ELFOEnergy Duct Medium

**HIGH EFFICIENCY AIR-COOLED LIQUID CHILLER
FOR INDOOR INSTALLATION**

WSA-XEE 122-402 SERIES

Nominal cooling capacity from 36 kW to 102 kW

ELFOEnergy Duct Medium is a high efficiency liquid chiller 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 hydronics unit with inverter electric pump
- **Compact, accessible design:** easy installation and maintenance even in shafts with restricted spaces
- **High available static head:** 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 enclosure with effective soundproofing.

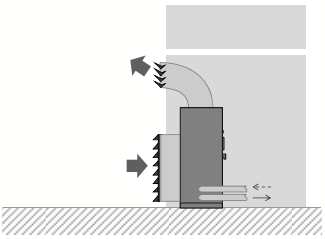
COMFORT AND RELIABILITY IN ONLY ONE PRODUCT

EASY TO POSITION IN AVAILABLE TECHNICAL SPACES

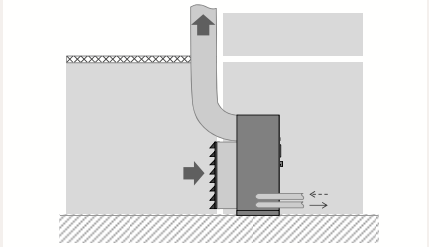
The unit can be positioned easily in one of the following settings:
- In shafts
- In service rooms, for instance, warehouses and store rooms
- Directly in the served area, in a visible position

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 VERTICAL DUCTED OUTLET



REAR INTAKE
AND REAR DUCTED OUTLET

EXAMPLE OF EXTERNAL
AIR EXHAUST GRILLE

This image represents only a few of positioning possibilities

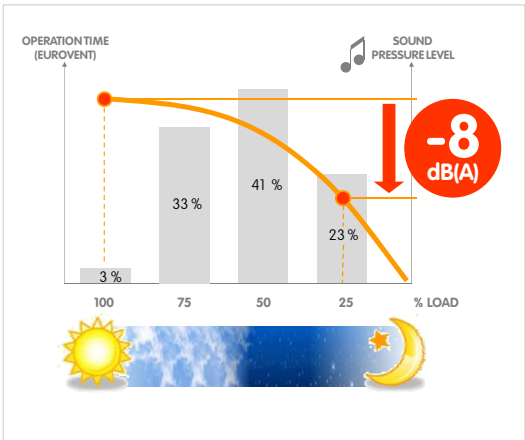
EXTERNAL FANS AT VARIABLE SPEED FOR MINIMAL NOISE EMISSION

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.

Il 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.



COMPLETELY AUTOMATIC OPERATING

The microprocessor controller manages operating automatically in line with **maximum efficiency** criteria, enables up to 6 units to be coordinated in a **local network** (Master-Slave function) and includes numerous **safety** functions and the management of any alarms

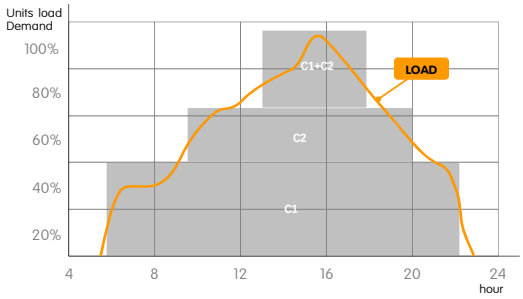
The interface terminal is equipped with a backlit **graphic display** and a multifunction access keyboard. The multi-level menu is protected by passwords which are differentiated by different user types. The daily / weekly clock programmer function is standard.

Thanks to its attractive **design**, the interface terminal can also be positioned inside the rooms being serviced or in a special system control room.

EFFICIENT PRECISION

The logic of sequential activation of the compressors allow to:

- **strictly follow the load being used**, therefore giving greater comfort
- **reduce the number of compressor start-ups** and, therefore, the principle cause of wear
- thus **increasing the service life of the unit**
- **reduce times and costs for any repairs**, thanks to the modular components, their reduced sizes and the minor cost in respect to semi-hermetic compressors.



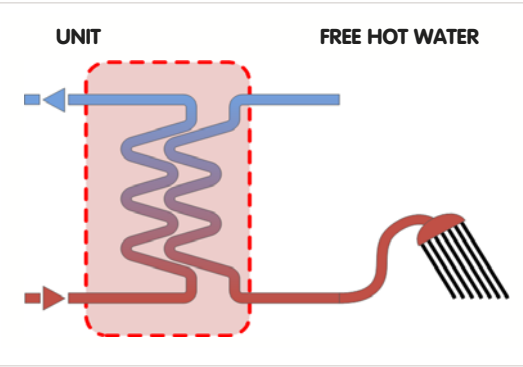
PRODUCES HOT WATER FREELY

Condensation heat recovery:

- **Partial**: recovers around 20% of the available heat (desuperheater).

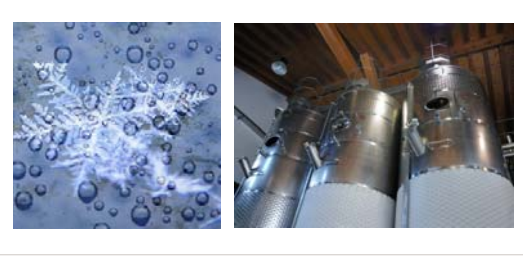
Allows the **free production of hot water** for:

- Hot water coil supply for post-heating;
- Domestic hot water production (with an intermediate exchanger);
- Other processes or operations.



EVEN FOR LOW TEMPERATURE WATER

The unit is also perfectly adapted for use in process cooling where the **low temperature** configuration (**Brine**) together with the addition of thermo-vector liquid glycol produces **chilled water up down –7 °C**.



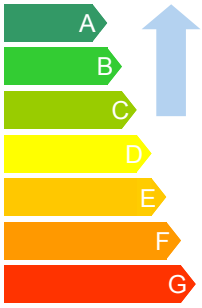
HIGH ENERGY EFFICIENCY WITHIN THE ANNUAL CYCLE

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**.

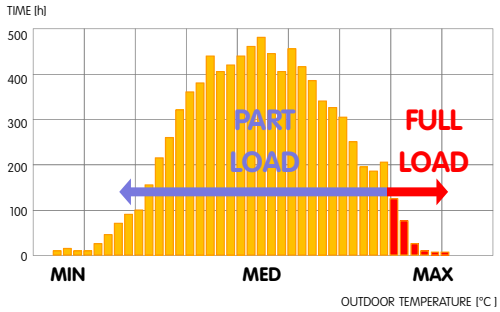
It is often possible to access the foreseen **benefits** to promote the use of the unit at low consumption.

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 power only for a short amount of time.
Therefore, it is essential to have the maximum efficiency under part-load condition.
This is the only way to actually reduce overall yearly consumptions.



PART-LOAD EFFICIENCY DETERMINES 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%

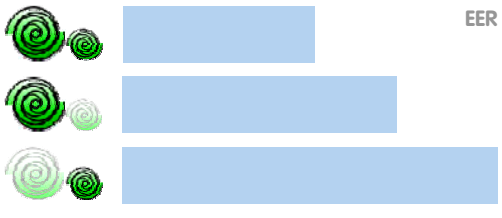
* EUROVENT (ESEER) supply times reference and ARI (IPLV) reference for seasonal efficiency calculations.

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:

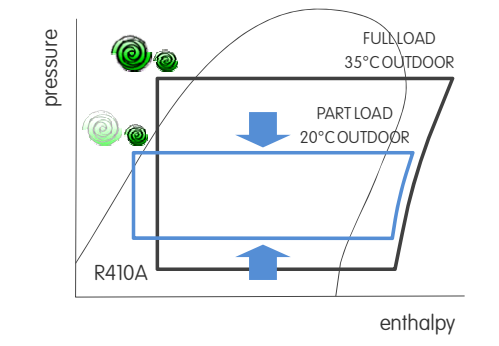
- compressors manufactured in **large ranges**, with strict quality controls and maximum reliability thanks to the high production volumes
- the refrigerant circuit uses two compressors, almost always of **different sizes** in order to obtain more control steps. This way, only the necessary energy is supplied.

THE SEQUENTIAL DEACTIVATION OF THE COMPRESSORS INCREASES EFFICIENCY



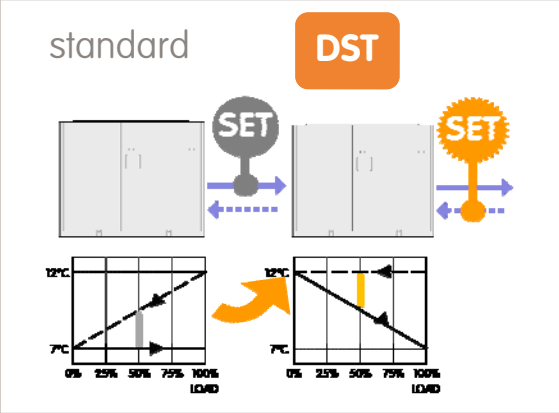
DOUBLED EFFICIENCY

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 equipped with standard **DST (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 water return temperature constant, 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 **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.

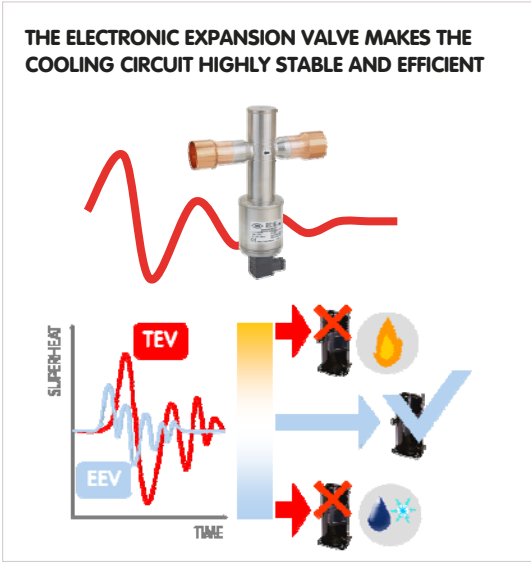


The direct expansion circuit allows them to operate the outdoor air treatment independently from ELFOEnergy Duct Medium, which can vary the system water supply temperature, thereby optimising energy efficiency in the yearly cycle.

STABLE AND RELIABLE OPERATING

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

- The **anti-freeze sensor on the water output** in addition to the device which **monitors the water flow** work together to maintain machine safety and combat the risk of freezing.
- 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.
- Furthermore, **continuous adaptation to load conditions** takes places without swings in the cooling circuit with the advantage of increasing the efficiency and the working life of the compressor.



HIGH HEAT EXCHANGE EFFICIENCY

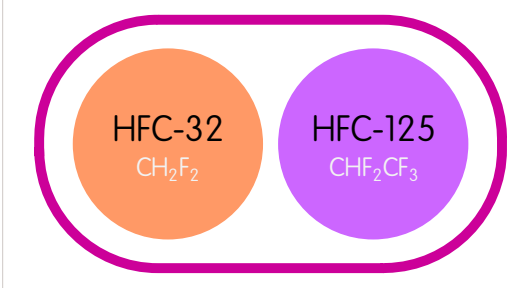
Thanks to the heat exchangers with large front surface and low profile , we obtain:

- **Improved operating temperature** of the cooling circuit and hence improved efficiency, since this reduces the difference between the air temperature and the refrigerant fluid temperature inside the exchanger;
- **Fan consumption reduction**, thanks to the lower profile of the exchanger which reduces pressure drop in the air flow. The automatic fan speed control, standard supplied, minimises moreover the air flow required for the correct operation and thus further reduces the consumptions;
- **Sound level reduction**, since larger surface areas allow lower air speeds 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 refrigerant circuit and therefore the responsible use of materials and small refrigerant quantity, for a reduced environmental impact.



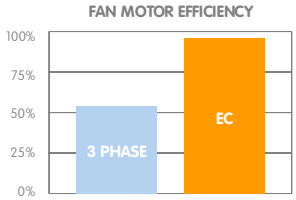
VERSATILITY OF REVERSED BLADES ROTOR

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.

EFFICIENCY OF THE ELECTRONIC CONTROLLED MOTOR

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

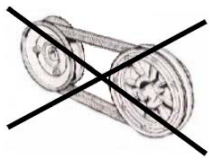
- The **lack of brushes** and the particular power supply increase efficiency by 70%;
- Even the life cycle increases, thanks to the **elimination of the brushes' natural abrasive erosion effects**;
- **Drastic** reduction at the start-up **of the starting current** thanks to the electronic fan with 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):

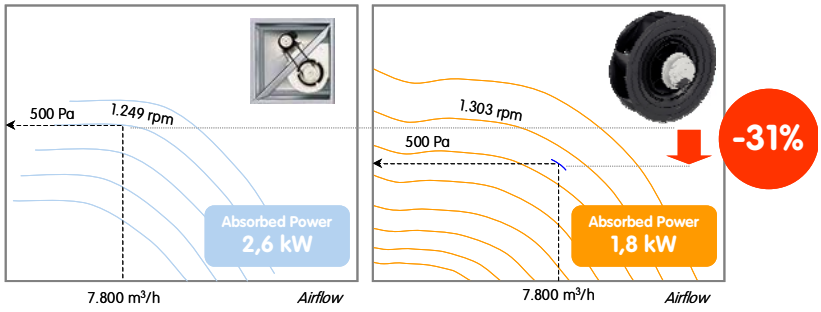
- The transmissions' inefficiencies are eliminated;
- The transmissions' wear and maintenance is eliminated.



