Instructions for Installing Your Electric QuietTorque™ QT 30.0SD LC Motor System

List of Equipment Supplied:

1 – Motor/Saildrive Assembly
2 – Motor Controller Assemblies
2 – Battery Power Switch
2 – 400A Class-T Fuse and holder
2 – Relays (also commonly called a “contactor” or “solenoid”)
1 – Throttle assembly w/ key switch and attached cable (p/n 01005)
    8 – #8 x ½” Phillips head screws
1 – Battery Monitor (display) w/ attached cable (p/n 01056)
    2 – #6 x 1” Phillips head screws
    2 – #6 x 1 ¾” Phillips head screws
8 – 3/8” x 2 ½” lag screws
1 – Heat exchanger and pump assembly

List of Tools Needed for Installation:

½” combination wrench (open and box end) or socket
9/16” combination wrench or socket
¾” combination wrench
1/8” hex wrench (Allen wrench)
3/16” hex wrench
#2 Phillips screwdriver
3” hole saw
1” drill or hole saw
5/16” drill
5/32” (0.156”) drill
Electric drill

Unpacking:

You will have received your motor kit on wood or lightweight plastic pallet (international and air ship orders). The motors will be mounted to the saildrives. the coolant loop is filled and the heat exchanger is connected to the cooling loop. For convenience, the coolant hoses to the motors are disconnected and plugged. This simplifies the installation, as filling and purging air from the cooling loop takes a significant amount of time.

Battery Installation:

Note: It is very important to provide sufficient ventilation in your battery compartment area. Flooded lead/acid batteries routinely give off hydrogen gas when charging. Even AGM and GEL batteries can outgas, if overcharged. Since hydrogen gas is lighter than air, always provide ventilation at the TOP of the compartment. Also, provide ventilation at the bottom to help facilitate airflow.

1. Before starting, measure up your desired spaces and make sure the batteries you wish to use will fit. Be sure to allow some space and access above the batteries for watering and terminal cleaning.

2. Locate all the batteries and secure in place. This is usually the most time consuming part of the installation.

3. Connect all the batteries in a series string in a (-) to (+) configuration. Always use a wrench with plastic coated handles when tightening battery terminals. If one is not available, wrap the handle with electrical tape. Batteries can produce very high currents in a short circuit situation that will melt (weld) metal and cause serious burns (refer to wiring diagram at back of instructions).

4. Use a voltmeter and verify you have the correct voltage at the (-) and (+) battery terminals. A fully charged 48V (nominal) battery bank will measure 50Vdc – 51Vdc.

5. Run a cable from the battery (-) to area where the motor will be installed. Traditionally, a black jacket has been used. Current ABYC standard calls for a yellow cable jacket. 2/0 cable is recommended.

6. Install fuses as close as practical to the (+) battery terminal(s). Leave the connection to the (+) terminal of the battery disconnected for now. Use red cable for the positive side connections.

7. Install the master power switches.

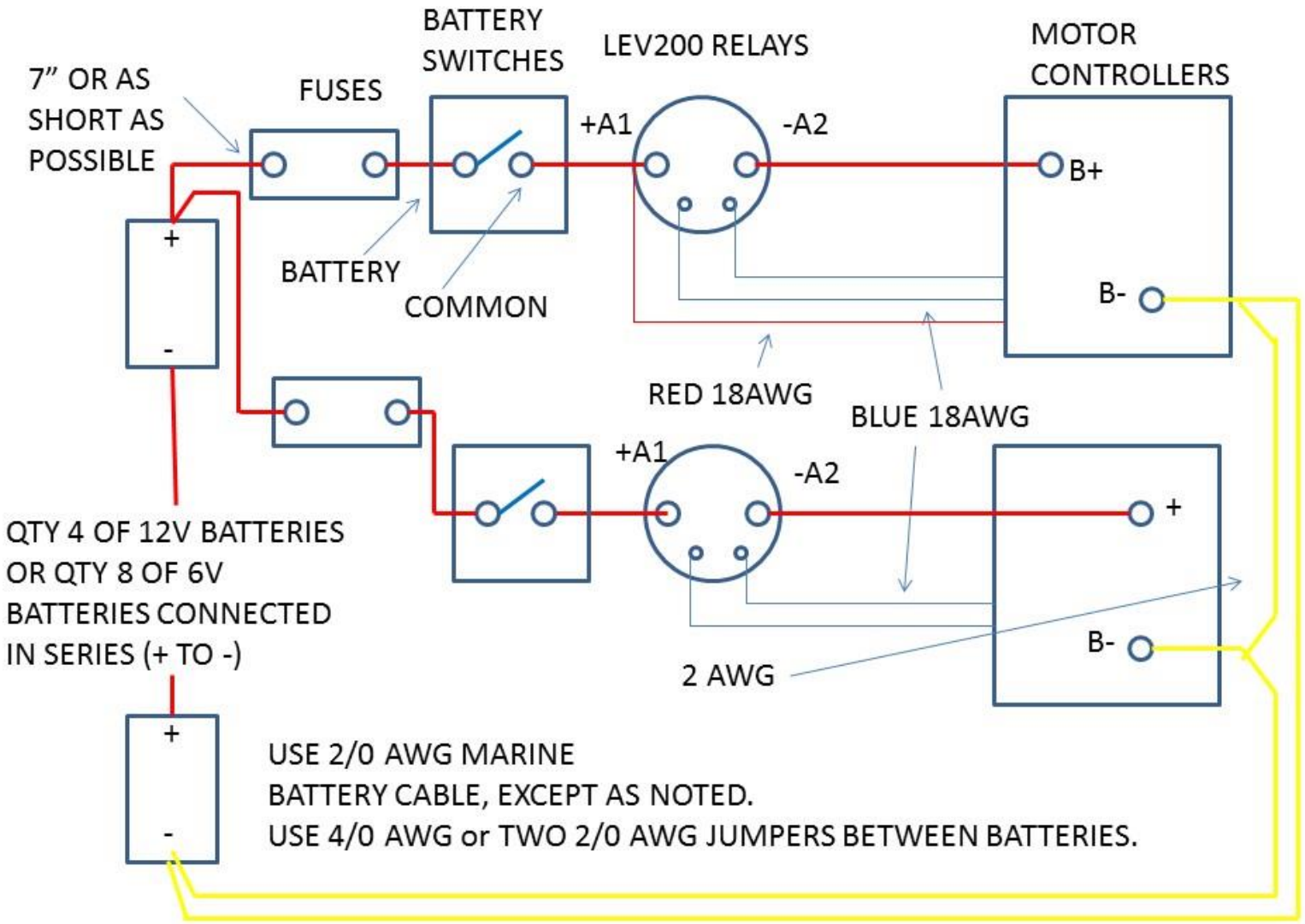
8. Make sure master power switches are off.

9. Install the relays after the power switches. Notice there is a (+A1) polarity marking on one of the large studs. This stud should be on the battery side. Connect the cable from the master power switch and the red 18AWG wire from the motor controller. It should be on top of the current carrying cable. Normally, the relays are installed near the motor, but can be anywhere between the master power switch and the motor.

