Technical
Bulletin
BT16H002GB-00

ELFOEnergy Duct Medium

High efficiency air-cooled heat pump for indoor installation

WSN-XEE 122-402 RANGE

Nominal cooling capacity from 34 kW to 99 kW
Nominal heating capacity from 41 kW to 111 kW

ELFOEnergy Duct Medium is the high efficiency heat pump for indoor installation:

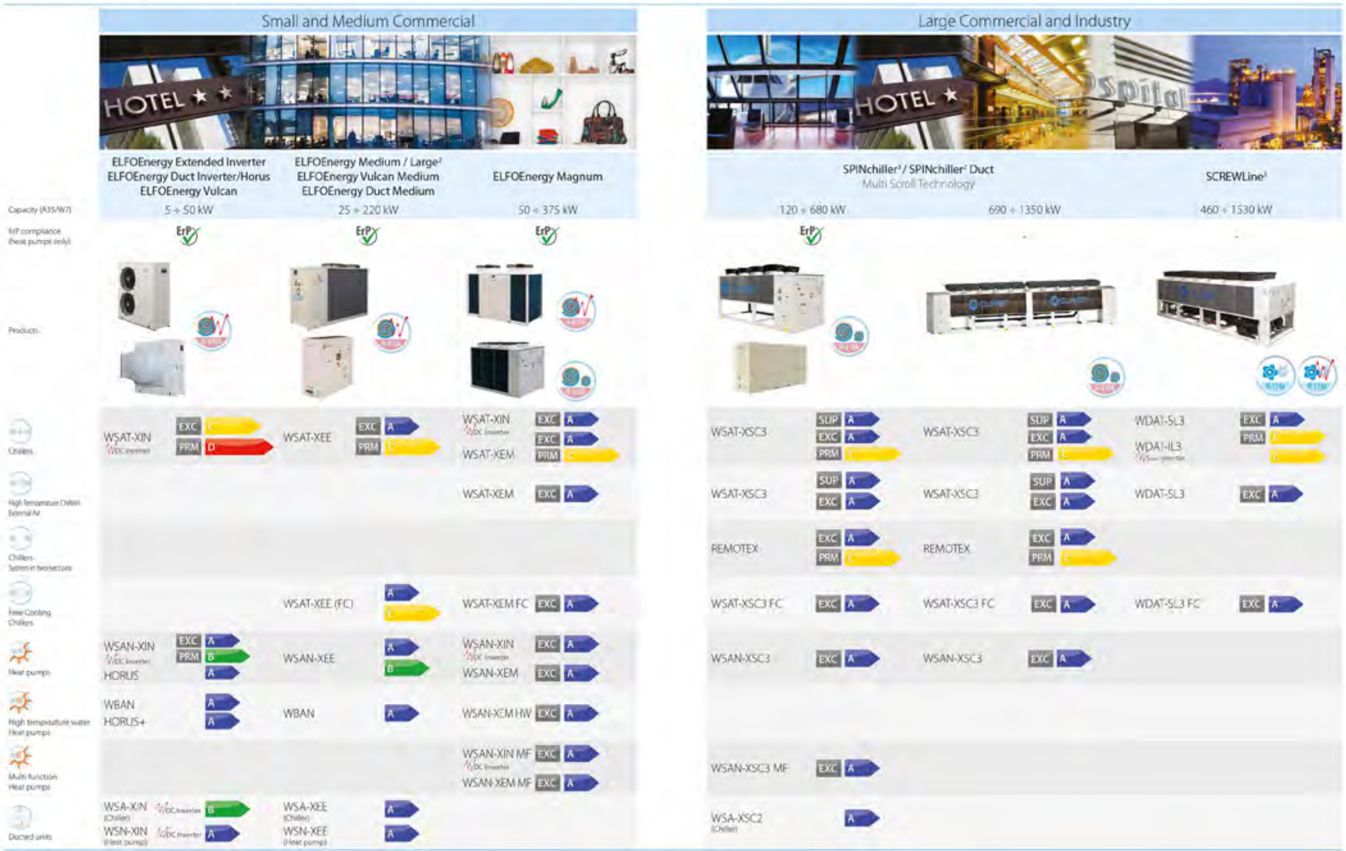
- Energy Efficiency Class A: modular scroll technology, high efficiency heat exchangers, electronic expansion valve, ECOBREEZE plug fans with permanent magnet motors
- ESEER seasonal efficiency at the top of its class: significantly reduced operating costs over the entire annual cycle, that can be further improved with the hydraulic pipework arrangement with inverter electric pump
- compact, accessible design: easy installation and maintenance even in shafts with restricted spaces
- high available static pressure: high performance ECOBREEZE plug fans for a correct air exhaust even in complex ducting layouts
- high silence: obtained with anti-vibration supports for compressors and fans, and metal casing with effective soundproofing.

Index of contents

Clivet hydronic system

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

HYDRONIC System - Air Source



Specialization

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

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

Centrality of the Air Renewal

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

ZEPHIR3

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
- From –40°C to +50°C of outdoor air temperature

Terminal and AHU complete system

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

ELFOSpace

High energy efficiency hydronic terminal units

AQX

Air-conditioning unit

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

ELFOEnergy Duct Medium: modular scroll technology for every application

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

WSN-XEE

Air cooled heat pump

- Heating high efficiency version
- Eurovent certification
- Partial recovery of the condensing heat

WSA-XEE

Air cooled liquid chiller

- Cooling high efficiency version
- Eurovent certification
- Partial recovery of the condensing unit

Dedicated series separately documentated

Cost or reliability?

The dilemma of modern system engineering applications

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



Comfort and reliability in a single product

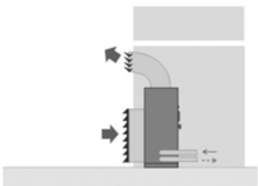
Easy to position in available technical spaces

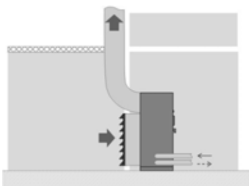
The unit can be positioned easily in one of the following settings:

- in shafts;
- in service rooms, for instance, warehouses and store rooms;
- directly in the served area, in a visible position.

Versatility is ensured by the two solutions available for the air exhaust from the source side heat exchanger.

- The first solution is the installation in the shaft or in the service room, with rear intake and vertical ducted outlet.
- The second is the installation in a shaft or service room or in the environment, with intake and ducted outlet both from the rear.



REAR INTAKE AND DUCTED VERTICAL EXHAUST


REAR INTAKE AND DUCTED REAR EXHAUST

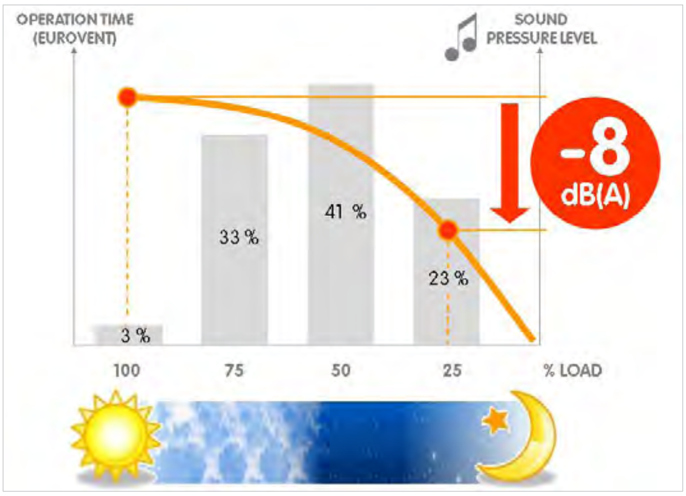

EXAMPLE OF EXTERNAL AIR EXHAUST GRILLE

External fans at variable speed for minimal noise emission

All units are supplied complete with electronic pressure control of the external exchanger. It automatically reduces the fan speed when the heat load is reduced.

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

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



Operating completely automatic

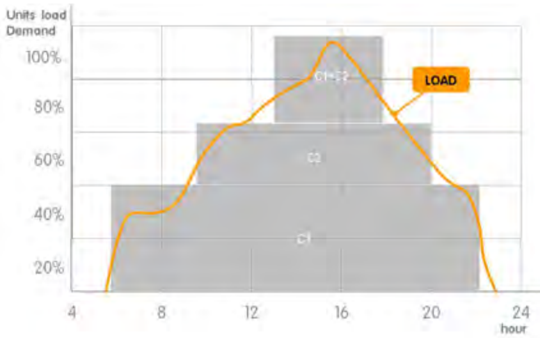
The microprocessor control automatically manages operation according to the maximum efficiency criterion and includes many safety and alarm management functions.

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

Efficient precision

The sequential activation logics 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.



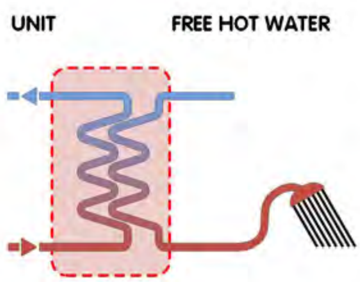
Produces hot water freely

Condensation heat recovery:

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

It allows the free DHW production for:

- Hot water coil supply for reheat
- Domestic hot water production (with intermediate exchanger)
- Other processes or operations



Even for low water temperature

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

High energy efficiency within the annual cycle

Increases the building value

The high efficiency reduces the complex primary energy requirements and the CO_2 emissions compared to traditional solutions. It follows the improvement of the energy class of the building and therefore its value on the property market.

It is often possible to access the foreseen benefits to promote the use of the unit at low consumption.

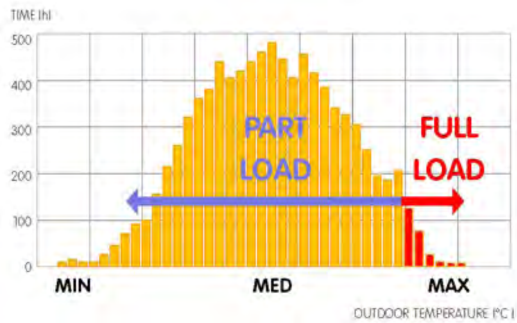
The small consumptions also reduce the environmental impact of the system, further improving the public image on this sensitive issue.

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.

SYSTEM LOAD	WEIGHT (ESEER) *	WEIGHT (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.

Modular Scroll technology boosts performance at part load

Since the maximum capacity is requested only for short periods of time, it is fundamental to place the maximum efficiency in the part load conditions. The unit uses high efficiency Scroll compressors. The advantages are:

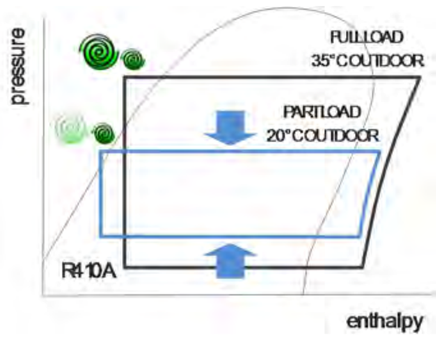
- compressors manufactured in large numbers on an industrial scale, with strict quality checks and highest reliability thanks to the high scale mass production volumes.
- the refrigerant circuit uses two compressors, almost always of different sizes in order to obtain more control steps. This way, only the necessary energy is supplied.

THE SEQUENTIAL DEACTIVATION OF THE COMPRESSORS INCREASES EFFICIENCY

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.

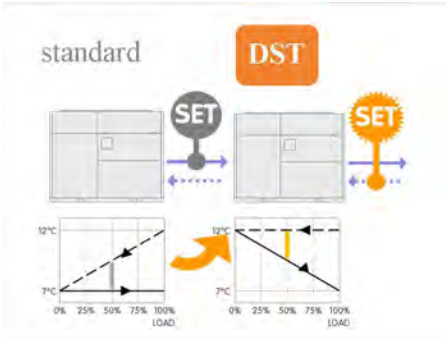


It further increases the seasonal energy efficiency

ELFOEnergy Duct Medium 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. In cooling at part load the evaporation temperature raises and therefore furtherly increases the 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 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 ELFOEnergy Duct Medium, which can vary the system water supply temperature, thereby optimising energy efficiency in the yearly cycle.

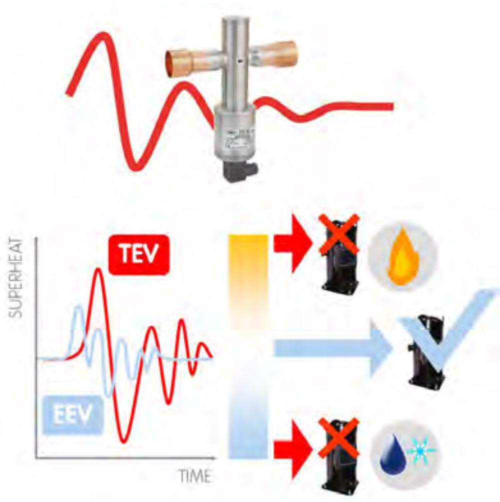
The DST function is not selectable if inverter built-in pumps are present.

Stable and reliable operating

The numerous technical solutions used in the refrigeration and hydraulic circuit as well as enabling very high levels of overall efficiency to be reached, also guarantee that the correct unit operating.

- The anti-freeze sensor on the outlet water in addition to the device which monitors the water flow work together to maintain unit safety and combat the risk of freezing.
- The electronic expansion valve (EEV) adapts rapidly and precisely to the actual load required for usage, allowing stable and reliable adjustment in comparison with mechanical thermostatic valves (TEV). This results also in a further increase in efficiency and longer compressor life.
- Furthermore, continuous adaptation to load conditions takes places without swings in the refrigeration circuit with the advantage of increasing the efficiency and the operating life of the compressor.

The electronic expansion valve makes the refrigeration circuit highly stable and efficient



Very high heat exchange efficiency

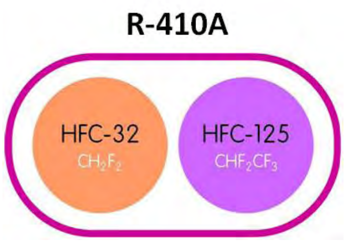
Thanks to the heat exchangers with large front surface and reduced depth, we obtain:

- Improved operating temperature of the refrigeration circuit and therefore greater efficiency, as the difference between the air's temperature and the temperature of the refrigerating fluid inside the exchanger is reduced
- Lower ventilation consumption, thanks to the reduced depth of the exchanger, which decreases pressure drops on the air flow. Moreover, the automatic fan speed control, provided as standard, minimises the air flow rate required for correct operation and therefore further reduces consumption
- Lower noise levels, as greater surfaces allow for slower speed of the air on the exchangers

High efficient refrigerant

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

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



Versatility of reversed blades rotor

This particular type of rotor offers a wider field of operation compared with a traditional forward curved blade fan. When necessary, this can supply high static pressures simply by varying the number of revolutions. The accurate balancing and the self-lubricating bearings ensure its rotating stability over time.

The efficiency of the electronic controlled motor

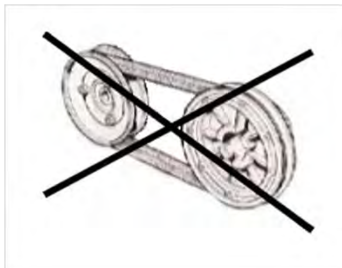
The external rotor electric motor is driven by the continuous magnetic switching of the stator. The advantages are:

- the lack of brushes and the particular power supply increase efficiency by 70%;
- increase in the working life, thanks to the elimination of the brush wear;
- drastic reduction at the start-up of the starting current thanks to the electronic fan with the "soft start" function.

