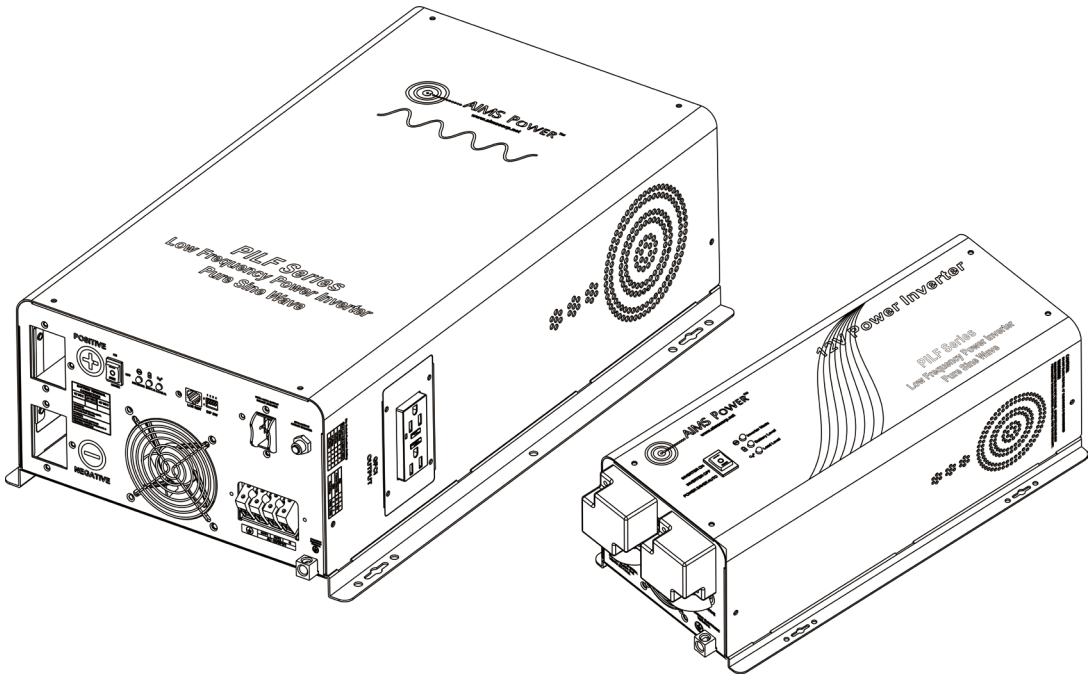
AIMS POWER™

www.aimscorp.net

# *PILF Series*

# DC to AC Power Inverter

# User's Manual




# Low Frequency Pure Sine Wave

# Table of Contents

1. Important Safety Information ..... - 3 -
1.1 General Safety Precautions ..... - 3 -
1.2 Precautions When Working with Batteries ..... - 3 -
2. Introduction ..... - 4 -
2.1 General Information ..... - 4 -
2.2 Applications ..... - 4 -
2.3 Mechanical Drawings ..... - 5 -
2.4 Design Features ..... - 7 -
2.5 Electrical Performance ..... - 8 -
2.5.1 Inverter ..... - 8 -
2.5.2 Power Saver ..... - 9 -
2.5.3 Protections ..... - 10 -
2.5.4 Remote Control ..... - 11 -
2.5.5 LED Indicator & Power Switch ..... - 11 -
2.5.6 Audible Alarm ..... - 12 -
2.5.7 FAN Operation ..... - 12 -
2.5.8 DIP Switches ..... - 13 -
2.5.9 Other Features ..... - 14 -
3. Installation ..... - 14 -
3.1 Unpacking and Inspection ..... - 14 -
3.2 Location ..... - 15 -
3.3 DC Wiring & Fusing ..... - 15 -
3.4 AC Wiring ..... - 16 -
3.5 Grounding ..... - 17 -
3.6 Mounting ..... - 18 -
3.6.1 Installation Tools Required ..... - 18 -
3.6.2 Inverter Mounting Recommendations ..... - 20 -
4. Troubleshooting Guide ..... - 22 -
5. Limited Warranty ..... - 24 -
Appendix 1 - PILF Series Spec Sheet ..... - 25 -
Appendix 2 - Installation Diagram ..... - 26 -

Thank you for purchasing an AIMS Power™ DC to AC power inverter.
We think that you will find this product to be extremely reliable and easy to use.
Please read the manual completely before installing or operating the inverter.

# 1. Important Safety Information

**WARNING!**
Before using the inverter, you should read and save the safety instructions.
All wiring must follow the National Electric Code, The Canadian Electrical Code Part 1, Provincial or other codes in effect at the time of installation, regardless of suggestions in this manual.
All wires should be copper conductors.

## 1.1 General Safety Precautions

1-1-1. Do not expose the inverter to rain, snow, spray, mist or dust. To reduce risk of fire, do not cover or obstruct the ventilation openings. Do not install the inverter in a zero-clearance compartment, as overheating may result. We recommend 1 foot of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit. A minimum air flow of 145CFM is required.

1-1-2. To avoid risk of fire and electronic shock, make sure that the existing wiring is in good electrical condition and that the wire is not undersized. Do not operate the inverter with damaged or substandard wiring. All wires must be secure.

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

1-1-4. Do not disassemble the power inverter. It contains no user-serviceable parts. Attempting to service the inverter yourself may result in electrical shock or fire. Internal capacitors remain charged after all power is disconnected. Unless approved by AIMS Power, this could also void the warranty.

1-1-5. To reduce the risk of electrical shock, disconnect both AC and DC power from the power inverter before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

1-1-6. Ensure proper fusing during installation. Non-fused systems to a battery could possibly be a fire hazard.

**CAUTION: Equipment damage**
The output side of the inverters' AC wiring should at no time be connected to public power or a generator. This condition is far worse than a short circuit. If the unit survives this condition, it will shut down until corrections are made.

## 1.2 Precautions When Working with Batteries

1-2-1. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately rinse eye with running cold water and get medical attention.
1-2-2. Never smoke or allow a spark or flame in the vicinity of a battery or engine.

1-2-3. Do not drop or place metal tools on the battery. The resulting spark or short-circuit on the battery may cause fire or an explosion.
1-2-4. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a battery. A short circuit battery can produce a current high enough to weld a ring or the like to metal, causing a severe burn.

# 2. Introduction

## 2.1 General Information

PILF Series Pure Sine Wave Inverters are DC to AC low frequency power inverters. By design, these inverters offer the highest surges available along with a clean pure sine wave. This is most beneficial when using power equipment or other devices that have inductive loads and high power surges at startup.

The surge ability is 300% of the continuous output rating for up to 20 seconds. This provides plenty of time for just about any startup requirement your load may have.

Although the inverter has high surge capabilities, the efficiency rating is reduced as more heat will be generated during surge times. If efficiency is important, a larger inverter is recommended.

The battery's output capacity, along with the size of the cables and fuses, are critical factors in determining whether the inverter can supply sufficient power for your requirements.

## 2.2 Applications

Power tools–circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.
Office equipment – computers, printers, monitors, routers, scanners
Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines
Kitchen appliances – coffee makers, blenders, ice markers, toasters
Industrial equipment – metal halide lamps, high pressure sodium lamps
Home entertainment – televisions, audio equipment, video games, stereos, musical instruments, satellite equipment

