User manual

How to use and maintain a Green Marine electric motor system for a lifetime of boating pleasure

Powerful
electric propulsion

Table of contents

1. Introduction

Thank you for choosing a Green Marine electric motor system for your boat. With this manual, you will be able get the most out of your motor system.

Our systems are built to last a lifetime. With the instructions in this manual, we give you the tools to achieve this lifespan. Refer to this manual before using the Green Marine motor system, and make sure that the manual is always close by when you use the motor system. The manual can of course also be found on our website.

2. Safety

Our systems are designed to be safe to use. Even though we do everything we can to ensure that safety is not an issue, there are risks associated with working with electronics and moving parts. It is therefore important to be aware of the safety guidelines of the motor system.

2.1 Safety symbols

CAUTION
This symbol indicates the risk of possible injury to the user/installer, extensive material damage if the user or installer does not avoid this risk, or void of warranty if this step is not followed.

TIP
With this, Green Marine emphasizes the importance of a certain action for the use of the motor system.

2.2 General guidelines

- It is important that the motor system works at the prescribed voltage. The prescriptions can be found on the datasheets of the motor systems.
- The system is intended exclusively for powering boats. Green Marine cannot be held liable for use in any other way.
- A repair or replacement may only be carried out by a professional designated by Green Marine. In the event that the motor system is repaired or replaced by a private individual, a commissioning must be carried out by Green Marine.
- Use only original or recommended accessories.

CAUTION
If the motor system needs to be repaired, use only original replacement parts. The use of non-standard parts can result in serious injury or damage.

- Keep electronics away from water.
- Green Marine accepts no liability for damage suffered by the buyer, or all possible claims by third parties as a result of (the use of) the drive, direct or indirect and/or consequential damage, environmental, hearing, business and immaterial damage, or incorrect advice, unless the damage is due to gross negligence on the part of Green Marine.
- Before use, you must take into account the legislation in the relevant country, or at the location where the drive is located. The buyer is responsible for complying with all precautions, whether or not legal, at the location where the drive is used, regardless of whether the drive is operational at that time. This also includes measures for fire safety, as well as providing for the safety of others in the vicinity of the drive.
- Green Marine reserves the rights and powers to which they are entitled under European legislation. Imitation or reproduction of the device is expressly not permitted.
- In case of damage to the drive, you must switch off the drive via the main power switch and contact Green Marine or an installer designated by Green Marine.

2.3 Safety of use

- In the event of overheating, smoke development, or as soon as you suspect a defect, switch off the motor system immediately via the main switch. Please contact Green Marine or a Green Marine designated installer.
- Observe the permissible ambient temperature for the use of the motor and battery system and the charging of the battery system. See the relevant datasheets for more information.
- The motor system may only be used by persons who are qualified for this purpose and who are physically and mentally fit. Observe the respective national regulations.
- Keep the drive and control options out of reach of children or persons who are unable to handle them properly.
- Have the operation and safety provisions of the entire system explained to you by the installer or the seller.
- Make sure you're familiar with all of the system's controls.
- Make sure the main power switch is off when you're done boating so that there is no voltage on the system if something unexpected happens.

3. Usage

It is important to check the operation of the system regularly. This way you can find any problems early and avoid unpleasant situations.

3.1 Boating

- Check the condition of the motor system (see 'Maintenance') heading.

CAUTION
Only depart with a system that is in good condition.

- Check whether the boat is still connected to shore power. If this is the case, take the boat off shore power.
- Check that the main power switch is turned on.
- Check that the thrust lever is in a neutral position.

CAUTION
The motor will not start if the thrust lever is not in neutral position. Put it in a neutral position with the ignition switch set to 'off', and try again.

- Make sure the batteries are sufficiently charged to complete your planned cruise.
- Be especially careful when there are people in the water, even when traveling at a slow speed.

CAUTION
Turn off the motor immediately via the ignition switch if there are swimmers directly around the boat.

