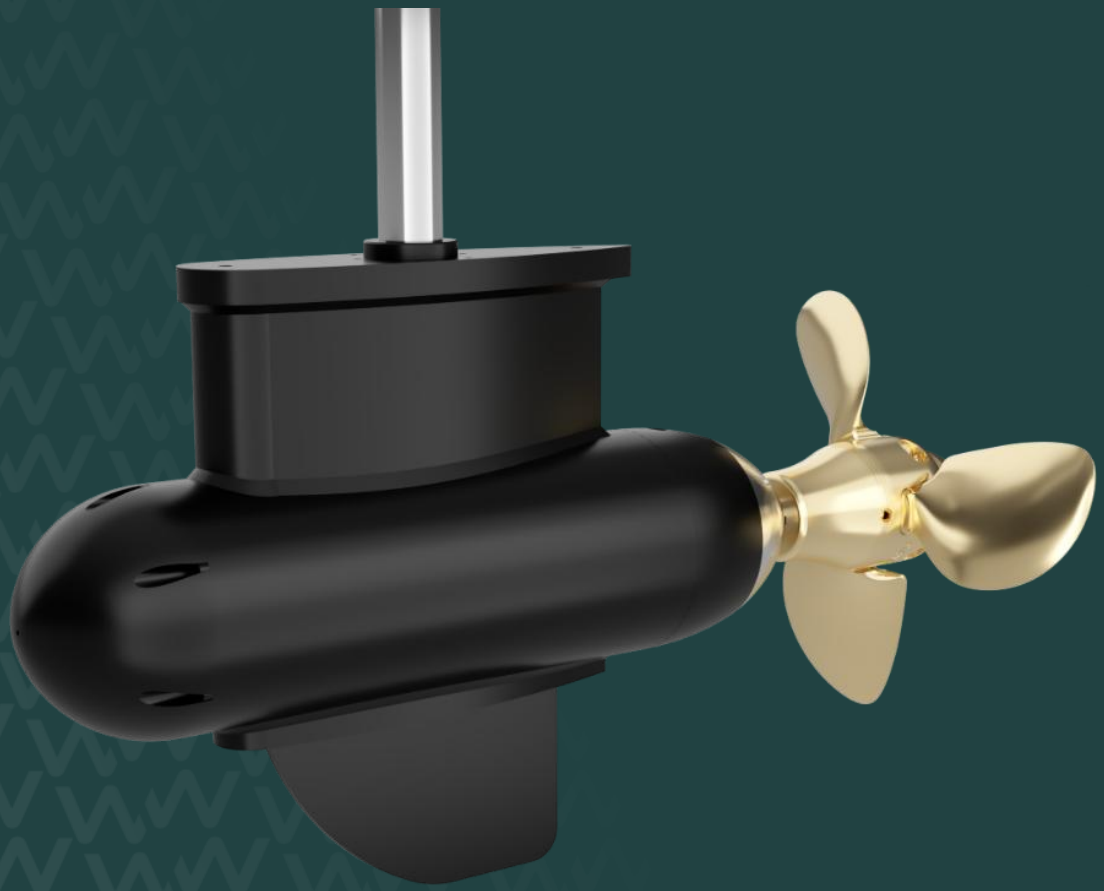
waterworld

ELECTRIC PROPULSION SYSTEMS

WW-9384EN260



2.0/3.5/8.0/18.0p

WW-1501XXX

INSTALLATION MANUAL

Foreword

Dear user,

Congratulations on your purchase! We are delighted that you have chosen WaterWorld's electric drive.

WaterWorld POD motors are designed and manufactured with the utmost care, with the aim of providing you with a safe, reliable, environmentally friendly and easy-to-use propulsion system. We are constantly striving to improve the WaterWorld drives and greatly appreciate any comments you have about the design or use. You can find our contact details on the back of this manual.

We recommend that you read this manual carefully so that you can install and use the drive correctly. We hope you enjoy your WaterWorld propulsion!

Sincerely,

The WaterWorld team

Table of Contents

1 Introduction

1.1 How to use this manual

This manual contains essential information for the safe use of the WaterWorld electric actuators. Both maintenance and troubleshooting are covered in this manual.

It is critical that every person responsible for the installation of this system, as well as anyone who will be using the motor, thoroughly study this manual. It is necessary to closely follow and carry out the warnings and safety instructions in this manual.

The installation and maintenance of WaterWorld motors must be carried out by specialized and competent installers, who comply with the laws and regulations in force, combined with the safety aspects mentioned in this manual. Keep this manual with your system in a safe and easily accessible place! You can download a copy or latest version at www.waterworldelectronics.com

1.2 Warnings and symbols

DANGER

Indicates that there is a potential risk of injury to the user/installer or significant property damage if the user or installer does not avoid this risk.

WARNING!

Special information, respectively commandments and prohibitions with regard to damage prevention.

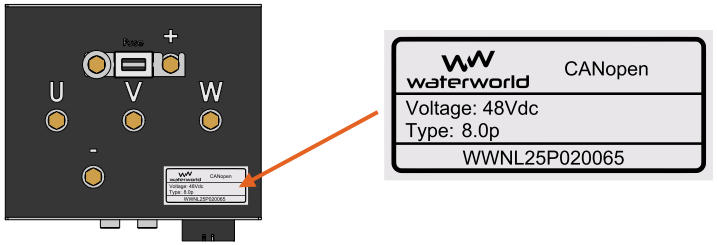
CAUTION! Instructions that deserve extra attention and must be followed.

1.3 Serial Numbers

You can find the identification label with the serial number on the front of the motor controller.
This label contains the following information:

- Manufacturer
- Type number
- Unique kit serial number (pod motor and motor controller)

The serial number is displayed as:
WWNLxxPxxxxxx



CAUTION!
Never remove the identification labels and/or other stickers on the motor/motor controller.

2 Pre installatie checklist

2.1 Step-by-step plan for installation

1. **Read the manual**
   We aim to provide you with a clear and comprehensive manual. This includes not only information about the WaterWorld POD motor, but also guidance on the entire vessel, the propeller, and the batteries.

   Please note, however, that every installation is unique and should be carried out by a qualified professional.

1. **Check the scope of delivery**
   Check that you have received everything that belongs in the delivery. Arrange all parts clearly and compare them with the list in chapter 4 of this manual and the enclosed packing slip. If you have any questions, please contact your supplier directly.

2. **Prepare the boat**
   Make sure you have a clean and dry environment. Please check the following points before installation:

- No permanent bilge water at the motor installation location
- Have a properly functioning bilge pump to prevent clogging
- Prevent leakage or condensation from above at components
- Ensure adequate ventilation and good air circulation

Make sure all of the above points are in order before proceeding.

4. **Make the right choice of screw**
   See the advice *section 8.2 (Guidelines for screw selection)* of the manual.

5. **Check accessibility**
   Ensure that all components remain easily accessible for maintenance and service.

6. **Ensure proper weight distribution**
   Take into account the weight of the battery pack and distribute it evenly throughout the boat. Make sure that batteries are accessible for maintenance, cabling and (in the case of wet batteries) topping up. With WaterWorld LFP batteries, the on and off button must be accessible at all times.

7. **Choose the correct cabling**
   Please refer to *section 5.8.3* for the correct choice of cable. Keep cables as short as possible and make sure the length of the positive and negative cables is the same for equal discharge of multiple batteries.

8. **Read the safety instructions**
   Read Chapter 3 (Safety) first. Then read the relevant section for each component and connect everything according to the connection diagram on *section 5.1 (Connection diagram 2.0 - 3.5p)* or *paragraph 5.2 (Connection diagram 8.0 - 18.0p)*

9. **Start the installation**

3 Safety

3.1 General guidelines

Read the safety and warning instructions in this manual and always observe them.

- Comply with local laws, regulations and required qualifications
- Ignoring instructions can result in injury and property damage
- WaterWorld Electronics is not liable for damage caused by improper use
- Only use the system at the specified voltage
- Standard: 48 V nominal (min. 42 V – max. 60 V)
- Use the system only for powering vessels
- Improper use will void warranty
- Keep electronics away from water
- Have installation and repair carried out by a licensed installer
- Use only original or recommended WaterWorld parts
- Use of non-original parts may result in damage, injury, and void warranty
- Have battery replacements carried out by a qualified installer
- Regularly check the operation of the system and the batteries
- WaterWorld, supplier and producer are not liable for indirect, consequential or improper use, unless there is gross negligence
- Be aware of local laws at the location of use
- The user is responsible for compliance with safety regulations
- It is not allowed to copy or imitate the system
- In case of different battery packs, contact your supplier
- Never carry out repairs on the system yourself
- Do not touch damaged cables or components
- Don't just lift the system; Use suitable lifting equipment
- When sailing, check that the propeller cannot touch the bottom

3.2 Safety features of the drive

Your WaterWorld electric drive is equipped with several safety features:

- **Overheat protection (motor and motor controller)**
  Power is automatically reduced when excessive temperatures are detected
- **Fuse on the motor controller**
  Depending on the motor power, a fuse is integrated into the motor controller
- **External fuse for cablingPrevents fire, overheating and overloading of the system**

  CAUTION!
  This fuse is not included as standard and must be installed separately

- **Main switch**
  Always switch off the main switch when leaving the boat or during maintenance. This is not included as standard.
  Consult your supplier for the correct specifications.
- **Battery overload protection**
  At low battery voltage, the power is automatically limited, allowing you to sail safely with reduced power
- **Ignition switch**
  Allows the system to be switched off immediately in emergency situationsAlways turn off the system when people are in the water
- **Display**
  Continuously shows the remaining sailing timeGives warnings in case of too high or too low battery voltage
- **Cabling Inspection**
  Regularly check live cables for:
  - Damage
  - Fractions
  - Loose connections
- **Protection of cables and connections**
  Provide cable lugs with protective caps. Battery terminals must always be covered
- **Handling in the event of damageIn the event of damaged cables or components:**
  - Switch off the system immediately
  - Decommission the system
  - Replace the damaged parts before reuse

WARNING!

