



Pure Sine Wave Inverter

OWNER'S MANUAL

DC-AC Power Inverter



Special Feature:

- DC Fuse: Accessible on rear cover.
- 1.5 times rated power for 10 seconds
- 2 times rated power for 2 seconds
- Remote Control (Optional)
- USB Output: 5V,500mA (Optional)
- Variable speed DC fans, Controlled by: Temperature and Load.
- Protection: LED Indicator& Audible Alarm.
- 12V or 24V Models (Input voltage range: -15% ~ +25%)
- Output voltage regulation: $\pm 10\%$
- Output waveform: Pure Sine Wave
- Frequency: $50\text{Hz} \pm 1\%$
- CE and RoHS Approved
- 12 months warranty

Thank you for purchasing the Voltech Pure Sine Wave Inverter. Carefully read, understand and comply with all instructions before use.

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Specifications are subject to change without prior notice

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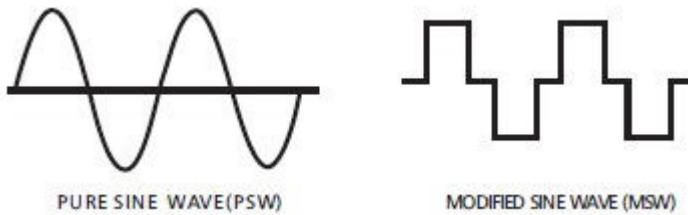
Version of Instruction manual 2.0

1. INTRODUCTION

1.1 What is an Inverter?

Power inverter is an electronic device that converts DC (Direct Current) battery power to standard AC (Alternating Current) power. DC is the power that is stored by a battery while AC is the standard power needed to run electrical equipment. A Power Inverter can be used in places and situations where AC power is not available.

1.2 Pure Sine Wave Inverter

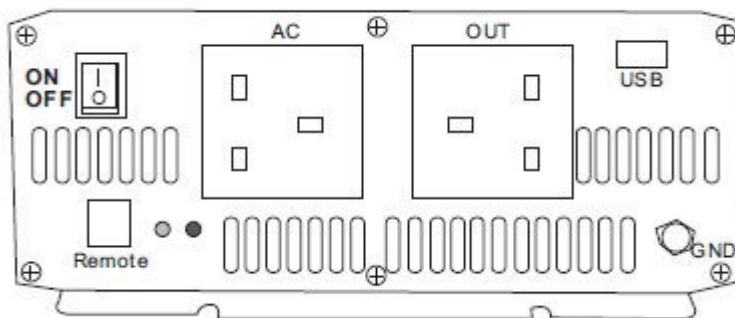


If you want to run your equipment exactly to the manufacturer's specifications, choose a *pure sine wave* inverter. With pure sine wave, motors start easier and run cooler. As well, some equipment **may only** operate properly with a pure sine wave inverter, such as laser printers, variable speed motors and digital clocks/devices.

2. MAIN COMPONENTS

2.1 Front Panel

The front panel view shows the inverter's ON/OFF Switch, AC Output Receptacle, LED Indicator Light, Vent Outlet, Remote Control port, Chassis Ground, USB.



A. ON/OFF Switch.

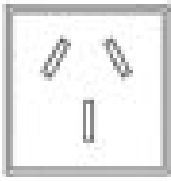
This switch controls ON/OFF operation of the inverter.

B. LED Indicator Light:

a) Fault: Turns Red to show fault, reference to Troubleshooting

b) Inverter: This light will illuminate Green whenever connected equipment has inverted AC power available at the outlet.

C. AC Output Receptacle: Australia (10Amp)



D. Vent Outlet.

Allows hot air pushed from the rear cooling fan to exit. Therefore it **MUST** be kept clear whenever the power inverter is to be used.

E. Chassis Ground (some models)

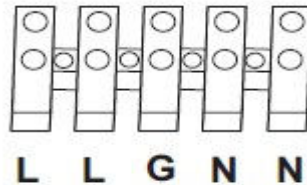
Properly grounds the Inverter to vehicle grounding system or to earth ground.

G. Remote Switch Port (Optional):

Use to connect the remote ON/OFF switch via a communication cable.

