Frequently Asked Questions

Electronic Ballasts and GFC Protection

Is it possible for electronic ballasts to trip circuits with ground fault circuit protection?

Some problems have been encountered where electronic ballasts are used on circuits having ground fault protection. This usually occurs in (but is not limited to) indoor pool areas and hospitals. For ICU hospital rooms and some laboratory areas, magnetic ballasts or perhaps incandescent lamps should only be used. The usual scenario is one in which the circuit is energized and the circuit breaker almost immediately trips, shutting off the power to the circuit. Sometimes, the culprit is mistakenly claimed to be inrush current. While inrush current can also cause breakers to trip, it is usually not the case when there is a ground fault protection device in the circuit.

First, a brief review of ground faults. A ground fault is a condition whereby current flows in the ground wire (green wire) of an appliance or fixture. It is usually measured or sensed by determining the difference in current between the "hot" lead (black wire) and the neutral (white wire). Since current can't just disappear, any difference is taken up by the green ground lead. Why is this a problem? If there is current flowing in the ground lead (which is usually attached to the housing or exposed metal of an appliance), that means there is probably an internal short from the hot lead to the housing. If someone touches the housing, they can get an electrical shock. This potential situation is especially dangerous in areas where one is likely to be in contact with water, since water can conduct electricity.

To protect people against this, one can install a ground fault circuit interrupter (GFCI). This can take the form of a circuit breaker or an electrical outlet with built-in GFCI capability. These devices protect the individual by sensing a certain level of leakage current through ground and interrupting the circuit. The "trip current" is typically around 4-6 milliamperes (mA).

Next, let's review some facts about GFC requirements. The National Electric Code (NEC) stipulates that circuits serving indoor pools and surrounding areas require ground fault protection. In hospitals, it is often a requirement that ICUs also be protected. For this application, lower trip current levels (3-4 mA) are often specified.

Now for the crux of the issue. All fluorescent electronic ballasts have a certain amount of leakage current through the ground wire. This is not a flaw; it is inherent in the design in order to meet FCC requirements for RFI. Typical leakage current is 1-2 mA. Therefore, it only takes 3-4 ballasts to trip a GFCI.

Since this situation has not been very common, not much has been written about it to date. This issue does require further investigation. If a situation like this occurs, and it appears to be due to the above, the only solution is to reballast with magnetic ballasts. In general, however, it is always recommended that you confer with the ballast manufacturer before drawing definitive conclusions.

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