Advantages of direct coupling (plug fan)

The motor's rotation is transmitted directly to the rotor, without the use of transmissions (belts and pulleys):

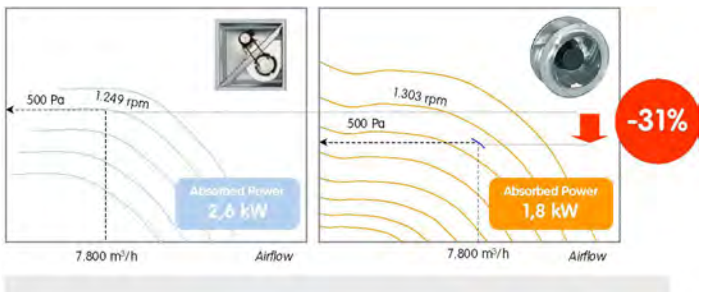
- the transmissions' inefficiencies are eliminated;
- the transmissions' wear and maintenance is eliminated.



Efficiency of the ventilation system increases by 30%

The comprehensive ventilation system, made up of rotor and motor, is therefore very versatile and efficient.

Consumption is 30% lower than a ventilation system of the same capacity used by traditional units available on the market.



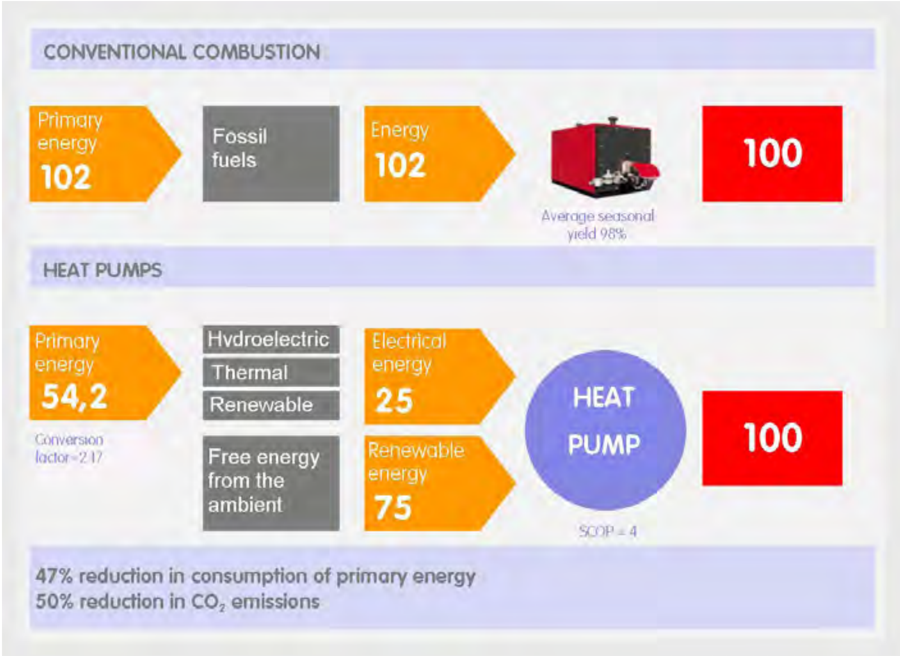
Electrical power absorbed by electric motor, data constructor - Example, referred to flow of 7.800 m3/h with 500 Pa external static pressure.

Higher levels of silence with composite

The fan impeller is made of a hybrid structure with aluminium alloy and plastic, with optimised aerodynamic blades. Thus electric absorption from the motor is reduced, obtaining a high level of silence whilst operating. This further technological progress increases the advantages in comparison with traditional centrifugal fans.

Advanced heat pump

Renewable energy heat pump technology



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

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

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

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

Coils protected against the formation of ice

The advanced heat pumps particular technology for this unit, guarantees its continued and reliable operation.

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

Smart management of defrosts

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

Reliability and saving throughout the entire life-cycle

System industrialisation

The unit may be supplied complete with the functions and components which are often supplied with the system. Thus reducing:

- 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;
- dimensions: integration of system members into the unit reduces technical spaces and increases the space available for other uses. Its compact structure allows the unit to be carried through the shaft doors and to be positioned in service corridors.

The fan section is removable for an easier transport.

The whole upper part of the unit is easily removable. The reduction of the unit height and weight simplify its handling and transport.

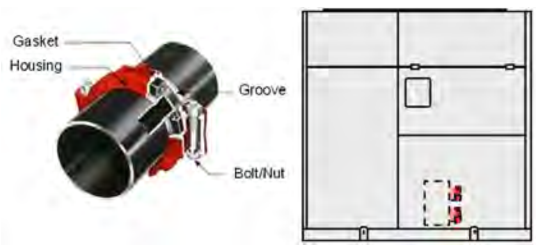
The built-in pumps are versatile, ready-for-use and reliable

The optional hydronic assembly is complete with everything required for the system start-up and operating: antifreeze heaters, safety valve, charge/drain valves, pressure gauges. It also includes the pumping unit with the following solutions:

- high efficiency pump for high and low static pressure, with high efficiency EC motor in Class A and complete with air flow automatic control;
- low static pressure pump, for constant water flow system and heads up to 150 kPa (referred to nominal flow);
- high static pressure pump, for constant water flow system and heads up to 200 kPa (referred to nominal flow).

Start-up semplification with quick water connections

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



THE QUICK CONNECTIONS ARE STANDARD SUPPLIED

The right air flow for every type of system

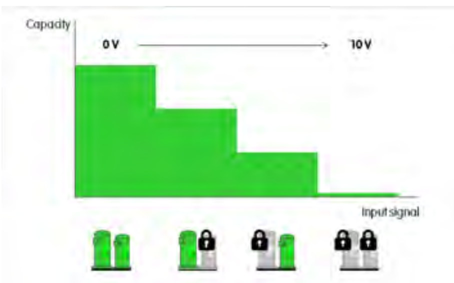
By setting the fan speed on the display, it is possible to modify the air flow, adapting the static pressure yield to the pressure drop carried out by the system and thus, simplifying the start up of the unit. It is no longer necessary to calibrate or modify the transmissions in as much as it is the fan system which adapts to the system.

Demand limit

The partial or total activation of the compressors can be disabled to limit the overall electric capacity absorbed.

The external signal is of analogical type 0-10 V / 4-20 mA. The greater the signal, the lower the capacity that the unit is enabled to deliver, activating the compressors and fans.

The Demand Limit function does not act on the control.



Versatility

The various supply temperatures that can be set make the unit perfectly suitable for various types of systems, such as:

- distribution to terminal units, such as fan coils or other air treatment units
- distribution to radiant panels, induction terminals or chilled beams
- heat dissipation on water loop systems
- service and process fluid heat treatment.

PERFECT FOR THE VARIOUS TYPES OF SYSTEMS

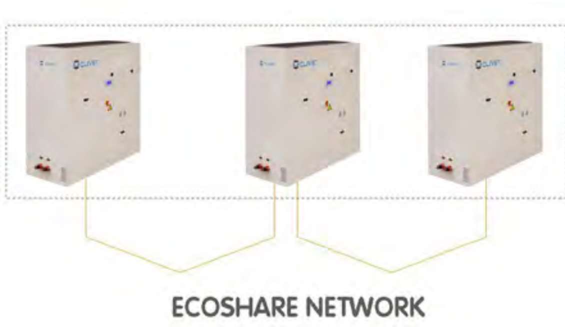
Modularity

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

The 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 area served.

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



ECOSHARE ENHANCES THE BENEFITS OF MODULAR SCROLL TECHNOLOGY

Remote system management:

The unit is standard equipped with:

- potential-free contact for remote on-off control
- free pump control contact, when built-in pump is not present;
- alarm cumulative potential-free contact;
- RS485 serial port with Modbus / LonWorks / BACnet protocol

Thanks to the different communication protocols available, the unit is able to exchange information with the main supervisory systems using serial connections.

Standard unit technical specifications

Compressor

Hermetic orbiting scroll compressor complete with motor winding and delivery gas over-temperature and over-current devices. Fitted on rubber antivibration mounts and complete with oil charge.

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

The compressors are connected in TANDEM on a single refrigeration circuit and equipped with an biphasic oil equalisation.

Structure

Sheet steel structure made with zinc-magnesium superficial traitment that guarantees excellent mechanical characteristics and high corrosion strength over time.

Zinc-magnesium base painted with polyester powder RAL 9001

Panelling

External sheet steel panelling with pre-painted zinc-magnesium superficial traitment that ensures superior resistance to corrosion for outdoor installation and eliminates the need for periodical painting. The panels can be easily removed to fully access internal components and are lined with sound-proof material on the inside to contain the unit's sound levels.

Internal exchanger

Direct expansion heat exchanger with braze welded stainless steel INOX AISI 316 plates and complete with external thermal/anti-condensation insulation.

The exchanger is complete with:

- differential pressure switch, water side
- antifreeze heater to protect the water side exchanger, preventing the formation of frost if the water temperature falls below a set value.

External exchanger

finned exchanger, made from copper pipes arranged in staggered rows and mechanically expanded for better adherence to the collar of the fins. The fins are made from aluminium with a special corrugated surface, set a suitable distance apart to ensure maximum heat exchange efficiency.

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

Protective coverings available on request.

Fan

ECOBREEZE device (STD)

Plug fans without scroll with reverse blades driven by electronically-controlled "brushless" DC motors with direct coupling.

Refrigeration circuit

Refrigeration circuit with:

- replaceable antiacid dehydrator filter with solid cartridge
- liquid flow and moisture indicator
- inversion valve of the 4-way cycle
- liquid receiver
- non-return valve
- cutoff valve on liquid line
- electronic expansion valve
- high pressure safety pressure switch
- high pressure safety valve
- low pressure safety valve
- inlet liquid separator

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
- ON/OFF and alarm reset buttons
- proportional-integral-derivative water temperature control
- daily, weekly programmer of temperature set-point and unit on/off
- unit switching on management by local or remote (serial)
- antifreeze protection water side
- compressor overload protection and timer
- prealarm function for water 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
- input for remote ON/OFF control
- input for remote HEAT/COOL control
- relay for remote cumulative fault signal
- digital input for double set-point enabling
- potential-free contacts for compressor status
- phase monitor
- inlet for demand limit (power input limitation according to a 0÷10V external signal)

Configurations

- EV - Vertical air expulsion (Standard)
- EO - Horizontal exhaust air
- B - Water low temperature
- D - Partial energy recovery

Water circuit accessories

- High efficiency single inverter pump for primary circuit
- Flush hydraulic connections
- Low static pressure single pump
- High static pressure single pump
- Couple of manually operated shut-off valves (accessory provided separately)
- User side DWH switching valve
- Steel mesh strainer on the water side

(note: to be located at the exchanger inlet. We disclaim any liability and make the guarantee void, if an appropriate mechanical filter is not provided inside the system)

Other accessories

- Finned coil protection grill
- Copper / aluminium condenser coil with acrylic lining
- High and low pressure gauges
- Cutoff valve on compressor supply and return
- Electrical panel ventilation
- Multi-function phase monitor
- Power factor correction capacitors (cosfi > 0.95)
- ECOSHARE function for the automatic management of a group of units
- Disposal for inrush current reduction
- Serial communication module for Modbus supervisor
- Serial communication module for LonWorks supervisor
- Serial communication module for BACnet-IP supervisor
- Remote control via microprocessor remote control (accessory separately supplied)
- Mains power supply (accessory separately supplied)
- Energy meter
- Set-point compensation with 0-10 V signal
- Set-point compensation with outdoor air temperature probe
- Limit extension kit in heating up to -10°C (W.B.)
- Rubber antivibration mounts (accessory supplied separately)
- Additional lifting brackets

Test

All the units are factory-tested in specific steps, before shipping them. After the approval, the moisture contents present in all circuits are analyzed, in order to ensure the respect of the limits set by the manufacturers of the different components.

Unit for indoors installation only, away from atmospheric agents

Unit configuration

WSN-XEE	402	-	-	-
(1)	(2)	(3)	(4)	(5)

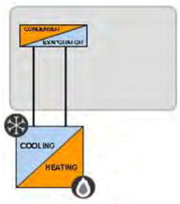
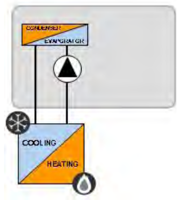
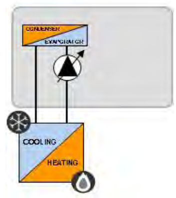
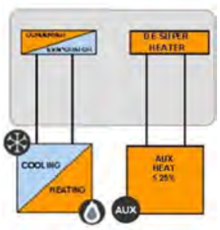
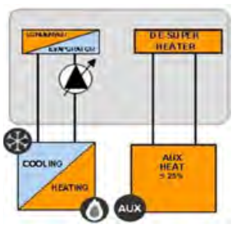
(1) Series
WSN = Ductable air-cooled heat pump with scroll compressor
XEE = ELFOEnergy Medium

(2) Size and compressors
402 = Compressor nominal capacity in HP + No. of compressors

(3) Energy recovery
(-) recovery not required (standard)
D - Partial energy recovery (25% of the available heat)

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

(5) Pumping unit
(-) not required
1PUHE -High efficiency single inverter pump for primary circuit
1PUB - Low static pressure single pump
1PUA - High static pressure single pump

Functionalities	Hydronic units		
2- PIPE SYSTEM Hot or chilled water production for installation	**1.1** Standard unit 	**1.2** Unit with standard efficiency hydronic assembly 	**1.3** Unit with high efficiency hydronic assembly 
2- PIPE SYSTEM + PARTIAL RECOVERY Hot or chilled water production for installation - Free production of hot water from partial recovery	**2.1** Standard unti with partial recovery 	**2.2** Unit with standard efficiency hydronic assembly with partial recovery 	**2.3** Unit with high efficiency hydronic assembly with partial recovery 

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

General technical data

Size			122	162	182	222	262	302	352	402
Cooling										
Cooling capacity	1	kW	34.1	41.3	47.9	54.9	64.9	75.3	86.7	99.3
Compressor power input	1	kW	13.0	14.6	17.1	21.5	23.5	26.5	32.3	36.5
Total power input	2	kW	16.4	18.1	21.3	25.6	28.5	32.8	39.0	43.2
Partial recovery heating capacity	3	kW	11.8	14.0	16.3	19.1	22.1	25.5	29.7	33.9
Cooling capacity (EN14511:2013)	4	kW	33.9	41.0	47.6	54.5	64.5	75.0	86.3	98.9
Total power input (EN14511:2013)	4	kW	15.9	17.7	20.5	24.9	27.5	31.5	37.4	41.6
EER (EN 14511:2013)	4		2.13	2.32	2.32	2.19	2.35	2.38	2.31	2.38
ESEER	4		2.93	3.12	3.14	3.14	3.37	3.21	3.43	3.53
Heating										
Heating capacity	5	kW	40,5	48,2	58,3	67,2	79,2	92,4	103	111
Compressor power input	5	kW	11,1	12,9	15,1	17,8	21,0	23,6	27.4	31.6
Total power input	2	kW	13.6	15.9	19.3	22.0	25.9	30.3	34.1	38.3
Heating capacity (EN14511:2013)	6	kW	41.0	48.3	59.0	68.0	80.0	92.4	103	112
Total power input (EN14511:2013)	6	kW	13.3	15.5	18.7	21.4	25.1	28.7	32.6	36.8
COP (EN 14511:2013)	6		3.09	3.12	3.16	3.17	3.19	3.22	3.17	3.05
ErP Space Heating Energy Class - AVERAGE Climate - W35	12		A	A	A	A	A	A	A	A
Compressor										
Type of compressors	7		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		No	2	2	2	2	2	2	2	2
Rated power (C1)		HP	14	16	20	22	27	30	35	40
Std Capacity control steps		No	2	3	3	3	3	2	3	3
Oil charge (C1)		l	3.50	5.90	5.90	6.00	6.60	6.80	8.10	10.2
Refrigerant charge (C1)		kg	12	14	18	19	21	26	30	32
Refrigeration circuits		No	1	1	1	1	1	1	1	1
Internal exchanger										
Type of internal exchanger	7		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow-rate (User Side)	1	l/s	1.56	1.89	2.19	2.51	3.10	3.60	4.04	4.54
Internal exchanger pressure drops	1	kPa	34	39	40	39	46	22	23	28
Water content		l	2.90	3.40	4.00	4.70	5.40	6.40	7.00	7.00
External Section Fans										
Type of fans	9		RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD
Number of fans		No	2	2	2	2	3	3	3	3
Fan diameter		mm	500	500	500	500	500	500	500	500
Type of motor	10		EC	EC	EC	EC	EC	EC	EC	EC
Standard airflow		l/s	4444	4444	5000	5000	6667	7500	7500	7500
Max external static pressure		Pa	510	510	390	390	570	390	390	390
Connections										
Water fittings			1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"
Power supply										
Standard power supply		V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50
Noise Levels										
Sound power in the duct	11	dB(A)	84	84	87	87	84	87	87	87

