

# INSTALLATION AND OPERATORS GUIDE



## ***For Professional Series Landscape Lighting Transformers***

Covers GL, MTP and GLP Series Transformers from 100 to 1200 watts



**JUSTIN, INC.**

### **ELECTRONIC PRODUCTS DIVISION**

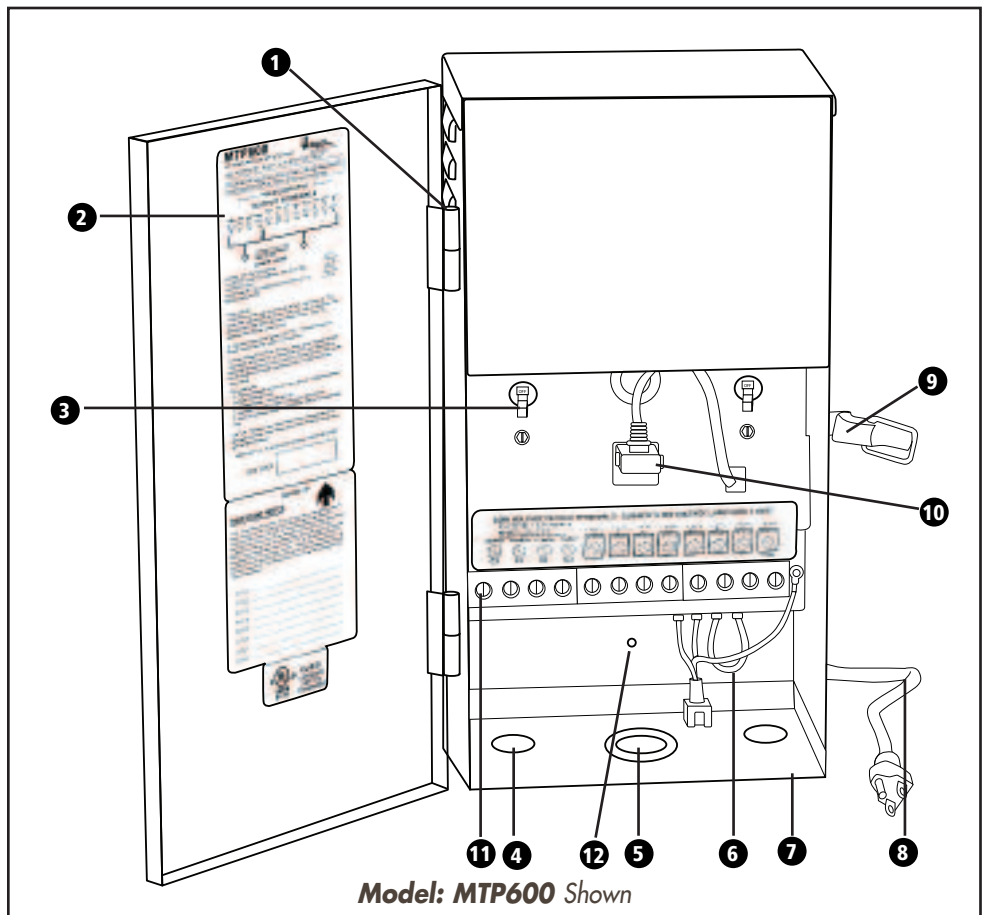
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If you have a concern or problem with any Justin product, first contact your local distributor. For continuing or unresolved problems, contact factory technical department at (800) 989-4517 between 8:00am and 4:00 pm PST, Monday through Friday

## MOUNTING INSTRUCTIONS

**Warning:** Transformers must be installed in accordance with the National Electrical Code (NEC) and local codes. Failure to do so will void the warranty and may result in serious injury and/or damage to the transformer.

1. Find a suitable, flat-surfaced location to mount transformer, taking into consideration proximity to 120 volt AC power source.
2. Attach provided template to wall at desired height. (Should be mounted at least 1.5' from the ground for safe and convenient operation.)
3. Center punch and drill (with an appropriate bit size for the screws to be used) at crosshair marks on the template.
4. Using appropriate screws for the selected mounting surface, insert screws into predrilled holes deep enough to slip transformer keyhole slots over. (Make sure screws are of a load bearing quality.)
5. Hang transformer case securely over screws.
6. Install security screw if desired. #10 minimum.



