



P. O. Box 98 ♦ 1094 North Main St.
Ashland City, TN 37015
Phone (615)792-6884 Fax # (615)792-6898

INSTALLATION MANUAL





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PM3 Series Well Lights

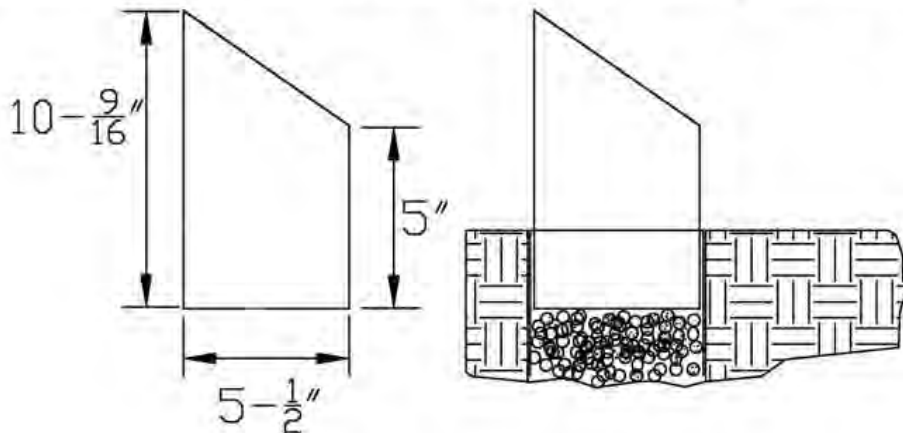


INSTALLATION FOR 3A and 3C SERIES FIXTURES (Well Lights)

P. M. Lighting 3 Series in-ground well fixtures are classified in two different categories: *Angled Well Lights* and *Flat-Top Well Lights*. Within each category, the fixtures can be ordered with various styles of a protective lens cover and each series is available with a copper or aluminum ring to house the bulb. Additionally, flat-top well lights can be ordered with different options to add decorative trim rings to the fixtures. All copper ring well lights include all stainless steel hardware while aluminum ring well lights have black powder-coated steel wing nuts and stainless steel studs.

Installation instructions for all types of 3A and 3C Series Well Lights are basically the same, regardless of options. Simply dig a hole at the location desired 6" in diameter and approximately 12" deep for the well light to be inserted, add 7" of gravel in the bottom of the hole for drainage, and connect the wire terminals to the main or "T" lead to the transformer using included Quick Connect lead connectors or hard wire if preferred. Bury all cable a maximum of 6" underground if desired.

We Recommended 7" of gravel to allow for water drainage.



Installation Tips: A post-hole digging tool provides an easy method for digging holes for well lights. Also, bury flat wells deeper to allow an almost fully-recessed fixture in lawn areas to make lawn maintenance easier. **NOTE: In-ground well lights must be avoided when lawns are aerated so homeowners must be made aware if this to avoid subsequent damage. Always use the protective lens cover to avoid collection of debris which may create a fire hazard.**



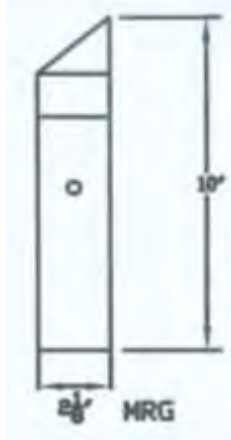
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MRH Series Mini-Well Lights

INSTALLATION FOR MRG COPPER SERIES FIXTURES (Well Lights)

P. M. Lighting MRG Copper Series in-ground well fixtures are also classified in two different categories: *Angled Well Lights* and *Flat-Top Well Lights*. Within each category, the fixtures can be ordered with an eyebrow (Angled) or without an eyebrow (Flat-Top) and either a clear or prismatic lens. The clear lens allows the light to shine cleanly from the fixture while the prismatic lens diffuses the light for a softer illumination.

Installation instructions for all types of MRG Copper Series Well Lights are basically the same, regardless of options. Simply dig a hole at the location desired 4" in diameter and approximately 12" deep for the well light to be inserted, add 5" of gravel in the bottom of the hole for drainage, and connect the wire terminals to the main or "T" lead to the transformer using included Quick Connect lead connectors or hard wire if preferred. Bury all cable a maximum of 6" underground if desired.



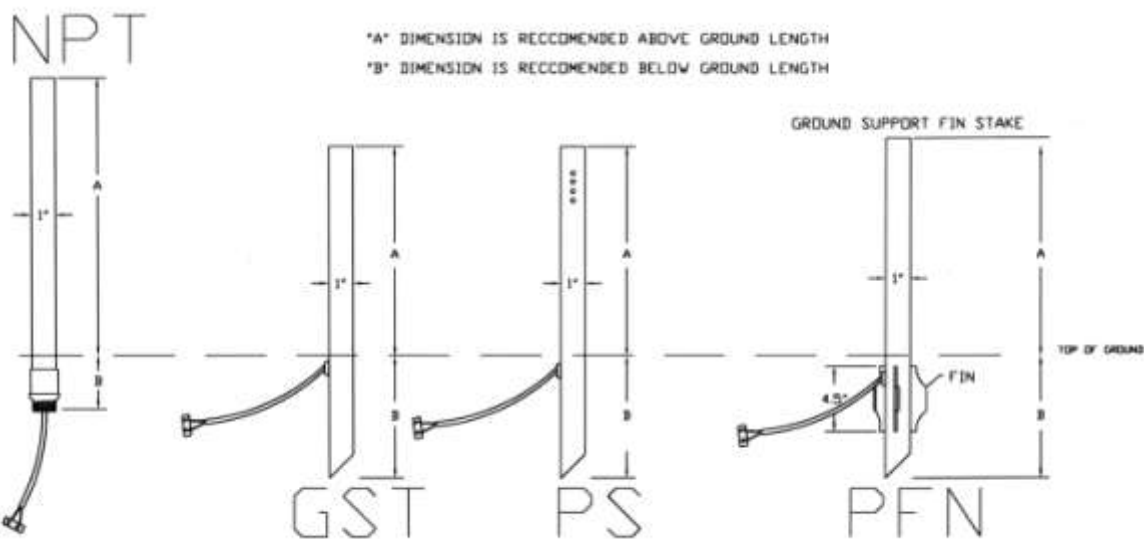
All in-ground Well Lights should be installed over a bed of gravel to help facilitate drainage and prolong bulb life!



Installation Tips: Various filters are available for MRG Copper Series fixtures to enhance the beauty of the landscape lighting and provide depth and additional elements of color for the overall design. These drop-in lens are simple to install between the fixture's fixed lens and MR16 bulb and are available in blue, amber, green, opal, and solite, options. Additionally, a honeycomb drop-in louver is available to further hide the light source when desired.

STAKE INSTALLATION FOR FIXTURES

P. M. Lighting fixture stakes are classified in two different categories: *Power Stakes* and *Ground Stakes*. Within each category, three different mounting methods are available including straight mounting (#1 Type), copper fin mounting for additional stability (#2 Type), and NPT mounting (#3 Type) for using a standard 1/2" thread pipe fitting.



Overview of Installation: For all #1 Type and #2 Type stakes (all except NPT mounted stakes), position the stakes at the desired location and drive the stake into the ground using the P.M. Lighting Driver Tool (DRIVER) to protect the stake top. Take care to avoid driving stakes directly into rocky soil which may damage the stake. Alternately, drive a 1" steel pipe into the ground before driving the stake to establish a pilot hole. **DO NOT USE FIN MOUNTED STAKES IN EXTREMELY ROCKY LOCATIONS!** If preferred, straight mounted stakes (#1 Type) can be installed over a 3/4" PVC pipe length driven directly into the ground or encased the #1 type stake in concrete (use a can as a mold or use quick setting concrete. Connect wire terminals to the main or "T" lead to the transformer using included Quick Connect lead connectors or hard wire if preferred. Bury all cable a maximum of 6" underground if desired.



CAUTION: Use a dead blow hammer/ mallet to protect the ceramic socket from damage.





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DEPTH INSTALLATION CHART

Stakes should be installed with an adequate amount of length below ground for optimal results. Note that stakes with copper mounting fins (#2 Type) lose one or more inches of height above ground on 20” and shorter stakes. Refer to the Depth Chart below for specific recommended measurements.

#1 Type Stake (straight mounting)

Stake Length	Measurement “A” (above ground)	Measurement “B” (below ground)
12”	8”	4”
16”	11”	5”
20”	14”	6”
24”	17”	7”
30”	22”	8”
40”	31”	9”

#2 Type Stake (copper fin mounting)

Stake Length	Measurement “A” (above ground)	Measurement “B” (below ground)
12”	5”	7”
16”	9”	7”
20”	13”	7”
24”	17”	7”
30”	22”	8”
40”	31”	9”

#3 Type Stake (NPT mounting)

All #3 Type stakes can be mounted with Measurement “B” between ½” and 1 ½” as desired. NPT Stakes are mounted on any ground stake or surface mount that has a standard ½” NPT threaded hole. Our IT-03 plastic replaceable stakes and BR/FL-NPT Brass Flange are available for installing the #3 Type stakes.

