

Pod Drive eSSA User Manual



Pod Drive 12 eSSA / Pod Drive 20 eSSA

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Acknowledgement

Thanks for choosing ePropulsion products, your trust and support in our company are sincerely appreciated. We are dedicated to providing high-performance electric marine propulsion systems, electric outboards, sup/kayak motors, reliable lithium batteries and accessories. Welcome to visit www.epropulsion.com and contact us if you have any concerns.

Using This Manual

Before use of the product, please read this user manual thoroughly to understand the correct and safe operations. By using this product, you hereby agree that you have fully read and understood all contents of this manual. ePropulsion accepts no liability for any damage or injury caused by operations that contradict this manual.

Due to ongoing optimization of our products, ePropulsion reserves the rights of constantly adjusting the contents described in the manual. ePropulsion also reserves the intellectual property rights and industrial property rights including copyrights, patents, logos and designs, etc.

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ePropulsion reserves the rights of final interpretation of this manual.

This manual is multilingual, in case of any discrepancy in the interpretation of different language versions, the English version shall prevail.

Safety Warning

ePropulsion attaches great importance to safety and advises anyone who comes into close contact with ePropulsion products, such as installation, operation, maintenance, or servicing, to exercise caution, use common sense, follow the instructions in this manual, and adhere to the safety information on the machine installation stickers to ensure the safety of individuals and property and reduce safety risks.

The following are the relevant information symbols found in the user manual or product label stickers:

Danger or Warning Signs: These signs indicate potential hazards or significant risks that, if not avoided, could result in death or serious personal injury. Extra caution and attention should be exercised regarding your safety or the safety of the product.

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Important warning:

Tips or important points of information that help quickly grasp the use of the pod drive motor and improve efficiency. Please read and follow the instructions following the safety warning signs.



Caution:

When installing, operating, maintaining or servicing ePropulsion products, there are many safety risks. You need to be alert, perform relevant operations reasonably, and pay attention to safety.



Entanglement hazard:

Rotating parts can cause severe injury or death. Never wear jewelry, unbuttoned cuffs, ties or loose-fitting clothing and always tie long hair back when working near moving/rotating parts such as the flywheel, PTO shaft and propeller. Keep hands, feet and tools away from all moving parts.



Electric shock hazard:

These areas or components may pose a risk of electric shock. The equipment uses 102.4V DC power. When accessing or opening electrical connectors, switches, cables and other electricity-related items, turn off the power to prevent electric shock.



Burn hazard:

Some parts of the pod drive become very hot during operation and may remain hot when turned off. Keep hands and other body parts away from these areas.



Do not approach when the pod drive is running:

These parts of the pod drive are potentially dangerous when operating - keep clear of these areas when the pod drive is running, or about to start.



Do not connect or disconnect when the pod drive is running:

These parts of the pod drive may pose a risk of electric shock if connected to or disconnected from the power supply during operation.



Warning:

This product can expose you to chemicals including arsenic, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov.

Product Serial Number

The serial number is located as shown below. Please note and keep in a safe place, as it may be needed when purchasing accessories, or if you need service or warranty, or if your motor is stolen.

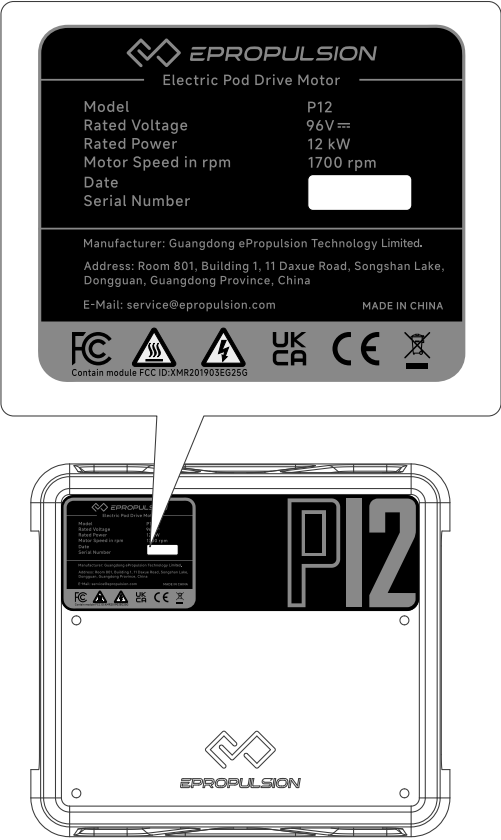


Table of Contents

- THANK YOU 1
- Conditions of Use 1
- Safety Warning 1
- Product Serial Number 3
- 1 Product Introduction 8
 - 1.1 In the Package 8
 - 1.1.1 Packaging List 8
 - 1.1.2 Optional Accessory List 12
 - 1.2 Parts and Diagram 15
 - 1.2.1 P12 Motor 15
 - 1.2.2 P12 Driver 16
 - 1.2.3 P20 Motor 16
 - 1.2.4 P20 Driver 17
 - 1.3 Specification 17
 - 1.4 Important Notes 18
 - 1.4.1 Motor Selection 15
 - 1.4.2 Motor Installation 16
 - 1.4.3 Users 16
 - 1.4.4 General Boating Advice 17
 - 1.4.5 Specific to this Installation 17
 - 1.5 Performance and Range 20
 - 1.6 Declaration of Conformity 22
 - 1.7 FCC Compliance Statement 22
 - 1.8 Disposal and Environment 22
- 2 Unpacking 23
 - 2.1 Safety Notice 23
 - 2.2 Tools and Equipment Required for Unpacking 23
 - 2.3 Check the Package 23
 - 2.4 Unpacking 23
 - 2.4.1 P12 Unpacking 23
 - 2.4.2 P20 Unpacking 24
 - 2.5 Disposal of packaging materials 26

3 Pod Installation	27
3.1 Before Installation.....	27
3.2 Adjusting Pad Version (only for P12)	34
3.3 Saildrive Version	37
3.4 Switch to saildrive version from adjusting pad version.....	38
3.5 Installation of the Controller.....	39
3.6 Motor and controller connection	41
3.7 Propeller Installation.....	42
4 Connections	45
4.1 Examples System Setup.....	45
4.1.1 Single Motor System Connection.....	46
4.1.2 Twin Motor and Twin Console System Connection	48
4.1.3 Twin Motor System Connection	50
4.2 High Voltage Cables Connection	52
4.2.1 Make a cable (crimped cable connector)	52
4.2.2 Connecting Cables to the bus box	53
4.2.2.1 Required accessories and tools.....	53
4.2.2.2 Installation.....	53
4.2.3 Connecting the DC-DC Module and 12V Battery	56
4.2.3.1 Required Accessories and Tools	56
4.2.3.2 Installation Steps	56
4.2.4 Connecting the G102-100 Battery Bank.....	57
4.2.4.1 Required Accessories and Tools	57
4.2.4.2 Installation Steps	58
4.2.5 Connecting the pod drive motor's Main Power and 12 volt Cables	59
4.2.5.1 Required Accessories and Tools	59
4.2.5.2 Installation Steps	59
4.3 Connection of Communication Devices.....	61
4.3.1 Required Accessories for Single Motor System Connection.....	61
4.3.2 Installation Steps.....	61
4.3.2.1 Connecting Interactive Devices and Accessories	61
4.3.2.2 Smart throttle connection	62
4.4 Grounding	63
4.5 Purchasing Accessories and Connections	65
4.5.1 Installation of the 4G Antenna.....	65

4.5.2 Installation of the External GPS Module	66
4.6 Communication Terminator Connection	68
5 Operation.....	69
5.1 Smart Throttle Button Functions (single & double throttles)	69
5.2 Starting the System	71
5.2.1 Start.....	71
5.2.2 System problem feedback method after startup	71
5.3 Perform initial configuration	71
5.4 Home Page.....	74
5.5 Propulsion Page	75
5.5.1 Control Console.....	75
5.5.2 Traction Battery	76
5.5.3 Motor(s)	77
5.6 Setting.....	77
5.6.1 Pod drive Setting	78
5.6.1.1 Propulsion switch	78
5.6.1.2 Power Limit Setting	79
5.6.2 Control console Settings.....	79
5.6.2.1 Smart throttle settings	79
5.6.2.2 Display settings.....	81
5.6.3 General settings.....	82
5.6.3.1 System firmware information	82
5.6.3.2 Maintenance - All maintenance timing tips.....	83
5.6.3.3 Charger Power Setting.....	84
5.6.3.4 Password Mode.....	85
5.6.3.5 Connectivity.....	86
5.7 Operation	88
5.7.1 Starting the Pod drive motor.....	88
5.7.2 Adjusting the Power	88
5.7.3 Shutdown Operation.....	88
5.8 Hydro Generation Function.....	89
5.9 Idle Mode, Sleep.....	91
5.9.1 Idle Mode	91
5.9.2 System Sleep	91
5.10 Cautions	92

5.11 Troubleshooting	93
5.11.1 Mechanical Faults/Solutions.....	93
5.11.2 System Faults/Solutions.....	94
5.12 Main driver lameness	97
5.13 Other Interfaces	98
6 Emergency Situations	99
6.1 Collision	99
6.2 Sodden machine	99
6.3 Overtemperature Protection	99
7 Maintenance.....	100
7.1 Maintenance.....	100
7.1.1 Routine maintenance	100
7.1.2 Pod maintenance	101
7.2 Partial Maintenance and Care Guidelines	102
7.2.1 Gearbox Oil Replacement Procedure (Only for P20)	102
7.2.2 Anode Inspection & Replacement	104
7.2.3 Propeller	105
7.2.4 Underwater Component Cleaning and Antifouling Painting.....	105
8 Limited Warranty	106
8.1 Warranty Exclusions	107
8.2 Limited Warranty Claim Procedures	108

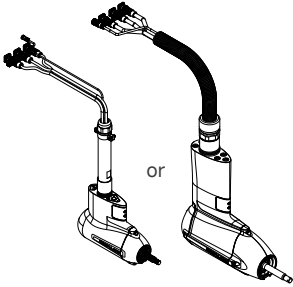
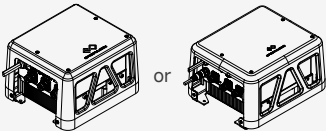
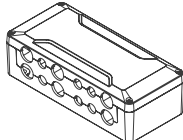
1 Product Introduction

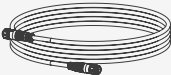
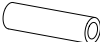
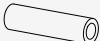
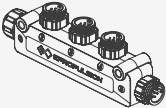
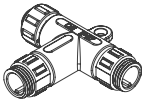
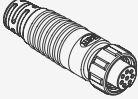
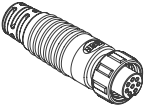
The Pod Drive 12 eSSA (P12) and Pod Drive 20 eSSA (P20) are electric pod drive motors with an input power of 12kW and 20kW. It can be controlled by using smart throttle and smart display 5". The electric pod drive motors are environmentally friendly, clean, and efficient. They are suitable for yachts/sailboats under 30m. The P12 supports adapter block (standard) and saildrive adapter (optional) and the P20 only supports saildrive adapter (standard).

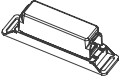
1.1 In the Package

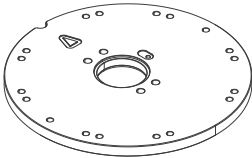
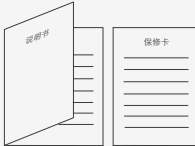
When opening the packages please check contents against the list below. If anything is missing or damaged, please contact your dealer.

1.1.1 Packaging List

Items	Qty.	Figure	Function
Pod drive motor	1		Provide the main propulsion of the boat
Driver	1		Control the motor to start or stop, rotate right or left, and adjust rotational speed
Bus box	1		Transfers electrical energy from the power system's main circuit to different components or modules within the circuit.
96V Power Cable 5m	1		Transfer DC power from the battery to the power input of the motor to provide the power needed for normal operation of the motor

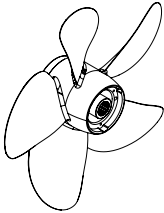
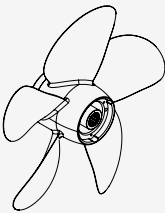
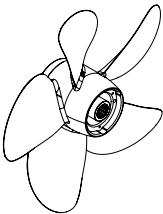
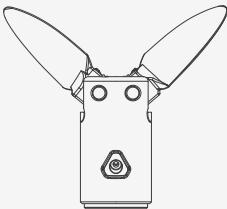
Items	Qty.	Figure	Function
eSSA Communication Cable 1m	1		Connect the motor and other devices such as the smart throttle, smart display and battery.
eSSA Communication Extension Cable 10m	2		Extend the communication distance of the CAN communication cable
Heat Shrink Tubing (Red $\Phi 19.1\text{mm}$)	1		Protect the main power cable after stripping it
Heat Shrink Tubing (Black $\Phi 19.1\text{mm}$)	1		Protect the main power cable after stripping it
Cable Lug (SC50-8-L)	6		Retrofit terminal for rear end of main power cable
eSSA Communication 5-way T Connector	1		Connect the motor and each device to the CAN communication network (controller LAN)
eSSA Communication 3-way T Connector	1		Connect the motor and each device to the CAN communication network (controller LAN)
eSSA Communication Terminator 120 Ω	1		Improve the quality of communication
eSSA Communication Terminator 360 Ω	1		Improve the quality of communication

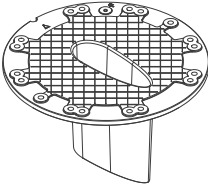
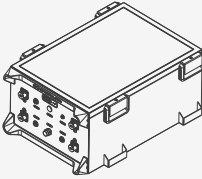
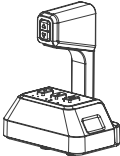
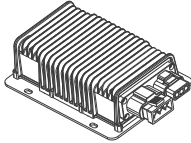
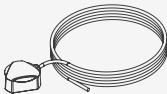
Items	Qty.	Figure	Function
12V Fuse Connecting Cable	1		10 sq.mm cable, 500mm length, with SC10-8 copper lugs on both ends
12V Fuse	1		/
12V Fuse Base	1		/
Pod installation kit	/	/	For P12 and P20: M6*14 screws, 2 pcs M6 lock washers, 2 pcs M8*16 screws, 1 pcs M6*16 screws, 8 pcs M6*14 screws, 6 pcs M6 lock nuts, 6 pcs Additionally, only for P20: M4*10 screws, 3 pcs M4 lock washers, 3 pcs M10*45 flange bolts, 8 pcs M12*40 flange bolts, 4 pcs Straight Pin 12X30 , 1 pcs M12 screw sealing rings, 5 pcs O-ring 80x4mm, 1 pcs P20 sealing strip, 1 pcs

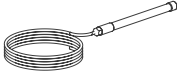
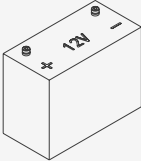
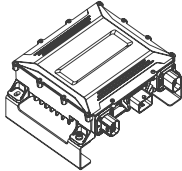
Items	Qty.	Figure	Function
Grounding Line	2	/	The wire length is 1.5 meters. It is UL1015, 4AWG wire material. One end has an M6 terminal (connected to the controller), and the other end has an M8 terminal which connect the motor to the driver, or connect the driver to the grounding busbar. Note: The customer shall prepare the grounding busbar by themselves.
Adapter Plate	1		Connection of the hull and the thruster Note: The P20 adapter plate is a standard configuration; the P12 adapter plate is a standard configuration, and the adapter plate can be optionally configured.
User Manual, Warranty Card	1		Give information about the features, functions, performance, purpose and maintenance of the product.

1.1.2 Optional Accessory List

Other accessories not included in the package are also required to operate the pod drive motor such as propellers, smart throttle, smart display 5", G102 battery, battery charger, and communication cables. Users can buy official accessories provided by ePropulsion Technology authorized dealers.

Items	Figure	Function
X12/P12 Propeller 11 13/16" x 9 13/16" RH		Stainless steel propeller, Right-Handed Propeller, Suitable for heavy-duty scenarios of X12/P12
X12/P12 Propeller 11 13/16" x 9 13/16" LH		Stainless steel propeller, Left-Handed Propeller, It is suitable for the heavy-duty scenarios of dual or multiple X12/P12 units and should be used in combination with the RH propeller.
P20 Propeller 15" x 10 3/4" RH		Stainless steel propeller, Right-Handed Propeller, suitable for heavy-duty scenarios of P20.
Folding Propeller 13" x 9 3/4"		Foldable aluminum bronze propeller, suitable for P12 sailing boat scenarios.

Items	Figure	Function
Adapter Plate		Adapter plate, which is used to install the P12 on the YANMAR SD25 base or the VOLVO PENTA 120S/130S/150S base.
G102 Battery and Cables		ePropulsion LiFePo4 system battery, 10kWh capacity. Provides safe and reliable electrical power.
Smart Throttle		Start, stop the motor and control the power output
Smart Display 5"		Display system information such as power, speed, battery level and set system functions
DC-DC Converter		DC-DC Converter to charge the 12V battery from the high voltage batteries
GPS module		It is recommended to purchase. The machine's built-in antenna is located inside the driver, and the signal is poor when the driver is installed inside the cabin. Obtaining a ship's Global Positioning System (GPS) signal can provide the ship's position and speed information, helping ship managers with ship management and adjusting course plans.

Items	Figure	Function
4G antenna		It is recommended to purchase. The machine's built-in antenna is located inside the driver, and the signal is poor when the driver is installed inside the cabin. The 4G antenna is a kind of communication equipment. The machine realizes remote network connection through the 4G antenna to realize remote control and monitoring. At the same time, it can support high speed data transmission, which is convenient for the crew to carry out online data sharing and backup operations.
12V battery		Provide power to the system's 12V equipment
G battery charger		Charge the G102 battery



The POD requires a 12V battery (not provided with the POD) to meet the following three requirements simultaneously:

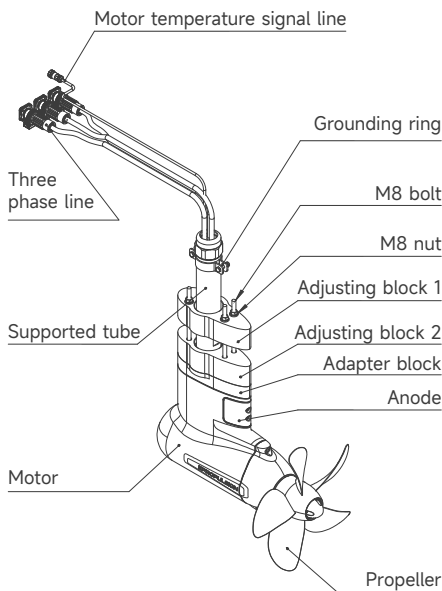
1. The charging current should be $\geq 36A$ (matching the 500W output current of the DCDC).
2. The continuous discharge should be $\geq 40A$.
3. The recommended capacity is $\geq 80Ah$ (to ensure a dormant condition of more than 6 months).



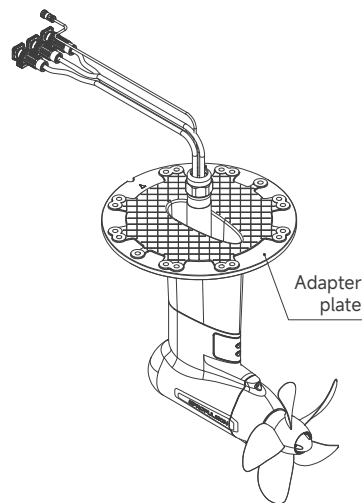
If a conventional lead - acid battery is used, the recommended capacity is $\geq 120Ah$.

1.2 Parts and Diagram

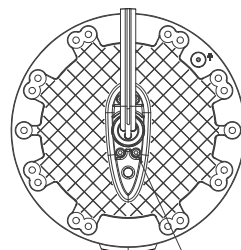
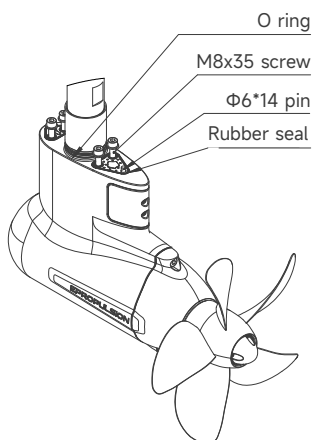
1.2.1 P12 Motor



Adjusting Pad Version

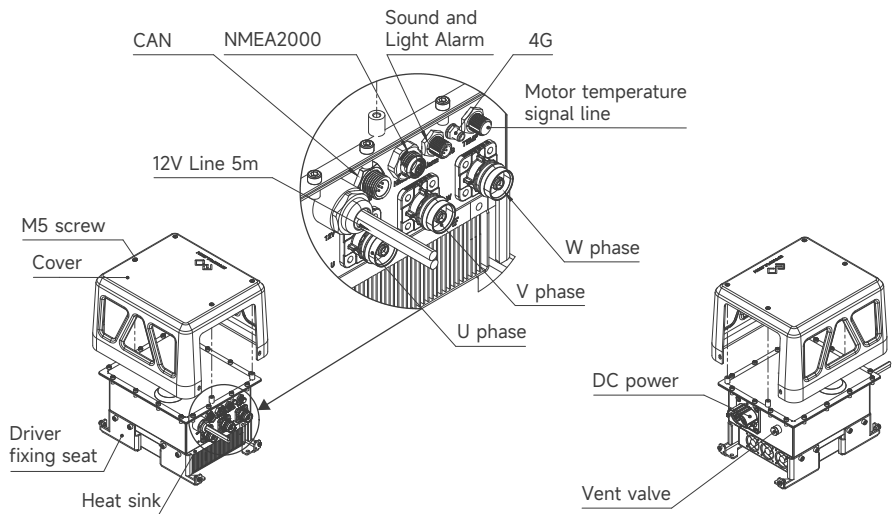


Saildrive Version

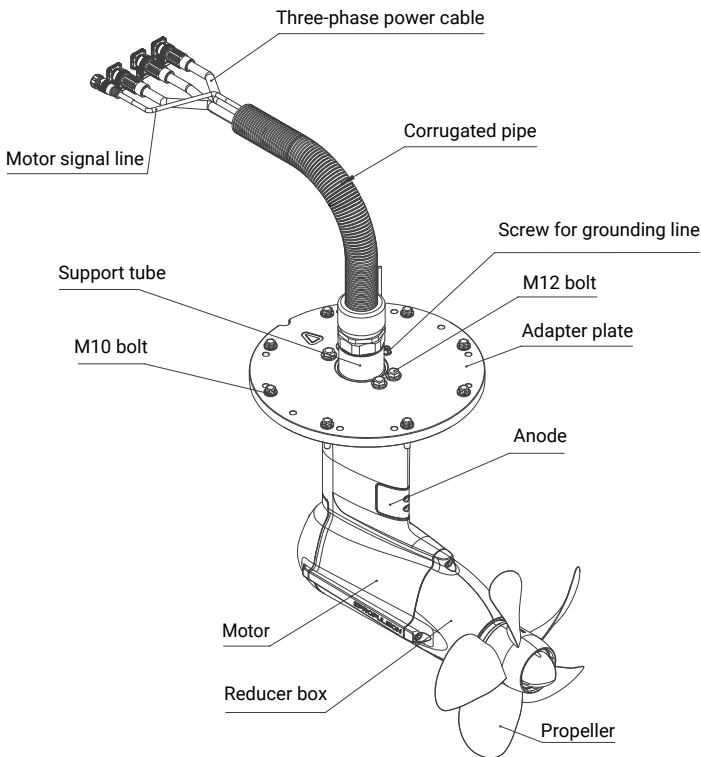


Tighten with M8x35 screws.
A 6mm hexagon socket screwdriver bit is required.
The length should be not less than 220mm, which shall be provided by the customer.

