

> 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



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

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

STRUCTURE

Base and cover: Robust galvanized profile sheet metal, finished in RAL5007 epoxy-polyester powder paint.

Supporting structure: extruded aluminium alloy profiles with fibre glass reinforced nylon joints.

Panelling: 25 mm thick (or 50 mm on request) sandwich type outer panels comprising 0.5 mm thick galvanized plates pre-finished on the outside, between which is a polyurethane foam mattress to ensure the unit's heat and sound insulation. Inner walls in contact with treated air are in galvanized steel for hygiene and cleanliness. Non-removable panels are fixed in place using screws in nylon bushes complete with screw caps.

Removable panels are attached to the structure with nylon inserts or eccentrics and feature handles to facilitate handling.

COMPRESSORS

Scroll type hermetically sealed compressors with body heating system for low temperature start-up protection and internal temperature sensor for thermal protection of motor. The compressors are installed on rubber anti-vibration mountings in a separate compartment isolated from the air flow. Maintenance can therefore be performed in complete safety even with the unit running. A phase sequence relay safety device prevents the compressor spiral from spinning in the wrong direction.

CONDENSER

The condenser unit comprises one copper pipe and aluminium fin condenser pack for each circuit. Clever design and accurate sizing ensure high performance, high efficiency condensing. A metal grill protects the fins from accidental damage.

CONDENSER FANS

The axial fans are directly coupled to electric motors with built-in Klixon thermal cut-outs.

All fans are installed on rubber anti-vibration mountings.

Motor protection category is IP 54. Fans come complete with a protective safety grill.

EVAPORATOR

The evaporator is a high efficiency copper pipe and corrugated aluminium fin pack. The evaporator pack for units with 2 cooling circuits comprises 2 interconnected circuits for a more homogenous flow of treated air.

A stainless steel condensation drip tray is located under the evaporator, complete with drain connection.

EVAPORATOR FANS

The double intake centrifugal fans are statically and dynamically balanced.

They are driven by a pulley and belt system with V belt and variable pitch drive pulley.

The three-phase electric motor, with IP55 protection, is installed on a sliding base that permits belt tensioning.

Units that consume over 7.5 kW feature start-up connections to limit start-up current peaks.

Each fan is installed separately from the rest of the unit on rubber anti-vibration mountings.

In the standard version (MD), air delivery is directed downwards. On request, air delivery can be configured in other directions: up (MU), left (ML), right (MR), with the exception of the configurations in the "Impossible versions" diagram.

The basic useful head is of 100 Pa and, on request, can be increased to 400 Pa; requests for higher head have to be evaluated by our technical office.

COOLING CIRCUIT

Components: cables, tap on liquid line, dehydration filter, liquid indicator, safety valve, thermostat expansion valve, high and low pressure controllers.

AIR FILTERS

All units comprise a filter that precedes the cooling section and treats the entire air flow with the same efficiency. The standard version is fitted with a 48 mm thick corrugated filter in galvanized steel, with G4 filtration rating (according to EN 779). The filter is flameproof, washable and synthetic. Other filtration ratings are available according to the type of pollutant to be abated:

F5: 48 mm thick corrugated filter with galvanized steel frame and F5 filtration rating (according to EN 779). The filter is flameproof, washable and synthetic.

F7: 300 mm thick rigid bag filter in polyester with paper/fibre glass filter featuring constant calibrated pleating. The F7 filters are always preceded by grade G4 filters that protect them.

Installation of the bag filters requires an additional section that influences the unit's final size, as shown in the sizing diagrams.

There is always a door or removable panel to facilitate maintenance and/or replacement of the filters.

ELECTRICAL CONTROL PANEL

The panel includes:

- Main switch
- Compressor protection fuses
- Protection fuses for axial fans
- Thermal magnetic cut-outs for centrifugal fans
- Fuses for primary and secondary transformer winding protection
- Compressor relays
- Fan relays
- Connector for remote control panel
- Remote control panel
- External signal terminals
- Free contacts for main alarm
- External signal terminals
- Free contacts for main alarm
- Microprocessor for controlling these functions:
 - Air temperature regulation with return control;
 - Anti-freeze protection on the water heating coil;
 - Compressor timing;
 - Automatic rotation of the compressor start-up sequence;
 - Alarm signalling;
 - Alarm resetting;
 - Capacity step control for the unit's output;
 - Cumulative alarm contact for remote signalling;
 - Forced capacity step control to restrict power for machines with four compressors;
 - Alarms log;
 - Programming operation in settable time bands;
- On the screen:
 - Temperature of intake air;
 - Temperature set-point and configured differentials;
 - Alarms description;
 - Hour and start-up counter for the unit, compressors and pumps (if present);

Power supply 400V/3~/50Hz + N for versions 9.4/10.2; 400V/3~/50Hz for versions 12.2/13.2/14.2/16.2

CONTROL AND SAFETY DEVICES

- High pressure controller with manual reset;
- High pressure safety valve;
- Minimum temperature probe for air delivery;
- Maximum temperature probe on the hot air generator;
- Compressor and fan overheating protection;

TESTING

All units are tested in the factory and are delivered complete with lubricating oil and refrigerant.

