Technical Bulletin

BT18H003GB-01

Remotex

Air cooled heat pump in two sections

MSRN-XSC3 + CEV-XN 90.4 - T160.4 RANGE

Nominal cooling capacity from 240 kW to 1228 kW
Nominal heating capacity from 280 kW to 1419 kW

- Hydronic system in two sections which expands the possibilities for application of traditional packaged products
- Easy to use: the internal section inlcudes all the main hydraulic components
- Double refrigeration circuit: high seasonal energy efficiency and high level of reliability
- Long life: all sensitive components are protected against the atmospheric agents
- Certainty of the result: all configurations are standardized and specifically optimized
- Easy transport and positioning in the installation replacements
- Use versatility: it adapts to installations where space and noise are challengers

Clivet hydronic system

Designed to provide high energy efficiency and sustainability of the investment, the wide range of Clivet liquid chillers and heat pumps for high efficiency air conditioning of Residential and Commercial spaces and for Industrial applications it is available with air or water source.

HYDRONIC System - Air Source

Specialization

Every intended use has specific requirements which determine the overall efficiency. For this, the Clivet hydronic system always offers the best solution in every project.

- Modular range with over 8000 kW of overall capacity
- Capacity control with Screw and modular Scroll technology
- Multifunction versions
- Outdoor or indoor (ductable type) installation

Centrality of the Air Renewal

From the Air Renewal depends the comfort in the spaces. Since it often represents the main building energetic load, it also determines the running costs of the entire system.

ZEPHIR3
Packaged Primary Air supply system with thermodynamic energy recovery.

- Simplifies the system, reduces the heating and cooling generators
- Purifies the air with standard electronic filters
- Increases the energy efficiency and it also allows a savings of 40% on the running costs
- From –40°C to +50°C of outdoor air temperature

Terminal and AHU complete system

The hydronic terminal units are very diffused for their versatility and reliability. The Clivet range includes many versions that simplify the application in differents type of installation and building.

ELFOSpace
High energy efficiency hydronic terminal units

AQX
Air-conditioning unit

- Cased and uncased terminal units, from 1 to 90 kW
- Horizontal and vertical installation
- Energy-saving DC fans
- Modular air conditioning units up to 160.000 m³/h
- EUROVENT certification

Remotex: modular scroll technology for every application

Remotex is the new generation of Clivet liquid chillers and heat pump with modular scroll technology. Thanks to its high seasonal efficiency and range versatility, it represents the ideal solution for different types of installation.

MSRN-XSC3 + CEV-XN

Air coole heat pump

- EXCELLENCE high efficiency version
- Production of hot water up to 53°C
- Partial recovery of the condensing heat

MSRT-XSC3 + CEV-XT

Air cooled water chiller

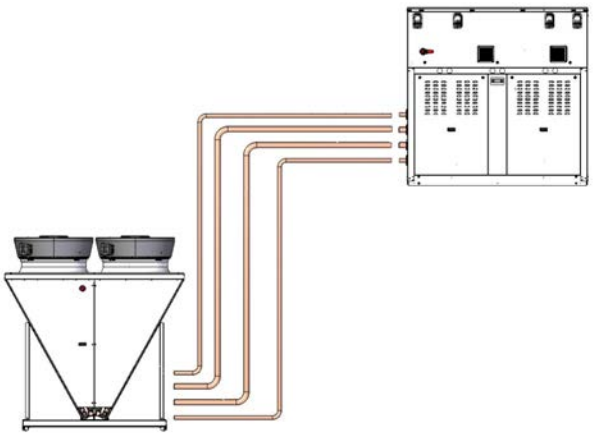
- EXCELLENCE high efficiency version and PREMIUM compact version
- Operating with 52°C of outdoor air temperature
- Partial recovery of the condensing heat

What is REMOTEX?

Remotex is the innovative hydronic system in two sections which expands the application possibilities of the traditional packaged products.

It consists of one or more internal sections, each connected to its external section by the refrigerant lines.

- Each internal section is a real industrialized central cooling plant, able to provide liquid at a temperature controlled to use . It contains two refrigeration circuits with Multiscroll technology complete with electrical panel and with microprocessor control. It can also contain the Hydropack pumping units, with on-off or inverter technology, and many other integrated features, including the free partial condensing heat recovery.
- Each outdoor section contains the energy exchangers with outdoor air, complete with wired fans and power supply and control panel.



There are several configurations available for each indoor section with the outdoor section, all standardized and specially optimized.

This allows a great ease of transport and positioning in the new buildings and in the system replacements, always with the best choice according to the specific constraints of each project.

- Energy efficiency
- Noiselessness
- External climate
- Compactness
- Initial investment.

What the main advantages of the Remotex system are:

Efficiency

All Remotex models feature high part-load energy efficiency, which means high SEER seasonal efficiency.

EXCELLENCE version it's the best match between capital cost and total lifecycle cost.

Apart from the high seasonal efficiency, the EXCELLENCE version stands out for its extremely high energy efficiency ratio during full-load cooling, COP which exceeds the value 3.2.

This is all possible thanks to Scroll modular technology, high efficiency heat exchangers and to Axitop diffusers and to an electronic control device supplied as standard.

This allows for:

- energy efficiencies equal to or higher than most units on the market equipped with screw compressors, even when inverter driven
- efficient use even in a large number of industrial and process applications
- upgrade of the building's energy class and, therefore, increased value
- maximum savings on running and maintenance costs.

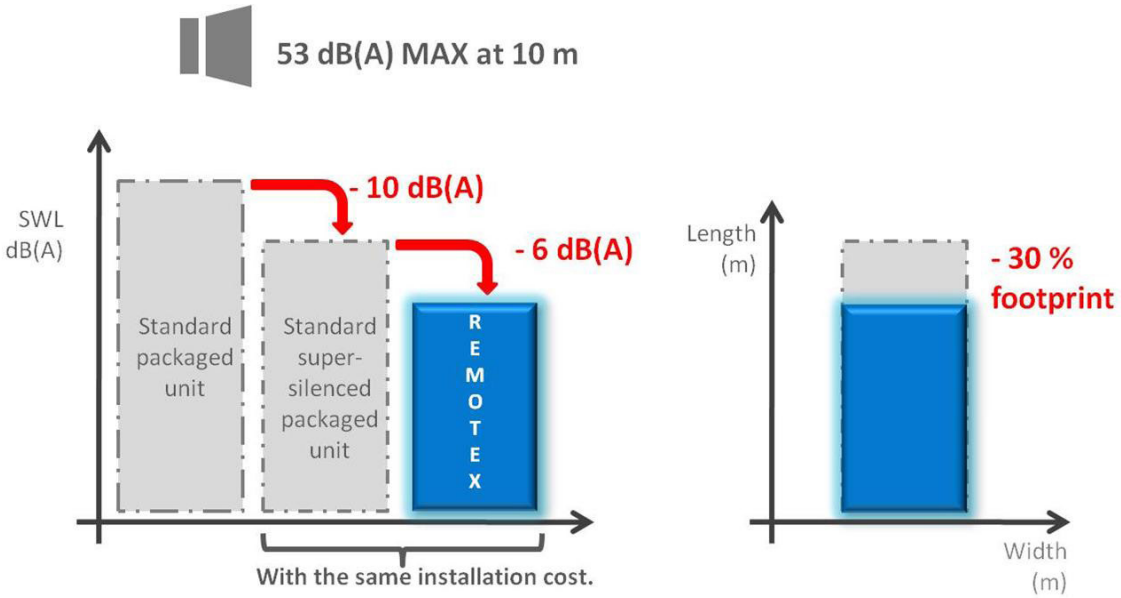
Silent operation

The combination of the perfectly sound-proofed internal section with the various external sections (with high or medium air flow capacity) provides a solution for all requirements - even solving problems linked to tight restrictions on noise emissions.

Both energy version Excellence is available in Super-silenced acoustic configuration, which allows the sound level to be greatly minimised of 5 dB(A).

In this way you can ensure the maximum installation flexibility, an indispensable condition when there are limited spaces, or in the case of replacement when upgrading the existing installations where silent operation is required.

Remotex is therefore the best solution able to meet the most demanding application requirements in terms of efficiency, compactness and quietness.



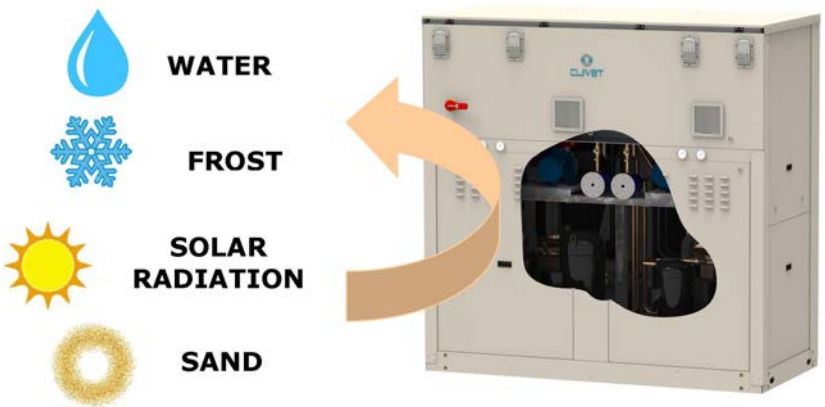
Dimensions and flexibility

Our Remotex system allows for great installation layout flexibility. The internal unit can be installed in any position with any direction in any technical facilities. All it needs is 2,5 m^2 surface area. The external unit only needs to be accommodated outdoors for the release of heat outside. This means it takes up less room than any packaged unit.

The design of the indoor unit, which includes the electrical panel and the components of the refrigeration circuit, is also suitable for an outdoor installation. This solution allows a further installation flexibility: it is possible to superimpose the outdoor unit to the indoor unit, by means of a special structure that the installer must provide. In this case, the obstruction in the plant is very low. This way, the storage footprint will be minimal indeed.

Protection

The parts which are more vulnerable to wear and tear are housed in a soundproof protective compartment, thus extending their service life. The benefits of this are magnified if the system is properly installed inside the building. This makes sense if you imagine how easily servicing can take place without having to worry about sheltering the parts, especially in places subject to extreme weather conditions. And it is not only the component parts of the cooling circuit that are protected. It is the entire hydraulic part with all its pumping units and pipework to be shielded from frost and adverse weather conditions.



Scalability

The layout of the central heating/cooling unit can be adapted to requirements. The heating and cooling capacity can be a combination of heat pumps or only cooling functions with silent external or compact units. This means highly scalable solutions in terms of operations, size and time.

Such a central unit can be easily built up over the years. It does have to be designed, purchased and installed in one fell swoop.

Easier installation

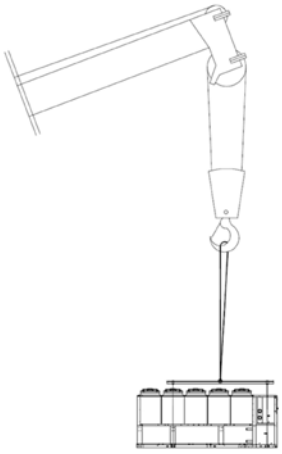
The two-section system gives a considerable edge during the installation stage, such as reduced handling weight and greater flexibility in positioning it.

A single 400 KW packaged unit can reach up to 5 metres of length, the weight can be close to 3,5 tons and the mass distribution is highly unbalanced. All of this requires the use of means of transportation of high-capacity, high-cost, which must be handled with extreme caution for obvious safety reasons.

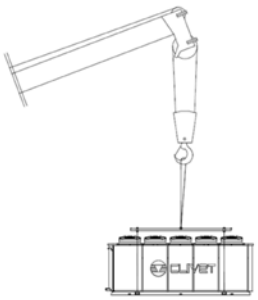
Remotex makes easier the handling operations because the weight of the single lifting does not exceed 1,9 tons for the indoor units and 1.6 tons for the outdoor units, and is distributed in a uniform way.

The advantage on the lifting costs compared to the traditional packaged solution can reach up the 50%.

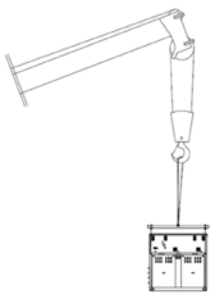
Not only, but the option of having a series of pre-installed accessories such as hydronic groups, valves and filters makes it much easier to install and start.



Sollevamento gruppo monoblocco: fino a **3,5 ton**



Sollevamento sezione esterna REMOTEX: max **1,6 ton**



Sollevamento sezione interna REMOTEX: max **1,9 ton**

Performance

The split two-section systems usually have two standalone modules which sometimes even come from different manufacturers. The Remotex system has been specially designed to match the internal and external systems as closely as possible.

All the sections have been inspected and approved by Clivet's laboratories. Reliability and high performance levels from a top European company specialised in multiscroll systems.

Sustainability

The Remotex system combines the benefits of a hydronic system with the advantages of a split system.

The split or VRF systems entail using huge amounts of coolant which pass through areas occupied by people before reaching the room terminals. This often involves setting up inconvenient systems to detect any coolant leakage in all such areas and making regular checks.

This is bound to fall under the scrutiny of environmental laws and legislation aimed at protecting human health. Any system using less coolant which is easy to monitor and service as well as quicker to access and repair in the event of unforeseen breakdown can only afford relief in this sense.

Remotex

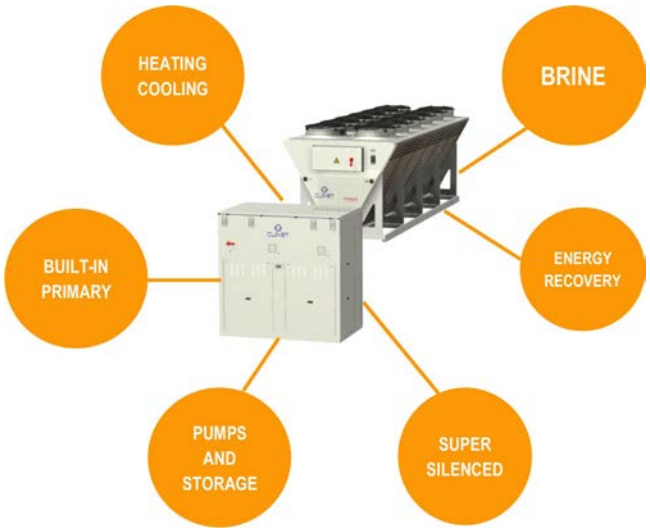
Provides all Clivet technological developments for their medium capacity hydronic systems

High efficiency Scroll compressors, high performance heat exchangers, electronic control fans, fully automatic operation: these are only some of the technologies available with Remotex, in a range of models that are ideal for high capacity air conditioning systems in commercial, residential and industrial buildings.

The best combination between the initial investment and the costs throughout the entire life cycle of the system.

- the EXCELLENCE version stands out for its extremely high energy efficiency under both part and full load conditions. (A- class Eurovent certification)

Remotex can also be supplied in many configurations equipped with the main components installed built-in.



Advantages

High efficiency all year round

Remotex reduces yearly energy consumption thanks to its high part-load efficiency i.e., by far the most frequent condition throughout the system's life-cycle. This way, even the value of the served building increases. The main components are manufactured on an industrial scale, with maximum manufacturing reliability and can be easily found as spare parts.

To further increase energy efficiency in a system with several Remotex units operating on the same equipment, there is the innovative ECOSHARE feature, which automatically distributes the load and activates the necessary pumps.

System simplification

All of the features are provided by Clivet already assembled and tested built-in, differently then other manufacturers who make numerous additional components available to be installed on site.

Compact and versatile

Suitable for any type of terminals, from fan coils to radiant systems and chilled beams, Remotex heat pump is also available in Super-silenced configuration. Energy recovery for producing hot water free of charge, Master-Slave management devices.

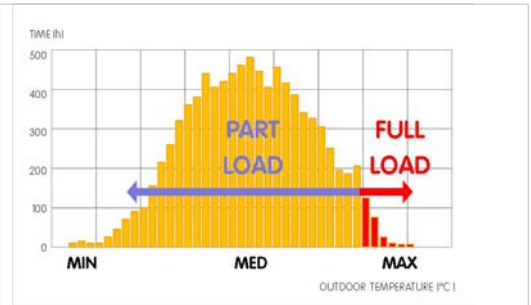
Comfort and energy saving in one solution

Maximum efficiency is necessary with a part load

The system is required to generate maximum capacity only for a short amount of time.

Therefore, it is essential to have the maximum efficiency under part-load conditions.

This is the only way to actually reduce overall yearly consumptions.



Part load efficiency determines the seasonal efficiency

Seasonal efficiency is conventionally represented by ESEER parameters according to Eurovent and IPLV parameters according to ARI. Both give great importance to part load operation, since it is the predominant condition.

CARICO IMPIANTO	PESO (ESEER) *	PESO (IPLV) *
100%	3%	1%
75%	33%	42%
50%	41%	45%
25%	23%	12%

* EUROVENT (ESEER) supply times reference and ARI (IPLV) reference for seasonal efficiency calculations.

MultiScroll technology enhances part-load efficiency

Remotex uses high efficiency Scroll compressors.

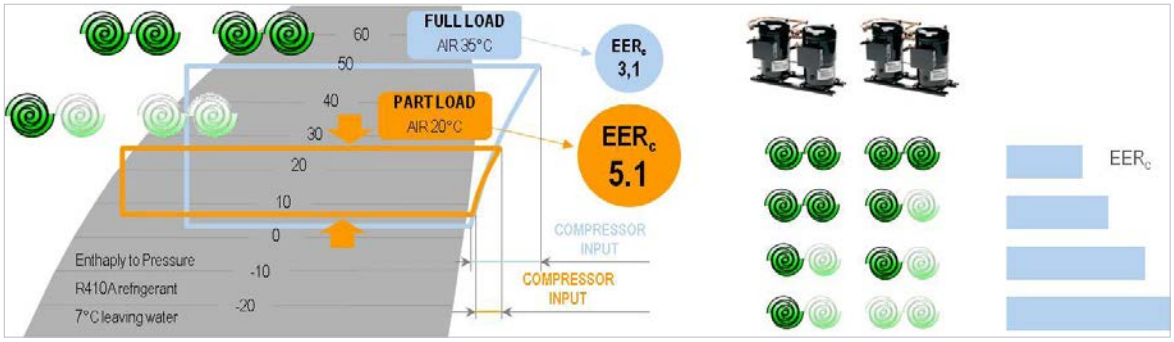
The advantages are:

- compressors manufactured in large ranges on an industrial scale with strict quality control inspections and maximum manufacturing reliability thanks to the high production volumes.
- every refrigeration circuit uses two Scroll compressors, depending on the different sizes of the unit. When two compressors are used, their sizes are different in order to obtain more control steps. This way, only the necessary energy is supplied.

Doubled efficiency

The heat exchange surface is sized for full capacity operation. Under part load condition, some compressors are automatically deactivated. Under this condition, in fact, the compressors in operation make use of a much larger surface.

This entails a reduced condensation temperature and an increased evaporation temperature. This way, the compressor capacity consumption is reduced with respect to the yield thereby increasing the overall efficiency of the unit.



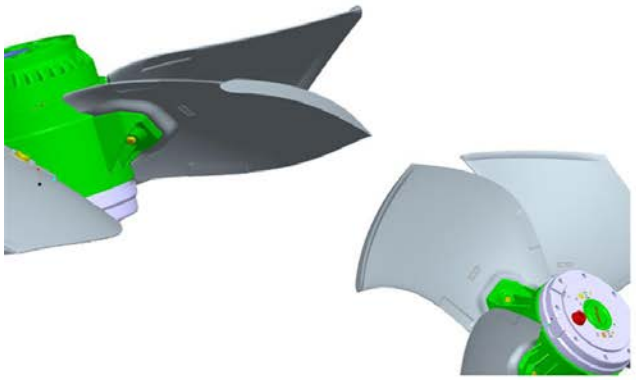
EERc =Energy efficiency referred to compressors

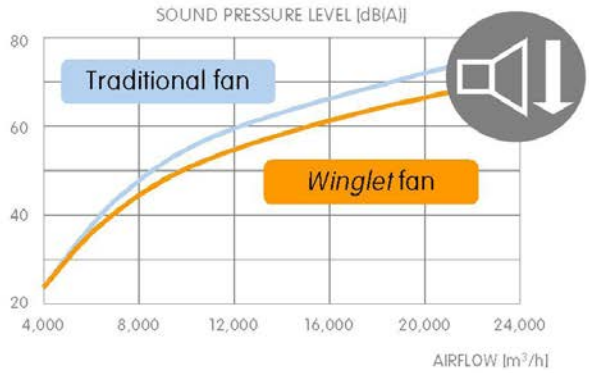
Efficient and silent ventilation technology

Advanced aerofoil fans

The external axial fans are equipped with the innovative Winglet airfoil-vane with integrated baffle, able to increase the aerodynamic efficiency.

It results in a consumption reduction of the 10% and a medium sound emission lower of 6 dB than the traditional fans.



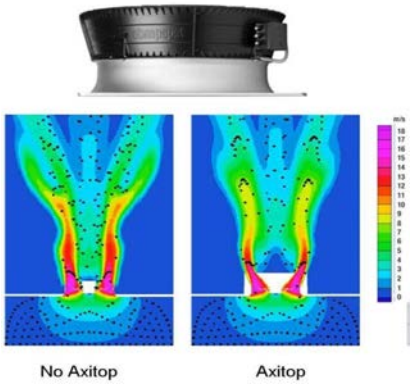


Diffusers for fans

Also the innovative air handling system on the external exchangers is the result of the Clivet design evolution.

The new AxiTop diffuser creates an ideal air distribution: it aerodynamically decelerates the flow and transforms a big part of its dynamic energy in static pressure, obtaining:

- –3 dB of sound reduction
- reduction of 3% of the absorbed energy



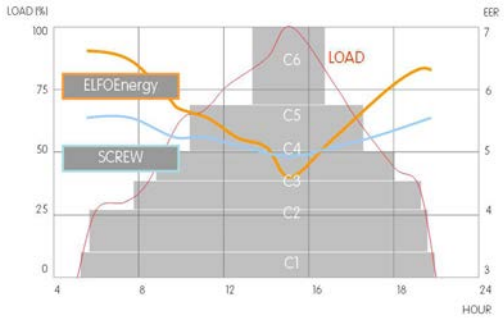
Energy efficiency improved by Axitop

Superior flexibility and reliability

Efficient precision

Sequential activation of Remotex compressors allow:

- adapting to the load required for use, thereby ensuring added comfort
- reducing the number of compressor start-ups, i.e., the main cause of wear
- increasing the unit's useful life
- reducing repair times and costs, thanks to the modular components, their reduced dimensions and reduced cost compared to semi-hermetic compressors.

