PotenzaX Transformer

Professional Series

Installation Instructions

LANDSCAPE LIGHTING
1838
STANDARD FOR SAFETY

ETL 1838 Version

Switching Options

Professional Series

Installation Instructions

Switching Options:

• In order to have your new lighting system closely match your client's lifestyle it is necessary to explore the many Switching Options that are available to them. This will allow your firm to design a lighting system that will have the flexibility and reliability that they require. Below is a discussion of the features and benefits of each Switching Option.

Manual Switch *A hardwire connection between the transformer and a specific light switch or switches*

Best Use: In a "Use Area" such as an outdoor dining area where you only need the lights on when you are using the space. Sports and Recreation areas are also good zones for this type of control. Combine with photocell for automatic off in the daytime control.

Drawback: Doesn't allow for automatic operation. Owner must remember to turn it off. Expensive in remodeling.

Photocell *A device that automatically turns the transformer on at dusk and off at dawn*

Best Use: For zones that will primarily provide a security buffer such as a perimeter pathway that has AccentoLumes or a series of TrellisSolares. Very dependable and inexpensive.

Drawback: If used with high wattage lamps this type of control can run up an electrical bill because it keeps the lights on from dusk to dawn. No two photocells will come on at exactly the same time because they receive different sun exposures. Try to use one photocell per multiple transformer zone. See timer drawbacks.

Timer *A device that automatically turns the transformer on and off at specific times*

Best Use: For the Owner that wants the straightforward low-tech way to control their lights.

Drawback: Has to be constantly adjusted to keep the lights going on at dusk since it gets dark at different times. No two timers will come on at exactly the same time because the setting pins are at 30 minute intervals. On projects that have several transformers that must turn on and off exactly at the same time use one central timer per multiple transformer zone. A separate timer with photocell can be mounted to provide an upstream control set-up on the 120 volt side of several downstream transformers. This application is great for commercial, large residential or multi-family projects. Simply provide the timer or photocell with unswitched power, then all devices beyond it will be switched automatically.

Photocell / Timer *A combination that automatically turns the transformer on at dusk and off at a specific time*

Best Use: General purpose landscape lighting. Easy to set and easy to use.

Drawback: Mechanical timers don't automatically reset themselves after a power outage like the photocell only does. Use one central photocell/timer on commercial or large residential projects where there are several transformers that need to be switched alike. See also timer and photocell drawbacks.

Smart Home or X-10 *A wide range of products that can control any device from anywhere in the house*

Best Use: On new construction where budget is no problem and the Owner wants to have ultimate control.

Drawback: Big bucks and proprietary equipment that needs to be professionally installed. Since it can be computer board based, a static discharge in the wrong place can cost hundreds to repair. Can give intermittent problems that are difficult to trace without expensive equipment.

Manual Override *A switch that manually turns the transformer on at any time of day or night*

Any of the above options can have a Manual Override switch installed. Typically, electricians will use a "3-way" type switch to accomplish this. Call factory for more details and wiring diagram.

Motion Detector *A device that automatically turns a light fixture on when motion crosses its line of sight*

With the proper wiring any of the above options can have a Motion Detector *override* installed. We recommend using this type of actuator on 120v security lights and only in areas that are not used by invited guests. Nothing is more annoying than having a beautiful *mood lighting* design destroyed by an uncontrolled Motion Detector flood light.

Circuiting Guidelines

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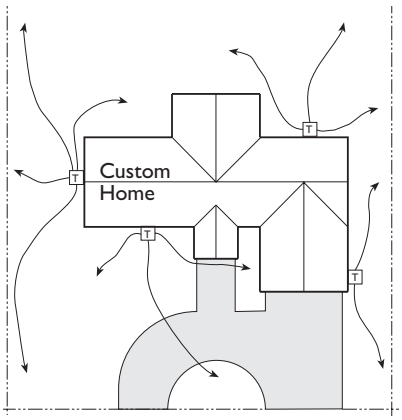
Installation Instructions



