

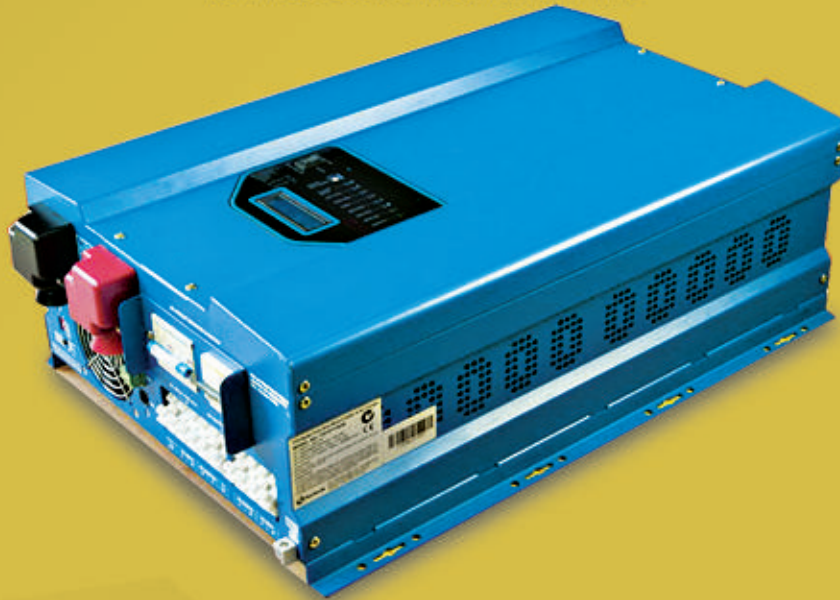


# TorTech

Total Transformer Solutions

## High Power Inverter

3 x surge capability | Reliable | Rugged construction  
low idle current Ultra low THD



### **Key design advantages:**

#### **High Output Capacity**

Up to 12000W

#### **Ultra Low THD**

(Typically 7%) very high overload capacity

#### **Handles three x 3 times the surge power**

Surge is 3x rated load power for 20sec minimum.

#### **Four Step intelligent battery charging**

the battery which is connected on the DC side.

#### **Powerful Charge Rate**

up to 120Amp Selectable from 0-100%

#### **Auto Gen Start Function**

For Off Grid System with generator as back up power. Automatically starts generator when the battery voltage reaches low levels. Increases lifetime of battery.

**MPPT Solar Charger Controller option** available

**Adjustable dual frequencies 50/60hz**

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## CONTENTS

1. Home	
2. Contents	
3. High Power HP Series Inverter Charger.....	1
4. High Power Inverter Features.....	2
5. Ultra-Low THD.....	3
6. Inverter Selection.....	4-5
7. Inverter Diagram.....	6
8. Specifications.....	7-8
9. Comparison Against other Inverter.....	9-10
10. Inverter FAQ's.....	11
11. Warranty and Approvals.....	12





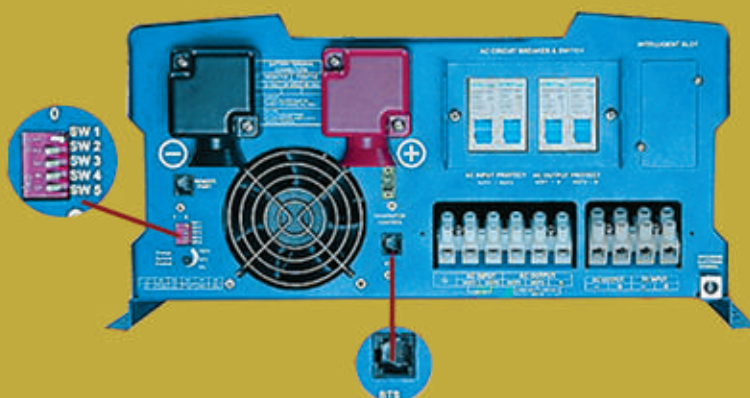
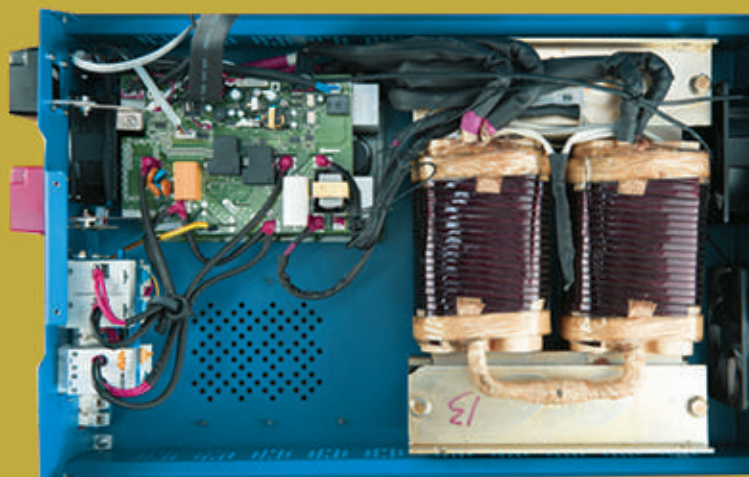
# Tortech

