



# TorTech

Total Transformer Solutions ABN. 36 003 233 350

TORTECH Pty Ltd  
4/31 Wentworth St Greenacre NSW 2190  
Po Box 194 Nth Strathfield NSW 2137  
Tel: (02) 9642 6003 Fax: (02) 9642 6127  
Email: enquiries@tortech.com.au  
Website: www.tortech.com.au

## TPS Solar Inverter Specification & Manual

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# 1 TPS Features



- Advanced Topology with DSP (Digital Signal Processor) Control
- N+X redundancy function optional
- High power density with extraordinary reliability and performance
- Input/output isolated design, improved safety
- “All master” dynamic mechanism eliminate single point failure to optimize reliability
- Pure sine wave output (THD < 3%) for harsh environment and various equipments
- Output frequency: 50 / 60Hz switch selectable
- Low power “Power Saving Mode” to conserve energy
- Capable of driving highly inductive & capacitive loads at start moment.
- LED indicators give informative displays of operating status
- Various Protections: Input low voltage / Overload / Short circuit / Low battery alarm / Input over voltage / Over temperature

## Application:

**Power tools:** Circular saws, Drills, Grinders, Sanders, Buffers, Weed and hedge trimmers, Air compressors.

**Office equipment:** Computers, Printers, Monitors, Facsimile machines, Scanner.

**Household items:** Vacuum cleaners, Fans, Fluorescent and incandescent lights, Shavers, Sewing machines.

**Kitchen appliances:** Coffee makers, Blenders, Ice makers, Toasters.

**Industrial equipment:** Metal halide lamp, High – pressure sodium lamp.

**Home entertainment electronics:** Television, VCRs, Video games, Stereos, Musical instruments, Satellite equipment.

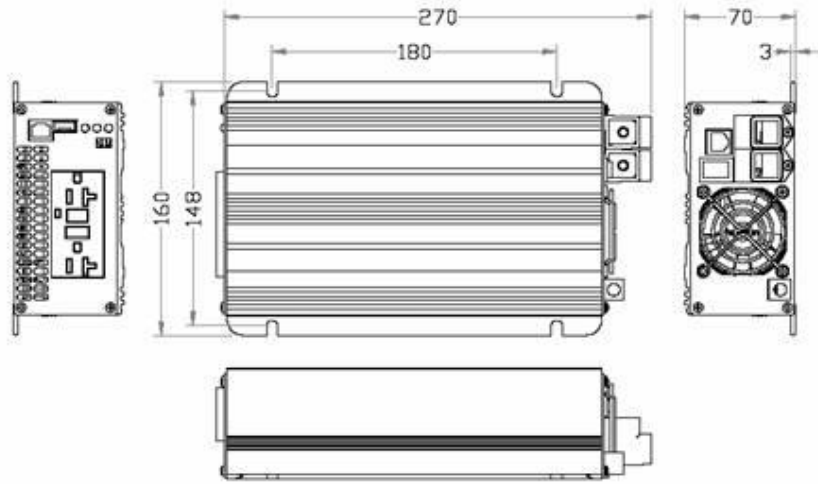
## 2 TPS Technical Specification

Specification	Model No.										
Item	TPS 0612	TPS 1012	TPS 1024	TPS 2012/24	TPS 3012/24	TPS 0612E	TPS 1012E	TPS 1024E	TPS 2012/24E	TPS 3012/24E	
<b>Input</b>											
Nominal voltage	12Vdc										
Operating range	10Vdc ~ 15Vdc										
Startup voltage	11.75Vdc										
<b>Output</b>											
Output Waveform	Pure sine wave										
Output Power	600W	1000W	1500W	2000W	3000W	600W	1000W	1500W	2000W	3000W	
Surge Rating	2* P <sub>rated</sub>										
Nominal Output Voltage	110 / 115 / 120Vac					220 / 230 / 240Vac					
Output Voltage Regulation	± 5%										
Output Frequency	50/60Hz ± 0.1%(Freq Switchable)										
Output Current @ 220/230/240						2.73A / 2.61A / 2.50A	4.55A / 4.35A / 4.17A	6.825A / 6.525A / 6.255A	9.10A / 8.70A / 8.34A	13.65A / 13.05A / 12.51A	
Output Current @ 110/115/120	5.45A / 5.22A / 5A	9.09A / 8.70A / 8.33A	13.64A / 13.04A / 12.5A	18.18A / 17.39A / 16.67A	27.28A / 26.09A / 25A						
Crest factor	3:1										
THD	<3%, linear load; <5%, non-linear load; <10% (when battery lower than pre-alarm level) Note: non-linear load condition: P.F.>0.7										
Peak Output Current @ 220/230/240	---					5.46A / 5.22A / 5.00A	9.10A / 8.70A / 8.34A	13.65A / 13.05A / 12.5A	18.20A / 17.40A / 16.68A	27.3A / 26.1A / 25.02A	
Peak Output Current @ 110/115/120	10.92A / 10.44A / 10A	18.2A / 17.4A / 16.68A	27.3A / 26.1A / 25A	36.4A / 34.8A / 33.36A	54.6A / 52.2A / 50.04A	---					
Efficiency	>88% (typical), 90% (peak)					>90% (typical), 92% (peak)					
No load Current Draw	<12W			<20W			<12W			<20W	
Stand-by Current Draw	<6W			<10W			<6W			<10W	
Over load protection	Refer to Sec.3.9 and Sec.3.10										
<b>Environmental</b>											
Noise	<50 dB										
Operating temperature	Operation temperature: -20 to +70°C -5 to +40 °C with full performance.										
Storage temperature	-30 ~ 70°C										
Operating humidity	90% RH (no condense)										
Operating Attitude	1500m										
<b>Mechanical</b>											
Dimension L x W x H (mm)	270*160*70	350*180*88	350*180*88	400*200*166	400*200*166	270*160*70	350*180*88	350*180*88	400*200*166	400*200*166	
Weight (Kg)	2.5	4.0	4.5	8.0	9.5	2.5	4.0	4.5	8.0	9.5	
Force cooling	Load and Temperature Controlled Cooling Fan										
<b>Certification</b>											
Certification	CE*										
Safety	EN60950										

