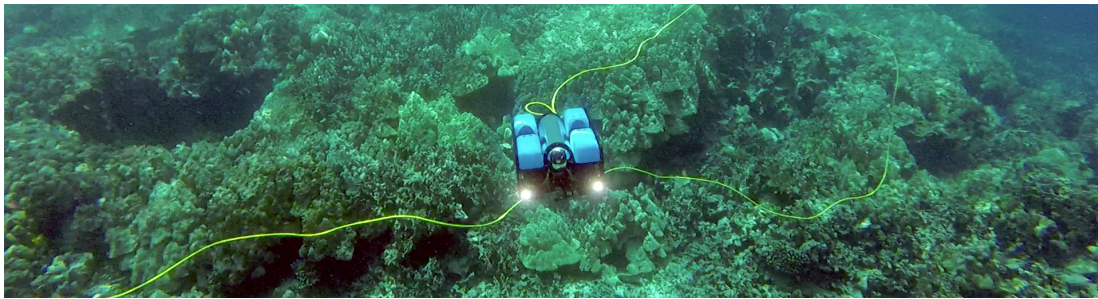


[BlueROV2 Main \(/brov2/\)](/brov2/)[Kit Assembly \(/brov2/assembly/\)](/brov2/assembly/)[Software Setup \(/brov2/software-setup/\)](/brov2/software-setup/)[Operating Manual \(/brov2/operation/\)](/brov2/operation/)[📄 Datasheet \(http://bluerobotics.com/downloads/bluerov2.pdf\)](http://bluerobotics.com/downloads/bluerov2.pdf)[ArduSub.com \(http://ArduSub.com\)](http://ArduSub.com)[BlueROV2 Heavy Kit \(/brov2-heavy/\)](/brov2-heavy/)[Payload Skid \(/payload-skid/\)](/payload-skid/)

BlueROV2 Assembly



Archived Assembly Instructions

These are the most recent assembly instructions. Depending on the age of your kit, you may wish to refer to an older version:

- [Assembly Instructions for Kits Shipped Prior to March 2017 \(/brov2/assembly-pre201703/\)](/brov2/assembly-pre201703/)

Assembly Intro

The BlueROV2 kit comes almost ready to dive. The assembly can be completed with basic hand tools; no soldering or potting is required. We have included a couple of the tools to make assembly and regular use as easy as possible.

Safety



When working with electricity, especially in water, always practice caution. Always ensure that connections are secure and watertight. Keep your body away from spinning motors and propellers.



When working with silicone grease and threadlocker, take care to minimize skin contact. Wear protective nitrile or PVC gloves when handling.



Only apply threadlocker to screws contacting metal or the HDPE frame. Most threadlockers are not chemically compatible with polycarbonate, and will damage the thrusters, fairings, and dome flange if used here. Refer to the documentation and chemical compatibility notes of your threadlocker of choice for more information.

Required Tools (Not Included)

- #2 Phillips head screwdriver
- Wire cutters or scissors (for cutting zip ties)
- Medium-strength (blue) threadlocker such as Loctite 243 (https://www.amazon.com/Loctite-1330799-Resistant-thread-locker-6-milliliter/dp/B004L439FE/ref=sr_1_1?ie=UTF8&qid=1466440165&sr=8-1&keywords=loctite+243+thread-locker)
- Isopropyl alcohol or isopropyl alcohol wipes

- 2 mm flat head screw driver

What's Included

Frame

Quantity	Part	Usage
2	Front center panel (1/2" thick black HDPE)	
2	Rear center panel (1/2" thick black HDPE)	
1	Bottom panel (1/2" thick black HDPE)	
2	Side panel (3/8" thick black HDPE)	
2	Enclosure Cradle (4" Series) (black anodized aluminum)	Mounting the electronics enclosure to the frame
8	M4x18 socket head cap screw (316 stainless steel)	Mounting the electronics enclosure cradles to the frame
12	M5x16 button head cap screw (316 stainless steel)	Assembling the frame
7	8-16 thread, 5/8" long, thread-forming screw	Mounting the ballast to the frame
7	Ballast Weight (200g, 7 oz)	

Electronics Enclosure

Quantity	Part	Usage
1	Electronics Tray (4" Series)	
1	Watertight Enclosure for ROV/AUV w/ Dome End Cap installed	Electronics enclosure
1	Aluminum End Cap with 14 Holes w/ 3 Cable Penetrator Blank, 1 Bar30 Pressure Sensor, 1 Enclosure Vent and Plug, and 1 power cable (installed)	
1	Set of tether board power wires (installed)	Provided power to the tether board
4	M3x16 socket head cap screw (316 stainless steel)	Mounting the electronics enclosure to the electronics enclosure cradle
1	Fathom-X Tether Interface Board installed	Long distance ethernet connection
1	3DR Pixhawk (installed)	Autopilot
1	I ² C Splitter with cable	Allows for up to 4 I ² C devices
1	Raspberry Pi 3 (installed)	Companion computer
1	Low-Light HD USB Camera (installed)	Camera
1	Pixhawk Power Module (installed)	Powers the Pixhawk and monitors current and battery voltage
2	Universal Battery Elimination Circuit (UBEC) (installed)	Powers the Raspberry Pi and Pixhawk servo rails

Battery Enclosure

Quantity	Part	Usage
2	Enclosure Clamp (3" Series) (black anodized aluminum w/ rubber strip)	Mounting the battery enclosure to the frame
1	Watertight Enclosure for ROV/AUV (3" Series)	Battery Enclosure
1	Aluminum End Cap (3" Series)	
1	Aluminum End Cap with 4 Holes (3" Series) w/ 2 blank penetrators and 1 vent installed (anodized aluminum 6061)	

Quantity	Part	Usage
1	XT90 to 3.5 mm bullet connector adapter	Adapting power wire connector to battery connector
4	M4x14 socket head cap screw (316 stainless steel)	Mounting the battery cradle to the frame
4	M3x12 socket head cap screws (316 stainless steel)	Connecting the battery cradles to each other
1	1 1/2" long x 3/8" diameter heat shrink	Battery cable strain relief
2	1 1/2" long x 3/8" diameter heat shrink	Battery cable strain relief

Thrusters

Quantity	Part	Usage
3	T200 Thrusters w/ Clockwise Propeller installed	
3	T200 Thrusters w/ Counter-Clockwise Propeller installed	
6	Cable Penetrator Nut	Penetrator nuts for Thrusters (Located in packaging with Thrusters)
6	O13 O-ring	Penetrator O-rings for Thrusters (Located in packaging with Thrusters)
16	M3x16 socket head cap screw (316 stainless steel)	Mounting thrusters 1, 2, 3, and 4 to the frame
8	M3x12 socket head cap screw (316 stainless steel)	Mounting thrusters 5 and 6 to the frame
30	5 1/2" zip ties (nylon)	Routing the thruster and lumen cables

Fairings

Quantity	Part	
4	BlueROV2 Fairings (blue polycarbonate)	
4	Subsea Buoyancy Foam (R-3318 urethane foam)	
16	#4 size, 3/4" long pan head self tapping screw (316 stainless steel)	Mounting the fairings and buoyancy to the frame

Tether

Quantity	Part	Usage
1	Fathom Tether w/ installed Cable Penetrator for 8 mm Cable (25-300m)	
1	Tether Cable Thimble	Mounting the tether to the frame
5	Heavy Duty Zip Ties	Mounting the tether to the thimble and frame

Tools

Quantity	Part	Usage
1	Silicone Grease - 10g Tube	Lubricate O-rings prior to installation
1	O-Ring Pick	Remove and install O-rings
1	2.5 mm hex driver	Install M3 screws
1	#1 Phillips head screwdriver	Install the fairing screws
1	Penetrator Wrench	Install penetrators
1	1.5 mm hex key	Thruster disassembly
1	2 mm hex key	Change propellers
1	3 mm hex key	Install M4 and M5 screws

Quantity	Part	Usage
1	MicroSD to SD Adapter	
1	Hand Operated Vacuum Pump (Included as of January 2018)	Pressure test WTEs

Lights

Quantity	Part
1-2	Lumen Subsea Light w/ Mounts (Pair, Pre-Connected) (Optional)

SOS Leak Sensor

Quantity	Part
1	SOS Leak Sensor Probe Host Board (installed)
2	6" Probe (installed)
2	12" Probe (installed)
20	Replacement SOS Probe Tips
1	Test Cable

Desiccant

(Added to all ROVs ordered after February 14, 2018)

Quantity	Part
1	150 gram container of Moisture Indicating Silica Gel Desiccant
3	Desiccant Bags

Spares (Added to all ROVs ordered after February 14, 2018)

Quantity	Part	Usage
2	Cable Penetrator Blank	Fill the hole for Lumen Penetrator if you aren't using Lumens
2	O13 O-ring	Extra penetrator O-rings
2	Cable Penetrator Nut	1x Used for Battery Cable in Battery Enclosure / 1x Used with Cable Penetrator Blank if you aren't using Lumens

What You Need for Operation that is Not Included

There are some items necessary for operation that are not included with the kit.