## TRANSFORMER SIZING

Low voltage lighting systems require the use of a transformer to reduce the standard 120 volt power from ordinary household electricity to the 12 volts needed to power low voltage lamps. Transformers vary in size or capacity. The total lamp wattage (load) of all fixtures connected to one transformer must not exceed the wattage capacity of the transformer. Therefore, to determine the transformer size needed, simply add up the wattage of all lamps you plan to use +10% for cable & connections that add hidden watts to your system.)

**Transformer size = total fixture watts x 1.1**

**Tip:** All low voltage connections must be tight and waterproof.

Select a transformer that matches as closely as possible to your total lamp wattage. For example: if you have 13 fixtures all rated at 20 watts, you will need a 300-watt transformer (13 x 20 = 260) watts plus 10% = 286). If your total wattage is too great, either divide the total load between two transformers or use a more powerful model. Selecting a transformer with about 20% higher capacity than your total lamp wattage will allow for adding a fixture or two later.

## LOW VOLTAGE CABLE LENGTH

In planning a low voltage system, it is necessary to consider the impact of voltage drop. Because of cable's inherent resistance, voltage drops along its length; the end-of-run lamps will be dimmer than those at the beginning. Since voltage drop is a function of cable length and cable size and total fixture wattage, voltage drop can be minimized in several different ways:

- Use multiple cable runs
- Use heavy gauge cable (8 or 10 gauge)
- Shorten cable lengths or runs
- Reduce wattage of individual fixtures
- Reduce the total number of fixtures on a run
- Use multiple transformers in different locations

Cable is measured by gauge. The lower the number, the thicker the cable and the more current it carries. Cable for low voltage lighting is available in three gauges: #12-2, #10-2, and #8-2. As noted, #8-2 gauge is the largest and is capable of carrying the most current. Refer to the Cable Length Guide to estimate the maximum allowable cable length that will keep the farthest fixture from the transformer from becoming dim (below 10.5 volts). In addition to, your transformer's output options, the design of your lighting system and corresponding cable layout can help minimize voltage drop (see 12-Volt Cable Layout Options, Output Adjustment Switch, and Multi-Tap Installation sections.)

## FEATURES AND CONTROLS

### 1 Take-apart stainless steel hinges

The door can be removed for greater access to wiring compartment during installation. To remove, open door and lift straight up and off of hinges. To replace, line up door hinges over pins of housing hinges and carefully push down.

### 2 Operating Instructions inside door.

Refer to these instructions for additional information on wiring to the transformer.

### 3 Magnetic overload circuit breakers

For reliable automatic secondary circuit protection. Circuit breakers may also be used as on/off rocker switches.

### 4 1/2" - 3/4" knockouts

For conduit and accessory mounting.

### 5 1-1/4" - 2" knockouts

For conduit and accessory mounting.

### 6 Accessory terminal strip

For easy installation of optional photocell, motion sensor, or other external switching devices.

### 7 Collapsible, swing-down bottom tray

Bottom tray can swing-down for greater access to wiring compartment during installation. The tray is held in place with a hinge screw and a retaining screw on each side of the transformer enclosure. Loosen the two retaining screws (nearer to the front of the enclosure on each side) and pull down on tray to open.

### 8 Power cord

6-foot, heavy-gauge, grounded, water-resistant power cord with integrally molded plug.

### 9 Lockable, stainless steel latch

Can be secured to prevent tampering.

### 10 120-volt accessory receptacle

For use with optional, removable multi-setting mechanical 24-hour timer or remote photocell module PCM12.

### 11 Terminal strip

For multiple low voltage cable connections. Cover flap opens to individually marked voltage taps.

