



**PX - TROUBLESHOOTING**

**1. PX - Troubleshooting Guide**

It is extremely difficult to troubleshoot an electrical system without the proper tools. The two most essential diagnostic tools used for electrical troubleshooting are the digital voltmeter and the amp clamp. The amp clamp has both voltage and amperage reading functions and is the tool of choice for the professional lighting installer.

Most problems with 12 volt systems stem from inadequate cable size, incorrect cabling methods and non-waterproof wire splices. Refer to our circuiting guidelines.

<b>Problem</b> <b>No power at plug</b>	<b>Cause</b> <ul style="list-style-type: none"> <li>• <b>Tripped breaker or GFCI</b></li> </ul>
	<b>Solution</b> <ul style="list-style-type: none"> <li>• <b>Reset circuit breaker in main panel or the GFCI usually located in a bathroom, garage, or kitchen.</b></li> </ul>
<b>Problem</b> <b>GFCI keeps tripping</b>	<b>Cause</b> <ul style="list-style-type: none"> <li>• <b>Ground problem or defective GFCI</b></li> </ul>
	<b>Solution</b> <ul style="list-style-type: none"> <li>• <b>GFCIs are notorious for nuisance tripping. Use a high grade model such as the Hubbell #GF5252I</b></li> </ul>
<b>Problem</b> <b>Transformer is cycling on and off at night</b>	<b>Cause</b> <ul style="list-style-type: none"> <li>• <b>Excessive wattage load or short</b></li> </ul>
	<b>Solution</b> <ul style="list-style-type: none"> <li>• <b>Reduce lamp wattage, fixture quantity, or increase size of transformer. See shorting solution below.</b></li> </ul>
<b>Problem</b> <b>Photocell transformer is cycling on &amp; off in the daytime</b>	<b>Cause</b> <ul style="list-style-type: none"> <li>• <b>Photocell wiring incorrect</b></li> </ul>
	<b>Solution</b> <ul style="list-style-type: none"> <li>• <b>Reverse the hot and common wires on the photocell 120 V input. Request wiring schematic for proper wiring.</b></li> </ul>
<b>Problem</b> <b>One cable run not working</b>	<b>Cause</b> <ul style="list-style-type: none"> <li>• <b>Cut cable or short</b></li> </ul>
	<b>Solution</b> <ul style="list-style-type: none"> <li>• <b>Test cable for voltage. If none, it is cut. If there is very low voltage and the cable is hot, there is a short. Check all fixtures and splices for defects.</b></li> </ul>

Problem <b>Lamps are burning out prematurely</b>	Cause <ul style="list-style-type: none"> <li>• <b>Excessive voltage at lamp</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>Drop the affected cable run down to the next lower voltage tap or increase wattage load on that cable to drop voltage. Also, some lamps are rated for a very short life such as the 4414 (300 hours). Use halogen lamps.</b></li> </ul>
Problem <b>Lamps have a yellow or golden tone</b>	Cause <ul style="list-style-type: none"> <li>• <b>Voltage too low</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>Move affected cable to the next higher voltage tap or reduce load on cable. If possible, run additional cable to first fixture to reduce voltage loss.</b></li> </ul>
Problem <b>Lamp goes on and off when fixture is moved</b>	Cause <ul style="list-style-type: none"> <li>• <b>Too much tension on socket leads</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>With spring type sockets, it is important to leave some slack so the socket contacts make a good connection to the lamp base.</b></li> </ul>
Problem <b>System is getting dimmer with age</b>	Cause <ul style="list-style-type: none"> <li>• <b>Splices are corroding</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>As non-waterproof splices corrode, they create electrical resistance which reduces voltage. To fix, simply dig up all splices on the project and waterproof them with FX LiteSplice or equal. Do not use black electricians tape.</b></li> </ul>
Problem <b>Photocell transformer is coming on too soon</b>	Cause <ul style="list-style-type: none"> <li>• <b>Transformer is in dark location</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>In order to operate properly, the photocell must have a good look at daylight. Move to a brighter location</b></li> </ul>
Problem <b>Fixtures have a white mineral deposit on them</b>	Cause <ul style="list-style-type: none"> <li>• <b>Irrigation water is hitting them</b></li> </ul>
	Solution <ul style="list-style-type: none"> <li>• <b>Schedule the irrigation to come on after the lights have gone off. This is especially true with the 50 W spots — very hot.</b></li> </ul>
Problem	Cause <ul style="list-style-type: none"> <li>• <b>Excessive voltage at lamp</b></li> </ul>

<b>The closest lamp to the transformer is burning out prematurely</b>	Solution <ul style="list-style-type: none"><li>• <b>The closest lamp will always have a higher voltage reading than the last lamp. Cable fixtures so that there is about 40' from first to last within a lighting zone. See system layout for details.</b></li></ul>
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## 2. PX - Testing Incoming Power to Transformer

The power path of your PX Power Transformer begins at the Electrical Panel (1). Inside the panel is a series of Circuit Breakers, one of which feeds 120 volts of power to the Receptacle (2) that your transformer is plugged into.

