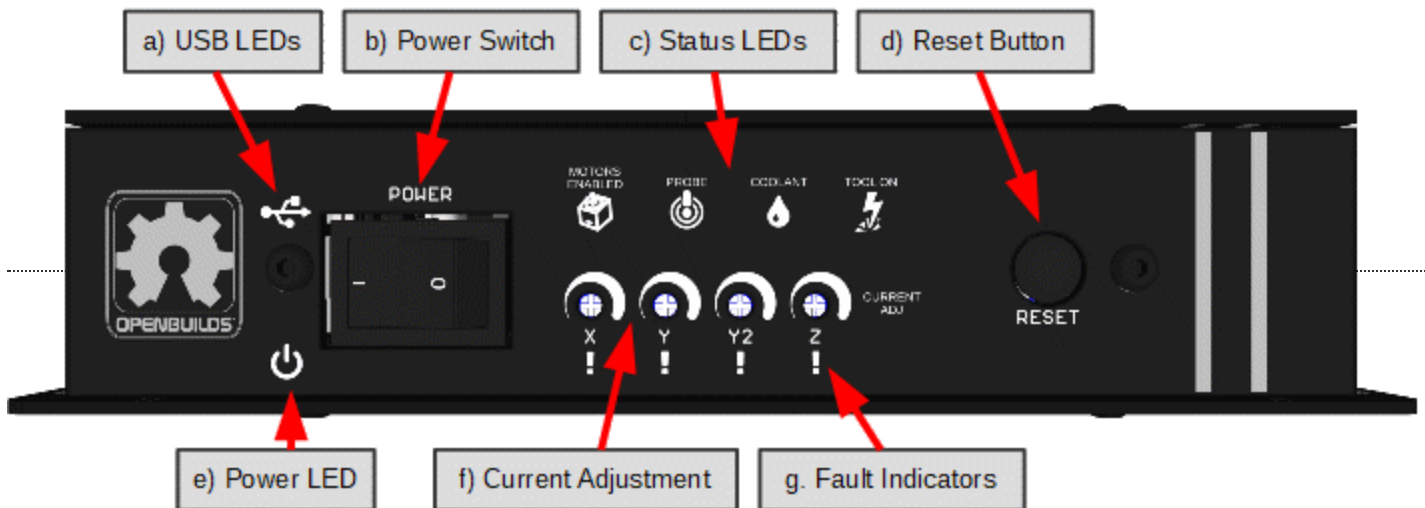




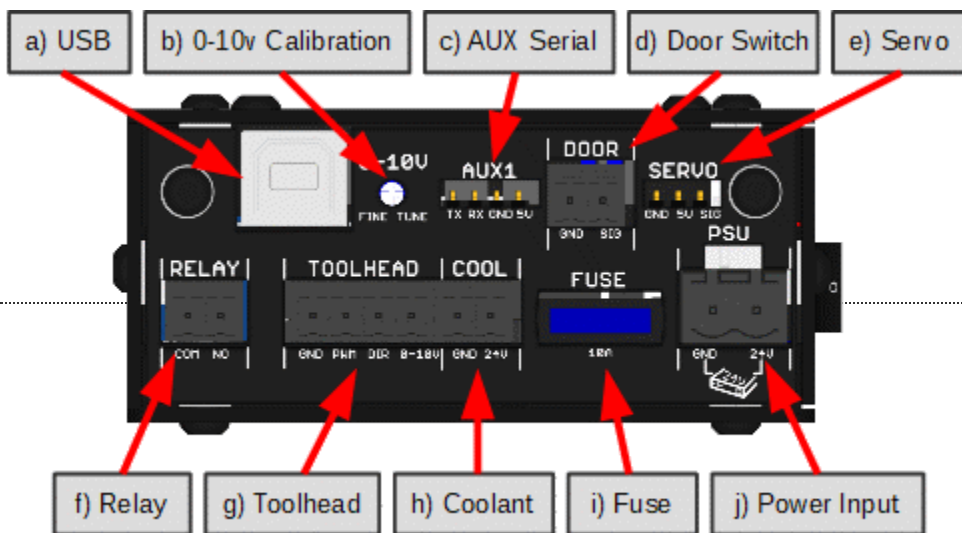
Introduction to the OpenBuilds BlackBox Features

