



**48-1U-2000RM**

**1U 19", 2 Post Rack Mount  
& 4 Post Open Frame Cabinet Mount**

**Pure Sine  
Wave Inverter**

**User Manual**

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## **Materials Provided:**

**Qty. (1)** AC Input Box

## **Four Post/Cabinet Mount:**

**Qty. (2)** Front ears with handle

**Qty. (2)** Cabinet rails

## **Two Post Rackmount:**

**Qty. (2)** Mounting brackets (flush or 6" offset) - see Section 8-0

## **Hardware:**

**Qty. (4)** Flat head screws for mounting handles to short ears (pre-installed), M4x8mm

**Qty. (2)** Black button head screws to mount AC input box to stand-offs, M3x6mm

**Qty. (14)** Pan head Philips screw for side rails (Four Post mounting; 6 pcs.) or Two Post mounting brackets (8 max). (See Section 8-0), M3x6mm

**Qty. (6)** M3x6mm Flathead Four Post and Two Post mounting (3 per side)

**Qty. (1)** Hex Key (Allen Wrench), 4mm

## 1. Features

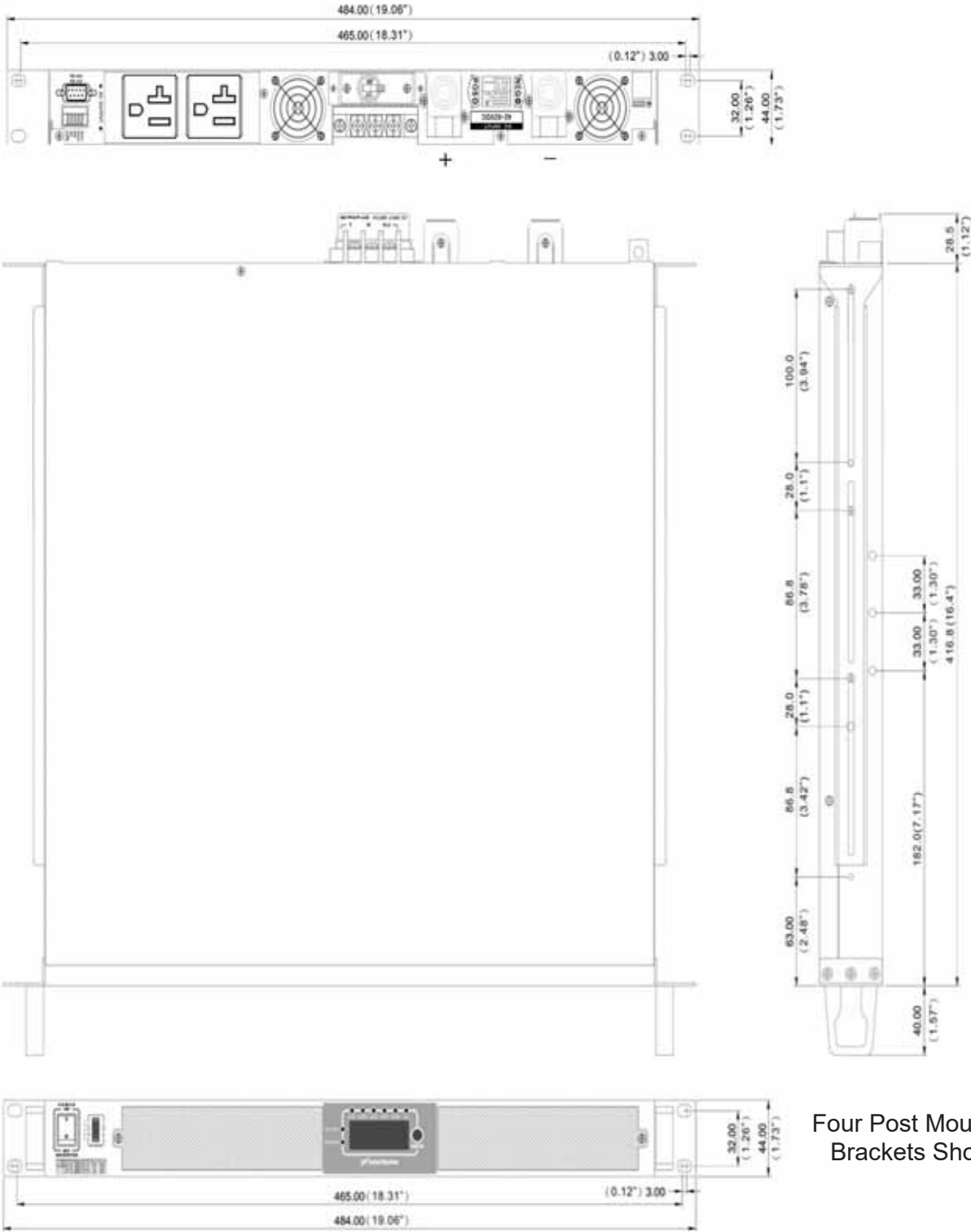
- Pure sine wave output (THD < 3%) R Load
- By pass function
- Inverter mode / UPS mode
- Output frequency: 50 / 60Hz switch
- RS – 232 interface / remote controls port / Wire connection to PC
- Wired Remote control
- Thermostatically controlled cooling fan
- Protection :    Input low voltage            Overload            Short circuit  
                          Low battery alarm    Input over voltage    Over temperature

## 1-1 Electrical Performance

Specification	Model	
Item	48-1U-2000RM	
Continuous Output Power	1700W	2 KVA
Surge Rating	1Min.	1870W
	20 Sec.	2040W
Peak	3000W	
Input Voltage	48V	
<b>Frequency</b>	<b>50/60Hz ± 0.05% (Switch Selectable)</b>	
Output Voltage	100~120VAC (Tune VR); Factory Default: 115 VAC, +/- 1/2 Volt	
Adjustment Peak Output Current	25A	
<b>Efficiency (full load)</b>	<b>90%</b>	
No load Current Draw	0.45A	
Output Waveform	<b>Pure Sine Wave &lt; 3% THD</b>	
P.F.	1.0	
Input Voltage Range	42-62 VDC	
DC Input over voltage alarm	61.0VDC	
DC Input over voltage shut-down	62.0VDC	
DC Input under voltage alarm	43.0VDC	
DC Input under voltage shut-down	42.0VDC	
Protection	Overload, Short Circuit, Reverse Polarity (Fuse), Over/Under Input Voltage, Over Temperature	
Digital Display	OVP, UVP, OTP, OLP, VAC, AMP, WATT, VDC, TEMP, Hz	
Safety	EN60950-1	
EMC	FCC Class A	
Interface Control Port	RS-232 With Baud Rate 2400, 4800, 9600, 19200 (Switch Selectable)	
AC Input	110V AC (90 ~ 130V)	
AC Frequency	(50Hz ~ 60 Hz) ± 3%	
Bypass	4~6ms	
	<b>Inverter mode or UPS mode by selector switch</b>	
Operating Temperature Range	-20°C to 50°C	
Storage Temperature Range	-30°C to 70°C	
Dimensions	17.1"(L) ×16.7"(W) ×3.5"(H)	
Weight	28.2 Lbs	

Specifications are subject to change without notice.