10. Connect the two blue wires to the coil connections on the relays. They are not polarity sensitive.

11. Connect a cable to the other large stud on each relay and run to the area where the motor will be installed.

12. To the greatest extent possible, route the + and - cables together. This helps minimize electrical interference to your VHF radio and minimizes any risk of magnetic interference that could affect your compass. Long runs may also be twisted. Do not bundle with other wiring.



Throttle Quadrant Installation:

1. Locate a convenient area in the cockpit. This should be a flat surface. Often, there is already a hole where the old engine controls were. A sheet aluminum plate can be cut to fit, in this case.

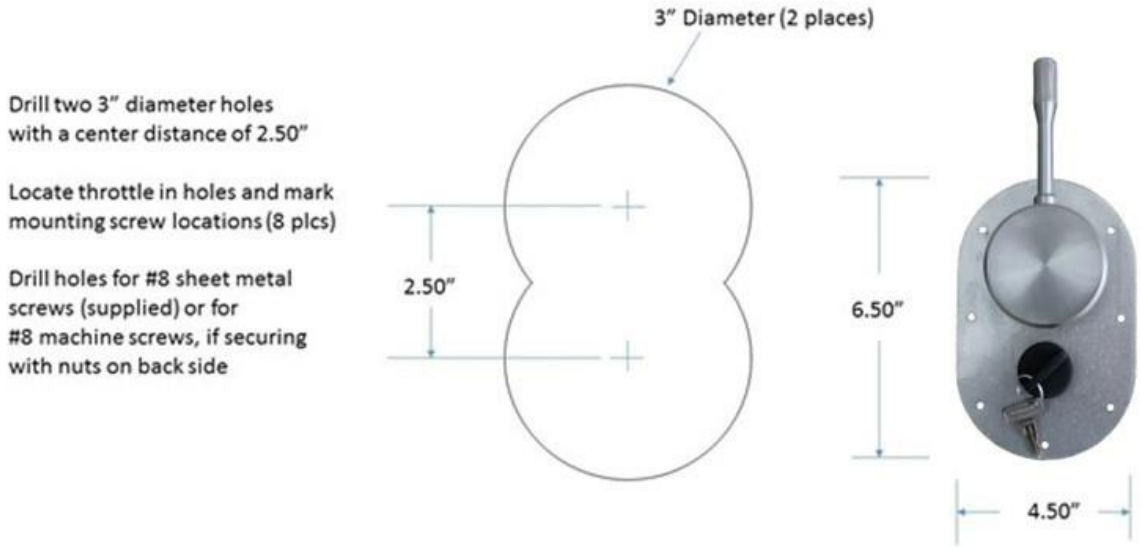
2. If you have a separate throttle and key switch, cut a 3” (80mm) hole for the throttle and a 0.875” (23mm) hole for the key switch. If you have a throttle with a key switch mounted, cut two 3” (80mm) holes with a 2.50” (64mm) center spacing.

3. Put throttle and/or key switch in place and mark the screw holes.

4. Drill holes for the desired screws and secure in place. #8 x ½” screws are supplied. Use a sealant around the flange of the throttle quadrant to make it water tight. The screws can be sheet metal screws or machine screws and nuts. They should be stainless steel.

5. Run the cable(s) to the area where the electric engine will be installed and secure in place.

Throttle Mounting Template



Battery Monitor Installation:

1. Find a location in the cockpit to install the Battery Monitor. This should be a flat surface with good visibility from the normal steering position.

2. Use Fig. 1 to determine hole placement for mounting.

3. Drill the appropriate holes.

4. Apply sealant around the holes and drive in provided screws from the backside. Use the shortest screws that will work. These are pre-drilled holes and have been filled with white silicone sealant. The sealant will be pushed out of the way as the screws are tightened. Use the shortest #6 screw that will provide at least ¼" (6mm) engagement with the holes in the backside of the battery monitor. #6 x 1" and #6 x 1 ¾" Phillips head screws are supplied and will work for most installations. They should protrude no more than 1" into the battery monitor.

5. Run the cable to the engine area and secure.

Electric Engine Installation:

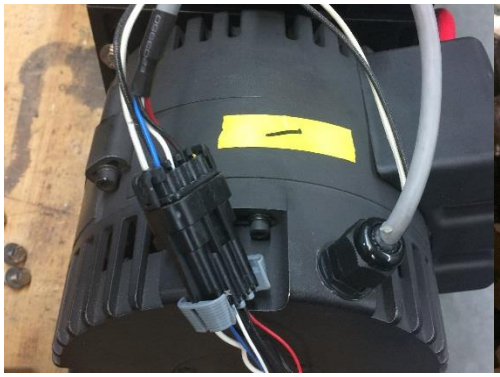
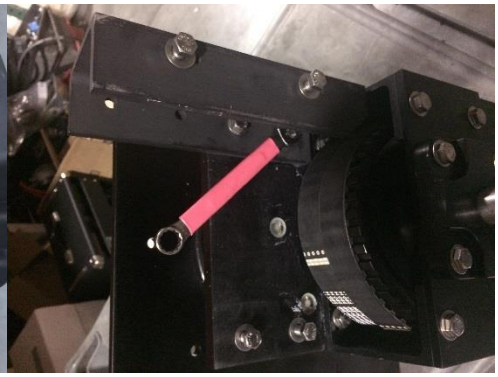
1. If you do not already have a fiberglass platform meant for mounting a saildrive, construct a platform as shown in Figure 1 around a 9” hole cut through hull.

2. Place saildrive unit into position and mark holes. There are 8 holes on a 12” circle. They are drilled for 3/8” (M10) bolts or lag screws. It may be easier to perform this step if the motors are first removed.

3. Remove saildrive and drill pilot holes.

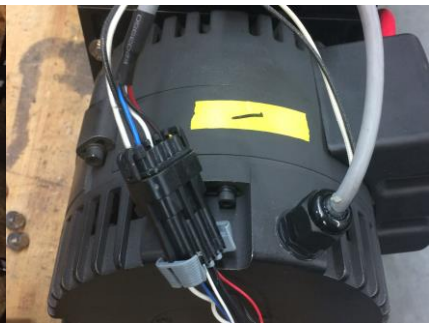
4. Re-install saildrive assembly and seal with a good marine sealant, such as 3M 5200 applied to the entire contact surface. Allow to cure.

5. Install the motors on the saildrive. The belts should be tensioned so there is less than ¼” deflection between pulleys with moderate finger pressure.

6. Remove plug above mounting plate and fill with ATF to level of hole (approx. 2L). Put pipe dope on plug and install tightly.

7. Install the motor controllers close enough to the saildrive for the cables to reach. Connect the power cables (M1, M2 and M3) to the terminals on the motor controllers labeled M1, M2 and M3. Connect the encoder cable. Make sure the motor labeled “1” is connected to the controller labeled “1” and the motor labeled “2” is connected to the controller labeled “2”.



