

FLOATBOXX mechanical assembly instruction

Release version

Document v0.2

May 2023

Disclaimer

These are Do-It-Yourself products. Floatboxx is not responsible for damages or harm caused by the proper and/or improper use of these parts. We do our best to make the boxes waterproof, but cannot give guarantees about waterproofness. Test yourbox for waterproofness during and after assembly. Check your box regularly for water ingress. This assembly instruction is not aimed to be complete.

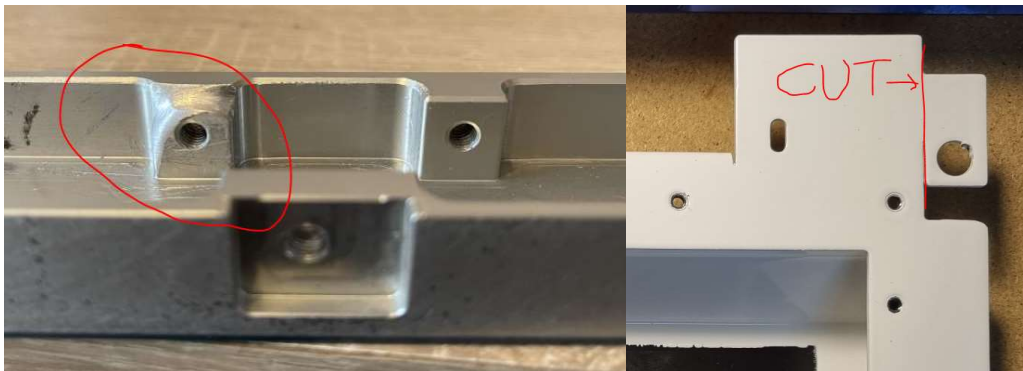
Tips

- Easiest is to first assemble the Floatboxx and then solder your battery cable ! Because you need the cable glands for both steps.
- M5 screws happen to fit inside #10-32 thread. (otherway around is not advised)
- Metric 3 mm allen key (for M5 countersunk screws) happens to fit the #10-32 countersunk screws.
- Stock #10-32 screws are black. We use shiny stainless steel screws for Metric.
- Do not use powertools to screw bolts and nuts !

Known conflicts

We tried to design with all popular accessories in mind to make it easy to install on most combinations. Yet there are still some “collisions” that remain. These can be solved by simply grinding/cutting the conflicting element:

- TFL WTF and Growler rails have an extreme large threaded protrusion for the footpad screw. This collides with the cable gland.
 - Best file the protusion on the rails to not touch the cable gland (see picture)
- BadgerWheel Rails have a small “stop” block in the right rails (similar to the stock left rail) that collides with the cable gland and Floatboxx
 - Best grind away the “stop” block from the right side Tail Rail
- Badger Bumper: the front bumper has an extra ridge near the wheel. This collides with the Floatboxx connector cover.
 - Grind away the plastic ridge from the front Badger Bumper.
- Badger Bumper stainless steel bracket:
 - it is possible that the welding of the Floatboxx collides with the stainless steel bracket. Then the bracket does not fit snug. Grind the bracket (preferably not the Floatboxx).
 - Floatboxx has 2 flaps in front. Possibly they collide too much with the stainless steel bracket. The flaps can be cut off from the Floatboxx (see picture).



