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Version: December 05, 2024, Marine Energy Storage System



Marine Energy Storage System

ONE-STOP SOLUTION



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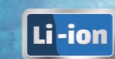
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*ROYPOW,
Your Trusted Partner*

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Innovative Energy Storage System for Marine Use

Introduction of ROYPOW Marine ESS

Why ROYPOW Marine ESS

Complete Electric System - One-stop Solution



ROYPOW

For One-stop New Energy Solutions

- R&D, manufacturing and sales of motive power systems and energy storage systems as one-stop solutions
- Fully automatic production lines, a full range of test equipment and an advanced MES
- Covering Low-Speed Vehicles' Batteries, Industrial Batteries, as well as Residential ESS, Commercial & Industrial ESS, and Mobile ESS
- Self-development of power electronics technologies, including PCS, BMS, and EMS



750+ Employees
190+ R&D People
105,000 m² Headquarters Floor Area
2,500 m² Testing Center
202 Patents

Quality Control Certificates:

- ✓ Environmental Management System: ISO 14001:2015
- ✓ Occupational Health and Safety Management System: ISO 45001:2018
- ✓ Quality Management System: ISO 9001:2015, IATF16949:2016
- ✓ Information Security Management System: ISO/IEC 27001:2022
- ✓ Social Accountability Management System: SA8000:2014
- ✓ Hazardous Substance Process Management: IECQ QC 080000



Product Certifications:

UL 1973, UL 9540A, UL 9540, UL 2580, UL 2271, UL 1741			FCC, IEC/EN 61000-6, BS EN IEC 61000-6
IEEE 1547			IEC 60730, ISO 13849-1
IEC 62619			UN 38.3
EN 62477, EN 62040, (EU) 2023/1542, EN 62109-1, EN 62109-2			RoHS Directive 2011/65/EU & (EU) 2015/863

R&D and Manufacturing Highlights

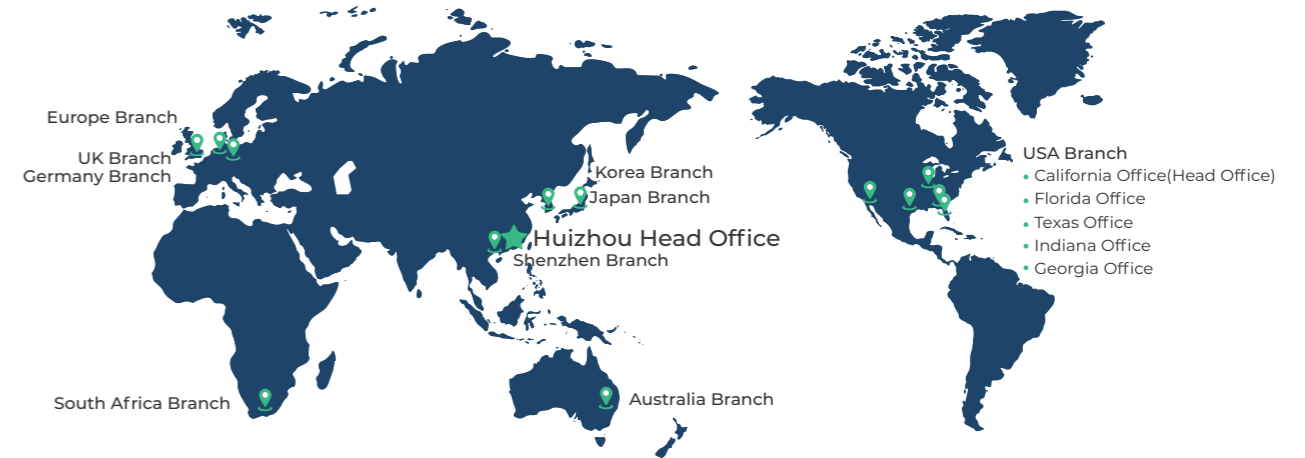
As a result of these investments, ROYPOW is capable of "end-to-end" integrated delivery, making our products out-perform the industry norms.

- Fully Automatic Production Lines
- BMS, PCS, EMS All Designed in House
- All-round Testing
- Advanced MES System

Global Sales and Service Network

- Timely Delivery
- Hassle-free After-sales Service
- Fast Response Technical Support

ROYPOW has comprehensively unfolded its overseas market layout to ensure the localization of R&D, manufacturing, marketing and service, becoming one of your most reliable and valuable partners.



Upgrading to New Technology, with Our Turnkey Solutions.