Single Transformer

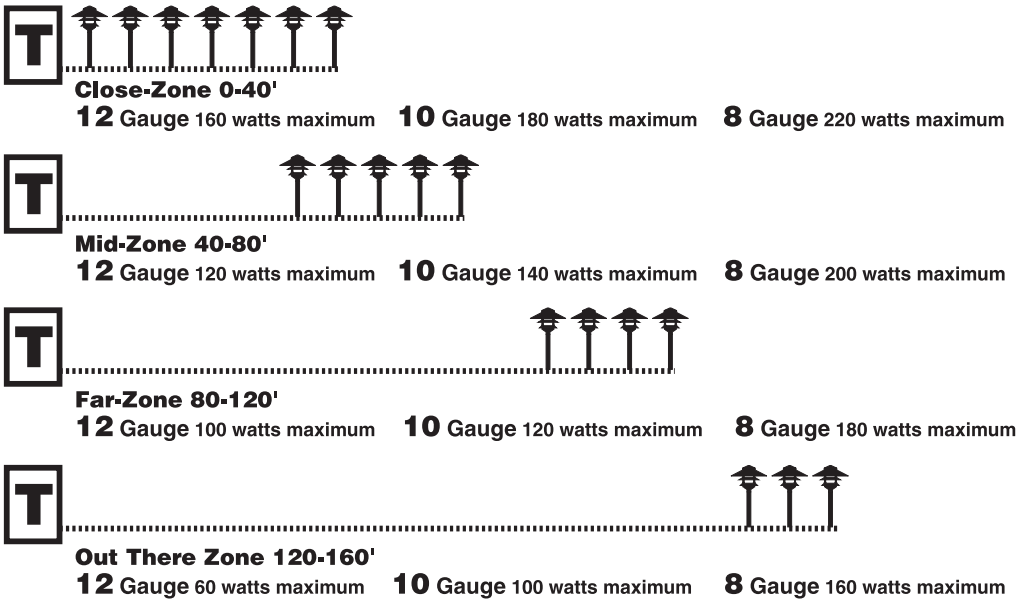
When using only one transformer, it is very important to center the transformer on the *wattage load*. If the project calls for 150 watts in both front and back yard, the PX-300 or 600 should be centered on the side of the house that will receive the most lighting. A common mistake is to locate the single transformer on the service side of the house or in the garage, which might result in excessively long cable runs to reach lighted areas. The primary goal in laying out low voltage systems is to minimize cable runs because of the negative effect voltage drop has on lamp output performance.

Multiple Transformers

A common error in laying out multiple transformer circuits is to group several PX-300 or 600's in one location because of utility or visual considerations only. As with any low voltage layout, the prime directive should be to locate the transformers as close to the fixtures as possible in order to minimize cable runs and resulting voltage drop. The other multi-transformer layout consideration is "use zoning". Having several transformers allows the client to selectively control light in separate areas. This approach is similar to irrigation design in that the goal is to individually control areas that have similar needs. In lighting, a recreation area has different lighting needs than does a front entry. Therefore, the lights that serve these different lighting use areas need to be on separate transformers and switch controls.

Loads PER CABLE

Add cable runs as necessary



Volts at Lamp	Lamp life of Rated	Lumen output of Rated
13.0*	50%	350%
12.5*	75%	175%
12.0	**100%**	**100%**
11.5	200%	80%
11.0	300%	75%
10.5	500%	65%
10.0	900%	50%

* All low voltage fixtures are designed to operate at or below 12 volts. Exceeding 12 volts can cause excessive heat build up and possible fixture failure .

Lamp Life

- Lamp life is rated in hours of operation. If lamps are rated for 4000 hours at 12 volts it means that at 4000 hours, **50% of the lamps are still working and 50% are not.**
- For maximum light output, tune lighting circuits to provide between 11.5 and 12.0 volts as measured at lamp terminals when all of the lamps on the circuit are operating.
- For longer lamp life, adjust voltage down so lamps receive between 10.5 and 11.5 volts at the lamp terminals.
- Voltage can be regulated by adjusting circuit load/run by using FX PotenzaX Transformers.
- To determine circuit voltage, use FX Digital Voltmeter.

System Layout

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Installation Instructions

Cabling & Voltage Drop:

✔ **Provide all fixtures with between 10.5-11.5 volts with all lamps installed and operating.**

