

Pure Sine Wave Inverter

Instructions

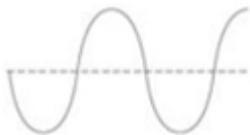
Retain these instructions for future reference



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1. Overview

The Pure Sine Wave (PSW) inverter provides a 230V supply which closely replicates the domestic mains supply. This makes it ideal for powering more sensitive equipment which may not be compatible with traditional Modified Sine Wave (MSW) inverters.



Pure Sine Wave (PSW)

2. Contents



Protective covers
(1000, 2000, 3000W models only)

3. Optional Parts



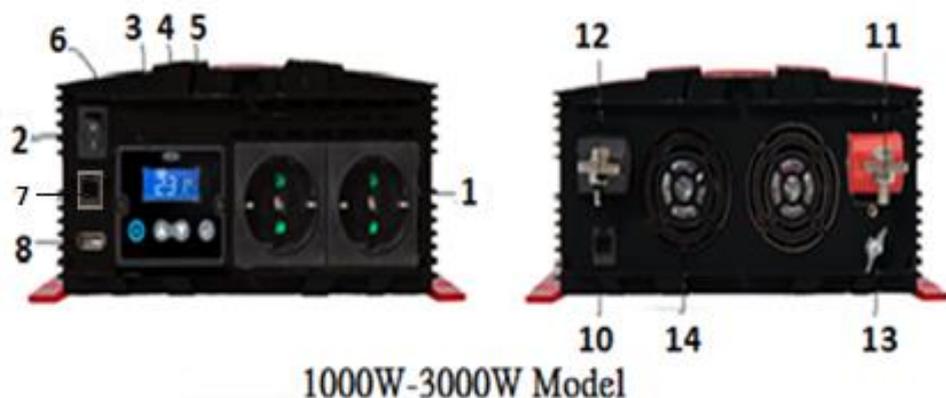
LCD Frame kit
For 1000~2500W



LCD Display & Frame kit
For 600W



Current Sensor kit
For 600~3000W



1-Mains 230V AC outlets(s)

2-Power on/off switch

3-Power indicator

4-Over load indicator

5-Over temperature indicator

*only fitted on 1000W~3000W

6-LCD display*

7-Comms port (RJ-11)

8-USB port (2.1A)

9-Display port(RJ-11)**

10-Sensor port (RJ-11)

11-Battery positive (+)

12-Battery negative(-)

13-Earth connection

14-Cooling fan(s)

** Display port is behind LCD display on 1000W-3000W models.



CAUTION

There may be sparks produced when making battery connections, ensure no flammable materials are present. Incorrect connection of cables to the battery (reverse polarity) may damage the unit and is not covered by the warranty.

Single Battery System

cables

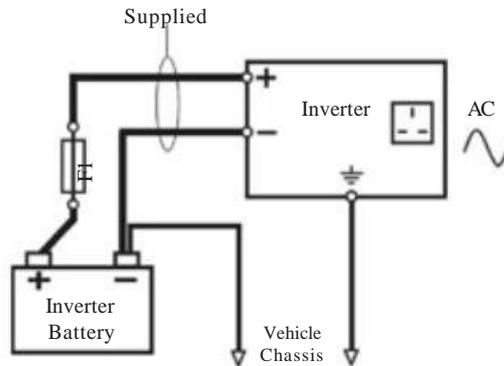


Fig1 – Example single battery system

Dual Battery System

For heavy duty applications a secondary battery can be fitted to increase the inverter running time. An additional relay may also be fitted to allow this battery to be charged from the vehicle alternator when the vehicle engine is running, Fig2 shows an example installation.