With years of dedication to new energy solutions, we are proud to offer customers professional solutions for:

- Low-speed Vehicle Batteries
- Industrial Batteries
- Battery Systems for Off-highway Applications
- Battery Systems for Emerging Applications
- Residential Energy Storage Systems
- Commercial & Industrial Energy Storage Systems
- Mobile Energy Storage Systems
- Chargers



Innovative Energy Storage System For Marine Use

ROYPOW Marine ESS (energy storage system) is specifically designed to meet the energy needs on the water. Whether it is a long or short trip, our system can support you all the way. It is ideal to be installed on your luxurious boats.



Motor Yachts



Sailing Yachts

INTEGRATED SEAMLESSLY
INTO NEW OR EXISTING YACHTS

UNDER **35** FEET

ROYPOW Marine ESS

Greener, Safer and Quieter!

Whether you sail for fun or on a professional basis, it is of the utmost importance to have a safe and reliable power supply for all the electrical equipment to properly function, especially in the middle of the sea!

ROYPOW marine ESS delivers a pleasant sailing experience with all the power needed for household equipment onboard and leaves the hassles, fumes and noise behind. Now it's time to upgrade your yachts and start your journey freely and independently!



Just Enjoy the Luxury Yacht Life!

NO WORRY OF

Noisy environment

Frequent maintenance

Air pollution

Violation against the anti-idling law

High fuel costs

Enjoy Exceptional Value with ROYPOW Marine ESS

ROYPOW marine energy storage system allows motor / sailing yacht owners, clubs or charter companies to explore on the sea freely with complete peace of mind by providing both AC and DC power to run an air conditioner and other high power loads in all climate conditions – all silently and emission-free.



Diesel Engine VS ROYPOW Marine ESS



Marine energy storage system	ROYPOW LiFePO ₄ battery-driven	Diesel / lead-acid battery-driven
Operation costs	Eliminates your exposure to fluctuating fuel costs, less maintenance	Expensive fuel costs, frequent maintenance on engine wear and battery swapping
Eco-friendly	Emission-free	Large quantities of fume emission and high corrosion
Noise	Low noise, runs quieter	Loud
Maintenance	Minimal	Need belt, oil, filter changes and frequent replacements
Engine idling	No idling time, engine-free	Lots of idling, rely on the engine

Why ROYPOW Marine ESS

Multiple Charging Sources

48 V Alternator
To charge the battery efficiently when the yacht is cruising

Solar Power
Save the run time of engine or generator

Shore Power
Utilize power from the onshore electricity grid when in port

Better Sailing Experience

No Carbon Monoxide
From generator & engine idling

Quiet
No annoying engine noise

Zero Emission
No worry of environmental legislation

Intelligent Management

Bluetooth Connectivity (Optional)
Monitoring battery status from mobile phones anytime

