



DISCONNECT SWITCH REQUIREMENTS FOR DISTRIBUTED GENERATION CUSTOMERS

060559

Department: Electric Distribution

Section: Design and Construction

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Rev. #07: This document replaces PG&E Document 060559, Rev. #06. For a description of the changes, see Page 7.

Note: This document also is included in PG&E's [Distribution Interconnection Handbook](#).

Purpose and Scope

This document describes the requirements for low-voltage (0–600 V), isolating, disconnect switches for customer generation and energy storage systems. These requirements apply to customer generation and energy storage systems that are designed to parallel and backfeed (e.g., PV) into the PG&E system or for emergency or backup purposes only. This document also describes PG&E's minimum functional and location requirements for switches. A disconnect switch device provides a visible open clearance point when it is necessary to isolate the customer's generator from the PG&E system.

General Information

1. Provide a disconnect device to electrically isolate the customer's generator from the PG&E system in order to establish a clearance point for maintenance and repair work in accordance with PG&E safety rules and practices.
2. The disconnect switch device must be installed to only isolate the customer generation sources and must not disconnect customer loads.
3. The disconnect device must be installed between the PG&E meter and all generation sources.
4. The device must be physically located for ease of access and visible to PG&E employees within 10 feet of the meter. The device must be located in close proximity, or within line of sight, of the meter.
5. General or light duty disconnect switches typically are installed when the voltage is 240 V or less and the ampere rating 600 amps or less. Use heavy-duty disconnect switches for all applications above 240 V and 600 amps.
6. The ampacity rating of a disconnect switch must be equal to or greater than the ampere rating of the generator.
7. The neutral conductor shall not be switched.
8. Three-pole switches may be used in single-phase applications.
9. Disconnect switches with an interlock are allowed provided they meet all of the functional requirements. An interlock system allows the switch to be opened (off) by the producer, but cannot be closed (on) until reset by PG&E.
10. All disconnect devices must have locking provisions that accept a PG&E padlock with a 5/16-inch lock shaft. Keyed locks are not allowed. If the disconnect device is operable without opening the enclosure, the operating handle must be lockable. If the enclosure must be opened to operate the disconnect device, the enclosure must be lockable.
11. Molded case circuit breakers, pull-out type disconnects, or any other similar device are not acceptable as an approved disconnect switch.
12. For applications not described, contact the PG&E Electric Generation Interconnection (EGI) department.
13. Interconnections in any PG&E sealable compartment are **NOT** allowed without written authorization from the Electric Meter Engineering or Electric Distribution Standards departments. For any questions, contact PG&E's EGI department.

Disconnect Switch Requirements for Distributed Generation Customers

Disconnect Switch Requirements

Basic

As specified and in *Electric Rule 21*, “Generating Facility Interconnections,” and in PG&E’s [Distribution Interconnection Handbook](#), the generating system or facility must have an ac disconnect switch. The device must meet all of the PG&E requirements, as specified in this document.

All disconnect switches must conform to nationally recognized standards and meet all applicable certification requirements. These include, but are not limited to: NFPA 70–National Electrical Code (NEC), California Electrical Code (CEC), Underwriters Laboratories (UL), or other Nationally Recognized Testing Laboratory (NRTL).

PG&E-approved disconnect switch models, rated up to 1200 amps, currently listed in *both the Eaton and Siemens Safety Switch Cross-Reference Guides*, meet all of the functional requirements described below. These guides can be found on PG&E’s [Distribution Interconnection Handbook](#) website at <http://www.pge.com/dih/>. Disconnect switches rated over 1200 amps and up to 4000 amps must meet all of the requirements described in this document.

Functional

- Manually operated: Operated by a person and not operated electronically.
- Gang-operated: One switch handle opens and closes all phases simultaneously.
- Includes marking or signage on the switch that clearly indicates the open (off) and closed (on) positions.
- Lockable in the open (off) position using a PG&E padlock.
- Allows visible verification that an air-gap of separation has occurred between the blades and contact points.
- Has a viewing window, for visible verification, on all pad-mounted (floor standing) disconnect switches. A viewing window is not required, but allowed, on all wall-mounted disconnect switches.
- A fusible ac disconnect switch is required for generators that do not have over-current protection (i.e., breakers, fuses) at the point of interconnection with the utility.
- Adequately sized to handle fault and overcurrent conditions.

Labeling

- Permanently attached signage on the front that explains this is the ac disconnect switch for the generation. Example: “UTILITY AC DISCONNECT SWITCH”.
- Labels shall be permanent and suitable for the environment and shall be engraved phenolic or comply with ANSI Z535.4. Lettering shall be a minimum 3/8” high and in all capitals.
- When the disconnect switch is not grouped with the meter panel provide a map showing the location.
- If a Net Generation Output Meter (NGOM) is installed provide proper labeling as described and a map showing the location if not grouped together with the other meter(s) and disconnect switch.

