

Actuator Electrical Setup

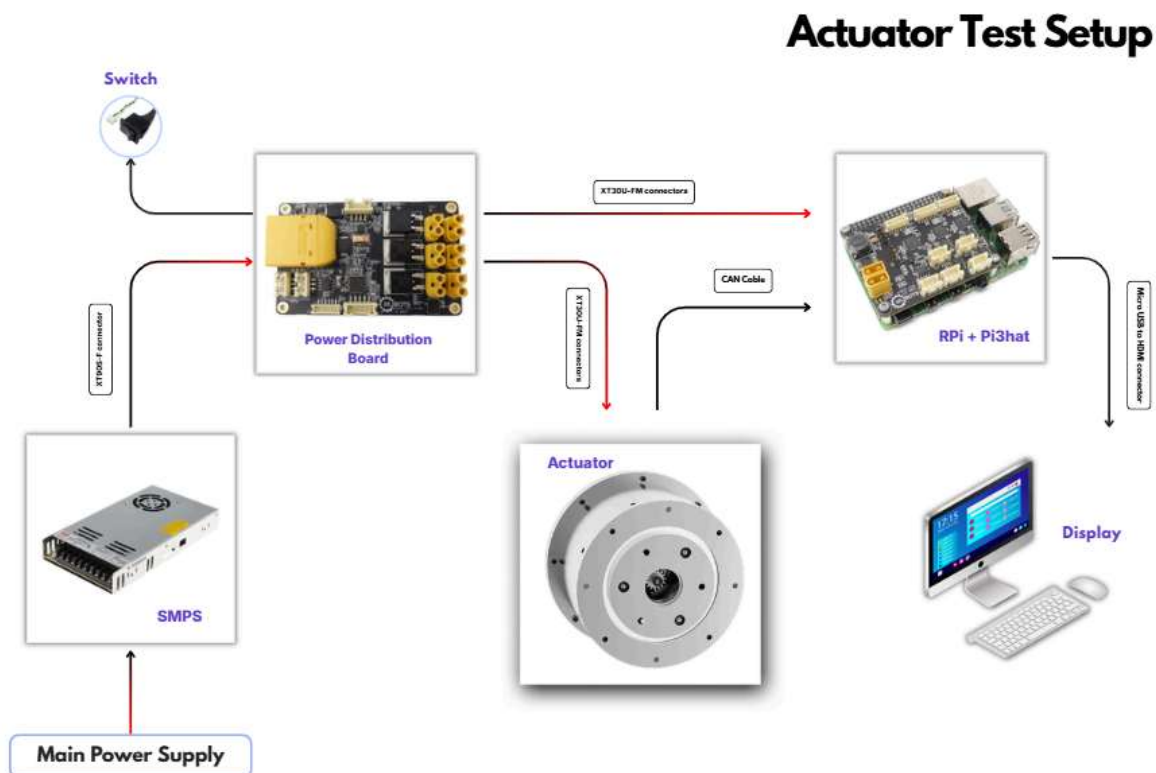
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Test Setup

Setting Up the Actuator A2 Test Setup: Electrical Connections

This guide provides step-by-step instructions for establishing the electrical connections in the Actuator A2 test setup. It is designed for users integrating the high-torque quasi-direct-drive BLDC actuator (XT30U-M) with supporting components, such as the mjbots Power Distribution Board and Raspberry Pi with mjbots Pi3 Hat. The setup ensures safe power distribution, communication, and control for testing and development.

For a visual overview, refer to the diagram below, which illustrates the key components and connections.



Components Overview

Component	Description	Qty
Actuator A2	High-torque quasi-direct-drive BLDC actuator with integrated motor controller, XT30U-M power and 3-pin CAN-FD ports	1
mjbots power_dist r4.5b	Power distribution board to safely supply power to all components	1
Raspberry Pi 5 + mjbots pi3 hat r4.5 (pre-assembled)	Raspberry Pi : Central control unit for actuator commands and data processing mjbots pi3hat r4.5 : CAN bus interface for communication between Raspberry Pi and actuator	1
<u>SMPS</u> (preferable 24V-36V) or equivalent	AC-to-DC power supply delivering clean 24–36 V for full actuator performance	1
XT90S-F connector	Main power input connector (pre-wired to SMPS)	1
<u>XT30U-FM power cable</u>	Power output cables with male and female XT30 connectors	1
Illuminated rocker switch + PH4 harness	Main power on/off switch with LED status indicator	1
Micro USB to HDMI connector	For connecting Raspberry Pi video output to monitor	1
Pre-flashed microSD card (minimum 64 GB)	Raspberry Pi OS pre-installed	1

The following table lists the required components, their descriptions, and quantities for the setup.