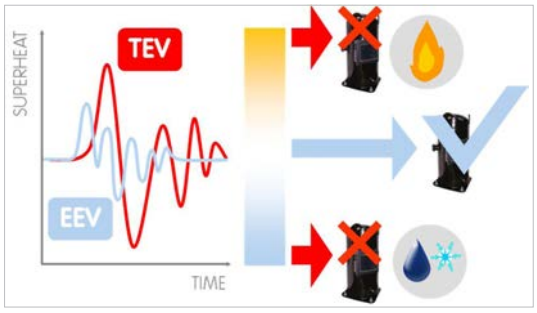


THE NUMBER OF START-UPS DECREASES THEREFORE THE LIFE CYCLE INCREASES

Stable and reliable operation

The electronic expansion valve (EEV) adapts rapidly and precisely to the actual load required for usage, allowing stable and reliable adjustment in comparison with mechanical thermostatic valves (TEV). This results also in a further increase in efficiency and longer compressor life.

The overheating control allows preventing phenomena that are hazardous to the compressors, such as overtemperature and return fluids, thereby increasing even more efficiency and durability.



Simplified maintenance

Besides being efficient, Remotex improves the system maintenance.

In fact, the malfunction of a compressor does not compromise overall operation.

Furthermore, Scroll compressors are very compact, easy to find and easy to handle in case of replacement.

Controlled power supply

Proper power supply ensures optimal unit operation and protects its many electrical components.

The phase monitor, standard supplied:

- controls the presence and the exact sequence of the phases
- checks any voltage anomalies (-10%)
- automatically restarts the unit as soon as the proper power supply is restored.

The EXCELLENCE version is fitted with a multifunction monitor, where limit values and the service schedule of Clivet's Technical Support can be modified.

The automatic control device coordinates resources ensuring maximum efficiency

Operating completely automatic

The microprocessor control automatically manages operation according to the maximum efficiency criterion and includes many safety and alarm management functions.

It also includes advanced functions, such as daily and weekly programming and automatic maximum power consumption limitation (demand limit).

Modularity

In the event of particularly large buildings requiring high capacities, it is advisable to use several units.

The Remotex units are designed to be connected in parallel in modular logic, thereby granting the following advantages:

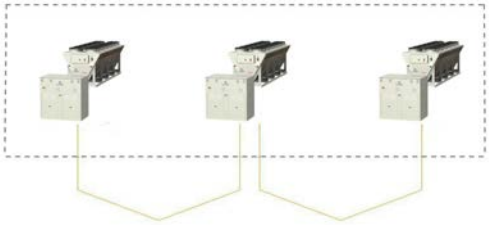
Increased flexibility, enhanced by the control that can adapt to the load

Increased reliability, since the malfunction of one unit does not compromise the capacity supply of the other units.

Increased efficiency, since energy is produced where and when required, according to the served area.

The microprocessor control combined with ECOSHARE allows controlling up to 7 units in local network (1 Master unit and 6 Slave).

MODULAR SYSTEM THAT ENHANCES Remotex TECHNOLOGY ADVANTAGES



ECOSHARE NETWORK

Remote system management

Remotex is standard equipped with:

- potential-free contact for remote on/off control
- potential-free contacts for remote display of the compressor status
- setting from user interface: Off / local On / serial On
- potential-free contact to remote any possible alarm

The various communication protocols allow the unit to exchange information with the main supervision systems by means of serial connections.

Energy measuring

Monitoring energy consumption and instant power employed is the starting point to improve the system's energy management and efficiency. With the optional energy meter, the user displays all the information related to the unit's electrical parameters on the interface built-in the unit or via the serial connection.

Moreover, the integration with the Demand Limit function supplied as standard allows to act on consumption levels by limiting them if they exceed the expected limit.

Remotex technology industrialised the system

Remotex can be supplied equipped with components that are often provided separately.

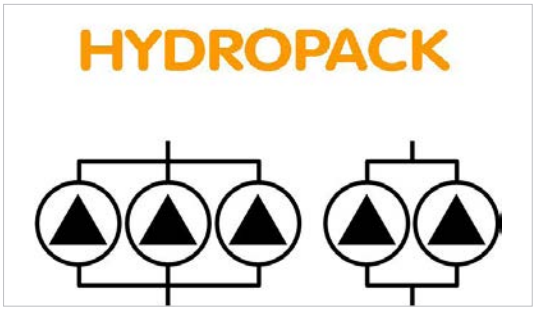
This allows reducing:

- design times: all accessories are made to ensure the best overall efficiency;
- installation costs: the accessories already mechanically connected, electrically wired and individually tested are ready to be put to operate immediately;
- overall dimensions: system components are integrated with the unit, thereby reducing the technical area and increasing the area available for other uses.

The built-in pumps are versatile, ready-for-use and reliable

The various solutions available are:

- HYDROPACK, the modular solution with two or three parallel pumps. Automatically reduces the water flow rate when in critical conditions, thereby preventing jams due to overloading, requiring the subsequent intervention of specialised technical personnel.
  It is very useful during start-ups, when restarting after operating breaks (e.g. at the weekend) or after a long period of inactivity.
- Inverter driven HYDROPACK allows water flow-rate-head calibration



Variable flow-rate advantages

Pumping energy for moving the water has an heavy impact on seasonal efficiency. The variable flow control is available for all units and drives to energy savings during partial load.

Pump energy consumption is proportional with cubic rotation speed. Evident the advantage when reducing flow-rate of 40% comparing to nominal conditions: energy saving is of 75% on pump energy consumption.

The control logic I based on keeping stable the water temperature entering and leaving difference, guaranteeing at the same time the best efficiency and a working envelope within an acceptable range for the heat exchanger (pressure losses).

The control logic applies to both flow-rate and compressor regulation thanks to steps. Proportional-Integral-Derivative guarantees a precise and stable operation.

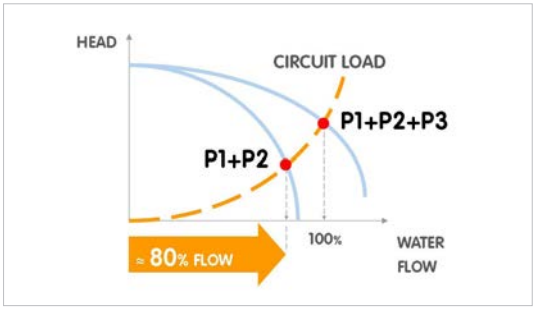
The possibility of independent pump management in case of failure is embedded in the unit keeping operative the system.

The exceptional HydroPack operation continuity

Due to its modularity, HYDROPACK maintains good water flow in the system even in the event of one of the pumps being temporarily unavailable.

In fact, with a deactivated pump, the residual flow is:

- about 80% of the rated flow (3 pump configuration)
- about 60% of the rated flow (2 pump configuration)



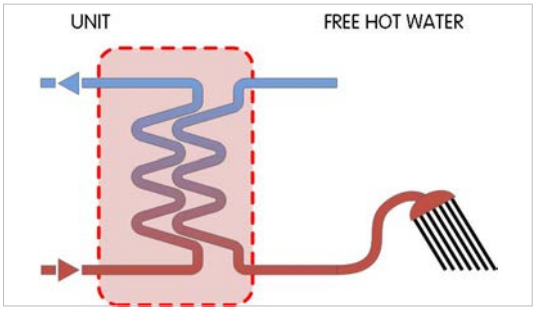
Produces hot water freely

Condensation heat recovery:

- partial: it recovers about the 25% of the available heat (desuperheater)

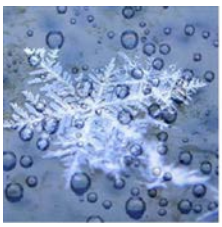
It allows the free DHW production for:

- hot water coil supply for reheat
- domestic hot water production (with intermediate exchanger)
- other processes or operations



Even for low water temperature

The unit is also perfectly adapted for use in process cooling where the low temperature version (Brine) together with the addition of glycol to the thermo-vector liquid produces chilled water down to –8 °C.



Further considerations on the installation

The vast operating field of Remotex allows it to adapt to most system applications. In some cases, special duty conditions may exceed the unit operating field. Simple devices on the system allow proper operation and meeting any requirement. Here are two examples.

Water flow rate values outside the limits

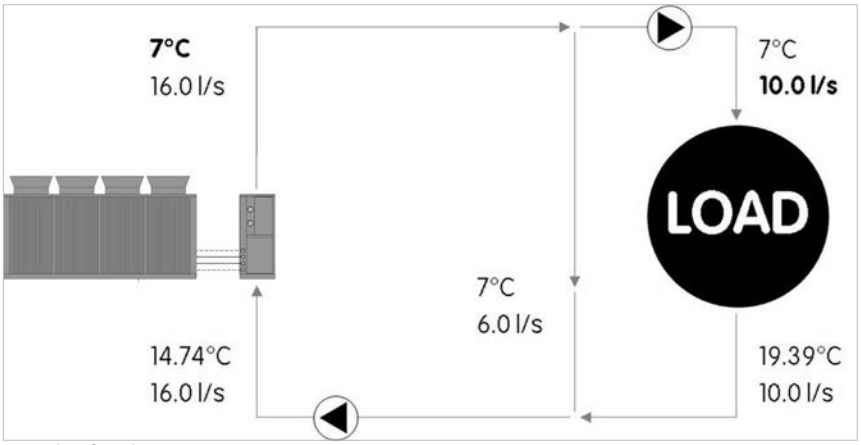
Remotex operates with constant water flow rate to the evaporator, between a minimum and maximum value indicated in the technical documents.

Flow rate values below the limit may cause unwanted formation of ice, incrustations, reduced control precision, and the unit to stop following the intervention of built-in safety devices.

Flow values above the limit may cause high pressure drops, high pumping costs, and reduced control precision, and erosion damages to the exchangers.

In this example, the required flow-rate is lower than the maximum value allowed to the evaporator, while the operating temperatures fall within the functional field of the unit.

A properly sized bypass piping resolves the problem.



Example referred to MSRN-XSC3 160.4 SC EXCELLENCE version.
Appropriate water flow rate for the correct unit operation.

Temperature values outside the limits

Remotex operates with the system supply temperatures indicated in the technical documentation.

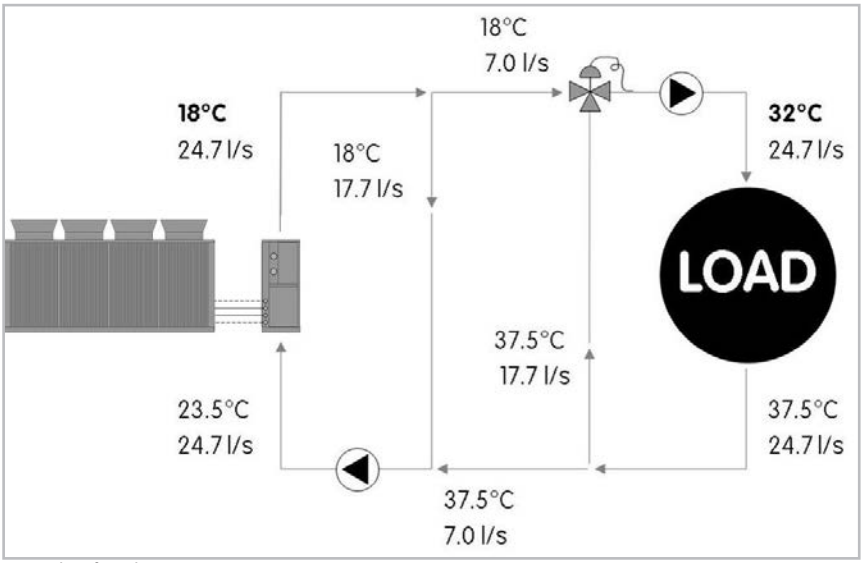
Temperature limits below the limit may cause unwanted formation of ice and the unit to stop following the intervention of built-in safety devices.

Temperature values under the limit may cause malfunctions and damages to the compressors, reduced control precision, and the unit to stop following the intervention of built-in safety devices.

In this example, the required temperature exceeds the maximum value allowed to the evaporator, while the water flow rate falls within the functional field of the unit.

A properly sized bypass piping and mixing system resolve the problem.

Should both the water flow rate and the operating temperature exceed the values intended for the chiller, all you have to do is combine the two cases described above.



Example referred to MSRN-XSC3 160.4 SC EXCELLENCE version.
Appropriate supply water temperature for the correct unit operation. Nominal water flow rate.

Evaporator thermal gradient

Remotex nominal capacities refer to an evaporator thermal gradient equal to 5 °C. A different thermal gradient may be used in full load operation, provided that both the operating flow and temperatures fall within the limits. As an indication, this corresponds to a minimum thermal gradient of approximately 3 °C and a maximum of 10 °C (the exact values must be determined based on the allowed flows and temperatures).

Standard unit technical specifications - Excellence and Premium Version

INTERNAL SECTION

Compressor

High efficiency hermetic orbiting scroll compressor complete with oil charge, motor over-temperature and over-current devices and protection against excessive gas discharge temperature with oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops. Compressors, fitted on rubber antivibration mounts to prevent transmission of noise and vibration, are connected in TANDEM on a single refrigerating circuit with biphasic oil equalisation, it allows to reach high efficiency at partial load. Uniform compression process with reduced number of moving parts which ensure very low levels of noise and vibration.

Structure

Structure and base made entirely of sturdy sheet steel, thickness of 30/10 or 40/10, with the surface treatment in Zinc–Magnesium painted , for the parts in view, with polyester powder RAL 9001 that guarantees excellent mechanical characteristics and high corrosion strength over time.

Panelling

External pre-painted zinc-magnesium paneling, thickness 15/10, with the surface treatment in Zinc–Magnesium painted with polyester powder RAL 9001 that ensures superior resistance to corrosion for outdoor installation and eliminates the need for periodical painting. The panels can be easily removed to fully access internal components and are lined with sound-proof material on the inside to contain the unit's sound levels.

Internal exchanger

Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates, in pack without seals using copper as the brazing material, with low refrigerant charge and large exchange surface, complete with:

- external thermal insulation no-condensation, thickness 9,5 mm, in extruded elastomer foam with closed cells.
- differential pressure switch, water side
- antifreeze heater to protect the water side exchanger, preventing the formation of frost if the water temperature falls below a set value.

Maximum operating pressure exchanger: 10 bar on the water side and 45 bar on the refrigerant side.

Refrigeration circuit

Two independent refrigeration circuits, copper made and factory-assembled, welded with continuity metallic solution, completed with:

- replaceable antiacid dehydrator filter with solid cartridge;
- liquid flow and moisture indicator;
- electronic expansion valve;
- non return valve
- 4-way reverse-cycle valve
- high pressure safety pressure switch;
- high pressure safety valve;
- low pressure safety valve;
- cutoff valve on liquid line;
- cutoff valve on compressor supply.
- inlet liquid separator
- thermal insulated of suction line with insulation material in highly flexible closed-cell elastomer based on EPDM rubber.

Each refrigeration circuit is pressure tested to check leaks.

Electrical panel

Fully constructed and wired in accordance with EN 60204.

The capacity section includes:

- main door lock isolator switch;
- terminals main power (400V / 3Ph / 50Hz);
- isolating transformer for auxiliary circuit power supply (230V/24V);
- compressor circuit breaker;
- compressor control contactor.

The control section includes:

- interface terminal with graphic display;
- display of the set values, the error codes and the parameter index;
- ON/OFF and alarm reset buttons;
- proportional-integral-derivative water temperature control;
- daily, weekly programmer of temperature set-point and unit on/off;
- unit switching on management by local or remote (serial);
- antifreeze protection water side;
- compressor overload protection and timer;
- pre-alarm function for water antifreeze and high refrigerant gas pressure;
- self-diagnosis system with immediate display of the fault code;
- automatic rotation control for compressor starts;
- compressor operating hour display;
- remote ON/OFF control;
- input for remote HEAT/COOL control
- relay for remote cumulative fault signal;
- input for demand limit (absorbed power limit according to an external 0÷10V signal);
- potential-free contacts for compressor status;
- digital input for double set-point enabling;
- electrical panel ventilation;
- multifunction phase monitor;
- Modbus connection with the external section.

All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser. All electrical cables are colored and numbered in accordance with the wiring diagram

EXTERNAL SECTION

External exchanger

Finned exchanger, made from copper pipes arranged in staggered rows and mechanically expanded for better adherence to the collar of the fins. The exchangers are planned, designed and produced directly by CLIVET. The fins are made of aluminium with a special corrugated surface, set a suitable distance apart to ensure maximum heat exchange efficiency. Each finned heat exchanger is directly cooled by the air flow of its specific fans.

Fan

Axial fans with high performance and low-noise, balanced statically and dynamically, with blades in aluminum sheet coated in PP and sickle profile terminating with "Winglets", Wall ring in sheet steel pre-galvanised, directly coupled to the three-phase electric motor with external rotor and IP54 protection and class F insulation. Fans are located in aerodynamically shaped structures, equipped with accident prevention steel guards.

Diffusers for external section fans - Axitop

Axitop diffusers installed on the outdoor section fans to recover dynamic energy, resulting in increased efficiency and minimal sound emission. It creates an ideal air distribution: it aerodynamically decelerates the flow and transforms a big part of its dynamic energy in static pressure.

Electrical panel

Fully constructed and wired in accordance with EN 60204.

The capacity section includes:
- main door lock isolator switch;
- fan overload circuit breakers;
- fan activation relay;
- fan wiring

The control section includes:
- fan protection;
- outdoor air temperature probe;
- Modbus connection with internal section.

INTERNAL AND EXTERNAL SECTION

Configurations

D - Partial energy recovery

B - Water low temperature

SC - Acoustic configuration with compressor soundproofing

EN - Super-silenced acoustic configuration

Accessories - Hydronic assembly

- HYDROPACK (n.b.: other types are available by head)
- Inverter driven HYDROPACK
- Steel mesh mechanical strainer (accessory separately provided). Note: To be located at the exchanger inlet. We disclaim any liability and make the guarantee void, if an appropriate mechanical filter is not provided inside the system.

Accessories

- High and low pressure gauges
- Cutoff valve on compressor supply and return
- Couple of manual shut-off valves (accessory provided separately)
- Electrical panel antifreeze protection
- Power factor correction capacitors (cosfi > 0.9)
- ECOSHARE function for the automatic management of a group of units
- Disposal for inrush current reduction (SOFT STARTER)
- Serial communication module for BACnet-IP supervisor
- Serial communication module for Modbus supervisor
- Serial communication module for LonWorks supervisor
- Device for consumption reduction of the external section ECOBREEZE fans
- Remote control via microprocessor remote control (accessory separately supplied)
- Mains power supply unit (accessory separately supplied)
- Energy meter
- Set-point compensation with 0-10 V signal
- Set-point compensation with outdoor air temperature probe
- Rubber antivibration mounts (supplied separately)
- Refrigerant leak detector with pump down function in the casing
- Variable flow-rate control

On special request are available:
- finned coil protection grill
- copper / aluminium condenser coil with acrylic lining
- copper / aluminium condenser coil with Energy Guard DCC Aluminum
- copper /copper condenser coil with brass shoulders

Test

Unit subjected to factory-tested in specific steps and test pressure of the piping of the refrigerant circuit (with nitrogen and hydrogen), before shipping them. After the approval, the moisture contents present in all circuits are analyzed, in order to ensure the respect of the limits set by the manufacturers of the different components.