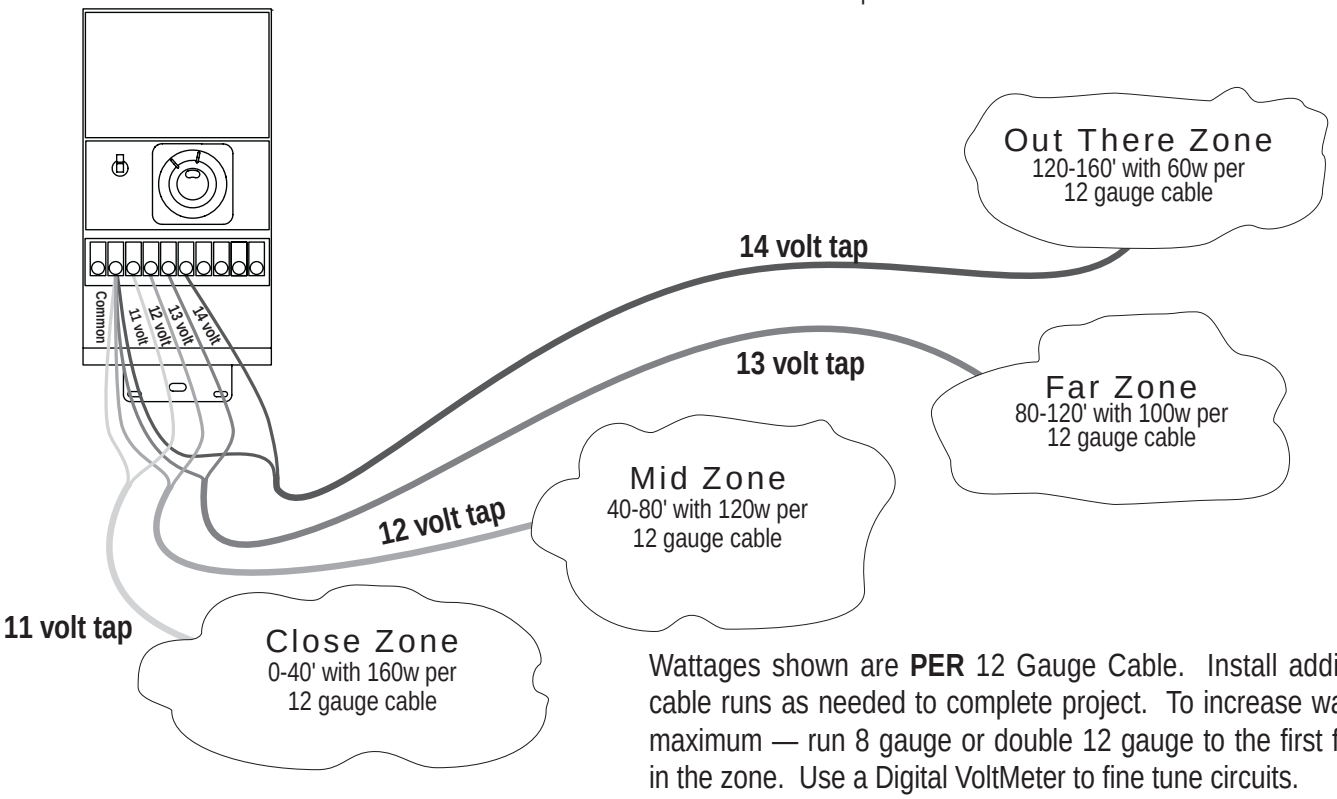
This is accomplished by:

❶ Group fixtures into ***distance zones*** from the PotenzaX transformer — 0-40', 40-80', 80'-120 and 120-160'. Do not have a fixture that is 10' away from the transformer on the same **cable run** as a fixture that is 100' away. Try to center load your runs as much as possible to **minimize the voltage differential** between the first and last light (one volt difference is optimum, two volts is too much).

❷ Run a separate cable run to each zone according to our Circuiting Guidelines on page #7 in this booklet.

Note: All the lights can be in the 40-80' zone but you still need to run **several separate** cable runs to reduce the **load per cable,** thereby minimizing voltage loss. Typically a 300 watt transformer has three *separate cable runs* with about 80 to 120 watts on each cable — a 600 watt transformer has about five *separate cable runs,* again, with about 80 to 120 watts on each cable.

❸ By using the **FX PotenzaX** transformer and a VoltMeter you can then select the **transformer voltage tap** (11, 12, 13 or 14 volt that provides each fixture about 10.5 - 11.5 volts.



Wattages shown are **PER** 12 Gauge Cable. Install additional cable runs as needed to complete project. To increase wattage maximum — run 8 gauge or double 12 gauge to the first fixture in the zone. Use a Digital VoltMeter to fine tune circuits.

Summary:

✔ For maximum light output and lamp life, the goal in low voltage systems is to provide each lamp with between 10.5 - 11.5 volts. To stay within this **1 volt optimum differential** you must group the fixtures into **distance zones** from the transformer as shown above and not overload the cable with **excessive wattage.** Using the FX MultiTap transformer you can then select the **voltage tap** that will provide no more than 11.5 volts at the first lamp. If you have grouped the fixtures according to the above graphic then the last light will have around 10.5 volts. When it's possible, **center feed** the zone as this will provide a much more even voltage to each fixture.

