

# MEANWELL DC/AC POWER INVERTERS

A301/A302-100 = 100 Watts

A301/A302-150 = 150 Watts

A301/A302-300 = 300 Watts

A301 = 12VDC input

A302 = 24VDC input

230VAC output

## MODIFIED SINE WAVE



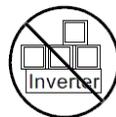
Don't  
disassemble



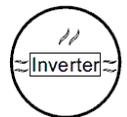
Keep away from  
moisture



Keep away from  
fire & heat



Don't stack  
inverters



Maintain good  
ventilation

## WARNINGS:

- For indoor use only.
- Do not use if the inverter is damaged.
- Hazardous voltage inside - do not attempt to open or repair.
- Read all manuals and instructions before connecting or using the inverter.
- Only connect 220/230/240V AC appliances that are in good condition.
- For independent use, do not connect to the AC electricity grid.
- Batteries require regular maintenance. Once aged, batteries should be changed by qualified personal as failed batteries may cause fire or other hazards.

## FEATURES:

- 12VDC or 24VDC input voltage models available
- Peak Power Technology runs appliances with high startup current
- Built in safety protection against AC power overload, low and high battery voltages
- Heavy Duty cigarette plug included (also battery terminal clamps/clips - 300W only)
- Power on (green) and fault (red) LED lamp (separate lamps on 300W only)
- Approved AS/NZS mains power outlet socket
- USB port with 5VDC output at 0.5A (A301-100) or 0.3A (A302-100)
- Temperature controlled automatic cooling fan (300W only)

## SPECIFICATIONS:

Part No.	A301/A302-100	A301/A302-150	A301/A302-300
Input Voltage	12V/24V Battery or DC source (-15% ~ +25%)		
Input Current: (Max DC Amps)	15A/10A	15A/10A	35A/15A
Input Standby Current	0.25A/0.2A	0.25A/0.2A	0.36A/0.2A
Output	230 Volts AC, 50Hz (Modified Sine Wave)		
Continuous Output Power	100W	90W	300W
Peak Output Power < 5-20min		150W (20 min)	360W (5 min)
Surge Output Power	200W	300W	600W
Efficiency (typical)	90%	78%/82%	82%/85%
Low Battery Alarm		10±0.5V/21.5±1V	10±0.5V/21.0±0.8V
Low Battery Shutdown	10±0.5V/19.5±1V	9.5±0.5V/19.5±1V	9.5±0.5V/19.5±0.8V
High Battery Shutdown	16±1V/31±1V		
Forced Cooling (300W only)	> 100W or > 40°C (NTC) fan on		
Thermal Shutdown	60±5°C		45±5°C
Fuse Quantity & Size	15A/10A	15A/10A	15A/10A, 35A/20A
Fuse Location	External*	External*	External*
Battery Cable Length	650mm	700mm	800mm x 2
Dimensions (L x W x H)	170x65x60mm+	165x94x69mm	165x88x74mm
Weight	0.55kg	0.8kg	1.1kg

\* External 15A/10A fuse included in cigarette plug (all units) and 35A/20A fuse in battery clamp/clip cable (300W only).

+ Designed to fit vehicle centre console cup holder (70mm dia.) and features DC cable exit at the top.

## WHAT IS AN INVERTER?

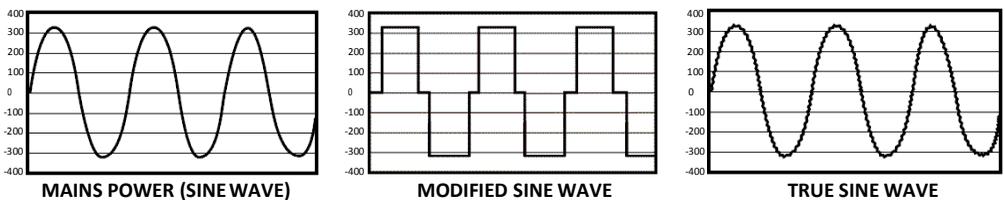
Inverters are designed for powering household appliances from a battery or low voltage DC source. They are electronic devices that convert battery power to AC mains power.

