

EPSILON ECHOS air/water chillers and heat pumps



Technical information manual



General

An extensive and complete range composed of twelve models, conceived and developed for providing the maximum comfort and the highest levels of environmental well-being.

Configurations

HP: Reversible heat pump

LE: For connection to remote evaporator

DK: With fan, possibility for duct connection (see specific documentation)

LN: Low sound level

Optional pump-/tank module

Quick facts

- ▶ Eco-friendly cooling
- ▶ Long-lasting reliability
- ▶ Extremely quiet operation
- ▶ Compact dimensions
- ▶ High performance at any temperature
- ▶ Efficient energy performance
- ▶ Fast and quick installation



TECHNICAL FEATURES

EPSILON ECHOS water chiller

Air/water cooled water chillers and heat pumps with axial fans.

EPSILON ECHOSLE

Motocondensing and reversible motocondensing units with axial fans.

STRUCTURE

Made in galvanised steel sheet and painted at 180 °C with RAL 7035 polyester powder, which ensures high weather resistance.

The panels can easily be removed to provide full access to internal parts.

COMPRESSOR

The sizes 6 and 8 are equipped with rotary vane compressors, complete with thermal protection inside the electric engine and rubber anti-vibration mounts.

The sizes 10 and 41 are hermetic scroll type, complete with thermal protection inside the electric engine and rubber anti-vibration mounts.

CONDENSER

The condenser is composed of an aluminium-finned copper-tube multi-row coil, of high efficiency.

The finned coil pack is protected by a metal mesh.

FANS

Helical fans coupled directly to the 6-pole electric motor with external rotor, IP 54 degree of protection.

Each fan has shaped nozzles and is fitted with protection grille in compliance with UNI EN 294.

EVAPORATOR (For EPSILON ECHOS only)

Plate type heat exchanger in AISI 316 stainless steel covered with closed-cell foam.

The heat exchanger is fitted with temperature probe for anti-freeze protection and vane operated flow switch supplied as standard.

COOLING CIRCUIT

BASIC VERSION

Comprises: feeding plug on fluid and suction line, fluid sight glass, dehydrating filter, thermostatic expansion valve for pressure external control, pressure transducer, high and low pressure switches and safety valve (except for sizes 6, 8, 10).

VLE VERSION

Comprises: feeding plug on fluid and suction line, fluid sight glass, dehydrating filter, pressure transducer, high and low pressure switches and safety valve (except for sizes 6, 8, 10).

ELECTRICAL PANEL

With main disconnect switch, breakers for auxiliary and main power circuit protection, remote disconnect switch for compressors. The unit is controlled via microprocessor with display of the main functions.

The electrical panel consists of:

- Automatic disconnect switch for the main and auxiliary power circuits (sizes 6 and 10);
- Main disconnect switch and fuses for main and auxiliary power circuit protection (sizes 14 to 41);
- Compressor remote switches;
- Regulator of fan turns for condensate control;
- Pump relay and remote disconnect switch (sizes from 16 to 34, versions ST1P -ST1P5);
- General alarm dry contacts;
- Microprocessor to control the following functions:
 - Control of ingoing water temperature
 - Anti-freeze protection;
 - Compressor operation timers;
 - Control of high pressure pre-alarm (to avoid in many cases the unit blockage);
 - Alarm signals;
 - Alarm reset;
 - Self-adjusting control to provide proper operation when the plant water content is low;
 - External ON-OFF digital input;
- Display of:
 - Outgoing water temperature;
 - Condensation temperature;
 - Currently set temperature and differential;
 - Alarm description;
 - Hour counter for compressor and pump operation;

CONTROL AND SAFETY DEVICES

- Cooled water temperature control probe (on evaporator intake);
- Anti-freeze probe on evaporator outtake which activates the anti-freeze alarm (with limited trip automatic reset);
- Manual reset high pressure controller;
- Low pressure controller (with limited trip automatic reset);
- Vane actuated mechanical flow switch (supplied as standard);
- Condensing pressure controlled by operation circuit regulator with low external temperatures;
- High pressure safety valve (except for sizes 6, 8, 10);
- Compressor overtemperature protection.