- A gamepad controller. We recommend this Xbox One Controller (https://www.microsoft.com/en-us/store/d/xbox-wireless-controller/8vcw8gln9vrf/ljvk?cid=msft_web_collection&activetab=pivot%3atechspecstab) or this Logitech Gamepad (<http://gaming.logitech.com/en-us/product/f310-gamepad>).
- A laptop or a Windows 10 tablet. QGroundControl works on Mac, Windows 10, and Linux.
- A battery for the BlueROV2. We recommend getting our 18Ah Lithium-ion Battery (<https://www.bluerobotics.com/store/rov/bluerov2/battery-li-4s-18ah-r2-rp/>) or 2 or 3 of these (http://www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idProduct=56844)
- A battery charger, such as our Lithium Battery Charger (<http://www.bluerobotics.com/store/electronics/batteries/lithium-battery-charger/>).
- A USB Cable - A-Male to Mini-B (any length) such as this one (https://www.amazon.com/AmazonBasics-USB-2-0-Cable-Male/dp/B00NH13S44/ref=sr_1_3?s=electronics&ie=UTF8&qid=1525883524&sr=1-3&keywords=mini+usb+cable)
- An Ethernet Patch Cable (any length) such as this one (https://www.amazon.com/AmazonBasics-Network-Ethernet-Patch-Cable/dp/B013PUMQYY/ref=sr_1_1_sspa?ie=UTF8&qid=1525883675&sr=8-1-spons&keywords=ethernet+cable+3ft&psc=1)

Assembling the Frame

Mounting the Battery Enclosure to the Bottom Panel

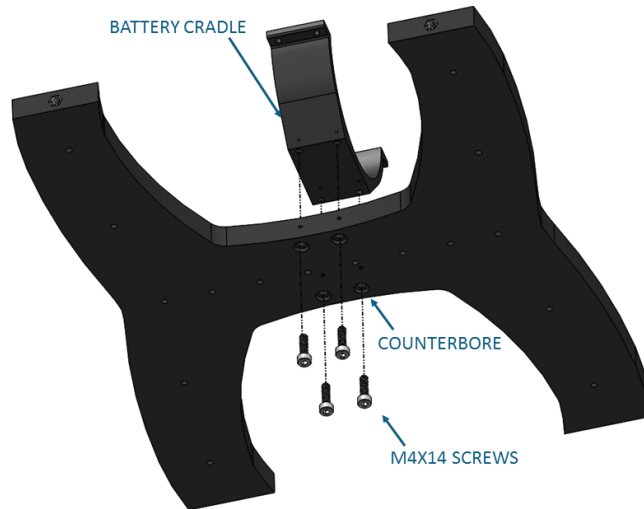
To mount the battery enclosure to the bottom panel you will need the following parts and tools:

- 2 x Enclosure Clamp (3" Series)
- 1 x Threadlocker
- 1 x Bottom panel
- 1 x Bag with four M4x14 socket head cap screws and four M3x12 socket head cap screws
- 1 x Watertight Enclosure for ROV/AUV (3" Series)
- 1 x 3 mm hex key
- 1 x 2.5 mm hex driver

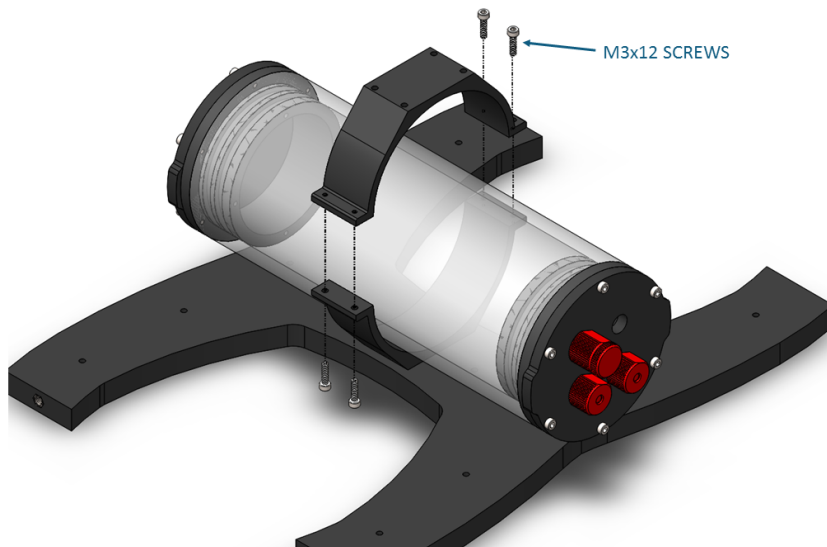
1. Remove the Aluminum End Cap with 4 Holes (3" Series) to open the Watertight Enclosure for ROV/AUV (3" Series) and set the bags inside of it to the side, except for the bag with four M4x14 and four M3x12 screws in it.
2. Apply one drop of threadlocker to the bottom of each M4x14 socket head cap screw. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.



3. Attach one of the Enclosure Clamps (3" Series) to the bottom panel using the four M4x14 socket head cap screws. Be sure that the screw head is in the counterbore (<https://en.wikipedia.org/wiki/Counterbore>). The bottom panel is only counterbored on one side. Tighten the screws until you can feel them start to dig into the bottom panel.



4. Apply one drop of threadlocker to each of the 4 M3x12 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
5. Place the Watertight Enclosure for ROV/AUV (3" Series) between the two Enclosure Clamps (3" Series). The Enclosure Clamps have tapped holes on one side and untapped holes on the other. Install the four M3x12 screws into the Enclosure Clamps (3" Series) so that the screws pass through the untapped holes on the first clamp and are secured into the tapped holes on the alternate clamp. Install all four screws loosely at first and then slowly tighten them on both sides evenly. Take care not to overtighten the screws. Keep the battery enclosure approximately centered in the Enclosure Clamps (3" Series).



When you are finished tightening the screws, both sides should look similar to this.

