BDM-1200 LV

Installation User Manual

Northern Electric Power Co. Ltd.

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You can download the latest warranty terms and conditions from website at northernep.com.

For technical problems concerning NEP products and requiring assistance, please refer to CONTACT.

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All trademarks, including company, brand products and service names, are recognized, even if not explicitly identified as such. Missing designations does not mean that a product or brand is not a registered trademark.

INFORMATION ON THIS DOCUMENT

Target Group

This document is intended for “Qualified Persons" and "End Users".

Tasks marked with a warning symbol and the caption “Qualified Persons” require associated skills to avoid and deal with the dangers and risks in installing and using the product and tools described in this document.

Tasks not marked do not require specidic qualifications and/or skill sets and therefore can be performed by end users.

Qualified Persons

QUALIFIED PERSONS

> **Qualified Persons Required**

Qualified Persons are required to be familiar, understand and capable of following all applicable regulations, directives and laws, and are aware of the potential risks to perform the activities marked in this document.

The following knowledge and skills are required for qualified persons:

- Knowledge of how an inverter works and is operated.
- Knowledge of all applicable standards and directives, including country-specific grid conditions and regulatory guidelines.
- Knowledge and training of how to minimize and deal with dangers and risks associated with using, installing, and repairing electrical devices and installations.
- Knowledge and training in the installation and commissioning of electrical devices, especially those associated with PV systems.
- Knowledge and training of and compliance with this document and all safety information.
- Knowledge of warranty terms and conditions associated with the product described in this document.

INFORMATION

> **"Qualified Person" means he/she is properly licensed regarding the local authority and regulations in:**
>
> - Safely and properly installing electrical equipment and PV power systems.
> - Safely and properly applying all applicable installation codes in practice.
> - Properly analyzing and minimizing the hazards in performing electrical work and finished works for all persons and properties involved.
> - Properly selecting and using Personal Protective Equipment (PPE).

End Users

End users can be referred to any who intends to use the product described in these documents and must avoid performing tasks marked in this document with requirement for qualified persons.

End users should use this document for a comprehensive understanding of general features and functions involved in the product, and as a guideline for performing tasks that do not require specific qualifications independently.

WARNING

> **DO NOT** put this product in use unless it has been successfully installed and commissioned by a qualified person following the requirements and steps described in the section of Installation and Commissioning as well as all applicable laws and safety regulations.

Content and Structure

This document describes the unpacking, mounting, installation, commissioning, startup, operation, troubleshooting, maintenance, as well as the disconnection of the product. Applicable inverter models are listed below:

- BDM-1200LV
- BDM-1200LV(WF)

This document, as well as any data, images and illustrations included herein, is reduced to the essential information for the user's guidance and therefore may deviate from the real product. The update of this document may not be announced.

For the latest version of this document and further information on the product described, please visit website at northernep.com.

For technical problems concerning the products in this document and requiring assistance, please refer to CONTACT.

Warning Messages

The following warning messages are used in this document and should be familiarized before installation or operation of the product.

Failure to follow may result in injury, damage to properties, or a fatal event.

DANGER

> **DANGER** denotes a hazardous situation which, if not avoided, will result in death or severe injury.

WARNING

> **WARNING** denotes a hazardous situation which, if not avoided, can result in death or severe or moderate injury.

CAUTION

> **CAUTION** denotes a hazardous situation which, if not avoided, can result in moderate or minor injury.

NOTICE

> **NOTICE** denotes a situation which, if not avoided, can result in property damage.

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 the 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 voids the user's authority to operate the equipment.

SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

Users of these documents are cautioned to familiarize themselves with safety instructions contained in this section and always observe when working.

Users are reminded that all electrical or electronic devices come with residual risks despite compliance with international safety requirements and careful construction. To prevent injury and property damage, and to ensure long-term operation of the product, please adhere to all applicable safety instructions in handling and usage of the product.

⚠ DANGER

Danger to life due to electrical shock when live components are touched in disassembled products.

High voltages and energies are present in live components and cables inside the product during operation, e.g. capacitors, connectors. Touching live components and cables may result in death or severe injuries due to electric shock.

- **DO NOT** disassemble the product.
- **DO NOT** touch live components.

⚠ DANGER

Danger to life due to electrical shock when live DC cables or components are touched.