Transformer Installation

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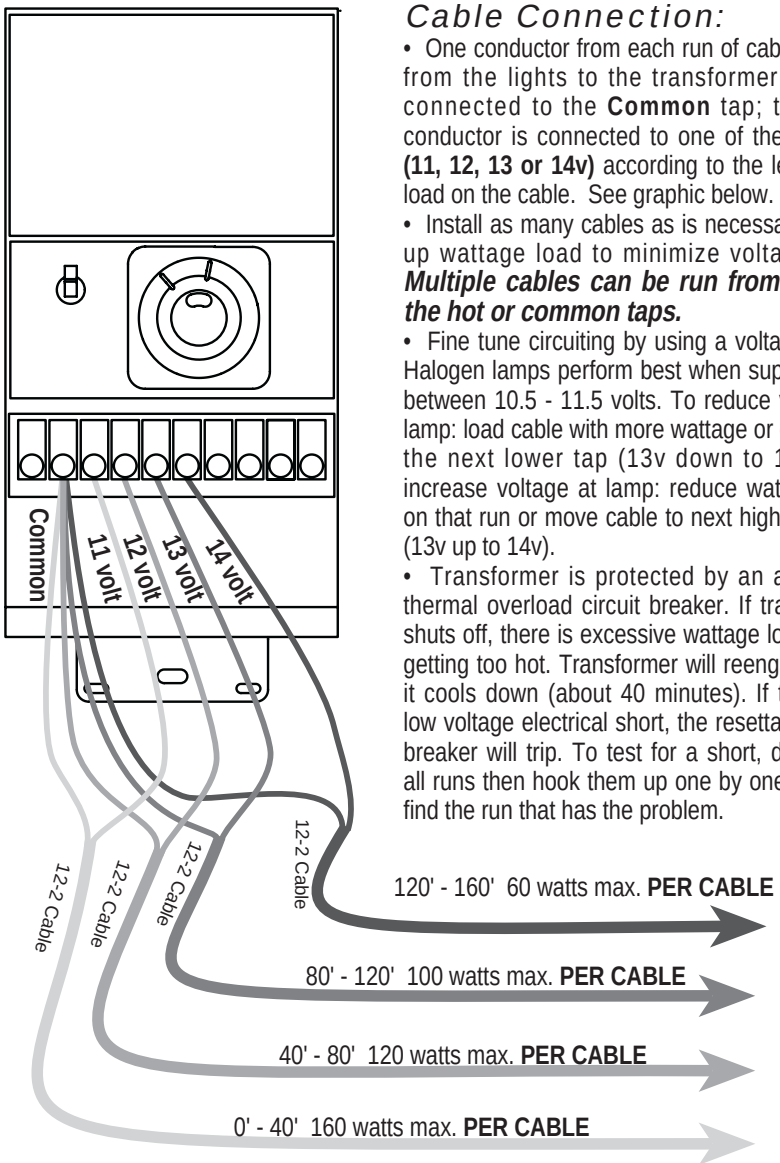
Installation Instructions

General Notes:

• All transformers hum so do not install on bedroom wall. If possible, hang transformer on garden wall, fence post or in the pool equipment area. Provide free air ventilation — do not seal unit in.



Cable Connection:

• One conductor from each run of cable coming from the lights to the transformer must be connected to the **Common** tap; the other conductor is connected to one of the hot taps **(11, 12, 13 or 14v)** according to the length and load on the cable. See graphic below.

• Install as many cables as is necessary to split up wattage load to minimize voltage drop. ***Multiple cables can be run from each of the hot or common taps.***

• Fine tune circuiting by using a voltage meter. Halogen lamps perform best when supplied with between 10.5 - 11.5 volts. To reduce voltage at lamp: load cable with more wattage or change to the next lower tap (13v down to 12v). To increase voltage at lamp: reduce wattage load on that run or move cable to next higher hot tap (13v up to 14v).

• Transformer is protected by an automatic thermal overload circuit breaker. If transformer shuts off, there is excessive wattage load or it is getting too hot. Transformer will reengage when it cools down (about 40 minutes). If there is a low voltage electrical short, the resettable circuit breaker will trip. To test for a short, disconnect all runs then hook them up one by one until you find the run that has the problem.

General Guidelines:

• Mount transformer a minimum of 12" off finished grade and away from direct irrigation spray. Transformer must be in a free air space — do not install in a small sealed enclosure or direct bury. Use 1" or 1 1/2" grey conduit fittings to seal cable knock out. If you install a power cord with a photocell be sure to maintain polarity (hot & common). Reversing polarity on the photocell will damage it. **You must install the included black cap or black electrical tape over the photocell to have the transformer switch on during the daytime — even if you switch on the manual override on top of the timer.**

• NOTE ON CIRCUIT BREAKERS (non brand specific):
Most circuit breakers are designed for a 75° ambient (outside) temperature. If the ambient temperature is higher the wattage/amperage rating of the breaker is reduced.
Example: if you are in Phoenix it might be 100° or hotter at night — this can reduce the wattage load rating of the transformer. If you find the circuit breaker is tripping only on hot nights the solution might be to reduce the wattage load on the transformer.

You can add cables as necessary up to the wattage of the transformer.
Example:

PX-600 =

4 runs on the 12v tap at 150w each
OR
4 runs on the 14v tap at 100w each and
2 runs on the 13v tap at 100w each

Cap off any unused tap with supplied wire nuts — exposed taps have electricity running through them! Do not join taps together — transformer failure will result.

