

# TOUGHPOWER

by IntelliQuip

## USER INSTRUCTION MANUAL

Models: TP-600  
TP-1000  
TP-1000<sub>DUAL</sub>

**Congratulations on purchasing the most powerful compact portable battery box on the market!**

**You can take great pride in knowing that the ToughPower is the only portable battery box that has:**

1. 600W or 1000W Pure Sine Wave Inverter for high power appliances
2. Automatic Low Voltage Shutdown *and Recovery* to protect the battery
3. The internal microprocessor monitors and displays on the LCD *all* charging inputs - Mains, Car, Solar, External, and Dual Battery (*TP1000DUAL model only*)
4. Dual Battery Bypass Controller (*TP-1000DUAL model only*) - direct connection to the car Alternator for BULK charging and then DC-DC Charger to finish off the battery charge - automatically controlled
5. With Dual Battery Bypass Controller setup - direct BULK power from the car Alternator to the 1000W Pure Sine Wave Inverter. Effectively providing power indefinitely to high power appliances. *TP-1000DUAL model only*
6. Integrated Mains Charger, DC-DC Charger and MPPT Controller (for 12V *Nominal* Solar Panels)
7. The fastest, most powerful Mains Charger 10A integrated *inside* the Lid
8. The fastest, most powerful DC-DC Charger 10A integrated *inside* the Lid

**Good Choice...you won't be disappointed**



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## 2. Product Safety & Warnings

The ToughPower is intended for indoor use only. Ensure the unit is mounted correctly in the upright position, undercover and located with **adequate ventilation** around the box.

**Avoid all contact with water**, rain, snow or spray! Do not power ON the unit if it is wet as it could potentially result in electrocution and/or permanent irreparable damage to the internal electronics. Warranty will be voided if there is damage caused by water.

**Do not attempt to disassemble** the ToughPower as this may result in electric shock. Warranty will be voided if any attempt is made to modify, repair or attempt unauthorised access to the electronics.

Disconnect all Charging Supply leads before making or breaking the connections to the Battery.

The ToughPower is not a toy! **Children must not play** with the ToughPower. The ToughPower can only be used by children aged from 8yrs and above and persons with reduced physical, sensory or mental capacities or lack of experience and knowledge only if they have been given supervision or instruction concerning the use of the ToughPower in a safe way and understand the hazards involved.

**Do not insert foreign objects into the outlets** as this may lead to electrocution and/or damage the electronics. The 240V AC outlet socket should be respected the same as a standard mains electrical socket. Warranty will be voided if there is damage caused by such activity.

**WARNING – Explosive gases.** Prevent flames and sparks. Do not use the ToughPower in close proximity of flammable fumes, gases, or naked flames. Provide adequate ventilation to allow any heat and battery gases to be safely dissipated during charging.

Do not attempt to charge non-rechargeable batteries. This product is designed for charging 12V deep cycle rechargeable batteries 80-120 Ahr capacity.

When the ToughPower is not in use, firstly fully charge the battery, then switch the Master ON/OFF Switch to OFF. Refer to your Battery manufacturer's recommended instructions for battery storage. *Typically it is advised to to never store your battery in a discharged state, to keep the battery in a cool and dry location with plenty of ventilation, and to recharge every 3-4 months.*

Cleaning and user maintenance shall not be made by children without supervision.

Deep cycle batteries are heavy! Be sure to "bend with your knees" when lifting – or ask a friend to help carry the ToughPower.

For all PLUGGABLE equipment – the socket-outlet shall be installed near the equipment and shall be easily accessible.

### CAUTION

Risk of Explosion if Battery is replaced by an incorrect type.  
Dispose of used batteries according to the instructions on the battery.

### 3. What's Included...

#### TP-600 & TP-1000

- 1 x ToughPower
- 1 x Kettle Cord
- 1 x 4-Pin CIG Accessory Cable
- 1 x User Manual



#### TP-1000<sub>DUAL</sub>

- 1 x ToughPower
- 1 x Kettle Cord
- 1 x 4-Pin CIG Accessory Cable
- 1 x 2-Pin Accessory Cable
- 1 x User Manual



### 4. General Specifications

**External Dimensions:** 394mm x 215mm x 406mm (L x W x H)

**Operating Temperature:** 0 – 50°C

**Material:** UV Stable Roto-moulded Box and Lid

**Weight:** TP-600 4.5kg *battery not included*

TP-1000 5.6kg *battery not included*

TP-1000<sub>DUAL</sub> 5.7kg *battery not included*

**Suitable for:** 12V Deep Cycle Batteries AGM/Gel/Calcium/Wet Lead Acid & Lithium LiFePO4 (TP-1000<sub>DUAL</sub>)

**Battery 'Space Claim':** 344mm x 179mm x 249mm (L x W x H)

Will fit most deep cycle 80Ah - 120Ah Batteries

**Certifications:** AU Prov Pat Appln No 2017903530

Electromagnetic Compatibility (EMC) AS/NZS 61000.6.4:2007

Information Technology Equipment - Safety AS/NZS 60950:2015

Safety of Portable Inverters AS/NZS 4763:2011

Household and similar Electrical Appliances - Safety - Particular requirements for Battery Chargers AS/NZS 60335.2.29:2004 + A1 + A2 with

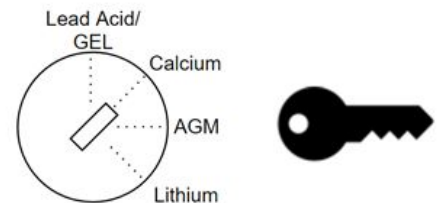
Household and similar Electrical Appliances - Safety AS/NZS 60335.1:2011 + A1 + A2

## 5. Quick Start - Initial Setup

Follow these instructions to set-up your ToughPower unit correctly.

1. Ensure the Master Switch is in the OFF position
2. Open the lid
3. Using the Key inserted in the Concealed Key-Switch select the 12V Battery Type that you intend to fit in the box
  - a. TP-600 selection: Lead Acid/GEL, Calcium and AGM
  - b. TP-1000 & TP-1000<sub>DUAL</sub> selection: Lead Acid/GEL, Calcium, AGM & *Lithium (LiFePO4)*

**Note:** For *Lead Crystal* batteries select AGM (same charging profile)



4. Remove the Key and store in a secure location
5. Place your battery inside the box, secure it using the Battery Strap
6. Connect and secure cables to battery terminals

**Warning:** Check the Polarity of your connections!

Reds to Red (Positive to Positive) Blacks to Black (Negative to Negative)

Ensure each cable connection to the battery terminal is secure and tight

7. Close the lid and attach the two latches
8. Turn the Master Switch to the **ON** position
9. The LCD will prompt you to update the battery settings:
  - a. Touch the arrows to select the correct values for your Battery Condition and Capacity
  - b. When finished touch **SAVE** and then **HOME**



10. Although the unit is now ready to be used, it is **highly recommended** to allow the ToughPower to complete a **full charge** so the internal battery monitor gets synchronised with the battery state of charge. If you don't do this you will only ever see the Voltage displayed on the LCD, and no % or time predictions will be displayed.

The easiest way to achieve this is with the Mains Charger (though you can use Solar or Car charging)

- a. Plug the desired input charge source (Mains - Kettle cord)
- b. Wait until charging is **FULL** or Battery percentage shows 100%



**Note:** This is a Quick Start guide intended for the skilled user only. For more detailed instructions and explanations refer to the relevant section in the User Manual.



## 6. Battery Selection, Fitting and Configuration

### 6.1 Battery Type Selection

The ToughPower has a built-in integrated Multi-Stage DC-DC Battery Charger *inside* the Lid. This Charger has specific Charging Profiles for each deep cycle Battery chemistry. These are:

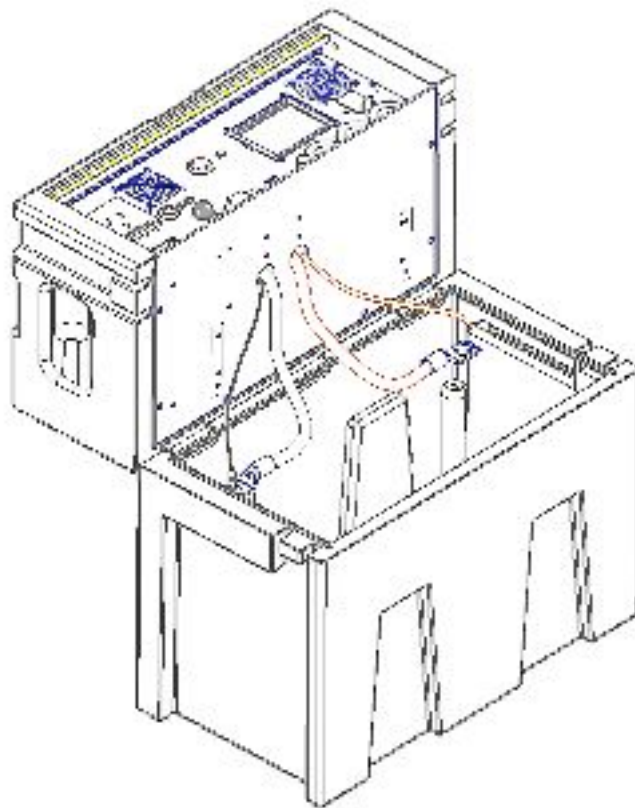
- Wet Lead Acid/GEL
- AGM (*Lead Crystal* batteries select AGM profile as they have the same charging voltage profile)
- Calcium
- Lithium  $\text{LiFePO}_4$  *TP-1000 & TP-1000<sub>DUAL</sub> models only*. For other Lithium-Ion batteries refer to section **Charging Voltage Limits** to confirm if compatible.