H. Hardwire Terminal Block (2500W to 6000W):

Note: When the load current is $>10A$ (2300W) You must use the output terminal connection which can be found inside the AC output panel of the inverter.



Ensure the inverter is turned off & DC input is disconnected before opening the cover to connect the Hard Wire option.

Seek professional assistance if you are unfamiliar with electrical wiring.

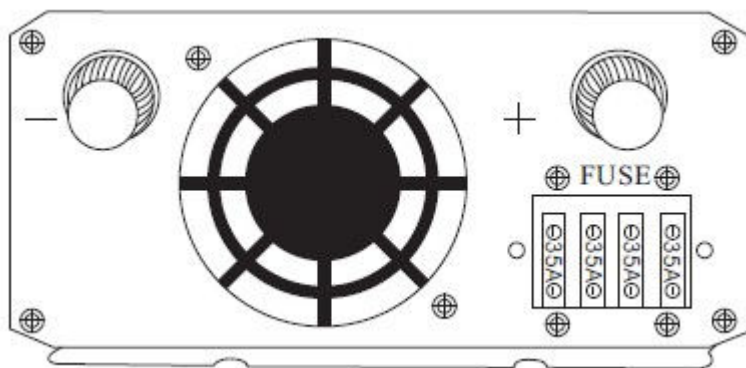
Check with local authorities as regulations may apply.

I. USB Port (Optional):

USB Port provides power to operate and charge USB-enabled devices.

2.2 Rear Panel

The rear panel view shows the inverter's Cooling fan, DC Battery Terminals, Fuses, Chassis Ground (some models).



A. Temperature and Load controlled Multi-Speed Cooling Fan

Quiet, efficient fan prolongs equipment service life.

1. Load <40% or inner temperature less than 30 °C, = fan(s) *don't run*.
2. Load >40% to <60% = the fan's rotational speed is 40%
3. Load >60% to <80%, = the fan's rotational speed is 60%
4. Load >80% to <100% = the fan's rotational speed is 80%
5. Load @100% = the fan's rotational speed is 100%
6. Once Inner temperature is more than 45°C, the fan's rotational speed is 100%.

B. DC Battery Terminals

Connect the inverter to battery or other power sources.

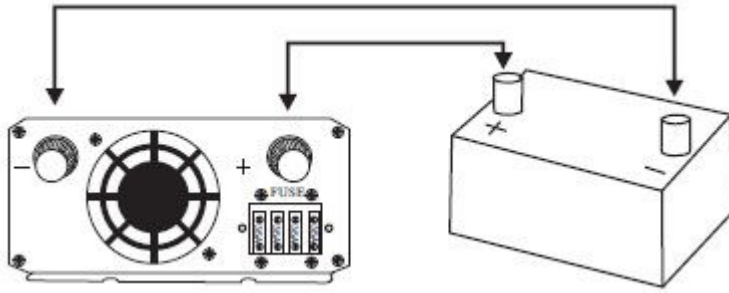
Negative (-) and Positive (+) DC terminals should be kept insulated to protect from accidental short circuits.

- a) Connect the red cable to the red post marked (+) on the back of the inverter. Connect the other end to the positive terminal on the battery
- b) Connect the black cable to the black post marked (-) on the back of the inverter. Connect the other end to the negative terminal on the battery.

If you connect the cables to the incorrect terminals, you will reverse the polarity and damage the inverter.

 **PROHIBITED: REVERSE POLARITY.**

DAMAGE CAUSED BY REVERSE POLARITY WILL NOT BE COVERED BY WARRANTY.



C. Fuse

Fuses for DC Input have been fitted to the rear panel. So as to be easily accessible in order to facilitate checking & replacing if required. Depending on the installation this maybe possible without removing the inverter.

3. HOW TO USE INVERTER

3.1 Load consideration

When an appliance with a motor starts, it requires a momentary surge of power. This surge of power is the “starting load” or “peak load”. Once started, the appliance requires less power to continue to operate. This is known as the “continuous load”. It is important to know the starting loads and the continuous loads of the appliances that are to be powered by the inverter.