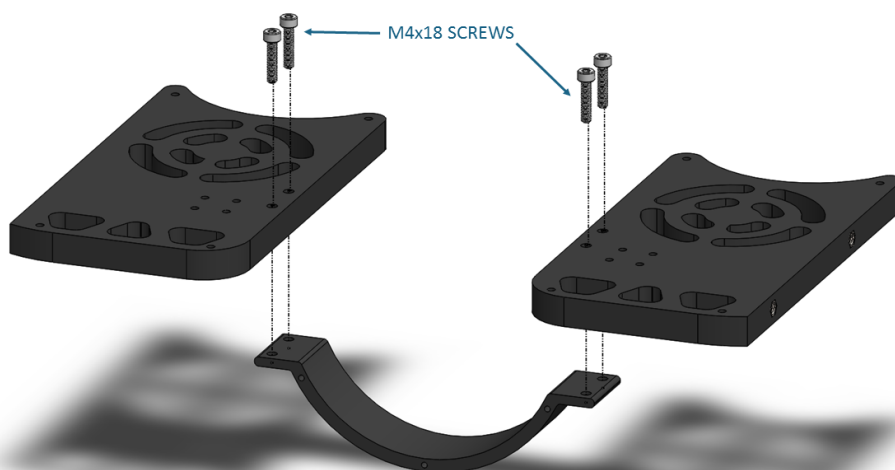


Assembling the Center Panels

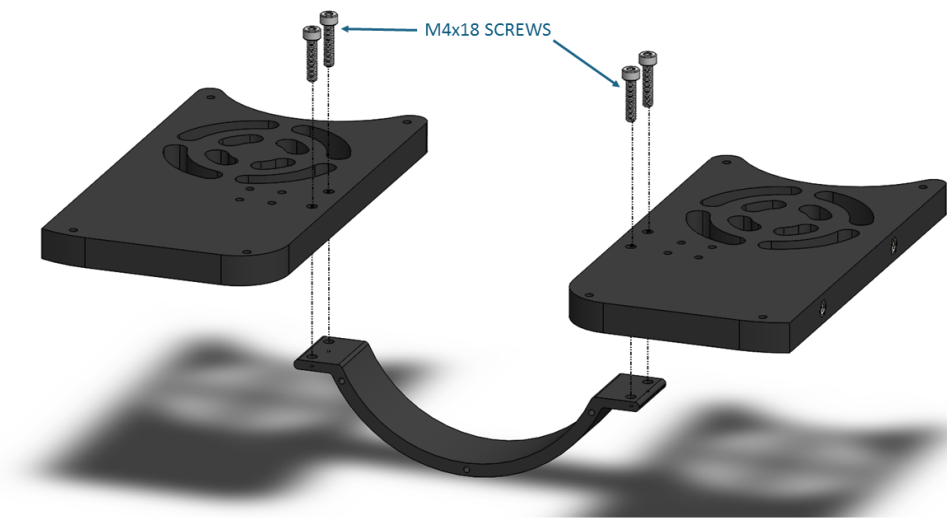
To assemble the center panels you will need the following parts and tools:

- 2 x Enclosure Cradle (4" Series)
- 2 x Front center panels
- 2 x Rear center panels
- 1 x Threadlocker
- 1 x Bag with eight M4x18 socket head cap screws
- 1 x 3 mm hex key

1. Apply one drop of threadlocker to each of the eight M4x18 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
2. Attach one of the Enclosure Cradle (4" Series) to the rear center panels. Tighten the screws until they indent the rear center panels slightly.



3. Attach the other Enclosure Cradle (4" Series) to the front center panels. Tighten the screws until they indent the front center panels slightly.

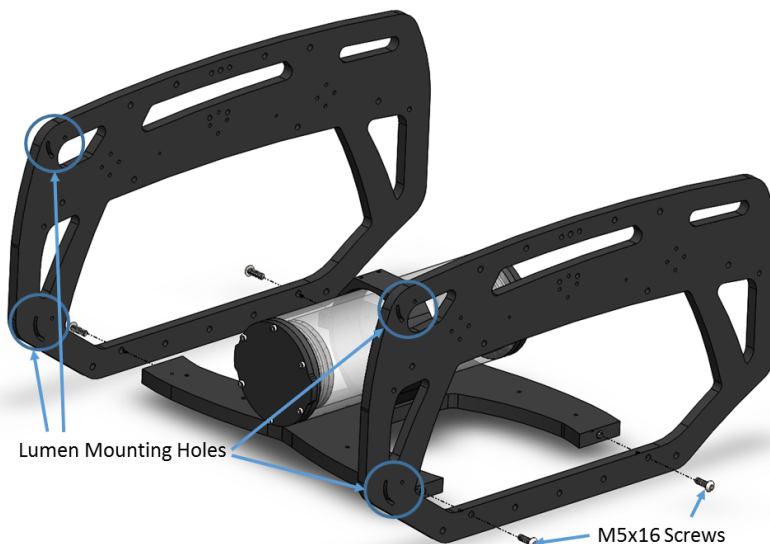


Assembling the Frame

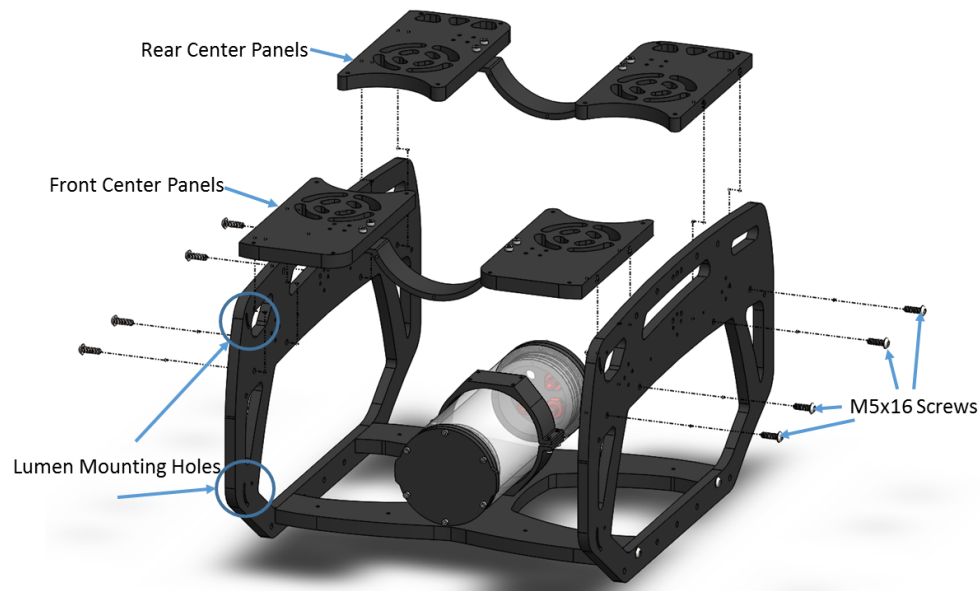
To assemble the frame you will need the following parts and tools:

- 1 x Threadlocker
- 1 x Bag with 12 M5x16 button head cap screws
- 2 x Side panels
- 1 x Bottom panel with the Watertight Enclosure for ROV/AUV (3" Series) installed
- 1 x Front center panel assembly
- 1 x Rear center panel assembly
- 1 x 3 mm hex key

1. Apply one drop of threadlocker to each of the 12 M5x16 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
2. Install both side panels to the bottom panel using four of the M5x16 screws; the Aluminum End Cap (3" Series) on the Watertight Enclosure for ROV/AUV (3" Series) should be on the same side as the Lumen mounting holes. **It is very important to avoid overtightening these screws.** Tighten these screws using the provided 3 mm hex key. Hold the short end of the 3 mm hex key while you are tightening the M5x16 screws. Do not tighten beyond the tightness you can achieve holding the short end of the 3 mm hex key.



3. Install the center panel assemblies to the side panels using the remaining eight M5x16 screws. **It is very important to avoid overtightening these screws.** Tighten these screws using the provided 3 mm hex key. Hold the short end of the 3 mm hex key while you are tightening the M5x16 screws. Do not tighten beyond the tightness you can achieve holding the short end of the 3 mm hex key.



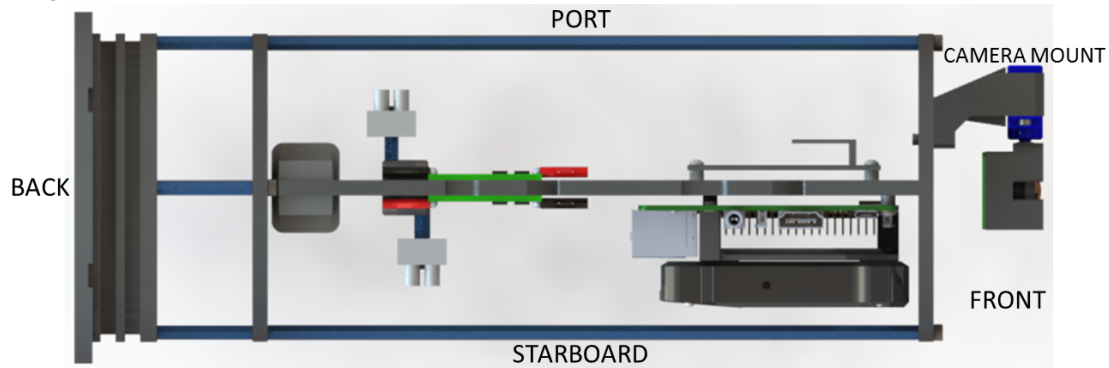
Now the BlueROV2 should look like the picture below.