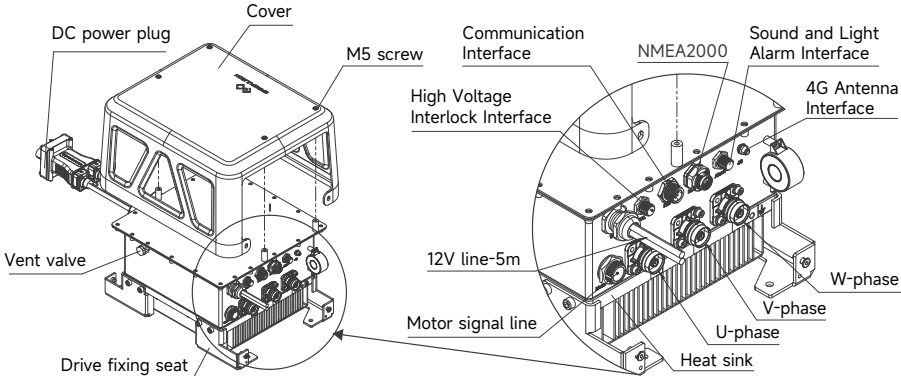
1.2.2 P12 Driver



1.2.3 P20 Motor



1.2.4 P20 Driver



There are two versions of the front connection terminals of the three - phase power cords for P12 and P20. In case of after - sales problems requiring component replacement, please provide the corresponding SN number and pictures of the connection terminals to facilitate the provision of after - sales materials.

1.3 Specification

	Pod12	Pod20
Rated input power (Forward/Backward)	12kW/6kW	20kW/10kW
Recommended battery	ePropulsion Lithium Iron Phosphate Battery	
Rated input voltage	96 Vdc	
Input voltage range (high voltage)	86-115 Vdc	
Input voltage range (low voltage)	10.5-16 Vdc	
Net Weight	Pod Drive Motor: 22kg Driver: 9kg	Pod Drive Motor: 31kg Driver: 17.5kg

	Pod12	Pod20
Dimensions (Length * Width * Height)	Pod Drive Motor: 603mm×420mm×122mm Driver: 285mm×250mm×192mm	Pod Drive Motor: 642mm×596mm×168mm Driver: 343mm×296mm×197mm
Cooling method	Pod Drive Motor: Natural cooling Driver: Fan cooling	
Rated rotational speed	1700rpm	1500rpm
Rated rotational speed	1700rpm	1500rpm
Rated power rotational speed range	1400~2100rpm	1200~1800rpm
Operating Temperature	-5°C ~ 55°C	
Storage Temperature	-25°C~ 70°C	
ePropulsion Connectivity Service	Supported	
Suitable propeller (purchase separately)	Propeller 11 13/16" x 9 13/16" Folding propeller 13" x 9 3/4"	Propeller 15" x 10 3/4"



When the high-voltage input voltage is below 96Vdc, there will be an undervoltage alarm. At the same time, the motor starts to linearly reduce power at 96V until the 86V power drops to 0W.

1.4 Important Notes

1.4.1 Motor Selection

Please follow the instructions of the boat manufacturer and ePropulsion authorised dealer in choosing a suitable motor. Do not exceed the maximum power permitted, and do not overload the motor.

1.4.2 Motor Installation

This manual gives installation advice that must be followed as a condition of use, in addition to which:

1. We strongly advise professional installation of the whole motor system.
2. Specifically, you must not attempt installation if you don't have the necessary electrical, mechanical, boatbuilding and regulatory knowledge and experience.
3. Regulations vary but for example many authorities will class 96V as a "high voltage" installation, requiring the electrical work to be undertaken or at least thoroughly checked by a person with relevant qualifications. Other regulations that vary between countries and authorities may cover further aspects of the installation such as safety standards, risk assessment and documentation.
4. It is the responsibility of the installer to ensure that the installation complies with all regulations and standards that apply to the intended area of operation.
5. If you are in any doubt about the installation work please consult your dealer.

1.4.3 Users

1. This product must only be operated by adults who have fully read and understood this manual. ePropulsion accepts no liability for any damage or malfunction caused by operations that contradict the content of this manual.
2. You should only use this motor system if you are also familiar with all other aspects of operating your boat. If the boat is new to you, you should learn how the boat behaves in different conditions, including tide, wind and waves. Take professional advice and/or instruction as necessary.
3. If you are in any doubt about the operation of the motor or boat please consult your dealer before use.

1.4.4 General Boating Advice

Before operation:

1. Familiarize yourself with all the functions and operations of the motor and the boat it's fitted to. Make sure at least one other person on board is sufficiently familiar with the boat and its systems that they could take over from you in the event of emergency
2. Check the weather conditions and refer to weather forecasts before boating. Avoid boating in hazardous weather conditions.
3. Check there is sufficient and operational safety equipment, including but not limited to: life jackets, buoyancy aids or other personal flotation devices, fire extinguishers, bells and whistles, communication equipment, and paddles, etc.
4. Check that the boat and equipment comply with local boating safety regulations.

5. If the electric motor is the only power source for your boat, make sure the batteries on board have sufficient charge for your round trip. As a minimum you need to calculate distance and battery consumption over that distance, making allowance for the effects of wind, tide and other variables that may affect range.

1.4.5 Specific to this Installation

1. If the motor hits an object in the water, stop operation immediately. Return to the nearest port and seek assistance from your dealer.
2. Only operate the motor when the propeller is submerged in the water; operating it in air is strictly prohibited.
3. If the boat is powered by other means, such as sails, when the speed of P12 exceeds 30 km/h, the speed of P20 exceeds 40 km/h, and the battery level is higher than 90%, please pull out the U, V, and W three-phase lines from driver to avoid damage to the controller caused by excessive reverse charging voltage.
4. Avoid covering GPS and 4G antenna to avoid signal attenuation (loss).
5. The distance and speed values shown are measured by the Global Positioning System (GPS) and may be subject to errors in the event of weak GPS signal or changes in external forces such as atmospheric conditions, ocean currents, wind, etc.
6. If the malfunctions, the smart display will display an error message and the system may stop or enter a limp home (reduced power) mode. The most likely reason for malfunctions include: collision, obstruction (eg seaweed or rope around the propeller or steering), motor or motor driver temperature too high, and low battery voltage. Refer to the Troubleshooting section of this manual for detailed information and corresponding solutions.

1.5 Performance and Range

	Pod Drive 12 eSSA*				Pod Drive 20 eSSA*			
Input power (kW)	3	6	9	12	5	10	15	20
Speed (km/h /mph)	10/5.4	13/7.0	15/8.1	16.5/8.9	11.5/6.2	14/7.5	16/8.6	18/9.7
Battery life (hour: minute)	3:20	1:40	1:06	0:50	4:00	2:00	1:20	1:00
Battery life (km/nmi)	33.3/18	21.6/11.7	15.2/8.9	13.8/7.4	46/24.8	28/15	21.3/11.5	18/9.7

- 💡 The performance data is based on a 19-foot shallow draft sailboat with 1200kg displacement, powered by one Pod Drive 12 eSSA with one G102-100 battery in calm lake water.
- 💡 The performance data is based on a 21.3-foot shallow draft sailboat with 2000kg displacement, powered by one Pod Drive 20 eSSA with two G102-100 batteries in calm lake water. The data is for reference only, and the actual performance is affected by external factors
- 💡 such as the boat type and the environment.

1.6 Declaration of Conformity

We Guangdong ePropulsion Technology Limited, hereby, declares that this equipment is compliance with the applicable Directives and European Norms, and amendments.

Object of the Declaration:

Product: Electric Pod Drive Motor

Model: P12,P20



The object of the declaration is in conformity with the following directives and regulation:

Recreational Craft Directive (RCD) 2013/53/EU

Electromagnetic Compatibility (EMC) Directive 2014/30/EU

Restriction of Hazardous Substances Directive 2011/65/EU and Delegated Directive (EU) 2015/863

EC REACH Regulation (EC 1907/2006)

Regulation on General Product Safety 2023/988

Applied Standards:

ISO 16315:2016

EN 61000-6-2:2005

EN IEC 61000-6-2:2019

EN 61000-6-3:2007

EN IEC 61000-6-3:2021

Manufacturer

Name: Guangdong ePropulsion Technology Limited

Address: Room 801, Building 1, 11 Daxue Road, Songshan Lake, Dongguan, Guangdong Province, China

Signature:

A handwritten signature in black ink, appearing to read '陶师正' (Tao Shizheng).

Date: 2025.4.21

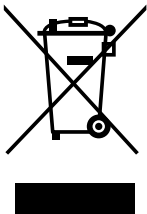
Shizheng Tao, Chief Executive Officer & Cofounder of
Guangdong ePropulsion Technology Limited

1.7 FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

1.8 Disposal and Environment



This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

2 Unpacking

2.1 Safety Notice



Use appropriate safety equipment, including gloves, safety shoes, and other protective tools.



Familiarize yourself with all safety measures before proceeding with the operation.



Due to the product's substantial weight, at least two people are required for handling.

2.2 Tools and Equipment Required for Unpacking



Prepare unboxing tools, such as a rubber hammer, phillips screwdriver, etc.



Handling equipment: forklift.

2.3 Check the Package



Check for any obvious damage or transportation damage to the package and record.



Confirm that the labels on the package match the purchased product.

2.4 Unpacking

2.4.1 P12 Unpacking

Step 1:

Two people should carry the carton to an appropriate unpacking area. Before opening the packaging, ensure that the machine is stably positioned and will not tilt.

Step 2:

Place the carton in the direction indicated as the upward side of the carton, and cut open the outer layer of adhesive tape.

Step 3:

The packaging structure of the whole machine is as follows. After unpacking the carton, according to the steps from top to bottom, one person should use both hands to take out the multiple wire harness accessories on the top layer, the busbar box, the fuse installation kit, the motor, and the packaging box of the driver in sequence.

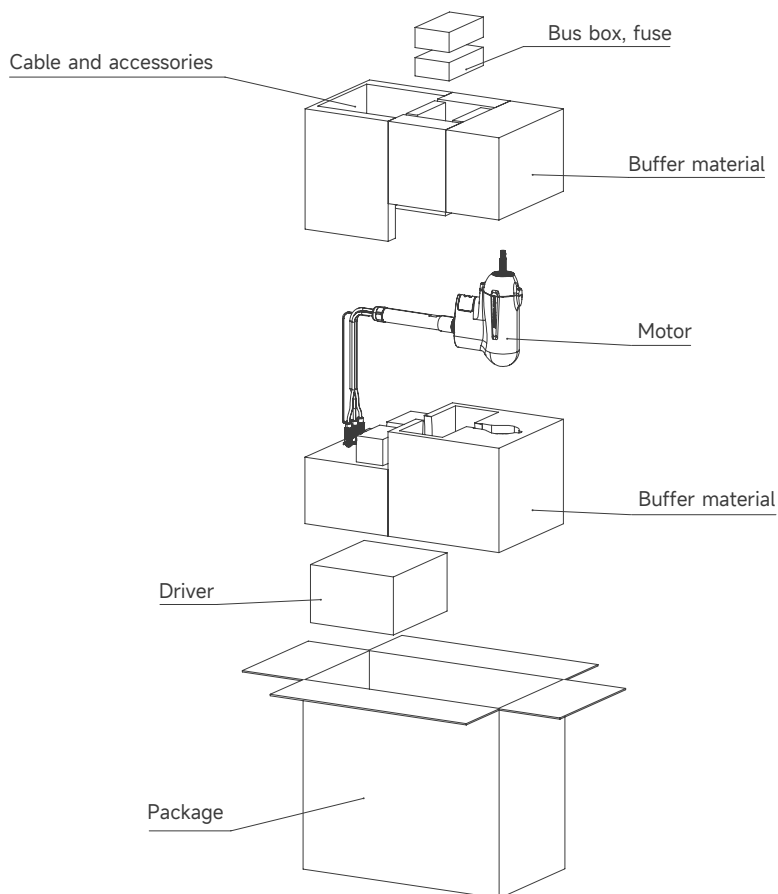


Figure 2-1

2.4.2 P20 Unpacking

Step 1:

Use a forklift according to the forklift symbol on the external packaging to move the product. Before opening the packaging, ensure that the machine is stably positioned and will not tilt.

Step 2:

Place the carton in the direction indicated as the upward side of the carton, and cut open the outer layer of adhesive tape.

Step 3:

The packaging structure of the whole machine is as shown below. Please follow the steps from top to bottom. One person should use both hands to take out the packaging box of the driver, the box of accessory wire harnesses, and the packaging box of the adapter plate in sequence, and open the boxes to take out the internal parts; take out the pearl cotton for protecting the motor shaft; rotate the pearl cotton by 90° and place it upright on the ground; push out the motor along the slot of the pearl cotton by hand, and then hold the motor shaft with one hand and fix the corrugated pipe with the other hand for securing.

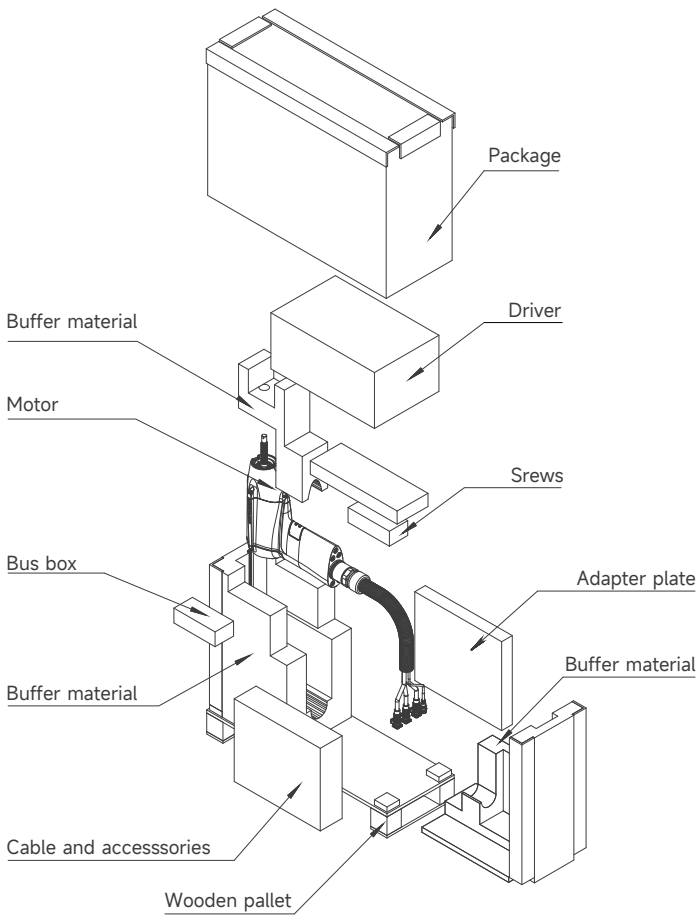


Figure 2-2

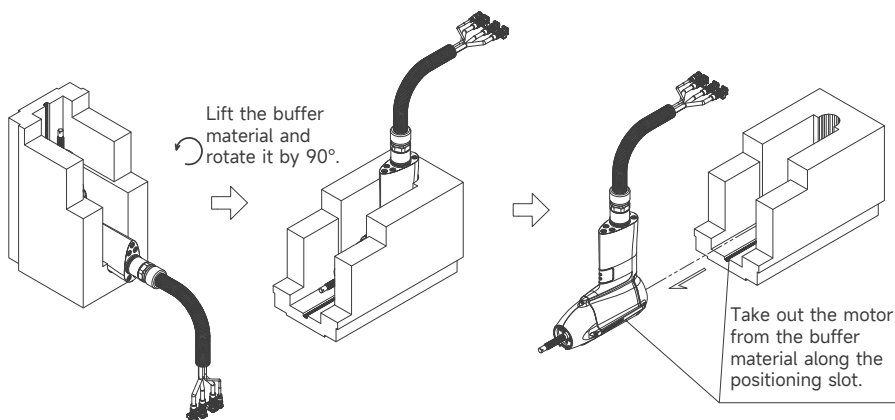


Figure 2-3



Please check the product for any damage or missing parts. If there are any issues, please contact customer support.



During the unpacking process, be careful to avoid damaging the product. Check all accessories and ensure they are complete.

2.5 Disposal of packaging materials

1. Recycle packaging materials, such as wood, paper, etc., by sorting them accordingly.
2. Follow local environmental regulations for the proper disposal of waste materials.
3. Please make sure to read the user manual provided with the product.



Dispose of packaging materials in accordance with local regulations to protect the environment.

3 Pod Installation

3.1 Before Installation

1. Preparation:

- (1) machine main part: Check the machine for any abnormal damage. Organize and secure power cables and communication cables in suitable positions for easy handling.
- (2) Tools: Prepare the tools and equipment required for installation as follows:

Tool	Specification	Qty	Purpose	Tightening Torque (N.m)
Torque Wrench	Torque range: 0~100Nm	1	To control the torque during the installation of the machine and boat mounting bolts	/
3mm Allen Bit	Specification: 3mm, suitable for M4 socket head cap screws and M5 flat head socket head screws	1	For installing the propeller fairing, anode, bus box cover and driver cover of P12/P20	1.5~2.0(M4) 3.0~3.5(M5)
5mm Allen Bit	Specification: 3mm, suitable for M10x1 bolt	1	For tightening oil injection bolt of P20	6~7
6mm Extended Allen Bit	Specification: 6mm, length ≥ 220mm, suitable for M8 socket head cap screws	1	For installing the adapter plate of P12 to the motor housing	12~13
10mm Hexagonal Sleeve	Specification: 10mm, suitable for M6 hexagonal bolts and nuts	1	For installing the driver and bus box of P12/P20 to the hull, and installing the grounding ring of P12	5.2~5.7
13mm Hexagonal Sleeve	Specification: 13mm, suitable for M8 hexagonal bolts and nuts	/	For connecting 96V power cables to bus box, 12V power cables to batteries, grounding lines to busbar of P12/P20, and tightening adjusting block of P12 to the hull	12~13
16mm Hexagonal Sleeve	Specification: 16mm, suitable for M10 hexagonal bolts and nuts	1	For installing the adapter plate of P12/P20 to the hull	24~25

Tool	Specification	Qty	Purpose	Tightening Torque (N.m)
18mm Hexagonal Sleeve	Specification: 18mm, suitable for M12 hexagonal bolts and nuts	1	For installing the adapter plate of P20 to the motor housing	42~43
27mm Hexagonal Sleeve	Specification: 27mm, suitable for M16 hexagonal bolts and nuts	1	For installing the propeller of P12	95~100
30mm Hexagonal Sleeve	Specification: 30mm, suitable for M20 hexagonal bolts and nuts	1	For installing the propeller of P20	95~100
Crane	Lifting capacity $\geq 100\text{kg}$	1	To lift and install the machine of P20	/
Lifting Rope	Bearing capacity $\geq 100\text{kg}$	1	To lift and install the machine of P20	/
Wire Cutter	EC-50M	1	For cutting the battery terminal power cables of P12/P20	/
Wire Stripper	SW-1018	1	For stripping the battery terminal power cables of P12/P20	/
Crimping Plier	/	1	For crimping the battery terminal power cables of P12/P20	/
Heat Gun	/	1	For shrinking heat shrink tubes of P12/P20	/
Thread Sealant	Loctite 243	-	For thread anti-loosening, apply to threads before thread	/
Waterproof Sealant	THREEBOND 1215	-	For waterproof sealing parts during product installation	/

(3) Accessory Preparation: Prepare the accessories inside the product packaging box.

2. Installation Preparation:



Check the size and space of the machine installation position on the hull. Ensure that there will be no interference with the hull and other components during various movement states of the machine. Also, make sure that the installation position is accurate, easy to adjust, and meets the installation requirements. The dimension diagrams of the two models are as follows:

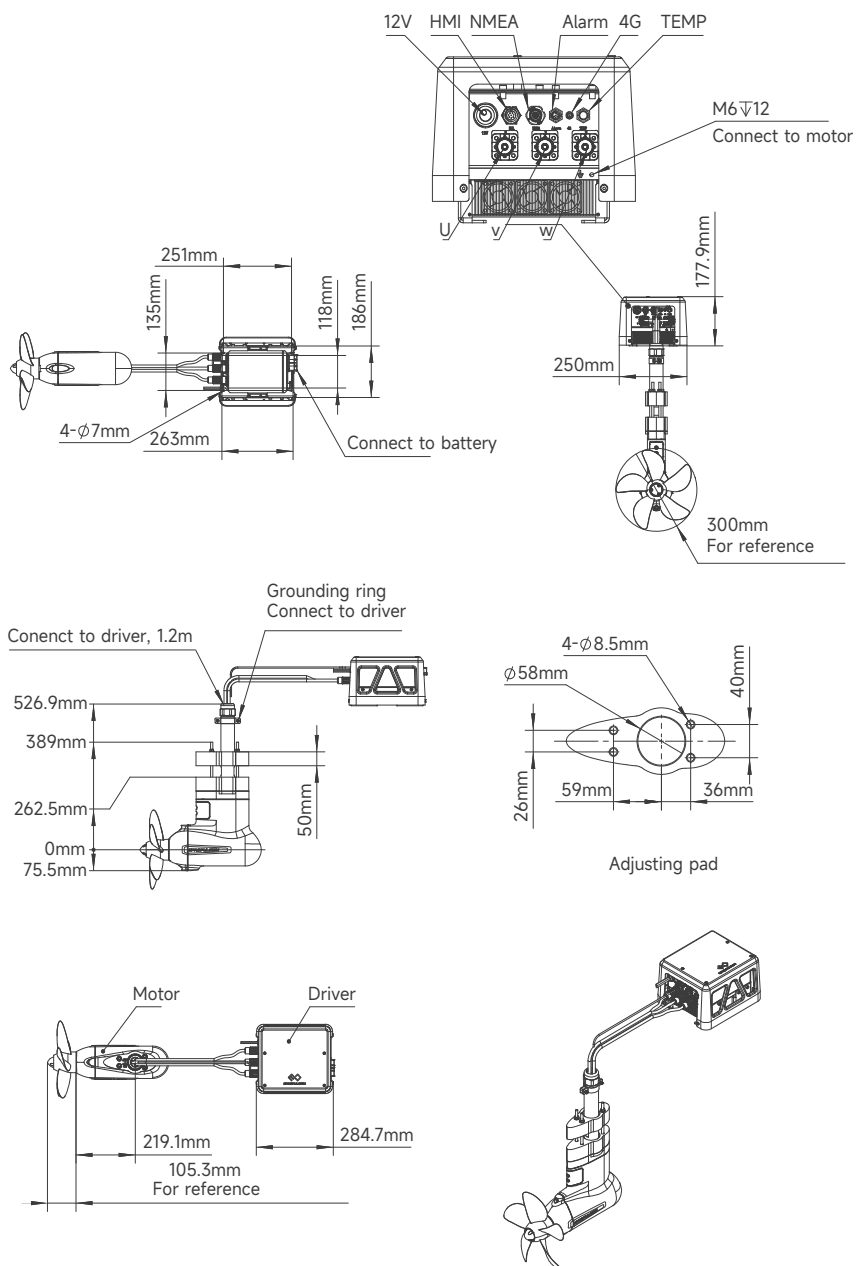


Figure 3-1

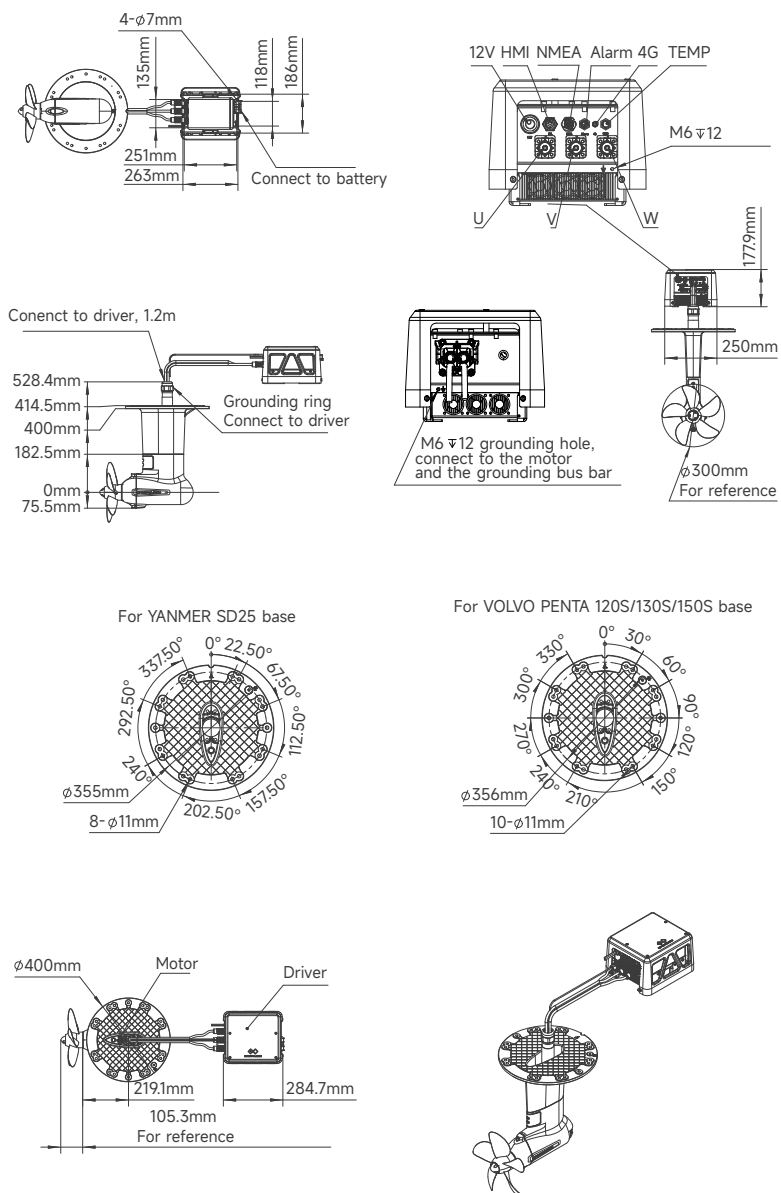
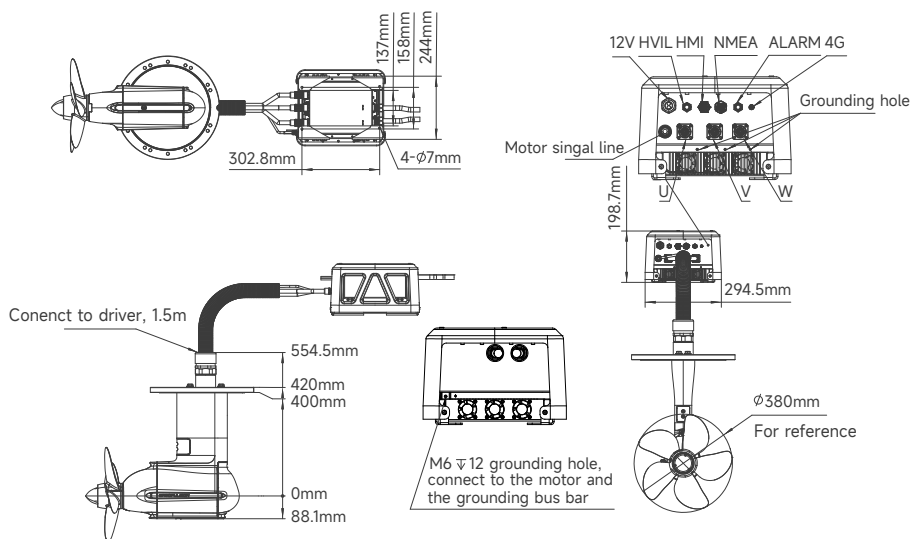
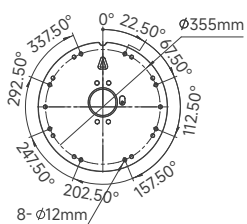


Figure 3-2



For YANMAR SD25 base



For VOLVO PENTA 120S/130S/150S base

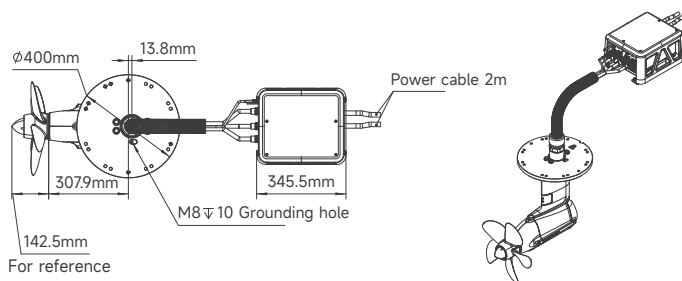
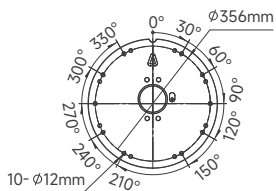


Figure 3-3

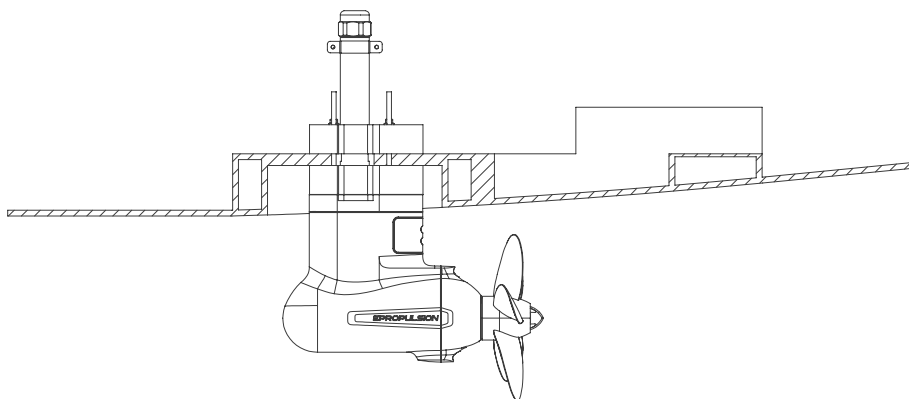


Figure 3-4

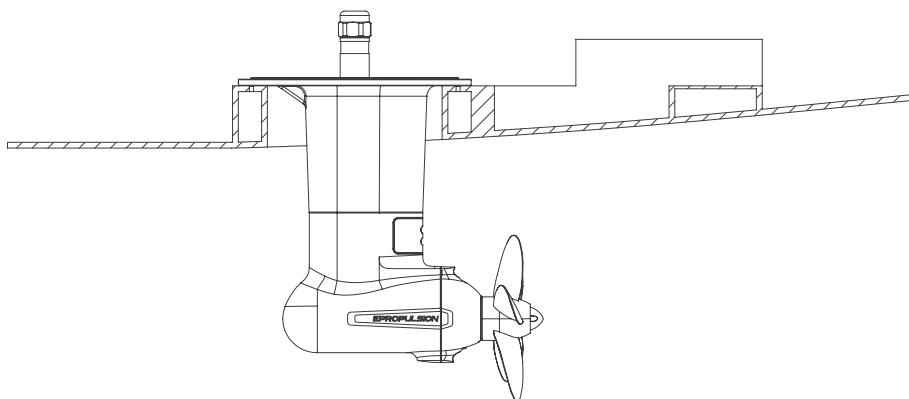


Figure 3-5

· **Propeller installation requirements:**

In order to avoid resonance of the bottom plate of the boat during the operation of the machine, please ensure that the distance between the tip of the propeller blade and the hull is ≥ 0.14 times the diameter of the propeller. If the propeller blades provided by ePropulsion are used, please ensure that

- The distance for P12 is greater than 42mm
- The distance for P20 is greater than 53.2mm

· **Cabin ventilation requirements:**

- The installation location of the P12 driver should have a cabin ventilation volume of not less than 360 cubic meters per hour.
- The installation location of the P20 driver should have a cabin ventilation volume of not less than 500 cubic meters per hour.

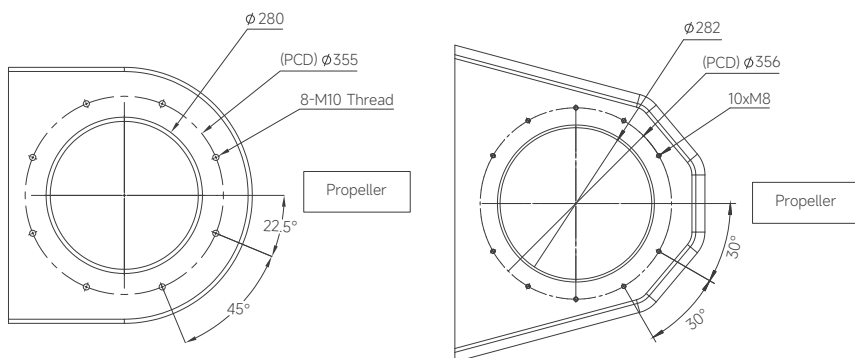
· **Installation environment and location:**

- The driver should be installed in a dry environment inside the cabin.
- Support horizontal or vertical installation.
- To ensure heat dissipation, there should be no obstructions within a range of 100 millimeters around the driver.

(1) There are two specifications for the installation bolts of the POD.

Specification of the adapter plate: Refer to section 3.2 for the hole opening size. The size of the bolt is M8. Please use the punching card attached with the main machine. The recommended hole opening size is $\phi 8.5 \sim 9.0$ mm. It is required that the main machine is firmly fastened to the hull and can bear the thrust of the machine.

Specification of the adapter plate: Please use the base that is compatible with Yanmar SD25 or Volvo Penta 120S/130S/150S. The specific hole positions of the base are as follows:



(2) Pre-installation preparations:

1. Confirm the motor model: Check if the motor's specifications (size, weight, voltage, and power) match the boat.
2. Design layout: Read the user manual and consider the entire system's layout and design. Ensure that the machine and related system components are properly installed on the boat for safe and effective operation..
3. Simulate the installation process: Follow the instructions in the user manual and simulate the relevant procedures to ensure a low-risk installation process.
4. Organize the boat interior: Based on the simulation process, clear irrelevant items, keep the interior dry and tidy, and ensure a smooth installation and debugging process without any abnormalities.

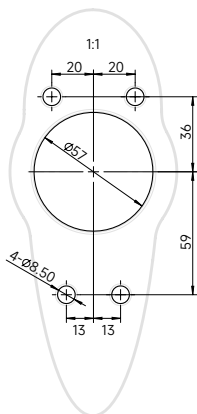
3.2 Adjusting Pad Version (only for P12)



Step 3 and Step 4 should be completed as quickly as possible to avoid prolonged pauses, which might cause the glue to solidify and result in poor adhesion between the mating parts.

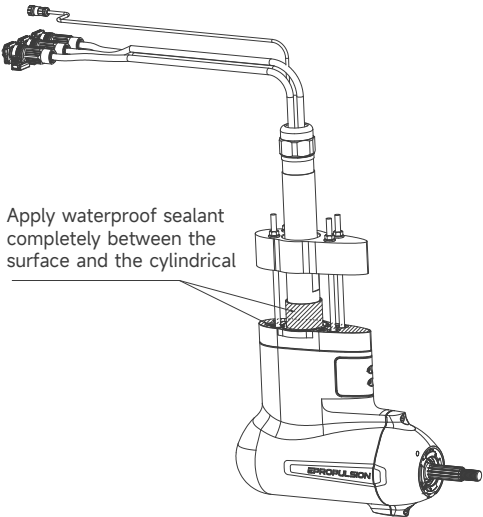
Step 1: Drill holes

Please refer to the mount template to drill holes for pod drive motors on the suitable position of the hu.



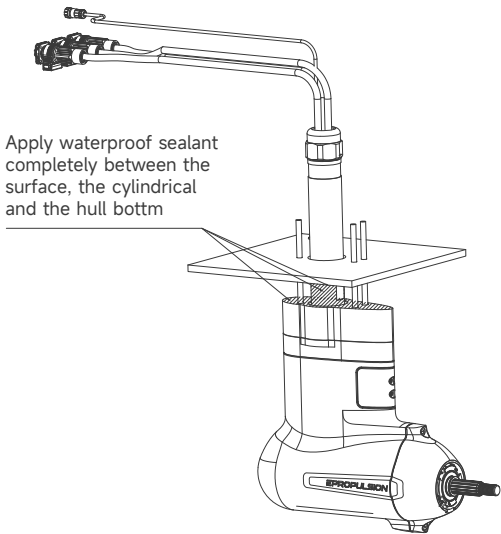
Step 2: Mount the adjusting pad

Apply waterproof sealant completely between the mating surface and the mating cylindrical surface.



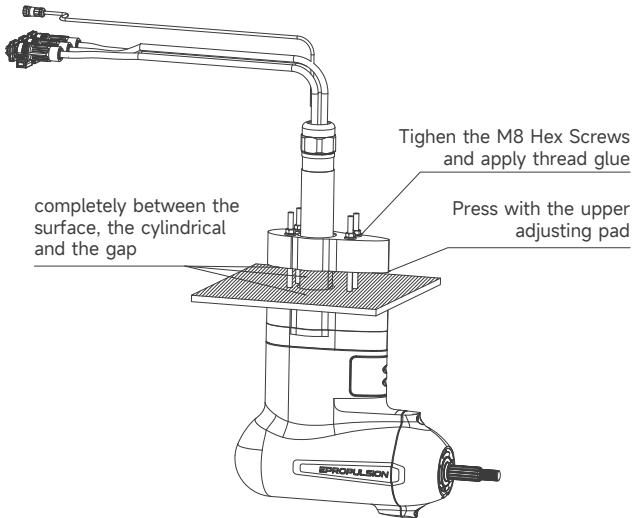
Step 3: Motor through the hull hole

Apply waterproof sealant completely between the mating surface and the mating cylindrical surface.



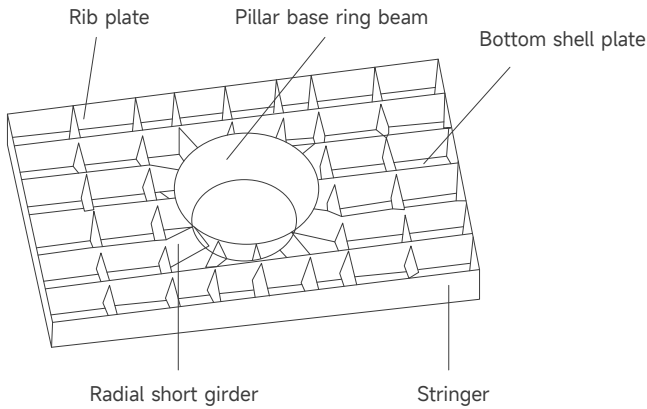
Step 4: Motor through the hull hole

Apply waterproof sealant completely between the mating surface and the mating cylindrical surface. The lower adjusting pad can be cut to match the shape of the hull bottom.



⚠ This product is a high - power pod thruster. It is necessary to strengthen the area where the machine is connected to the bottom of the ship to avoid damage to the bottom of the ship during high - power propulsion.

For aluminum - alloy ship types, it is recommended to carry out reinforcement according to the following requirements:

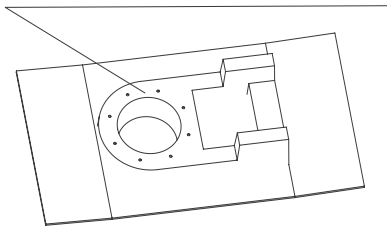


Step 5: Apply primer and anti-biological adhesion coating on the outside of the motor

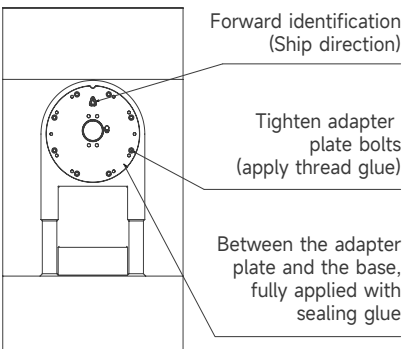
3.3 Saildrive Version

Step 1: Clean the oil and polish the end face

Clear the oil engine on the base, polish the end face, and ensure that the clearance in any direction during the trial installation of the SD25 adapter plate does not exceed one A4 paper thickness

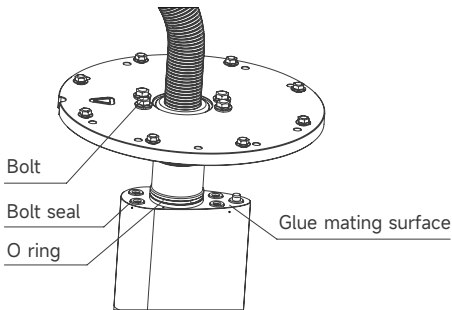
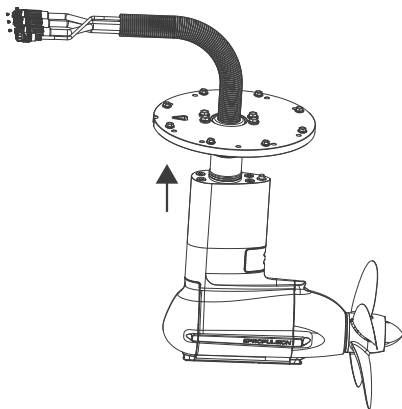


Step 2: Mount the SD25 adapter plate



Step 3: Mount underwater motor

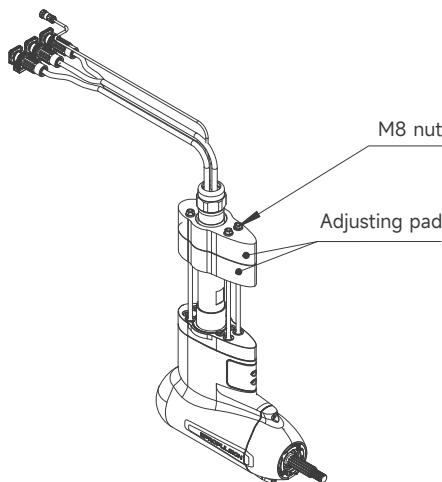
The motor passes through from the bottom of the ship to the top in sequence. The O-ring needs to be greased. The bolts and threaded holes are pre-coated with threaded glue for bolt tightening and assembly.



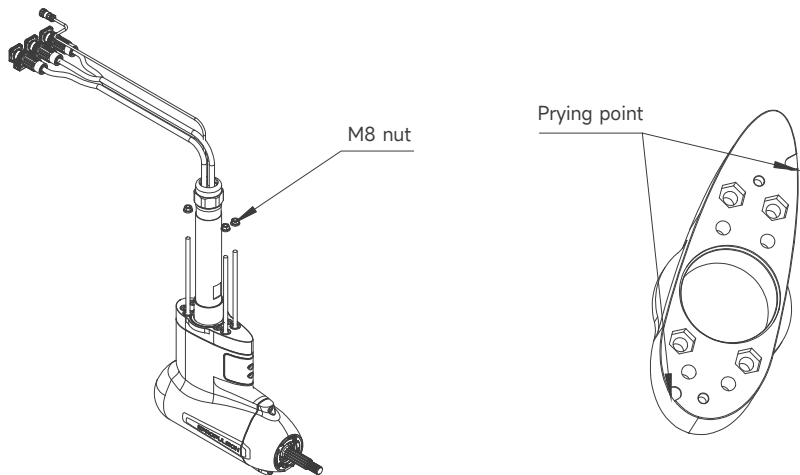
Step 4: Apply primer and anti-biological adhesion coating on the outside of the motor

3.4 Switch to saildrive version from adjusting pad version

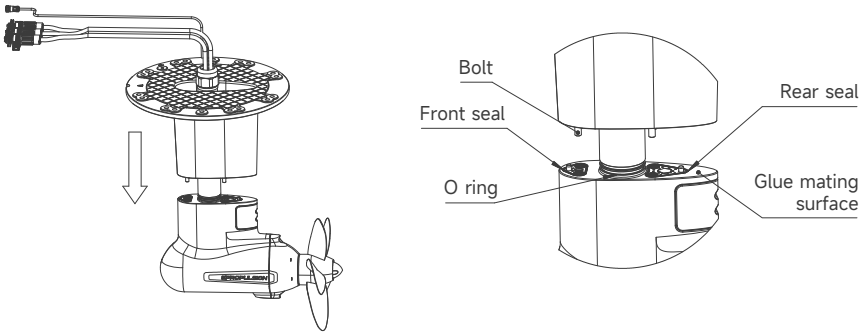
Step 1: Remove the following components from the adjusting pad version.



Step 2: Remove the fixing bolts, and remove the adjusting pad through the pry point.



Step 3: After removal, it can be mounted according to the process of the saildrive version;



3.5 Installation of the Controller

1. Remove the Controller Housing

Use an Allen wrench to remove the 8 M5 flat-head screws of the outer cover, and then take off the controller housing.

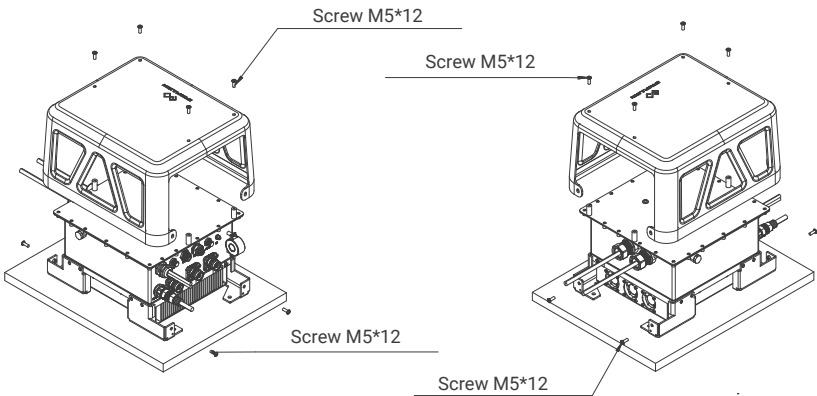


Figure 3-6

2. Drill Holes at an Appropriate Position on the Hull

When determining the position for drilling holes, consider whether the length of the battery input bus is sufficient to reach the battery and whether the length of the three-phase wires is sufficient to reach the connector of the driver.

If the hull material is fiberglass reinforced plastic (FRP), the following drilling dimensions are recommended. Note that the drilling depth should not be less than 15mm.

If the hull material is metal, the following drilling dimensions are recommended. Note that the specification of the screw is an M6x14 hexagon head three-combination screw. After the screw

passes through the installation hole of the hull, a length for locking the nut should be reserved, with a minimum reservation of 8mm.

The hole positioning can be carried out by fitting with the actual controller. Place the controller at the target position, mark the corresponding hole positions with a marker pen, and then drill holes after taking away the controller.

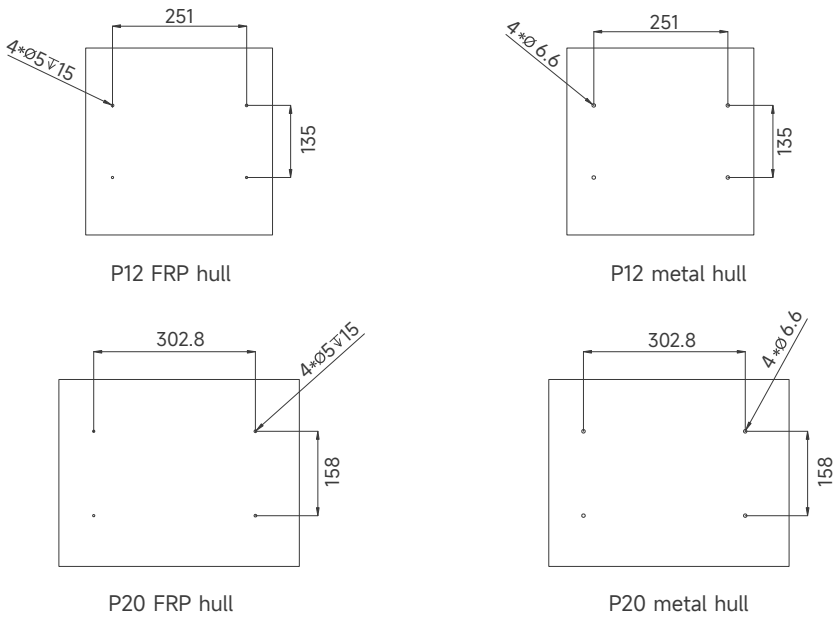


Figure 3-7

3. Fix and lock the drive controller to the hull with screws

If the hull material is fiberglass reinforced plastic (FRP), it is recommended to use M6 self-tapping screws.