Location

- Easily accessible by PG&E, when requested.
- Located 10 feet or less, in line of sight, from PG&E’s electric meter at the point of common coupling or interconnection and is seen easily from the meter panel.
- Installed in an approved electric meter room 10 feet or less, in line of sight, from the PG&E’s electric meter.
- If installed outdoors with the meter the disconnect switch must be at the same grade level.
- Not allowed on; any floor or level above grade, on a roof, or inside a room or area that is not an approved electric meter room.

Disconnect Switch Requirements for Distributed Generation Customers

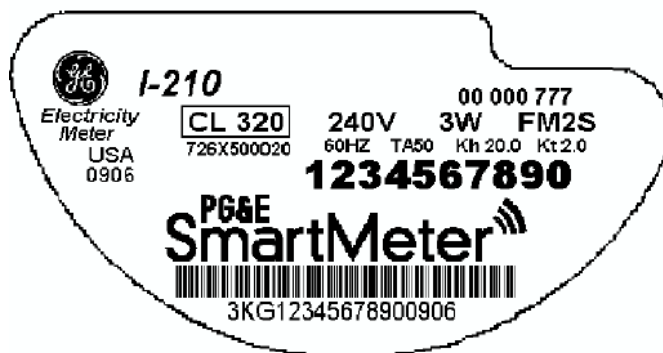
- When wall-mounted or floor standing (pad-mounted), installed at a vertical height of between 48 inches (minimum) and 75 inches (maximum), as measured from the ground to the top of the disconnect switch enclosure.
- Clearly marked on the submitted single-line diagram indicating the manufacturer, model type, voltage rating, current rating, and location.
- If the device is not adjacent to the PG&E's electric revenue meter(s), a clear map and signs indicating of the location of the disconnect switch are required. If the disconnect switch is not accessible outside the locked premises, include signs with contact information and a distribution provider-approved locking device for the premises.
- Installed in a safe and acceptable location that meets the same working space requirements as a meter panel. See Greenbook section 5.4.4 Working Space.

Exemption to the Disconnect Switch installation Requirement

Applicants with inverter-based generating systems that are supplied by PG&E single phase services up to 240 volts may be exempted from installing a disconnect switch, as determined by PG&E, if the meter panel that is interconnected with the generation source(s) meets **all** of the following conditions:

- Self-contained (not transformer-rated).
- Accepts form "S" socket-based (e.g., FM2S) meters (not bolt-on meters).
- Rated for 320 amps (CL 320) or less of "continuous" current.
- Single-phase, 120/240 volt or 120/208 volt.

Any generation system that does not meet these conditions must install a disconnect switch, as required by PG&E.



Typical Socket-Based Meter Label

Disconnect Switch Requirements for Distributed Generation Customers

Definitions:

Backfeed: The energizing of a utility's distribution system from a non-utility generation source.

Disconnect Switch: A disconnect device that the customer is required to install and maintain in accordance with the requirements described in this document. It will completely isolate the customer's generating facility and system from the electric utility's distribution grid. The device includes a visible open, as defined below.

Distributed Generation: Any type of customer-owned electric generator, static inverter, or generating facility and system that has the capability of being operated in parallel with an electric utility's distribution system.

Distribution System: The infrastructure constructed, maintained, and operated by a utility to deliver electric service to retail customers at primary and secondary distribution voltages.

Generating Facility: All or part of the customer's electrical generator(s) or inverter(s) together with all protective, safety, and associated equipment necessary to produce electric power at the customer's facility.

Onsite Generation System: A facility or energy system for generating electricity that:

- A. Uses renewable, gas, propane, or other form of energy to generate electricity.
- B. Is isolated from the distribution system at the customer's premise when the utility grid is de-energized.
- C. Operates in parallel or not in parallel with the utility's distribution facilities.
- D. Is intended primarily to offset part or all of the customer's requirements for electricity from the utility.

Open Position: The disconnect blades are separated from the contacts for each phase, preventing the flow of electricity between them.

Visible Open: An air gap must be visible at the trailing edge of the moveable disconnect blades when the switch is in the open position.

