

## 15-Amp PWM Motor Controller with Digital Filtering

### SPD-2115B-E and SPD-2115B-ES

The SPD-2115B-E(S) PWM Motor Controller allows you to control the speed of a DC motor, brightness of a lamp or other load using a potentiometer or an analog voltage level (0-5V). Use of PWM and low on-resistance MOSFETs allows for high efficiency control with minimal power loss.

#### Absolute Maximum Ratings:

Parameter	Max	Units
Continuous Output Current	15	A
Instantaneous Output Current	25	A
Continuous Input Voltage	36	V

**Warning – operating at or above the absolute maximum ratings may damage your controller or your equipment under control.**

#### Operating Parameters:

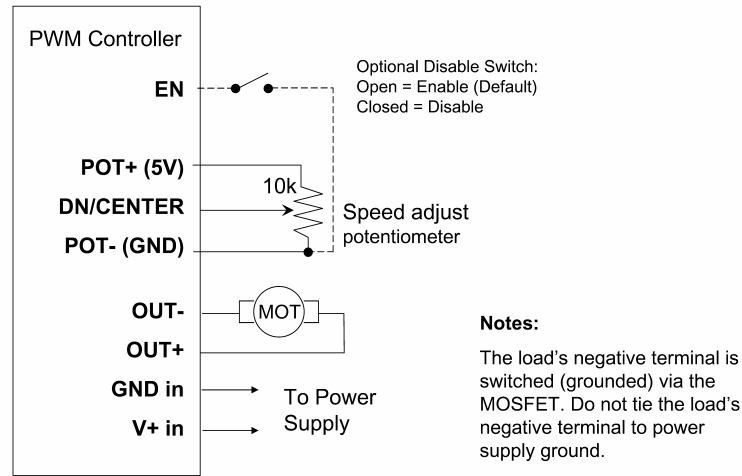
Parameter	Min	Typical	Max	Units
Input Voltage	5.5	--	36	V
Input Voltage, Transient Low (0.5 sec)	0	--	--	V
Continuous Output Current	--	--	15	A
Digital Logic Input Low Level	0	--	1.5	V
Digital Logic Input High Level	3.5	--	5	V
Digital Input Capacitance	--	0.1	--	uF
Analog Voltage Input	0.0	--	5.0	V
Potentiometer Total Resistance	1	10	30	kΩ
Soft Start from Disabled Mode, Ramp Rate*	--	100	--	% / s
PWM Frequency	150	200	250	Hz
Quiescent Current Drain	5	6	8	mA
Temperature	-40	25	+100	°C

\* on SPD-2115B-ES models

#### Pin-out:

Pin Label	Function	Active H/L
<b>EN</b>	PWM output enable (internal pull-up)	H = enable L = disable
<b>POT+</b>	Upper pin of potentiometer (5V)	--
<b>Center</b>	Wiper of potentiometer	--
<b>POT-</b>	Lower pin of potentiometer (GND)	--
<b>OUT-</b>	Negative output to LOAD	--
<b>OUT+</b>	Positive output to LOAD	--
<b>GND in</b>	Ground from power supply	--
<b>V+ in</b>	Positive Power Supply	--

**Connection Diagram:**



**Operation:**

A potentiometer of 1k – 30k can be used to control the pulse width. Alternatively, a varying voltage (0 – 5 V) level applied between the CENTER and POT- pins can be used as well. The voltage input is converted to a pulse width at the output (0 – 100%).

There is a built-in dead-band for potentiometer operation that sets the duty cycle to:  
 0% for any voltage level < 0.10 V.  
 100% for any voltage level > 4.90 V.

This dead-band along with digital filtering ensures smooth and reliable operation even with dirty potentiometers.

**Output Enable:**

The output is enabled by default and is internally pulled up. Bringing the EN pin low immediately brings the PWM output to 0%. Allowing the pin to return to high re-enables the PWM output at the previous duty cycle.

**Soft Start (on SPD-2115B-ES models only):**

The output is automatically ramped up back to the original PWM level at a rate of 100% per second when the controller is switched from disabled to enabled. This reduces the stress placed on power supplies and mechanical linkages as motors come back up to speed, or as high temperature resistive loads heat up (such as light bulbs).

**Application Notes:****A fuse appropriately rated for the load device is required to ensure safe operation.**

This controller is not reverse-polarity protected. **Ensure that it is wired correctly before applying power.** Always turn off the power supply before making any changes to the wiring.

PWM controllers switch currents at high frequencies to vary the average power to the load. This switching can cause undesirable RF interference. To minimize such interference, it is recommended to twist the input V+ and Ground wire pair as well as the Out+ and Out- wire pair.

Ensure that the controller has adequate air flow for proper cooling. If operating for extended periods of time in high temperature environments, a cooling fan may be necessary.

**Use the shortest possible wiring between the load and controller, and between the controller and the power source.** Ensure that the cables carrying the load current are adequately sized. If the wiring from the power source to the controller is more than 12 inches long, a 2200 uF 50V filter capacitor should be connected to the V+ and GND terminals of the PWM controller. Inadequate power supply filtering or other causes leading to a high impedance path to the power supply will result in higher losses in the filter capacitor and wiring, and may damage the load and/or controller.

The heat sink on the controller is electrically live. Do not connect anything to the heat sink, and do not use it as a mounting location. Use only the holes provided on the board itself for mounting.

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**30-Day Limited Warranty:**

Subject to the provisions described below, CRITICAL VELOCITY ENTERPRISES, LLC ("Critical Velocity") warrants this product to be free from defects in material and workmanship for thirty (30) days from the date of purchase by the original consumer. If any part is found to be defective during the warranted period, it will be repaired or replaced with the same or functionally equivalent product by Critical Velocity, at its discretion, free of charge provided you: (1) return the failed product to Critical Velocity with shipping prepaid, and (2) provide Critical Velocity with proof of the original date of purchase. Repaired or replacement products will be returned to you with shipping charges prepaid.

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