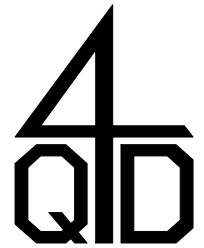


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## Instruction Manual

### Porter controller

This manual applies to Porter boards issue 30-50-03

The Porter is a simple controller designed for golf caddies, small material handling machines, Electric wheelbarrows and similar machines.

It has extremely simple wiring and operates over a wide battery voltage range (12v to 48v) so it is a very versatile controller as well as being economical and simple.

## Specifications

- Operating voltage:** . . . . . 12 - 36v battery  
 . . . . . 10v to 46v  
 . . . . . 47v absolute maximum  
 . . . . . 9v absolute minimum
- Motor current:** . . . . . 30a continuous - with suitable heatsink.  
 . . . . . 40A typical limit - depends on motor.
- Ramps:** . . . . . linear, fixed, 2 seconds accel, 2 second decel, 0-100%  
 . . . . . other rates are possible (factory change)
- Throttle: Type:** . . . . . variable resistor (2 wire) 0-5K  
 . . . . . or 0-10K with minor on-board modification.  
 . . . . . *[bracketed figures apply to 10K version]*  
 . . . . . Pot fault detect: 9.3K *[18.6K]*  
 . . . . . Pot current: 600µA approx
- or voltage input:** . . . . . low source impedance, must sink 2mA *[1mA]* .  
 . . . . . 0-3v  
 . . . . . fault detect: 7v
- Ignition:** . . . . . Off<sup>†</sup> at zero speed  
 . . . . . or with pot fault detected.  
 . . . . . Automatic ramp-down at power off.
- Quiescent current** when off . . typically 3mA at 24v
- Reverse polarity protection:** . Automatic, electronic
- Max reverse voltage** . . . . . 60V

# Wiring

Wiring could not be any simpler. Just six connections as shown in the diagram below.

The six connections are:

Motor + (internally connected to Battery +)

Motor -

Battery +

Battery -

2 wires for speed pot.

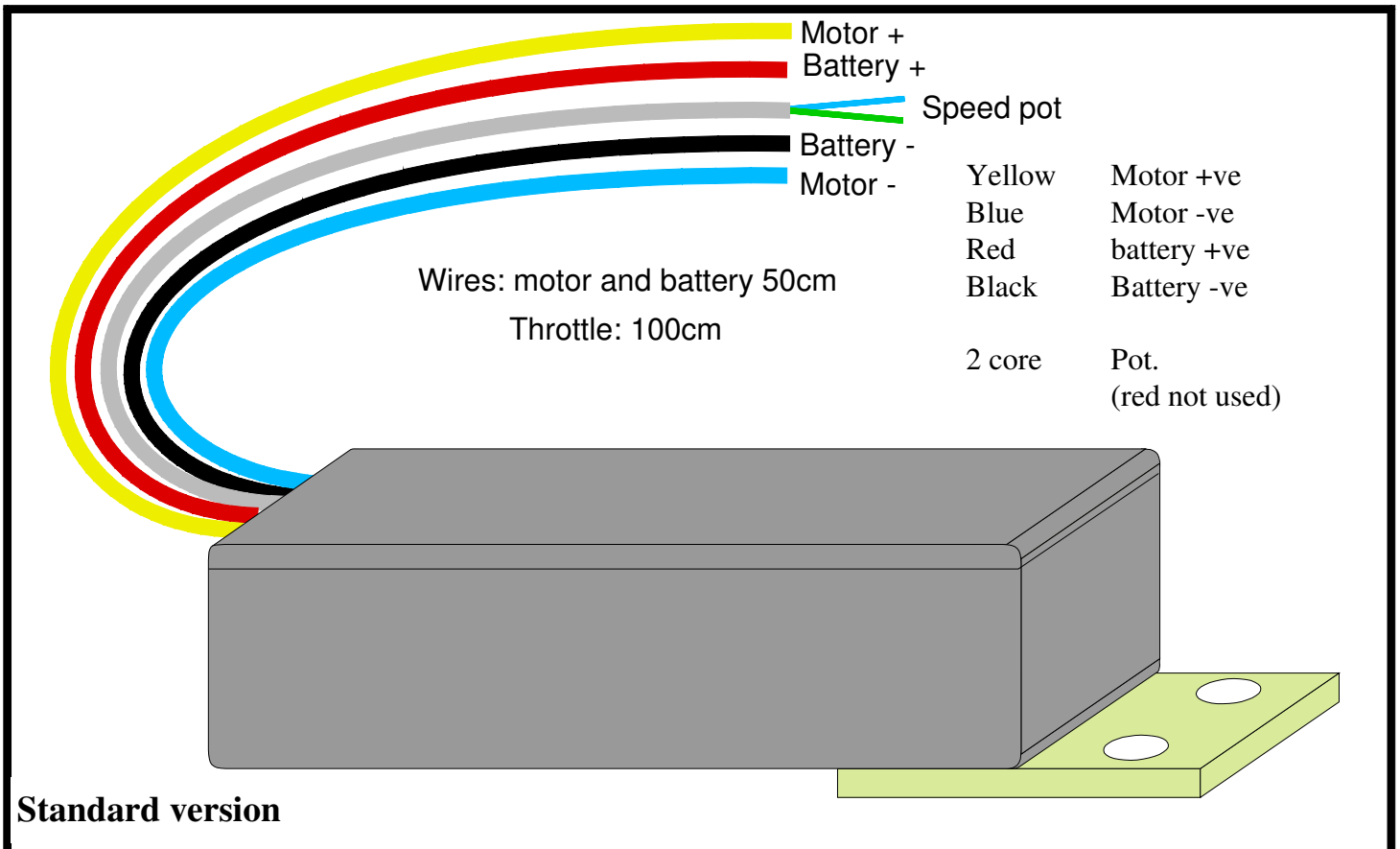
The controller is available in two versions: the standard version is boxed as shown below. The alternative version is a circuit board only as shown on right.