Total Transformer Solutions

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## High Power HP Series Inverter Charger



The Tortech High Power Inverter series is a combination of an inverter, charger, solar regulator and Auto-transfer switch into one complete system.

**It is packed with unique features and is one of the most advanced inverter chargers in the market today:**

- 1 High Output Capacity
- 2 Ultra Low THD (Typically 7%) very high overload capacity - Under full linear load
- 3 The surge power rating is 3x rated load power for a period of 20sec minimum
- 4 Battery Temperature Sensing for increase Charging Precision
- 5 Powerful Charge Rate - up to 120Amp Selectable from 0-100%
- 6 Auto Gen Start Function For Off Grid System with generator as back up power
- 7 MPPT Solar Charger Controller available
- 8 Automatic regulation of voltage (as power changed the output voltage is held constant)
- 9 Adjustable dual frequencies 50/60hz
- 10 Both input and output have double pole circuit breaker switches
- 11 3 Year Full Australian warranty





## High Power Inverter Features

The TorTech Series Pure Sine Wave Inverter is a combination of an inverter, charger, MPPT solar controller and Auto-transfer switch in one complete system. It is packed with unique features and it is one of the most advanced inverter/chargers in the market today.

### Features of the TorTech HP Series Inverter & Charger:

- ✓ Smart Remote Control (RMT)
- ✓ Battery Temperature Sensor (BTS)
- ✓ Automatic Generator Starting (AGS)
- ✓ Support Solar Panel Installations with MPPT Function
- ✓ Designed to Operate under Harsh Environment
- ✓ DC Start & Automatic Self-Diagnostic Function
- ✓ Compatible with Both Linear & Non-Linear Load
- ✓ Easy to Install & Easy to Operate & Easy to Solve
- ✓ Low DC Voltage Supports Home & Office Appliances
- ✓ Powerful Charge Rate Up to 120Amp, Selectable From 0%-100%
- ✓ High Efficiency Design & "Power Saving Mode" to Conserve Energy
- ✓ Battery Priority Mode, Designates the Inverter-Preferred UPS Configuration
- ✓ 13 Vdc Battery Recover Point, Dedicated for Renewable Energy Systems
- ✓ 8 pre Set Battery Type Selector plus De-sulphation for Totally Flat Batteries
- ✓ 4-step Intelligent Battery Charging, PFC (Power Factor Correction) for Charger
- ✓ 8 ms Typical Transfer Time Between Utility & Battery, Guarantees Power Continuity
- ✓ 15s Delay Before Transfer when AC Resumes, Protection for Load when Used with Generator

### Low Battery Trip Volt:

The Low Battery Trip Volt is set as 10.0VDC (12V Battery systems) by default. It can be customized to 10.5VDC.

### AC Input Range:

There are different acceptable AC input ranges for different kinds of loads. It can be customized from 184-253VAC to 154-253VAC.

### Load Sensing Cycle:

The inverter is factory defaulted to detect load for 250ms in every 30 seconds. This cycle can be customized to 3 seconds through the SW3 on DIP switch.

### Frequency adjust:

The frequency of the inverter is arranged by the SW4.

The factory default configuration for 240VAC inverter is 50Hz. While the output frequency can be easily changed once a qualified frequency is applied to the inverter.

### Solar / AC Priority Setting:

Our inverter is designed AC priority by default. This means, when AC input is present, the battery will be charged first, and the inverter will transfer the input AC to power the load.

The AC Priority and Battery Priority switch is available by default. When you choose battery priority, the inverter will invert from the battery despite the AC input (after initial brief charge cycle).