Appliance power is rated in watts. This information is usually stamped or printed on most appliances and equipment. In some cases, a tool will be rated in amperes. To convert from amps to watts, multiply:

Amps x AC voltage = Watts (Eg: 2.0 A x 230 V = 460 Watts)

This formula yields an approximation of the continuous wattage load of that appliance.

The startup load of an appliance is a major factor of whether this inverter can power it.

Startup load is momentary. With many appliances, it is approximately twice the continuous load, but some appliance startup loads can be as high as eight times the continuous load.

If you are unsure of your equipments Power requirements an ‘Energy use’ meter may be used to measure the *starting peak & continuous wattage* .

In order to lesson the possibility of damaging the inverter or the equipment.

This inverter will automatically shut down in the event of an output overload,

When this occurs a Red LED indicator will turn on and the Buzzer signals a fault.

3.2 Configuring the Battery Bank

To determine the **approx' minimum** battery amp-hour rating that you will need to operate appliances from the inverter and any DC appliances powered by the battery bank, follow these steps:

1. List the maximum continuous wattage that the inverter has to supply.
2. Estimate the number of hours the appliances will be in use between battery recharges. This will vary depending on appliances. For example, a typical home-use coffee maker draws 500 watts during its brew time of 5 minutes. It maintains the temperature of the pot, requiring 100 watts. Typical use of a microwave oven is only for a few minutes. Some longer operating time appliances are lamps, TVs, computers and refrigerator/freezers.

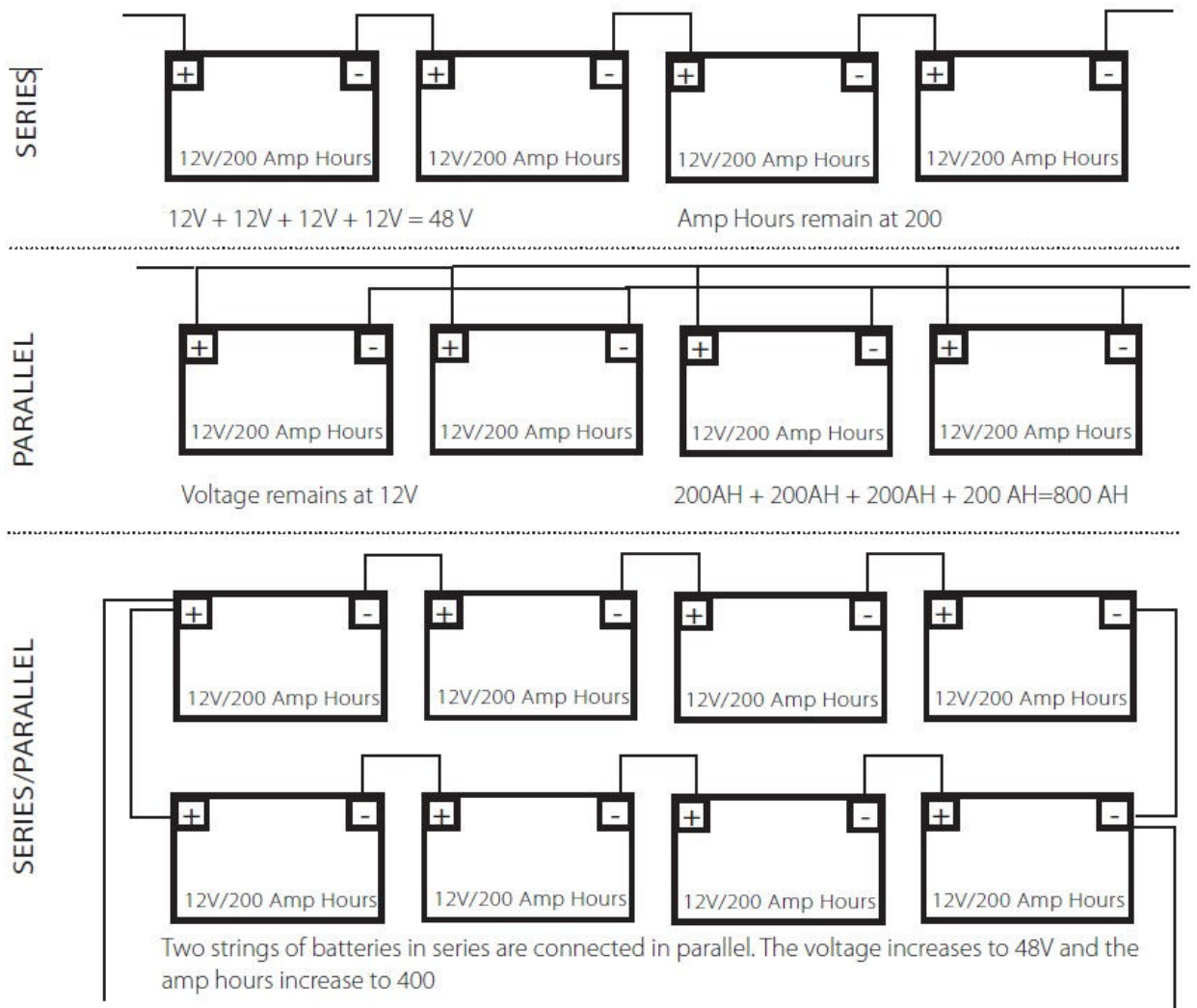
Determine the total watt-hours of energy needed. This is done by multiplying average power consumption in watts by hours of run time. For example: 500 watts for 10 hours = 5000 watt hours. To get an estimate of the maximum current (in amps) that a battery bank must be capable of delivering to the inverter, divide the load watts by ten. For example a 500 watt appliance load will need 50 amps at 12 volts DC. Using the 500 watts (or 50 amps) for 10 hours example as above, then 50 amps is needed for 10 hours. This provides us with the basic amp-hours (AH) of battery that is required. Ten hours at 50 amps equals 500 amp-hours (AH). There are additional factors that determine actual run time. These include:

- AC appliance load and time in use (basic AH).
- Cable gauge and length (cable losses).
- Charge level of the batteries (between use, chargers have to be able to fully charge the batteries).
- Temperature of the batteries (colder batteries provide fewer amps).
- Age and condition of the batteries (older batteries lose AH capacity).
- Compliance with turning off unnecessary AC loads.
- Use of DC appliances and compliance with turning off unnecessary DC loads.

3.3 Battery Wiring Examples

In renewable energy systems, batteries are connected to each other in one of three ways:

- Series (voltage increases, amperage stays the same as a single battery)
- Parallel (voltage stays the same as a single battery, amperage increases)
- Series/Parallel (both voltage and amperage increase)



3.4 Placement of inverter

The location where to install inverter must be:

- A. DRY: Do not allow water to drip or splash onto it.
- B. COOL: Ambient air temperature should be between $0^{\circ}C$ and $40^{\circ}C$ - ideally between $15^{\circ}C$ and $25^{\circ}C$. Do not place the inverter on or near a heating vent or any piece of equipment which is generating heat above room temperature. Do not place the inverter in direct sunlight unnecessarily.
- C. VENTILATED: Allow at least one inch of clearance around the unit for air flow. Do not place items on or over the inverter during operation. Make sure that air is allowed to circulate freely around the unit. A fan is helpful in the case where the inverter is operating at maximum
- D. SAFE: Do not install the inverter in the same compartment as the batteries or in any compartment where flammable liquids or fumes may be or may become present.
- E. DUST: Do not install the inverter in a dusty environments. The dust can be drawn into the unit when the cooling fan is working.
- F. CLOSE TO BATTERIES: Avoid excessive cable lengths. Do not install the inverter in the same compartment as batteries.

3.5 Mounting position of the inverter

The inverter may be mounted on a horizontal or vertical service. Away from heat sensitive materials & flammable items. (Follow All Safety Instructions).

3.6 Connections

Follow the connection sequence described below.

Step 1: Ensure that the ON/OFF switch on the Inverter is in the OFF position. If the power source is a DC power supply, switch it OFF as well.

Step 2: Connect inverter to power source.

Connect the DC cables to the DC battery terminals on the rear panel of the inverter. The red terminal is positive (+) and the black terminal is negative (-). (See Page 5, 2.2B)

Step 3: Connect inverter to appliances.

