NEMA17 Motor Driver Controller

USB Stepper Motor Kit

Quick start and reference

motorcontrol.tscircuit.com

Open in desktop Chrome or Microsoft Edge.

Setup & motion 2–5 / Firmware 6 / Protocol 7

Before you power on

For supervised bench testing and prototyping. Keep out of safety-critical systems. Use guards and an independent hardware stop where unexpected motion could cause injury.

Moving shaft. Secure the unloaded motor on a dry, nonconductive surface. Keep hands, clothing and cables clear of the shaft.

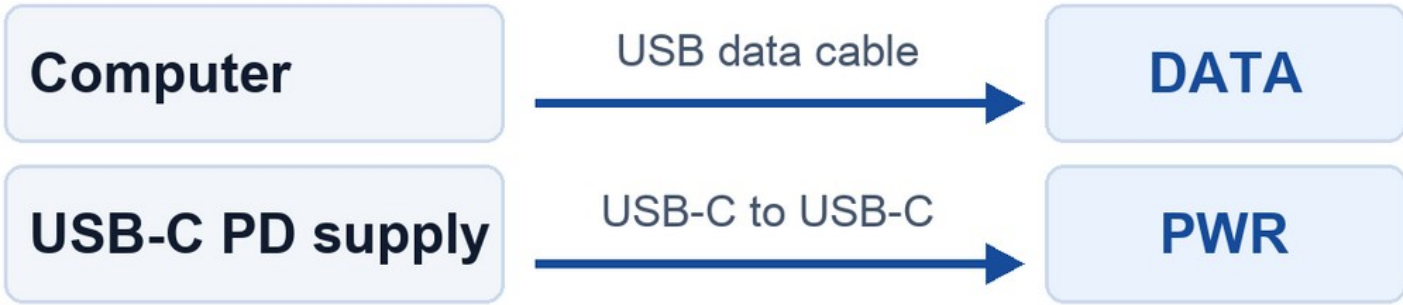
Power and wiring. Unplug **PWR** and **DATA** before wiring the motor. Use a compatible USB-C Power Delivery supply and undamaged cables.

Heat and holding torque. Let the motor and controller cool before handling. **Stop** releases the coils. Support loads that could fall when holding torque is lost.

Shutdown

Click **Stop** and wait for motion to end. Click **Disconnect**, then unplug **PWR** and **DATA**.

Connect and make a first move

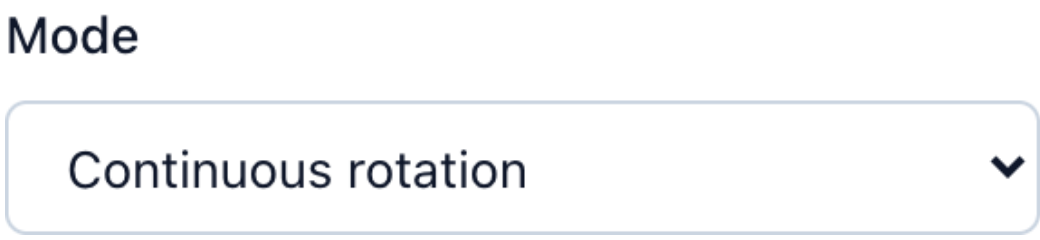


1. With power off, check the motor connection. Connect **DATA** to your computer.
2. Open **Motor bench**. Click **Connect board**, choose the controller and confirm **Connected**.
3. Connect the supply to **PWR**. In **Board controls**, select a motor voltage supported by your kit and supply. Try **9 V** if supported. Click **Request voltage** and wait for **settled**. **5 V** keeps the driver disabled.
4. Choose **Move a number of steps** and **full** step size. Set **50** steps at **40** full steps/sec. Select a direction and click **Start movement** for about a quarter turn, then automatic stop.

Keep Motor bench visible during motion.

Run and jog one motor

Continuous rotation



Select **Continuous rotation**, a direction and **40 full steps/sec** (about 12 RPM). Click **Start movement**, then **Stop** to finish.

Keyboard jogging

Stop and disconnect Motor bench. In **Single stepper**, click **Connect motor**. Request power if needed. Set a low speed, then click outside the speed field.

Hold **Up** or **Right** for forward, **Down** or **Left** for reverse. Release to slow down. Press **Space** or **Esc** for an immediate stop.

Save and return

Under **Saved positions**, click **SAVE** while stopped. Jog away, stop and click **GOTO**. Save again after a restart.

Jog multiple axes

Open **Gantry** for X/Y or **3-axis gantry** for X/Y/Z. Use a separate powered controller for each axis. Connect each board to its matching axis in the browser.

Keys to hold

X Left / Right
Y Down / Up
Z Shift + Down / Shift + Up

Use the on-screen arrows or the **Joystick** for simultaneous X/Y motion. Release the input to slow down. **Space**, **Esc**, or the on-screen stop button stops all axes.

Check travel

Start slowly and check each axis direction. Where supported, set soft limits inside the safe travel and recheck after restarting.

Position and RPM are estimates from commanded steps. Missed steps or manually moving the shaft can shift the physical position. Verify travel before using **GOTO**.

Update firmware

Find **Motorcontrol Desktop** and firmware downloads at motorcontrol.tscircuit.com/firmware.html.

1. **Prepare.** Stop motion and disconnect all dashboards. Unplug **PWR**. Keep only the controller you're updating attached to **DATA**.
2. **Identify.** Open **Firmware** in Motorcontrol Desktop. Click **Identify controller**, choose the USB board and check its ID and proposed version.
3. **Install firmware.** Confirm the update and leave **DATA** plugged in until **Verified** appears. Reconnect in Motor bench, check the version, then repeat the first move on page 3.

Manual recovery

With PWR off, send **{"cmd":"bootloader"}** and a newline over DATA (page 7). If firmware is unresponsive, hold **BOOTSEL** while reconnecting DATA. Copy the UF2 for your exact board onto **RPI-RP2**. Check the version after restart.

USB serial protocol

Disconnect Motor bench. Open **DATA** at **115200 baud**. Stepper protocol **3** uses one JSON object per line.

Read board status

Send this line and end it with a newline.

```
{"id":1,"cmd":"status"}
```

Read **telemetry** for status. Match **ack** by **id**. Check **ok** or read the **error**.

Read **capabilities** before sending motion commands. Motion stops if heartbeats expire. **stop** releases the coils. Supported commands vary by firmware.



github.com/tscircuit/motorcontrol → docs/protocol.md

Troubleshoot

Board missing from the chooser

Try a known data cable in **DATA**. Use desktop Chrome or Edge. Close other motor-control tabs and serial monitors, then reconnect.

Connected but no motion

Check **PWR** and the supply's supported PD voltages. The request must settle above 5 V before motion. If measured voltage is available, compare it with the request.

Buzzing or stalled shaft

Click **Stop**, remove the load, and retry at a lower speed. Unplug both USB cables before reseating the motor connector.

Fault or temperature alarm

Stop and let the motor and controller cool. Check the fault displayed in Motor bench before retrying.

For software help, report the PCB revision, firmware version and symptom. Motorcontrol issues