



DESIGN EXCELLENCE

Blue-Airco is an advanced marine low-voltage air-conditioning system that offers a highly efficient and sustainable solution to ensure precise climate control giving the best comfort on board. The 12, 24 and 48 VDC variants currently under patent, provide a solution suitable for all types of craft, from small boats to vessels over 60 feet.

Blue-Airco operates on low-voltage direct current that is converted into three-phase alternating current, always at low voltage, with variable voltage and frequency, thus allowing optimal and precisely adjustable performance, ensuring constant internal temperature within the compartment. The system includes an electronic expansion valve that allows control of the superheating and subcooling values of the refrigerant fluid, optimizing the energy efficiency in any operating condition. The fan section is equipped with a variable-speed high efficiency BLDC motor, electronically controlled to ensure high performance and silence.

The compressor starts smoothly at very low speed thanks to the torque and speed control, then it accelerates to cool down or heat up the air fast. As the air temperature approaches the desired value the compressor and fan will slow down in order to maintain the air temperature very close to the SET POINT, without fluctuations, while the expansion valve will finely regulate the refrigerant flow rate to the compressor to optimize the performance with the highest energy saving.

This is not just a modification or enhancement to something that already exists; it is entirely new and ground-breaking technology for the boat industry reducing energy consumption by 50% compared to ON-OFF systems. With no start-up peak current and low power consumption this allows vessels without a generator to run air conditioning silently from their domestic batteries. In ECO mode these units draw no more than 160W in 12V, ensuring peace and quiet overnight.

Blue-Airco offers numerous advantages over traditional marine air conditioning systems, including:

- Maximum thermal comfort without temperature fluctuations;
- Great energy saving in every working condition;
- No start-up peak current thanks to inverter technology;
- Quiet and reliable operation by controlling fan and compressor speed and superheating;



- Corrosion resistance using titanium alloy heat exchanger;
- Long lifespan from design efficiencies, materials and state of the art technology;
- Versatility of use.

The low voltage air-conditioners currently available in the marine market are ON-OFF type or 2-speed compressors without electronic expansion valve and none permit fine adjustment the speed of the compressor and fan, causing high energy consumption and poor comfort, especially at partial loads. There are in the marine market also “low voltage” variable speed air-conditioners, however they first convert the low voltage DC power to high voltage AC and then they employ a rectifier to convert the high voltage AC to high voltage DC. The DC/AC converter and rectifier cause important energy losses, high voltage in the system, higher temperature with decrease of reliability as a consequence.

ENVIRONMENTAL STATEMENT

Blue-Airco has invested significant resources in research and development to reduce to a minimum the refrigerant emissions and to reach “leakage zero”. By optimizing the heat exchangers and minimizing the overall volume of the refrigerant circuit, the refrigerant charge has been reduced by around 30% compared to other air-conditioners available in the marine market. The target “leakage zero” has been reached by eliminating flare joints and pressure testing every air-conditioning unit with helium allowing detection of even the smallest leaks. Moreover, the very low vibration level of the variable speed compressor and the titanium condenser coil, protecting the circuit from marine corrosion, ensure the integrity of the circuit over the time.

The environmental impact has been reduced at each stage of the production process, for example, the soldering to join copper pipes is done using hydrogen, which is produced on-site and has significantly improved the working environment for the employees and eliminated other normally occurring health and safety issues associated with brazing. At the same time, it gives a higher quality due to better soldering with a more concentrated heat and electronically adjusted flame. The climate impact is negligible because the hydrogen is produced locally at the workstations from distilled water, thus eliminating the consumption of conventional energy sources such as propane and acetylene and thereby no need for truck transportation of bottles.



PERFORMANCE AND AUTONOMY

self-contained unit	compressor speed	cooling capacity BTU/h	input power W	input current A
SDC08V12	max	8,400	420	35
	med	6,700	290	24
	min (ECO)	4,200	160	13
SDC12V12	max	12,400	530	44
	med	8,200	330	28
	min (ECO)	4,700	150	13
SDC10V48	max	10,700	790	16
	med	8,200	450	9
	min (ECO)	4,500	200	4
SDC18V48	max	18,200	1100	23
	med	12,600	600	13
	min (ECO)	5,000	220	5

Tested at 32°C (89.6°F) seawater temperature (tropical conditions)

AIR-CONDITIONING AUTONOMY BASED ON ENERGY STORAGE (SEAWATER TEMPERATURE 32°C, TROPICAL CONDITIONS)

Self-contained unit 8.000 BTU/h (SDC08V12) + pump (007001PUMOP12V)

Lithium LiFePo4				Average speed	ECO mode	MAX speed
Battery Voltage	Battery Energy	Theoretical storage	Real storage (80%)	Autonomy air-cond.	Autonomy air-cond.	Autonomy air-cond.
V	Ah	kWh	kWh	h	h	h
12	100	1.2	0.96	2.8	4.6	2.0
12	200	2.4	1.92	5.6	9.1	4.1
12	300	3.6	2.88	8.5	13.7	6.1
12	400	4.8	3.84	11.3	18.3	8.2

Self-contained unit 12.000 BTU/h (SDC12V12) + pump (007001PUMOP12V)

Lithium LiFePo4				Average speed	ECO mode	MAX speed
Battery Voltage	Battery Energy	Theoretical storage	Real storage (80%)	Autonomy air-cond.	Autonomy air-cond.	Autonomy air-cond.
V	Ah	kWh	kWh	h	h	h
12	100	1.2	0.96	2.4	4.4	1.6
12	200	2.4	1.92	4.8	8.7	3.2
12	300	3.6	2.88	7.2	13.1	4.8
12	400	4.8	3.84	9.6	17.5	6.4

Self-contained unit 10.000 BTU/h (SDC10V48) + pump (GEN001PUMOP48V)						
Lithium LiFePo4				Average speed	ECO mode	MAX speed
Battery Voltage	Battery Energy	Theoretical storage	Real storage (80%)	Autonomy air-cond.	Autonomy air-cond.	Autonomy air-cond.
V	Ah	kWh	kWh	h	h	h
48	100	4.8	3.84	7.7	15.4	4.6
48	200	9.6	7.68	15.4	30.7	9.1
48	300	14.4	11.52	23.0	46.1	13.7
48	400	19.2	15.36	30.7	61.4	18.3
Self-contained unit 18.000 BTU/h (SDC18V48) + pump (GEN001PUMOP48V)						
Lithium LiFePo4				Average speed	ECO mode	MAX speed
Battery Voltage	Battery Energy	Theoretical storage	Real storage (80%)	Autonomy air-cond.	Autonomy air-cond.	Autonomy air-cond.
V	Ah	kWh	kWh	h	h	h
48	100	4.8	3.84	5.5	12.0	3.2
48	200	9.6	7.68	11.0	24.0	6.4
48	300	14.4	11.52	16.5	36.0	9.6
48	400	19.2	15.36	21.9	48.0	12.8