Partslist

- Floatboxx pre-series + lid + foamrubber sealing
 - o Including small foam pad, vent stickers, bag of screws (the bag contains min. 1 spare of each)
 - o Optional: JST extension wires, connector cover, cable glands,...
- Little Focer V3 or V3.1 and 1 mm thermal pad
- on/off switch \varnothing 19 mm (pre-wired available from MakersPEV/Customwheel)
- charge plug Neutrik NC3 MPR-HD XLR (pre-wired available from MakersPEV/Customwheel)
- hall/footpad: 2x Switchcraft connectors (pre-rewired available from MakersPEV/Customwheel).
 - o Standard MakersPEV/Customwheel wires (~100mm) are too short, ask them for longer 200 mm wires. Or use the JST extension set from Floatboxx.
- M20x1,5 or PG13,5 messing cable gland with lock nut suitable for XT60. If you slightly grind the 4 corners, a XT60 passes through certain types of M20 cable gland. The XT60 can never fit trough the plastic insert and dome nut of the cable gland. **Also make sure the Dome Nut is 22 mm (not 24).**
- Molex 6-pin with the gasket outside the box:
 - o Build your own
 - Molex CONN PLUG HSG 6POS 5.84MM 194290044, panel mount w/o boss
 - Molex CONN PIN 14-16AWG CRIMP TIN 0194170027, male pin, 6x
 - 4 mm bullets with double AWG14 wires: 90 mm from Molex flange to bullet end
 - o Buy pre-wired in the EU from Customwheel or in the US from Khaos. (contact us for details)



Tools



Flat-nose plier with bend	Allen key screwdriver	Screwdriver	Socket Driver for M3	Socket driver for M4	Spanner 22 mm
Ideally 40° - 200 mm	3 mm	PH1	5,5 mm hex *	7 mm hex	For M20 cable gland

*smallest outside head diameter you can find, to avoid damage to the electronics components!

Installation of connectors

Cable gland for battery cable

1. Place the counternut of the cable gland inside the Floatboxx.
 - a. The 24 mm nut should brace itself or help brace it with a thin plate/screwdriver.
2. Mount the cable gland from the outside and turn it tight with the 22mm spanner or Flat-nose pliers untill it touches the boxx.
3. Keep the plastic/neoprene insert and dome nut on the cable gland for now.

Note 1: if you use PG13,5 (OD 20,4 mm) you might need to make the hole in the Floatboxx larger. Scratch of some paint and aluminum with a deburring tool or a knife. Try to keep the hole round.

Note 2: if the XT60 does not fit through the body of the M20/PG13,5 cable gland, you must slide it over the cable before soldering the XT60 in the cable step !



Charge port

1. Grind the corners of the counternut so it fits inside a circle of $\varnothing 26$ mm (inside height of boxx is $\sim 26,5$ mm). You can use a file or a powertool. Most nuts are made of messing so they are easy to grind. Make sure to keep some of the hexagon intact so you can tighten it still.
2. Place the charge port in the hole in the preferred orientation (use the charger cable to align and hold the port in position)
3. Apply some Loctite on the counternut (against vibrations) and tighten with the Flat-nose pliers.



On/off button

Place in the hole and tighten the counternut with the Flat-nose pliers.

Motor Molex

1. Place the 6-pin Molex on the outside of the box with the clip facing down and over the 2x M4 studs
 - a. Don't forget the rubber gasket in between
2. Use 2x M4 washer and 2x M4 locking nuts. Tighten handtight with a 7 mm socket driver (maximum torque of M4: 4 Nm = 3 lbs.ft)

Note: this type of Molex is not 100% airtight on its own due to the open structure and crimped pins. Flowable silicone should be used to waterproof it, preferably before installing. Refer to Third party waterproofing kits for advise.

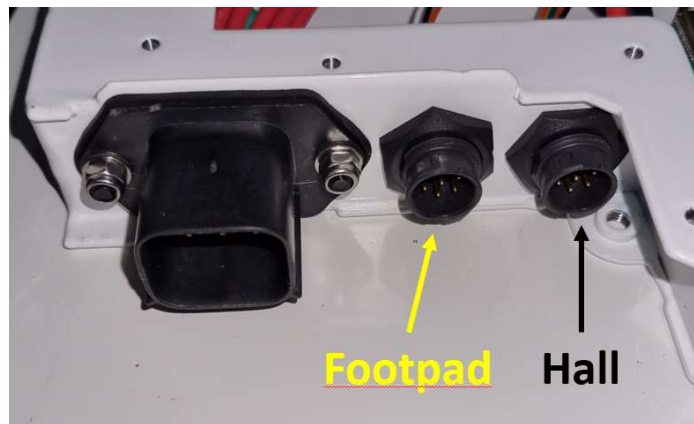
Hall/Footpad connector

Place the connectors from the inside and tighten with counternut on the outside

1. First the hall sensor connector in the right D-shaped hole
2. Then the footpad sensor connector in the left D-shaped hole

Note 1: if the connector does not fit through the hole, scrape some powderpaint from the edge.