1-2 Mechanical Drawings



Four Post Mounting Brackets Shown

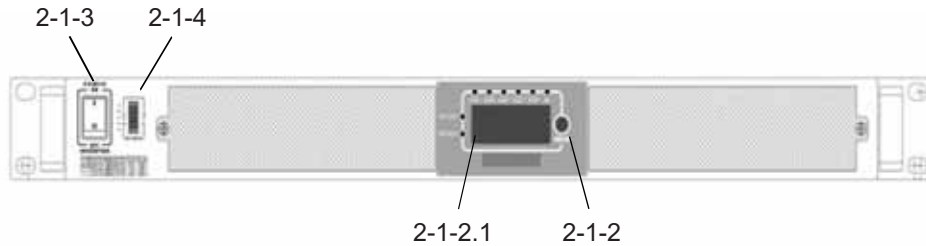
For installation of two post mounting brackets, refer to page 23 section 8.0 Mounting Bracket Installation Two Post Relay Rack.

## 2. Introduction:

Please read the instructions in this manual before installing and using this model.

### 2-1 Front Panel Operation:

#### 2-1-1 Front View:



#### 2-1-2 Function Key

By sequentially pushing the “Function Key”, the display will show system status such as VAC, Amp, Watts. When a malfunction occurs, the display will flash and indicate the problem (ex. UVP = Under Voltage Protection) on the screen. See page 12 & 13 for details.

#### 2-1-2.1 System Status Numeric Display Panel

LED display provides system status and problem modes.

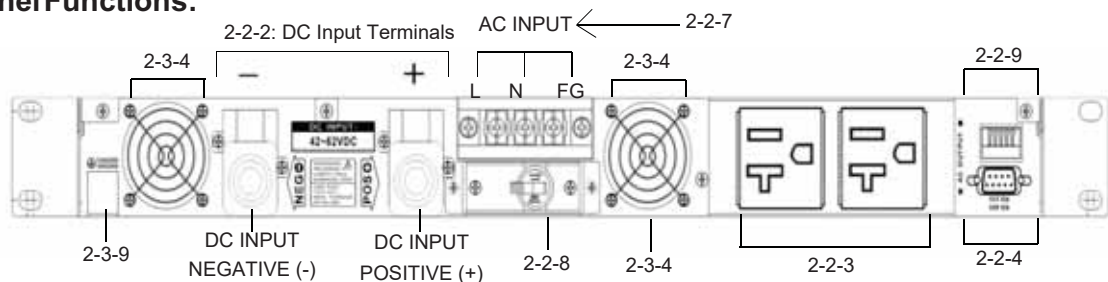
#### 2-1-3 ON / OFF switch :

Leave the Power ON / OFF switch in the OFF position during installation.

#### 2-1-4 Operating Mode and Baud Rate Selector & Voltage Adjustment

UPS Mode: External AC source (ex. utility power) is primary and unit switches to inverter power if external AC source is interrupted. INV Mode: Unit operates as an inverter continuously. External AC is not passed through the unit. See Appendix A, 7-1.

## 2.2 Rear Panel Functions:



#### 2-2-1 Ventilation openings :

Do not obstruct, allow at least 3 inches of clearance for air flow.

#### 2-2-2 Battery terminals :

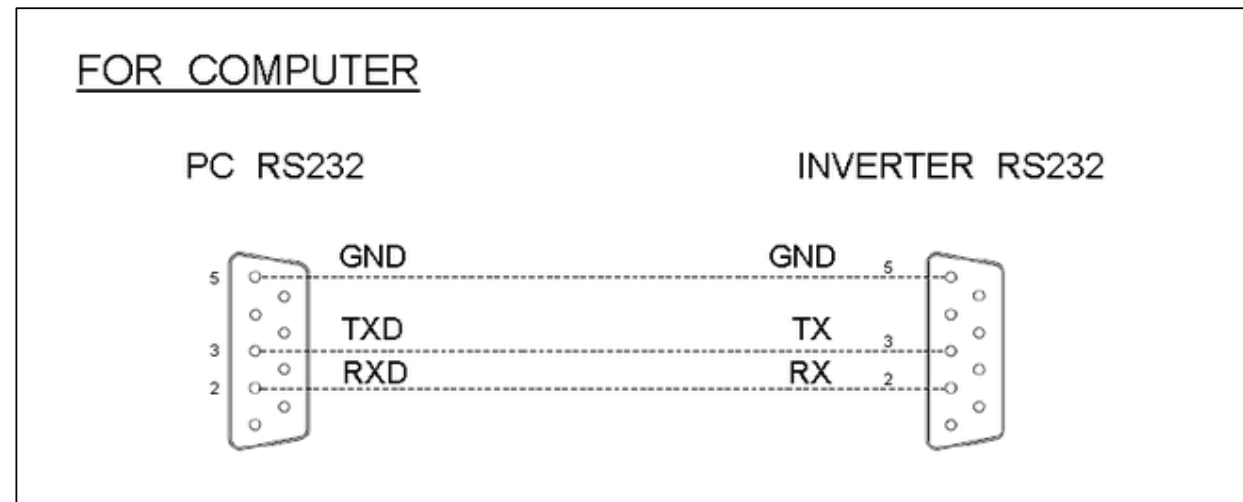
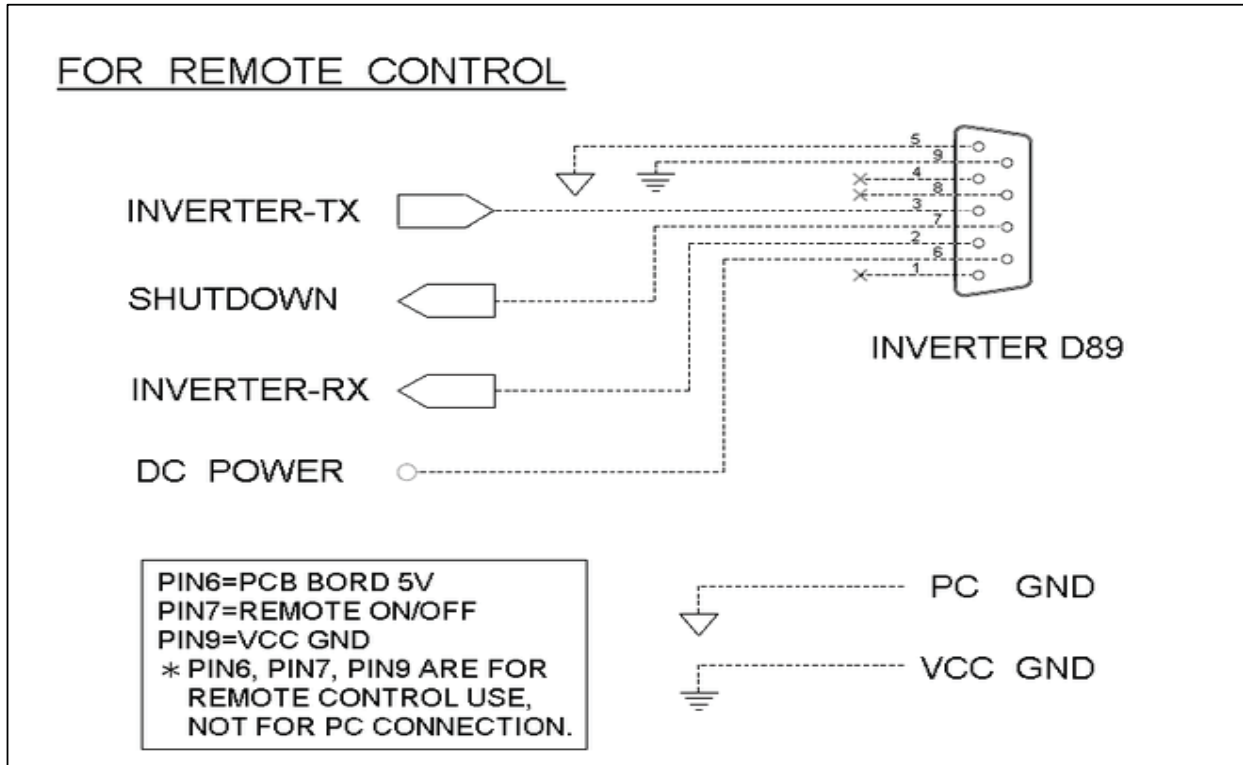
Connect to 48V Battery or other DC Power Source.

