Technical Bulletin

BT14H001GB-01

SPINchiller³

High efficiency air cooled reversible heat pump for outdoor installation

WSAN-XSC3 90.4-240.4 RANGE

Nominal heating capacity from 283 kW to 692 kW
Nominal cooling capacity from 232 kW to 595 kW

- R-410A modular scroll technology
- Two independent refrigeration circuit
- Partial recovery of the condensing heat

EXCELLENCE version

- Eurovent Class A / Up to 48°C outdoor air temperature

Clivet is taking part in the EUROVENT certification programme up to 600 kW. The products concerned appear in the certified products list of the EUROVENT www.eurovent-certification.com site.

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

	Small and Medium-sized Applications in the Services Sector			Large-sized Applications in the Services and Industry Sectors		
	ELFOEnergy Extended Inverter ELFOEnergy Extended Inverter Duct	ELFOEnergy Medium / Vulcan / Large[3] ELFOEnergy Duct Medium	ELFOEnergy Magnum	SPINchiller[3] / SPINchiller Duct Modular Scroll Technology		SCREWLine[3]
Capacities (A35/W7)	5 ÷ 31 kW	25 ÷ 250 kW	30 ÷ 250 kW	270 ÷ 680 kW	710 ÷ 1360 kW	460 ÷ 1420 kW
Chillers	WSAT-XIN DC Inverter D	WSAT-XEE EXC A PRM C	WSAT-XIN DC Inverter EXC A PRM C	WSAT-XSC3 EXC A PRM C	WSAT-XSC3 EXC A PRM C	WDAT-SL3 EXC A PRM C
High Temperature Chillers External Air			WSAT-XIN HA DC Inverter A	WSAT-XSC3 EXC A	WSAT-XSC3 EXC A	WDAT-SL3 EXC A
Free cooling Chillers		WSAT-XEE (FC) A C	WSAT-XIN FC DC Inverter EXC A PRM C	WSAT-XSC3 FC EXC A	WSAT-XSC3 FC EXC A	WDAT-SL3 FC EXC A
Heat pumps	WSAN-XIN DC Inverter B	WSAN-XEE A B	WSAN-XIN DC Inverter EXC A PRM C	WSAN-XSC3 EXC A PRM C	WSAN-XSC3 EXC A PRM C	
Heat pumps High temperature water		WBAN A	WSAN-XIN HW A			
Multi-function heat pump			WSAN-XIN MF DC Inverter EXC A PRM C	WSAN-XSC3 MF EXC A PRM C	WSAN-XSC3 MF EXC A PRM C	
Ducted units	WSA-XIN (Chiller) DC Inverter D WSN-XIN (Heat pumps) B	WSA-XEE (Chiller) A WSN-XEE (Heat pumps) A		WSA-XSC2 (Chiller) A		

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

SPINchiller³: modular scroll technology for every application

SPINchiller³ 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.

WSAT-XSC3

Air cooled water chiller

- EXCELLENCE high efficiency version and PREMIUM compact version
- Operating with 52°C of outdoor air temperature
- Total / partial recovery of the condensing heat
- Eurovent certification

Dedicated series separately documentated

WSAT-XSC3 FREE-COOLING

Air cooled water chiller with FREE-COOLING

- Direct FREE-COOLING
- Indirect FREE-COOLING (No-Glycol)

Dedicated series separately documentated

WSAN-XSC3

Air coole heat pump

- EXCELLENCE high efficiency version
- Eurovent certification

Dedicated series separately documentated

WSAN-XSC3 MULTIFUNCTION

Air cooled heat/cool heat pump with simultaneous operating

- EXCELLENCE high efficiency version
- 4-pipe system
- 2-pipe system and total condensing heat recovery

Dedicated series separately documentated

Cost or reliability?

The dilemma of modern system engineering applications

Air-conditioning systems in trade centres influence both the starting investment and monthly management costs, for the whole of their working lives. This theme is even more relevant in residential applications with centralised systems. Furthermore, maximum working flexibility requirements should be added to that, in serving different users while avoiding wasting energy and thus, money. Finally, there are several industrial applications which require hot or chilled water as service fluid, process fluid or vector fluid for operator comfort and for conserving goods and enabling cycles to function correctly. Furthermore, in all these cases, the working reliability of the system is decisive.

High efficiency hydronic systems

The high efficiency hydronic systems are extremely versatile, reliable and widespread

Despite their apparently low costs, split, multi-split and VRF direct expansion systems have a lot of limits in these applications. For example, they require a separate system for primary air treatment. The pipes that contain the refrigerant cross the served rooms and therefore they are subject to restrictions and use limitations. They cannot operate in the FREE-COOLING mode, the high efficiency and convenient mode that allows energy savings.

The hydronic systems are certainly more complete and versatile. They make it possible to adopt various types of terminals in the served environment, from fan coil units exposed or integrated in the furnishings, up to radiant or induction systems. They are also irreplaceable in the service and process industrial applications.

The main component performances, like air-cooled liquid chillers and hydronic heat pumps, are checked and certificated by appropriate certification programs, as Eurovent.

Clivet technological evolution

Clivet chillers reduce consumption and are compact and reliable

With over twenty years of technological evolution, Clivet liquid chillers and heat pumps represent the state of the art in air-conditioning of residential, trade and industrial environments.

Their success is based on high energy efficiency, compactness and management maintenance simplicity, with wide versatility in the choice of the most suitable model for the specific use.

SPINchiller³

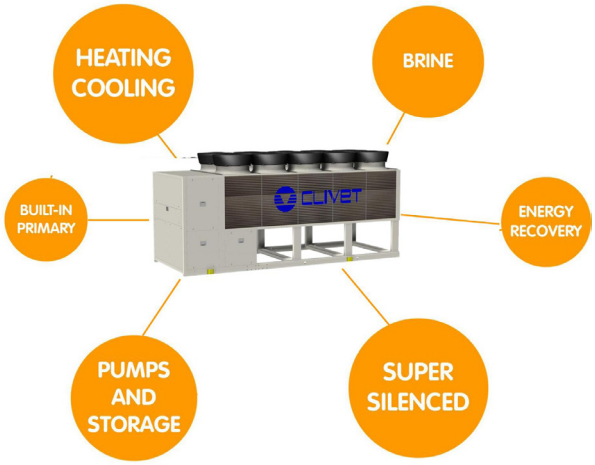
Provides all Clivet technological developments for their medium capacity hydronic systems

High efficiency Scroll compressors, high performance heat exchangers, electronic control fans, fully automatic operation: these are only some of the technologies available with SPINchiller³, in a range of models that are ideal for high capacity air conditioning systems in commercial, residential and industrial buildings.

The two available versions allow to choose the best combination between the initial investment and the costs throughout the entire life cycle of the system.

- The EXCELLENCE SC version stands out for its extremely high energy efficiency under both part and full load conditions. (A- class Eurovent certification)
- The distinctive feature of the PREMIUM version is its compactness and high part-load efficiency.

SPINchiller³ can also be supplied in many configurations equipped with the main components installed built-in.



Advantages

High efficiency all year round

SPINchiller³ 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 SPINchiller³ 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.

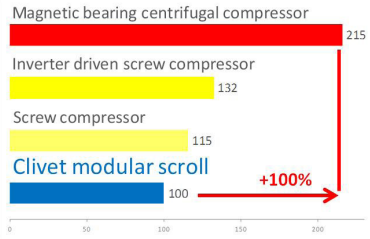
Compact and versatile

Suitable for any type of terminals, from fan coils to radiant systems and chilled beams, SPINchiller³ heat pump is also available in Super-silenced configuration. Energy recovery for producing hot water free of charge, Master-Slave management devices.

Borderless multiscroll technology

With SPINchiller³ the modular scroll compressor technology reaches the best levels of performance and versatility ever, guaranteeing competitiveness in more and more demanding applications. The top class seasonal efficiency rewards SPINchiller³ in comparison to any other air cooled chiller technology. A comparison with three SPINchiller³ competitors such as:

- Air cooled liquid chillers with magnetic bearing centrifugal compressors
- Air cooled liquid chillers with modulating capacity screw compressors
- Air cooled liquid chillers with inverter screw compressors;



shows that SPINchiller³ is the best solution, considering its seasonal efficiency similar to the inverter screw chillers and a capital cost lower than that of centrifugal compressor chillers, even considering the capital investment pay back, that for analized technologies are always above acceptable values normally considered for system investment equal to 3 years.

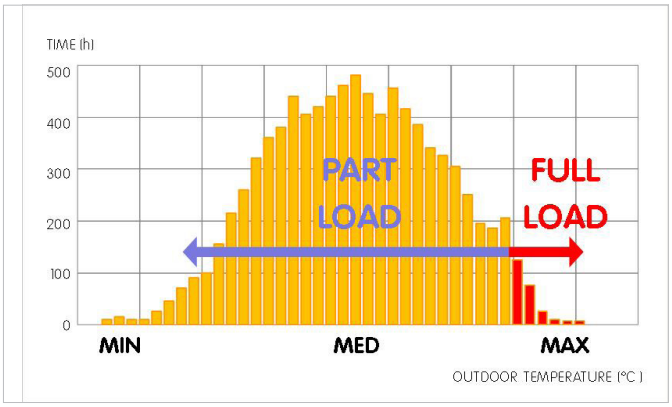
Comfort and energy saving in one solution

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.

SPINchiller technology enhances part-load efficiency

SPINchiller³ uses high efficiency Scroll compressors.

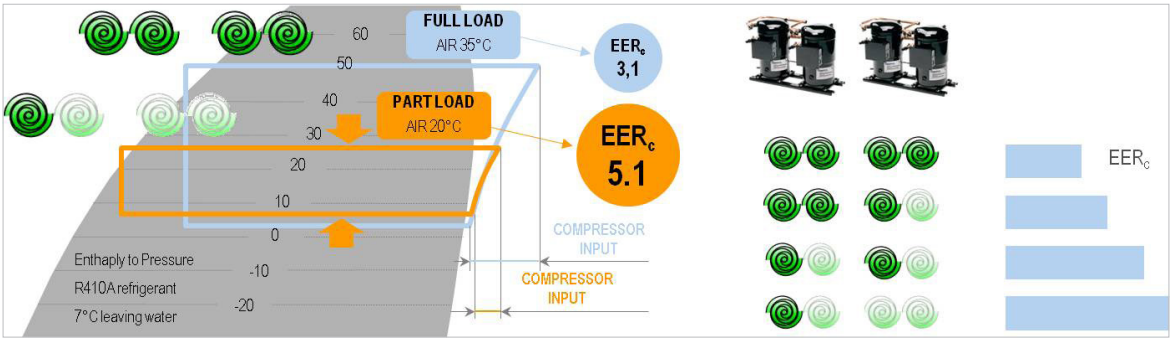
The advantages are:

- 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 or three 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.



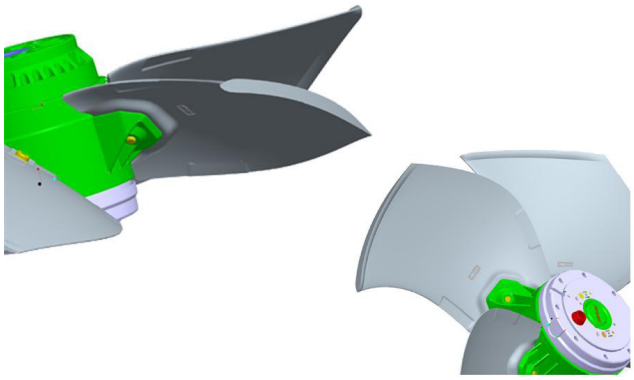
EERc = Efficienza energetica riferita ai compressori

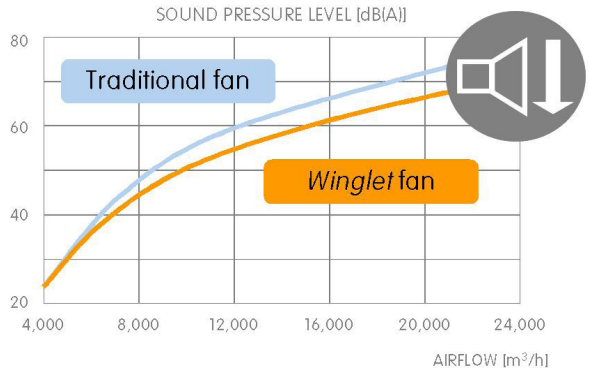
Efficient and silent ventilation technology

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

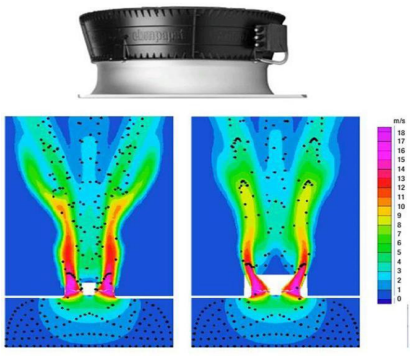
Also the innovative air handling system on the external exchangers is the result of the Clivet design evolution. The new AxiTop diffuser creates an ideal air distribution: it aerodynamically decelerates the flow and transforms a big part of its dynamic energy in static pressure, obtaining:

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

Moreover all units are supplied with a condensation electronic control. It automatically reduces the fan speed as the heat load drops.

Since fans are the unit's main noise source, the benefits are evident especially during the night hours, when the load is reduced but sensitivity to noise is enhanced.

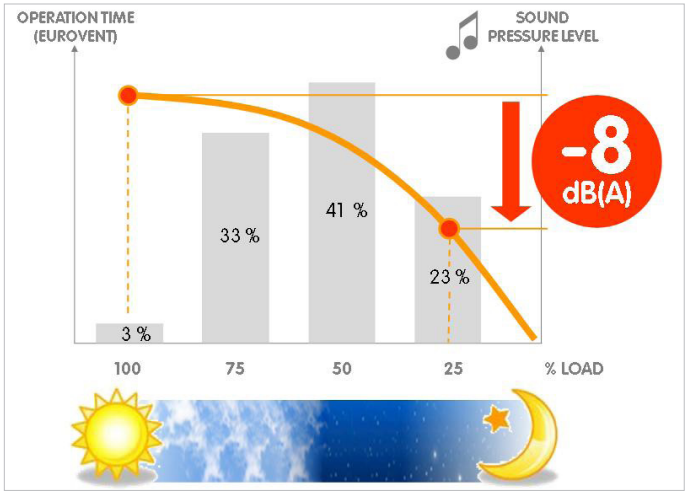
All this translates into a reduction of sound pressure down to 8 dB(A) compared to full load operation in 90% of operating time of the unit.



Energy efficiency improved by Axitop

Fans at variable speed for minimal noise emission

All SPINchiller³ units are equipped with electronic condensation control. It automatically reduces the fan speed when the heat load is reduced. Since the fans are the unit's main noise source, the benefits are evident especially during the night hours, when the load is reduced but sensitivity to noise is enhanced. All this translates into a sound pressure reduced down to 8 dB(A) compared to full load operation in 90% of operating time of the unit.



The best choice for every business

Excellence version: maximum efficiency

All SPINchiller³ models feature high part-load energy efficiency, which means high ESEER seasonal efficiency.

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

Apart from the high seasonal efficiency, the standard EXCELLENCE SC version stands out for its extremely high energy efficiency ratio (COP) during full-load heating, which exceeds the value 3.1 and places it in Eurovent Energy Efficiency class A.

This is all possible thanks to Scroll modular technology, high efficiency heat exchangers and ECOBREEZE fans fitted with a permanent-magnet motor and 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.

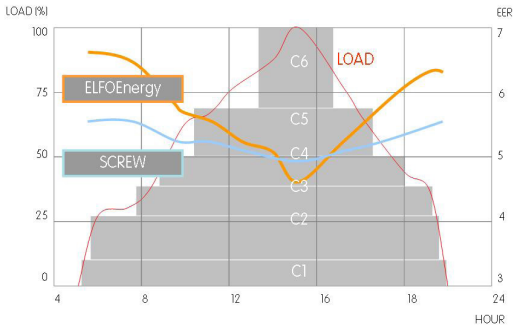
With Eurovent's implementation of the EN14511:2011 standard in 2012, reaching top energy efficiency levels at full load means calculating performance by also taking into account the energy consumption required to overcome pressure drops to allow for the circulation of the solution inside the exchangers.

Superior flexibility and reliability

Efficient precision

Sequential activation of SPINchiller³ 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.

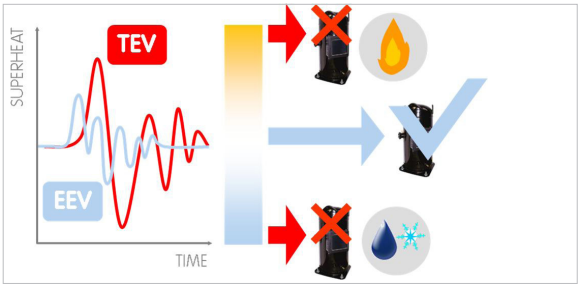


THE NUMBER OF START-UPS DECREASES THEREFORE THE LIFE CYCLE INCREASES

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

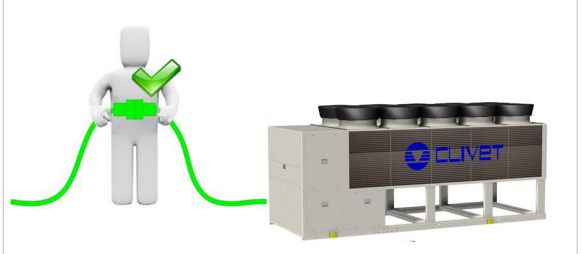
Besides being efficient, SPINchiller³ improves the system maintenance. In fact, the malfunction of a compressor does not compromise overall operation. Furthermore, Scroll compressors are very compact, easy to find and easy to handle in case of replacement.

Controlled power supply

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

The phase monitor, standard supplied.