The ToughPower box has been designed to accommodate most 80-120 Ahr sized batteries. We advise that you check the size of the battery before you buy! The “space claim” in the ToughPower for the battery is:

344mm x 179mm x 249mm (L x W x H)

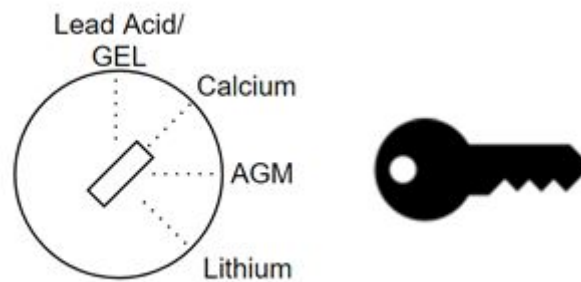
To ensure your safety, ongoing integrity of the Battery, and to provide optimised Charging, it is very important that you **correctly set the Battery Type**. Failure to do so could result in significant damage to the battery and electronics, rendering them both inoperable, and/or permanently damage any device attached to the ToughPower.

Due to the high current Charging capability of the ToughPower, and the safety and product damage risks mentioned above, the selection of the Battery Type has been provided by a **Concealed Key Switch**. The Concealed Key Switch can only be accessed with there is no Battery fitted in the Box.



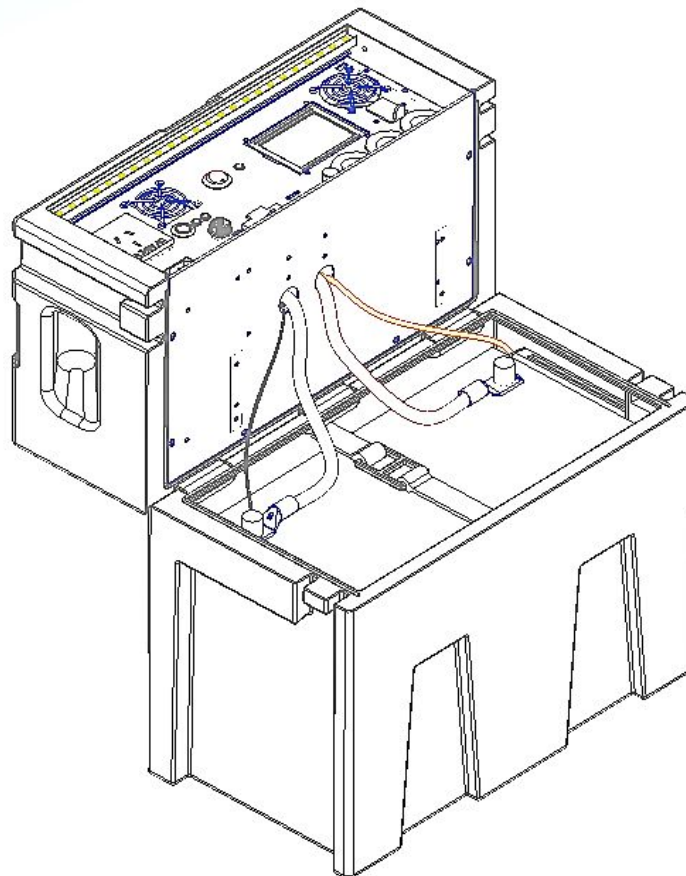


Using the Key provided, simply turn the Key to select the Battery Type that you intend to fit in the ToughPower. After making the selection we recommend that you remove the Key and store it in a secure location. After which there is no risk that an unsupervised child, or anyone else, can change the Battery Type selected.



**Note:** **Lithium LiFePO<sub>4</sub>** *TP-1000 & TP-1000DUAL models only*  
For **Lead Crystal** battery select AGM setting

Now you can place your battery inside the box, secure it using the Battery Strap, and then Connect the Battery Terminals.



**Warning:** Check the Polarity of your connections!  
Reds to Red (Positive to Positive) & Blacks to Black (Negative to Negative)  
Connect the thinner black cable (Battery Sensor) to the Negative terminal  
*TP-1000DUAL* has two red cables - connect both to the Positive Battery terminal  
Ensure each cable connection to the battery terminal is secure and tight

After closing the Lid, you can turn the ToughPower **ON**. The LCD screen will display the Battery Type selected:

TP-600 V1.00.000 - H1.0 LEAD/GEL	TP-1000DUAL V1.00.000 - H1.0 LEAD/GEL
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## 6.2 Battery Capacity & Condition Setup

In addition to selecting the battery chemistry type it is necessary to set-up its Capacity and Condition. This is only required when fitting a new battery, and by doing so, it will ensure that the ToughPower is able to perform calculations and estimations to keep track of the charge in and out of the unit based on the battery characteristics.

To update the battery configuration, follow these steps:

1. From the Home screen touch the Battery Icon to see the Battery Setup Configuration.
2. Touch and hold the **EDIT** button, the screen will update and display >> next to each parameter.
  - To save the configuration touch **SAVE** button
  - To reset the configuration to the default factory settings touch **DFLT** button and then touch **SAVE**
  - To modify each parameter, touch the arrows >> next to them and select the desired value

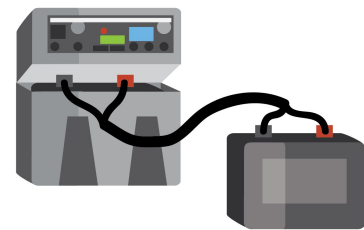
Type	LEAD/GEL	Type	LEAD/GEL
Condition	NEW	Condition >>	NEW
Capacity	100Ah	Capacity >>	100Ah
(HOME) Batt setup EDIT		(HOME) DFLT SAVE EDIT	
Type	LEAD/GEL		
Condition >>	NEW		
Capacity >>	BattBank		
(HOME) DFLT SAVE EDIT			

3. For Battery Condition, available options are:
  - NEW (new battery)
  - USED (regular use - up to 2yrs old)
  - OLD (2 yrs or older)
4. For Battery Capacity, available options are:
  - From 80Ah to 130Ah, & "Battery Bank" option (refer below)
  - Enter the Battery Capacity as stated on your Battery
5. When completed, touch **SAVE** to save the current configuration.
6. Touch **HOME** button to exit Battery Configuration and return to the Home screen.

**Note:** Updating the battery setup will reset all LOGS and USAGE records.

### 6.3 Battery Bank Setup

A second (or third) battery can be connected to the ToughPower to create a *Battery Bank*. With the addition of a second Battery connected in parallel you will be able to either extend the time between charging, or power more devices. The additional Battery must be the same *Type* of Battery chemistry as is fitted in the ToughPower otherwise you risk damaging the Battery as the *Charging Voltage* is specific to the Battery Type!



You will need to make a small cable with either Ring Terminals or Alligator Clips on **both ends** to connect to the *terminal posts* of both Batteries. **Remember:** connect Positive to Positive, & Negative to Negative. Keep the cable as short as possible and we recommend using AWG6 sized cable.

This method of connecting the two batteries directly to the terminal posts allows the ToughPower to provide the same *Low Voltage Shutdown* and *Charging Protections* to the second Battery.

Refer to section **Battery Capacity & Condition Setup** for instructions on how to set the “*Battery Bank*” option on the ToughPower LCD Screen.

Type	LEAD/GEL
Condition >>	NEW
Capacity >>	BattBank
(HOME) DFLT SAVE EDIT	

**Note:** When the *Battery Bank* option is setup correctly, the *time prediction* and *battery percentage* functions are disabled. For monitoring, the Battery Voltage will continue to be displayed on the LCD Screen.

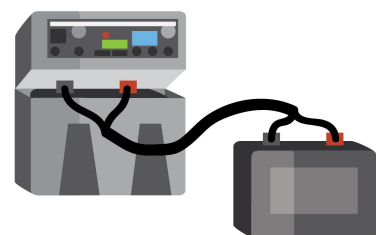
**Note:** Take special care to attach the Battery Terminals correctly! It must be **Parallel Connection** - Red to Red (Positive to Positive), and Black to Black (Negative to Negative). Incorrect terminals connection will cause permanent damage to the sensitive electronics inside the ToughPower.

**Warning:** You **cannot make a Series Configuration** to increase the system Voltage! The ToughPower is a 12V system only.

### 6.4 Charging a Boat Battery

A variation of the Battery Bank Setup is possible whereby an external Battery can be connected and charged by the ToughPower, and then disconnected after charging. For example: Charging a recreational boat deep cycle Battery.

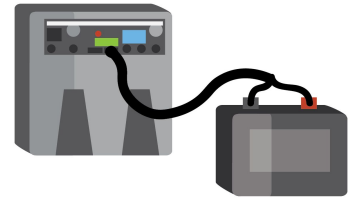
**Note:** This battery must be the same *Type* of Battery chemistry as is fitted in the ToughPower otherwise you risk damaging the Battery as the *Charging Voltage* is specific to the Battery Type! The Battery must have been removed from the boat/vehicle before connecting to the ToughPower.



Using the same or similar cable as described above in **Battery Bank Setup**, you will need to make a small cable with either Ring Terminals or Alligator Clips on **both ends** to connect to the *terminal posts* of both Batteries. Remember: connect Positive to Positive, & Negative to Negative. Keep the cable as short as possible and we recommend using AWG6 sized cable.

