Power Master Mk VI

Unlimited Speed Controller

General

Power Master run any motor designed for high performance electric cars and will handle currents in excess of 150 Amps continuous on variable throttle up to 18 Vdc (6 to 12 cells). Significant gains can be achieved when using Power Master with stock motors due to the very low on resistance.

Features

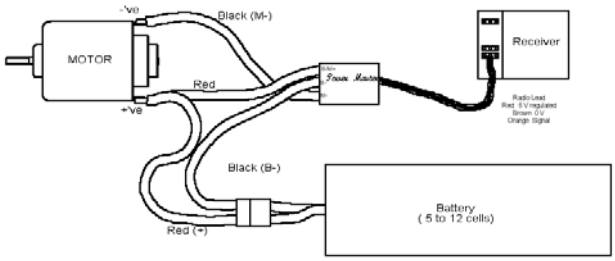
- High variable current (150Amps for 10 secs, 95Amps continuous)
- BEC with supply voltage monitoring.
- Programmed for maximum power output.
- Very low on resistance (0.7mΩ or 0.0007Ω) for minimum loss and high available currents.
- Small package, lightweight. (~7g without leads)
- Micro controller controlled full digital operation for proper performance under adverse conditions (dust, moisture, electrical interference and vibration).
- Innovative design.
- Uses the very latest and best available surface mount components for the highest possible power output from the smallest package. Better components are incorporated as soon as they become available.
- Programmable for brake, power, neutral positions, ramp up & initial brake (brake during neutral).
- Accommodates all radios, allowing complete control over power and brake spans.
- No Radio Signal failsafe. Applies brake after 1/8th sec. without radio signal, and flashes LED.
- LED which shows radio signal failure, full throttle, neutral, full brake, and assists in programming.
- Programmable soft power up to assist in preventing wheel spin. Ramping can be from 0 sec to approx. 0.6 sec. for full throttle range. New algorithm provides better response out of corners and those that like to "pump" the throttle.
- Programmable Initial Brake allows for quick controlled speed reduction into corners. Initial Brake from 0 to 50% of full brake
- Switch less programming.
- Dual Brown Out detection provides protection for radio & Speed Control by reducing power drawn from battery when the loaded battery voltage is below ~5V. Provides almost instant restart and prevents reprogramming caused by bad battery connections or short circuits for small time intervals.
- Ramp Up and Initial Brake are now programmed in a separate programming sequence, so that variables effecting handling can easily be changed without effecting throttle positions programming.

Mounting

Power Master can be attached to the car with double-sided tape or with cable ties. Find a position that allows exposure to the passing air, both over and through Power Master.

Connections

Power Master requires no external schottky diode, as it is included in the device, however, if you intend to run in excess of 50 Amps continuously, it would be a good idea to add one across the motor terminals. Keep motor and battery wires as short as possible to reduce power loss and radio interference and keep radio wires away from power leads. Wire battery, motor and radio lead as per the following diagram.

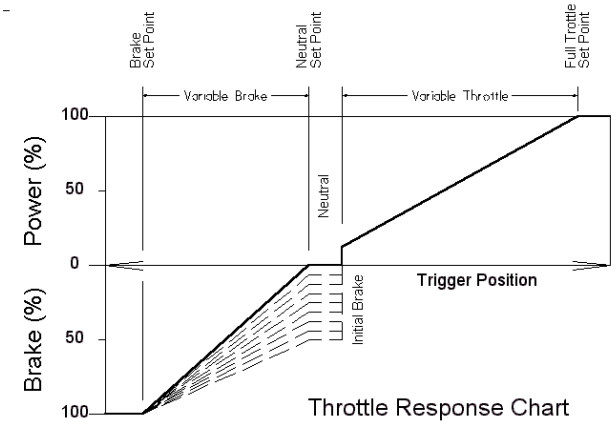


Power Master Wire Connections

Programming

Power Master has been programmed and tested, but will require reprogramming to suit your radio.

Power Master is programmable for Full Throttle, Neutral, and Full Brake positions, Ramp Up and Initial Brake. The following graph shows Power Master's response after programming.



