



# SUBMERSIBLE BATTERY

## ASSEMBLY & INSTALLATION



### Overview

The Biomark **Submersible Battery** is shipped unassembled. This document covers the assembly of the **72 Ah** (2-week runtime) **or 180 Ah** (4-week runtime) submersible battery pack. Please follow these procedures to successfully install and seal your submersible battery pack. Failure to follow manufacturer guidelines and specifications may void Biomark's manufacturer's warranty.

### Shipment includes:

- (1) Submersible battery enclosure
- (1) Submersible battery enclosure entry plate with Battery Management System (BMS) & Wiring
- (1) Sealing Gasket
- (2) Foam inserts
- (40) Stainless Steel 1/4-20 x 2.5" partially threaded hex head screw – 7/16" hex size
- (80) Stainless Steel .281" ID .625" OD – standard 1/4" flat washers used
- (80) Stainless Steel Nylon-Insert Locknut, 1/4"-20 Thread Size- 7/16" hex size
- Bus Bar Kit
  - Each kit will include (2) Vertical and (1) Horizontal bus bars with the following battery terminal hardware:
  - 72Ah Battery Terminal Hardware
    - (8) M6 - 1 x 12mm full thread hex head screw– 10mm hex size

- (8) M6 6.4mm ID 11.4mm OD flat washer
    - (8) M6 6.5mm ID 11.8mm OD split lock washer
  - 180ah Battery Terminal Hardware
    - (8) M8 – 1.25 x 15mm full thread hex head screw – 13mm hex size
    - (8) M8 8.4mm ID 16mm OD flat washer
    - (8) M8 8.5mm ID 14.8mm OD split lock washer
- Tool Kit:
  - (1) Fat Wrench Wheeler Torque Screwdriver Kit – ¼” drive
  - (1) 7/16” combination wrench
  - (1) 7/16” ¼” drive socket
  - (1) 13mm socket (1/4” drive) (180 Ah Battery Cell)
  - (1) 10mm socket (1/4” drive) (72 Ah Battery Cell)

## Torque Specifications

LOCATION	TORQUE SPECIFICATIONS
<b>Battery Terminal Hardware (72 Ah Pack)</b>	30-inch pounds (in/lbs.)*
<b>Battery Terminal Hardware (180 Ah Pack)</b>	30-inch pounds (in/lbs.)
<b>Entry Plate Hardware (40-sealing bolts)</b>	30-inch pounds (in/lbs.)

*\*Use a minimum of 30-inch pounds of torque until you hear an audible click, or until the split washer is fully compressed and the bolt is firmly secure.*

## Assembly & Installation Instructions

Assembly and installation of the submersible battery pack must be performed in a clean environment to ensure proper seal of waterproof enclosure, and on a large flat surface, free of contaminants or obstructions.

### Step 1: Label Batteries

Label the batteries from 1-4 with a permanent marker to ensure proper installation of each independent cell within the enclosure. Place the four battery pack cells in a 2 by 2 configuration, with cell 1 and 2 on top (orientated from left to right; positive (red) -negative (black) and positive (red) - negative (black)) and 3 and 4 on the bottom (orientated from left to right; negative (black) - positive (red), and negative (black) -positive (red)). Obtain proper battery sequence prior to moving to step 2.





## Step 2: Install Battery Cells into the Submersible Battery Box

For easy installation of battery cells into battery box, tilt battery box vertically so opening is orientated upward and label on outside of box is facing away from you. Install battery cell #4 into bottom right position of battery box (orientation is negative-positive). Install battery cell #3 into bottom left position of battery box (orientation is negative-positive). Install Battery cell #2 into top right position of battery box (orientation is positive-negative). Install Battery cell #1 into top left position of battery box (orientation is positive-negative).

*TIP: Battery box is constructed for tight fit of each cell within box, allowing batteries to drop into place is acceptable. If you have trouble achieving proper battery placement, please contact us.*

## Step 3: Battery Management System

Observe the battery management system (BMS) located at the center of the battery pack entry plate. This device maximizes the charging sequence for each 3.2 V cell within the submersible battery pack. Each positive terminal of all (4) battery cells will connect to the BMS via labeled (Red) wire. In addition, the negative (blue/black) wire will connect the BMS to the negative terminal of battery #4.