Note 2: the D-shape of the connector is minimal, so to keep the orientation, hold the inside of the connector while tightening the nut.



Prepare the lid

Glue the self-adhesive foamrubber on the inside of the lid. Make sure

1. the lid is free of dirt, grease, dust
2. The foamrubber fits nicely within the boundaries of the mounting edge

Note: only about 10 mm edge of the foamrubber is needed to seal the box around, so you could cut out a middle section of the foamrubber before glueing.



Placing the lid

1. Place the lid on the Floatboxx
2. Insert all 16 M3 countersunk screws first, then start tightening them diagonally (like the bolts of a carwheel)
3. Limit the tightening torque for M3 to 1,5 Nm = 1,1 lbf.ft
4. The mounting edge of the lid should touch the mounting flange of the boxx: metal-to-metal.

Testing for waterproofness

Now that all connectors are placed, you could test and fix the waterproofness. Refer to other Third party kits.

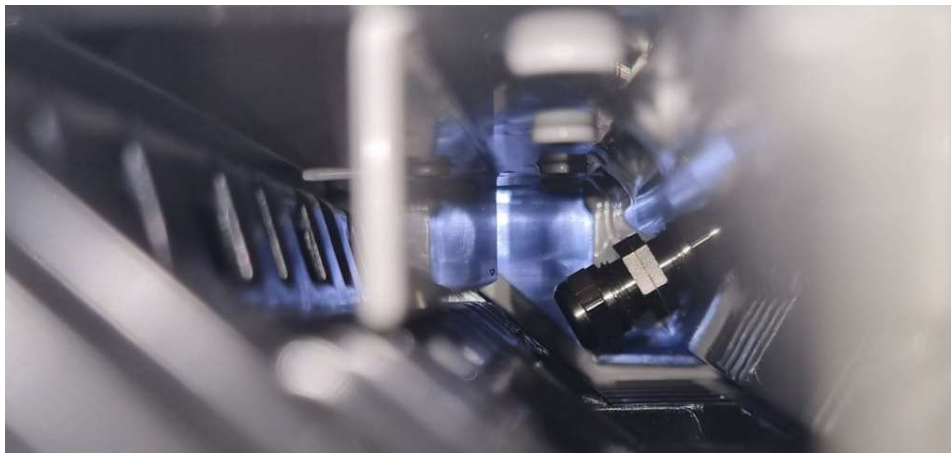
Powdercoating can be tricky for silicone/polymer sealant to stick. You should use a surface activator or thinner or acetone first to chemically roughen the surface. This improves the stickiness a lot. When applying the sealant be sure to besmear it against the surface with your finger or a tool to improve the contact.

We prefer to use Hybrid Polymer construction kit, it does not flow that nice, but sticks all the better. Others use flowable silicone with great success too. Standard silicone is possible, but test its stickiness first.

When waterproofing is done you can close the vent hole with a sticker, unless you want to use it for the LED cable gland. Be sure the surface is free of dust and grease.

LED cable gland

If you want to run a cable to the front for LEDs, the Tiny LED cable gland that we sell fits nicely in the front area. We use an M10 cable gland because a JST PH-3 fits through a $\varnothing 10$ mm hole (2x PH-2 for addressable LEDs surely fits). The original vent hole in the Floatboxx is ideally positioned to place this cable gland. Enlarge the hole to $\varnothing 10$ mm and drill another $\varnothing 8$ mm hole for the vent sticker.



Alternatively you can choose another location to drill the $\varnothing 10$ mm hole for the LED cable gland.

Make sure you fix the M10 panel nut of the cable gland with some loctite !

