



### Understanding Amps Interrupting Capacity and Short Circuit Current Rating

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When discussing fault current ratings of electrical devices and equipment, the terms AIC (Amps Interrupting Capacity) and SCCR (Short Circuit Current Rating) are often incorrectly used interchangeably. The two terms have different meaning and application, but the lighting industry has often used AIC as the only term for fault current specification, which has caused confusion among some electrical engineers designing power systems that include dimmers.

**AIC** applies to protective interrupting devices such as circuit breakers and fuses. The unit of measure for AIC is Amps RMS Symmetrical. This figure, which is typically in range of 5000 to 200,000 amps, describes the maximum fault current that the protective device can clear safely, without welding closed or causing damage to equipment or personnel.

**SCCR** applies to complete pieces of equipment or components such as dimmer racks or subassemblies such as dimmer modules. The unit of measure is also Amps RMS Symmetrical, and describes the maximum fault current that the equipment can withstand safely—or the maximum available fault current of the feeder to which the equipment can be safely connected.

#### How do engineers use SCCR and AIC ratings?

In designing the electrical system, the engineer must insure that available fault current, AIC ratings of protective devices, and SCCR of switchgear and utilization equipment are *coordinated* from the utility transformer to the last outlet in the system. At every point in the system, the available fault current can be calculated, and the engineer must insure that it does not exceed the AIC of protective devices or SCCR of equipment installed at that point. The engineer has tools available for limiting available fault current, the most common being wire length. The impedance of a wire run means that the longer the run, the lower the available fault current at the end of the wire. Other devices such as electronic current limiting circuit breakers and current limiting fuses have a characteristic known as *let-through current*. These devices can be used to limit fault current when equipment with a low SCCR must be connected to a source of high available fault current, and no long run of wire is possible.

#### Dimmer Rack Short Circuit Current Ratings (SCCR)

UL lists dimmer racks to the UL508 and UL891 standards. Part of the UL evaluation involves determining the Short Circuit Current Rating or SCCR of the equipment. This typically requires connecting the equipment to a source with a known available fault current, and then introducing a short circuit at an applicable point in the equipment. For a dimmer rack, this means a bolted short circuit between phases. At the end of the test, the equipment does not have to function, but any damage must be contained within the physical enclosure, and parts may not have moved or deformed outside limits set by the standard.

It is interesting to note that fault current translates into incredibly strong *electromotive force* in the event of a short circuit. This is the reason that one will often hear statements like “That bus bar is *braced* for 100,000 amps”. Not only does the bus bar have to avoid melting in the presence of a short circuit, it also has to be restrained so that it does not rip off its mounts when the fault occurs.

#### Dimmer Module Short Circuit Current Ratings (SCCR)

When UL evaluates an ETC Sensor dimmer module, the *entire* module is tested to determine its Short Circuit Current Rating when plugged into a Sensor dimmer rack. The ability of the dimmer module to safely interrupt fault currents is determined by a *combination* of components including the branch circuit breaker and the choke. Even when very large fault currents are available on the input to the module, the choke limits that fault current to less than the AIC rating of the circuit breaker. In the case of Sensor dimmers, the AIC rating of the circuit breaker is typically 10,000 amps, but the dimmer module rating in



the UL listing is typically 100,000 amps. UL tests this by connecting the module to a 100,000 amp source and energizing it into a dead short circuit on the module output. The breaker must clear the fault safely without parts exiting the dimmer rack, and without energized parts coming into contact with the metal parts of the enclosure. Interestingly, UL is not interested in whether the unit functions or not after clearing the fault—as long as it's safe. It's important to remember that a Sensor dimmer module does not have a stand-alone Short Circuit Current Rating—the rating is only applicable when the module is plugged into a Sensor dimmer rack.

### **ETC rack marking will change**

ETC is changing the way we mark dimmer racks, aux bays, and dimmer modules. Up until now, the rack or aux bay has been marked with an AIC rating. Moving forward, this will be changed to a Short Circuit Current Rating or SCCR. The numerical values of these ratings, some of the highest in the industry, will not change. Only the nomenclature moves from AIC to the more widely accepted SCCR.

To summarize, ETC is making this label change to more accurately describe the proper rating of racks, aux bays, and dimmer modules using SCCR rather than AIC. This will allow engineers to more easily design power distribution systems that include ETC dimmers. This clarification should allow fewer questions during the design phase and may even save money in the installation of switchgear. Please feel free to contact ETC with any additional questions.