

Using a Volt/Amp Meter to Troubleshoot A Low-Voltage Outdoor Lighting System

A volt/amp meter will assist in answering your troubleshooting questions.

1. Why does my transformer put out 11 volts instead of 12 volts?

Outdoor lighting transformers step-down power at a ratio of 10 to 1. If you put 120 volts into a transformer, you will get 12 volts out. However, not all outlets provide exactly 120 volts. Thus, if you have only 110 volts going into the transformer, you will only get 11 volts out. You can test the input voltage by putting the volt probes into the outlet that your transformer plugs into.



Photo 1
Testing Voltage

2. I need to add some lights to my system. Will my transformer be able to handle the extra load?

You can find out by testing the wattage on your transformer. Using your volt/amp meter, find the voltage coming out of the transformer. (See Photo 1) Next, use the amp meter to check the amperage of the circuit. (See Photo 2) Watts = Volts x Amps. For example, 12 volts x 9 amps = 108 watts. If you have more than one circuit on your transformer, repeat the process for each one, adding the results to get the total wattage on your transformer. You should not exceed 80% of the rated capacity of your transformer. Example: 150 watt transformer has 120 usable watts.



Photo 2
Testing Amperage

3. Why does my transformer keep blowing the fuse / tripping the circuit breaker?

If your transformer is overloaded, it may do either or both of these. To find out if your transformer is overloaded, remove all the light circuits from the transformer, then replace the fuse or reset the breaker. Test one circuit at a time by alternately hooking them up and following the instructions for testing wattage from #2. If the transformer is overloaded, you may need to replace it with one of higher capacity, or add another transformer to pick up the extra load.

4. Why do my lights seem dimmer at the end of the run?

If you are using a series run (Diagram 1c) that is 50 feet or more in length, you can fix the problem by extending the main wire to the center of the run (Diagram 1a), which cuts your longest run in half. This reduces voltage drop, and makes the voltage more even through the system.

Diagram 1-Voltmeter test points

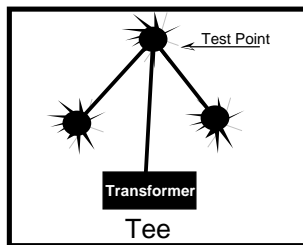


Diagram 1a

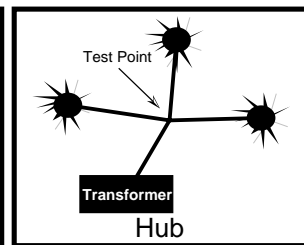


Diagram 1b

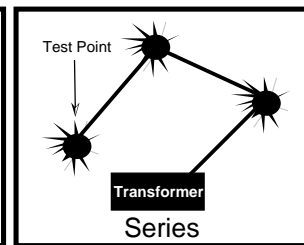


Diagram 1c

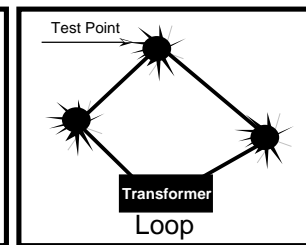


Diagram 1d

5. How much voltage drop is on my circuit? How do I fix a voltage drop problem?

First, test the voltage on the circuit at the transformer. Next, test the voltage at the hub (Diagram 1b), or at the T (Diagram 1a), or at the farthest fixture on a series or loop run (Diagram 1c and 1d). Subtract the transformer voltage from the system voltage. This is the amount of voltage you have lost through your wiring, or your voltage drop. The optimal voltage for lighting is between 12 volts and 10.8 volts. You can fix a voltage drop problem a few different ways:

1. Select a higher transformer voltage setting. Some transformers have a voltage selector switch or multiple voltage taps. Increase these accordingly.

2. Increase the wire size. Larger wire has a lower resistance, and less voltage drop will occur.

See table 1. **CAUTION: DO NOT OVER-AMP WIRE; IT CAN CAUSE FIRE DANGER!**

3. If you are using a series run, you can reduce voltage drop by changing it to a loop or T run.

Wire Gauge	Max Amps	Max Watts	Resistance Per Foot
12	16	192	.00162
10	24	288	.00108
8	32	384	.00064

Table 1



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