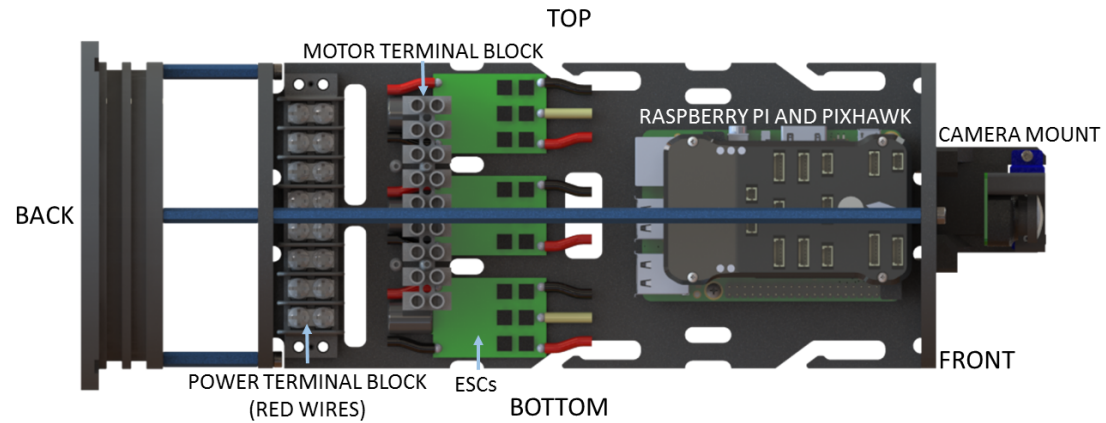
Electronics Enclosure Overview

The images below show orientation of the main pieces of hardware in the electronics enclosure. They also point out the names of several of the important parts for assembly that will be discussed in the remaining instructions.

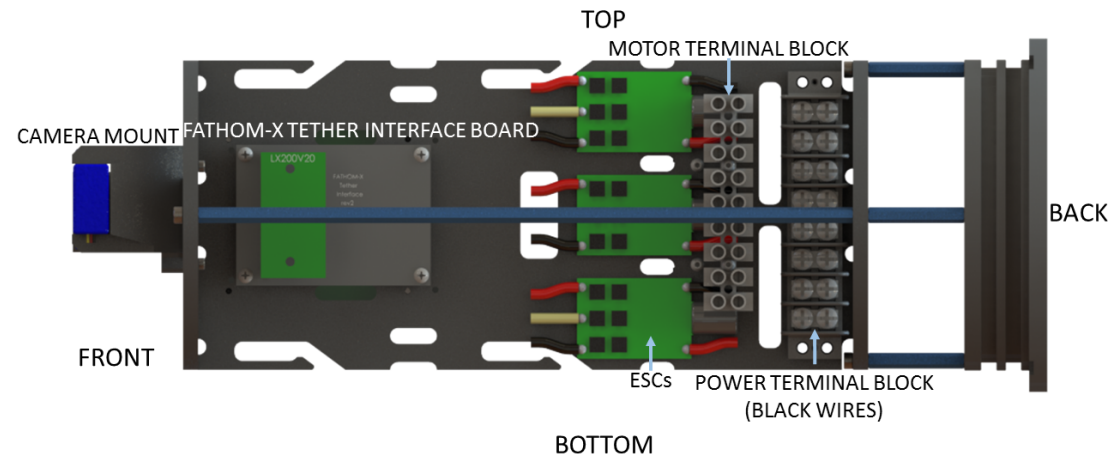
Top View



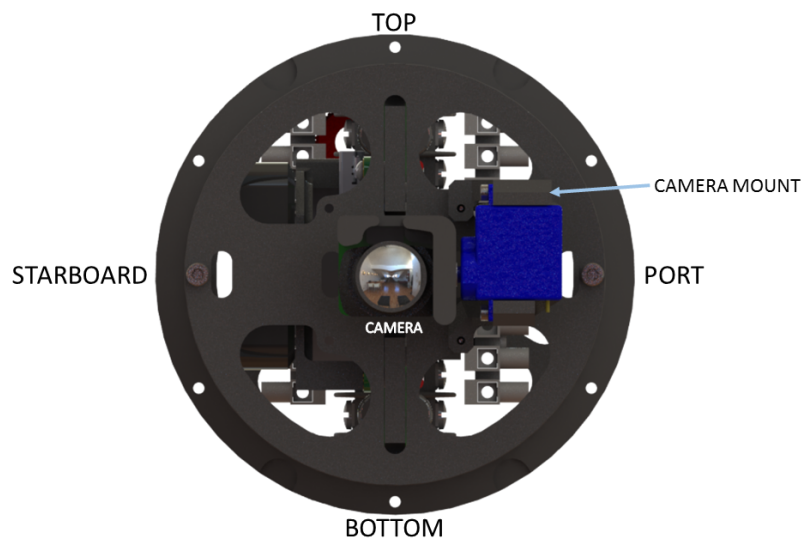
Starboard View



Port View



Front View



Connection diagrams

These diagrams outline all of the electrical connections between components in the ROV. There is a different diagram for each version of the ROV that Blue Robotics has produced.

- BlueROV2 with red-wire (BEC) ESCs (/brov2/cad/connections/BlueROV2_bec.pdf) (Pre-2018)
- BlueROV2 with no-red-wire ESCs (/brov2/cad/connections/BlueROV2_no_bec.pdf) (2018 and later)
- BlueROV2 Heavy (/brov2/cad/connections/BlueROV2_heavy.pdf)

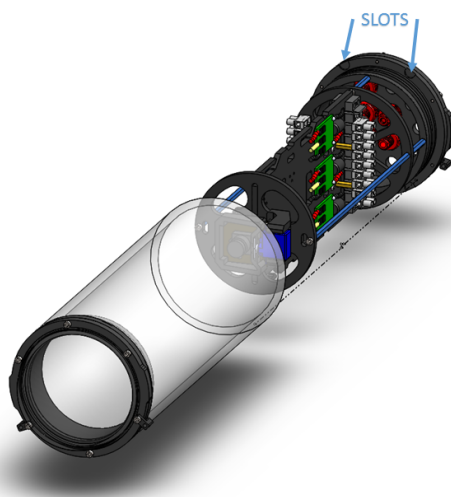
Installing the Cables

Removing the Electronics Enclosure Endcap

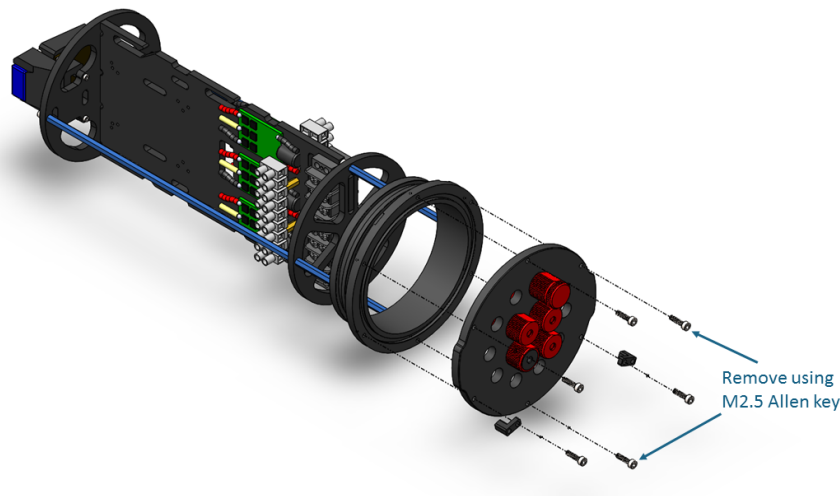
The endcap will need to be removed from the electronics enclosure in order to install the cable penetrators. To remove the endcap you will need the following parts and tools:

- 1 x Large flat head screw driver (Optional)
- 1 x The electronics enclosure assembly
- 1 x 2.5 mm key driver

1. Remove the Watertight Enclosure for ROV/AUV with Dome End Cap installed from the rear O-Ring Flange (4" Series). If this step is difficult, you can place a large flat head screwdriver into the slots on the O-Ring Flange (4" Series), and then twist to get a gap between the acrylic tube and the O-Ring Flange (4" Series). Once you have the gap, you can wedge a screw driver between the end of the acrylic tube and the O-Ring Flange (4" Series) to finish removing the acrylic tube.