High DC voltages are present in the DC cables when PV modules are exposed to light. Touching live DC cables or components may result in death or severe injuries due to electric shock.

- **DO NOT** touch non-insulated parts or cables.
- **DO NOT** touch live components when voltage sources are still connected or just disconnected.
- **DO NOT** connect DC connectors to the product that is under load.
- Personal protective equipment **MUST** be worn suitably and properly for all work on the product and the system.
- Voltage sources **MUST** be disconnected from the product before all work.

⚠ DANGER

Danger to life due to electrical shock in case of over-voltages and missing surge protections.

Over-voltage may be conducted onto other properties (e.g. the electrical network of the building, connected devices via network cables or data cables) in the event of a flash or lightning strike when there is no surge protection integrated into the system. Touching live product, components and cables may result in death or severe injuries due to electric shock.

- Within the same electrical system and network, make sure all devices are integrated in the range of existing over-voltage protection.
- Integrate suitable surge protection to the transition from any cables, products or conductive component within the system that is laid outdoor to the indoor system.

⚠ DANGER

Danger to life due to electrical shock from touching ungrounded components or from touching live components in case of a ground fault.

Touching ungrounded PV modules, array frame, inverter or live system component, or parts of the system components that are still live in the event of a ground fault, may result in death or severe injuries due to electric shock.

- PV modules and the array frames, including electrically conductive surfaces, **MUST** be connected and grounded in compliance with all applicable regulations.

In the event of a ground fault,

- **DO NOT** touch any parts or frame of the PV array.
- **DO NOT** touch any cables without reliable insulation.
- **DO NOT** connect the product to any strings with ground faults.
- Before working on the product, voltage sources **MUST** be disconnected.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

⚠ WARNING

Risk of Injury from exposure to substances, gases and dust.

In rare cases, damaged electrical components can cause formation of toxic chemicals inside the inverter, in such presence of substances, gases or dust. Exposure or inhaling such chemicals may result in poisoning, skin irritation or burns, breathing difficulty and nausea.

- Personal protective equipment **MUST** be worn suitably and properly for all work.

⚠ WARNING

Danger to life due to fire or explosion.

In rare cases, operating under fault conditions may generate a gas mixture inside any electrical device that can be explosive or flammable while switching operational state (e.g. switching the product ON/OFF in a ground fault event). Flying debris from the fire or explosion may result in death or severe injuries.

- **DO NOT** work the DC Switch on the product in the event of ground fault.
- Before working on the product, voltage resources **MUST** be disconnected and fully de-energized.
- PV arrays **MUST** be disconnected using a disconnecting device instead of bare hands.
- AC circuit breaker (if any) **MUST** be disconnected.

CAUTION

Risk of injury and property damage due to inappropriate modifications or technical specifications.

Modifications or alterations to the product and its connected system are not allowed unless with written permission of NEP. Unauthorized modifications may cause incompliance with product's technical requirement (e.g. maximum input voltage or current), that may result in moderate or minor injuries, and property damages.

- Any guarantee and warranty claims in such cases will be voided.

CAUTION

Risk of injury due to hot enclosures.

Touching parts of product enclosure that may get hot during operation (e.g. heatsink) and may result in burn injuries.

- **DO NOT** touch any parts other than the cover lid of the product.
- Before working on the product, voltage sources **MUST** be disconnected and the product left to cool down for 30 minutes.

CAUTION

Risk of injury due to weight of product.

Lifting the product incorrectly or dropping in transportation or mounting may result in injuries like bruises or muscle strains.

- Make sure to take the weight of the product into account in transportation and lifting and proceed carefully.
- To avoid muscle strain or injury, please use proper lifting techniques and any necessary aid/tools.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

NOTICE

Damage to product and property due to wrong output type.

The product described in this document is designed to directly tie with and feed power into public utility power grid. Connecting the product to any other forms of AC output source or equipment may result in product and property damage.

- **DO NOT** connect AC output of the product to any other sources than the utility grid, which will otherwise void any guarantees and warranty claims.

NOTICE

Damage to product due to aggressive cleaning agents.

When cleaning, using aggressive chemicals and cleaning agents may cause damage to the product and components.

- Use a wet cloth with clear water to clean the product.

INFORMATION

The product must ONLY be connected and operated with PV arrays of protection class II, in accordance with IEC 61730, application class A. The PV modules must also be compatible with this product. Power sources other than compatible PV arrays **MUST** not be connected and operated with the product.

