hysteresis.
The **cooling set-point** is given by parameter [par. G01=xx] while the hysteresis (IST) is given by [par. C03=xx].
The **heating set-point** is given by parameter [par. G02=xx] while the hysteresis (IST) is given by [par. C03=xx].



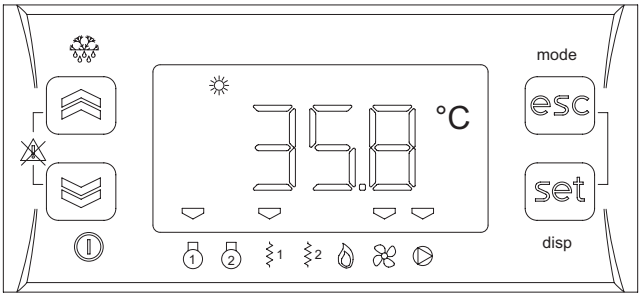
If the additional / integrating heating elements are installed and on when the request to switch the internal fan to the OFF status is transmitted, first the heating elements are turned off then the fan is turned off after the time entered for parameter P03.

(Note : if a mechanical thermostat and not the temperature probe is used for regulating in the fan's thermostated operating mode, the operating hysteresis will be given by the intrinsic hysteresis of the mechanical thermostat while the fan will always operate in parallel to the compressor).

ADJUSTMENT AND CONTROL

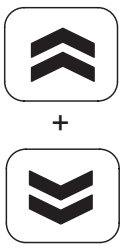
Control system

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



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

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

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

ADJUSTMENT AND CONTROL

Display
The following are shown in normal display :

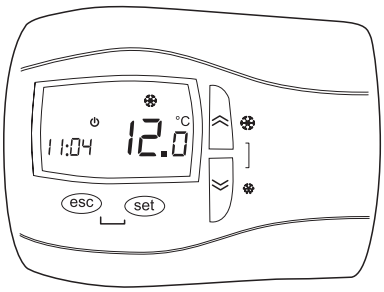
• adjustment temperature, or unit outlet water temperature (in degrees Celsius with decimal point)

• alarm code, if at least one is activated (in case of several alarms the code of the first according to the Table of Alarms is displayed)

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

	Icon	Description	Colour	On fixed	On flashing
Operation status and modes	⚠	Alarm	Red	Alarm in progress	Alarm deactivated
	☀	Heating	Green	Heating mode from keyboard	Heating mode from remote
	❄	Cooling	Green	Cooling mode from keyboard	Cooling mode from remote
	⏻	Standby	Green	Standby from keyboard	Standby from remote
	❄	Defrost	Green	Defrost in progress	-
		Economy	Green	not used	-
Unit of measure		Clock	Red	Time display format 24.00	Time setting format 24.00
	°C	Centigrade degrees	Red	Unit of measure of selected parameter	-
	Bar	Bar	Red	not used	-
	%R.H.	Relative humidity	Red	not used	-
	ABC	Menu	Red	Menu browsing	-
Users	①	Compressor 1	Amber	User activated	Safety timing
	②	Compressor 2	Amber	User activated	Safety timing
	③	not used	-	-	-
	④	not used	-	-	-
		Antifreeze heater Supplementary heating element 1st step	Amber	User activated	Safety timing
		Fans	Amber	User activated	Safety timing
		Pumps	Amber	User activated	Safety timing

Remote control



Suitable for wall mounting, it has all the functions of the standard interface fitted on the unit.
The buttons, functions associated with the buttons and the display indications are the same as those provided for the standard interface.
All configuration and control operations are further facilitated by the double display which allows the name and value of the selected parameter to be shown at the same time.

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

ADJUSTMENT AND CONTROL

Menu structure

The control system provides for three menus with tree structure.

