

ETC Application Note

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Application Note #

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ETC Application Notes are designed to provide specific helpful information regarding ETC's technology or about solving a problem using ETC equipment.

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Distributed Dimming Power Feed Considerations

Understanding System Diversity:

With ETC dimming products we are all quite comfortable with the rack style of dimming systems, where very large ampacity feeds allow us a great degree of flexibility when it comes to power allocation, depending on load amounts and circuit distribution. More specifically, we can feed racks with considerably less power than their full "nameplate rating" and be reasonably certain the main feed breaker will not be overloaded and trip, thus causing an unintended blackout. This is due to dimming system "diversity". In other words, typical 2.4 kW dimmer racks do not have a full load on each dimmer, and in a performance lighting application, all dimmers are rarely on simultaneously. In fact, many dimmers will have no load connected at all. All these conditions contribute to diversity.

Distributed Dimming:

When working with distributed dimming solutions, however, the situation is somewhat different, for the following reasons:

- Distributed dimmers have smaller capacity, usually 720W or 1200W each.
- Distributed dimmers are more likely to be loaded closer to their ratings, even when only a single fixture is connected to each dimmer.
- Since distributed dimmers are deployed at the loads on an "as-needed" basis, it is highly likely that every distributed dimmer will have a load connected, unlike a typical dimmer-per-circuit system where some portion of the dimmers will have no load.

This means that two of the three conditions that we take for granted to create diversity in a dimmer-per-circuit, rack-based system will likely not apply to distributed dimmers. The only factor that creates diversity in a distributed dimmer system is the likelihood that not all loads will be turned on at once.

Factors that affect a Distributed System:

Now that we know that there is inherently less diversity in a distributed system, other factors become important:

- Distributed dimming units are typically fed by small circuits of 20A single-phase or 20A three-phase, not the large three-phase 400A (or larger) feeds that are typical for a dimmer rack system.
- These 20A feeds are typically from standard building breaker panels. This means that unlike the 100%-rated ETC Sensor 20A branch breakers we are all used to, the standard building breakers are thermal/magnetic units and are rated for only 80% of their ampacity for continuous loads. This is not a characteristic of the distributed dimmer itself, but rather the building circuit breaker feeding the dimmer. Continuous loads are defined as those that are on for 3 hours or more. Therefore, a *non-continuous* load is one that continues for less than 3 hours.

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That means that a 20A breaker feeding a distributed dimmer is only rated for 1920W for loads of three hours or more, and not the expected 2400W. If the unit is a 4 x 6A dimmer bar, for instance, it will not be possible to use it for four 575W loads if they are all going to be on at full for three hours or more.

In practical terms, this situation has little impact on a typical performance lighting application, since theatrical loads would almost never be left on full for three hours or more. In this case, the 80% continuous rating of the feed breaker would never be exceeded.

However, in an architectural or television application, users need to be aware of the 80% rating of the feed breaker (1920W for a 20A breaker) where loads will be left on for three hours or more. In such a case, the per-dimmer load should be reduced on one or more dimmers to get the total for the 20A feed below 1920W.

Considerations for Distributed Systems

There are a number of solutions that distributed dimming provides that we can easily enjoy. Retrofitting an existing facility that has previously been limited by a few switched outlets in the ceiling of the cafetorium can now use SmartBars or SmartModules to provide a fairly comprehensive small sized dimming system. Use the bars in the Front of House positions and SmartPack Wall Mounts for the overstage circuits and you have a solution that utilizes existing power wiring and can be easily tied in to the breaker panel backstage.

To work in distributed architectural environments where circuits will be on for 3 hours or more, make sure to size lamps to not exceed 1920W with 4x6A dimmers, or choose the next size up in SmartBars or SmartModules (6x10A).

Distributed dimming is one additional tool in your dimming arsenal and when used smartly can be a great solution to specific environments. If you have further questions, feel free to contact ETC for solutions.