Inverters are compact and often lightweight making them an ideal source of portable mains power. Thanks to their portability they are commonly used in cars, caravans, motor homes, boats, 4WDs, utility vehicles, trucks and buses.

Using an inverter with standard household appliances is a much cheaper option than purchasing specialized 12V or 24V appliances for times when mains power is not available.

There are two different types of inverters, Modified Sine Wave (MSW) and True Sine Wave (TSW). The difference between the two is how close the output replicates normal mains power.

These graphs show the difference in output between mains power, MSW and TSW inverters.



Logically it follows that the process used in a TSW inverter is more complex than a MSW inverter and subsequently they are a lot more expensive.

In reality most electric appliances operate unaffected on a modified sine wave and hence they are more common in applications requiring intermittent use.

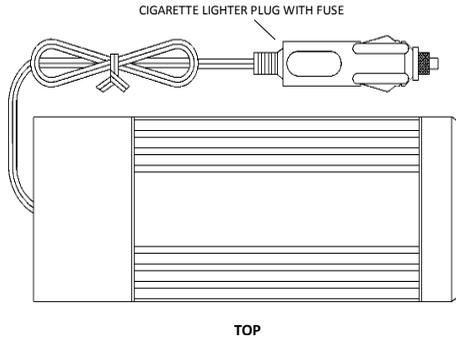
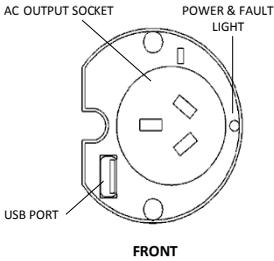
True sine wave inverters are reserved for use on sensitive electrical appliances (such as medical equipment) and in permanent or continuously operating installations.

Inverters are available with different power output levels to suit the type of appliances to be powered. Small inverters are designed for powering one small low power electrical or electronic appliance. Larger inverters can be used to power multiple small appliances or one larger appliance. Typically inverters are not suitable for running appliances with very high power requirements such as electric heaters, stoves and air conditioners. This is due to their high current draw and the resultant battery consumption.

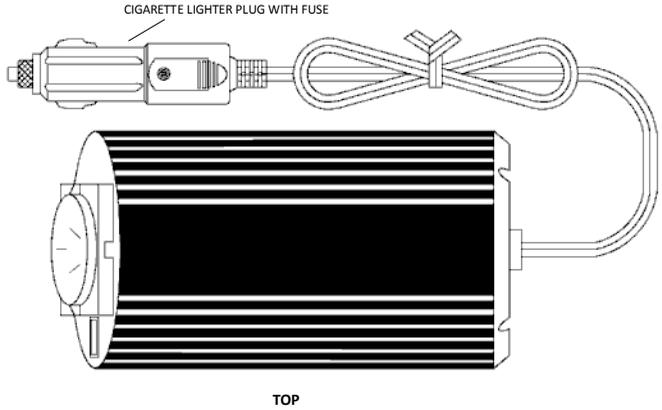
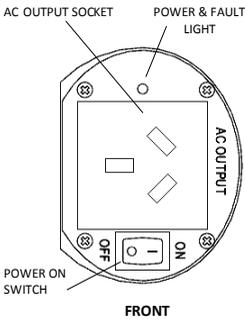
# CONNECTIONS / CONTROLS & ACCESSORIES

After unpacking your inverter take a moment to check that you have the correct model (A301 = 12V, A302 = 24V) and all the correct accessories are included. Familiarize yourself with the connections and the controls on the inverter.