Menu	Access procedure	Submenu	Parameters	Available functions
Operation mode	Press (prolonged)  (ESC button associated function)	StbY	-	Change operation mode
		HEAt		
		COOL		
UP button	Press  (UP button direct function)	-	-	Value increases, the next label
DOWN button	Press  (DOWN button direct function)	-	-	Value decreases, the next label
Main view (disp)	Press (prolonged)  (SET button direct function)	AI.	AIL1	Display input AI1
			AIL2	Display input AI2
			AIL3	Display input AI3
			AIL4	Display input AI4 (se abilitato)
			AIL5	Display input AI5 (se abilitato)
		rtC	-	Visualizzazione orologio
		SEtP	-	Visualizzazione set-point impostato
		SEtr	-	Visualizzazione set-point reale
Status	Pres  (SET button direct function)	AI.	AIL1	Display input AI1
			AIL2	Display input AI2
			AIL3	Display input AI3
			AIL4	Display input AI4
			AIL5	Display input AI5
		di.	diL1	Display input DI1
			diL2	Display input DI2
			diL3	Display input DI3
			diL4	Display input DI4
			diL5	Display input DI5
			diL6	Display input DI6
		AO	tCL1	-
			AOL1	Display output AO1
			AOL2	Display output AO2
			AOL3	Display output AO3
			AOL4	Display output AO4
			AOL5	Display output AO5
		dO	dOL1	Display output DO1
			dOL2	Display output DO2
			dOL3	Display output DO3
			dOL4	Display output DO4
			dOL5	Display output DO5
			dOL6	Display output DO6
		CL	HOUr	Adjusting clock : hour
			dAtE	Adjusting clock : data
			YEAr	Adjusting clock : year
			HEAt	Viewing and setting set-point: heating
			COOL	Viewing and setting set-point: cooling
			HEAt	Display set-point real: heating
			COOL	Display set-point real: cooling
			CPO1	Viewing compressor 1 operating hours
			CPO2	Viewing compressor 2 operating hours
			PUO1	Viewing hours operating pump 1
			PUO2	Viewing hours operating pump 2

ADJUSTMENT AND CONTROL

Menu	Access procedure	Submenu		Parameters	Available functions
Programming	Press **ESC + SET at the same time**  (combined function buttons ESC + SET)	PAr	CL	CL20	Offset probe SIW (ST1) - input AI1
				CL21	Offset probe SIW (ST2) - input AI2
				CL22	Offset probe SIW (ST3) - input AI3
				CL23	STAE offset probe (S1) - input AI4
				CL24	Input Offset AI5 (S2)
			CF	CF01	Selection Protocol COM1 (TTL)
				CF20	Protocol controller address Eliwell
				CF21	Family Controller Protocol Eliwell
				CF30	Address Controller Modbus Protocol
				CF31	Baud rate serial output
				CF32	Protocol Modbus Parity
			Ui	Ui10	Selecting main view
			Ui	Ui11	Selecting main display remote terminal
			tr	tr10	Set point in cooling
				tr11	Minimum set point in cooling
				tr12	Maximum set point in cooling
				tr13	Hysteresis in cooling
				tr15	Differential set point in cooling
				tr20	Set point in heating
				tr21	Minimum set point in heating
				tr22	Maximum set point in heating
				tr23	Hysteresis in heating
				tr25	Differential set point in heating
			Pi	Pi01	Interval of inactivity pump anti-lock
				Pi03	Minimum time to pump up anti-lock
				Pi50	Approval with antifreeze pump
				Pi51	Set-point with antifreeze pump
				Pi52	With hysteresis antifreeze pump
			Hi	Hi20	Enabling integrative resistance
				Hi10	Set-point electrical resistance with antifreeze
				Hi15	Hysteresis antifreeze with electrical resistance
				Hi22	Differential resistance integrative
				Hi25	Hysteresis resistance integrative
				Hi26	2nd step differential resistance integrative
			dF	dF11	Set-point start counting defrost
				dF13	Cumulative counting time defrost
				dF30	Enabling dynamic defrost
			dS	dS00	Enabling climate
				dS01	Proportional band (cooling)

ADJUSTMENT AND CONTROL

Menu	Access procedure	Submenu		Parameters	Available functions
				d502	Proportional band (heating)
				d503	Differential maximum (cooling)
				d504	Differential maximum (heating)
				d505	Set start-point adjustment (cooling)
				d506	Set-point adjustment starting (heating)
			AL	AL51	Set-point alarm antifreeze
				AL52	Antifreeze alarm hysteresis
		FnC		dEF	Manual defrost
				tA	Silence alarms
			St	OFF	Change in OFF state
				On	Change in status ON
			CC	UL	Upload program parameters
				dL	Download the program parameters
				Fr	Format Multi Function Key
				EUr	Reset historical alarms, long press button 
		PASS		-	Enter password
		EU		-	Viewing historical alarms
Alarm silence	Pressure contemporary buttons  (combined function UP+DOWN button)	-	-	-	Manual
Manual defrost	Long press button  (UP button function associated)	-	-	-	Enable manual defrost

Press SET to go from one level to that below. Press ESC to go to higher level.
Press the UP and DOWN buttons respectively to scroll the menu up and down inside the same level.

