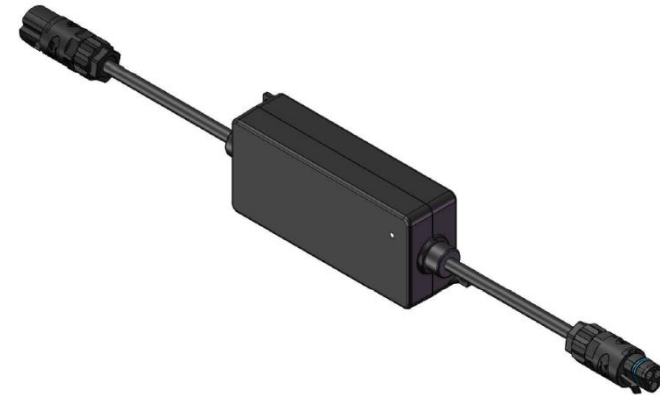




Installation and Operation Manual

BDM-BR-10A

Integrated NS Protection



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COMPANY PROFILE

Northern Electric & Power Inc. (NEP) is an international supplier of cutting-edge clean energy technologies headquartered in the United States. The company maintains facilities both here and abroad, including a more than 18 acre site in the Tsingtao Export Processing Zone and has more than 650,000 square feet of building space.

The company's founders are well-known experts in the fields of power electronics, automatic control, signal processing, and communications; each holding multiple U.S. and world patents in their specialty areas.

NEP has a complete product line of grid-tied solar inverters, including 180W~600W micro inverters, 1.5kW~5kW single phase solar inverters, 10kW~500kW three-phase solar inverters, and rapid shutdown devices. 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 BDM-800-U/600-U micro inverter from NEP. We hope you will find our products meet your need for renewable energy. Meantime, we appreciate your feedback regarding our products.

1.2 Grid-tied PV System

Grid-tied PV system consists of PV panels, grid-tied inverter and junction boxes. The DC output from the PV panels is converted into AC energy and feedback to the grid through the BDM-800-U/600-U. BDM-800-U/600-U PV micro inverter contains isolation transformer with basic insulation between PV input and AC grid output.

1.3 How to Use This Manual







This manual provides detailed product information and installation instructions for the BDM-800-U/600-U 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.

1.4 Label

Label is located on the side of the inverter. The information on the label includes technical data as well as type and serial number of the device. Safety instructions 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 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 WARRANTY.

ALL THE INSTALLATION SHOULD BE DONE BY CERTIFIED ELECTRICIAN.

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

ALL INSTALLATION SHOULD FOLLOW THE LOCAL ELECTRIC CODES. FURTHER PROTECTION ON THE AC WIRING FROM THE INVERTERS SHOULD BE PROVIDED AND MAY BE REQUIRED BY LOCAL AND NATIONAL WIRING REGULATIONS. THIS PROTECTION IS LIKELY TO INCLUDE RESIDUAL CURRENT DEVICES, EARTH FAULT MONITORS AND CIRCUIT BREAKERS. THIS PRODUCT MAY CAUSE AC CURRENT WITH A DC COMPONENT. IF A RESIDUAL CURRENT-OPERATED PROTECTIVE DEVICE (RCD) OR A MONITORING DEVICE (RCM) IS USED FOR PROTECTION IN CASE OF DIRECT OR INDIRECT CONTACT, ONLY AN RCD OR RCM OF TYPE B IS ALLOWED ON THE AC SIDE OF THIS PRODUCT.

NEVER DISCONNECT PV MODULE FROM THE MICRO-INVERTER WITHOUT FIRST ISOLATING THE AC MAINS. ALL PV CONNECTORS AND AC CONNECTORS ARE FORBIDDEN TO BE DISCONNECTED UNDER LOAD BEFORE SWITCHING OFF THE CIRCUIT BREAKER ON THE AC BRANCH.

PLEASE CONTACT AUTHORIZED SERVICE AGENTS FOR ANY SERVICE WORK.