VERSIONS

LAMBDA ECHOS /HP: Reversible heat pump

In addition to the components listed for LAMBDA ECHOS, this unit also includes: 4-way reversing valve, refrigerant tank, second thermostatic valve, microprocessor for automatic summer/winter switching and a patented automatic coil defrosting system with separate circuits.

OTHER VERSIONS

LAMBDA ECHOS /LN: Silenced unit

The unit was designed to ensure minimized sound emissions. The LN version does not affect the noise created in the channels, which depends on the combination of required flow and head and can only be abated by channel silencers. The LN version comprises: compressor noise deadening caps, condensing coils with increased exchange surface and axial fan speed regulator.

AIR CONDITIONING UNIT

LAMBDA ECHOS BASIC VERSION

This version can ensure 100% air recirculation. There is no air replacement. Air can only be retaken at the back.

LAMBDA ECHOS FC2S

This version can operate with external air supply. Unlike the basic version it has a mixing chamber with 2 shutters, one of which is on the air intake and the other on the external air intake mouth.

The unit can work in freecooling/ freeheating mode.

There is also a "shutter servo-control" for all versions with shutters. The "Pco" control is also required for automatic modulation of the shutters.

LAMBDA ECHOS FC3S

This version can work with external air supply and expulsion of used air. Unlike the FC2S version, it features a mixing chamber with 3 shutters and air expulsion fans. The unit can work in freecooling/ freeheating mode. The intake fan is supplied as standard with the rear intake and the same features as the discharge fan. The following can be supplied on request:

- different air flow and heads;
- different air flow return directions.

LAMBDA ECHOS GC2S

Unlike the FC2S version, this unit features a unit comprising one or more condensation direct exchange gas heat generators. The generator's main components:

- AISI 430 stainless steel combustion chamber
- AISI 304L stainless steel exchanger tubes and fume collector for increased resistance to corrosion caused by condensation

- Pre-mixed gas burner that ensures no carbon monoxide and emission of nitrogen oxide under 35 parts per million
- Circuit board that controls the burner and constantly modulates heat capacity (fuel consumption) between the minimum and maximum value according to the parameter settings configured and detected by the Pco control
- Flue for uptaking combustion fumes

Thanks to premixing and modulation when the need for heat decreases, the generator consumes less gas and thereby increases its yield by up to 105% (value calculated on the basis of the lower heating value).

The GASTEC certified generator, constructed according to the 90/396/EC gas directive, is housed in a unit the panels of which are insulated with rock wool complying with the criteria of MD 12/04/96. Air flow is separated from the gas feed and a ventilation grille is located between the burner and the outside environment.

The generator also features these safety devices:

- Temperature cut-out upstream of the generator;
- Flame detection electrode;
- Pressure cut-out that controls any obstruction of the flue and/or air suction pipe;
- Pressure differential cut-out for detecting air flow (supplied as standard with all units).

All these devices, when enabled, stop the burner, are signalled by the Pco control in cumulative order and have to be reset manually.

LAMBDA ECHOS GC3S

Unlike the FC3S version, this unit comprises a unit with one or more condensation direct exchange gas heat generators. The generator's characteristics are given in the description of the GC2S version.

LAMBDA ECHOS RS4S

In addition to the FC3S configuration, another module is added containing a static plate air/air cross flow heat recuperator.

The aluminium plate pack recuperates sensible heat from exhaust air, with a winter efficiency of 50-55% depending on the model. The two air flows (exhaust and return) are kept fully separate to prevent cross-contamination.

This configuration also features Pco control to manage recuperation using logic that can be set according to whether there is an air quality probe.

The free-cooling option for RS unit is made possible by a fourth shutter for external air bypassing the recuperator.

LAMBDA ECHOS GS4S

Unlike the RS4S version, the unit comprises a module containing one or more condensation direct exchange gas heat generators. The generator's characteristics are given in the description of the GC2S version.