TESTING

BASIC VERSION

The units are factory-tested and supplied complete with oil and refrigerant.

VLE VERSION

The units are factory-tested and supplied with the cooling circuit complete with nitrogen.



VERSIONS

/DC:

Unit with recovery condenser

The condenser is brazed plate type.

The recovery enablement occurs automatically depending on the

water temperature; the safety disablement

of the recovery, in case of high pressure, is also automatically controlled.

It is not available for the HP version.

/HP:

Reversible heat pump

In addition to the basic version components, the unit comprises:

4-way reversing valve, fluid collector, check valves, a second thermostatic valve.

Enablement via microprocessor of the following: summer/winter mode switch, automatic defrosting, digital input for summer/winter mode remote switch.

/LE /HP:

Reversible motocondensing unit (heat pump)

In addition to the basic version components, the unit comprises:

4-way reversing valve, fluid collector, check valves, thermostatic valve.

Enablement via microprocessor of the following: summer/winter mode switch, automatic defrosting, digital input for summer/winter mode remote switch.

/SLN:

Super Low Noise unit

Unit is comprised of an oversized condensing coil and low speed fans with subsequent reduction of noise level.

HYDRAULIC SYSTEM OPTIONS

/ST 1P:

Unit with pump

The unit consists of one circulator (sizes from 6 to 18) or a circulation pump (sizes from 20 to 41), expansion vessel, hydraulic circuit water discharge valve, safety valve calibrated at 6 bar, value corresponding to the maximum allowed operation pressure.

/ST 1PS:

Unit with pump and tank

In addition to the /ST 1P version components, the unit has an insulated storage tank.

STANDARD EQUIPMENT

- Main switch
- Compressor fuses
- Hour meter
- Coil protection guard
- Microprocessor control
- Condensing pressure control with fan speed control
- Self-adaptable control logic
- Flow switch (equipped as standard)
- Certification to directive 97/23 EEC (PED)
- Summer/Winter selection from digital input (enabled by customer from the control device)
- Remote On/Off control from standard-supply digital input
- Condensate drain pan (standard for models 6 to 18)
- Phase monitor

ACCESSORIES

REFRIGERANT CIRCUIT ACCESSORIES

- Liquid line valve
- Liquid line solenoid valve
- Electronic expansion valve
- Brine Kit

HYDRAULIC CIRCUIT ACCESSORIES

- Automatic filling kit with pressure gauge (for ST 1P-1PS version)
- No-frost heater (version ST excluded)
- No-frost heater (for ST 1P version)
- No-frost heater (for ST 1PS version)
- Integration heaters (for HP/ST 1PS version)
- Electronic modulation of the water flow

ELECTRICAL ACCESSORIES

- Power supply: 230/1/50
- Power supply: 400/3/50+N
- RS485 serial interface
- Remote control terminal
- Single voltage-free operating contacts
- User interface
- Electronic soft-starter
- Set point compensated according to external air temperature

VARIOUS ACCESSORIES

- Rubber antivibration mounts (for basic - ST 1P version)
- Rubber antivibration mounts (for ST 1PS version)
- Pre-painted aluminium condensing coil
- Condensing coil treated with anti-corrosion paint
- Packing in wooden crate
- Condensate drain pan
- Vaschetta raccogli condensato

"BRINE KIT" ACCESSORY

It is applied if the evaporator output temperature is included within +3°C and -8°C. It consists in a higher thermal insulation of the exchanger and piping, a specific calibration of the low pressure switches and of the anti-freeze alarm, and dimensioning check of the mechanical thermostatic valve.

If it is not included in the set-up, the "Check condensation" accessory must be added.

