

NetSure[™] Inverter Cassette System

User Manual

Specification Number: BMK1125608-001 (VTC Number:02405677); BMK1125608-002 (VTC Number:024000A1)

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

Visit https://www.vertiv.com/en-emea/support/ for additional assistance.

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Admonishments Used in this Document



DANGER! Warns of a hazard the reader *will* be exposed to that will *likely* result in death or serious injury if not avoided. (ANSI, OSHA)



WARNING! Warns of a potential hazard the reader *may* be exposed to that *could* result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



CAUTION! Warns of a potential hazard the reader *may* be exposed to that *could* result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



ALERT! Alerts the reader to an action that *must be avoided* in order to protect equipment, software, data, or service. (ISO)



ALERT! Alerts the reader to an action that *must be performed* in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



FIRE SAFETY! Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



SAFETY! Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

Important Safety Instructions

Safety Admonishments Definitions

Definitions of the safety admonishments used in this document are listed under "Admonishments Used in this Document" on page v.

General Safety



DANGER! YOU MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

- a) The tasks should be performed in the order indicated.
- b) Remove watches, rings, and other metal objects.
- c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC voltmeters prior to making contact.
- d) Wear eye protection.
- e) Use certified and well-maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.
- f) The equipment is not suitable for use in locations where children are likely to be present.
- g) This product is intended only for installation in a Restricted Access Location.

Voltages

AC Input Voltages



DANGER! This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain deenergized during installation. DO NOT apply AC input power to the system until all electrical connections have been completed and checked.

AC Output Voltages



DANGER! This system produces AC output voltage capable of producing fatal electrical shock. AC output voltage is present even if only the DC input is connected!



DANGER! Follow local lockout/tagout procedures to ensure AC branch circuit protection devices remain de-energized during installation at loads, as required.

DC Input Voltage



DANGER! This system operates from DC input voltage. Although the DC voltage is not hazardously high, the DC input power can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact a DC input terminal or exposed wire connected to a DC input terminal. NEVER allow a metal object, such as a tool, to contact more than one DC input terminal at a time, or to simultaneously contact a DC input terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.

For this system we are connecting DC input power which is secured by customers CB/Fuse.



ALERT! Performing maintenance and/or troubleshooting procedures may interrupt power to the loads, if AC output voltage (for AC distribution) is not sufficient.

Personal Protective Equipment (PPE)



DANGER! ARC FLASH AND SHOCK HAZARD.

Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done to determine the "hazard/risk" category, and to select proper PPE.

Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority.

Hazardous Voltage



DANGER! HAZARD OF ELECTRICAL SHOCK.

More than one disconnect may be required to de-energize the system before servicing. The inverter system is not supplied with internal input voltage disconnect devices. It is a dual input power supply. Even if the main AC power to the inverter system has been disconnected, potential harm still exists from the inverters taking power from the DC input power source.

Handling Equipment Containing Static Sensitive Components

ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

Maintenance and Replacement Procedures



CAUTION! When performing any step-in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.



NOTE! When performing any step-in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.

Static Warning



This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

- 1. Strictly adhere to the procedures provided in this document.
- 2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
- 3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
- 4. After removing equipment containing static sensitive components, place the equipment only on static dissipative surfaces such as conductive foam or ESD bag. Do not use ordinary Styrofoam or ordinary plastic.
- 5. Store and ship equipment containing static sensitive components only in static shielding containers.
- 6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

1 General Information and Installation Acceptance Checklist

1.1 Customer Documentation Package

This document (UMBMK1125608) provides *User Instructions* for the Vertiv[™] NetSure[™] Inverter Cassette System: Spec. No. BMK1125608, BMK1125608-001=02405677 (VTC number), BMK1125608-002=024000A1 (VTC number).

The complete Customer Documentation Package consists of...

System Installation Manual

• System Installation Instructions: UMBMK1125608

Controller User Manual

M831A Controller User Instructions: UM1M831A

Inverter User Manual

• Inverter Instructions: UM1I2301200

Engineering Drawings

• Engineering Drawings: BMK1125608-001-01-CD for Cassette system

Table of Set Values:

• 10031687-01-TV

1.2 System Description

The Vertiv [™] NetSure[™] Power, AC Power Systems, 2.4kW/2.5kVA are complete integrated power systems including maximum three (3) inverters, intelligent control, Signals DI&DO also Modbus communication, and distribution.