Unit configuration

MSRN-XSC3 + CEV-XN	160	4	EXC	SC	CREFO	AXI	-	-	-
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

(1) Range
MSRN = Air-cooled liquid chiller in two sections with scroll compressor
XSC3 = Remotex range

CEV-XN = Air cooled remote condenser

(2) Size
160 = Nominal compressor capacity (HP)

(3) Compressors
4 = Compressor quantity

(4) Energy efficiency
EXC = EXCELLENCE version: high energy efficiency

(5) Acoustic configuration
SC = Acoustic configuration with compressor soudproofing
EN = Super-silenced acoustic configuration

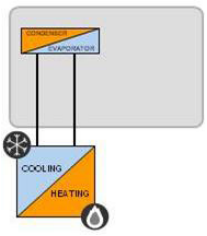
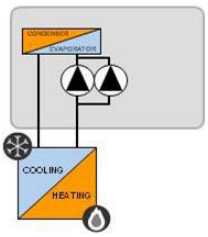
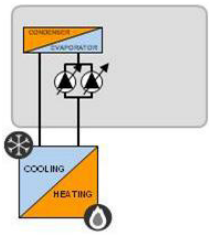
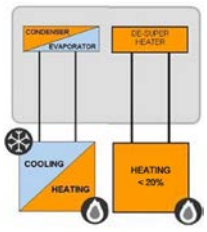
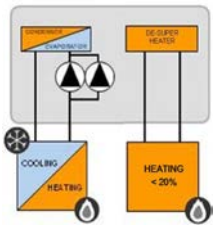
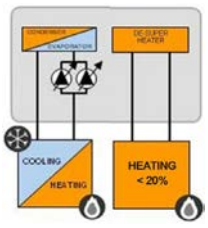
(6) Type of fans
CREFO - Device for fan consumption reduction of the external section, on/off type (standard)
CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type

(7) Fan diffusers
AXI - Diffuser for high efficiency fan (standard)

(8) Condensation heat recovery
(-) recovery not required (standard)
D - Partial energy recovery (25% of available heat)

(9) Low evaporator water temperature configuration
(-) Low water temperature: not required (standard)
B - Water low temperature, down to –8°C (Brine)

(10) Pumping unit user side
(-) not required
2PM - Hydropack user side with no. 2 of pumps
3PM - Hydropack user side with no. 3 of pumps
2PMV- Hydropack user side with no. 2 of inverter pumps
3PMV - Hydropack user side with no. 3 of inverter pumps

Functionalities	Hydronic units		
2-PIPE SYSTEM Production of hot or chilled water for installation	**1.1** Standard unit 	**1.2** Standard unit with HYDROPACK 	**1.3** Standard unit with inverter driven HYDROPACK 
2-PIPE SYSTEM + PARTIAL RECOVERY Production of hot or chilled water for installation Free production of hot water from partial recovery	**2.1** Standard unit with partial recovery 	**2.2** Standard unit with partial recovery and HYDROPACK 	**2.3** Standard unit with partial recovery and inverter driven HYDROPACK 

Accessories separately supplied		
• **RCMRX** - Remote control via microprocessor remote control	• **PSX** - Mains power supply unit	• **AMRX** - Rubber antivibration mounts

STANDARD CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

General technical data - PERFORMANCE

Internal section size - MSRN-XSC3			90.4	100.4	110.4	120.4	140.4	160.4
External section size - CEV-XN			**105.0**	**105.0**	**115.0**	**130.0**	**160.0**	**170.0**
Cooling								
Cooling capacity	1	[kW]	240	260	285	320	366	407
Compressor power input	1	[kW]	76,5	84,8	94,6	107	121	137
Total power input	2	[kW]	87,0	95,5	105	117	135	151
Partial recovery heating capacity	3	[kW]	60,6	65,9	72,1	81,0	92,6	103
EER	1	-	2,76	2,73	2,71	2,73	2,71	2,70
SEER	7		4,13	4,07	4,03	4,00	4,11	4,10
Water flow-rate (User Side)	1	[l/s]	11,7	12,6	13,9	15,4	17,7	19,9
Internal exchanger pressure drops	1	[kPa]	30,2	34,8	31,8	39,0	42,8	42,0
Cooling capacity (EN14511:2013)	4	[kW]	239	255	279	309	361	402
Total power input (EN14511:2013)	4	[kW]	86,8	95,4	105	121	135	151
EER (EN 14511:2013)	4	-	2,75	2,67	2,65	2,56	2,67	2,67
Heating								
Heating capacity	5	[kW]	280	310	337	371	419	473
Compressor power input	5	[kW]	78,0	86,2	94,1	104	117	131
Total power input	2	[kW]	88,6	97,1	105	115	131	145
COP	5	-	3,16	3,19	3,21	3,23	3,20	3,26
Heating capacity (EN14511:2013)	6	[kW]	280	307	333	366	419	476
Total power input (EN14511:2013)	6	[kW]	88,5	96,9	105	115	130	145
COP (EN 14511:2013)	6		3,16	3,17	3,18	3,19	3,22	3,28
SCOP - AVERAGE Climate - W35	7		3,80	3,81	3,83	3,69	3,89	3,72

Acoustic configuration: super-silenced (EN)

General technical data - PERFORMANCE

Internal section size - MSRN-XSC3			90.4	100.4	110.4	120.4	140.4	160.4
External section size - CEV-XN			**150.0**	**150.0**	**160.0**	**180.0**	**185.0**	**190.0**
Cooling								
Cooling capacity	1	[kW]	240	259	280	320	362	411
Compressor power input	1	[kW]	76,2	83,8	93,8	105	120	133
Total power input	2	[kW]	86,1	93,8	104	115	132	146
Partial recovery heating capacity	3	[kW]	60,7	65,5	70,9	81,0	91,5	104
EER	1	-	2,79	2,76	2,70	2,78	2,74	2,81
SEER	5		4,18	4,16	4,04	4,17	4,14	4,20
Water flow-rate (User Side)	1	[l/s]	11,1	12,2	13,3	14,7	17,0	19,1
Internal exchanger pressure drops	1	[kPa]	27,4	32,7	29,4	35,3	39,5	38,8
Cooling capacity (EN14511:2013)	4	[kW]	239	258	280	319	361	410
Total power input (EN14511:2013)	4	[kW]	85,9	93,8	104	116	134	146
EER (EN 14511:2013)	4	-	2,78	2,75	2,70	2,75	2,70	2,81
Heating								
Heating capacity	5	[kW]	280	310	336	377	425	466
Compressor power input	5	[kW]	78,0	86,2	94,1	104	117	130
Total power input	2	[kW]	88,1	96,4	104	114	130	143
COP	5	-	3,18	3,22	3,22	3,30	3,28	3,26
Heating capacity (EN14511:2013)	6	[kW]	282	304	333	376	425	468
Total power input (EN14511:2013)	6	[kW]	88,1	96,2	104	115	129	143
COP (EN 14511:2013)	6		3,20	3,16	3,19	3,28	3,29	3,28
SCOP - AVERAGE Climate - W35	7		3,85	3,82	3,84	3,72	3,92	3,75

1. Data referred to the following conditions: internal exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water=40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data referred to the following conditions: internal exchanger water = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
6. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
7. Data calculated according to the EN 14825:2016 Regulation

Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

DUAL CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

General technical data - PERFORMANCE

Internal section size - MSRN-XSC3			D90.4	D100.4	D110.4	D120.4	D140.4	D160.4
External section size - CEV-XN			**D105.0**	**D105.0**	**D115.0**	**D130.0**	**D160.0**	**D170.0**
Cooling								
Cooling capacity	1	[kW]	479	521	570	640	732	814
Compressor power input	1	[kW]	153	170	189	214	242	273
Total power input	2	[kW]	174	191	210	235	270	301
Partial recovery heating capacity	3	[kW]	121	132	144	162	185	206
EER	1	-	2,75	2,73	2,71	2,73	2,71	2,70
SEER	7	-	4,18	4,12	4,07	4,04	4,14	4,13
Water flow-rate (User Side)	1	[l/s]	11,7	12,6	13,9	15,4	17,7	19,9
Internal exchanger pressure drops	1	[kPa]	30,2	34,8	31,8	39,0	42,8	42,0
Cooling capacity (EN14511:2013)	4	[kW]	478	509	558	617	721	804
Total power input (EN14511:2013)	4	[kW]	174	191	210	241	271	301
EER (EN 14511:2013)	4	-	2,75	2,67	2,65	2,56	2,67	2,67
Heating								
Heating capacity	5	[kW]	561	620	674	742	839	947
Compressor power input	5	[kW]	156	172	188	208	234	262
Total power input	2	[kW]	177	194	210	230	262	291
COP	5	-	3,17	3,19	3,21	3,23	3,20	3,26
Heating capacity (EN14511:2013)	6	[kW]	560	613	666	731	839	952
Total power input (EN14511:2013)	6	[kW]	177	194	210	229	261	290
COP (EN 14511:2013)	6		3,16	3,17	3,18	3,19	3,22	3,28
SCOP - AVERAGE Climate - W35	7		3,81	3,81	3,83	3,69	3,89	3,72

Acoustic configuration: super-silenced (EN)

General technical data - PERFORMANCE

Internal section size - MSRT-XSC3			D90.4	D100.4	D110.4	D120.4	D140.4	D160.4
External section size - CEV-XT			**D150.0**	**D150.0**	**D160.0**	**D180.0**	**D185.0**	**D190.0**
Cooling								
Cooling capacity	1	[kW]	480	518	561	640	723	821
Compressor power input	1	[kW]	152	168	188	209	239	267
Total power input	2	[kW]	172	188	208	230	264	292
Partial recovery heating capacity	3	[kW]	121,4	131,1	141,9	161,9	182,9	207,7
EER	1	-	2,79	2,76	2,70	2,79	2,74	2,81
SEER	7	-	4,23	4,21	4,07	4,20	4,17	4,23
Water flow-rate (User Side)	1	[l/s]	11,7	12,6	13,9	15,4	17,7	19,9
Internal exchanger pressure drops	1	[kPa]	30,2	34,8	31,8	39,0	42,8	42,0
Cooling capacity (EN14511:2013)	4	[kW]	478	517	560	639	722	819
Total power input (EN14511:2013)	4	[kW]	172	188	207	232	267	292
EER (EN 14511:2013)	4	-	2,78	2,75	2,70	2,75	2,70	2,81
Heating								
Heating capacity	5	[kW]	559	620	672	755	850	932
Compressor power input	5	[kW]	156	172	188	208	234	261
Total power input	2	[kW]	176	193	209	229	259	286
COP	5	-	3,17	3,22	3,22	3,30	3,28	3,26
Heating capacity (EN14511:2013)	6	[kW]	564	609	665	752	850	937
Total power input (EN14511:2013)	6	[kW]	176	192	208	229	258	286
COP (EN 14511:2013)	6		3,20	3,16	3,19	3,28	3,29	3,28
SCOP - AVERAGE Climate - W35	7		3,86	3,82	3,85	3,79	3,93	3,75

1. Data referred to the following conditions: internal exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water=40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data referred to the following conditions: internal exchanger water = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
6. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
7. Data calculated according to the EN 14825:2016 Regulation

Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

TRIPLE CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

General technical data - PERFORMANCE

Internal section size - MSRT-XSC3			T110.4	T120.4	T140.4	T160.4
External section size - CEV-XT			**T115.0**	**T130.0**	**T160.0**	**T170.0**
Cooling						
Cooling capacity	1	[kW]	889	998	1142	1269
Compressor power input	1	[kW]	284	320	363	410
Total power input	2	[kW]	316	352	405	452
Partial recovery heating capacity	3	[kW]				
EER	1	-	2,82	2,83	2,82	2,81
SEER	7	-	4,08	4,05	4,15	4,14
Water flow-rate (User Side)	1	[l/s]	13,3	14,7	17,0	19,1
Internal exchanger pressure drops	1	[kPa]	29,4	35,3	39,5	38,8
Cooling capacity (EN14511:2013)	4	[kW]	837	926	1082	1205
Total power input (EN14511:2013)	4	[kW]	315	362	406	452
EER (EN 14511:2013)	4	-	2,65	2,56	2,67	2,67
Heating						
Heating capacity	5	[kW]	1011	1113	1257	1419
Compressor power input	5	[kW]	282	312	351	393
Total power input	2	[kW]	315	344	393	436
COP	5	-	3,21	3,23	3,20	3,26
Heating capacity (EN14511:2013)	6	[kW]	1000	1097	1258	1427
Total power input (EN14511:2013)	6	[kW]	315	344	391	435
COP (EN 14511:2013)	6		3,18	3,19	3,22	3,28
SCOP - AVERAGE Climate - W35	7					

Acoustic configuration: super-silenced (EN)

General technical data - PERFORMANCE

Internal section size - MSRT-XSC3			T110.4	T120.4	T140.4	T160.4
External section size - CEV-XT			**T160.0**	**T180.0**	**T185.0**	**T190.0**
Cooling						
Cooling capacity	1	[kW]	840	949	1082	1228
Compressor power input	1	[kW]	293	333	376	417
Total power input	2	[kW]	323	364	413	455
Partial recovery heating capacity	3	[kW]	213	240	274	311
EER	1	-	2,60	2,61	2,62	2,70
SEER	5	-				
Water flow-rate (User Side)	1	[l/s]	13,3	14,7	17,0	19,1
Internal exchanger pressure drops	1	[kPa]	29,4	35,3	39,5	38,8
Cooling capacity (EN14511:2013)	4	[kW]	840	958	1082	1229
Total power input (EN14511:2013)	4	[kW]	311	349	401	437
EER (EN 14511:2013)	4	-	2,70	2,75	2,70	2,81
Heating						
Heating capacity	5	[kW]	1008	1131	1275	1398
Compressor power input	5	[kW]	282	312	351	390
Total power input	2	[kW]	313	343	389	428
COP	5	-	3,22	3,30	3,28	3,26
Heating capacity (EN14511:2013)	6	[kW]	998	1128	1275	1405
Total power input (EN14511:2013)	6	[kW]	313	344	388	429
COP (EN 14511:2013)	6		3,19	3,28	3,29	3,28
SCOP - AVERAGE Climate - W35	7		3,84	3,69	3,89	3,72

1. Data referred to the following conditions: internal exchanger water = 12/7 °C. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water=40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data referred to the following conditions: internal exchanger water = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B. Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W
6. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
7. Data calculated according to the EN 14825:2016 Regulation

Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

STANDARD CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

General technical data - INTERNAL UNIT CONSTRUCTION

Internal section size - MSRT-XSC3			90.4	100.4	110.4	120.4	140.4	160.4
Compressor								
Type of compressors		-	SCROLL					
Refrigerant		-	R-410A					
No. of compressors		Nr	4	4	4	4	4	4
Rated power (C1)		[HP]	45	50	55	60	70	80
Rated power (C2)		[HP]	45	50	55	60	70	80
Std Capacity control steps		-	6	6	6	4	6	4
Oil charge (C1)		[l]	10	11	13	13	13	13
Oil charge (C2)		[l]	10	11	13	13	13	13
Refrigeration circuits		-	2	2	2	2	2	2
Internal exchanger								
Type of internal exchanger	2	-	PHE					
Water content		[l]	24,0	24,0	29,0	29,0	32,0	37,0
System water content	3	l	1284	1628	2072	2499	2526	3227
Connections								
Water fittings		-	4"	4"	4"	4"	4"	4"
Power supply								
Standard power supply		V	400/3/50					
Refrigerant connections								
Gas line	7	mm	42	42	54	54	54	54
Liquid line	7	mm	35	35	35	42	42	42
Electrical data								
F.L.I. - Total		kW	106,5	117,4	127,0	144,6	165,8	187,0
F.L.A. - Total		A	180,6	191,9	208,7	237,5	266,5	295,5
M.I.C. - Value	6	A	431,0	442,3	459,1	487,9	586,4	615,4
M.I.C. - with soft start accessory	6	A	293,2	304,5	321,3	350,1	414,4	443,4

The combinations between internal and external unit are uniquely identified by following the table columns.

Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

1. PHE = plate exchanger
2. Recommended system water content that does not consider the internal exchanger water content (evaporator). With outdoor air low temperature applications or low medium requested loads, the minimum installation water volume is obtained doubling the indicated value.
3. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components. Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations. Unbalance between phase max 2 %. Voltage variation: max +/- 10%.
4. Where not specified, the diameters of the supply and liquid lines are equal in both refrigeration circuits. In size 220.4 the circuit 1 diameter both of the supply and the liquid line is 42 mm, the circuit 2 diameter is 54 mm.

STANDARD CONFIGURATION

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

General technical data - EXTERNAL UNIT CONSTRUCTION

External section size - CEV-XT			90.0	105.0	115.0	120.0	145.0
Fans							
Type of fans	1	-	AX				
Number of fans		Nr	6	6	6	8	8
Type of motor	2	-	AC	AC	AC	AC	AC
Standard airflow		[l/s]	36779	36143	35703	48075	47272
Power supply							
Standard power supply		V	400/3/50				
Refrigerant connections							
Supply line	4	mm	42	54	54	54	54
Liquid line	4	mm	35	35	42	42	42
Electrical data							
F.L.I. - Total		kW	11,6	11,6	11,6	15,5	15,5
F.L.A. - Total		A	23,4	23,4	23,4	31,2	31,2
M.I.C. - Value	3	A	41,6	41,6	41,6	67,6	67,6

1. AX = axial fan
2. AC = asynchronous three-phase external rotor motor.
3. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components. Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations. Unbalance between phase max 2 %. Voltage variation: max +/- 10%.
4. Where not specified, the diameters of the supply and liquid lines are equal in both refrigeration circuits. In size 220.4 the circuit 1 diameter both of the supply and the liquid line is 42 mm, the circuit 2 diameter is 54 mm.

Acoustic configuration: super-silenced (EN)

General technical data - EXTERNAL UNIT CONSTRUCTION

External section size - CEV-XT			115.0	120.0	130.0	150.0	160.0
Fans							
Type of fans	4	-	AX				
Number of fans		Nr	8	8	8	10	10
Type of motor	5	-	AC	AC	AC	AC	AC
Standard airflow		[l/s]	40357	38374	36663	47773	52594
Power supply							
Standard power supply		V	400/3/50				
Refrigerant connections							
Supply line	7	mm	42	54	54	54	54
Liquid line	7	mm	35	35	42	42	42
Electrical data							
F.L.I. - Total		kW	9,7	9,7	9,7	12,1	12,1
F.L.A. - Total		A	17,8	17,8	17,8	22,3	22,3
M.I.C. - Value	6	A	26,1	26,1	26,1	30,6	30,6

1. AX = axial fan
2. AC = asynchronous three-phase external rotor motor.
3. M.I.C.=Maximum unit starting current. The M.I.C. value is obtained adding the max. compressor starting current of the highest size to the power input at max. admissible conditions (F.L.A.) of the remaining electric components. Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations. Unbalance between phase max 2 %. Voltage variation: max +/- 10%.
4. Where not specified, the diameters of the supply and liquid lines are equal in both refrigeration circuits. In size 220.4 the circuit 1 diameter both of the supply and the liquid line is 42 mm, the circuit 2 diameter is 54 mm.

Sound levels

EXTERNAL SECTION: CEV-XT

Compressor soundproofing (SC)

Size	Sound power level (dB)								Sound Pressure level at 10m	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
105.0	94	82	83	81	77	76	74	70	**52**	**84**
115.0	94	82	83	81	77	76	74	70	**52**	**84**
130.0	94	82	83	81	77	76	74	70	**52**	**84**
160.0	95	83	84	82	79	77	76	72	**53**	**85**
170.0	95	83	84	82	79	77	76	72	**53**	**85**

Super-silenced (EN)

Size	Sound power level (dB)								Sound Pressure level at 10m	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
150.0	87	78	79	76	74	72	71	66	**48**	**80**
160.0	87	78	79	76	74	72	71	66	**48**	**80**
180.0	87	78	79	76	74	72	71	66	**48**	**80**
185.0	88	79	80	77	74	73	72	67	**48**	**81**
190.0	88	79	80	77	74	73	72	67	**48**	**81**

INTERNAL SECTION: MSRT-XSC3

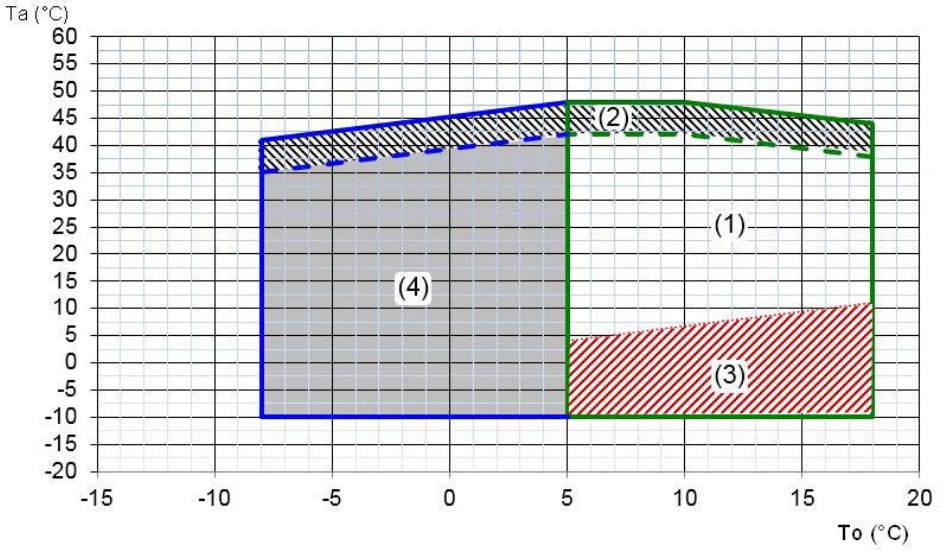
Size	Sound power level (dB)								Sound Pressure level at 1m	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	50	55	69	73	77	77	71	64	**64**	**82**
100.4	50	59	72	74	77	78	71	63	**64**	**82**
110.4	50	56	72	74	78	79	73	66	**65**	**83**
120.4	50	56	72	75	79	79	73	65	**66**	**84**
140.4	50	55	73	76	82	81	74	65	**68**	**86**
160.4	50	55	74	76	82	82	75	66	**68**	**86**

I livelli sonori si riferiscono alla sezione esterna dotata di Axitop nelle condizioni nominali di prova. Il livello di pressione sonora è riferito ad 10 m di distanza dalla superficie esterna dell'unità funzionante in campo aperto e a pieno carico.
Le misure vengono effettuate in accordo alla normativa UNI EN ISO 9614-2, nel rispetto di quanto richiesto dalla certificazione EUROVENT 8/1, la quale prevede una tolleranza di 3 dB(A) sul livello di potenza sonora, che è l'unico dato acustico da considerarsi impegnativo.
Dati riferiti alle seguenti condizioni:
- acqua scambiatore interno = 12/7 °C
- temperatura aria esterna 35°C

Nel caso di installazioni multiple, il calcolo del livello sonoro totale seguirà quanto riportato nelle normative inerenti all'acustica

Operating range - Cooling

Acoustic configuration: compressor soundproofing (SC) / super-silenced (EN)

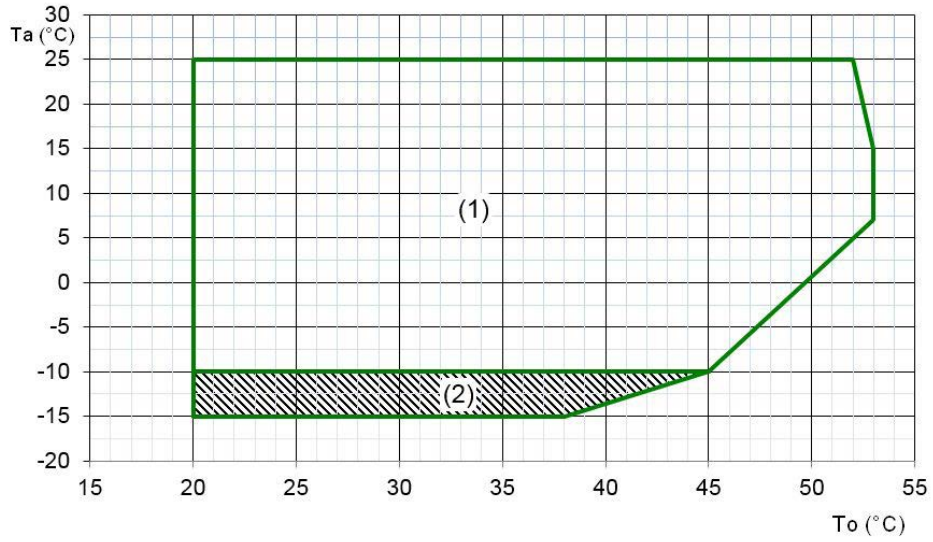


Ta (°C) = external exchanger inlet air temperature (D.B.)
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Unit operating range with automatic staging of the compressor capacity
3. Standard unit operating range with air flow automatic modulation. Only with CREFB option.
4. Unit operating range in 'B - Low water temperature' configuration (40% ethylene glycol). Only with CREFB option.