## Ultra-Low THD

### Why are Tortech inverters better (what is the THD)?

Tortech inverters are designed low THD of 5% in contrast to 20% from most competitors. This means that only 5% of the power is not available at the fundamental frequency. With 20% THD, there is 20% of the power that is not present at the fundamental frequency. This means that a 5% THD inverter is much more efficient than an inverter with THD of 20%.

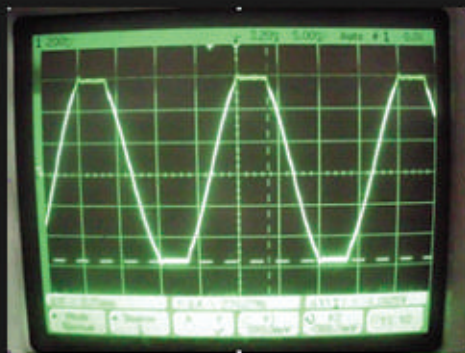


Low THD under full load

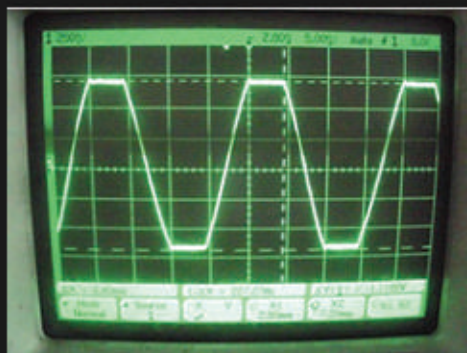


Pure sine Wave Form

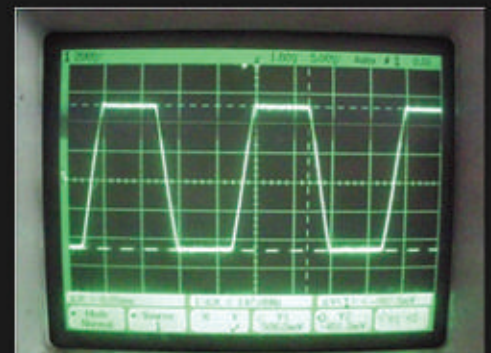
In laymen terms, a 5% THD inverter (Tortech) will result in better performance of your load device in comparison to a 20%THD inverter. This is very important when powering reactive loads, an inverter producing high THD will result in a very high current draw.



5% THD



9.5% THD



22.4% THD



## Inverter Selection

### HOW DO I CHOOSE THE CORRECT INVERTER?

1. Calculate the total load
2. Choose the correct voltage rating
3. Choose the correct size of inverter based on your output load rating

#### STEP 1

#### Calculate the total load

The main factor that determines the size of your inverter is the total load connected. The total load can be worked out in watts by summing up individual power consumption of all your appliances.

(If you have a TV (200w), fridge (300w) and a fan(600w) your total power consumption will be  $200+300+600 = 1100w$ ). This is the continuous load rating. Motors require approximately about 25% more than their rated power (to meet the in-rush).

**Note : For installations with Electric Motors Please refer to the table below.**

Model	HP 1KW	HP 1.5KW	HP 2KW	HP 3KW	HP 4KW	HP 5KW	HP 6KW	HP 8KW	HP 10KW	HP 12KW
Continuous Output Power	1000W	1500W	2000W	3000W	4000W	5000W	6000W	8000W	10000W	12000W
Surge Rating(20s)	3000W	4500W	6000W	9000W	12000W	15000W	18000W	24000W	30000W	36000W
Capable of Starting Electric Motor	1HP	1.5HP	2HP	3HP	4HP	5HP	6HP	8HP	10HP	12HP

#### STEP 2

#### Choose your battery bank voltage

Batteries that are connected in series will increase the voltage capacity where as batteries that are connected in parallel increase the current capacity. Batteries are rated on voltage and AH(Amp-hour capacity). The AH capacity gives you an approximate idea of the duration you can power your load.

2 x 12V batteries rated 200AH connected in series to give 24V will have an AH capacity of 200AH.

2x12V batteries rated 200AH connected in parallel to give 12V will have an AH capacity of 400AH.

(A 200AH battery with a C10 rating can supply 20A of current for 10hours. A 200AH battery with a C24 rating can supply 8.3A for 24 hours).

If you want to supply a load that consists of a TV (200w), fridge (300w) and a fan (600w) for 6 hours. You would need a battery of 550AH at 24V. It is important to use the correct sized battery for specific applications, an inverter is not a free energy machine, all it does is convert DC (Direct Current) power from the battery into AC (Alternating Current) for your appliances.