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 absorption from the electric motor, manufacturer data - Example referred to the flow of 7,800 m3/h with static pressure equal to 500 Pa

HIGHER LEVELS OF SILENCE WITH THE COMPOSITE CONSTRUCTION

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.

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 BUILT-IN PUMPS ARE VERSATILE, READY-FOR-USE AND RELIABLE

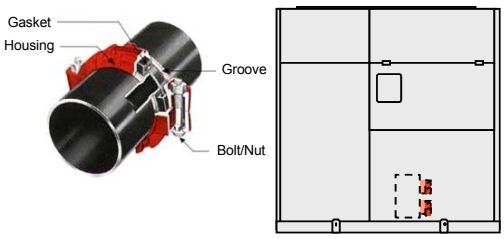
The optional hydronics unit is complete with everything required for the system start-up and operating: antifreeze heating elements, safety valve, charge/drain valves, pressure gauges. It also includes the pumping unit with the following solutions:

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

START-UP SEMPLIFICATION WITH RAPID WATER CONNECTIONS

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

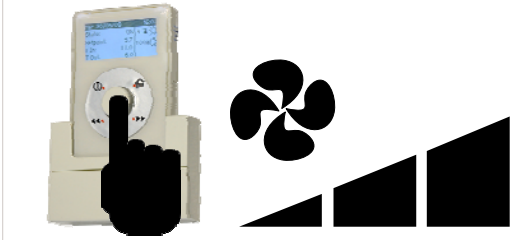
THE RAPID CONNECTIONS ARE STANDARD SUPPLIED



THE RIGHT AIR FLOW RATE FOR EVERY TYPE OF SYSTEM

By setting the fan speed on the display, it is possible to modify the air flow, adapting the head 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**.

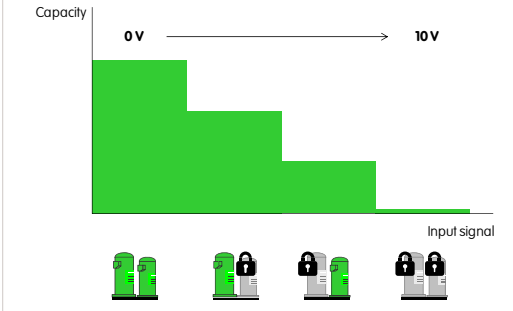


DEMAND LIMIT

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.

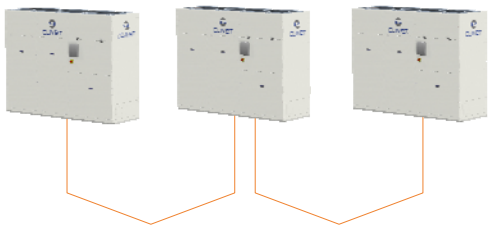
PERFECT FOR THE DIFFERENT SYSTEM TYPES

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 served area.

- The microprocessor control allows controlling up to 6 units in local **network** (Master-Slave function).



MASTER-SLAVE NETWORK

REMOTE MANAGEMENT OF THE SYSTEM

The unit is standard equipped with:

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

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

Modbus®

LonWorks

BACnet™

TECHNICAL UNIT FEATURES

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.
A oil heater is automatically switched on at the compressor shut-down to prevent oil dilution by the refrigerant.
The compressors are connected in tandem on a single refrigerator circuit and they are equipped with a bi-phase equalization of the oil.

STRUCTURE
Supporting structure realised in galvanised steel sheet able to supply excellent mechanical features and long-lasting resistance to corrosion.

PANELLING
External panelling with pre-painted panels covered with thermo-insulating and soundproofing material (class 1 flame resistant - DIN 53438).
The housing panels can be removed by unbolting them and using the handles.

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 comes 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.
Correct power supply to the expansion valve is ensured by the subcooling circuit.

FAN
ECOBREEZE device (STD)
Plug fans without scroll with reverse blades driven by electronically-controlled "brushless" DC motors with direct coupling.

REFRIGERANT CIRCUIT
The circuit is complete with:
- replaceable anti-acid solid cartridge dehydrator filter
- sight glass with moisture indicator
- electronic expansion valve
- high pressure switch
- low pressure switch
- high pressure safety valve
- low pressure safety valve
- liquid line shut-off valve

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
- antifreeze protection on the water side
- compressor overload protection and timer
- pre-alarm function for water anti-ice and high refrigerant gas pressure
- self-diagnosis system with immediate display of the error code
- automatic compressor start rotation control
- compressor operating hour display
- remote ON/OFF control
- relay for remote cumulative fault signal
- input for demand limit (absorbed power limit according to an external signal 0÷10V)
- Master-Slave function
- RS485 Serial port with MODBUS protocol

CONFIGURATIONS
- EV Vertical air exhaust (standard)
- EO Horizontal air exhaust

- B Water low temperature
- D Partial energy recovery

HYDRAULIC CIRCUIT ACCESSORIES
- High efficiency inverter single pump for primary circuit
- Water connections flush with the unit
- Single pump at low discharge head
- Single pump at high discharge head
- Couple of manual shut-off valves (separately supplied accessories)
- Stainless steel mesh mechanical filter (separately supplied accessories)

The units can be supplied without hydronic unit on the utility side.

OTHER ACCESSORIES
- Finned coil protection grill.
- Copper / aluminium condenser coil with acrylic lining
- Electrical panel ventilation
- Phase monitor
- Power capacitors
- Disposal for inrush current reduction
- High and low pressure gauges
- Compressor discharge and suction shut-off valve
- Free contacts for compressor state
- Free contacts compressor state and local / remote management
- Compensation of set point with signal 0-10 V
- Compensation of set point with signal 4-20 mA
- Set point compensation with outside temperature probe
- Set point compensation according to the outside enthalpy
- LonWorks serial communication module
- BACnet-IP serial communication module
- BACnet-MSTP serial communication module
- Kit to remote the control interface by microprocessor (separately supplied accessories)
- Rubber antivibration mounts (separately supplied accessories)
- Additional lifting brackets

TEST
All the units are factory-tested in specific steps, before shipping them.

Unit for indoors installation only, away from atmospheric agents

STANDARD UNIT

GENERAL TECHNICAL SPECIFICATIONS

Sizes			122	162	182	222	262	302	352	402
COOLING										
Cooling capacity	1	kW	36.4	42	49.7	58.7	68	78.9	90.1	102
Compressor power input	1	kW	11.6	13.7	16	19.8	23.2	26.1	30.2	35
Heating capacity partial recovery	2	kW	12	13.9	16.4	19.6	22.8	26.2	30.1	34.3
Cooling capacity (EN14511:2011)	3	kW	36.1	41.7	49.3	58.3	67.5	78.6	89.8	102
Total power input (EN14511:2011)	3	kW	12.8	14.9	17.6	21.4	24.7	27.9	32.1	37.7
EER (EN 14511:2011)	3		2.83	2.8	2.81	2.72	2.74	2.81	2.79	2.7
ESEER			4.24	4.39	4.42	4.37	4.34	4.32	4.45	4.41
COMPRESSOR										
Type of compressors	4		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
N°. of Compressors		Nr	2	2	2	2	2	2	2	2
Nominal capacity (C1)		HP	14	16.5	19.5	22.5	27	30	35	40
Standard capacity steps		Nr	2	3	3	3	3	2	3	3
Oil charge (C1)		l	3.6	5.7	5.7	5.7	6.4	6.4	7.9	10
Refrigerant charge (C1)		kg	8	10	14	14	14	17	23	24
Refrigerant circuits		Nr	1	1	1	1	1	1	1	1
INTERNAL EXCHANGER										
Type of internal exchanger	5		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow rate (Internal Exchanger)	3	l/s	1.7	2	2.4	2.8	3.3	3.8	4.3	4.9
Internal exchanger pressure drop	3	kPa	42.1	41.7	45.5	47.5	48.8	24.6	25.8	25.9
Water content		l	2.9	3.4	4	4.7	5.4	6.4	7	8
EXTERNAL SECTION FANS										
Type of fans	6		RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD
Number of fans		Nr	2	2	2	2	3	3	3	3
Fan diameter		mm	500	500	500	500	500	500	500	500
Type of motor	7		EC	EC	EC	EC	EC	EC	EC	EC
Air flow		l/s	4444	4444	5000	5000	6667	7500	7500	8333
Air flow		m^3/h	16.000	16.000	18.000	18.000	24.000	27.000	27.000	30.000
Installed unit power		kW	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Max external static pressure		Pa	570	570	450	450	570	450	420	240
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
DIMENSIONS										
Length		mm	1450	1450	1875	1875	2650	2650	2650	2650
Depth		mm	780	780	780	780	780	780	780	780
Height		mm	1995	1995	1995	1995	1995	1995	1995	1995

(1) Data referred to the following conditions:
- Internal exchanger water temperature = 12/7 °C
- Input air temperature to the external exchanger = 35°C

(2) Exchanger water temperature - Partial recovery = 40/45°C

(3) Data calculated in compliance with Standard EN 14511:2011referred to the following conditions :
- Internal exchanger water temperature = 12/7 °C
- Input air temperature to the external exchanger = 35°C
- Static pressure of the ducted external section = 120 Pa

(4) SCROLL = scroll compressor

(5) PHE = plate exchanger

(6) RAD = radial fan

(7) EC = Motor at electronic switching

UNIT WITH HIGH EFFICIENCY INVERTER SINGLE PUMP ACCESSORY

GENERAL TECHNICAL SPECIFICATIONS

Sizes			122	162	182	222	262	302	352	402
COOLING										
Cooling capacity	1	kW	36,4	42	49,7	58,7	68	78,9	90,1	102
Compressor power input	1	kW	11,6	13,7	16	19,8	23,2	26,1	30,2	35
Heating capacity partial recovery	2	kW	12	13,9	16,4	19,6	22,8	26,2	30,1	34,3
Cooling capacity (EN14511:2011)	3	kW	36,1	41,7	49,3	58,3	67,5	78,6	89,8	102
Total power input (EN14511:2011)	3	kW	12,8	14,9	17,6	21,4	24,7	27,9	32,1	37,7
EER (EN 14511:2011)	3		2,83	2,8	2,81	2,72	2,74	2,81	2,79	2,7
ESEER			4,24	4,39	4,42	4,37	4,34	4,32	4,45	4,41
COMPRESSOR										
Type of compressors	4		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
N°. of Compressors		Nr	2	2	2	2	2	2	2	2
Nominal capacity (C1)		HP	14	16.5	19.5	22.5	27	30	35	40
Standard capacity steps		Nr	2	3	3	3	3	2	3	3
Oil charge (C1)		l	3.6	5.7	5.7	5.7	6.4	6.4	7.9	10
Refrigerant charge (C1)		kg	8	10	14	14	14	17	23	24
Refrigerant circuits		Nr	1	1	1	1	1	1	1	1
INTERNAL EXCHANGER										
Type of internal exchanger	5		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow rate (Internal Exchanger)	3	l/s	1.8	2	2.4	2.8	3.3	3.8	4.3	4.9
Internal exchanger pressure drop	3	kPa	42.1	41.7	45.5	47.5	48.8	24.6	25.8	25.9
Water content		l	2.9	3.4	4	4.7	5.4	6.4	7	8
EXTERNAL SECTION FANS										
Type of fans	6		RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD
Number of fans		Nr	2	2	2	2	3	3	3	3
Fan diameter		mm	500	500	500	500	500	500	500	500
Type of motor	7		EC	EC	EC	EC	EC	EC	EC	EC
Air flow		l/s	4444	4444	5000	5000	6667	7500	7500	8333
Air flow		m^3/h	16.000	16.000	18.000	18.000	24.000	27.000	27.000	30.000
Installed unit power		kW	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Max external static pressure		Pa	570	570	450	450	570	450	420	240
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
DIMENSIONS										
Length		mm	1450	1450	1875	1875	2650	2650	2650	2650
Depth		mm	780	780	780	780	780	780	780	780
Height		mm	1995	1995	1995	1995	1995	1995	1995	1995

(1) Data referred to the following conditions:
- Internal exchanger water temperature = 12/7 °C
- Input air temperature to the external exchanger = 35°C

(2) Exchanger water temperature - Partial recovery = 40/45°C

(3) Data calculated in compliance with Standard EN 14511:2011referred to the following conditions :
- Internal exchanger water temperature = 12/7 °C
- Input air temperature to the external exchanger = 35°C
- Static pressure of the ducted external section = 120 Pa
- Static pressure of the ducted external section = 120 Pa

(4) SCROLL = scroll compressor

(5) PHE = plate exchanger

(6) RAD = radial fan

(7) EC = Motor at electronic switching

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	55	66.9	74.8	80.5	88.9
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION										
F.L.I. - Total		kW	22.2	24.7	28	31.6	38.7	42.3	47.8	52.6
M.I.C. MAXIMUM INRUSH CURRENT										
M.I.C. - Value		A	124.2	135.1	142.1	197.1	209	217	269	316

Voltage unbalance: max 2 %
Power supply: 400/3/50 Hz +/-6%

Electrical data refer to standard units; according to the installed accessories, the data can suffer variations.

