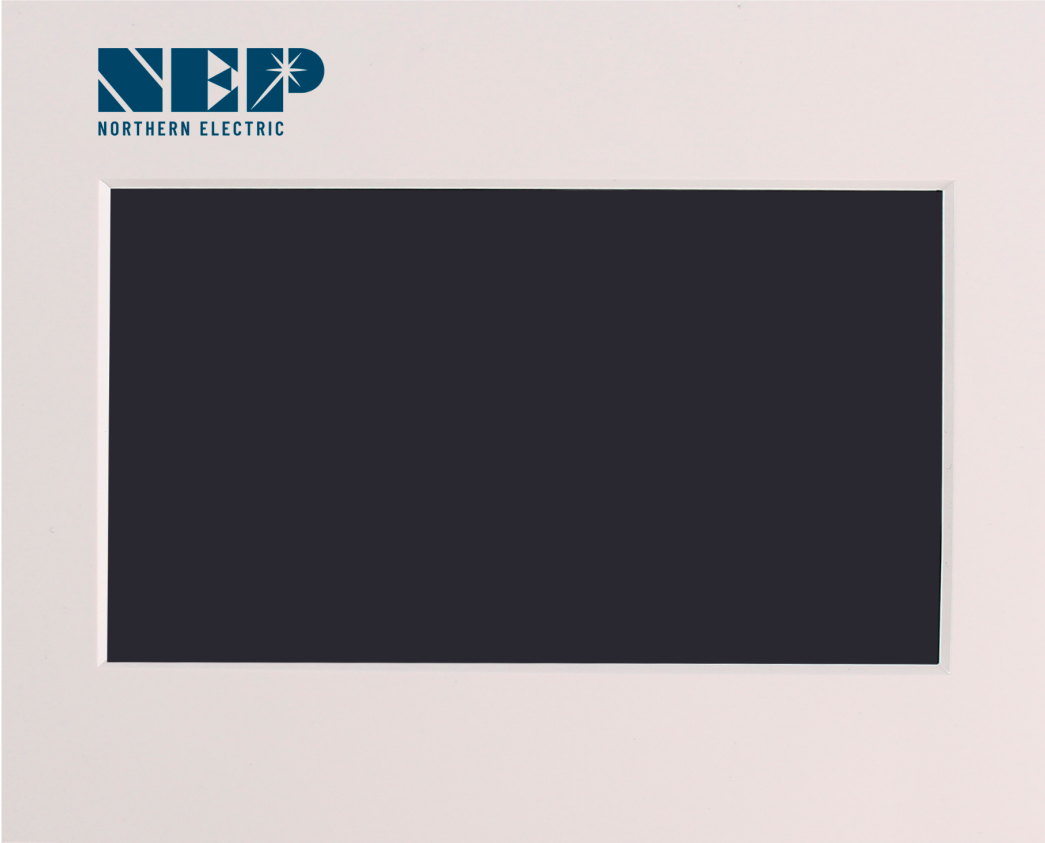
NORTHERN ELECTRIC

(888) 598-9901
info@northernep.com
www.northernep.com

Installation and Operation Manual

BDG-256 Gateway



RECOGNIZED COMPONENT
ETL
c US
Intertek

Modified 04/13/2023 by JMB

NORTHERN ELECTRIC

(888) 598-9901
info@northernep.com
www.northernep.com

Contents

Contents---- 2
COMPANY PROFILE---- 4
1. INTRODUCTION---- 5
1.1 Prefix---- 5
1.2 Standards Compliance---- 5
1.3 How to Use This Manual---- 5
1.4 Label---- 5
2. SAFETY INSTRUCTION---- 6
3. FCC COMPLIANCE---- 7
4. INSTALLATION---- 8
4.1 Check the BDG-256/BDG-256P3 shipping box for the following items:---- 8
4.2 Other Parts and Tools---- 8
4.3 Outdoor Installation---- 9
4.4 Indoor Installation---- 9
5. Connecting to Internet---- 11
5.1 Using Included Wi-Fi Booster---- 11
5.2 Connecting to Router via WPS---- 12
5.3 Connecting to Router Without WPS---- 13
5.4 Using Smart Movile Devices---- 14
5.5 Using AP (Access Point) Mode---- 15
5.6 Using Cell Modem---- 16
5.7 Test Internet Connection---- 16
5.8 Mobile App---- 16
6. Commissioning---- 17
6.1 Inverter/RSD Serial Input---- 17
6.1.A Manually on Device---- 17
6.1.B Using USB Barcode Scanner---- 18
6.1.C Using Web Browser---- 18
6.2 Installer Registration---- 19
6.3 Homeowner Registration---- 20
6.4 Pre-Commissioning Setup---- 20
6.4 Create a Site on NEP Website---- 20
6.5 Verify and Map Site---- 21
6.6 Commission the Gateway and Confirm Site Setup---- 21
6.7 Grant Homeowner Access to Module View (Optional)---- 21
7. User Interface---- 22
7.1 Main Interface---- 22
7.2 Interface Overview---- 23

Modified 04/13/2023 by JMB

7.3 Energy Functions---- 23
7.3.A Today's Energy---- 23
7.4 Settings---- 24
7.4.A IP Setting---- 24
7.4.B Date and Time Setting---- 24
7.4.C Communication Address Setting---- 25
7.5 Backup/Clear Data---- 25
7.6 Status Bar---- 26
8. Data Sheets---- 27
11. WARRANTY AND PRODUCTION INFORMATION---- 28
What does this warranty cover and how long does it last?---- 28
What will NEP do?---- 28
How do you get service?---- 28
What does this warranty not cover?---- 28
Disclaimer Product---- 29

NORTHERN ELECTRIC

(888) 598-9901
info@northernep.com
www.northernep.com

COMPANY PROFILE

Northern Electric Power Technology Inc. (NEP) is a U.S.-based company with manufacturing and R&D facilities in Asia. Our mission is to develop cutting-edge clean energy technologies and provide state-of-the-art solar inverter, rapid shutdown, and monitoring products to our customers.

Our headquarters are located in Tsingtao, a major industrial center and trading port in northeastern China. Our campus occupies over 18 acres in the Tsingtao Export Processing Zone, with more than 650,000 square feet of building space. We plan to connect our campus through a micro smart grid demo community, powered by solar, wind, and micro turbines. In addition to our headquarters, we have operation offices Pleasonton, USA.

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

NEP offers a complete product line of grid-tied solar inverters, including micro inverters ranging from 180W to 2000W, and industry leading Rapid Shutdown Devices (RSD). Our field deployment results have demonstrated the high efficiency and reliability of NEP solar inverters.

At NEP, we are committed to developing Clean, Reliable, Affordable, and Efficient products for our customers worldwide.

NORTHERN ELECTRIC

(888) 598-9901
info@northernep.com
www.northernep.com

1. INTRODUCTION

1.1 Prefix

The BDG-256/BDG-256P3 communication gateway for BDM micro inverters. We hope that our products will meet your needs for renewable energy. We highly value your feedback regarding our products and would greatly appreciate any comments you may have.

Thank you for your business, and please do not hesitate to contact us if you have any questions or concerns.

1.2 Standards Compliance

The BDG-256 complies 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 BDG-256/BDG-256P3 gateway. 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

	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 mark The product complies with essential requirements of relevant directives of EU.

Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

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.

