Technical Bulletin

BT15L003GB-01

ClivetPACK² FFA

PACKAGED ROOFTOP AIR CONDITIONER
FULL FRESH AIR

CSRN-XHE2 FFA 12.2-24.4 range

Air flow from 3.000 to 9.000 m3/h

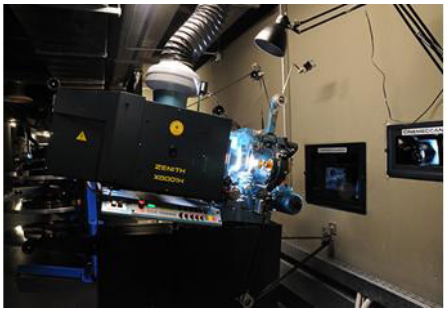
- High efficiency R-410A scroll compressors
- Two single refrigeration circuits
- EC brushless fans
- Energy recovery of exhaust air
- Maximum compacteness

Specific applications require the continuous intake of full fresh air

In commercial and industrial food services, fumes and vapours are discharged from the cooking area through extraction hoods. For proper operation, they require the simultaneous introduction of the same quantity of exhaust air. This air must be suitably filtered and treated to guarantee that it complies with hygienic requirements and ensures the users comfort and therefore their productivity.

This same requirement also applies to other different final destination. Specific extractors are installed in the projection corridors in multiplex cinemas, which cool the powerful and expensive projector lamps. You can find the same type of operation in photographc laboratories.

In other situations, hygienic and normative requirements require the continuous operation with full fresh air. For example, in the smoking areas and chemical laboratories.

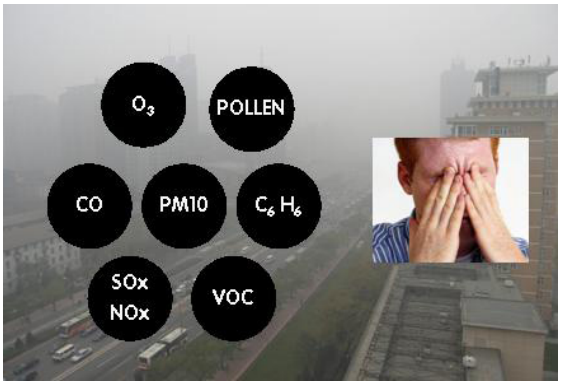


The fresh air is a source of pollutants

Fresh air contains dangerous polluting agents, such as particulates and fine dust, pollen, bacteria and so on.

For this reason, the air must be filtered to make it compatible with the needs of the operators and with the technical and hygienic requirements of the utilised machines and the final products.

As outside temperature and humidity conditions change considerably over the space of a year, the fresh air must also be treated to control its temperature and humidity before introducing it to the environment.



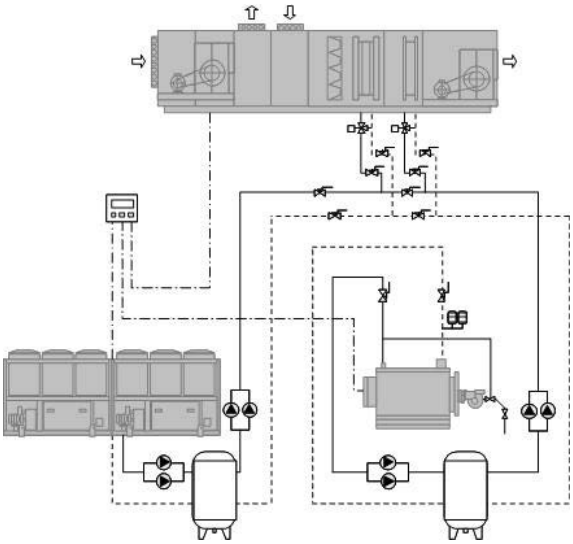
With traditional solutions, each system is a new experience

For these applications, hydronic systems are often selected. They are based on chiller feeding or powering air handling units for the production of cooling energy, heat pumps or boilers for the production of thermal energy, suitably isolated distribution circuits and complete with circulation pumps, shut-off devices and so on. An automatic regulation device is also required for the proper operation of the entire system.

Each system option must be carefully selected and sized during the design, therefore purchased from different suppliers. After the on-site assembly operations, the entire system is calibrated and therefore verified and tested, and any corrective actions that are necessary are performed.

We make the same considerations with direct expansion air handling units.

The other commercial direct expansion systems are not suitable for operating with full fresh air, as they are designed for operation with total or partial recirculation.



CLIVETPack series for medium attendance applications

SMARTPACK
CKT-XHE 41 - 151 cooling only
CKN-XHE 41 - 151 reversible heat pump
Nominal airflow: 2200 - 9600 m3/h
Cooling capacity: 12 - 52 kW
Configurations:
CAK single fan section for full recirculation
CBK single fan section for recirculation and fresh air
CCK double fan section for recirculation, fresh air, exhaust, thermodynamic recovery

CLIVETPack²
CSRT-XHE2 15.1 - 45.2 cooling only
CSRN-XHE2 15.1 - 45.2 reversible heat pump
CSRN-XHE 15.2-44.4 HSE air-air heat pump
Nominal airflow: 9000 - 23000 m3/h
Cooling capacity: 49 - 134 kW
Configurations:
CAK single fan section for full recirculation
CBK single fan section for recirculation and fresh air
CCK double fan section for recirculation, fresh air, exhaust, thermodynamic recovery
CCKP double fan section with fresh air and THOR thermodynamic recovery

CLIVETPack²
CSRT-XHE2 49.4 - 110.4 cooling only
CSRN-XHE2- 49.4 - 110.4 reversible heat pump
Nominal airflow: 22000 - 60000 m3/h
Cooling capacity: 155 - 376 kW
Configurations:
CAK single fan section for full recirculation
CBK single fan section for recirculation and fresh air
CCK double fan section for recirculation, fresh air, exhaust, thermodynamic recovery
CCKP double fan section with fresh air and THOR thermodynamic recovery

Clivet series for high attendance applications

CLIVETPack
CSNX-XHE 82 - 402 reversible heat pump
Nominal airflow: 3600 - 16500 m3/h
Fresh airflow up to 80%
Cooling capacity: 45.6 - 144 kW
Configurations:
CB single fan section for recirculation and fresh air
CC double fan section for recirculation, fresh air, exhaust, thermodynamic recovery

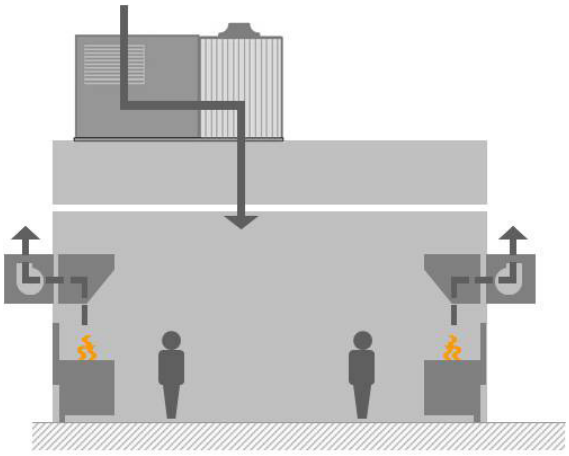
Clivet series for full fresh air application

ClivetPACK² FFA
CSRT-XHE2 FFA 12.2-24.4 cooling only
CSRN-XHE2 FFA 12.2-24.4 reversible heat pump
Nominal airflow: 3000 - 9000 m3/h
Cooling capacity: 33 - 90 kW
Configurations:
CBFFA for fresh air supply only
CCFFA for fresh air supply with extraction and exhaust

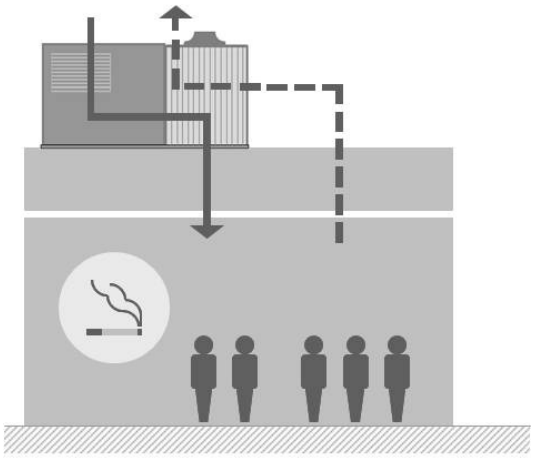
ClivetPACK² FFA is the industrialised direct expansion solution of Clivet for full fresh air conditioning

Thousands rooftop ClivetPACK units have been already installed successfully for medium and high attendance environments, such as shopping centres and multiplex cinemas. Clivet offers ClivetPACK² FFA, a unit:

- industrialised, designed according to the criteria of total quality and individually tested before shipping;
- full fresh air thanks to an innovative direct expansion circuit with reversible heat pump;
- able to treat only intake air or also extraction and discharge, without contamination between the air flows;
- high energy efficiency, for the reduction of the annual operating costs and of the environmental impact.



Only intake version



Intake and exhaust version

Advantages

ClivetPACK² FFA simplifies the system and reduces its cost

Thanks to the packaged solution, the system components are already included and installed inside the unit. Its compactness dimensions allow to install it outside on the roof, on the terrace or on the ground. The technical rooms inside the served rooms are therefore eliminated. The fresh air receives the heating or cooling energy produced by the unit, eliminating the traditional fluid distribution circuits and the relevant costs for the pipe thermal insulation and for the pumping.

-60%
on the total installation cost

ClivetPACK² FFA offers the best comfort for users

The fresh air is always purified and conditioned before intake. With electronic filters for the fresh air, which acts as a highly efficient electrostatic purifier, ClivetPACK² FFA reduces pollutants such as fumes, fine dust, viruses, and bacteria. With the capacity step compressors, the variations of air temperature sent to the environment are reduced, to further benefit for the user comfort.

H-10
equivalent filtration efficiency

ClivetPACK² FFA increases efficiency and reduces management costs

Electronically controlled ventilating sections, reversible heat pump technology, additionally optimised for operating at partial load, low pressure drop electronic filters that can be regenerated through washing: every detail in ClivetPACK² FFA was designed for the best efficiency. This reduces the operating costs and CO_2 emissions, with direct benefit to the environment.

-50%
management cost reducion

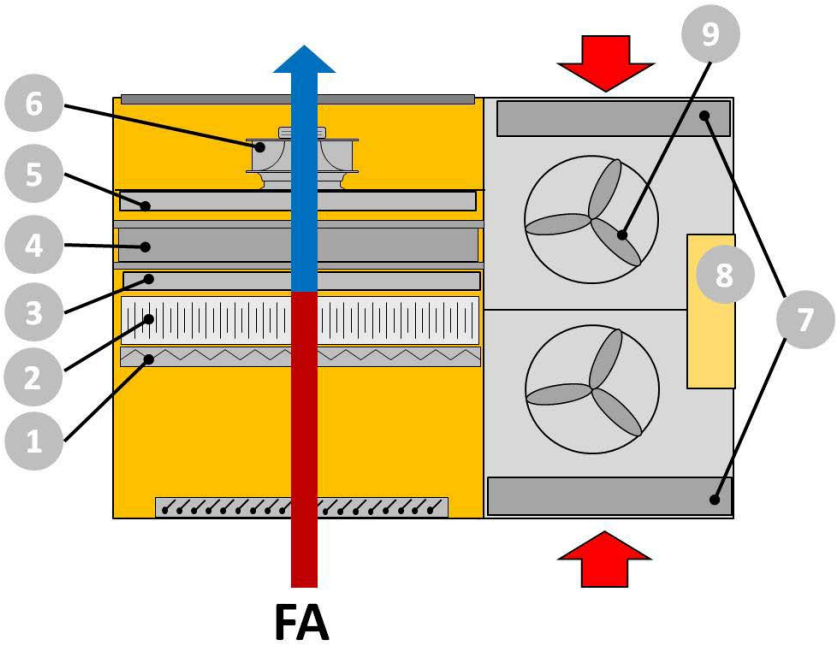
The system is included into a single unit

ClivetPACK² FFA have all the components for system operation. In the standard configuration (Clivet reference ID - CBFFA), the fresh air is filtered and treated by the direct expansion coil and then intake into the area to be air conditioned. The control is completely automatic and is based both on the conditions measured by the standard supplied room probe, as well as on the fresh air conditions. Also the FREE-COOLING function is activated automatically: the served area is cooled without activating the compressors.

VERSION WITH ONLY SUPPLY

FA. Fresh air
S. Treated air supply

1. Standard filtration (G4 efficiency)
2. Second stage of filtration (optional):
   - electronic type (efficiency equivalent to H10);
   - F7 efficiency filter
3. Heating with water coil or electric heaters (optional)
4. Internal exchanger for air handling
5. Hot gas post-heating (optional)
6. Supply fan section
7. External exchanger
8. Electrical panel
9. External fan section



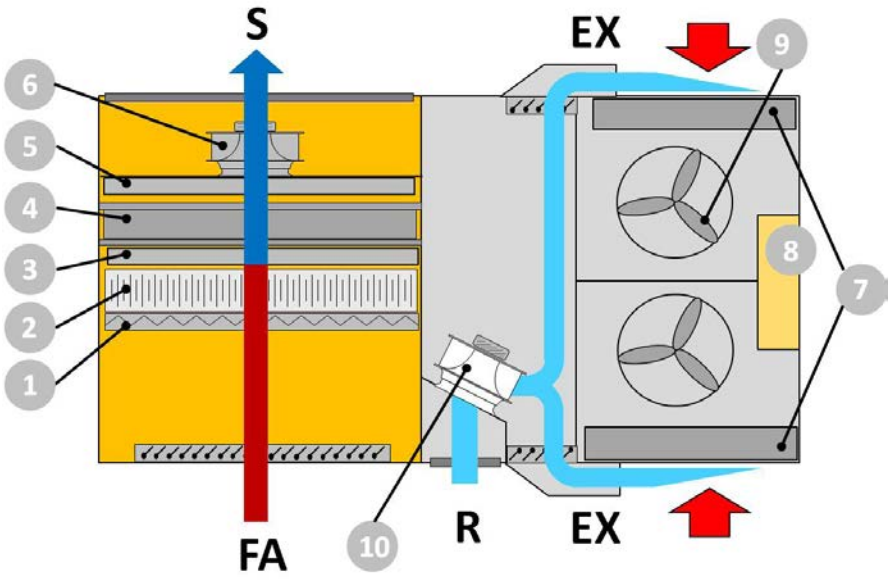
ClivetPACK² FFA is also available in optional configuration featuring a section of air extraction from the served area and exhaust outside (Clivet reference ID - CCFFA).

The intake and exhaust air flows are totally separated by a steel wall. The exhaust air is used by a thermodynamic energy recovery system: it increases therefore the seasonal efficiency of the direct expansion circuit, without the great pressure drops typical of the static or rotative traditional recuperators. This configuration is complete with filter on exhaust air, and the external exchanger is easily washable from the outside of the served room; it is therefore necessary to check that the exhaust air does not contain pollutants that can damage the unit, such as acids, saline solutions, high temperature fumes at high temperature and so on.

VERSION WITH EXTRACTION AND EXHAUST

FA. Fresh air
S. Treated air supply
R. Air return
EX. Air exhaust

1. Standard filtration (G4 efficiency)
2. Second stage of filtration (optional):
   - electronic type (efficiency equivalent to H10)
   - F7 efficiency filter
3. Heating with water coil or electric heaters (optional)
4. Internal exchanger for air handling
5. Hot gas post-heating (optional)
6. Supply fan section
7. External exchanger
8. Electrical panel
9. External fan section
10. Exhaust fan section



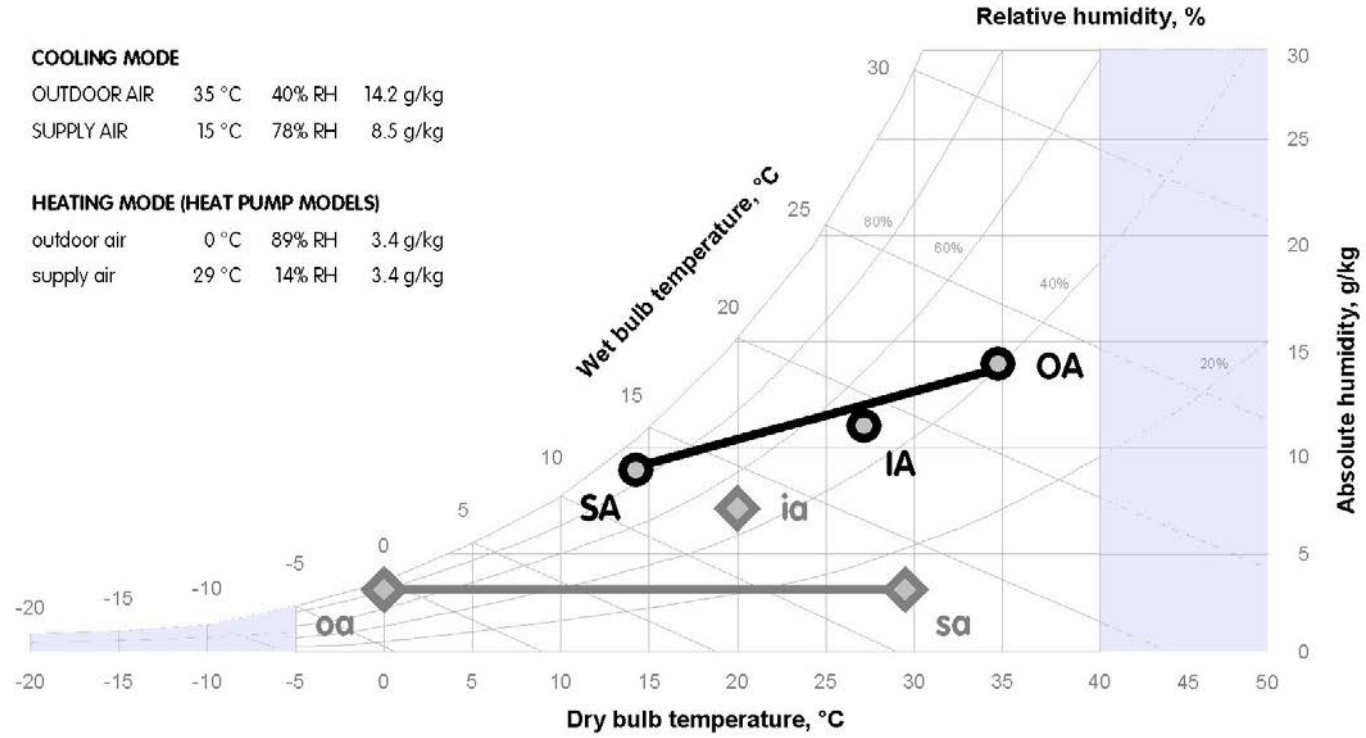
In a move the users are satisfied and the initial investment and operating costs are reduced

Guaranteed comfort all year long

ClivetPACK² FFA is a full fresh air conditioner that is able to maintain the comfort conditions in the served area, without additional associated air conditioning systems.

The unit has enough capacity to win both the fresh air load and the internal loads. Therefore, it is enough to take care of the system for air distribution and diffusion in the served area, in particular in small rooms and with highly concentrated loads such as in commercial kitchens.

The reversible heat pump model of ClivetPACK² FFA can work also in cold and very harsh climates, and it can be associated, when heeded necessary, to additional integrated heating options, all at high efficiency operating.



Indicative example of application. The 'sa' point humidity can be increased via the humidification devices available as an option.

Great system simplification and increase in reliability

With ClivetPACK² FFA system's initial costs are greatly reduced compared with a traditional solution based on air handling units equipped with a static or rotary heat recovery system and separate production, for example by chiller and boilers.

Most of the normal engineering activities are in fact created by Clivet inside the unit:

- component selection and dimensioning;
- water and mechanical connections;
- electric and control wiring;
- functional test.

The user simply has to connect the air distribution ducts and power the unit.

High energy efficiency and reduction of operating costs

Most technical innovations in the refrigeration circuit and the fan section of ClivetPACK² FFA allow to achieve very high overall efficiency.

This also reduces seasonal consumption up to 50% in comparison to traditional solutions.

As a result, this also reduces operating costs and the environmental impact of the system, thanks to the lower amount of primary energy needed for its function.

By reducing the total requirement of primary energy, the complete system is thus more efficient compared with traditional solutions. Consequently, the building's energy performance also improves, and with it its value on the real estate market.

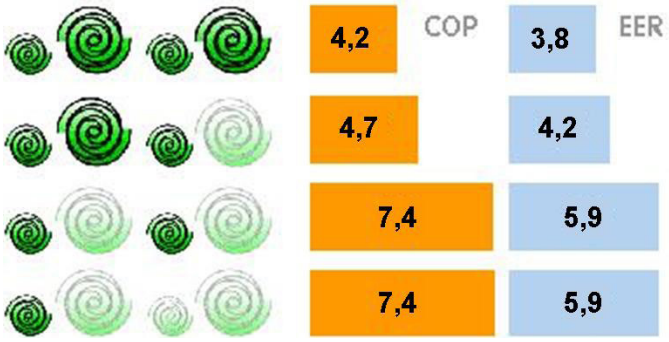
High production efficiency year round

Maximum efficiency even at a part load

As maximum power is only required for short periods of time, it is very important to achieve maximum efficiency in partial load conditions. ClivetPACK² FFA uses Scroll-type high-efficiency compressors. The advantages are:

- compressors manufactured in large ranges, with strict quality controls and maximum reliability thanks to the high production volumes;
- the refrigeration circuit uses two different-sized compressors, in order to obtain more adjustment steps. It is thus possible to supply for usage only the energy that is actually required;
- efficiency increases by over 50% when operating at partial load, thanks to the bigger heat exchange surfaces available.

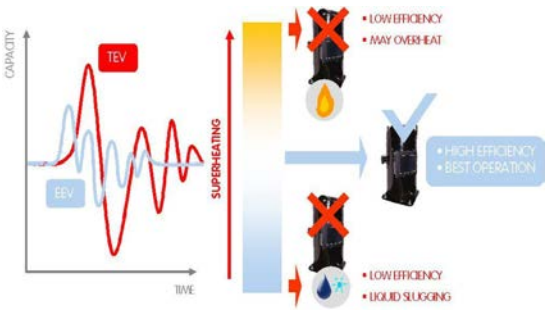
THE SEQUENTIAL DEACTIVATION OF THE COMPRESSORS INCREASES EFFICIENCY



Example referred to CSRN-XHE2 FFA 20.4. EER e COP referred to external temperature of 7°C/35°C.

Stable and reliable functioning

The electronic expansion valve (EEV) adapts rapidly and precisely to the actual load required for usage, allowing stable and reliable adjustment in comparison with mechanical thermostatic valves (TEV). This results also in a further increase in efficiency and longer compressor life.



FREE-COOLING

As soon as the external conditions allow it, the unit is capable of automatically activating the FREE-COOLING mode, which, keeping the compressors off and drawing in suitably filtered fresh air allows to cool the served room.. This operating mode is especially useful in spring and autumn or in case of high ambient loads. It allows substantial reduction of the unit energy consumption and compressors.

Designed for improved energy use

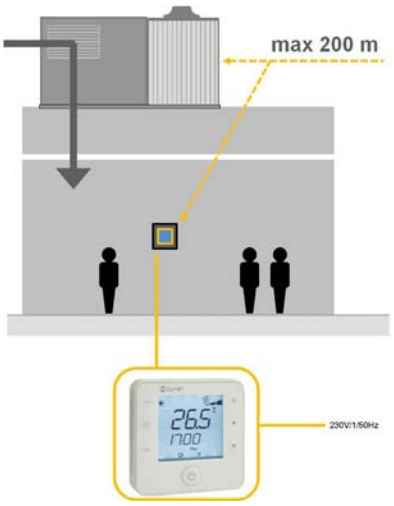
Continuous control of the comfort in the served environment

The effective temperature and humidity conditions in the served zone are detected by ClivetPACK² FFA with an ambient sensor supplied standard.

An innovative graphic interface prepared for wall-installation (with 230V power supply and wiring at the Customer's care) is supplied as standard, with the option to be removed from the support and connected on-board for maintenance operations.

Among the main functions it allows to:

- the temperature and humidity measurement is made by probes into the unit;
- daily/weekly start-up or power-off programming of the unit;
- operating mode (heat or cool) and/or set-point manual change ;
- alarm and unit stata display;
- operating paramenter management.

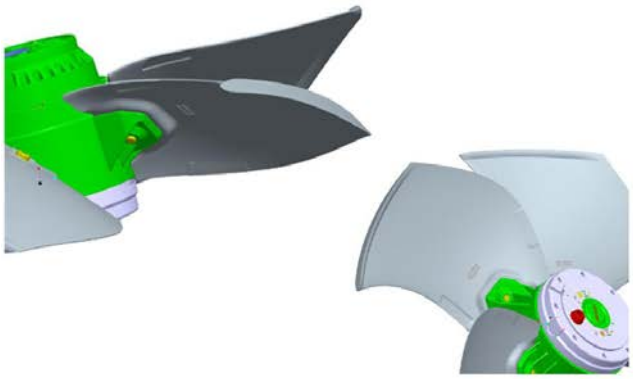


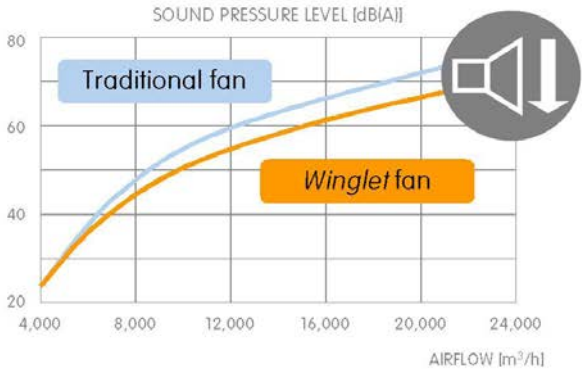
High efficiency and low sound emission external fans

The external axial fans are equipped with the innovative Winglet airfoil-vane with integrated baffle, able to increase the aerodynamic efficiency.

