High efficiency air-cooled liquid chiller for indoor installation

ELFOEnergy Duct Medium

WSA-XEE 182-352 SERIES

TECHNICAL BULLETIN

R-410A

SIZE	182	222	262	302	352
COOLING CAPACITY kW	49.7	58.7	68.0	78.9	90.1

Clivet partecipa al programma di certificazione EUROVENT.
I prodotti interessati figurano nell'elenco dei prodotti certificati del sito EUROVENT
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Index of contents

Features and benefits 4

Standard unit technical specifications 13

Unit configuration 15

General technical data 16

Electrical data 17

Sound levels 17

Operating range 18

Correction factors for glycol use 19

Fouling Correction Factors 19

Admissible water flow rates 19

Exchanger operating range 19

Overload and control device calibrations 19

Performances in cooling 20

Internal exchanger pressure drops 21

Electric fan performances (rated airflow) 21

Configurations 22

Water circuit accessories 23

Accessories 30

Accessories separately supplied 34

Option compatibility 34

Dimensional drawings 35

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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

Dedicated series separately documentated

WSA-XEE

Air cooled liquid chiller

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

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

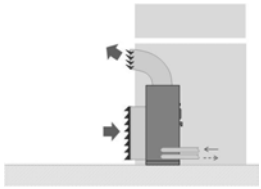
Easy to position in available technical spaces

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

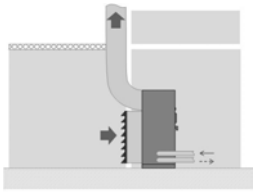
- in shafts;
- in service rooms, for instance, warehouses and store rooms;
- directly in the served area, in a visible position.

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

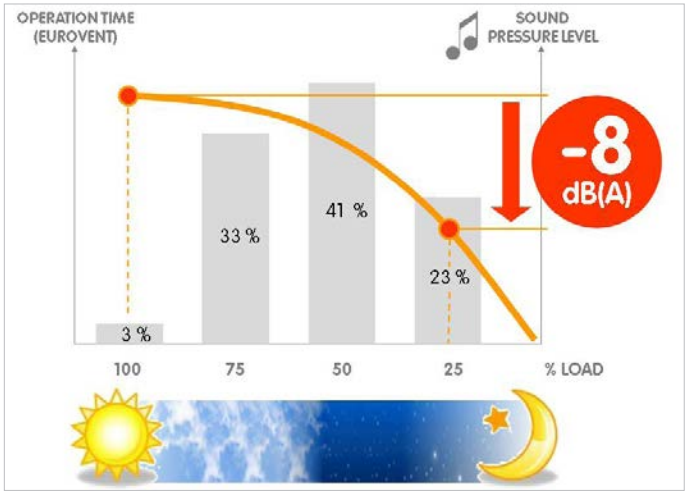
EXAMPLE OF EXTERNAL AIR EXHAUST GRILLE

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

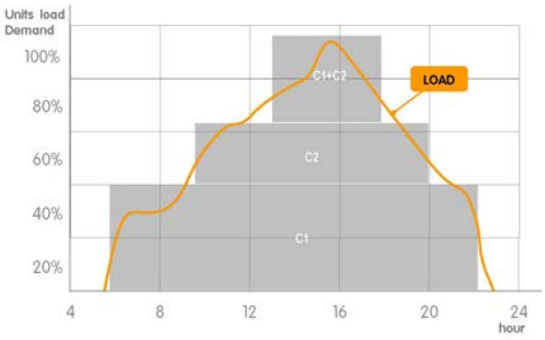
The microprocessor control automatically manages operation according to the maximum efficiency criterion and includes many safety and alarm management functions.

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.



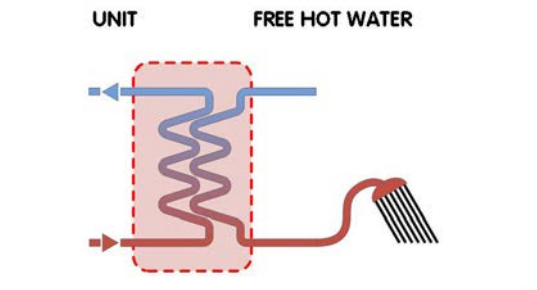
Produces hot water freely

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.

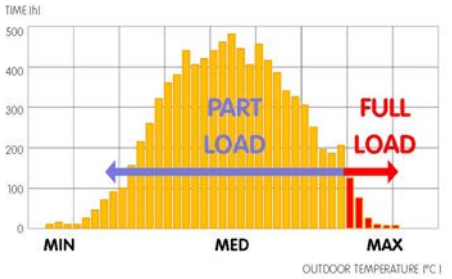
The small consumptions also reduce the environmental impact of the system, further improving the public image on this sensitive issue.

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%

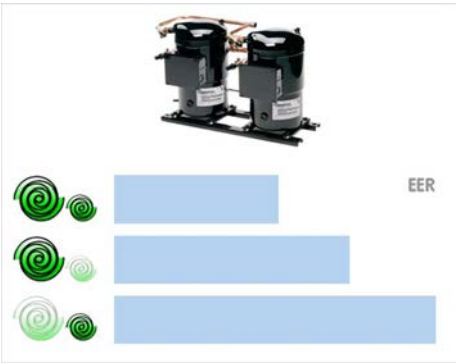
* EUROVENT (ESEER) supply times reference and ARI (IPLV) reference for seasonal efficiency calculations.

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.

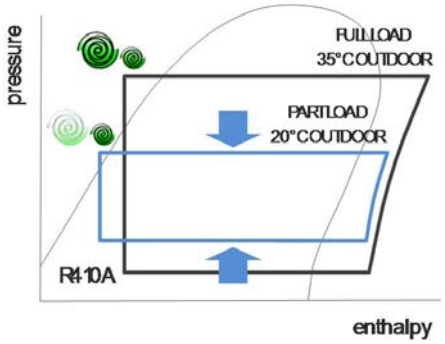
THE SEQUENTIAL DEACTIVATION OF THE COMPRESSORS INCREASES EFFICIENCY



Doubled efficiency

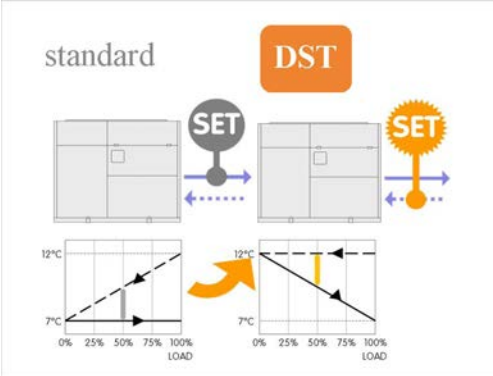
The heat exchange surface is sized for full capacity operation. Under part load condition, some compressors are automatically deactivated. Under this condition, in fact, the compressors in operation make use of a much larger surface.

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.

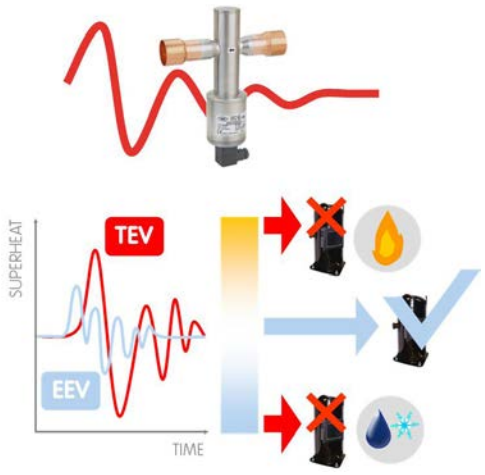
The DST control allows considerable consumption and operation costs reduction, especially in civil applications, upon verification of the air treatment system's dehumidification capacity during part-load cooling. The DST control is particularly interesting when combined with active thermodynamic fresh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

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.