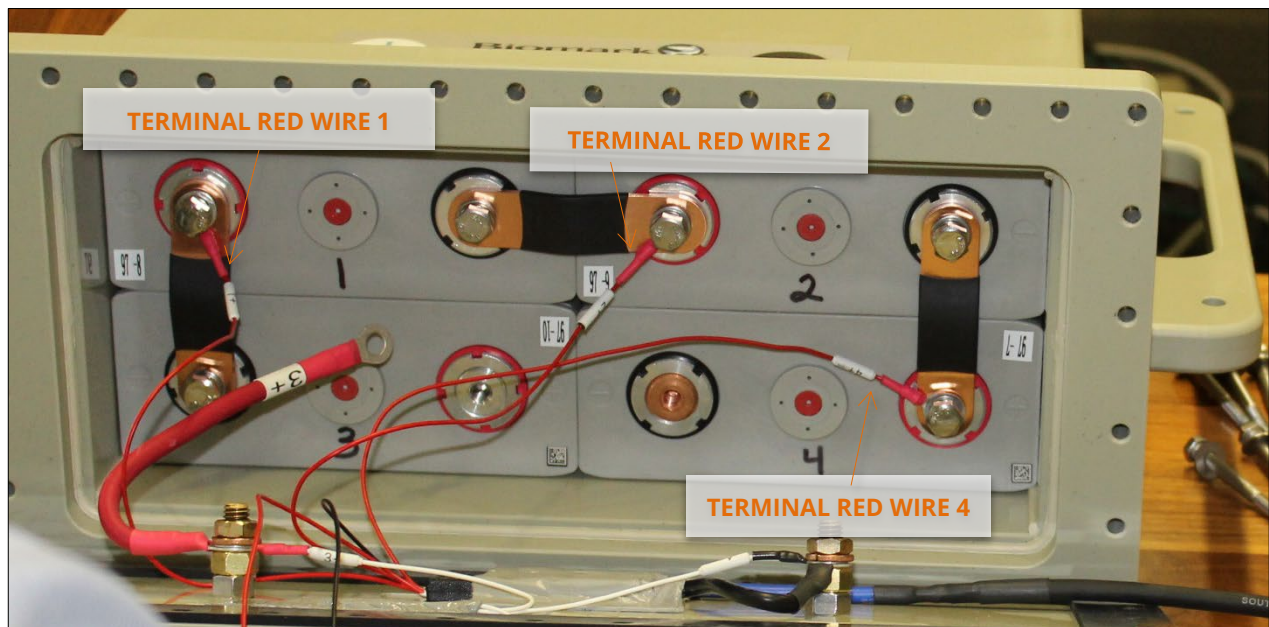
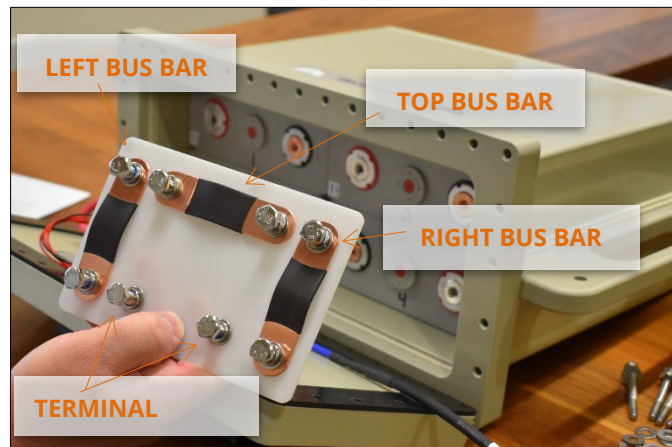


## Step 4: Install Bus Bars & BMS Wiring for 12 Volt Battery Configuration

Lay the battery box (Horizontally) onto a flat surface with the battery label faced up.

Remove vertical (Left) bus bar and associated battery terminal hardware from included packaging. Slide ring terminal of Red wire (labeled #1 extending from BMS) over end of provided battery terminal bolt, and through top hole of vertical bus bar.

**NOTE:** Proper placement of hardware is in the following order - Bolt- head-split lock washer-flat washer-ring terminal-bus bar.



