

Mecanum Mixer

SKU: 3109-0001-0001 V1.0



SUMMARY

The Mecanum Mixer is a simple RC PWM mixer for mecanum wheeled robot chassis. It reads 3 PWM signals from any standard radio system or arduino-like microcontroller, and mixes them into 4 output PWM signals to be read by 4 motor controllers, one for each wheel of the chassis. A test button and channel reversing DIP switches help installation and set up. The Mecanum Mixer's voltage range is from 5V to 15V. The input and output PWM range is 1000us to 2000us.

Features:

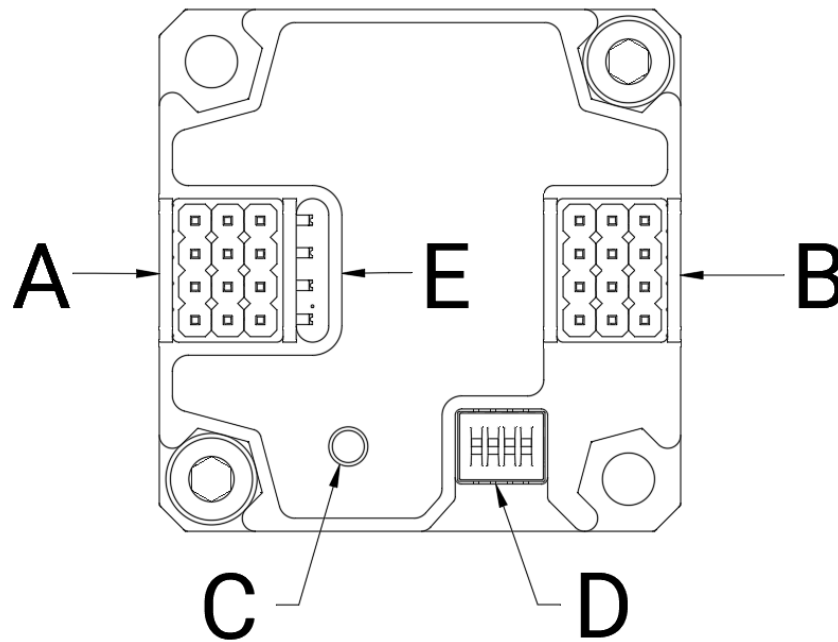
- Reverse Voltage Protection
- Valid Signal Indication
- Test Button and Reverse Switches for ease of implementation
- Fully Encased Rugged Design
- goBILDA® Hole Pattern Compatible

SUMMARY OF PRODUCT RATINGS			
Input Voltage	5V - 15V	Outputs	4
Current Draw	20 mA	Output Current	5A / Channel
Input Power Connector	TJC8 (0.1" Pin Header)	Servo Output Connectors	Dual TJC8 Servo Headers
Input Signal Connector	TJC8 (0.1" Pin Header)	Servo Compatible	YES

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1 Hardware Overview



Hardware Overview		
ID	Name	Description
A	TJC8 Input (0.1" Pin Header)	3 Input Signal and 1 Input Power Connectors
B	TJC8 Output (0.1" Pin Header)	4 Output Signal Channels, one for each wheel of a mecanum chassis
C	Test Button	This will spin all 4 wheels in order to aid in the installation process
D	DIP Switches	4 DIP Switches, for reversing the 4 Output channels
E	Indicator LEDs	4 LEDS for Indicating power and signal status

1.1 TJC8 Input Connectors

The Mecanum Mixer has 4 TJC8 input connectors:

- 3 Signal Inputs: Forward/Reverse, Rotate, and Strafe. These inputs are measured for mixing and have three terminals, Power (+), Ground (-), and Signal (S).
- 1 Power Input: for external battery use with three terminals, Power (+), Ground (-), and Power (+).

Typically, when used with motor controllers, the Mecanum Mixer and receiver is powered from the motor controllers and the power input is not used. Note: The Servo Commander does possess reverse voltage protection; however, if reverse voltage is applied, it is possible to damage any connected servos, as not all servos have the same level of protection.

1.2 TJC8 Output Connectors

The Mecanum Mixer has 4 TJC8 Output Connectors, one for each wheel of a standard mecanum chassis. These signal outputs also accept power from a motor controller or other logic device when available. In most applications this is how the Mecanum Mixer is powered.

