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Version: Nov. 8, 2023, Marine Energy Storage System



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# Marine

**Energy Storage System** 

**ONE-STOP** SOLUTION





# Contents

# ROYPOW Your Trusted Partner





# 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!



# No worry of









Frequent maintenance

**Just Enjoy the Luxury Yacht Life!** 

#### **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 <sub>4</sub> 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





#### xample:

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 serformance 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**





## 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 four XBmax5.1L batteries, delivering continuous power output of 400A and 20kW

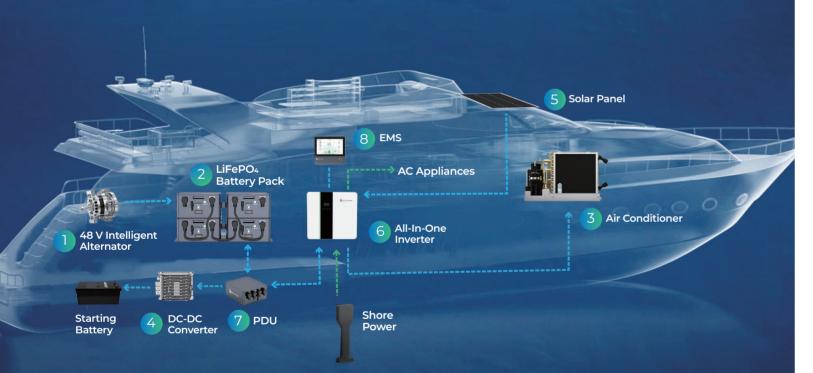


IP65 protection rating



# 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.





#### 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 LiFePO<sub>4</sub> Battery

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

Designed specifically for marine use, the bidirectional



4 DC-DC Converter

Up to 10 Years Design Life

Maintenance

✓ Automotive-grade

>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.



10,000 BTU/h Cooling Capacity

12,000 BTU/h Heating Capacity

≤ 50 dB Noise Level

# ✓ 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.



- Inverter
- Battery Charger
- MPPT Solar
  Charge Controller

#### 7 PDU (Power Distribution Unit)

different power supply equipment, and maintain the proper operation of electrical devices.



Maximum Bus Power

20kW

Maximum Bus Current 400A

**IP65** 

#### 8 EMS (XTouch 7)

region, ensuring the safe, stable, and efficient operation of the system.



- ✓ Real-time Monitoring
- ✓ Coordinated Control
- Economic Operation Management

Products

Air Conditioner



# **ROYPOW Air Conditioner** Comfort. Anytime. Anywhere

Designed in a compact way with corrosion protection, ROYPOW air conditioner is easy to retrofit, highly efficient and durable for marine environments. It provides powerful cooling and heating capabilities for on-board comfort all year round.

10,000 BTU/h 12,000 BTU/h >13 EER
Cooling Capacity Heating Capacity High Efficiency

**≤ 50** dB



#### **High Efficiency**

Powerful cooling & heating capability offers instant comfort



#### Durable & Reliable

Anti-corrosion coating provides protection 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	MS10-C3A/T
Power supply	DC48 V
Cooling capacity	10,000 BTU / h
Cooling input power	748 W
Cooling rated current	15.6 A
Heating capacity	12,000 BTU / h
Heating input power	795 W
Heating rated current	16.7 A
EER (Energy Efficiency Ratio)	13.5 BTU / W. h (3.9 W / W)
COP (Coefficient Of Performance)	15 BTU / W. h (4.4 W / W)
Sea water flower	0.7m³ / H
Air flow	580m³ / H
Refrigerant	R314a
Noise level	≤ 50 dB
Net weight	59.5 lbs / 27.0 kg

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 LiFePO<sub>4</sub> 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.



Up to

10 Years Design Llife

**Zero**Maintenance

**>6,000**Life Cycles

IP65

#### Scalable capacity to fit your power needs

8 In Parallel Maximum

40 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



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.

#### **Technical Specifications**



Model		XBmax 5.1L	XBmax 5.1L-24
Rated voltage	(cell 3.2 V)	51.2 V	25.6 V
Rated capacit	y (@ 0.5C, 77°F/25℃)	100 Ah	200 Ah
Maximum vol	tage (cell 3.65 V)	58.4 V	29.2 V
Minimum volt	tage (cell 2.5 V)	40 V	20 V
Standard capa	acity (@ 0.5C, 77°F/25°C)	≥ 5.12 kWh (support paralle	I connection up to 8 pcs)
	ischarge / charge °F/ 25°C, SOC 50%, BOL)	100 A / 50 A	200 A / 100 A
Cooling mode	9	Natural (passive) cooling	
Working range of SOC		5% - 100%	
Ingress protection rating		IP65	
Life cycle (@ 7 1C discharge, l	'7°F/ 25°C, 0.5C charge, DoD 50%	> 6	5,000
Remaining ca (according to pattern, temp	pacity at the end of life warranty period, driving profile, etc)	EO	L 70%
Operating temperature	Charging / Discharging temperature	-4 °F ~ 131°F	(-20°C ~ 55°C )
Storage temperature	Short-term (within one month) Long-term (within one year)		(-20°C ~ 55°C ) = (0°C ~ 35°C )
Dimensions (L	_ x W x H)	20.15 x 14.88 x 8.26 in	ich (512 x 378 x 210mm)
Weight		99.2	bs (45 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