Note: Ensure all components are compatible and sourced from reliable vendors. For details on the mjbots Pi3 Hat, refer to the [mjbots Pi3 Hat Documentation](#).

Prerequisites

- Verify all components are undamaged and match the specifications in the table above.
- Work in a static-free environment to avoid damaging sensitive electronics.
- Have basic tools ready: screwdrivers, wire strippers, and a multimeter for polarity checks.
- Familiarize yourself with safety guidelines for handling high-voltage DC power (21-24V recommended for optimal performance).

Step-by-Step Electrical Connection Instructions

Follow these steps in sequence to avoid electrical hazards or component damage. Always double-check polarities and connections before powering on.

1. Prepare the Main Power Supply

- Use a switched-mode power supply (SMPS) configured for continuous 24V DC output. Attach an XT90 connector to the output leads.
 - **Alternative Option:** For portable setups, use a 10-24V LiPo battery pack with an XT90 female connector. We recommend maintaining 21-24V DC for optimal actuator performance and longevity.
- **Safety Check:** Ensure the SMPS is unplugged from the AC mains and powered off.
- For a visual guide on wiring the XT90 connector to the SMPS, watch the [XT90 Connector Wiring Tutorial](#) (links to the Power Connectors section).

2. Connect the Power Supply to the Power Distribution Board (PDB)

- The PDB (mjbots power_dist r4.5b) features a male XT90 connector for input.
- Plug the XT90 output from the SMPS (or battery) into the male XT90 on the PDB.
 - **Polarity Verification:** Use a multimeter to confirm positive (+) and negative (-) alignments. Incorrect polarity can damage components.
- Ensure the illuminated rocker switch on the PDB is in the OFF position.
- Do not turn on the main power supply (SMPS or battery) at this stage.

3. Distribute Power from the PDB

- The PDB provides five XT30 female connectors for power output. The order of connection does not matter.
- **Connect to the Raspberry Pi + Pi3 Hat Assembly:**
 - Use an XT30 male-female power cable.
 - Plug the male end into one of the PDB's XT30 female ports.
 - Connect the female end to the power input on the mjbots Pi3 Hat (pre-assembled on the Raspberry Pi).
 - For more on the Pi3 Hat, see the [mjbots Pi3 Hat Integration Guide](#).
- **Connect to the Actuator A2:**
 - The Actuator A2 includes a built-in XT30 male connector.
 - Plug it directly into another XT30 female port on the PDB, or use an XT30 extension cable for added flexibility and reach.

4. Establish CAN Bus Communication

- Connect the 3-pin CAN cable (included with the Actuator A2) from the actuator's CAN port to the CAN bus connector on the mjbots Pi3 Hat.
 - **ID Configuration Note:** The actuator ships with a preset CAN ID of 1. Ensure this matches your software configuration to avoid communication errors.
 - To verify or change the actuator ID, refer to the [Actuator ID Configuration Tutorial](#) (links to the CAN Bus Setup section).

5. Connect the Display

- Attach a display monitor to the Raspberry Pi using a micro USB to HDMI connector (or equivalent HDMI adapter).
- This allows visual monitoring of the Raspberry Pi OS and actuator status during testing.

6. Final Safety Checks and Power-On

- Confirm the PDB rocker switch is OFF.
- Recheck all connections for secure fits and correct polarities.
- Turn on the main power supply (SMPS or battery).
- Flip the PDB rocker switch to ON. Observe the LED status indicator on the switch and any blinking lights on the Pi3 Hat, indicating successful power-up.

- **Expected Behavior:** The Pi3 Hat should show brief LED activity as the system initializes.

Next Steps

Your Actuator A2 test setup is now electrically connected and ready for software configuration and testing. Proceed to the [Software Setup and Initial Testing Tutorial](#) for instructions on running actuator commands via the Raspberry Pi.

If you encounter issues, such as no LED activity or communication failures, consult the [Troubleshooting Guide](#) or contact support.

This setup is scalable for multi-actuator configurations; for advanced integrations, explore the [Multi-Actuator Expansion Documentation](#).