3.3 Safety instructions for the drive

Always follow the directions in this manual.

- Switch off the drive immediately via the main switch if:
  - Overheating
  - Smoke development
  - Finding a defect
- Only use the operator within the permissible ambient temperature:
  - Minimum: -20 °C
  - Maximum: 40 °C
- Do not touch the drive shaft, motor or battery parts during or immediately after use
- Always switch off the system via the main switch when assembling and disassembling work
- Do not perform any maintenance or cleaning on the propeller or drive shaft while the system is powered on

DANGER

DANGER!
Always switch off the engine when people are near the boat.

3.4 Safety instructions for the batteries

Do not use the WaterWorld system if the battery is damaged and inform the supplier or installer of the system.

- Do not store flammable objects near the batteries. • Never smoke and avoid sparks or flames in the vicinity of the batteries.
- Make sure you have plenty of water on hand; If battery acid comes into contact with the skin or eyes, rinse immediately with water and seek medical attention.
- Only use charging cables that are suitable for outdoor use.
- Always unroll the reel from a 230 Volt socket completely, if you use it.
- Avoid strong mechanical forces on the batteries and cables of the system. • Remove metal jewellery and watches before starting work on batteries and always use insulated tools.
- Never short-circuit batteries. Never allow tools and metal objects to touch the battery pack to avoid sparks, fire, or explosion.
- When connecting the batteries, make sure that the polarity is correct and that the connections are securely fastened.
- Never swap the polarity.
- When connecting the batteries, connect the red positive cable first and then the black negative cable.
- When disconnecting the batteries, make sure that you disconnect the black negative cable first and then the red positive cable.
- Battery terminals should be clean, corrosion-free, and covered with pole caps.
- Do not place batteries in an insufficiently ventilated area. When placed in a locker, proper ventilation must be provided.
- Connect only identical batteries (type, capacity, age).
- Only connect batteries with the same state of charge.
- Always make sure that battery terminals are in optimal contact with the cable lugs that connect to them.
- Do not connect other consumers (e.g. fish finder, light, radios, etc.) to the same battery bank that powers the POD.
- In the event of a battery failure, it is recommended to replace all batteries.
- When working on batteries, always switch off the system via the main switch.

CAUTION!
Avoid stainless steel rings between the battery terminal and the connected cable at all times.

CAUTION!
More information about the batteries can be found in the manual 48-6800 and 48/35 charger on www.waterworldelectronics.com

3.5 Safety instructions for use

Please read this manual thoroughly before using the system.

- Only operate the WaterWorld system if you are qualified and competent to do so.
- Comply with the national laws and regulations of the country in which you are sailing
- Keep the drive and controls out of reach of children and unauthorized persons
- Have the operation and safety instructions explained by the shipyard or installer
- Inspect the system for mechanical damage before departure
- Check the operation of the system at the start of each trip at low speed.
- Only sail with a system that is technically in good condition
- Make sure the batteries are sufficiently charged
- Familiarize yourself with all the controls and know how to stop the system quickly
- As a driver, you are responsible for the safety of people on board and in the surrounding area
- Adhere to the basic rules of conduct for safe boating
- Take special care when people are in the water

DANGER
Sedule the engine always when people are in the water or in the immediate vicinity of the boatThe rotating propeller can cause serious injury or death

- Inform yourself in advance about the sailing area, weather conditions and sea conditions
- Take into account influences such as wind, currents and sailing direction on the range
- Always plan a sufficient safety margin for the available range
- Make sure that the required safety equipment is in place and accessible, such as:
    - Life jackets
    - Anchor
    - Paddle
    - Communication tools

4 Delivery

4.1 Standard package contents

Standard delivery package includes:

- Pod motor with cap nut and lock washer
- Motor controller with stainless steel suspension bracket(s) and wiring harness
- Terminal Resistors
- Display
- Throttle side mount (top mount optional ask your supplier)
- Relay (in case of 2.0p and 3.5p, the relay is integrated into the motor controller)
- Ignition switch with 2 keys
- Data cables (included with the separate components)
- Disconnect capacitor

Not included:

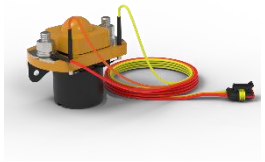
- Main current switch
- Fuses for individual batteries
- Anode
- Pelvic fin

4.1.1 Throttle

A side-mount throttle is included in the standard delivery, including a 1.5m RJ45 data cable. In the network of a standard pod system, you can mount and set up to 2 throttles. For more info see *section 5.11 (Throttle)*

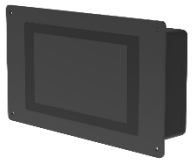
4.1.2 Ignition switch

The ignition switch comes with 2 keys and 3 meters of cable (easy to extend if necessary). Each set of keys is unique, in case of loss of keys, it is best to purchase a new ignition lock. The ignition switch has an IP65 rating.



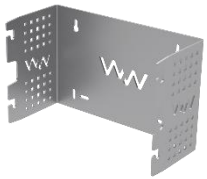
4.1.3 Relays

The relay is supplied with the 8.0p and 18.0p systems and fits the plug with similarly colored wires on the 23- or 35-pin plug. With the 2.0 p and 3.5p, the relay is integrated into the motor controller. The relay must be mounted with the red wire on the side of the battery. See the connection diagram for more information.



4.1.4 Display

The digital color display with Touch function comes with a 3-meter RJ45 data cable. The display has an IP65 rating. When this is mounted in an open boat, please note that the display can get very hot in full sun. We recommend that the display is well ventilated and covered against the weather when you are not using the ship. When mounting in an aluminium console, you must provide the console with (natural) ventilation so that no moisture can penetrate through the back of the display.



4.1.5 Mounting bracket for motor controller

The motor controller is mounted using a separate bracket, which is attached to the controller with the supplied aluminum strips and stainless steel bolts and nuts. The bracket can first be secured to the mounting surface, after which the motor controller can be placed or hung into position.
Mounting materials required to attach the bracket to the vessel are not included.

4.1.6 Terminal Resistors

Depending on the type of pod, one (2.0p and 3.5p) or two end resistors (8.0p and 18.0p) are included. Place these terminal resistors in the remaining open data ports. The specific data ports in which you place them are irrelevant, as all components can be connected in series with each other. The order in which you do this is also not important. Refer to the sample connection diagram for more information

4.2 Additional components

4.2.1 Anodes

An aluminum or zinc anode is **NOT STANDARD** included with the system. These anodes **are REQUIRED** to meet the warranty conditions, but are **NOT** included in the base module. Depending on the type of water in which you sail, fresh or salt, you can choose an aluminum or zinc anode respectively.

4.2.2 Mounting kit for fixed POD

- Full thread tube stainless steel 316:

2.0p	= M30x1,5 L:130mm
3.5p	= M30x1,5 L:130mm
8.0p	= M40x1,5 L:180mm
18.0p	= M50x1,5 L:220mm

4.2.3 Mounting kit for steerable POD

- Rudder stock stainless steel 316

2.0p	= M30x1,5	W:800mm
3.5p	= M30x1,5	W:800mm
8.0p	= M40x1,5	W:800mm
18.0p	= M50x1,5	W:650mm

- Thread KM lock nut stainless steel 316

2.0p	= M30x1,5
3.5p	= M30x1,5
8.0p	= M40x1,5
18.0p	= M50x1,5

- Adjusting ring, stainless steel 316

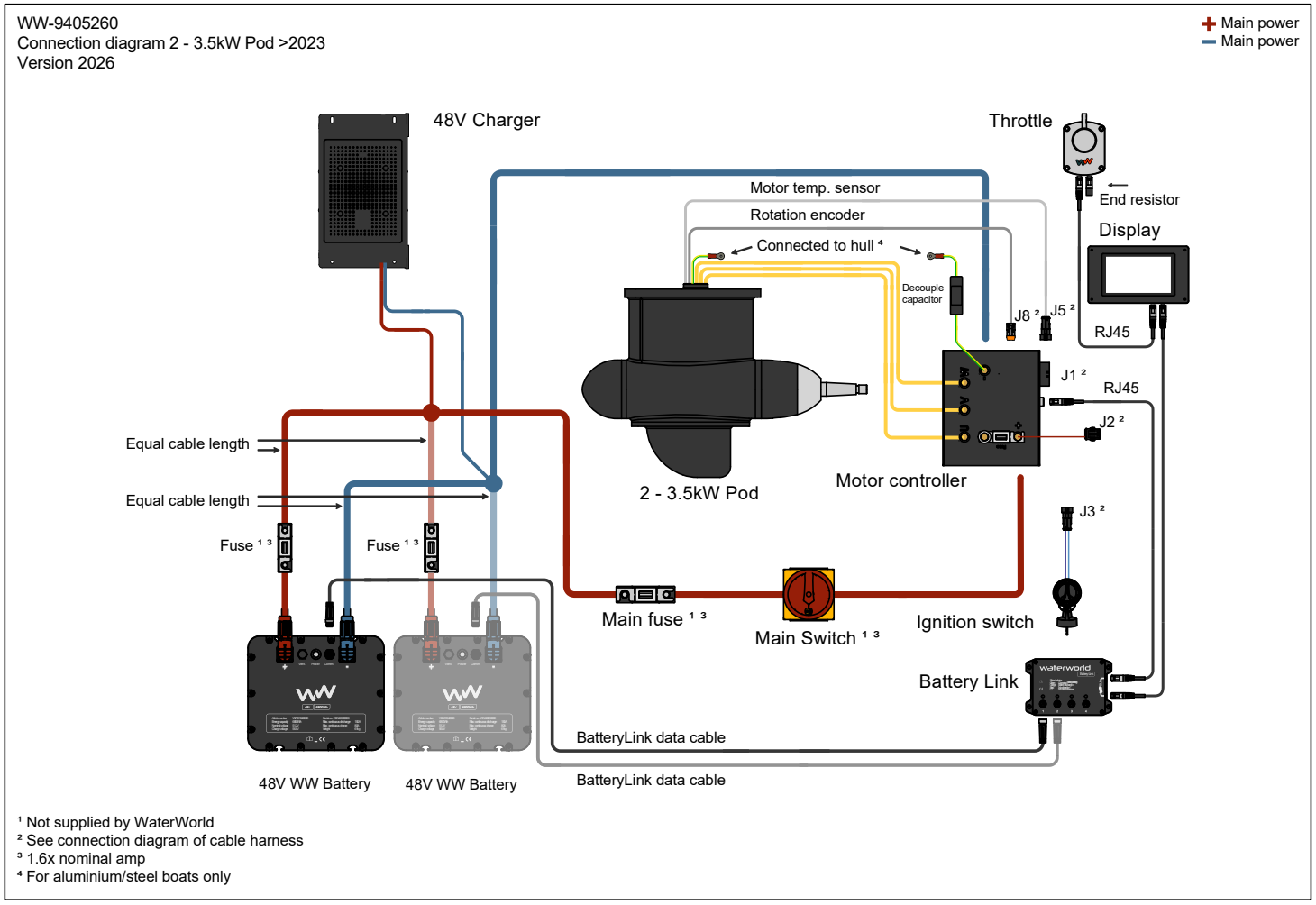
2.0p	= 30mm
3.5p	= 30mm
8.0p	= 40mm
18.0p	= 50mm