2. Remove the Aluminum End Cap with 14 Holes by removing the six M3x12 screws using the M2.5 hex driver. Place the M3x12 screws, clips (small L-shaped parts), and face seal O-ring in a safe place.

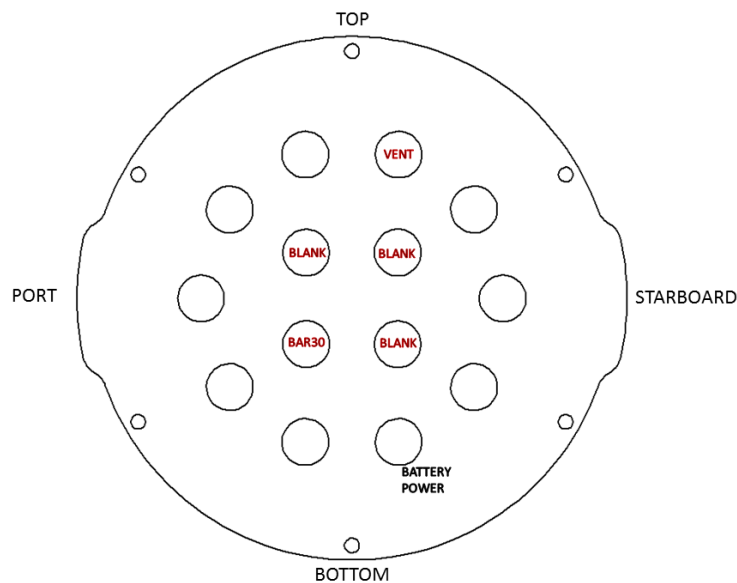


Installing the Penetrators

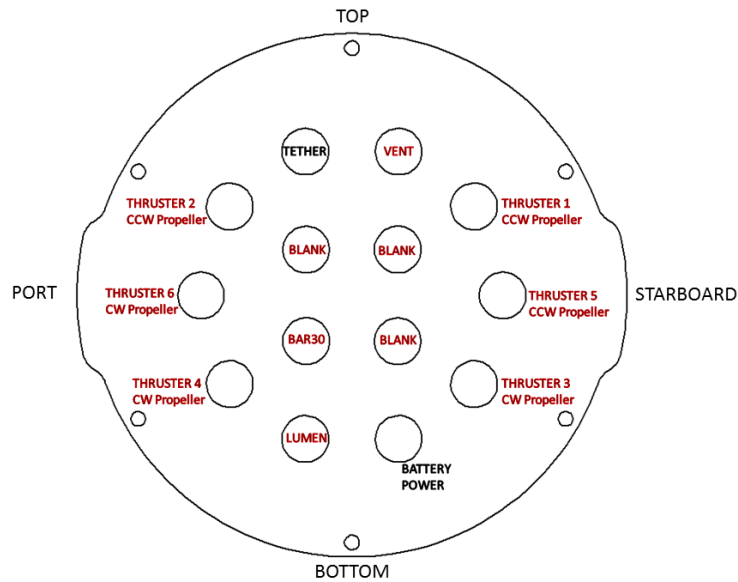
To install the Penetrators you will need the following parts and tools:

- 1 x Cable Penetrator Nut (Black for Standard Tether/Red for Slim Tether), and O-ring from one end of the Tether
- 6 x Cable Penetrator Nut (red), and O-ring from bag inside each Thruster tube packages
- (Optional if no Lumens) 1 x Cable Penetrator Nut (red) and O-ring from spares bag
- 1 x Silicone Grease - 10g Tube
- 1 x Aluminum End Cap with 14 Holes w/ 3 Cable Penetrator Blanks, 1 Bar30 Pressure Sensor, 1 Enclosure Vent and Plug, and 1 power cable installed
- 3 x T200 with counter-clockwise thrusters
- 3 x T200 with clockwise thrusters
- 1 x Set of Lumen lights (optional)
- 1 x Fathom ROV Tether
- 1 x Penetrator Wrench

The Aluminum End Cap with 14 Holes comes with 3 Cable Penetrator Blanks, 1 Bar30 Pressure Sensor, 1 Enclosure Vent and Plug, and 1 power cable installed.



If you install the remaining penetrators as shown in the diagram below, it will keep everything neat and organized.



1. Remove eight of the O-rings and apply silicone grease to them. Keep the other O-ring in the bag, you will need it in a minute.

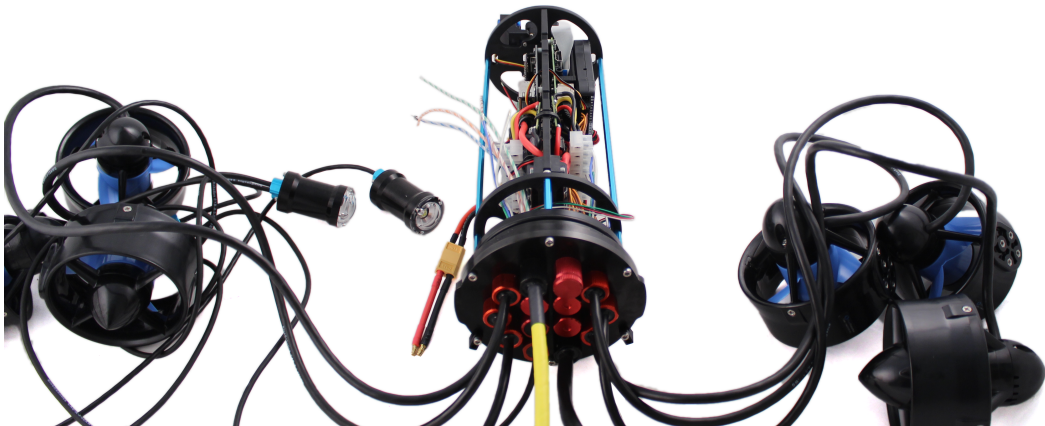


2. Wipe the exterior surface of the electronics enclosure endcap clean with isopropyl alcohol or isopropyl alcohol wipes, and make sure it is free of any particles in the areas where the penetrator O-rings will sit.
3. Install the O-rings onto all of the thruster penetrators, the lumen penetrator, and the tether penetrator.
4. Install the penetrators to the end cap in the order shown below. Tighten to finger tight, then use the provided wrench to tighten them an additional $\sim 1/16$ of a turn. If you can't loosen them with your fingers, they are tight enough.
 1. Thruster 1 (CCW propeller) with red penetrator nut
 2. Thruster 5 (CCW propeller) with red penetrator nut
 3. Thruster 3 (CW propeller) with red penetrator nut
 4. Lumen with red penetrator nut (or Blank Penetrator (red) if not installing Lumens)
 5. Thruster 4 (CW propeller) with red penetrator nut
 6. Thruster 6 (CW propeller) with red penetrator nut
 7. Thruster 2 (CCW propeller) with red penetrator nut
 8. Tether with black penetrator nut (standard Tether) or red penetrator nut (Slim Tether)

Installing the End Cap

To reinstall the Aluminum End Cap with 14 Holes you will need the following parts and tools:

- The face seal O-ring, the 6 M3x12 screws, and the clips that you removed from the end cap earlier
 - 1 x Silicone Grease - 10g Tube
 - 1 x Aluminum End Cap with 14 Holes with all Cable Penetrators and Blank Penetrators installed
 - 1 x 2.5 mm hex driver
1. Clean the O-ring and make sure that it is free of any debris or damage.
 2. Clean the O-Ring Flange (4" Series) and make sure that the O-ring groove is free of any debris or damage.
 3. Apply Silicone grease to the O-ring.
 4. Install face seal O-ring onto the O-Ring Flange (4" Series).
 5. Apply one drop of threadlocker to each of the M3x12 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
 6. Install Aluminum End Cap with 14 Holes with all Cable Penetrators and Blank Penetrators installed onto the O-Ring Flange (4" Series). Do not fully tighten any screws when first installing them; it may cause the O-ring to slip out of its groove. The end cap's orientation when installed should match the image below. Make sure that the clips are oriented correctly. One should be just right of the Thruster 3 penetrator, and the other should be just left of the Thruster 4 penetrator.

