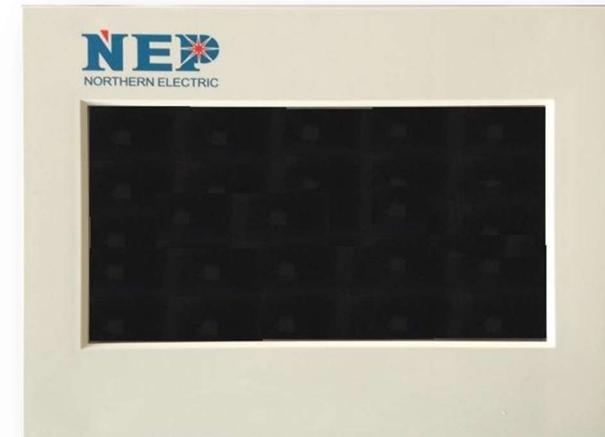




Installation and Operation Manual

NEPGatewayBDG256/BDG-256P3



USA

Address: 2570 N. First Street, Suite 200, San Jose, CA 95131
TEL: +1 888-598-9901

Japan

Address: 〒810-0012 福岡県福岡市中央区白金1丁目2-1-16 2階
TEL: +81 050-6865-7085

China

Address: ShouchuanCenter, No.6 Changcheng South Road, Chengyang District,
Qingdao, China, 266109
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Web: <http://www.northernep.com>



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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.

NEP has a complete product line of grid-tied solar inverters, including 250W~800W micro inverters, Rapid shutdown. 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 BDG-256/BDG-256P3 communication gateway for BDM micro inverters. We hope you will find our products meet your need for renewable energy. Meantime, we appreciate your feedback regarding our products.

1.2 How to Use This Manual

This manual provides detailed product information and installation instructions for the BDG-256/BDG-256P3 micro solar inverter. 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.

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 WARRANTY. BESIDES THE CABLE CONNECTORS, NOTHING INSIDE THE GATEWAY SHOULD BE MODIFIED. ALL INSTALLATION SHOULD FOLLOW THE LOCAL ELECTRIC CODES. BDG-256/BDG-256P3 DOES NOT INCLUDE COMPONENTS THAT CAN BE SERVED BY CUSTOMERS. PLEASE CONTACT AUTHORIZED SERVICE AGENTS FOR ANY SERVICE WORK.

2. 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.

3. INSTALLTION

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

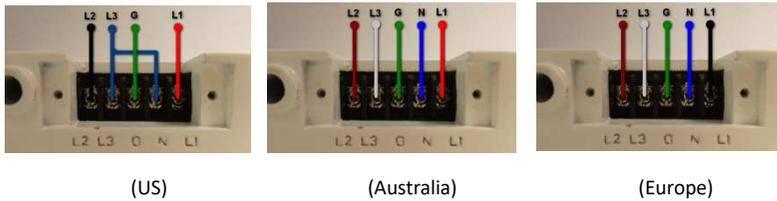
- BDG-256/BDG-256P3 Communications Gateway
- AC power cord (BDG-256)
- BDG-256/BDG-256P3 Communications Gateway Installation and Operation Manual and Warranty

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-256

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



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 connector. Multiple types of USB devices are supported by BDG-256/BDG-256P3, including USB disk, USB keyboard, USB mouse, USB scanner, etc.



Figure 1 BDG-256 Front View



Figure 2 BDG-256P3 Side View

Outdoor installation

When installed outdoor, BDG-256 must be inside a weather proof outdoor enclosure. For U.S. and Japan installations, L1 and L2 wires shall be connected to the power terminal inside the weather proof outdoor enclosure. For installations in Europe, L and N wires shall be connected to the power terminal inside the weather proof outdoor enclosure.



Figure 3 BDG-256 inside a weather proof outdoor enclosure

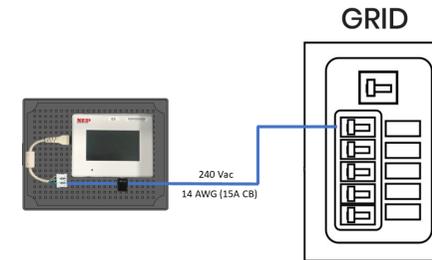


Figure 4 Connecting BDG-256 gateway to power grid

Indoor installation

BDG-256 and BDG-256P3 can be installed indoor by being directly mounted on a wall. The power plug should be plugged in 240Vac (for U.S and Japan) or 230Vac (for Europe and other countries) power outlet. The power outlet shall have no GFDI protection.

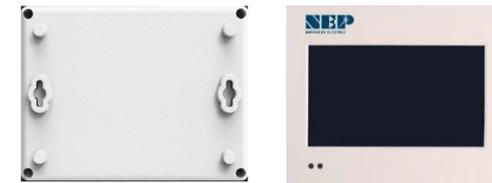


Figure 5 Back and front View



Figure 6 240Vac outlet (US and Japan)



Figure 7 230Vac outlet (Europe)

4. USER INTERFACE

4.1 Main Interface

BDG-256/BDG-256P3 takes approximately 1-2 minutes to start up after power has been turned on. After start-up, the system will enter the main interface shown in Fig. 8 (all three numbers will read "0" at start-up for the first time).



