



## *DC Motor Controller*

*MPC600-144*

*MPWC600-144*

*MPWC600-192*

## Component and Installation Guide

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## ***INTRODUCTION***

Auburn Scientific was established to develop and produce highly reliable industrial grade products that will meet the needs of high power electric motor applications.

The Auburn Scientific Motor Controller is targeted toward DC power applications where the power source could be rectified line voltage or a significant set of large batteries. As seen in the Connection Diagram, the motor, battery pack and controller make up the major components of a typical application.

### **CAUTION!**

The controller is intended to be used in an environment where high voltages and high currents exist. Installation of the controller, batteries, or motor should only be attempted by a skilled technician familiar with high power electrical installations.

### **CAUTION!**

**THERE IS NO MARGIN FOR ERROR IN HIGH POWER INDUSTRIAL APPLICATIONS. MISTAKES IN WIRING, FAILURE TO VERIFY THAT POWER IS DISCONNECTED BEFORE CONNECTIONS ARE MADE OR ALTERED, AS WELL AS CARELESSNESS, CAN RESULT IN DESTRUCTIVE AND DEADLY SITUATIONS!**

## GENERAL DESCRIPTION

### Auburn Scientific DC MOTOR CONTROLLER

The Auburn Scientific is a Pulse Width Modulated DC motor controller specifically designed for high power DC Voltage applications. The Controller has been extensively tested with the Advanced DC 9 inch electric motor. This combination seems to provide a good compromise between power output and source current draw.

### PRINCIPLES OF OPERATION

The Controller uses a Pulse Width Modulation at > 15,000 cycles per second to control the motor currents. This widely used principle is an excellent method of controlling intermediate power demand requirements for motor drive applications. This methodology switches battery current on and off to the motor. The "On Time" or "Pulse Width" for any given cycle can vary from 0% to 100%. The power available to the motor is equivalent to the amount of time that current is switched on. Using this method, efficiency, measured by comparing power available to the motor to total power delivered from the power source, can be maintained in the 95+ % range.

The Auburn Scientific Controller is particularly good in the area of efficiency by virtue of very low "On Resistance" through the FET transistors and the small amount of time the transistors spend in the On-Off transition.

### SPECIFICATIONS

	MPC600-144	MPWC600-144	MPWC600-192
On Resistance	< .004 Ohms	< .004 Ohms	<.004 Ohms
Switch Time	< .1 micro seconds	< .1 micro seconds	< .1 micro seconds
Frequency	> 15,000 cycles/sec	> 15,000 cycles/sec	> 15,000 cycles/sec
Motor Current Limit	680 Amps	680 Amps	680 Amps
Operating Voltage	55 to 144 volts	55 to 144 volts	55 to 192 volts
Weight	22 pounds (10 KG)	22 pounds (10 KG)	22 pounds (10 KG)
Cooling System	AIR	Liquid	Liquid
No load current Draw	100 Milli-amps	100 Milli-amps	100 Milli-amps

## **FEATURES**

The Controller provides for logarithmic power control with pre-programmed acceleration ramp. This allows the user more precise control of the motor power as well as limiting how fast the power comes on if the motor control input (5K Ohm variable resistor) is inadvertently set to full scale.

The maximum motor current is adjusted to the factory-defined maximum for a stalled motor condition (680 amps.) See Specification Table in the General Description Section for details on your controller.

High Pot Input Lockout circuitry is included to reduce the possibility of the dangerous situation in which the speed control input was set to greater than zero before the enable or contact switch is turned on. The Controller will not switch power to the motor until the speed control has been set to zero Ohms for at least 250 milli-seconds before the enable is set high.

Auburn Scientific motor controllers have an open Pot shutdown feature. This feature will shut the controller off and put it in a "sleep" state in the event that the Pot circuit is opened, or the Pot resistance exceeds about 6 K Ohms. To recover from an "open Pot" situation, all power must be shut off from the controller, and it must be allowed to completely discharge. At that time the error which caused the condition must be corrected before power is reapplied and normal operation is restored.

- Note: In our experience, we have found that a few Pot Boxes labeled 5K Ohms, actually exceed 7K Ohms full scale. Consequently, we recommend as part of the installation process, the pot values be measured at both extremes. The Pot value measurements should yield the following for a good quality Pot Box.
  1. A value of 0 (or very close to 0) exists at one extreme
  2. A value of 5Kohms (+/- 10 %) exists at the other extreme

The Controller has a low voltage shut off. This limit is set at the factory to 55 volts. In the case where the power source voltage has dropped below this value, the controller will switch off until the voltage increases above the limit. The Controller will not function if the V+ voltage is below the low voltage shut-off value.

The Controller has a temperature-controlled current reduction feature. If the controller is used in a high temperature application, the current limit value is gradually reduced as the internal controller temperature increases. This function starts current reduction at 50 degrees C (122 degrees F).

The Controller is designed specifically to "run cool". Additional heat sinks are not necessary under normal operating conditions. Under high heat conditions defined as extended periods of high current operation or ambient temperatures above 35 degrees C (95 degrees F), it is recommended that liquid cooling be used. If liquid cooling is not available, mounting the controller in a location that provides additional heat dissipation or increased airflow will help.

The Controller has a maximum temperature shutdown that disables the controller if the internal temperature exceeds 85 degrees C.

