



What to know about reliability?

Let's walk you through an example. It's an oversimplification by purpose. You have a car. For the sake of argument it's not an electric car but it runs on some fossil fuel. Even if it's a low emission, high quality German car, you have to take it for routine maintenance every 30,000km. Everyone takes that for granted, right?

Now let's say, again for the sake of argument, that you have a large family with 3 kids in school and you use your washing machine every day for two hours. About the same amount of hours you would commute with your car. You don't have to take your washing machine for routine maintenance every 600 hours. Actually, you don't take your washing machine for routine maintenance. Ever.



Why? The key difference is the fact that your washing machine has an electric motor and your car has a combustion engine. Combustion engines are high maintenance compared to electric motors. For you as a person considering an electric motor for your boat this has two implications: your maintenance costs for the boat with electric propulsion are significantly lower compared to a diesel. And you will experience significantly higher reliability.

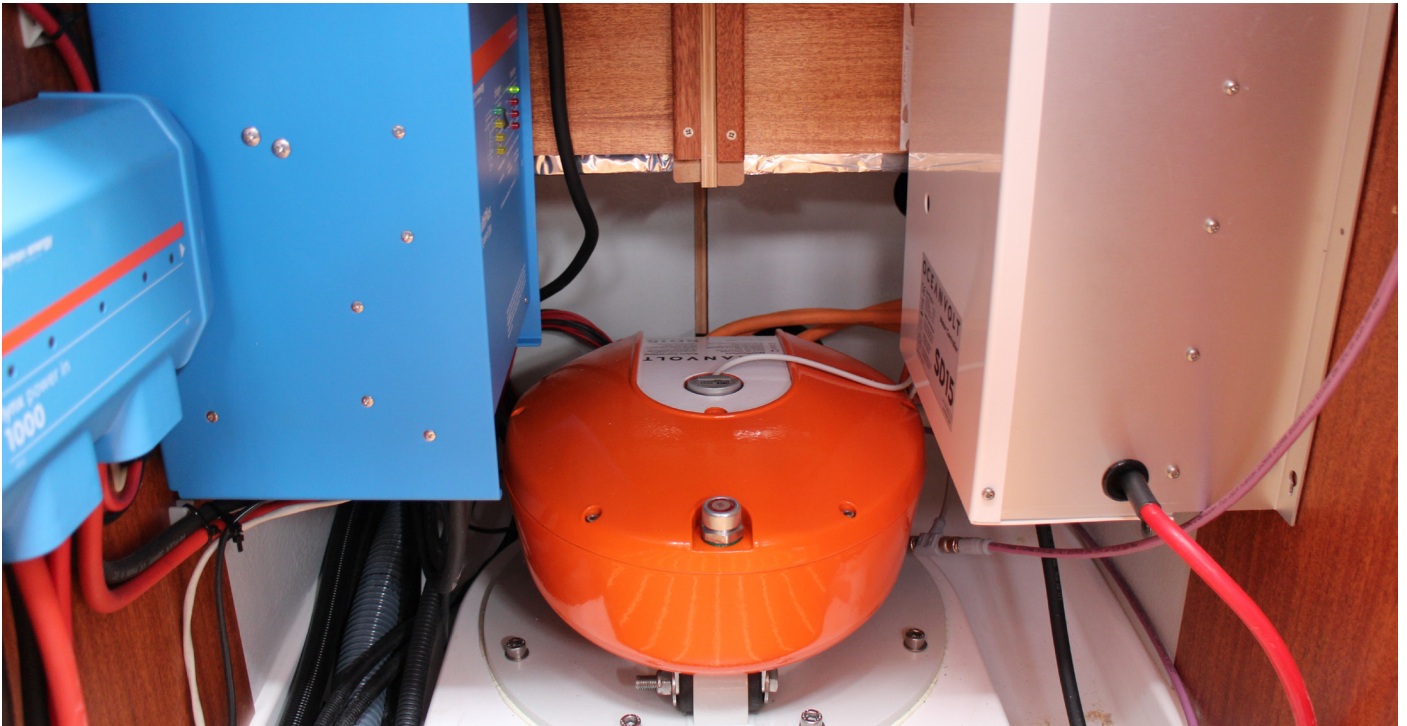
When considering an electric motor or hybrid propulsion solution for your boat, be sure to talk with the vendor about the issue of maintenance and reliability. The vendor you are talking to should be able to give you an exact description on what (if any) maintenance is required for the system/solution through its lifetime and what is the expected life expectancy of the solution. Also make sure that you look at the warranty, you should expect to receive a 2 year standard warranty for the system. If you are purchasing lithium batteries as a part of the solution, they should be covered by the warranty and preferably have a separate warranty of perhaps 5 years.