1.3 Test Button

The Mecanum Mixer can be challenging to install given the complexity of wiring as well as the number of channels and motor controllers. Each signal must be wired to the correct port to control a motor that spins in the desired direction. The test button helps verify the wiring is correct. The use and setup of this button is described in greater depth in *Section 2: Typical Application / Implementation*.

1.4 DIP Switches

4 DIP switches are included to invert the direction of the 4 output channels. This can also be performed by reversing the terminals of the motor. However, this can be a pain if your chassis is already wired. This feature is also critical if your chassis is built with 4 continuous rotation servos whose directions cannot be reversed. The signal outputs are defaulted to comply with a servo chassis.

1.5 Indicator LEDs

The Mecanum Mixer has 4 LEDs next to the 4 inputs. The TOP LED corresponding with the power input displays board power and status. The other LEDs correspond to the 3 input signals. When a valid signal is achieved, the LED next to that channel flashes; if the signal is invalid, the LED remains off. These 4 LEDs will also show the board boot process with a “worm” flash pattern.

2 Typical Application / Implementation

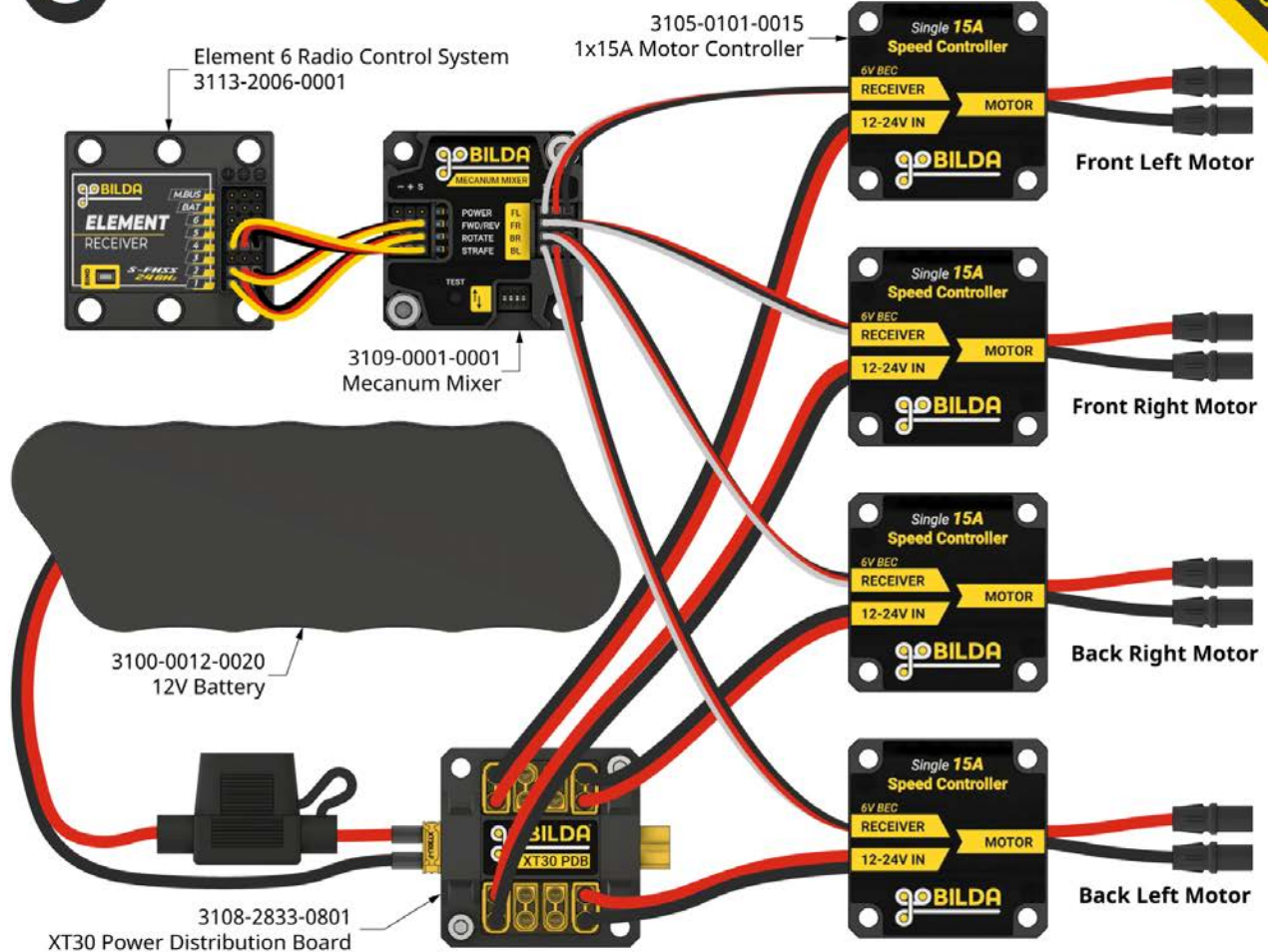
In this section we walk through how to implement the Mecanum Mixer in its intended use-case. For this example, we will also use four 1x15A Motor controllers (3105-0101-0015) and a goBILDA Radio System (3113-2006-0001) as well as a few other parts described below.