LA VALVOLA DI ESPANSIONE ELETTRONICA RENDE ALTAMENTE STABILE ED EFFICIENTE IL CIRCUITO FRIGORIFERO



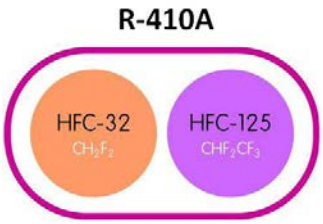
Very high heat exchange efficiency

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.

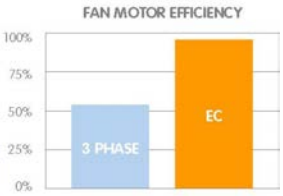
When necessary, this can supply high static pressures simply by varying the number of revolutions.

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:

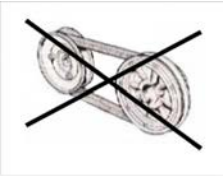
- the lack of brushes and the particular power supply increase efficiency by 70%;
- increase in the working life, thanks to the elimination of the brush wear;
- drastic reduction at the start-up of the starting current thanks to the electronic fan with the "soft start" function.



Advantages of direct coupling (plug fan)

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

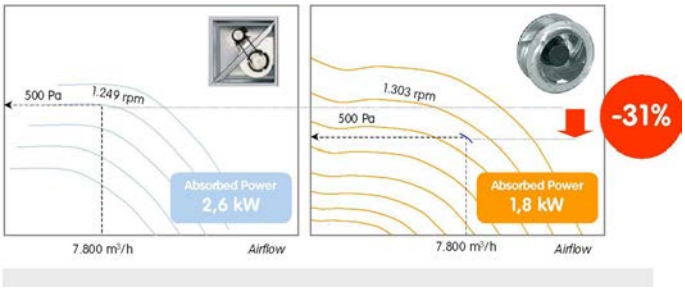
- the transmissions' inefficiencies are eliminated;
- the transmissions' wear and maintenance is eliminated.



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

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.

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.

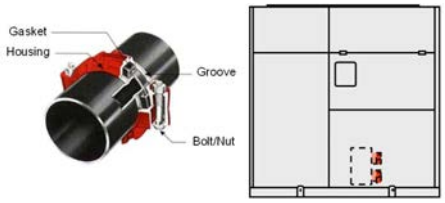
The built-in pumps are versatile, ready-for-use and reliable

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.

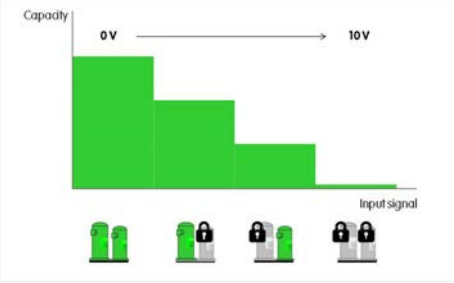
It is no longer necessary to calibrate or modify the transmissions in as much as it is the fan system which adapts to the system.

Demand limit

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

The external control signal is of analogical type 0-10 V. 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

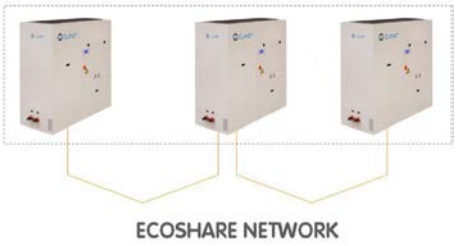
Modularity

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).



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 anti-acid solid cartridge dehydrator filter
- liquid flow and moisture indicator
- cutoff valve on liquid line
- electronic expansion valve
- high pressure safety pressure switch
- high pressure safety valve
- low pressure safety 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
- 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
- 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)
- Steel mesh strainer on the water side (accessory separately supplied)

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
- 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

WSA-XEE 352 - - -

(1) (2) (3) (4) (5)

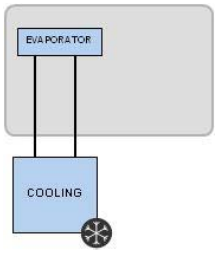
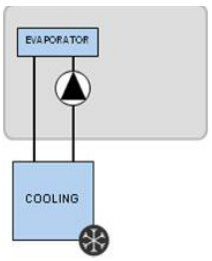
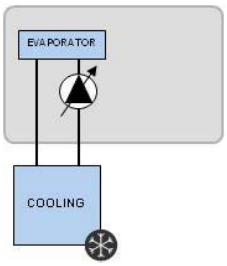
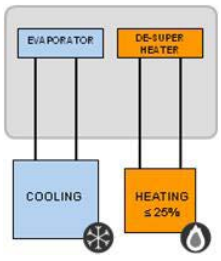
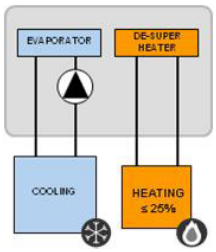
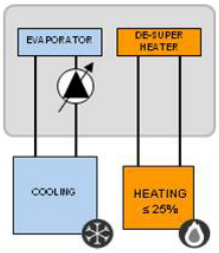
(1) Series
WSA = Ductable air-cooled chiller with scroll compressor
XEE = ELFOEnergy Medium

(2) Size and compressors
352 = 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 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 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

Standard unit

General technical data

Size			182	222	262	302	352
Cooling							
Cooling capacity	1	kW	49.7	58.7	68.0	78.9	90.1
Compressor power input	1	kW	16.0	19.8	23.2	26.1	30.2
Partial recovery heating capacity	2	kW	16.4	19.6	22.8	26.2	30.1
Cooling capacity (EN14511:2013)	3	kW	49.3	58.3	67.5	78.6	89.8
Total power input (EN14511:2013)	3	kW	17.6	21.4	24.7	27.9	32.1
EER (EN 14511:2013)	3		2.81	2.72	2.74	2.81	2.79
SEER	9		3,81	3,80	3,82	3,81	3,80
Compressor							
Type of compressors	4		Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		Nr	2	2	2	2	2
Rated power (C1)		HP	20	22	27	30	35
Std Capacity control steps		Nr	3	3	3	2	3
Oil charge (C1)		l	5.90	6.00	6.60	6.80	8.10
Refrigerant charge (C1)		kg	14	14	14	17	23
Refrigeration circuits		Nr	1	1	1	1	1
Internal exchanger							
Type of internal exchanger	5		PHE	PHE	PHE	PHE	PHE
Water flow-rate (User Side)	3	l/s	2,36	2,79	3,23	3,75	4,29
Internal exchanger pressure drops	3	kPa	45,5	47,0	49,6	24,1	25,6
Water content		l	4.00	4.70	5.40	6.40	7.00
External Section Fans							
Type of fans	6		RAD	RAD	RAD	RAD	RAD
Number of fans		Nr	2	2	3	3	3
Fan diameter		mm	500	500	500	500	500
Type of motor	7		EC	EC	EC	EC	EC
Standard airflow		l/s	5000	5000	6667	7500	7500
Installed unit power		kW	2.70	2.70	2.70	2.70	2.70
Max external static pressure		Pa	450	450	570	450	420
Connections							
Water fittings			1 1/2"	1 1/2"	1 1/2"	2"	2"
Power supply							
Standard power supply		V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50
Sound levels							
Sound power in the duct	8	dB(A)	80	81	79	82	84