The quickest way to see if the transformer is operating properly is to take a Volt Meter or Amp clamp and test the power level at the Receptacle on the face of the Transformer (3). If your transformer has a timer, you must remove the timer in order to test the Transformer Receptacle.

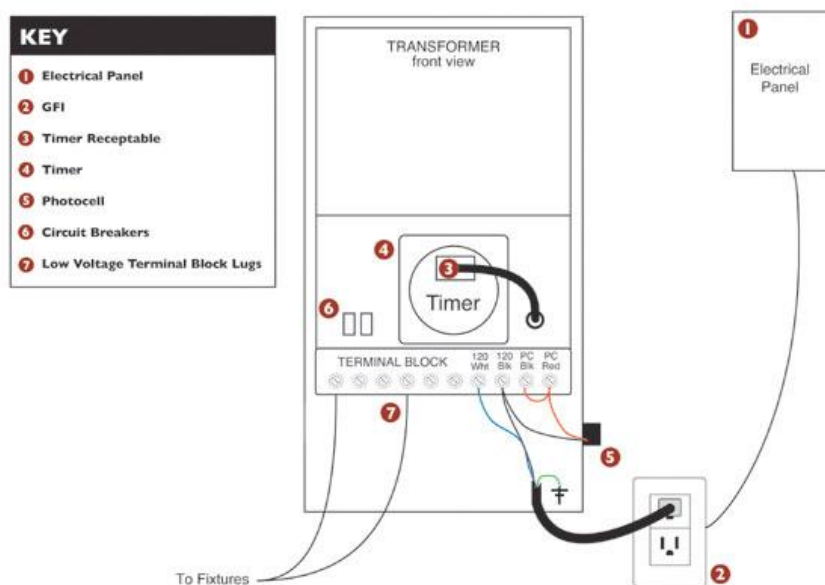
Make sure your Volt Meter is set on the 200 V~ (AC) setting. On most digital volt meters, this will be two clicks to the right. If you get a reading between 115-125 volts AC, you will know that the transformer is getting power to it; therefore, the GFCI Receptacle (2) and the Circuit Breaker in the Electrical Panel (1) have not tripped.

If, on the other hand, you get no voltage reading, check to see that the GFCI receptacle hasn't been tripped. Note that sometimes the GFCI that protects the circuit for your transformer is NOT the one the transformer is plugged into. It may be found in the kitchen, laundry room or another location within the house. If the GFCI has tripped, reset it and test your transformer again.

If the GFCI is set properly, next check the Circuit Breaker in the Electrical Panel. If tripped, reset it and test your transformer.

If you have a Receptacle Tester (RT), insert it into the Receptacle in which your transformer is plugged into. The RT will tell you if the wiring from the Electrical Panel to the receptacle is OK or not. If it does not indicate two orange lights, something is wrong with the wiring.

**Note: All high voltage side testing should be performed by a trained electrician, electrical shock can occur if testing is not done properly.**



### 3. PX - Testing the Components

#### Testing the Timer

If the system is equipped with a timer and you suspect it may be malfunctioning, remove Timer and test voltage at transformer receptacle. If reading is +/- 120 volts, you've got power to the transformer. You could also plug in a working light or appliance into the receptacle to see if there is power at the receptacle. Replace timer and test by manually turning the timer on (switch is on the upper left side of the timer). If the system does not come on, remove timer and plug pigtail directly into receptacle on face of transformer. If system now works, the timer is defective. Replace timer.

**Note:** Factory-installed timers have a maximum load capacity of 1750 watts. If daisy chaining transformers together in a master-slave configuration that exceeds 1750 watts of load, install a timer with the capacity to handle the additional load.

**VERY IMPORTANT:** The photocell is installed on the HIGH VOLTAGE side of the transformer! Be sure to unplug the transformer when installing the photocell.

