



## 3.3.5 BlackBox 4X 0-10v Analog Output

OpenBuilds BlackBox includes a 0-10v Analog Signal Voltage output that can be used to control spindles/other toolheads that need a 0-10v signal to run.

**NB Note** this is a low level logic Signal voltage, it should not be used to drive anything directly. This signal should be connected to an external drive system, for example a VFD or a DC Spindle Controller. If you need help, head over to our Forums to ask about specific devices and how to connect them

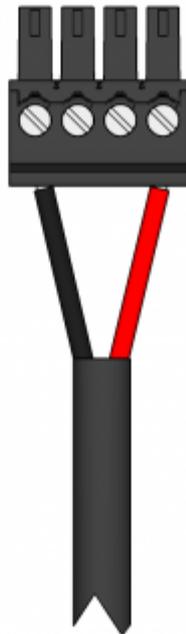
- To use the signal, connect between the GND and 0-10v pins on the toolhead plug as shown.
- To Activate the signal, send an M3 Sxxx where X=0-1000 (1000 = default Grbl configuration, or send S=what you have set for \$30 - Max spindle speed, RPM). For example, to have a 10v output send M3 S1000, to have a 5v output send M3 S500, to have a 1v output send M3 S100 etc. (NB scale accordingly if your \$30 is not '1000')
- If you want to use this feature to control Spindle RPM (on supported spindles), please read <https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration#30---max-spindle-speed-rpm>  
[\[https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration#30---max-spindle-speed-rpm\]](https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration#30---max-spindle-speed-rpm)

### Calibrate output voltage

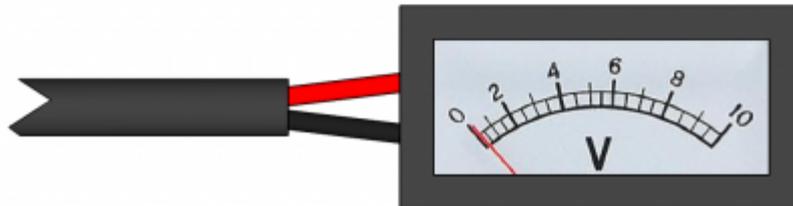
TIP: You may need to fine tune the output to be exactly 10v:

1. Send an M3 S1000 to the controller (1000 = default Grbl configuration, or send S=what you have set for \$30 - Max spindle speed, RPM)
2. Measure the voltage between GND and the 0-10v Terminal
3. Use a small flat head screwdriver to adjust the 0-10v Fine Tuning Adjustment until the output is exactly 10.0v

This will ensure that command Spindle RPM is as close to the actual as possible



0-10v Fine Tuning Adjustment



### Checkout our Forums for more information:

**Huanyang VFD:** <https://openbuilds.com/threads/vfd-spindle-control-via-openbuilds-blackbox-controller-and-software.15167/> [<https://openbuilds.com/threads/vfd-spindle-control-via-openbuilds-blackbox-controller-and-software.15167/>]

**YL620-A VFD** <https://openbuilds.com/threads/yl620-a-vfd-settings.15780/> [<https://openbuilds.com/threads/yl620-a-vfd-settings.15780/>]

docs/blackbox/connect-vfd.txt · Last modified: 2020/06/02 20:23 by admin

- [Log In](#) 
- [Media Manager](#)
- [Sitemap](#)