**Do not** pull the wires: you could disconnect the internal push-on connections, or break the wires to the pot.

**Do not** solder to the tabs or pot connector.

**Do not** allow the pot wires to touch any other item: if these are accidentally connected to anything this could blow the controller.

**Do not** allow the battery voltage to fall below 9v. Not only can this damage the battery, but it can also cause the controller to seriously overheat and possibly fail beyond repair.



## Power wiring

2.5mm<sup>2</sup> cable is adequate for most applications, but 4mm<sup>2</sup> may be preferred, especially for the motor.

**Caution** Take care not to muddle the battery and motor wiring - connecting a battery wire to a motor terminal can destroy the controller.

## Motor Wiring:

If the motor rotates in the wrong direction, exchange yellow and blue wires.

## Battery Wiring

Keep battery wiring as short as possible. The Porter is protected against reversed battery but will not work with the battery reversed.

## Battery Circuit breaker

A circuit breaker or fuse is advised in the battery connections, to act as an emergency disconnect in the event of a fault in wiring or any other component. In some applications such a circuit breaker is a legal requirement.

A 30 amp breaker should be adequate for most uses.

## Pot wiring

The controller uses just two connections to the pot: it detects the pot's resistance. A 5 K pot should be used (or 10K with the 10K version: see back page for modification). When modified, the values quoted below will be doubled.