【 + 】 is positive, 【 - 】 is negative. Reverse polarity connection will blow the internal fuse and may damage the inverter permanently.

#### 2-2-3 AC outlet : NEMA 20R x 2

2-2-4 RS-232:

Connect to remote control unit (option accessory) or connect to computer to remote control working status.



**WARNING!**

Any damages caused by using incorrect RS232 cable will be outside of our warranty scope. If you are not sure which one is correct RS232 cable, please contact Newmar Technical Support at 714-751-0488.

2-2-5 Connect chassis ground terminal to earth or to vehicle chassis using # 8 AWG wire.



**WARNING!**

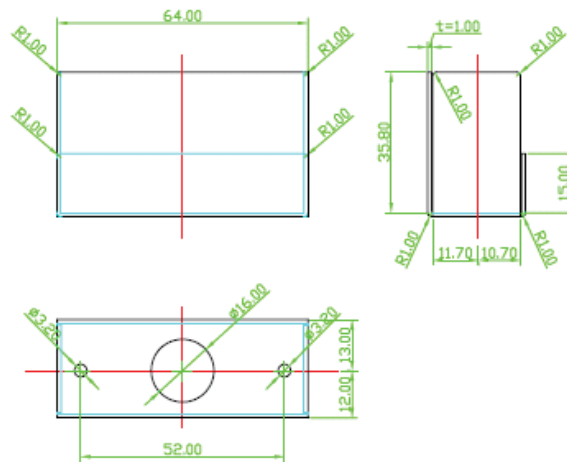
Operation of the inverter without a proper ground connection may result in an electrical safety hazard.



**WARNING!**

Shock Hazard. Before proceeding further, carefully check that the inverter is NOT connected to any batteries, and that all wiring is disconnected from any electrical sources. Do not connect the output terminals of the inverter to an incoming AC source.

**2-2-6 AC Input Terminal (L, N, FG) Cover:**



**2-2-7 AC Input Terminal Block**

AC box with two screws and strain relief provided (not shown) to make external AC connection to inverter.

**2-2-8 AC Input Circuit Breaker**

Protects inverter and input wiring from short circuit.

**2-2-9 Alarm Contacts**

Activates with any alarm condition, ex. under voltage protection (UVP), overload protection (OLP), etc.



## 2-3 Installation:

The power inverter should be installed in a location that meets the following requirements. Note, for installation of Mounting Ears, refer to section 8-0 on page 19.

2-3-1 Dry – Do not allow water to drip or splash on the inverter.

2-3-2 Cool – Ambient air temperature should be between  $-20^{\circ}\text{C}$  and  $50^{\circ}\text{C}$ , the cooler the better.

2-3-3 Safe – Do not install in a battery compartment or other areas where flammable fumes may exist, such as fuel storage areas or engine compartments.

2-3-4 Ventilated – Allow at least one inch of clearance around the inverter for air flow. Ensure the ventilation openings on the rear and bottom of the unit are not obstructed.

2-3-5 Dust-free – Do not install the inverter in a dusty environment with dust, wood particles or other filings/shavings. The dust can be pulled into the unit when the cooling fan is operating.

2-3-6 Close to batteries – Avoid excessive cable lengths. Do not install the inverter in the same compartment as batteries.

Use the recommended wire lengths and sizes (see section 2-6).

Do not mount the inverter where it will be exposed to the gases produced by the battery. These gases are very corrosive and prolonged exposure will damage the Inverter.

2-3-7 Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

2-3-8 Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

2-3-9 Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."



**CAUTION!**

This equipment has a connection between the earthed conductor of the DC supply circuit and the earthing conductor.

- 2-3-10 This equipment shall be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from a earthing terminal bar or bus to which the DC supply system earthing electrode is connected.
- 2-3-11 This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system shall not be earthed elsewhere.
- 2-3-12 The DC supply source is to be located within the same premises as the equipment.
- 2-3-13 Switching or disconnecting devices shall not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.
- 2-3-14 The unit is intended for connection to a branch circuit with 20A fuse protection
- 2-3-15 Please confirm that the AC input switch is at OFF position before connecting/disconnecting the AC power. Please don't touch the AC INPUT terminals by hands or other conductors to avoid the electric shock.
- 2-3-16 Protection in PRIMARY CIRCUITS against overcurrents, short circuits and earth faults shall be provided, either as an integral part of the equipment or as part of the building installation.
- 2-3-17 The Aluminum conductors must not be used for protective earthing conductors.
- 2-3-18 For supply connections, use wires suitable for at least 105°C. Since from test results the temperature results are higher than 90°C.

