

## FEATURED PRODUCT

### CLEAR-VU™ STA-DRY® Terminal

- CLEAR-VU™ tubing and sealed window provide optimal clarity for visual inspection!
- STA-DRY® adhesive-lined tubing ensures a waterproof seal



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## Electrical Terminology Explanation Part 2

### Resistance

Resistance in terms of electricity is anything that limits the flow of current. An analogy to this would be placing a faucet where the hole is located in the previous Tech Tip. Imagine the faucet is opened completely and not restricting the flow of water, this has ZERO resistance. As soon as you start to close the faucet, you are limiting the flow of water, adding resistance. Similar to the flow of electricity in the trailer harness; with every plug/socket union or if corrosion is built up on the wire, it causes resistance.



For every plug and socket connection a small voltage drop will occur. This is due to the contacts not mating 100%, thus causing some resistance. The construction of pins and receptacles don't always make full contact; even the most efficient design will have some voltage drop. Corrosion has a similar more devastating effect, where the copper surface of pins and wire are being diminished, such that fewer electrons can flow on the surface causing the voltage to drop.

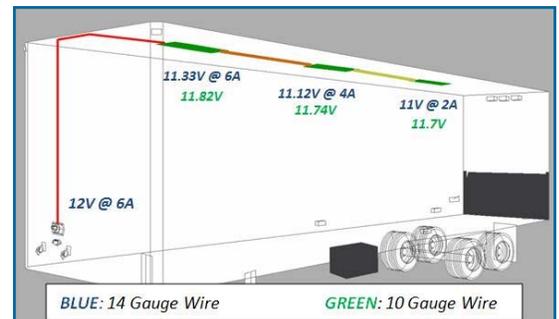
Most people don't realize that copper wire has its own resistance. It is proportional to the length of the wire and its cross-section/thickness (gauge). In other words, if you have a very thin gauge of wire i.e. 14Ga in your cable, the current will experience more resistance when trying to reach its destination. There will be more resistance using a smaller gauge, as opposed to using a bigger gauge wire, i.e. 10Ga. Also causing resistance are the amount of interior dome lights and their distance to/from each other.



- Most people don't realize that resistance exists at the plug and socket connection
- The smaller the gauge the more resistance there is
- Corrosion is the main and most aggressive resistance causer, so keep your lines corrosion free

Let's put some math behind this concept and see how this affects a trailer lighting system.

A typical trailer setup will have a minimum of 3 LED dome lights and most will draw about 2 Amps each (please refer to your lighting supplier for more detailed information). For the purpose of this Tech Tip we will use 3 lights that draw 2 Amps each, which totals a whopping 6 Amps of current. Using a 14Ga wire, 6 Amps of current from a 12V truck battery system will yield a .47V drop. This means that the first light on the trailer located roughly 15' from the socket will only see **11.33V of the possible 12V!** The second light located 10' from the first will draw 4 Amps of current from the first light, creating a .21V drop giving it only **11.12V**. Last we have the third light which has 2 Amps of current on the wire; it will have a .1 drop. The third light will only be provided **11V** when it is ON. That's **1V** of current lost through the wire from resistance. In the illustration, you can see that the power/current drains as it gets to the third light. Values in **GREEN** are indicative of using a 10Ga. wire in the cable. Notice there is less voltage drop when using a bigger gauge wire.



The above example is as close to perfect as you get, with only the copper of the wire and distance doing the voltage drop. But consider the other factors that add resistance to the trailer wiring. Again, most people don't realize that resistance exists at the plug and socket connection. Even worse, the main and most aggressive resistance causer... corrosion!!