# 2.3 Mechanical Drawings

**PILF Series 600~1500W Models DC Input (Battery Side）**

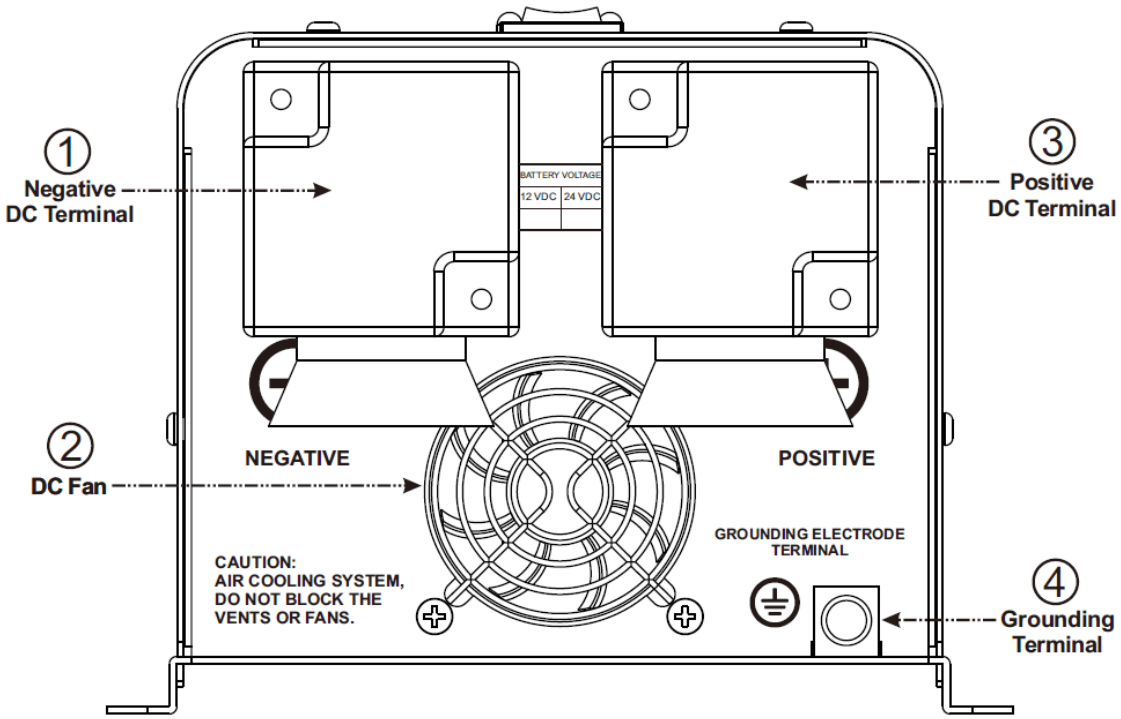



**Figure 1**

**PILF Series 600~1500W Models AC Output (Load side)**

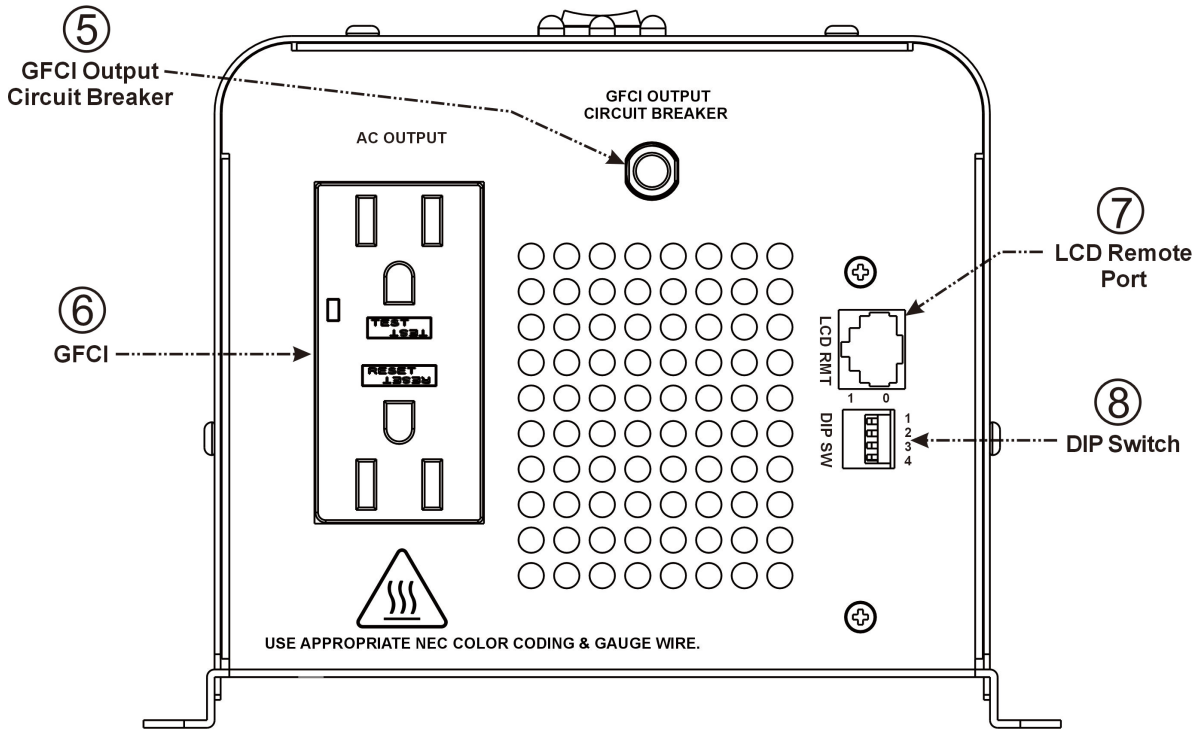



**Figure 2**

**PILF Series 2000~4000W Models**

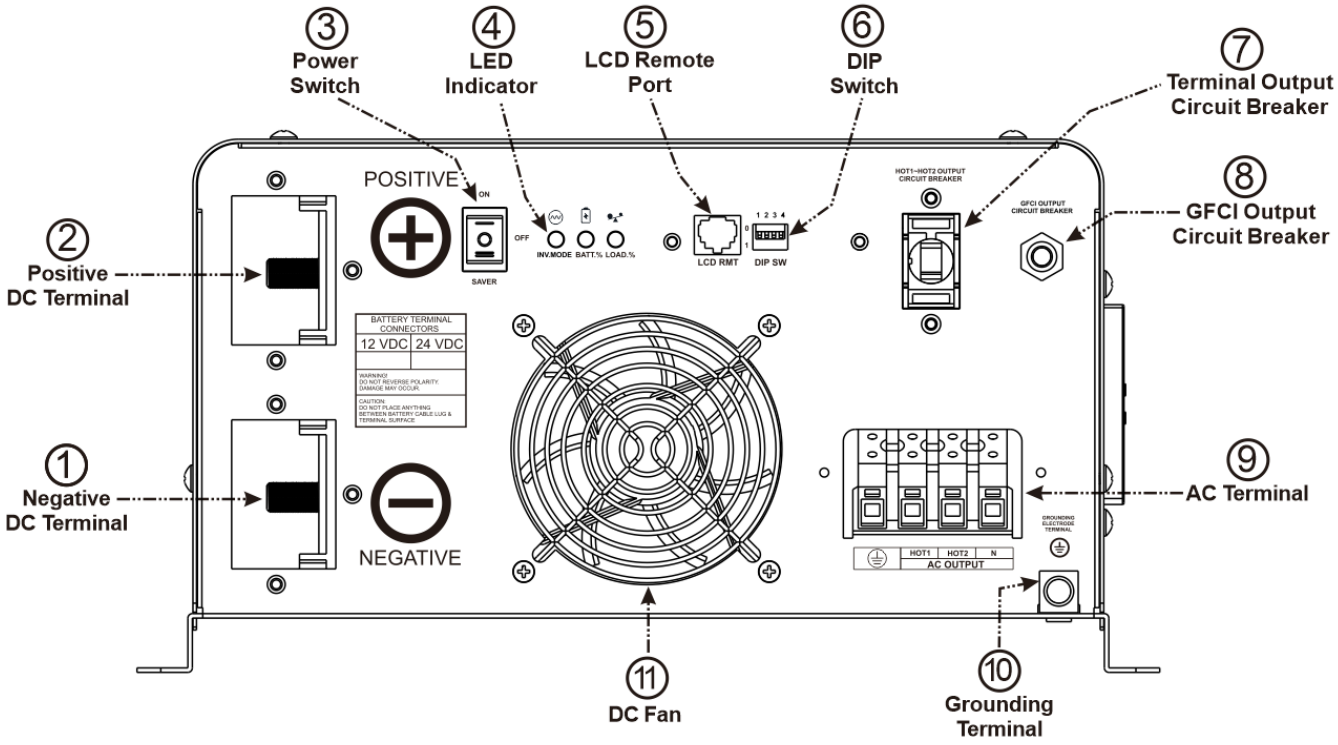



**Figure 3**

**PILF Series 2000~4000W Models AC GFCI Side**

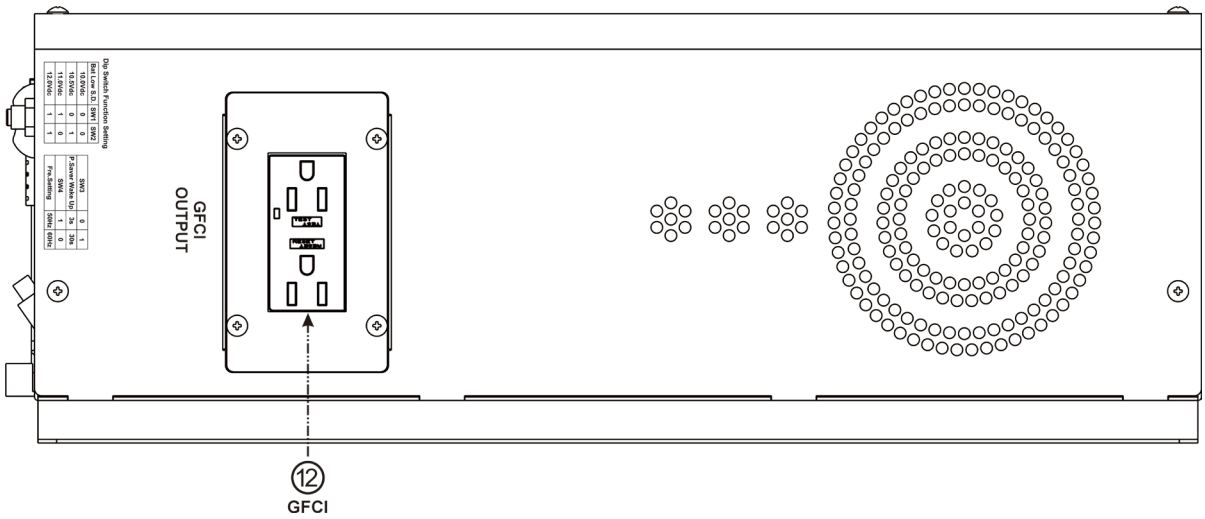



**Figure 4**

## 2.4 Design Features

- Microprocessor controlled (DSP)
- Pure sine wave & low frequency topology
- High overload capacity up to 300% of continuous rated power (20 sec)
- Low inactive current, low power “Power Saving Mode” to conserve energy
- Automatic protections: over/low battery voltage, over temperature, overload, short circuit, and AC output circuit breaker
- Optional remote on/off LCD switch – Part # REMOTELF only **(DO NOT USE REMOTELFLED OR REMOTEHF)**
- 3-step intelligent cooling fans
- Extensive protection against various harsh environments
- 13Vdc battery recovery point

# 2.5 Electrical Performance

## 2.5.1 Inverter

**Topology**

Inverter: Full Bridge & Low Frequency Topology.