8. Connect a yellow (-) cable to the (B-) terminal on each controller. There will also be up to three smaller yellow wires with 5/16” terminals. Put these on top of the battery cable terminal and secure with the supplied bolt.

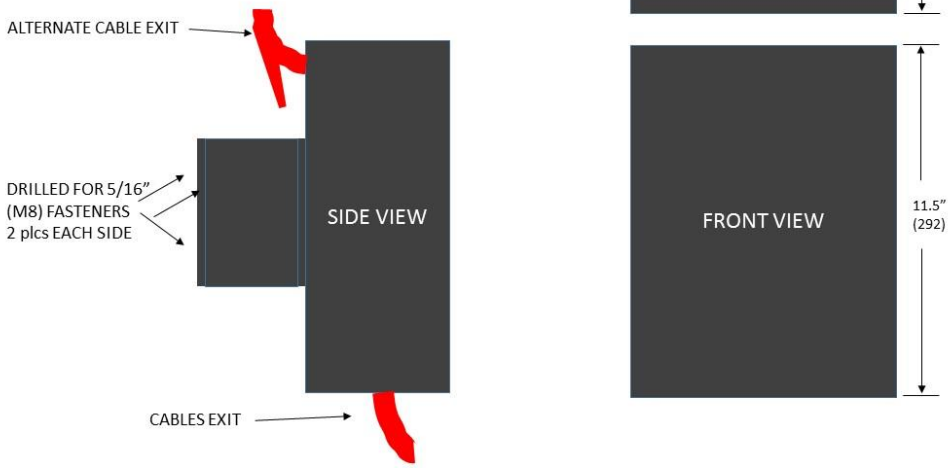
9. Connect the red (+) cable from the relay with the 18AWG red wire to the **(B+)** terminal on the controller with the grey controller module mounted with it.

10. Connect the red (+) cable from the other relay to the **(+)** terminal on the other motor controller. MAKE SURE THIS POLARITY IS CORRECT. Reconnect the cable between the (+) battery terminal and the fuse.

11. Connect the Throttle Quadrant cable and Battery Monitor cable to the grey control module. They secure with a twist and are waterproof. The display connector has 8 pins. The throttle has 6 pins. They also have an alignment post. Make sure to connect the correct connectors together and rotate until the alignment post is aligned. Do not force them together. They go together easily when properly aligned. Rotate the locking collar clockwise to secure.

MOTOR CONTROLLER DIMENSIONS AND MOUNTING

- 2 x CONTROLLERS NEED TO MOUNT WITHIN 6" (150mm) OF EACH OTHER
- IP 68 RATED FAN COOLING ALLOWS FOR VERTICAL OR HORIZONTAL MOUNTING
- CABLES CAN EXIT FROM TOP AND/OR BOTTOM
- SECURE TO MOUNTING SURFACE, SUCH AS BULKHEAD, WITH UP TO 5/16" (M8) SCREWS (4 plcs)



12. Install and connect the (optional) Charge Current Sensor. It plugs into the connector labeled "CHG CURR" on the controller. See wiring diagram "Charge Current Sensor Connection.

    *****Note: If you have a diesel generator, or intend to motor frequently with an auxiliary (suitcase) generator, this device is highly recommended. It will help insure accurate state of charge and time to discharge information is displayed.*****

Cooling System:

The “LC” designation in our product labeling scheme refers to liquid cooled motors. In these systems, fresh water cooling of the motors and the motor controllers are used. This is similar to the fresh water cooling systems employed in most modern marine diesel engines. The “fresh water” is actually a water/ glycol solution. This solution is pumped through the water jackets of the motors and the motor controllers where it picks up the excess heat generated when they are in operation. It then passes through a heat exchanger where the glycol solution comes in close thermal contact to seawater that is pumped through copper tubes within the heat exchanger. The excess heat is transferred to the seawater and pumped overboard.

Unlike a diesel engine cooling system, this system does not need to operate under pressure. There is far less excess heat generated in an electric motor than in an internal combustion engine. For this reason, the cooling system can operate at much lower temperatures and at atmospheric pressure. Even in warm tropical waters, and high power settings, the glycol solution temperature will remain below 55 C (131 F). At this temperature, there is no need to raise the boiling point by operating under pressure.

Unlike a conventional internal combustion engine, the glycol solution does not come in contact with ferrous metals. As such, it will stay clean and does not need flushing and replacing at regular intervals.

The glycol solution is circulated by a small magnetically coupled centrifugal pump. This pump comes on anytime the motor is in operation and remains on for 2 minutes once the motor comes to a stop.

The seawater is drawn into the heat exchanger by a self-priming impeller pump. It is positioned on the front of the propeller shaft and turns any time the motor is in operation. Its speed goes up and down with motor speed, thus providing more seawater flow at high power levels when there is more waste heat produced.

Since the seawater pump is on the end of the propeller shaft, the flow will be reversed when the motor is operating in the reverse direction. Since the seawater exit is normally above the waterline, it will not pump seawater. This is not a concern, as periods of operation up to several minutes without water flow will not result in a significant rise in internal operating temperature. Normal cooling will resume when moving in the forward direction again.

In addition, the system will cut back power in the event of a loss of cooling water for an extended time. There is no concern for damaging the motors or motor controllers. Continued operation is allowed, though power will be cut back to insure the motors and controllers do not overheat.

Heat Exchanger/Pump Assembly Installation:

Your motor will be shipped with the fresh water cooling part of the system filled and ready for operation. The heat exchanger/pump assembly will need to be installed near the motor and connected to a seawater supply. Once this is done, the system will be ready for operation.

Installation:

1. Find a location close enough to the motor that the hoses will reach and secure the heat exchanger to the assembly to a bulkhead or other supporting structure. The intake side of the circulating pump (in line with the body of the pump) should be down or horizontal and not above the outlet of the pump.

2. Connect a 1" ID hose from the intake seacock to the intake side of a seawater strainer.

3. Connect a 1" ID hose from the outlet side of the strainer to the intake side of the seawater pump. Use a high quality hose designed for this purpose. If you have a right hand (RH) prop, connect to the port side fitting. If you have a left hand (LH) prop, connect to the starboard side fitting.

4. Connect a hose from the other side of the seawater pump to the intake side of the heat exchanger. This is the side connected to the outlet of the circulating pump.