4G Module
For software upgrading, remote monitoring and diagnosing

Cost-effective

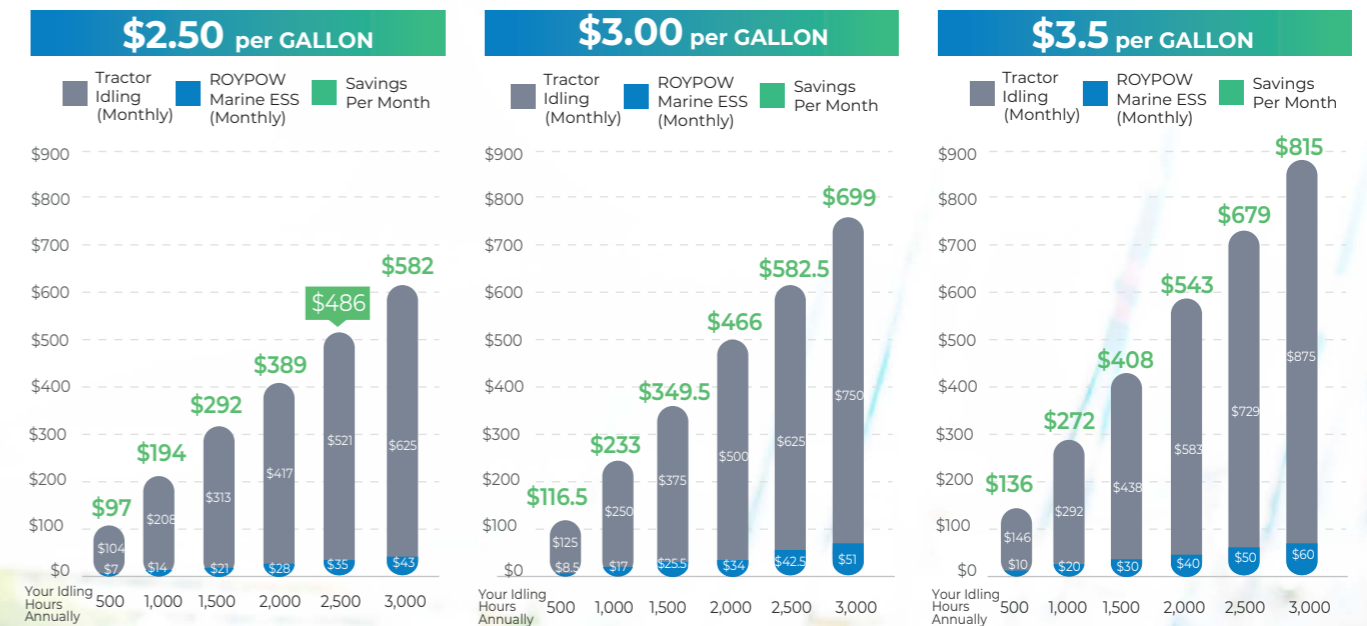


Cost-effective
No belt, oil, filter changes and no wear on engine idling

Fast-charging
Up to 1.5 hours for full charge with maximum output of 11 kW/h

Fuel Savings
Reduced fuel consumption to save on bills

How ROYPOW Marine ESS saves on Fuel Bills



Example:

If you idle **2,500** hours per year with a fuel price of **\$2.50** per gallon, you can save up to **\$486** per month on fuel alone with ROYPOW marine ESS!

Engine idling assumptions

Annual miles.....**100,000** MI.
Idling fuel cost**1.0** gph

Save your cost per month with ROYPOW marine ESS

(based on fuel consumption only). Fuel savings from start / stop off time is not included.

*Fuel consumption will vary based on ambient temperature and tractor cab insulation characteristics.

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions. The fuel prices above are based on US dollars. Fuel cost will vary from countries and regions



Intelligent Management System

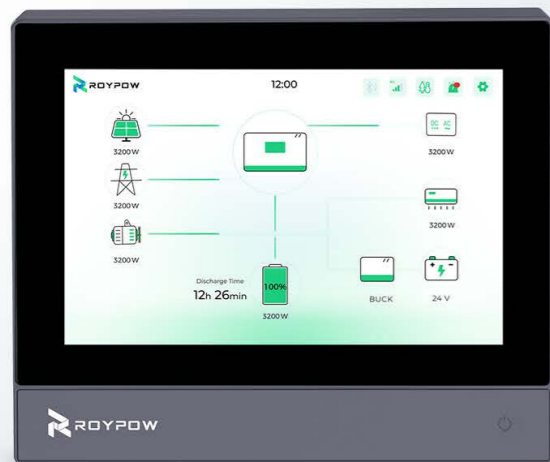


01 Remote Monitoring & Control

- ✓ Monitor and manage marine energy storage system from mobile phones anytime and anywhere
- ✓ Remotely turn on / off the HVAC system in advance for unrivaled comfort and convenience

02 Wi-Fi Connection Everywhere

Automatically switch to available network operators globally with built-in wireless data terminal ✓



XTouch 7+ Energy Management System (EMS)

The energy management system (EMS) collects, manages and coordinates equipment in the region, ensuring the safe, stable, and efficient operation of the system. It can realize real-time monitoring, coordinated control, and economic operation management, and support functions such as load tracking, photovoltaic power forecasting, and demand-side management.

PDU Power Distribution Unit

Power Distribution Unit is an essential component of vehicle and marine energy storage systems. Its main function is to distribute electrical currents to various endpoints, connect power supply equipment, and maintain the proper operation of electrical devices.

Highly integrated system with multiple interfaces that can support the entire range of marine components



Save space and ensure a rational distribution of electrical circuits

Support up to 8 XBmax5.1L batteries, delivering continuous power output of 350A and 17.9kW/pcs