 TechLine 800-688-1269 Website http://www.FXL.com

LiteSplice Installation

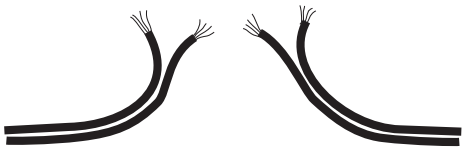
Professional Series

Installation Instructions

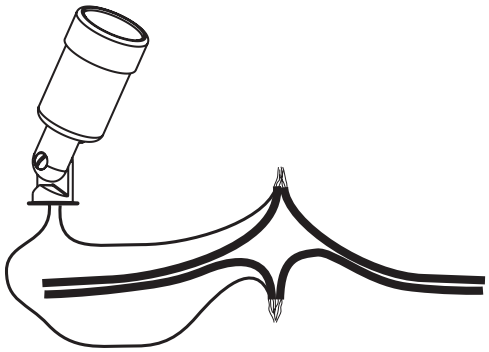
Why Use The LiteSplice?

*Without a **waterproof** splice connection any system will develop voltage loss and low grade shorts making your lighting professional life hell. Below is our proven method of insuring you and your client years of trouble free high performance from the FX System.*
FX Does NOT recommend the use of Quick Clip style connectors or Pre-filled wirenuts because they are not waterproof and will rot out creating resistance and shorts. A little more time spent during installation is repaid handsomely in reduced service calls.

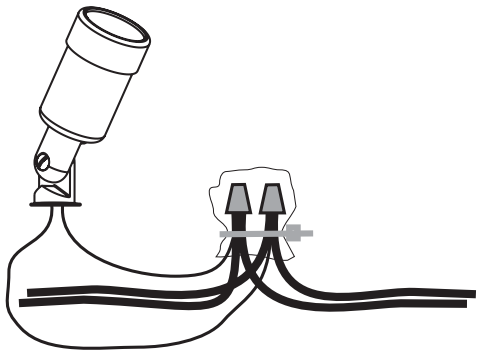
Begin with a 12,10 or 8 gauge direct burial low voltage cable mainline. (Use stranded 12 gauge THHN (120v style) wire for conduit runs such as wall lights or trellis lights).



Cut the mainline cable in half and strip back 3/4" of the insulation from each side to expose the multi-strand copper conductor.



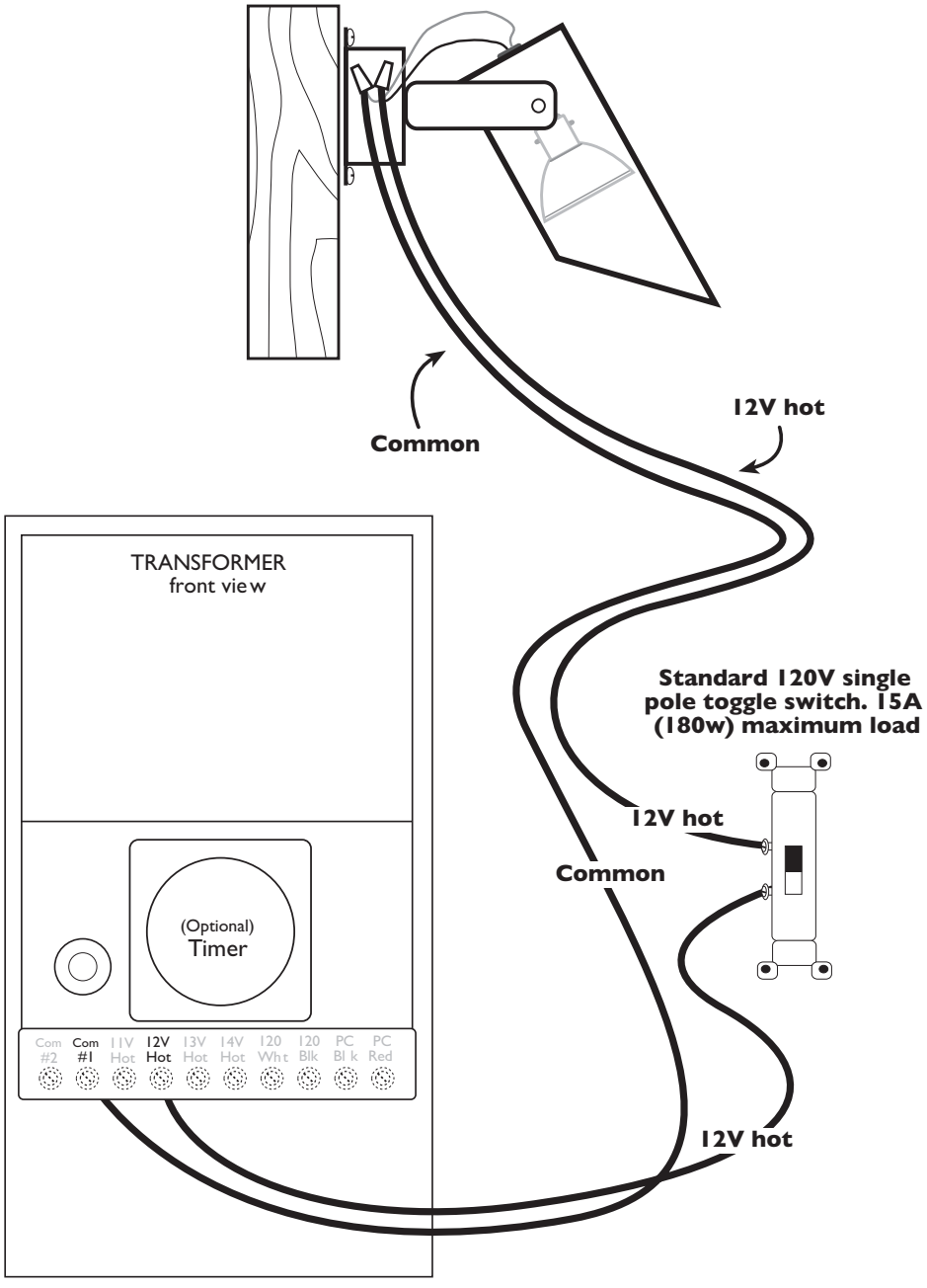
Join one of the fixture's conductors to each side of the mainline as shown in the diagram. Since there is no polarity in low voltage it doesn't matter which side is which when joining the conductors together. Install a wirenut on each side. Now is the time to test the individual circuits (cables) for voltage drop. If you were a good boy and followed the Circuiting Guidelines included with the FX MultiTap Transformer you should be able to provide each fixture with between 10.5 - 11.5 volts with all lamps installed and operating. Test now before you install the SpliceGel because it's easier to stick the VoltMeter's probes inside the wirenuts to get a reading.