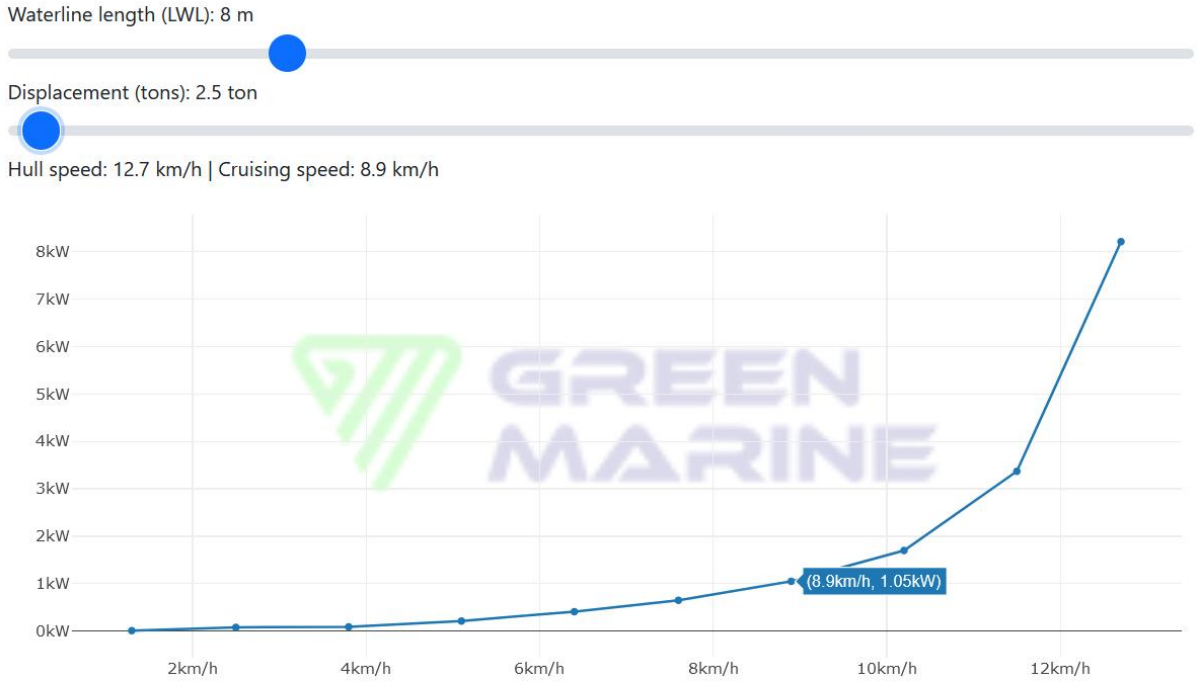
3.2 Power usage

Pay attention to your power consumption while boating. At higher speeds (above cruising speed), power consumption increases exponentially and the remaining boating time decreases rapidly. The image below shows the (estimated) power consumption for a boat with a length (on the waterline) of 8 meters and a displacement of 2.5 tons:

- Up to the cruising speed of 8.9 km/h, the power consumption increases minimally, to a consumption of 1.05 kW.

- At speeds higher than the cruising speed, you will see the power consumption increase rapidly.
- At the cruising speed of 12.7 km/h you use 8.2 kW.

With a 10-kWh battery pack, you would only be able to sail for an hour (with some buffer left in the battery) compared to 8 hours of boating at cruising speed.



3.3 Charging

- Check that the shore power is correctly connected before charging the batteries. Make sure that the shore power cable is in good condition and that the plugs are properly attached.
- It is often a good idea to charge the batteries immediately after use, so that they are ready for the next trip. Pay attention to overloading or overcharging, always use the right charger with the correct charging settings. Green Marine always supplies a battery charger that fits your battery pack.
- The included battery charger can always fully charge the battery pack in a few hours. Make sure that the battery is not charged too often for a short time. To keep the battery cells in the battery pack properly balanced, they must be fully charged regularly.

CAUTION
Never charge when the batteries or the charger have been submerged in water or condensation is visible on the charger. Please contact your Green Marine dealer or Green Marine directly.

3.4 Underwater

If the boat is flooded or there is water in the boat that causes electrical components to be wet or damp, never start the boat. Contact your Green Marine dealer or Green Marine to discuss the best approach.

3.5 Salt water

If you are going to use the boat at sea, you cannot use an outside water cooling. You will always need a closed cooling system to cool the motor and the motor controller.

CAUTION
Cooling with salt water can seriously damage the motor and controller.

4. Maintenance

The motor system should be checked regularly for correct operation. Which checks these are, and when you should perform them, is described in this section.

CAUTION
Always carry out maintenance work when the motor system is off and the main power switch is also off.

4.1 Before departure

CAUTION
Always carry out maintenance work when the motor system is off and the main power switch is also off.

- In the case of a water-cooled system:
    - Check the coolant level and top up if necessary.
    - Check the water filter before each use and clean the filter if necessary.
    - Check that the pump is working and that there are no blockages in the water inlet (with outdoor water cooling).

- Check that the electrical components, such as the motor, controller and batteries, are dry, that there is no bilge water in the boat that could damage the drive system and that there is no condensation.

CAUTION
Water can cause a short circuit and damage the system. It can also cause corrosion of (parts of) the system.

- Check the system for any mechanical damage.
- Check the battery status before each cruise.

4.2 After 50 hours of boating

Check the motor mounts on which the motor is installed and have them adjusted if the alignment of the motor with the propeller shaft is no longer optimal.

4.3 Annual checks

Have your system checked annually by a professional, or do a thorough check of your drive system yourself.

- Check the condition of the batteries and connections of the battery cables. These tightened parts can eventually loosen, partly due to vibrations in the boat, and therefore make less good contact with, for example, the battery terminals. This results in higher resistances and a less efficient system.
- Clean the water pump filters and check for any blockages (if any part of the system is water-cooled).
- Check for moisture damage such as corrosion of contacts, battery terminals and/or plugs.
- Live cables or cords to which the device, component or module is connected must be checked regularly for insulation damage or breakage. If damage or break in the cables/cables is detected, the device must be taken out of operation immediately until the relevant cable/cord has been replaced.