See Figure 1.1 on page 1 for Isometric View.

See Figure 1.2 on page 2 for typical equipment arrangements.

A system consists of the following components.

Figure 1.1 Isometric View (BMK1125608-001 for instance)





Figure 1.2 Typical Equipment Arrangements, BMK1125608-001, BMK1125608-002 (Front-Cabled Only)

1.2.1 Main Rack

The system always includes one (1) main rack. The main rack is equipped with AC input/output terminals, output protection breaker, three inverters and a M831A controller (controller is not included in BMK1125608-002),14pin signal port, a group of DC input terminal and an EPO equipment.

1.2.2 M831A Controller

Only BMK1125608-001 contains one main controller, BMK1125608-002 doesn't contain one. The controller provides power system control, inverter control, monitoring functions, and local/remote alarm functions. The controller also provides data acquisition, system alarm management and energy management. The controller contains an LCD display and keypad for local access. The controller provides Ethernet connection. It also comes with a comprehensive web page and SNMP capability for remote system management.

1.2.3 Inverters

The shelf houses up to three (3) (n+1 system design philosophy) I230-1200 Inverters.

1.3 Installation Acceptance Checklist

Provided below is an Installation Acceptance Checklist. This checklist helps ensure proper installation and initial operation of the system. As the installation procedures presented in this document are completed, check the appropriate box on this list. If the procedure is not required for your installation site, also check the box in this list to indicate that the procedure was read. When installation is done, ensure that each block in this list has been checked.



NOTE! The system is not powered up until the end of this checklist.



NOTE! Some of these procedures may have been performed at the factory for you.

Physically Installing the System

Carefully mounting the rack inside the customers cabinet

Inverters Installed

Making Electrical Connections

Earthing Connections Made

- AC Connections Made
- External Alarm, Reference, Monitoring, and Control Connections Made
- Ethernet Connection Made (if required)
- DC Connections Made

Initially Starting the System

□ System Installation Checked, System Started, Configured, and Checked

2 Installing the System

2.1 General Requirements

- This product is intended only for installation on or above a non-combustible surface.
- This product must be located in a controlled environment with access to crafts persons only.
- This product is intended for installation in network telecommunication facilities (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- This product is intended for connection to the common bonding network in a network telecommunication facility (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- The installer should be familiar with the installation requirements and techniques to be used in mounting the system's rack(s) to the floor.
- Rack ventilating openings must not be blocked and temperature of air entering inverters must not exceed their rated operating ambient temperature range.
- Clearance requirements are:
 - -Recommended minimum aisle space clearance for the front of each rack is 600 mm.
 - -At least 100mm clearance on the backside is required for the rear of each rack.
 - -Recommended minimum free space above each rack is 300 mm.



NOTE! Use of large-diameter wire may require greater clearance.

2.2 Unpacking

When the equipment arrives, make sure that all the boxes included in the shipping specification are delivered and that they have their correct numbers.

Leave the final unpacking of each unit until the installation is to begin, thus avoiding the loss of loose details such as sets of parts delivered with the units.

When handling printed board assemblies, suitable ESD-protection shall be used.

2.3 Installing Inverters

The inverters are normally delivered in separate boxes. Unpack them and place them in the shelves, but do not connect them.

3 Making Electrical Connections

3.1 General Cabling Information

The racks of the AC Power System are built for front cabling only. Changing the cabling mode on site is **not** recommended.

3.1.1 Front Cabling

All cables enter the front of the rack. Refer to Figure 3.1.

The AC cables should be routed from the left side of the rack.

Figure 3.1 Front Cabling



WARNING! Connecting the AC mains to the AC output connector will damage the inverters.

3.1.2 Signal Cable Entry

BMK1125608-001 can use the front 14pin signal interface, which are 2 DO, 2 DI, 1 RS485, 1 EPO interface, please refer to the label of the signal cable terminal. In normal use, the EPO terminal should be connected with a short wire. Once the short wire falls off, the AC output will be directly disconnected. In case of BMK1125608-002 system so the CAN communication of the cassette must be connected with Vertiv CAN communication loop together with the main cabinet NCU (controller) and a signal from the EPO board pin nr J1:2 must be connected to the main cabinet IB2, or any DI and a special configuration SW must be installed in the cabinet NCU, please refer to the system SD page 2.

