

ferroli

RGC

AIR COOLED WATER CHILLERS AND HEAT PUMPS
WITH CENTRIFUGAL FANS

53.5 ÷ 200 kW IN COOLING MODE

57.5 ÷ 214 kW IN HEATING MODE



TECHNICAL MANUAL

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.

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GENERAL SPECIFICATIONS

Presentation of the unit

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

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

This series is composed of 12 models divided in four sizes with nominal cooling capacity from **53.5 to 200 kW** and heating capacity from **57.5 to 214 kW**.

The units product cold water from 5 to 25°C (in summer) and hot water from 30 to 55°C (in winter) and they can be equipped with continuous adjustment of centrifugal fans speed in order to allow the units to operate both with low outdoor temperature in cooling mode and with high outdoor temperature in heating mode as well as to reduce noise emissions (IMV accessory).

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

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

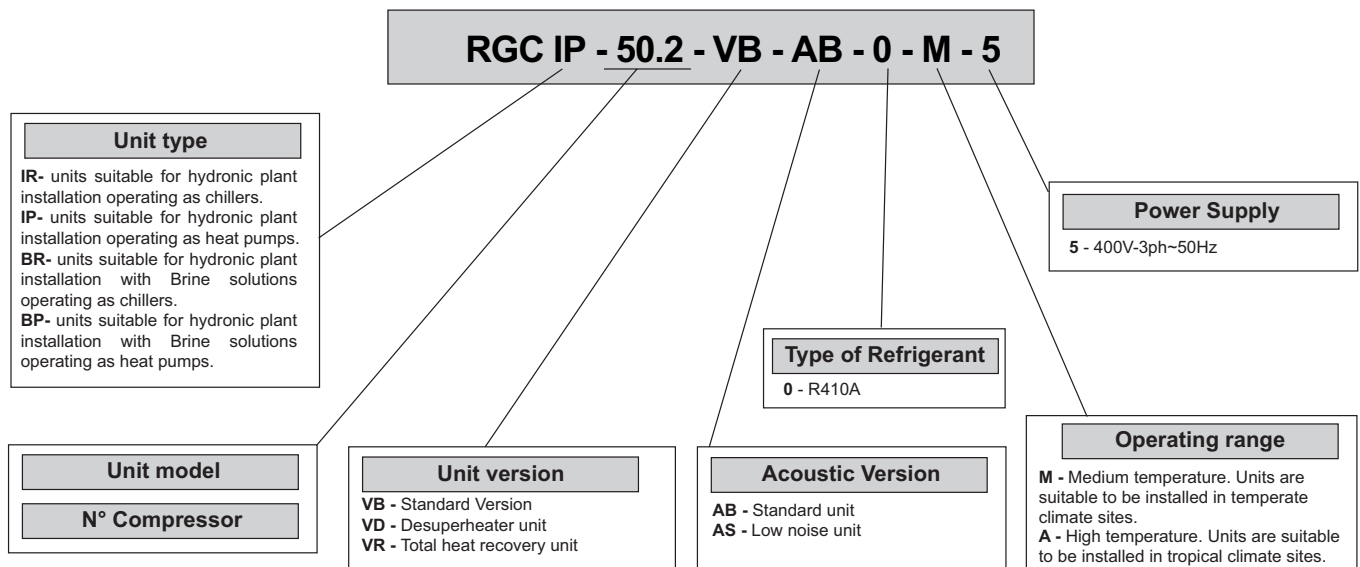
A variety of other accessories are available to extend the capabilities of the units.

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

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

Identification code of the unit

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



The available special versions are described below:

VB: **Standard unit.**

VD: **Desuperheater unit (available for both IR units and IP units)**

Produces cold water in the same way as the standard version plus hot water **from 30 to 70°C** at the same time. This is achieved by installing a water-refrigerant gas heat exchanger between the compressor and coils in order to recover 15 to 20% of the heating capacity that would otherwise be dispersed in the air.

VR: **Total Heat Recovery unit**

Produces cold water as in the standard version plus hot water at a temperature of **35 to 50°C** at the same time. This is achieved thanks to a water-refrigerant gas heat exchanger that totally recovers the heating capacity that would otherwise be dispersed in the air. The total heat recovery function is enabled and disabled by means of a valve on the compressor delivery of each circuit: when the temperature of the water that enters the recuperator drops, the valve switches the hot gas flow from the condensing coils to the recovery heat exchanger. On the other hand, when the temperature of the water reaches the set-point, the valve shuts off the heat recuperator and switches the hot gas flow to the condensing coils.

GENERAL SPECIFICATIONS

Description of the components

The complete series of industrial chillers and heat pumps for use in hydronic systems includes **12 constructional sizes** ranging from **53.5 to 200 kW** in the cooling mode and **from 57.5 to 214 kW** in the heating mode.

Main components:

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

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

2a. The power section includes:

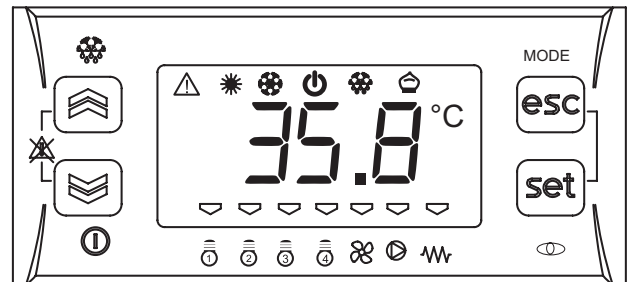
- Main door-locking circuit-breaker.
- Fuse-holder that can be isolated with protection fuse triad for each compressor.
- Fuse-holder that can be isolated with protection fuse for compressor oil heaters and antifreeze (if installed).
- Control contactor for each compressor.
- Protection fuse for the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

2b. The auxiliary section includes:

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

2c. The microprocessor monitoring section includes:

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



Control system main functions: temperature control of the water produced by the unit, smart defrosting control, compressor and pump operating hour counter, timing and cycling of start-ups, input parameters by keyboard, alarms management, operating mode change (only IP unit), dynamic set-point (climatic control), "Adaptive" function for better temperature control for unit without storage tank. If you installed the hydronic kit these functions are enabled: antifreeze with pump, start-up cycle after prolonged inactivity (anti-sticking), if the hydronic kit installed has 2 pumps there is a cycling between each pump to ensure an equivalent lifetime, with inverter modulating hydronic kit the water flow of the plant can be adjusted.

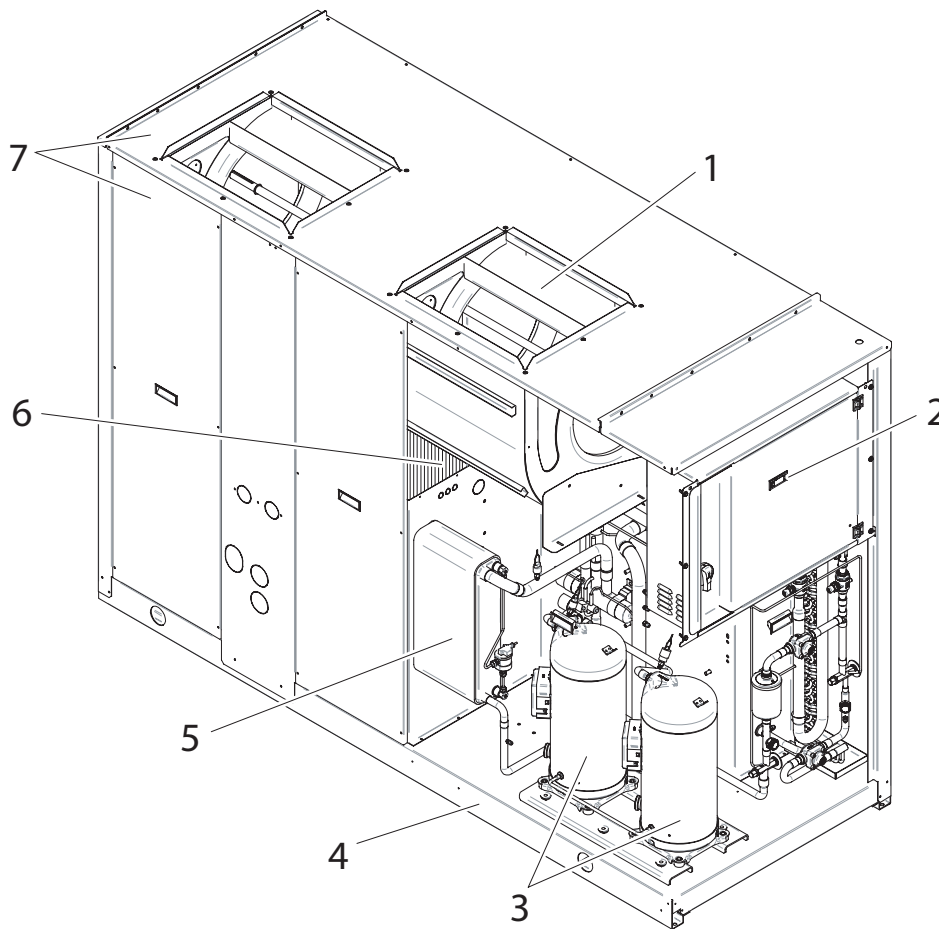
Digital input functions: low pressure, high pressure, high temperature on compressor supply, phase presence and sequence monitoring device on power supply, differential water pressure control, compressors thermal protection, fans thermal protection, pumps thermal protection (only if installed MP accessory),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

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

Analogic input functions: in and out water temperature, coil temperature probe, external air temperature probe (if present), in and out recovery water temperature (only for the **VR** Version)..

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

GENERAL SPECIFICATIONS



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

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

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

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

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

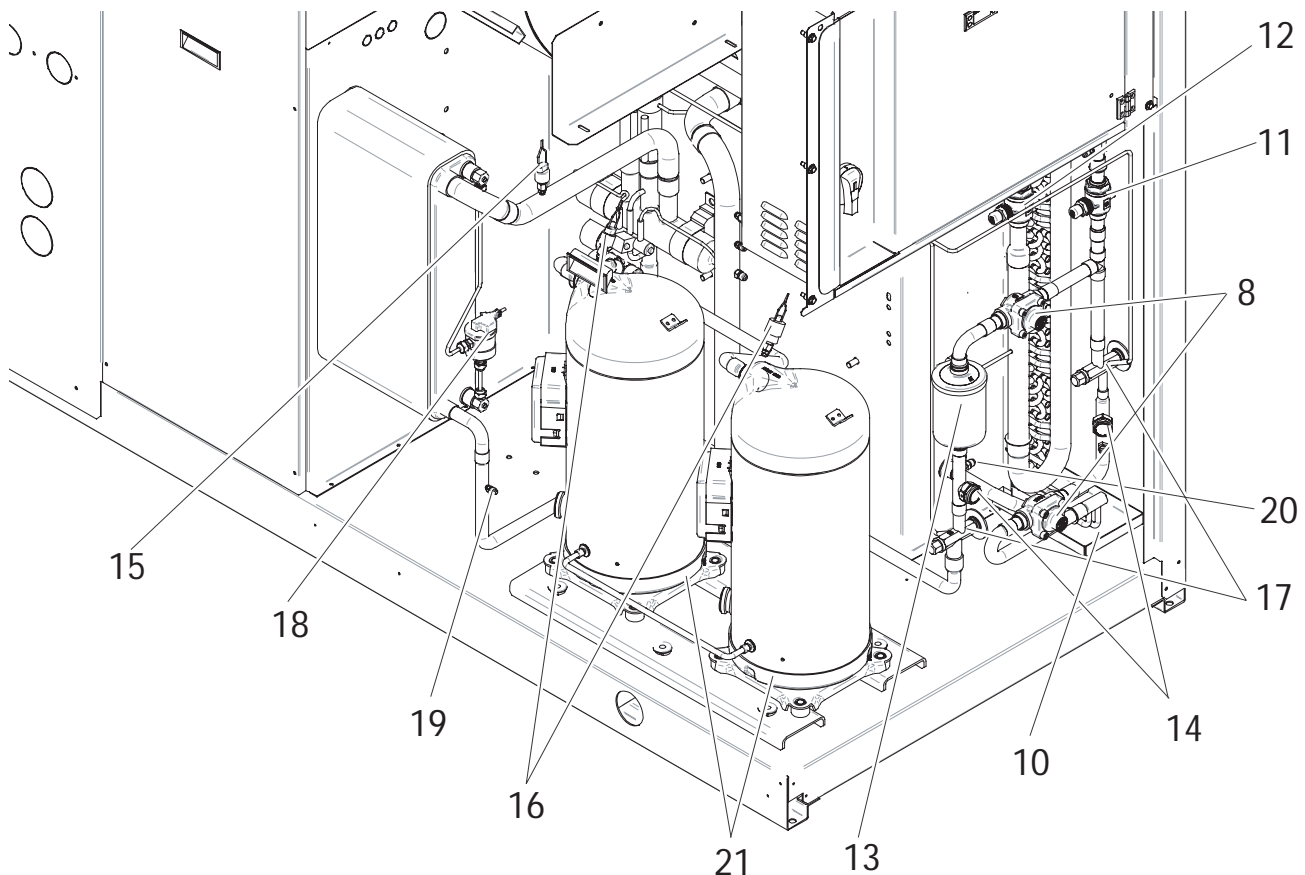
8. One-way valves (IP unit only), allowing the coolant to pass into the appropriate exchangers, depending on the operating cycle.

9. 4-way cycle reversal valve (IP unit only), reverses the flow direction of the coolant as the summer/winter operating mode is changed.

GENERAL SPECIFICATIONS

Hydraulic and cooling circuit components

- 10. Drain Pan Kit (standard for IP version).** Provides a pan under the coil to drain the condensing water, fitted with 1/2" outlet connection positioned opposite the electric control panel.
- 11. Fluid cock.** Ball type, this allows the gas flow on the fluid line to be turned on and off. Along with the cock on the compressor delivery, it allows the components of the fluid line to be subjected to extraordinary maintenance work and the compressors to be replaced if necessary (without discharging the coolant from the unit).
- 12. Compressor delivery cock.** Ball type, allows the gas delivered to the compressors to be turned on and off.
- 13. Dehydrator filter.** Mechanical type. Retains impurities and traces of moisture in the circuit. **Hermetic** type for models **50÷80**; **cartridge** type for models **90÷200**.
- 14. Fluid and humidity indicator.** Signals when fluid passes through the circuit, indicating that the coolant charge is correct. The fluid indicator light also indicates the amount of moisture in the coolant by changing colour.
- 15. Low pressure switch (N°1 of series IR version, N°2 of series IP version).** With fixed setting. It is installed on the suction pipe and blocks the compressors if the operating pressures drop below the tolerated values. Automatically resets as the pressure increases. If it activates frequently, the unit will block and can only be restarted by resetting via the user interface terminal.
- 16. High pressure switch (n°2).** With fixed setting. Are installed on the delivery pipe and blocks the compressors if the operating pressures exceed the tolerated values. If it activates, the unit will block and can only be restarted by resetting via the user interface terminal.
- 17. Thermostatic valve.** With external equalizer, this supplies the evaporator correctly, keeping the selected overheating degree at a steady level.
- 18. Water differential pressure switch.** This is standard supply and is installed on the connections between the water inlet and outlet of the exchanger. It stops the unit if it activates.
- 19. Pressure taps: 1/4 " SAE (7/16" UNF) type with flow regulator.** Allow the operating pressure of the system to be measured: compressor delivery, lamination component inlet, compressor intake.
- 20. Pressure taps: 5/16 " SAE type with flow regulator.** Allow the charge/discharge of the gas from the system, precisely from compressor outlet an expansion valve inlet.
- 21. Electrical heating elements to heat the compressor oil.** "Belt" type. These activate when the compressor turns off and keep the temperature of the oil sufficiently high so as to prevent coolant from migrating during these pauses.
- Safety valve.** Installed on the delivery pipe of the compressors, this operates if extreme faults should occur in the plant.
- Fluid receiver (IP unit only),** this is a plenum tank that accounts for variations to the coolant charge the machine must supply as the summer/winter operating mode varies.
- Fluid separator (IP unit only),** on the compressor intake to protect against possible fluid back-flows.