Make sure the load power within the rated power of inverter and the start power should not exceed the peak power of the inverter.

Step 4: Turn on the inverter 1st, then turn on the appliance you want to run.

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.

4. IMPORTANT SAFETY INSTRUCTIONS

Incorrect installation and misuse of the inverter may result in danger to the user or hazardous conditions.

1. Do not attempt to connect the output to any other power source, including any AC mains.
2. Make sure the opening to the ventilation fan and vent holes are not blocked.
3. Avoid pulling on the cords and cables. Always grip plugs firmly when unplugging from power source and when disconnecting cables.
4. To avoid electrical hazard, be sure to unplug the inverter from its external power source before inserting the AC plug.
5. For indoor use only. Avoid exposure to external heat sources including direct/prolonged sunlight, dust, corrosive chemicals and moisture.
6. It is normal for inverters to become warm during use. Avoid touching the device during use or positioning near heat-sensitive materials.
7. Do not drop or subject the inverter to undue shock.
8. Do not place anything on top of the inverter.
9. The use of improper cables, connectors, or accessories not supplied with this product constitutes misuse and may result in injury or damage.
10. Do not attempt to service or disassemble. The unit is not user-serviceable. Attempting to disassemble or service the unit can result in electrical hazard, including death from High-Voltage electric shock! If you experience problems with the unit, discontinue use and contact a competent Technician or the original place of purchase.
11. When cleaning the inverter, please switch off power & unplug the inverter. Carefully clean with a dry cloth. Do not use wet cloth or cleanser.

12. Disconnect all AC and DC connections before working on any circuits associated with the inverter. Turning the ON/OFF switch on the inverter to off position may not entirely remove dangerous voltage.
13. Keep the Inverter, Batteries & all cabling away from children.

5. PROTECTION FEATURE

This Inverter is equipped with numerous protection features to ensure safe operation.

Input Low Voltage Protection:

A: When battery voltage is below $10.8V \pm 0.2V$ (for 12V input inverter)/ $21.6V \pm 0.4V$ (for 24V input inverter)/ $43.2V \pm 0.8V$ (for 48V input inverter) The **Buzzer will sound 2 times and RED LED will blink 2 times every eight seconds**, which indicates DC power supply voltage is descending and batteries need to recharge.

B: When input voltage is below $10.2V \pm 0.2V$ (for 12V input inverter)/ $20.4V \pm 0.4V$ (for 24V input inverter)/ $40.8V \pm 0.8V$ (for 48V input inverter), The **Buzzer will sound 3 times and RED LED will blink 3 times every eight seconds**; AC output will be automatically shut off.

Input Over Voltage Protection

When input voltage reach $15.5V \pm 0.2V$ (for 12V input inverter)/ $31V \pm 0.4V$ (for 24V input inverter)/ $62V \pm 0.8V$ (for 48V input inverter), The **Buzzer will sound 4 times and RED LED will blink 4 times every eight seconds**; the AC output will be shut off automatically.

Short Circuit Protection

When short circuits occur, **RED LED constantly flashing**; AC output will be shut off.

Overload Protection

When overloads occur, **RED LED constantly flashing**; AC output will be shut off.

Reverse polarity protection: Fuse and/or MOSfet

a. via Fuse: When battery terminals are reverse connected, fuse(s) will be blown to protect appliances.

b. via MOSfet(Optional): When battery terminals are reverse connected, the inverter won't work until the fault is corrected.

Over Temperature Protection

When heat sink temperature exceeds $45^{\circ}C$, the inner cooling fan will automatically turn on to cool the inverter; when Temp drops to less than $30^{\circ}C$, the inner cooling fan will automatically shut off.

When inner temperature exceeds $75^{\circ}C$, The **Buzzer will sound 5 times and RED LED will blink 5 times every eight seconds**; AC output will automatically shut off.

6. TROUBLESHOOTING

TV Interference

You can sometimes get interference on TV & Radio receivers. This may be improved through use of a filter(s) but most problems occur because of Weak Signal to the TV.

