

Bulletin 64-1-3

Connection of interactive inverters on the load side of service disconnecting means Rules 64-060, 64-102 and 64-112

Issued May 2022

Supersedes Bulletin 64-1-2

Scope

- 1) Introduction
- 2) Point of connection
- 3) Existing ground fault protection on the main service
- 4) Disconnecting means and overcurrent protection for inverters operating in parallel

1) Introduction

Rule 64-112 3) permits the output circuit of an interactive inverter to be connected on the load side of the service disconnecting means of other source(s) at any distribution equipment on the premises, with some conditions.

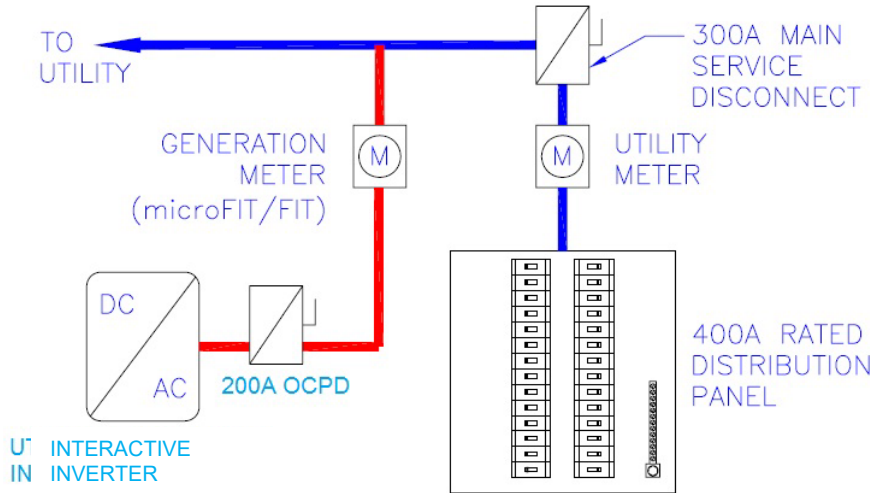
Where distribution equipment such as a switchboard, panel board, or splitter is supplied simultaneously from a primary power source (the supply authority) and one or more interactive inverters, the conditions outlined in Rule 64-112 4) and 5) must be satisfied in order to have the output circuit of the inverters connected on the load side of the service disconnecting means, otherwise the connection must be made on the supply side of the service disconnecting means.

2) Point of connection

Rules 64-112 4) c) & d) permit the sum of the ampere ratings of the overcurrent devices of the source circuits feeding the distribution equipment to exceed the busbar or conductor rating by a maximum of 125% in dwelling units and 120% in buildings other than dwelling units.

- Where the interactive inverter(s) output circuit **exceeds limits permitted** in Rule 64-112 4) c) & d), it shall be connected on the supply side, as shown in Diagram B1.

Diagram B1 – Example of connection of interactive inverter output circuit on the supply side of service disconnecting means, when inverter output overcurrent protection device (OCPD) rating exceeds limits permitted in Rule 64-112 4)