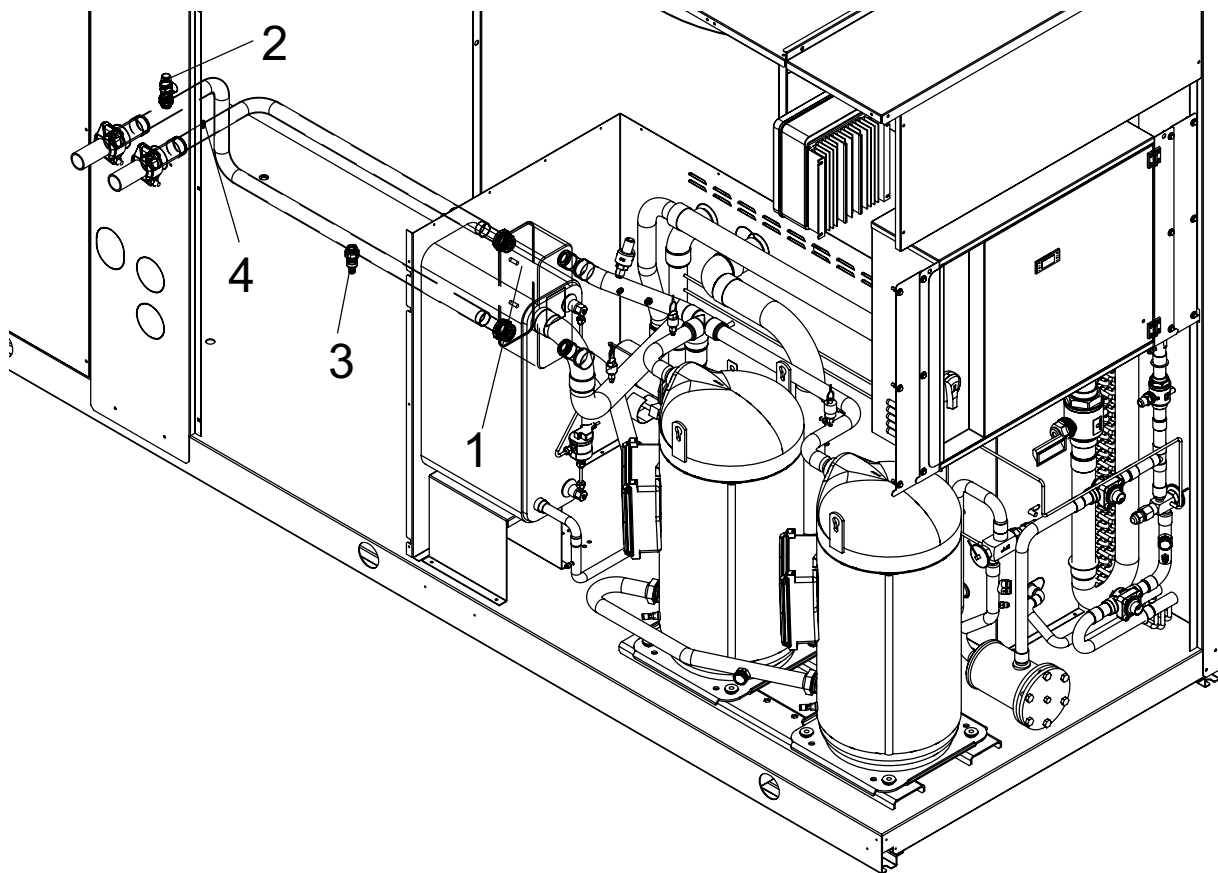


GENERAL SPECIFICATIONS

Desuperheater unit VD (available for both IR units and IP units)

Hydraulic and chilling circuit components:

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

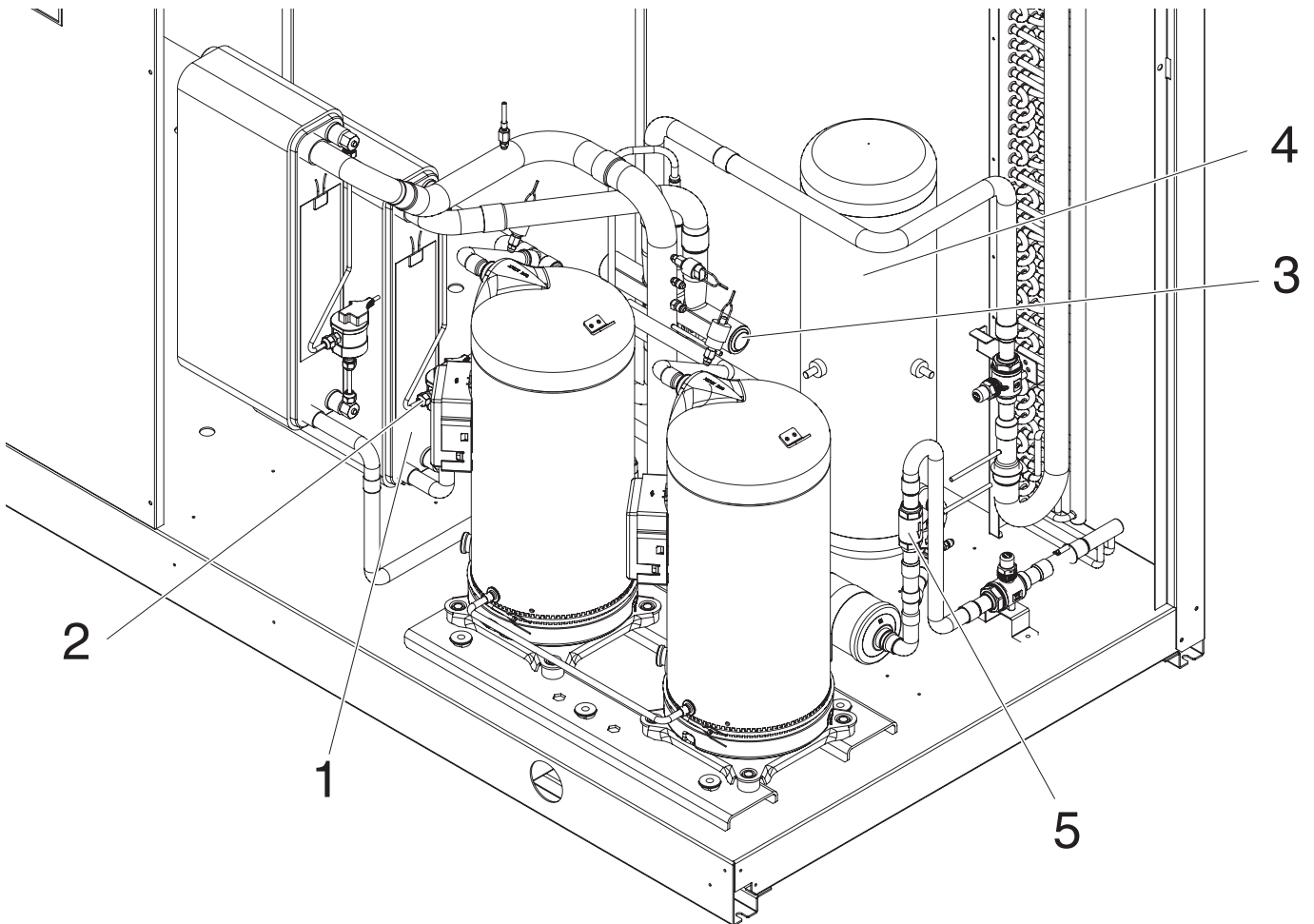


GENERAL SPECIFICATIONS

Total Heat Recovery VR (only available for IR units)

Hydraulic and cooling circuit components:

- 1. Heat recovery exchanger.** 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 dispersion towards the outside. Standard supply also includes an electric antifreeze heater to prevent the parts from freezing during the winter, if it is not drained.
- 2. Differential water pressure switch.** Installed on exchanger. It disables the heat recovery version if activated owing to lack of water flowing through the recovery exchangers.
- 3. Heat recovery management valve.** This delivers refrigerant to the condensing coils or heat recovery exchanger, depending on demands for hot water, and into the appropriate exchangers depending on whether hot water is required or not.
- 4. Fluid receiver.** This is a plenum tank that accounts for the refrigerant charge variations required by the machine as the operating modes change (condensing in air or in water).
- 5. One-way valves.** Make the refrigerant obligatorily pass through the appropriate heat exchangers (coils / heat exchanger), depending on the operating mode.



ACCESSORIES AND OPTIONAL EQUIPMENT

Accessories

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

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

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

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

Water storage tank. It consists of:

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

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

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

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

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

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

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

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

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

NB: YOU CAN CHOOSE ONLY ONE KIT.

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

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

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

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

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

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

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

7 Water safety valve.

8 Water outlet.

9 Air vent.

10 Antifreeze heater connection (RAG accessory).

ACCESSORIES AND OPTIONAL EQUIPMENT

MP. Hydronic Kit.

MP : Hydronic Kit with 1 o 2 Pumps (The second pump, mounted in parallel to the first, allows to have a spare pump to be activated in case of failure of the first). Besides the pumps, this accessory is equipped with all the hydraulic components (water filter, expansion tank, on-off valves, water pressure gauge, air vent, water outlet) required for complete installation and easy maintenance. **Different water accumulation tank configurations are therefore available in combination with the Hydronic Kit accessory:**

MP1 / MP2 AM 2P STD: Accumulation on the Plant Delivery side (Standard)^(A): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 86 to 150 kPa (from 9 to 15 m.w.c.) for the circulating water.

MP1 / MP2 AM 2P HP1: Accumulation on the Plant Delivery side (High)^(B): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 198 to 255 kPa (from 20 to 25 m.w.c.) for the circulating water.

MP1 / MP2 PS 2P STD: Accumulation pre-engineered for the primary and secondary circuit : The sole function of the pump is to circulate the water around the primary circuit: this circuit includes the accumulation tank and plate exchanger (chiller water circuit). The installer must mount the pumping section relative to the secondary circuit formed by the accumulation tank (with the pre-engineered wet connections) and the system served. No high working head version available.

MP1 / MP2 SS 2P STD: Hydronic Kit without Water Storage Tank (Standard)^(A). The pump draws water from the system, sends it to the plate heat exchanger and returns it to the system. During normal operating conditions, the pump in this configurations can provide a residue head from 86 to 150 kPa (from 9 to 15 m w.c.).

MP1 / MP2 SS 2P HP1: Hydronic Kit without Water Storage Tank (High Working Head)^(B). The pump draws water from the system, sends it to the plate heat exchanger and returns it to the system. During normal operating conditions, the pump in this configurations can provide a residue head from 198 to 255 kPa (from 20 to 25 m w.c.).

MP1M AM 2P STD: Accumulation on the Plant Delivery side (Standard)^(A): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 86 to 150 kPa (from 9 to 15 m.w.c.) for the circulating water. The **Inverter** control enables the calibration of the plant water flow directly from the control panel permitting: energy savings compared to a traditional setting, reduction of water hammer in the pipes thanks to gradual start-ups and shutdowns, noise reduction of the pump, reducing starting current and improved thermal protection against overload.

MP1M AM 2P HP1: Accumulation on the Plant Delivery side (High)^(B): The pump draws water from the system, sends it to the plate exchanger and from thence to the inertial accumulation tank. During normal operating conditions, the pump in this configuration is able to provide a residue head from 198 to 255 kPa (from 20 to 25 m.w.c.) for the circulating water. The **Inverter** control enables the calibration of the plant water flow directly from the control panel permitting: energy savings compared to a traditional setting, reduction of water hammer in the pipes thanks to gradual start-ups and shutdowns, noise reduction of the pump, reducing starting current and improved thermal protection against overload.

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MP1M SS 2P HP1: Hydronic Kit without Water Storage Tank (High Working Head)^(B). The pump draws water from the system, sends it to the plate heat exchanger and returns it to the system. During normal operating conditions, the pump in this configurations can provide a residue head from 198 to 255 kPa (from 20 to 25 m w.c.). The **Inverter** control enables the calibration of the plant water flow directly from the control panel permitting: energy savings compared to a traditional setting, reduction of water hammer in the pipes thanks to gradual start-ups and shutdowns, noise reduction of the pump, reducing starting current and improved thermal protection against overload.

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

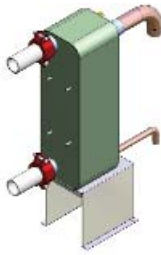
(B): For the working head values depending on the water flow rate, consult the High Working Head MP-AM graph.

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

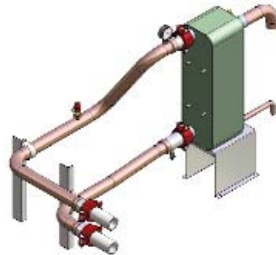
NOTE: It is essential to purchase the units with either the KT or MP accessory described previously. The choice of one automatically excludes the other.

ACCESSORIES AND OPTIONAL EQUIPMENT

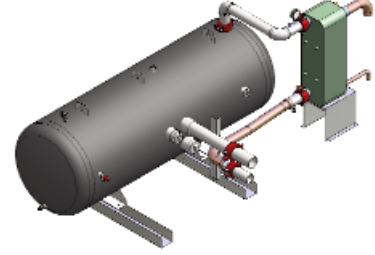
VICTAULIC CONNECTION KIT



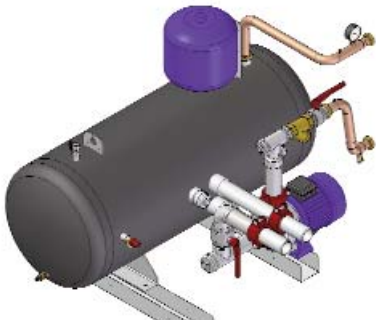
COMPLETE PIPE KIT



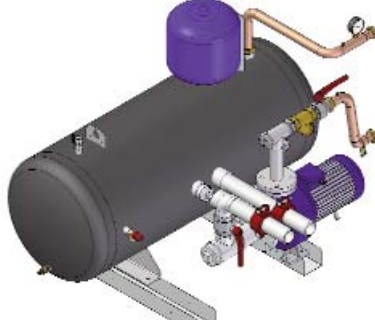
WATER STORAGE TANK PIPE KIT



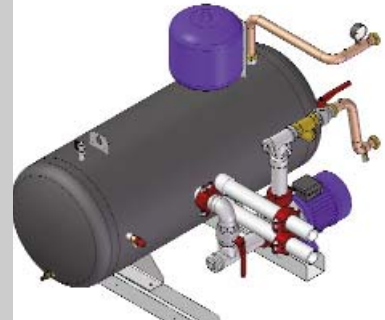
M1P AM 2P STD



M1P AM 2P HP1



M1P PS 2P STD



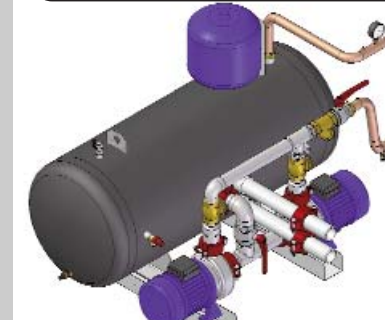
M2P AM 2P STD



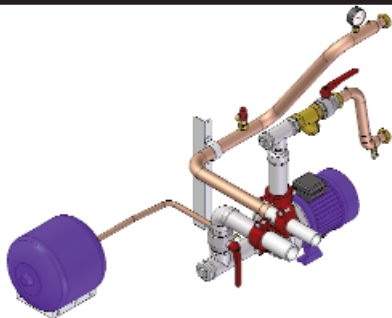
M2P AM 2P HP1



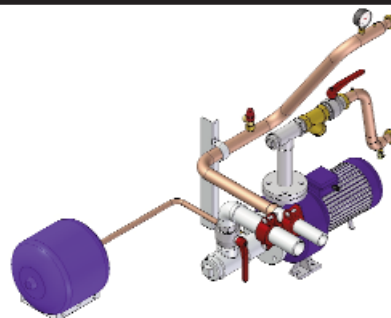
M2P PS 2P STD



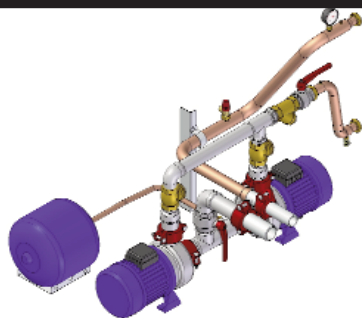
M1P SS 2P STD



M1P SS 2P HP1



M2P SS 2P STD



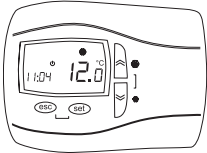
M2P SS 2P HP1



ACCESSORIES AND OPTIONAL EQUIPMENT

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

The control unit has the following buttons:



MODE key : used to select the operating mode

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

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

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

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

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

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

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

SND- External Air Probe (M). External air probe mounted near coil allows smart defrosting, climatic variation of setpoint and enables heat pump stop reducing the external air temperature below a setpoint.

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

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

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

SS - Soft Starter (M). Soft starter for compressor, reduce the maximum starting current up to 60% of nominal starting current.

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

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

CSF - Voltage monitor and sequence meter (M). 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 $\pm 10\%$ the rated voltage (MIN=360 V - RATED=400V - MAX=440V). It blocks the unit if the voltage is outside the limits provided for.

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

Mechanical options

Special finned heat exchangers

- Coils with copper fins
- Coils with tin-coated copper fins
- Coils with aluminium fins with acrylic, epoxy or hydrophilic coating.