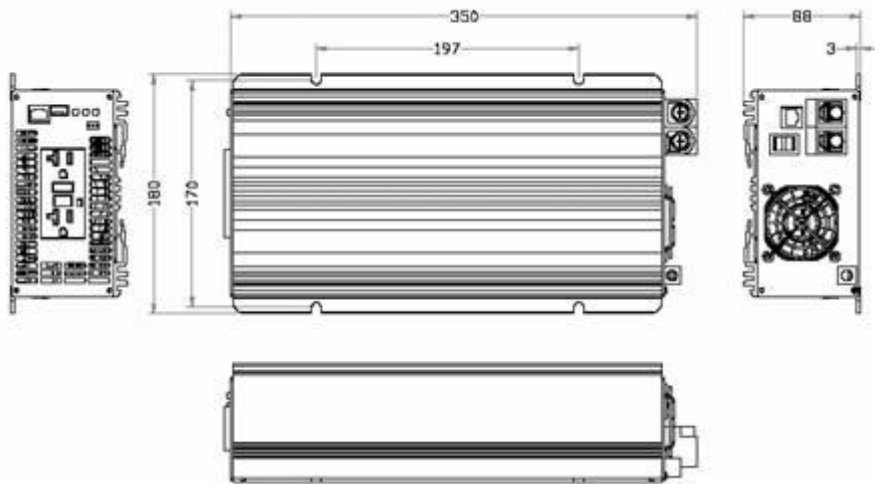
EMC	FCC Part 15 class B, EN55022 Class B
<b>Control</b>	
Protection	Overload, Short circuits, Reverse polarity, Over / under input voltage, Over temperature
Startup time	< 5 Seconds
Power Saving Recovery Time	5 Seconds
<b>Human Interface</b>	
LED Indicator	3-LED installed
Audible Alarm	Buzzer
Communication Interface	RS 232

\*CE is estimated to be obtained in Dec, 2011.