If the hull material is metal, it is recommended to use M6 three-combination screws plus lock nuts.

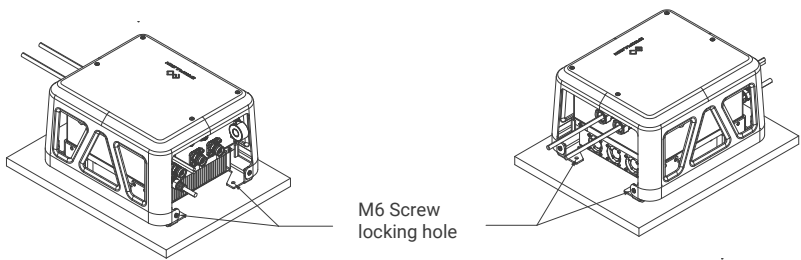


Figure 3-8

3.6 Motor and controller connection

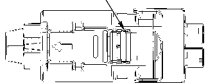
The pod motor comes with 4 cables, including 3 U, V, and W three-phase cables, as well as 1 communication cable between the motor and the controller. Please refer to the structure introduction in 1.2 for details. The colors of the three-phase plug and the socket of the controller are black, orange, and gray. There are indicator labels on the motor wiring harness, and indicator screen prints next to the socket of the controller. Please insert the three-phase plug into the socket with the same color and instruction text, and then insert the communication cable plug into the corresponding socket of the controller and tighten it.

 Please check if the U, V, and W connections are correct. Incorrect U, V, and W connections may cause the motor to reverse.

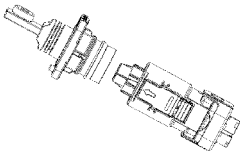
The specific steps for matching three-phase connectors are as follows:

1. Before plugging in the plug and socket, you need to push the CPA buckle of the plug to the unlocking/starting position, as shown in the figure below.

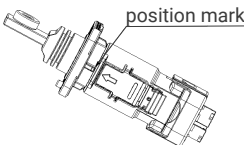
CPA unlocking/starting position



2. Insert the plug and socket along the axial direction of the terminal, as shown in the figure below.

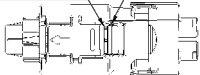


3. Push the plug until you hear a clicking sound, indicating that the plug and socket are in place, and the plug is close to the position mark on the socket, as shown in the figure below.



4. After the plug and socket are inserted into place, push the CPA buckle of the plug to the locked/terminated position, as shown in the figure below.

position mark CPA locked/terminated position



5. The final state of the matching is as shown in the figure below. After the matching is completed, check whether the plug is close to the position mark on the socket, and the CPA buckle is close to locked/terminated position mark.



- ⚠ If the three-phase plug and socket are not properly connected, it may cause problems such as motor failure and leakage.
- ⚠ The unlocking process of the three-phase cable connector is opposite to the matching process. The above steps can be operated in the opposite order.

3.7 Propeller Installation

Refer to the following steps to install or replace the propeller:

1. Turn off the system or turn off the 12V power supply.
2. Remove the M4 screws fixing the propeller tail fairing.
3. Straighten and remove the cotter pin(only P20 has a cotter pin).
4. Remove the nuts and washers securing the propeller.
5. Pull the propeller straight out along the axis. If the propeller is stuck and cannot be removed from the shaft, please contact customer support for assistance.
6. Apply a layer of 2-4-C lubricant containing polytetrafluoroethylene (PTFE) to the propeller shaft to prevent the propeller from sticking to the shaft.
7. Assemble the thrust washer and propeller onto the output shaft. Then, install the washer and hex slotted nut onto the propeller shaft.
8. Use tools to tighten the nut and align the slot in the nut with the hole in the output shaft. Insert the cotter pin and bend it at the opening(only P20 has a cotter pin)..
9. Secure the tail cone to the propeller hub using four M4 screws.

- ⚠ It is mandatory to shut down and disconnect the power supply of the outboard motor before removing and installing the propeller.
- ⚠ **Cautious:** There are various safety risks during the installation process, so it is essential to be vigilant and perform operations with caution to ensure safety.
- ⚠ During trial runs, please stay away from the propeller to avoid any risk of being cut or injured.

💡 After installing the propeller nut of P20, insert the cotter pin and bend it to secure it in place. This precaution is essential to prevent the propeller nut from loosening and coming off during machine operation, which could result in the propeller detaching and falling into the water.

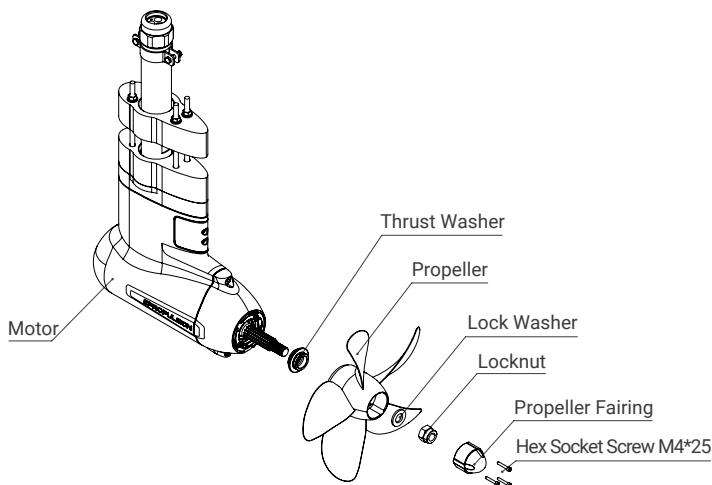


Figure 3-9

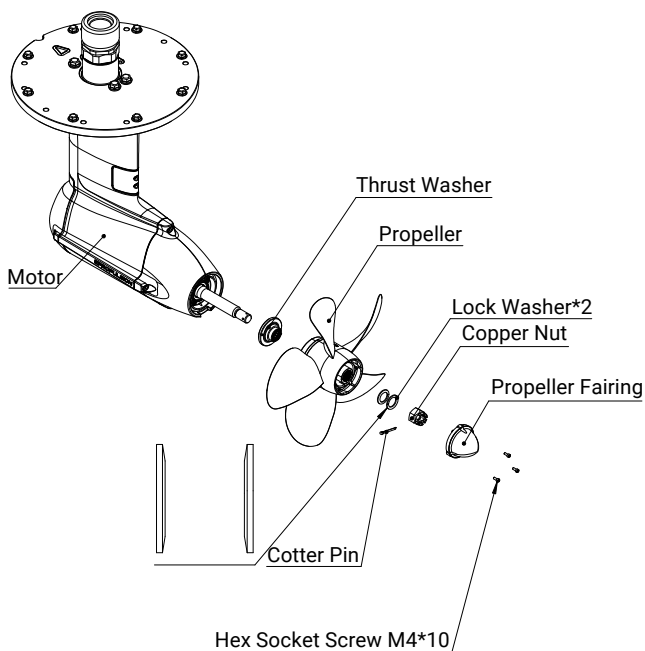


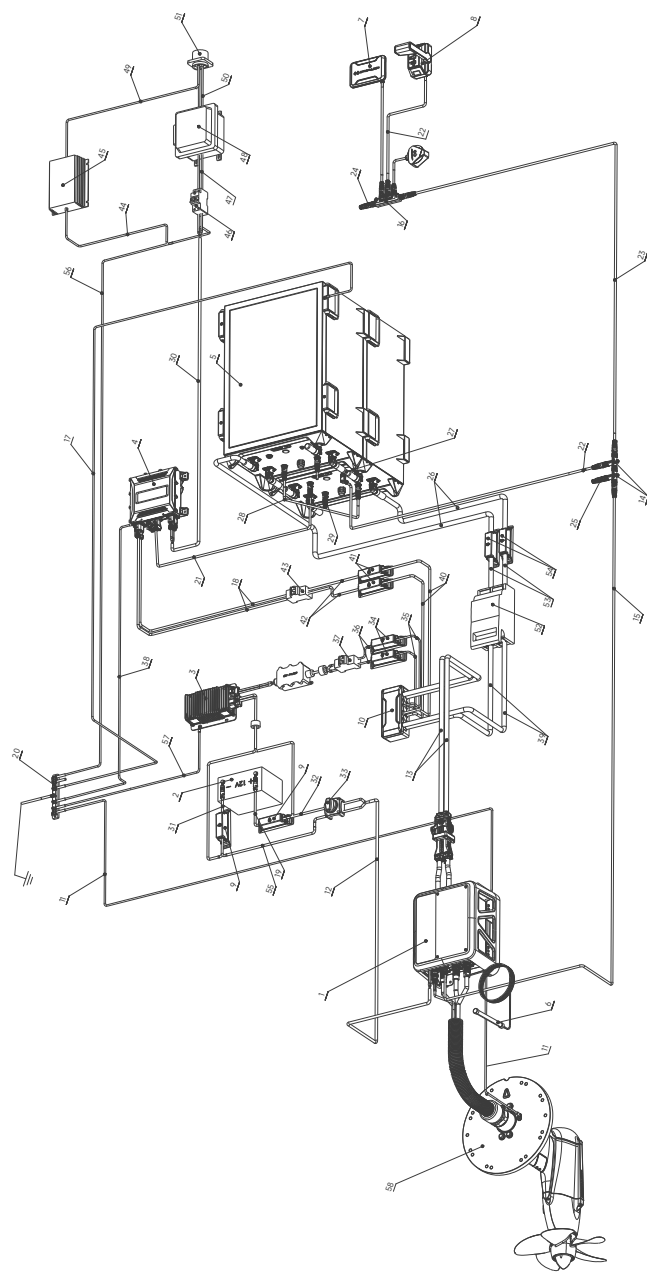
Figure 3-10

4 Connections

4.1 Examples System Setup

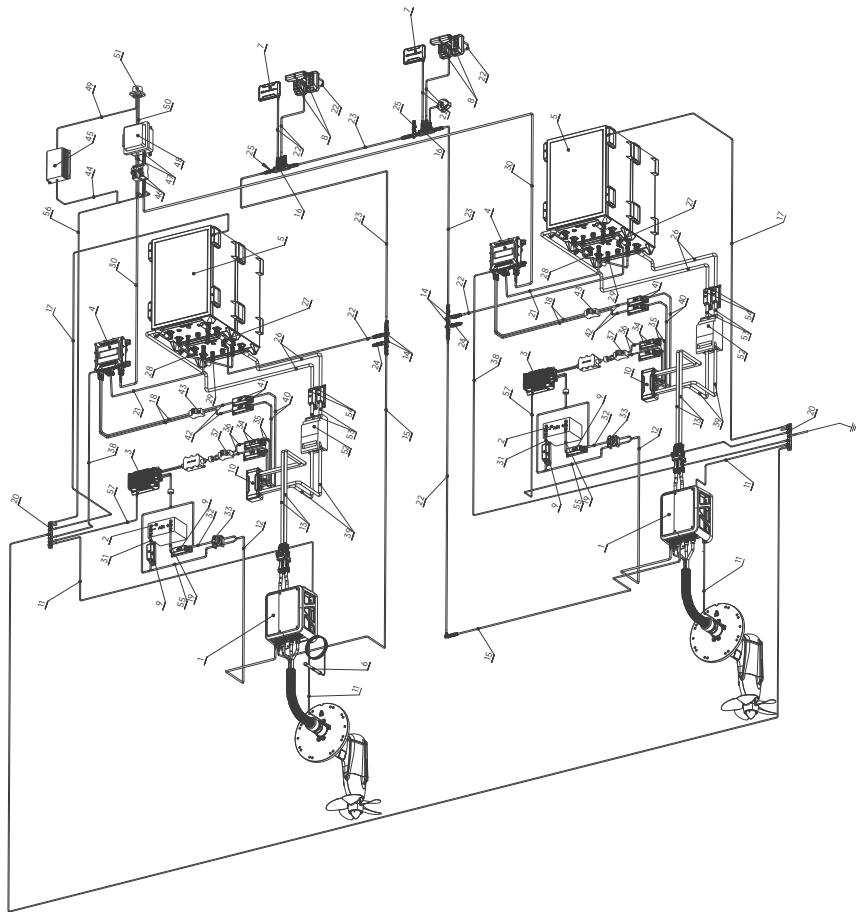
-  The accessories marked * are not included in the package. Users need to adjust according to local regulatory requirements, such as fuses, circuit breakers and cables.
-  One 12V Fuse is included in the package, which should be installed between the 12V power cable of the inboard motor and the positive of the 12V battery. If local regulations require the installation of fuses for both positive and negative, customers need to purchase and install fuses based on local regulations.
-  When the communication cable length is insufficient and a communication extension cable is necessary, please contact the ePropulsion authorized dealers. When the length of the communication cable from the inboard to the interaction system or battery exceeds 30m, the communication terminators need to be replaced from one 360Ω and one 120Ω to two 120Ω. Please contact the ePropulsion authorized dealers for purchase the 120Ω communication terminator.
-  Whether the negative pole of the 12V battery is grounded needs to be adjusted according to local regulations.
-  The pod drive system can support up to four motors and two consoles. For setups not shown here, please contact your ePropulsion dealer for assistance.

4.1.1 Single Motor System Connection



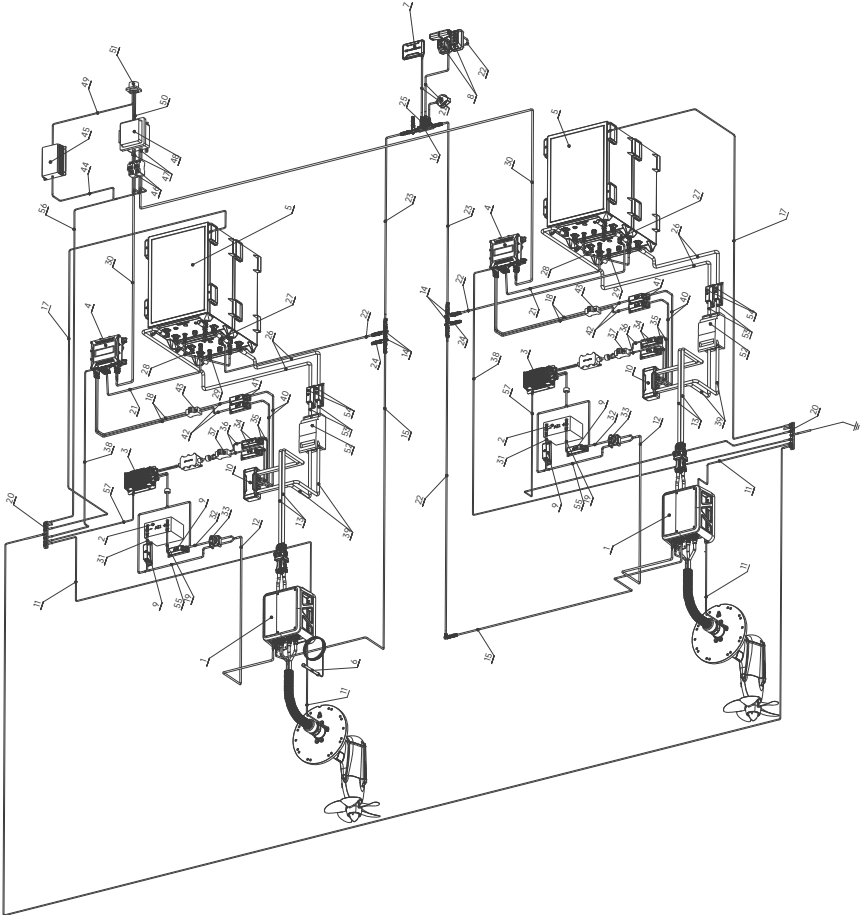
1. Driver	23. eSSA Communication Extension Cable 10m	40. G Battery Charger Output Fuse and Bus Box Connecting Cable
2. 12V battery	24. eSSA Communication Terminator 120Ω	41. G Battery Charger Output Fuse (45A)*
3. DCDC 96V-12V	25. eSSA Communication Terminator 360Ω	42. G Battery Charger Output Fuse and Circuit Breaker Connecting Cable
4. G Battery Charger 16A	26. Battery to fuse power cable	43. G Battery Charger Output Circuit Breaker (40A)*
5. G102-100 Battery	27. G Battery Bridging Cable (Positive & Negative)	44. Current Isolator Grounding Line
6. 4G Antenna	28. Battery Communication Cable	45. Current Isolator
7. Smart Display 5"	29. Battery Communication Terminator	46. G Battery Charger Input Leakage Protector
8. Smart Throttle	30. Motor and Battery Output Fuse Connecting Cable	47. G Battery Charger Input Fuse and Leakage Protector Connecting Cable
9. 12V Fuse (150A)	31. 12V Fuse Connecting Cable (Negative)	48. G Battery Charger Input Fuse (24A)*
10. Bus Box	32. 12V Fuse to Switch Cable (Positive)	49. Charging Port Grounding Line
11. Grounding Line	33. 12V Battery Two-Way Switch	50. G Battery Charger and Fuse Connecting Cable
12. 12V Power Cable 5m (Come with driver)	34. DCDC Input Fuse(50A)	51. G Battery Charger Input Port
13. Motor to bus bar power cable	35. Bus Box to DCDC Input Fuse Connecting Cable	52. 4 Way Fuse Switch Circuit Breaker (250A)*
14. eSSA Communication 3-way T Connector	36. DCDC Input Fuse to Circuit Breaker Connecting Cable	53. Bus Fuse and Circuit Breaker Connecting Cable
15. Communication Cable 10m	37. Connecting Cable	54. Bus Fuse (DC 400A)
16. eSSA Communication 5-way T Connector	38. DCDC Input Fuse to Circuit Breaker Connecting Cable	55. 12V Fuse to Switch Cable (Negative)
17. G102-100 Battery Grounding Line	39. Connecting Cable	56. G Battery Charger Input Grounding Line
18. Charger output power cable	37. DCDC Input Circuit Breaker (40A)*	57. DCDC Grounding Line
19. 12V Fuse Connecting Cable (Positive)	38. G Battery Charger Grounding Line	58. Motor
20. Grounding Bus Bar	39. Bus Box and Battery Output Fuse Connecting Cable	59. GPS
21. Charger Communication Cable		
22. eSSA Communication Cable 1m		

4.1.2 Twin Motor and Twin Console System Connection



1. Driver	23. eSSA Communication Extension Cable 10m	40. G Battery Charger Output Fuse and Bus Box Connecting Cable
2. 12V battery	24. eSSA Communication Terminator 120Ω	41. G Battery Charger Output Fuse (45A)*
3. DCDC 96V-12V	25. eSSA Communication Terminator 360Ω	42. G Battery Charger Output Fuse and Circuit Breaker Connecting Cable
4. G Battery Charger 16A	26. Battery to fuse power cable	43. G Battery Charger Output Circuit Breaker (40A)*
5. G102-100 Battery	27. G Battery Bridging Cable (Positive & Negative)	44. Current Isolator Grounding Line
6. 4G Antenna	28. Battery Communication Cable	45. Current Isolator
7. Smart Display 5"	29. Battery Communication Terminator	46. G Battery Charger Input Leakage Protector
8. Smart Throttle	30. Motor and Battery Output Fuse Connecting Cable	47. G Battery Charger Input Fuse and Leakage Protector Connecting Cable
9. 12V Fuse (150A)	31. 12V Fuse Connecting Cable (Negative)	48. G Battery Charger Input Fuse (24A)*
10. Bus Box	32. 12V Fuse to Switch Cable (Positive)	49. Charging Port Grounding Line
11. Grounding Line	33. 12V Battery Two-Way Switch	50. G Battery Charger and Fuse Connecting Cable
12. 12V Power Cable 5m (Come with driver)	34. DCDC Input Fuse(50A)	51. G Battery Charger Input Port
13. Motor to bus bar power cable	35. Bus Box to DCDC Input Fuse Connecting Cable	52. 4 Way Fuse Switch Circuit Breaker (250A)*
14. eSSA Communication 3-way T Connector	36. DCDC Input Fuse to Circuit Breaker Connecting Cable	53. Bus Fuse and Circuit Breaker Connecting Cable
15. Communication Cable 10m	37. Connecting Cable	54. Bus Fuse (DC 400A)
16. eSSA Communication 5-way T Connector	38. Connecting Cable	55. 12V Fuse to Switch Cable (Negative)
17. G102-100 Battery Grounding Line	39. DCDC Input Circuit Breaker (40A)*	56. G Battery Charger Input Grounding Line
18. Charger output power cable	40. G Battery Charger Grounding Line	57. DCDC Grounding Line
19. 12V Fuse Connecting Cable (Positive)	41. Bus Box and Battery Output Fuse Connecting Cable	58. Motor
20. Grounding Bus Bar		59. GPS
21. Charger Communication Cable		
22. eSSA Communication Cable 1m		

4.1.3 Twin Motor System Connection



1. Driver	23. eSSA Communication Extension Cable 10m	40. G Battery Charger Output Fuse and Bus Box Connecting Cable
2. 12V battery	24. eSSA Communication Terminator 120Ω	41. G Battery Charger Output Fuse (45A)*
3. DCDC 96V-12V	25. eSSA Communication Terminator 360Ω	42. G Battery Charger Output Fuse and Circuit Breaker Connecting Cable
4. G Battery Charger 16A	26. Battery to fuse power cable	43. G Battery Charger Output Circuit Breaker (40A)*
5. G102-100 Battery	27. G Battery Bridging Cable (Positive & Negative)	44. Current Isolator Grounding Line
6. 4G Antenna	28. Battery Communication Cable	45. Current Isolator
7. Smart Display 5"	29. Battery Communication Terminator	46. G Battery Charger Input Leakage Protector
8. Smart Throttle	30. Motor and Battery Output Fuse Connecting Cable	47. G Battery Charger Input Fuse and Leakage Protector Connecting Cable
9. 12V Fuse (150A)	31. 12V Fuse Connecting Cable (Negative)	48. G Battery Charger Input Fuse (24A)*
10. Bus Box	32. 12V Fuse to Switch Cable (Positive)	49. Charging Port Grounding Line
11. Grounding Line	33. 12V Battery Two-Way Switch	50. G Battery Charger and Fuse Connecting Cable
12. 12V Power Cable 5m (Come with driver)	34. DCDC Input Fuse(50A)	51. G Battery Charger Input Port
13. Motor to bus bar power cable	35. Bus Box to DCDC Input Fuse Connecting Cable	52. 4 Way Fuse Switch Circuit Breaker (250A)*
14. eSSA Communication 3-way T Connector	36. DCDC Input Fuse to Circuit Breaker Connecting Cable	53. Bus Fuse and Circuit Breaker Connecting Cable
15. Communication Cable 10m	37. Connecting Cable	54. Bus Fuse (DC 400A)
16. eSSA Communication 5-way T Connector	38. DCDC Input Fuse to Circuit Breaker Connecting Cable	55. 12V Fuse to Switch Cable (Negative)
17. G102-100 Battery Grounding Line	39. Connecting Cable	56. G Battery Charger Input Grounding Line
18. Charger output power cable	37. DCDC Input Circuit Breaker (40A)*	57. DCDC Grounding Line
19. 12V Fuse Connecting Cable (Positive)	38. G Battery Charger Grounding Line	58. Motor
20. Grounding Bus Bar	39. Bus Box and Battery Output Fuse Connecting Cable	59. GPS
21. Charger Communication Cable		
22. eSSA Communication Cable 1m		

4.2 High Voltage Cables Connection

4.2.1 Make a cable (crimped cable connector)

When you receive the cable, "Driver to bus box power cable" and "Battery to bus box power cable" are integrated. You need to cut one of the integrated cables from an appropriate position according to the placement and distance of the battery, bus box and outboard motor on board. And crimp the cable connector (a total of 4 cable connectors needs to be crimped) at the cutting place to make "Motor to bus box power cable" and "Battery to bus box power cable".