It results in a consumption reduction of the 10% and a medium sound emission lower of 6 dB than the traditional fans.

Both the consumptions and the sound emission can be furtherly reduced by the ECOBREEZE fan, available as option.





High efficiency ventilation with electronically controlled fans

How to improve ventilation whilst reducing prime (electric) energy consumption

A significant portion of the running costs of the fresh air systems is due to the consumption for ventilation. To this there should be added the charge for the study of the correct operating conditions, and for the required long and precise calibrations at the worksite.

The ClivetPACK² FFA ventilation technique allows both of these operational costs to be greatly minimised.

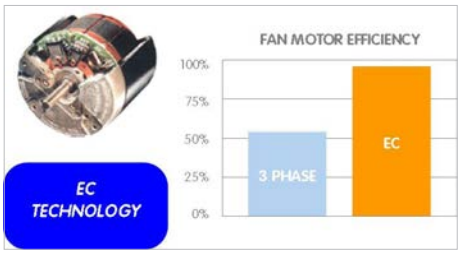
Versatility of reversed blades rotor

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

Efficiency of the electronic controlled motor

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

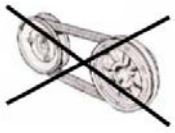
- the lack of brushes and the particular power supply increase efficiency by 70%;
- even the life cycle increases, thanks to the elimination of the brushes' natural abrasive erosion effects;
- the electronic control also includes a "soft start" solution, which drastically reduces the starting current of the fan and limits even more the system's electrical commitment.



Advantages of direct coupling (PLUG FAN)

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

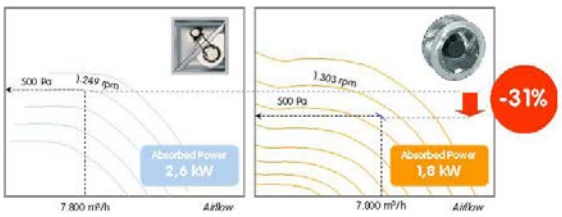
- the transmissions' inefficiencies are eliminated;
- the transmissions' wear and maintenance is eliminated.



Efficiency of the ventilation system increases by 30%

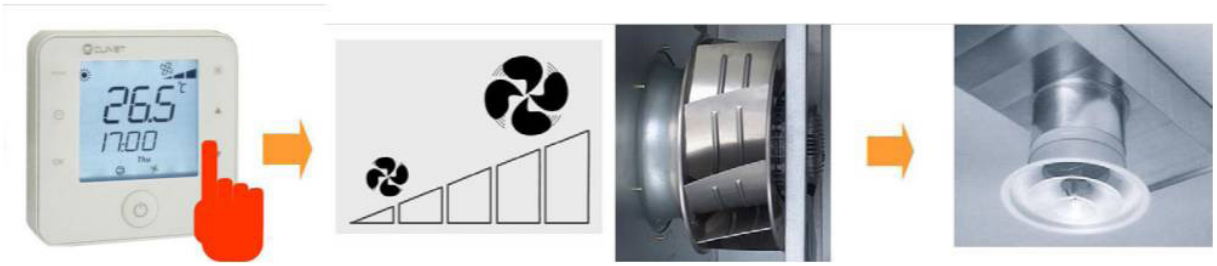
The comprehensive ventilation system, made up of rotor and motor, is therefore very versatile and efficient.

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



Air flow automatic adjustment

The original technology used eliminates the need for on-site calibration of traditional fans, as well as the time that would be required and the associated costs. The required flow rate is set on the display and maintained automatically by the unit, which controls the speed of the ventilating sections. During the installation and start-up phase, the unit controls to the effective pressure drop in the air distribution and diffusion system. Furthermore, during its entire operating life, the progressive fouling of the air filters is automatically compensated for thanks to this system.



Notes - the automatic control of the flow-rate at a constant value is supplied as standard in supply. In the CCFFA version, also in exhaust. as optional.

High air filtration efficiency with electronic filters H10

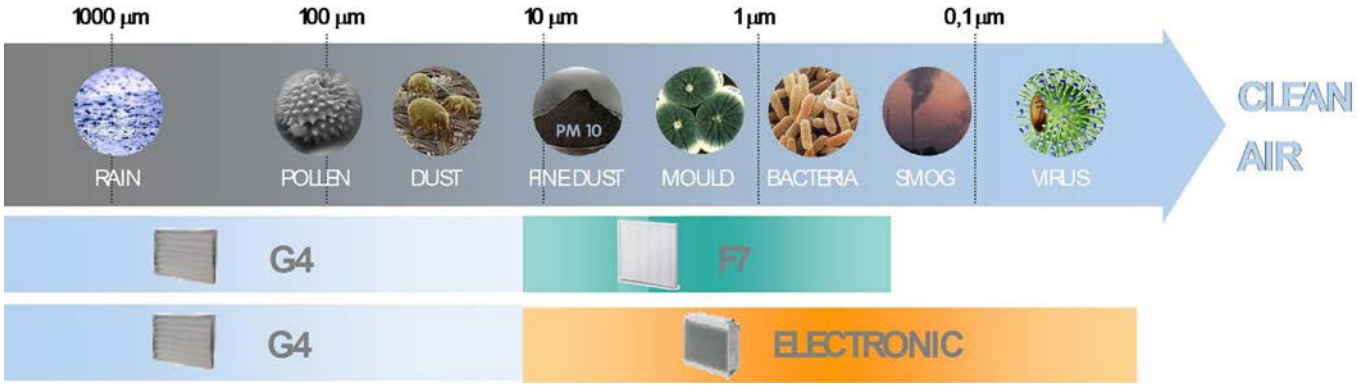
How to increase the filtration efficiency whilst minimising its operational costs

High efficiency filters (F7 category) of a traditional system increase the energy spent on ventilation, because of greater loss of pressure. And also require more frequent maintenance, with a significant cost at the end of each year to replace the filters.

The electronic filters available for ClivetPACK² FFA make fresh air filtering even more efficient and at the same time they reduce costs for ventilation and maintenance compared with traditional systems.

Very high filtration efficiency

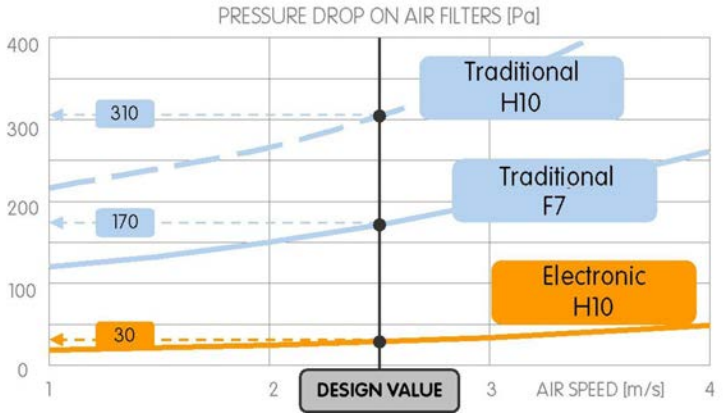
The efficiency of electronic filters on SMARTPACK is equivalent to classification H10 used in traditional filters, that is the category indicated as "absolute filter". These are effective even against smoke, fine dust, particulates PM10, PM2,5, PM1, bacteria, germs and viruses.



The ventilation energy is reduced

The highest filtration efficiency is obtained with practically no pressure drops.

These are dependant on the metal pre-filter located upstream of the plates to trap the largest particles, to homogeneously distribute the air flow and to contain the magnetic field generated during operation.



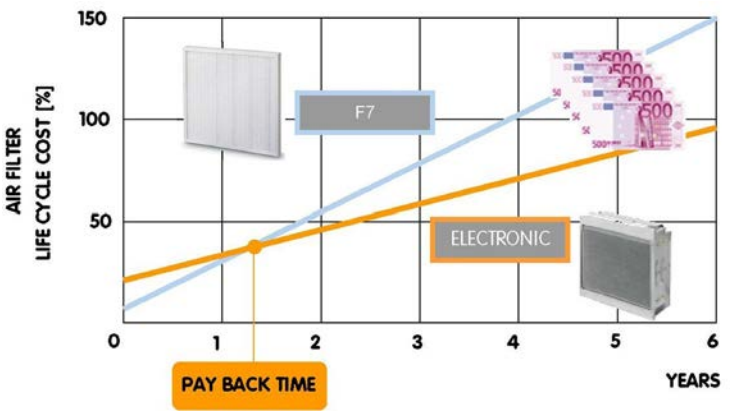
Return on investment (roi)achieved in second year of operation

The reduction of ventilation consumption is the first item of saving for electronic filters.

Savings on maintenance are even more evident, because electronic filters are washable and do not need to be replaced at regularly as traditional filters.

Taking as reference the price of a standard unit, the total yearly running cost is reduced from over 20% for the version with traditional filters to less than 8% thanks to the electronic filters.

The deriving payback is usually less than one and a half years.



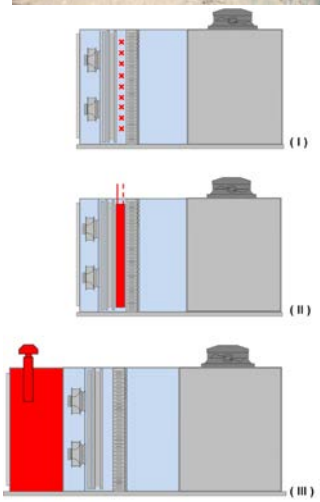
The full fresh air conditioner is efficient and reliable also in severe climates

High efficiency heating solutions

The reversible ClivetPACK² FFA heat pump model is also able to operate with particularly severe outdoor temperatures.

In many areas, these conditions only occur for brief periods of time when the system is used. The use of electric heaters (I) makes it possible to maintain the advantages of the packaged solution, both with regard to design simplicity as well as implementation rationality. The electric heaters can turn on automatically as auxiliary heating, or with an fresh air preheating function before the air is heated by the heat pump.

Alternately, the hot water coil (II) option extends the operating field of the unit to even colder climates. When necessary, it can also heat-up the external air before the treatment or integrate the capacity delivery from the heat pump. It can also fully substitute it in automatic mode, below an outside temperature value chosen by the user. For example, after having estimated the different supply costs of the energy sources in the individual application situations. In the event the heat pump is damaged, the hot water coil is automatically activated in emergency mode. Another available solution is the condensed gas burner heating module with modulating control (III). It is the solution frequently used in very cold climates. As the hot water coil performs the task of heat integration needed in the operation field of the heat pump, it can automatically become the only heat source with an outdoor temperature below the value chosen by the user and is automatically activated in emergency mode. Unlike systems powered by a thermal power station it does not require the distribution of hot water outside of the building: this simplifies the system, eliminates pumping consumption and avoids the use of devices and controls against the risk of freezing.



In very cold climates it is also necessary to foresee the 'Application for low outdoor temperature" option. The operation fields of the different heating options are shown separately.

Advanced heat pump

The particular heat pump technology developed for ClivetPACK² FFA guarantees its continuous and reliable operation.

The ICE PROTECTION SYSTEM device prevents icing on the base of the external exchanger during winter operation, thanks to a special subrefrigeration circuit. This prevents damages caused by freezing. The automatic defrost cycles on the remaining external exchanger surface are managed in predictive mode, reducing both the frequency and the duration. The built-in electronics analyses not only the external conditions, but also the evaporation pressure variation in the exchanger.

The activation of the two predictive defrosting cycles is alternated on the unit's two circuits. One circuit always remains active for heating: this prevents introducing air that is too cold to the environment, maintaining comfortable conditions for the user.

Criteria to determine the size of the combustion heat generator

The heating capacity that needs to be installed is determined based on the conditions the unit will work under, such as the fresh air temperature, internal loads and energy losses of the building.

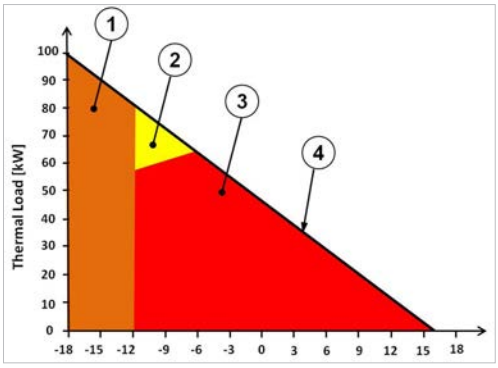
The size of the heat generator is based on one of the modes below:

- hybrid, as an integration for the heat pump to maintain the heating capacity supplied as the outdoor temperature drops;
- bivalent, to fully replace the heat pump when the outdoor temperature drops below the operating limits or the latter is not available.

In hybrid mode, the heating capacity required is met by the heat pump and the additional resource, whose capacity may be smaller than the capacity provided by the heat pump.

In bivalent mode, as well as serving as an additional resource, the thermal resource must fully replace the heat pump. Therefore, the chosen heating capacity must be higher or identical to the one provided by the heat pump.

The unit control manages the operation of the thermal resource by giving priority to the heat pump, which also carries out the exhaust air thermodynamic recovery whenever required (configuration with exhaust air energy recovery).



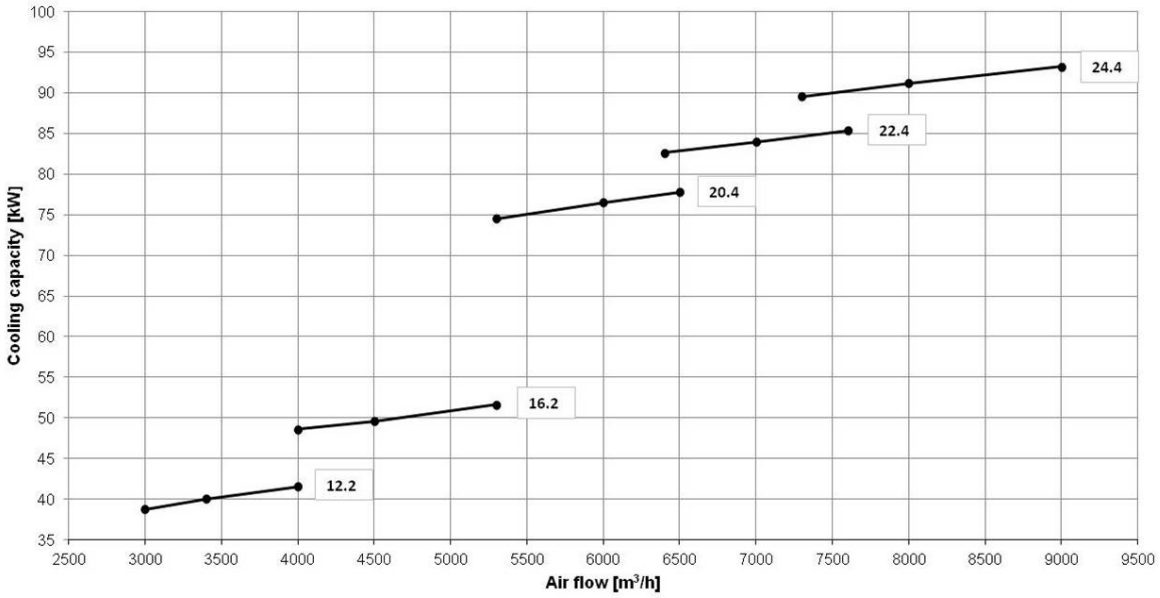
The load that needs to be met increases as the outdoor temperature drops.
Ex: CSRN-XHE2 FFA 20.4
Condensing gas module with modulating control 65kW (Hybrid function)
Condensing gas module with modulating control 100kW (bivalent function)

1. Bivalent function
2. Hybrid function
3. Heat pump
4. Thermal load line

How choosing the unit

The selection of the most appropriate size for an installation can be performed starting from the supply airflow value, established this value it is possible to choose among different available thermo-refrigerant treatments.

It is well-known that buildings built with modern technologies, that improve efficiency, have different needs than the previous buildings. In this case, the designer has to design systems with different potentialities.



Unit configuration

CSRN-XHE2 FFA	20.4	CCFFA	M0	R0	CHW2	PCOSM	CREFO
		(1)	(2)	(3)	(4)	(5)	(6)

1. Configuration
CBFFA for fresh air supply only
CCFFA for fresh air supply with extraction and exhaust

2. Air supply
M0 Horizontal air supply
M3 Downward air supply
M5 Upflow air supply

3. Air return
R0 Horizontal air return (only CCFFA configuration)
R3 Downward air return (only CCFFA configuration)

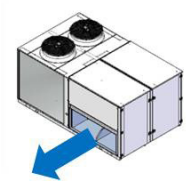
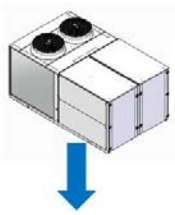
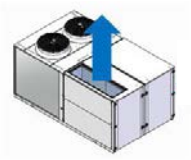
4. Auxiliary heating
- Standard
EH - Electric heaters
CHW2 - 2row hot water coil
GC - Gas heating module

5. Airflow
- Standard
PCOSM - Constant supply airflow
PCOSME- Constant airflow in supply and exhaust

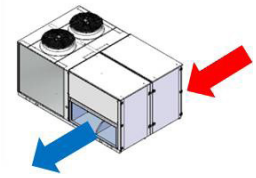
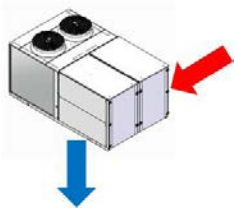
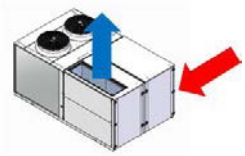
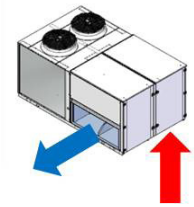
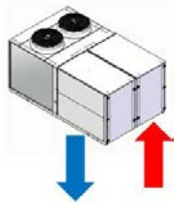
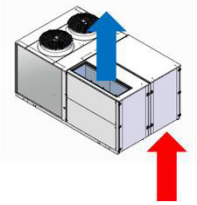
6. External section fan
CREFO - Device for fan consumption reduction of the external section, on/off type
CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type

Supply and return configurations

Fresh air supply only (CBFFA configuration)

Functionalities			
Air supply only	M0	M3	M5
	Standard unit	Option	Option
			

Fresh air supply with extraction and exhaust (CCFFA configuration)

Functionalities			
Air supply with extraction and exhaust	M0 - R0	M3 - R0	M5 - R0
	Standard unit	Option	Option
			
	M0 - R3	M3 - R3	M5-R3
	Option	Option	Option
			

Filtration	G4	G4+F7	G4+FES H10

Auxiliary heating	Heat pump standard unit and electric heaters	Heat pump and hot water coil	Gas heating module

Accessories separately supplied		
CLMX - Clivet Master System	**AMRX -** Rubber antivibration mounts	**RCX -** Roof curb

Standard unit technical specifications

Compressor

Hermetic Scroll compressor with orbiting spiral, equipped with motor protective device for overtemperatures, overcurrents and excessive temperatures of the supply gas. It is mounted on rubber antivibration mounts and comes with a full oil charge.

An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops. The compressors are connected in TANDEM on a single refrigeration circuit and have a biphasic oil equalisation (size 20.4 - 24.4), Digital Scroll and on/off Scroll (size 12.2 - 26.2). They are capacity step controlled.

Structure

The support base is assembled with a painted galvanized steel frame. The internal structure is made of zinc - magnesium bent galvanized steel. The alloy Zn - Mg allows an excellent corrosion proofing thanks to the galvanic protection typical of the combination zinc - magnesium.

Panelling

Sandwich panels in the air treatment section with dual walls in steel sheet metal with polyurethane insulation (40 kg/m3), thickness of outer sheet metal 6/10 mm galvanized and painted using polyester powders colour RAL 9001, polyurethane thickness 30mm with thermal conductivity coefficient 0.022W/mK, thickness of internal sheet metal 5/10 mm hot galvanized. The panel is also provided with a PVC profile for thermal insulation and a EPDM rubber gasket that ensures the hermetic seal.

All panelling can easily be removed to allow complete accessibility to internal components.

Internal exchanger

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

External exchanger

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

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

Fan

Internal section

Plug fans without scroll with reverse blades driven by electronically-controlled "brushless" dc motors with direct coupling. No transmission sizing is needed.

External section

Helical fans with die-cast aluminium blades, directly coupled to a three-phase electric motor with external rotor, with built-in thermal overload protection, IP 54 index of protection. Located inside an aerodinamically shaped nozzles to increase efficiency and minimise noise levels; fitted with safety grills.

Refrigeration circuit

The refrigeration circuit is complete with:

- refrigerant charge;
- liquid flow and moisture indicator;
- high pressure safety pressure switch;
- filter dryer;
- electronic expansion valve;
- non-return valve;
- 4-way reverse cycle valve;
- liquid receiver;
- liquid separator;
- high pressure safety valve;
- low pressure safety valve.

Filtration

Fresh air intake side

Pleated filter for greater filtering surface, made up of galvanized plate frame with galvanized and electric-welded protective mesh, and regenerable filtering media made from polyester fibre sized with synthetic resins. G4 efficiency according to CEN-EN 779 standard (Eurovent class EU4/5 - average efficiency 90.1% ASHRAE 52-76 Atm). Self-extinguishing (resistance to fire class 1 - DIN 53438).

Drain pan

Inox steel AISI 304 condensate collection tray with anti-condensate insulation, welded, fitted with drain pipe.

Electrical panel

The electrical panel is located inside the unit and is easily accessible thanks to a hinged panel.

The capacity section includes:

- main door lock isolator switch;
- compressor circuit breaker;
- compressor power supply remote control switch;
- fan motor thermal protections of internal and external section;
- circuit breaker to protect auxiliary circuit.

The microprocessor control section includes:

- compressor overload protection and timer;
- potential-free contacts for remote ON-OFF, cumulative alarm, fire alarm inlet, fan status, compressor status, summer/winter mode, settable input;
- remote control with user interface;
- intuitive graphical interface retro lighted;
- switch on and off daily and weekly programmer and set point;
- unit On/Off and overload reset;
- manual changing of the operating mode (hot or cold);
- display of operating status;
- display of alarms and failure code;
- management of the operating parameters.

Version with extraction and exhaust (only CCFFA configuration)

Standard unit specifications like standard version, and then:

- exhaust fan.

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

No drive sizing is required.

Fans have a regulation control of the air flow rate at.constant value.

Thermodynaic recovery on the exhaust air.

Accessories

- Two-rows hot water coil
- Modulating 3-way valve
- Modulating 2-way valve
- Hot gas re-heating coil
- Immersed electrodes steam humidifier
- Water to waste evaporating wet-deck humidifier
- Remote keypad for indoor temperature and humidity control
- Roof curb
- Electric heaters
- Condensing gas heating module with modulating control
- High efficiency F7 air filter
- Electronic filters
- Phase monitor
- Progressive compressor start-up soft-starter
- Power factor correction capacitors (cosfi > 0.9)
- Device for fan consumption reduction of the external section, ECOBREEZE type
- Constant supply airflow
- Sandwich panels of the handling zone in M0 fire reaction class
- Differential pressure switch for dirty air filters
- High and low pressure gauges
- High static pressure fan
- Serial communication module for Modbus supervisor
- Serial communication module for LonWorks supervisor
- Serial communication module for BACnet-IP supervisor
- Clivet Master System (accessory separately supplied)
- Application for low outdoor temperature
- Rubber antivibration mounts (accessory supplied separately)
- Rubber antivibration mounts for unit and gas module. (accessory separately supplied)
- Set up for shipping via container

All the handling coils can be covered with aluminium - Fin Guard - copper/copper.

Test

Unit manufactured according to the ISO 9001 quality standards and subject to functional testing at the end of the production line.

