Connecting PVG-C for Rapid Shutdown System

Application Note: PVGC-20200418
Version: 3.0

WARNING:

PVG is a device with memory. If the last state of a PVG is unknown, please test and confirm it is at OFF state before wiring. ON state PVGs may result in high voltage on the PV strings.

While plugging or unplugging PV connections in a system, inverter should be fully disconnected or deactivated and there should be no current on PV cables.

1 Executive Summary

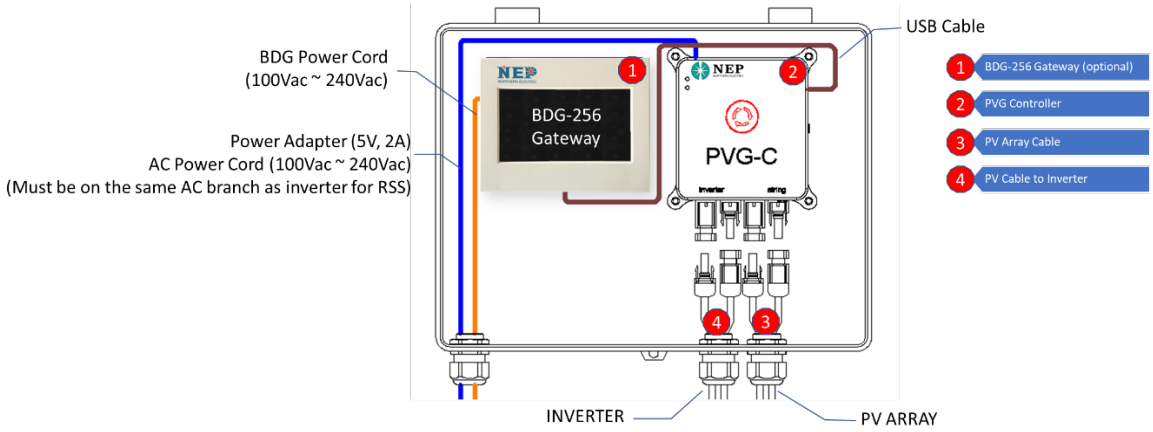
PVG-C is a PVG controller for residential and small commercial systems. It has the following key features:

- It is powered by a 5V adapter (accessary). Losing power supply triggers rapid shutdown.
- It supports primary/secondary mode
- It supports ON-GRID and OFF-GRID mode
- It can be connected to a BDG-256 gateway for monitoring individual PVGs.

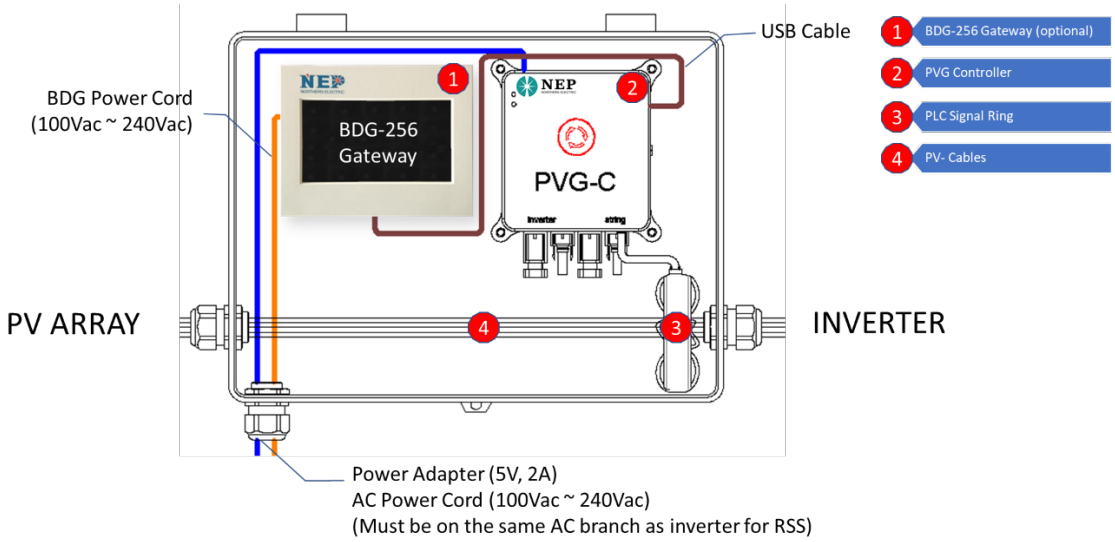
This application note describes the details on connecting PVG-C.