Tools needed to make the cable:

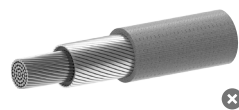
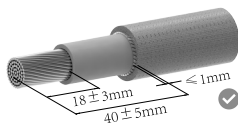
No.	Tools	Recommended model
1	Wire cutter	EC-50M
2	Wire stripper	SW-1018
3	Crimping plier	/

Crimping cable connectors:

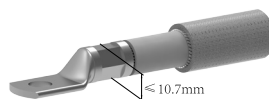
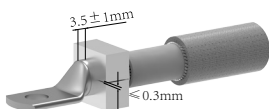
MAKING THE BATTERY TO BUS BOX AND BUS BOX TO MOTOR POWER CABLES

Cut one of the two 96V power cables into two pieces, paying attention to which end is which and the distance from each to bus box (battery and motor connectors are different). Then:

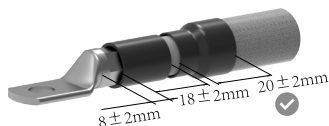
- Strip back the insulation/shielding as follows:
 - outer sheath and metal shielding layer by $40\pm5\text{mm}$. When cut, the metal shielding layer must not extend more than 1mm beyond the outer sheathing. (Contact between the metal shielding layer and terminals or inner cores will cause insulation failure.)
 - inner sheaths (on positive and negative cables) by $18\pm3\text{mm}$



- Slide the terminals over the inner cores and crimp at approx. 3.5mm from the terminal end. After crimping the height of the uncrimped sides should be 10.7mm or less (if more, crimp again).



3. Fit heat shrink tubing over the joints between the terminals and the inner cables, and (separately) over the shielding layer. Leaving the joints or the shielding exposed to air may result in insulation and system failure.



- ⚠ Please use the crimping tool corresponding to the specifications of the terminal to ensure a proper crimping process. Make sure the crimping is fully seated. Otherwise, poor crimping may lead to local heating and severe damage.
- ⚠ During the crimping process, pay special attention to prevent the shield layer from contacting the terminal and core wire, to avoid leakage or short circuits.

4.2.2 Connecting Cables to the bus box

4.2.2.1 Required accessories and tools

1. Bus box
2. Motor to bus box power cable
3. Battery to bus box power cable
4. Bus box to DC-DC power cable
5. G battery charger
6. M4 hex wrench, M6 hex wrench, M8 hex wrench

4.2.2.2 Installation

The cables that go into the bus box should be installed by reference to the symbols next to the terminals, as follows:

- a.BAT - connected to G102 battery bank
- b.96V-1, 96V-2, 96V-3 - connect to the DC-DC module or other 102.4V electrical equipment
- c.CHG - connect to charger
- d.MOT - connect to the motor

(1) Remove the top cover of the bus box (4x M4 screws). Then remove the positive/negative baffle plate, to access the positive terminals.

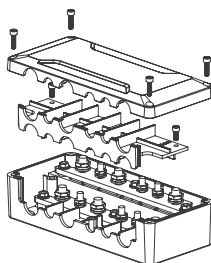


Figure 4.3

(2) Connect the positive cables for Motor, Battery, Charger & DC-DC Module

1. Undo the terminal nuts, and remove the spring and flat washers
2. Install the positive cables (red sleeves) to the terminals on the lower copper bar. BAT+ connects to G102 Battery; CHG+ connects to charger; 96V-1+, 96V-2+, 96V-3+ connect to DCDC or other 102.4V Device; MOT+ connects to Pod motor; The figure after installation is shown below.

The terminal should go on first, followed by the flat washer, the spring washer and the nut.

Note the locking torque for the M6 nuts should be 5N.m, and M8 nuts 10N.m.

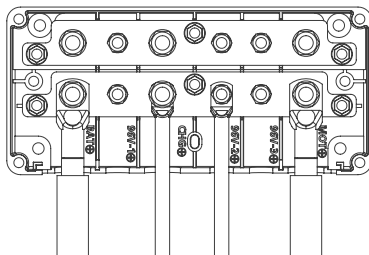


Figure 4.4

3. Reinstall the baffle plate.

Once the positive cables are installed as above, put the baffle plate back in place with its holding screws.

4. Connect the negative cables for Motor, Battery, Charger & DC-DC Module

Undo the terminal nuts, and remove the two washers.

Install the positive cables (red sleeves) to the terminals on the lower copper bar. BAT- connects to G102 Battery; CHG- connects to charger; 96V-1-, 96V-2-, 96V-3- connect to DCDC or other 102.4V Device; MOT+ connects to Pod motor; The figure after installation is shown below.

The terminal should go on first, followed by the flat washer, spring washer, nut.

The locking torque for the M6 nuts should be 5.2~5.7N.m, and M8 nuts 12~13N.m.

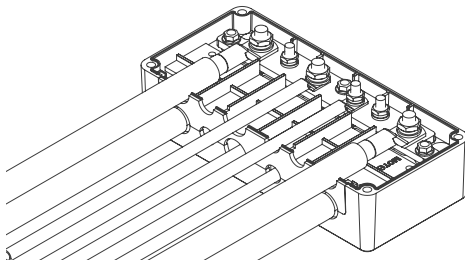


Figure 4.5

⚠ If parallel connecting the batteries, the positive and negative connectors of the battery output cable need to connect with the first battery and the last battery respectively. Otherwise, it might cause overcurrent alarms or parallel faults, which shortens the battery life.

5. Bus Box installation

The length*width*height of the bus box are 203.5 * 93.5 * 64mm, with a weight of 1kg. The bus box should be fitted to a flat surface, as far from sources of moisture and heat as is reasonably practical.

Please use the punch card shown in the figure below to punch holes in the appropriate position of the hull. After punching, select the corresponding screws according to the material of the hull. Lock the M6 screws with the torque of 5.2~ 5.7N.m

If the hull material is fiberglass, it is recommended to use the M6x16 self-tapping screws. At this time, the drilling size is 5.0-5.2mm, and the drilling depth should not be less than 15mm.

If the hull material is metal, it is recommended to use the M6x20 bolts and nuts for installation. At this time, the hole size is 6.6-7mm. Note that the M6x20 bolts actually protrude 12.5mm from the bus box, and the nut engagement length needs to be guaranteed to be more than 8mm. At this time, the M6x20 bolts only support steel plate thickness ≤ 6.5 mm. If the steel plate is too thick, please replace it with M6 longer specification bolts to avoid insufficient nut engagement length.

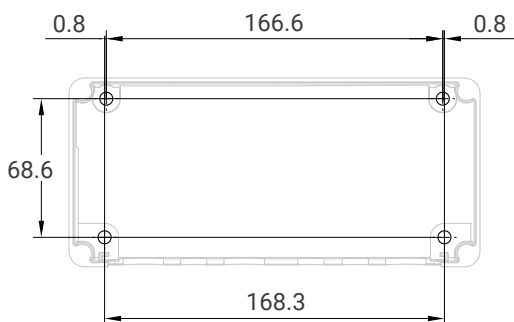


Figure 4.6

(3) Put bus box cover back on (with screws)

When the bus box connections have been made it should look like this.

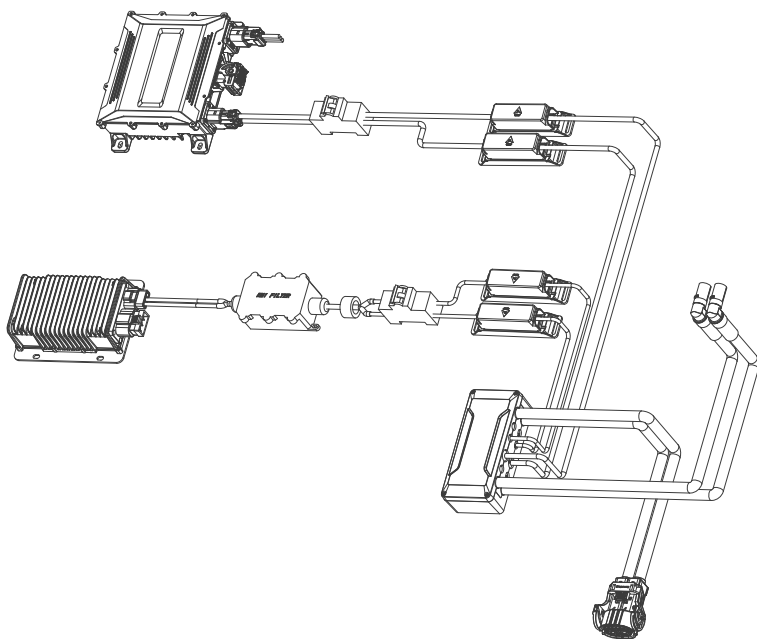


Figure 4.7

- ⚠ Before connecting the DCDC, please determine the positive and negative identification of the input and output terminals, and connect them one by one with the positive and negative copper bars of the bus box and the positive and negative of the battery to avoid damage to the DCDC, battery, pod drive motor and system caused by incorrect positive and negative connection.
- ⚠ Please configure the fuses, circuit breakers in accordance with local regulations, and purchase separately.

4.2.3 Connecting the DC-DC Module and 12V Battery

4.2.3.1 Required Accessories and Tools

1. Bus box part completed in step 4.2.2
2. M6 hexagon wrench
3. 12V battery (purchased by the user)
4. Hex socket wrench suitable for 12V battery terminal screws and nuts

4.2.3.2 Installation Steps

Step 1: Connecting the Bus Bar with the DC-DC Module

See 4.2.2 if not already done.

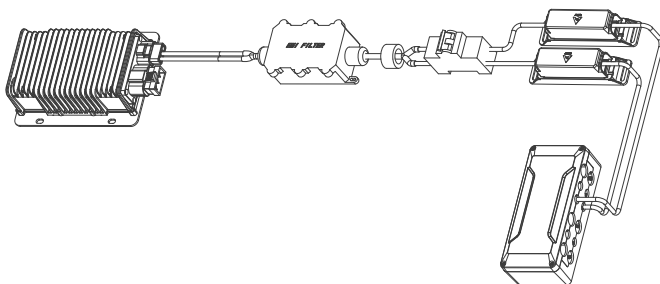


Figure 4.8

Step 2: Connecting the DC-DC Output and 12V Battery

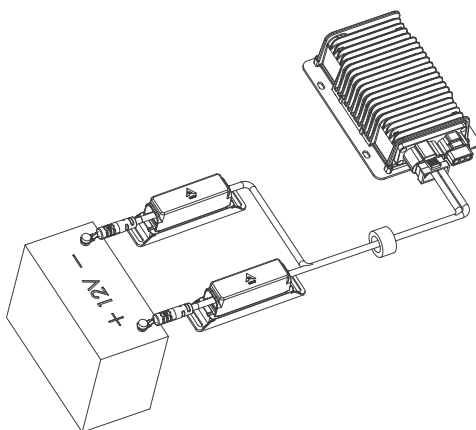


Figure 4.9



When connecting DC-DC and 12V battery, pay attention to avoid short circuits.



Before connecting the DCDC, please determine the positive and negative identification of the input and output terminals, and connect them one by one with the positive and negative copper bars of the bus box and the positive and negative of the battery to avoid damage to the DCDC, battery, pod drive motor and system caused by incorrect positive and negative connection.



Please configure the fuses, circuit breakers in accordance with local regulations, and purchase separately.

4.2.4 Connecting the G102-100 Battery Bank

4.2.4.1 Required Accessories and Tools

1. G102-100 battery bank (at least 4 G102 batteries are needed, connected in parallel, to operate pod drive motor).
2. Bus box part completed in step 4.2.2.
3. 96V power cable.



Ensure that the main switch is turned off before connecting the batteries.



Users can also connect multiple batteries in parallel to increase battery capacity. Refer to the G102 battery user manual for battery usage and cautions.

4.2.4.2 Installation Steps

Insert the battery connector leads from the bus box into the corresponding color terminals on the G102-100 battery. After installation, refer Figure 4.9.

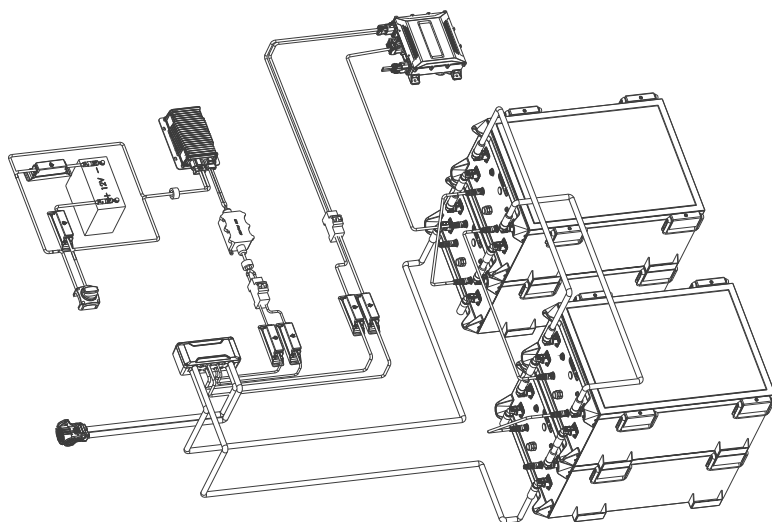


Figure 4.10



Please configure the fuses, circuit breakers in accordance with local regulations, and purchase separately.

4.2.5 Connecting the pod drive motor's Main Power and 12 volt Cables

4.2.5.1 Required Accessories and Tools

- ① Pod Drive Motor
- ② Bus box, DC-DC module, and 12V battery connected in step 4.2.3



If you need to extend the 12V cable, prepare the following:

- ① 12V extension cable (user should purchase a specified cable not exceeding 3m in length)
- ② M8 hexagon screws and nuts
- ③ M8 hex socket wrench
- ④ Heat shrink tubing, electrical tape, etc

4.2.5.2 Installation Steps

Step 1: Connecting the High-Voltage Motor Power Cable from the bus box

Connect the orange self-locking plug on the motor power cable from the bus box to the motor's orange connector. Follow these steps:

Open the locking mechanism of the orange self-locking connector, by sliding the latch as shown in Figure 4.11, and lifting the black handle as shown in Figure 4.12.

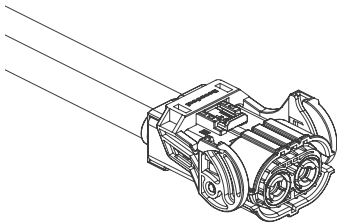


Figure 4.11 High-voltage interlock connector- Installation step 1

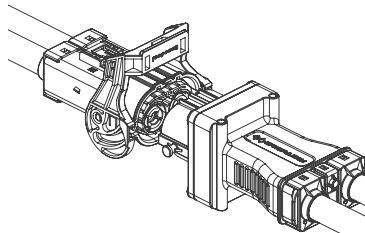


Figure 4.13 High-voltage interlock connector - Installation step 2

Insert the motor cable connector into the motor's orange plug, figure 4.13. Push down the black handle, figure 4.14.

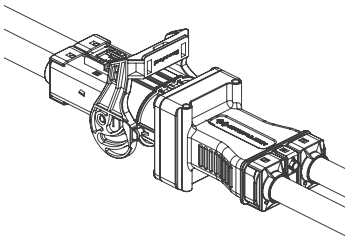


Figure 4.13 High-voltage interlock connector - Installation step 3

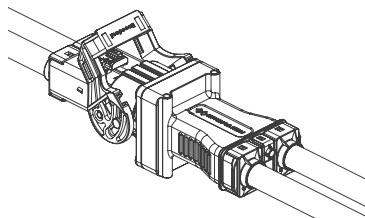


Figure 4.14 High-voltage interlock connector - Installation step 4

Press the black handle down firmly to secure the connector. Close the locking latch as shown in figure 4.15.

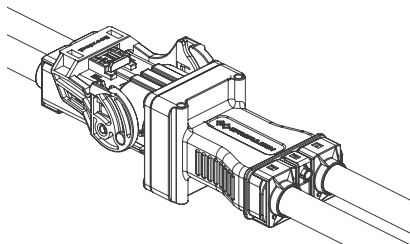


Figure 4.15 High-voltage interlock connector - Installation step 5

-  You can use an M4x80mm screw to fix the high-voltage interlock pconnector to the boat (user-provided).
-  If the "96V power cable 5m" provided with the pod drive is not long enough for your installation needs, please contact your dealer to purchase a longer high-voltage extension cable.
-  After cutting and crimping the cables, check to ensure that the positive and negative poles are correctly matched to avoid damage to the pod drive motor.
-  Before connecting the high-voltage connector, it is necessary to check whether there are water droplets condensing inside the connector. If there are water droplets condensing inside the connector, it is necessary to dry the water droplets before connecting the connector.
-  After the high-voltage connector is connected, the connector and cable should not be soaked in water.
-  When the high-voltage connector is unconnected, it is necessary to use the protective cover that comes with the connector or tape to cover the unplugged connector, keep the metal conductive terminals inside the connector dry, and avoid water splashing into the connector, which may cause corrosion of the metal conductive terminals.
-  Do not charge high voltage connectors when they are not connected, as charging unconnected connectors can cause rapid corrosion of the internal terminals of the connectors, and charging high voltage connectors when they are not connected poses a risk of electric shock.

Step 2: Connecting the Low-Voltage Power Cable

Connect the red and black twin cables from the pod drive to the 12V battery. Match the red cable with the positive pole and the black cable with the negative pole of the 12V battery. Connect them to the 12V battery terminal screws and tighten the nuts. (Note: The 12V battery should be placed near the pod drive motor).



After completing the above installation steps, the cable can be fixed by expanding or winding it based on the distance between the battery compartment and the driver.



12V Cable Extension: The pod drive motor's 12V cable is approximately 5m long. If the length is not suitable for your installation requirements, please contact your dealer to purchase a dedicated extension cable, and have a professional handle the installation, ensuring that the total length of the low-voltage cable does not exceed 8m (extension cable specification requirements: copper conductor cross-sectional area should be larger than 35 square millimetres).



Proper insulation treatment should be carried out at the connection position of the extension cable to prevent battery short circuits and potential fire hazards.

4.3 Connection of Communication Devices



This example is for a single-pod drive system with a single group of G102 batteries. The setup and connections for other scenarios should be based on the "System Device Connection Plan." Contact an authorised ePropulsion dealer to purchase accessories and for further information. Professional installation recommended.

4.3.1 Required Accessories for Single Motor System Connection

1. Smart throttle ×1
2. Smart display 5" ×1
3. G102-100 battery ×4 (specific number of batteries matched according to the scenario and endurance requirements)
4. eSSA Communication 1m Extension Cable ×4
5. eSSA Communication 10m Extension Cable ×1
6. eSSA Communication 5-Way T-Connector ×1 & eSSA Communication 3-Way T-Connector ×2

4.3.2 Installation Steps

4.3.2.1 Connecting Interactive Devices and Accessories

Referring to Figure 4.16, connect the components using the cables as shown. The components are as follows:

1. eSSA communication cable 10m(connect to driver)
2. 5-way T-connector ×1
3. 3-way T-connector ×2
4. Communication terminator(s) - see 4.5
5. eSSA communication cable 1m,(one end with a 90° right-angle connector, connected to the MOTOR interface of the G102 battery, smart throttle, smart display 5")
6. GPS
7. eSSA communication cable 10m(connect to G102 battery)

 After connecting the interactive devices, make sure to tighten the threads of each connector to ensure stability and waterproofing.

 After the communication connector is connected, the connector and cable cannot be soaked in water, and there should be no connectors with metal conductive pins exposed. If the connector with metal conductive pins is exposed, please check whether the communication cable connection is carried out according to the user manual, or add and tighten the waterproof cover of the communication connector.

 Unconnected communication connectors need to tighten the waterproof cap of the connector to avoid splashing water and steam entering the connector.

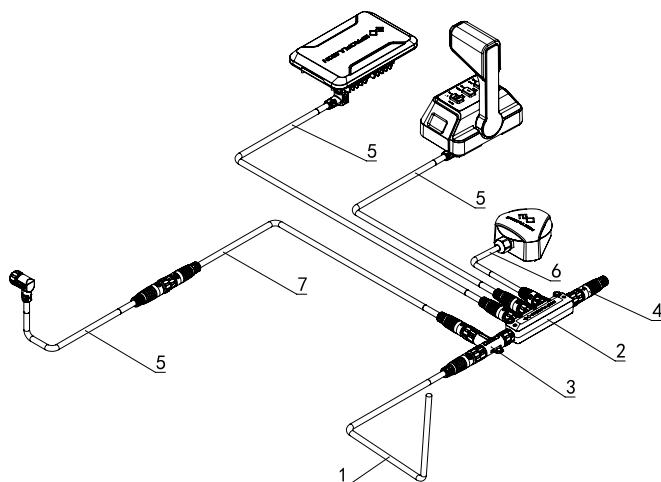


Figure 4.16

4.3.2.2 Smart throttle connection

Each smart throttle has a BUS port and DUAL port at the bottom.

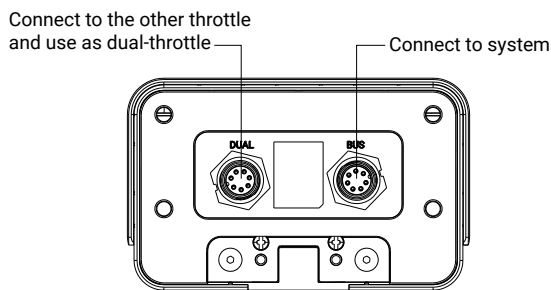


Figure 4.17

Specific connecting instructions for different scenarios are as follows:

- **Single Smart Throttle Mode**

The smart throttle's BUS port should be connected to the CAN bus.

- **Dual Smart Throttle Mode**

For the 1# smart throttle, the BUS port should be connected to the CAN bus, and the DUAL port should be linked to the DUAL port of the second smart throttle. The 2# smart throttle's BUS port must be left without connection.



All operations must be done without power. Do not connect or disconnect the cables while there is power.

4.4 Grounding

In order to ensure safety and stability of system operation, the pod drive eSSA(2 grounding line), DCDC module, G102-100 battery, and 12V battery (purchased by the user) must be grounded during system installation.

Grounding preparation and operation:

Hull grounding bolt, or grounded copper bar/bus bar and connected to the hull grounding point. Users or operators can prepare grounding line, connection terminals, bolts and other materials by combining the DCDC module, G102-100 battery, 12V battery layout position, and grounding bolt or grounding copper bar/bus position. Refer to the following instructions for grounding.

