T15 PLUS

AC/DC CHARGER WITH LITHIUM BALANCER

INSTRUCTION MANUAL

T15 PLUS Manual Contents

T15 PLUS Instructions

Thank you for purchasing this Tahmazo T15 Plus charger. With Tahmazo T15 Plus, you can charge your battery packs anywhere. This digital charger will charge different types of battery using DC12V or AC100-240V power supply. T15 Plus is an innovative multi-function charger with built-in lithium balancer, designed to maximise charge efficiency using its unique advanced algorithm. In order to ensure you obtain optimum performance, please read the following instructions carefully.

Features

01 Built-in switching power supply provides a more constant power to the charger

02 A truly all-in-one charger/balancer that incorporates a built-in lithium (Li-Po/Li-Ion/Li-FEPO4) balancer for 2-6 cells
Each individual cell voltage at 1/100% accuracy can be displayed from the charger

03 Dual input voltage of DC11-15V or AC100-240V/50-60Hz

04 Capable of charging and discharging:
- 1-14 NiCad or NiMh cells
- 1-6 Lithium-Ion (3.6v), Lithium Polymer (3.7v) or LiFePO4 (3.3v) cells or
- 2-12v Lead-Acid batteries

05 Adjustable charge current (0.1-6.0A)

06 Adjustable discharge current (0.1A-1.0A) Auto limited to a maximum of 5W

07 "Zero Delta V" peak detection for NiCad/NiMh batteries

08 "Constant current/Constant Voltage" charge method for lithium batteries and lead-acid batteries

09 Pack cycling (Charge to Discharge/Discharge to Charge)

10 2-line, 16 character, blue backlit LCD

11 Built-in intelligent balancing circuit that will individually balance each lithium cell within the tolerance of 5mV during charge or discharge

12 "On-board Voltage monitoring" displays voltage of each cell on the screen during balancing

13 Various warning messages for improper input voltage, wrong connections, unsuitable battery condition and reverse polarity on output

14 Packaged in a rugged, extruded aluminum case

T15 PLUS Instructions

Specifications

	Description
Input voltage	DC 11.0-15.0V or AC 100-240V/50-60Hz
Battery type & cells	1-14 Nickel-Cadmium cells 1-14 Nickel-Metal Hydride cells 1-6 Lithium-Ion(3.6v) or Lithium-Polymer(3.7v) or LiFePO4(3.3v) cells 1 - 6 Lead-Acid cells (2V per cell)
Charge current	0.1A ~ 6A per 100mA step (auto limited to a maximum of 50W)
Discharge current	0.1A ~ 1A per 10mA step (auto limited to 5W maximum)
Trickle charge current	0 ~ 200mA
Balancing current	Max. 280mA
Charge termination	NiCd/NiMh "zero delta V" peak detection. Delta-peak voltage adjustable from 5mV to 25mV Li-Ion/Li-Po/LiFePO4/Pb "Constant current / constant voltage"
Cycling	Charge to Discharge/Discharge to Charge (for NiCd/NiMH only)
Display type	2-line, 16 character, blue backlit LCD
Dimension	159mm x 152mm x 68mm
Weight	650g

T15 PLUS Safety Precautions

01 Do not attempt to charge incompatible types of rechargeable batteries. This charger is designed to only charge and discharge nickel-cadmium, nickel-metal hydride, lithium-ion, lithium-polymer, LiFePO4 and lead-acid batteries

02 Make sure the charger is place on a firm level surface for charging or discharging

03 Do not attempt to charge batteries at excessive charge currents. Check with the battery manufacturer for the maximum charge rate applicable

04 Do not use automotive type battery chargers to power the charger

05 Do not leave the charger unattended while charging. Disconnect the battery and remove input power from the charger immediately if the charger becomes hot. Allow the charger or battery to cool down before reconnecting

06 Do not allow water, moisture or foreign objects into the charger

07 Do not place the battery or charger on or near a flammable object while in use.
Keep away from carpets, cluttered workbenches, etc