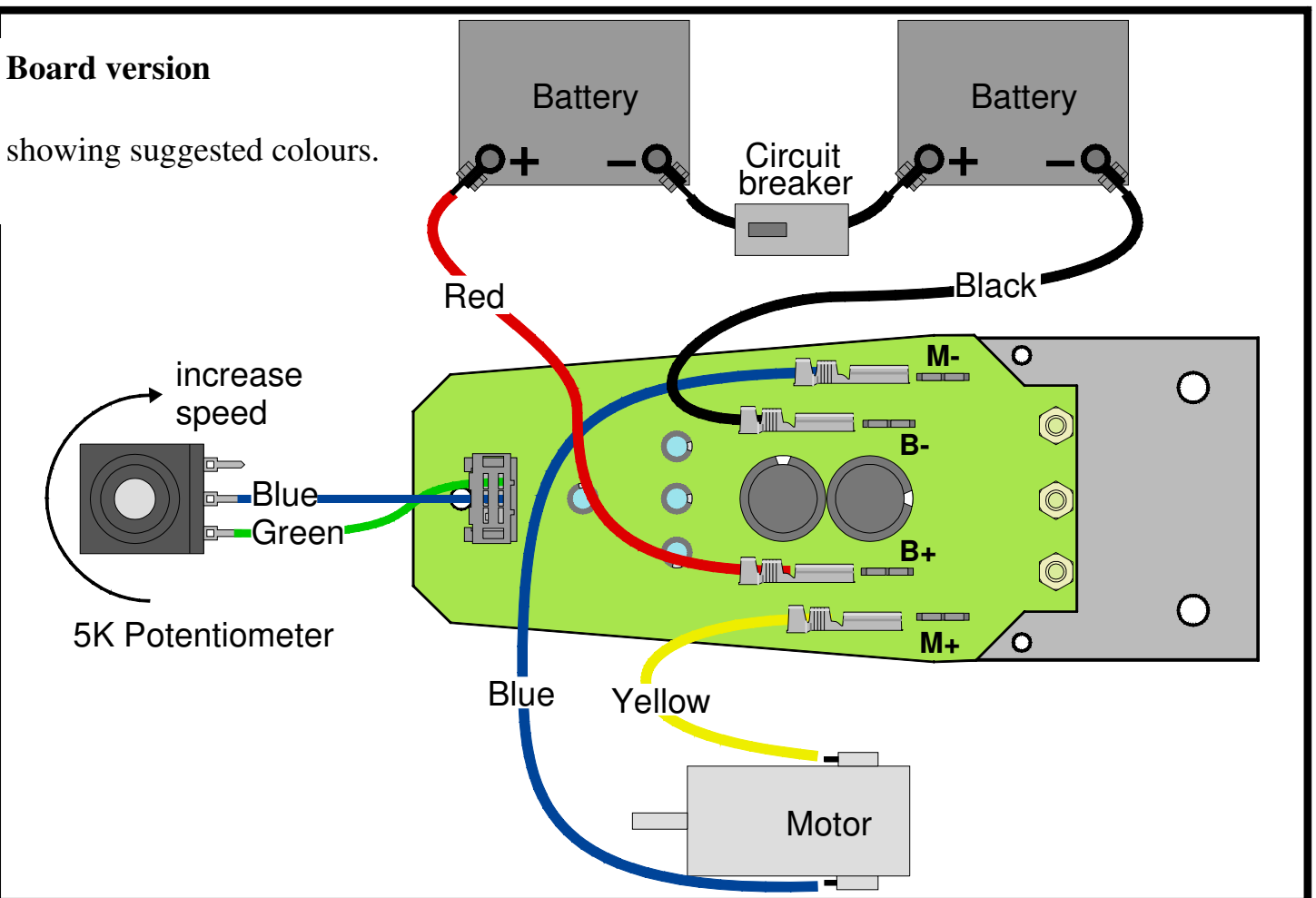
Zero resistance will give zero speed and 5K will give full speed. Beware that pots sold as 4K7 may have a 20% tolerance: if over 4K7 they should work, but if less than 4K7, full speed will not be obtained.

The boxed version may be supplied with a 3 core wire: the red wire is not used.

If the potentiometer goes high resistance (above about 9.3K) the controller will switch off as it detects a fault in the pot.

## Board version

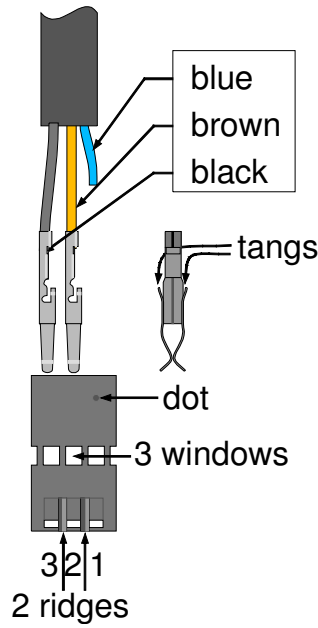
showing suggested colours.



## Wiring with Throttle GTH-103

The twist grip throttle is ideal for use with the porter. Wiring is shown right. Note that only the Black and Brown wires are connected.