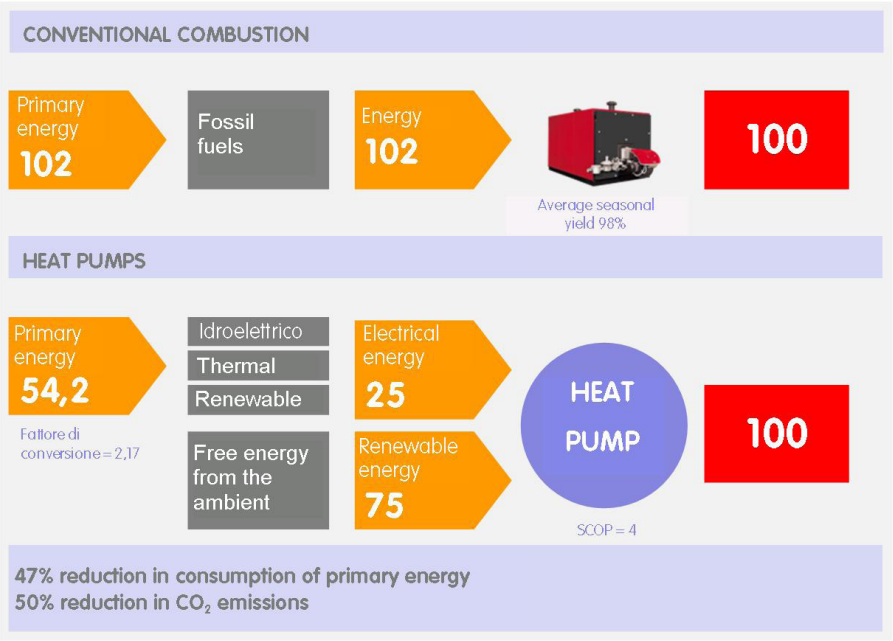
- controls the presence and the exact sequence of the phases
- checks any voltage anomalies (-10%)
- automatically restarts the unit as soon as the proper power supply is restored.



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

Renewable energy heat pump technology

The electric Heat pump technology promotes and provides incentives by the European Union with specific standards, such as the EU Directive 2009/28/CE of April 23rd 2009 that recognises ambient heat as a renewable source.



Compared to a combustion system, the electric heat Pump allows:

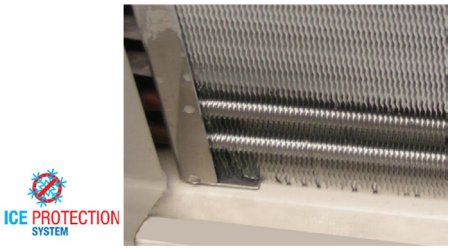
- Energy saving and reduction of the CO2 emissions by an average of 50%
- Use of electric energy, increasingly produced through alternative and renewable sources
- Operation and reduced maintenance reliability
- No fossil combustion and therefore absence of chimney, absence of periodical controls on the emissions in the ambient and no local production of fine dust
- Cost reduction of first investment with the reversible models that use a single system for both heating and cooling.

In heating mode, the reversible heat pump range by SPINchiller³ offers high efficiency in both full load operation and Partial load. The energy saving cycle operation throughout the year is noteworthy. Thanks to the brilliant half-load performance even when in cooling mode. This result was aided with precise technological choices and a long history of specialised experience.

Coils protected against the formation of ice

The particular technology of the heat pump developed by Clivet guarantees its continued and reliable operation.

The ICE PROTECTION SYSTEM device prevents icing on the base of the external exchanger during winter operation, thanks to a special subcooling circuit. This prevents damages caused by freezing.



Smart management of defrosts

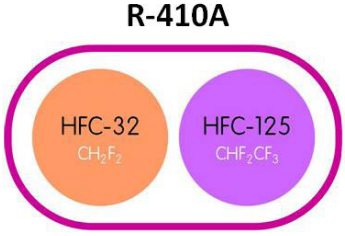
The automatic defrost cycles on the remaining external exchanger surface are managed in predictive mode, reducing both the frequency and the duration. The electronics on board analyse not only the external conditions, but also the evaporation pressure variation in the exchanger.

The standard defrosting cycle management involves the stop of the ventilation. This reduces the time required for defrosting and prevents the introduction of too cold air in the served area, maintaining comfortable conditions for the users.

High efficient refrigerant

R410A is the mix of two refrigerants used in equal parts: R32 that supplies the heating capacity and R125 that controls the flammability. It is a chlorine free refrigerant (HFC) with numerous advantages:

- ODP (Ozone Depletion Potential) = 0
- High volumetric effect thanks to the high coefficient global thermal exchange and to the pressure variation (glide) which is almost nil during the evaporation phase
- Elevated density and efficiency, with greater compactness of the refrigeration circuit and therefore the responsible use of materials and small refrigerant quantity, for a reduced environmental impact.



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).

Versatility

The various supply temperatures that can be set make SPINchiller³ perfectly suitable for various types of systems, such as: - heat dissipation on water loop systems

- distribution to terminal units, such as fan coils or other air treatment units
- distribution to radiant panels, induction terminals or cold beams.

PERFECT FOR THE VARIOUS TYPES OF SYSTEMS

Modularity

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

The SPINchiller³ units are designed to be connected in parallel in modular logic, thereby granting the following advantages:

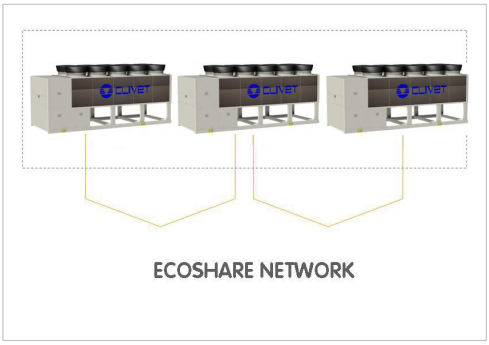
Increased flexibility, enhanced by the control that can adapt to the load

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 SPINchiller² TECHNOLOGY ADVANTAGES



Remote system management

SPINchiller³ 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.

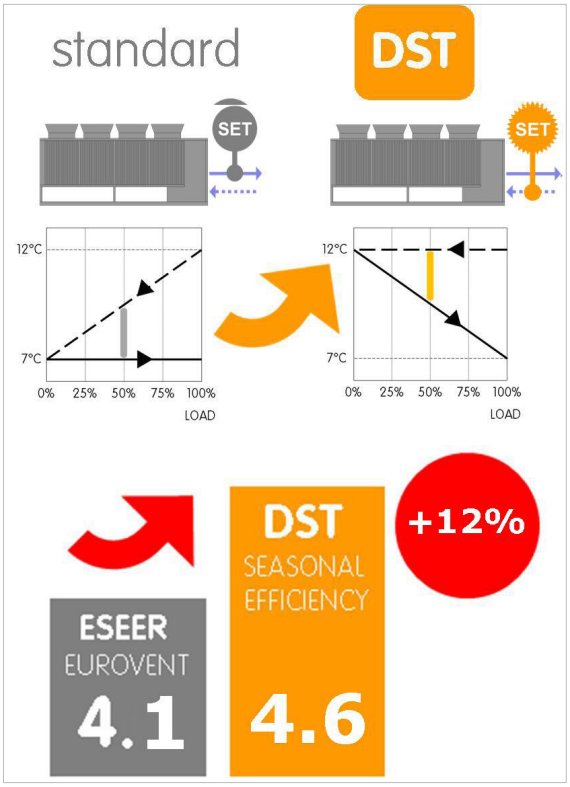
Seasonal energy efficiency is further increased with the DST operating logic

SPINchiller[3] is equipped with standard DST control (Dynamic Supply Temperature) control logic, which can be activated by the user.

Unlike the traditional control logic that aims at maintaining the water supply temperature constant, the DST logic aims at keeping constant the water return temperature, modifying the supply temperature dynamically according to the load. This way, evaporation temperature increases during part-load cooling, thereby increasing seasonal energy efficiency.

The DST control allows a considerable consumption and operation costs reduction, especially in civil applications, upon verification of the air treatment system's dehumidification capacity during cooling at part load.

The DST control allows considerable consumption and operation costs reduction, especially in civil applications, upon verification of the air treatment system's dehumidification capacity during part-load cooling. The DST control is particularly interesting when combined with active thermodynamic fresh air systems. The direct expansion circuit allows them to operate the outdoor air treatment independently from SPINchiller[2], which can vary the system water supply temperature, thereby optimising energy efficiency in the yearly cycle.



Example

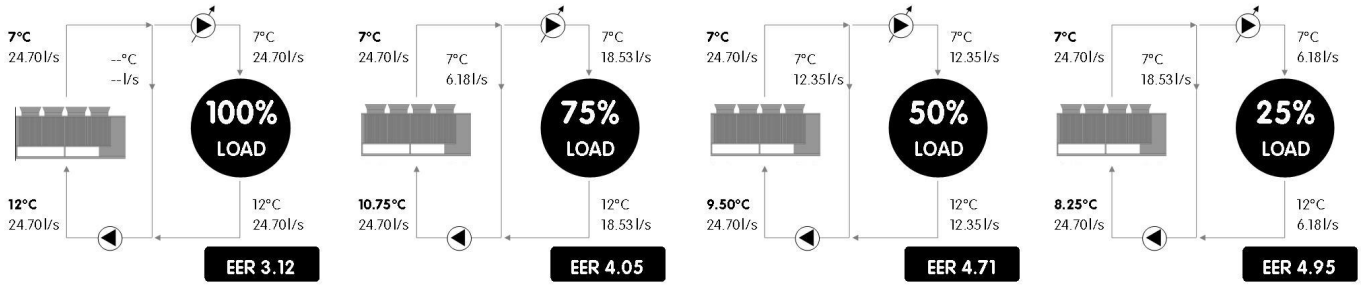
The following diagram represents the various operating temperatures in the production of chilled water under various load conditions for a typical civil system consisting of: - primary circuit with constant water flow rate - secondary circuit with variable water flow-rate according to the load (linear variability for simplicity).

The traditional control logic keeps the water supply temperature to room terminals and outdoor air treatment units constant, in order for the latter to carry out the dehumidification.

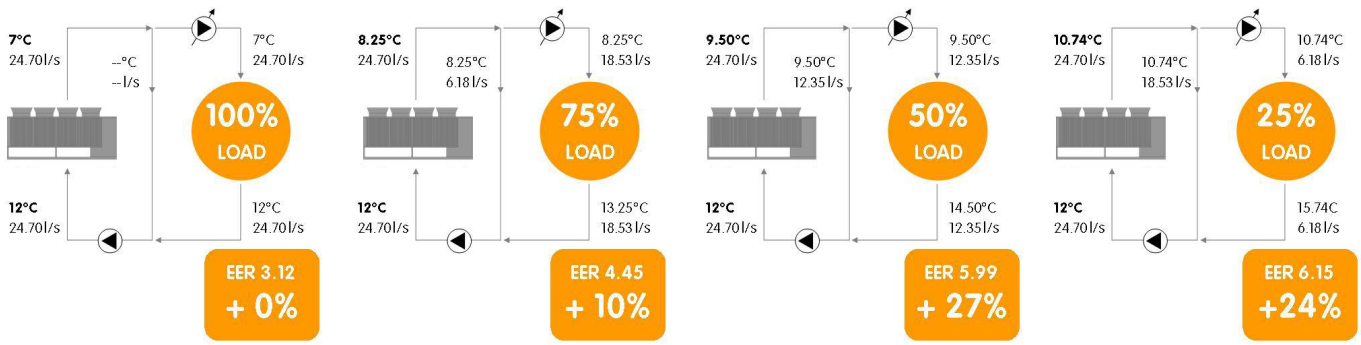
The DST control logic, on the other hand, allows increasing the system water supply temperature during part-load operation, thereby increasing seasonal energy efficiency for SPINchiller[3].

The DST application must be verified during the design stage according to specific system constraints.

Traditional control logic (system water flow rate temperature = constant)



DST control logic (system water return temperature = constant)



SPINchiller³ technology industrialised the system

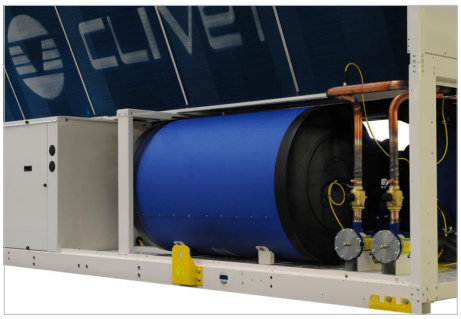
SPINchiller³ can be supplied equipped with components that are often provided separately.

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.

Built-in inertial accumulation available

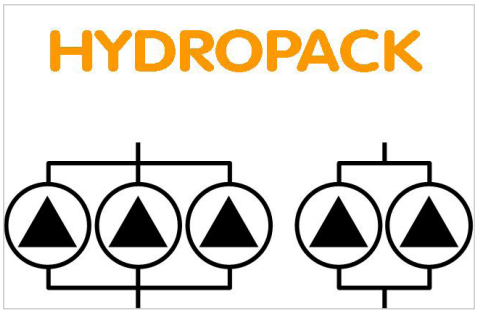
In most SPINchiller³ systems it can be installed without inertial accumulation on the system. In fact, the unit quickly adapts to the load due to modular compressors, electronic thermostatic valve and low water content plate heat exchangers. However, in the event of hydraulic distribution networks with reduced dimensions, it is important to provide the system with a hydraulic flywheel. In such cases, inertial accumulation is available built-in, equipped with insulating coating and all the necessary safety devices. This allows eliminating installation times and costs and freeing space inside the building.



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

The various solutions available are:

- standard pump, with a wide range of available pressures;
- Standard pump with standby pump. The built-in microprocessor balances its operating hours and in case of any breakdown signals the fault and automatically activates the standby pump.
- 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.

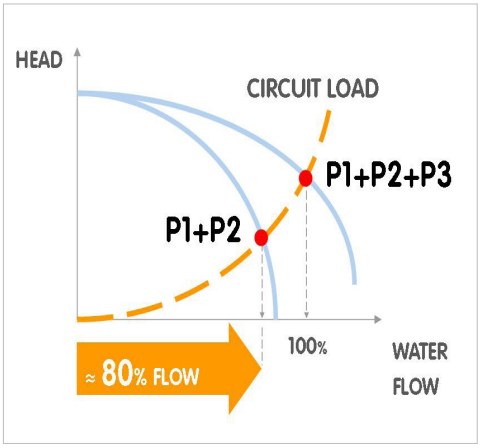


The exceptional HydroPack operation continuity

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)



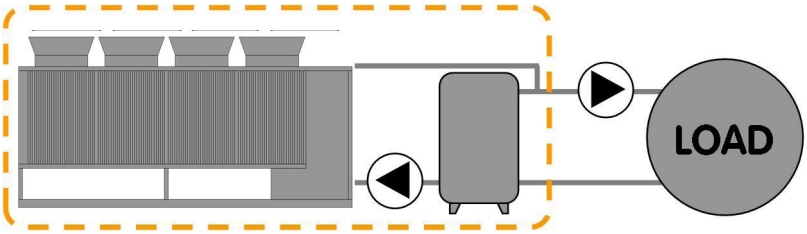
Even the primary circuit can be integrated built-in

A connection to the secondary use circuit is all that's needed. In this way, the system results even more simple and reliable.

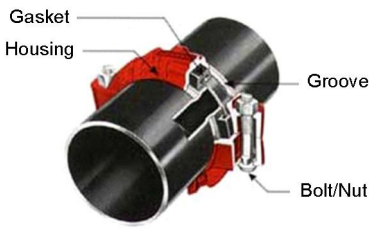
The units are complete with quick connections on the hydraulic side, which further reduce start-up times by eliminating pipe threading operations.

Furthermore, other system components are also available as accessories, such as hydraulic connections reported on the external walls of the unit and the required water filter.

SPINchiller² CAN CONTAIN MOST OF THE SYSTEM COMPONENTS



THE QUICK CONNECTIONS ARE STANDARD SUPPLIED



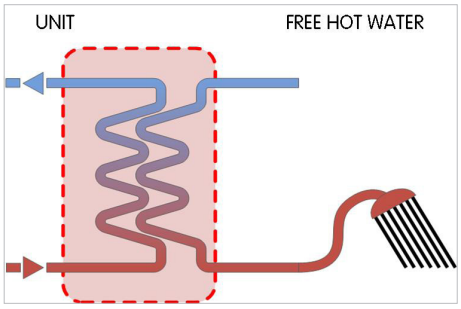
Produces hot water freely

Condensation heat recovery:

- Partial: it recovers about the 20% of the available heat (desuperheater)

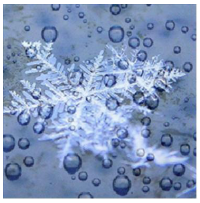
It allows the free DHW production for:

- 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 SPINchiller³ 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

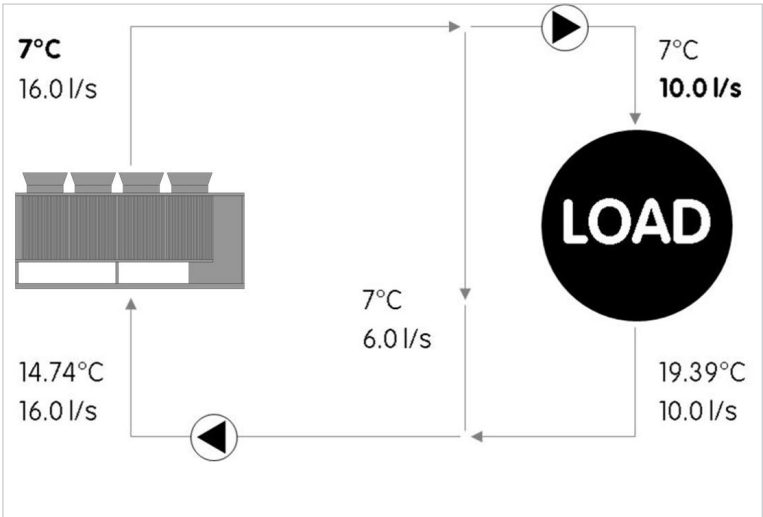
SPINchiller³ operates with constant water flow rate to the evaporator, between a minimum and maximum value indicated in the technical documents.