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

1. Data refer to the following conditions: internal water exchanger = 12/7 °C; outdoor air temperature 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 = ventilatore radiale
7. EC Electronic switching motor
8. 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.
9. Data calculated according to the EN 14825:2016 Regulation

Electrical data

Size			182	222	262	302	352
F.L.A. Full load current at max admissible conditions							
F.L.A. - Total		A	51,0	59,0	72,9	80,8	86,5
F.L.I. Full load power input at max admissible conditions							
F.L.I. - Total		kW	30,0	33,6	41,7	45,3	50,8
M.I.C. Maximum inrush current							
M.I.C. - Value		A	146,1	201,1	215,0	223,0	275,0
M.I.C with soft-start accessory - Value		A	122,1	142,8	156,7	164,7	180,5

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

Sound levels

Size	Sound power level (dB)								Sound power level	Sound pressure level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
182	73	77	80	78	73	69	65	54	62	79
222	73	77	80	78	73	70	65	54	62	79
262	71	76	79	77	73	70	65	56	61	79
302	73	78	80	78	74	70	65	55	63	80
352	77	82	85	82	78	76	70	58	66	84

Sound levels refer to units 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

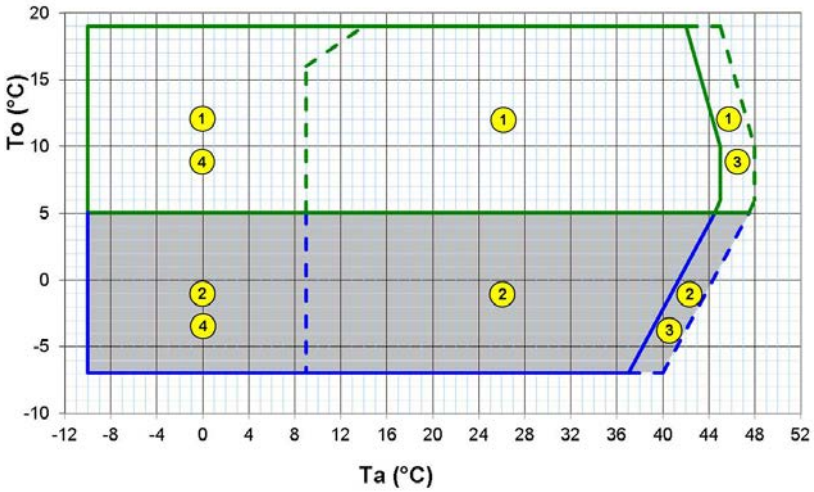
Please note that when the unit is installed in conditions different from nominal test conditions (e.g. near walls or obstacles in general), the sound levels may undergo substantial variations.

Operating range

Size			182	222	262	302	352
External exchanger							
Max entering air temperature	1	°C	45	45	45	45	45
Max entering air temperature	2	°C	48	48	48	48	48
Min. entering air temperature	3	°C	-10	-10	-10	-10	-10
Min. entering air temperature	4	°C	-7.0	-7.0	-7.0	-7.0	-7.0
Internal exchanger							
Max inlet water temperature		°C	27	27	27	27	24
Min. leaving water temperature	5	°C	5.0	5.0	5.0	5.0	5.0
Min. leaving water temperature	6	°C	-7.0	-7.0	-7.0	-7.0	-7.0

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

1. unit at full load
2. Unit with automatic staging of the compressor capacity.
3. unit at full load
4. Part-load unit
5. Standard unit and external exchanger entering air 35 °C (no 'Low water temperature (Brine)' configuration).
6. Unit in 'Low water temperature (Brine)' configuration. Fluid processed with 40% ethylene glycol



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

Ta (°C) = entering external exchanger air temperature (dry bulb).
To (°C)= leaving internal exchanger water temperature

1. Standard unit:(no "Liquid low temperature" configuration)
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

Correction factors for glycol use

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2,0	-3,9	-6,5	-8,9	-11,8	-15,6	-19,0	-23,4
Safety temperature	°C	3,0	1,0	-1,0	-4,0	-6,0	-10,0	-14,0	-19,0
Cooling Capacity Factor	Nr	0,995	0,990	0,985	0,981	0,977	0,974	0,971	0,968
Compressor power input Factor	Nr	0,997	0,993	0,990	0,988	0,986	0,984	0,982	0,981
Internal exchanger glycol solution flow factor	Nr	1,003	1,010	1,020	1,033	1,050	1,072	1,095	1,124
Pressure drop Factor	Nr	1,029	1,060	1,090	1,118	1,149	1,182	1,211	1,243

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

Fouling Correction Factors

	Internal exchanger	
m2 °C / W	F1	FK1
0.44 x 10 (-4)	1,00	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		182	222	262	302	352
Qmin	[l/s]	1.3	1.5	1.7	2.9	3.2
Qmax	[l/s]	3.6	4.2	4.7	8.1	9.0

Exchanger operating range

TYPE OF TEST	Internal exchanger	
	DPr	DPw
	[kPa]	[kPa]
CLIVET C	4500	1000
PED (CE)	4500	1000

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

Overload and control device calibrations

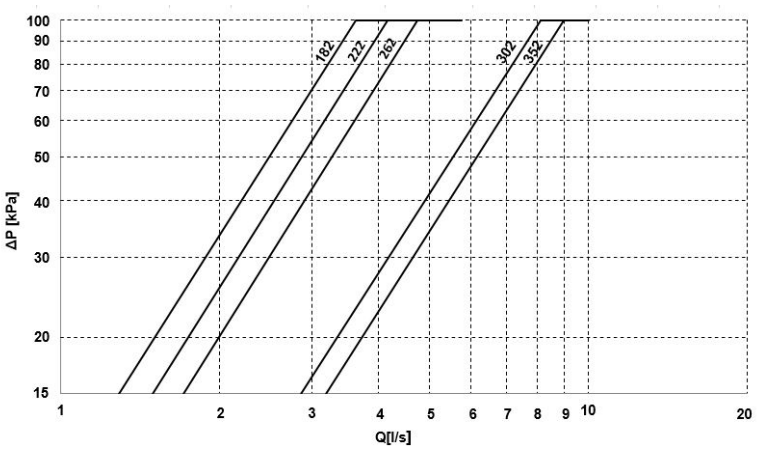
Setting instruments		apre	chiude	valore
High pressure safety pressure switch	[kPa]	4050	3300	-
Low pressure safety switch	[kPa]	450	600	-
low pressure switch (Brine)	[kPa]	200	350	-
antifreeze protection	[°C]	3	5.5	-
high pressure safety valve	[kPa]	-	-	4500
low pressure safety valve	[kPa]	-	-	3000
Max no. of compressor starts per hour	[n°]	-	-	10
high compressor discharge temperature safety thermostat	[°C]	-	-	120

Performances in cooling

Size		Entering external exchanger air temperature (°C)													
		25		30		32		35		40		42		44	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
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	101	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	104	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	107	26.0	101	28.3	98.9	29.3	95.3	30.8	89.2	33.6	86.6	34.7	84.0	35.9
	10	110	26.3	104	28.7	101	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 = 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).