ACCESSORIES

ACCESSORIES FOR THE MOTOR-CONDENSER SECTION

- Step-type condensation pressure control
- High and low pressure controllers
- Compressor inlet and delivery valves
- Solenoid valve on the liquid line (double valve for the HP version)
- Liquid tank (standard for the HP version)
- Finished aluminium condenser pack
- Condenser pack with anti-corrosion treatment
- Protective grid with metal filter

ACCESSORIES FOR THE FAN SECTION

- Air discharge different from standard
- Air intake different from standard
- Increased head of the discharge fans (between 100 and 400 Pa)
- Increased head of the intake fans (between 100 and 400 Pa)
- Corrugated filters with F5 filtration rating
- Rigid bag filters with F7 filtration rating
- Hot water heating coil
- Electric heating coil
- 3-way valve with modulating servo-control for regulating the hot water coil
- Sandwich panels of increased thickness (50mm)
- Humidifier with coated electrodes and steam supply arrow
- Shutter servo-controls
- Shutter servo-controls with spring return
- Dirty filter alarm
- Rain-proof covers to protect the air intake and exhaust air outlet shutters.

ELECTRICAL ACCESSORIES

- "Pco" control
- Remote control panel
- RS485 serial interface
- $\text{Cos}\phi \geq 0.9$ power factor correction
- Switching contacts
- Free-cooling heat control
- Electronic soft starter
- Power supply different from the standard

VARIOUS ACCESSORIES

- Vibration dampers
- Noise deadening caps on the compressors

technical data

UNIT SIZE			9.4	10.2	12.2	13.2	14.2	16.2
Cooling								
Nominal cooling capacity	(1)	kW	86,5	95,0	117,5	130,2	142,8	156,4
Sensible cooling capacity	(1)	kW	59,3	65,8	81,2	89,2	97,2	104,7
Compressor absorbed power	(1)	kW	27,0	28,4	32,0	38,4	43,7	49,0
Heating								
Nominal heating capacity	(2)	kW	88,4	96,5	115,4	132,8	149,9	167,4
Compressor absorbed power	(2)	kW	21,2	21,8	31,3	29,7	35,9	41,4
Compressors								
Type			Scroll					
Quantity / Circuits		n°/n°	4 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
Capacity steps		n°	0-25-50-75-100	0 - 50 - 100	0 - 50 - 100	0 - 50 - 100	0 - 50 - 100	0 - 50 - 100
Total oil charge		l	6,8	12,4	12,4	14,4	14,2	16
Total refrigerant charge LAMBDA ECHOS		kg	12,7	12,7	18,88	18,88	22,44	26
Total refrigerant charge LAMBDA ECHOS/HP		kg	16,7	16,7	22,88	22,88	26,44	30
Fan section								
Type			Centrifugal					
Air flow		m³/h	15.400	17.600	20.900	23.650	25.300	27.500
Std available static pressure		Pa	100	100	100	100	100	100
Coil crossing speed		m/s	1,81	2,07	1,83	2,07	2,22	2,41
Air filters								
Thickness		mm	48					
Efficiency			G4					
Motor condenser section								
Type			Axial					
Air flow		m³/h	33.200	33.200	44.000	44.000	43.200	43.200
Hot water heating coil (optional)								
Potential	(3)	kW	115,8	125	156,5	169,1	176,3	185,5
Water flow rate		l/s	1,9	2	2,55	2,76	2,88	3,03
Pressure drop		kPa	19,6	23,8	16,8	19,6	22,4	23,8
Electric heating coil (optional)								
Potential		kW	25	30	30	30	40	40
Stages		n°	2	2	2	2	2	2
Hot air generator for GC2S GC33 GS3S								
Quantity			1	1	2	2	1	1
Model	(4)		L	L	S	S	XL	XL
Maximum rated thermal input		kW	93,4	93,4	108	108	145	145
Generator yield in HI		%	95,3	95,3	93,1	93,1	93,5	93,5
Max methane gas consumption	(5)	m³/h	10,4	10,4	12,3	12,3	16,4	16,4
Amount of condensation produced		l/h	2,6	2,6	2,9	2,9	3,9	3,9
Basic unit size and weights								
Length		mm	5.650	5.650	5.650	5.650	5.650	5.650
Width		mm	2.240	2.240	2.240	2.240	2.240	2.240
Height		mm	1.640	1.640	1.960	1.960	1.960	1.960
Operating weigh		kg	2.070	2.096	2.268	2.274	2.326	2.378

(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