Technical Bulletin

BT16E017GB-07

ELFOEnergy Magnum - Cooling only

High efficiency air-cooled liquid chiller
for outdoor installation

WSAT-XEM 50.4 - 120.4 RANGE

Nominal cooling capacity **(A35/W7)** from 143 kW to 355 kW

- R-410A multiscroll technology
- Two independent refrigeration circuit
- Total/partial recovery of the condensing heat

EXCELLENCE version

- Eurovent Class A / Up to 52°C outdoor air temperature / Perferct for LEED

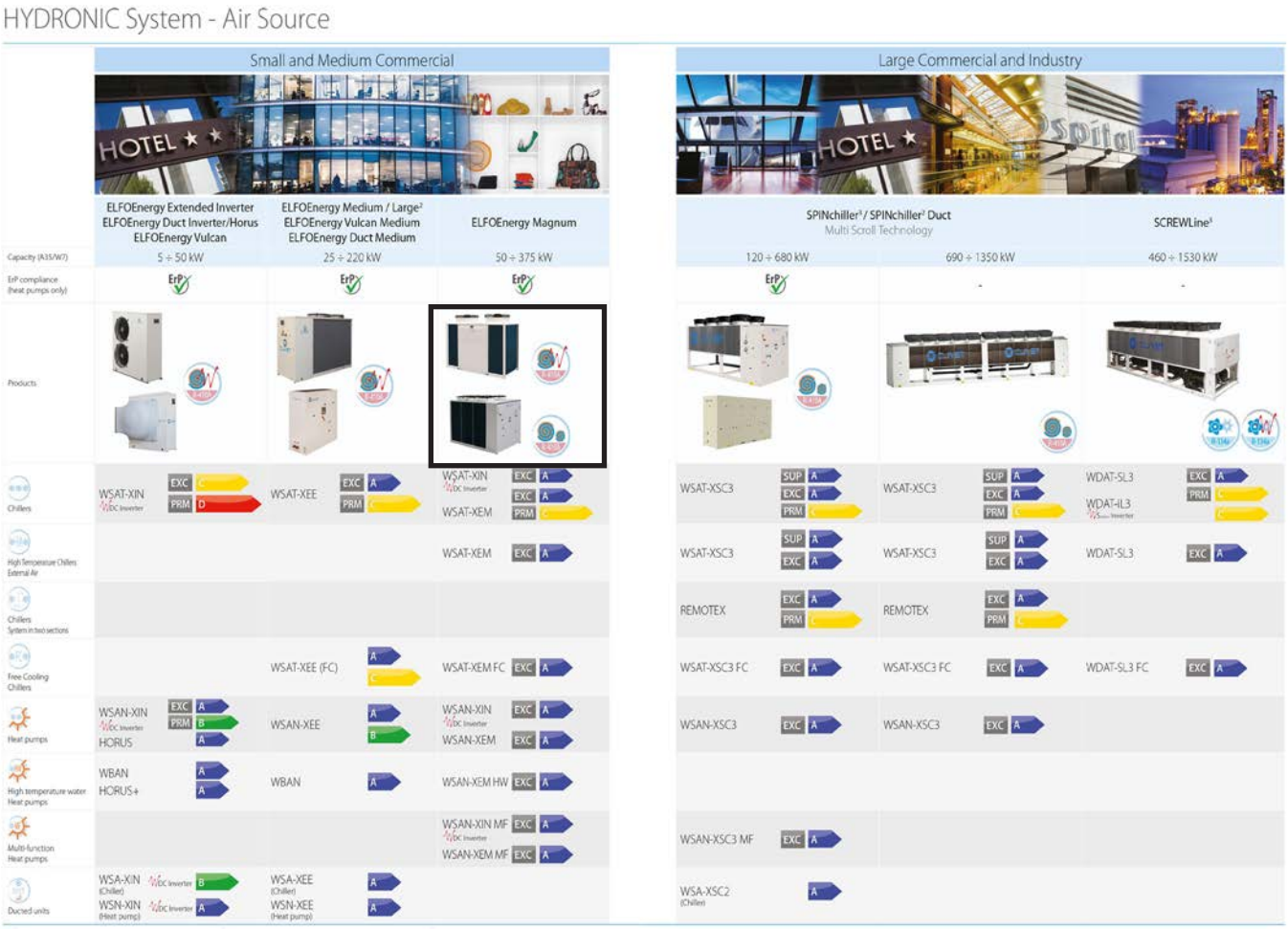
PREMIUM version

- Eurovent Class C / Compact version

Clivet is taking part in the EUROVENT certification programme up to 1.500 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.



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.

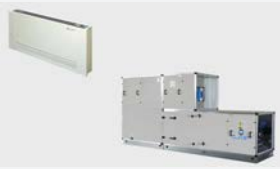
ZEPHIR3

Autonomous primary air energy thermodynamic recovery system

- Simplifies the system, reduces the heating and cooling generators
- Purifies the air with the standard electronic filters
- Increases the energy efficiency and it also allows a savings of 40% on the running costs
- rom –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
- Fitted air conditioning units up to 160.000 m3/h
- EUROVENT certification

ELFOEnergy Magnum: modular scroll technology for every application

ELFOEnergy Magnum 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.

MAGNUM COOL ONLY

WSAT-XEM:

- Air cooled water chiller
- EXCELLENCE high efficiency version
- PREMIUM compact version
- Total/partial recovery of the condensing heat

MAGNUM HEAT PUMP

WSAN-XEM:

- Air cooled heat pump
- EXCELLENCE high efficiency version

MAGNUM MULTIFUNCTION

WSAN-XEM MF:

- Air cooled heat/cool heat pump with simultaneous operating
- EXCELLENCE high efficiency version
- 4-pipe system
- 2-pipe system and total condensing heat recovery

MAGNUM HEAT PUMP HIGH TEMPERATURE

WSAN-XEM HW:

- Air cooled heat pump
- EXCELLENCE high efficiency version
- Production of hot water up to 65°C
- Extended operating range

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.

ELFOEnergy Magnum

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 ELFOEnergy Magnum, in a range of models that are ideal for medium and 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.

EXCELLENCE Version:

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

PREMIUM Version:

The PREMIUM version has a high-level of compactness and develops excellent part-load efficiency thanks to the Multiscroll technology. This solution is intended for the applications that favour the initial investment.

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

Advantages

High efficiency all year round

ELFOEnergy Magnum 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 ELFOEnergy Magnum units operating on the same equipment, there is the innovative ECOSHARE feature, which automatically distributes the load and activates the necessary pumps.

4.6
ESEER
Seasonal
Efficiency

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.

A
Energy
Class
Cooling

Compact and versatile

Suitable for any type of terminals, from fan coils to radiant systems and chilled beams, ELFOEnergy Magnum is also available in Super-silenced configuration. Energy recovery for producing hot water free of charge, FREE-COOLING. Seasonal energy efficiency is further increased with the DST operating logic, which maintains a constant return temperature.

5.4
DST
Seasonal
Efficiency

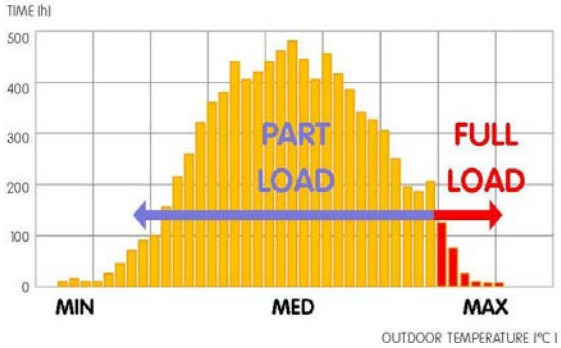
Comfort and energy saving in one solution

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.

Maximum efficiency is necessary with a part load

Magnum uses high efficiency Scroll compressors.

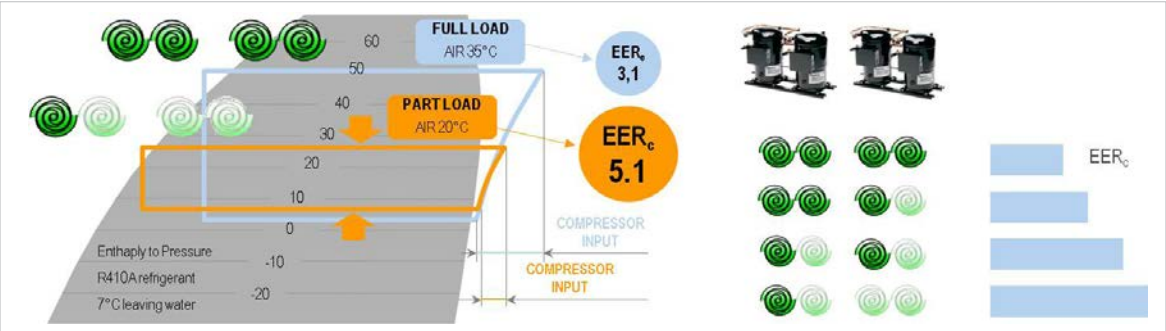
The advantages are:

- Compressors manufactured in large numbers on an industrial scale, with strict quality checks and highest reliability thanks to the high scale mass 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.



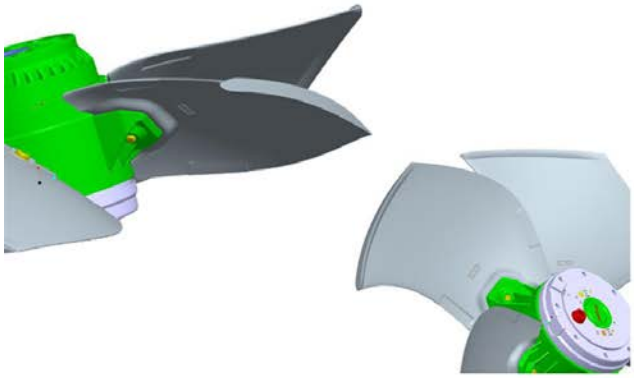
EERc = Efficienza energetica riferita ai compressori

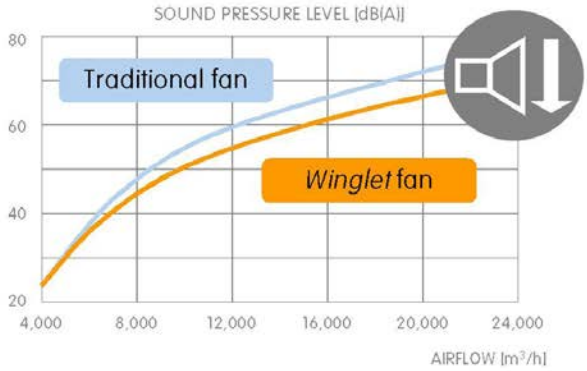
Efficient and silent ventilation technology

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.





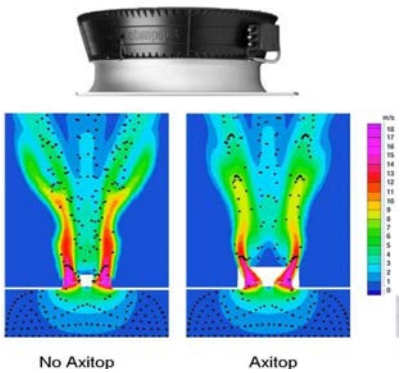
Diffusers for fans (optional)

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 kinetic energy in static pressure.

Obtaining:

- down to –3 dB of silence
- reduction of 3% of the absorbed energy



ECOBREEZE fans, electronically controlled (optional)

With ECOBREEZE, the electric motor with an external rotor is driven by the continuous magnetic switching of the stator, deriving from the integrated electronic control.

The advantages are:

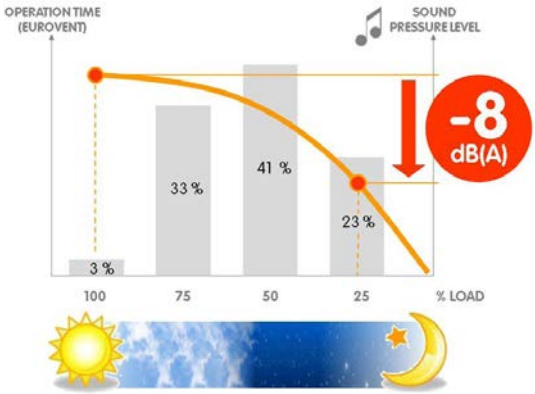
- **70% increase in efficiency** thanks to the brushless technology and the special electricity supply**;**
- **increase in the working life,** thanks to the elimination of the brush wear;
- **Reduction in the electrical consumption by the system,** thanks to a drastic reduction of the inrush current for the fans obtained using the integrated 'Soft starter' function.

Fans at variable speed for minimal noise emission

All units ELFOEnergy Magnum are supplied with a condensation electronic control. It automatically reduces the fan speed as the heat load drops.

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



Two versions available for the various investment dynamics

Business oriented

All ELFOEnergy Magnum models feature high part-load energy efficiency, which means high ESEER seasonal efficiency. The two versions available allow choosing the best combination between the initial investment and the costs throughout the entire life-cycle of the system.

Excellence version: maximum efficiency

Apart from the high seasonal efficiency, the standard EXCELLENCE SC version stands out for its extremely high energy efficiency ratio (EER) during full-load cooling, 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, to the speed electronic control of the phase cutting fans and to Axitop diffusers and to an electronic control device supplied as standard.

This allows for:

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

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.

Premium version: compact and aggressive

The optional PREMIUM version also develops excellent part-load efficiency, but features a compact design for the heat exchangers and structure. Therefore this solution is intended for applications that favour the initial investment rather than overall cost reduction throughout the lifespan of the system.

100% silent operation

Both energy versions, Excellence and Premium, are available in Super-silenced acoustic configuration, which allows the sound level to be greatly minimised of 6 dB(A), maintaining unchanged at the same time the dimensions.

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

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

-6 dB(A)

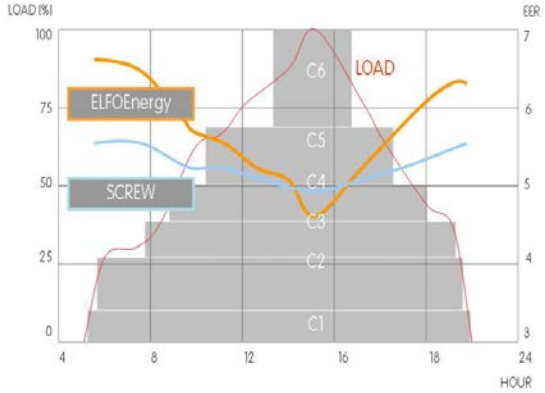
Sound Level

Superior flexibility and reliability

Efficient precision

Sequential activation of ELFOEnergy Magnum compressors allow:

- accurately following the load heating/cooling, supplying better comfort;
- reducing the number of compressor start-ups which is the main cause for wear and tear
- increasing the life cycle of the unit
- reducing time and costs for any repairs, thanks to the modularity of components, their reduced dimensions and the lower cost compared to semi-hermetic compressors.

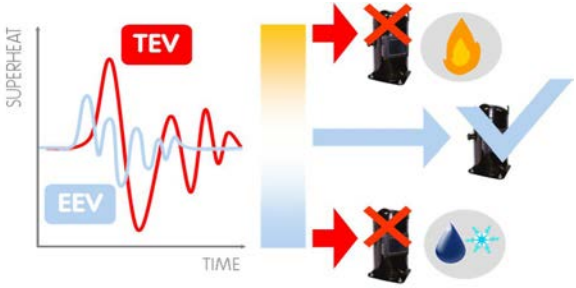


THE NUMBER OF START-UPS DECREASES THEREFORE THE LIFE CYCLE INCREASES

Stable and reliable operation

The electronic expansion valve (EEV) adapts quickly and precisely to the actual load required for use, thereby allowing for a more stable and accurate control compared to the mechanical thermostatic valves (TEV). All this results in further efficiency and greater compressor durability.

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.



Controlled power supply

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

The phase monitor, standard supplied in the EXCELLENCE and PREMIUM versions:

- 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 automatic control device coordinates resources ensuring maximum efficiency

Advanced control

The control system combines in a single solution the operating efficiency and the user-friendliness.Continuously monitoring all of the unit operating parameters, it ensures the maintenance of an optimal energy efficiency. The control includes many safety functions and a complete alarm management.

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

It allows the management of several units in cascade up to 1 master and 6 slave (Ecoshare)

The interface terminal is equipped with a backlit graphic display and a multifunction access keyboard. The multilevel menu is protected by different passwords according to the type of user..

Perfect for LEED certification

The whole EXCELLENCE range satisfies both requirements 2 (Minimum Energy Performance) and 3 (Fundamental Refrigerant Management) of Energy and Atmosphere section. They also meet Credit 4 parameters (Enhanced Refrigerant Management) allowing 1 point acquisition.

Clivet is committed in promoting the green building principles and has become a member of GBC Italia. This organization collaborates with USGBC, the U.S. nonprofit organization that promotes worldwide the LEED system of indipendent certification.

Modularity

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

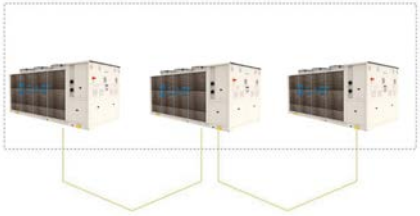
The Magnum units are designed to be connected in parallel in modular logic, thereby granting the following advantages:

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).



ECOSHARE NETWORK

Remote system management

ELFOEnergy Magnum 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.

Modbus®

LonWorks

BACnet™

Seasonal energy efficiency is further increased with the DST operating logic

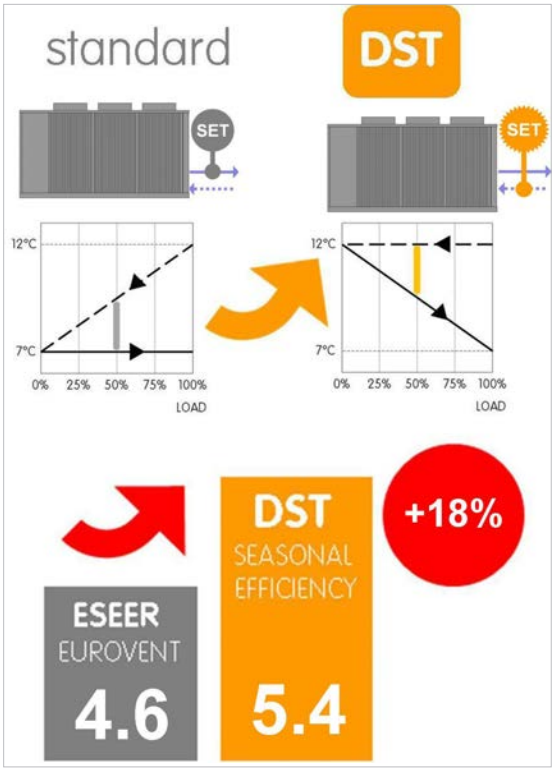
ELFOEnergy Magnum is equipped with standard DST control (Dynamic Supply Temperature) control logic, which can be activated by the user.

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.

The DST control logic is as an alternative to the control logic at variable flow-rate.



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:

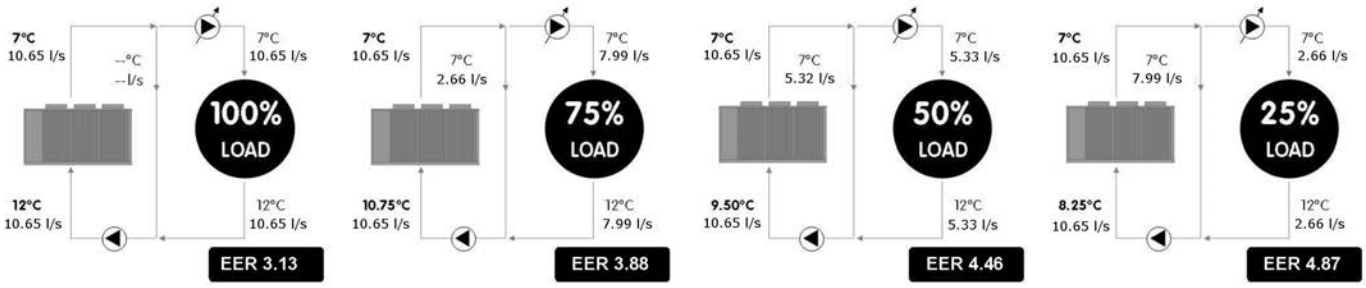
- primary circuit with constant water flow rate
- secondary circuit with variable water flow-rate according to the load (linear variability for simplicity).

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.

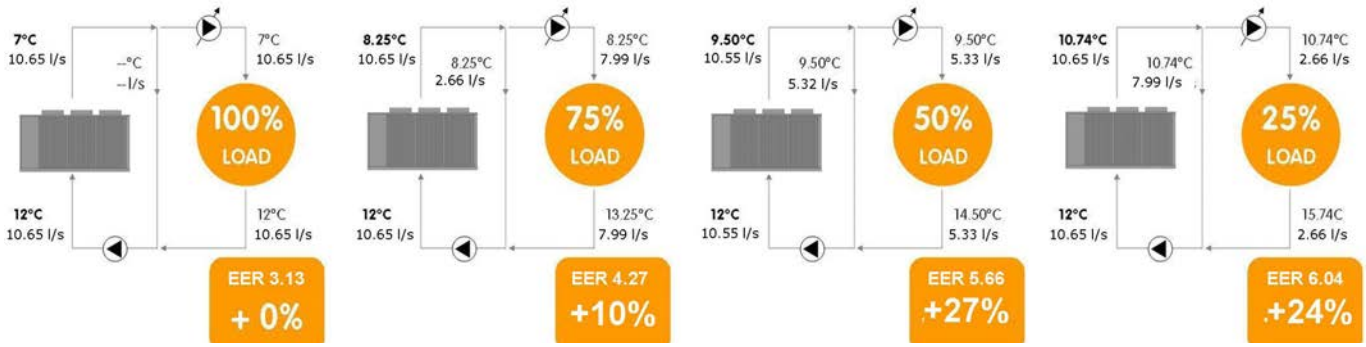
The DST control logic, on the other hand, allows increasing the system water supply temperature during part-load operation, thereby increasing seasonal energy efficiency for ELFOEnergy Magnum.