Electrical options

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Technical specifications of unit AB Standard Unit / AS Low noise Unit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph - 50 Hz												V-ph-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)	16.5	18.5	21.7	25.6	28.2	31.6	35.5	40.5	45.0	50.5	56.0	62.8	kW
Compressors EER	3.24	3.17	3.17	3.07	3.23	3.23	3.15	3.11	3.18	3.13	3.21	3.18	-
Total power input (1)	22.0	24.0	27.2	31.1	34.4	37.8	44.5	49.5	61.5	67.0	78.0	84.8	kW
Total power input (1) (E)	18.0	20.0	23.3	27.3	30.6	34.1	37.9	42.9	52.9	58.7	66.5	73.7	kW
Total EER	2.43	2.44	2.53	2.53	2.65	2.70	2.52	2.55	2.33	2.36	2.31	2.36	-
Total EER (E)	2.97	2.93	2.95	2.88	2.97	2.99	2.96	2.94	2.70	2.69	2.71	2.71	-
ESEER (E)	4.10	4.04	4.07	3.98	4.10	4.13	4.08	4.05	3.73	3.71	3.74	3.74	-
Water flow rate (1)	2.56	2.80	3.29	3.76	4.35	4.87	5.35	6.02	6.83	7.55	8.60	9.56	l/s
Water pressure drops (1) (E)	42	51	48	40	40	40	40	39	39	39	58	57	kPa
Working head (1) (MP)	135	116	97	75	143	129	113	92	116	95	141	107	kPa

Compressor

Type	Scroll												/
Quantity	2												n°
Load steps	0-50-100												%
Oil charge CP1	3.25	3.25	3.25	3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	l
Oil charge CP2	3.25	3.25	3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	6.3	l

Heat Exchanger

Type	Brazen plates												/
Quantity	1												n°
Water volume	3.6	3.6	4.6	5.4	7.6	8.4	9.7	10.9	12.6	14.5	11.1	13.0	l

Fan

Type	Centrifugal												-	
Quantity	1			2			3			4			n°	
Total air flow rate	29050	29050	28100	27680	41460	40100	47440	47440	62190	59820	82920	79760	m³/h	
Working head NOM/MAX (3)	50 / 150												rpm	
Power input	5.5			6.2			9			16.5			22	kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3.38			4.72			5.90			7.41			m²

Water Storage Tank (SAA accessory)

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

Electrical Data

Units without hydronic kit

Total maximum power input [FLA]	52.7	55.3	62.8	73.1	80.6	86.1	101	109	138	152	178	193	A
Total maximum power input [FLI]	30.3	32.5	35.9	40.3	47.1	52.7	60.9	65.6	82.7	91.5	108	119	kW
Total maximum starting current [MIC]	150	151	177	215	269	275	328	336	389	403	498	513	A

Units with hydronic kit MP PS STD (1 or 2 pumps)

Total maximum power input [FLA]	55.2	57.8	65.3	75.6	84.0	89.5	104	113	143	157	185	199	A
Total maximum power input [FLI]	31.7	33.9	37.3	41.7	48.9	54.5	62.7	67.4	85.6	94.4	112	123	kW
Total maximum starting current [MIC]	152	154	180	218	273	278	331	340	394	408	505	519	A

Units with hydronic kit MP AM STD and MP SS STD (1 or 2 pumps)

Total maximum power input [FLA]	55.9	58.5	66.0	76.3	85.4	90.9	106	114	144	158	186	201	A
Total maximum power input [FLI]	32.1	34.3	37.7	42.1	50.0	55.6	63.8	68.5	85.9	94.7	113	124	kW
Total maximum starting current [MIC]	153	155	180	218	274	279	333	341	394	409	507	521	A

Units with hydronic kit MP AM HP1 and MP SS HP1 (1 or 2 pumps)

Total maximum power input [FLA]	58.9	61.6	69.0	79.3	86.8	92.4	109	117	146	161	189	204	A
Total maximum power input [FLI]	34.1	36.3	39.7	44.1	50.8	56.5	65.6	70.3	87.5	96.3	115	126	kW
Total maximum starting current [MIC]	156	158	183	221	275	281	336	345	397	411	509	524	A

Data referred to standard operating condition.

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

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

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

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

(SAA): with storage tank

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Standard performances AB Standard unit / AS Low noise Unit

Mod. 50-100

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	5	61.1	11.6	57.0	13.3	53.9	14.7	50.6	16.2	47.1	17.8	43.6	19.4	40.0	21.0
	6	62.8	11.7	58.6	13.4	55.4	14.8	52.0	16.3	48.4	18.0	44.8	19.6	41.1	21.2
	7	64.6	11.8	60.3	13.6	57.0	15.0	53.5	16.5	49.8	18.2	46.1	19.8	42.3	21.4
	8	66.4	11.9	62.0	13.7	58.6	15.1	55.0	16.7	51.2	18.4	47.4	20.0	-	-
	9	68.2	12.1	63.7	13.9	60.2	15.3	56.5	16.8	52.6	18.6	48.7	20.2	-	-
	10	70.1	12.2	65.4	14.0	61.8	15.4	58.0	17.0	54.0	18.8	50.0	20.4	-	-
	11	71.8	12.3	67.1	14.1	63.4	15.6	59.5	17.2	55.4	18.9	51.3	20.6	-	-
	12	73.8	12.4	68.9	14.3	65.1	15.7	61.1	17.4	56.9	19.1	52.7	20.8	-	-
60	5	66.9	13.0	62.4	14.9	59.0	16.5	55.4	18.1	51.5	20.0	47.7	21.8	43.9	23.6
	6	68.7	13.1	64.2	15.1	60.7	16.6	56.9	18.3	53.0	20.2	49.1	22.0	45.1	23.8
	7	70.7	13.2	66.0	15.2	62.4	16.8	58.6	18.5	54.5	20.4	50.5	22.2	46.4	24.0
	8	72.8	13.4	67.9	15.4	64.2	17.0	60.3	18.7	56.1	20.6	51.9	22.5	-	-
	9	74.8	13.5	69.8	15.6	66.0	17.1	61.9	18.9	57.6	20.8	53.4	22.7	-	-
	10	76.7	13.7	71.6	15.7	67.7	17.3	63.6	19.1	59.1	21.0	54.8	22.9	-	-
	11	78.7	13.8	73.5	15.9	69.5	17.5	65.2	19.3	60.7	21.2	56.2	23.2	-	-
	12	80.8	13.9	75.5	16.0	71.3	17.6	67.0	19.5	62.3	21.4	57.7	23.4	-	-
70	5	78.5	15.2	73.3	17.5	69.3	19.3	65.0	21.3	60.5	23.5	56.1	25.6	51.5	27.6
	6	80.7	15.4	75.3	17.7	71.2	19.5	66.9	21.5	62.2	23.7	57.6	25.8	52.9	27.9
	7	83.1	15.5	77.5	17.9	73.3	19.7	68.8	21.7	64.0	23.9	59.3	26.1	54.5	28.2
	8	85.4	15.7	79.7	18.1	75.4	19.9	70.7	21.9	65.8	24.2	61.0	26.4	-	-
	9	87.8	15.9	81.9	18.2	77.5	20.1	72.7	22.2	67.6	24.4	62.6	26.6	-	-
	10	90.1	16.0	84.1	18.4	79.5	20.3	74.6	22.4	69.4	24.7	64.3	26.9	-	-
	11	92.4	16.2	86.2	18.6	81.6	20.5	76.5	22.6	71.2	24.9	66.0	27.2	-	-
	12	94.9	16.3	88.6	18.8	83.8	20.7	78.6	22.8	73.1	25.2	67.7	27.4	-	-
80	5	89.8	18.0	83.9	20.7	79.3	22.8	74.4	25.1	69.2	27.7	64.1	30.2	58.9	32.6
	6	92.3	18.1	86.2	20.9	81.5	23.0	76.5	25.3	71.1	27.9	65.9	30.5	60.5	32.9
	7	95.0	18.3	88.7	21.1	83.9	23.2	78.7	25.6	73.2	28.2	67.8	30.8	62.3	33.3
	8	97.7	18.5	91.2	21.3	86.2	23.5	80.9	25.9	75.3	28.5	69.7	31.1	-	-
	9	100	18.7	93.7	21.5	88.6	23.7	83.2	26.1	77.4	28.8	71.7	31.4	-	-
	10	103	18.9	96.2	21.7	91.0	23.9	85.4	26.4	79.4	29.1	73.6	31.7	-	-
	11	106	19.1	98.7	21.9	93.3	24.2	87.5	26.7	81.5	29.4	75.4	32.0	-	-
	12	109	19.3	101	22.2	95.8	24.4	89.9	26.9	83.7	29.7	77.5	32.3	-	-
90	5	104	19.8	97.0	22.8	91.7	25.1	86.0	27.7	80.1	30.5	74.1	33.2	68.1	35.9
	6	107	20.0	100	23.0	94.2	25.3	88.4	27.9	82.3	30.8	76.2	33.5	70.0	36.3
	7	110	20.2	103	23.2	97.0	25.6	91.0	28.2	84.7	31.1	78.4	33.9	72.0	36.6
	8	113	20.4	105	23.5	100	25.9	93.6	28.5	87.1	31.4	80.6	34.3	-	-
	9	116	20.6	108	23.7	102	26.1	96.2	28.8	89.5	31.7	82.9	34.6	-	-
	10	119	20.8	111	23.9	105	26.4	98.7	29.1	91.8	32.1	85.1	34.9	-	-
	11	122	21.0	114	24.2	108	26.6	101	29.4	94.2	32.4	87.2	35.3	-	-
	12	126	21.2	117	24.4	111	26.9	104	29.7	96.7	32.7	89.6	35.6	-	-
100	5	116	22.2	109	25.5	103	28.1	96.4	31.0	89.7	34.2	83.1	37.2	76.3	40.3
	6	120	22.4	112	25.7	106	28.4	99.1	31.3	92.2	34.5	85.4	37.6	78.4	40.6
	7	123	22.6	115	26.0	109	28.7	102	31.6	94.9	34.8	87.9	38.0	80.7	41.1
	8	127	22.9	118	26.3	112	29.0	105	31.9	97.6	35.2	90.4	38.4	-	-
	9	130	23.1	121	26.6	115	29.3	108	32.3	100	35.6	92.9	38.8	-	-
	10	134	23.3	125	26.8	118	29.6	111	32.6	103	35.9	95.3	39.2	-	-
	11	137	23.5	128	27.1	121	29.8	113	32.9	106	36.3	97.8	39.5	-	-
	12	141	23.8	131	27.4	124	30.1	117	33.2	108	36.6	100	39.9	-	-

Tw= Outlet water temperature °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Mod. 115-200

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	5	128	24.9	119	28.7	113	31.6	106	34.8	98.5	38.4	91.3	41.8	83.8	45.2
	6	131	25.1	123	28.9	116	31.9	109	35.1	101	38.7	93.8	42.2	86.1	45.7
	7	135	25.4	126	29.2	119	32.2	112	35.5	104	39.1	96.5	42.7	88.6	46.1
	8	139	25.7	130	29.5	123	32.6	115	35.9	107	39.6	99.2	43.1	-	-
	9	143	25.9	133	29.8	126	32.9	118	36.3	110	40.0	102	43.6	-	-
	10	147	26.2	137	30.1	129	33.2	121	36.6	113	40.4	105	44.0	-	-
	11	150	26.5	140	30.4	133	33.5	125	37.0	116	40.7	107	44.4	-	-
	12	154	26.7	144	30.7	136	33.9	128	37.3	119	41.1	110	44.9	-	-
130	5	144	28.4	134	32.7	127	36.0	119	39.7	111	43.8	103	47.7	94.3	51.6
	6	148	28.7	138	33.0	130	36.4	122	40.1	114	44.2	106	48.2	96.9	52.1
	7	152	29.0	142	33.3	134	36.7	126	40.5	117	44.6	109	48.7	100	52.6
	8	156	29.3	146	33.7	138	37.1	130	40.9	121	45.1	112	49.2	-	-
	9	161	29.6	150	34.0	142	37.5	133	41.4	124	45.6	115	49.7	-	-
	10	165	29.9	154	34.4	146	37.9	137	41.8	127	46.0	118	50.2	-	-
	11	169	30.2	158	34.7	149	38.3	140	42.2	130	46.5	121	50.7	-	-
	12	174	30.5	162	35.1	153	38.6	144	42.6	134	46.9	124	51.2	-	-
145	5	163	31.6	152	36.3	144	40.0	135	44.1	126	48.6	117	53.0	107	57.3
	6	168	31.9	157	36.7	148	40.4	139	44.5	129	49.1	120	53.5	110	57.9
	7	173	32.2	161	37.0	152	40.8	143	45.0	133	49.6	123	54.1	113	58.5
	8	178	32.6	166	37.5	157	41.3	147	45.5	137	50.1	127	54.7	-	-
	9	182	32.9	170	37.8	161	41.7	151	46.0	141	50.6	130	55.2	-	-
	10	187	33.2	175	38.2	165	42.1	155	46.4	144	51.2	134	55.8	-	-
	11	192	33.5	179	38.6	170	42.5	159	46.9	148	51.7	137	56.3	-	-
	12	197	33.9	184	39.0	174	42.9	163	47.3	152	52.2	141	56.9	-	-
160	5	180	35.4	168	40.8	159	44.9	149	49.5	139	54.6	129	59.5	118	64.3
	6	185	35.8	173	41.2	164	45.3	154	50.0	143	55.1	132	60.1	122	64.9
	7	191	36.1	178	41.6	168	45.8	158	50.5	147	55.7	136	60.7	125	65.6
	8	196	36.5	183	42.0	173	46.3	162	51.1	151	56.3	140	61.4	-	-
	9	202	36.9	188	42.5	178	46.8	167	51.6	155	56.8	144	62.0	-	-
	10	207	37.3	193	42.9	183	47.2	171	52.1	159	57.4	148	62.6	-	-
	11	212	37.6	198	43.3	187	47.7	176	52.6	164	58.0	151	63.2	-	-
	12	218	38.0	203	43.7	192	48.2	181	53.1	168	58.5	156	63.8	-	-
180	5	205	39.3	192	45.2	181	49.8	170	54.9	158	60.5	147	66.0	135	71.4
	6	211	39.7	197	45.6	186	50.3	175	55.4	163	61.1	151	66.6	138	72.0
	7	217	40.1	203	46.1	192	50.8	180	56.0	167	61.7	155	67.3	142	72.8
	8	223	40.5	209	46.6	197	51.4	185	56.6	172	62.4	160	68.0	-	-
	9	230	40.9	214	47.1	203	51.9	190	57.2	177	63.0	164	68.7	-	-
	10	236	41.3	220	47.5	208	52.4	195	57.8	182	63.7	168	69.4	-	-
	11	242	41.7	226	48.0	213	52.9	200	58.3	186	64.3	173	70.1	-	-
	12	248	42.1	232	48.5	219	53.4	206	58.9	191	64.9	177	70.8	-	-
200	5	228	44.1	213	50.7	202	55.9	189	61.6	176	67.9	163	74.0	150	80.0
	6	235	44.5	219	51.2	207	56.4	194	62.2	181	68.5	167	74.7	154	80.8
	7	241	44.9	225	51.7	213	57.0	200	62.8	186	69.2	172	75.5	158	81.6
	8	248	45.4	232	52.3	219	57.6	206	63.5	191	70.0	177	76.3	-	-
	9	255	45.9	238	52.8	225	58.2	211	64.1	197	70.7	182	77.1	-	-
	10	262	46.3	244	53.3	231	58.7	217	64.8	202	71.4	187	77.8	-	-
	11	269	46.8	251	53.8	237	59.3	222	65.4	207	72.1	192	78.6	-	-
	12	276	47.2	258	54.4	244	59.9	229	66.0	213	72.8	197	79.4	-	-

Tw= Outlet water temperature °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Desuperheater unit (VD)

Standard Unit AB

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°
Total water content of recovery exchangers	0.6	0.6	0.6	0.6	0.8	0.8	1.3	1.3	1.3	1.3	1.8	1.8	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VD(1)	55.6	60.9	71.6	81.8	94.6	106	116	131	149	164	187	208	kW
Compressor power input VD (1)	15.8	17.8	20.8	24.6	27.1	30.3	34.1	38.9	43.2	48.5	53.8	60.3	kW
Total power input VD (1)	21.3	23.3	26.3	30.1	33.3	36.5	43.1	47.9	59.7	65.0	75.8	82.3	kW
EER VD (1)	2.61	2.61	2.72	2.72	2.84	2.90	2.69	2.73	2.50	2.52	2.47	2.53	-
Water flow VD (1)	2.66	2.91	3.42	3.91	4.52	5.06	5.54	6.26	7.12	7.84	8.93	9.94	l/s
Water pressure drop VD (1)	45	55	52	43	43	43	43	42	42	42	63	62	kPa
Recovered heating capacity (1)	15.7	17.6	20.0	23.6	27.1	30.4	34.4	38.4	44.0	49.3	55.4	61.3	kW
Recovered water flow rate (1)	0.75	0.84	0.96	1.13	1.29	1.45	1.64	1.83	2.10	2.36	2.65	2.93	l/s
Recovered water pressure drop (1)	9	11	14	19	15	18	11	14	18	22	18	21	kPa

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

Low noise Unit AS

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°
Total water content of recovery exchangers	0.6	0.6	0.6	0.6	0.8	0.8	1.3	1.3	1.3	1.3	1.8	1.8	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VD(1)	55.6	60.9	71.6	81.8	94.6	106	116	131	149	164	187	208	kW
Compressor power input VD (1)	15.8	17.8	20.8	24.6	27.1	30.3	34.1	38.9	43.2	48.5	53.8	60.3	kW
Total power input VD (1)	21.3	23.3	26.3	30.1	33.3	36.5	43.1	47.9	59.7	65.0	75.8	82.3	kW
EER VD (1)	2.61	2.61	2.72	2.72	2.84	2.90	2.69	2.73	2.50	2.52	2.47	2.53	-
Water flow VD (1)	2.66	2.91	3.42	3.91	4.52	5.06	5.54	6.26	7.12	7.84	8.93	9.94	l/s
Water pressure drop VD (1)	45	55	52	43	43	43	43	42	42	42	63	62	kPa
Recovered heating capacity (1)	15.7	17.6	20.0	23.6	27.1	30.4	34.4	38.4	44.0	49.3	55.4	61.3	kW
Recovered water flow rate (1)	0.75	0.84	0.96	1.13	1.29	1.45	1.64	1.83	2.10	2.36	2.65	2.93	l/s
Recovered water pressure drop (1)	9	11	14	19	15	18	11	14	18	22	18	21	kPa