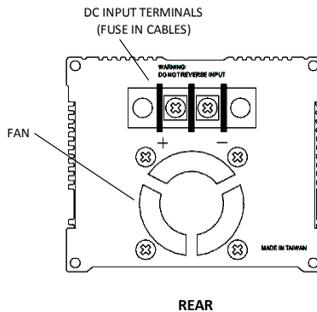
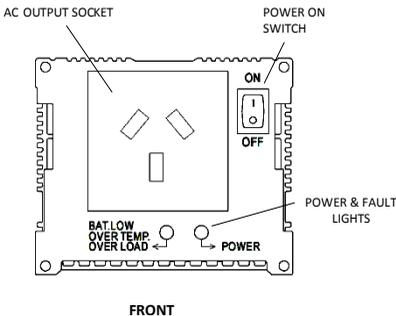
## Part No. A301/A302-100



## Part No. A301/A302-150



## Part No. A301/A302-300



## PLACEMENT / LOCATION / MOUNTING OF INVERTER

### Caution:

- *The inverter must be mounted away from any flammable items and gas appliances.*
- *Batteries should be mounted in a separate well-vented area/enclosure.*
- *The inverter must always be protected from rain, water and moisture.*

Meanwell inverters are designed for indoor use only. For best performance the inverter must be used or mounted in a cool, dry, clean and well-ventilated area. For best TV and Radio reception keep the inverter as far away from TVs, radios, antenna cables and antennas as possible.

All inverters should be mounted in a suitable horizontal (recommended) or vertical origination. The 300W inverter should have at least 5cm clearance from the front and rear panels of the inverter to provide good ventilation for the cooling fan.

## SUITABLE POWER SOURCE:

In order to operate the inverter a suitable 12V or 24V DC power supply is required. This can be vehicle or caravan batteries, a portable power pack or battery bank joined in series and/or parallel to produce 12V or 24V DC. For serious applications, deep cycle batteries are recommended for best performance. For occasional use in a vehicle it is recommended that the vehicle's motor be run whenever the inverter is used with high power loads or over long periods of time.

The size of the batteries used will determine how long the inverter will supply power to an appliance and how well the inverter will perform. Most batteries are marked with their size in Amp hours (Ah).

Because the inverter is capable of drawing high currents the inverter should only be connected to suitable size batteries. Connection to undersized batteries could damage the batteries and may result in the inverter shutting down within a short period due to low battery voltage.

The amount of power drawn from batteries is proportional to the inverter load.

Part No.	A301/A302-100	A301/A302-150	A301/A302-300
Recommended minimum Battery Size	40/20Ah	60/30Ah	80/40Ah
Run time with max. load and min. battery size	120min	120min	120min
Run time for a 20W globe and min. battery size	10 hours	15 hours	30 hours

## CONNECTION TO POWER SOURCE

### Caution:

- Even though the inverter is powered from batteries, it still produces Dangerous High Voltage AC power and has the potential to fatally injure if incorrectly installed or used.
- Before making any connections ensure the inverter is switched off and no AC appliances are plugged into the AC output sockets.
- Double check battery negative and positive posts before making the input connections, a wrong connection (Reverse polarity) will cause the fuses to blow and may damage the inverter.
- A small spark (electrical arc) can occur when making the final battery connection; this is most common when the inverter has not been used for a long time. This spark is caused by the inverter's large input capacitors charging quickly. To minimize this, make the last connection quickly and completely.
- Do not make any connections if there are any flammable fumes present or any volatile fuels or gases are near.
- Batteries can be dangerous, follow all battery manufacturer's instructions and warnings.
- Meanwell inverters are designed FOR INDEPENDENT USE ONLY. The inverter cannot be connected to household wiring whether the building is connected to the electricity grid or not.

The 300W inverter can be connected to a power source on a temporary basis with the supplied battery clamp/clip leads for full 300W output or all units can be plugged into a suitable cigarette lighter socket for a maximum of 180W output.

### "HARD WIRED" CONNECTION:

When mounting the 300W inverter in a vehicle, caravan, boat, truck or home it may be preferable to use longer DC battery cables than those supplied, so that the inverter can be placed in a more convenient, cooler or more protected location.