Mounting of the Little Focer

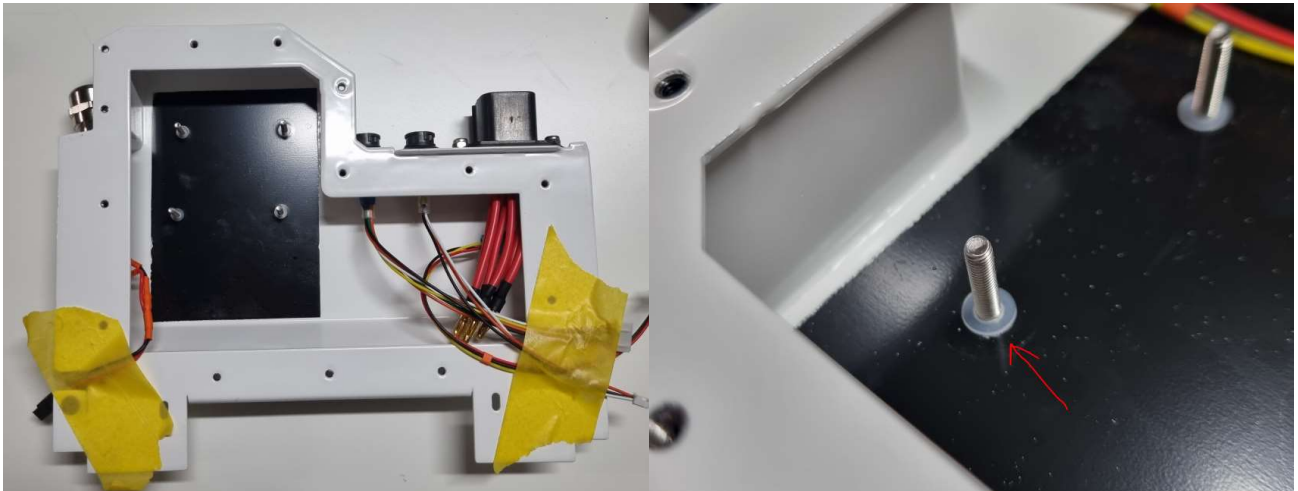
Before installing the controller, make sure you are satisfied of all the connectors.

Use some tape to keep the cables out of the way.

During the installation of the controller, be carefull not to damage the electronics components ! It is advised to wear gloves to avoid ESD (electrostatic discharges).

The position of the Little Focer is fixed by the 4x M3 studs. The USB port is in the front.

1. Place 4 nylon washers on the studs first
 - a. The MOSFETS of the controller should NOT touch the aluminum bottom plate. The nylon washers guarantee a distance of minimum 0,5 mm.



