

**VERSATEMP EVH-X** 

DIRECT EXPANSION HIGH EFFICIENCY INTERNAL HORIZONTAL AUTONOMOUS AIR-CONDITIONER

EVH-X 5-17 RANGE

#### WATER-AIR HEAT PUMP

Nominal cooling capacity from 2,3 to 4,2 kW Nominal heating capacity from 2,8 to 4,9 kW





**Technical** 

**Bulletin** 

BT12C010GB-03



VERSATEMP EVH-X is the high efficiency packaged air-conditioner that automatically heats or cools spaces throughout the whole year, using water as source.

Thanks to its rotating compressor, its electronic expansion valve, its plate exchanger and its multi-speed centrifugal fan, this unit stands out due to its high level of efficiency in all operating conditions and its great reliability. The VERSATEMP EVH-X design can be elegantly added to different settings both in its cased and in its uncased configuration, available for its maximum integration within furnishings.

The operating silence is ensured by the particular sound-proofing of the compressor compartment, by the accurate balancing of the fans and by the standard anti-vibration devices for all moving parts.

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# Total comfort is required all year round, even in the most difficult application situations

In applications like offices, shops, hotels and public buildings it is necessary to maintain comfort all year round, regardless of the external conditions and the different uses of the served ambient. Each area requires its own temperature, humidity and air purification level, in the fastest and simplest way for users.

The maintenance cost of this comfort depends on the chosen air-conditioning system, both when purchasing and above all during use and maintenance over its working lifetime. The rationale of the chosen system and its energy efficiency are therefore fundamental factors of choice.

Finally, an air-conditioning system must be perfectly integrated into a building, in harmony with the structure and the furniture. In some cases, this is a very complex challenge, where, for instance, external units cannot be installed and air vents cannot be fitted, as in certain buildings or historical structures due to regulatory or aesthetic reasons.



# Highly efficient and reliable reversible electric heat pump technology

Electric heat pumps represent an efficient and advantageous choice for ambient air-conditioning. These devices enable energy to be exchanged between the external ambient, known as the source, and the served setting, using the particular refrigeration circuit which they are equipped with. This transfer only requires the use of electrical energy and is highly efficient, therefore at low consumption. Furthermore, reversible electric heat pumps simplify the system, since only one plant can operate heating and cooling requirements over the entire annual cycle.

Thanks to their energy efficiency, electric heat pumps guarantee the desired level of comfort with reduced management costs and a low impact on the environment. For this reason there are numerous initiatives to aid their production with economic and fiscal incentives.

# Heat pump systems which use water as heat source are even more efficient than traditional systems

In the face of apparently limited costs, direct expansion systems, for instance, split, multisplit and VRF/VRV systems have numerous limitations in their applications. The piping which contains the refrigerant passes through served settings and is therefore subject to restrictions and usage limitations. It must be limited in length and insulated. Furthermore, external units may be totally incompatible with the architectural and constructions characteristics of the building.

Hydronic systems are without doubt more complete and versatile. Often the system costs for medium and small sized systems are higher in that they are more highly articulated and subject to labour costs for installation, set up and calibration. The complexity increases even more in large-scale centralised systems with four-pipe distribution.

On the other hand, when each area is equipped with its own heat pump which uses water as a heat source, there are only two supply pipes, which save space and installation costs and pump usage costs. Furthermore, there are no length limitations, since they contain water and not refrigerant. The water temperature is generally neutral in comparison with the served ambient and therefore the pipes do not need to be insulated. By using water as a heat source, the energy efficiency of the heat pump further increases, even as much as by 30%.





# The compact and silent solution

EVH-X brings together the Clivet reversible heat pump technology and the VERSATEMP system reliability in a unit simple to false ceiling positioning and versatile like a fan coil.

A high efficient rotating compressor with ecological refrigerant R410A, electronic expansion valve, plate exchanger source side and multispeed fan: are only some of the solutions available in this completely automatic air-conditioner.

It's the ideal solution when there are the necessity to install the false ceiling unit or for its maximum integration within furnishings. Furthermore, it contains only a minimum quantity of ecological refrigerant (less than 3 kg), and is therefore not subject to restrictions on use. The two water supply ducts do not have length limitations, even, in many cases, they do not need to be insulated and result easy to install and maintain.

It purifies and conditions the air in all settings



Use water as heat source

It contains the best reversible heat pump technology in its interior

# **Advantages**

### **System simplification**

Thanks to its one-piece construction, the system components and installations are already within the unit itself. The heat or cooling energy which is generated by the unit is directly transferred into the served ambient. The supply water may come from an energy transfer WLHP loop circuit, from a natural source such as a groundwater, or even from water works in certain cases where architectural constraints make any other system solution impossible.

#### Silence and reduction of management costs

Thanks to the numerous construction solutions which have been adopted and to its special automatic control, vibrations and sound emissions are undoubtedly reduced. The reversible heat pump technology at high energy efficiency maintains the required comfort only where and when it is needed, reducing the consumption and therefore the management costs over the entire annual cycle. In all the applications which allow it, the devices which limit water consumption reduce these expenses even further.

## The perfect solution for the system retrofit

Different versions are available and are compatible with VERSATEMP products of the EVH series, as far as regards capacities, sizes and water connections. VERSATEMP EVH-X is therefore the ideal solution for the retrofit of the existing systems and their possible completion or enlargement.







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# High energy efficiency all year round

VERSATEMP EVH-X increases the overall system cost thanks to technological solutions from the inside, all choices for efficient operation and long-lasting is guaranteed by strict quality controls in the construction phase and rigorous testing functional on the finished product.

### **High efficiency rotary compressor**

With silent and reliable operation, it uses the ecological refrigerant R410A and it is contained within a special compartment which has been further sound-proofed.

### **Electronic expansion valve**

The electronic expansion valve (EEV) rapidly and precisely adapts to the effective load required. Furthermore, in the heat pump operation it ensures stability also with high water temperatures.

### Source side plate exchanger

Universally recognised for its highly efficient heat exchange, it is complete with a regulation probe and safety device and is offered with a matching mechanical steel knit strainer which can ensure excellent performance over time.

### Multi-speed fan

The EXTRAQUIET, QUIET and POWERFUL speeds allow to achieve always the best operating conditions in the different applications. In the AUTO mode, the unit automatically sets the most appropriate speed to quickly reach the comfort conditions, thanks to the automatic compensation depending on the distance between the effective temperature in the served room and the set-point.

# The silent comfort

The compressor is housed in a dedicated compartment, made of thick stainless steel and covered with sound-proofing material. It is equipped with a double anti-vibration support system, a vibration sound absorber in the refrigerant circuit, and also with a metal closure hood and finishing in the cased configuration.

At the end of the steady state phase, the AUTO fan mode activation maintains furthermore the minimum speed necessary to maintain the comfort, further increasing the acoustic comfort in the room.

# **Reliability and safety**

Among the numerous adopted solutions, are:

- The combination of outlet water anti-freeze sensor, treated air anti-freeze sensor, entering
  water temperature sensor and water flow-rate monitoring device protects the unit from the ice
  formation and any malfunctioning which may derive from it.
- The thermostatic valve with MOP (Maximum Operating Pressure) function automatically controls the evaporating pressure to an optimal value for the efficient compressor operating, even upon changes of the heat exchange conditions with the water source.
- The electronic control of the thermostatic valve also uses dynamic algorithms, managing the regularity of the refrigerant flow in the circuit and ensuring a compressor stable operating and, therefore, an increase of its efficiency and operating life.













VERSATEMP EVH-X is extremely versatile and reliable even in solutions controlled by the User.

# Standard automatic functions

The standard VERSATEMP EVH-X version is equipped with a standard automatic control, complete with a micro processor card and control and safety sensors built-in. Given that it is without a user display, this version represents an efficient solution in all applications open to the public where the operating parameters could otherwise be inappropriately changed.

The standard automatic control:

- it detects the space conditions and compares them with the user set point;
- it can decide the operating mode automatically (heating or cooling);
- it decides the activation of resources and can automatically select the fan speed depending on the distance from the scheduled set point;
- it can manage without further accessories a mini local network of 15 units, one of which is a master and the others slaves which replicate its operating.

### Voltage-free contact user interface

The standard version has a series of voltage-free contacts, or rather contacts without tension, for managing the following functions remotely: Switching on and switching off, Changing function mode (heating or cooling), setting the Set point (standard or economic), Cumulative alarm.

### User interface with wall display

The control can be cased or uncased. It has a modern aspect and is very simple to use even for non-specialised users. Furthermore, it has different access levels, password protected, available for managing the different unit functions.

Among the main functions, it detects the temperature using the temperature sensor in its interior, schedules the operating time bands, displays and manages the operating alarms and parameters, enables the manual management of the fan speed and operating mode (heating or cooling).

**USER INTERFACE INSTALLATION** 

## User interface by serial connection

on the wal

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







ON / OFF



in an uncased box

# Perfect for the retrofit of the existing versatemp systems

VERSATEMP EVH-X can be easily installed in the existing systems to substitute or integrate VERSATEMP units of the EVH series thanks to:

- delivered capacity and water connection compatibility;
- same or smaller sizes;
- different protocols available for the supervision Systems

The units have been set for two different types of intervention work: - Total substitution (all the units in the system) - Partial substitution (only some of the units in the system)

### In case of total substitution

The total substitution of VERSATEMP EVH units can be carried out without any changes of the water components of the system (such as pumps, ducts, by-passes) and without balancing interventions. The new VERSATEMP EVH-X unit are able to correctly operate even when they are powered with water flow-rates of the substituted units, which are typically lower than the nominal flow. Furthermore, they have lower pressure drops on the exchanger water side. A new hydraulic equilibrium is established in the system.

If the intention is to make the units operate with the same water flow-rate of the substituted units, even though it is not necessary, it is sufficient only to provide a flow controller on each unit and on the main system ducting.



### In case of partial substitution

If only some units are substituted on the existing VERSATEMP system, it is necessary to provide a flow controller which balances the branch where the new units are installed.

Indeed, due to the lower pressure drops of the EVH-X, the system can be unbalanced as follows:

- excessive reduction of the water flow-rate on branches that maintain the existing units;
- increase of the water flow-rate on branches equipped with new units

It is therefore necessary to provide for a flow controller on each unit (available as an accessory), or on the whole branch involved with the substitution.



NEW



NEW

NEV



# Easy to connect to the water network

System components for connecting VERSATEMP EVH-X to water circuit are available as accessories and are already sized to ensure the proper operating and efficiency of the unit.

The assembly of hydraulic valves and cock outside the unit allows their place in a easily accessible position of the ceiling for routine maintenance.

Further components which are needed for connecting the hydraulic supply network are available as accessories for installation, encharged to the Client:

- steel mesh strainer
- ON/OFF motorised 2-way valve for variable flow-rate system
- motorised 2-way modulating valve for system with disposable water
- hand shut-off valves
- hand by-pass valve for system cleaning
- water balancing valve
- flexible pipe for water supply and condensate drain

The unit is complete with plate heat exchanger and control and safety devices.



# The versatility in different application systems

The integration of the unit with the optional hydraulic components makes it easier to start and run the system operation in the different installations: constant or variable flow-rate loop.

The pipe work arrangements enable the unit to be intercepted from the system, the system cleaning (fluxing), the water mechanical filtration during the ordinary operating to protect the exchanger from fouling.

The 2-way modulating valve, available as accessory, allows to:

- further extend the application range to systems fed with groundwater or aqueduct. It is so possible to reduce the water consumption;
- extend the standard unit operating range in cooling mode with source at low water temperature;
- maximize the efficiency in heating mode also with source at high water temperature.

In the presence of the 2-way modulating valve, the water feeding must be at variable flow-rate. This allows an interesting energy saving on the installation and then a further reduction of the management costs.



- E Hand by-pass valve

\* to instal outside the unit

# Standard unit technical specifications

### Compressor

Hermetic rotary compressor with gas compression in the crankcase, direct suction, no oil heater. It is mounted on antivibration rubber pads. Includes oil feed.

