AMERICAN CONTROL ELECTRONICS
An ISO 9001:2008 Certified Company

# PWP110

**1Q PWM NEMA 1 Adjustable Speed Drive for PMDC Brushed Motors**

14300 De La Tour Drive
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**Full manual available online**

## Specifications

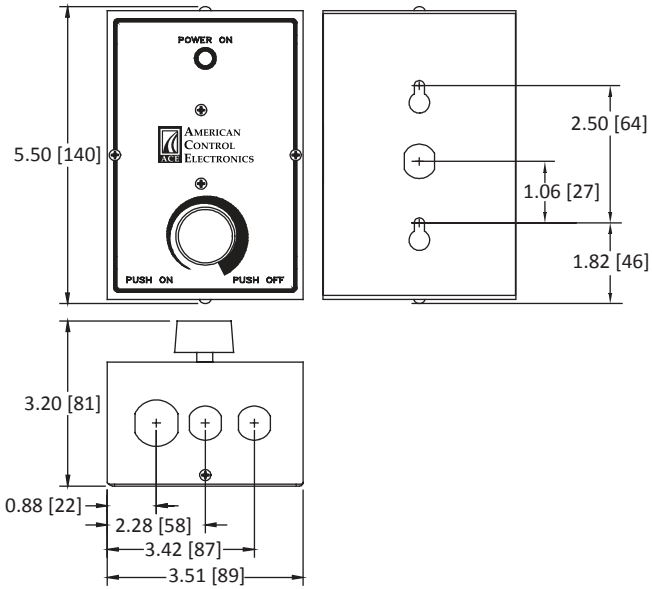
| Model | Line Voltage (VAC) | Armature Voltage Range (VDC) | Continuous Armature Current (Amps) | Horsepower Range |
|---|---|---|---|---|
| PWP110-1 | 115 | 0 - 130 | 1.0 | 1/100 - 1/10 |
| PWP110-3 | 115 | 0 - 130 | 3.0 | 1/10 - 1/4 |

**AC Line Voltage**.....115 VAC ± 10%, 50/60 Hz, single phase
**Form Factor**.....1.05
**Acceleration Time Range**.....1 second
**Deceleration Time Range**.....1 second
**Load Regulation**.....1% base speed or better
**Speed Range**.....80:1
**Vibration** *(0 - 50 Hz)*.....0.5G maximum
*(>50 Hz)*.....0.1G maximum
**Ambient Temperature Range**.....10°C - 40°C
**Weight**.....0.8 lbs
**Safety Certifications**.....UL/cUL Recognized Equipment, file # E132235

## Safety Warnings

- **DO NOT INSTALL, REMOVE, OR REWIRE THIS EQUIPMENT WITH POWER APPLIED.** Have a qualified electrical technician install, adjust and service this equipment. Follow the National Electrical Code and all other applicable electrical and safety codes, including the provisions of the Occupational Safety and Health Act (OSHA), when installing equipment.
- **Circuit potentials are at 115 VAC above earth ground**. Avoid direct contact with the printed circuit board or with circuit elements to prevent the risk of serious injury or fatality. Use a non-metallic screwdriver for adjusting the calibration trim pots. Use approved personal protection equipment and insulated tools if working on this drive with power applied.
- Reduce the chance of an electrical fire, shock, or explosion by using proper grounding techniques, over-current protection, thermal protection, and enclosure. Follow sound maintenance procedures.
- **ACE strongly recommends the installation of a master power switch in the line voltage input.** The switch contacts should be rated for 250 VAC and 200% of motor nameplate current.
- **Removing AC line power is the only acceptable method for emergency stopping.** Do not use dynamic braking, decelerating to minimum speed, or coasting to a stop for emergency stopping. They may not stop a drive that is malfunctioning. Removing AC line power is the only acceptable method for emergency stopping.
- Line starting and stopping (applying and removing AC line voltage) is recommended for infrequent starting and stopping of a drive only. Dynamic braking, decelerating to minimum speed, or coasting to a stop is recommended for frequent starts and stops. Frequent starting and stopping can produce high torque. This may cause damage to motors.
- **Do not disconnect any of the motor leads from the drive** unless power is removed or the drive is disabled. Opening any one lead while the drive is running may destroy the drive.
- This product does not have internal solid state motor overload protection. It does not contain speed-sensitive overload protection, thermal memory retention, or provisions to receive and act upon signals from remote devices for over temperature protection. If motor protection is needed in the end-use product, it needs to be provided by additional equipment in accordance with NEC standards.

## Dimensions




ALL DIMENSIONS IN INCHES [MILLIMETERS]

## Installation

**Mounting**

- Drive components are sensitive to electrostatic discharge. Avoid direct contact with the circuit board. Hold the drive by the chassis or heat sink only.
- Protect the drive from dirt, moisture, and accidental contact.
- Provide sufficient room for access to the terminals and calibration trim pots.
- Mount the drive away from heat sources. Operate the drive within the specified ambient operating temperature range.
- Prevent loose connections by avoiding excessive vibration of the drive.
- Mount the drive with its board in either a horizontal or vertical plane. Six 0.19" (5 mm) wide slots in the chassis accept #8 pan head screws. Fasten either the large base or the narrow flange of the chassis to the subplate.
- The chassis should be earth grounded. Use a star washer beneath the head of at least one of the mounting screws to penetrate the anodized chassis surface and to reach bare metal.