General technical data

Configuration: fresh air supply only (CBFFA)

Size			12.2	16.2	20.4	22.4	24.4
Cooling							
Cooling capacity	1	kW	33.1	49.5	76.1	83.4	90.4
Sensible capacity	1	kW	18.8	27.8	38.3	43.3	48.0
Compressor power input	1	kW	9.2	12.9	20.0	21.7	23.3
EER	1		3.60	3.84	3.81	3.84	3.88
Heating							
Heating capacity	2	kW	39.6	50.0	73.2	81.4	89.5
Compressor power input	2	kW	9.9	11.9	17.2	18.2	20.7
COP	2		4.00	4.20	4.26	4.47	4.32
Compressor							
Type of compressors	3		Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		No	2	2	4	4	4
Std Capacity control steps		No	2	3	4	4	4
Refrigeration circuits			2	2	2	2	2
Air Handling Section Fans (Supply)							
Type of supply fan	4		RAD	RAD	RAD	RAD	RAD
Number of supply fans		No	1	1	1	1	1
Fan diameter		mm	400	400	560	560	560
Type of motor	5		EC	EC	EC	EC	EC
Supply airflow		m^3/h	3400	4500	6000	7000	8000
Supply airflow		l/s	944	1250	1667	1944	2222
Installed unit power		kW	1.3	1.3	2.9	2.9	2.9
Max. static pressure supply fan	6	Pa	675	470	775	730	650
High static pressure air handling section fans (OPTIONAL)							
Type of supply fan			RAD	RAD	RAD	RAD	RAD
Number of supply fans		Nr	1	1	1	1	1
Fan diameter		mm	500	500	500	500	500
Supply airflow		l/s	944	1250	1667	1944	2222
Supply airflow		m^3/h	3400	4500	6000	7000	8000
Installed unit power		kW	2,6	2,6	5,5	5,5	5,5
Max. static pressure supply fan		Pa	890	810	1260	1260	1260
Fans (Exhaust) (only with CCFFA configuration)							
Type of exhaust fan	7		RAD	RAD	RAD	RAD	RAD
Number of exhaust fans	7	No	1	1	1	1	1
Fan diameter	7	mm	400	400	500	500	500
Type of motor	7		EC	EC	EC	EC	EC
Exhaust airflow	8	l/s	0-944	0-1250	0-1667	0-1944	0-2222
Installed unit power	7	kW	1.3	1.3	2.6	2.6	2.6
Max. exhaust static pressure	7	Pa	550	400	670	560	430
External Section Fans							
Type of fans	9		AX	AX	AX	AX	AX
Number of fans		No	2	2	2	2	2
Fan diameter		mm	630	630	800	800	800
Standard airflow		l/s	6940	6940	11670	11670	11670
Installed unit power		kW	1.05	1.05	1.5	1.5	1.5
Connections							
Condensate drain		mm	20	20	20	20	20
Power supply							
Standard power supply		V	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50

1. Fresh air temperature: 35°C D.B./ 24°C W.B. EER referred only to compressors
2. Fresh air temperature: 7°C D.B./ 6°C W.B. COP referred only to compressors
3. SCROLL = scroll compressor
4. RAD = radial fan
5. EC Electronic switching motor
6. Available nett pressure to overcome the supply
7. CCFFA - configuration for fresh air supply with extraction and exhaust
8. Range of variability of the exhaust air flow (only for CCFFA configuration)
9. AX = axial fan

Electrical data

Configuration: fresh air supply only (CBFFA)

SIZE			12.2	16.2	20.4	22.4	24.4
F.L.A. - Full load current at max admissible conditions							
FLA Compressor 1		[A]	12,1	13,6	10,1	10,1	14,3
FLA Compressor 2		[A]	12,1	17,5	14,3	14,3	14,3
FLA Compressor 3		[A]	-	-	10,1	14,3	14,3
FLA Compressor 4		[A]	-	-	14,3	14,3	14,3
FLA external Fan unit		[A]	2,5	2,5	3,9	3,9	3,9
FLA supply Fan unit		[A]	2,1	2,1	4,4	4,4	4,4
FLA Total	1	[A]	31,7	38,6	61,5	65,7	69,9
L.R.A. Starting current							
LRA Compressor 1		[A]	75	101	64	64	101
LRA Compressor 2		[A]	75	111	101	101	101
LRA Compressor 3		[A]	-	-	64	101	101
LRA Compressor 4		[A]	-	-	101	101	101
F.L.I. - Full load power input at max admissible conditions							
FLI Compressor 1		[kW]	7,3	8,3	6,1	6,1	8,3
FLI Compressor 2		[kW]	7,3	10,2	8,3	8,3	8,3
FLI Compressor 3		[kW]	-	-	6,1	8,3	8,3
FLI Compressor 4		[kW]	-	-	8,3	8,3	8,3
FLI external Fan unit		[kW]	1,3	1,3	1,9	1,9	1,9
FLI supply Fan unit		[kW]	1,3	1,3	2,9	2,9	2,9
FLI Total	2	[kW]	18,6	22,6	35,8	38	40,1
M.I.C. Maximum inrush current							
MIC		[A]	92,2	129,7	148,2	152,4	156,6

Configuration: fresh air supply with extraction and exhaust (CCFFA)

SIZE			12.2	16.2	20.4	22.4	24.4
F.L.A. - Full load current at max admissible conditions							
FLA Compressor 1		[A]	12,1	13,6	10,1	10,1	14,3
FLA Compressor 2		[A]	12,1	17,5	14,3	14,3	14,3
FLA Compressor 3		[A]	-	-	10,1	14,3	14,3
FLA Compressor 4		[A]	-	-	14,3	14,3	14,3
FLA external Fan unit		[A]	2,5	2,5	3,9	3,9	3,9
FLA supply Fan unit		[A]	2,1	2,1	4,4	4,4	4,4
FLA exhaust Fan unit		[A]	2,1	2,1	4	4	4
FLA Total	1	[A]	33,8	40,7	65,4	69,6	73,8
L.R.A. Starting current							
LRA Compressor 1		[A]	75	101	64	64	101
LRA Compressor 2		[A]	75	111	101	101	101
LRA Compressor 3		[A]	-	-	64	101	101
LRA Compressor 4		[A]	-	-	101	101	101
F.L.I. - Full load power input at max admissible conditions							
FLI Compressor 1		[kW]	7,3	8,3	6,1	6,1	8,3
FLI Compressor 2		[kW]	7,3	10,2	8,3	8,3	8,3
FLI Compressor 3		[kW]	-	-	6,1	8,3	8,3
FLI Compressor 4		[kW]	-	-	8,3	8,3	8,3
FLI external Fan unit		[kW]	1,3	1,3	1,9	1,9	1,9
FLI supply Fan unit		[kW]	1,3	1,3	2,9	2,9	2,9
FLI return Fan unit		[kW]	1,3	1,3			
FLI exhaust Fan unit		[kW]	1,3	1,3	2,6	2,6	2,6
FLI Total	2	[kW]	19,9	23,9	38,4	40,6	42,7
M.I.C. Maximum inrush current							
MIC		[A]	94,3	131,8	152,2	156,4	160,6

Voltage unbalance between phases: max 2 % Power supply: 400/3/50 Hz.
Voltage variation: max +/- 10%
Values not including accessories

1. Value including all the unit standard components. To obtain the value of F.L.A. including accessories, add to the total F.L.A. value that of any accessories (see electrical data of accessories)
2. Value including all the unit standard components. To obtain the value of F.L.I. including accessories, add to the total F.L.I. value that of any accessories (see electrical data of accessories)

Electrical input of optional components

To obtain the electrical input of the unit including accessories, add the standard data in Electrical Data table to those for the selected accessories.

Size		12.2	16.2	20.4	22.4	24.4
F.L.A. Full load current						
F.L.A. EH12 - 9 kW electric heaters	A	13,0	13,0	-	-	-
F.L.A. EH15 - 13.5 kW electric heaters	A	17,3	17,3	-	-	-
F.L.A. EH17 - 18 kW electric heaters	A	26,0	26,0	26,0	26,0	26,0
F.L.A. EH26 - 27 kW electric heaters	A	-	-	39,0	39,0	39,0
F.L.A. HSE5 - Immersed electrodes steam humidifier of 5kg/h	A	5,4	5,4	-	-	-
F.L.A. HSE8 - Immersed electrodes steam humidifier of 8kg/h	A	8,7	8,7	8,7	8,7	8,7
F.L.A. HSE9 - Immersed electrodes steam humidifier of 15kg/h	A	-	-	16,2	16,2	16,2
F.L.A. LTEMP1 - Configuration for low external temperature	A	0,50	0,50	0,50	0,50	0,50
F.L.A. VENH - High static pressure fans	A	1,90	1,90	4,00	4,00	4,00
F.L.I. Power consumption:						
F.L.I. EH12 - 9 kW electric heaters	kW	9,0	9,0	-	-	-
F.L.I. EH15 - 13.5 kW electric heaters	kW	12,0	12,0	-	-	-
F.L.I. EH17 - 18 kW electric heaters	kW	18,0	18,0	18,0	18,0	18,0
F.L.I. EH26 - 27 kW electric heaters	kW	-	-	27,0	27,0	27,0
F.L.I. HSE5 - Immersed electrodes steam humidifier of 5kg/h	kW	3,8	3,8	-	-	-
F.L.I. HSE8 - Immersed electrodes steam humidifier of 8kg/h	kW	6,0	6,0	6,0	6,0	6,0
F.L.I. HSE9 - Immersed electrodes steam humidifier of 15kg/h	kW	-	-	11,3	11,3	11,3
F.L.I. LTEMP1 - Configuration for low external temperature	kW	0,20	0,20	0,20	0,20	0,20
F.L.I. VENH - High static pressure fans	kW	1,30	1,30	2,60	2,60	2,60

The 'FES - Electronic filters' option doesn't imply any change of the unit standard electrical data.

The Demand Limit function, present in the Rooftop Clivet units, is not available for the ClivetPACK² FFA unit series. In particular conditions, the full fresh air proper operating may indeed require the access to all the available resources.

Pressure drops of optional components

The value of static pressure available on the supply and return duct is obtained by subtracting from the available net maximum pressure (see general table of technical data) the pressure drops of any accessories.

Size			12.2	16.2	20.4	22.4	24.4
CHW2 - 2row hot water coil		Pa	16	23	17	21	25
CHPG - Hot gas re-heating coil		Pa	11	14	11	12	14
HWS - Water to waste evaporating wet-deck humidifier		Pa	18	27	18	22	27
GC - Gas heating module		Pa	45	70	54	67	80
F7 - F7 high efficiency air filter	1	Pa	125	145	120	128	138
FES - Electronic filters		Pa	18	32	16	19	24

The values shown are to be considered approximate for units operating power in normal use with standard air flow rate.

1. Pressure drops with filters with average dirtiness

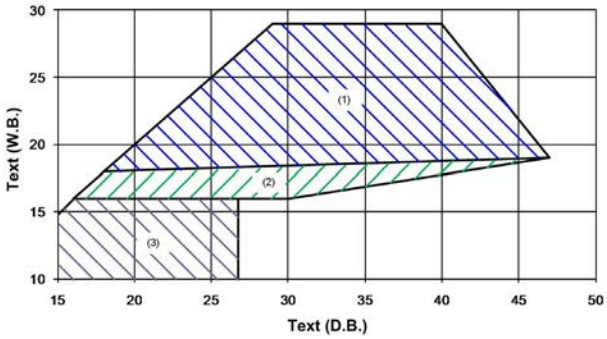
Sound levels

Size	Sound power level								Sound pressure level	Sound Power Level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
12.2	76	79	76	77	77	76	74	73	65	83
16.2	76	79	78	80	80	78	75	79	66	85
20.4	92	82	80	81	79	77	74	75	67	84
22.4	92	83	81	82	80	78	75	73	68	85
24.4	92	84	82	84	82	79	76	76	69	87

The sound levels are referred to unit operating at full load in nominal conditions. The sound pressure level is referred at a distance of 1 m. from the ducted unit surface operating in free field conditions. External static pressure 50 Pa. (standard UNI EN ISO 9614-2)

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

Operating range (Cooling)



The limits are indicative and take into consideration:
- general and non specific sizes
- standard airflow
- operation at full load
- unit correctly installed and serviced

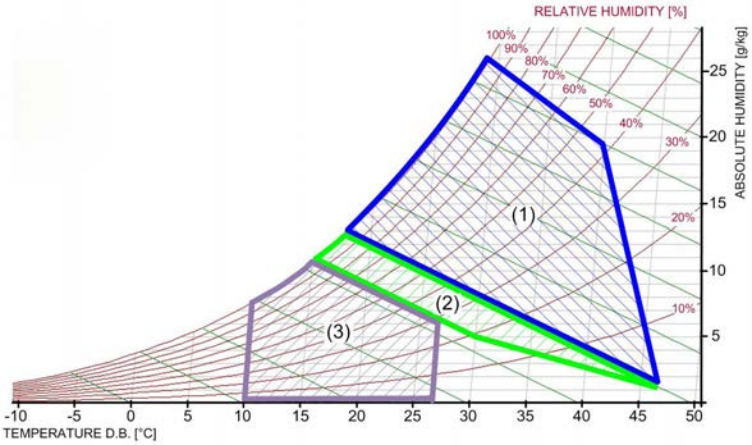
Text (D.B.) = Ambient air temperqature / handling coil inlet
dry bulb measured temperature
(D.B.=DRY BULB)

Text (W.B.) = Ambien air temperature / handling coil inlet
WARNING! WET BULB TEMPERATURE
(W.B. = WET BULB)

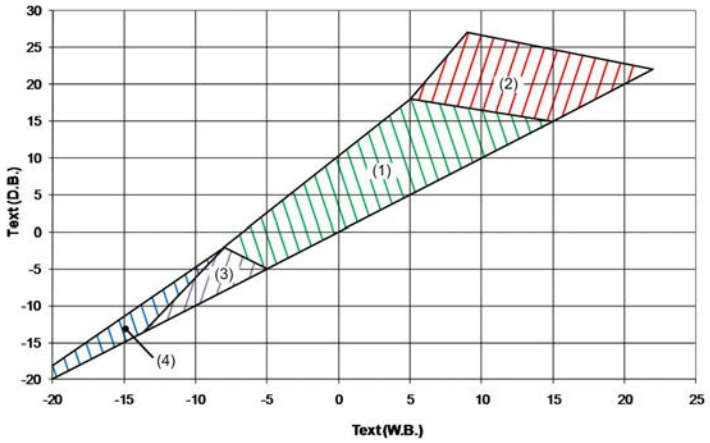
1. Operation range at full load
2. Operating field at partial load (one active compressor for each refrigerant circuit)
3. FREE-COOLING range operating

WET BULB TEMPERATURE - EXAMPLE

28°C W.B. { 40°C D.B. / 41%R.H.
35°C D.B. / 59%R.H.
30°C D.B. / 86%R.H.



Operating range (Heating)

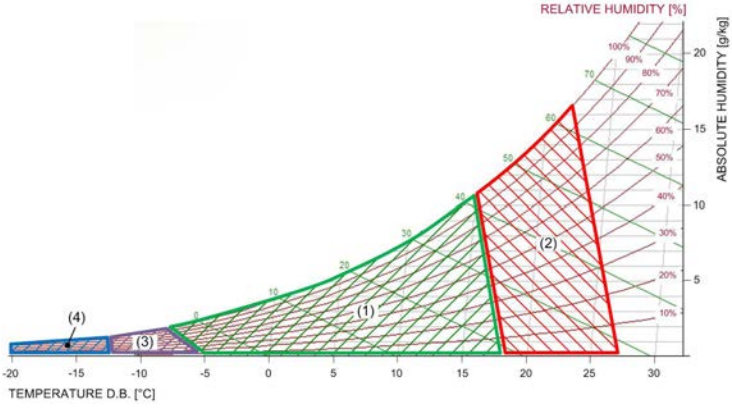


The limits are indicative and take into consideration:
- general and non specific sizes
- standard airflow
- operation at full load
- unit correctly installed and serviced

Text (D.B.) = Ambient air temperqature / handling coil inlet
dry bulb measured temperature
(D.B.=DRY BULB)

TEXT (W.B.) = Fresh air temperature/inlet of treatment coil
WARNING! WET BULB TEMPERATURE
(W.B. = WET BULB)

1. Operation range at full load
2. Operating field at partial load (one active compressor for each refrigerant circuit)
3. Operating field of the unit with external low temperature equipment and pre-heating resistances or hot water coil options.
4. Operating field of the unit with external low temperature equipment and hot water coil or gas heating module options



Performance in cooling at part loads

Configuration: fresh air supply only (CBFFA)

SIZE	% OF PART LOAD	FRESH AIR TEMPERATURE (°C)																	
		20/16						25/18						30/21					
		kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER
12.2	25%	10,9	6,5	1,5	14,5	12,5	7,54	11,3	7,7	1,6	18,4	14,4	6,89	12,0	8,3	1,8	22,7	17,6	6,51
	50%	17,4	9,4	3,1	12,1	10,1	5,59	17,9	10,4	3,5	16,0	12,2	5,10	19,0	11,0	4,0	20,4	15,5	4,74
	75%	27,4	16,0	4,6	6,4	6,2	5,98	28,2	18,2	5,2	9,3	8,5	5,41	30,1	19,2	5,9	13,1	11,9	5,13
	100%	35,2	17,3	6,4	5,3	2,8	5,50	36,9	19,5	7,3	8,2	4,7	5,05	38,7	20,6	8,3	11,9	8,6	4,66
16.2	25%	15,7	10,0	2,3	13,6	12,0	6,96	16,5	11,2	2,6	17,7	14,1	6,35	17,1	11,8	3,0	22,2	17,2	5,79
	50%	23,2	11,3	4,7	12,8	10,0	4,97	23,8	13,7	5,3	16,0	12,2	4,48	25,1	14,5	6,1	20,4	15,1	4,14
	75%	36,3	21,9	6,5	6,0	5,9	5,62	38,1	24,6	7,4	9,0	8,3	5,12	39,7	26,0	8,5	12,8	11,7	4,67
	100%	44,2	22,6	8,6	5,5	3,5	5,14	46,4	25,4	9,9	8,4	5,6	4,69	48,3	26,8	11,3	12,2	9,5	4,27
20.4	25%	24,8	13,3	3,4	13,6	11,3	7,24	25,8	15,1	4,0	17,6	13,4	6,52	26,6	16,1	4,6	22,0	16,7	5,85
	50%	49,6	26,6	6,9	7,2	5,9	7,16	51,5	30,2	8,0	10,2	8,1	6,45	53,2	32,1	9,2	14,0	11,8	5,78
	75%	57,5	29,2	9,8	6,0	3,9	5,84	59,7	33,1	11,4	8,8	6,2	5,26	61,7	35,3	13,1	12,5	10,1	4,72
	100%	70,0	30,1	13,1	5,5	0,4	5,34	72,7	34,2	15,1	8,3	2,7	4,81	75,1	36,4	17,4	11,9	7,0	4,32
22.4	25%	25,4	14,4	3,5	14,1	11,9	7,23	26,5	16,4	4,0	18,1	13,9	6,56	27,4	17,4	4,6	22,6	17,2	5,89
	50%	51,5	28,9	6,9	8,1	7,1	7,49	53,6	32,9	7,9	11,2	9,3	6,80	55,4	35,1	9,1	15,1	13,0	6,10
	75%	60,0	31,6	9,9	7,0	5,4	6,09	62,5	36,0	11,3	9,9	7,7	5,53	64,6	38,3	13,0	13,7	11,4	4,96
	100%	76,4	33,9	14,3	6,0	1,7	5,34	79,5	38,6	16,4	8,8	3,9	4,85	82,2	41,1	18,9	12,5	8,2	4,35
24.4	25%	25,6	14,2	3,5	14,9	12,4	7,33	26,4	16,9	4,0	18,8	14,5	6,63	27,6	18,5	4,5	23,1	17,7	6,09
	50%	51,2	28,5	7,0	9,7	8,4	7,34	52,6	34,1	7,9	12,5	10,7	6,63	55,5	37,2	9,0	16,1	14,1	6,13
	75%	64,0	34,8	11,0	7,5	6,2	5,81	65,6	39,9	12,6	10,4	8,6	5,20	69,3	42,7	14,5	14,1	12,1	4,80
	100%	82,3	37,6	15,4	6,4	2,7	5,34	86,0	42,8	17,7	9,3	5,1	4,86	89,0	45,7	20,4	13,0	9,0	4,36

SIZE	% OF PART LOAD	FRESH AIR TEMPERATURE (°C)																	
		35/24						40/27						43/28					
		kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER
12.2	25%	12,8	8,9	2,1	27,0	20,7	6,16	13,5	9,5	2,3	31,3	23,9	5,76	-	-	-	-	-	-
	50%	20,1	11,4	4,5	24,8	18,8	4,42	21,0	11,9	5,1	29,2	22,1	4,08	21,1	14,4	5,5	29,8	23,3	3,85
	75%	32,0	20,2	6,7	17,0	15,3	4,78	33,8	21,2	7,6	20,7	18,8	4,48	34,4	24,2	7,7	20,8	20,0	4,45
	100%	39,8	21,5	9,4	15,8	12,7	4,23	40,2	22,4	10,8	19,6	17,0	3,72	40,5	25,6	11,2	19,5	18,1	3,62
16.2	25%	17,6	12,3	3,4	26,7	20,6	5,20	17,9	12,4	3,9	31,5	23,9	4,55	-	-	-	-	-	-
	50%	26,7	14,9	6,9	24,9	18,7	3,86	28,0	15,5	7,8	29,4	22,1	3,59	-	-	-	-	-	-
	75%	40,7	26,9	9,7	16,8	15,7	4,19	41,4	27,2	11,3	21,3	19,5	3,67	-	-	-	-	-	-
	100%	49,5	27,8	12,9	16,2	13,6	3,84	50,4	28,1	15,0	20,7	17,6	3,36	50,1	29,4	16,2	22,6	18,9	3,09
20.4	25%	27,0	16,9	5,2	26,4	20,1	5,15	27,1	17,7	6,0	30,9	23,5	4,50	-	-	-	-	-	-
	50%	53,9	33,8	10,6	17,9	15,8	5,10	54,1	35,3	12,2	21,8	19,7	4,45	-	-	-	-	-	-
	75%	62,5	37,1	15,0	16,2	14,2	4,16	62,8	38,7	17,3	20,0	18,3	3,63	-	-	-	-	-	-
	100%	76,1	38,3	20,0	15,6	11,5	3,81	76,4	40,0	23,0	19,4	15,9	3,32	76,4	42,5	24,9	20,9	17,4	3,07
22.4	25%	27,8	18,4	5,3	27,0	20,5	5,20	27,9	19,1	6,1	31,6	23,9	4,55	-	-	-	-	-	-
	50%	56,2	36,9	10,4	19,0	16,7	5,39	56,4	38,5	12,0	23,0	20,5	4,71	-	-	-	-	-	-
	75%	65,5	40,4	15,0	17,5	15,4	4,38	65,8	42,1	17,2	21,4	19,3	3,83	-	-	-	-	-	-
	100%	83,4	43,3	21,7	16,2	12,5	3,84	83,7	45,1	24,9	20,1	16,7	3,36	-	-	-	-	-	-
24.4	25%	29,1	19,9	5,2	27,4	20,8	5,64	30,3	21,2	5,8	31,8	24,0	5,22	30,1	33,6	6,2	29,9	25,2	4,86
	50%	58,2	39,9	10,3	19,9	17,5	5,67	60,7	42,4	11,6	23,6	20,9	5,24	60,3	45,9	12,4	25,1	22,2	4,88
	75%	72,7	45,0	16,6	17,9	15,6	4,38	76,1	47,2	18,7	21,8	19,2	4,06	75,6	50,3	20,0	23,4	20,6	3,78
	100%	90,4	48,0	23,3	16,8	13,2	3,88	90,4	49,9	26,8	20,7	17,4	3,37	89,1	53,3	29,0	22,2	18,9	3,07

PARTIAL LOAD PERCENTAGE = SUPPLIED POWER / FULL LOAD CAPACITY, REFERRED TO THE SAME CONDITIONS

Fresh air temperature (°C) D.B. / W.B.
DB = Dry bulb
WB = Wet bulb
kWf = Cooling capacity in kW
kWs = Evaporator sensible capacity in kW
kWe = Compressor power input in kW
Td = Dry bulb air outlet temperature °C
Tw = Supply temperature a wet bulb
EER referred only to compressors
Not all cooling yields take into account the heat dissipated by the fan motors

Performance in heating at part loads

Configuration: fresh air supply only (CBFFA)

SIZE	% OF PART LOAD	FRESH AIR TEMPERATURE (°C)																								
		-5/-6					0/-1					2/1					7/6					12/11				
		kWt	kWe	Td	Tw	COP	kWt	kWe	Td	Tw	COP	kWt	kWe	Td	Tw	COP	kWt	kWe	Td	Tw	COP	kWt	kWe	Td	Tw	COP
12.2	25%	-	-	-	-	-	9,1	1,7	7,4	3,2	5,43	9,5	1,8	9,7	5,2	5,23	10,5	2,2	15,7	10,1	4,74	11,6	2,7	21,7	14,8	4,32
	50%	15,5	2,7	7,4	1,5	5,69	17,4	3,3	14,1	6,7	5,27	18,1	3,6	16,8	8,6	5,08	20,0	4,3	23,5	13,3	4,60	22,1	5,3	30,5	17,9	4,20
	75%	23,1	4,3	13,4	4,8	5,35	26,0	5,3	21,1	9,9	4,86	27,1	5,8	24,1	11,8	4,69	29,5	7,1	31,4	16,2	4,18	31,9	8,7	38,8	20,5	3,65
	100%	31,2	6,0	19,9	8,0	5,20	35,1	7,5	28,4	12,9	4,68	36,6	8,1	31,8	14,8	4,52	39,6	9,9	39,8	18,9	4,00	42,3	12,4	47,5	22,9	3,41
16.2	25%	-	-	-	-	-	11,7	2,4	7,2	3,1	4,88	12,2	2,6	9,5	5,1	4,68	13,3	3,1	15,3	9,9	4,25	14,6	3,7	21,3	14,7	3,94
	50%	21,5	4,2	7,9	1,9	5,08	24,1	5,1	14,7	7,0	4,78	25,1	5,5	17,5	8,9	4,58	27,5	6,6	24,2	13,6	4,16	30,2	7,8	31,1	18,1	3,86
	75%	30,0	5,7	13,1	4,6	5,30	33,7	7,0	20,6	9,7	4,85	35,2	7,6	23,7	11,6	4,65	38,4	9,2	31,0	16,0	4,19	41,7	11,2	38,4	20,4	3,71
	100%	39,1	7,2	18,5	7,3	5,43	44,0	9,0	26,9	12,3	4,89	45,9	9,8	30,3	14,2	4,68	50,0	11,9	38,3	18,5	4,20	54,1	14,9	46,3	22,6	3,63
20.4	25%	-	-	-	-	-	-	-	-	-	-	15,7	1,9	9,3	5,0	8,34	17,5	2,1	15,2	9,8	8,19	19,4	2,5	21,2	14,7	7,61
	50%	-	-	-	-	-	41,9	5,8	19,2	9,1	7,19	37,5	5,0	19,3	9,8	7,50	41,9	5,9	26,6	14,5	7,07	46,5	7,2	34,1	19,0	6,50
	75%	-	-	-	-	-	52,4	9,3	24,1	11,2	5,66	48,6	8,8	24,4	11,9	5,51	61,4	12,5	35,8	17,7	4,91	67,5	15,1	44,1	22,0	4,47
	100%	57,3	10,2	20,9	8,4	5,62	64,2	12,9	29,5	13,3	4,98	66,9	14,0	32,9	15,2	4,78	73,2	17,2	41,3	19,4	4,26	78,6	21,2	49,4	23,4	3,71
22.4	25%	-	-	-	-	-	-	-	-	-	-	20,7	2,5	10,2	5,4	8,20	23,1	3,0	16,3	10,3	7,63	25,8	3,7	22,5	15,1	7,06
	50%	-	-	-	-	-	40,0	4,8	15,7	7,4	8,34	41,5	5,1	18,4	9,4	8,21	46,4	6,0	25,6	14,1	7,67	51,6	7,3	33,0	18,7	7,07
	75%	-	-	-	-	-	54,5	8,8	21,4	10,0	6,21	56,8	9,4	24,5	11,9	6,03	63,9	11,7	32,7	16,6	5,45	70,4	14,1	40,7	21,0	4,99
	100%	-	-	-	-	-	71,1	13,5	28,0	12,7	5,27	74,3	14,8	31,4	14,6	5,02	81,4	18,2	39,7	18,9	4,47	87,3	22,3	47,6	22,9	3,91
24.4	25%	-	-	-	-	-	21,9	2,7	7,5	3,3	8,11	22,8	2,9	9,9	5,3	7,94	25,4	3,4	15,9	10,2	7,41	28,4	4,1	22,1	15,0	6,85
	50%	-	-	-	-	-	43,8	5,4	15,1	7,1	8,12	45,6	5,7	17,8	9,1	7,96	51,0	6,8	24,9	13,8	7,45	56,8	8,3	32,2	18,4	6,85
	75%	-	-	-	-	-	59,8	9,9	20,6	9,7	6,05	62,4	10,7	23,6	11,6	5,84	70,2	13,3	31,7	16,3	5,30	77,4	16,0	39,6	20,7	4,83
	100%	69,7	12,1	18,6	7,4	5,76	78,0	15,2	26,9	12,3	5,13	81,7	16,8	30,3	14,2	4,86	89,5	20,6	38,5	18,5	4,34	96,0	25,3	46,2	22,6	3,79

PARTIAL LOAD PERCENTAGE = SUPPLIED POWER / FULL LOAD CAPACITY, REFERRED TO THE SAME CONDITIONS

Fresh air temperature (°C) D.B. / W.B.
DB = Dry bulb
WB = Wet bulb
kWt = Heating capacity supplied (kW) with coils without ice
kWe = Compressor power input in kW
Td = Dry bulb air outlet temperature °C
Tw = Supply temperature a wet bulb
COP referred only to compressors
Not all heating yields take into account the heat dissipated by the fan motors

Accessories

EH - Electric heaters

The option is indicated for cold climate and provide preheat of entering air to the handling coil and thereby increase unit capacity. Ideal for lower outside temperature applications where it is required to active the heaters only for short duration in the year. In these cases, simplification of the system is more economical than electrical conduction cost. The fins are made of aluminium, with a size suitable to ensure high efficiency and maintain low power density on the surfaces to limit overheating. The low temperature of the heating heaters increases their lifespan and limits the effect of air ionization.

