



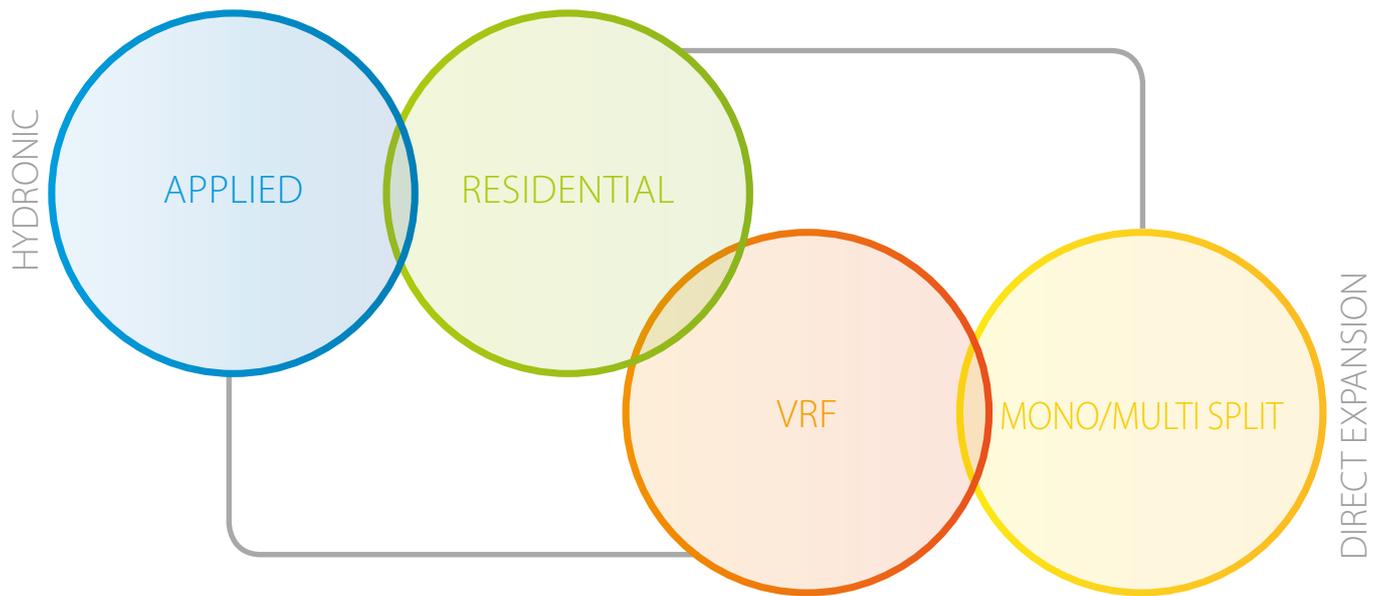
AQX
Air Handling Units



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Clivet. Change things

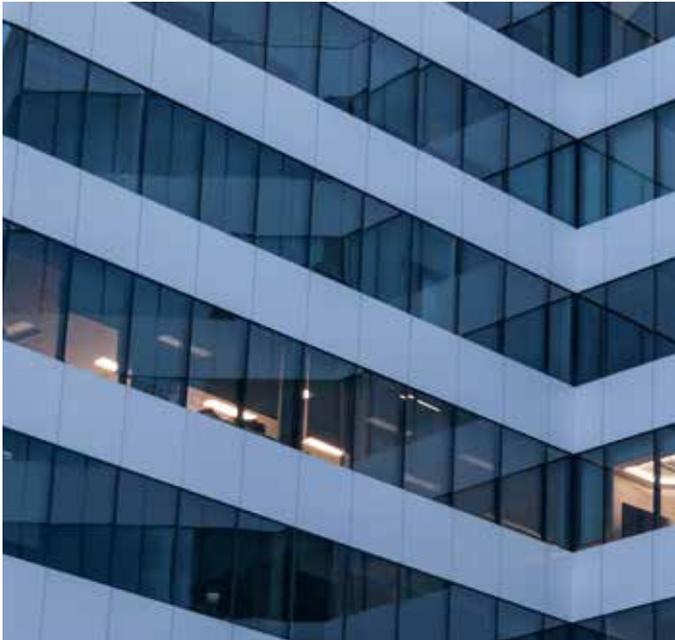


Solutions to ensure sustainable comfort and the well-being of people and the environment

In 30 working on the design, manufacturing and distribution of air conditioning and handling systems, combining high efficiency with minimal environmental impact, Clivet has developed solutions to ensure sustainable comfort and the well-being of people and the environment.

Designing and developing year-round air conditioning solutions with innovative technologies are part of Clivet's DNA, which means the company has always been ready for the future.





Made by CLIVET AIR HANDLING UNITS System solution

Air is life. That is why we work to provide people around the world with the quality of the air they want. Ideal comfort results from air temperature, humidity and quality properly controlled before being introduced into the space, depending on its intended use. Therefore air handling units in air conditioning systems must be versatile and

reliable to meet those expectations, with strict control of the indoor comfort. This applies in residential buildings as well as in commercial and industrial applications. Furthermore, additional hygienic solutions must be provided in critical production processes, such as food and beverage, to hospitals and pharmaceutical industry.

Clivet designs, produces and delivers Air Handling Units to fulfill all these strict requirements, all over the world. Two key product lines are available.

- Clivet AQX, complete with Eurovent certification and fully compliant with demanding ErP Ecodesign European standards
- Clivet CLA, made on the same quality and construction, for all applications and markets asking for features other than Eurovent and Ecodesign.

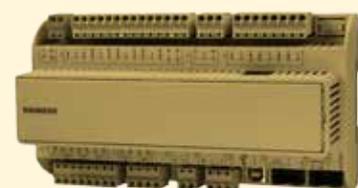
Air Handling Units

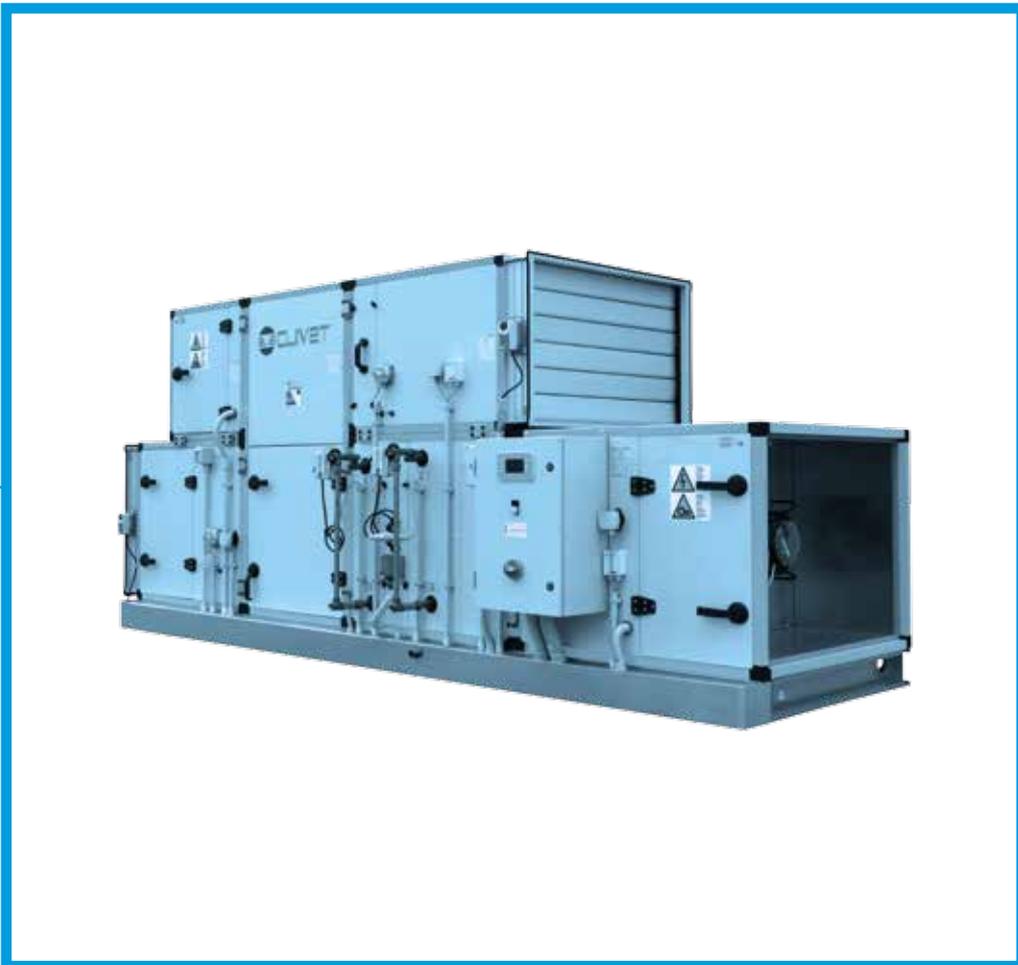


Functional sections



Control system





Air Handling Units



Based on our innovative standard design, each of our products can be tailored to your standards and requirements. As an example, we can position access doors to accommodate constructive constraints, provide you with inspection windows in a specific position, and so on. At the same time, virtually all components and functions can be selected and incorporated into every CLIVET AQX unit.

Durable

Our products are designed for long-term use and this is reflected in our dedication to quality. Thanks to the solid construction of our equipment, many Companies already choose Clivet products.

Economical and energetically conscious engineering

The sustainability of your business is the main driver to all our resources. We do believe our internal quality criteria allow the energy-

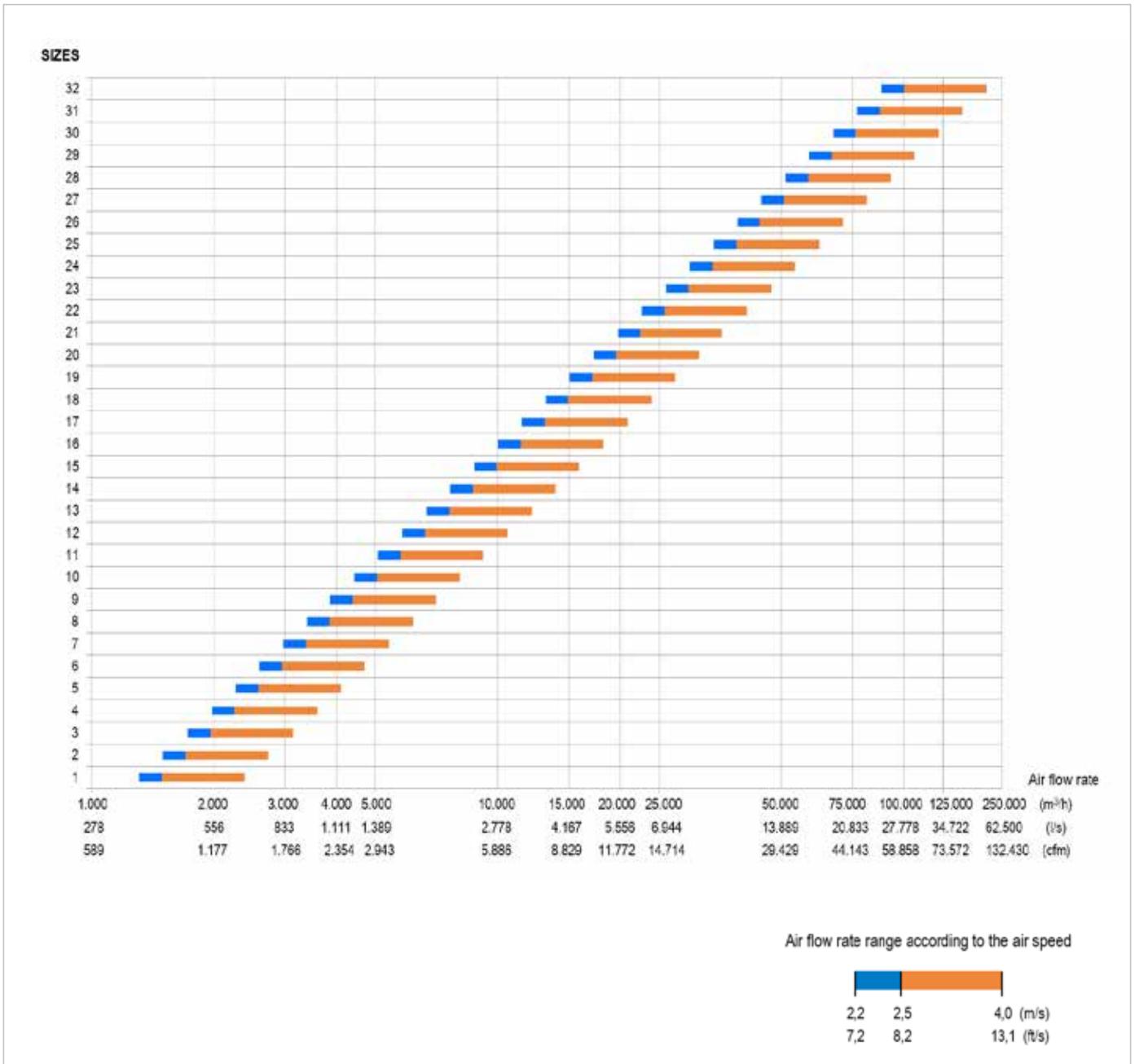
conscious use of our products, resulting in both effective operation cost and protection of the environment.

Quiet running

All our air handling units are designed to operate extremely efficiently and with very low sound pressure levels.

Easy maintenance

The completeness of our range will amaze you for its high performance, and the simplicity and generosity of the project will allow you an ease of use, management and maintenance for many years.



About Clivet AQX

Customized products of the highest standard of quality, safety and sustainability express the consequent premium strategy Clivet puts into practice.

Clivet is able to achieve and optimize all of this. Our AQX are based on a modular design, capable of adapting to the needs of variety of installation types. Due at the ingenious concept of variants and custom-made product we are able to meet your requirement exactly.

The AQX Clivet project allows configurations suitable for any type of application. Everything through simple structural changes already made available and selectable.

The completeness of the versions available and the flexibility of the AQX range includes air flow rates from 278 to 44,444 l/s (1,000 to 160,000 m³/h or 589 to 94,170 cfm) with front speeds between 2.2 and 2.5 m/s and a static pressure of up to 2,500 Pa. This allows us to satisfy all the plant requirements, respecting the optimal design conditions in all situations that the market requires.

Quality & Certifications

Clivet products comply with applicable product directives, as required in all EU countries, in order to guarantee an appropriate level of safety.

The wide range of Clivet products and complete systems comply with the requirements of the implementing measures for Directives 2009/125/EC (ErP-Energy related Products) and 2010/30/EU (Energy labelling), whose purpose is to reduce the energy consumption of products for heating, cooling, ventilation and hot water production, encouraging the user towards energy-efficient choices. Directives 2009/125/EC (ErP) and 2010/30/EU (ELD) include the following Regulations: (EU) 206/2012, (EU)626/2011; (EU) 811/2013, (EU) 813/2013; (EU) 1253/2014, (EU) 1254/2014; (EU) 2016/2281.

With the aim of providing Customer satisfaction, Clivet S.p.A. has supplemented and certified its Quality, Environment and Safety Management Systems, in accordance with the ISO 9001, ISO 14001 and OHSAS 18001 International Standards.

Clivet is committed in promoting the green building principles and has become a member of GBC Italia. This organization collaborates with USGBC, the U.S. nonprofit organization that promotes worldwide the LEED® system of independent certification.



Clivet participates in the EUROVENT "Liquid Chilling Packages and Heat Pumps", "Rooftops", "Air Handling Units" and "VRF" Certification programmes. The products concerned feature in the EUROVENT guide to certified products and on the website www.eurovent-certification.com. The programmes apply to water chillers up to 1500 kW, to rooftops up to 100 kW, to air handling units and to VRF up to 100 kW.

