

cube

26÷44 kW

Air/air and Roof-Top air-conditioners
and heating pumps





TECHNICAL FEATURES

CUBE

Self-contained air conditioner with cooling only or air/air heat pump with scroll compressors, "Roof-Top" version.

STRUCTURE

Base, cover and frame: made of extra-thick galvanised sheet metal, coated with RAL 5014 epoxy-polyester powder paint.

Panelling: made with sandwich panels 25mm thick (50mm on request) composed of a 0.5mm thick galvanised sheet casing that is pre-painted externally, which encloses a polyurethane foam pad that provides the thermal-acoustic insulation of the unit. The surface of the panels in contact with the treated air is made of galvanised sheet metal to facilitate cleaning and sanitising operations.

The non-removable panels are fixed to the structure by means of nylon bushes with a cap. The removable panels are secured to the structure by means of eccentric fastenings or nylon inserts and have handles to facilitate their removal.

COMPRESSORS

Hermetically sealed scroll compressors, with body heating system for low temperature start-up protection and internal temperature sensor for thermal protection of the motor. The compressors are installed on rubber anti-vibration mountings in a tank separate from the air flow, which means that maintenance operations can be carried out in complete safety even with the unit running. A safety device (phase sequence relay) prevents inverse rotation of the compressor scroll.

REFRIGERATION CIRCUIT

Includes: inlets, shut-off valve on the liquid line, dehydrator filter, liquid sight-glass, safety valve, thermostat-controlled expansion valve, and high and low pressure switches.

CONDENSER

Composed of finned coil with copper pipes scored internally and shuttered aluminium fins. The particular design and precise sizing enhance the heat exchange properties, giving the coil a high level of efficiency. A metal grill is installed as standard to protect the coil when fitted outside the unit.

CONDENSER FANS

Axial fans, at high pressure, directly coupled to the electric motor with built-in Klixon thermal breakers. All the fans are installed on rubber anti-vibration mountings. The motor degree of protection is IP 54. All the fans include a protective safety grille.

EVAPORATOR

Finned coil with copper pipes and corrugated fins in aluminium. The condensate collection tray, made in stainless steel, complete with drain connection is installed at the base of the coil.

EVAPORATOR FANS

Radial fans-plug type-without screw pump and electronic regulator are directly coupled to the electric motor. The electric motor, with IP 55 degree of protection, is directly connected to the ventilator shaft, therefore preventing transmissions and consequent energy loss. Each ventilator is provided with a suction nozzle on which the pressure gauges are fitted, which send a signal proportional to the airflow produced, therefore keeping it independent of the surrounding conditions at all times (loss of pipe pressure, dirty filters ...)

On request, the air delivery can be provided with directions other than the standard, conforming to specifications in the section "Versions not possible". The standard available pressure is 100 Pa; on request it can be increased up to 400 Pa. All requirements for greater available pressure values must be evaluated by our technical office. The standard available pressure of intake fans depends on the set up of the unit and must be obtained from the technical book.

AIR FILTERS

All the units have a filtering section that precedes the treatment coil and which therefore operates on the entire flow of treated air with the same efficiency. The standard version is supplied complete with 48mm thick corrugated filter with frame in galvanised sheet metal with G4 filtration degree (according to EN 779). The filtering material is synthetic, washable and flameproof. Other filtration degrees are provided depending on the type of pollutant to be retained: F5: 48mm thick corrugated filter with frame in galvanised sheet with F5 filtration degree (according to EN 779). The filtering material is synthetic, washable and flameproof. F7: 300mm thick rigid pocket filter in polyester with filtering material of pleated fiberglass paper with constant calibrated spacing. The F7 filters are always preceded by filters with a G4 degree of protection. The fitting of pocket filters does not require dimensional modifications of the unit.

ELECTROSTATIC FILTERS

If a high level of filtration efficiency is required (up to H10) also maintaining the pressure losses within contained values it is possible to provide for electrostatic filters electrically charged. The filters have a metal prefilter, a filtering section for ionising, separation of air flow from the particles in suspension and a collection section for the captured particles. The filters autonomously signal the need for cleaning. All versions have a door or removable panel to facilitate maintenance and/or filter replacement/cleaning operations.