Install bolt/ring terminal/bus bar assembly into positive terminal of battery cell #1, and hand tighten. Install remaining terminal bolt into bottom hole of vertical bus bar and into negative terminal of battery #3.

Next, remove from packaging and install horizontal bus bar from negative terminal of battery #1 to positive terminal of battery #2 (repeat above process to ensure (Red) #2 wire from BMS is installed to positive terminal of battery #2).

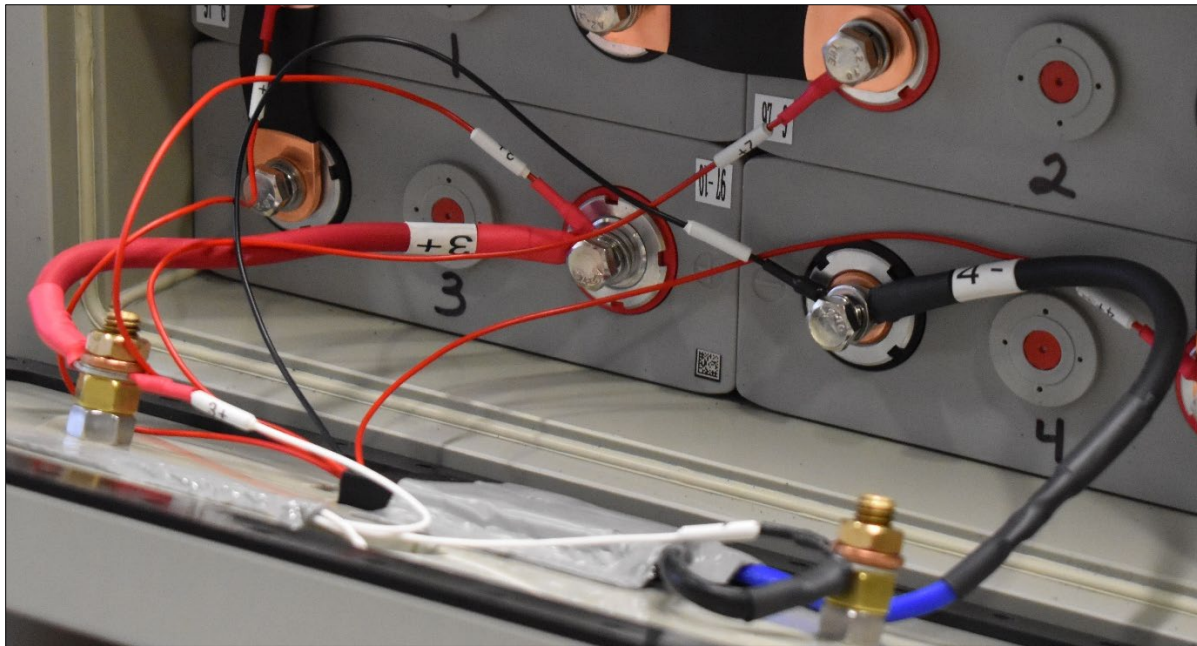
Install remaining vertical bus bar from negative terminal of battery #2 to positive terminal of battery #4 (repeat above process to ensure (Red) #4 wire from BMS is installed to positive terminal of battery #4).

## Step 5. Connect Entry Plate to Battery Cells

Place the battery entry plate in front of the battery box assembly with the positive (Red) wire facing left, and negative (Black) facing right.

Install positive (Red) wire extending from the battery pack entry plate to positive terminal of battery #3. **Ensure positive (Red) wire extending from battery pack entry plate, and (Red) wire labeled #3 from BMS, are placed onto terminal bolt and secured to positive terminal of battery #3.**

Repeat similar steps to install negative (Black) wire extending from battery pack entry plate, and (Black) #4 black wire extending from BMS, to negative terminal of battery #4.