IT IS IMPORTANT TO NOTE THAT NOTHING INSIDE THE PRODUCT SHOULD BE MODIFIED, ASIDE FROM THE CABLE CONNECTORS. ANY MODIFICATION TO THE INTERNAL COMPONENTS OF THE PRODUCT MAY RESULT IN MALFUNCTION OR DAMAGE, AND MAY ALSO VOID THE PRODUCT'S WARRANTY.

ALL INSTALLATION SHOULD FOLLOW THE LOCAL ELECTRIC CODES.

WHEN THE PHOTOVOLTAIC ARRAY IS EXPOSED TO LIGHT, IT SUPPLIES A DC VOLTAGE TO THE PVG RSD

THIS PHOVOLTAIC RAPIC SHUTDOWN EQUIPMENT (PVRSE) DOES NOT PERFORM ALL OF THE FUNCTIONS OF A COMPLETE PHOTOVOLTAIC RAPIC SHUTDOWN SYSTEM (PVRSS). THIS PVRSE MUST BE INSTALLED WITH OTHER EQUIPMENT TO FORM A COMPLETE PVRSS THAT MEETS THE REQUIREMENTS OF NEC (NFPA 70) SECTION 690.12 FOR CONTROLLED CONDUCTORS OUTSIDE THE ARRAY. OTHER EQUIPMENT INSTALLED IN OR ON THIS PV SYSTEM MAY ADVERSLY AFFECT THE OPERATION OF THE PVRSS. IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT THE COMPLETED PV SYSTEM MEETS THE RAPIC SHUTDOWN FUNCTIONAL REQUIREMENTS. THIS EQUIPMENT MUST BE INSTALLED ACCORDING TO THE MANUFACTURER’S INSTALLATION INSTRUCTIONS.

(888) 598-9901
info@northernep.com
www.northernep.com

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.

(888) 598-9901
info@northernep.com
www.northernep.com

4. INSTALLATION

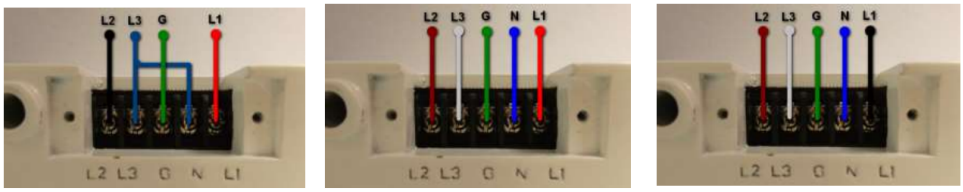
4.1 Check the BDG-256/BDG-256P3 shipping box for the following items:

- BDG-256/BDG-256P3 Communications Gateway
- AC power cord (BDG-256)
- BDG-256/BDG-256P3 Communications Gateway Installation and Operation Manual and Warranty

For BDG-256, there are three types of AC power code for three major regions of the world.

Region	Accessory Part Number
North America	BDG-256-PC-NA
Europe	BDG-256-PC-EU
Australia	BDG-256-PC-AU

For BDG-256P3, the wires are connected following the marks on the gateway



(US) (Australia) (Europe)

4.2 Other Parts and Tools

- Ethernet cable
- USB devices, such as USB disk, USB keyboard, USB mouse, USB scanner, etc

Ethernet cable is used to connect the BDG-256/BDG-256P3 to an Ethernet router or hub. There is a web server built inside BDG-256/BDG-256P3, which can be visited by type in the BDG-256/BDG-256P3 IP address on a web browser. If the BDG-256/BDG-256P3 is connected to the internet directly or through a router, users may also visit the

BDG-256/BDG-256P3 through a website.

USB devices can be connected to the BDG-256/BDG-256P3 through the USB connecter. Multiple types of USB devices are supported by BDG-256/BDG-256P3, including USB disk, USB keyboard, USB mouse, USB scanner, etc.

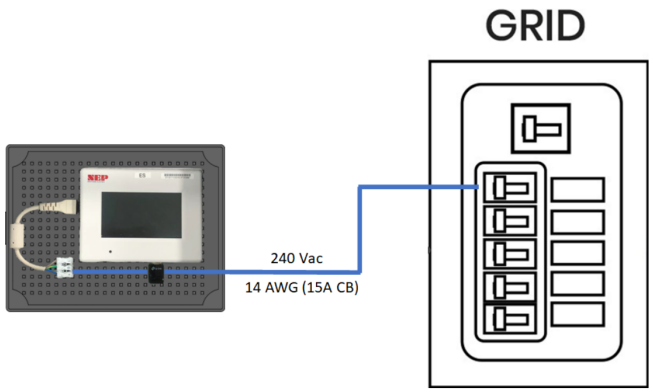
Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

4.3 Outdoor Installation

When installed outdoors, the BDG-256 must be housed inside a weatherproof outdoor enclosure. An enclosure is included with your purchase of the Gateway. For installations in the U.S. and Japan, the L1 and L2 wires must be connected to the power terminal located inside the weatherproof outdoor enclosure. For installations in Europe, the L and N wires must be connected to the power terminal inside the weatherproof outdoor enclosure.





4.4 Indoor Installation

The BDG-256 and BDG-256P3 gateways can be installed indoors by mounting them directly on a wall. We recommend hardwiring the gateway to the power terminals, but it can also be powered using the included power plug. When using the power plug, it should be plugged into a 120/240Vac outlet (for U.S. and Japan) or a 230Vac outlet (for Europe and other countries). If the power plug is connected to an outlet, it should not have GFCI protection.