CONTROL BOARD

Comprises the main disconnecting switch, auxiliary and main power circuit breakers, compressor remote control switch. Microprocessor control with display for the visualisation of the main functions.

The control board is composed of:

- Main disconnecting switch and main and auxiliary power circuits breakers;
- Compressor remote control switch;
- Fan rotation controller for condensation control;
- General alarm dry contacts;
- Microprocessor for controlling the following functions:
 - Regulation of the water temperature with inflow control;
 - Antifreeze protection;
 - Compressor timing;
 - Management of high pressure pre-alarm (to prevent in many cases the unit blockage);
 - Enablement of the summer/winter switch;
 - Automatic defrosting;
 - Alarm signalling;
 - Alarm reset;
 - Self adjustable flow to allow optimal operation in the event of low water content in the system;
 - Digital input for external ON-OFF;
 - Digital input for remote switch of summer/winter.

Display screen for:

- Outgoing water temperature;
- Incoming water temperature;
- Condensate temperature;
- Set temperature and set differentials;
- Alarm description;
- Compressor operation counter;
- Power supply 400V/3~/50Hz for all configurations.

CONTROL AND SAFETY DEVICES

- Supply water temperature control probe (located in the exchanger inlet);
- Antifreeze probe that activates the antifreeze alarm (with automatic rearm for limited trip);
- High pressure switch (manual rearm);
- Low pressure switch (with automatic rearm for limited trip);
- Flow controller alarm for lack of water supply (manual rearm);
- Condensate pressure control by speed regulator with low external temperature.
- High pressure safety valve;
- Internal thermal protection for compressors overheating
- External protection for compressor overheating

TESTING

All units are tested in the factory and supplied complete with oil and refrigerant fluid. Testing provides the following checks:

- Leak check: check the sealing by putting the circuit under pressure
- Check Chiller operation (cooling capacity, power consumption, load losses..etc)
- Check Heat Pump operation (thermal capacity, power consumption, etc)
- Check the safety devices trip

VERSIONS

Consult the configuration table to check if one operation interferes with another.

CUBE /HP: reversible heat pump

In addition to the standard components are included: four-way reversing valve, liquid receiver, second thermostat-controlled expansion valve, microprocessor for automatic summer/winter switching and patented automatic defrosting for coil.

AIR TREATMENT SYSTEM OUTFIT

CUBE BASE

Version designed for 100% recirculation. No air exchange.

CUBE FC2S

Version designed for operating with outdoor air supply. With respect to the basic version, the FC2S has a mixing chamber with two dampers, one on the recovery air intake and the other on the outdoor air intake. The unit is suited for operation in freecooling/freeheating mode. For all versions with dampers is available the "damper servo control" device. To obtain automatic damper modulation, the pCO controller must also be present.

CUBE FC3S (high efficiency with free energy recovery)

Version suitable for operation with outdoor air supply and with expulsion of the exhaust air. In comparison with FC2S version, the FC3S has a mixing chamber with three dampers. The unit is suited for operation in freecooling/freeheating mode. The expulsion of air is carried out by the axial fan which, in combination with the overpressure generated within the environment due to the quantity of external air introduced through the appropriate damper, is able to autonomously extract the amount of air to expel from the flow of recirculating air. The innovative configuration of the unit allows the partial recovery of the energy expelled from the conditioned environment. The expelled air, in fact, is conveyed on the condenser coil, therefore reducing the condensate temperature and thereby increasing the efficiency of the unit. Similarly, the expelled air is conveyed on the evaporation coil also during heating pump operation, thus considerably increasing performance.