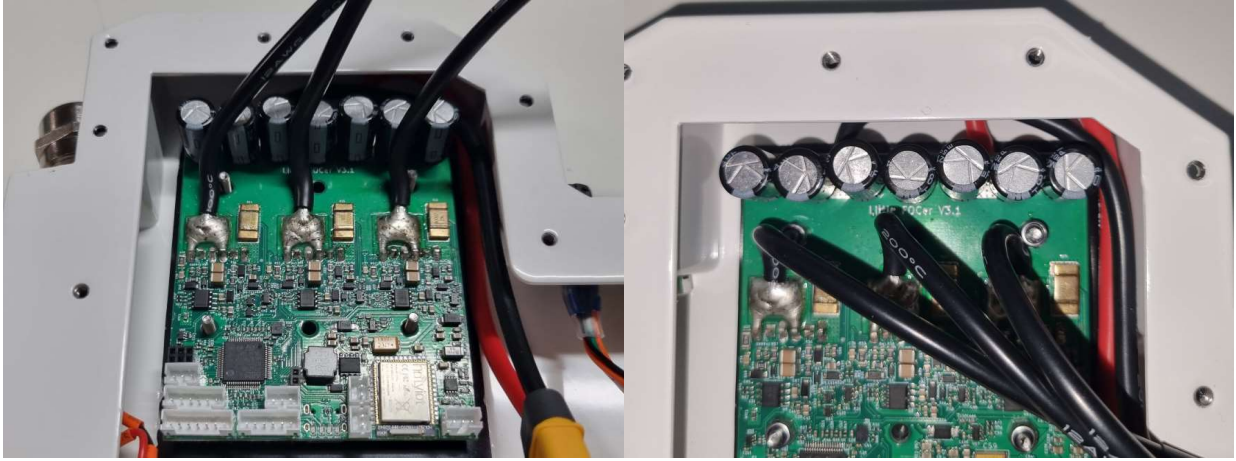
2. Place the thermal pad

- a. Place the thermal pad temporarily on the MOSFETS of the controller and make 4 holes in the thermal pad for the M3 studs. Make the holes a little larger ($\varnothing 7-9$ mm) so the thermal pad will not rest on the nylon washers.
- b. Remove the thermal pad from the controller and place it carefully in the box over the studs and washers.
- c. Strike the thermal pad flat. If you have wrinkles, they are best between the MOSFETs and not below them.



3. Place the Little Focer

- a. Hold the controller in 1 hand and guide the powercable with your 2nd hand to fit nicely next to the controller. I prefer the powercable on the motor connector side. You cannot switch sides without taking the controller back out !!
- b. Lower the controller until it rests on the M3 studs. Then slide it gently backward while guiding the powercable under the edge of the box, until the holes meet the M3 studs
- c. Then lower the controller on the M3 studs while still guiding the powercable
 - i. Make sure the powercable sit comfortable and is not pinched below the controller.
- d. Check that the controller is touching the thermal pad and sits nice and even. Basically all 4 studs should show equal length of thread.



4. Tighten that Focer !
 - a. Put a nylon washers on each studs. (these protect the PCB from the metal nuts)
 - b. Mount the 4x M3 locking nuts by hand as far as possible
 - c. Use the 5,5 mm socket driver to tighten them more. But carefull to never sink too low and touch electronics components. Max M3 torque 1,5 Nm = 1,1 lbf.ft
5. Connect the 3 motor phase bullets to get them out of your way
 - a. Make sure all small wires are below the 3 motor phase wires
 - b. You could mark the mating wires for later, but if you always do left-left, middle-middle, right-right, you should be good.



Cables

Battery harness cable step 1

1. Now you install the battery harness cable through the gland.
 - a. Carefull without touching the electronics components
2. Cut the wires to lengths and solder your connectors.
 - a. Make sure the glands are on the cable before soldering !
3. Only tighten the cable gland after you test fitted the box within your rails with the battery box and motor installed. And give the battery cable some millimeters slack.

Installation in the rails

Before tightening the battery harness cable, you best install the Floatboxx in the rails with motor for test fitting.

1. Check the list of potential collisions and solutions at the beginning of this manual.
2. Use 2x M5x10 countersunk screws in the 2 rear holes of the Floatboxx.

3. Also fix the left front of the Floatboxx to the rail with the M5x16 so that the boxx is fixed by 3 screws.

Battery harness cable step 2

1. When everything fits, remove the right rail again.
2. Layout the cable like it should go through the axle block. Give a few mm slack.
3. Tighten the dome nut to fix the battery cable.
4. Install the right rail again with 1x M5x10 screw.

Internal electric connections

Now all other internal connectors can be plugged. Do not overstretch wires. Use extension cables if needed.

Attention 1: certain components require a fixed sequence for plugging in multiple connectors !!

Attention 2: certain components require a anti-spark connector to connect to high voltage !!

Connecting the Motor

The 6-pin Molex socket is on a slightly different location than in a classic box, so you have to change the bending/layout of the motor cable slightly. This might require some elbow grease. Just be gentle to not overbend the cable or pull a wire out of the connector.

Connect the Hall sensor connector to the socket on the right, in the corner.