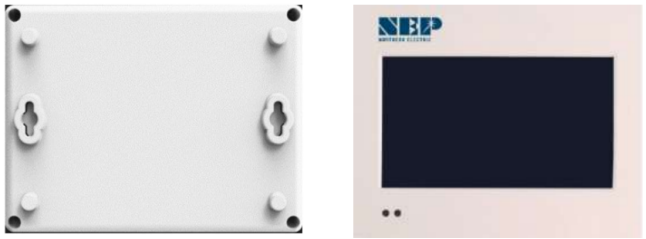


Figure 5 Back and front View



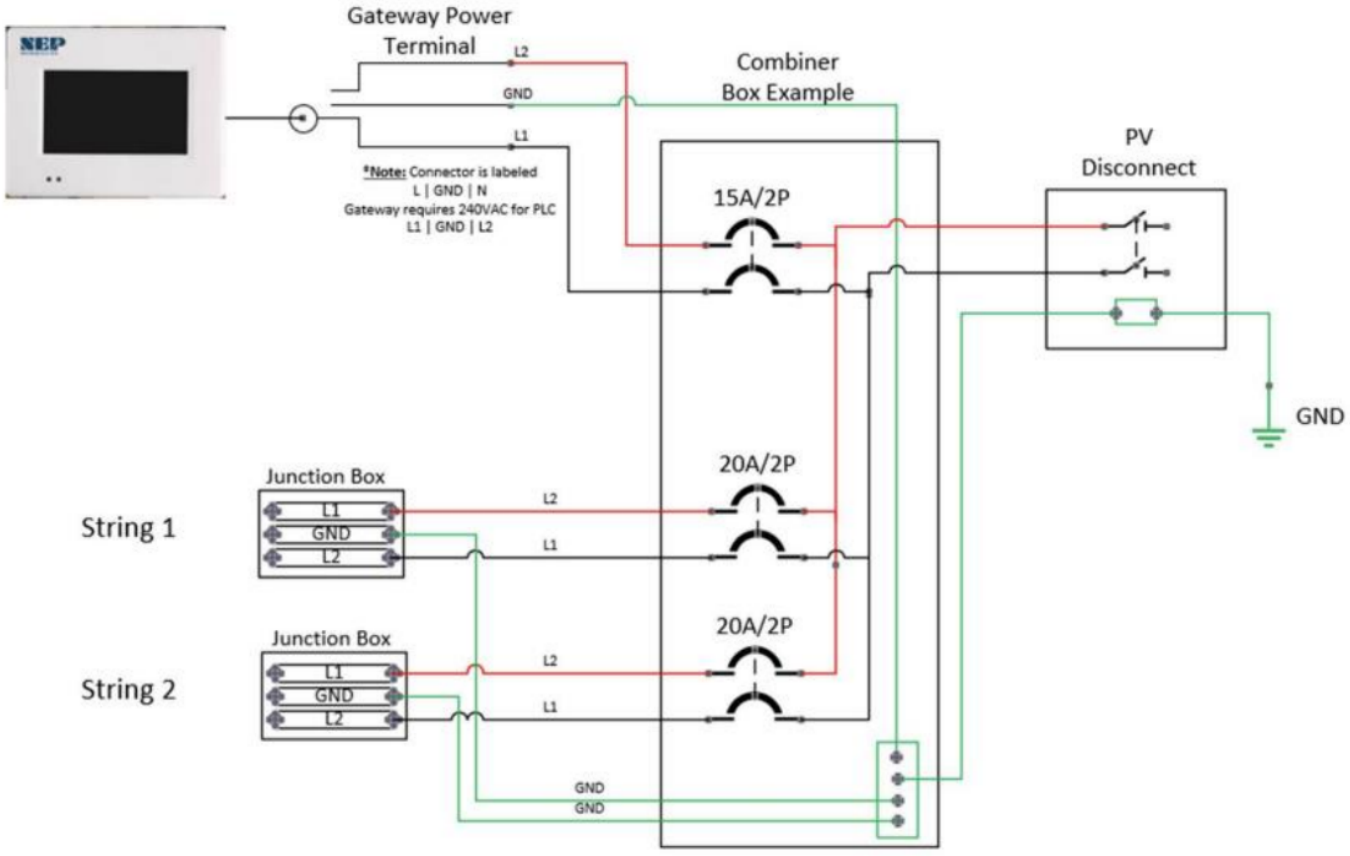
Figure 6 240Vac outlet (US and Japan)



Figure 7 230Vac outlet (Europe)

Modified 04/13/2023 by JMB

NORTHERN ELECTRIC
(888) 598-9901
info@northernep.com
www.northernep.com



Modified 04/13/2023 by JMB

NORTHERN ELECTRIC

(888) 598-9901
info@northernep.com
www.northernep.com

5. Connecting to Internet

5.1 Using Included Wi-Fi Booster

- Plug the Booster directly into the same outlet as the Gateway or into an outlet within 5ft of the Gateway.
- Insert the TP-Link (Black USB) into the bottom of the Gateway
- Go to Settings and select "System Config". Make sure to click on the box next to Engineer Mode. A pop-up will then ask for a password. The password is "1,2,3,4".
- Go back to Settings and select Ethernet, then select WPS, and finally select Yes to set the Gateway to WPS mode.
- The screen should have a pop-up that says “Looking to Connect”
- Go to the booster and click the white button on the bottom of the unit next to the ethernet port. Make sure you click and release this button.
- Within two minutes the gateway should say Connected.
- Before disconnecting click “okay” to Reboot the Gateway
- After the reboot is finished, unplug the booster and plug it in to the outlet next to the router.
- Connect the booster to the router via ethernet cable (make sure to use the cord provided in the box)
- Make sure all 3 icons on the booster are lit up blue.
- Go back to the Gateway and open settings and select Network Test. Run a Network Test to make sure the connection is Good.
- Scroll to the left of the setting's screen and click on Date&Time. Make sure you select the box next to "Synchronize with internet clock".

Note: The Booster must be plugged directly into an outlet and **cannot be used with extension cables**.
Note: Wait for the system to restart after connecting **before** moving the Booster.



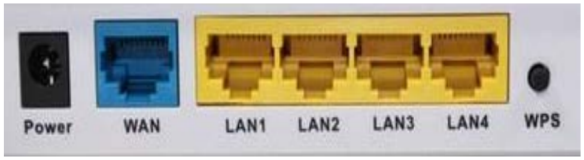
(888) 598-9901
info@northernep.com
www.northernep.com

5.2 Connecting to Router via WPS

- Plug the wireless adapter to BDG-256 gateway, and wait for several seconds for several seconds



- Press the WPS button on the router for 2 seconds, and for most routers, the WPS button would flash at this point



- Within 2 minutes, return to the BDG-256 gateway, click on Setting/Ethernet, and press “WPS” (the red button). If the gateway reports the WPS setup is successful, the IP address on the gateway screen will be updated instead of 0.0.0.0 within 5 minutes

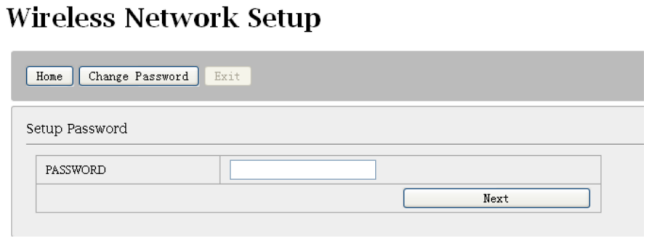


Modified 04/13/2023 by JMB

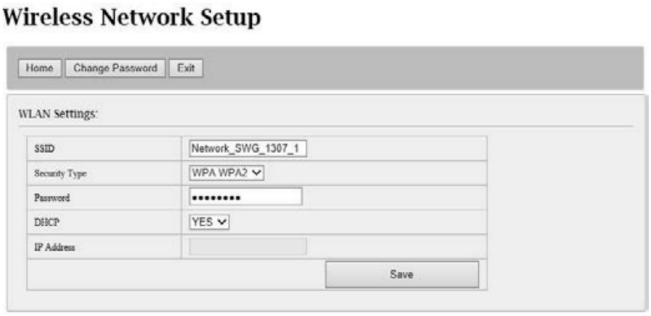
(888) 598-9901
info@northernep.com
www.northernep.com

5.3 Connecting to Router Without WPS

- Connect the BDG gateway to a router with a cable, and a few seconds later, an IP address will appear at the bottom of the BDG-256 screen
- Log on to the webpage: http://BDG_IP/wifi (BDG-IP refers to the IP shown at the bottom of BDG-256 screen, e.g. 10.208.32.52)
- Set Wi-Fi parameters
- Enter the password “gateway”



Set WLAN parameters and save your settings



SSID: This is the name of your home wireless network.

Security type: The wireless adapter supports several security protocols. Please refer to the user manual for your wireless router to determine the appropriate security type (although the default setting works for most routers).

Password: Enter the password for your home wireless network.

DHCP: If set to "yes," the wireless router will automatically assign an IP address to the gateway. This is the most common setting and does not need to be changed unless you're an advanced user.