The Product is compliant with the ErP (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 811/2013 (rated heat output ≤ 70 kW at specified reference conditions) and the Commission delegated Regulation (EU) No 813/2013 (rated heat output ≤ 400 kW at specified reference conditions)

1. Data referred to the following conditions:
   Internal exchanger water temperature = 12/7°C
   Entering eExternal exchanger air temperature = 35°C
2. The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
3. Option. Recovery exchanger water = 40/45°C
4. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 12/7°C - Entering external exchanger air temperature = 35°C
5. Data referred to the following conditions: Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
6. Data compliant to Standard EN 14511:2013 referred to the following conditions: - Internal exchanger water temperature = 40/45 °C. Entering external exchanger air temperature = 7°C D.B./6°C W.B.
7. SCROLL = scroll compressor
8. PHE = plate exchanger
9. RAD = radial fan
10. EC Electronic switching motor
11. Sound power measured in accordance with UNI EN ISO 9614 and Eurovent 8/1 standards for ducted unit with available pressure equal to 120 Pa.
12. Seasonal Space Heating Energy Efficiency Class according to Commission delegated Regulation (EU) No 811/2013. W = Water outlet temperature (°C)

Electrical data

Size			122	162	182	222	262	302	352	402
F.L.A. - Full load current at max admissible conditions										
F.L.A. - Total		A	37.5	41.4	47.0	55.0	66.9	74.8	79.6	88.9
F.L.I. - Full load power input at max admissible conditions										
F.L.I. - Total		kW	22.2	24.7	28.0	31.6	38.7	42.3	47.7	52.6
M.I.C. Maximum inrush current										
M.I.C. - Value		A	124	135	142	197	209	217	268	316
M.I.C. with soft start accessory		A	80.4	94.1	116	136	148	156	172	183

Voltage unbalance between phases: max 2 %
Voltage variation: max +/- 10%
Electrical data refer to standard units; according to the installed accessories, the data can suffer variations.

Sound levels

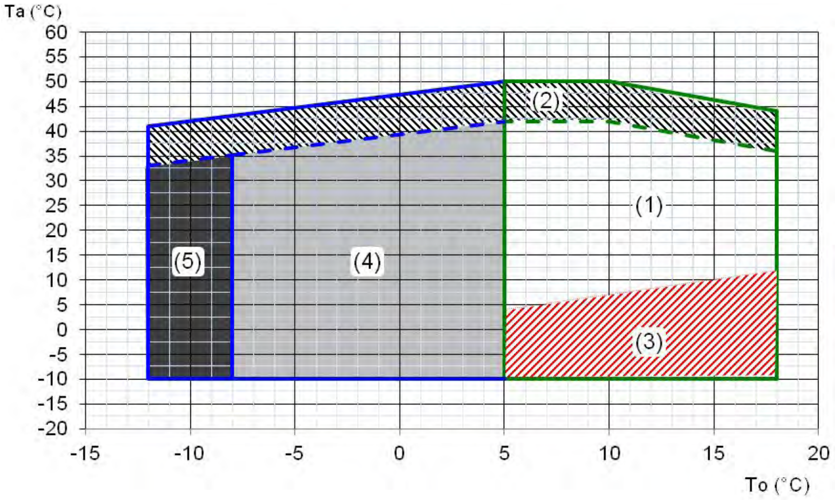
Size	Sound power level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
122	71	76	78	77	72	67	64	54	61	78
162	71	76	78	77	72	68	65	53	61	78
182	73	77	80	78	73	69	65	54	62	79
222	73	77	80	78	73	70	65	54	62	79
262	73	78	81	78	74	71	66	55	63	80
302	73	78	80	78	74	70	65	55	63	80
352	77	82	85	82	78	76	70	58	67	84
402	78	84	86	83	79	77	71	60	68	85

Sound levels refer to standard units (no accessories) at full load. The sound pressure is measured at 1 m from the external surface of the ducted unit operating in an open field.
(standard UNI EN ISO 9614-2)

Data referred to the following conditions:
- internal exchanger water temperature = 12/7°C
- outdoor air temperature 35°C
Static available pressure 120 Pa

Please note that when the unit is installed in conditions different from nominal test conditions (e.g. near walls or obstacles in general), the sound levels may undergo substantial variations.

Operating range (Cooling)



Operating range valid for all sizes.

Ta (°C) = External exchanger entering air temperature (D.B.)
To (°C) = Leaving internal exchanger water temperature

1 = Standard unit operating range at full load

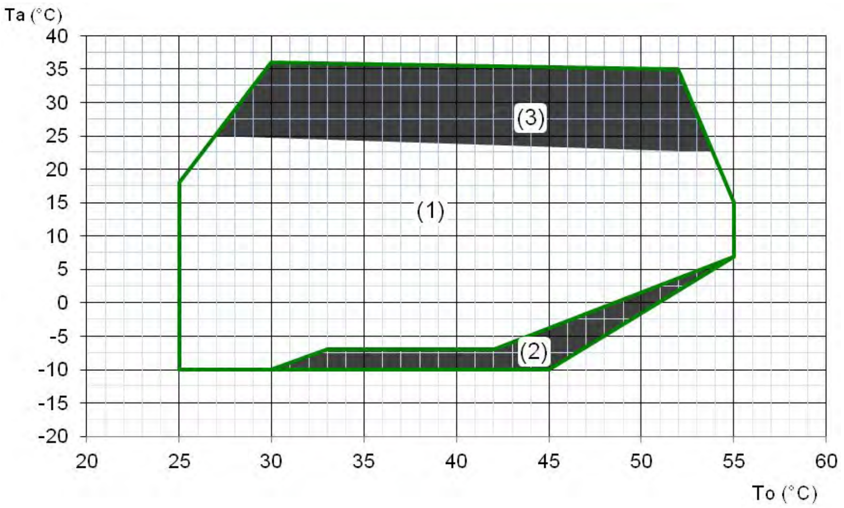
2 = Unit operating range with automatic staging of the compressor capacity

3 = Standard unit operating range with air flow automatic modulation

4 = Unit operating range in 'B - Low water temperature' configuration (40% ethylene glycol)

5 = Extended of operating range (extremely low water temperature option available on request)

Operating range (Heating)



Operating range valid for all sizes.

Ta (°C) = External exchanger entering air temperature (D.B.)
To (°C) = Leaving internal exchanger water temperature

1 = Standard unit operating range at full load

2 = Unit with 'Heating limit extension kit' device up to -10°C (W.B.)

3 = Standard unit operating range with air flow automatic modulation

Correction factors for glycol use

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2,0	-3,9	-6,5	-8,9	-11,8	-15,6	-19,0	-23,4
Safety temperature	°C	3,0	1,0	-1,0	-4,0	-6,0	-10,0	-14,0	-19,0
Cooling Capacity Factor	No	0,997	0,994	0,99	0,986	0,981	0,976	0,970	0,964
Compressor power input Factor	No	1,000	1,001	1,001	1,001	1,001	1,002	1,002	1,002
Internal exchanger glycol solution flow factor	No	1,003	1,010	1,020	1,033	1,05	1,072	1,095	1,124
Pressure drop Factor	No	0,989	0,983	0,979	0,980	0,984	0,993	1,004	1,020

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

Fouling Correction Factors

	Internal exchanger	
m2 °C / W	F1	FK1
0.44 x 10 (-4)	1,00	1,00
0.88 x 10 (-4)	0,97	0,99
1.76 x 10 (-4)	0,94	0,98

The cooling performance values provided in the tables are based on the external exchanger having clean plates (fouling factor 1). For different fouling factor values, multiply the performance by the coefficients shown in the table.
F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

SIZE		122	162	182	222	262	602	352	402
Qmin	[l/s]	1,0	1,1	1,3	1,5	1,7	2,9	3,2	3,2
Qmax	[l/s]	2,8	3,2	3,6	4,2	4,7	8,1	9,0	9,0

Exchanger operating range

	Internal exchanger		
	DPr		DPw
PED (CE)	4500	4500	1000

DPr = Max. operating pressure referigerant gas side
DPw = Max. operating pressure water side (utility)

Overload and control device calibrations

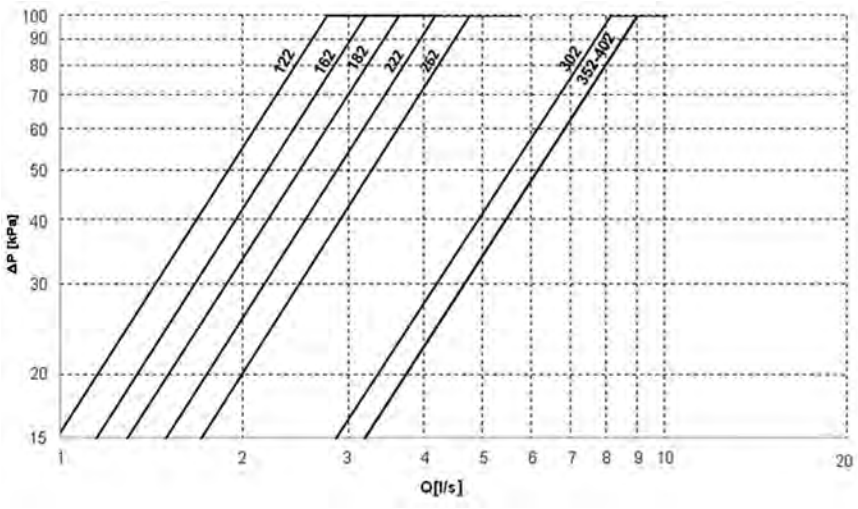
			open	closed	value
High pressure safety pressure switch		[kPa]	4050	3300	-
Antifreeze protection		[°C]	3.00	5.50	-
High pressure safety valve		[kPa]	-	-	4500
Low pressure safety valve		[kPa]	-	-	2950
Max no. of compressor starts per hour		[n°]	-	-	10
High compressor discharge temperature safety thermostat		[°C]	-	-	140

Performances in cooling

Size	To (°C)	Entering external exchanger air temperature (°C)											
		25		30		35		40		42		50	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
122	5	37.4	10.4	34.9	11.6	32.0	12.8	29.4	14.2	28.8	14.6	16.1	8.39
	6	38.4	10.6	36.0	11.7	33.1	13.0	30.5	14.3	29.8	14.8	16.7	8.49
	7	39.6	10.7	36.9	11.8	34.1	13.0	31.4	14.4	30.7	15.0	17.2	8.57
	10	43.0	11.1	40.0	12.2	37.1	13.4	34.6	14.8	33.9	15.5	18.9	8.88
	15	48.8	11.8	45.4	13.0	42.2	14.3	40.6	15.7	23.0	6.70	-	-
	18	52.4	12.3	49.0	13.4	46.0	14.7	25.7	6.56	24.9	6.86	-	-
162	5	45.2	11.7	42.4	12.9	39.1	14.3	35.5	15.9	34.3	16.6	19.8	10.1
	6	46.1	11.9	43.2	13.0	40.0	14.4	36.3	16.0	35.3	16.6	20.4	10.2
	7	48.0	12.0	44.9	13.2	41.3	14.6	37.9	16.1	36.6	16.8	21.2	10.3
	10	52.3	12.4	48.9	13.6	45.0	15.0	41.4	16.6	40.4	17.2	23.3	10.5
	15	56.8	12.9	53.2	14.1	49.2	15.5	45.9	16.9	45.1	17.8	-	-
	18	63.6	13.7	59.1	14.9	55.4	16.2	52.7	17.8	31.1	8.23	-	-
182	5	52.7	13.8	49.3	15.2	45.3	16.8	41.0	18.6	39.6	19.4	18.4	9.27
	6	53.8	13.9	50.2	15.3	46.2	16.9	42.0	18.7	40.6	19.5	18.8	9.32
	7	55.9	14.1	52.2	15.5	47.9	17.1	43.7	18.9	42.2	19.7	19.6	9.43
	10	60.8	14.5	56.6	16.0	52.1	17.5	47.6	19.5	46.5	20.2	21.5	9.66
	15	66.1	15.1	61.5	16.6	56.8	18.1	52.8	20.1	51.6	20.9	-	-
	18	74.1	15.9	68.9	17.3	63.9	19.1	41.2	10.7	39.8	11.2	-	-
222	5	60.8	17.6	56.6	19.1	51.9	21.0	48.0	23.0	46.7	23.8	19.2	9.77
	6	61.8	17.8	57.7	19.3	52.9	21.1	49.0	23.1	47.9	24.0	19.7	9.84
	7	64.2	18.0	59.7	19.7	54.9	21.5	51.0	23.3	50.0	24.3	20.6	9.97
	10	69.6	18.7	64.4	20.4	59.5	22.2	56.1	24.1	40.1	14.7	21.1	9.20
	15	75.4	19.4	69.7	21.1	64.9	23.0	45.9	14.6	44.4	15.2	-	-
	18	83.4	20.7	78.0	22.4	73.9	24.2	51.6	15.3	50.5	15.8	-	-
262	5	71.7	19.0	67.1	20.9	61.7	22.9	56.2	25.1	54.2	26.1	26.3	13.4
	6	73.2	19.1	68.5	21.0	62.9	23.1	57.4	25.4	55.6	26.3	27.0	13.5
	7	76.0	19.5	71.0	21.3	64.9	23.5	59.9	25.6	57.7	26.6	28.0	13.7
	10	82.5	20.1	76.8	22.0	70.9	24.1	65.2	26.3	63.5	27.2	30.8	14.0
	15	89.9	20.9	84.0	22.7	77.1	24.9	72.0	27.2	70.5	28.3	-	-
	18	101	21.9	93.6	24.0	86.8	26.1	82.4	28.6	51.8	14.4	-	-
302	5	82.2	21.8	77.1	23.8	71.2	25.9	65.0	28.3	63.2	29.3	34.6	16.9
	6	84.1	22.0	78.7	24.0	73.0	26.1	66.6	28.5	64.6	29.6	35.4	17.1
	7	87.2	22.4	81.4	24.4	75.3	26.5	69.0	28.9	67.2	29.8	36.8	17.2
	10	94.5	23.3	88.6	25.2	81.8	27.3	75.6	29.7	73.5	30.7	40.3	17.7
	15	104	24.2	97.2	26.1	89.5	28.5	83.8	30.7	82.2	31.9	-	-
	18	116	25.4	108	27.6	100	29.7	95.2	32.2	53.6	14.1	-	-
352	5	95.8	26.4	89.2	28.8	81.8	31.6	75.9	34.6	74.5	36.0	37.9	17.7
	6	98.5	26.9	91.8	29.2	84.7	31.9	78.5	35.0	77.2	36.4	39.3	17.9
	7	102	27.1	94.1	29.6	86.7	32.3	81.0	35.4	79.7	37.0	40.6	18.1
	10	109	28.2	101	30.7	94.0	33.4	88.7	36.5	55.0	18.3	40.6	16.5
	15	123	30.1	114	32.6	107	35.4	66.0	18.4	64.2	19.1	-	-
	18	132	31.4	123	34.1	117	36.8	71.4	19.0	69.8	19.7	-	-
402	5	109	30.2	102	32.8	94.0	35.8	86.7	39.0	84.6	40.2	39.2	18.0
	6	112	30.5	105	33.2	97.0	36.1	89.7	39.3	87.5	40.7	40.6	18.2
	7	115	31.0	107	33.7	99.3	36.5	92.2	39.7	90.2	41.0	41.8	18.3
	10	125	32.0	116	34.8	108	37.7	101	40.9	99.3	42.4	46.1	19.0
	15	140	34.0	131	36.8	122	39.9	80.4	23.3	78.2	24.1	-	-
	18	151	35.5	140	38.3	132	41.2	87.1	24.0	84.9	24.7	-	-

kWf = Total cooling capacity (kW)
The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Electrical power absorbed by compressors (kW)
To = Leaving internal exchanger water temperature (°C) - in/out water temperature differential = 5°C

Internal exchanger pressure drops



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 [kPa]

The water flow rate must be calculated with the following formula

Q [l/s] = kWf / (4,186 x DT)
kWf = Cooling capacity in (kW)

DT = Temperature difference between 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. (See the WATER CIRCUIT ACCESSORIES).