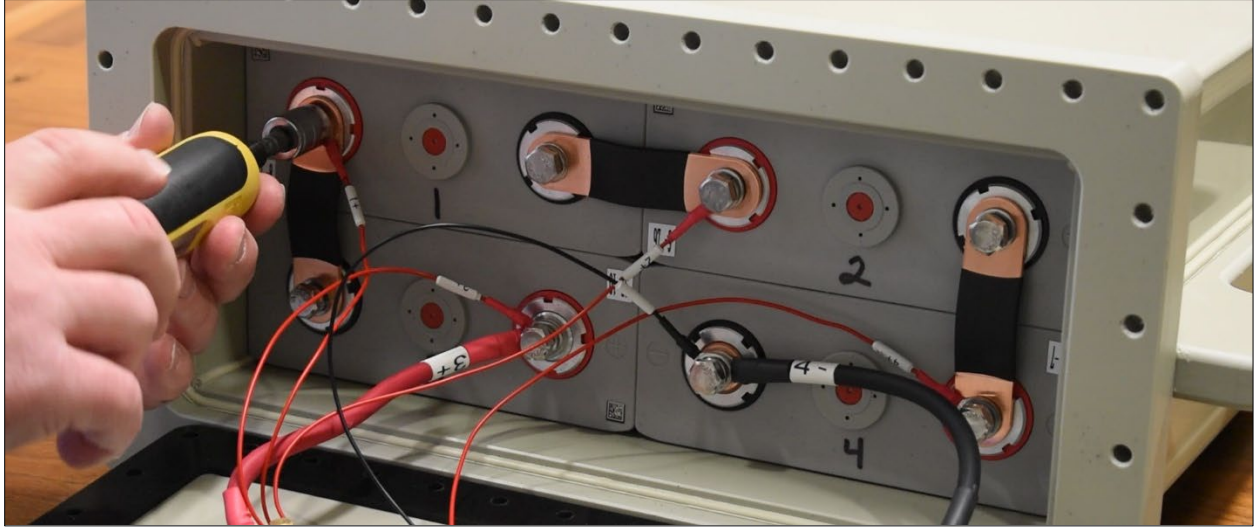
Twist the base of the Fat Wrench until the black line in the white indicator reaches 30 in. - Lb.

## Step 6. Properly Tighten Battery Terminal Hardware

Unpackage provided torque screwdriver and set to 30-inch pounds.

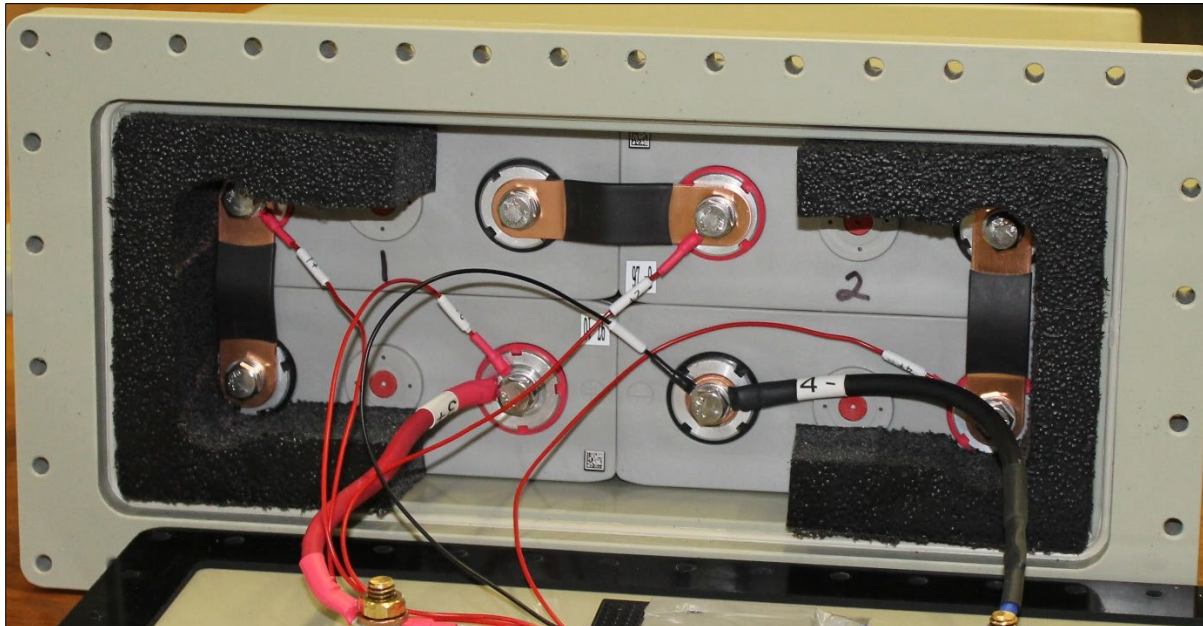
**\*NOTE:** Failure to torque battery hardware to manufacturer's specifications may cause adverse battery performance.