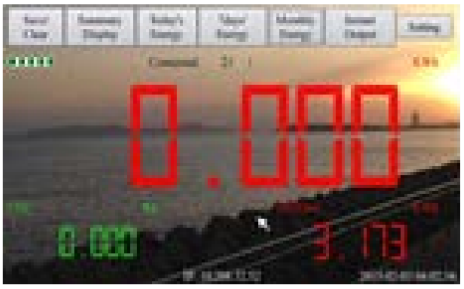
IP: If DHCP is set to "no," advanced users can manually assign an IP address to the gateway. However, be cautious when using this setting, as setting an incorrect IP address can result in conflicts with other network devices.

Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

- Plug in the wireless adapter, and then reboot gateway

If a Wi-Fi connection is established, a signal strength bar will be displayed in the upper left corner of the screen and the IP address of the gateway will appear at the bottom of the screen.



5.4 Using Smart Movile Devices

- On an iPhone, click on Settings/General/About. Input name “MI Installer”
- Turn on “Personal Hotspot”, and input Wi-Fi Password “my-gateway”. This password is for other devices such as the BDG-256 gateway to connect to this mobile device.
- On the BDG-256 gateway, click on Setting/Ethernet, and choose “Connect to Mobile” or “Link to Mobile” (the green button).



- If the connection has been set, a flashing banner “Personal Hotspot: 1 Connection” will appear at the top of the iPhone screen.
- Continue from Step-3 of **5.2**
- After using the hot-spot communication, Wi-Fi setup can be restored, if the Wi-Fi configuration in BDG-256 gateway is not changed by hot-spot link. First hit on the button “Disconnect from Mobile” (see Step-3), and then reboot the gateway, then the Wi-Fi connection will be restored.

NOTE:

1. set the name of the hotspot link as **“MI Installer”**
2. set the password of the hotspot link as **“my-gateway”**

Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

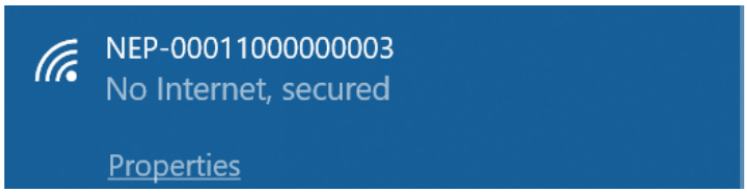
5.5 Using AP (Access Point) Mode

Note: This method only applies to BDG-256 gateways with firmware version "20170701-01" or later, and with the "TP-LINK" WiFi dongle shipped inside the BDG-256 box.

- Click on the AP button on the BDG-256 gateway and follow the instructions to reboot the gateway. Note that after reboot the IP address at the bottom of the gateway is 192.168.99.1



- Search for a WiFi network named NEP-xxxxxxxxxxxxxx (xxxxxxxxxxxxxx is the gateway SN) on a phone or computer, and link the phone or computer to this WiFi network, the password is 12345678



- Log on to the webpage: http://192.168.99.1/wifi Enter password gateway

- The pull down menu SSID List shows all available WiFi networks. Click on Search WiFi may rescan the available WiFi networks. If the WiFi network is "hidden" and does not show in the list, the network name can also be input manually on the line of SSID



Modified 04/13/2023 by JMB

- Click on Save. Uncheck AP on the BDG-256 gateway touch screen and then reboot the gateway following instructions

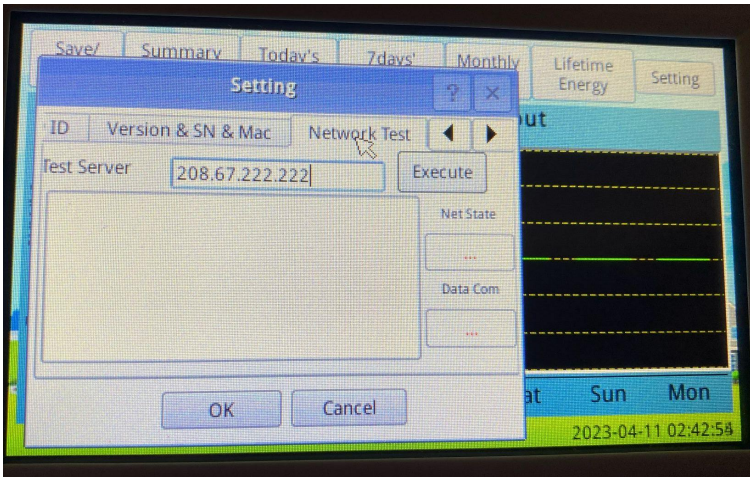
If Wi-Fi is connected, a signal strength bar at the left upper corner and an IP address at the bottom should be notified.

5.6 Using Cell Modem

- Power on the NEP cell modem kit.
- Verify that the AT&T 5-year prepaid SIM card is already pre-installed in the kit.
- Make sure that everything is connected properly and securely out of the box.
- Power on the Gateway.
- Test the Wi-Fi connection of the Gateway by following the steps in **5.7**

5.7 Test Internet Connection

- To test the Wi-Fi connection of the gateway, navigate to the Menu and select Network Test, then select Execute on the gateway. The gateway will then check the network connection and report whether the connection is "Good" or "Bad."



5.8 Mobile App

Search for "**NEPViewer**" at APP store

Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

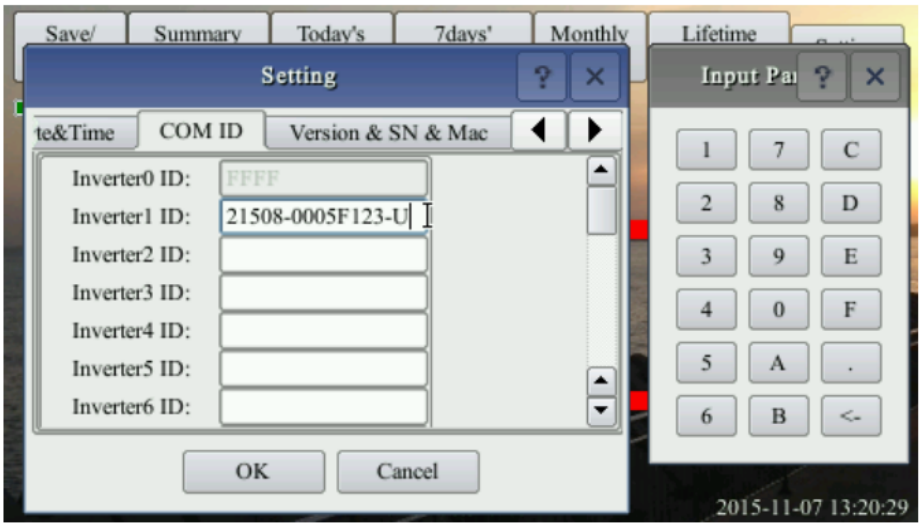
6. Commissioning

6.1 Inverter/RSD Serial Input

Before beginning the process of serial input, it is crucial to have a complete site map to determine the order in which serial numbers will be inputted. It is important to note that the module connected to the longer DC connection on the inverter will end in 1, while the module connected to the shorter DC connection will end in 0.

6.1.A Manually on Device

- One method of inputting serial numbers is manually with the provided stylus directly into the gateway. Although this method may be difficult for larger PV arrays, it can be a simple solution for small arrays. To input serial numbers, navigate to Setting → COM ID on the gateway, where a list of empty cells and inverter numbers will be displayed on the left side.
- To input serial numbers, locate the values between the dashes from the list of serials on your site map. For example: 21508-0005F130-U. It's important to note which serial corresponds to each inverter/module number on your site map for easier input later into the web portal. Once the serial number is inputted and saved, the gateway will prompt a reboot.