## 2-4 Quick Hook up and Testing:

2-4-1 Unpack and inspect the power inverter. Check to see that the AC input circuit breaker is in the OFF position and the AC input circuit breaker on rear panel is also in the OFF position.

2-4-2 Connect the cables to the DC input terminals on the rear panel of the power inverter. The red terminal is positive (+) and the black terminal is negative (-). Insert the cables into the terminals and tighten relative nut to clamp the wires securely.



### **WARNING!**

You may observe a spark when you make this connection since current may flow to charge capacitors in the power inverter. Do not make this connection in the presence of flammable fumes as explosion or fire may result.

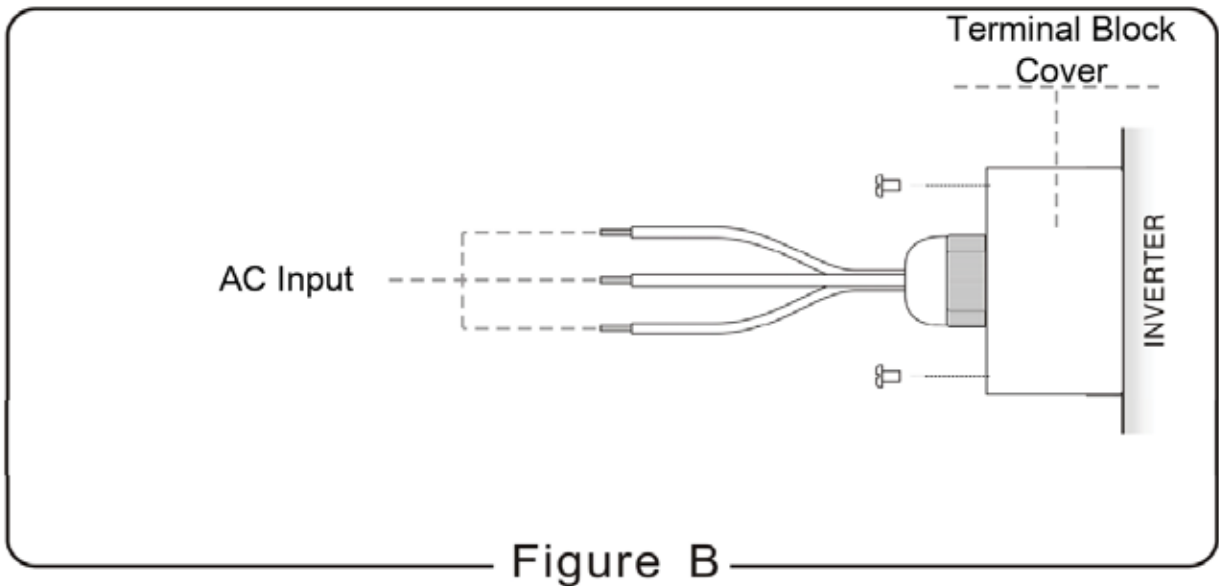
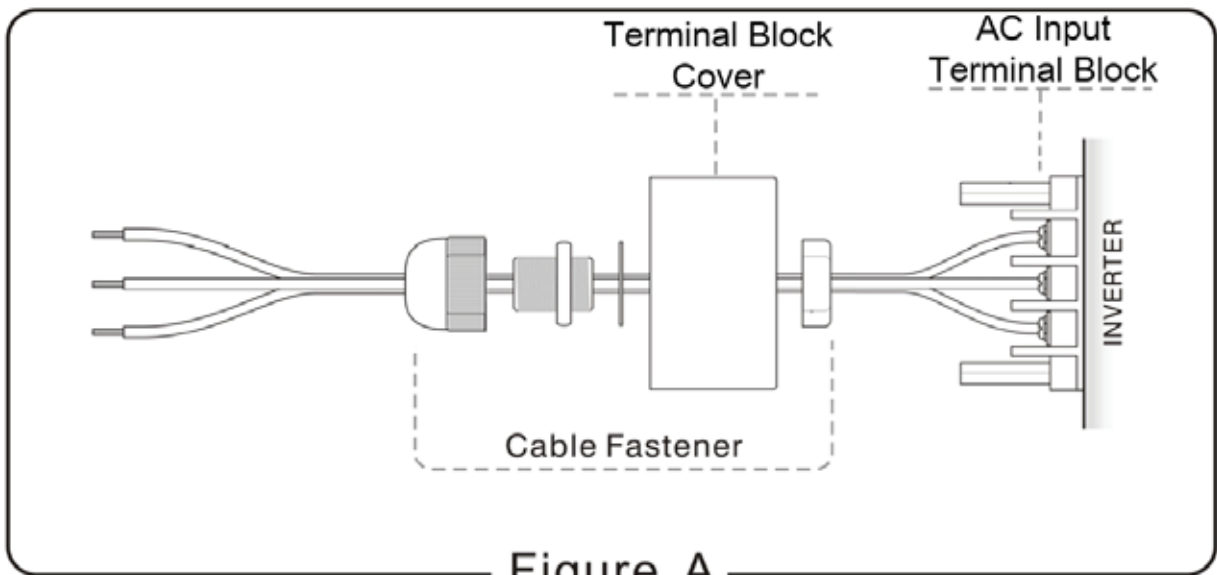


### **WARNING!**

Make sure all the DC connections are tight (torque to 9-10 ft-lbs, 11.7-13Nm). Loose connections will overheat and could result in a potential hazard.

2-4-3 Connect L-N-FG socket and AC supplier(Please refer to the cover mechanical drawings on page 7)

- First to fasten power cables at L-N-FG terminal block. (refer to figure A)
- Line up cable fastener and terminal block cover to let power cables go through them individually.
- Have terminal block cover fixed by cable fastener.
- Turn the screws to tighten terminal block cover. (refer to figure B)
- Connect power cables to AC supplier individually, and make sure correct connection.



**WARNING!**

Connect only to the main supply after terminal block covers are installed.

2-4-4 Before proceeding further, carefully check that the cable you have just connected connects the negative terminal of the inverter to the negative output power source.



**CAUTION!**

Reverse polarity connection will blow a fuse and may permanently damage the Inverter. Damage caused by reverse polarity connection is not covered by our warranty.

2-4-5 Connect the cable from the negative terminal of the inverter to the negative terminal of the power source. Make a secure connection.