## Inverter Selection

### STEP 3

#### Keep the length of the DC cables short / Increase their diameter

It is important to note that the resistance of a DC cable is dependent on the length and the cross sectional area. The longer the cables, the higher its resistance will be. The resistance will also be high with reduction in cross sectional area. This is of very high importance and might be the deciding factor in powering your load for extended periods of time.

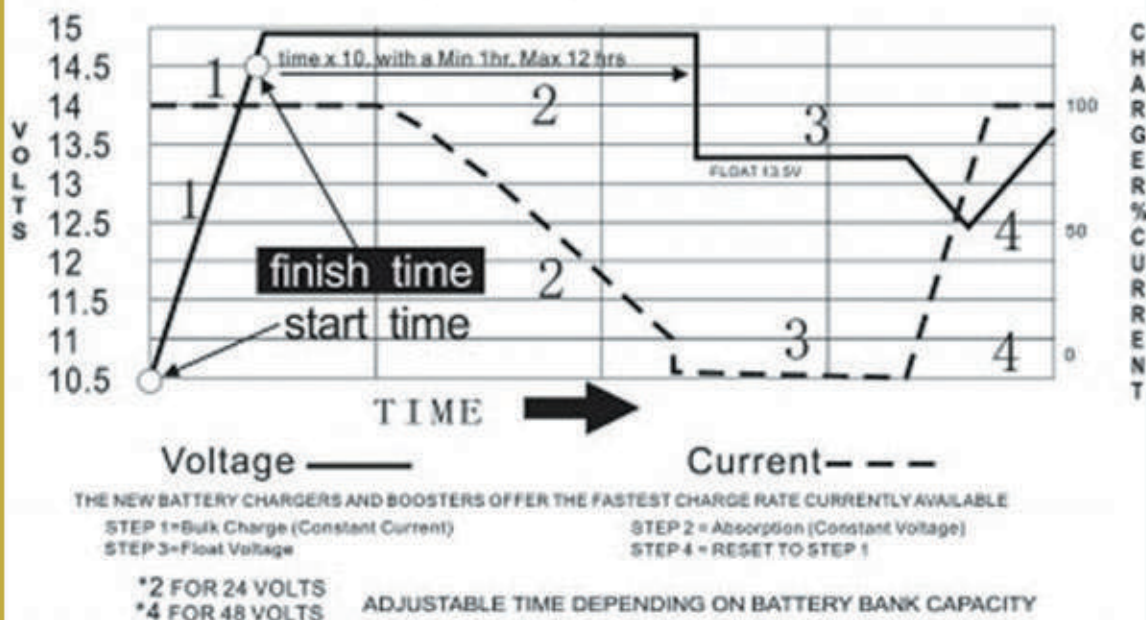
Tortech inverters come with a low voltage shut down of 10.5VDC/11VDC (adjustable for a 12VDC inverter), 21VDC/22VDC (adjustable for a 24VDC inverter, 42VDC/44VDC (adjustable for a 48VDC inverter). If the DC cables are too long or too thin, this will result in a significant voltage drop due to the resistance which might cause the inverter to see lesser voltages at its terminals (significantly lesser than the battery voltage). This will in turn result in the inverter shutting down improperly.

Once these three factors are accounted for in the planning of your inverter system, you should face very little problems.