4.2.4 Rudder arm:

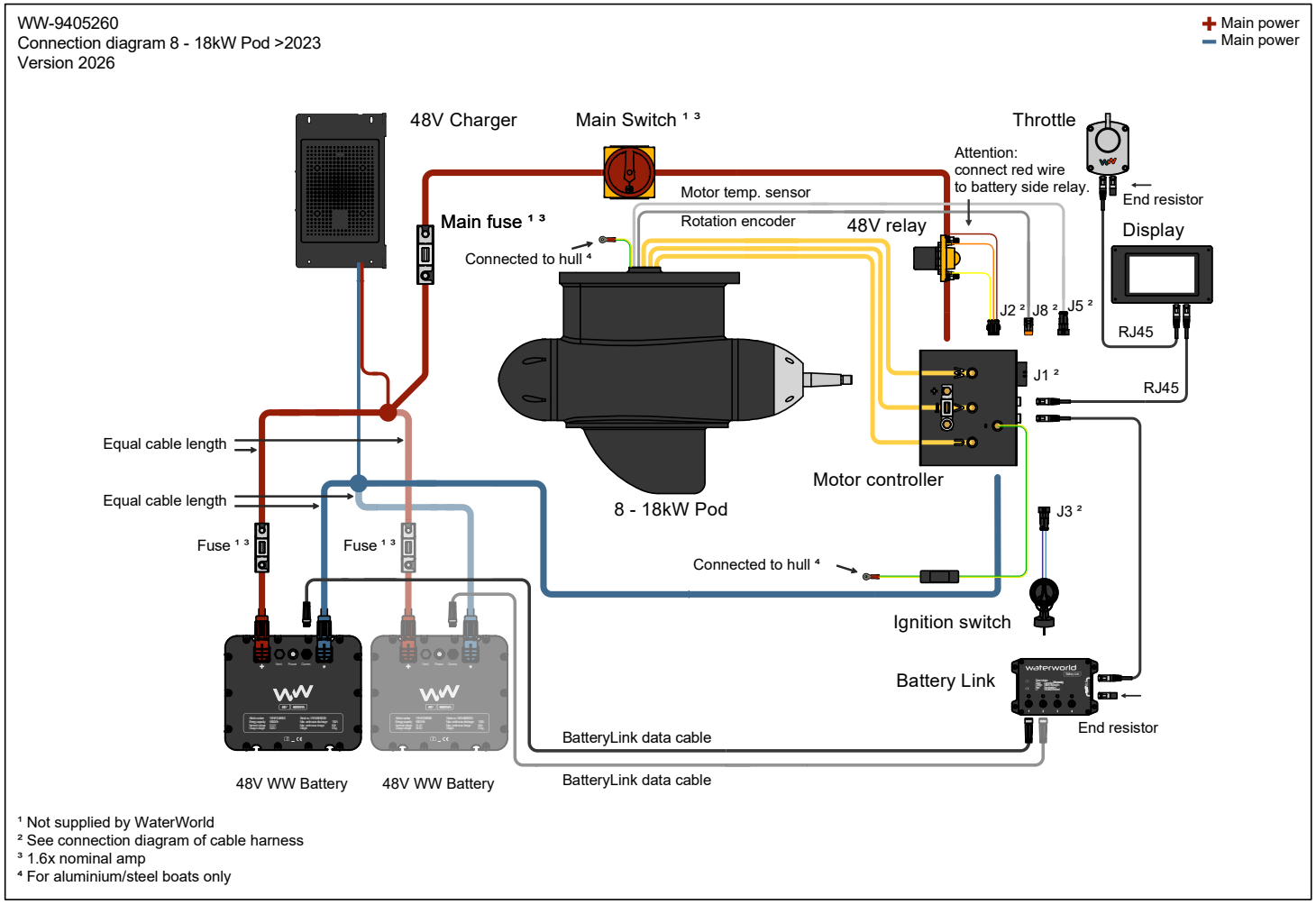
2.0p	= 30mm
3.5p	= 30mm
8.0p	= 40mm
18.0p	= 50mm

5 Installation of the system

5.1 Wiring diagram 2.0 - 3.5p



5.2 Wiring diagram 8.0 - 18.0p



5.3 Bonding of the rudder stock or threaded tube

1. Work the wires coming out of the pod from the wire side through the rudder stock or the wire tube.

2. Clean the internal threads of the pod with **Loctite SF7064**.

3. Clean the external threads of the rudder stock or threaded tube with **Loctite SF7064**.

4. Let this evaporate for a few minutes. Avoid contamination of the thread.

5. At the rudder stock, screw the KM nut cleaned with **Loctite SF7064** on the thread to the end of the thread.

6. Manually apply a continuous line of **Loctite 549** to the surface of the threads and at the same time twist the tube as far into the pod as it will go.

7. Then tighten the KM with suitable tools so that it is very well secured and secures the rudder stock.

8. Let it dry at room temperature for **at least 24 hours** before loading. For best results, this is **72 hours!**

5.4 Electrical insulation and grounding

For the safe and reliable operation of the WaterWorld system, it is important that the electrical components are correctly assembled and connected. The main guidelines for the placement, isolation and grounding of the system are described below.

5.4.1 Insulation of motor controller and battery charger

For boats with an aluminum or steel hull, the motor regulator and battery charger must be electrically isolated from the boat hull and each other. Mount these components on a non-conductive surface, such as plastic, wood, or another insulating mounting plate. This prevents unwanted electrical connections from forming between the electrical components and the boat's chassis.
Please note the following points during installation:

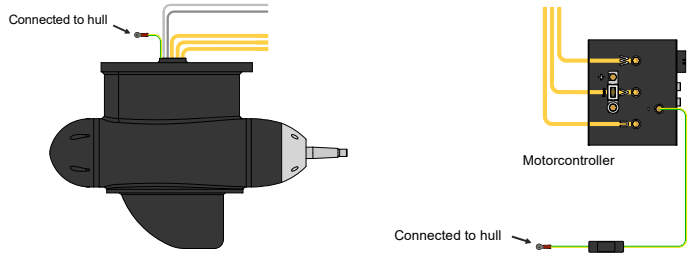
- Make sure that the motor regulator and charger housing do not make direct electrical contact with the hull and each other.
- Use plastic spacers or insulating mounting plates if necessary.
- Check that mounting bolts or mounting brackets do not form an electrical connection to the hull. Correct insulation of these components helps prevent malfunctions and reduces the risk of galvanic corrosion.

5.4.2 Grounding and isolation cable

Depending on the material of the boat hull, different guidelines apply for connecting the disconnect cable:

Fiberglass or wooden boats: For boats with a fiberglass or wooden hull, it is **not necessary** to connect the disconnect cable to the hull.

Aluminum or steel boats: For boats with an aluminum or steel hull, the yellow/green wire coming out of the POD must be connected to the hull of the boat. Securely attach the cable with the eyelet to a suitable ground point on the boat's chassis. Keep the length of this wire as short as possible to ensure a good connection. The hull of the boat must then be connected to the negative pole of the motor regulator via the decoupling capacitor.



When installing, always check:

- whether the connection is tight;
- whether the contact surface is clean and free of corrosion;
- and whether the cable is not under tension or can be damaged.

CAUTION!
Improper grounding or electrical connection to the hull can result in system failure, galvanic corrosion, or damage to electrical components. Therefore, always check the installation before using the system.

5.5 Placement of the POD motor

The pod motor is best installed by means of the following step-by-step plan:

5.5.1 Step-by-step plan for mounting a steerable setup

1. Check the requirements of national regulations and regulations for the installation.
2. Install a stern tube in the vessel according to the supplier's instructions. Ensure sufficient reinforcement at the place of the stern tube.
3. When installing below the waterline, consider using a special stern tube that is resistant to water pressure. Consult your supplier for more information.
4. If necessary, lower the rudder stock at the top of the ship to evenly distribute the power of the pod and reduce the load on the stern tube
5. Adjust the height of the pod motor with the adjusting ring, which will be placed on the sterntube.
6. Before bonding the rudder stock to the pod, check that the length of the rudder stock is sufficient for mounting and sealing above the waterline. If necessary, shorten the rudder stock.
7. Deburr the edge of the rudder stock to prevent damage to the cables.
8. Optional: install plain bearings between the stern tube and the adjusting ring, as well as between the hull and the pod, if required for specific boat requirements."
9. Make sure that the wires coming out of the rudder stock can move freely to prevent wear and tear on the motor cables. Use spiral cable wrap to protect the cables while turning the rudder stock.
10. Make sure that the distance between the plane of the ship and the top of the propeller is 1/3 of the diameter of the propeller, to minimize noise transmission from the propeller to the hull.

