

DC Power Systems

RAPTOR SERIES *HIGH PERFORMANCE ELECTRIC VEHICLE MOTOR DRIVES*

Model # RAPTOR 1200

SERIES DC MOTOR CONTROLLER

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Raptor 1200 Product Overview

Thank You for purchasing this DCP motor controller. We design and manufacture products for High Performance Electric Vehicles. This motor controller employs the latest generation of power MOSFETs to provide extremely low on resistance, resulting in a high current capacity and extreme efficiency. Thermostatically controlled fan forced air cooling is provided with gradual over temperature shutdown. The controller employs a High Side switching topology, meaning it switches the B+ input to the motor. Control of an external battery contactor allows the controllers on-board filter capacitor bank to precharge prior to engagement of battery power.

Required Accessories

For your safety and that of others, some basic precautionary measures must be employed when designing, working on, and driving electric vehicles. This may be old hat, but the good design harpy won't let them pass without saying 'em again:

- Use a contactor in the battery circuit, rated for the amperage and voltage of the system.
- Use a fuse rated for the voltage and available fault current of the battery.
- A secondary disconnect, accessible to the driver, must be employed. This can be a circuit breaker, switch or separable connector system.
- Use wire rated for the current & voltage of your system. Generally, 2/0 welding cable is acceptable for light (<800lbs) battery strings, but 4/0 is recommended for severe duty applications where sustained high current (>400Amps) is expected.

Controllers have failure modes which can result in runaway (stuck throttle) conditions. This controller has been designed to prevent and preclude as many of those from ever occurring as possible. However, it could still happen, according to Murphy's Law. Please follow the Recommended Controller Wiring System document in this manual. Failure to do so could result in damage to the controller, and serious injury or death to vehicle occupants or bystanders.

Recommended installation guidelines

There are several good books on the subject of electric vehicle conversion and design. Read them and save yourself the hassle of repeating other peoples mistakes. The purpose of these instructions is not to detail EV conversion or represent one companies products ahead of another, but to provide guidance on the correct application of the motor control system.

Note: See Diagram on page 8

Battery Contactor

The main battery contactor needs to be chosen for it's ability to carry the intended continuous battery current, and to interrupt the peak battery pack DC voltage. The controller is designed to operate contactors with 12VDC coils and a maximum continuous coil current of 4A . When the controller is turned on, it begins to charge the internal filter capacitor to the positive battery bus voltage. After a 1.5 second delay, the controller switches the contactor coil lead to ground, energizing the contactor.

Main Fuse

The main fuse needs to be sized to protect the wiring in the drive system. Use the smallest amperage rating fuse which doesn't nuisance trip. A Bussman type FWH-600 (600A 500VDC) or equivalent is required. Semiconductor protection type fuses are the only acceptable types.

- Buss FWH-600 or equivalent fuse ONLY.
- Fuse DC voltage rating must be greater than the peak battery voltage.
- Fuse current rating: Maximum 800 Amp. Most high current fuses have very long (2 minutes or more) tolerance to 50 - 100% overloads. Thus a 600A fuse likely won't fail in a 1200A vehicle application, because you'll rarely draw those high currents for extended times.

Some installations use multiple fuses at various points in the battery pack, a good idea if their is a possibility of an interpack short circuit. All fuses should be of equal type and rating.

Safety Disconnect

The safety disconnect provides a way to disconnect the battery pack from the controller and contactor. It may be a circuit breaker, a mechanical switch, or a large removable connector. Make sure it is rated for the current capacity and DC Voltage of your system. Some installations disconnect both the positive and negative leg of the battery pack, a very good idea. For runaway motor protection however, opening at least one battery lead creates redundancy of the battery contactor function, a minimum safety requirement.

Drive Motors

The motor controller is designed to operate with series wound brush commutated DC motors rated for operation from 48 - 156VDC. Operation with shunt or compound wound motors is possible, as are permanent magnet types.

Tachometers

Can be driven directly from a Xolox trigger mounted on the motor shaft.

Auxiliary Fusing

Two auxiliary circuits to the motor controller should be fused. The 12V signal from the ignition circuit (Red wire) should be fused at a maximum of 5A. The controller draws less than 0.1A from this input. The main battery + input should be fused for 5A @ 250VDC. This fuse needs to be of the slow blow type, as the controller can draw a pulse current of ~12A during the precharge cycle.

Optional Main Battery Power On

An optional input for race only applications allows the controller to be powered from the main battery pack. When this is used, you don't need 12V control power. Connect to Battery + with a suitable switch.

Controller Installation

Choose a location outside the drivers compartment to mount the controller. Any mounting position except "fan up" is acceptable, a horizontal surface is preferred. Protect the controller from direct contact with rain and airborne water. Mount the controller as close to the motor as is reasonably possible. Ideally, your motor leads should be less than 4 feet long. Often it is possible to place the controller above the motor on a plate, allowing free airflow into and out of the controller while protecting it from road spray. Do not place the controller in a zero clearance compartment, or one without at least 200CFM of airflow.

The fan sucks air in, blowing it across the heatsink to where it exits the controller below the bus bars. Place the controller such that any "ram air" effect causes an increase in air pressure on the fan side of the controller. But, make sure water can't enter the controller!

High current wiring to the motor controller should use 5/16" mounting hole ring terminals of solid copper. Bolt them to the controller using 5/16" hardware. Place sleeving or heatshrink over the terminals once secured to provide electrical insulation.

The green connector block is removable for easy assembly. Use 18 - 14AWG 300V rated wire to route the control wiring from the various connections to the terminal block.

Throttle Sensor Mounting

Controller is designed to accept a 0-5K ohm throttle sensor, Curtis PB-6 or equivalent.

RATINGS

Input Voltage Range:	48 - 156 VDC Nominal (40 - 190 VDC max)
Input Current (Battery):	1200A max, 500A sustained @ 40C ambient derate 200A per 10C rise above 40C
Output Current (Motor):	1800A max, 700A sustained @ 40C
Switching Frequency:	18Khz
Contactors control:	Switches 4A rated 12V coil. Uses vehicle 12V
Operating temperature:	-30C ~ +65C
Weight:	18 lb.
Dimensions:	6.75 x 9 x 12 (HxWxL, inches)

FEATURES

- Goof Proof control wiring - connections are high voltage fault tolerant
- Failed open, short and floored-on-startup throttle lockout
- External battery contactor control with capacitor precharge delay
- Microprocessor controlled, forced air cooled

LIMITED WARRANTY

DCP warrants every product it sells to be free from defects in materials or workmanship for a period of **1 year** to the original purchaser from the date of purchase. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent or consequential damages arising through the use of our products. DCP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose, however some areas do not allow limitations on how long an implied warranty lasts, so the preceding exclusion may not apply to you. This is DCP's sole written warranty, no other warranty is expressed or implied.

In the event you should need warranty repair, Please see the Return Procedure below. DCP reserves the right to repair or replace merchandise at its option. DCP reserves the right to make changes to any of its products or specifications without notice. All Sales Are Final.

Return Procedure

Call DCP at (707) 350-0156 or
email: nosmokin@earthlink.net

Explain the nature of the problem and obtain a Return Authorization number. You pay shipping to us, we pay the return shipping. Package the device in it's original container, we are not responsible for damage In shipping.