Performance in Heating

Size	Ta (°C) D.B./W.B.	Leaving exchanger water temperature (°C)									
		35		40		45		50		55	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
122	-7 / -8	28.8	8.38	28.7	9.51	28.3	10.8	-	-	-	-
	-5 / -6	30.3	8.42	30.1	9.55	29.8	10.8	-	-	-	-
	0 / -1	34.7	8.53	34.5	9.66	34.0	10.9	33.4	12.4	-	-
	2 / 1	36.4	8.57	36.1	9.70	35.7	11.0	35.2	12.5	-	-
	7 / 6	41.5	8.69	40.9	9.80	40.5	11.1	39.7	12.6	39.0	14.3
	12 / 11	48.1	8.85	47.4	9.95	46.6	11.2	45.5	12.7	44.6	14.4
162	-7 / -8	34.5	10.1	34.4	11.4	33.9	12.9	-	-	-	-
	-5 / -6	36.2	10.2	36.2	11.4	35.7	12.9	-	-	-	-
	0 / -1	41.5	10.2	41.3	11.5	40.5	12.9	40.0	14.7	-	-
	2 / 1	43.6	10.2	43.4	11.5	42.8	12.9	41.8	14.7	-	-
	7 / 6	49.5	10.3	49.2	11.5	48.2	12.9	47.0	14.6	46.6	16.7
	12 / 11	57.4	10.4	56.7	11.6	55.3	13.0	53.8	14.7	53.1	16.7
182	-7 / -8	42.0	11.8	41.6	13.2	40.8	14.9	-	-	-	-
	-5 / -6	44.2	11.8	43.9	13.3	43.1	14.9	-	-	-	-
	0 / -1	50.6	11.9	50.1	13.4	49.4	15.0	48.0	17.1	-	-
	2 / 1	53.3	11.9	52.7	13.4	51.6	15.0	50.4	17.1	-	-
	7 / 6	60.5	12.0	60.0	13.5	58.3	15.1	56.9	17.1	55.7	19.5
	12 / 11	70.1	12.2	69.2	13.6	67.0	15.3	65.2	17.2	63.5	19.6
222	-7 / -8	48.3	13.8	48.2	15.4	48.0	17.4	-	-	-	-
	-5 / -6	50.8	13.9	50.5	15.5	50.4	17.4	-	-	-	-
	0 / -1	58.0	14.1	57.6	15.7	56.8	17.5	55.8	19.8	-	-
	2 / 1	61.4	14.2	60.9	15.8	59.9	17.6	58.9	19.9	-	-
	7 / 6	69.8	14.4	68.5	16.0	67.2	17.8	65.8	20.0	64.7	22.6
	12 / 11	80.7	14.7	79.2	16.3	77.5	18.1	75.2	20.3	73.6	22.8
262	-7 / -8	56.8	16.1	56.3	18.1	55.3	20.3	-	-	-	-
	-5 / -6	60.0	16.2	59.4	18.2	58.5	20.4	-	-	-	-
	0 / -1	68.8	16.5	67.9	18.4	66.2	20.6	64.5	23.2	-	-
	2 / 1	72.8	16.6	71.5	18.5	70.1	20.7	68.2	23.3	-	-
	7 / 6	82.7	16.9	81.1	18.7	79.2	21.0	76.7	23.5	74.9	26.4
	12 / 11	95.8	17.1	93.8	19.0	91.4	21.2	88.0	23.8	85.7	26.7
302	-7 / -8	65.8	18.3	65.5	20.4	64.7	22.6	-	-	-	-
	-5 / -6	69.1	18.4	69.1	20.5	68.0	22.7	-	-	-	-
	0 / -1	79.7	18.9	78.3	20.8	77.3	23.0	75.6	25.9	-	-
	2 / 1	83.7	19.1	83.2	21.0	81.4	23.2	79.8	26.0	-	-
	7 / 6	95.2	19.5	94.1	21.3	92.4	23.6	89.6	26.3	87.4	29.4
	12 / 11	110	19.9	109	21.8	106	24.1	103	26.8	100	29.9
352	-7 / -8	73.1	21.7	73.3	23.9	72.0	26.8	-	-	-	-
	-5 / -6	76.9	21.8	77.2	24.0	75.8	26.9	-	-	-	-
	0 / -1	88.3	22.1	87.7	24.2	86.2	27.0	84.5	30.4	-	-
	2 / 1	92.8	22.2	92.2	24.3	90.8	27.1	88.5	30.5	-	-
	7 / 6	106	22.5	105	24.6	103	27.4	100	30.7	98.4	34.5
	12 / 11	123	22.9	121	25.0	119	27.8	115	31.1	113	34.8
402	-7 / -8	83.4	25.0	80.5	27.3	79.0	30.8	-	-	-	-
	-5 / -6	87.4	25.1	84.6	27.1	83.2	30.9	-	-	-	-
	0 / -1	100	25.5	95.8	27.9	94.8	30.5	92.3	34.9	-	-
	2 / 1	105	25.6	101	28.0	99.1	31.2	96.9	35.0	-	-
	7 / 6	119	26.0	114	28.4	111	31.6	110	35.3	108	39.4
	12 / 11	138	26.4	131	28.8	128	32.0	125	35.7	123	39.7

kWt = Internal exchanger heat power (kW)
The data do not consider the part related to the pumps, required to overcome the pressure drop for the solution circulation inside the exchangers
kWe = Electrical power absorbed by compressors (kW)
Ta = Entering external exchanger air temperature
DB = Dry bulb
WB = Wet bulb

Electric fan performance (nominal airflow)

			70	80	90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570
122	Airflow	m³/h	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	-
	Airflow	l/s	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	-
	Fan RPM	rpm	1377	1385	1393	1400	1416	1460	1460	1482	1503	1524	1545	1565	1585	1605	1625	1645	1684	-
	Total input	kW	2,48	2,54	2,6	2,64	2,76	2,876	3,08	3,26	3,42	3,6	3,78	3,96	4,12	4,3	4,48	4,68	5,06	-
162	Airflow	m³/h	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000	-
	Airflow	l/s	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	-
	Fan RPM	rpm	1390	1398	1406	1413	1428	1451	1473	1494	1515	1536	1557	1577	1597	1617	1636	1656	1695	-
	Total input	kW	2,58	2,64	2,68	2,74	2,84	3	3,18	3,34	3,52	3,7	3,88	4,06	4,22	4,4	4,58	4,78	5,16	-
182	Airflow	m³/h	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	-	-	-	-
	Airflow	l/s	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	-	-	-	-
	Fan RPM	rpm	1475	1482	1490	1497	1512	1533	1554	1575	1596	1615	1635	1654	1674	1692	-	-	-	-
	Total input	kW	2,82	2,88	2,94	3,02	3,14	3,34	3,54	3,72	3,9	4,1	4,28	4,48	4,66	4,86	-	-	-	-
222	Airflow	m³/h	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	-	-	-	-
	Airflow	l/s	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	-	-	-	-
	Fan RPM	rpm	1475	1482	1490	1497	1512	1533	1554	1575	1596	1615	1635	1654	1674	1692	-	-	-	-
	Total input	kW	2,82	2,88	2,94	3,02	3,14	3,34	3,54	3,72	3,9	4,1	4,28	4,48	4,66	4,86	-	-	-	-
262	Airflow	m³/h	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000
	Airflow	l/s	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667
	Fan RPM	rpm	1337	1345	1353	1361	1377	1401	1424	1446	1468	1489	1510	1531	1552	1572	1592	1613	1653	1693
	Total input	kW	3,27	3,36	3,45	3,54	3,72	3,99	4,23	4,47	4,71	4,95	5,22	5,49	5,76	6,03	6,27	6,54	7,11	7,71
302	Airflow	m³/h	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	-	-	-	-
	Airflow	l/s	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	-	-	-	-
	Fan RPM	rpm	1487	1494	1502	1509	1523	1545	1566	1586	1606	1626	1646	1665	1684	1703	-	-	-	-
	Total input	kW	4,38	4,47	4,56	4,68	4,86	5,16	5,46	5,73	6	6,3	6,57	6,87	7,14	7,44	-	-	-	-
352	Airflow	m³/h	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	-	-	-	-
	Airflow	l/s	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	-	-	-	-
	Fan RPM	rpm	1487	1494	1502	1509	1523	1545	1566	1586	1606	1626	1646	1665	1684	1703	-	-	-	-
	Total input	kW	4,38	4,47	4,56	4,68	4,86	5,16	5,46	5,73	6	6,3	6,57	6,87	7,14	7,44	-	-	-	-
402	Airflow	m³/h	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000	-	-	-	-
	Airflow	l/s	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	-	-	-	-
	Fan RPM	rpm	1496	1504	1511	1518	1533	1554	1575	1595	1615	1626	1646	1665	1684	1703	-	-	-	-
	Total input	kW	4,5	4,59	4,71	4,8	4,98	5,28	5,58	5,85	6,12	6,3	6,57	6,87	7,14	7,44	-	-	-	-

The performance has been calculated in relation to the internal pressure drop of a standard unit.

Cooling performance at part loads

Size	STEP	Entering external exchanger air temperature (°C) D.B. / W.B.											
		35			30			25			20		
		kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER	kWf	kWe_tot	EER
122	2	34,1	16,4	2,1	36,9	15,2	2,4	39,6	14,1	2,8	41,9	13,1	3,2
	1	20,2	8,9	2,3	21,5	8,3	2,6	22,7	7,8	2,9	23,6	7,4	3,2
162	3	41,3	18,1	2,3	44,9	16,7	2,7	48,0	15,5	3,1	50,7	14,4	3,5
	2	25,4	10,1	2,5	27,1	9,5	2,9	28,4	8,9	3,2	29,7	8,5	3,5
	1	22,5	9,2	2,4	23,9	8,7	2,7	25,0	8,2	3,0	26,1	7,8	3,4
182	3	47,9	21,3	2,3	52,2	19,7	2,7	55,9	18,2	3,1	59,0	17,0	3,5
	2	32,8	13,2	2,5	35,4	12,3	2,9	37,4	11,5	3,3	39,1	10,8	3,6
	1	22,6	9,8	2,3	23,9	9,3	2,6	25,1	8,8	2,9	26,2	8,4	3,1
222	3	54,9	25,6	2,1	59,7	23,8	2,5	64,2	22,2	2,9	68,3	20,7	3,3
	2	41,4	16,9	2,5	44,7	15,8	2,8	47,4	14,9	3,2	49,7	13,9	3,6
	1	22,8	9,8	2,3	24,1	9,3	2,6	25,3	8,8	2,9	26,4	8,4	3,2
262	3	64,9	28,5	2,3	70,9	26,3	2,7	76,0	24,4	3,1	80,5	22,6	3,6
	2	42,5	16,6	2,6	45,3	15,6	2,9	47,7	14,6	3,3	49,6	13,7	3,6
	1	33,5	13,3	2,5	35,7	12,4	2,9	37,5	11,7	3,2	38,9	11,0	3,5
302	2	75,3	32,8	2,3	81,4	30,7	2,7	87,3	28,6	3,1	92,0	26,7	3,4
	1	43,5	17,7	2,5	46,2	16,7	2,8	48,5	15,7	3,1	50,4	14,8	3,4
352	3	86,7	39,0	2,2	94,0	36,4	2,6	101,5	33,9	3,0	108,0	31,6	3,4
	2	57,0	22,3	2,6	61,1	20,9	2,9	64,6	19,7	3,3	67,7	18,6	3,6
	1	46,6	18,4	2,5	49,7	17,3	2,9	52,2	16,3	3,2	54,3	15,3	3,5
402	3	99,3	43,2	2,3	107,0	40,4	2,7	115,0	37,7	3,0	122,0	35,2	3,5
	2	69,9	26,8	2,6	74,7	25,0	3,0	79,0	23,4	3,4	82,6	22,0	3,8
	1	47,3	18,0	2,6	50,1	17,0	3,0	52,4	16,0	3,3	54,3	15,1	3,6

kWf = Cooling capacity in kW
kWe_tot = Overall electrical capacity input by the unit in kW
Internal exchanger water = output temperature 7°C/ input * (variable) / constant flow equal to the nominal value.
STEP = Active capacity steps (the maximum number indicates full capacity / the minimum number indicates the smallest staging step)
DB = Dry bulb
WB = Wet bulb

Heating performance at part load

Size	STEP	Entering external exchanger air temperature (°C) D.B. / W.B.																	
		-7/-8			-5/-6			0 / -1			2/1			7/6			12/11		
		kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP	kWt	kWe_tot	COP
122	2	28,8	10,9	2,65	30,3	10,9	2,78	34,7	11,0	3,15	36,4	11,1	3,29	41,5	11,2	3,72	48,1	11,3	4,25
	1	15,7	5,7	2,74	16,5	5,8	2,87	18,9	5,8	3,25	19,9	5,8	3,40	22,6	5,9	3,83	26,2	6,0	4,38
162	3	34,5	13,1	2,63	36,2	13,2	2,74	41,5	13,2	3,14	43,6	13,2	3,30	49,5	13,3	3,72	57,4	13,4	4,28
	2	19,6	7,3	2,70	20,6	7,3	2,81	23,6	7,3	3,23	24,8	7,3	3,39	28,2	7,4	3,82	32,7	7,4	4,40
	1	17,3	6,5	2,67	18,2	6,5	2,78	20,8	6,5	3,19	21,9	6,5	3,35	24,8	6,6	3,78	28,8	6,6	4,35
182	3	42,0	16,0	2,63	44,2	16,0	2,77	50,6	16,1	3,15	53,3	16,1	3,31	60,5	16,2	3,74	70,1	16,4	4,28
	2	26,5	9,8	2,70	27,9	9,8	2,84	31,9	9,9	3,23	33,7	9,9	3,40	38,2	10,0	3,84	44,3	10,1	4,39
	1	17,6	6,7	2,61	18,5	6,7	2,75	21,2	6,8	3,13	22,3	6,8	3,29	25,3	6,8	3,71	29,3	6,9	4,25
222	3	48,3	18,0	2,69	50,8	18,1	2,81	58,0	18,3	3,17	61,4	18,4	3,34	69,8	18,6	3,76	80,7	18,9	4,27
	2	33,7	12,2	2,76	35,5	12,3	2,89	40,5	12,4	3,26	42,9	12,5	3,44	48,7	12,6	3,86	56,4	12,8	4,40
	1	17,4	6,4	2,74	18,3	6,4	2,87	20,9	6,5	3,24	22,1	6,5	3,41	25,2	6,6	3,83	29,1	6,7	4,36
262	3	56,8	21,1	2,70	60,0	21,2	2,84	68,8	21,5	3,21	72,8	21,6	3,38	82,7	21,9	3,78	95,8	22,1	4,34
	2	33,9	12,4	2,75	35,8	12,4	2,89	41,1	12,6	3,26	43,5	12,7	3,44	49,4	12,8	3,85	57,2	12,9	4,42
	1	26,0	9,1	2,85	27,5	9,2	3,00	31,5	9,3	3,39	33,4	9,3	3,57	37,9	9,5	4,00	43,9	9,6	4,59
302	2	65,8	25,0	2,63	69,1	25,1	2,75	79,7	25,6	3,11	83,7	25,8	3,24	95,2	26,2	3,63	110,0	26,6	4,14
	1	35,5	13,0	2,74	37,2	13,0	2,86	42,9	13,3	3,24	45,1	13,4	3,38	51,3	13,6	3,78	59,3	13,8	4,30
352	3	73,1	28,4	2,57	76,9	28,5	2,70	88,3	28,8	3,07	92,8	28,9	3,21	106,0	29,2	3,63	123,0	29,6	4,16
	2	43,8	16,4	2,67	46,1	16,5	2,79	52,9	16,7	3,18	55,6	16,7	3,33	63,5	16,9	3,76	73,7	17,1	4,30
	1	34,5	12,7	2,71	36,3	12,8	2,84	41,7	12,9	3,22	43,8	13,0	3,38	50,0	13,1	3,82	58,0	13,3	4,37
402	3	83,4	31,7	2,63	87,4	31,8	2,75	100,0	32,2	3,11	105,0	32,3	3,25	119,0	32,7	3,64	138,0	33,1	4,17
	2	54,6	20,2	2,71	57,2	20,2	2,83	65,4	20,5	3,19	68,7	20,6	3,34	77,9	20,8	3,74	90,3	21,1	4,29
	1	35,1	12,5	2,81	36,8	12,5	2,94	42,1	12,7	3,32	44,2	12,7	3,47	50,1	12,9	3,89	58,1	13,0	4,45

kWt = Thermal power in kW
kWe_tot = Overall electrical capacity input by the unit in kW
Internal exchanger water = output temperature 35°C/ input * (variable) / constant flow equal to the nominal value.
STEP = Active capacity steps (the maximum number indicates full capacity / the minimum number indicates the smallest staging step)
DB = Dry bulb
WB = Wet bulb