08 Do not cover the air intake holes on the charger as this could cause the charger to overheat

09 Connect the input leads to a power supply first, and then connect the battery

10 Do not attempt to charge non-rechargeable batteries

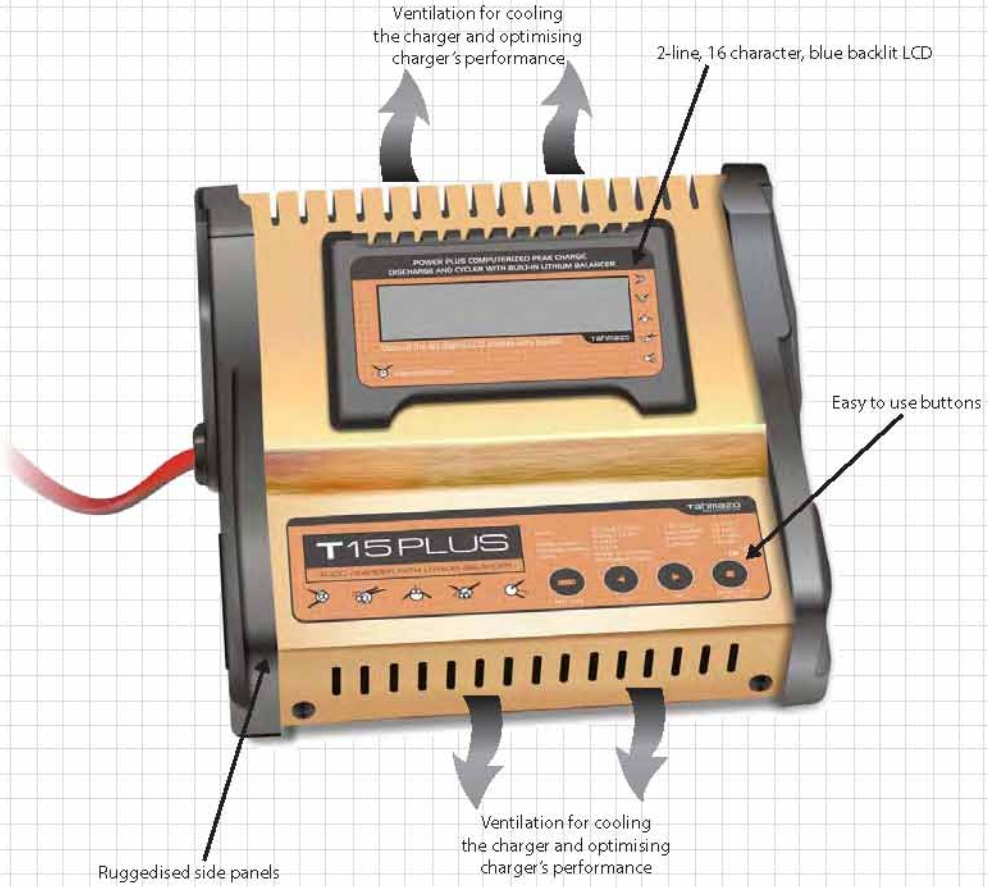
11 Do not disassemble the charger

12 Do not connect the charger to both DC 11-15v and AC power supply at the same time

13 This charger is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the charger safely

14 The battery must be placed in a well ventilated area

Get To Know T15 PLUS



Get To Know T15 PLUS

Get To Know T15 PLUS

T15 PLUS Quick Start

Connect the Charger to a Power Supply

T15 Plus can be operated from either a 12V lead acid battery, DC 11-15V power supply or AC100-240V wall outlet.

- **DC Power Supply**
  Connect the charger's red clip to the positive (+) terminal on the power source, and the black clip to the negative (-) terminal. The charger will display "Input voltage" error message if the input is below 11V, or above 15V. If this happens, please check the input power supply to make sure there is adequate power. (If using a DC power supply, please ensure that the rating of the power supply is at least 2A regulated)

- **AC Power Supply**
  Connect the AC Plug to a regular AC 100-240V wall outlet.

Connect the Battery Pack to the Charger

Two (2) 4mm sockets **RED** and **BLACK** are located on the right side of the charger. Connect the battery charging leads to these sockets with the positive (+) lead connected to the red socket and the negative (-) lead to the black socket.

For your Lithium battery pack, connect the balancing connector of your battery pack to the balancing board. Then connect the balancing board to the balancing port located on the right side of the charger.

T15 PLUS Quick Start

Select the Type of Battery to Charge or Discharge

When the charger is connected to the power supply, the charger will show a battery mode that was last used. Press the button to select the battery type: **NiCd NiMh Li-Po Pb**.