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)



ELFOEnergy magnum technology industrialised the system

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

So are reduced:

- design time: all the accessories are created to guarantee the best overall performance;
- installation costs: the accessories which are already mechanically connected, electrically wired and individually checked are ready to start operating immediately;
- the dimensions: the unit integration of the installation parts reduces the shafts and increases the space for other uses.

Integrated inertial storage tank available

In most Magnum systems it can be installed without inertial storage tank 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 storage tank 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.

Water flow-rate continuous modulation

The energy used for the vector pumping is fundamental on the seasonal efficiency.

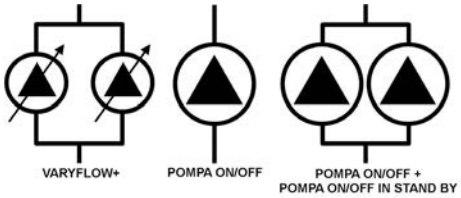
The VARYFLOW + modulating pumping unit made up of two pumps in parallel controlled by inverter, allows a precise water flow-rate modulation reducing notably the consumptions and at the same time it guarantees its functionality also in case of temporary unavailability of one of the two pumps, guaranteeing about the 80% of the nominal flow-rate.

The water flow-rate is modulated by keeping the supply/return water temperature differential constant.

If the installation water temperature is in critical conditions, **VARYFLOW+** allows to extend the ELFOEnergy Magnum operating ranges guaranteeing the operating.

In case of particular installation needs, the hydronic assemblies are also available:

- **ON/OFF pump:** the traditional solution with high available pressure.
- **ON/OFF pump + ON/OFF pump in stand-by:** the solution that favours reliability. The built-in control balances the operating hours of the two pump and in case of any failure it signals the damage and automatically activates the stand-by pump.



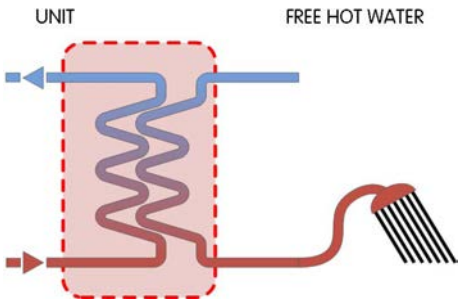
Produces hot water freely

Condensation heat recovery:

- artial: it recovers about the 20% of the available heat (desuperheater)
- Total: it recovers the 100% of the available heat

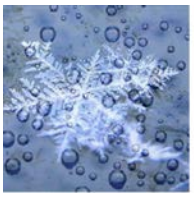
It allows the free DHW production for:

- 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 ELFOEnergy Magnum 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

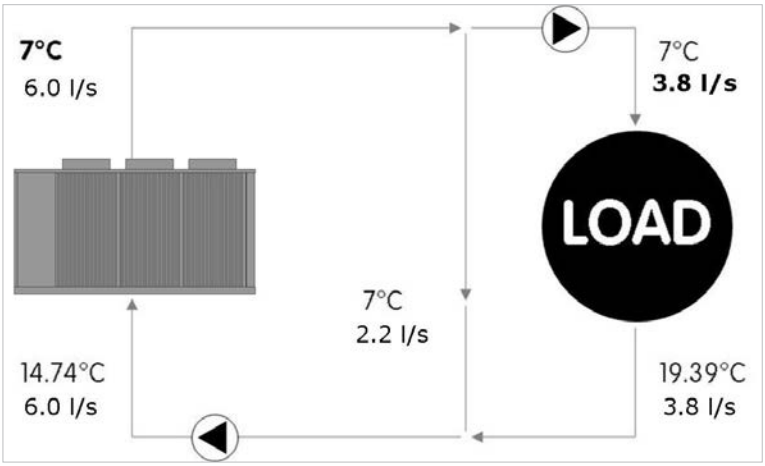
ELFOEnergy Magnum operates with constant water flow rate to the evaporator, between a minimum and maximum value indicated in the technical documents.

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

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

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

A properly sized bypass piping resolves the problem.



Example referred to WSAT-XEM 80.4 EXCELLENCE version.
Appropriate water flow rate for the correct unit operation.

Temperature values outside the limits

ELFOEnergy Magnum operates with the system supply temperatures indicated in the technical documentation.

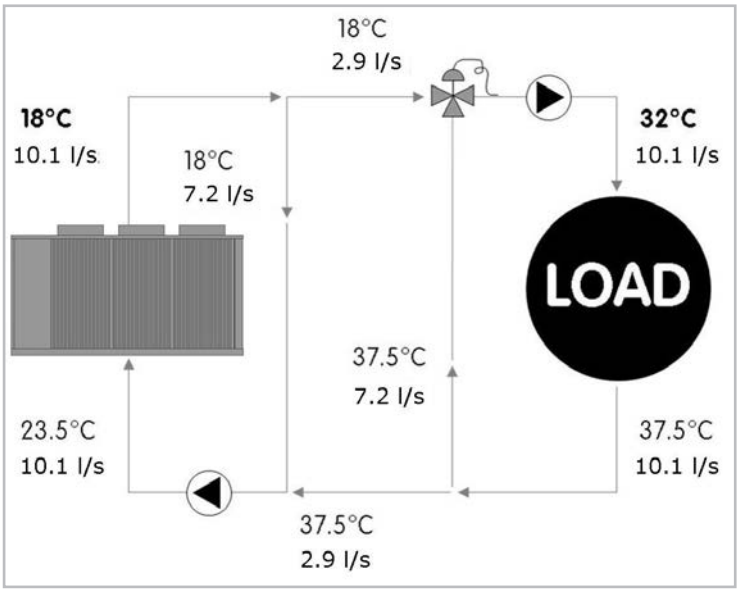
Temperature limits below the limit may cause unwanted formation of ice and the unit to stop following the intervention of built-in safety devices.

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 WSAT-XEM 80.4 EXCELLENCE version.
Appropriate supply water temperature for the correct unit operation. Nominal water flow rate.

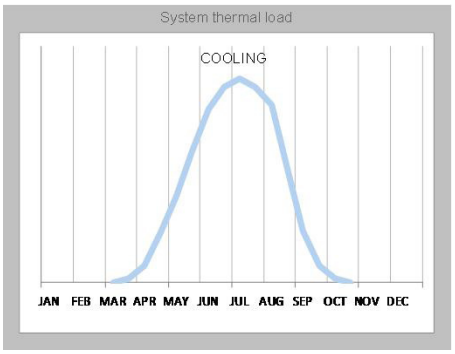
Evaporator thermal gradient

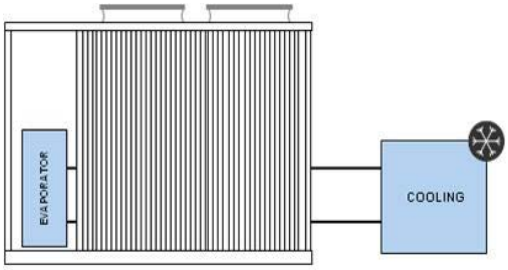
ELFOEnergy Magnum nominal capacities refer to an evaporator thermal gradient equal to 5 °C. A different thermal gradient may be used in full load operation, provided that both the operating flow and temperatures fall within the limits. As an indication, this corresponds to a minimum thermal gradient of approximately 3 °C and a maximum of 8°C (the exact values must be determined based on the allowed flows and temperatures).

System solutions

Standard unit

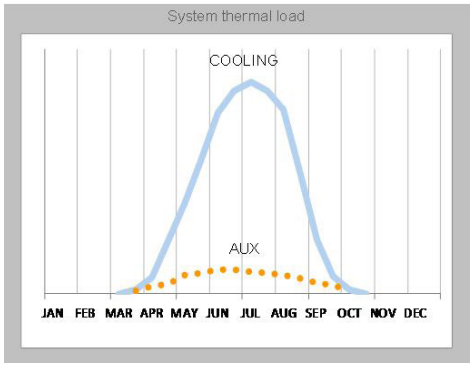
- **Production of chilled water**

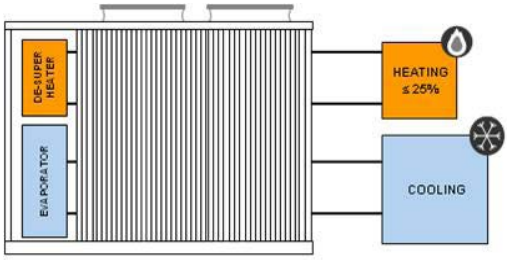




Unit with partial energy recovery

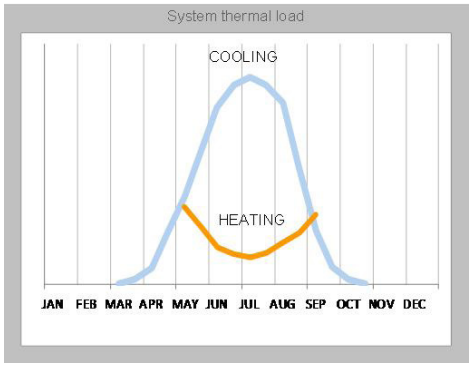
- **Production of chilled water**
- **Free production of hot water from partial energy recovery**

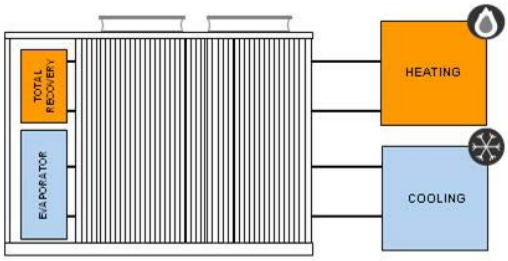




Unit with total energy recovery

- **Production of chilled water**
- **Free production of hot water from total energy recovery**





Standard unit technical specifications

Compressor

First circuit: Hermetic scroll compressors in tandem, equipped with a motor protection device for overheating, overcurrents and excessive temperatures of the supply gas. They are installed on anti-vibration mounts and equipped with oil charge. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.

Second circuit: Hermetic scroll compressor in tandem equipped with a motor protection device for overheating, overcurrents and excessive temperatures of the supply gas. They are installed on anti-vibration mounts and equipped with oil charge. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops.

Structure

Supporting structure realised with steel frame with zinc-magnesium superficial traitment painted with polyester powder RAL 9001, that ensures excellent mechanical features and high long-term resilience against corrosion.

Panelling

External pre-painted zinc-magnesium in steel sheet 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, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate 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

Direct expansion finned exchanger, made from copper pipes in staggered rows and mechanically expanded to the fin collars. The fins are made from aluminium with a corrugated surface and adequately distanced to ensure the maximum heat exchange efficiency.

Fan

Helical fans with shaped aluminium blades coupled directly to a three phase electric motor with thermal protection incorporated in version IP 54. Located in aerodynamically shaped nozzles to increase efficiency and minimise noise levels. They are fitted with protective safety guard grilles and supply with variable speed electronic control (phase cutting)

Refrigeration circuit

Double refrigeration circuit complete, for each circuit, with:

- replaceable anti-acid solid cartridge dehydrator filter
- liquid flow and moisture indicator
- High pressure safety pressure switch
- High pressure transducer
- low pressure transducer
- refrigerant temperature probe
- electronic thermostatic expansion valve
- high pressure safety valve
- low pressure safety valve
- cutoff valve on compressor supply
- cutoff valve on liquid line

Electrical panel

The capacity section includes:

- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- compressor circuit breaker
- 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
- keys for ON/OFF control, alarm reset
- proportional-integral water temperature control
- daily, weekly programmer of temperature set-point and unit on/off
- set point compensation in function of the outdoor air temperature
- set-point compensation with signal 0-10 V
- unit switching on management by local or remote (serial)
- antifreeze protection water side
- compressor overload protection and timer
- prealarm function for water antifreeze and high refrigerant gas pressure
- self-diagnosis system with immediate display of the fault code
- automatic rotation control for compressor starts
- compressor operating hour display
- remote ON/OFF control
- 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
- phase monitor
- ECOSHARE function for the automatic management of a group of units
- numeration of electrical panel cables

Built-in configuration options

- VARYP - VARYFLOW+ (2 inverter pumps)
- HYG1 - Hydronic assembly with one ON/OFF pump
- HYG2 - Hydronic assembly with two ON/OFF pumps
- ACC - Storage tank
- CCCA - Copper / aluminium condenser coil with acrylic lining
- CCCA1 - Condenser coil with Aluminium Energy Guard DCC treatment
- HEDIF - Diffuser for high efficiency axial fan
- CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type
- CREFO - Device for fan consumption reduction of the external section, on/off type
- SFSTR - Disposal for inrush current reduction
- MF2 - Multi-function phase monitor
- CMSC8 - Serial communication module for BACnet supervisor
- CMSC9 - Serial communication module for Modbus supervisor
- CMSC10 - Serial communication module for LonWorks supervisor
- PFCP - Power factor correction capacitors (cosfi > 0.9)
- PGFC – Finned coil protection grill
- MHP - High and low pressure gauges
- SDV - Cutoff valve on compressor supply and return
- RPRPDI - Refrigerant leak detector with pump down function in the casing
- RE-20 / RE-25 - Electrical panel anti-freeze protection
- D - Partial energy recovery
- R - Total energy recovery (only for EXCELLENCE version)

Accessories

- RCTX - Remote control
- BACX - BACnet serial communication module
- CMMBX - Serial communication module to supervisor (Modbus)
- CMSLWX - LonWorks serial communication module
- IFWX - Steel mesh strainer on water side
- PGFCX - Finned coil protection grill
- MHPX - High and low pressure gauges
- AVIBX - Anti-vibration mount support

Unit equipment with low outdoor temperatures

<table>
<tr><th>Minimum outdoor air temperature</th><th>Operating unit</th><th>Unit in stand-by *
(fed unit)</th><th>Unit in storage
(unit not fed)</th></tr>
<tr><td>+11°C</td><td rowspan="5">√ standard unit</td><td rowspan="5">√ standard unit</td><td rowspan="6">√ standard unit

Unit without water or conteining water with an appropriate quantity of glycol.

At the unit start-up the water temperature or water with glycol must be inside the operating range indicated in the “Operating range” graph.

To know the water freezing temperature at the glycol percetage changing refer to the specific ‘Correction factor for antifreeze solutions’ table.</td></tr>
<tr><td>+2°C</td></tr>
<tr><td>-5°C</td></tr>
<tr><td>-7°C</td></tr>
<tr><td>-10°C</td></tr>
<tr><td>Tra –10°C e –18°C</td><td>NOT POSSIBLE</td><td>√ glycol in an appropriate percentage (1)</td></tr>
</table>

Data referred to the following conditions:
internal exchanger water = 12/7°C
* consider the unit powered electrically, with active control on pumping units. It is recommended to set a set-point value lower than standard (eco mode)

1. Operating range where the water pumping unit must be powered and always active, or with a periodical activation of the outdoor temperature operating pump to guarantee the correct unit operation

At the unit start-up the water temperature or water with glycol must be inside the operating range indicated in the “Operating range” graph.
To know the water freezing temperature on varying the glycol percentage refer to the specific ‘Correction factors for glycol use’ table.

Air conditions which are at rest are defined as the absence of air flowing towards the unit. Weak winds can induce air to flow through the exchanger and air-levels which can cause a reduction in the operating range. In the presence of predominant winds it is necessary to use suitable windbreak barriers.

Unit configuration

WSAT-XEM	50 .	4	EXC	SC	CREFP	-	-	-
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

(1) Series
WSAT = Air-cooled liquid chilled with scroll compressor
XEM - ELFOEnergy Magnum range

(2) Size
50 - Nominal compressor capacity (HP)

(3) Compressors
4 - Compressor quantity

(4) Energy efficiency
EXC - EXCELLENCE version: high energy efficiency
PRM - Compact PREMIUM version (Only for size 70.4 ÷ 120.4)

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

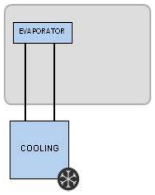
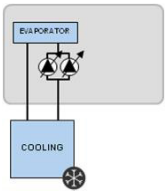
(6) Type of fans
CREFP - Device for fan consumption reduction of the external section at variable speed (phase cutting) (standard)
CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type (Only for size 70.4 ÷ 120.4)
CREFO - Device for fan consumption reduction of the external section, on/off type (only for PREMIUM version)

(7) Diffuser for fans
(-) not required (standard)
HEDIF - Diffuser for high efficiency axial fan (Only for size 70.4 ÷ 120.4)

(8) Energy recovery
(-) not required (standard)
D - Partial energy recovery
R - Total energy recovery (only for EXCELLENCE version)

(9) Hydronic assembly
(-) not required (standard)
VARYP - VARYFLOW+ (2 inverter pumps)
HYG1 - Hydronic unit with one ON/OFF pump
HYG2 - Hydronic unit with two ON/OFF pumps

<table>
<tr><th>Functionalities</th><th colspan="4">Diagram hydronic assemblies</th></tr>
<tr>
<td>2 PIPE
SYSTEM

Chilled water production
for installation</td>
<td>1.1
Standard
Unit
(Std)
 
</td>
<td>1.2
Unit
with VARYFLOW+
(VARYP)
 
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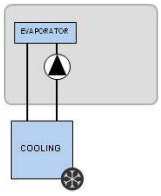
<td>1.3
Unit
with one ON/OFF pump
(HYG1)
 
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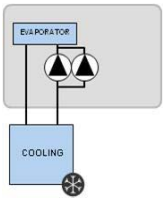
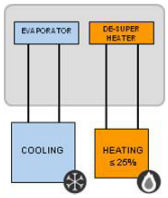
<td>1.4
Unit
with two ON/OFF pumps
(HYG2)
 
</td>
</tr>
<tr>
<td>2 PIPE
SYSTEM
+
PARTIAL RECOVERY

Chilled water production
for installation
-
Free production
of hot water from
partial recovery</td>
<td>2.1
Unit
with partial recovery
(D)
 
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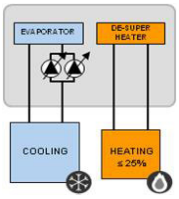
<td>2.2
Unit
with partial recovery
and VARYFLOW+
(D+VARYP)
 
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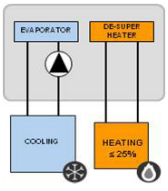
<td>2.3
Unit
with partial recovery
and one ON/OFF pump
(D+HYG1)
 
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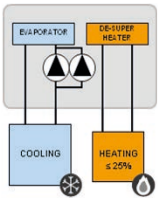
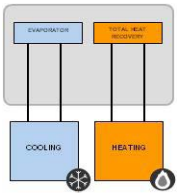
<td>2.4
Unit
with partial recovery
and two ON/OFF pumps
(D+HYG2)
 
</td>
</tr>
<tr>
<td>2 PIPE
SYSTEM
+
TOTAL RECOVERY

Chilled water production
for installation
-
Free production
of hot water from
total recovery</td>
<td>3.1
Unit
with total recovery
(R)
 
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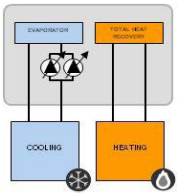
<td>3.2
Unit
with total recovery
and VARYFLOW+
(R+VARYP)
 
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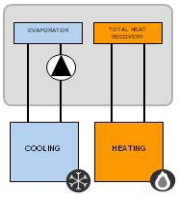
<td>3.3
Unità
with total recovery
and one ON/OFF pump
(R+HYG1)
 
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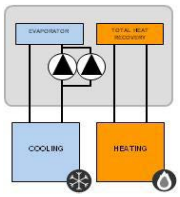
<td>3.4
Unità
with total recovery
and two ON/OFF pumps
(R+HYG2)
 
</td>
</tr>
</table>

EXCELLENCE Version

Acoustic configuration: compressor soundproofing (SC)

General technical data - Performance

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Cooling												
Cooling capacity	1	[kW]	143	158	171	183	198	224	259	288	316	355
Compressor power input	1	[kW]	41,0	45,3	49,5	53,3	56,1	64,9	76,6	81,1	91,6	103
Total power input	2	[kW]	45,8	50,1	54,3	58,1	63,3	71,4	83,7	91,9	102	114
Partial recovery heating capacity	3	[kW]	36,8	40,6	44,1	47,2	50,7	57,7	67,4	73,8	81,8	91,8
Total recovery heating capacity	3	[kW]	177	195	211	226	244	277	323	354	392	441
EER	1		3,13	3,14	3,14	3,14	3,12	3,14	3,11	3,13	3,11	3,11
Water flow-rate	1	[l/s]	6,8	7,5	8,1	8,7	9,4	10,7	12,4	13,7	15,1	16,9
User side exchanger pressure drops	1	[kPa]	37,0	30,0	35,0	40,0	34,0	41,0	32,0	36,0	28,0	25,0
Cooling capacity (EN14511:2013)	4	[kW]	143	157	170	182	197	223	260	287	317	354
Total power input (EN14511:2013)	4	[kW]	45,8	50,2	54,5	58,4	63,0	71,5	83,7	91,6	102	114
EER (EN14511:2013)	4		3,12	3,13	3,12	3,11	3,12	3,12	3,10	3,13	3,10	3,10
SEER	6		4,23	4,42	4,51	4,51	4,41	4,52	4,52	4,33	4,26	4,40
SEPR	7		5,63	5,82	5,86	5,69	5,23	5,30	5,37	5,09	5,17	5,26
Cooling capacity (AHRI 550/590)	5	[kW]	142	157	170	181	196	223	258	286	316	353
Total power input (AHRI 550/590)	5	[kW]	45,7	50	54,1	57,9	63,1	71,3	83,4	91,6	102	114
COP_R	5		3,11	3,14	3,14	3,13	3,11	3,13	3,09	3,12	3,10	3,10
IPLV	5		4,86	4,96	5,02	5,05	4,92	5,06	5,09	4,75	4,82	4,91

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign Lot21.
'Contains fluorinated greenhouse gases'(GWP 2087,5)

1. Data referred to the following conditions: internal exchanger water temperature = 12 / 7 °C Entering external exchanger air temperature = 35°C Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water = 40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data compliant to Standard AHRI 550/590 referred to the following conditions: internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/
6. Data calculated according to the EN 14825:2016 Regulation
7. Data calculated according to the EU 2016/2281 Regulation

PREMIUM Version

Acoustic configuration: compressor soundproofing (SC)