For the sporadic connecting and charging of an external battery you do not have to change the *Battery Capacity* Setting on the LCD. However, if you do this the *prediction times* displayed will be *incorrect* whilst you have the external battery connected (and will revert to correct functionality when the external battery is removed).

Alternatively, you can connect the external battery via the *RHS Anderson Connector* for effective charging, however this is not recommended as the ToughPower *Low Voltage Shutdown* protections will not comply to the external Battery connected this way.



**Note:** As soon as you connect the external Battery to the ToughPower the two Batteries will commence “equalising” their Voltage. You will need to ensure a Charging Source is attached and charging otherwise you risk flattening the ToughPower Battery.

**Note:** Take special care to attach the Battery Terminals correctly! It must be **Parallel Connection** - Red to Red (Positive to Positive), and Black to Black (Negative to Negative). Incorrect terminals connection will cause permanent damage to the sensitive electronics inside the ToughPower.

## 7. Charging the Battery

The ToughPower controlled by an integrated microprocessor and includes:

- 10 Amp Multi-Stage DC-DC Charger - *Input 8-16 VDC*
- 10 Amp AC-DC Mains Charger - *Input 100-240VAC 50/60Hz 2A*
- MPPT Solar High Efficient Controller - for 12V *Nominal* Solar Panels
- Dual Battery Smart Charging Controller *TP-1000DUAL model only*

This unique technology provides maximum flexibility and options for charging – Mains Power to charge when at home, Car Charging for when you are on the move, Solar Power for when you're free camping.

To start charging your battery from any source first ensure you have selected the correct Battery Type using the Concealed Key-Switch and the Master ON/OFF Switch is in the **ON** position.

**Note:** When multiple CHARGING inputs are attached, and powered simultaneously, the internal electronics will automatically select the highest charging input.

**Note:** The battery is protected from OVER-VOLTAGE. Automatic shut-off will occur when the battery is fully charged.

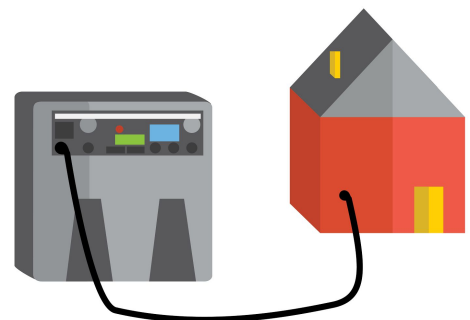
### 7.1 Mains Power Charging – (MAINS)

Using the Kettle Cord supplied, connect the Kettle 3-Pin Plug into the ToughPower and then connect the Australian 3-Pin Plug into a standard power point socket.

The LCD display will show that the battery is being charged from **MAINS** input.



The internal 10 Amp AC-DC Charger will receive and regulate the Mains input power to charge the Battery fitted in the ToughPower. The multi-stage charger will charge and condition the Battery, and will shut-off when charging is complete.



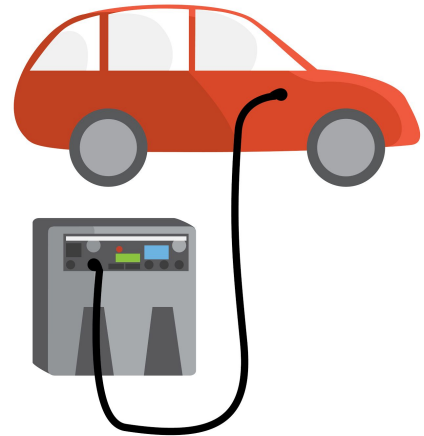
**Note:** If this Kettle Cord is damaged, do not use and discard immediately! Contact the manufacturer, or designated service agent, or similar qualified person for a suitable replacement part.

### 7.2 Car Power Charging – (CAR) 12V Systems only

Attach the provided 4-Pin CIG Plug Accessory Cable to your vehicle ignition controlled CIG Socket (ie. the car CIG Socket only has power when the car is running) and to the

ToughPower. Charging of the Battery will only occur when the Vehicle is running or the Car Key is in the “Accessories” position.

The LCD display will show that the battery is being charged from **CAR** input.



The internal 10 Amp DC-DC “Multi-Stage” Charger will receive and regulate the power to charge the Battery fitted in the ToughPower. The multi-stage charger is current limited and cannot draw more than 10 Amps of power. It will charge and condition the Battery, and will shut-off when charging is complete.

**Note:** The current will not exceed 10 Amp through your Vehicle CIG Socket.

**Warning:** It is recommended that the vehicle CIG Socket **must** be ignition controlled so that it is only powered when the vehicle is in “Accessories” mode or running. Check this with your vehicle manufacturer or local service provider otherwise you run the risk of discharging your car’s main battery.

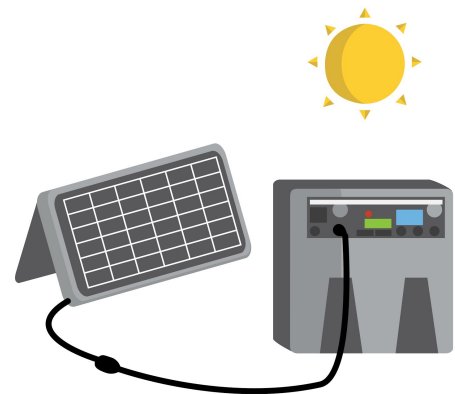
### 7.3 Solar Power Charging – (SOLAR) 12V Nominal Solar Panels only

The ToughPower can accept Regulated and Unregulated Solar Power **12V Nominal Solar Panels only**. When Unregulated Solar Panels are connected the internal electronics automatically detect this and will switch to MPPT Controller mode.

12V *Nominal* Solar Panels:  
Max Voc = 25V

The TP-1000<sub>DUAL</sub> is supplied with a 2-Pin Accessory Cable. Connect the 2-Pin Plug into the ToughPower then connect the bare ends to your Solar Panel using your preferred connector.

**Note:** Check the Polarity of your connections!



The TP-600 & TP-1000 are supplied with a 4-Pin CIG Plug Accessory Cable. This same Accessory Cable is used for both Car Charging and Solar Charging. To enable you to swap between the two charging options, it is recommended you attach a female CIG Socket to your Solar Panel, then simply connect the 4-Pin Plug into the ToughPower and connect the CIG Male Plug end into your Solar Panel female CIG Socket. **Note:** Check the Polarity of your connections!

**WARNING:** Great care must be taken when attaching connectors to ensure the polarity is correct!

The LCD display will show that the battery is being charged from **SOLAR** input.



The internal MPPT Controller and multi-stage charger will receive and regulate the power to charge the Battery fitted in the ToughPower. Up to 10 Amp charging can be achieved through Solar Charging. The multi-stage charger will charge and condition the Battery, and will shut-off when charging is complete.

#### 7.4 Dual Battery Bypass Controller: *TP-1000<sub>DUAL</sub> model only*

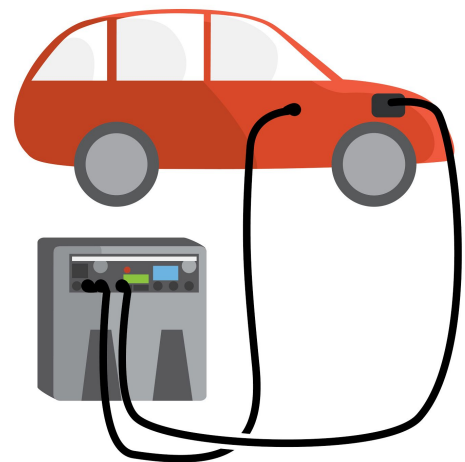
##### Direct Alternator Bulk Charge & DC-DC Charging

The advanced technology inside the Lid controls when to bypass the internal DC-DC Charger to allow the Vehicle's Alternator to provide BULK charging power direct to the ToughPower Battery, and then switch the internal DC-DC Charger inline to finish charging the battery.

This unique capability in the ToughPower allows the best of both existing dual battery charging technologies! Direct connection to the vehicle Alternator for BULK charging (no excess heat generated as with high current DC-DC Charging electronics) and then switch the 10A DC-DC Charger inline to complete the charging.

##### Dual Battery Setup Instructions

1. Attach the provided 4-Pin CIG Accessory Cable to a vehicle ignition controlled CIG Socket and to the ToughPower. **Note:** the vehicle *CIG Socket MUST be ignition controlled* - ie only has power when the car is running.
2. Attach an AWG6 cable from your vehicle's main battery to the ToughPower's LHS Anderson Input Socket. We recommend you include a **100A fuse** as close to the vehicle battery (AWG6 cable and fuse not supplied).
3. Make sure the ToughPower is switched **ON** and the internal electronics will do the rest!



With both vehicle input charging cables connected to the ToughPower, the ToughPower will start charging as soon as the vehicle key is turned into the Accessories position or the engine starts running. **Note:** If at any time the CIG Accessory Cable gets disconnected or the vehicle is turned off charging will be disabled.

**Note:** The charging current through the CIG Accessory Cable is limited to *10 Amps*. The current will not exceed 10 Amps through your vehicle CIG Socket.

While charging through the CIG Accessory Cable the ToughPower will evaluate if BULK Charge (from the vehicle alternator) is required, during this stage the HOME screen displays the BULK icon next to the charging source to acknowledge the presence of the Dual Battery setup.