Configurations

EO - Horizontal exhaust air

Configuration which allows to reduce the height of the shaft where the unit is installed. The air exhaust outlet, complete with coupling flange, is at the rear of the unit.

B - Water low temperature

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

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

In the selection phase, it is necessary to indicate the type of function required, and the unit will be optimised with:

- Unit with single operation set-point
- Unit with double operating set-point

The unit in this configuration have a different operation field, indicated in the operating limits section.

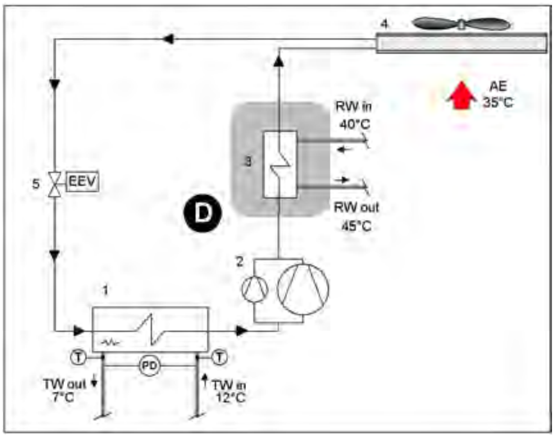
In low temperature operation, some staging steps could not be available.

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

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

D - Partial energy recovery

A configuration that allows the free production (heat recovery) of hot water when running in cooling mode. The heat recovery employs heat exchangers which "desuperheat" the hot gas at the compressor outlet upstream of the external heat exchanger condensation stage. The partial heat recovery performance is given in the GENERAL TECHNICAL DATA table (the thermal power which can be recovered is around 25% of the sum of the cooling capacity and the electrical power draw of the compressors). The partial heat recovery increases the efficiency (EER) of the unit by around 5% when in operation. The recovery heat exchanger water inlet temperature must be kept over 35°C to prevent the refrigerant condensation. In some cases, it may be advisable to fit a control valve to the water circuit to ensure this limit is observed.



D - Partial recovery device

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

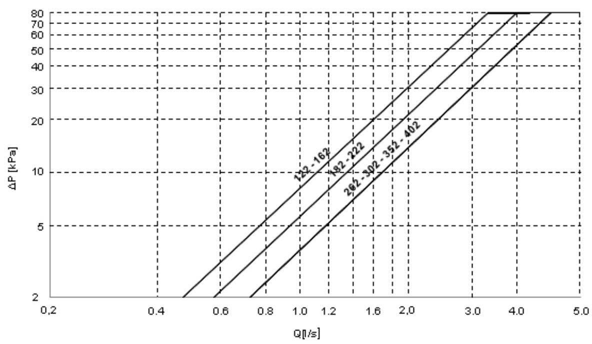
T - Temperature probe
PD - Differential pressure switch

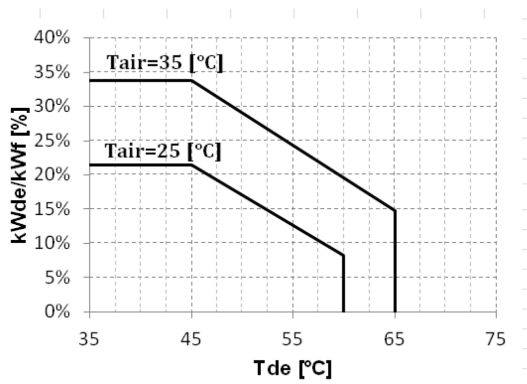
TW in chilled water inlet
TW out chilled water outlet

RW in - Recovery water inlet
RW out - Recovery water outlet

AE Outdoor air
EEV - Electronic expansion valve

Pressure drops of partial energy recovery exchanger





Q = water flow rate[l/s]
ΔP = water side pressure drops (kPa)
Example: Requested cooling capacity: 75 kW with chilled water at 12/7°C and 35°C outdoor air.
Size purpose of the study: WSN-XEE 302
Hot water required temperature: +45°C
Recovery capacity: 34% di 75 kW = 25.5 kW
Design flow-rate: 1,22 l/s

kWde/kWf = Heat recovered/Cooling capacity [%]
Tde = Leaving recovery exchanger water temperature [°C]

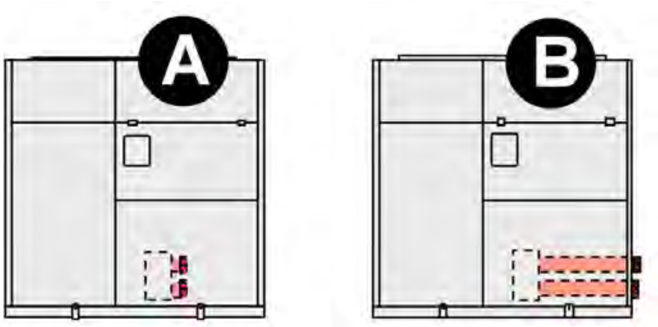
Water circuit accessories

ABU - Flush hydraulic connections

An option which simplifies the hydraulic connections which would otherwise be carried out within the unit (with the responsibility of the client).

Includes internal piping to the external unit panel, two quick connections flush to the unit, two outlet connections for the system connections which are to be soldered by the client.

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



A - Standard unit
B - Unit with ABU option

Main diagram, not to scale

IMPORTANT!

The water connections flush with the unit are supplied as standard in units which are complete with at least one of the following options:

- High efficiency single inverter pump for primary circuit / Low static pressure single pump / High static pressure single pump

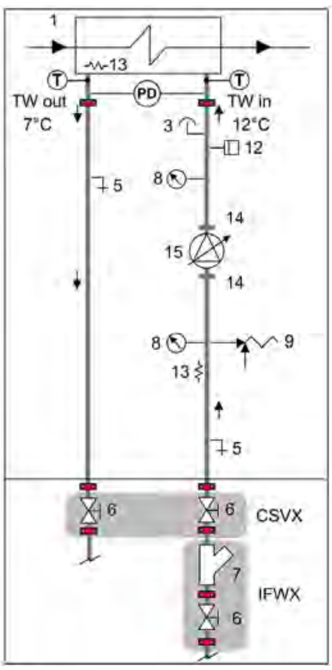
GENERAL NOTE

It is also advisable to provide the system with the following components, which are excluded from the Clivet supplies:
- Shut-off valves, if not included in Clivet's supply
- Devices to support pipes and anti-vibration elastic joints
- Expansion tank (e.g. for closed-circuit systems)
- Control thermostat on supply
- Additional vents and drains where necessary

1PUHE - High efficiency single inverter pump for primary circuit

Built-in hydronics unit as standard supply. The wet rotor circulation pump has the following characteristics: protection rating IP 44, DN flanged fittings, EC motor with automatic control, pump body in cast iron coated in cataphoresis, polypropylene thermal insulation, stainless steel shaft, metal impregnated carbon bearings with synthetic impeller.

Water circuit operating diagram with 1PUHE pump



1. Internal exchanger
3. Purge valve
5. Drain valve
6. Butterfly shut-off valve with quick couplings
7. Steel mesh strainer
8. Pressure gauge
9. Safety valve (6 Bar)
12. System load safety pressure switch (it avoids the pump operation if water is not present)
13. Anti-ice electric heater
14. Coupling with DN flanges and bolts
15. Wet rotor circulation pump with high efficiency inverter

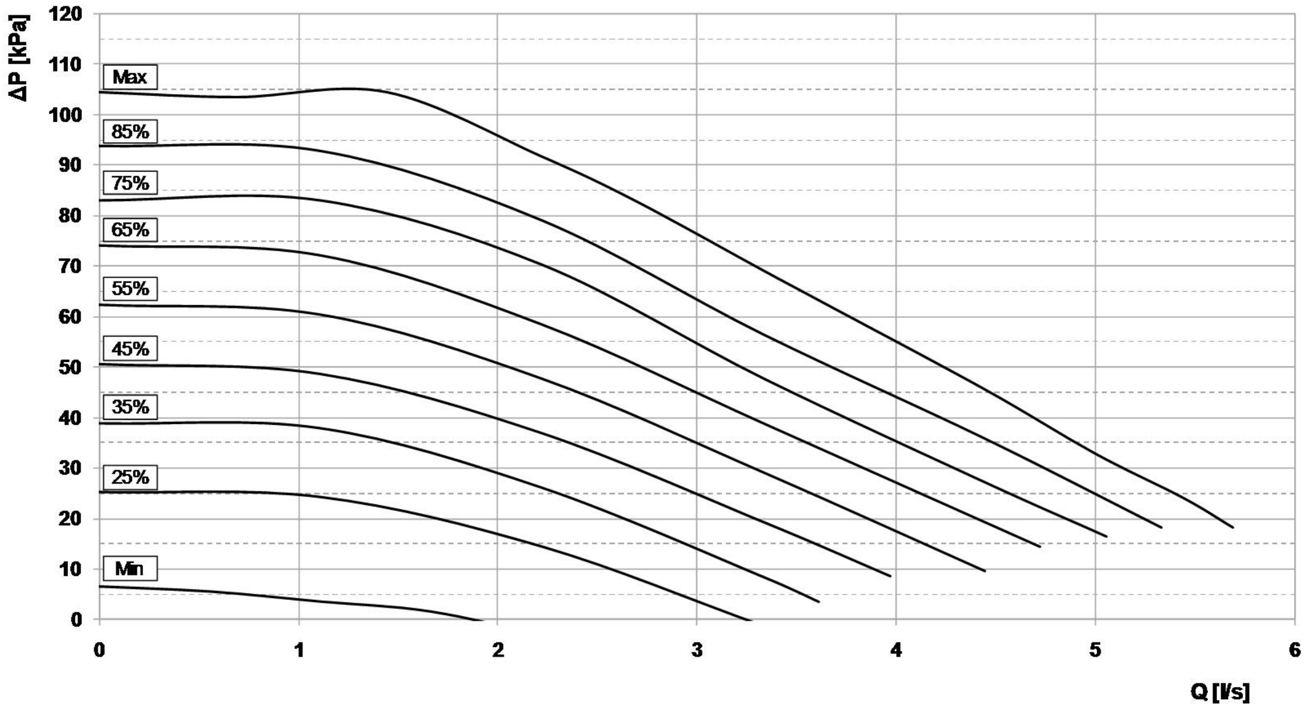
T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

CSVX - Couple of manual shut-off valves
IFWX - Steel mesh strainer on water side

The grey area indicates further optional components.

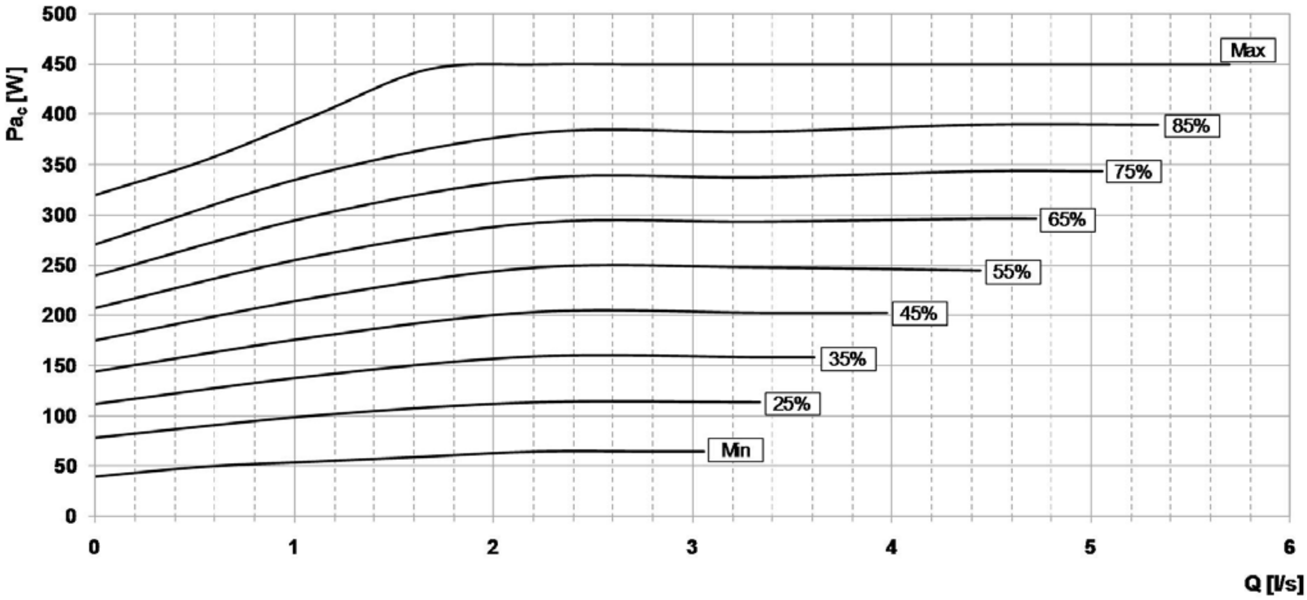
Pump head curves for size 122-182



Q = Water flow rate [l/s]
ΔP = Pump head [kPa]

Attention: in order to obtain available pressure values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present).