5.5.2 Step-by-step plan for mounting a fixed set-up

1. Check the national rules and regulations for the installation.
2. Ensure adequate reinforcement at the location where the pod motor attaches to the hull. Consult a specialist if you are unsure about this.
3. Mount the pod motor as horizontally as possible.
4. Depending on the trim, make three holes in the hull according to the specifications for the sizes per pod.
5. Attach the pod with gasket (not supplied by WaterWorld) or sealant to the plane with the two bolts provided. Tighten the bolts finger tight. When using sealant: only tighten it by hand and tighten again after 24 hours for a good seal.
6. Tighten the threaded tube with the included KM nut. Tighten it by hand; The gasket or sealant should provide the seal.
7. Make sure that the distance between the plane of the ship and the top of the propeller is usually one third of the diameter of the propeller, to minimize noise transmission to the hull.
8. Use a spiral hose around the wire tube to prevent moisture from entering the pod through the open wire tube while allowing ventilation.
9. Wrap a piece of spiral cable wrap around the cables in the wire tube for protection.

CAUTION!
In both cases, in aluminum and steel boats, the ground cable of the pod must be electrically connected to the hull

5.6 Positioning the motor controller

1. Check the requirements of national regulations and regulations for the installation.
2. Ideally, choose a location within the cable length from the pod.
3. Make sure the motor controller is protected from rain, bilge water, or condensation.
4. Ensure adequate ventilation in the installation space of the motor controller.
5. Use the supplied terminal caps when connecting the power and phase cables to prevent short circuits caused by tool contact.
6. Connect the motor controller according to the installation diagram
7. Check all connections.

The motor controller is cooled by fans—two or four at the rear, depending on the motor power. Ensure unobstructed airflow for proper heat dissipation. Air is drawn in and expelled from the rear. If necessary, install ventilation grilles at the top to allow fresh air intake and heat to escape.

CAUTION!
In the case of aluminium and steel boats, the motor controller must be electrically isolated from the hull and the battery charger.

Cable thickness from collection point (busbar)
WaterWorld recommends and uses the following cable thicknesses:

Waterworld 2.0p:
Up to 2.2kW power consumption, max. 45 Amps.
A cable thickness of 35 mm² is recommended for this

Waterworld 3.5p:
Up to 3.8kW power consumption, max. 80 Amps.
A cable thickness of 35 mm² is recommended for this.

Waterworld 8.0p:
Up to 8.8kW power consumption, max. 180 Amps.
A cable thickness of 50 mm² is recommended for this.

WaterWorld 18.0p:
Up to 19.8kW power consumption, max 400 Amps.
A cable thickness of 95 mm² is recommended for this.

The above data is based on cable lengths up to and including 5 meters, for further advice on shorter and longer lengths, please refer to the table on *subsection 5.8.3 (Recommended cable thicknesses)*

Phase cables
The phase cables must not be extended or shortened. Use only the cables as supplied from the factory to ensure safe and correct operation of the system. If you have any questions or deviating situations, always contact the supplier.

5.7 Batteries

If WaterWorld batteries are used, refer to the battery manual available on the WaterWorld website.

CAUTION!
Make sure that there is never voltage on the system when installing and mounting the system!

1. The drive operates on 48 Volts. Provide a battery pack that is suitable for this application in quality and capacity. Use traction, semi traction - deep cycle, or lithium batteries that meet specifications.

   CAUTION!
   If in doubt about the specifications of lithium batteries, it is advisable to consult with WaterWorld. It is possible that the batteries damage the motor, or vice versa if both are not suitable for each other.

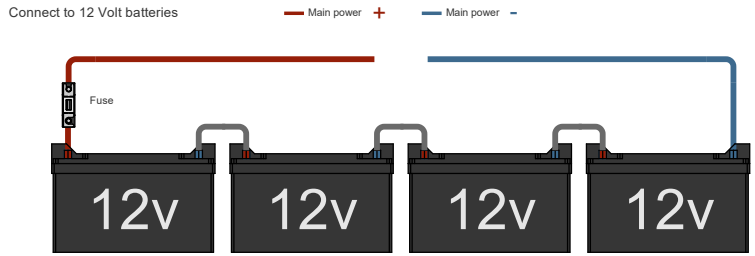
2. Place the batteries in the vessel in such a way that:
   - The weight is well distributed and the boat is neatly straight on the waterline
   - The batteries cannot slide in the boat after installation
   - The batteries are accessible for connecting the cables and for later service work
   - the batteries do not get in the way of the daily use of the boat.
   - cabling to the motor and charger is possible without unnecessary cable length

3. Check the individual voltage of all batteries and make sure they are equal to each other within 0.1 Volt before connecting the batteries to each other. If this is not the case, all batteries must first be fully charged individually.

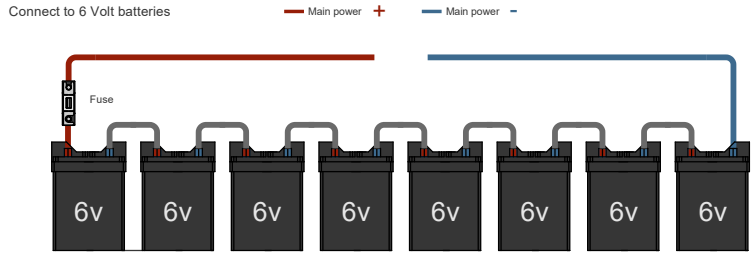
4. Connect the batteries to each other according to the applicable diagram. Below are examples of 4 x 12 Volt batteries in series and 8 x 6 Volt batteries in series

   CAUTION!
   Also check the manual of the lithium batteries for the correct installation.

   Connecting to 12 Volt batteries:



   Connecting to 6 Volt batteries:



   CAUTION!
   Wait to connect the batteries to the rest of the system until everything is plugged in and tested for closure.

5.8 Battery charger – selection and installation

5.8.1 Selection

The battery charger must be matched to the battery pack and be suitable for:

- The correct voltage level
- The required charging power (amps)
- The type of batteries
- Application in a maritime environment

5.8.2 Placement

When positioning the battery charger, take into account the same aspects as for the motor and batteries:

- Protection against moisture
- Sufficient ventilation
- Good accessibility
- Correct and safe cabling

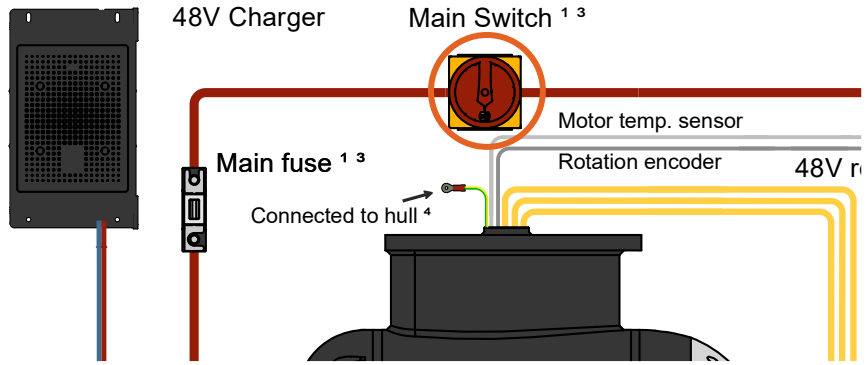
CAUTION!
In the case of aluminium and steel boats, the battery charger must be electrically isolated from the hull and the motor controller.

5.8.3 Recommended cable thicknesses

Cable Diameter	Cable section	L(+) + L(-) up to 5 m	L(+) + L(-) up to 10 m	L(+) + L(-) up to 15 m	L(+) + L(-) up to 20 m
mm	mm²	I max (A)	I max (A)	I max (A)	I max (A)
0.98	0.75	2.3	1.1	0.8	0.6
1.38	1.5	4.5	2.3	1.5	1.1
1.78	2.5	7.5	3.8	2.5	1.9
2.26	4	12	6	4	3
2.76	6	18	9	6	5
3.57	10	30	15	10	8
4.51	16	48	24	16	12
5.64	25	75	38	25	19
6.68	35	105	53	35	26
7.98	50	150	75	50	38
9.44	70	210	105	70	53
11.00	95	285	143	95	71
12.36	120	360	180	120	90

5.9 Main power switch

Mount the main power switch in an easily accessible place in the (red) positive cable between the motor controller and the batteries, so that in case of emergency or maintenance, the system can easily be switched off from the batteries.

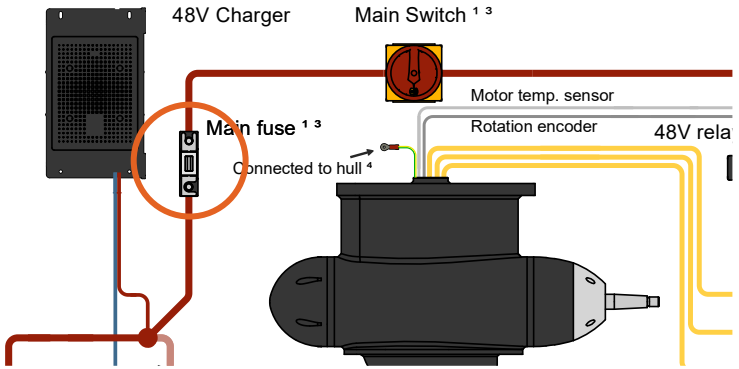


Once the system is installed, make sure that the main circuit breaker is always OFF ("0" or "off" position) when working on the components and when disconnecting and connecting power cables.