The electrical heating heaters are managed by a thermal control device with two power settings.

The electric heater activation depends on the outside air temperature. This electric heater generate a preliminary treatment of the outside air before entering into the active thermodynamic heat recovery exchanger. In the event that fresh air temperature is lower than the preset control parameter, the unit stops both electric heater and ventilation in order to prevent introduction of too cold air in the served space(s).

Matching of the electric heaters

Size	12.2	16.2	20.4	22.4	24.4
9 kW	√	√	-	-	-
13.5 kW	√	√	-	-	-
18 kW	-	-	√	√	√
27 kW	-	-	√	√	√

This operation involves variation of the main electrical data of the unit.

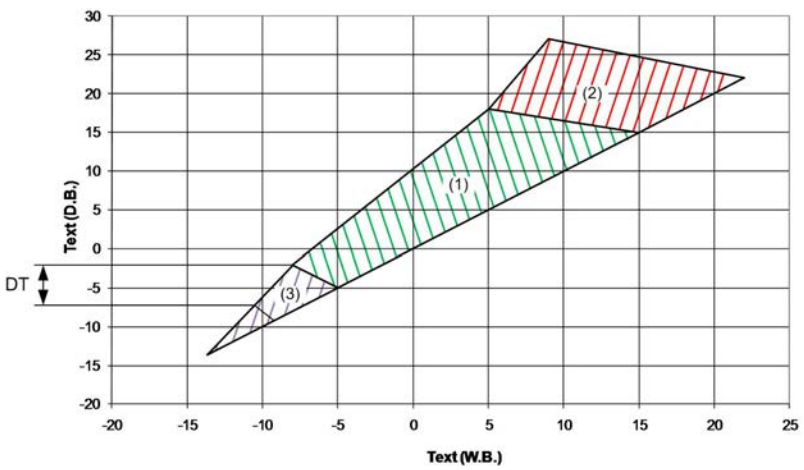
Hot water coil, electric heaters and gas module cannot be mounted at the same time.

CAUTION! When selecting the unit, it must be checked that the overall heating capacity generated by the unit, complete with electric heaters, is suitable for maintaining the conditions of comfort in the served environment, based on outdoor conditions and the foreseen thermal loads. If the environment requires greater heating capacity, it is advisable to equip the unit with the hot water coil option or the gas heating module.

Extension of operating limits with heating heaters

The minimum operating temperature for the unit complete with the electric heaters varies based on the considered size and the power selected for the heaters. It can be easily obtained by subtracting the value DT (shown in the table below) from the lower limit of the temperature of the air entering the indoor exchanger TEXT(D.B.) for standard units, at the desired conditions.

Size	Air flow rate [m³/h]	ELECRIC HEATING CAPACITY/ DT			
		9kW	13.5kW	18kW	27kW
12.2	3400	7,8	10,5	-	-
16.2	4500	5,9	7,9	-	-
20.4	6000	-	-	8,9	13,3
22.4	7000	-	-	7,6	11,4
24.4	8000	-	-	6,7	10,0



The limits are indicative and take into consideration:
- general and non specific sizes

- Standard airflow
- operation at full load
- unit correctly installed and serviced

Text (D.B.) = Ambient air temperqature / handling coil inlet
CAUTION! dry bulb measured temperature (D.B.=DRY BULB)

Text (W.B.) = fresh air temperature/inlet of treatment coil
CAUTION! temperature measured with wet bulb (W.B.=WET BULB)

1. Operation range at full load
2. Operating field at partial load (one active compressor for each refrigerant circuit)
3. Operation range of the unit equipped with electric heaters

GC - Condensing gas heating module with modulating control

Option consisting of a combustion chamber and condensation burner with modulating control. It is available in various capacities and heats the environment served. The module can be chosen to integrate the heat pump or as an alternative to it. In this case, its heating capacity must be at least equal to the capacity envisioned in the project.

Thanks to the condensation technology with pre-mix and extremely efficient modulation (up to 105% depending on the lower heat value), consumption is very contained and considerably reduced during operation at partial load. The burner with low polluting emissions (NOx lower than 80mg/kWh) in accordance with Class 5 of European standard EN 676.

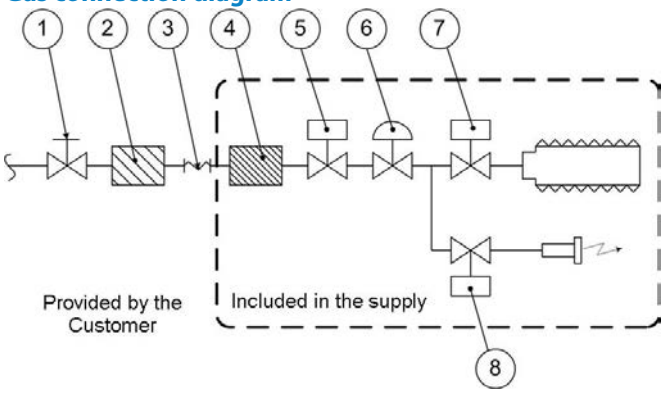
The option is supplied on a separate module, easy to connect to the unit during installation.

The gas module presence needs the horizontal supply.

The heating module includes:

- hot air generator with condensation and integrated modulating adjustment, powered with methane gas;
- kit for transformation of power with liquefied petroleum gas (LPG);
- kit of steel chimney for exhaust fumes;
- all the control and safety devices.

Gas connection diagram



1. GAS COCK
2. GAS FILTER (LARGE SECTION)
3. ANTI-VIBRATION JOINT
4. GAS FILTER (SMALL SECTION)
5. SAFET GAS SOLENOID VLAVE
6. PRESSURE STABILISER
7. MAIN GAS BURNER SOLENOID VALVE
8. PILOT BURNER GAS SOLENOID VALVE

Gas use features

		35kW		44kW		65kW		82kW	
NOx class	Val	5							
		min	max	min	max	min	max	min	max
Rated thermal input	kW	7.6	34.85	8.50	42.00	12.40	65.00	16.40	82.00
Efficiency Hi (P.C.I.)	%	106.97	96.30	105.88	96.19	108.06	96.82	108.35	97.60
Efficiency Hs (P.C.S.)	%	96.37	86.76	95.39	86.66	97.36	87.22	97.62	87.93
Max condensation produced	l/h	0.9		1.1		2.1		3.3	
Carbon monoxide CO (0% di O_2)	ppm	<5		<5		<5		<5	
Nitrogen oxides - NOx (0% di O_2)		41 mg / k Wh 23 ppm		35 mg / k Wh 20 ppm		40 mg / k Wh 23 ppm		34 mg / k Wh 19 ppm	
Available flue pressure	Pa	90		90		120		120	
Gas connection diameter	GAS	UNI ISO 7/1-3/4"		UNI ISO 7/1-3/4"		UNI ISO 7/1-3/4"		UNI ISO 7/1-1"	
Exhaust pipe diameter	mm	80		80		80		80	

Matching of the gas heating module

	Capacity	12.2	16.2	20.4	22.4	24.4
GC01X	**35 kW**	√	√	X	X	X
GC08X	**44 kW**	√	√	X	X	X
GC09X	**65 kW**	X	X	√	√	√
GC10X	**82 kW**	X	X	√	√	√

This option reduces the available static pressure (supply air side).

The component requires gas supply (gas connections to be made by the Customer). The location of the unit and the fume drain mode must comply with laws and standards in force in the Country of use.

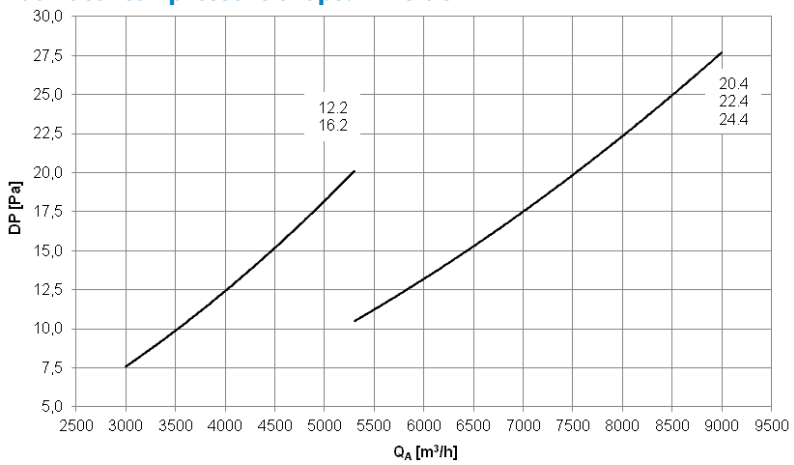
The assembly of the chimney kit must be performed on site by the Customer. According to specific requirements of installation, the chimney length can be increased by means of appropriate joints and fittings (not supplied by Clivet). For further details, refer to the Installation, use and maintenance manual.

'Electric heaters', '2-row hot water coil', 'Combustion heating module' cannot be assembled simultaneously.

CHW2 - Two-rows hot water coil

Option recommended for very cold climates since it allows heating of the served room. The battery is equipped with a thermostat for the anti-freeze function. The anti-freeze function is always active, even when the unit is in standby. If necessary, it forces opening of the valve to the maximum allowable value for allow passage of water in the coil and to prevent the formation of ice. In heat pump mode, the hot water coil may allow both pre-heating of the entering main coil air temperature, as well as integration of the capacity provided by the heat pump. As an alternative, it may intervene in complete substitution of the heating capacity provided by the compressors. This is possible by setting a turning point, i.e. a temperature limit of the fresh air below which use of the compressors is blocked, and the water coil is used as the sole resource. If the water coil provides pre-heating of the air, the control logic reduces its power to a preset value, which keeps the compressors from operating with condensation temperatures that are too high. If instead the water coil is used as the main resource (e.g. because the compressors are not available), the maximum power will be provided.

Hot water coil pressure drops: AIR side

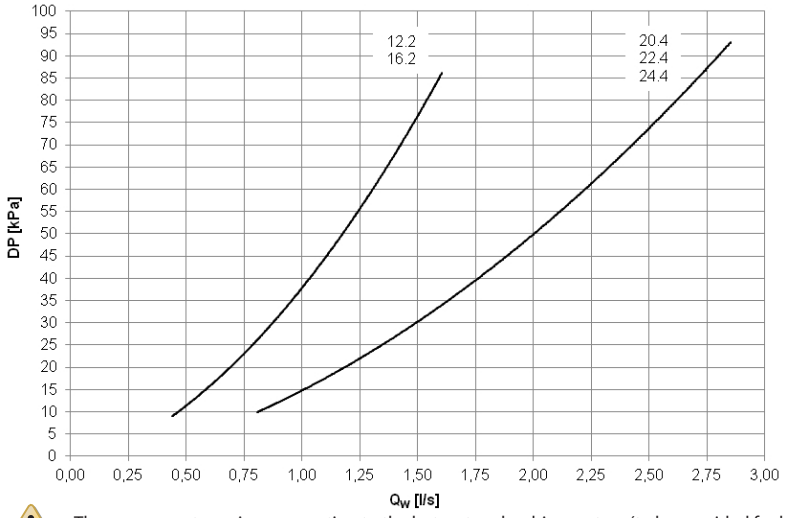


The air side pressure drops are relative to the medium air temperature of 20°C and are to be added to the pressure drops due to ducts, terminal devices and any other component that causes a drop in working discharge head.

Q_A [m3/h] = airflow
DP [kPa] = pressure drops

This option reduces the available static pressure (supply air side).

Hot water coil pressure drops: WATER side



Pressure drops on the water side are calculated considering an average water temperature of 65°C

Q_w [l/s] = water flow-rate
DP [kPa] = pressure drops

The water flow rate must be calculated with the following formula

Qw [l/s] =P / (4.186 x DT)

P = Heating capacity in kW
DT = Temperature difference between entering / leaving water

The component requires connection to the hot water plumbing system (to be provided for by the Customer).

Hot water coil, electric heaters and gas module cannot be mounted at the same time

Performances of hot water coil (two-row)

			Ti/To [°C]																													
			80 / 70		80 / 65		70 / 55		70 / 60		60 / 40		80 / 70		80 / 65		70 / 55		70 / 60		60 / 40		80 / 70		80 / 65		70 / 55		70 / 60		60 / 40	
			kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td
12.2	Qo [m³ / h]		3000										3400										4000									
	Qo [l / s]		833										944										1111									
	TM [°C]	-10	56,0	39,9	54,1	38,2	47,2	32,0	49,2	33,8	38,2	24,0	61,2	38,1	59,0	36,4	51,5	30,5	53,7	32,2	41,6	22,7	68,6	35,8	66,0	34,1	57,6	28,5	60,1	30,2	46,4	21,0
		-5	52,2	42,3	50,2	40,6	43,4	34,4	45,4	36,2	34,5	26,3	57,0	40,6	54,8	38,9	47,4	33,0	49,6	34,7	37,6	25,1	63,8	38,5	61,4	36,8	53,0	31,1	55,5	32,8	42,0	23,6
		0	48,4	44,7	46,5	42,9	39,7	36,7	41,7	38,5	30,9	28,6	52,8	43,1	50,7	41,4	43,3	35,4	45,5	37,1	33,7	27,5	59,2	41,0	56,8	39,4	48,5	33,6	51,0	35,3	37,6	26,1
		5	44,6	47,0	42,7	45,2	36,1	39,0	38,0	40,8	27,4	30,7	48,8	45,5	46,7	43,8	39,4	37,7	41,6	39,5	29,8	29,7	54,7	43,6	52,3	41,9	44,1	36,1	46,6	37,9	33,3	28,5
		10	41,0	49,3	39,2	47,5	32,6	41,2	34,5	43,0	23,9	32,9	44,8	47,9	42,8	46,1	35,5	40,0	37,7	41,8	26,0	32,0	50,2	46,1	47,9	44,4	39,8	38,6	42,2	40,3	29,0	30,8
		15	37,4	51,4	35,6	49,7	29,1	43,4	31,0	45,2	20,5	34,9	41,0	50,2	38,9	48,4	31,8	42,3	33,9	44,1	22,3	34,1	45,9	48,5	43,5	46,8	35,5	40,9	37,9	42,7	24,8	33,1

TM = Air inlet temperature of water coil (°C)
Ti / To = Leaving/entering water temperature (°C)
Qo = Airflow (l/s)
kWt = Heating capacity (kW)
Td = Outlet air temperature from the water coil (C)

Thermal yields referred to the max. water coil capacity. The thermo regulator coke the 3-way modulating valve limiting the inlet air temperature at desired values.

			Ti/To [°C]																													
			80 / 70		80 / 65		70 / 55		70 / 60		60 / 40		80 / 70		80 / 65		70 / 55		70 / 60		60 / 40		80 / 70		80 / 65		70 / 55		70 / 60		60 / 40	
			kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td	kWt	Td
16.2	Qo [m³ / h]		4000										4500										5300									
	Qo [l / s]		1111										1250										1472									
	TM [°C]	-10	68,6	35,8	66,0	34,1	57,6	28,5	60,1	30,2	46,4	21,0	74,3	34,1	71,5	32,5	62,4	27,0	65,2	28,7	50,2	19,8	83,0	31,8	79,8	30,2	69,5	25,1	72,7	26,7	55,9	18,2
		-5	63,8	38,5	61,4	36,8	53,0	31,1	55,5	32,8	42,0	23,6	69,2	36,9	66,5	35,2	57,4	29,7	60,2	31,4	45,4	22,5	77,3	34,7	74,1	33,1	64,0	27,9	67,2	29,5	50,5	20,9
		0	59,2	41,0	56,8	39,4	48,5	33,6	51,0	35,3	37,6	26,1	64,2	39,6	61,5	37,9	52,5	32,4	55,3	34,1	40,6	25,0	71,7	37,5	68,6	35,9	58,6	30,7	61,7	32,3	45,2	23,7
		5	54,7	43,6	52,3	41,9	44,1	36,1	46,6	37,9	33,3	28,5	59,3	42,2	56,7	40,5	47,8	35,0	50,5	36,7	36,0	27,6	66,2	40,3	63,2	38,7	53,3	33,4	56,4	35,0	40,0	26,3
		10	50,2	46,1	47,9	44,4	39,8	38,6	42,2	40,3	29,0	30,8	54,5	44,8	51,9	43,1	43,1	37,5	45,7	39,2	31,4	30,0	60,9	43,0	57,9	41,4	48,1	36,1	51,1	37,7	34,9	28,9
		15	45,9	48,5	43,5	46,8	35,5	40,9	37,9	42,7	24,8	33,1	49,8	47,3	47,2	45,6	38,5	40,0	41,1	41,7	26,8	32,4	55,6	45,7	52,7	44,0	42,9	38,7	46,0	40,3	29,9	31,5
20.4	Qo [m³ / h]		5300										6000										6500									
	Qo [l / s]		1472										1667										1806									
	TM [°C]	-10	101,6	41,2	98,2	39,5	85,9	33,3	89,4	35,1	69,8	25,2	111,0	39,4	107,1	37,7	93,7	31,7	97,6	33,5	76,0	23,8	117,4	38,3	113,3	36,6	99,0	30,7	103,2	32,4	80,3	23,0
		-5	94,9	43,8	91,5	42,0	79,3	35,8	82,8	37,5	63,3	27,5	103,7	42,1	99,9	40,3	86,6	34,3	90,4	36,0	69,0	26,3	109,7	41,0	105,6	39,2	91,5	33,3	95,6	35,1	72,8	25,5
		0	88,3	46,2	85,0	44,5	72,9	38,1	76,3	39,9	56,9	29,8	96,5	44,6	92,8	42,9	79,5	36,8	83,3	38,5	62,0	28,7	102,1	43,6	98,1	41,9	84,1	35,9	88,2	37,6	65,5	27,9
		5	81,8	48,6	78,5	46,8	66,5	40,4	69,9	42,2	50,6	32,0	89,4	47,1	85,8	45,3	72,6	39,1	76,4	40,9	55,1	30,9	94,6	46,1	90,7	44,4	76,7	38,3	80,8	40,1	58,2	30,3
		10	75,4	50,9	72,2	49,1	60,2	42,6	63,6	44,4	44,4	34,1	82,5	49,5	78,8	47,7	65,7	41,5	69,5	43,3	48,3	33,1	87,3	48,6	83,4	46,8	69,5	40,7	73,5	42,5	51,0	32,5
		15	69,1	53,1	65,9	51,3	54,0	44,8	57,4	46,6	38,2	36,0	75,6	51,8	72,0	50,0	58,9	43,7	62,7	45,5	41,6	35,2	80,0	50,9	76,1	49,2	62,3	43,0	66,3	44,8	43,9	34,7
22.4	Qo [m³ / h]		6400										7000										7600									
	Qo [l / s]		1778										1944										2111									
	TM [°C]	-10	116,1	38,5	112,1	36,8	98,0	30,9	102,1	32,6	79,4	23,2	101,6	41,2	98,2	39,5	85,9	33,3	89,4	35,1	69,8	25,2	101,6	41,2	98,2	39,5	85,9	33,3	89,4	35,1	69,8	25,2
		-5	108,5	41,2	104,5	39,5	90,5	33,5	94,6	35,3	72,1	25,7	94,9	43,8	91,5	42,0	79,3	35,8	82,8	37,5	63,3	27,5	94,9	43,8	91,5	42,0	79,3	35,8	82,8	37,5	63,3	27,5
		0	101,0	43,8	97,1	42,1	83,2	36,0	87,2	37,8	64,8	28,1	88,3	46,2	85,0	44,5	72,9	38,1	76,3	39,9	56,9	29,8	88,3	46,2	85,0	44,5	72,9	38,1	76,3	39,9	56,9	29,8
		5	93,6	46,3	89,7	44,6	75,9	38,5	79,9	40,2	57,6	30,4	81,8	48,6	78,5	46,8	66,5	40,4	69,9	42,2	50,6	32,0	81,8	48,6	78,5	46,8	66,5	40,4	69,9	42,2	50,6	32,0
		10	86,3	48,7	82,5	47,0	68,7	40,8	72,7	42,6	50,5	32,7	75,4	50,9	72,2	49,1	60,2	42,6	63,6	44,4	44,4	34,1	75,4	50,9	72,2	49,1	60,2	42,6	63,6	44,4	44,4	34,1
		15	79,1	51,1	75,3	49,4	61,6	43,1	65,6	44,9	43,4	34,8	69,1	53,1	65,9	51,3	54,0	44,8	57,4	46,6	38,2	36,0	69,1	53,1	65,9	51,3	54,0	44,8	57,4	46,6	38,2	36,0
24.4	Qo [m³ / h]		7300										8000										9000									
	Qo [l / s]		2028										2222										2500									
	TM [°C]	-10	127,2	36,6	122,7	34,9	107,2	29,2	111,8	30,9	86,8	21,8	101,6	41,2	98,2	39,5	85,9	33,3	89,4	35,1	69,8	25,2	101,6	41,2	98,2	39,5	85,9	33,3	89,4	35,1	69,8	25,2
		-5	118,9	39,4	114,4	37,7	99,1	32,0	103,6	33,7	78,7	24,4	94,9	43,8	91,5	42,0	79,3	35,8	82,8	37,5	63,3	27,5	94,9	43,8	91,5	42,0	79,3	35,8	82,8	37,5	63,3	27,5
		0	110,7	42,1	106,3	40,4	91,0	34,6	95,6	36,3	70,8	26,9	88,3	46,2	85,0	44,5	72,9	38,1	76,3	39,9	56,9	29,8	88,3	46,2	85,0	44,5	72,9	38,1	76,3	39,9	56,9	29,8
		5	102,6	44,7	98,3	43,0	83,1	37,1	87,6	38,9	62,9	29,3	81,8	48,6	78,5	46,8	66,5	40,4	69,9	42,2	50,6	32,0	81,8	48,6	78,5	46,8	66,5	40,4	69,9	42,2	50,6	32,0
		10	94,7	47,2	90,3	45,5	75,2	39,6	79,7	41,4	55,2	31,7	75,4	50,9	72,2	49,1	60,2	42,6	63,6	44,4	44,4	34,1	75,4	50,9	72,2	49,1	60,2	42,6	63,6	44,4	44,4	34,1
		15	86,8	49,7	82,5	48,0	67,5	42,0	71,9	43,8	47,4	34,0	69,1	53,1	65,9	51,3	54,0	44,8	57,4	46,6	38,2	36,0	69,1	53,1	65,9	51,3	54,0	44,8	57,4	46,6	38,2	36,0

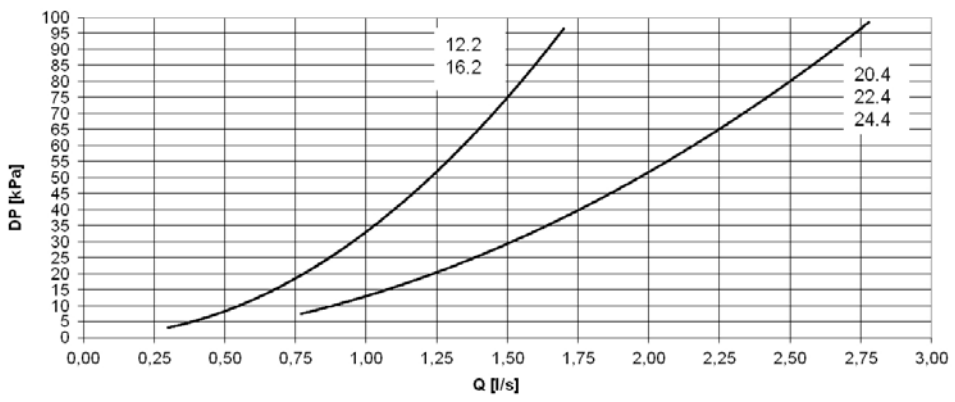
TM = Air inlet temperature of water coil (°C)
Ti / To = Leaving/entering water temperature (°C)
Qo = Airflow (l/s)
kWt = Heating capacity (kW)
Td = Outlet air temperature from the water coil (C)

Thermal yields referred to the max. water coil capacity. The thermo regulator coke the 3-way modulating valve limiting the inlet air temperature at desired values.