IT-03 Mounting Stake





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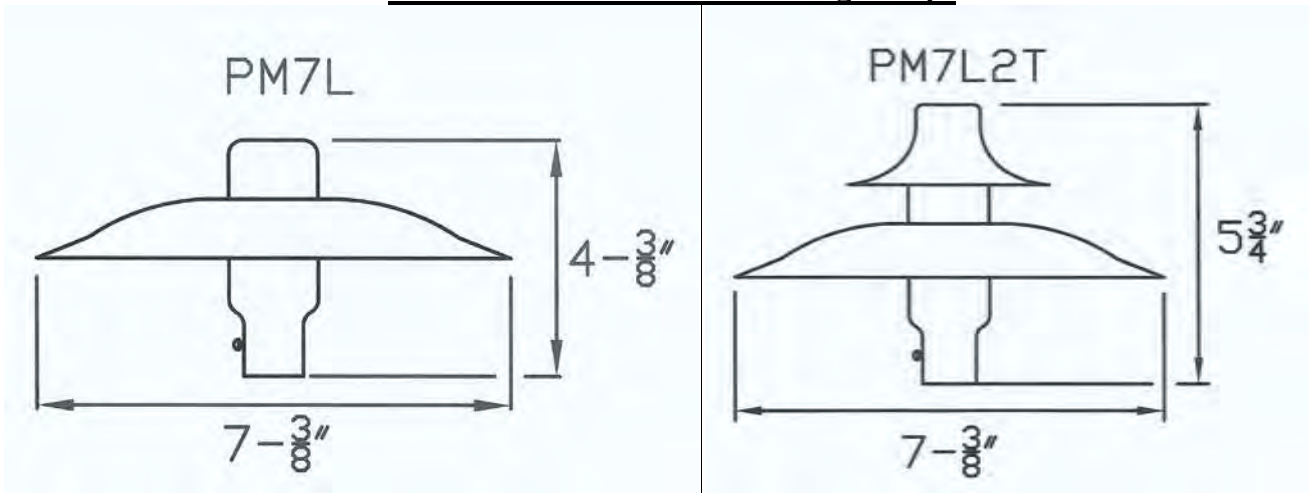
PM7 Series and all Path Lights



INSTALLING TOPS AND FIXTURES ON STAKES

P. M. Lighting offers several sizes and style of tops and fixtures in its line of landscape lighting products and are categorized based on the type of stake used: **Path Light Tops** do not have the socket built in to the top so these require **Power Stakes** to complete the fixture. Additionally, a **Swivel Arm** is available to convert a Ground Stake to an adjustable Power Stake (see sections below on Swivel Arms and MRH Series / PM1 Series Fixtures).

PM7 and PM7 Two-Tier Path Light Tops



Overview of Installation: All path light tops, including PM7, PM7L, PM7H, PM7LH, PM7L2T, PM7XL, PM7XLC, PM5, and PM5L can be added to any length of Power Stake for maximum flexibility in landscape lighting design. The tops slide over the Power Stake and are secured by one of two methods: **Push-Pin Method** - push the plastic pin into one of the four (4) side mounting holes at the desired height; **Screw Method** - adjust the top to the desired height and tighten the brass screw.

Adjusting Light Output on Path Lights: Each path light top can be adjusted up or down to change the amount of light output of the fixture. Select the desired height (using the different hole positions for push-pin tops or any position in between for screw-mounted tops) and secure the top to the Power Stake. Adjust position as needed to the optimal light output desired.

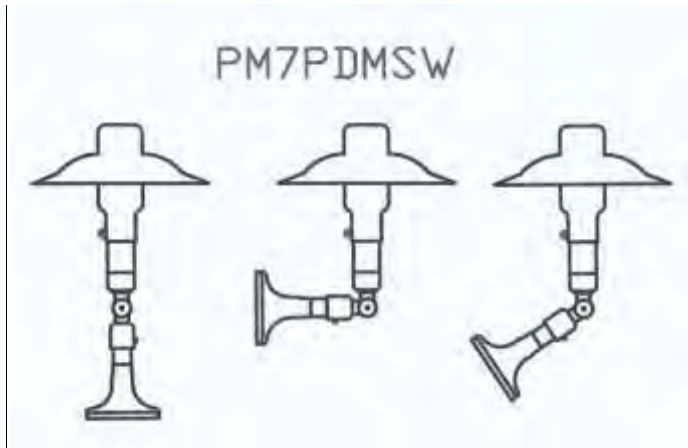
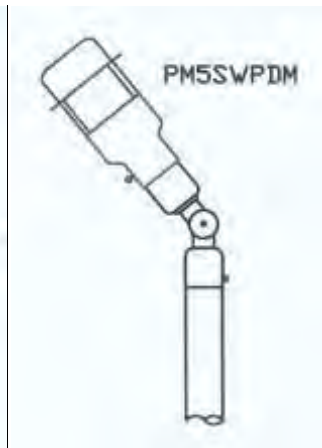
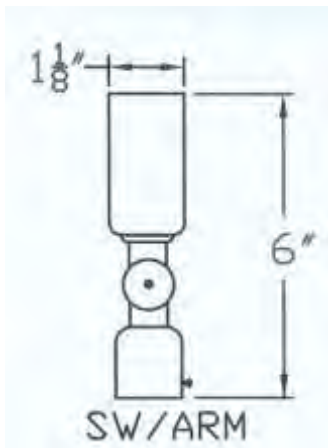
Installation of Half-Top Path Lights: Half-Top Path Fixtures are an excellent choice to light various scenarios with the same fixture, for example when lighting both walkway on one side and a garden on the other. The Half-Top fixture provides a traditional circular illumination on the side of the light with the overhang while the open side of the fixture spreads light to softly illuminate the desired area on the opposite side. When installing Half-Top Path Lights (PM7H & PM7LH), position the top accordingly to achieve the desired effect and tighten the screw to secure the top to the Power Stake. Due to the increased area of illumination of the Half-Top Path Lights, one may wish to increase the wattage of the bulb (maximum of 35 watts) for greater spread on the open side of the fixture. If using Half-Top Path Lights with push-pin mounting, position the Power Stake with the side mounting holes aligned with the top to achieve the desired position.

Installation of Swivel Arm: P. M. Lighting offers a *Swivel Arm*, complete with adjustable brass knuckle and socket to convert a Ground Stake or extended Surface Mount to an adjustable Power Stake. This application is helpful in certain applications where path light tops need to be angled to light gardens, structures, or other specific lighting requirements. The Swivel Arm allows the Path Light Top to be angled in any direction for maximum flexibility.

Swivel Arm

w/ PM5 & GS

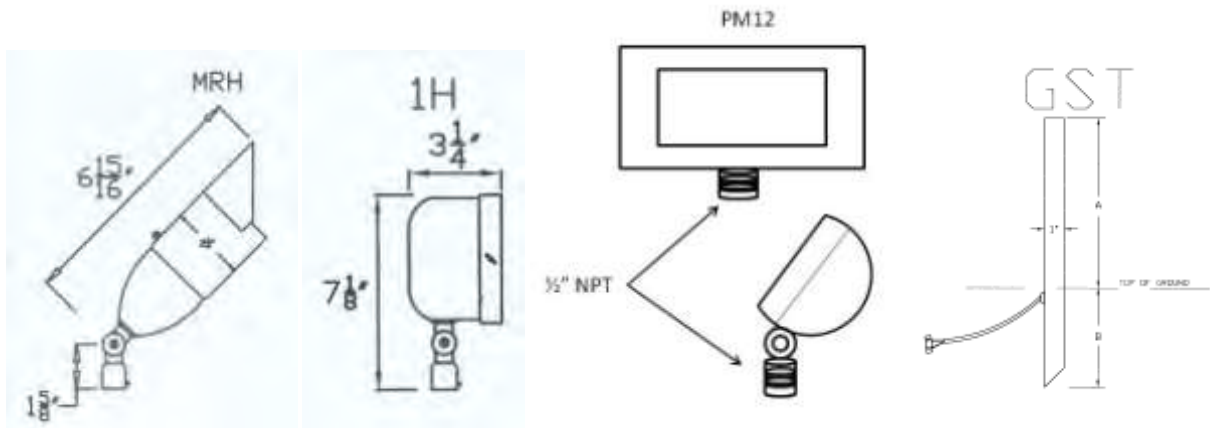
w/ PM7 & Surface Mount



Overview of Installation: Installation of the Swivel Arm is fast and easy. Simply connect the male terminals on the wire leads of the Swivel Arm to the female terminals on the wire leads of the Ground Stake or extended Surface Mount, slide the brass knuckle over the post and tighten the brass screw in the desired position. The angle of the Swivel Arm can be adjusted in both lateral and vertical direction by loosening the two screws on the brass knuckle to reposition the fixture as desired.

Directional Lights

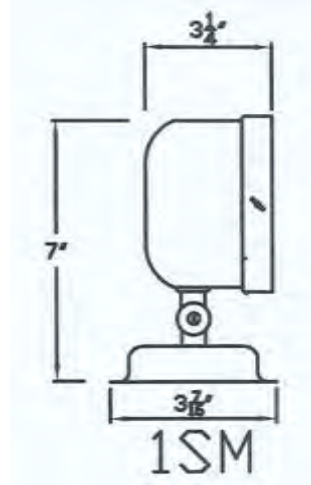
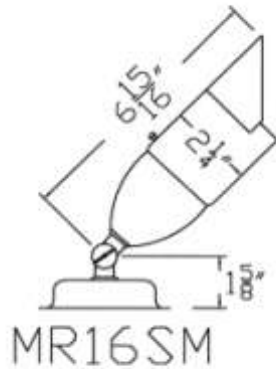
MRH, PM1, and PM12 Series Light Fixtures



Overview of Installation: All MRH Series, PM1 Series, and PM12 Series solid copper fixtures come ready to connect to either an extended Surface Mount or a Ground Stake (each purchased separately) available in multiple lengths to meet the needs of the landscape lighting design. Additionally, these fixtures are available with an optional 1/2" NPT threaded mount for use with any stake or surface mount that has a standard 1/2" NPT threaded hole, such as the IT-03 plastic stake, the SM-NPT surface mount or the BR/FL-NPT Brass mounting flange. **MRH Series and PM1 Series** fixtures are complete so only a Ground Stake (with wire harness) is required to complete the fixture. **NOTE: MR16 and PM1 Series fixtures can also be ordered as a complete fixture with a low-profile surface mount, so no stake is needed at all for these.** Simply connect the male terminals on the wire leads of the fixture to the female terminals on the wire leads of the Ground Stake or Surface Mount, slide the brass knuckle over the post and tighten the brass screw in the desired position. The angle of the fixture can be adjusted in both lateral and vertical direction by loosening the two screws on the brass knuckle to reposition the fixture as desired. For extended Surface Mounts with the **Deluxe Surface Mount Cover**, make sure to slide the cover over the stake before attaching the fixture head to the stake.

The MRH Series and PM1 Series solid copper fixtures are also available in a low-profile Surface Mount style, with the adjustable brass knuckle mounted directly to the fixed mounting base. These fixtures are mounted to the location (for example a deck, wall, or tree) using the included stainless steel screws in the holes provided in the base of the surface mount. Two **Quick Connect** lead connectors are supplied to connect the fixture to the main lead run. Additional information on installing Quick Connects can be found in the installation section for **Power Stakes and Ground Stakes**. When ordering low-profile Surface Mount style fixtures, please specify if the wire lead required is **bottom-exit** or **side-exit** from the base of the fixture.

