

Compact Sine Inverter

Instructions for installation & use

Applies to the following models:

Output power:	700watt, 1000 watt, 1500watt, 2000 watt & 3000 watts
Output voltage:	110VAC and 230VAC output, 50Hz & 60Hz
Output frequency:	50Hz & 60Hz
Input voltage:	12VDC & 24VDC input

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1. Important Safety Information

Please read and observe these installation instructions, which contain further safety information.

WARNING: Explosive gasses may be generated by a battery on charge. To prevent ignition, allow time for gasses to disperse before attempting to connect this unit to the supply battery.

1.1 General safety precautions

- Do not expose the inverter to water, mist, snow, road spray, dust, or other contaminants.
- Do not cover or obstruct the ventilation slots; leave at least 50mm clearance
- Do not install the inverter in a sealed compartment as overheating may occur.
- To avoid the risk of fire and electric shock, ensure that all wiring is in good condition and adequately sized to carry the maximum operating currents. Do not operate the Inverter with damaged or substandard wiring.
- In the event of a catastrophic failure, there are some components in the inverter can cause momentary arcs and sparks. To prevent from fire or explosion, do not put batteries, flammable materials, or anything potentially flammable in the immediate vicinity of the inverter.

1.2 Precautions when working with batteries

- If battery acid contacts skin or clothing, wash it out with soap and water immediately.
- If battery acid contacts your eyes, flush with cold running water for at least 20 minutes and seek medical attention immediately.
- Never smoke or expose a flame in the vicinity of the battery or the engine.
- Take care not to drop metal tools onto the battery. The resulting spark or battery short-circuit may cause an explosion.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when operating with a lead-acid batteries. An accidental short circuit can melt metal items and cause burns.

DC power supply cables must be sized to carry the maximum current that the inverter can draw from the DC supply and should be fused at the power source, normally the battery. Further guidance is contained in this manual.

The inverter's AC output is potentially hazardous & protection measures may need to be incorporated in the AC power distribution arrangement. Further guidance is contained in this manual.

2. Features

- Pure sine wave output (THD < 3%)
- Output frequency 50Hz or 60Hz, switch selectable
- Input & output fully isolated
- Auto power saving mode
- High efficiency 89~94%
- Drives poor power factor loads
- Starts high inrush loads
- Tri-colour status lamps
- Speed controlled cooling fan
- Optional remote status & indication panel
- Optional remote control input
- Protected from input low, input high, overload, short circuit, & overheating
- Low battery alarm

3. Installation

Choosing a location

Choose a location where the unit will not be subjected to water spray, dust, or insect ingress. Locations subjected to high temperature or vibration must be avoided if performance and reliability are not to be impaired. The inverter may be mounted in any orientation, but ensure that there is sufficient clearance around the unit to allow air to circulate without undue restriction. Ideally, the unit should be located close to, but not immediately adjacent to, the battery. This is to minimise voltage drop in the DC input leads.

Connections

INCORRECT CONNECTION MAY CAUSE DAMAGE
PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY

Before proceeding, ensure that the inverter front panel switch is in the *Off* position.

EARTHING - The "chassis ground" terminal on the inverter rear panel must be wired to the vehicle chassis (or protective earth if used in a building). Minimum wire size is 6mm² for length up to 1 metre, otherwise 16mm².

DC INPUT - Two DC input bolts are provided on the rear of the unit with the label & moulding colours showing polarity and nominal input voltage. The DC power cables must be connected in the following sequence:

1. Connect both +ve & -ve supply cables to the inverter (red is +ve & black is -ve).
2. Connect the -ve cable to battery -ve.
3. Connect the +ve cable to battery +ve or to the battery fuse +ve. On first contact, this connection will cause a spark, which is normal. **Ensure any battery gases are dispersed before making this connection.**

Cables should be run directly from the inverter studs to the batteries, with a suitable fuse at, or near to the battery positive. In order to minimise feed voltage drop and prevent fire risk, it is essential to use cables capable of handling the high current drawn. If the voltage drop is excessive, the inverter low voltage cut-off may operate prematurely & surge capability will be impaired. The table below gives recommended minimum cable & fuse sizes for typical installations. Note the maximum cable length; longer cables may cause damage to the inverter. Performance will be improved by using larger or shorter cables wherever possible.