### 12 Security screw hole

## Calculate Approximate Voltage Drop

**Tip:** Expect a voltage drop of greater than 1.5 volts when cable length is longer than recommended. Use the formula below to calculate maximum cable length.

$$V_d = \frac{L \times W \times 2}{K_c}$$

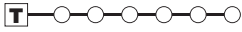
$V_d$  = Voltage drop in the section of cable, in volts  
 $L$  = Length of the section of cable (one way distance), in feet.  
 $W$  = Total Watts carried by the section of cable for the lamps it supplies  
 $K_c$  = 'Cable Constant', as follows:

Cable Size (AWG)	$K_c$
12	7500
10	11920
8	18960

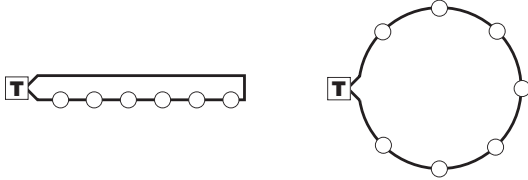
### 12 VOLT CABLE LAYOUT OPTIONS:

**Tip:** Connect all lamps in parallel. EXAMPLE: Connect one side of each lamp to 'COM' terminal, the other side to '12V' terminal.

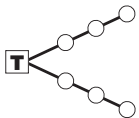
1. Straight run installation: Fixtures run in sequence directly from the transformer.



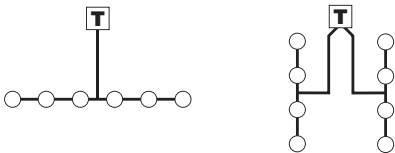
2. Loop Installation: Fixtures are arranged in a looped circuit, reducing the effects of voltage drop. See "Dual Circuit", next column.



3. Split load installation or multiple cable run: Fixtures run in two or more directions from the transformer. Locating the transformer in the center of the run reduces the effects of voltage drop.



4. "T" Installation (RECOMMENDED): Allows more equal distribution of power to the center of the run, or to a run some distance away. Cable running from the transformer must be of a heavier gauge (#8 or #10).



### OUTPUT ADJUSTMENT SWITCH

Justin GLP transformers come equipped with a 2-position output voltage switch. Set the switch using the following as a guide.

**HIGH** - The correct setting in most cases. Provides expected lamp life while maintaining good brilliance..

**LOW** - Increases lamp life when fixtures are located very near the transformer and/or when fixtures total less than 1/2 the transformer's rated wattage.

### MULTI-TAP INSTALLATION

**Tip:** Multi-Tap transformers supply output voltage which exceeds 12 volts. Extreme care must be taken during installation to avoid premature lamp burnout due to high voltage. Use of a voltmeter during installation is the only way to ensure a proper voltage at the fixture. As a guide when designing your job, expect a 2 volt drop for every 100 feet of 12-2 cable to which 200 Watts of evenly spaced fixtures are connected.

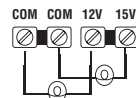
Refer to sample diagram. Connect one side of fixtures (common) up to 300 watts per circuit, using 12 gauge or larger direct burial cable. Strip 3/4" of cable insulation and twist wire strands tightly before insertion into transformer's output terminals. Each terminal will accept two #8, four #10, or 6 #12 wires. Tighten connector screws firmly. Connect remaining side of fixtures to output tap according to your voltage needs. Retighten all connections after one week of operation. It is always best to connect your fixtures to the 12-volt tap first, then use a voltmeter to measure the AC voltage of the fixture nearest to the transformer. Subtract the measured voltage from 12 and add the result to determine your higher tap. Example: With fixtures connected to 12-volt tap, measured voltage at first equals 10. 12 volts required at fixture minus 10 volts measured equals a 2-volt difference. Add the difference to 12 in order to determine the appropriate tap to be used. (2 + 12 = 14)

### CABLE CONNECTION DETAIL

**Tip:** For proper connection, strip off 3/4" of cable installation, twist wire strands tightly and use a high quality straight blade screwdriver with minimum 3/16" wide tip to tighten all screw terminals firmly.

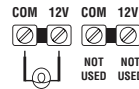
**TIP: 100-300 Watt units are single circuit, 600 Watt units are two circuits, 900 Watt units are three circuits and 1200 Watt units are four circuits.** See installation instructions in transformer cover for single and multiple circuit output terminal details. All transformers have one manual reset circuit protector per circuit.

#### SINGLE CIRCUIT - 100-200 WATT - GL



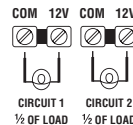
**Tip:** When using single circuit transformers, full rated load may be connected to one pair of 'COM 12V' or 'COM 15V' terminals.