On some occasions when there is interference on every station, you can try the following:

- Place the inverter farther from the TV and TV antenna and cable.
- Make sure the Inverter Casing is grounded to the Vehicle Ground(Chassis)
- Try to change the direction of TV signals cable and TV antenna to reduce the interference to minimum.
- Use screened antenna cable of higher quality.

SYMPTOM	POSSIBLE CAUSE	SOLUTIONS
ON/OFF switch is switched on, LED does not light. Buzzer is off. There is no AC voltage	There is no voltage at the DC input Terminals	<ol style="list-style-type: none"> 1. Check the continuity of the battery input circuit 2. Check that the battery fuse is intact. Replace if blown 3. Check that all connections in the battery input circuit are tight
	Polarity of the input voltage has been reversed that has blown the DC side fuses. (Note: Reverse polarity may cause permanent damage)	Correct the polarity of the input connections and replace the fuse. If the unit does not work after replacing the fuse, the unit has been permanently damaged Call Technical Support
Buzzer alarm is sounded 1 time. There is no AC voltage.	<ol style="list-style-type: none"> 1. Loose AC output connections. 2. Short circuit of AC Output wiring. 	<ol style="list-style-type: none"> 1. Tighten AC output connections 2. Check AC wiring for short circuit.
Buzzer sounds 2 times and Red LED blinks 2 times every eight seconds	Voltage at the DC input terminals reads below; $10.8 \pm 0.2 \text{VDC}$ (12V version), $21.6 \pm 0.4 \text{VDC}$ (24V version), $43.2 \pm 0.8 \text{VDC}$ (48V version).	<ol style="list-style-type: none"> 1. Check that the battery is fully charged. Recharge if low. 2. Check that the battery cables are thick enough to carry the required current over the required length. Use thicker cables if required. 3. Tighten connections of the battery input circuit

<p>Buzzer sounds 3 times and Red LED blinks 3 times every eight seconds</p>	<p>Voltage at the DC input terminals reads below; 10.2±0.2VDC(12V version) 20.4±0.4VDC(24V version) 40.8±0.8VDC(48V version)</p>	<ol style="list-style-type: none"> 1. Check that the battery is fully charged. Recharge, if low 2. Check that the battery cables are thick enough to carry the required current over the required length. Use thicker cables, if required 3. Tighten connections of the battery input circuit.
<p>Buzzer sounds 4 times and Red LED blinks 4 times every eight seconds</p>	<p>Higher input DC voltage than 15.5±0.2VDC(12V version), 31±0.4VDC(24V version), 62±0.8VDC(48V version)</p>	<ol style="list-style-type: none"> 1. Check that the voltage at the DC input terminals is more than 15V/30V/60V DC. 2. Ensure that the maximum charging voltage of the battery charger /alternator / solar charge controller is below 15 V/30V/60VDC 3. Ensure that an un-regulated solar panel or wind turbine is not used to charge a battery
<p>Buzzer sounds 5 times and Red LED blinks 5 times every eight seconds</p>	<p>System overheating</p>	<ol style="list-style-type: none"> 1. Check that the fan is working. If not, the fan / fan control circuit may be defective Call Technical Support 2. If the fan is working, check that the ventilation slots on the suction side and the openings on the discharge side of the fan are not obstructed 3. If the fan is working and the openings are not obstructed, check that enough cool replacement air is available. Also check that the ambient air temperature is less than 45° C 4. Reduce the load to reduce the heating effect 5. After the cause of overheating is removed and the unit cools down, it will reset automatically
<p>Red LED constantly flashing</p>	<p>The loads is 200% higher than rated power.</p>	<ol style="list-style-type: none"> 1. Disconnect the load 2. Reduce the load 3. Cool the unit.