(888) 598-9901
info@northernep.com
www.northernep.com

6.1.B Using USB Barcode Scanner

- NEP offers a barcode scanner that can simplify the process of inputting serial numbers. To use the scanner, plug it into the gateway's USB port and navigate to the COM ID screen as in section 6.1.A. Scan the barcode of the desired module into the Inverter1 cell, and repeat until all serial numbers have been input. Make sure to note which module corresponds to each serial number for easier identification later on. Once all serials have been input, the gateway will prompt for a reboot.

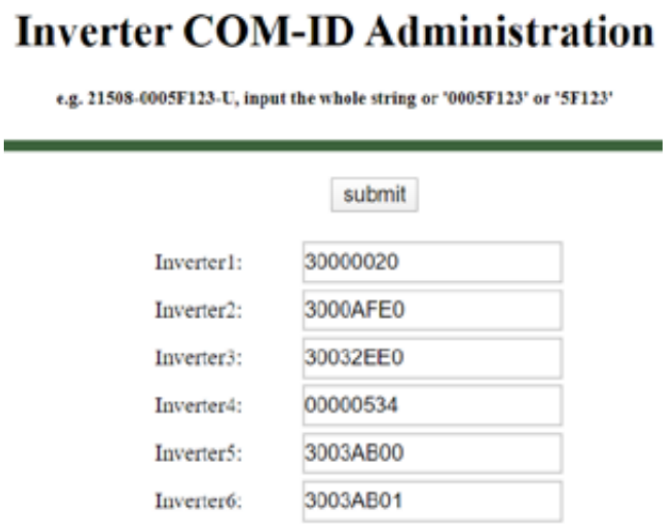


6.1.C Using Web Browser

- Another option for serial input is through a web browser. This method requires the gateway to be assigned an IP address and connected to WiFi. To begin, access the web browser on your device (such as a phone or laptop) and enter the gateway's IP address followed by "/module"

(e.g. http://192.168.99.1/module)

- Once on the module input screen, you can easily input the serial numbers using your keyboard. After inputting all the necessary serial numbers, remember to reboot the gateway to ensure the changes are applied. To do this, simply remove the power source and plug it back in. Finally, return to the module input screen on the gateway to confirm that all the serial numbers were successfully entered.

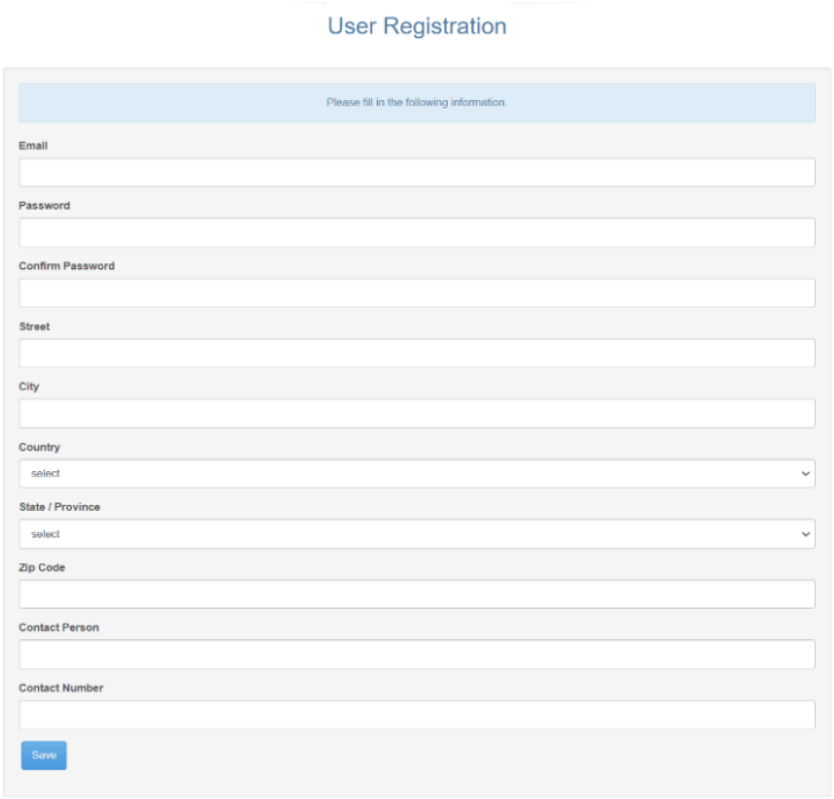


Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

6.2 Installer Registration

- If you are new to using NEP products, please visit our registration page at https://user.nepviewer.com/pv_manager/register.php?lang=en to create an account for yourself or your company. We recommend providing as much detail as possible to help us better understand your needs.
- Once you have registered, please contact NEP Support via email at support@northernep.com or by calling (888) 598-9901 to have your account upgraded to an installer account. This will allow you to access additional features and resources to help you better manage your NEP products.



6.3 Homeowner Registration

- To start using NEP products, homeowners can register for an account by visiting https://user.nepviewer.com/pv_manager/register.php?lang=en. Once they have created their account, they can begin to enjoy the benefits of NEP's solar products.

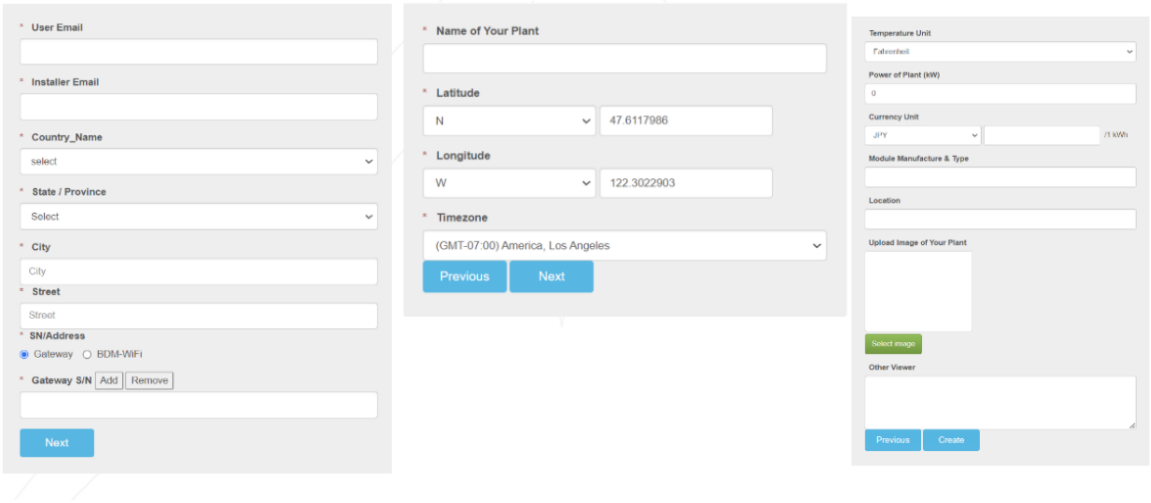
6.4 Pre-Commissioning Setup

- Begin by connecting the BDG-256 gateway to the internet using one of the three methods outlined in the "BDG-256 Quick Installation Guide."
- Once connected, enter the serial numbers of the inverters using one of the three methods described in the same guide.

Note: It is recommended to complete steps 3.1 and 3.2 in a warehouse or homeowner's garage using a standard 120V outlet before installing the gateway onto the home's 240V wiring. Only perform Step 6.4b prior to arriving at the job site if using the NEP range extender.