Beginning at the positive terminal on battery #1, torque all battery terminal hardware to 30-inch pounds. **Note: when tightening bolts with additional wire connections, orientate all ring terminals towards the middle of the grouped batteries.** This will allow for proper placement of foam inserts described in the following step.



### Step 7. Install Foam Inserts

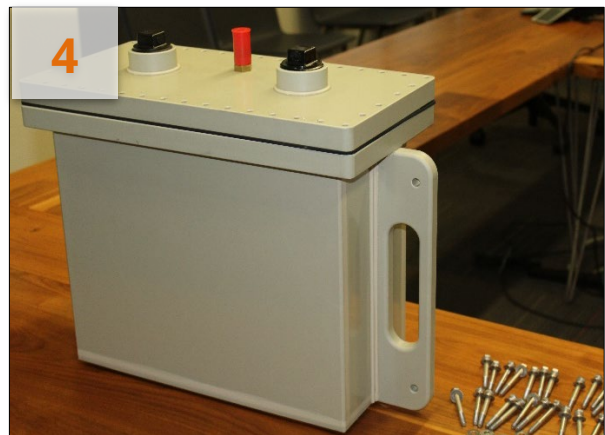
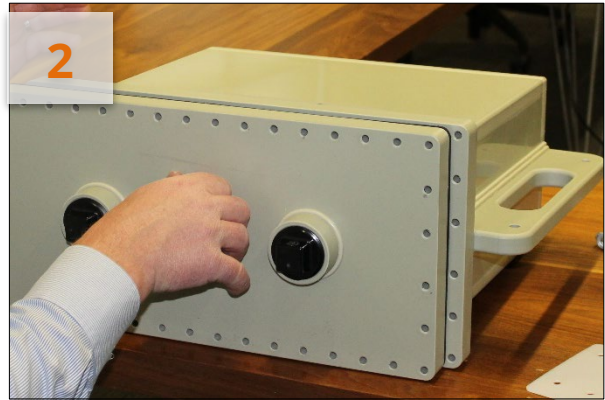
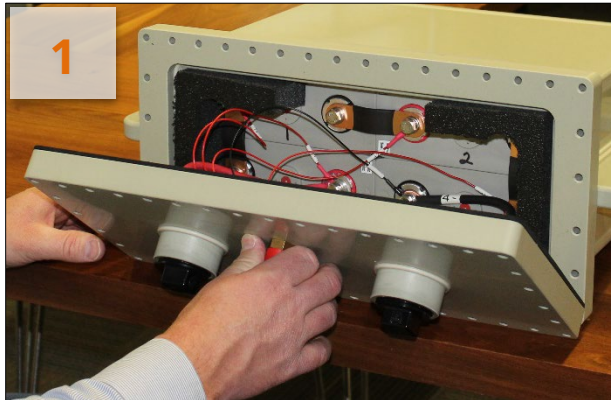
Install foam inserts along the inside frame of the battery enclosure. Double check placement to prevent wiring from pinching between the entry plate and gasket flange of battery box.



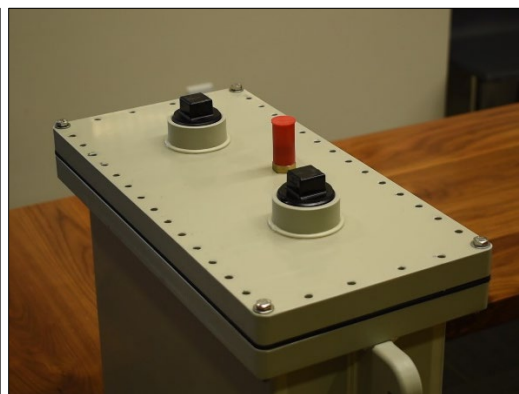
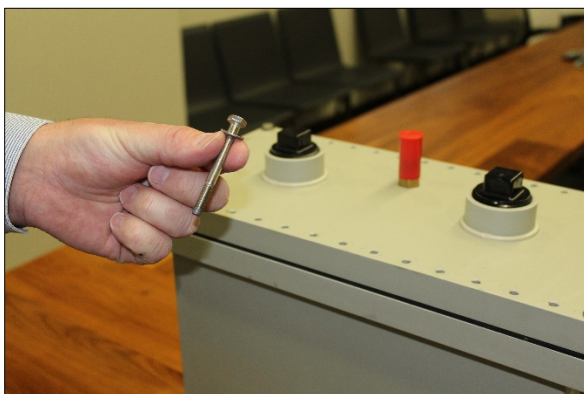
## Step 8. Seal Battery Box Entry Plate to Battery Box