General technical data - Performance

Size			70.4	80.4	90.4	100.4	110.4	120.4
Cooling								
Cooling capacity	1	[kW]	184	208	243	262	289	332
Compressor power input	1	[kW]	59,9	68,5	82,0	88,9	97,5	110
Total power input	2	[kW]	67,1	75,7	89,2	96,1	105	121
Partial recovery heating capacity	3	[kW]	48,8	55,3	65,0	70,2	77,3	88,4
EER	1		2,74	2,75	2,72	2,73	2,76	2,75
Water flow-rate	1	[l/s]	8,7	9,9	11,5	12,4	13,7	15,8
User side exchanger pressure drops	1	[kPa]	38,0	47,0	37,0	43,0	41,0	30,0
Cooling capacity (EN14511:2013)	4	[kW]	183	207	242	261	288	330
Total power input (EN14511:2013)	4	[kW]	66,9	76,0	89,3	96,4	105	122
EER (EN14511:2013)	4		2,74	2,73	2,71	2,71	2,73	2,71
SEER	6		4,08	4,13	4,32	4,17	4,19	4,10
SEPR	7		5,27	5,27	5,55	5,31	5,45	5,26
Cooling capacity (AHRI 550/590)	5	[kW]	183	207	242	260	287	330
Total power input (AHRI 550/590)	5	[kW]	67,3	75,9	89,4	96,3	105	121
COP_R	5		2,72	2,73	2,71	2,70	2,73	2,73
IPLV	5		4,51	4,54	4,66	4,67	4,68	4,51

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign Lot21.
'Contains fluorinated greenhouse gases'(GWP 2087,5)

1. Data referred to the following conditions: internal exchanger water temperature = 12 / 7 °C Entering external exchanger air temperature = 35°C Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water = 40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data compliant to Standard AHRI 550/590 referred to the following conditions: internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/
6. Data calculated according to the EN 14825:2016 Regulation
7. Data calculated according to the EU 2016/2281 Regulation

EXCELLENCE Version

Acoustic configuration: super-silenced (EN)

General technical data - Performance

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Cooling												
Cooling capacity	1	[kW]	139	154	166	177	193	216	250	280	307	343
Compressor power input	1	[kW]	42,3	46,8	51,5	55,2	58,0	66,9	80,1	83,7	94,7	108
Total power input	2	[kW]	45,2	49,7	54,7	58,4	62,4	71,3	84,5	90,3	101	114
Partial recovery heating capacity	3	[kW]	36,3	40,1	43,4	46,4	50,1	56,5	66,0	72,7	80,4	90,1
Total recovery heating capacity	3	[kW]	174	193	208	223	241	271	317	349	386	432
EER	1		3,08	3,09	3,03	3,03	3,09	3,03	2,96	3,10	3,03	2,99
Water flow-rate	1	[l/s]	6,7	7,3	7,9	8,4	9,2	10,3	11,9	13,4	14,7	16,4
User side exchanger pressure drops	1	[kPa]	34,0	27,0	32,0	37,0	31,0	38,0	29,0	33,0	25,0	22,0
Cooling capacity (EN14511:2013)	4	[kW]	139	153	165	176	192	215	249	279	306	342
Total power input (EN14511:2013)	4	[kW]	45,7	50,3	55,3	59,1	63,1	72,2	85,3	91,2	102	115
EER (EN14511:2013)	4		3,03	3,05	2,98	2,98	3,04	2,97	2,92	3,06	3,00	2,96
SEER	6		4,51	4,36	4,50	4,56	4,54	4,63	4,72	4,40	4,44	4,48
SEPR	7		5,73	6,01	5,88	5,72	5,37	5,39	5,37	5,27	5,32	5,39
Cooling capacity (AHRI 550/590)	5	[kW]	139	153	165	176	192	215	249	279	306	341
Total power input (AHRI 550/590)	5	[kW]	45,1	49,5	54,5	58,2	62,2	71,1	84,2	90,0	101	114
COP_R	5		3,08	3,09	3,02	3,02	3,08	3,02	2,95	3,10	3,03	2,99
IPLV	5		5,07	5,11	5,06	5,09	5,03	5,12	5,12	4,86	4,90	4,91

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign Lot21.
'Contains fluorinated greenhouse gases'(GWP 2087,5)

1. Data referred to the following conditions: internal exchanger water temperature = 12 / 7 °C Entering external exchanger air temperature = 35°C Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water = 40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data compliant to Standard AHRI 550/590 referred to the following conditions: internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/
6. Data calculated according to the EN 14825:2016 Regulation
7. Data calculated according to the EU 2016/2281 Regulation

PREMIUM Version

Acoustic configuration: super-silenced (EN)

General technical data - Performance

Size			70.4	80.4	90.4	100.4	110.4	120.4
Cooling								
Cooling capacity	1	[kW]	178	201	234	251	276	319
Compressor power input	1	[kW]	62,3	71,4	85,0	93,0	102	115
Total power input	2	[kW]	66,7	75,8	89,4	97,4	107	122
Partial recovery heating capacity	3	[kW]	48,0	54,4	63,9	68,8	75,7	86,8
EER	1		2,66	2,65	2,62	2,58	2,59	2,61
Water flow-rate	1	[l/s]	8,5	9,6	11,2	12,0	13,2	15,2
User side exchanger pressure drops	1	[kPa]	35,0	44,0	34,0	40,0	38,0	27,0
Cooling capacity (EN14511:2013)	4	[kW]	177	200	233	250	275	317
Total power input (EN14511:2013)	4	[kW]	67,2	76,7	90,3	98,3	108	124
EER (EN14511:2013)	4		2,64	2,60	2,58	2,54	2,55	2,56
SEER	6		4,08	4,26	4,36	4,25	4,22	4,15
SEPR	7		5,43	5,42	5,37	5,50	5,46	5,37
Cooling capacity (AHRI 550/590)	5	[kW]	177	199	233	250	275	317
Total power input (AHRI 550/590)	5	[kW]	67,3	75,9	89,4	96,3	105	121
COP_R	5		2,66	2,64	2,61	2,57	2,59	2,61
IPLV	5		4,66	4,67	4,69	4,73	4,70	4,56

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign Lot21.
'Contains fluorinated greenhouse gases'(GWP 2087,5)

1. Data referred to the following conditions: internal exchanger water temperature = 12 / 7 °C Entering external exchanger air temperature = 35°C Evaporator fouling factor = 0.44 x 10^(-4) m2 K/W
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water = 40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data compliant to Standard AHRI 550/590 referred to the following conditions: internal exchanger water temperature = 6,7 °C. Water flow-rate 0,043 l/s per kW. Entering external exchanger air temperature 35°C. Evaporator fouling factor = 0.18 x 10^(-4) m2 K/
6. Data calculated according to the EN 14825:2016 Regulation
7. Data calculated according to the EU 2016/2281 Regulation

EXCELLENCE Version

Acoustic configuration: compressor soundproofing (SC)

General technical data - Construction

Size			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Compressor												
Type of compressors			Scroll									
Refrigerant			R-410A									
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		[HP]	25	25	30	35	35	40	45	50	55	60
Rated power(C2)		[HP]	25	30	30	30	35	40	45	50	55	60
Std Capacity control steps			6	5	4	5	6	6	6	6	6	4
Oil charge (C1)		[l]	7	7	7	7	8	10	10	11	13	13
Oil charge (C2)		[l]	7	7	7	8	8	10	10	11	13	13
Refrigerant charge (C1)	1	[kg]	16	18	22	22	26	27	28	37	37	42
Refrigerant charge(C2)	1	[kg]	16	18	22	22	26	27	28	37	37	42
Refrigeration circuits			2	2	2	2	2	2	2	2	2	2
Internal exchanger												
Type of internal exchanger	2		PHE									
Water content		[l]	15,6	18,8	18,8	18,8	23,2	23,2	31,6	31,6	42,0	52,4
Minimum system water content	3	l	592	593	881	878	889	881	865	1129	1427	1834
External Section Fans												
Type of fans	4		AX									
Number of fans		Nr	8	8	8	8	4	4	4	6	6	6
Type of motor	5		AC/P									
Standard airflow		[[l/s]	20722	19917	19900	19472	23856	22947	22944	33833	33611	33833
Installed unit power		[kW]	0,6	0,6	0,6	0,6	1,8	1,8	1,8	1,8	1,8	1,8
Connections												
Water fittings			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Power supply												
Standard power supply		V	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

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

Sound levels

Standard unit

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)
50.4	88	95	84	84	83	81	68	61	**88**	**69**
55.4	88	95	84	84	83	81	68	61	**88**	**69**
60.4	88	95	84	84	83	81	68	61	**88**	**69**
65.4	88	95	84	84	83	81	68	61	**88**	**69**
70.4	91	88	88	85	83	82	67	60	**88**	**68**
80.4	91	88	88	85	83	82	67	60	**88**	**68**
90.4	91	88	88	85	83	82	67	60	**88**	**68**
100.4	93	90	90	88	88	85	71	62	**92**	**72**
110.4	93	90	90	88	88	85	71	62	**92**	**72**
120.4	93	90	90	88	88	85	71	62	**92**	**72**

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

Unit with HEDIF - "Diffuser for high efficiency axial fan" option

Size	Sound power level	Sound pressure level
70.4	86	66
80.4	86	66
90.4	86	66
100.4	90	70
110.4	90	70
120.4	90	70

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

PREMIUM Version

Acoustic configuration: compressor soundproofing (SC)

General technical data - Construction

Size			70.4	80.4	90.4	100.4	110.4	120.4
Compressor								
Type of compressors			SCROLL					
Refrigerant			R-410A					
No. of compressors		Nr	4	4	4	4	4	4
Rated power (C1)		[HP]	35	40	45	50	55	60
Rated power(C2)		[HP]	35	40	45	50	55	60
Std Capacity control steps			6	6	6	6	6	4
Oil charge (C1)		[l]	8	10	10	11	13	13
Oil charge (C2)		[l]	8	10	10	11	13	13
Refrigerant charge (C1)	1	[kg]	18	24	26	27	32	35
Refrigerant charge(C2)	1	[kg]	18	24	26	27	32	35
Refrigeration circuits			2	2	2	2	2	2
Internal exchanger								
Type of internal exchanger	2		PHE					
Water content		[l]	19,2	19,2	26,4	26,4	29,5	42,0
Minimum system water content	3	l	828	817	807	1028	1299	1713
External Section Fans								
Type of fans	4		AX					
Number of fans		Nr	4	4	4	4	4	6
Type of motor	5		AC/P					
Standard airflow		[[l/s]	23800	23550	24450	24450	23900	34450
Installed unit power		[kW]	1,90	1,90	1,90	1,90	1,90	1,90
Connections								
Water fittings			3″	3″	3″	4″	4″	4″
Power supply								
Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

1. Dati riferiti alle seguenti condizioni: Temperatura acqua scambiatore interno = 12/7°C. Aria entrante allo scambiatore esterno 35°C.
2. La Potenza Assorbita Totale non tiene conto della quota parte relativa alle pompe e necessaria per vincere le perdite di carico per la circolazione della soluzione all'interno degli scambiatori
3. Dati calcolati in conformità alla Norma EN 14511:2013 riferiti alle seguenti condizioni: Acqua scambiatore interno = 12/7°C. Aria entrante allo scambiatore esterno 35°C
4. PHE = scambiatore a piastre
5. AX = ventilatore assiale

Sound level

Standard unit

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)
70.4	88	85	85	83	83	81	67	59	**87**	**67**
80.4	88	85	86	83	83	81	67	59	**87**	**67**
90.4	89	86	86	84	84	81	67	59	**88**	**68**
100.4	90	87	86	84	84	81	67	59	**88**	**68**
110.4	90	87	87	84	84	81	67	59	**88**	**68**
120.4	93	90	90	88	88	85	71	62	**92**	**71**

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

Unità con opzione HEDIF - "Diffusore per ventilatore assiale ad alta efficienza"

Size	Sound power level	Sound pressure level
70.4	85	65
80.4	85	65
90.4	86	66
100.4	86	66
110.4	86	66
120.4	90	69

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

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			50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Compressor												
Type of compressors			Scroll									
Refrigerant			R-410A									
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4
Rated power (C1)		[HP]	25	25	30	35	35	40	45	50	55	60
Rated power(C2)		[HP]	25	30	30	30	35	40	45	50	55	60
Std Capacity control steps			6	5	4	5	6	6	6	6	6	4
Oil charge (C1)		[l]	7	7	7	7	8	10	10	11	13	13
Oil charge (C2)		[l]	7	7	7	8	8	10	10	11	13	13
Refrigerant charge (C1)	1	[kg]	16	18	22	22	26	27	28	37	37	42
Refrigerant charge(C2)	1	[kg]	16	18	22	22	26	27	28	37	37	42
Refrigeration circuits			2	2	2	2	2	2	2	2	2	2
Internal exchanger												
Type of internal exchanger	2		PHE									
Water content		[l]	15,6	18,8	18,8	18,8	23,2	23,2	31,6	31,6	42,0	52,4
Minimum system water content	3	l										
External Section Fans												
Type of fans	4		AX									
Number of fans		Nr	8	8	8	8	4	4	4	6	6	6
Type of motor	5		AC/P									
Standard airflow		[[l/s]	16700	16700	16100	16100	19340	18500	18500	27800	27800	27230
Connections												
Water fittings			3"	3"	3"	3"	3"	3"	3"	4"	4"	4"
Power supply												
Standard power supply		V	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

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

Sound levels

Standard unit

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)
50.4	82	89	78	78	77	75	62	55	**82**	**63**
55.4	82	89	78	78	77	75	62	55	**82**	**63**
60.4	82	89	78	78	77	75	62	55	**82**	**63**
65.4	82	89	78	78	77	75	62	55	**82**	**63**
70.4	85	82	82	79	77	76	61	54	**82**	**62**
80.4	85	82	82	79	77	76	61	54	**82**	**62**
90.4	85	82	82	79	77	76	61	54	**82**	**62**
100.4	87	84	84	82	82	79	65	56	**86**	**66**
110.4	87	84	84	82	82	79	65	56	**86**	**66**
120.4	87	84	84	82	82	79	65	56	**86**	**66**

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

Unit with HEDIF - "Diffuser for high efficiency axial fan" option

Size	Sound power level	Sound pressure level
70.4	81	61
80.4	81	61
90.4	81	61
100.4	85	65
110.4	85	65
120.4	85	65

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

PREMIUM Version

Acoustic configuration: super-silenced (EN)

General technical data - Construction

Size			70.4	80.4	90.4	100.4	110.4	120.4
Compressor								
Type of compressors			SCROLL					
Refrigerant			R-410A					
No. of compressors		Nr	4	4	4	4	4	4
Rated power (C1)		[HP]	35	40	45	50	55	60
Rated power(C2)		[HP]	35	40	45	50	55	60
Std Capacity control steps			6	6	6	6	6	4
Oil charge (C1)		[l]	8	10	10	11	13	13
Oil charge (C2)		[l]	8	10	10	11	13	13
Refrigerant charge (C1)	1	[kg]	18	24	26	27	32	35
Refrigerant charge(C2)	1	[kg]	18	24	26	27	32	35
Refrigeration circuits			2	2	2	2	2	2
Internal exchanger								
Type of internal exchanger	2		PHE					
Water content		[l]	19,2	19,2	26,4	26,4	29,5	42,0
Minimum system water content	3	l						
External Section Fans								
Type of fans	4		AX					
Number of fans		Nr	4	4	4	4	4	6
Type of motor	5		AC/P					
Standard airflow		[[l/s]	18900	18330	18900	19440	18900	28060
Connections								
Water fittings			3"	3"	3"	4"	4"	4"
Power supply								
Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

1. Dati riferiti alle seguenti condizioni: Temperatura acqua scambiatore interno = 12/7°C. Aria entrante allo scambiatore esterno 35°C.
2. La Potenza Assorbita Totale non tiene conto della quota parte relativa alle pompe e necessaria per vincere le perdite di carico per la circolazione della soluzione all'interno degli scambiatori
3. Dati calcolati in conformità alla Norma EN 14511:2013 riferiti alle seguenti condizioni: Acqua scambiatore interno = 12/7°C. Aria entrante allo scambiatore esterno 35°C
4. PHE = scambiatore a piastre
5. AX = ventilatore assiale

Sound level

Standard unit

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)
70.4	82	79	79	77	77	75	61	53	**81**	**61**
80.4	82	79	80	77	77	75	61	53	**81**	**61**
90.4	83	80	80	78	78	75	61	53	**82**	**62**
100.4	84	81	80	78	78	75	61	53	**82**	**62**
110.4	84	81	81	78	78	75	61	53	**82**	**62**
120.4	87	84	84	82	82	79	65	56	**86**	**65**

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

Unit with HEDIF - "Diffuser for high efficiency axial fan" option

Size	Sound power level	Sound pressure level
70.4	80	60
80.4	80	60
90.4	81	61
100.4	81	61
110.4	81	61
120.4	85	64

Sound levels refer to units with full load under nominal test conditions.
The sound pressure level refers to a distance of 1 meter from the outer surface of the unit operating in open field.
Measures are according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification, which provides for a tolerance of 3 dB(A) on the sound power level, which is the only acoustic data to be considered binding.

Data referred to the following conditions:
Internal exchanger water = 12/7°C
Ambient temperature = 35 °C

EXCELLENCE Version

Acoustic configuration: compressor soundproofing (SC)

Electrical data

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions											
F.L.A. - Compressor 1	A	19,7	19,7	30,5	30,5	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2	A	30,5	30,5	30,5	30,5	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3	A	19,7	30,5	30,5	30,5	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4	A	30,5	30,5	30,5	36,5	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan	A	2,6	2,6	2,6	2,6	4,1	4,1	4,1	4,1	4,1	4,1
F.L.A. - Total	A	111,3	122,1	133,0	139,0	150,9	167,7	196,5	216,7	233,5	262,3
L.R.A. - Locked rotor amperes											
L.R.A. - Compressor 1	A	118	118	174	174	174	174	174	225	272	310
L.R.A. - Compressor 2	A	174	174	174	174	225	272	310	310	310	310
L.R.A. - Compressor 3	A	118	174	174	174	174	174	174	225	272	310
L.R.A. - Compressor 4	A	174	174	174	225	225	272	310	310	310	310
L.R.A. - Single External Fan	A	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions											
F.L.I. - Compressor 1	kW	11,9	11,9	17,0	17,0	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2	kW	17,0	17,0	17,0	17,0	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3	kW	11,9	17,0	17,0	17,0	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4	kW	17,0	17,0	17,0	22,6	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan	kW	0,6	0,6	0,6	0,6	1,9	1,9	1,9	1,9	1,9	1,9
F.L.I. - Total	kW	60,4	65,6	70,7	76,3	86,9	96,9	113,9	128,9	138,9	155,9
M.I.C. Maximum inrush current											
M.I.C. - Value	A	254,3	265,1	276,0	327,0	338,9	394,3	446,7	466,9	483,7	512,5
M.I.C. with soft start accessory	A	192,3	203,1	214,0	229,8	241,7	261,5	308,9	329,1	345,9	374,7

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations..
Power supply: 400/3/50 Hz. Voltage variation: max +/-10

Voltage unbalance between phases: max 2 %
for non standard voltage please contact Clivet technical office
Units are in compliance with the european law CEI EN 60204 and CEI EN 60335..

PREMIUM Version

Acoustic configuration: compressor soundproofing (SC)

Electrical data

Size		70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions							
F.L.A. - Compressor 1	A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2	A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3	A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4	A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan	A	4,1	4,1	4,1	4,1	4,1	4,1
F.L.A. - Total	A	150,9	167,7	196,5	208,5	225,3	262,3
L.R.A. - Locked rotor amperes							
L.R.A. - Compressor 1	A	174	174	174	225	272	310
L.R.A. - Compressor 2	A	225	272	310	310	310	310
L.R.A. - Compressor 3	A	174	174	174	225	272	310
L.R.A. - Compressor 4	A	225	272	310	310	310	310
L.R.A. - Single External Fan	A	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions							
F.L.I. - Compressor 1	kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2	kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3	kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4	kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan	kW	1,90	1,90	1,90	1,90	1,90	1,90
F.L.I. - Total	kW	86,9	96,94	113,9	125,1	135,1	155,9
M.I.C. Maximum inrush current							
M.I.C. - Value	A	338,9	394,3	446,7	458,7	475,5	512,5
M.I.C. with soft start accessory	A	241,7	264,5	308,9	320,9	337,7	374,7

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations..
Power supply: 400/3/50 Hz. Voltage variation: max +/-10

Voltage unbalance between phases: max 2 %
for non standard voltage please contact Clivet technical office
Units are in compliance with the european law CEI EN 60204 and CEI EN 60335.

EXCELLENCE Version

Acoustic configuration: super-silenced (EN)

Electrical data

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions											
F.L.A. - Compressor 1	A	19,7	19,7	30,5	30,5	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2	A	30,5	30,5	30,5	30,5	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3	A	19,7	30,5	30,5	30,5	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4	A	30,5	30,5	30,5	36,5	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan	A	2,6	2,6	2,6	2,6	4,1	4,1	4,1	4,1	4,1	4,1
F.L.A. - Total	A	111,3	122,1	133,0	139,0	150,9	167,7	196,5	216,7	233,5	262,3
L.R.A. - Locked rotor amperes											
L.R.A. - Compressor 1	A	118	118	174	174	174	174	174	225	272	310
L.R.A. - Compressor 2	A	174	174	174	174	225	272	310	310	310	310
L.R.A. - Compressor 3	A	118	174	174	174	174	174	174	225	272	310
L.R.A. - Compressor 4	A	174	174	174	225	225	272	310	310	310	310
L.R.A. - Single External Fan	A	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions											
F.L.I. - Compressor 1	kW	11,9	11,9	17,0	17,0	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2	kW	17,0	17,0	17,0	17,0	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3	kW	11,9	17,0	17,0	17,0	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4	kW	17,0	17,0	17,0	22,6	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan	kW	0,6	0,6	0,6	0,6	1,9	1,9	1,9	1,9	1,9	1,9
F.L.I. - Total	kW	60,4	65,6	70,7	76,3	86,9	96,9	113,9	128,9	138,9	155,9
M.I.C. Maximum inrush current											
M.I.C. - Value	A	254,3	265,1	276,0	327,0	338,9	394,3	446,7	466,9	483,7	512,5
M.I.C. with soft start accessory	A	192,3	203,1	214,0	229,8	241,7	261,5	308,9	329,1	345,9	374,7

Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations..
Power supply: 400/3/50 Hz. Voltage variation: max +/-10

Voltage unbalance between phases: max 2 %
for non standard voltage please contact Clivet technical office
Units are in compliance with the european law CEI EN 60204 and CEI EN 60335..