OVERVIEWING THE PRODUCT

Product Overview

1	AC Output Terminal
2	Wi-Fi Dongle (optional)
3	LED display
4	DC input 1 (+)
5	DC input 1 (-)
6	DC input 2 (+)
7	DC input 2 (-)
8	DC input 3 (+)
9	DC input 3 (-)

Identifying the Product

Serial Number (S/N)

SN is on the sticker which is positioned at the right bottom corner of the product.

Symbols on the label

INFORMATION

> **INFO** denotes information that is important but not safety-relevant for a task or topic.

The labeling of the product is located on the front or rear of the inverter. The information on the label includes technical data as well as the 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.
	**ETL Intertek mark** The product complies with essential requirements of relevant directives of US.

INSTALLING THE PRODUCT

Safety

⚠ WARNING

Danger to life due to fire or explosion.

All electrical devices can cause fires despite careful construction. Flying debris from the fire or explosion may result in death or severe injuries.

- **DO NOT** install the product in an environment with any flammable materials or gases.
- **DO NOT** install the product in an environment with any potentially explosive items or gases.

⚠ CAUTION

Risk of injury due to weight of product.

Lifting the product incorrectly or dropping in transportation or mounting may result in injuries like bruises or muscle strains.

- Make sure to take the weight of the product into account during transportation and lifting and proceed carefully.
- To avoid muscle strain or injury, please use proper lifting techniques and any necessary aid/tools.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

⚠ CAUTION

Risk of injury due to existing cables within walls.

Drilling holes in a wall may damage power cables or pipes for gas or water routed inside.

- Make sure to take cables or pipes into account before drilling.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

ℹ INFORMATION

Risk of shortened product lifespan due to inappropriate installation environment.

Installing the product in an inappropriate environment may risk shortening its lifespan. To ensure optimal performance and operation, please:

- **DO NOT** install the product in exposure to direct sunlight.
- **DO NOT** install the product in direct exposure to rain or snow.
- **DO NOT** install the product in exposure to splash of salt water.
- Make sure the installation site meets ventilation requirement of the product.

ℹ INFORMATION

The pollution degree of the external environment for NEP's inverters is **PD3**.

Pollution Degree 3 indicates:

Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected.

INFORMATION

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. Microinverters have integrated surge protection, greater than most string inverters. However, if the surge has sufficient energy, the protection built into the microinverter 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. Installations of surge protection devices should follow vendor instructions.

Parts required

In addition to the micro inverters, PV modules, racking, and associated hardware, you’ll need the micro inverter installation kit. This kit includes the following items:

- Protective end cap Male
- Mounting Bracket (adapter plate)

Other Parts and Tools Required

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

- Junction box
- Sockets, wrenches for mounting hardware

Procedure of Mounting

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

WARNING

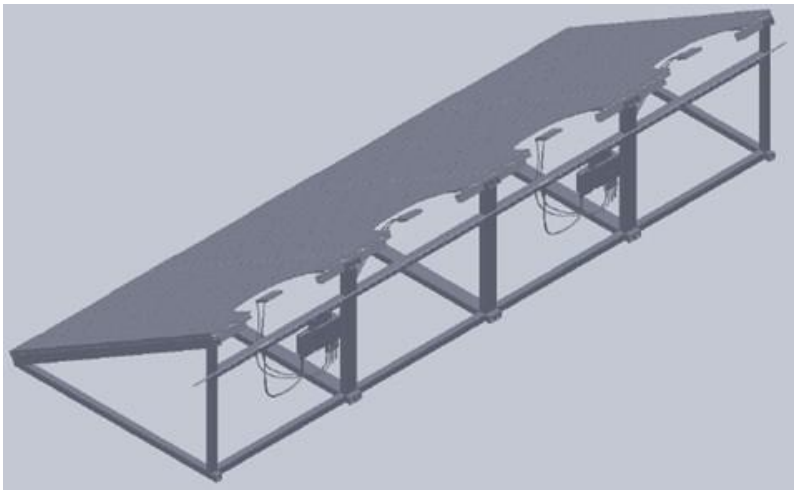
ONLY USE ELECTRICAL SYSTEM COMPONENTS APPROVED FOR WET LOCATIONS.

2. Attaching the microinverter(s) to the racking.
3. Connecting the microinverter(s) wiring harnesses.
4. Grounding the system (optional).