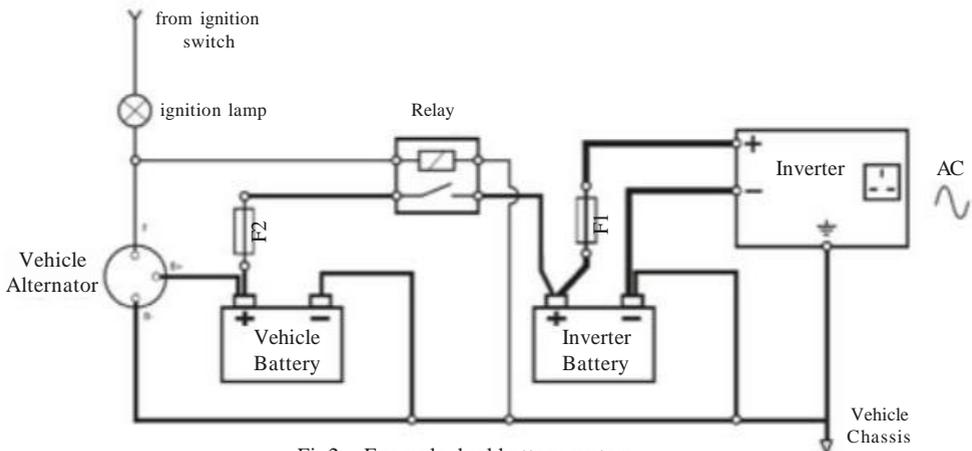


Fig2 – Example dual battery system

Earth Connection

Ensure the inverter is earthed by connecting a cable from the inverter earthing bolt N to a suitable earth within the installation (normally the vehicle chassis).

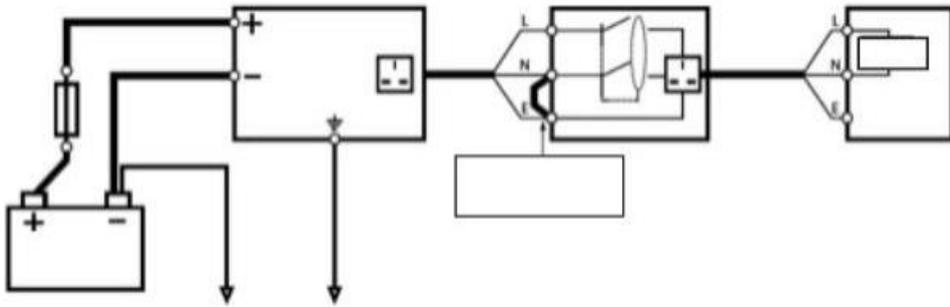


Fig3 – Example RCD installation



CAUTION

It is recommended the inverter is wired and tested by a qualified electrician

Remote Mounting LCD Display (1000/2000/3000W Models)

For installations where the inverter may be inaccessible, the LCD display can be removed from the inverter and mounted remotely using the optional LCD Frame Kit

1. Ensure that the inverter power on/off switch is in the OFF (0) position.
2. Remove 2 x screws holding LCD in position
3. Pull LCD forwards and unclip data connector from circuit board
4. Connect 6 metre extension lead to circuit board
5. Fit blanking plate and fix with 2 x screws, a slot is provided for cable to exit
6. Fix LCD into mounting frame using 2 x screws
7. Fit frame where display is required and attach 6 metre cable to rear
8. Snap fit endplates to cover screw fixings
9. Turn the power on/off switch to the ON (I) position.
10. Inverter can now be controlled remotely from the LCD display

Adding an LCD Display (600W Model)

An LCD display can also be added to models without this function by using the optional LCD Display & Frame Kit

1. Connect 6 metre extension lead to display port J on inverter
2. Fit frame where display is required and attach 6 metre cable to rear
3. Snap fit endplates to cover screw fixings
4. Turn the power on/off switch to the ON (I) position.
5. Inverter can now be controlled remotely from the LCD display

Current Sensor Installation (optional)

To enable monitoring of the input current and hours remaining function, the optional current sensor should be fitted as shown in Fig4