BDM-800-U/600-U IS A GRID-TIED SOLAR INVERTER. IT MAY REQUIRE APPROVAL FROM LOCAL UTILITY COMPANY TO CONNECT IT TO THE POWER GRID.

BDM-800-U/600-U DOES NOT INCLUDE COMPONENTS THAT CAN BE SERVED BY CUSTOMERS.



WARNING:

WHEN THE PHOTOVOLTAIC ARRAY IS EXPOSED TO LIGHT, IT SUPPLIES A DC VOLTAGE TO THE MICRO-INVERTER.

4. INSTALLATION



WARNING: BE AWARE THAT INSTALLATION OF THIS EQUIPMENT INCLUDES RISK OF ELECTRIC SHOCK. NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED WHEN A GROUND FAULT IS INDICATED.

Parts Included

In addition to the micro inverters, PV modules, racking, and associated hardware, you'll need the BDM-800-U/600-U installation kit. This kit includes the following items:

- Mounting Bracket (adapter plate)
- AC connection cable

Other Parts and Tools Required

In addition to your PV array and its associated hardware, you will need the following parts:

- Sockets, wrenches for mounting hardware

Lightning Surge Suppression

Lightning does not actually need to strike the equipment or building where PV system is installed to cause damage. Often, a strike nearby will induce voltage spikes in the electrical grid that can damage equipment. BDM-800-U/600-U has integrated surge protection, greater than most string inverters. However, if the surge has sufficient energy, the protection built into the BDM-800-U/600-U can be exceeded, and the equipment can be damaged.

Since the NEP Limited Warranty does not cover "acts of God" such as lightning strikes, and since lightning strikes can occur anywhere, it is best practice to install surge protection as part of any solar installation. Installation of surge protection devices should follow vendor instructions.

Installation Procedure



WARNING: DO NOT CONNECT BDM-800-U/600-U TO THE UTILITY GRID OR ENERGIZE THE AC CIRCUIT(S) UNTIL YOU HAVE COMPLETED ALL OF THE INSTALLATION PROCEDURES AS DESCRIBED IN THE FOLLOWING SECTIONS.

Installing the BDM-800-U/600-U Micro inverter System involves several key steps:

1. Measuring service and installing the AC branch circuit junction box.



WARNING: ONLY USE ELECTRICAL SYSTEM COMPONENTS APPROVED FOR WET LOCATIONS.

2. Attaching the BDM-800-U/600-U Micro inverter to the racking.
3. Connecting the BDM-800-U/600-U Micro inverter wiring harnesses.
4. Grounding the system (optional).
5. Completing the BDM-800-U/600-U Micro inverter installation map and connecting the PV modules.

The finished system should be similar as in the diagram. Detailed installation steps are listed in the following section.

Step 1 - Install the AC Branch Circuit Junction Box

1. Measure service entrance conductors to confirm AC service at the site. Acceptable ranges are shown in the table below:

- Europe

L1 to L2	230 Vac
----------	---------

2. Mount the adapter plate at a suitable location on the PV racking system (typically at the end of a row of modules).
3. Install an appropriate junction box with the adapter plate.
4. Connect the open wire end of the AC interconnect cable into the junction box using an appropriate gland or strain relief fitting. The AC interconnect cable requires a strain relief connector with an opening of 3/8 inches in diameter.

Step 2 - Attach BDM inverter to the Racking

1. Mark the approximate centers of each PV module on the racking system. Evaluate the location of the micro inverter with respect to the PV module junction box or any other obstructions.

DC circuits of BDM inverter are isolated and insulated from ground. An integrated ground protection circuit is included in the micro inverter.

WARNING: ALLOW A MINIMUM OF 2.75 INCHES BETWEEN THE TOP OF THE ROOF AND THE BOTTOM OF BDM-800-U/600-U, AND ALSO A MINIMUM 2.75 INCHES BETWEEN THE BACK OF THE PV MODULE AND THE TOP OF BDM-800-U/600-U. DO NOT MOUNT BDM-800-U/600-U IN A LOCATION THAT ALLOWS LONG-TERM EXPOSURE TO DIRECT SUNLIGHT.