### Charging Current for Various Model's

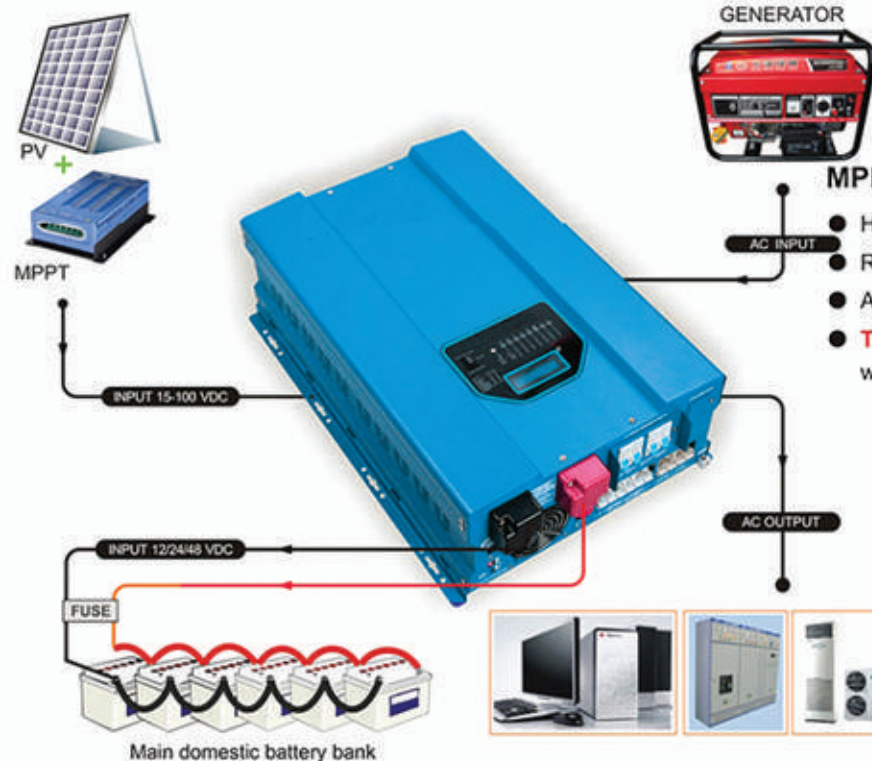
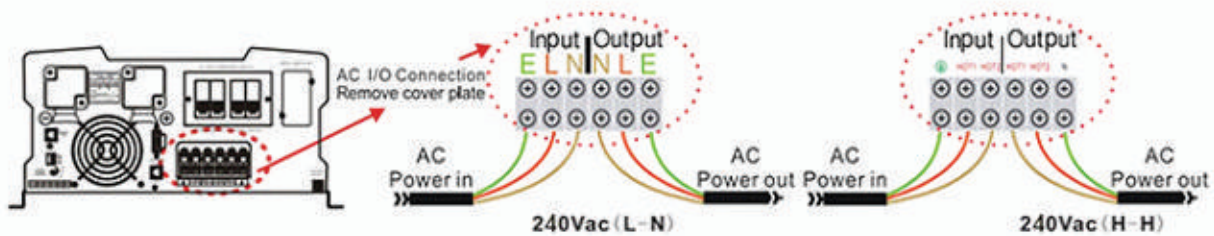
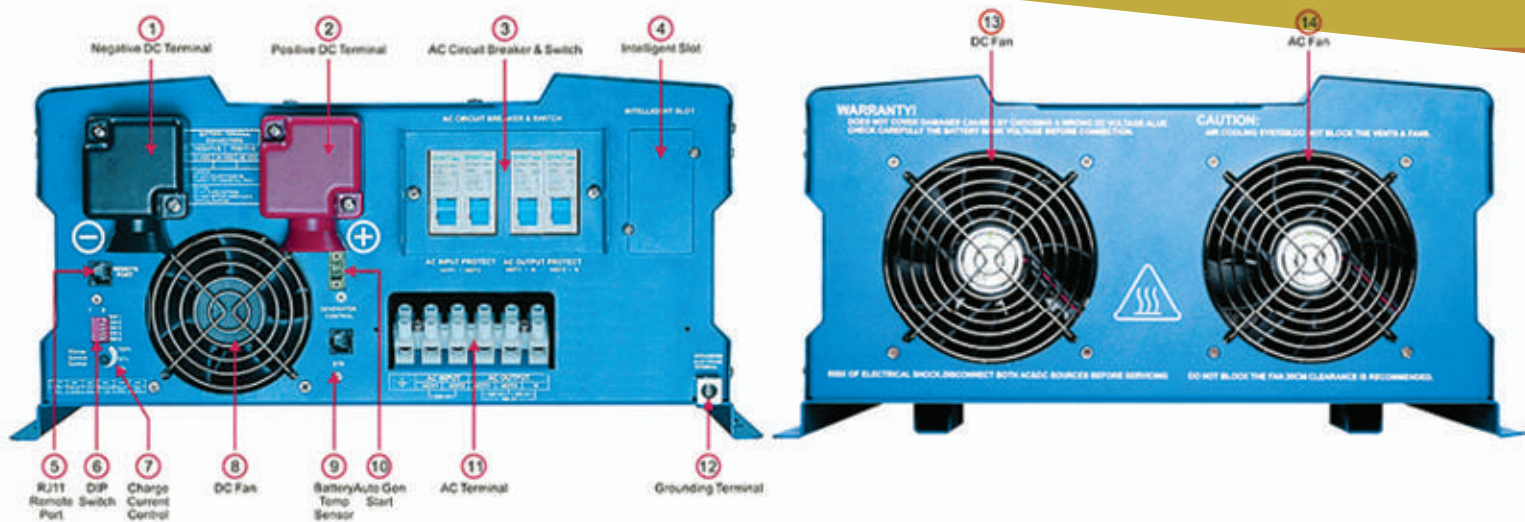
Model Watt	Battery Voltage	Charging Current	Model Watt	Battery Voltage	Charging Current
1KW	12 Vdc	35± 5 Amp	2KW	12 Vdc	60± 5 Amp
1KW	24 Vdc	20± 5 Amp	2KW	24 Vdc	30± 5 Amp
1KW	48 Vdc	10± 5 Amp	2KW	48 Vdc	15± 5 Amp
3KW	12 Vdc	80± 5 Amp	4KW	12 Vdc	100± 5 Amp
3KW	24 Vdc	45± 5 Amp	4KW	24 Vdc	55± 5 Amp
3KW	48 Vdc	25± 5 Amp	4KW	48 Vdc	35± 5 Amp
5KW	24 Vdc	65± 5 Amp	6KW	24 Vdc	80± 5 Amp
5KW	48 Vdc	40± 5 Amp	6KW	48 Vdc	50± 5 Amp
8KW	24 Vdc	100± 5 Amp	10KW	48 Vdc	80± 5 Amp
8KW	48 Vdc	65± 5 Amp	12KW	48 Vdc	120± 5 Amp