CUBE GC2S

In comparison with the FC2S version, this unit is equipped with a module containing a direct exchange gas-fired condensation heat generator. The main components of the generator are:

- combustion chamber in AISI 430 stainless steel
- heat exchanger pipes and exhaust manifold made in AISI 304L stainless steel to increase resistance to the corrosion due to the production of condensate
- premixed gas burner that guarantees the absence of carbon monoxide and nitrous oxide emission less than 35 parts per million
- control board that controls the burner and modulates the thermal capacity (fuel consumption) in continuous mode between the minimum and maximum values based on the parameters set and measured by the Pco controller.
- stack for combustion fume exhaust

With the technology of premixing and modulation upon decreasing heat requirement from the environment, the generator consumes less gas, increasing its efficiency up to 105% (value calculated based on the net heating value). The generator certified by GASTEC and constructed in compliance with the European gas directive 90/396/EC is housed inside a module with panels insulated with mineral wool according to the criteria of Ministerial Decree 12/04/96. The air flow is separated from the gas feed point, and a ventilation grille puts the outside environment in contact with the burner. The generator also has the following safety devices:

- safety thermostat downstream from the exchanger;
- electrode for flame detection;
- safety pressure switch that detects any obstruction of the flue pipe and/or the air intake duct;
- differential pressure switch for detecting air flow (standard supply with all the units).

All these devices stop the burner when tripped and are signalled in cumulatively by the pCO controller. They must be reset manually.

CUBE GC3S (high efficiency with free energy recovery)

In comparison with the FC3S version, this unit is equipped with a module containing a direct exchange gas-fired condensation heat generator. For the generator features see the description of version GC2S.

CUBE RS4S

Added to the FC3S unit outfit are recirculation/expulsion fans and a module which inside has a static type air/air heating recovery device with plates and cross flows.

Composed of an aluminium plate set, allowing heat recovery that is sensitive to the expelled air which during winter operation has an efficiency that is variable between 50-55 % according to the model. The two flows of air (expulsion and recovery) are completely separate and therefore any type of contamination between them is avoided.

Even with this outfit the Pco controller is installed as standard, which manages recovery according to an adjustable logic depending on the presence or absence of an air quality probe.

The possibility to achieve the freecooling mode also for the RS version is guaranteed by the presence of a fourth damper for outdoor air from the recovery by pass

ACCESSORIES

MOTOR-CONDENSER ACCESSORIES

- High and low pressure gauges
- Intake and outtake valves
- Fluid line solenoid valve (double valve for the HP version)
- Fluid receiver (as standard on the HP version)
- Prepainted aluminium coil
- Condenser coil coated with anti-corrosion treatment
- Coil protection grid with metal filter

VENTILATION SYSTEM ACCESSORIES

- Air supply different from the standard
- Air recovery different from the standard
- Increased head of fans delivery rate
- Increased head of fans recovery rate (only for RS4S version)
- Corrugated filters with F5 degree
- Rigid pocket filters with F7 degree
- Electrostatic filters
- Hot water heating coil
- Electric heating coil
- Three-way valves with modulating servo control to adjust the hot water coil
- Immersed electrodes humidifier with steam distribution nozzle •
Damper servo controls
- Damper servo controls with spring return
- Dirty filter alarm
- Rainproof covers on the dampers communicating with the outside (recovery and expulsion)
- Sandwich panel 25 or 50 mm thick

ELECTRICAL ACCESSORIES

- "Pco" controller
- Remote control panel
- RS485 serial interface
- Power factor correction: $\cos\phi \geq 0.9$
- Operation dry contacts
- Enthalpic free-cooling
- Electronic soft starter
- Power supply different from standard