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

Inputs and outputs

To monitor the unit, the controller has the following inputs and outputs :
- Analogue inputs : 4
- Digital inputs : 5
- Analogue outputs : 1
- Digital outputs : 6

DESCRIPTION			CHARACTERISTICS
Analogue inputs			
AI1	SIW	water inlet probe	NTC temperature sensor (-30°C ÷ 90°C)
AI2	SUW	water outlet probe	NTC temperature sensor (-30°C ÷ 90°C)
AI3	SL	liquid probe	NTC temperature sensor (-30°C ÷ 90°C)
AI4	STAE / IN CF1	outside air probe / remote ON/OFF - S/W.-demand limit-economy	NTC temperature sensor (-30°C ÷ 90°C) / DIG IN
AI5	IN CF2	see AI5 on "digital inputs"	configured as digital input
- Input AI4 is factory-set as not enabled. Its configuration for specific use must be carried out at the time of installation according to the needs of the moment, modifying the configuration by parameter. - Input AI5 is factory-set as neutral and its configuration for specific use must be carried out at the time of installation according to the needs of the moment, modifying theconfiguration by parameter. **Modification and parameter configuration operations must only be carried out by an authorised service centre or by competent personnel.**			
Digital inputs			
DI1	TC1*	Thermal switch compressor 1 – thermo-statted delivery 1 –high pressure switch	Digital input with voltage-free contact
DI2	TC2*	Thermal switch compressor 2 –thermo-statted delivery 2 – high pressure switch	Digital input with voltage-free contact
DI3	PB +SEQ + TV	Low pressure switch + sequence meter + fan thermal switch	Digital input with voltage-free contact
DI4	TP1	Thermal switch pump 1	Digital input with voltage-free contact
DI5	TP2	Thermal switch pump 2	Digital input with voltage-free contact
DI6	P.diff.	Differential pressure switch	Digital input with voltage-free contact
AI5-IN DIG	Multiconf.	remote ON/OFF - S/W.-demand limit-economy	Analogue input configured as digital
*refer to section alarms. ER10-ER11 for more details Note for input ID5 thermal switch pump 2. If only one pump is used and only one thermal switch is required, ID5 can be used as an additional multiconf. input for Remote ON/OFF - S/W.-demand limit-economy. In this way it is possible to have both the - remote ON/OFF, and - S/W - demand limit – economy - External probe ID5 is factory-configured as pump 2 thermal switch. To modify the configuration, refer to the section “configurable inputs setting”.			

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

Controller technical data

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

Alarms

Alarm activation and reset
The controller can perform a complete diagnosis of the unit, detecting all operation faults and signalling a number of alarms.
Activation of an alarm involves :
• blocking of users concerned
• signalling of alarm code on the display (in case of simultaneous alarms the one with the lowest index is displayed whereas the complete list of active alarms can be shown by accessing the “Status \ AL”) menu
• recording of event in the alarms history

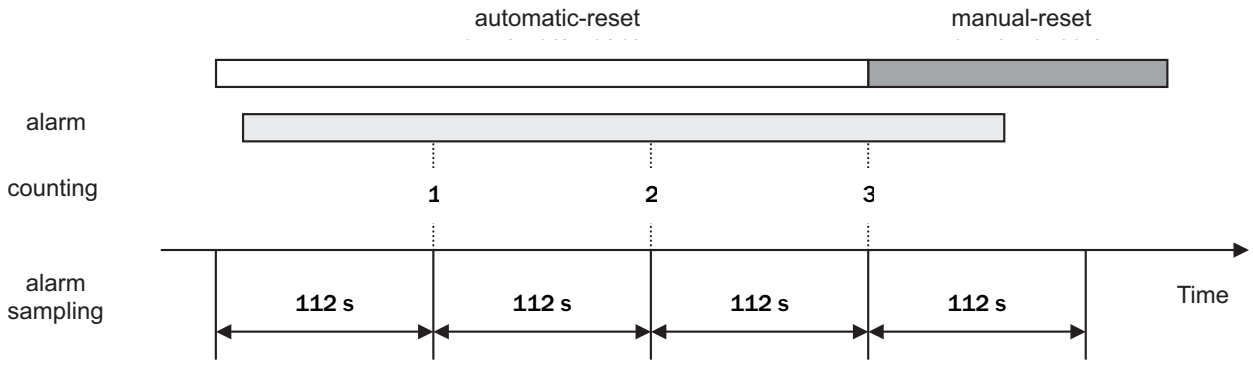
Alarms that can damage the unit or system require **manual resetting** or an action by the operator to reset the controller (pressing the UP and DOWN buttons at the same time). It is advisable to carefully check the cause of the alarm and make sure the problem is eliminated before restarting the unit.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