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Recovered heating capacity Desuperheater unit (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kW _t = 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
60	70	3.0	3.5	4.0	4.6	5.2
	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
70	65	6.8	7.9	9.4	10.2	11.6
	70	4.3	4.9	5.9	6.4	7.2
	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
80	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
	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
90	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
	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
100	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
	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
110	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
		kW _t = 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
130	70	10.0	11.4	12.9	14.6	16.5
	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
145	65	15.2	17.3	19.6	22.2	25.1
	70	9.6	10.8	12.3	14.0	15.8
	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
160	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
	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
180	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
	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
200	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
	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
220	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

kW_{tr} = RECOVERED HEATING CAPACITY [KW]

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Total heat recovery unit (VR)

Standard Unit AB

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°
Total water content of recovery exchangers	4.6	4.6	5.4	6.2	9.7	10.9	12.6	14.5	11.1	13.0	14.6	16.3	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VR(1)	55.6	60.9	71.6	81.8	94.6	106	116	131	149	164	187	208	kW
Total power input VR (1)	15.8	17.8	20.8	24.6	27.1	30.3	34.1	38.9	43.2	48.5	53.8	60.3	kW
EER VR (1)	3.52	3.42	3.44	3.33	3.49	3.50	3.40	3.37	3.45	3.38	3.48	3.45	-
Water flow VR (1)	2.66	2.91	3.42	3.91	4.52	5.06	5.54	6.26	7.12	7.84	8.93	9.94	l/s
Water pressure drop VR (1)	45	55	52	43	43	43	43	42	42	42	63	62	kPa
Recovered heating capacity (1)	70.6	77.8	91.4	105	120	135	148	168	190	210	238	265	kW
Recovered water flow rate (1)	3.37	3.72	4.37	5.02	5.73	6.45	7.07	8.03	9.08	10.0	11.4	12.7	l/s
Recovered water pressure drop (1)	39	47	52	54	47	47	45	46	47	48	50	51	kPa

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

Low noise Unit AS

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°
Total water content of recovery exchangers	4.6	4.6	5.4	6.2	9.7	10.9	12.6	14.5	11.1	13.0	14.6	16.3	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VR(1)	55.6	60.9	71.6	81.8	94.6	106	116	131	149	164	187	208	kW
Total power input VR (1)	15.8	17.8	20.8	24.6	27.1	30.3	34.1	38.9	43.2	48.5	53.8	60.3	kW
EER VR (1)	3.52	3.42	3.44	3.33	3.49	3.50	3.40	3.37	3.45	3.38	3.48	3.45	-
Water flow VR (1)	2.66	2.91	3.42	3.91	4.52	5.06	5.54	6.26	7.12	7.84	8.93	9.94	l/s
Water pressure drop VR (1)	45	55	52	43	43	43	43	42	42	42	63	62	kPa
Recovered heating capacity (1)	70.6	77.8	91.4	105	120	135	148	168	190	210	238	265	kW
Recovered water flow rate (1)	3.37	3.72	4.37	5.02	5.73	6.45	7.07	8.03	9.08	10.0	11.4	12.7	l/s
Recovered water pressure drop (1)	39	47	52	54	47	47	45	46	47	48	50	51	kPa

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IR COOLING UNIT ONLY

Recovered heating capacity Total heat recovery unit (VR)

MOD.	TWE	TWR - RECOVERY TEMPERATURE (°C)				
		35	40	45	50	55
		kW _t = RECOVERED HEATING CAPACITY [KW]				
50	5	71.5	69.5	67.3	65.1	63.1
	6	73.2	71.1	69.0	66.7	64.5
	7	75.1	73.0	70.6	68.4	66.0
	8	77.0	74.8	72.4	70.0	67.5
	9	78.9	76.6	74.2	71.6	69.1
	10	80.7	78.4	75.9	73.3	70.6
	11	82.6	80.3	77.6	74.9	72.1
12	84.6	82.0	79.5	76.6	73.8	
60	5	78.5	76.4	74.1	71.8	69.6
	6	80.5	78.2	75.9	73.5	71.0
	7	82.6	80.2	77.8	75.3	72.7
	8	84.7	82.3	79.8	77.1	74.5
	9	86.8	84.2	81.6	78.9	76.2
	10	88.8	86.2	83.5	80.7	77.9
	11	90.8	88.2	85.4	82.5	79.5
12	93.1	90.3	87.4	84.4	81.3	
70	5	92.2	89.7	87.1	84.3	81.6
	6	94.5	91.9	89.1	86.3	83.5
	7	96.8	94.2	91.4	88.5	85.5
	8	99.3	96.5	93.6	90.5	87.4
	9	102	98.9	95.8	92.5	89.5
	10	104	101	98.0	94.7	91.4
	11	107	104	100	96.8	93.4
12	109	106	103	99.0	95.4	
80	5	106	103	100	97.3	94.3
	6	109	106	103	99.5	96.2
	7	111	108	105	102	98.5
	8	114	111	108	104	101
	9	117	114	110	107	103
	10	120	116	113	109	105
	11	123	119	115	111	108
12	126	122	118	114	110	
90	5	122	118	115	111	107
	6	125	121	117	114	110
	7	128	124	120	116	112
	8	131	127	123	119	115
	9	134	130	126	122	118
	10	138	133	129	125	120
	11	141	137	132	128	123
12	144	140	135	130	126	
100	5	136	133	129	124	120
	6	140	136	132	127	123
	7	143	139	135	130	126
	8	147	143	138	134	129
	9	151	146	142	137	132
	10	154	150	145	140	135
	11	158	153	148	143	138
12	162	157	152	146	141	

MOD.	TWE	TWR - RECOVERY TEMPERATURE (°C)				
		35	40	45	50	55
		kW _t = RECOVERED HEATING CAPACITY [KW]				
115	5	150	146	142	137	133
	6	154	150	145	141	136
	7	158	153	149	144	139
	8	162	157	153	148	143
	9	166	161	156	151	146
	10	170	165	160	154	149
	11	174	169	163	158	152
12	178	173	167	161	156	
130	5	169	165	160	155	150
	6	174	169	164	159	154
	7	178	173	168	163	157
	8	183	178	172	167	161
	9	187	182	176	170	165
	10	192	186	180	174	168
	11	196	190	184	178	172
12	201	195	189	182	176	
145	5	192	186	181	175	170
	6	196	191	185	179	173
	7	201	196	190	184	178
	8	207	201	194	188	182
	9	212	206	199	192	186
	10	217	210	204	197	190
	11	222	215	208	201	194
12	227	220	213	206	198	
160	5	212	207	201	194	188
	6	217	211	205	199	192
	7	223	217	210	204	197
	8	229	222	216	209	202
	9	234	228	221	213	206
	10	240	233	226	218	211
	11	246	238	231	223	215
12	252	244	236	228	220	
180	5	241	234	227	220	213
	6	247	240	232	225	217
	7	253	246	238	231	223
	8	259	252	244	236	228
	9	266	258	250	241	233
	10	272	264	256	247	238
	11	278	270	261	252	243
12	285	277	268	258	249	
200	5	268	261	253	245	237
	6	274	267	259	251	242
	7	282	274	265	257	248
	8	289	280	272	263	254
	9	296	287	278	269	260
	10	303	294	285	275	265
	11	310	301	291	281	271
12	317	308	298	288	277	

TWE= Evaporator outlet water temperature °C

TWR: Recovery outlet water temperature (°C)

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Technical specifications of unit AB Standard Unit / AS Low noise Unit

Model	50	60	70	80	90	100	115	130	145	160	180	200	UM
Power supply	400V - 3ph - 50 Hz												V-ph-Hz
Type of refrigerant	R410A												/
Circuits	1												n°
Cooling capacity (1) (E)	52.9	57.5	67.2	74.1	89.2	99.0	110	122	138	154	178	198	kW
Compressors power input (1)	16.7	18.4	21.8	24.7	28.0	31.4	35.4	40.0	43.9	49.8	55.0	62.5	kW
Compressors EER	3.17	3.13	3.08	3.00	3.19	3.15	3.11	3.05	3.14	3.09	3.24	3.17	-
Total power input (1)	22.2	23.9	27.3	30.2	34.2	37.6	44.4	49.0	60.4	66.3	77.0	84.5	kW
Total power input (1) (E)	18.2	19.9	23.4	26.4	28.4	32.0	37.8	42.4	51.8	58.0	65.5	73.4	kW
Total EER	2.38	2.41	2.46	2.45	2.61	2.63	2.48	2.49	2.28	2.32	2.31	2.34	-
Total EER (E)	2.91	2.89	2.87	2.81	3.14	3.09	2.91	2.88	2.66	2.66	2.72	2.70	-
ESEER (E)	4.01	3.99	3.96	3.87	4.33	4.27	4.02	3.97	3.68	3.66	3.75	3.72	-
Water flow rate (1)	2.53	2.75	3.21	3.54	4.26	4.73	5.26	5.83	6.59	7.36	8.50	9.46	l/s
Water pressure drops (1) (E)	41	49	46	35	38	38	39	37	36	37	57	56	kPa
Working head (1) (MP)	138	120	102	85	149	137	117	98	125	100	144	109	kPa
Heating capacity (2) (E)	57.5	62.6	73.8	82.3	98.7	109	124	135	153	171	195	214	kW
Compressors power input (2)	16.7	18.5	21.9	25.1	29.0	31.4	36.4	40.1	45.1	50.0	56.2	62.6	kW
Compressor COP	3.44	3.39	3.37	3.28	3.40	3.48	3.41	3.37	3.39	3.42	3.47	3.42	-
Total power input (2)	22.2	24.0	27.4	30.6	35.2	37.6	45.4	49.1	61.6	66.5	78.2	84.6	kW
Total power input (2) (E)	18.2	20.0	23.5	26.8	29.4	32.0	38.8	42.5	53.0	58.2	66.7	73.5	kW
Total COP	2.59	2.61	2.69	2.69	2.80	2.90	2.73	2.75	2.48	2.57	2.49	2.53	-
Total COP (E)	3.16	3.13	3.14	3.07	3.36	3.41	3.20	3.18	2.89	2.94	2.92	2.91	-
Water flow rate (2)	2.75	2.99	3.53	3.93	4.72	5.22	5.92	6.45	7.31	8.17	9.32	10.23	l/s
Water pressure drops (2) (E)	48	58	55	44	47	46	49	45	45	46	68	65	kPa
Working head (2) (MP)	117	102	84	69	121	112	92	80	101	81	120	93	kPa

Compressor

Type	Scroll												/
Quantity	2												n°
Load steps	0-50-100												%
Oil charge CP1	3.25	3.25	3.25	3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	l
Oil charge CP2	3.25	3.25	3.25	3.25	4.7	4.7	6.8	6.8	6.3	6.3	6.3	6.3	l

Heat Exchanger

Type	Brazen plates												/
Quantity	1												n°
Water volume	3.6	3.6	4.6	5.4	7.6	8.4	9.7	10.9	12.6	14.5	11.1	13.0	l

Fan

Type	Centrifugal												-	
Quantity	1			2			3			4			n°	
Total air flow rate	29050	29050	28100	27680	41460	40100	47440	47440	62190	59820	82920	79760	m³/h	
Working head NOM/MAX (3)	50 /150												rpm	
Power input	5.5			6.2			9			16.5			22	kW

Coil

Type	Aluminum fins and copper tubes												/
Quantity	1												n°
Front area	3.38			4.72			5.90			7.41			m²

Water Storage Tank (SAA accessory)

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

Electrical Data

Units without hydronic kit

Total maximum power input [FLA]	52.7	55.3	62.8	73.1	80.6	86.1	101	109	138	152	178	193	A
Total maximum power input [FLI]	30.3	32.5	35.9	40.3	47.1	52.7	60.9	65.6	82.7	91.5	108	119	kW
Total maximum starting current [MIC]	150	151	177	215	269	275	328	336	389	403	498	513	A

Units with hydronic kit MP PS STD (1 or 2 pumps)

Total maximum power input [FLA]	55.2	57.8	65.3	75.6	84.0	89.5	104	113	143	157	185	199	A
Total maximum power input [FLI]	31.7	33.9	37.3	41.7	48.9	54.5	62.7	67.4	85.6	94.4	112	123	kW
Total maximum starting current [MIC]	152	154	180	218	273	278	331	340	394	408	505	519	A

Units with hydronic kit MP AM STD and MP SS STD (1 or 2 pumps)

Total maximum power input [FLA]	55.9	58.5	66.0	76.3	85.4	90.9	106	114	144	158	186	201	A
Total maximum power input [FLI]	32.1	34.3	37.7	42.1	50.0	55.6	63.8	68.5	85.9	94.7	113	124	kW
Total maximum starting current [MIC]	153	155	180	218	274	279	333	341	394	409	507	521	A

Units with hydronic kit MP AM HP1 and MP SS HP1 (1 or 2 pumps)

Total maximum power input [FLA]	58.9	61.6	69.0	79.3	86.8	92.4	109	117	146	161	189	204	A
Total maximum power input [FLI]	34.1	36.3	39.7	44.1	50.8	56.5	65.6	70.3	87.5	96.3	115	126	kW
Total maximum starting current [MIC]	156	158	183	221	275	281	336	345	397	411	509	524	A

Data referred to standard operating condition.

- (1): water temperature: in 12°C - out 7°C air temperature: in 35°C d.b.
 (2): water temperature: in 40°C - out 45°C air temperature: in 7°C d.b. 87% RH
 (3): Adjustable changing the diameter of the motors pulley
 (MP): with standard hydronic kit MP AM STD and MP SS STD

(SAA): with storage tank

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Standard performances in cooling mode AB Standard Unit / AS Low noise Unit

Mod. 50-100

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
50	5	60.4	11.7	56.4	13.5	53.3	14.9	50.0	16.4	46.5	18.1	43.1	19.7	39.6	21.3
	6	62.1	11.8	57.9	13.6	54.8	15.0	51.4	16.5	47.8	18.2	44.3	19.9	40.7	21.5
	7	63.9	11.9	59.6	13.7	56.4	15.1	52.9	16.7	49.2	18.4	45.6	20.1	41.9	21.7
	8	65.7	12.1	61.3	13.9	58.0	15.3	54.4	16.9	50.6	18.6	46.9	20.3	-	-
	9	67.5	12.2	63.0	14.0	59.6	15.5	55.9	17.1	52.0	18.8	48.2	20.5	-	-
	10	69.3	12.3	64.7	14.2	61.1	15.6	57.4	17.2	53.4	19.0	49.4	20.7	-	-
	11	71.0	12.4	66.3	14.3	62.7	15.8	58.8	17.4	54.8	19.2	50.7	20.9	-	-
	12	73.0	12.6	68.1	14.5	64.4	15.9	60.4	17.6	56.2	19.4	52.1	21.1	-	-
60	5	65.6	12.9	61.3	14.9	57.9	16.4	54.4	18.0	50.6	19.9	46.8	21.7	43.0	23.4
	6	67.5	13.0	63.0	15.0	59.5	16.5	55.9	18.2	52.0	20.1	48.1	21.9	44.2	23.7
	7	69.4	13.2	64.8	15.1	61.3	16.7	57.5	18.4	53.5	20.3	49.5	22.1	45.5	23.9
	8	71.4	13.3	66.6	15.3	63.0	16.9	59.1	18.6	55.0	20.5	51.0	22.4	-	-
	9	73.4	13.4	68.5	15.5	64.7	17.0	60.8	18.8	56.5	20.7	52.4	22.6	-	-
	10	75.3	13.6	70.3	15.6	66.5	17.2	62.4	19.0	58.0	20.9	53.7	22.8	-	-
	11	77.2	13.7	72.1	15.8	68.2	17.4	64.0	19.2	59.5	21.1	55.1	23.0	-	-
	12	79.3	13.8	74.0	15.9	70.0	17.5	65.7	19.3	61.1	21.3	56.6	23.3	-	-
70	5	76.7	15.3	71.6	17.6	67.7	19.4	63.5	21.4	59.1	23.6	54.8	25.7	50.3	27.8
	6	78.8	15.4	73.6	17.8	69.6	19.6	65.3	21.6	60.8	23.8	56.3	25.9	51.7	28.0
	7	81.1	15.6	75.7	17.9	71.6	19.8	67.2	21.8	62.5	24.0	57.9	26.2	53.2	28.3
	8	83.4	15.8	77.9	18.1	73.6	20.0	69.1	22.0	64.3	24.3	59.5	26.5	-	-
	9	85.7	15.9	80.0	18.3	75.7	20.2	71.0	22.3	66.1	24.5	61.2	26.8	-	-
	10	88.0	16.1	82.1	18.5	77.7	20.4	72.9	22.5	67.8	24.8	62.8	27.0	-	-
	11	90.2	16.2	84.2	18.7	79.7	20.6	74.8	22.7	69.6	25.0	64.4	27.3	-	-
	12	92.7	16.4	86.5	18.9	81.8	20.8	76.8	22.9	71.4	25.3	66.2	27.5	-	-
80	5	84.6	17.3	79.0	19.9	74.7	22.0	70.1	24.2	65.2	26.7	60.4	29.1	55.5	31.5
	6	86.9	17.5	81.1	20.1	76.7	22.2	72.0	24.4	67.0	26.9	62.0	29.4	57.0	31.8
	7	89.5	17.7	83.5	20.3	79.0	22.4	74.1	24.7	68.9	27.2	63.9	29.7	58.7	32.1
	8	92.0	17.9	85.9	20.6	81.2	22.7	76.2	25.0	70.9	27.5	65.7	30.0	-	-
	9	94.5	18.0	88.2	20.8	83.4	22.9	78.3	25.2	72.8	27.8	67.5	30.3	-	-
	10	97.0	18.2	90.6	21.0	85.6	23.1	80.4	25.5	74.8	28.1	69.3	30.6	-	-
	11	100	18.4	92.9	21.2	87.8	23.3	82.4	25.7	76.7	28.4	71.0	30.9	-	-
	12	102	18.6	95.4	21.4	90.2	23.6	84.7	26.0	78.8	28.6	73.0	31.2	-	-
90	5	102	19.6	95.0	22.6	89.9	24.9	84.3	27.5	78.5	30.3	72.7	33.0	66.8	35.7
	6	105	19.8	97.7	22.8	92.4	25.1	86.7	27.7	80.6	30.5	74.7	33.3	68.6	36.0
	7	108	20.0	101	23.0	95.1	25.4	89.2	28.0	83.0	30.9	76.9	33.6	70.6	36.4
	8	111	20.3	103	23.3	97.7	25.7	91.7	28.3	85.3	31.2	79.0	34.0	-	-
	9	114	20.5	106	23.5	100	25.9	94.3	28.6	87.7	31.5	81.2	34.4	-	-
	10	117	20.7	109	23.8	103	26.2	96.8	28.9	90.0	31.8	83.4	34.7	-	-
	11	120	20.9	112	24.0	106	26.4	99.2	29.2	92.3	32.1	85.5	35.0	-	-
	12	123	21.1	115	24.2	109	26.7	102	29.4	94.8	32.5	87.8	35.4	-	-
100	5	113	22.0	105	25.3	100	27.9	93.6	30.8	87.1	33.9	80.7	37.0	74.1	40.0
	6	116	22.2	108	25.6	103	28.2	96.2	31.1	89.5	34.3	82.9	37.3	76.1	40.4
	7	120	22.5	112	25.8	105	28.5	99.0	31.4	92.1	34.6	85.3	37.7	78.4	40.8
	8	123	22.7	115	26.1	108	28.8	102	31.7	94.7	35.0	87.7	38.1	-	-
	9	126	22.9	118	26.4	111	29.1	105	32.1	97.3	35.3	90.1	38.5	-	-
	10	130	23.2	121	26.7	114	29.4	107	32.4	100	35.7	92.5	38.9	-	-
	11	133	23.4	124	26.9	117	29.7	110	32.7	102	36.0	94.9	39.3	-	-
	12	137	23.6	127	27.2	121	29.9	113	33.0	105	36.4	97.5	39.7	-	-