Electric fan performances (rated airflow)

Size	External static pressure (Pa)		70	80	90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570
182	Airflow	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	Airflow	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	Airflow	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	Airflow	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	Airflow	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	-	-	-

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

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 –7°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

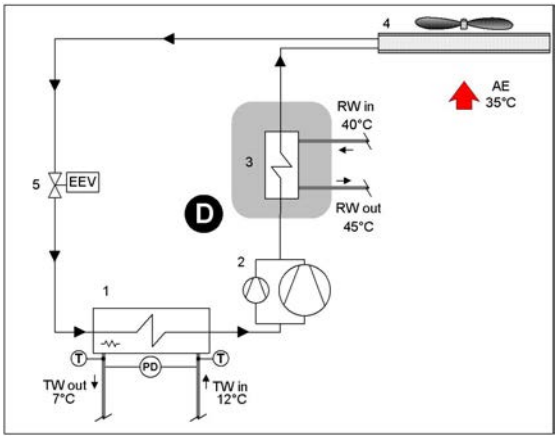
- Unit with single operation set-point
- Unit with double operating set-point

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

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

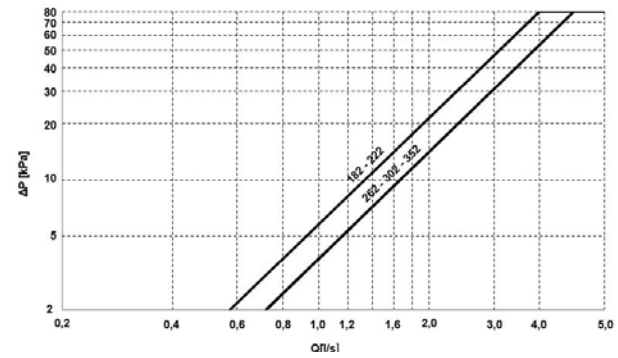
TW in chilled water inlet
TW out chilled water outlet

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

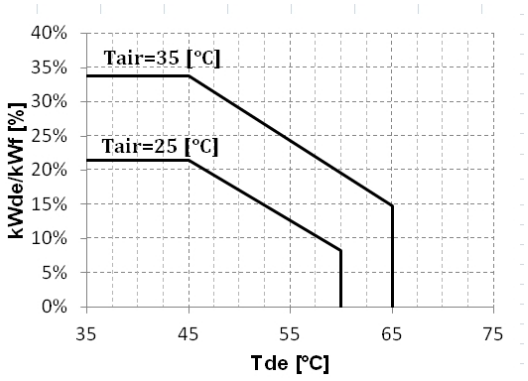
AE Outdoor air

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]

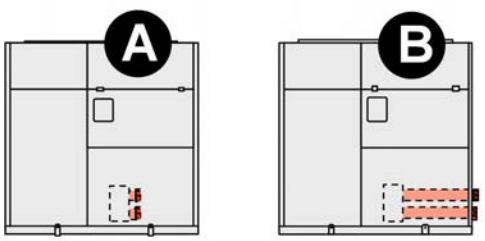
Water circuit accessories

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

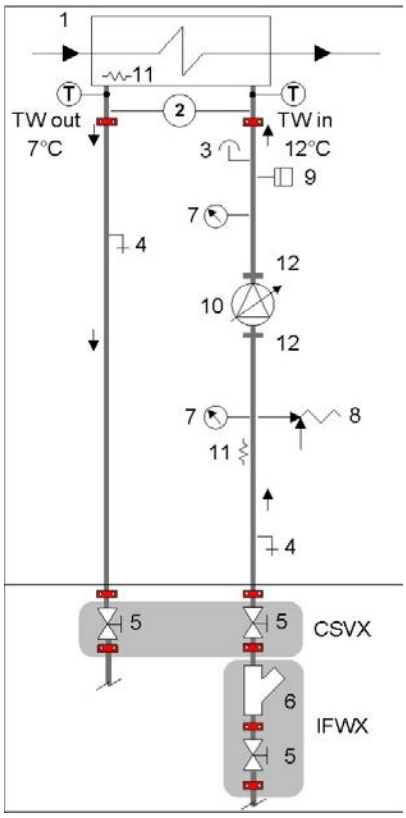
It is also advisable to provide the system with the following components, which are excluded from the Clivet supplies::

- 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 impelle.

Water circuit operating diagram with 1PUHE pump



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

T - Temperature probe

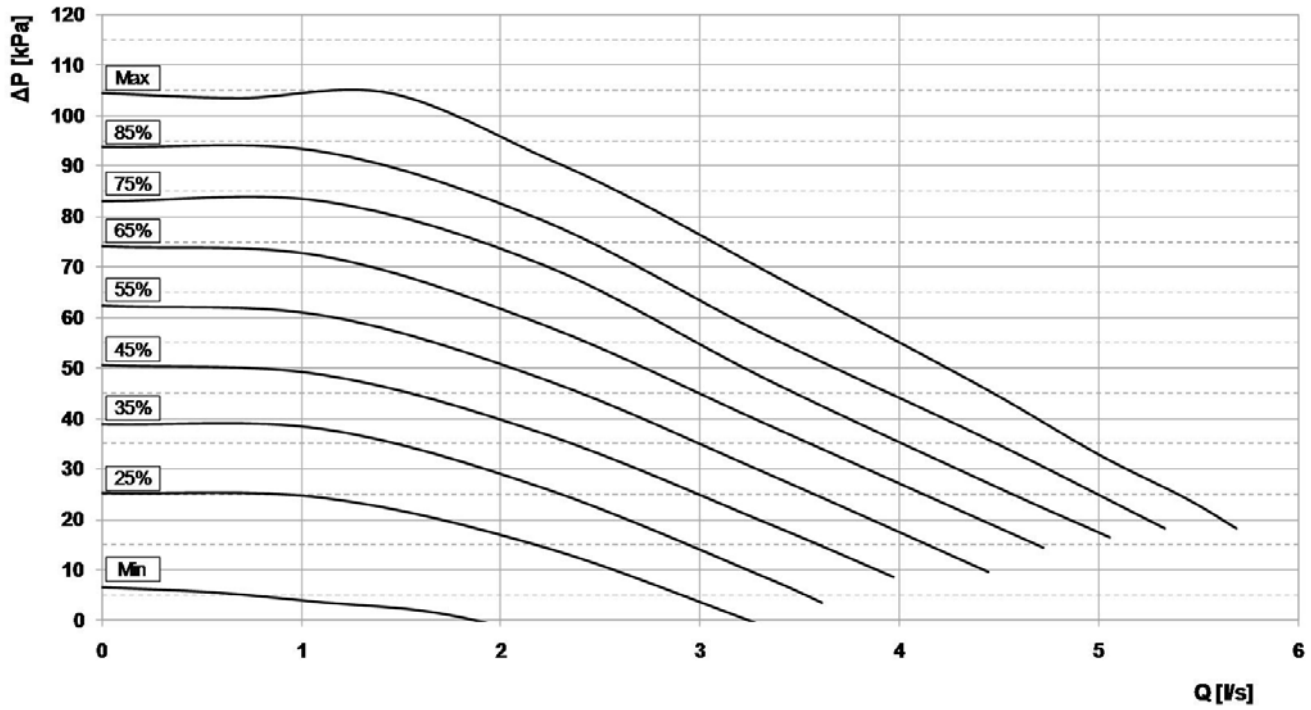
TW in chilled water inlet
TW out chilled water outlet

CSVX - Couple of manual shut-off valves

IFWX - Steel mesh strainer on water side

The grey area indicates further optional components.