What to know about safety?

Safety is a lot of things. From our viewpoint it's a culture and process issue. Safety for our clients using our products and solutions is one of the most important things starting from the design board. All of our products are built so that they are safe to operate and own. They are built so that even in a catastrophic situation like water coming inside the boat you as the owner are not in danger.

When looking at an electric or hybrid solution for your boat, there are a few key concepts that you should understand. The single most important thing affecting safety is the voltage the system is designed around. Voltage divides electric propulsion systems for boats into two categories. Low voltage systems, meaning systems designed to operate below 50V and high voltage systems, designed to operate usually above 230V.



A solution like the Oceanvolt SEA® is built around low voltage, specifically 48V. This is a conscious design choice with safety in mind. It makes owning a product simple and safe as you as the owner are allowed to install or troubleshoot issues that may arise. A simple \$20 voltage meter is the only tool you would need. It is safe to operate. If you need help, any electrician can be of assistance anywhere in the world.



In the EU, USA, Canada, New Zealand and Australia – generally speaking OECD countries – you have laws and regulations that govern how and who is able to do electrical work. Anyone is allowed to do electrical installations in low voltage systems. However, when you move into High Voltage the game changes totally. You need to be a certified electrician who is allowed to work with High Voltage. Add a boat and this becomes a marine environment and an electrician will need to have both High Voltage qualifications and a permit to be able to work in a marine environment. This has several implications for you as a potential owner of a boat with a high current system installed:

- If you are thinking of refitting an existing boat with a High Voltage solution, you cannot do the installation by yourself. You have to use the installation service of a marina or an electrician who has the relevant qualifications.
- If you are the owner of a new boat that has an installation and you run into an issue, you must not touch the system on your own, as it is life threateningly dangerous to touch a high voltage system without the necessary qualifications.
- If you need to have the boat serviced or have someone to look at an issue, you will have to find a place where there are qualified electricians who are able to work on high voltage systems on boats. They are found in two places: super yacht marinas and commercial ports servicing ships.



Some vendors currently offering High Voltage electric propulsion solutions to boats use “Automotive Grade” or “Adopted from the Auto Industry” type slogans in their marketing. While this may be factually true and correct, as a potential owner of a High Voltage solution there is a significant difference you should keep in mind. Nearly all electric cars run on High Voltage. No manufacturer has ever intended any of their electric vehicles to be serviced by the owner. If an electric car breaks down (and unfortunately they sometimes do) you have to call a towing company and they will tow the car to the nearest certified repair center.

In a boating environment, the game is different. Most owners rightfully expect to be somewhat self-sufficient and be able to diagnose and repair most issues themselves. Unless you happen to be a High Voltage qualified, Marine Environment certified electrician, you aren't allowed by law to touch a high voltage solution. And it's for your own good as High Voltage is life cheatingly dangerous.

In a very broad sense, the voltage of the system is equivalent to how much power the engine is able to produce. On a typical boat installation, you would need perhaps an equivalent of maximum 100hp of Diesel equivalent of power. Meaning roughly a 30kW propulsion solution. This can be safely achieved with 48V current.



Checklist to go through with vendors before installation

When thinking of a low voltage electric propulsion solution for a boat, make sure that the following topics are covered when you discuss this with a vendor:

General Installation Issues	Notes
How is the installation done?	
Who is responsible for the installation?	
What does the warranty say regarding installation?	
What support material does the vendor provide for the installation?	
Are online videos and documentation available?	
Does the vendor support you doing the installation yourself? This is a good trick question and the answer should give you an idea about the maturity of the solution and the degree of confidence the vendor has in it's own product.	

When thinking of an electric propulsion solution, keep in mind voltage matters. Discuss voltage with vendors. If high voltage is something that fits your needs, make sure that you at least have the following topics covered:

High Voltage Motor Installation	Notes
How does the vendor propose to do the installation?	
Who exactly is the final party responsible for the outcome? Ultimately of course it's you as the owner but at least on paper there should be one responsible vendor.	
Who is doing the installation? Make sure that they have the necessary qualifications; it's your safety and your family's safety we are talking about and this is potentially a life and death issue.	
Think how do you intend to use the boat. Is it a day sailer? Or do you intend to do extended cruises or longer trips. Ask specific questions as to exact locations where it is possible to do maintenance work on a high voltage solution in the regions you are thinking of visiting.	

We hope that all of this didn't scare you away from electric propulsion, as it was meant to help you understand some of the issues around the subject. Please don't hesitate to contact us if you wish to talk to us directly.