OPERATING LIMITS

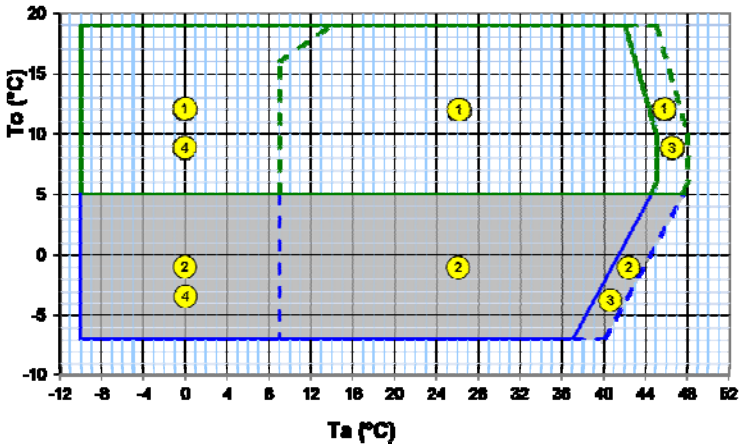
SIZE			122	162	182	222	262	302	352	402
EXTERNAL EXCHANGER										
Max air intake temperature	1	°C	45	45	45	45	45	45	45	44
Max air intake temperature	2	°C	48	48	48	48	48	48	48	47
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-7	-7	-7	-7	-7	-7	-7	-7

INTERNAL EXCHANGER

Max water inlet temperature		°C	21	27	27	27	27	27	24	24
Min. water outlet temperature	5	°C	5	5	5	5	5	5	5	5
Min. water outlet temperature	6	°C	-7	-7	-7	-7	-7	-7	-7	-7

Data referred to the following conditions :
- internal exchanger water = 12/7°C
- external exchanger air 35°C
(1) Unit at full load
(2) Unit with automatic staging of the compressor capacity
(3) Full load unit
(4) Part-load unit

(5) Standard unit and external exchanger air intake temperature 35°C (no 'Low water temperature (Brine)' configuration)
(6) Unit in 'Low water temperature (Brine)' configuration and air (35 °C) entering the external heat exchanger. 40% ethylene glycol based water.



Graph referred to size 352.
The detail of each size is shown in tabular date.

Ta = external exchanger air intake temperature
(dry bulb)

To (°C) = internal exchanger water outlet temperature

1. Standard unit:
   (not with 'Low temperature liquid')
2. Operation field extension for unit in 'Low water temperature (Brine)' configuration (40% ethylene glycol).
3. Unit with automatic staging of the compressor capacity.
4. Unit at full-load with air flow automatic modulation.

COOLING PERFORMANCE

SIZE	To (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (ºC)													
		25		30		32		35		40		42		44	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
122	5	38.2	9.22	36.1	10.3	35.3	10.8	34.0	11.5	31.8	12.7	30.9	13.2	30.0	13.8
	6	39.5	9.32	37.4	10.4	36.5	10.8	35.2	11.6	32.9	12.8	32.0	13.3	31.1	13.9
	7	40.8	9.42	38.6	10.5	37.7	10.9	36.4	11.6	34.1	12.9	33.1	13.4	32.2	13.9
	8	42.0	9.52	39.8	10.6	38.9	11.0	37.5	11.7	35.2	13.0	34.2	13.5	33.2	14.0
	9	43.3	9.62	41.1	10.7	40.1	11.1	38.7	11.8	36.3	13.1	35.3	13.6	34.3	14.1
	10	44.6	9.71	42.3	10.8	41.3	11.2	39.9	11.9	37.4	13.2	36.3	13.7	35.3	14.2
162	5	44.2	11.0	41.8	12.2	40.8	12.7	39.3	13.5	36.7	15.0	35.6	15.6	34.5	16.2
	6	45.7	11.1	43.2	12.3	42.2	12.8	40.7	13.6	38.0	15.0	36.9	15.6	35.8	16.2
	7	47.2	11.2	44.6	12.4	43.6	12.9	42.0	13.7	39.3	15.1	38.2	15.7	37.0	16.3
	8	48.6	11.3	46.0	12.5	45.0	13.0	43.3	13.8	40.6	15.2	39.4	15.8	38.3	16.4
	9	50.1	11.4	47.4	12.6	46.3	13.1	44.7	13.9	41.8	15.3	40.7	15.9	39.5	16.5
	10	51.5	11.5	48.8	12.7	47.7	13.2	46.0	14.0	43.1	15.4	41.9	16.0	40.7	16.6
182	5	52.4	12.8	49.5	14.3	48.3	14.9	46.5	15.8	43.3	17.5	42.0	18.2	40.6	19.0
	6	54.1	13.0	51.2	14.4	50.0	15.0	48.1	15.9	44.8	17.6	43.4	18.3	42.0	19.1
	7	55.9	13.1	52.9	14.5	51.6	15.1	49.7	16.0	46.3	17.7	44.8	18.4	43.4	19.1
	8	57.6	13.2	54.6	14.6	53.3	15.2	51.2	16.1	47.7	17.8	46.2	18.5	44.7	19.2
	9	59.4	13.3	56.2	14.7	54.9	15.3	52.8	16.2	49.1	17.9	47.6	18.6	46.0	19.3
	10	61.1	13.4	57.8	14.8	56.4	15.4	54.3	16.3	50.5	18.0	48.9	18.6	47.3	19.3
222	5	62.1	16.1	58.7	17.8	57.2	18.5	55.0	19.5	51.2	21.3	49.6	22.0	48.0	22.8
	6	64.2	16.3	60.6	17.9	59.1	18.6	56.9	19.7	53.0	21.4	51.3	22.2	49.7	22.9
	7	66.2	16.5	62.5	18.1	61.0	18.8	58.7	19.8	54.7	21.6	53.0	22.3	51.3	23.0
	8	68.2	16.6	64.4	18.3	62.9	19.0	60.5	20.0	56.4	21.7	54.7	22.4	52.9	23.1
	9	70.2	16.8	66.3	18.4	64.7	19.1	62.3	20.1	58.1	21.9	56.3	22.5	54.5	23.3
	10	72.2	16.9	68.2	18.6	66.6	19.3	64.0	20.3	59.7	22.0	57.9	22.7	56.1	23.4
262	5	72.0	19.0	68.0	20.9	66.3	21.7	63.8	22.9	59.3	25.0	57.4	25.8	55.5	26.7
	6	74.4	19.1	70.2	21.0	68.5	21.8	65.9	23.0	61.3	25.1	59.3	26.0	57.4	26.8
	7	76.7	19.3	72.5	21.2	70.7	22.0	68.0	23.2	63.2	25.3	61.2	26.1	59.2	27.0
	8	79.1	19.5	74.7	21.4	72.8	22.2	70.0	23.4	65.1	25.4	63.1	26.3	61.0	27.1
	9	81.4	19.7	76.9	21.6	75.0	22.4	72.1	23.6	67.0	25.6	64.9	26.4	62.8	27.2
	10	83.7	19.8	79.0	21.8	77.1	22.5	74.1	23.7	68.9	25.7	66.7	26.5	64.6	27.4
302	5	83.6	21.5	79.2	23.6	77.3	24.4	74.5	25.7	69.5	27.8	67.4	28.7	65.3	29.6
	6	86.1	21.7	81.5	23.8	79.6	24.6	76.6	25.9	71.5	28.0	69.4	28.9	67.2	29.8
	7	88.5	21.9	83.8	24.0	81.9	24.8	78.9	26.1	73.7	28.2	71.5	29.1	69.3	29.9
	8	91.0	22.2	86.2	24.2	84.2	25.1	81.2	26.3	76.0	28.3	73.8	29.2	71.7	30.0
	9	93.5	22.4	88.5	24.5	86.5	25.3	83.5	26.5	78.4	28.5	76.3	29.2	74.2	30.0
	10	95.9	22.7	90.9	24.8	88.9	25.6	85.9	26.8	80.9	28.5	79.0	29.2	77.0	29.9
352	5	95.3	24.7	90.1	27.1	88.0	28.1	84.8	29.6	79.3	32.3	77.0	33.4	74.7	34.6
	6	98.1	25.1	93.0	27.4	90.8	28.3	87.5	29.9	81.6	32.7	79.1	33.9	76.6	35.1
	7	100.9	25.4	95.7	27.6	93.5	28.6	90.1	30.2	84.0	33.0	81.4	34.2	78.7	35.5
	8	103.7	25.7	98.5	28.0	96.2	28.9	92.7	30.5	86.5	33.3	83.9	34.5	81.2	35.7
	9	106.6	26.0	101.1	28.3	98.9	29.3	95.3	30.8	89.2	33.6	86.6	34.7	84.0	35.9
	10	109.6	26.3	103.8	28.7	101.4	29.7	97.9	31.2	91.9	33.8	89.5	34.9	87.1	36.0

kWf = Cooling capacity in Kw. The data do not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers.
kWe = Compressor power input in kW
To = internal exchanger outlet water temperature (°C) – in/out water thermal gradient = 5°C

COOLING PERFORMANCE

SIZE	To (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (ºC)													
		25		30		32		35		40		42		44	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
402	5	108.1	28.8	102.2	31.5	99.8	32.6	96.1	34.4	90.0	37.4	87.6	38.6	85.1	39.9
	6	111.5	29.2	105.4	31.9	103.0	33.0	99.2	34.7	92.8	37.6	90.3	38.9	87.6	40.1
	7	114.8	29.5	108.6	32.2	106.1	33.3	102.2	35.0	95.6	37.9	92.9	39.1	90.2	40.3
	8	118.1	29.8	111.7	32.5	109.1	33.6	105.1	35.3	98.3	38.2	95.6	39.3	92.7	40.5
	9	121.2	30.1	114.7	32.8	112.0	33.9	108.0	35.6	101.0	38.4	98.2	39.6	95.3	40.7
	10	124.4	30.4	117.6	33.1	114.9	34.2	110.7	35.9	103.7	38.7	100.8	39.8	97.9	40.9

kWf = Cooling capacity in kW. The data do not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers.
kWe = Compressor power input in kW
To = Water outlet temperature from internal exchanger in° C– water heat drop in/out = 5°C

PERFORMANCES OF ELECTRIC FANS - (NOMINAL AIR FLOW)

SIZE	EXTERNAL STATIC PRESSURE (Pa)		70	80	90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570
122	Air flow	l/s	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444
	Fan RPM	rpm	1298	1308	1316	1324	1339	1363	1386	1409	1431	1452	1474	1495	1516	1536	1557	1577	1618	1658
	Total input	kW	1.98	2.04	2.10	2.14	2.24	2.42	2.60	2.78	2.94	3.10	3.26	3.44	3.62	3.78	3.98	4.16	4.52	4.90
162	Air flow	l/s	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444	4444
	Fan RPM	rpm	1308	1316	1324	1332	1348	1371	1394	1417	1439	1460	1482	1502	1523	1544	1564	1585	1626	1666
	Total input	kW	2.04	2.10	2.14	2.20	2.30	2.48	2.66	2.84	3.00	3.16	3.34	3.50	3.68	3.86	4.04	4.22	4.58	4.98
182	Air flow	l/s	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	-	-
	Fan RPM	rpm	1429	1437	1444	1451	1466	1488	1510	1531	1552	1572	1592	1610	1631	1650	1668	1686	-	-
	Total input	kW	2.52	2.58	2.64	2.70	2.80	3.00	3.20	3.40	3.60	3.80	3.96	4.14	4.34	4.52	4.70	4.88	-	-
222	Air flow	l/s	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	-	-
	Fan RPM	rpm	1429	1437	1444	1451	1466	1488	1510	1531	1552	1572	1592	1610	1631	1650	1668	1686	-	-
	Total input	kW	2.52	2.58	2.64	2.70	2.80	3.00	3.20	3.40	3.60	3.80	3.96	4.14	4.34	4.52	4.70	4.88	-	-
262	Air flow	l/s	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667	6667
	Fan RPM	rpm	1291	1300	1308	1316	1332	1356	1380	1403	1425	1447	1468	1489	1510	1531	1551	1572	1613	1653
	Total input	kW	2.88	2.97	3.06	3.15	3.27	3.57	3.84	4.11	4.35	4.59	4.83	5.10	5.34	5.61	5.88	6.15	6.69	7.26
302	Air flow	l/s	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	-	-
	Fan RPM	rpm	1423	1430	1438	1445	1460	1482	1504	1525	1546	1567	1587	1606	1626	1644	1663	1682	-	-
	Total input	kW	3.72	3.78	3.87	3.96	4.14	4.44	4.71	5.01	5.31	5.61	5.88	6.15	6.42	6.69	6.99	7.26	-	-
352	Air flow	l/s	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	-	-	-
	Fan RPM	rpm	1429	1437	1444	1451	1466	1488	1510	1531	1552	1572	1592	1610	1631	1650	1668	-	-	-
	Total input	kW	3.78	3.87	3.96	4.05	4.20	4.50	4.80	5.10	5.40	5.70	5.94	6.21	6.51	6.78	7.05	-	-	-
402	Air flow	l/s	8333	8333	8333	8333	8333	8333	8333	8333	8333	-	-	-	-	-	-	-	-	-
	Fan RPM	rpm	1575	1582	1588	1595	1608	1629	1648	1668	1687	-	-	-	-	-	-	-	-	-
	Total input	kW	4.95	5.04	5.13	5.22	5.40	5.73	6.03	6.36	6.66	-	-	-	-	-	-	-	-	-