When the charging current through the CIG Accessory Cable exceeds 8.5A the BULK input will be enabled to test the available vehicle alternator current. After testing for 30 seconds if the BULK charging current exceeds 10 Amps the ToughPower will remain in ALTERNATOR BULK charge until the charging current drops below 11 Amps (after the BULK Charging stage). During this stage, the HOME screen will show the input source as BULK.



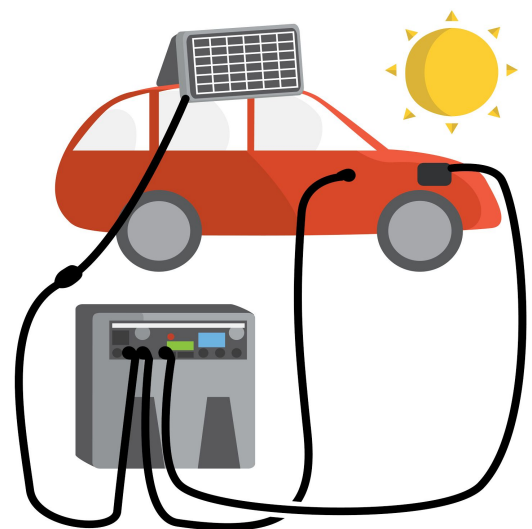
When BULK charge has finished, the built-in DC-DC Charger will finish off the charging process providing the required final charging stages for the selected Battery Type (Note: A TP-1000DUAL fitted with a Lithium LiFePO4 Battery does not have a float stage).



## 7.5 Multiple Charging Sources Connected

The ToughPower can be set-up with multiple Input Charging Sources *permanently* connected. The advanced technology inside the Lid automatically controls when to switch between Input Sources based on which is providing the greatest charging power.

This capability includes attaching the Kettle Cord to a Mains Power supply. Obviously this cannot be done when driving, however it is a convenient charging option when you have an overnight stay at a powered site in a caravan park.



## 7.6 External Power Charging – (EXT)

An External 12V Battery Charger can be connected to the ToughPower to provide high current charging. Perfect if you already own a Generator and a high current 12V Battery Charger and want to minimise your Generator run time whilst maximising the input charge into the Battery. This capability is permitted using the **Right Hand Side** Anderson *Output* Connector only. The maximum charging current permitted is 50 Amps as the Anderson Connector is protected with a 50A Self Resetting Circuit Breaker.

You will need to fit an Anderson Style Connector to your 12V Battery Charger, then connect it to the RHS Anderson Output Connector. **Note:** Check the Polarity of your connections!

Ensure the ToughPower is switched **ON**, and all other **input Charging Sources must be disconnected** from the ToughPower.

By attaching to the RHS Anderson Connector the internal electronics and microprocessor will monitor the charging input from the External 12V Battery Charger, and display information on the LCD.



**Note:** All other **input charging sources must be disconnected** when using an External Charger.

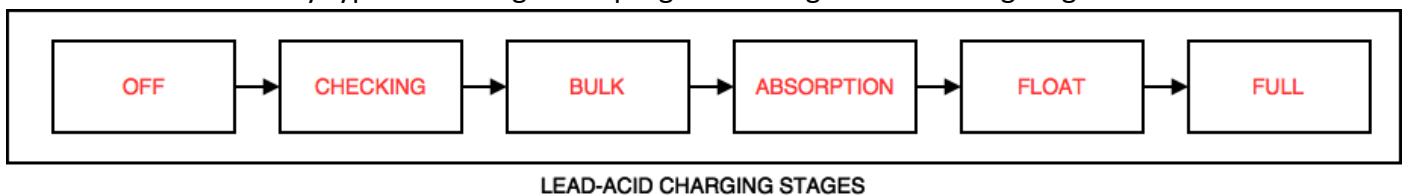
Alternatively, you can *open* the ToughPower Lid, and attach the External 12V Battery Charger's *Alligator Clips* directly to the Battery terminals. This *bypasses* the ToughPower's electronics and therefore the LCD will *not* display accurate information about the battery state of charge.

**Note:** For this method of charging, all other **input Charging Sources must be disconnected** and all **Power Outlets must be disconnected** from the ToughPower.

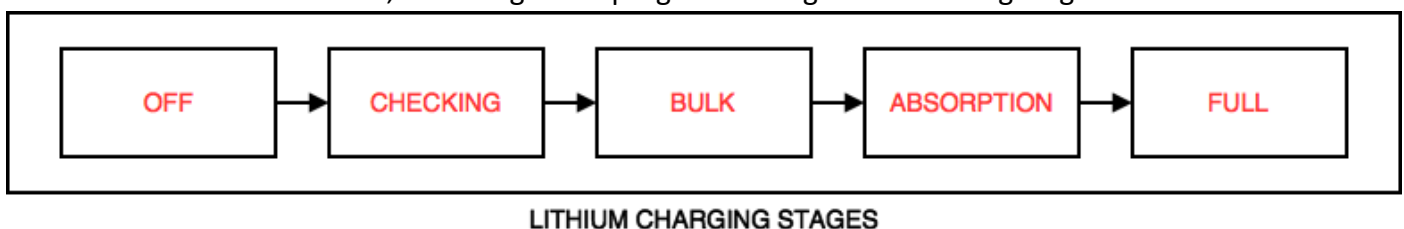
## 7.7 Charging Stages

The ToughPower it is equipped with a built-in integrated multi-stage DC-DC Battery Charger. This section provides a brief description of each stage.

For all Lead-Acid battery types the charger will progress through the following stages:



For Lithium LiFePO4 batteries, the charger will progress through the following stages:



- **OFF:** Charger is disabled.
- **CHECKING:** In this stage (reduced constant-current/trickle charge), the charger charges the battery with a reduced constant current. This trickle charge stage occurs for battery voltages between 35% to 70% (typical) of the voltage limit provided in the **Charging Voltage Limits** section below.

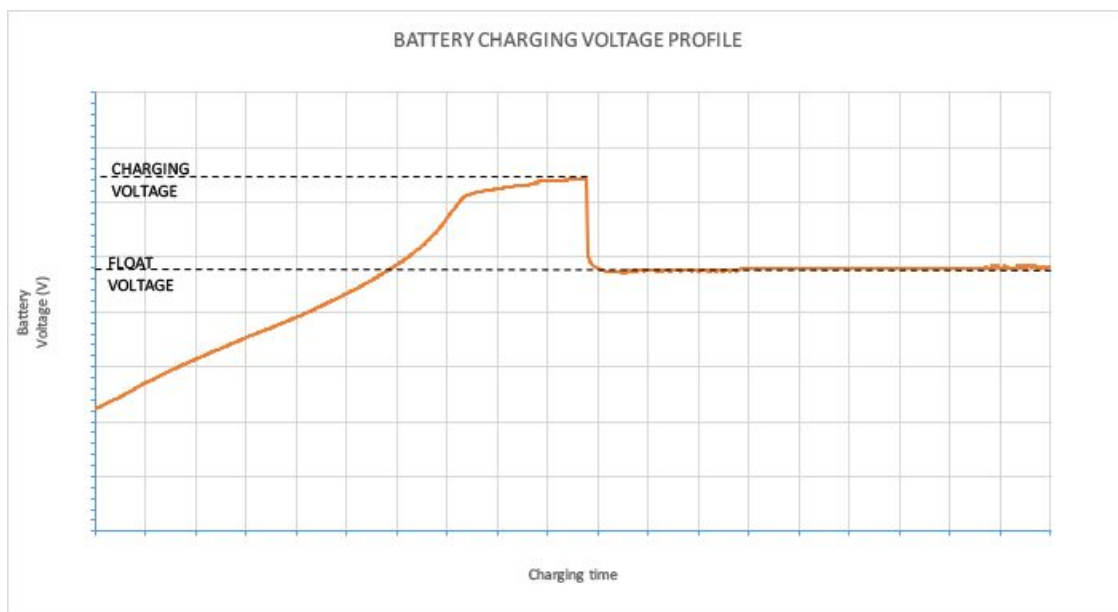
- **BULK:** In this stage (full constant-current) the charger charges the battery with a constant current. This constant current stage occurs for battery voltages between 70% to 98% (typical) of the voltage limit provided in the **Charging Voltage Limits** section below.
- **ABSORPTION:** In this stage (constant-voltage) the charger charges the battery with a configured constant voltage. This constant voltage stage occurs for battery voltages above 98% (typical) of the voltage limit described in **Charging Voltage Limits** section below.
- **FLOAT:** In this stage, the charger charges the battery with a reduced constant voltage. **Note:** This stage is not applicable for Lithium LiFePO4 batteries.
- **FULL:** Charger disabled, charging complete.

## 7.8 Charging Voltage Limits

The Battery Charger applies the appropriate Charging and Float Voltages depending on the Battery Type as well as combining automatic Temperature Compensation.

Battery Type	Charging Voltage ( $V_{DC}$ ) at 25°C	Float Voltage ( $V_{DC}$ ) at 25°C
LEAD/GEL	14.2	13.3
CALCIUM	15.3	13.3
AGM	14.6	13.3
LITHIUM LiFePO4	14.6	N/A

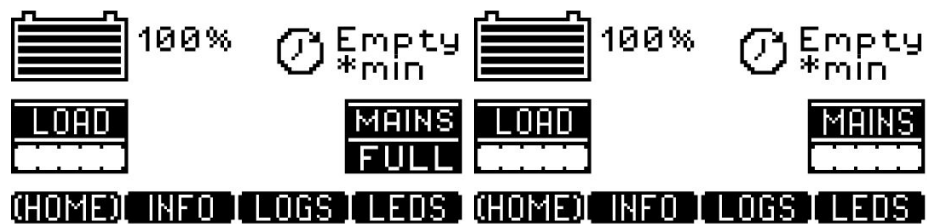
**Note:** For *Lithium LiFePO4* batteries there is no FLOAT stage.