Tw= Outlet water temperature in °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Mod. 115-200

MOD.	Tw	OUTDOOR AIR TEMPERATURE (°C D.B.)													
		20		25		30		35		40		45		50	
		kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa	kWf	kWa
115	5	126	24.8	117	28.6	111	31.5	104	34.7	96.8	38.3	89.6	41.7	82.3	45.1
	6	129	25.1	120	28.8	114	31.8	107	35.0	99.4	38.6	92.1	42.1	84.6	45.5
	7	133	25.3	124	29.1	117	32.1	110	35.4	102	39.0	94.8	42.5	87.1	46.0
	8	137	25.6	127	29.5	121	32.5	113	35.8	105	39.4	97.5	43.0	-	-
	9	140	25.9	131	29.8	124	32.8	116	36.1	108	39.8	100	43.4	-	-
	10	144	26.1	134	30.1	127	33.1	119	36.5	111	40.2	103	43.9	-	-
	11	148	26.4	138	30.3	130	33.4	122	36.9	114	40.6	105	44.3	-	-
	12	152	26.6	142	30.6	134	33.8	126	37.2	117	41.0	108	44.7	-	-
130	5	139	28.1	130	32.3	123	35.6	115	39.2	107	43.2	99.4	47.1	91.3	51.0
	6	143	28.3	134	32.6	126	35.9	119	39.6	110	43.6	102	47.6	93.8	51.4
	7	147	28.6	137	32.9	130	36.3	122	40.0	114	44.1	105	48.1	96.6	52.0
	8	151	28.9	141	33.3	134	36.7	125	40.4	117	44.6	108	48.6	-	-
	9	156	29.2	145	33.6	137	37.0	129	40.8	120	45.0	111	49.1	-	-
	10	160	29.5	149	34.0	141	37.4	132	41.3	123	45.5	114	49.6	-	-
	11	164	29.8	153	34.3	145	37.8	136	41.7	126	45.9	117	50.1	-	-
	12	168	30.1	157	34.6	149	38.2	139	42.1	130	46.4	120	50.5	-	-
145	5	158	30.8	147	35.4	139	39.0	130	43.1	121	47.5	112	51.7	103	55.9
	6	162	31.1	151	35.8	143	39.4	134	43.5	125	47.9	116	52.2	106	56.5
	7	167	31.4	156	36.1	147	39.8	138	43.9	128	48.4	119	52.8	109	57.0
	8	171	31.8	160	36.5	151	40.3	142	44.4	132	48.9	122	53.3	-	-
	9	176	32.1	164	36.9	155	40.7	146	44.8	136	49.4	126	53.9	-	-
	10	181	32.4	169	37.3	160	41.1	150	45.3	139	49.9	129	54.4	-	-
	11	185	32.7	173	37.6	164	41.5	154	45.7	143	50.4	132	54.9	-	-
	12	190	33.0	178	38.0	168	41.9	158	46.2	147	50.9	136	55.5	-	-
160	5	176	34.9	164	40.2	155	44.3	146	48.8	135	53.8	125	58.7	115	63.5
	6	181	35.3	169	40.6	159	44.7	150	49.3	139	54.3	129	59.2	118	64.0
	7	186	35.6	174	41.0	164	45.2	154	49.8	143	54.9	133	59.8	122	64.7
	8	191	36.0	178	41.4	169	45.7	158	50.4	147	55.5	136	60.5	-	-
	9	196	36.4	183	41.9	173	46.1	163	50.9	151	56.1	140	61.1	-	-
	10	202	36.7	188	42.3	178	46.6	167	51.4	155	56.6	144	61.7	-	-
	11	207	37.1	193	42.7	183	47.0	171	51.9	159	57.2	148	62.3	-	-
	12	212	37.5	198	43.1	188	47.5	176	52.4	164	57.7	152	62.9	-	-
180	5	203	38.6	190	44.4	179	48.9	168	53.9	157	59.4	145	64.8	133	70.1
	6	209	39.0	195	44.8	184	49.4	173	54.4	161	60.0	149	65.4	137	70.7
	7	215	39.4	201	45.3	190	49.9	178	55.0	166	60.6	153	66.1	141	71.5
	8	221	39.8	206	45.8	195	50.4	183	55.6	170	61.3	158	66.8	-	-
	9	227	40.2	212	46.2	200	50.9	188	56.2	175	61.9	162	67.5	-	-
	10	233	40.6	218	46.7	206	51.4	193	56.7	180	62.5	166	68.2	-	-
	11	239	41.0	223	47.2	211	52.0	198	57.3	184	63.1	171	68.8	-	-
	12	246	41.4	229	47.6	217	52.5	203	57.8	189	63.7	175	69.5	-	-
200	5	226	43.9	211	50.5	199	55.6	187	61.3	174	67.6	161	73.7	148	79.6
	6	232	44.3	217	50.9	205	56.1	192	61.9	179	68.2	166	74.3	152	80.4
	7	239	44.7	223	51.5	211	56.7	198	62.5	184	68.9	171	75.1	157	81.2
	8	246	45.2	229	52.0	217	57.3	204	63.2	189	69.6	175	75.9	-	-
	9	253	45.7	236	52.5	223	57.9	209	63.8	195	70.3	180	76.7	-	-
	10	259	46.1	242	53.1	229	58.5	215	64.5	200	71.0	185	77.5	-	-
	11	266	46.6	248	53.6	235	59.0	220	65.1	205	71.7	190	78.2	-	-
	12	273	47.0	255	54.1	241	59.6	226	65.7	210	72.4	195	79.0	-	-

Tw= Outlet water temperature in °C

kWf = refrigerating power (kW).

kWa = Power input of compressors (kW)

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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Desuperheater unit (VD)

Standard Unit AB

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°
Total water content of recovery exchangers	0.6	0.6	0.6	0.6	0.8	0.8	1.3	1.3	1.3	1.3	1.8	1.8	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VD(1)	55.0	59.8	69.9	77.1	92.8	103	114	127	144	160	185	206	kW
Compressor power input VD (1)	16.0	17.7	20.9	23.7	26.9	30.1	34.0	38.4	42.1	47.8	52.8	60.0	kW
Total power input VD (1)	21.5	23.2	26.4	29.2	33.1	36.3	43.0	47.4	58.6	64.3	74.8	82.0	kW
EER VD (1)	2.56	2.58	2.65	2.64	2.80	2.84	2.65	2.68	2.46	2.49	2.47	2.51	-
Water flow VD (1)	2.63	2.86	3.34	3.68	4.43	4.92	5.45	6.07	6.88	7.64	8.84	9.84	l/s
Water pressure drop VD (1)	44	53	49	38	41	41	42	40	40	40	61	60	kPa
Recovered heating capacity (1)	15.2	17.0	19.4	22.9	26.2	29.2	33.2	37.1	42.4	47.5	52.4	58.1	kW
Recovered water flow rate (1)	0.73	0.81	0.93	1.10	1.25	1.39	1.58	1.77	2.03	2.27	2.50	2.78	l/s
Recovered water pressure drop (1)	8	10	13	18	14	17	10	13	17	20	16	19	kPa

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



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

Low noise Unit AS

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°
Total water content of recovery exchangers	0.6	0.6	0.6	0.6	0.8	0.8	1.3	1.3	1.3	1.3	1.8	1.8	l
Max. operating pressure on wet side	600												kPa

Unit specification

Cooling capacity VD(1)	55.0	59.8	69.9	77.1	92.8	103	114	127	144	160	185	206	kW
Compressor power input VD (1)	16.0	17.7	20.9	23.7	26.9	30.1	34.0	38.4	42.1	47.8	52.8	60.0	kW
Total power input VD (1)	21.5	23.2	26.4	29.2	33.1	36.3	43.0	47.4	58.6	64.3	74.8	82.0	kW
EER VD (1)	2.56	2.58	2.65	2.64	2.80	2.84	2.65	2.68	2.46	2.49	2.47	2.51	-
Water flow VD (1)	2.63	2.86	3.34	3.68	4.43	4.92	5.45	6.07	6.88	7.64	8.84	9.84	l/s
Water pressure drop VD (1)	44	53	49	38	41	41	42	40	40	40	61	60	kPa
Recovered heating capacity (1)	15.2	17.0	19.4	22.9	26.2	29.2	33.2	37.1	42.4	47.5	52.4	58.1	kW
Recovered water flow rate (1)	0.73	0.81	0.93	1.10	1.25	1.39	1.58	1.77	2.03	2.27	2.50	2.78	l/s
Recovered water pressure drop (1)	8	10	13	18	14	17	10	13	17	20	16	19	kPa

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



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

TECHNICAL SPECIFICATIONS AND STANDARD PERFORMANCES - IP HEAT PUMP UNITS

Recovered heating capacity Desuperheater unit (VD)

MOD.	TWR	OUTDOOR AIR TEMPERATURE (°C D.B.)				
		25	30	35	40	45
		kW _{tr} = 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	
60	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	
70	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	
80	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	
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	

kW_{tr} = RECOVERED HEATING CAPACITY [KW]

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

CORRECTION FACTOR FOR THE USE OF GLYCOL

Correction factor for the use of glycol IN HEATING MODE

Correction factor for the use of ethylene glycol with water produced between 30+55°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 8.9	20 / 18.1	30 / 27.7	40 / 37.5
Freezing point [°C]	0	-3.2	-8	-14	-22
Heating capacity CCPF Power input CCPA	1.000	0.995	0.985	0.975	0.970
Compressor power input CCPA	1.000	1.010	1.015	1.020	1.030
Water flow rate CCQA	1.000	1.038	1.062	1.091	1.127
Water pressure drop CCDP	1.000	1.026	1.051	1.077	1.103

Correction factor for the use of Propylene Glycol with water produced between 30+55°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 9.6	20 / 19.4	30 / 29.4	40 / 39.6
Freezing point [°C]	0	-3.3	-7	-13	-21
Heating capacity CCPF Power input CCPA	1.000	0.990	0.975	0.965	0.955
Compressor power input CCPA	1.000	1.010	1.020	1.030	1.040
Water flow rate CCQA	1.000	1.018	1.032	1.053	1.082
Water pressure drop CCDP	1.000	1.026	1.051	1.077	1.103

Correction factor for the use of glycol IN COOLING MODE

Correction factor for the use of ethylene glycol with water produced between 5+20°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 8.9	20 / 18.1	30 / 27.7	40 / 37.5
Freezing point [°C]	0	-3.2	-8	-14	-22
Cooling capacity CCPF Power input CCPA	1.00	0.99	0.98	0.97	0.95
Compressor power input CCPA	1.00	1.00	0.99	0.99	0.98
Water flow rate CCQA	1.00	1.04	1.08	1.12	1.16
Water pressure drop CCDP	1.00	1.08	1.16	1.25	1.35

Correction factor for the use of Propylene Glycol with water produced between 5+20°C.

Percentage Of glycol in mass / volume	0 / 0	10 / 9.6	20 / 19.4	30 / 29.4	40 / 39.6
Freezing point [°C]	0	-3.3	-7	-13	-21
Cooling capacity CCPF Power input CCPA	1.00	0.98	0.96	0.94	0.92
Compressor power input CCPA	1.00	0.99	0.98	0.95	0.93
Water flow rate CCQA	1.00	1.01	1.03	1.06	1.09
Water pressure drop CCDP	1.00	1.05	1.11	1.22	1,38

GENERAL SPECIFICATIONS - BRINE UNIT BR - BP

Specific data for Brine Unit (BR-BP)

Correction factors to apply to the basic version data

	ETHYLENE GLYCOL										PROPYLENE GLYCOL									
Percentage Of glycol in mass / volume	10 / 8.9																			
freezing point [°C]	-3.2																			
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12	4	2	0	-2	-4	-6	-8	-10	-12		
Cooling capacity c.f.	0.926	0.869	0.812	-	-	-	-	-	-	0.890	0.819	0.751	-	-	-	-	-	-		
Compressor power input c.f.	0.974	0.964	0.954	-	-	-	-	-	-	0.974	0.964	0.954	-	-	-	-	-	-		
Water flow rate c.f.	0.943	0.885	0.828	-	-	-	-	-	-	0.943	0.885	0.828	-	-	-	-	-	-		
Water pressure drop c.f.	1.040	1.045	1.050	-	-	-	-	-	-	1.040	1.045	1.050	-	-	-	-	-	-		
Percentage Of glycol in mass / volume	20 / 18.1																			
freezing point [°C]	-8																			
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12	4	2	0	-2	-4	-6	-8	-10	-12		
Cooling capacity c.f.	0.912	0.855	0.798	0.738	0.683	-	-	-	-	0.874	0.807	0.740	0.690	0.641	-	-	-	-		
Compressor power input c.f.	0.967	0.957	0.947	0.927	0.897	-	-	-	-	0.945	0.935	0.925	0.900	0.875	-	-	-	-		
Water flow rate c.f.	0.955	0.895	0.836	0.773	0.715	-	-	-	-	0.915	0.845	0.774	0.723	0.671	-	-	-	-		
Water pressure drop c.f.	1.090	1.095	1.100	1.110	1.120	-	-	-	-	1.110	1.115	1.120	1.130	1.140	-	-	-	-		
Percentage Of glycol in mass / volume	30 / 27.7																			
freezing point [°C]	-14																			
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12	4	2	0	-2	-4	-6	-8	-10	-12		
Cooling capacity c.f.	0.899	0.842	0.785	0.725	0.670	0.613	0.562	-	-	0.869	0.799	0.729	0.680	0.630	0.583	0.536	-	-		
Compressor power input c.f.	0.960	0.950	0.940	0.920	0.890	0.870	0.840	-	-	0.935	0.923	0.910	0.888	0.865	0.838	0.810	-	-		
Water flow rate c.f.	0.967	0.905	0.844	0.780	0.720	0.659	0.604	-	-	0.934	0.859	0.784	0.731	0.678	0.627	0.576	-	-		
Water pressure drop c.f.	1.140	1.145	1.150	1.155	1.160	1.175	1.190	-	-	1.160	1.175	1.190	1.200	1.210	1.255	1.300	-	-		
Percentage Of glycol in mass / volume	40 / 37.5																			
freezing point [°C]	-22																			
Produced water temperature	4	2	0	-2	-4	-6	-8	-10	-12	4	2	0	-2	-4	-6	-8	-10	-12		
Cooling capacity c.f.	0.884	0.827	0.770	0.710	0.655	0.598	0.547	0.490	0.437	0.848	0.784	0.719	0.670	0.620	0.570	0.520	0.478	0.438		
Compressor power input c.f.	0.880	0.870	0.860	0.840	0.810	0.790	0.760	0.724	0.686	0.865	0.855	0.845	0.820	0.795	0.773	0.750	0.714	0.680		
Water flow rate c.f.	1.150	1.151	1.153	1.154	1.155	1.157	1.158	1.159	1.161	1.116	1.114	1.112	1.110	1.108	1.107	1.105	1.103	1.101		
Water pressure drop c.f.	1.190	1.195	1.200	1.210	1.220	1.235	1.250	1.269	1.290	1.230	1.275	1.320	1.375	1.430	1.500	1.570	1.642	1.724		

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

Consider unit **IR 160.2** in the Basic Version with air temperature: in 35°C d.b. and water temperature out 7°C:

- Cooling capacity of the Basic Version unit (VB): Pf_{VB} = 158 kW
- Power input of the Compressors in the Basic Version unit (VB): Pass_{CP,VB} = 53.2 kW
- Water Flow Rate of the Basic Version unit (VB): Q_{VB} = 7.55 l/s
- Water pressure drop of the Basic Version unit (VB): Δp_{VB} = 39 kPa
- **with 30% brine and -2°C temperature of the water produced**

The corresponding values for the Brine Unit are:

- Cooling capacity Pf_{BR/BP} = Pf_{VB} × (0.725) = 115 kW
- Compressor power input Pass_{CP,BR/BP} = Pass_{CP,VB} × (0.92) = 48.9 kW
- Water flow rate Q_{BR/BP} = Q_{VB} × (0.78) = 5.89 l/s
- Water pressure drop Δp_{BR/BP} = Δp_{VB} × (1.155) = 32 kPa

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

With Pf_{VB} calculate Q_{VB} and using the graph water pressure drop Basic Version you have Δp_{VB}. Then apply the corrective coefficients indicated on the tables for BR-BP.