AQX air handling units are energy classified in according to Eurovent's guidelines for air handling units RS 6/C/005-2015. The energy class expresses the unit's total energy consumption. The energy class is calculated by the design programme based on the actual data of the designed unit.



The AQX design is based on the demands in the following CEN and ISO standards:

- EN 305:1999 - Heat exchangers. Definition and test procedures.
- EN 308:1998 - Heat exchangers. Test procedures.
- EN 779:2012 - Particulate air filters for general ventilation.
- EN 1216:2008 - Heat exchangers.
- EN 1751:2014 - Aerodynamic testing of dampers and valves.
- EN 1886:2008 - Air handling units. Mechanical performance.
- EN 13053:2011 - Ratings and performance for units and components.

- EN 13779:2008 - Ventilation for non-residential buildings. Performance requirements.
- EN ISO 16890:2017 - Air filters for general ventilation.
- EN 60204-1:2006 - Machine safety. Electrical equipment of machines.
- EN ISO 3741:2010 - Determination of sound power level in reverberation rooms.
- EN ISO 5136:2009 - Determination of sound power level in a duct.
- EN ISO 12100:2010 - Safety of machinery.
- EN ISO 12944-2:2018 - Corrosion protection. Classification of environments.



Eurovent Certification according to EN 1886

Model boxes	PU50	RW50
Casing Mechanical Strength	D1	D1
Maximum relative deflection mm x m ⁻¹	4.00	4.00
Casing Air Leakage at -400 Pa	L1	L2
Maximum leakage rate (f ₄₀₀) l x s ⁻¹ x m ⁻²	0.15	0.44
Casing Air Leakage at +700Pa	L1	L2
Maximum leakage rate (f ₄₀₀) l x s ⁻¹ x m ⁻²	0.22	0.63
Filter Bypass Leakage	F9	F9
Maximum filter bypass leakage rate k in% of the volume airflow	0.50	0.50
Thermal Transmittance	T2	T3
Thermal Transmittance (U) W/m ² x K	0.5 < U <= 1	1 < U <= 1.4
Thermal Bridging of the casing	TB3	TB3
Thermal bridging factor (k _b) W/m ² x K	0.45 < kb <= 0.6	0.45 < kb <= 0.6

Acoustic insulation [dB]

Frequency	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
PU50	6	11	12	14	13	29	36
RW50	11	14	15	20	20	28	36

PU50: Double skin polyurethane panel, 50mm Thick
 RW50: Double skin mineral rock wool panel, 50mm Thick



Detail with rotary recuperator, pressure transducer and wiring



Detail with coil valves, damper actuator, pressure transducer and air quality probe

Product Information

Air handling unit casing

- Rigid frames with sound and thermal insulated panels with thermal break.

Materials

- Profile type 50 mm – Panels Thickness 50 mm.
- Panel Internal skin: galvanized steel, aluminum, stainless steel AISI 304, galvanized preplastified sheet, stainless steel AISI 316, galvanized perforated steel. Measure: 0.50 to 2.0 mm.
- Panel external skin: the same for the internal panel. Measure: the same for internal panel.
- The drain pans material in in aluminum standard or in options in S.S. AISI 304 or S.S. AISI 316.

Mineral wool with oriented fiber

- Fixing: fixed to the sheet metal with polyurethane glue.
- Thickness: 50 mm.
- Density: 90 kg/m³.
- Fire reaction class: 0 according to UNI 9177.

Polyuretane injected

- Thickness: 50 mm.
- Density: 43 kg/m³ according to EN 1602.
- Fire reaction class: 1 according to UNI 9177.

Operating temperatures

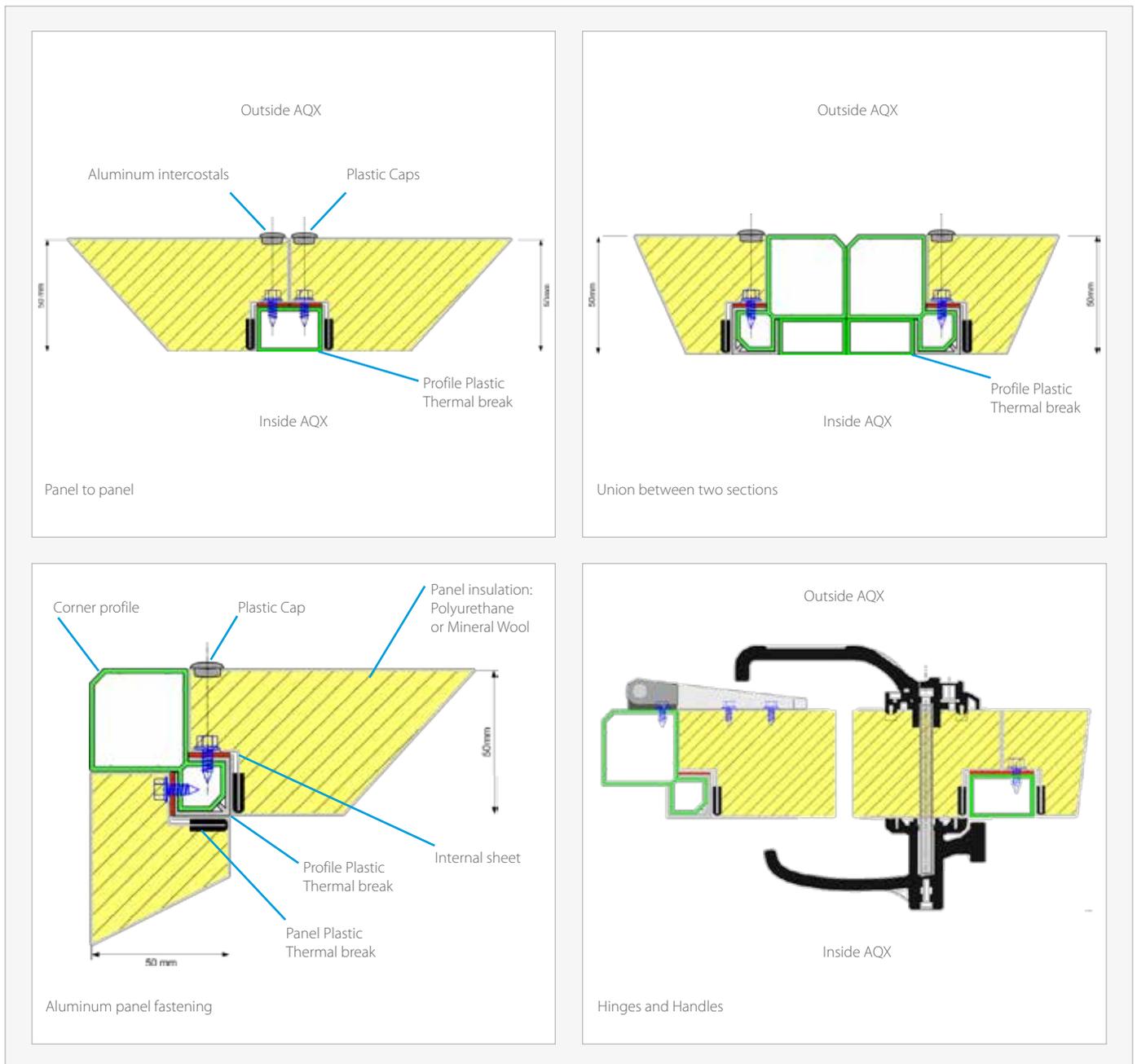
General temperatures for the air in the air handling unit:

- Standard design: -40/+70°C.
- Special design: on request.
- The performance of the air handling unit casing corresponds with the following classifications according to the European standard EN 1886, 2th edition 2008.

Mechanical strength

- Class D1, maximum relative deflection

Explosion proof air handling unit series AQX -X: the explosion proof air handling units type corresponds to the following categories: equipment group II, equipment category 2, explosive atmosphere caused by gasses, vapors and mists G, temperature class T3 and/or T4. The fans is ATEX category II 2G IIB T3 or II 3G IIB T4 of this category are designed for areas where an explosive atmosphere as a mix of air, gases, vapors or mists.



Features

Thermal break design

The best thermal performance and the minimum heat losses are assured by the highest-level technology frame:

- Structure with aluminium profiles and ABS gasket for thermal break;
- Double chamber type profiles so that the fixings screws are totally concealed;
- Solid connecting corners made of glass-reinforced nylon, complete with thermal break;
- Concealed intermediate profile for best thermal break and reduced length;
- Modular frame for an easier transport and lifting in plant;
- Section junction realised with ABS profile for a perfect thermal break;
- The base frame is independent for each section, made of galvanized thick sheet steel.

Double skin panels

- The closing panels are double skin type, with double sheet steel and insulation through either polyurethane foam (thickness 50mm, density 43 kg/m³) or fibrous mineral wool (density 90 kg/m³), complete with gasket for thermal break.
- External sheet is coated with polyester powder, colour RAL 9001.
- For best individual customisation, AQX units can be selected with seven types of materials for the internal and external panels, with different thicknesses.
- On request, panels can be supplied with doors for inspection and service. There are solutions with hinges to allow left or right openings or even the total removal of the door, complete with internal and external handles to assure the maximum safety.
- The unit can be equipped with double-wall portholes made of polycarbonate and with sealing gaskets.

ECO water expanded polyurethane, carbon dioxide expander

ODP (Ozone Depletion Potential) = 0

GWP (Global Warming Potential) = 1

1300 times less greenhouse effect potential than traditional HCF R134a expanders.



Control Systems AQX



Coil control section



Control panel and wiring



Damper control

Sheet Thickness (mm)	0,5	0,6	0,8	1,0	1,2	1,5	2,0
Galvanized steel	✓	✓	✓	✓	✓	✓	✓
Aluminium	n.a.	n.a.	✓	✓	✓	✓	✓
Stainless Steel AISI 304	✓	✓	✓	✓	✓	✓	n.a.
Galvanized preplastified	✓	✓	n.a.	n.a.	n.a.	n.a.	n.a.
Galvanized prepainted	n.a.	✓	✓	✓	✓	✓	n.a.
Stainless Steel AISI 316	✓	✓	✓	✓	✓	✓	n.a.
Galvanized perforated steel (only internal)	n.a.	n.a.	n.a.	✓	n.a.	n.a.	n.a.

Frame in aluminum profile having 50x50 mm section, for its light weight and extra corrosion resistance. All profiles are double chamber type so that the fixing screws are totally concealed and there are no projections inside the AQX, and they are also fitted with a gasket to be inserted inside the profile, and to ensure maximum seal.

Basement is in galvanized steel, it is developed along the entire perimeter for each independent section, height 140 mm complete of lifting holes.

Fixing fittings are self-tapping screws, located in nylon bushes and retained in the panel with an external cap. This system completely hides the screws in the panel, and thanks to the self-centering screws, the tightness over time is ensured.

Doors for inspection and internal service can be provided with outward or inward opening for pressurized sections.

Portholes are double-wall type made of polycarbonate and with sealing gaskets. The fastening system with locking screws that only enter the polycarbonate structure (and therefore not into the sandwich panel) and the continuous internal-external gasket, prevents the formation of

condensation and ensures maximum sealing. Additional lighting can be provided inside, to simplify maintenance in all conditions.

The door opening handles provided can be adjustable so that the tightness of the seal can be maintained over time. An antifriction band, placed on the profile where the door holds, is always included in order to prevent the wear of the plastic latch (Nylon) after several closure operations.

Roof units AQX are designed for outdoor installation. In this version, the unit features a roof construction which together with the double sealing of the panels provides protection against the effects of the weather.

Control system AQX is available with a pre-installed and fully integrated control system. All units can be equipped with adjustment accessories to provide a more complete product and quick installation. These include sensors for measuring temperature, humidity and air quality, inverters, regulating valves, damper actuators, safety and control devices. The system is ready to communicate with a BMS system.



Indoor unit



Outdoor unit

Custom made AQX Clivet

Indoor unit

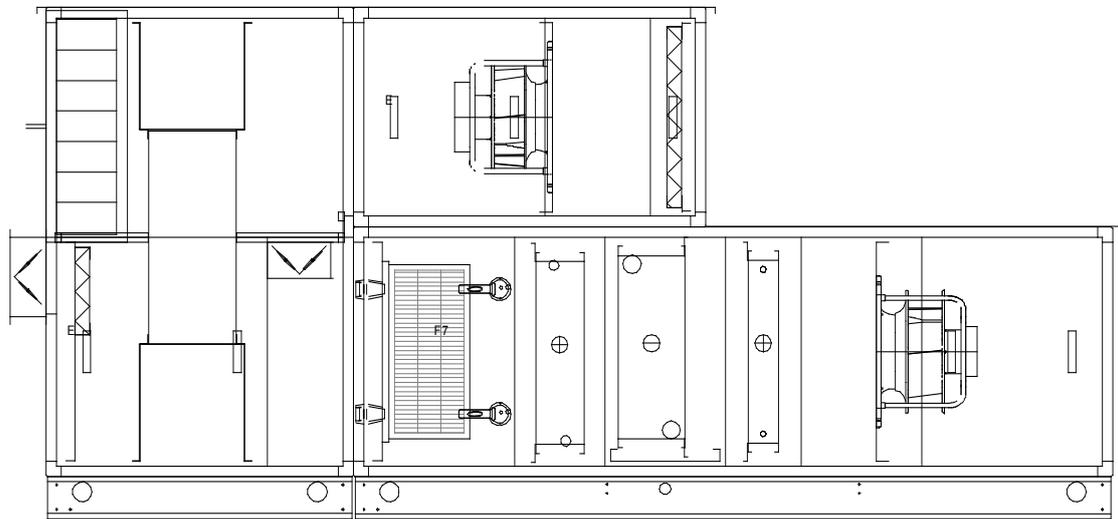
EQUIPMENT FOR INTERNAL INSTALLATION

This is the basic design for all our units and from which all the variants derive. In addition to the usual quality, stability, efficiency, silence, flexibility, hygiene and ease of maintenance, which are the main criteria on which it is based. Each air handling unit is based on an innovative modular system, which will be designed specifically for your application.

Outdoor unit

WEATHERPROOF VERSIONS

Our roof unit offers many advantages and in particular where they are exposed to adverse weather conditions. Our long experience has allowed us to create a project able to eliminate all the negative effects deriving from external exposure. A typical example is the anti-fingerprint coating produced in series, which among other things, provides additional corrosion protection.