2.1 Wiring

- 1) The 4 motor controller inputs should be plugged into the corresponding outputs on the Mecanum Mixer. The 4 Motor outputs are labeled Front Left, Front Right, Back Right, Back Left. These must correspond to the locations of each motor in the chassis.
- 2) Use the 3 included Male to Male TJC8 Leads to connect channels 1, 2, and 4 to the Mecanum Mixer's Rotate, Forward/Reverse and Strafe pins, respectively.
- 3) All of the XT30 Power Leads from the motor controllers must be attached to the main power supply. In this case we use a XT30 PDB (3108-2833-0801) to connect a 12V battery.
- 4) Each motor controller should be connected to one motor. It is optimal to connect red to red and black to black; however, this connection can be flipped to drive the motor in the opposite direction. Note: The motor direction can also be reversed on the Mecanum Mixer.

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3109-0001-0001 Product Insight #2

In this setup, the right gimbal on the transmitter will drive the chassis in a traditional skid-steer style, while the X axis of the left gimbal will drive the chassis side-to-side. In case it is hard to see above, here is how the receiver is wired to the mixer:

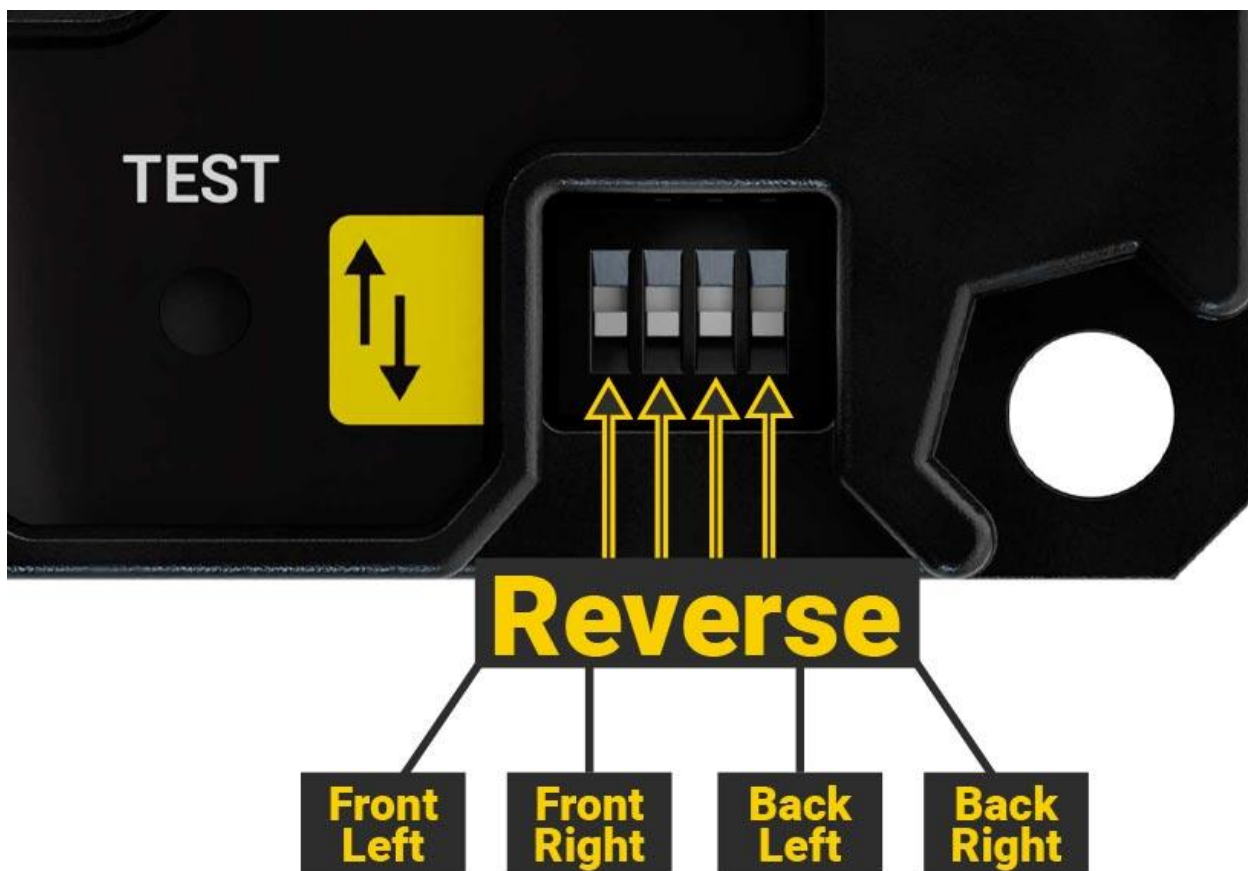
- Ch1 -> Rotate
- Ch2 -> FWD/REV
- Ch4 -> Strafe