DC circuits of microinverters are isolated and insulated from ground. An integrated ground protection circuit is included in the microinverter.

5. Completing the microinverter installation map and connecting the PV modules.

The finished system should be similar to the diagram shown below.



INFORMATION

To only install one inverter or **BALCONY SOLUTION**

Please follow the sign

CONNECTING THE PRODUCT

Safety: Electrical Connections

DANGER

Danger to life due to electric shock.

DO NOT touch any live components.

TO prevent risk of electric shock during installation and maintenance, please make sure that the AC and DC inputs are properly terminated and the AC voltage source is disconnected.
DO NOT stay close to the instruments during severe weather conditions including storms, lightning, etc.

AC Connection

STEP 1 - Install the AC Branch Circuit Junction Box

Measure service entrance voltage to confirm AC voltage at the site. Acceptable ranges differ according to local grid parameters. Specifics are shown in the table below:

- North America
  - 120 Volt AC Single Phase

L1 to N	**120 V_{ac}**

  - 208 Volt AC Three Phase

L1 to L2	**208 V_{ac}**

- Australia and New Zealand

L1 to L2	**230 V_{ac}**

- Europe

L1 to L2	**230 V_{ac}**

Mount the adapter plate at a suitable location on the PV racking system (typically at the end of a row of modules).

Install an appropriate junction box with the adapter plate.

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 product to the Racking

Mark the approximate centers of each PV module on the racking system. Evaluate the location of the microinverter with respect to the PV modules, junction box, or any other obstructions.

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

⚠ WARNING

> ALLOW A MINIMUM OF .75 INCHES BETWEEN THE TOP OF THE ROOF AND THE BOTTOM OF MICROINVERTER. WE ALSO RECOMMEND THAT YOU ALLOW .50 INCHES BETWEEN THE BACK OF THE PV MODULE AND THE TOP OF MICROINVERTER. DO NOT MOUNT MICROINVERTER IN A LOCATION THAT ALLOWS LONG-TERM EXPOSURE TO DIRECT SUNLIGHT.

STEP 3 - Interconnect Microinverters into Branch

Each product comes with one AC output lead with a T-connection connector at the end. Plug the AC connector of each microinverter into the respective Trunk-T on the Trunk Cable to form a continuous AC branch circuit. Please check the rating label of the trunk cable for the maximum allowable number of microinverters in one AC branch circuit.

⚠ WARNING

> DO NOT EXCEED THE MAXIMUM NUMBER OF MICROINVERTERS IN AN AC BRANCH CIRCUIT, AS DISPLAYED ON THE UNIT-RATING LABEL. FOR 12AWG TRUNK CABLE, EACH AC BRANCH CIRCUIT MUST BE PROTECTED BY A DEDICATED OVERCURRENT PROTECTION DEVICE (OCPD) WITH A MAXIMUM RATING OF 20A.

ⓘ INFORMATION

> NEP microinverters are designed to be able to interconnect with other NEP microinverter models.

Install a protective end cap on the open AC connector at the end of each branch or split branch section.