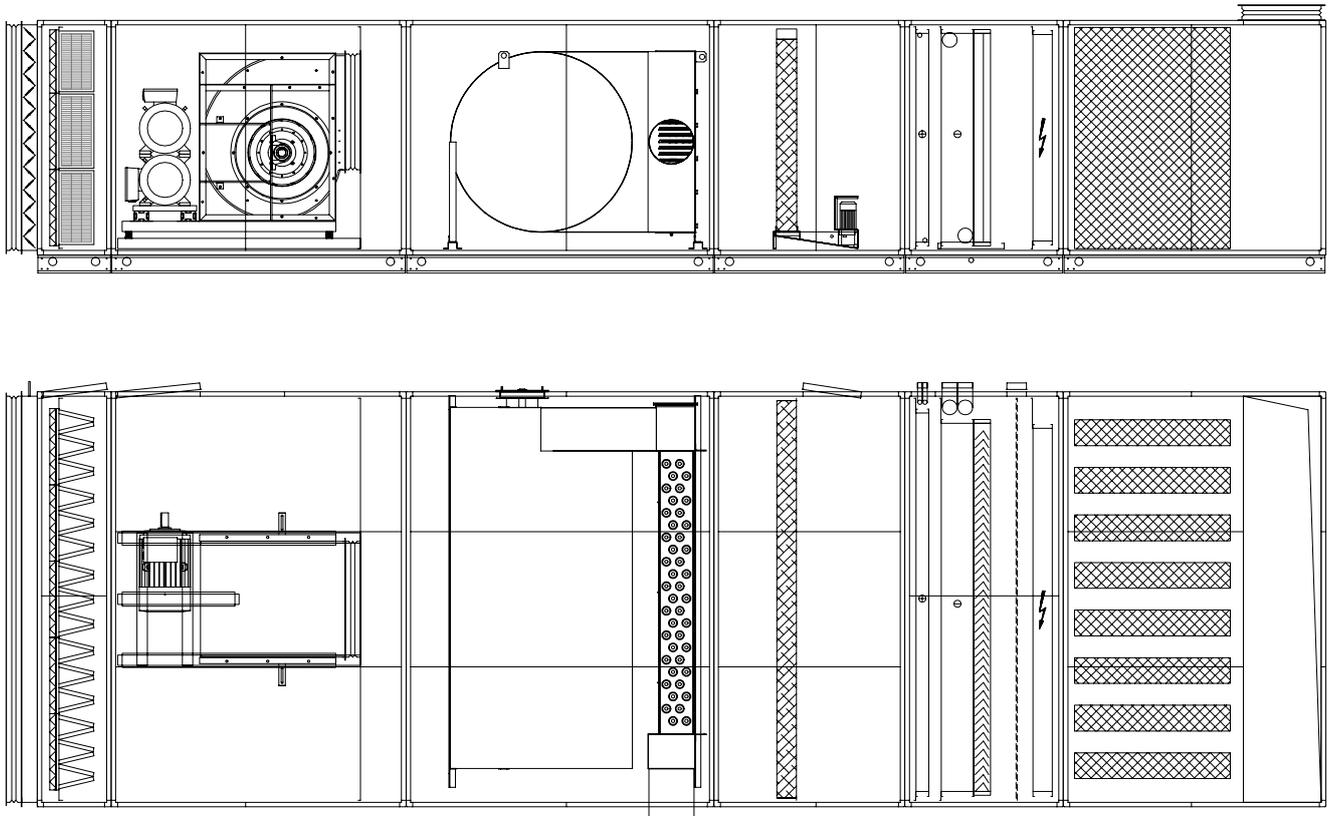
1. Bidirectional AQX complete with rotary high efficiency recovery

AQX some applications

1. AQX unit for heating, cooling, dehumidification, reheating, and heat wheel recovery

Synthetic filter G4 86%, fan type PLUG FAN EC, motor with integrated electronic speed controller 0-10 V DC signal with Modbus support, Heat Wheel recovery unit efficiency 76.21%, synthetic filter G4

86%, recirculation damper class 2, exhaust air damper class 2, fresh air damper class 2, rigid bag filter F7 85%, heating coil medium temperature 2 rows, cooling coil low temperature with drain pan made in aluminum, heating coil medium temperature 1 row, fan type PLUG FAN EC, motor with integrated electronic speed controller 0-10 V DC signal with Modbus support.



2. Unidirectional AQX for colder climatex with sound attenuators

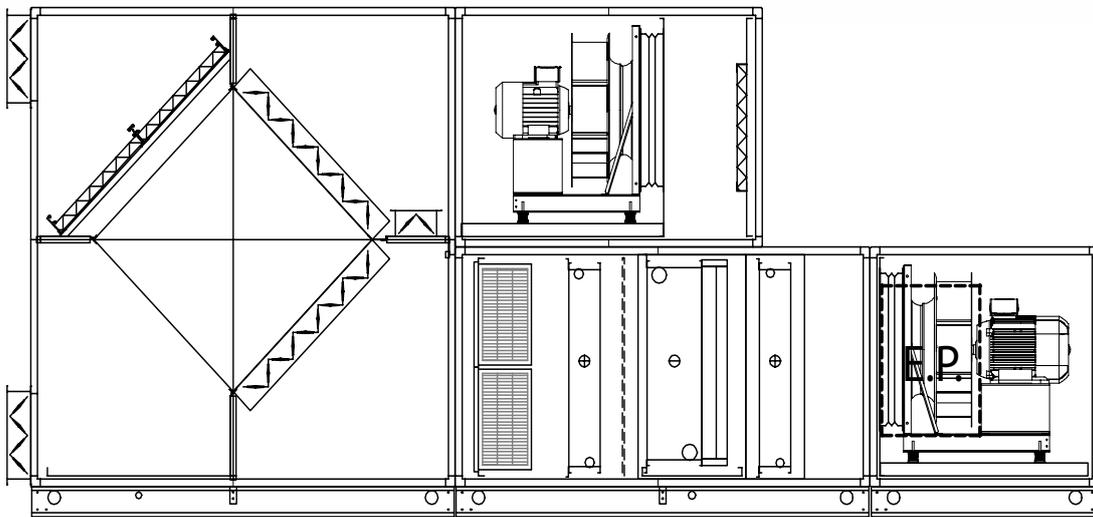
2. AQX unit for heating, cooling and heat with indirect gas heater

Inlet section with frontal damper Class 2, rigid bag filter F7 85%, Fan type with Backward curved blades eff. Class IE2 with pulley 280x4, fan efficiency 82%, inspection window, lamp holder, switch and wiring, with frequency converter IP 54, spring antivibration mounts, safety microswitch. Inverter installation is mandatory for RPM management. Gas burner modulating. Air diffusion plenum. Honeycomb humidification with pump and glass fiber pack, thickness 150 mm, efficiency 90%, air diffusion plenum, heating coil medium

temperature 1 row, cooling coil with drain pan made in aluminum, electric heater number of stages 2; 400/3/50 Hz. Tubes in steel and fins in galvanized steel. Double safety thermostat with automatic + manual reset.

Sound attenuator length 1200 galvanized steel execution. Unit with anti-vibrating flexible connections.

Additional elements: Run/Standby motors (2x30 kW, 4 poles), controls, damper with electric heater, antifreezing kit for heating coil with pump and probe on water outlet, extra control for measure to average temperature of 4 ambient temperature probes, electric heater inside the motors frame. MODBUS module.

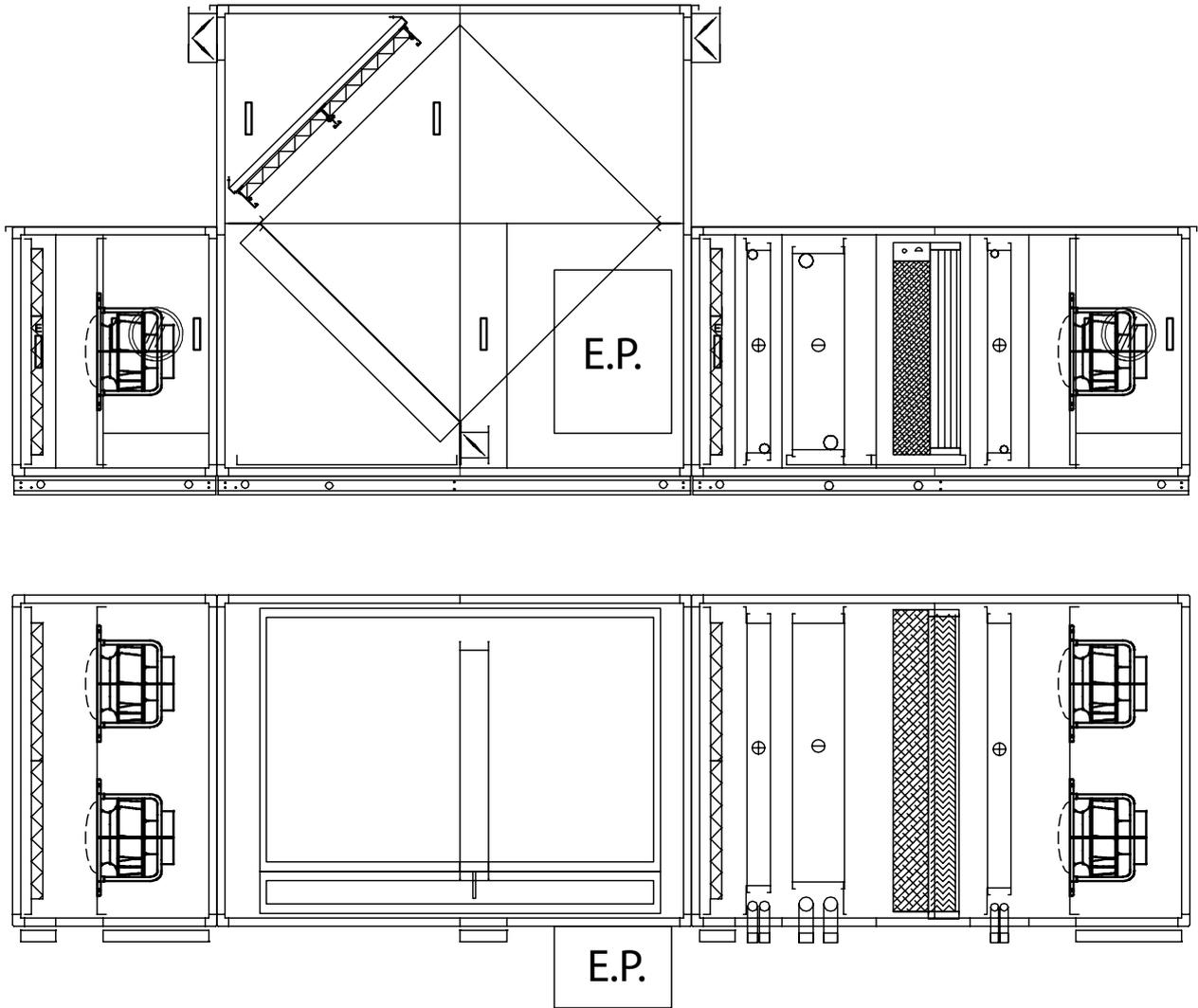


3. Bidirectional AQX, overlap design complete with plate high efficiency recovery
(E.P. = Electrical Panel with electronic control)

3. AQX with heating, cooling and heat recovery - plate exchanger

Heating medium temperature hot water, cooling medium temperature cold water. Continuous control (heating and cooling) of outlet/ambient temperature. Limited minimum inlet temperature

with optimal energy efficient operation of a plate heat exchanger. Aluminum recovery unit with filter synthetic G4 86%. Recirculation damper, fresh damper and exhaust damper. Fan type plug fan with safety microswitch, poles 6 with motor efficiency Class IE2.

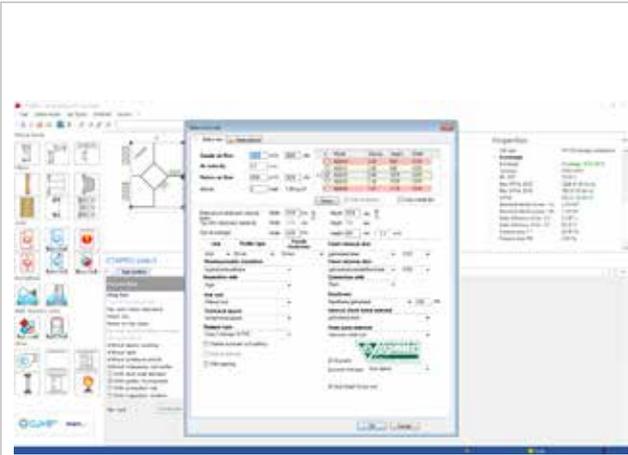


4. Bidirectional AQX, in line design, complete with cross flow high efficiency recovery and double plug fan section
(E.P. = Electrical Panel with electronic control)

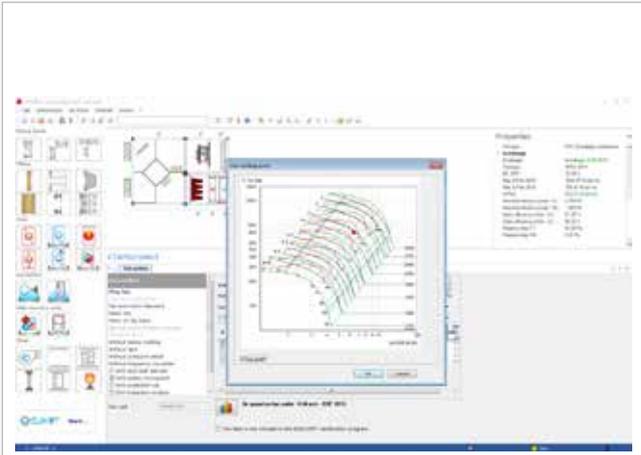
4. AQX with heating, cooling and heat recovery - plate heat exchanger

Heating medium hot water, cooling medium cold water. Continuous control (heating and cooling) of outlet/ambient temperature. Limited minimum inlet temperature with optimal energy efficient operation

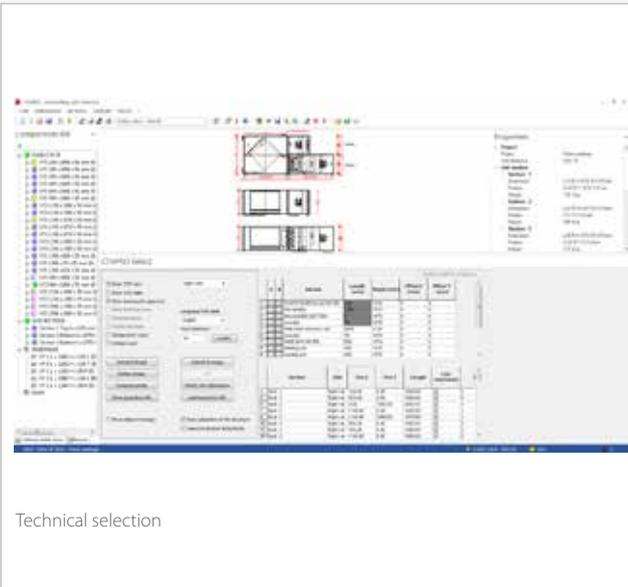
of a plate heat exchanger. Aluminum recovery unit with filter synthetic G4 86 %. Recirculation damper, fresh damper and exhaust damper. Fan type Plug Fan EC. Motor with integrated electronic speed controller 0 – 10 Vdc signal with Modbus support. Safety microswitch on inspection door. Fan wall mounting two elements. Control panel with main switch.



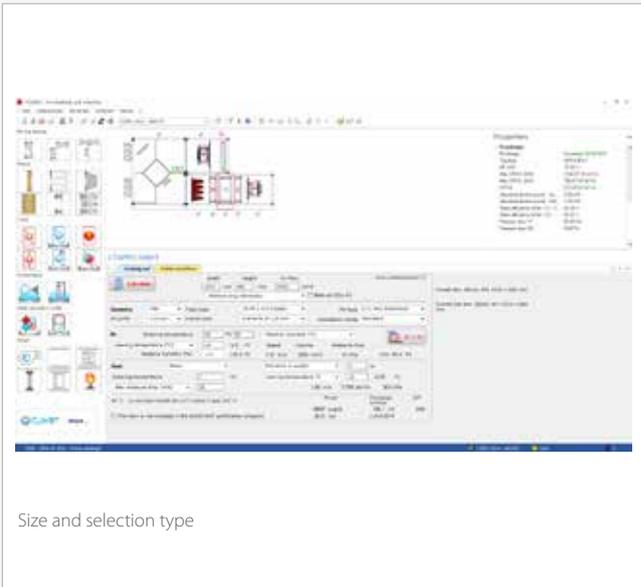
Selection unit size



Fan selection



Technical selection



Size and selection type

Selection Program Clivet AQX CTA PRO

CTA PRO Clivet is the powerful selection software to offer a fast and complete service for the customer, in order to make the correct technical choice and the economic evaluation of each AQX. It is a complete tool that can configure any type of product and respond exactly to the most stringent design requirements. The result is a complete economic offer that includes all the technical data and drawings, the technical details of the unit details, the relative air treatment and the fan performance curves

CTA PRO Clivet is a very advanced software developed and designed to quickly convert into an executive order. It is able to produce technical drawings and other technical details to be sent and approved by the customer, production drawings, bill of materials, code generation for each component used.