5. Connect a 1" ID hose from the heat exchanger to the seawater hull exit fitting. Normally, this is above waterline.

6. There is a grounding lug on the heat exchanger that should be connected to the boat's grounding system.

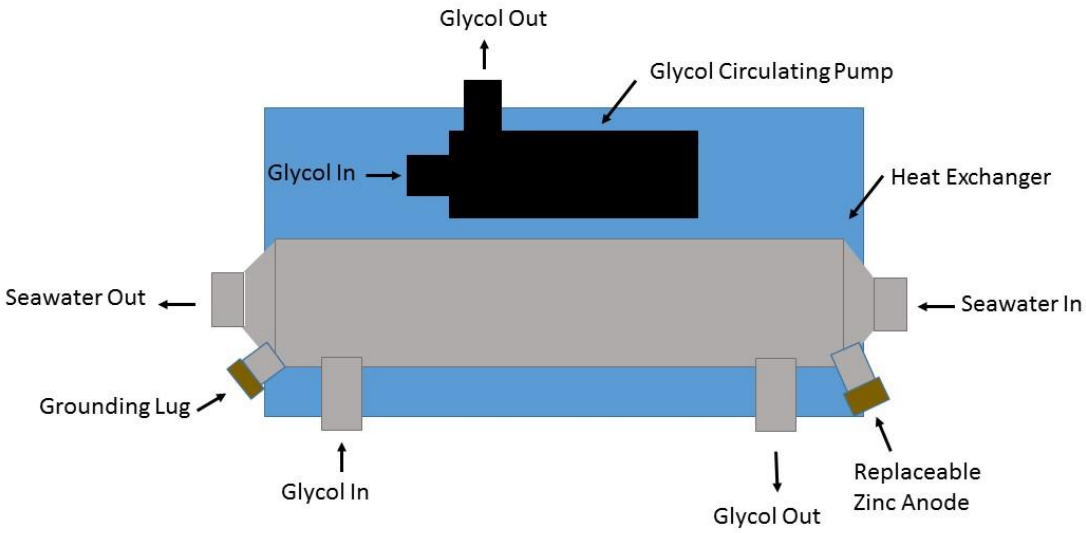
7. Remove the plug from the end of the filler hose that is connected to the intake side of the circulating pump.

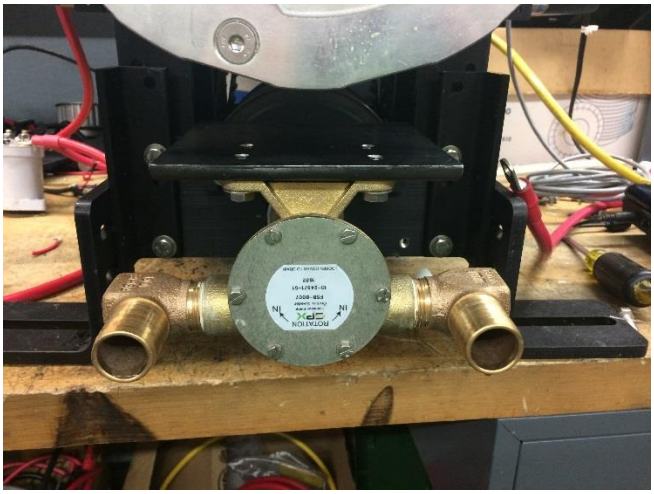
8. Install the reservoir bottle to the hose and secure with a hose clamp.

9. Secure the bracket holding the reservoir bottle in a location just above the highest point of the motor.

10. Fill the bottle with 50/50 water/glycol mix just to the bottom of the bottle.

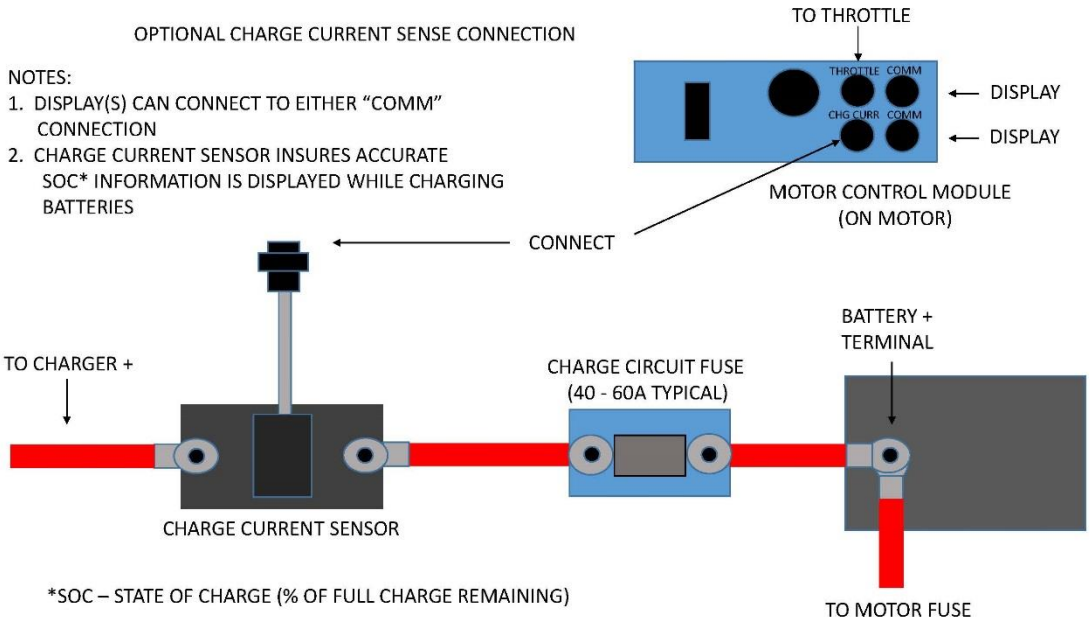
11. In operation, this should be checked periodically and filled, if the level has gone down. This may be necessary several times when new, as there will be small air bubbles trapped within the system. Fill when cold.


Glycol Out
Glycol Circulating Pump
Glycol In
Heat Exchanger
Seawater Out
Seawater In
Grounding Lug
Glycol In
Glycol Out
Replaceable
Zinc Anode



Charger/Generator Current Sensor Wiring:

If you plan to charge while underway, either directly from a dc generator, or through an ac generator powering one or more battery chargers, refer to the wiring diagram at the end of these instructions. This charge current sensors will insure the SOC reading on the display is accurate while charging. If it is not used, the Electric Yacht controls will not be aware that charging current is flowing into the batteries. Instead, it will only see a voltage that is high for the actual SOC and display an incorrect SOC value. It is highly recommended that this sensor is installed if charging while underway will be done with any frequency.