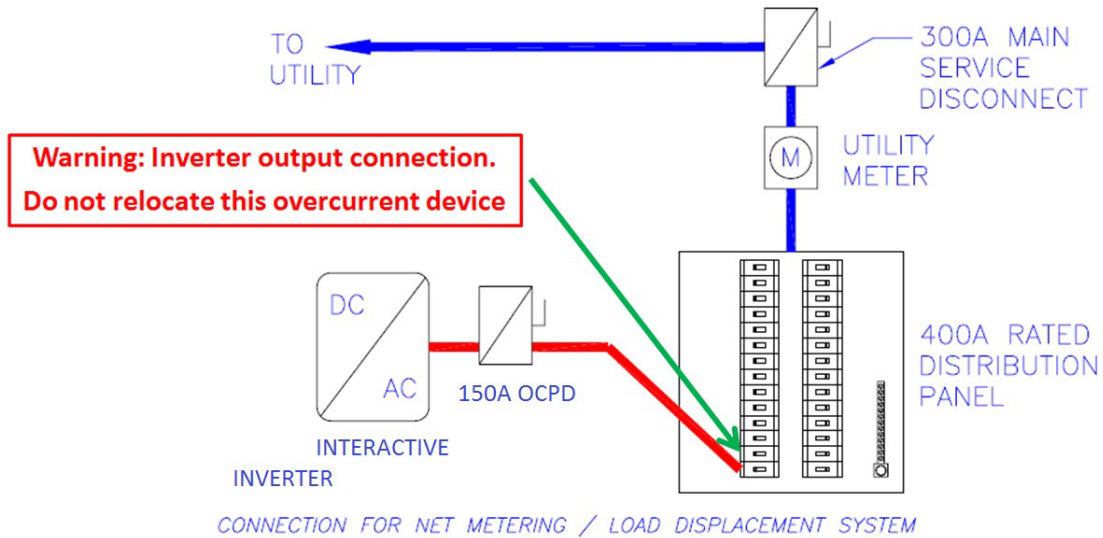


- Where the distribution equipment busbar is rated less than the sum of the ampere ratings of all OCPD supplying it, Rule 64-112 4) b) requires the point of interconnection of the interactive inverter(s) output circuit to be at the opposite end from the main input feeder connection as shown in the example illustrated by Diagram B2. The 120% or 125% limitation of 64-112 c) or d) is applicable or means shall be provided to limit the input and output current of the interconnected systems to ensure the busbar or conductor cannot be overloaded as per Rule 64-112 4) e) (see Note 1). A warning shall be posted beside the OCPD to prevent relocating it on the bus, as shown on diagram B2 below

Note 1

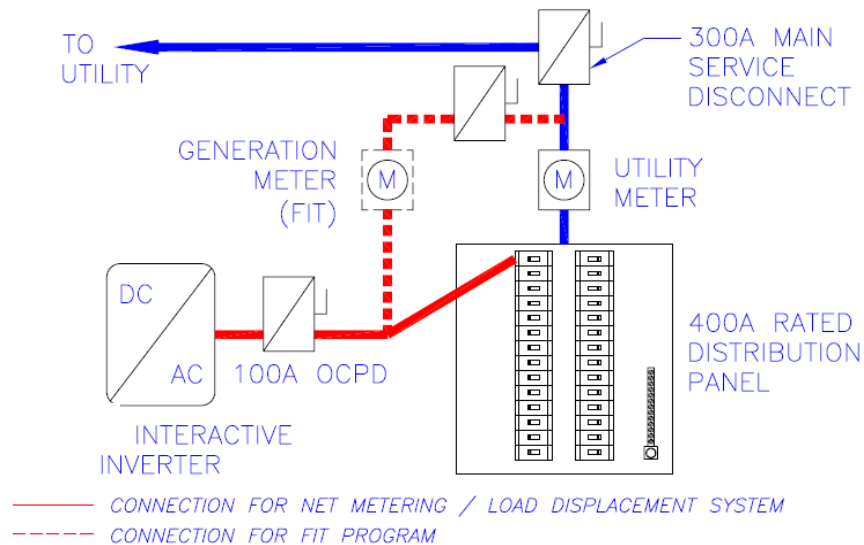
64-112 4) e) permits the use of “means” to allow the sum of the ampere ratings of all OCPD connected to a busbar to exceed the 120% and 125% limitations of 64-112 4) c) & d). This allows the use of any size of interconnected system connected at the opposite end of the busbar from the input feeder or main circuit location provided it uses a method of monitoring and controlling the current to not exceed the limits stated in 64-112 4) c) & d). One acceptable method to meet the requirements of this subrule would be the use of CT’s on each source and an associated control system to throttle the current contribution of the interconnected source.

Diagram B2 – Example of connection of interactive inverter output circuit on the load side of main service disconnecting means, when the sum of the OCPD supplying the bus is greater than the bus rating and within the limits permitted by Rules 64-112 4) c) & d)



- Where the sum of the ampere ratings of all OCPD supplying the bus is equal to or less than the bus rating, the connection can be made either on the supply side or load side of the service disconnecting means (with no restrictions on the location of interactive inverter OCPD on the bus), as shown in Diagram B3

Diagram B3 – Example of connection of interactive inverter output circuit on the load side of main service disconnecting means, when the sum of the OCPD supplying the bus is equal to or less than the bus rating