Operating range - Heating

Acoustic configuration: compressor soundproofing (SC) / super-silenced (EN)



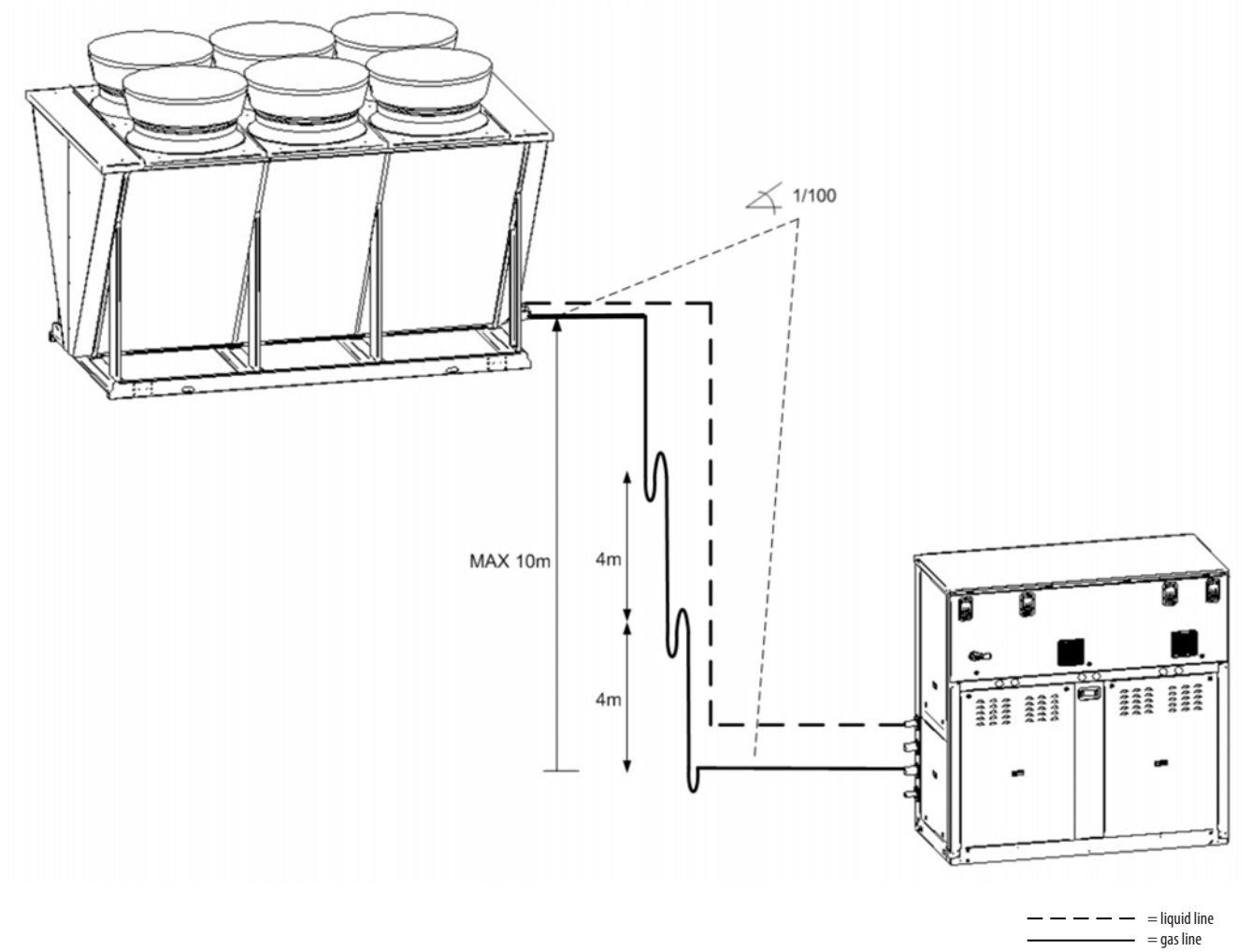
Ta (°C) = external exchanger inlet air temperature (D.B.)
To (°C) = internal exchanger outlet water temperature

1. Standard unit operating range at full load
2. Field in which the unit operation is allowed for a limited period regarding the system start-up.

Refrigerant connections

Maximum piping length and lift

	Maximum equivalent piping length (m)	Maximum difference in heigh (m)
Water chiller is below remote condenser	20	10
Water chiller is above remote condenser	20	5



In the exemplifying connection diagram are represented only one supply piping (gas line) and one liquid piping. The number of lines must be doubled because the unit is equipped with a double refrigeration circuit.

Provide gradients in the horizontal sections (1/100). When the external unit is positioned higher than the internal unit provide siphons every 4 m in the vertical stretches.

When the condenser is installed above the compressor the supply line must have a trap at the compressor level which drops to the floor. This will reduce the risk of condensed liquid refrigerant returning up the compressor line during shutdowns. In the vertical supply sections it is recommended to insert an oil collecting siphon to allow the oil to be drawn in the line, in addition to the pit at the base.

In the horizontal sections are recommended to create a slope towards the gas flow to facilitate the oil flow.

The equivalent length is the sum of the pipe effective length plus a length which is equal to the pressure drops distributed and concentrated.
To determine the equivalent length refer to tables and data declared by the pipe supplier.

Table of located leaks

Piping diamter	Standard 90° bend	Wide radius 90° bend	90° elbow m/f	45° bend	45° elbow m/f	180° bend	Fitting direction inversion	Direct flow		
								No reduction	Reduction 1/4	Reduction 1/2
										
mm	Equivalent length									
28	0,8	0,5	1,2	0,4	0,6	1,2	1,5	0,5	0,7	0,8
35	1,0	0,7	1,7	0,5	0,9	1,7	2,1	0,7	0,9	1,0
42	1,2	0,8	1,9	0,6	1,0	1,9	2,4	0,8	1,1	1,2
54	1,5	1,0	2,5	0,8	1,4	2,5	3,0	1,0	1,4	1,5

Performance correction factors for combination with remote condenser

	Total equivalent length (m)			
	7,5	10	15	20
Cooling and heating Capacity corrective coeffcient	1,00	0,99	0,98	0,96
Compressor power input corrective coefficient	1,00	1,01	1,03	1,05

Refrigerant charge for combination with remote condenser

Size			90.4	100.4	110.4	120.4	140.4	160.4
EXCELLENCE SC	C1	[kg]	44	46	47	64	66	69
	C2	[kg]	44	46	47	64	66	69
EXCELLENCE EN	C1	[kg]	44	46	54	71	73	75
	C2	[kg]	44	46	54	71	73	75

The unit is shipped with nitrogen charge, the refrigerant charge indicated refers to an equivalent distance of 7,5m and has to be made during installation at the start-up and is provided by the Customer. Indicative values to be evaluate during the installation.

Refrigerant charge for different equivalent lengths

MSRN-XSC3 EXC SC					
Size	Refrigerant charge		Total equivalent length (m)		
			10	15	20
90.4	C1	kg	2	5	8
	C2	kg	2	5	8
100.4	C1	kg	2	5	9
	C2	kg	2	5	9
110.4	C1	kg	2	6	9
	C2	kg	2	6	9
120.4	C1	kg	2	7	12
	C2	kg	2	7	12
140.4	C1	kg	3	8	12
	C2	kg	3	8	12
160.4	C1	kg	4	8	13
	C2	kg	4	8	13

MSRN-XSC3 EXC EN					
Size	Refrigerant charge		Total equivalent length (m)		
			10	15	20
90.4	C1	kg	2	5	8
	C2	kg	2	5	8
100.4	C1	kg	2	5	9
	C2	kg	2	5	9
110.4	C1	kg	2	5	8
	C2	kg	2	5	8
120.4	C1	kg	3	8	13
	C2	kg	3	8	13
140.4	C1	kg	2	7	12
	C2	kg	2	7	12
160.4	C1	kg	3	8	13
	C2	kg	3	8	13

Notes - Warnings

The liquid and supply lines should be insulated to prevent heat exchanges that can compromise the correct refrigerating operation. The supply line must be properly insulated in case of possible contact with persons in order to avoid accidental burns.

The lack of insulation from vibrations could generate pipe breaks and refrigerant leaks.

The unit is shipped with nitrogen charge, the refrigerant charge has to be made during installation, at the start-up and is provided by the Customer.

The dimensioning of the connection refrigerant lines is very important for the proper operating and reliability of the system.

The connection must be made by a qualified refrigerator technician, respecting the local operations and good rules in force.

STANDARD CONFIGURATION

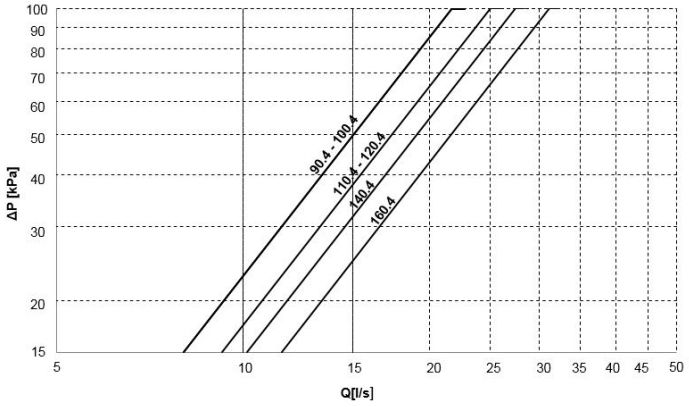
Acoustic configuration: compressor soundproofing (SC)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
90.4	5	258	62,1	242	68,5	225	75,2	205	83,7	198	88,7	69,1	27,7
	6	265	62,8	250	68,9	233	76,0	211	85,6	204	89,0	71,2	27,7
	7	273	63,2	258	69,6	240	76,5	217	85,7	210	89,2	73,4	27,8
	10	293	64,6	275	71,0	254	78,0	231	86,8	225	90,4	78,6	28,2
	15	340	67,6	317	73,6	294	81,3	272	90,0	167	47,4	-	-
	18	374	69,3	350	75,9	325	83,2	300	93,3	188	48,5	-	-
100.4	5	279	69,0	264	75,5	246	83,8	224	93,5	216	97,2	90,7	36,0
	6	290	69,5	273	76,4	252	84,7	231	95,0	223	98,6	93,7	36,5
	7	298	69,9	280	77,1	260	84,8	235	96,4	231	100	97,0	37,0
	10	319	71,6	301	78,6	276	86,9	252	97,6	246	104	103	38,6
	15	367	75,0	345	81,8	320	90,1	298	101,1	199	60,4	-	-
	18	408	77,1	383	84,6	353	93,0	332	105,8	225	62,5	-	-
110.4	5	310	76,0	290	84,3	271	93,2	246	105	237	111	140	61,7
	6	321	77,2	301	85,2	277	94,1	253	106	246	111	145	61,7
	7	328	78,0	308	86,0	285	94,6	260	106	253	112	149	62,4
	10	352	79,6	329	87,7	304	96,2	276	109	264	116	156	64,6
	15	403	82,7	376	91,2	349	99,9	327	115	195	60,9	-	-
	18	443	85,4	414	93,2	381	103	363	119	219	62,3	-	-
120.4	5	346	86,3	327	94,6	302	105	277	116	267	123	141	60,3
	6	356	87,1	335	95,5	312	106	287	117	277	124	146	61,1
	7	370	87,7	347	96,5	320	107	293	119	282	126	149	61,9
	10	394	89,3	368	98,5	339	109	310	122	298	129	157	63,5
	15	458	93,4	428	103	394	113	369	126	206	57,9	-	-
	18	503	96,6	474	106	438	116	412	132	229	58,8	-	-
140.4	5	396	98,6	372	109	345	119	318	132	304	140	146	58,7
	6	407	99,7	383	109	355	120	328	133	317	141	152	59,2
	7	421	101	396	110	366	121	337	134	325	142	156	59,6
	10	448	103	419	112	386	123	357	136	345	147	166	61,9
	15	511	108	480	117	445	129	422	146	256	77,2	-	-
	18	568	112	528	121	491	132	469	151	289	79,0	-	-
160.4	5	441	112	417	121	385	133	351	149	337	159	179	79,6
	6	453	113	428	123	396	134	361	150	349	160	185	79,7
	7	468	114	442	124	407	137	372	152	361	161	191	80,3
	10	493	117	464	126	429	139	392	154	387	164	205	81,8
	15	572	123	533	132	495	146	458	159	268	73,6	-	-
	18	629	127	591	136	548	150	506	162	297	74,7	-	-

kWf = Cooling capacity in kW. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Compressor power input in kW
To (°C) = Leaving internal exchanger water temperature (°C) - Performances in function of the inlet/outlet water temperature differential = 5°C
Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

Internal exchanger pressure drop



The pressure drops are calculated considering a water temperature of 7°C

Q = water flow-rate [l/s]
DP = water side pressure drops [kPa]

The water flow-rate must be calculated with the following formula

Q [l/s] = kWf / (4,186 x DT)

kWf = Cooling capacity in kW.
DT = Temperature difference between inlet / outlet water

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical strainer that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as Clivet option (see the HYDRONIC ASSEMBLY ACCESSORIES). If the mechanical filter is selected and installed by the Customer, it is forbidden the use of filters with the mesh pitch higher than 1,6 mm, because they can cause a bad unit operation and also its serious damaging.

STANDARD CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
90.4	-7/-8	204	61,0	203	68,0	200	75,6	-	-	-	-
	-5/-6	215	61,4	213	68,3	210	75,8	-	-	-	-
	0/-1	245	62,6	242	69,1	237	76,5	-	-	-	-
	2/1	259	63,0	255	69,6	249	76,9	243	85,8	-	-
	7/6	295	64,3	289	70,9	280	78,0	272	86,8	271	92,0
	12/11	343	65,9	254	58,0	173	48,0	312	88,7	311	93,8
100.4	-7/-8	224	67,5	223	75,1	219	83,4	-	-	-	-
	-5/-6	235	67,9	234	75,4	230	83,7	-	-	-	-
	0/-1	269	69,0	267	76,4	261	84,6	-	-	-	-
	2/1	284	69,4	281	76,9	275	85,0	269	95,2	-	-
	7/6	324	70,7	317	78,3	310	86,2	302	96,6	301	102
	12/11	376	72,6	366	80,1	356	88,0	346	98,6	345	104
110.4	-7/-8	244	73,9	242	82,0	239	90,90	-	-	-	-
	-5/-6	257	74,4	255	82,4	251	91,30	-	-	-	-
	0/-1	294	75,6	290	83,6	284	92,40	-	-	-	-
	2/1	310	76,1	305	84,2	299	92,90	291	103	-	-
	7/6	352	77,5	344	85,7	337	94,10	329	105	326	111
	12/11	408	79,5	397	87,6	386	96,00	375	107	373	113
120.4	-7/-8	269	82,2	267	91,3	265	101	-	-	-	-
	-5/-6	283	82,6	280	91,5	278	102	-	-	-	-
	0/-1	325	83,7	319	92,6	313	102	-	-	-	-
	2/1	342	84,2	335	93,1	329	103	323	115	-	-
	7/6	389	85,7	381	94,7	371	104	360	116	360	123
	12/11	451	87,9	439	96,9	426	106	413	119	413	126
140.4	-7/-8	306	91,0	305	101	302	111	-	-	-	-
	-5/-6	321	91,8	320	101	316	112	-	-	-	-
	0/-1	366	93,6	362	103	358	114	-	-	-	-
	2/1	386	94,4	382	104	374	115	366	128	-	-
	7/6	440	96,6	430	107	419	117	411	130	409	137
	12/11	509	99,5	497	109	481	120	470	133	468	140
160.4	-7/-8	346	100	342	111	338	122	-	-	-	-
	-5/-6	363	101	359	112	354	124	-	-	-	-
	0/-1	414	104	407	115	398	126	-	-	-	-
	2/1	437	105	429	116	419	128	411	141	-	-
	7/6	495	108	485	119	473	131	461	145	460	152
	12/11	575	112	560	123	544	134	529	149	525	156

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

STANDARD CONFIGURATION

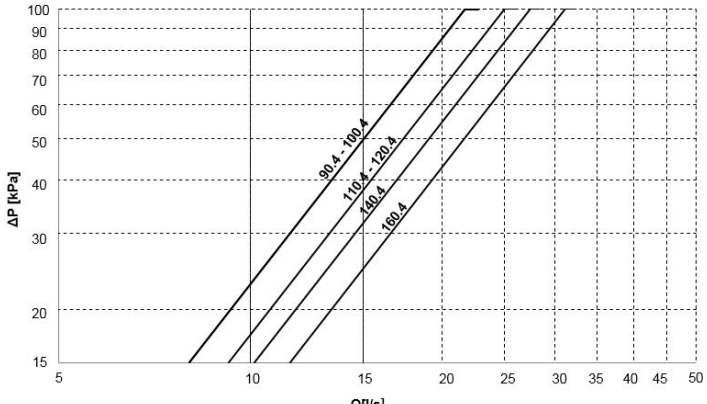
Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
90.4	5	258	61,9	243	68,2	225	74,9	205	83,3	198	88,3	69,1	27,5
	6	266	62,6	250	68,6	233	75,7	211	85,3	204	88,6	71,3	27,6
	7	274	63,0	258	69,3	240	76,2	217	85,3	210	88,9	73,4	27,7
	10	293	64,3	276	70,7	254	77,7	231	86,4	225	90,0	78,7	28,1
	15	340	67,3	318	73,3	295	80,9	273	89,6	167	47,2	-	-
	18	375	69,0	350	75,6	326	82,9	300	92,9	188	48,3	-	-
100.4	5	278	68,3	262	74,7	244	82,9	223	92,5	215	96,2	90,2	35,6
	6	289	68,7	272	75,5	251	83,7	230	94,0	222	97,6	93,2	36,1
	7	297	69,1	279	76,3	259	83,8	234	95,3	230	98,9	96,6	36,6
	10	318	70,8	299	77,7	274	86,0	251	96,5	245	103	103	38,1
	15	365	74,1	343	80,9	318	89,1	297	100	198	59,8	-	-
	18	406	76,3	382	83,7	351	92,0	330	105	224	61,8	-	-
110.4	5	305	75,3	286	83,6	266	92,5	242	104	233	110	137	61,2
	6	315	76,6	296	84,5	273	93,3	249	105	242	110	142	61,2
	7	323	77,4	303	85,3	280	93,8	256	105	249	111	147	61,9
	10	347	79,0	324	87,0	299	95,5	271	108	260	115	153	64,1
	15	397	82,0	370	90,4	343	99,1	322	114	192	60,4	-	-
	18	435	84,7	408	92,5	375	102	357	118	215	61,8	-	-
120.4	5	346	84,6	327	92,7	302	103	277	114	267	120	141	59,1
	6	356	85,3	335	93,6	312	104	287	115	277	122	146	59,9
	7	370	86,0	347	94,6	320	105	293	117	282	123	149	60,6
	10	394	87,5	368	96,5	339	107	310	119	298	126	157	62,2
	15	458	91,5	428	101	394	111	369	123	206	56,8	-	-
	18	503	94,7	474	104	438	114	412	129	229	57,6	-	-
140.4	5	391	97,4	367	107	341	118	314	130	301	138	144	58,0
	6	402	98,5	378	108	350	118	324	131	313	139	150	58,5
	7	416	99,7	391	109	362	120	333	132	321	140	154	58,9
	10	443	102	414	111	381	122	352	134	341	146	164	61,2
	15	505	107	474	116	439	127	417	144	253	76,3	-	-
	18	561	110	521	120	485	131	464	150	285	78,1	-	-
160.4	5	445	109	421	119	389	130	354	146	340	156	180	77,7
	6	457	110	432	120	400	131	364	147	352	156	187	77,9
	7	472	112	446	121	410	133	375	148	364	157	193	78,4
	10	497	114	468	123	433	135	396	150	391	160	207	79,9
	15	577	120	538	129	500	142	462	155	270	71,9	-	-
	18	634	124	597	133	553	147	510	159	300	73,0	-	-

kWf = Cooling capacity in kW. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Compressor power input in kW
To (°C) = Leaving internal exchanger water temperature (°C) - Performances in function of the inlet/outlet water temperature differential = 5°C
Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

Internal exchanger pressure drop



The pressure drops are calculated considering a water temperature of 7°C

Q = water flow-rate [l/s]
DP = water side pressure drops [kPa]

The water flow-rate must be calculated with the following formula

Q [l/s] = kWf / (4,186 x DT)

kWf = Cooling capacity in kW.
DT = Temperature difference between inlet / outlet water

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical strainer that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as Clivet option (see the HYDRONIC ASSEMBLY ACCESSORIES). If the mechanical filter is selected and installed by the Customer, it is forbidden the use of filters with the mesh pitch higher than 1,6 mm, because they can cause a bad unit operation and also its serious damaging.

