

> LAMBDA ECHOS
Roof Top air conditioner, cooling only

> LAMBDA ECHOS /HP
Roof Top air conditioner with
reversible heat pump

> LAMBDA ECHOS /LN
Low noise version

> LAMBDA ECHOS /SLN
Super low noise version





index

Technical characteristics	06
Technical data standard unit	10
Electrical data standard unit	11
LAMBDA ECHOS	12
Cooling capacity with nominal air supply	
Cooling capacity with reduced air supply	
Cooling capacity with increased air supply	
LAMBDA ECHOS with heat recuperator	18
Cooling capacity with nominal air supply	
Cooling capacity with reduced air supply	
Cooling capacity with increased air supply	
Operating limits	24
Sound level	25
Overall dimensions, weights, clearances and hydraulic connections	26
Installations recommendations	55

TECHNICAL CHARACTERISTICS

LAMBDA ECHOS

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

STRUCTURE

Base, covering, and weight-bearing structure: made of extra-thick galvanised plate, coated with RAL 5014 epoxy-polyester powder paint.

Panelling: made with sandwich panels 25mm thick (50mm on request) composed of a casing of 0.5mm thick galvanised sheet 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 to facilitate the cleaning and sanitising operations.

The non-removable panels are fixed to the structure by means of nylon bushes with 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 technical compartment 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.

CONDENSERS

Composed of fin packs with copper pipes scored internally and corrugated aluminium fins for each circuit. The particular design and precise sizing enhance the heat exchange properties, giving the packs a high level of efficiency.

CONDENSER FANS

Axial fans directly coupled to the electric motor with built-in Klixon thermal cut-outs.

All the fans are installed on rubber anti-vibration mountings. The protection rating of the motors is IP 54. All the fans include a protective safety grille.

EVAPORATOR

Finned pack with copper pipes and corrugated fins in aluminium created with interlaced circuits to make the flow of treated air more homogeneous.

The stainless steel condensation drip tray complete with drain connection is installed at the base of the pack.

EVAPORATOR FANS

Double intake centrifugal fans statically and dynamically balanced.

The fans are driven by a pulley and belt system with V-belt (driving pulley with variable diameter for motor powers up to 11kW).

The three-phase electric motor with IP 55 protection rating is installed on a sliding base that permits belt tightening.

To limit breakaway starting currents, units that consume 7.5 kW or more feature star/delta start-up connections.

Each fan is fitted on a support frame, separated from the rest of the unit by rubber anti-vibration mountings.

The air supply and return can be supplied indifferently on the two sides of the machine provided both are from the same side.

The standard head is 100 Pa; on request it can be increased up to 400 Pa. All requirements for greater head values must be evaluated by our technical office.

COOLING CIRCUIT

Includes: filling 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.

AIR FILTERS

All the units have a filtering section that precedes the treatment pack 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 with G4 filtration rating (according to EN 779). The synthetic filtering medium is washable and flameproof.

Other filter ratings are provided depending on the type of pollutant to be eliminated:

F5: 48mm thick corrugated filter with frame in galvanised sheet with F5 filtration rating (according to EN 779). The synthetic filtering medium is washable and flameproof.

F7: 300mm thick rigid pocket filter in polyester with filtering medium made of pleated fiberglass paper with constant calibrated spacing. The F7 filters are always preceded by filters with a G4 rating as protection.

All versions have a door or removable panel to facilitate maintenance and filter replacement operations.

ELECTRICAL PANEL

The switchbox includes:

- main switch
- compressor protection fuses
- protection fuses for axial fans
- thermal-magnetic circuit breakers for centrifugal fans
- fuses for protecting the primary and secondary windings of the transformer
- remote switches for compressors
- remote switches for fans
- connector
- remote control panel
- external consent terminals
- general alarm switching contacts
- Microprocessor for controlling the following functions:
 - Regulation of the air temperature with return control;
 - Antifreeze protection on the hot water pack;
 - Compressor timing;
 - Automatic rotation of compressor start-up sequence;
 - Alarm signalling;
 - Alarm reset;
 - Step partialisation of the power delivered by the unit;
 - Cumulative alarm contact for remote signalling;
 - Forced partialisation due to pressure limit on machines with four compressors;
 - Alarm history recording;
 - Programming operation with settable time segments
- Display on the screen for:
 - Return air temperature;
 - Temperature and differential setpoints set;
 - Alarm description;
 - Hour counter for operation and number of start-ups of the unit, the compressors, and the pumps (if present).