### Structure

Structure made entirely in Zinc–Magnesium plate that guarantees excellent mechanical characteristics and high corrosion strength over time. The compressor area is made from thick metal plate and is completely insulated with soundproofing material to minimise noise output. The ventilating section is completely lined with anti-condensate and soundproofing material.

#### **Internal exchanger**

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

#### External exchanger source side (water)

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
- entering water temperature sensor
- leaving water temperature sensor, with antifreeze function
- Vent valve

#### Fan

dual intake centrifugal fan, directly coupled, motor with external rotor, located in the centre of the fan in an aerodynamically optimum position and suspended on antivibration dampers. Forward blades for maximum efficiency and low noise, statically- and dynamically-balanced according to the ISO 1940 standards, section 6.3. The scroll, the rotor and the frame are made from galvanized steel plate (sendzimir).

The fan is mounted on a fixing plate that can be installed rotated by 180° so that the air supply intake is located on the upper part.

### **Refrigeration circuit**

Refrigeration circuit with:

- liquid receiver
- non-return valve
- 4-way reverse cycle valve
- high pressure safety pressure switch
- electronic thermostatic valve
- inlet pressure transducer for electronic thermostatic valve
- Inlet temperature probe for electronic thermostatic valve

#### **Filtration**

Flat filter, made up of a galvanized plate frame with galvanized and electric-welded protective mesh and 100% regenerable polyester filtering media with PVC resin. G2 efficiency according to CEN-EN 779 standard (Eurovent class EU4/5 - average efficiency 79% ASHRAE 52-76 Atm). Self-extinguishing (resistance to fire class 1 - DIN 53438).

#### **Drain pan**

Condensate collecting tray plate "Aluzink" welded, fitted with a discharge coupling and covered externally with anti-condensate insulation.

Trap on the drop conduit to be performed by the installer



## **Electrical panel**

The electrical panel, consisting of a microprocessor control, is located inside the unit and can be accessed via a panel which can be easily removed.

#### The capacity section includes:

- power input terminals
- main fuse

#### The control section includes:

- microprocessor control
- self-test system
- switch on and off daily and weekly programmer and set point
- cumulative alarms device, potential-free contacts for remote ON-OFF, summer/winter mode change, ECO setpoint setting, water flow presence
- antifreeze protection on the air side
- antifreeze protection water side
- no water flow-rate protection
- return air temperature probe with thermoregulation function
- manual or automatic fan speed selection

#### Accessories

- Water balancing valve (Accessory separately supplied)
- Spring antivibration mounts (Accessory separately supplied)
- Filter-holder frame with lateral and bottom exhaust
- Steel mesh strainer (Accessory separately supplied)
- Condensate drain pump (Accessory separately supplied)
- 200 mm flexible pipes for the connection to the water circuit + drop conduit (Accessory separately supplied)
- 500 mm flexible pipes for the connection to the water circuit + drop conduit (Accessory separately supplied)
- Shut-off valve for by-pass (water side) (separately supplied accessories)
- 2-way ON-OFF valve for variable flow-rate loop (Accessory separately supplied)
- 2-way modulating valve for disposable water system (Accessory separately supplied)
- Electronic room control with display, for wall installation (Accessory separately supplied)
- Electronic room control with display, for wall installation in built-in box (Accessory separately supplied)
- RS485 serial port with Modbus protocol, built-in
- RS485 Serial port with Modbus protocol (Accessory separately supplied)
- BACnet serial communication module (Accessory separately supplied)
- LonWorks serial communication module (Accessory separately supplied)
- Air supply duct with flexible connection (Accessory separately supplied)
- Return air duct (Accessory separately supplied)
- Air discharge and intake duct (Accessory separately supplied)

NOTE: The compatibility of the different options is shown in the table at the end of the "Accessory" section.

# **General technical data**

Size			5	7	9	11	15	17
Cooling A 27/19 W 30								
Cooling capacity (EN14511:2011)	1	kW	2.26	2.83	3.16	3.45	3.87	4.16
Total power input (EN14511:2011)	1	kW	0.54	0.66	0.74	0.77	0.85	0.92
EER (EN 14511:2011)	1	kW	4.22	4.27	4.28	4.50	4.54	4.51
Cooling capacity	2	kW	2.24	2.81	3.14	3.42	3.84	4.13
Sensible capacity	2	kW	1.91	2.41	2.75	2.93	3.22	3.50
Compressor power input	2	kW	0.46	0.58	0.64	0.67	0.74	0.81
Total power input	2	kW	0.53	0.65	0.72	0.76	0.84	0.91
Heating A 20 W 20								
Heating capacity (EN14511:2011)	3	kW	2.76	3.38	3.85	4.15	4.50	4.92
Total power input (EN14511:2011)	3	kW	0.55	0.65	0.77	0.82	0.94	1.06
COP (EN 14511:2011)	3	kW	4.99	5.20	4.97	5.05	4.81	4.66
Heating capacity	4	kW	2.78	3.40	3.87	4.18	4.53	4.95
Compressor power input	4	kW	0.48	0.57	0.68	0.73	0.83	0.95
Total power input	4	kW	0.55	0.64	0.76	0.82	0.93	1.05
Heating A 20 W 15								
Heating capacity (EN14511:2011)	5	kW	2.46	2.97	3.33	3.66	3.98	4.42
Total power input (EN14511:2011)	5	kW	0.55	0.64	0.73	0.80	0.89	1.02
COP (EN 14511:2011)	5	kW	4.42	4.60	4.47	4.59	4.40	4.30
Heating capacity	6	kW	2.48	2.99	3.35	3.69	4.01	4.45
Compressor power input	6	kW	0.48	0.56	0.64	0.71	0.79	0.92
Total power input	6	kW	0.55	0.63	0.72	0.80	0.89	1.02
Compressor								
Type of compressors	7		ROT	ROT	ROT	ROT	ROT	ROT
No. of compressors		No	1	1	1	1	1	1
Air Handling Section Fans (Supply)								
Type of fans	8		CFG	CFG	CFG	CFG	CFG	CFG
Airflow		l/s	148	148	170	190	222	222
Airflow		m3/h	533	533	612	684	800	800
Water side exchanger								
Type of exchanger	9		PHE	PHE	PHE	PHE	PHE	PHE
Water flow-rate	10	l/s	0.129	0.162	0.181	0.195	0.219	0.236
Pressure drop	11	kPa	18	21	26	22	27	26
Connections								
Water fittings	12		1/2″	1/2″	1/2″	1/2″	1/2″	1/2″
Condensate drain	13		15	15	15	15	15	15
Power supply								
Standard power supply		V	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50

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.

Performances referred to the standard speed fan (Quiet)

A 27/19 W 30 = Unit inlet air temperature 27°C D.B. / 19°C W.B. Unit inlet water temper

A 20 W 20 = Unit inlet air temperature 20°C Unit inlet water temperature 20°C

A 20 W 15 = Inlet air temperature 20°C Inlet water temperature 15°C

DB = dry bulb WB = wet bulb

- Ambient air 27°C D.B./19°C W.B. Exchanger water temperature 30°C / 35°C. Values read in compliance with EN14511:2011 and including the required system fan motor and water pump capacity for overcoming pressure drops inside the unit.
- Ambient air 27°C D.B./19°C W.B. Exchanger water temperature 30°C / 35°C. The value does not take into account the power of the fan's motor and the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
- 3. Ambient air 20°C D.B. Exchanger inlet water temperature 20°C. The water temperature at the exchanger output is read in relation to the flow of water being chilled. Values read in compliance with EN14511:2011 and including the required system fan motor and water pump capacity for overcoming pressure drops inside the unit.
- 4. Ambient air 20°C D.B. Exchanger inlet water temperature 20°C. The value does not take into account the power of the fan's motor and the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
- 5. Ambient air 20°C D.B. Exchanger inlet water temperature 15°C. The water temperature at the exchanger output is read in relation to the flow of water being chilled. Values read in compliance with EN14511:2011 and including the required system fan motor and water pump capacity for overcoming pressure drops inside the unit.
- 6. Ambient air 20°C D.B. Exchanger inlet water temperature 15°C. The value does not take into account the power of the fan's motor and the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers
- ROT = rotary compressor
- CFG = centrifugal fan
- PHE = plate exchanger
- 10. Water flow calculated in relation to the performances in cooling
- 11. Total pressure drop of the standard unit (without optional hydraulic pipe works). To obtain the total drops with any additional hydraulic components see accessory section.
- 12. inlet / outlet

13. External diameter pipe

# **Electrical data**

Size		5	7	9	11	15	17
F.L.A Full load current at max admissible conditions							
F.L.A Compressor 1	A	2.82	3.50	3.90	4.55	5.13	5.86
F.L.A Single supply fan	A	0.41	0.41	0.41	1.5	1.5	1.5
F.L.A Total	A	3.23	3.91	4.31	6.05	6.63	7.36
F.L.I Full load power input at max admissible conditions							
F.L.I Compressor 1	kW	0.65	0.75	0.85	1.02	1.12	1.25
F.L.I Single External Fan	kW	0.09	0.09	0.09	0.15	0.15	0.15
F.L.I Total	kW	0.74	0.84	0.94	1.17	1.27	1.40
M.I.C. Maximum inrush current							
M.I.C Value	A	18.4	19.4	20.4	23.5	26.7	26.9

Data refer to standard units. Power supply: 230/1/50 Hz. Voltage variation: max. +/-10%