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

CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2.0	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4
Safety temperature	°C	3.0	1.0	-1.0	-4.0	-6.0	-10.0	-14.0	-19.0
Cooling Capacity Factor	Nr	0.995	0.990	0.985	0.981	0.977	0.974	0.971	0.968
Compressor 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

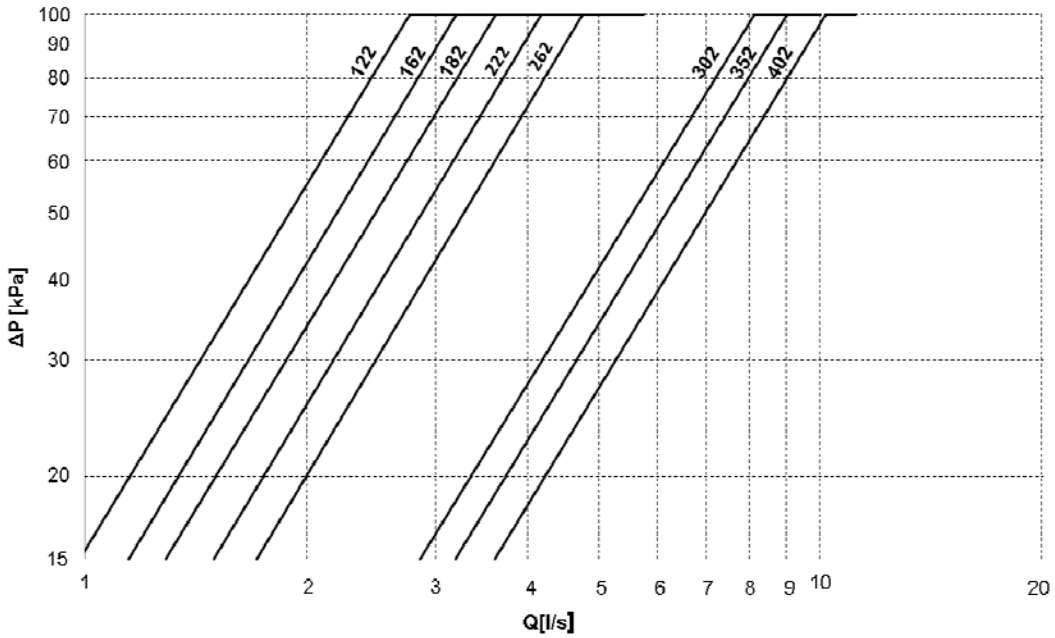
The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit during inactivity in winter.

FOULING CORRECTION FACTORS

FOULING FACTOR	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

INTERNAL EXCHANGER PRESSURE DROP



The water side pressure drops are calculated considering an average water temperature of 7°C

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

THE WATER FLOW-RATE CAN BE CALCULATED WITH THE FOLLOWING FORMULA

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

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

To the internal exchanger pressure drops must be added the pressure drops of the steel mesh mechanical filter 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 HYDRAULIC CIRCUIT ACCESSORIES)

ADMISSIBLE WATER FLOW RATE

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

SIZE		122	162	182	222	262	302	352	402
Qmin	[l/s]	1.0	1.1	1.3	1.5	1.7	2.9	3.2	3.6
Qmax	[l/s]	2.8	3.2	3.6	4.2	4.7	8.1	9.0	10.2

EXCHANGER OPERATING LIMIT

TYPE TESTING	INTERNAL EXCHANGER			
	DPr			DPw
CLIVET (C)	**kPa**	4500	4500	1000
PED (CE)	**kPa**	4500	4500	1000

DPr = Maximum work pressure refrigerant gas side
DPw = Max. operating pressure water side (utility)

Attention! For different approvals contact our sales office

OVERLOAD AND CONTROL DEVICE CALIBRATION

CALIBRATED INSTRUMENTS		OPEN	CLOSED	VALUE
High pressure switch	kPa	4050	3300	-
Low pressure switch	kPa	450	600	-
Low pressure switch (Brine)	kPa	200	350	-
Antifreeze protection	°C	3.00	5.50	-
High pressure safety valve	kPa	-	-	4500
Low pressure safety valve	kPa	-	-	3000
Max no. of compressor starts per hour	Nr	-	-	10
Safety thermostat to protected against compressor discharge over-temperature	°C	-	-	120

SOUND LEVELS

SIZE	Sound Power Level (dB)								Sound pressure level	Sound power level
	Sound pressure level									
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	dB(A)	dB(A)
122	69	74	76	75	70	65	62	52	**59**	**76**
162	70	75	77	76	71	67	64	52	**60**	**77**
182	74	78	81	79	74	70	66	55	**63**	**80**
222	75	79	82	80	75	72	67	56	**64**	**81**
262	71	76	79	77	73	70	65	56	**61**	**79**
302	76	81	83	81	77	73	68	58	**65**	**82**
352	77	82	85	82	78	76	70	58	**66**	**84**
402	80	86	88	85	81	79	73	62	**70**	**87**

The sound levels refer to the unit at full load.

The sound pressure level refers to a distance of 1 m from the outer surface of the ducted unit operating in open field. (norm UNI EN ISO 9614-2)

Data referred to the following conditions:
- Internal exchanger water temperature = 12/7°C
- Outdoor air temperature 35°C
- Useful static pressure 120 Pa

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

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 a non-freezable solution to be cooled (for instance, water and ethylene glycol in appropriate quantities) up to a temperature of between +4°C and –7°C.

Includes:
- Appropriate exchangers, complete with thick closed-cell insulation;
- Electronic-type expansion valve, functional calibration and safety devices adapted to the particulars of use.

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 (only at low temperature)
- Unit with double operation 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.
For further information, contact the Clivet sales network.

D - PARTIAL ENERGY RECOVERY

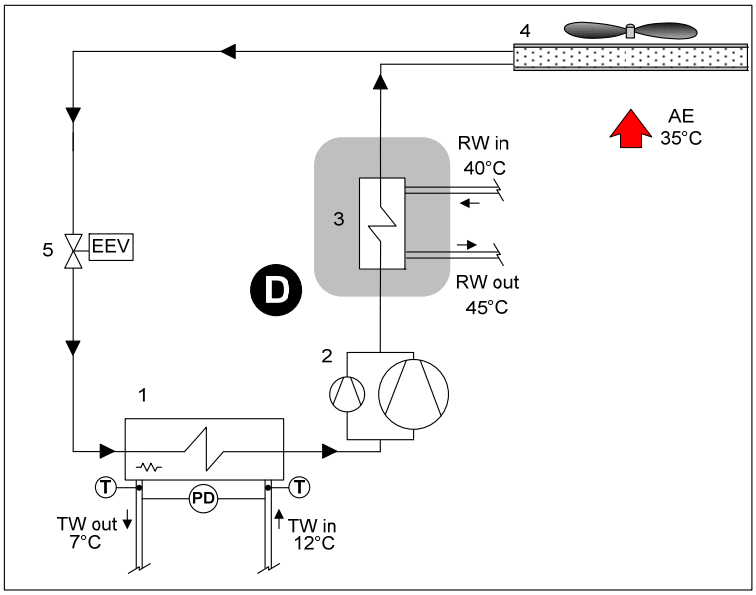
A configuration that allows the free production (heat recovery) of hot water when running in cooling mode.

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 condensing. In some cases, it may be advisable to fit a control valve to the hydraulic circuit to ensure this limit is observed.



D - Partial recovery device

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

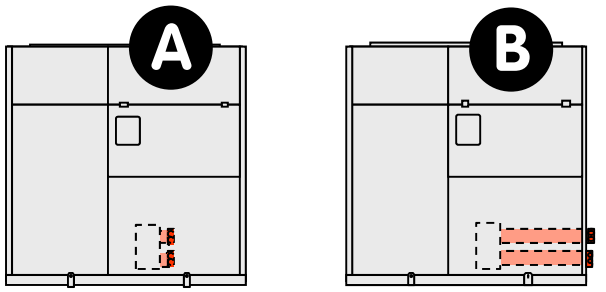
T	Temperatura Probe
PD	Differential Pressure switch
TW in	Chilled water Inlet
TW out	Chilled water Outlet
RW in	Recovery water inlet
RW out	Recovery water outlet
AE	Outdoor air
EEV =	Electronic expansion valve

HYDRAULIC CIRCUIT ACCESSORIES

ABU - WATER CONNECTIONS FLUSH WITH THE UNIT

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 fast fittings flush to the unit, two outlet connections for the system connections which are to be soldered by the client.

The accessory is supplied built-in the unit.



A - STANDARD UNIT
B - UNIT WITH OPTION ABU

Main diagram, not to scale

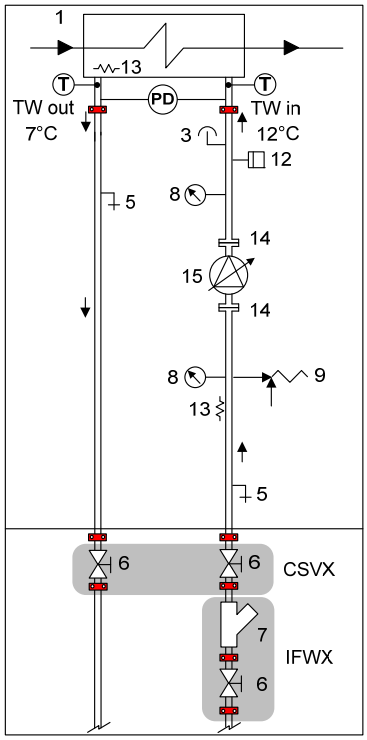
IMPORTANT!
The water connections flush with the unit are supplied as standard in units which are complete with at least one of the following options
- High efficiency inverter single pump for primary circuit / Low head single pump / High head single pump

GENERAL NOTE
It is also advisable to provide the system with the following components, which are excluded from the Clivet supplies:
- Shut-off valve, where not provided for in the Clivet supplies.
- Piping support device and elastic vibration-proof joints
- Expansion tank (e.g. for closed circuit systems) - Flow control thermometer
- Extra vent valves and discharge cocks 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.
For information about alternative pumping units, refer to HYDRAULIC CIRCUIT ACCESSORIES.

HYDRAULIC CIRCUIT OPERATING DIAGRAM WITH 1PUHE PUMP



1 - Internal exchanger
2 - Differential pressure switch
3 - Vent valve
5 - Drain cock
6 - Butterfly shut-off valve with quick couplings
7 - Steel-mesh filter
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 - Antifreeze resistance
14 - Coupling with DN flanges and bolts
15 - Wet rotor circulation pump with high efficiency inverter

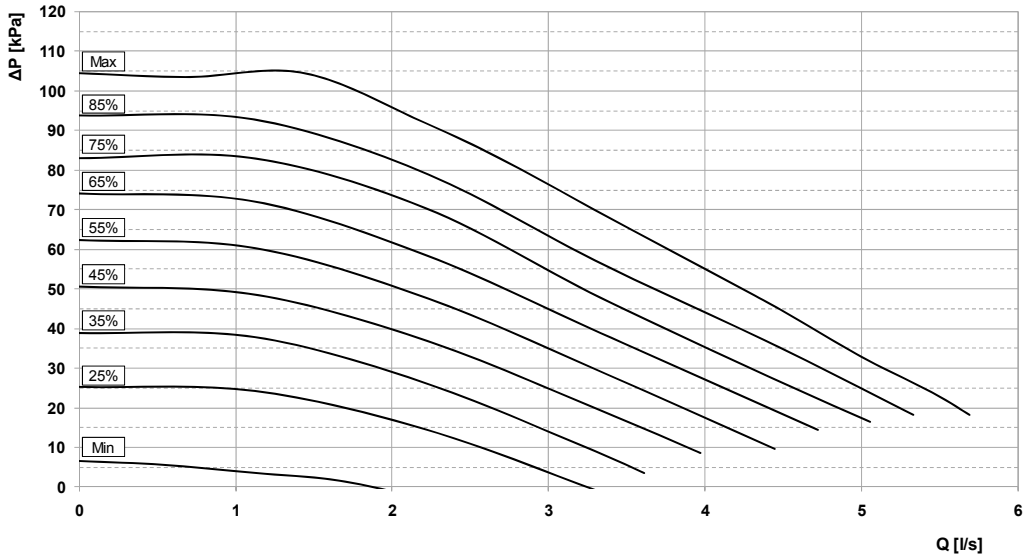
T Temperatura Probe
PD Differential Pressure switch

TW in chilled water inlet
TW out chilled water outlet

CSVX = Couple of shut-off valves to manual opera
IFWX = Steel mesh filter water side

The grey area indicates further optional components.