Surface Mounted MRH Series and PM1 Series Fixtures



Installation Tips For Glare Reduction: To hide or minimize the light source (bulb filament) from view, use MRH Series fixtures with built-in *eyebrows* or add optional *Glare Shields* to PM1 Series and *Glare Clips* to PM5 Series fixtures. Glare Shields attach to the PM1 Series fixtures by loosening the wingnuts on the fixture and slide the mounting slots in the shield over the studs. Tighten the wingnuts to secure the shield in place. For PM5 Series fixtures (PM5 and PM5L) simply snap the Glare Clips onto the back half of the fixture and adjust as desired.

MR16 Fixtures Water Drainage Note: When using MRH or PM12 fixtures *for down lighting*, *specify these fixtures with a drain hole when ordering*. This drain hole eliminates standing water in the lens. Check the item code to ensure the proper item is ordered. (Code for down lighting is 4 for example: MRH-P148.)

Various Directional Fixture Examples





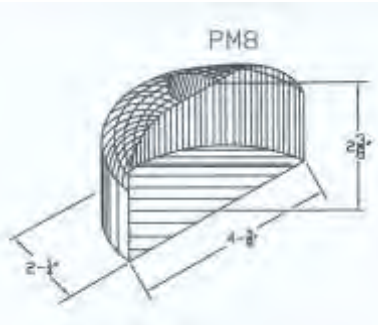
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PM8 Series Deck & Step Lights

DECK, STEP, & ACCENT LIGHTING FIXTURES

P. M. Lighting offers several sizes and styles of fixtures in our line of products to fill most every need in landscape lighting design. Several fixtures are designed for specific applications designed to compliment traditional lighting of pathways and gardens include the following: **Deck & Wall Lights** softly illuminate deck posts, walls, and rock or brick structures such as sitting walls. **Brick & Step Lights** add safety lighting to the riser of deck stairs or can be used to accent certain areas of walls. **Hanging Tree Lights** are designed to freely hang from the limbs of trees or over the tops of gazebos and other outdoor structures when down lighting is desired to provide a moonlight effect.

PM8 Deck Light



Overview of Installation: The PM8 Deck Light and PM8 Step Light are available as shown above to mount directly to a flat surface such as a wall or deck post, similar to a sconce or under a step tread for the PM8-Step Light. Screw holes are provided to mount the fixture using the included stainless steel mounting screws. An acrylic mounting template is available separately for the PM8 Deck Light to aid in positioning mounting holes and can be ordered from P. M. Lighting, LLC when ordering the PM8 Deck Lights. A 3/8" hole must be drilled behind the fixture for the wire lead to exit the back or side of the post or wall and Quick Connects can be added to the lead for easy connection to the main run. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect)

For halogen systems, P. M. Lighting recommends the use of a 10 watt or lower bulb in all PM8 Deck Light fixtures to avoid excessive heat that may burn and cause injury when contact is made with the copper housing.



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PM8 Series Surface Mounted & Rock Wall Lights

PM8-SML Surface Mounted Deck Light



The PM8 Deck Light is also available with an adjustable Surface Mount for mounting on smaller 4" X 4" deck posts or for any situation where an adjustable wall sconce is desired. A 3/8" hole must be drilled behind the fixture for the wire lead to exit the back or side of the post or wall and Quick Connects can be added to the lead for easy connection to the main run. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect) A side exit for the wire is available for custom orders to eliminate the need to drill behind the fixture.

For halogen systems, P. M. Lighting recommends the use of a 10 watt or lower bulb in all PM8 Deck Light fixtures to avoid excessive heat that may burn and cause injury when contact is made with the copper housing.

PM8SL Slim Line Rock Wall & Deck Light



The PM8SL Rock Wall & Deck Light is an excellent fixture for mounting under the capstone of stacked rock walls. Simply place the flat bracket between the top of the wall and under the capstone and secure the capstone in place. Run the wire out the back of the wall as desired and use Quick

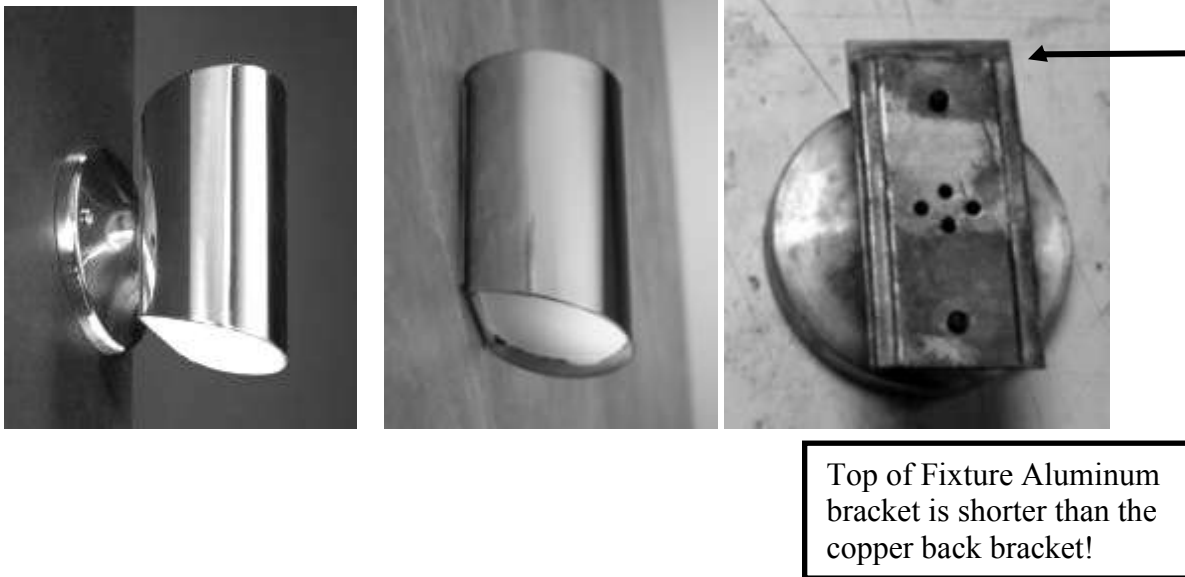


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Connects for easy connection to the main run. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect)

For halogen systems, P. M. Lighting recommends the use of a 10 watt or lower bulb in all PM8 Deck Light fixtures to avoid excessive heat that may burn and cause injury when contact is made with the copper housing.

PM4 and PM4-SM Deck/Wall Light



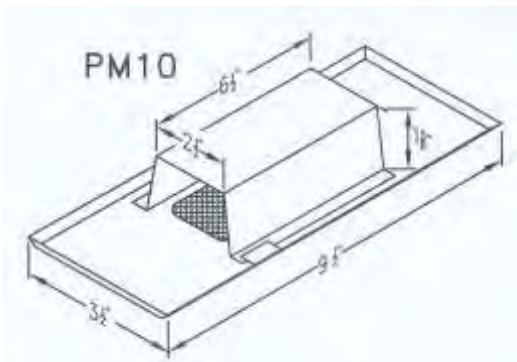
Overview of Installation: The PM4 Deck/Wall Light is available as shown above to mount directly to a flat surface such as a wall or deck post, similar to a sconce. The install, mount the copper base (or back plate on the PM4-SM) to the deck post or wall using the screw holes provided and the stainless steel mounting screws provided. A 3/8" hole must be drilled behind the mounting base for the wire lead to exit the back or side of the post or wall. For the PM4, thread the wire lead through the center of the base and the 3/8" hole and use the screws to secure the fixture base cover to the base. Lastly, Quick Connects can be added to the lead for easy connection to the main run. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect) Please note that light will be reflected both upwards and downwards from this fixture. ***NOTE: For the bi-directional PM4, the base must be mounted correctly as shown above for lens to fit properly.***

For halogen systems, P. M. Lighting recommends the use of a 10 watt or lower bulb in all PM4 Deck Light fixtures to avoid excessive heat that may burn and cause injury when contact is made with the copper housing.

Brick & Step Lights

More options

PM10 Brick & Step Light



Overview of Installation: The PM10 Brick & Step Light is designed to be recessed into a cutout or the space of a single brick. Either cut the recess in the desired location (such as the riser of the step) or remove a brick to create the recess and slide the fixture into the opening. A hole must be drilled through the recess to thread the wire lead to connect to the main run.

The PM10 Brick & Step Light has two (2) primary parts: (1) the aluminum reflector light box and (2) the solid copper cover with lens. To assemble, install a **G4 bulb (recommended 10 watt maximum)** into the socket and slide the tabs on the inside of the cover over the lip of the reflector box to secure. Once assembled, slide the fixture into the recess as described above. Quick Connects can be added to the lead for easy connection to the main run. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect) If applicable, secure the copper cover to the wall with brass screws provided for installation into wood steps and walls.

Alternate Step Light Fixture – MRGF-R



Overview of Installation: An easy and beautiful way to add lights to step risers or sidewalls, the MRGF-R recessed light fits into a 2 7/8" hole drilled at least 2 1/2" deep. Brass mounting screws complete the installation. Fixture can be mounted vertically (as shown) or under a header, such as for a garage door header. Use a bi-pin lamp or MR16 style lamp up to 20 watts for the best lighting effects.



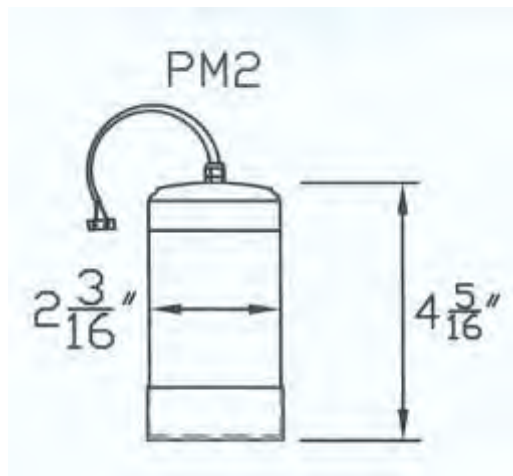
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PM2 Series Hanging or Surface Mounted Lights

PM2 Hanging Tree Light



PM2-SM Surface Mounted Light



Overview of Installation: The PM2 Hanging Tree Light is one of the easiest fixtures to install on a landscape lighting system. Designed to hang freely over tree limbs and other supports (such as arbor joists and struts), simply bend the 8" section of heat-shrink protected cord to form a hook as needed and connect the Quick Connects to the main run. For the PM2-SM, three mounting screw holes are used to mount the fixture to any overhead structure such as arbors, ceilings, etc. The wire can be ran either as a side exit or bottom exit as desired (specify when ordering) to run with the surface or behind the surface. Alternately, hard wire the wire lead to the main run if desired. (See additional information below on installing the Quick Connect) Either a G4 or MR16 style bulb can be used in the PM2 Hanging Tree Light. A maximum of 35 watts is recommended.