High efficiency Mosfets, 16bit, 4.9MHZ microprocessor and heavy-duty transformers that output PURE SINE WAVE AC with an average THD of 8% (min 3%, max 10%) depending on the load connected and the battery voltage.

The Peak efficiency of the PILF series is 92%

**Overload Capacity**

The PILF series inverters have a high overload capacity, making it ideal to handle high startup loads.

1. For 110%<Load<125% (±10%), no audible alarm for 14 minutes, then beeps 0.5s for every 1s in the 15th minute, and will Fault (Turn off) after the 15th minute.
2. For 125%<Load<150% (±10%), beeps 0.5s for every 1s and will Fault (Turn off) after 1 minute.
3. For 300%≧Load>150% (±10%), beeps 0.5s every for every 1s and will Fault (Turn off) after 20s.

**NOTE**

**Initial Power On :**

After turning on the inverter, it requires some time to perform a self-diagnostic check and prepare to supply full power. Therefore, ensure that the load(s) are switched on only after waiting a few seconds. Avoid powering on the inverter with the load already connected, as this could prematurely activate the overload protection system. Additionally, when switching on a load, it may need a temporary surge of higher power to start. To prevent overloading the inverter, switch on multiple loads one at a time rather than all at once.

## 2.5.2 Power Saver

The Power Switch for the PILF Series inverters has 3 positions:
“Power On”、 “Power Off”、“Power Saver Auto”.

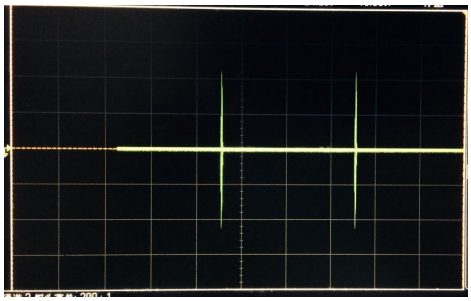
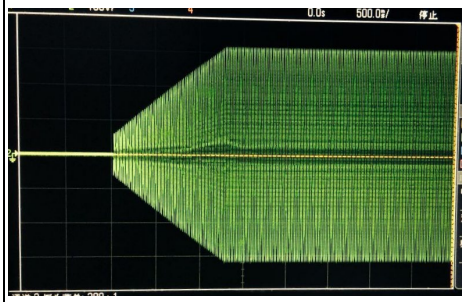
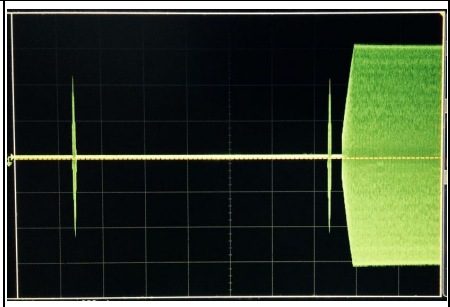
When the power switch is in “Power Off” position, the inverter is powered off.

When the power switch is turned to either of “Power On” or “Power Saver Auto”, the inverter is powered on.

Power saver function is designed to conserve battery power when AC power is not or rarely required by the loads.

In this mode, the inverter pulses the AC output looking for an AC load (i.e. electrical appliance). Whenever an AC load (greater than 50 watt resistive loads only) is turned on, the inverter recognizes the need for power and automatically starts inverting and output goes to full voltage. When there is no load (or less than 50 watt resistive loads only) detected, the inverter automatically goes back into search mode to minimize energy consumption from the battery bank.

In “Power Saver Auto” mode, the inverter will draw power mainly in sensing moments, thus the idle consumption is significantly reduced.

| **Power Saver On** | **Power Saver Off** | **Power Saver On (Load Detected)** |
|---|---|---|
|  |  |  |
| **Figure 5** | **Figure 6** | **Figure 7** |

Note: The minimum power of a load to take inverter out of sleep mode (Power Saver On) is 50 Watts.
The PILF Series is designed with extraordinarily low idle power consumption which is only a mere 2-3 % of its rated power.

When in the search sense mode, the Green LED (Inverter Mode) will blink, and the inverter will make a ticking sound. At full output voltage, the Green LED (Inverter Mode) will light continuously, and the inverter will make a steady humming sound.

**Exceptions**
Some devices when scanned by the load sensor cannot be detected. Small fluorescent lights are the most common example. (Try altering the plug polarity by turning the plug around). Some computers and sophisticated electronics have power supplies that do not present a load until line voltage is available. When this occurs, each unit waits for the other to begin. To drive these loads either a small companion load must be used to bring the inverter out of its search mode, or the inverter may be programmed to remain at full output voltage (Power On mode). In these instances, it is recommended to use the Power On mode and not the Saver mode.

## 2.5.3 Protections

The PILF series inverter is equipped with extensive protection against various harsh environments and external faults.
These protections include:

- Low and high voltage battery alarm
- Inverter over temperature
- Overload
- Short circuit
- Fan lock

When over temperature or overload occurs, and after the fault is cleared, the power switch must be cycled off/on to restart the inverter. Wait 5 seconds after turning inverter off, before turning back on.
The low battery voltage trip point can be customized from a defaulted value of 10Vdc、10.5Vdc、11.0Vdc and 12.0Vdc thru SW1&SW2 on the DIP switch.
The inverter will go to over temp protection when the heat sink temp ≥ 221°F, and go to Fault (shutdown Output) after 30 seconds. The main power switch must be reset to reset the inverter.
Once fault has been determined and fixed, clear the fault, then reset the inverter.

## 2.5.4 Remote Control – ONLY USE REMOTELF FOR PORT LABELED LCD RMT. ANY OTHER REMOTE WILL DAMAGE INVERTER AND VOID WARRANTY.

In additional to the main power switch, an optional LCD remote panel can control the inverter when connected to the "LCD RMT Port" via an Ethernet cable. It works in parallel with the built-in switch panel. The inverter will turn on when either panel switches to "Power On" or "Power Saver Auto." If both switches send conflicting commands, the priority is:

1. Power Saver Auto
2. Power On
3. Power Off

The inverter only powers off when both switches are set to "Unit Off."

The Max length of the LCD remote control data cable is 60 feet (18 meters).
The LCD remote control panel displays the following information **(monitor only, not adjustable)**:

- Battery voltage
- Output voltage
- Output frequency
- Output load
- Fault code
- Battery capacity


**WARNING**

Never cut the ethernet cable when the cable is attached to the inverter and battery is connected to the inverter. Even if the inverter is turned off, it will damage the remote PCB inside if the cable is short circuited during cutting.