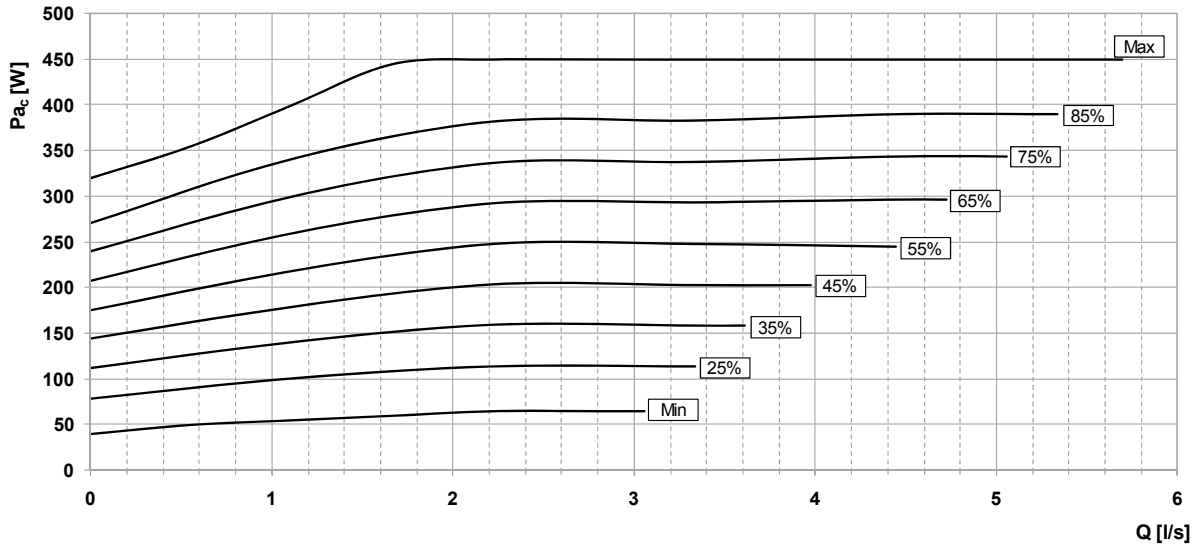
PUMP HEAD GRAPHS FOR UNIT SIZES 122-182



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

Attention: in order to obtain useful head 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).

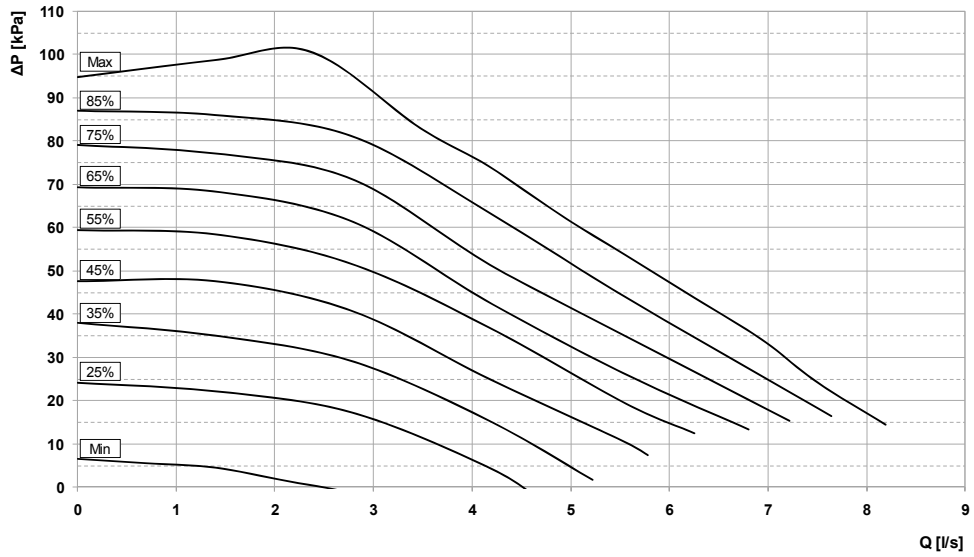
PUMP ABSORPTION CURVES FOR UNIT SIZE 122-182
FOR UNIT SIZES 122-182



Q = AIR FLOW [l/s]
Pa_C = CAPACITY ABSORBED BY THE PUMP [W]

The diagrams refer to the standard supply pumps.

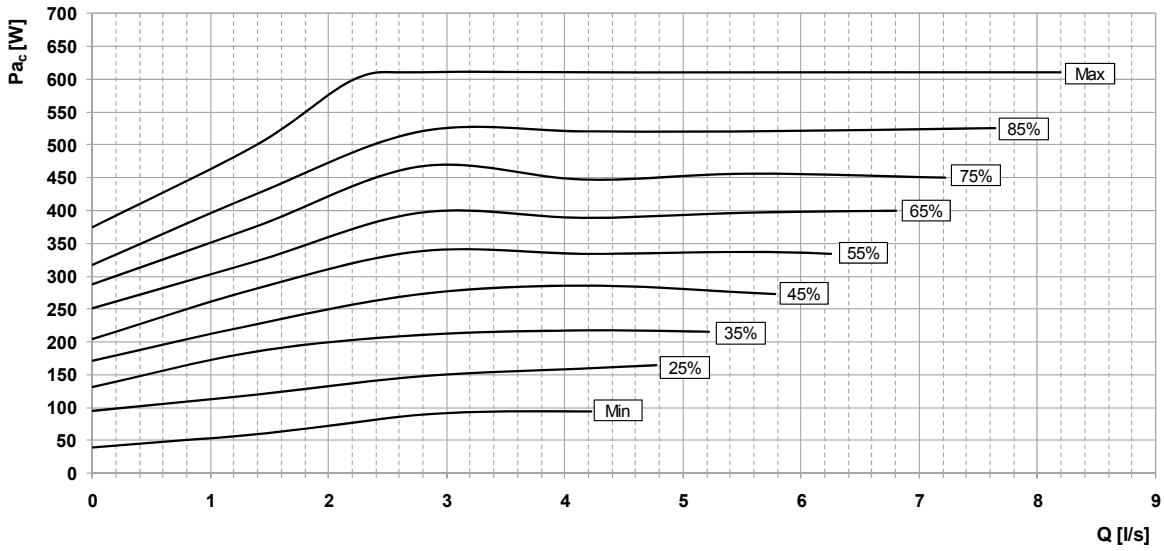
HEAD GRAPHS FOR UNIT SIZES 222-352



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

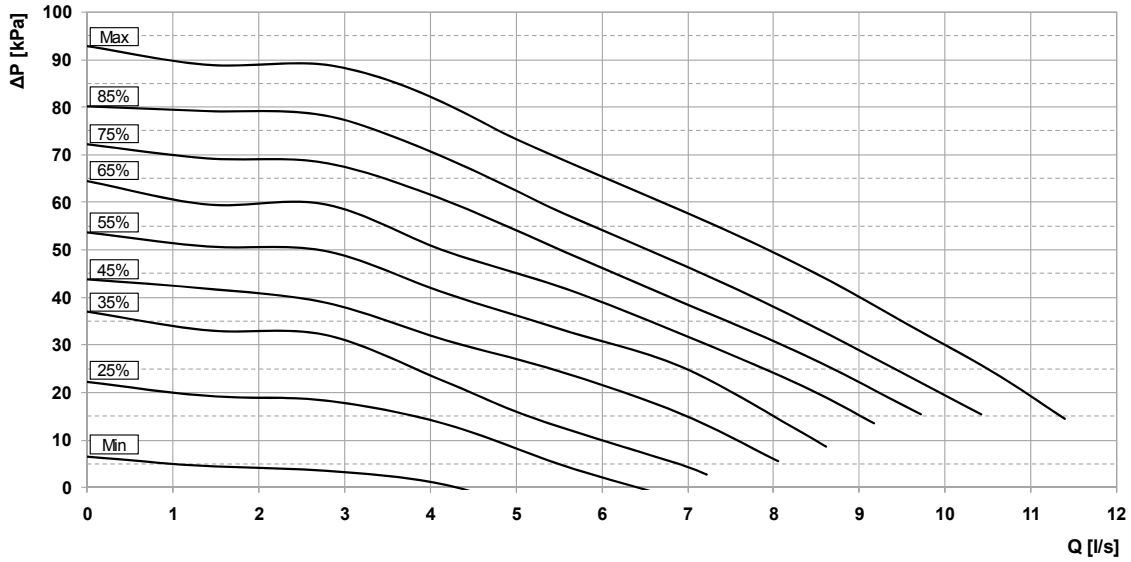
Attention: in order to obtain useful head values, the head represented in these diagrams must be lowered of the Internal exchanger and "IFWX - Steel knit filter on the water side" accessory (where present).

PUMP ABSORPTION CURVES FOR UNIT SIZE 222-352



Q = AIR FLOW [l/s]
Pa_C = CAPACITY ABSORBED BY THE PUMP [W]

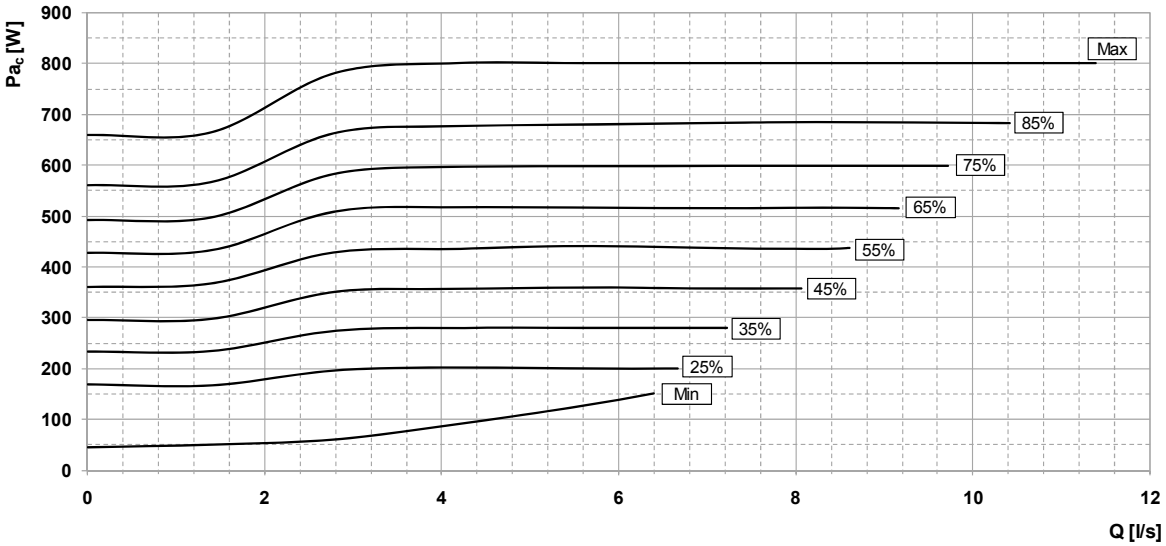
PUMP HEAD GRAPHS FOR UNIT SIZE 402



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

Attention: in order to obtain useful head 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 UNIT SIZE 402



Q = AIR FLOW [l/s]
Pa_C = CAPACITY ABSORBED BY THE PUMP [W]

1PUB - SINGLE PUMP AT LOW DISCHARGE HEAD

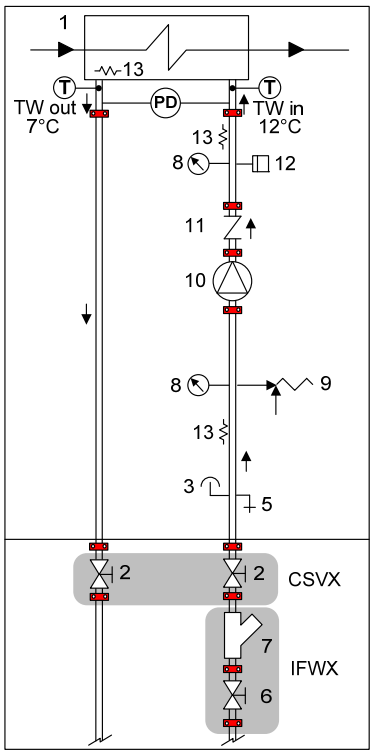
Option provided built-in consisting in a constant flow rate water pump with **low head**.
Centrifugal electric pump with pump body and impeller made with AISI 304 stainless steel.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP44-protection.
Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.