STANDARD CONFIGURATION

Acoustic configuration: super-silenced (EN)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
90.4	-7/-8	203	61,0	202	68,0	200	75,6	-	-	-	-
	-5/-6	215	61,4	212	68,3	209	75,8	-	-	-	-
	0/-1	244	62,6	241	69,1	236	76,5	-	-	-	-
	2/1	258	63,0	254	69,6	249	76,9	243	85,8	-	-
	7/6	294	64,3	288	70,9	280	78,0	272	86,8	271	92,0
	12/11	342	65,9	253	58,0	173	48,0	311	88,7	310	93,8
100.4	-7/-8	224	67,5	223	75,1	219	83,4	-	-	-	-
	-5/-6	235	67,9	234	75,4	230	83,7	-	-	-	-
	0/-1	269	69,0	267	76,4	261	84,6	-	-	-	-
	2/1	284	69,4	281	76,9	275	85,0	269	95,2	-	-
	7/6	324	70,7	317	78,3	310	86,2	302	96,6	301	102
	12/11	376	72,6	366	80,1	356	88,0	346	98,6	345	104
110.4	-7/-8	244	73,9	242	82,0	238	90,9	-	-	-	-
	-5/-6	257	74,4	254	82,4	251	91,3	-	-	-	-
	0/-1	293	75,6	289	83,6	284	92,4	-	-	-	-
	2/1	309	76,1	305	84,2	298	92,9	290	103	-	-
	7/6	352	77,5	344	85,7	336	94,1	328	105	325	111
	12/11	408	79,5	396	87,6	358	96,0	374	107	373	113
120.4	-7/-8	274	82,4	272	91,6	270	102	-	-	-	-
	-5/-6	289	82,8	285	91,8	283	102	-	-	-	-
	0/-1	330	83,9	324	92,8	319	103	-	-	-	-
	2/1	349	84,4	341	93,4	335	103	328	115	-	-
	7/6	396	85,9	387	95,0	377	104	367	117	367	124
	12/11	459	88,1	446	97,2	434	107	420	119	421	126
140.4	-7/-8	310	91,2	309	101	306	112	-	-	-	-
	-5/-6	326	92,0	325	102	320	112	-	-	-	-
	0/-1	372	93,7	367	104	363	114	-	-	-	-
	2/1	392	94,6	387	105	380	115	371	128	-	-
	7/6	446	96,8	436	107	425	117	417	130	415	137
	12/11	516	99,7	504	110	488	120	477	133	475	141
160.4	-7/-8	340	99,9	337	110	333	122	-	-	-	-
	-5/-6	358	101	354	112	348	123	-	-	-	-
	0/-1	408	104	400	114	392	126	-	-	-	-
	2/1	430	105	422	116	413	127	405	141	-	-
	7/6	487	108	477	119	466	130	454	144	453	152
	12/11	566	112	551	122	535	134	520	148	517	156

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

DUAL CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
D90.4	5	516	124	485	137	451	150	410	167	395	177	138	55,3
	6	531	126	500	138	466	152	422	171	408	178	142	55,5
	7	547	126	516	139	479	153	434	171	420	178	147	55,6
	10	585	129	551	142	508	156	461	174	450	181	157	56,4
	15	679	135	635	147	589	163	545	180	334	94,7	-	-
	18	749	139	700	152	651	166	600	187	376	96,9	-	-
D100.4	5	558	138	528	151	491	168	449	187	432	194	181	72,0
	6	581	139	547	153	504	169	463	190	446	197	187	73,0
	7	597	140	560	154	521	170	469	193	462	200	194	74,0
	10	639	143	601	157	551	174	504	195	492	208	207	77,1
	15	734	150	690	164	640	180	597	202	398	121	-	-
	18	815	154	767	169	706	186	664	212	449	125	-	-
D110.4	5	620	152	580	169	541	186	492	210	474	222	279	123
	6	641	154	601	170	555	188	507	212	491	222	289	123
	7	657	156	616	172	570	189	520	212	506	225	298	125
	10	704	159	659	175	607	192	551	218	529	232	311	129
	15	806	165	751	182	697	200	654	231	391	122	-	-
	18	885	171	828	186	762	207	726	238	438	125	-	-
D120.4	5	692	173	654	189	604	209	554	232	534	245	281	121
	6	712	174	671	191	625	212	574	234	553	248	292	122
	7	739	175	695	193	640	214	586	238	565	252	298	124
	10	789	179	736	197	677	218	619	243	596	258	314	127
	15	916	187	856	206	789	226	738	252	412	116	-	-
	18	1006	193	947	211	876	233	823	264	457	118	-	-
D140.4	5	792	197	744	217	689	238	635	263	609	280	292	117
	6	813	199	765	218	709	239	656	265	634	282	304	118
	7	842	202	792	221	732	242	673	268	649	284	312	119
	10	896	206	839	225	771	247	713	272	690	295	331	124
	15	1022	216	960	235	890	257	844	291	513	154	-	-
	18	1136	223	1055	243	983	264	939	303	577	158	-	-
D160.4	5	883	223	835	243	771	267	701	298	674	319	357	159
	6	906	226	856	246	793	269	722	300	698	320	370	159
	7	936	229	884	248	814	273	743	303	722	322	383	161
	10	986	234	928	253	858	277	785	307	775	328	411	164
	15	1144	245	1066	264	991	291	916	318	536	147	-	-
	18	1257	253	1183	273	1097	300	1012	325	595	149	-	-

kWf = Cooling capacity in kW. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Compressor power input in kW
To (°C) = Leaving internal exchanger water temperature (°C) - Performances in function of the inlet/outlet water temperature differential = 5°C
Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

DUAL CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
D90.4	-7/-8	408	122	405	136	400	151	-	-	-	-
	-5/-6	430	123	426	137	420	152	-	-	-	-
	0/-1	489	125	483	138	474	153	-	-	-	-
	2/1	517	126	510	139	499	154	487	172	-	-
	7/6	591	129	578	142	561	156	545	174	543	184
	12/11	685	132	508	116	347	96,0	623	177	621	188
D10..4	-7/-8	448	135	445	150	437	167	-	-	-	-
	-5/-6	470	136	468	151	459	167	-	-	-	-
	0/-1	539	138	533	153	521	169	-	-	-	-
	2/1	568	139	561	154	549	170	538	190	-	-
	7/6	648	141	635	157	620	172	604	193	602	205
	12/11	752	145	732	160	712	176	692	197	690	209
D110.4	-7/-8	489	148	485	164	477	182	-	-	-	-
	-5/-6	514	149	509	165	502	183	-	-	-	-
	0/-1	588	151	580	167	569	185	-	-	-	-
	2/1	620	152	610	168	597	186	582	207	-	-
	7/6	705	155	689	171	674	188	657	210	652	222
	12/11	817	159	794	175	772	192	750	214	747	227
D120.4	-7/-8	538	164	534	183	530	203	-	-	-	-
	-5/-6	567	165	560	183	555	203	-	-	-	-
	0/-1	649	167	637	185	626	205	-	-	-	-
	2/1	685	168	671	186	659	206	645	230	-	-
	7/6	777	171	761	189	742	208	721	232	720	246
	12/11	902	176	877	194	852	213	825	237	827	252
D140.4	-7/-8	612	182	610	201	604	223	-	-	-	-
	-5/-6	642	184	640	203	631	224	-	-	-	-
	0/-1	733	187	725	207	716	228	-	-	-	-
	2/1	773	189	763	209	749	230	732	255	-	-
	7/6	881	193	860	213	839	234	822	260	819	274
	12/11	1018	199	993	219	963	239	940	266	936	281
D160.4	-7/-8	691	201	684	222	676	245	-	-	-	-
	-5/-6	727	203	719	224	708	247	-	-	-	-
	0/-1	829	209	813	230	797	253	-	-	-	-
	2/1	873	211	858	232	839	255	823	283	-	-
	7/6	990	217	970	238	947	262	923	289	920	305
	12/11	1149	224	1119	246	1088	269	1058	298	1051	313

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

DUAL CONFIGURATION

Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
D90.4	5	516	124	485	136	451	150	411	167	396	177	138	55,1
	6	531	125	501	137	467	151	423	171	408	177	143	55,3
	7	547	126	517	139	480	152	434	171	420	178	147	55,4
	10	586	129	551	141	508	155	462	173	451	180	157	56,1
	15	680	135	635	147	589	162	545	179	335	94,4	-	-
	18	750	138	700	151	651	166	600	186	377	96,6	-	-
D100.4	5	555	137	525	149	489	166	447	185	430	192	180	71,2
	6	578	137	544	151	501	167	460	188	444	195	186	72,2
	7	594	138	558	153	518	168	467	191	460	198	193	73,2
	10	636	142	598	155	549	172	501	193	490	206	206	76,3
	15	730	148	687	162	637	178	594	200	396	120	-	-
	18	811	153	763	167	703	184	661	209	447	124	-	-
D110.4	5	610	151	571	167	533	185	484	208	467	220	275	122
	6	631	153	592	169	546	187	499	210	483	220	285	122
	7	646	155	606	171	561	188	512	210	498	223	293	124
	10	693	158	648	174	598	191	542	216	520	231	306	128
	15	793	164	739	181	686	198	644	229	384	121	-	-
	18	871	169	815	185	750	205	715	237	431	124	-	-
D120.4	5	692	169	654	185	604	205	554	228	534	240	281	118
	6	712	171	671	187	625	207	574	230	553	243	292	120
	7	739	172	695	189	640	209	586	233	565	246	298	121
	10	789	175	736	193	677	214	619	238	596	253	314	124
	15	916	183	856	201	789	222	738	247	412	114	-	-
	18	1006	189	947	207	876	228	823	259	457	115	-	-
D140.4	5	783	195	735	214	681	235	628	260	601	276	289	116
	6	804	197	756	216	701	236	649	262	627	278	301	117
	7	832	199	783	218	723	239	665	264	642	280	308	118
	10	885	204	829	222	762	244	705	269	682	291	327	122
	15	1010	213	948	232	879	254	834	288	506	153	-	-
	18	1123	221	1042	240	971	261	928	299	570	156	-	-
D160.4	5	891	218	842	237	778	261	707	291	680	312	360	155
	6	914	221	863	240	800	262	729	294	704	312	373	156
	7	945	224	892	243	821	267	750	296	729	314	386	157
	10	995	229	937	247	866	271	792	300	782	320	415	160
	15	1154	240	1075	258	1000	285	924	311	541	144	-	-
	18	1268	247	1193	267	1106	293	1021	317	600	146	-	-

kWf = Cooling capacity in kW. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Compressor power input in kW
To (°C) = Leaving internal exchanger water temperature (°C) - Performances in function of the inlet/outlet water temperature differential = 5°C
Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

DUAL CONFIGURATION

Acoustic configuration: super-silenced (EN)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
D90.4	-7/-8	407	122	404	136	399	151	-	-	-	-
	-5/-6	429	123	425	137	419	152	-	-	-	-
	0/-1	488	125	482	138	473	153	-	-	-	-
	2/1	516	126	508	139	497	154	485	172	-	-
	7/6	589	129	576	142	559	156	543	174	541	184
	12/11	683	132	506	116	346	96	622	177	619	188
D10..4	-7/-8	448	135	445	150	437	167	-	-	-	-
	-5/-6	470	136	468	151	459	167	-	-	-	-
	0/-1	539	138	533	153	521	169	-	-	-	-
	2/1	568	139	561	154	549	170	538	190	-	-
	7/6	648	141	635	157	620	172	604	193	602	205
	12/11	752	145	732	160	712	176	692	197	690	209
D110.4	-7/-8	488	148	484	164	476	182	-	-	-	-
	-5/-6	513	149	508	165	501	183	-	-	-	-
	0/-1	587	151	579	167	568	185	-	-	-	-
	2/1	619	152	609	168	596	186	581	207	-	-
	7/6	703	155	687	171	672	188	656	210	650	222
	12/11	815	159	793	175	771	192	749	214	745	227
D120.4	-7/-8	548	165	544	183	540	203	-	-	-	-
	-5/-6	577	166	570	184	565	204	-	-	-	-
	0/-1	661	168	649	186	638	206	-	-	-	-
	2/1	697	169	683	187	670	206	657	230	-	-
	7/6	791	172	775	190	755	209	734	233	733	247
	12/11	918	176	893	194	868	213	840	238	842	252
D140.4	-7/-8	621	182	619	202	612	223	-	-	-	-
	-5/-6	651	184	649	203	640	225	-	-	-	-
	0/-1	743	187	735	207	726	229	-	-	-	-
	2/1	784	189	774	209	759	230	742	256	-	-
	7/6	893	194	872	214	850	234	833	261	830	275
	12/11	1032	199	1007	219	976	240	953	267	949	281
D160.4	-7/-8	680	200	674	221	665	244	-	-	-	-
	-5/-6	715	202	707	223	696	246	-	-	-	-
	0/-1	815	208	800	229	784	252	-	-	-	-
	2/1	859	210	845	231	825	254	810	281	-	-
	7/6	974	216	954	237	932	261	908	288	905	304
	12/11	1131	224	1101	245	1071	268	1040	296	1034	311

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

TRIPLE CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
T110.4	5	930	228	870	253	812	280	737	315	711	333	419	185
	6	962	232	902	255	832	282	760	317	737	333	434	185
	7	985	234	924	258	855	284	780	318	759	337	447	187
	10	1057	239	988	263	911	289	827	327	793	349	467	194
	15	1209	248	1127	274	1046	300	981	346	586	183	-	-
	18	1328	256	1243	280	1143	310	1090	358	657	187	-	-
T120.4	5	1038	259	981	284	906	314	830	349	801	368	422	181
	6	1069	261	1006	287	937	317	861	352	830	372	437	183
	7	1109	263	1042	290	960	320	879	357	847	377	446	186
	10	1183	268	1103	295	1016	327	929	365	894	387	471	190
	15	1374	280	1284	308	1183	340	1107	378	618	174	-	-
	18	1508	290	1421	317	1314	349	1235	396	686	176	-	-
T140.4	5	1189	296	1116	326	1034	357	953	395	913	419	438	176
	6	1220	299	1148	327	1064	359	985	398	951	423	457	178
	7	1263	303	1188	331	1098	363	1010	402	974	426	468	179
	10	1344	310	1258	337	1157	370	1070	408	1035	442	497	186
	15	1533	324	1440	352	1334	386	1267	437	769	232	-	-
	18	1705	335	1583	364	1474	397	1408	454	866	237	-	-
T160.4	5	1324	335	1252	364	1156	400	1052	447	1011	478	536	239
	6	1359	339	1284	368	1189	403	1083	451	1047	479	555	239
	7	1405	343	1325	372	1221	410	1115	455	1083	483	574	241
	10	1479	352	1392	379	1287	416	1177	461	1162	492	616	245
	15	1716	368	1599	396	1486	437	1374	477	804	221	-	-
	18	1886	380	1774	409	1645	450	1518	487	892	224	-	-

kWf = Cooling capacity in kW. The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Compressor power input in kW
To (°C) = Leaving internal exchanger water temperature (°C) - Performances in function of the inlet/outlet water temperature differential = 5°C
Data calculated considering an equivalent distance between the internal and the external section of 7,5 m.

TRIPLE CONFIGURATION

Acoustic configuration: compressor soundproofing (SC)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
T110.4	-7/-8	733	222	727	246	716	273	-	-	-	-
	-5/-6	771	223	764	247	753	274	-	-	-	-
	0/-1	882	227	870	251	853	277	-	-	-	-
	2/1	930	228	915	253	896	279	873	310	-	-
	7/6	1057	233	1033	257	1010	282	986	315	978	334
	12/11	1225	239	1192	263	1158	288	1125	321	1120	340
T120.4	-7/-8	808	247	802	274	795	304	-	-	-	-
	-5/-6	850	248	840	275	833	305	-	-	-	-
	0/-1	974	251	956	278	939	307	-	-	-	-
	2/1	1027	253	1006	279	988	309	968	345	-	-
	7/6	1166	257	1142	284	1112	312	1081	349	1080	370
	12/11	1353	264	1316	291	1279	319	1238	356	1240	377
T140.4	-7/-8	918	273	915	302	905	334	-	-	-	-
	-5/-6	963	275	961	304	947	336	-	-	-	-
	0/-1	1099	281	1087	310	1073	342	-	-	-	-
	2/1	1159	283	1145	313	1123	344	1098	383	-	-
	7/6	1321	290	1290	320	1258	350	1232	390	1228	411
	12/11	1527	298	1490	328	1444	359	1410	399	1404	421
T160.4	-7/-8	1037	301	1027	333	1014	367	-	-	-	-
	-5/-6	1090	304	1078	336	1061	371	-	-	-	-
	0/-1	1243	313	1220	344	1195	379	-	-	-	-
	2/1	1310	316	1287	348	1258	383	1234	424	-	-
	7/6	1484	325	1455	357	1420	393	1384	434	1380	457
	12/11	1724	337	1679	369	1632	403	1586	446	1576	469

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

TRIPLE CONFIGURATION

Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
T110.4	5	916	226	857	251	799	277	726	313	700	330	412	184
	6	946	230	888	253	819	280	748	315	725	330	427	184
	7	969	232	909	256	841	281	767	315	747	334	440	186
	10	1040	237	973	261	897	286	814	324	780	346	460	192
	15	1190	246	1109	271	1029	297	965	343	577	181	-	-
	18	1306	254	1223	277	1125	307	1072	355	646	185	-	-
T120.4	5	1038	254	981	278	906	308	830	342	801	360	422	177
	6	1069	256	1006	281	937	311	861	345	830	365	437	180
	7	1109	258	1042	284	960	314	879	350	847	370	446	182
	10	1183	262	1103	290	1016	320	929	357	894	379	471	187
	15	1374	275	1284	302	1183	333	1107	370	618	170	-	-
	18	1508	284	1421	311	1314	342	1235	388	686	173	-	-
T140.4	5	1174	292	1102	322	1022	353	942	390	902	414	433	174
	6	1205	296	1134	323	1051	355	973	393	940	418	451	175
	7	1248	299	1174	327	1085	359	998	397	962	421	462	177
	10	1328	306	1243	333	1143	366	1057	403	1023	437	491	183
	15	1515	320	1422	348	1318	381	1251	432	760	229	-	-
	18	1684	331	1564	360	1456	392	1391	449	855	234	-	-
T160.4	5	1336	327	1263	356	1166	391	1061	437	1020	467	541	233
	6	1371	331	1295	360	1200	394	1093	440	1056	468	560	234
	7	1417	335	1337	364	1231	400	1125	444	1093	471	579	235
	10	1492	343	1405	370	1299	406	1188	450	1173	481	622	240
	15	1731	359	1613	387	1500	427	1386	466	811	216	-	-
	18	1903	371	1790	400	1660	440	1531	476	900	219	-	-

kWf = Potenza frigorifera in kW. il dato non tiene conto della quota parte relativa alle pompe e necessaria per vincere le perdite di carico per la circolazione della soluzione all'interno degli scambiatori
kWe = Potenza elettrica assorbita dai compressori in kW
To = Temperatura acqua uscita scambiatore interno (°C) - Salto termico acqua ingresso/uscita =5°C
Dati calcolati considerando una distanza equivalente tra sezione interna e sezione esterna di 7,5 m.

TRIPLE CONFIGURATION

Acoustic configuration: super-silenced (EN)

Heating performance

Size	Ta (°C) D.B./W.B.	Leaving internal exchanger water temperature (°C)									
		35		40		45		50		53	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
T110.4	-7/-8	731	222	726	246	714	273	-	-	-	-
	-5/-6	770	223	762	247	752	274	-	-	-	-
	0/-1	880	227	868	251	851	277	-	-	-	-
	2/1	928	228	914	253	894	279	871	310	-	-
	7/6	1055	233	1031	257	1008	282	984	315	976	334
	12/11	1223	238	1189	263	1156	288	1123	321	1118	340
T120.4	-7/-8	822	247	816	275	810	305	-	-	-	-
	-5/-6	866	248	855	275	848	306	-	-	-	-
	0/-1	991	252	973	278	956	308	-	-	-	-
	2/1	1046	253	1024	280	1006	310	985	346	-	-
	7/6	1187	258	1162	285	1132	313	1100	350	1100	371
	12/11	1378	264	1339	292	1302	320	1260	357	1262	379
T140.4	-7/-8	931	274	928	303	918	335	-	-	-	-
	-5/-6	977	276	974	305	960	337	-	-	-	-
	0/-1	1115	281	1102	311	1088	343	-	-	-	-
	2/1	1175	284	1161	314	1139	345	1114	384	-	-
	7/6	1339	290	1308	320	1275	351	1250	391	1246	412
	12/11	1549	299	1511	329	1464	360	1430	400	1424	422
T160.4	-7/-8	1020	300	1010	331	998	366	-	-	-	-
	-5/-6	1073	303	1061	335	1044	369	-	-	-	-
	0/-1	1223	312	1200	343	1176	378	-	-	-	-
	2/1	1289	315	1267	347	1238	328	1214	422	-	-
	7/6	1461	324	1432	356	1397	391	1362	432	1358	456
	12/11	1697	335	1652	367	1606	402	1561	444	1551	467

kWt = Internal exchanger heating capacity (kW). The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers.
The kWt heating capacity does not consider any defrosting cycles. For the real heating capacity calculation, including defrosting cycles, please refer to "Integrated heating capacities" table.
kWe = Compressor power input in kW.
Ta = Entering external exchanger air temperature.
D.B. = Dry bulb
W.B. = Wet bulb
With Ta below -5°C 'OHE - Limit extension kit in heating' accessory included.

Admissible water flow-rates

Minimum (Qmin) and maximum (Qmax) admissible water flow for the unit to operate correctly.

EXCELLENCE SC / EN		90.4	100.4	110.4	120.4	140.4	160.4
Qmin	[l/s]	6,7	7,4	8,0	9,3	10,1	11,5
Qmax	[l/s]	18,3	20,0	21,8	25,1	27,5	31,2

Correction factors for glycol use

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2,0	-3,9	-6,5	-8,9	-11,8	-15,6	-19,0	-23,4
Safety temperature	°C	3,0	1,0	-1,0	-4,0	-6,0	-10,0	-14,0	-19,0
Cooling Capacity Factor	Nr	0,997	0,994	0,99	0,986	0,981	0,976	0,970	0,964
Compressor power input Factor	Nr	1,000	1,001	1,001	1,001	1,001	1,002	1,002	1,002
Internal exchanger glycol solution flow factor	Nr	1,003	1,010	1,020	1,033	1,05	1,072	1,095	1,124
Pressure drop Factor	Nr	0,989	0,983	0,979	0,980	0,984	0,993	1,004	1,020

The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit.

Fouling Correction Factors

	Internal exchanger	
m2 K / W	F1	FK1
0.44 x 10 (-4)	1,0	1,0
0.88 x 10 (-4)	0,97	0,99
1.76 x 10 (-4)	0,94	0,98

F1 = Cooling capacity correction factors

FK1 = Compressor power input correction factor

Overload and control device calibrations

			open	closed	value
High pressure safety pressure switch		[kPa]	4050	3300	-
Antifreeze protection		[°C]	3	5.5	-
High pressure safety valve		[kPa]	-	-	4500
Low pressure safety valve		[kPa]	-	-	2950
Max no. of compressor starts per hour		[n°]	-	-	10
High compressor discharge temperature safety thermostat		[°C]	-	-	140

Exchanger operating range

	DPr		DPw
PED (CE) - Internal echanger	4500	4500	1000
PED (CE) - External exchanger	4500	4500	1000

DPr = Maximum operating pressure on refrigerant side in kPa
DPw = Maximum operating pressure on water side in kPa

Configurations

Consult the "Option compatibility" section.