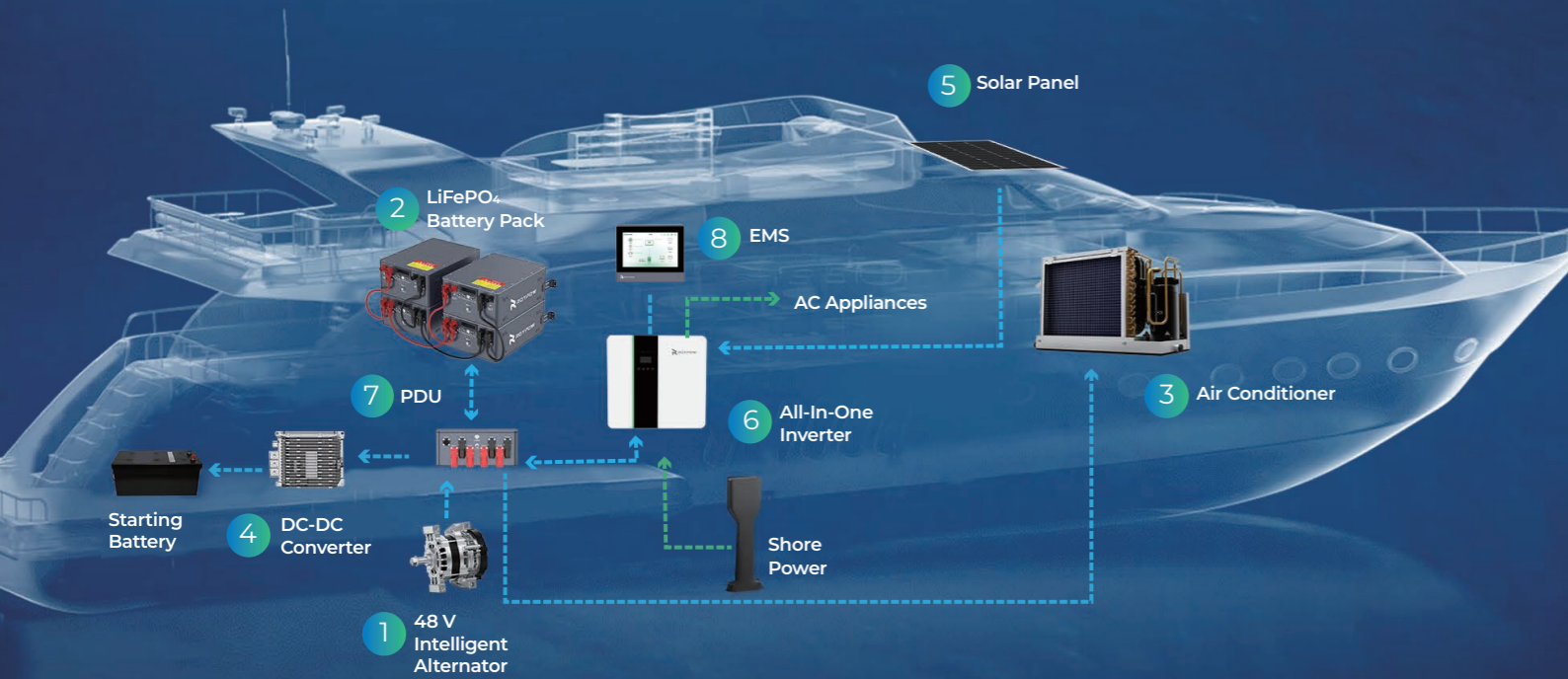


IP65 protection rating



Complete Electric System One-Stop Solution

Recommended for yachts under 65 feet, ROYPOW offers a one-stop power solution - alternator, battery pack, air conditioner, DC-DC converter, inverter (optional) & solar panel (optional) in one system, delivering the most ecological and stable source of onboard power.



Ultra-thin

Marine Energy Storage Packs Included

1 48 V Intelligent Alternator

48 V intelligent alternator's overall popularity is attributed to its high safety and efficiency, which offers the best sailing experience on the sea.



Up to **5 kW**
Continuous Generated Output

Up to **85%**
Conversion Efficiency

2 LiFePO₄ Battery

High energy storage capacity of ROYPOW LiFePO₄ battery meets the power requirements for cabins without the need to idle or run the generator.



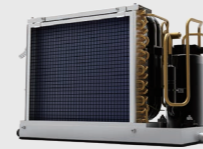
Up to **10** Years Design Life

0 Maintenance

>6,000 Life Cycles

3 Air Conditioner

Designed for marine environments, this air conditioner with variable speed expels the heat out of the cabin effectively and runs quietly, creating a cozy resting environment.



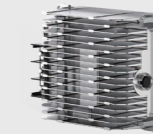
15,000 BTU / h Cooling Capacity

13,000 BTU / h Heating Capacity

>15 EER High Efficiency

4 DC-DC Converter

Designed specifically for marine use, the bidirectional DC - DC converter is vibration-tested to ensure it can withstand the rigid marine conditions with high performances retained.

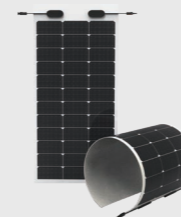


Automotive-grade

Max. efficiency at **95%**

5 Solar Panel (Optional)

ROYPOW solar panel is designed to provide long-lasting durability and performance in the extreme marine conditions.



Foldable

Lightweight

6 All-in-one Inverter (Optional)

The all-in-one solar charge inverter is a combination of an inverter, a battery charger and an MPPT solar charge controller into one complete system to reduce component and simplify installation.