1. Connect the motor and the driver for grounding conduction, as shown in the following figure.

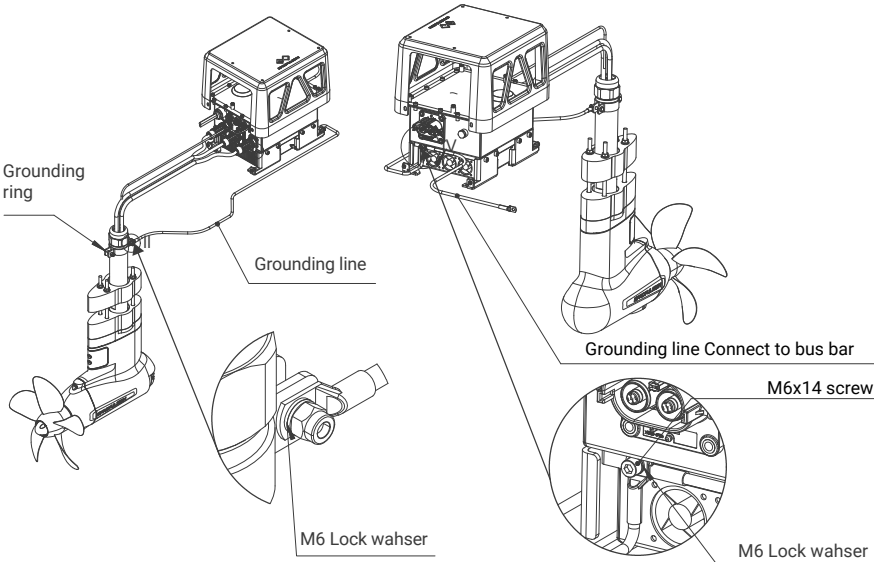


Figure 4-18

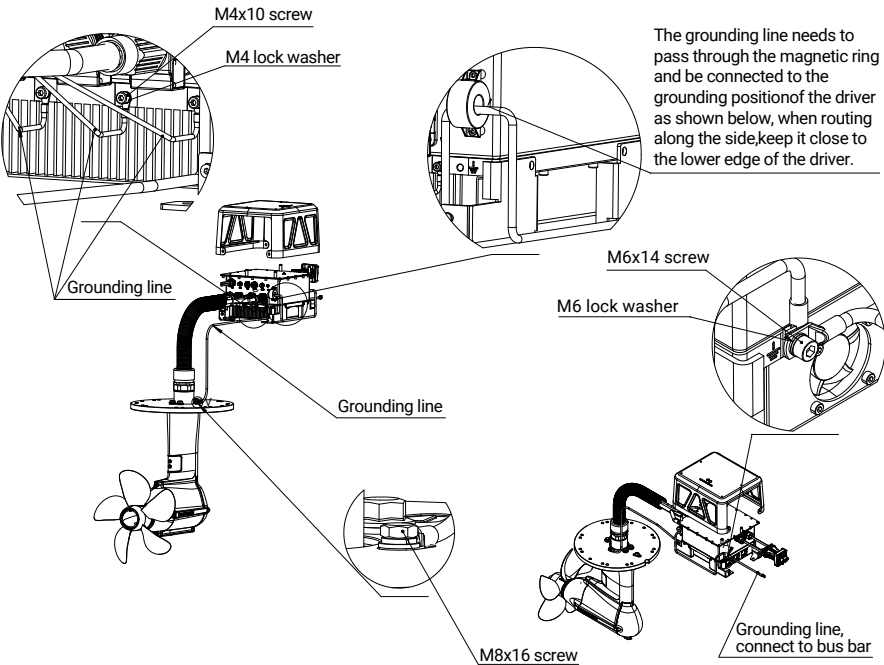


Figure 4-19

2. Refer to the following figure and prepare the grounding wire by yourself. Connect one end of the grounding wire to the mounting foot of the G102-100 battery through an M8 fastener (which should be prepared by yourself), and connect the other end to the grounding busbar or the grounding point of the hull.

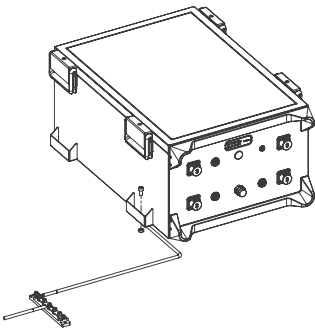


Figure 4-20

4.5 Purchasing Accessories and Connections

Although the driver has integrated 4G and GPS antennas, the driver is usually installed in the cabin, which has strong obstruction and poor signal. It is recommended to connect the optional 4G and GPS antennas externally.

4.5.1 Installation of the 4G Antenna

Step 1:

Connect the SMA male connector at the end of the 4G fiberglass antenna to the 4G interface of the driver, and manually tighten the connector.

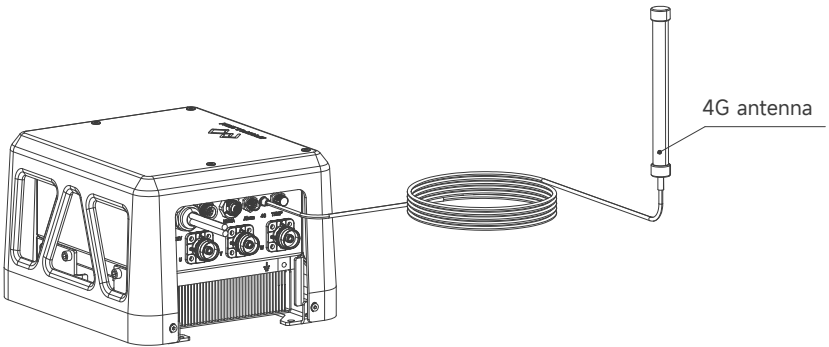


Figure 4-21

Step 2:

Fix the 4G antenna on the boat (outdoors). There are two fixing options, as shown in the following images.

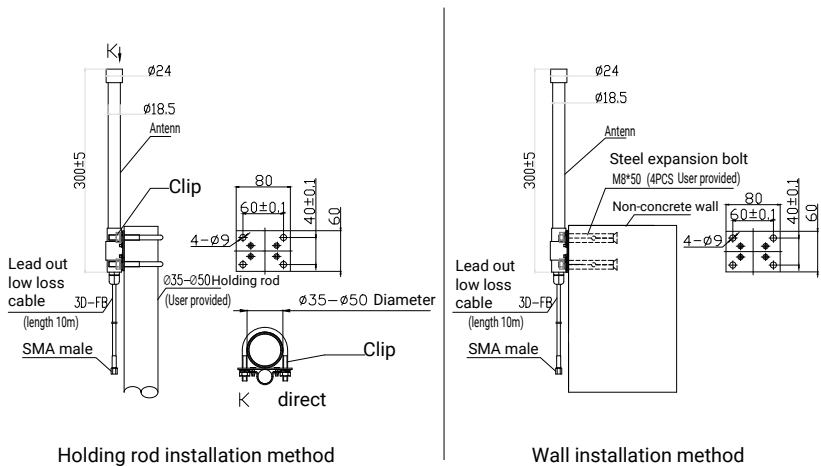


Figure 4.22

- Pole Mounting: The customer provides a pole with an outer diameter of $\phi 35 \sim \phi 50$ mm. Then, use a supporting bracket to secure the 4G antenna tightly to the pole.
- Fixing to an existing structure: choose an area that's likely to have a clear signal, such as the top of a cabin or communication arch. Drill holes as appropriate and fix the aerial in place using 4 M8 x 50 mm bolts (not supplied).

4.5.2 Installation of the External GPS Module

Step 1:

Connect the CAN communication port of the external GPS module to the 3-way T-connector.

Step 2:

Select a location for the GPS module that's outdoors, open to the sky, flat, and out of the way (won't get trodden on etc). There are two fixing options.

• **3M Adhesive Attachment**

Attach the double-sided adhesive pad to the back of the GPS module as shown below. Make sure the chosen location is clean and dry, then stick the module in place. The bond will take a few hours to acquire full strength.

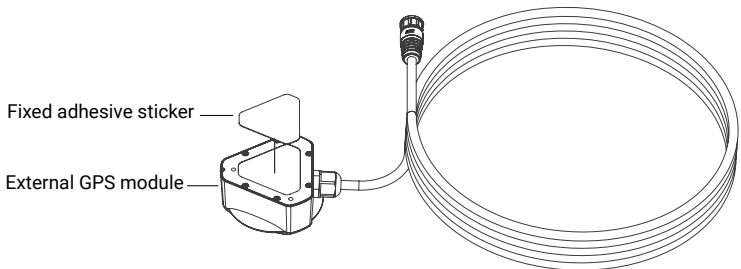


Figure 4.23 GPS external module adhesive pad fixing

• **Self-Tapping Screw Fixation**

Opening the decorative cover of the external GPS module, use the three M3 self-tapping screws provided with the accessories to secure the external GPS module in an open outdoor area. After confirming that all three self-tapping screws are tightened, finally, snap the decorative cover onto the GPS casing, aligning the snap direction with the logo direction.

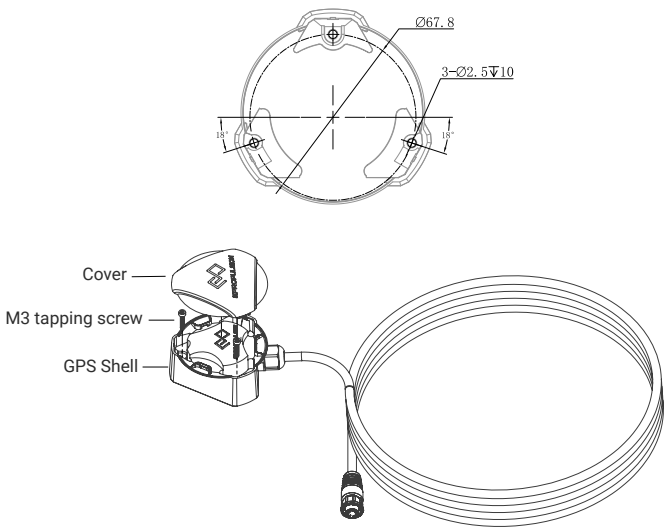
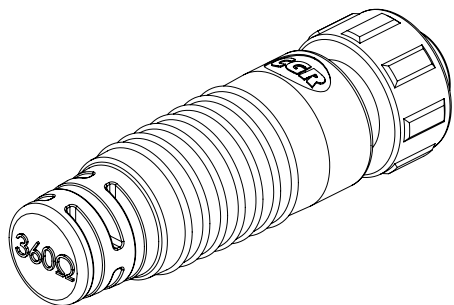


Figure 4.24 GPS External Module Screw Fixing

4.6 Communication Terminator Connection

For more stable communication between various components, it is necessary to connect different combinations of communication terminators to the T connector according to the following scenarios. The resistance value of each communication terminator is marked on its tail, as shown in the figure:



Quantity of motors	Using an external GPS module			Not using external GPS modules		
	Communi- cation	Communi- cation	Communi- cation	Communi- cation	Communi- cation	Communi- cation
	Terminator 1	Terminator 2	Terminator 3	Terminator 1	Terminator 2	Terminator 3
1	120Ω	/	/	120Ω	360Ω	/
2	120Ω	120Ω	/	120Ω	120Ω	360Ω
3	120Ω	360Ω	360Ω	120Ω	120Ω	/
4	120Ω	360Ω	/	120Ω	360Ω	360Ω

5 Operation

5.1 Smart Throttle Button Functions (single & double throttles)



- Single-throttle operation

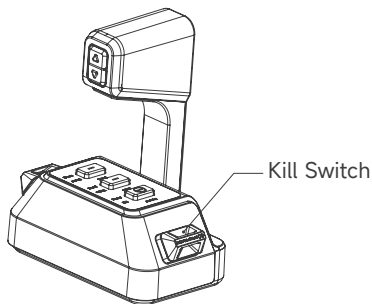
Button	Function
Power	Press and hold down this button for 1 second to power the system on or off. Switch console (when two throttles are fitted): When the system is turned on, press the Power button twice on the inactive console to activate it.
Dock	Press the button once to enter Dock mode, where the default maximum power limit is set to 70% to ensure smoother handling during mooring. The maximum power limit can be adjusted via the display interface. To exit Dock mode, press the button once while the gear is in the N position.

The factory default for the throttle handle is Starboard mode, ie the handle is to the right of the main unit when facing forwards on the boat. To change to Port mode please refer to section 5.6.2.2.

• **Dual-throttle operation**

Button	Function
Power	Press and hold down this button for 1 second to power the system on or off. Switch console: When the system is turned on, press the Power button twice on the inactive console to activate it.
Hold	Direction holding function or anchor mode: Press twice to enter Hold mode, and when in Hold mode press once to exit.This function is under development.
Dock	Press the button once to enter Dock mode, where the default maximum power limit is set to 70% to ensure smoother handling during mooring. The maximum power limit can be adjusted via the display interface. To exit Dock mode, press the button once while the gear is in the N position.
1Lever	Press once to enter left lever control mode. Press twice to enter right lever control mode. Press three times to exit mode. In 1Lever control mode the chosen throttle adjusts power input to both throttles simultaneously. This mode can only be entered with both throttles in neutral position.
FN	Function button: Press once to enter or activate the function, and press again to exit the function. For function configuration, please use the Smart Display to select (see section 5.5.2.2).

 Kill Switch Notes



Kill Switch can be placed on either end of the Smart Throttle, depending which way throttle is facing.
Motor will not work without kill switch in place.
Kill switch should be removed when motor is turned off.
In an emergency, motor can be stopped by pulling kill switch off throttle.
Motor can be restarted after emergency stop by first putting throttle in neutral position, then replacing the kill switch, and operating as normal.

5.2 Starting the System

5.2.1 Start

- 💡 Long press the Power button for 1s to start the system. When the smart throttle panel lights up, the system is started.
- 💡 After powering on the system, wait until the Power button light is steady green and the smart display "READY" lights up before driving.

5.2.2 System problem feedback method after startup

If the smart throttle chirps after the system is started and the display displays an error message, refer to Troubleshooting to solve the problem.

5.3 Perform initial configuration

Step 1: Read the system devices

After all accessories are assembled, power on, turn on the smart throttle, and the Smart display will automatically read the Serial Numbers (SN) of the devices in the system.

- 💡 Manually check whether the SN of all parts on board is displayed on the display. If it is correct, click Confirm; If SN of any part is not displayed, check the connection of parts on the ship is normal and click Check again. The system will read it again.
- 💡 When there is only one console and one motor, the system will automatically complete the system initialization settings and proceed directly to the home page.



Step 2: Configure the location of the equipment

When there is only one console and motor, the system will automatically complete the system initialization settings and directly enter the home page.

If the system includes more than one console or motor, the user needs to configure the console accessories and the position of the motors. The following illustrates the configuration process with two sets of consoles and two motors.

1. Configuration display

When there are two consoles, the display will display two consoles. By default, the console where the current display is located is Console A.

2. Configure smart throttle

When it is a single-throttle, manually click any button of the throttle to match successfully.

When it is a dual-throttle, click any button of the left and right throttles respectively to match successfully.



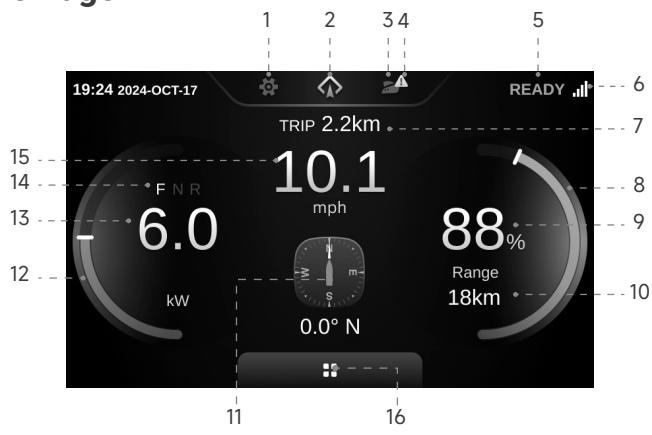
3. After console A is configured, the remaining parts will be automatically matched to console B.

4. Configure motors

Click the SN of the motors to configure them to the port and starboard sides of the boat.



5.4 Home Page



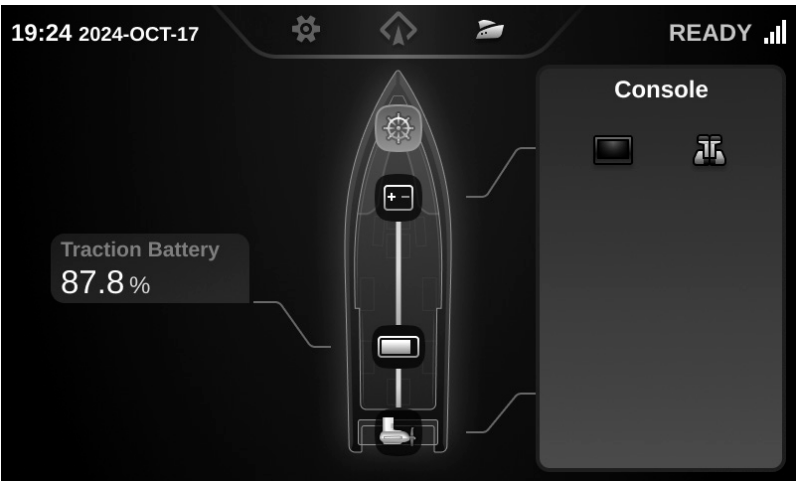
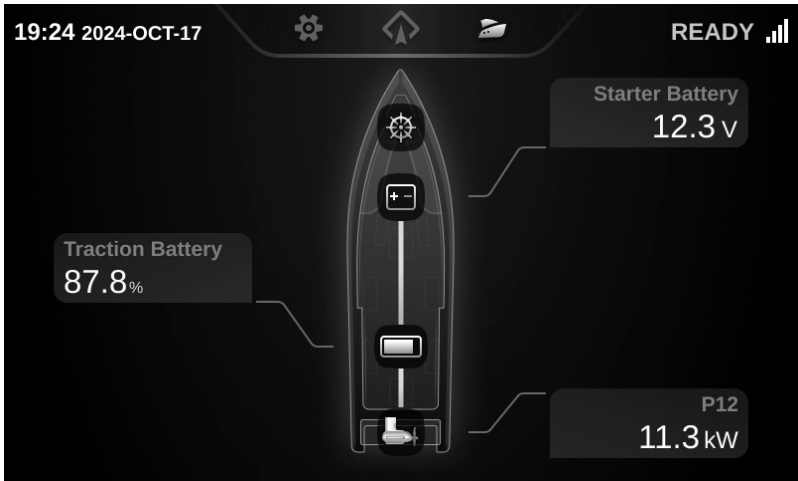
No.	Function	Description
1	Setting page	Click to go to the setting page.
2	Home page	Click to go to the home page.
3	Propulsion page	Click to go to the propulsion page.
4	Warning	When the system fails, it will prompt a fault icon.
5	System status	READY indicates that the system is ready to start.
6	4G network signal strength	/
7	Travelled time/ distance	You can switch between trip distance and time in settings.
8	Battery indicator bar	The indicator changes with battery level.
9	Battery level	Battery level
10	Remaining distance or time	The remaining distance/time supported by the current battery level. You can switch between distance and time in the settings.
11	Compass	/
12	Power indicator	The indicator will change as the power output changes.
13	Current power/ Current RPM	You can switch between current power or current RPM in the settings.
14	Gear	F: Forward gear N: Neutral R: Backward gear
15	Speed	Current speed, which can be switched between KNOTS, KM/H, and MPH in the settings.
16	Function	Press to enter the function page to enter the Dock mode or adjust the lightness

5.5 Propulsion Page

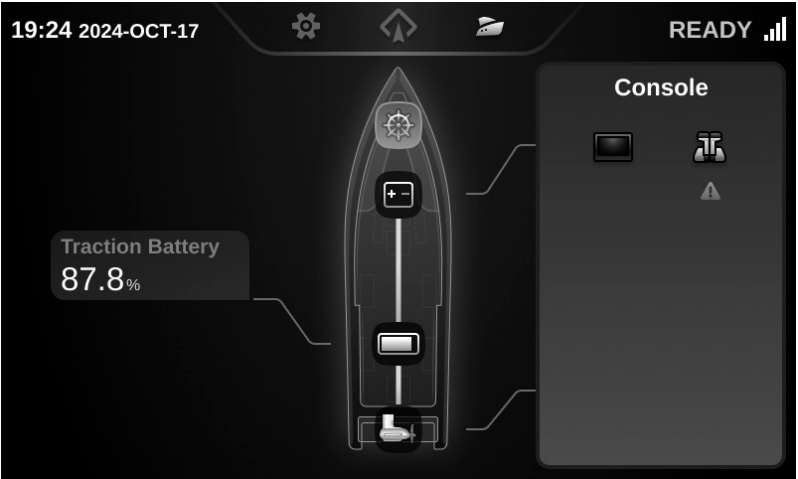
5.5.1 Control Console



Click on the console icon to view the accessories for each console.



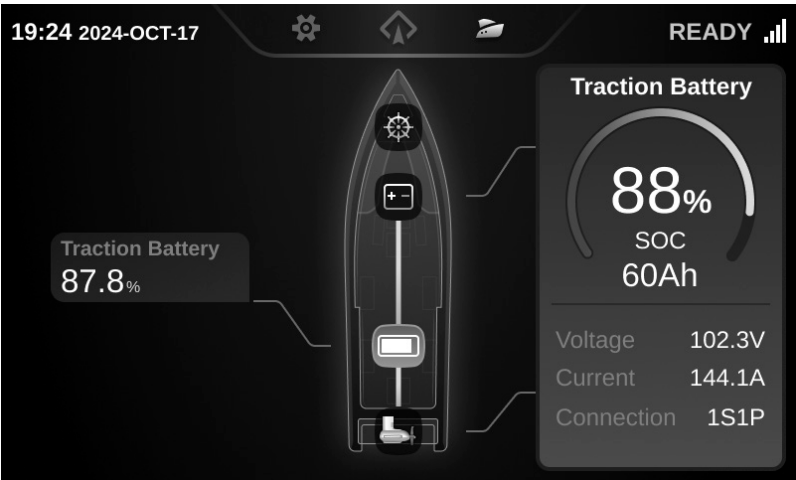
If an accessory fails, its icon will turn orange or red. Click the fault icon to view the problem in more detail.



5.5.2 Traction Battery



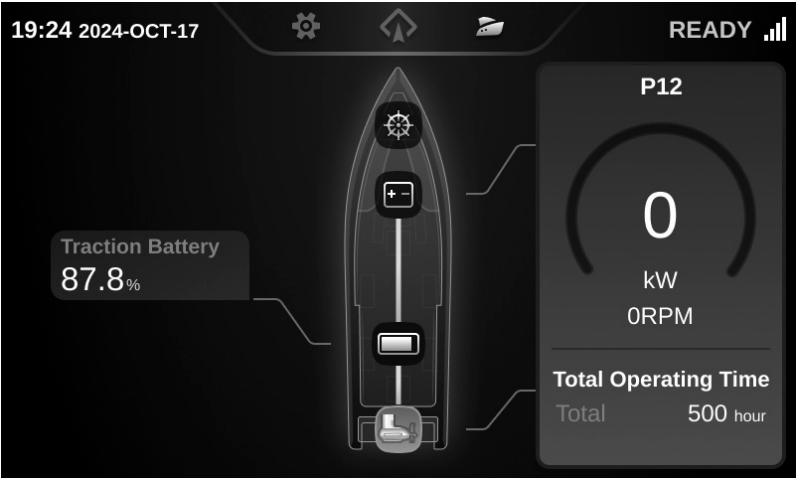
Click on the Traction Battery icon to view the remaining power, voltage, and current.



5.5.3 Motor(s)

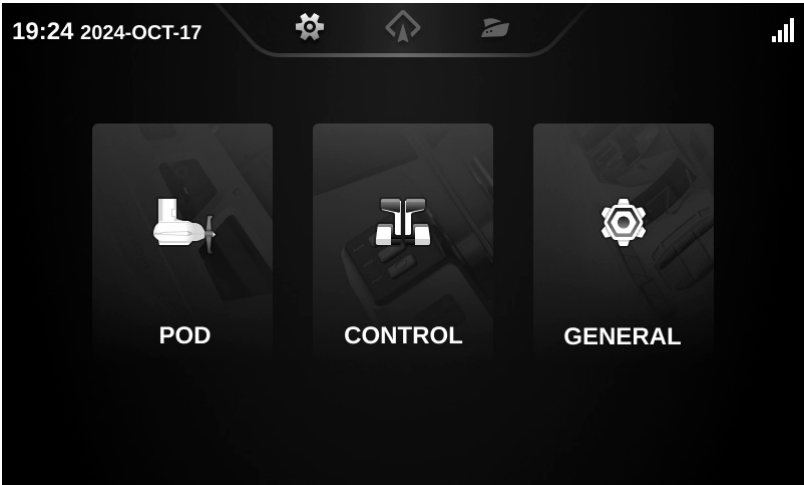


Click on the Motor icon(s) to view current power, rotational speed and cumulative run time.