Wire Connection Options

OPTION 1 – Quick Connection

Quick Connectors (QC Kit)



Quick Connect Installation

Quick Connects are a fast and easy method for connecting P. M. Lighting landscape lighting fixtures to main runs to the transformer. These connectors will work on both 12 gauge and 10 gauge cable for home runs. The teeth on the ratchet devices lock the pierced terminals into place to securely hold the connection over time.

To install or replace Quick Connects, slide one wire into the hole in the Quick Connect, position the metal piercing pin in the slot and push into place with a pair of pliers. Insert one wire into the top of one side of the QC Connector and the second wire into the bottom side of the other QC connector to install the two pieces opposite each other as shown in the picture.

OPTION 2 – Hard Wire w/ Barrel Crimp & Sealed LV-CON



The hard wired method is one of the most dependable and long lasting wiring methods in the industry. Using a copper barrel crimp, this connection is solid copper to copper for continuity in voltage current. The silicone filled LV-CON connectors seal the connection to make a watertight seal to protect the connection.

Strip the ends of the wires approximately 1-1/4" in length and twist the copper strands together. Slide on a copper barrel and crimp the barrel tightly on the exposed copper wires. Slide the wire into the opening of the LV-CON base, pull the wires above the V-Slot and bend the wires to the side into the V-Slot (the side with the hole). Lastly, slide the silicone filled top of the LVV-CON onto the base and push the parts together to snap them into the ratchets, locking the 2 pieces together. If possible, snap the pieces to the 2nd ratchet as shown above.

ALTERNATE WIRE CONNECTION OPTIONS

- 1) Silicone Filled Wire Nuts
- 2) Soldered Connection
- 3) Specialty Connectors (ACE Connector)



Silicone Filled Wire Nuts



Specialty Connectors (ACE)



Soldered Connections



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80% RULE ON TRANSFORMERS

When installing MTH, MTS, and MTTS Series multi-tap transformers, it is recommended that one uses the 80% rule when designing runs and calculating transformer loads. The full amount of transformer wattage can only be utilized when short distance runs are used and only when connected to the 12 volt taps. Each common (ground) wire has a 300-watt maximum load. (80% of that would be 240 watts.)

Example:

- 300 watt transformer = 240 watt max (unless you do not exceed 12v taps)
- 600 watt transformer = 480 watt max (unless you do not exceed 12v taps)
- 900 watt transformer = 720 watt max (unless you do not exceed 12v taps)
- 1200 watt transformer = 960 watt max (unless you do not exceed 12v taps)

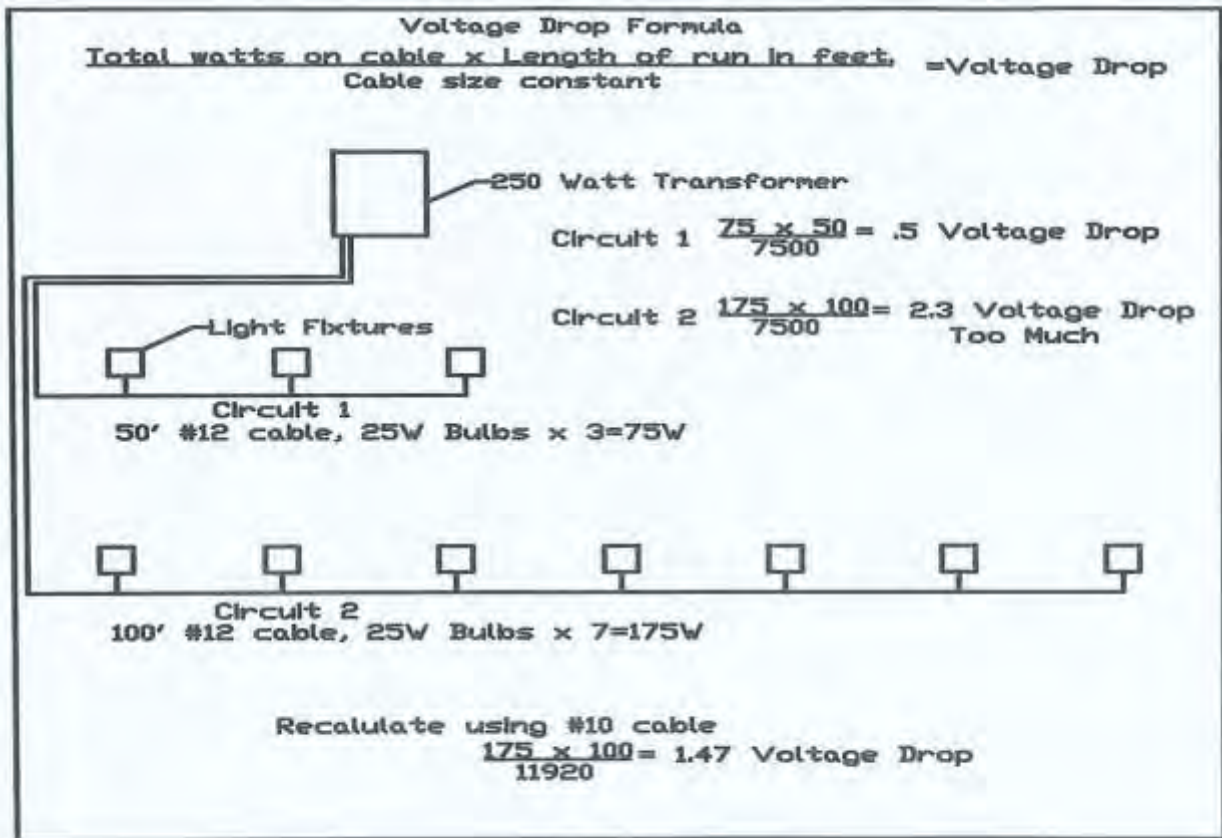
Voltage Range for Fixtures: It is recommended that all halogen lights are connected to achieve a range of between 10.8 volts and 11.8 volts at each fixture (but never more than 12 volts) to increase the life of the bulbs. Lights measuring less than 10.4 volts may create discoloration in the illumination (i.e. the light will glow more amber in color than white).

LED Fixtures and Voltage: LEDs are electronic circuit boards in a sense and therefore operate in a voltage range, typically between 8 – 24 volts, depending on the components and manufacturer. These will light the same as long as they are within the operating range but most low-voltage LEDs are designed to operate closer to the 12V standard for heat management to reduce wear and increase the life of the components.

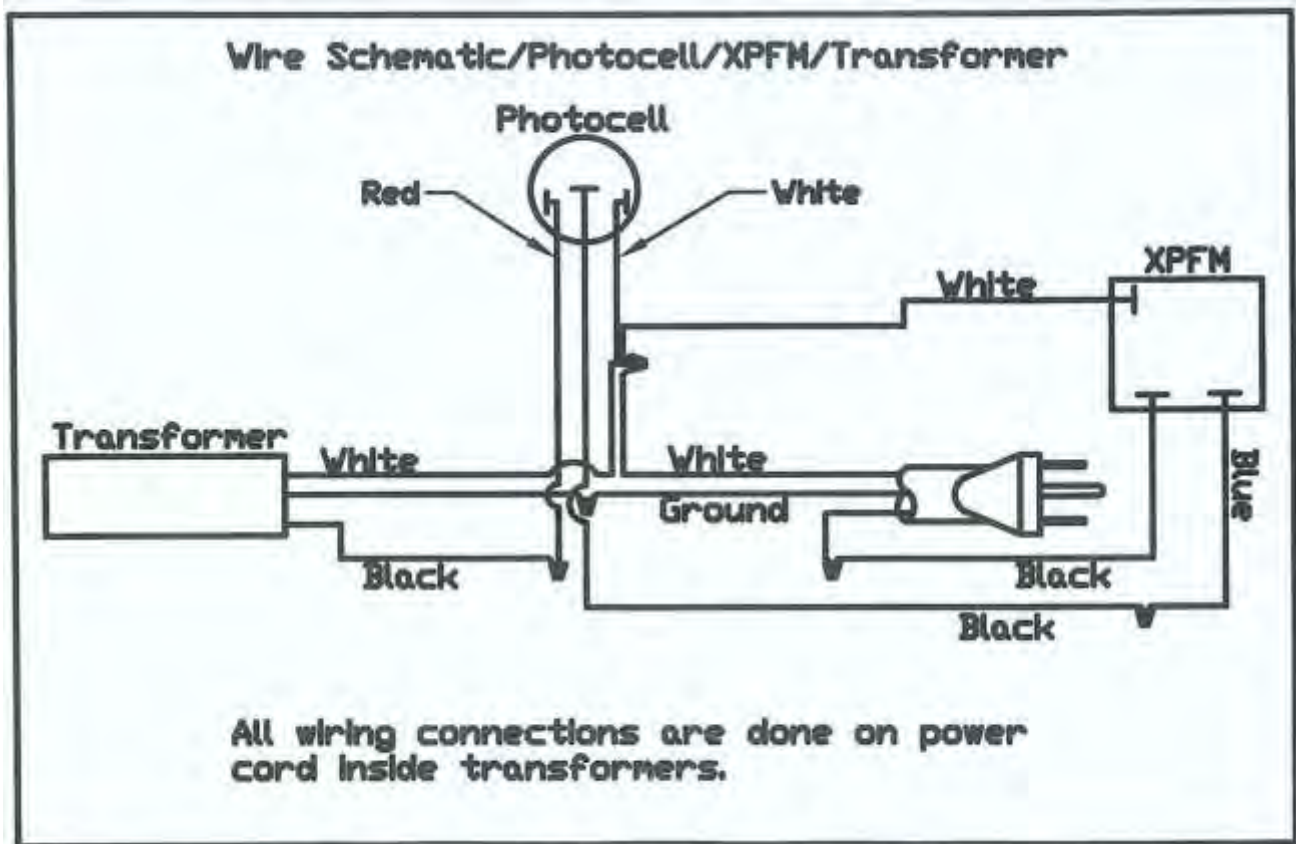
Designing Lead Runs: The recommended method for wiring a group of fixtures is to run a solid lead from the transformer to a central area for the group. This wire is the “home lead”. Wire the group of fixtures to the home lead using a “T Method” to balance the amount of current distributed throughout the group of fixtures. Example: To install 5 fixtures (assume these are 3C Series well lights which each contain a 36watt bulb) one would run the home lead to the center fixture and connect 2 fixtures on each lead right and left of the “T”. Regardless of the number of fixtures connected to a home lead, the wattage on each side of the “T” should be balanced as close as possible so all fixtures receive approximately the same amount of voltage. Remember the voltage drops the longer the run and higher the total watts per home lead (Refer to Voltage Drop Calculator for more information). Each side of the “T” should not exceed 25 feet of wire. Additionally, each common (white ground) is a total of 300 watts (80% Rule provides 240 watts as described above).