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

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

Number of events per hour
The counting of events per hour is provided for some alarms : if the number of events reaches a fixed limit in the last hour, the alarm goes from automatic to manual reset.
Sampling of alarms occurs every 112 seconds. If an alarm is activated several times in a sampling period (112 seconds) it is counted only once.

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



Alarms history
The controller enables the recording of alarms occurring during unit operation (up to a max. of 99 events). The following are memorised for each event :
- alarm code
- input time
- input date
- output time
- output date
- type of alarm (automatic or manual reset)

This information can be shown by accessing the “Programming \ EU” menu.
When the number of events memorised is more than 99, alarm Er90 is generated and the subsequent events are memorised overwriting the oldest alarms.
The alarms history can be cancelled by means of the Eur function available inside the “Programming \ FnC” menu.

Table of alarms

Code	Alarm		Type of alarm	input	COMPRESSORS	EXCHANGER FANS (WITH LOSS)	PRIMARY CIRCUIT PUMPS	EXCHANGER RESISTANCES PRIMARY	AUXILIARY OUTPUT
Er05	Low pressure -sequence meter + fans thermal switch - inverter thermal switch (if present)		A/M	ID3	OFF	OFF			
Er 10*	Compressor 1 thermal protection	High pressure	M	ID1	OFF comp.1				
Er 11*	Compressor 2 thermal protection		M	ID2	OFF comp.2				
Er20	Primary circuit water differential pressure switch		A/M	ID6	OFF		OFF if manual-reset	OFF	
Er21	Primary circuit pump 1 thermal protection		M	ID4	OFF	OFF	OFF p.1	OFF	
Er22	Primary circuit pump 2 thermal protection		M	ID5	OFF	OFF	OFF p.2	OFF	
Er30	Primary circuit antifreeze		M	AI2	OFF				
Er45	Clock fault error		A						
Er46	Clock to be set error		A						
Er47	Remote keyboard communication error		A						
Er60	Primary exchanger inlet water temperature probe fault		A	AI1	OFF	OFF	OFF	OFF	OFF
Er61	Primary exchanger outlet water temperature probe fault		A	AI2	OFF	OFF	OFF	OFF	OFF
Er62	Liquid temperature probe		A	AI3					
Er68	External air temperature probe fault		A	AI4					
Er80	Configuration error		A		OFF	OFF	OFF	OFF	OFF
Er90	Recordings for alarms history exceeded signalling		M						

Notes:
(1) A = automatic reset, M = manual reset
(2) Only when the alarm becomes manual reset

Er05 Low pressure – Sequence meter
The alarm becomes manual reset when the number of events per hour is more than 3.
The alarm is bypassed for 60 seconds from activation of the compressor or the reverse cycle valve.

Er20 Differential pressure switch
The alarm is activated if the associated digital input remains activated for at least 5 seconds and automatically resets if the digital input remains not activated for at least 3 seconds. The alarm becomes manual reset if the digital input remains activated for more than 10 seconds.
The alarm is bypassed for 15 seconds from pump activation.

Er30 Antifreeze
The alarm is bypassed for 3 minutes from switching on of the unit (in heating mode only).

Er62 Liquid probe fault
When the alarm is activated the fans work with on-off logic by compressor request. The defrost input and output are managed according to compressor operation time.

Er68 Outside air probe fault
When the alarm is activated, climate adjustment in heating/cooling and dynamic defrost are unavailable.

Er90 Maximum number of recordings in alarms history exceeded
Indicates that the alarms history buffer is full. Every new alarm will be memorised, cancelling the oldest alarm.