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

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 calculated 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 1×10^{-12} W.

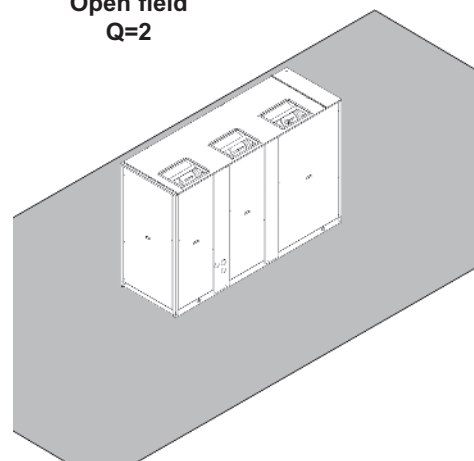
The **Total** sound power level in **dB(A)** measured in compliance with **ISO 9614** standards, is certified according to the **Eurovent** certification program and it is the only mandatory value (the values of octave band in the table are indicative).

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

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

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

Open field
Q=2



AB Standard unit

Mod.	SWL (dB)									SPL (dBA)			
	Octave bands (Hz)								Total		1m	5m	10m
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)(E)			
50	83.3	82.0	82.4	84.4	82.5	83.4	80.9	75.5	91	89	71	62	57
60	83.3	82.0	82.4	84.4	82.5	83.4	80.9	75.5	91	89	71	62	57
70	83.3	82.0	82.4	84.4	82.5	83.4	80.9	75.5	91	89	71	62	57
80	83.3	82.0	82.4	84.4	82.5	83.4	80.9	75.5	91	89	71	62	57
90	85.8	84.2	83.9	85.9	84.5	85.4	84.0	80.0	94	91	73	65	59
100	85.8	84.2	83.9	85.9	84.5	85.4	84.0	80.0	94	91	73	65	59
115	94.6	91.1	90.4	92.1	89.8	90.1	88.9	84.5	100	96	78	69	64
130	94.6	91.1	90.4	92.1	89.8	90.1	88.9	84.5	100	96	78	69	64
145	95.2	91.7	91.0	92.7	90.4	90.7	89.5	85.1	101	97	79	70	65
160	95.2	91.7	91.0	92.7	90.4	90.7	89.5	85.1	101	97	79	70	65
180	101.8	98.2	96.8	95.7	93.3	89.8	83.6	85.5	105	98	79	71	66
200	101.8	98.2	96.8	95.7	93.3	89.8	83.6	85.5	105	98	79	71	66

AS Low noise unit

Mod.	SWL (dB)									SPL (dBA)			
	Octave bands (Hz)								Total		1m	5m	10m
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)(E)			
50	80.2	78.9	79.3	81.3	79.4	80.3	77.8	72.4	88	86	68	59	54
60	80.2	78.9	79.3	81.3	79.4	80.3	77.8	72.4	88	86	68	59	54
70	80.2	78.9	79.3	81.3	79.4	80.3	77.8	72.4	88	86	68	59	54
80	80.2	78.9	79.3	81.3	79.4	80.3	77.8	72.4	88	86	68	59	54
90	82.8	81.2	80.9	82.9	81.5	82.4	81.0	77.0	91	88	70	62	56
100	82.8	81.2	80.9	82.9	81.5	82.4	81.0	77.0	91	88	70	62	56
115	91.6	88.1	87.4	89.1	86.8	87.1	85.9	81.5	97	93	75	66	61
130	91.6	88.1	87.4	89.1	86.8	87.1	85.9	81.5	97	93	75	66	61
145	92.2	88.7	88.0	89.7	87.4	87.7	86.5	82.1	98	94	76	67	62
160	92.2	88.7	88.0	89.7	87.4	87.7	86.5	82.1	98	94	76	67	62
180	98.8	95.2	93.8	92.7	90.3	86.8	80.6	82.5	102	95	76	68	63
200	98.8	95.2	93.8	92.7	90.3	86.8	80.6	82.5	102	95	76	68	63

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

OPERATING RANGE

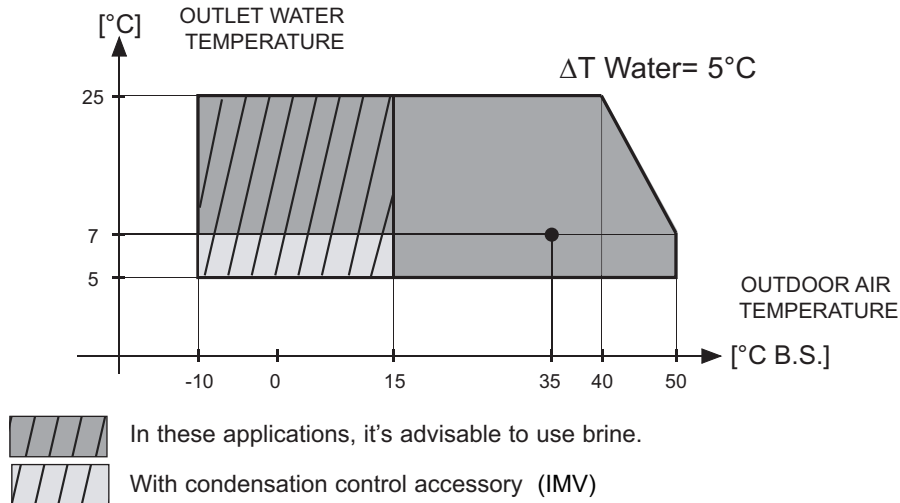
Operating range

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

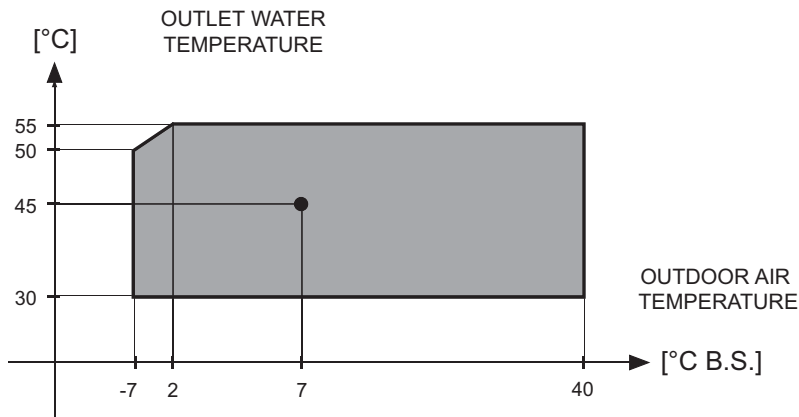
Thermal Water Head		Limit value
Minimum	°C	3
Maximum	°C	8

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

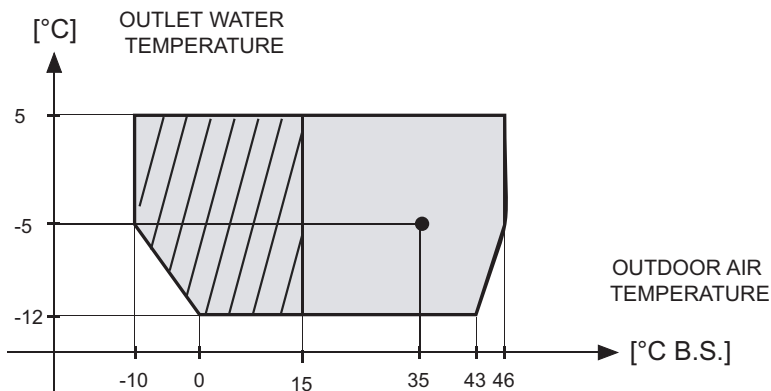
COOLING MODE



HEATING MODE



COOLING MODE Brine Unit BR - BP

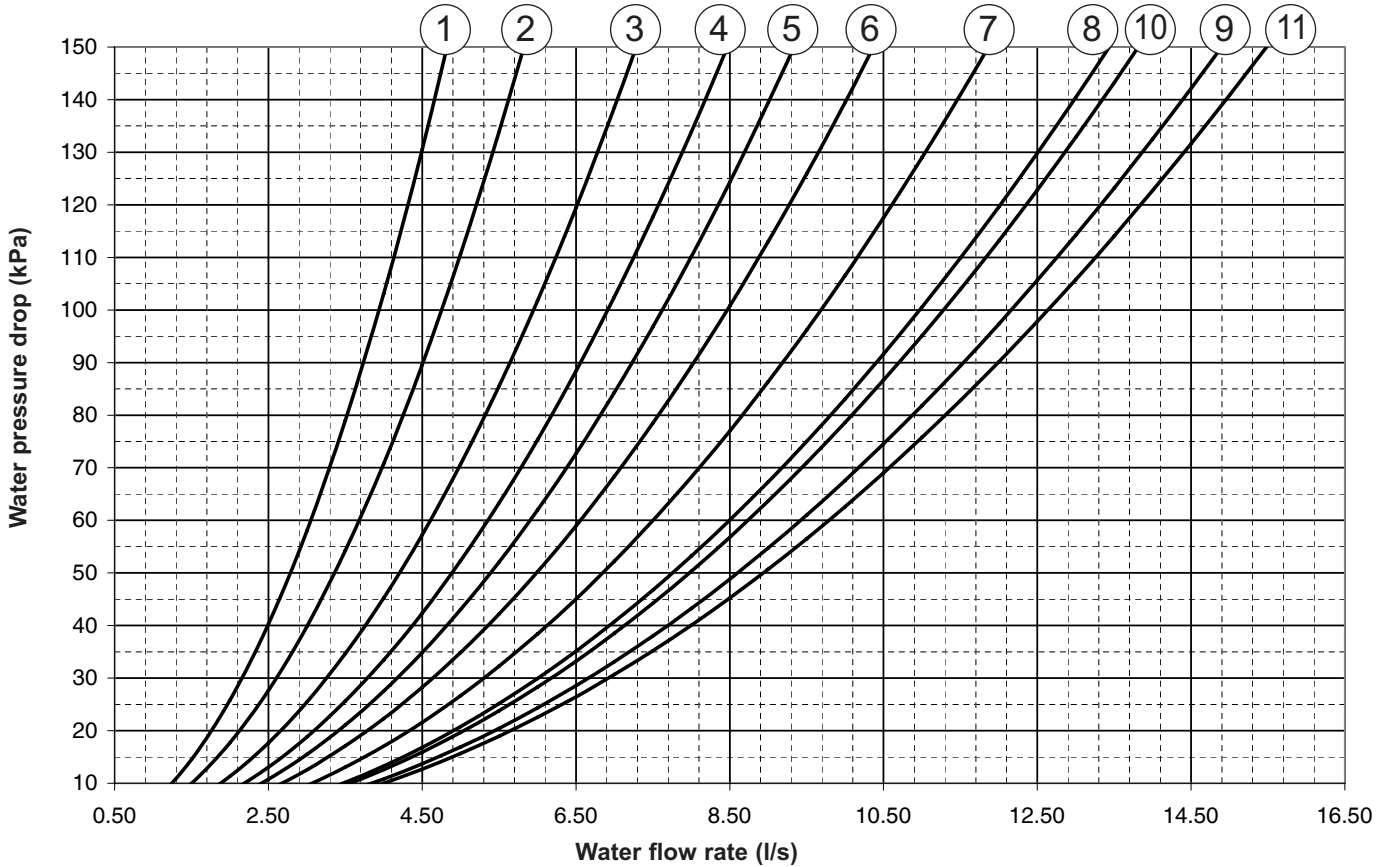


Use water glicol as specified in the paragraph "Specification data for Brine Unit BR - BP".

With condensation control accessory (IMV)

WATER PRESSURE DROP PLATE HEAT EXCHANGER

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

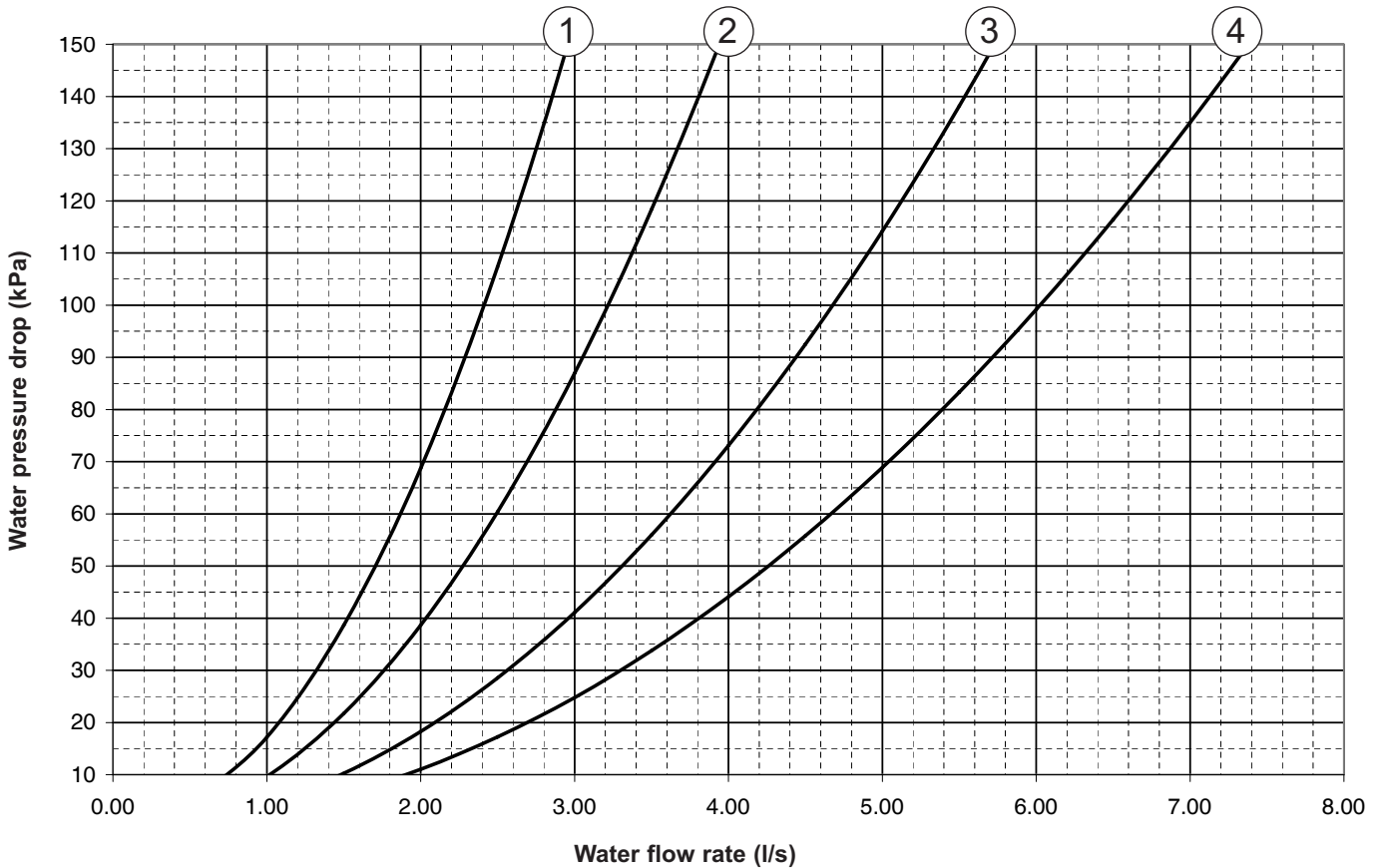


Operation range

Unit Size		50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference		1	2	3	4	5	6	7	8	9	10	11			Q =Water flow rate Δp =Water pressure drop
Lower limit value	Q	1.2	1.5	1.9	2.2	2.4	2.7	3.1	3.5	3.8	3.6	4.0	l/s		
	Δp	10											kPa		
Upper limit value	Q	4.8	5.8	7.3	8.5	9.3	10.4	11.9	13.4	14.9	13.8	15.5	l/s		
	Δp	150											kPa		
Max. operating pressure on wet side		600											kPa		