ALL IN ONE

Inverter + Battery Charger + MPPT Solar Charge Controller

7 PDU (Power Distribution Unit)

Its main function is to distribute electrical currents to different power supply equipment, and maintain the proper operation of electrical devices.



Maximum Bus Power **17.9** kW / pcs

Maximum Bus Current **350** A

IP65

Parallel Working for Higher Power

8 EMS (XTouch 7+)

It collects, manages and coordinates equipment in the region, ensuring the safe, stable, and efficient operation of the system.

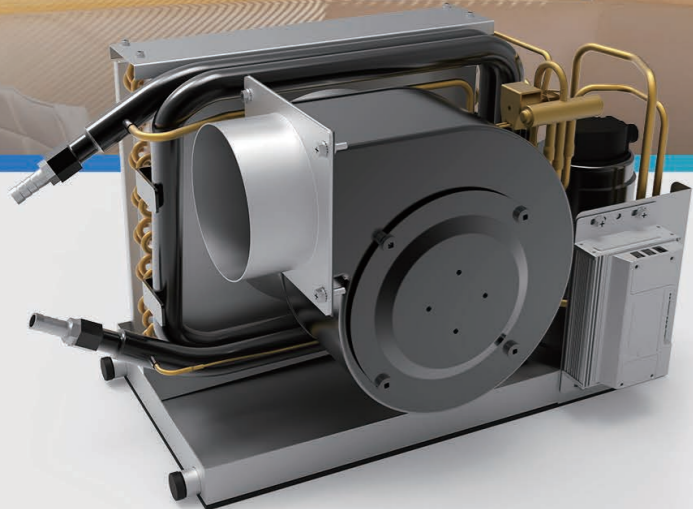


Real-time Monitoring

Coordinated Control

Economic Operation Management

Operating Temperature:
-4°F ~ 158°F (-20°C ~ 70°C)



48V DC Water-Cooled Inverter Air Conditioner

Ultimate Comfort for Every Voyage

15,000 BTU/h
Max. Cooling Capacity

13,000 BTU/h
Max. Heating Capacity

>15 EER
High Efficiency



High Efficiency

Powerful cooling & heating capacity offers instant comfort



Durable & Reliable

The titanium alloy condenser protects against salty air and high-humidity environments and prolongs service life



Energy & Cost Saving

Energy efficiency is achieved through advanced inverter and heat pump technology, maximizing return on investment

Technical Specifications



Model	XKFR15-YTM
Power Supply	48V DC
Cooling Capacity	5,000-15,000BTU
Heating Capacity	5,000-13,000BTU
Cooling Input Power	(500-1,200W)
Heating Input Power	(600-1,200W)
EER (Energy Efficiency Ratio)	15.3BTU/W.h (4.5W/W)
COP (Coefficient of Performance)	14.3BTU/W.h (4.2W/W)
Maximum Power	1500W
Maximum current	30A
Cooling Air Volume	363CFM-(620m ³ /H)
Heating Air Volume	363CFM-(620m ³ /H)
Noise Level	<55dB(A)
Temperature Applicable Range	32°F/122°F (0~50°C)
Applicable Voltage Range	40V~60V
Net Weight	61.5 lbs. (27.9 kg)
Product Dimension (L x W x H)	25.9 x 14.3 x 17 inch (658 x 363 x 432 mm)
Sea Water Flow	0.75m ³ /H
Refrigerant	R32/1.1 lbs (500 g)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions

Reliable Power for Your Journey

Travel to the most beautiful places with ROYPOW LiFePO₄ batteries that are built tough to withstand the most rugged conditions so you can spend more time enjoying the great outdoors and less time worrying about power.



Technical Specifications

Model	XBmax 5.1L-B	XBmax 5.1L-24-A	XBmax 5.1L-12C
Rated voltage (cell 3.2 V)	51.2 V	25.6 V	12.8 V
Rated capacity (@ 0.5C, 77°F/ 25°C)	100 Ah	200 Ah	400 Ah
Maximum voltage (cell 3.65 V)	58.4 V	29.2 V	14.6 V
Minimum voltage (cell 2.5 V)	40 V	20 V	10 V
Standard capacity (@ 0.5C, 77°F/ 25°C)	≥ 5.12 kWh (support parallel connection up to 8 pcs)		
Continuous discharge / charge current (@ 77°F/ 25°C, SOC 50%, BOL)	100 A / 50 A	200 A / 100 A	200 A / 100 A
Cooling mode	Natural (passive) cooling		
Working range of SOC	5% - 100%		
Ingress protection rating	IP65		
Life cycle (@ 77°F/ 25°C, 0.5C charge, 1C discharge, DoD 50%)	> 6,000		
Remaining capacity at the end of life (according to warranty period, driving pattern, temp. profile, etc)	EOL 70%		
Operating temperature	Charging / Discharging temperature: -4 °F ~ 131°F (-20°C ~ 55°C)		
Storage temperature	Short-term (within one month): -4 °F ~ 131°F (-20°C ~ 55°C) Long-term (within one year): 32 °F ~ 95°F (0°C ~ 35°C)		
Dimensions (L x W x H)	20.08 x 15 x 15 inch (510 x 381 x 205 mm)		
Weight	121.25 lbs. (55 kg)		