Pump about two squeezes of SpliceGel into the baggie and insert both wirenut connections into it. Push out the air and work the Gel into the bottom of the wirenut assuring a waterproof connection. Install the cable tie as shown and cinch down to complete the *most cost effective permanent waterproof low voltage connection known to man.* The Gel will set-up rock hard in about 3 days. It's best to leave 12-18" of slack at each fixture to allow for relocation or if you need to splice in additional cables in the future. Since this is a permanent splice solution — you will need to cut it off and start from scratch to add cables to the splice.

Expert Installation Tips

Kill switch for a low voltage fixture



Follow all local and NEC codes.

Timer Programming

Professional Series

Installation Instructions

General Notes:

Installer:
Leave this sheet with the Project Owner

• To test Photocell/Timer transformer YOU MUST PUT INCLUDED BLACK CAP OR BLACK ELECTRICIAN'S TAPE OVER THE PHOTOCELL BEFORE THE MANUAL OVERRIDE WILL WORK.

• Install PhotoCell models in areas that receive daylight exposure

Manual ON- OFF

If trying to manually turn on a -PC model in the daytime — You must put black cap or tape over the photocell before the manual on will work.

Current ON Time
5pm to 11pm
—
green pin at 5pm
red pin at 11pm

This Timer is currently reading 8:00pm. To disable the timer for an extended period — unplug it and plug the black power cord directly into the outlet under the timer.

Timer Setting & Operation:

• To set timer for additional ON time move red pin to later in the night.

• You can set two on and two off times. This is useful for owners who want the lights to go off at midnight then go back on and off again in the early morning.

• Timer pins represent 30 minute intervals — it is impossible to perfectly sync multiple transformers with separate timers and/or photocells. Use one central control if perfect sync is desired.

PhotoCell Setting & Operation:

• Set timer to go on at around 2:00PM — the PhotoCell will immediately shut off the transformer. At dusk the PhotoCell will then have power to it to turn the transformer ON. Set the tripper pins on the timer to the desired OFF time. To test Photocell/Timer transformer YOU MUST PUT BLACK CAP OR TAPE OVER THE PHOTOCELL BEFORE THE MANUAL OVERRIDE WILL WORK.