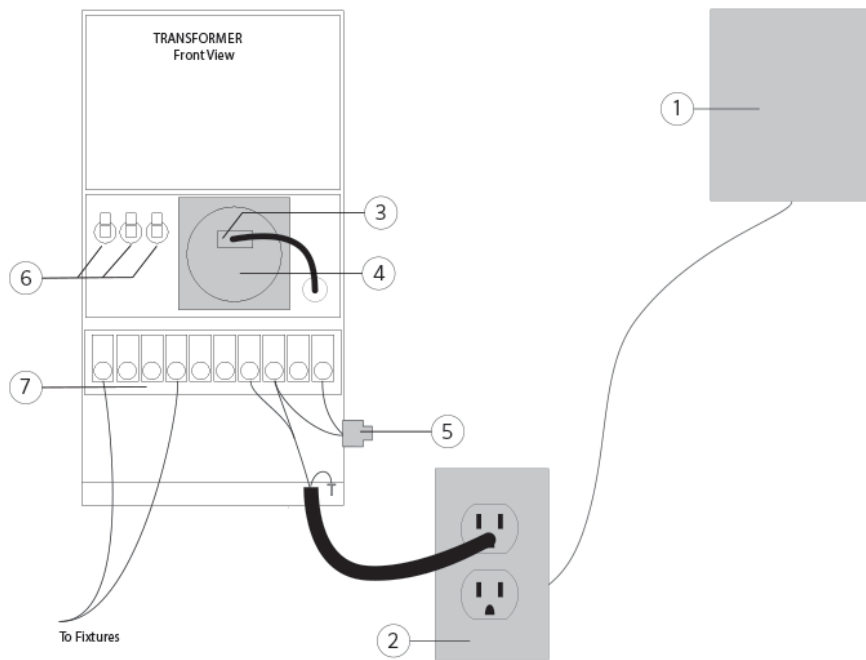
### Testing the PhotoCell

If the system is equipped with a photocell, test by placing the bootie or a piece of black electrical tape over the photo eye. Wait approximately 2 minutes for the system to activate. When testing a transformer with both timer and photocell, be sure you have manually switched the timer to the “On” position. If the system does not activate after 2 minutes, unplug the transformer from power supply (2). Remove photocell. Reinstall the red jumper wire between the #9 and #10 lugs. Plug the transformer back into the power supply. If Transformer now works, you have isolated the problem to a bad photocell. Replace with new photocell.

**Note:** FX factory-installed photocells have a maximum wattage capacity of 1000 watts. If daisy chaining transformers together in a master-slave configuration that exceeds 1000 watts, install a commercial grade photocell.

## 4. PX - Circuit Overload or Short Circuit Troubleshooting

If the circuit breakers (6) on the face of the transformer keep tripping, the system is experiencing either a circuit overload or there is a short in the system.



1. Electrical Panel
2. GFCI
3. Timer Receptacle
4. Timer
5. Photocell
6. Circuit Breakers
7. Low Voltage Terminal Block Lugs

### Circuit Overload

If the amperage load on any given common lug exceeds 25 amps, the circuit breaker will trip. Test the amperage load on all cables on each common lug using an amp clamp. The digital amp clamp should be set on the 200 A setting. Test each individual cable on each common lug with the amp clamp. To remedy an overload, either reduce the wattage of the lamps in the fixtures or rebalance the amp load between commons. Remember, each common can handle a maximum of 25 amps.

Using the digital amp clamp, turn clamp on to the 200 A setting.

- Clamp around the cables on each common.
- Clamp each individual wire on each common.

- A reading over 25 amps on any given common indicates circuit overload. This is not a transformer problem; it's an installation issue.

## Short Circuit

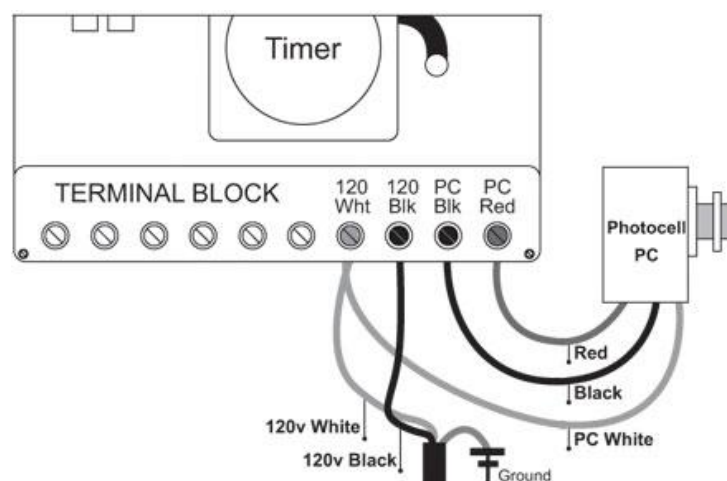
The circuit breakers (6) will trip if there is a short somewhere in the cabling. To test for a short circuit, check each cable on the common tap that is tripping individually. If one cable reads excessively high — 10+ amps higher than it should — there is most likely a short somewhere in that circuit. Example: A circuit with 100 watts of load (five 20 watt fixtures) should have an amp reading of approximately 8 amps. If the cable is reading 18 amps or more, it has a short somewhere in the cable.