# Performances in cooling

									E	XCHAN	GER EN	TERINO	5/LEAVI	NG WA	FER TEN	<b>APERAT</b>	URE (°C	:)							
SIZES	Ta(°C) DB/WB		20	/25			25	/30			30	/35			35,	/40			40	/45			45,	/50	
		kWf	kWs	kWe	EER	kWf	kWs	kWe	EER	kWf	kWs	kWe	EER	kWf	kWs	kWe	EER	kWf	kWs	kWe	EER	kWf	kWs	kWe	EER
	22/16	2,11	1,68	0,38	5,55	2,09	1,67	0,42	4,98	2,04	1,66	0,47	4,34	1,94	1,65	0,54	3,59	1,81	1,64	0,62	2,92	1,63	1,63	0,71	2,30
	24/17	2,19	1,81	0,38	5,76	2,17	1,8	0,42	5,17	2,1	1,79	0,47	4,47	2	1,78	0,53	3,77	1,86	1,77	0,62	3,00	1,68	1,68	0,71	2,37
-	26/18	2,27	1,94	0,37	6,14	2,24	1,93	0,41	5,46	2,17	1,92	0,47	4,62	2,07	1,9	0,53	3,91	1,92	1,89	0,62	3,10	1,73	1,73	0,71	2,44
5	27/19	2,35	1,94	0,37	6,35	2,32	1,92	0,41	5,66	2,24	1,91	0,46	4,87	2,13	1,89	0,53	4,02	1,98	1,87	0,62	3,19	1,79	1,79	0,71	2,52
	28/20	2,44	1,93	0,37	6,59	2,4	1,91	0,4	6,00	2,32	1,89	0,46	5,04	2,2	1,87	0,53	4,15	2,04	1,85	0,61	3,34	1,85	1,83	0,71	2,61
	30/22	2,63	1,87	0,36	7,31	2,57	1,84	0,4	6,43	2,47	1,82	0,45	5,49	2,34	1,79	0,52	4,50	2,17	1,77	0,61	3,56	1,97	1,75	0,71	2,77
	22 / 16	2,65	2,12	0,4	6,63	2,6	2,09	0,5	5,20	2,51	2,07	0,6	4,18	2,39	2,04	0,7	3,41	2,24	2,01	0,81	2,77	2,06	1,99	0,91	2,26
	24/17	2,77	2,28	0,39	7,10	2,7	2,24	0,49	5,51	2,61	2,21	0,59	4,42	2,48	2,18	0,7	3,54	2,32	2,15	0,81	2,86	2,13	2,11	0,91	2,34
7	26 / 18	2,9	2,45	0,38	7,63	2,82	2,41	0,49	5,76	2,71	2,37	0,59	4,59	2,57	2,33	0,7	3,67	2,4	2,3	0,8	3,00	2,2	2,2	0,91	2,42
· '	27 / 19	3,03	2,49	0,38	7,97	2,93	2,45	0,48	6,10	2,81	2,41	0,58	4,84	2,66	2,36	0,69	3,86	2,48	2,32	0,8	3,10	2,28	2,28	0,91	2,51
	28/20	3,17	2,56	0,37	8,57	3,05	2,52	0,47	6,49	2,91	2,47	0,58	5,02	2,75	2,43	0,69	3,99	2,56	2,38	0,8	3,20	2,35	2,34	0,91	2,58
	30/22	3,46	2,83	0,35	9,89	3,3	2,78	0,45	7,33	3,13	2,73	0,56	5,59	2,94	2,68	0,68	4,32	2,73	2,63	0,79	3,46	2,51	2,51	0,91	2,76
	22/16	2,86	2,37	0,56	5,11	2,86	2,37	0,6	4,77	2,81	2,37	0,66	4,26	2,71	2,37	0,74	3,66	2,56	2,37	0,85	3,01	2,35	2,35	0,99	2,37
	24/17	2,97	2,56	0,55	5,40	2,97	2,56	0,59	5,03	2,92	2,56	0,65	4,49	2,81	2,56	0,74	3,80	2,65	2,56	0,86	3,08	2,44	2,44	1	2,44
0	26/18	3,08	2,76	0,54	5,70	3,08	2,75	0,58	5,31	3,03	2,75	0,65	4,66	2,92	2,75	0,74	3,95	2,75	2,74	0,86	3,20	2,53	2,53	1	2,53
	27 / 19	3,2	2,76	0,52	6,15	3,2	2,75	0,57	5,61	3,14	2,75	0,64	4,91	3,02	2,74	0,74	4,08	2,85	2,74	0,86	3,31	2,62	2,62	1	2,62
	28/20	3,33	2,75	0,5	6,66	3,32	2,75	0,56	5,93	3,25	2,74	0,64	5,08	3,13	2,74	0,74	4,23	2,95	2,73	0,86	3,43	2,71	2,71	1,01	2,68
	30/22	3,6	2,73	0,47	7,66	3,58	2,72	0,54	6,63	3,49	2,71	0,63	5,54	3,35	2,7	0,74	4,53	3,16	2,7	0,87	3,63	2,91	2,69	1,02	2,85
	22/16	3,23	2,63	0,55	5,87	3,19	2,61	0,6	5,32	3,11	2,58	0,67	4,64	2,98	2,56	0,75	3,97	2,82	2,53	0,85	3,32	2,61	2,51	0,97	2,69
	24/17	3,34	2,83	0,55	6,07	3,29	2,8	0,6	5,48	3,2	2,78	0,67	4,78	3,08	2,75	0,75	4,11	2,91	2,73	0,85	3,42	2,7	2,7	0,97	2,78
11	26/18	3,45	3,01	0,55	6,27	3,4	2,99	0,6	5,67	3,31	2,96	0,67	4,94	3,18	2,93	0,75	4,24	3,01	2,91	0,85	3,54	2,8	2,8	0,97	2,89
	27 / 19	3,57	2,99	0,55	6,49	3,52	2,96	0,6	5,87	3,42	2,93	0,67	5,10	3,28	2,91	0,75	4,37	3,11	2,88	0,85	3,66	2,89	2,85	0,97	2,98
	28/20	3,7	2,95	0,55	6,73	3,64	2,92	0,6	6,07	3,54	2,89	0,66	5,36	3,4	2,86	0,75	4,53	3,21	2,83	0,85	3,78	2,99	2,8	0,97	3,08
	30/22	3,96	2,79	0,55	7,20	3,9	2,76	0,59	6,61	3,79	2,72	0,66	5,74	3,63	2,69	0,75	4,84	3,43	2,65	0,85	4,04	3,19	2,62	0,97	3,29
	22 / 16	3,83	3	0,7	5,47	3,66	2,91	0,71	5,15	3,48	2,82	0,74	4,70	3,28	2,72	0,74	4,43	3,07	2,63	0,88	3,49	2,85	2,54	0,99	2,88
	24/17	3,96	3,22	0,7	5,66	3,78	3,13	0,71	5,32	3,59	3,04	0,74	4,85	3,4	2,95	0,8	4,25	3,019	2,85	0,88	3,43	2,97	2,76	0,99	3,00
15	26/18	4,09	3,43	0,7	5,84	3,91	3,34	0,71	5,51	3,72	3,25	0,74	5,03	3,52	3,16	0,8	4,40	3,31	3,07	0,88	3,76	3,1	2,98	0,99	3,13
15	27/19	4,22	3,39	0,69	6,12	4,04	3,31	0,71	5,69	3,84	3,22	0,74	5,19	3,64	3,13	0,8	4,55	3,44	3,05	0,88	3,91	3,22	2,96	0,99	3,25
	28/20	4,36	3,32	0,69	6,32	4,17	3,24	0,7	5,96	3,98	3,16	0,74	5,38	3,77	3,08	0,8	4,71	3,57	3	0,88	4,06	3,35	2,92	0,99	3,38
	30/22	4,63	3,04	0,69	6,71	4,45	2,98	0,7	6,36	4,26	2,92	0,74	5,76	4,05	2,85	0,8	5,06	3,83	2,79	0,88	4,35	3,6	2,73	0,98	3,67
	22/16	4,12	3,24	0,63	6,54	3,95	3,15	0,72	5,49	3,78	3,06	0,8	4,73	3,6	2,97	0,89	4,04	3,42	2,89	0,98	3,49	3,23	2,8	1,06	3,05
	24/17	4,24	3,43	0,63	6,73	4,07	3,34	0,72	5,65	3,89	3,26	0,8	4,86	3,72	3,17	0,89	4,18	3,54	3,08	0,98	3,61	3,36	2,99	1,07	3,14
17	26/18	4,36	3,64	0,64	6,81	4,19	3,56	0,72	5,82	4,01	3,47	0,81	4,95	3,83	3,38	0,89	4,30	3,66	3,29	0,98	3,73	3,48	3,21	1,06	3,28
17	27 / 19	4,49	3,67	0,64	7,02	4,31	3,59	0,72	5,99	4,13	3,5	0,81	5,10	3,95	3,41	0,89	4,44	3,77	3,33	0,98	3,85	3,6	3,24	1,06	3,40
	28/20	4,63	3,74	0,65	7,12	4,44	3,66	0,73	6,08	4,26	3,57	0,81	5,26	4,07	3,49	0,89	4,57	3,89	3,41	0,97	4,01	3,71	3,32	1,06	3,50
	30/22	4,91	4,05	0,67	7,33	4,72	3,97	0,74	6,38	4,53	3,89	0,81	5,59	4,33	3,81	0,89	4,87	4,13	3,73	0,97	4,26	3,93	3,65	1,05	3,74

Performances referred to the standard speed fan (Quiet)

EER referred only to compressors

 $\label{eq:alpha} \begin{array}{l} Ta = entering \mbox{ air temperature to the air handling coil (°C)} \\ DB = dry \mbox{ bulb } \qquad WB = wet \mbox{ bulb } \end{array}$ 

kWf = Cooling capacity in kW. kWe = Compressor power input in kW kWs = sensible cooling capacity (kW)

