

V2G Charger Installation Requirements

General Background

PGE allows customers with EV's to operate vehicle-to-grid (V2G) chargers on bi-directional meters to offset their energy costs and provide benefits to the grid. Installations of V2G-capable chargers must meet PGE's [Electric Service Requirements](#) (ESR) Section 1.4.6 which defines the requirements for all participating installations with bidirectional meters.

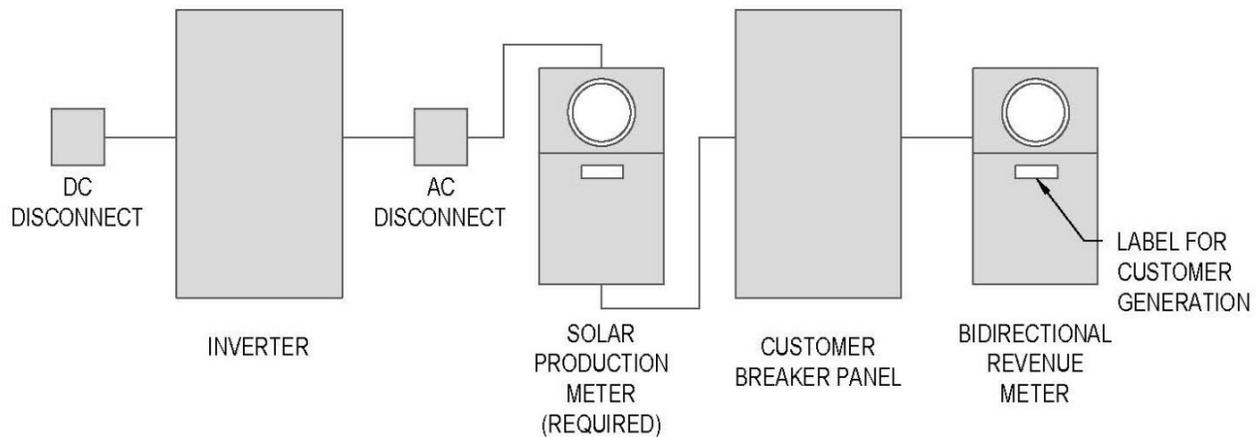


Figure 1: Typical Metering for Residential Net Metering diagram from ESR Section 1.4.6

Visual Open Disconnect Requirements

Customer electrical systems with production capabilities that will affect the service conductors by more than 30 A require a **lockable disconnect switch with a visible open** located within 10' of the meter and no closer than 3' of the source. Any variance from these requirements must be approved by PGE.

The visible open disconnect is included to provide a second validation point of a system's safety before PGE employees (metermen, linemen, etc) interface with parts of the system that could unintentionally be energized by the customer's source. A PGE employee must be able to independently (without customer or electrician involvement) open the disconnect and visually confirm contacts are separated and close the disconnect when work is complete.

- A maximum of 6 bi-directional visible open disconnects can be installed on a service to allow for reasonably quick operation by a PGE Meterman
- All bi-directional visible open disconnects shall be within 10 feet of the meter unless approved by PGE
 - Disconnects in the same general area as the meter and within line of sight may be approved by Meter Gear Review
 - Disconnects outside of the general area of the meter or located out of line-of site require a specific variance by PGE and additional labeling
- A single visible open disconnect switch can be used to shut off multiple sources by placing it upstream of a distribution panel that feeds the sources
- Acceptable types of visible open disconnects include standard knife-blade style disconnect switches or switchboard mounted disconnect switches
- Draw-out Circuit Breakers are not acceptable as they do not meet the intent of rapid operation by PGE Personnel
- Pringle Switches / Bolted-Pressure Switches are not validated for use at this time

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Example V2G Disconnect Configurations

Many V2G charger installations are likely to have only EV chargers on the service in order to participate in Schedule 38. This creates a system where the V2G chargers are both the only loads on the service as well as the bi-directional sources which offers some unique configurations not thoroughly described in the ESR. Potential configurations for V2G charger installations that meet the intent of the ESR are provided here for reference and guidance. They do not supersede any written requirements or review feedback from Meter Gear Review or PGE Inspectors.

A single bidirectional service may have a maximum of 6 visible open disconnects required to be operated to fully isolate all V2G chargers on the system. These disconnects may be standalone knife blade style units or they may be integrated into the service switchboard if PGE has access to the distribution section and the disconnect switch compartment can be opened from the front for visual verification without specialized tools.

Multiple Visible Open Service Disconnects

For services 800A and smaller, up to 6 knife blade disconnects can be fed directly from the meter as service disconnects or fed through a service entrance distribution panel. These disconnects can feed the V2G chargers directly if there are fewer than 6 chargers (Figure 2). For cases where there are more than 6 chargers requiring visible open disconnects, the disconnects can feed distribution panels that then feed the chargers (Figure 3).