2WVM - Modulating 2-way valve

3WVM - Modulating 3-way valve

To be used in conjunction with the hot water coil (optional). It is controlled by the built-in by means of a 0-10V signal and allows fully automatic control of the hot water coil. The valve with modulating actuator is provided already installed and wired built-in the unit.



Pressure drop
Modulating 3-way valve

Q [l/s] = water flow-rate
Dp [Pa] = pressure drop

Option requiered for unit with 2- row hot water coil.

LTEMP1 - Application for low outdoor temperature

This option is necessary for very cold climates, where the fresh air temperature can be between -10°C and -20°C.

The option involves self-regulating heater thermostatically controlled able to protect the electrical panel from freezing, ensuring the correct operation. Usually located on the outer wall of the unit, the control keyboard is positioned inside the heated electrical panel to ensure quick response and to preserve the LCD from damage.

This option involves variation of the main electrical data of the unit.

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

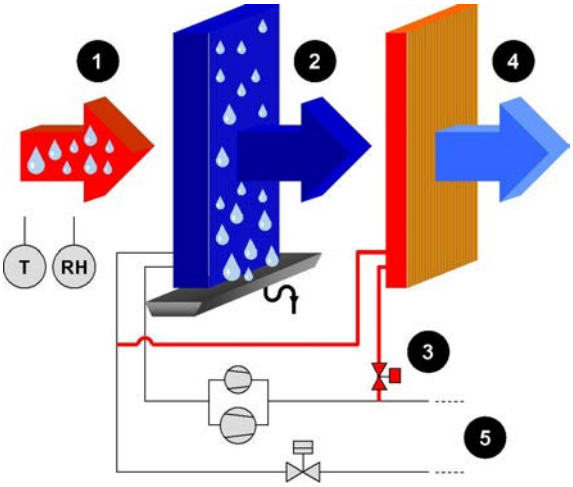
IMPORTANT! It is necessary to make precautions against build up of snow and ice in front of the exhaust and fresh air inlet locations.

CPHG - Hot gas re-heating coil

This option is recommended during the summer when the intakr air dehumidification is required.

The air flow to enter the room may contain a higher level of humidity than desired. The dehumidification process is used to reduce it. The air flow is first cooled in the handling coil with separation of condensation. It is then freely re-heated to maintain the desired condition of comfort in the served room. The re-heat coil is located behind the treatment coil and is activated by diverting a flow of hot refrigerant gas downstream from the compressors through the action of a dedicated solenoid valve. The process starts working based on the humidity set-point established by the user. With respect to traditional devices, such as electrical heating elements or hot water coils, use of the re-heat coil does not consume any extra energy. It also lowers refrigerant condensation temperature, which provides two positive effects: power absorbed by the compressors is considerably reduced, and at the same time, cooling power is increased, resulting in greater efficiency (EER). The ambient humidity control is performed by the ambient sensor equipped with an integrated humidity probe (standard with unit).

This option reduces the available static pressure (supply air side).



1. Fresh air and humidity / temperature probe
2. Chilled and dehumidified air in the internal exchanger (evaporator)
3. Automatic hot gas pump valve
4. Air treated by the post-heating exchanger
5. External exchanger (condenser)

Indicative scheme - not in scale

Performances of hot gas re-heating coil

			FRESH AIR TEMPERATURE [°C]														
			25	27	30	32	35	25	27	30	32	35	25	27	30	32	35
			kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt
12.2	Qo (m^3 / h)		3000					3400					4000				
	Qo (l / s)		833					944					1111				
	Ta (°C)	10	7,8	8,4	9,3	10,2	11,1	8,5	9,1	10,0	11,0	12,0	9,2	9,8	10,9	11,9	13,0
		12	7,2	7,8	8,7	9,6	10,5	7,8	8,5	9,4	10,4	11,3	8,5	9,2	10,2	11,2	12,3
		14	6,7	7,3	8,1	9,0	9,9	7,2	7,8	8,8	9,7	10,7	7,8	8,5	9,5	10,6	11,6
		16	6,1	6,7	7,5	8,4	9,3	6,6	7,2	8,2	9,1	10,1	7,2	7,8	8,8	9,9	10,9
		18	5,5	6,1	7,0	7,8	8,7	6,0	6,6	7,5	8,5	9,4	6,5	7,2	8,2	9,2	10,2
		20	5,0	5,5	6,4	7,3	8,2	5,4	6,0	6,9	7,9	8,8	5,8	6,5	7,5	8,5	9,6
16.2	Qo (m^3 / h)		4000					4500					5300				
	Qo (l / s)		1111					1250					1472				
	Ta (°C)	10	9,3	10,1	11,1	12,2	13,3	10,0	10,8	11,9	13,1	14,2	11,0	11,9	13,1	14,4	15,7
		12	8,7	9,4	10,4	11,5	12,6	9,3	10,0	11,2	12,3	13,5	10,2	11,1	12,3	13,6	14,9
		14	8,0	8,7	9,7	10,8	11,8	8,6	9,3	10,4	11,6	12,7	9,4	10,3	11,5	12,7	14,0
		16	7,3	8,0	9,0	10,1	11,1	7,8	8,6	9,7	10,8	12,0	8,6	9,4	10,7	11,9	13,2
		18	6,6	7,3	8,3	9,4	10,5	7,1	7,8	8,9	10,1	11,2	7,8	8,6	9,9	11,1	12,4
		20	6,0	6,6	7,6	8,7	9,8	6,4	7,1	8,2	9,3	10,5	7,0	7,8	9,0	10,3	11,6

Ta = Leaving air temperature from the handling coil and entering the post-heating coil
Qo = Airflow (l/s)
kWt = Heating capacity (kW)
The reheating coil is powered by the cold gas bled from the condensing coil.
As the condensation hot gas temperature is linked to the fresh air temperature, the indicative potentials of the post-heating coil are expressed according to the fresh air temperature.

			FRESH AIR TEMPERATURE [°C]														
			25	27	30	32	35	25	27	30	32	35	25	27	30	32	35
			kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt	kWt
20.4	Qo (m^3 / h)		5300					6000					6500				
	Qo (l / s)		1472					1667					1806				
	Ta (°C)	10	14,1	15,2	16,7	18,4	20,0	15,3	16,4	18,1	19,9	21,6	16,0	17,2	19,0	20,9	22,8
		12	13,1	14,1	15,7	17,3	18,9	14,1	15,3	17,0	18,7	20,5	14,8	16,0	17,8	19,7	21,5
		14	12,0	13,1	14,6	16,2	17,8	13,0	14,1	15,8	17,6	19,3	13,7	14,9	16,6	18,5	20,3
		16	11,0	12,0	13,6	15,2	16,8	11,9	13,0	14,7	16,4	18,2	12,5	13,7	15,4	17,3	19,1
		18	10,0	11,0	12,5	14,1	15,7	10,8	11,9	13,6	15,3	17,0	11,3	12,5	14,3	16,1	17,9
		20	8,9	10,0	11,5	13,1	14,7	9,7	10,8	12,4	14,1	15,9	10,2	11,3	13,1	14,9	16,7
22.4	Qo (m^3 / h)		6400					7000					7600				
	Qo (l / s)		1778					1944					2111				
	Ta (°C)	10	15,9	17,1	18,9	20,7	22,5	16,8	18,1	19,9	21,9	23,8	17,7	19,0	21,0	23,0	25,1
		12	14,7	15,9	17,7	19,5	21,3	15,5	16,8	18,7	20,6	22,6	16,3	17,7	19,6	21,7	23,7
		14	13,5	14,7	16,5	18,3	20,1	14,3	15,6	17,4	19,3	21,3	15,0	16,4	18,3	20,3	22,4
		16	12,4	13,5	15,3	17,1	18,9	13,1	14,3	16,2	18,1	20,0	13,7	15,1	17,0	19,0	21,0
		18	11,2	12,4	14,1	15,9	17,7	11,9	13,1	14,9	16,8	18,7	12,5	13,8	15,7	17,7	19,7
		20	10,1	11,2	13,0	14,7	16,5	10,6	11,9	13,7	15,6	17,5	11,2	12,5	14,4	16,4	18,4
24.4	Qo (m^3 / h)		7300					8000					9000				
	Qo (l / s)		2028					2222					2500				
	Ta (°C)	10	17,2	18,5	20,5	22,4	24,5	18,2	19,6	21,6	23,7	25,9	19,5	21,0	23,2	25,5	27,8
		12	15,9	17,2	19,2	21,1	23,1	16,9	18,2	20,3	22,4	24,5	18,1	19,6	21,7	24,0	26,3
		14	14,7	16,0	17,9	19,8	21,8	15,5	16,9	18,9	21,0	23,1	16,6	18,1	20,3	22,5	24,8
		16	13,4	14,7	16,6	18,5	20,5	14,2	15,5	17,5	19,6	21,7	15,2	16,7	18,8	21,1	23,3
		18	12,2	13,4	15,3	17,3	19,2	12,9	14,2	16,2	18,3	20,3	13,8	15,2	17,4	19,6	21,8
		20	10,9	12,2	14,1	16,0	17,9	11,5	12,9	14,9	16,9	19,0	12,4	13,8	15,9	18,1	20,4

Ta = Leaving air temperature from the handling coil and entering the post-heating coil
Qo = Airflow (l/s)
kWt = Heating capacity (kW)

The reheating coil is powered by the cold gas bled from the condensing coil.
As the condensation hot gas temperature is linked to the fresh air temperature, the indicative potentials of the post-heating coil are expressed according to the fresh air temperature.

FES - Electronic filters

The second stage of filtration with high efficiency is created through electrostatic cells filter. The filtration efficiency is over 95% for particles that have diameters over 0,5 micron and it is equivalent to classification H10 used in the traditional filters, i.e. the class identified as "absolute filter" effective also onto smokes, thin dusts, PM10 PM2, PM1, bacteria, germs and viruses. Electronic filters eliminate higher absorbed fan power, caused by traditional filter pressure drops and they are regenerated by washing. Clogging of the electronic filter is signalled by a sensor, enabling scheduled routine maintenance, that the user can easily do by simply washing in water using a cleaning agent that is not aggressive for aluminum. The electronic filters are made with aluminium alloy and are complete with metal cleanable mesh pre-filter. The electronic control circuit has integrated water-proof protection that allows the washing.

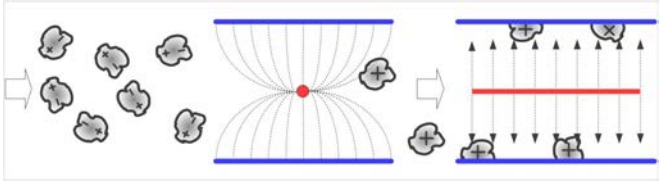
This option reduces the available static pressure (supply air side).

This operation involves variation of the main electrical data of the unit.

The H10 class electronic filters and the F7 pocket filters cannot be included simultaneously on the unit.

How the electronic filters work

The air and the dirty particles in suspension pass through a magnetic field created by ionization cables that charge them with positive potential. The dirty particles pass through the electric field created between, the plates charged positively (that repulse) and the plates with negative charge where dirty particles in suspension collect (Van der Vaals principle). The particles deposited can be periodically removed by washing from the collector.



Electronic filters high efficiency in an installation

Concerning commercial applications, after the pre filter G4 sometimes are used two stage of filtration at traditional high efficiency, of F6 and F7 class, disposed in series. Choosing the electronic filters on ClivetPACK² FFA, the user get a bigger filtration efficiency and at the same time a reduction of the fans electric consumption.

Indeed we have to consider the particles with diameter in a range between 0,35 and 0,45 micron where usually there are the biggest concentration of dangerous pollutants. In this range the traditional filtration system provide:

F6 (about 0,35 ÷ 0,45 µm) = filtration efficiency 20%

F7 (about 0,35 ÷ 0,45 µm) = filtration efficiency 50%

The resulting efficiency F6+F7 (initial pollution 100%) is equal to 100 x (1-20) x (1-50) = 40%.

This happens with a typical pressure drop (with dirty filters) of 70 + 80 = 150 Pa.

The filtration efficiency of the electronic filter in the same range is greater than 75%, and further increases for bigger particles (it exceeds the value of 95% for particles bigger than 0.5 microns). The corresponding pressure drop is less than 40 Pa, and thus with a reduction of over 70% compared to the traditional system.

The operating costs reduction in an application

Considering a typical installation in tertiary application, where the system operates for 14 hours per day and 6 days week, to a total amount of 4.300 hours in one whole year. Price of the electric energy is in this case 0,15 EUR/kWh.

In this example it is assumed (=100%) the unit standard's price, complete therefore with filters G4 but without of second filtration stage of high efficiency.

The bigger initial price of the electronic filters vs the traditional filters has a pay back in less than one and a half year thanks to lower costs of ventilation and ordinary maintenance.

Unit	**CSRN-XHE2 FFA C 204 (6.000 m³/h)**	
Second filtration stage	**Tasche F7**	**Elettronico H10**
FILTRATION SYSTEM PURCASE COST		
filtration system purchase cost	+ 2,7 %	+ 16,4 %
ENERGY COST		
Fan energy absorption per year	3,6 %	3,3 %
MAINTENENCE COST		
Maintenance scheduling	3	1
Spare price (per visit)	3,2 % (filter F7)	0,7 % (wire+cleaner)
Maintenance time per visit	60	90
Maintenance unitary price	30 EUR/h	
Maintenence cost per year	9,9 %	0,9 %
OPERATION COST PER YEAR		
Energy + Maintenance, % on the std. unit cost	13,5 %	4,2 %
PAYBACK	-	**17 month (1,4 years)**

F7 - High efficiency F7 air filter

The multi-dihedral filters with rigid pockets, class F7, are filtering components that are in addition to the standard G4 filters, for more effective filtering. They are widely used in air conditioning systems and industrial applications that require suitable performance concerning fine dusts and particles with dimensions greater than 1 µm. Class F7 filters are made of fibreglass paper, pleated with constant calibrated spacing, mounted on frames with a sturdy structure in extruded moulded polyester; the ample filtering surface reduces air side pressure drops. Class F7 filters must be replaced after reaching their limits of dirtiness with scheduled periodic maintenance. An optional accessory, dirty filter differential switch, can be fitted to signal when admissible limit of fouling has been reached so as not to excessively reduce the airflow with respect to the nominal value.

This option reduces the available static pressure (supply air side).

PSAF - Differential pressure pressure switch for dirty air filters

It allows to detect and signal (by an appropriate warning) the reaching of the max. level of air filter clogging. The unit handler receives an indication when to perform the necessary maintenance of the filters. The detecting device is installed in the unit and it is already connected to the unit electrical panel and pre-calibrated in the factory. The calibration can be modified by the qualified assistance centre during the start-up. When the unit has the second stage of filtration with high efficiency F7 air filters, the warning signal is unique and it operates with cumulative logically. This device is not applicable at the "Electronic air filter" option, being equipped with clogging integrated signalling and therefore not compatible with differential pressure switch.

HSE - Immersed electrodes steam humidifier

This device is suitable for winter operation when humidity is required for the ambient without cooling the air flow.

The automatic modulating control allows you to adjust the steam production and its relative management costs to the actual requirements.

Available in different capacities, the device is suitable for using soften water having medium conductivity and is equipped with: water load solenoid valve, disposable cylinder, water drainage solenoid valve, distribution nozzle, control electronic board to verify the water level, conductivity, anti-foam device, water drainage manual forcing. To ensure maximum hygiene, the cylinder can automatically empty after a determined period of stand-by.

The accessory is installed inside the unit and is connected to the electrical panel of the unit.

The ambient humidity control is performed by the ambient sensor equipped with an integrated humidity probe (standard with unit).

Matching of immersed electrode and steam humidification module

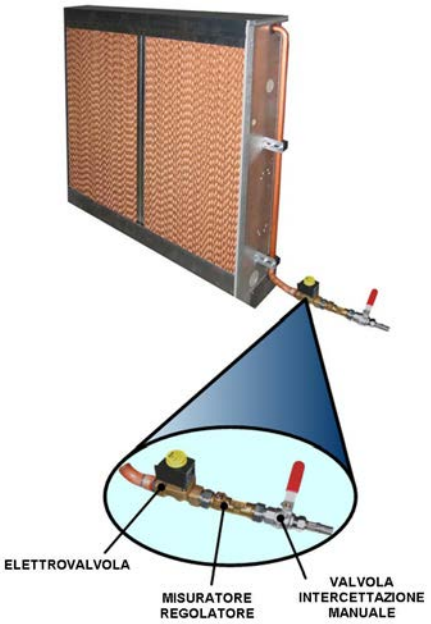
Size	12.2	16.2	20.4	22.4	24.4
5 kg/h	√	√	-	-	-
8 kg/h	√	√	√	√	√
15 kg/h	-	-	√	√	√

This operation involves variation of the main electrical data of the unit.

This accessory requires connection to a water supply network and discharge water circuit with adeguate frost protection. Provided by the Customer.

HWS - Water to waste evaporating wet-deck humidifier

This option is recommended when quick, efficient humidification of the served room is required. Humidification of the air mixture occurs by passing the air flow through a honeycomb package that is kept humid at all times by a series of nozzles that inject water in small drops. The reserve of water for treatment is taken directly from the water mains. During operation, the pure water vapour is mixed with the air currents. The remaining part, enriched with mineral salts, is collected in the tub and eliminated. The constant exchange of water ensures cleaning of the evaporation septum and provides maximum limitation of the formation and proliferation of Legionnaire's Disease. With this option, energy consumption for water evaporation is limited. Whenever the packaged humidifier is active, in addition to humidifying, adiabatic cooling of the air takes place, which is constantly compensated for by the thermal control device. Direct connection to the plumbing system eliminates the need for special water treatment and easy control of the humidification process by means of the measuring and adjusting device of the water flow rate provided standard.



The accessory is installed inside the unit and is connected to the electrical panel of the unit.

The ambient humidity control is performed by the ambient sensor equipped with an integrated humidity probe (standard with unit).

Size		12.2	16.2	20.4	22.4	24.4
Ta (°C) D.B.	Ta (°C) W.B.	Kg/h	Kg/h	Kg/h	Kg/h	Kg/h
30	15,1	20	26	35	40	46
35	17,6	24	32	43	50	58
40	19,8	30	39	53	61	70

Ta D.B. = dry bulb temperature of the air at evaporator heater input
Ta W.B. = wet bulb temperature of the air at evaporator heater input
Approximate values of the maximum rate of steam released by the wet deck humidifier to the air to obtain controlled thermal and humidity conditions in supply.
The data refer to a unit with standard air flow rate in supply.

This option reduces the available static pressure (supply air side).

This accessory requires connection to a water supply network and discharge water circuit with adeguate frost protection. Provided by the Customer.

CTERM - Remote keypad for indoor temperature and humidity control

This option makes it possible to directly measure the temperature and humidity of the ambient. The automatic thermal regulation is done on the humidity and temperature probes in the thermostat installed in ambient.

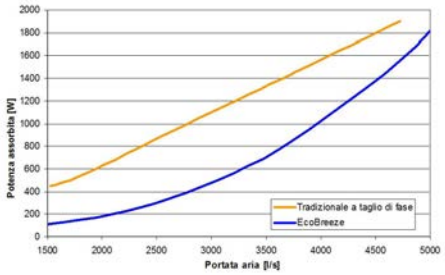
CREFB - Device for fan consumption reduction of the external section, ECOBREEZE type

An option able to considerably reduce both energy consumption as well as sound emissions in the unit's outdoor section.

ECOBREEZE uses axial fans that are directly coupled to the electronically controlled motor and activated by the continuous magnetic switching of the stator. The lack of brushes (brushless) and the particular power supply increase both the useful life as well as efficiency. Consumption is even reduced by 50%.

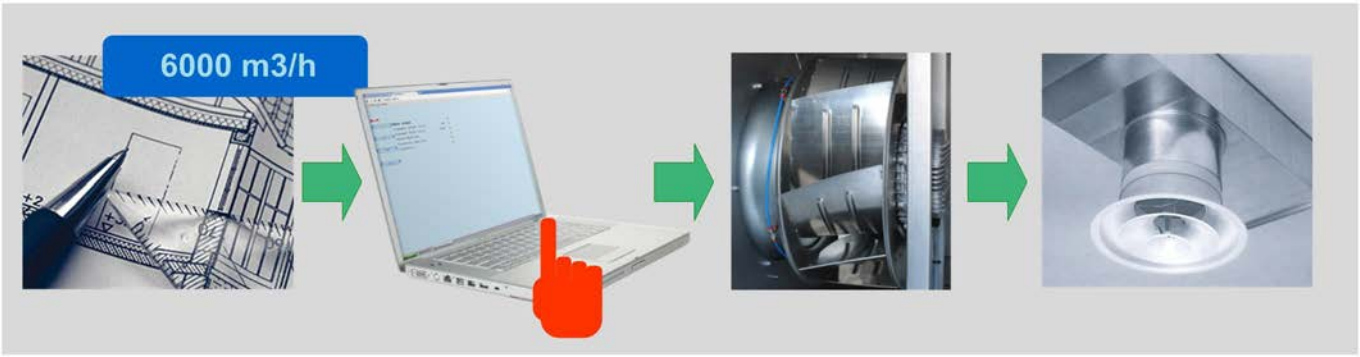
In particularly harsh or emergency conditions, for example when the outdoor temperature reaches the operating limits, before choking the supplied power or stopping the unit, the fans are able to increase the rotation speed, supplying an additional flow rate of up to 15% of the rated value. This guarantees that the unit will operate also when a traditional unit would be in alarm conditions.

ECOBREEZE also reduces the sound emissions, both because the rotation speed is always modulated to the most suitable value based on the operating conditions, as well as because the electronic regulation technology used does not create particular frequencies or vibrations when rotating.



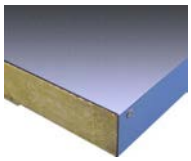
PCOSM - Constant supply airflow

The original technology used eliminates the need for on-site calibration of traditional fans, as well as the time that would be required and the associated costs. The required flow rate is set on the display and maintained automatically by the unit, which controls the speed of the ventilating sections. During the installation and start-up phase, the unit controls to the effective pressure drop in the air distribution and diffusion system. Furthermore, during its entire operating life, the progressive fouling of the air filters is automatically compensated for thanks to this system.



PCM0 - Sandwich panels of the handling zone in M0 fire reaction class

Option indicated when, by law, the air treatment area must have metallic internal walls made with fire-proof insulating material. Sandwich panels with dual walls made of steel sheet metal with fire-proof insulation made of Rockwool ((90 kg/m3) comply with the French standards, which require "M0" reaction to fire class.



MHP - High and low pressure gauges

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

PTCO - Set up for shipping via container

Option that allows shipping via container.

It includes the sheet steel slide application for an easy unit scrolling, packaging with protective angle brackets and nylons, anchoring systems. If necessary the lateral lifting brackets and the main isolator switch handle can be removed to avoid damages during transport (components removed and put inside the unit).

For particular requirements, please contact Clivet Shipping Department.

VENH - High static pressure fans

A higher capacity fan section is available for applications requiring high supply and return head. The option is comprised of radial fans coupled directly to electronically controlled motors (brushless). When you select a unit on the www.clivet.com website, if you enter the air flow, the available supply and return pressure and the accessories that determine the head loss on the air side, you will be automatically shown a selection of high head fans, when required.

CMSC9 - Serial communication module for Modbus supervisor

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

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

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

CMSC10 - Serial communication module for LonWorks supervisor

It allows the serial connection to supervision systems, using LonWorks as the communication protocol. It allows access to a list of operating variables, control and alarms compliant with the Echelon standard.

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

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

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

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

CMSC11 - Serial communication module for BACnet-IP supervisor

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

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

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

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

PFCP - Power factor correction capacitors (cosfi > 0.9)

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

PM - Phase monitor

The phase monitor allows verifying the proper phase connection and their unbalance in the units, which are powered by a three-phase system.

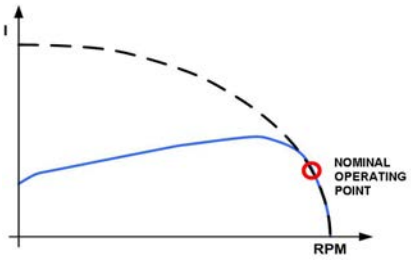
The monitor communicates with the control circuit and orders the switch-off of the unit, should one of the following cases occur: improper phase connection, the limit value referring to the unbalance between the phases is exceeded, over/undervoltage for a certain amount of time. Once the line conditions are restored, the unit is reactivated manually.

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

SFSTC - Progressive compressor start-up soft-starter

This option is also known as "Soft starter". An electronic device which automatically starts up the compressors gradually, reducing the starting current for the unit by around 40% in comparison with the nominal value. This results in the electrical capacity system and the related protection devices being sized with lower parameters, thus having a lower initial investment cost.

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



(---) POWER INPUT WITHOUT SFSTC OPTION
(___) POWER INPUT WITH SFSTC OPTION

Accessories separately supplied

AMRX - Rubber antivibration mounts

AMRMX - Rubber antivibration mounts for unit and gas module

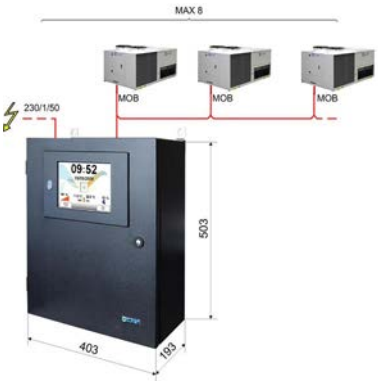
The rubber anti-vibrating dampers are to be mounted on designated areas on the support brackets. Their function is to dampen the vibrations produced by the unit by reducing the noise transmitted to the support structures.