## 7.9 Charging Complete

When charging finishes the HOME screen will show the charging source with a FULL message. At this point the Battery Charger will automatically shut off and there is no risk of overcharging the battery.

With the Battery fully charged and synchronized the ToughPower will be able to keep track of the charge in and out of the unit and estimate the remaining time to Full or Empty.



Under some circumstances the **FULL** message may disappear because the Battery Charger will resume charging again if the Battery Charge Level drops. The user can identify that the charge has been completed because the Battery Charge Level will automatically change from showing **Volts** to **Percentage** as well as showing the time remaining icon.

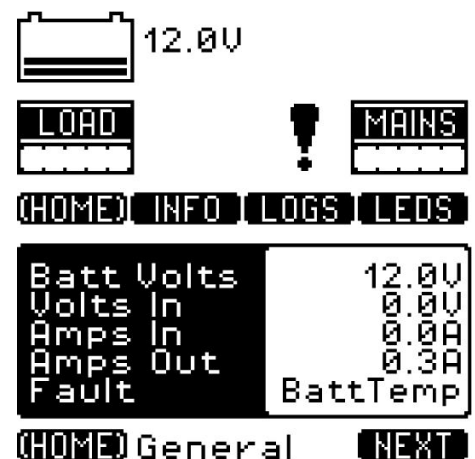
**Note:** In the event of LOW VOLTAGE (battery protection), the ToughPower will automatically shut-off and the Battery Charging State will be reset.

## 7.10 Charging Protections

The built-in integrated multi-stage charger is equipped with several protections that will ensure the battery is always protected. The LCD Screen will indicate this condition with a *Warning icon* to the left of the Input Source icon as shown. The *FAULT led* will also pulse. To find out more information simply touch the Warning icon.

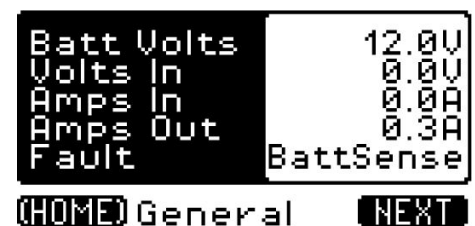
### Fault: BattTemp

If the battery temperature falls below 0°C or rises above 50°C charging will be immediately disabled to prevent any damage to the battery. Charging will automatically resume after the battery temperature gets above 5°C or below 45°C. During this condition the *FAULT led* will pulse red twice every 3 seconds.



### Fault: BattSense

If the battery sensor harness gets damaged, the multi-stage charger will be immediately disabled to prevent damage to the battery. *Please contact IntelliQuip support for assistance.* Under this condition the *FAULT led* will pulse red once every 3 seconds.



## 8. Using the ToughPower

### 8.1 Time Prediction - LCD Screen

As described in the section **Charging Complete**, the *Time Prediction* feature will be enabled after a FULL charge of the battery has been completed. This is to ensure that the built-in charger is synchronized with the battery state and can start keep tracking of the charge in and out of the battery.

For *Time Prediction*, the ToughPower uses built-in sensors to measure current (Amps) flowing in and out of the ToughPower as well as a combination of software algorithms to compensate for the changes in capacity of Lead-Acid type batteries when being used. The effects are described by Peukert's Law, the internal algorithms use the following constants for each type of battery:

Type	Peukert constant
LEAD/GEL	1.30
CALCIUM	1.20
AGM	1.10
LITHIUM LiFePO4	1.00

In addition, the Battery Condition influences the overall capacity as well. The following values are added to the Peukert constant to improve the accuracy of the calculations:

Condition	Add
NEW	0.00
USED	0.10
OLD	0.20

**Note:** In terms of *Time Prediction* it is almost impossible to have 100% accuracy due to several external variables impacting the result. Hence, time prediction calculations should be taken as a *reference only*. Always check the Battery Voltage and use that as a reference as well.

The time remaining icon will change depending on the overall **Load** on the system. When the ToughPower is being discharged the time icon will show *Empty* and whilst charging it will show *Full*, as shown in the examples below. **Note:** Time prediction is updated every 15 seconds.

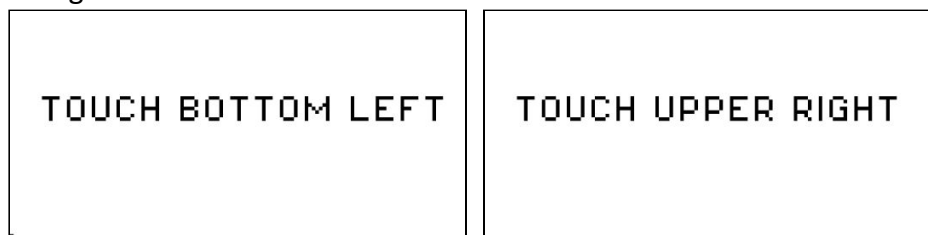


## 8.2 LCD Touch Screen Calibration

The ToughPower is equipped with a resistive Touch Screen panel which comes factory calibrated. If for any reason the touch functionality becomes inaccurate you can attempt to recalibrate it by following the next steps.

Touch-screen calibration steps:

1. Turn OFF the Master ON/OFF Switch
2. Press and hold the Pure Sine Wave Inverter ON/OFF button
3. Turn ON the Master ON/OFF Switch
4. Follow the on-screen instructions:
  - a. TOUCH BOTTOM LEFT, a small square will appear on the bottom left corner, touch it with your finger
  - b. TOUCH UPPER RIGHT, a small square will appear on the upper right corner, touch it with your finger



5. End of calibration

## 8.3 LCD Automatic Shutoff

The ToughPower LCD Screen will automatically turn off after 30 seconds of inactivity to reduce current consumption. To wake up the LCD Screen simply touch the screen once. The LCD Screen will also wake up automatically when a new charging Input is connected or the Inverter is turned ON.

## 8.4 LCD HOME Screen

### 8.4.1 Battery Status

The *Battery icon* located on the HOME Screen indicates the *State of Charge* of the battery. If a new battery has been set-up but it has not been completely charged the HOME screen will only show the *Battery Voltage*. *Time Prediction* has not yet been enabled so will not be displayed.






After a *full battery charge* has been completed, the HOME screen will now display the *Time Prediction* icon as well as allow the user to switch between *Charge Percentage* or *Battery Voltage* (whatever your preference) simply by touching it.



### 8.4.2 System Output LOAD




The system **LOAD** bar graph located in the HOME screen provides a quick representation of how much load the ToughPower unit is providing to the Outlets.

ToughPower Model	Maximum Amps OUT	 12.5V	 Empty 2hrs
TP-1000 & TP-1000DUAL	100		
TP-600	50	(HOME)	INFO LOGS LEDS

### 8.4.3 System Input CHARGE

The system **INPUT** charge icon appears on the HOME screen as soon as an *Input Source* is detected. It shows the *active* source input while the bar graph provides a quick representation of how much load the Input Charger is taking.

Based on the connected Input Source type the System Input *Bar Graph* will represent the Charging Current (A) with respect to the maximum Amps IN for its type.

Input Source	Maximum Amps IN (A)	 12.7V	
MAINS	10		
CAR	10		
BULK	100		
SOLAR	20		
EXT	50	(HOME)	INFO LOGS LEDS

## 8.5 LCD INFO Screen

From the HOME screen touch the INFO icon to access the ToughPower information screens. This view provides useful and detailed information about real-time status of the ToughPower. To navigate through the different information screens, simply touch the NEXT icon located on the bottom right corner or use a swipe right/left gesture.

### 8.5.1 General Information

This view provides dynamic information about the ToughPower real-time status.

- Batt Volts: Indicates the Battery voltage.
- Volts In: Indicates the charging input voltage.



- Amps In / Watts In: When charging from SOLAR input the screen will display *Watts In* to indicate the power in. Any other charging source will show the current in (Amps) on the screen.
- Amps Out: Indicates the current consumption of the unit.
- Stage / Timer / Fault: This label can show the Charger Stage whilst charging or the *time remaining* of the Timer AC if it has been enabled or Charger Fault information.

If the multi-stage charger detects a fault condition, the INFO screen will show Fault details.

Possible fault conditions are:

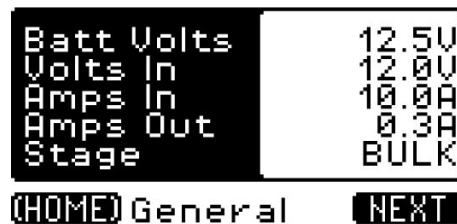
- BattSense: Battery Sensor fault.
- BattTemp: Battery Temperature fault.



For more details refer to the **Charging Protections** section.

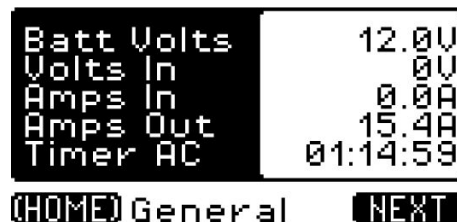
Example A:

This shows the General INFO screen whilst charging the ToughPower. The Charger Stage can vary as described in the **Charging Stages** section.