A design tool on the Antares website is available for calculating inverter cable sizes & voltage drop, & is accessible at the following URL:

<http://www.antares.co.uk/design-tools.html>

(If you are viewing an electronic version of this document, click above to connect to the design tool)

If you need power cables to be made up for your installation, please contact Antares.

Minimum input cable size & recommended battery supply input fuse:

Note that these are minimum cable sizes; performance will be improved by using larger or shorter cables wherever possible.

Model	Wire size, 2m	Wire size, 2–4m	Wire size, 4-6m	Input fuse
12 volt, 700 watt	16	25	25	100 amp
24 volt, 700 watt	10	10	16	50 amp
12 volt 1000 watt	16	25	35	150 amp
24 volt 1000 watt	10	16	25	75 amp
12 volt 1500 watt	35	50	70	200 amp
24 volt 1500 watt	16	25	35	100 amp
12 volt 2000 watt	50	70	Not recommended	250 amp
24 volt 2000 watt	16	25	35	125 amp
12 volt 3000 watt	95	120	Not recommended	400 amp
24 volt 3000 watt	35	50	70	200 amp

Note: cable length is the total of each of the two cables connecting the inverter to the battery.

Battery stud fuses are available from Antares, please enquire.

REMOTE CONTROL – An RJ11 telephone style connector on the inverter rear panel provides for connection of the remote control module, or combined remote control & display panel, both of which are available as optional accessories. Install information for this panel is provided at the end of this document.

Part numbers are:

Remote control & display panel, 12 volts: 91072
Remote control & display panel, 24 volts: 91073
Remote control module, 12 volt only: 70577, plus loaded software version part no.

Note: The remote control module allows the inverter to be switched on & off remotely, using a 12 volt DC signal. The remote controller response is controlled by its own software, which can be programmed on request to meet the specific needs of the application. At the time of writing, standard variants are:

- i. Ignition controlled
- ii. Ignition controlled, with 10 minute run-on after ignition off.

Please enquire if you would like more details on the options available.

AC OUTPUT - The AC output available at the socket on the front panel may be routed to the point of use using normal mains cabling, extension leads or multiple outlet socket strips. You will need to decide on the need for a residual current detection device at the output, & whether to earth the inverter's neutral or to leave it floating (as supplied).