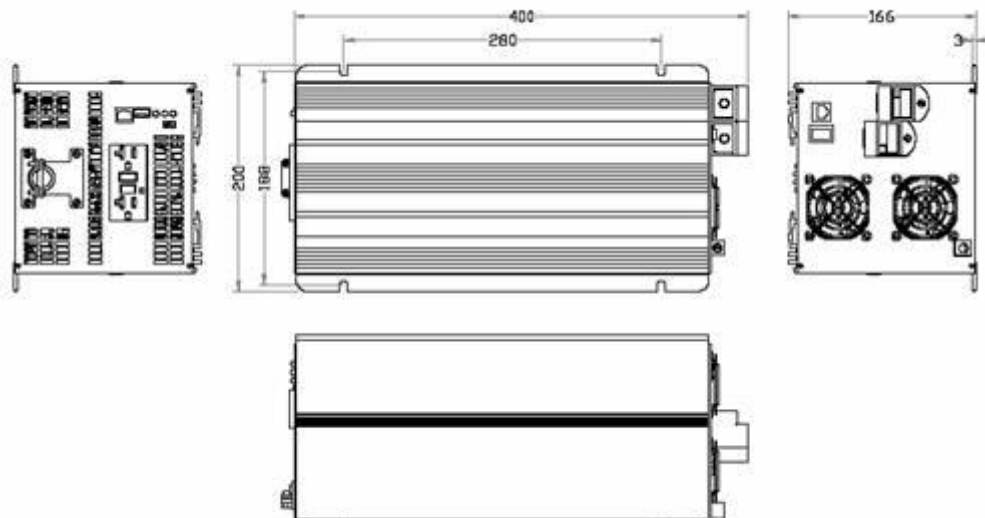
TPS 600W Dimension



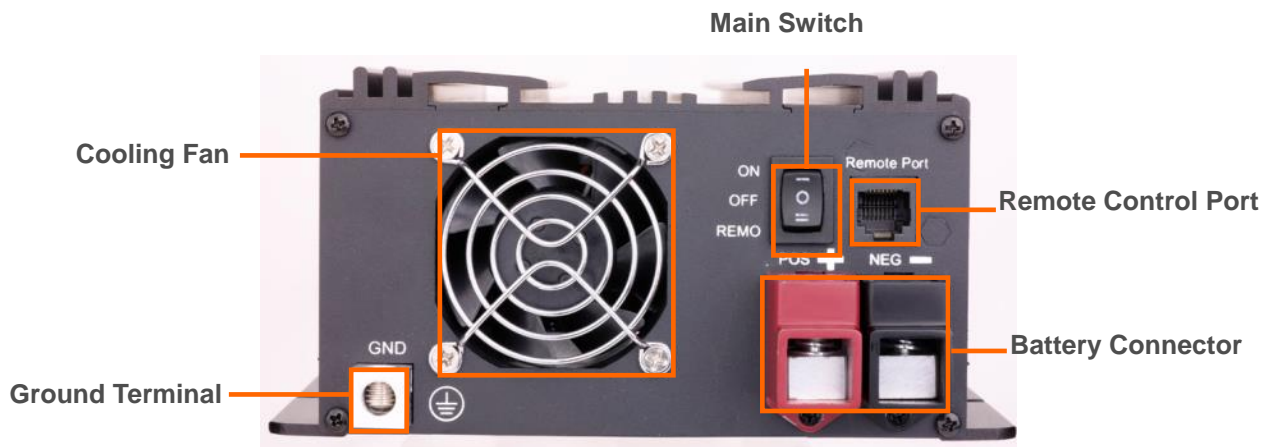
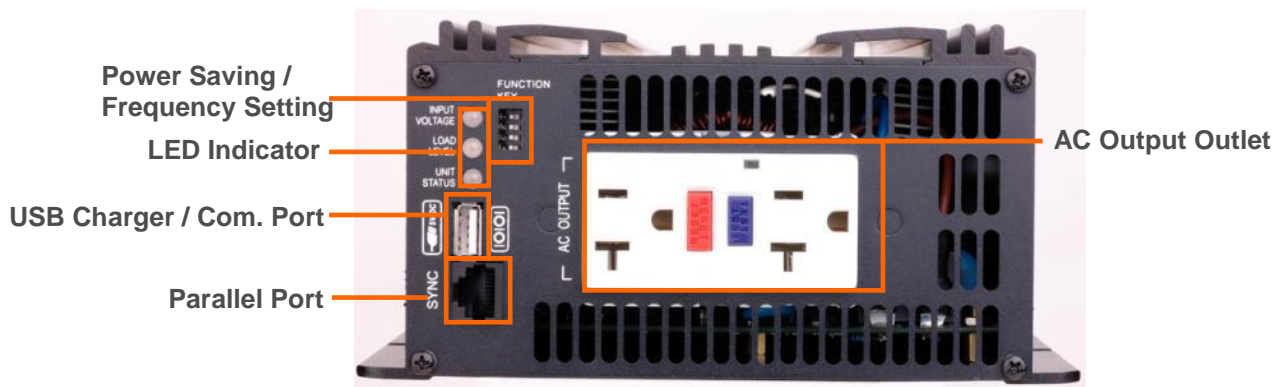
TPS 1000W & 1500W Dimension



TPS 2000W & 3000W Dimension



### 3 Application



#### 3.1 LED Display Status

There are 3 dual color led indicators on the front panel.

##### Status Indicator

<b>Green LED</b>	Solid	Inverter ok
	Blink (slow)	Power Saving
<b>Orange LED</b>	Solid	Eeprom fault
	Blink (slow)	Bus soft start fail
	Blink (fast)	Inverter soft start fail
<b>Red LED</b>	Solid	Over Temperature
	Blink (slow)	Bus over/under
	Blink (fast)	Short Circuit
<b>Orange + Red LED</b>	Orange and Red interchanged (slow)	Inverter voltage low/high
	Orange and Red interchanged (slow)	Negative power protection