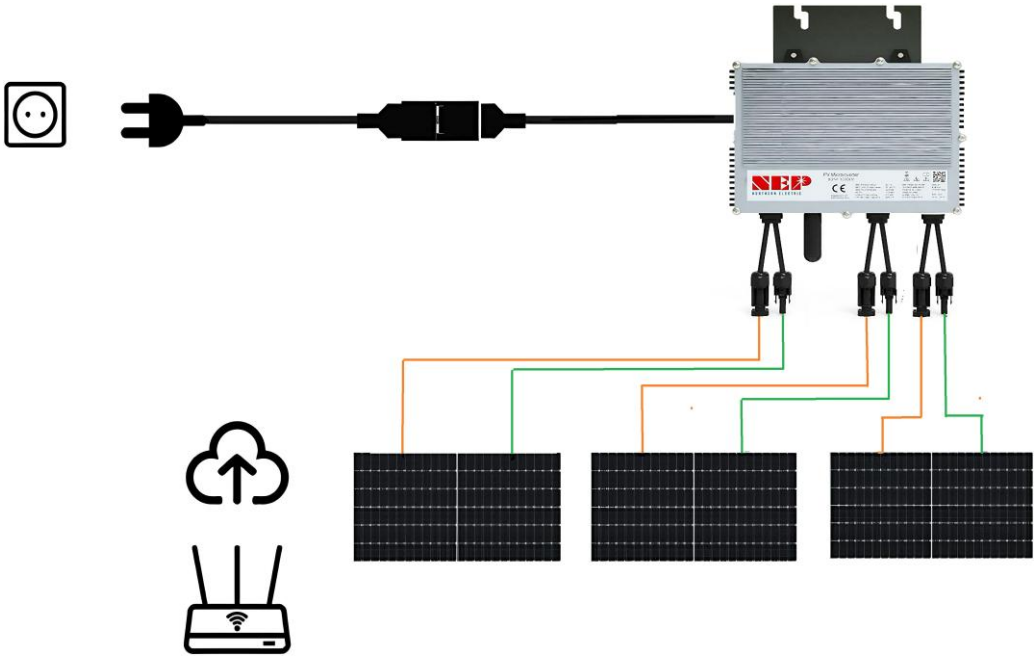
⚠ WARNING

> MAKE SURE PROTECTIVE END CAPS HAVE BEEN APPLIED ON ALL UNUSED AC AND DC CONNECTORS.
>
> MAKE SURE PROTECTIVE END CAPS HAVE BEEN APPLIED ON THE END OF TRUNK CABLE.

BALCONY SOLUTION **Typical Balcony Solution Topology**

INFORMATION

> For Balcony Solution products, the AC output terminals are customized and different from standard issue products.



> For balcony solution, there is only one inverter in the system. The monitoring is realized by Wi-Fi connection between Wi-Fi dongle on the inverter and home router.

STEP 4 – Ground the system

Each product has an integrated ground protection circuit. The grounding wire is through the trunk cable and should be securely connected to the grounding connector in the junction box, or grounding prong of the plug, if used.

STEP 5 - Ground the system through racking (option)

BDM-1200LV may also be grounded through the racking.

STEP 6 - Complete the Serial Number (SN) map and connect the PV Modules

A microinverter SN map is a diagrammatic representation of the physical location of each microinverter in your PV installation. The virtual array in NEP microinverter gateway (BDG-256) is generated from the map you create using the SN stickers from each microinverter. THIS SN MAP IS VERY IMPORTANT FOR ACCURATE REPRESENTATION WITHIN THE NEP MONITORING PLATFORMS AND IF TROUBLESHOOTING IS EVER REQUIRED.

Each product has a removable serial number label located on the mounting plate. Enter this serial number into the

BDG-256 and correlate it with the correct microinverters and modules on the connection map.

DC Connection

Safety: Connecting DC

⚠ DANGER

Danger to life due to electrical shock when live DC cables or components are touched.

High DC voltages are present in the DC cables when PV modules are exposed to light. Touching live DC cables or components may result in death or severe injuries due to electric shock.

- **DO NOT** touch non-insulated parts or cables.
- **DO NOT** touch live components when voltage sources are still connected or just disconnected.
- **DO NOT** connect DC connectors to the product under load.

- Personal protective equipment **MUST** be worn suitably and properly for all work on the product and the system.
- Voltage sources **MUST** be disconnected from the product before all work.

⚠ DANGER

Danger to life due to electrical shock from touching ungrounded components or from touching live components during a ground fault.

Touching ungrounded PV modules, array frame, inverter or live system components, or parts of the system components that are still live in the event of a ground fault, may result in death or severe injuries due to electric shock.

- PV modules and the array frames, including electrically conductive surfaces, **MUST** be connected and grounded in compliance with all applicable regulations.

In the event of a ground fault,

- **DO NOT** touch any parts or frame of the PV array.
- **DO NOT** touch any cables without reliable insulation.
- **DO NOT** connect the product to any string or branch with ground faults.
- Before working on the product, voltage resources **MUST** be disconnected.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

! CAUTION

Risk of injury and property damage

In connecting DC cables to the inverter, maximum input current and voltage **MUST** not exceed permitted range as stated in Product Parameters.

- Any guarantee and warranty claims in such cases will be voided.

