EPROPULSION STEER TOWARD INFINITY	Department: Marketing Date： 2017/03/13 Version: 1.0

Battery Selection Guide for Navy 6.0

Thanks for choosing an ePropulsion outboard, your trust and support to our company are sincerely appreciated. This Battery Selection Guide is a reference for helping customers choose proper batteries for NAVY 6.0 outboard.

Both Lithium-based and lead-acid batteries can be used to supply power for NAVY 6.0. For performance consideration, lithium-based batteries are preferred because of its better discharge capability and longer cycle life compared with lead-acid batteries. When you choose the battery, some important parameters you need to care about. Here is a brief description of each:

Voltage: This is the most important component of your battery. Making a mistake here is what can possibly cause a damage to the motor driver and motor even with redundant protection. The rated voltage of NAVY 6.0 is 48Volts. Here the rated voltage is not same as charge voltage. For example, the rated voltage for a normal lithium ion battery cell is 3.7Volts, while the charge voltage is about 4.2Volts. The Navy 6.0 system can work within the voltage range from 39Volts to 60Volts. For recommendation, you can choose a lithium ion based battery with 13 cells in series, or a lithium iron phosphate (LiFePO4) based battery with 15 cells in series. You can also choose 12Volts battery pack and serially link four batteries to make a 48Volts battery. For example, most of the lead-acid batteries is 12Volts. Also there are some 24Volts lithium battery packs existing in the market, and you can serially link two batteries of them to make a 48Volts battery to power the engine.

Discharge Current: The discharge current represents the discharge capability

of your battery. Usually it has two kinds of discharge current parameters. One is the pulse discharge current, which is the maximum current your battery is capable of discharging in few seconds. And the other is the continuous discharge current, which determines the maximum current your battery can supply in the whole discharge cycle. When you choose the battery, you should pay more attention to continuous discharge current parameter. The rated current of NAVY 6.0 is 125A, so the battery at least can provide more than the rated current in continuous way. For recommendation, a battery with more than 150A continuous discharge current is preferred. If you use four 12Volts batteries in series, each of the battery should have the more than 150A continuous discharge capability. If you have a 48Volts battery with only 80A continuous discharge capability, then you need two batteries in parallel to make NAVY 6.0 work in full power. The discharge current can never be too high. If your battery is capable of providing 300A or even more but the motor only requires 125A, nothing bad will happen, you will simply have more available power than is necessary.

Capacity: The capacity is similar to the gas for your car. The more of it you have the longer you can drive but the more of it you have the more weight you are carrying. You need to find a battery that is a good balance of capacity vs weight vs cost. To describe the capacity of a battery, there are two units. One is "Ah", and the other is "Wh", which is also called the energy capacity. They have the equation "Ah x Nominal Voltage = Wh". In order that you can select the proper capacity according to your travelling time and range requirements, you can do some simple calculations. For example, a 48Volts battery with 65Ah has a nominal energy capacity of 3120wh (65Ah x 48V = 3120Wh). When the NAVY 6.0 is operated at 6KW input power constantly, it is able to run 0.52h (3120Wh/6000W = 0.52h) approximately. But this is the theory situation and most of the battery, especially the lead-acid battery, cannot discharge its rated capacity in high current. So for recommendation, if you choose lithium battery, 50Ah or more capacity is preferred. If you choose the lead-acid battery, the AGM or GEL batteries are operational, and the battery capacity is required to be 130Ah or above to ensure its discharge capability. The deep cycle marine batteries are also recommended since they have deep and durable discharge capacity. But the

starter batteries are not recommended, which is not suitable for continuous large current discharging. Try to use higher capacity batteries so as to increase the duration and reduce the over discharge damage to the battery.

Brands Recommendation: There are some battery brands existing in the market. You can follow the instructions above to choose the right battery for NAVY 6.0. Here I have two recommended brands for your selection.

1. MASTERVOLT http://www.mastervolt.com/

   They have many kinds of batteries from lithium ion battery to AGM battery. For example, you can choose AGM 12/130 model with four in series to power the NAVY 6.0. Or you can choose MLI Ultra 24/5000 lithium battery with two in series. But the lithium battery with better performance is more expensive than lead-acid battery.

2. SUPER B http://www.super-b.com/

   They have some 12Volts lithium iron phosphate batteries. For example, you can choose SB12V50E-XC or SB12V100E-ZC model with four in series to power the NAVY 6.0.

Final Note before Making a Purchase: Before making your battery purchase, ensure you are buying a battery that has exactly the right voltage as specified for the motor. The continuous discharge current is higher than the rated current of the motor. If you use serial and/or parallel connection in your battery configuration, make sure that only the same batteries (same type, same capacity, same age, same manufacturer, same charging status) are used in the system. If you both have the serial and parallel connections in one system, it is recommended to parallel the batteries first and then make them in series. Please note that never make wrong polarity connection when serial or parallel linking, and double check the connections before connecting to

engine system. As for the charging, please follow the instructions of your battery supplier.

Also notice that if you cannot guarantee the batteries are always in a place that is dry and clean, then it is very important to choose a battery with IP65 or higher level water protection feature.

Thanks again for choosing NAVY 6.0 electric outboard. If you have questions about batteries selection, please do not hesitate to contact us. And also ePropulsion will provide our own designed lithium ion battery to customers shortly. The battery is 48Volts standalone and has 65Ah capacity with 80A continuous discharge current. With our thoughtful parallel strategy, customers can parallel two or more batteries to power NAVY 6.0 as if they are using a single battery. In addition, the battery is equipped with automotive grade battery management system to ensure its high performance and reliability. Together with completely waterproof IP67 feature, this battery is an ideal mate for NAVY on clean cruising.