Pump absorption curves for size 122-182

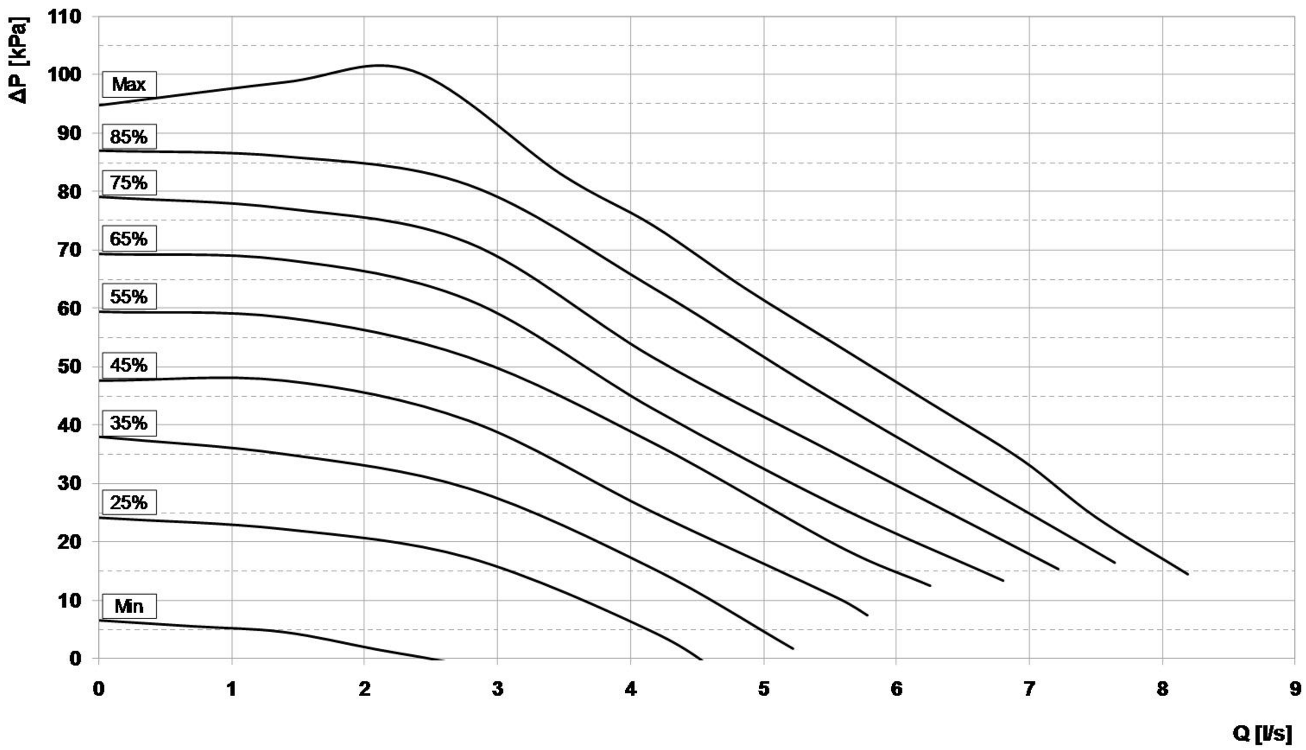


Q = Water flow rate [l/s]
Pac = Capacity absorbed by the pump (W)

Built-in pump electrical data

SIZE		122	162	182
1PUHE				
FLI Total	[kW]	0,45	0,45	0,45
FLA Total	[A]	2,4	2,4	2,4

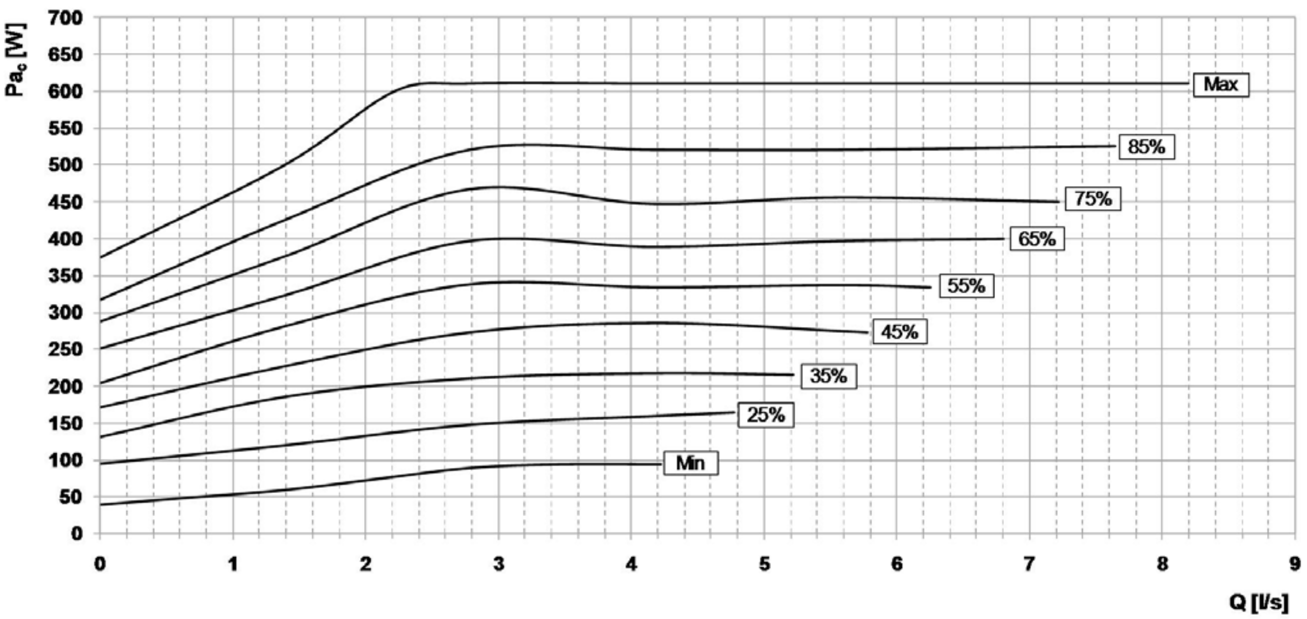
Pump static pressure curves for size 222-352



Q = Water flow rate [l/s]
ΔP = Pump head [kPa]

Attention: in order to obtain available pressure values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present).

Pump absorption curves for size 222-352

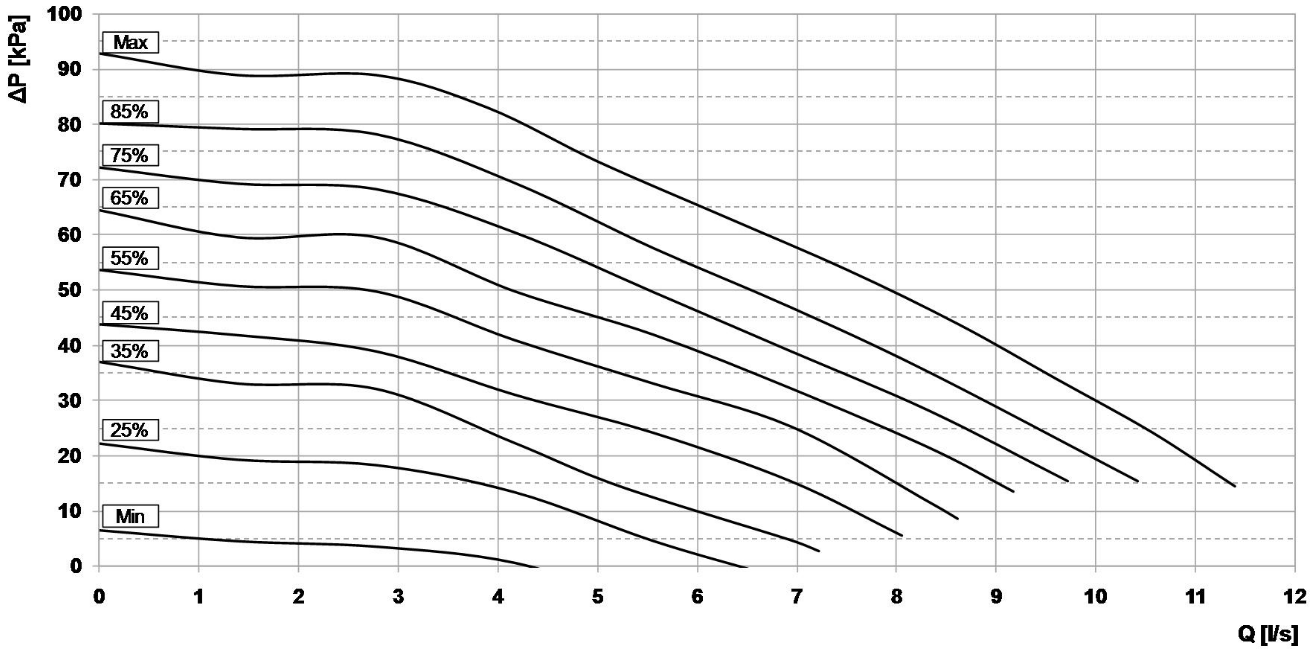


Q = Water flow rate [l/s]
Pac = Capacity absorbed by the pump (W)

Built-in pump electrical data

SIZE		222	262	302	352
1PUHE					
FLI Total	[kW]	0,5	0,5	0,5	0,5
FLA Total	[A]	2,6	2,6	2,6	2,6

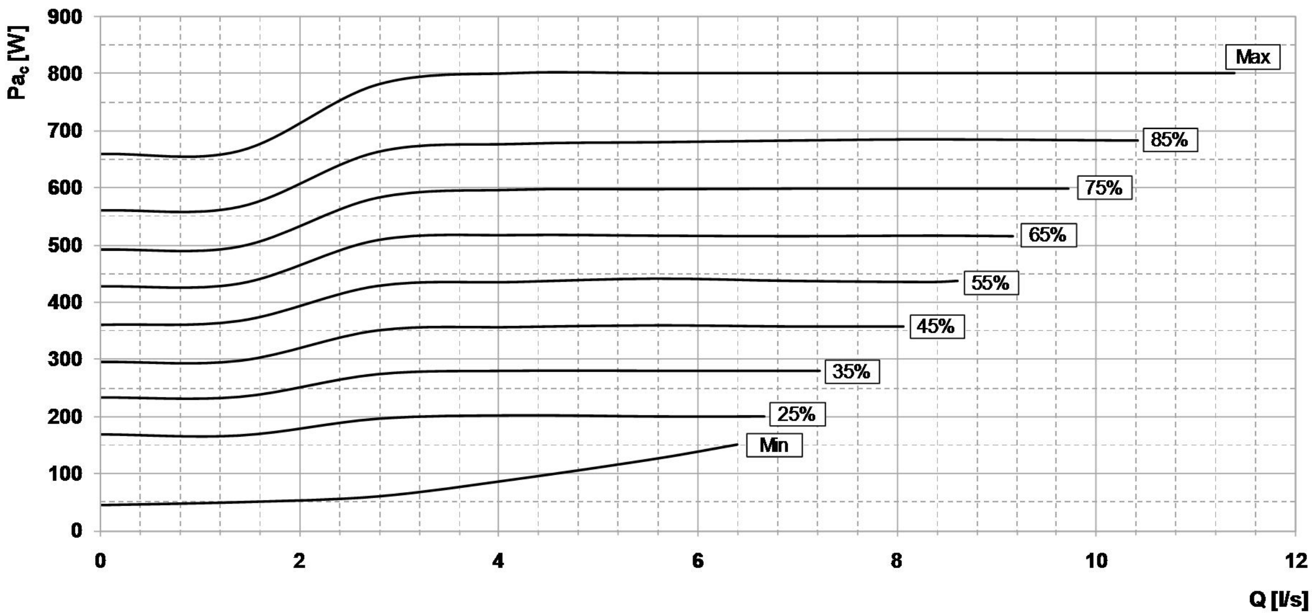
Pump static pressure curves for size 402



Q = Water flow rate [l/s]
ΔP = Pump head [kPa]

Attention: in order to obtain available pressure values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present).

Pump absorption curves for size 402



Q = Water flow-rate [l/s]
Pac = Capacity absorbed by the pump (W)

Built-in pump electrical data

SIZE		402
1PUHE		
FLI Total	[kW]	0,8
FLA Total	[A]	3,5

1PUB - Low static pressure single pump

Option provided built-in consisting in a constant flow rate water pump with low static pressure.

Centrifugal electric pump, with body and impeller made with AISI 304 steel.

Mechanical seal using ceramic, carbon and EPDM elastomer components.

Three-phase electric motor with IP44-protection.

Complete with a thermoformed insulating casing, quick couplings with an insulated casing, safety valve, pressure gauges, system safety pressure switch, stainless steel, antifreeze, intake, immersion-type heaters.

Only for size from 182 to 402.

1PUA - High static pressure single pump

Option provided built-in consisting in a constant flow rate water pump with high static pressure.

Centrifugal electric pump, with body and impeller made with AISI 304 steel.

Mechanical seal using ceramic, carbon and EPDM elastomer components.

Three-phase electric motor with IP44-protection.

Complete with a thermoformed insulating casing, quick couplings with an insulated casing, safety valve, pressure gauges, system safety pressure switch, stainless steel, antifreeze, intake, immersion-type heaters.

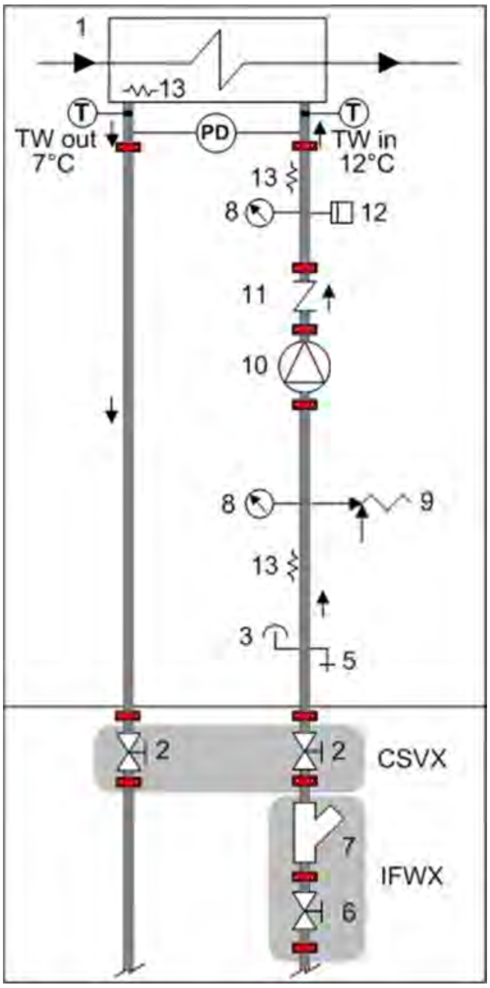
The 1PUB and 1PUA options are supplied as standard with a hydraulic connection kit on the system return water (for installation external to the unit, encharged to the client

The kit is composed of:

- no. 1 cast-iron shut-off butterfly valve, complete with activation lever with a mechanical calibration lock
- n. 1 of quick connection

Only for size from 182 to 402.