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 toWSAN-XSC3 200.4 SC EXCELLENCE version.
Appropriate water flow rate for the correct unit operation.

Temperature values outside the limits

SPINchiller³ operates with the system supply temperatures indicated in the technical documentation.

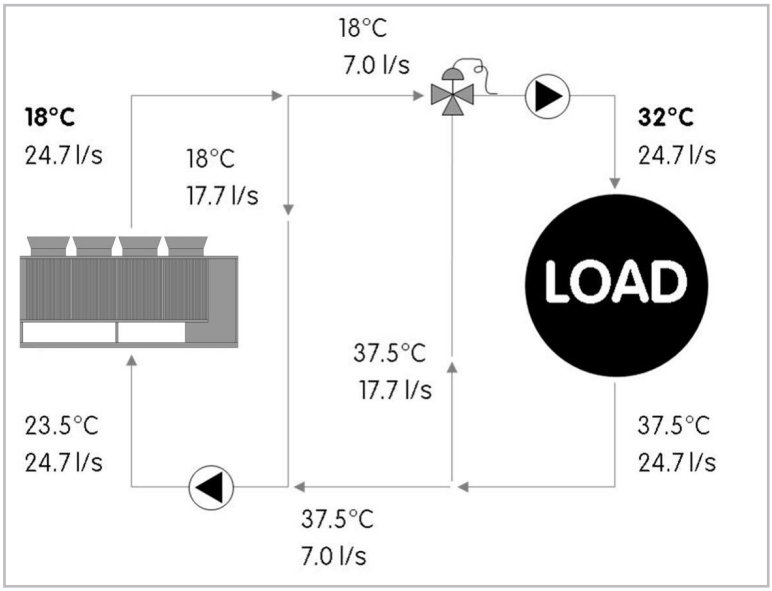
Temperature limits below the limit may cause unwanted formation of ice and the unit to stop following the intervention of built-in safety devices.

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 WSAN-XSC3 200.4 SC EXCELLENCE version.
Appropriate supply water temperature for the correct unit operation. Nominal water flow rate.

Evaporator thermal gradient

SPINchiller³ 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).

Unit configuration

WSAN-XSC3	200 . 4	EXC	SC	AXIX	-	-	-
(1)	(2) (3)	(4)	(5)	(6)	(7)	(8)	(9)

(1) Range
WSAN = Pompa di calore condensata ad aria con compressore scroll
XSC3 = SPINchiller3 range

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

(3) Compressors
4 = Compressor quantity

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

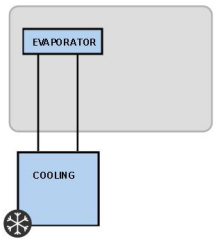
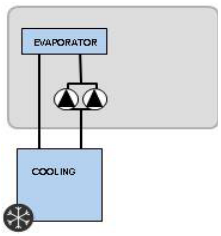
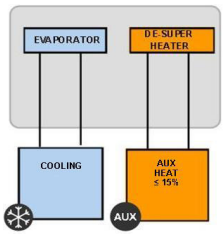
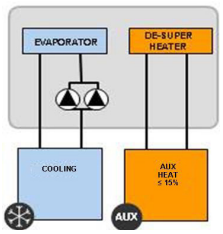
(5) Acoustic configuration
SC = Acoustic configuration with compressor soudproofing
EN = Super-silenced acoustic configuration

(6) Fan diffusers
AXIX - Diffuser for high efficiency fan (standard - separately supplied)
NAXI - Diffuser not required

(7) Condensation heat recovery
(-) recovery not required (standard)
D - Partial energy recovery (15% of available heat)

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

(9) Pumping unit
(-) not required
2PM - Hydropack with no. 2 of pumps
3PM - Hydropack con no. 3 of pumps

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

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

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

General technical data - Performance

Size			90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
Cooling												
Cooling capacity	1	[kW]	244	263	291	323	371	417	474	520	559	595
Compressor power input	1	[kW]	78,3	85,6	94,6	108	123	137	158	172	188	208
Total power input	2	[kW]	87,9	95,2	104	118	135	150	173	188	204	224
Partial recovery heating capacity	3	[kW]	64,5	69,8	77	86,3	98,7	110,8	126,4	138,3	149,5	160,7
EER	1	-	2,78	2,77	2,79	2,74	2,74	2,78	2,73	2,77	2,74	2,65
Water flow-rate (User Side)	1	[l/s]	11,7	12,6	13,9	15,4	17,7	19,9	22,7	24,8	26,7	28,4
Internal exchanger pressure drops	1	[kPa]	33,8	38,0	38,0	37,1	39,6	39,3	34,5	40,6	37,5	42,9
Cooling capacity (EN14511:2013)	4	[kW]	243	262	290	322	369	416	473	518	557	593
Total power input (EN14511:2013)	4	[kW]	88,7	96,1	105	119	137	151	175	189	206	226
EER (EN 14511:2013)	4	-	2,74	2,73	2,75	2,7	2,7	2,75	2,7	2,74	2,7	2,62
ESEER	4	-	3,94	3,99	4	3,99	3,97	4,09	4,07	4,12	4,11	4,02
Heating												
Heating capacity	5	[kW]	282	311	338	376	424	469	541	598	643	693
Compressor power input	5	[kW]	77,8	86,0	94,0	104	116	130	151	166	184	198
Total power input	2	[kW]	87,3	95,6	104	114	129	143	167	182	199	214
COP	5	-	3,23	3,25	3,26	3,31	3,30	3,28	3,24	3,29	3,23	3,23
Heating capacity (EN14511:2013)	6	[kW]	283	312	340	378	426	471	543	600	646	696
Total power input (EN14511:2013)	6	[kW]	88,5	97,1	105	115	131	145	169	184	202	217
COP (EN 14511:2013)	6	[kW]	3,23	3,25	3,26	3,31	3,30	3,28	3,24	3,29	3,23	3,23

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. 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) m2 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.

Acoustic configuration: super-silenced (EN)

General technical data - Performance

Size			90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
Cooling												
Cooling capacity	1	[kW]	232	255	279	307	355	400	451	499	537	563
Compressor power input	1	[kW]	82,4	89,3	98,6	115	129	143	166	179	199	224
Total power input	2	[kW]	89,4	96,3	106	122	138	152	178	191	211	235
Partial recovery heating capacity	3	[kW]	62,9	68,8	75,5	84,4	96,8	108,6	123,5	135,7	147,3	157,4
EER	1	-	2,59	2,65	2,64	2,52	2,58	2,63	2,54	2,62	2,55	2,40
Water flow-rate (User Side)	1	[l/s]	11,1	12,2	13,3	14,7	17,0	19,1	21,5	23,9	25,7	26,9
Internal exchanger pressure drops	1	[kPa]	31,2	35,0	35,4	34,0	36,5	35,9	31,5	37,6	34,4	38,7
Cooling capacity (EN14511:2013)	4	[kW]	231	254	278	307	354	399	450	498	535	562
Total power input (EN14511:2013)	4	[kW]	90,2	97,2	107	123	139	153	179	192	212	237
EER (EN 14511:2013)	4	-	2,56	2,62	2,61	2,50	2,55	2,60	2,51	2,59	2,52	2,37
ESEER	4	-	3,85	3,94	3,93	3,93	3,88	3,97	3,91	3,99	3,98	3,90
Heating												
Heating capacity	5	[kW]	282	311	338	376	424	469	541	598	643	693
Compressor power input	5	[kW]	77,8	86,0	94,0	104	116	130	151	166	184	198
Total power input	2	[kW]	87,3	95,6	104	114	129	143	167	182	199	214
COP	5	-	3,23	3,25	3,26	3,31	3,30	3,28	3,24	3,29	3,23	3,23
Heating capacity (EN14511:2013)	6	[kW]	283	312	340	378	426	471	543	600	646	696
Total power input (EN14511:2013)	6	[kW]	88,5	97,1	105	115	131	145	169	184	202	217
COP (EN 14511:2013)	6	[kW]	3,20	3,22	3,22	3,28	3,26	3,25	3,22	3,25	3,20	3,20

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. 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) m2 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.

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

General technical data - Construction

Size			90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
Compressor												
Type of compressors		-	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		[HP]	45	50	55	60	70	80	90	100	100	120
Rated power (C2)		[HP]	45	50	55	60	70	80	90	100	120	120
Std Capacity control steps		Nr	6	6	6	4	6	4	6	6	5	4
Oil charge (C1)		[l]	10	11	13	13	13	13	13	13	13	13
Oil charge (C2)		[l]	10	11	13	13	13	13	13	13	13	13
Refrigerant charge (C1)	1	[kg]	47	47	47	57	64	65	79	79	81	95
Refrigerant charge (C2)	1	[kg]	47	47	47	57	64	65	79	79	88	95
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2	2	2
Internal exchanger												
Type of internal exchanger	2	-	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Minimum system water content	3	[l]	22	22	24	29	32	37	49	49	62	62
External Section Fans												
Type of fans	4	-	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	6	6	6	6	8	8	10	10	10	10
Type of motor	5	-	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P
Standard airflow		[l/s]	37357	37357	36797	36365	49807	49063	62677	61219	60854	60489
Connections												
Water fittings		-	4"	4"	4"	4"	4"	4"	4"	5"	5"	5"
Power supply												
Standard power supply		V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50
Electrical data												
FLA Total		A	192,9	204,2	221,0	249,8	282,9	295,5	367,6	396,6	436,8	477,0
FLI Total		kW	117,7	128,6	138,2	155,8	180,7	201,9	231,2	252,4	275,8	299,2
M.I.C. - Value	6	A	485,3	496,6	513,4	542,2	658,8	687,8	917,1	946,1	986,3	1026,5
M.I.C. - with soft start accessory	6	A	347,5	358,8	375,6	404,4	486,8	515,8	757,1	786,1	826,3	866,5

1. Indicative values for standard units with possible +/-10% variation. The actual data are indicated on the label of the unit.
2. PHE = Plate exchanger
3. The minimum system water content calculated value does not consider the internal exchanger water content. With outdoor air low temperature applications or low medium requested loads, the minimum installation water volume is obtained doubling the indicated value
4. AX = axial fan
5. AC/P = asynchronous three-phase external rotor motor with phase cutting speed automatic control
   Unbalance between phase max 2 % Voltage variation: max +/- 10%
   Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.
6. M.I.C. = compressor 2 starting current + compressor 1 current at 75% of the max load + circuit 1 fan

Sound levels

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	109	107	90	83	75	68	62	60	92	72
100.4	108	106	90	83	75	68	61	58	92	72
110.4	108	106	90	83	76	69	62	59	92	72
120.4	108	106	90	83	76	69	62	59	92	72
140.4	109	107	91	84	78	71	63	59	92	72
160.4	110	108	92	85	80	73	65	61	93	73
180.4	110	108	100	85	77	71	66	62	95	75
200.4	110	108	100	85	78	72	66	62	95	75
220.4	109	107	101	84	77	71	66	62	95	74
240.4	108	106	101	83	74	69	65	61	95	74

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification.

Data referred to the following conditions.
- internal exchanger water = 12/7 °C
- Ambient temperature = 35 °C

EXCELLENCE VERSION

Acoustic configuration: super-silenced (EN)

General technical data - Construction

Size			90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
Compressor												
Type of compressors		-	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		[HP]	45	50	55	60	70	80	90	100	100	120
Rated power (C2)		[HP]	45	50	55	60	70	80	90	100	120	120
Std Capacity control steps		Nr	6	6	6	4	6	4	6	6	5	4
Oil charge (C1)		[l]	10	11	13	13	13	13	13	13	13	13
Oil charge (C2)		[l]	10	11	13	13	13	13	13	13	13	13
Refrigerant charge (C1)	1	[kg]	47	47	47	57	64	65	79	79	81	95
Refrigerant charge (C2)	1	[kg]	47	47	47	57	64	65	79	79	88	95
Refrigeration circuits		Nr	2	2	2	2	2	2	2	2	2	2
Internal exchanger												
Type of internal exchanger	2	-	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Minimum system water content	3	[l]	22	22	24	29	32	37	49	49	62	62
External Section Fans												
Type of fans	4	-	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	6	6	6	6	8	8	10	10	10	10
Type of motor	5	-	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P	AC/P
Standard airflow		[l/s]	30588	30588	29943	29570	40784	39924	50870	49776	49467	49159
Connections												
Water fittings		-	4"	4"	4"	4"	4"	4"	4"	5"	5"	5"
Power supply												
Standard power supply		V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50
Electrical data												
FLA Total		A	192,9	204,2	221,0	249,8	282,9	295,5	367,6	396,6	436,8	477,0
FLI Total		kW	117,7	128,6	138,2	155,8	180,7	201,9	231,2	252,4	275,8	299,2
M.I.C. - Value	6	A	485,3	496,6	513,4	542,2	658,8	687,8	917,1	946,1	986,3	1026,5
M.I.C. - with soft start accessory	6	A	347,5	358,8	375,6	404,4	486,8	515,8	757,1	786,1	826,3	866,5

1. Indicative values for standard units with possible +/-10% variation. The actual data are indicated on the label of the unit.
2. PHE = Plate exchanger
3. The minimum system water content calculated value does not consider the internal exchanger water content. With outdoor air low temperature applications or low medium requested loads, the minimum installation water volume is obtained doubling the indicated value
4. AX = axial fan
5. AC/P = asynchronous three-phase external rotor motor with phase cutting speed automatic control
   Unbalance between phase max 2 % Voltage variation: max +/- 10%
   Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.
6. M.I.C. = compressor 2 starting current + compressor 1 current at 75% of the max load + circuit 1 fan

Sound levels

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
90.4	106	100	78	80	73	65	55	52	86	66
100.4	106	100	80	81	74	66	55	51	86	66
110.4	106	100	80	81	75	67	57	53	86	66
120.4	106	100	80	82	75	67	57	53	86	66
140.4	105	99	79	81	76	68	57	52	86	66
160.4	106	100	81	83	79	71	59	53	87	67
180.4	107	102	93	83	76	69	61	57	90	69
200.4	108	102	93	83	78	70	61	56	90	69
220.4	108	102	94	83	77	70	62	57	90	69
240.4	107	101	94	82	74	68	61	57	90	69

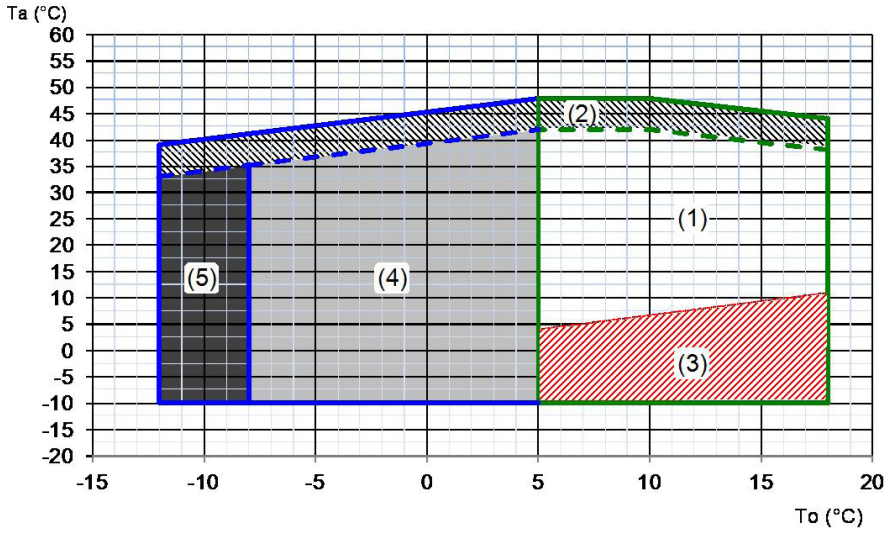
Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the standard unit outer surface operating in open field. Measures according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification.

Data referred to the following conditions.
- internal exchanger water = 12/7 °C
- Ambient temperature = 35 °C

The indicated sound levels are only valid within the operating field of the standard unit at full load as indicated in the 'Operating range - cooling' graph in the "Super-silenced EN" configuration. With outdoor air temperatures the unit operates at full load automatically increasing the airflow and taking the same sound levels of the "Soundproofed Compressors SC" configuration.

Operating range - Cooling

Compressor soundproofing (SC) / super-silenced (EN)

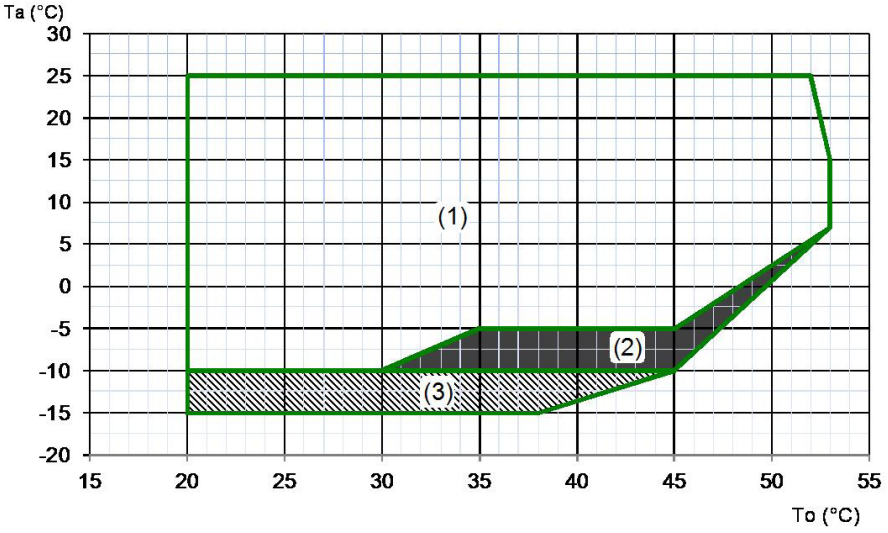


Ta (°C)= external exchanger inlet air temperature (D.B.)
To (°C)= internal exchanger outlet water temperature

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
4. Unit operating range in 'B - Low water temperature' configuration (40% ethylene glycol)
5. Extended of operating range (extremely low water temperature option available on request)

Operating range - Heating

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. Unti operating range with 'OHE - operating range extension kit up to -10°C (W.B.)
3. Range in which the unit operation is allowed only for a limited period (max 1 hour).