CAUTION!
The main switch should be able to be switched off while charging the batteries.

5.10 Main fuse

Install the main fuse between the main circuit breaker and the positive pole of the batteries, as close as possible to the battery, so preferably in the battery compartment. Make sure that this main fuse is inside the boat, but remains visible by opening a hatch. The capacity of the fuse in amperes should be approximately 1.6 times as large as the maximum amperes of the motor (see specifications)



WaterWorld recommends the following fuses:

WaterWorld 2.0p: 160 A fuse

WaterWorld 3.5p: 160 A fuse

WaterWorld 8.0p: 325 A fuse

WaterWorld 18.0p: 600 A fuse

CAUTION!
The main fuse is not included in the standard scope of delivery.

5.11 Throttle

5.11.1 Placement

Mount the throttle in a suitable location that is easily accessible to the driver. Consult the dimensional drawing on the website for the correct dimensions and installation specifications.

CAUTION!
Make sure that the throttle is mounted in such a way that crew members of the boat cannot easily run into it, resulting in sudden sailing away or speeding up.

CAUTION! The throttle is set by default as follows:

- Turning clockwise → sailing forward
- Turning counterclockwise → sailing backwards

This setting is correct when the throttle is mounted on the starboard side of the steering console.

5.11.2 Portside Placement

When mounted on the **port side** of the steering console, the operation is reversed:

- Turning counterclockwise → sailing forward
- Turning clockwise → sailing backwards

If desired, the direction of rotation can be adjusted so that the operation corresponds to the standard setting. This can be done as follows:

Adjust throttle direction via display (see display instructions)

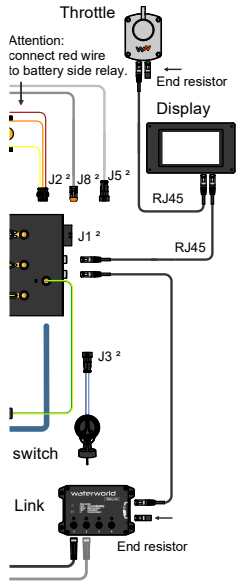
CAUTION!
This work may only be carried out by an authorized dealer or installer.

5.12 Display

Mount the display in the appropriate location. This must be clearly visible to the driver of the boat. When this is mounted in an open boat, please note that the display can get very hot in full sun. We recommend that when you are not using the ship, cover the display well ventilated against the weather. When mounting in an aluminium console, you must provide the console with (natural) ventilation so that no moisture can penetrate through the back of the display. Make sure you have the right side of the display up. Otherwise, the display will be upside down.

5.13 Connecting throttle and display

The throttle display, and any other network components, such as a BatteryLink, can be connected in various ways. This can be done using a daisy-chain configuration. The order in which the components are connected does not matter, as long as a terminating resistor is applied to the final component. The illustration shows an example of a wiring diagram, with the corresponding step-by-step instructions below.



Example step-by-step plan connection diagram:

1. Connect an RJ45 cable from the throttle to the display.
2. Connect an RJ45 cable from the display to the motor controller.
3. Insert a terminal resistor into the remaining throttle port.

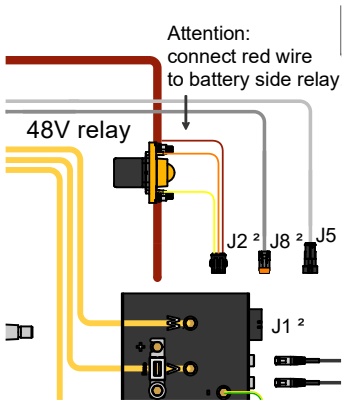
CAUTION!
The end resistors are located, in a new delivery, in the RJ45 connectors of the motor controller. Silicone protective covers are placed over the end resistors. During the construction of the ship and the installation of the WaterWorld system, leave these items in place for as long as possible. They protect the RJ45 connectors from construction contamination.

5.14 Relays

Mount the supplied relay (in case of 8.0p and 18.0p) to the (red) positive cable, between the controller and the main power switch.

The loose red wire with M8 eye comes on the bolt of the relay on the battery side, above the battery cable. Make sure there is a good connection of this red wire, a bad connection can lead to malfunctions when starting the engine.

There is a plug with 3 wires on the relay, which is connected to the motor regulator on the socket. This one has the same color wires and only fits one way.



With the 2.0p and 3.5p, the relay is integrated into the motor controller and no external relay needs to be used.

5.15 The ignition switch

Mount the ignition switch in the appropriate location, easily accessible to the driver, for example next to the display or under the throttle. The cable can be extended if desired.

5.16 Configuration of the system via the WaterWorld display

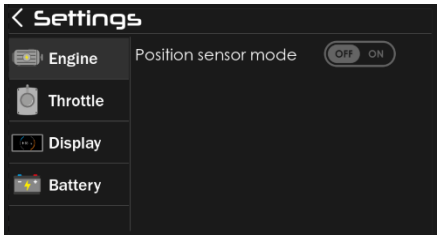
The system is configured via the Settings menu:

On the main screen, swipe up to open the summary screen. Then select **Settings** to change settings.

5.16.1 Engine

For motors set as *sensorless* , the position sensor can be activated if necessary.

If this function is not supported, the message "not supported" will be displayed.



5.16.2 Throttle

To the right of **"Throttle",** the number of throttles connected is displayed:

- With one throttle: **"1"**
- With two throttles: **"2"***

The **Mounting side** option indicates on which side of the steering console the selected throttle is mounted. This setting allows the mounting side to be adjusted (left/right). This change does **not affect the direction of rotation of the screw**.

* The secondary throttle can be configured via the app in combination with a WW Connect. Please refer to the WW Connect manual for further details. If you do not have access to this, the setting can also be configured at the factory. Please contact your supplier for the available options.

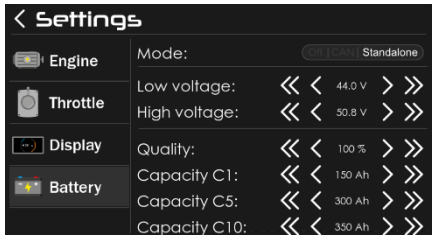
5.16.3 Battery

To the right of **"Mode"** the battery level can be set:

- **OffNo battery data is displayed**
- **CANAccu data is displayed via CAN communication (e.g.** BatteryLink or SmartShunt)
- **StandaloneThe battery capacity is set manually. To do this, settings must be entered according to the specifications of the battery.**

Standalone

The battery capacity is set manually. To do this, **C-values** and **voltage settings must** be entered according to the specifications of the battery.



C-values

CAUTION!
Enter all C values.

Loodaccu's:

- C10 = average of C5 and C20
- C1 = 50% of the C5 value

Example:

C20 = 400 Ah

C10 = 350 Ah

C5 = 300 Ah

C1 = 150 Ah

Lithiumaccu's

- All C values equal to the C1 value

Voltage settings

- **Low Voltage****
  Set to the minimum battery voltage (see battery specifications)
- **High Voltage****
  Used for the "**Startup ask if full" function**

  **** These settings do not apply to WaterWorld batteries**

Startup ask if full
When starting up, a message appears asking if the battery is fully charged. This function works based on the set High Voltage.

CAUTION!
For WaterWorld batteries, these settings do not apply. In this case, only set **Mode = CAN** . The BatteryLink automatically takes care of the communication. Settings for C-values and voltages are then not necessary.

5.17 Step-by-step testing and commissioning procedure

Follow the steps below to test and commission a WaterWorld electric drive.

Step 1 – Checking the batteries Measure

the voltage of the battery pack with a multimeter on the battery terminals.

- Minimum voltage: **48 V**
- Expected voltage: **± 52 V**
- Lithium batteries: up to **± 60 V**

CAUTION!
Make sure all batteries have the same voltage. The maximum voltage difference may be **0.1 V**.

Step 2 – Preparation

- Check if the contact in the dashboard is disabled
- Make sure the throttle is in the neutral position

The display notifies you when the throttle is not in neutral

Step 3 – Switch on the system

- Set the main switch to "**ON**" or "**I**"
- Turn the ignition switch clockwise to turn on the system
- A distinct click of the relay is audible

Check the display:

- Check if the display is active
- Open the tension screen via the icon at the top right
- Check that the displayed voltage corresponds to the measured value

Step 4 – Engage forward

- Carefully move the throttle forward one position
- Check if propeller water is visible behind the boat

Then check:

- Toerental (RPM)
- Power (kW)
- Return the throttle to the neutral position

Step 5 – Temperature Control

5.1 Checking Temperatures
Check on the display:

- Motor controller temperature
- Engine temperature
- The motor controller temperature corresponds to the ambient temperature of the compartment
- The engine temperature is approximately the same as the outside water temperature at the start

Step 6 – Power off

- Turn off the ignition
- Turn off the main power switch

Step 7 – Connecting shore power

- Connect the shore power cable

Check the battery charger:

- Check that the charger starts up correctly according to the manual

Check the battery voltage:

- Check on the display whether the battery voltage rises to the specified charge level
- Refer to the battery specifications

Step 8 – First charge

- Fully charge the battery pack before the first cruise
- Fully charge the power pack before setting up the display

See section 5.16 (Configuration of the system via the WaterWorld display)

Step 9 – Test run

- Take a test run
- Visually check the system
- Watch for deviations in noise and vibration

Check at full power:

- Toerental: **1400 – 1500 RPM**
- Power: **100% – 110% of rated power**

CAUTION

- High speed + low power → propeller too small
- Low speed + low power → screw too big

See section 8.2 (Screw selection guidelines)

6 Operation and use of the system

6.1 Switch on and sail away

Follow the steps below to safely turn on the system and sail away:

1. **Disconnecting shore power**

   CAUTION!
   First, disconnect the shore power connection.