Voltage Drop

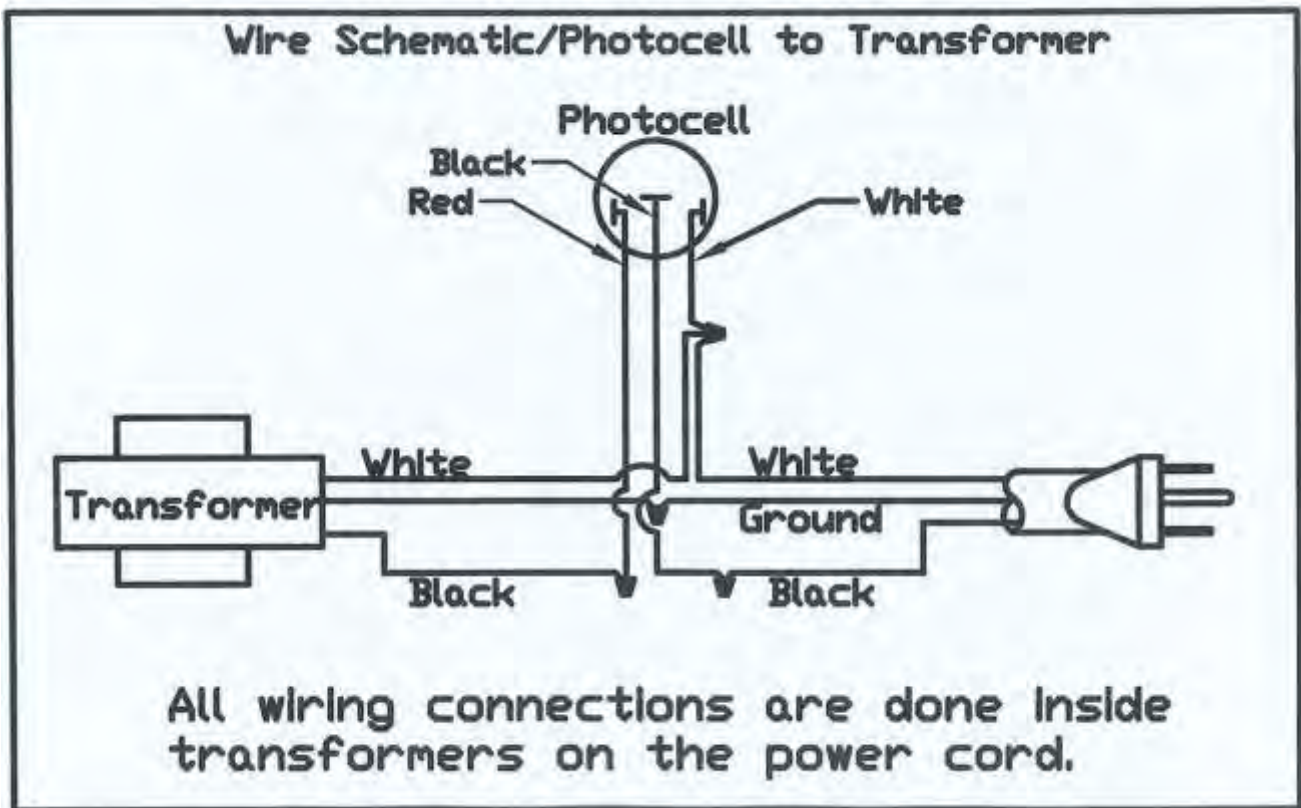
<u>EFFECT OF VOLTAGE ON LAMP LIFE / LIGHT OUTPUT</u>		
<u>Voltage Lamp</u>	<u>Life Expectancy of lamp</u>	<u>% of Rated Candlepower</u>
13.2	2/3 rated life	350
12.6	3/4 rated life	180
12	As Rated	100
11.5	2 x rated life	80
11	3 x rated life	75
10.75	4 x rated life	70
10.5	5 x rated life	65
10	9 x rated life	50



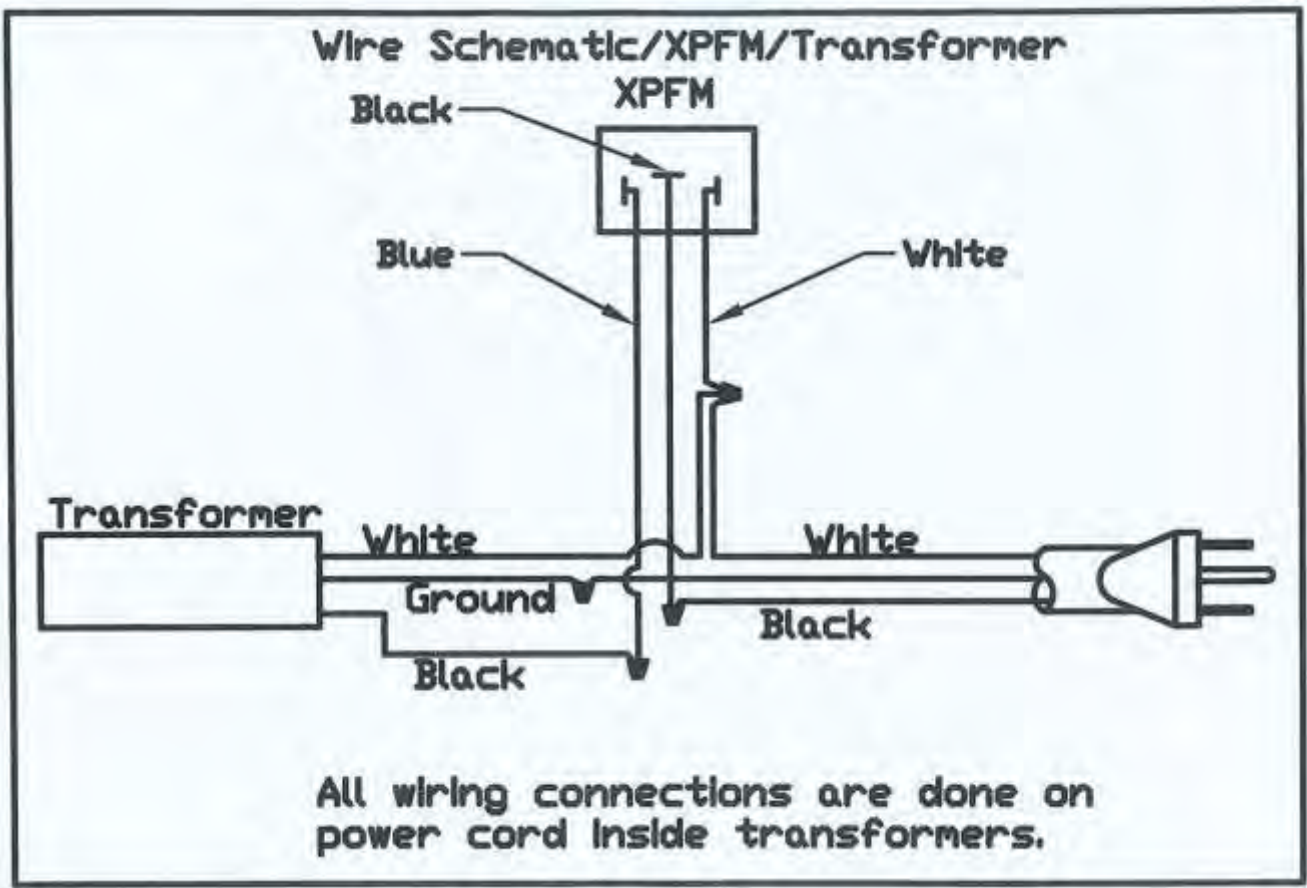
Schematic for Wiring a Photocell and XPFM to MTH Series Hard Wire Transformers



