AMERICAN CONTROL ELECTRONICS™

PWP110 SERIES

USER MANUAL

PWP110-1
PWP110-3

Dear Valued Consumer:

Congratulations on your purchase of the **PWP Series** drive. This User Manual was created for you to get the most out of your new device and assist with the initial setup. Please visit www.americancontrolelectronics.com to learn more about our other drives.

Thank you for choosing **American Control Electronics**!

Safety First!

SAFETY WARNINGS

Text in gray boxes denote important safety tips or warnings. Please read these instructions carefully before performing any of the procedures contained in this manual.

- 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.
- 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.

It is possible for a drive to run at full speed as a result of a component failure. American Control Electronics strongly recommends the installation of a master switch in the main power input to stop the drive in an emergency.

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 protective equipment and insulated tools if working on this drive with power applied.

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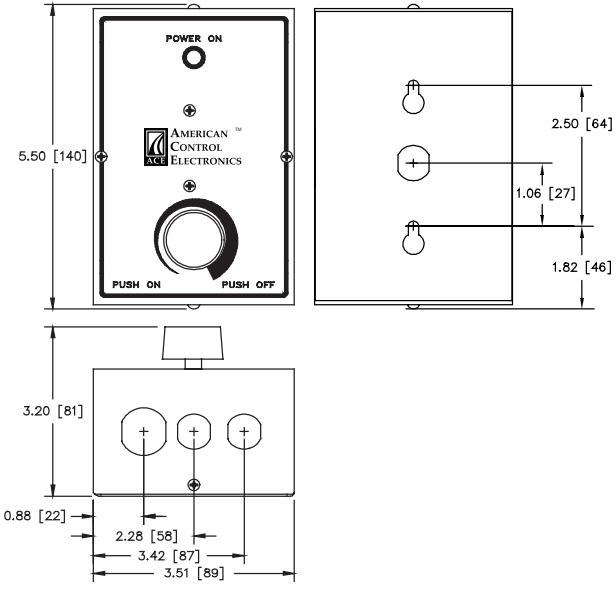
Section 1. Specifications

Model	*Maximum Armature Current (ADC)*	*HP Range with 130 VDC Motor*	*Enclosure*
PWP110-1	*1.0*	*1/100 - 1/10*	*NEMA 1*
PWP110-3	*3.0*	*1/10 - 1/4*	*NEMA 1*

AC Line Voltage	115 VAC ± 10%, 50/60 Hz, single phase
DC Armature Voltage	0 - 130 VDC
Acceleration Time (no load)	1 second
Deceleration Time (no load)	1 second
Form Factor	1.05
Load Regulation	1% base speed or better
Speed Range	80:1
Vibration	0.5G maximum (0 - 50 Hz) 0.1G maximum (> 50 Hz)
Safety Certifications	UL/cUL Recognized Equipment, File # E132235
Ambient Temperature Range	10°C - 40°C

Section 2. Dimensions



ALL DIMENSIONS IN INCHES [MILLIMETERS]

Figure 1. PWP110 Dimensions

Section 3. Installation

Do not install, rewire, or remove this control with input power applied. Failure to heed this warning may result in fire, explosion, or serious injury. Make sure you read and understand the Safety Precautions on page i before attempting to install this product.

Mounting

Drives come with three conduit holes at the bottom of the case. The units may be vertically wall mounted or horizontally bench mounted using the two keyholes on the back of the case.

1. For access to the keyholes and the board, remove the two screws from the top and bottom of the case. Then remove the two outside screws on the front cover. Grasp the front cover and pull it straight out.
2. Install the mounting screws in the two keyholes.
3. Set the POWER switch to the OFF position (full CCW) before applying the AC line voltage.
4. Install conduit hardware through the conduit holes at the bottom of the case.
5. Reinstall the front cover. Avoid pinching any wires between the front cover and the case.
6. Reinstall the four screws. Turn the screws clockwise to tighten.

Wiring

Do not install, rewire, or remove this control with input power applied. Failure to heed this warning may result in fire, explosion, or serious injury.

Circuit potentials are at 115 VAC above ground. To prevent the risk of injury or fatality, avoid direct contact with the printed circuit board or with circuit elements.