2 Wiring the PVG-C controller

There are two ways to wire a PVG-C controller. The first way is for small residential systems, where each PV string is controlled by one PVG-C controller. In this case, each PV string can be directly plugged into the PVG-C.



In the 2nd approach, where the string inverter has multiple PV string, these multiple strings (they must all be PV+ or PV- but not mixed) may pass through one external PLC signal ring.



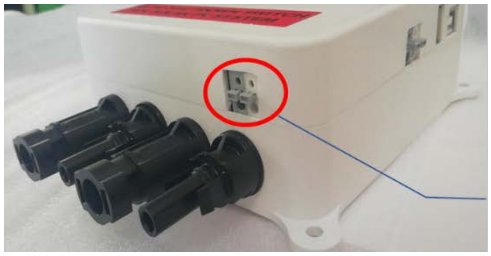
3 PVG-C connection pins and switches

3.1 Power supply

PVG-C uses 5Vdc power supply from AC adapter (accessory included in the package). In order to comply with the NEC2017 that AC disconnection shall trigger rapid shutdown, the AC adapter should be on the same AC branch as inverter.

3.2 External PLC Signal Ring

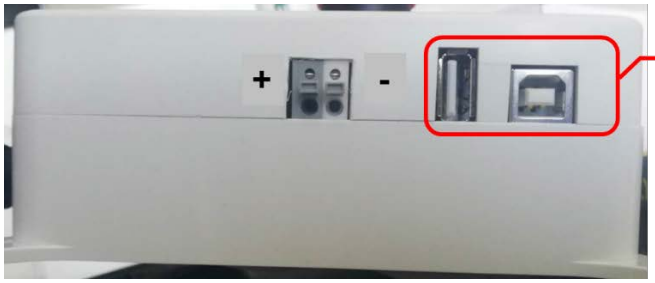
One external PLC signal ring can be attached to the PVG-C. For inverters connected with multiple PV strings, either all PV- (or all PV+) cables can pass through this ring for PV PLC communications. ***But PV- and PV+ should NOT be mixed in the ring.***



Connector for external PLC signal ring

3.3 Panel level monitoring through BDG-256 gateway

A BDG-256 gateway can be connected to the PVG-C and monitor each PV panel output in real time through a PVG. The usage of the BDG-256 gateway can be found in the tech note (Quick Installation Guide on BDG-256 Gateway). Further, multiple PVG-C can be daisy chained and connect to one BDG-256 gateway.

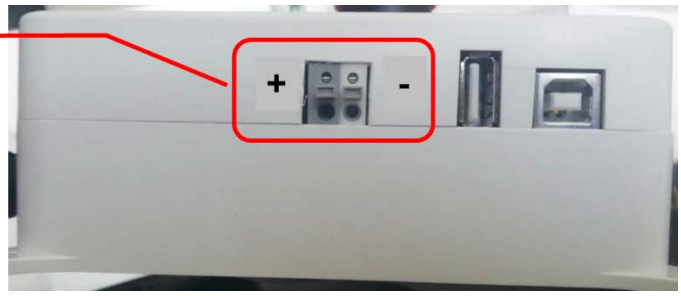


Daisy chain PVG-C w/ USB cable. USB type-B (square) is the starting point, and USB type-A (flat) is the ending point. BDG-256 is the starting point if connected.

3.4 Relay output

For some systems, a relay is desired for a synchronized command of RSD. These two pins can be used to drive a 5V, 50mA maximum relay. Once RSD disconnect command is initiated, a 5V is output on these two pins. Once RSD disconnect command is stopped, the 5V output stops simultaneously.

Output 5Vdc once RSD is activated.



3.5 ON-GRID / OFF-GRID switch

A PVG-C can be set as for ON-GRID (default) or for OFF-GRID. By setting to OFF-GRID, loss of AC power supply does not trigger a rapid shutdown. The only way to trigger RSD is through the E-STOP.

3.6 PRIMARY / SECONDARY switch

A PVG-C can be set as a PRIMARY or SECONDARY (default). Each RSD system can have only one primary and multiple secondaries. Primary and secondaries are daisy chained together through the USB cable.

The PRIMARY PVG-C can command all RSDs, including RSDs controlled by SECONDARY PVG-C, to connect or to disconnect. Further, a BDG-256 gateway can be plugged in the primary PVG-C-D1 controller (see 3.3) and monitor each and every PV panel of the whole RSD system including PV panels controlled by SECONDARY PVG-C controllers. ***If no PRIMARY is connected, each SECONDARY PVG-C can work on its own.***