**Wiring**

Use 14 - 16 AWG wire for AC line and motor wiring.

**Fusing**

The drives provide fusing for the AC line. Fuses are fast acting fuses. Model PWP110-1 contains a fuse rated for 3A at 250 VAC. Model PWP110-3 contains a fuse rated for 5A at 250 VAC.

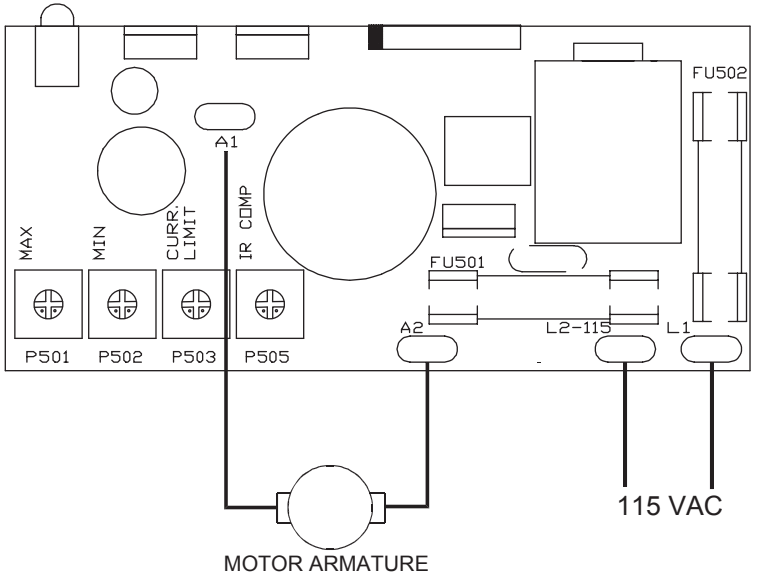
## Connections

**Line Input**

Connect the AC line power leads to terminals as shown in the figure to the right.

**Motor**

Connect the DC armature leads to terminals A1 and A2. If the motor does not spin in the desired direction, power down the drive and reverse these connections.



# Startup

- Verify that no foreign conductive material is present on the printed circuit board.

1. To turn on the drive, turn the speed adjust potentiometer clockwise until it clicks.
2. Slowly advance the speed adjust potentiometer clockwise (CW). The motor slowly accelerates as the potentiometer is turned CW. Continue until the desired speed is reached.
3. Turn the speed adjust potentiometer fully counterclockwise (CCW) until it clicks to shut the drive off.



# Calibration

**Minimum Speed (MIN):** The MIN setting determines the minimum motor speed when the speed adjust potentiometer is set for minimum speed. It is factory set for zero speed. To calibrate MIN:

1. Set the MIN trim pot full CCW.
2. Set the speed adjust potentiometer for minimum speed.
3. Adjust the MIN trim pot until the desired minimum speed is reached or is just at the threshold of rotation.

**Maximum Speed (MAX):** The MAX setting determines the maximum motor speed when the speed adjust potentiometer is set for maximum speed. To calibrate MAX:

1. Set the MAX trim pot full CCW.
2. Set the speed adjust potentiometer for maximum speed.
3. Adjust the MAX trim pot until the desired maximum speed is reached.

Check the MIN and MAX adjustments after recalibrating to verify that the motor runs at the desired minimum and maximum speed.

**Torque (CURR. LIMIT):** The CURR. LIMIT setting determines the maximum torque for accelerating and driving the motor. To calibrate the CURR. LIMIT:

1. With the power disconnected from the drive, connect a DC ammeter in series with the armature.
2. Set the CURR. LIMIT trim pot to minimum (full CCW).
3. Set the speed adjust potentiometer to maximum speed (full CW).
4. Carefully lock the motor armature. Be sure that the motor is firmly mounted.
5. Apply line power. The motor should be stopped.
6. Slowly adjust the CURR. LIMIT trim pot CW until the armature current is 150% of motor rated armature current. **Continuous operation beyond this rating may damage the motor.**
7. Turn the speed adjust potentiometer CCW.
8. Remove line power.
9. Remove the stall from the motor.
10. Remove the ammeter in series with the motor armature if it is no longer needed.

**IR Compensation (IR COMP):** The IR COMP setting determines the degree to which motor speed is held constant as the motor load changes. To calibrate the IR COMP:

1. Set the IR COMP trim pot full CCW.
2. Increase the speed adjust potentiometer until the motor runs at midspeed without load. A handheld tachometer may be used to measure motor speed.
3. Load the motor armature to its full load armature current rating. The motor should slow down.
4. While keeping the load on the motor, rotate the IR COMP trim pot until the motor runs at the speed measured in step 2. If the motor oscillates (overcompensation), the IR COMP trim pot may be set too high (CW). Turn the IR COMP trim pot CCW to stabilize the motor.
5. Unload the motor.