ADJUSTMENT AND CONTROL

Functions available for the user

Unit lighting : ON-OFF
When the unit is powered it may be in STAND BY status (the display shows the message StbY) or ON status. It is possible to switch between ON and STAND BY by pressing (prolonged) the DOWN button.
When the unit is STAND BY all the users are disabled and the antifreeze function is not activated.
Operation mode selection
When the unit is ON, one of the operation modes can be selected by accessing the “Operation mode” menu.
- Cooling COOL
- Heating HEAt
- STANDBY StdbY

Remote ON/OFF
This function allows remote selection of the STANDBY mode. If the input is activated (contact open) the controller is in STANDBY mode and the operation mode cannot be modified from keyboard.
The function is available if one of the configurable inputs is configured for this, contact closed = unit ON (display SIW), contact open = OFF (display StdbY).
Remote Cooling-Heating
This function allows remote selection of Cooling or Heating mode. If the input is activated (contact open) the unit is in heating mode. If the input is not activated (contact closed) the unit is in cooling mode. The operation mode cannot be modified from the keyboard (but STANDBY mode can be selected).
To enable this function, follow the indications in the section “configurable inputs setting”.
Set point
The set point value in cooling (COOL) and heating (HEAt) can be set by accessing the “Status \ SP” menu. The purpose of the controller is to keep the water temperature at the unit inlet as close as possible to the set value, by activating the compressor according to an on-off logic.
Operation in heat pump mode
For all units in heat pump version the parameter tr01 enables operation in heat pump mode when it assumes value 1. It is possible set an outside air temperature value (parameter HP01) below which operation in heat pump mode is blocked (the supplementary electrical heating elements remain activated in any case, if present).
Antifreeze
The plate-type exchanger is protected by activation of an electrical heating element and activation of the antifreeze alarm, occurring in sequence when the exchanger outlet water temperature reaches dangerous values. The storage tank is protected by the antifreeze heater (accessory) activated in parallel with the plate-type exchanger heating element.
When the outside air temperature approaches 0°C, if the unit is not working, the pump is activated in any case to prevent excessive cooling of the water in the pipes.
Supplementary electrical heating elements
The parameter H102 enables operation of the electrical elements supplementing the heat pump when it assumes value 1. The heating elements are activated according to a two-step logic depending on the unit inlet water temperature. When present, the heating elements also carry out a storage tank antifreeze function.
Climate adjustment
In heating, the parameter dS00 allows enabling of climate adjustment when it assumes value 1. The heating set point is adjusted according to the outside air temperature (if the external probe is installed).
To configure this function, follow the indications in the section “configurable inputs setting”.

Dynamic defrost
The activation limit is modified in a dynamic way according to the outside air temperature (if the external probe is installed).
Power Limitation (Demand Limit).
With this function, the unit can be forced to operate at 50% maximum power, from a digital output, thus reducing energy consumption.
To enable this function, proceed as indicated in the section “configurable inputs setting”.
Economy Function
This function allows the set point to be varied by a certain value from a digital input.
In cooling mode the set point is increased by the value set on tr15 (e.g. going from 9.5°C to 14.5 °C).
In heating mode the set point is decreased by the value set on tr25 (e.g. going from 42°C to 36°C)
To enable this function, proceed as indicated in the section “configurable inputs setting”.
Serial communication
The device is configured for communicating on a serial line using the MODBUS protocol. When connecting the device it must be assigned an address univocally identifying it among all the devices connected to the same serial line (“*Modbus individual address*”). This address must be between 1 and 247 and is configurable by means of the parameter CF30 (see section on serial communication).
Recording hours of operation
The controller can record the hours of compressor and pump operation. Access the “Status \ Hr” menu to show the values. The hours are reset by pressing (prolonged) the SET button, while the hours of operation are displayed.
Power failure
In case of a power failure, when the power is restored the controller will go to the status prior to the power failure. The procedure is cancelled if a defrost is in progress. All timing in progress is cancelled and reinitialised.
Clock
The controller has an internal clock for memorising the date and time of each alarm occurring during unit operation (see “Alarms history”). The clock can be set by accessing the “Status \ CL” menu.

Configurable inputs setting

The configurable inputs are AI4 and AI5.
For configuration, access the parameters CL and select the required function according to the following tables.