7. SPECIFICATIONS – (KS models are not available)

Item		Model					
		TS-300-12/24	KS500P	KS600P	TS-800-12/24	TS-1500-12/24	KS2000P
O U T P U T	Rated Power	300W	500W	600W	800W	1500W	2000W
	Surge Power	120%<Load<150% Rated power for 10s,150%<Load<200% Rated power for 2s					
	AC Voltage	100V/110V/115V/120Vac or 220V/230V/240Vac					
		AC output regulation: 10%					
		Frequency:50Hz±1%					
	Waveform	Pure Sine Wave(THD<3%) at rated input voltage					
Protection	AC short circuit, Overload, Over temperature						
I N P U T	Bat. Voltage Range	10.8V-15.5V(12V version) 21.6V-31V(24V version) 43.2V-62V(48V version)					
	Efficiency	More than 85%					
	Protection	Battery Low Alarm, Battery Low Shutdown, Battery Polarity Reverse by Fuse					
	Battery Types	Open & sealed lead acid battery					
Dimension((L*W*H)cm)		17*15*5.5	21*15*7	21*15*7	37.5*15*7.2	36*22*9	29*22*9
Packing	PCS/CTN	12	6	6	4	2	2
	KGS/CTN	16.5	14.5	15.5	14.5	11.5	13.5
	MEAS(L*W*H)cm	44*42*32	42*34*45	42*34*45	45*34*42	45*31*38	45*31*38
Item		Model					
		TS-2500-12/24	KS3000P	KS4000P	KS5000P	KS600P	
O U T P U T	Rated Power	2500W	3000W	4000W	5000W	6000W	
	Surge Power	120%<Load<150% Rated power for 10s					
		150%<Load<200% Rated power for 2s					
		100V/110V/115V/120Vac or 220V/230V/240Vac					
	AC Voltage	AC output regulation: 10%					
		Frequency:50Hz±1%					
Waveform	Pure Sine Wave(THD<3%) at rated input voltage						
Protection	AC short circuit, Overload, Over temperature						
I N P U T	Bat. Voltage Range	10.8V-15.5V(12V version) 21.6V-31V(24V version) 43.2V-62V(48V version)					
	Efficiency	More than 85%					
	Protection	Battery Low Alarm, Battery Low Shutdown, Battery Polarity Reverse by Fuse					
	Battery Types	Open & sealed lead acid battery					

Dimension((L*W*H)cm		44.5*22*9	36*22*15	41*22*15	36*22*15	36*22*15	
Packing	PCS/CTN	2	1	1	1	1	
	KGS/CTN	15	10.5	11.5	14.5	15	
	MEAS(L*W*H)cm	50*32*36	56*35*26	56*35*26	67*34*24	67*34*24	
AC Out Receptacle		USA, UK, Germany, France, Australia, Brazil, Italy, South Africa, etc.					
Cooling		Temperature and Load Controlled					
Environment	Operating Temperature	-15 ° C to 40° C					
	Storage Temperature	-40 to 85° C					
	Relative Humidity	20% ~ 90% RH non-condensing					

Note: *The specifications are subject to change without prior notice for further improvement of products.

8. MAINTENANCE

To keep your inverter operating properly, there is very little maintenance required. You should clean the exterior periodically with a dry cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

9. WARRANTY

We guarantee this product against defects in materials and workmanship for a period of 12 months from the date of retail purchase by end user.

This warranty will be considered void if the unit has been misused, altered, or accidentally damaged. We are not liable for anything that occurs as a result of the user's fault.

If the warranty period for your product has expired or the unit was damaged by misuse or incorrect installation or if other conditions of the warranty have not been met, or if no dated proof of purchase is available then Costs to repair your unit may be applicable.

FOR TECHNICAL ADVICE OR HELP PLEASE CONTACT:

PH: 07 3219 6655

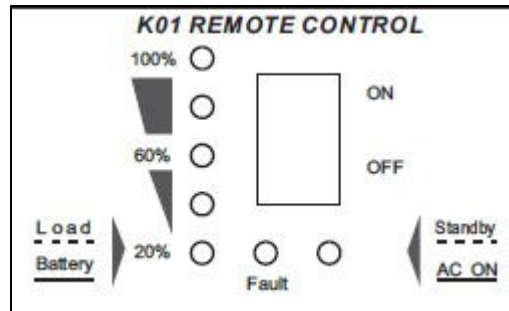
FAX: 07 3219 6644

EMAIL: support@electroparts.com.au

WEB: www.electroparts.com.au

Appendix I: Remote Control

Remote Control Switch



- **Power ON/OFF Switch**

Power ON/OFF switch is to turn the inverter on or off.