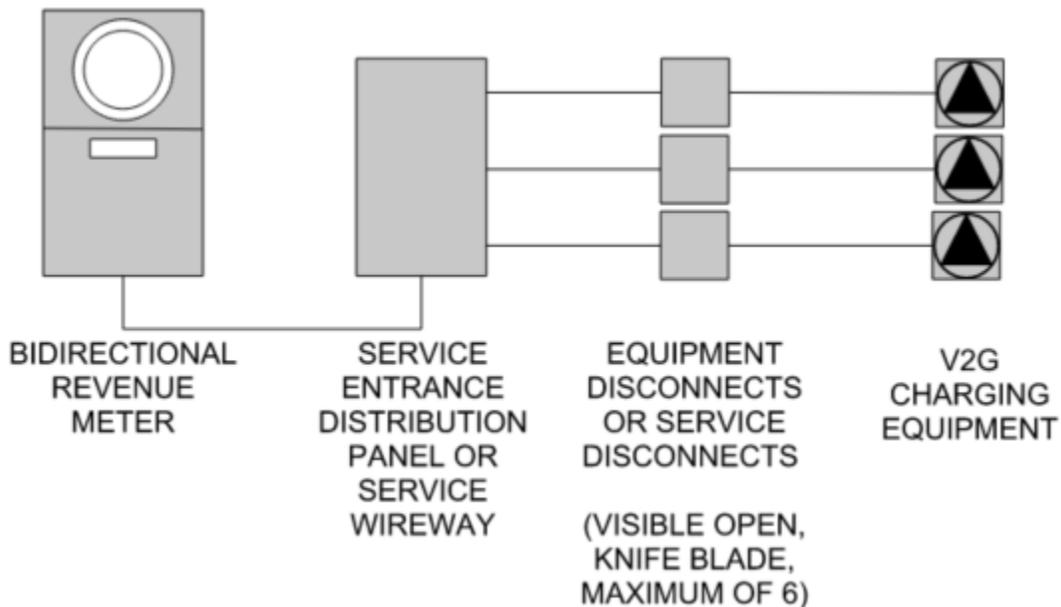


Figure 2: Multiple Visible Open Disconnects for 6 or Fewer V2G Chargers Example Configuration

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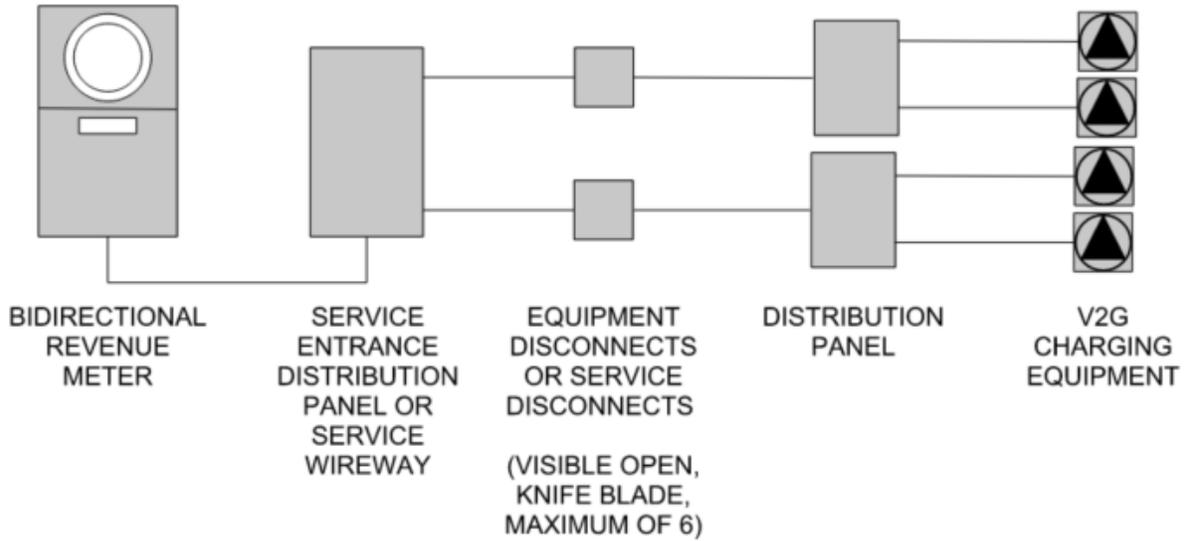


Figure 3: Multiple Visible Open Disconnects for More than 6 V2G Chargers Example Configuration

Single Visible Open Knife-Blade Service Disconnect

When all chargers can be installed on a service which can be served by a single knife-blade style disconnect, it is allowable for the service disconnect to act as the visible open required in ESR 1.4.6. This configuration is only acceptable for services 800A and below (ESR Chapter 10) which can be served using a standalone CT cabinet and a knife-blade disconnect. Visible open disconnecting means that operate at higher currents and can be mounted in a switchboard such as bolted-pressure switches (pringle switches) and draw-out circuit breakers are not approved.