The CTA PRO Clivet integration has therefore made possible the complete automated management of the process, to reduce the time of the offer and delivery and improve the service to our customers.

All units can be equipped with control accessories. This is to provide a more complete product and for a quicker installation. These accessories include temperature, humidity and air quality sensors, inverters, regulating valves, damper actuators, safety and control devices.



Fan section



Cooling and heating section



Humidification section



Plate recuperator section



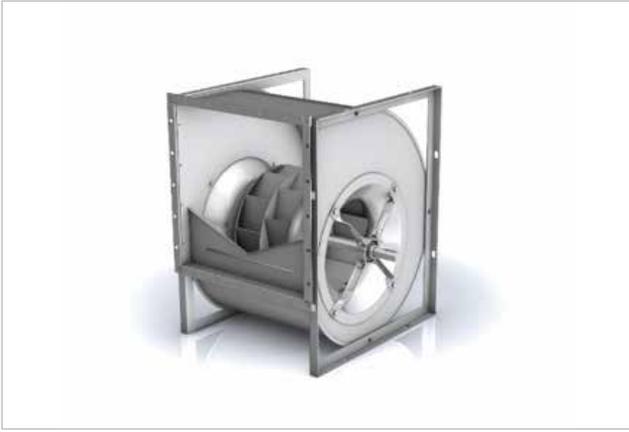
Filter section



Sound attenuation section

Functional Sections

Fan, heating, humidification, cooling, heat recovery section, sound attenuation and other possible sections can be selected for each air handling unit



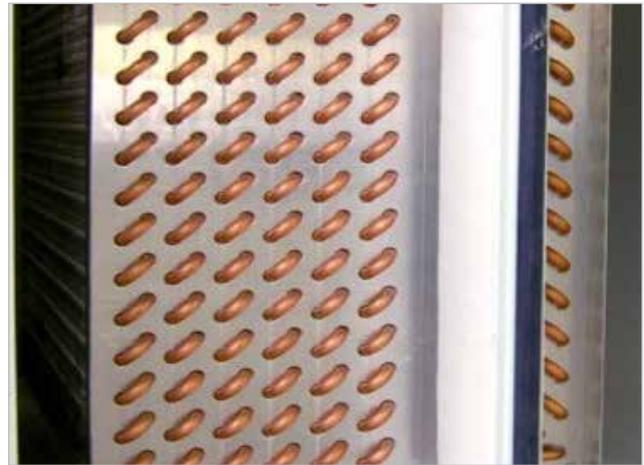
Fan belt drive



Fan section with EC Plug fan



Heating section



Cooling section

General Overview

Fan section

FAN TYPES:

Belt Drive

- Forward curved Blade, Backward curved Blade, Backward curved Aerofoil Blade.
- Anti vibration mounts: rubber or spring.
- Pulley: 1 to 6 belts.
- Belts trapezoidal section, type SP High Performance with variable pulley.
- Motor slide: adjustable belts.
- Tensions by only one bolt.
- Inside canvas on air discharge.
- Motors and fans: standard and ATEX.
- Safety microswitch is provided on the door.

Plug Fan

- Motors and fans: standard and ATEX.
- Safety microswitch is provided on the door.

EC Plug Fan

- Efficiency: IE4.
- Motors: EC brushless with electronic commutation, driven by 0-10V signal or ModBus protocol, smaller and cost effective.
- Safety Microswitch is provided on the door.

Humidification section

Clivet equips its units with a wide range of humidification systems to meet specific customer needs. The systems used are of an adiabatic and isothermal type.

Adiabatic systems

The adiabatic system consists of a cellulose fiber evaporator (Honeycomb) with a thickness of 100, 150 and 200 mm to guarantee an efficiency of 60%, 70% and 80% adequately. Evaporation units are without pump or with circulation pump, can be interfaced with the most modern supervision systems.

Isothermal systems

Pressure saturated steam humidifier from 1 to 4 bar up to a capacity of 500 kg/hr. Steam produced by immersed electrodes: these are electrodes that, immersed in untreated water, exploit its conductivity, heating it up to produce steam. The maximum capacity of the system, obtained with the parallel coupling of individual units, is 180 kg/hr. Steam produced by resistance: these are electric resistors, which, immersed in drinking water, softened or demineralized, produce steam up to a maximum capacity of 180 kg/hr.

Heat recovery section

In compliance with the laws in force and in response to the continuous demand for energy saving, the Clivet AQX air handling



Humidification section



Humidification section



Heat recovery section



Filter section

units can be equipped with air / air or air / water recovery units with static or rotary heat recovery or with glycoled water coil.

Static recovery

This is a static cross-flow plate recovery unit with no moving parts, therefore very reliable and safe. Furthermore, the use of this equipment in air conditioning systems significantly reduces operating costs, such as the recovery of energy that would otherwise be dispersed in the form of heat.

Rotary recovery

These are rotating air-air heat exchangers in aluminum, both to exchange only sensible heat, and to recover sensible and latent heat. These systems guarantee maximum performance with an efficiency up to 85%, depending on the case and operating conditions, thanks to the high exchange surface in relation to the volume.

Run around coil

Run-around coil is a recovery system with two heat exchangers, one on fresh air and one in exhaust air, that transfers energy with a water circuit and a circulator pump.

Heating section and cooling section

Heating and cooling heat exchangers are available in different types: water, high temperature water, steam and direct expansion. Standard coils are made with copper tubes and aluminum fins: they are available in different diameters, thickness, and four types of tubes geometry. Fins

have different shapes and space to increase the thermal exchange. They can be supplied in aluminum, copper or coated. The header in steel or copper can be treaded or flanged.

Coils are standard supplied with drain pan with thermal insulation, properly sloped to eliminate water stagnation.

- Geometry: P60, P3012, P40. Fin Pitch: 2.0 to 10 mm. Tube type: copper, iron SS304, SS316, Cu Sn.
- Fin type: aluminum, pre painted Aluminum, copper, copper tinned. Frame type: fe zn, SS 304, SS 316, Aluminum.
- Thick and material fins: 0.11 and 0.25 mm in aluminum or pre-coated aluminum and copper.
- Tube materials: tinned copper and copper thickness - 0.35 - 0.4 - 0.6 - 0.75 - 1 mm, steel - 1 mm, stainless steel AISI 304-1 mm, stainless steel AISI 316-1 mm.
- Cooling coils with inclined drain pan standard aluminium. 304/316 stainless steel (optional). Moisture eliminators frame: aluminum or 304/316 stainless steel on request.
- Blade: plastic, aluminum or 304/316 stainless steel on request
- Mounted on Guides.

Filter section

The filter section provides the quality of the incoming air. Regarding the desired air quality and the filtration level, different filters are installed, with average filtration up to absolute, which are installed by civil and commercial applications up to hospitals and laboratories. There are many types: cartridge, synthetic, zig-zag, roller filter, rigid bag, bag, metal, activated carbon and absolute.

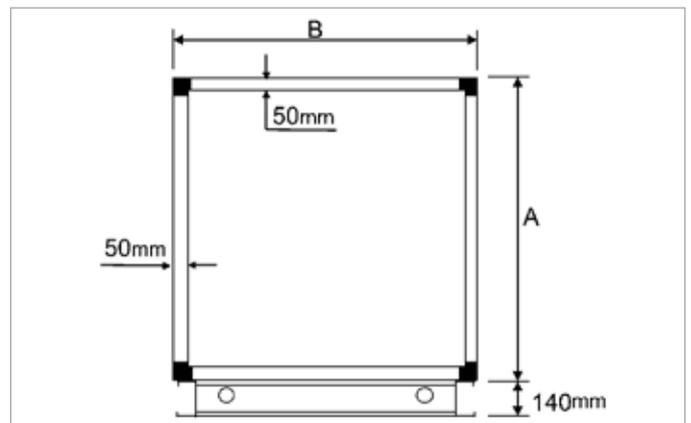
Size	Height (A)	Width (B)	Net coil height	Net coil width	Net Area	Air flow rate at 2,2 m/s		Airflow rate at 2,5 m/s		Air flow rate at 4,0 m/s	
	[mm]	[mm]	[mm]	[mm]	[m ²]	[m ³ /h]	[l/s]	[m ³ /h]	[l/s]	[m ³ /h]	[l/s]
AQX 1	570	770	360	460	0.17	1,312	364	1,490	414	2,385	663
AQX 2	570	820	360	525	0.19	1,497	416	1,701	473	2,722	756
AQX 3	620	920	360	605	0.22	1,725	479	1,960	544	3,136	871
AQX 4	720	870	480	520	0.25	1,977	549	2,246	624	3,594	998
AQX 5	720	920	480	595	0.29	2,262	628	2,570	714	4,113	1,143
AQX 6	720	1,020	480	680	0.33	2,585	718	2,938	816	4,700	1,306
AQX 7	820	970	600	625	0.38	2,970	825	3,375	938	5,400	1,500
AQX 8	820	1,020	600	715	0.43	3,398	944	3,861	1,073	6,178	1,716
AQX 9	820	1,170	600	815	0.49	3,873	1,076	4,401	1,223	7,042	1,956
AQX 10	920	1,120	720	780	0.56	4,448	1,236	5,054	1,404	8,087	2,246
AQX 11	920	1,220	720	890	0.64	5,075	1,410	5,767	1,602	9,228	2,563
AQX 12	1,070	1,220	840	875	0.74	5,821	1,617	6,615	1,838	10,584	2,940
AQX 13	1,070	1,370	840	1,005	0.84	6,686	1,857	7,598	2,111	12,156	3,377
AQX 14	1,170	1,370	960	1,005	0.96	7,641	2,123	8,683	2,412	13,893	3,859
AQX 15	1,170	1,570	960	1,150	1.10	8,744	2,429	9,936	2,760	15,898	4,416
AQX 16	1,320	1,570	1,080	1,170	1.26	10,008	2,780	11,372	3,159	18,196	5,054
AQX 17	1,420	1,620	1,200	1,210	1.45	11,500	3,194	13,068	3,630	20,909	5,808
AQX 18	1,420	1,770	1,200	1,385	1.66	13,165	3,657	14,960	4,156	23,933	6,648
AQX 19	1,520	1,820	1,320	1,440	1.90	15,054	4,182	17,107	4,752	27,372	7,603
AQX 20	1,520	2,070	1,320	1,650	2.18	17,250	4,792	19,602	5,445	31,363	8,712
AQX 21	1,670	2,120	1,440	1,725	2.48	19,785	5,496	22,483	6,245	35,770	9,936
AQX 22	1,770	2,220	1,560	1,835	2.86	22,672	6,298	25,763	7,156	41,221	11,450
AQX 23	1,920	2,370	1,680	1,950	3.28	25,946	7,207	29,484	8,190	47,174	13,104
AQX 24	2,020	2,470	1,800	2,085	3.75	29,724	8,257	33,777	9,383	54,043	15,012
AQX 25	2,120	2,620	1,920	2,240	4.30	34,060	9,461	38,704	10,751	61,932	17,203
AQX 26	2,270	2,820	2,040	2,415	4.93	39,014	10,837	44,334	12,315	70,943	19,706
AQX 27	2,270	3,170	2,040	2,765	5.64	44,674	12,409	50,765	14,101	81,225	22,563
AQX 28	2,270	3,570	2,040	3,170	6.47	51,217	14,227	58,201	16,167	93,122	25,867
AQX 29	2,270	4,020	2,040	3,630	7.41	58,649	16,291	66,647	18,513	106,635	29,621
AQX 30	2,270	4,570	2,040	4,155	8.48	67,132	18,648	76,286	21,191	122,057	33,905
AQX 31	2,270	5,170	2,040	4,760	9.71	76,906	21,363	87,394	24,276	139,830	38,842
AQX 32	2,270	5,870	2,040	5,455	11.13	88,135	24,482	100,154	27,821	160,246	44,513

AQX unit size specifications

Cross sections dimensions

Our units are sized in 32 standard sizes to work in cooling with continuous coverage air flow rate between 2.2 m/s and 2.5 m/s. According to specific architectural requirements and structural constraints, the unit **height and width can be fitted with step 50 mm**.

This allows always to have the right machine for any type of system while maintaining optimal working conditions.



Damper

Casing - Aluminum

Aerofoil blade - Aluminum

Gear mechanism - Polypropylene

Gasket - TPE-V + PP (TPE-V is the partially cross-linked thermoplastic elastomers derived to EPDM) + (Polypropylene)

Class leakage certified according to EN1751 type of leakage:

- class 2 - temperature -15°C / +80°C
- class 2 - temperature -40°C / +80°C
- class 3 - temperature -15°C / +80°C
- class 4 - temperature -20°C / +80°C

Shaft - Galvanised steel 12 mm x 12 mm

Damper with electrical heater (option)

Damper suitable for actuator or manual management.



Aerofoil blade

The **standard Class 2 damper** is the base product for adjusting the airflow in the air conditioning unit or ventilation ducts. Designed using extruded aluminum blades and frames, it can be supplied with handle for manual movement and actuator motor, mounting bracket for motorised movement. The polypropylene gear system is installed inside the shoulder profiles.

Construction:

- Frame - Extruded aluminum, thickness 1.8 mm
- Blade - Extruded aluminum airfoil design
- Gear mechanism - polypropylene with minimum water absorption
- Gasket on blades
- Shafts - brass and galvanized steel shaft, 12 mm x 12 mm square (with slot indicating open/close)



Damper with gear mechanism

Available the new **Class 3 damper** in accordance to UNI EN 1751:2003, certified at the TÜV Sud in Munich.

Construction:

- Frame - Extruded aluminum, thickness 1.8 mm
- Blade - Extruded aluminum, airfoil design
- Gear mechanism - polypropylene with minimum water absorption
- Special gasket in TPE-V
- Shafts - brass and galvanized steel shaft, 12 mm x 12 mm square (with slot indicating open/close)

As for air tightness, **Class 4 damper** marks the highest efficiency level, according to the European norm UNI EN 1751:2003. Designed by Research and Development Centre, this damper combines a special set of gaskets, covering caps for the blades and gear mechanism.

An efficient damper with an easy assembling made up of top-level materials for high performances.