WATER PRESSURE DROP OF THE DESUPERHEATER VD

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

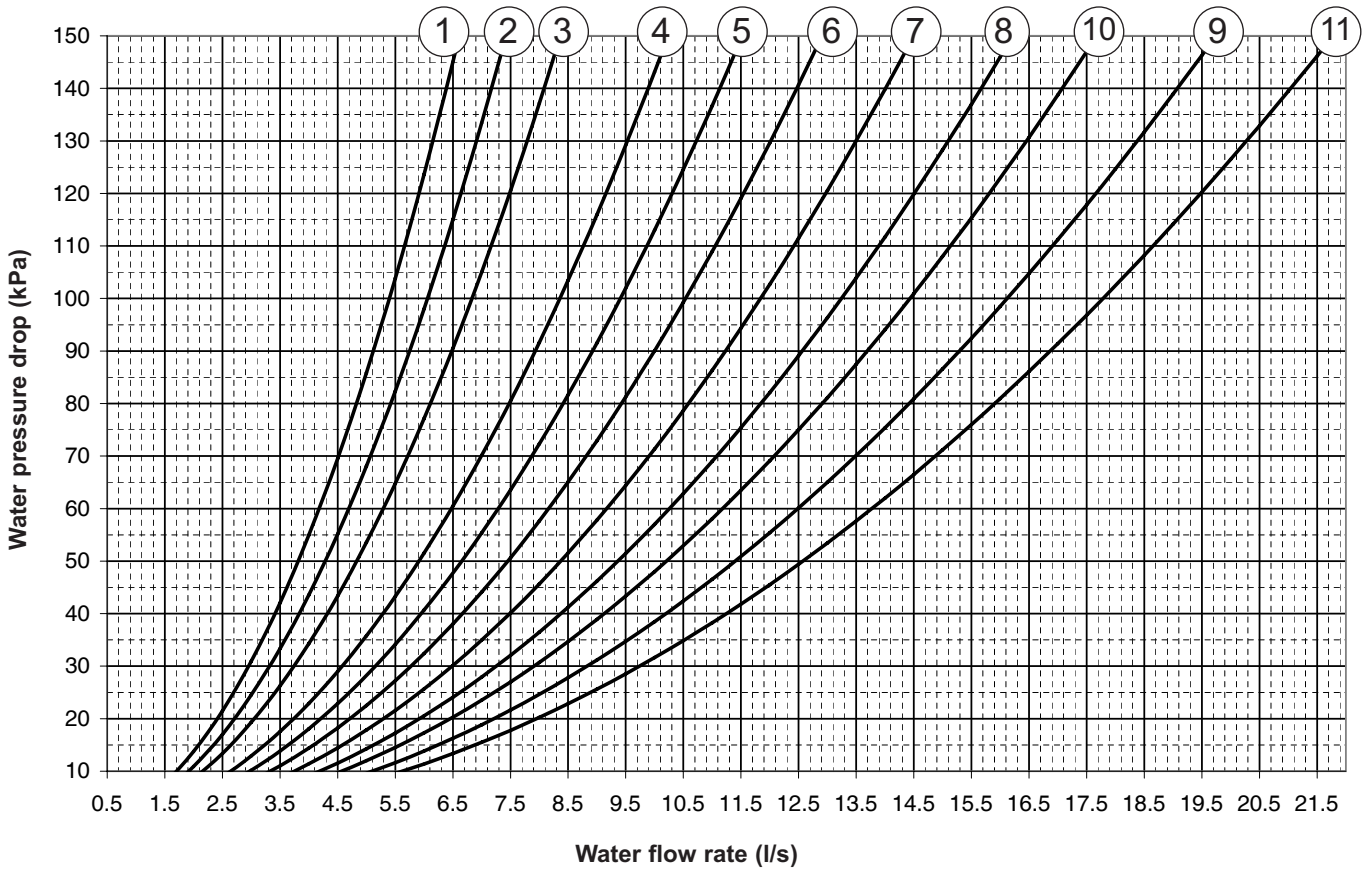


Operation range

Unit Size		50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference		1				2		3			4				Q =Water flow rate Δp =Water pressure drop
Lower limit value	Q	0.8				1.0		1.5			1.9		l/s		
	Δp	10											kPa		
Upper limit value	Q	3.0				3.9		5.7			7.4		l/s		
	Δp	150											kPa		
Max. operating pressure on wet side		600											kPa		

WATER PRESSURE DROP TOTAL HEAT RECOVERY VR

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



Operation range

Unit Size		50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference		1	2	3	4	5	6	7	8	9	10	11			Q =Water flow rate Δp =Water pressure drop
Lower limit value	Q	1.71	1.71	1.92	2.16	2.64	2.98	3.33	3.74	4.19	4.56	5.10	5.62	l/s	
	Δp	10											kPa		
Water flow recovery (1)	Q	3.37	3.72	4.37	5.02	5.73	6.45	7.07	8.03	9.08	10	11.4	12.7	l/s	
Pressure drop recovery (1)	Δp	39	47	52	54	47	47	45	46	47	48	50	51	kPa	
Upper limit value	Q	3.37	3.72	4.37	5.02	5.73	6.45	7.07	8.03	9.08	10	11.4	12.7	l/s	
	Δp	150											kPa		
Max. operating pressure on wet side		600											kPa		

(1): water temperature: evaporator inlet 12°C - evaporator outlet 7°C
 water temperature: recovery inlet 40°C - recovery outlet 45°C

WORKING HEAD OF THE HYDRONIC KIT MP AM STD, MP SS STD AND MPM AM STD

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

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

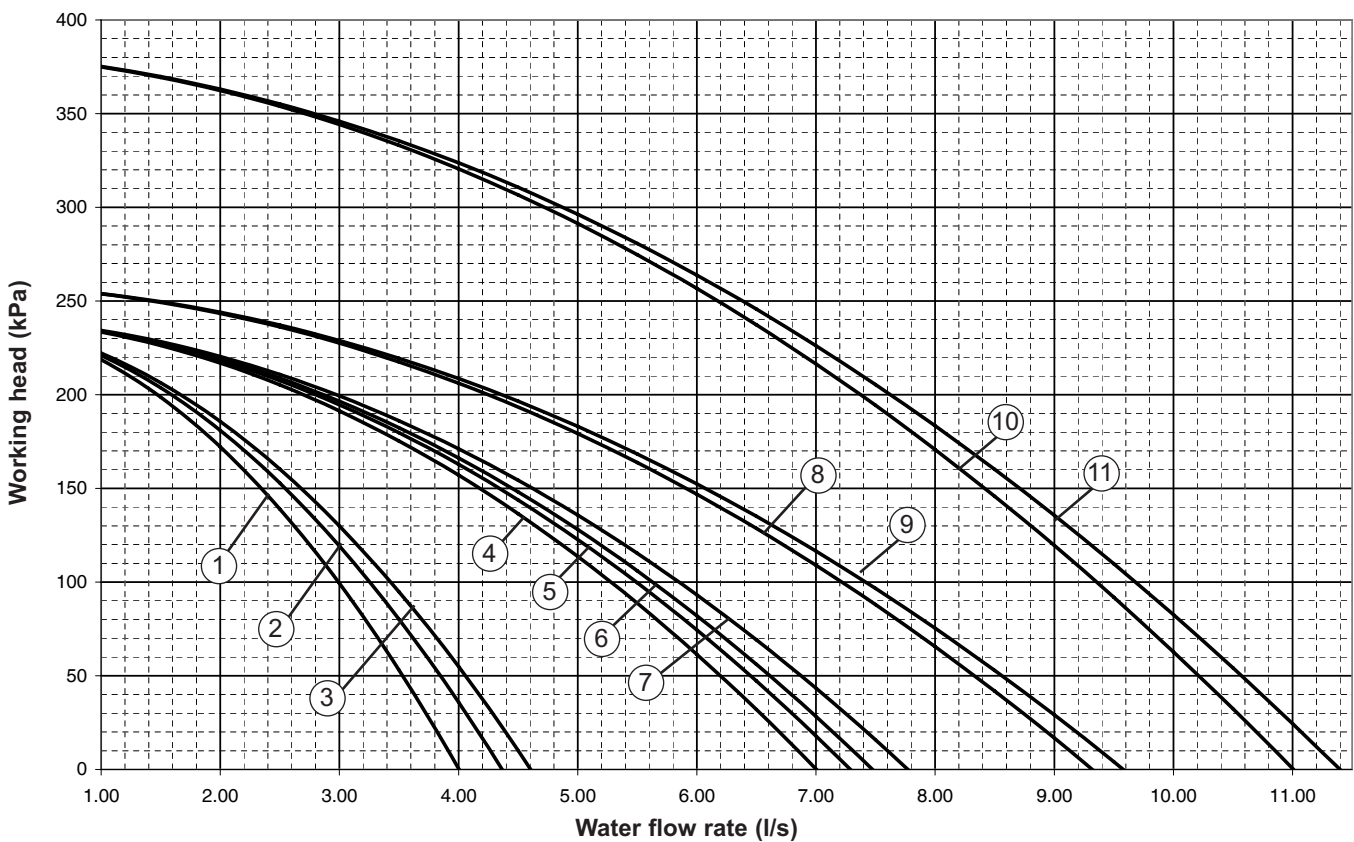
For hydronic kit with **inverter pump (MPM)** the graphic is at the maximum pump speed, for lower speed values curve decreases according to the following formulas:

$$Q_2 = Q_1 * \frac{n_2}{n_1} \quad n: \text{ pump speed [Hz]}$$

$$H_2 = H_1 * \frac{n_2^2}{n_1^2} \quad Q: \text{ water flow [l/s]} \quad H: \text{ working head [kPa]}$$

$$P_2 = P_1 * \frac{n_2^3}{n_1^3} \quad P: \text{ power input [kW]}$$

$$n_1 = 100\% \\ 30\% \leq n_2 \leq 100\%$$



Operation range

Unit Size	50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference	1		2	3	4	5	6	7	8	9	10	11		Q=Water flow rate
Lower limit value	1.25		1.50	1.88	2.19	2.41	2.68	3.06	3.47	3.85	3.57	4.00	l/s	
Upper limit value	4.00		4.36	4.61	6.71	7.00	7.29	7.48	9.32	9.58	11.00	11.40	l/s	
Max. operating pressure on wet side	600												kPa	

HIGH WORKING HEAD OF THE HYDRONIC KIT MP AM HP1, MP SS HP1 AND MPM AM HP1

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

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

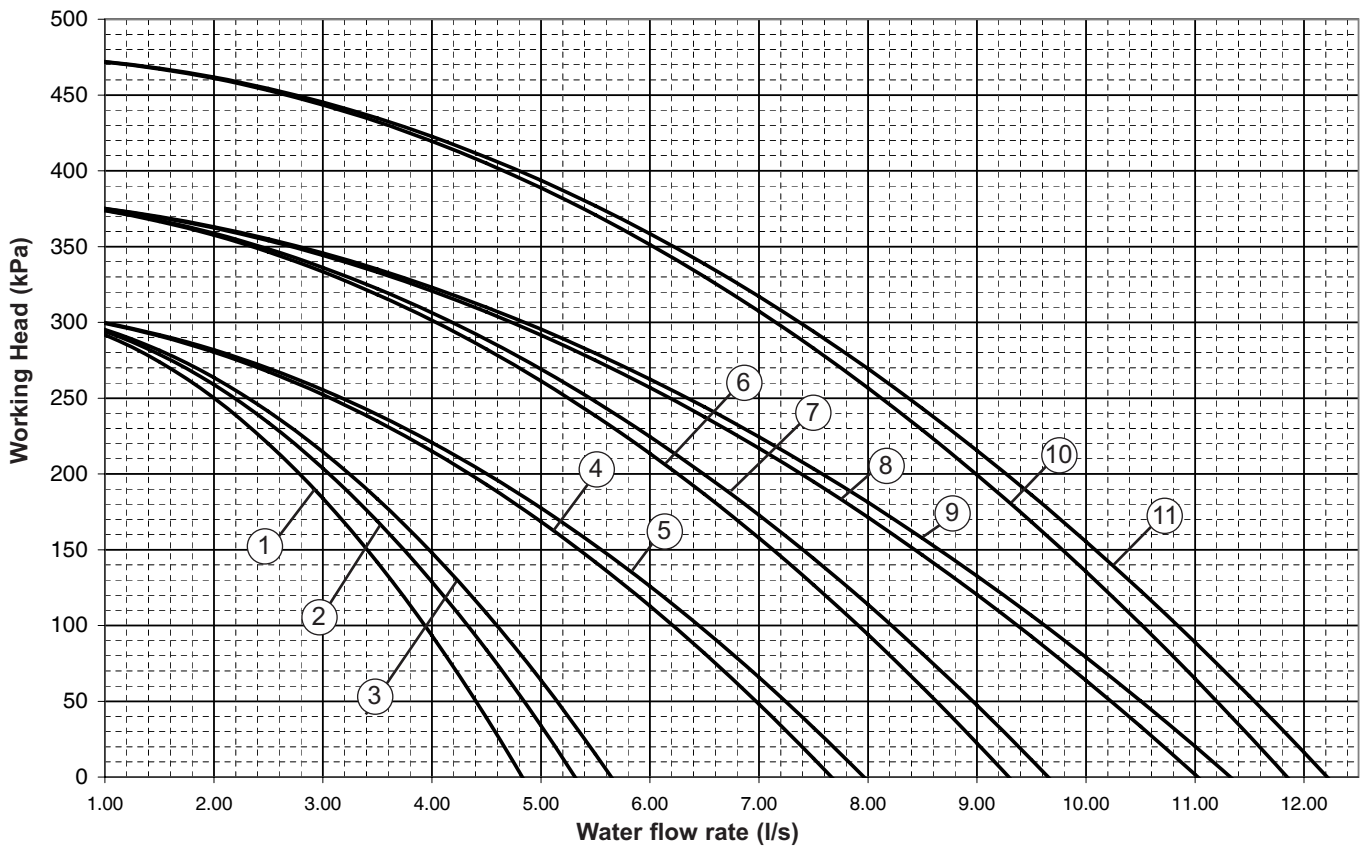
For hydronic kit with **inverter pump (MPM)** the graphic is at the maximum pump speed, for lower speed values curve decreases according to the following formulas:

$$Q_2 = Q_1 * \frac{n_2}{n_1} \quad n: \text{pump speed [Hz]}$$

$$H_2 = H_1 * \frac{n_2^2}{n_1^2} \quad Q: \text{water flow [l/s]} \quad H: \text{working head [kPa]}$$

$$P_2 = P_1 * \frac{n_2^3}{n_1^3} \quad P: \text{power input [kW]}$$

$$n_1 = 100\% \\ 30\% \leq n_2 \leq 100\%$$



Operation range

Unit Size	50	60	70	80	90	100	115	130	145	160	180	200	UM	NOTES
Graph reference	1		2	3	4	5	6	7	8	9	10	11		Q=Water flow rate
Lower limit value	1.25		1.50	1.88	2.19	2.41	2.68	3.06	3.47	3.85	3.57	4.00	l/s	
Upper limit value	4.82		5.31	5.65	7.67	7.96	9.29	9.65	11.03	11.32	11.85	12.21	l/s	
Max. operating pressure on wet side	600												kPa	

MAXIMUM VOLUME OF WATER

Maximum volume of water in the system with wet module

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

Maximum setting value 600 kPa.

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

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

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

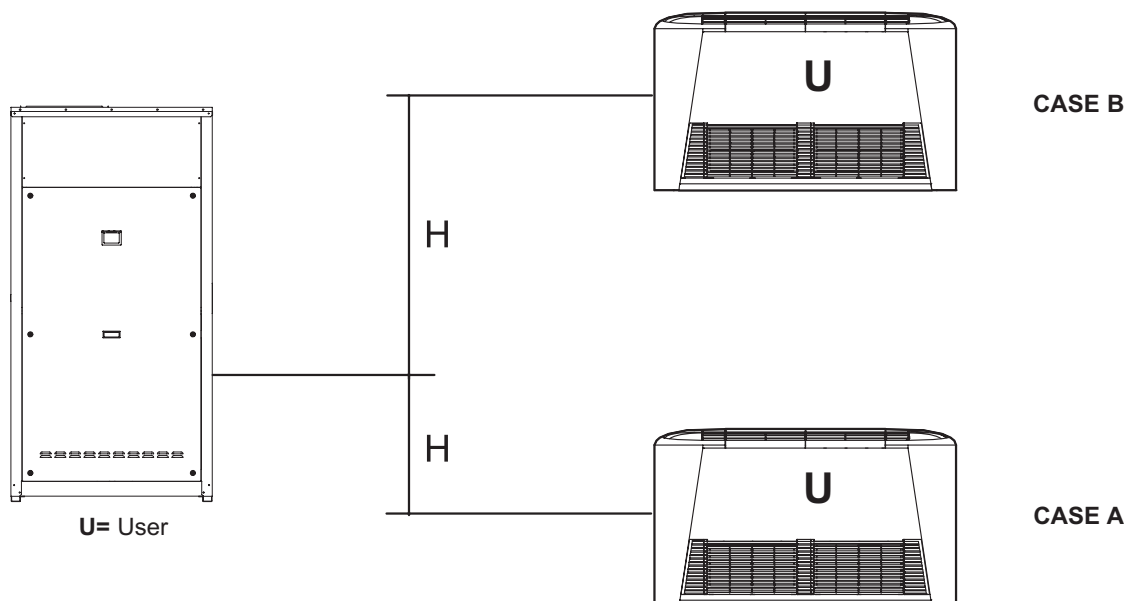
Tab.1

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

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

Corrective factors per total maximum volume of the system with brine

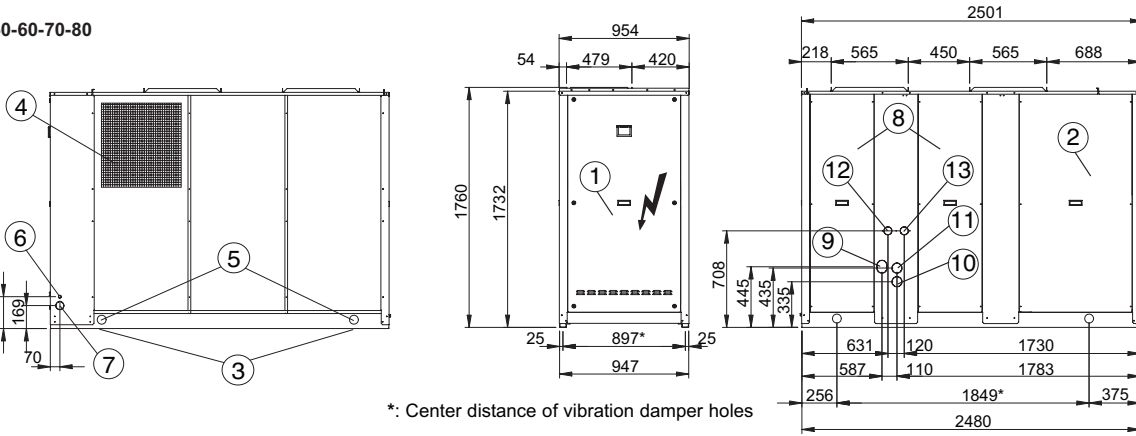
% of brine	0%	10%	20%	30%	40%
Cooling Mode	1.000	0.738	0.693	0.652	0.615
Heating Mode	1.000	0.855	0.811	0.769	0.731