1PUA - SINGLE PUMP AT HIGH DISCHARGE HEAD

Option provided built-in consisting in a constant flow rate water pump with **high head**.
Centrifugal electric pump with pump body and impeller made with AISI 304 stainless steel.
Mechanical seal using ceramic, carbon and EPDM elastomer components.
Three-phase electric motor with IP44-protection.
Complete with thermoformed insulated casing, fast fittings with insulated casing, safety valve, pressure gauges, system load safety pressure switch, stainless steel anti-freeze immersion resistances located at the intake and at the supply point.

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 made up of:
- 1 cast-iron shut-off butterfly valve with fast fittings and activation lever with a mechanical calibration lock
- 1 quick fittings.

OPERATING DIAGRAM OF THE HYDRAULIC CIRCUIT WITH 1PUB - 1PUA PUMPS



1 - Internal exchanger
2 - Differential pressure switch
3 - Vent valve
5 - Drain cock
6 - Butterfly shut-off valve with quick couplings
7 - Steel-mesh filter
8 - Pressure gauge
9 - Safety valve (6 Bar)
10 - Centrifugal electric pump with high efficiency impeller
12 - System charge safety pressure switch (keeps pumps from operating if there is no water)
13 - Antifreeze heater

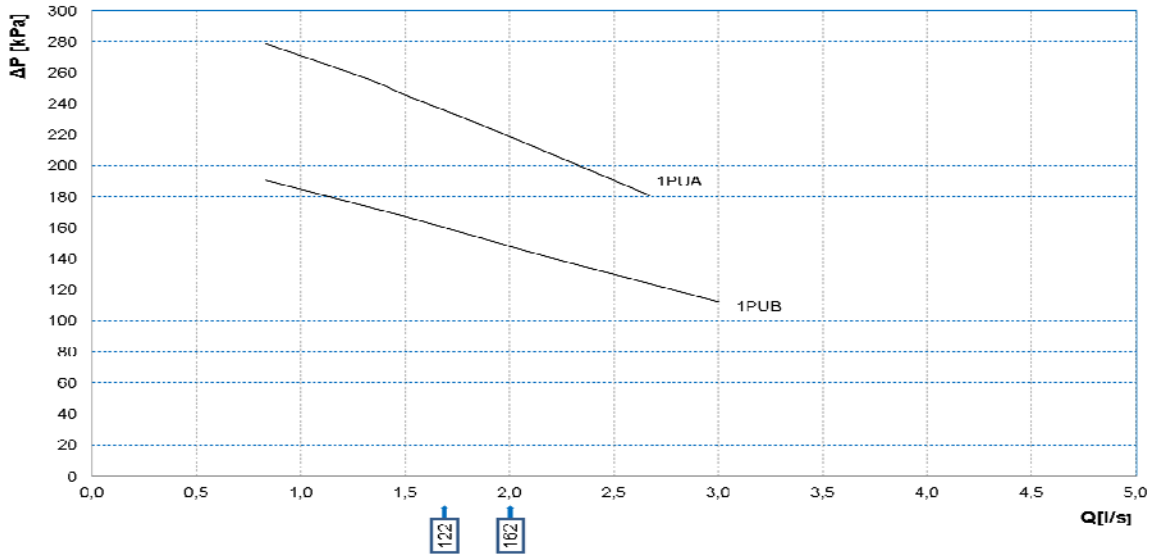
T Temperatura Probe
PD Differential Pressure switch

TW in chilled water inlet
TW out chilled water outlet

CSVX = Couple of shut-off valves to manual opera
IFWX = Steel mesh filter water side

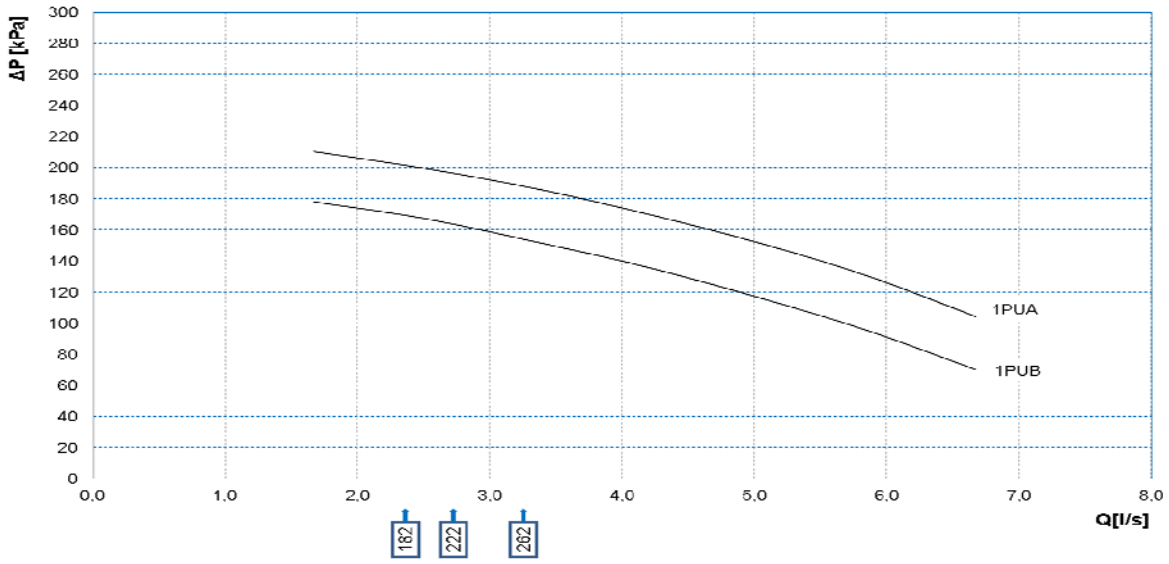
The grey area indicates further optional components.

1PUB / 1PUA OPTION PERFORMANCES FOR UNIT SIZE 122-162



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

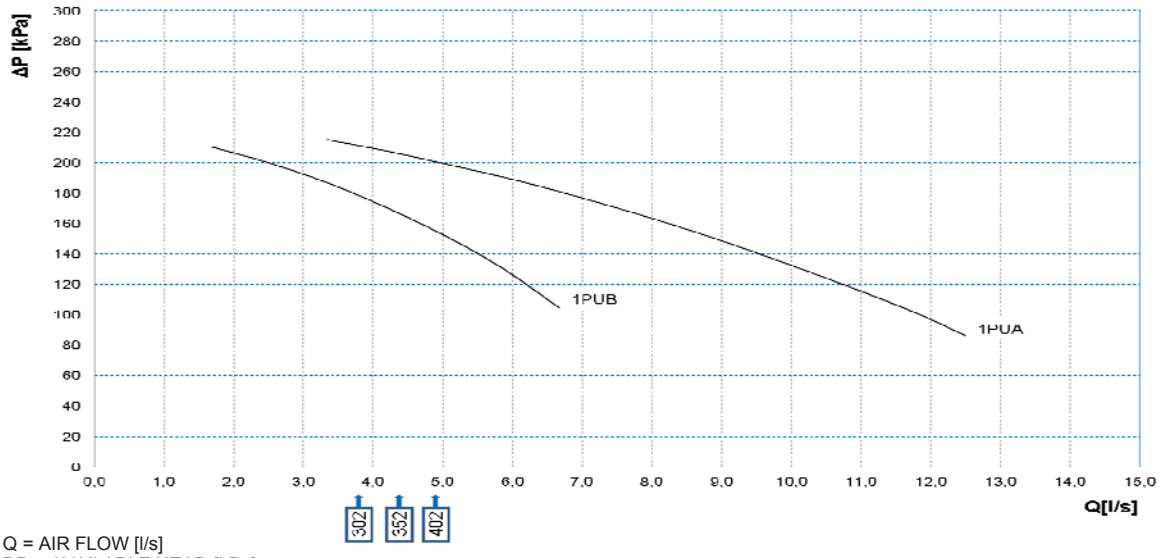
1PUB / 1PUA OPTION PERFORMANCES FOR UNIT SIZE 182-262



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

Attention: in order to obtain useful head 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 PERFORMANCES FOR UNIT SIZE 302-402



Q = AIR FLOW [l/s]
DP = AVAILABLE HEAD [kPa]

Attention: in order to obtain useful head 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).

CSVX - COUPLE OF SHUT-OFF VALVES TO MANUAL OPERATION

Il kit allows to isolate the hydraulic circuit at the inlet and outlet. Also including:
- no. 2 cast-iron shut-off butterfly valves with fast fittings and activation lever with a mechanical calibration lock
- no. 2 quick connections

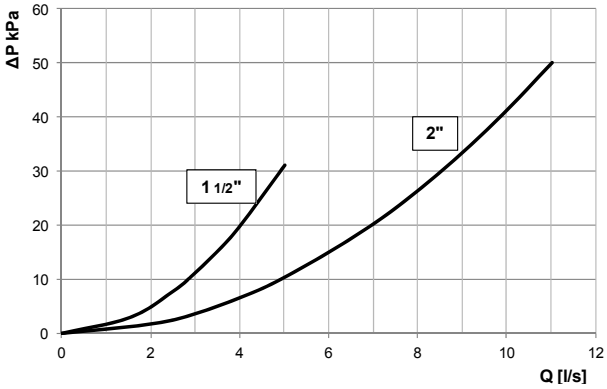
Installation is the responsibility of the client, externally to the unit.

Separately supplied accessories

IFWX - STEEL MESH FILTER WATER SIDE

The device stops the exchanger from being clogged by any impurities which are in the hydraulic circuit. The mechanical steel mesh filter must be placed on the water input line. It can be easily dismantled for periodical maintenance and cleaning.
It also includes:
- 1 cast-iron shut-off butterfly valve with fast fittings and activation lever with a mechanical calibration lock
- 2 quick fittings.

STEEL MESH FILTER PRESSURE DROP



Q = WATER-FLOW RATE [l/s]
DP = WATER-SIDE PRESSURE DROP [kPa]

Note: The pressure drops referred to a clean filter

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

Installation is provided by the Client, externally to the unit.

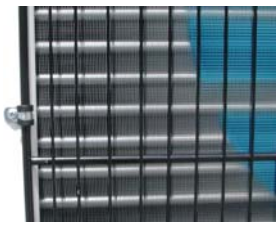
Check for the presence of the required hydraulic shut-off valves in the system, in order to carry out the periodical maintenance.

We disclaim any liability and make the guarantee void, if an appropriate mechanical filter is not provided upstream of the system.
Degree of filtration admitted 800µm'.

Separately supplied accessories

OTHER 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 is possible the passage of people such as parkings, terraces, etc.
The accessory is supplied and installed built-in.

This option is not suitable for application in sulphuric environments.

CCCA - COPPER / ALUMINIUM CONDENSER COIL WITH ACRYLIC LINING

Batteries with copper tubes and aluminium fins with acrylic paint. They can be used in the presence of saline concentrations in the air and other weathering agents moderately aggressive.

Attention!
- Variation in cooling capacity -2.7%
- Variation in compressor input capacity +4.2%
- Reduction in operating limits -2.1°C

FANQE - ELECTRICAL PANEL VENTILATION

This option is necessary for very hot climates, where the external temperature can be between +40°C and +50°C. It is made up of a forced ventilation system, activated by a thermostat, which provides for the correct usage temperature to be maintained by the components inside the electrical panel. The 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 intervenes only with unit fed and not isolated. Make attention that the unit not exceed the temperature of 50°C inside the electrical panel during the stockage or on unit installed but not fed.

PM - PHASE MONITOR

The phase monitor makes it possible to check the correct connection of the phases and their imbalance in units powered with a tri-phase system. If the connection of the phases is not correct, or the threshold of phase imbalance is exceeded, or the voltage is too high or too low for a certain amount of time, the monitor acts on the control circuit and orders the unit to be shut down. As soon as nominal line conditions are restored, the unit is automatically reset. As soon as nominal line conditions are restored, the unit reset is manual.

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.

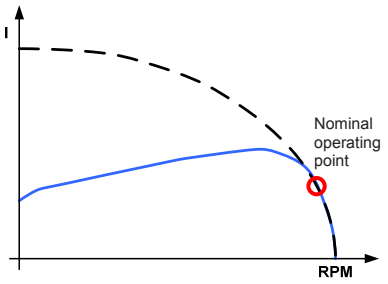
PFCP - POWER FACTOR CORRECTION CAPACITORS

The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the unit, such as asynchronous motors. By re-phasing it is possible to reduce the intensity of the line current by reducing a part of the power of the mains (reactive power). This often leads to an economic benefit which the energy provider grants to the final user. The component makes it possible to bring the cosfi power factor to values which on average are greater than 0.9.
The device is installed and wired built-in the unit.

SFSTR - BREAKAWAY CURRENT REDUCING DEVICE

Option also known as 'Soft starter'. Electronic device that automatically and gradually starts the compressors reducing the start-up current of about 40% in comparison with the nominal value. It follows that the electrical power and its protective devices can be sized with lower parameters , so with a lower cost of initial investment.

The device is installed and tested built-in.