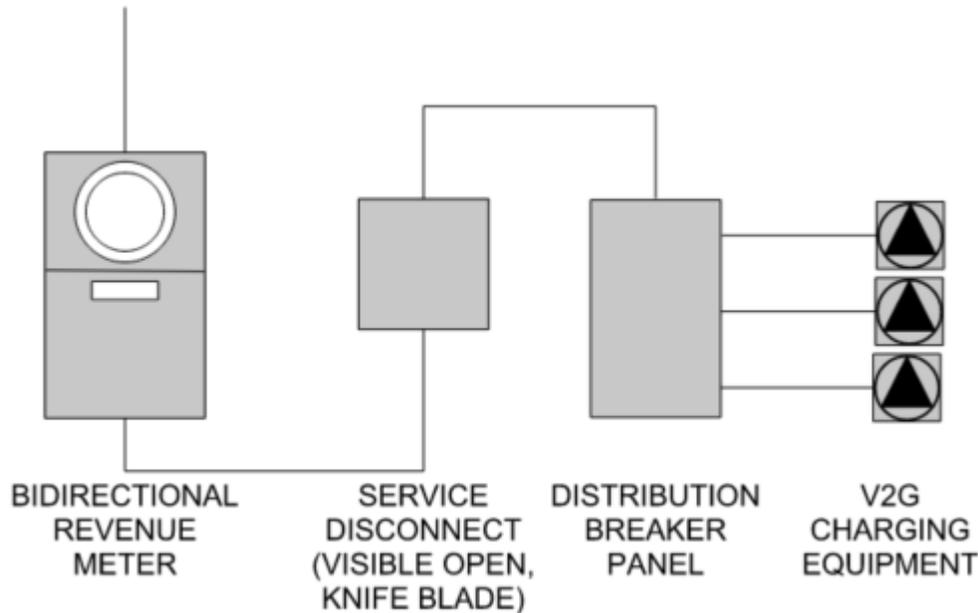


Figure 4: Single Visible Open Disconnect Example Configuration

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Switchboard Mounted Disconnect Switches

For services greater than 800A that require switchboard metering (ESR Chapter 11), switchboard mounted branch/feeder circuit disconnect switches can serve as visible open disconnects if PGE has access to the distribution section of the switchboard and the disconnect switch compartment can be opened from the front for visual verification without specialized tools.

Up to 6 switchboard-mounted disconnects may be installed after the CT and metering sections of the switchboard for the purpose of isolating V2G chargers. These disconnect switches may feed downstream distribution or V2G chargers directly.

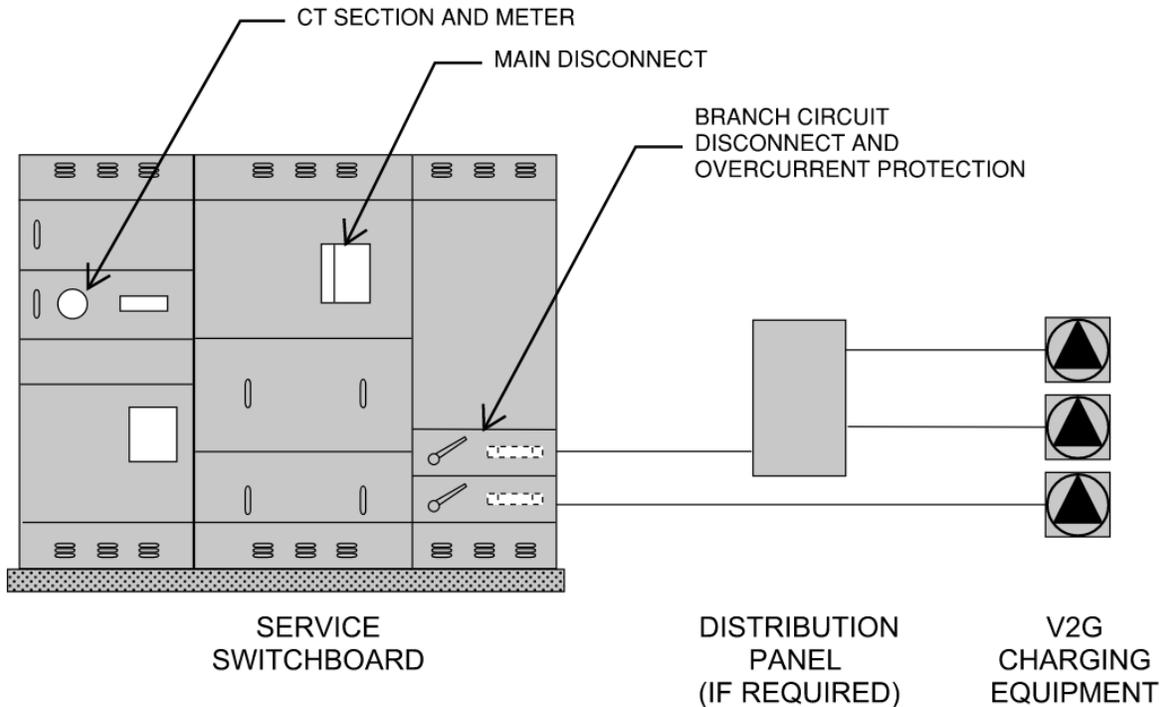


Figure 5: Switchboard Mounted Disconnect Example Configuration