ELECTRONIC THERMOSTATIC VALVE

L'utilizzo di questo accessorio è particolarmente indicato sulle unità che si trovano ad operare in condizioni di carico termico molto variabile o di modalità di funzionamento variabili, come nel caso della gestione congiunta di condizionamento e produzione di acqua ad alta temperatura. L'impiego della valvola termostatica elettronica infatti permette di:

- massimizzare lo scambio termico all'evaporatore
- minimizzare i tempi di risposta alle variazioni del carico e di condizioni operative
- ottimizzare la regolazione del surriscaldamento
- garantire la massima efficienza energetica

PRESSOSTATIC CONDENSATION/EVAPORATION CONTROL WITH FAN REV. REGULATOR

The unit microprocessor control verifies all its functioning parameters and carries out a continuous fan speed adjustment by means of a fan rev. regulator, in order to optimise the operative conditions and the unit efficiency.

Moreover, this adjustment has a sound level reduction effect on the unit. In fact, the typical conditions where the control will modulate the fan speed are at night and mid-seasons. This means that every time there is a chance, the machine will reduce the fan speed and also its sound level to its minimum.

SELF-ADAPTABLE REGULATION LOGIC

This function allows the unit control to dynamically vary the outlet water set point according to the stop and functional cycles of the machine: in practice, by increasing and reducing the water outlet temperature, the control avoids that compressor start-ups are too close in time, decreasing the number of peaks and protecting the unit components

REMOTE ON/OFF FROM DIGITAL INPUT

This function is standard on all units and consists in a remote contact that allows to switch on and off the machine through a signal that can be taken inside the building by a BMS (Building Management System) system.

SUMMER/WINTER SELECTION FROM DIGITAL INPUT

This function is standard on all heat pumps. When the unit is switched on, a functioning mode must be set, which can be either the heat pump or the chiller one. Through this remote contact, the functioning mode can be modified even inside the building and without a direct access to the microprocessor control

FILLING SYSTEM WITH MANOMETER

This accessory allows the automatic load of the hydraulic system, the adjustment of the correct working pressure, which can always be verified by using the manometer, and enables the continuous maintenance of such pressure, reintegrating the missing water if necessary.

RS-485 INTERFACE

The growing diffusion of both domotic and BMS (Building Management System) systems led to the integration of all the system components under an only supervision. To respond to this request, the unit can be equipped with a serial board that allows the correct machine integration in the "building-system", by using MODBUS or CAREL communication protocols..

REMOTE CONTROL USER TERMINAL

Intended for a professional user, it consists in a faithful reproduction of the control panel, from where the unit can be completely set and all its parameters visualised on the display. Insertion of passwords, which enable different access levels, are required to access the parameters.

The type of terminal depends on the control installed on the unit

USER INTERFACE µAD

By using a simple and intuitive interface, this device allows to carry out the following main functions:

- Switching on and off the unit
- The unit function mode switch-over from heat pump to chiller and vice versa
- Enabling the sleep function
- The weekly timer thermostat function with automatic ON/OFF management of the unit
- Displaying unit functioning conditions

SOFT-STARTER

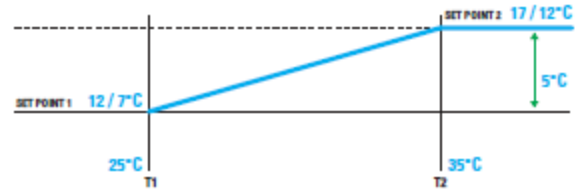
Blue Box units adopt all the required functioning set-ups and logics to minimise peak currents. The Soft-Starter accessory allows a further 40% reduction of normal current peaks, through an electronic control of the electric motor start-up.

COMPENSATION OF THE SET-POINT according to the external air temperature

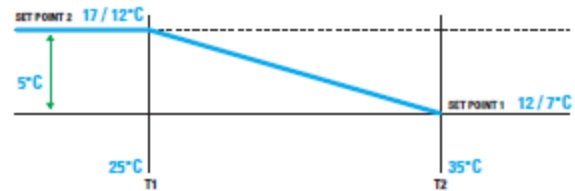
The unit microprocessor control can compensate the set point in a dynamic way, on variation of the external air temperature. The compensation can be positive or negative: with positive compensation, on increase of the air temperature the functioning set also increases. With negative compensation on increase of the air temperature the set decreases. Compensation can be made either on the summer set point or on the winter set point (heat pumps).

By default, both summer and winter negative compensation is set, but this configuration can be modified from the microprocessor keyboard. Unless otherwise specified, default values are indicated in the graphics below.