Press the ◄ or ► button to select the mode of operation: Charge/Discharge or Cycle(applicable only for NiCd and NiMh)

For the selection of the type of Lithium battery, refer to **Operations For Lithium Battery** - Selecting type of Lithium battery on page 15.

Note: In order to balance Lithium batteries during charge or discharge, ensure that both battery output leads and balancing connector on the battery pack are connected to both 4mm socket and the balancing port(using the balancing board) on the charger

Set the Charging or Discharging Current

Once you have selected the battery type, press the ■ button (the charge/discharge current parameter* will blink). Then press the ◄ or ► button to change the parameter to the desired value. Press the ■ button to select the next parameter (if any). ('C' denotes Current measured in milliampere hour or mAh).

Start Charging or Discharging

Hold the ■ button for 5 seconds to start charging or discharging. To stop the charging or discharging process, press the ■ button at any time.

View Data

You can view the charging or discharging data by pressing the button for 5 seconds, during or after the charging/discharging operation. The screen display will return to the previous function page after 5 seconds.

T15 PLUS Operations for NICAD Batteries

Connecting NiCd batteries to T15 Plus

Two (2) 4mm sockets **RED** and **BLACK** are located on the right side of the charger. Connect the battery charging leads to these sockets with the positive (+) lead connected to the red socket and the negative (-) lead to the black socket.

Charging NiCd batteries

Press  until the screen shows **NiCd CHARGE**
(NiCd blinks)

Press  (1.0A blinks) follow by  or  to change the charge current

Once this is done, press and hold  to start charging

Discharging NiCd batteries

Press  until the screen shows **NiCd CHARGE**
(NiCd blinks)

Press  once until the screen shows **NiCd DISCHARGE**

Press  (1.0A blinks) follow by  or  to set the discharge current

Press  (4.8V blinks) follow by  or  to set the discharge cutoff voltage

Once this is done, press and hold  to start discharging

Cycling NiCd batteries

Press  until the screen shows **NiCd CHARGE**
(NiCd blinks)

Press  twice until the screen shows **NiCd CYCLE**

Press  follow by  or  to select the cycling option (Charge to Discharge C-D or Discharge to Charge D-C)

Press  follow by  or  to set the number of cycles

Press  follow by  or  to change the charge current

Press  follow by  or  to set the discharge current

Once this is done, press and hold  to start the cycling

T15 PLUS Operations for NICAD Batteries

Setting Delta Peak Voltage

Press  until the screen shows **NiCd CHARGE** (NiCd blinks)

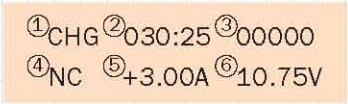
Press  until the screen shows **delta-peak-volt**

Press  follow by  or  to select the delta-peak sensitivity from 5mV to 25mV per cell. See Delta Peak Charging reference on page 18

Once it is set, press follow by or to return to the previous menu

Viewing Data During Charging And Discharging

Once the charging or discharging starts, the data shown on the page are:



1. Mode of operation
   CHG – Charge
   BLC – Charge with balancing board
   DCH – Discharge
   C ⟶ D – Charge then Discharge
   D ⟶ C – Discharge then Charge
2. Duration of operation
3. Charge or Discharge capacity
4. Type of battery selected
   NC – NiCd
   NM – NiMH
   LI – Lithium Ion
   LP – Lithium Polymer
   LF – Lithium FePO4
   Pb – Lead Acid
5. Charging(+ve) or Discharging(-ve) current
6. Voltage of the battery pack

T15 PLUS Operations for NICAD Batteries

Press ■ follow up ◀ or ▶ to display detailed data.
The detailed data includes:

①INPUT = 12.00V
②OUTPUT = 13.18v

1. Input voltage
2. Output voltage

①ChgCAPA=00000mAH
②DchCAPA=00000mAH

1. Charge capacity in mAH
2. Discharge capacity in mAH

①CHG PEAK=12.00V
②DCHG AVR=13.18V

1. Peak charging voltage
2. Average discharge voltage

①LCB-[01] = 0.000V
②LCB-AVG = 0.000V

1. Voltage of [01] lithium cell. Press ■ followed by ◀ or ▶ to see the voltage of the other Lithium cells in the pack
2. Average cell voltage of the Lithium battery pack

①LCB-MAX = 0.000V
②LCB-MIN = 0.000V

1. Maximum cell voltage of the Lithium battery pack
2. Minimum cell voltage of the Lithium battery pack

To exit the detailed data view, press ■

Cancelling Charging Or Discharging

Press ■ at any time to stop the charging, discharging or cycling operation.