Figure 3.2 CAN Connection of 024000A1(BMK1125608-002)



				T1	T2
\bigcirc		AC OUT	1	DO1_NC	EPO_LINK2
Ň	N		2	DO1_COM	EPO_LINK1
		ON	3	DO1_NO	DO2_NC
AC IN	AC OUT	OFF	4	DI1+	DO2_COM
L	L		5	DI1-	DO2_NO
		CB	6	RS485A	DI2+
			7	RS485B	DI2-

NOTE! In case the cassette rack nr. BMK1125608-002 (VTC nr.024000A1) mounted together with Vertiv DC system
(NCU exist in the system) and the customer need an emergency shut off function so, the application engineer needs to connect the pin J1:2 to an DI+ port for an IB2 or IB0 or to FA10 of the NCU back connection, then a special configuration file needed for NCU to activate this function.

3.2 Wiring Considerations

All wiring and branch circuit protection should follow the current edition of applicable local standards/codes.

3.2.1 Recommended Wire Sizes, Branch Circuit Protection and Wiring Illustrations

System Shelf Frame Grounding

System shelf grounding is accomplished through ground washers properly installed on the rack brackets.

For rack grounding requirements, refer to the CE, applicable local codes, and your specific site requirements.

AC Input Connections (Spec. No. BMK1125608 List 001 and 002)

AC Input Branch Circuit Protection and Wire Size Selection

Figure 3.3 AC input and AC Output Connector Connection



WARNING! Connecting the AC mains to the AC output connector will damage the inverters.

Refer to Table 3.1 for recommended wire sizes.

Table 3.1 Inverter System Recommended AC Input Wire Size

Spec	AC Input	AC Input Cable
BMK1125608-001	L+N	6mm²
BMK1125608-002	L+N	6mm²

DC Input Connections (Spec. No. BMK1125608 List 001 and 002)



NOTE! There is no battery for this system there is only DC power connection

DC Input Connection and Wire Size Selection

Refer to Table 3.2 for recommended wire sizes.

Table 3.2 Inverter System Recommended DC Input Wire Size

Spec	DC Input Cable Size
BMK1125608-001	16mm ²
BMK1125608-002	16mm ²

AC Output Connections (Spec. No. BMK1125608 List 001and 002)



NOTE! The recommended power with at least one redundancy unit in the system.

AC Output Branch Circuit Protection and Wire Size Selection

Refer to Table 3.3 or recommended wire sizes.

Table 3.3 Inverter System Recommended AC Output Wire Size

Spec	AC Output Power	AC Load CB	AC Output Cable Size	
BMK1125608-001	2.5KVA	1x12A	For the AC load connection, the customers must follow the local rules and the size of the cable will depend on the breaker current	
BMK1125608-002	2.5KVA	1x12A	rating and the distance between the system and the load. In general, we have 12A CB installed in the system AC distribution	

3.3 Earthing

3.3.1 Protective Earth

The power supply PE, the inverter module shell, and the earthing of the signal line are all connected to the mechanical structure of the mounting frame. The earthing point of the entire structure is on the M6 screw on the left mounting ear.

Figure 3.4 Earthing Principle of BMK1125608-001 and BMK1125608-002





NOTE! The recommended PE cable size is 6 mm².

3.4 Ethernet Connection to the M831A Controller (if required)



NOTE! If the Web Interface is not being used with this system, skip this procedure. When the customer using BMK1125608-002 so they should have an NCU already in the cabinet and there is no need for mini-NCU.

The M831A Controller provides a Web Interface via an Ethernet connection to a TCP/IP network. An RJ-45 10BaseT jack is provided on the front of the M831A for connection into a customer's network running TCP/IP. This jack has a standard Ethernet pin configuration scheme, twisted pair. Refer to Figure 3.4 for location and Table 3.4 for pin outs. Use shielded Ethernet cable (grounded at both ends). Note that the M831A RJ-45 jack is connected to chassis ground. Refer to the M831A User Instructions for operational details.



NOTE! You can access the Web pages of the power system locally by using a "crossover" or "straight" cable connected directly between your PC and the controller.



WARNING! The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only.