If longer cables are required only use suitably insulated automotive battery cable according to the following table:

Part No.	A301-300 (12 Volt)	A302-300 (24 Volt)
Up to 1.5m	6AWG(14mm <sup>2</sup> )	9AWG(7mm <sup>2</sup> )
3m	4AWG(21mm <sup>2</sup> )	7AWG(11mm <sup>2</sup> )
6m	2AWG(33mm <sup>2</sup> )	5AWG(17mm <sup>2</sup> )

- It is required that a 35A (A301-300) or 20A (A302-300) circuit breaker or high current fuse be placed in the DC positive (+) line close to the battery.

- It is recommended that a heavy duty battery switch with a current rating higher than the fuse be fitted in the DC positive (+) line close to the batteries to allow the supply to the inverter to be switched off, this can also be achieved by using a circuit breaker which has a trip facility.
- Positive and Negative cables should be run close together to reduce cable inductance. The cables should also be protected from any damage.
- Any connections should be made securely using the proper hardware. Procon Technology recommends the use of DeOxit as a contact cleaner to improve conductivity and protect metal. See... [www.procontechology.com.au/deoxit.htm](http://www.procontechology.com.au/deoxit.htm)

## OPERATION

### *Caution:*

- *Never connect the AC output of the inverter to normal fixed building wiring or any wiring connected to the mains grid. Normally AC wiring contains a MEN link - this neutral to earth link can damage the inverter and compromise safety.*
- *This inverter is designed for direct connection to appliances however extension leads and power boards can be used for low wattage appliances.*

## PROTECTION FEATURES

Meanwell inverters include sophisticated circuitry that monitors the operation of the inverter and turns the inverter off if a problem is detected. A fault light will illuminate and an audible alarm may be heard if this occurs. This prevents damage to the inverter, batteries and/or appliance being powered.

- **Low Battery** - This feature will sound an alarm when the battery system powering the inverter is low. It is recommended that the appliance is turned off, then the inverter is turned off and the batteries recharged before switching on again.

If the appliance is allowed to continue to run, the inverter will turn off when the batteries are very low to prevent over discharging the batteries or damaging the inverter. This will cause a sudden disruption of power to the appliance that may cause problems for some devices. e.g. computers that need to be shut down properly.

- **High Battery** - This feature will shut down the inverter when the battery system is too high in voltage. This prevents damage to the inverter. An over voltage condition could occur if the wrong battery system is used or a fault occurs whilst attempting to charge the battery when it is connected to the inverter.
- **Overload** - This feature will turn the inverter off when the total load connected to the inverter exceeds the inverter's rating (see "Determining suitable loads/appliances"). This may occur due to highly inductive loads such as any appliance with a motor

causing a sudden peak load on the inverter.

If this occurs, switch "OFF" the appliance and the inverter. After 5 seconds turn the inverter "ON" and the inverter will provide power again. Turn the appliance "ON", if the inverter shuts down more than 3 times, it is likely that the appliance is drawing more load than the inverter can supply, and a larger inverter would be recommended. Note if the load is a motor ensure that it is started under no-load conditions or try fitting a soft-start device to the motor (or purchase an appliance with one already fitted).

- High temperature - If the inverter has reached a high temperature, this feature will sound an alarm and then turn the inverter off. This may occur from continuously running high loads for long periods, due to high ambient temperatures or due to poor ventilation. If this occurs, turn the inverter off and allow it to cool before resuming operation. If possible reduce the load on the inverter and improve ventilation.

#### **DETERMINING SUITABLE LOADS/APPLIANCES:**

Each inverter is fitted with AS/NZS Australian socket outlet. All appliances have a rating plate that shows the amount of power (Watts) used or the current (Amps) drawn under normal conditions.

The following table shows the maximum combined AC Watts or AC Amps which can be run by the inverter for less than 20 minutes continuous.