## 2.5.5 LED Indicator & Power Switch

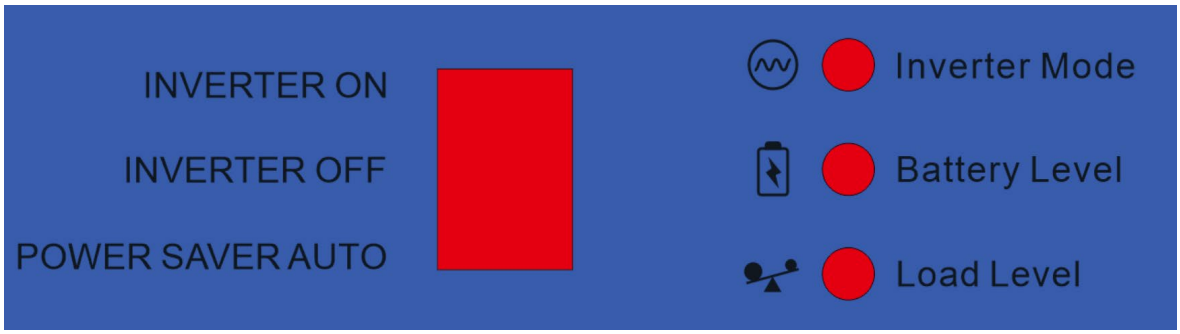



**Figure 8**

| The LED Indicators for the PILF Series Inverter | | | | | | |
|---|---|---|---|---|---|---|
| LED | Inverter Mode | | Battery Level | | Load Level | |
| 1 | GN | Inv Normal Mode | GN | Batt.V Normal | GN | 0~50% Load |
| 2 | YE | Inv Alarm Mode | YE | Batt.V Low | YE | 50~100% Load |
| 3 | RD | Inv Fault Mode | RD | Batt.V High | RD | Overload |

## 2.5.6 Audible Alarm

| | |
|---|---|
| **Battery Voltage Low** | Batt.% Yellow LED light,<br>The buzzer beeps 0.5s every 5.0s. |
| **Battery Voltage High** | Batt.% Red LED light,<br>The buzzer beeps 0.5s every 1.0s and Fault after 60s. |
| **Invert Mode Over-Load Function** | (1)110%<load<125% (±10%), No audible alarm in 14 minutes,<br>Beeps 0.5s every 1.0s in 15$^{th}$ minute and Fault after 15 minutes;<br>(2)125% <load<150% (±10%), Beeps 0.5s every 1.0s and Fault after 60s;<br>(3) Load>150% (±10%), Beeps 0.5s every 1.0s and Fault after 20s; |
| **Over Temperature** | Heat sink temp. ≥ 221°F（105℃）, INV.Mode Yellow LED blink,<br>The buzzer beeps 0.5s every 1.0s; |

## 2.5.7 FAN Operation

There is one multiple speed and multiple controlled DC fan which starts to work according to the below logic.
The Operation of the DC fan at the DC terminal side is controlled by the following logic:

| Condition | Enter Condition | Leave condition | Speed |
|---|---|---|---|
| **HEAT SINK TEMPERATURE** | T ≤ 60°C/140°F | T > 65°C/149°F | OFF |
| | 65℃/149℉ ≤ T < 85°C/185°F | T ≤ 60℃/140℉<br>T ≥85℃/185℉ | 50% |
| | T > 85°C/185°F | T≤ 80°C/176°F | 100% |
| **LOAD Percentage** | Load < 30% | Load ≥ 30% | OFF |
| | 30% ≤ Load < 50% | Load ≤ 20%<br>Load ≥ 50% | 50% |
| | Load ≥ 50% | Load ≥ 40% | 100% |

Allow at least 12 inches of clearance around the inverter for air flow. Make sure that the air can circulate freely around the unit.
Fan noise level <60db at a distance of 1m (similar to an electric toothbrush).

## 2.5.8 DIP Switches

On the DC end of inverter, there are 4 DIP switches which enable users to customize the performance of the inverter.

| Low Battery Alarm & Trip Point | SW 1 | SW 2 |
|---|---|---|
| 10.5Vdc / 10.0Vdc | 0 | 0 |
| 11.0Vdc / 10.5Vdc | 0 | 1 |
| 11.5Vdc / 11.0Vdc | 1 | 0 |
| 12.5Vdc / 12.0Vdc | 1 | 1 |

**Low Battery Trip Point Setting Switch (SW1&SW2):**
Deep discharge of the lead acid battery leads to high losses in capacity and early aging. In different applications a different low voltage disconnection level is preferred. For example, for solar applications, user may intend to have less DOD to prolong the battery life cycle. While for mobile applications users may intend to have more DOD to reduce battery capacity and on-board weight.

| SW.3 | 0 | 1 |
|---|---|---|
| Power Saver Wake Up | Search Load Per 3s | Search Load Per 30s |
| SW.4 | 1 | 0 |
| Frequency Setting | 50Hz | 60Hz |

**Power Save Override Setting Switch (SW3):**
The power switch should be in “Power Saver on” for the following performance:
In Power Saver Mode, the inverter is initially in standby mode and sends a pulse to detect the presence of a load every 3s or 30s. Each pulse lasts for 250ms. The inverter will remain in standby mode until a load has been detected, it will wake up from standby mode and start to invert electricity from the battery bank to supply the load (minimum load).

**Frequency Setting Switch (SW4):**
The output frequency of the inverter can be set at 50Hz or 60Hz by SW4.

## 2.5.9 Other Features

**Low Battery Shutdown Recovery**
After low battery voltage shut off, the inverter can restore operation after the battery voltage recovers to 13V (with power switch still in the "On" position). This feature is useful in case the power switch is inaccessible, or user is not present and battery voltage recovers.

 **WARNING**
Never leave the loads unattended, some loads (like a heater) may cause accidents in such cases.
It is better to shut everything off after a low voltage trip than to leave your load on, due to the risk of a fire.

The inverter is not reversed polarity protected. Reversing the battery polarity on the DC input connections will cause permanent damage to the inverter which is not covered under warranty.

A battery can present a risk of electrical shock, burn from high short circuit current can cause a fire or explosion from vented gases. Observe proper precautions.

**High Voltage!** Do not open unless qualified to do so.
Please read the instructions before installing this product.

Risk of electric shock. Use only the Ground-Fault Circuit-Interrupter (120VAC,60Hz 20A, TGMT20L:E229322). Other types may fail to operate properly when connected to this unit.

**Conformal Coating**
AIMS Power's entire line of PILF inverters have been processed with a conformal coating on the PCB, making it water, rust, dust and corrosion resistant.
While these units are designed to withstand corrosion from the salty air, they are not splash proof. DO NOT EXPOSE TO WATER OR DAMP ENVIRONMENTS.

# 3. Installation

* All wiring and installations must follow the National Electric Code and/or the Canadian Electrical Code Part 1

## 3.1 Unpacking and Inspection

Carefully remove the inverter from its shipping package and inspect all contents. Verify the following items are included:

- The PILF Series Power Inverter
- Red and black DC terminal covers
- AC terminal block cover with two Phillips screws
- Two Flange nuts and 4 Phillips screws (installed on the DC terminals).
- Power Inverter Owner's Manual

If items appear to be missing or damaged, contact AIMS Power. If at all possible, keep your shipping box and all packaging. It will help protect your inverter from damage if it ever needs to be returned for service.

Save your proof-of-purchase as a record of ownership; it will also be needed if the unit should require warranty work. The serial number is on the side of the inverter (number that does NOT start with an 8).

## 3.2 Location

Follow all the local regulations to install the inverter.
Install the equipment in a dry, clean, cool location with good ventilation.
Operational temperature: -10℃~40℃ (-14°F to 104°F)
Storage temperature: -40~70℃ (-40°F to 158°F)
Relative humidity: 0% to 95%， non-condensing
Cooling: Forced air

## 3.3 DC Wiring & Fusing

**WARNING**

Damage to the power inverter will occur if correct polarity is not observed when installing the inverter's DC input cables. Wiring should meet all local codes and standards and be performed by qualified personnel such as a licensed electrician.

It is suggested the battery bank be kept as close as possible to the inverter.
The following is a suggested wiring option for 5 to 10ft DC cable maximum.
Please find the following minimum wire size. In case of DC cable longer than 20ft, you must increase the cross section of cable to reduce Voltage drops. This will significantly reduce the performance of your inverter.
*fuse size must be smaller than maximum cable rating, but large enough for full inverter performance.
*Min. cable and Max. Fusing guide at 5% voltage drop at full output.

| Inverter Model | Inverter Specifications | Est. Cable Length @25℃/77°F | |
|---|---|---|---|
| | | 0~1.5m/60″ | 1.5m/60″~3.0m/120″ |
| PILF6W12V120V | 600W 120Vac 12Vdc/60Adc | Cable：6AWG；<br>Fuse：80A； | Cable：4AWG；<br>Fuse：80A； |
| PILF10W12V120V | 1000W 120Vac 12Vdc/100Adc | Cable：4AWG；<br>Fuse：100A； | Cable：4AWG；<br>Fuse：100A； |
| PILF15W12V120V | 1500W 120Vac 12Vdc/150Adc | Cable：4AWG；<br>Fuse：150A； | Cable：4AWG；<br>Fuse：150A； |
| PILF20W12V120V | 2000W 120Vac 12Vdc/200Adc | Cable：1/0AWG；<br>Fuse：200A； | Cable：2/0AWG；<br>Fuse：200A； |
| PILF24W12V120V | 2400W 120Vac 12Vdc/240Adc | Cable：1/0AWG；<br>Fuse：300A； | Cable：1/0AWG；<br>Fuse：300A； |
| PILF30W12V120V | 3000W 120Vac 12Vdc/300Adc | Cable：1/0AWG；<br>Fuse：300A； | Cable：1/0AWG；<br>Fuse：300A； |
| PILF30W12V240VS | 3000W 120/240Vac 12Vdc/300Adc | Cable：1/0AWG；<br>Fuse：300A； | Cable：1/0AWG；<br>Fuse：300A； |
| PILF40W12V120V | 4000W 120Vac 12Vdc/400Adc | Cable：4/0AWG；<br>Fuse：500A； | Cable：4/0AWG；<br>Fuse：500A |