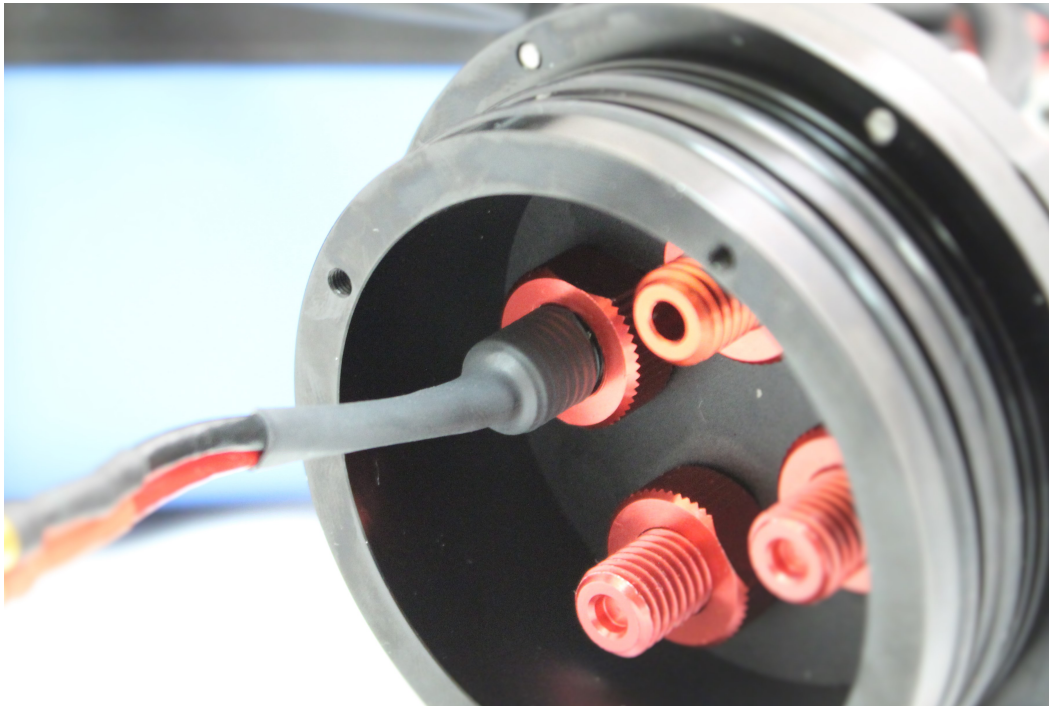


Finishing the Battery Enclosure

To complete the assembly of the battery enclosure you need the following parts and tools:

- 1 x Bag labeled "Extra Blank Penetrators [2]"
 - 1 x Silicone Grease - 10g Tube
 - 1 x End Cap with 4 Holes (3" Series)
 - 1 x Penetrator wrench
 - 1 x XT90 to 3.5 mm bullet connector adapter
 - 1 x 1.5 inch piece of heat shrink
 - 1 x Heat gun, hairdryer, or lighter
1. Apply silicone grease to the O-ring.
 2. Install the O-ring onto the battery power cable penetrator.
 3. Install the battery power cable penetrator into the opening in the battery end cap.
 4. Install one Cable Penetrator Nut (Red) on to the battery power cable penetrator and tighten with penetrator wrench.

5. Place the 1.5 inch long piece of black heat shrink over the end of the battery power cable penetrator.
6. Apply heat to the heat shrink using your heat gun, hairdryer, or lighter until the heat shrink is firmly attached to the penetrator and snug to the two wires. You should be able to see the threads in the penetrator through the heat shrink.



7. Install the XT90 to bullet connector adapter to the battery power wire.



8. If you wish to do the Optional Preliminary Vacuum Test, remove the Vent Plug from the Vent Penetrator Bolt and install the endcap onto the battery enclosure. You will also need to remove the Vent Plug for the Vent Penetrator Bolt on the electronics enclosure.

Optional Preliminary Vacuum Test

This is the best point in the assembly process to perform a vacuum test. Since you have installed all of the penetrators, but have not done any of the wiring, troubleshooting will be as easy as possible. You will need to use the vacuum pump that comes with the kit.

1. Install the Watertight Enclosure (4" Series) with installed Dome onto the O-Ring Flange (4" Series) that is attached to the Aluminum End Cap with 14 Holes (4" Series)



2. Assemble the vacuum tee.

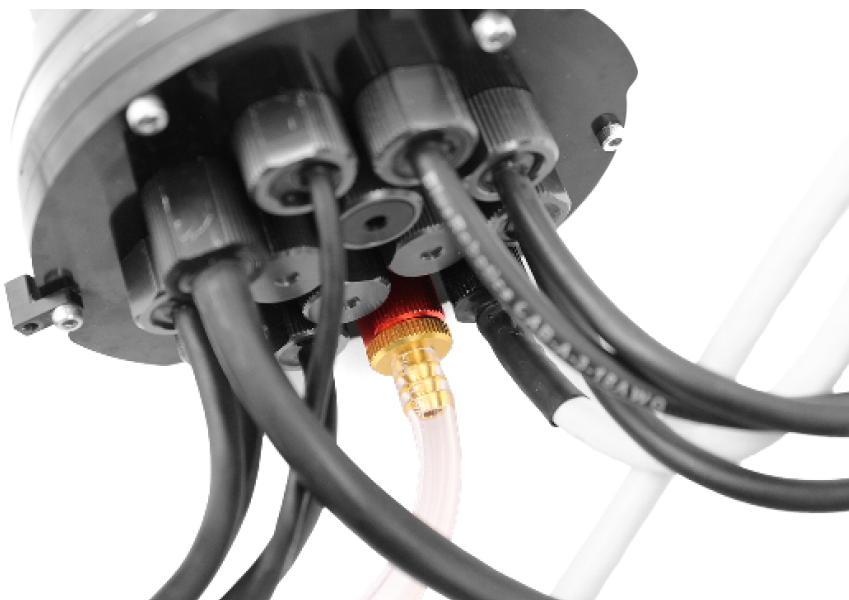


Now you are ready to perform the preliminary vacuum test.

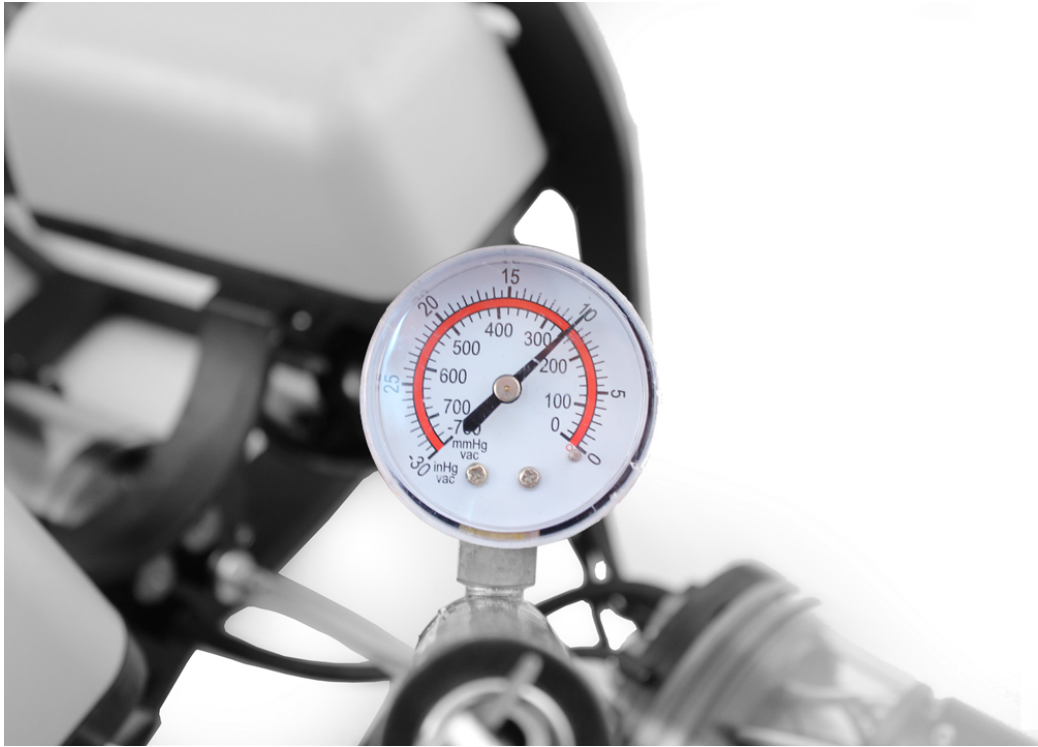
1. Test your vacuum pump to ensure that it is not leaking. See our Testing the Test Setup Tutorial (<http://docs.bluerobotics.com/tutorials/vacuum-test-plug/#testing-the-test-setup>) for detailed instructions.
2. Insert one of the vacuum plugs into the battery enclosure vent penetrator.