Example B: *Applies only to TP-1000 & TP-1000<sub>DUAL</sub> models*

This shows the General INFO screen when the Timer AC has been activated.



Example C:

This shows the General INFO screen when a Solar panel is connected.

Batt Volts	12.5V
Watts In	60W
Amps In	4.0A
Amps Out	0.3A
Stage	BULK

(HOME) General    NEXT

### 8.5.2 Usage Information

The ToughPower keeps track of the charge *in* and *out* of the battery. This information is displayed on the *Usage* page of the **INFO** screen.

- Used: Amps Hour used from any of the Outlets.
- Mains In: Amps Hour charged from Mains.
- Solar In: Amps Hour charged from Solar.
- Car In: Amps Hour charged from Car input (includes charge from Bulk input if available).

Used	4.2Ah
Mains In	10.3Ah
Solar In	1.1Ah
Car In	0.0Ah
Log time >>	00:45:24

(HOME) Usage    NEXT

At any time, the user can reset the log time by touching and holding the >> arrows next to *Log time*. Otherwise the logging time will automatically reset after 99:59:59 (approximately 41 days).

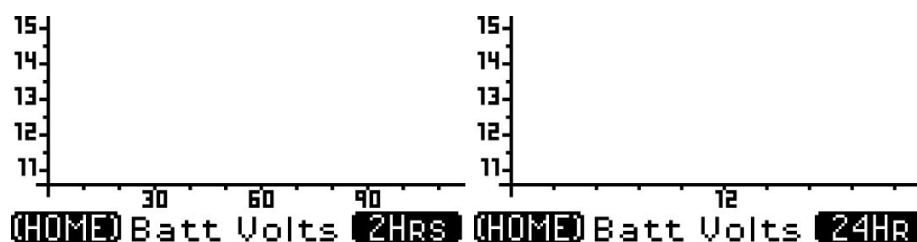
Used	0.0Ah
Mains In	0.0Ah
Solar In	0.0Ah
Car In	0.0Ah
Log time >>	00:00:01

(HOME) Usage    NEXT

### 8.6 LCD LOGS Screen

*Applies only to TP-1000 & TP-1000DUAL model*

The built-in sensors of the ToughPower actively monitor three key *Battery Status* measurements: Voltage, Amperes In and Amperes Out. The LOGS screens represent this information in two time frames, 2HRS and 24Hrs. The user can switch between them by touching the 2HRS/24HR button on the bottom right corner. To navigate through the different log screens simply touch the bottom log label or use a swipe right/left gesture on the screen.



The 2Hrs time interval log provides real time data allowing the user to *closely* monitor the battery status over the last 120 minutes. To represent this data, the ToughPower takes a sample every 1 second, after 60 samples it computes the average and updates the graph with the latest value.

**Note:** This data will be reset when the unit is turned off.

The 24Hrs time interval log provides history of the battery for the last 24 running hours (system up-time) allowing the user to have an *overall view* of a complete system charge or how much charge has been used. The 24Hrs data is updated every 12 minutes and it is saved in the internal system memory. This means restarting the ToughPower will *not* reset this data. However, setting a new battery will reset the logs.

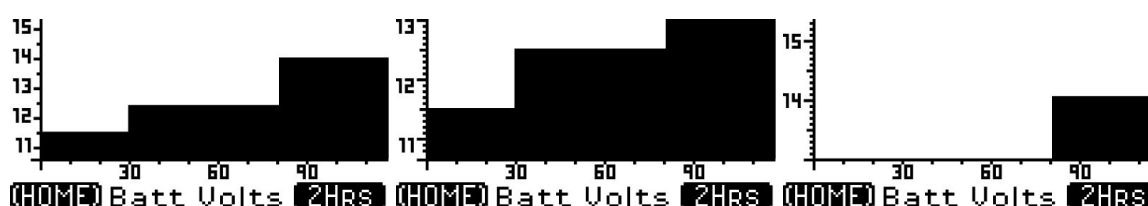
In every log screen near the axis origin there is a small square tick marker that flashes every 1 second to indicate the logging feature is running. Under LOW VOLTAGE protection mode, the logging stops to allow the user to analyse the logs.

### 8.6.1 Battery Voltage logs

The *Battery Voltage* logs allow the user to monitor the Voltage over the last 2Hrs or 24Hrs time frames. By default, this log displays the voltage range from 10.8 - 15.3 Volts.

Touching the lower end of the vertical axis changes the range to 10.8 - 13 Volts.

Touching the upper end of the vertical axis changes the range to 13 - 15.3 Volts.

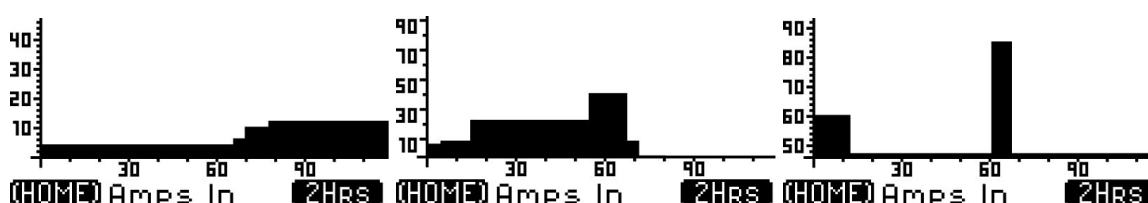


### 8.6.2 Amps In logs

The *Amps In* logs show the charging current from any source during the last 2Hrs or 24Hrs time frames. By default, these logs display the charging current ranging from 0 - 45 Amps.

This range can be expanded to 0 - 95 Amps by touching the vertical axis.

Touching once more in the upper portion of the vertical axis will change the range from 45 - 95 Amps.



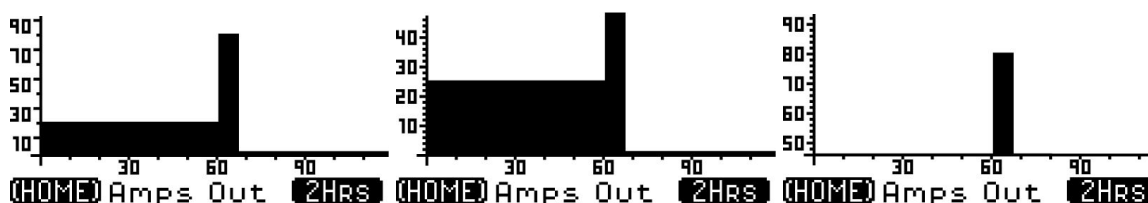
### 8.6.3 Amps Out logs

The *Amps Out* logs show the Output Current used from any Outlet over the last 2Hrs or 24Hrs time frames. By default, these logs display the output current ranging from 0 - 95 Amps.

By touching the lower end of the vertical axis, the range changes to 0 - 45 Amps.

Touching the axis one more time returns to the default range.

By touching the upper portion of the vertical axis will change the range from 45 - 95 Amps.



## 8.7 USB Charger

The ToughPower is equipped with two independent fast charge USB chargers compatible with Android and Apple smartphones and tablets. Each USB port can provide up to 2.5A @ 5V. For additional information about USB low voltage cut-off please refer to section **USB Low Voltage Protection**.

To start charging your USB device, simply connect it to any of the two USB port on the front panel and ensure the ToughPower is turned ON. The USB ports are disabled when the ToughPower is switched OFF.

**Note:** For Apple devices, it is recommended to use original Apple USB leads to get the maximum charging capabilities. Using non-original Apple leads may result in low charging rates.

**Note:** When the system is in LOW VOLTAGE mode, the two USB ports are still powered so that you can use them for emergency only.

## 8.8 LED Lighting

A LED light strip is located at the top front of the ToughPower. This is ideal for lighting up your campsite or work area. Simply touch the **LEDS** button on the **HOME** screen to toggle ON/OFF. A brightness control screen will be displayed to adjust the brightness in 10% increments or to select one of the three *brightness presets* (Low, Med, Max).



To access the brightness control while the LED light strip is already ON, touch and hold the **LEDS** button from the HOME screen and it will pop up.

To modify any preset value simply dial in the desired brightness value then press and hold the preset button, the LED strip will blink to confirm the updated value. To reset the presets back to default configuration touch and hold the percentage textbox the LED strip will blink twice to confirm the new settings.

## 8.9 240V<sub>AC</sub> 50Hz Mains Power Output

There are 3 ToughPower models:

**TP-600** is fitted with a 600W Pure Sine Wave Inverter

- Continuous Power 500W
- 600W (5min)
- Peak Power 1200W

**TP-1000** is fitted with a 1000W Pure Sine Wave Inverter

- Continuous Power 800W
- 1000W (5min)
- Peak Power 2000W

**TP-1000<sub>DUAL</sub>** is fitted with a 1000W Pure Sine Wave Inverter

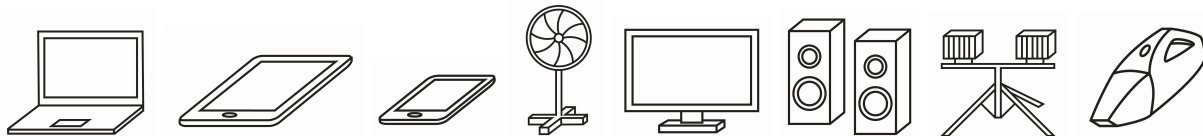
- Continuous Power 800W
- 1000W (5min)
- Peak Power 2000W



All models provide 240V AC 50Hz “Mains” Power 10A maximum load.