The intra-building port(s) of the equipment or subassembly MUST NOT be metallically connected to the interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

The intra-building port (RJ-45) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

Figure 3.5 M831A Ethernet Port



Table 3.4 M831A RJ-45 Ethernet Port Pin Configuration

Port Pin Number	Name	Definition
1	Tx+	Send Signal +
2	Tx-	Send Signal -
3	Rx+	Receive Signal +
4		no connection
5		no connection
6	Rx-	Receive Signal -
7		no connection
8		no connection

4 Initially Starting and Checking the System

- For the start-up of an AC Power System, see the document:
- Table of Set Values:
 - 10031687-01-TV
- Engineering Drawings

BMK1125608-001-01-CD

5 Operating Procedures

5.1 Controllers and Inverters

For operation instructions on these units, refer to the following documents.

- M831A Controller User Instructions UM1M831A
- I230-1200 Inverter User Instructions UM1I2301200

5.2 EPO Function

The Inverter Cassette System contains an EPO (Emergency Power Off) function. Connection points for an external EPO normally closed switch are provided on the customer interface board or terminal connection. If an external EPO switch is wired to the customer interface board, opening the switch activates the EPO function. The EPO function shuts down and locks out the inverters. When the EPO switch is closed, the inverters remain off. Refer to Figure 5.1 The inverters will restart when the input power is removed and restored after 30 seconds or more (until the LEDs on the modules extinguish). Please refer to the schematic diagram.



NOTE! After activating the EPO and to start the system again, please follow these steps:

NOTE! If a customer method is not including a mains power disconnection, the inverters will stay locked OFF until the input power is recycled. If the EPO switch is closed without recycling the input power, the inverters will remain off and have a local alarm visible on the module. The EPO alarm from the controller will extinguish. And you need to reboot the controller to start the system again.

- 1. Turn off the AC supply of the whole system
- 2. Check the EPO fuse/push-button It is in a correct position
- 3. Pull/remove M831A from the system to cancel the commands
- 4. Turn ON the AC to start the inverters.
- 5. Insert the M831A back in its position and check that all LVDs tuned ON again.

Figure 5.1 EPO Control Connection in AC Power System



5.3 Local Controls and Indicators

5.3.1 M831A Local Controls and Indicators

There are three (3) indicators located on the M831A's front panel.

Location and Identification: Refer to Figure 5.2.

Refer to Table 5.1 for the function of the indicators.

Figure 5.2 Local Indicators and Menu Navigation Keys Locations



Table 5.1 Local Indicators

Indicator	Normal State	Fault State	Fault Cause
Status (Green)	On	Off	No input power to the M831A.
Observation Alarm (Yellow)	Off	On	The system has one or more active Observation alarms. Alarm conditions are programmable.
Major or Critical Alarm (Red)	Off	On	The system has one or more active Major or Critical alarms. Alarm conditions are programmable.

5.3.2 Inverter Local Controls and Indicators

There are three (3) indicators located on the Inverter's front panel.

Location and Identification: Refer to Figure 5.3.

Refer to Table 5.2 for the function of the indicators.



NOTE! AC voltage must be present at the inverter input terminals.

Figure 5.3 Local Indicators and Menu Navigation Keys Locations



Table 5.2 Local Indicators

Indic	ator	Normal State	Alarm State	Alarm Cause
	Power (Green)	On	Off	No output voltage.
	Coreeny		Flashing	The Inverter is being identified by the controller. Online upgrade.
	Protection (Yellow)	Off	On	AC Input Abnormal DC Input Abnormal Overload System Over Temperature ESTOP Alarm Emergency Shutdown Alarm (REPO Alarm) Parallel Current Sharing Abnormal (Current Sharing Alarm)
			Flashing	Loss of communication with the controller, the inverter can provide power (slow flashing 1s) No output voltage, the inverter cannot provide power (fast flashing 300ms)
	Alarm (Red)	Off	On	High Voltage Bus Fault (Abnormal high and low voltage of bus) Inverter Failure Discharger Failure Rectifier Failure Output Short Circuit Parallel Communication Failure (Voltage, Frequency, Address conflict) Invalid model type
			Flashing	Fan not operating (Inverter shuts down).