I/O	Sigla	digital/analogic input	Configuration	Polarity	Offset (range) / Status
AI4	S1	Not configured	CL03 = 0 CL33 = 0 CL53 = 0	----	----
		External probe sensor (provided with accessory SND3)	CL03 = 2 CL33 = 9 CL53 = 0	NTC probe	CL23 (-12,0... +12,0 [°C]) CL I3 = Start value scale AiL4 [°C] CL I2 = Full scale value AiL4 [°C]
		External probe air as analog input 4-20 mA	CL03 = 3 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL I3 = Start value scale AiL4 [°C] CL I2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-10 V	CL03 = 4 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL I3 = Start value scale AiL4 [°C] CL I2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-5 V	CL03 = 5 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL I3 = Start value scale AiL4 [°C] CL I2 = Full scale value AiL4 [°C]
		External probe air as analog input 0-1 V	CL03 = 6 CL33 = 9 CL53 = 0	----	CL23 (-12,0... +12,0 [°C]) CL I3 = Start value scale AiL4 [°C] CL I2 = Full scale value AiL4 [°C]
		ON/STBY remote (digital input)	CL03 = 1 CL33 = 0 CL53 = +1	input active open contact	open contact = STAND-BY
		Summer / Winter remote (digital input)	CL03 = 1 CL33 = 0 CL53 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50% (digital input)	CL03 = 1 CL33 = 0 CL53 = +21	input active close contact	close contact = Demand Limit 50%
		Economy (digital input)	CL03 = 1 CL33 = 0 CL53 = +22	input active close contact	close contact = economy
AI5	S2	Not configured	CL04 = 0 CL34 = 0 CL54 = 0	----	----
		External probe sensor (analogic input)	CL04 = 2 CL34 = 9 CL54 = 0	NTC probe	CL24 (-12,0... +12,0 [°C])
		ON/STBY remoto (digital input)	CL04 = 1 CL34 = 0 CL54 = +1	input active open contact	open contact = STAND-BY
		Summer / Winter remote (digital input)	CL04 = 1 CL34 = 0 CL54 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50% (digital input)	CL04 = 1 CL34 = 0 CL54 = +21	input active close contact	close contact = Demand Limit 50%
		Economy (analogic input)	CL04 = 1 CL34 = 0 CL54 = +22	input active close contact	close contact = economy
DI5		Not configured	CL44 = 0	----	----
	QF2.2	thermal pump 2	CL44 = -48	input active open contact	open contact = thermal pump 2
		ON/STBY remote	CL44 = -1	input active open contact	open contact = STAND-BY
		Summer / Winter remote	CL44 = +3	input active close contact	close contact = HEAT (Winter)
		Demand Limit 50%	CL44 = +21	input active close contact	close contact = Demand Limit 50%
		Economy	CL44 = +22	input active close contact	close contact = economy

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

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

Probe characteristics

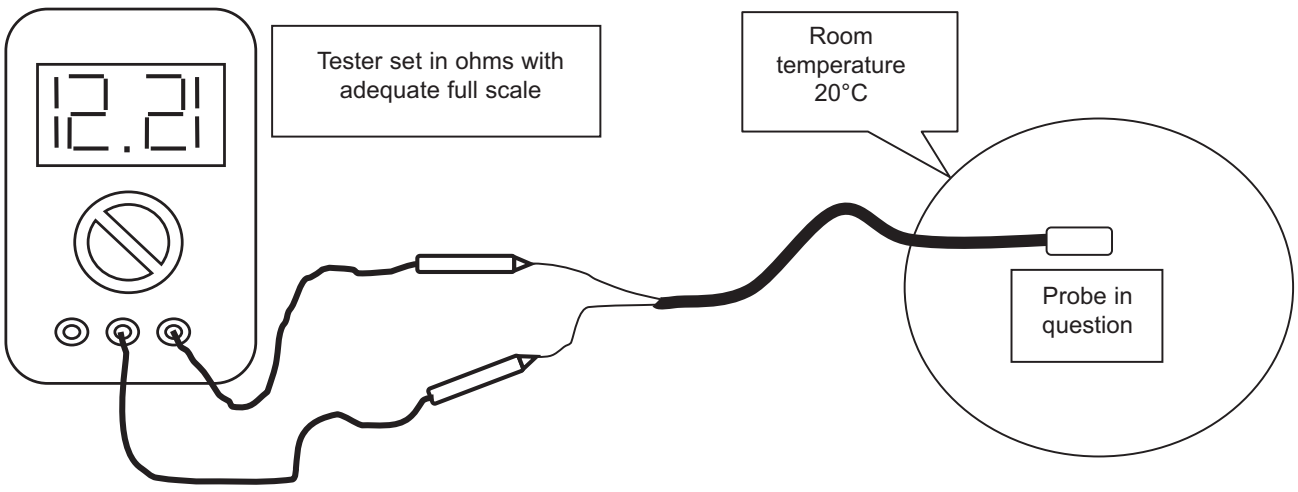
NTC10K-25°C type temperature probes are used.
When the probe bulb is at a temperature of 25°C the electrical resistance measurable at the probe ends with a multimeter is approx. 10 kΩ. The thermistor of these probes has a negative temperature coefficient: the electrical resistance value decreases as the temperature increases.