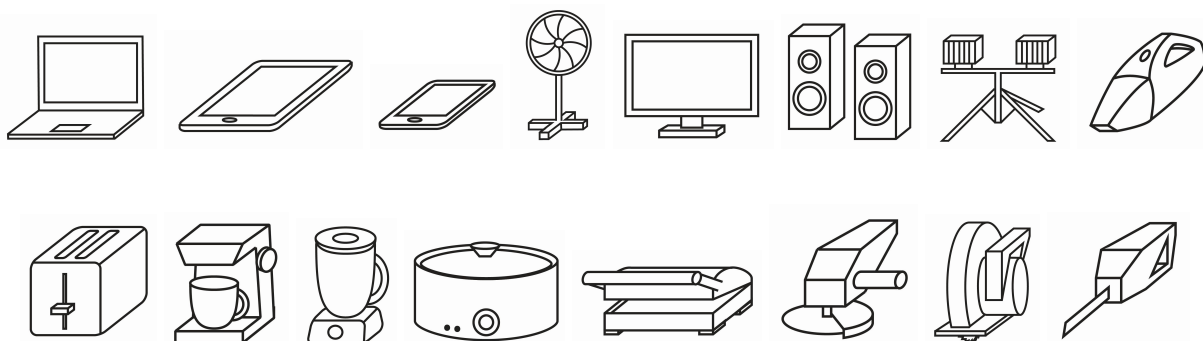
Simply connect your mains power appliance into the 3 Pin Socket and press the push button to switch ON. A green LED will light to show that the Inverter has sufficient power from the battery to operate.

Appliances that can be used with the **TP-600** model:



**Note:** Always check the Wattage capacity of the appliance before connecting to the ToughPower!

Appliances that can be used with the **TP-1000 & TP-1000<sub>DUAL</sub>** models:



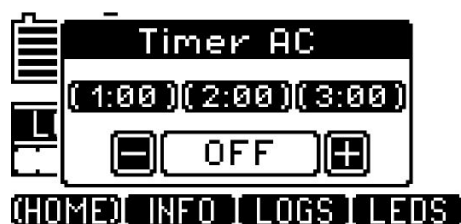
**Note:** Always check the Wattage capacity of the appliance before connecting to the ToughPower!

### 8.9.1 Timer AC

*Applies to TP-1000 & TP-1000<sub>DUAL</sub> models*

The TP-1000 & TP-1000<sub>DUAL</sub> is equipped with a *Timer* for the Pure Sine Wave Inverter. This allows the user to turn ON and run the Inverter for a specific time interval. Simply turn ON the Pure Sine Wave Inverter, and the LCD screen will show the **Timer AC** control window to allow the selection of a timer pre-set, or

alternatively, adjust the timer in 15 min increments. If timer is left as OFF the Inverter will run until it is turned OFF by the user.



When the timer is set, once the configured time expires the inverter will automatically turn OFF. The progress of the timer can be checked from the INFO screen.



### 8.9.2 Pure Sine Wave Inverter Safety Protections

The Pure Sine Wave Inverter has an in-built safety cut-off function that will automatically disable the Inverter when a *Low Voltage Battery* condition exists – this is to protect the battery from damage. The battery will need to be recharged before you can recommence using 240V<sub>AC</sub> power.

The Inverter has an audible alarm that will sound when an *Over Temperature* condition exists. Power to the 240V<sub>AC</sub> socket will shut off so to prevent damaging the electronic circuits. After a 15-minute cool-down period the Inverter can then be switched back on.

**Note:** The Inverter cannot be used whilst the ToughPower is charging from MAINS or an EXTERNAL source. The following message will appear to indicate this restriction.



### 8.9.3 AC Overload

If the electrical device that you have connected has a higher Power Rating than the built-in Pure Sine Wave Inverter, then the Inverter will not have enough power to power the device and will turn itself OFF. An audible alarm will indicate this condition. This includes devices that have a rating above the Continuous Power Rating of the Inverter, and below the Peak Power Rating of the Inverter.

Example A: An Angle Grinder with 1500W Power Rating, or Pod Coffee Machine with Power Rating 1360W can be connected to the TP-1000 & TP-1000<sub>DUAL</sub>. Both devices can be powered for a shortened period as

their Power ratings exceed 1000W but are below the instantaneous Peak Power rating of 2000W. The Inverter will automatically shut itself OFF after a short period of powering these devices.

Example B: A Kettle with 2200W Power Rating, or Gerni (High Pressure hose) with 2400W Power Rating can not be connected to any model. The Inverter will immediately shut itself OFF should you attempt to power these devices.

### 8.9.4 Car Alternator BULK Power supply to Inverter

*TP-1000<sub>DUAL</sub> model only*

When the ToughPower is connected as per the **Dual Battery Bypass Controller** setup, and the car is running, the ToughPower will attempt to obtain the required power for the 1000W Pure Sine Wave Inverter from the car Alternator. Direct BULK power from the car Alternator effectively means that your car can provide an “unlimited” source of power to high power appliances instead of discharging the ToughPower battery.

## 8.10 12V<sub>DC</sub> Power

### 8.10.1 Low Current Outlets

The ToughPower unit is equipped with three low current 12V<sub>DC</sub> Outlet Sockets.

- CIG socket
- Engel socket
- Merit socket



The combined simultaneous load on these outlets cannot exceed 15 Amps, otherwise the Circuit Breaker will disconnect the power.

Simply connect your appliance to the appropriate socket as required. Power is immediately available. These three DC Outlet sockets are protected by a single **15 Amp Manual Reset Circuit Breaker**. The circuit breaker button will “pop” out to indicate that current has been stopped to the three Outlet Sockets. After waiting a few minutes, the circuit breaker button can be depressed and power to the three DC outlet sockets will resume.

### 8.10.2 High Current Outlets

For **High Current** 12V<sub>DC</sub> power the ToughPower is equipped with Anderson Connector/s. The TP-1000<sub>DUAL</sub> model is provided with 1 Anderson connector while the TP-600 & TP-1000 models are provided with 2 Anderson connectors.

Attach your high current device to the Anderson Connector and power is immediately available. The Anderson Connector/s have a **50 Amp Max** load. This connector is protected with a **50 Amp Self Resetting Circuit Breaker**. When an overcurrent condition exists the internal circuit-breaker will activate and stop power to the connector. After a few minutes the circuit breaker will automatically reset and power to the connector will resume.



## 8.11 System Protections

The ToughPower is equipped with software and hardware protections that will ensure the internal electronics components and the connected battery remain within safety operating parameters. If the unit enters any protection mode or detects any faults the status LED located on the front of the ToughPower (next to the Master Switch) will pulse RED to notify this condition as detailed in section **FAULT LED Indication**.

Under normal operation the LED will turn on GREEN.

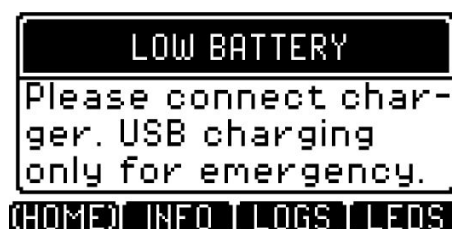
Table below summarizes what features are enabled and available depending on the active protection mode.

PROTECTION MODE	INPUTS				POWER OUTLETS		LED	USB
	MAINS	CAR	SOLAR	EXT	AC	DC		
<b>NORMAL</b>	ENABLED	ENABLED	ENABLED	ENABLED	ENABLED	ENABLED	ENABLED	ENABLED
<b>LOW-VOLTAGE</b>	ENABLED	ENABLED	ENABLED	DISABLED	DISABLED	DISABLED	DISABLED	ENABLED *
<b>RECOVERY</b>	ENABLED	ENABLED	ENABLED	DISABLED	DISABLED	DISABLED	DISABLED	ENABLED *
<b>OVER-TEMP</b>	DISABLED	DISABLED	DISABLED	DISABLED	DISABLED	ENABLED	DISABLED	ENABLED
<b>OVER-TEMP-LCD</b>	DISABLED	DISABLED	DISABLED	DISABLED	DISABLED	ENABLED	DISABLED	ENABLED

Note: \* When the system is in LOW VOLTAGE & RECOVERY modes, the two USB ports are still powered so that you can use them for emergency only.

### 8.11.1 Low Voltage Protection

The built-in sensors monitor the Battery Voltage constantly. If during usage the Battery Voltage drops below the pre-set limits defined for each battery type (see table below) the ToughPower will automatically activate the LOW VOLTAGE Protection Mode. All AC and DC Power Outlets are automatically *disabled* to isolate and protect the battery from damage. All Charging Inputs remain *open* to accept Charging Power as soon as it becomes available. The LCD will display the following message to notify this event.



Type	Low Voltage Cut-off ( $V_{DC}$ )
LEAD/GEL	10.8
CALCIUM	10.8
AGM	10.8
LITHIUM LiFePO4	11.6

For Lead-Acid family battery types the Low Voltage limit is dynamic depending on the System Load to compensate for the internal battery losses associated with these types of batteries.

System LOAD	Low Voltage Cut-off (V <sub>DC</sub> )
0% - 20%	10.8
20% - 40%	10.7
40% - 60%	10.6
60% - 80%	10.5
80% - 100%	10.4

When the built-in Pure Sine Wave Inverter is in operation if the Battery Voltage drops below the safety limits the unit may activate the LOW VOLTAGE Protection Mode or in some cases the Inverter's built-in protection may beep to alert of a Low Voltage condition and turn off the AC output off.