##### Load Level Indicator

LED status	OFF	Green Solid	Orange Solid	Red Solid	Red Blink
TPS 600	0 ~ 30W	30 ~ 198W	198 ~ 450W	450 ~ 576W	Over 576W
TPS 1000	0 ~ 50W	50 ~ 330W	330 ~ 750W	750 ~ 960W	Over 960W
TPS 1500	0 ~ 75W	75 ~ 495W	495 ~ 1125W	1125 ~ 1450W	Over 1450W
TPS 2000	0 ~ 100W	100 ~ 660W	660 ~ 1500W	1500 ~ 1920W	Over 1920W
TPS 3000	0 ~ 150W	150 ~ 990W	990 ~ 2250W	2250 ~ 2880W	Over 2880W

Input Level Indicator:

LED Status	Battery Cut-off Level (12Vdc)			Recovery Level
Load level	0~29%	30~69%	70~100%	12.5Vdc for battery low 14.0Vdc for battery high
<b>Red Solid</b>	<10Vdc	<9.9Vdc	<9.7Vdc	
<b>Red Blink</b>	10 ~11.3Vdc	9.9 ~11.2Vdc	9.7~11.0Vdc	
<b>Green Solid</b>	11.3~14Vdc	11.2~13.9Vdc	11.0~13.7Vdc	
<b>Orange Blink</b>	14~15 Vdc	13.9~14.9Vdc	13.7~14.7Vdc	
<b>Orange Solid</b>	>15Vdc	>14.9Vdc	>14.7Vdc	

### 3.2 Power Saving Mode

Power Saving Mode can be set by 3 Dip Switches, SW1, SW2 and SW3 on front panel. For example: when the power saving watt setting is 15W, if load level>15W, the inverter will go to normal operation.

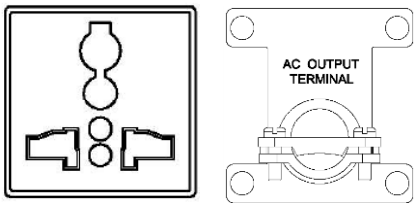
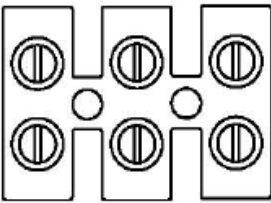
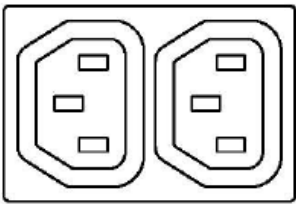
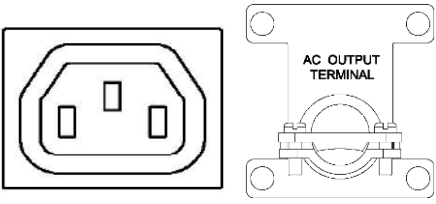
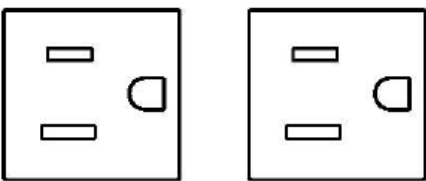
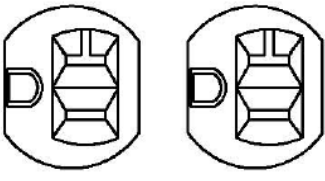
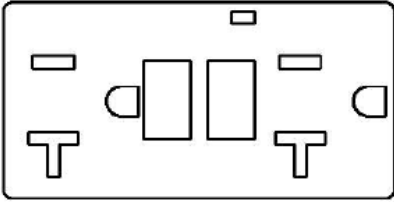
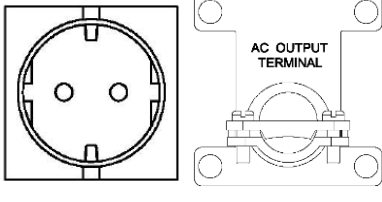
TPS0612E	TPS1012/24E	TPS 2012/24E 3012/24E	SW1	SW2	SW3
DISABLE	DISABLE	DISABLE	OFF	OFF	OFF
13W	20W	40W	ON	OFF	OFF
35W	50W	100W	OFF	ON	OFF
60W	80W	160W	ON	ON	OFF
85W	110W	220W	OFF	OFF	ON

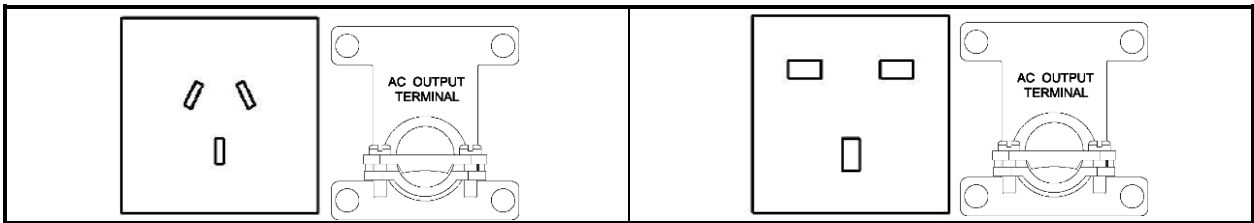
### 3.3 Output Frequency Setting

Frequency can be set by a Dip Switch SW4 on front panel.