Cut the blue wire short and make sure it cannot short to anything else in the controller.



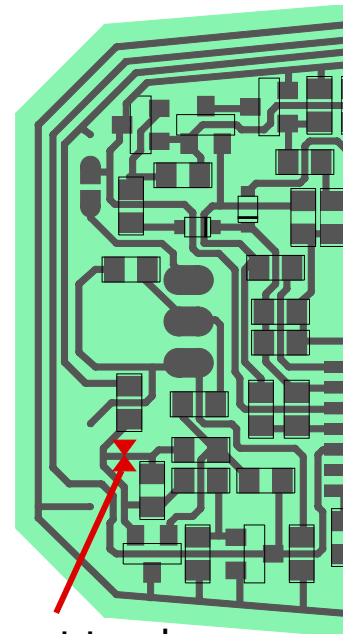
## Use with 10K potentiometer

For use with a 10K potentiometer a track on the board must be broken, to engage another resistor.

This track is indicated on the diagram, right.

Scratch through or cut the track with a sharp knife or other pointed tool.

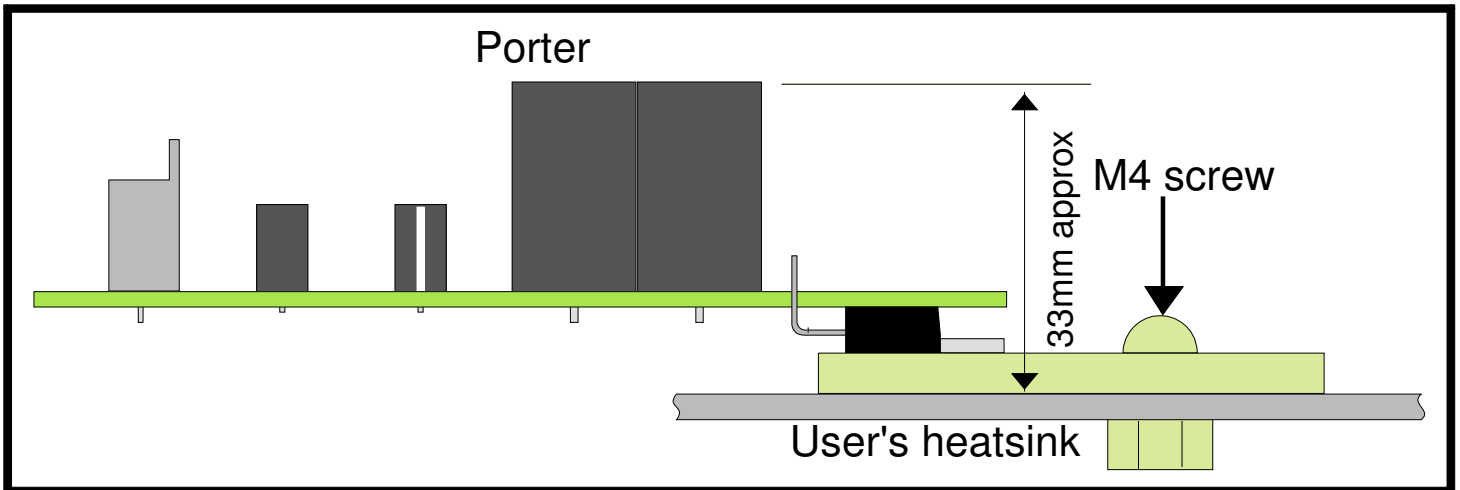
*Take care not to damage other tracks or components on the board.*



cut track

Porters supplied modified to 10K pot by the factory have a circular black label on the heatsink and/or circuit board.

## Mounting



Mounting of the Porter is the same for the standard version or the board version. The flat metal tab should be bolted onto the metalwork of the machine to act as an additional heatsink.

This is shown above.

Mounting holes are 1.3inches (33mm) apart and are 4.2mm diameter for M4 screws.

The current the Porter gives reduces as the MOSFET

(heatsink) temperature increases, so a good external heat sink will increase the length of time for which the Porter can give sustained high currents.

A large, thick heatsink, with good air-flow, will increase the length if time high current can be used. Thermal paste should be used between the Porter's own heatsink and your additional one to increase heat flow between them.