2-4-6 Set the AC input circuit breaker to the ON position; you will hear the “beep-beep beep” sound. After that, you will hear the continuous sound of the internal alarm. Then, when the AC voltage shows on the display, the device will have completed start-up operation.

2-4-7 Set the AC input circuit breaker to the OFF position and the device will shut down completely.

2-4-8 Use a true RMS power meter to accurately measure the output voltage of the inverter.

**2-5 AC Safety Grounding:**

During the AC wiring installation, AC input and output ground wires are connected to the inverter. The AC input ground wire must connect to the incoming ground from your AC utility source.

The AC output ground wire should go to the grounding point for your loads (for example, a distribution panel ground bus bar).

2-5-1 Neutral Grounding (GFCI's) :

2-5-1-1 **120V models:** The neutral conductor of the AC output circuit of the inverter is automatically connected to the safety ground during inverter operation. This conforms to national electrical code requirements that separately derived AC sources (such as inverter and generators) have their neutral conductors tied to ground in the same way that the neutral conductor from the utility is tied to ground at the GFCI breaker panel. For models configured with a transfer relay, while AC utility power is presenting and the Inverter is in bypass mode, this connection (neutral of the Inverter's AC output to input safety ground) is not present so that the utility neutral is only connected to ground at your breaker panel, as required.



**WARNING!**

Do not operate the power inverter without connecting it to ground.  
Electrical shock hazard may result.

**CAUTION:** This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment.

If this connection is made, all of the following conditions must be met:

This equipment shall be connected to directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.

- This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system shall not be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices shall not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor."

## 2-6 Making DC Wiring Connections:

Follow this procedure to connect the battery cables to the DC input terminals on the Inverter. Your cables should be as short as possible (ideally, less than 10 feet / 3 meters) and large enough to handle the required current in accordance with the electrical codes or regulations applicable to your installation.

Cables that are not an adequate gauge (too small) or are too long will cause decreased inverter performance such as poor surge capability and frequent low input voltage warnings and shutdowns.

These low input voltage warnings are due to DC voltage drop across the cables from the Inverter to the batteries.


The longer and smaller diameter of these cables, the greater the voltage will drop.

## 2-7 Inverter Operation:


To operate the power inverter, turn it on using the ON/OFF switch on the front panel. The power inverter is now ready to deliver AC power to your loads.


If you are operating several loads from the power inverter, turn them on separately after the Inverter has been turned on.

This will ensure that the power inverter does not have to deliver the starting currents for all the loads at once.



**CAUTION!**  
EXTERNAL SURFACES GET HOT.

During the period of the unit running, the case may become very warm. Please do not touch the side marked “” directly.



**WARNING!**  
The installation of a fuse must be on the Positive (+) cable. Failure to place a fuse on Positive (+) cables running between the Inverter and battery may cause damage to the Inverter and will void warranty.

Increasing your DC cable size will help improve the situation. The following size cable and fuse rating is recommended for optimum inverter performance and safety.

Model No	Wire AWG	Inline Fuse	Length
48-1U-2000RM	#2	70A	10' Max

The inverter will indicate high and low DC voltage conditions as follows:

Model	DC Input over voltage shut-down	DC Input over voltage alarm	DC Input under voltage alarm	DC Input under voltage shut-down
48-20001U	62.0VDC	61.0VDC	43.0VDC	42.0VDC

The following refers to LED indicators on pages 16-17.

2-7-1 Function Button:

Press this button to toggle through indicators (2-7-2 through 2-7-7 below.)

2-7-2 Output Voltage Indicator:

VAC LED illuminates and alpha-numeric display shows output Voltage value.

2-7-3 Output Current Indicator:

AMP LED illuminates and displays output Current value.

2-7-4 Output Watts Indicator:

WATT LED illuminates and displays output Watt value.

2-7-5 Input DC Voltage Indicator:

VDC LED Illuminates and displays input DC voltage value.

2-7-6 Temperature Indicator:

TEMP LED illuminates and displays internal operating temperature value.

2-7-7 Output Frequency AC Indicator:

HZ LED illuminates and displays output frequency value.

2-7-8 ON-LINE Indicator:

Illuminates when external AC power is available.

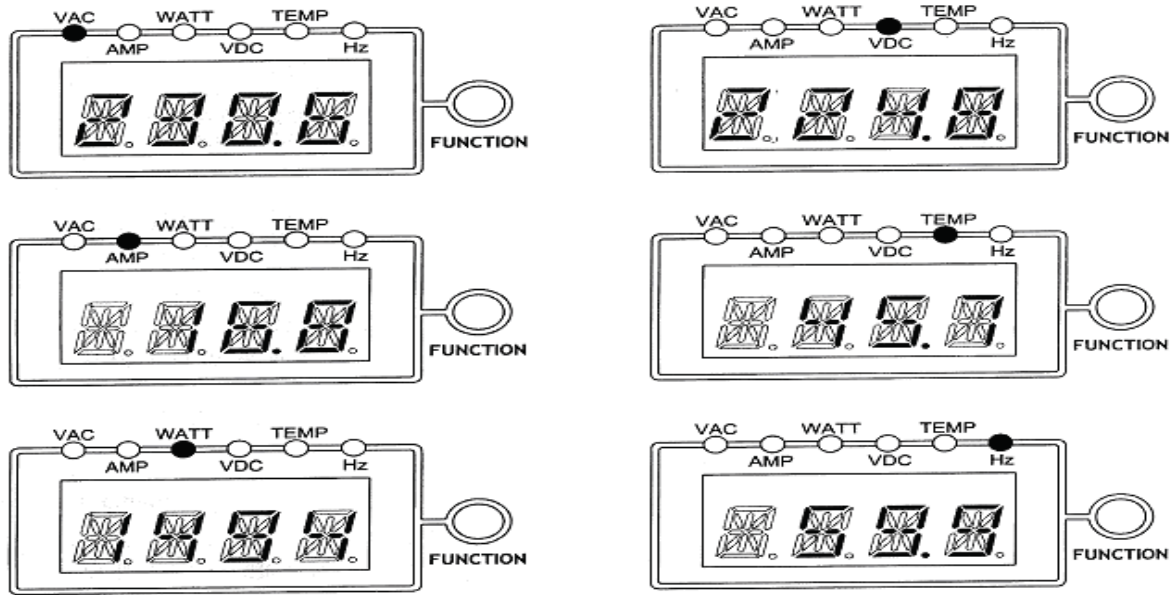
2-7-9 Bypass Indicator:

Illuminates when unit is running from DC power. Either set in Inverter Mode or when set up in UPS mode and AC input is lost.