Frequency	S4 Status
50Hz	OFF
60Hz	ON

### 3.4 AC Outlets Available

<b>Universal</b>	<b>HARD WIRE</b>
	
<b>IEC-2</b>	<b>IEC-1</b>
	
<b>NEMA 5-15R</b>	<b>NEMA 5-20R</b>
	
<b>North America (GFCI)</b>	<b>Schuko</b>
	
<b>Australia / New Zealand</b>	<b>United Kingdom</b>



### 3.5 Audible Alarm

#	Alarm mode	Beep mode	Remark
1	Alarm	Beep 1 time/ 1s	1. Input level <11.3 or >14.0Vdc 2. Load > 150%
2	Fault	Beep always	All fault mode
3	Switch on / off	Chirp one time	When Switch on / off the unit
	Remote on / off	Chirp one time	When Remote Switch on/off the unit

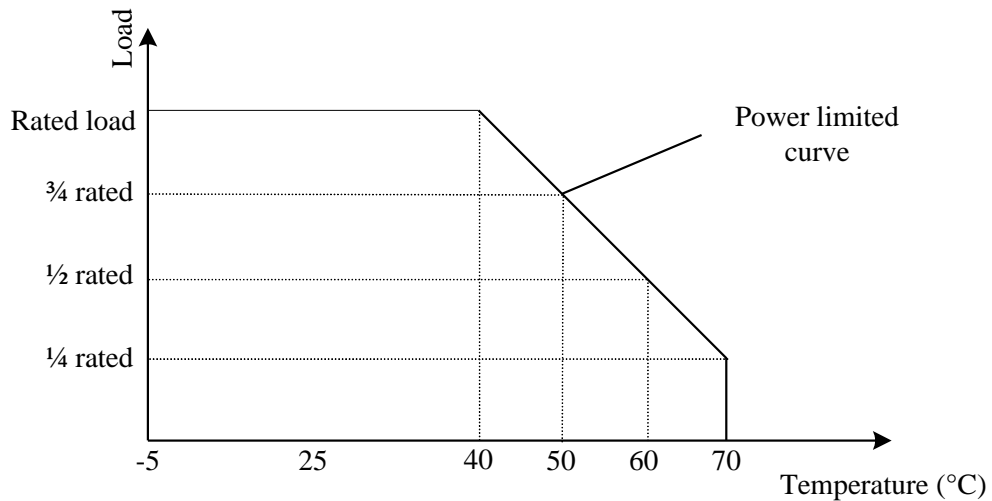
### 3.6 Output Voltage Setting

Output voltage should be set by RS232 communication. Please refer to monitor software user manual.

### 3.7 Fan Control

Load Level and Temperature	Fan Speed
Load ≤ 10% and temperature ≤ 40 °C	0
Else	Full speed