6.4 Create a Site on NEP Website

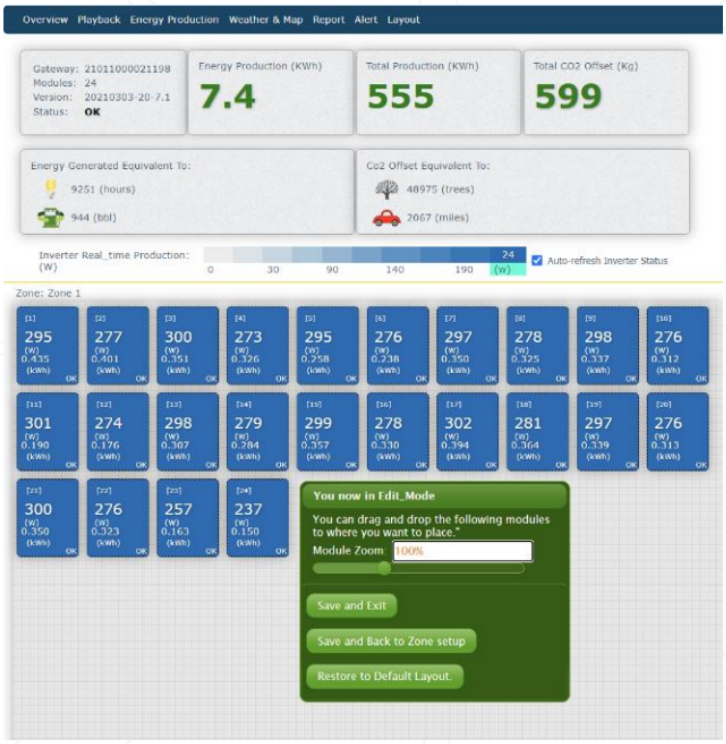
- Access your installer account on the NEP website at https://user.nepviewer.com/pv_manager/login.php using your registered email and log in to your account. Then, click on the "Add Site" button to create a new site.
- Fill out all the necessary fields in the site creator, including the serial number of the gateway, which can be found on the top-left of the gateway bezel or by navigating to Menu > Software on the gateway. If you have multiple gateway serial numbers, click the "Add" button above the serial number field to add more.
- Provide a name for the site and enter its accurate coordinates to receive precise weather data on the following page
- On the last page of the site creator, provide any additional information that you deem necessary and then click the "Create Site" button to create the site.



Modified 04/13/2023 by JMB

6.5 Verify and Map Site

- Once you have confirmed the creation of the site on the NEP website, navigate to your dashboard where you should be able to see it.
- Click on the site to access its information and then click on "Open Viewer." The site's production data should now be visible on the first page. Note that it may take up to two hours for the gateway and inverters to fully register with the website.
- To access the module view, click on the dial. Here, you should see each microinverter listed. If you cannot see them, verify that the microinverters are listed on the device's ComID menu or allow more time for them to register.
- You can customize the site layout by navigating to Layout > Manage Layout. From here, you can drag modules as needed and change their orientation. You can also add different zones for various roofs or sections of the same roof from the Layout tab.



6.6 Commission the Gateway and Confirm Site Setup

- Contact NEP Support by emailing support@northernep.com or calling (888) 598-9901 to schedule a commissioning appointment for the gateway and to confirm that the site was set up correctly.

6.7 Grant Homeowner Access to Module View (Optional)

- Note that homeowners do not have access to the module view by default. If you would like to grant them access, please contact NEP Support via email at support@northernep.com or call (888) 598-9901.

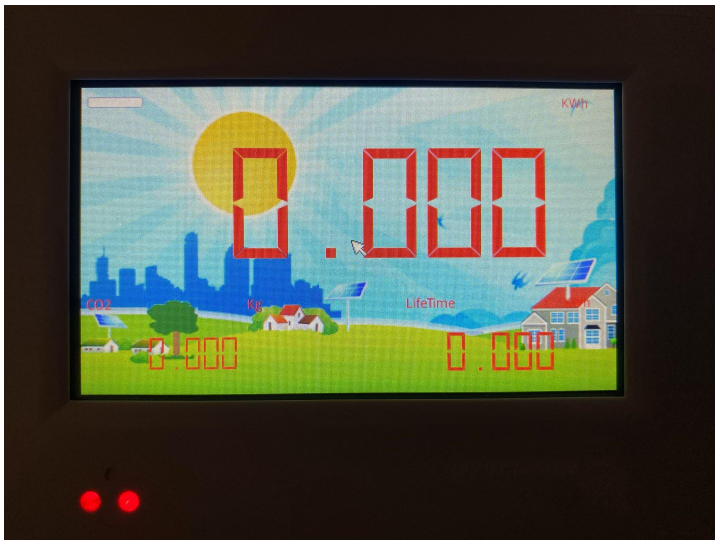
Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

7. User Interface

7.1 Main Interface

- BDG-256/BDG-256P3 takes approximately 1-2 minutes to start up after power has been turned on. During start-up, the system performs a series of checks to ensure that it is functioning correctly. Once start-up is complete, the system will enter the main interface shown in Fig. 8, which displays real-time data about the system's performance. Note that all three numbers will read “0” at start-up for the first time, but they will begin to update as data is collected.



The BDG-256/BDG-256P3 main interface, as shown above, is organized into three horizontal rows: the top tool bar, middle display area, and lower status bar. The tool bar contains 7 buttons: Save/Clear, Summary Display, Today's Energy, 7-Day's Energy, Monthly Energy, Yearly Energy, and Settings. Each button is used to display their respective content in the middle display area. This area shows the power-time curve for the current day as well as a power generation bar chart. The status bar displays the device status, IP address, and current date. It is important to note that after powering on the BDG-256/BDG-256P3, it will take approximately 1-2 minutes to start up and enter the main interface, which initially displays all three numbers as "0."

7.2 Interface Overview

- If the main interface remains idle for 2-3 seconds, it will automatically switch to a numeric summary interface. This interface is divided into three parts. The upper part displays Today's Energy, which shows the current day's power generation. The lower right corner displays Lifetime, which shows the total power generation since the device started recording. The lower left corner displays CO2 reduction, which shows the amount of carbon dioxide emissions reduced due to the use of the system. Touching any part of the screen will bring up the main interface again.

7.3 Energy Functions

The BDG-256/BDG-256P3 has a menu bar located at the top of the screen, which provides access to different screen pages related to energy and power. These pages can be accessed by pressing the corresponding menu button.