NOTE: Using a smaller cable may cause a low battery or high temperature fault.
NOTE: Not all sizes of cable have the same Amp ratings. Above chart is for reference only. Ensure your cable size and fuse size are rated properly to prevent possible fire

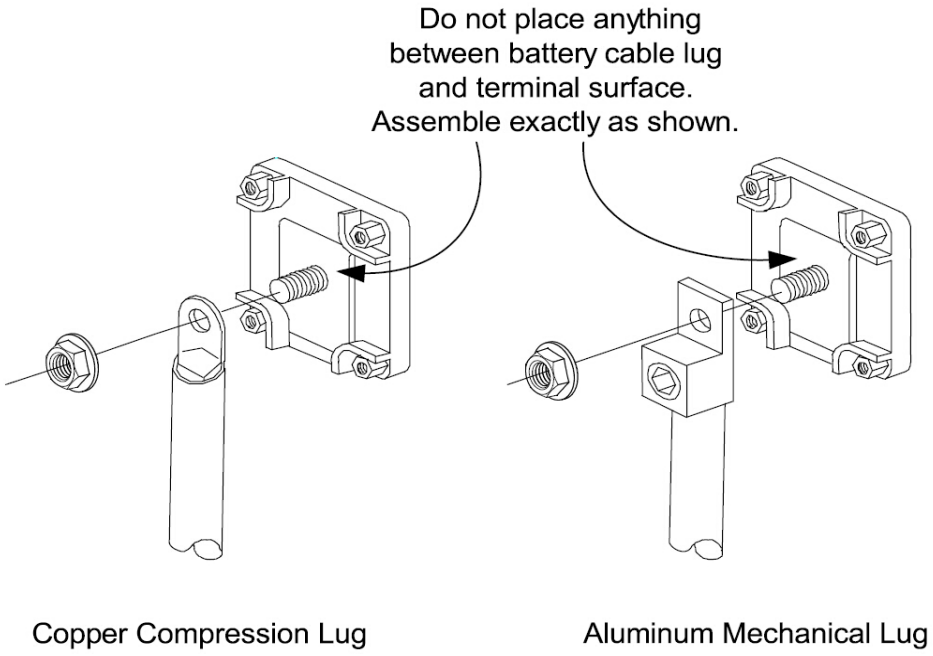



**Figure 9**

**Reducing RF interference**

To reduce the effect of radiated interference, twist the DC cables. To further reduce RF interference, shield the cables with sheathing /copper foil / braiding.

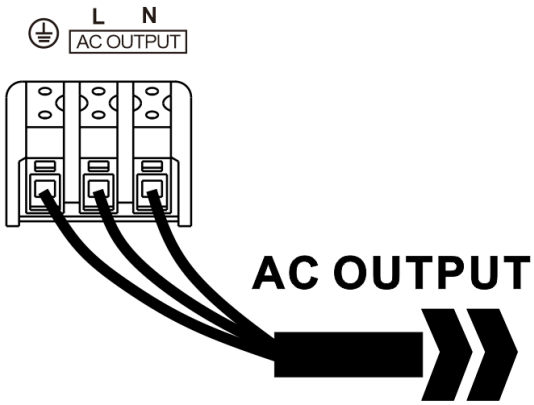
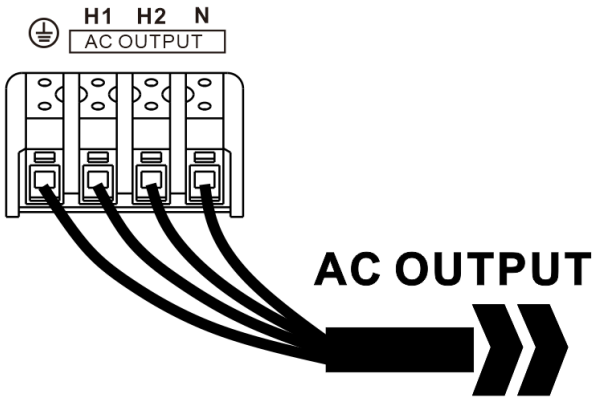
**Taping battery cables together to reduce inductance**

Do not keep the battery cables far apart. In case it is not convenient to twist the cables, keep them taped together to reduce their inductance.

| | |
|---|---|
| **WARNING** | The torque rating range for the DC terminals are 12.5NM-20.5NM (9.25-15.19 pound-foot), and the suggested torque rating is 17NM (12.6 pound-foot). Over torquing may break the bolt. |
| | **Equipment Damage**<br>The inverter is not reverse polarity protected. Reversing the battery polarity on the DC input connections will cause permanent damage to the inverter which is not covered under warranty. Always check polarity before making connections to the inverter. |
| | The inverter contains capacitors that may produce a spark when first connected to battery. Do not mount in a confined compartment with vented battery or gases. |
| | Ensure the inverter is off before connecting or disconnecting the battery cables, and that load is also off. |

# 3.4 AC Wiring

The AC terminal is rated for wires ranging from 8 AWG to 20 AWG. We recommend using 10 to 8 AWG wire to connect to the AC terminal block. Make sure the AC cable rating allows for a minimum of the maximum ac output of inverter. Please consult a qualified electrician about the specific wire gauge required in terms of wire material and inverter power. There are several ways of connecting the terminal block depending on the model. All the wirings are CE compliant. Contact our technical support team if you are not sure about how to wire any part of your inverter.

<table>
<tr><th colspan="3">AC Output Wiring Diagram</th></tr>
<tr><td>Single Phase</td><td>G / L / N<br>➢ L~N:120Vac</td><td> 
</td></tr>
<tr><td>Split Phase</td><td>G / H1 / H2 / N<br>❖ H1~N:120Vac<br>❖ H2~N:120Vac<br>❖ H1~H2:240Vac</td><td> 
</td></tr>
<tr><td>WARNING</td><td colspan="2">DO NOT LOOSEN OR TOUCH THE REAR SET SCREWS ON THE TERMIANL BLOCK<br>● The output voltage of this unit must never be connected to any other AC power，short circuit or damage will result.<br>● Always switch on the inverter before plugging in any device.<br>● Damage caused by AC wiring mistakes are not covered under warranty.</td></tr>
</table>

The AC terminal output is not ground fault protected.
Installation in recreational vehicles requires GFCI protection of certain branch circuits.
Note all applicable codes.

**Preventing Paralleling of the AC Output**

The AC output of the unit should never be connected to the utility power / generator.
Such a connection will result in parallel operation of the different power sources and AC power from the utility / generator will be fed back into the unit which will instantly damage the inverter and may also pose a fire and safety hazard.

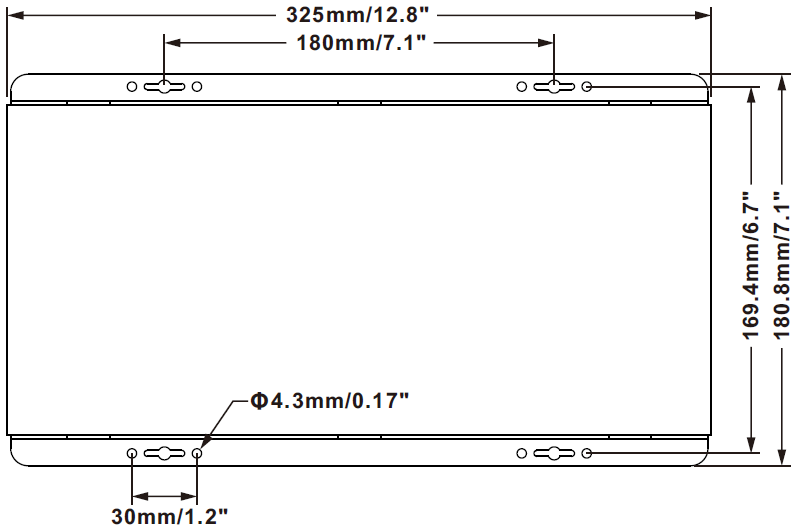
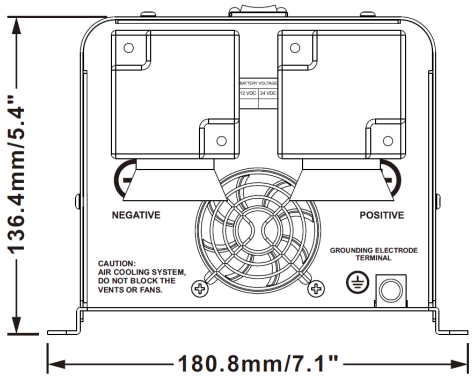
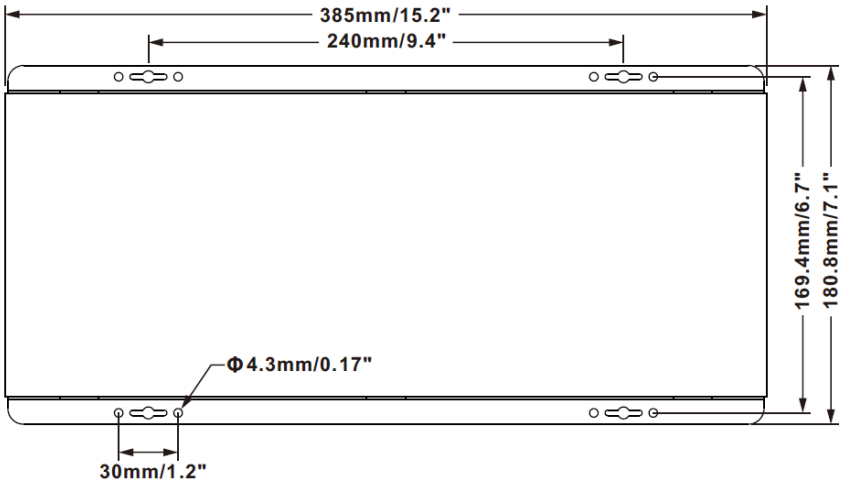
## 3.5 Grounding

