

# PURKEYS

A MISSION CRITICAL ELECTRONICS BRAND

## INVERT™ PURE SINE WAVE

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### USER GUIDE





# CONTENTS

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General Information .....	2
General Inverter Safety .....	3
General Cautions .....	4
Call-outs .....	6
Installation.....	7
Controller Cable .....	8
Harness Recommendations.....	8
Operation .....	10
Available Battery Indication.....	10
Fault Indication.....	11
LVD Settings .....	12
Buzzer.....	12
Limited Commercial Warranty Policy.....	13

## **GENERAL INFORMATION**

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Purkeys' Invert™ Pure Sine Wave inverters provide reliable 12 VDC to 110 VAC power in heavy-duty vehicles. They are available in 1500 and 2000 watts.

### **DynaBalance™ Monitoring Technology**

The Invert comes with a controller that measures input voltage and input current (even under load) to dynamically estimate the battery's state of charge. This enables the controller to indicate available battery capacity and turn off when the battery's state of charge drops to turn-off point.

Inverters that do not have this functionality can turn off too late if the inverter is only supplying a small amount of power, or too soon when the inverter is supplying high power (such as when powering a microwave).

# INVERT PURE SINE INSTALLATION GUIDE

## GENERAL SAFETY

This guide contains important information regarding safety and operation of this product. Before use, read and understand all cautions, warnings, and instructions. Failure to do so could result in injury and/or property damage. It may also void your product warranty.

### Explosion Hazard:

Do not use the inverter near flammable fumes or gases. Do not use the inverter in an enclosure containing automotive-type, lead-acid batteries, as these batteries, unlike sealed batteries, vent explosive hydrogen gas, which can be ignited by sparks from electrical connections.

### Crash Hazard:

Drivers should not configure or troubleshoot the inverter while they are driving the vehicle.

### Shock Hazard:

Keep children away from the inverter; it generates the same potentially deadly AC power as a normal household wall outlet.

### Heated Surfaces:

The inverter housing may become uncomfortably warm, reaching 140° F (60° C) after extended operation. Ensure that there are at least 2 inches (5 cm) of space around the inverter. During operation, keep it away from flammable materials.

### Additional Safety Guidelines:

- Do not insert foreign objects into the inverter outlets or ventilation openings.
- Never connect the inverter to power utility AC distribution wiring.
- Do not use the inverter in temperatures over 100° F (40° C)
- Do not expose the inverter to water, rain, snow, or spray.
- Do not use a 24 volt jumpstarter with the inverter connected to the batteries.

## GENERAL CAUTIONS

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To reduce the risk of fire, electric shock, explosion, or injury:

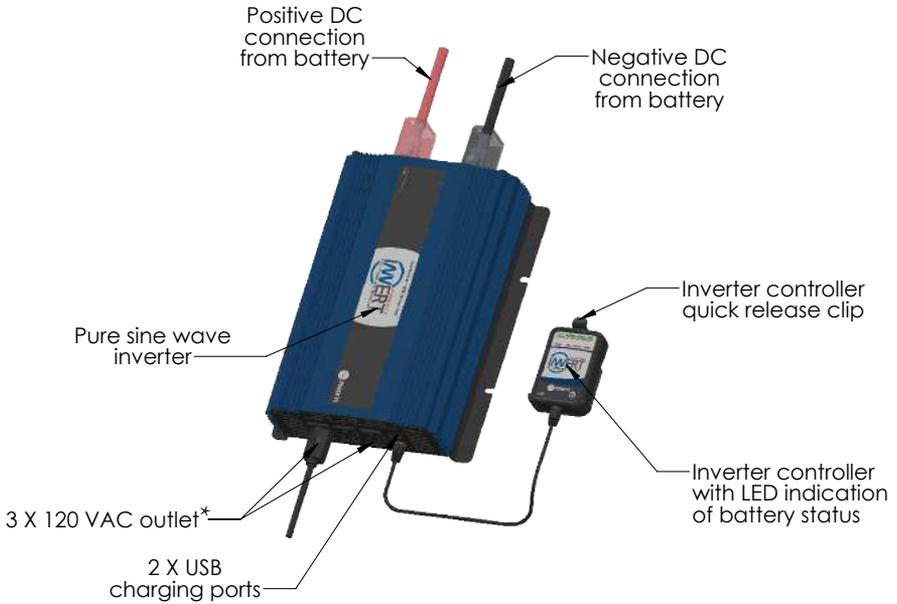
- Ensure the inverter negative DC input terminal or the battery negative terminal is connected to earth ground if the inverter is used outside your vehicle.
- Do not install in the engine compartment—install in a well-ventilated area.
- Do not use with positive grounded electrical systems (the majority of modern vehicles use negative grounded electrical systems).
- Observe correct polarity when connecting the inverter DC input terminals to the battery. Connect the battery positive to the positive input connector of the inverter and the battery negative to the inverter negative input terminal. A reverse polarity connection will result in a blown fuse and may cause permanent damage to the inverter. Damage due to reverse polarity is not covered under warranty.
- Do not use the inverter if it is wet.
- Do not connect in parallel with another AC source.
- Disconnect appliance plug from inverter AC outlet before working on the appliance.
- The metal chassis of the inverter and the ground terminal of the outlet(s) are internally connected to the negative battery terminal on the inverter. This means the metal chassis of the inverter and the AC load will automatically be grounded.
- This inverter will not run high wattage applications that exceed the output power limit or the surge power limit.

