











MO Super Charger

Parts:

Image	Part	Qty	Link Info	Link Purchase
	XIAO ESP32C6	1	LINK	AliExpress
	XIAO Can Breakout Board	1	LINK	AliExpress
	60V 150A Relay Contactor	1		AliExpress
	R48-2000 PCB ADAPTER CARD	1		AliExpress
	AC to DC5V 1A 5W Converter	1		AliExpress
	5V TIMER DELAY RELAY	1		Amazon

	MIDI FUSE HOLDER	1		Ebay
	40A MIDI FUSE	1		Ebay
	60v 5 Leg Bosch Style Relay	3		AliExpress
	Fuse Holders	3		Amazon
	5 Core Thinwall Cable 0.75m2 - 2M	2M		Ebay
	2 Core Cable Thin Wall Wire (42 AMP Rated 4.5mm ² 11 AWG	2M		Amazon
	Black Single core thinwall cable 0.75mm2	3M		Available Everywhere
	Red Single core thinwall cable 0.75mm2	3M		Available Everywhere

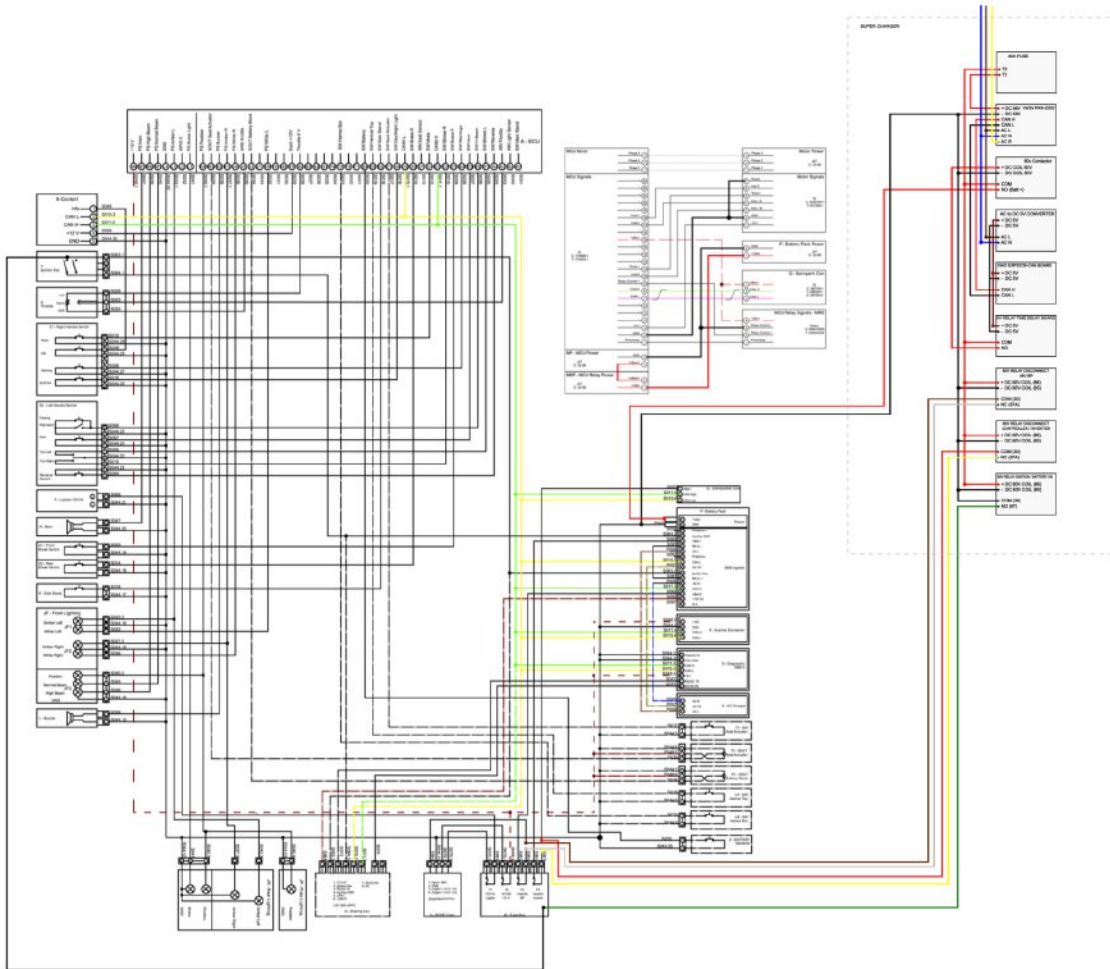
	<p>Expandable Braided Sleeving Wire Black Braided Sleeving Cable</p>	<p>1M</p>		<p>Amazon</p>
	<p>M6 x 40MM Flathead</p>	<p>2</p>		<p>Amazon</p>
	<p>M6 x 20MM Flathead</p>	<p>4</p>		<p>Amazon</p>
	<p>Tinned Copper Terminals Connectors, SC4-6 Battery SC Ring Terminal</p>	<p>7</p>		<p>Amazon</p>
	<p>4 Pin Automotive connectors Male / Female</p>	<p>1</p>		<p>Amazon</p>
	<p>Superseal 3 way connector male / female</p>	<p>1</p>		<p>Available everywhere</p>
	<p>Threaded Knurled Insert Nuts, M4 x 10mm x 6mm OD (Main Body)</p>	<p>10</p>		<p>Amazon</p>
	<p>Threaded Knurled Insert Nuts M6x8x10mm (Main Body)</p>	<p>2</p>		<p>Amazon</p>