B - Water low temperature (Brine)

Configuration also known as "Brine". Enables an "unfreezable" solution to be cooled (for example, water and ethylene glycol in suitable quantities) up to a temperature of between +4°C and –8°C. It includes:

- suitable exchangers with extra-thick closed-cell insulation
- electronic expansion valve, functional calibration and safety devices suitable for particular uses.

During the selection phase it is necessary to indicate the required operating type, the unit will be optimised on the basis of this: - Unit with single operating set-point (only at low temperature) - Unit with double operating set-point

The unit in this configuration has a different operation range, indicated in the operating range section.

In low temperature operation, some staging steps could not be available.

The glycol concentration must be chosen based on the minimum temperature the water can reach. The presence of glycol influences pressure drops on the water side and the unit's output as indicated in the table reporting the "correction factors for use with glycol".

The "Extremely low water temperature" option for the chilled water production down to -12°C is available on request.

D - Partial energy recovery

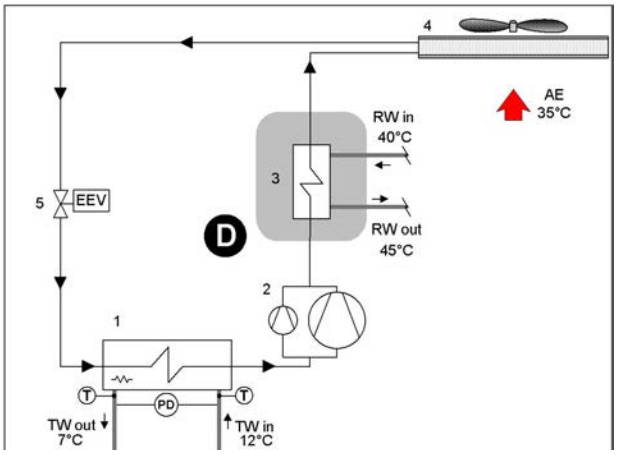
A configuration which enables the production of hot water free-of-charge while operating in the cooling mode, thanks to the partial recovery of condensation heat that would otherwise be disposed of into the external heat source.

This option is also known as "desuperheater". It is made up of a Inox 316 stainless steel brazed plate heat exchangers, suitable for recovering a part of the capacity dispersed by the unit (the dispersed heating capacity is equal to the sum of the cooling capacity and the electrical input capacity of the compressors).

The partial recovery device is considered to be operating when it is powered by the water flow which is to be heated. This condition improves the unit performance, since it reduces the condensation temperature: in nominal conditions the cooling capacity increases indicatively by 3.2% and the power input of the compressors is reduced by 3.6%.

When the temperature of the water to be heated is particularly low, it is opportune to insert a flow regulation valve in the hydraulic circuit, to maintain the recovery output temperature at higher than 35°C and thus avoid refrigerant condensation in the partial energy recovery device.

The power delivered by the partial recovery is 25% of the thermal power dissipation (cooling + electrical power absorbed by the compressors)



D - Partial recovery device

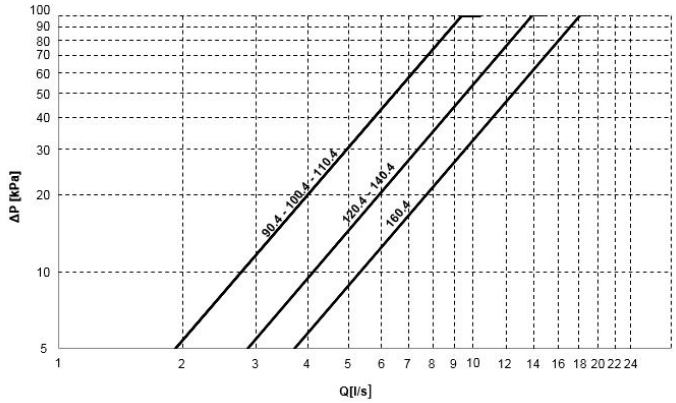
1 - Internal exchanger
2 - Compressors
3 - Recovery exchanger
4 - External exchanger
5 - Expansion electronic valve

TW in chilled water inlet
TW out chilled water outlet

RW in - Recovery water input
RW out - Recovery water output

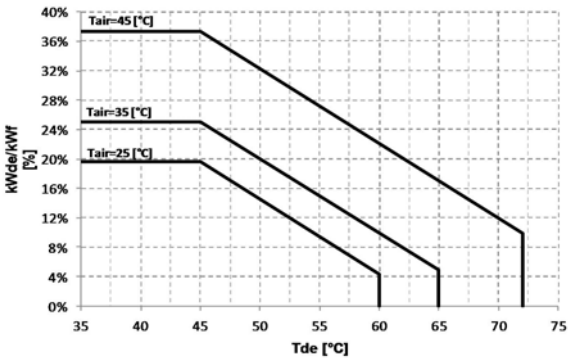
T - Temperature probe
PD - Differential pressure switch
AE Outdoor air

Pressure drops of partial energy recovery exchanger



Q = water flow-rate[l/s]
DP = water side pressure drops (kPa)

Partial recovery heating capacity



kWde/kWf = Heat recovered/Cooling capacity [%]
Tde = Heat recovering device outlet water temperature [°C]

HydroPack

2PM/3PM - Hydronic assembly user side with 2/3 ON/OFF pumps

Option supplied on the unit. Pumping unit consisting of two or three parallel electric pumps with a self-adaptive modular activation logic.

It enables the automatic reduction of the liquid flow rate in critical conditions, avoiding blocks due to overloading and consequential intervention work by specialised technical personnel.

Centrifugal electric pump with impeller made with AISI 304 steel and AISI 304 stainless steel body or grey cast iron (depending on models).

Mechanical seal using ceramic, carbon and EPDM elastomer components.

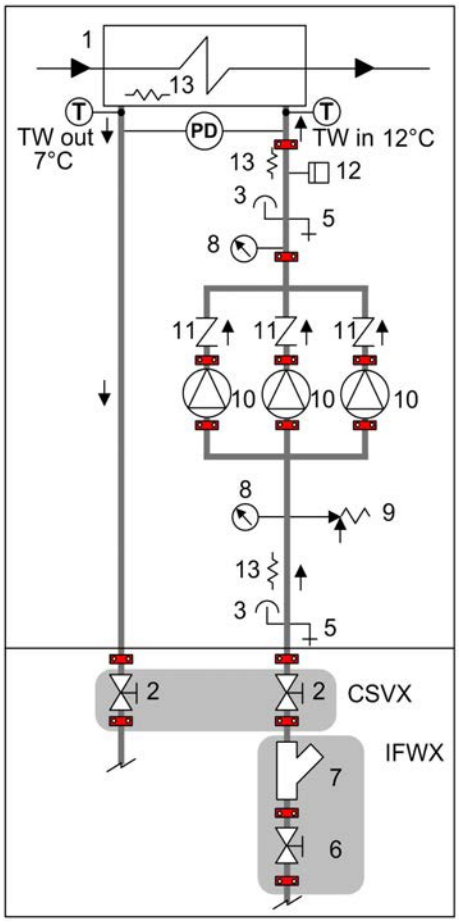
Three-phase electric motor with IP44-protection. Complete with thermoformed insulated casing, quick connections with insulated casing,non return valve, safety valve, pressure gauges, system load safety pressure switch, stainless steel antifreeze immersion heaters located at the return and supply point.

The various models which are available can be differentiated by the system available pressure.

The 2PM / 3PM option is supplied with a kit made up of 2 quick blind connections, for the removal of one pump in case of maintenance.

Provided with hydraulic interceptions to the outside of the unit (option 'CSVX - A pair of manually operated shut-off valves') to facilitate any major maintenance operations

HYDROPACK



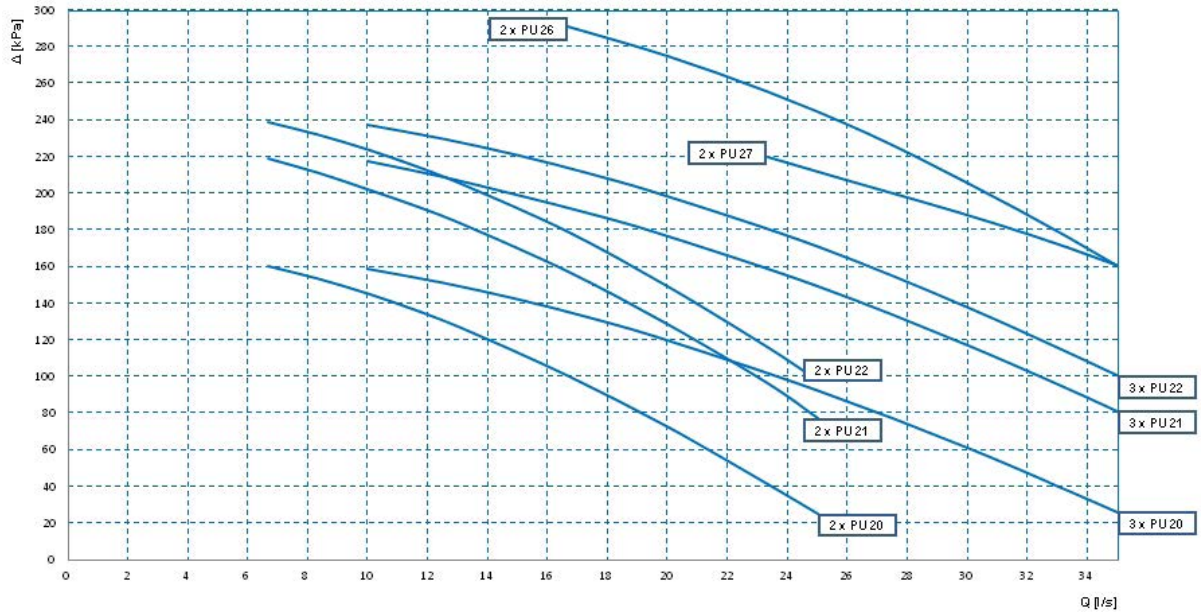
Illustrative diagram referred to unit size 240.4 with Hydropack with no. 3 of pumps

1 - Internal exchanger
2 - Cutoff valve
3 - Purge valve
5 - Draw off cock
6 - Cutoff valve with quick joints
7 - Steel mesh strainer water side
8 - Manometer
9 - Safety valve (6 Bar)
10 - Packaged electric pump with high efficiency impeller
11 - Non return valve
12 - System safety pressure switch (prevents the pumps from operating if no water is present)
13 - Antifreeze heater
T - Temperature probe
PD - Differential pressure switch
TW in chilled water inlet
TW out chilled water outlet
IFWX = Steel mesh strainer water side
CSVX - Couple of manual shut-off valves

The grey area indicates further optional components.

2PM/3PM option performances (HydroPack)

Head



Q[l/s]= water flow rate
Δ [kPa] = pump head
PU2* = 2-pole pump

Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- User side exchanger pressure drops
- IFVX accessory –Steel mesh filter on the water side (where applicable)

Hydropack electrical data

2×PU20	2×1.8	2×3.4
2×PU21	2×2.9	2×4.8
2×PU22	2×3.3	2×5.6
2×PU26	2×5.5	2×10.4

2×PU27	2×5.5	2×10.4
3×PU20	3×1.8	3×3.4
3×PU21	3×2.9	3×4.8
3×PU22	3×3.3	3×5.6

2PMV/3PMV - Hydronic assembly user side with 2/3 inverter pumps

Option supplied on the unit. Pumping unit consisting of parallel electric pumps and controlled by inverter to adapt to the different application conditions.

It enables the automatic reduction of the liquid flow rate in critical conditions, avoiding blocks due to overloading and consequential intervention work by specialised technical personnel.

Through the inverter calibration, standard supplied, it is possible to adapt the pump flow-rate/head to the installation feature.

Centrifugal electric pump with impeller made with AISI 304 steel and AISI 304 stainless steel body or grey cast iron (depending on models).

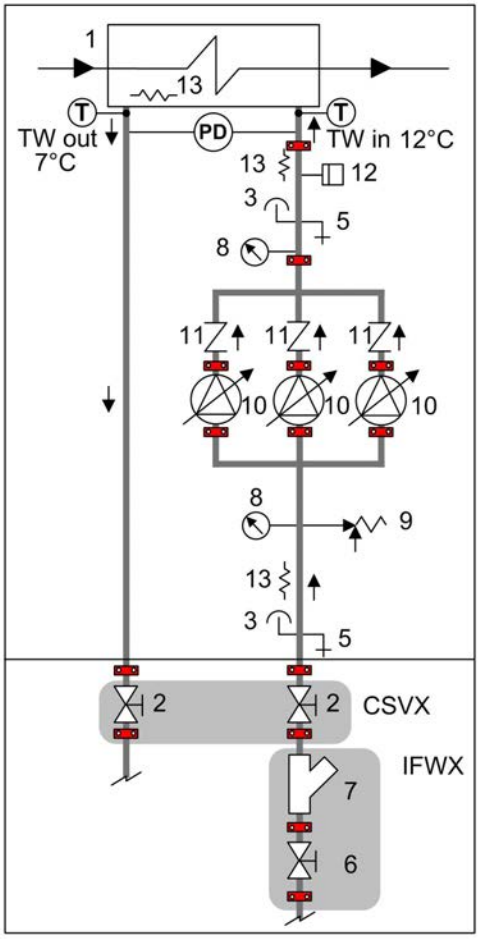
Mechanical seal using ceramic, carbon and EPDM elastomer components.

Three-phase electric motor with IP44-protection. Complete with thermoformed insulated casing, quick connections with insulated casing,non return valve, safety valve, pressure gauges, system load safety pressure switch, stainless steel antifreeze immersion heaters located at the return and supply point.

In combination with the "IVFDT" - Variable flow-rate control option, it allows the water flow rate variation to the installation in part load operation to obtain the maximum unit efficiency and lower pumping unit consumption.

The 2PMV / 3PMV option is supplied with a kit made up of 2 quick blind connections, for the removal of one pump in case of maintenance.

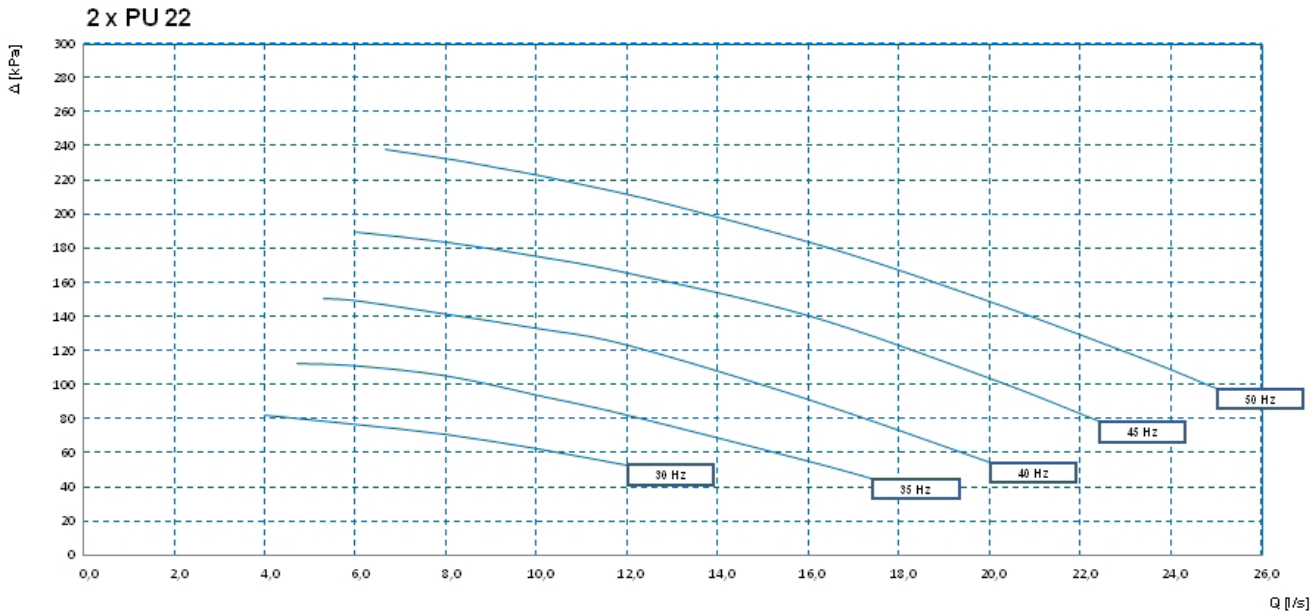
Provided with hydraulic interceptions to the outside of the unit (option 'CSVX - A pair of manually operated shut-off valves') to facilitate any major maintenance operations



1 - Internal exchanger
2 - Cutoff valve
3 - Purge valve
5 - Draw off cock
6 - Cutoff valve with quick joints
7 - Steel mesh strainer water side
8 - Manometer
9 - Safety valve (6 Bar)
10 - Packaged electric pump with high efficiency impeller activated by inverter
11 - Non return valve
12 - System safety pressure switch (prevents the pumps from operating if no water is present)
13 - Antifreeze heater
T - Temperature probe
PD - Differential pressure switch
TW in chilled water inlet
TW out chilled water outlet
IFWX = Steel mesh strainer water side
CSVX - Couple of manual shut-off valves
The grey area indicates further optional components.

2PMV option performances

Head

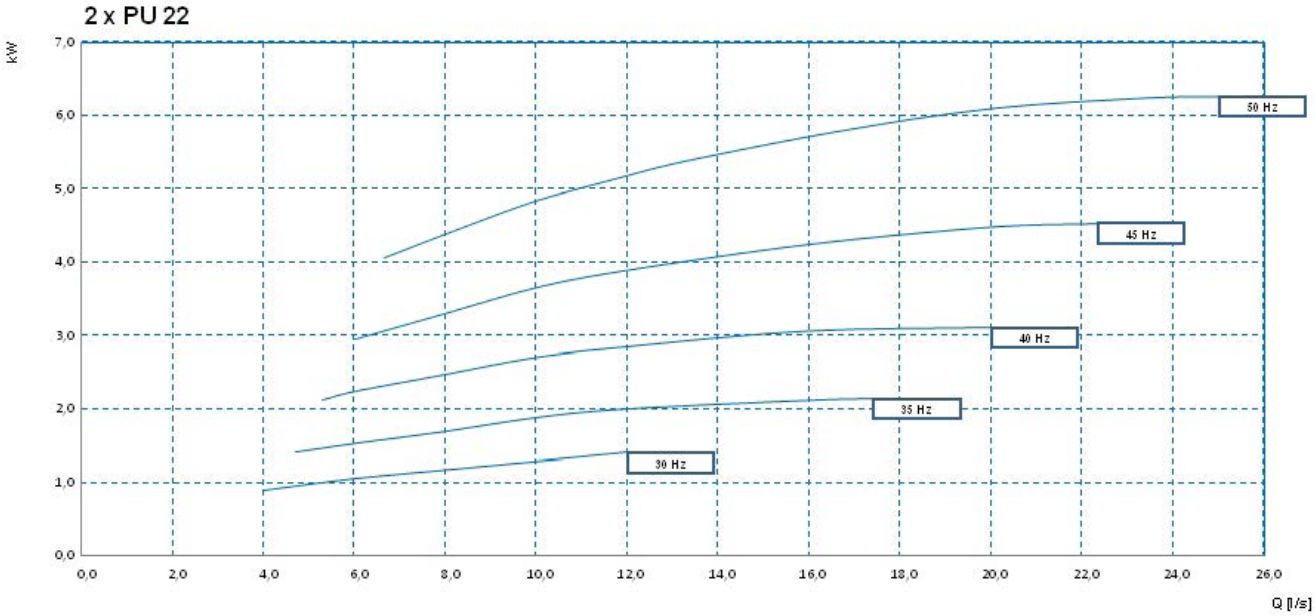


Q[l/s]= water flow rate
Δ [kPa] = pump head

Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- internal exchanger pressure drops
- IFVX accessory –Steel mesh filter on the water side (where applicable)

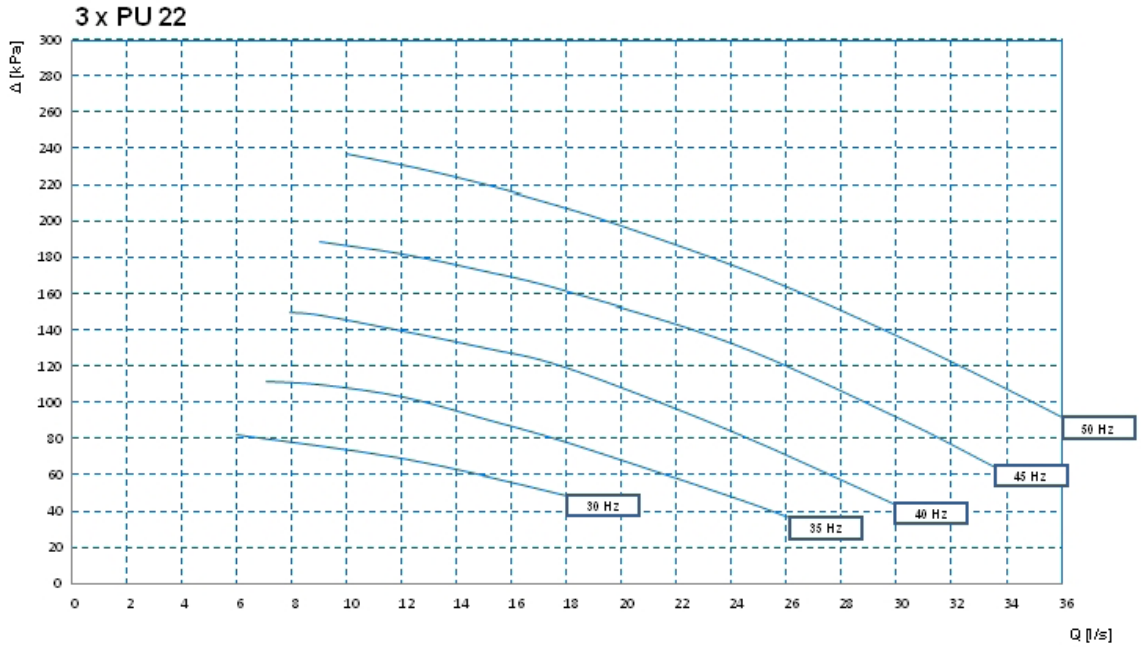
Power input



Q[l/s]= water flow rate
kW = power input

3PMV option performances

Head

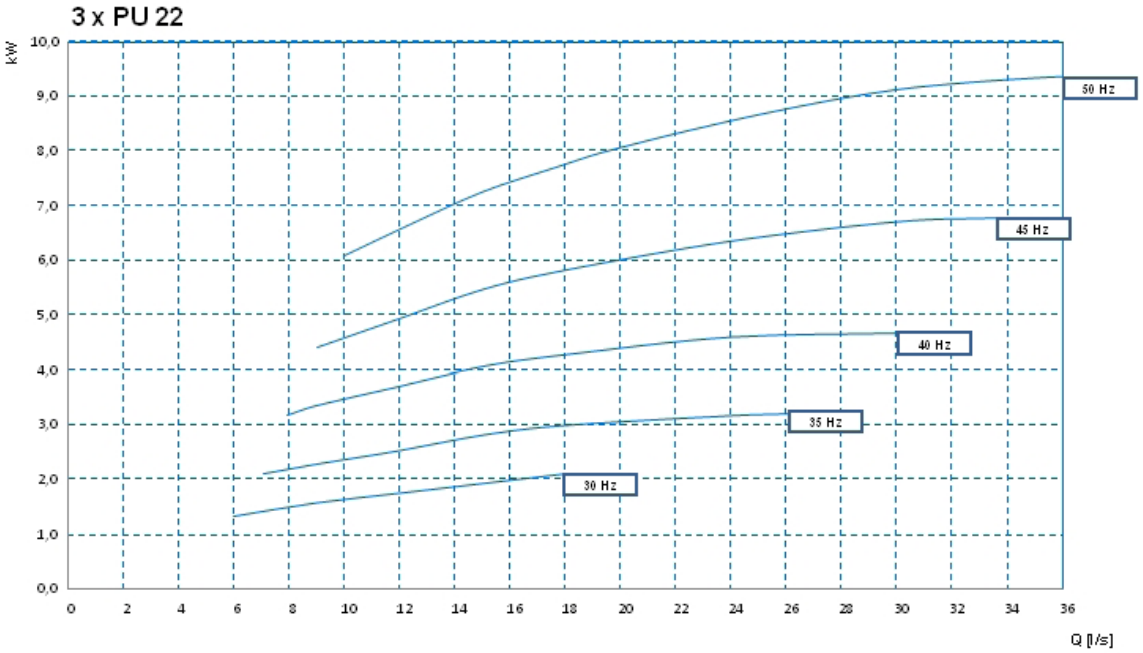


Q[l/s]= water flow rate
Δ [kPa] = pump head

Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams:

- internal exchanger pressure drops
- IFVX accessory –Steel mesh filter on the water side (where applicable)

Power input



Q[l/s]= water flow rate
kW = power input

Accessories

INTERNAL SECTION

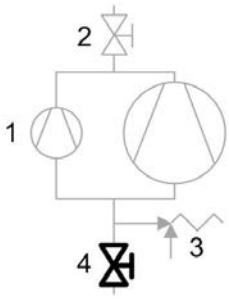
MHP - High and low pressure gauges

It includes two liquid pressure gauges for the analog measurement of refrigerant pressures on suction and discharge lines of the compressors with pressure sockets installed in the unit in an easily accessible location.