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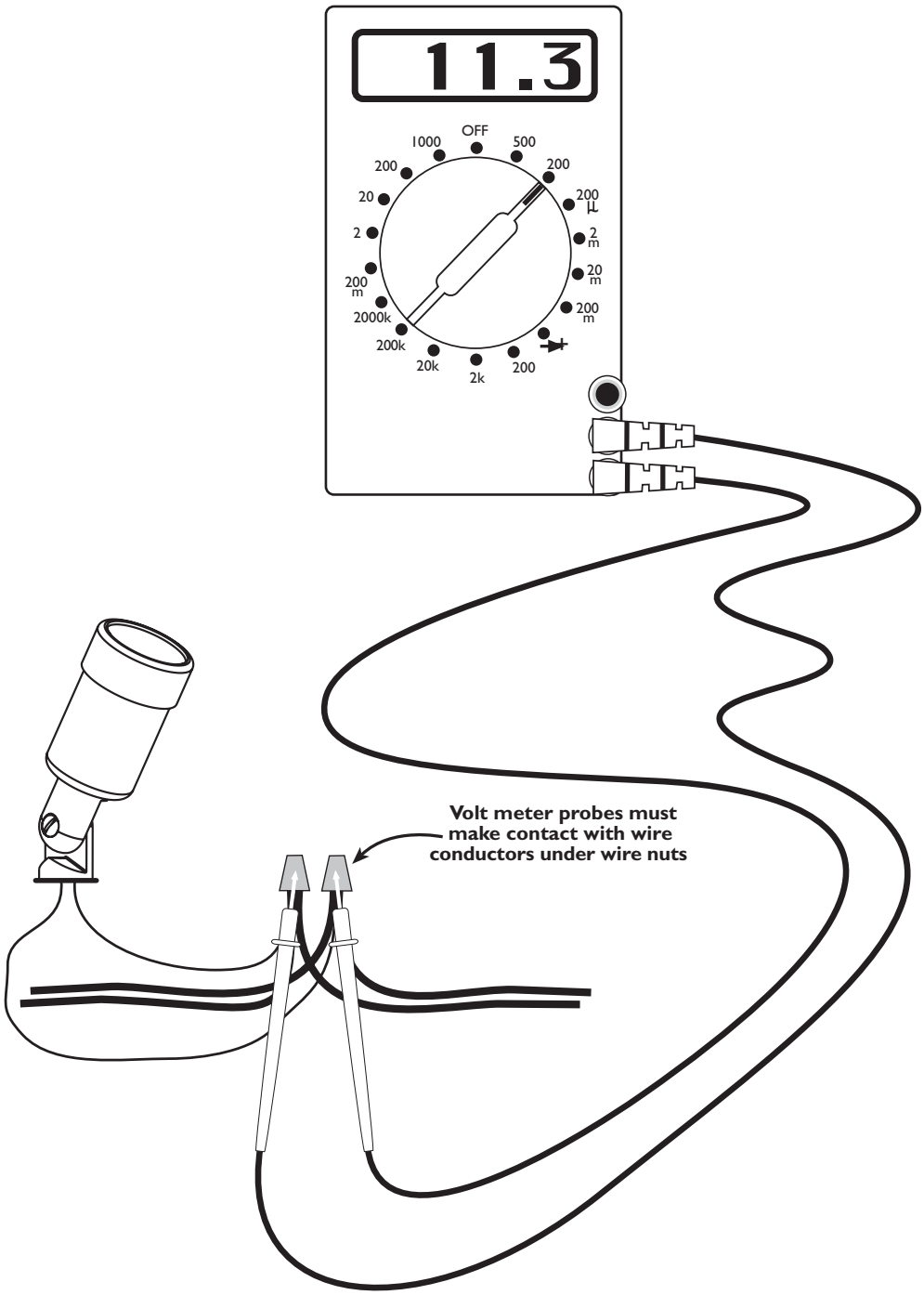
Expert Installation Tips