Tip the battery box assembly vertically with Biomark battery label faced away from you and inspect the proper alignment of the entry plate with the battery pack flange.

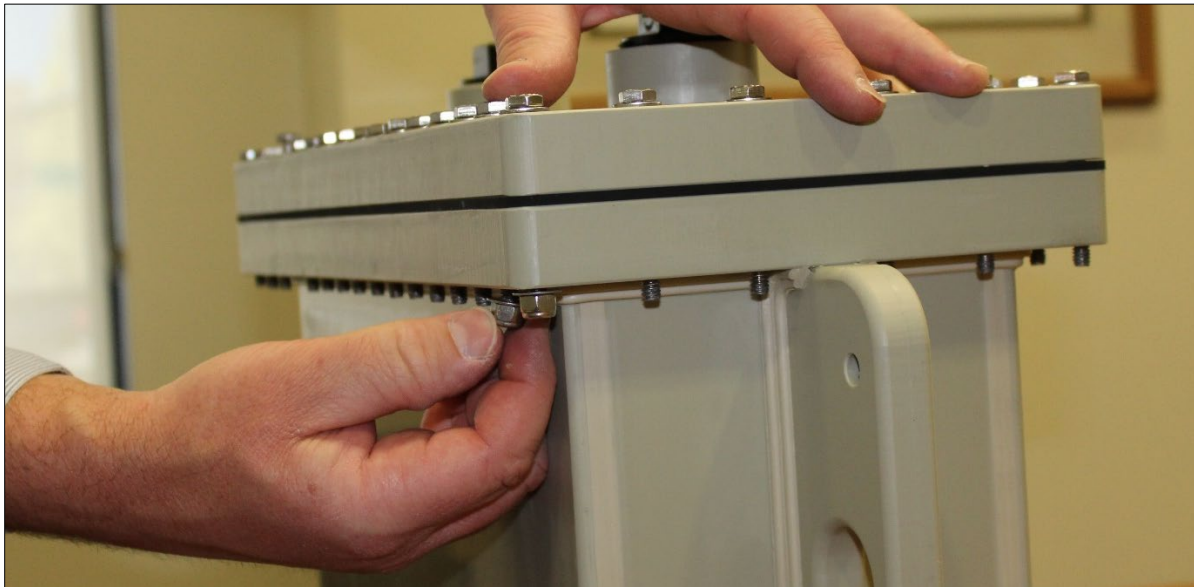
**ADVISORY:** Ensure all wires clear entry plate, sealing gasket, and battery box flange. Failure to prevent pinching of internal wiring may result in severed electrical connection or improper seal of battery pack.



Install sealing bolts into each of the four corners of the entry plate, lining up each location to achieve proper gasket alignment. **Each sealing bolt should be fixed with a 1/4" flat washer.** Continue installation of remaining hardware