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	180.4	200.4	220.4	240.4
Qmin	[l/s]	7,4	7,4	8,0	9,3	10,1	11,5	14,3	14,3	16,4	16,4
Qmax	[l/s]	20,0	20,0	21,8	25,1	27,5	31,2	38,6	38,6	44,0	44,0

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 during inactivity in winter.

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]	-	-	3000
Max no. of compressor starts per hour		[n°]	-	-	10
High compressor discharge temperature safety thermostat		[°C]	-	-	120

Exchanger operating range

	Internal exchanger		
	DPr		DPw
PED (CE)	4500	4500	1000

DPr = Maximum operating pressure on refrigerant side in kPa

DPw = Maximum operating pressure on water side in kPa

Standard unit technical specifications - EXCELLENCE Version

Compressor

Hermetic orbiting scroll compressor complete with motor over-temperature and over-current devices and protection against excessive gas discharge temperature. Fitted on rubber antivibration mounts and complete with oil charge.

An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.

The compressors are connected in TANDEM, on a single refrigeration circuit. They have a biphasic oil equalisation and are equipped with supply cutoff valves.

Structure

Structure made entirely in Zinc–Magnesium plate that guarantees excellent mechanical characteristics and high corrosion strength over time. The entire structure has been sized with modern calculation tools and finished elements to ensure the maximum safety and sturdiness of the system.

Zinc-magnesium base painted with polyester powder RAL 9001.

Panelling

External pre-painted zinc-magnesium panelling 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 with braze welded stainless steel INOX AISI 316 plates and complete with external thermal/anti-condensation insulation.

The exchanger is complete with:

- 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.

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 fins are made from aluminium with a special corrugated surface, set a suitable distance apart to ensure maximum heat exchange efficiency.

A correct power supply to the expansion valve is ensured by the subcooling circuit; this circuit also prevents the formation of ice at the base of the heat exchanger during winter operation.

Protective coverings available on request.

Fan

Axial fans with sickle profile blades terminating with "Winglets", directly coupled to the three-phase electronic controlled motor with external rotor. Fans are housed in aerodynamically shaped structures, equipped with accident prevention guards and supplied with variable speed electronic control. Complete with Axitop diffusers to recover dynamic energy, resulting in increased efficiency and minimal sound emission; the Axitop difusser installation is provided by the Customer.

Refrigeration circuit

Refrigeration circuit with:

- replaceable anti-acid solid cartridge dehydrator filter
- sight glass with moisture and liquid indicator
- liquid receiver
- electronic expansion valve
- no-return valve
- 4-way reversing valve
- high pressure safety pressure switch
- high pressure safety switch
- low pressure safety switch
- cutoff valve on liquid line
- cutoff valve on compressor supply

Configurations

D - Partial energy recovery

B - Low water temperature

SC - Acoustic configuration with compressor soundproofing

EN - Super-silenced acoustic configuration

Electrical panel

The capacity section includes:
- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- compressor circuit breakers
- fan overload circuit breakers
- 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
- prealarm function for water anti-ice and high refrigerant gas pressure
- self-diagnosis system with immediate display of the error code
- automatic compressor start rotation control
- compressor operating hour display
- remote ON/OFF control
- remote HEAT/COOL control
- relay for remote cumulative fault signal
- inlet for demand limit (power input limitation according to a 0÷10V external signal)
- digital input for double set-point enabling
- potential-free contacts for compressor status
- electrical panel ventilation
- multifunction phase monitor

Accessories - Hydronic assembly

- HYDROPACK (n.b.: other types are available by head)
- Storage tank
- Storage tank with primary circuit with pump built-in the unit (n.b.: only for units complete with a Standard pump / Standard pump with a standby pump.
- 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

- Coil and technical compartment guards
- Anti-hail protection grilles
- Copper / aluminium condensing coil with acrylic lining
- Copper / aluminium condenser coil with Energy Guard DCC Aluminum
- Copper /copper condenser coil
- High and low pressure gauges
- Cutoff valve on compressor supply and return
- Couple of manual shut-off valves (accessory provided separately)
- Electrical panel ventilation
- Electrical panel antifreeze protection
- Power factor correction capacitors (cosfi > 0.9)
- ECOSHARE function for the automatic management of a group of units
- Breakaway current reducing device (SOFT STARTER)
- Serial communication module for BACnet-IP supervisor
- Serial communication module for Modbus supervisor
- Serial communication module for LonWorks supervisor
- ECOBREEZE external sectionfans consumption reduction device
- Device to reduce the consumption levels of On/OFF fans on the external section
- Remote control via microprocessor remote control (accessory separately supplied)
- Mains power supply unit (accessory separately supplied)
- Energy meter
- Set-point compensation with signal 0-10 V
- Set-point compensation with outdoor air temperature probe
- Limit extension kit in heating up to -10°C (W.B.)
- Spring antivibration mounts (supplied separately)

On request are available:
- copper /copper condenser coil with brass shoulders

Test

All the units are factory-tested in specific steps, 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.

Configurations

Consult the special prospective reported in the final section to check for compatibility between different options.

B - Low water 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 wter production down to -12°C is available on request.

D - Partial energy recovery

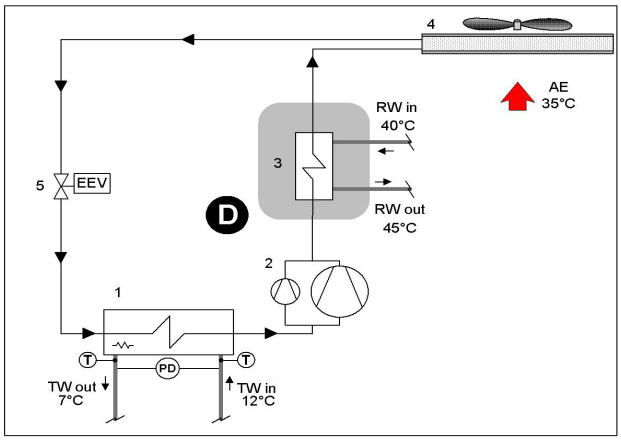
A configuration which enables the production of hot water free-of-charge while operating in the cooling mode, thanks to the partial recovery of condensation heat that would otherwise be disposed of into the external heat source.

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 20% 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

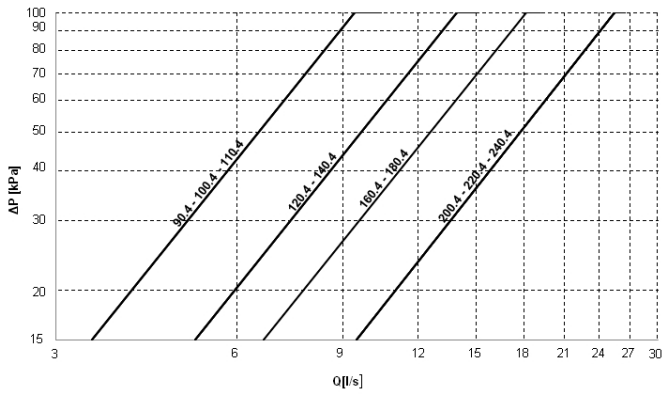
TW in chilled water inlet

TW out chilled water outlet

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

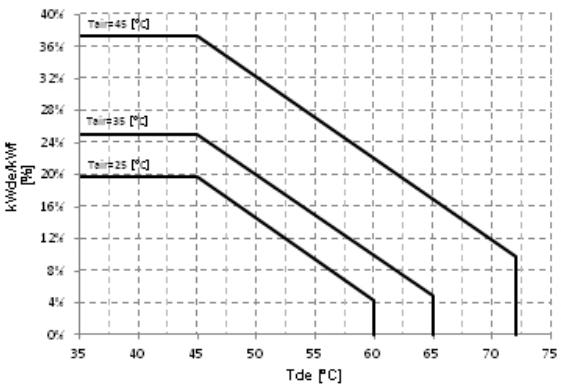
T - Temperature probe
PD - Differential pressure switch
AE Outdoor air

Pressure drops of partial energy recovery exchanger



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

Partial recovery heating capacity



kWde/kWf = Heating capacity/cooling capacity [%]
Tde = Leaving recovery exchanger water temperature [°C]

Example: Requested cooling capacity: 500 kW with chilled water at 12/7°C and 35°C outdoor air.
Size purpose of the study: WSAT-XSC3 EXC SC 180.4
Hot water required temperature: +45°C
Recovery capacity: 25% di 500 kW = 125 kW
Design flow-rate: 6,0 l/s

Efficient use of energy with heat recovery

In almost all systems fitted with a chiller used to produce chilled water there is also the need to have hot water. The recovery of condensation heat is an efficient way of producing hot water while the chiller is in operation. It has the double benefit of both reducing the heat load to the condenser, thereby eliminating dissipation costs and generating free hot water, thereby reducing the costs of the auxiliary heater.

Application versatility of recovery devices

The hot water produced by heat recovery can be used in a number of ways: to reheat air in handling units, to preheat hot water for domestic use or industrial processes, to heat up water in swimming pools, showers and spas, to preheat hot water for laundries or industrial kitchens.

Post-heating in air handling units to control humidity levels in hospitals and labs

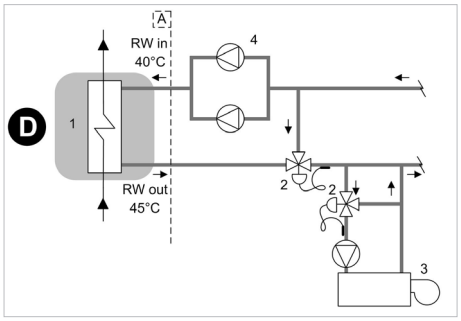
Preheating of hot water for domestic use or for industrial process

Heating of water in swimming pools, showers and SPAS

Preheating of hot water for laundries and industrial kitchens

Air heating

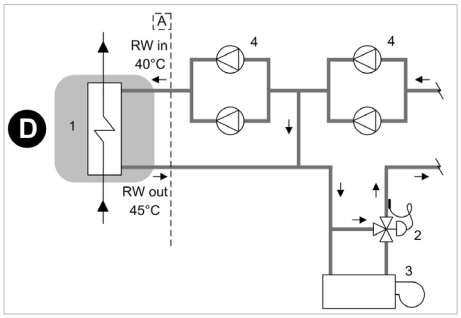
The heat recovery device can be used to cover the entire heat load required. The hot water supply temperature is controlled via a modulating control valve that needs to be fitted on the system at the outlet of the recovery unit. The auxiliary heating device is recommended to cover the thermal energy demand when the chiller is not in operation or is operating at part load.



Example of how heat recovery is used to cover the entire heat demand and control the operating temperature

Water preheating

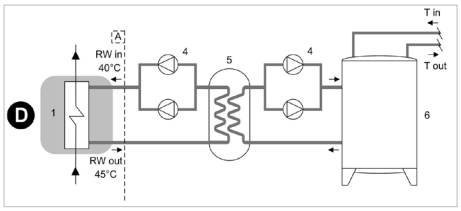
The heat recovery device can be used to preheat water at the inlet of the main heating device (e.g. boiler). In this case, the demand for hot water is greater than the amount of heat recovered by condensation and the recovery device only covers part of the required heat load. By preheating the water, heating consumption levels are therefore reduced and the main heating device has a lower installed power requirement.



Example of how heat recovery is used to preheat hot water in the system

Domestic hot water production

The heat recovery device can be used to produce water for domestic use. In order to prevent contamination of domestic water with the chiller's process fluid, it is necessary to insert an intermediate heat exchanger. Using an inertial heat storage tank allows to have a reserve of preheated water and enables the intermediate exchanger to operate more efficiently.



Example of how heat recovery is used to preheat hot water for domestic use

A - Unit supply limit
1 - Recovery exchanger
3 - Auxiliary heating device (ex.boiler)
5 - Intermediate heat exchanger
RW in - Recovery water input
T in - Drinkable water inlet

D - Partial energy recovery
2 - Control modulating valve
4 - Electric pump with standby pump
6 - Inertial heat storage
RW out - Recovery water output
T out - Drinkable water outlet to the auxiliary heater

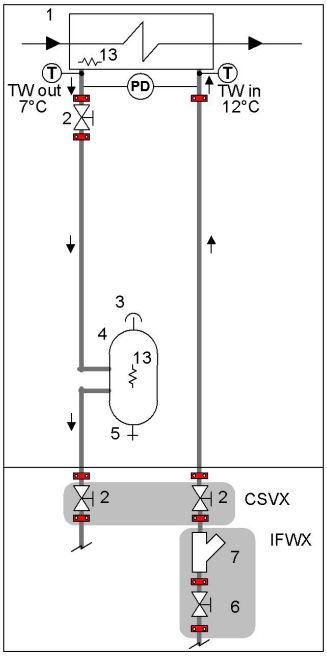
The diagrams refer to partial energy recovery, though they also apply to total energy recovery (Clivet R). Please note that the diagrams are only meant as a guide.

Accessories - Hydronic assembly

A550/A700/A900 - 550 / 700 / 900 l. storage tank

Option supplied built-in the unit. Steel storage tank complete with double layer covering with closed-cell insulation, stainless steel anti-freeze immersion resistance, bleed valve, draw off cock, cast-iron shut-off butterfly valve with quick connections and activation lever with a mechanical calibration lock at the evaporator output, quick connections with insulated casing. The various available models can be differentiated by capacity.

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
4 - Storage tank with antifreeze heater
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.

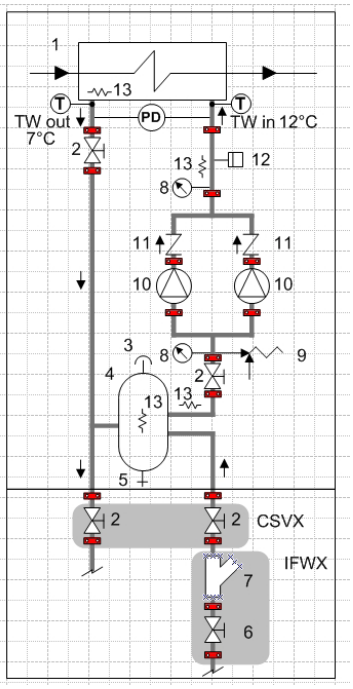
A550PPS/A700PPS/A900PPS - 550/700/900 l. storage tank with primary circuit with pump built-in

Option supplied built-in. Simplifies system design and manufacture. This accessory includes the components provided for the A550 / A700 / A900 options, as well as:

- primary circuit, already set up and tested inside the unit;
- cast-iron butterfly shut-off valve, with quick connections and activating handle and mechanical calibration lock in evaporator outlet and on the pump supply.
- 2PM - HYDROPACK with no. 2 of pumps or 3PM - HYDROPACK with no. 3 of pumps according to the size

Attention: option not compatible with DST control logic (Dynamic Supply Temperature) activable by the User.

If the water flow rate on the primary circuit is greater than the one on the secondary circuit, this allows to directly control the supply temperature to the secondary one. Vice versa, if the water flow rate on the primary circuit is lower than the one on the secondary circuit, this means the supply water is mixed with the system's return water and therefore there is no direct control over the temperature of the chilled water produced



1 - Internal exchanger
2 - Cutoff valve
3 - Purge valve
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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.

Built-in pump electrical data

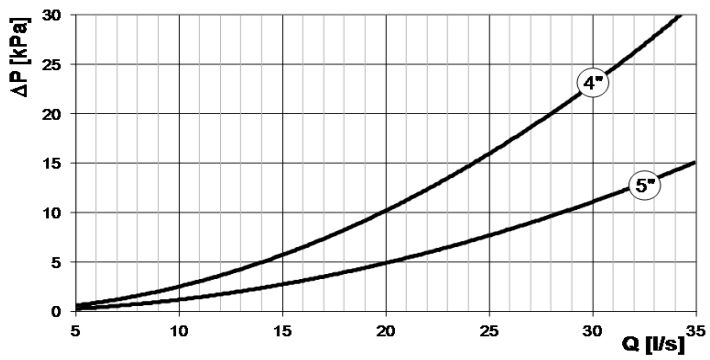
Size		90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
EXCELLENCE SC											
FLI	[kW]	3,6	3,6	3,6	3,6	3,6	3,6	3,6	5,4	5,4	5,4
FLA	[A]	6,8	6,8	6,8	6,8	6,8	6,8	6,8	10,2	10,2	10,2
EXCELLENCE EN											
FLI	[kW]	3,6	3,6	3,6	3,6	3,6	3,6	3,6	5,8	5,4	5,4
FLA	[A]	6,8	6,8	6,8	6,8	6,8	6,8	6,8	9,6	10,2	10,2

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 KNIT FILTER PRESSURE DROP



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

STEEL MESH FILTER FEATURES

EXCELLENCE	90.4-180.4	200.4-240.4
Diameter	4"	5"
Degree of filtration	1,6 mm	

PREMIUM	90.4-180.4	200.4-240.4
Diameter	4"	5"
Degree of filtration	1,6 mm	

Pressure drop referred to a clean filter

IInstallation is the responsibility of the Client, externally to the unit

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

Separately supplied accessory

HydroPack

2PM/PM - HydroPack with no.2/3 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 body and impeller made with AISI 304 steel.

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.