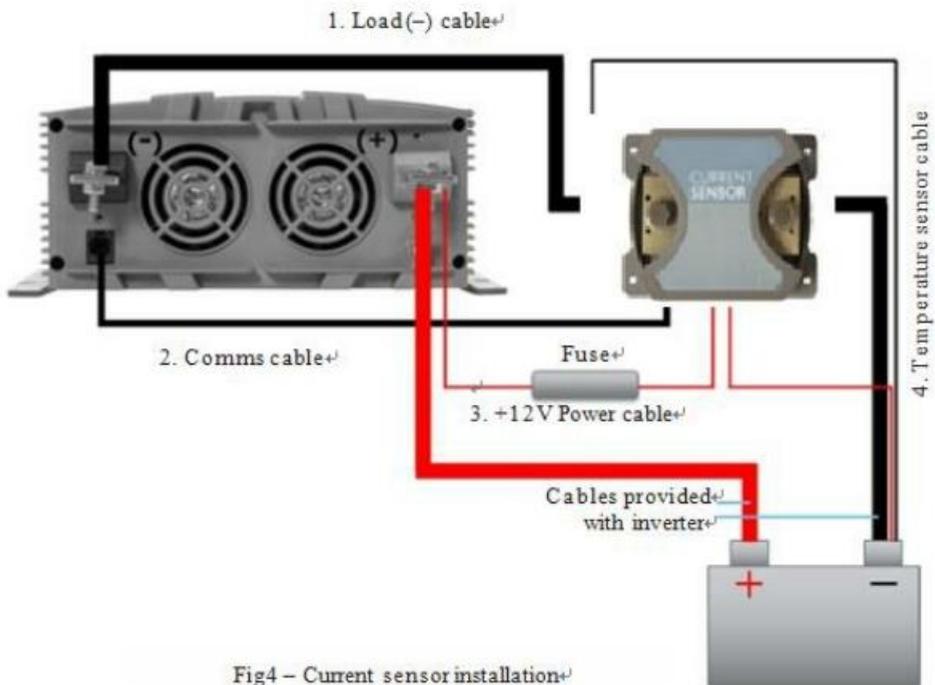


Fig4 – Current sensor installation

1. Using black battery cable supplied with inverter, attach one end to battery(-) terminal and other end to batt(-) terminal on Current Sensor
2. Using red battery cable supplied with inverter, attach one end to battery(+) terminal and other end to inverter(+) terminal
3. Now connect cables 1-4 (supplied with current sensor) as shown in Fig4

- | | |
|-------------------------------|--|
| 1 - Load(-) cable, | negative connection from inverter to sensor
Use 1x4AWG cable for 600/1000W models
Use 2x2AWG cable for 2000/3000W models |
| 2 - Comms cable, | data connection from sensor port K on inverter to current sensor |
| 3 - +12V Power cable, | 12V power supply to sensor |
| 4 - Temperature sensor cable, | temperature compensation for a more accurate current reading |

5. General Information

Continuous & Surge Power

A Continuous rating is the amount of power the inverter can handle for a number of hours without overloading. The Surge rating is a brief burst of power the inverter can provide to help start certain types of load.

Loads Requiring Surge Power

The power rating shown on most electrical appliances is a continuous rating but some appliances require up to five times this power for a brief period in order to start operating. This needs to be considered when rating the inverter to avoid overloading it.

When using a microwave oven it should also be noted that the electrical power required from the supply is around 50% higher than the actual cooking power of the microwave.

Example Appliance	Typical Rated Power	Typical Surge Power Required (<1 sec)
Electric Drill	500W	1000W
800W Microwave Oven	1200W	2400W
Angle Grinder	900W	2700W
Portable Air Compressor	200W	700W
Laser Printer	500W	2500W

6. Operation

Switching On

1. Ensure that the inverter power on/off switch is in the OFF (0) position.
2. Plug the appliance into the AC output socket on the inverter, ensuring it does not exceed the maximum output power of the inverter
3. Turn the power on/off switch to the ON (I) position.
4. The Power indicator will illuminate green and mains power will be available from the AC output socket(s). On models fitted with a display the LCD screen will also illuminate.

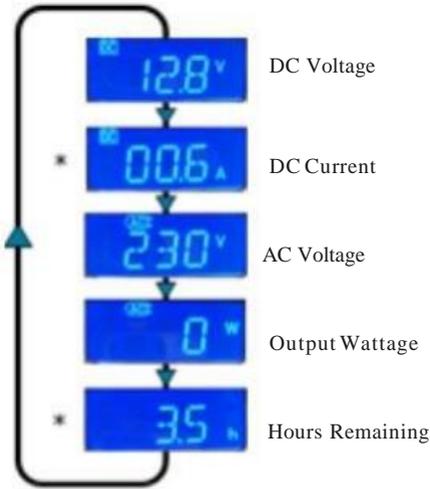
7. LCD Display & Indicators

Where fitted the LCD display provides additional information to help monitor and manage power from the inverter.