Construction:

- Frame - Extruded aluminum, thickness 1.8 mm
- Blade - Extruded aluminum, airfoil design
- Gear mechanism in Zamak
- Flocked covers for blade profiles
- Special set of gaskets in TPE-V (they are partially cross-linked thermoplastic elastomers derived to EPDM) on the blades and in EPDM (EPDM materials have a resistance to hot water, steam, aging and chemicals and are ideal for application in a wide range of temperatures) on the shoulders
- Shaft - galvanised steel, 12 mm x 12 mm square (with slot indicating open/close)

Design:

- Temperature - working condition range of -15°C / +80°C
- Blade - 100 mm pitch
- Gear mechanism - housed inside the shoulder profile. Materials according to ROHS / PAK

Horizontal Damper

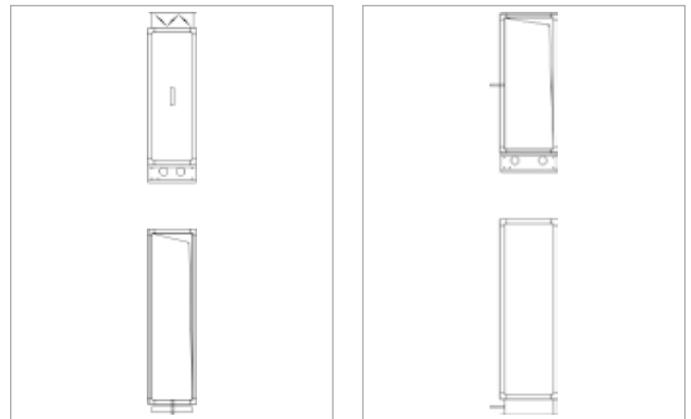
The supply module with horizontal damper is used to adjust the airflow by increasing / decreasing the total pressure. They are made with aluminum frames. They are produced from special aluminum alloy profiles with an aerodynamic shape to reduce resistance and losses. They are airtight with the use of neoprene gaskets and by-pass elements. The damper blades can be guided easily by servomotors or manually rotated. The blades can move parallel or against each other for both configurations. Welding is not used in the production of components. The standard section has a front shutter with external damper without actuator. Available as an option with manual control, with flexible anti-vibration mounts, with grid, with cover net, with rainproof hood. It is also available with plenum without light, with inspection window and with drain pan.



Horizontal damper section

Vertical Damper and from the Side Damper

The supply module with vertical and from the side damper is used to adjust the airflow by increasing / decreasing the total pressure. Materials, components, accessories are the same used in the module with horizontal damper.



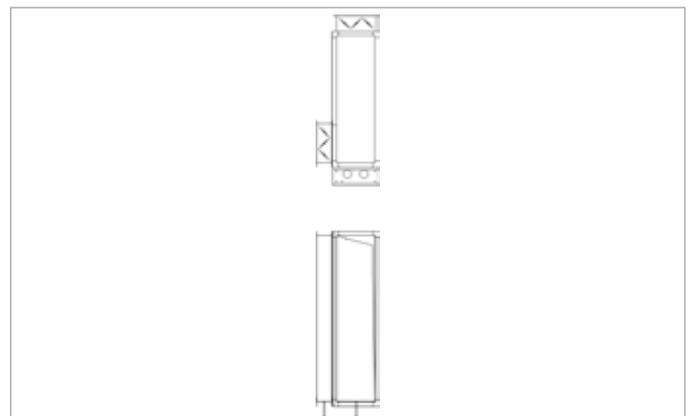
Vertical damper section

Damper on the side section

Mixing Modules with Two Dampers

The mixing section with two dampers is designed to save energy by mixing the required amount of fresh air and return air. The system uses the fresh air damper and the extract air damper to regulate the mixture of air to be treated. The dampers can be positioned on both sides, outside or inside. The control system of this mechanism is of vital importance thanks to the arrangement of fresh air / percentage of indoor air.

The mixing box has a front recirculation damper with external damper, without actuator. It is available with manual control, servo control, with flexible anti-vibration mounts, with aluminum grille, with cover net and with rain hood. At the top there is a fresh air damper with the same options for the recirculation sections.

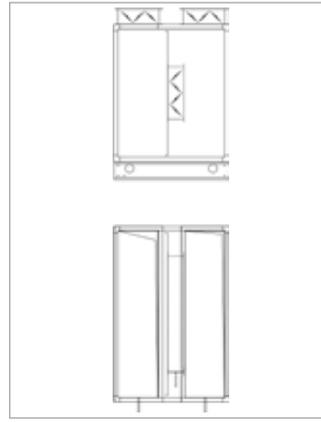


Mixing module with two dampers

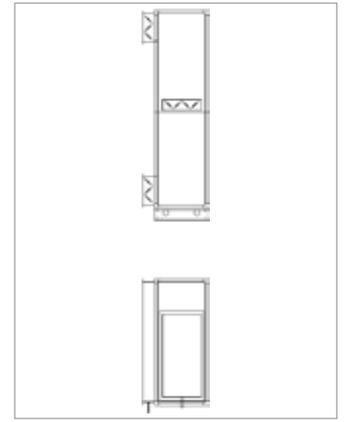
Combined mixing modules with Three Dampers (vertical and horizontal version)

The mixing modules with three dampers are also designed to save energy, such as modules with two dampers. The only difference is that two fans are used when there is a mixture module with three dampers. One is for expulsion and one is for fresh air. The third damper, which is located at the connection point between two modules, is the mixing area. The air speed in the third damper is higher than that provided by the air speed of the exterior side dampers.

The combined mixing box has an exhaust air damper and a fresh air damper with the same options and features as the dampers of the mixing modules with two dampers. In addition there is a third damper (recirculation), without actuator or at most with manual.



Combined mixing modules with three dampers (horizontal version)



Combined mixing modules with three dampers (vertical version)

Filter section

EN ISO 16890 for Air filtration

Since June 2018 EN ISO 16890 "Air filters for general ventilation" is in force.

This norm defines testing procedures and a classification system for air filters used in general ventilation equipment, it is a global harmonization that replace the existing localized standards: ASHRAE 52.2 which is dominant in USA and EN 779:2012 which is dominant in Europe.

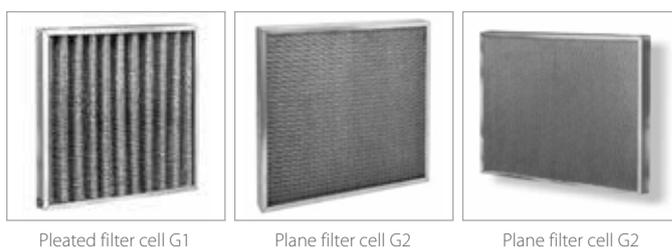
The norm classifies the air filters based on their ability to retain the dispersed airborne particulate PM10, PM 2.5 and PM1.

EN 779:2012 classification is still used here below.

Classes	Minimum Efficiency	Type of particulate
ISO ePM 1	ePM1 min \geq 50%	Gas, nanoparticles, gas
ISO ePM 2.5	ePM2.5 min \geq 50%	Bacteria, molds and pollens
ISO ePM 10	ePM10 min \geq 50%	Pollens, dust and sand
ISO Coarse	ePM10 min \leq 50%	Sand

Metallic filters

- **Metallic mesh pleated filter cell, class G1** according to EN 779:2012, thickness 48 mm, without pressure switch ($50\% \leq Am < 65\%$). The filter media is protected by wire mesh on both sides to ensure the consistency of the pack and the regularity of the pleat. The more extended filter surface area (compared to plane cells) allows more dust holding capacity (DHC) and therefore a greater service life.
- **Metallic mesh plane filter cell, class G1/G2** according to EN 779:2012 ($50\% \leq Am < 65\%$ / $65\% \leq Am < 80\%$). The filter media is protected by wire mesh on both sides to ensure the consistency of the pack.
- **Metallic mesh plane filter cell, class G2** according to EN779:2012 ($65\% \leq Am < 80\%$). The filter media is protected by micro-expanded wire mesh on both sides, which ensures both the consistency of the pack and the strength of the whole.
 - Medium Efficiency
 - Efficiency: G2 dry (EN 779)
 - Panel Type Filter
 - Casing: Galvanized Steel or Stainless Steel
 - Media: Aluminum Mesh Filter or AISI 304 Stainless Steel



Filter section: pleated synthetic fibre filter cell

- **Pleated synthetic fibre filter cell, class G3** according to EN 779:2012, thickness 48 mm, without pressure switch ($80\% \leq Am < 90\%$). The filter media is protected by wire mesh on both sides to ensure the consistency and the regularity of the pack. The extended filter surface area (compared to panel cells) allows more dust holding capacity (DHC) and therefore greater service life. Filter media progressive density synthetic fibre.
- **Pleated synthetic fibre filter cell, class G4** according to EN 779:2012 ($Am \geq 90\%$). The filter media is protected by wire mesh on both sides to ensure the consistency of the pack and the regularity of the pleat. The more extended filter surface area (compared to panel cells) allows more dust holding capacity (DHC) and therefore a greater service life.



Class G3/G4 pleated filters

Filter media progressive density synthetic fibre

- Frame U-shaped galvanized steel. Electro-welded galvanised steel wire protection mesh.
- Filter media pleated glass fiber paper with continuous calibrated spacing made by thermoplastic spacer hot-melt.
- Applications Air filtration in civil and industrial air-conditioning systems in which a high efficiency against fine dust is required.
- The reduced thickness allows installation in spaces normally intended for filter cells.
 - Medium efficiency
 - Efficiency: G3 to G4 (EN 779)
 - Efficiency: M5, M6, F7 plate filter width 48 and 98 mm
 - Panel type filter
 - Casing: galvanised steel
 - Standard dimensions
 - Media: synthetic fibre filter material
 - Cleanable



Simple synthetic fibre filter

Filter section: bag filter and roll filter

High efficiency rigid bag filters

Efficiency: From F6 to F9 (EN 779) casing: recycled polystyrene media: glass fibre side or front access suitable for Incineration, not cleanable. Section with filters standard on rails without prefilters, pressure switch and light. In option inspection window, microswitch on doors and prefilters G4 EN 779 on counterframes.

- 3V rigid bag filter **class F7** according to EN 779:2012 ($80\% \leq Em < 90\%$). The low energy impact 3V frame, in addition to a new filter media, allows to minimize the pressure drop.
- 3V rigid bag filter **class F8** according to EN 779:2012 ($90\% \leq Em < 95\%$). The low energy impact 3V frame, in addition to a new filter media, allows to minimize the pressure drop.
- 3V rigid bag filter **class F9** according to EN 779:2012 ($Em \geq 95\%$). The low energy impact 3V frame, in addition to a new filter media, allows to minimize the pressure drop.



Rigid Bag Filter

High Efficiency Soft Bag Filters

Efficiency: From F6 to F8 (EN 779)

Bag type filter casing: galvanised steel media: synthetic not cleanable.

- Thermowelded synthetic fibre bag filter **class F6** according to EN 779:2002 ($60\% \leq Em < 80\%$). Bags with optimised shape for high dust holding capacity (DHC).
- Thermowelded synthetic fibre bag filter **class F7** according to EN 779:2002 ($80\% \leq Em < 90\%$). Bags with optimised shape for high dust holding capacity (DHC).
- Thermowelded synthetic fibre bag filter **class F8** according to EN 779:2002 ($90\% \leq Em < 95\%$). Bags with optimised shape for high dust holding capacity (DHC).



Soft Bag Filter

Automatic Roll Filter G3

The section is provided without light and without manometer. In option with microswitch on doors and with inspection window.

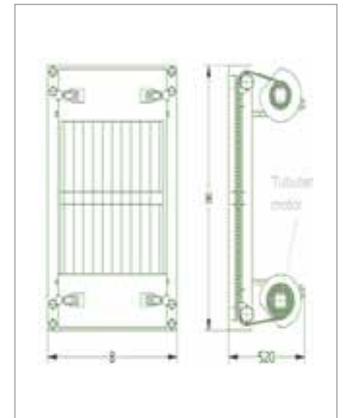
- Efficiency: G3
- Casing: galvanised steel
- Media: synthetic fibre
- Not cleanable
- Motor: 230/1/50
- Power consumption: 160 - 240 Watt
- Temperature: -10 °C / 40 °C
- Control panel with safety button, tubular motor, differential pressure switch
- Completely wired

Main features:

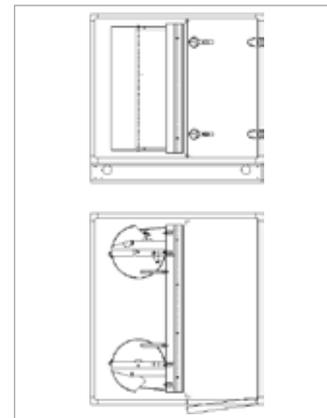
- Filter with automatic unwinding and replacement of the filter fabric with a roller system. The upper coil (dragged) provides the new support, the lower coil (loader) collects the clogged filter material. Between the two both equipped with protective casing, there is a window that contains, inside the guides, the portion of material exposed to the flow. The electric part consists of a control panel complete with key and safety button, a tubular motor with thermal switch positioned inside the lower roller, an adjustable pressure switch adjustable from 50 Pa to 500 Pa, an electromagnetic brake and a microswitch end of the race. When the critical pressure drop is reached, the pressure switch controls the release of the brake and the function of the rotating motor, in order to change the portion of filter media exposed to the airflow. The end of the microswitch roller interrupts this cycle and provides an alarm signal when the new filter material falls below the safety limit, while the electromagnetic brake prevents spontaneous unwinding of the clean roll and keeps the portion of material exposed to the flow extract.
- Construction: roll protective carter, support frame, pulling rolls and lateral guide rails in galvanised steel.
- Special executions: with support frames for bag filters in cascade.



Automatic roll filter



Automatic roll filter system



Roll filter section

Filter section: carbon filters

Activated carbon filters

Section with filters high efficiency cartridges, available in casing galvanized steel or rigid bag. Section without pressure switch, without light. In option with inspection window, microswitch on doors and with the support plate in stainless steel. For the bag rigid carbon filters are available in option galvanized steel counterframes with filters G4.

Casing: galvanised steel

- Media: micro granulated activated carbon in cylindrical cartridge
- Not cleanable
- Temperature: up to 50 °C
- Humidity: up to 70%
- Media: standard is for organic substance
- Options for other gas
- Options: stainless steel plate
- G4 filters are suggested downstream
- Activated carbon cylindrical cartridge filter. It is commonly used for the deodorization and the chemical-physical adsorption of gaseous pollutants. The design of a purification system with activated carbon requires the knowledge of the chemical composition of pollutants, the relative concentration and the thermo-hygrometric conditions of the air to be treated.



Cartridge carbon filter

Casing: rigid bag

- Media: micro granulated active carbon
- Frame: plastic
- Temperature: up to 50 °C
- Humidity: up to 70%
- Versions suitable for incineration available
- G4 filters are suggested downstream
- Activated carbon 4V rigid bag filter for the deodorisation. The 4 V solution (8 packs), offers a high filter surface and a long life service.



Rigid bag carbon filter

Media Absolute Filters and HEPA Absolute Filters (class from E10 to H14)

- **Multi-V filter EPA class E10** according to EN 1822:2010 ($E \geq 85\%$ @ MPPS). The 6-V solution (3 V for the half size) offers an extended filter surface, which allows high nominal air flows.
- **Multi-V filter EPA class E12** according to EN 1822:2010 ($E \geq 99.5\%$). The 6V solution (3V for the half size) offers an extended filter surface, which allows high nominal air flows.
- **Multi-V filter HEPA class H13** according to EN 1822:2010 (Eintegral $\geq 99.95\%$ - Elocal $\geq 99.75\%$). The 6V solution (3V for the half size) offers an extended filter surface, which allows high nominal air flows.
- **Multi-V filter HEPA class H14** according to EN 1822:2010 (Eintegral $\geq 99.995\%$ - Elocal $\geq 99.975\%$). The 6V solution (3V for the half size) offers an extended filter surface, which allows high nominal air flows.



