How to Avoid Voltage Drop Problems with FloppyFlex and FloppyTape

What is Voltage Drop

You may have noticed in our FloppyTape and FloppyFlex specifications that we specify maximum lengths for both product and lead-in cables. This is because of the natural phenomena of voltage drop. As electricity travels, it encounters resistance from the wires, LEDs and various components on the PCB track. By the end of the run length, the voltage has decreased significantly from the original level.

LEDs are designed to work with an optimal voltage. Any excessive voltage drop will result in dimmer LED output, or even erratic flickering behavior. In the case of Digital products, there is additional concern of voltage drop affecting the control signal. These problems are especially prevalent when the maximum distance length specifications are exceeded, and wire and components are introduced into the connection. While voltage drop is unavoidable, there is an acceptable amount of drop that will be imperceptible to the human eye. Maximum run length and maximum lead-in cable lengths factor this in, giving you the best distance guidelines for designing a project.

Limit run lengths

One of the easiest ways to mitigate the effects of voltage drop is minimizing the lead-in cable length wherever possible. For color changing products like RGB FloppyTape and FloppyFlex, that means locating the FloppyDrive controller as close as possible to the beginning of the run. Or conversely, limit the run length of FloppyFlex or FloppyTape.

Use thicker cables

Depending on the installation design, locating the controller near the installation site may not be ideal. In these situations, it may be possible to increase the physical wire thickness of the lead-in cable. Larger diameter wires have less resistance and are more efficient at delivering power without as much voltage drop. There are some limitations to this, FloppyTape can only accept a certain wire diameter because there is only so much space on the PCB to solder the lead-ins. For FloppyFlex, thicker wire leads can be spliced onto the power feeds by experienced TMB personnel.

Variable voltage power supplies

Another option for solid-color FloppyFlex or FloppyTape products is remote installation of a variable voltage power supply (PSU). This is useful when you need to hide the PSU in a location far away from the beginning of the tape run. Have your qualified installer splice the necessary lead-in cable length to the DC output side of the PSU. They can then attach a meter to the bare end to measure the voltage. Ideally this would be done before soldering FloppyTape or terminating FloppyFlex with a power feed. If that is not the case, just meter as close to the beginning of the run as possible.

This voltage reading should ideally be whatever the product is rated for – in the case of FloppyFlex or FloppyTape, you should have a voltage readout of 24 VDC. Most likely you will have less than 24 Volts due to voltage drop along the lead-in cable. Simply adjust the PSU (usually via a set screw) to increase the initial sending Voltage until your meter reads an accurate 24 Volts.

Double-end feeds

Voltage drop issues are not particularly evident at the beginning of LED strips because at that point the voltage is still reasonably optimal for LEDs to illuminate. However, by the time the current travels to the end of the strip, you start to see dimming problems. This is because voltage drop continues to increase the further you send the current so that the most loss is at the end of the run.

One way to cheat this is to send two leads from PSU or FloppyDrive to attach both at the beginning and end of the run. When powering from both sides, the lowest voltage will be in the center of the run, effectively halving the voltage drop and lessening the perceptible effects. Be cautious using this method with digital products as their communication signal is usually only sent in one direction only. With open PCB products like FloppyTape, it is also possible to solder the lead-in to the center of the strip and distribute the voltage drop to both the beginning and end of the strip – again effectively halving the voltage drop and its perceptible effects.

sales@tmb.com
www.tmb.com

Los Angeles +1 818.899.8818
London +44 (0)20.8574.9700
New York +1 201.896.8600
Beijing +86 10.8492.1587
Toronto +1 519.538.0888