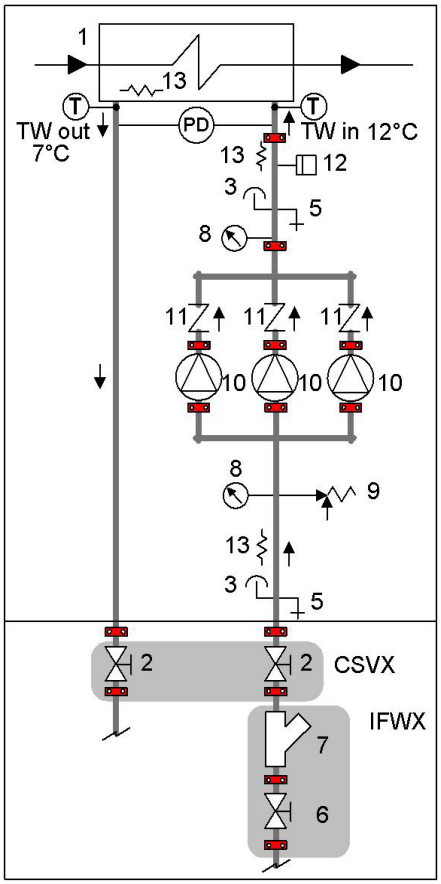
The various models which are available can be differentiated by the system available pressure.

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.

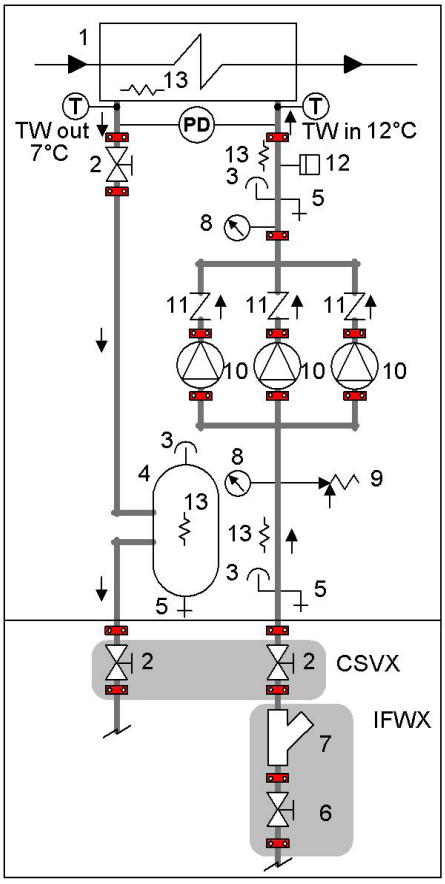
The 2PM / 3PM option is: - compatible with A550 / A700 / A900 options, 550 / 700 / 900 l. storage tank, not compatible with A550PPS / A700PPS / A900PPS options, 550 / 700 / 900 l. storage tank with primary circuit with pump built-in

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



HYDROPACK WITH STORAGE TANK



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

1 - Internal exchanger
2 - Cutoff valve
3 - Purge valve
4 - Storage tank with antifreeze heater
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
13 - Antifreeze heater
T - Temperature probe
PD - Differential pressure switch

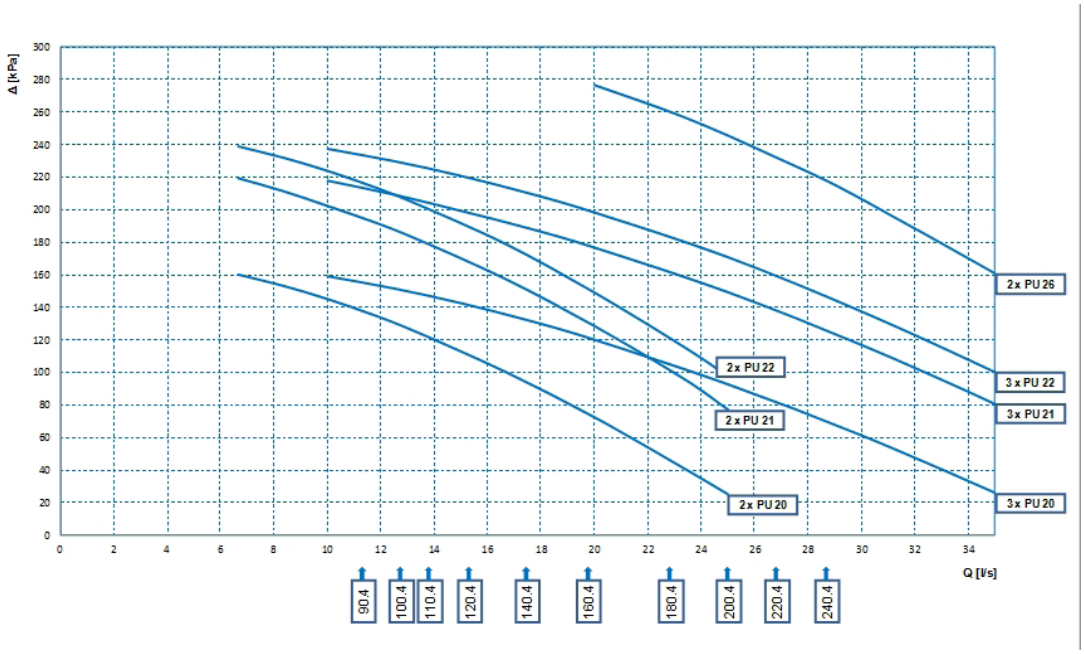
TW in chilled water inlet
TW out chilled water outlet

IFWX = Steel mesh strainer water side

The grey area indicates further optional components.

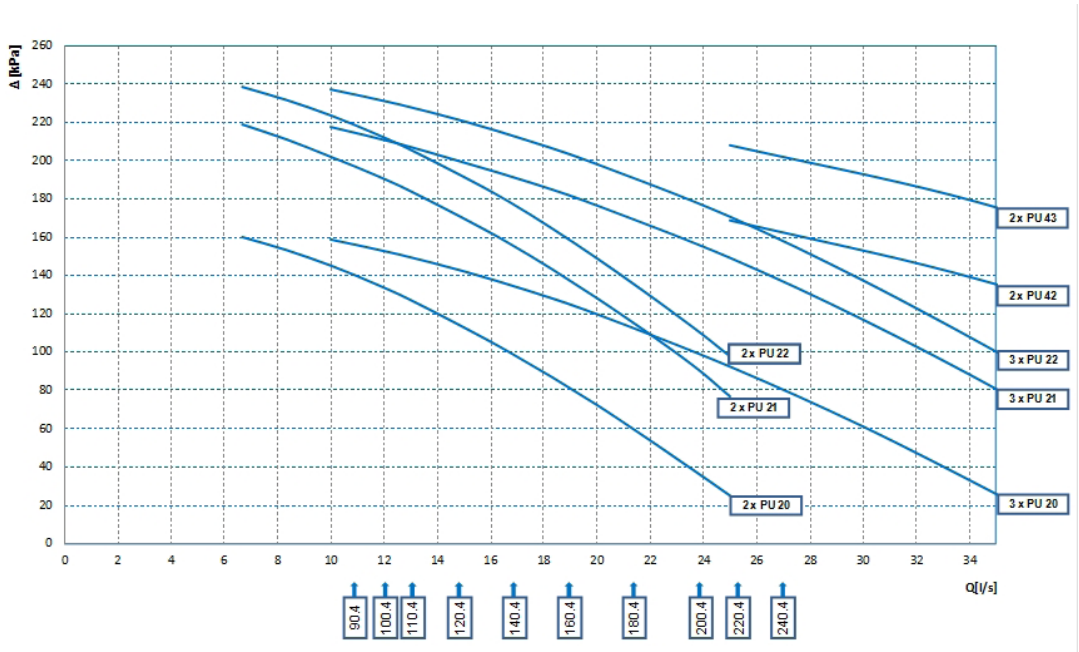
2PM/3PM option performances (HydroPack)

Excellence version (SC)



Q[l/s]= WATER FLOW RATE
DP [kPa] = PRESSURE DROPS
PU2* = 2-pole pump; PU4* = 4-pole pump

Excellence version (EN)



Q[l/s]= WATER FLOW RATE
DP [kPa] = PRESSURE DROPS
PU2* = 2-pole pump; PU4* = 4-pole pump

Caution: to obtain the available pressure values, you need to subtract the following from the head values represented in these diagrams: –Evaporator pressure drops –IFVX accessory –Steel mesh filter on the water side (where applicable)

Hydropack electrical data

PUMP	Rated power [kW]	Nominal power [A]	PUMP	Rated power [kW]	Nominal power [A]
2×2PU20	2×1.8	2×3.4	2×2PU43	2×7.5	2×15.4
2×2PU21	2×2.9	2×4.8	3×2PU20	2×1.8	3×3.4
2×2PU22	2×3.3	2×5.6	3×2PU21	2×2.9	3×4.8
2×2PU26	2×5.5	2×10.4	3×2PU22	2×3.3	3×5.6

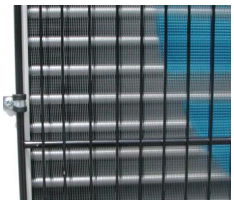
Accessories

PGFC- Coil guards

This accessory is used to protect the external coil from the accidental contact with external things or people.

Ideal for installation in places where persons can pass from, such as car parks, terraces, etc.

The accessory is provided and installed built-in the unit.



PGCCH - Condensing coil anti-hail protection grilles

These accessories are to protect the external coil from hail damage. Indeed, hail impact can deform the coil fins worsening the heat exchange with the air.

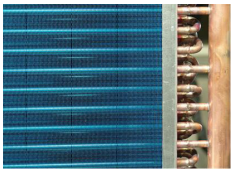
The accessory is provided and installed built-in the unit.

CCCA - Copper / aluminium condensing coil with acrylic lining

Coils with copper pipes and aluminium fins with acrylic lacquering. Can be used in settings with moderately aggressive saline low concentrations and other chemical agents.

Attention!

- Cooling capacity variation -2.7%
- variation in compressor power input +4.2%
- operating range reduction -2.1°C

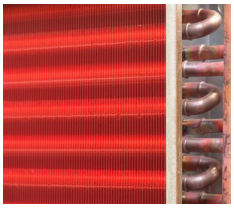


CCCA1 - Copper / aluminium condensing coils with Aluminium Energy Guard DCC treatment

A treatment which offers an optimal thermal exchange and guarantees and protects the finned coil exchangers from corrosion over time. 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.

CCCC - Copper / copper condensing coil

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 on request

MHP - High and low pressure gauges

Although the standard unit already displays digital parameters of pressures in the refrigeration circuit, this option allows analog display of refrigerant pressures on suction and discharge lines for ease of use by maintenance technicians.

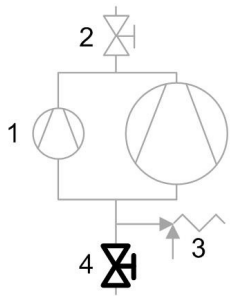
The two liquid pressure gauges and corresponding pressure sockets are installed on the machine in an easily accessible location.

The device is installed built-in the unit.

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.

The device is installed built-in the unit.



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

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

This option is necessary for very cold climates, where the external temperature can be between -10°C and -39°C. It includes self-regulating temperature maintaining resistances which are able to protect the electrical panel against condensation and frost guaranteeing that it functions correctly. The choice of device should be carried out on the basis of the minimum temperatures reached at the unit installation site.

The device is installed built-in the unit.

This accessory is necessary for the unit to operate correctly in the FCD (FREE-COOLING) configuration with external temperature at less than -10°C. Furthermore, it is necessary for correct unit maintenance (not operations) in all the remaining configurations.

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.

PFCP - Power-factor 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

The device allows automatic management of units that operate on the same hydraulic circuit, by creating a local communication network. There are two control modes that can be set via a parameter during the activation stage. They both distribute the heat load on the available units by following the distribution logic to benefit from efficiency levels at part load.

Moreover:

Mode 1 - it keeps all the pumps active

Mode 2 - it 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. There are various unit sizes. Every unit must be fitted with the ECOSHARE feature. 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).

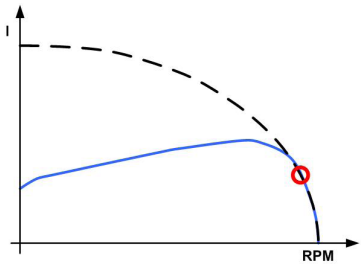
The unit supplied with this device can also be equipped at the same time with the RCMRX option and one of the CMSC11 / CMSC9 / CMSC10 options.

SFSTR – Starting current reduction device (SOFT STARTER)

This option is also known as "Soft starter". An 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 electrical capacity system and the related protection devices being sized with lower parameters, thus having a lower initial investment cost.

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



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

CMSC11 - Serial communication module for BACnet-IP supervisor

This enables 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.

The device is 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

This enables 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.

The device is 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

This enables 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.

The device is 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)

CREFB - ECOBREEZE external section fans consumption reduction device

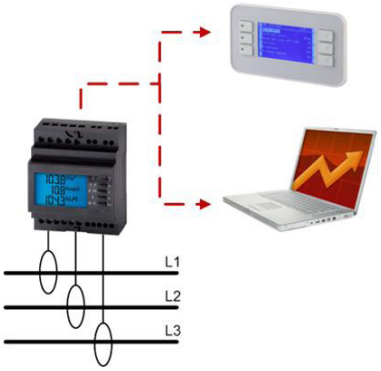
An option which regards the external helical fans, as an alternative to the phase-cut device which is supplied as standard in SC version. It provides for an IP54 brushless electronically commutated electrical motor and incorporated thermal protection. Supplied with variable speed control.

CONTA2 - Energy meter

Allows to display and record the unit's main electrical parameters. The data can be displayed with the user interface on the unit 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.

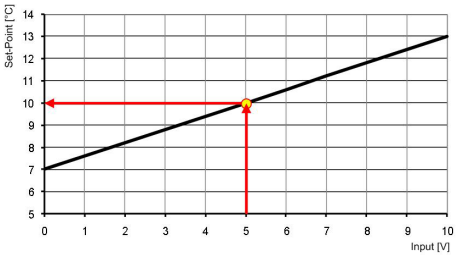


Only the following parameters are available on the LonWorks protocol: absorbed power (kW) and absorbed energy (kWh)

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

This device enables the set-point to be varied which is pre-set using an external 0÷10 V signal.

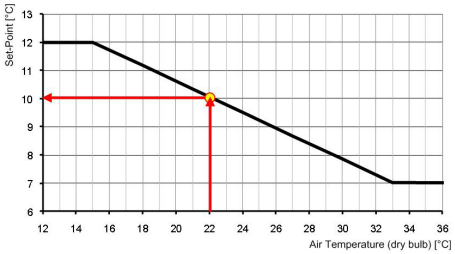
The device is installed and wired built-in the unit.



SPC2 - Set-point compensation with outdoor temperature probe

This device enables the set-point to be varied automatically which is pre-set depending on the enthalpy of the outdoor air. This device enables the liquid flow temperature to be obtained, which varies depending on external conditions, enabling energy savings throughout the entire system.

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



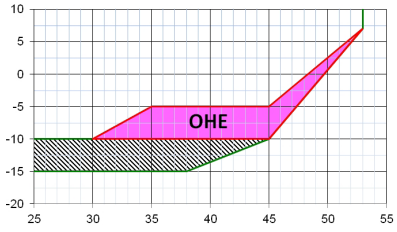
SPC1 - Set-point compensation with 4-20 mA signal o 10-10 V

Il dispositivo consente la variazione del set-point pre-impostato attraverso un segnale esterno di tipo 4÷20 mA. o 0-10 V

OHE - Limit extension kit in heating up to -10°C (W.B.)

The device allows to extend heating unit operation fields up to -10°C wet bulb outdoor yemperature. Clivet automatic control ensures the ongoing operation at the unit full capacity.

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



Accessories separately supplied

CSVX - Couple of manual shut-off valves

Il kit allows to isolate the hydraulic circuit at the inlet and outlet.

It includes:

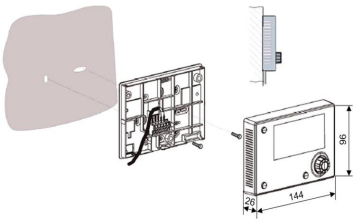
- no. 2 cast-iron shut-off butterfly valves with fast fittings and activation lever with a mechanical calibration lock
- no. 2 of quick connections

Installation is the responsibility of the Client, externally to the unit.

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.

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

AMMX - Spring antivibration mounts

The spring 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.