Information Mode

Various information modes are available by pressing  to move forward or backwards through the screens.



DC Voltage	Input voltage available from the battery supply.
DC Current	Input current being used from the battery supply in order to power the load. *The optional Current Sensor must be fitted to enable measurement of input current.
AC Voltage	Output voltage available from the AC outlets.
Output Wattage	Output power being consumed by the connected loads.
Hours Remaining	An estimate of time remaining before the battery will be depleted based on the current load. *The optional Current Sensor must be fitted to enable measurement of hours remaining.

Setup Mode

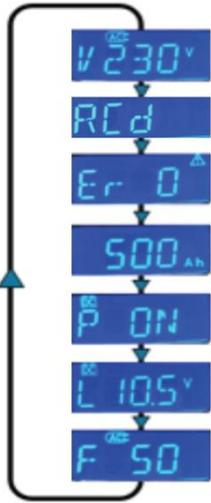
The inverter can be configured by entering the setup mode

To enter Setup Mode press & hold \leftarrow key

Press \blacktriangle \blacktriangledown keys to select item then press \leftarrow , chosen setting will then flash

Adjust setting using \blacktriangle \blacktriangledown then press \leftarrow to set

Press and hold \leftarrow key to exit back to **Information Mode**



	Setting	Default
Output Voltage	200/220/230/240V	230V
RCD Test	N/A	N/A
Last Error Code	N/A	N/A
Battery Size	90 – 540Ah (in 30Ah steps)	90Ah
Power Saving Mode	ON/OFF	ON
Low Voltage Cut-off	9.5 – 11.0V (in 0.5V steps)	10.0V
Output Frequency	50/60Hz	50Hz

- Output Voltage** Sets the AC output voltage. Only change if the application requires a different voltage for optimum performance
- Last Error Code** Allows the last error code to be viewed
- Battery Size** Sets the Ah rating of the battery supplying the inverter. The value is used when calculating input current and hours remaining in conjunction with the Current Sensor
- Power Saving Mode** If the inverter does not detect a load for 10 minutes it will enter a sleep mode to reduce drain on the battery. In this mode the power indicator will flash green
- Low Voltage Cut-Off** Sets the voltage at which the inverter will switch off should the input voltage become too low
- Output Frequency** Sets the output frequency of the inverter. Only change if the application requires a different frequency for optimum performance
- RCD Test** Tests the earth leakage protection function is working correctly. This test should be carried out at least every three months.

Indicator & Error modes

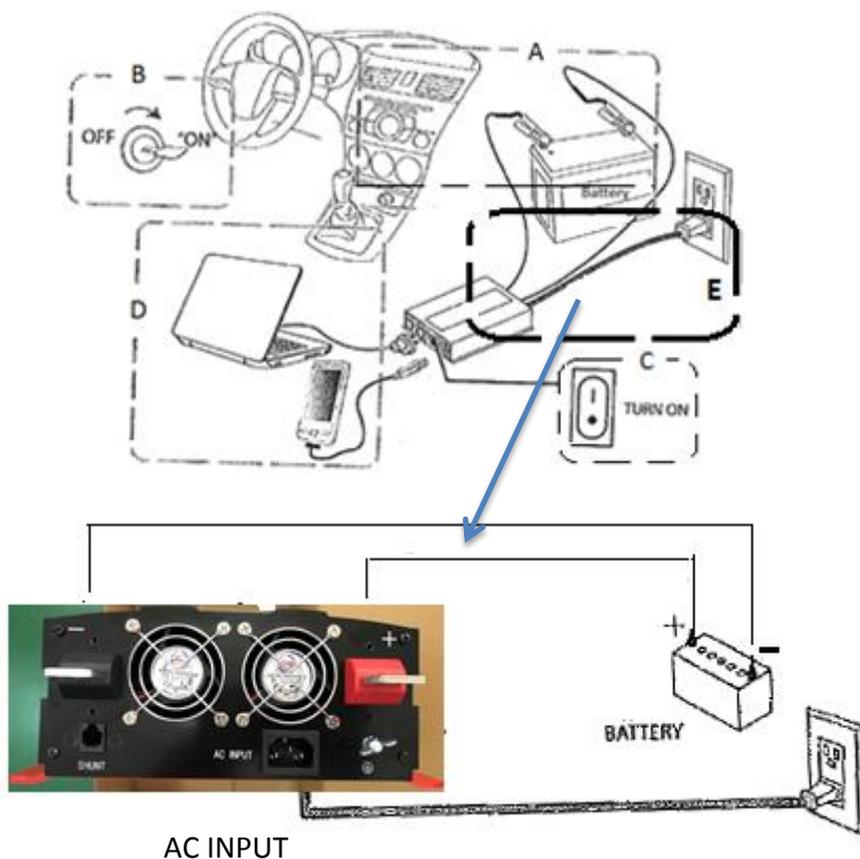
-  **Power** Illuminates green to show the unit is switched on and power is available from the AC output socket(s)
-  **Overload** Illuminates red if the units has been overloaded due to excessive current or a short circuit
-  **Over Temperature** Illuminates yellow if the unit has overheated
-  **Audible Alarm** An alarm sound will be heard if the unit has switched off due to a fault