Requirements for PV Modules

- All PV modules of connected arrays should be of the same type.
- All PV modules of connected arrays should be aligned properly and tilted identically.
- **DO NOT** parallel modules in one string of DC input.
- In connecting each independent MPPT, PV arrays in parallel connection should have the same number of modules.
- For connection of PV modules to the inverter, all PV modules **MUST** be fitted with the supplied DC connectors.
- When assembling the DC connectors, cables **MUST** be equipped with DC connectors of the correct polarity.
  - e.g. [**positive**] connection cable to [**positive**] DC connectors, [**negative**] connection cable to [**negative**] DC connectors.
- Before connecting the PV modules to the inverter, the inverter's DC switch **MUST** be switched **OFF**.
- The DC input voltage AND DC input current of the PV array **MUST** never exceed the maximum input voltage and current of theinverter.

DC Connection Procedure

Completely install all microinverters and all system inter-wiring connections prior to installing the PV modules.

1. Mount the PV modules above their corresponding microinverter. Each microinverter comes with 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 microinverter. Then connect the negative DC wire from the PV module to the positively marked DC connector (female socket) of the microinverter. Repeat for all remaining PV modules using one microinverter for every 1,2,3, or 4 modules depending on the microinverter model.

Removing DC

Safety: Disconnection

⚠ DANGER

> **Danger to life due to electrical shock when live components are touched in disassembled products.**
>
> High voltages and energies are present in live components and cables inside the product during operation, e.g. capacitors, connectors. Touching live components and cables may result in death or severe injuries due to electric shock.
>
> - **DO NOT** disassemble the product.
> - **DO NOT** touch live components.
>
> The product **MUST ONLY** be opened for maintenance reasons by a qualified person, after:
>
> - Both DC and AC switches or isolators, if any, externally connected or integrated, are switched to OFF.
> - Both DC and AC connections are plugged out/sealed.
> - Voltages inside the product are fully discharged.

⚠ DANGER

> **Danger to life due to electrical shock when live DC cables or components are touched.**
>
> High DC voltages are present in the DC cables when PV modules are exposed to light. Touching live DC cables or components may result in death or severe injuries due to electric shock.
>
> - **DO NOT** touch non-insulated parts or cables.
> - **DO NOT** touch live components when voltage sources are still connected or just disconnected.
> - **DO NOT** connect DC connectors to the product under load or during operation.
> - Personal protective equipment **MUST** be worn suitably and properly for all work on the product and the system.
> - Voltage sources **MUST** be disconnected from the product before all work.

CAUTION

Risk of injury due to weight of product.

Lifting the product incorrectly or dropping in transportation or mounting may result in injuries like bruises or muscle strains.

- Make sure to take the weight of the product into account in transportation and lifting and proceed carefully.
- To avoid muscle strain or injury, please use proper lifting techniques and any necessary aid/tools.
- Personal protective equipment **MUST** be worn suitably and properly for all work.

Procedure of Disconnecting

QUALIFIED PERSONS

Before any work on the disconnection of the inverter, **ALWAYS** disconnect it from all voltage sources in the described sequence as follows:

1. Disconnect the AC by opening the branch circuit breaker(s).
2. Disconnect the first AC connector in the branch circuit.
3. Cover the module with an opaque cover.
4. Using a DC current probe, verify there is no current flowing in the DC wires between the PV module and the micro inverter.
5. Care should be taken when measuring DC currents, most clamp-on meters must be zeroed first and tend to drift with time.
    - **Do not pull on the cable**.
    - Instead, use the disassembly tool for PV connectors at the point of interconnection of female and male connectors.
    - Pull out the connectors in a downward direction.

6. Use a suitable measuring device to ensure that **no voltage** is left at the DC inputs of the inverter.
7. Disconnect the PV module DC wire connectors from the microinverter.
8. Remove the microinverter from the PV array racking.
9. Use a suitable measuring device to ensure that **no voltage** is left at the AC inputs.
    - Measure the voltage by inserting the probe into the opening of each terminal.
    - Check the voltages between L and N, and between L and PE.
10. If necessary, remove the M5 screw securing the inverter to mounting bracket. Lift the inverter from the mounting bracket.

Disposal of the inverter should be in accordance with disposal regulations for electronic waste. Refer to Recycling and Disposal.