5.6 Setting

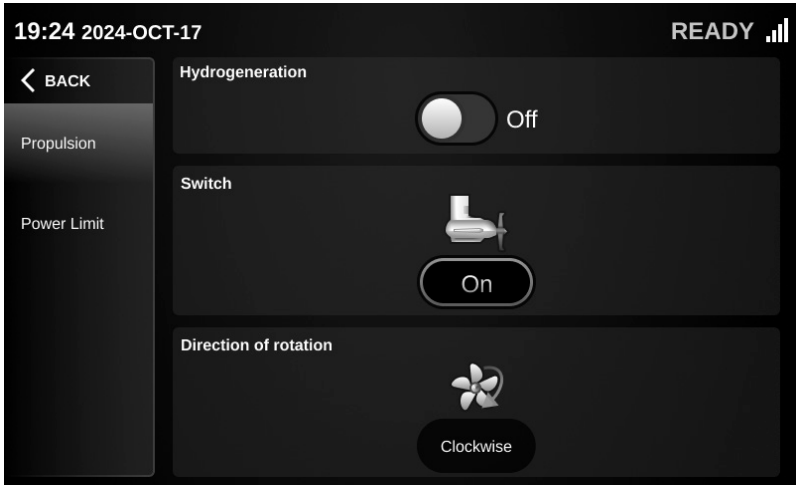
The Settings page is accessed by clicking the gear icon, just to the left of top centre on the screen. This covers three groups of settings: Pod drive, Control and General.



Button	Function
POD	Click to enter the propulsion setting page, you can set the motor switch and reverse propeller switch.
CONTROL	Click to enter the console setting page, you can set single-throttle assembly, dual-throttle FN function, Smart display, etc.
GENERAL	Click to enter the general setting page to set firmware update, maintenance, connectivity and more.

5.6.1 Pod drive Setting

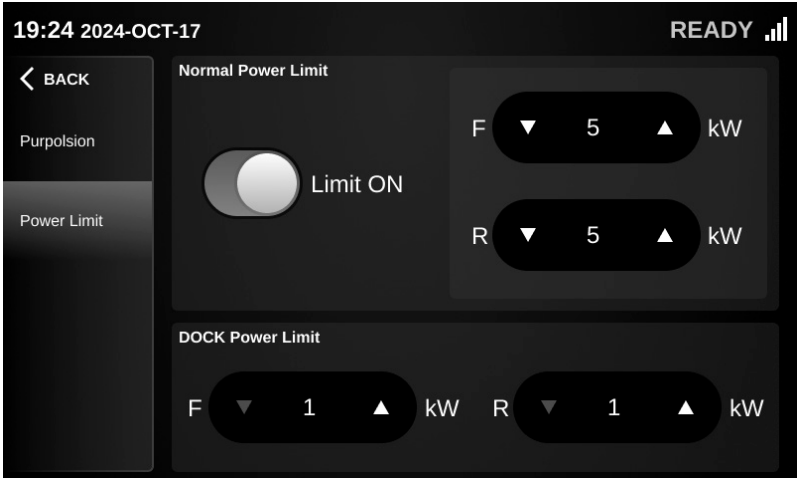
5.6.1.1 Propulsion switch



Function	Description
Hydrogeneration	If enabled, the pod drive will reverse to charge the battery when the boat is propelled by other means, eg sailing. This will only work if connected to ePropulsion batteries.
Switch	Click to switch the motor on or off. If the switch springs back, the setting has failed.

Function	Description
Direction of rotation	Click to switch the rotational direction of the propeller. If the switch bounces back, the setting fails.

5.6.1.2 Power Limit Setting



Normal Power Limit

After turning on the normal power limit, the maximum power for F and R gears can be adjusted. Clicking the increase/decrease buttons increments or decrements the power by 1 kW, while a long press allows for rapid adjustment. The maximum power for the R gear is set at 50% of the full power.

Dock Power Limit (under development)

In DOCK mode, the adjustable range for the maximum power in F gear is up to 70% of the full power, while the maximum power in R gear is set at 50% of the full power. When the normal power limit is enabled, the maximum power in DOCK mode cannot exceed the maximum power of normal mode.

5.6.2 Control console Settings

5.6.2.1 Smart throttle settings

1. Single-throttle Settings



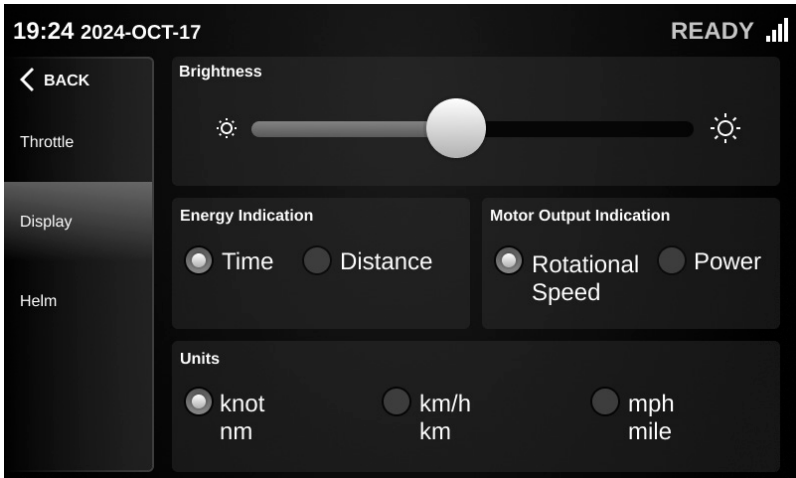
Function	Description
Starboard	Click and set the smart throttle installation mode to starboard installation. If it springs back, the setting fails.
Port	Click and set the smart throttle installation mode to port installation. If it springs back, the setting fails.

2. Set dual-throttle



Function	Description
None	Set the FN function of smart throttle to sync left and right handle after clicking.
Sync	Set the FN function of smart throttle to sync left and right handle after clicking. When the throttle values of the left and right throttle are not much different, the system will forcibly synchronize the throttle values of the two sides into one value. When the throttle values of the left and right throttle differ greatly, the respective throttle values of the two rockers are maintained.

5.6.2.2 Display settings



Button	Function
Brightness	Drag to adjust the brightness of the display. This setting is still saved after powered off.
Energy indication	Switch between Time or Distance remaining, taking current speed and battery level into account. This will change the display on the home page.
Motor output indication	Switch between the Rotational Speed (RPM) and Power input to the motor. This will change the display on the home page.
Units	Switch speed and distance units between knots (nautical miles per hour), km/h (kilometres per hour) and mph (miles per hour). This will change the display on the home page and ePropulsion setting page.

5.6.3 General settings

5.6.3.1 System firmware information



Function	Description
System version	Display the system/software version.
Serial number	Click Device List to go to the device serial number list page. You can view all device SN and software and hardware version.
New version update	When there is a new version available, you will be prompted with the content of the new version and the estimated time to update. Users can choose to update immediately or in the early morning. If early morning update is chosen, this will be at 0200 the next day. Note: 1. Update must meet two conditions: 1) 12V supply voltage > 10V; 2) The system has no operating power. ie high voltage side is turned off. 2. The system cannot run during the update process, so it is recommended to choose early morning update or update when the boat is not in use.

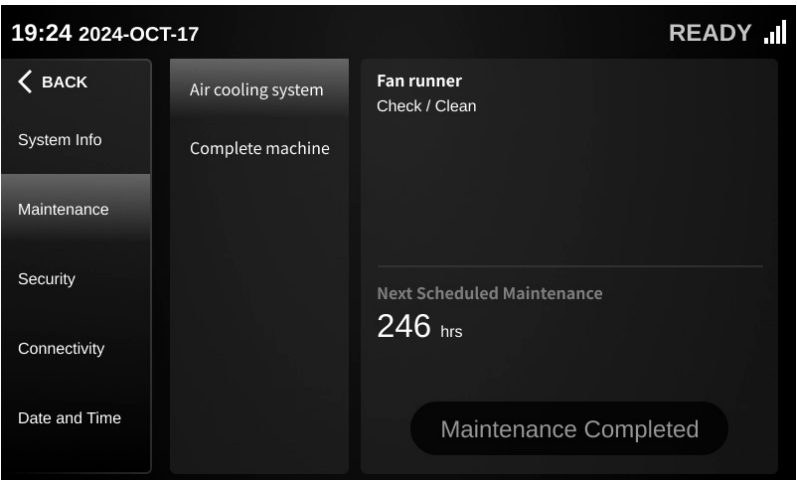
Device list page

- 1. Click Reset to reset the device original factory settings.
- 2. Device List displays the SN and software and hardware versions of all components of the propulsion.

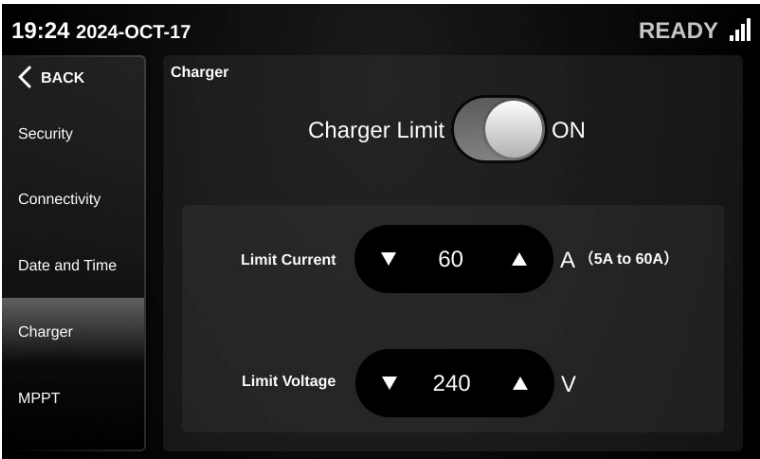


5.6.3.2 Maintenance - All maintenance timing tips

The system automatically calculates the maintenance time based on various maintenance items. When the maintenance time is reached, the system will notify the user on the display. After the user completes the maintenance, they can click "Maintenance Complete" to reset the timer.



5.6.3.3 Charger Power Setting



Press Input to set the maximum charging current and voltage.

The maximum charging current range is 5 to 60A.

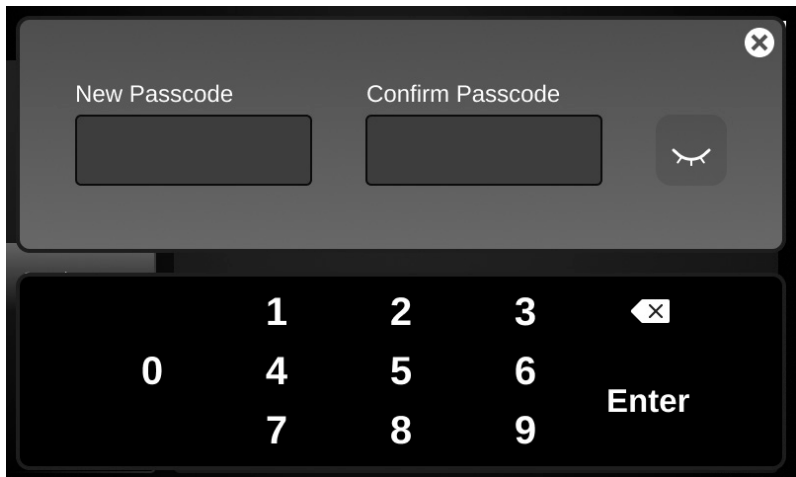
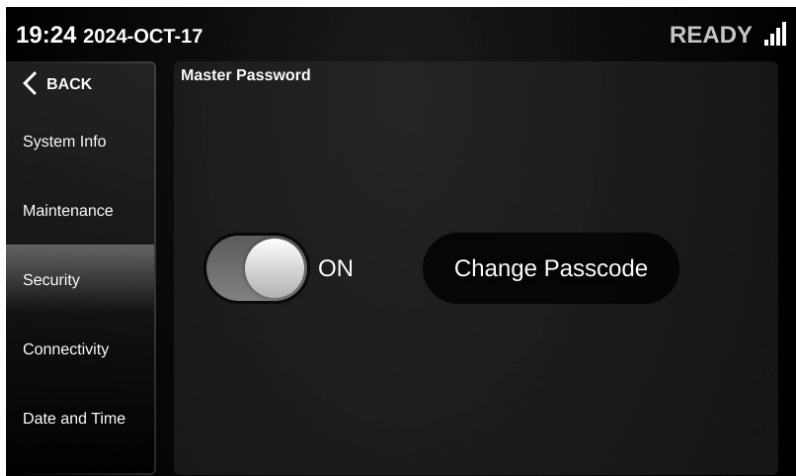
The voltage can choose between 220V, 110V, 100V, 120V, 127V, 230V, 240V.

Close the pop-up window once the settings are completed. The system will automatically save the settings. If failed, it will prompt "Setting Failed".

Press Restore Default Settings to restore all the settings by default.

5.6.3.4 Master Password Mode

 It is under development.



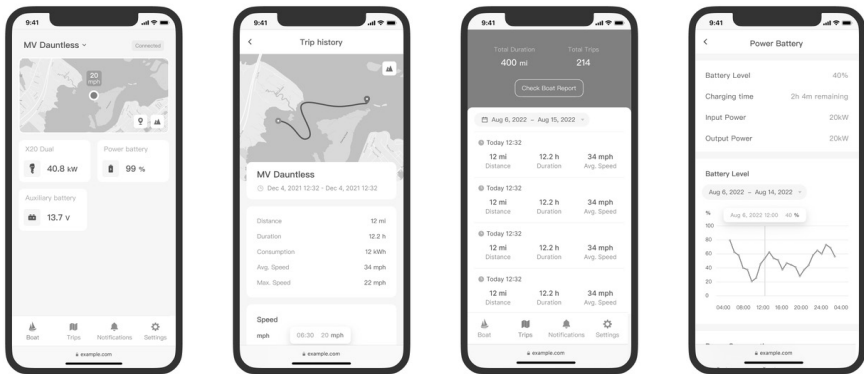
-  After turning on the Master Password mode, input the same 4-digit password twice to activate.
-  After turning on the systems or entering IDLE mode, only after inputting the proper password to sail the ship.
-  If forget the password or the display does not work, manually disconnect the display communication cable, and the system will unlock automatically.
-  Please contact after sales processing for further usage.

5.6.3.5 Connectivity

The ePropulsion Link

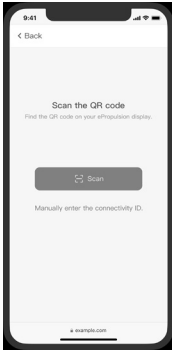
Pod drive offers connectivity capabilities by communicating with the ePropulsion cloud through its 4G antenna. You can link your product to the ePropulsion Link, a user-friendly software designed for personal boat owners, enabling them to monitor their boat's status remotely on their mobile devices. ePropulsion Link offers various features, including but not limited to:

- Real-time location and speed tracking
- Monitoring the battery level and estimating remaining charging time
- Creating geofences and monitoring speed violations
- Automatically generating trip histories and boat reports
- Sharing data access with co-owners
- Setting up text message notifications



To connect your ePropulsion system to the ePropulsion Link, follow these steps:

1. Visit <https://link.epropulsion.com>.
2. Click "Sign Up" and create your account.
3. Upon visiting the home page for the first time, click "Create Boat" to register your first boat.
4. After registering your first boat, click "Connect Now" to access the connection page.
Additionally, locate the QR code for connection on the boat's display by navigating to Settings > General > Connectivity. You can either scan the QR code or manually enter the serial number to establish a connection.
5. Once successfully connected, you can access real-time information such as the boat's location and battery level on your home page.



OTA Update

An over-the-air (OTA) update involves wirelessly delivering new software to local devices. Regular OTA updates not only introduce new features but also enhance the user experience. Boat owners benefit from both time and cost savings as remote software updates eliminate the need to physically visit a dealership.

To check if a new software version is available, access the boat display through the following path: Settings > General > System Info.

If your ePropulsion system is connected to the ePropulsion Link, you will also receive notifications about new software versions within the ePropulsion Link. OTA access can be found on the propulsion system page.

You can choose to either install the update immediately or schedule it for later, typically during the night. The installation time varies depending on the changes and the number of components involved but usually takes less than 30 minutes. After a successful installation, you will see that your system is running the latest version on the boat display, and you will receive a notification of the successful update within the ePropulsion Link.



5.7 Operation

5.7.1 Starting the Pod drive motor

1. Place the kill switch on the intelligent throttle.
2. Tie the lanyard to your wrist or life jacket.
3. Press and hold the Power button for 1 second to turn on the device. You can start driving only when the Power button light stays on green and the "READY" indicator on the display screen lights up.

5.7.2 Adjusting the Power

When the battery is connected and switched on, power on the control system to start the pod drive, then slowly push the throttle forwards to increase the power.



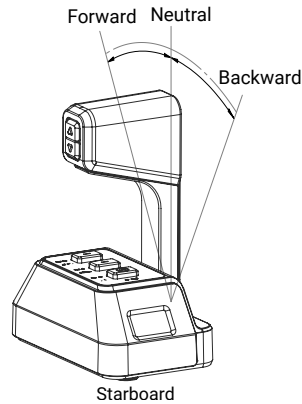
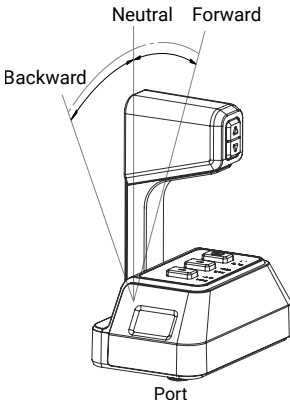
Before switching on the smart throttle, the throttle must be in the neutral position.



If you find a blinking "RESET" on the display, you are reminded to reset the throttle to neutral position.



If you pull the throttle directly from forward to reverse, the motor will stop briefly before entering reverse gear. This is to protect the gearbox from damage.



5.7.3 Shutdown Operation

This product can be stopped in the following four ways:

1. Turn the throttle handle to the zero throttle position.
2. Pull out the kill switch.
3. Press and hold the "POWER" button.
4. Pull out the power cord.

5.8 Hydro Generation Function

The machine can drive the propeller to charge the battery (only the ePropulsion battery) through water flow.

The pod drive will enter the hydro generation state if the following conditions are met:

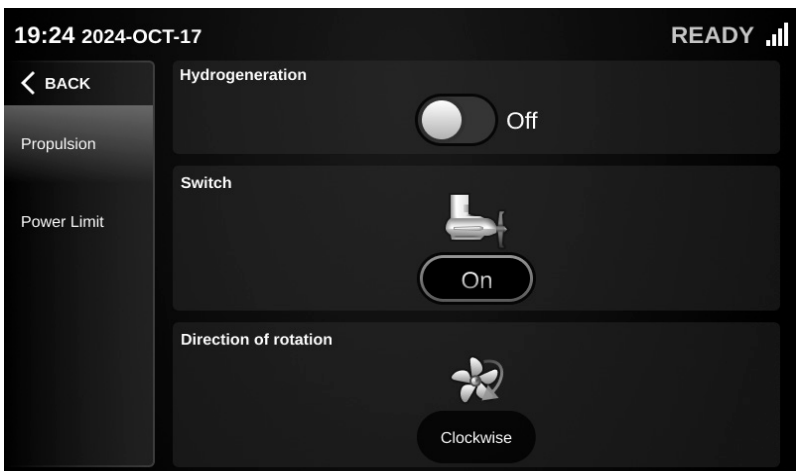
1. The control system is set to turn on the hydro generation function (enabled by default).
2. The control system is in the neutral position.
3. The ePropulsion battery charge state is below 90%.
4. Boat speed is above 6km/h or the shaft rotation speed remains above 800rpm for 4 seconds.
5. ePropulsion batteries are connected, including a communication cable (as well as main power cables etc). It will not work with other manufacturer's batteries.

When any of the following conditions occur, the hydro generation won't work:

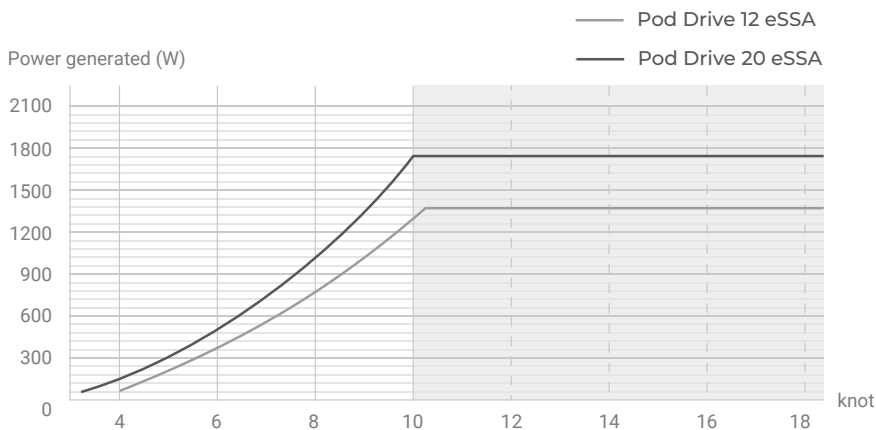
1. The hydro generation function is turned off (in control system).
2. The control system (throttle) is in the forward / reverse state (not in the neutral position).
3. The system is currently in intelligent function mode.
4. boat is stopped, not travelling fast enough, or travelling too fast.
5. The battery level is higher than 90%.
6. Batteries from a supplier other than ePropulsion are in use.



When case 4 and case 5 are satisfied at the same time, please pull out the U, V, and W three-phase lines from driver to avoid damage to the controller caused by excessive reverse charging voltage.



The typical reverse charging curves of P12/P20 are as follows:



This curve represents data under ideal conditions and is for reference only. There may be deviations in real conditions.

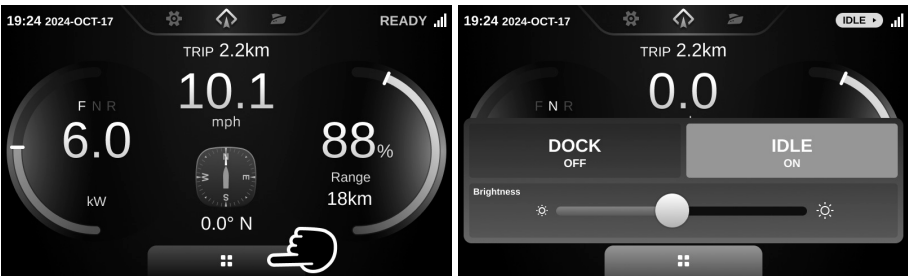
5.9 Idle Mode, Sleep

For convenience and enhancing experience in various scenarios, the pod drive motor is equipped with idle mode, sleep mode, and wake-up function.

5.9.1 Idle Mode

In scenarios such as short-term anchoring, leisure, or entertainment, press the function button at the bottom of the smart display to enter the anchoring mode page and the activate idle mode to prevent accidental triggering of the interactive system and avoid potential risks to users. In idle mode, the main propulsion, electric steering, and electric tilt and trim will stop. After maintaining the idle mode for 30 minutes, the display will turn off, and the screen can be reactivated by operating the interactive system.

Exiting idle mode requires manual operation through the interactive system to return to normal operation mode.



5.9.2 System Sleep

The pod drive motor system performs regular self-checks to ensure the pod drive and system are in a safe and fault-free state. When the user powers off the system by long-pressing the throttle POWER ON button, the system switches to sleep mode. For the system to function properly during sleep, please ensure that the 12V battery remains connected and the power is turned on continuously. During sleep mode, if the 12V battery voltage is detected to be low, boat network registered users will receive messages via the App or other means notifying them of the low 12V battery level. Please charge your battery promptly to avoid any inconvenience during the next voyage. In the event of system malfunctions, we will upload the fault information through the boat network, and registered users can view the relevant information on the App or other platforms. Please refer to section 5.11 for fault handling and contact the after-sales service and dealers to address any issues.