2. Mount one micro inverter at each of these locations using hardware recommended by your module racking vendor

Step 3 - Connect the BDM-800-U/600-U Wiring Harnesses

Each BDM-800-U/600-U comes with one built-in AC cable with male and female 3-pin AC connectors on both ends. The three pins of this connector are for phases L1 and L2 or L1 and N and ground. Plug the AC connectors of neighboring BDM inverters to form a continuous AC branch circuit. Please check the rating label of the trunk cable for the maximum allowable number of BDM-800-U/600-U on one AC branch circuit.

WARNING: DO NOT EXCEED THE MAXIMUM NUMBER OF BDM-800-U/600-U IN AN AC BRANCH CIRCUIT, AS DISPLAYED ON THE UNIT-RATING LABEL. For 12AWG trunk cable, EACH BDM-800-U/600-U AC BRANCH CIRCUIT MUST BE SOURCED FROM A DEDICATED BRANCH CIRCUIT PROTECTED BY A 20A MAXIMUM BREAKER.

Install a protective end cap on the open AC connector at the end of the truck cable.

WARNING: MAKE SURE PROTECTIVE END CAPS HAVE BEEN INSTALLED ON ALL UNUSED AC CONNECTORS. UNUSED AC BDM-800-U/600-U WIRE HARNESS CONNECTORS ARE LIVE WHEN THE SYSTEM IS ENERGIZED BY THE UTILITY SYSTEM.

Step 4 – Connect BDM-BR-10A and BDM-800-U/600-U micro inverter

For BDM-800-U/600-U-U model which has no internal relay, BDM-BR-10 shall be installed for integrated NS protection.



Step 5 – Ground the system

Each BDM-800-U/600-U has an integrated ground protection circuit. The grounding wire is through the trunk cable, and should be securely connected to the ground connector in the junction box.

Step 6 – Complete the connection map and connect the PV Modules

BDM-800-U/600-U connection Map is a diagrammatic representation of the physical location of each BDM-800-U/600-U in your PV installation. The virtual array in NEP micro inverter gateway BDG-256P3 is created from the map you create.

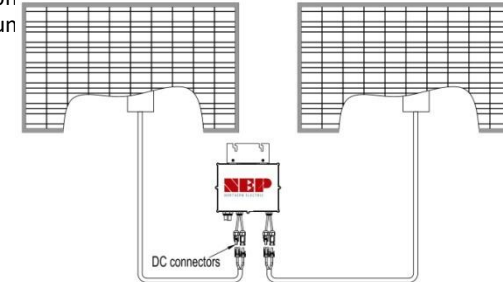
Complete the connection map

Each BDM-800-U/600-U has a removable serial number label located on the mounting plate. Enter this serial number into the monitoring platform NEPViewer.




Connect the PV Modules

Completely install all BDM-800-U/600-U and all system inter-wiring connections prior to installing the PV modules.

1. Mount the PV modules above their corresponding BDM-800-U/600-U. Each BDM-800-U/600-U comes with two oppositely sexed DC connectors.
2. First connect the positive DC wire from the PV module to the negatively marked DC connector (male pin) of the BDM-800-U/600-U. Then connect the negative DC wire from the PV module to the positively marked DC connector (female socket) of the BDM-800-U/600-U. Repeat for all remaining PV modules using one BDM-800-U/600-U for each module. All PV modules shall be ungrounded.



5. COMMISSIONING

-  **WARNING:** CONNECT BDM-BR-10A TO THE ELECTRICAL UTILITY GRID ONLY AFTER RECEIVING PRIOR APPROVAL FROM THE UTILITY COMPANY.
-  **WARNING:** BE AWARE THAT ONLY QUALIFIED PERSONNEL CAN CONNECT BDM-800-U/600-U TO THE ELECTRICAL UTILITY GRID.
-  **WARNING:** ENSURE THAT ALL AC AND DC WIRING IS CORRECT. ENSURE THAT NONE OF THE AC AND DC WIRES IS PINCHED OR DAMAGED. ENSURE THAT ALL JUNCTION BOXES ARE PROPERLY CLOSED.