T15 PLUS Operations for NiMH Batteries

Connecting NiMH Batteries to T15 Plus

Two (2) 4mm sockets **RED** and **BLACK** are located on the right side of the charger. Connect the battery charging leads to these sockets with the positive (+) lead connected to the red socket and the negative (-) lead to the black socket.

Charging NiMH Batteries

Press until the screen shows **NiMH CHARGE** (NiMH blinks)

Press (1.0A blinks) follow by or to change the charge current

Once this is done, press and hold to start charging

Discharging NiMH Batteries

Press until the screen shows **NiMH CHARGE** (NiMH blinks)

Press once until the screen shows **NiMH DISCHARGE**

Press (1.0A blinks) follow by or to set the discharge current

Press (4.8V blinks) follow by or to set the discharge cutoff voltage

Once this is done, press and hold to start discharging

T15 PLUS Operations for NiMH Batteries

Cycling NiMH Batteries

Press ▬ until the screen shows **NiMH CHARGE** (NiMH blinks)

Press ▶ twice until the screen shows **NiMH CYCLE**

Press ■ follow by ◀ or ▶ to select the cycling option (Charge to Discharge C-D or Discharge to Charge D-C)

Press ■ follow by ◀ or ▶ to set the number of cycles

Press ■ follow by ◀ or ▶ to change the charge current

Press ■ follow by ◀ or ▶ to set the discharge current

Once this is done, press and hold ■ to start the cycling

Setting Delta Peak Voltage

Press ▬ until the screen shows **NiMH CHARGE** (NiMH blinks)

Press ▶ until the screen shows **delta-peak-volt**

Press ■ follow by ◀ or ▶ to select the delta-peak sensitivity from 3mV to 25mV per cell. See Delta Peak Charging reference on page 18.

Once it is set, press ■ follow by ◀ or ▶ to return to the previous menu

Viewing Data During Charging and Discharging

See Data View explanation on page 11.

Cancelling Charging or Discharging

Press ■ at any time to stop the charging, discharging or cycling operation.

T15 PLUS Operations for Lithium Batteries

Connecting Lithium Batteries to T15 Plus

Two (2) 4mm sockets **RED** and **BLACK** are located on the right side of the charger. Connect the battery output leads to these sockets with the positive (+) lead connected to the red socket and the negative (-) lead to the black socket.

Then connect the battery balancing connector to the balancing board. Connect the balancing board to the balancing port located on the right side of the charger. **DO NOT CONNECT** more than 1 battery pack to the balancing board.

Selecting Type of Lithium Battery

Press until the screen shows **LiPo CHARGE** (LiPo blinks) or **LiFe CHARGE** (LiFe blinks) or **Lilo CHARGE** (Lilo blinks)

Press or 3 times until the screen shows **Lithium Type**

Press (LiPo blinks) and select the correct Lithium battery: LiPo or LiFe or Lilo

Charging Lithium Batteries

Press until the screen shows **LiPo CHARGE** (LiPo blinks) or **LiFe CHARGE** (LiFe blinks) or **Lilo CHARGE** (Lilo blinks)

Press (1.0A blinks) follow by or to change the charge current. For safety reason, T15 Plus is designed to automatically deliver 1C charge rate to the lithium batteries, based on the user selected battery capacity

Press (3.7V blinks) follow by or to change the voltage of the battery pack (See Table 1-Voltage of lithium battery pack below)

Once this is done, press and hold to start charging

Table 1-voltage of Lithium Battery Pack

	Voltage of Battery Pack		
No. of cells	LiPo	LiFe	Lilo
1	3.7V	3.3V	3.6V
2	7.4V	6.6V	7.2V
3	11.1V	9.9V	10.8V
4	14.8V	13.2V	14.4V
5	18.5V	16.5V	18.0V
6	22.2V	19.8V	21.6V

T15 PLUS Operations for Lithium Batteries

Watch Out for Error Messages

BALANCER CON. NOT CONNECTED
will be displayed if you charge or discharge the Lithium battery without connecting the balancing cable to the balancing port of the T15 Plus.