DIMENSIONAL DATA

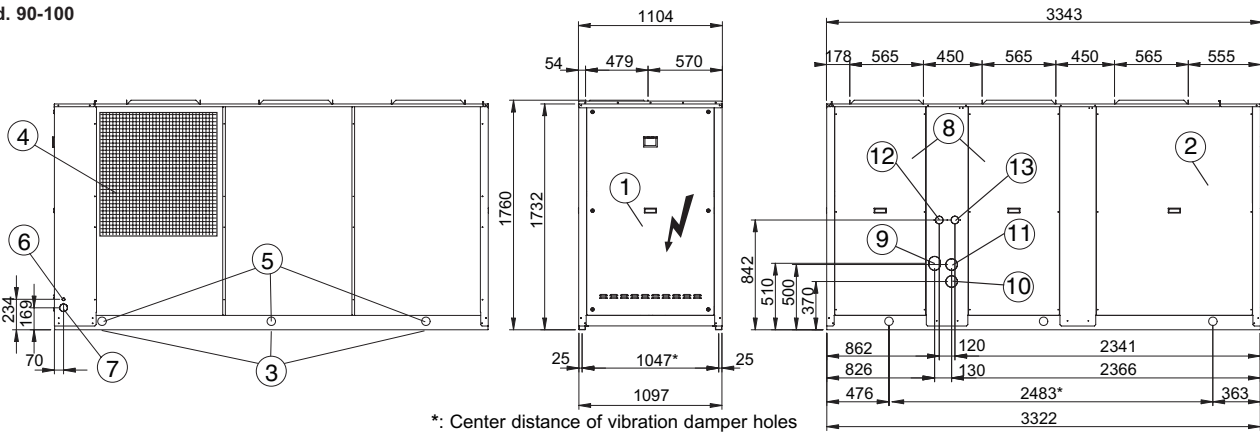
Overall dimensions

Mod. 50-60-70-80



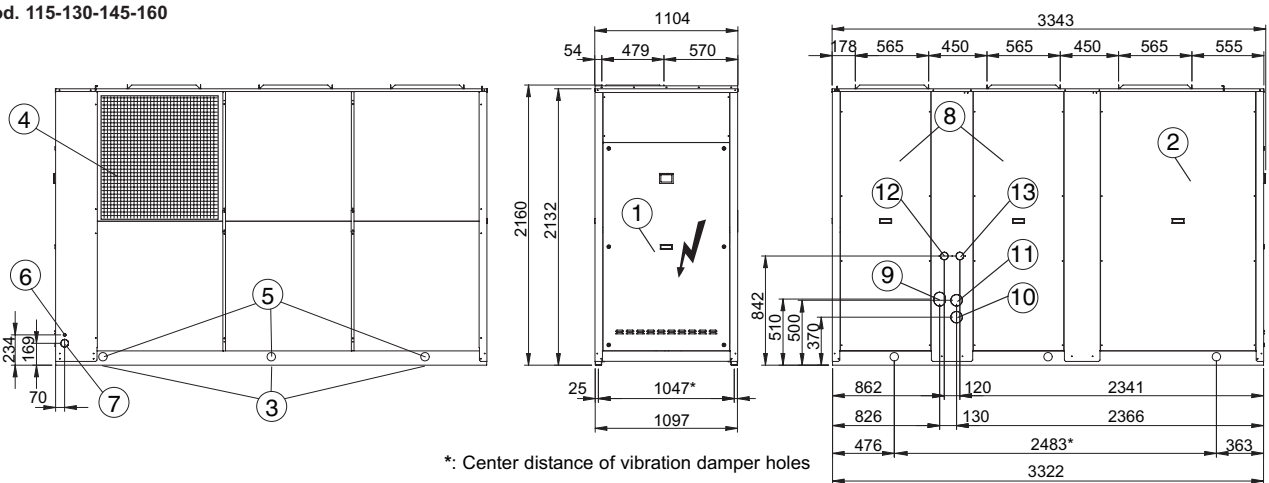
*: Center distance of vibration damper holes

Mod. 90-100



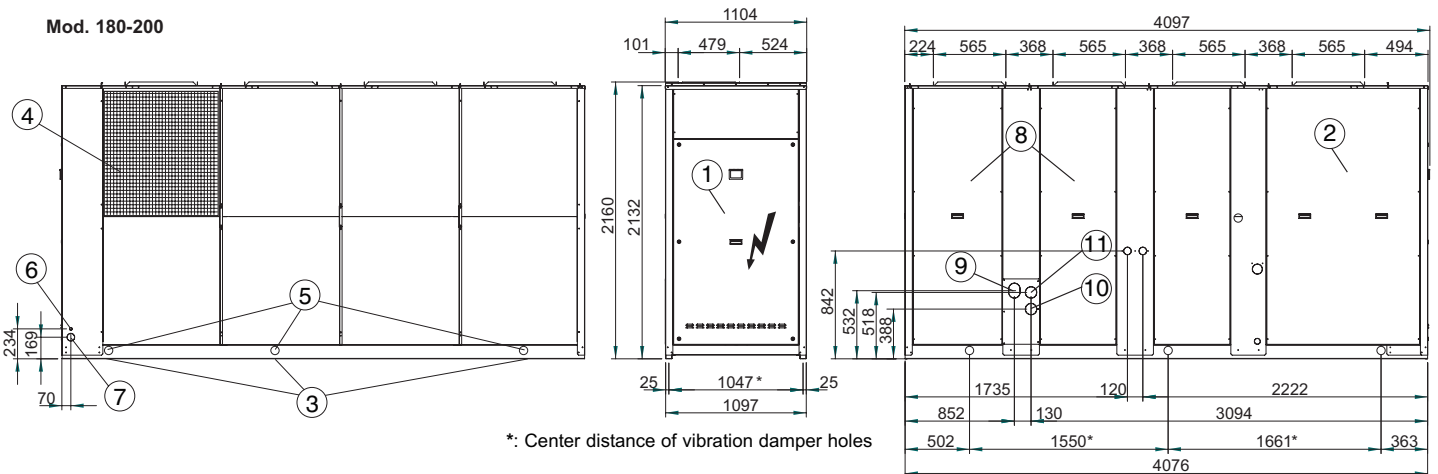
*: Center distance of vibration damper holes

Mod. 115-130-145-160



*: Center distance of vibration damper holes

Mod. 180-200

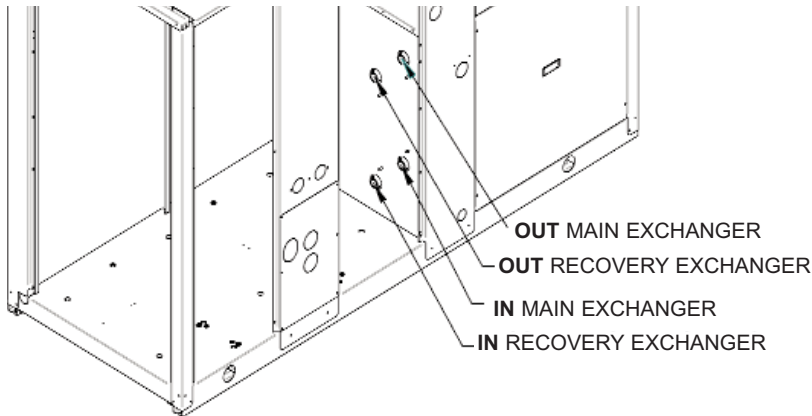


*: Center distance of vibration damper holes

DIMENSIONAL DATA

Description of the components

- | | |
|--|--|
| <ul style="list-style-type: none"> 1 - Access panel to electric panel's power section 2 - Access panel to compressor compartment 3 - Vibration damper fixing holes (4 pcs) 4 - Coil protection grilles (accessory) 5 - \varnothing 65 mm lifting holes 6 - \varnothing 22 mm input hole for accessory cables 7 - \varnothing 60 mm hole for electric power supply input 8 - Access panel to pump compartment 9 - Water inlet for MP AM STD and MP SS STD | <ul style="list-style-type: none"> 10 - Water inlet for KT and MP PS STD 11 - Water outlet 12 - Water inlet for Desuperheater (only VD-VR version) 13 - Water outlet for Desuperheater (only VD-VR version) <p>Note (1): Victaulic connections Kit do not allow external connections.</p> |
|--|--|



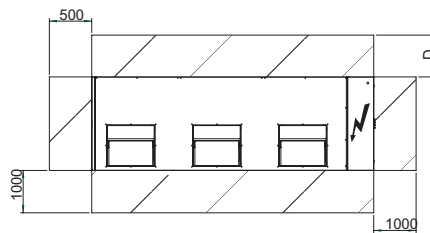
		Rif.	50÷80	90÷200
VICTAULIC CONNECTIONS KIT	IN	(1)	2" M	2 ½" M
	OUT	(1)		
PIPES KIT COMPLETE	IN	10	1 ½" VIC	2" VIC
	OUT	11		
PIPES KIT WITH TANK	IN	10	1 ½" VIC	2" VIC
	OUT	11		
M1P M2P AM STD	IN	9	2" VIC	2 ½" VIC
	OUT	11		
M1P M2P AM HP1	IN	9	2" VIC	2 ½" VIC
	OUT	11		
M1P M2P SS STD	IN	9	2" VIC	2 ½" VIC
	OUT	11		
M1P M2P SS HP1	IN	9	2" VIC	2 ½" VIC
	OUT	11		
M1P M2P PS STD	IN	10	2" VIC	2 ½" VIC
	OUT	11		
VD	IN	12	1 ¼" VIC	1 ¼" VIC
	OUT	13		
VR	IN	12	2" VIC	2 ½" VIC
	OUT	13		

Minimum operative space

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

In the case of operation of multiple units, the functional spaces must be doubled.

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



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

Fig.1

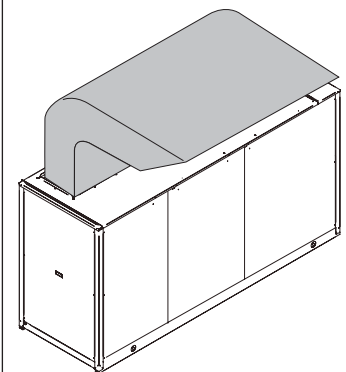


Fig.2

WEIGHT DURING OPERATION AND TRANSPORT

UNIT WITHOUT WATER STORAGE TANK

Unit WITHOUT Hydronic Kit

Weight during transport			Weight during operation		
IR Version		IP Version	IR Version		IP Version
Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]	Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]
50	663	695	50	666	698
60	663	695	60	667	699
70	702	735	70	706	739
80	727	759	80	732	765
90	1011	1050	90	1018	1057
100	1091	1130	100	1099	1138
115	1278	1322	115	1288	1332
130	1305	1349	130	1316	1360
145	1341	1388	145	1356	1401
160	1389	1439	160	1404	1453
180	1549	1600	180	1564	1614
200	1593	1643	200	1608	1658

Unit WITH Hydronic Kit

Weight during transport			Weight during operation		
IR Version		IP Version	IR Version		IP Version
Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]	Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]
50	778	810	50	798	830
60	778	810	60	799	831
70	817	850	70	838	871
80	842	874	80	865	897
90	1155	1194	90	1184	1223
100	1235	1274	100	1265	1304
115	1434	1478	115	1467	1511
130	1461	1505	130	1495	1539
145	1497	1544	145	1535	1580
160	1545	1595	160	1583	1632
180	1748	1799	180	1793	1843
200	1792	1842	200	1837	1887

UNIT WITH WATER STORAGE TANK

Unit WITHOUT Hydronic Kit

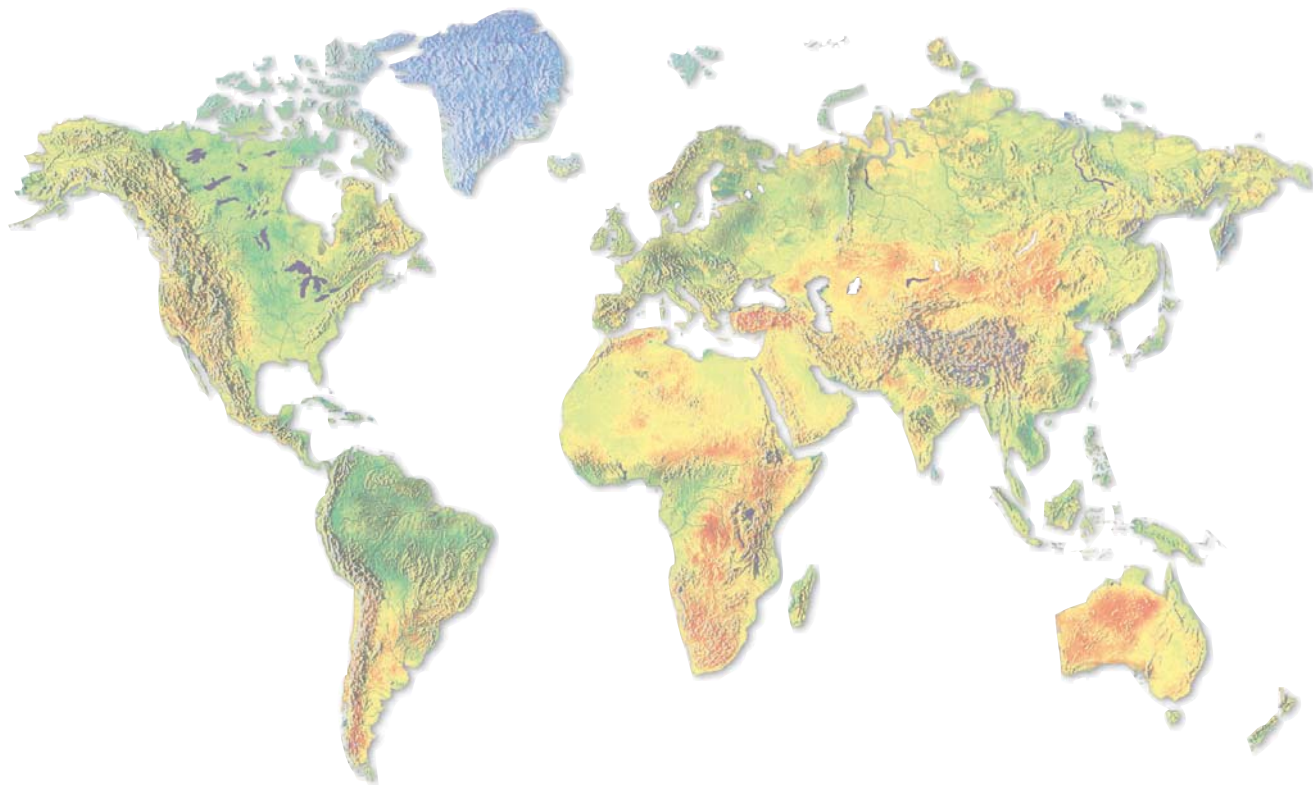
Weight during transport			Weight during operation		
IR Version		IP Version	IR Version		IP Version
Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]	Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]
50	737	769	50	948	980
60	737	769	60	949	981
70	776	809	70	989	1022
80	801	833	80	1015	1047
90	1115	1154	90	1496	1535
100	1195	1234	100	1577	1616
115	1383	1426	115	1766	1810
130	1410	1453	130	1794	1838
145	1446	1493	145	1834	1879
160	1494	1543	160	1882	1931
180	1690	1741	180	2168	2218
200	1734	1785	200	2212	2262

Unit WITH Hydronic Kit

Weight during transport			Weight during operation		
IR Version		IP Version	IR Version		IP Version
Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]	Acoustic version Mod.	AB-AS Weight [Kg]	AB-AS Weight [Kg]
50	842	874	50	1070	1102
60	842	874	60	1070	1102
70	881	914	70	1110	1143
80	906	938	80	1136	1168
90	1245	1283	90	1645	1684
100	1325	1363	100	1726	1765
115	1524	1568	115	1929	1972
130	1551	1594	130	1957	2000
145	1587	1634	145	1996	2042
160	1635	1684	160	2044	2094
180	1868	1919	180	2373	2423
200	1912	1963	200	2417	2467

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

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