#### SINGLE CIRCUIT - 300 WATT - GLP



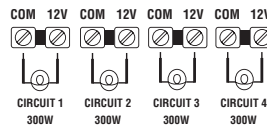
**Tip:** When using single circuit transformers, full rated load may be connected to one pair of 'COM 12V' terminals.

#### DUAL CIRCUIT - 600 WATT - GLP



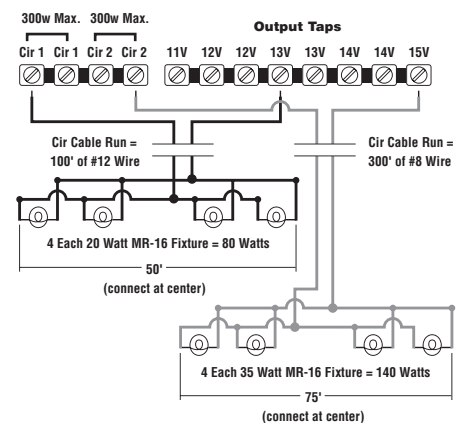
**Tip:** In a loop installation, low voltage polarity must be maintained by connecting the start and return of the first conductor to the 'COM' terminals, the other conductor to the '12V' terminals.

#### FOUR CIRCUIT - 1200 WATT - GLP



### SAMPLE MULTI-TAP CONNECTION 600 WATT MTP TRANSFORMER W/2 CIRCUITS

#### Common Terminals



## REMOTE PHOTOCELL CONTROL FUNCTION FOR PCM12 MODULES

### Photocell Mounting

1. Mount photocell eye where exposed to sunlight.
2. Run photocell cable with plug end back to transformer enclosure.
3. Locate square shaped hole in enclosure bottom and feed plug through to socket on PCM12 marked "PHOTOCELL INPUT". Plug photocell in.
4. To test, apply input power to transformer and turn photocell control knob to position 6. "DUSK TO DAWN".
5. Cover photocell eye completely. Transformer should turn on within 5 minutes.
6. Uncover photocell eye for normal operation.

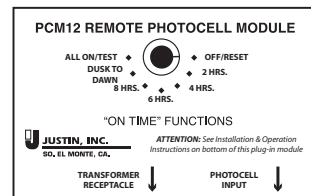
### Timer Setting:

Timer does not require time-of-day setting or battery backup maintenance. It depends on the photocell "darkness signal" to begin the 'on duration' cycle. It has six modes of operation.

- By moving the dial to one of the four 'on time' switches (2, 4, 6, 8 hours), you tell the unit to turn on at darkness, begin timing, and turn off when the selected time period ends.

- With dial turned to 'DUSK TO DAWN', the timer never activates, allowing the unit to operate from dusk until dawn.

- To test your system during daylight hours, use "ALL ON /TEST" to override the photocell and turn the system on. Whenever input power is applied to the transformer, the lights will remain on.



### MECHANICAL TIMER SETTING PROCEDURE

1. Turn the outer rim of the timer face (the section with numbers) Clockwise until the arrow on the inner rim points to the approximate time of day.

**Note:** The numbers on the timer face correspond to the hours in a day. Each hour is divided into four fifteen-minute sections.

2. To set time 'ON': Locate push pegs on the outer rim of the timer face and firmly push pegs outward from the timer face until you hear and audible 'click'

**Note:** Each peg keeps light or appliance 'ON' for fifteen-minute sections. Use as few or as many pegs as necessary throughout the day. All pegs must be pushed out between the desired hours of on time.

3. Time 'OFF' is automatically set by leaving the pegs flush against the timer face.

**Note:** You can set multiple on or off programs.

4. Locate override switch on top of timer Make sure it is set to 'AUTO'.

**TIP:** When equipped with timer, transformer may be operated manually by sliding override switch to 'ON'.

### TIMER REMOVAL & REPLACEMENT

When so equipped, the timer supplied with your new transformer is a removable (plug-in) style. Located inside the cover of the transformer enclosure. It can be pulled out and replaced with a new timer, remote photocell module, or remote control module. To replace a timer, simply grasp both sides of its plastic case and pull firmly. Next, remove the timer plug from the timer.