48 V

# 7 11 2011 121 201

#### **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





Wide working temperature range:  $-4^{\circ}F \sim 221^{\circ}F (-20^{\circ}C \sim 105^{\circ}C)$ 

- ✓ Smooth start-stop, torque boosting during vehicle acceleration
- ✓ Power generation efficiency management and rate optimization prevent lithium battery's over-heating / over-charging damages, etc
- Energy saving and emission reduction

#### **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 · cm²
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

#### Products

#### DC-DC Converter

#### AUTOMOTIVE-GRADI

# 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	<ol> <li>At temperature below -40°F (-40°C), the output is turned off.</li> <li>At temperature between 104°F - 140°F (40°C - 60°C), full power output is reached.</li> <li>At temperature between 140°F - 185°F (60°C - 85°C), linear reduced output of 2,500 W - 0 W is provided.</li> <li>At temperature above 185°F (85°C), output is turned off.</li> </ol>
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 ----





#### **✓ 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





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 pow	/er	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 / 2	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/C	AN(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.

#### Products EN

#### EMS

# 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	XBmax5.1L-PDU
Operating temperature	-22 °F - 140°F (-30 ~ 60°C)
Operating voltage range	DC8 ~ 65 V
Maximum bus power Input/output	20 kW
Maximum bus current Input/output	400 A (450 A, 20 s)
Battery bus interface	100 A x 4 groups
DC High-power load interface	400 A x 1 group
DC device interface (Inverter)	150 A x 3 groups
DC device interface (A/C)	100 A x 1 group
DC device interface (DC/DC)	100 A x 1 group
DC device interface with precharge function (Alternator/ Generator)	100 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)	19.96 x 14.8 x 7.28 inch (507 x 376 x 185 mm)
Weight	10 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	Xtuch7
Display Size	7.0 Inch
Display Type	IPS LCD Display
Resolution	1024 x 600
Brightness	1000 cd / m2
Colours	24-bit RGB
Touch Screen	Projected Capacitive
Operating Voltage	8-60V,25W
Current Draw	<4 W operating, <2 W standby
Storage Temp	-20°C to 50°C (-4°F to 122°F)
Operating Temp	-20°C to 50°C (-4°F to 122°F)
Ingress Protection	IP65
Interfaces	CAN、RS485、USB、KL15、KL30
Featured functions	Energy allocation management, Wi-Fi hotspot, Remote control, OTA
Dimensions (H x W x D)	7.17 x 6.61 x 1.4 inch (182 x 168 x 36 mm)
Weight	1 kg

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



Available Option

#### **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



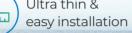
Durable & weather-resistant



High conversion efficiency









#### **Electrical performance**

#### ASP100M36S

Model	ASP100NH36S	
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 /  $m^2$ , 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 <sup>2</sup>	
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



## ROYPOW, Your Trusted Partner

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# For One-stop Energy Solutions

ROYPOW TECHNOLOGY is dedicated to the R&D, manufacturing and sales of motive power systems and energy storage systems as one-stop solutions.

With more than 20 years of combined experience in manufacturing renewable energy and battery systems, ROYPOW provides Lithium-ion Batteries covering most daily living and working fields: for Low-Speed Vehicles such as golf carts, personnel carriers; Industrial Batteries for use in Material Handling Equipment such as forklifts, aerial work platforms and floor cleaning machines as well as renewable Energy Storage Systems for residential, commercial, industrial, vehicle-mounted and marine applications.

ROYPOW has established a worldwide network to serve customers with a manufacturing center in China and subsidiaries in the USA, the UK, Germany, Europe, South Africa, Australia, and Japan to date. ROYPOW owns and operates fully automatic production lines, a full range of test equipment and an advanced MES that collectively address all aspects of its manufacturing process, from electronics, software design to module assembly, battery assembly as well as initial and final testing.

As a renewable energy innovator, ROYPOW is committed to the mission of achieving energy sustainability while creating a better life for human beings.



#### Global Sales and Service Network System

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

ROYPOW has comprehensively unfolded its overseas market layout to realize the localization of R&D, manufacturing, marketing and service, then become your most reliable partner.



#### 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 including golf carts and sightseeing cars;
- Industrial Batteries including forklifts, aerial work platforms and floor cleaning machines;
- Residential Energy Storage Systems & Portable Power Units including home storage and portable energy storage products, as well as off-grid energy storage (for forest cabin, island villa without electricity, etc.);
- ✓ Vehicle-Mounted Energy Storage Systems including RV and truck energy storage and air conditioning system, as well as off-grid solar system for RV;
- Marine Energy Storage Systems & Batteries including trolling motors, fish finders, other off-grid energy storage systems for marine, and marine power system;
- ✓ Chargers for forklifts, aerial work platforms, floor cleaning machines, golf carts and various marine batteries.