Do not disconnect any of the motor leads from the drive unless power is removed or the drive is disabled. Opening any one motor 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 signal from remote devices for over temperature protection. If motor over protection is needed in the end-use product, it needs to be provided by additional equipment in accordance with NEC standards.

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

Shielding Guidelines

Under no circumstances should power and logic level leads be bundled together. Induced voltage can cause unpredictable behavior in any electronic device, including motor controls.

As a general rule, it is recommended to shield all conductors. If it is not practical to shield power conductors, it is recommended to shield all logic-level leads. If shielding of all logic-level leads is not practical, the user should twist all logic leads with themselves to minimize induced noise.

It may be necessary to earth ground the shielded cable. If noise is produced by devices other than the drive, ground the shield at the drive end. If noise is generated by a device on the drive, ground the shield at the end away from the drive. Do not ground both ends of the shield.

If the drive continues to pick up noise after grounding the shield, it may be necessary to add AC line filtering devices, or to mount the drive in a less noisy environment.

Logic wires from other input devices, such as motion controllers and PLL velocity controllers, must be separated from power lines in the same manner as the logic I/O on this drive.

Line Fusing

PWP110 models come with preinstalled fuses. Model PWP110-1 is preinstalled with a 3 amp fuse. Model PWP110-3 is preinstalled with a 5 amp fuse.

Connections

Do not connect this equipment with power applied. Failure to heed this warning may result in fire, explosion, or serious injury.

Power Input

Connect the AC line power leads to terminals L1 and L2(115). Refer to Figure 2 on page 7.

Motor

Drives supply motor armature voltage from A1 and A2 terminals. It is assumed throughout this manual that, when A1 is positive with respect to A2, the motor will rotate clockwise (CW) while looking at the output shaft protruding from the front of the motor. If the motor does not spin in the desired direction, remove power and reverse the A1 and A2 connections.

Connect a DC motor to terminals A1 and A2. Refer to Figure 2 on page 7. Ensure that the motor voltage rating is consistent with the drive's output voltage.

Speed Adjust Potentiometer

Models are preinstalled with a 10K ohm, 1/4 W potentiometer / power switch for speed control.

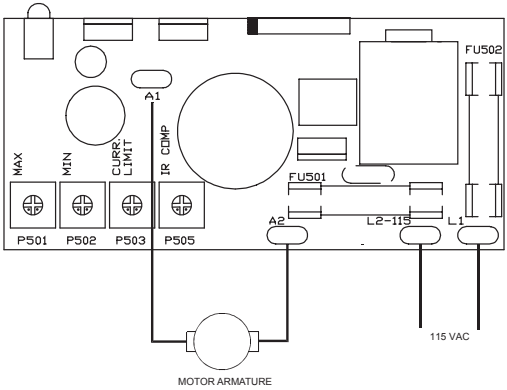


Figure 2. Connections

Section 4. Operation

Change voltage switch settings only when the drive is disconnected from AC line voltage. Make sure both switches are set to their correct position. If the switches are improperly set to a lower voltage position, the motor will not run at full voltage and may cause damage to the transformer. If the switches are improperly set to a higher voltage position, the motor will overspeed, which may cause motor damage, or result in bodily injury or loss of life.

Dangerous voltages exist on the drive when it is powered. BE ALERT. High voltages can cause serious or fatal injury. For your safety, use personal protective equipment (PPE) when operating this drive.

If the motor or drive does not perform as described, disconnect the AC line voltage immediately. Refer to the Troubleshooting section, page 16, for further assistance.

Before Applying Power

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

Startup

1. Turn the speed adjust potentiometer knob CW to turn the power on (an audible “click” will be heard). The POWER ON LED lights when the power is on.
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.
4. Turn the speed adjust potentiometer knob CCW to turn the power off (an audible “click” will be heard). The POWER ON LED turns off when the power is off.

Starting and Stopping Methods

Dynamic braking, coasting to a stop, or decelerating to minimum speed is recommended for frequent starts and stops. Do not use any of these methods for emergency stopping. They may not stop a drive that is malfunctioning. Removing AC line power (both lines) is the only acceptable method for emergency stopping.