	Threaded Knurled Insert Nuts M6x8x8mm (LID)	2		Amazon
	4mm Pan head machine screws	10		Available everywhere
	Spade terminals Various sizes male / female	4		Available everywhere
	Connector choc block small 5 way	1		Available everywhere
	R48-2000e3 2000W Module	1		Available on ebay used / new surplus
	Underseat AC Socket	1		Available from silence / people on fb
	Longer bolts for 2 rear silence top box bracket bolts.			

Wiring Diagram:

See attachment wiring_diagram.pdf for high resolution version.

CASO POWERTRAIN VOTOL



General Description Power ON:

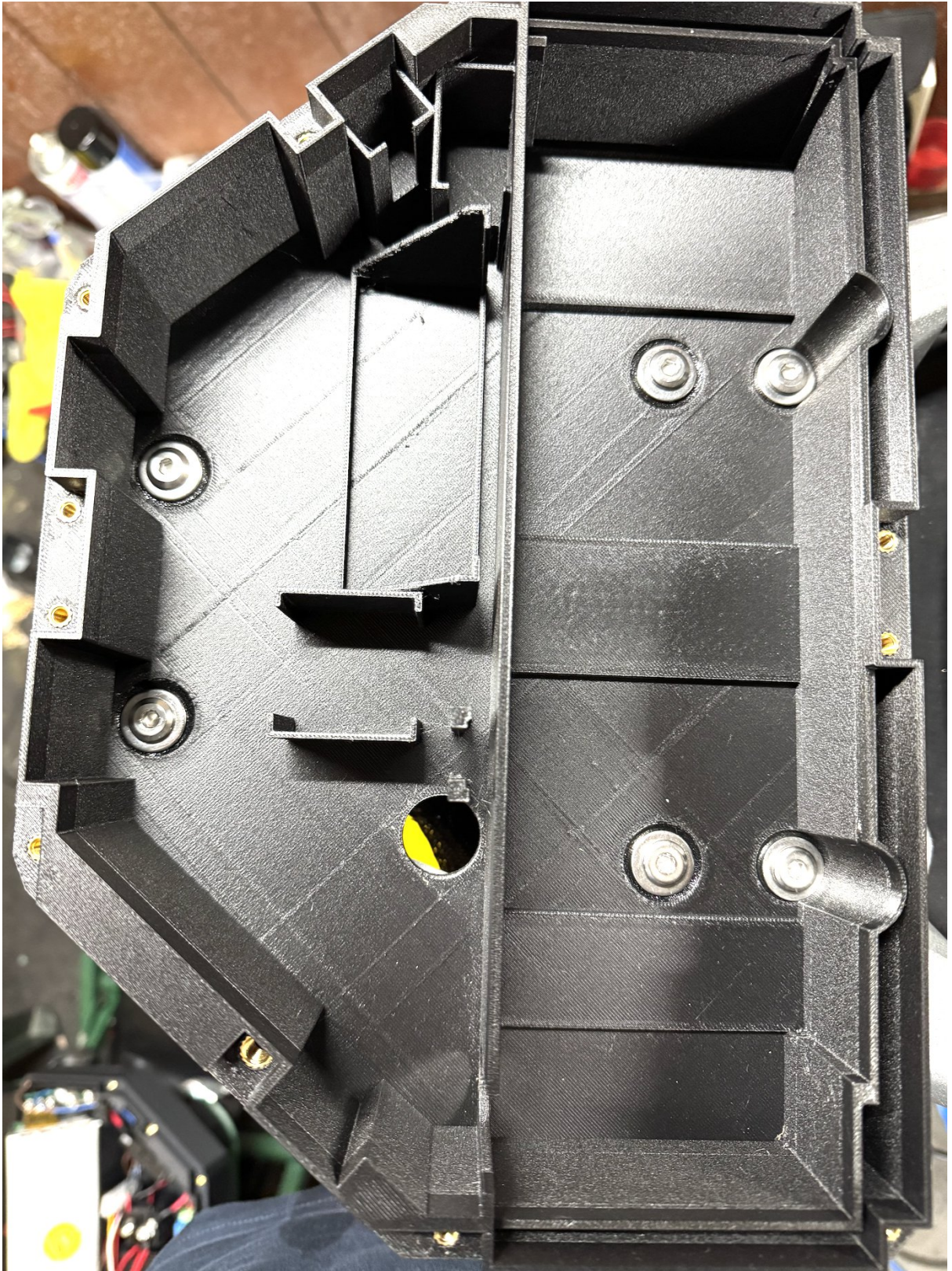
1. AC is connected to the under seat AC IEC socket.
2. Vertiv R48-2000 PSU is powered on, this outputs 57.4v (or whatever you've configured it too)
3. The + output of the Vertiv R48 is connected to a 40A midi fuse.
4. The + out of the MIDI fuse goes to the COM post on the 60V 150A contactor/relay.
5. The 60V 150A com post powers / is connected to:
 - a. A 60V 5 Leg relay that is normally closed which when powered on disconnects the power from the battery pack (multi pin connector) to the bikes electronics (Brown / White wires going to fuse box).
 - b. A 60V 5 Leg relay that is normally closed which when powered on disconnects the power to the motor controller (red / yellow wires going to fuse box).
 - c. A 60V 5 Leg relay that is normally open when powered on connects the ignition to battery -. This is the same as turning on the ignition which activates the main terminals on the battery.
 - d. The COM on the 5V timed delayed relay board.
6. The AC power also powers the 5V AC to DC converter. This powers:

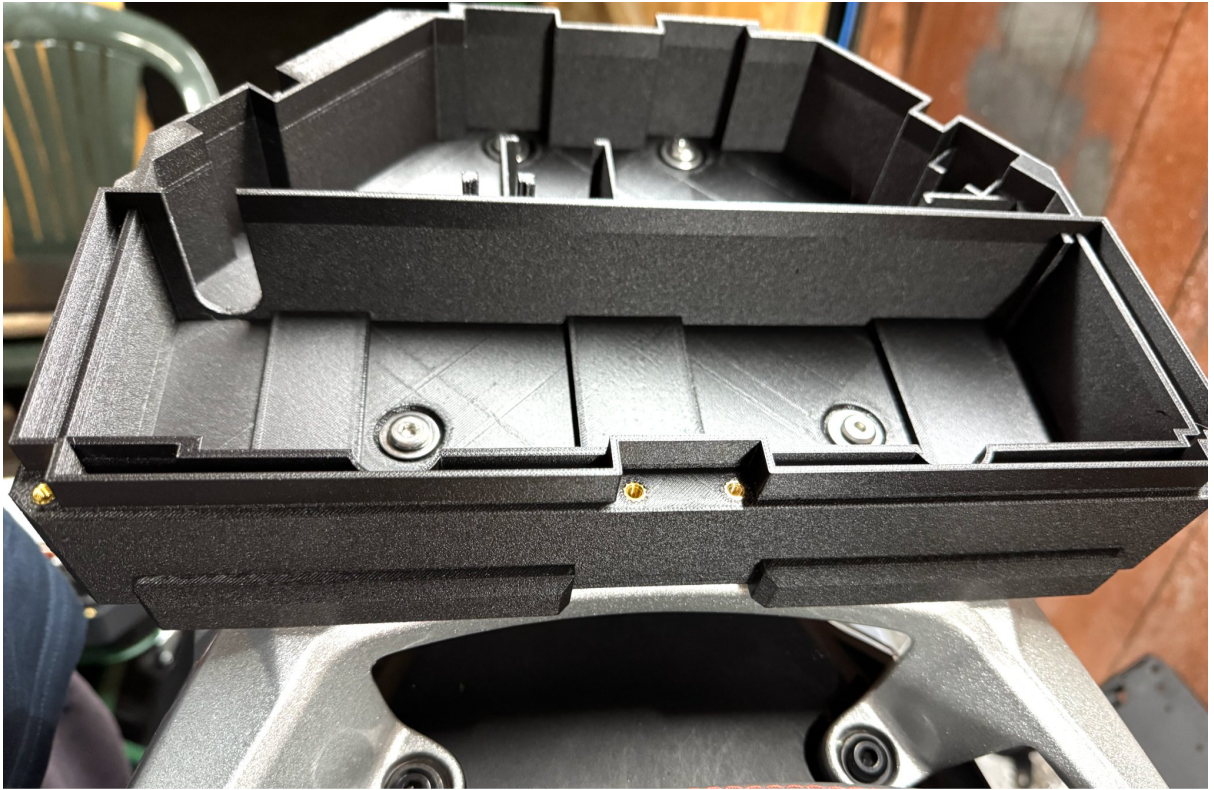
- a. The ESP32 + Can breakout board.
 - b. The 5V timed delay relay board (set to 2 seconds delay ON).
7. The normally open connector of the 5V time delayed relay (2 seconds ON delay) connects the + output of the Vertiv R48 to the coil + of the 60V 150a contactor / relay.
8. The output of the Vertiv R48 is now connected to the main battery + terminal. The time delay is important as the battery will not activate the main battery + terminal. without a short delay before applying the Vertiv power to the battery. Why the delay?? Without the delay I believe the BMS detects voltage on the main battery terminals so does not try to turn on the contactor inside the battery.
9. All the - (negatives) go to a bolt mounted in a 3D printed holder.