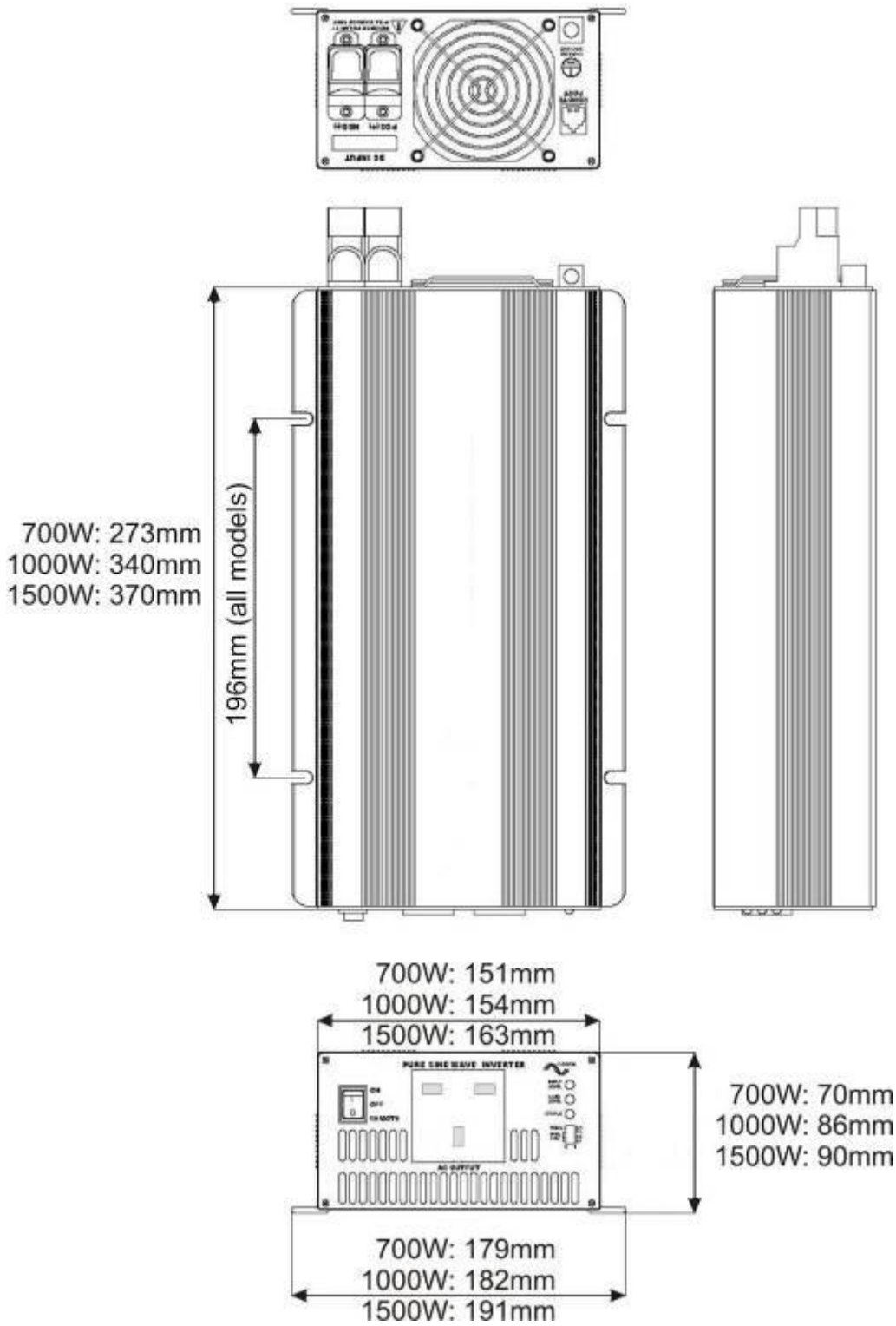
Note: If you have purchased a 110VAC output inverter with US style (NEMA) socket(s), it is normally supplied with an earthed neutral. Please call for guidance if you are unsure of the implications, or use the URL & link above to view the guidance document.