Note: 1. Only authorized personnel are allowed to operate or make adjustments to the batteries
 2. All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions
 3. 6,000 cycles achievable if the battery is not discharged below 50% DOD. 3,500 cycles at 70% DoD

Up to

10

Years
Design Life

Zero

Maintenance

>6,000

Life Cycles

IP65

Rating

Scalable capacity to fit your power needs


8

In Parallel
Maximum


40

kWh In Parallel
Maximum


Advantages




Ultra Safe
Multiple protections, thermal & chemical stability




Long Runtime
Longer service life; consistent high performance




High Reliability
Automotive grade lithium ferro-phosphate cells (LiFePO₄ cells)




Maintenance Free
No filling of distilled water; no frequent battery replacements




Fast Charging
Can be charged much faster than traditional lead-acid batteries



More Durable
Engineered to resist vibration & shock



Light Weight
Space & weight saving, easy to stack and store



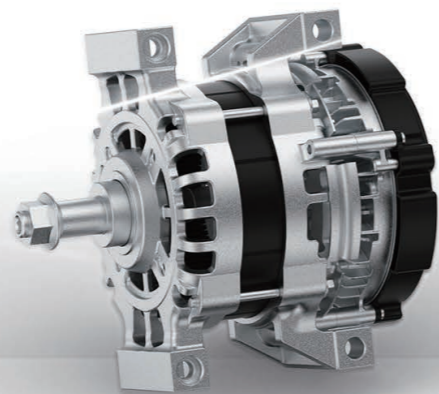
Wide Working Temperature Range
Discharge at -4°F - 131°F (-20°C - 55°C)

! Tips: Why Choose LiFePO₄ Batteries For Marine Use?






Except providing longer life, LiFePO₄ batteries have higher energy density and are more stable and reliable. They are environmentally "green" and lightweight to reduce the overall weight.

48 V Intelligent Alternator

48 V intelligent generator's overall popularity is attributed to its high safety and efficiency, which offers the best sailing experience on the sea.



It can achieve

-  Automotive-grade, safe and reliable
-  Energy saving and emission reduction
-  Smooth start-stop, torque boosting during vehicle acceleration
-  Wide working temperature range: -4°F ~ 221°F (-20°C ~ 105°C)
-  Power generation efficiency management and rate optimization prevent lithium battery's over-heating / over-charging damages, etc

Technical Specifications

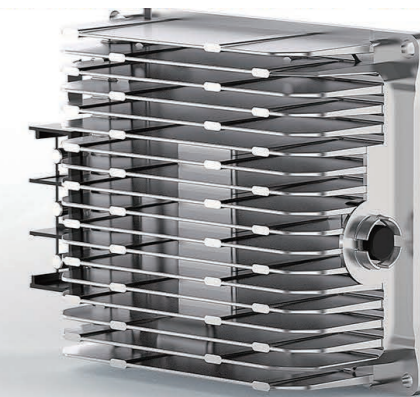
Model	XGen4850Z
Nominal operating voltage	40 V ~ 57.6 V
Generator performance	Peak: 11.5 kW @ >4000 rpm, 105°C, 20 s Continuous: 5.5 kW @ >6000 rpm, 105°C
Efficiency	Peak: ≥85%
Rotor inertial	≤37 kg · cm ²
Max operational speed	12000 rpm
Anti-reverse connection	Mechanical poka-yoke
Communication	CAN 2.0B
Motor type	Claw pole machine
Cooling type	Air
Motor overall protection	Motor: IP25 Inverter: IP6K9K
Nominal operating temperature	-30°C ~ 105°C
Motor diameter	≤150 mm
Motor length	≤ 160 mm (without shaft and pulley)
Weight	≤ 19.84 lbs (9 kg)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions




AUTOMOTIVE-GRADE

Bidirectional DC-DC Converter

Designed specifically for marine applications, the bidirectional DC - DC converter is vibration-tested to ensure it can withstand the rigid road conditions with high performances retained.