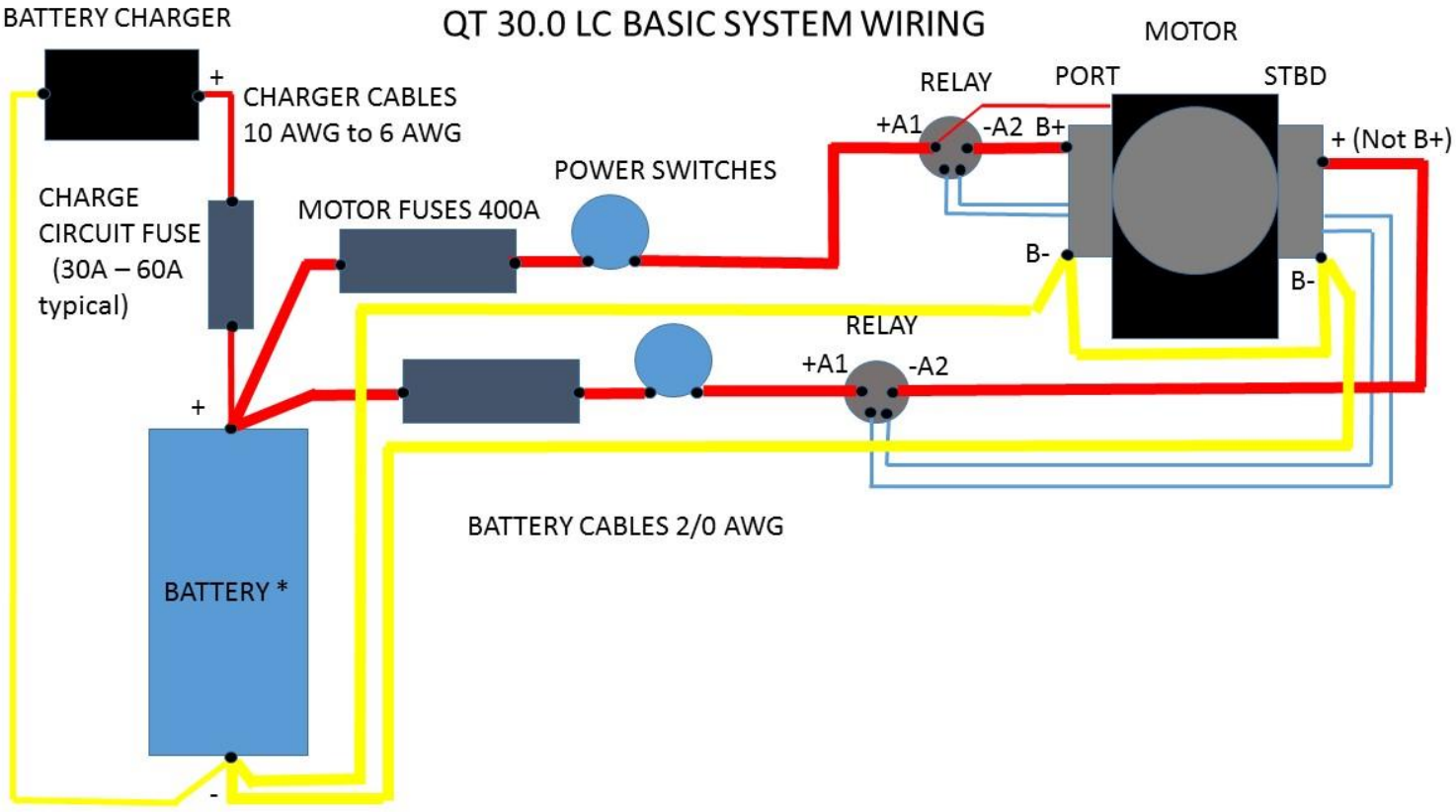


Charging System Connections:

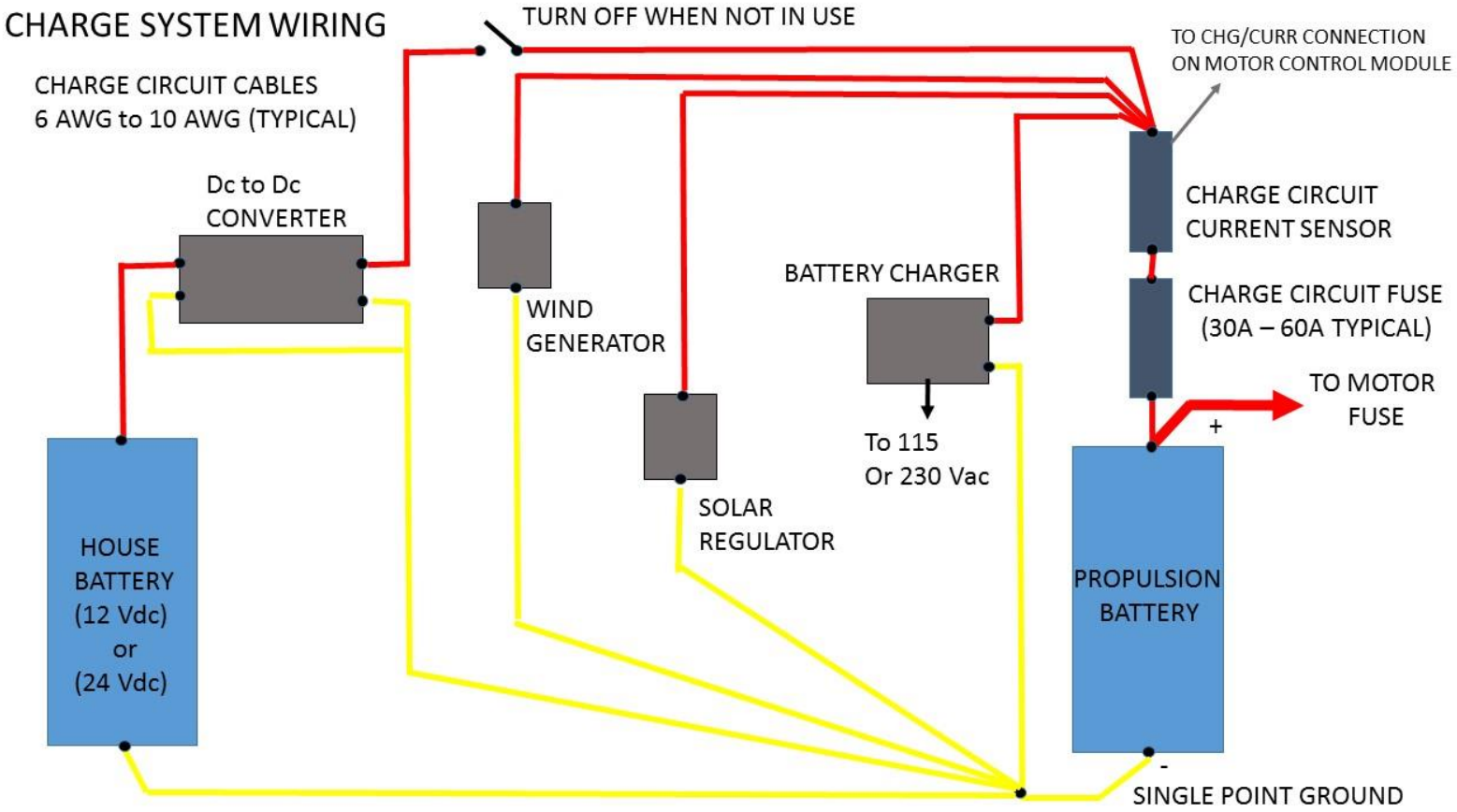
To complete your system, you will need to address the battery charging system. This can be a complex topic, as there are many ways to accomplish battery charging. Below are some representative wiring diagrams.

A basic system is addressed in the diagram below. In this system, charging is accomplished using shore power and a battery charger. Power for the charger can also come from a small "suitcase" generator. Typically, this is a 2 kW generator powering a charger with an output of 25Adc – 30Adc.

A battery charger of this size would be powered by a 115Vac circuit with a minimum 15A rating. Ideally, it will have its own circuit breaker, allowing it to be turned on or off, as needed.



Following is a more general diagram showing multiple charging sources. Also, note that all the negative battery connections are made at one point. This point should also be connected to the boat's grounding system.