2-7-10 Output Frequency DC Indicator:

Hz LED illuminates and displays output frequency value



Display Accuracy:

Function	VAC	AMP	WATT	VDC	TEMP	Frequency	
Range	100-120 VAC	0-20A	0-2KW	42-62 VDC	0-120°C	50Hz	60Hz
Accuracy	± 1%	1%±0.5A	± 3%	± 2%	± 1%	±0.01	±0.01

2-7-11 Over Voltage Protection Indicator: (OVP)

The over voltage indicator indicates that the power inverter has shut down because input voltage exceeded 61VDC. (See page 15)

2-7-12 Under Voltage Protection Indicator: (UVP)

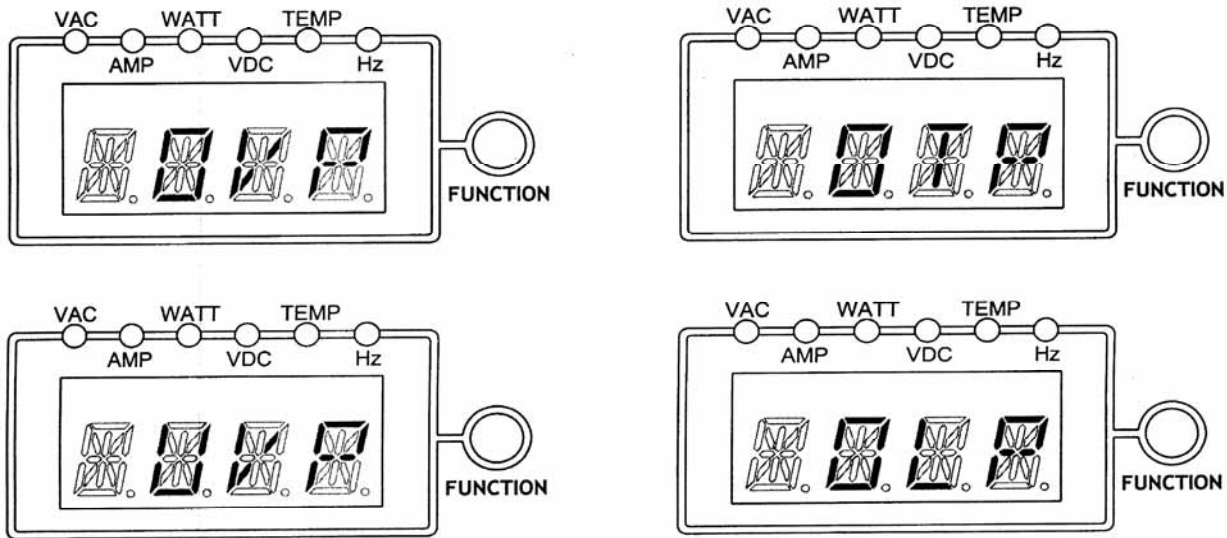
The under voltage indicator indicates that the power inverter has shut down because input voltage fell below 43VDC. (See page 15)

2-7-13 Over Temp Protection Indicator: (OTP)

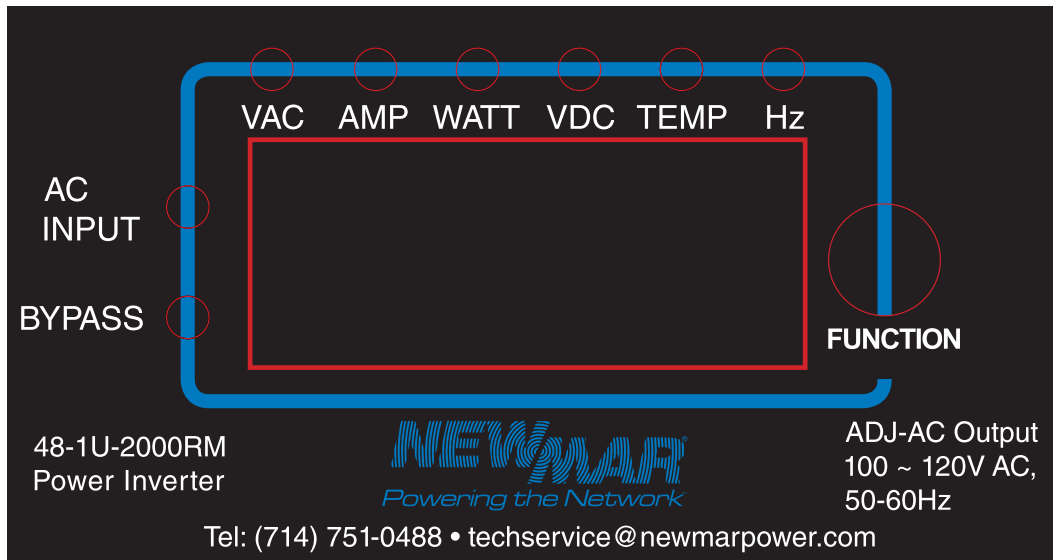
The over temp indicator indicates that the power inverter has shut itself down because its internal temp has become excessively elevated. The power inverter may overheat because it has been operated at power levels above its rating, because it has been installed in a location which does not allow it to dissipate heat properly or due to blocked ventilation openings on front and/or rear panel. The power inverter will automatically turn back on, once it has cooled.

### 2-7-14 Overload Protection Indicator: (OLP)

The overload indicator indicates that the power inverter has shut down. When the overload is removed, the Inverter will return to normal operation.