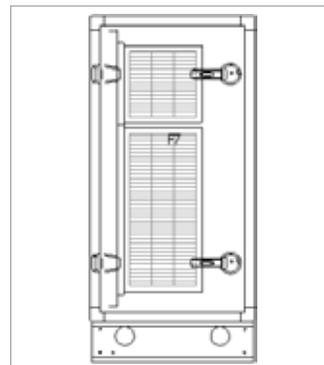
Absolute filter class E



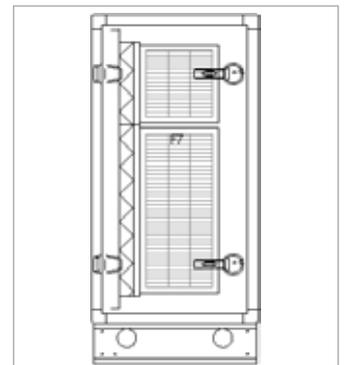
Absolute filter class H

Filter section inspection door

- Access from side: simplifies maintenance of the filter section

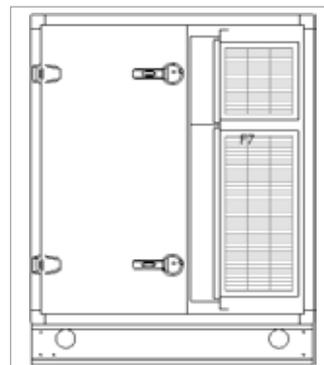


Bag filter

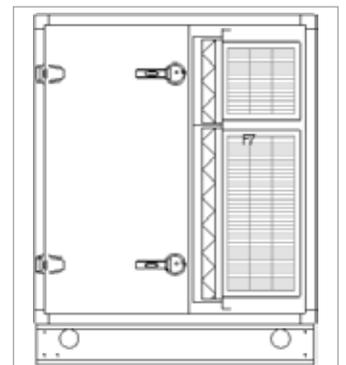


Pre filter + Bag filter

- Frontal access filter: improves the fixing on filter frame and reduces the bypass leakage



Bag filter



Pre filter + Bag filter

Heating section

Heating section with water heater

Depending on the conditions, the heating coils are in this module. The coils used with steam or hot water are made of copper tubes with aluminum fins. Optionally it is possible to use steel pipes / fins in steel, stainless steel or galvanized steel pipes or electrical resistors. The heat exchanger is designed to achieve the optimal pressure drop on both sides of the air and water. Usually the heaters of the heating coil are equipped with carbon steel pipes, while the heads of the steam coils are made of copper. The water inlet sides for the heating coils come from the bottom of it while the steam inlet is the top of the steam coil. The air speed on this coil can exceed 3 m/s if there is no cooling coil after it. All coils must be selected with the certified Eurovent software and suitable for working with a pressure gauge of 13 bar. The test pressure must be 20 bar.

Options: U-shaped drainage manifold that works with the pressure principle of the water pressure gauge, preventing the wastewater from going in one direction. Thermostat that avoids any possible freezing occasion.

Geometry:

- P60, P3012, P40.
- Fin Pitch: 2.0 to 10 mm.
- Tube type: copper, iron SS304, SS316, CuSn.
- Fin type: aluminum, pre painted Al, copper, copper tinned.
- Frame type: fe zn, SS 304, SS 316, aluminum.
- Fluid water or water with ethylenic or propylenic in weight or volume.



Detail heating section



Detail heating section

Heating section with steam heater

The steam coil consists of a frame and a pack of aluminum fins, in which the copper tubes are assembled, collected and distributed. Aluminum fins and copper tubes are joined by mechanical expansion. The manifold and distribution pipes are made of steel and are equipped with a treated or flanged connection and an air vent and discharge valve. The frame of the steam heater protects the elbows of the pipe and serves to mount the heater in the unit. The coil heater is inserted into the housing by guides that facilitate its removal. The manifold tube, the distribution tube and the welding joints are protected against corrosion with a temperature-resistant coating.

The water inlet sides for the heating coils come from the bottom of it while the steam inlet is the top of the steam coil. The air speed on this coil can exceed 3 m/s if there is no cooling coil after it.

Geometry:

- P60, P3012, P40.
- Fin Pitch: 2.0 to 10 mm.
- Tube type: copper, iron SS304, SS316, CuSn. Fin type: aluminum, pre painted Al, copper, copper tinned.
- Frame type: fe zn, SS 304, SS 316, Aluminum.
- Fluid steam.



Steam coils

Heating section with electric heater

Electric heater module

Electric heaters are generally used in units that have constant flow. It has staged structure and should be provided with safety thermostat. Electric heater modules should not be used for air flow rates higher than 30,000m³/h in order to avoid high electric energy usage. During installation cabling and controlling this unit is highly important.

Construction:

- Finned Elements
- Frame: Galvanised - 304 Stainless Steel
- Elements: tubes in steel and fins in galvanized steel
- Stages: 1 to 6
- Double safety thermostat 2 stage (automatic reset e manual reset)
- Wide Range for electric heater module. Available in many sizes



Electric heater elements



Detail safety thermostat

Heating section with indirect gas heater

- The section with indirect hot generators has a robust structure that makes them an ideal heat source for many civil and industrial applications. The outer casing of the air heater is made of standard carbon steel and is double-walled and thermally insulated. The insulation is available with a thickness of 50 mm or 100 mm depending on the needs of the application. The internal assembly can be extracted on its front plate for repair or maintenance and the tube plates are equipped with a terminal inspection cover to facilitate cleaning. Depending on the use, the combustion chamber and the heat exchanger, which make up the energy module, are made of different types of steel (aluminized steel, AISI 430, AISI 304, AISI 316, AISI 321, AISI 310 stainless steel etc.). Versions for condensation, medium temperature, low temperature and high temperature are available to maximize heat exchange and durability. The use of the system involves a combination with a high efficiency burner.
- The burners series covers a firing range from 45 to 2,650 kW, and it has been designed for use in low or medium temperature. Operation can be “two stage progressive” or, alternatively, “modulating” with the installation of a PID logic regulator and respective probes. Burners series guarantees high efficiency levels in all the various applications, thus reducing fuel consumption and running costs. The exclusive design ensures reduced dimensions, simple use and maintenance. Optimisation of sound emissions is guaranteed by the special design of the air suction by incorporated sound proofing material. A wide range of accessories guarantees elevated working flexibility. In option with technical space for protection burner.



Combustion chamber with burner



Safety thermostat

Section with anti-freeze protection

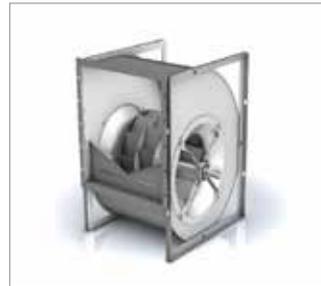
The anti-freeze protection device used is a freeze sensor. Its housing is provided on IP55 box for indoor units, internally for outdoor units and directly on the frame inside the section housing. A seven-meter capillary tube connected to the frame is evenly distributed across the cross-section within the section housing. The frame of the section is fixed to the cover panel and mounted on guides, which allows the removal.



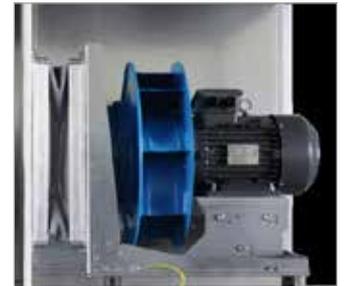
Section with anti-freeze protection

Fan section

- **Belt drive fan module** - This module contains the blower and the housing fan placed on supports which can slide on rails using vibration absorber. All fans are certified and their optimum operation points are specified on the computer. To prevent conduction of vibration and noise, created during operation, into the frame, rails holding the fan is connected to the frame with springs or rubber insulators. Fan outlet is connected to the module outlet using flexible elements. The fans are driven utilizing belt and pulley systems. The pulley are mounted onto the shaft by using conical fittings. The belt tension system is simple and designed to easy access. The electric motors are 2, 4, or 6 poles, 380V, 50Hz, IP 56 protection class depending on the fan. The nominal power of the motor is selected to be 20% above the shaft power (safety factor). Variable speed, direct-coupled motor-fan combinations are also available upon request. All rotary parts used in the module are dynamically balanced.



Belt drive fan



Direct drive fan

- **Plug fan module** - Plug fan module is a centrifugal fan with an impeller with backward curved blades. Impeller part is directly placed on the motor shaft. Since there are no belts involved in mechanism, problems caused by it also reduced. Can cover up to 90,000m³/h and 2,000 Pa total pressure. Sound level is lower during operating conditions since it does not guide air in to ducts directly. Rails holding the fan is connected to the frame with springs or rubber insulators. Fan outlet is connected to the module outlet using flexible elements.

Options for fan module:

- Kill stop - direct power cut off
- Glands for cable cross sections without leakage
- Differential pressure transmitter processing signal and showing volume flow rate and an inlet pressure with a digital screen
- Switch that gives and/or cuts signal when the pressure set is exceeded
- Gauge that shows the initial pressure difference between two set points
- Safety guard for rotating elements
- Safety guard for fan rotor
- Safety guard for door failures
- Flexible connection elements for AQX inlet - AQX outlet - fan outlet module
- Maintenance switch just to cut of fan electricity temporarily during maintenance



Plug fan



EC plug fan



EC plug fan



Detail EC plug fan, inlet air

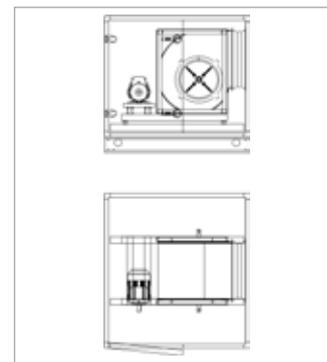
Belt drive

This fan range employs housings with square-shaped outlet and sizes from the R20 normal number series, in accordance to AMCA Standard 99-0098 76 and to ISO 497-1973. The ADH range is made of double width, double inlet centrifugal fans. Volume flow rate from 450 m³/h to 240,000 m³/h

Total pressure up to 2,500 Pa. 17 sizes from 160 up to 1,000 mm wheel diameter.

Forward curved blade. Backward curved blade. Backward curved aerofoil blade

- Anti vibration mounts: rubber or spring
- Pulley: 1 to 6 Belts
- Belts: trapezoidal section type SP high performance
- Variable pulley: available
- Motor slide: adjustable belts



Belt drive fan section

- Tensions by only one bolt
- Inside canvas on air discharge
- Motors and fans: standard and ATEX, efficiency IE3
- Isolating class: F
- Motor type: 2 to 4/8 poles with safety microswitch
- Class B temperature rise
- Easy maintenance
- Protection: IP 55
- Standard international size
- Option top horizontal outlet: duct side damper, protection net, inspection window, inspection door on scroll, differential pressure sensor, plenum 1,000 mm length without light, with inspection window, with drain pan.

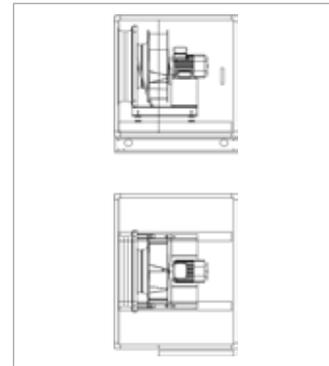
Plug fan

Plug fan is the new generation in our fan range.

The result: more efficiency and reduced turbulent conditions.

This ensures:

- A lower energy consumption
- A lower costs
- A lower noise levels
- Canvas on air discharge
- Motors and fans : standard and ATEX, efficiency IE3
- Safety microswitch is provided on the door
- Option top horizontal outlet: duct side damper, protection net, inspection window, differential pressure sensor, plenum 1,000 mm length without light, with inspection window
- The motor can be driven with inverter device (frequency converter). Input voltage 380-480/3/50. Protection degree IP55, for internal installation.



Direct drive fan section

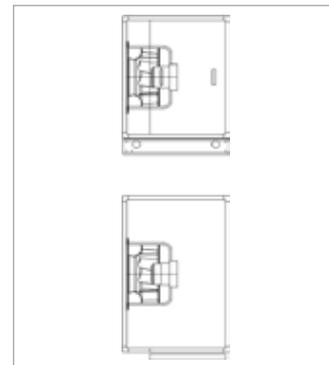
EC plug fan

EC plug fans provide a compact and high efficiency solution for air handling units.

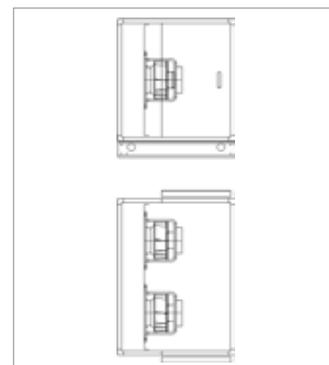
The high performance impeller, motor and electronics system are all optimally adjusted to one another, leading to an overall efficiency of well above 60%. A significant contribution to this efficiency is made by the external rotor design GreenTech EC motor. This is a mains-powered, permanently-energised synchronous motor with electronic commutation. An important feature of these motors is the integrated variable speed drive (VSD) that allows for simple speed control, control with sensor input or MODBUS high level interface (HLI) connection over RS485.

The electronics and motor form one unit, which is a key advantage of EC plug fans over conventional fans. Not only does the singular unit feature save space, the reduced quantity of components required increases reliability and reduces installation time.

- Efficiency: IE4
- Motors: Brushless EC with electronic switching regulated by 0-10 V signal or ModBus protocol. Safety microswitch supplied as standard.
- Option top horizontal outlet: duct side damper, protection net, Inspection window, differential pressure sensor, plenum 1000 mm length without light, with inspection window, with potentiometer for speed control.



EC plug fan section



EC plug fan section with two fans

Humidification system

Humidification system with spray humidifier (steam humidifier with generator)

Electrodes air humidifier main features:

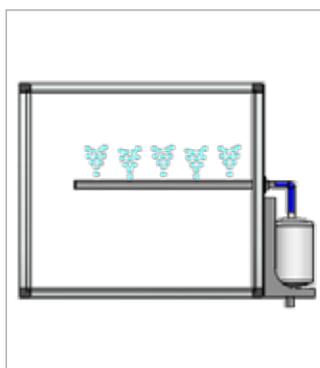
- Patented automatic cleaning method for the hydraulic unit and electrodes
- Isothermal humidifier
- Steam temperature 110 °C
- Mechanical parts designed for easy use and maintenance
- Do not suited for "softened" water due to excessive electrodes corrosion
- Automatic lime discharge even for larger particles (up to 40 mm diameter)
- Contact-free, non-mechanical electronic water indicator
- Guaranteed free from high pressure created by steam traps
- Humidifier control: 0-10V or ON-OFF input for external controller
- Drain pan with aluminum. Without drop eliminator
- Indirect steam into airflow by electric boiler, low pressure, many sizes 1.5 to 260 kg/h steam production, modular design for higher production, power supply 230/1/50 or 400/3/50.
- Section length 900 mm without light and drop eliminator. Option inspection window.



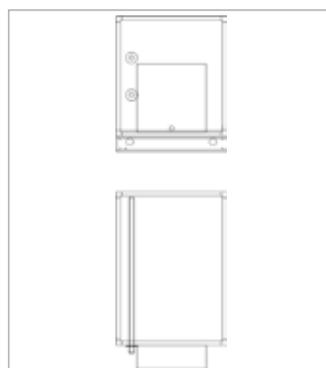
Section with steam generator



Diffusion system



Indirect steam with external boiler



Electrodes air humidifier section

Humidification system with steam humidifier (steam humidifier with generator)

The immersed electrode humidifier is the essence of extensive experience in the field of steam humidification, and represents the most rational choice for a wide variety of applications: homes, offices, industrial facilities and steam baths.

One of its main strengths is the fact that it operates on mains water, with the software to adjust operation automatically based on the feed water characteristics. The humidifier is available in a wide range. Indirect steam into airflow by electric boiler, low pressure, many sizes 1.5 to 260 kg/h steam production.