3. Insert the other vacuum plug into the electronics enclosure vent penetrator.



4. Pump the vacuum until the gauge reads 10 in. Hg [34 kPa] vacuum. If you cannot pull a vacuum, try the suggestions following step 6, below.



5. Let the BlueROV2 and pump sit for 15 minutes.
6. If the gauge reads above 9 in. Hg [31 kPa] after 15 minutes, your seals are acceptable.



If the gauge reads below 9 in. Hg [31 kPa] vacuum after 15 minutes, you should check the following:

1. Make sure that the M3 screws on the front and back end caps of the battery and electronics enclosure using the M2.5 hex driver. If you are able to tighten one or more, attempt the vacuum test again.
2. Make sure that the penetrators on the battery and electronics enclosure are fully tightened. Check by attempting to loosen by hand. If you are able to loosen one or more, tighten them then attempt the vacuum test again.
3. Make sure that all of the O-rings are installed in the penetrators. If any are missing, install then attempt the vacuum test again.

4. Check that the face seal O-rings and radial O-rings are installed in the battery and electronics enclosures and in good condition. If you find a damaged or missing O-ring, install and attempt the vacuum test again.

If you are still having trouble holding vacuum, please contact us at support@bluerobotics.com (<mailto:support@bluerobotics.com>)

To continue assembling the BlueROV2, remove the acrylic tube and dome from the electronics enclosure.

Installing the Power Wires from the Penetrators

To install the wires from the penetrators you will need the following parts and tools:

- 1 x Large (~#2) Phillips head screw driver
1. Connect the battery power bullet connectors to bullet connectors on XT60 to bullet connector adapter.
 2. Connect the Lumen power wire (red) to the Power Terminal Block with the other red wires. Use the rear screw terminal that is second from the bottom. To help keep the cable routing neat, bring the cable through the ESC wires and take out most of the slack.
 3. Connect the Lumen ground wire (black) to the Power Terminal Block with the other black wires. Use the rear screw terminal that is second from the bottom. To help keep the cable routing neat, bring the cable through the ESC wires and take out most of the slack.

Installing the Signal Wires from the Penetrators

To install the wires from the penetrators you will need the following parts and tools:

- 1 x Small (~2 mm) flat head screw driver
1. Connect the Lumen signal wire to the Pixhawk channel 7 with the yellow wire oriented toward the bottom of the Pixhawk.
 2. Connect the Bar30 cable to the I²C port on the Pixhawk.
 3. Connect the motor wires to the motor wire terminal block, as shown in the diagrams below.
 4. Connect the tether wires to the Fathom-X Tether Interface Board. The other 6 wires can do not need to be connected to anything the operate the ROV. They are for future expansion.

If you received your BlueROV2 prior to March 14th, 2017 you will need to install the SOS Leak sensor using the archived instructions. ([/brov2/assembly-pre201703/#installing-the-sos-leak-sensor](#))

Cable Routing

To route the cables in the Electronics Enclosure so that they will not snag on the Watertight Enclosure for ROV/AUV (4" Series) with Dome End Cap installed you will need the following parts and tools:

- 3 x 5 1/2" zip ties
 - 1 x Wire strippers or scissors
1. On the starboard side (Pixhawk side) collect the Bar30 wires and the Lumen signal wire and zip tie them to the long hex standoff slightly forward of the Motor Terminal Block using one zip tie. Make sure that the locking head of the zip tie and the wires are oriented to the inside of the long hex standoff.

2. On the port side (Fathom-X Tether Interface Board side) collect the Fathom Tether wires and zip tie them to the long hex standoff approximately even with the back of the Fathom-X Tether Interface Board and approximately even with the Motor Terminal Block. Make sure that the locking heads of the zip ties and the wires are oriented to the inside of the long hex standoff.

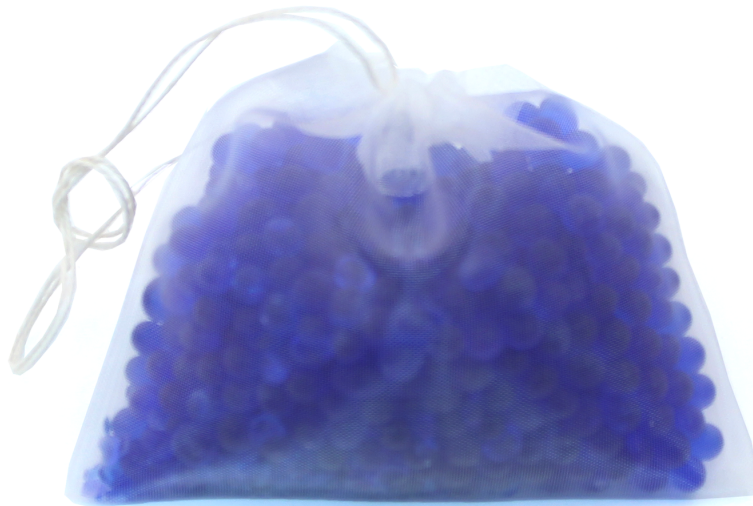
Final Assembly

Adding Desiccant to the Electronics Enclosure

If you ordered your BlueROV2 prior to February 14, 2018 you will need to order Moisture Indicating Silica Gel Desiccant (<https://bluerobotics.com/store/tools/desiccant-r1/>) in order to complete this step. This step is optional, but it will improve the usability of the BlueROV2, especially if you are planning on operating your ROV in humid environments with cold water.

The desiccant will absorb humidity that is inside of the Electronics Enclosure to prevent the dome from fogging up during dives. It will turn pink as it absorbs humidity.

1. Fill one of the Desiccant Bags with Moisture Indicating Silica Gel Desiccant and close the draw string. Make sure that you close the lid of the Moisture indicating Silica Gel Desiccant after you have filled the bag. It will become saturated in about a day if left open to air.



1. Install the desiccant bag near the Fathom-X Tether Interface. This step will have to be combined with installing the Watertight Enclosure (4" Series) over the Electronics Tray since the bag will be "floating" inside of the enclosure

[Pictures Coming Soon]

Mounting the Electronics Enclosure onto the Frame

To mount the Electronics Enclosure to the frame you need the following parts and tools:

- 1 x Watertight Enclosure for ROV/AUV (4" Series) with Dome End Cap installed
 - 1 x Threadlocker
 - 1 x Bag with four M3x16 screws
 - 1 x 2.5 mm hex driver
1. Apply silicone grease to the two radial O-rings on the O-Ring Flange (4" Series) that is attached to the Electronics Tray then install the Watertight Enclosure (4" Series) with installed Dome End Cap to the O-Ring Flange (4" Series).
 2. Apply one drop of threadlocker to each of the four M3x16 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
 3. Mount the Electronics Enclosure to the frame using the M3x16 screws so that the dome is on the same side as the front center panels (the center panels *without* the 3 large holes). Install the M3x16 screws through the clips and into the Enclosure Cradle (4" Series). It is easier to install these screws if the clips are not fully tightened until all screws are through the clips and threading into the Enclosure Cradle (4" Series). This allows to clips to rotate so you can find the threaded hole in the Enclosure Cradle (4" Series) easily.