PREMIUM Version

Acoustic configuration: super-silenced (EN)

Electrical data

Size		70.4	80.4	90.4	100.4	110.4	120.4
F.L.A. - Full load current at max admissible conditions							
F.L.A. - Compressor 1	A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 2	A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Compressor 3	A	30,5	30,5	30,5	36,5	44,9	59,3
F.L.A. - Compressor 4	A	36,5	44,9	59,3	59,3	59,3	59,3
F.L.A. - Single External Fan	A	4,1	4,1	4,1	4,1	4,1	4,1
F.L.A. - Total	A	150,9	167,7	196,5	208,5	225,3	262,3
L.R.A. - Locked rotor amperes							
L.R.A. - Compressor 1	A	174	174	174	225	272	310
L.R.A. - Compressor 2	A	225	272	310	310	310	310
L.R.A. - Compressor 3	A	174	174	174	225	272	310
L.R.A. - Compressor 4	A	225	272	310	310	310	310
L.R.A. - Single External Fan	A	14,0	14,0	14,0	14,0	14,0	14,0
F.L.I. - Full load power input at max admissible conditions							
F.L.I. - Compressor 1	kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 2	kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Compressor 3	kW	17,0	17,0	17,0	22,6	27,6	36,1
F.L.I. - Compressor 4	kW	22,6	27,6	36,1	36,1	36,1	36,1
F.L.I. - Single External Fan	kW	1,90	1,90	1,90	1,90	1,90	1,90
F.L.I. - Total	kW	86,9	96,94	113,9	125,1	135,1	155,9
M.I.C. Maximum inrush current							
M.I.C. - Value	A	338,9	394,3	446,7	458,7	475,5	512,5
M.I.C. with soft start accessory	A	241,7	264,5	308,9	320,9	337,7	374,7

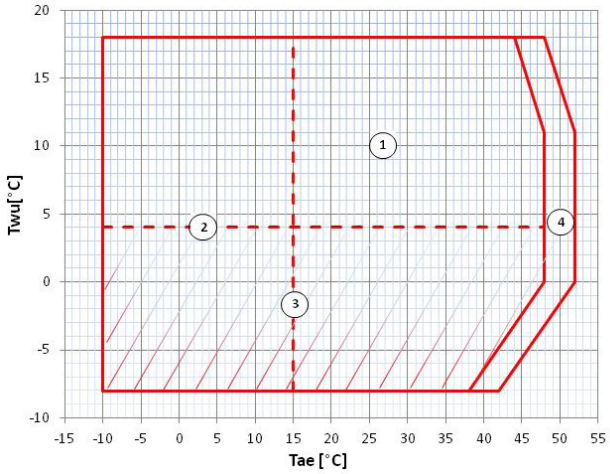
Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations..
Power supply: 400/3/50 Hz. Voltage variation: max +/-10

Voltage unbalance between phases: max 2 %
for non standard voltage please contact Clivet technical office
Units are in compliance with the european law CEI EN 60204 and CEI EN 60335.

Operating ranges - Cooling

EXCELLENCE Version

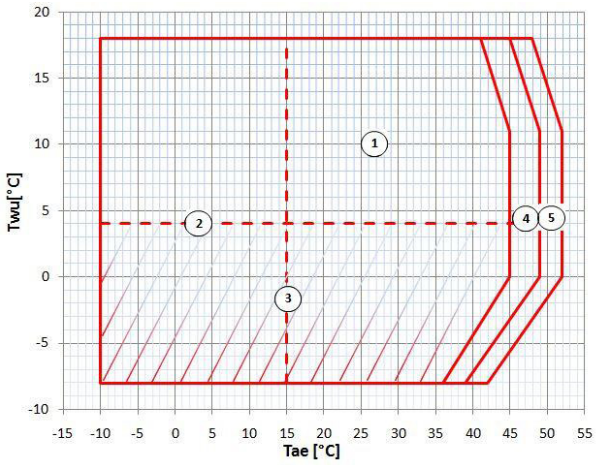
Compressor soundproofing (SC)



Twu [°C] = Internal exchanger outlet water temperature
Tae [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Operating range where the use of ethylene glycol is mandatory in relation to the temperature of the water at the outlet of the user side exchanger
4. Unit operating range with automatic staging of the compressor capacity

Super-silenced (EN)

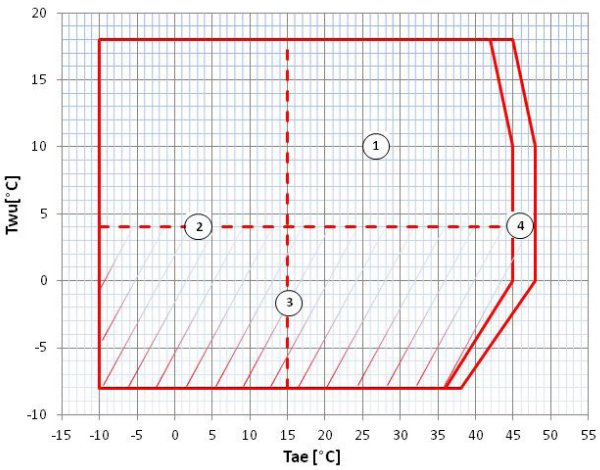


Twu [°C] = Internal exchanger outlet water temperature
Tae [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Operating range where the use of ethylene glycol is mandatory in relation to the temperature of the water at the outlet of the user side exchanger
4. Extended operating range with air flow-rate automatic increasing. Inside this field the sound levels are the same of the 'compressor soundproofing (SC)' acoustic configuration
5. Unit operating range with automatic staging of the compressor capacity

PREMIUM Version

Compressor soundproofing (SC)



Twu [°C] = Internal exchanger outlet water temperature
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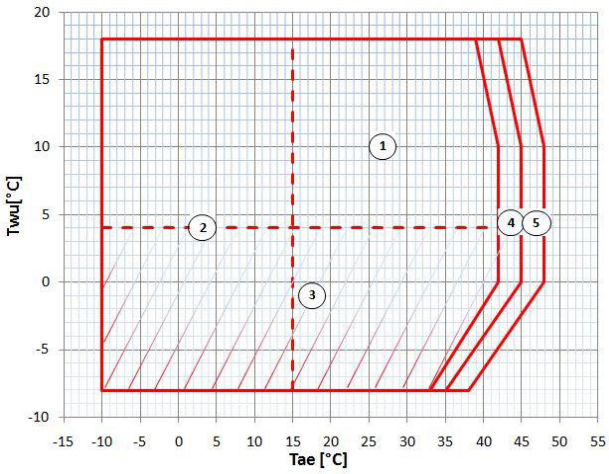
1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Operating range where the use of ethylene glycol is mandatory in relation to the temperature of the water at the outlet of the user side exchanger
4. Unit operating range with automatic staging of the compressor capacity.

Super-silenced (EN)



Twu [°C] = Internal exchanger outlet water temperature
Tae [°C] = External exchanger inlet air temperature

1. Standard unit operating range at full load
2. Standard unit operating range with air flow automatic modulation
3. Operating range where the use of ethylene glycol is mandatory in relation to the temperature of the water at the outlet of the user side exchanger
4. Extended operating range with air flow-rate automatic increasing. Inside this field the sound levels are the same of the 'compressor soundproofing (SC)' acoustic configuration
5. Unit operating range with automatic staging of the compressor capacity

Admissible water flow-rates

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

EXCELLENCE (SC/EN)		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
Qmin	[l/s]	3,8	4,5	4,5	4,5	5,4	5,4	7,4	7,4	9,7	11,5
Qmax	[l/s]	12,6	15,1	15,1	15,1	18,0	18,0	25,0	25,0	32,5	38,5

PREMIUM (SC/EN)		70.4	80.4	90.4	100.4	110.4	120.4
Qmin	[l/s]	4,5	4,5	6,2	6,2	6,9	9,7
Qmax	[l/s]	15,0	15,0	20,9	20,9	23,5	32,5

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	1	-1	-4	-6	-10	-14	-19
Cooling Capacity Factor	Nr	0,995	0,990	0,985	0,981	0,977	0,974	0,971	0,968
Compressor power input Factor	Nr	0,997	0,993	0,990	0,988	0,986	0,984	0,982	0,981
Internal exchanger glycol solution flow factor	Nr	1,003	1,010	1,020	1,033	1,050	1,072	1,095	1,124
Pressure drop Factor	Nr	1,029	1,060	1,090	1,118	1,149	1,182	1,211	1,243

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 °C / 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 switch	[kPa]	4050	3300	-
Low pressure alarm (gas side)	[kPa]	450	600	-
Antifreeze protection	[°C]	4,0	6,0	-
High pressure safety valve (gas side)	[kPa]	-	-	4500
Low pressure safety valve (gas side)	[kPa]	-	-	3000
Max no. of compressor starts per hour (gas side)	[n°]	-	-	10
Differential pressure switch (water side)	[kPa]	3	5	-
Max. pressure without hydronic assembly (water side)	[kPa]	-	-	1000
Max. pressure with hydronic assembly (water side)	[kPa]	-	-	600
Safety valve calibration (water side) (1)	[kPa]	-	-	600

(1) Available only with hydronic assembly option

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

EXCELLENCE Version

Acoustic configuration: compressor soundproofing (SC)

Cooling performance

(continued)

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		48		52	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
50.4	5	151	33,5	144	36,9	136	40,4	125	44,5	115	49,0	63,9	28,7
	7	160	34,1	152	37,5	143	41,0	132	45,1	120	49,7	67,6	29,0
	10	173	34,9	164	38,4	155	41,9	142	46,1	132	50,7	76,3	29,1
	12	183	35,6	174	39,2	163	42,6	151	46,8	-	-	-	-
	15	198	36,6	188	40,2	176	43,7	163	48,0	-	-	-	-
	18	214	37,8	202	41,5	190	45,1	175	49,2	-	-	-	-
55.4	5	167	37,2	159	40,9	149	44,6	137	49,1	126	53,9	70,0	31,6
	7	176	37,8	168	41,7	158	45,3	145	49,8	133	54,6	74,9	31,8
	10	192	38,9	182	42,8	171	46,5	157	51,0	145	55,8	84,4	32,1
	12	203	39,6	192	43,6	181	47,3	166	51,9	-	-	-	-
	15	220	40,8	208	44,7	196	48,7	180	53,3	-	-	-	-
	18	238	42,0	225	46,1	211	50,0	194	54,6	-	-	-	-
60.4	5	181	40,8	172	44,8	162	48,7	149	53,4	137	58,3	76,2	34,2
	7	191	41,6	181	48,6	171	49,5	157	54,3	144	59,2	81,1	34,5
	10	208	42,8	197	47,0	186	50,8	171	55,6	158	60,7	91,6	34,9
	12	219	43,6	208	47,9	196	51,9	180	56,6	-	-	-	-
	15	238	44,9	225	49,2	211	53,4	195	58,3	-	-	-	-
	18	256	46,2	242	50,6	228	54,9	210	59,9	-	-	-	-
65.4	5	194	43,9	184	48,2	173	52,4	159	57,6	147	63,1	81,7	37,0
	7	204	44,8	194	49,1	183	53,3	168	58,4	154	63,9	86,6	37,2
	10	220	46,0	209	50,4	196	54,7	181	59,8	168	65,4	97,2	37,6
	12	232	46,9	220	51,3	207	55,6	191	60,9	-	-	-	-
	15	251	48,3	239	53,0	224	57,4	206	62,7	-	-	-	-
	18	271	49,9	256	54,5	241	59,1	222	64,5	-	-	-	-
70.4	5	207	46,3	198	50,8	187	55,2	172	60,8	158	66,9	88,1	39,2
	7	220	47,3	209	51,7	198	56,1	183	61,7	168	67,7	94,3	39,4
	10	241	48,7	228	53,3	215	57,8	198	63,4	184	69,5	106	39,9
	12	254	49,7	241	54,3	227	58,7	209	64,5	-	-	-	-
	15	276	51,3	262	56,1	246	60,7	227	66,3	-	-	-	-
	18	299	53,3	282	57,9	265	62,6	246	68,3	-	-	-	-
80.4	5	234	52,9	224	58,1	211	63,8	195	69,4	180	76,1	100	44,6
	7	248	53,9	238	59,0	224	64,9	206	70,3	191	76,8	107	44,7
	10	271	55,4	257	60,6	243	66,4	224	72,3	207	78,6	120	45,2
	12	287	56,7	272	62,0	256	67,9	236	73,4	-	-	-	-
	15	311	58,3	294	63,6	278	69,7	256	75,5	-	-	-	-
	18	337	60,2	318	65,9	299	71,5	276	77,2	-	-	-	-
90.4	5	273	63,3	258	69,3	244	75,3	225	82,8	208	90,7	116	53,2
	7	288	64,7	274	70,6	259	76,6	238	84,2	219	92,2	123	53,6
	10	305	65,8	289	72,2	274	78,0	252	85,8	235	93,6	136	53,8
	12	325	67,9	308	73,7	291	79,7	268	87,5	-	-	-	-
	15	355	70,2	337	76,5	317	82,6	293	90,3	-	-	-	-
	18	381	72,2	361	78,9	337	85,2	314	93,1	-	-	-	-

kWf = Internal exchanger cooling capacity (kW)
kWe = Compressor power input (kW)
To (°C) = Leaving internal exchanger water temperature (°C)
Performances in function of the entering/leaving water temperature differential = 5°C

EXCELLENCE Version

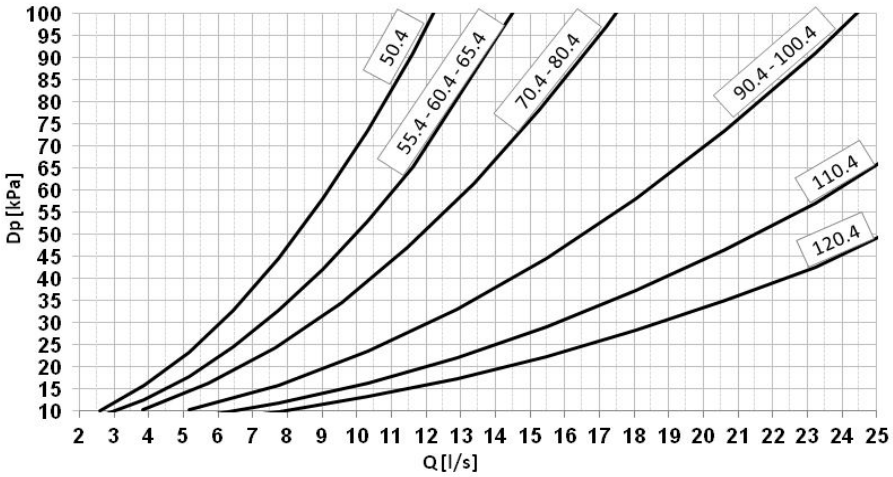
Acoustic configuration: compressor soundproofing (SC)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		48		52	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
100.4	5	302	67,0	288	73,3	274	79,8	254	88,0	233	97,2	130	57,0
	7	320	68,3	305	74,3	288	81,1	265	89,4	245	98,4	137	57,3
	10	340	69,6	323	75,7	306	82,4	280	90,9	258	99,7	150	57,3
	12	355	70,9	339	76,9	321	83,7	296	92,4	-	-	-	-
	15	391	73,2	373	79,6	351	86,8	326	94,8	-	-	-	-
	18	417	75,5	396	81,8	376	88,8	347	97,4	-	-	-	-
110.4	5	336	69,6	320	69,6	302	90,3	277	99,4	255	109	142	64,1
	7	353	77,2	335	84,1	316	91,6	291	101	267	110	150	64,1
	10	372	78,5	353	85,7	332	93,0	306	102	283	112	164	64,3
	12	394	80,3	375	87,5	353	95,3	327	104	-	-	-	-
	15	449	83,3	449	90,6	384	98,1	355	107	-	-	-	-
	18	461	85,8	435	93,2	409	100	380	110	-	-	-	-
120.4	5	375	85,1	355	92,9	336	102	310	112	285	123	159	72,0
	7	397	86,9	377	94,9	355	103	328	113	301	125	169	72,7
	10	433	90,1	410	97,9	387	106	355	117	329	128	191	73,4
	12	458	91,9	432	100	407	108	376	118	-	-	-	-
	15	494	95,3	467	104	441	112	405	122	-	-	-	-
	18	535	98,7	506	107	474	116	436	126	-	-	-	-

kWf = Internal exchanger cooling capacity (kW)
kWe = Compressor power input (kW)
To (°C) = Leaving internal exchanger water temperature (°C)
Performances in function of the entering/leaving water temperature differential = 5°C

Internal exchanger pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow-rate [l/s]
Dp = Pressure drop [Pa]

The water flow rate must be calculated with the following formula

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

kWf = Cooling capacity [kW]
DT = Temperature difference between entering / leaving water.

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical strainer that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as Clivet option (IFWX). 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.

Version PREMIUM

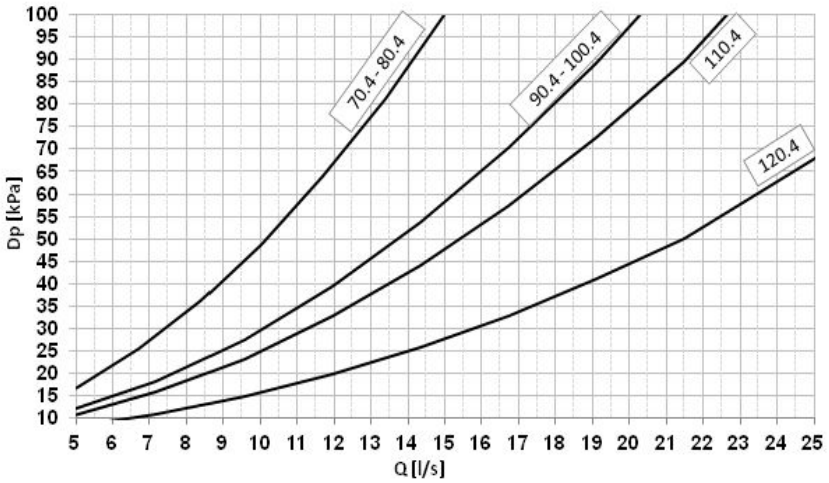
Acoustic configuration: compressor soundproofing (SC)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		45		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
70.4	5	199	49,5	187	53,9	175	58,7	161	64,4	149	70,8	87,6	39,8
	7	209	50,5	197	55,0	184	59,9	169	65,5	158	71,8	92,6	40,0
	10	224	51,8	211	56,5	197	61,5	182	67,3	172	73,8	102	40,9
	12	237	53,0	223	57,8	209	62,9	194	68,6	-	-	-	-
	15	257	55,0	241	59,8	226	64,9	210	70,9	-	-	-	-
	18	275	56,9	257	61,8	241	66,8	225	73,0	-	-	-	-
80.4	5	223	56,7	211	61,9	198	67,2	182	73,7	168	80,5	99,0	45,2
	7	236	57,9	223	63,1	208	68,5	191	74,7	179	81,6	105	45,5
	10	252	59,2	238	64,6	222	70,1	205	76,5	193	83,2	115	46,1
	12	265	60,4	251	65,9	236	71,7	217	77,9	-	-	-	-
	15	290	62,7	272	67,9	254	73,5	236	80,0	-	-	-	-
	18	310	64,5	290	69,9	272	75,7	254	82,2	-	-	-	-
90.4	5	260	67,3	245	73,8	231	80,0	212	87,7	197	95,9	116	48,3
	7	277	68,8	261	75,0	243	82,0	223	89,5	210	97,5	123	50,1
	10	291	70,6	274	77,0	257	83,6	238	91,2	224	99,9	133	50,4
	12	308	72,6	290	78,7	271	85,4	252	92,9	-	-	-	-
	15	335	75,6	315	82,1	294	88,4	276	96,5	-	-	-	-
	18	359	78,2	336	84,5	315	91,2	297	99,4	-	-	-	-
100.4	5	279	73,2	264	79,8	247	87,2	228	95,9	213	106	125	59,4
	7	296	74,8	280	81,6	262	88,9	241	97,8	226	108	133	60,0
	10	313	76,3	295	83,4	276	91,2	256	99,4	241	110	143	61,1
	12	332	78,1	312	85,3	291	93,2	271	102	-	-	-	-
	15	362	81,5	340	88,7	317	96,5	297	106	-	-	-	-
	18	386	84,4	363	91,7	338	99,6	319	109	-	-	-	-
110.4	5	308	80,2	292	87,8	274	95,6	252	105	235	115	138	58,0
	7	326	82,0	307	89,4	289	97,5	265	107	247	117	145	60,0
	10	347	83,8	325	91,5	304	99,4	280	109	264	119	157	60,0
	12	359	85,2	339	93,0	318	101	294	111	-	-	-	-
	15	389	88,4	366	96,1	343	104	319	114	-	-	-	-
	18	415	91,2	391	99,3	367	107	341	117	-	-	-	-
120.4	5	359	90,8	338	99,3	315	109	288	119	269	131	152	58,0
	7	380	92,8	357	101	332	110	305	121	286	133	160	60,0
	10	414	95,8	388	105	361	114	332	125	315	137	170	60,0
	12	439	98,5	410	107	382	117	353	128	-	-	-	-
	15	474	103	442	111	412	121	384	132	-	-	-	-
	18	508	106	474	115	443	125	416	136	-	-	-	-

kWf = Internal exchanger cooling capacity (kW)
kWe = Compressor power input (kW)
To (°C) = Leaving internal exchanger water temperature (°C)
Performances in function of the entering/leaving water temperature differential = 5°C

Internal exchanger pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow-rate [l/s]
Dp = Pressure drop [Pa]

The water flow rate must be calculated with the following formula

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

kWf = Cooling capacity [kW]
DT = Temperature difference between entering / leaving water.