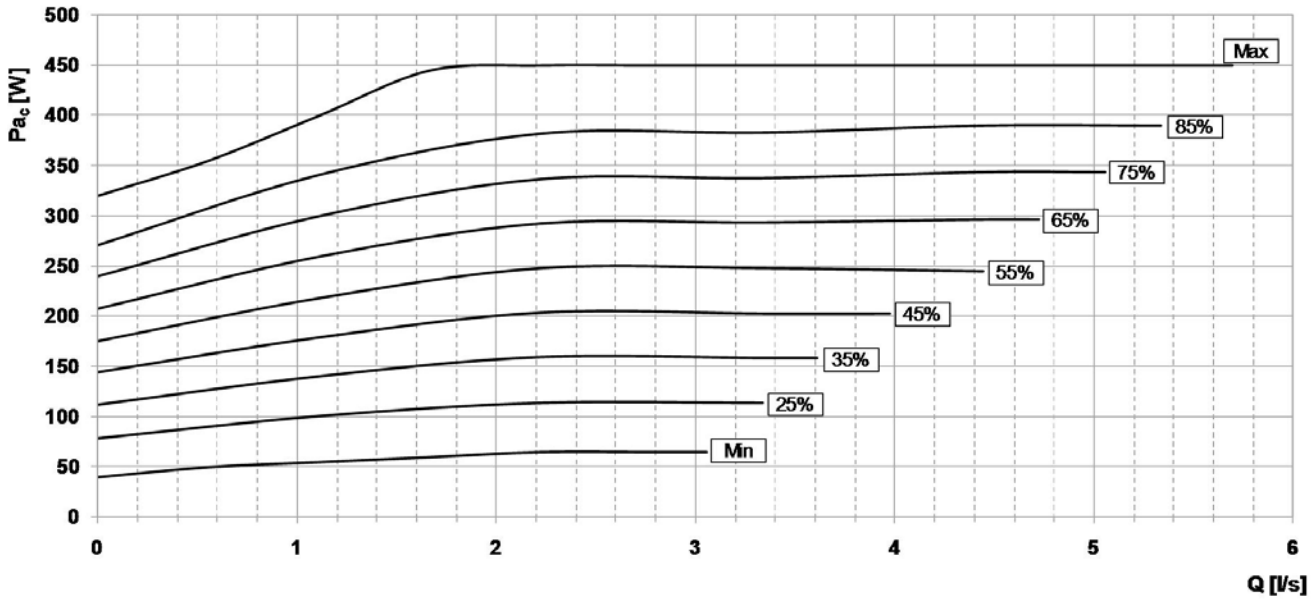
Pump head curves for size 182



Q = Water flow rate [l/s]
DP = Available pressure [kPa]

Attention: in order to obtain 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



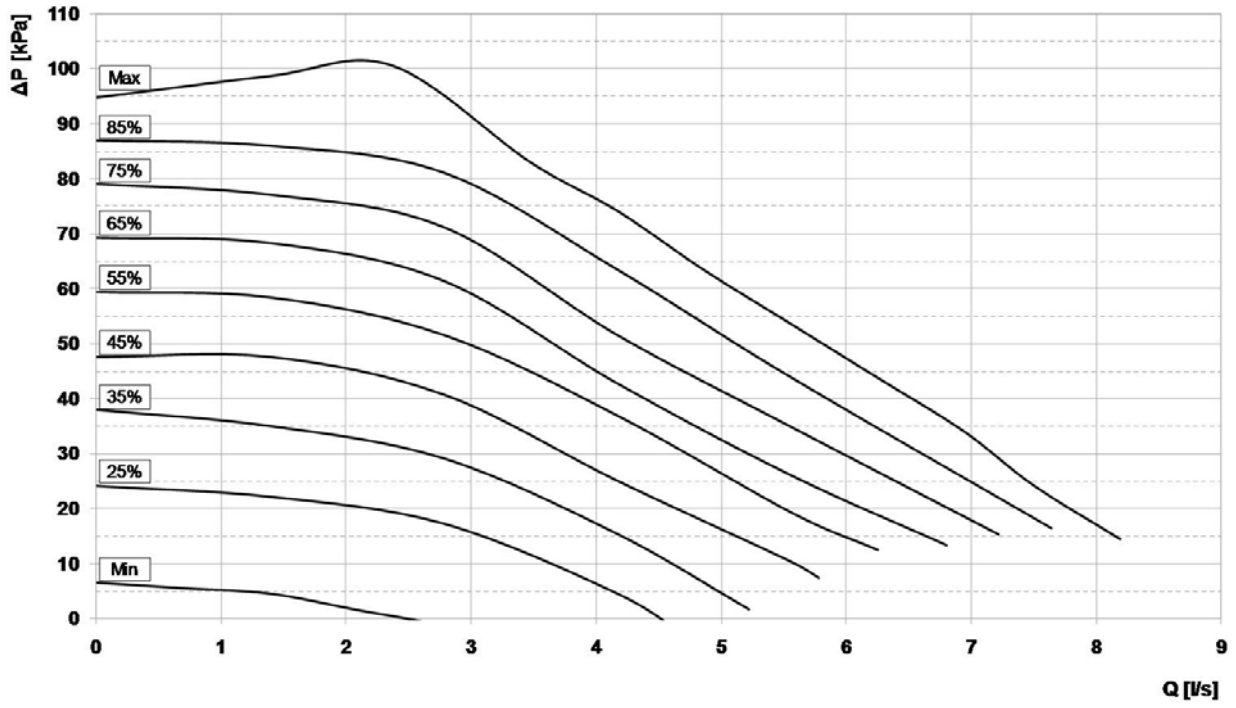
Q = Water flow rate [l/s]
Pac = Capacity absorbed by the pump (W)

The diagrams refer to the standard supply pumps.

Built-in pump electrical data

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

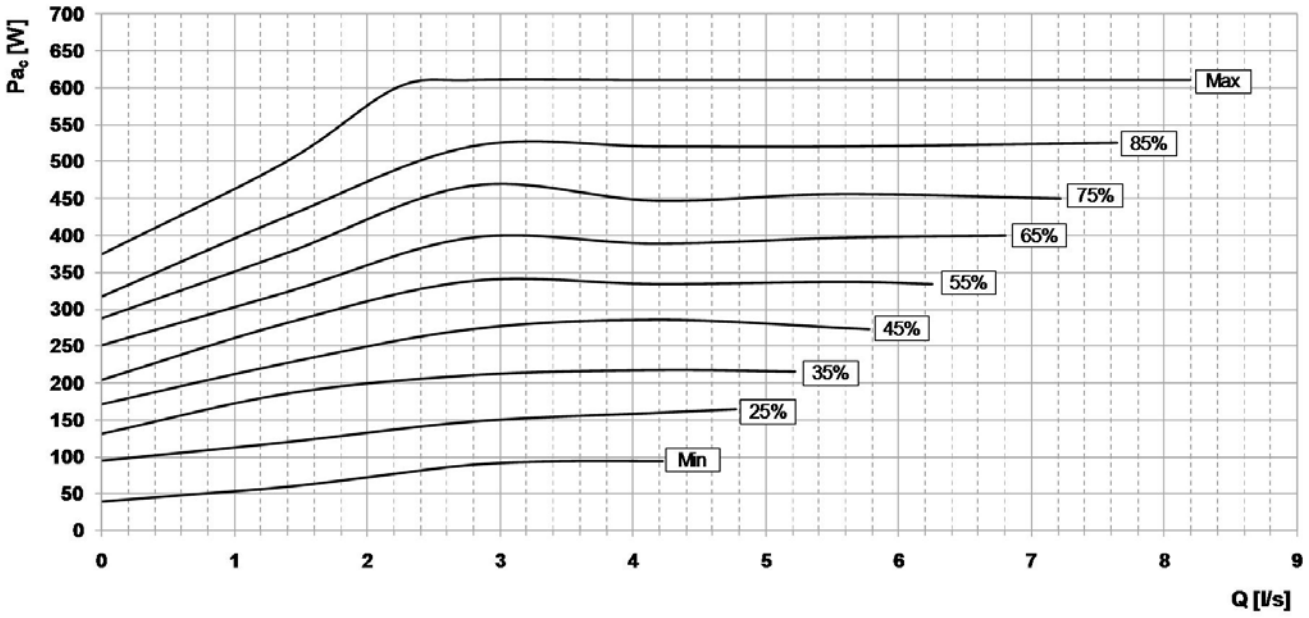
Pump static pressure curves for size 222-352



Q = Water flow rate [l/s]
DP = Available pressure [kPa]

Attention: in order to obtain 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

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.