6 Maintenance

6.1 System Maintenance Procedures

It is recommended that the maintenance procedures listed in Table 6.1 be performed every 6 months to ensure continual system operation.

Table 6.1 Maintenance Procedures to Be Performed at 6-Month Intervals

Procedure	Referenced In	Completed ($$)
Check ventilation openings for obstructions such as dust, papers, manuals, etc.		
Inspect the cables connections to the system	Refer to Making Electrical Connections in page 3 of this document.	



NOTE! This table may be reproduced as necessary to record and document system performance.

7 Troubleshooting and Repair

7.1 Controller and Inverters

For troubleshooting and repair instructions on these units, refer to the following documents.

- M831A (NetSure[™] Control Unit) User Instructions, UM1M831A
- I230-1200 Inverter User Instructions, UM1I2301200
- Engineering Drawings: BMK1125608-001-01-CD

7.2 M831A Controller Configuration

If any M831A Controller configuration settings were changed, refer to the M831A *User Instructions* (UM1M831A) and save a copy of the configuration file. This file can be used to restore the M831A Controller settings, if required, at a later time.

7.3 System Troubleshooting Information

This system is designed for ease in troubleshooting and repair. The various indicators as described in the section entitled *Operating Procedures* in the Controller and Inverter User Instructions are designed to isolate failure to a specific element. Once the faulty element has been identified, refer to "Replacement Information" and "Replacement Procedures" in this chapter on page 15.

7.3.1 Troubleshooting Alarm Conditions on the M831A Controller

The M831A Controller displays alarm conditions as listed in the Available Alarms section of the M831A User Instructions (UM1M831A). Programmable external alarm relays are also available, there are 2xDO relays for customers use. Refer to the "Table of Set Values" supplied with your power system documentation for your alarm relay configurations.

The M831A's Active Alarm and Alarm History submenus allow the User to view alarm details. Refer to the M831A User Instructions (UM1M831A) to access these menus.

7.4 Replacement Information

7.4.1 Replacement Assemblies

When a trouble symptom is localized to a faulty inverter, controller, or system circuit board; that particular device or circuit board should be replaced in its entirety. No attempt should be made to troubleshoot or repair individual components on any inverter, controller, or circuit board.

7.5 Replacement Procedures



DANGER! Adhere to the "Important Safety Instructions" presented at the front of this document on page vi.

7.5.1 Replacing the M831A Controller



DANGER! Follow all "Important Safety Instructions" found in the documentation provided with the system the M831A Controller is installed in.



ALERT! M831A CONTROLLER HANDLING. Installation or removal of the M831A Controller requires careful handling. To avoid possibility of M831A Controller damage from static discharge, a static wrist strap grounded through a one megohm resistor should always be worn when handling the M831A Controller. ESD-protective packaging material must also be used when carrying/shipping the M831A Controller.



NOTE! Depending on your network security settings, when you remove a device that is connected to your network and assign the same IP address to the replacement device, you may not be allowed to communicate with the replacement device over the network. Contact your network administrator for assistance.

The M831A is hot swappable. It can be removed and installed with the system operating and without affecting the output bus.

Procedure

- Before performing this procedure, ensure the replacement M831A contains the same configuration file as the existing M831A. Refer to the Configuration Label on the side of the replacement M831A for the Configuration Part Number (see Figure 7.1). If the existing controller is operational, navigate the menus to view its configuration file (MAIN SCREEN/ESC).
- 2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system while this procedure is being performed.
- 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
- 4. Loosen the captive fastener securing the latch mechanism to the front of the replacement M831A. Pull the latch mechanism away from the M831A (this will retract the latch mechanism located on the bottom of the M831A). This unlocks the M831A from the shelf. Refer to Figure 7.2.
- 5. Slide the M831A Controller completely from the shelf.
- 6. Loosen the captive fastener securing the latch mechanism to the front of the replacement M831A. Pull the latch mechanism away from the M831A (this will retract the latch mechanism located on the bottom of the M831A).
- 7. Slide the M831A completely into its mounting position.
- 8. Push the latch mechanism into the front panel of the M831A, and secure by tightening the captive fastener. This locks the M831A securely to the shelf.
- 9. Wait for the controller to finish booting and verify that the complete system operates normally.
- 10. Enable the external alarms or notify appropriate personnel that this procedure is finished.
- 11. Ensure that there are no local or remote alarms active on the system.