- - - CURRENT ABSORBED WITHOUT SFSTR OPTION
— CURRENT ABSORBED WITH 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

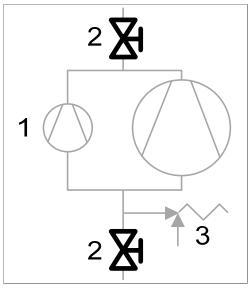
It allows measurement of the pressure of the refrigerant at the supply and return of the compressors, making these parameters easier to check by technicians assigned to operate the unit. The two liquid pressure gauges and corresponding pressure sockets are installed on the unit in an easily accessible location.

The device is installed and wired built-in.

SDV - CUT-OFF VALVE ON THE DELIVERY AND ON COMPRESSOR SUCTION

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.

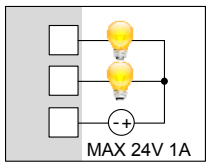
The device is installed built-in.



1 - Compressors
2 - SDV option
3 - Safety valve

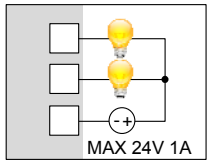
CFSC - FREE CONTACTS FOR COMPRESSOR STATE

Option to display the compressor operating status from the remote location. The contacts are available in a special terminal block.



CLSCLR - FREE CONTACTS FOR COMPRESSOR STATE AND FOR OPERATION IN LOCAL/ REMOTE MODE

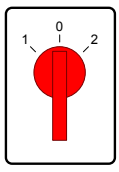
Option to display the compressor operating status from the remote location . The contacts are available in a special terminal block.



The three-position selector allows the following actions:

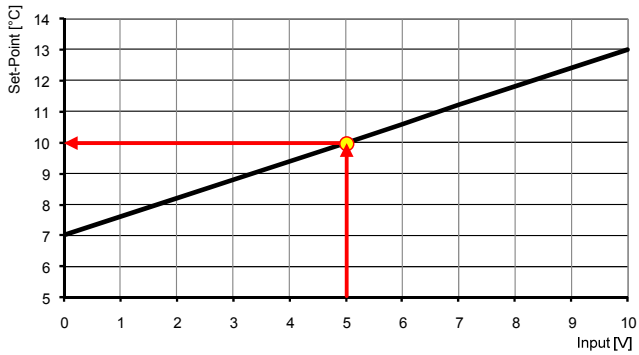
- Sequential unit switching off that allows its next correct restarting
- Enabling to the unit starting from the built-in multifunction keypad.
- Enabling to the unit starting via serial port from remote supervisor

SELECTOR POSITION	UNIT STATUS
0	OFF
1	LOCAL ON
2	FROM SERIAL ON



SPC4 - SPC4 - SET POINT COMPENSATION WITH 0-10 V SIGNAL

The device allows variation of the set-point pre-set by an external signal of type 0÷10 V.



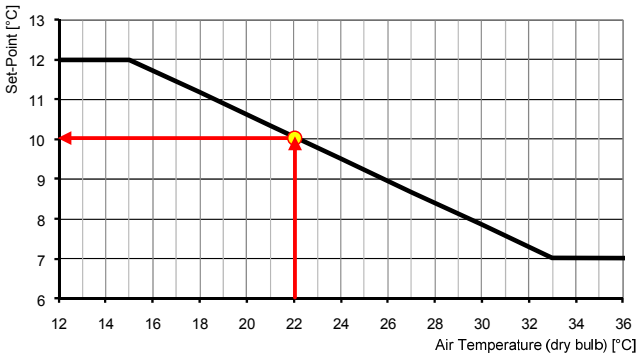
SPC1 - SET POINT COMPENSATION WITH 4-20 mA

The device allows variation of the set-point pre-set by an external signal of type 4÷20 mA.

SPC2 - SET POINT COMPENSATION WITH OUTSIDE TEMPERATURE PROBE

The device allows the automatic control of the set-point pre-set depending on outside air temperature. It provides the *sliding* temperature of the liquid, that is variable depending on external conditions, for the benefit of saving energy of the system.

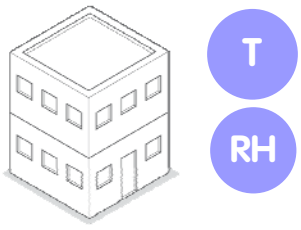
The device is installed and wired built-in.



SPC3 - SET POINT COMPENSATION ACCORDING TO THE OUTSIDE ENTHALPY

The device allows the automatic control of the unit set-point according to the external enthalpy.
It provides the *sliding* temperature of the liquid, that is variable depending on external conditions, for the benefit of saving energy of the system.

The device is installed and wired built-in.



CMSC10 - SERIAL COMMUNICATION MODULE FOR LONWORKS SUPERVISION SYSTEM

Allows the serial connection to supervision systems, by using LonWorks protocol. It allows the access to the entire list of operation variables, controls and alarms according to 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.

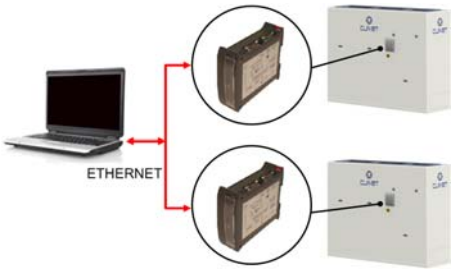
CMSC11 - SERIAL COMMUNICATION MODULE FOR BACNET-IP SUPERVISION SYSTEM

CMSC12 - SERIAL COMMUNICATION MODULE FOR BACNET-MSTP SUPERVISION SYSTEM

Allows the serial connection to supervision systems, by using BACnet as communication protocol. It allows the access to the entire list of operation variables, controls and alarms.
Device has the following comms ports:

- 1 port ethernet RJ45 for BACnet IP protocol,
- 1 port RS485 for BACnet MSTP protocol.

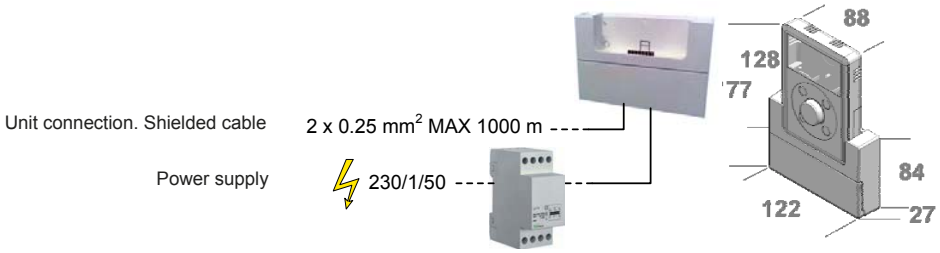
The device configuration occurs via Web Linux Server integrated and can be made from a PC connected to the network.



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

KRIX - KIT TO REMOTE THE CONTROL INTERFACE BY MICROPROCESSOR

Option that allows to install in a remote location the built in multifunction keyboard.
Includes the compartment for the keyboard and the power supply transformer,
it must be connected during unit installation at a maximum distance of 1000 m.



The support must be installed to the wall with anchor bolts. It may also be fitted to universal built-in housing 503 (installation to be done by the Client).

The transformer is set up for mounting on DIN guide. It must be powered at 230/1/50 and connected electrically to the support of the multifunction keypad (installation to be done by the Client).

Separately supplied accessories

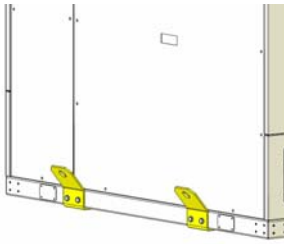
AMRX - RUBBER ANTIVIBRATION MOUNTS

The rubber anti-vibration devices are fastened in housings on the longitudinal members. They reduce the vibrations caused by the unit, reducing the noises transmitted by the support structures. These elastic bodies soften axial and tangential stresses. Their mechanical and physical characteristics remain nearly unchanged over time thanks to the highly resistant material they are made of.
As an alternative to the rubber anti-vibration devices, it is possible to use neoprene rubberized strips on the longitudinal support members. (not supplied by Clivet)

Separately supplied accessories

STSOL - ADDITIONAL LIFTING BRACKETS

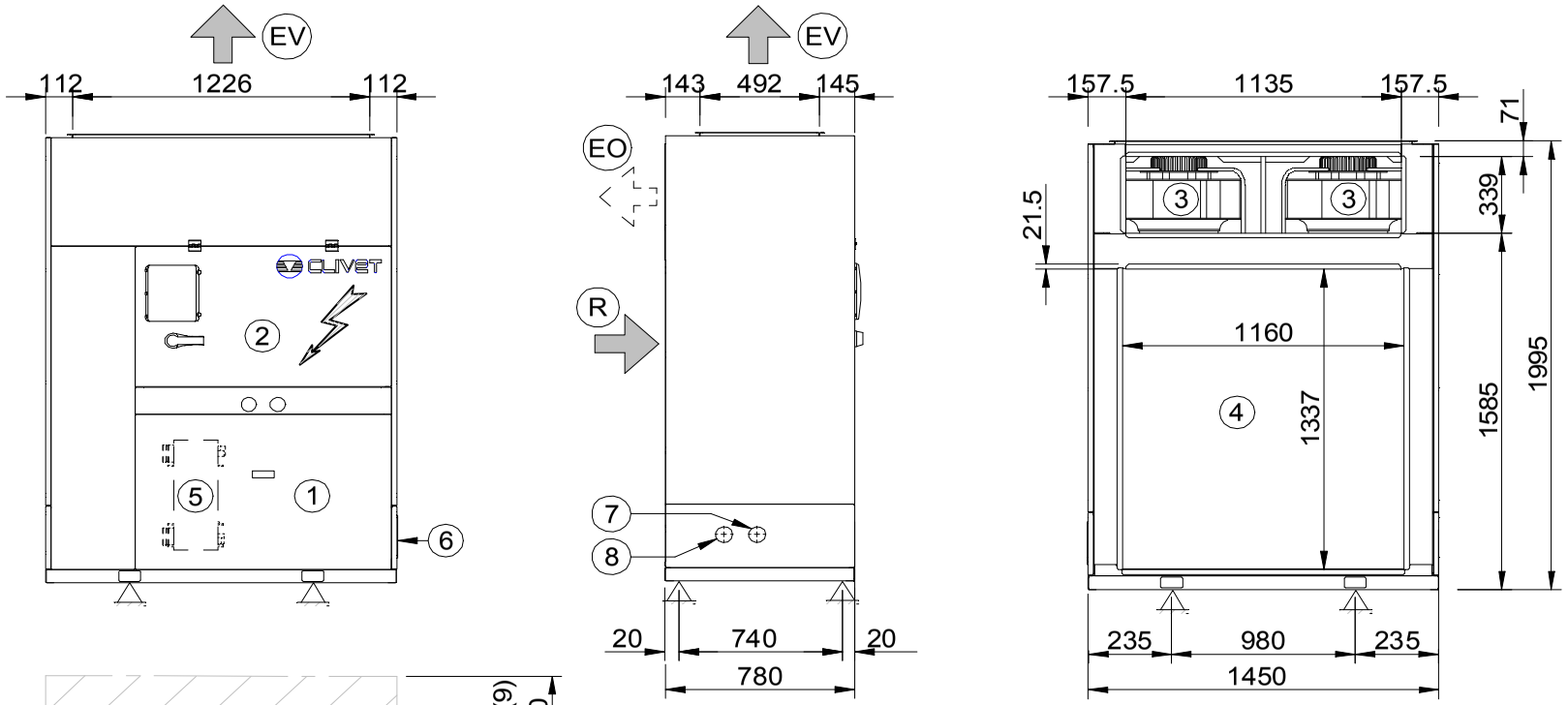
This option guarantees the unit lifting by a crane. The unit is provded with 4 anchorage points for the eye-bolt insertion and it is made of 2 painted steel 60/10 metal struts which cross all the unit width.
The device is installaed built-in.

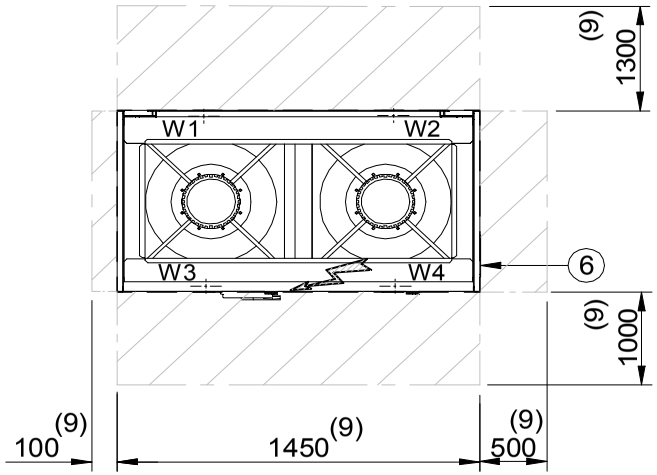


The device can not be removed after the unit placing if the 'AMRX - Rubber antivibration mounts' accessory is provided. In the absence of the antivibration mounts remove the device before the ground fixing.