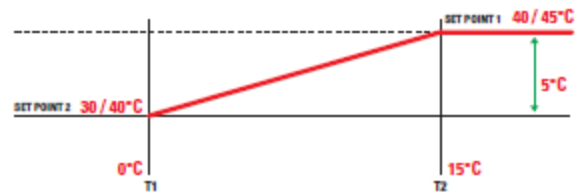
SUMMER COMPENSATION - POSITIVE



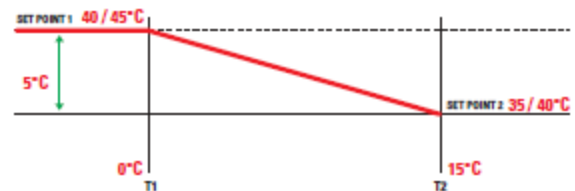
SUMMER COMPENSATION - NEGATIVE



WINTER COMPENSATION - POSITIVE



WINTER COMPENSATION - NEGATIVE



EPSILON ECHOS - TECHNICAL DATA

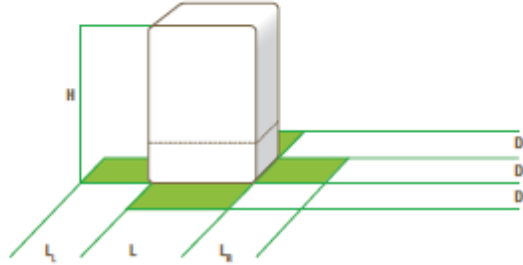
UNIT SIZE		6	8	10	14	16	18	21	25	28	31	37	41	
Cooling (Gross values)														
Nominal cooling capacity	(1)	kW	5,7	7,1	8,8	13,0	14,9	17,7	19,0	23,7	27,1	30,2	35,6	40,1
Total power input for cooling	(1),(2)	kW	2,1	2,8	3,5	4,6	5,6	6,5	6,2	8,3	9,6	10,7	12,1	13,6
EER	(1)		2,76	2,54	2,48	2,81	2,66	2,73	3,09	2,85	2,84	2,83	2,94	2,94
ESEER			3,31	3,12	2,93	3,29	3,16	3,26	3,64	3,29	3,29	3,25	3,37	3,39
Efficiency class			C	D	E	C	D	C	B	C	C	C	B	B
Cooling (EN 14511 values)														
Nominal cooling capacity	(1),(8)	kW	5,7	7,0	8,8	12,8	14,7	17,6	18,9	23,4	26,9	30,0	35,3	39,7
EER	(1),(8)		2,73	2,51	2,46	2,70	2,56	2,64	3,00	2,75	2,75	2,75	2,85	2,85
ESEER	(8)		3,11	2,93	2,75	2,96	2,84	2,93	3,21	2,96	2,96	2,93	3,04	3,02
Efficiency class			C	D	E	D	D	D	B	C	C	C	C	C
Heating (Gross values)														
Nominal heating capacity	(3)	kW	6,5	8,0	10,0	14,1	16,4	19,5	20,5	26,3	30,5	33,5	38,1	43,6
Total power input for heating	(2),(3)	kW	2,3	2,8	3,5	4,7	5,5	6,4	6,4	8,0	9,2	10,6	11,9	13,5
COP	(3)		2,81	2,86	2,88	3,03	2,97	3,04	3,19	3,26	3,33	3,17	3,21	3,24
Efficiency class			C	C	C	B	C	B	B	A	A	B	A	A
Heating (EN 14511 values)														
Nominal heating capacity	(3),(8)	kW	6,5	8,1	10,1	14,2	16,6	19,7	20,7	26,5	30,7	33,8	38,4	43,9
COP	(3),(8)		2,80	2,84	2,86	2,97	2,92	2,99	3,14	3,20	3,27	3,12	3,15	3,18
Efficiency class			D	C	C	C	C	C	B	A	A	B	B	B
Compressors														
Quantity/Refrigerant circuits		n°/n°	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Capacity steps		%	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100
Fans														
Quantity		n°	1	1	1	2	2	2	2	2	2	2	2	2
Air flow		m³/h	4.000	4.000	3.800	8.000	8.000	7.600	14.000	14.000	13.200	19.000	19.000	17.800
Evaporator														
Water flow rate		l/h	982	1.214	1.512	2.229	2.557	3.047	3.273	4.067	4.666	5.192	6.119	6.889
Pressure drop		kPa	5	7	6	46	46	46	32	47	46	44	45	56
Hydraulic module														
Available pump pressure		kPa	55	51	50	44	42	40	153	108	93	76	135	104
Storage tank capacity		l	70	70	70	70	70	70	140	140	140	140	140	140
Sound level														
Sound power value (standard unit)	(4)	dB(A)	63	65	66	68	70	70	72	73	73	74	75	75
Sound pressure value (standard unit)	(5)	dB(A)	32	34	35	37	39	39	41	42	42	42	43	43
Sound power value (SLN version)	(4)	dB(A)	58	60	62	63	65	66	67	68	68	69	70	-
Sound pressure value (SLN version)	(5)	dB(A)	27	29	31	32	34	35	36	37	37	37	38	-