Electrical power supply 400V/3~/50Hz + N for sizes 9.4/10.2; 400V/3~/50Hz for sizes 12.2/13.2/14.2/16.2

CONTROLS AND SAFETY DEVICES

- High pressure switch with manual reset
- High pressure safety valve
- Supply air minimum temperature probe
- Maximum temperature probe on the heat generator
- Overtemperature protection for compressors and fans.

TESTING

All units are tested in the factory and supplied complete with oil and refrigerant fluid.

VERSIONS

LAMBDA ECHOS /HP: Reversible heat pump

In addition to the components of the LAMBDA ECHOS, the HP version includes: four-way reversing valve, liquid receiver, second thermostat-controlled expansion valve, microprocessor for automatic summer/winter switching, and a patented automatic pack defrost system with separate circuits.

ACCESSORY VERSIONS

LAMBDA ECHOS /LN: Silenced unit

This unit is designed to reduce the sound emissions that are propagated externally to it. The LN version has no repercussion on the noise propagated inside the channels, which depends directly on the combination of flow rate and head required and can be eliminated only by using channel silencers. The LN version uses a system of control on the rotation speed of the axial fans.

LAMBDA ECHOS /SLN: Super-silenced unit

In addition to the rpm regulation present on the LN version, this machine is equipped with a closed compartment for the compressors insulated with sound-proofing material.

AIR TREATMENT MODULE OUTFITTING

LAMBDA ECHOS BASIC

Version designed for operating in 100% recirculation. No air exchange.

LAMBDA ECHOS FC2S

Version designed for operating with a portion of outdoor air. With respect to the basic version, the FC2S has a mixing chamber with two dampers, one on the recirculating air duct and one on the outside air duct.

The unit is suitable for operating in freecooling/freeheating mode.

For all the versions with dampers, the "damper servo control" accessory is available. To obtain automatic damper modulation, the "pCO" controller must also be present.

LAMBDA ECHOS FC3S

Version suitable for operating with a portion of outdoor air and with expulsion of the exhaust air. With respect to the FC2S version, the FC3S has a mixing chamber with three dampers and return air fans for expelling the exhaust air. The unit is suitable for operating in free-cooling/free-heating.

The return air fan is standard supply with rear return and the same features as the supply air fan. Different air flow and head ratings can be provided on request.

The innovative configuration of the unit makes it possible to recover part of the energy expelled from the environment treated. The expelled air, in fact, is conveyed on the condenser pack, therefore reducing the condensation temperature and thereby increasing the efficiency of the unit. Similarly, the expelled air is conveyed on the evaporator pack also during heat pump operation, thus considerably increasing performance. This system of recovery is supplied as standard for all the units equipped with extractor fans (FC3S, GC3S, RS4S, GS4S).

LAMBDA ECHOS GC2S

With respect to the FC2S version, this unit is equipped with a module containing one or more gas-fired condensation heat generators (direct exchange).

The main components of the generator are:

- combustion chamber in AISI 430stainless steel
- exchanger pipes and exhaust manifold made of 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
- electronic 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 heat 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.

LAMBDA ECHOS GC3S

With respect to the version FC3S, this unit is equipped with a module containing one or more gas-fired condensation heat generators (direct exchange). For the characteristics of the generator, see the description of the GC2S version.

LAMBDA ECHOS RS4S

In addition to the outfitting of the FC3S, this unit has a module containing static plate air/air cross flow heat generator.

The aluminium plate pack allows considerable heat recovery from the exhaust air, with efficiency in winter operation that between 50% and 55%, depending on the model. The two air flows (exhaust and return) are kept completely separate to prevent any type of contamination.

The pCO controller is also installed in this version as standard supply. The controller handles recovery based on a logic that can be set according to the presence or absence of the air quality probe.

The free-cooling option is also available for the RS version units thanks to the presence of a damper for the outdoor air that bypasses the recuperator.