### Battery Charging Processes





# Inverter Diagram



## MPPT SOLAR CHARGE & DISCHARGE CONTROLLER

- High converting efficiency higher than **97%**
- Reversed **current protection** for preventing equipment damage
- Automatic **battery temperature** compensation for long-term reliability
- **Three stage** charge control system (bulk, absorption, and float mode) with temperature compensation

**NOTE:** In-Built MPPT Solar Controllers Have:

Nominal voltage	Charging Current	Maximum Open Circuit Voltage
12 (V DC)	60 (A)	0-45 (V DC)
24 (V DC)	40 (A)	0-60 (V DC)
48 (V DC)	40 (A)	70-100 (V DC)

\* Please Note that PV Panels can have a High Open Circuit Voltage under "Cold" Conditions.





## Specifications

### ELECTRICAL SPECIFICATIONS

	Model	1.0KW	1.5KW	2.0KW	3.0KW	4.0KW	5.0KW	6.0KW	8.0KW	10.0KW	12.0KW
Inverter Output	Continuous Output Power	1.0KW	1.5KW	2.0KW	3.0KW	4.0KW	5.0KW	6.0KW	8.0KW	10.0KW	12.0KW
	Surge Rating(20s)	3.0KW	4.5KW	6.0KW	9.0KW	12.0KW	15.0KW	18.0KW	24.0KW	30.0KW	36.0KW
	Output Waveform	Pure Sine wave/Same as input(Bypass Mode)									
	Nominal Efficiency	>88%(Peak)									
	Line Mode Efficiency	>95%									
	Power Factor	0.9-1.0									
	Nominal Output Voltage rms	240Vac									
	Output Voltage Regulation	±10% RMS									
	Output Frequency	50Hz ± 0.3Hz/60Hz ± 0.3Hz									
	Short Circuit Protection	Yes( 1sec after fault )									
Typical transfer Time	10ms(Max)										
THD	< 10%										
DC Input	Nominal Input Voltage	12.0Vdc ( *2 for 24Vdc, *4 for 48Vdc)									
	Minimum Start Voltage	10.0Vdc									
	Low Battery Alarm	10.5Vdc / 11.0Vdc									
	Low Battery Trip	10.0Vdc / 10.5Vdc									
	High Voltage Alarm	16.0Vdc									
	Low Battery voltage recover	15.5Vdc									
	Idle Consumption-Search Mode	< 25 W when Power Saver On									
	Charger	Output Voltage	Depends on battery type								
Charger Breaker Rating		10A	15A	20A	20A	20A	30A	30A	40A	40A	40A
Max Charge Power Rate		1/3 Rating Power									
Battery Initial Voltage for Start Up		10-15.7V for 12V( *2 for 24V, *4 for 48V)									
Over Charge Protection Shutdown		15.7V for 12V (*2 for 24V, *4 for 48V)									
Remote Control		Yes(Optional)									
Bypass & Protection		Input Voltage Waveform	Sine wave (Grid or Generator)								
	Nominal Voltage	110Vac			120Vac		220Vac		230Vac		
	Max Input AC Voltage	150VAC For 120Vac LV Mode;300VAC For 230Vac HV Mode;									
	Nominal Input Frequency	50Hz or 60Hz (Auto detect)									
	Low Freq Trip	47±0.3Hz for 50Hz, 57±0.3Hz for 60Hz									
	High Freq Trip	55±0.3Hz for 50Hz, 65±0.3Hz for 60Hz									
	Overload protection(SMPS load)	Circuit breaker									
	Output Short circuit protection	Circuit breaker									
	Bypass breaker rating	10A	15A	20A	30A	40A	40A	40A	50A	63A	63A
	Transfer switch rating	30amp for UL & TUV					40amp for UL			80amp for UL	
	Bypass without battery connected	Yes (Optional)									
	Max bypass current	30amp					40amp			80amp	