<b>Part No.</b>	<b>A301/A302-100</b>	<b>A301/A302-150</b>	<b>A301/A302-300</b>
AC max load (Watts)	100W	150W	300W
AC max load (Amps)	0.4A	0.6A	1.2A

Some appliances that use an electric motor or transformer may draw 2 to 6 times their rating when first turned on. These are called inductive loads and are the most difficult for the inverter to run. For these appliances it is often a matter of trial and error to see what size inverter will run them, if in doubt always use a larger inverter using the above table as a guide. Motors operated via an inverter (soft-start) or speed-control circuit will often start up without trouble whereas much smaller wattage motors operated directly from AC power may cause the inverter to shut down. Please note that induction motors (often used in electric fans) may hum and overheat when operated from a Modified Sine Wave (MSW) inverter. Use a True Sine Wave (TSW) inverter instead.

#### **CONNECTING AN APPLIANCE AND RUNNING THE INVERTER**

- Connect the appliance AC plug to the inverter AC outlet socket.
- Switch the inverter "ON", the "Green" power light will illuminate to indicate operation.
- Turn the appliance "ON", if the appliance is fitted with an "On/Off" switch always switch the inverter on before switching the appliance on and always turn the

appliance off before switching the inverter off. If necessary, use a power board with switches.

- When not in use, turn the inverter off. Leaving the inverter on, even with no AC load connected, will drain the battery.

## **TROUBLESHOOTING / FAQ:**

### **Q. Why does the inverter turn itself off?**

A. If the red "OVER LOAD" light illuminates this indicates that there is a problem, and the inverter will usually turn off. Most commonly this would be caused by an appliance that is drawing too much power and for too high or too low battery voltage. Note a low input voltage can occur when a voltage drop, due to insufficient sized cables or batteries. Or when there are poor connections to the input to the inverter. Initially an audible warning will occur and only after a further drop in battery voltage does the unit shut down. Operation is restored once the battery voltage returns to normal. All other "OVER LOAD" faults will cause the inverter to shut down until it is switched off and on again.

### **Q. The inverter will not run my appliance even though the appliance label indicates that it draws less power than the size of the inverter?**

A. Electrical appliances can be divided into three groups by the way they draw energy (current) from their power supply. These groups are "Resistive", "Inductive" and "Capacitive" appliances or "loads". Some appliances are a combination of these loads.

- The most common resistive loads are incandescent or filament lights and heating elements. These devices are non-linear and draw a higher current at start up and, after a short delay once they "warm up", they always draw a constant power or current from the inverter, that is a 100 Watt light will draw approximately 100 Watts from the power supply at all times. Resistive loads are the easiest load for an inverter to run provided that it can handle the start-up current. Note a light dimmer with "soft start" capability can be used to reduce the start-up current.
- Inductive loads such as an electric motor require a large rush of power (surge current) to start and then usually draw a more constant power once running. Inductive loads contain coils of wire (motors, transformers, ballasts, solenoids) When the power is first turned on these coils of wire draw a large inrush or surge current which forms the magnetic flux (magnetic field) which allows these devices to work.
- The most common inductive appliances are: refrigerators, air conditioners, pumps, transformers, power tools and fluorescent lights. These appliances can draw 2 - 6 times their normal running power at start up. e.g. to run a 200 Watt refrigerator a 600 or 1000 Watt inverter may be needed.
- Capacitive loads are found in as many TVs and other electronic appliances (desktop computer, monitor etc.) and require a large surge current to start only when they have not been used for a while. This is often due to large capacitors in the switched mode power supply that must be quickly charged when the appliance is turned on. If the

appliance has not used for a while these capacitors slowly go flat. If the inverter trips on overload then restarting a few times may allow these appliances to work.

- There are some appliances such as large refrigerators, air conditioners and other compressor driven appliances that have extremely high startup currents, because they have an electric motor that must start under load. These appliances are not recommended for use with an inverter. However check with the manufacturer as motors with "soft-start" capability may be capable of being used with an inverter.