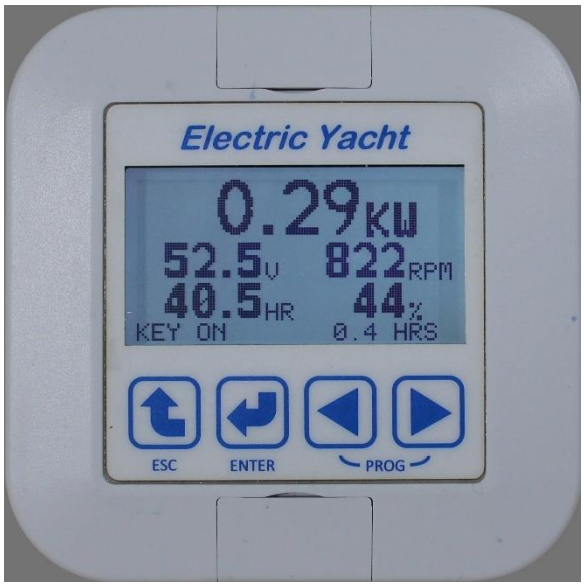
Catamaran Wiring:

If you have a two motor catamaran system with prewired cables, refer to the wiring diagram that will be sent along with these instructions.

1. The long display and throttle cables plug into the motor control module, as above.
2. The opposite ends of these cables will be supplied with terminal blocks.
3. The throttle(s) and displays will be supplied with terminal blocks.

Initial Check Out:

1. With the key switch in the “OFF” position (it can be removed in this position), turn on the Master Power switch. The display should come on and show information. It takes several seconds for the readings to stabilize.



2. Connect a volt meter between the (-) terminal on the motor controller and the (+) terminal on the relay. Verify correct voltage and polarity.

3. The Battery Monitor should be on and say “KEY OFF” in small text at the bottom left corner of the display area.

4. Press and hold the left arrow and right arrow buttons on the battery monitor (display) about 10 seconds until the display changes to show battery type. You are now in programming mode. Press the “ESC” key at any time to exit programming mode and return to normal operation. The “light bulb” key sets the backlight brightness for night time use.

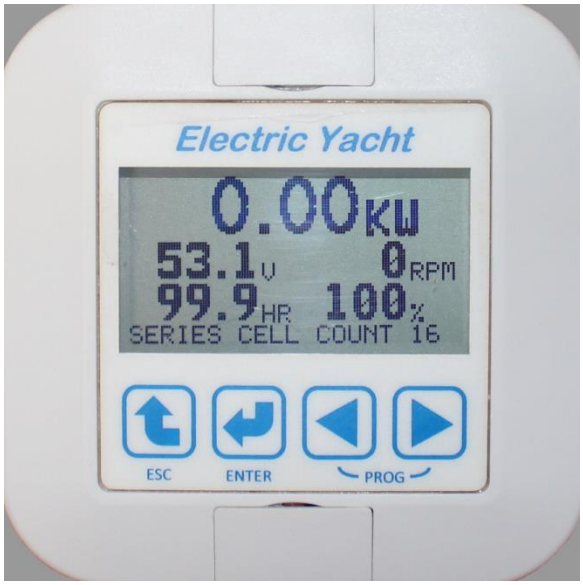
5. Use the left or right arrow to choose your battery type. Press the “ENTER” key.

    a. Flooded refers to traditional “wet cell” batteries.
    b. AGM refers to traditional Absorbed Glass Matt, such Lifeline batteries.
    c. TPPL refers “Thin Plate Pure Lead”, examples would include Odyssey and Northstar brands.
    d. LiFePO4 refers to “Lithium Iron Phosphate”, an example is Lithionics brand.
    e. NMC refers to lithium “Nickel Manganese Cobalt”, an example is the Torqeedo brand.

6. Use the left and right arrows to choose the nominal battery voltage. In most cases, this will be 48V. Press the “ENTER” key.

7. Use the left and right arrow keys to select the amp-hour capacity of your battery. Press the “ENTER” key.

8. Turn the key switch on. A “click” should be heard as the power relay is energized. With the boat securely tied to a dock, or in an area of open water, slowly advance the throttle. Use the right or left arrow to advance the number on the screen until there is propeller rotation. If the propeller is driving the boat forward (ahead) direction, slowly advance the throttle to full and slowly advance the number on the screen until the motor does not increase in speed with further advance. If the propeller is rotating is driving the boat in the reverse (astearn) direction, press the other direction key to move the number through zero. Move the throttle



fully ahead and advance the number until no further increase in motor speed occurs. Press the “ENTER” key.

Note: If operating out of the water, the motor will spin up to full speed at low power settings. This is normal. Final adjustments must be made in the water.

9. Press the “ENTER” key again. The next setting is regeneration. On the left is the regeneration relative value. The range is 0 to 100 in increments of 5. If you wish to allow the propeller to free wheel, set it to 0. If you wish to have the propeller rotate as slowly as possible, set it to 100. There will be very minimal rotation at this setting. In most cases, an initial setting should be established. A number between 20 and 30 is a good starting point. This value will be fine tuned later. Press “ENTER” again. Several numbers will be shown briefly. Then, you will be returned to the normal operating screens and the settings will have been saved.

Open Water Checkout:

1. In protected water with light to no wind and minimal wave action, slowly advance the throttle to full throttle and let the boat accelerate until running at a constant speed.

2. Observe the battery current.
    a. If it is at least 350A, you have a good match between your reduction ratio and your propeller.
    b. If it is less than 350A and the motor speed is over 2900RPM (ME1114) or less then 350A and over 1900RPM (ME1115), you have a little too much reduction. As long as you are getting adequate performance, this is fine. If not, you will need to replace the motor pulleys with the next larger size. Contact us and we will supply.
    c. If the maximum motor speed is less than 2700 RPM (ME1114 motors) or 1750 RPM (ME1115 motors), you don't have enough reduction. This condition will result in slightly reduced efficiency. It is not harmful, but it is a recommended to replace the motor pulleys with a smaller size.

3. Check the reverse performance. Due to differences in propeller efficiency between forward and reverse, the current draw will likely be different.

4. Install the covers over the motor controllers.

The motor system is now ready to operate.

*****Note for users of LiFePO4 batteries*****

LiFePO4 Li-ion batteries have a very flat voltage discharge curve. This does not allow resetting the SOC based on voltage, which can be done with lead acid chemistries.

If these batteries are charged with the motor power off, which is commonly done, the SOC may not reset to 100%. To correct this, press and hold the ESC key for 12 seconds, until you see the SOC reset to 100%.

Regeneration Fine Tuning:

1. Go sailing on a day when the boat can be sailed at, or near, hull speed.
2. Press and hold both arrow keys to enter the programming mode as described in step 7 of the Initial Checkout section.
3. Press the “ENTER” key until the Regeneration screen is shown as in step 12 of the Initial Checkout section.
4. Use the arrow keys to adjust the regeneration amount to maximize the energy produced, as shown on the middle left section of the screen (in kW).
5. Press “ENTER” again to save the value and return to normal operation.