DIMENSIONAL DRAWINGS: WSA-XEE 122-162

DAA2S122_162_S_4
Date: 12/11/2012





(1) COMPRESSOR SHAFT
(2) GENERAL ELECTRICAL PANEL
(3) EXHAUST RADIAL ELECTRIC FAN
(4) EXTERNAL EXCHANGER
(5) INTERNAL EXCHANGER
(6) POWER INPUT
(7) INTERNAL EXCHANGER WATER OUTLET (QUICK CONNECTION)
(8) INTERNAL EXCHANGER WATER INLET (QUICK CONNECTION)
(9) FUNCTIONAL CLEARANCES
(R) FRESH AIR RETURN
(EV) VERTICAL AIR EXPULSION (STANDARD)
(EO) HORIZONTAL AIR EXPULSION (OPTION)

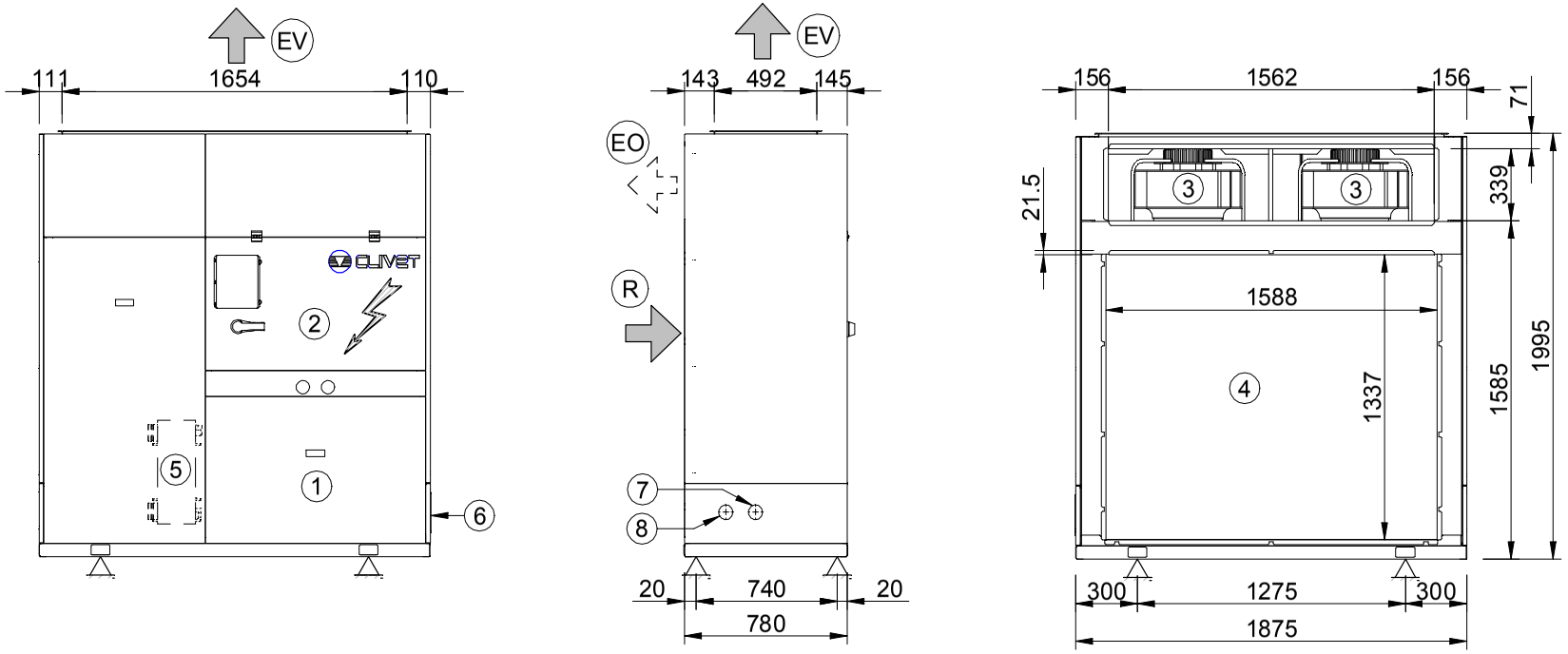
Sizes			122	162
Water connections		Ø	1 1/2"	1 1/2"

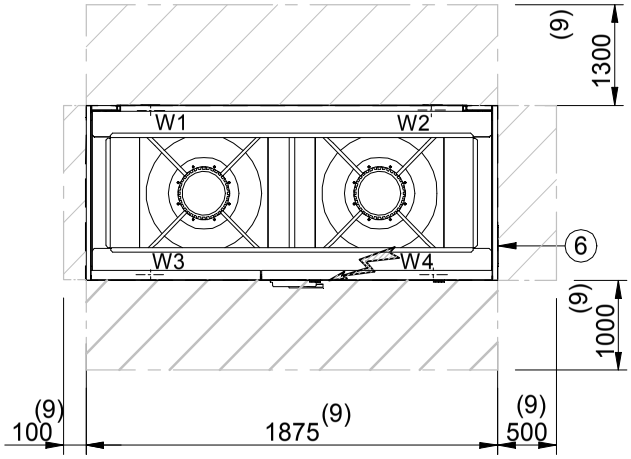
Sizes			122	162
W1 Supporting point		kg	88	83
W2 Supporting point		kg	124	151
W3 Supporting point		kg	107	105
W4 Supporting point		kg	144	173
Shipping weight		kg	456	506
Operating weigh		kg	463	513

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

DIMENSIONAL DRAWINGS: WSA-XEE 182-222

DAA2S122_162_S_4
Date: 12/11/2012





(1) COMPRESSOR SHAFT
(2) GENERAL ELECTRICAL PANEL
(3) EXHAUST RADIAL ELECTRIC FAN
(4) EXTERNAL EXCHANGER
(5) INTERNAL EXCHANGER
(6) POWER INPUT
(7) INTERNAL EXCHANGER WATER OUTLET (QUICK CONNECTION)
(8) INTERNAL EXCHANGER WATER INLET (QUICK CONNECTION)
(9) FUNCTIONAL CLEARANCES
(R) FRESH AIR RETURN
(EV) VERTICAL AIR EXPULSION (STANDARD)
(EO) HORIZONTAL AIR EXPULSION (OPTION)

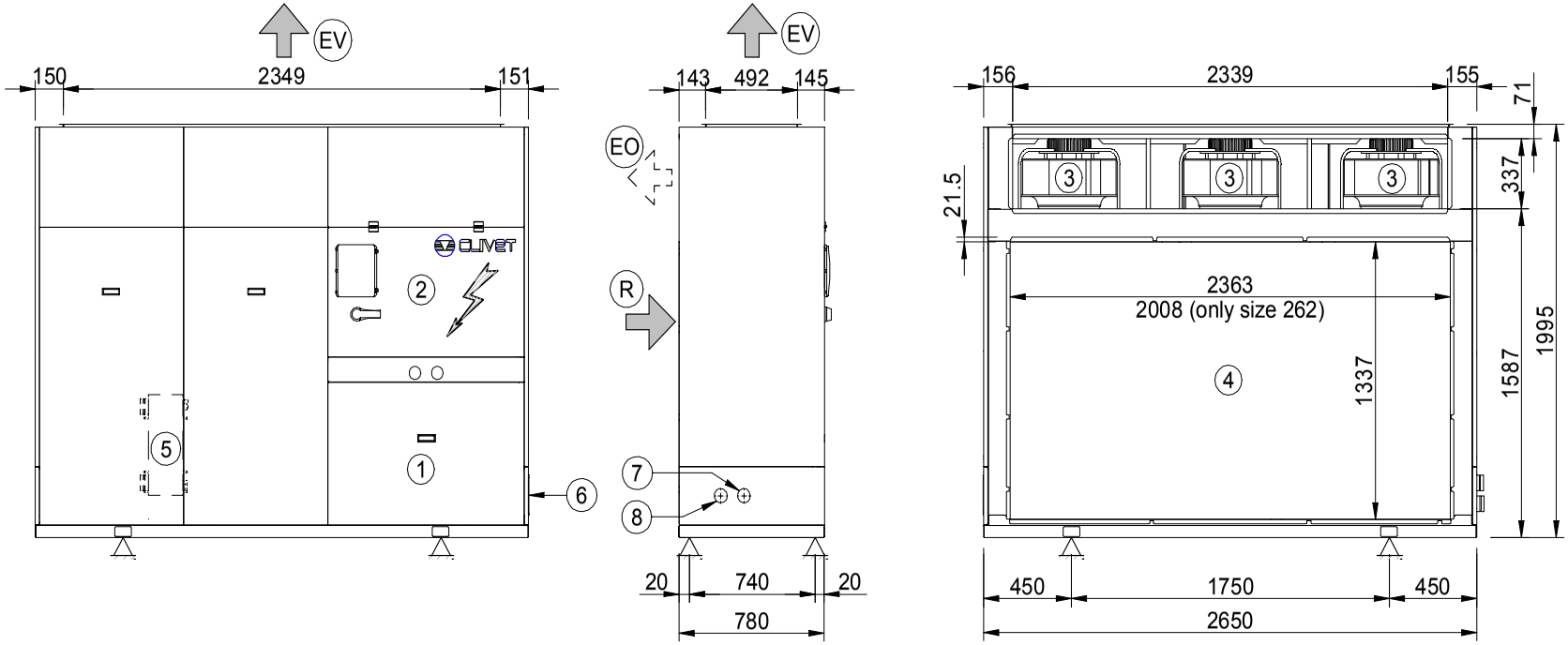
Size			182	222
Water connections		Ø	1 1/2"	1 1/2"

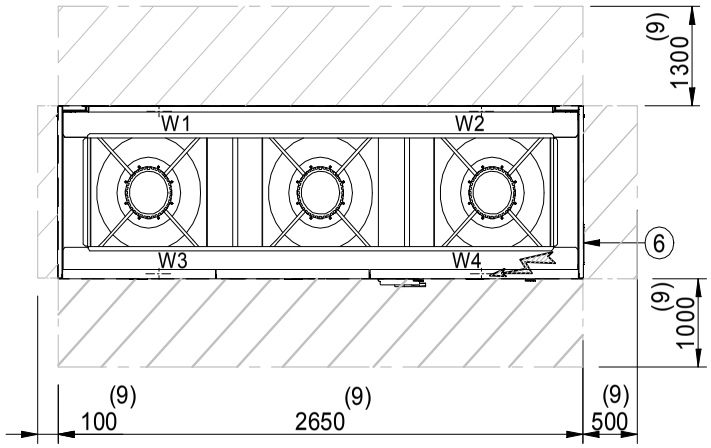
Size			182	222
W1 Supporting point		kg	98	98
W2 Supporting point		kg	169	171
W3 Supporting point		kg	117	118
W4 Supporting point		kg	188	191
Shipping weight		kg	565	572
Operating weigh		kg	572	578

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

DIMENSIONAL DRAWINGS: WSA-XEE 262-402

DAA2S 262-402_S_4
Date: 12/11/2012





(1) COMPRESSOR SHAFT
(2) GENERAL ELECTRICAL PANEL
(3) EXHAUST RADIAL ELECTRIC FAN
(4) EXTERNAL EXCHANGER
(5) INTERNAL EXCHANGER
(6) POWER INPUT
(7) INTERNAL EXCHANGER WATER OUTLET (QUICK CONNECTION)
(8) INTERNAL EXCHANGER WATER INLET (QUICK CONNECTION)
(9) FUNCTIONAL CLEARANCES
(R) FRESH AIR RETURN
(EV) VERTICAL AIR EXPULSION (STANDARD)
(EO) HORIZONTAL AIR EXPULSION (OPTION)

Size			262	302	352	402
Water connections		Ø	1 1/2"	2"	2"	2"

Size			262	302	352	402
W1 Supporting point		kg	128	138	153	153
W2 Supporting point		kg	192	202	250	250
W3 Supporting point		kg	146	154	168	168
W4 Supporting point		kg	210	217	265	265
Shipping weight		kg	667	704	829	829
Operating weigh		kg	676	711	836	836

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

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INDEX OF THE TECHNICAL SECTION

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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 ESPAÑA S.A.
Parque Empresarial Villapark, Avda. Quitapesares 50 - 28670, Villaviciosa de Odón, Madrid - España
Tel. + 34 91 6658280 - Fax + 34 91 6657806 - info@clivet.es

CLIVET UK LTD
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 NEDERLAND B.V.
Siliciumweg 20a, 3812 SX Amersfoort - Netherlands
Tel. + 31 (0) 33 7503420 - Fax + 31 (0) 33 7503424 - info@clivet.nl

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 FZC
Dubai Silicon Oasis, High Bay Complex, Int No. 3, PO Box 28178, Dubai,UAE
Tel. + 97 14 3208499 - Fax + 97 14 3208216 - info@clivet.ae

CLIVET AIRCONDITIONING SYSTEMS (P) LTD
3C3, Gundecha Onclave—Kherani Road, Saki Naka, Andheri (East) - Mumbai 400 072 (INDIA)
Tel. + 91 - 22 - 6193 7000 - Fax + 91 - 22 - 6193 7001 - sales.india@clivet.com