1. PX – Locating the Transformer

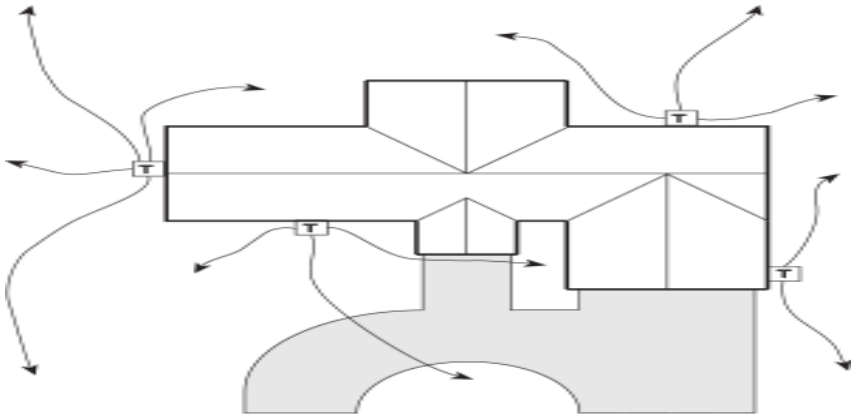
Locate transformer(s) in a well ventilated area away from direct irrigation spray and central to where the majority of the lighting fixtures will be installed. The goal is to minimize the length of cable runs from your transformer to the lighting fixtures thus minimizing voltage drop and cable size.

Transformer(s) with power cords must be located adjacent to a 120 volt GFCI protected exterior electrical receptacle. If a 120 volt power source is not available at the desired transformer installation location, it is advised that you hire a licensed electrician to run a dedicated 120 volt, 15 amp circuit to the desired location.

Test all existing receptacles with both a receptacle tester and a digital voltmeter or amp clamp to verify proper wiring and voltage at the receptacle.

SINGLE TRANSFORMER

When using only one transformer, it is very important to center the transformer on the wattage load. If the project calls for 135 watts in both front and back yard, the PX-300 or PX-600 should be centered on the side of the house that will receive the most T 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.



Sample diagram of home with transformer and lamp placement

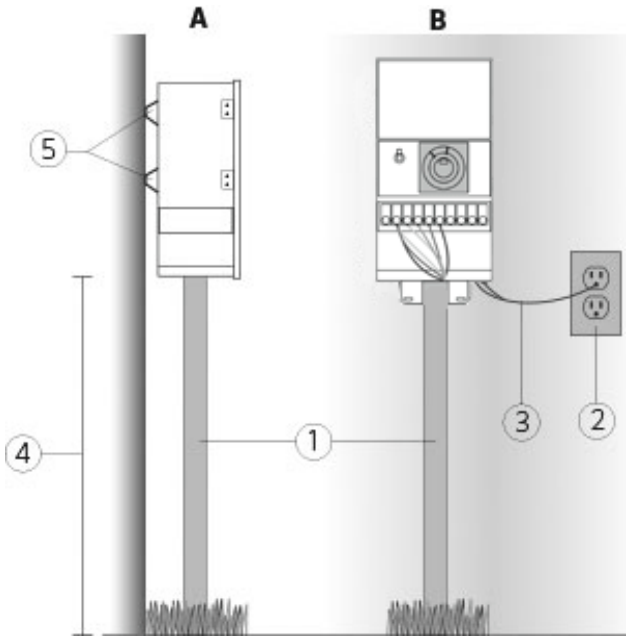
MULTIPLE TRANSFORMERS

A common mistake in laying out multiple transformer circuits is to group several transformers 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 front entry. Therefore, the lights that serve these different lighting use areas need to be on separate transformers and switch controls.

2. PX - Mounting Transformer

Wall Mount

By code, all transformers must be installed a minimum of 12" above finish grade as measured from finish grade to the bottom of the transformer. Using the template enclosed within the accessories bag and a 9" torpedo level, mark top anchor locations on wall, drill pilot holes, insert anchors and install screws into anchors leaving approximately 1/8" of thread exposed on the screw. Mount transformer on screws.