5.10 Cautions

1. In case of emergencies, such as a crewmember falling into the water, you can pull the kill switch off the throttle to stop the pod drive.

The product will automatically shut down if it is not running properly. It will shut down in the following situations:

- When the throttle lever is turned to the neutral position.
- When the "POWER" button is pressed and held to power off.
- When the kill switch is pulled off.
- When the power cable is disconnected, or the pod drive motor is unable to connect to the battery.
- When the high voltage battery is low on power.
- When the 12V battery voltage drops below 10.5V.
- When the propeller hits an object.

2. When the pod drive is running, parts such as the output shaft and propeller rotate continuously and should be avoided. If you need to go near these moving parts, avoid wearing jewelry, unbuttoned cuffs, ties, or loose clothing, and always tie back long hair. Keep hands, feet, and tools away from all moving parts.



3. During the operation of the pod drive, it will continuously dissipate heat, causing some surfaces to become hot. Be careful to avoid burns.



5.11 Troubleshooting

5.11.1 Mechanical Faults/Solutions

NOTE: most "abnormalities" are caused by external factors such as weed or rope around propeller, foreign objects caught in steering mechanism, etc. Please check for such issues before assuming there is a mechanical fault!

Failure	Possible Reasons	Possible Solutions
Abnormal Noise	The POD is not firmly installed on the hull	Tighten the bolts
	The bolts of the outer shell are loose	Tighten the bolts
	The propeller is loose	Tighten it
Abnormal Vibration	The propeller is not installed in place	Tighten it
	The propeller is damaged	Replace it
	Resonance is caused by the propeller being too close to the bottom plate of the boat	Check whether the spacing meets 0.14 times the diameter of the propeller. Adjust and rectify if it does not meet the requirement
	Parts or fasteners are loose	Tighten them
Fan Stops Rotating	Abnormal control / The fan is damaged	Check / Replace
Over-temperature Alarm	There is too much dust on the heat dissipation teeth of the driver, resulting in poor heat dissipation	Clean it
	Biological attachment on the underwater part of the machine	Clean it

5.11.2 System Faults/Solutions

Fault position	Fault name	Fault code	Solution
Drive motor	Encoder fault	P101003	1. Check the external wiring
	Power tube pass-through failure	P100F03	1. Check the external wiring 2. Check the insulation of the motor.
	Motor overspeed	P101113	1. Check the operating conditions
	Emergency stop	P101603	1. Check if the emergency stop button is pressed
	Phase current overcurrent hardware failure	P100C03	1. Check the operating conditions 2. Check whether there is a short circuit in the system power supply
	Phase current overcurrent software failure	P100D03	1. Check the operating conditions
	Motor stalled	P101203	1. Check the operating conditions 2. Overhaul the transmission system
	Severe overvoltage of bus	P100603	1. Check the high voltage power supply circuit
	Severe bus undervoltage	P100813	1. Check the battery SOC 2. Check the main contactor status
	General overvoltage of bus	P100712	1. Check the high voltage power supply circuit
	General bus undervoltage	P100912	1. Check the battery SOC
	MOS severe overtemperature	P100003	1. Check the operating conditions 2. Check whether the heat dissipation channel is blocked 3. Check coolant level

Fault position	Fault name	Fault code	Suggested measures
Drive motor	The motor is seriously overheated	P100203	1. Overhaul the motor or drive system 2. Check whether the heat dissipation channel is blocked 3. Check coolant level
	MOS general overtemperature	P100402	1. Check the operating conditions 2. Check whether the heat dissipation channel is blocked
	Motor general overtemperature	P100502	1. Check the operating conditions 2. Check whether the heat dissipation channel is blocked
	Auxiliary power overvoltage	P100A13	1. Check the external input 12V power supply
	Auxiliary power undervoltage	P100B13	1. Check the external input 12V power supply
	Busoff fault	P101443	1. Check the cable and end point resistance 2. Confirm whether there is interference
	Communication loss	P101543	1. Check whether the communication cable or motor controller is disconnected
X-ECU	GPS antenna short circuit	P130321	1. Check the GPS antenna line
	Open GPS antenna	P130421	1. Check the GPS antenna line
	CAN_A BUSOFF	P130843	1. If recoverable, no processing is required 2. Troubleshoot the cable for poor contact
	CAN_B BUSOFF	P130941	1. If recoverable, no processing is required 2. Troubleshoot the cable for poor contact
	CAN_C BUSOFF	P130A43	1. No need to process if recoverable 2. Troubleshoot the cable for poor contact

Fault position	Fault name	Fault code	Suggested measures
X-ECU	Auxiliary power overvoltage	P130B11	1. Check the external input 12V power supply
	Auxiliary power supply undervoltage	P130C11	1. Check the external input 12V power supply
	BMS node lost	P130D41	1. Check the BMS line and cable 2. Confirm whether the BMS is connected and the power supply is normal
	Drive motor controller node missing	P130E43	1. Check the drive motor controller circuit and cable 2. Confirm whether the drive motor controller is connected and the power supply is normal
	Wired remote operation box node is lost	P131143	1. Confirm whether the cable remote operation box is turned on 2. Check the cable remote operation box line and cable 3. Confirm whether the cable remote operation box is connected and the power supply is normal
	Display node missing	P131441	1. Check the display line and cable 2. Confirm whether the display is connected and the power supply is normal
	High voltage interlock 1 signal failure	P132002	1. Re-check the high voltage interlock signal 1 wire device 2. Replace the high voltage wiring harness
	High voltage interlock 2 signal failure	P132102	1. Re-check the high voltage interlock signal 2 wire device 2. Replace the high voltage cable

Fault position	Fault name	Fault code	Suggested measures
Wired remote operation box	Throttle calibration data abnormal	H120203	1. Keep away from strong magnetic fields and recalibrate 2. If it occurs repeatedly, contact after-sales processing
	Abnormal throttle angle	H120003	1. Keep away from strong magnetic fields and recalibrate
	Kill switch abnormality	H120403	1. Check whether the kill switch is properly located in the slot
Display screen	CAN BUSOFF	H110041	1. If recoverable, no processing is required 2. Troubleshoot the cable for poor contact
	ECU LOST	H110141	1. If recoverable, no processing is required 2. Troubleshoot the cable for poor contact

5.12 Main driver lameness

When encountering a fault in the following table, the system will automatically or require the user to manually trigger the interactive system to enter the main drive lameness for different faults to ensure the safe return of the user.

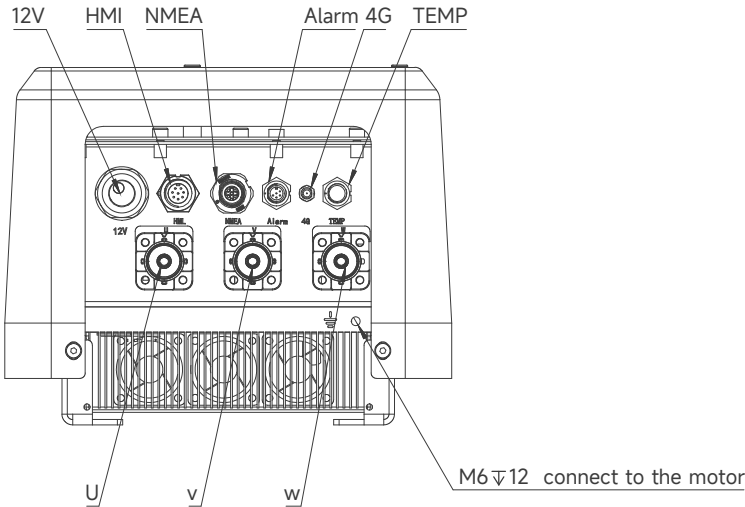
Fault position	Trigger condition	Processing strategy
Driver motor controller	Bus voltage general overvoltage	Linear power drop
	Bus voltage General undervoltage	Linear power drop
	MOS over temperature	Linear power drop
	Motor overtemperature	Linear power drop
	Controller temperature sensor failure	Reduce power by 50%
	Motor temperature sensor failure	Reduce power by 50%
	Single drive plate failure	Reduce power by 50%

Fault position	Trigger condition	Processing strategy
BMS	Low SOC	Linear power drop
X-ECU	High voltage interlock failure	5kw
Close operation	Secondary failure	Reduce power by 50%

Warning: When the main driver is in limp mode, the pod drive may experience significant shaking or noise. Limp mode can cause damage to the pod drive, so please use the lowest possible power output to reduce damage to the system.

5.13 Other Interfaces

The machine supports external sound and light alarm devices (not included) and NEMA2000 devices (not included) . And corresponding identification is printed near the interface of the driver. Taking P12 as an example, the following figure shows the external interface of the driver. The external interface area and specifications of P20 are the same as P12.



6 Emergency Situations ---

6.1 Collision

If the machine strikes some object beneath the water, please follow below procedures.

1. Stop the machine immediately and then turn off the main switch.
2. Check the mechanical structure to see if there are damages.
3. Return to the nearest harbor or pier in low power.
4. Call your dealer to check the machine.

6.2 Sodden machine

If the machine is sodden, stop it immediately and turn off the main switch then disconnect the battery. Bring the machine to the dealer. And ensure the machine is thoroughly inspected before operating it again.

6.3 Overtemperature Protection

When the operating temperature is high, the max input power will be limited within rated power, and the power will decrease with the rise of temperature. If the system temperature keeps rising and surpasses a threshold, the motor will shut down automatically to avoid over temperature. Users should stop operating the machine and wait until the temperature falls within the normal range.

7 Maintenance

7.1 Maintenance

7.1.1 Routine maintenance

Maintenance items	Maintenance methods	Maintenance frequency
Attachment on the Outer Surface of the Machine Body	Regularly lift the boat and rinse the submerged and splashed parts with fresh water. If there is biological attachment on the surface of the machine, clean the attached organisms.	Regular inspection (every 6 months)
Wear of Machine Wiring Harnesses	Regularly check the reliability of the wiring harness connections and fixings, and whether there is wear with the hull through-holes, etc.	Check after each use or regularly (every 3 months)
Regular Inspection of the Machine Grounding Wire	Regularly check whether the grounding wire is damaged or broken, and whether the fixing screws are loose.	Check after each use or regularly (every 3 months)
Replacement of Sacrificial Anodes of the Whole Machine	Replace the anodes if more than one-third of them are consumed.	Regular inspection (every 6 months)
Inspection and Replacement of the Propeller and Cotter Pins	Check whether the propeller is damaged, with damaged coating or deformed. Check whether the cotter pins are broken, bent, stuck or fallen off, etc. Replace them if damaged.	Regular inspection (every 6 months)

7.1.2 Pod maintenance

Mainten- -ance items	Method of operation	Main work	Maintenance cycle					
			First maintenance			Ongoing maintenance		
			100 hours (Or 3 months)	200 hours (Or 6 months)	500 hours (Or 1 year)	200 hours (Or 6 months)	500 hours (Or 1 year)	1000 hours (Or 4 years)
Integrity Inspection of the Whole Machine	Check whether the POD is firmly fixed, and whether the external screws and nuts are loose, broken or fallen off.	Inspection	●			●		
Gear Oil Replacement (Only for P20)	Refer to 7.2.1 to replace the gear oil, oil filling bolts and oil drain bolts.	Inspection/ Replace- ment			●			●
Air-cooling System	Fan Flow Channel	Check and clean		●			●	

7.2 Partial Maintenance and Care Guidelines

7.2.1 Gearbox Oil Replacement Procedure (Only for P20)

The gearbox contains gear oil for lubricating and cooling the transmission system. When adding or replacing gear oil, visually observe if water is present in the discharged gear oil. If there is water, it may precipitate at the bottom during discharge. Water can also mix with the gear oil, causing the gear oil to appear milky. If water is observed, immediately stop using the pod drive motor and contact after-sales support for inspection and maintenance. Water in the gearbox can lead to damage in the transmission system. When adding or replacing gear oil, observe if there are metal particles in the discharged gear oil. A small amount of fine particles indicates normal gear wear, but if there are a significant number of metal shavings or larger particles (flakes), it may indicate abnormal gear wear, and you should contact after-sales support for further inspection. The method for discharging and adding gear oil is as follows:

Step 1:

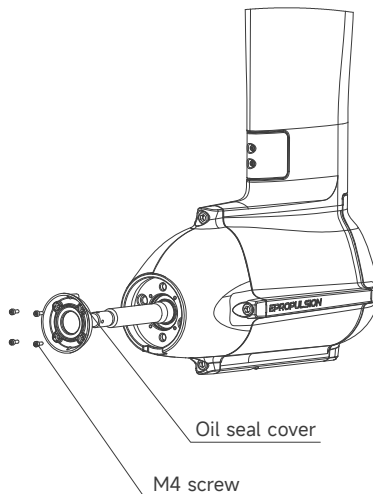
Power off and shut down.

Step 2:

Remove the propeller.

step 3:

Remove the oil seal cover and the 4 M4 screws that fix the oil seal cover.

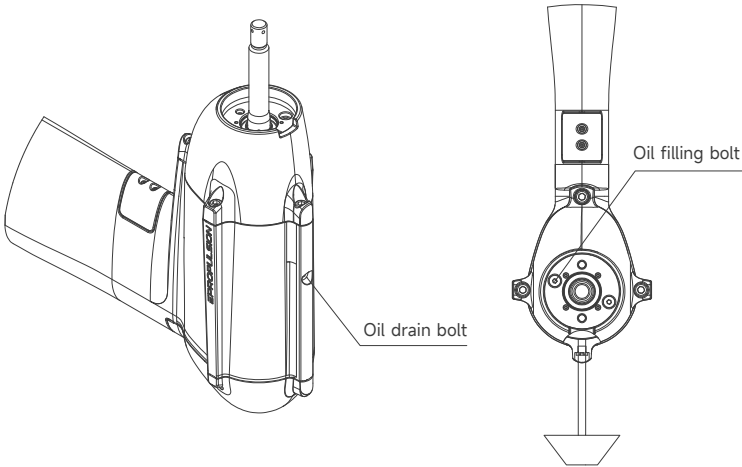


Step 4:

Tilt the pod drive motor so that the oil drain bolt is at the lowest point. Place a pan under the lower oil drain bolt and remove it. Then remove the two oil filling bolts, and allow the gear oil to drain completely.

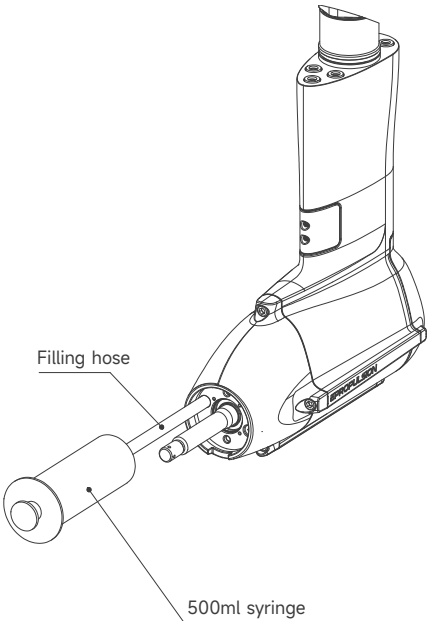
Step 5:

Place the pod drive motor in a vertical position and screw the new oil drain bolt into the oil drain hole to secure it.



Step 6:

Pour 500 ml of new gear oil into one of the oil filling holes (the other is to let air escape).



Step 7:

Insert and do up the oil filling bolts.

Step 8:

Refer to 3.1.3, and install the propeller.

 When adding gear oil, please inject 500ml of oil in a fixed quantity. Insufficient oil will lead to inadequate lubrication, a decrease in the service life of the whole machine, or damage to the seals and seal failure. Excessive oil will result in a greater loss of system efficiency and serious overheating of the gearbox.

 Please change oil after the crane, do not operate underwater.

Selection of gear oil:

Kinematic viscosity (40 °C): 18 ~ 30 (mm²/s)

Kinematic viscosity (100 °C): 4 ~ 7 (mm²/s)

Viscosity index: ≥ 145

Brinell viscosity (-40 °C): ≥ 2700 (mPa.s)

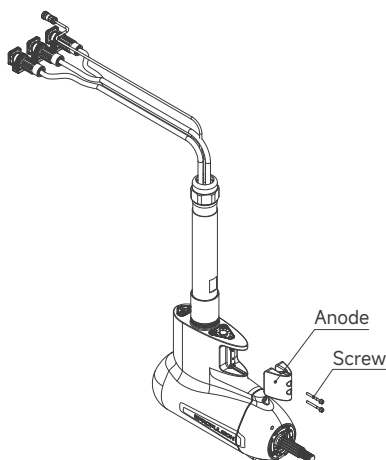
Pour point: ≤ -40 °C

Flash point: ≥ 180 °C

Recommended oil: FUCHS BluEV EDF 4101(default oil filling), ZF AG9, Mobil ATF 660.

7.2.2 Anode Inspection & Replacement

As shown in the figure below, the underwater part of the machine is equipped with a Anode, which corrodes itself to protect the machine from corrosion. It needs to be inspected regularly as the requirements in 7.1.1, especially when navigating in seawater, as this can accelerate corrosion. The Anode must be replaced before it is completely eroded. Note: The surface of the Anode and the gearbox surface it contacts with should not be painted or coated with protective coatings; otherwise, the corrosion resistance of the Anode will be reduced.



7.2.3 Propeller

The propeller is an important component of the motor. To ensure safe navigation and optimal performance of the motor, the propeller should be regularly disassembled and inspected. During the inspection, pay attention to the following:

- (1) Check if each blade of the propeller has any wear or other damage.
- (2) Check if the propeller shaft is damaged.
- (3) Check if there are fishing lines, water plants, or other foreign objects wrapped around the propeller shaft.
- (4) Check whether the propeller shaft oil seal is damaged. For the propeller disassembly and installation methods, please refer to section 3.7 - "Propeller Installation".

7.2.4 Underwater Component Cleaning and Antifouling Painting

Please clean the underwater components regularly at least once a year. The plastic surface can be treated with vinyl cleaner.

Before cleaning, please shut down the system and secure it against restarting.

Please carefully cover the contact area between the anode block and the motor shaft, and do not apply anti-fouling paint to this area.

Please follow treatment instructions and the instructions concerning personal protection equipment issued by the manufacturer for specific antifouling paints.

Please follow the national regulations on handling, application, use, and disposal of anti-fouling paints. Do not use any anti-fouling paints containing heavy metals such as copper.

It is recommended to use the following anti-fouling paint:

International Trilux 33 in combination with International Primocon

Hempel Silic One in combination with Hempel Light Primer and Hempel Silic One Tiecoat

Hempel Hard Racing TecCel in combination with Hempel Underwater Primer

8 Limited Warranty

Guangdong ePropulsion Technology Co., Ltd. ("ePropulsion"), China, warrants its products to be free of defects in material and workmanship under normal usage with proper installation and routine maintenance for a period of twenty-four (24) months from the date of delivery of invoice (the "Limited Warranty Period"). The Limited Warranty is provided to the first end customer of ePropulsion products ONLY. The Customer is entitled to free repair or replacement of defective or non-conforming parts. Any warranty claim must be made within six (6) months of discovery of issues as provided below.

If the Limited Warranty Period has expired, you can still enjoy maintenance services from dealers/distributors authorized by ePropulsion (the "ePropulsion Service Partners") who will endeavour to keep costs to a minimum.

In all warranty cases, ePropulsion will only bear the repair or replacement cost for items that are covered by the Limited Warranty. Any costs not covered by the Limited Warranty – such as those related to product installation, disassembly, transportation, financing, rental, etc – shall be borne by the customer alone.

Beyond the Limited Warranty, the Customer may have statutory rights in their jurisdiction according to applicable laws. Nothing in this Limited Warranty affects such rights. The Customer may have warranty claim rights arising from the purchase contract with ePropulsion Service Partners in addition to the rights granted by this Limited Warranty.

Products used for commercial or professional purposes*, even if only temporarily, are not covered by the Limited Warranty. Instead, the statutory warranty in your jurisdiction shall apply. You are encouraged to consult with ePropulsion Service Partners for applicable warranty and advice before engaging in such use.

*** Commercial/Professional Purposes include those where the product is used with the intention of making profit, or high frequency, or very high reliability requirements, etc .**

To keep your warranty valid, please note the following:

Products without the original product label will not be covered by ePropulsion's Limited Warranty. Keep the product label intact and record the serial number from it. Never remove the label from the product;

The Limited Warranty is not transferable and will not be reissued;

The Limited Warranty may change from time to time. Please visit our website (<http://www.epropulsion.com>) for the latest version.

Capacity guarantee for high-voltage batteries

A guarantee of the capacity of the high-voltage batteries, in addition to the standard guarantee. Depending on the long-term average temperature and the usage profile, this guarantee runs for a longer life.

Comment on average temperature:

The average temperature is calculated using the Arrhenius equation; this means that higher temperatures are given a greater weighting.

8.1 Warranty Exclusions

ePropulsion may refuse a warranty claim if:

- The product is operated in contradiction to what is written in the user manual;
- Damage is caused by accident, misuse, dropping, improper care or storage, wilful abuse, physical damage, unauthorized repair;
- Water ingress is caused by external sources such as fishing nets, submersion, etc;
- Product has been modified, altered, dismantled, or had parts/accessories attached in any way not expressly permitted or recommended by ePropulsion;
- Due to failure of, or damage caused by, any 3rd party products;
- The high-voltage batteries have been repositioned in the boat, without contacting ePropulsion service. Repositioning may result in changes to cabling, and other risks to system operation;
- The battery has been incorrectly charged, overcharged, over-discharged, or operated in temp out of scope described in the user manual;
- Consumables (such as replacement propeller, anodes, oil/fluids...etc.);
- Purchases of products from unauthorized dealers or sellers;
- Normal wear and tear and routine servicing;
- Damage caused by improper packing or handling of the product during its return. The additional damage part will be deemed out of warranty;
- Incorrect shipping of lithium batteries. These are classed as a UN9 hazardous item, and must be shipped in accordance with regulations in your jurisdiction. Non-compliance may result in warranty exclusion.

8.2 Limited Warranty Claim Procedures

The process shown below must be followed in order to make a Limited Warranty claim:

1. Contact your nearest ePropulsion Service Partner with details of the problem. They will advise if such defects are covered by the Limited Warranty or any additional rights you may have from your purchase.
2. Send the defective product to them (or the Service Partner they advise) together with Proof of 1(st)-time (first time) Purchase (e.g., receipt, invoice, etc., with information of product purchased and date of purchase), the Confirmation of Online Warranty Registration, ex-factory Serial Number, etc. Note that all labels must be kept intact. Warranty claims will only be valid only when the information above is correct, genuine, and complete.
3. Make sure the product is properly packed during delivery, the original packaging is highly recommended.
4. The ePropulsion Service Partner will examine and diagnose the defective products to check the validity of the warranty claim.
5. If your warranty claim is accepted, the Product or its defective components/parts will be either repaired or replaced free of charge. Note that any delivery cost incurred in the process shall be borne by you.
6. If your warranty claim is rejected, a repair/replacement cost and fee with round trip delivery cost will be estimated and sent to you for confirmation. ePropulsion Service Partners will only begin the work after your written confirmation that you wish to proceed with the repair/replacement and will pay for it.

ePropulsion

(*In order to validate warranty, please fill in this form first and read the Warranty Policies.)

|| OWNER INFO. ||

Owner Name			
Address			
Phone		Email	

|| DEALER INFO. ||

Store Name			
Address			
Phone		Email	

|| PRODUCT INFO. ||

Date of Purchase (mm/dd/yyyy)	
Serial No.	



Thanks for reading this user manual.

If you have any concerns or find any problems while reading, please don't hesitate to contact us. We are delighted to offer service for you.

Guangdong ePropulsion Technology Limited

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