### 2-7-15 Operating Mode Indicators, Baud Rate Selector and AC Voltage Adjust

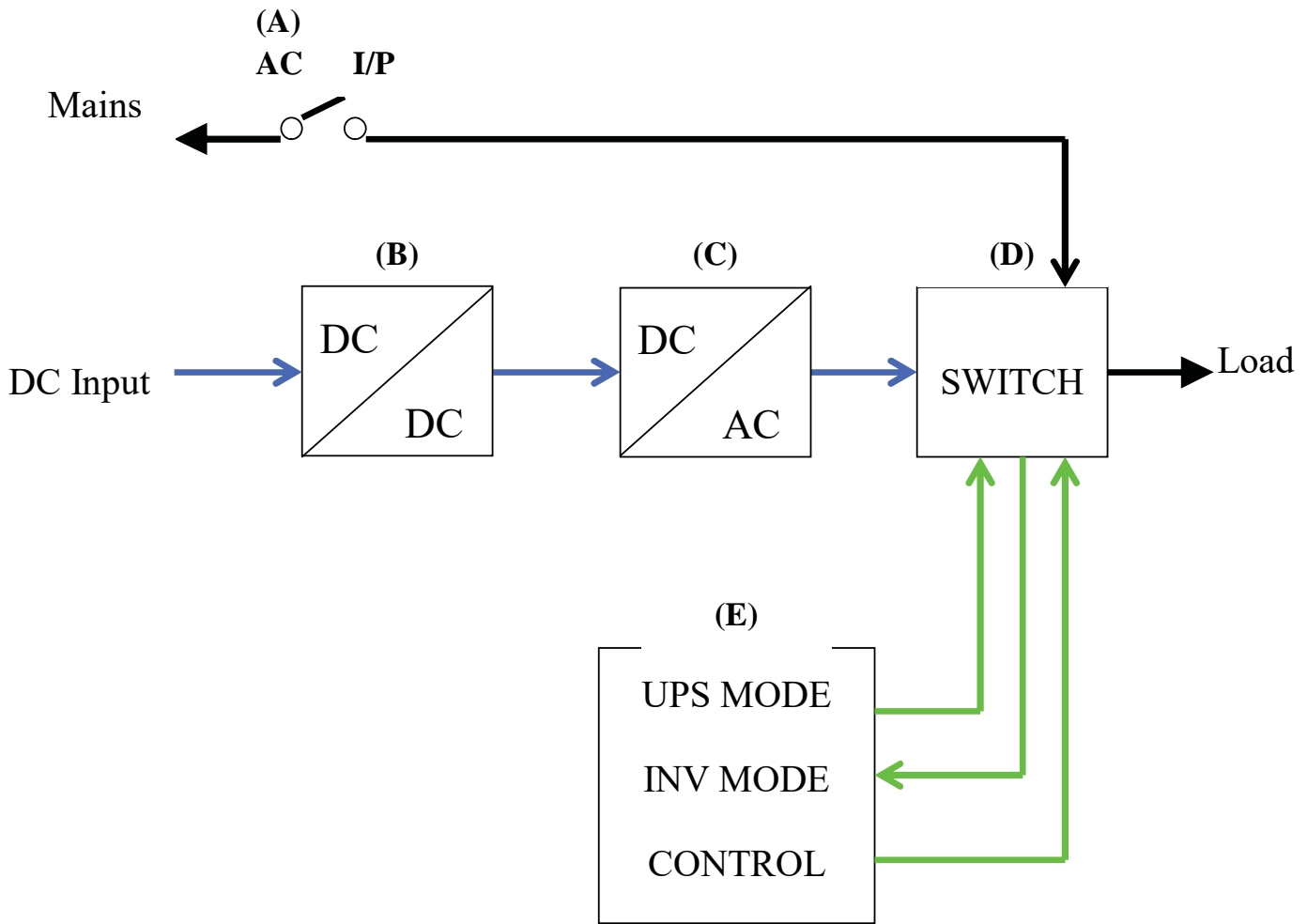


### 2-7-16 AC Input:

This LED illuminates when external AC power is available.

### 2-7-17 Bypass:

This LED illuminates when AC input has failed or is out of tolerance and the Inverter is providing AC power from the battery.



(A) AC INPUT SWITCH

(B) DC TO DC

(C) DC TO AC

(D) TRANSFER SWITCH

(E) UPS MODE & INVERTER MODE

UPS MODE: If AC Mains fails the Inverter takes over

INVERTER MODE: A C loads are powered continuously by the Inverter (from Battery)

## 2-8 Cooling Fan Working Code:

Cooling fan is load and temperature controlled.

When output power is under 300W, the cooling fan does not operate. Once output power is 300W, the cooling fan will start to operate.

If the ventilation opening is obstructed or has poor ventilation, the inverter will enter over temperature protection mode (OTP). The cooling fan will continue working to reduce the internal temperature. Once the temperature has reduced sufficiently, the inverter will turn on automatically.

### 3. Maintenance:

Very little maintenance is required to keep your inverter operating properly.

You should clean the exterior of the unit periodically with a dry cloth to prevent accumulation of dust and dirt. At the same time, tighten the bolts on the DC input terminals.

### 4. Troubleshooting Guide:



#### **WARNING!**

Do not open or disassemble the inverter. Attempting to service the unit yourself may result in a risk of electrical shock or fire.

Common problems – Television interference:

Operation of the power inverter can interfere with over-the-air television reception on some channels. If this situation occurs, the following steps may help to alleviate the problems.

- Make sure that the chassis ground lug on the back of the power inverter is solidly connected to the ground system of your site or vehicle ground.
- Do not operate high power loads with the power inverter while watching television.
- Make sure that the antenna feeding your television provides an adequate (“snow free”) signal and that you are using good quality cable between the antenna and the television.
- Move the television as far away from the power inverter as possible.
- Keep the cables between the battery and the power inverter as short as possible and twist them together about 2 to 3 twists per foot. This will reduce radiated noise from the cables.

<b>Problem &amp; Symptoms</b>	<b>Possible Cause</b>	<b>Solution</b>
Low output voltage (110V: 95-105VAC)	Using average reading voltmeter	Use true RMS reading meter (Ref. point 2-4-7)
OLP Indicator	Over load	Reduce load.
No output voltage: UVP or OVP Indicator	Low/High input voltage	Recharge battery, check connections and cable. (Ref. point 2-7-1) OVP: Check for charger fault
No output voltage Over Temp indicator Load less than 1000W	Thermal shutdown	Improve ventilation , Make sure ventilation openings in inverter are not obstructed, Reduce ambient temperature.
No output voltage, Over load indicator	Short circuit or wiring error. Very high power load	Check AC wiring for short circuit or improper polarity (hot and neutral reversed.) Remove load.

## 5. Warranty:

We warrant this product against defects in materials and workmanship for a period of 2 years from the date of purchase and will repair or replace any defective power inverter when directly returned (freight paid) to us. Please call Technical Service for an RMA number.

This warranty will be considered void if the unit has suffered any obvious damage by natural and man-made factors, or alteration (either internal or external) and does not cover damage arising from improper use such as plugging the unit into an unsuitable power source, attempts to operate products with excessive power consumption requirement, or use in unsuitable environments.

If you have a problem with your 48-1U-2000RM, or have any questions about the installation and proper operation of the unit, please contact NEWMAR's Technical Services Department: Phone: 714-751-0488 - From the hours of 7:30 a.m. to 5:00 p.m. weekdays, P.S.T.

Fax: 714-957-1621

E-mail: [techservice@newmarpower.com](mailto:techservice@newmarpower.com)

## 6. Important Safety Instructions



### **WARNING!**

Before you install and use your inverter, read and save these safety instructions.

### 6-1 General Safety Precautions

6-1-1 Do not expose the inverter to rain, snow, spray, or heavy dust. To reduce risk of hazard, do not cover or obstruct the ventilation openings. Do not install the inverter in a zero-clearance compartment. Overheating may result.