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

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

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

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



Serial communication

The unit can communicate on serial line using the **Modbus** communication protocol with **RTU** coding.
The unit can be connected to an RS485 network by means of the serial interface supplied as an accessory, and respond to requests from any master device connected to the network.

Serial line settings

The serial line must be set as follows :

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

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

Device address

To communicate correctly, each device connected to the serial network must have an univocal address ("*Modbus individual address*") of between 1 and 247. This address can be set by modifying the parameter CFG3.

Modbus commands

The Modbus commands implemented by the controller are :

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

Table of addresses

All the available resources are stored in the controller as WORD (2 byte) and therefore require the reading or writing of an entire Modbus register. According to the Modbus protocol, to identify a register of address X the address X-1 must appear in the message.
Some registers contain more than one piece of information : in this case the bits representing the resource value are identified by means of the number of bits used ("Bit number") and by the least significant bit ("Lsb"). In the writing operation for these registers it is necessary to read the current register value, modify the bits representing the resource concerned and rewrite the entire register.

Example.

Bit number = 4
Lsb = 7
Resource value = 3

15	14	13	12	11	**10**	**9**	**8**	**7**	6	5	4	3	2	1	0
0	1	1	0	1	**0**	**0**	**1**	**1**	1	0	1	1	0	1	0

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

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

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

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

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

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

MU : indicates the unit of measure of the resource

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

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

** If several operation modes are enabled by mistake:*

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

SETTING AT WORK

General Rules

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

MAINTENANCE

Maintenance

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

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

Structure
To prevent the creation of anomalous vibrations and noise, make sure the various steel parts are secured together and that the inspection panels are properly fixed to the unit.
In case of oxidation, treat with paints suitable for eliminating or reducing the phenomenon in the parts of the unit affected.

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

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

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

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

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

SAFETY AND POLLUTION

General considerations

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

a. Access to the unit

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

b. Elements of risk

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

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

c. Pollution

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

SAFETY AND POLLUTION

Refrigerant safety card

1 SUPPLIER COMPANY AND PRODUCT IDENTIFICATION

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

2 COMPOSITION / INFORMATION ON INGREDIENTS

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

3 IDENTIFICATION OF HAZARDS

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

4 FIRST-AID MEASURES

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

5 FIRE-PREVENTION MEASURES

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

6 MEASURES AGAINST ACCIDENTAL SPILLING OF THE PRODUCT

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

7 HANDLING AND STORAGE

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

8 CONTROL OF EXPOSURE / PERSONAL PROTECTION

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

9 CHEMICAL-PHYSICAL PROPERTIES

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

10 STABILITY AND REACTIVITY

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

11 TOXICOLOGICAL INFORMATION

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

12 ECOLOGICAL INFORMATION

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

SAFETY AND POLLUTION

13 CONSIDERATIONS ON DISPOSAL

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

14 INFORMATION FOR TRANSPORT

Designation for transport	LIQUEFIED GAS N.A.S. (DIFLUOROMETHANE, PENTAFLUOROETHANE)
UN No.	3163
Class/Div	2.2
ADR /RID No.	2, 2nd A
ADR/RID hazard no.	20
ADR label	Label 2 : non-toxic non-flammable gas.
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.

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

First aid

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

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

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

Swallowing:
• Do not make the victim vomit. If the victim is conscious, have him rinse his mouth out with clean water and then drink 200-300 ml of water.
• Immediately seek medical help.
• Do not administer adrenaline or sympathomimetic drugs after exposure owing to the risk of cardiac arrhythmia.
Consult the technical safety briefs available from coolant manufacturers for further information about the characteristics of the cooling fluid.

The manufacturer declines all responsibility for any inaccuracies in this manual due to printing or typing errors.
The reserves the right to modify the products contents in this catalogue without previous notice.

NOTE

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Ferroli

Cod. 3QE25110

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