To program Power Master follow this procedure:-

1. Turn on the transmitter and apply full throttle.
2. Whilst still applying full throttle, plug in the controller to the battery. (PM will need to have been unplugged for at least 3 seconds prior to this step. If any voltage is stored in PM, PM will do a brown out quick start up and avoid the programming sequence).
3. PM replies with two (2) flashes on the LED. (If 2 flashes aren't received, increase the throttle trim and repeat steps 1 & 2 again. If still no response, reverse the throttle output from the radio repeat steps 1 & 2 again. Most radios have reversing switches for this.
4. After receiving 2 flashes, return the throttle to Neutral. After 2 seconds PM saves the Neutral setting and responds with 1 flash.
5. Move the throttle to where you want full throttle to occur. After 2 seconds PM saves the Full Throttle setting and responds with 1 flash.
6. Move the throttle where you want Full Brake to occur. After 2 seconds PM saves the Full Brake setting and responds with 3 flashes.

7. Programming is finished and PM is programmed with no ramping and no Initial Brake.

So normal sequence is :-

```
F.Throttle ✳✳ _ _ Neutral ✳ _ _
F.Throttle ✳ _ _ F.Brake ✳✳✳ ready
```

where (✳) = LED flash and (_) = 1 second

Ramping & Initial Brake

i. If after step 3 above the throttle is held at Full Throttle for a further 2 seconds, PM will reply with two (2) more flashes on the LED.

ii. Return the throttle to Neutral and re-apply within 1 second. The LED goes off and then back on. PM counts 1 step of Ramp. You can skip this step or repeat it up to 8 counts. Each count programs PM with approx. 0.07 second ramp (it will take PM 0.07 sec to achieve full throttle from neutral if full throttle is applied suddenly) up to a max. ramp time of ~0.6 seconds.

iii. Return the throttle to Neutral. PM will wait 1 second and flash 3 times as before.

iv. Apply the throttle again during the next 1 second and Step ii will be repeated but this time for Initial Brake. As before, this step can be skipped or repeated up to 8 times giving a maximum of 50% brake during Neutral.

v. Return the throttle to Neutral. PM will wait 1 second and flash 3 times. Ramping and Initial Brake are now programmed.

Sequence is :-

```
F.Throttle ✳✳ _ _ maintain F.Throttle ✳✳
Pulse throttle (0 to 8 times for Ramping)
Neutral _ ✳✳✳ Pulse throttle (0 to 8
times for Initial Brake) Neutral _ ✳✳✳
ready
```

where (✳) = LED flash and (_) = 1 second

Note :- Both the previous sequences can be repeated as often as you wish, each one being completely independent of the other, so that Ramping & Initial Brake can be readily reprogrammed without effecting the throttle positions.

If either of Ramping or Initial Brake is programmed to 8 steps, PM will automatically proceed to the next Step without waiting for the 1 second of Neutral.

Warning - Power Master casing/heatsink may not be isolated if included. Prevent contact with motor or battery terminals.

Warranty - Power Master is warranted for life against faulty parts or workmanship. Abuse, reverse connections & exceeding maximum ratings are not covered.

Specs

Dimensions	28 x 22 x 12 mm for h version. 32 x 22 x 12 mm for v version. 22 becomes 24 for cased version
Weight	~7g without leads
Rating	6 - 15Vdc, 150 Amp caseless
Max. current	644 Amp continuous, 2480 peak (mosfet spec.)
Tested continuous current	95 Amp caseless, 120 Amp with case.
Suitable Motor	Any
BEC radio connection	5Vdc, 1Amp cont., 2 Amp peak
PWM frequency	4 kHz fixed
Throttle	Fully variable from 12% to full (12% will just move most cars)
Ramping	Adjustable 0 to 0.6 seconds (8 steps)
Brake	Fully variable from Initial Brake to Max
Initial Brake	Adjustable 0 - 50% (8 steps)
Maximum mosfet temp.	60°C

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Disclaimer

Although great care was taken in designing, programming and assembly of this speed controller, the end user will take all responsibility for any damage or injury caused by any device containing this controller. Due to the nature of radio control, no guarantees can be given as to the safe use of this product.