Schematic for Wiring a Photocell to MTH Series Hard Wire Transformers



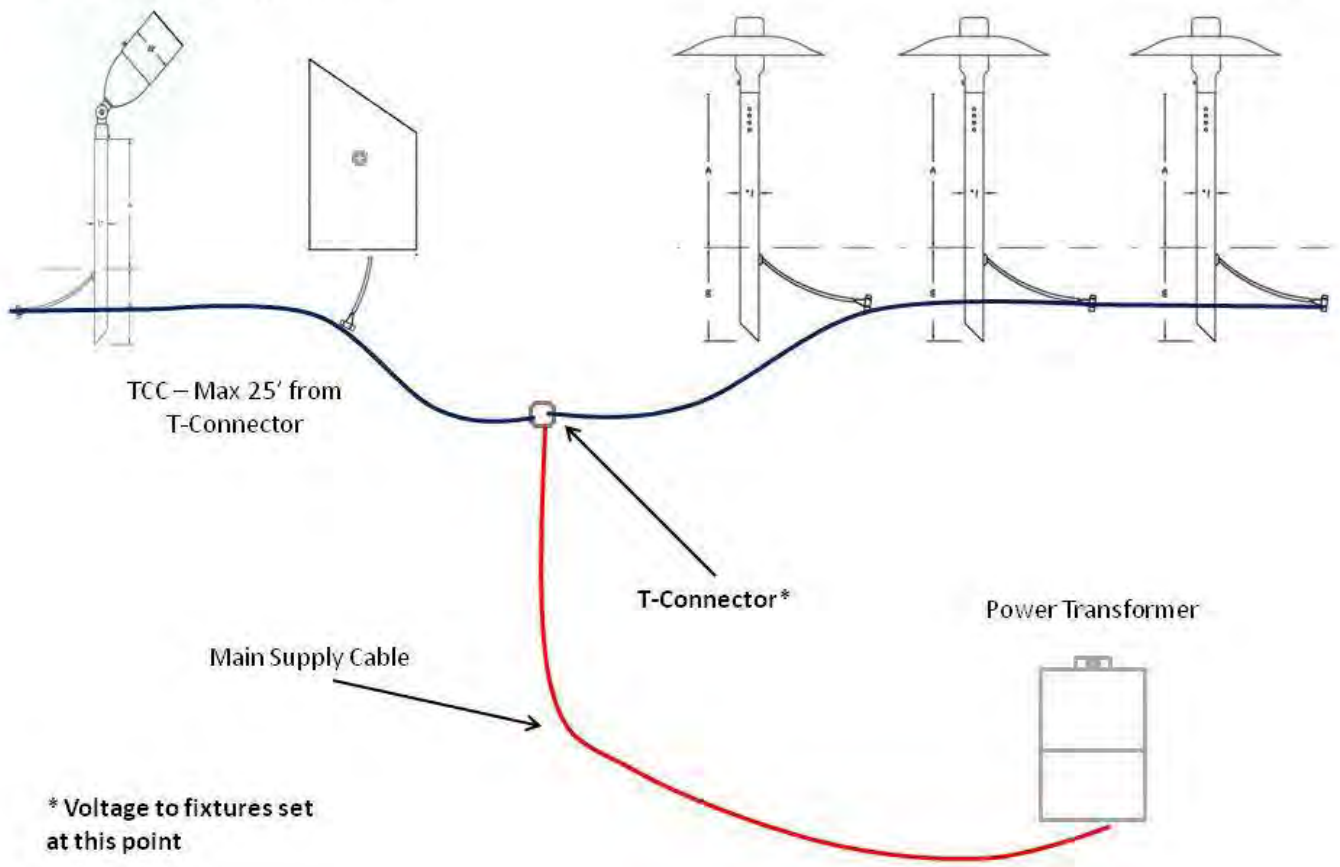
Schematic for Wiring the XPFM to MTH Series Hard Wire Transformers



Cable Design & Wiring Methods

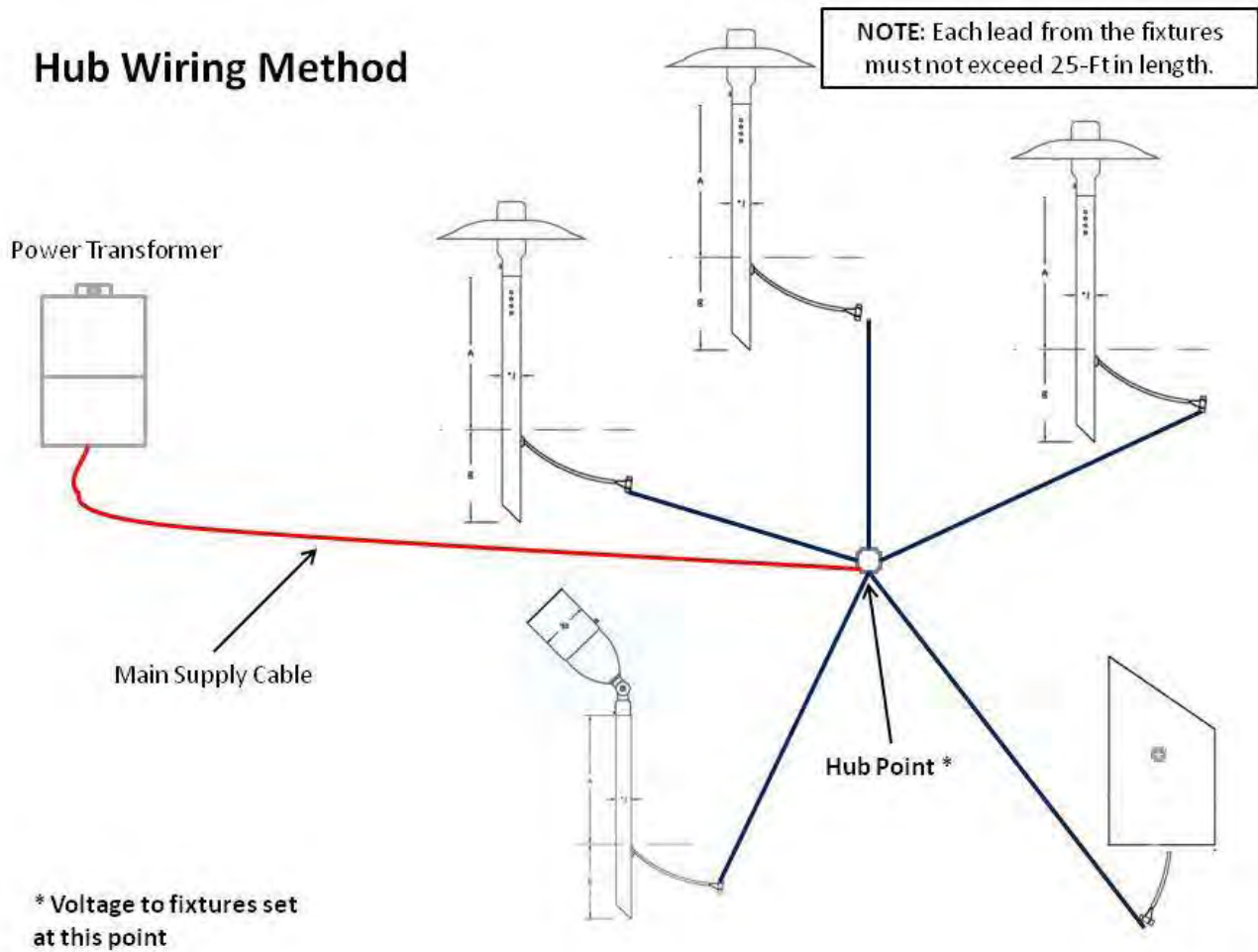
T- Wiring Method

NOTE: TCC = T-Connector Cable - Must not exceed a total of 50-Ft in length.



Cable Design & Wiring Methods

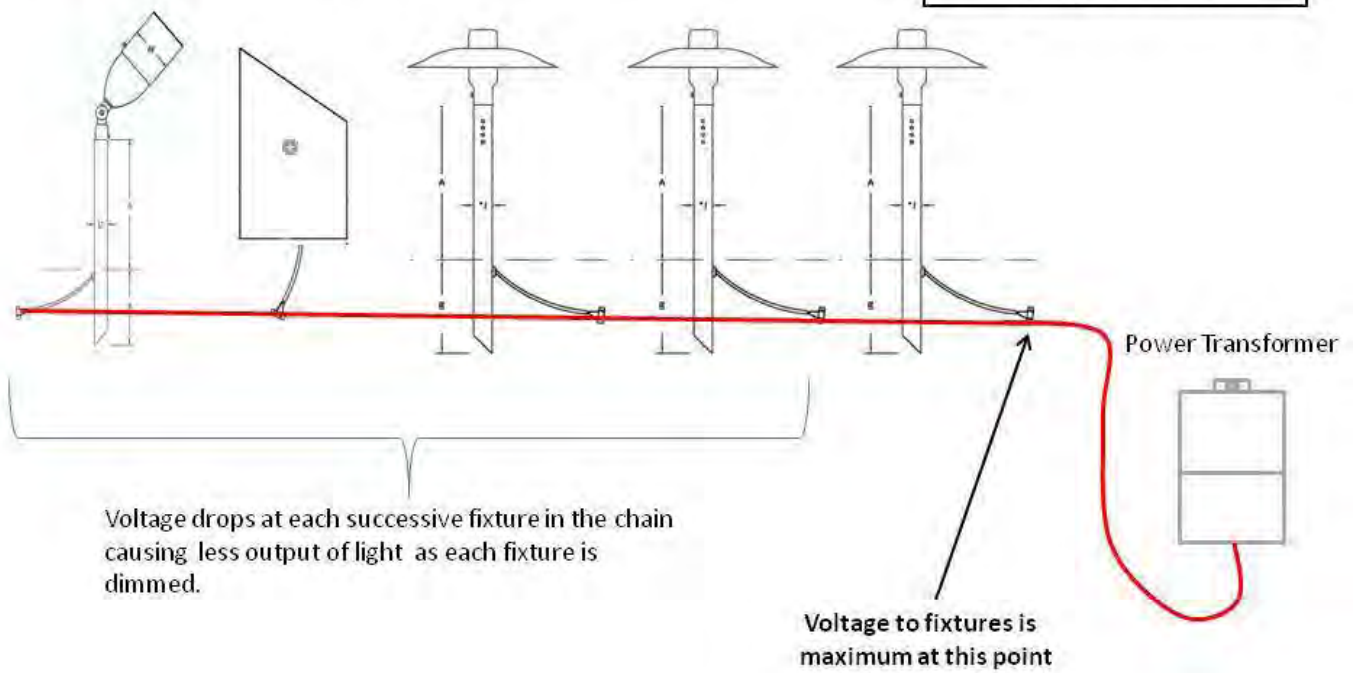
Hub Wiring Method



Cable Design & Wiring Methods

Daisy Chain Wiring Method

NOTE: Daisy Chain Method is NOT recommended for halogen lighting installations.



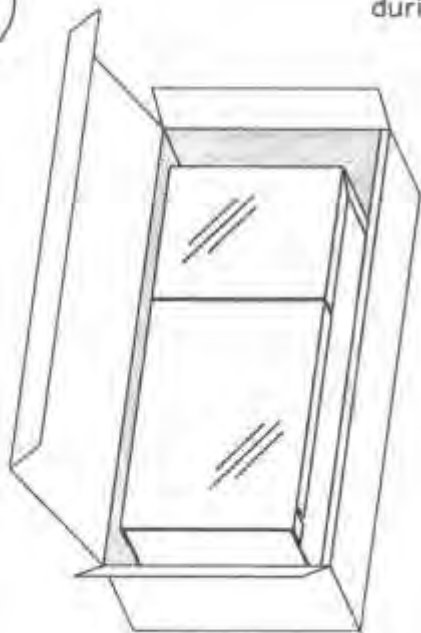
Low Voltage Power Module Installation Guide

300W 600W 900W 1200W 1500W

!! ATTENTION !!

Please read and understand thoroughly this installation guide to ensure safe and efficient operation of this Power Module.

1



Carefully remove the transformer and inspect for any damage that may have been incurred during shipment.