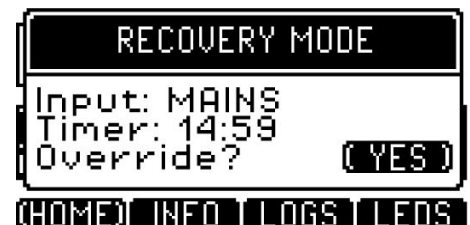
At this point it is recommended to connect a Charging Source before trying to continue to use any of the ToughPower Power Outlets. Follow recommendations detailed in the next section **Recovery Protection**.

**Note:** It is highly recommended that a full charge be completed after the ToughPower goes into LOW VOLTAGE Protection Mode. This will extend the battery lifespan and prevent any long-term damage.

### 8.11.2 Recovery Protection

If the ToughPower enters LOW VOLTAGE Protection Mode, connect any active Charging Source (except for EXTERNAL) as described in section **Charging the Battery**. By doing this the ToughPower will enter RECOVERY Protection Mode. In this mode the ToughPower will charge the battery but will keep the AC and DC Power Outlets *disabled* for a period to allow the battery to recover some charge.

Depending on the type of Charging Source a *Recovery Timer* will automatically be set. For MAINS and CAR the Recovery Timer will count down 15 minutes, and for SOLAR it will take 30 minutes. When the Recovery Timer expires, the ToughPower clears the RECOVERY Protection Mode condition and returns to Normal operation.



The Recovery Timer can be overridden at any time by touching the **YES** button to re-enable the AC & DC Power Outlets and return to Normal operation.

When in RECOVERY Protection Mode the INFO screen will show the Battery Volts as Not Available (N/A). When the Recovery Timer expires, or the user overrides it, the Battery Voltage will be displayed again.

Examples below show the INFO General Screen when in Recovery Protection Mode. The left image indicates that the Battery Voltage reading is N/A (i.e. Power is disabled to Power Outlets) and the right image showing that a Charging Source is inputting 8 Amps 12V into the Battery and that Power to the Power Outlets is still disabled.



### 8.11.3 Over Temperature Protection

The ToughPower built in Temperature Sensors monitor different internal temperatures and the Battery temperature constantly to protect the internal components as well as the battery. While using the Toughpower, if any of these sensors surpasses a predefined safety limit the ToughPower will enter OVER TEMPERATURE Protection Mode. Refer to the table in the section **System Protections** for the features that are disabled and available during this Mode.

Allow the unit to cool down before trying to use any of the ToughPower Power Outlets. The OVER TEMPERATURE Mode will clear automatically once the internal temperatures fall below safe temperature limits and return to Normal operation. Any Charging Inputs that are connected and active will automatically resume at the return of Normal operation.

The LCD will prompt the following message.



Note: For optimum performance, locate the ToughPower away from direct sunlight and in a well ventilated area. Failure to do so could result in unnecessary and avoidable over temperature disruptions due to rising ambient temperature caused by confined spaces and continued exposure to the sun.

### 8.11.4 Over Temperature LCD Protection

A second stage, Over Temperature safety limit will automatically shut off the LCD to prevent any damage to the screen. Refer to the table in the section **System Protections** for the features that are disabled and available during this Mode.

Allow the unit to cool down before trying to use any of the ToughPower Power Outlets. The OVER TEMPERATURE LCD Protection Mode will clear automatically once the internal temperatures fall below safe temperature limits and return to Normal operation. Any Charging Inputs that are connected and active will automatically resume at the return to Normal operation.

### 8.11.5 Over Load Protection

In the possible event of an *overload*, all Power Outlets of the ToughPower are protected to prevent any damage.

For the 12V<sub>DC</sub> Low Current Outlets the ToughPower is equipped with a single **15 Amp Manual Reset Circuit Breaker**. If the combined output current exceeds 15 Amps, the Circuit Breaker button will “pop” out to indicate that current has been stopped to the three Outlet Sockets. After waiting a few minutes, the Circuit Breaker button can be depressed and power to the three DC Outlet Sockets will resume.

For the 12V<sub>DC</sub> High Current Outlets the Anderson Connector is protected with a **50 Amp Self Resetting Circuit Breaker**. When an overcurrent condition exists the internal Circuit Breaker will activate and stop power to the Anderson Connector. After a few minutes the Circuit Breaker will automatically reset and power to the Anderson Connector will resume.

The 240V<sub>AC</sub> Inverter Outlet is protected in case of an overload. In such event an audible alarm will emit a “beep” sound and the Inverter Fault LED will turn ON (red). The 240V<sub>AC</sub> outlet will be *disabled* until the device causing the overload is disconnected.

#### 8.11.6 USB Low Voltage Protection

The two independent fast charge USB Chargers are independent of the DC Outlets and the Pure Sine Wave Inverter. This means that they will remain *enabled* and available even during a Protection event.

To protect the battery from Low Voltage damage, the circuitry controlling the USB Chargers will be disabled when the Battery Voltage gets below 11.2V.

#### 8.11.7 FAULT LED Indication

The table below indicates the FAULT led behaviour when a Fault is detected or the system is in Protection mode.

Fault / Protection	LED PULSES RED (every 3 seconds)
Low Voltage Recovery Protection Over Temperature Protection Over Temperature LCD Protection	4
Charger - Battery Invalid temperature	2
Charger - Battery sensor error	1

## 9. FAQ & TroubleShooting

**I've set the Battery Type key switch, installed the Battery, switched it ON, but the LCD doesn't light up - what's wrong?**

Maybe you have attached the cables to the battery terminals "back-to-front". Don't worry, you haven't blown a fuse or done any damage as the electronics inside are fully protected for Reverse Battery Protection. Check: Red to Positive, Black to Negative.

Otherwise, the battery could be faulty, or old and dead flat.

**What type of Battery can I fit?**

It must be a rechargeable 12V Deep Cycle battery. Lead Acid, GEL, Calcium, AGM. Lithium LiFePO4 is compatible only on TP-1000 & TP-1000DUAL models. 80Ahr up to 120Ahr.

**Can I install the ToughPower as a Dual Battery?**

Yes you sure can - the TP-1000DUAL has been designed specifically for a Dual Battery setup! Refer to the User Manual for instructions.

**When I get home from Camping should I turn it OFF and put it in the cupboard, or leave it ON and plugged into the wall to keep it charged?**

When the ToughPower is not in use, firstly fully charge the battery, then switch the Master ON/OFF Switch to OFF. Refer to your Battery manufacturer's recommended instructions for battery storage. *Typically, it is advised to never store your battery in a discharged state, to keep the battery in a cool and dry location with plenty of ventilation, and to recharge every 3-4 months.*

**Can I Charge the Battery and use Power at the same time?**

Yep sure can! All the charging electronics inside the Lid are fully protected with current limiting capability.

**Can I leave the ToughPower outside?**

No - we don't. Whilst it is made from tough rugged plastic.... It does have sensitive electronics inside and water and electronics don't mix! You wouldn't leave your fridge, coffee pod machine or phone outside either. Best to put it undercover out of the weather and in a well-ventilated area.

**1000W Inverter - that will pull heaps of power, won't that flatten the battery?**

Yes it will! If you are going to use it every day to run high energy appliances like a camp fridge *and* make a few cups of coffee with your pod machine *and* make a few slices of toast then you need a **plan** to re-charge the battery - every day! That is why the TP-1000DUAL model is Dual Battery Setup compatible. Simply idle your car if you plan to run the Inverter for a long time and the Alternator will put in BULK charge! BTW - this is a good idea if you need to use an Angle Grinder or Sabre Saw for the odd job!

**Can I undo the screws and access the electronics inside the Lid?**

No. There are sensitive electronics inside. If you do, it will void the warranty.

### **What Solar Panels can I connect?**

Any Unregulated 12V nominal Solar Panel

Any Regulated 12V nominal Solar Panel

For the TP-600 and TP-1000 model, you need to connect your Solar Panels through the 4 Pin Socket on the ToughPower. The Accessory Cable provided connects to this 4 Pin Socket and has a Male Cig Plug. We recommend that you attach a Female Cig Socket to your Solar Panel cable to connect to the Accessory Cable. Note: Check the polarity!

For the TP-1000DUAL model, you need to connect your Solar Panels through the 2 Pin Socket on the ToughPower. The Accessory Cable provided connects to this 2 Pin Socket and has bare wire ends. We recommend that you attach a 2 pin connector of your choice to both this Accessory Cable and the mating connector to your Solar Panel cable. Note: Check the polarity!

### **Can I attach a 2nd Battery so I have more capacity?**

Yes sure! The battery must be the same type of Battery as you have fitted in the ToughPower. You will need to make a small cable with either Ring Terminals or Alligator Clips on both ends to connect to the terminal posts of *both* Batteries. Remember: Connect Positive to Positive, & Negative to Negative. Keep the cable as short as possible and we recommend using AWG6 sized cable. Refer to the User Manual for instructions.

### **Sometimes when on Solar Charging the LCD screen shows that it is “CAR” Charging**

The TP-600 & TP-1000 models share a common input for CAR & SOLAR charging. If the connected solar panel voltage is below a predefined limit it will get detected as a CAR input. Charging will still work but the HOME screen will display CAR logo.

## **10. Warranty & Contact**

For standard Warranty terms and conditions please visit our Website:

<http://www.intelliquip.com.au>

### **Company contact details:**

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