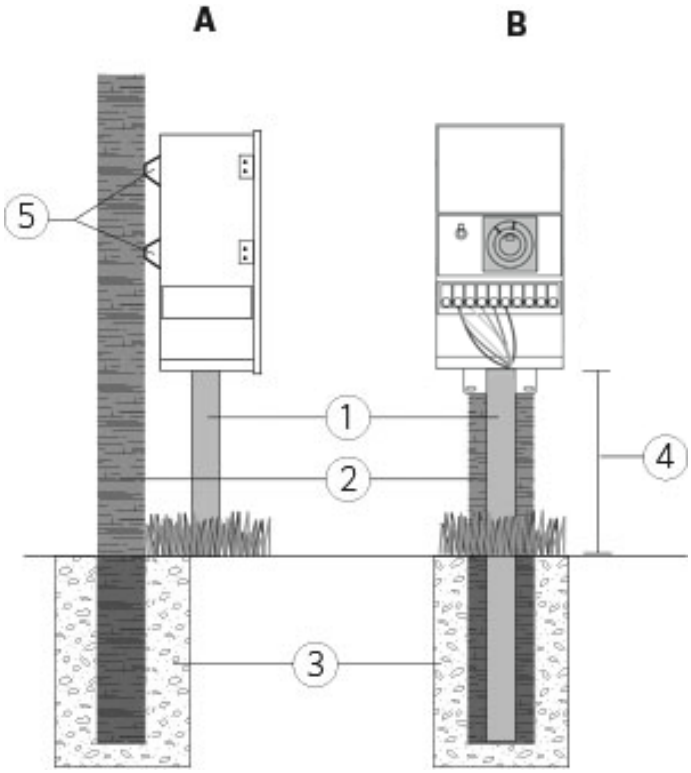
Mark locations for bottom anchors with permanent marker. Remove transformer from wall. Drill bottom anchor holes, install anchors. Place transformer back on top anchors and install screw(s) into anchors at bottom of transformer to secure it to the wall.

A - Side View
B - Front View

1. 1½" conduit
2. 120 volt receptacle with weatherproof cover
3. Power cord
4. 12" minimum
5. Mounting brackets

Post Mount Installation

Install pressure treated 4" x 4" x 36" (min) post in concrete footing. Install single anchor screw (provided) 1½"–2" below the top of post. Place transformer on screw. Place a 9" torpedo level on top of transformer and level transformer. Once level, secure transformer to post by installing 1 or 2 screws on the bottom mounting bracket.



A - Side View

B - Front View

1. 1½" conduit
2. 4 x 4 post
3. Concrete footing
4. 12" minimum

Transformer Electrical Notes

Transformer	Max Wattage Load	Max Low Volt Amps	Max Hi Volt Amps
PX-300 Series Transformers	300 watts	25 amps	2.5 amps
PX-600 Series Transformers	600 watts	50 amps	5.0 amps
PX-900 Series Transformers	900 watts	75 amps	7.5 amps

All PX Series Transformers come equipped with a 3 foot, 12 gauge, 3-prong electrical power cord to be used in conjunction with a typical 120 volt electrical receptacle. The PX power cord should be used only in conjunction with a GFCI protected 120 volt exterior receptacle.

For hard wire installations, remove the PX power cord and wire the transformer in compliance with local electrical building codes. It is recommended that the electrician install a dedicated 15 or 20 amp circuit breaker in the electrical panel.

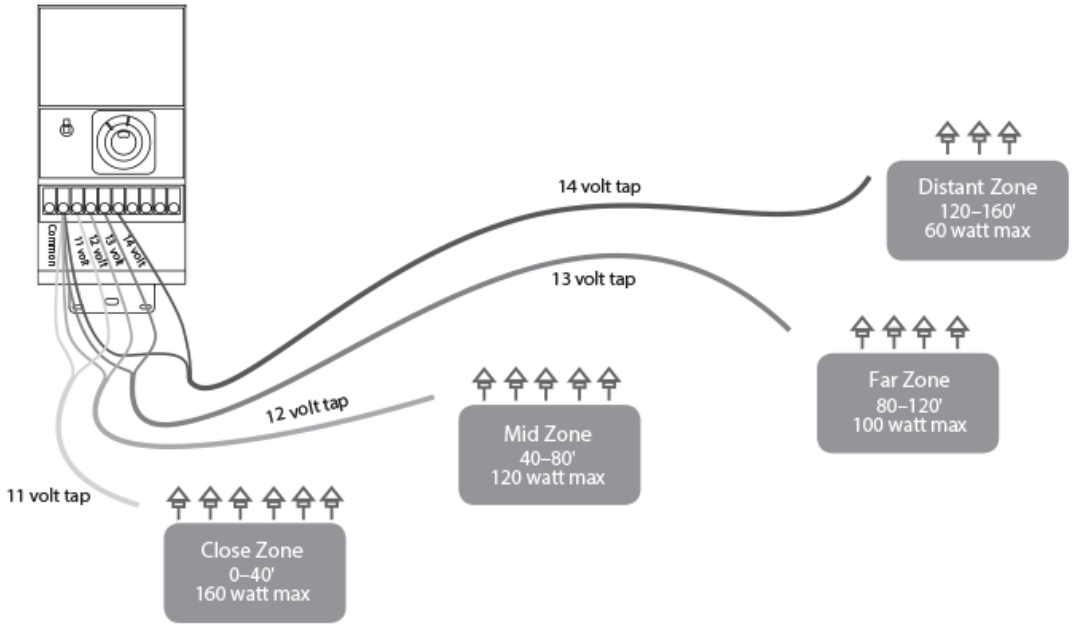
3. PX - Running Cable to Lighting Fixtures