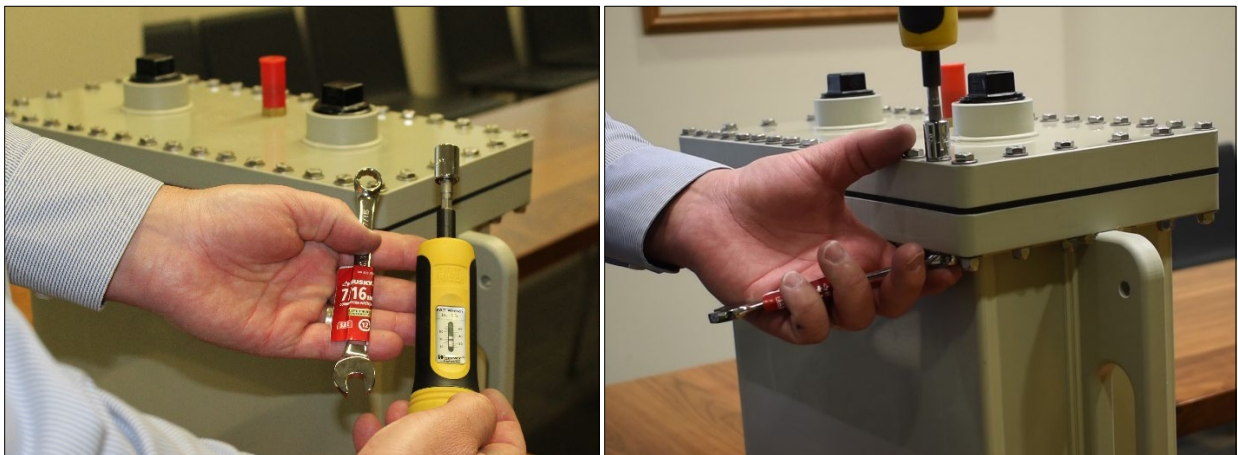


To secure bolts in place, install flat washer between battery box flange and nut for each bolt.



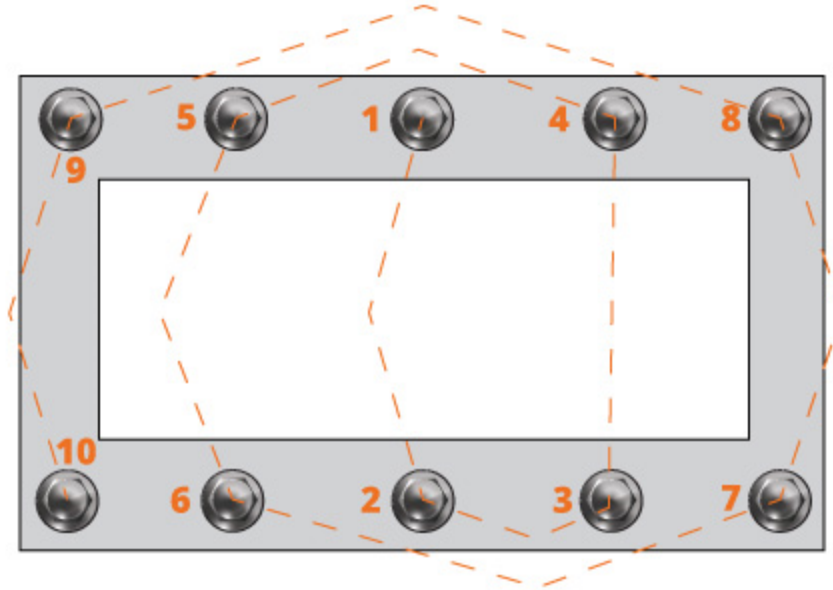
### Step 9. Torque Sealing hardware to manufactures specifications

Finish installation by using the provided torque screwdriver fixed with a 7/16" socket, and 7/16" combination wrench. **Torque specifications for sealing hardware is 30-inch pounds (in/lbs.)**

