Installation and Operation Manual

PVG-4

Rapid Shutdown Device

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COMPANY PROFILE

Northern Electric & Power Inc. (NEP) was founded in the United States and has manufacturing and R&D facilities in China. The mission of the company is to develop cutting-edge clean energy technologies and provide state-of-the-art solar inverter products to its customers. The first round of investment to the company was US$20 Million, with a planned total investment of US$50 Million. The company is headquartered in the city of Tsingtao, a major industrial center and trading port in the northeastern China. The company campus occupies more than 18 acres in the Tsingtao Export Processing Zone, and has more than 650,000 square feet building space. The campus is planned to be connected through a micro smart grid demo community and powered by electricity from solar, wind and micro turbines. Outside China, the company has operation offices in Chicago, U.S. and Vancouver, Canada.

The technology founders of the company are well-known experts in the fields of power electronics, automatic control, signal processing, and communications. Each of the founders has multiple U.S. and world patents in their specialty areas. They received Ph.D. degrees from top universities in North America, and each has more than 10 years engineering and management experiences in leading U.S. companies.

NEP has a complete product line of grid-tied solar inverters, including 180W~500W micro inverters, 1.5kW~5kW single phase solar inverters, and 10kW~500kW three-phase solar inverters. Field deployment results demonstrated high system efficiency and reliability of NEP solar inverters.

NEP is committed to develop *Clean, Reliable, Affordable and Efficient* (CARE) products for worldwide customers.

1. INTRODUCTION

1.1 Prefix

Dear customer, thank you for choosing the PVG rapid shutdown devices. We hope you will find our products meet your need for renewable energy. Meantime, we appreciate your feedback regarding our products.

1.2 Standards Compliance

PVG rapid shutdown devices comply with the NEC 2014 and NEC 2017 article 690.12, and CEC 2015 section 64-218.

1.3 How to Use This Manual

This manual provides detailed product information and installation instructions for the PVG rapid shutdown devices (RSD). Please read through this manual before installation and operation.

WARNING: This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.

1.4 Label

The label is located on the side of the inverter. The information on the label includes technical data as well as type, firmware version and serial number of the device. Safety instructions on the label are listed and explained below:

	Danger! The term “danger” describes an issue which, if ignored can cause personal injury.
	Attention! With the term “attention” a circumstance is listed which may cause property damage if disregarded.
	Instructions for use! Under “Instructions for Use“, it is pointed out that installation and operating instructions are to be read and understood before installation or repair.
	Caution, hot surface! Under “Caution, hot surface”, it should be noted that surfaces of equipment may be hot and create a burn hazard.
	Special disposal instructions! With “Note Separate Disposal”, it is pointed out that this product may not be disposed of with normal garbage. An improperly conducted disposal can lead to damage to the environment.
CE	CE mark The product complies with essential requirements of relevant directives of EU

2. SAFETY INSTRUCTION

WARNING:

PLEASE READ THIS MANUAL BEFORE INSTALLATION. ANY DAMAGE TO THE PRODUCT DUE TO NOT FOLLOWING THIS MANUAL IS NOT COVERED BY THE WARRANTEE.

ALL THE INSTALLATION SHOULD BE DONE BY CERTIFIED ELECTRICIAN.

BESIDES THE CABLE CONNECTORS, NOTHING INSIDE THE PRODUCT SHOULD BE MODIFIED.

ALL INSTALLATION SHOULD FOLLOW THE LOCAL ELECTRIC CODES.

WARNING:

WHENTHEPHOTOVOLTAICARRAY IS EXPOSED TOLIGHT, IT SUPPLIES A DC VOLTAGETOTHE PVG RSD.

3. FCC COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

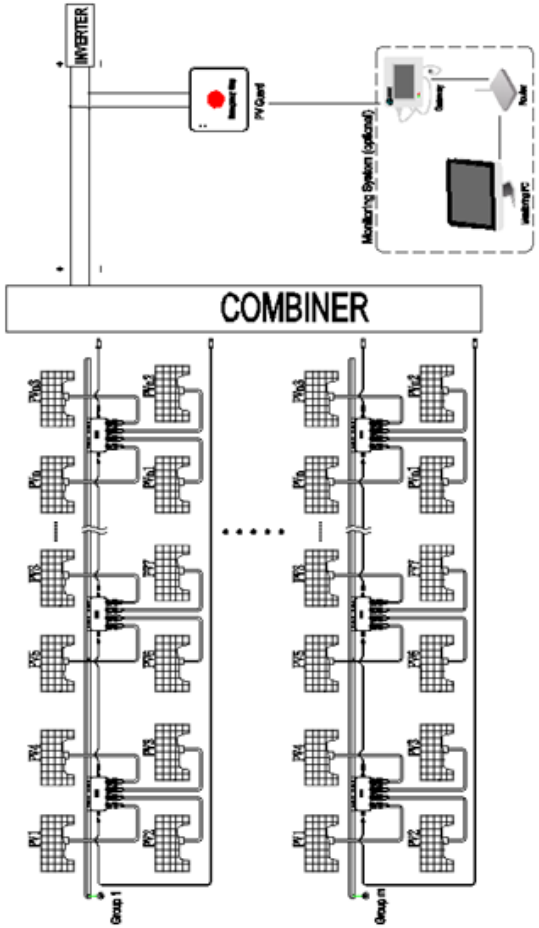
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user’s authority to operate the equipment.