# INVERT PURE SINE INSTALLATION GUIDE

Precautions when working with batteries:

- Batteries contain very corrosive diluted sulphuric acid (electrolyte). Precautions should be taken to prevent contact with skin, eyes, or clothing.
- Batteries generate hydrogen and oxygen during charging, resulting in an explosive gas mixture. Be sure to ventilate the battery area and follow the battery manufacturer's recommendations.
- Never smoke or allow flame near batteries.
- Be careful not to drop metal tools on the battery, as this could spark or short circuit the battery or other electrical parts and could cause an explosion.
- Remove metal items such as rings, bracelets, and watches when working with batteries. Use caution when working with metal tools, as batteries can produce a short circuit current high enough to melt/weld metals, which can cause severe burn.
- If you need to remove a battery, always remove the ground terminal from the battery first.
- Do not insert objects into the air vents.

## CALL-OUTS

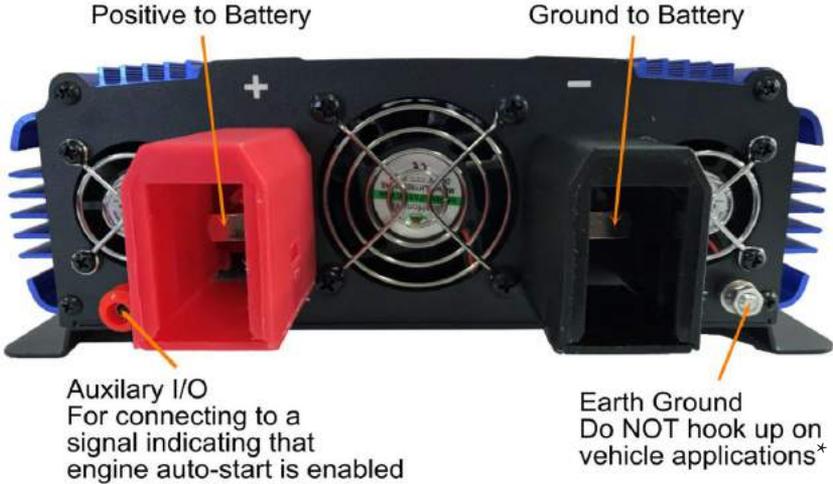


\*On the 2000 watt inverter, each AC outlet has a 15 amp circuit breaker/on-off switch. If the circuit breaker trips, reset the circuit breaker/switch by turning the switch off, then back on. The switches can also be used to individually switch the three AC outlets on or off.

# INVERT PURE SINE INSTALLATION GUIDE

## INSTALLATION

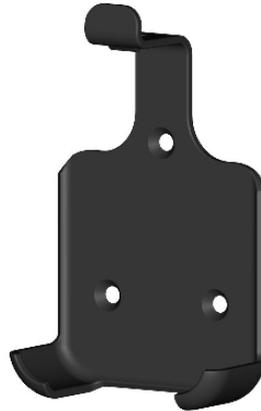
Step 1: Select the best location and install the inverter in the cab or sleeper of the tractor.



\* This ground stud is already connected internally to the battery ground stud, the inverter housing, and the ground of the AC sockets; therefore, it does not need to be connected in vehicle applications.

Step 2: Install the quick release clip in a convenient location (i.e. the interior wall of the tractor). It can be installed in either of the following ways:

- Use the provided velcro and stick the clip to the selected location.
- Use the provided flathead screws to mount the clip.