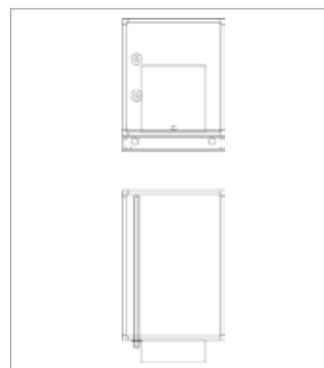
- Modular design for higher production
- Drain Pan with aluminum without drop eliminator
- Steam obtained from the external steam generator is mixed with air under control to obtain the required humidity. Stainless steel condense trays are standard equipment for this module. The system can be observed through the leak proof observation window.
- Power supply 230/1/50 or 400/3/50
- Section length 900 mm without light and drop eliminator - option
- Inspection window - option



Range of indirect steam



Detail humidifier control



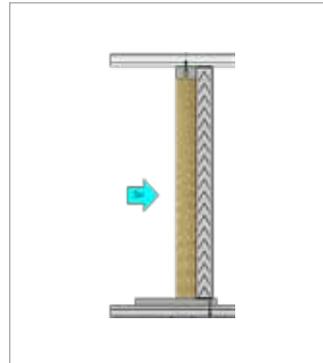
Steam humidifier section

Humidification system with honeycomb humidifier

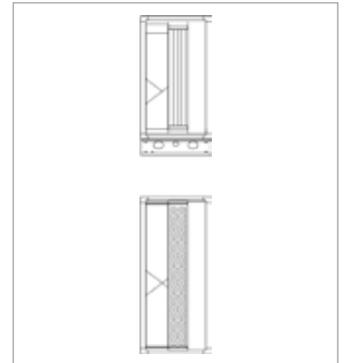
The honeycomb humidifier section consists of a section housing, a honeycomb humidifier and a negative or positive pressure condensate drain siphon. It is also equipped with a double-wall inspection window and interior lighting (option). The honeycomb humidifier model is available with circulating water or with direct water.

Evaporative Cooler without internal pump

- Structure
- Double panel
- Drain panel
- Components
- Innovative cellulose media treated with resin to stop biological growth
- Air saturation level = 16% better than a traditional cooling pad
- Lower air pressure drop
- Thickness 150 mm
- Air saturation approximately 90%
- Drop eliminator frame Al/PVC fins - 1 fold
- Option with inspection window



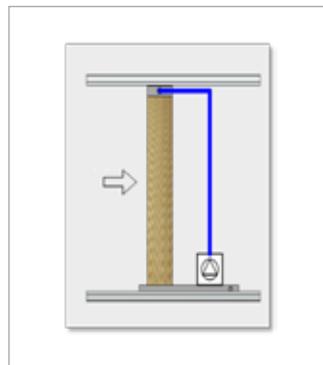
Honeycomb humidifier without pump



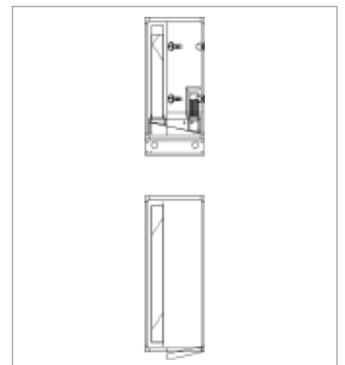
Honeycomb humidifier without pump section

Evaporative cooler with internal pump

- Structure
- Double panel
- Drain panel
- Components
- Innovative cellulose media treated with resin to stop biological growth
- Air saturation level = 16% better than a traditional cooling pad
- lower air pressure drop
- Thickness 150 mm
- Air saturation approximately 90%
- Access door
- Recirculation pump and floating valve
- Drop eliminator frame Al/PVC fins - 1 fold
- Option with inspection window



Honeycomb humidifier with pump

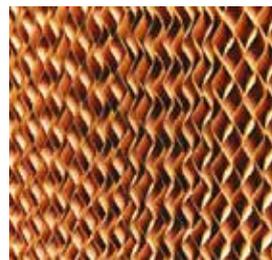


Honeycomb humidifier with pump section

Honeycomb pad

Our "Cooling & Darkening" pad is characterized by a unique and patented "Double Elbow" shape of the channels, conceived in order to achieve higher cooling and humidification properties. This particular shape provides the panel with both an increased cooling efficiency and a darkening property, since it stops the light passage. The patented design of this new pad is the result of an innovative construction technology that provides it with exclusive features:

- Increased cooling efficiency (16% higher than traditional cooling pads) with a lower pressure drop.
- Total darkening to sunlight.
- The cooling & darkening pad represents a very profit table investment since it is cheaper than a system comprising a cooling pad with a separated light trap.
- Drain pan in aluminum.



- High mechanical resistance
- Ideal for unclean environments
- High cooling efficiency
- Reach compliant
- Versatile and easy to replace
- Algae, fungi and bacteria protection
- UV - rays protection

Description honeycomb pad

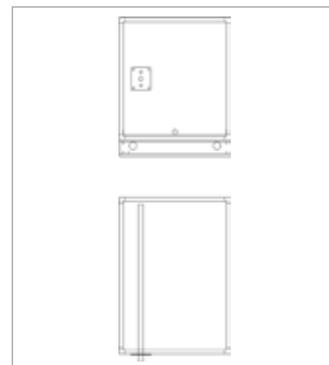
Humidification with supply production steam and with high-pressure humidifier

Humidification with supply production steam

This system uses steam from external production networks. One or more special diffusers are supplied in a dedicated section. Materials and control are on request according to the project.



Diffuser supply production steam



Section dedicated

High-Pressured Humidifier (Fog/Spray System)

The entry frame of this module, which holds the nozzles, is made of stainless steel. Its dimensions may vary depending on the desired design conditions. Up to 78 l/h up to 8,100 l/h can be increased using different pumps and compressors. The solenoid valves are used to enable the desired capacity.

Options for humidification module:

- Cabinet for external humidifier units.
- Drain pan with aluminum.



High pressure humidifier

Cooling section

Cooling section with chilled water

The cooling process takes place through this exchanger. Heat is lost through the surface of the coil, making the air colder. The amount of heat lost depends on the length of the coil. They are made of copper tubes with aluminum fins. The heads of cold water batteries are generally made of carbon steel and are made of copper for the hygiene coils. Maintain proper maintenance of the cooling coils. The antifreeze protection thermostat must be equipped with the cooling coil when the winter conditions are below 5°C. A drop separator is used when the front cooling speed exceeds 2 m/s. The drop separators are designed and produced to capture the maximum amount of water. They are extruded from aluminum profiles. The holder for the separator and the condensation tray are made of stainless steel. All coils must be selected with the certified Eurovent software and suitable for working with a pressure gauge of 13 bar. The test pressure must be 20 bar.

- PVC fins to eliminate drops
- Aluminum drain pan

Geometry:

- P60, P3012, P40.
- Fin pitch: 2.0 to 10 mm.
- Tube type: copper, iron SS304, SS316, CuSn.
- Fin type: aluminum, pre painted aluminum, copper, copper tinned.
- Frame type: fe zn, SS 304, SS 316, aluminum.
- Fluid water or water with ethylenic or propylenic in weight or volume. Without drop eliminator.

Cooling section with chilled water with droplet eliminator

The eliminators of drops allow the separation of fluids in a gaseous stream, the most common case is the separation of drops of water present in a stream of air. The panel-type drop eliminators in special tech-solutions, manufactured in PVC that meets the reference guidelines on flame resistance, have been designed to offer a high separation efficiency, overcoming very demanding tests, both for the efficiency of separation due to its high mechanical strength. They are characterized by a remarkable ease of handling, which facilitates their use in the installation during the installation phase and during subsequent maintenance work. On request, all these products can be supplied with frames made of various materials, both plastic and metallic.

Geometry:

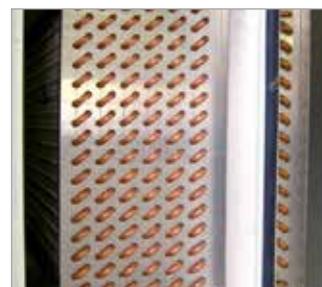
- P60, P3012, P40.
- Fin pitch: 2.0 to 10 mm.
- Tube type: copper, iron SS304, SS316, CuSn.
- Fin type: aluminum, pre painted aluminum, copper, copper tinned.
- Frame type: fe zn, SS 304, SS 316, aluminum.
- Fluid water or water with ethylenic or propylenic in weight or volume.

Options:

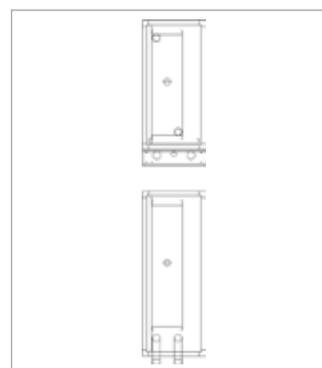
- Drop eliminator frame Aluminum SS 304/SS 316
- PVC / Aluminum / SS 304 / SS 316 fins.



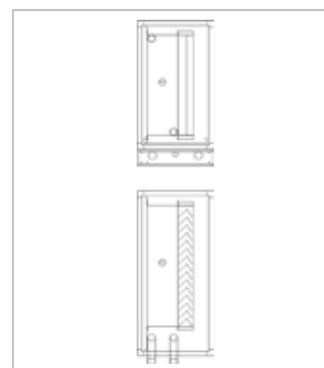
Detail cooling section with integrated control



Detail cooling coil



Cooling section with water cooler



Cooling section with droplet eliminator

Advantages:

- Low pressure drops
- Mechanical strength
- Simplicity in positioning thanks to their modularity
- Lightweight, which permits easy handling
- Resistance to most chemicals and to biological aggression

The **Droplet Separator system** has been designed to fully meet the requirements of modern air handling systems and provides an integrated water drainage system that does not require further processing on the profiles. The new concept of anchoring the blades has significantly improved the assembly time and special design of the molded profiles in nylon (pitch 25 mm and 33 mm), allows you to more easily and safely apply the blade profiles (in their polypropylene, black polypropylene versions and aluminum).

Construction:

- Frame - extruded aluminum
- Blade - 3 different design of extruded polypropylene, black polypropylene and aluminum
- Special system of anchorage in nylon or aluminum
- Adjustable closing profile

Design:

- Temperature - working condition range of 130°C polypropylene
- 70°C black polypropylene
- Blade - 25mm / 33mm pitch
- Polypropylene
- Materials according to ROHS / PAK
- Hygienic certificate in ILH Berlin laboratories

Options:

- Anodized / painted profiles
- Secondary process on the frame (ex. blunted corners and holes)
- Certified silicon and halogen agents free



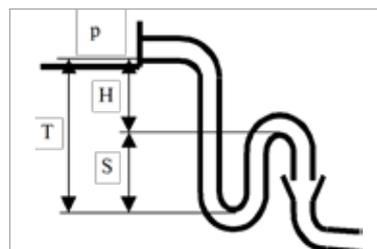
Detail droplet eliminator

Drain Trap

Theoretical calculation of the drain trap

The theoretical calculation of the height of the drain trap involves a number of considerations, depending on the position of the drain trap in reference to the fan.

Failure to heed the following rules will lead to the emptying of the drain trap and thus incorrect draining of the tank.



Theoretical calculation of the drain trap

- p: pressure in the tank being drained in mm wc (1 mm wc = 9.81 Pa)
- T: vertical distance between the lower edge of the tank drain and the upper edge of the first loop of the drain trap (mm)
- S: vertical distance between the upper edge of the first loop of the drain trap and the lower edge of the second loop (mm)

Depression discharge

Formula:

$$T = - 2 p$$

$$S = T / 2$$

Example

$$p = - 300 \text{ Pa} = - 30 \text{ mm}$$

$$T = 60 \text{ mm}$$

$$S = 30 \text{ mm}$$



Depression discharge

1. Discharge

Pressure discharge

Formula

$$T = 2 p$$

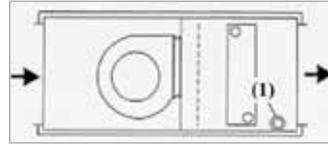
$$S = T / 2$$

Example

$$p = 400 \text{ Pa} = 40 \text{ mm}$$

$$T = 80 \text{ mm}$$

$$S = 40 \text{ mm}$$



Pressure discharge

1. Discharge

Cooling section with direct expansion

The direct expansion evaporator coils are designed and engineered to offer maximum heat transfer efficiency in a wide range of operating conditions. Evaporator coils are countercurrent and have optimized intake manifolds and refrigerant distributors. The distributor pipes are of equal length to guarantee a fair distribution of the refrigerant in each circuit.

Spaced or positioned optional fins manage surface frost. The multi-coil and interlaced coil circuit allows cooling control levels.



Detail direct expansion coil



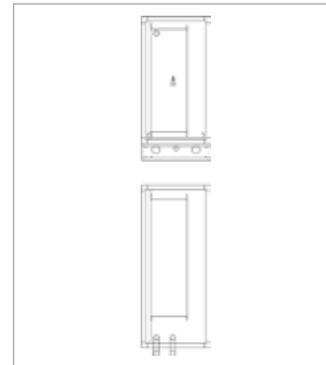
Direct expansion coils

Geometry:

- P60, P3012, P40.
- Fin Pitch: 2.0 to 10 mm.
- Tube type: copper, iron SS304, SS316, CuSn.
- Fin type: aluminum, pre painted aluminum, copper, copper tinned.
- Frame type: FeZn, SS 304, SS 316, aluminum.
- Fluid : gas: R410A, R22, R134a, R407c, R404a, R507A without drop eliminator

Options:

- Drop eliminator frame SS 304/SS 304.
- Fins, frame : Al/Al fins, Al/Al fins, SS 316/SS 316 Fins, SS 304/ PVC Fins , SS 316/PVC fins.



Direct expansion section

Heat recovery section

Heat recovery section with plate recuperator

Energy is saved by exchanging heat between fresh air and exhaust air without mixing them. Fresh air and exhaust air remain in separate systems. By transferring the energy carried by the exhaust air, the fresh air temperature is increased towards the battery outlet temperature in winter. The opposite occurs in the summer. The counter-current heat exchanger is made of high quality aluminum or stainless steel. Its efficiency is really important which determines the coil entry temperatures. Therefore, it should be selected well based on the design conditions.

Range:

- Airflow up to 100,000 m³/h

Main features:

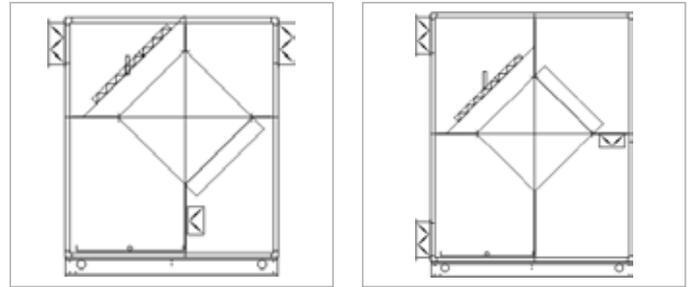
- Aluminum fins, epoxy coated fins (Gold) and hydrophilic aluminum.
- Aluminum corner profiles and epoxy coated aluminum corner profiles.
- Galvanised steel, aluminum and epoxy coated galvanised steel side plates.
- With or without bypass and damper

Characteristics:

- High efficiency, up to 80%
- Low pressure drops; suggested ΔP 200 Pa.
- Max differential pressure up to 2000 Pa (extra option up to 2500 Pa)
- Max working temperature up to 90°C (no silicone)
- Option up to 200°C

Versions:

- **Plate heat recovery unit overlap (as first section):** aluminum heat recovery unit without pressure switch, without light. With synthetic G4 filter EN 779 48 mm thickness on fresh air, automatic fin pitch, bypass damper, fresh air damper, exhaust air damper. (A)
 - Options: additional sealing, inspection window, microswitch on door, light.
- **Plate heat recovery unit in the middle of the unit (on line section):** aluminum heat recovery unit without pressure switch, without light. With synthetic G4 filter EN 779 48 mm thickness on fresh air, automatic fin pitch, bypass damper, fresh air damper, exhaust air damper. (B)
 - Options: additional sealing, inspection window, microswitch on door, light.