Not all cooling yields take into account the heat dissipated by the fan motors

# **Performance in Heating**

<table-container>          SNE         Image: Partial series and series</table-container>								1	EXCHANG	ER ENTERI	NG/LEAVI	NG WATEI	R TEMPER	ATURE (°C	:)					
New         New         COP         New         New         COP         New         COP         New         New         COP         New         New         COP         New         New <th>SIZES</th> <th>Ta (°C) DR</th> <th></th> <th>12/7</th> <th></th> <th></th> <th>15/10</th> <th></th> <th></th> <th>17/12</th> <th></th> <th></th> <th>20/15</th> <th></th> <th></th> <th>25/20</th> <th></th> <th></th> <th>35/30</th> <th></th>	SIZES	Ta (°C) DR		12/7			15/10			17/12			20/15			25/20			35/30	
10         2.19         0.39         5.62         2.44         0.39         6.62         2.41         0.39         6.62         2.41         0.39         6.62         2.44         0.39         7.28         0.31         0.44         6.00         3.77         0.45         5.70         5.75         5.76         5.76         5.78         5			kWt	kWe	COP	kWt	kWe	COP	kWt	kWe	COP	kWt	kWe	СОР	kWt	kWe	COP	kWt	kWe	COP
15         2.21         0.42         5.26         2.44         0.45         5.67         2.58         0.43         5.07         2.75         0.46         5.96         3.04         0.47         6.25         5.95           12         2.2         0.46         5.02         2.73         0.46         5.05         2.55         0.45         5.06         2.57         0.45         5.05         2.55         5.56         3.55         5.57         3.52         2.75         0.45         5.05         3.55         5.55         3.55         5.57         3.55         5.57         3.55 <th></th> <th>10</th> <th>2,19</th> <th>0,39</th> <th>5,62</th> <th>2,45</th> <th>0,39</th> <th>6,28</th> <th>2,61</th> <th>0,39</th> <th>6,69</th> <th>2,84</th> <th>0,39</th> <th>7,28</th> <th>3,2</th> <th>0,4</th> <th>8,00</th> <th>3,27</th> <th>0,43</th> <th>7,70</th>		10	2,19	0,39	5,62	2,45	0,39	6,28	2,61	0,39	6,69	2,84	0,39	7,28	3,2	0,4	8,00	3,27	0,43	7,70
18         2.1         0.44         5.02         2.43         0.45         5.04         0.46         5.27         2.15         0.46         5.17         0.16         5.08         0.90         0.47         0.10         0.50         5.56           10         2.10         0.44         4.76         2.31         0.45         0.51         2.17         0.48         5.00         2.05         0.51         2.01         0.45         0.51         2.01         0.45         0.51         2.01         0.45         0.51         0.51         0.51         0.50         0.50         0.50         0.51 <th></th> <th>15</th> <th>2,21</th> <th>0,42</th> <th>5,26</th> <th>2,44</th> <th>0,43</th> <th>5,67</th> <th>2,58</th> <th>0,43</th> <th>6,00</th> <th>2,79</th> <th>0,44</th> <th>6,34</th> <th>3,1</th> <th>0,44</th> <th>7,05</th> <th>3,18</th> <th>0,47</th> <th>6,82</th>		15	2,21	0,42	5,26	2,44	0,43	5,67	2,58	0,43	6,00	2,79	0,44	6,34	3,1	0,44	7,05	3,18	0,47	6,82
1         2         0.4		18	2,21	0,44	5,02	2,43	0,45	5,40	2,56	0,46	5,57	2,75	0,46	5,98	3,04	0,47	6,47	3,12	0,50	6,29
122         219         0.48         4.56         2.39         0.49         4.50         2.50         0.51         0.50         2.50         0.51         5.70         2.50         0.50         2.50         2.50         2.50         2.50         2.50         2.50         2.50         2	5	20	2,2	0,46	4,78	2,41	0,47	5,13	2,54	0,48	5,29	2,73	0,48	5,69	2,99	0,49	6,10	3,07	0,52	5,94
125         135         130 <th></th> <th>22</th> <th>2,19</th> <th>0,48</th> <th>4,56</th> <th>2,39</th> <th>0,49</th> <th>4,88</th> <th>2,52</th> <th>0,49</th> <th>5,14</th> <th>2,7</th> <th>0,5</th> <th>5,40</th> <th>2,95</th> <th>0,51</th> <th>5,78</th> <th>3,03</th> <th>0,54</th> <th>5,65</th>		22	2,19	0,48	4,56	2,39	0,49	4,88	2,52	0,49	5,14	2,7	0,5	5,40	2,95	0,51	5,78	3,03	0,54	5,65
100         100 <th></th> <th>25</th> <th>2,15</th> <th>0,5</th> <th>4,30</th> <th>2,36</th> <th>0,52</th> <th>4,54</th> <th>2,49</th> <th>0,52</th> <th>4,79</th> <th>2,65</th> <th>0,53</th> <th>5,00</th> <th>2,87</th> <th>0,54</th> <th>5,31</th> <th>2,95</th> <th>0,57</th> <th>5,21</th>		25	2,15	0,5	4,30	2,36	0,52	4,54	2,49	0,52	4,79	2,65	0,53	5,00	2,87	0,54	5,31	2,95	0,57	5,21
10         12.2         0.3         6.3         0.2         0.4         7.3         0.4         7.3         0.2         0.4         0.3         0.4         0.3         0.4         0.3         0.4         0.3         0.4         0.3         0.4         0.3         0.4         0.3         0.4         0.3         0.5         0.3         0.5         0.3         0.5         0.3         0.5         0.3         0.5         0.3         0.5         0.3         0.5         0.3         0.5         0.5         0.3         0.5         0.5         0.5         0.3         0.5         0.5         0.3         0.5 <th></th> <th>30</th> <th>2,08</th> <th>0,55</th> <th>3,78</th> <th>2,3</th> <th>0,57</th> <th>4,04</th> <th>2,42</th> <th>0,58</th> <th>4,17</th> <th>2,57</th> <th>0,59</th> <th>4,36</th> <th>2,74</th> <th>0,6</th> <th>4,57</th> <th>2,81</th> <th>0,63</th> <th>4,50</th>		30	2,08	0,55	3,78	2,3	0,57	4,04	2,42	0,58	4,17	2,57	0,59	4,36	2,74	0,6	4,57	2,81	0,63	4,50
15         2,59         0,46         5,32         0,20         0,48         6,30         0,32         0,50         0,31         0,30         0,52         0,50         0,31         0,30         0,50         0,32         0,50         0,31         0,30         0,50         0,30         0,50         0,30         0,50         0,30         0,50         0,30         0,50         0,30         0		10	2,52	0,38	6,63	2,92	0,4	7,30	3,17	0,41	7,73	3,52	0,42	8,38	4,02	0,43	9,35	4,07	0,48	8,52
18         2.61         5.12         2.91         0.52         5.60         3.1         0.53         5.85         3.36         0.54         6.22         3.74         0.55         6.80         3.72         0.60         5.72           20         2.01         0.56         4.66         2.95         5.27         3.08         0.50         5.28         3.66         0.55         5.28         3.68         5.75         3.28         0.55         3.68         3.61         5.75         3.58         5.75         3.58         5.75         3.58         5.75         3.68         5.78         3.58         5.75         3.58         5.75         3.68         5.75         3.78         5.75         3.78         5.75         3.78         5.75         3.78         5.75         3.78         5.75         3.78         5.75         3.78         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         3.79         5.75         4.75         5.75         4.78         5.70         5.75         4.78         5.70         5.75         5.70 <th></th> <th>15</th> <th>2,59</th> <th>0,46</th> <th>5,63</th> <th>2,92</th> <th>0,48</th> <th>6,08</th> <th>3,13</th> <th>0,49</th> <th>6,39</th> <th>3,42</th> <th>0,5</th> <th>6,84</th> <th>3,84</th> <th>0,51</th> <th>7,53</th> <th>3,89</th> <th>0,56</th> <th>6,94</th>		15	2,59	0,46	5,63	2,92	0,48	6,08	3,13	0,49	6,39	3,42	0,5	6,84	3,84	0,51	7,53	3,89	0,56	6,94
20         2.61         0.54         4.83         2.9         0.55         5.27         3.08         0.55         5.30         5.33         0.57         5.84         3.67         0.58         6.33         3.72         0.63         5.79           22         2.61         0.56         4.66         2.89         0.88         4.90         3.01         0.63         5.90         5.90         5.04         5.05         3.33         0.61         5.05         3.66         0.66         3.66         3.66         0.60         3.66         3.60         3.60         4.42           25         2.65         0.66         3.66         3.70         0.55         5.90         0.70         4.90         0.71         4.30         0.63         4.50         3.44         0.71         4.30         0.63         4.50         3.60         0.71         4.30         0.63         4.50         3.60         0.71         4.30         0.63         4.50         3.60         0.71         4.30         0.63         4.50         3.60         0.61         4.50         3.60         0.61         3.60         0.61         3.60         0.61         3.60         0.61         3.61         0.61         6.61		18	2,61	0,51	5,12	2,91	0,52	5,60	3,1	0,53	5,85	3,36	0,54	6,22	3,74	0,55	6,80	3,79	0,60	6,31
22         2.61         0.56         4.66         2.89         0.58         4.98         0.60         5.19         3.29         0.6         5.48         3.61         0.61         5.29         3.66         0.66         5.32           25         2.66         0.66         4.33         2.86         0.62         4.61         3.01         0.63         4.78         3.23         0.64         5.05         3.68         0.62         4.60         3.01         0.71         0.71         0.73         4.69         3.64         0.74         0.71         0.71         0.73         4.69         3.64         0.72         0.75         5.05         3.49         0.50         3.20         0.66         6.37         4.39         0.63         6.97         4.44         0.75         6.56           10         2.93         0.61         4.82         3.21         0.64         5.90         3.20         0.66         5.37         3.73         0.75         5.36         4.39         0.65         5.31         3.75         0.75         5.36         4.29         0.50         4.34         0.75         4.56           20         2.92         0.64         4.53         3.66         3.71	7	20	2,61	0,54	4,83	2,9	0,55	5,27	3,08	0,56	5,50	3,33	0,57	5,84	3,67	0,58	6,33	3,72	0,63	5,89
25         2.6         0.6         4.33         2.86         0.62         4.61         3.01         0.63         4.78         3.23         0.64         5.05         5.33         0.65         5.43         3.58         0.70         5.09           30         2.94         0.75         5.06         3.26         0.75         5.95         3.90         5.91         5.91 <th></th> <th>22</th> <th>2,61</th> <th>0,56</th> <th>4,66</th> <th>2,89</th> <th>0,58</th> <th>4,98</th> <th>3,06</th> <th>0,59</th> <th>5,19</th> <th>3,29</th> <th>0,6</th> <th>5,48</th> <th>3,61</th> <th>0,61</th> <th>5,92</th> <th>3,66</th> <th>0,66</th> <th>5,52</th>		22	2,61	0,56	4,66	2,89	0,58	4,98	3,06	0,59	5,19	3,29	0,6	5,48	3,61	0,61	5,92	3,66	0,66	5,52
30       2,55       0,66       3,86       2,78       0,68       4,09       2,93       0,7       4,19       3,12       0,71       4,39       3,41       0,73       4,69       3,46       0,78       4,72         10       2,94       0,57       5,16       3,27       0,55       5,55       3,47       0,50       5,00       3,27       0,59       5,00       3,27       0,59       5,30       3,20       0,61       5,30       3,47       0,62       5,00       3,50       0,63       5,16       3,20       0,61       5,10       3,27       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,60       5,11       0,61       1,10       0,61       1,10       0,10       0,10       0,11       0,10       0,10       0,10       1,10       0,10       1,10       0,10       1,10       0,10       1		25	2,6	0,6	4,33	2,86	0,62	4,61	3,01	0,63	4,78	3,23	0,64	5,05	3,53	0,65	5,43	3,58	0,70	5,09
10         2,94         0,57         5,16         3,27         0,55         5,95         3,49         0,54         6,46         3,84         0,53         7,25         4,45         0,54         6,36         7,25           15         2,95         0,59         5,00         3,27         0,59         5,54         3,48         0,59         5,00         3,27         0,63         6,37         4,39         0,63         6,97         4,44         0,67         5,61           18         2,94         0,61         4,82         3,24         0,63         5,14         3,45         0,60         5,13         3,76         0,7         5,61         4,29         0,55         5,54         3,49         0,55         5,61         4,24         0,55         5,56         4,29         0,56         5,49         0,56         5,49         0,57         5,68         3,24         0,65         3,24         0,67         5,12         3,76         0,75         5,83         4,44         0,55         5,65         4,29         0,59         5,14         3,45         0,65         5,21         3,75         0,75         5,80         4,16         0,81         4,16         0,81         5,14         4,16		30	2,55	0,66	3,86	2,78	0,68	4,09	2,93	0,7	4,19	3,12	0,71	4,39	3,41	0,73	4,69	3,46	0,78	4,42
15         2.95         0.50         5.00         3.27         0.59         5.54         3.48         0.59         5.90         3.82         0.66         6.37         4.39         0.63         6.97         4.44         0.67         6.59           18         2.94         0.61         4.82         3.25         0.61         5.33         3.47         0.62         5.01         3.92         0.64         5.92         4.33         0.68         6.37         4.38         0.72         6.69           20         2.93         0.64         4.56         3.20         0.66         4.88         3.40         0.67         5.12         3.73         0.77         5.61         4.29         0.75         5.69         4.94         0.67         5.68         4.08         4.07         5.68         4.99         5.68         3.61         0.77         4.69         3.67         0.75         4.89         4.61         0.60         5.68         4.60         6.77         4.81         0.61         5.74         4.11         3.65         5.74         4.11         3.65         5.74         4.12         0.70         4.80         6.60         4.74         0.70         5.78         4.61         0.61		10	2,94	0,57	5,16	3,27	0,55	5,95	3,49	0,54	6,46	3,84	0,53	7,25	4,45	0,54	8,24	4,50	0,58	7,72
18         2,94         0,61         4,82         3,25         0,61         5,33         3,47         0,62         5,60         3,79         0,64         5,92         4,33         0,68         6,37         4,38         0,72         6,05           20         2,93         0,62         4,73         3,24         0,63         5,14         3,45         0,65         5,11         3,76         0,67         5,61         4,29         0,72         5,56         4,34         0,76         5,68           22         2,92         0,64         4,56         3,22         0,66         4,88         3,43         0,67         5,12         3,73         0,7         5,33         4,24         0,57         5,56         4,29         0,64         4,21         0,66         4,21         0,67         4,88         0,75         5,68         4,80         0,70         4,81         0,60         7,77         4,81         0,62         7,76         4,86         0,67         7,30           10         3,33         0,66         5,02         3,66         0,68         5,22         3,60         0,69         5,54         4,12         0,7         5,59         4,61         0,70         5,60		15	2,95	0,59	5,00	3,27	0,59	5,54	3,48	0,59	5,90	3,82	0,6	6,37	4,39	0,63	6,97	4,44	0,67	6,59
9         20         2,93         0,62         4,73         3,24         0,63         5,14         3,76         0,67         5,61         4,29         0,72         5,96         4,34         0,76         5,68           22         2,92         0,64         4,56         3,22         0,66         4,88         3,43         0,67         5,12         3,73         0,7         5,33         4,24         0,75         5,65         4,29         0,79         5,40           25         2,9         0,67         4,33         3,19         0,7         4,94         3,29         0,8         4,11         3,56         0,83         4,29         3,99         0,89         4,48         4,04         0,44         4,34         0,43         4,31         0,77         4,94         3,57         0,59         6,61         4,24         0,67         4,81         0,60         4,44         0,44         0,44         0,43         0,43         0,43         0,44         0,43         0,44         0,74         5,30           10         3,33         0,66         5,02         3,64         0,57         5,34         4,12         0,7         5,89         4,61         0,7         6,40         0,5		18	2,94	0,61	4,82	3,25	0,61	5,33	3,47	0,62	5,60	3,79	0,64	5,92	4,33	0,68	6,37	4,38	0,72	6,05
22         2,92         0,64         4,56         3,22         0,66         4,88         3,43         0,67         5,12         3,73         0,7         5,33         4,24         0,75         5,65         4,29         0,79         5,40           25         2,9         0,67         4,33         3,19         0,7         4,56         3,38         0,72         4,69         3,67         0,75         4,89         4,16         0,81         5,14         4,21         0,80         4,14         0,81         5,14         4,21         0,80         4,14         0,41         0,55         0,83         4,29         3,99         0,89         4,48         4,04         0,94         4,31           10         3,35         0,59         5,68         3,65         0,64         5,70         3,86         0,55         5,94         4,17         0,66         6,32         4,69         0,68         6,90         4,74         0,73         6,50           18         3,31         0,66         5,02         3,62         0,68         5,32         3,81         0,75         4,48         0,75         5,59         4,50         0,75         6,40         0,75         5,50         1,76         <	9	20	2,93	0,62	4,73	3,24	0,63	5,14	3,45	0,65	5,31	3,76	0,67	5,61	4,29	0,72	5,96	4,34	0,76	5,68
25         2,9         0,67         4,33         3,19         0,7         4,56         3,38         0,72         4,69         3,67         0,75         4,89         4,16         0,81         5,14         4,21         0,86         4,92           30         2,84         0,74         3,84         3,11         0,77         4,04         3,29         0,8         4,11         3,56         0,83         4,29         3,99         0,89         4,48         4,04         0,94         4,31           10         3,35         0,59         5,68         3,68         0,59         6,61         4,24         0,6         7,07         4,81         0,62         7,76         4,86         0,7         4,86         0,7         3,86         0,55         5,94         4,17         0,66         5,22         4,60         0,7         5,89         4,61         0,72         6,40         4,66         0,77         6,90         4,74         0,73         5,78         4,17         0,60         5,22         4,50         0,71         4,50         0,71         5,78         4,16         0,71         5,78         4,61         0,70         5,78         4,61         0,70         5,78         4,17		22	2,92	0,64	4,56	3,22	0,66	4,88	3,43	0,67	5,12	3,73	0,7	5,33	4,24	0,75	5,65	4,29	0,79	5,40