They are elastic bodies that 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.

Alternatively, rubberized neoprene anti-vibration strips may be used on the unit longitudinal support members.

Installation provided by the Customer.

CLMX - Clivet Master System



CLIVET MASTER SYSTEM is the ideal system for the remote and centralised control of the ClivetPACK and SMARTPack climate control units. It can manage up to eight units connected with a serial connection. It includes a box for wall installation, as well as the electronic power supply and serial communication devices, a controller with a touch-screen display and a USB port at the front used to export the alarm log.

The device allows to easily and intuitively access all the information on the status of the system and the climate control units. It also provides:

- auto-detection of units connected,
- setting all unit parameters,
- setting of the zone set-point,
- unit stata display,
- control and management of the alarms and creation of an alarm log,
- hourly operation scheduling (ON / OFF / ECO),
- rotation of the units even for individual areas,
- temperature, humidity and air quality trends,
- automatic language management (English, Italian, French, Spanish and German).

The component must be combined with the RS485 serial port option with Modbus protocol built-in of each rooftop.

Operating temperature from 0°C to 50°C with relative humidity lower than 90% without condensate.

Installation provided by the Customer.

P-MATIC - Clivet supervisory system

Clivet P-MATIC is a Clivet supervision system that allow to schedule and manage all the installed Clivet conditioning units, optimizing their functional operating and the others systems in order to reduce the energy consumption.

The software navigation is easy and intuitive, thanks to the tridimensional graphic interface. It is so possible to change complex activities of system operating into simple and reliable activities made by the Customer.

Clivet P-MATIC let to visualize the maintenance status of the conditioning units, valuate and manage the alarms.

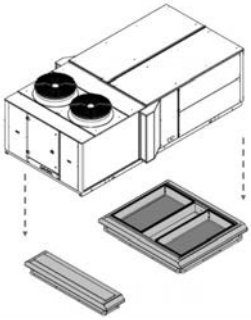
The user operates on the system, through the supervision Workstation or the user interface display on the PLC (Programmable Logic Controller), according to the controller installation component. The data Exchange between the Workstation, the units and the remote control electronic devices is performed by serial/bus network on RS485 standard communication protocol, or by LAN network (Local Area Network) Ethernet TCP/IP.

The integrated remote monitoring software allows accessing to the Clivet on-line technical assistance services.

For further information refer to the technical documentation.

Installation provided by the Customer.

RCX - Roof curb



Option that allows to connect the unit to the building roof, ideal with downflow supply and return.

It is made up of two part, a solid steel frame for the air duct connection and a adjustment support in height. Both parts are made of galvanized steel with a steel rain cover profile painted in the same unit colour. it has an adequate support and a duct connection semplification. It is supplied not assembled and it has to be assembled directly in the construction site, to facilitate the transport and installation. It is complete with adjusting screws to adapt to any slopes or difference in height of the cover. Once the frame is assembled, it will be necessary to insulate and seal the roof curb to the roof to guarantee the resistance to atmospheric agents, later it will be necessary only to place the unit.

Option not available with gas module.

Performances in cooling

Configuration: fresh air supply only (CBFFA)

Size	Airflow [m³/h]	Fresh air D.B / W.B. [°C]																	
		20 / 16						25 / 18						30 / 21					
		kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER
12.2	3000	34,3	16,4	6,4	4,2	0,8	5,36	35,8	18,4	7,2	7,0	3,0	4,97	37,5	19,4	8,2	10,7	7,0	4,57
	3400	35,2	17,3	6,4	5,3	2,6	5,50	36,9	19,5	7,3	8,2	4,7	5,05	38,7	20,6	8,3	11,9	8,6	4,66
	4000	36,4	18,5	6,4	6,7	4,6	5,69	38,2	21,0	7,3	9,6	6,7	5,23	40,0	22,2	8,3	13,4	10,5	4,82
16.2	4000	43,3	21,5	8,3	4,5	1,9	5,22	45,3	24,1	9,5	7,3	4,0	4,77	47,1	25,4	10,9	11,1	8,1	4,32
	4500	44,2	22,6	8,6	5,5	3,5	5,14	46,4	25,4	9,9	8,4	5,6	4,69	48,3	26,8	11,3	12,2	9,5	4,27
	5300	45,5	24,0	8,4	6,9	5,4	5,42	47,8	27,3	9,6	9,9	7,5	4,98	49,8	28,8	11,1	13,8	11,3	4,49
20.4	5300	68,3	28,6	13,0	4,4	-1,7	5,25	70,8	32,2	15,0	7,2	0,6	4,72	73,2	34,3	17,3	10,7	5,0	4,23
	6000	70,0	30,1	13,1	5,5	0,4	5,34	72,7	34,2	15,1	8,3	2,7	4,81	75,1	36,4	17,4	11,9	7,0	4,32
	6500	71,0	31,1	13,2	6,2	1,7	5,38	73,8	35,5	15,2	9,0	3,9	4,86	76,2	37,9	17,5	12,6	8,1	4,35
22.4	6400	75,1	32,7	14,2	5,3	0,3	5,29	78,0	37,0	16,4	8,0	2,6	4,76	80,7	39,4	18,8	11,6	6,8	4,29
	7000	76,4	33,9	14,3	6,0	1,7	5,34	79,5	38,6	16,4	8,8	3,9	4,85	82,2	41,1	18,9	12,5	8,1	4,35
	7600	77,4	35,0	14,3	6,7	2,9	5,41	80,7	40,0	16,5	9,6	5,1	4,89	83,5	42,8	19,0	13,2	9,2	4,39
24.4	7300	81,1	36,3	15,3	5,7	1,4	5,30	84,3	41,1	17,7	8,5	3,6	4,76	87,4	43,8	20,2	12,1	7,8	4,33
	8000	82,3	37,6	15,4	6,4	2,7	5,34	86,0	42,8	17,7	9,3	4,9	4,86	89,0	45,7	20,4	13,0	9,0	4,36
	9000	83,9	39,4	15,5	7,4	4,2	5,41	87,8	45,1	17,9	10,3	10,1	4,91	90,9	48,2	20,5	14,0	10,4	4,43

Size	Airflow [m³/h]	Fresh air D.B / W.B. [°C]																	
		35 / 24						40 / 27						43 / 28					
		kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER	kWf	kWs	kWe	Td	Tw	EER
12.2	3000	38,6	20,2	9,4	14,6	11,2	4,11	39,0	20,6	10,8	18,8	15,6	3,61	38,1	21,6	11,7	20,5	17,3	3,26
	3400	39,8	21,5	9,4	15,8	12,7	4,23	40,2	22,4	10,8	19,6	17,0	3,72	40,5	25,6	11,2	19,5	18,1	3,62
	4000	41,3	23,2	9,5	17,4	14,4	4,35	41,6	23,6	10,9	21,8	18,5	3,82	40,9	23,4	11,8	24,8	19,8	3,47
16.2	4000	48,3	26,3	12,4	15,0	12,3	3,90	48,9	26,7	14,5	19,4	16,6	3,37	48,7	28,1	15,8	21,1	18,0	3,08
	4500	49,5	27,8	12,9	16,2	13,6	3,84	50,4	28,1	15,0	20,7	17,6	3,36	50,1	29,4	16,2	22,6	18,9	3,09
	5300	51,2	29,8	12,6	17,9	15,1	4,06	52,2	30,1	14,7	22,4	18,8	3,55	52,0	31,8	15,9	24,3	20,2	3,27
20.4	5300	74,1	36,0	19,8	14,4	9,8	3,74	74,2	37,4	22,9	18,2	14,5	3,24	74,1	39,7	24,8	19,6	16,0	2,99
	6000	76,1	38,3	20,0	15,6	11,5	3,81	76,4	40,0	23,0	19,4	15,9	3,32	76,4	42,5	24,9	20,9	17,4	3,07
	6500	77,3	39,9	20,1	16,4	12,5	3,85	77,6	41,6	23,2	20,2	16,7	3,34	-	-	-	-	-	-
22.4	6400	82,0	41,4	21,5	15,4	11,3	3,81	82,2	43,0	24,8	19,2	15,7	3,31	81,6	45,7	26,9	20,7	17,3	3,03
	7000	83,4	43,3	21,7	16,2	12,5	3,84	83,7	45,1	24,9	20,1	16,7	3,36	-	-	-	-	-	-
	7600	84,7	45,0	21,8	17,0	13,4	3,89	85,3	46,9	25,0	20,9	17,5	3,41	-	-	-	-	-	-
24.4	7300	88,9	45,8	23,1	15,9	12,1	3,85	88,9	47,7	26,6	19,8	16,4	3,34	87,7	50,8	28,9	21,3	18,0	3,03
	8000	90,4	48,0	23,3	16,8	13,2	3,88	90,4	49,9	26,8	20,7	17,4	3,37	89,1	53,3	29,0	22,2	18,9	3,07
	9000	92,4	50,7	23,5	17,9	14,4	3,93	92,9	52,9	26,9	21,8	18,4	3,45	91,8	56,8	29,1	23,3	19,8	3,15

kWf = Evaporator power output [kW]
kWs = Evaporator sensible capacity [kW]
kWe = Electrical power absorbed by compressors (kW)
Td = Dry bulb temperature of internal exchanger leaving air [°C]
Tw = Wet bulb temperature of internal exchanger leaving air [°C]
EER referred only to compressors

Performance in Heating

Configuration: fresh air supply only (CBFFA)

Size	Airflow [m³/h]	Fresh air D.B / W.B. [°C]																			
		-5/-6				0/-1				2/1				7/6				12/11			
		kWt	kWe	Td	COP	kWt	kWe	Td	COP	kWt	kWe	Td	COP	kWt	kWe	Td	COP	kWt	kWe	Td	COP
12.2	3000	31,1	6,6	22,2	4,71	34,8	8,1	31,1	4,30	36,0	8,9	34,5	4,04	38,7	10,9	42,4	3,55	41,4	13,8	50,8	3,00
	3400	31,2	6,0	19,1	5,20	35,1	7,5	27,7	4,68	36,6	8,1	31,1	4,52	39,6	9,9	39,0	4,00	42,3	12,4	47,0	3,41
	4000	31,4	5,5	15,6	5,71	35,4	6,7	23,7	5,28	37,1	7,3	27,1	5,08	40,6	8,8	34,9	4,61	43,4	10,8	42,5	4,02
16.2	4000	39,0	7,8	20,6	5,00	43,6	9,6	29,2	4,54	45,4	10,5	32,7	4,32	49,1	12,9	40,7	3,81	53,5	16,7	49,6	3,20
	4500	39,1	7,2	17,8	5,43	44,0	9,0	26,2	4,89	45,9	9,8	29,6	4,68	50,0	11,9	37,5	4,20	54,1	14,9	45,8	3,63
	5300	39,4	6,6	14,5	5,97	44,2	8,1	22,4	5,46	46,3	8,8	25,6	5,26	50,8	10,7	33,3	4,75	54,7	13,0	41,0	4,21
20.4	5300	57,1	11,2	23,3	5,10	64,2	14,2	32,5	4,52	66,6	15,4	36,0	4,32	72,2	18,9	44,4	3,82	77,5	24,0	53,2	3,23
	6000	57,3	10,2	20,0	5,62	64,2	12,9	28,7	4,98	66,9	14,0	32,2	4,78	73,2	17,2	40,5	4,26	78,6	21,2	48,9	3,71
	6500	-	-	-	-	64,6	12,1	26,7	5,34	67,4	13,2	30,0	5,11	73,8	16,2	38,2	4,56	79,1	19,9	46,2	3,97
22.4	6400	63,3	11,5	20,9	5,50	71,2	14,4	29,9	4,94	74,1	15,8	33,3	4,69	80,6	19,4	41,6	4,15	86,2	24,2	49,9	3,56
	7000	-	-	-	-	71,1	13,5	27,3	5,27	74,3	14,8	30,7	5,02	81,4	18,2	38,9	4,47	87,3	22,3	47,1	3,91
	7600	-	-	-	-	71,5	12,9	25,2	5,54	74,6	14,1	28,5	5,29	81,9	17,2	36,6	4,76	88,1	21,0	44,6	4,20
24.4	7300	69,5	12,4	20,0	5,60	78,0	15,5	28,7	5,03	81,3	17,0	32,1	4,78	88,4	20,8	40,3	4,25	94,7	25,6	48,5	3,70
	8000	69,7	12,1	17,8	5,76	78,0	15,2	26,2	5,13	81,7	16,8	29,6	4,86	89,5	20,6	37,7	4,34	96,0	25,3	45,8	3,79
	9000	70,1	10,9	15,4	6,43	78,6	13,7	23,4	5,74	82,0	14,9	26,6	5,50	90,3	18,3	34,6	4,93	97,3	22,1	42,4	4,40

kWt = Condenser power output [kW]
kWe = Electrical power absorbed by compressors (kW)
Td = Dry bulb temperature of internal exchanger leaving air [°C]
COP referred only to compressors
Not all thermal yields take into account the heat dissipated by the fan motors

Integrated heating capacities

Air temperature external exchanger inlet °C (D.B. / W.B.)	-5 / -5.4	0 / -0.6	5 / 3.9	OTHERS
Heating capacity multiplication coefficient	0,89	0,88	0,94	1

The integrated heating capacity represents the real heating capacity considering the defrost cycles too.
To obtain the integrated heating capacity multiply the heating performance value in kWt (shown in the heating performance tables) by the coefficients indicated in the table.
DB = dry bulb
WB = wet bulb
Attention!
In case of below zero fresh air temperature with a long period of heat pump operating mode it is necessary to help the evacuation of the water produced during the defrost cycle; this to avoid the formation of ice in the unit basement. Pay attention that the evacuation will not create inconveniences to things or persons.

Handling electric fan performance - Standard airflow

Available static pressure (Pa) (supply)			90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570	630	690	750
	Airflow	m^3/h	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	-	-
	Airflow	l/s	944	944	944	944	944	944	944	944	944	944	944	944	944	944	944	944	944	-	-
12.2	Fan RPM	rpm	1312	1327	1356	1398	1442	1485	1527	1568	1608	1647	1684	1721	1760	1798	1871	1941	2009	-	-
	Sound power	dB(A)	76,3	76,2	76	75,7	75,8	76,1	76,5	76,9	77,3	77,6	78	78,3	0	79,3	80,2	81	81,8	-	-
	Total input	kW	0,38	0,39	0,42	0,46	0,5	0,54	0,58	0,62	0,66	0,7	0,75	0,79	0,84	0,89	0,98	1,09	1,19	-	-
	Airflow	m^3/h	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	-	-	-	-	-
	Airflow	l/s	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	-	-	-	-	-
16.2	Fan RPM	rpm	1635	1646	1668	1701	1734	1768	1800	1833	1864	1898	1931	1963	1995	2027	-	-	-	-	-
	Sound power	dB(A)	83,6	83,4	83,1	82,8	82,4	82,2	81,9	81,7	81,6	81,8	82	82,2	82,4	82,6	-	-	-	-	-
	Total input	kW	0,62	0,63	0,66	0,71	0,75	0,81	0,86	0,91	0,97	1,02	1,07	1,13	1,18	1,24	-	-	-	-	-
	Airflow	m^3/h	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
	Airflow	l/s	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667
20.4	Fan RPM	rpm	915	927	952	988	1024	1059	1094	1129	1162	1196	1228	1260	1291	1321	1381	1440	1497	1553	1607
	Sound power	dB(A)	72,9	73	73	73	73,1	73,3	74	74,7	75,3	76	76,9	77,8	78,6	79,3	80,8	82,2	83,6	84,9	86,1
	Total input	kW	0,54	0,57	0,61	0,67	0,74	0,81	0,88	0,96	1,04	1,12	1,21	1,29	1,38	1,47	1,67	1,87	2,07	2,27	2,49
	Airflow	m^3/h	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	-
	Airflow	l/s	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	-
22.4	Fan RPM	rpm	1023	1034	1054	1086	1117	1149	1180	1210	1240	1270	1300	1329	1358	1387	1442	1496	1548	1600	-
	Sound power	dB(A)	75,6	75,7	76	76,4	76,4	76,4	76,4	76,5	76,7	77,2	77,7	78,2	78,7	79,2	80,5	81,7	82,8	83,9	-
	Total input	kW	0,71	0,73	0,79	0,87	0,94	1,01	1,09	1,16	1,25	1,33	1,42	1,52	1,61	1,71	1,91	2,12	2,33	2,56	-
	Airflow	m^3/h	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	-	-
	Airflow	l/s	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	-	-
24.4	Fan RPM	rpm	1137	1146	1164	1191	1218	1246	1273	1301	1328	1355	1382	1408	1434	1460	1512	1563	1612	-	-
	Sound power	dB(A)	78,1	78,2	78,4	78,7	79,1	79,3	793	79,3	79,3	79,3	79,4	79,5	79,9	80,3	79,8	81,8	82,7	-	-
	Total input	kW	0,92	0,94	1	1,09	1,18	1,27	1,35	1,43	1,52	1,61	1,7	1,79	1,89	1,99	2,2	2,43	2,66	-	-

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.

Handling electric fan performance - Minimum airflow

Available static pressure (Pa) (supply)			90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570	630	690	750	800
12.2	Airflow	m^3/h	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	-	-
	Airflow	l/s	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	833	-	-
	Fan RPM	rpm	1203	1217	1267	1300	1345	1393	1439	1480	1523	1567	1620	1650	1691	1728	1801	1878	1949	2020	-	-
	Sound power	dB(A)	73,2	73,1	73	73,3	73,8	74,2	74,7	75,1	75,6	76,3	77	77,4	77,9	78,5	79,5	80,5	81,4	82,4	-	-
	Total input	kW	0,31	0,33	0,37	0,39	0,42	0,46	0,50	0,54	0,58	0,62	0,67	0,70	0,75	0,79	0,88	0,98	1,08	1,18	-	-
16.2	Airflow	m^3/h	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	-	-	-	-
	Airflow	l/s	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	-	-	-	-
	Fan RPM	rpm	1503	1514	1528	1564	1602	1639	1676	1711	1746	1783	1819	1852	1887	1921	1985	2047	-	-	-	-
	Sound power	dB(A)	80,5	80,4	80,2	79,9	79,6	79,4	79,3	79,5	79,9	80,2	80,4	80,7	81	81,2	81,7	82,3	-	-	-	-
	Total input	kW	0,51	0,52	0,00	0,58	0,63	0,68	0,73	0,77	0,82	0,86	0,91	0,96	1,01	1,07	1,18	1,29	-	-	-	-
20.4	Airflow	m^3/h	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300
	Airflow	l/s	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472
	Fan RPM	rpm	843	857	884	925	964	1003	1041	1078	1114	1149	1183	1217	1251	1284	1348	1410	1470	1528	1584	1629
	Sound power	dB(A)	70,3	70,3	70,4	70,4	71,2	72	72,8	73,9	75,1	76,1	77	78	79	79,9	81,6	83,2	84,7	86	87,3	88,2
	Total input	kW	0,44	0,46	0,50	0,56	0,62	0,69	0,77	0,84	0,92	1,00	1,08	1,16	1,25	1,34	1,51	1,70	1,89	2,09	2,31	2,49
22.4	Airflow	m^3/h	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	-
	Airflow	l/s	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	-
	Fan RPM	rpm	958	969	992	1027	1061	1095	1128	1160	1193	1,23	1,26	1,29	1317	1347	1405	1461	1516	1571	1623	-
	Sound power	dB(A)	74	74,2	74,4	74,4	74,4	74,5	74,6	75,3	75,9	76,5	77	77,7	78,5	79,2	80,6	81,9	83,2	84,4	85,6	-
	Total input	kW	0,60	0,63	0,68	0,74	0,80	0,88	0,96	1,03	1,12	1,20	1,29	1,38	1,47	1,56	1,76	1,96	2,18	2,39	2,61	-
24.4	Airflow	m^3/h	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	-	-
	Airflow	l/s	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	-	-
	Fan RPM	rpm	1057	1067	1087	1117	1148	1178	1208	1237	1266	1295	1324	1352	1380	1408	1463	1516	1567	1617	-	-
	Sound power	dB(A)	76,4	76,5	76,8	77,2	77,3	77,3	77,3	77,3	77,4	77,7	78,1	78,6	79	79,5	80,5	81,6	82,7	83,8	-	-
	Total input	kW	0,77	0,79	0,85	0,93	1,01	1,08	1,16	1,24	1,32	1,41	1,50	1,59	1,69	1,79	2,00	2,21	2,43	2,66	-	-

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.

Handling electric fan performance - High airflow

Available static pressure (Pa) (supply)			90	100	120	150	180	210	240	270	300	330	360	390	420	450	510	570	630	690	750
12.2	Airflow	m^3/h	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	-	-	-
	Airflow	l/s	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	-	-	-
	Fan RPM	rpm	1503	1514	1528	1564	1602	1639	1676	1711	1746	1783	1819	1852	1887	1921	1985	2047	-	-	-
	Sound power	dB(A)	80,5	80,4	80,2	79,9	79,6	79,4	79,3	79,5	79,9	80,2	80,4	80,7	81	81,2	81,7	82,3	-	-	-
	Total input	kW	0,51	0,52	0,00	0,58	0,63	0,68	0,73	0,77	0,82	0,86	0,91	0,96	1,01	1,07	1,18	1,29	-	-	-
16.2	Airflow	m^3/h	5300	5300	5300	5300	5300	5300	5300	5300	-	-	-	-	-	-	-	-	-	-	-
	Airflow	l/s	1472	1472	1472	1472	1472	1472	1472	1472	-	-	-	-	-	-	-	-	-	-	-
	Fan RPM	rpm	1873	1884	1905	1935	1963	1991	2020	2048	-	-	-	-	-	-	-	-	-	-	-
	Sound power	dB(A)	87,4	87,3	87,3	87,1	86,7	86,5	86,2	85,9	-	-	-	-	-	-	-	-	-	-	-
	Total input	kW	0,86	0,88	0,92	0,97	1,02	1,08	1,14	1,20	-	-	-	-	-	-	-	-	-	-	-
20.4	Airflow	m^3/h	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
	Airflow	l/s	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806
	Fan RPM	rpm	968	979	1002	1036	1070	1103	1136	1168	1200	1231	1262	1293	1323	1353	1410	1466	1521	1575	1627
	Sound power	dB(A)	74,2	74,4	74,8	74,7	74,8	74,8	74,9	75,4	76,0	76,6	77,1	77,7	78,5	79,2	80,6	81,9	83,1	84,3	85,5
	Total input	kW	0,62	0,64	0,70	0,76	0,83	0,90	0,97	1,05	1,13	1,22	1,31	1,40	1,49	1,58	1,78	1,98	2,20	2,42	2,64
22.4	Airflow	m^3/h	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	-
	Airflow	l/s	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	-
	Fan RPM	rpm	1091	1100	1119	1148	1177	1206	1235	1264	1292	1320	1348	1375	1402	1430	1483	1535	1586	1635	-
	Sound power	dB(A)	77,1	77,2	77,5	77,9	78,2	78,1	78,1	78,2	78,2	78,3	78,5	79,0	79,4	79,8	80,6	81,6	82,7	83,7	-
	Total input	kW	0,83	0,85	0,91	0,99	1,08	1,16	1,23	1,32	1,40	1,49	1,58	1,67	1,77	1,87	2,08	2,30	2,52	2,75	-
24.4	Airflow	m^3/h	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	-	-	-	-
	Airflow	l/s	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	-	-	-	-
	Fan RPM	rpm	1251	1259	1275	1299	1323	1348	1372	1397	1421	1446	1470	1495	1519	1542	1589	-	-	-	-
	Sound power	dB(A)	80,5	80,5	80,6	80,9	81,1	81,4	81,7	81,8	81,8	81,8	81,8	81,8	81,9	81,9	82,1	-	-	-	-
	Total input	kW	1,17	1,20	1,26	1,35	1,45	1,55	1,66	1,76	1,85	1,94	2,04	2,13	2,24	2,34	2,55	-	-	-	-

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.