Figure8 BDG-256/BDG-256P3 Main Display

Figure 8 shows the BDG-256/BDG-256P3 main interface. The main interface is arranged in three horizontal rows, which consist of the tool bar at the very top, the display area in the middle, and the status bar at the lower part of the screen. The tool bar contains 7 buttons: Save/Clear (backup/restore factory defaults), Summary Display (summary display interface), Today's Energy (current day power generation), 7-Day's Energy (power generation over the past 7 days), Monthly Energy (power generation over each month), Yearly Energy (power generation over each year), and Settings. These buttons are used to display their respective content in the middle display area. The display area shows the power-time curve for the current day as well as a power generation bar chart. The status bar shows the device status, IP address, and current date.

4.2 Interface Overview

If the main interface is idle for 2-3 sec., it will switch to a numeric summary interface, which is described below: The screen is divided into three parts. The upper part shows Today's Energy (current day power generation), the lower right corner shows Lifetime (total power generation since device started recording), and the lower left corner shows CO2 reduction (reduction in carbon dioxide emissions). Touching any part of the screen will bring up the main interface.



Figure 9 BDG-256/BDG-256P3 System Summary Display

4.3 Energy Functions

A menu bar locates on the top of the screen. Different screen pages on energy and power can be called by pressing on these menu buttons.

4.3.1 Today's Energy

Pressing this button will display the power-time curve screen (see Figure 10). The x-axis represents the time (4:00-20:00), and the y-axis represents the NEP micro inverters (BDM-250) output power (kW). The total output energy (kWh) is displayed on the upper left corner. The real-time output power (kW) and today's total energy generated (kWh) are displayed on the upper right corner. Part of the curve can be magnified by drawing a box on the curve using finger or touch pen. Pressing the Today's Energy button again cancels the enlarged display and restores the original display.



Figure 10 Today's Power

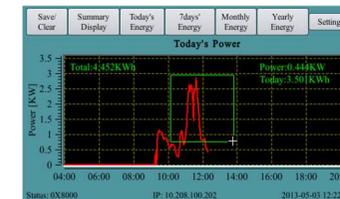


Figure 11 Drawing a box on Today's Power

4.3.2 Last 7 Days' Energy

Pressing this button will bring up a bar chart showing power generation over the past 7 days (see Figure 12)..The x-axis represents the date and the last one corresponds to today. The y-axis represents the amount of energy generated (kWh) on the day.



Figure 12 Last 7 Days' Energy

4.3.3 Monthly Energy

Pressing this button will bring up a bar chart showing power generation over each month for the last 12 months (see Figure 13). This display is similar to the Last 7 Days' Energy display. The x-axis represents months and the current month is on the last. The y-axis represents the amount of energy generated (kWh) in the month.



Figure 13 Monthly Energy

4.3.4 Lifetime Energy

Pressing this button brings up a bar chart showing power generation over each year for the past 20 years (see Figure 14). This display is also similar to the Last 7 Days' Energy display. The x-axis represents the years and the current year locates on the last. The y-axis represents the amount of energy generated (kWh) in the year.

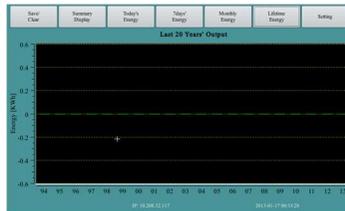


Figure 14 Yearly Energy

4.4 Setting

Pressing the Setting button will bring up the settings dialogs.

4.4.1 IP Setting

BDG-256's IP address may be manually set in the Ethernet settings tab (Figure 15). They may also be obtained through DHCP (requires a system restart after setting). If the IP address must be changed, double click on the address box to bring up a small keypad on the screen.

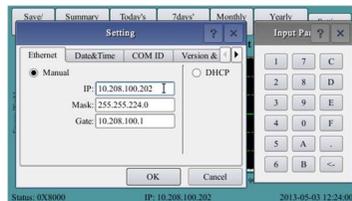


Figure 15 IP Setting

4.4.2 Date & 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 zone of North America. For other parts of the world, the time zone "World" may be chosen.



Figure 16 Date & Time Setting

4.4.3 Communication Address Setting

The communications address settings tab (Figure 17) is used to set the power line communication address of the micro-inverters linked to the device. One BDG-256 gateway can monitor up to 255 micro inverters. Inverter-0 on the address list corresponds to the total output of all inverters connected to the gateway.

Address settings 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 hex characters (0~F) on the BDM micro inverter bar code before the last letter for country. Another way to input the micro inverter communication address is through an internal web portal (see Section 5).



Micro inverter address



Figure 17 Communication Address Setting

4.5 Backup/Clear Data

When a USB flash disk is inserted, press the Save/Clear button to call up the following dialog box (see Figure 18).