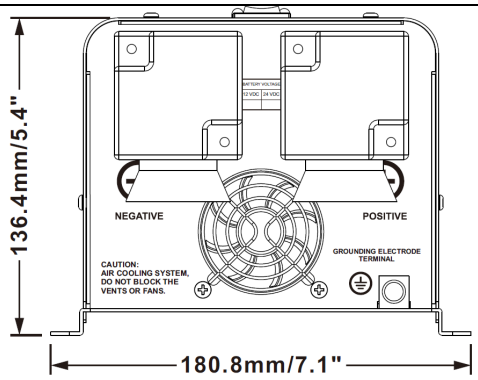
Connect an 8 AWG gauge or greater copper wire between the grounding terminal on the inverter and the earth grounding system or the vehicle chassis.

# 3.6 Mounting

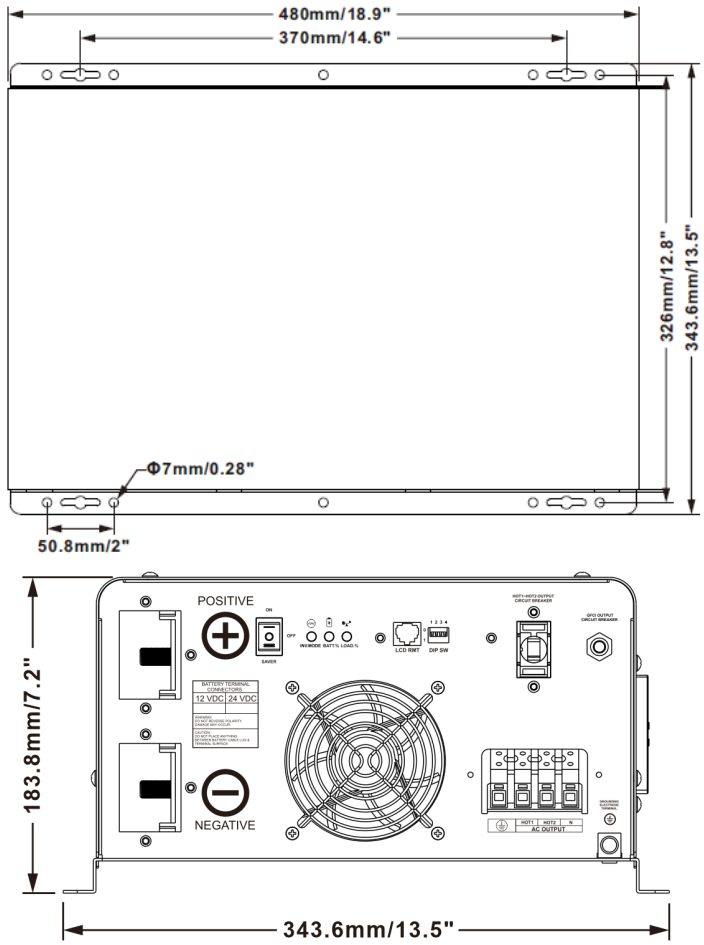
## 3.6.1 Installation Tools Required

- Wire Termination Crimper
- Cable Ties
- Drill
- Phillips Screwdriver (with a magnetic end)
- Slotted Screwdriver
- Tape Measurer
- Wire Cutters
- Needle Nose Pliers
- Wire strippers

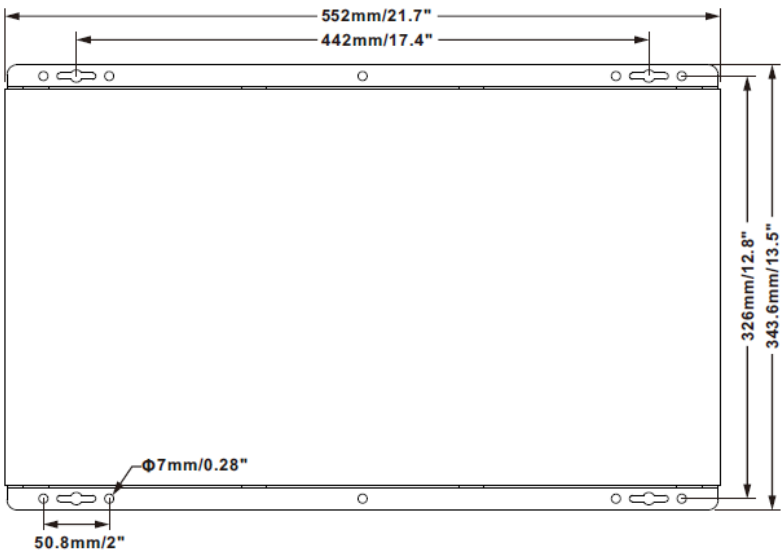
| | |
|---|---|
| **PILF 600W** |  <br>  |
| **PILF 1000-1500W** |  |



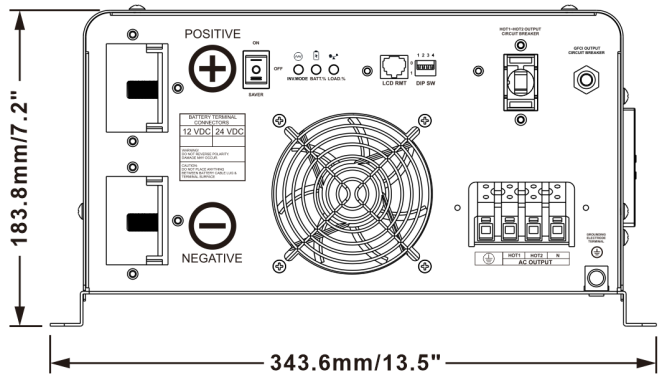

**PILF 2000-3000W**




**PILF 4000W**




PIPilPI

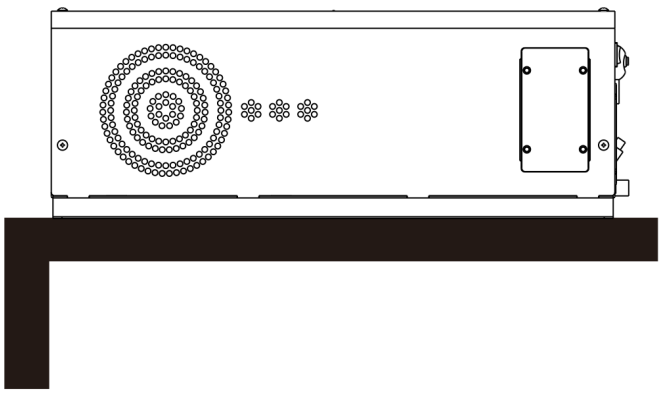



## 3.6.2 Inverter Mounting Recommendations

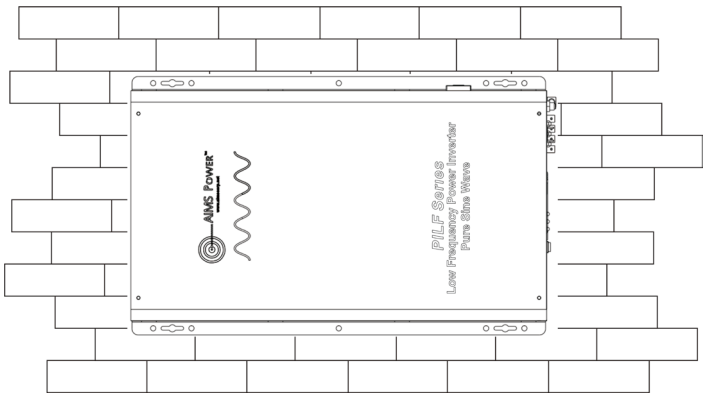
NOTE: The inverter mounting location should provide adequate ventilation and clearance to minimize the increased temperature during operation. Allow at least 6" of clearance on the sides and 12" of clearance on the fan sides.

1. Locate a suitable, secure mounting surface as close to the batteries as possible without being in the same compartment. Some batteries emit gases, and no electronic device should be mounted in a confined space with no ventilation along with the battery.
2. Mount the inverter using four each ¼-20 steel bolts, flat and lock washers, and nuts. The length of the bolts should be equal to the thickness of the mounting surface plus ¾".
3. To mount the inverter securely, the surface and the mounting hardware must also be able to support at least twice the weight of the inverter.