Mounting

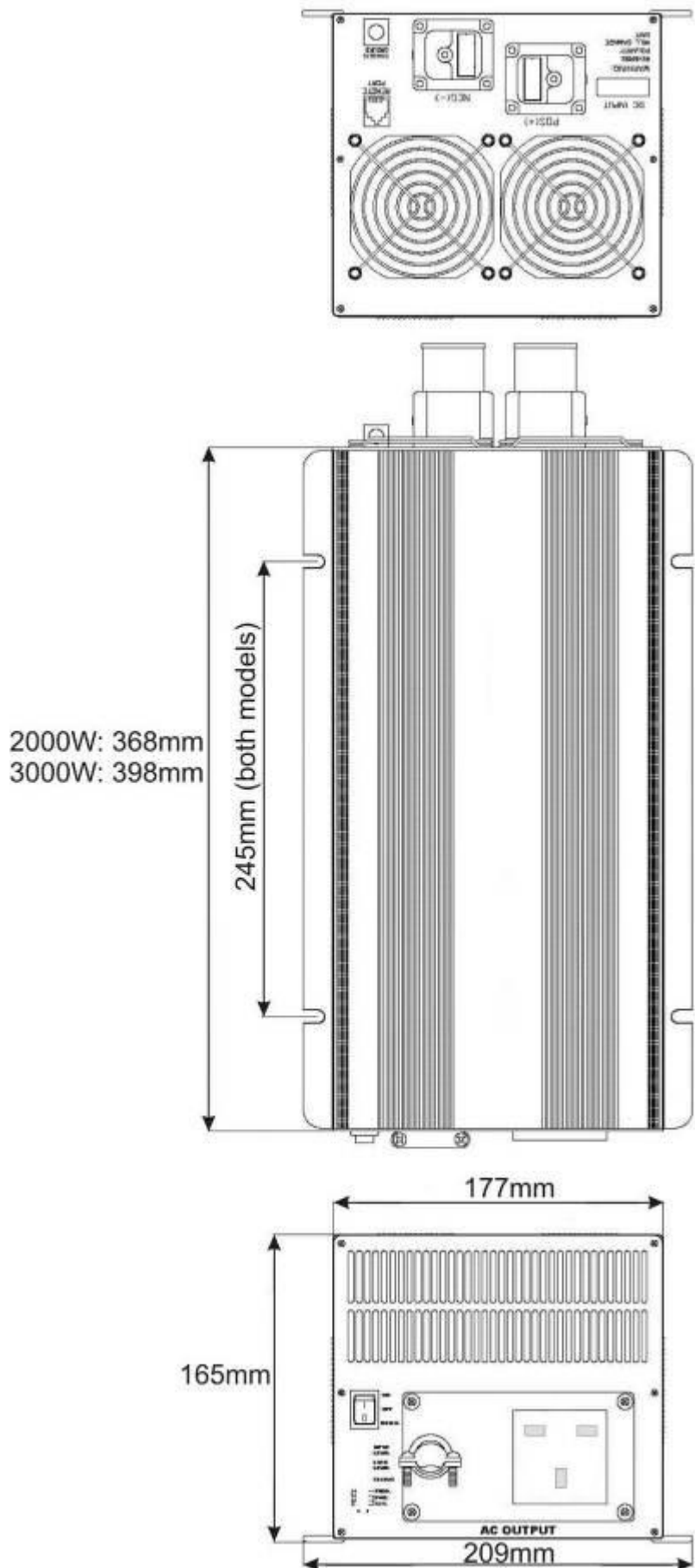
Integral flanges are provided for ease of mounting in situations where the unit needs to be secured to prevent movement, such as in vehicles. Ideally, the mounting should make electrical contact with the vehicle bodywork. The "chassis ground" terminal must be wired to the vehicle chassis or to protective earth if used in a building; see "EARTHING" above

Mounting hole locations are shown below;

700 watt, 1000 watt & 1500 watt models:



2000 watt, & 3000 watt models:



Setup

DIP switches S1 to S4 on the unit front panel set the AC output frequency and the power save mode settings. Set the switches to suit your application as detailed in the tables below. The power figures in the table are the thresholds where the inverter will automatically switch on or off. Note that these figures are approximate and the actual thresholds will depend on the type of load connected.

Power save mode DIP switch settings:

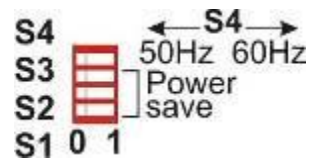
700W	1000W & 1500W	2000W & 3000W	S1	S2	S3
Disabled	Disabled	Disabled	OFF	OFF	OFF
15W	20W	40W	ON	OFF	OFF
25W	40W	80W	OFF	ON	OFF
40W	55W	125W	ON	ON	OFF
50W	75W	170W	OFF	OFF	ON
65W	95W	210W	ON	OFF	ON
75W	115W	245W	OFF	ON	ON
85W	135W	280W	ON	ON	ON

Output frequency DIP switches:

Frequency	S4
50Hz	OFF
60Hz	ON

Switch settings:

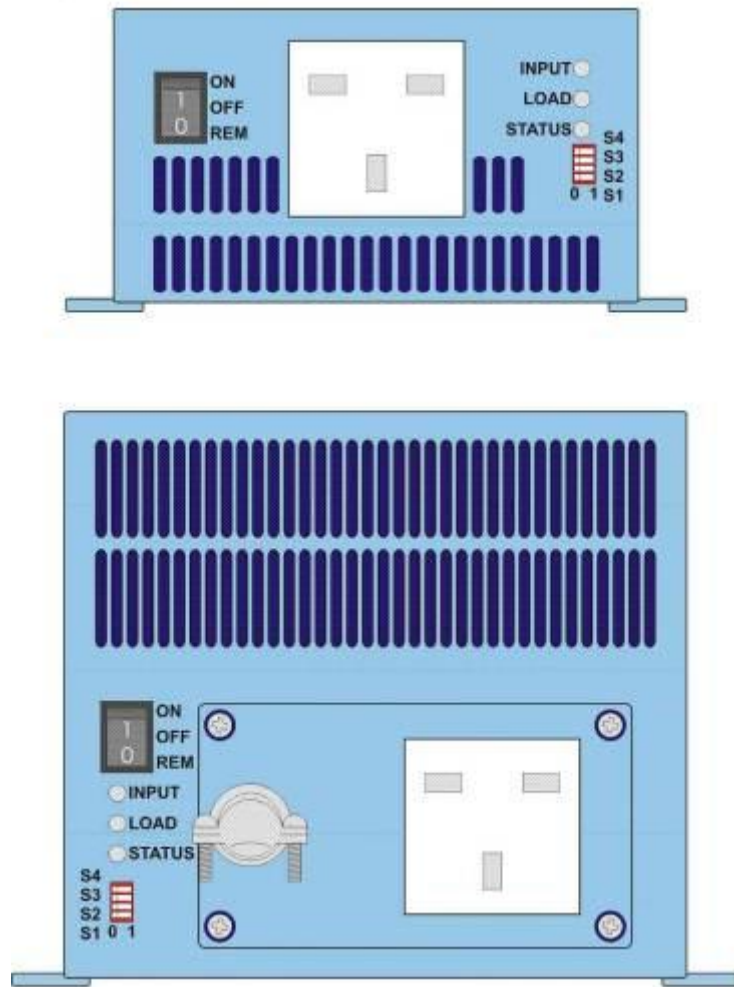
OFF = 0
ON = 1



Powersave mode:

When *powersave mode* is selected by setting the DIP switches to one of the above thresholds, the inverter “pings” the output every few seconds to check any connected load. If the sensed load is above the threshold, the inverter starts up. If the load falls, & remains below the threshold, the inverter shuts down. If you are unsure, the best way to determine the inverter response is to connect the intended load & observe the inverter response. Power draw in no-load & power-save states are listed in the product specification towards the end of this document.

4. Operation



Before using the inverter, check that the DIP switches S1 to S4 have been correctly set – see *Setup* in section 3.

If a remote control or remote panel is being used with the inverter, set the front panel switch to the remote position “REMO.” to allow the remote control to function. The front panel switch can be used in the ON or OFF positions to override the remote control.

The front panel lamps show the inverter status as detailed in the tables below:

INPUT LEVEL indicator:

LED condition	12VDC	24VDC	48VDC
Red, slow flash	10.3~10.6V	20.5~21.2V	40.8~42.4V
Red	10.6~11.0V	21.2~21.8V	42.4~43.5V
Orange	11.0~12.1V	21.8~24.1V	43.5~48.1V
Green	12.1~14.2V	24.1~26.6V	48.1~56.3V
Orange flash	14.2~15.0V	28.6~30.0V	56.3~59.6V
Red flash	over 15V	over 30V	over 59.6V

Note 1: See table below for input voltage shutdown thresholds.