Step 3: Connect the cable to the REMOTE connection on the inverter, then to the connection on the base of the controller.

Step 4: As the inverter operates, it “learns” the characteristics of the battery and self-calibrates so that it can more accurately estimate the dynamic LVD point. To get a head start on this learning/calibration process, turn on/off one of the higher loads the inverter will be powering in this manner:

With the inverter on, turn the load on for 5 or more seconds, then turn the load off for 5 or more seconds. Repeat 10 times.

## CONTROLLER CABLE

The Invert comes with a 1' and 8' controller cable. If another length is needed, the controller cable can be CAT5, CAT5e, or CAT6 and must have male RJ45 connectors on both ends (shielded or unshielded are both okay). The cable must be 8-position and 8-conductor (8p8c) and it cannot be a cross-over cable. Most RJ45/Ethernet type cables will work as long as the conductors are 24 gauge or larger.

We recommend :

- the conductors in the cable be 24 gauge or larger
- the cable be 16' or shorter

## HARNESS RECOMMENDATIONS

The current rating for the 1500 W inverter is 150 amps and the current rating for the 2000 W inverter is 200 amps. The harness that connects the inverter to the battery must be constructed with cables large enough to safely handle the high currents that the inverter will draw from the battery.

For best operation, cables should also be sized so that the total voltage drop in the cables does not exceed 0.5 volts at the rated output of the inverter. The positive cable must be fused with an appropriately sized fuse so as to protect the cables in case of a short circuit.

The following tables show the acceptable cables gauges, the maximum recommended cable length (length of the positive cable plus the length of the negative cable), and the recommended fuse sizes for harnesses for the 1500 W and 2000 W inverters.

# INVERT PURE SINE INSTALLATION GUIDE

1500 watt inverter:

Wire Gauge	Max Recommended ft. (Pos. Length + Neg. Length)	Recommended Fuse Size
6	-	-
4	13	150
2	21	200
1	27	200
0	34	200
00	43	200
000	54	200
0000	68	200

2000 watt inverter:

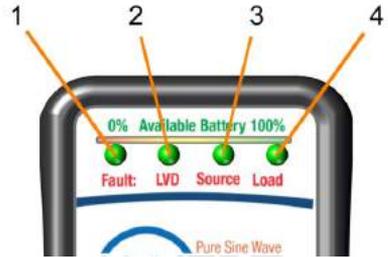
Wire Gauge	Max Recommended ft. (Pos. Length + Neg. Length)	Recommended Fuse Size
6	-	-
4	-	-
2	16	200
1	20	250
0	25	300
00	32	300
000	40	300
0000	51	300

Installation Complete

## OPERATION

### AVAILABLE BATTERY INDICATION

The Invert controller has green LEDs that indicate how much power is available for the driver to use.

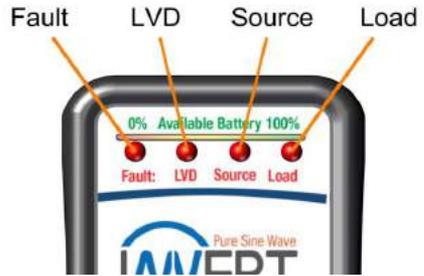


LED	LED STATUS	INDICATION
1	Solid Green	Less than 25%
1	Blinking Green	about to shutdown
1-2	Solid Green	25-50% available battery
1-3	Solid Green	50-75% available battery
1-4	Solid Green	75-100% available battery

# INVERT PURE SINE INSTALLATION GUIDE

## FAULT INDICATION

The Invert controller also indicates if there is an issue with the inverter. The Fault light will blink red to indicate that the inverter has turned off due to a fault condition.



LED	LED STATUS	FAULT	SOLUTION
Fault	Blinking red	Communication fault	Check cable connection at inverter and controller. Check cable for opens or shorts, replace if necessary.
LVD	Blinking red	Low Voltage Disconnect	Battery is low, inverter shut off to protect batteries. Turn off inverter, start engine to charge battery.
Fault and LVD	Blinking red Fault LED, solid red LVD LED	Undervoltage fault	Voltage to inverter is below 9.5 V, turn inverter off, then back on.
Fault and Source	Blinking red Fault LED, solid red Source LED	Overvoltage fault	Turn off inverter, correct overvoltage.
		Over-temperature fault	Turn inverter off and let cool down.
Fault and Load	Blinking red Fault LED, solid red Load LED	Overload fault	Turn off inverter, turn off some of the loads being used.