High static pressure electric fan performance - Standard airflow

Available static pressure (Pa) (supply)			300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200	1260	1320
12.2	Airflow	m^3/h	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	-	-	-	-	-	-	-	-
	Airflow	l/s	944	944	944	944	944	944	944	944	944	944	-	-	-	-	-	-	-	-
	Fan RPM	rpm	1090	1162	1231	1296	1358	1417	1474	1529	1582	1633	-	-	-	-	-	-	-	-
	Sound power	dB(A)	75,7	77,6	79,3	80,9	82,4	83,7	84,9	86,0	87,0	88,0	-	-	-	-	-	-	-	-
	Total input	kW	0,68	0,79	0,92	1,04	1,16	1,29	1,43	1,56	1,71	1,86	-	-	-	-	-	-	-	-
16.2	Airflow	m^3/h	4500	4500	4500	4500	4500	4500	4500	4500	4500	-	-	-	-	-	-	-	-	-
	Airflow	l/s	1250	1250	1250	1250	1250	1250	1250	1250	1250	-	-	-	-	-	-	-	-	-
	Fan RPM	rpm	1192	1256	1318	1378	1435	1491	1545	1597	1647	-	-	-	-	-	-	-	-	-
	Sound power	dB(A)	76,8	77,9	79,2	80,4	81,6	82,7	83,8	84,8	85,8	-	-	-	-	-	-	-	-	-
	Total input	kW	0,92	1,05	1,19	1,33	1,47	1,63	1,78	1,95	2,12	-	-	-	-	-	-	-	-	-
20.4	Airflow	m^3/h	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
	Airflow	l/s	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667
	Fan RPM	rpm	1271	1331	1389	1445	1501	1554	1607	1658	1708	1757	1805	1853	1899	1945	1990	2034	2077	2119
	Sound power	dB(A)	83,9	84,5	85,2	85,9	86,7	87,4	88,2	89,1	89,9	90,8	91,6	92,4	93,2	94,0	94,7	95,4	96,1	96,7
	Total input	kW	1,12	1,28	1,44	1,60	1,77	1,95	2,13	2,31	2,49	2,69	2,88	3,09	3,30	3,51	3,74	3,95	4,17	4,39
22.4	Airflow	m^3/h	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
	Airflow	l/s	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944
	Fan RPM	rpm	1377	1431	1484	1536	1586	1636	1684	1731	1778	1823	1868	1912	1956	1999	2041	2082	2123	2164
	Sound power	dB(A)	86,4	86,8	87,2	87,7	88,2	88,7	89,2	89,8	90,3	90,9	91,4	92,1	92,7	93,4	94,0	94,6	95,2	95,8
	Total input	kW	1,36	1,53	1,71	1,89	2,07	2,26	2,45	2,64	2,85	3,06	3,28	3,49	3,70	3,92	4,15	4,38	4,62	4,87
24.4	Airflow	m^3/h	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	-
	Airflow	l/s	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	-
	Fan RPM	rpm	1493	1541	1589	1637	1683	1728	1773	1817	1860	1903	1945	1986	2027	2067	2106	2145	2184	-
	Sound power	dB(A)	89,0	89,1	89,4	89,7	90,0	90,4	90,7	91,1	91,5	91,9	92,3	92,7	93,2	93,6	94,0	94,5	95,0	-
	Total input	kW	1,66	1,84	2,03	2,22	2,42	2,62	2,84	3,05	3,26	3,47	3,70	3,93	4,17	4,41	4,66	4,91	5,16	-

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.
Performances with "VENH - High static pressure fans" option

High static pressure electric fan performance - Minimum airflow

Available static pressure (Pa) (supply)			420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200	1260	1320
12.2	Airflow	m^3/h	3000	3000	3000	3000	3000	3000	3000	3000	3000	-	-	-	-	-	-	-
	Airflow	l/s	833	833	833	833	833	833	833	833	833	-	-	-	-	-	-	-
	Fan RPM	rpm	1204	1270	1334	1394	1452	1508	1562	1614	1664	-	-	-	-	-	-	-
	Sound power	dB(A)	79,8	81,5	82,9	84,3	85,5	86,7	87,7	88,6	89,3	-	-	-	-	-	-	-
	Total input	kW	0,83	0,94	1,06	1,18	1,31	1,44	1,58	1,72	1,85	-	-	-	-	-	-	-
16.2	Airflow	m^3/h	4000	4000	4000	4000	4000	4000	4000	4000	-	-	-	-	-	-	-	-
	Airflow	l/s	1111	1111	1111	1111	1111	1111	1111	1111	-	-	-	-	-	-	-	-
	Fan RPM	rpm	1277	1339	1399	1456	1511	1565	1616	1667	-	-	-	-	-	-	-	-
	Sound power	dB(A)	79,1	80,5	81,8	83,0	84,2	85,3	86,3	87,2	-	-	-	-	-	-	-	-
	Total input	kW	1,05	1,19	1,33	1,47	1,62	1,77	1,92	2,08	-	-	-	-	-	-	-	-
20.4	Airflow	m^3/h	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300
	Airflow	l/s	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472
	Fan RPM	rpm	1329	1390	1449	1506	1561	1615	1668	1721	1771	1820	1868	1915	1962	2007	2051	2094
	Sound power	dB(A)	84,0	85,0	86,1	87,2	88,2	89,3	90,3	91,3	92,2	93,1	93,9	94,7	95,5	96,2	96,8	97,5
	Total input	kW	1,28	1,43	1,59	1,76	1,92	2,10	2,28	2,47	2,66	2,84	3,04	3,23	3,43	3,64	3,85	4,06
22.4	Airflow	m^3/h	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400
	Airflow	l/s	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778	1778
	Fan RPM	rpm	1426	1480	1534	1586	1636	1686	1735	1782	1829	1875	1920	1965	2009	2052	2095	2137
	Sound power	dB(A)	86,0	86,6	87,2	87,9	88,5	89,2	89,9	90,7	91,4	92,2	92,9	93,6	94,3	95,0	95,7	96,3
	Total input	kW	1,55	1,71	1,89	2,06	2,25	2,45	2,64	2,83	3,03	3,24	3,45	3,66	3,89	4,12	4,36	4,59
24.4	Airflow	m^3/h	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300	7300
	Airflow	l/s	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028	2028
	Fan RPM	rpm	1515	1566	1614	1663	1710	1756	1802	1846	1890	1934	1976	2018	2059	2100	2140	2,18
	Sound power	dB(A)	87,9	88,3	88,7	89,2	89,6	90,1	90,6	91,2	91,7	92,2	92,7	93,3	93,9	94,5	95,1	95,6
	Total input	kW	1,80	1,98	2,18	2,37	2,56	2,76	2,96	3,18	3,40	3,62	3,85	4,07	4,30	4,53	4,77	5,02

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.
Performances with "VENH - High static pressure fans" option

High static pressure electric fan performance - High airflow

Available static pressure (Pa) (supply)			240	270	300	330	360	390	420	480	540	600	660	720	780	840	900	960	1020	1080
12.2	Airflow	m^3/h	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	-	-	-	-
	Airflow	l/s	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	-	-	-	-
	Fan RPM	rpm	1072	1108	1143	1178	1211	1244	1277	1339	1399	1456	1511	1565	1616	1667	-	-	-	-
	Sound power	dB(A)	74,4	75,2	75,9	76,7	77,5	78,3	79,1	80,5	81,8	83,0	84,2	85,3	86,3	87,2	-	-	-	-
	Total input	kW	0,69	0,74	0,80	0,86	0,93	0,99	1,05	1,19	1,33	1,47	1,62	1,77	1,92	2,08	-	-	-	-
16.2	Airflow	m^3/h	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	5300	-	-	-	-		
	Airflow	l/s	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	1472	-	-	-	-	-	-
	Fan RPM	rpm	1221	1251	1280	1309	1337	1365	1393	1448	1502	1554	1605	1655	-	-	-	-	-	-
	Sound power	dB(A)	77,8	78,1	78,4	78,8	79,3	79,7	80,2	81,0	81,8	82,7	83,7	84,5	-	-	-	-	-	-
	Total input	kW	0,99	1,07	1,14	1,21	1,28	1,36	1,43	1,59	1,75	1,91	2,08	2,25	-	-	-	-	-	-
20.4	Airflow	m^3/h	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
	Airflow	l/s	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806
	Fan RPM	rpm	1264	1293	1323	1351	1380	1407	1435	1489	1542	1593	1643	1693	1741	1788	1835	1880	1925	1970
	Sound power	dB(A)	84,7	84,9	85,1	85,4	85,6	85,9	86,2	86,7	87,3	88,0	88,6	89,3	89,9	90,7	91,4	92,1	92,8	93,5
	Total input	kW	1,08	1,16	1,24	1,32	1,40	1,48	1,57	1,74	1,91	2,09	2,28	2,48	2,68	2,87	3,07	3,27	3,48	3,70
22.4	Airflow	m^3/h	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600
	Airflow	l/s	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111	2111
	Fan RPM	rpm	1394	1420	1445	1471	1496	1521	1546	1595	1643	1690	1736	1781	1826	1870	1913	1955	1997	2038
	Sound power	dB(A)	87,9	87,9	87,9	88,0	88,2	88,3	88,5	88,9	89,3	89,7	90,1	90,5	91,0	91,4	91,9	92,4	92,9	93,4
	Total input	kW	1,36	1,45	1,54	1,62	1,71	1,80	1,89	2,08	2,27	2,48	2,67	2,87	3,08	3,30	3,52	3,75	3,98	4,22
24.4	Airflow	m^3/h	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
	Airflow	l/s	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
	Fan RPM	rpm	1571	1593	1614	1636	1658	1679	1701	1744	1787	1829	1871	1911	1951	1991	2030	2069	2107	2145
	Sound power	dB(A)	91,8	91,8	91,7	91,6	91,6	91,6	91,5	91,7	91,9	92,2	92,4	92,7	93,0	93,3	93,6	93,9	94,2	94,5
	Total input	kW	1,83	1,92	2,01	2,11	2,21	2,31	2,41	2,61	2,82	3,03	3,26	3,49	3,72	3,97	4,21	4,45	4,69	4,94

The performance takes into account the pressure drops in the unit (pressure drops in treatment coil, standard filters, etc.).
To determine the performance required of the fans, you must add to the usable static pressure desired the pressure drops of any accessories.
Performances with "VENH - High static pressure fans" option

Extraction and exhaust electric fan performances - 50% exhaust air

Available static pressure (Pa) (extraction/exhaust)			60	90	120	150	180	210	240	270	300	330	360	390	420
12.2	Airflow	m3/h	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
	Airflow	l/s	472	472	472	472	472	472	472	472	472	472	472	472	472
	Fan RPM	rpm	817	893	965	1032	1095	1156	1214	1270	1323	1375	1426	1475	1522
	Sound power	dB(A)	62,4	64	65,8	67,4	68,9	70,4	71,7	73	74,2	75,2	76,3	77,2	78,2
	Total input	kW	0,14	0,17	0,2	0,23	0,26	0,29	0,32	0,35	0,38	0,41	0,45	0,48	0,52
16.2	Airflow	m3/h	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
	Airflow	l/s	625	625	625	625	625	625	625	625	625	625	625	625	625
	Fan RPM	rpm	934	1000	1061	1119	1176	1232	1285	1336	1386	1434	1480	1526	1570
	Sound power	dB(A)	66,5	67,4	68,2	69	70	71,1	72	73	73,8	74,7	75,5	76,4	77,2
	Total input	kW	0,18	0,21	0,24	0,28	0,31	0,34	0,38	0,41	0,45	0,49	0,52	0,56	0,59
20.4	Airflow	m3/h	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
	Airflow	l/s	833	833	833	833	833	833	833	833	833	833	833	833	833
	Fan RPM	rpm	650	702	754	803	850	896	940	983	1023	1063	1100	1137	1173
	Sound power	dB(A)	64,6	65,6	66,8	68,2	69,4	70,9	72,3	73,6	74,8	75,9	77	78,1	79
	Total input	kW	0,19	0,23	0,28	0,32	0,37	0,41	0,46	0,51	0,56	0,61	0,67	0,72	0,78
22.4	Airflow	m3/h	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
	Airflow	l/s	972	972	972	972	972	972	972	972	972	972	972	972	972
	Fan RPM	rpm	701	748	794	839	882	924	966	1006	1045	1083	1120	1156	1191
	Sound power	dB(A)	67,6	67,8	68,6	69,3	70,3	71,2	72,2	73,2	74,2	75,3	76,2	77,2	78,1
	Total input	kW	0,22	0,27	0,31	0,37	0,41	0,46	0,52	0,57	0,62	0,68	0,73	0,79	0,85
24.4	Airflow	m3/h	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
	Airflow	l/s	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111	1111
	Fan RPM	rpm	765	807	848	889	929	968	1005	1042	1079	1115	1150	1184	1218
	Sound power	dB(A)	70,4	70,5	70,6	71,2	71,8	72,3	73,1	73,9	74,6	75,3	76,1	76,9	77,7
	Total input	kW	0,26	0,31	0,37	0,42	0,47	0,53	0,58	0,64	0,7	0,76	0,82	0,88	0,94

50% EXHAUST AIR = Extraction and exhaust air flow equal to 50% of the supply flow

Extraction and exhaust electric fan performances - 100% exhaust air

Available static pressure (Pa) (extraction/exhaust)			60	90	120	150	180	210	240	270	300	330	360	390	420
12.2	Airflow	m3/h	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400	3400
	Airflow	l/s	944	944	944	944	944	944	944	944	944	944	944	944	944
	Fan RPM	rpm	1223	1268	1312	1356	1398	1442	1485	1527	1568	1608	1647	1684	1721
	Sound power	dB(A)	77,6	76,9	76,3	75,9	75,5	75,7	76,1	76,5	76,8	77,2	77,6	77,9	78,3
	Total input	kW	0,30	0,34	0,38	0,42	0,46	0,50	0,54	0,58	0,62	0,66	0,70	0,75	0,79
16.2	Airflow	m3/h	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
	Airflow	l/s	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
	Fan RPM	rpm	1530	1566	1603	1639	1672	1706	1739	1772	1805	1837	1869	1902	1935
	Sound power	dB(A)	84,4	84,1	83,8	83,5	83,1	82,7	82,4	82,1	81,9	81,7	81,5	81,8	82
	Total input	kW	0,48	0,53	0,57	0,62	0,66	0,71	0,76	0,81	0,87	0,92	0,98	1,03	1,08
20.4	Airflow	m3/h	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
	Airflow	l/s	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667	1667
	Fan RPM	rpm	1010	1044	1078	1110	1141	1170	1198	1226	1253	1280	1307	1334	1340
	Sound power	dB(A)	79,7	79,5	79,3	79,2	79,2	79,2	79,3	79,3	79,4	79,5	79,8	80	80,3
	Total input	kW	0,52	0,58	0,63	0,69	0,75	0,82	0,89	0,96	1,04	1,12	1,19	1,27	1,34
22.4	Airflow	m3/h	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
	Airflow	l/s	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944	1944
	Fan RPM	rpm	1148	1178	1208	1237	1266	1293	1320	1345	1370	1394	1418	1441	1465
	Sound power	dB(A)	82,9	83	82,9	82,8	82,7	82,6	82,5	82,5	82,6	82,6	82,6	82,7	82,7
	Total input	kW	0,71	0,79	0,86	0,92	0,99	1,05	1,12	1,2	1,28	1,36	1,45	1,54	1,63
24.4	Airflow	m3/h	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
	Airflow	l/s	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222
	Fan RPM	rpm	1288	1315	1342	1368	1394	1419	1444	1468	1491	1514	1537	1558	1580
	Sound power	dB(A)	85,8	85,8	85,9	85,9	85,7	85,6	84,8	85,5	85,4	85,4	85,4	85,5	85,5
	Total input	kW	0,96	1,05	1,13	1,21	1,28	1,36	1,43	1,51	1,59	1,67	1,76	1,86	1,95

100% EXHAUST AIR = Extraction and exhaust air flow equal to 100% of the supply flow

Option compatibility

CSRN-XHE2 FFA OPTIONS			
REF.	**DESCRIPTION**	**VERSION CBFFA**	**VERSION CCFFA**
Versions			
RE1	Active Energy recovery of expelled air	-	√
Configurations			
CREFO	Device for fan consumption reduction of the external section, on/off type	√	√
CREFB	Device for fan consumption reduction of the external section, ECOBREEZE type	O	O
CHW2	Two-rows hot water coil	O	O
GC	Condensing gas heating module with modulating control	O	O
PCMO	Sandwich panels of the handling zone in M0 fire reaction class	O	O
AMRX	Rubber antivibration mounts	◊	◊
AMRMX	Rubber antivibration mounts for unit and gas module	◊	◊
Refrigeration circuit			
EVE	Electronic expansion valve	√	√
LTEMP1	Application for low outdoor temperature	O	O
CPHG	hot gas re-heating coil	O	O
MHP	High and low pressure gauges	O	O
Aeraulic circuit			
M0	Horizontal air supply	√	√
M3	Downward air supply	O	O
M5	Upflow air supply	O	O
R0	Horizontal air return	√	√
R3	Downward air return	O	O
DAOP	Overpressure damper on the fresh air	√	√
VENH	High static pressure fans	O	O
PCOSM	Constant supply airflow	√	√
PCOSME	Constant airflow in supply and exhaust	-	º
FPG4	Pleated air filter class G4 (EN 779 norm)	√	√
F7	High efficiency F7 air filter	O	O
FES	Electronic filters	O	O
PSAF	Clogged filter differential pressure switch air side	O	O
HSE	Immersed electrodes steam humidifier	O	O
HWS	Water to waste evaporating wet-deck humidifier	O	O
Hydraulic circuit			
2WVM	Modulating 2-way valve	O	O
3WVM	Modulating 3-way valve	O	O
Electric circuit			
THTUNE	Wall mounted electronic room control	√	√
EH	Electric heaters.	O	O
CMSC9	Serial communication module to Modbus supervisor	O	O
CMSC10	Serial communication module to LonWorks supervisor	O	O
CMSC11	Serial communication module for BACnet-IP supervisor	O	O
CTERM	Remote keypad for indoor temperature and humidity control	O	O
SFSTC	Progressive compressor start-up Soft starter	O	O
CLMX	Clivet Master System	◊	◊
PM	Phase monitor	O	O
PFCP	Power factor correction capacitors (cosfi > 0.9)	O	O
Various			
PM	Phase monitor	◊	◊
PFCP	Power factor correction capacitors (cosfi > 0.9)	O	O

√ Standard

O Option

◊ Separately supplied option

Functional spaces

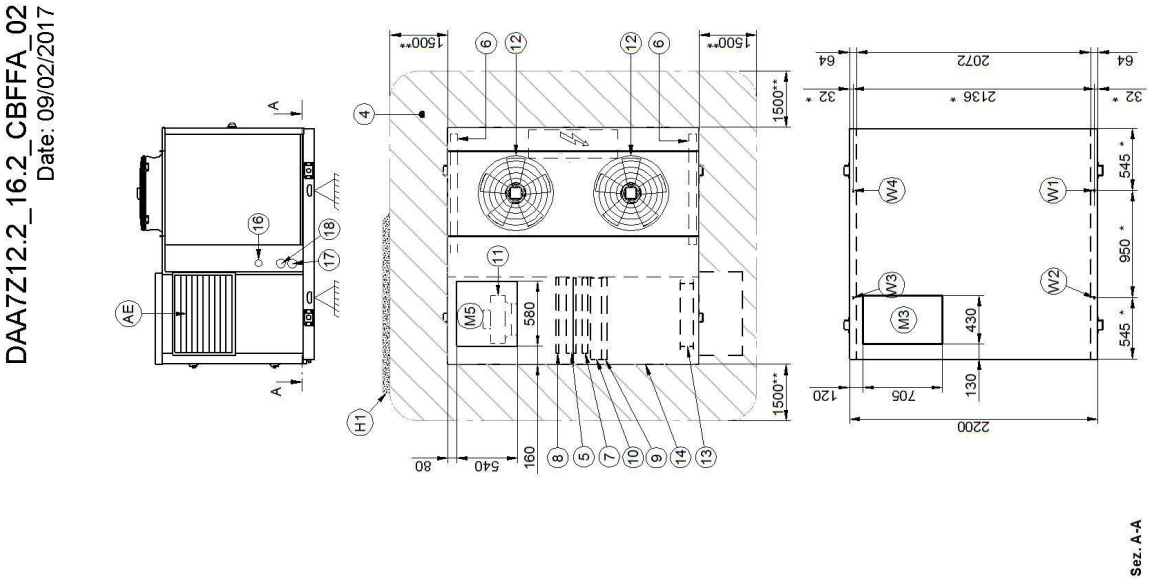
When placing the unit, it is necessary to comply with the functional spaces indicated in the dimensions. Compliance with functional spaces is essential to:

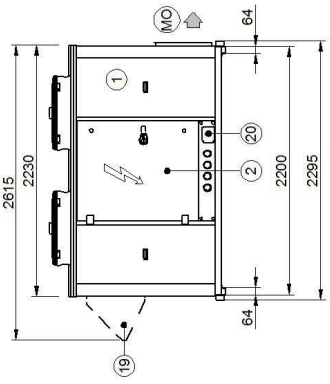
- ensure proper operation of the unit;
- allow maintenance technicians easy access to the equipment compartments;
- protect authorized operators and exposed persons.

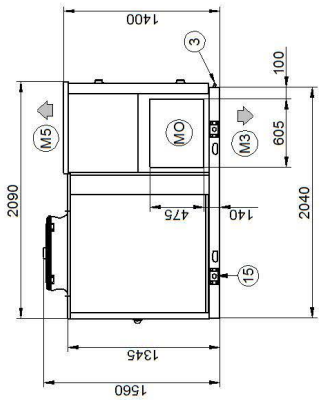
If several units are placed near one another, the functional spaces between units must be doubled.

Dimensional drawings

Size 12.2 - 16.2 - CBFFA configuration







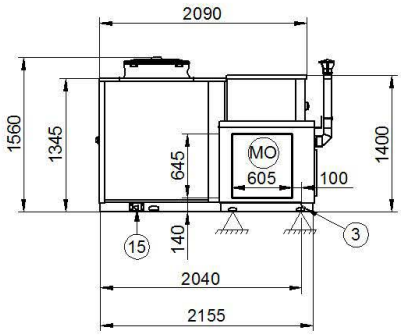
1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electrostatic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils - filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 3/4"
18. H2O heating coil output Ø 3/4"
19. Outdoor Air Return Cap (Optional) Accessory Separately Supplied
20. Power Input

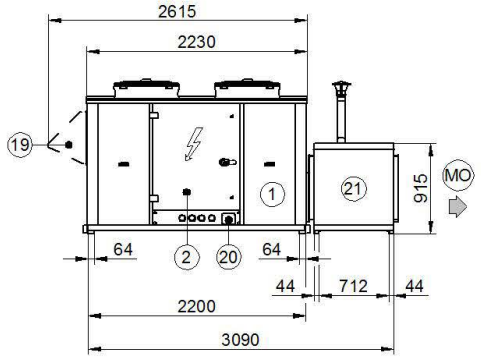
(M0) Horizontal air supply
(M3) Downward air supply (Optional)
(M5) Upflow air supply (Optional)
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

Size		12.2	16.2
W1 Supporting point	kg	350	360
W2 Supporting point	kg	266	268
W3 Supporting point	kg	289	291
W4 Supporting point	kg	368	378
Operating weight	kg	1273	1297
Shipping weight	kg	1273	1297

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

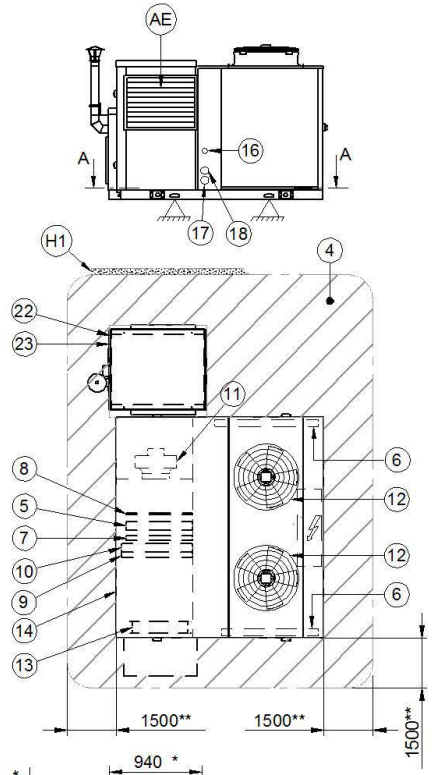
Size 12.2 - 16.2 Combustion module - CBFFA configuration

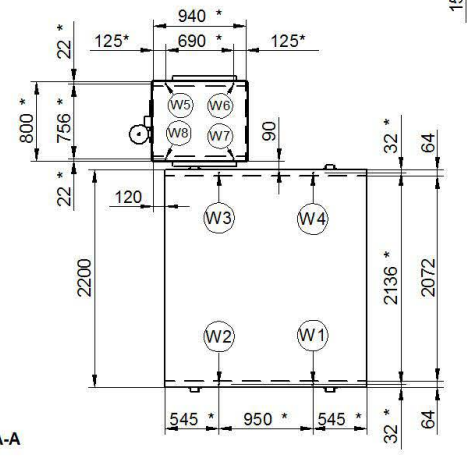




1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electrostatic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 3/4"
18. H2O heating coil output Ø 3/4"
19. Outdoor air return cap (optional) accessory separately supplied
20. Power input
21. Gas module (accessory separately supplied)
22. Gas connection
23. Condensate drain (only for condensation gas heating module)

(MO) Horizontal air supply
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance





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Size		12.2	16.2
W1 Supporting point	kg	350	360
W2 Supporting point	kg	266	268
W3 Supporting point	kg	289	291
W4 Supporting point	kg	368	378
Operating weight	kg	1273	1297
Shipping weight	kg	1273	1297

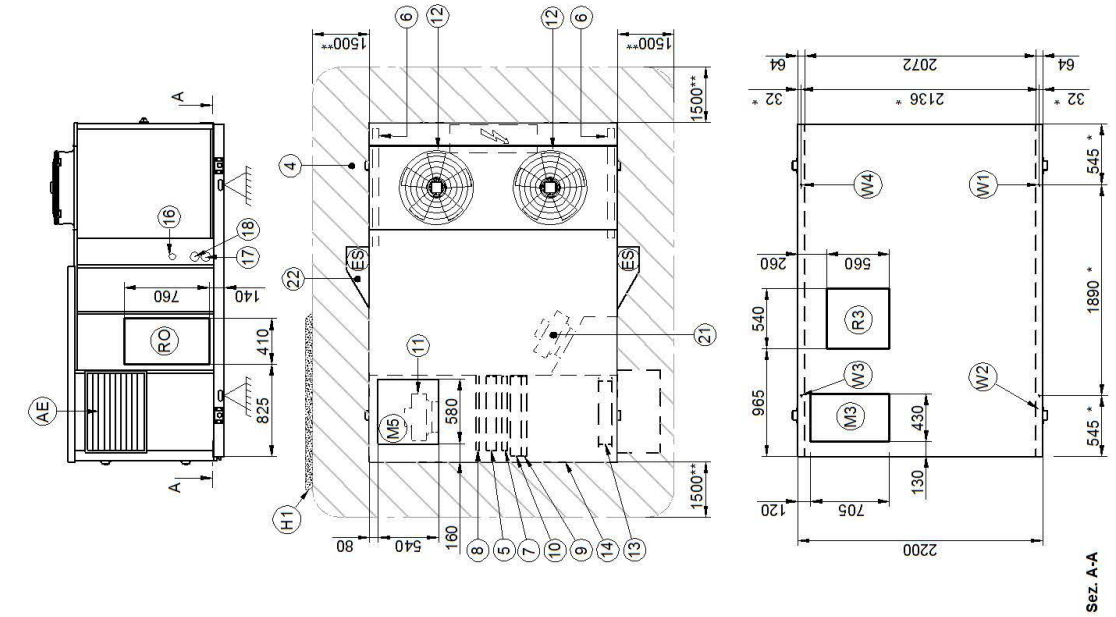
GAS MODULE WEIGHT DISTRIBUTION

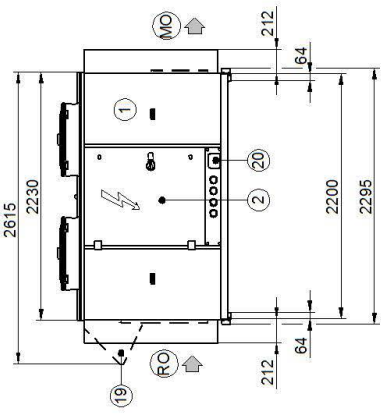
Size		12.2 - 16.2
W5 Supporting point	kg	70
W6 Supporting point	kg	58
W7 Supporting point	kg	58
W8 Supporting point	kg	70
Operating weight	kg	256
Shipping weight	kg	256