**Note:** Shorts and overloads are NOT covered by the FX warranty and can only be detected when the transformer is tested in the field.

## 5. PX - Troubleshooting Photocell

Remove the timer (if applicable) and place a black bootie over the PhotoCell (PC). Wait 2 minutes, then perform a voltage test by placing one of your voltmeter probes on "120 Volt Common" and the other on "PC Hot Tap". If you read 120 volts (+/- 5 volts), the PC is operating fine.

If, on the other hand, you get a 0 reading on the voltmeter, remove the PC from the transformer, install a jumper wire between "PC Black" and "PC Hot Tap" and retest with your voltmeter. If you get a reading of 120 volts (+/- 5 volts), the PC is bad. Replace the PhotoCell.

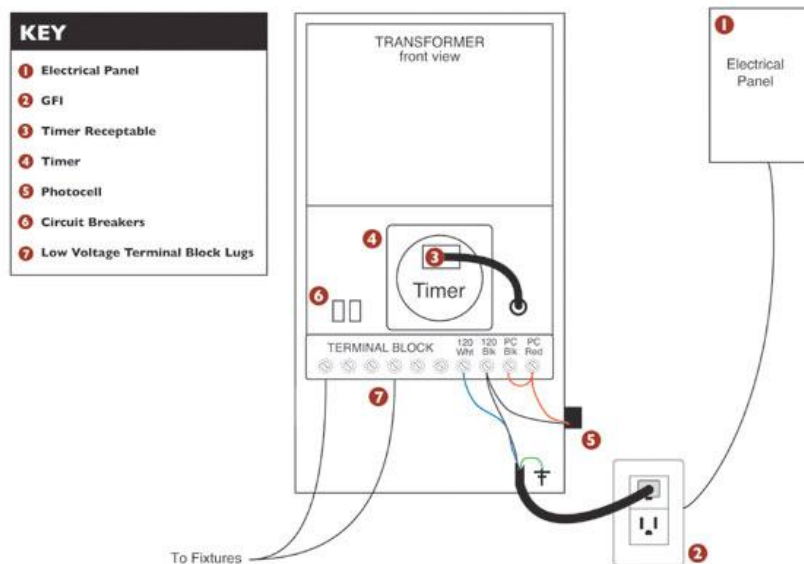


**VERY IMPORTANT:** The photocell is installed on the HIGH VOLTAGE side of the transformer! Be sure to unplug the transformer when installing the photocell.

## 6. PX - Testing Transformer Power

The first test to perform will determine if power is passing through the transformer and any switching devices (timer, photocell) to the low voltage taps.

1. If the transformer includes a PhotoCell (PC), cover the photo eye with a black bootie and switch the timer to the “on” position by rotating the small knob on the top of the timer counterclockwise.
2. Next, turn your voltmeter on and place one of the probes on the lug labeled “Circuit #1 Common 300 w Max” and the other probe on the voltage Tap labeled “Low Volt Hot 11 volt”.



Repeat this test on the 12 volt, 13 volt and 14 volt taps and also on circuit #2 and #3 if applicable.

If your readings are 11 volts +/- 0.5 volt, 12 volts +/- 0.5, etc, you will have determined that the transformer and all switching devices are operating properly.



If your low voltage taps are getting power and your lights still don't work, most likely there is a problem with the circuit cable (cut cable), a problem with the lamps or a problem with the wire connectors.

If you've determined that the transformer is getting proper voltage from the electrical panel to the receptacle on the face of the transformer and your system still isn't working, we will next test to see if your timer has malfunctioned. To test the timer, you must have a voltmeter.

**Note: All high voltage side testing should be performed by a trained electrician, electrical shock can occur if testing is not done properly.**

1. First remove the two screws located on each end of the clear terminal block face plate.
2. Raise the face plate up and place one voltmeter probe on the voltage tap labeled "120v Common White" and one on the tap labeled "Photocell Hot Black".
3. Make sure the timer is switched to the "on" position by rotating the small knob on the top of the timer counterclockwise.
4. If your reading is approx 120 volts, you know the timer is working.
5. If you get no reading, remove the timer, reinsert the plug into the timer receptacle and test the two taps again. If your voltmeter is reading approx 120 volts, you've determined that the timer has **malfunctioned**. Install a new timer.

If the voltmeter reading is 0 when performing this test, something has come loose inside the transformer and it will need to be returned to the factory for repair. This is, however, a very rare occurrence.

**Note:** if your transformer includes a PhotoCell (PC) you must cover the photo eye with a black bootie or electrical tape in order to simulate night time. Removing the timer but not covering the PhotoCell will not provide an accurate test as the power path will stop at the PhotoCell.