1. Front Side



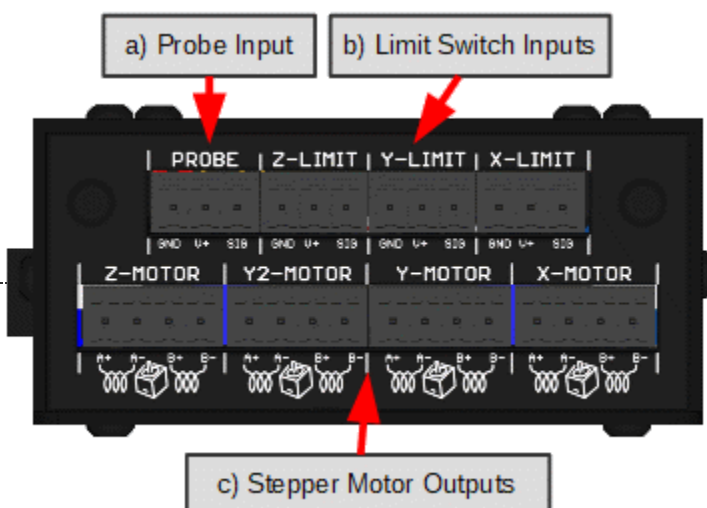
- a) USB LEDs: Flashes in Red/Green to indicate serial data transmit/receive traffic
- b) Power Switch: Used to turn the Main Power off, can be used in case of an emergency to bring the machine to an immediate stop
- c) Status LEDs
 - Motors Enabled LED: Indicates when the firmware has the Motor Drivers Enabled. In Grbl Settings set $\$4=1$ (required for BlackBox drivers to function correctly) and $\$1=255$ (to keep motors always enabled)
 - Probe LED: Lights up when the Probe Input activates
 - Coolant LED: Shows status of the Coolant signal (M8 = on, M9 = off)
 - Tool On LED: Reflect the status of the PWM / Spindle / Laser output: Refer to Sections [3.3.1](#), [3.3.2](#), [3.3.3](#), [3.3.4](#) and [3.3.5](#)
- d) Reset Button: Restarts the Firmware
- e) Power LED:
 - If the Power LED is Green: Power Input OK
 - If the Power is Red: Power connected with incorrect polarity
- f) Current Adjustment: Adjust stepper driver current, see Section [2.2.1 Current Adjustment](#)
- g) Fault Indicators: Indicates a problem with the stepper driver on the relevant axis: The LED indicates
 - Overtemperature Fault: Adjust current down a little, Check Fan
 - Overcurrent Fault: Adjust current down a little
 - Short Circuit Fault: Check Wiring
 - Undervoltage: Check input Voltage

2. Left Side



- a) USB: Port for connecting the controller to your computer
 - Drivers: Section 4.1 Install Device Drivers
 - Troubleshooting: Section 6.3 Toubleshoot USB Connection / Firmware Not detected
- b) 0-10v Calibration: Used to calibrate the 0-10v Spindle control signal
 - Calibration: Section 3.3.5 0-10v Analog Signal / VFD
- c) AUX Serial: (Advanced feature) Refer to Section 5.1 AUX1 Serial Header
- d) Door Switch Input: (Advanced feature) Refer to Section 3.6 Connect Door Sensor
- e) Servo: Used for pen-plotter applications: See Section 3.3.6 RC Servo
- f) Relay: Used as a Plasma trigger: See Section 3.3.4 Plasma Cutter but can also be repurposed for other uses: See Section 2.1.3 Onboard Relay
- g) Toolhead Connector
 - GND: Common GND for connections
 - PWM: 5V TTL PWM signal, straight from Grbl (M3 Sxxx where xxx = scaled between value of \$30 [<https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration#30---max-spindle-speed-rpm>] and \$31 [<https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration#31---min-spindle-speed-rpm>])
 - DIR: Direction Pin, from Grbl. (M3 vs M4)
 - 0-10v: 0-10v Signal, typically used with VFD Spindles. See Section 3.3.5 0-10v Analog Signal / VFD
- h) Coolant: General output, switchable with M8/M9, refer to Section 3.7 Coolant Output
- i) Fuse: Protection fuse for the power input
- j) Power Input: Connect to 24v Power Supply. Double check polarity before powering on. See Section 3.1 Connect Power Supply

3. Right Side



- a) Probe Input: Connect to a Probe, see Section [3.5.1 OpenBuilds XYZ Probe Plus](#) and [3.5.2 OpenBuilds Z Touch Plate](#) as well as more information on [XYZ Probe Plus Documentation](#)
- b) Limit Switch Inputs: Connect [Limit switches](#): See Section [3.4.1 OpenBuilds Xtension Limit Switches](#) and [3.4.2 Micro Limit Switch Kit](#)
- c) Stepper Motor Outputs: Connect motors: See Sections [3.2.1](#), [3.2.2](#) and [3.2.3](#)) for connection details, and [6.1 Identify Motor Coils](#) for troubleshooting information

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