2. **Checking the ignitionCheck that the ignition switch is in the "off" position** .

3. **Check the throttleMake sure the throttle is in the neutral position.**

4. **Check safetyMake sure you have enough free space to sail away, or secure the boat properly when testing the system.**

5. **Switching on the main switchSet the main switch to "ON"** or **"I".**

6. **Arm systemTurn the ignition switch clockwise to arm the system.**
   A distinct click of the relay may be heard.

7. **Check display**
   Check that the display starts up and shows the correct information.

8. **Check throttleCheck throttle operation in:**
   Neutral
   Forward position
   Backwards
9. **Moving awayCarefully switch the throttle lever to forward or reverse and apply light power.**

10. **Usage**
    We wish you a safe journey!

6.2 Moor and switch off

Follow the steps below to safely moor and power off the system:

1. **Checking the throttle**
   After mooring and securely securing the boat, make sure the throttle is in the neutral position.

2. **Disabling the system**
   Turn off the system using the ignition switch.

3. **Switching off the main switch**
   Turn off the main power switch.

   WARNING!
   Always turn off the main power switch when swimming around the boat or when repairs or maintenance are being carried out.

4. **Connecting shore power**
   Connect the shore power and check that the charger is functioning correctly.

6.3 6.2 Explanation of the display

The display provides an overview of the most important system information and provides access to settings and functions.

6.3.1 Basic Main Screen

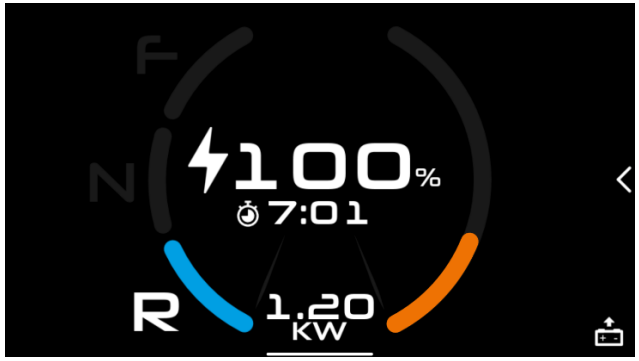


Figure 11.1

The information on the display in Figure 1.1 is as follows:

Battery level:	100%	Percentage of charge of the battery
Time:	7:01	Estimated remaining sailing time based on current consumption (not visible during loading or regeneration)
Direction:	R	Direction: ○ **F** = forward ○ **N** = neutral ○ **R** = backward
Power:	1.20 KW	Current power in kW (or W at low values)The orange radian icon indicates the power demand (1/2 circle = 100%).

6.3.2 Swipe Control

Swipe gestures can be used to adjust the view:

- **Swipe from bottom to top** → overview screen
- **Swipe from right to left** → extended main screen (RPM, temperatures, etc.)
- **Swipe from left to right** → basic main screen

Tip:
When a white bar is visible at the bottom, you can return to the main screen by swiping up.

6.3.3 Icons on the display

Battery icon: 
This icon is used when you have inserted a standalone battery. It allows you to correct the percentage of State of Charge (SoC) to 100% after the charger has fully charged the battery. Consult the charger's user manual for this.

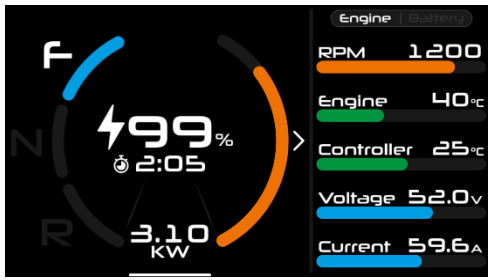
Arrow icon: 
This allows you to slide in a menu from the right side of the screen that provides information about the motor and, when connected to CAN, the battery(s).

When a warning or error is active, one of the following icons is flashing. Click on the icon to go to the "Alarm" screen.


An alert is active


An error is active.

6.3.4 Extended main screen



Tap the arrow icon in the top right (or **Swipe right to left)** to open the side menu. It displays information about the **engine** and, if connected via CAN, the battery:

- **RPM** – Engine speed (revolutions per minute)
- **Engine** – Engine temperature (°C)
- **Motor Controller** – Motor Controller Temperature (°C)
- **Voltage** – System voltage (V)
- **Current** – Stroomafname (A)
- **Phase** – Fasestroom (A)

6.3.5 Overview screen

When you swipe up on the main screen, you will be taken to the overview screen.

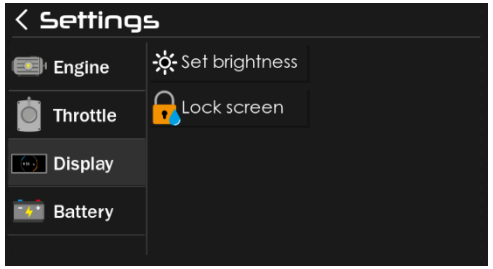
In this screen, you can choose from the following options:

- Settings screen
- Alarm screen
- Information screen

Swipe up or down to exit this screen.

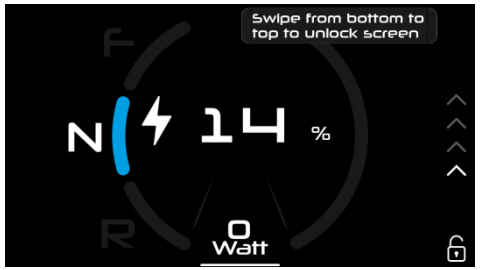
6.3.6 Settings

To access the display settings, you must first select Settings in the overview screen. Within this *Display Settings* screen, you have the option to adjust various display settings, including the screen lock and brightness.

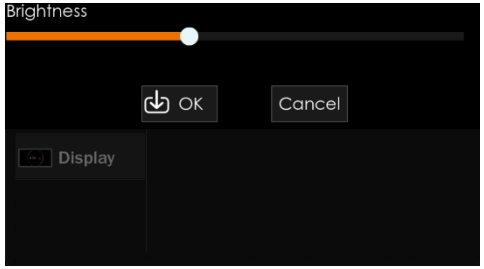


When you press the **'Lock Screen' icon** , you will automatically return to the main screen. Most of the icons disappear and the screen only shows the most important data. The display cannot be operated in this condition.

The screenlock function is mainly intended to prevent unwanted operation, for example during cleaning of the display or when the screen is exposed to moisture.



To turn off the screen lock, swipe your finger from the bottom to the top of the screen. As soon as the padlock is no longer visible, the screenlock is deactivated and the display can be used normally again.



The **'Set brightness'** button allows the brightness of the display to be adjusted using a slider. Press **OK** to confirm and save the chosen setting.

The other settings within the Settings menu are further explained in section 5.16.

6.3.7 Alarm

In the event of a fault, a flashing warning triangle icon appears at the bottom of the display. The color of this icon indicates the severity of the notification:

- **Orange** indicates a warning
- **Red** indicates an error message

To view the meaning of the message, press **'Alarm'** in the menu .
For a complete overview and explanation of all warnings and error messages, please refer to **chapter 9**.

.

6.3.8 Info

Within the "**Info**" menu , you will find detailed system information for the various components.

The following parts are available here:

- Engine
- Display
- Throttle
- Battery

The following information is displayed for each component:

- Software versions
- Firmwareversies
- Hardwareversies
- Hardware Names

This information is important when discussing the system with your vendor and can help with diagnosis, support, and service. It is therefore recommended that you have this screen handy when contacting your supplier.

6.3.9 Boost function

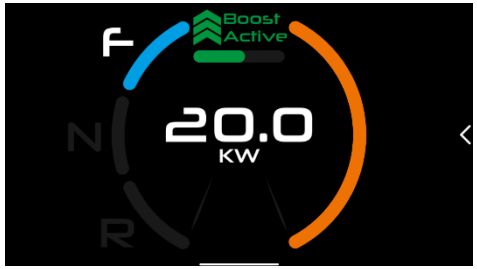
When configured with a boost function, additional power can be temporarily supplied above the rated engine power.

For example: a 15 kW motor with a boost capacity of up to 20 kW. In this case, 20 kW can be used for up to 5 minutes, after which the power is automatically reduced to the nominal power of 15 kW.

Depending on the configuration, the boost function may be available for:

- Forward
- Backwards
- Both directions

Display



When the boost function is active, the message **"Boost Active"** is shown on the display .

A green bar will appear below this notification that visually displays the remaining boost time. As time passes, this bar decreases.

Once the maximum boost time is reached:

- The message "Boost Active" **disappears**
- Does the green bar disappear
- Power is automatically returned to nominal level

Restoring the boost function

After use, the boost function automatically becomes available again after a while. The available boost time is gradually rebuilt.

The construction speed and waiting time are set by the manufacturer or installer. Usual values are:

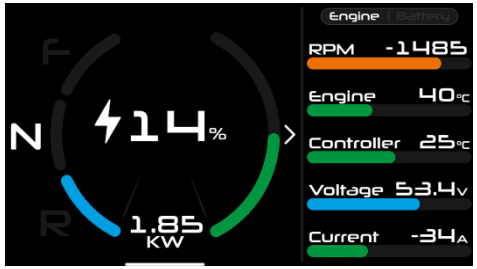
- The boost function is available again after approximately 10 seconds
- 1 second of boost time is built up per second

Reactivating the boost

To be able to use the boost function again, the throttle lever must first be turned back until the required power falls below the rated power (in this example: below 15 kW).

Once this condition is met, the green bar will become visible again and the boost function can be activated again.

6.3.10 Regeneration



If the display shows a **green radial bar** on the right side (instead of an orange one), it means that the system — if this function is configured — is generating energy and feeding it back to the battery(ies). This process is referred to as regeneration.