## Specifications

Solar Charger (Optional)	Rated Voltage	12Vdc / 24Vdc / 48Vdc											
	Solar Input Voltage Range	15-30Vdc / 30-55Vdc / 55-100Vdc											
	Rated Charge Current	40 ~ 60A											
	Rated Output Current	15A											
	Self Consumption	< 10mA											
	Bulk Charge	14.5V(default)											
	Floating Charge	13.5V(default)											
	Equalization Charge	14.0V(default)											
	Over Charge Disconnection	14.8V											
	Over Charge Recovery	13.6V											
	Over Discharge Disconnection	10.8 V(default)											
	Over Discharge Reconnection	12.3V											
	Temperature Compensation	-13.2mV/°C											
	Ambient Temperature	0 ~ 40°C(Full load) 40 ~ 60°C(Derating)											
Mechanical Spec	Mounting	Wall Mount											
	Inverter Dimensions(L*W*H)	388*415*200mm				488*415*200mm				588*415*200mm			
	Inverter Weight (Solar Chg.)KG	21+2.5	22+2.5	23+2.5	27+2.5	38+2.5	48+2.5	49+2.5	60+2.5	66+2.5	70+2.5		
	Shipping Dimensions(L*W*H)	550*520*310mm				650*520*310mm				750*520*310mm			
	Shipping Weight (Solar Chg.)KG	23+2.5	24+2.5	25+2.5	29+2.5	40+2.5	50+2.5	51+2.5	62+2.5	68+2.5	72+2.5		
	Display	Status LEDs / Status LEDs+LCD											

### NOTE:

- \* For installations which size restrictions, please enquire about our TXF series.
- \* For Stationary low Power applications, please enquire about our TPS Series (High Frequency- Electronic type Inverter).





## Comparison Against other Inverters

APC



Vs

TXF



Vs

HP



Very High idle consumption



THD<20%



LCD



40% lesser idle consumption



THD<10%



50% lesser idle consumption

### Frequency Adjust

In inverter mode will operate at 50/60hz set by SW4 switch

### THD<3% (Total Harmonic distortion)

Pure sine wave form with an average THD of 3%

### Battery Temperature Sensor (BTS)

To ensure proper charging of the batteries based on temperature. Extending battery life by preventing overcharging in warm temperatures and undercharging in cold temperature

LCD

### Automatic Voltage Regulation





The voltage is steady as the load changes



## Comparison Against other Inverters

### COMPARISON OF TORTECH HP INVERTER TO OTHERS ON MARKET

Note 1: 'V' With function; 'X' Without function; 'O' Option function;  
Note 2: Specifications are subjected to change without prior notices.