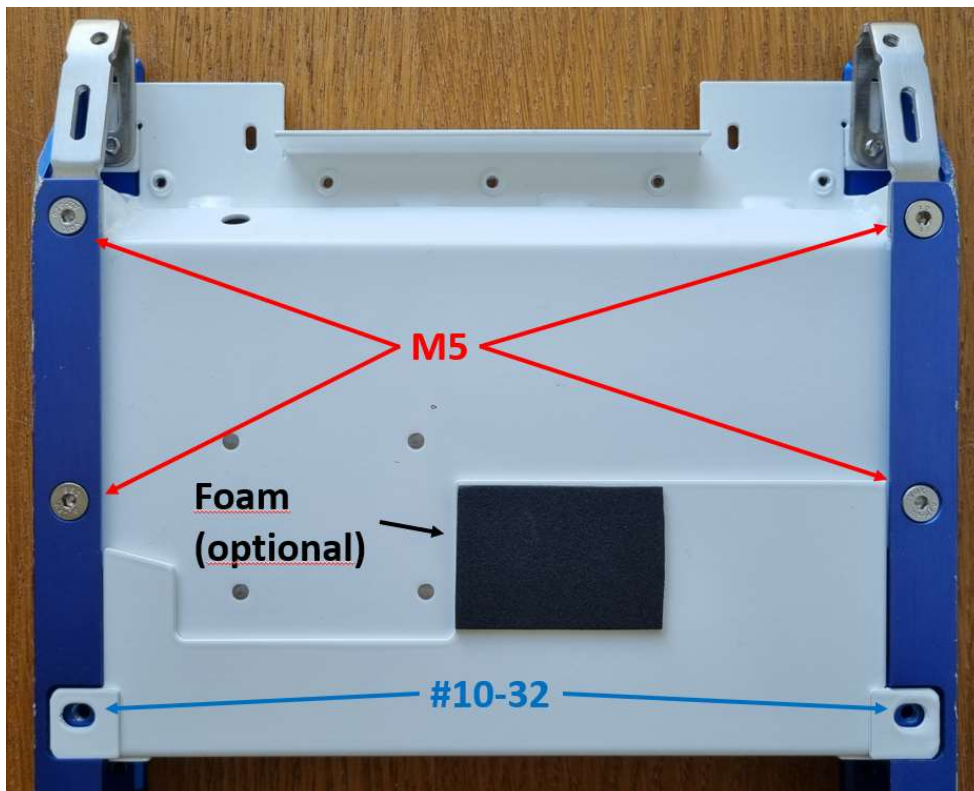
Final assembly

Connector cover

The connector cover works similar as the classic plastic variant: clamped by the bumper to the rail.

Do not use the M5 in the middle to fix the connector cover. Glue some foam (provided) instead to limit vibrations.

Note: if the cover does not fit between the rails, either scrape some powderpaint of the edge OR loosen the Floatboxx screws on the rails, push the cover in and then tighten the Floatboxx again.



Bumpers

As advised with every bumper installation: first insert all screws sufficiently. Then tighten them all one-by-one.

Use 2x M5x16 countersunk screws (or 2x M5x20 depending on the bumper thickness) to fix the bumper to the Floatboxx, through the rails in the front. Be sure to place the screws straight in the thread and not angled!! **If the bumper does not allow a straight position of the screw, make the holes in the plastic bumper larger! This is needed for some BANG Bumpers.**

Bang Bumpers do not have the plastic lip in the front as stock bumpers do. We provide 3 mm spacers to fill this gap. Use it! See picture below.



Badger Bumper stainless steel brackets uses #10-32 thread however the Floatboxx M5x16 fits into the thread as well. Use the M5x16 for tightening the Floatboxx to the rails through the stainless steel brackets ! Check the collision chapter at the beginning for possible conflicts with Badger Bumpers.

Use 2x #10-32 standard screws to fix the 2 rear holes of the bumper to the rails

Lid

If everything is fixed, there are no loose ends and no loose components left, the lid can be closed. Again, first insert all 16 M3 countersunk screws and then start tightening them diagonally. Screw until metal-to-metal but with max. torque for M3 to 1,5 Nm = 1,1 lbf.ft

Connect and install the footpad.

In recent deliveries we supply an extra 2 mm alu plate (unpainted). This can be glued on top of the lid to limit the deformation of the Floatboxx when subject to large impacts. This item is still being tested and is not needed for normal use.

VESC tool

The Little Focer placed with the capacitors to the rear requires a 180° yaw offset in IMU settings.