Frequent starting and stopping can produce high torque. This may cause damage to motors, especially gearmotors that are not properly sized for the application.

Automatic Restart Upon Power Restoration

All drives automatically run to set speed when power is applied.

Line Starting and Stopping

Line starting and stopping (applying and removing AC line voltage) is recommended for infrequent starting and stopping of a drive only. When AC line voltage is applied to the drive, the motor accelerates to the speed set by the speed adjust potentiometer or analog signal. When AC line voltage is removed, the motor coasts to a stop.

Section 5. Calibration

Dangerous voltages exist on the drive when it is powered. When possible, disconnect the voltage input from the drive before adjusting the trim pots. If the trim pots must be adjusted with power applied, use insulated tools and the appropriate personal protection equipment. **BE ALERT.** High voltages can cause serious or fatal injury.

PWP110 series drives have user-adjustable trim pots. Each drive is factory calibrated to its maximum current rating. Readjust the calibration trim pot settings to accommodate lower current rated motors.

All adjustments increase with CW rotation, and decrease with CCW rotation. Use a non-metallic screwdriver for calibration. Each trim pot is identified on the printed circuit board.

Minimum Speed (MIN)

The MIN setting determines the minimum motor speed when the speed adjust potentiometer is set for minimum speed.

To calibrate the MIN:

1. Set the speed adjust potentiometer or input voltage signal for minimum speed.
2. Adjust MIN 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 MAX until the desired maximum speed is reached.

Torque (CURR LIMIT)

CURR LIMIT should be set to 120% of motor nameplate current rating. Continuous operation beyond this rating may damage the motor. If you intend to operate beyond the rating, contact your American Control Electronics representative for assistance.

The CURR LIMIT setting determines the maximum torque for accelerating and driving the motor in the forward direction. To calibrate 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 full CW or input voltage signal to maximum speed.
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 120% of motor rated armature current.
7. Turn the speed adjust potentiometer CCW or decrease the input voltage signal.
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.

Use the following procedure to recalibrate the IR COMP setting:

1. Set the IR COMP trim pot to minimum (full CCW).
2. Increase the speed adjust potentiometer or input voltage signal until the motor runs at midspeed without load (for example, 900 RPM for an 1800 RPM motor). 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.

Section 6. Application Notes

Direction Switch

For a Forward/Reverse switch, use a double-pole, two-position switch to swap the motor armature leads (Figure 3). To change direction, first remove AC line power from the drive. Once the motor has come to a complete stop, toggle the direction switch. Re-apply AC line power to accelerate to set speed.

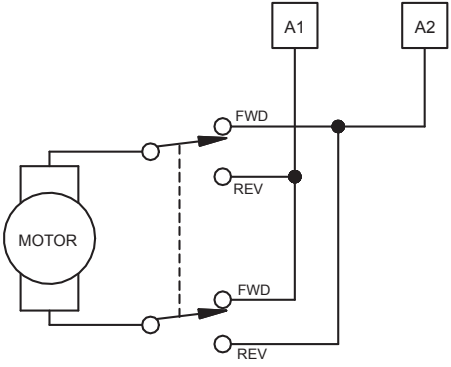


Figure 3. Direction Switch

Section 7. Troubleshooting

Dangerous voltages exist on the drive when it is powered. When possible, disconnect the drive while troubleshooting. High voltages can cause serious or fatal injury.

Before Troubleshooting

Perform the following steps before starting any procedure in this section:

1. Disconnect AC line voltage from the drive.
2. Check the drive closely for damaged components.
3. Check that no conductive or other foreign material has become lodged on the printed circuit board.
4. Verify that every connection is correct and in good condition.
5. Verify that there are no short circuits or grounded connections.
6. Check that the drive's rated armature is consistent with the motor ratings.