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2.2 Install Validation

First lift the chassis so that all 4 wheels may spin freely; often, setting it on a box or foam cubes works best. Start by pressing the test button. When pressed, the Mecanum Mixer sends a signal to each channel / motor controller. It does this in clockwise order around the chassis, starting with the Front Left, and moves around the chassis. For now, disregard the direction each motor turns. If the motors run in the correct order, then the connections from motor controllers to Mecanum Mixer are correct. If the motors don't move in this order, please inspect the wiring between the Mecanum Mixer and the motor controllers.

Next, press the button again and verify that each wheel spins forward; that is, spins to drive the chassis forward. If any of the wheels spin backwards, flip the corresponding DIP switches on the Mecanum Mixer. Repeat this test until all wheels spin forward.



Finally we will verify that the input signals from the transmitter are correct. One channel at a time, move the sticks on the transmitter so that the wheels spin slowly. If they travel in the opposite direction, flip the corresponding DIP switch on the transmitter.

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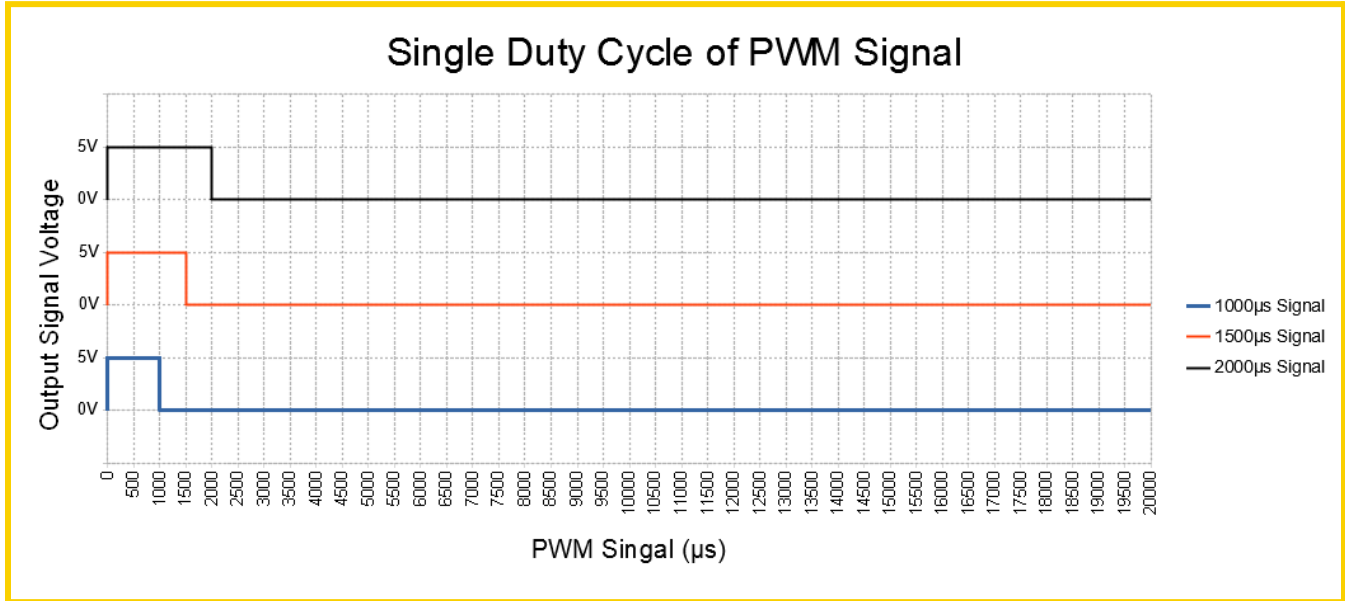
- 1) Right Gimbal, Up and Down: This should move the chassis forward and reverse, Up to move forward.
- 2) Right Gimbal, Left and right: This should make the robot rotate in place, left to turn left and vice versa.
- 3) Left Gimbal, Left and Right: This should move the chassis left and right in translation.