Mounting the Thrusters to the Frame

If you ordered your BlueROV2 prior to September 13, 2017, see the archived thruster mounting instructions here (</brov2/assembly-pre201703/#mounting-the-thrusters-to-the-frame>). Once you have mounted the thrusters, please return to these instructions to continue with mounting the lights (</brov2/assembly/#mounting-the-lights>).

To mount the thrusters to the frame, you need the following parts and tools:

- 1 x 2.5 mm hex driver
- 3 x T200 Thruster with Clockwise Propeller installed
- 3 x T200 Thruster with Counter-Clockwise Propeller installed
- 1 x Bag with 16 M3x16 screws and 8 M3x12 screws in smaller bag
- 1 x Assembled ROV frame

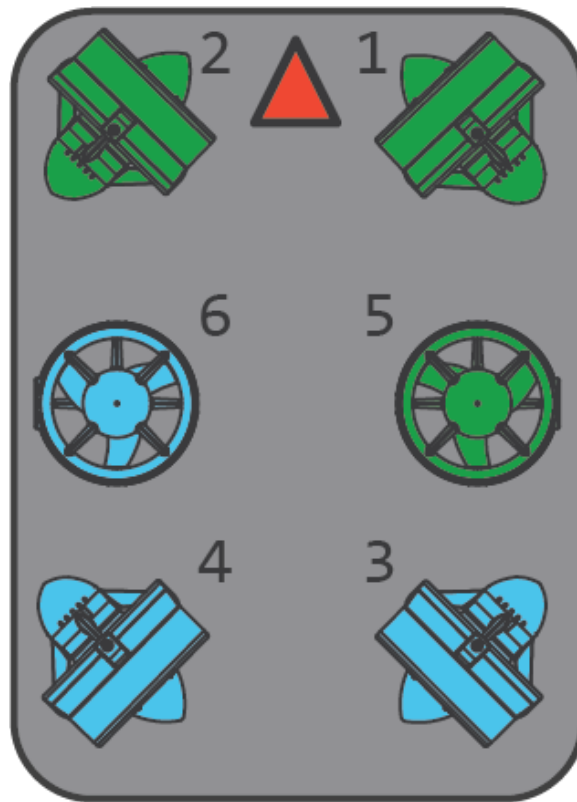
Note: If you received your BlueROV prior to March 14th, 2017 you will need to install the Counter-Clockwise Propellers. See the archived instructions (</brov2/assembly-pre201703/#changing-the-propellers>) for details.

The horizontal thrusters have two mounting options. One is at a 45° angle to forward, and the other is at a 30° angle to forward. The thrusters mounted at 45° will give you equal thrust in all directions. Mounting the thrusters at 30° will give you 25% more forward thrust in exchange for 25% less thrust in strafing. To mount the thrusters at 45° use the holes shown in the picture below. The hole with the asterisk is the hole that should be closest to the nose cone on the thruster.

To mount the thrusters at 30° use the holes shown in the pictures below. The hole with the asterisk is the hole that should be closest to the nose cone on the thruster.

For the sake of clarity, the hole with the asterisk on the thruster shown below is the hole that is closest to the nose cone.

Here is a diagram of where the thrusters go, and how they should be oriented. The green thrusters should have counter-clockwise propellers and blue thrusters should have clockwise propellers. The order of installation matters here. You cannot get the front thrusters on if the rear ones were installed first.



1. Install thrusters 1 and 2 underneath the front center panels, using the M3x16 screws. Tighten the screws so that they indent the frame slightly. It is physically possible to keep turning the screw at this point, but it isn't recommended. DO NOT use threadlocker unless you have threadlocker rated for use with polycarbonate
2. Install thrusters 5 and 6, using the M3x12 screws on the side panels. Tighten the screws so that they indent the frame slightly.
3. Install thrusters 3 and 4 underneath the rear center panels, using the M3x16 screws. Tighten the screws so that they indent the frame slightly.

Mounting the Lights

To install the Lumen mounts you will need the following parts and tools:

- 1 x Bag with the Lumen mounts, O-rings, and four M3x12 socket head cap screws
- 1 x 2.5 mm hex driver
- 1 x BlueROV2 frame
- 1 x Threadlocker

1. Apply one drop of threadlocker to each of the M3x12 screws. Roll the screws around on a paper towel to evenly spread the threadlocker and to remove excess threadlocker.
2. Install the mounts. Make sure not to overtighten the screw that goes into the slot. Only tighten it so that it slightly indents the frame.
3. Loop one of the size 133 O-rings from the bag that had the Lumen Mounts and screws around each Lumen Mount and Lumen as shown below.

Mounting the Tether to the Frame

The tether needs to be firmly mounted to the frame to prevent the tether penetrator from being loosened through normal use. To do this, you will need the following parts and tools:

- 1 x Bag with thimble and 5 large zip ties
- 1 x Fathom Tether
- 1 BlueROV2 frame

1. Loop the tether around the plastic thimble at a point about 12 inches (30 cm) away from the tether penetrator.
2. Firmly attach 3 of the zip ties, alternating directions as they are installed, around the tether right where it enters and exits the thimble. Hold the tether firmly in place against the thimble until it is secured.
3. Attach the thimble to the rear panel as shown

Thruster and Lumen Cable Management

To clean up the thruster and lumen wires, you will need the bag of 30 zip ties and your scissors/wire cutters.

The primary goal of Thruster and Lumen cable management is to prevent the wires from getting cut by the propellers. Make sure to check that no wire can reach a propeller after you have finished routing the cables. Below are some examples of what the cable routing should look like.

Installing the Fairings and Buoyancy

The buoyancy comes preinstalled in the fairings, but make sure it is still in all of the fairings prior to installing the fairings. To install the fairings, you will need the following parts and tools:

- 4 x Fairings with buoyancy installed
- 1 x Bag with 16 self tapping screws
- 1 x #1 Phillips head screwdriver

1. Remove the Lumens from their mount. You only need to remove the lower two Lumens from their mount if you have four.
2. Install the screws through the center panels and into the fairings.
3. Reinstall the Lumens.

Mounting Ballast to the Frame

To mount the ballast to the frame you need the following parts and tools:

- 7 x 200g ballast weights
- 7 x 8-16 Thread, 5/8" Long, Thread-Forming Screw
- 1 x #2 phillips head screwdriver

To get the longest battery life and the best driving experience, it is important to have the ROV close to balanced from front to back in water and close to neutrally buoyant. Trimming the ballast may involve a bit of trial and error. The pictures below should provide a good starting point for mounting ballast if you have a stock BlueROV2 with the recommended battery.

(http://www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idProduct=56844)

BlueROV2 with 2 *Lumen* Lights

BlueROV2 with 4 *Lumen* Lights

Topside Setup

To get your topside ready to connect to the BlueROV2 you will need the following parts and tools:

- 1 x Fathom-X Tether Interface Board
- 1 x 2 mm flat head screw driver

- 1 x Computer (Mac, Windows, Linux)
- 1 x Ethernet cable
- 1 x USB to Ethernet adapter (if your computer does not have an Ethernet Port)
- 1 x Mini-USB cable

1. Connect the Fathom Tether to the Fathom-X Tether Interface Board.
2. Connect the Ethernet port of the Fathom-X Tether Interface Board to you computer. If you do not have an Ethernet port on you computer connect the Ethernet port on the Fathom-X Tether Interface Board to a USB to Ethernet adapter then connect the adapter to your computer.
3. Connect your Mini-USB the the Fathom-X Tether Interface Board and to a USB power supply that can supply at least 500 milliamps. Most computer USB ports can do this, but if the "Link" LED does not light up try using a USB charger.

Next Steps

First, set up the software on your topside computer. Please see our Software Setup (/brov2/software-setup/) page.

Next, refer to the Operating Manual (/brov2/operation/) to learn how complete your first dive.

BlueROV2 Main (/brov2/)	Kit Assembly (/brov2/assembly/)	Software Setup (/brov2/software-setup/)
Operating Manual (/brov2/operation/)		
 Datasheet (http://bluerobotics.com/downloads/bluerov2.pdf)		ArduSub.com (http://ArduSub.com)
BlueROV2 Heavy Kit (/brov2-heavy/)	Payload Skid (/payload-skid/)	