For additional assistance, contact your local American Control Electronics distributor or the factory direct:

(844) AMCNTRL or FAX: (800) 394-6334

PROBLEM	POSSIBLE CAUSE	SUGGESTED SOLUTIONS
Line fuse blows.	1. Line fuse is the wrong size.	1. Check that the line fuse is correct for the motor size.
	2. Motor cable or armature is shorted to ground.	2. Check motor cable and armature for shorts.
	3. Nuisance tripping caused by a combination of ambient conditions and high-current spikes (i.e. reversing).	3. Add a blower to cool the drive components, decrease CURR LIMIT settings, resize motor and drive for actual load demand, or check for incorrectly aligned mechanical components or "jams". See page 13 for information on adjusting the CURR LIMIT trim pot.
Line fuse does not blow, but the motor does not run.	1. Speed adjust potentiometer is set to zero speed.	1. Increase the speed adjust potentiometer setting.
	2. Drive is in current limit.	2. Verify that the motor is not jammed. Increase CURR LIMIT setting if set too low.
	3. Drive is not receiving AC line voltage.	3. Apply AC line voltage.
	4. Motor is not connected.	4. Remove power. Connect the motor to A1 and A2. Reapply power.
Motor runs in the opposite direction	1. Motor connections to A1 and A2 are reversed.	1. Remove power. Reverse connections to A1 and A2. Reapply power.
Motor runs too fast.	1. MAX is set too high.	1. Calibrate MAX.

PROBLEM	POSSIBLE CAUSE	SUGGESTED SOLUTIONS
Motor will not reach the desired speed.	1. MAX setting is too low.	1. Increase MAX setting.
	2. IR COMP setting is too low.	2. Increase IR COMP setting.
	3. CURR LIMIT setting is too low.	3. Increase CURR LIMIT setting.
	4. Motor is overloaded.	4. Check motor load. Resize the motor and drive if necessary.
Motor pulsates or surges under load.	1. IR COMP is set too high.	1. Adjust the IR COMP setting slightly CCW until the motor speed stabilizes.
	2. Motor bouncing in and out of current limit.	2. Make sure motor is not undersized for load; adjust CURR LIMIT trim pot CW.

Section 8. Accessories & Replacement Parts

Displays

Open Loop..... OLD100-1

Kits

Fuse

1.5 - 5 Amp Fuse Kit..... 050-0066

Logic Cards

Current Sensing

5 Amps.....CMC100-5

20 amps CMC100-20

Notes

Notes

Unconditional Warranty

A. Warranty

American Control Electronics warrants that its products will be free from defects in workmanship and material for twelve (12) months or 3000 hours, whichever comes first, from date of manufacture thereof. Within this warranty period, American Control Electronics will repair or replace, at its sole discretion, such products that are returned to American Control Electronics, 14300 De La Tour Drive, South Beloit, Illinois 61080 USA.

This warranty applies only to standard catalog products, and does not apply to specials. Any returns of special controls will be evaluated on a case-by-case basis. American Control Electronics is not responsible for removal, installation, or any other incidental expenses incurred in shipping the product to and from the repair point.

B. Disclaimer

The provisions of Paragraph A are American Control Electronics's sole obligation and exclude all other warranties of merchantability for use, expressed or implied. American Control Electronics further disclaims any responsibility whatsoever to the customer or to any other person for injury to the person or damage or loss of property of value caused by any product that has been subject to misuse, negligence, or accident, or misapplied or modified by unauthorized persons or improperly installed.

C. Limitations of Liability

In the event of any claim for breach of any of Americn Control Electronics's obligations, whether expressed or implied, and particularly of any other claim or breach of warranty contained in Paragraph A, or of any other warranties, expressed or implied, or claim of liability that might, despite Paragraph B, be decided against American Control Electronics by lawful authority, American Control Electronics shall under no circumstances be liable for any consequential damages, losses, or expenses arising in connection with the use of, or inability to use, American Control Electronics's product for any purpose whatsoever.

An adjustment made under warranty does not void the warranty, nor does it imply an extension of the original 12-month warranty period. Products serviced and/or parts replaced on a no-charge basis during the warranty period carry the unexpired portion of the original warranty only.

If for any reason any of the foregoing provisions shall be ineffective, American Control Electronics's liability for damages arising out of its manufacture or sale of equipment, or use thereof, whether such liability is based on warranty, contract, negligence, strict liability in tort, or otherwise, shall not in any event exceed the full purchase price of such equipment.

Any action against American Control Electronics based upon any liability or obligation arising hereunder or under any law applicable to the sale of equipment or the use thereof, must be commenced within one year after the cause of such action arises.

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