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical strainer that must be placed on the water input line. It is a device compulsory for the correct unit operation, and it is available as Clivet option (IFWX). 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: super-silenced (EN)

Cooling performance

(continued)

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		48		52	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
50.4	5	149	34,7	141	38,1	133	41,6	121	45,8	115	49,0	50,2	32,4
	7	157	35,3	149	38,8	139	42,3	128	46,5	120	49,7	54,2	33,2
	10	169	36,4	161	39,9	150	43,4	139	47,7	132	50,7	60,3	33,5
	12	179	37,1	169	40,7	159	44,2	146	48,5	-	-	-	-
	15	194	38,3	183,0	41,9	171	45,5	157	49,8	-	-	-	-
	18	208	39,5	196	43,1	183	46,8	169	51,1	-	-	-	-
55.4	5	164	38,5	156	42,3	146	46,0	134	50,5	126	53,9	56,9	35,3
	7	174	39,2	164	43,0	154	46,8	141	51,3	133	54,6	61,4	35,9
	10	188	40,4	178	44,2	167	48,0	153	52,6	145	55,8	68,7	36,8
	12	199	41,3	188	45,2	176	49,0	162	53,6	-	-	-	-
	15	215	42,6	203	46,6	189	50,5	174	55,1	-	-	-	-
	18	232	44,0	218	48,0	204	52,0	189	56,7	-	-	-	-
60.4	5	177	42,6	168	46,7	157	50,5	144	55,2	137	58,3	61,4	38,4
	7	187	43,6	177	47,6	166	51,5	152	56,2	144	59,2	66,4	39,6
	10	202	44,9	191	49,1	178	53,0	165	57,9	158	60,7	73,7	40,2
	12	214	45,9	201	50,1	188	54,2	174	59,1	-	-	-	-
	15	231	47,4	218	51,7	203	55,9	187	60,8	-	-	-	-
	18	249	49,0	233	53,4	218	57,4	202	62,7	-	-	-	-
65.4	5	189	45,7	179	49,9	168	54,2	155	59,5	147	63,1	67,0	41,8
	7	200	46,7	189	51,0	177	55,2	162	60,5	154	63,9	71,5	42,4
	10	215	48,0	203	52,4	190	56,7	175	62,0	168	65,4	78,2	42,4
	12	227	49,1	214	53,6	200	57,9	185	63,2	-	-	-	-
	15	245	50,7	230	55,3	215	59,8	200	65,0	-	-	-	-
	18	263	52,4	248	57,2	231	61,6	214	67,2	-	-	-	-
70.4	5	204	48,1	194	52,4	182	57,0	168	62,7	158	66,9	70,3	44,8
	7	216	49,2	204	53,7	193	58,0	177	63,8	168	67,7	75,4	45,4
	10	235	50,9	222	55,3	209	59,7	192	65,6	184	69,5	84,9	47,2
	12	248	52,0	235	56,5	220	61,0	203	66,9	-	-	-	-
	15	268	53,8	253	58,4	238	63,0	219	68,8	-	-	-	-
	18	291	55,8	273	60,5	256	65,1	237	71,4	-	-	-	-
80.4	5	229	55,5	217	60,6	205	65,6	188	72,2	180	76,1	83,7	49,9
	7	243	56,7	230	62,0	216	66,9	199	73,3	191	76,8	89,9	50,6
	10	263	58,4	249	63,8	234	69,1	216	75,4	207	78,6	98,8	51,9
	12	278	59,8	263	65,1	246	70,5	228	76,8	-	-	-	-
	15	300	61,9	284	67,1	265	72,5	245	78,9	-	-	-	-
	18	324	63,8	306	69,3	285	74,9	265	81,3	-	-	-	-
90.4	5	265	66,4	251	72,5	237	78,5	217	86,4	208	90,7	98,8	60,9
	7	282	67,9	266	74,1	250	80,1	229	87,7	219	92,2	107	62,0
	10	297	69,7	282	75,7	264	81,6	243	89,9	235	93,6	115	63,1
	12	315	71,7	298	77,8	280	83,8	257	92,1	-	-	-	-
	15	343	74,7	323	81,1	304	87,1	279	95,3	-	-	-	-
	18	367	77,3	344	83,5	323	90,0	300	98,1	-	-	-	-

kWf = Internal exchanger cooling capacity (kW)
kWe = Compressor power input (kW)
To (°C) = Leaving internal exchanger water temperature (°C)
Performances in function of the entering/leaving water temperature differential = 5°C

EXCELLENCE Version

Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		48		52	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
100.4	5	297	68,0	282	75,6	266	82,7	246	91,0	233	97,2	112	64,3
	7	314	70,7	296	77,2	280	83,7	258	92,5	245	98,4	118	65,2
	10	332	72,3	315	78,7	296	85,3	272	94,0	258	99,7	126	67,1
	12	351	73,9	333	80,5	314	87,2	289	95,9	-	-	-	-
	15	380	76,4	361	83,1	340	90,0	313	98,9	-	-	-	-
	18	405	78,7	383	85,7	361	92,8	335	101	-	-	-	-
110.4	5	329	78,9	311	86,3	294	93,2	270	103	255	109	124	72,8
	7	345	80,5	326	87,8	307	94,7	280	104	267	110	131	73,7
	10	363	82,1	343	89,0	322	96,6	297	106	283	112	141	74,8
	12	384	84,2	364	91,3	341	98,8	315	108	-	-	-	-
	15	417	87,3	396	94,7	370	102	342	111	-	-	-	-
	18	444	90,2	419	97,1	396	105	365	114	-	-	-	-
120.4	5	366	88,7	347	97,0	326	105	299	116	285	123	140	82,0
	7	386	90,9	366	99,0	343	108	316	118	301	125	150	84,5
	10	421	94,0	396	102	372	111	342	122	329	128	163	86,0
	12	444	96,4	418	105	392	113	362	124	-	-	-	-
	15	480	100	451	108	421	117	392	128	-	-	-	-
	18	517	104	486	113	454	121	422	132	-	-	-	-

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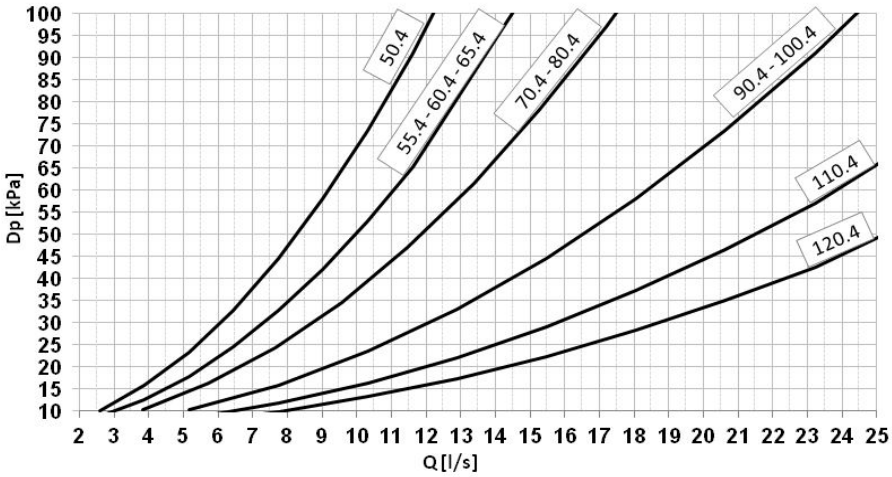
Internal exchanger pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow-rate [l/s]
Dp = Pressure drop [Pa]

The water flow rate must be calculated with the following formula

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

kWf = Cooling capacity [kW]
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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 (IFWX). 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.

Version PREMIUM

Acoustic configuration: super-silenced (EN)

Cooling performance

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		45		48	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
70.4	5	193	51,4	182	56,1	169	61,3	156	67,0	149	70,8	75,4	43,8
	7	203	52,6	191	57,2	178	62,3	164	68,2	158	71,8	79,8	45,2
	10	218	54,3	204	59,0	190	64,1	176	70,1	172	73,8	86,8	46,8
	12	230	55,7	215	60,6	201	65,7	188	71,8	-	-	-	-
	15	248	57,9	232	62,9	217	68,1	205	74,3	-	-	-	-
	18	263	59,9	245	64,8	231	70,2	223	77,3	-	-	-	-
80.4	5	218	59,3	204	64,6	191	70,2	176	76,4	168	80,5	86,1	49,0
	7	229	60,5	215	65,8	201	71,4	185	77,8	179	81,6	91,7	50,9
	10	244	62,2	229	67,7	214	73,2	199	79,7	193	83,2	101	52,0
	12	257	63,7	242	69,2	226	74,8	211	81,4	-	-	-	-
	15	278	65,9	261	71,5	244	77,2	230	83,8	-	-	-	-
	18	296	68,1	278	73,8	260	79,6	248	86,5	-	-	-	-
90.4	5	255	70,4	240	76,8	224	83,5	206	91,2	197	95,9	102	58,5
	7	268	72,0	251	78,5	234	85,0	216	92,9	210	97,5	107	60,3
	10	283	73,9	264	80,2	245	86,9	229	94,5	224	99,9	114	61,1
	12	298	75,8	279	82,3	259	89,1	243	97	-	-	-	-
	15	320	78,6	301	85,4	280	92,2	265	101	-	-	-	-
	18	339	81,8	317	87,8	299	95,0	285	104	-	-	-	-
100.4	5	272	76,5	255	83,2	239	91,1	220	100	213	106	110	65,7
	7	287	78,3	269	85,4	251	93,0	232	102	226	108	117	68,3
	10	302	80,0	284	87,2	265	95,1	246	104	241	110	124	69,4
	12	319	82,4	300	89,8	281	97,7	264	107	-	-	-	-
	15	345	86,1	326	93,7	304	102	290	111	-	-	-	-
	18	370	89,8	346	97,0	327	105	318	116	-	-	-	-
110.4	5	298	84,1	282	91,9	264	100	243	110	235	115	120	71,8
	7	316	86,2	297	93,8	276	102	255	112	247	117	127	73,5
	10	333	88,3	311	96,1	290	104	269	114	264	119	135	75,7
	12	350	90,5	327	98,3	306	107	286	116	-	-	-	-
	15	375	93,8	351	102	329	110	312	121	-	-	-	-
	18	397	96,5	372	105	350	113	335	124	-	-	-	-
120.4	5	349	94,9	326	104	303	113	278	124	269	131	137	80,3
	7	368	97,1	344	106	319	115	295	126	286	133	146	81,8
	10	399	101	372	110	346	119	322	130	315	137	161	84,0
	12	421	104	392	113	366	122	344	134	-	-	-	-
	15	454	108	423	117	396	127	377	139	-	-	-	-
	18	485	112	451	122	424	132	416	145	-	-	-	-

kWf = Internal exchanger cooling capacity (kW)
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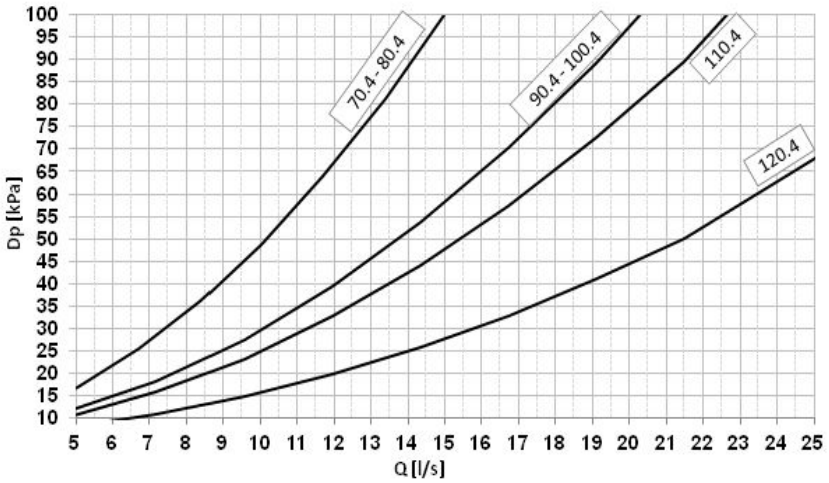
To (°C) = Leaving internal exchanger water temperature (°C)
Performances in function of the entering/leaving water temperature differential = 5°C

Internal exchanger pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow-rate [l/s]
Dp = Pressure drop [Pa]

The water flow rate must be calculated with the following formula

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

kWf = Cooling capacity [kW]
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EXCELLENCE Version

Acoustic configuration: compressor soundproofing (SC)

Cooling performance at part loads

Size	Load	Entering external exchanger air temperature (°C)											
		35°C			30°C			25°C			20°C		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
50.4	100%	143	45,4	3,15	152	42,0	3,63	160	38,5	4,16	167	35,3	4,74
	75%	107	31,5	3,41	114	29,0	3,93	120	27,0	4,44	125	25,1	5,00
	50%	71,6	19,3	3,71	76,1	18,1	4,21	80,1	17,1	4,69	83,6	16,1	5,20
	25%	36,3	9,87	3,68	38,3	9,18	4,17	40,1	8,62	4,65	41,8	8,12	5,15
	Minimun	36,3	9,87	3,68	38,3	9,18	4,17	39,7	8,54	4,65	40,9	7,94	5,14
55.4	100%	158	49,8	3,16	168	46,2	3,63	176	42,4	4,16	184	38,8	4,74
	75%	118	34,4	3,44	126	31,8	3,95	132	29,6	4,46	138	27,4	5,02
	50%	78,8	21,0	3,76	83,8	19,7	4,25	88,1	18,6	4,75	91,8	17,4	5,27
	25%	40,0	10,7	3,73	42,2	9,99	4,22	44,0	9,36	4,71	45,9	8,80	5,22
	Minimun	40,0	10,7	3,73	42,2	9,99	4,22	43,6	9,26	4,71	44,9	8,61	5,21
60.4	100%	171	54,0	3,16	181	53,1	3,41	191	46,1	4,14	198	42,1	4,71
	75%	128	37,2	3,44	136	36,4	3,74	143	32,1	4,46	149	29,7	5,02
	50%	85,4	22,5	3,79	90,6	22,2	4,08	95,4	19,9	4,78	99,2	18,7	5,31
	25%	43,3	11,5	3,77	45,6	11,3	4,05	47,7	10,0	4,75	49,6	9,43	5,26
	Minimun	43,3	11,5	3,77	45,6	11,3	4,05	47,2	9,95	4,75	48,5	9,22	5,26
65.4	100%	183	57,9	3,16	194	53,6	3,61	204	49,4	4,13	213	45,3	4,70
	75%	137	39,7	3,45	145	36,7	3,95	153	34,3	4,46	160	31,8	5,02
	50%	91,3	23,9	3,81	96,8	22,5	4,31	102	21,2	4,81	107	19,9	5,34
	25%	46,3	12,2	3,79	48,8	11,4	4,29	51,0	10,7	4,78	53,3	10,0	5,30
	Minimun	46,3	12,2	3,79	48,8	11,4	4,29	50,5	10,6	4,78	52,1	9,83	5,30
70.4	100%	198	62,5	3,16	209	58,1	3,60	220	53,6	4,10	230	49,6	4,63
	75%	148	43,4	3,42	157	40,2	3,90	165	37,7	4,38	172	35,3	4,89
	50%	98,8	26,7	3,70	105	25,2	4,15	110	23,9	4,61	115	22,7	5,07
	25%	50,1	13,6	3,68	52,6	12,8	4,13	55,0	12,0	4,58	57,5	11,4	5,03
	Minimun	50,1	13,6	3,68	52,6	12,8	4,13	54,5	11,9	4,58	56,2	11,2	5,03
80.4	100%	224	71,5	3,14	238	65,6	3,63	248	60,5	4,11	259	55,9	4,63
	75%	168	49,4	3,41	179	45,2	3,95	186	42,3	4,40	194	39,5	4,91
	50%	112	30,2	3,72	119	28,0	4,24	124	26,6	4,68	129	25,2	5,14
	25%	56,9	15,4	3,70	59,9	14,2	4,22	62,1	13,4	4,65	64,7	12,7	5,11
	Minimun	56,9	15,4	3,70	59,9	14,2	4,22	61,5	13,2	4,65	63,2	12,4	5,10
90.4	100%	259	83,1	3,12	274	77,2	3,55	288	71,2	4,04	301	65,5	4,59
	75%	194	57,0	3,41	206	52,8	3,89	216	49,5	4,37	226	46,0	4,90
	50%	130	34,4	3,77	137	32,3	4,25	144	30,6	4,71	150	28,8	5,22
	25%	65,7	17,5	3,75	69,0	16,3	4,23	72,0	15,4	4,69	75,2	14,5	5,19
	Minimun	65,7	17,5	3,75	69,0	16,3	4,23	71,3	15,2	4,69	73,5	14,2	5,19
100.4	100%	288	90,8	3,17	305	84,1	3,63	320	78,1	4,09	333	72,4	4,60
	75%	216	63,2	3,42	229	58,4	3,91	240	55,1	4,35	250	51,7	4,84
	50%	144	39,1	3,68	152	36,8	4,14	160	35,1	4,55	167	33,4	4,99
	25%	73,0	19,9	3,66	76,8	18,6	4,13	79,9	17,6	4,53	83,4	16,8	4,96
	Minimun	73,0	19,9	3,66	76,8	18,6	4,13	79,1	17,5	4,53	81,5	16,4	4,96
110.4	100%	316	101	3,12	335	93,9	3,57	353	87,0	4,06	368	80,7	4,57
	75%	237	70,1	3,38	251	64,9	3,87	265	61,0	4,34	276	57,2	4,83
	50%	158	43,0	3,67	168	40,4	4,15	177	38,4	4,60	184	36,5	5,04
	25%	80,1	21,9	3,66	84,4	20,4	4,13	88,3	19,3	4,58	92,1	18,4	5,02
	Minimun	80,1	21,9	3,66	84,4	20,4	4,13	87,4	19,1	4,58	90,0	18,0	5,02
120.4	100%	355	113	3,14	377	105	3,60	397	96,8	4,10	415	89,9	4,61
	75%	267	78,1	3,41	283	72,1	3,92	297	67,6	4,40	311	63,4	4,91
	50%	178	47,5	3,74	188	44,5	4,24	198	42,2	4,70	207	40,1	5,17
	25%	90,1	24,1	3,73	94,9	22,5	4,22	99,1	21,2	4,69	104	20,1	5,15
	Minimun	90,1	24,1	3,73	94,9	22,5	4,22	98,1	20,9	4,69	101	19,7	5,15

kWf = Cooling capacity in kW kWe_tot = Overall electrical capacity input by the unit in kW
Load = % of cooling capacity compared to the value at full load
Acqua scambiatore interno = uscita 7°C / ingresso * (variabile) / portata costante, pari al valore nominale

PREMIUM Version

Acoustic configuration: compressor soundproofing (SC)

Cooling performance at part loads

Size	Load	Entering external exchanger air temperature (°C)											
		35°C			30°C			25°C			20°C		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
70.4	100%	184	67,5	2,72	197	62,6	3,14	209	58,1	3,59	219	53,8	4,08
	75%	138	47,1	2,92	148	43,7	3,38	157	41,1	3,81	165	38,5	4,27
	50%	91,8	29,4	3,13	98,4	27,6	3,56	104	26,4	3,96	110	25,1	4,38
	25%	46,6	15,6	2,99	49,5	14,6	3,39	52,2	13,9	3,76	54,9	13,2	4,14
	Minimun	46,6	15,6	2,99	49,5	14,6	3,39	51,7	13,8	3,76	53,7	13,0	4,13
80.4	100%	208	76,1	2,74	223	70,7	3,15	236	65,5	3,60	247	60,5	4,09
	75%	156	52,8	2,96	167	49,0	3,41	177	46,0	3,85	185	43,0	4,31
	50%	104	32,5	3,20	111	30,6	3,64	118	29,1	4,06	124	27,6	4,48
	25%	52,8	17,1	3,10	56,1	16,0	3,51	59,0	15,1	3,90	61,8	14,4	4,30
	Minimun	52,8	17,1	3,10	56,1	16,0	3,51	58,4	15,0	3,90	60,4	14,1	4,29
90.4	100%	243	89,6	2,71	261	82,7	3,16	277	76,4	3,62	291	70,8	4,11
	75%	182	61,7	2,95	196	56,8	3,44	208	53,3	3,90	218	49,9	4,37
	50%	122	37,4	3,24	130	35,0	3,73	138	33,2	4,17	145	31,4	4,62
	25%	61,6	19,7	3,12	65,7	18,4	3,58	69,2	17,3	3,99	72,6	16,5	4,41
	Minimun	61,6	19,7	3,12	65,7	18,4	3,58	68,5	17,2	3,99	71,0	16,1	4,40
100.4	100%	262	96,5	2,72	280	89,3	3,13	296	82,4	3,60	311	76,1	4,08
	75%	197	66,2	2,97	210	61,1	3,43	222	57,3	3,88	233	53,5	4,36
	50%	131	40,0	3,28	140	37,4	3,74	148	35,4	4,19	155	33,5	4,64
	25%	66,5	21,0	3,17	70,4	19,5	3,60	74,1	18,4	4,03	77,7	17,4	4,45
	Minimun	66,5	21,0	3,17	70,4	19,5	3,60	73,4	18,2	4,02	75,9	17,1	4,44
110.4	100%	289	105	2,75	307	96,9	3,17	326	89,5	3,65	343	82,6	4,15
	75%	217	71,8	3,02	230	66,1	3,48	245	61,9	3,95	257	57,8	4,45
	50%	145	43,0	3,36	154	40,1	3,83	163	38,0	4,30	171	35,9	4,78
	25%	73,3	22,4	3,27	77,3	20,8	3,71	81,6	19,6	4,16	85,7	18,5	4,62
	Minimun	73,3	22,4	3,27	77,3	20,8	3,71	80,8	19,4	4,16	83,8	18,2	4,62
120.4	100%	332	121	2,74	357	112	3,18	380	104	3,66	400	96,0	4,16
	75%	249	83,9	2,97	268	77,4	3,46	285	72,6	3,93	300	67,8	4,42
	50%	166	51,2	3,25	178	47,9	3,72	190	45,5	4,18	200	43,1	4,64
	25%	84,3	26,7	3,16	89,8	24,9	3,61	95,0	23,5	4,04	99,9	22,3	4,48
	Minimun	84,3	26,7	3,16	89,8	24,9	3,61	94,0	23,3	4,04	97,7	21,8	4,47

kWf = Cooling capacity in kW kWe_tot = Overall electrical capacity input by the unit in kW
Load = % of cooling capacity compared to the value at full load
Acqua scambiatore interno = uscita 7°C / ingresso * (variabile) / portata costante, pari al valore nominale