Usage Guidelines:

1. Take your time. Without the noise of the old engine, it is more enjoyable to cruise under power. Running at a slower speed will increase range and battery life.

2. On light air days, dial in a few amps of current to keep the boat moving through dead spots.

3. Plan ahead. Minimize motor usage if you might need to make a long cruise home under power.

4. To maximize battery life, don’t discharge below 50% on a regular basis. If you need to use more, recharge as soon as possible. Never leave batteries in a discharged state for a long period of time.

5. Always turn off the Master Power switch when leaving the boat. The key switch does not remove power from the controller. There is a small current draw if the Master Power switch is not off.

Maintenance:

Your electric system should require far less maintenance than your old gas or diesel engine. Following are general guidelines.

1. Grease the two bearings on the motor unit once/year or every 500 hours. Use a good grade of waterproof wheel bearing grease.

2. Drain and replace ATF in saildrive leg at annual intervals or when boat is hauled out for bottom painting or other maintenance.

3. Check the water level of your batteries periodically, if you have flooded lead acid. Add distilled water if needed. Only add water when the batteries are charged. If you are using good “Smart” chargers, this should only be necessary once or twice a year. AGM or LiFePO4 batteries don’t need watering.

4. Occasionally feel all of the connections after running the motor at high current for at least ten minutes. Any hot terminals should be cleaned and re-tightened.

5. Clean the battery tops and terminals once per year or when corrosion is evident. Recoat the terminals with dielectric grease.

6. It is recommended to replace the timing belt every five years. It can be done in about an hour with hand tools.

7. Check the coolant level at regular intervals. It should be just visible at the bottom of the overflow reservoir when cold. Add a 50/50 water glycol solution as needed.

8. Replace the seawater pump impeller at annual intervals. Use Johnson Pump p/n 09-1027B or equivalent.

Happy Sailing!

Motor Controller connections (rectangular connector):

1 – Logic Power
2 – CAN Termination
3 – Relay Coil (BLU)
4 – Relay Coil (BLU)
13 – CAN High (RED)
15 – Encoder Power (-) (BLK)
18 – FWD
21 – Encoder Sine (BLU)
22 – Analog Speed Input
24 – CAN Termination (GRN)
26 – Encoder Power (+) (RED)
27 – CAN Low (BLU)
30 – REV
33 – Motor Temp Sensor
35 – Encoder Cosine (WHT)

Battery Monitor Connector Pin Out:

1 – Power (+12Vdc) (RED)
2 – RS-485 (+) (WHT)
3 – RS-485 (-) (GRN)
4 – Common (BLK)
5 – CAN HIGH
6 – CAN LOW
7 – Unused (+24Vdc)
8 – Unused

Throttle Connector Pin Out:

1 – Potentiometer Power (+5V) (GRN)
2 – Potentiometer Wiper (WHT)
3 - +48V (RED)
4 – Logic Power to Motor Controller (ORG)
5 – Potentiometer Common (BLU)
6 – Unused

Charge Current Sensor Pin Out:

1 – Power (+5V) (RED)
2 – Current Sensor Output Signal (WHT)
3 – Unused
4 – Unused
5 – Ground (0Vdc) (BLK)
6 – Unused

Motor Controller to Motor Connection:

M1 to M1 (Stamped into motor case near terminal)
M2 to M2
M3 to M3

Motor Controller to Motor Encoder:

A – Encoder Sine (BLU)
B – Encoder Cosine (WHT)
C – 0Vdc (BLK)
D – N/C

E – +5Vdc (RED)
F – Shield (BLK)
G – Temp Sensor (BLK)
H – Temp Sensor (WHT)

Motor Pulley Replacement:

This procedure can be done with the motor in the boat.

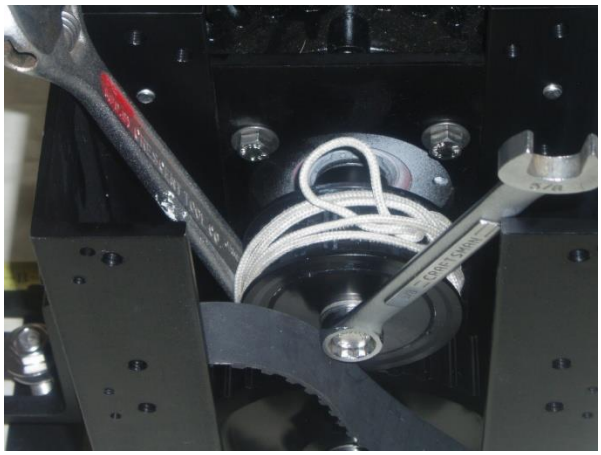
1. Disconnect the battery bank positive terminal.

2. Loosen the four bolts that hold the black motor plate to the frame.

3. Slide the belt off the motor pulley.

4. Make a pulley holding tool by passing a 6’ (approx.) piece of 1/8” or 3/16” rope line through the handle of a Crescent wrench (or similar) and tying the ends. Wrap the rope around the pulley CW.

5. Loosen the bolt on the end of the motor shaft with a 5/8” box end wrench.



6. Slide off the old pulley, key and spacer washers that are under it. If it is stuck, use a gear or wheel puller to remove it. DO NOT hammer, as this can damage the motor bearings.

7. Put some fresh anti-sieze compound on the motor shaft.

8. Slide the pulley and key onto the motor shaft.

9. Wrap the rope around the pulley CCW.

10. Install and tighten the bolt, use removable (blue) Loctite on the threads.

11. Slide the belt back on the pulley.

12. Slide the motor way from the center shaft until tight. Cog tooth timing belts do not need to be overly tight. A deflection of 1/8” – 1/4” with moderate finger pressure is adequate.

13. Tighten the four motor plate bolts.

14. Re-connect the battery positive terminal

Belt Replacement:

This procedure can be done with the motor in the boat.

1. Disconnect the battery bank positive terminal.

2. Loosen the four bolts that hold the black motor plate to the frame.

3. Slide the belt off the motor pulley.

4. Remove the four bolts securing the bearing plate to the motor frame and slide off bearing plate.

5. Remove the old belt and replace with the new one.

6. Replace the bearing plate and tighten bolts. Use removable (blue) Loctite on the bolt threads.

7. Push the motor outward until the belt is tight. Cog tooth timing belts do not need to be overly tight. 1/8” – 1/4” deflection with moderate finger pressure is adequate.

8. Tighten the four motor plate bolts.

9. Re-connect battery positive terminal.

LIMITED WARRANTY

This products of JASM, LLC d/b/a Electric Yacht, a Minnesota Limited Liability Corporation, are warranted to be free from defects in material and workmanship for a period of 36 months from the date of purchase by the first non-commercial retail customer and 12 months from date of purchase for commercial use customers. The above warranty shall be subject to the terms, conditions, and exclusions below.

For warranty service, contact JASM, LLC for instructions. For work required by the manufacturer, prior authorization will be obtained before part(s) are shipped to JASM, LLC.

This warranty is applicable to the first purchaser only and is not transferable. All requests for warranty service must be made within the warranty period.