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.

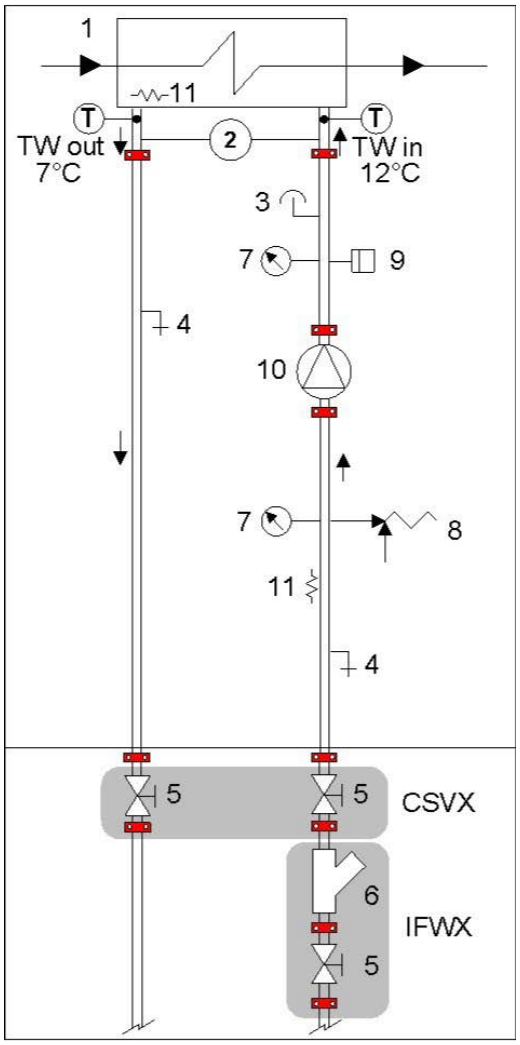
Complete with a thermoformed insulating casing, quick couplings with an insulated casing, safety valve, pressure gauges, system safety pressure switch, stainless steel, antifreeze, intake, immersion-type heaters.

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

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



1. Internal exchanger
2. Differential pressure switch
3. Purge valve
4. Drain valve
5. Butterfly shut-off valve with quick couplings
6. Steel mesh strainer
7. Pressure gauge
8. Safety valve (6 Bar)
9. System load safety pressure switch (it avoids the pump operation if water is not present)
10. Centrifugal electric pump with high efficiency impeller
11. Anti-ice electric heater

T - Temperature probe

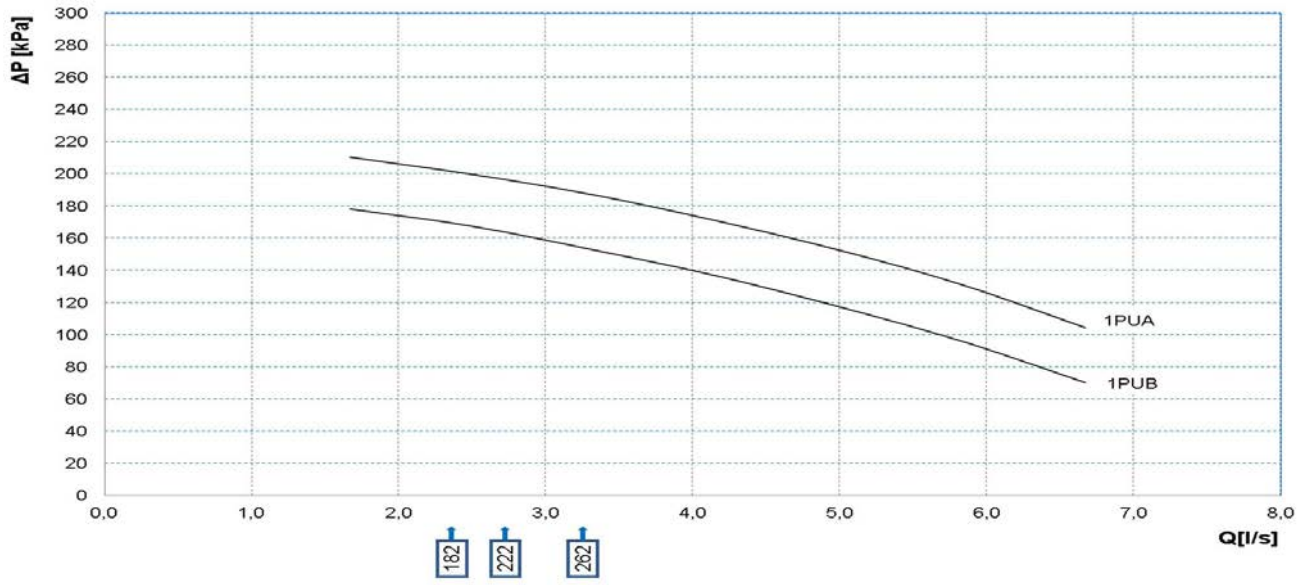
TW in chilled water inlet
TW out chilled water outlet

CSVX - Couple of manual shut-off valves

IFWX - Steel mesh strainer on water side

The grey area indicates further optional components.

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



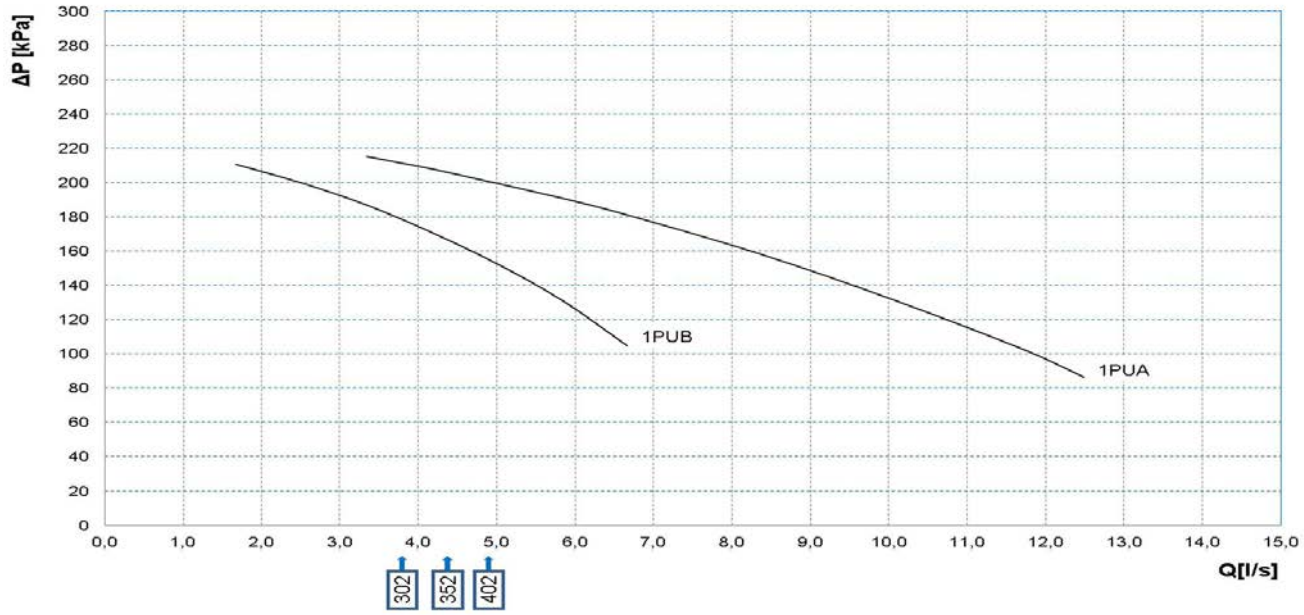
Q = Water flow rate [l/s]
DP = Available pressure [kPa]