- **Battery Capacity/Load Voltage indicator**

Load: Slow flash, 1time per second. Show the approximate connected equipment load level. Five Levels---20%,40%,60%,80%,100%.

Battery: Solid green. Show the battery residual capacity.

Five Levels---20%,40%,60%,80%,100%.

Transfer time(Between Load and battery): Every 8seconds

- **Standby/AC ON Indicator**

Standby: Slow flash, load power is less than 5% of rated power or standby.

AC ON: Solid green. Inverter's output is continuous.

- **Fault:** Turns red to show fault, refer to Troubleshooting of Inverter Manual.

Connecting the Communications Cable

The communications cable is 3meters, 6-conductor cable (wired like a normal telephone-type cable). This cable is connected to the RJ11 jack on the rear of the remote control and to the REMOTE port located on the rear of the inverter.

Notice:

The Inverter's ON/OFF Switch and Remote control's ON/OFF Switch are in parallel.

To use the remote control to turn the Inverter OFF, You must have the inverter's ON/OFF Switch set to OFF. And vice-versa.

Appendix II: Recommendations

For correct operation, the battery voltage should be between $0.9 \times V_{nom}$ and $1.29 \times V_{nom}$ where V_{nom} is 12V, 24V or 48V depending on model, and must be able to supply sufficient current to your inverter. The following table displays the recommended things (battery cable, Fuse, Battery Capacity) per inverter type :

Inverter type	Input Voltage	DC Battery Cable	Fuse	Battery Capacity
300W	12V	4mm ² (1*Red/1*Black)	35A*1	≥50Ah
	24V	2.5mm ² (1*Red/1*Black)	20A*1	≥25Ah
	48V	2.5mm ² (1*Red/1*Black)	10A*1	≥12Ah
500W/600W	12V	6mm ² (1*Red/1*Black)	35A*4	≥100Ah
	24V	4mm ² (1*Red/1*Black)	20A*4	≥50Ah
	48V	2.5mm ² (1*Red/1*Black)	10A*4	≥25Ah
1000W	12V	10mm ² (1*Red/1*Black)	35A*4	≥160 Ah
	24V	6mm ² (1*Red/1*Black)	20A*4	≥80Ah
	48V	4mm ² (1*Red/1*Black)	10A*4	≥40Ah
1500W	12V	10mm ² (2*Red/2*Black)	35A*6	≥250Ah
	24V	6mm ² (2*Red/2*Black)	20A*6	≥125Ah
	48V	4mm ² (2*Red/2*Black)	10A*6	≥60Ah
2000W	12V	16mm ² (2*Red/2*Black)	35A*8	≥320Ah
	24V	10mm ² (2*Red/2*Black)	20A*8	≥160Ah
	48V	6mm ² (2*Red/2*Black)	10A*8	≥80Ah
2500W	12V	16mm ² (2*Red/2*Black)	35A*10	≥400Ah
	24V	10mm ² (2*Red/2*Black)	20A*10	≥200Ah
	48V	6mm ² (2*Red/2*Black)	10A*10	≥100Ah
3000W	12V	16mm ² (2*Red/2*Black)	35A*12	≥480Ah
	24V	10mm ² (2*Red/2*Black)	20A*12	≥240Ah
	48V	6mm ² (2*Red/2*Black)	10A*12	≥120Ah
4000W	12V	25mm ² (2*Red/2*Black)	35A*12	≥640Ah
	24V	16mm ² (2*Red/2*Black)	20A*12	≥320Ah
	48V	10mm ² (2*Red/2*Black)	10A*12	≥160Ah
5000W	12V	35mm ² (2*Red/2*Black)	35A*20	≥800Ah
	24V	25mm ² (2*Red/2*Black)	20A*20	≥400Ah
	48V	16mm ² (2*Red/2*Black)	10A*20	≥200Ah
6000W	12V	35mm ² (2*Red/2*Black)	35A*20	≥960Ah
	24V	25mm ² (2*Red/2*Black)	20A*20	≥480Ah
	48V	16mm ² (2*Red/2*Black)	10A*20	≥240Ah