### 3.8 Power Limitation



**Figure 1** Power de-rating vs. Ambient Temperature

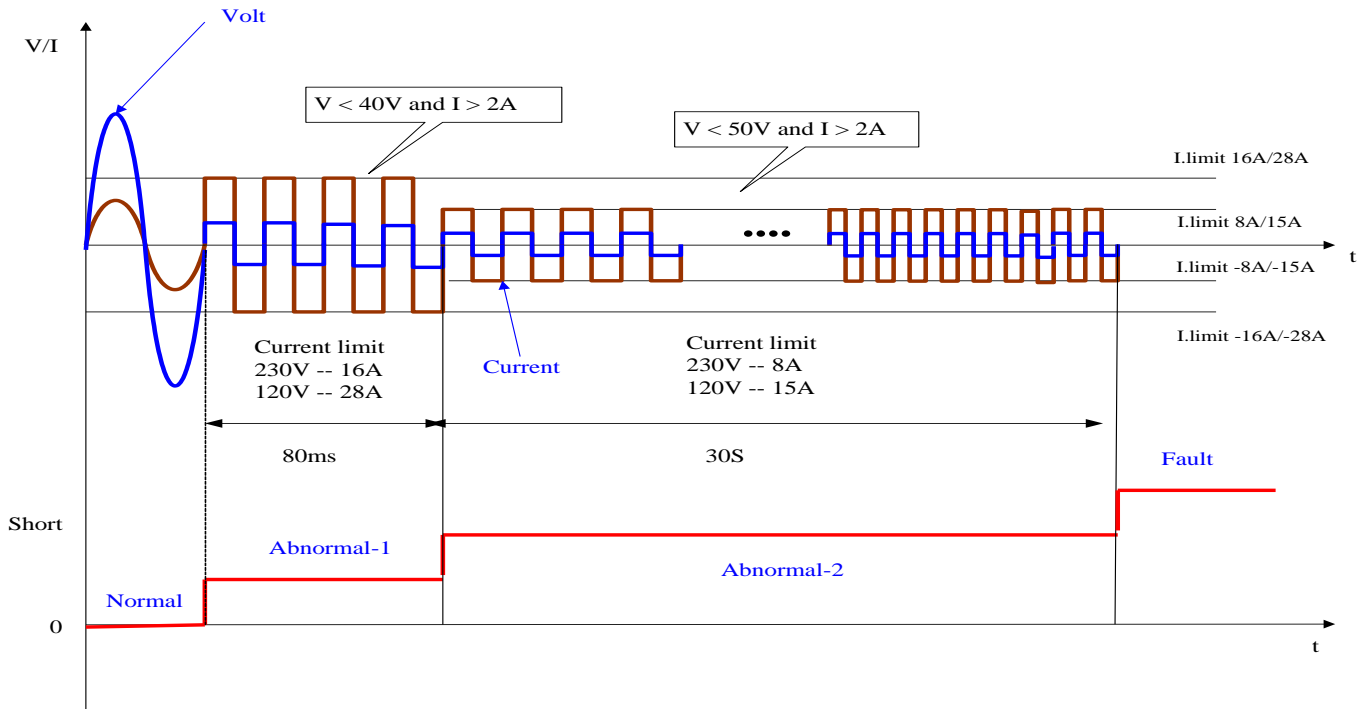


### 3.9 Short Circuit Protection

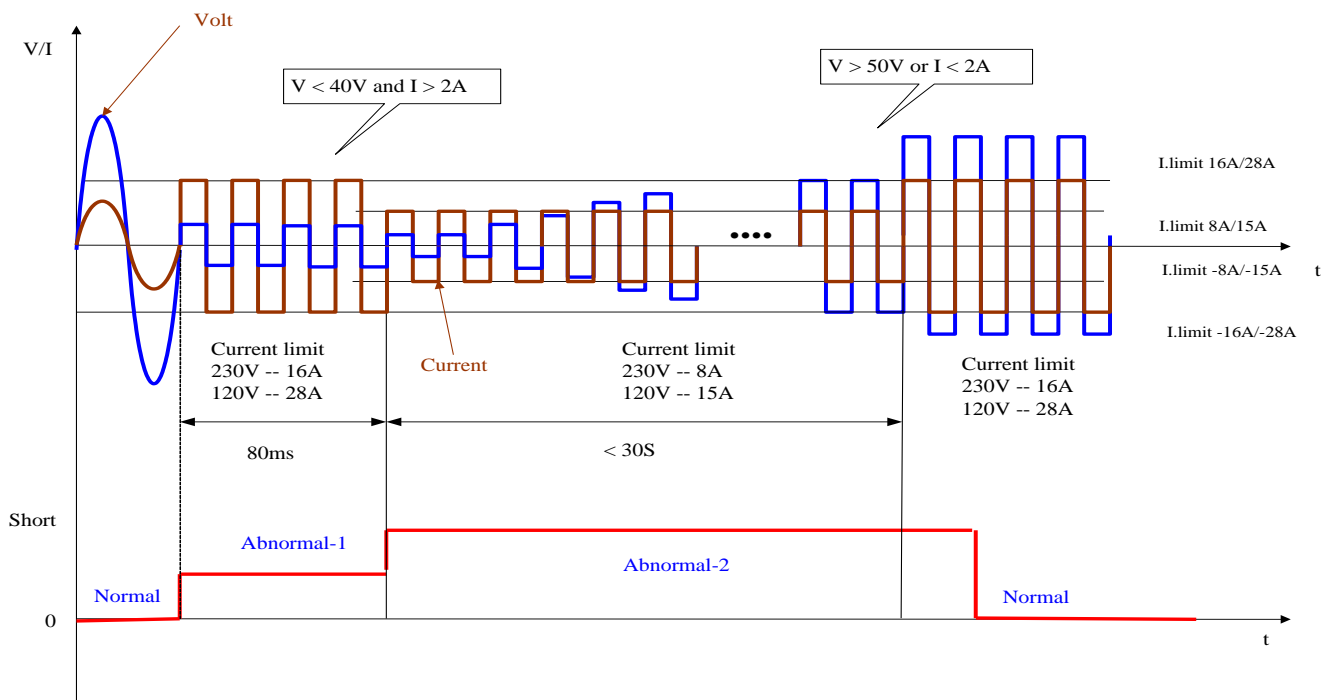
Short circuit protection consists of 2 stages:

Stage 1. The short current is set as 16A (28A for 120Vac) for inverter, if output voltage <math><40V\_{ac}</math> and output current >math>2A</math> for 4 cycles, inverter will judge as short circuit fault may have happened, and the short circuit protect will go to the second stage.