6-1-2 To avoid a risk of fire and electronic shock. Make sure that existing wiring is in good electrical condition, and that wire size is not undersized. Do not operate the Inverter with damaged or substandard wiring.

6-1-3 This equipment contains components which can produce arcs or sparks. To prevent fire or explosion, do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, joints, fittings, or other connection between components of the fuel system.

## **6-2 Precautions When Working with Battery bank**

- 6-2-1 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 20 minutes and get medical attention immediately.
- 6-2-2 NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- 6-2-3 Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery or other electrical part may cause an explosion.
- 6-2-4 Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery.  
A lead-acid battery produces a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

## 7 Appendices A

### 7-1 110V Dip Switch (at the left side of inverter)

S1	FREQ. (Hz)	S2	S3	BAUD RATE	S4	S5	VOLTAGE OUTPUT (VAC)	S6	MODE
ON	60	OFF	OFF	2400	OFF	OFF	100	ON	UPS
OFF	50	OFF	ON	4800	OFF	ON	110	OFF	INV
----	----	ON	OFF	9600	ON	OFF	115	----	----
----	----	ON	ON	19200	ON	ON	120	----	----

**S1 ( FREQ. Hz ) – 50Hz/60Hz**

**S2 S3 (BAUD RATE ) – 2400 / 4800 / 9600 / 19200**

**S4 S5 (VOLTAGE OUTPUT ) – 100VAC/110VAC/115VAC/120VAC**

**When you set up S1~S5, please reset the inverter and let update data through CPU.**

**S1: Freq (Hz)**

**S2/S3: Baud Rate**

**When you set up S1~S3, please reset the inverter and let it update data through CPU.**

**Factory Default: S1-S3 all ON**

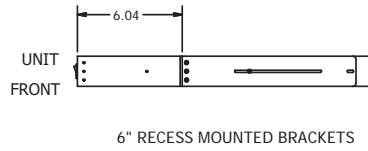
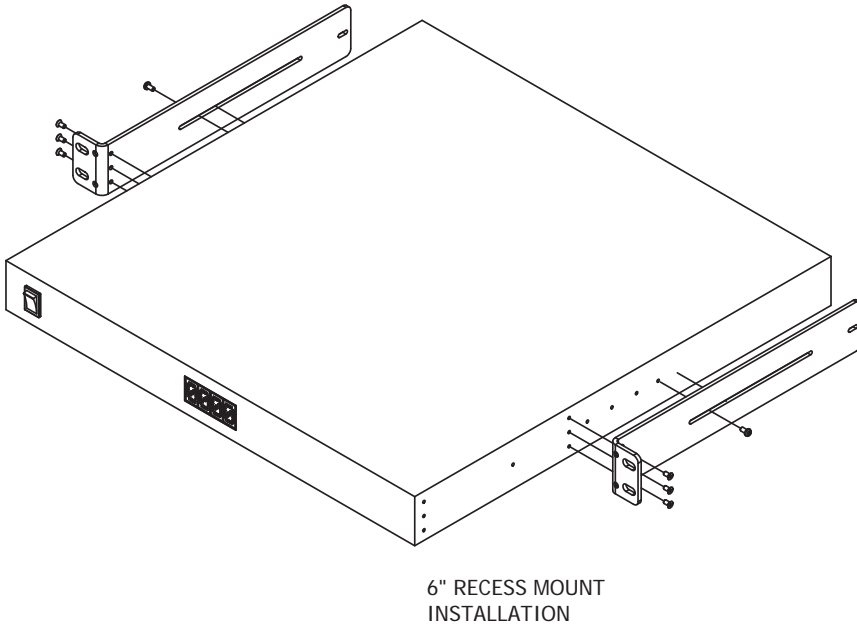
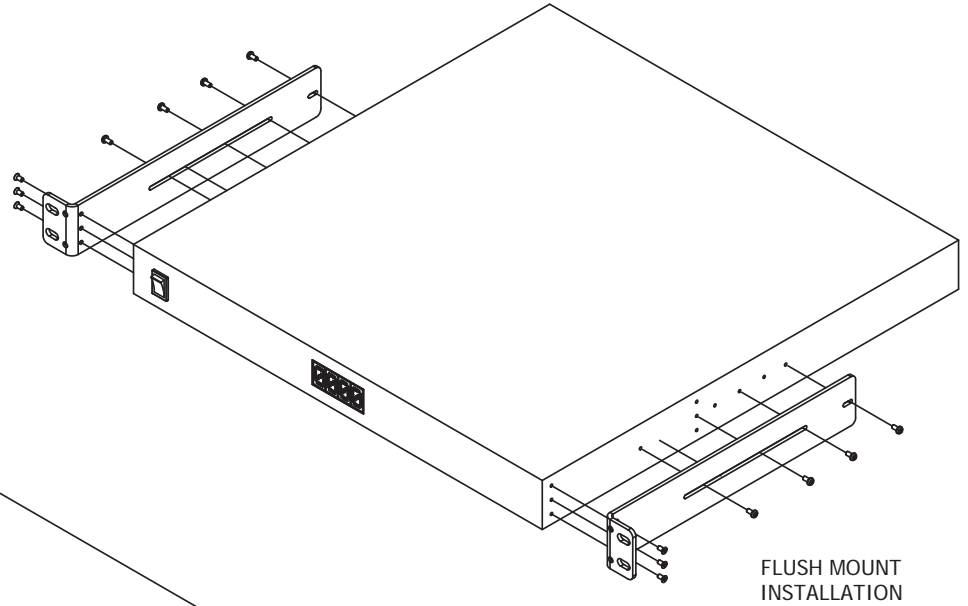
**S6 INV/UPS Mode Select DIP Switch:**

- This switch allows user to choose between two modes:
  - Inverter (OFF) mode: Unit acts as an inverter full time, does not pass external AC to loads. Operates exclusively from battery.
  - UPS mode (ON): When utility/external AC power is available ('AC INPUT' LED illuminates), unit passes this AC power source to the connected 120 VAC loads. When external AC power droops or is interrupted, the unit's fast transfer switch automatically transfers AC load to inverter AC power provided from 48 volt battery. When external AC power resumes or returns to normal, the unit automatically transfers the AC load back to external AC power source.

It is recommended that the DIP switch positions be determined before powering up the inverter. If switch positions are changed while the unit is in operation, the inverter will not identify the change. The inverter must be turned OFF and back ON before the CPU will update and identify the new switch position(s).

# 8 Mounting Bracket Installation: Two Post Relay Rack

The two post mounting brackets supplied can be utilized for both flush and center mount 6" recess or installation.



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1-10-2017