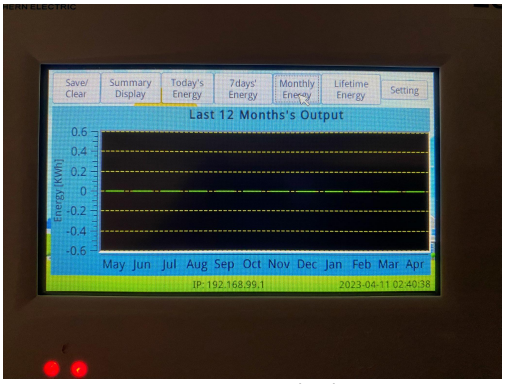
7.3.A Today's Energy

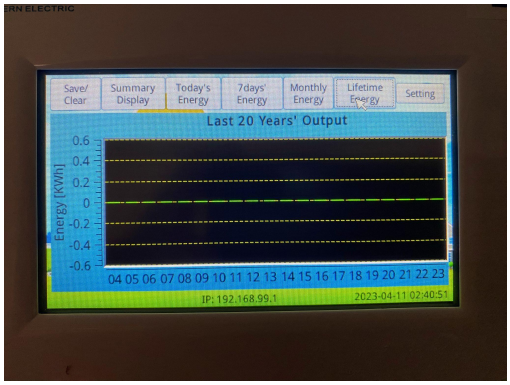
- **Today's Energy--**Pressing the Today's Energy button will display the power-time curve screen, as shown in Figure 10. The x-axis represents time (4:00-20:00), and the y-axis represents the output power (kW) of NEP microinverters (BDM-250). The total output energy (kWh) is displayed in the upper left corner, while the real-time output power (kW) and today's total energy generated (kWh) are displayed in the upper right corner. Users can magnify a part of the curve by drawing a box on it using their finger or a touch pen. Pressing the Today's Energy button again cancels the enlarged display and restores the original display.

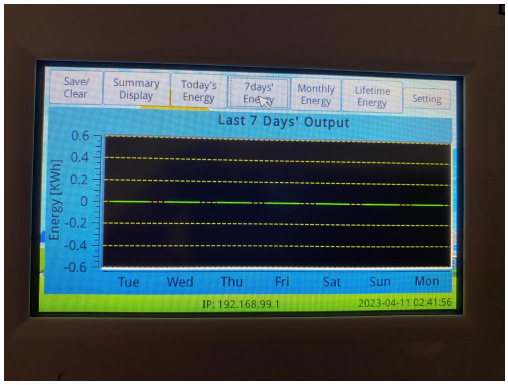
- **Last 7 Days Energy--**Pressing the "Last 7 Days Energy" button will display a bar chart showing power generation over the past 7 days (see Figure 12). The x-axis represents the date, with the last one corresponding to today, and the y-axis represents the amount of energy generated (kWh) on each day.

- **Monthly Energy--**Pressing the Monthly Energy button will display a bar chart presenting the power generation for each month of the past 12 months (refer to Figure 13). The display is similar to the Last 7 Days Energy chart, with the x-axis representing each month and the current month displayed last. The y-axis represents the amount of energy generated (kWh) in each month.

- **Lifetime Energy**--When you press the Lifetime Energy button, you'll see a bar chart displaying the power generation over each year for the past 20 years (see Figure 14). This chart is similar to the Last 7 Days' Energy display. The x-axis shows the years, with the current year at the end. The y-axis represents the amount of energy generated (kWh) in each year.







Modified 04/13/2023 by JMB

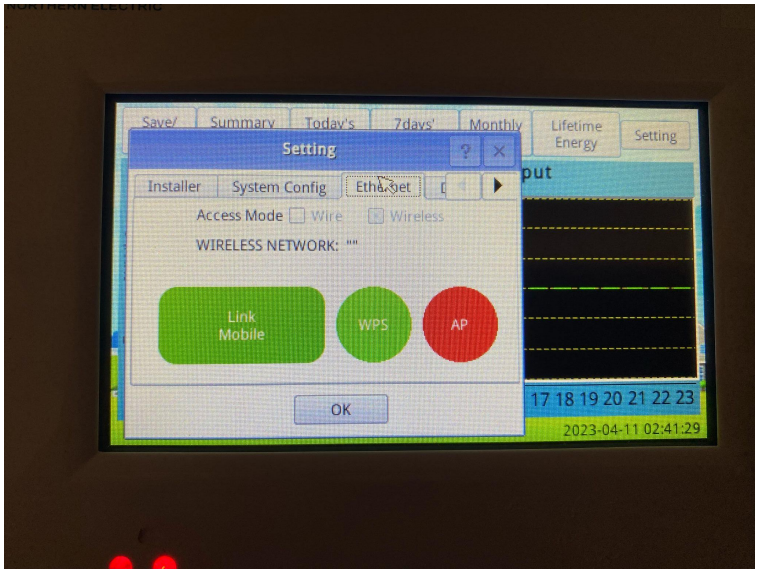
(888) 598-9901
info@northernep.com
www.northernep.com

7.4 Settings

To access the settings of the BDG-256/BDG-256P3, press the "Settings" button located in the tool bar at the top of the screen. This will bring up the settings dialogues.

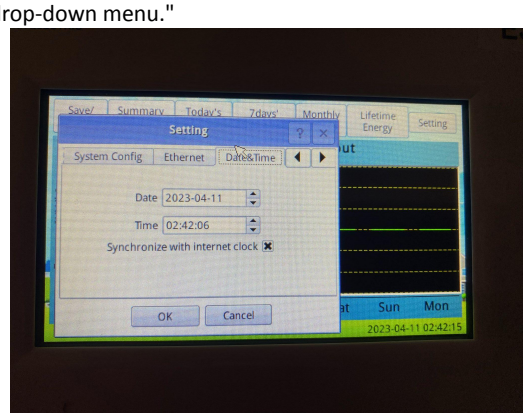
7.4.A IP Setting

- The BDG-256's IP address can be manually set in the Ethernet settings tab (refer to Figure 15) or obtained through DHCP, which requires a system restart after setting. To change the IP address, double-click on the address box to bring up a small keypad on the screen.



7.4.B Date and Time Setting

- "The Date & Time settings tab (Figure 16) is used to set the date, time, and time zone. BDG-256 supports all five time zones of North America, and for other parts of the world, users may choose the "World" time zone or select their specific time zone from the drop-down menu."

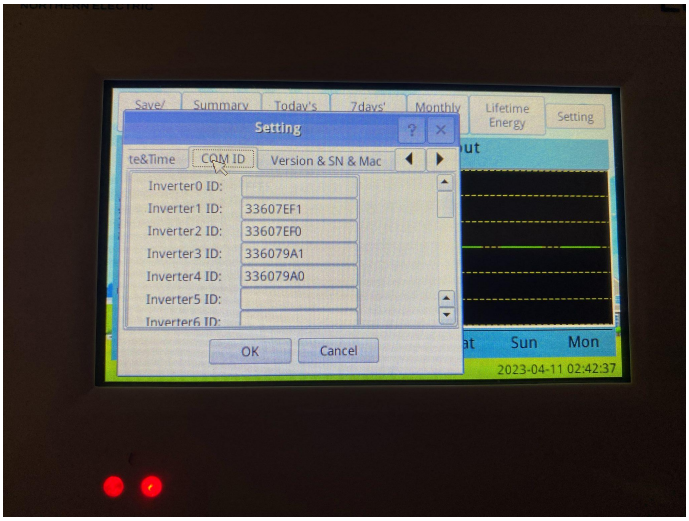


Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

7.4.C Communication Address Setting

- The Communications Address Settings tab (Figure 17) is used to assign power line communication addresses to the micro-inverters that are connected to the BDG-256 gateway. A single gateway can monitor up to 255 micro-inverters, and Inverter-0 on the address list corresponds to the total output of all the inverters connected to the gateway.
- Communication addresses can be input using either the small input panel on the touch screen or an external USB keyboard. The communication address of a micro-inverter consists of the 8 hexadecimal characters (0~F) on the BDM micro-inverter barcode before the last letter indicating the country. Alternatively, micro-inverter communication addresses can also be input through an internal web portal (see Section 5).