It can achieve

-  High efficiency & reduced switching losses
-  Rugged design for mobile environments
-  Wide operating temperature range -40°F ~ 185°F (-40°C ~ 85°C)

Technical Specifications

Model	XDC2500-12
48 V Voltage range	24 V - 36 / 48 / 54 V - 57 V
12 V Voltage range	8 V - 8.5 / 14 / 15.5 V - 16 V
Max. Rated Power	Buck: 2.5 kW (178 A @14 V), Boost: 2 kW (41 A @48 V) Buck mode: The derating factor is 15.5 V - 16 V , 8.5 V-8 V corresponding to 100% - 0 load Boost mode: The derating factor is 54 V - 57 V, 36 V-24 V corresponding to 100% - 0 load
Over-temperature protection range	248°F (120°C)
CAN communication	CAN communication
Wake-up type	KL15
Precharge time	Once pre-charge instruction is received, the 48 V side busbar capacitor voltage is expanded from 12 V to rated 48 V set by the controller in 150 ms.
Working temperature range	1. At temperature below -40°F (-40°C), the output is turned off. 2. At temperature between 104°F - 140°F (40°C - 60°C), full power output is reached. 3. At temperature between 140°F - 185°F (60°C - 85°C), linear reduced output of 2,500 W - 0 W is provided. 4. At temperature above 185°F (85°C), output is turned off.
Ingress protection rating	IP67
Weight	< 6.6 lbs (3 kg)
Dimension	9.4 x 6.9 x 3.0 inch (238 x 175 x 75 mm)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions.

All-in-one Inverter

Featuring higher response speed, reliability and industrial standard, this all-in-one inverter integrates an inverter, a battery charger and an MPPT solar charge controller into one complete system, largely simplifying off-grid solar installation and ideal for mobile applications!

Features

Around **30%** MPPT Energy Efficiency Improvement

94% Maximum Inverter Efficiency

✓ UPS Function

Seamless switching of uninterrupted power supply to meet electricity demand in versatile scenarios

✓ Power Saving

Power saving mode automatically reduces power consumption at zero-load

✓ Real-time Monitoring

The LCD panel displays data and settings, which can be viewed via the app and webpage



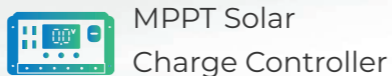
ALL IN ONE



Inverter



Battery
Charger



MPPT Solar
Charge Controller

Technical Specifications



Model	SUN6000S-E		
Rated battery voltage	48 V		
Max. discharge current	110 A		
Max. charge current	95 A		
PV			
Recommended max. PV input power	7,000 W		
Rated input voltage	360 V		
Max. input voltage	550 V	Number of MPPT trackers	2
MPPT operating voltage range	120 V ~ 500 V	Max. input current per MPPT	14 A
Shore power			
Rated grid voltage	220 V / 230 V / 240 V, 50 Hz / 60 Hz		
Rated AC power	6,000 VA		
Grid voltage range	176 Vac ~ 270 Vac		
Inverter			
Rated voltage, frequency	220 V / 230 V / 240 V, 50 Hz / 60 Hz		
Max. AC power output (off grid)	6,000 VA		
General			
Degree of protection	IP65		
Allowable relative humidity range	5% ~ 95%		
Max. operating altitude	4,000 m		
Display	LCD & APP		
Switch time	< 10 ms		
Max. efficiency of solar inverter	97.6%		
European efficiency	97%		
Topology	Transformerless		
Communication	RS485 / CAN(optional: WiFi / 4G / GPRS)		
Ambient temperature range	-4°F ~ 131°F (-20°C ~ 55°C)		
Dimension (W * D * H)	21.7 x 7.9 x 20.5 inch(550 x 200 x 520 mm)		
Weight	70.55 lbs (32.0 kg)		

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions.

PDU

Power Distribution Unit

Power Distribution Unit is an essential component of vehicle and marine energy storage systems. Its main function is to distribute electrical currents to various endpoints, connect power supply equipment, and maintain the proper operation of electrical devices.