1) External air temperature 35°C; evaporator ingoing-outgoing water temperature 12-7°C
 2) The total capacity is represented by the sum of the power absorbed by compressors and that absorbed by fans
 3) External air temperature 7°C BS, 6°C BU; condenser ingoing-outgoing water temperature 40-45 °C
 4) Noise power levels measured according to ISO 3744, under nominal operating conditions

5) Sound pressure levels measured at 10 metres from the unit in free field under nominal operating conditions, according to ISO 3744
 6) Values according to EN 14511-3:2011

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EPSILON ECHOS - TECHNICAL DATA



BASIC VERSION E ST1P			6	8	10	14	16	18	21	25	28	31	37	41
L	Length	mm	925			925			1.105			1.305		
D	Depth	mm	375			375			505			505		
H	Height	mm	700			1.350			1.385			1.585		
W	Operating weight	(1) kg	74	82	89	118	135	147	178	190	224	324	326	337

VERSION ST1PS			6	8	10	14	16	18	21	25	28	31	37	41
L	Length	mm	925			925			1.105			1.305		
D	Depth	mm	375			375			505			505		
H	Height	mm	1.049			1.699			1.850			2.050		
W	Operating weight	(1) kg	123	131	138	183	200	212	312	318	332	417	424	435

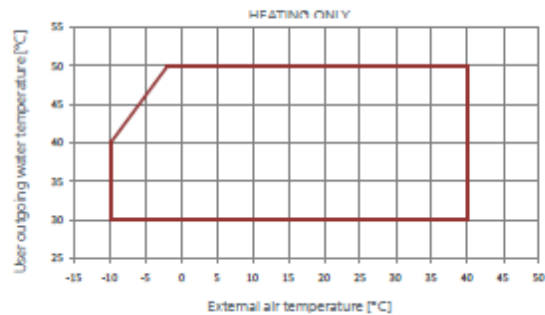
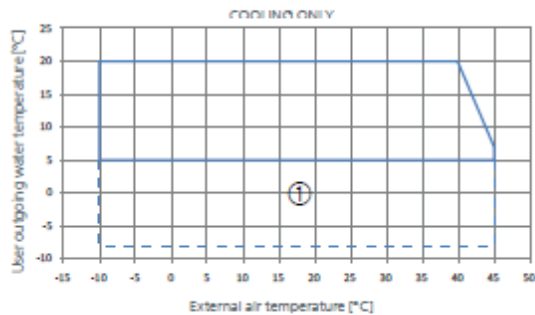
VERSION SLN AND SLN/ST1P			6	8	10	14	16	18	21	25	28	31	37	
L	Length	mm	925			925			1.105			1.305		
D	Depth	mm	375			375			505			505		
H	Height	mm	700			1.350			1.385			1.585		
W	Operating weight	(1) kg	74	82	119	118	135	178	178	190	322	324	326	