3209-0001-0005 Product Insight #1

Mecanum wheels allow you to strafe side-to-side and diagonally. To achieve this, the wheels need to be controlled in a specific way. The green arrows represent rotation of the left slant wheels. The blue arrows represent the rotation of the right slant wheels. To drive forward, backward or to strafe, the left slant wheels move together and the right slant wheels move together. However to rotate skid-steer style, the left slant wheels move counter to one another as do the right slant wheels. This requires four separate channels on your motor controller.

3 Control Interface

Servo position is controlled by a PWM signal set by the input knob or recalled by one of the buttons. Typically this signal is referenced in terms of the height of its square wave. The duty cycle of this signal is adjustable, but the maximum is between 2.5% and 12.5%. This 2.5 to 12.5% duty cycle refers to the maximum range of 1000µs to 2000µs when the signal is high, the rest of the time the signal is low.

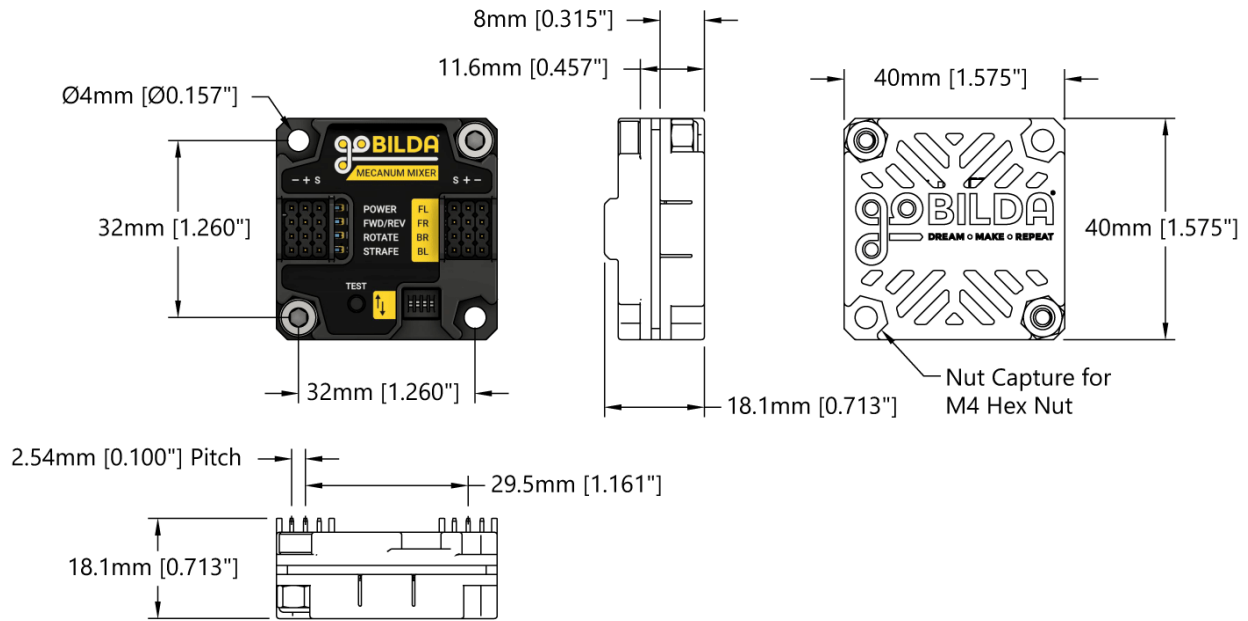


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4 Schematic/Drill Guide



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5 Datasheet / Revision History