SDV - Cutoff valve on compressor supply and return

An option which integrates the supply cutoff valve, which is supplied as standard. The presence of the cock at the intake as well enables the compressors to be isolated and substituted without discharging the refrigerant from within the refrigeration circuit. This means that the extraordinary maintenance activities are facilitated.

Device installed built-in the unit.



1. Compressors
2. Cutoff valve
3. Safety valve
4. SDV option

PFCP - Power-factor correction capacitors (cosfi > 0.9)

The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the unit (e.g. asynchronous motors). The component allows to put the cosfi power factor to values on average higher than 0.9, reducing the network reactive power. This often leads to an economic benefit which the energy provider grants to the final user.

The device is installed and wired built-in the unit.

ECS - ECOSHARE function for the automatic management of a group of units

Device allows automatic management of units that operate on the same hydraulic circuit, by creating a local communication network. There are three control modes that can be set via a parameter during the units stat-up. Two control modes distribute the heat load on the available units by following the distribution logic to benefit of efficiency levels at part load and one shift the supply water set-point temperature on the group of units.

Moreover:

Mode 0 - shift the water set-point temperature and keeps all the pumps active;

Mode 1 - distribute the heat load and keeps all the pumps active;

Mode 2 - distribute the heat load and activates only the pumps of the unit required to operate.

The device allows for rotation based on the criterion of minimum wear and management of units in stand-by. In case of failure of one unit the load is distributed in the other units.

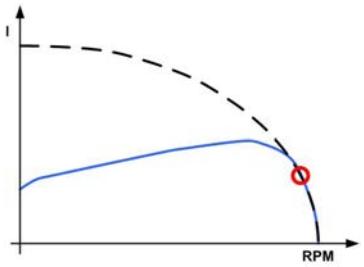
The units can be of various sizes but of the same type: all reversible heat pumps, or all air-cooled liquid chiller.The set of units is controlled by a Master unit. The local network can be extended up to 7 units (1 Master and 6 Slave).

The unit supplied with this device can also be equipped at the same time with the RCMRX option and one of the CMSC8 / CMSC9 / CMSC10 options.

SFSTR – Disposal for inrush current reduction (SOFT STARTER)

Electronic device which automatically starts up the compressors gradually, reducing the starting current for the unit by around 40% in comparison with the nominal value. This results in the reduction of the starting torque of the ON/OFF compressor, it is more protected from mechanical stresses leading to an increased life of the component. The noise is also reduced.

Device installed and wired built-in the unit.



–– Absorbed current without SFSTR option
– Absorbed current with SFSTR option

CMSC11 - Serial communication module for BACnet supervisor

Module allows the serial connection of the supervision system, using BACnet/IP as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems.

Device installed and wired built-in the unit.

The configuration and management activities for the BACnet networks are the responsibility of the client.

The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMSC9 - Serial communication module for Modbus supervisor

Module allows the serial connection of the supervision system, using Modbus as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems.

Device installed and wired built-in the unit

The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CMSC10 - Serial communication module for LonWorks supervisor

Module allows the serial connection of the supervision system which uses the LonWorks communication protocol. It enables access to a list of operating variables, commands and alarms which comply with the Echelon® standard.

Device installed and wired built-in the unit.

The configuration and management activities for the LonWorks networks are the responsibility of the client.

LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

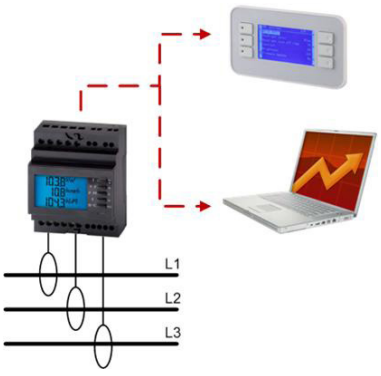
The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)

CONTA2 - Energy meter

Allows to display and record the unit's main electrical parameters. The data can be displayed on the device display or via the supervisor through the specific protocol variables..

It is possible to control:
- voltage (V),
- absorbed current (A),
- frequency (Hz),
- cosfi,
- power input (KW),
- absorbed energy (KWh),
- harmonic components (%).

The device is installed and wired built-in the unit.



On the device is present a serial port with Modbus protocol for the connection to the supervision system.

SCP4 - Set-point compensation with 0-10 V signal

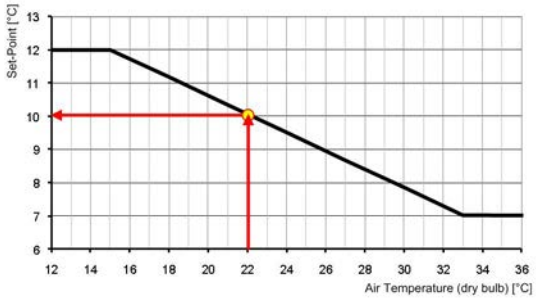
Device allows the changing of the preset set point by means to an external 0÷10 V signal. The interruption of the signal the set-point is at the nominal set value. The limit values can be changed within wide values.

Device installed and wired built-in the unit.

SPC2 - Set-point compensation with outdoor air temperature probe

Device allows the automatic regulation of the preset set-point depending of the outside temperature air measured by the unit probe. This device allows to get the sliding supply water temperature, which varies depending on external conditions, enabling energy savings throughout the entire system.

Device installed and wired built-in the unit.



IVFDT - Inverter driven variable flow-rate user side control depending on the temperature differential

This option allows water flow-rate modulation to the unit during partial load conditions, maintaining stable the temperature difference between inlet and outlet to the heat exchanger.

The option is available only when the unit thermoregulation is set on the return temperature.

Designed for systems with primary circuit variable flow-rate systems decoupled from secondary circuit. With no building load the unit switches off the compressors while concerning pumps is possible to select:

- Active pumps with minimum flow-rate, monitoring secondary circuit temperature variations
- Pump switching off, periodically activating them (settable time) leading secondary circuit temperatures on primary circuit
- Pump switching off and waiting for the user signal for activation (free potential)

Flow-rate modulation is managed by embedded logic thanks to built-in flow-rate control device and temperature probes. This device is installed and wired.

This option is available only with inverter driven HYDROPACK selected (2PMV / 3PMV)

RPRPDI - Refrigerant leak detector with pump down function in the casing

Leak detector device built-in installed and placed inside the compressor box, It detects leaks of the internal refrigeration circuit and automatically enables the "pump-down" function, storing the refrigerant inside the finned coil exchanger. During pump-down, cooling capacity is not produced by the unit. At the end of the operation the unit is switched off and a dedicated alarm signal is available directly inside the electrical panel.

The device respects BREEAM regulations.

Accessories

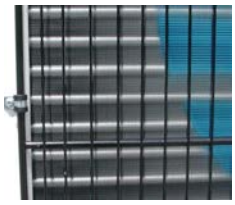
EXTERNAL SECTION

PGFC- Finned coil protection grilles

Grilles made in drawn of electro-welded steel and coated to protect the external coil from accidental contact with people and things. Ideal for installation in places where persons can pass from, such as car parks, terraces, etc.

Accessories supplied and installed on the unit.

Option available only on special request



CCCA - Copper / aluminium condensing coil with acrylic lining

Condensing coils with copper pipes and aluminum fins with acrylic lacquering. Can be used in settings with moderately aggressive low saline concentrations and other chemical agents. The acrylic coating is used as the most economical and effective method particularly in protecting aluminum surfaces exposed to the corrosive influence of the humid and salty air in regions with marine climates.

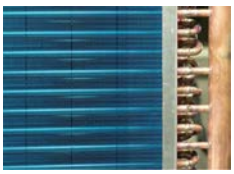
Attention!

- Cooling capacity variation -2.7%

- Variation in compressor power input +4.2%

- Operating range reduction -2.1°C

Option available only on special request



CCCA1 - Copper / aluminium condensing coils with Aluminium Energy Guard DCC treatment

Condensing coils with copper pipes and aluminum fins with Aluminium Energy Guard DCC treatment. Complete treatment which offers an optimal thermal exchange and guarantees and protects the finned coil exchangers from corrosion over time and UV rays. Can be used in settings with very aggressive saline concentrations and other chemical agents in the air thus maintaining the performance of the coils over time and with negligible pressure drop.

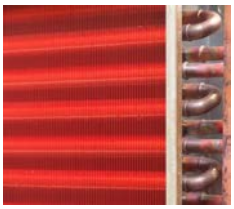
Option available only on special request

CCCC - Copper / copper condensing coil

Condensing coils with copper pipes, copper fins and brass structure. Can be used in settings with moderately aggressive saline concentrations and other chemical agents.

This option is not suitable for application in sulphuric environments

Option available only on special request



CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type

An option which regards the external helical fan. It provides for an IP54 brushless electronically commutated electrical motor and incorporated thermal protection. Supplied with variable speed control.

The option is compulsory for industrial applications where the outdoor air temperature is lower than 10°C.

RE-20 / RE-25 / RE-30 / RE-35 / RE-39 - Electrical panel anti-freeze protection

It includes self-regulating electric heaters with thermost which are able to protect the electrical panel against condensation and frost guaranteeing its correctly functions down to -39°C. This accessory operates even when the unit is switched off provided that the power supply is maintained active and the unit continues to be electrically connected.

Device installed and wired built-in the unit.

This accessory operates even when the unit is switched off provided that the power supply is maintained active and the unit continues to be connected.

This accessory does not lead to substantial variations in the electrical data for the unit which has been declared in the Electrical Data section.

Accessories separately supplied

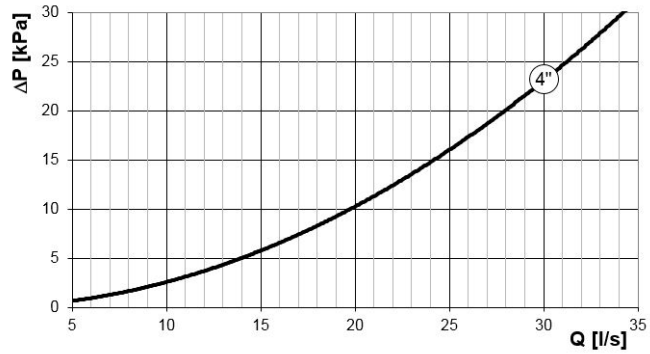
INTERNAL SECTION

IFWX - Steel mesh strainer water side

The device stops the exchanger from being clogged by any impurities which are in the hydraulic circuit. The mechanical steel mesh strainer must be placed on the water input line. It can be easily dismantled for periodical maintenance and cleaning. It also includes:

- cast-iron shut-off butterfly valve with quick connections and activation lever with a mechanical calibration lock;
- quick connections with insulated casing.

STEEL MESH FILTER PRESSURE DROP



Q = water flow rate (l/s) DP = water side pressure drop (kPa)

STEEL MESH FILTER FEATURES

EXCELLENCE	
Diameter	4"
Degree of filtration	1,6 mm

Pressure drop referred to a clean filter

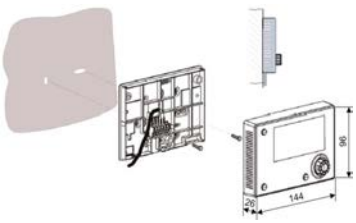
Installation provided by the the Costumer, externally to the unit

Check for the presence of the required hydraulic shut-off valves in the system, in order to undertake periodical maintenance

RCMRX - Remote control via microprocessor remote control

This option allows to have full control over all the unit functions from a remote position.

It can be easily installed on the wall and has the same aspect and functions of the user interface on the unit.



All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser.

The device must be installed on the wall with suitable plugs and connected to the unit (installation and wiring to be conducted by the Customer). Maximum remote control distance 350 m without auxiliary power supply. For distances greater than 350 m and in any case less than 700 m it is necessary to install the 'PSX - Mains power unit' accessory.

Data and power supply serial connection cable n.1 twisted and shielded pair. Diameter of the individual conductor 0.8 mm.

Installation provided by the the Costumer

PSX - Mains power supply unit

The device allows the unit and the remote control to communicate with the user interface even when the serial line is longer than 350m.

It must be connected to the serial line at a distance of 350m from the unit and allows to extend the length to 700m maximum in total. The device requires an external power supply at 230V AC.

Power supply at 230V AC provided by Customer

AMRX - Rubber antivibration mounts

The rubber antivibration mounts are attached in special housing on the support frame and serve to smooth the vibrations produced by the unit thus reducing the noise transmitted to the support structure.

Installation provided by the the Costumer

CSVX - Couple of manual shut-off valves

Kit composed of no. 2 cast-iron shut-off butterfly valves, it includes: fast fittings and activation lever with a mechanical calibration lock and no. 2 of Victaulic type quick connection with insulated casing to isolate the hydraulic circuit at the inlet and outlet.

Installation provided by the the Costumer, externally to the unit

Option compatiblity

Acoustic configuration: compressor soundproofing (SC) / super-silenced (EN)

REFERENCE	DESCRIPTION	90.4	100.4	110.4	120.4	140.4	160.4
	CONFIGURATIONS AND MAIN ACCESSORIES						
B	Water low temperature	0	0	0	0	0	0
D	Partial energy recovery	0	0	0	0	0	0
B + D	Water low temperature + Partial energy recovery	0	0	0	0	0	0
	2PM - HYDROPACK USER SIDE WITH 2 PUMPS						
(PU20)	Pump 20	0	0	0	0	0	X
(PU21) / (PU22)	Pump 21 / Pump 22	0	0	0	0	0	0
(PU26)	Pump 26	X	X	X	X	X	0
	3PM - HYDROPACK USER SIDE WITH 3 PUMPS						
(PU20)	Pump 20	X	X	X	X	X	X
(PU21)	Pump 21	X	X	X	0	0	0
(PU22)	Pump 22	0	0	0	0	0	0
	2PMV - HYDROPACK USER SIDE WITH NO.2 OF INVERTER PUMPS						
(PU22)	Pump 22	0	0	0	0	X	X
	3PMV - HYDROPACK USER SIDE WITH NO.3 OF INVERTER PUMPS						
(PU22)	Pump 22	0	0	0	0	0	0
	IVFDT - INVERTER DRIVEN VARIABLE FLOW-RATE USER SIDE CONTROL DEPENDING ON THE TEMPERATURE DIFFERENTIAL						
(2PM) / (3PM)	Hydropack user side with no. 2 of pumps / Hydropack user side with no. 3 of pumps	X	X	X	X	X	X
(2PMV) / (3PMV)	Hydropack user side with no.2 of inverter pumps / Hydropack user side with no.3 of inverter pumps	0*	0*	0*	0*	0*	0*
	OTHER ACCESSORIES						
CREFB	Device for fan consumption reduction of the external section, ECOBREEZE type	0	0	0	0	0	0
CREFO	Device for fan consumption reduction of the external section, on/off type	•	•	•	•	•	•

• Standard

0 Option

X Not available

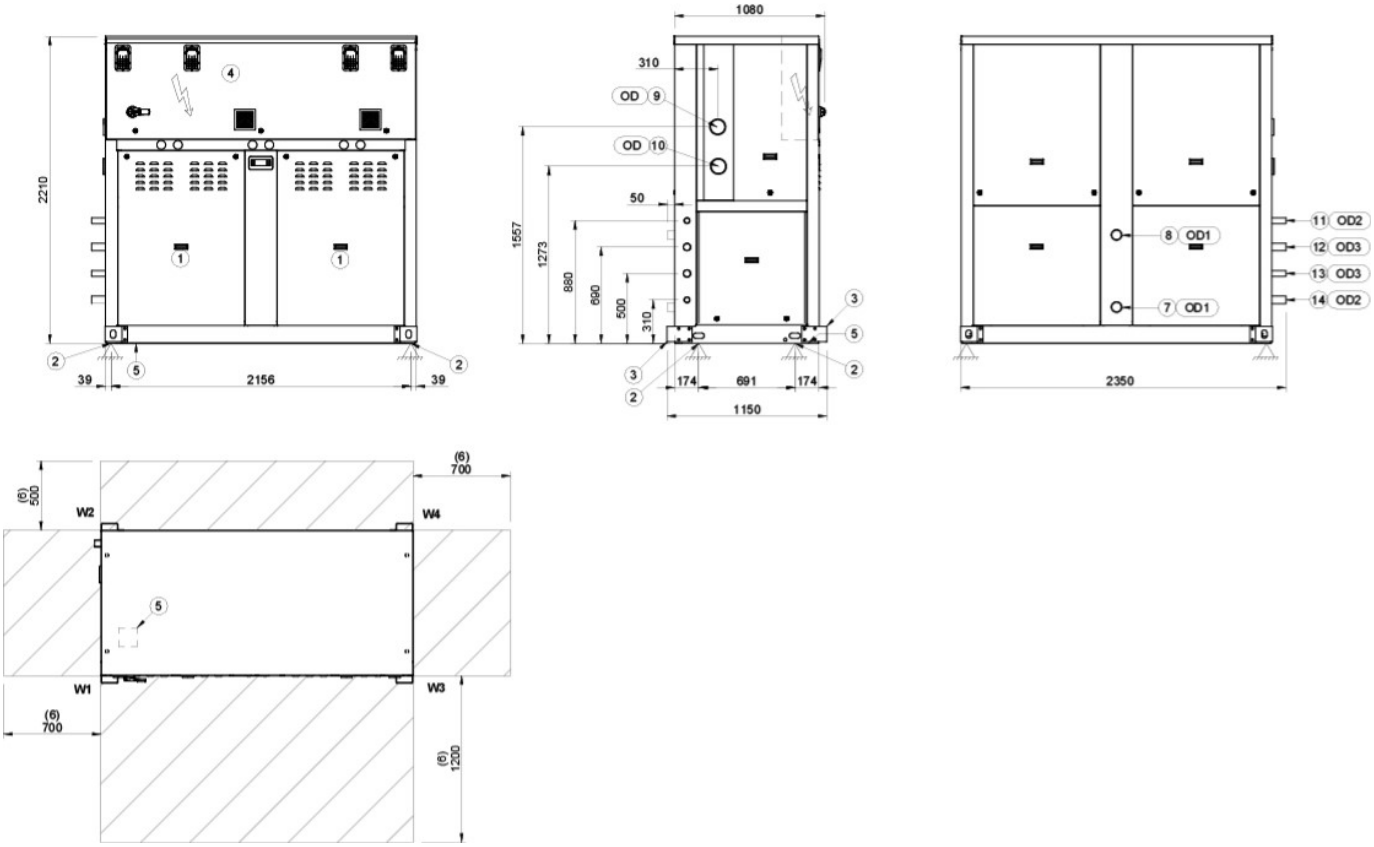
0* Necessary matching: variable flow-rate control and built-in inverter pumps

Dimensional drawings

INTERNAL SECTIONS: MSRN-XSC3

Size 90.4 - 160.4

DAA4X0002 _00
DATA/DATE 29/06/2018



1. Compressors
2. Antivibration fixing holes ø 15mm
3. Lifting brackets (removable)
4. General electrical panel
5. Power input
6. Suggested clearance
7. Recovery side exchanger water inlet (optional)
8. Recovery side exchanger water outlet (optional)
9. Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
10. Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
11. Circuit 1 liquid line
12. Circuit 1 gas line
13. Circuit 2 gas line
14. Circuit 2 liquid line