30         2,84         0,74         3,84         3,11         0,77         4,04         3,29         0,8         4,11         3,56         0,83         4,29         3,99         0,89         4,48         4,04         0,94         4,31           10         3,35         0,59         5,68         3,68         0,59         6,24         3,9         0,59         6,61         4,24         0,6         7,07         4,81         0,62         7,76         4,86         0,67         7,30           15         3,34         0,66         5,02         3,65         0,64         5,70         3,86         0,65         5,94         4,17         0,66         6,32         4,60         0,72         6,40         4,66         0,77         6,07         6,07         6,07         6,07         6,07         6,07         6,07         5,39         4,51         0,75         5,09         4,61         0,70         5,09         4,61         0,77         6,07         6,07         5,07         4,04         0,76         5,32         4,51         0,78         4,56         0,78         4,51         0,78         4,51         0,78         4,51         0,70         5,32         4,51         0,78		25	2,9	0,67	4,33	3,19	0,7	4,56	3,38	0,72	4,69	3,67	0,75	4,89	4,16	0,81	5,14	4,21	0,86	4,92
10         3,35         0,59         5,68         3,68         0,59         6,24         3,9         0,59         6,61         4,24         0,60         7,07         4,81         0,62         7,76         4,86         0,67         7,30           15         3,34         0,63         5,30         3,65         0,64         5,70         3,86         0,65         5,94         4,17         0,66         6,32         4,69         0,68         6,90         4,74         0,73         6,52           18         3,31         0,66         5,02         3,62         0,68         5,32         3,82         0,69         5,54         4,12         0,7         5,89         4,61         0,72         6,40         4,66         0,77         6,07         6,08         4,61         0,80         5,78           20         3,22         0,69         4,77         3,59         0,77         4,58         3,79         0,71         5,34         4,08         0,75         4,58         0,78         4,51         0,88         5,51           20         3,22         0,75         4,27         3,55         0,77         4,55         3,77         0,79         4,68         3,98         0		30	2,84	0,74	3,84	3,11	0,77	4,04	3,29	0,8	4,11	3,56	0,83	4,29	3,99	0,89	4,48	4,04	0,94	4,31
15         3,34         0,63         5,30         3,65         0,64         5,70         3,86         0,65         5,94         4,17         0,66         6,32         4,69         0,68         6,90         4,74         0,73         6,52           18         3,31         0,66         5,02         3,62         0,68         5,32         3,82         0,69         5,54         4,12         0,7         5,89         4,61         0,72         6,40         4,66         0,77         6,07         6,07         6,07         6,08         4,61         0,80         5,78         4,51         0,78         5,78         4,51         0,83         5,78         4,51         0,80         5,78         4,51         0,83         5,71         6,07         4,04         0,76         5,32         4,51         0,78         5,78         4,60         0,83         5,78         4,56         0,83         5,71           20         3,26         0,71         4,29         3,58         0,74         5,70         4,04         0,76         5,32         4,51         0,83         5,14         4,83         0,83         5,14         4,83         0,83         5,14         4,83         0,83         5,14		10	3,35	0,59	5,68	3,68	0,59	6,24	3,9	0,59	6,61	4,24	0,6	7,07	4,81	0,62	7,76	4,86	0,67	7,30
18         3,31         0,66         5,02         3,62         0,68         5,32         3,82         0,69         5,54         4,12         0,7         5,89         4,61         0,72         6,40         4,66         0,77         6,07         5,78         4,56         0,75         6,08         4,61         0,80         5,78           22         3,26         0,71         4,59         3,75         0,74         5,07         4,04         0,76         5,32         4,51         0,78         5,78         4,50         0,83         5,71           25         3,27         0,75         4,27         3,5         0,77         4,55         3,77         0,71         5,32         4,40         0,83         5,14         4,43         0,81         4,11         0,71         5,16         3,17		15	3,34	0,63	5,30	3,65	0,64	5,70	3,86	0,65	5,94	4,17	0,66	6,32	4,69	0,68	6,90	4,74	0,73	6,52
11         20         3,29         0,69         4,77         3,59         0,7         5,13         3,79         0,71         5,34         4,08         0,73         5,59         4,56         0,75         6,08         4,61         0,80         5,78           22         3,26         0,71         4,59         3,56         0,73         4,88         3,75         0,74         5,07         4,04         0,76         5,32         4,51         0,78         5,78         4,56         0,83         5,51           25         3,2         0,75         4,27         3,5         0,77         4,55         3,7         0,79         4,68         3,98         0,81         4,91         4,43         0,83         5,34         4,48         0,88         5,10           30         3,07         0,82         3,74         3,39         0,85         3,99         3,58         0,87         4,11         3,86         0,9         4,28         0,93         4,60         4,33         0,88         4,43           30         3,07         0,82         5,47         4,26         0,74         5,76         6,03         5,14         0,8         6,43         5,17         0,83         6,26 <th></th> <th>18</th> <th>3,31</th> <th>0,66</th> <th>5,02</th> <th>3,62</th> <th>0,68</th> <th>5,32</th> <th>3,82</th> <th>0,69</th> <th>5,54</th> <th>4,12</th> <th>0,7</th> <th>5,89</th> <th>4,61</th> <th>0,72</th> <th>6,40</th> <th>4,66</th> <th>0,77</th> <th>6,07</th>		18	3,31	0,66	5,02	3,62	0,68	5,32	3,82	0,69	5,54	4,12	0,7	5,89	4,61	0,72	6,40	4,66	0,77	6,07
22         3,26         0,71         4,59         3,56         0,73         4,88         3,75         0,74         5,70         4,04         0,76         5,32         4,51         0,78         5,78         4,56         0,83         5,51           25         3,2         0,75         4,27         3,5         0,77         4,55         3,7         0,79         4,68         3,98         0,81         4,91         4,43         0,83         5,34         4,48         0,88         5,10           30         3,07         0,82         3,74         3,39         0,85         3,99         3,58         0,71         4,55         4,11         3,86         0,9         4,29         4,28         0,93         4,60         4,33         0,98         4,43           10         3,89         0,7         5,56         4,21         0,7         6,01         4,17         0,76         4,58         0,71         6,69         5,29         0,74         7,15         5,32         0,76         6,33         5,17         0,83         6,26           15         3,76         0,72         5,47         4,26         0,74         5,76         4,58         0,76         5,03         0,83<	11	20	3,29	0,69	4,77	3,59	0,7	5,13	3,79	0,71	5,34	4,08	0,73	5,59	4,56	0,75	6,08	4,61	0,80	5,78
25         3,2         0,75         4,27         3,5         0,77         4,55         3,7         0,79         4,68         3,98         0,81         4,91         4,43         0,83         5,34         4,48         0,88         5,10           30         3,07         0,82         3,74         3,39         0,85         3,99         3,58         0,87         4,11         3,86         0,9         4,29         4,28         0,93         4,60         4,33         0,98         4,43           10         3,89         0,7         5,56         4,21         0,7         6,01         4,15         0,71         6,69         5,29         0,74         7,15         5,32         0,76         6,95           15         3,76         0,72         5,22         4,05         0,74         4,26         0,74         5,76         4,58         0,76         5,03         5,14         0,83         5,17         0,83         6,26           15         3,76         0,72         5,47         4,26         0,74         5,76         4,58         0,76         5,03         0,83         6,43         5,17         0,83         6,46         5,91           16         3,68		22	3,26	0,71	4,59	3,56	0,73	4,88	3,75	0,74	5,07	4,04	0,76	5,32	4,51	0,78	5,78	4,56	0,83	5,51
30         3,07         0,82         3,74         3,39         0,85         3,99         3,58         0,87         4,11         3,86         0,9         4,29         4,28         0,93         4,60         4,33         0,98         4,43           10         3,89         0,70         5,56         4,21         0,7         6,01         4,42         0,7         6,01         4,50         0,71         5,69         5,29         0,74         7,15         5,32         0,76         6,95           15         3,76         0,72         5,22         4,05         0,74         5,76         4,58         0,76         6,03         5,14         0,8         6,43         5,17         0,83         6,26           18         3,68         0,74         4,97         3,97         0,77         5,16         4,17         0,77         5,20         4,48         0,79         5,67         5,03         0,88         6,06         5,06         0,86         5,91           20         3,63         0,76         4,78         0,79         4,97         4,07         0,77         5,20         4,48         0,89         4,88         0,86         5,48         4,99         0,89         5,6		25	3,2	0,/5	4,27	3,5	0,//	4,55	3,/	0,79	4,68	3,98	0,81	4,91	4,43	0,83	5,34	4,48	0,88	5,10
10         3,89         0,7         5,56         4,21         0,7         6,01         4,42         0,7         6,51         4,75         0,71         6,69         5,29         0,74         7,15         5,22         0,76         6,93           15         3,76         0,72         5,22         4,05         0,74         4,26         0,74         5,76         4,58         0,76         6,03         5,14         0,8         6,43         5,17         0,83         6,26           18         3,68         0,74         4,97         3,97         0,77         5,16         4,17         0,77         5,42         4,48         0,79         5,67         5,03         0,83         6,06         5,06         0,86         5,91           20         3,63         0,76         4,78         3,91         0,77         5,16         4,17         0,77         5,20         4,42         0,82         5,39         4,96         0,86         5,07         4,99         0,89         5,63           20         3,63         0,76         4,90         0,82         4,95         4,42         0,82         5,39         4,96         0,86         5,77         4,99         0,89         5,3		30	3,07	0,82	3,/4	3,39	0,85	3,99	3,58	0,8/	4,11	3,86	0,9	4,29	4,28	0,93	4,60	4,33	0,98	4,43
15         3,76         0,72         5,22         4,05         0,74         5,76         4,58         0,76         6,03         5,14         0,88         6,43         5,17         0,83         6,23           15         3,68         0,74         4,07         3,97         0,77         5,16         4,17         0,77         5,42         4,48         0,79         5,67         5,03         0,83         6,06         5,06         0,86         5,77         4,99         0,89         5,76           20         3,63         0,76         4,78         3,91         0,79         4,95         4,11         0,79         5,20         4,42         0,82         5,39         4,96         0,86         5,77         4,99         0,89         5,63           22         3,59         0,78         4,60         3,86         0,82         4,71         4,06         0,82         4,95         0,84         5,18         4,88         0,89         5,48         4,91         0,92         5,36           22         3,59         0,82         4,29         3,79         0,86         4,41         3,98         0,86         4,35         0,84         5,18         4,88         0,89 <td< th=""><th></th><th>10</th><th>3,89</th><th>0,7</th><th>5,56</th><th>4,21</th><th>0,/</th><th>6,01</th><th>4,42</th><th>0,/</th><th>6,31</th><th>4,/5</th><th>0,/1</th><th>6,69</th><th>5,29</th><th>0,74</th><th>7,15</th><th>5,32</th><th>0,76</th><th>6,95</th></td<>		10	3,89	0,7	5,56	4,21	0,/	6,01	4,42	0,/	6,31	4,/5	0,/1	6,69	5,29	0,74	7,15	5,32	0,76	6,95
18         3,68         0,74         4,97         3,97         0,77         5,16         4,17         0,77         5,42         4,48         0,79         5,67         5,03         0,83         6,06         5,06         0,86         5,97           15         20         3,63         0,76         4,78         3,91         0,79         4,95         4,11         0,79         5,20         4,42         0,82         5,39         4,96         0,86         5,77         4,99         0,89         5,63           20         3,59         0,78         4,60         3,86         0,82         4,11         0,79         5,20         4,42         0,82         5,39         4,96         0,86         5,77         4,99         0,89         5,63           20         3,59         0,78         4,60         3,88         0,82         4,71         4,06         0,82         4,35         0,84         5,18         4,88         0,89         5,48         4,91         0,92         5,36           25         3,52         0,82         4,29         3,79         0,86         4,41         3,98         0,86         4,63         0,89         4,75         0,93         5,11         4		10	3,/6	0,72	5,22	4,05	0,74	5,4/	4,20	0,74	5,/0	4,58	0,76	6,03	5,14	0,8	6,43	5,17	0,83	6,26
15         20         3,53         0,76         4,78         3,59         0,79         4,95         4,11         0,79         5,20         4,42         0,82         5,39         4,96         0,86         5,77         4,99         0,89         5,89           22         3,59         0,78         4,60         3,86         0,82         4,71         4,06         0,82         4,95         0,84         5,18         4,88         0,89         5,48         4,91         0,92         5,36           25         3,52         0,82         4,29         3,79         0,86         4,41         3,98         0,86         4,63         4,26         0,89         4,75         0,93         5,11         4,78         0,96         5,00           30         3,42         0,89         3,84         3,69         0,95         3,88         3,87         0,95         4,07         4,12         0,98         4,50         1,02         4,44         4,56         1,05         4,36           30         3,42         0,89         3,84         3,69         0,95         3,88         3,87         0,95         4,12         0,98         4,50         1,02         4,44         4,56         1	15	18	3,68	0,74	4,9/	3,97	0,77	5,10	4,1/	0,77	5,42	4,48	0,79	5,6/	5,03	0,83	6,06	5,06	0,86	5,91
22         5,59         6,70         4,00         5,60         6,70         4,71         4,00         6,02         4,75         6,75         6,76         4,60         5,46         4,71         6,92         5,56           25         3,52         0,82         4,29         3,79         0,86         4,41         3,98         0,86         4,63         4,26         0,89         4,79         4,75         0,93         5,11         4,78         0,96         5,00           30         3,42         0,89         3,84         3,69         0,95         3,88         3,87         0,95         4,07         0,98         4,53         1,02         4,44         4,56         1,05         4,36	15	20	3,03	0,70	4,/8	3,91	0,79	4,95	4,11	0,79	3,20	4,42	0,82	5,39	4,90	0,80	5,//	4,99	0,89	5,05
30         3,42         0,89         3,84         3,69         0,95         3,88         3,87         0,95         4,07         0,95         4,10         0,95         5,11         4,76         0,96         5,90         5		22	2,52	0,70	4,00	2,00	0,02	4,/1	4,00	0,02	4,90	4,33	0,04	2,10	4,00	0,09	5 11	4,91	0,92	5,00
30 3/42 0/07 3/04 3/04 0/25 3/04 3/07 0/25 4/07 4/27 4/27 4/27 1/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 4/24 4/27 1/27 1/27 1/27 4/24 4/27 1/27 1/27 1/27 1/27 1/27 1/27 1/27 1		20	3,52	0,82	2.94	3,79	0,00	2 99	3,90	0,00	4,05	4,20	0,09	4,79	4,73	1.02	3,11	4,70	1.05	1.36
		10	J,42	0,09	5 00	1.57	0,95	5,00 6.01	1 70	0,95	6 20	5 10	0,90	6.49	5 66	0.84	6 74	5 70	0.00	6 2/
10 7,23 0,72 3,70 7,0 0,70 0,70 0,70 0,70 0,70 0,70		10	4,2J	0,72	5.24	4.45	0.84	5 30	4,13	0.84	5 55	1 98	0,79	5 70	5.5	0,04	6 11	5.54	0,90	5 77
18 407 084 <b>485</b> 439 089 <b>403</b> 459 089 <b>516</b> 49 091 <b>538</b> 541 005 560 545 101 <b>538</b>		18	4.07	0.84	4 85	4 39	0.89	4.93	4 59	0.89	5 16	4.9	0.91	5 38	5 41	0.95	5 69	5.45	1.01	5 39
<b>17</b> 70 403 087 <b>463</b> 434 097 <b>472</b> 455 097 <b>405</b> 485 094 <b>516</b> 526 088 <b>547</b> 540 104 <b>516</b>	17	20	4.03	0.87	4.63	4 34	0.02	4 72	4.55	0.02	4 95	4.85	0.94	5 16	5 36	0.95	5.47	5.40	1.04	5 10
20 1,05 3,07 1,05 1,07 1,05 1,02 1,02 1,05 0,02 1,05 0,07 1,05 0,07 3,10 5,50 0,50 3,17 5,40 1,04 3,17 77 3,99 0.9 4.43 4.3 0.95 4.53 4.5 0.95 4.74 4.8 0.98 4.90 5.3 1.01 5.75 5.24 1.07 4.00		20	3 99	0,07	4 43	43	0.92	4.53	4.5	0.92	4 74	4.8	0.98	4 90	53	1 01	5.25	5 34	1.07	4 99
22 3,3 0,5 <b>4,4</b> 4,73 1 <b>4,73</b> 4,43 1 <b>4,43</b> 4,73 1,07 <b>4,79</b> 5,7 1,07 <b>4,60</b> 5,77 1,07 <b>4,80</b> 5,77 1,17 <b>4,66</b>		25	3.93	0.95	4.14	4.23	1	4.23	4.43	1	4.43	4 73	1.03	4.59	5,5	1.07	4.89	5.27	1 13	4.66
30 3.84 1.02 3.76 4.13 1.08 3.82 4.33 1.08 4.01 4.62 1.12 4.13 5.13 1.17 4.38 5.17 1.23 4.20		30	3,84	1,02	3,76	4,13	1,08	3,82	4,33	1,08	4,01	4,62	1,05	4,13	5,13	1,07	4,38	5,17	1,13	4,20