VERSION SLN/ST1PS			6	8	10	14	16	18	21	25	28	31	37	
L	Length	mm	925			925			1.105			1.305		
D	Depth	mm	375			375			505			505		
H	Height	mm	1.049			1.699			1.850			2.050		
W	Operating weight	(1) kg	123	131	182	183	200	310	306	298	415	417	424	

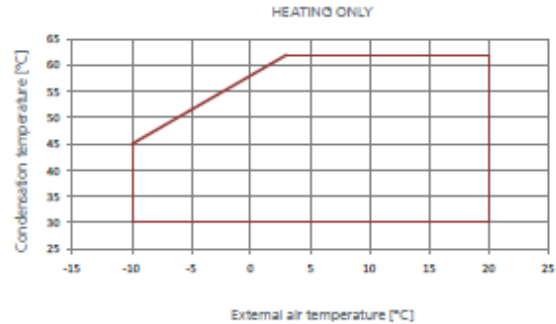
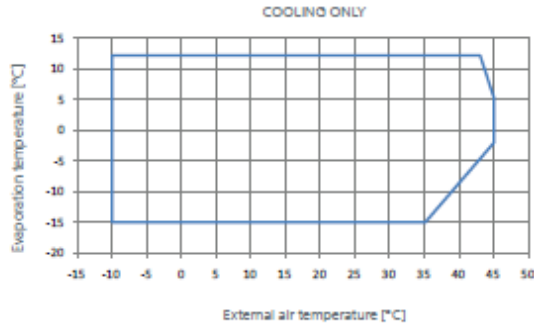
CLEARANCE AREAS			6	8	10	14	16	18	21	25	28	31	37	41
LL	Left side	(2) mm	300			300			300			300		
LR	Right side	(2) mm	600			600			600			600		
DF	Front	(2) mm	900			900			900			900		
DR	Back	(2) mm	300			300			300			300		

(1) The reported weight is only indicative and may be different depending on unit outfit

(2) The clearance areas are reported considering as front side the side with the fans



The heat exchanger on the user side must have a thermal expansion loop between -4°C and 7°C
 T the unit can operate within these values only with glycol/ water mixture on the evaporator side



EPSILON ECHOS - ELECTRICAL DATA

BASIC VERSION			0	8	10	14	16	18	21	25	28	31	37	41
Maximum absorbed power	(1)	kW	3.1	3.9	5.0	6.6	8.0	9.3	9.5	11.6	13.1	15.1	16.7	18.7
Maximum absorbed current	(2)	A	16.8	19.8	9.1	11.9	14.1	16.4	18.3	21.5	24.4	28.0	40.0	41.0
Maximum input current	(3)	A	61	82	67	67	68	74	76	99	99	101	163	165
Maximum input current with soft-starter (option)	(3)	A	3	49	40	40	41	44	45	59	59	60	97	99
Additional electric resistance (optional)	(4)	kW	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0	9.0	9.0	9.0
VERSION ST1P OR ST1PS			6	8	10	14	16	18	21	25	28	31	37	41
Maximum absorbed power	(1)	kW	3.3	4.1	5.2	6.8	8.2	9.5	10.0	12.1	13.6	15.6	17.6	19.6
Maximum absorbed current	(2)	A	17.7	20.7	10.0	13.1	15.3	17.6	21.1	24.3	27.2	30.8	42.6	43.6
Maximum input current	(3)	A	62	83	68	68	69	75	79	102	102	103	165	167
Maximum input current with soft-starter (option)	(3)	A	37	50	41	41	41	45	47	61	61	62	99	100
Additional electric resistance (optional)	(4)	kW	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0	9.0	9.0	9.0
POWER SUPPLY			6	8	10	14	16	18	21	25	28	31	37	41
Standard power supply		V/Hz	220/1~50				400/3N~50							
Optional power supply	(4)	V/Hz	400/3N~50		220/1~50									

All reported data refer to unit with standard power supply.

(1)Electrical power that must be supplied by the mains to power the unit

(2)Tripping current of unit Internal breakers. This value is never exceeded and must be used to size the line and its protections (refer to the electric diagram supplied with the unit)

(3)Maximum Input current calculated considering the compressor start and the maximum current absorbed by all other devices

(4)To be requested when ordering

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