Stage 2. The short current is set as 8A(15A for 120Vac) for inverter, if output voltage <math><50V\_{ac}</math> and output current >math>2A</math> for 30 seconds, inverter will judge as short circuit happen, otherwise the short circuit alarm will vanish.



**Figure 2** Power limited during Short Circuit



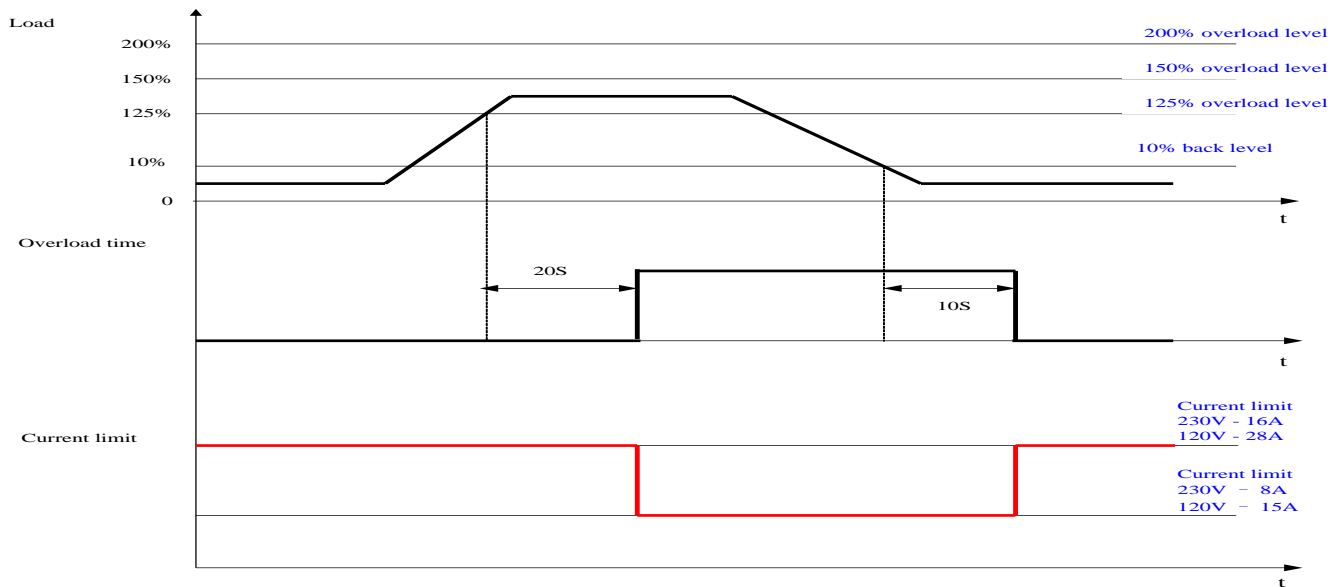
**Figure 3** Unit Resumed from Short Circuit Condition

### 3.10 Over Load Protection

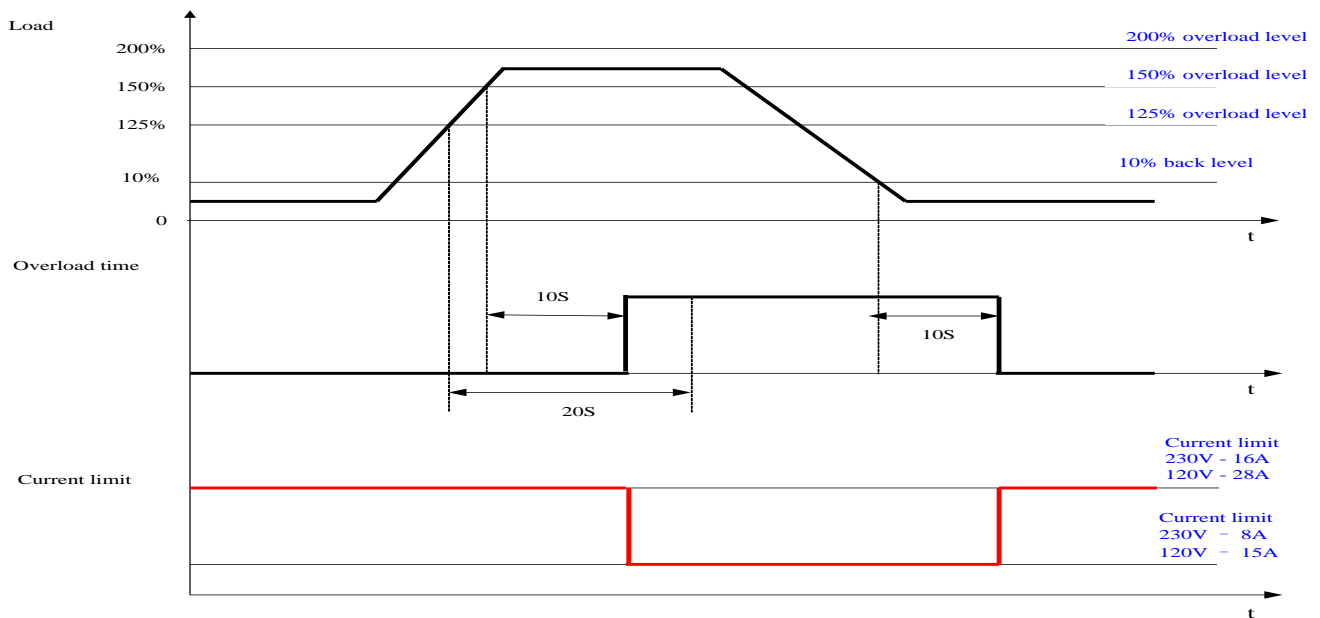
Over load protection consists of 2 stages:

Stage 1. The overload protection will happen when the load power exceed the power rated. With 20s of 125% overload / 10s of 150% overload / 5s of 200% overload, the inverter will judge as overload and set the current limit to 8A (120Vac is 15A), then it goes to the second stage.

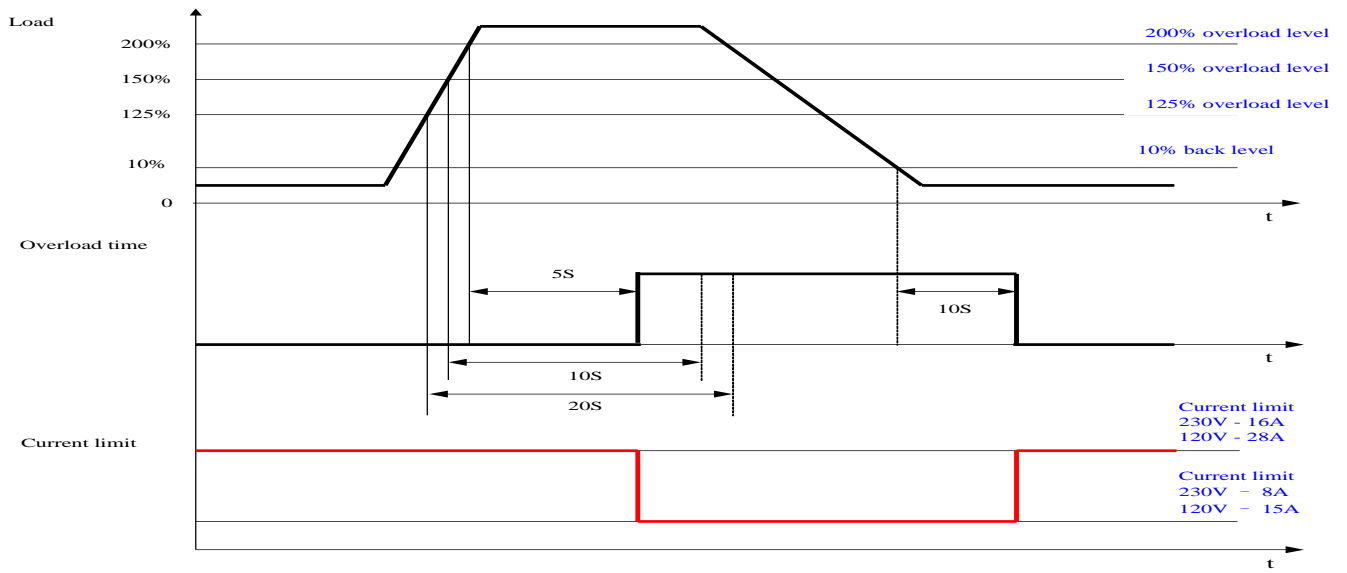
Stage 2. The inverter continues working with the current limit (8A/15A). If the load power is less than 10% for 10s, it will recover the current limit to 16A (120Vac is 28A), and works normally.



**Figure 4** Overload (125%) protection and recovery timing



**Figure 5** Overload (150%) protection and recovery timing



**Figure 6** Overload (200%) protection and recovery timing

## 4 Optional Features

### 4.1 Redundant Design (optional)

TPS is N+X designed inverter, which embeds the latest power technology. The inverter can be stacked in N+X redundant configuration up to a Maximum of 4 pcs.

With advance DSP control technique, inverter can expand as AC load requirement increases. With built in control circuit to each inverter module, the inverter modules are capable of parallel and synchronized operation without a central controller required.



### 4.2 In-Parallel Application

A distribution unit and a cable are for parallel application.  
The cable is necessary in parallel operation, or not it is dangerous for user.



### 4.3 Remote Control

TPS can be switched on or off remotely by wired remote controller