EXCELLENCE Version

Acoustic configuration: super-silenced (EN)

Cooling performance at part loads

Size	Load	Entering external exchanger air temperature (°C)											
		35°C			30°C			25°C			20°C		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
50.4	100%	139	45,5	3,06	149	42,0	3,54	157	38,5	4,08	162	34,8	4,66
	75%	105	30,8	3,40	112	28,5	3,91	118	26,6	4,44	122	24,3	5,01
	50%	69,7	18,1	3,85	74,4	17,0	4,37	78,6	16,1	4,88	81,1	14,9	5,44
	25%	36,1	9,36	3,85	37,9	8,66	4,37	39,3	8,05	4,88	40,6	7,45	5,44
	Minimun	36,1	9,36	3,85	37,9	8,66	4,37	39,2	8,03	4,88	40,0	7,35	5,44
55.4	100%	154	50,0	3,08	164	46,2	3,55	174	42,4	4,09	178	38,2	4,66
	75%	115	33,7	3,42	123	31,3	3,93	130	29,2	4,47	134	26,6	5,03
	50%	76,9	19,7	3,91	82,1	18,5	4,43	86,8	17,5	4,95	89,1	16,2	5,50
	25%	39,8	10,2	3,91	41,8	9,44	4,43	43,4	8,76	4,95	44,5	8,09	5,51
	Minimun	39,8	10,2	3,91	41,8	9,44	4,43	43,3	8,74	4,95	44,0	7,98	5,51
60.4	100%	166	54,7	3,03	177	50,8	3,47	187	46,8	4,00	192	42,1	4,56
	75%	124	36,8	3,38	132	34,3	3,86	140	32,0	4,37	144	29,2	4,93
	50%	82,8	21,4	3,88	88,3	20,2	4,37	93,4	19,1	4,89	96,0	17,6	5,44
	25%	42,9	11,1	3,88	45,0	10,3	4,37	46,7	9,56	4,89	48,0	8,81	5,45
	Minimun	42,9	11,1	3,88	45,0	10,3	4,37	46,6	9,53	4,89	47,4	8,69	5,45
65.4	100%	177	58,4	3,02	189	54,2	3,48	200	49,9	4,01	206	45,1	4,58
	75%	133	39,2	3,38	142	36,5	3,88	150	34,1	4,40	155	31,2	4,96
	50%	88,4	22,7	3,90	94,4	21,4	4,42	100	20,3	4,94	103	18,7	5,50
	25%	45,8	11,8	3,90	48,1	10,9	4,42	50,0	10,1	4,94	51,6	9,36	5,51
	Minimun	45,8	11,8	3,90	48,1	10,9	4,42	49,9	10,1	4,94	50,9	9,24	5,51
70.4	100%	193	62,3	3,09	204	58,1	3,52	216	53,6	4,04	222	48,7	4,57
	75%	145	42,1	3,43	153	39,4	3,89	162	36,9	4,39	167	34,0	4,91
	50%	96,4	24,7	3,89	102	23,5	4,35	108	22,3	4,84	111	20,8	5,35
	25%	49,9	12,8	3,89	52,1	12,0	4,35	54,1	11,2	4,84	55,6	10,4	5,35
	Minimun	49,9	12,8	3,89	52,1	12,0	4,35	53,9	11,1	4,84	54,9	10,2	5,35
80.4	100%	216	71,3	3,03	230	66,4	3,46	243	61,1	3,98	250	55,5	4,50
	75%	162	48,0	3,37	172	44,9	3,83	182	41,9	4,35	188	38,6	4,86
	50%	108	28,0	3,86	115	26,5	4,33	122	25,1	4,84	125	23,4	5,35
	25%	55,9	14,5	3,86	58,5	13,5	4,33	60,8	12,6	4,84	62,5	11,7	5,35
	Minimun	55,9	14,5	3,86	58,5	13,5	4,33	60,6	12,5	4,84	61,7	11,5	5,35
90.4	100%	250	84,4	2,96	266	78,5	3,39	282	72,3	3,90	289	65,8	4,40
	75%	187	56,6	3,31	200	52,8	3,78	211	49,4	4,28	217	45,4	4,77
	50%	125	32,6	3,83	133	30,9	4,32	141	29,2	4,82	145	27,2	5,32
	25%	64,7	16,9	3,83	67,8	15,7	4,32	70,4	14,6	4,82	72,3	13,6	5,33
	Minimun	64,7	16,9	3,83	67,8	15,7	4,32	70,2	14,6	4,82	71,4	13,4	5,33
100.4	100%	280	90,3	3,10	296	83,8	3,54	314	77,3	4,06	324	70,7	4,58
	75%	210	61,1	3,44	222	57,0	3,90	235	53,4	4,41	243	49,4	4,91
	50%	140	36,0	3,89	148	34,1	4,35	157	32,4	4,84	162	30,4	5,33
	25%	72,5	18,7	3,89	75,5	17,4	4,35	78,4	16,2	4,84	80,9	15,2	5,33
	Minimun	72,5	18,7	3,89	75,5	17,4	4,35	78,2	16,2	4,84	79,8	15,0	5,33
110.4	100%	307	101	3,03	326	94,4	3,45	345	87,1	3,96	356	79,2	4,50
	75%	230	68,3	3,37	244	63,9	3,82	259	59,9	4,32	267	55,1	4,85
	50%	154	39,9	3,85	163	37,9	4,30	172	36,0	4,79	178	33,5	5,32
	25%	79,6	20,7	3,85	82,9	19,3	4,30	86,2	18,0	4,79	89,1	16,7	5,32
	Minimun	79,6	20,7	3,85	82,9	19,3	4,30	85,9	17,9	4,79	87,9	16,5	5,32
120.4	100%	343	114	2,99	366	106	3,46	386	97,6	3,95	400	88,7	4,50
	75%	257	76,9	3,34	274	71,3	3,85	289	66,9	4,33	300	61,5	4,87
	50%	171	44,6	3,84	183	41,9	4,36	193	39,9	4,84	200	37,1	5,38
	25%	88,7	23,1	3,84	93,1	21,4	4,36	96,5	19,9	4,84	99,9	18,5	5,39
	Minimun	88,7	23,1	3,84	93,1	21,4	4,36	96,2	19,9	4,84	98,6	18,3	5,39

kWf = Cooling capacity in kW kWe_tot = Overall electrical capacity input by the unit in kW
Load = % of cooling capacity compared to the value at full load
Acqua scambiatore interno = uscita 7°C / ingresso * (variabile) / portata costante, pari al valore nominale

PREMIUM Version

Acoustic configuration: super-silenced (EN)

Cooling performance at part loads

Size	Load	Entering external exchanger air temperature (°C)											
		35°C			30°C			25°C			20°C		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
70.4	100%	178	66,6	2,67	191	61,5	3,10	203	56,9	3,57	211	52,3	4,02
	75%	133	44,9	2,97	143	41,7	3,43	152	39,1	3,90	158	36,4	4,34
	50%	88,9	26,3	3,38	95,3	24,7	3,86	102	23,5	4,32	105	22,1	4,76
	25%	46,0	13,6	3,38	48,5	12,6	3,86	50,8	11,8	4,32	52,7	11,1	4,76
	Minimun	46,0	13,6	3,38	48,5	12,6	3,86	50,7	11,7	4,32	52,0	10,9	4,76
80.4	100%	201	75,8	2,64	215	70,2	3,06	229	64,9	3,53	240	59,1	4,06
	75%	150	51,0	2,95	161	47,4	3,40	172	44,4	3,86	180	40,9	4,39
	50%	100	29,6	3,39	107	27,9	3,85	114	26,5	4,32	120	24,7	4,85
	25%	51,9	15,3	3,39	54,7	14,2	3,85	57,2	13,3	4,32	59,9	12,3	4,86
	Minimun	51,9	15,3	3,39	54,7	14,2	3,85	57,1	13,2	4,32	59,1	12,2	4,86
90.4	100%	234	89,3	2,62	251	82,8	3,04	268	76,3	3,51	279	69,9	3,99
	75%	176	59,7	2,94	189	55,6	3,39	201	52,0	3,87	209	48,1	4,35
	50%	117	34,3	3,42	126	32,3	3,89	134	30,6	4,38	139	28,6	4,87
	25%	60,7	17,8	3,42	64,0	16,5	3,89	67,0	15,3	4,38	69,7	14,3	4,88
	Minimun	60,7	17,8	3,42	64,0	16,5	3,89	66,8	15,3	4,38	68,8	14,1	4,88
100.4	100%	251	97,3	2,58	269	89,7	3,00	287	82,6	3,47	303	75,6	4,01
	75%	188	64,9	2,90	202	60,1	3,36	215	56,1	3,83	227	52,0	4,37
	50%	126	37,1	3,38	135	34,8	3,87	143	32,9	4,35	152	30,8	4,92
	25%	65,0	19,2	3,38	68,6	17,7	3,87	71,7	16,5	4,35	75,8	15,4	4,93
	Minimun	65,0	19,2	3,38	68,6	17,7	3,87	71,5	16,4	4,35	74,8	15,2	4,93
110.4	100%	276	106	2,60	297	98,1	3,03	316	90,6	3,49	328	82,4	3,98
	75%	207	70,9	2,92	223	65,6	3,39	237	61,5	3,86	246	56,5	4,35
	50%	138	40,4	3,42	148	37,8	3,92	158	35,9	4,40	164	33,3	4,92
	25%	71,5	20,9	3,42	75,6	19,3	3,92	79,0	17,9	4,41	82,0	16,6	4,93
	Minimun	71,5	20,9	3,42	75,6	19,3	3,92	78,8	17,9	4,41	80,9	16,4	4,93
120.4	100%	319	122	2,62	344	113	3,05	368	104	3,55	384	94,7	4,05
	75%	239	81,7	2,92	258	75,8	3,40	276	70,8	3,89	288	65,4	4,40
	50%	159	47,2	3,37	172	44,4	3,87	184	42,0	4,37	192	39,3	4,89
	25%	82,6	24,5	3,37	87,5	22,6	3,87	91,9	21,0	4,37	95,9	19,6	4,90
	Minimun	82,6	24,5	3,37	87,5	22,6	3,87	91,6	21,0	4,37	94,7	19,3	4,90

kWf = Cooling capacity in kW kWe_tot = Overall electrical capacity input by the unit in kW
Load = % of cooling capacity compared to the value at full load
Acqua scambiatore interno = uscita 7°C / ingresso * (variabile) / portata costante, pari al valore nominale

Configurations

D - Partial energy recovery

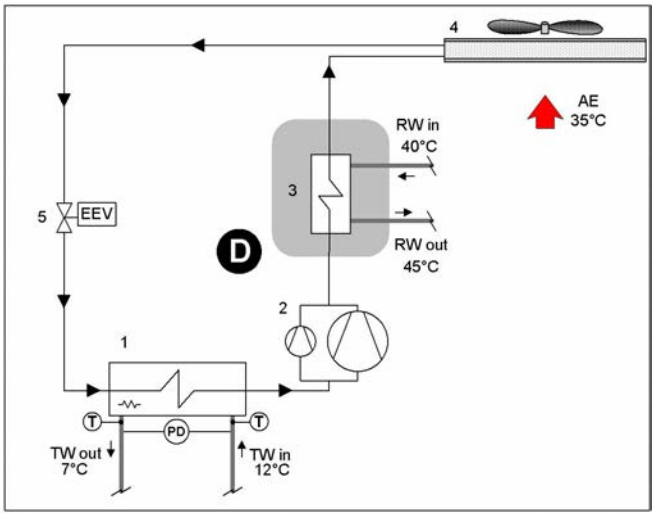
Configuration with recovery side brazed stainless steel (316 AISI) plate exchangers, and components per the legend of the enclosed plumbing circuit diagram. All water fittings are Victaulic type.

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 rejected to the external heat source. It is possible to recovery about 20% of the unit rejected heating capacity equal to the sum of the cooling capacity and the compressor power input.

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%.

Hot water availability is always subordinate to the production of chilled water. The heating capacity request is made by the digital contact enabling, that activates the pump recovery side (outside the unit).

The partial energy recovery option (D) is available both in the EXCELLENCE (EXC) and PREMIUM (PRM) configuration.



D - Partial recovery device

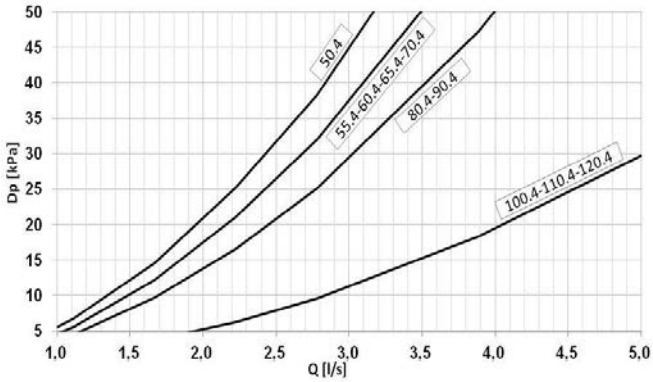
1 - Internal exchanger
2 - Compressors
3 - Recovery exchanger
4 - External exchanger
5 - Electronic expansion valve

RW in - Ingresso acqua recupero
RW out - Uscita acqua recupero

T - Sonda di temperatura
PD - Pressostato differenziale
AE Aria esterna

TW out chilled water outlet
TW out Uscita acqua refrigerata

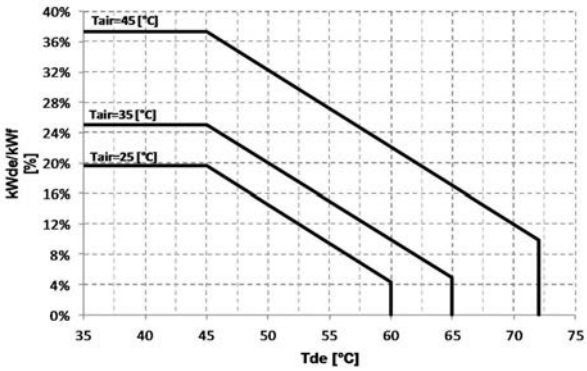
Partial energy recovery pressure drop curves



The pressure drops on the water side are calculated by considering an average water temperature at 7°C.

Q = Water flow-rate [l/s]
DP = Pressure drops [kPa]

Partial recovery heating capacity



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

R - Total energy recovery

Configuration with recovery side brazed stainless steel (316 AISI) plate exchangers, ON/OFF solenoid valves, temperature sensors on the supply and return of the hot water circuit and components according to the key on the diagram shown below.

A configuration which enables the production of hot water free-of-charge while operating in the cooling mode, thanks to the total recovery of condensation heat that would otherwise be disposed of into the external heat source. 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 rejected to the external heat source. It is possible to recover approximately 100% of the rejected unit heating capacity equal to the sum of the cooling capacity and the relative compressor power input.

Hot water availability is always subordinate to the production of chilled water. The heating capacity request is made by the digital contact enabling, that activates the pump recovery side (outside the unit).

See the following example:

1. cooling capacity request = 100% / Heating capacity request = 0% >Production only of cooling capacity;
1. cooling capacity request = 100% / Heating capacity request = 0% >Production of cooling and heating capacity by recovery;
1. cooling capacity request = 50% / Heating capacity request = 100% >Production of cooling and heating capacity by recovery, equal to the 50% of the requested heating capacity.

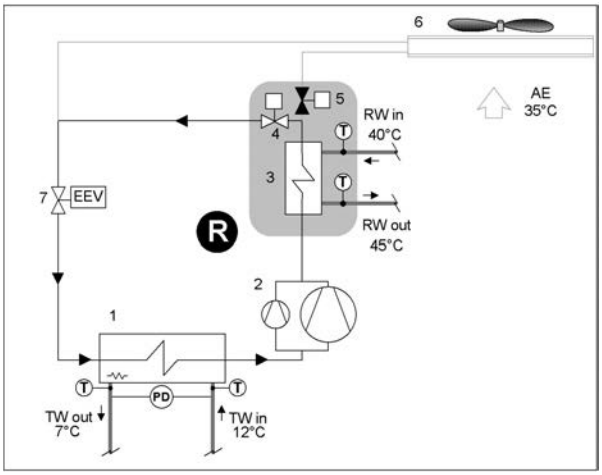
The total energy recovery (R) is available only in the EXCELLENCE (EXC) configuration.

To prevent constant switching in the unit's refrigeration circuit, it is necessary to install a storage tank with an adequate capacity in the system's hot water circuit.

In the absence of hot water circulation in the recovery exchanger, the maximum inlet air temperature is reduced by approximately 2°C compared with the unit without "Total Energy Recovery" mode.

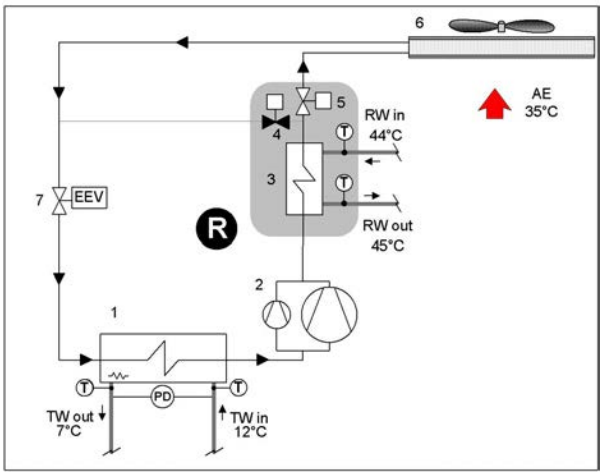
Total operating energy recovery

The pump on the recovery exchanger must be activated when hot water is required. Condensation takes place entirely in the recovery circuit



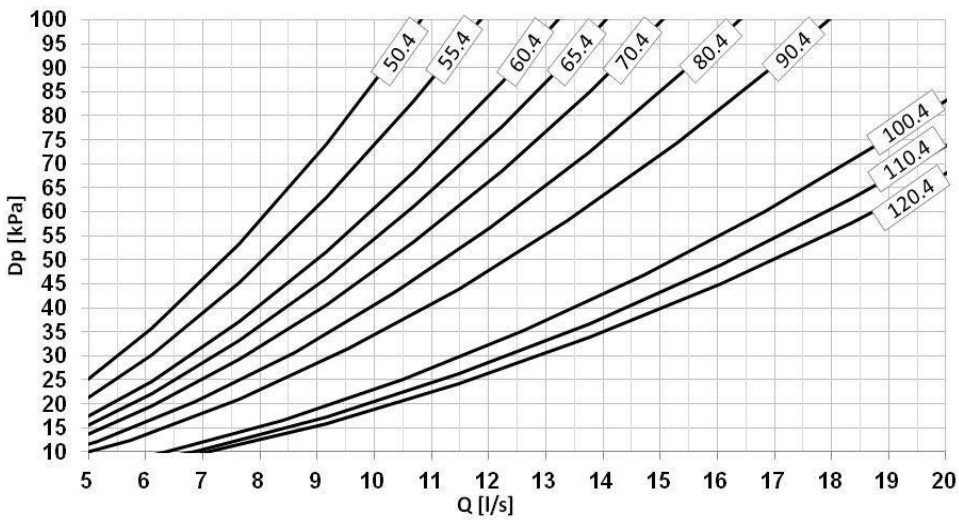
Total non-operating energy recovery

When the recovery set-point has been satisfied, the condensing coil is reactivated. In this condition, the total recovery circuit operates as a Partial recovery circuit (Desuperheater).



R - Total recovery device
1 - Internal exchanger
2 - Compressor
3 - Recovery exchanger
4 - Total recovery enabling valve
5 - External exchanger enabling valve
6 - External exchanger
7 - Expansion electronic valve
T - Temperature probe
PD - Differential pressure switch
TW in chilled water inlet
TW out chilled water outlet
RW in - Recovery water inlet
RW out - Recovery water outlet
AE Outdoor air

Pressure drops of the total energy recovery exchanger



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

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

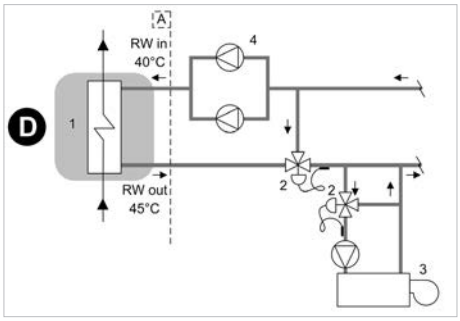
Preheating of hot water for domestic use or for industrial process

Heating of water in swimming pools, showers and SPAS

Preheating of hot water for laundries and industrial kitchens

Air heating

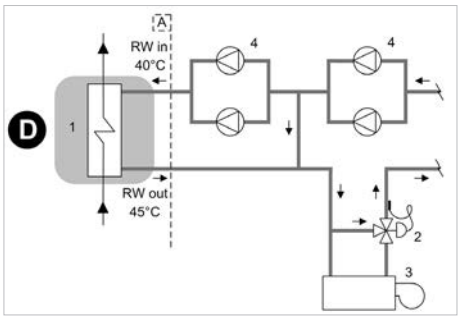
The heat recovery device can be used to cover the entire heat load required. The hot water supply temperature is controlled via a modulating control valve that needs to be fitted on the system at the outlet of the recovery unit. The auxiliary heating device is recommended to cover the thermal energy 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

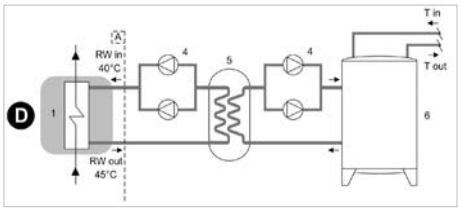
The heat recovery device can be used to preheat water at the inlet of the main heating device (e.g. boiler). In this case, the demand for hot water is greater than the amount of heat recovered by condensation and the recovery device only covers part of the required heat load. By preheating the water,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

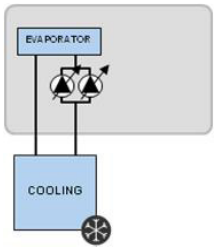
A - Unit supply limit
1 - Recovery exchanger
3 - Auxiliary heating device (ex.boiler)
5 - Intermediate heat exchanger
RW in - Recovery water input
T in - Drinkable water inlet

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.