VoltMeter



Transformer Flow Chart

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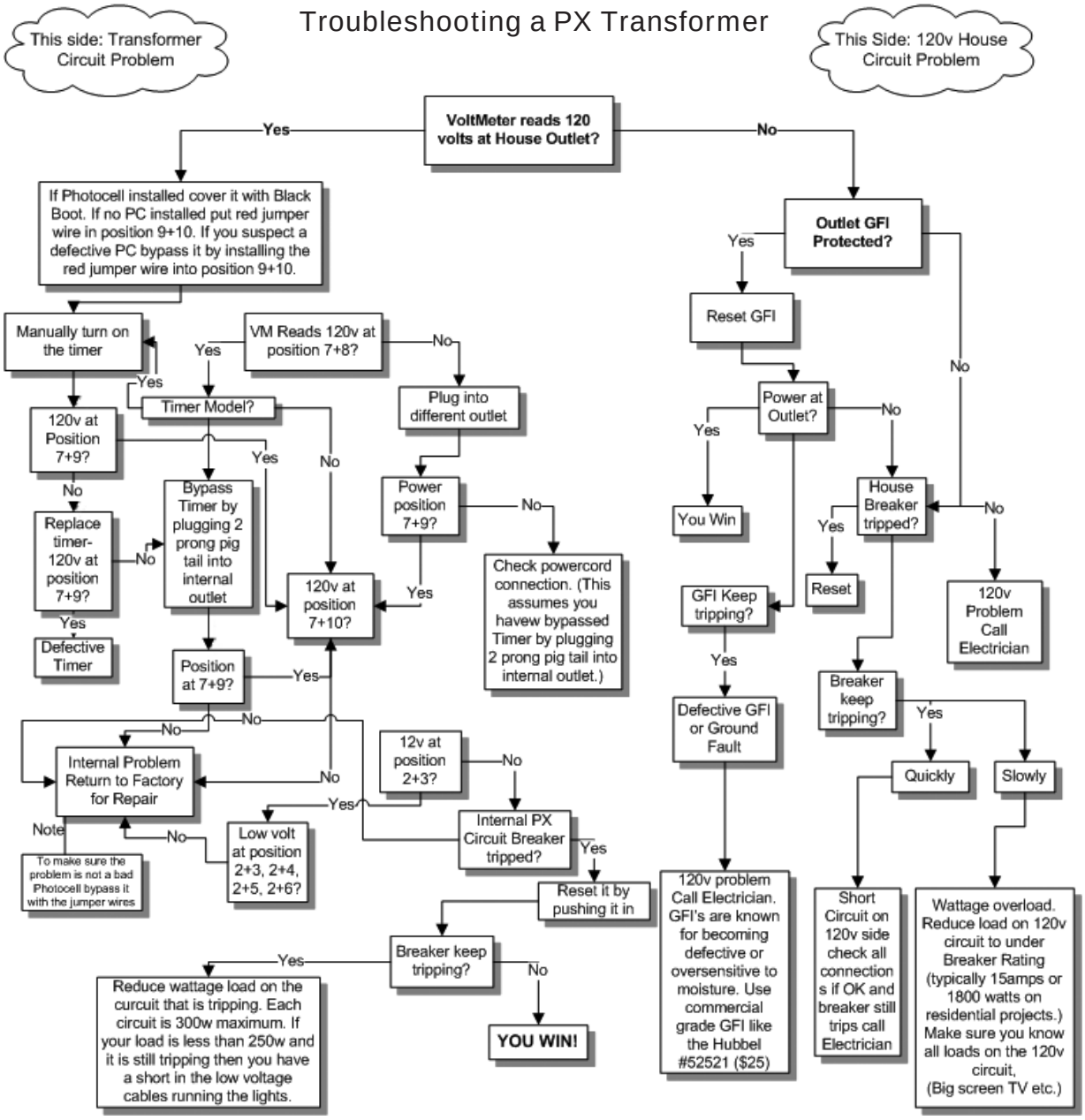
Installation Instructions

Troubleshooting a PX Transformer



Circuit #2 Common 300w Max	Circuit #1 Common 300w Max	Low Volt Hot 11 Volt	Low Volt Hot 12 Volt	Low Volt Hot 13 Volt	Low Volt Hot 14 Volt	120 Volt Common White	120 Volt Hot Input Black	Photocell Hot Black	Photocell Hot Red
				POSITION #					
#1	#2	#3	#4	#5	#6	#7	#8	#9	#10

System Diagnostics

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Installation Instructions

It is extremely difficult to troubleshoot an electrical system without the proper tools. The most essential diagnostic tool is the Digital Voltmeter. Please acquire a voltmeter before proceeding. Most problems with 12v systems stem from inadequate cable size and non-watertite splices. For maximum performance and lamp life all lamps should receive between 10.5 - 11.5 volts with all lamps operating. Please use our Circuiting Guidelines for cable sizing and use a fully encapsulated direct burial splice system like the FX LiteSplice.

Problem	Cause	Solution
No power at plug	Tripped breaker or GFI	Reset circuit breaker in main panel or the GFI usually located in a bathroom, garage or kitchen.
GFI keeps tripping	Ground problem or defective GFI	GFI's are notorious for nuisance tripping. Use a high grade model such as the Hubbell #GF5252I
Transformer is cycling on & off at night	Excessive wattage load or short	Reduce lamp wattage, fixture quantity or increase size of Transformer. See shorting solution below.
PhotoCell Transformer is cycling on & off in the daytime	PhotoCell wiring incorrect	Reverse the hot and common wires on the PhotoCell 120v input. Request wiring schematic for proper wiring.
One cable run not working	Cut cable or short	Test cable for voltage — if none then it is cut — if there is very low voltage and the cable is hot then there is a short. Check all fixtures and splices for defects.
Lamps are burning out prematurely	Excessive voltage at lamp	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.
The closest lamp to the transformer is burning out prematurely	Excessive voltage at lamp	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.
Lamps have a yellow or golden tone	Voltage too low	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.
Lamp goes on and off when fixture is moved	Too much tension on socket leads	With spring type sockets it is important to leave some slack so the socket contacts make a good connection to the lamp base.
System is getting dimmer with age	Splices are corroding	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. Black tape don't get it!
PhotoCell Transformer is coming on too soon	Transformer is in dark location	In order to operate properly the photocell must have a *good look* at daylight. Move to a brighter location.
Fixtures have a white mineral deposit on them	Irrigation water is hitting them when they're on — like washing a car in the hot sun.	To avoid having mineral build-up schedule the irrigation to come on after the lights have gone off. This is especially true with the 50w spots — very hot. To remove the deposits use Lime Away bathroom cleaner.
The fixtures are corroding and my client is about to kill me	Inferior metals and finish	Next time buy your clients the best engineered and built components available — FX!

Questions?
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