

Applying Safety Switches in Photovoltaic Installations

Introduction

Schneider Electric has been a leader in providing electrical equipment for photovoltaic systems for over two decades. Our knowledge of how to apply products and ensure that a photovoltaic system is operating safely and reliably is unmatched in the industry. As the photovoltaic industry has grown, so have the questions and misinformation surrounding photovoltaic installations.

The intention of this document is to break down some of the myths and misunderstandings concerning photovoltaic applications and ratings for enclosed safety switches.

Myth:

The Square D® brand switch, since it is not UL® Listed for single-pole dc switching, cannot be used to switch single poles in photovoltaic applications.

Fact:

In the absence of a UL product standard to evaluate photovoltaic disconnect equipment, Schneider Electric has partnered with industry experts to fully understand the photovoltaic market demands for this application. This partnership then developed stringent photovoltaic system testing requirements for dc switches. Schneider Electric's self-certification for single-pole circuit switching is the end result of this industry partnership. The results of those findings and product evaluation have been documented on page 2 of Data Bulletin 3110DB0401R0909. This Square D data bulletin for applying our enclosed safety switch provides a sound and reliable means to disconnect a dc photovoltaic source backed by nearly a decade of proven photovoltaic field service.

Manufacturers have used the practice of self certification to evaluate their product for special purpose applications and to provide guidance for applications that are not UL Listed for decades. Examples of this practice include the derating of circuit breakers for application in elevated ambient conditions, addressing performance at high altitudes or even different frequency. There is no UL Listing on these derating curves to ensure appropriate application of the product in these special applications. Does that mean the circuit breaker should not be used in that application because it is not UL Listed for that application? Clearly, the answer is no.

The absence of a Square D UL Listing for single-pole circuit switching has created a myth that says one cannot use single-pole switching in photovoltaic systems. The myth asks one to disregard almost a decade of proven photovoltaic experience with single-pole switching and asks that one disregard one of the many industry standard practices for products that are not UL Listed.

So is this myth true? The answer is a resounding NO.

Myth:

Rating a disconnect switch to UL 1741 provides the same safety and reliability one has come to expect from a UL 98 switch.

Fact:

Evaluation of a safety switch to UL 1741 has limited value from a safety and performance perspective. The UL 1741 standard is focused on the safety evaluation of inverters and controllers used in photovoltaic systems. It does not focus on dc switching outside of the inverters and controllers. For this type of dc switching, the UL 98 product safety standard provides the most appropriate evaluation for a safety switch.

The UL 1741 standard basically permits the switch manufacturer to mark existing product "Suitable for Use in an NEC 690 application" with limited modification (i.e. a new label).

For example, in most cases, switches are marked for specific photovoltaic installations and are specifically configured for that application. This situation requires the contractor to carry multiple types of switches on his truck (i.e. switches for the ac and dc side of the system for inverter 1, 2, 3, etc.). A switch rated for the specific application results in multiple switches, with various ratings, for a single installation; this is the seed from which errors will grow. This approach to photovoltaic switching provides the contractor with a high probability of installing the switch in the wrong application. This possibility of error jeopardizes the photovoltaic system's safety and reliability.

As a market leader in photovoltaic applications, Square D provides a single disconnect solution for the ac and dc side of the inverter. This removes contractor confusion. Square D takes a "Keep It Simple" approach to photovoltaic switching requirements.

The myth asks that you disregard the exacting safety and reliability testing of a UL 98 "Enclosed Dead Front Switch" and accept a UL 1741 label as the keystone for the photovoltaic system's dc switching performance. The myth also asks one to disregard the "Keep It Simple" principle and rely on the contractor to apply multiple switching products to the correct photovoltaic application.

Is the myth of "rating a disconnect switch to UL 1741 provides the same safety and reliability you have come to expect from a UL 98 switch", true? The answer is a resounding NO.