EXCELLENCE VERSION

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	263	64	247	70	229	77	209	86	201	91	70	28
	6	270	64	255	71	238	78	215	88	208	91	73	28
	7	279	65	263	71	244	78	221	88	214	91	75	29
	10	298	66	280	73	258	80	235	89	229	93	80	29
	15	334	69	312	75	290	83	268	92	164	49	92	31
	18	356	71	333	78	310	85	285	96	179	50	98	32
100.4	5	282	70	267	76	249	85	227	95	218	98	92	36
	6	294	70	277	77	255	86	234	96	226	100	95	37
	7	302	71	284	78	263	86	237	97	234	101	98	37
	10	323	72	304	80	279	88	255	99	249	105	105	39
	15	358	76	337	82	312	91	291	102	194	61	119	40
	18	384	78	361	85	332	94	313	107	212	63	128	41
110.4	5	316	76	296	84	276	93	251	105	242	111	142	62
	6	327	77	307	85	283	94	258	106	250	111	148	62
	7	335	78	314	86	291	95	265	106	258	112	152	62
	10	359	80	336	88	310	96	281	109	269	116	159	65
	15	399	82	372	91	345	100	324	115	193	61	188	68
	18	426	85	398	93	366	103	349	119	211	62	202	70
120.4	5	350	88	331	96	305	106	280	118	270	124	142	61
	6	360	88	339	97	316	107	290	119	280	126	147	62
	7	373	89	351	98	323	108	296	121	285	128	150	63
	10	399	91	372	100	342	110	313	123	301	131	159	64
	15	446	95	417	104	384	115	359	128	201	58.7	178	67
	18	473	98	445	107	412	118	387	134	215	59.6	190	69
140.4	5	401	100	377	110	349	121	322	134	308	142	148	60
	6	412	101	388	111	359	121	332	134	321	143	154	60
	7	426	102	401	112	371	123	341	136	329	144	158	61
	10	454	105	425	114	391	125	361	138	349	149	168	63
	15	500	109	469	119	435	130	413	148	251	78.3	194	67
	18	538	113	499	123	465	134	444	154	273	80.2	209	69
160.4	5	453	112	428	122	395	134	359	150	346	160	183	80
	6	465	113	439	123	407	135	370	151	358	160	190	80
	7	480	115	453	125	417	137	381	152	370	162	196	80
	10	506	118	476	127	440	139	402	154	397	165	211	82
	15	566	123	527	133	490	146	453	160	265	73.9	235	85
	18	600	127	565	137	523	151	483	163	284	75.0	249	86
180.4	5	522	127	489	141	452	155	413	175	401	182	151	60
	6	541	129	505	142	467	157	423	176	411	184	155	61
	7	551	130	515	143	474	158	431	176	419	185	158	62
	10	578	133	539	145	497	160	464	181	439	190	165	63
	15	647	139	603	152	558	166	519	189	355	117	184	66
	18	692	143	642	156	595	171	552	194	387	119	195	68

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

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

Cooling performance (continued)

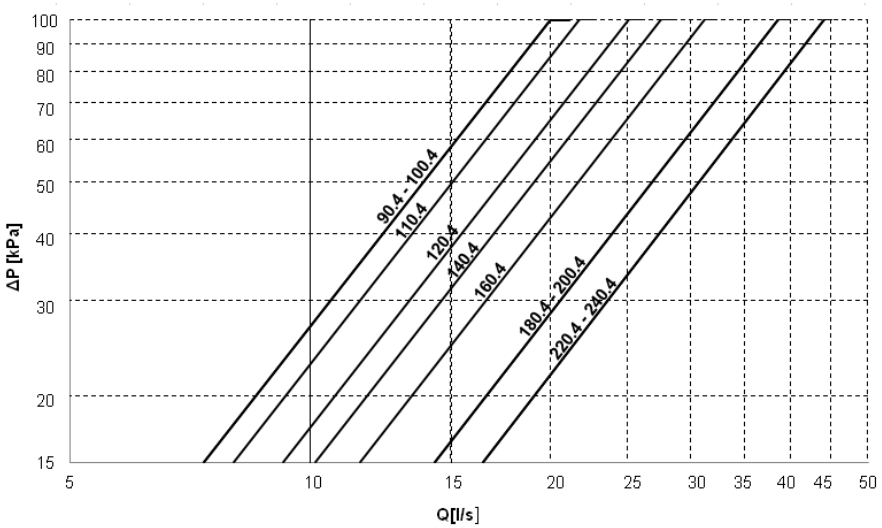
Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
200.4	5	569	141	533	154	496	169	458	185	448	192	274	119
	6	583	143	547	156	511	170	473	187	460	193	282	119
	7	599	145	561	157	520	172	482	188	471	194	288	120
	10	626	148	588	160	543	175	505	190	493	198	302	122
	15	689	155	652	169	608	183	572	199	380	112	345	128
	18	741	160	695	174	650	188	613	205	413	114	371	133
220.4	5	617	155	581	170	534	187	486	209	471	219	265	119
	6	633	157	596	171	547	188	499	209	480	222	271	121
	7	645	158	607	171	559	188	506	211	490	226	276	123
	10	675	160	631	174	581	192	525	218	519	233	292	127
	15	753	168	704	182	651	201	606	231	372	122	326	133
	18	802	173	748	188	694	206	659	235	406	125	345	137
240.4	5	656	171	617	187	570	207	514	227	502	242	262	118
	6	672	173	635	188	583	208	529	229	513	246	268	120
	7	685	175	647	188	595	208	543	232	524	249	273	122
	10	718	176	672	192	619	212	561	240	555	259	290	127
	15	798	184	744	200	693	220	646	255	370	116	327	135
	18	848	190	790	208	737	227	701	258	397	118	360	140

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

Internal exchanger pressure drop

Acoustic configuration: compressor soundproofing (SC)



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)

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.

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC) /

Acoustic configuration: super-silenced (EN)

Heating performance

Size	Ta (°C)	Leaving internal exchanger water temperature (°C) - Thermal gradient 5°C									
		30		35		40		45		50	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
90.4	-5 / -5.4	219	61	217	68	213	76	210	85	209	90
	0 / -0.6	248	63	245	69	240	76	235	85	234	90
	5 / 3.9	280	64	275	70	268	77	261	86	260	91
	7 / 6	297	64	290	71	282	78	273	87	272	92
	10 / 8.2	315	64	311	72	213	60	292	88	291	93
	15 / 13	363	66	348	72	107	30	329	89	328	94
100.4	-5 / -5.4	240	68	237	75	234	84	229	93	227	99
	0 / -0.6	273	69	270	76	264	85	259	95	258	100
	5 / 3.9	307	70	302	78	296	86	289	96	288	102
	7 / 6	325	71	319	78	311	86	303	96	302	102
	10 / 8.2	349	71	341	79	333	87	323	97	323	103
	15 / 13	398	73	386	81	377	89	364	99	364	105
110.4	-5 / -5.4	262	74	259	82	254	91	248	102	246	108
	0 / -0.6	299	76	294	84	288	92	281	103	279	109
	5 / 3.9	334	77	329	85	321	93	312	104	311	110
	7 / 6	354	77	346	86	338	94	330	105	327	111
	10 / 8.2	380	78	371	86	362	95	352	106	349	112
	15 / 13	432	80	421	88	409	97	396	108	394	114
120.4	-5 / -5.4	291	83	288	92	285	102	281	114	280	121
	0 / -0.6	332	84	326	93	320	103	314	114	314	121
	5 / 3.9	373	85	364	94	357	103	349	116	346	122
	7 / 6	394	86	386	95	376	104	365	116	365	123
	10 / 8.2	423	87	413	96	402	105	390	117	392	125
	15 / 13	483	89	468	98	455	107	439	120	443	127
140.4	-5 / -5.4	330	92	329	101	323	112	319	125	318	132
	0 / -0.6	375	93	370	103	364	114	355	126	357	134
	5 / 3.9	420	95	414	105	403	115	397	129	394	136
	7 / 6	445	96	435	106	424	116	416	130	414	137
	10 / 8.2	478	98	465	107	453	118	442	131	441	138
	15 / 13	544	100	528	110	512	120	499	134	496	141
160.4	-5 / -5.4	366	101	362	111	355	123	349	136	346	143
	0 / -0.6	415	104	408	114	398	126	391	139	391	147
	5 / 3.9	464	106	456	117	445	128	436	142	432	150
	7 / 6	490	107	480	118	469	130	457	143	455	151
	10 / 8.2	525	109	514	120	500	131	488	145	485	153
	15 / 13	600	113	584	123	566	135	551	149	545	156
180.4	-5 / -5.4	424	118	420	132	414	147	405	165	400	176
	0 / -0.6	477	121	474	134	464	149	455	166	452	178
	5 / 3.9	534	123	525	135	516	150	505	168	500	179
	7 / 6	563	123	554	136	541	151	529	169	526	180
	10 / 8.2	602	125	589	137	574	152	564	170	558	181
	15 / 13	685	127	667	140	647	154	634	172	627	183

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.
kWe = Compressor power input in kW
Ta = Entering external exchanger air temperature
W.B. = Wet bulb
D.B. = Dry bulb

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC) /

Acoustic configuration: super-silenced (EN)

Heating performance

(continued)

Size	Ta (°C)	Leaving internal exchanger water temperature (°C) - Thermal gradient 5°C									
		30		35		40		45		50	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
200.4	-5 / -5.4	467	129	464	144	456	160	445	178	437	190
	0 / -0.6	529	132	521	146	512	162	501	181	494	193
	5 / 3.9	592	135	582	149	572	165	557	184	553	195
	7 / 6	620	136	611	150	598	166	581	185	578	196
	10 / 8.2	663	137	651	152	636	168	618	186	613	198
	15 / 13	753	141	735	155	717	171	693	190	688	201
220.4	-5 / -5.4	503	144	500	160	491	178	475	199	469	213
	0 / -0.6	568	146	560	162	551	181	537	202	531	216
	5 / 3.9	637	149	626	165	612	183	597	204	590	218
	7 / 6	667	150	658	166	643	184	627	206	622	219
	10 / 8.2	712	152	701	168	683	185	665	207	659	220
	15 / 13	807	155	791	171	767	188	745	210	738	223
240.4	-5 / -5.4	542	155	539	172	528	192	513	216	502	231
	0 / -0.6	610	158	603	175	591	195	580	219	570	234
	5 / 3.9	684	160	672	177	657	197	642	221	635	236
	7 / 6	716	161	705	179	693	198	672	222	669	237
	10 / 8.2	763	162	751	180	735	200	715	224	708	238
	15 / 13	861	165	847	183	823	202	802	226	791	240

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.
kWe = Compressor power input in kW
Ta = Entering external exchanger air temperature
W.B. = Wet bulb
D.B. = Dry bulb

Integrated heating capacities

Entering external exchanger air temperature °C (D.B. / W.B.)	-5 / -5.4	0 / -0.6	5 / 3.9	Others
Heating capacity multiplication coefficient	0,89	0,88	0,94	1

The integrated heating capacity represents the real heating capacity considering the defrost cycles too.
To obtain the integrated heating capacity multiply the heating performance value in kWt (shown in the heating performance tables) by the coefficients indicated in the table.
DB = dry bulb
WB = wet bulb
In case of below zero outdoor air temperature with a long period of heat pump operating mode it is necessary to help the evacuation of the water produced during the defrost cycle; this to avoid the formation of ice in the unit basement. Pay
attention that the evacuation will not create inconveniences to things or persons.

EXCELLENCE VERSION

Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		39		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
90.4	5	253	67	237	73	221	81	204	89	201	91	70.4	28
	6	262	67	246	74	226	82	210	90	208	91	72.5	28
	7	269	68	251	75	232	82	215	90	214	91	74.7	29
	10	288	70	268	76	247	84	230	91	229	93	80.1	29
	15	321	73	298	80	278	89	258	94	164	49	-	-
	18	342	75	321	82	295	91	275	96	179	50	-	-
100.4	5	279	72	261	80	242	88	222	97	218	98	91.7	36
	6	287	73	268	80	249	88	231	97	226	100	94.8	37
	7	297	74	277	81	255	89	236	98	234	101	98.2	37
	10	315	76	295	83	271	91	253	100	249	105	105	39
	15	351	79	329	86	305	95	282	104	194	61.1	-	-
	18	377	81	350	89	325	99	299	106	212	63.2	-	-
110.4	5	305	80	287	88	263	97	244	108	242	111	142	62
	6	315	81	294	89	271	98	253	108	250	111	148	62
	7	326	82	303	90	279	99	256	109	258	112	152	62
	10	346	83	322	91	295	101	274	111	269	116	159	65
	15	385	87	359	96	331	107	308	115	193	60.9	-	-
	18	409	89	382	98	353	109	329	117	211	62.3	-	-
120.4	5	337	93	315	102	290	113	273	123	270	124	142	61
	6	348	94	326	103	301	114	281	124	280	126	147	62
	7	357	95	334	104	307	115	287	126	285	128	150	63
	10	379	98	354	107	325	117	306	129	301	131	159	64
	15	421	102	394	111	365	124	342	134	201	58.7	-	-
	18	454	105	420	115	391	126	363	137	215	59.6	-	-
140.4	5	389	104	367	115	339	126	316	137	308	142	148	60
	6	404	106	377	116	347	127	327	139	321	143	154	60
	7	413	107	386	117	355	129	332	141	329	144	158	61
	10	437	110	409	120	376	131	350	147	349	149	168	63
	15	486	116	452	126	422	139	398	154	251	78.3	-	-
	18	514	119	482	130	450	143	424	158	273	80.2	-	-
160.4	5	442	116	412	127	380	140	357	153	346	160	183	80
	6	453	117	426	129	391	141	368	154	358	160	190	80
	7	468	119	436	130	400	143	373	156	370	162	196	81
	10	493	122	458	133	421	146	388	160	397	165	211	82
	15	545	128	508	140	471	155	442	166	265	73.9	-	-
	18	579	133	540	144	499	159	470	170	284	75.0	-	-
180.4	5	503	136	469	149	434	163	400	182	401	182	151	61
	6	518	137	481	151	444	165	409	183	411	184	155	61
	7	530	138	491	152	451	166	417	184	419	185	158	62
	10	556	141	514	154	474	169	443	186	439	190	165	63
	15	617	148	575	162	534	178	486	191	355	117	-	-
	18	655	152	610	166	568	184	512	196	387	119	-	-

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

EXCELLENCE VERSION

Acoustic configuration: super-silenced (EN)

Cooling performance (continued)

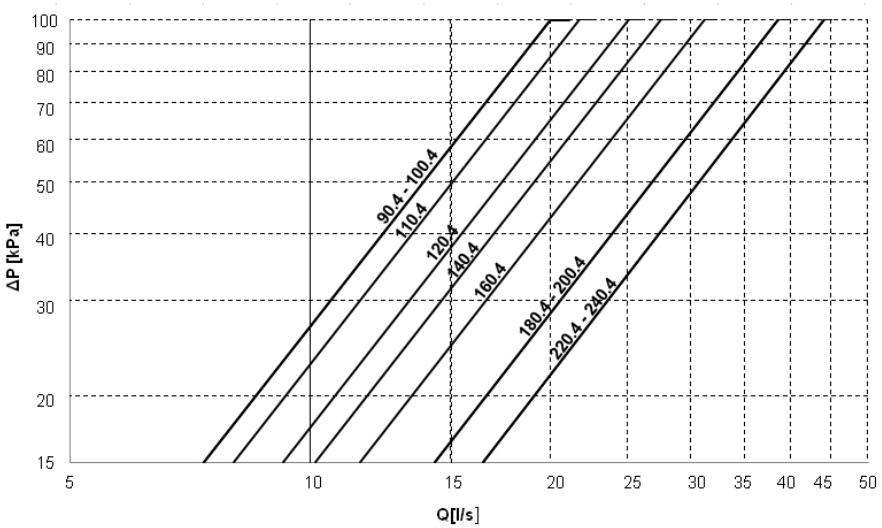
Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		39		42		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
200.4	5	549	148	514	161	476	176	450	189	448	192	274	119
	6	563	150	526	163	488	177	463	191	460	193	282	119
	7	572	151	537	165	499	179	472	192	471	194	288	120
	10	601	155	561	168	522	183	494	195	493	198	302	122
	15	662	163	622	177	586	192	562	206	380	112	-	-
	18	704	168	658	182	622	198	594	210	413	114	-	-
220.4	5	605	161	563	177	516	196	477	218	471	219	265	119
	6	620	163	576	179	528	198	487	221	481	222	271	121
	7	632	164	587	180	537	199	497	220	490	226	276	123
	10	660	167	611	183	557	203	525	227	519	233	292	127
	15	732	176	679	192	627	215	573	237	372	122	-	-
	18	777	181	724	198	668	223	602	242	406	125	-	-
240.4	5	634	181	589	198	541	219	501	245	502	242	262	118
	6	648	183	603	200	554	221	512	249	513	246	268	120
	7	663	184	616	202	563	224	523	249	524	249	273	122
	10	691	187	640	205	584	227	549	254	555	259	290	127
	15	763	196	708	214	655	240	602	264	370	116	-	-
	18	809	202	755	222	702	246	634	270	397	118	-	-

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

Internal exchanger pressure drop

Acoustic configuration: super-silenced (EN)



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)

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.

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

Cooling performance at part load

Size	STEP	External exchanger entering air temperature (°C)											
		35			30			25			20		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
90.4	6	244	88	2,78	259	81	3,20	268	75	3,59	281	69	4,09
	5	212	73	2,90	225	68	3,34	234	62	3,75	244	57	4,27
	4	177	58	3,07	187	53	3,54	195	49	3,98	203	45	4,53
	3	136	43	3,13	144	40	3,61	150	37	4,05	156	34	4,61
	2	92	29	3,16	98	27	3,64	102	25	4,09	106	23	4,66
	1	45	15	3,01	47	14	3,47	49	13	3,90	51	12	4,44
100.4	6	263	95	2,77	279	88	3,19	290	81	3,58	303	74	4,08
	5	224	77	2,92	237	70	3,36	246	65	3,78	257	60	4,30
	4	179	57	3,17	190	52	3,65	197	48	4,10	206	44	4,67
	3	150	46	3,24	159	43	3,73	165	39	4,19	172	36	4,78
	2	118	36	3,30	126	33	3,81	130	30	4,28	136	28	4,87
	1	57	18	3,13	60	17	3,61	62	15	4,05	65	14	4,62
110.4	6	291	104	2,79	308	96	3,21	320	89	3,61	334	81	4,11
	5	241	81	2,97	255	74	3,43	265	69	3,85	277	63	4,38
	4	183	57	3,23	194	52	3,72	201	48	4,18	210	44	4,76
	3	166	50	3,29	176	46	3,80	183	43	4,26	191	39	4,86
	2	149	44	3,37	158	41	3,88	164	38	4,36	171	35	4,97
	1	71	22	3,20	76	21	3,69	79	19	4,14	82	17	4,72
120.4	4	323	118	2,74	343	109	3,15	356	102	3,50	372	93	3,98
	3	255	87	2,92	270	80	3,36	280	75	3,73	293	69	4,25
	2	183	55	3,30	193	51	3,80	201	48	4,22	210	44	4,81
	1	90	28	3,22	95	26	3,71	99	24	4,12	103	22	4,69
140.4	6	371	135	2,74	393	125	3,15	408	115	3,54	426	106	4,03
	5	305	104	2,92	323	96	3,36	336	89	3,78	351	82	4,30
	4	235	72	3,25	249	66	3,75	259	61	4,21	270	56	4,80
	3	214	64	3,32	227	59	3,82	235	55	4,29	246	50	4,89
	2	194	57	3,41	205	52	3,93	213	48	4,42	223	44	5,03
	1	93	29	3,25	98	26	3,74	102	24	4,20	107	22	4,79
160.4	4	417	150	2,78	442	138	3,21	459	129	3,56	480	118	4,05
	3	328	111	2,97	348	102	3,42	361	95	3,79	377	87	4,32
	2	234	71	3,28	248	65	3,78	257	61	4,20	269	56	4,78
	1	115	36	3,21	122	33	3,70	126	31	4,11	132	28	4,68
180.4	6	474	173	2,73	503	160	3,15	522	147	3,54	545	135	4,03
	5	410	141	2,90	434	130	3,34	451	120	3,75	471	110	4,28
	4	350	109	3,20	371	101	3,69	385	93	4,14	403	85	4,72
	3	251	83	3,04	266	76	3,50	276	70	3,94	289	64	4,48
	2	199	58	3,45	211	53	3,97	219	49	4,46	229	45	5,08
	1	90	29	3,14	96	26	3,61	99	24	4,06	104	22	4,62
200.4	6	520	188	2,77	551	173	3,20	572	159	3,59	598	146	4,09
	5	437	147	2,97	463	135	3,42	481	125	3,85	503	115	4,38
	4	354	107	3,30	375	99	3,80	389	91	4,26	407	84	4,86
	3	295	88	3,36	312	81	3,87	324	75	4,35	339	68	4,95
	2	246	70	3,53	260	64	4,07	270	59	4,57	283	54	5,21
	1	123	35	3,50	130	32	4,03	135	30	4,53	141	27	5,16
220.4	6	559	204	2,73	593	188	3,15	615	174	3,54	643	159	4,03
	5	473	165	2,86	501	152	3,30	520	140	3,71	544	129	4,22
	4	347	106	3,26	367	98	3,76	381	90	4,22	399	83	4,81
	3	291	86	3,36	308	80	3,87	320	74	4,35	334	67	4,96
	2	172	51	3,34	182	47	3,85	189	44	4,32	197	40	4,92
	1	117	35	3,30	124	33	3,80	129	30	4,27	134	28	4,87
240.4	4	595	224	2,65	631	206	3,06	655	193	3,39	684	177	3,86
	3	471	164	2,87	499	151	3,30	518	141	3,67	541	130	4,17
	2	354	104	3,39	375	96	3,90	389	90	4,33	407	82	4,93
	1	176	52	3,36	187	48	3,87	194	45	4,30	203	41	4,89

kWf = Cooling capacity in kW kWe_tot = Unit total power input in kW
STEP = Active capacity steps (the maximum number indicates full capacity / the minimum number indicates the smallest partialization step)
Internal exchanger water = output temperature 7°C/ input * (variable) / constant flow equal to the nominal value.