Note 2: These inverters are designed to operate over the following input voltage ranges:







12volt: 10.5 to 15.0VDC
 24 volt: 21.0 to 30.0VDC

NB: 48 volt inverters are available to special order (some are held in stock – please enquire)

LOAD LEVEL indicator:

LED condition	OFF	Green	Orange	Red	Red flash
700W	0~56W	56~230W	230~525W	525~672W	over 672W
1000W	0~80W	80~330W	330~750W	750~960W	over 960W
1500W	0~120W	120~495W	495~1125W	1125~1450W	over 1450W
2000W	0~160W	160~660W	660~1500W	1500~1920W	over 1920W
3000W	0~240W	240~990W	990~2250W	2250~2880W	over 2880W

STATUS indicator:

LED condition	LED flash pattern	Status
Green, continuous		All OK
Green, slow flash		In power saving state
Red, fast flash		Overvoltage
Red, slow flash		Undervoltage
Red, double flash		Overheat
Red, continuous		Overload (shutdown)

Protection thresholds:

Input	DC input voltage thresholds					Overtemperature thresholds			
	Overvoltage		Alarm	Undervoltage		Interior		Heatsink	
	Shutdown	Restart		Shutdown	Restart	Shutdown	Restart	Shutdown	Restart
12V	15.3V	14.3V	11.0V	10.2V	12.7V	70°C	45°C	90°C	60°C
24V	30.6V	28.8V	22.0V	20.3V	25.2V				
48V	61.0V	58.1V	44.0V	40.8V	49.7V				

Note: These inverters are designed to operate over the following input voltage ranges:

12volt: 10.5 to 15.0VDC
 24 volt: 21.0 to 30.0VDC

5. Specifications

700 watt models:

Parameter	12VDC 110VAC	24VDC 110VAC	12VDC 230VAC	24VDC 230VAC
Continuous output	700 watts			
Maximum output	770 watts			
Maximum surge load	1400 watts			
Frequency stability	50Hz or 60Hz, $\pm 0.05\%$			
Waveform	Pure sine wave, THD less than 3% on resistive load			
Efficiency, up to:	89%	91%	91%	93%
No load input current	1.25A max	0.64A max	1.2A max	0.6A max
Power-save input current	0.25A max	0.15A max	0.25A max	0.15A max
Safety compliance	UL458		CE: EN60950-1	
EMC compliance	FCC class A		CE e13 022986	
Operating temperature	0 to 40°C, see also protection thresholds above			
Mass	2.7kg			

1000 watt models

Parameter	12VDC 110VAC	24VDC 110VAC	12VDC 230VAC	24VDC 230VAC
Continuous output	1000 watts			
Maximum output	1100 watts			
Maximum surge load	2000 watts			
Frequency stability	50Hz or 60Hz, $\pm 0.05\%$			
Waveform	Pure sine wave, THD less than 3% on resistive load			
Efficiency, up to:	89%	92%	91%	94%
No load input current	1.43A max	0.75A max	1.25A max	0.65A max
Power-save input current	0.25A max	0.15A max	0.25A max	0.15A max
Safety compliance	UL458		CE: EN60950-1	
EMC compliance	FCC class A		CE e13 022694	
Operating temperature	0 to 40°C, see also protection thresholds above			
Mass	4kg			

1500 watt models

Parameter	12VDC 110VAC	24VDC 110VAC	12VDC 230VAC	24VDC 230VAC
Continuous output	1500 watts			
Maximum output	1650 watts			
Maximum surge load	3000 watts			
Frequency stability	50Hz or 60Hz, $\pm 0.05\%$			
Waveform	Pure sine wave, THD less than 3% on resistive load			
Efficiency, up to:	89%	91%	91%	93%
No load input current	1.45A max	0.75A max	1.4A max	0.7A max
Power-save input current	0.28A max	0.15A max	0.28A max	0.15A max
Safety compliance	UL458		CE: EN60950-1	
EMC compliance	FCC class A		CE e13 022876	
Operating temperature	0 to 40°C, see also protection thresholds above			
Weight	4.8kg			