Figure 7.1 M831A Configuration Label Location



Figure 7.2 Latch Mechanism on the M831A

M831A



7.5.2 Replacing an Inverter

Refer to the I230-1200 Inverter User Instructions (UM1I2301200)

Inverter Module Replacement

Inverters can be inserted or removed with power applied (hot swappable).



NOTE! Each inverter module locks into a module mounting shelf by means of a latch located on the bottom of the inverter. The latch and inverter handle are interactive. Pushing the handle up into the inverter's front panel causes the latch to extend to the locking position; pulling the handle down out from the inverter's front panel causes the latch to retract. See Figure 7.3.



DANGER! Take care when removing an inverter that was in operation, as inverter surfaces could be very hot.

WARNING! To prevent damage to the latching mechanism, ensure the handle is in the open position when installing or removing an inverter. NEVER hold the handle in the closed position when installing an inverter into a shelf.

Procedure



NOTE! Refer to Figure 7.3 as this procedure is performed.

- 1. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any alarms associated with this system while this procedure is performed.
- 2. On the inverter to be removed, loosen the captive screw on the inverter's handle. Pull the handle down out from the inverter's front panel (this will also retract the latch mechanism). See Figure 7.3.
- 3. Grasp the handle and pull firmly to remove the inverter from the shelf.
- 4. Place the replacement inverter into the mounting position without sliding it in completely.
- 5. Loosen the captive screw on the inverter's handle. Pull the handle down out from the inverter's front panel (this will also retract the latch mechanism). See Figure 7.3.
- 6. Push the inverter completely into the shelf.
- 7. Push the handle up into the inverter's front panel. This will lock the inverter securely to the shelf. Tighten the captive screw on the handle.
- 8. Certain functions (i.e. inverter addressing) may require adjustment when adding or replacing an inverter. Refer to the Power System documentation for instructions.

- 9. After the inverters are physically installed in the module mounting shelf(s), they are ready for operation immediately after power is supplied to them. Verify that the inverters are operating normally.
- 10. Enable the external alarms or notify appropriate personnel that this procedure is finished.
- 11. Ensure that there are no local or remote alarms active on the system.

Figure 7.3 Installing an Inverter



Inverter Fan Replacement

Each inverter uses a fan (P/N 32010474) for cooling. If fan replacement should become necessary, perform the following procedure.



CAUTION! In a system with NO redundant inverter.



NOTE! When performing any step in this procedure that requires removal of existing hardware, retain all hardware for use in subsequent steps.

Procedure

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NOTE! Refer to Figure 7.4 as this procedure is performed.

- 1. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any alarms associated with this system while this procedure is performed.
- 2. Remove the inverter from the shelf. Refer to a previous procedure for step-by-step instructions.
- 3. Place the inverter on a static-safe work surface. Connect an approved grounding strap to your wrist for the remainder of this procedure.
- 4. On this inverter, remove the front panel by removing the three (3) screws securing the front panel to the chassis.
- 5. For proper orientation of the new fan, observe the location of the fan wires and the fan rotation and air flow arrows on the old fan.
- 6. Carefully remove the fan from the inverter chassis and unplug the fan power cable from the printed circuit card.
- 7. Plug the power cable of the replacement fan into the connector on the printed circuit card. Carefully slide the replacement fan into the inverter chassis (ensure the fan wires and fan rotation and air flow arrows match the orientation of the old fan).
- 8. Note that the fan has four holes in the front corners and that the faceplate has three tabs. Carefully slide the faceplate into position, aligning the fan holes with the faceplate tabs. Secure the faceplate to the inverter chassis with the three (3) screws previously removed.
- 9. Replace the inverter into the shelf. Refer to the previous procedure for step-by-step instructions.
- 10. When the fan starts, check to ensure that it is providing front-to-back airflow. If air direction is wrong, immediately remove the inverter from the shelf. Repeat previous steps to check fan orientation and correct as necessary. Reinstall the inverter and again check for proper airflow.
- 11. Enable the external alarms or notify appropriate personnel that this procedure is finished.
- 12. Ensure that there are no local or remote alarms active on the system.