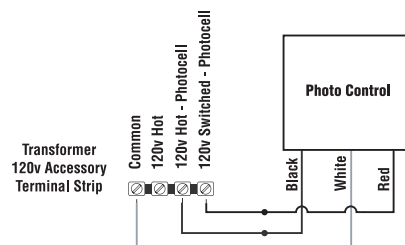
To install a new timer, insert timer plug into timer before plugging into transformer's timer receptacle.

### INSTALLATION OF FIELD INSTALLED PHOTOCELL

1. Turn input power off.
2. Select a location or mount the photo control so that artificial light doesn't cause the unit to turn off. Do not install the photo control so that it directly faces the midday sun. Take care to keep the photocell EYE free of obstructions.

3. The photo control can be mounted in any approved outdoor junction box or fixture.

4. Wire the photo control according to the illustration.



5. Switch power on. The controlled load should turn on regardless of whether you are installing the unit during the day or at night.

6. If it is daylight the control should switch off within a few minutes.

7. If a timer is also installed, it must be set to turn on during daylight hours, then off at desired time. (see below)

### TIMER SETTING PROCEDURE WITH FIELD INSTALLED PHOTOCELL

The combination timer and photocell is designed for photocell-on, timer-off operation.

1. Set ON TIME during daylight hours - 2 PM or so.
2. Set OFF TIME at desired off time.
3. Set timer dial to the current time of day.

**EXAMPLE:** For on at dusk, off at 12 PM, PUSH OUT all 40 pins between 2 and 12 PM.

**Tip:** It is normal for the transformer to temporarily turn on during daylight at the timer on setting. Approximately 5 minutes is required for the photocell to stabilize and turn the unit off.

**Tip:** When equipped with plug-in timer and photocell, normal operation requires uninterrupted 120 volt power.

### LOW VOLTAGE DIMMER

Justin transformers are ready for use with a low voltage system (inductive load) dimmer. When wired in the 120 volt line, the dimmer will allow you to adjust different levels of lamp brilliance. Your transformer will

not work with any dimmer not specifically designed for low voltage systems. A dimmer can be installed at the 120v Accessory Terminal. (Item LVD 1000K)

### TROUBLESHOOTING CHECKLIST

Although low voltage lighting systems operate with a minimum of maintenance, occasionally some problems will occur. Here are solutions to some of the most common problems.

#### Entire system will not operate

1. Check 120-volt outlet to ensure you have power to outlet.
2. Check or reset circuit breakers on transformer
3. Check low voltage cable connection at transformer
4. Check transformer alone by disconnecting low voltage cable from output terminals, by passing timer and/or photocell.

#### System operates for 15 minutes, and then turns off.

1. Timer incorrectly set. See setting procedure.

#### Circuit breaker on transformer trips

1. Check end of cable to ensure copper strands are not touching.
2. Check connection of cable at transformer to ensure

copper strands are not touching.

3. Recalculate total wattage to ensure that you have not exceeded rated wattage of transformer or circuits.

4. Check for other shorts at fixture connection points.

### PRODUCT WARRANTY

ALL JUSTIN, INC. TRANSFORMERS AND CONTROLS (EXCLUDING PLUG-IN TIMERS AND PHOTOCELLS) ARE GUARANTEED TO BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS WITH NORMAL USE FOR A PERIOD OF 10 YEARS FROM THE DATE OF MANUFACTURE STAMPED ON EACH UNIT. LIMITED LIFETIME WARRANTY ON STAINLESS STEEL UNITS. FOR WARRANTY SERVICE, THE PRODUCT MUST BE SHIPPED PREPAID TO THE FACTORY IN ITS ORIGINAL PACKING CARTON. JUSTIN, INC. RESERVES THE RIGHT TO MAKE THE FINAL DETERMINATION REGARDING WARRANTY VALIDATION. ANY TRANSFORMER JUDGED IN WARRANTY WILL BE REPAIRED OR REPLACED AND RETURNED TO ITS OWNER AT NO ADDITIONAL COST. ANY UNIT JUDGED OUT OF WARRANTY WILL, AT THE OWNER'S OPTION, BE EXCHANGED WITH A NEW UNIT AND CHARGED AT OUR CURRENT PRICING, RETURNED FREIGHT COLLECT.