Disconnect Switch Requirements for Distributed Generation Customers

Customer Installed Disconnect Switches and Wiring Diagrams

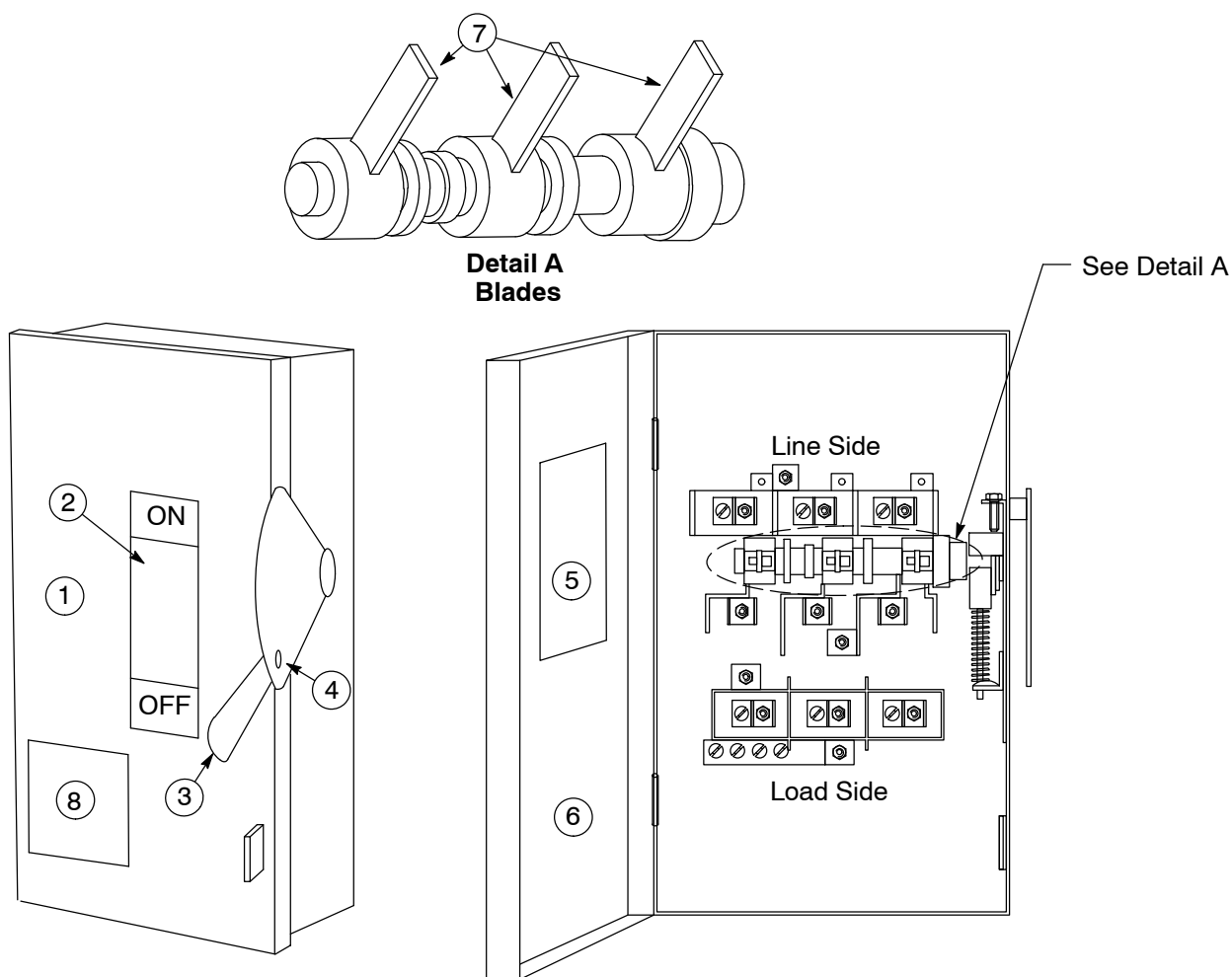


Figure 1
Typical AC Disconnect Switch

Table 1 List of Items Required for the AC Disconnect Switch

Item	Description
1	AC Disconnect Switch Enclosure – General or heavy-duty, indoor or outdoor, fused or unfused, UL/NRTL certified. As required.
2	Visible ON/OFF label.
3	Switch Handle – Manual, single pole for gang operation.
4	Provision For Locking in the Off (Open) Position – Accommodates a PG&E padlock with 5/16-inch lock shaft.
5	Device Label – Includes relevant information (device ratings, UL certification, etc.) about the device.
6	Operable Door – Allows visible verification of blade position.
7	Blades – Solid or Fused. Allows visible verification that separation from contacts has occurred.
8	Ultraviolet (UV) and Weatherproof label stating “Utility Disconnect Switch” – Placed on the outside in the front of the disconnect switch. See Labeling requirements on Page 2.