Operating diagram of the hydraulic circuit with 1PUB - 1PUA pumps



1 - Internal exchanger
2 - Cutoff valve
3 - Purge valve
5 - Draw off cock
6 - Cutoff valve with quick joints
7 - Steel mesh strainer water side
8 - Manometer
9 - Safety valve (6 Bar)
10 - Packaged electric pump with high efficiency impeller
11 - Non return valve
12 - System safety pressure switch (prevents the pumps from operating if no water is present)
13 - Antifreeze heater

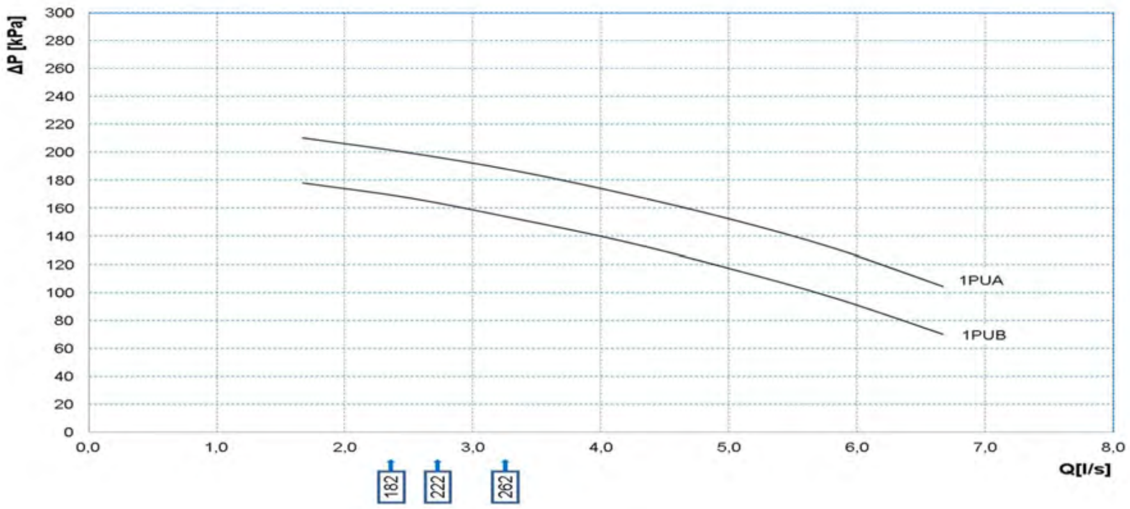
T - Temperature probe
PD - Differential pressure switch

TW in chilled water inlet
TW out chilled water outlet

IFWX - Steel mesh strainer water side
CSVX - Couple of manual shut-off valves

The grey area indicates further optional components.

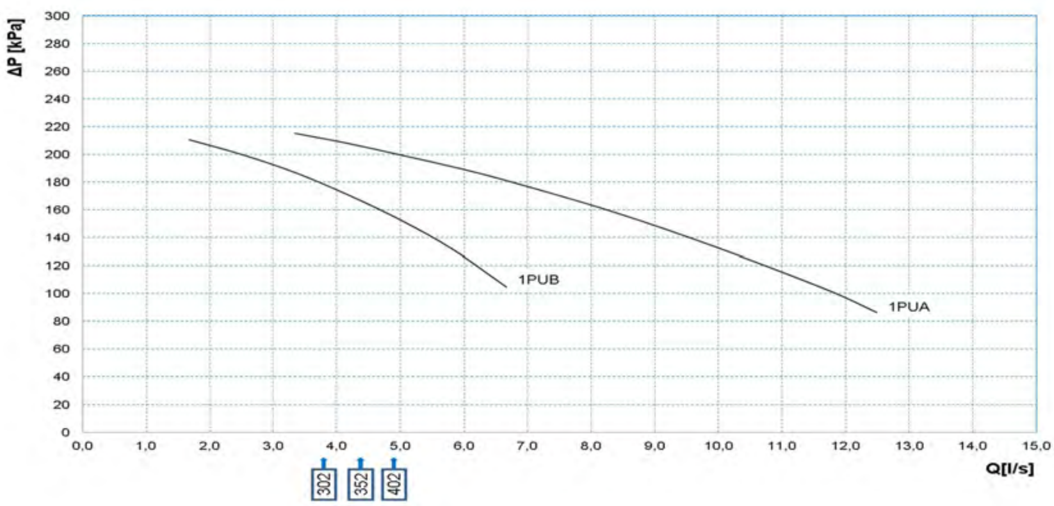
1PUB / 1PUA option performance for size 182-262



Q = Water flow rate [l/s]
ΔP = Pump head [kPa]

Attention: in order to obtain available pressure values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present)

1PUB / 1PUA option performance for size 302-402



Q = Water flow rate [l/s]
ΔP = Pump head [kPa]

Attention: in order to obtain available pressure values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present)

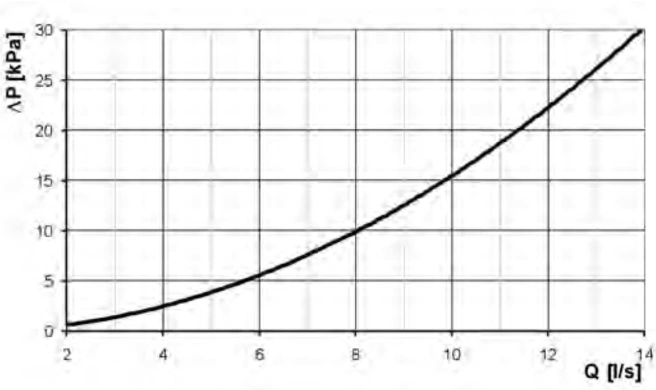
Built-in pump electrical data

SIZE		182	222	262	302	352	402
1PUA							
FLI Total	[kW]	1,7	1,7	1,7	1,7	1,7	1,7
FLA Total	[A]	3,8	3,8	3,8	3,8	3,8	3,8
1PUB							
FLI Total	[kW]	1,8	1,8	1,8	1,7	1,7	1,7
FLA Total	[A]	3,3	3,3	3,3	3,8	3,8	3,8

IFWX -Steel mesh strainer on the water side

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

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



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

The device compulsorily requires the installation of the "CSVX - A COUPLE OF SHUT-OFF VALVES TO MANUAL OPERATION" accessory"

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

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

We disclaim any liability and make the guarantee void, if an appropriate mechanical filter is not provided upstream of the system. Admitted filtration degree 1,6 mm

Accessory separately supplied

CSVX - Couple of manually operated shut-off valves

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

It includes:

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

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

Accessory separately supplied

VACSUX - User side DHW switching valve

The user side DHW switching valve is also supplied as a separate accessory.

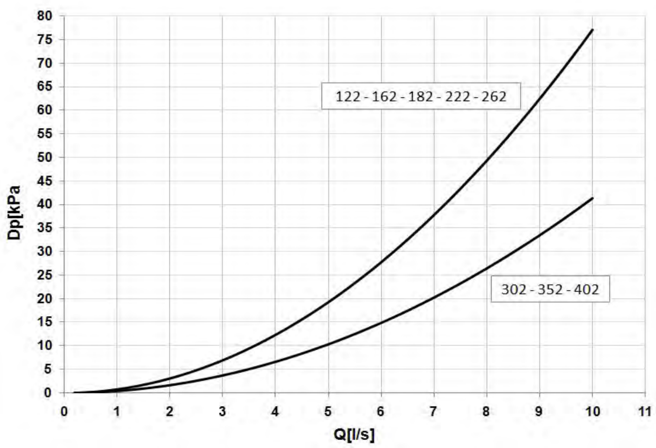
The DHW is called by the closure of the potential-free contact present in the unit electric panel.In heating, the control regulates the 3-way valve commutation because it deviates the flow-rate from installation to DHW storage tank, changes the installation set into the DHW one, thermoregulates and activates or deactivates the compressors depending on the distance from the DHW set. In cooling, the control switches off the compressors due to the mode changing, regulates the 3-way valve commutation and starts the compressors after the safety time owed to on/off.

For sizes from 122 to 262 the DHW switching valve is 1"1/2.
For sizes from 302 to 402 the DHW switching valve is 2".

The DHW switching valve has a IP 40 protection degree.

It is therefore compulsory that client provides a protection for the external liquid valve.

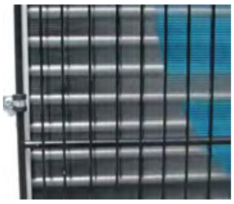
DHW switching valve pressure drops



Q = Water flow-rate [l/s]
Dp = Pump head [kPa]

Accessories

PGFC – Finned coil protection grill



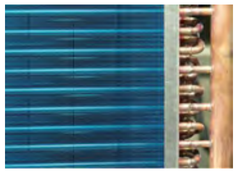
This accessory is used to protect the external coil from the accidental contact with external things or people.

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

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

This option is not suitable for application in sulphuric environments

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 low concentrations and other chemical agents

Attention!

- Cooling capacity variation -2,7%

- variation in compressor power input +4,2%

- operating range reduction -2,1°C

FANQE - Electrical panel ventilation

This option is necessary for very hot climates, where the outdoor temperature can be between +40°C and +50°C. It is made up of a system of forced ventilation, activated by a thermostat, which provides for the correct operating temperature to be maintained for the components inside the electrical panel. This option includes a thermostat which activates forced ventilation when necessary.

The device is 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.

The device operates only with powered units and not switched units. Be careful that you do not exceed a temperature of 50 ° C inside the electrical panel during storage or on the installed unpowered unit.

MF2 - Multi-function phase monitor

The phase monitor controls the electrical parameters of the power line to the unit. It works on the command circuit and orders the unit to be switched off when one of the following cases is present: when the phase connections do not respect the correct sequence, or when there is over voltage or under voltage for a certain amount of time (limit values of over and under voltage and the time interval can be manually and separately set). When the line conditions are re-established, the unit is re-armed automatically.

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

The device prevents sudden changes of voltage; however, the voltage must always be in a range between 380V and 480V.

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

The device allows automatic management of units that operate on the same hydraulic circuit, by creating a local communication network.

There are two control modes that can be set via a parameter during the activation stage. They both distribute the heat load on the available units by following the distribution logic to benefit from efficiency levels at part load.

Moreover:

Mode 1 - it keeps all the pumps active

Mode 2 - it activates only the pumps of the unit required to operate

The device allows for rotation based on the criterion of minimum wear and management of units in stand-by. There are various unit sizes. Every unit must be fitted with the ECOSHARE feature. The set of units is controlled by a Master unit.

The local network can be extended up to 7 units (1 Master and 6 Slave).

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

PFCC - Power factor correction capacitors (cosfi >0.95)

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 0.95, reducing the network reactive power. This often leads to an economic benefit which the energy provider grants to the final user.

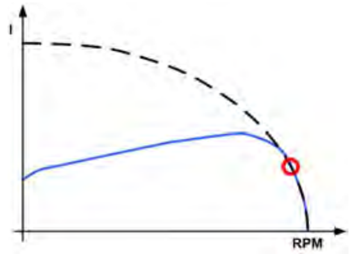
The device is built-in the unit.

SFSTR - Disposal for inrush current reduction

This option is also known as "Soft starter". An electronic device which automatically starts up the compressors gradually, reducing the starting current for the unit by around 40% in comparison with the nominal value.

This results in the electrical capacity system and the related protection devices being sized with lower parameters, thus having a lower initial investment cost.

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



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

ELFOEnergy Duct Medium electrical data (SERIE WSA-XEE) WITH SFTR OPTION

Size		122	162	182	222	262	302	352	402
M.I.C. Maximum inrush current									
M.I.C. with soft start accessory	A	80,4	94,1	116,1	136,1	148	156	171,8	183,2

MHP - High and low pressure gauges

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

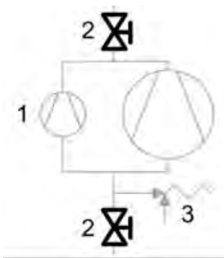
The two liquid pressure gauges and corresponding pressure sockets are installed built-in the unit in an easily accessible location.

The device is built-in the unit.

SDV - Cutoff valve on compressor supply and return

This option makes it possible to be isolated and substituted without discharging the refrigerant from within the refrigeration circuit. This means that the extraordinary maintenance activities are facilitated.

The device is built-in the unit.



1. Compressors
2. SDV option
3. Safety valve

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

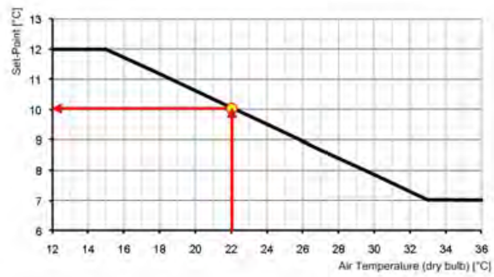
This device enables the set-point to be varied which is pre-set using an external 0÷10 V signal.

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

SPC2 - Set-point compensation with outdoor air temperature probe

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

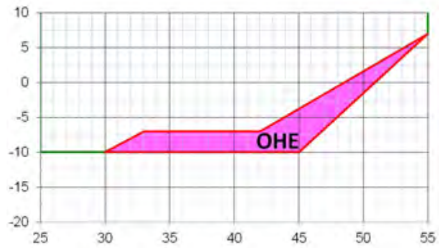
The device is installed and wired built-in the unit.



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

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

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



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 protocol

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

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

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

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

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

CMSC11 - Serial communication module for BACnet-IP supervisor

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

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

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

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

CONTA2 - Energy meter

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

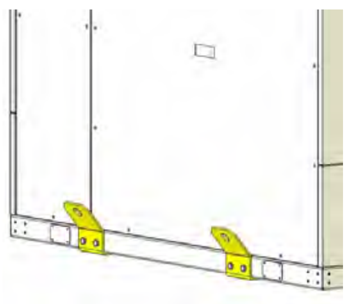
It is possible to control:

- voltage (V),
- absorbed current (A),
- frequency (Hz),
- cosfi,
- power input (KW),
- absorbed energy (KWh),
- harmonic components (%).

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

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

STSOL - Additional lifting brackets



Option allowing the unit lifting by crane.

It provides 4 anchor points for the eyebolt insertion and it is made by 2 60/10 painted steel longerons which cross all the unit length.

The device is built-in the unit.

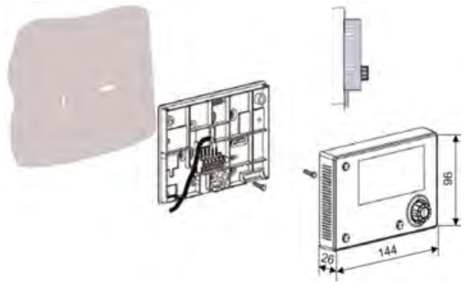
The device can be removed after the unit laying if the 'AMRX - Rubber antivibration mounts' accessory is supplied. In the absence of antivibration mounts remove the device before the ground fixing.

Accessories separately supplied

RCMRX - Remote control via microprocessor control

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

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



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

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

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

Installation provided by Customer

PSX - Mains power supply

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

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

Power supply at 230V AC provided by Customer

AMRX - Rubber antivibration mounts

The rubber antivibration mounts must be fixed to designated housings on the support stringers and are used to dampen vibrations produced by the unit, thereby reducing the noise transmitted to the support structures. They are flexible bodies able to dampen axial and tangential stresses and maintain the mechanical properties almost constant over time thanks to high resistance materials of which they are made.