Hydronic units

VARYP - VARYFLOW+ (2 inverter pumps)

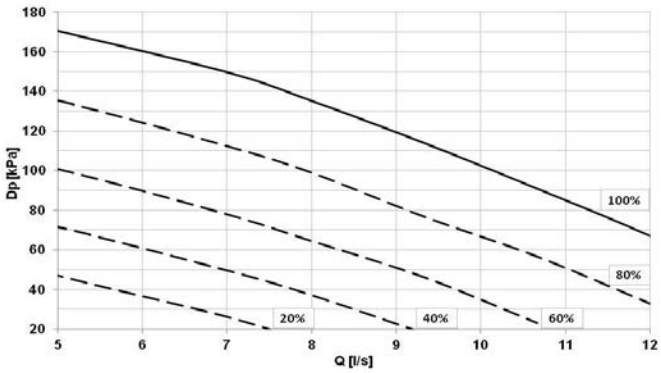


Configuration with 2 centrifugal electric pumps arranged in parallel and controlled by inverter, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.

The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

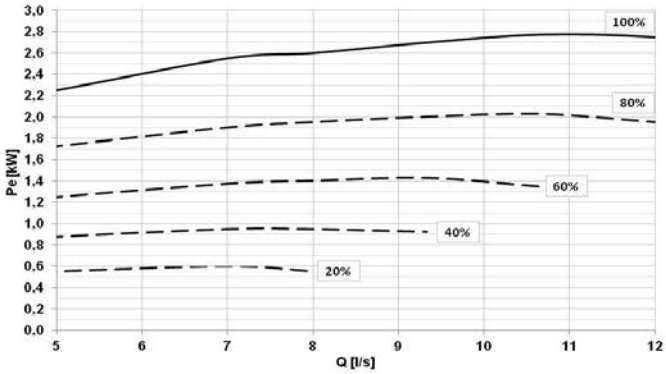
The control, modulates the water flow-rate keeping constant the delta T. If the water temperature is in critical conditions, it allows to extend the unit operating ranges guaranteeing its operating, automatically reducing the water flow-rate. In the event of one of the two pumps is temporarily unavailable, it guarantees about the 80% of the nominal flow-rate.

Pressure head VARYFLOW+ (Size 50.4 ÷ 65.4)



Q = Water flow-rate [l/s]
DP = Pressure head [kPa]

Absorption curves VARYFLOW+ (Size 50.4 ÷ 65.4)

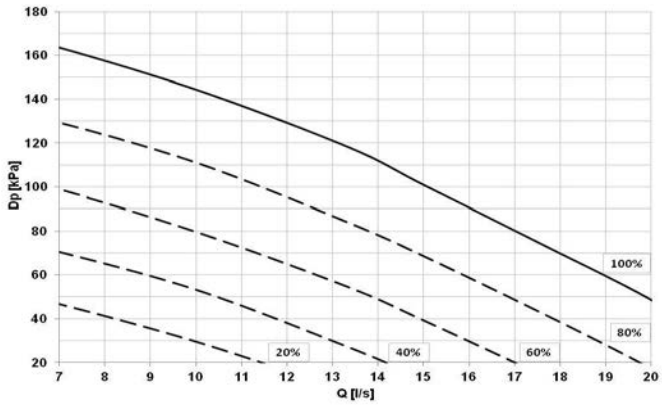


Q = Water flow-rate [l/s]
Pe = Electric power consumption [kW]

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

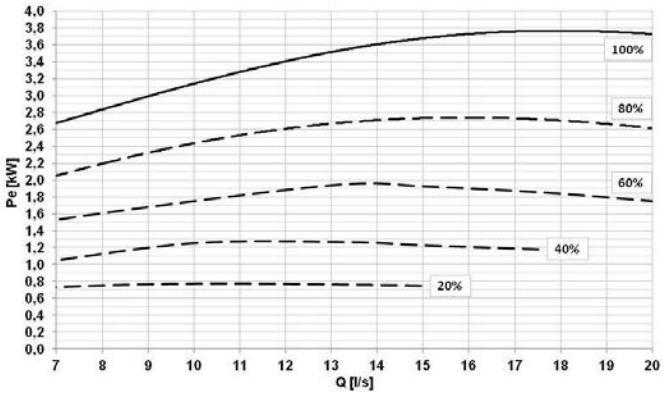
- Evaporator pressure drops user side
- IFWX accessory –Steel mesh filter on the water side (where applicable)

Pressure head VARYFLOW+ (Size 70.4 ÷ 90.4)



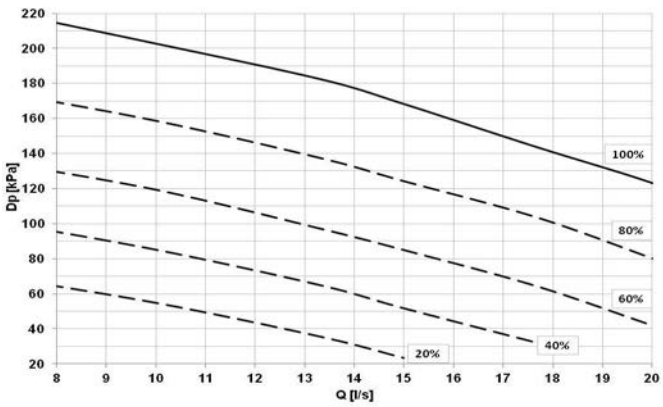
Q = Water flow-rate [l/s]
DP = Pressure head [kPa]

Absorption curves VARYFLOW+ (Size 70.4 ÷ 90.4)



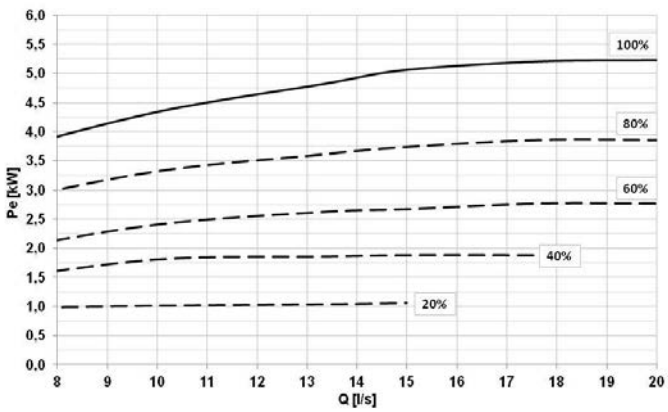
Q = Water flow-rate [l/s]
Pe = Electric power consumption [kW]

Pressure head VARYFLOW+ (Size 100.4 ÷ 120.4)



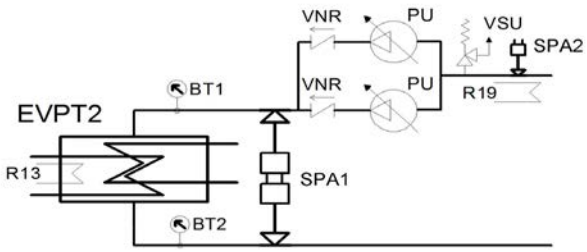
Q = Water flow-rate [l/s]
DP = Pressure head [kPa]

Absorption curves VARYFLOW+ (Size 100.4 ÷ 120.4)



Q = Water flow-rate [l/s]
Pe = Electric power consumption [kW]

Water diagram



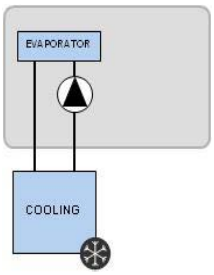
EVPT2 = Plate evaporator 2 circuits
R13 = Evaporator group heater
BT1 = Probes of entering water temperature
BT2 = Probes of leaving water temperature
VNR = Non return valves
SPA1 = Differential water pressure switch
PU = Hydronic assembly VARYFLOW +
VSU = Water safety valve
R19 = Hydronic assembly heaters
SPA2 = System water pressure switch

Electrical data

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
EXCELLENCE											
F.L.A.	A	6,4	6,4	6,4	6,4	7,4	7,4	7,4	9,0	9,0	9,0
F.L.I.	Kw	2,2	2,2	2,2	2,2	3,0	3,0	3,0	4,4	4,4	4,4
PREMIUM											
F.L.A.	A	-	-	-	-	7,4	7,4	7,4	9,0	9,0	9,0
F.L.I.	Kw	-	-	-	-	3,0	3,0	3,0	4,4	4,4	4,4

Electrical data refer to the entire hydronic group.

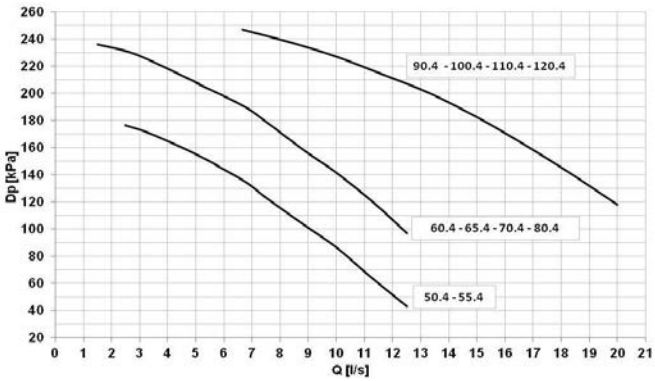
HYG1 - Hydronic assembly with one ON/OFF pump



Configuration with 1 centrifugal electric pump, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type.

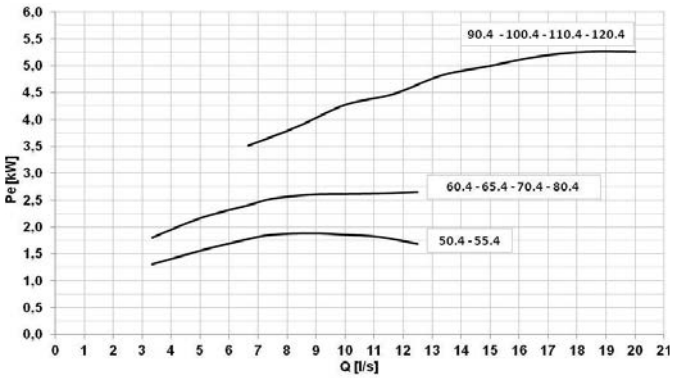
The electric pump is equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

ON/OFF pump pressure head (Size 50.4 - 120.4)



Q = Water flow-rate [l/s]
DP = Pressure head [kPa]

ON/OFF pump absorption curves (Size 50.4 - 120.4)

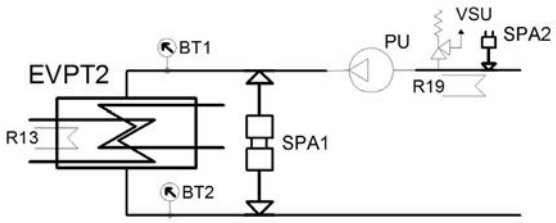


Q = Water flow-rate [l/s]
Pe = Electric power consumption [kW]

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

- Evaporator pressure drops user side
- IFWX accessory –Steel mesh filter on the water side (where applicable)

Water diagram

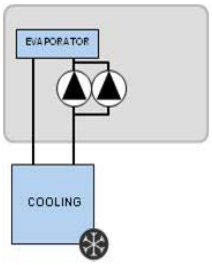


EVPT2 = Plate evaporator 2 circuits
R13 = Evaporator group heater
BT1 = Probes of entering water temperature
BT2 = Probes of leaving water temperature
SPA1 = Differential water pressure switch
PU = Hydronic assembly 1 ON/OFF pump
VSU = Water safety valve
R19 = Hydronic assembly heaters
SPA2 = System water pressure switch

Electrical data

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
EXCELLENCE											
F.L.A.	A	3,7	3,7	4,5	4,5	4,5	4,5	8,7	8,7	8,7	8,7
F.L.I.	Kw	1,5	1,5	2,2	2,2	2,2	2,2	4,0	4,0	4,0	4,0
PREMIUM											
F.L.A.	A	-	-	-	-	4,5	4,5	8,7	8,7	8,7	8,7
F.L.I.	Kw	-	-	-	-	2,2	2,2	4,0	4,0	4,0	4,0

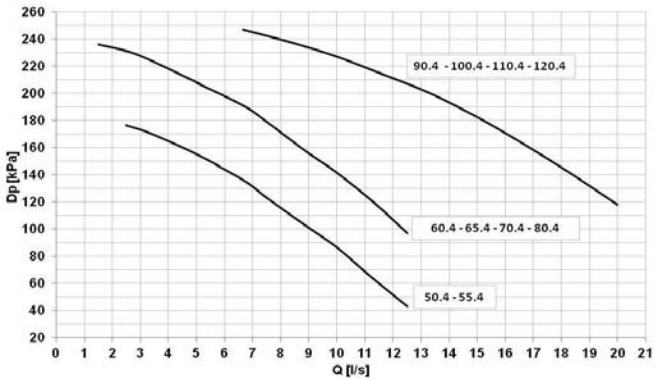
HYG2 - Hydronic assembly with two ON/OFF pumps



Configuration with 2 centrifugal electric pumps, 1 stand-by, with housing and impeller made with AISI 304 stainless steel, and components as described on the water diagram key. All water fittings are Victaulic type. The electric pumps are equipped with three-phase electric motor with IP55-protection and complete with thermoformed insulated casing.

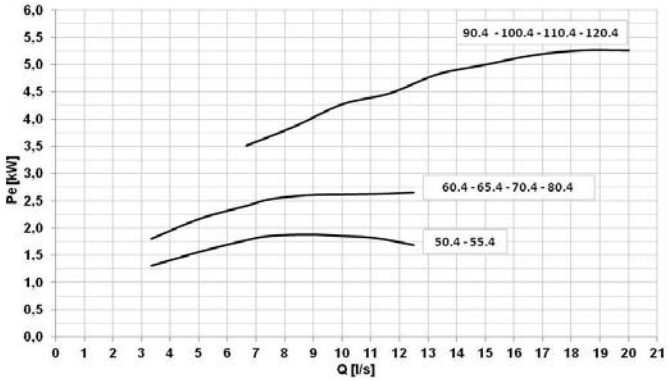
The control balances the operating hours and in case of failure it is signaled and the stand-by pump is automatically activated.

ON/OFF pump pressure head (Size 50.4 - 120.4)



Q = Water flow-rate [l/s]
DP = Pressure head [kPa]

ON/OFF pump absorption curves (Size 50.4 - 120.4)

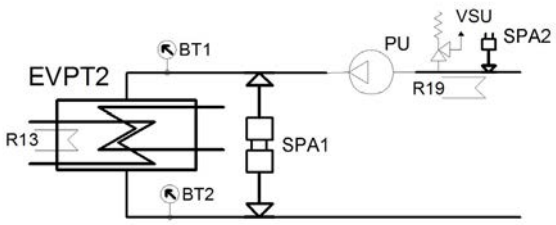


Q = Water flow-rate [l/s]
Pe = Electric power consumption [kW]

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

- Evaporator pressure drops user side
- IFWX accessory –Steel mesh filter on the water side (where applicable)

Water diagram



EVPT2 = Plate evaporator 2 circuits
R13 = Evaporator group heater
BT1 = Probes of entering water temperature
BT2 = Probes of leaving water temperature
VNR = Non return valves
SPA1 = Differential water pressure switch
PU = Hydronic assembly 2 ON/OFF pumps
VSU = Water safety valve
R19 = Hydronic assembly heaters
SPA2 = System water pressure switch

Electrical data

Size		50.4	55.4	60.4	65.4	70.4	80.4	90.4	100.4	110.4	120.4
EXCELLENCE											
F.L.A.	A	3,7	3,7	4,5	4,5	4,5	4,5	8,7	8,7	8,7	8,7
F.L.I.	Kw	1,5	1,5	2,2	2,2	2,2	2,2	4,0	4,0	4,0	4,0
PREMIUM											
F.L.A.	A	-	-	-	-	4,5	4,5	8,7	8,7	8,7	8,7
F.L.I.	Kw	-	-	-	-	2,2	2,2	4,0	4,0	4,0	4,0

Electrical data refer to a single pump.

Built-in configuration options

ACC - 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.

For sizes 50.4 ÷ 65.4 the storage tank capacity is 300L.

For sizes 70.4 ÷ 120.4 the storage tank capacity is 500L.

CCCA - Copper / aluminium condenser coil with acrylic lining

Coils with copper pipes and aluminium fins with acrylic lacquering. Can be used in settings with moderately aggressive saline 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 - Condenser coil with Aluminum 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.

HEDIF - Diffuser for high efficiency axial fan

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

- down to –3 dB of silence
- reduction of 3% of the absorbed energy

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.

Available only for size 70.4 ÷ 120.4

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

Axial fans with sickle profile blades terminating with "Winglets", directly coupled to the electronic controlled motor (IP54), driven by the magnetic switching of the stator. The brushless technology and the special supply increase both the life expectancy and the efficiency. As a result the electric consumption is reduced up to 50%. Fans are located in aerodynamically shaped structures to increase efficiency and reduce noise level. The assembly is protected by accident prevention guards.

Supplied with variable speed control.

Available only for size 70.4 ÷ 120.4

CREFO - Device for fan consumption reduction of the external section, on/off type

Option that affects the external axial fans, as an alternative of the control device at variable speed, standard supplied. It requires the three-phase electric motor with an external rotor and built-in thermal protection, IP54 in progress. The condensation pressure automatic control occurs by the switching on or off of fans of the whole fan section.

Available only for Version PREMIUM.

The choice of this option limits the operating range in cooling with outdoor air temperatures higher than +15°C.

SFSTR - Disposal for inrush current reduction

Electronic device that automatically and gradually starts the compressors, thereby reducing the current peak generated in star-triangle start-ups and therefore reduces the mechanical stress on the motor and the electrodynamic stress on the power cables and on the mains.

For sizes 50.4 ÷ 65.4 the disposal for inrush current reduction is for supply voltage 400/3/50+N.

For sizes 70.4 ÷ 120.4 the disposal for inrush current reduction is for supply voltage 400/3/50.

MF2 - Multi-function phase monitor

The multifunction phase monitor controls all phases and their sequence, checks for voltage anomalies (+/–10%), and automatically restores operation of the unit as soon as the power supply returns to normal.

This control allows to:

- protect the internal components of the unit, which are powered by an abnormal voltage, may operate incorrectly or break;
- quickly identify, among the alarms of the unit's components, the real cause of the malfunction due to the sudden change in voltage.

CMSC8 - Serial communication module for BACnet 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 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.

PFCP - Power-factor correction capacitors (cosfi > 0,9)

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

PGFC – Finned coil protection grill

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.

MHP - High and low pressure gauges

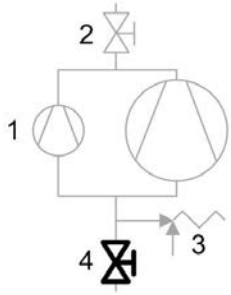
Despite the unit already enabling a series of digital displays on the operating pressure of the refrigeration circuit, this option enables analogical measuring of refrigerant pressures at compressor intake and supply thus easing the checking of these parameters for the technicians who are managing the unit. The two liquid pressure gauges and related pressure sensors are attached built-in in easily accessible positions.

SDV - Cutoff valve on compressor supply and return

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

Device installed built-in the unit.a.

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



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

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

The device respects BREEAM regulations.

RE-20 / RE-25 - Electrical panel anti-freeze protection

It includes self-regulating electric heaters with thermost which are able to protect the electrical panel against condensation and frost guaranteeing its correctly functions down to -25°C. This accessory operates even when the unit is switched off provided that the power supply is maintained active and the unit continues to be electrically connected.

Device installed and wired built-in the unit.

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

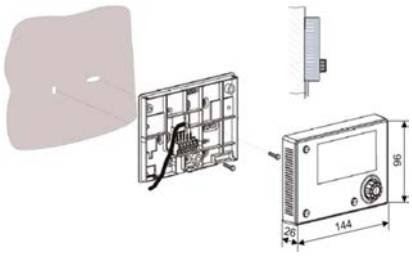
This accessory does not lead to substantial variations in the electrical data for the unit which has been declared in the Electrical Data section.

Accessories separately supplied

RCTX - 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 should be installed on the wall using suitable plugs, electrically hooked up and connected to the unit (installation and wiring are the responsibility of the Customer). Max. remote distance 350 m without auxiliary supply.

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

BACX - BACnet serial communication module

Allows the serial connection to supervision systems by using BACnet-IP as a communication protocol. It allows the access to the entire list of operating variables, controls and alarms. With this accessory every unit can communicate with the main supervision systems.

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)

CMMBX - Serial communication module to supervisor (Modbus)

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

CMSLWX - LonWorks serial communication module

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 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.

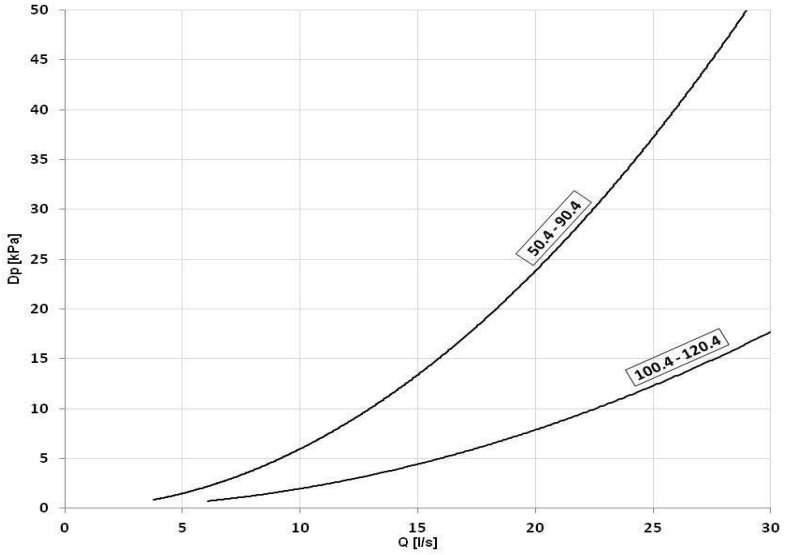
IFWX - Steel mesh strainer on the water side

The device prevents any impurity in the hydraulic circuit from soiling the exchanger. The stainless steel mesh mechanical filter must be placed on the water inlet line. It needs to be easy to remove for periodical maintenance and cleaning operations.

Moreover, it consists of:

- cast-iron shut-off butterfly valve with quick coupling and throttle drive and mechanical calibration stop
- quick couplings with an insulated casing

Steel mesh strainer pressure drops



Q = Water flow rate[l/s]
Dp = Water side pressure drops [kPa]

PGFCX - Finned coil protection grill

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.

