

# Motor Controller User Manual

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## Introduction

The Motor Controller was constructed with the collaboration of other sub-system teams and had to go through many design reviews. Some key features to note is that it contains 3 main parts: a plate for the body, the body, and a lid.

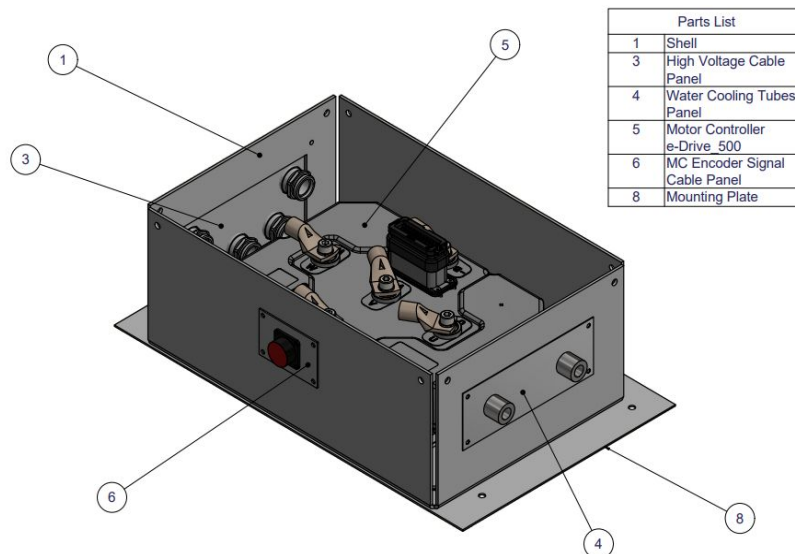
## Design Objectives

Some of the goals that were considered when designing this enclosure included:

- ❖ Water resistance
- ❖ Strain relief cables
- ❖ Easy assembly
- ❖ Integrated onto the chassis logically
- ❖ Appropriate sized enclosure
- ❖ Cost efficient

## Component Layout

The Motor Controller consists of 3 main parts: an aluminum 6061 plate the body will lay on which would then be mounted on the chassis, an aluminum 3003 body with 3 panel cutouts, and an aluminum 3003 lid. The body and the lid started as flat pieces which would later be bent into the desired shape. The 3 panels are made out of 6061 aluminum and are: a panel for the 2 water cooling tubes, a panel for 5 high voltage cables, and a panel for 1 motor controller encoder signals.



**Figure 1:** An isometric view of the Motor Controller Enclosure without its lid attached.

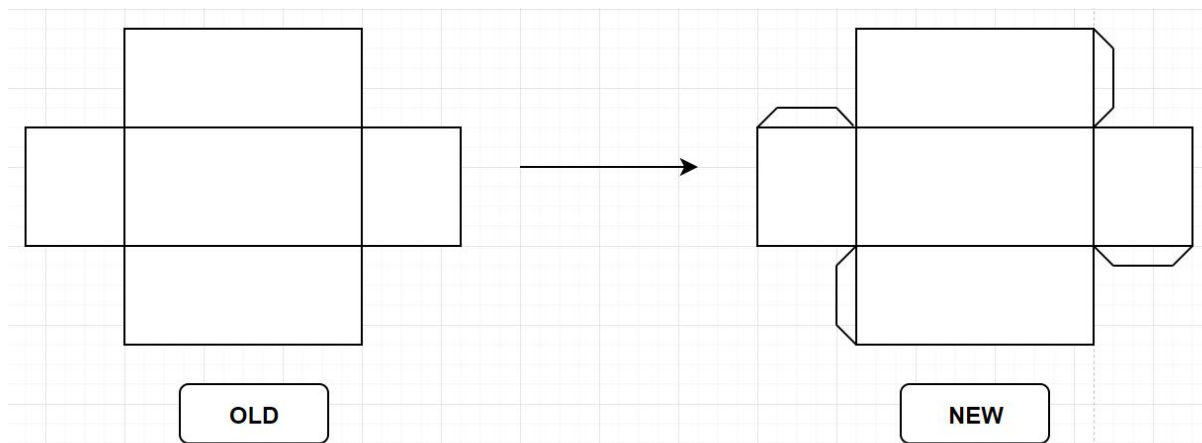
### **Current State of the Design**

The current state of design for the Motor Controller is that all parts were able to be manufactured. This includes the mounting plate, lid, shell, and 3 panels. However the lid and the shell were never bent to its desired shape.

Some issues that need to be addressed is that when the shell is folded to its desired shape it will have a really big open seam on the sides. In addition to that, there is no way to hold the walls for the shell together after they have been folded. These same issues apply to the lid as well. The lid also needs to include the press-fit lock nuts in and it is highly recommended to do this before folding the lid. The rivet nuts also need to be attached onto the mounting plate using the rivet gun. After all those issues have been addressed, the enclosure still needs to be waterproof. Its original idea was to include gasket tape around the lid or shell and on the 3 panels. Anything else that may have a potential entrance for water we were planning on using waterproofing tape to seal that up.

### **Recommendation for Future Team**

Some recommendations into modifying this enclosure would be to include tabs on the side of the shell component in order to minimize the amount of open seams there are as well as to hold the walls better in place. A rough sketch is shown below of what was said. Additionally, find a better place to put the MC, currently it is located behind the driver, and find a way to merge the Motor Controller with the CarMan enclosure instead of having two separate enclosures like our original concept.



**Figure 2:** A schematic of the unfolded view of the new shell concept for the Motor Controller.

**Bill of Materials**

Bill of Materials							
#	Description	Part Number	Quantity	Cost	Total	Website	Notes
1	Corrosion-Resistant 3003 Aluminum Sheet 0.0630" Thick 36" x 48"	8973K604	2	\$81.77	163.54	<a href="https://www.mcmaster.com/8973k604-8973K606">https://www.mcmaster.com/8973k604-8973K606</a>	Bendable Al, used for body and lid
2	6061 Aluminum Sheet						Non-Bendable Al, used for panels and plate, in shop no need to buy
3	Flush-Mount Press-Fit Nut for Sheet Metal 8-32 Thread Size	94674A520	2	8.44	16.88	<a href="https://www.mcmaster.com/94674a520">https://www.mcmaster.com/94674a520</a>	for the Lid
4	Aluminum Heavy-Duty Rivet Nut 6-32 Internal Thread, .020"-.080" Material Thickness	94020A311	1	\$8.12	8.12	<a href="https://www.mcmaster.com/94020a311">https://www.mcmaster.com/94020a311</a>	For the MC Plate to hold the body in place
5	316 Stainless Steel Button Head Hex Drive Screw Super-Corrosion-Resistant 8-32 Thread Size 3/8" Long	98164A134	2	6.54	13.08	<a href="https://www.mcmaster.com/98164a134">https://www.mcmaster.com/98164a134</a>	For panels to be attached, in shop no need to buy
6	Nylon Insert Locknuts for 8-32 Thread Size						For panels to be attached, in shop no need to buy

FSAE Electric Car

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