Attention: in order to obtain 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
1PUA						
FLI Total	[kW]	1,7	1,7	1,7	1,7	1,7
FLA Total	[A]	3,8	3,8	3,8	3,8	3,8
1PUB						
FLI Total	[kW]	1,8	1,8	1,8	1,7	1,7
FLA Total	[A]	3,3	3,3	3,3	3,8	3,8

1PUB / 1PUA option performance for size 302-352



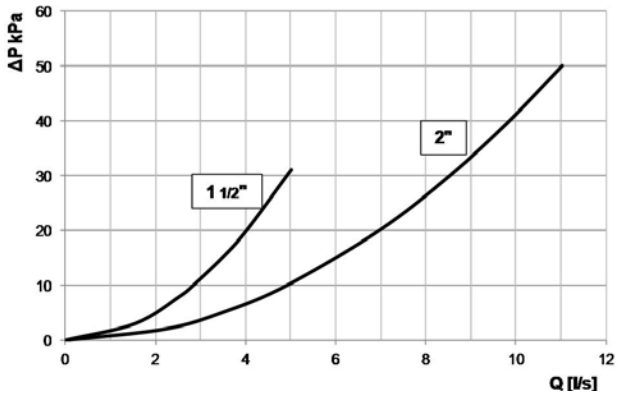
Q = Water flow rate[l/s]
DP = Available pressure [kPa]

Attention: in order to obtain 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).

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:

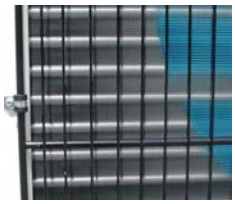
- no. 2 cast-iron shut-off butterfly valves with fast fittings and activation lever with a mechanical calibration lock
- no. 2 of quick connections

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

Accessory separately supplied

Accessories

PGFC - Finned coil protection grill



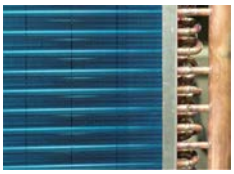
This accessory is used to protect the external coil from the accidental contact with external things or people.

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 low saline concentrations and other chemical agents.

Attention!

- Cooling capacity variation -2.7%

- variation in compressor power input +4.2%

- operating range reduction -2.1°C

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 480.

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

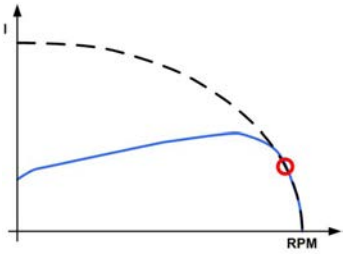
The device is built-in the unit.

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		182	222	262	302	352
M.I.C. Maximum inrush current						
M.I.C. with soft start accessory	A	116,1	136,1	148	156	171,8

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

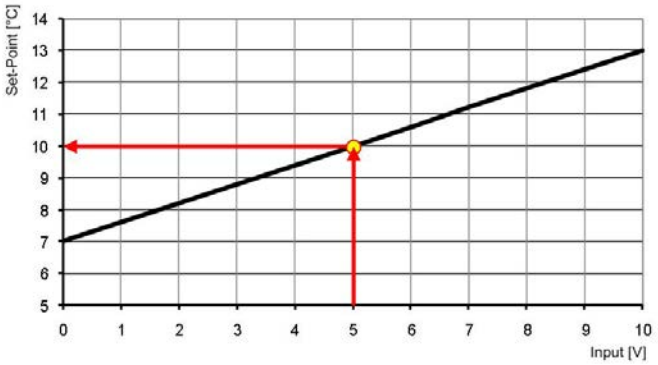
An option which integrates the supply cutoff valve, which is supplied as standard. The presence of the cock at the intake as well enables the compressors to be isolated and substituted without discharging the refrigerant from within the refrigeration circuit. This means that the extraordinary maintenance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

The device is built-in the unit.

1. Compressors
2. SDV option
3. Safety valve

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

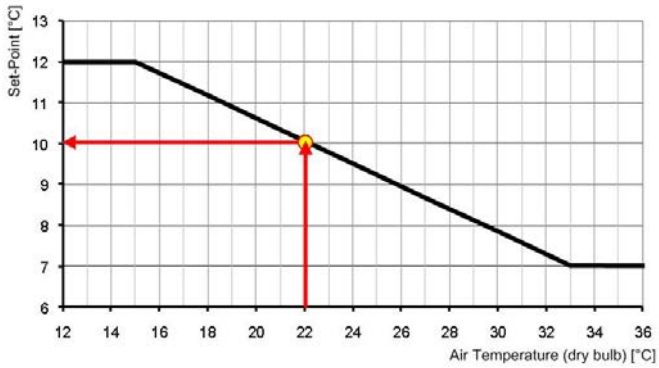
This device enables the set-point to be varied which is pre-set using an external 0÷10 V signal.



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.



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 BACnet 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 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.

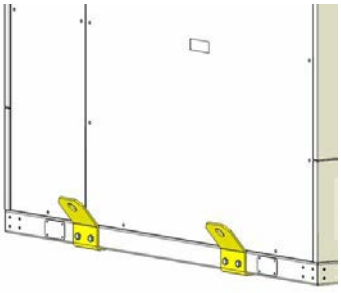
Only the following parameters are available on the LonWorks protocol: power input (kW) and absorbed energy (kWh)

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.