Once the transformer has been installed and all fixture locations determined, the next step is to run the correct size cable from the transformer to the fixtures while providing each fixture with between a 10.5 and 11.5 volt operating range. This is accomplished by:

1. Grouping fixtures into distance zones as illustrated below. Do not have a fixture that is 10' away from the transformer on the same cable run as one that is 100' away.
2. Use the proper cabling method for the application. Try to center load all cable runs when possible to minimize the voltage differential between fixtures. Maximum voltage differential between the first fixture and the last fixture on any given circuit should not exceed 1 volt with a 0.5 volt differential being optimum.
3. Use the correct size cable to accommodate voltage drop. As a general rule of thumb, limit the wattage load per each cable run to no more than 100 to 160 watts.
4. Choosing the correct voltage tap on the PX Transformer terminal block. The PX Series Transformer low voltage tap lugs are the biggest in the industry. If your system has 5 cable runs that all need to be installed into the 13 volt tap, multiple cables will easily fit into each of the lugs.

Summary: For maximum light output and lamp life, the goal when installing low voltage systems is to provide each lamp with between 10.5 and 11.5 volts. To stay within a 0.5 to 1.0 volt differential between the first light and the last light on a given circuit, you must group the fixtures into distance zones and not overload the cable with excessive wattage. As a rule of thumb, limit the distance between the first fixture and the last fixture on any given run to no more than 50 feet.

The FX MultiTap Transformer allows you the opportunity to utilize the voltage tap that will provide each circuit with the proper voltage. For cable runs in the “distant zone” you would typically select the 13 or 14 volt tap. For cable runs in the “close zone,” you would typically install the cable run into the 11 or 12 volt tap depending upon the wattage load and size of cable.

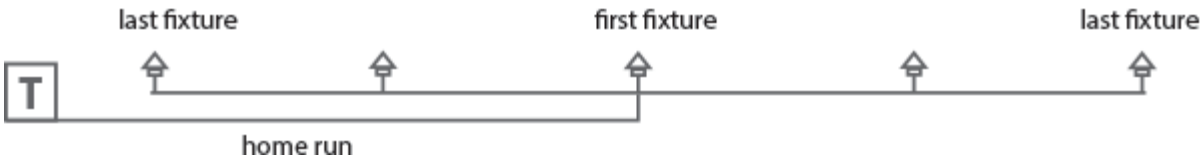


Cabling Methods

Within each cabling zone, you may utilize any of a number of cabling methods. The primary objective is to minimize voltage drop by installing the proper size feeder cable (home run) to each zone and to make sure that each fixture on each cable run is receiving between 10.5 and 11.5 volts, or 10–15 volts for LED fixtures. Center feeding the “home run” (the main cable run from the transformer to the first fixture on the circuit) will help minimize the voltage differential between the first fixture and the last fixture on the cable run.

Tee method (Recommended for Incandescent systems)

The tee method center feeds the “home run” section of the cable and reduces the voltage differential between the first fixture and the last fixture on either side of the “tee.” This method is the preferred circuiting technique as it is easy to install and minimizes the voltage drop between first and last fixtures.



Daisy chain method (Recommended for LED systems)

Daisy chained circuits are the least efficient cabling method as more voltage is fed to the first fixture on the run and due to voltage drop, each subsequent fixture receives less and less voltage. This is not a problem for FX LED fixtures due to its large voltage acceptance range of 10–15 volts.

CABLE STATS

Low voltage lighting systems are typically installed using UF (underground feeder) rated stranded cable. The most common cable used is referred to as 12/2 stranded cable. The size of cable used in wiring the lighting system will be determined by the wattage load and the length of cable run from the transformer to the lighting fixtures.

It is very important to note that all low voltage cable has a maximum safe rating. Overloading cable can create a dangerous safety hazard so be sure to cable your lighting system with the proper size cable.