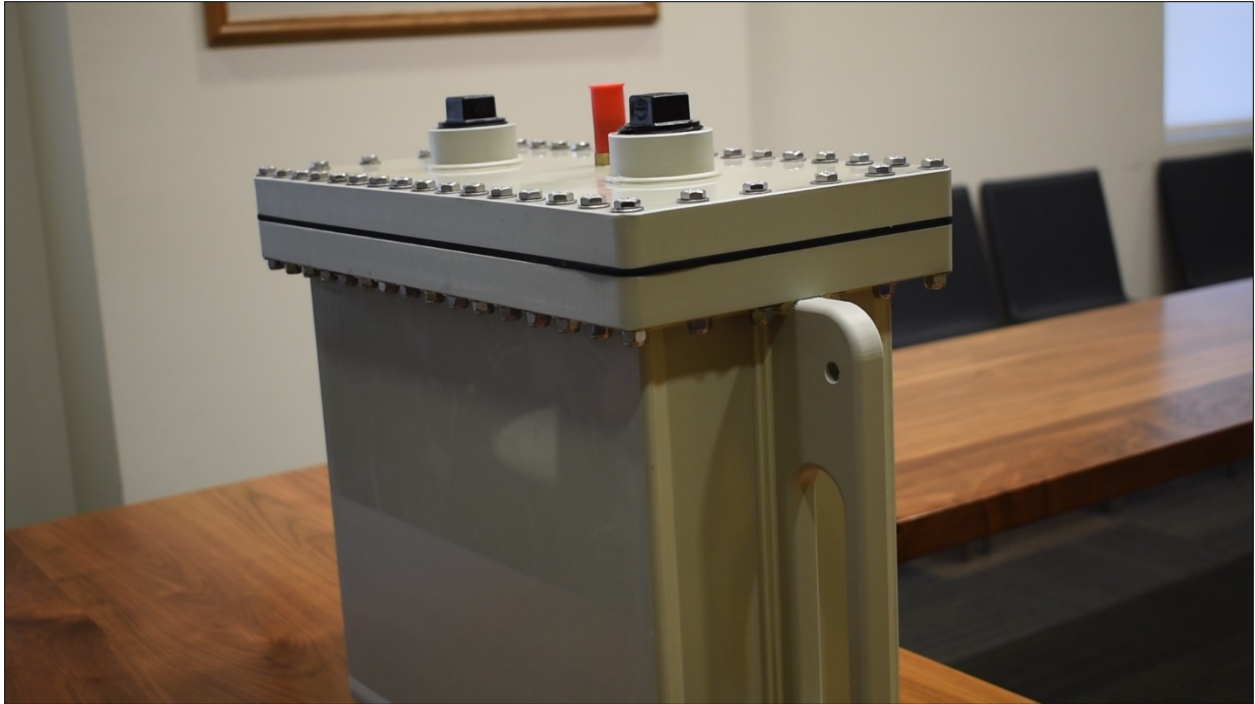


The recommended torquing pattern is spiral tightening sequence, beginning at center of enclosure and moving outward through all bolts. Proper torque can be confirmed by performing the pattern twice or ensuring that the washer is firmly compressed. See the Spiral Tightening Sequence diagram on the next page.



**Spiral Tightening Sequence Diagram**

Once the battery pack has been assembled, properly sealed, and proper voltage verified, no maintenance or periodic servicing is required. If you have any questions regarding the battery installation, battery wiring, or sealing process, please contact a Biomark representative.



## Step 10. Battery Pack Charging Procedures

Due to domestic and international Lithium-Ion battery shipping restrictions, limitations are placed on battery cell capacity. **Each submersible battery pack requires a full charge cycle prior to deployment.** Please observe the following submersible battery pack charging guidelines:

### Charger Specifications:

- Quick Charge Corporation
- Model #QP1225 (USA), #QPXU1225 (EURO)
- 117V 60hz 3 amp
- Programed for Biomark Lithium ION battery Packs

### Charge Cycle Duration:

- Average charge cycle varies depending on battery condition.

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**\*\*DO NOT** use Biomark provided battery charger on any other battery pack. **\*\*DO NOT** use any other battery charger to charge Submersible Battery Pack.

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### Connecting Charger to Submersible Battery Pack

- Connect your Quick Charge <sup>™</sup> charger to AC power source (110/220 depending on application) and ensure selector switch is in the “OFF” position.
- Remove protective pipe plugs on positive and negative terminal posts of submersible battery pack (show picture of pipe plugs on battery pack).
- Connect positive (+) lead of charger output cable to the positive (+) terminal post of submersible battery pack.

## SUBMERSIBLE BATTERY INSTALLATION

- Connect negative (-) lead of charger output cable to negative (-) terminal post of submersible battery pack. **ADVISORY:** Charger clamps **MUST** connect to brass terminal post only. Conducting charging cycle with charger clamps connected to stainless steel seal nut will void product warranty.
- Place selector switch of charger to "ON" position. LED indicator will display charge status and illuminate "Green" when charging cycle is complete.

Once charged, replace protective pipe plugs over positive (+) and negative (-) terminal posts. Tighten plugs to just beyond hand tight. Excessive tightening or additional thread sealant is not necessary to maintain waterproof integrity of battery box enclosure.

Submersible Battery Pack is ready for use with Submersible Antenna System.