Disconnect Switch Requirements for Distributed Generation Customers

Customer Installed Disconnect Switches and Wiring Diagrams

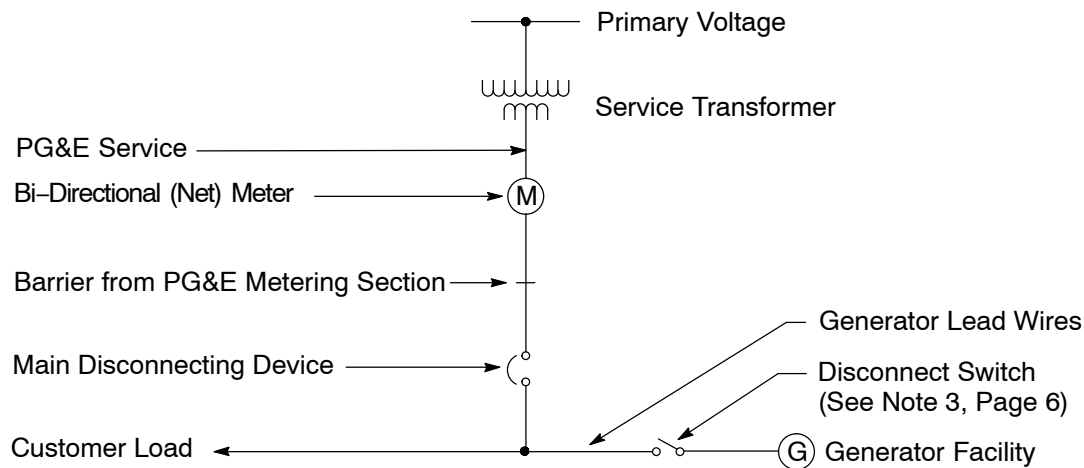


Figure 2
Typical Disconnect Switch Wiring Diagram

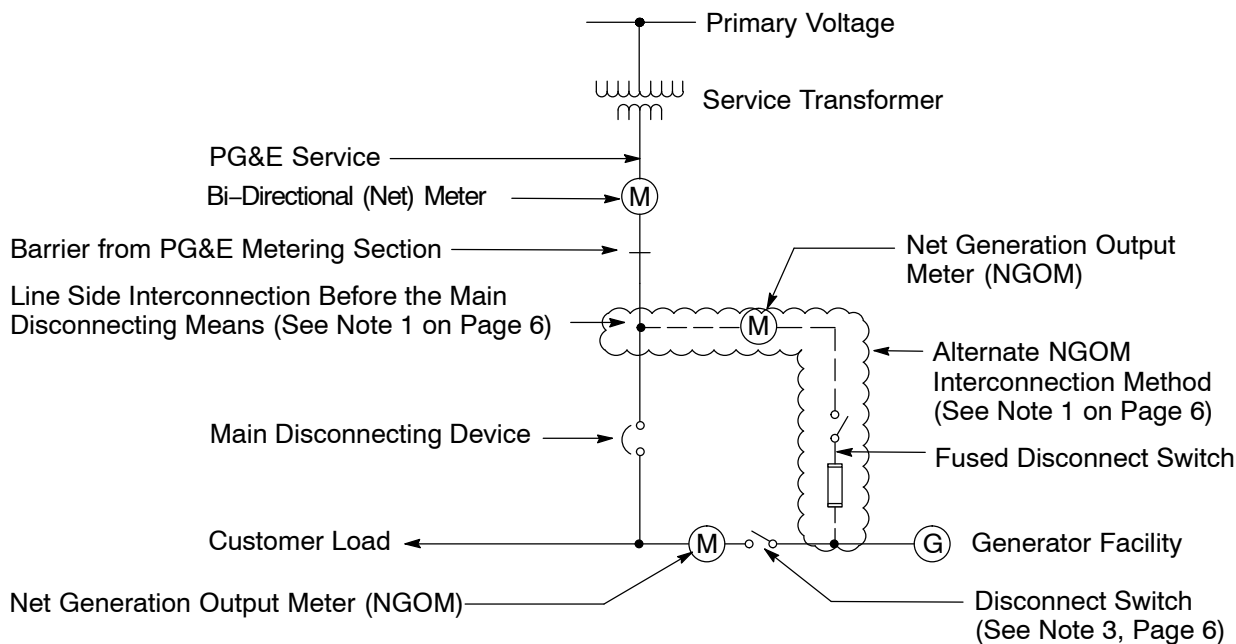


Figure 3
NGOM Disconnect Switch Interconnection

Notes for Figure 2 and Figure 3:

1. An interconnection placed before the main disconnecting device requires approval. Submit a variance request to the PG&E's Electric Generation Interconnection (EGI) Department. If a line (Supply) side interconnection is approved, install a fused disconnect switch before the NGOM, as shown in Figure 3. Note, customer cables and equipment are **not** allowed in any PG&E-sealed section.
2. Energy storage systems must have an acceptable disconnecting device that is easily accessible, as determined by PG&E, to prevent backfeed into the NGOM while performing work on the NGOM.
3. The disconnect switch may qualify for the exemption if all the requirements on Page 3 are met.

Disconnect Switch Requirements for Distributed Generation Customers

Revision Notes

Revision 07 has the following changes:

1. Revised Note 1 on Page 1 (General Information).
2. Revised Note 2 on Page 1 (General Information).
3. Corrected Figure 3 on Page 6.