Warning

The maximum voltage for Lithium Ion is 4.1V per cell, Lithium Polymer is 4.2V per cell and Li-FE (or A123 battery) is 3.7V per cell. Therefore it is extremely important to choose the proper battery type to be charged or discharged. Otherwise it may cause serious damage to the batteries, which in turn may result in a fire.

Discharging Lithium Batteries

Press ⏏ until the screen shows **LiPo DISCHARGE** (LiPo blinks) or **LiFe DISCHARGE** (LiFe blinks) or **Lilo DISCHARGE** (Lilo blinks)

Press ■ (1.0A blinks) follow by ◄ or ► to change the discharge current

Press ■ (3.7V blinks) follow by ◄ or ► to change the voltage of the battery pack (See Table 1-Voltage of Lithium battery pack on page 15)

Once this is done, press and hold ■ to start discharging

Viewing Data During Charging and Discharging

See Data View explanation on page 11.

Cancelling Charging or Discharging

Press ■ at any time to stop the charging, discharging or cycling operation.

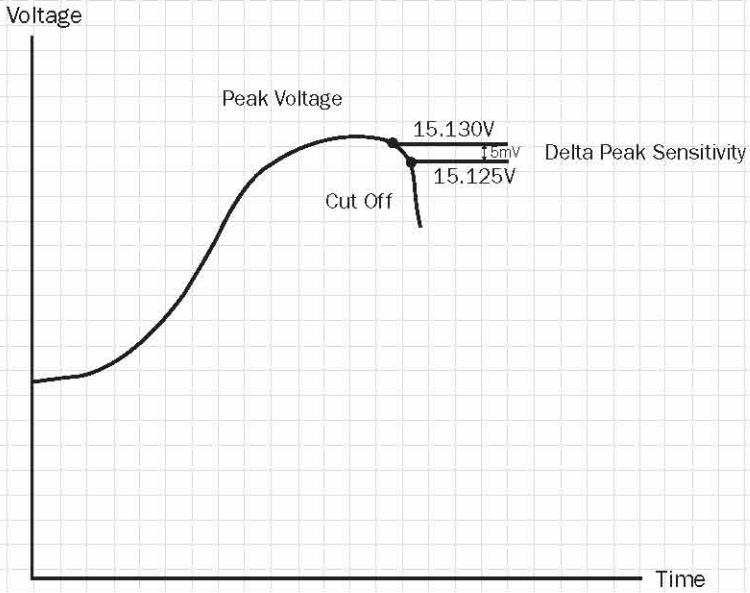
T15 PLUS Error Messages

INPUT BATTERY VOLTAGE ERROR	When input voltage is below 11.0V or exceed 15V
NO BATTERY	When a battery is not connected to the charger's output
OUTPUT BATTERY REVERSE POLARITY	When a battery is connected to the output in reverse
OUTPUT CIRCUIT PROBLEM	When the circuit of the charger has a problem. If you encounter this problem, please return the charger to your nearest Tahmazo dealer or the shop that you have purchased this charger from
CHECK THE BATT. OPEN CIRCUIT	When a battery becomes disconnected during an operation
CHECK THE BATT. OVER VOLTAGE	If wrong voltages are set while charging Lithium or Pb batteries
CHECK THE BATT. LOW VOLTAGE	If wrong voltages are set, or batteries are over discharged, while charging Lithium or Pb batteries
BALANCER VOLTAGE IS TOO HIGH	If voltage per cell is too high during balancing, this message should appear. Check the condition of the Lithium battery, or consult the battery manufacturer
BALANCER VOLTAGE IS TOO LOW	If the battery cells are short-circuited during balancing, this message should appear
DON'T CHARGE LIXX WITH THIS MODE	If the charger starts charging, discharging or cycle for NiCd/NiMh or Pb batteries, whiles the battery is connected to the balancing port
BALANCER CON. NOT CONNECTED	If the charger is set to charge or discharge Lithium battery without connecting the balancing cable to the balancing port via the balancing board

T15 PLUS Delta-Peak Charging

Delta-peak Charging

Delta-Peak is a method of charging NiCd and NiMh batteries to its maximum possible capacity without over-charging the batteries. During the charging process, the voltage of the batteries increases. When the cells are fully charged, the voltage of the cells levels off and then decreases slightly. These conditions are known as Zero delta V or negative delta V. When this condition occurs, the charging process is terminated.



Tahmazo T15 Plus allows users to define the amount of voltage drop before the charging process terminates.

Tahmazo™

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