Re-install Microinverter

1. Attach the replacement microinverter to the PV module racking using hardware recommended by your module and or racking vendor.
2. Connect the AC cable of the replacement microinverter and the neighboring microinverters to complete the branch circuit connections.
3. Complete the Microinverter Serial Number (SN) map and connect the PV Modules.
    1. Collect the SN sticker of the newly installed microinverter.
    2. Each microinverter has a removable SN located on the mounting plate. Be sure to collect the SN sticker for the newly installed microinverter, to enter this SN into a BDG-256. Take note of the SN from the older replaced microinverter.
    3. Connect the PV Modules
    4. Completely install all microinverters and all system inter-wiring connections prior to installing the PV modules.
        1. Mount the PV modules above their corresponding microinverter. Each microinverter comes with 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 micro inverter. Then connect the negative DC wire from the PV module to the positively marked DC connector (female socket) of the microinverter. Repeat for all remaining PV modules using one microinverter for every 1,2,3, or 4 modules, depending on the microinverter model.
4. Replace the SN of the old replaced microinverter, in the BDG-256 gateway, with the SN from the new replacement microinverter.

COMMISSIONING

⚠ WARNING

> CONNECT MICROINVERTER TO THE ELECTRICAL UTILITY GRID ONLY AFTER RECEIVING PRIOR APPROVAL FROM THE UTILITY COMPANY.

⚠ WARNING

> BE AWARE THAT ONLY QUALIFIED PERSONNEL CAN CONNECT MICROINVERTER TO THE ELECTRICAL UTILITY GRID.

⚠ WARNING

> ENSURE THAT ALL AC AND DC WIRING IS CORRECT. ENSURE THAT NONE OF THE AC AND DC WIRES ARE PINCHED OR DAMAGED. ENSURE THAT ALL JUNCTION BOXES ARE PROPERLY CLOSED.

Commissioning

Following these steps to commission the microinverter PV system:

1. Turn on the AC disconnects or circuit breakers on each microinverter AC branch circuit.
2. Turn on the main utility-grid AC circuit breaker. Your system will start producing power after a few minutes time.
3. The microinverter will begin to send performance data over the power line communication (PLC) to the BDG-256. The time required for each microinverter in the system to communicate to the BDG-256 will vary depending on the number of microinverters in the system.

Operating Instructions

The microinverter becomes powered when sufficient DC voltage from the module is applied. The status LED will start flashing after sufficient DC power is applied, as an indication that the microinverter is live.

LED	Status	Meaning
Green Light Flashing every **two** seconds	Standby	OK
Red Light Flashing every **two** seconds	Standby	Error
Orange Light Flashing every **two** seconds	Standby	No Communication with BDG-256
Green Light Flashing every **one** seconds	Producing	Standby
Red Light Solid	Producing	Grounding Fault
Orange Light Flashing every **one** seconds	Producing	No Communication with BDG-256

TROUBLESHOOTING

In case of a fault, BDM inverters have multiple protective functions that will prevent output power. The fault message may be sent to a connected BDG-256 gateway through power line communication (PLC). Or for BDM-WF (Wi-Fi), the same alert is sent through Wi-Fi internet connection and can be monitored through NEPViewer (please refer to the tech note "Configuring BDM Wi-Fi").

The alert message is a 16-bit code.

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 fault
Bit-15	PLC Communication Error

⚠ WARNING

> DO NOT ATTEMPT TO REPAIR THE MICROINVERTER; IT CONTAINS NO USER-SERVICEABLE PARTS. IF THE TROUBLESHOOTING METHODS FAIL, PLEASE RETURN THE MICROINVERTER TO YOUR DISTRIBUTOR FOR MAINTENANCE.

⚠ WARNING

> NEVER DISCONNECT THE DC WIRE CONNECTORS UNDER LOAD. ENSURE THAT NO CURRENT IS FLOWING ON THE DC WIRES PRIOR TO DISCONNECTING. AN OPAQUE COVERING MAY BE USED TO COVER THE MODULE PRIOR TO DISCONNECTING.

⚠ WARNING

> PRODUCT IS POWERED BY DC POWER FROM PV MODULES. MAKE SURE YOU DISCONNECT THE DC CONNECTIONS AND RECONNECT DC POWER TO WATCH FOR THE TWO SECONDS LED ON AND TWO SECONDS LED OFF AFTER DC IS APPLIED.

⚠ WARNING

> ALWAYS DISCONNECT AC POWER BEFORE DISCONNECTING PV MODULE WIRES FROM A MICROINVERTER. THE AC CONNECTOR OF THE FIRST MICROINVERTER IN A BRANCH CIRCUIT IS SUITABLE AS A DISCONNECTING MEANS ONCE THE AC BRANCH CIRCUIT BREAKER IN THE LOAD CENTER HAS BEEN OPENED (SWITCHED OFF).

