cases, modules with low-rated short-circuit currents and high values of the required series protective fuse could allow the use of one overcurrent device to provide reverse-current protection for multiple modules or strings of modules and overcurrent protection for the conductors. The PV module manufacturer should be contacted for specific information regarding allowable source circuit configurations.

Δ 690.9 Overcurrent Protection.

(A) Circuits and Equipment. PV system dc circuit and inverter output conductors and equipment shall be protected against overcurrent. Circuits sized in accordance with 690.8(A)(2) are required to be protected against overcurrent with overcurrent protective devices. Each circuit shall be protected from overcurrent in accordance with 690.9(A)(1), (A)(2), or (A)(3).

(1) Circuits Where Overcurrent Protection Not Required. Overcurrent protective devices shall not be required where both of the following conditions are met:

(1) The conductors have sufficient ampacity for the maximum circuit current.
(2) The currents from all sources do not exceed the maximum overcurrent protective device rating specified for the PV module or electronic power converter.

(2) Circuits Where Overcurrent Protection is Required on One End. A circuit conductor connected at one end to a current-limited supply, where the conductor is rated for the maximum circuit current from that supply, and also connected to sources having an available maximum circuit current greater than the ampacity of the conductor, shall be protected from overcurrent at the point of connection to the higher current source.

Informational Note: Photovoltaic system dc circuits and electronic power converter outputs powered by these circuits are current-limited and in some cases do not need overcurrent protection. Where these circuits are connected to higher current sources, such as parallel-connected PV system dc circuits, energy storage systems, or a utility service, the overcurrent device is often installed at the higher current source end of the circuit conductor.

It may be possible for other PV source circuits, other supply sources through the inverter, and energy storage system (ESS) circuits to supply current to source circuits in the event of a fault. An overcurrent device is required for each conductor at each connection point to limit the fault current on that conductor, unless the conductors are sized for the maximum available current. Where more than two strings of PV modules are connected in parallel, overcurrent devices might be required in the dc PV source or output circuits.

(3) Other Circuits. Circuits that do not comply with 690.9(A)(1) or (A)(2) shall be protected with one of the following methods:

(1) Conductors not greater than 3 m (10 ft) in length and not in buildings, protected from overcurrent on one end
(2) Conductors not greater than 3 m (10 ft) in length and in buildings, protected from overcurrent on one end and in a raceway or metal clad cable
(3) Conductors protected from overcurrent on both ends
(4) Conductors not installed on or in buildings are permitted to be protected from overcurrent on one end of the circuit where the circuit complies with all of the following conditions:

a. The conductors are installed in metal raceways or metal-clad cables, or installed in enclosed metal cable trays, or underground, or where directly entering pad-mounted enclosures.
b. The conductors for each circuit terminate on one end at a single circuit breaker or a single set of fuses that limit the current to the ampacity of the conductors.
c. The overcurrent device for the conductors is an integral part of a disconnecting means or shall be located within 3 m (10 ft) of conductor length of the disconnecting means.
d. The disconnecting means for the conductors is installed outside of a building, or at a readily accessible location nearest the point of entrance of the conductors inside of a building, including installations complying with 230.6.

Section 690.9(A)(3) addresses circuits with sources of overcurrent on both ends with four protection options.

Section 690.9(A)(3)(1) permits short conductor lengths to be protected from overcurrent on one end. Short conductors are common where combiner boxes are installed next to inverters, and the language in this requirement will reduce the need for fuses on both ends of a short wire. The "tap rule" in 240.21(B) is an example of where the 10-foot length is used for feeder taps with remote overcurrent protection.

Section 690.9(A)(3)(2) permits conductors of 10 feet or less in buildings if they are in raceways or metal-clad cables, which is similar to the requirement in 240.21.

Section 690.9(A)(3)(3) covers conductors in general with sources of overcurrent on both ends since they would require overcurrent protection on both ends as required by Article 240.

Section 690.9(A)(3)(4) covers longer runs with overcurrent on one end where the conductors are located outside of the building. Since conductors in PV systems have very limited short-circuit current on at least one end of the conductor, overcurrent protection is typically located on one end of the circuit. With the language related to inputs to electronic conversion devices, many dc circuits will be required to have overcurrent protection on both ends of the circuit where on buildings and where greater than 10 feet in length, in accordance with 690.9(A)(3)(1).

(B) Device Ratings. Overcurrent devices used in PV source circuits shall be listed for use in PV systems. Electronic devices that are listed to prevent backfeed current in PV system dc circuits shall be permitted to prevent overcurrent of conductors on the PV array side of the device. Overcurrent devices, where