Technical Specifications

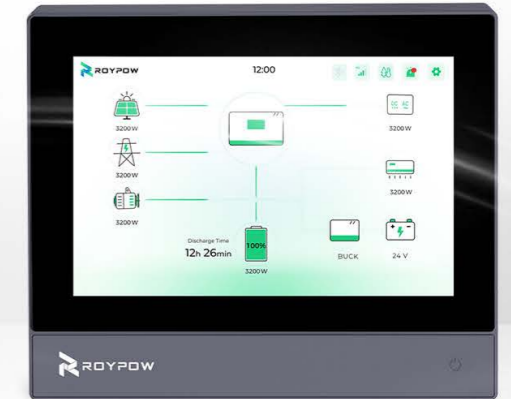
Model	Xp350-PRO
Operating temperature	-22 °F - 140°F (-30 ~ 60°C)
Operating voltage range	DC8 ~ 65 V
Maximum bus power Input/output	17.9 kW@51.2 V
Maximum bus current Input/output	450 A 30 S
Battery bus interface	100 A / 200 A X 4 groups
DC High-power load interface	350 A x 1 group
DC device interface (Inverter)	150 A x 1 group
DC device interface (A/C)	30 A x 1 group
DC device interface (DC/DC)	50 A x 2 groups
DC device interface with precharge function (Alternator/Generator)	120 A x 1 group
Terminal form	≤100 A, fast plug, > 100 A, Glen interface
PDU protection level	≥IP65
Short circuit protection	YES
Shell material	Aluminum shell
Dimension (L x W x H)	14.8 x 5.31 x 5.31 inch (376 x 135 x 160 mm)
Weight	11.02 lbs. (5 kg)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions

XTouch 7+

Energy Management System (EMS)

The energy management system (EMS) collects, manages and coordinates equipment in the region, ensuring the safe, stable, and efficient operation of the system. It can realize real-time monitoring, coordinated control, and economic operation management, and support functions such as load tracking, photovoltaic power forecasting, and demand-side management.



Technical Specifications

Model	XTouch 7+
Operating Voltage	DC8V~60V
Operating Current	200mA (DC48V)
Display	7-inch, 1280*800 Resolution, Capacitive Screen, 500cd/㎡, with Backlight
Flash	512M
Buzzer	Support
4G Module	FDD-LTE: B1/2/3/4/5/7/8/9/12/13/17/18/19/20/25/26/28/66 TDD-LTE: B34/38/39/40/41(194M) WCDMA: B1/2/4/5/6/8/9/19 GSM: 850/900/1800/1900 Maximum Speed Rate: DL: 10Mbps; UL: 50Mbps
BLE	Bluetooth V5.0, 2402MHz - 2480MHz
Supported Device Protocols	Modbus, CAN, RS485, LIN

General Specifications

Dimension (L x W x H)	7.01 x 5.91 x 1.34 inch (178 x 150 x 34 mm)
Weight	1.54 lbs. (700 g)
Ingress Protection	IP21
Operating Temperature	-4 °F ~ 158°F (-20°C~70°C)
Storage Temperature	-40 °F ~ 194°F (40°C~90°C)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions

Solar Panel

Maximize your savings and enjoy the peace of mind that comes with solar panel's top durability, reliability and efficiency. Ideally suited for marine applications.



Flexible
& foldable



Durable &
weather-resistant



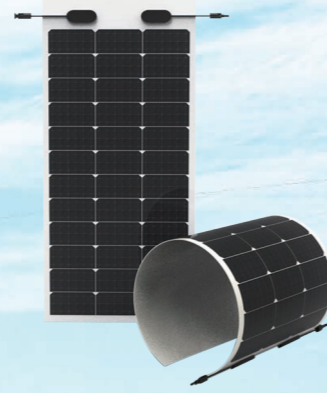
High conversion
efficiency



Compact &
lightweight



Ultra thin &
easy installation



Technical Specifications



Electrical performance

XLASP100

Maximum power	100 W
Power tolerance	+5 W
Optimum operating voltage	20.12 V
Optimum operating current	5.01 A
Open circuit voltage	24.45 V
Short circuit current	5.31 A
Module efficiency	20.74%

STC: AM=1.5, Irradiance 1.000W / m², Module temperature 77°F (25°C).

Temperature coefficient

Nominal module operating temperature	109°F ± 36°F (43°C ± 2°C)
Power temperature coefficient	- 0.36% / °C
Voltage temperature coefficient	- 0.28% / °C
Current temperature coefficient	- 0.06% / °C

Mechanical behavior

Backplane color	White
Solar cell	36 (3 x 12) / monocrystalline - PERC / 162.75 mm
Encapsulating materials	EVA / POE
Frame	Frameless
Protection grade of junction box	IP68
Cable (length / sectional area)	90 mm / 4 mm ²
Connector	MC4
Module actual size (L * W)	39.0 x 19.3 inch (990 x 491 mm)
Module assembly size (L *W *H)	1,070 mm x 520 mm x 1.7 mm (excluding junction box)
Module weight	3.1 lbs (1.4 kg)

Note: All data are based on ROYPOW standard test procedures. Actual performance may vary according to local conditions