## LVD SETTINGS

There are five low voltage disconnect (LVD) settings available on the controller.

Note that unlike other inverters that have a fixed LVD point, these inverters have a dynamic LVD point based on how much current the inverter is drawing from the battery. The approximate voltages listed here are the voltages of the battery after the inverter turns off. The inverter will actually operate down to as low as 9.5 volts under heavy loads. The inverter measures the current draw and dynamically adjusts the LVD point so that after it turns off the unloaded battery voltage will be approximately what is listed here.

Setting	Approximate Voltage	Function
Low 1	11.2	This setting is activated by connecting an active high 12 volt signal (indicating that engine auto-start is enabled) to the auxiliary I/O pin
Low 2	11.8	Allows the battery to reach near 0% state of charge (ideal for deep cycle batteries that are not needed to start a truck)
Medium 1	12.0	<b>Default setting.</b> Allows the battery to reach about 25% state of charge
Medium 2	12.2	Allows the battery to reach about 50% state of charge
High	12.4	Allows the battery to reach about 75% state of charge

## BUZZER

The Invert controller includes a buzzer function that does the following:

Beep Type	Description
Short Beep	Indicates power button has been pressed
Constant Beeping	LVD shutoff warning (will shut off in 30 seconds)

# INVERT PURE SINE INSTALLATION GUIDE

## LIMITED COMMERCIAL WARRANTY POLICY

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MCE Purkeys FE, LLC (hereafter “Purkeys”), warrants each product to be free of defects in material or workmanship under normal use and service. This warranty is for the benefit of Original Equipment Manufacturers, Dealers, Warehouse Distributors, Fleets, or other End Users (hereafter “Customers”) and covers products manufactured by Purkeys and sold new to Customers either directly by Purkeys or by its authorized dealers, distributors, or agents. The length of the Warranty Period is 36 months.

The warranty period commences on the in-service or install date and is not transferable. Failure to provide the in-service or install date on the warranty claim form will cause the warranty period to begin on the date the part was manufactured, or date of sale recorded on the original sales invoice, whichever is earlier.

A completed warranty claim form should accompany all parts submitted to Purkeys for consideration for repair or replacement under warranty. The submitted claim form should contain all of the information required. Lack of a properly or fully completed claim form will result in delay or denial of warranty claim. Claims must be submitted no later than 30 days after part is removed.

This warranty does not apply if, in sole judgement of Purkeys, the product has been damaged or subjected to accident, faulty repair, improper adjustment, improper installation or wiring, neglect, misuse, or alteration or if the product failure is caused by defects in peripheral vehicle components or components attached to the Product or failure of a part not manufactured by Purkeys.

This warranty shall not apply if any Purkeys product is used for a purpose for which it is not designed or is in any way altered without the specific prior written consent of Purkeys. ANY product alleged by a Customer to be defective must be inspected by Purkeys as a part of the warranty claims process in order to confirm that the part has failed as a result of a defect in material or workmanship.

Transportation for products and parts submitted to Purkeys for warranty consideration must be prepaid by Customer. Repaired or replaced products and or components will be returned to Customer pre-paid by Customer or “freight collect” to the address provided by Customer in the warranty claim form. No charge will be made for labor or material in effecting such repairs.

The Warranty provided by Purkeys hereunder is specifically limited to repair or replacement of the Product as Purkeys deems most appropriate in its sole discretion. Purkeys neither assumes nor authorizes any other person to assume on its behalf any other warranty or liabilities in connection with Purkeys products. The Warranty does not apply to fuses or other “consumable” or maintenance items which are or may be a part of any Purkeys product.

**THIS WARRANTY DOES NOT APPLY TO LOSS OF VEHICLE OR EQUIPMENT, LOSS OF TIME, INCONVENIENCE, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. PURKEYS SPECIFICALLY DISCLAIMS AND SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES arising out of or from the use of Purkeys products by the Customer.**

**THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, INCLUDING COMMON LAW WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, AND ANY OTHER EXPRESS OR IMPLIED WARRANTIES. ALL OTHER SUCH WARRANTIES ARE SPECIFICALLY DISCLAIMED.**

This Limited Commercial Warranty supersedes all previous Warranty Policies issued by Purkeys and any of its suppliers.



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