VARIOUS ACCESSORIES

- Rubber anti-vibration dampers
- Soundproof covers on the compressors

technical data

UNIT SIZE			1.2	2.2	3.2	4.2
Cooling						
Nominal cooling capacity	(1)	kW	26.7	34.1	40.8	45.7
Sensitive cooling capacity	(1)	kW	19.2	23.9	28.9	32.4
Compressor power consumption	(1)	kW	6.1	8.7	8.8	10.8
Heating						
Nominal heating capacity	(2)	kW	26.4	35.3	40.3	46.1
Compressor power consumption	(2)	kW	5.5	7.7	7.9	9.6
Compressors						
Type			Scroll			
Cooling Circuits/ Quantity		no/no	2 / 1	2 / 1	2 / 1	2 / 1
Capacity steps		%	0 - 50 - 100	0 - 50 - 100	0 - 50 - 100	0 - 50 - 100
Total oil charge		l	3.4	3.4	3.4	3.4
LAMBDA ECHOS total cooling capacity		kg	7	7	10.2	10.2
LAMBDA ECHOS/HP total cooling capacity		kg	8	8	11.4	11.4
Fans						
Type			Radial			
Air flow		m ³ /h	4,950	6,050	7,260	8,250
STD available static pressure		Pa	100	100	100	100
Air filters						
Thickness		mm	48			
Efficiency			G4			
Motor condenser						
Type			Axial			
Air flow		m ³ /h	10,500	10,500	11,500	11,500
Water heating coil (optional)						
Potential	(3)	kW	70	70	71	73
Water flow		l/s	5.434	7.477	9.341	11.028
Pressure drop		kPa	17	30	38	51
Electric heating coil (optional)						
Potential		kW	8	8	10	10
Operation Stages		no	1	1	2	2
Hot air generator for GC2S GC33 GS3S fittings						
Quantity			1	1	1	1
Model	(4)		XXS	XXS	XS	XS
Maximum rated thermal input		kW	37	37	45	45
Generator yield in HI		%	94.1	94.1	94.3	94.3
Max methane gas consumption	(5)	m ³ /h	4.11	4.11	5.03	5.03
Amount of condensate produced		l/h	0.8	0.8	1.5	1.5

(1) Calculation conditions: ambient air 27°C BS., 19.5 BU.; external air 35°C. Mixture with 30% external air.

(2) Calculation conditions: ambient air 20°C; external air 8.3°C BS, 6.1°C BU. Mixture with 30% external air.

(3) Coil data at: Supplied air temperature 20°C; in/out water temperature: 80/65

(4) Nominal heating capacity: XXS= 35kW; XS= 45kW(5) Referred at 15°C, 1013 mbar and supply pressure of 20mbar

electrical data

UNIT SIZE			1.2	2.2	3.2	4.2
Delivery/recovery fans (3)						
Number of delivery fans	(2)	no	1	1	1	1
Fan rated power	(3)	kW	1	1	2.3	2.3
Fan rated current		A	1.6	1.6	3.6	3.6
Motor condenser (4)						
Number of axial fans		no	1	1	1	1
Fan rated power		kW	0.66	0.66	0.66	0.66
Fan rated current		A	2.95	2.95	2.95	2.95
Humidifier with coated electrodes (optional)						
Rated steam production		kg/h	5	5	5	5
Number of cylinders		no	1	1	1	1
Operating range		kg/h	5 - 8	5 - 8	5 - 8	5 - 8
Input power		kW	3,75 - 6	3,75 - 6	3,75 - 6	3,75 - 6
Power consumption		A	5,4 - 8,7	5,4 - 8,7	5,4 - 8,7	5,4 - 8,7
Total						
Maximum power consumption	(1),(5)		11.1	13.9	16.6	19.3
Maximum peak current	(5)		60	77	82	91
Maximum power consumption	(2),(5)		20	24	28	33
Power supply		V/ph/Hz	400/3+N/50 ±5%			
Auxiliary power supply		V/ph/Hz	230-24/1~/50			

(1) Mains power output required for unit operation.

(2) Internal safety devices tripping current. It is the unit's maximum power input. This value must never be exceeded and should be taken into account when sizing the line and relative safety devices (see the wiring diagram supplied with the unit).

(3) Value for BASIC units and useful head rating for delivery 100 Pa.

(4) Value for FC3S units and useful heat rating for intake 100 Pa.

(5) The values indicated are referred only for FC3S version with 100Pa of available pressure and they cannot be used for electrical line sizes in other layouts. For these is necessary to refer to electrical diagram supplied with units.