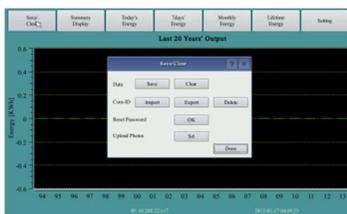


Figure 18 Backup/Clear Data

Press the Save button, and press “Yes” in the confirmation window that appears to compress and backup all collected data to the USB flash disk. The document will automatically use the backup date for its name.

Press the Reset button, and press Yes in the confirmation window that appears to clear all collected data. The device settings will not be changed.

4.6 Status Bar

The bottom field on all display pages consists of the status bar, which displays the device's operating status, the current IP address, and the current date and time. “OK” means that the device is operating normally. A 16-bit error code will be displayed in the form of a hex number if there happens to be a malfunction. The meaning of the error code is listed in the following table.

| 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 |

5. WEB INTERFACE

The BDG-256/BDG-256P3 information can be accessed through two web pages. The first one is a web server inside the BDG-256/BDG-256P3 gateway. The second one is a web server provided by NEP, which access requires internet service.

MICROVIEWER monitoring w/ built-inBDG-256/BDG-256P3

The local web portal built inside BDG-256/BDG-256P3 can be accessed through home network without internet service. If there is internet service, however, remote monitoring can be accessed through NEPVIEWER from anywhere at anytime

To access the web portal inside BDG-256/BDG-256P3, user only needs to type in the IP address of BDG-256/BDG-256P3 on a web browser. (Please see Section 4.4.1 for configuring the IP address of BDG-256/BDG-256P3). The administration page for inverter address can be accessed by <http://GATEWAY-IP/module> (for example <http://10.208.100.202/module>)



Figure 19 MICROVIEWER monitoring

Inverter COM-ID Administration

(e.g. 21508-0005F123-T; input the whole string or "0005F123" or "5F123")

submit ALL

phase

Inverter1: 0001A04 A

Inverter2: 10001002 A

Inverter3: 10001003 A

Inverter4: 10001004 A

Inverter5: 10001005 A

Inverter6: 10001006 A

Inverter7: 10001007 A

Inverter8: 10001008 A

Figure 20 Inputting inverter s/n through a webpage

6. SPECIFICATION

| Communications Interface | BDG-256 | BDG-256P3 |
|-----------------------------------|---|-----------------------|
| Communication with Micro Inverter | Power Line Communication | |
| Ethernet | 10/100 auto-sensing, auto-negotiation | |
| USB | USB 2.0 interface, auto-sensing, auto-negotiation | |
| Monitoring capacity | 255 micro inverters | |
| Human Interface | | |
| Display | 5-in LCD touch screen | 7-in LCD touch screen |
| Power Requirements | | |
| AC inlet | 100 - 240 Vac, 50/60 Hz | |
| Power consumption | 5 watts maximum | 8 watts maximum |
| Mechanical Data | | |
| Dimensions (WxHxD) | 6.69" x 4.33" x 1.46" | 7.83" x 6.34" x 1.81" |
| Weight | 5.29 oz (150g) | 25.40 oz (720g) |
| 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 | |
| Environmental rating | IP30. For installation indoors or in an NRTL-certified, NEMA type 3R enclosure. | |
| Features | | |
| Standard warranty term | 1 year | |
| Compliance | UL 60950-1 2nd Edition Rev Dec 19, 2011 CSA C22.2 2nd 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 55022:2010 EN 61000-3-2:2006+A1:2009+A2:2009 EN 61000-3-3:2008 EN 55024:2010 EMC Directive 2004/108/EC | |

7. 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/BDG-256P3 communication gateway. This Warranty Period lasts for 1 year from the date of purchase at the 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 Co. Ltd

Address: ShouchuanCenter, No.6 Changcheng South Road, Chengyang District, Qingdao, China, 266109

Phone: +86 532 87963900

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:

1) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;

2) 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;

3) the product if repairs have been done to it other than by NEP or its authorized service centers (hereafter "ASCs");

4) the product if it is used as a component part of a product expressly warranted by another manufacturer;

5) the product if its original identification (trade-mark, serial number) markings have been defaced, altered, or removed;

6) the product if it is located outside of the country where it was purchased;

7) 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.

Warranty Card

Customer Information

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Tel: _____ Fax: _____ E-mail: _____

System Information

Fault Product(s) Serial Numbers: _____

System Commissioning Date: _____ Product Models: _____

No. of Products Used: _____ Bill of Lading Date: _____

Fault Product(s) Quantities: _____ Fault Time/Date: _____

Fault Message(s) or Code(s): _____

Brief Fault Description and Photos:

Installation Information

Modules Used: _____

Modules Quantity: _____ Inverters quantity per string: _____

Installation Company Name: _____

Installer Name: _____

For the information on our warranty terms and conditions, please see our website: www.northernep.com
All fields must be completed in order to process claim.

Customer Signature: _____ Date: _____

*All rights reserved by NEP. This information is subject to changes without notice.





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