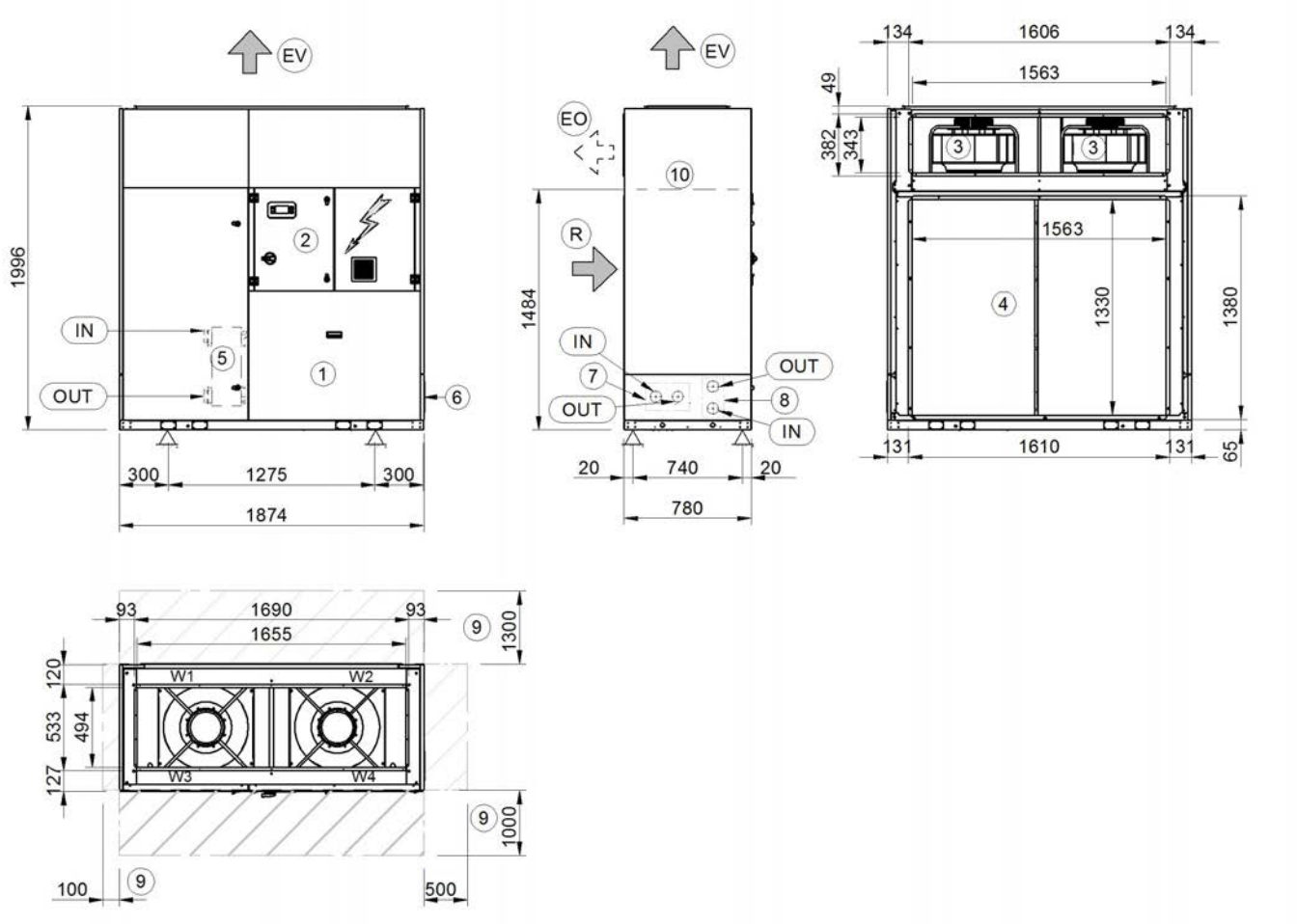


The device can be removed after the unit laying if the 'AMRX - Rubber antivibration mounts' accessory is supplied. In the absence of antivibration mounts remove the device before the ground fixing

Dimensional drawings

Sizes 182-222

DAB2S182_222_0 REV00
DATA 23/06/2016



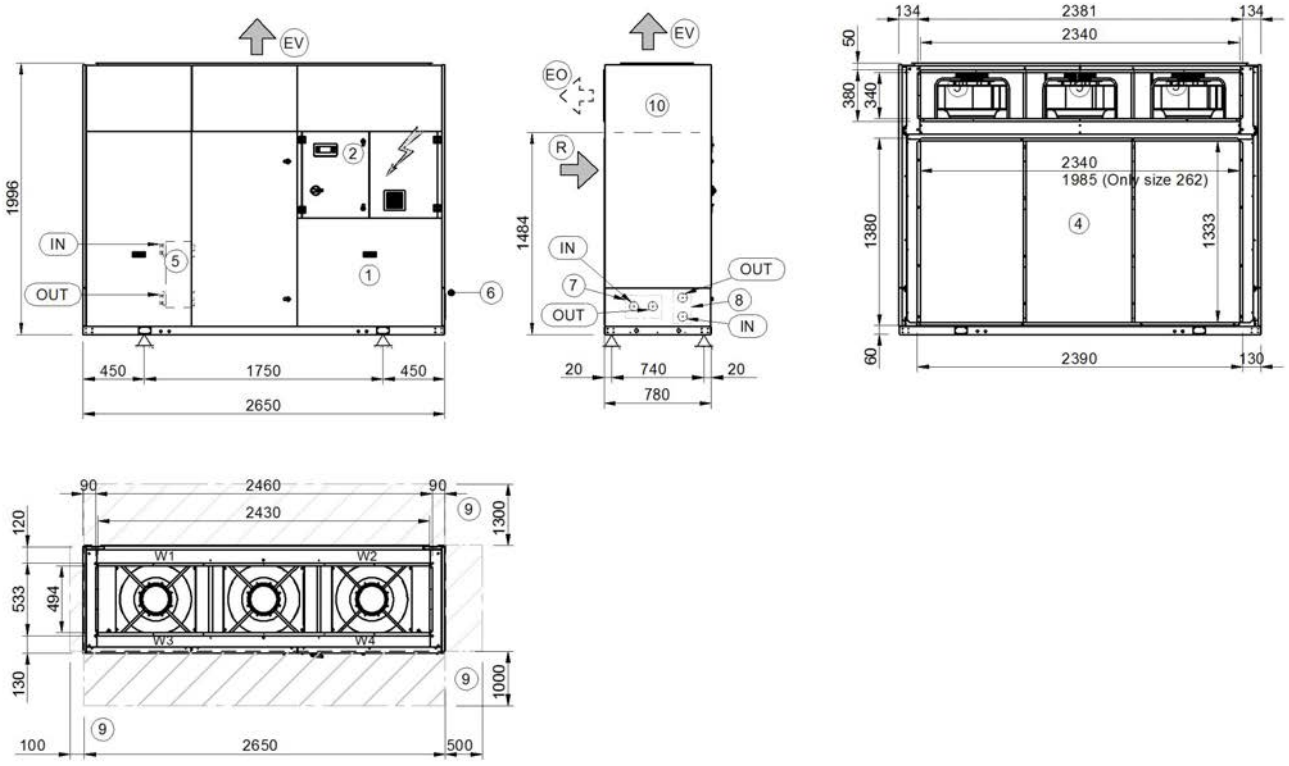
(1) Compressor compartment
(2) General electrical panel
(3) Exhaust radial electric fans
(4) External exchanger
(5) Internal exchanger
(6) Electric line input
(7) Hydraulic fittings flush with unit (optional)
(8) Partial recovery water fittings (optional)
(9) Functional clearances
(10) Separation line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

Size			182	222
A - Length		mm	1874	1874
B - Width		mm	780	780
C - Height		mm	1996	1996
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 weight		kg	572	578

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

Sizes 262-302-352

DAB2S262_402_0 REV00
DATA 23/06/2016



(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) Partial recovery water fittings (optional)
(9) Functional clearances
(10) Separation line
(R) Outdoor air return
(EV) Vertical air exhaust (standard)
(EO) Horizontal air exhaust (optional)

Size			262	302	352
A - Length		mm	2650	2650	2650
B - Width		mm	780	780	780
C - Height		mm	1996	1996	1996
W1 Supporting Point		kg	128	138	150
W2 Supporting Point		kg	192	202	242
W3 Supporting Point		kg	146	154	164
W4 Supporting Point		kg	210	217	255
Shipping weight		kg	667	704	804
Operating weight		kg	676	711	810

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

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