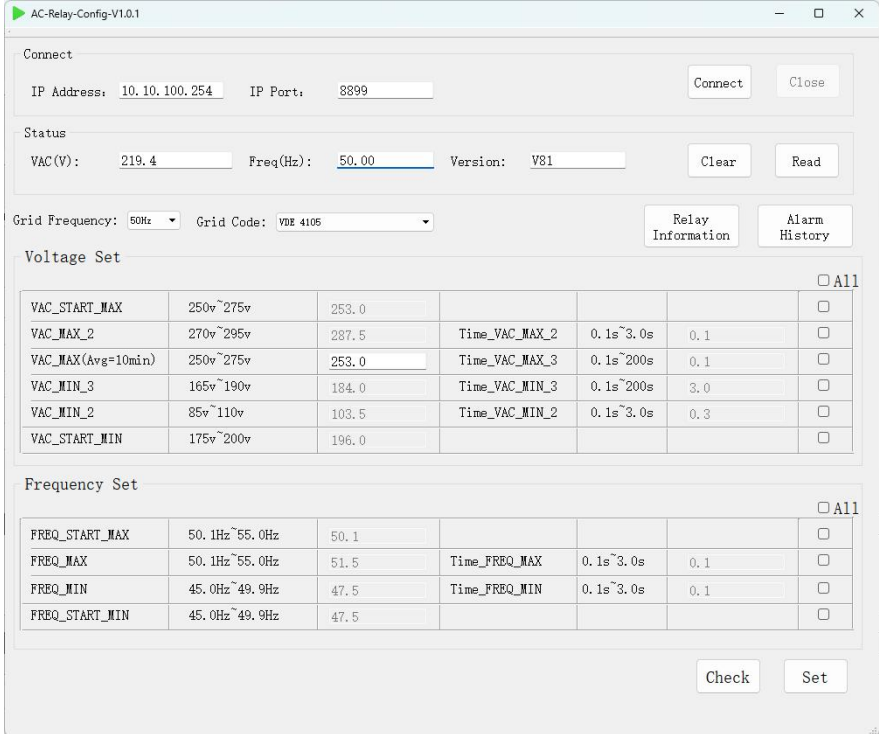
Following these steps to commission the BDM-800-U/600-U PV system:

1. Turn on the AC disconnects or circuit breakers on each BDM-800-U/600-U AC branch circuit.
2. Turn on the main utility-grid AC circuit breaker. Your system will start producing power after a few minutes wait time.
3. The BDM-800-U/600-U will start to send performance data over the power lines using power line communication (PLC) to the BDG-256P3. The time required for each BDM-800-U/600-U in the system to communicate to the BDG-256P3 will vary with the number of BDM-800-U/600-U in the system.

6. OPERATING INSTRUCTIONS

The BDM-BR-10A is powered by AC. The status LED will indicate the relay status.

The setting of BDM-BR-10A is through a computer device interface



AC-Relay-Config-V1.0.1

Connect

IP Address: 10.10.100.254 IP Port: 8899

Status

VAC(V): 219.4 Freq(Hz): 50.00 Version: V81

Grid Frequency: 50Hz Grid Code: VDE 4105

Voltage Set All

VAC_START_MAX	250v~275v	253.0				<input type="checkbox"/>
VAC_MAX_2	270v~295v	287.5	Time_VAC_MAX_2	0.1s~3.0s	0.1	<input type="checkbox"/>
VAC_MAX(Avg=10min)	250v~275v	253.0	Time_VAC_MAX_3	0.1s~200s	0.1	<input type="checkbox"/>
VAC_MIN_3	165v~190v	184.0	Time_VAC_MIN_3	0.1s~200s	3.0	<input type="checkbox"/>
VAC_MIN_2	85v~110v	103.5	Time_VAC_MIN_2	0.1s~3.0s	0.3	<input type="checkbox"/>
VAC_START_MIN	175v~200v	196.0				<input type="checkbox"/>