EXCELLENCE VERSION

Acoustic configuration: super-silenced (EN)

Cooling performance at part load

Size	STEP	External exchanger entering air temperature (°C)											
		35			30			25			20		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
90.4	6	232	89	2,59	246	82	2,99	255	76	3,36	267	70	3,82
	5	204	74	2,77	216	68	3,19	224	63	3,58	235	57	4,08
	4	175	58	3,03	186	53	3,49	193	49	3,92	202	45	4,46
	3	135	44	3,08	143	40	3,55	148	37	3,99	155	34	4,54
	2	92	29	3,11	97	27	3,59	101	25	4,03	105	23	4,59
	1	44	15	2,97	47	14	3,42	49	13	3,84	51	12	4,38
100.4	6	255	96	2,65	270	89	3,05	280	82	3,43	293	75	3,90
	5	218	76	2,85	231	70	3,29	240	65	3,69	251	60	4,21
	4	182	56	3,24	192	52	3,73	200	48	4,19	209	44	4,78
	3	152	46	3,31	161	42	3,82	167	39	4,29	174	36	4,89
	2	120	36	3,38	127	33	3,89	132	30	4,37	138	28	4,98
	1	58	18	3,20	61	17	3,69	63	15	4,14	66	14	4,72
110.4	6	279	106	2,64	296	97	3,04	307	90	3,42	321	82	3,89
	5	231	81	2,84	244	75	3,28	254	69	3,68	265	63	4,19
	4	182	57	3,22	193	52	3,71	200	48	4,17	210	44	4,75
	3	166	50	3,29	175	46	3,79	182	43	4,26	190	39	4,85
	2	148	44	3,36	157	41	3,87	163	38	4,35	171	34	4,96
	1	71	22	3,19	75	21	3,68	78	19	4,13	82	17	4,71
120.4	4	307	122	2,52	326	112	2,90	338	105	3,22	353	96	3,67
	3	246	89	2,75	260	82	3,17	270	77	3,52	283	70	4,01
	2	183	56	3,24	193	52	3,73	201	49	4,14	210	45	4,71
	1	90	28	3,16	95	26	3,64	99	24	4,04	103	22	4,59
140.4	6	355	138	2,58	377	127	2,97	391	117	3,34	409	107	3,80
	5	296	105	2,81	313	97	3,24	325	89	3,64	340	82	4,14
	4	235	72	3,25	249	67	3,74	259	62	4,20	270	57	4,79
	3	214	65	3,31	227	59	3,81	235	55	4,28	246	50	4,88
	2	194	57	3,40	205	52	3,92	213	48	4,40	223	44	5,02
	1	93	29	3,24	98	26	3,73	102	24	4,19	107	22	4,77
160.4	4	400	152	2,63	424	140	3,03	440	131	3,36	460	120	3,83
	3	318	111	2,86	337	102	3,29	349	96	3,65	365	88	4,16
	2	236	71	3,32	250	65	3,83	259	61	4,25	271	56	4,84
	1	116	36	3,25	123	33	3,75	127	31	4,16	133	28	4,74
180.4	6	451	178	2,54	478	164	2,92	496	151	3,28	519	139	3,74
	5	392	144	2,73	415	132	3,14	431	122	3,53	450	112	4,02
	4	333	109	3,06	353	100	3,52	366	93	3,96	383	85	4,51
	3	238	82	2,90	253	76	3,35	262	70	3,76	274	64	4,28
	2	189	58	3,29	201	53	3,79	208	49	4,26	218	45	4,85
	1	86	29	2,99	91	26	3,45	94	24	3,87	98	22	4,41
200.4	6	499	191	2,62	529	175	3,02	549	162	3,39	574	149	3,86
	5	422	148	2,86	447	136	3,29	464	125	3,70	485	115	4,21
	4	345	105	3,27	365	97	3,77	379	90	4,23	396	82	4,82
	3	295	87	3,37	312	80	3,88	324	74	4,36	339	68	4,97
	2	246	69	3,54	260	64	4,08	270	59	4,58	282	54	5,22
	1	122	35	3,51	130	32	4,04	135	30	4,54	141	27	5,17
220.4	6	537	211	2,55	569	194	2,93	591	179	3,29	617	165	3,75
	5	458	168	2,72	486	155	3,13	504	143	3,52	527	131	4,01
	4	343	104	3,30	363	96	3,80	377	88	4,27	394	81	4,86
	3	293	86	3,40	311	79	3,91	323	73	4,40	337	67	5,01
	2	173	51	3,37	184	47	3,89	190	44	4,36	199	40	4,97
	1	118	35	3,33	125	32	3,84	130	30	4,31	135	28	4,92
240.4	4	563	235	2,40	597	216	2,76	620	202	3,07	648	186	3,49
	3	451	169	2,67	478	156	3,07	496	145	3,41	518	134	3,88
	2	339	104	3,27	359	95	3,77	373	89	4,18	389	82	4,76
	1	169	52	3,24	179	48	3,73	186	45	4,15	194	41	4,72

kWf = Cooling capacity in kW kWe_tot = Unit total power input in kW
STEP = Active capacity steps (the maximum number indicates full capacity / the minimum number indicates the smallest partialization step)
Internal exchanger water = output temperature 7°C/ input * (variable) / constant flow equal to the nominal value.

EXCELLENCE VERSION

Acoustic configuration: compressor soundproofing (SC)

Acoustic configuration: super-silenced (EN)

Heating performance at part load

Size	STEP	External exchanger entering air temperature (°C)																		
		-7/-8			-5/-5.4			-0/0.6			2/1			7/6			12/11		
		kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP
90.4	6	210	70	2,98	219	71	3,09	248	72	3,44	264	73	3,64	297	74	4,03	339	75	4,52
	5	180	58	3,10	189	58	3,24	214	59	3,61	226	60	3,79	255	61	4,21	291	62	4,72
	4	150	45	3,30	157	46	3,44	179	46	3,85	189	47	4,03	214	48	4,50	244	48	5,03
	3	115	35	3,27	121	35	3,43	139	36	3,87	147	36	4,06	167	37	4,56	192	37	5,12
	2	80	25	3,23	85	25	3,41	99	25	3,91	105	26	4,11	121	26	4,67	140	26	5,29
	1	40	13	3,16	43	13	3,34	49	13	3,82	52	13	4,03	60	13	4,57	70	13	5,18
100.4	6	230	77	3,00	240	78	3,10	273	79	3,48	289	79	3,66	325	80	4,05	371	82	4,55
	5	197	63	3,12	207	63	3,26	234	64	3,63	248	65	3,81	280	66	4,24	319	67	4,75
	4	164	49	3,31	172	50	3,46	196	51	3,87	207	51	4,06	234	52	4,53	267	53	5,06
	3	126	38	3,29	133	38	3,45	152	39	3,89	161	39	4,08	183	40	4,59	210	41	5,15
	2	88	27	3,24	93	27	3,43	108	28	3,93	115	28	4,13	132	28	4,69	153	29	5,32
	1	44	14	3,17	47	14	3,36	54	14	3,84	57	14	4,05	66	14	4,60	76	15	5,21
110.4	6	250	83	3,01	262	84	3,11	299	85	3,50	315	86	3,67	354	87	4,06	404	89	4,56
	5	214	68	3,13	225	69	3,27	255	70	3,64	270	71	3,82	305	72	4,25	347	73	4,76
	4	178	54	3,32	187	54	3,47	213	55	3,88	225	55	4,07	255	56	4,54	290	57	5,07
	3	137	42	3,30	144	42	3,46	165	42	3,90	175	43	4,10	200	43	4,60	228	44	5,16
	2	96	29	3,25	102	30	3,44	118	30	3,94	125	30	4,15	144	31	4,71	166	31	5,33
	1	48	15	3,18	51	15	3,37	59	15	3,86	62	15	4,06	72	16	4,61	83	16	5,22
120.4	4	271	92	2,95	291	93	3,15	332	94	3,55	344	94	3,66	394	96	4,12	449	97	4,61
	3	208	69	3,02	220	69	3,18	253	70	3,61	266	70	3,78	306	72	4,26	349	73	4,77
	2	145	46	3,17	154	46	3,35	178	47	3,81	189	47	4,02	217	48	4,54	249	49	5,10
	1	73	23	3,11	77	23	3,28	89	24	3,74	94	24	3,94	109	24	4,45	124	25	5,00
140.4	6	315	104	3,02	330	104	3,16	375	106	3,54	396	107	3,69	445	109	4,08	508	111	4,59
	5	270	86	3,15	283	86	3,29	320	88	3,66	339	88	3,84	383	90	4,27	437	91	4,79
	4	224	67	3,34	235	68	3,48	268	69	3,90	283	69	4,09	321	70	4,56	365	72	5,10
	3	172	52	3,32	181	52	3,48	208	53	3,92	220	53	4,12	251	54	4,62	287	55	5,19
	2	120	37	3,27	128	37	3,46	148	37	3,96	157	38	4,17	181	38	4,73	209	39	5,36
	1	60	19	3,20	64	19	3,38	74	19	3,88	79	19	4,08	91	20	4,63	105	20	5,25
160.4	4	337	116	2,91	366	114	3,22	415	116	3,56	428	118	3,62	490	120	4,08	559	123	4,56
	3	259	87	2,99	274	87	3,14	314	88	3,56	331	89	3,74	380	90	4,21	434	92	4,72
	2	181	58	3,14	192	58	3,31	222	59	3,77	235	59	3,97	270	60	4,49	310	61	5,04
	1	90	29	3,07	96	30	3,24	111	30	3,69	117	30	3,89	135	31	4,40	155	31	4,94
180.4	6	398	133	3,00	424	134	3,16	477	136	3,50	501	137	3,66	563	139	4,05	643	141	4,55
	5	341	109	3,12	358	110	3,26	405	112	3,63	429	113	3,81	484	114	4,24	553	116	4,75
	4	284	86	3,31	298	86	3,45	339	88	3,87	358	88	4,05	406	90	4,52	462	91	5,05
	3	218	66	3,29	230	67	3,45	263	68	3,89	278	68	4,08	317	69	4,58	363	71	5,15
	2	152	47	3,24	161	47	3,43	188	48	3,93	199	48	4,13	229	49	4,69	265	50	5,31
	1	76	24	3,17	81	24	3,36	94	24	3,84	99	25	4,05	115	25	4,59	132	25	5,20
200.4	6	439	145	3,02	467	145	3,21	529	148	3,57	551	150	3,68	620	152	4,08	708	155	4,58
	5	376	119	3,15	395	120	3,28	446	122	3,66	473	123	3,84	533	125	4,27	608	127	4,78
	4	313	94	3,34	328	94	3,48	373	96	3,90	394	96	4,09	447	98	4,56	509	100	5,09
	3	240	72	3,31	253	73	3,47	290	74	3,92	306	74	4,12	350	76	4,62	400	77	5,19
	2	167	51	3,27	178	51	3,46	206	52	3,96	219	53	4,17	252	53	4,73	291	54	5,35
	1	84	26	3,20	89	26	3,38	103	27	3,87	109	27	4,08	126	27	4,63	146	28	5,25
220.4	6	472	159	2,97	503	160	3,15	568	162	3,50	593	164	3,62	667	166	4,01	762	169	4,51
	5	404	131	3,09	424	131	3,23	480	134	3,59	508	135	3,78	574	137	4,20	655	139	4,70
	4	336	102	3,28	353	103	3,42	402	105	3,83	424	106	4,02	481	107	4,48	547	109	5,01
	3	258	79	3,26	272	80	3,41	312	81	3,85	330	82	4,04	376	83	4,54	430	84	5,10
	2	180	56	3,21	191	56	3,40	222	57	3,89	236	58	4,09	272	58	4,65	314	60	5,26
	1	90	29	3,14	96	29	3,32	111	29	3,81	118	29	4,01	136	30	4,55	157	30	5,16
240.4	4	493	171	2,89	542	171	3,18	610	174	3,51	625	174	3,59	716	177	4,04	816	181	4,52
	3	378	128	2,96	400	128	3,12	459	130	3,53	484	131	3,70	556	133	4,18	634	136	4,68
	2	264	85	3,11	280	85	3,28	324	87	3,74	343	87	3,94	395	89	4,45	452	91	5,00
	1	132	43	3,05	140	44	3,21	162	44	3,66	172	45	3,86	198	45	4,36	226	46	4,90

kWf = Cooling capacity in kW kWe_tot = Unit total power input in kW
STEP = Active capacity steps (the maximum number indicates full capacity / the minimum number indicates the smallest partialization step)
Internal exchanger water = output temperature 7°C/ input * (variable) / constant flow equal to the nominal value.

Option compatiblity - EXCELLENCE version

Acoustic configuration: compressor soundproofing (SC)

REFERENCE	DESCRIPTION	90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
CONFIGURATIONS AND MAIN ACCESSORIES											
B	Water low temperature	0	0	0	0	0	0	0	0	0	0
D	Partial energy recovery	0	0	0	0	0	0	0	0	0	0
B + D	Water low temperature + Partial energy recovery	0	0	0	0	0	0	0	0	0	0
A550	550 l. storage tank	0	0	0	0	X	X	X	X	X	X
A700	700 l. storage tank	X	X	X	X	0	0	0	X	X	X
A900	900 l. storage tank	X	X	X	X	X	X	X	0	0	0
STORAGE TANK AND PUMP WITH PRIMARY CIRCUIT BUILT-IN											
A550PPS	550 l. storage tank with primary circuitwith pump built-in	0	0	0	0	X	X	X	X	X	X
A700PPS	700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	0	0	0	X	X	X
A900PPS	900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	0	0	0
2PM - HYDROPACK WITH 2 PUMPS											
(PU20)	Pump 20	0	0	0	0	0	X	X	X	X	X
(PU21) / (PU22)	Pump 21 / Pump 22	0	0	0	0	0	0	0	X	X	X
(PU26)	Pump 26	X	X	X	X	X	X	X	0	0	0
+ A550PPS	+ 550 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A700PPS	+ 700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A900PPS	+ 900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A550	+ 550 l. storage tank	0	0	0	0	X	X	X	X	X	X
+ A700	+ 700 l. storage tank	X	X	X	X	0	0	0	X	X	X
+ A900	+ 900 l. storage tank	X	X	X	X	X	X	X	0	0	0
3PM - HYDROPACK WITH 3 PUMPS											
(PU20)	Pump 20	X	X	X	X	X	X	X	0	0	X
(PU21)	Pump 21	X	X	X	X	0	0	0	0	0	0
(PU22)	Pump 22	0	0	0	0	0	0	0	0	0	0
+ A550PPS	+ 550 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A700PPS	+ 700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A900PPS	+ 900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A550	+ 550 l. storage tank	0	0	0	0	X	X	X	X	X	X
+ A700	+ 700 l. storage tank	X	X	X	X	0	0	0	X	X	X
+ A900	+ 900 l. storage tank	X	X	X	X	X	X	X	0	0	0
OTHER ACCESSORIES											
CREFB	Device for the reduction of the Eco Breeze ext. section fan consumptions	0	0	0	0	0	0	0	0	0	0
CREFP	Device for the reduction of the ext. Section fan consumptions at variable speed (phase-cutting)	•	•	•	•	•	•	•	•	•	•

• Standard

0 Option

X Not available

Option compatiblity - EXCELLENCE version

Acoustic configuration: super-silenced (EN)