Wire Size	Max Load at 12 Volts
16/2	10.4 amps - 125 watts
14/2	12 amps - 144 watts
12/2	16 amps - 192 watts
10/2	24 amps - 288 watts
8/2	25 amps - 300 watts **

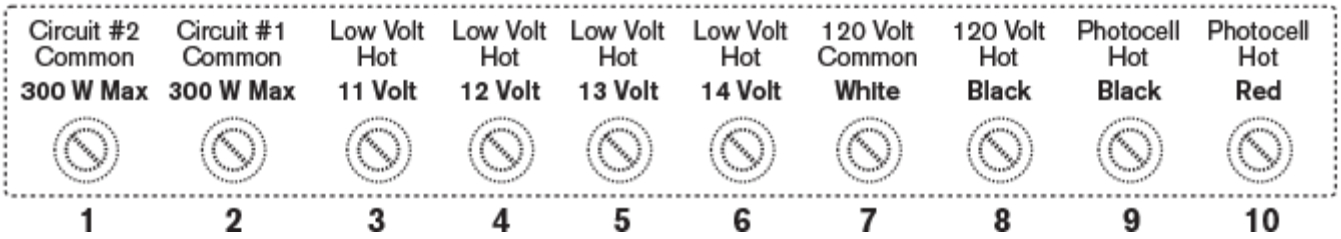
** 8 gauge cable has the capacity of handling up to 32 amps and 384 watts of load; however, the maximum capacity of the circuit breaker in the transformer equals 25 amps or 300 watts.

Connecting Cables to Terminal Block

The PX Series Transformer terminal block consists of 9 or 10 terminal lugs depending upon the transformer model. The PX 300 Series Transformer includes one “common” lug, an 11, 12, 13, and 14 volt “hot” lug and four lugs wired to the line voltage side of the transformer. The PX 600 Series Transformer terminal block has two “common” lugs, four low voltage “hot” lugs and four line voltage lugs. The PX 900 Series Transformer terminal block has three “common” lugs, a 12, 13, and 14 volt “hot” lug and the four line voltage lugs.

Each of the **“common” lugs** in any of the PX Series Transformers has a **maximum wattage capacity of 300 watts or 25 amps**. Each of the “hot” lugs in any of the PX Series Transformers has a maximum wattage capacity equal to the maximum load of the transformer. In other words, the 13 volt tap on a PX 600 Transformer can handle up to 600 watts of load. But the commons can handle only up to 300 watts each.

Terminal block of a PX 600 Series Transformer



Number of cables in each lug

The PX Series Transformer has the industry’s largest terminal block lugs. You will be able to easily fit many cables into each voltage lug should your installation call for it. (We have actually installed over ten 12 gauge cables into a single lug.)

Common lugs

One conductor from each cable run coming from the lights to the transformer must be connected to one of the common lugs. As previously stated, each common lug can handle a maximum capacity of 300 watts or 25 amps of load. The other conductor will be installed into the hot lug that provides the optimum voltage for each circuit.

Choosing the proper “hot” voltage lug

Choosing the proper “hot” voltage lug in which to install the conductor is determined by the circuit’s voltage drop. If a circuit’s voltage drop is calculated to be about 3 volts, install the “hot” side of the cable into the 14 volt tap to assure proper voltage at the lamp. (14 volts minus 3 volts = 11 volts) Note: The voltage reading at each “hot” lug will vary depending upon the incoming voltage provided by the 120 volt receptacle. If the receptacle reads 128 volts, it is not uncommon for the 12 volt lug on the transformer to read 12.6–12.9 volts. On the other hand, if the receptacle is reading only 116 volts, the 12 volt lug may only read 11.8–12.2 volts. Always verify both high voltage and low voltage readings with a digital voltmeter. (See page 11) Fine tune each circuit by using a digital voltmeter. Lamps perform best when supplied between 10.5 and 11.5 volts. Before waterproofing wire connections, take a voltage reading at the first and last fixture on each circuit. If the voltage reading at the first fixture on the circuit reads less than 10.5 volts, move the conductor up to a lug that will provide approximately 11 to 11.5 volts. (Example – voltmeter reads 9.6 volts at the first fixture on the circuit and the conductor is was installed on the 11 volt lug. Move the conductor to the 12 or 13 volt lug and it will now read 10.6 or 11.6 volts.) If the voltage reading exceeds 12 volts, move the conductor down to a voltage tap that will meet the desired voltage range (10.5–11.5 volts).

Circuit breakers

All PX Series Transformers are protected with high quality circuit breakers located on the face of the transformer. The PX 300 has a single 25 amp circuit breaker. The PX 600 has two 25 amp circuit breakers and the PX 900 has three 25 amp circuit breakers. These circuit breakers should always remain in the “On” position; otherwise the system will not operate. They are NOT to be used as “On/ Off” switches. Switching the transformer should be performed by other means. The circuit breakers are safety switches which will trip if the system experiences a short in the cabling or a system overload. If the circuit breakers are tripping, refer to the troubleshooting section of this guide. Once the problem has been resolved, the circuit breakers can be manually reset.

Internal circuit breaker

As an additional safety measure, each PX Series Transformer has an internal thermal overload circuit breaker that automatically shuts the system down should it be subjected to excessive heat. The internal circuit breaker cannot be manually reset. Once the transformer cools off (approximately 40 minutes), the internal breaker will reset and the system will reengage.