The Enclosure:

- 3D printed with PETG-CF
- Heated threaded inserts 10 x M4 x 10mm are inserted into the main body for the Lid to mount onto the main body.
- Heated threaded inserts 2 x M6 x 10mm are inserted into the main body; this is for the shad top box plate bolts to go through the lid and bolt into the main body.
- Heated threaded inserts 2 x M6 x 8mm are inserted into the lid, this is for the shad top box plate to bolt into.
- There is a 3mm 3d printed TPU gasket between the main body and lid.
- The main body mounts to the silence official top box bracket via 4 x M6 x 20mm Hex flat head bolts. And 2 x M6 x 40mm hex flat head bolts, these 2 bolts go all the way through the metal plate to give an anchor point to retain the cables coming out of the bottom of the main body.
- The metal silence bracket has spacers inserted under the 2 rear bolts to lift the bracket slightly to allow cables to pass through the hole in the plastics of the scooter.
- Air inlet and outlet is separated by the T shaped piece placed on top of the Vertiv r48.

STL Files: See Attached ZIP File.









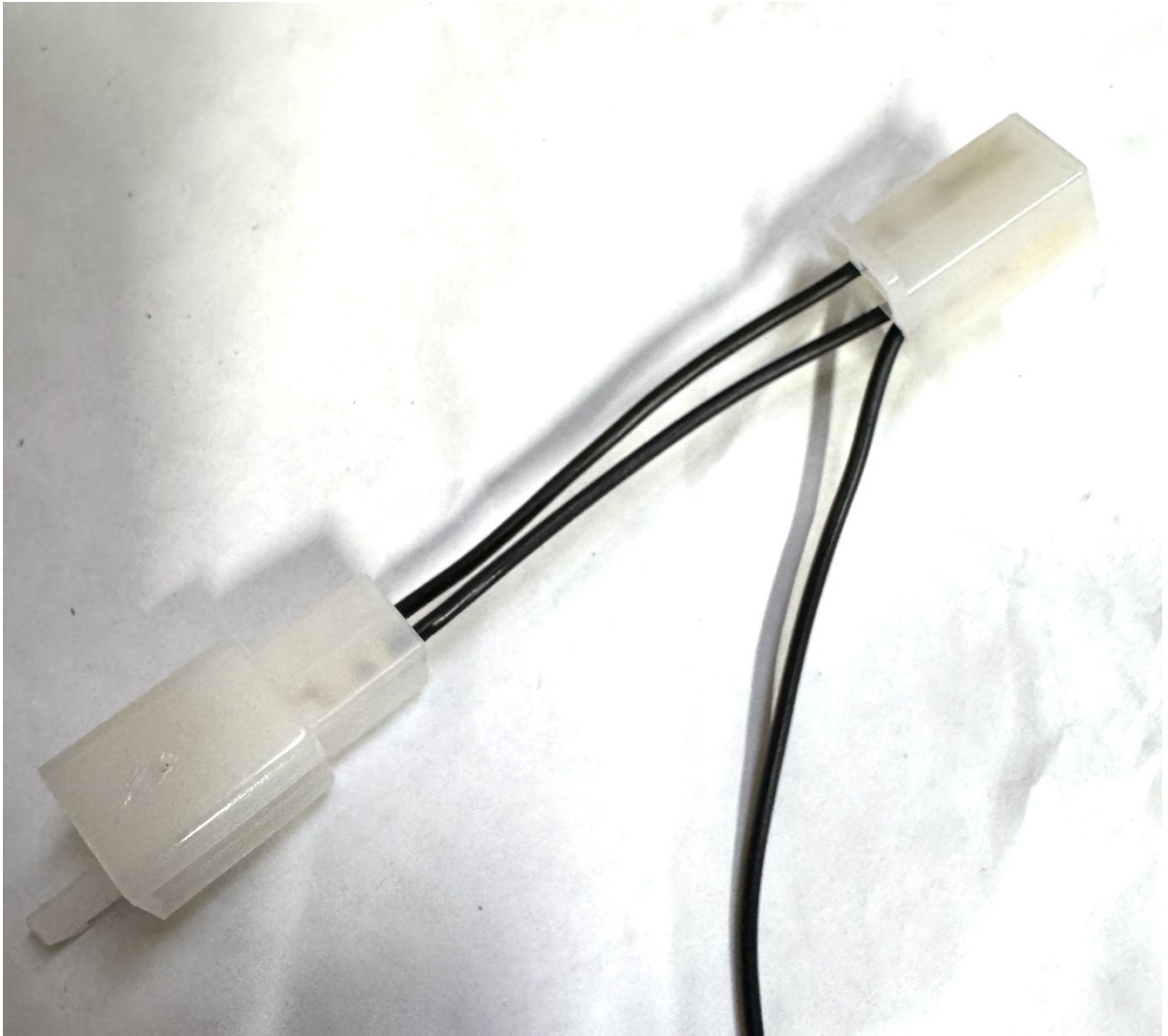


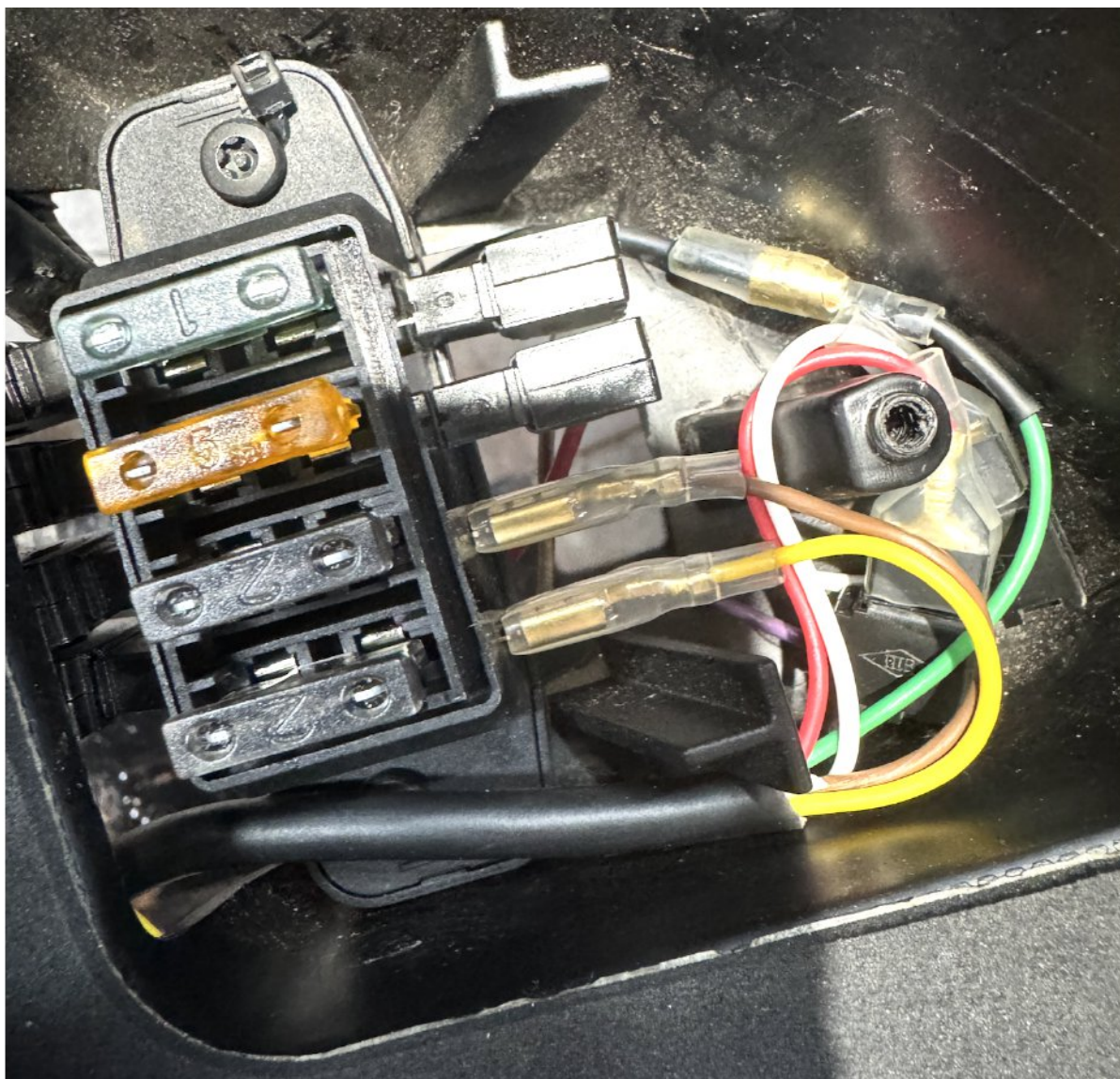
Wiring:

See wiring diagram for full details but I'll include some important points here. It's important to note ZERO wires are cut to install the charger.