REFERENCE	DESCRIPTION	90.4	100.4	110.4	120.4	140.4	160.4	180.4	200.4	220.4	240.4
CONFIGURATIONS AND MAIN ACCESSORIES											
B	Water low temperature	0	0	0	0	0	0	0	0	0	0
D	Partial energy recovery	0	0	0	0	0	0	0	0	0	0
B + D	Water low temperature + Partial energy recovery	0	0	0	0	0	0	0	0	0	0
A550	550 l. storage tank	0	0	0	0	X	X	X	X	X	X
A700	700 l. storage tank	X	X	X	X	0	0	0	X	X	X
A900	900 l. storage tank	X	X	X	X	X	X	X	0	0	0
STORAGE TANK AND PUMP WITH PRIMARY CIRCUIT BUILT-IN											
A550PPS	550 l. storage tank with primary circuitwith pump built-in	0	0	0	0	X	X	X	X	X	X
A700PPS	700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	0	0	0	X	X	X
A900PPS	900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	0	0	0
2PM - HYDROPACK WITH 2 PUMPS											
(PU20)	Pump 20	0	0	0	0	0	0	0	0	X	X
(PU21) / (PU22)	Pump 21 / Pump 22	0	0	0	0	0	0	0	0	X	X
(PU26)	Pump 26	X	X	X	X	X	X	X	X	0	0
+ A550PPS	+ 550 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A700PPS	+ 700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A900PPS	+ 900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A550	+ 550 l. storage tank	0	0	0	0	X	X	X	X	X	X
+ A700	+ 700 l. storage tank	X	X	X	X	0	0	0	X	X	X
+ A900	+ 900 l. storage tank	X	X	X	X	X	X	X	0	0	0
3PM - HYDROPACK WITH 3 PUMPS											
(PU20)	Pump 20	X	X	X	X	X	X	X	X	0	0
(PU21)	Pump 21	X	X	X	X	0	0	0	0	0	0
(PU22)	Pump 22	0	0	0	0	0	0	0	0	0	0
+ A550PPS	+ 550 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A700PPS	+ 700 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A900PPS	+ 900 l. storage tank with primary circuitwith pump built-in	X	X	X	X	X	X	X	X	X	X
+ A550	+ 550 l. storage tank	0	0	0	0	X	X	X	X	X	X
+ A700	+ 700 l. storage tank	X	X	X	X	0	0	0	X	X	X
+ A900	+ 900 l. storage tank	X	X	X	X	X	X	X	0	0	0
OTHER ACCESSORIES											
CREFB	Device for the reduction of the Eco Breeze ext. section fan consumptions	0	0	0	0	0	0	0	0	0	0
CREFP	Device for the reduction of the ext. Section fan consumptions at variable speed (phase-cutting)	•	•	•	•	•	•	•	•	•	•

• Standard

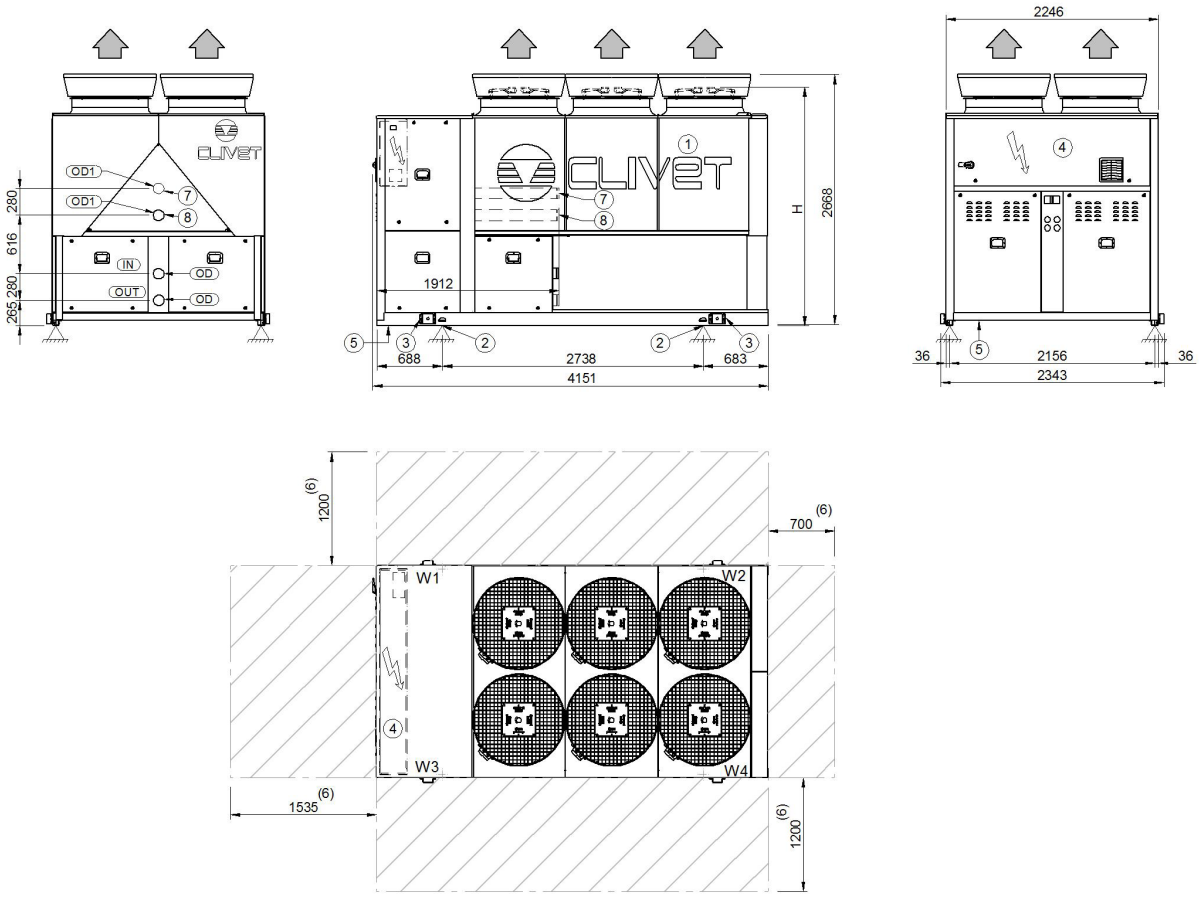
0 Opzione

X Non disponibile

Dimensional drawings

Size 90.4-120.4 - Acoustic configuration : Compressor soundproofing (SC) / Super-silenced (EN)

DAA8N90 4_120 4_EXC_SC_EN_1
Data/Date 04/09/2014



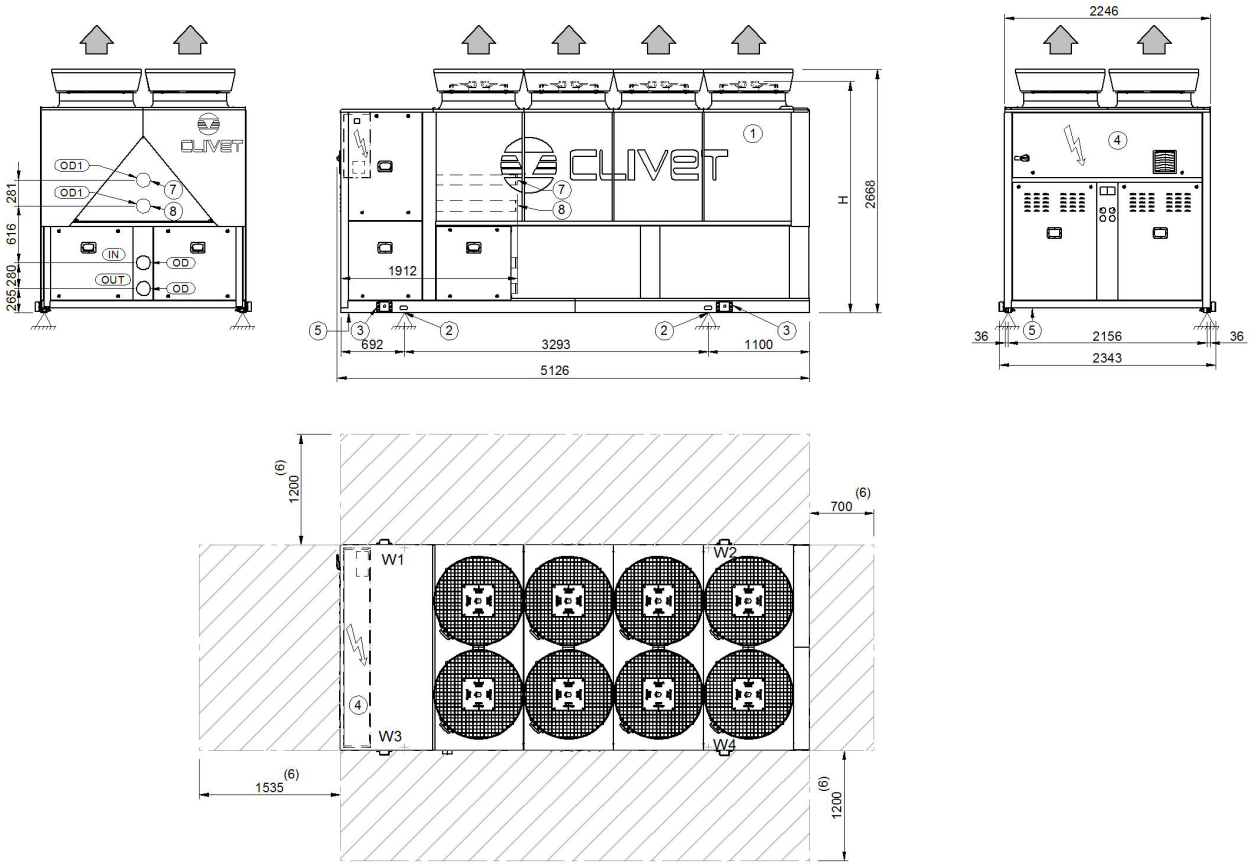
1. External exchanger
2. Antivibration fixing holes Ø 25mm
3. Lifting brackets (removable, if required, after unit positioning)
4. Main electrical panel
5. Power input supply
6. Recommended functional clearances
7. Entering exchanger water recovery side (optional)
8. Leaving exchanger water recovery side (optional)

Size		SC-EXC				EN-EXC			
		90.4	100.4	110.4	120.4	90.4	100.4	110.4	120.4
H (without Axitop)	mm	2484	2484	2484	2484	2484	2484	2484	2484
OD (internal exchanger)	mm	114,3	114,3	114,3	114,3	114,3	114,3	114,3	114,3
OD1 (partial recovery)	mm	76,1	76,1	76,1	76,1	76,1	76,1	76,1	76,1
A - Length	mm	4151	4151	4151	4151	4151	4151	4151	4151
B - Depth	mm	2246	2246	2246	2246	2246	2246	2246	2246
C - Height	mm	2668	2668	2668	2668	2668	2668	2668	2668
W1 Supporting point	kg	926	942	956	1002	926	942	956	1002
W2 Supporting point	kg	626	629	638	671	626	629	638	671
W3 Supporting point	kg	914	930	945	992	914	930	945	992
W4 Supporting point	kg	613	617	626	661	613	617	626	661
Shipping weight	kg	2966	3006	3050	3206	2966	3006	3050	3206
Operating weight	kg	3079	3118	3165	3326	3079	3118	3165	3326

The presence of optional accessories may result in a substantial variation of the weights shown in the table. Fan diffusers are separately supplied.

Size 140.4-160.4 - Acoustic configuration : Compressor soundproofing (SC) / Super-silenced (EN)

DAA8N140 4_160 4_EXC_SC_EN_1
Data/Date 04/09/2014



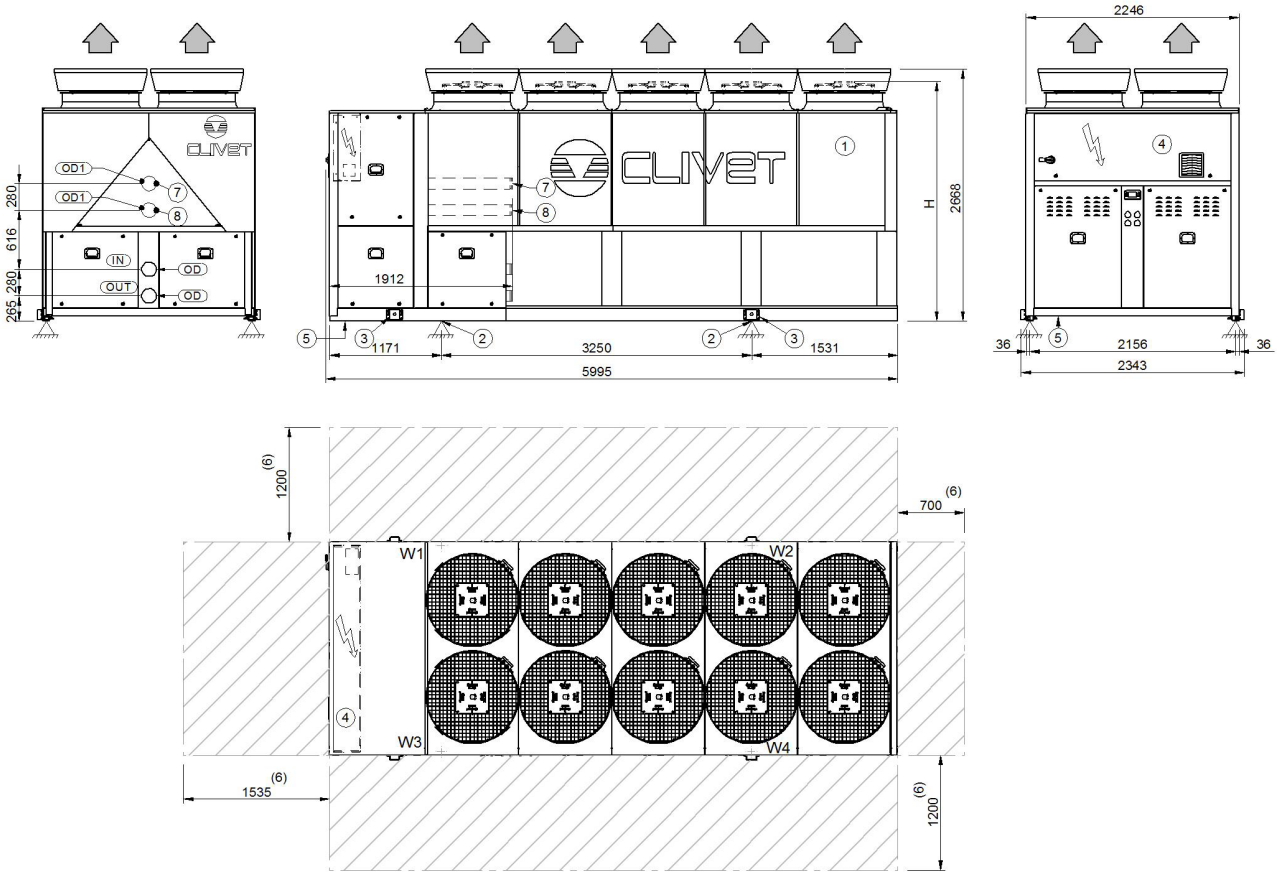
1. External exchanger
2. Antivibration fixing holes Ø 25mm
3. Lifting brackets (removable, if required, after unit positioning)
4. Main electrical panel
5. Power input supply
6. Recommended functional clearances
7. Entering exchanger water recovery side (optional)
8. Leaving exchanger water recovery side (optional)

Size		SC-EXC		EN-EXC	
		140.4	160.4	140.4	160.4
H (without Axitop)	mm	2484	2484	2484	2484
OD (internal exchanger)	mm	114,3	114,3	114,3	114,3
OD1 (partial recovery)	mm	76,1	76,1	76,1	76,1
A - Length	mm	5126	5126	5126	5126
B - Depth	mm	2246	2246	2246	2246
C - Height	mm	2668	2668	2668	2668
W1 Supporting point	kg	1145	1172	1145	1172
W2 Supporting point	kg	733	750	733	750
W3 Supporting point	kg	1135	1165	1135	1165
W4 Supporting point	kg	723	743	723	743
Shipping weight	kg	3583	3672	3583	3672
Operating weight	kg	3736	3830	3736	3830

The presence of optional accessories may result in a substantial variation of the weights shown in the table. Fan diffusers are separately supplied.

Size 180.4-240.4 - Acoustic configuration : Compressor soundproofing (SC) / Super-silenced (EN)

DAA8N180 4_240 4_EXC_SC_EN_1
Data/Date 04/09/2014



1. External exchanger
2. Antivibration fixing holes Ø 25mm
3. Lifting brackets (removable, if required, after unit positioning)
4. Main electrical panel
5. Power input supply
6. Recommended functional clearances
7. Entering exchanger water recovery side (optional)
8. Leaving exchanger water recovery side (optional)

Size		SC-EXC				EN-EXC			
		180.4	200.4	220.4	240.4	180.4	200.4	220.4	240.4
H (without Axitop)	mm	2484	2484	2484	2484	2484	2484	2484	2484
OD (internal exchanger)	mm	114,3	139,7	139,7	139,7	114,3	139,7	139,7	139,7
OD1 (partial recovery)	mm	76,1	76,1	76,1	76,1	76,1	76,1	76,1	76,1
A - Length	mm	5995	5995	5995	5995	5995	5995	5995	5995
B - Depth	mm	2246	2246	2246	2246	2246	2246	2246	2246
C - Height	mm	2668	2668	2668	2668	2668	2668	2668	2668
W1 Supporting point	kg	1413	1429	1468	1510	1413	1429	1468	1510
W2 Supporting point	kg	912	923	943	974	912	923	943	974
W3 Supporting point	kg	1402	1417	1476	1504	1402	1417	1476	1504
W4 Supporting point	kg	900	911	951	968	900	911	951	968
Shipping weight	kg	4428	4480	4628	4745	4428	4480	4628	4745
Operating weight	kg	4627	4680	4838	4956	4627	4680	4838	4956

The presence of optional accessories may result in a substantial variation of the weights shown in the table. Fan diffusers are separately supplied.

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