3) Existing ground fault protection on the main service

As per Rule 64-112 4) f), the point of connection on the load side of the main service disconnecting means shall be made on the line side of all ground fault protection devices except as provided for in Rule 64-112 5):

- a) There is ground fault protection for equipment from all ground fault current sources; and
- b) Ground fault protection devices used with sources connected to the load side are identified and approved as suitable for back-feeding. (See Note 2)

Note 2

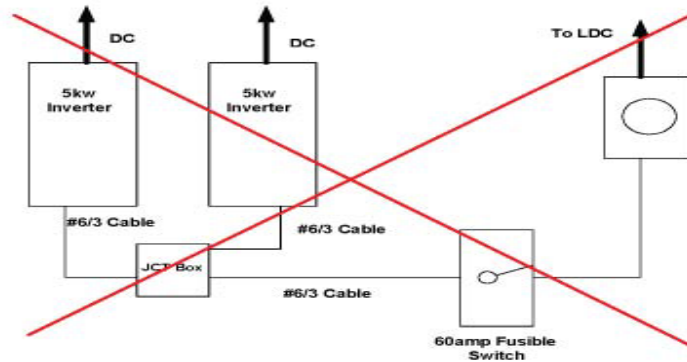
A circuit breaker with ground fault protection that is **not** suitable for back-feeding will have terminals **clearly marked “line” and “load”**. See Bulletin 14-5-* for more information.

4) Disconnecting means and overcurrent protection for inverters operating in parallel

Question 1

For an installation that incorporates two inverters tied to a common ac feeder, does a single disconnecting means on the ac common output satisfy Rules 64-060 and 84-020? (See Diagram B4)

Diagram B4 – Single disconnecting means for multiple inverters, unacceptable design



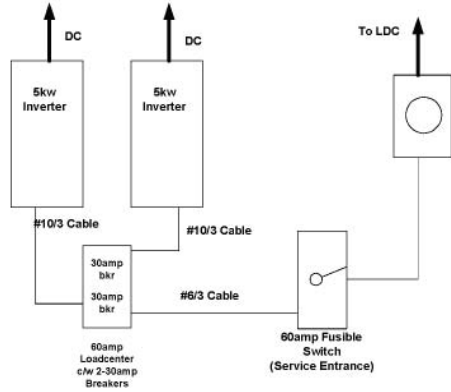
Answer 1

No.

Rationale 1

The single disconnecting means satisfies Rule 84-022 for the supply authority disconnecting means; however Rules 84-020 and 64-060 require separate disconnecting means for each power production source (inverter). The separate disconnecting means are also required for compliance with Rule 14-414. Diagram B5 shows an example of a code compliant installation.

Diagram B5 – Separate disconnecting means for each inverter



Question 2

For an installation that incorporates two inverters tied to a common ac feeder, does each inverter output require a separate individual overcurrent device to be installed at the tap point, if the output conductors to each inverter are rated for the common feeder overcurrent rating (i.e. 60 A as per Diagram B4).

Answer 2

Yes

Rationale 2

Rules 64-102 b) ii) and 64-112 require individual overcurrent protection to be provided for each inverter output as per Section 14 Rules. In addition, Rule 84-010 requires equipment and conductors that are energized from both directions to be provided with overcurrent protection from each source of supply. Although the larger tap conductors do not require overcurrent protection, the connected equipment (the inverter) does, in order to comply with the rule. The inverter manufacturer’s installation instructions shall also be followed and overcurrent protection shall also meet their requirements (Rule 2-034). Diagram B5 shows an example of a code compliant installation.

Inverters with integral overcurrent/disconnecting devices

If the inverters have integral overcurrent protective / disconnecting devices, then external devices, referenced by Questions 1 and 2 are not required to be installed; however, the length of the conductors from the inverter to the point of common connection must then comply with Rule 14-100.

AC modules and micro-inverters

AC modules and micro-inverters that operate in a multiple ac module or micro-inverter system configuration are considered as one generation source. The requirement for a separate disconnecting means and overcurrent protection for each inverter, referenced by Questions 1 and 2, is not applicable. For the maximum number of ac modules or micro-inverters that are permitted to be connected to one branch circuit, manufacturer’s installation instructions shall be followed.