Frequency Set All

FREQ_START_MAX	50.1Hz~55.0Hz	50.1				<input type="checkbox"/>
FREQ_MAX	50.1Hz~55.0Hz	51.5	Time_FREQ_MAX	0.1s~3.0s	0.1	<input type="checkbox"/>
FREQ_MIN	45.0Hz~49.9Hz	47.5	Time_FREQ_MIN	0.1s~3.0s	0.1	<input type="checkbox"/>
FREQ_START_MIN	45.0Hz~49.9Hz	47.5				<input type="checkbox"/>

7. TROUBLESHOOTING AND MAINTENANCE

WARNING: DO NOT ATTEMPT TO REPAIR THE BDM-BR-10A; IT CONTAINS NO USER-SERVICEABLE PARTS. IF TROUBLESHOOTING METHODS FAIL, PLEASE RETURN THE BDM-BR-10A TO YOUR DISTRIBUTOR FOR MAINTENANCE.

8. SPECIFICATION

MODEL	BDM-BR-10A
Nominal Input/Output Grid Voltage	230 Vac
Nominal Input/Output Grid Frequency	50 Hz
Maximum Input/Output Relay AC Current	10 Aac
Ingress Protection	IP66, IP67
Protective Class	II
Temperature Range	-40C ~ 65C
Compliance	IEC 62109-1/2 VDE 4105

BDM-BR-12A is used with BDM-800-U/600-U-U for integrated NS protection.

MODEL		BDM-800-U	BDM-600-U
INPUT(DC)	Max Recommended PV Power (W)	1200	1200
	Max DC Open Circuit Voltage (Vdc)	60	60
	Max DC Input Current (Adc)	18 x 2	14 x 2
	MPPT Tracking Accuracy	>99.5%	>99.5%
	MPPT Tracking Range (Vdc)	22-55	22-55
	Isc PV (absolute maximum) (Adc)	20 x 2	20 x 2
	Maximum Backfeed Current (Adc)	0	0
OUTPUT(AC)	Rated AC Apparent Power (VA)	750	600
	Rated AC Output Power (W)	750	600
	Rated AC Output Current (Aac)	3.26	2.61
	Nominal Power Grid Voltage (Vac)	230	230
	Nominal Power Grid Frequency (Hz)	50	50
	Inverter Topology	Isolated (transformer w/ basic Insulation)	Isolated (transformer w/ basic Insulation)
	THD	<5% (at rated power)	<5% (at rated power)
	Power Factor	0.9 un ~ 0.9 ov	0.9 un ~ 0.9 ov
	Active Anti-islanding Method	Frequency Shift	Frequency Shift
	Inrush Current (Peak and Duration)	9.4A, 15us	9.4A, 15us
	Maximum Output Overcurrent Protection(Aac)	10.0	10.0
	Maximum Output Fault Current	9.6A peak	9.6A peak
	SYSTEM	CEC Efficiency	96.5%
EFFICIENCY	Night Time Tire Loss(W)	0.11	0.11
PROTECTION FUNCTIONS	Over/Under Voltage Protection	Yes	Yes
	Over/Under Frequency Protection	Yes	Yes
	Over Current Protection	Yes	Yes
	Reverse DC Polarity Protection	Yes	Yes
	Overload Protection	Yes	Yes
	Ground Fault Detection	Integrated	Integrated
	IP Rating	IP66/IP67	IP66/IP67
	Protective Class	I	I
	Overvoltage Category Mains	OVC III	OVC III
	Overvoltage Category PV	OVC II	OVC II
Environment Temperature	-40°C ~ +65°C	-40°C ~ +65°C	
OTHER PARAMETERS	Display	LED LIGHT	LED LIGHT
	Communications	POWERLINE	POWERLINE
	Dimension (D-W-H mm)	268*250*42	268*250*42
	Weight (Kg)	2.9	2.9

9.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 BDM-800-U/600-U Grid-Tied Inverter. This Warranty Period lasts for 10 years 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 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 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.

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 (monitoring gateway is required for verification):

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/en
All fields must be completed in order to process claim.

Customer Signature: _____ **Date:** _____



USA

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