Troubleshooting an inoperable BDM microinverter

To troubleshoot an inoperable microinverter, follow the steps in the order shown:

1. Check the connection to the utility grid. Verify that the utility voltage and frequency are within allowable ranges shown on the nameplate of microinverter.
2. Verify utility power is present at the microinverter in question by removing AC, then DC power. **Never disconnect the DC wires while the microinverter is producing power.** Re-connect the DC module connectors and then watch for the LED blinks.
3. Check the AC branch circuit interconnection harness between all the microinverters. Verify that each microinverter is energized by the utility grid as described in the previous step.
4. Make sure that any AC disconnects are functioning properly and are closed.
5. Verify the PV module DC voltage is within the allowable range shown in the label of micro inverter.
6. Check the DC connections between the micro inverter and the PV module.
7. PLC signal quality may be checked through the interface on the BDG-256 gateway. If the PLC signal is weak, it might be due to the distance between the microinverters and the gateway. It may also be caused by the interference from other electronic devices. In most cases, signal quality may be significantly improved by moving the BDG-256 closer to the microinverter arrays, and/or farther away from other interferers. In some cases, a signal filter (LCF) may be installed to reduce the interference to PLC communication. If there are two or more separate BDM systems close by, it is highly recommended to install LCF for each microinverter system to block interference from separate adjacent systems.
8. If the problem persists, please call customer support at NEP.

⚠ WARNING

> DO NOT ATTEMPT TO REPAIR THE MICROINVERTER; IT CONTAINS NO USER-SERVICEABLE PARTS. IF THE TROUBLESHOOTING METHODS FAIL, PLEASE RETURN THE MICROINVERTER TO YOUR DISTRIBUTOR FOR MAINTENANCE.

RECYCLING AND DISPOSAL

NOTICE

In requirement of WEEE, dispose the product using methods that are in accordance with local regulations for electronic waste

The product described in this document is involved and categorized in the regulations of **Waste Electrical and Electronic Equipment (WEEE)** from the **European Community Directive 2012/19/EU**. Such regulations shall be applied in disposal and recycling of the product.

In countries and regions where equivalent regulations to WEEE are implemented in disposal of electrical and electronic waste, disposing methods in accordance with all applicable laws should be taken.

- If the product is to be stored away or shipped, pack the inverter using the original packaging or packaging that is suitable for the weight and dimensions of the product.
- If the product is no longer required or a replacement of the product has been or is to be arranged:
  - **DO NOT** dispose of the product together with the household waste.
  - Inform your dealer of the product or an authorized partner of NEP with information about the disposing product.
  - Dispose the product to a suitably authorized facility for recycling electrical and electronic waste.

PRODUCT PARAMETERS

Input | DC

	BDM-1200/BDM-1200LV
Recommended PV Module Power Range / W	500 x 3
MPPT Voltage Range / V	22-55
Startup Voltage / V	24
Max. Input Voltage / V	60
Max. Input Current / A	18 x 3
Overvoltage Protection Category	II

Output | AC

	BDM-1200/BDM-1200LV
Peak Output Power / VA	1200
Max. Continuous Output Power / VA	1200
Rated Output Voltage / V	120
Nominal Output Voltage Range / V	Configurable
Max. Continuous Output Current / A	10
Nominal Frequency / Range / Hz	50 / Configurable
Power Factor (Nominal/Adjustable Range)	-0.85~0.85(full load)
AC Short Circuit Fault Current Over 3 cycles / Arms	15.3
THDi @Rated Power	<5%
Max. Units per 20A Branch	1
Overvoltage Protection Category	III

Efficiency

	BDM-1200/BDM-1200LV
Peak Efficiency	97.3%
MPPT Efficiency	>99.5%
Night Power Consumption / mW	110

General Data

	BDM-1200/BDM-1200LV
Operating Ambient Temperature Range / ℃	-40~65
Relative Humidity Range	0-100%
Dimensions (W x H x D) / mm	268 x 250 x 46.5
Weight / kg	3.4
AC Connection Type (inverter-inverter)	Trunk Cable
Communication Method	PLC or Wi-Fi(2.4G)
Protection Class	IP66/IP67

> The AC voltage/Frequency range may vary depending on the specific country grid.