LAMBDA ECHOS GS4S

With respect to the version RS4S, this unit is equipped with a containing one or more gas-fired condensation heat generators (direct exchange). For the characteristics of the generator, see the description of the GC2S version.

ACCESSORIES

MOTOR-CONDENSER SECTION ACCESSORIES

- Condensation control with rpm governor
- High and low pressure gauges
- Intake and supply shut-off valves
- Liquid line solenoid valve (double valve for the HP version)
- Liquid receiver (standard supply on the HP version)
- Condenser pack in pre-painted aluminium
- Condenser pack treated with anti-corrosion paint
- Pack protection grid with metal filter.

FAN SECTION ACCESSORIES

- Increased head of the supply air fans (from 100 to 400Pa)
- Increased head of the return air fans (from 100 to 400Pa)
- Rigid pocket filters with F7 rating
- Hot water heating pack
- Electric heating pack
- 3-way valve with modulating servo controls for hot water pack regulation
- Extra-thick sandwich panels (50mm)
- Immersed electrode humidifier with steam distribution nozzle
- Damper servo controls
- Damper servo controls with spring return
- Clogged filter alarm
- Rainproof covers on the dampers communicating with the outside (renewal and expulsion)

ELECTRICAL ACCESSORIES

- "pCO" controller
- Remote control panel
- RS485 serial interface
- $\cos\phi \geq 0.9$ power factor correction
- Single switching contacts
- Enthalpic free-cooling
- Electronic soft starter
- Power supplies different from the standard

MISCELLANEOUS ACCESSORIES

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

technical data

UNIT SIZE			17.4	19.4	20.4	24.4	27.4	30.4	33.4
Cooling									
Nominal cooling capacity	(1)	kW	169,8	185,5	202,9	246,1	270,3	302,6	327,9
Sensible cooling capacity	(1)	kW	119,6	129,8	141,0	173,0	188,5	210,6	226,7
Compressor absorbed power	(1)	kW	48,2	48,2	47,5	59,8	71,1	82,9	94,1
Heating									
Nominal heating capacity	(2)	kW	172,5	187,9	205,2	237,0	266,6	301,7	337,1
Compressor absorbed power	(2)	kW	42,4	46,4	50,1	57,7	67,6	77,2	89,1
Compressors									
Type						Scroll			
Quantity / Circuits		n°/n°	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
Capacity steps		n°	0-25-50-75-100						
Total oil charge		l	13	19	25	25	25	28	32
Total refrigerant charge LAMBDA ECHOS		kg	18	21	24	25,6	25,6	30,3	33,4
Total refrigerant charge LAMBDA ECHOS/HP		kg	22	25	28	29,6	29,6	34,3	37,4
Fan section									
Type						Centrifugal			
Air flow		m³/h	30.250	33.000	35.970	42.900	47.080	52.030	56.100
Std available static pressure		Pa	100	100	100	100	100	100	100
Air filters									
Thickness		mm	48						
Efficiency			G4						
Motor condenser section									
Type						Axial			
Air flow		m³/h	42.700	65.150	87.600	87.600	87.600	86.500	85.400
Hot water heating coil (optional)									
Potential	(3)	kW	193	202,3	211,96	267,35	281,16	318,26	331,59
Water flow rate		l/s	3,151	3,299	3,457	4,365	4,582	5,188	5,411
Pressure drop		kPa	38	42	45	84	91	22	24
Electric heating coil (optional)									
Potential		kW	45	60	60	75	75	80	80
Stages		n°	3	3	3	4	4	4	4
Hot air generator for GC2S GC33 GS3S									
Quantity			1	1	1	1 + 1	1 + 1	2	2
Model	(4)		XL	XXL	XXL	L + XL	L + XL	XL	XL
Maximum rated thermal input		kW	145	197	197	238	238	290	290
Generator yield in HI		%	93,5	91,6	91,6	93,5	93,5	93,5	93,5
Max methane gas consumption	(5)	m³/h	16,4	22,75	22,75	26,77	26,77	32,8	32,8
Amount of condensation produced		l/h	3,9	4,9	4,9	6,5	6,5	7,7	7,7

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

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

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

(4) Nominal heating capacity: S= 54kW; L= 93kW; XL=145kW; XXL= 197kW

(5) Referred at 15°C 1013mbar. Gas supply pressure 20mbar