Performances referred to the standard speed fan (Quiet)

COP referred only to compressors

Ta = entering air temperature to the air handling coil (°C) DB = dry bulb kWt = Provided heating capacity (kW). kWe = Compressor power input in kW

Not all thermal yields take into account the heat dissipated by the fan motors

# **Operating range (Cooling)**



The limits are meant as an indication and they have been calculated by considering:

- · general and non specific sizes
- standard airflow (Fan speed: Medium speed (M))
- · non-critical positioning and correct use of the unit
- · operation at full load
- difference between inlet / outlet water temperature = 5°C

Ta = handling air coil entering air temperature (°C)

WARNING! WET BULB TEMPERATURE (W.B. = WET BULB)

TH2O = Water temperature at plate exchanger input (°C)

1. Standard operating range

2. Operating range for unit equipped with 'V2MODX - 2-way modulating valve for installation with disposable water' option, i.e., groundwater or anyway a source at low water temperature. By this option the water feeding system must be at variable flow-rate.

WARNING: THE GRAPH REFERS TO A WATER TEMPERATURE DIFFERENTIAL OF 5°C. WITH A REDUCED WATER FLOW RATE, THE TEMPERATURE DIFFERENTIAL IS MORE THAN 5°C, SO IT IS NECESSARY TO REDUCE THE SPECIFIED OPERATING RANGE FOR STEPS EXCEEDING THE NOMINAL 5°C

EXAMPLE: WITH A TEMPERATURE DIFFERENTIAL OF 8°C, THE UPPER TH2O LIMIT IS NO LONGER 45°C BUT 42°C.

# **Operating range (Heating)**



The limits are meant as an indication and they have been calculated by considering:

- · general and non specific sizes
- standard airflow (Fan speed: Medium speed (M))
- non-critical positioning and correct use of the unit
- operation at full load
- difference between inlet / outlet water temperature = 5°C

Ta = handling air coil entering air temperature (°C)

WARNING! DRY BULB TEMPERATURE (D.B.=DRY BULB)

TH2O = Water temperature at plate exchanger input (°C)

- 1. Standard operating range
- 2. Operating field for water glycol system (to prevent frost)
- 3. Standard unit operating range. In this range the COP efficiency can be increased equipping the unit with the 'V2MODX - 2-way modulating valve for installation with disposable water' option, that controls the heat exchange with the source. In this way the unit performances are similar to the unit ones with feeding water temperature (T H2O) equal to 25°C. With this option the water feeding system must be at variable flow-rate.

WARNING: THE GRAPH REFERS TO A WATER TEMPERATURE DIFFERENTIAL OF 5°C. WITH A REDUCED WATER FLOW RATE. THE TEMPERATURE DIFFERENTIAL IS MORE THAN 5°C. SO IT IS NECESSARY TO REDUCE THE SPECIFIED OPERATING RANGE FOR STEPS EXCEEDING THE NOMINAL 5°C

EXAMPLE: WITH A TEMPERATURE DIFFERENTIAL OF 8°C, THE LOWER TH2O LIMIT IS NO LONGER 10°C BUT 13°C

# Standard unit water circuit pressure drops



O = water flow-rate (I/s) DP = water side pressure drops (kPa)



The standard unit (supply limit A) includes the following components: 1 - plate exchanger and water temperature control probes on the inlet and the outlet (to preventive from forming and to disable the compressor when the water temperature drops below a limit value)

2 - water side differential pressure switch (to control the water flow- rate presence)

3 - relief valve (to allow the air to bleed out from the system) 4 - drain valve (to allow to drain the exchanger for maintenance operations).

It does not include other shut-off or control parts.

# **Electric fans performance**

SIZES			5	7	9	11	15	17
Minimum speed - EXTRAQUIET (L)								
Airflow		l/s	126	126	148	119	152	152
Airflow		m3/h	454	454	533	430	547	547
Nominal head		Pa	40	40	40	40	40	40
Electrical power absorbed by the fan	1	kW	0.061	0.061	0.071	0.058	0.072	0.072
Standard speed - QUIET (M)								
Airflow		l/s	148	148	170	190	222	222
Airflow		m3/h	533	533	612	684	800	800
Nominal head		Pa	40	40	40	40	40	40
Electrical power absorbed by the fan	1	kW	0.071	0.071	0.082	0.088	0.095	0.095
Maximum speed - POWERFUL (H)								
Airflow		l/s	170	170	185	259	265	265
Airflow		m3/h	612	612	667	933	955	955
Nominal head		Pa	40	40	40	40	40	40
Electrical power absorbed by the fan	1	kW	0.082	0.082	0.092	0.112	0.128	0.128

1. Power absorbed by the fans in relation to the specified air flow rate and head

# **Airflow / head curves**





The letters next to the identification number of the unit size indicate: L = minimum speed (Extra-quiet) M = average speed (Quiet) H = maximum speed (Powerful)

The three speeds can be set via the user interface or the serial protocol as indicated in the user and maintenance manual.