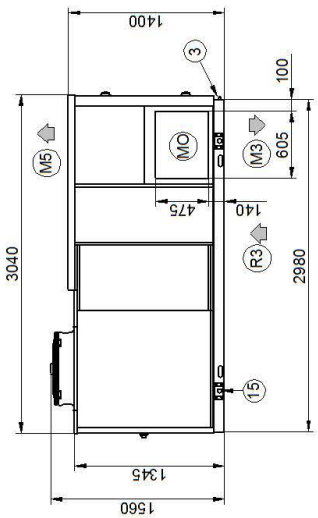
The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 12.2 - 16.2 - CCFFA configuration

DAA7Z12.2_16.2_CCFFA_02
Date: 09/02/2017







1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electrostatic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 3/4"
18. H2O heating coil output Ø 3/4"
19. Air intake cap (optional) accessory separately supplied
20. Power input
21. Exhaust electric fan
22. Air exhaust caps (accessory separately supplied

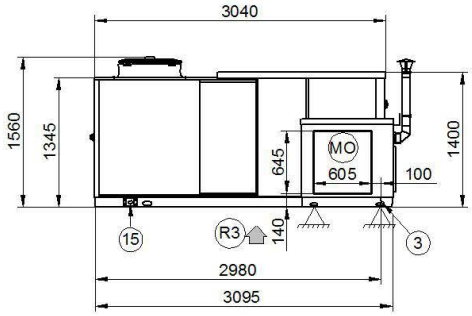
(ES) Air exhaust
(RO) Horizontal return
(R3) Downward air return
(MO) Horizontal air supply
(M3) Downward air supply (Optional)
(M5) Upflow air supply (Optional)
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

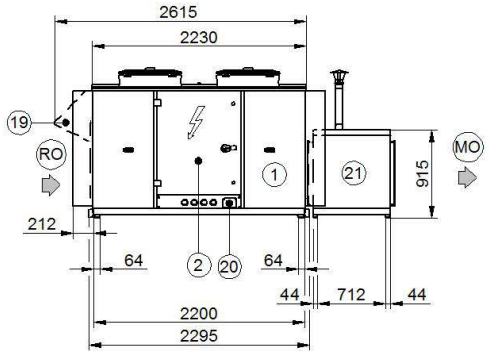
Size		12.2	16.2
W1 Supporting point	kg	386	396
W2 Supporting point	kg	290	292
W3 Supporting point	kg	319	321
W4 Supporting point	kg	406	416
Operating weight	kg	1401	1425
Shipping weight	kg	1401	1425

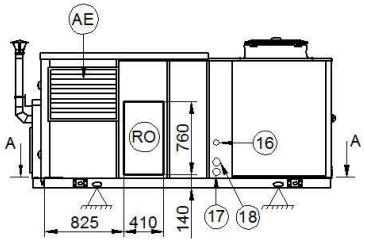
The presence of optional accessories may result in a substantial variation of the weights shown in the table.

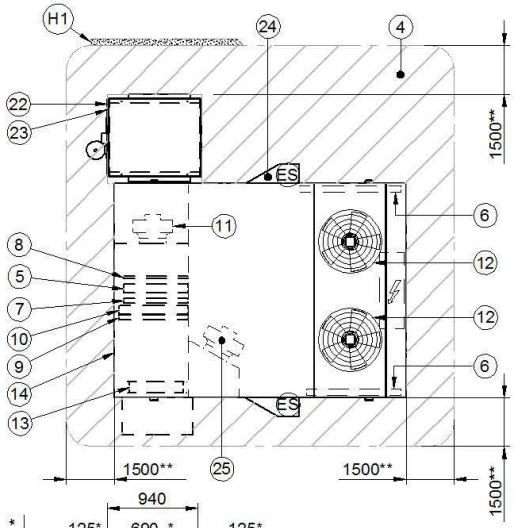
DAA7Z12.2_16.2_CCFFA_GC01X-GC08X_02
Date: 09/02/2017

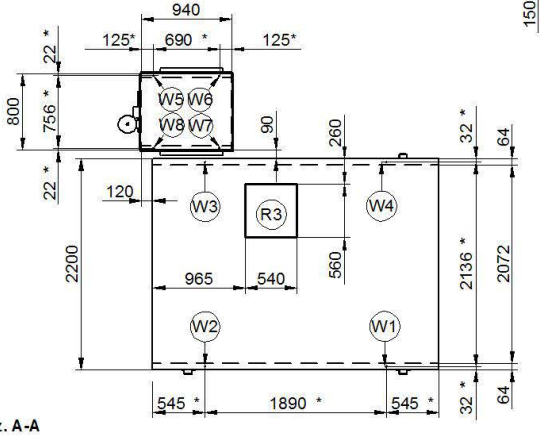
Size 12.2 - 16.2 Combustion module - CCFFA configuration











Sez. A-A

1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H20 heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electrostatic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H20 heating coil input Ø 3/4"
18. H20 heating coil output Ø 3/4"
19. Outdoor air return cap (optional) accessory separately supplied
20. Power input
21. Gas module (accessory separately supplied)
22. Gas connection
23. Condensate drain (only for condensation gas heating module)
24. Air exhaust caps (accessory separately supplied)
25. Exhaust electric fan

(ES) Air exhaust
(R0) Horizontal return
(R3) Downward air return
(M0)Horizontal air supply
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

Size		12.2	16.2
W1 Supporting point	kg	386	396
W2 Supporting point	kg	290	292
W3 Supporting point	kg	319	321
W4 Supporting point	kg	406	416
Operating weight	kg	1401	1425
Shipping weight	kg	1401	1425

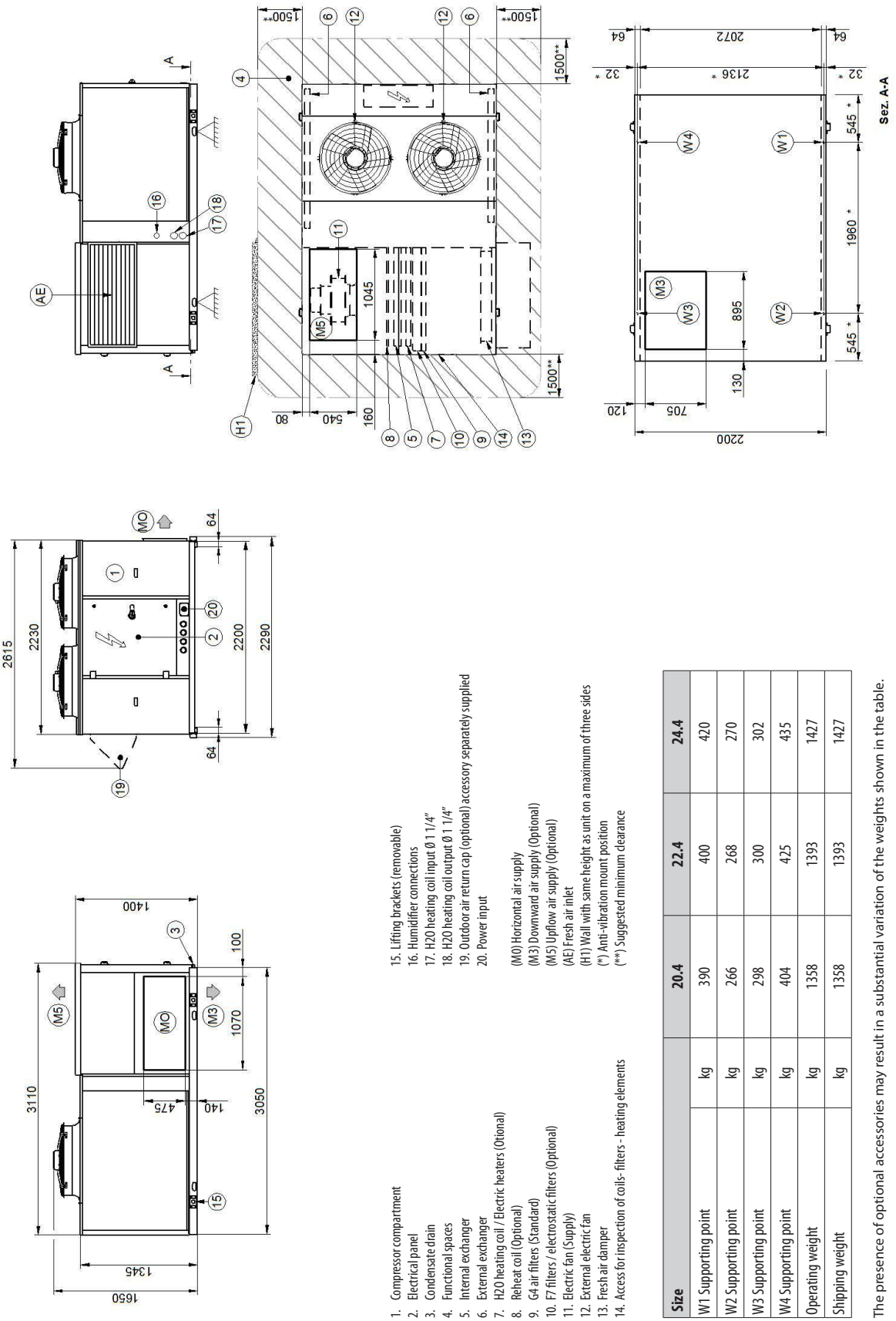
GAS MODULE WEIGHT DISTRIBUTION

Size		12.2 - 16.2
W5 Supporting point	kg	70
W6 Supporting point	kg	58
W7 Supporting point	kg	58
W8 Supporting point	kg	70
Operating weight	kg	256
Shipping weight	kg	256

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

Size 20.4 - 22.4 - 24.4 - CBFFA configuration

DAA7Z20.4_24.2_CBFFA_01
Date: 09/02/2017



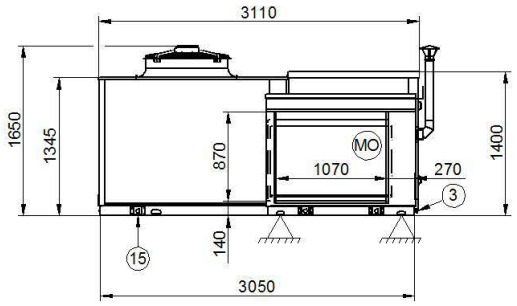
1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electrostatic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 1 1/4"
18. H2O heating coil output Ø 1 1/4"
19. Outdoor air return cap (optional) accessory separately supplied
20. Power input

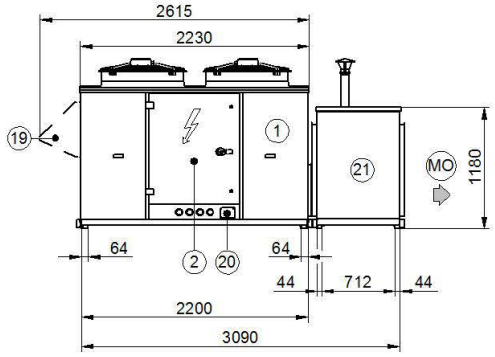
(M0) Horizontal air supply
(M3) Downward air supply (Optional)
(M5) Upflow air supply (Optional)
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

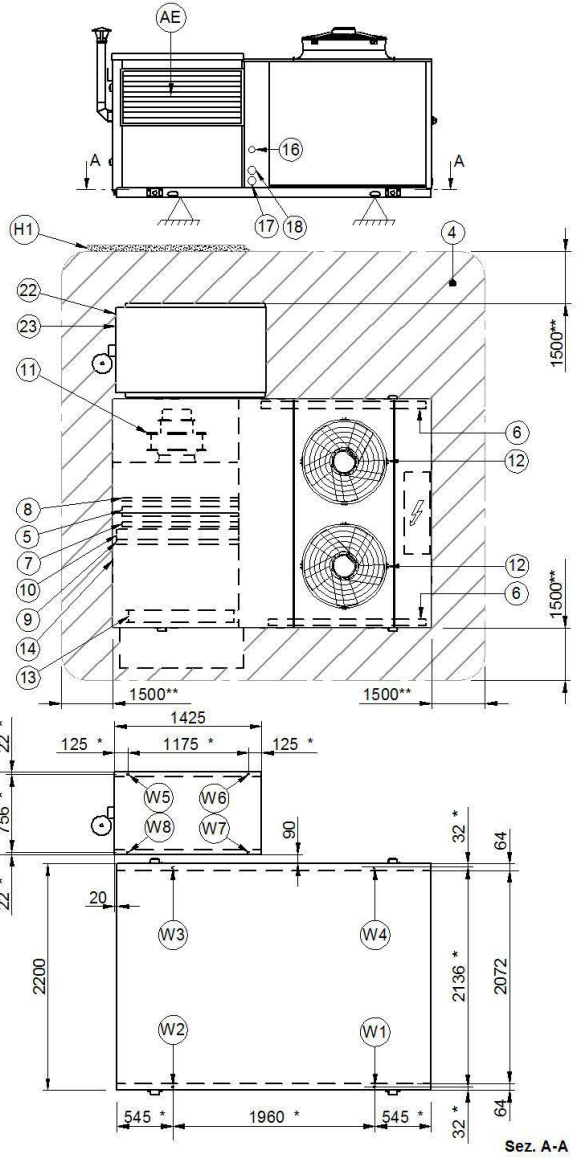
Size		20.4	22.4	24.4
W1 Supporting point	kg	390	400	420
W2 Supporting point	kg	266	268	270
W3 Supporting point	kg	298	300	302
W4 Supporting point	kg	404	425	435
Operating weight	kg	1358	1393	1427
Shipping weight	kg	1358	1393	1427

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

Size 20.4 - 22.4 - 24.4 - Combustion module - CBFFA configuration







1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electronic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 1 1/4"
18. H2O heating coil output Ø 1 1/4"
19. Outdoor air return cap (optional) accessory separately supplied
20. Power input
21. Gas module (accessory separately supplied)
22. Gas connection
23. Condensate drain (only for condensation gas heating module)

(M0) Horizontal air supply
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

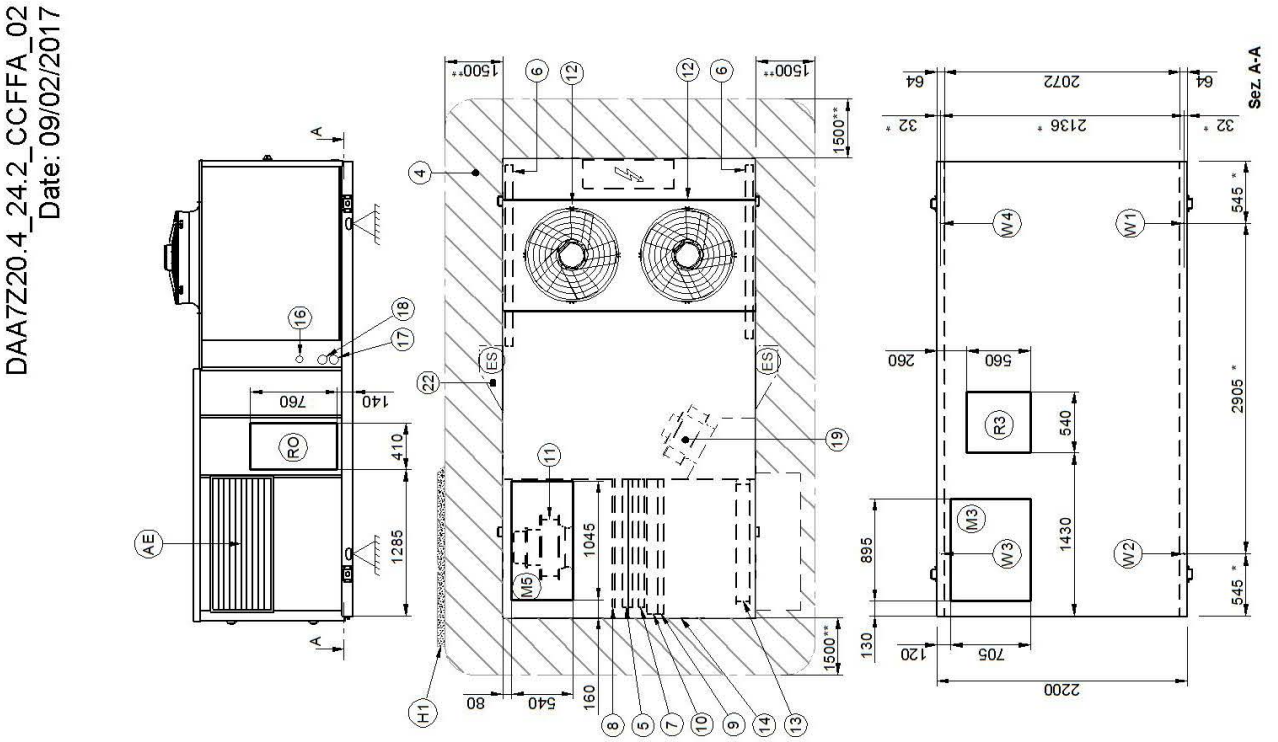
Size		20.4	22.4	24.4
W1 Supporting point	kg	390	400	420
W2 Supporting point	kg	266	268	270
W3 Supporting point	kg	298	300	302
W4 Supporting point	kg	404	425	435
Operating weight	kg	1358	1393	1427
Shipping weight	kg	1358	1393	1427

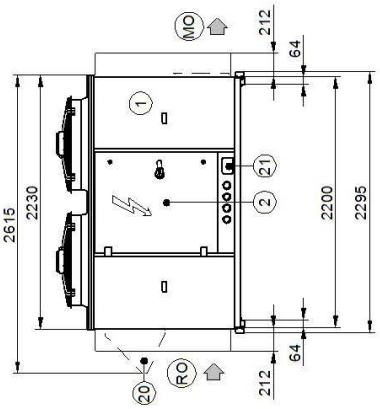
GAS MODULE WEIGHT DISTRIBUTION

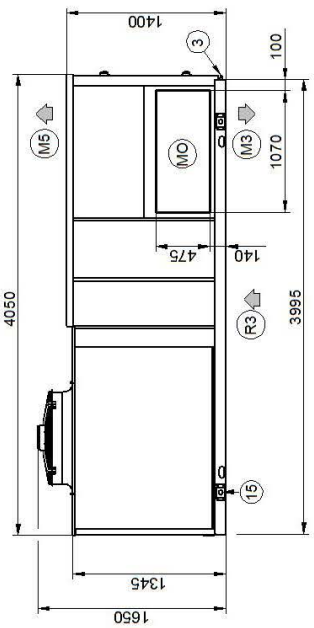
Size		20.4 - 22.4 - 24.4
W5 Supporting point	kg	70
W6 Supporting point	kg	58
W7 Supporting point	kg	58
W8 Supporting point	kg	70
Operating weight	kg	256
Shipping weight	kg	256

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

Size 20.4 - 22.4 - 24.4 - CCFFA configuration







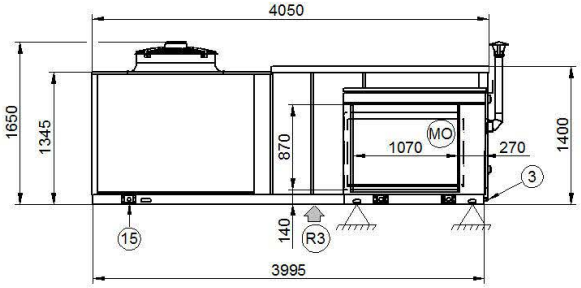
1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electronic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 1 1/4"
18. H2O heating coil output Ø 1 1/4"
19. Exhaust electric fan
20. Outdoor air return cap (optional) accessory separately supplied
21. Power input
22. Air exhaust caps (accessory separately supplied)

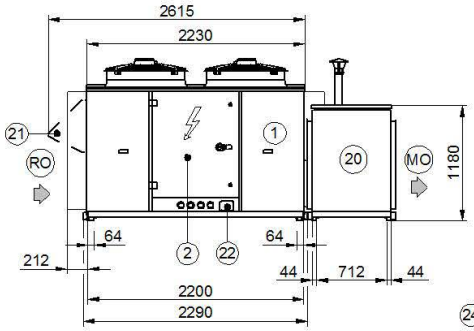
(ES) Air exhaust
(RO) Horizontal air return
(R3) Downward air return
(MO) Horizontal air supply
(M3) Downward air supply (Optional)
(M5) Upflow air supply (Optional)
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

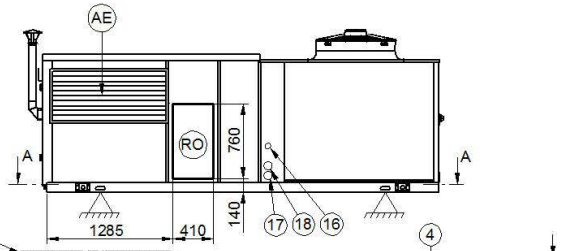
Size		20.4	22.4	24.4
W1 Supporting point	kg	445	455	475
W2 Supporting point	kg	308	310	312
W3 Supporting point	kg	346	348	350
W4 Supporting point	kg	461	482	492
Operating weight	kg	1560	1595	1629
Shipping weight	kg	1560	1595	1629

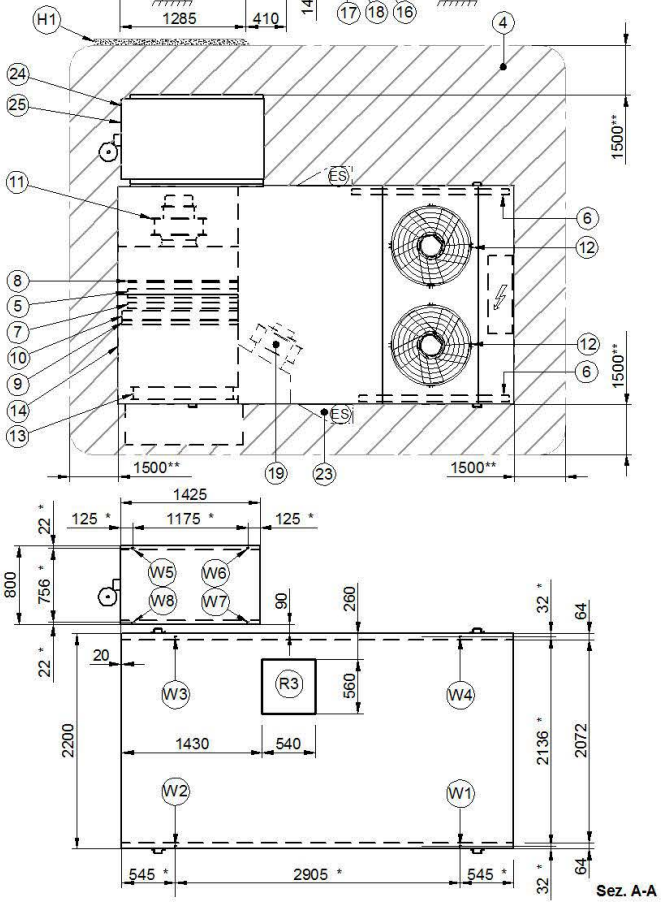
The presence of optional accessories may result in a substantial variation of the weights shown in the table.

Size 20.4 - 22.4 - 24.4 Combustion module - CCFFA configuration









1. Compressor compartment
2. Electrical panel
3. Condensate drain
4. Functional spaces
5. Internal exchanger
6. External exchanger
7. H2O heating coil / Electric heaters (Otional)
8. Reheat coil (Optional)
9. G4 air filters (Standard)
10. F7 filters / electronic filters (Optional)
11. Electric fan (Supply)
12. External electric fan
13. Fresh air damper
14. Access for inspection of coils- filters - heating elements
15. Lifting brackets (removable)
16. Humidifier connections
17. H2O heating coil input Ø 1 1/4"
18. H2O heating coil output Ø 1 1/4"
19. Exhaust electric fan
20. Gas module (accessory separately supplied)
21. Outdoor air return cap (optional) accessory separately supplied
22. Power input
23. Air exhaust caps (accessory separately supplied)
24. Gas connection
25. Condensate drain (only for condensation gas heating module)

(ES) Air exhaust
(RO) Horizontal air return
(R3) Downward air return
(MO) Horizontal air supply
(AE) Fresh air inlet
(H1) Wall with same height as unit on a maximum of three sides
(*) Anti-vibration mount position
(**) Suggested minimum clearance

Size		20.4	22.4	24.4
W1 Supporting point	kg	445	455	475
W2 Supporting point	kg	308	310	312
W3 Supporting point	kg	346	348	350
W4 Supporting point	kg	461	482	492
Operating weight	kg	1560	1595	1629
Shipping weight	kg	1560	1595	1629

GAS MODULE WEIGHT DISTRIBUTION

Size		20.4 - 22.4 - 24.4
W5 Supporting point	kg	70
W6 Supporting point	kg	58
W7 Supporting point	kg	58
W8 PSupporting point	kg	70
Operating weight	kg	256
Shipping weight	kg	256

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

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