Figure 7.4 Inverter Fan Replacement



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7.5.3 Circuit Board Replacement Procedures



ALERT! Circuit boards used in this power system contain static-sensitive devices. Read the Static Warning at the front of this document on page ix before performing any of the following procedures.

General

The following system components procedures can be performed with the system operating. Refer to Figure 7.5 For system components.



ALERT! When performing any step in these procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the rack; otherwise, service interruption or equipment damage may occur.



NOTE! When performing any step in these procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps.

EPO Board Replacement Procedure

- 1. If you want to replace the EPO board, isolate and disconnect all the AC and DC inputs and the DC output cables first, then remove the rack. Please refer to Figure 7.5.
- 2. Mark and disconnect all the signal cables then remove the EPO board.
- 3. Refer to SD drawing to reconnect the wires in the correct position after replacement.
- 4. Check the system first before reinstallation inside the cabinet.
- 5. After taking out the sub-rack, loosen the screws securing the top cover and remove the top cover. Loosen the 2 screws securing the EPO board, and the EPO board can be removed.

NOTE! Please don't mistake the wiring on the EPO board, please take pictures or refer to the wiring diagram for wiring. After mounting and completing the wiring of the new EPO board, test the system before reinstallation the rack inside the cabinet.

AC Load Circuit Breaker Replacement Procedure

- 1. The AC load circuit breaker replacement supports site work Please refer to Figure 7.5.
- 2. No need to take out the rack or open the top cover. Open the circuit breaker from the upper and lower notches and pull it out (the cable connected at the back is long enough to be pulled out with Circuit breaker), replace the circuit breaker, and then push it in after connecting the wires to the front panel.

Figure 7.5 Location of EPO Boards and AC Load Circuit Breaker



AC load circuit breaker

Figure 7.6 Replace EPO Boards



Figure 7.7 Replace the AC Load Circuit Breaker (Use screwdriver to push the latches to remove the CB)



8 Technical Data – AC Power System

NOTE! When the AC mains are OFF, DC current from the battery or DC supply must be sufficient to support the site's DC load plus the consumption of the inverters required to support the site's AC loads.



NOTE! The number of inverters is based on n+1 design philosophy (one redundancy but it is up to the customers to make it 2 if they want)

8.1 BMK1125608-001 or BMK1125608-002, 2.4kW/2.5kVA AC Power System



NOTE! The system is designed with n+1 solution.

8.1.1 System

AC Input

• 200-240 VAC 13.6A Max, (1W+N+PE), 50/60Hz

AC Output: 200/208/220/230/240 VAC, 50/60Hz, 12A Max

Maximum Input Current from Batteries: 54A @48VDC for Inverter DC Input

NOTE! When the AC mains are OFF, DC current from the battery or DC supply must be sufficient to support the site's inverters.

Max possible AC Load: Up to 2.5kVA or 2.4kW.

Operational Temperature: +5 °C to +45 °C

Storage Temperature: -40 °C to +70 °C

Relative Humidity: 5% to 90%

8.1.2 I230-1200 Inverter

AC input Voltage: 200-240 VAC, 50/60Hz

Maximum Power: 1250 VA/1200W per Inverter

Nominal DC input Voltage: 48 VDC

Input DCVoltage Range: 40 VDC - 58.5 VDC

Maximum Current: 27 A @ 48 VDC per Inverter

8.2 Approval

- CE Marking 93/68/ECC
- EMC Directive 2014/30/EU
- ETSI EN 300 386 v1.6.1, Class A
- Low Voltage Directive 2014/35/EU, EN62368-1 and EN 62040-1
- RoHS 2011/65/EU
- REACH 1907/2006
- WEEE 2002/96/EC

9 Mechanical Specifications

9.1 Overall Dimensions

9.1.1 Sub Racks

Refer to Table 3.3 for two shelves dimensions.



NOTE! All dimensions are in millimeters.

9.1.2 BMK1125608-001 and BMK1125608-002





9.1 Weights

Table 9.1 Product Weights

List Number or Part Number	Net Weight (KG), each	Description			
Common Equipment					
BMK1125608-001	7.6	Inverter System, three Inverters and one controller are included.			
BMK1125608-002	7.3	Inverter System, three Inverters are included.			
Inverter Module	Inverter Module				
112301200	1.1	Inverter Module			
Controller					
1M831A	0.3	M831A Controller			

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