Alternatively, rubberized neoprene anti-vibration strips may be used on the unit longitudinal support members (not supplied by Clivet)

Installation provided by Customer

Option compatibility

REFERENCE	DESCRIPTION	122	162	182	222	262	302	352	402
CONFIGURATIONS AND MAIN ACCESSORIES									
B	Water low temperature	0	0	0	0	0	0	0	0
D	Partial energy recovery	0	0	0	0	0	0	0	0
D + 1PUHE	Partial energy recovery + High efficiency inverter single pump for primary circuit.	X	X	X	X	0	0	0	0
D + 1PUA	Partial energy recovery + High static pressure single pump	X	X	X	X	0	0	0	0
D + 1PUB	Partial energy recovery + Low static pressure single pump	X	X	X	X	0	0	0	0
1PUS - STANDARD PUMP									
1PUHE	High efficiency single inverter pump for primary circuit.	0	0	0	0	0	0	0	0
1PUA	High static pressure single pump	X	X	0	0	0	0	0	0
1PUB	Low static pressure single pump	X	X	0	0	0	0	0	0

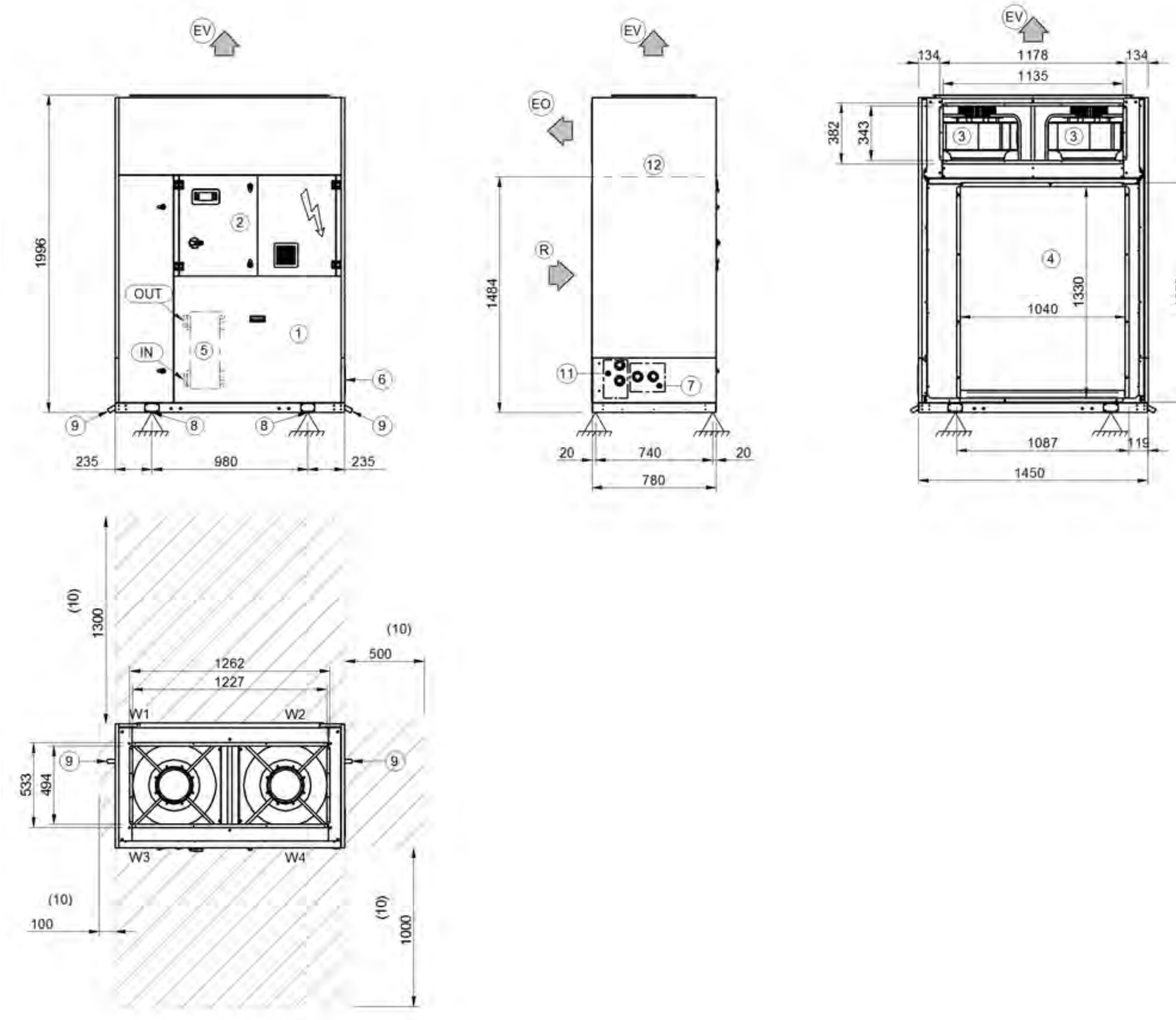
0 Option

× Not available

Dimensional drawings

Sizes 122-162

DAB2T122_162_0 REV00
DATA 20/06/2016



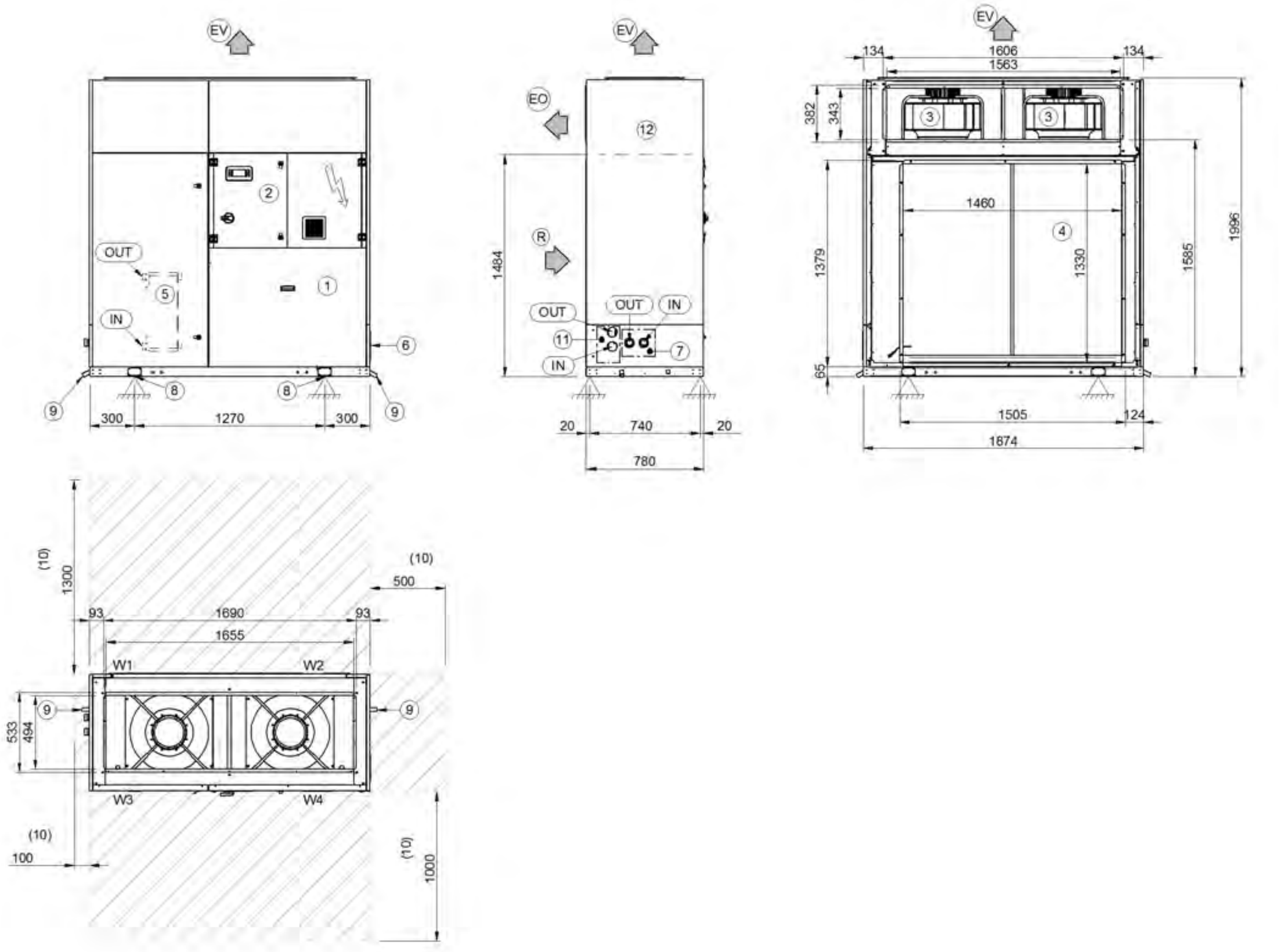
(1) Compressor compartment
(2) General electrical panel
(3) Exhaust radial electric fans
(4) External exchanger
(5) Internal exchanger
(6) Electric line input
(7) Hydraulic fittings flush with unit (optional)
(8) Supporting points
(9) Condensate discharge
(10) Functional clearances
(11) Partial recovery water fittings (optional)
(12) Separation line
(EV) Vertical air exhaust (standard)
(EO) Horizontal air exhaust (optional)
(R) Outdoor air return

Size			122	162
A - Length		mm	1450	1450
B - Width		mm	780	780
C - Height		mm	1996	1996
W1 Supporting Point		kg	95	90
W2 Supporting Point		kg	134	164
W3 Supporting Point		kg	116	114
W4 Supporting Point		kg	156	187
Shipping weight		kg	495	548
Operating weight		kg	501	555

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

Size 182-222

DAB2T182_222_0 REV00
DATA 20/06/2016



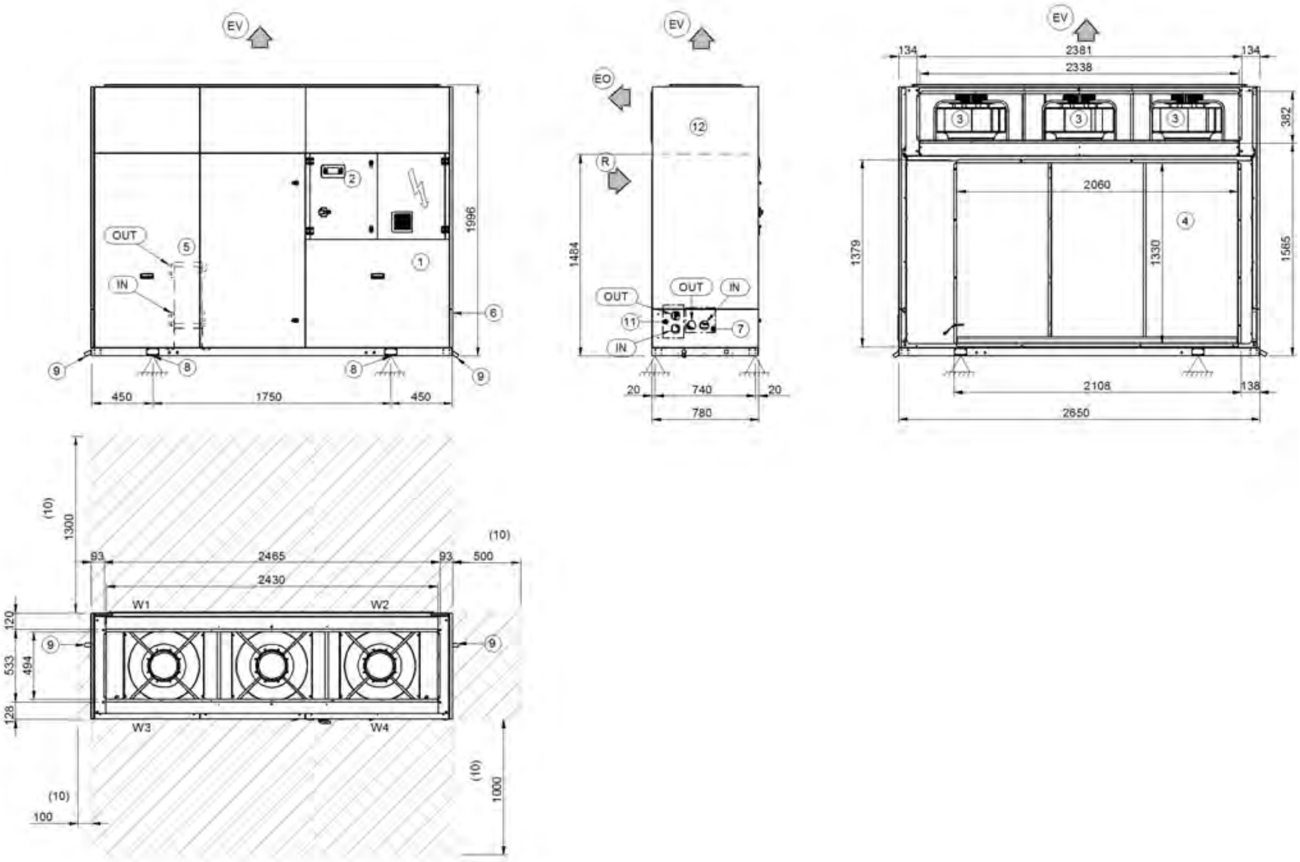
(1) Compressor compartment
(2) General electrical panel
(3) Exhaust radial electric fans
(4) External exchanger
(5) Internal exchanger
(6) Electric line input
(7) Hydraulic fittings flush with unit (optional)
(8) Supporting points
(9) Condensate discharge
(10) Functional clearances
(11) Partial recovery water fittings (optional)
(12) Separation line
(EV) Vertical air exhaust (standard)
(EO) Horizontal air exhaust (optional)
(R) Outdoor air return

Size			182	222
A - Length		mm	1874	1874
B - Width		mm	780	780
C - Height		mm	1996	1996
W1 Supporting Point		kg	106	106
W2 Supporting Point		kg	183	185
W3 Supporting Point		kg	127	128
W4 Supporting Point		kg	204	207
Shipping weight		kg	613	620
Operating weight		kg	620	626

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

Size 262-302-352-402

DAB2T262_402_0 REV00
DATA 20/06/2016



(1) Compressor compartment
(2) General electrical panel
(3) Exhaust radial electric fans
(4) External exchanger
(5) Internal exchanger
(6) Electric line input
(7) Hydraulic fittings flush with unit (optional)
(8) Supporting points
(9) Condensate discharge
(10) Functional clearances
(11) Partial recovery water fittings (optional)
(12) Separation line
(EV) Vertical air exhaust (standard)
(EO) Horizontal air exhaust (optional)
(R) Outdoor air return

Size			262	302	352	402
A - Length		mm	2650	2650	2650	2650
B - Width		mm	780	780	780	780
C - Height		mm	1996	1996	1996	1996
W1 Supporting Point		kg	139	149	161	166
W2 Supporting Point		kg	208	219	261	270
W3 Supporting Point		kg	158	167	177	182
W4 Supporting Point		kg	227	235	275	286
Shipping weight		kg	723	764	868	898
Operating weight		kg	732	770	874	904

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

CLIVET SPA
Via Camp Lonc 25, Z.I. Villapaiera - 32032 Feltre (BL) - Italy
Tel. + 39 0439 3131 - Fax + 39 0439 313300 - info@clivet.it

CLIVET UK LTD (Sales)
4 Kingdom Close, Segensworth East - Fareham, Hampshire - PO15 5TJ - United Kingdom
Tel. + 44 (0) 1489 572238 - Fax + 44 (0) 1489 573033 - info@clivet-uk.co.uk

CLIVET AIRCON LTD (Service and Maintenance Division)
Units F5&F6 Railway Triangle Ind Est, Walton Road - Portsmouth, Hampshire - PO6 1TG - United Kingdom
Tel. +44 (0) 2392 381235 - Fax. +44 (0) 2392 381243 - info@clivetaircon.co.uk

CLIVET ESPAÑA COMERCIAL S.L. (Sales)
Calle Gurb, 17 1º 1ª - 08500 Vic, Barcelona - España
Tel: +34 93 8606248 - Fax +34 93 8855392 - info@clivetcomercial.com

CLIVET ESPAÑA S.A.U. (Service and Maintenance Division)
Calle Real de Burgos Nº 12 - 28860 Paracuellos del Jarama, Madrid - España
Tel. +34 91 6658280 - Fax +34 91 6657806 - info@clivet.es

CLIVET GmbH
Hummelsbütteler Steindamm 84, 22851 Norderstedt - Germany
Tel. + 49 (0) 40 32 59 57-0 - Fax + 49 (0) 40 32 59 57-194 - info.de@clivet.com

CLIVET RUSSIA
Elektrozavodskaya st. 24, office 509 - 107023, Moscow, Russia
Tel. + 74956462009 - Fax + 74956462009 - info.ru@clivet.com

CLIVET MIDEAST FZCO
Dubai Silicon Oasis (DSO), High Bay Complex, Ind Unit No. 3, PO BOX 342009, Dubai, UAE
Tel. + 9714 3208499 - Fax + 9714 3208216 - info@clivet.ae

CLIVET AIRCONDITIONING SYSTEMS PRIVATE LIMITED
4BA, Gundecha Onclave - Kherani Road,Saki Naka, Andheri (East) - Mumbai 400 072 - India
Tel. +91 22 6193 7000 - Fax +91 22 6193 7001 - info.in@clivet.com