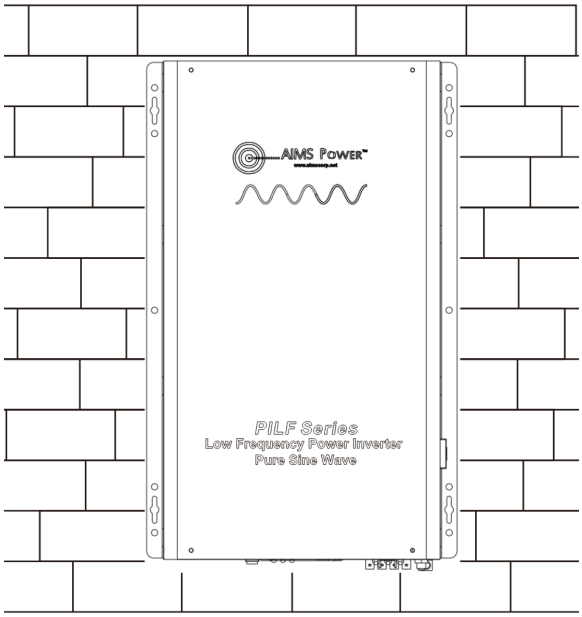
NOTE: Different surfaces may require different mounting techniques



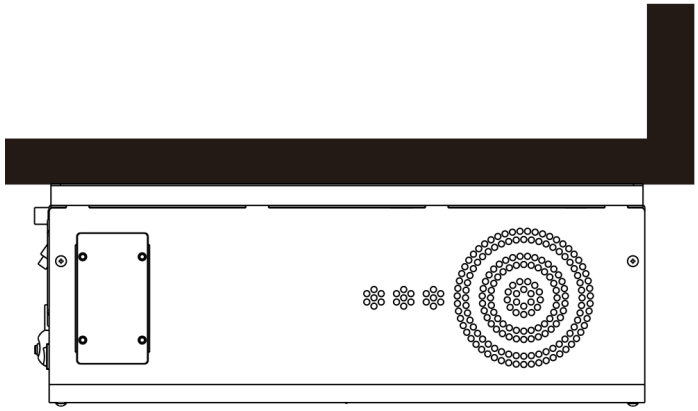
1: On a horizontal surface (shelf or tabletop) with top side up,




2: On a vertical surface (like a wall) with the DC terminals facing left and the fan axis horizontal.




3: On a vertical surface (like a wall) with the DC terminals facing down and the fan axis vertical.



**DO NOT MOUNT UPSIDE DOWN! TOP FACING DOWN (All models).**

**Warning!** The inverter surface may get as high as 80℃ (176℉) during operation, do not touch. The unit should be installed so it is not accessible to a passerby.

# 4. Troubleshooting Guide

Troubleshooting contains information about how to troubleshoot possible error conditions while using the PILF series Power Inverter.

## Indicator and Buzzer

| Inv Status | LED Indicator | | | Buzzer | Troubleshooting Guide |
|---|---|---|---|---|---|
| | INV M | Batt % | Load % | | |
| 1 | GN Blink | * | * | No Buzzing | Power Saver On Mode |
| 2 | GN | YE | - | Beep 0.5s/5.0s | Alarm：Battery Low Voltage |
| 3 | GN | RD | - | Beep 0.5s/1.0s | Alarm：Battery Over Voltage |
| 4 | GN | - | RD | Refer to “Audible Alarm” | Alarm：Overload |
| 5 | YE | - | - | Beep 0.5s/1.0s | Alarm：INV Over Temperature |
| 6 | RD | YE | * | No Buzzing | Standby：Battery Low Voltage |
| 7 | RD | RD | * | Beep Continuous | Fault：Battery Over Voltage |
| 8 | RD | RD Blink | * | Beep Continuous | Fault：Fan Lock |
| 19 | RD | * | RD | Beep Continuous | Fault：Overload |
| 10 | RD | * | RD Blink | Beep Continuous | Fault：AC Output Short Circuit |
| 11 | RD | * | * | Beep Continuous | Fault：INV Over Temperature |
| 12 | RD | RD | RD | Beep Continuous | Fault：Other Abnormal Issues |

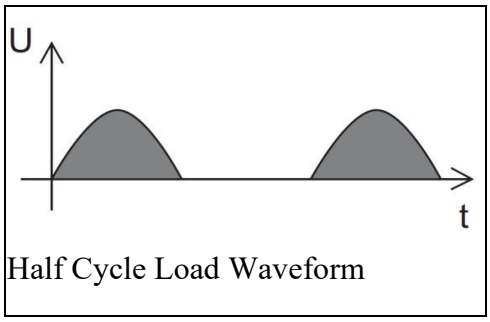
## Troubleshooting Guide

| Symptom | Possible Cause | Recommended Solution |
|---|---|---|
| Inverter will not turn on during initial power up. | Batteries are not connected Loose battery connection. | Check the batteries and cable connections. Check DC fuse and breaker. |
| | Low battery voltage. | Charge the battery. |
| No AC output voltage and no indicator lights ON. | Inverter has been manually turned to OFF mode. | Press the switch to “Power On” or “Power Saver Auto” position. |
| AC output voltage is low and the inverter turns itself off after a brief period. | Low battery. | Check the condition of the batteries and recharge if needed. |
| Noise from Transformer/case* | Applying specific loads such as hair dryer. | Remove the loads. |
| **LED & Buzzer Status** | **Possible Cause** | **Recommended Solution** |
| LED is Green, No Buzzer, No AC output voltage | The GFCI is tripped. | Reset the GFCI; If the test light is off, replace the GFCI or return the inverter for service. |
| | The AC output circuit breaker is tripped. | Reset the Breaker |
| LED is Red, Beep continuous, No AC output voltage | The temperature of the inverter's heat sink is too high. | Allow the unit to cool down, the high temp fault should self-correct. Verify that all vent openings are clear of obstruction. Reduce ambient temperature or load. |

***The reason for noise from the transformer and/or case**

Sometimes the transformer and/or case of the inverter may vibrate and make noise. If the noise comes from the transformer, most likely cause is described below:

That is a half wave load: A load that uses only half of an AC power cycle. This tends to cause an imbalance of the magnetic field of the transformer, reducing its rated working frequency from 20KHz to, say, maybe 15KHz (it varies according to different loads).
In such a case the frequency of noise falls exactly into the range (200Hz-20KHz) that human ears can hear.
The most common load is a hair dryer.



Half Cycle Load Waveform

If the noise comes from the case:
Normally when loaded with inductive loads, the magnetic field generated by the transformer keeps attracting or releasing the steel case at a specific frequency, this may also cause noise.
Reducing the load or using an inverter with a larger capacity will normally solve this problem. The noise will not do any harm to the inverter or the loads.

**Common FAQs:**

- Can the inverter be mounted in a closed box with no air- No
- Do not mount upside down (top side facing down)
- Max distance between inverter and battery should be less than 10 feet. If more than 10ft, use a bigger cable size.
- Cable & fuse size recommendation can be found on page 25.
- Can I extend the remote cable? NO
- Can I run the output load at 100% continually? NO, the load should be 50% or less for more than 1 hour to prolong the life of the inverter.
- Why is there no AC output in power saver? The AC load needs to be greater than 50 watts and resistive. This mode puts the inverter into a hibernation and does not save power when the device is running.

# Sec 5. Limited Warranty

## Warranty

All AIMS Power™ products come with warranty coverage against manufacturer defects as follows, from the date of purchase, unless otherwise indicated:

- 1-Year for non ETL certified units
- 2-Years for ETL certified units and batteries
- 3 Years for generators
- Batteries – AGM 5 year manufacturer defect. Lithium see below
- Solar products – product specific
- Cables - 10 years

Within the warranty coverage period, AIMS Power™ will either repair or replace, at its sole discretion, the defective product. A restocking fee may be applied if used or missing packaging and/or parts are not returned. Limited and prorated warranties on some products.

**NO REFUNDS AFTER 30 DAYS. REPAIR OR REPLACE ONLY.**

Any shipping charges that occur as a result of a warranty return or exchange are NOT covered by the warranty and are the responsibility of the customer.

The warranty **does not cover** the following:

- Products that AIMS Power™ determine, in its sole discretion, to be free of any material or workmanship defects or flaws
- Products evidencing excessive wear, misuse, improper installation, lightning or altered, excessive short circuit
- Products with missing or defaced labels, stickers, serial numbers or other identifying information
- Improper care or storage (e.g. water damage, exposure to extreme heat or cold temperatures, unsanitary environment)
- Systems that mix battery types, brands and/or old products with new products
- Alterations or customizations
- Items that were purchased second hand, or from an unauthorized seller (if you want to know if a seller is authorized, call us at 775-359-6703)
- Items outside of the covered warranty period

**NON-TRANSFERABLE:**

- This Limited Warranty is to the original purchaser of the Battery and is not transferable to any other person or entity

***RECEIVING YOUR ORDER – Be sure to inspect for any damage or incorrect quantities BEFORE signing for the product. If you accept the product, make sure to have the carrier NOTE the damage before signing.***

**Warranty Return Process**

It is our goal at AIMS Power™ to provide a comprehensive and hassle-free return and exchange process. As such, please review the below process before initiating warranty claim.

