PIXIE Dimmer not working correctly or failing to operate reliably?

Dimmers · https://pixiepartners.com.au/support-docs/pixie-dimmer-not-working-correctly-or-failing-to-operate-reliably/

This article is specifically related to issue with dimming leading edge versus trailing edge drivers.

The PIXIE SDD300BTAM smart dimmer is a trailing edge ONLY dimmer and can only be used to dim products nominated as trailing edge dimmable.

If a product is identified as a TRIAC dimmable device (leading edge driver), it is not compatible with PIXIE and you must source a trailing edge dimmable driver or device.

Will not work reliably

If the driver you are trying to use with a PIXIE G3 Dimmer is a TRIAC driver it is unlikely to work reliably and you should change your drivers.

TRIAC Dimmable Drivers

A TRIAC dimmable driver typically means it is designed for use with leading-edge dimmers, since TRIAC-based dimmers operate by cutting the leading edge of the AC waveform.

Can a trailing-edge dimmer control a TRIAC-based (leading-edge) driver?

Generally, no, or at least not reliably. Here’s why:

Different Dimming Mechanisms

Leading-edge dimmers (TRIAC-based): Work by turning off the waveform partway through each cycle and are typically designed for resistive or inductive loads, like magnetic transformers or certain LED drivers.

Trailing-edge dimmers (MOSFET-based): Cut the trailing edge of the AC waveform and work better with capacitive loads like electronic LED drivers.

Driver Compatibility Issues

Many TRIAC-compatible drivers are specifically designed to handle the sharp current spikes caused by leading-edge dimming but may not be optimized for the smooth switching of MOSFET-based trailing-edge dimmers.

If the driver is not designed for both leading and trailing-edge dimming (some modern ones are), using a trailing-edge dimmer could cause flickering, reduced dimming range, or failure to dim properly - and the dimmer can be damaged too.

Conclusion

A TRIAC dimmable driver is typically a leading-edge type. A trailing-edge dimmer (MOSFET-based) may not reliably dim a TRIAC-based driver unless the driver explicitly supports both leading and trailing-edge dimming. Always check the driver's datasheet for compatibility!

In most cases, using a trailing-edge dimmer (MOSFET-based) to control a TRIAC-dimmable driver won’t cause immediate damage to the dimmer, but it can lead to unstable operation and potential long-term reliability issues.

Can It Actually Damage the Dimmer?

If the trailing-edge dimmer is designed with protection circuits from leading edge dimming, it will likely just not work properly rather than fail. However as the PIXIE dimmer is designed exclusively as a trailing edge dimmer, these specific design elements are not considered.

However, if the dimmers have not been designed this way, the MOSFETs may be overstressed over time, leading to failure.

Worst case? If the driver causes excessive voltage spikes, it could potentially damage the dimmer’s output stage).

Recommendation

Always check compatibility before connecting a trailing-edge dimmer to a TRIAC-based driver.

If you notice flickering, buzzing, or erratic behavior, disconnect it to prevent long-term damage.