4. INSTALLATION

WARNING: BE AWARE THAT INSTALLATION OF THIS EQUIPMENT INCLUDES RISK OF ELECTRIC SHOCK.

PVG-4 System Diagram



Connecting PVG-C controller to a BDG-256 gateway (Option)

A BDG-256 gateway can connect one or multiple PVG-C controllers, and upload the monitoring data from PVG to NEPVIEWER monitoring website. For details of BDG-256 gateway and NEPVIEWER, please refer to the user manual of BDG-256 gateway.

Connecting BDG-256 gateway to PVG-C is optional, and shall not affect the rapid shutdown function of PVG-C and PVG-4.

WARNING: ONE PVG-C CAN ONLY MONITOR ONE CHANNEL OF PV PANELS (ONE MPPT).

5. OPERATING INSTRUCTIONS

WARNING: PVG RAPID SHUTDOWN SYSTEM SHALL BE CHECKED REGULARLY TO MAKE SURE IT FUNCTIONS PROPERLY. TEST SHALL BE DONE AT DAYTIME, AND BY MANULLAY PUSH DOWN THE EMERGENCY BUTTON. SOLID GREEN LIGHT SHALL BE ON WITHIN 10 SECONDS AFTER THE EMERGENCY BUTTON IS PUSHED.

WARNING: IN ORDER TO MAKE THE RAPID SHUTDOWN FUNCTION PROPERLY, THE VOLTAGE ON THE DC BUS CAPACITOR OF THE STRING INVERTER SHALL BE REDUCED TO LESS THAN 30Vdc WITHIN 10 SECONDS, USING ONE OF THE FOLLOWING APPROACHES:

1) A DC SWITCH ON THE DC INPUT OF THE STRING INVERTER IS SWITCHED OFF WITHIN 10 SECONDS TO DISCONNECT THE DC BUS OF THE INVERTER

2) IF THE INVERTER DC BUS CANNOT BE DISCONNECTED, A “BLEEDING” RESISTOR SHALL BE CONNECTED ACROSS THE DC INPUTS OF THE STRING INVERTER AND DISSIPATE THE ENERGY ON THE DC BUS WITHIN 10 SECONDS

PVG is powered by the PV panel. Thus the rapid shutdown is operable during daytime when the PV panel is energized. Rapid shutdown can be activated by one of the following two operations:

Option-1 Press the E-STOP button on the PVG controller (PVG-C)
Option-2 Disconnect AC adapter to the PVG-C remote controller

Flashing LED on the PVG-1/2/3/4 indicates the status of the switch inside the PVG.

LED on PVG-4	Status
OFF for 5 seconds, ON for 1 second	PVG switch is connected
OFF for 1 second, ON for 1 second	PVG switch is disconnected
OFF for 2 second, ON for 1 second	PVG status error

There are two LEDs on the PVG-C. RED LED flashing indicates the

controller is powered, while the green LED on PVG-C indicates the DC voltage is safe.

Green LED on PVG-C	Status
OFF	PV array DC voltage is above 30Vdc
ON	PV array DC voltage is below 30Vdc

To re-connect the PV panels, a re-connection command can be send to each PVG by the following steps:

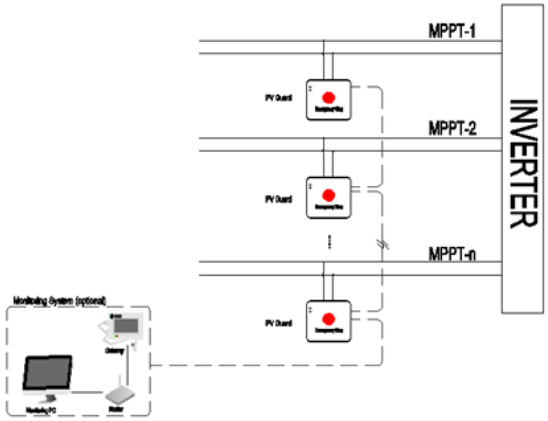
Step-1: Plug AC adapter into the PVG-C

Step-2: Release the E-Stop button on PVG-C

This operation can only be done at day time since the PVG is powered by PV panels. In most cases, all panels are re-connected immediately following the steps above.

6. PV PANEL MONITORING USING BDG-256

Using BDG-256 gateway, DC current, voltage, power, daily energy, and temperature of each PV panel can be monitored using MICROVIEWER locally, or NEPVIEWER remotely. BDG-256 usage should refer to the BDG-256 gateway manual. Connection of BDG-256 and PVG-C is as follows:



7. SPECIFICATION

MODEL		PVG-n
INPUT(DC)	Max Recommended PV Power	450(*n)
	Max DC Open Circuit Voltage	80 per input
	Max DC Input Current (Adc)	14
OUTPUT(DC)	Maximum Output Power (Wp)	0 ~ 450(*n)
	Maximum Output Current	14
	Maximum Output Voltage	0 ~ Voc(*n)
SYSTEM	Maximum System Voltage	600/1000/1500
	Maximum Series Fuse Rating	15
PROTECTION	Protection Degree	NEMA-6
	Ambient Temperature	-40C——+85C
	Display	LED LIGHT
	Communications	DC Power Line
	Product Safety Compliance	NEC 2014/2017 690.12

8. Mark

The following label shall be permanently placed close to the PVG-C remote controller.