- Contact AIMS Power™ via the AIMS Power return portal at https://aimspower.returnsportal.net/ to submit your warranty return request and obtain a Return Merchandise Authorization (RMA) number.

*Note: Be sure to provide the name from the original order as well as a copy of your receipt. Include a detailed description of the problem.*

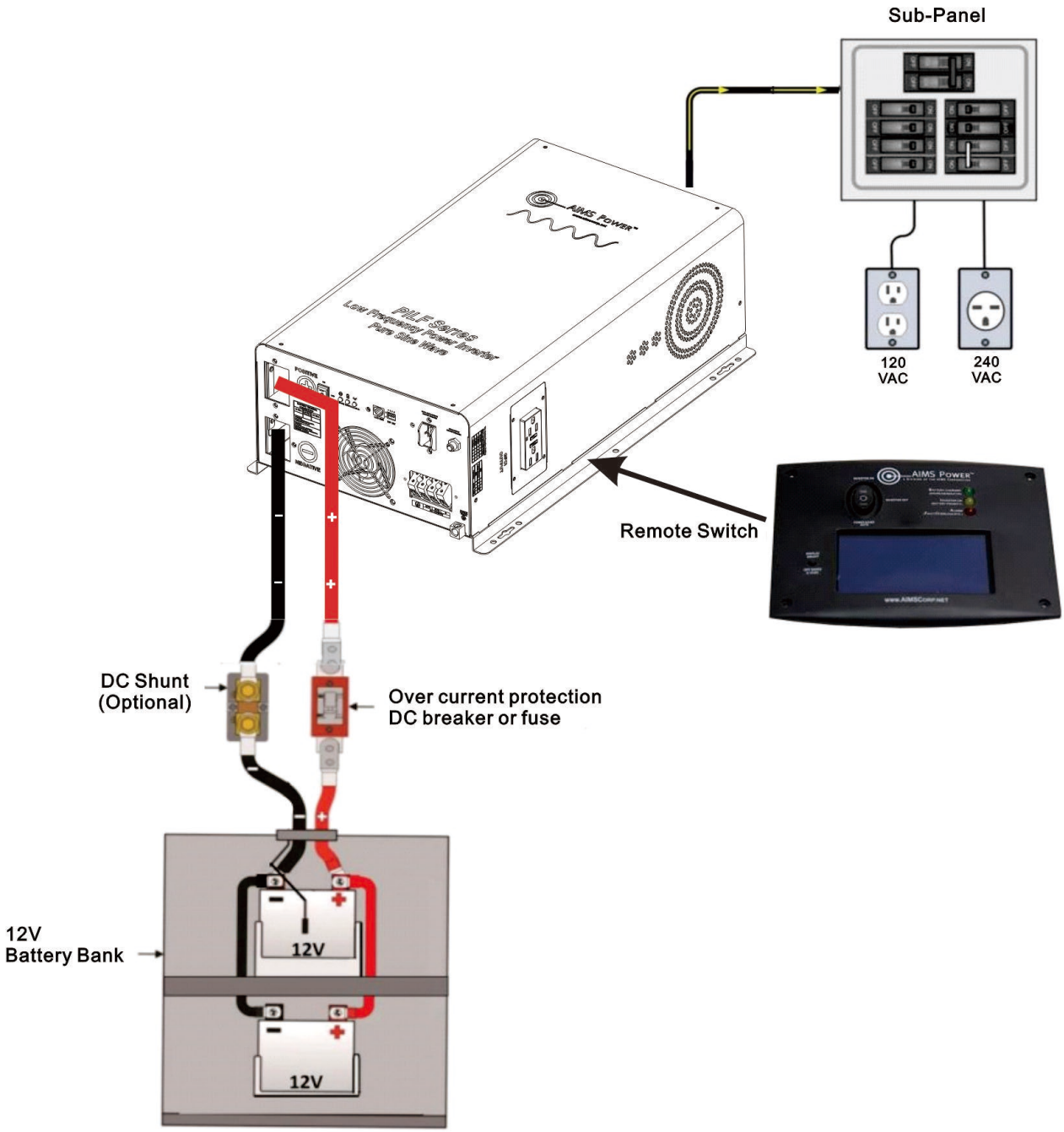
- An automated email will then be sent to the address indicated on the warranty return request containing further instructions regarding packing, shipping and documentation to include when returning the product as well as an RMA authorization number.
- Once the return is received and inspected an e-mail will be sent informing you that the return has been approved and processed. If there are any issues with the return, an additional e-mail will be sent notifying you of such.
- For any other questions please contact us via phone or email.

# Appendix 1 - PILF Series Spec Sheet

| PILF Series Low Frequency Power Inverter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Electrical Specifications** | | | | | | | | |
| **Power Inverter Model- PILF Series** | | **0612** | **1012** | **1512** | **2012** | **2412** | **3012** | **4012** |
| **Power Inverter Output** | Continuous Power Watt | 600 | 1000 | 1500 | 2000 | 2400 | 3000 | 4000 |
| | Surge Rating(20s) Watt | 1800 | 3000 | 4500 | 6000 | 7200 | 9000 | 12000 |
| | Capable of Electric Motor | 0.6HP | 1.0HP | 1.5HP | 2.0HP | 2.4HP | 3.0HP | 4.0HP |
| | Output Waveform | Pure Sine wave | | | | | | |
| | Nominal Efficiency | Up to 88% | | | | | | |
| | Power Factor | 0.9-1.0 | | | | | | |
| | Nominal Output Voltage | 120Vac (Single Phase) or 120/240Vac (Split Phase) | | | | | | |
| | Output Voltage Regulation | ±10% RMS | | | | | | |
| | Output Frequency | 50/60Hz ± 0.3Hz | | | | | | |
| | Short Circuit Protection | Yes, Current Limit Function (Fault after 1sec) | | | | | | |
| | THD | Typically−<3%, Max 10% under full linear load | | | | | | |
| **DC Input** | Nominal Input Voltage | 12.0Vdc | | | | | | |
| | Minimum Start Voltage | 10.0Vdc | | | | | | |
| | Low Battery Alarm | 10.5Vdc / 11.0Vdc /11.5Vdc / 12.5Vdc | | | | | | |
| | Low Battery Trip | 10.0Vdc / 10.5Vdc /11.0Vdc / 12.0Vdc | | | | | | |
| | High Voltage Alarm & Fault | ≥16.0Vdc | | | | | | |
| | High DC Input Recovery | ≤15.5Vdc | | | | | | |
| | Low Battery Voltage Recover | ≥13.0Vdc | | | | | | |
| | Idle Consumption-Search Mode | < 2.5W when Power Saver On Mode | | | | | | |
| | Remote Control | Yes. Optional | | | | | | |
| | Display | Tri-Color LEDs | | | | | | |
| **Mechanical Specification** | Mounting | Wall Mounted or Flat Placement | | | | | | |
| | Inverter Weight | 7.7Kg 17lbs | 11.8Kg 26lbs | 14.9Kg 33lbs | 21.5Kg 47.5lbs | 23.8Kg 52.4lbs | 26Kg 57.3lbs | 31.9Kg 70.4lbs |
| | Shipping Weight | 8.4Kg 18.5lbs | 12.5Kg 27.6lbs | 15.5Kg 34.2lbs | 24.1Kg 53.1lbs | 26.3Kg 58lbs | 28.4Kg 62.6lbs | 34.2Kg 75.4lbs |

| **INV & Dimensions** | **PILF 600W** | **PILF 1000-1500W** | **PILF 2000-3000W** | **PILF 4000W** |
|---|---|---|---|---|
| Inverter Dimensions (L*W*H) | 325*181*136mm 12.8*7.1*5.4" | 385*181*136mm 15.2*7.1*5.4" | 480*344*184mm 18.9*13.5*7.2" | 552*344*184mm 21.7*13.5*7.2" |
| Shipping Dimensions (L*W*H) | 435*230*210mm 17.1*9.1*8.3" | 495*230*210mm 19.5*9.1*8.3" | 590*445*270mm 23.2*17.5*10.6" | 660*445*270mm 26*17.5*10.6" |

# Appendix 2 - Installation Diagram




**※Specifications in this manual are subject to change without prior notice.**

AIMS POWER™
www.aimscorp.net

**AIMS Power, Inc.**
**9550 Gateway Drive**
**Reno, NV 89521**
**TEL: (775) 359-6703**
**FAX: (775) 359-6753**

**WWW.AIMSCORP.NET**


# PILF SERIES

## LOW FREQUENCY PURE SINE WAVE

## POWER INVERTER

**USER`S MANUAL**

**614-00106-00**