7.5 Backup/Clear Data

- When a USB flash drive is inserted, press the Save/Clear button on the toolbar to access the Save/Clear dialog box (see Figure 18). This dialog box allows you to save or restore the gateway's configuration files, or clear the configuration to restore factory defaults. To save the configuration file to the USB drive, select "Save Configuration," and to restore a previously saved configuration, select "Restore Configuration." To clear the configuration and restore factory defaults, select "Clear Configuration."

- Press the "Save" button to initiate the backup process and then confirm by selecting "Yes" in the pop-up window that appears. This will compress and backup all the collected data to the USB flash disk, and the backup file will be automatically named using the backup date.
- To clear all collected data, press the Reset button on the BDG-256/BDG-256P3 device. A confirmation window will appear; press "Yes" to proceed. This action will only clear the collected data and will not change any device settings.

(888) 598-9901
info@northernep.com
www.northernep.com

7.6 Status Bar

- The status bar, located at the bottom of all display pages, shows the device's current operating status, IP address, and date and time. The status "OK" indicates that the device is operating normally. In case of a malfunction, a 16-bit error code will be displayed in hexadecimal format. The meaning of the error code can be found in the table below.

Error code	Error
Bit-0	DC over voltage
Bit-1	DC under voltage
Bit-2	hardware error
Bit-3	Inverter over voltage
Bit-4	Frequency over
Bit-5	Frequency under
Bit-6	AC voltage RMS over
Bit-7	AC voltage RMS under
Bit-8	Peak AC voltage over
Bit-9	AC current RMS over
Bit-10	Peak AC current over
Bit-11	Temperature over
Bit-12	ADC error
Bit-13	GFDI fault indicator
Bit-14	Relay error (for some model)
Bit-15	PLC Communication Error

Modified 04/13/2023 by JMB

8. Data Sheets

Communication with Micro Inverter	Power Line Communication
Ethernet	10/100 auto-sensing, auto-negotiation
USB	USB 2.0 interface, auto-sensing, auto-negation
Wi-Fi	Support (accessory required)
Monitoring capacity	255 micro inverters (depending on interference on power grid)

HUMAN INTERFACE

Display	LCD touch screen

POWER REQUIREMENTS

AC inlet	100- 240 Vac, 50/60 Hz, 60mA
Power consumption	3.5 watts maximum

MECHANICAL DATA

Dimensions (W x H x D)	6.69" x 4.33" x 1.46" (170mm x 110 mm x 37 mm)
Weight	5.29 oz (150g)
Ambient temperature range	-40˚C to +55˚C (-40˚ to 131˚F) -40˚C to +49˚C (-40˚ to 120˚F) if installed in an enclosure
Cooling	Natural convection - no fans
Ennvironmental rating	IP30. For installation indoors or in an NRTL-certified, NEMA type 3R enclosure.

FEATURES

Standard warranty term	1 Year
Compliance	UL 60950-1 2 ed Edition Rev Dec 19, 2011 CSA C22.2 2 ed Edition Rev Dec 19, 2011 FCC Part 15 Class B AS/NZS 60950.1:2011 Inc A1 AS/NZS CISPR 22: 2009+A1:2010 EN 60950-1:2006+A11:2009+A1:2010 +A12:2011 EN 55022:201 EN 61000-3-2:2006+A1:2009+A2:2009 EN 61000-3-3:2008 EN 55024:2010 EMC Directive 2004/108/EC

Modified 04/13/2023 by JMB

(888) 598-9901
info@northernep.com
www.northernep.com

11. WARRANTY AND PRODUCTION INFORMATION

What does this warranty cover and how long does it last?

This Limited Warranty is provided by Northern Electric & Power Co. Ltd (NEP) and covers defects in workmanship and materials in your BDG-256. This Warranty Period lasts for 1 year from the date of purchase at the authorized point of sale to you, the original end user customer, unless otherwise agreed in writing. You will be required to demonstrate proof of purchase to make warranty claims.

This Limited Warranty is transferable to subsequent owners but only for the unexpired portion of the Warranty Period. Subsequent owners also require original proof of purchase as described in "What proof of purchase is required?"

What will NEP do?

During the Warranty Period, NEP will, at its option, repair the product (if economically feasible) or replace the defective product free of charge, provided that you notify NEP of the product defect within the Warranty Period, and provided that NEP through inspection establishes the existence of such a defect and that it is covered by this Limited Warranty.

NEP will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. NEP reserves the right to use parts or products of original or improved design in the repair or replacement. NEP repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of NEP.

How do you get service?

If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact NEP directly at:

Northern Electric & Power Inc

Email: support@northernep.com

What does this warranty not cover?

Claims are limited to repair and replacement or if in NEP's discretion that is not possible, reimbursement up to the purchase price paid for the product. NEP will be liable to you only for direct damages suffered by you and only up to a maximum amount equal to the purchase price of the product.

This Limited Warranty does not warrant uninterrupted or error-free operation of the product or cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and NEP will not be responsible for any defect in or damage to: a) the product if it has

(888) 598-9901
info@northernep.com
www.northernep.com

been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment; b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the NEP product specifications including high input voltage from generators and

lightning strikes; c) the product if repairs have been done to it other than by NEP or its authorized service centers (hereafter "ASCs"); d) the product if it is used as a component part of a product expressly warranted by another manufacturer; e) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed; f) the product if it is located outside of the country where it was purchased; and g) any consequential losses that are attributable to the product losing power whether by product malfunction, installation error or misuse.

Disclaimer Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY NEP IN CONNECTION WITH YOUR NEP PRODUCT AND IS, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL NEP BE LIABLE FOR: (a) ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, LOST REVENUES, FAILURE TO REALIZE EXPECTED SAVINGS, OR OTHER COMMERCIAL OR ECONOMIC LOSSES OF ANY KIND, EVEN IF NEP HAS BEEN ADVISED, OR HAD REASON TO KNOW, OF THE POSSIBILITY OF SUCH DAMAGE, (b) ANY LIABILITY ARISING IN TORT, WHETHER OR NOT ARISING OUT OF NEP'S NEGLIGENCE, AND ALL LOSSES OR DAMAGES TO ANY PROPERTY OR FOR ANY PERSONAL INJURY OR ECONOMIC LOSS OR DAMAGE CAUSED BY THE

CONNECTION OF A PRODUCT TO ANY OTHER DEVICE OR SYSTEM, AND (c) ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

IF YOU ARE A CONSUMER (RATHER THAN A PURCHASER OF THE PRODUCT IN THE COURSE OF A BUSINESS) AND PURCHASED THE PRODUCT IN A MEMBER STATE OF THE EUROPEAN UNION, THIS LIMITED WARRANTY SHALL BE SUBJECT TO YOUR STATUTORY RIGHTS AS A CONSUMER UNDER THE EUROPEAN UNION PRODUCT WARRANTY DIRECTIVE 1999/44/EC AND AS SUCH DIRECTIVE HAS BEEN IMPLEMENTED IN THE EUROPEAN UNION MEMBER STATE WHERE YOU PURCHASED THE PRODUCT. FURTHER, WHILE THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM EU MEMBERSTATE TO EU MEMBERSTATE OR, IF YOU DID NOT PURCHASE THE PRODUCT IN AN EU MEMBER STATE, IN THE COUNTRY YOU PURCHASED THE PRODUCT WHICH MAY VARY FROM COUNTRY TO COUNTRY AND JURISDICTION TO JURISDICTION.