Our Bottom Plates feature double knock-outs for adapting to standard conduit sizes, as well as a 1-5/8" diameter access hole to allow for a larger centrally located 1-1/2" conduit for a cleaner, more professional looking installation.

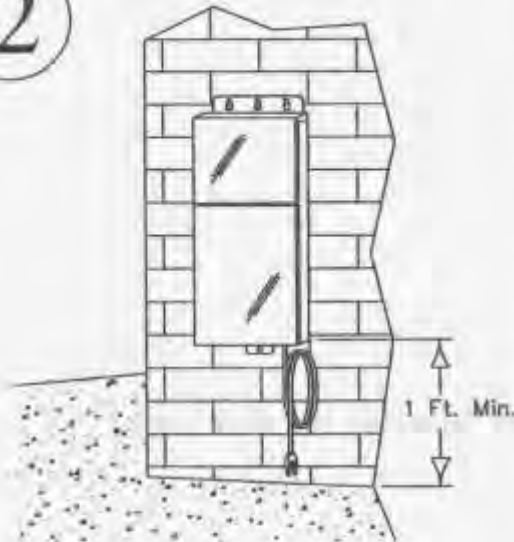


Example:
Bottom Plate

504-0098

MOUNTING THE UNIT:

2



Mount the Transformer to a solid surface using keyhole slots in the mounting bracket. (NOTE: The transformer must be mounted at least one foot above ground level, with the wire terminals facing down.)

Secure the Transformer using the appropriate wall anchors for the wall surface used. (Wall mounting screws and anchors not supplied.)

DETERMINE THE LOAD:

Our Multi-Tap transformers are equipped with secondary circuit breakers that are connected to the COM. Each circuit can be loaded up to a maximum of 300 watts.

3

- A) Add up your fixture's wattage. Divide your load into 300W max. per wire run. **DO NOT EXCEED 300W PER RUN!!**
- B) Measure the approx. distance from the transformer to the first fixture on each run. Refer to Chart 1 to pick the correct tap for each run. You may use one, two, three or all taps at once.

WATT	TAP 1 12V		TAP 2 13V		TAP 3 14V		TAP 4 15V		TAP 5 17V		TAP 6 20V		TAP 7 22V	
	AWG 12	AWG 10	AWG 12	AWG 10	AWG 12	AWG 10	AWG 12	AWG 10	AWG 12	AWG 10	AWG 12	AWG 10	AWG 12	AWG 10
100-149	15	24	51	81	87	138	123	195	194	309	302	480	374	595
150-199	10	16	34	54	58	92	82	130	130	206	201	320	249	396
200-249	8	12	25	41	43	69	61	98	97	155	151	240	187	297
250-300	N/A	10	N/A	32	N/A	55	N/A	78	N/A	124	N/A	192	N/A	238

CHART 1 (WIRE RUNS IN FEET)

Example:

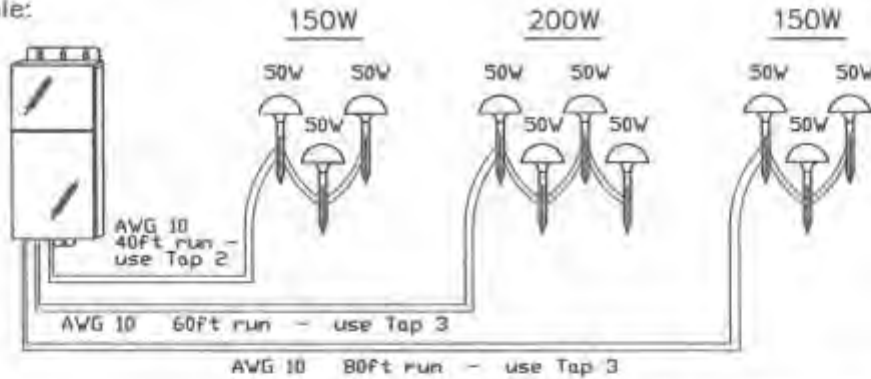


CHART 2 (WATTAGE LOSSES PER FOOT)

AWG	100W	150W	200W	300W
12	0.210	0.461	0.855	N/A
10	0.131	0.293	0.537	1.2

C) Once you find the correct tap for each run, see Chart 2 to calculate the cable losses.

$$\begin{aligned}
 \text{Cable loss} &= (\text{loss per foot} \times \text{distance}) \\
 &= (0.293 \times 40\text{ft}) + (0.537 \times 60\text{ft}) + (0.293 \times 80\text{ft}) \\
 &= (11.72) + (32.22) + (23.44) \\
 &= 67.38 \text{ watt losses total.}
 \end{aligned}$$

D) Determining Maximum Lamp Load:

All of our Transformers are designed to provide up to maximum wattage rating on any tap. However, you must take into account the cable losses.

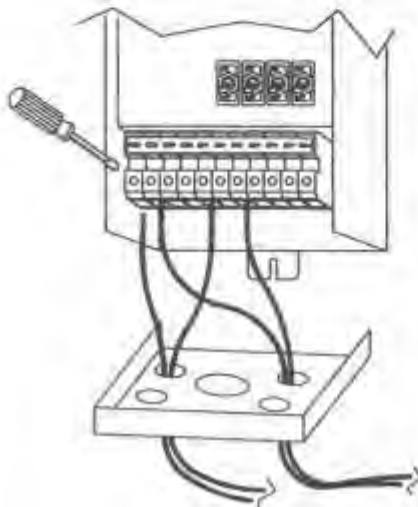
Example:

$$\begin{aligned}
 \text{Maximum Lamp Load} &= (\text{Transformer rating}) \text{ minus } (\text{cable losses}). \\
 &= (600\text{W}) - (67.38) \\
 &= \text{approximately } 530\text{W Lamp Load.}
 \end{aligned}$$

**** Your maximum lamp load should not exceed approximately 530W, ****

4

CONNECTING THE CABLES:



Loosen the two screws that hold the unit cover in place, and remove cover.

Run lighting cables through knockouts in Bottom Plate.

Connect the low voltage cables to the COMs and low voltage taps labeled on the Terminal blocks.

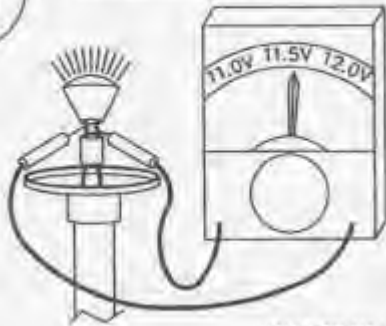
Make sure that all connecting screws are secure and tight.

REMEMBER!! Maximum 300W per circuit!! (Com)

Turn off ALL the circuit breakers in the transformer unit. Plug the 120V line cord into a grounded 120V outlet. Turn on one breaker at a time to ensure that your low voltage cable runs are connected per CHART1, and to ensure that there are not any short circuits.

5

CHECKING LAMP VOLTAGES:



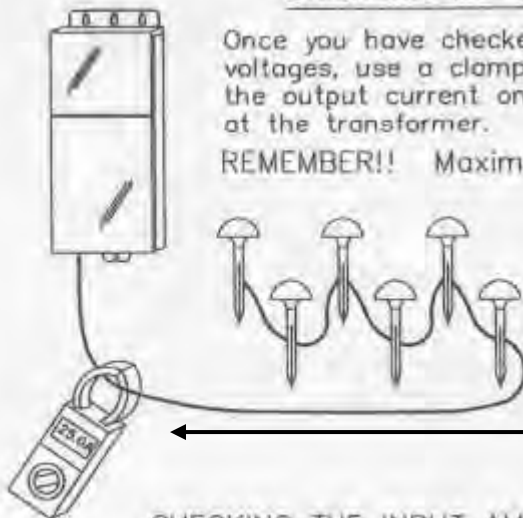
Check the voltage at each fixture using a True RMS Voltmeter, and make sure you have the proper voltage to the lamp:

The correct voltage should be between 11.0 Volts and 12.0 Volts.

CHECKING THE OUTPUT AMPS:

Once you have checked all the runs for correct voltages, use a clamp-on Amp Meter and check the output current on the low-voltage cable at the transformer.

REMEMBER!! Maximum 25Amp per circuit!!



Place CLAMP around the COMMON SIDE of the runs. Include all wires on each COMM for total AMP reading.

CHECKING THE INPUT AMPS:

Your Transformer is provided with a long loop in the optional photocell plug that you may utilize to measure the input current. Simply apply the clamp on the Amp Meter around the loop and measure the current. (See Chart 3)

REMEMBER!! Do not exceed the maximum input current!! If input current exceeds the max rating, either remove Fixtures or reduce lamp wattages in the Fixtures until input current is sufficiently reduced.

The Transformer is marked with a label showing the maximum input current.

PHOTOCELL JUMPER
 (300 or 500W Models)
 or
 LOOPED WIRE
 (900 to 1500W Models)

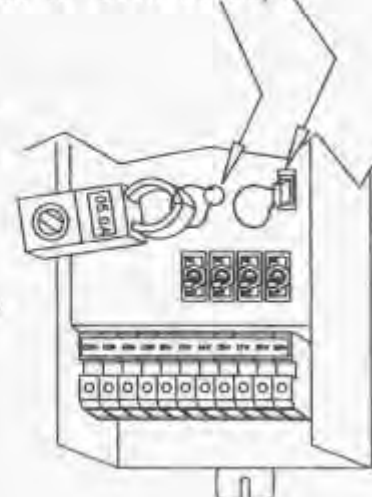


CHART 3 (INPUT CURRENT)

	300W	600W	900W	1200W	1500W
AMPS	2.5A	5.0A	7.5A	10.0A	12.5A

Low Voltage Power Module Installation Guide

!!NOTICE!!

Please read and understand thoroughly this installation guide to ensure safe and efficient operation of this Power Module. Save this installation for future reference.

Mounting Power Module

- 1) Remove the transformer from the shipping carton.
- 2) Mount the transformer to a solid surface, Utilized the keyhole slots in the mounting bracket. **(NOTE: THE TRANSFORMER MUST BE MOUNTED AT LEAST ONE FOOT ABOVE GROUND LEVEL WITH THE WIRE TERMINALS FACING DOWN.)**
- 3) Secure the transformer using the appropriate wall anchors for the wall surface used. (Wall mounting screws and anchors not supplied.)

Determine The Load

Our Multi-Tap transformers are equipped with secondary circuit breakers that are connected to the COM. Each circuit can be loaded up to a maximum of 300 watts.