This option is not suitable for application in sulphuric environments

MHPX - High and low pressure gauges

Despite the unit already enabling a series of digital displays on the operating pressure of the refrigeration circuit, this option enables analogical measuring of refrigerant pressures at compressor intake and supply thus easing the checking of these parameters for the technicians who are managing the unit. The two liquid pressure gauges and related pressure sensors are attached built-in in easily accessible positions.

AVIBX - Anti-vibration mount support

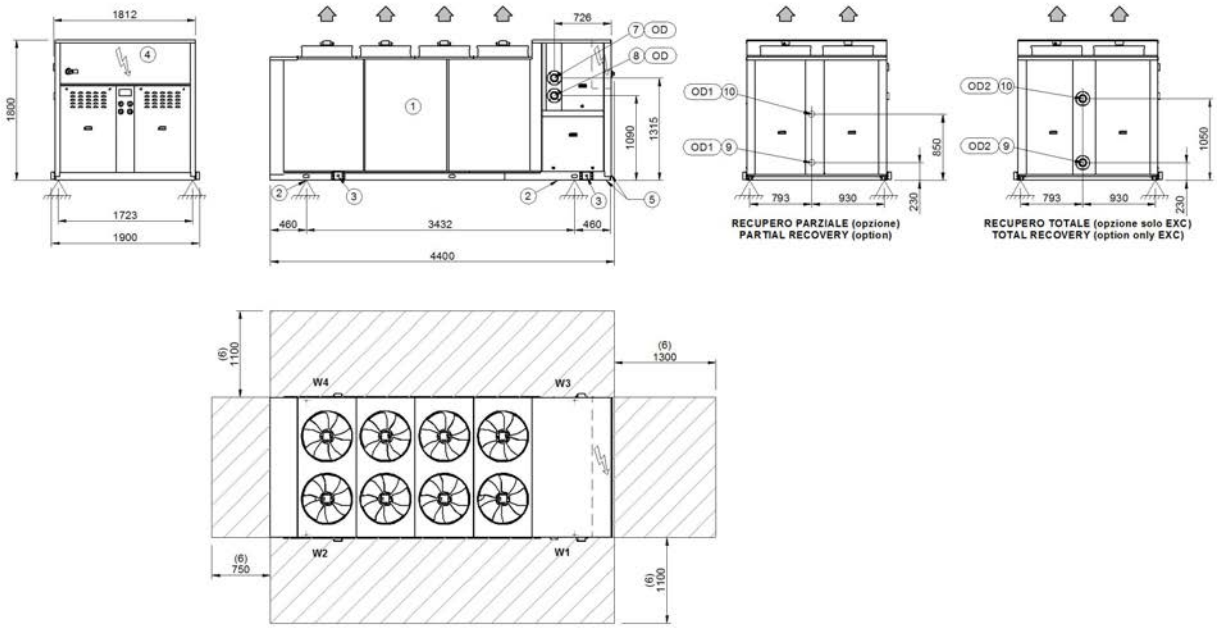
The base spring vibration isolators are attached in special housing on the support frame and serve to smooth the vibrations produced by the unit thus reducing the noise transmitted to the support structure.

Dimensional drawings - EXCELLENCE Version

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

DAAL250.4_65.4 EXC_1 REV01
Data/Date 17/05/2016

Size 50.4 - 55.4 - 60.4 - 65.4



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		50.4	55.4	60.4	65.4
OD (internal exchanger)	mm	88,9	88,9	88,9	88,9
OD1 (partial recovery)	mm	48,3	48,3	48,3	48,3
OD2 (total recovery)	mm	88,9	88,9	88,9	88,9
Length	mm	4400	4400	4400	4400
Height	mm	1800	1800	1800	1800
Depth	mm	1812	1812	1812	1812
W1 Supporting point	kg	434	440	457	481
W2 Supporting point	kg	294	300	313	315
W3 Supporting point	kg	439	450	461	500
W4 Supporting point	kg	299	310	317	334
Shipping weight	kg	1445	1480	1524	1605
Operating weight	kg	1466	1500	1548	1630

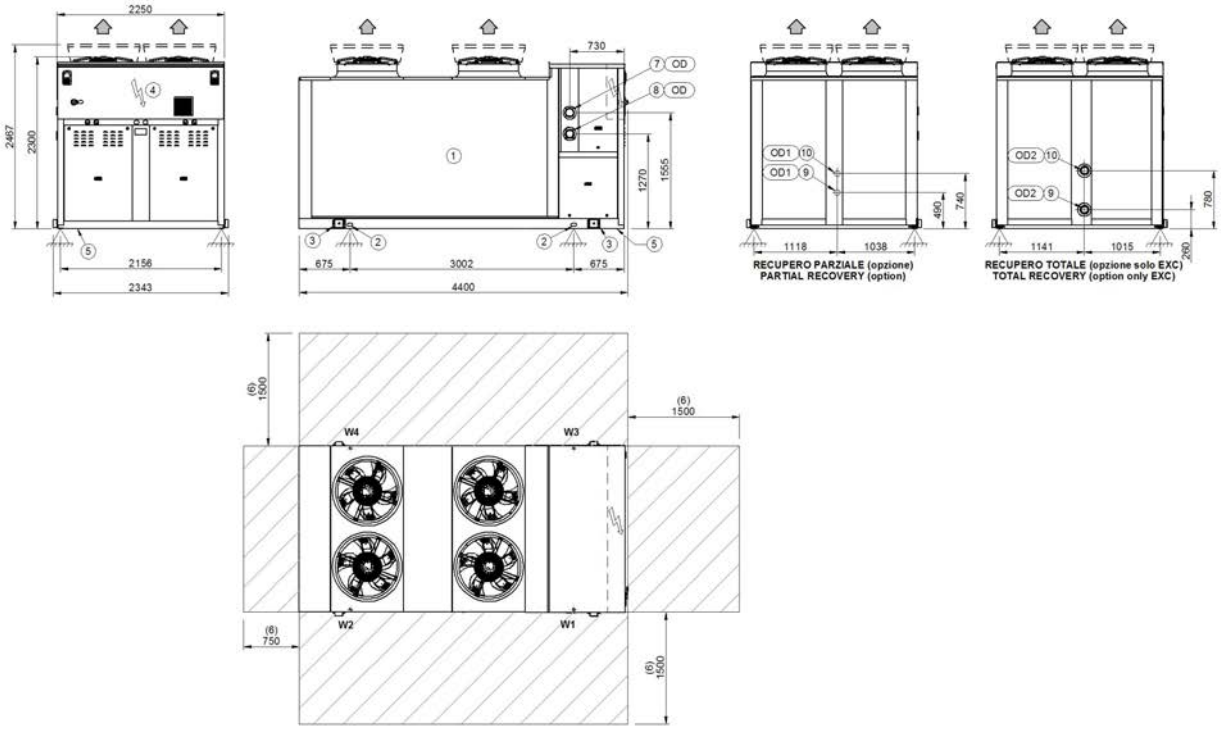
La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

Dimensional drawings - EXCELLENCE Version

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

DAAL290.4_100.4_110.4_PRM_EXC_3 REV03
Data/Date 16/05/2016

Size 70.4 - 80.4 - 90.4



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		70.4	80.4	90.4
OD (internal exchanger)	mm	88,9	88,9	88,9
OD1 (partial recovery)	mm	48,3	48,3	48,3
OD2 (total recovery)	mm	88,9	88,9	88,9
Length	mm	4400	4400	4400
Height	mm	2300	2300	2300
Height with AXITOP	mm	2460	2460	2460
Depth	mm	2250	2250	2250
W1 Supporting point	kg	694	721	760
W2 Supporting point	kg	441	454	471
W3 Supporting point	kg	717	748	793
W4 Supporting point	kg	464	481	503
Shipping weight	kg	2280	2361	2475
Operating weight	kg	2317	2403	2527

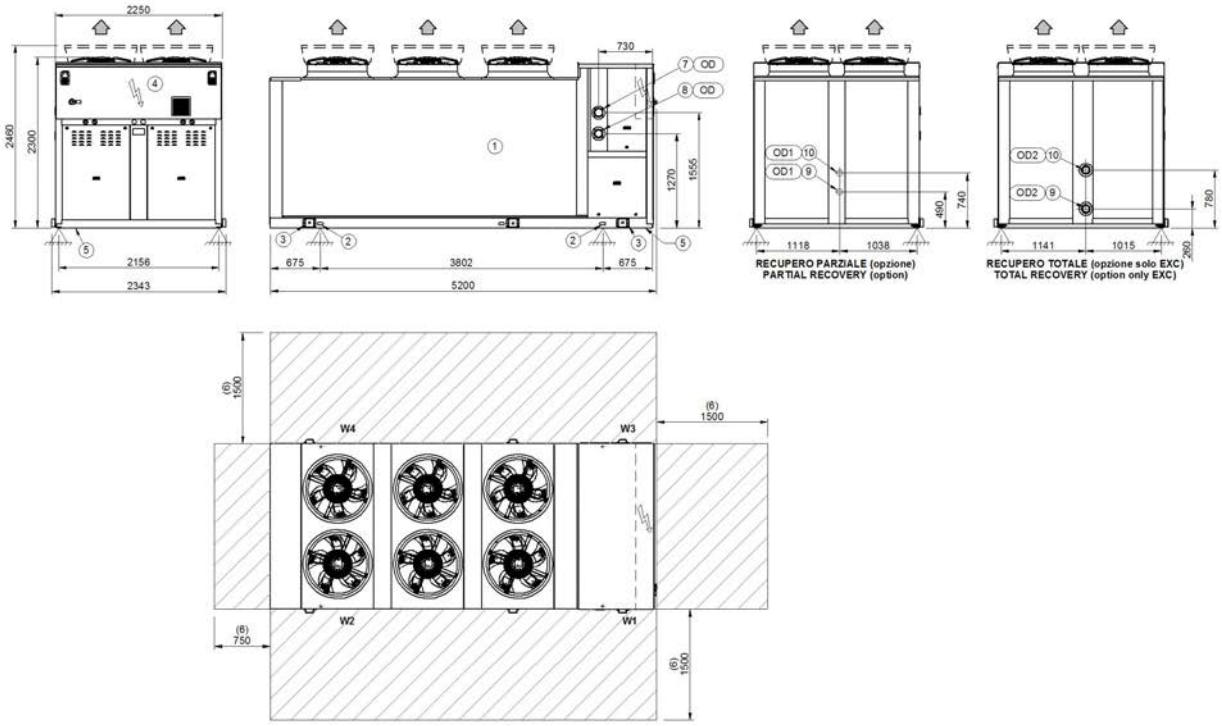
La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

Dimensional drawings - EXCELLENCE Version

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

Size 100.4 - 110.4 - 120.4

DAAL2120.4_PRM_EXC_3 REV03
Data/Date 16/05/2016



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		100.4	110.4	120.4
OD (internal exchanger)	mm	114,3	114,3	114,3
OD1 (partial recovery)	mm	60,3	60,3	60,3
OD2 (total recovery)	mm	114,3	114,3	114,3
Length	mm	5200	5200	5200
Height	mm	2300	2300	2300
Height with AXITOP	mm	2460	2460	2460
Depth	mm	2250	2250	2250
W1 Supporting point	kg	883	909	948
W2 Supporting point	kg	557	564	593
W3 Supporting point	kg	905	932	970
W4 Supporting point	kg	579	586	615
Shipping weight	kg	2876	2935	3070
Operating weight	kg	2924	2991	3126

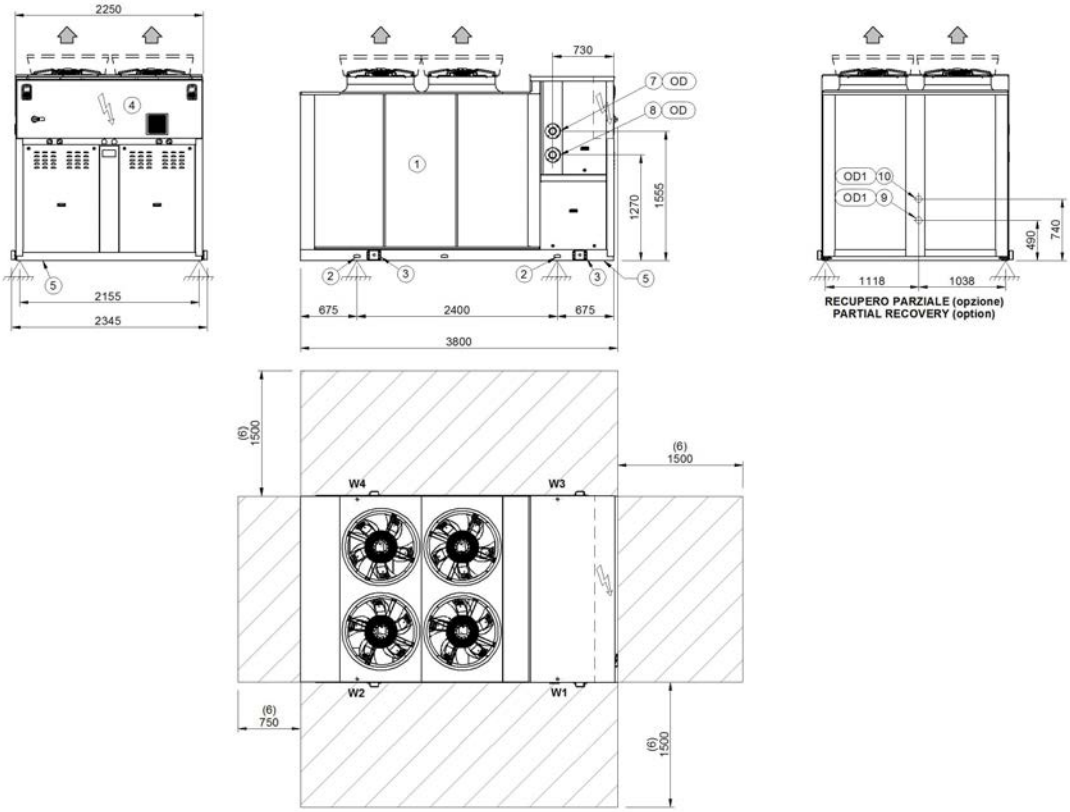
La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

Dimensional drawings - PREMIUM Version

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

Size 70.4 - 80.4

DAAL270.4_80.4 PRM_1 REV01
Data/Date 22/07/2015



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		70.4	80.4
OD (internal exchanger)	mm	88,9	88,9
OD1 (partial recovery)	mm	48,3	48,3
Length	mm	3800	3800
Height	mm	2300	2300
Height with AXITOP	mm	2460	2460
Depth	mm	2250	2250
W1 Supporting point	kg	650	681
W2 Supporting point	kg	392	410
W3 Supporting point	kg	675	712
W4 Supporting point	kg	418	440
Shipping weight	kg	2100	2200
Operating weight	kg	2135	2244

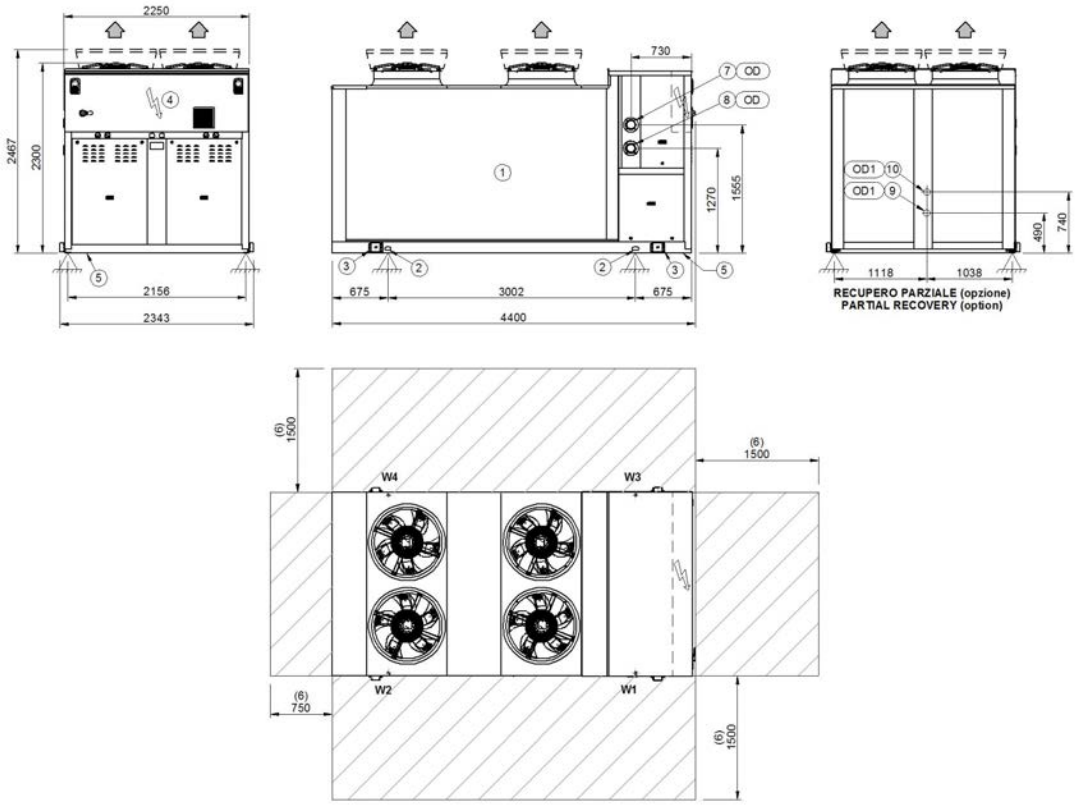
La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

Dimensional drawings - PREMIUM Version

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

Size 90.4 - 100.4 - 110.4

DAAL290.4_100.4_110.4_PRM_EXC_3 REV03
Data/Date 16/05/2016



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		90.4	100.4	110.4
OD (internal exchanger)	mm	88,9	114,3	114,3
OD1 (partial recovery)	mm	48,3	60,3	60,3
Length	mm	4400	4400	4400
Height	mm	2300	2300	2300
Height with AXITOP	mm	2460	2460	2460
Depth	mm	2250	2250	2250
W1 Supporting point	kg	734	810	840
W2 Supporting point	kg	451	473	487
W3 Supporting point	kg	763	832	862
W4 Supporting point	kg	480	495	509
Shipping weight	kg	2380	2560	2650
Operating weight	kg	2328	2610	2698

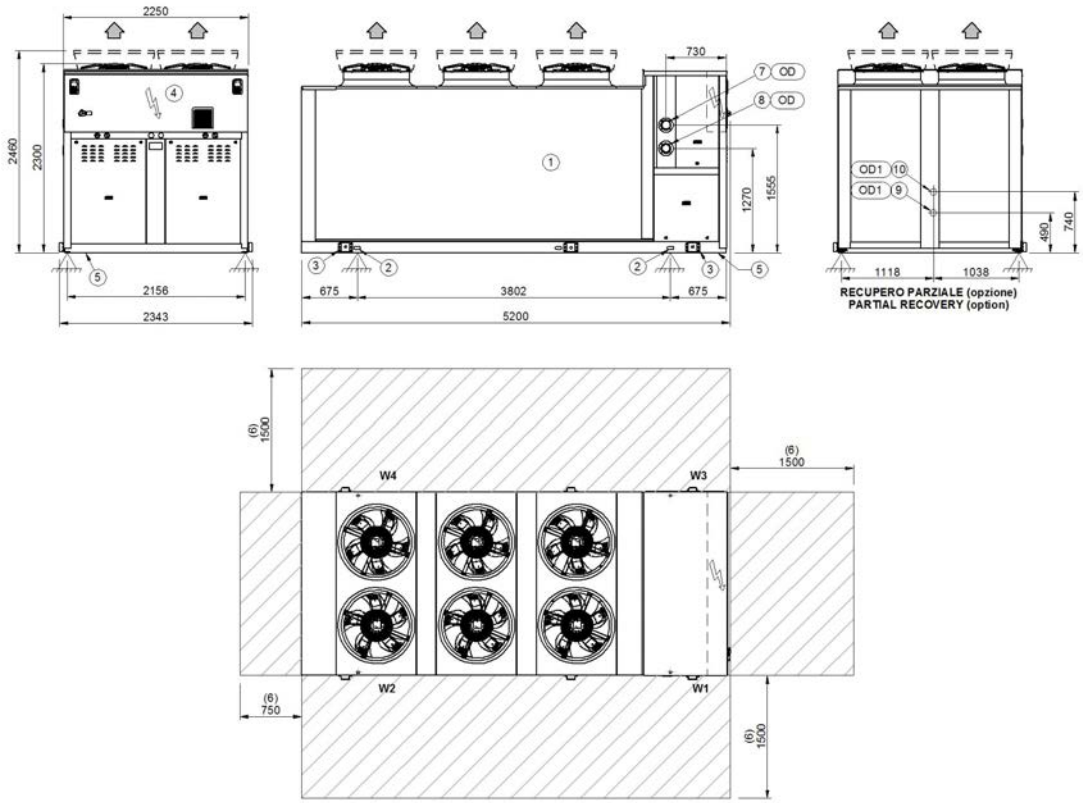
La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

Dimensional drawings - PREMIUM Version

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

Size 120.4

DAAL2120.4_PRM_EXC_3 REV03
Data/Date 16/05/2016



1) External exchanger
2) Unit fixing holes Ø 25mm
3) Lifting brackets (removable)
4) Main electrical panel
5) Power input supply
6) Recommended functional clearances
7) Water inlet user side of no pumps unit / Water outlet user side of unit with pumps (optional)
8) Water outlet user side of no pumps unit / Water inlet user side of unit with pumps (optional)
9) Recovery side exchanger water inlet (optional)
10) Recovery side exchanger water outlet (optional)

Size		120.4
OD (internal exchanger)	mm	114,3
OD1 (partial recovery)	mm	60,3
Length	mm	5200
Height	mm	2300
Height with AXITOP	mm	2460
Depth	mm	2250
W1 Supporting point	kg	919
W2 Supporting point	kg	564
W3 Supporting point	kg	939
W4 Supporting point	kg	584
Shipping weight	kg	2995
Operating weight	kg	3006

La presenza di accessori opzionali può comportare una variazione significativa dei pesi indicati in tabella

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