Heat recovery section with plate recuperator



Detail plate recuperator



Detail recuperator with by-pass



Detail recuperator in parallel

Heat recovery section with rotary recuperator

Rotating heat recovery It can also be called as a heat wheel, where it places inside the flow direction of the supply air and discharge. In the first half of the rotation the heat is transferred to the heat-absorbing materials of the thermal wheel and gives heat in the second part of rotation to the side that has less energy. The Rotary wheel has been specially designed with a special distribution to increase the heat transfer area and efficiency. The thermal wheel is usually made of galvanized steel or aluminum. It can be coated with epoxy for conditions where high corrosion resistance is required. There are three types of thermal wheel.

Condensation type: usually used for the recovery of sensible energy. The temperature of the exhaust air flow through the wheel must be cooled below the dew point for moisture transfer.

Enthalpy type: available for greater energy transfer thanks to the hygroscopic surface. The transfer of latent energy is possible, but cannot be consistent with the type of absorption.

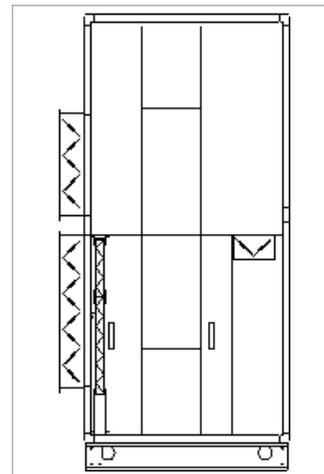
Absorption type: a higher sensible and latent energy transfer is possible due to the high hygroscopic coating.

Mains features:

- **Hygroscopic heat wheel recovery unit** (as first section or in line section) without pressure switch, without light. With G4 (eff.95%) EN779 synthetic filter on fresh air. With recirculation damper and exhaust air damper.
 - Options: with variator, inspection window, microswitch on door, light, additional damper and bag filter on fresh air, additional damper and bag filter on fresh/exhaust air.
- **Recuperator** designs and manufactures plate and rotary heat exchangers, the “core” of any heat recovery system.
 - The high efficiency allows a drastic reduction of energy consumption and air pollution.
 - Incorporating heat recovery into new and retrofit projects is a duty of all of us in this environmentally aware age.
- **Range**
 - Airflow up to 100,000 m³/h
 - High efficiency > 80%
 - Low pressure drops;
 - Suggested ΔP 150 Pa.
- **Rotors Treatment (Aluminium, Hybrid, Sorption and Epoxy anticorrosion)**
All the rotors have an aluminum based matrix (Aluminum matrix composites AMC refer to high performance aluminum concentric materials).
- **Aluminum**
The condensation wheel allows moisture transfer when, in winter conditions, the extract air falls below its dew temperature. It is the most economically advantageous solution to recover heat in most applications.
- **Hybrid**
The hybrid enthalpic wheel allows the sensible and latent recovery due its hygroscopic matrix AMC (Aluminum Matrix Composites) that allows the moisture exchange between the supply and exhaust side.
- **Sorption**
The adsorbent silica gel treatment (AR) which is applied to the aluminum layer, this allows the recovery of the sensible and latent heat, reaching very high efficiency values, ensuring considerable energy savings. Also available in the version with hygroscopic coating based on molecular sieve highly performing.
- **Epoxy anticorrosion (AC)**
In environments with aggressive atmosphere, it is recommended that the aluminum is protected by a paint coating non-toxic based and epoxy corrosion resistant (AC version - GOLD).
- **Driver - Speed rotation** is available with constant speed (400/3/50), or variable speed with speed regulator.



Heat recovery with rotary recuperator



Heat recovery section



Driver - rotation with variable speed



Driver - rotation with constant speed

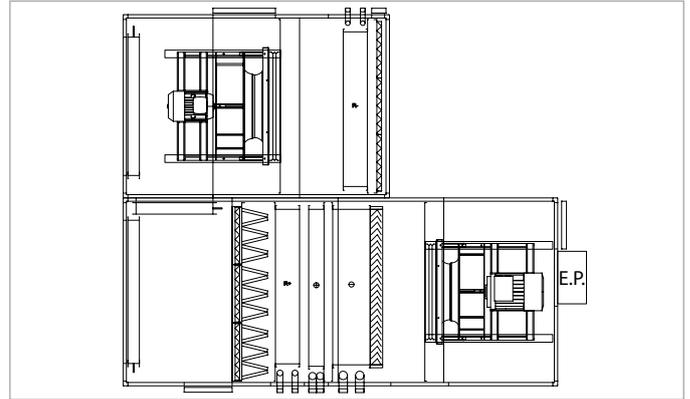
Heat recovery section with run around coil

The heat recovery section with fin recuperator consists of finned tubes placed in the outdoor air and exhaust air chambers together with the pump which circulates the water in the pipes. Copper tubes with aluminum fins are standard for this module. Stainless steel condensation trays are standard equipment for these modules. The fluid speed is controlled by the valves. To avoid the risk of freezing, a specific amount of glycol can be mixed with water. The antifreeze protection thermostats can also be used for its process

Application The run-around coil heat exchangers are used where it is a requirement that the two airflows must be kept completely separated, or where they are at a distance from each other, on two storeys of a building.

Piped circuit features:

- Air vent
- Manometer
- Safety valve
- Feed valve
- Pressure expansion
- Thermometer
- Motorized valve
- Flow measuring valve
- Pump
- Extract air
- Supply air
- Instructions
- Droplet eliminator is available with a droplet eliminator in the extract air section
- Modulating valve built into the pipe circuit manages the heat exchanger capacity



Detail AQX with heat recovery section between fresh air and exhaust air



Detail AQX with heat recovery section with fin recuperator

Outdoor units AQX

Outdoor AQX consists of an air handling unit casing with different options. The openings for air intake and outlet have louvers for effective protection against rain and snow.

Unit roof provide in option with Aluminum roof, stainless steel AISI 304 or AISI 316.

The technical space is expected for all length width 400 mm to 1,200 mm. For the coils, the space is depth 400 mm to 1,200 mm.

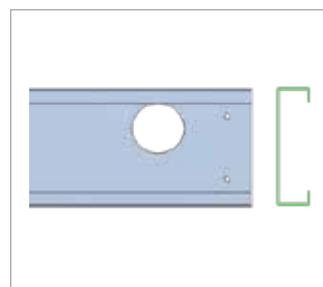


Outdoor unit AQX - detail

Base Frame AQX

The base frame is made of strong galvanized steel profiles in height 140 mm assembled with bolts. Optionally available in stainless steel AISI 304 and stainless steel AISI 316. On request without continuous base frame along the entire length. Every height is possible on request.

It is provided of 2-inch lifting holes.



Detail 2-inch lifting holes and particular design section



Base frame AQX - detail

Sound attenuation section and other options

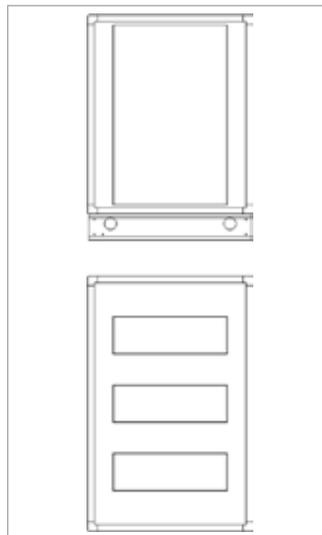
Sound Attenuator Module

Silencers are designed with respect to sound absorption levels that are placed in this module. Consists of rock wool filling material covered with glass-mat mounted onto the galvanized frame.

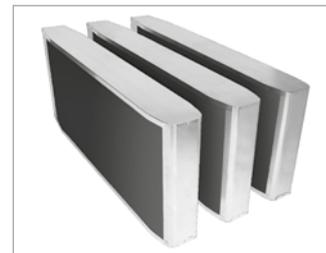
Sound attenuation is achieved on the return, exhaust and supply sides through suitable pitch and length. Air inlet sides are specially designed to form a laminar flow distribution.

Mains features:

- 600 mm length, 200 mm thickness, frame in galvanized steel (option with protection net)



Sound attenuation section



Sound attenuator module



Detail soundproofing section

Inspection door

Function:

Inspection section is used where the option of service, inspection or measuring is required, before or after an air handling function.

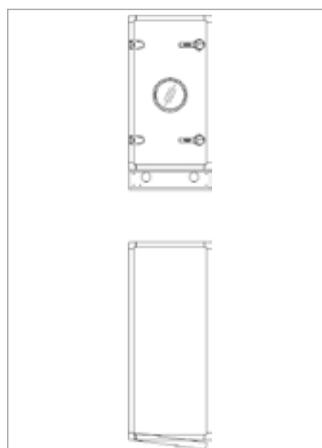
- High 1: Single height unit
- High 2: Double height unit
- Inspection side: right or left

Construction:

Inspection section AQX consists of an empty unit casing with an inspection door.

Accessories:

Inspection window fitted into the access door without light. Light with external microswitch on door.



Inspection section



Detail door and handle

Duct connection part

The AQX connection part is used when connecting ducts to the air handling unit, either as a rigid connection or as a rigid and flexible connection.

The flexible duct connection is a system designed to be connected between the fan and the exhaust flange in the AQX to isolate vibrations and noises towards the source.

The airtight flexible joint is fixed to the frame by screwless systems.

The fabric is combined with a special sealant that prevents leaks and tears of the fabric.



Duct connection



Flexible duct connection

Ultraviolet light for HVAC application

Ultraviolet (UV) lights can be used in air handling unit to improve Indoor Air Quality (IAQ) and can help to eliminate many types of fungi, virus, bacteria, germs and pathogenic microorganism.

It is made with high quality material and very resistant components.

It is typically designed for moisture-proof, maintaining cleans coils, drain pans, and duct sections of AQX. It allows a homogeneous disinfection treatment even inside small and very inaccessible space, such as in between coil fins and inside filters texture.

Every device has its own reflector, parabolic or not, to increase Germicidal Irradiation and direct all UV rays towards the surface that has to be treated.

It does not produce ozone or other secondary contaminants in the air stream.



UV Light



LCD interface

Main control with LCD display

Remote control

Control box

Control system



Main control



User interface



Electronic control cabinet

General Overview

Clivet AQX units are available with pre-installed and fully integrated control system.

AQX Control is an advanced, easy-to-use system with an external remote control panel for all settings.

It is a modern control system with a large number of alarm functions, time setting, operation values and operational status. The system is designed for damper actuators, inverters, pipe valves with wiring actuators, standard or customized control and for communication to a BMS system.

The panel can be positioned freely in the building.

The AQX air handling unit range is available with complete control and includes the main breaker, switching contactors, overload protection, variable frequency inverter and programmable controller as well as control peripherals such as temperature and humidity sensors, pressure switches, dampers, actuators, valves. The units are tested and pre-commissioned at the factory. This translates into high reliability, time saving and exclusion of problems in the commissioning of our customers

Integrated control panel

We have always been independent in the selection and control of the products we use. So we will use only the best and the most suitable in our units.

On request we can of course use products of your choice. The result of both will be a perfect solution for the integration of your air conditioning needs, thus greatly reducing installation and commissioning of the system.

Example unit with factory mounted controls:

- **Made in accordance with CEI EN 60439-1** with a rugged steel case, powder coated, degree of protection IP54.
- **Electrical panel door with lockable door**, manual selector summer and winter, microprocessor controller, display for control and programming at the door. When there are fans or reserve motors (stand-by) there is a manual selector with direct starting, if is used the inverter there is a switch on the AHU. Dual power in low voltage auxiliary circuit relay / programmer multifunction fuse to protect against short circuit of the inverter (if present).
- **Internal wiring** executed by unipolar wire with properties not propagate fire, laid in wiring duct. Terminal on of each wire by a crimp ferrule isolated, numbering of each wire by numbers and / or letters, numbered terminal for connection with external uses. The wires coming from the outside to be determined through special glands or cable clamps placed on the bar, each cable is signed for easy identification.
- **Main breaker with red yellow handle suitable for emergency maneuvers**, switch-breaker for motor protection of air handling units, supply 400/3/50, protection of transformers with fuses, contactors or relays to control each unit where required.
- **Electric heater with total capacity of 6 kW divided in 1 equal steps**. We use state solid relay and the system to have a modulating control for a more accurate temperature control and energy saving.
- **Inverter for supply fan, electricity supply 400/3/50**. Plug fan, set as from data sheet, set of minimum 40%, set of maximum as from data sheet. Centrifugal fan set of 50 Hz, set of minimum 30 Hz, set of maximum 55 Hz.
- **Return for supply fan, electricity supply 400/3/50**. Plug fan set from minimum frequency 40% to maximum as from data sheet. Centrifugal fan inverter set at 50 Hz, from minimum 30 Hz to maximum 55 Hz.
- **Motor supply fan**. EC brushless motor 1 kW - 400/3/50 with integrated modulating control.
- **Motor return fan**. EC brushless motor 1 kW - 400/3/50 with integrated modulating control.
- **Safety microswitch on the fan door** turns off all fans and communicates to the control.
- **Pressure switch synthetic filter set at 150 Pa** only alarm indication on the controller.
- **Pressure switch synthetic filter and bag filter set at 450 Pa** only alarm indication on the controller.
- **Pressure transducer for supply fan, electricity supply 24V, signal 0-10Vdc** for the constant pressure check with inverter connected at the motor. The measurement of the pression must be on the air supply duct at least 3 meters from the opening of the fan. The regulator will be set with the dates of the data sheet.
- **Pressure transducer for return fan, electricity supply 24V, signal 0-10Vdc**. For the constant pressure check with inverter connected at the motor. The measurement of the pression must be on the air supply duct at least 3 meters from the opening of the fan. The



State of the art control and safety equipment

BMS Communication

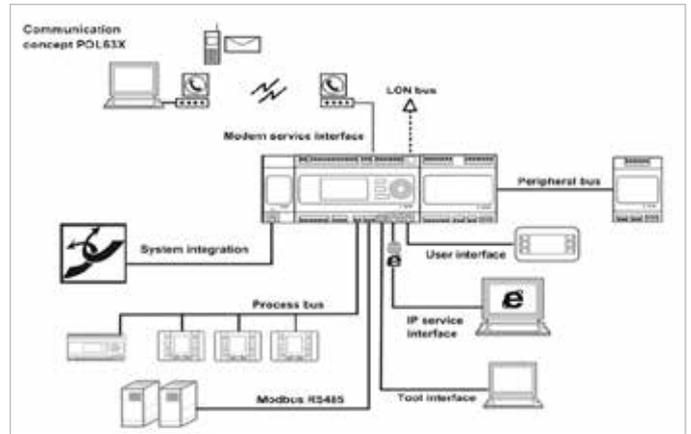
With AQX control is available a serial port to connect the AQX unit to a supervision system or a Building Management System (BMS), using ModBus as the communication protocol.

It allows the access to the complete list of operating variables, controls and alarms.

It is possible a customized solution for any application, in addition to the standard supervision command:

- ON/OFF of the unit
- Changeover heating or cooling
- Cooling and heating setpoint temperature
- Humidification and dehumidification set point value
- Air flow rate
- Alarms

Other communication protocols available: LonWorks, BACnet.



BMS Communication System



AQX control family

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