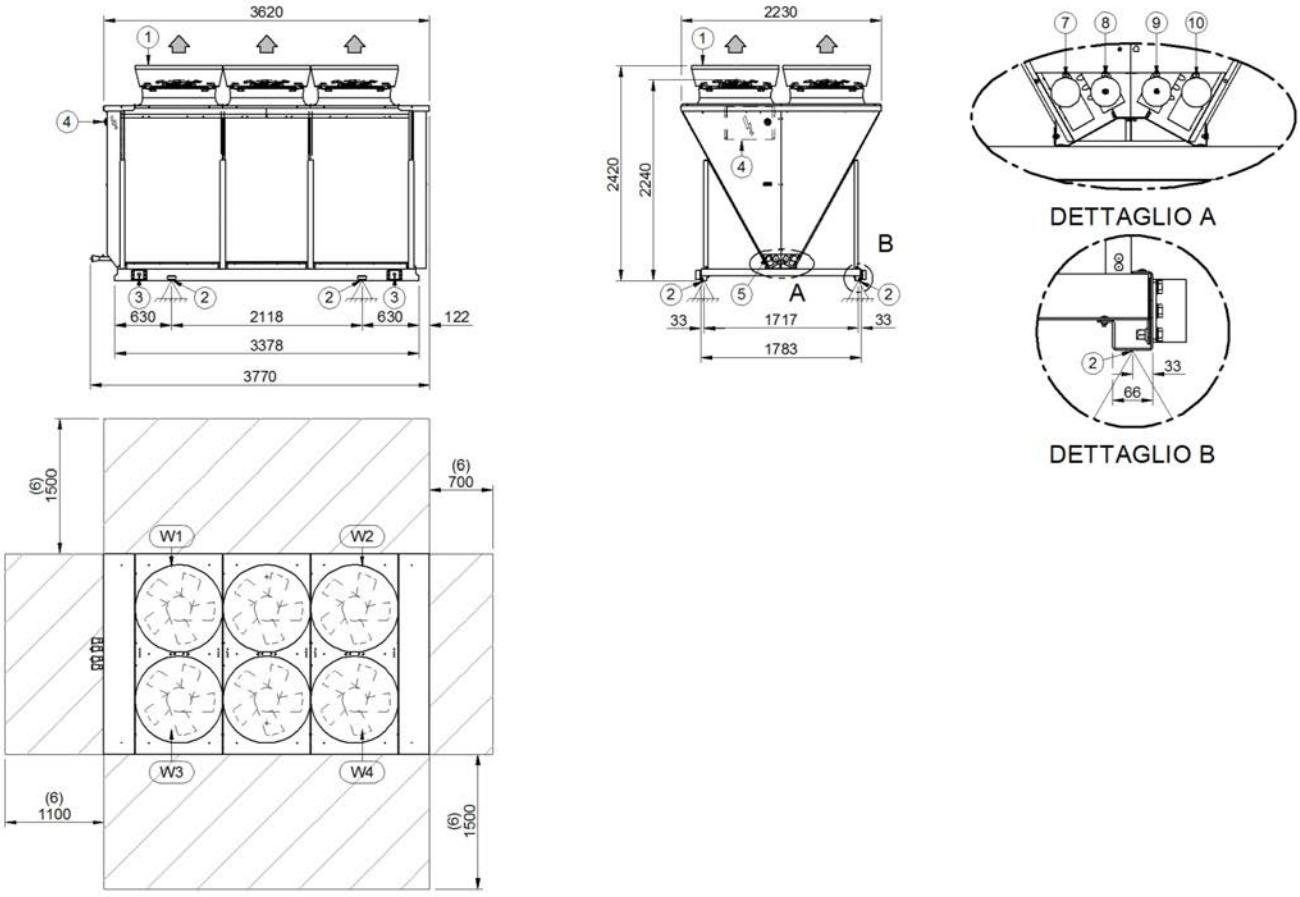
Size		90.4	100.4	110.4	120.4	140.4	160.4
Length	mm	2350	2350	2350	2350	2350	2350
Depth	mm	1150	1150	1150	1150	1150	1150
Height	mm	2210	2210	2210	2210	2210	2210
OD (internal exchanger)	mm	114,3	114,3	114,3	114,3	114,3	114,3
OD1 (partial recovery)	mm	60,3	60,3	60,3	60,3	60,3	60,3
OD2 (liquid line)	mm	35	35	35	42	42	42
OD3 (gas line)	mm	42	42	54	54	54	54
W1 Supporting point	kg	434	486	505	518	545	556
W2 Supporting point	kg	363	393	406	417	419	449
W3 Supporting point	kg	466	510	529	540	571	585
W4 Supporting point	kg	394	418	430	439	445	478
Operating weight	kg	1657	1807	1870	1914	1980	2068
Shipping weight	kg	157	1720	1780	1810	1870	1900

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

EXTERNAL SECTION: CEV-XN

Size 105.0 - 115.0 - 130.0

DAA5X0001 _00
DATA/DATE 04/06/2018



1. Axitop (removable)
2. Antivibration fixing holes ø 18mm
3. Lifting brackets (removable)
4. General electrical panel
5. Power input
6. Suggested clearance
7. Circuit 1 liquid line
8. Circuit 1 gas line
9. Circuit 2 gas line
10. Circuit 2 liquid line

For the measurement of the refrigeration connection diameter refer to the "General technical data - Construction" table.

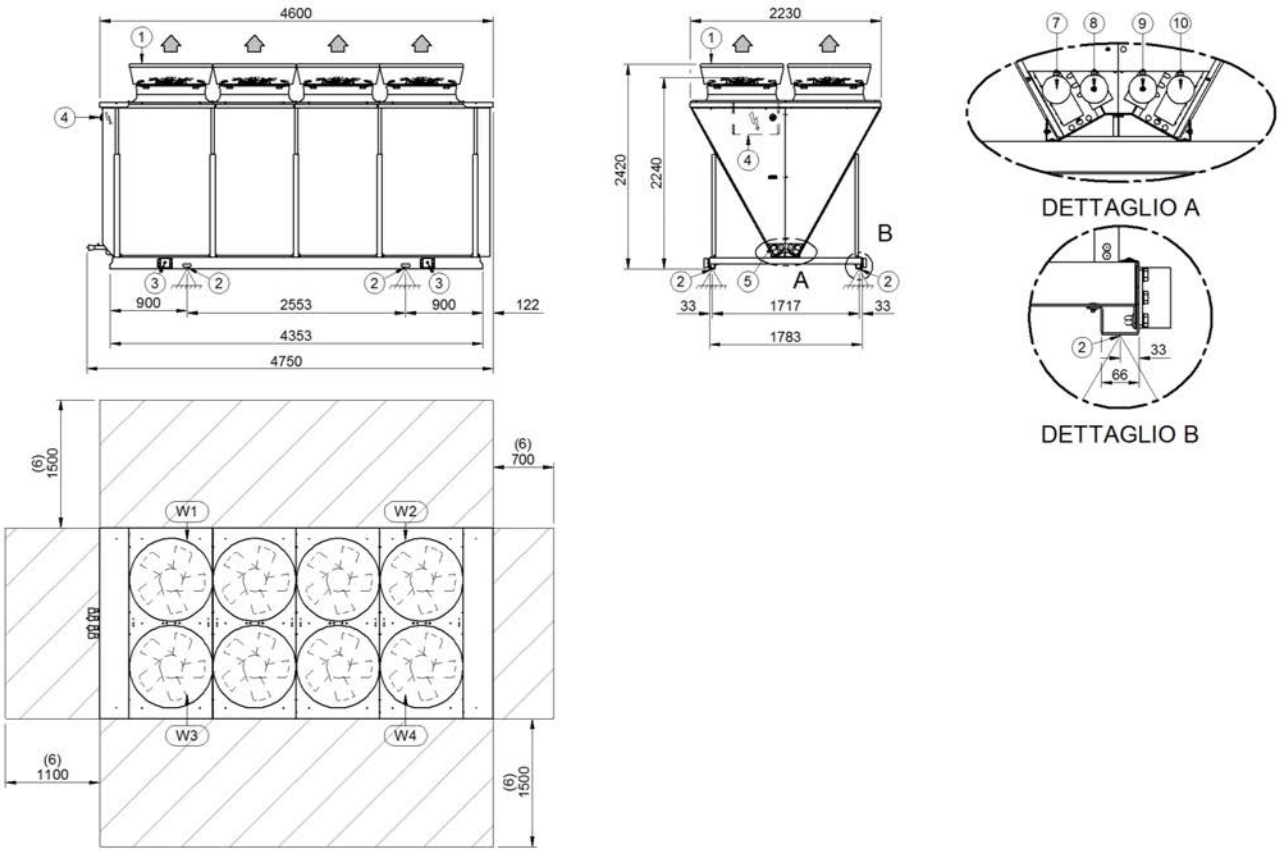
Size		105.0	115.0	130.0
Length	mm	3770	3770	3770
Depth	mm	2230	2230	2230
Height	mm	2420	2420	2420
W1 Supporting point	kg	273	277	295
W2 Supporting point	kg	268	273	292
W3 Supporting point	kg	273	277	295
W4 Supporting point	kg	268	273	292
Operating weight	kg	1082	1100	1174
Shipping weight	kg	1040	1060	1120

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

EXTERNAL SECTION: CEV-XN

Size 150.0 - 160.0 - 170.0 - 180.0

DAA5X0002_00
DATA/DATE 04/06/2018



1. Axitop (removable)
2. Antivibration fixing holes ø 18mm
3. Lifting brackets (removable)
4. General electrical panel
5. Power input
6. Suggested clearance
7. Circuit 1 liquid line
8. Circuit 1 gas line
9. Circuit 2 gas line
10. Circuit 2 liquid line

For the measurement of the refrigeration connection diameter refer to the "General technical data - Construction" table.

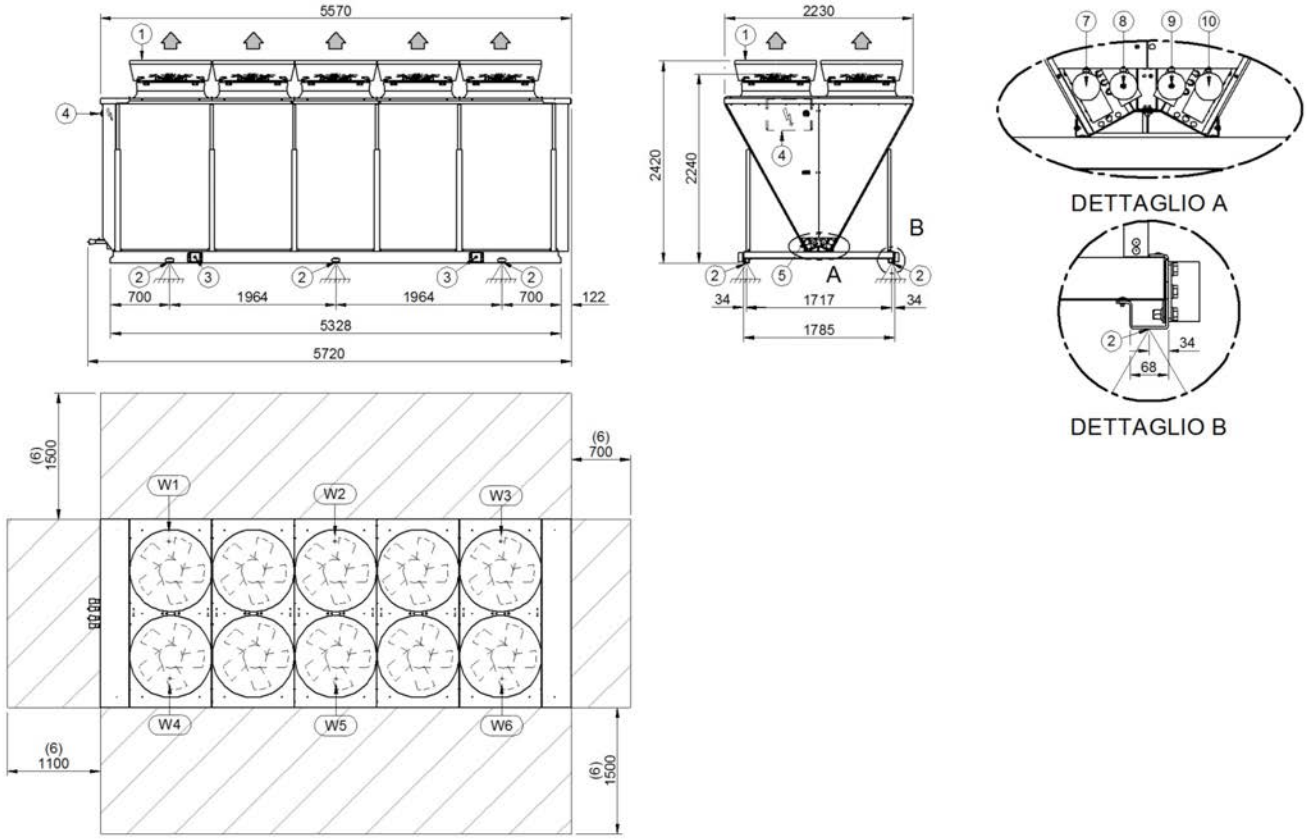
Size		150.0	160.0	170.0	180.0
Length	mm	4750	4750	4750	4750
Depth	mm	2230	2230	2230	2230
Height	mm	2420	2420	2420	2420
W1 Supporting point	kg	323	348	354	385
W2 Supporting point	kg	318	345	350	381
W3 Supporting point	kg	323	348	354	385
W4 Supporting point	kg	318	345	350	381
Operating weight	kg	1282	1386	1408	1532
Shipping weight	kg	1245	1335	1355	1465

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

EXTERNAL SECTION: CEV-XN

Size 185.0 - 190.0

DAA5X0003 _00
DATA/DATE 04/06/2018



1. Axitop (removable)
2. Antivibration fixing holes ø 18mm
3. Lifting brackets (removable)
4. General electrical panel
5. Power input
6. Suggested clearance
7. Circuit 1 liquid line
8. Circuit 1 gas line
9. Circuit 2 gas line
10. Circuit 2 liquid line

For the measurement of the refrigeration connection diameter refer to the "General technical data - Construction" table.

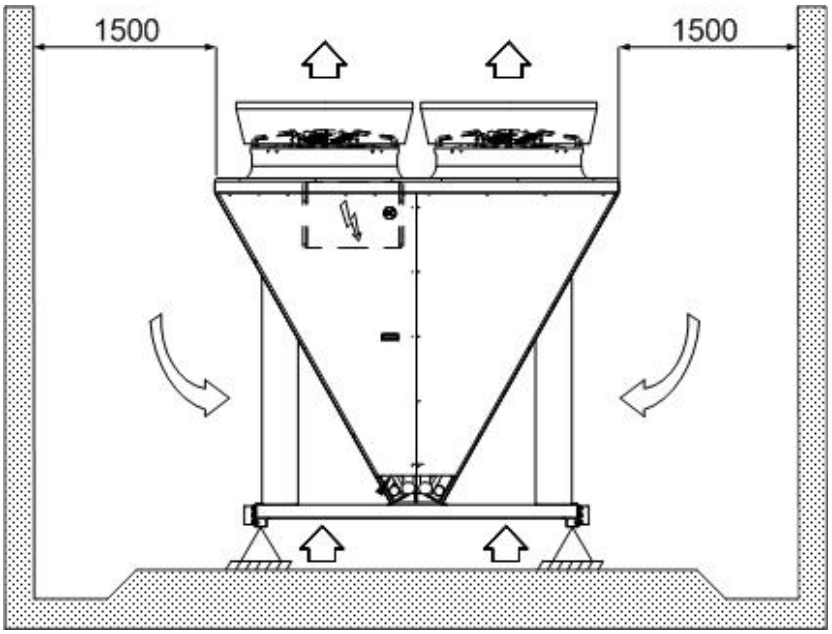
Size		185.0	190.0
Length	mm	5720	5720
Depth	mm	2230	2230
Height	mm	2420	2420
W1 Supporting point	kg	282	287
W2 Supporting point	kg	279	284
W3 Supporting point	kg	277	282
W4 Supporting point	kg	282	287
W5 Supporting point	kg	279	284
W6 Supporting point	kg	277	282
Operating weight	kg	1676	1706
Shipping weight	kg	1615	1645

The presence of optional accessories may result in a substantial variation of the weights shown in the table.

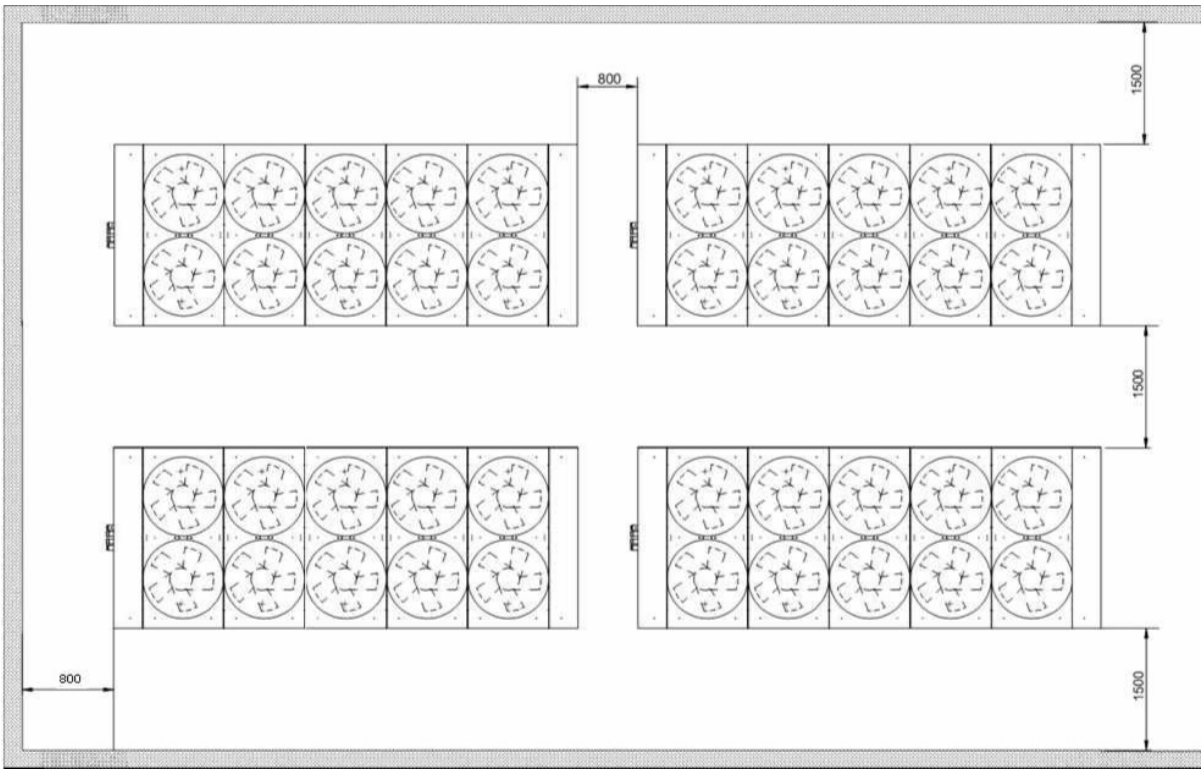
Position

The following aspects should be considered before installation:

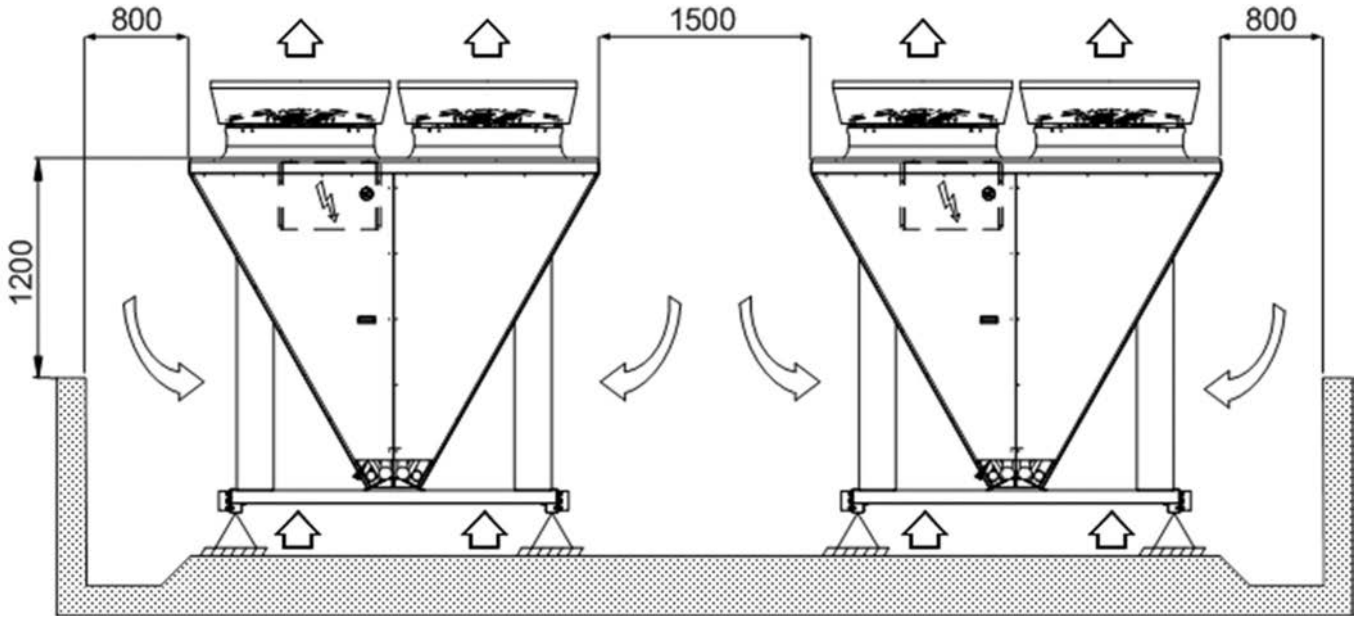
- check that the structure supports the rest of the unit;
- avoid installation in closed spaces;
- when there are walls in the proximity, follow the recommended minimum distances.



Particular attention should be paid in the choice of the recommended minimum distances, particularly in cases of systems with two or more units (Dual or Triple).



In the event that the surrounding walls are not full height, it is possible to reduce the clearance as indicated.



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