- 1) Add up your fixture's wattage. Divide your load into 300W maximum per wire run. **(NOTE: DO NOT EXCEED 300W PER RUN!!)**
- 2) Refer to chart1 to select cable for each run.

Cable	Rated Amps(max)	Rated Watts(max)
12-2	16A	192W
10-2	24A	288W
8-2	32A	384W

Chart 1 CABLE RATING (Maximum Usage Per Circuit)

Important!

If you exceed these "usage" rating there is a high probability that you will overload the cable, transformer, house breaker or all of the above!

- 3) Measure the approx. distance from the transformer to the first fixture on each run. You can calculate the cable losses according following voltage drop formula.

$$\text{Cable Voltage Drop} = (\text{Cable Length} \times \text{Cable Watts} / \text{Cable Constant}) \times 2$$

Cable	12-2	10-2	8-2
Cable Constant	7500	11920	18960

Chart 2 CABLE CONSTANT

Important!

Formulas take into account cable loss, voltage loss and in-rush current.

- 4) You can according to the voltage loss select the tap that you can use. You may use one, two, three or all taps at once.

Connecting The Cables:

- 1) Open the door and remove the door.
- 2) Run lighting cables through knockouts in bottom plate.
- 3) Connect the low voltage cables to the COMs and low voltage taps labeled on the terminal blocks. Note: one wire of each cable must be connected to the common terminal.
- 4) Make sure that all connecting screws are secure and tight.
Remember!! Maximum 300W per circuit!!
- 5) Turn off all the circuit breakers in the transformer unit. Plug the 120V line cord into a grounded 120V outlet. Turn on one breaker at one time to ensure that there are not any short circuits.

Checking Lamp Voltages, Output Amps and Input Amps

It is highly recommended to use an amp probe on the primary side and a voltage meter on the secondary side to check your output.

- 1) Check the voltage at each fixture using a true RMS voltmeter, and make sure you have the proper voltage to the lamp. The lamp optimum voltage range is 11.2V to 11.6V.
- 2) Use a clamp-on amp meter to check the output current on the low-voltage cable at the transformer and sure not exceed 25A maximum per circuit and not exceed the cable rating.
- 3) Use a clamp-on amp meter around the looped wire (900W ,1200W and 1500W) or jumper wire (300W and 600W) to measure the input current and sure not exceed the maximum input current. The transformer is marked with a label showing the maximum input current. (see chart 3)
- 4) Close the door.

SIZE	300W	600W	900W	1200W	1500W
MAX AMPS	2.5A	5.0A	7.5A	10.0A	12.0A

Chart 3 MAXIMUM INPUT CURRENT

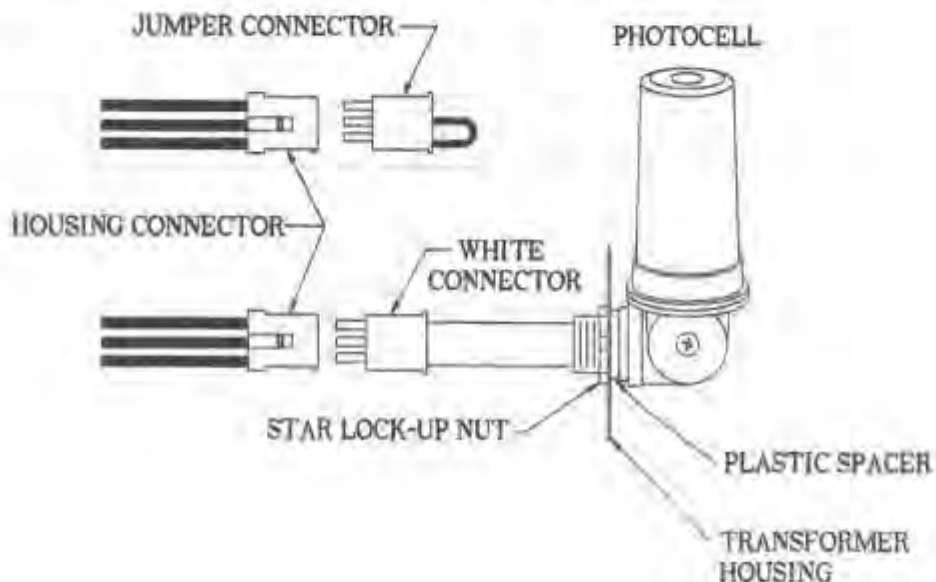
ADDED FEATURES INSTALLATION INSTRUCTIONS

INSTALLING THE 24 HOUR TIMER:

1. Open the front cover of the transformer housing.
2. Unplug the cord from the receptacle.
3. Plug the cord into the 24 Hour Timer.
4. Plug the 24 Hour Timer into the transformer receptacle.
5. Set the time on the 24 Hour Timer per the instructions provided with the Timer.

INSTALLING THE PHOTOCELL:

1. Make sure the power is off and the transformer is NOT plugged into an electrical outlet. **NOTE:** No splice or wiring is required if transformer is equipped with jumper connector.
2. Open front cover of the transformer case by lifting the cover up.
3. Remove the 7/8" diameter knockouts on the side of the enclosure and push the photocell white connector through the knockout hole. Inside the housing, slide the spacer and star nut over the white connector and thread it onto the photocell.
4. Locate on the inside panel the jumper connector and disconnect jumper from the panel housing connector.
5. Plug the photocell white connector into the panel housing connector. Ensure that the connectors plug together correctly.
6. Replace outer cover and plug transformer into the electrical outlet.
7. Turn on power. Position photocell so that no artificial light will cause the photocell to cycle on and off.
** In the unlikely event that the photocell should fail, the lighting fixtures will remain on, even in the daytime. If this should happen, follow these instructions and remove the defective photocell and replace the jumper connector in its place. Contact your local distributor to order a replacement photocell.*





Trouble Shooting Guide Appendix A-1

Lights are not on:

- ✓ Make sure the transformer is plugged into a 120V GFCI outlet
- ✓ Check the circuit breaker in the house panel or the GFCI. If off, turn it on then re-set system again. If one or more breakers trip again, there is most likely a short in the wire run to the light fixture.
- ✓ Check the secondary circuit breakers on the transformer panel. If off, turn them on one at a time. If one or more breakers trip again, there is most likely a short in the wire run to the light fixture.
- ✓ If using a photocell, bypass the photocell by plugging in the photocell jumper. If lights come on you have a bad photocell.
- ✓ If using a timer, bypass the timer by plugging the timer cord into the receptacle. If lights come on you have a bad timer.
- ✓ Gently touch the surface of the transformer, if it is hot and the lights are off, there must be a overload in the system.

Breaker in the house panel occasionally trips:

- ✓ Make sure the breaker is not under sized. Nominal breaker size is 20A.
- ✓ Make sure the breaker is not over loaded. Normally no more than 80%.
- ✓ Check the amperage at the transformer to make sure it does not exceed the breaker amperage rating.
- ✓ If all the above are normal and the problem still occurs, you may have a very sensitive breaker. You may change the breaker or request a surge protector.

Breaker in the transformer panel occasionally trips:

- ✓ Check the amperage on each run to make sure you do not exceed 25 Amp. If over 25 Amp you may have exceeded amps or a minor short in the run.
- ✓ Check the breaker rating to make sure it is a 25 Amp breaker.
- ✓ If all of the above are normal and the problem still occurs, you have a bad circuit breaker.



P. O. Box 98 ♦ 1094 North Main St.
Ashland City, TN 37015
Phone (615)792-6884 Fax # (615)792-6898

Trouble Shooting Guide Continued

Photocell turns on too soon or does not turn on at all:

- ✓ Make sure the photocell cap is removed.
- ✓ Check the location of photocell. Make sure it is properly located to receive day light.
- ✓ Make sure the photocell is plugged in the transformer panel.
- ✓ Of all of the above are normal, you may have a bad photocell.

Timer does not keep the time or does not work:

- ✓ Make sure the timer cord is plugged in.
- ✓ Make sure the timer trippers are set properly.
- ✓ Make sure the timer switch is turned on.
- ✓ If all the above are normal, you may have a bad timer.

Voltage Drop Chart For 12-2 Wire.

Watts	20	40	60	80	100	120	140	160	180	192
Amps	1.7	3.3	5	6.7	8.3	10	11.7	13.3	15	16
25	0.1	0.3	0.4	0.5	0.7	0.8	1	1.1	1.2	1.3
50	0.3	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.4	2.6
75	0.4	0.8	1.2	1.6	2	2.4	2.8	3.2	3.7	3.9
100	0.5	1.1	1.6	2.2	2.7	3.2	3.8	4.3	4.9	5.2
125	0.7	1.4	2	2.7	3.4	4.1	4.7	5.4	6.1	6.5
150	0.8	1.6	2.4	3.2	4.1	4.9	5.7	6.5	7.3	7.8
175	1	1.9	2.8	3.8	4.7	5.7	6.6	7.6	8.5	9.1
200	1.1	2.2	3.2	4.3	5.4	6.5	7.6	8.6	9.7	
225	1.2	2.4	3.7	4.9	6.1	7.3	8.5	9.7		
250	1.4	2.7	4.1	5.4	6.8	8.1	9.5			
275	1.5	3	4.5	5.9	7.4	8.9	10.4			
300	1.6	3.2	4.9	6.5	8.1					
325	1.8	3.5	5.3	7	8.8					
350	1.9	3.8	5.7	7.6	9.5					
375	2	4.1	6.1	8.1	10.1					
400	2.2	4.3	6.5	8.6						
425	2.3	4.6	6.9	9.2						
450	2.4	4.9	7.3	9.7						
475	2.6	5.1	7.7	10.3						
500	2.7	5.4	8.1	10.8						
525	2.8	5.7	8.5							
550	3	5.9	8.9							
575	3.1	6.2	9.3							
600	3.2	6.5	9.7							
625	3.4	6.8	10.1							
650	3.5	7								
675	3.7	7.3								
700	3.8	7.6								
725	3.9	7.8								
750	4.1	8.1								
775	4.2	8.4								
800	4.3	8.6								
825	4.5	8.9								
850	4.6	9.2								
875	4.7	9.5								
900	4.9	9.7								
925	5	10								
950	5.1	10.3								
975	5.3									
1000	5.4									

Distance to first fixture (or Hub) in feet

Appendix A-2