Ignition to negative

You need to make up a cable that connects to the ignition plugs inline behind the headlight and run the black wire to under the fuse board cover. This black wire connects to the green wire under the fuse board cover, the green wire going to the relay in the charger.



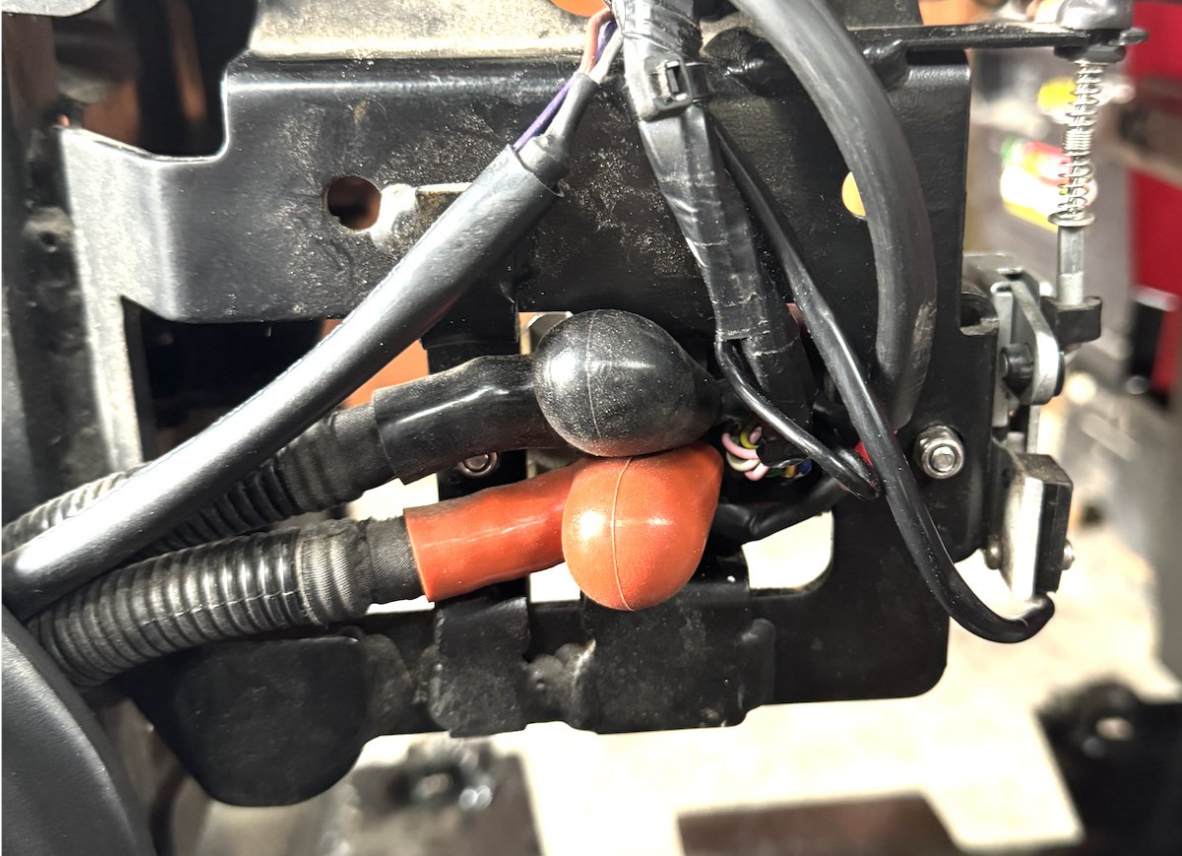


Disconnecting the Power to the Bike While Charging:

Above the image shows the other wires coming from the charger red/yellow and brown/white. These are the wires that are disconnected by the relays when the charger powers on. You just pull the spade terminals off the fuse board and connect the wires inline.

Battery Terminal Connections:

The 4.5mm cables connect to the main terminals on the chassis which connect to the battery.



AC wire IEC socket to Charger.