2000 watt models

Parameter	12VDC 110VAC	24VDC 110VAC	12VDC 230VAC	24VDC 230VAC
Continuous output	2000 watts			
Maximum output	2200 watts			
Maximum surge load	4000 watts			
Frequency stability	50Hz or 60Hz, $\pm 0.05\%$			
Waveform	Pure sine wave, THD less than 3% on resistive load			
Efficiency, up to:	89%	92%	91%	94%
No load input current	2.8A max	1.5A max	2.64A max	1.32A max
Power-save input current	0.6A max	0.3A max	0.6A max	0.25A max
Safety compliance	UL458		CE: EN60950-1	
EMC compliance	FCC class A		CE e13 022846	
Operating temperature	0 to 40°C, see also protection thresholds above			
Weight	9kg			

3000 watt models

Parameter	12VDC 110VAC	24VDC 110VAC	12VDC 230VAC	24VDC 230VAC
Continuous output	3000 watts			
Maximum output	3300 watts			
Maximum surge load	6000 watts			
Frequency stability	50Hz or 60Hz, $\pm 0.05\%$			
Waveform	Pure sine wave, THD less than 3% on resistive load			
Efficiency, up to:	89%	92%	91%	94%
No load input current	3.0A max	1.6A max	2.8A max	1.5A max
Power-save input current	0.55A max	0.35A max	0.55A max	0.3A max
Safety compliance	UL458		CE: EN60950-1	
EMC compliance	FCC class A		CE e13 022845	
Operating temperature	0 to 40°C, see also protection thresholds above			
Weight	9.8kg			

Notes on surge load ratings

The inverter will attempt to start a load which attempts to draw power up to the inverter's surge rating. A higher load may cause the inverter to shut down.

During an attempted surge load start, the inverter will automatically reduce its output voltage to limit the delivered power to the inverter's maximum rating. In such applications, you should ensure that any other connected AC loads can cope with this supply dip. If the surge load demand does not fall within the inverter's ratings within a few seconds, then the inverter may shut down.

Tungsten lamps can normally be started without difficulty.

Electric motors may prove problematic, as their start-up load demand can be 3 to 6 times their running current. This implies that the inverter must be substantially oversized in order to start motor loads. However, the introduction of a soft start unit to the motor supply can dramatically alleviate such start-up problems. Consult Antares for assistance if you are anticipating motor loads on the inverter.

6. Optional remote control & status panel - remote control units 91072 & 91073:

The inverter can be electrically controlled through the use of JP1 and the AUX blade connector on the rear of the unit.

Note: The rear panel must be removed to gain access to JP1 – see the leaflet that comes with the panel for location diagram.

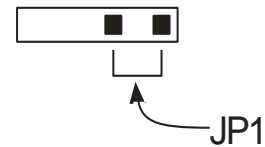
The default is for JP1 pins to be O/C (open circuit; not connected).

We do not recommend the use of the AUX connection with the jumper in this position; see below:

Pins:



With JP1 Connecting the two pins together Remote on/off control wire option



With JP1 in this position, the AUX blade is used to control the inverter on-off. When using the AUX blade, we do not recommend using the remote panel's ON/OFF switch except in emergency situations, see below for more details.

The AUX blade terminal responds as follows:

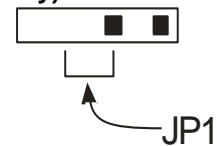
When AUX is high (+12V) the inverter will be ON.

When AUX is not connected, the inverter will resume normal mode of operation.

Notes:

1. If the Aux pin is not being used (or not connected) the remote panel will function normally.

With JP1 Not connecting the two pins together Output inhibit control wire option (recommended for specialist operation only)



With JP1 in this position, the AUX pin can be used to inhibit the inverter output (not on/off). When using the AUX blade, we do not recommend using the remote panel's ON/OFF switch except in emergency situations, see below for more details.

The AUX blade terminal responds as follows:

When AUX is taken high (+12V) the inverter output will switch off.

When AUX is not connected, the inverter will resume normal mode of operation.

Notes:

1. If the AUX pin is high, this will not prevent the inverter from being switched on. Only the process of taking the AUX pin high whilst the inverter is running will inhibit the output. When the AUX pin is disconnected the inverter will resume its last mode of operation.
2. If the Aux pin is not being used (or not connected) the remote panel will function normally.

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