Q = airflow (I/s)DP = available pressure (Pa)

# Performance corrective coefficients in relation to the speed of the treatment fans

		Minimur	n speed - EX	TRAQUIET		Standard speed - QUIET					Maximum speed - POWERFUL					
	Kf	Ks	Kt	Kef	Ket	Kf	Ks	Kt	Kef	Ket	Kf	Ks	Kt	Kef	Ket	
5	0,97	0,97	1	1,01	1,06	1	1	1	1	1	1,01	1,08	1,01	0,99	0,97	
7	0,96	0,95	0,99	1,01	1,02	1	1	1	1	1	1,04	1,10	1,03	1,01	0,96	
9	0,95	0,94	0,98	1,02	1,03	1	1	1	1	1	1,04	1,11	1,04	1	0,95	
11	0,93	0,83	0,94	1,01	1,14	1	1	1	1	1	1,04	1,16	1,02	1	0,93	
15	0,95	0,84	0,93	1,02	1,13	1	1	1	1	1	1,05	1,16	1,03	1	0,92	
17	0,94	0,85	0,95	1	1,12	1	1	1	1	1	1,05	1,16	1,03	1	0,92	

The performances at the handling fan speeds are obtained by multiplying the standard flow unit (Quiet) by the correction factors in the table.

Extra-quiet = Fan maximum speed Quiet (standard) = Fan medium speed Powerful = Fan maximum speed

Kf = output multiplying coefficient in cooling mode

Ks= sensible output multiplication coefficient

Kt = heating performance multiplication coefficient

Kef = multiplying coefficient of the power absorbed by the compressors in cooling mode

 ${\rm Ket} = {\rm multiplying\ coefficient\ of\ the\ power\ absorbed\ by\ the\ compressors\ in\ heating\ mode}$ 

# EVH-X performance table in the event of system retrofitting

SIZES			5	7	15				
EVH series equivalent size			7	11	15				
Water flow-rate	1	l/s	0.064	0.075	0.114				
Airflow	2	l/s	148	148	222				
Airflow	2	m3/h	533	533	800				
COOLING A 27/19 W 30									
ıg capacity kW 2.13 2.65 3.67									
Compressor power input		kW	0.52	0.66	0.82				
HEATING A 20 W 20									
Heating capacity		kW	2.48	2.99	4.16				
Compressor power input		kW	0.47	0.55	0.81				
OPERATION RANGE									
Min entering water temperature in cooling mode		°C	20	20	20				
Max entering water temperature in cooling mode		°C	40	39	39				
Min entering water temperature in heating mode		°C	13	14	14				
Max entering water temperature in heating mode		°C	45	45	45				

EVH-X water flow-rate = EVH water flow-rate
 EVH-X airflow at standard fan speed (Quiet)

A 27/19 W 30 = Unit inlet air temperature 27°C D.B. / 19°C W.B. Unit inlet water temper A 20 W 20 = Unit inlet air temperature 20°C Unit inlet water temperature 20°C

DB = dry bulb WB = wet bulb

**Note:** The thermal gradient between the inlet and outlet water temperature can be calculated according to the water flow rate and the power supplied by the unit.

$$DT [^{\circ}C] = \frac{kWt}{4.186 \times Q [l/s]}$$

Q = water flow rate[I/s]

DT = difference between inlet and outlet water temperature (°C)

kWt = based on the operating mode

-kWt = Pf + Pe compressor (COOLING)

- kWt = Pt - Pe compressor (HEATING)



# Sound levels

#### Extra-quiet = Fan maximum speed

				Sound Pow	er Level [dB]				Sound	Sound
SIZES				Octave b	oand (Hz)				Pressure Level	Power Level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
5	62	56	49	42	38	30	21	15	32	46
7	64	57	50	41	38	29	21	15	32	46
9	66	57	50	41	37	29	21	15	33	46
11	68	58	50	41	37	28	20	15	33	46
15	73	59	50	40	36	27	20	15	33	47
17	75	59	50	39	36	26	20	14	34	47

#### Quiet (standard) = Fan medium speed

				Sound Pow	er Level [dB]				Sound	Sound
SIZES				Octave b	oand (Hz)				Pressure Level	Power Level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
5	62	57	51	42	40	31	24	20	33	47
7	64	57	51	42	40	31	24	19	33	47
9	66	58	51	42	39	30	23	18	34	47
11	69	58	51	42	39	30	23	17	34	47
15	73	58	52	41	38	30	22	15	34	48
17	75	59	52	41	38	30	21	14	35	48

#### Powerful = Fan maximum speed

SIZES				Sound Pow Octave I	er Level [dB] band (Hz)				Sound Pressure Level	Sound Power Level
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
5	62	59	53	43	42	34	28	22	35	48
7	64	60	53	44	42	34	28	22	35	49
9	65	61	53	44	42	34	28	22	36	49
11	67	62	53	44	42	34	28	23	36	50
15	71	65	54	45	42	35	28	23	37	51
17	73	66	54	45	42	35	29	24	38	51

Sound levels refer to the unit at full load installed on the ceiling, ducted, with minimum, standard and maximum air flow rate of the fan. Available static pressure 40 Pa.

In accordance with the UNI-EN ISO 3744 regulation, the average sound pressure level refers to a distance of 1 m from the outer surface of a ducted unit installed on the ceiling.

Measurements are made in accordance to the UNI EN ISO 9614-2, with units installed over two sound reflective surfaces.

If the unit is installed in conditions other than the nominal ones(for instance, near walls or obstacles in generally) the sound levels may undergo substantial variations.

# Accessories

# **TPF - Filter-holder frame with lateral and bottom exhaust**

Device that makes it easier to take out the air filters in the event of a ducted unit or if the supply grid cannot be easily removed. It consists of a galvanised steel frame with doors to access and remove the filter both from the bottom and the side. The device is installed built-in the unit

Size	5-7-9	11-15-17
A	323	348





FILTER EXTRACTION: FROM THE BOTTOM



Provide for suitable access areas and clearances to remove the doors to take out the filter.

### MOBA - RS485 serial port with Modbus protocol, built-in

It allows the serial connection to supervision systems, using BACnet as the communication protocol. It allows the access to the complete list of operating variables, controls and alarms.

On the serial line can be connected up to 32 units for a typical distance of 1000 m. The connection is made using a suitable cable to RS485 network or formed by a twisted pair and shielded wires.

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





# **Accessories separately supplied**

### CIWMX - Electronic room control with display for wall installation with uncased box

Option which allows the remote control of the unit which can be easily installed in the main built-in units which are available on the market with squared or rounded 65 mm diameter / 31 mm deep profiles.

The electronic control with display is simple to use even for non-specialised users.

Thanks to the icon menu which is complete with back-lighting, it allows different unit functions to be controlled, including:

- switching the unit on and off
- reading the temperature using the probe in its interior
- display the alarm code and the unit stata
- password protection to access the unit's parameters
- changing the manual operating mode (hot or cold) and/or set point
- programming the daily and weekly time schedule for switching on and off and for setting the standard or economic set point.
- management of the operating parameters.
- language management for the navigation menu
- manually, or automatically, managing the fan speed, depending on the distance from the set- point.



Electrical connection for distances lower than 10m Electrical connection for distances exceeding 10m





The device is prepared for connection to a unit electrical panel (installation by the Client) with the following modes: - For a max distance of 10m only use the power supply cable and serial communication included in the pack. In this way electric power is supplied by the unit. - For a max distance of 200m use a shielded twisted pair cable with a min 0.5 / max 1.5 mm2 section. In this case the 230/1/50 electricity supply is by the Client (transformer integrated in the display).

#### **VIMANX - Hand shut-off valve**

Shut-off device which enables the unit to be hydraulically closed for maintenance operations and to prepare the system before connecting the unit. The hand valve is located on the water lines at the outlet.

#### Features of the hand shut-off valve

Size	5-7-9-11-15-17
Diameter of the fittings	1/2″
System side water fittings	FEMALE
Unit side water fittings	MALE

#### Water connection diagram



- 1. Internal exchanger with temperature probes
- 2. Differential pressure switch
- 3. Vent valve
- 4. Drainage bibcock
- 5. Steel mesh strainer (included with the VIFWX accessory)
- 6. Hand shut-off valve (included in the VIFWX accessory)
- 7. Shut-off valve for by-pass (water side) (BPH2OX accessory)
- 8. Hand shut-off valve (VIMANX accessory)
- A Standard unit supply limit

Option to be installed outside the unit on the water outlet pipe of the exchanger. Provide for spaces to assemble/disassemble the valve.



# 

### CWMX - Electronic control with display for wall installation

An option which enables the unit to be remotely controlled. It can be attached to a wall with the support in a horizontal or vertical position.

The electronic control with display is simple to use even for non-specialised users.

It allows different unit functions to be controlled, including:

- reading the temperature directly on the thermostat using the probe in its interior
- switching the unit on and off
- unit parameter protection with password
- programming the daily and weekly time schedule for switching on and off and for setting the standard or economic set point.
- changing the manual operating mode (hot or cold) and/or set point
- alarm and unit status display;
- management of the operating parameters.
- language management for the navigation menu
- back-lit icon menu

<u>/</u>!

• manual or automatic fan speed management in relation to how far away the setpoint is.



Electrical connection for distances lower than 10m







The device is prepared for connection to a unit electrical panel (installation by the Client) with the following modes: - For a max distance of 10m only use the power supply cable and serial communication included in the pack. In this way electric power is supplied by the unit. - For a max distance of 200m use a shielded twisted pair cable with a min 0.5 / max 1.5 mm2 section. In this case the 230/1/50 electricity supply is by the Client (transformer integrated in the display).

#### **BPH2OX – Shut-off valve for by-pass (water side)**

The device allows the exchanger by-pass inside the unit for the cleaning operations (flowing) the water circuit. This allows to prevent the exchanger from getting dirty. It consists of a 2-way hand valve.

#### **Option technical specifications**

Size	5-7-9-11-15-17
Diameter of the fittings	1/2″
Couplings	FEMALE

#### Water connection diagram



1. Internal exchanger with temperature probes 2. Differential pressure switch

3. Vent valve

4. Drainage bibcock

5. Steel mesh strainer (included with the VIFWX accessory)

6. Hand shut-off valve (included in the VIFWX accessory)

7.Shut-off valve for by-pass (water side) (BPH2OX accessory)

8-9-10. Regulating / shut-off valves for the system (see the VIMANX, V2MODX and V2ONX accessories)

A - Standard unit supply limit



### V2MODX - 2-way modulating valve for installation with disposable water

Option indicated in the applications with disposable water at a temperature relatively low (groundwater) or with a variable flow-rate loop where the unit must operate in heating with high water temperatures or in cooling with low water temperatures. The 2-way motorised valve, modulating type, is placed in the exchanger output water side and is fed by the unit. Its operating is combined with that of the refrigerant circuit: the modulation by 0-10V signal according to the refrigerant pressure in the exchanger source side, reduces the water consumption and maintains the unit in the provided operating range both in cooling and in heating mode.



The supplied valve ensures proper opening and closure for water differential pressures that do not exceed 800 kPa, i.e. 8 bar.

#### PRESSURE DROPS OF V2MODX OPTION



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

#### WATER CONNECTION DIAGRAM



- 1. Internal exchanger with temperature probes
- Differential pressure switch 2
- 3. Vent valve
- Drainage bibcock 4.
- 5. Steel mesh strainer (included with the VIFWX accessory)
- 6. Hand shut-off valve (included in the VIFWX accessory)
- Shut-off valve for by-pass (water side) (BPH2OX accessory) 7.
- 10. Two-way modulating valve for systems with disposable water (V2MODX accessory)
- A. Standard unit supply limit

Option to be installed outside the unit on the water outlet pipe of the exchanger. Provide for spaces to assemble/disassemble the valve.