Error code	Description	LEDs   	Inverter Status	Action
-	Normal operation	  	ON	None
	Battery low voltage warning	  	ON	Check for low battery voltage Check cable connections are not loose Reduce load to extend battery life
	Battery low voltage shutdown	  	OFF	Switch inverter off, recharge battery then switch back on
	Battery high voltage shutdown	  	OFF	Check battery voltage is correct for inverter model e.g. 24volt battery for a 24volt inverter
	Overload shutdown	  	OFF	Total load exceeded continuous rating Startup current exceeded surge rating Appliance short circuit fault
	Over temperature shutdown	  	OFF	Check for adequate ventilation around inverter Check inverter cooling fans are working
	RCD tripped	  	OFF	Earth fault detected, switch inverter off and check all appliances and wiring before switching back on
-	Power saving mode	  	SLEEP	None

AC transfer function : In front panel “AC INPUT” is connected, the unit will switch to external current supply automatically. The power discharge from the battery will be stopped. This state will be indicated by 3 (Green-Red-Yellow) light-emitting diode (LED), Flash every 2 seconds. As long as mains voltage is supplied, the inverter can not be restarted.

AC transfer time < 0.1s

Inverter will start SLEEP MODE in 10 min.



Description	LEDs 	Inverter Status	Action
Operate with external current supply (country current)		ON  SLEEP	Flash / every 2 seconds

Earth Leakage Protection

To provide protection in the event of a fault, the 230V outlets on this inverter are protected by an integral Residual Current Device (RCD). Should a fault occur the inverter will switch off to protect all connected circuits and display an error code.

Note: The RCD function must be tested at least every three months to ensure it trips correctly, this can be done in two ways:-

i) Enter Setup Mode > RCD > Press 8 key

ii) From Information Mode, press and hold  or  key for 3 seconds

If the RCD function is OK, the inverter will trip and **PASS** will be displayed.

If RCD does not trip correctly **FAIL** will be displayed, if this happens the inverter should not be used until it has been checked by a qualified electrician.

RCD Tripping current: 30 mA

Error code	Description	LEDs   	Inverter Status	Action
	RCD tripped	  	OFF	Earth fault detected, switch inverter off and check all appliances and wiring before switching back on

10. Specifications

Part No.	PSW 600		PSW 1000	
	12V	24V	12V	24V
Cont Power Rating (up to 12 hrs)	600 watts		1000 watts	
Peak Power Rating (up to 200ms)	1200 watts		2000 watts	
Output Voltage	200/220/230/240V AC $\pm 10\%$		200/220/230/240V AC $\pm 10\%$	
Output Frequency	50/60Hz		50/60Hz	
Output Waveform	Pure Sine Wave		Pure Sine Wave	
Input Voltage Range	9.5V – 16.5V	19V – 33V	9.5V – 16.5V	19V – 33V
	(12V nom)	(24V nom)	(12V nom)	(24V nom)
Input Current	59amps (max)	29.5 amps (max)	98amps (max)	49amps (max)
Efficiency @ 75% load	90%		90%	
No Load Current	< 1.5amp	< 1.1amp	< 1.6amp	< 1.1amp
Power Saving Mode	Yes		Yes	
Power Saving Mode Current	< 0.2amp		< 0.2amp	
Low Battery Alarm	10.0V-11.5V	20.0V-23.0V	10.0V-11.5V	20.0V-23.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Low Battery Shutdown	9.5V-11.0V	19.0V-22.0V	9.5V-11.0V	19.0V-22.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Thermal Protection	60 \pm 10°C		60 \pm 10°C	
USB Port	2.1 amp		2.1amp	
Display Panel Port	Yes		Yes	
Current Sensor Port	Yes		Yes	
Comms Port	Yes		Yes	
Dimensions (LxWxH) mm	330*170*81.5		355*247*118.5	
Weight	3.3 kgs		5.0 kgs	