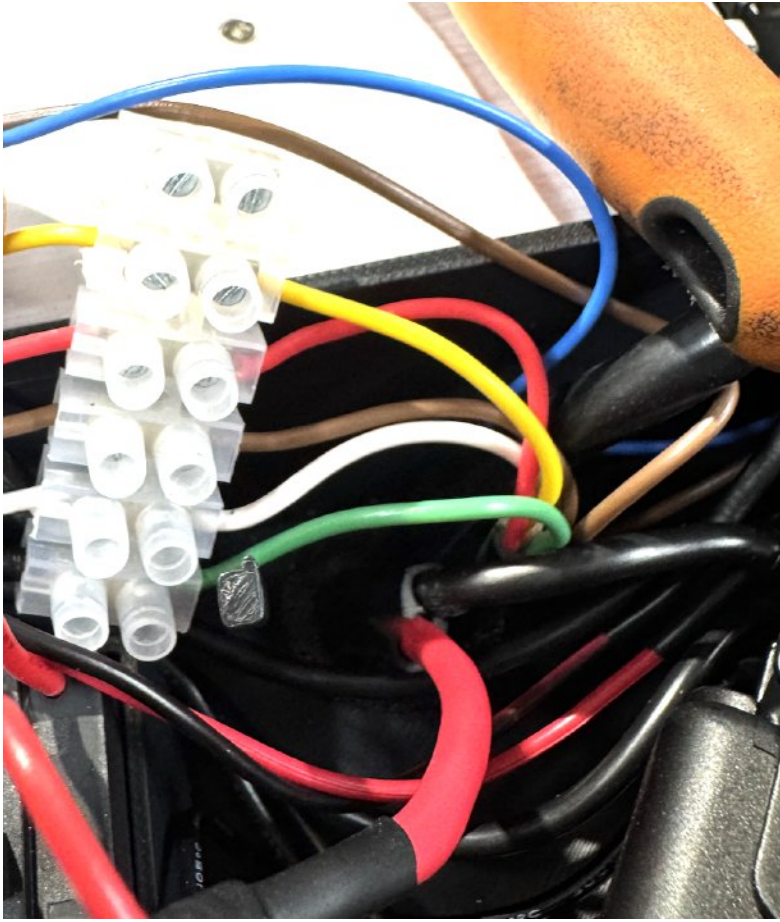
Cables exiting from charger before sheath being added:

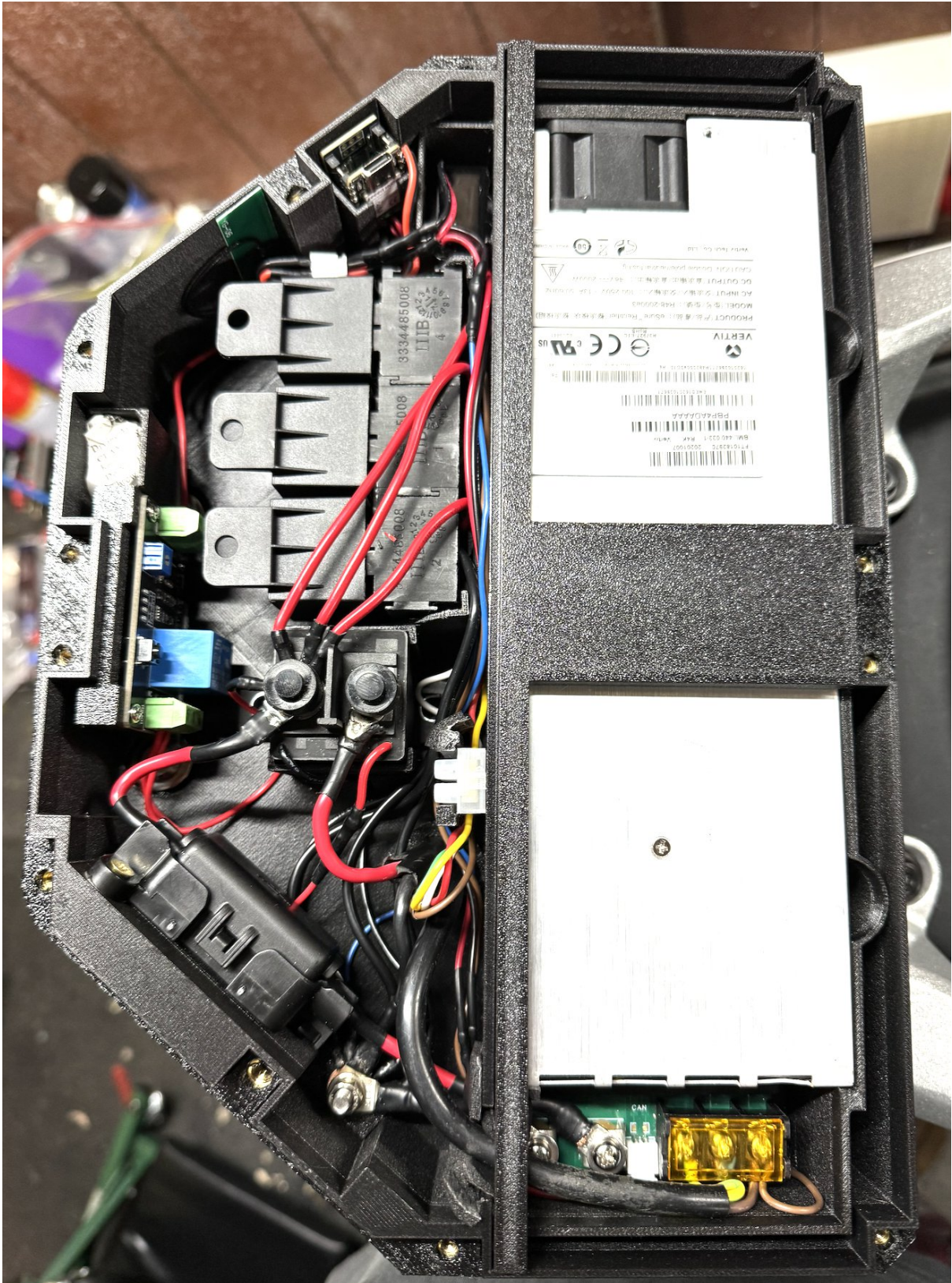






Connector block inside charger:





The Wifi Control:

- See attachment for Code mosuper.zip
- The ESP32 connects to your home wifi, if it can't connect it creates it's own access point allowing you to connect to it while away from home i.e. public charging.
- You visit the web page and you can monitor with live graphs and download the data into a CSV file:
 - Output voltage
 - Input Voltage
 - Output Current
 - Temperature (Vertiv internal temp).
- Permanent settings survive a power cycle.
- Online settings only last for the current power cycle.
- You can set the:
 - Output current 0-1.2 (0% to 120%).
 - Output voltage 48 -> 58v
 - Fan speed Auto / Full (Setting is persistent).
 - Walkin in / Out time (not tested yet).
 - Wifi AP and Wifi Home settings.
- Temperature Safety limit - this is the max temperature before the esp32 automatically issues a command to set the output current to 0.
- Managed Fan Mode this in conjunction with the Full Fan Speed Temp Threshold sets the fan speed to full if the temp goes above this temperature. The fan speed will return to auto with the temp drops 3c below this temp.

MO Super Charger 2000

Live Data



Output Voltage: -- V	↶	⬇
Output Current: -- A	↶	⬇
Current Limit: -- %	↶	⬇
Temperature: -- C	↶	⬇
Supply Voltage: -- V	↶	⬇
Unknown (0x08): --	↶	⬇

Set Permanent Voltage

e.g., 52.5

Set Permanent Voltage

Set Online Voltage

e.g., 50.0

Set Online Voltage

Set Permanent Current Limit

e.g., 0.5 (for 50%)

Set Permanent Current Limit

Set Online Current Limit

e.g., 0.5 (for 50%)

Set Online Current Limit

Set Fan Speed

Auto

Full Speed

Walk-in Control

Walk-in On

Walk-in Off

Set Walk-in Time (10s)

Set Walk-in Time (70s)

Temperature Safety Limit

Max Temp Allowed (C):

e.g., 40.0

Set Max Temperature

Temperature Fan Control

Enable Managed Fan Mode

Full Speed Fan Temp Threshold (C):

e.g., 35.0

Save Fan Config

WiFi Settings

WiFi Network SSID

WiFi Network Password

Access Point SSID

Access Point Password

Save and Reboot

Live Data



Output Voltage: **57.29 V**



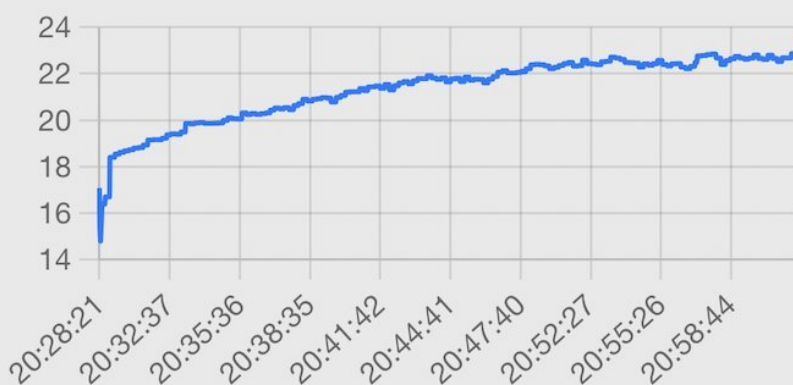
Output Current: **35.55 A**



Current Limit: **101.00 %**



Temperature: **22.95 C**



Supply Voltage: **235.46 V**



Live Data

Output Voltage: **57.97 V**



Output Current: **16.90 A**



Current Limit: **100.00 %**



Temperature: **20.61 C**