5. Winter storage or other decommissioning

You can safely store your electric boat in an indoor storage facility. Always check whether the storage facility is properly insured for the storage of electric boats and what the additional safety regulations are. By switching off the batteries and disconnecting the system, you can store your boat with peace of mind, if you take the following into account:

5.1 Going in winter storage

- Make sure the boat's main power switch is turned off.

- Disconnect the batteries from the rest of the drive system or turn off the batteries if you have Green Marine lithium batteries with an on/off button.
- Charges the batteries to at least 50%, but no more than 70%.
- Make sure you recharge the batteries at least once every 3 months to prevent deep self-discharge or when the charge level falls below 20%.

CAUTION
Never allow the batteries to fall below the recommended lower limit. This can cause deep discharge, which is harmful to lithium batteries.

- Store the batteries in a dry, cool and frost-free place. Extremely low temperatures can reduce the capacity of batteries or cause damage.
- Clean the motor: remove dirt, dust and salt deposits. Use a damp (not wet) cloth to clean the case, but avoid allowing water to reach the internal parts.
- Propeller: Check that the propeller is free of damage or dirt and clean it if necessary.
- Drivetrain: Clean and lubricate moving parts such as the propeller shaft and bearings to prevent them from rusting or seizing.
- In the case of water cooling: empty the cooling system to prevent freezing. When freezing, water expands, which can cause damage to components and pipes.
- For outdoor storage: make sure that no water can get into the boat and protect parts from freezing.

5.2 Coming out of winter storage

- Do a visual inspection of the motor system and check for damage, corrosion and leaks. Remove dust and dirt that has accumulated in the boat during storage.

- Battery system
    - Connect the batteries or turn on the batteries with the on/off button.
    - Fully charge the batteries, ensure sufficient charging time so that the cells are properly balanced.

- Cooling system
    - Fill the cooling system and check for any leaks.
    - Check the outside water system if it is in place.
    - Check the hose connections for leaks. Check the connection of the hose connections and tighten where necessary.

- Turn on the main power switch and check the operation of the motor.

CAUTION
Make sure that no one is present around the moving parts of the boat (propeller, propeller shaft, etc.) to avoid accidents. Turn off the main power switch again after the test.

- Take a test run to check that all parts are functioning correctly before you go out on the water for longer in the new boating season. Check the function of the control elements (ignition switch, thrust lever and display).

TIP:
Combine the annual maintenance of the motor system with taking the boat out of winter storage. This way you can start the new boating season with peace of mind. Please contact Green Marine if you want Green Marine to carry out this check.

6. Malfunctions

6.1 The motor does not start

#	Defect	Advice
1	Main circuit breaker disabled/defective	Check that the main power switch is turned on. Is that the case? Then it may be defective. Always check for defects in other parts of the system first. It would be a shame to replace the switch if the problem is caused by, for example, a fuse.
2	Faulty fuse	The motor system is protected against overload with fuses in several places. These fuses can sometimes wear out and break. Contact Green Marine or your Green Marine dealer to replace a faulty fuse.
3	Loose, poorly connected or corroded (battery) connections	Clean the connections and reconnect them properly. Preferably make sure that each connection has its own stud if busbars are used. Otherwise, always make sure that the connection to the highest current is connected first.
4	Thrust lever not in neutral	Check that the thrust lever is in neutral when starting the motor. If this is not the case, the motor system will first have to be switched off via the ignition switch, the lever must be put in neutral, after which the motor system can be started again via the ignition switch.
5	Loose plugs	If the motor system does not start, it may be caused by a loose plug. Check the various plug connections (such as the signal cable from motor to controller, or the signal cable to the ignition switch or thrust lever) and tighten them if they are loose.

6.2 The motor system gets too hot

#	Defect	Advies
1	The propellor is too big	Check the dimensions of the current propeller and compare it with the advice for the motor system that you will find on the datasheet. Is the propellor much bigger? Please contact Green Marine for tailor-made advice.
2	There is something in the propellor	As a result, the motor has to deliver too much power to turn the propeller properly. Remove all material that is stuck in the propellor and check that the propellor is not damaged.
3	The motor is not sufficiently cooled	Check the proper functioning of the cooling pump in the case of water cooling, and of the fans on the motor controller in the case of air cooling. Contact Green Marine or your Green Marine dealer in case of a defect.
4	Insufficient airflow/ventilation	In addition to the motor and/or controller, does the motor compartment also get very hot? Then there may be insufficient ventilation. Mechanical ventilation of the motor compartment can offer a solution. Contact Green Marine or your Green Marine dealer for the best solution for your boat.

7. End of life

If used properly, the motor system can last a lifetime. In the unlikely event that the system does come to the end of its lifespan, for example if it has been flooded for too long or has been damaged in some other way, the parts must be processed correctly. Please contact Green Marine for this. We are happy to help you.

8. Warranty

For the specific conditions, please refer to the warranty conditions for the motor and/or battery systems.