With this option the unit is provided full of rapid electric connections for the valve feeding and automatic control.

### V2ONX - ON/OFF 2-way valve for variable flow-rate loop

Option recommended for applications with a variable water flow-rate loop. It includes an ON/OFF motorised 2-way valve located at the outlet of the exchanger on the water side, powered and controlled by the unit. It operates in conjunction with the cooling circuit: when the compressor is stationary, the valve remains closed, thereby reducing water consumption.



The supplied valve ensures proper opening and closure for water differential pressures that do not exceed 2000 kPa, i.e. 20 bar.

#### PRESSURE DROPS OF THE V2ONX OPTION



0 = water flow-rate[1/s]DP = water side pressure drops (kPa)

#### WATER CONNECTION DIAGRAM



- 1. Internal exchanger with temperature probes
- 2. Differential pressure switch
- 3. Vent valve
- 4. Drainage bibcock
- Steel mesh strainer (included with the VIFWX accessory) 5.
- Hand shut-off valve (included in the VIFWX accessory) 6.
- Shut-off valve for by-pass (water side) (BPH2OX accessory)
- 7. 2-way ON-OFF valve for variable flow-rate loop (V2ONX accessory) 9
- Standard unit supply limit A.

Option to be installed outside the unit on the water outlet pipe of the exchanger. Provide for spaces to assemble/disassemble the valve.

With this option the unit is provided full of rapid electric connections for the valve feeding and automatic control.



### VIFWX - Steel mesh strainer and hand shut-off valve

The device protects the plate exchanger from any impurities inside the water circuit. The stainless steel mesh mechanical strainer must be placed on the water inlet line. It can be easily removed for periodical maintenance and cleaning operations. It also includes the hand two-way shut-off valve located on the inlet line and required for periodical maintenance operations.

#### PRESSURE DROPS OF THE VIFWX OPTION



Q = water flow rate[I/s] DP = water side pressure drops (kPa)



Pressure drop referred to a clean filter

#### WATER CONNECTION DIAGRAM





- 1. Internal exchanger with temperature probes
- 2. Differential pressure switch
- Vent valve
- 4. Drainage bibcock
- 5. Steel mesh strainer (included with the VIFWX accessory)
- 6. Hand shut-off valve (included in the VIFWX accessory)
- 7. Shut-off valve for by-pass (water side) (BPH20X accessory)
- 8-9-10. Regulating / shut-off valves for the system (see the VIMANX, V2MODX and V2ONX accessories)

A. Standard unit supply limit

#### **VIFWX option technical features**

Size	5-7-9	11-15-17
Filter diameter	1/2″	3/4″
Water fitting diameter	1/2″	1/2″
System side water fittings	FEMALE	FEMALE
Unit side water fittings	MALE	MALE
Degree of filtration	400 µm	400µm

Hydraulic connection performed by Customer. Provide for spaces to assemble/disassemble the components and for routine maintenance operations

Routine maintenance operations require a shut-off device on the unit's outlet pipe. Therefore we recommend combining it with one of the following options depending on the type of system: 'V2ONX - On/OFF 2-way valve for variable flow-rate loop', V2MODX - 2-way modulating valve for system with disposable water' or 'VIMANX - Hand shut-off valve'

#### FCVBX - Manual balancing valve

The device enables the water flow through the unit to be calibrated without measuring tables or devices. In this way it is possible to balance the water flow in the circuit. The special viewer enables instantaneous reading of the water flow (in litres / minute). The calibration can be easily carried out even by non-specialised operators, operating on the special control screws. It includes adaptors for varying the diameter between the balancing valve and the water fittings.

#### Features of the manual balancing valve

Size	5-7-9	11-15-17
Balancing valve diameter	3/4″	1″
Water fitting diameter	1/2″	1/2″
System side water fittings	MALE	MALE
Unit side water fittings	MALE	MALE
Max. operating pressure	10 bar	10 bar
Field flow control	0.05 ÷ 0.2 l/s	0.13 ÷ 0.5 l/s
flow rate coefficient (Kvs)	1.85	5.00

The water side pressure drop can be determined with the following formula:



Q = water flow-rate[I/s] Dp = water side pressure drops (bar) Kvs = flow rate coefficient [m3/h]



### PFHCX - 200 mm flexible pipes for water connection and condensate drain

### PFHC1X - 500 mm flexible pipes for water connection and condensate drain

An option which simplifies the water connection and reduces any vibrations between the unit and the system. It includes two flexible pipes with stainless steel net covering and a reinforced plastic pipe for the connection of the tray to the external drain.

#### Technical specifications of the flexible pipes for water connections

Size	5-7-9-11-15-17
Diameter of the fittings	1/2″
System side water fittings	FEMALE
Unit side water fittings	MALE
Max. operating pressure	12 bar
Min. bending radius	45 mm

#### Pressure drops of the single 200 mm flexible pipe



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

#### Pressure drops of the single 500 mm flexible pipe



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

#### Technical specifications of the flexible pipe for condensate drain

Size	5-7-9-11-15-17
Pipe diameter	15 mm
Pipe length	1 m

The flexible pipe of the condensate drain can be completed with a suitable trap to prevent the odour return in the room and connected to a suitable drain (installed by Customer).

### **CDPX - Condensate drain pump**

pipe and the 1.5m power supply cable

Device which enables condensation water to be discharged into the collection tray in case it cannot drain away due to gravity. It is necessary in installations where the external outlet is placed at a higher height than the condensate tray. The integrated sensor activates the pump only when necessary. If the water level in the tray should be greater than the pre-set limit, the unit stops the compressor to avoid the tray overflowing, signalling the fault with an alarm.

The device is designed to be installed outside the unit (to be carried out by the Customer). The pack includes the 1m condensate drain flexible



Technical specifications of the condensate drain pump

Size	5-7-9-11-15-17
Water flow rate with a 2m head	15 l/h
Water flow rate with a 10m head	4 l/h
Maximum supply height	10 m



Installation pump example



### **AMMX - Spring antivibration mounts**

The rubber antivibration mounts must be applied in designated areas on the support brackets and are used to dampen the vibrations produced by the unit by reducing the noise transmitted to the structures. They consist of steel spring elements inserted in elastomer retaining plates. They can dampen axial and tangential stress and their physical and mechanical properties remain constant over time thanks to the highly resistant materials they are made of.

The accessory includes the nut used for securing the item on the threaded bar. The bar used for ceiling installation (to be provided by the Customer) must have an M8 metric threading

# DAOJX - Air supply duct with flexible joint

Device that allows to duct the unit. It consists of a galvanised steel frame that must be secured to the supply flange and a PVC flexible duct that allows for a fair amount of freedom to decide where to position the air distribution grid.

Size	5-7-9	11-15-17
A	233	232
В	105	210
C	170÷250	170÷250

# DAIX - Air return duct with flexible joint

Device that allows to duct the unit. It consists of a galvanised steel frame that must be secured to the return flange and a PVC flexible duct that allows for a fair amount of freedom to decide where to position the air return grid.

Size	5-7-9	11-15-17
A	615	615
В	308	284
C	170÷250	170÷250

### DAOIX - Air supply and return duct with flexible joint

Option that brings together the features of both in just one accessory: 'DAOJX - Air supply duct with flexible joint' and 'DAIX - Air return duct'.

### **MOBX - RS485 serial port with Modbus protocol**

This accessory has the same technical specifications of MOBA accessory, with the exception of the installation and wiring to be complet by customer.



The device is ready for connecting to the electrical panel (installed by the customer).

### CMSLWX - LonWorks communication serial module

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

With this accessory, each unit can communicate with the main supervisor systems such as Trend, Johnson Controls, PlantVisor,

The device needs to be combined with the RS485 serial port option with Modbus protocol.



The package includes the transformer, which is powered by 230/1/50, and the Gateway of communication between the supervisor and the Modbus serial line. The configuration and management of the LonWorks network are the responsability of the Customer.



The device is prearranged to mounting in DIN rail, for external installation (7 DIN modules, installed by the customer)











## **BACX - BACnet communication serial module**

Allows to perform the serial connection to supervision systems by using BACnet as a communication protocol. It allows the access to the entire list of operating variables, controls and alarms



The device requires the coupling with the "RS485 serial port with Modbus protocol" option



The package includes the transformer, which is powered by 230/1/50, and the Gateway of communication between the supervisor and the Modbus serial line. The configuration and management of the BACnet network are the responsability of the customer.



The device is prearranged to mounting in DIN rail, for external installation (7 DIN modules, installed by the customer)

#### Main variables of supervision by serial (Modbus / LonWorks / BACnet).

- Current room temperature
- Ideal temperature Set-Point
- Maximum correction of the set-point temperature set by the user via electronic room control
- Fan speed (Extraquiet, Quiet, Powerful, AUTO)
- Operating mode (Heating, Cooling, AUTO)
- Alarm reset
- ECONOMIC operating mode (using a pre-set ECO set point)
- Remote ON-OFF
- Heating temperature hysteresis
- Cooling temperature hysteresis
- Deadband



# **Option compatibility**

REF.	DESCRIPTION	
Aeraulic circuit		
TPF	Filter-holder frame with lateral and bottom exhaust	0
DAOJX	Air supply duct with flexible connection	٥
DAIX	Return air duct	\$
DAOIX	Air discharge and intake duct	\$
	Hydraulic circuit	
CDPX	condensate drain pump	٥
VIFWX	Steel mesh strainer and hand shut-off valve	٥
FCVBX	Water balancing valve	٥
PFHCX	200 mm flexible pipes for the connection to the water circuit + drop conduit	\$
PFHC1X	500 mm flexible pipes for the connection to the water circuit + drop conduit	\$
V20NX	2-way ON-OFF valve for variable flow-rate loop	\$
BPH20X	Manual shut-off valve on the system water connections	\$
VIMANX	Hand shut-off valve	\$
V2MODX	2-way modulating valve for disposable water system	\$
	Electric circuit	
MOBA	RS485 serial port with Modbus protocol, built-in	0
MOBX	RS485 serial port kit with Modbus protocol	٥
CMSLWX	LonWorks serial communication module	٥
BACX	BACnet serial communication module	\$
CWMX	Electronic room control with display, for wall installation	♦
CIWMX	Electronic room control with display, for wall installation in built-in box	\$
Installation		
AMMX	Spring antivibration mounts	٥

0 Optional component ◊ Accessory separately supplied (optional)

# **Dimensional drawings**

## Size 5-9



- 1. Standard unit water inlet (female)
- 2. Standard unit water outlet (female)
- 3. Air filter
- 4. Condensate drain Ø 15 mm
- 5. Electrical panel
- 6. Power input
- 7. Fan

- 8. Compressor
- 9. Direct expansion exchanger
- 10. Plate exchanger
- 11. Functional spaces
- 12. Filter extraction (provide for the space to access the filter)
- 13. Airflow
- 14. Fixing brackets

SIZES	5	7	9
A (Lenght)	1034	1034	1034
B (Height)	361	361	361
C (Depth)	513	513	513
Weight	71	73	74
Standard unit water fittings	1/2″	1/2″	1/2″

# 

# Size 11-17



- 1. Standard unit water inlet (female)
- 2. Standard unit water outlet (female)
- 3. Air filter
- 4. Condensate drain Ø 15 mm
- 5. Electrical panel
- 6. Power input
- 7. Fan

- 8. Compressor
- 9. Direct expansion exchanger
- 10. Plate exchanger
- 11. Functional spaces
- 12. Filter extraction (provide for the space to access the filter)
- 13. Airflow
- 14. Fixing brackets

SIZES	11	15	17
A (Lenght)	1034	1034	1034
B (Height)	386	386	386
C (Depth)	513	513	513
Weight	77	81	82
Standard unit water fittings	1/2″	1/2″	1/2″



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