Function	Type	PS W7	APC	APP	HP-PV(High Power)
Picture					 <a href="#">Click Here</a>
Introduction		The most popular and basic inverter line.	Improved line based on PSW7, with additional DIP switches and optional AGS.	APC series with newly designed enclosure.	APS series with manual freq switch and low THD. HP series with inbuilt solar charger.
Product Performance					
Line-Interactive UPS		V	V	V	V
Off-Grid Inverter / Pure Inverter		V	V	V	V
PFC Charge Function 4-Stage Intelligent Charger		V	V	V	V
Battery Type Select		V	V	V	V
Charger Current Controller		V	V	V	V
Remote Control Function (RMT)		V	V	V	V
Communication Rs232		V	V	V	V
Power Factor 0~1.0		V	V	V	V
Un-limited Load Applicability		V	V	V	V
Un-limited Battery Backup Time		V	V	V	V
Single Phase / Dual Phase		V V	V V	V V	V V
Protection: 1.Overload ; 2.Over Temperature ; 3.Over Charge ; 4.Output Short Circuit ; 5.Fan lock;		V	V	V	V
Dip SW Function: SW1:Battery Low S.D. Point; SW2:AC Input V/F Range; SW3:Power Saver Function		X	V	V	V
Dip SW Function: SW4:Priority Mode Selection;		X	O	O	V
Auto Generator Starting (AGS)		X	O	O	V
High Efficiency & Low Idle consumption		X	X	V	V
AVR Function		X	X	X	V
Support Solar Panel Function		X	X	X	V
Battery Temperature Sensor (BTS)		X	X	X	V
Frquency Setting 50/60Hz		Auto Sensing	Default & Auto Sensing		Dip Sw5
Output Waveform Sinewave THD<10% Load Level		50%	50%	50% or 100%	100%
Power Mode (New)		X	AP 4KW 120/230Vac 12Vdc Series;		HP4~6KW: 120Vac 24Vdc Series; HP8KW: 230Vac 24Vdc Series; HP8~12KW: 230Vac 48Vdc Series;
Safety		CE、Soncap For All mode; UL for 1-3KW mode;			





## Inverter FAQ's

### ► What is the utility/battery priority mode? (see images below)

Tortech inverters come with an advanced micro-processor controlled utility/battery priority feature. This feature helps the user select the option of supplying the load from the battery\* or from an AC source (generator/utility). The inverter is programmed smart to give more priority to the AC source by default. This is done to increase the longevity of the battery.

Switch number 4 when in position 1 will give priority to the battery to supply the load. This is very useful when trying to reduce power consumption from the utility and maximise the extraction of PV power stored in the battery (see image settings below).

Switch number 4 is set to position 1 before connecting the DC input from the battery and the AC input from the generator or the utility. The inverter is turned on with AC input off (see image settings below). When the AC input is turned on after this condition, It will supply load from the battery till the battery runs low on charge, It will automatically switch to the AC input and charge the batteries simultaneously once the battery runs low on charge.

In the same way, if the switch is set to position 0, it will give priority to the AC input to supply the load. Use this setting if you want to use power from the generator/Utility and conserve the battery.

Switch NO	Switch Function		Position: 0	Position: 1
SW1	Low Battery Trip Volt		10.0VDC For Deep-Cycle Battery	10.5VDC For Starting Battery
			*2 for 24Vdc, * for 48Vdc	
SW2	AC Input	AC Source	For Utility Mode	For Generator Mode
	Range/(AVR)	240Vac HV	184-253Vac / (176-276Vac)	154-253Vac / (150-276Vac)
SW3	Power Saver Auto Setting		Power Saver off	Detect Load Per 3Secs
SW4	O/P Frequency Setting		50Hz	60Hz
SW5	Solar / AC Priority Setting		Utility Priority	Battery Priority

### ► What is the Auto-generator start feature?

Auto-generator start feature is applicable to users who want to auto-mate the battery charging process.

The inverter monitors the battery voltage and once it hits a low voltage value of (11V/22V/44V) the inverter shorts the relay and automatically starts the generator\*. The inverter will automatically give priority then to the battery to supply the load (switch 4 in position 1) and the cycle repeats.

### ► Does the inverter have output 240v sockets?

Tortech inverters rated 3000-9000W Surge, 1000-3000W continuous come with two flush mounted approved Australian sockets. An additional hard-wired terminal block is present for AC input, AC output.

### ► Does the inverter have adequate protection?

Tortech inverters come protected with an AC output circuit breaker for 240V and an AC input circuit breaker for the built in charger.

## Warranty and Approvals

### 3 Year Australian Warranty



- Local servicing and support from our Sydney based office.
- Testing - All inverters are 100% tested on load battery.
- This guarantees all the inverter characteristics, ratings and charger performance.
- The Internal transformer inside the inverter is a isolated transformer providing extra protection and safety. Ensuring the input is isolated from the output of the inverter.
- The inverter is tested to maintain performance under high vibration environments such as that in a moving vehicle.

### Approvals & Safety Compliance:

All Tortech HP range of inverters are fully tested and made to AS/NZS 60950, EN 60950 and IFC 60950-1999 standards. See reports

✓ Inbuilt Safety Protection - our transformer inverters have a circuit breaker on the DC and AC side. This provides short circuit protection under all conditions.

✓ RCD safety protection - this protects the from earth faults  
 All units are C-tick approved for EMC interference.