**Q. The inverter is powering my portable television, but I cannot get a clear picture?**

A. In poor reception areas it is quite common to have some interference on a portable TV (such as faint lines on the screen) when operating on a modified sine wave inverter.

- To improve your picture quality:
  - Keep the inverter as far away from the TV as possible.
  - Use an external long range or fringe area TV antenna with good quality coax cable.
  - Earth the inverter.

**Q. Can I run fluorescent lighting from my inverter?**

A. Most portable fluorescent work lamps should operate fine on an inverter even though they may be slow to start.

- Fluorescent lights are an inductive and capacitive load and often draw at least twice as much power from the inverter than their normal rating during start up.
- Normal household fluorescent lights should be avoided, because they contain power factor correction capacitors. Power factor correction is used in buildings installations to help smooth out the inductive effects of fluorescent light ballasts. If used with portable power inverters the power factor correction is effected by the harmonic distortion in the modified waveform, this causes a high load on the inverter that can overload the unit. If normal household fluorescent lights must be used, you will need to have a qualified electrician remove the power factor correction capacitor. The light should then be marked "For Inverter Use only". Or simply use a fluorescent light with electronic ballast!

**Q. Why does it damage the inverter if the battery leads are connected in reverse?**

A. Your inverter uses sophisticated electronics to convert DC battery power to AC mains power. If you accidentally connect the inverter to the batteries incorrectly (reverse polarity) a large current will be drawn by the inverter which will blow the protection fuses, as this occurs some of the high current could damage sensitive electronic components. Because of this risk it is important to always double-check the batteries polarity before making the input connections.

**Q. How do I check or change the fuses?**

A. All inverters have external fuses; these should only be checked or replaced by a suitably experienced person. Only replace the fuse with the same type and rating.

**Q. Why does the fan only operate sometimes?**

A. The 300W inverter features a temperature controlled automatic cooling fan, that only operates when needed. This allows the inverter to run very quiet when under low load conditions.

**Q. Why do some power tools not work properly?**

A. Some power tools use PWM variable speed controllers to vary the tool's speed as the trigger is squeezed. These power tools switch the power on and off very quickly in a similar way to how the inverter works. Because of this, some may not function properly with the inverters MSW output. On the other hand, a speed control can reduce the start-up current of the motor and allow an appliance to be used with an inverter where otherwise it would cause it to overload.

**Q. Can I run a laptop computer?**

A. Most laptop/notebook computer AC power adapters work perfectly fine with the inverter's modified sine wave output. Some however are more sensitive and may not function properly. If your power adaptor does not function or causes a humming noise or interference on the screen it is probably not suitable. Try using a universal AC adapter with your laptop or try using a TSW inverter.

**Q. Can I connect lights with dimmers to the inverter?**

A. Some old "TRIAC" type AC light dimmers may not work with a MSW inverter - try a TSW inverter instead. Most new "MOSFET" type AC light dimmers and motor speed controllers will work with MSW inverters but check with the manufacturer first. The Clipsal 32V light dimmer and Kambrook KD2 power board with dimming outlet were tested with a Meanwell MSW inverter and they worked fine (although with a reduced dimming range), hence some AC dimmers can work with a MSW inverter! Note, dimmers and speed controllers with "soft-start" capability are an excellent way to reduce and limit the start-up current impact on the inverter.

**WARRANTY**

Meanwell A301/A302 Modified Sine Wave Inverters are covered by a 12 Month Warranty. Failure to follow the operating instructions may damage the inverter and may void the warranty. Please read the operating instructions carefully before use.

**DISCLAIMER**

All specifications are subject to change without notice. Any circuit diagrams or assembly diagrams provided with equipment are for reference purposes only. Procon Technology makes no representation or warranty of any kind to the customer that they are qualified to make any repairs to our products, or that they are qualified to replace any parts. The customer assumes all responsibility for repairs or modifications not carried out by a qualified technician approved by Procon Technology.