The displayed power indicates the amount of energy generated. In this example, this is **1.85 kW**, which is stored in the battery(s).

No remaining sailing time is displayed during regeneration. This is because the available sailing time in this situation is considered "infinite", as long as energy is recovered.

7 MAINTENANCE AND SERVICE

7.1 Checks during the sailing season

Pay regular attention to your WaterWorld propulsion system and its energy system, including during the boating season. Pay particular attention to the following points:

- **Moisture and condensationMake sure that the room in which the motor controller is installed is kept free of moisture and condensation.**
  If the electronics have become wet, dry them carefully first and contact your installer. Do not turn on the system in this situation. Excessive condensation indicates inadequate ventilation; In that case, provide extra ventilation.

- **Motor cablesCheck the motor cables regularly for wear, damage and correct attachment.**

- **Lead-acid batteriesWhen not boating, it is recommended to keep the system connected to shore power to prevent discharge.**
  The battery charger stops automatically when the batteries are fully charged. When turning on the system, make sure that the charger is active. In the event of thunderstorms, it is advised to disconnect the shore power.

- **WaterWorld batteries or other lithium batteries**
  Always refer to the accompanying manual for specific instructions and recommendations.

WARNING! Always turn off the main power switch before cleaning or inspecting the system

7.2 Annual check-ups

Preferably have the system checked annually by your supplier or installer. During this check, the following points must be checked:

Algemene control

- **Correct operation of all components**
  Check that all parts are functioning properly.
- **Moisture and corrosion**
  Check for moisture problems and corrosion of contacts, battery terminals and plugs.
  If necessary, apply preventive contact spray and treat battery terminals.
- **Fixing connections**
  Check that all terminal terminals and plugs are tight.
- **Fixing Bolts and Nuts**
  Check that all fixing bolts and nuts are properly tightened.
- **Cables and parts**
  Check for damage to cables and components.
- **Battery Condition and Voltage**
  Check the condition and voltage of all batteries*.
- **Under load**
  Measure the voltage per battery with a multimeter while the engine is running. The voltage difference between the batteries must not exceed 0.1 Volts. If this is the case, contact your dealer or installer.
- **No loadMeasure the batteries individually again after charging.**
  Check that there is no excessive voltage difference. Refer to the battery details or contact your dealer to verify that the voltage is correct.

** These checks apply to lead-acid batteries connected in series.*

- **Pod motor**
  Check for any imbalance in the motor.
- **Display Settings**
  Check that the display is set correctly.

Corrosion and anode control

- **Visual Inspection**
  Check the POD, attachment points, and metal parts for signs of corrosion or damage to the protective coating.
- **Cleaning anodes**
  If necessary, clean the anodes with a wire brush to remove fouling and oxidation. This allows the anodes to retain their protective effect.
- **Checking the anodes**
  Check regularly whether the anodes still have enough material to provide protection.
- **Replacement of anodes**
  When an anode is largely corroded away, it must be replaced in time. Use only anodes that are suitable for the WaterWorld system and for the type of water being navigated (fresh or saltwater).

Checking the POD oil

- **Check for the presence of water**
  Check if there is water in the oil. If no water is present, the oil can be reused. When opening the drain or fill bolt, always replace the O-ring of the bolt.
- **Dark Oil**
  If the oil has a dark color, this indicates that the mechanical seal of the POD is damaged. In that case, the mechanical seal must be replaced.

  If in doubt, always contact your supplier or installer.

7.3 Winter storage

During and after winter storage, the same recommended checks apply as for previous inspections.

For lead-acid batteries, it is important that they are and remain fully charged.

- **If a power source is availableWhen a power source is available during winter storage, it is recommended to keep the shore power connected. The battery charger automatically switches on and off when needed.**

  It is advisable to check at least twice during the winter period that:
  - The charger is connected correctly
  - The batteries have sufficient voltage

- **If no power source is availableWhen no power source is available, the boat should be stored with fully charged lead-acid batteries.**

Then disconnect the main plus and minus connections of the battery pack so that no consumers are connected to the batteries.

Refer to the battery manuals for additional information and specific guidelines regarding winter storage.

7.4 Using the engine in salt water

When using the engine in salt water, extra attention should be paid to protection against corrosion and moisture. Please note the following points:

- **Sealing of the pod motor housing**
  Make sure the pod motor housing is properly sealed to prevent saltwater ingress.

- **Ventilation**
  Ensure that there is sufficient ventilation in the relevant rooms to limit moisture accumulation and condensation.

- **Inspection for corrosion**
  Regularly inspect all components for corrosion, especially electrical contacts and connections.

- **Cleaning**
  Clean the components thoroughly at least twice a year to remove salt deposits and contamination.

8 Technical specifications

8.1 System Specifications

Specification	2.0p	3.5p	8.0p	18.0p
Length (mm)	496	652	726	525
Width (mm)	108	150	206	108
Height (mm)	255	288	370	255
Weight (kg)	16	35	71	16
Rated speed (rpm)	1500	1500	1500	1500
Max power (kW)	2.2	8.8	19.8	3.8
Voltage (V)	48	48	48	48
Maximum current (A)	45	180	400	80
Max °C motor	120	120	120	120
Max °C engine control	88	88	88	88
Engine cooling	Water-cooled	Water-cooled	Water-cooled	Water-cooled
Cooling engine controller	Air-cooled	Air-cooled	Air-cooled	Air-cooled
Type	Permanent magneet	Permanent magneet	Permanent magneet	Permanent magneet
Besting Mode	Sensor	Sensor	Sensor	Sensor
IP value engine	IP 9X**	IP 9X**	IP 9X**	IP 9X**
IP value controller	IP 65	IP 65	IP 65	IP 65
Communication	CANopen	CANopen	CANopen	CANopen
Regeneration possible	Yes	Yes	Yes	Yes
Assembly	Fixed & controllable	Fixed & controllable	Fixed & controllable	Fixed & controllable
Relays	Internal	Internal	48 V DC / >400 A (continuous)	48 V DC / >400 A (continuous)
Display	5" color (touch), power supply via motor controller	5" color (touch), power supply via motor controller	5" color (touch), power supply via motor controller	5" color (touch), power supply via motor controller

8.2 Propeller selection guidelines

2.0p

- 12 x 7, 2-blade propeller (up to 10 km/h)
- 12 x 8, 2-blade propeller (above 10 km/h)

3.5p

- 12 x 7, 2-blade propeller (up to 10 km/h)
- 12 x 8, 2-blade propeller (above 10 km/h)

8.0p

- 14 x 8, 3-blade propeller (up to 10 km/h)
- 14 x 9, 3-blade propeller (above 10 km/h)

18.0p

- 15 x 10, 3-blade propeller (up to 10 km/h)
- 15 x 11, 3-blade propeller (above 10 km/h)
- 15 x 12, 3-blade propeller (above 12 km/h)

The most recent dimensional drawings and technical drawings are available via our website: www.waterworldelectronics.com/downloads

9 MALFUNCTIONS AND PROBLEMS

9.1 Error codes and warnings

In the event of a malfunction, a flashing warning triangle icon with an exclamation mark is shown at the bottom of the display. The color of this icon indicates the severity of the notification:

- **Orange exclamation mark (warning)**
  This indicates a warning. The system may not function optimally, but can usually still be used. Depending on the message, the available power may be limited.

- **Red flashing warning triangle (critical error)**
  This indicates a serious malfunction. The system is not functioning correctly and should be checked as soon as possible.

View error message

To see the meaning of a notification, open the menu and select **"Alarm."**

Error Message Inspection

If you receive an error message, perform the following checks:

- Check the data shown on the display, such as temperature and voltage
- Check that the propeller shaft system rotates smoothly
- Check the installation and all cabling connections

If the problem cannot be rectified, contact your dealer or installer.

9.2 Warning codes

9.2.1 Engine Warnings (EW)

Designation	Meaning	Solution
EWS01 No fan feedback	No feedback from fans	Check the fans and their connections
EWS02 Controller temperature too high	Engine controller temperature too high	Check fans or reduce power
EWS03 Controller temperature too high (Limited power)	Motor controller temperature too high (limited power)	Check fans or reduce power
EWS04 Motor temperature too high	Engine temperature too high	Check fans or reduce power
EWS05 Motor temperature too high (Limited power)	Engine temperature too high (limited power)	Check fans or reduce power
EWS06 Phase current too high	Phase current too high	Reduce power
EWS07 Throttle not present or neutral	Throttle not present or neutral	Connect throttle and put it in neutral
EWS08 No valid system parameters loaded	No valid system parameters loaded	Contact Supplier
EWS09 Position sensor fault (Sensorless drive active)	Position sensor error (sensorless active)	Connect/replace sensor and restart motor controller
EWS10 Charging disabled (Position sensor fault)	Charging disabled due to position sensor error	Fix Position Sensor Error
EWS11 Controller temperature sensor read fault	Engine controller temperature not readable	Contact Supplier
EWS12 Motor temperature sensor not present (Limited power)	Motor temperature sensor not connected (limited power)	Connect sensor to controller
EWS14 Power consumption limited by battery	Power limited by battery	Reduce power and charge battery
EWS16 Drive disabled. Ensure external drive is in neutral position	Drive switched off (hybrid not neutral)	Put external drive in neutral and check sensor
EWS18 Rotation speed too low. Check propeller	Too low rotation speed of the rotor has been detected. Check the screw.	Make sure the recommended propeller is installed. Turn off the drive system and remove obstructions from the propeller.
EWSnn Please contact supplier	Unknown Alert (Outdated Firmware)	Contact supplier with error code

