

Overview

There are two issues to be aware of when dimming track lighting: loading and common neutrals.

LOADING

Track lighting is often used in spaces where flexible lighting is necessary (i.e. art galleries and living rooms). In many of these cases, a GRAFIK Eye system is desired in order to create different scenes. However, the amount of track allowed per circuit is often unclear. Recently, there has been some confusion in interpreting what the National Electric Code (NEC) suggests for loading track lighting in both the 1993 and 1996 versions.

1993 NEC

As stated in the 1993 NEC *Section 410-102 Track Load*:

“For branch-circuit calculations, a maximum of 2 feet (609.6 mm) of lighting track or fraction thereof shall be considered 180 VA. Where multicircuit track is installed, the load requirement of this section shall be considered to be divided equally between circuits.

Exception: Where installed in dwelling unit(s) or the guest rooms of hotels or motels.”

1996 NEC

As stated in the 1996 NEC *Section 410-102 Track Load*:

“For load calculations, a maximum of 2 ft. (609.6 mm) of lighting track or fraction thereof shall be considered 150 VA. Where multicircuit track is installed, the load requirement of this section shall be considered to be divided equally between the circuits.

Exception: Where installed in a dwelling unit(s) or the guest rooms of hotels or motels.

(FPN): The 150 VA rating per 2 ft. (610 mm) of track is for load calculations only and does not limit the length of track that can be run or the number of fixtures allowed.”

1993 NEC vs. 1996 NEC

The change to from 1993 to 1996 is that the unit load for every 2 feet of track was reduced from 180 VA to 150 VA. This unit load is to be used to size the Feeder and Services as described in Section 220-10 (Section 215-2(a) in the 1999 NEC). It is not used for calculating connected loads, determining the maximum loading on the branch circuit, or determining the number of branch circuits. Additionally in the 1996 NEC, a clarification is given stating that track length is unlimited.

Determining Track Loads

Section 410-101(b) Connected Load states that “The connected load on lighting track shall not exceed the rating of the track. Lighting track shall be supplied by a branch circuit having a rating not more than that of the track.” Additionally, in *Section 210-22(c) Other Loads*, it is stated that “The rating of the branch-circuit overcurrent device serving continuous loads...shall be not less than the noncontinuous load plus 125% of the continuous load.” Therefore, the total lighting load on a 20A track can be no more than 16 amps.

Example

If an application requires 1500W (i.e. fifteen 100W fixtures) of lighting at 120V on 32 ft. of track, only one 20A circuit (with a maximum loading of 16A) would be required since this load draws only 12.5A.

Considering the 1500W load (at 12.5A), all of the track lighting could be placed on one zone of a GRAFIK Eye Control Unit provided a power booster is used to increase the zone’s maximum capacity from 800W to at least 1500W. For more information on increasing Zone Capacity, refer to the GRAFIK Eye 3000/4000 Series Specification Guide.

COMMON NEUTRALS

Common neutral interaction is interaction or “cross-talk” between at least two dimmers that share the same neutral wire. When solid-state dimmers are operating, voltage spikes may occur and are transmitted onto the neutral wire. Normally this is of little concern, except when the neutral wire is common to two or more phases of a 120V/208V, three-phase, four wire system. Under this condition, the voltage spikes may feed back to the dimmers via the common neutral wire, causing interaction between the dimmers.

When these voltage spikes occur, the current also increases. The current on the neutral wire can increase to be greater than the maximum current on any of the three-phase switch legs. If the increased current were to become continuous, the neutral wire and connections would experience additional heat and possible early failure.

Since all neutral conductors are eventually tied back to a neutral bus, there is a common neutral in every system. However, the impedance at the neutral bus is so low that any interference is transmitted through the bus and not back out individual neutral conductors.

Worst Case Scenario

The worst case scenario, given a common neutral, is when all three phases are experiencing the same firing angle. In this case, the neutral would be carrying 20.93A which does not exceed the rating for a #12 AWG conductor (25 amps at 75°C). However, according to the NEC, a 20A circuit must be derated by 20%, thus giving a rating of 16A maximum. Therefore, the worst case scenario of 20.93A on the neutral does exceed the conductor rating.

Multi-Circuit Track

When using multi-circuit track, each circuit should have its own separate neutral in order to prevent any "cross-talk" between the two circuits. If two-circuit track is used in conjunction with a GRAFIK Eye Control Unit, with both circuits on the same phase, there will be no "cross-talk." However, the neutral is still limited to carry a maximum of 16A.

Additional Information

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