During the warranty period, JASM, LLC, will repair or replace or refund the purchase price of any part that, upon examination by JASM, LLC, is found to be defective in material or workmanship under normal use and service. JASM, LLC shall in its sole discretion determine a defective part will be repaired or replaced or purchase price refunded. In the event of a refund, purchaser shall return the entire product to JASM, LLC, or its Authorized Service Dealer prior to receiving such refund. JASM, LLC, may retain all defective parts or components. Any repaired or replaced part or equipment will only be covered by the warranty period remaining on the original purchase.

JASM, LLC, does NOT warrant or make any representation in respect to installation errors made by a dealer, mechanic, installer, or individual. This warranty applies to defects in material and workmanship only; it does NOT apply to the following:

• Normal Wear and Tear: Like all mechanical devices, this motor needs periodic parts and service to perform well. This warranty does not cover repair when normal use has exhausted the life of a part or the motor.
• Improper Installation and Maintenance: This warranty does not apply to equipment or parts that have been subjected to improper or unauthorized installation, alteration, or modification, or that have been improperly maintained, repaired, serviced, or stored., as per the Owner's Manual.
• Damage caused by fire, flood, storm, or other natural acts and natural disasters.
• Damage caused by an accident or collision. Nicks and normal wear are not covered. This includes damage incurred during shipping.
• Damage caused by misuse, mistreatment, negligence.
• Products and components not manufactured by JASM, LLC. Purchaser shall be limited to warranty, if any, provided by the manufacturer, and JASM, LLC will not be held liable for any such defects.
• Use in an application for which the equipment was not designed.
• Reimbursement for transportation or shipping charges, towing charges, in and out of water charges, technician travel time, labor supplied by anyone other than JASM, LLC.
• Growth of marine organisms on internal or external surfaces or components.

This warranty is void if the equipment has been altered or modified in any way. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THIS WARRANTY IS PROVIDED IN PLACE OF ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE TO THE EXTENT ALLOWABLE BY LAW. TO THE EXTENT SUCH WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE CANNOT BE EXCLUDED AS A MATTER OF LAW, SUCH WARRANTIES ARE HEREBY LIMITED TO ONE YEAR AND SUBJECT TO THE Warranty EXCEPTIONS HEREIN TO THE EXTENT ALLOWED BY LAW. IN NO EVENT WILL JASM, LLC, INCLUDING THEIR OFFICERS, DIRECTORS, MEMBERS, EMPLOYEES OR AGENTS BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, INDIRECT, OR PUNITIVE DAMAGES, INCLUDING

WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, OR LOSS OF BUSINESS INFORMATION, ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, AND ALL SUCH DAMAGES ARE EXPRESSLY EXCLUDED TO THE EXTENT EXCLUSION IS PERMITTED BY LAW. In any event, any liability of JASM, LLC for any cause of action (whether in contract, tort, including without limitation, negligence, or otherwise) shall be limited to return of the purchase price paid by purchaser. Some states or countries do not allow exclusion or limitation of implied warranties or consequential, incidental, or other damages, and the foregoing may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state or country to country. No distributor, agent, or employee is authorized to make any modification or extension to this warranty. JASM, LLC makes no other warranty, guaranty, promise, or representation of any kind whatsoever regarding the product. Any other warranty, guaranty, promise, or representation by others are unauthorized and are not binding on JASM, LLC.

Mounting platform dimensions (Figure 1):

Template for Display (Figure 2):

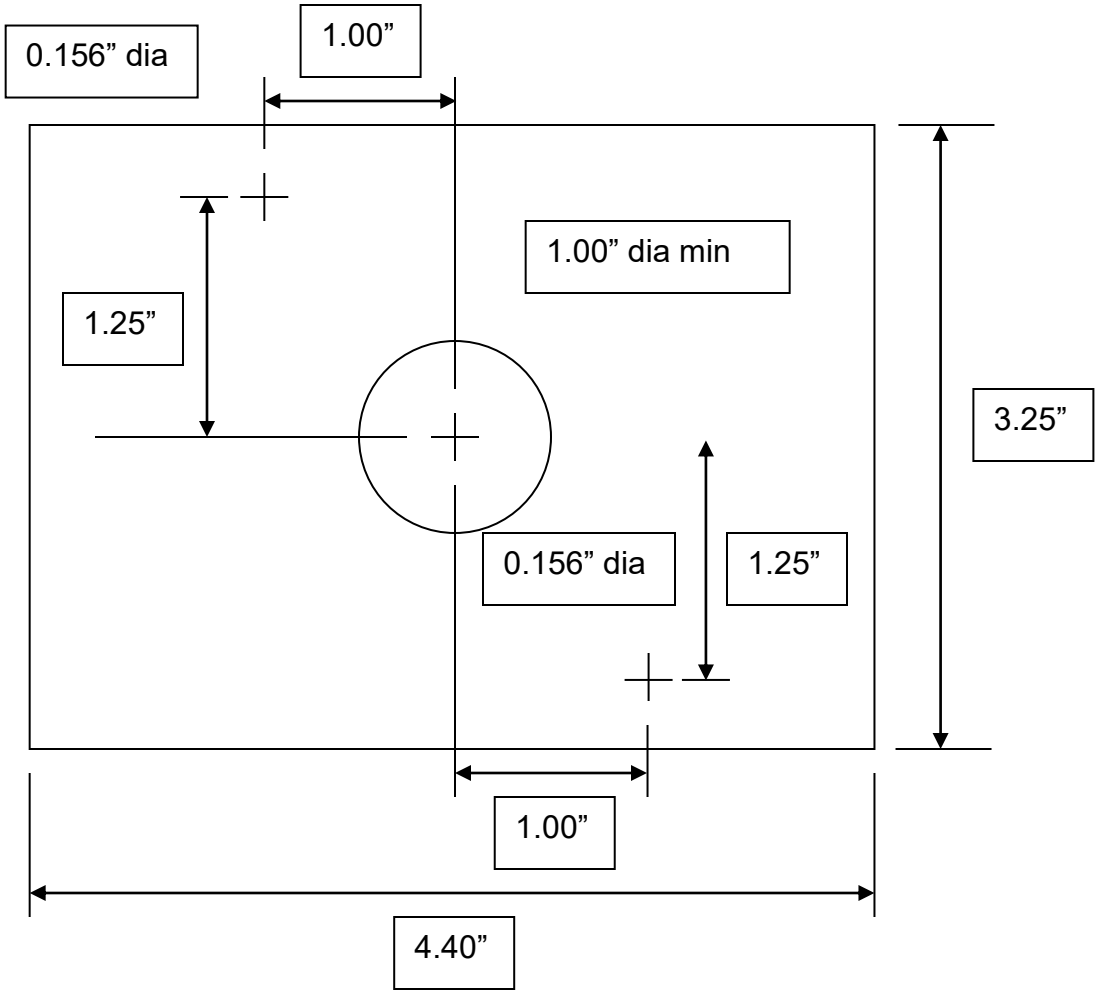


Fig. 2