9.2.2 Battery Warnings (BW)

Designation	Meaning	Solution
BWS01 Temperature too low	Temperature is too low	Use the battery in a warmer environment
BWS02 Temperature too high	Temperature is too high	Let the battery cool down
BWS03 Bus voltage too low	Bus voltage is too low	Battery charging
BWS04 Bus voltage too high	Bus voltage is too high	Stop regenerating (of the engine)
BWS05 Bus current too high	Bus flow is too high	Reduce the power or number of connected devices
BWS16 Vendor specific: 0x<value>.	Vendor-specific error code 0x<value>.	Contact the supplier. The following applies to the Battery-Link. In the case of the VE-Link, the manual of the Victron Smartshunt should be consulted. Meaning of <value> 0x0000nnbb • **nn** = composite error code (sum of the values below): 01: Time-out RS485 02: Communication Fails 04: Discharge MOSFET Disabled 05: MOSFET Discharge Disabled + RS485 Timeout nn > 05: Communication failed (incorrect data transfer) • **bb** = battery number (WW-8324, 4 batteries / WW-8324V3, 8 batteries) 01: battery 1 02: battery 2 04: battery 3 08: battery 4 battery number (WW-8324V3, 8 batteries) 10: battery 5 20: battery 6 40: battery 7 80: Battery accu nummer indication (WW-8324V1 / WW-8324V2, 8 accu's) 01: battery 5 02: battery 6 04: battery 7 08: battery 8 10: battery 1 20: battery 2 40: battery 3 80: battery 4

9.2.3 Display Alerts (DWS)

Designation	Meaning	Solution
DWS01 Battery not present	There is no battery available.	Check communication cable connection to Batterylink.
DWS02 No valid system parameters loaded	No valid parameters loaded.	Contact the supplier.
DWS03 Battery voltage too low, drive slowly	The battery voltage is too low, sail slowly.	Sail slowly.
DWS04 Standalone battery monitor not initialized	Stand-alone battery monitor not initialized.	Reset battery capacity to 100% (button in main menu).
DWS01 Battery not present	There is no battery available.	Check communication cable connection to Batterylink.

9.3 Error codes

9.3.1 Engine faults (EFS)

Designation	Meaning	Solution
EFS01 Configured motor type not supported	Configured engine type is not supported.	Contact the supplier.
EFS02 Configured motor current is too high	Configured motor current is too high.	Contact the supplier.
EFS03 Hardware is not supported	Hardware is not supported.	Contact the supplier.
EFS04 No valid parameters loaded	No valid parameters loaded.	Contact the supplier.
EFS05 No valid motor parameters loaded	No valid engine parameters loaded.	Contact the supplier.
EFS06 Serial not present	Serial is not present.	Contact the supplier.
EFS07 Controller temperature sensor not present	Temperature sensor of the motor controller is not present.	Contact the supplier.
EFS08 Controller temperature sensor not configured	Temperature sensor of the motor controller is not configured.	Contact the supplier.
EFS09 Controller temperature too high (Shutdown)	Temperature of the motor controller is too high. (Exit).	Allow the motor controller to cool down and try again.
EFS10 Motor temperature sensor not present	Temperature sensor of the motor is not present.	Connect the motor temperature sensor to the motor controller.
EFS11 Bus current too high (Shutdown)	Bus current is too high. (Exit)	Turn the motor controller off and on again.
EFS12 Bus voltage too low (Shutdown)	Bus voltage is too low. (Exit)	Check the battery voltage and switch the motor controller off and on again.
EFS13 Bus voltage too high (Shutdown)	Bus voltage is too high. (Exit)	Check the battery voltage and switch the motor controller off and on again.
EFS14 Position sensor fault	Position sensor error.	Connect the motor's encoder/hall sensor to the motor controller
EFS14 Position sensor fault - Set throttle to neutral for sensorless drive	Position sensor error. Sensorless control is activated.	Move the throttle to the neutral position
EFS15 Parameters config not supported	Configuration of the parameters is not supported.	Contact the supplier.
EFS16 Motor temperature sensor not configured	Engine temperature sensor is not configured.	Contact the supplier.

9.3.2 Gaslever fouten (TFS)

Designation	Meaning	Solution
TFS01 No valid parameters loaded	No valid parameters loaded.	Contact the supplier
TFS02 Serial not present	Serial is not present.	Contact the supplier.
TFS03 Parameters config not supported	Configuration of parameters is not supported.	Contact the supplier.

9.3.3 Display fouten (DFS)

Designation	Meaning	Solution
DFS01 No valid parameters loaded	No valid parameters loaded.	Contact the supplier.
DFS02 Serial not present	Serial is not present.	Contact the supplier.
DFS03 Engine not present	Engine is not present.	Check that the motor control is switched on. Check the communication cable to the motor control.

9.4 Problems and solutions

Some potential issues and associated solutions are described below.

My engine is losing power quickly

Possible causes:

- Low battery pack
- Insufficient cooling

Control and solution:

- Check the battery percentage and voltage on the display during use
- At low battery voltage:
    - Below 46 V → power is reduced
    - Below 42 V → motor can stop (depending on settings)
- Check for overheating

Possible causes of overheating:

- Heavy rotating propeller shaft
- Propeller that is too large
- Contamination or obstruction (e.g. line or rope) in the propeller

WARNING
always switch off the system before approaching the propeller shaft

My engine vibrates and/or makes excessive noise

Possible causes:

- Damaged propeller
- Insufficient water flow

Control and solution:

- Check the propeller for damage
- Check for obstructions that obstruct the flow of water

My engine has reduced power

Possible causes:

- Propeller problems

Control and solution:

- Check if anything is stuck in the propeller
- Check if the propeller is unbalanced
- Check that the propeller is not too large

WARNING
always switch off the system before carrying out any work on the propeller shaft

I lost my key

Solution:

- Always have a spare key
- Have an extra key made if necessary
- Contact your supplier for a replacement

10 WARRANTY

10.1 Warranty periods

The warranty period is 24 months and covers all components of the WaterWorld system. If you have combined a WaterWorld system with WaterWorld lithium batteries, the warranty period is 36 months. The warranty period begins on the day of delivery of the WaterWorld system to the end customer.

WaterWorld systems that are used commercially, even temporarily, are subject to an adjusted warranty period of one year from the delivery of the product to the customer.

In all cases, the warranty expires six months after discovery of a defect.

10.2 Warranty conditions

Water World Electronics B.V. warrants to the end user that the WaterWorld system is free from defects in materials and workmanship for the applicable warranty period.

In the event of a material or manufacturing defect, Water World Electronics B.V. will reimburse the costs necessary to repair this defect.

The warranty relates solely to the correction of the fault in question and does not cover any additional costs or indirect damages, including but not limited to:

• Towing costs• Crane costs• Telecommunications costs• Meals and accommodation• Loss of use• Loss of time• Other financial losses

Travel and/or transport costs are not reimbursed by Water World Electronics B.V.

Water World Electronics B.V. reserves the right to determine whether defective parts will be repaired or replaced.

Distributors and dealers who perform repair work on WaterWorld systems are not authorized to make legally binding statements on behalf of Water World Electronics B.V.

The following parts and work are excluded from the warranty:• Wearing parts• Routine maintenance• Cables• Fasteners

10.3 Disclaimer of Warranty

Your supplier or Water World Electronics B.V. reserves the right to refuse a warranty claim in the following cases:

• The warranty claim has not been made according to the prescribed procedure (see section 10.4).

• The product has not been used or handled in accordance with the instructions.

• The safety, use and maintenance instructions in this manual have not been followed.

• Prescribed maintenance has not been carried out or cannot be demonstrated.

• The product has been damaged by external influences, an accident, or by circumstances that cannot be attributed to Water World Electronics B.V.

• The WaterWorld system has been modified, modified, or fitted with parts or accessories not expressly authorized or recommended by Water World Electronics B.V.

• Service or repair work has not been carried out by Water World Electronics B.V. authorized companies, or where no original spare parts have been used, unless the customer can demonstrate that these circumstances did not affect the occurrence of the defect.

10.4 Warranty procedure

Compliance with the warranty procedure below is a condition for making a warranty claim.

• If you have a complaint, always contact your WaterWorld supplier first.

• Have your purchase invoice ready. This is used to verify where and when the system was purchased.

• **Note: Your proof of purchase or invoice is valid as proof of warranty. Therefore, keep it carefully.**

• Make sure that the serial number of the motor is available, if it is not stated on the purchase invoice.

• Provide a clear description of the complaint, including:• The circumstances under which it occurs• The frequency and severity of the problem• Other relevant information that may help with the diagnosis

• If possible, take pictures of the system and the situation in which the problem occurs.

• Your supplier may request that you carry out additional checks or measurements before assessing the substance of the complaint.

• If products have to be transported, ensure careful and correct transport. Damage due to improper transportation is not covered by the warranty.

11 Product Disposal / Recycling

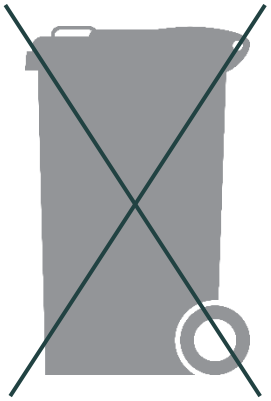
The WaterWorld engines are designed in accordance with **EU Directive 2012/19/EU (WEEE),** which covers the collection and recycling of electrical and electronic equipment. This directive aims to protect the environment and promote the reuse of valuable raw materials.

Waste electrical and electronic equipment should not be disposed of with household waste.

This type of waste can contain harmful substances that have negative consequences for the health of humans, animals and the environment. In addition, improper processing leads to the loss of valuable raw materials.

You must dispose of the product at a designated collection point or recycling station, in accordance with the applicable regional and national regulations. This applies to both private and business users.

By disposing of the product correctly, you contribute to environmentally friendly processing and the reuse of materials.



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ELECTRIC PROPULSION SYSTEMS

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