Part No.	PSW 1500		PSW 2000	
	12V	24V	12V	24V
Cont Power Rating (up to 12 hrs)	1500 watts		2000 watts	
Peak Power Rating (up to 200ms)	3000 watts		4000 watts	
Output Voltage	200/220/230/240V AC $\pm 10\%$		200/220/230/240V AC $\pm 10\%$	
Output Frequency	50/60Hz		50/60Hz	
Output Waveform	Pure Sine Wave		Pure Sine Wave	
Input Voltage Range	9.5V – 16.5V	19V – 33V	9.5V – 16.5V	19V – 33V
	(12V nom)	(24V nom)	(12V nom)	(24V nom)
Input Current	147 amps (max)	73.5 amps (max)	196amps (max)	98amps (max)
Efficiency @ 75% load	90%		90%	
No Load Current	<1.8 amp	< 1.3 amp	< 2.0amp	1.5amp
Power Saving Mode	Yes		Yes	
Power Saving Mode Current	< 0.2amp		< 0.2amp	
Low Battery Alarm	10.0V-11.5V	20.0V-23.0V	10.0V-11.5V	20.0V-23.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Low Battery Shutdown	9.5V-11.0V	19.0V-22.0V	9.5V-11.0V	19.0V-22.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Thermal Protection	60 \pm 10°C		60 \pm 10°C	
USB Port	2.1amp		2.1amp	
Display Panel Port	Yes		Yes	
Current Sensor Port	Yes		Yes	
Comms Port	Yes		Yes	
Dimensions (LxWxH) mm	375 * 247 * 118.5		425 * 247 * 118.5	
Weight	5.6 kgs		6.6kgs	

Part No.	PSW 2500		PSW 3000	
Voltage	12V	24V	12V	24V
Cont Power Rating (up to 12 hrs)	2500 watts		3000 watts	
Peak Power Rating (up to 200ms)	5000 watts		6000 watts	
Output Voltage	200/220/230/240V AC $\pm 10\%$		200/220/230/240V AC $\pm 10\%$	
Output Frequency	50/60Hz		50/60Hz	
Output Waveform	Pure Sine Wave		Pure Sine Wave	
Input Voltage Range	9.5V – 16.5V	19V – 33V	9.5V – 16.5V	19V – 33V
	(12V nom)	(24V nom)	(12V nom)	(24V nom)
Input Current	245amps (max)	122amps (max)	294amps (max)	147amps (max)
Efficiency @ 75% load	90%		90%	
No Load Current	< 2.0amp	1.8amp	< 3.0amp	< 2.8amp
Power Saving Mode	Yes		Yes	
Power Saving Mode Current	< 0.2amp		< 0.2amp	
Low Battery Alarm	10.0V-11.5V	20.0V-23.0V	10.0V-11.5V	20.0V-23.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Low Battery Shutdown	9.5V-11.0V	19.0V-22.0V	9.5V-11.0V	9.5V-11.0V
	± 0.5 volt	± 0.5 volt	± 0.5 volt	± 0.5 volt
Thermal Protection	$60 \pm 10^{\circ}\text{C}$		$60 \pm 10^{\circ}\text{C}$	
USB Port	2.1amp		2.1amp	
Display Panel Port	Yes		Yes	
Current Sensor Port	Yes		Yes	
Comms Port	Yes		Yes	
Dimensions (LxWxH) mm	455 * 247* 118.5		545*247*118.5	
Weight	7.3 kgs		8.8 kgs	