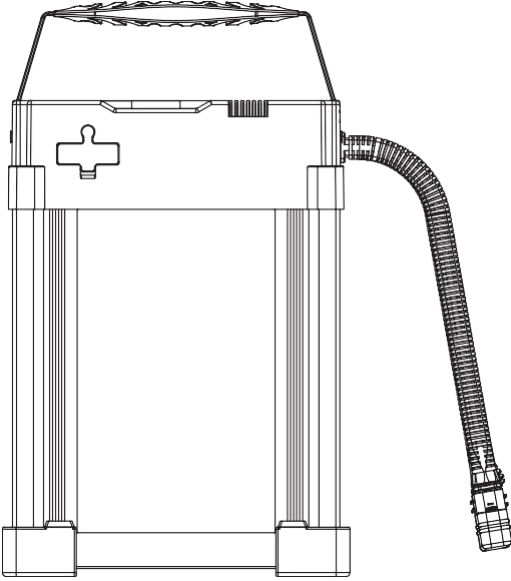




# Smart Battery User Manual

## Tattu Plus 1.0

Thank you for purchasing this product, please carefully follow all instructions in this manual.



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## Product Description

### Introduction:

Tattu Plus 1.0 is suitable for multiple drone systems. The battery system has many smart features. These features include data collection, safety reminder, power calculation, automatic balancing, charging reminder, abnormal status alarm, data transmission, history check and more. The battery status and operating history data can be accessed via CAN/SMBUS communication interface and PC software.

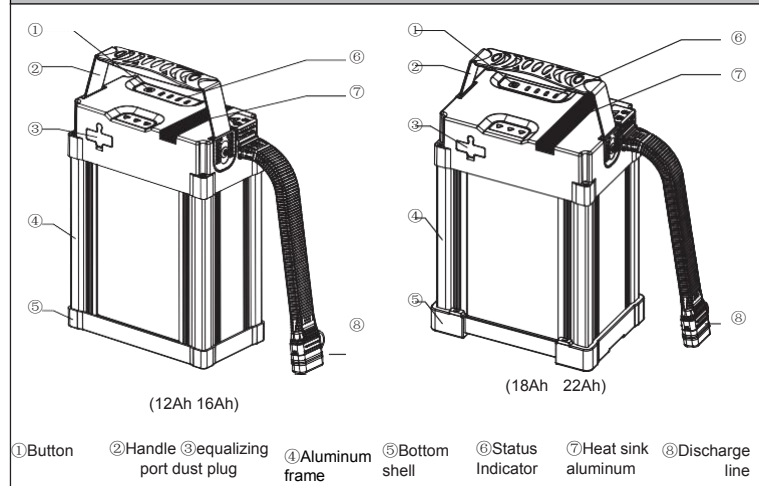
## Product Parameters

Model Item	12Ah 20C 44.4V	16Ah 15C 44.4V	18Ah 25C 44.4V	22Ah 25C 44.4V
Battery Type	Rechargeable lithium ion polymer battery pack			
Battery Configuration	12S1P			
Nominal Capacity	12Ah	16Ah	18Ah	22Ah
Power (Wh)	532.8Wh	710.4Wh	799.2Wh	976.8Wh
Typical Voltage	44.4V			
Recommended Charging Temperature	+10°C~+45°C			
Recommended Discharging Temperature	+10°C~+60°C			
Max. Continuous Discharge Current	100A			
Peak Discharge Current	150A (<3S)			
Max. Charging Voltage	50.4V (4.2V/cell)			
Recommended Landing Voltage	43.2V (3.6V/cell)			
Recommended Forced Landing Voltage	42.6V (3.55V/cell)			
Size (T*W*H)	90*163*223.8mm		116*172*235.5mm	
Battery weight	4150g(±100g)	4800g(±100g)	5200g(±100g)	6000g(±100g)

## Product List

Battery Pack(1 PC)	Molex charging balance Converter (1 PC)	User Manual(1 PC)

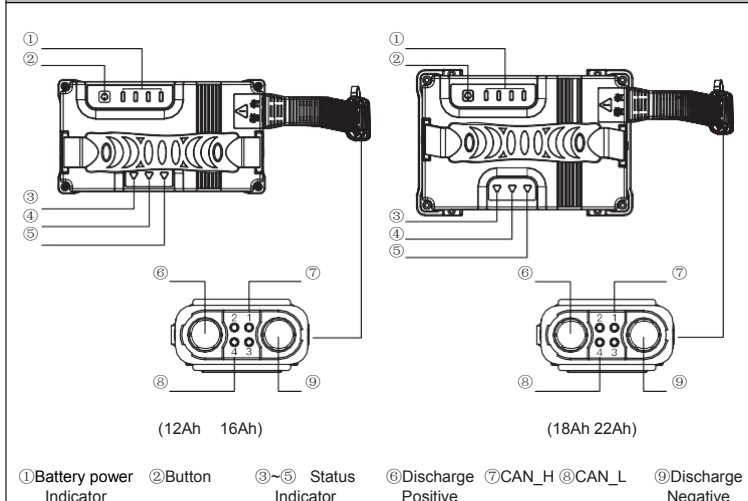
## 3D Diagram



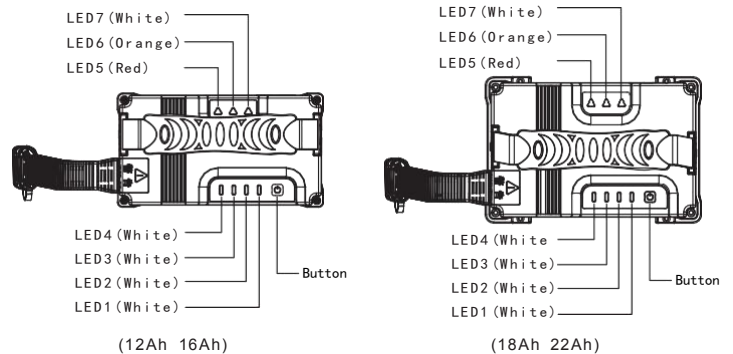
## Product Operational Guide

### 1. Overview

#### Top View



### 2. Definition of Indicator, Button and Balancing port

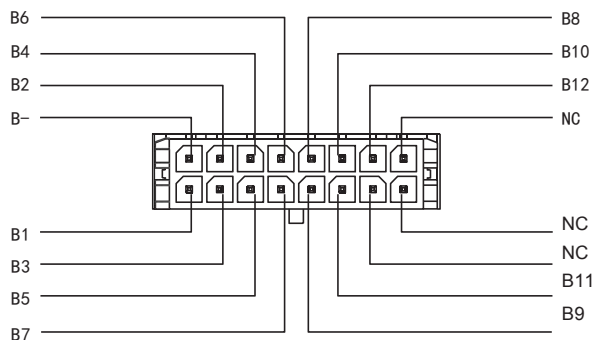


- ① LED1, LED2, LED3, LED4 are white, showing battery and lifetime
- ② LED5, LED6, LED7 are different colors, showing battery health status

### ③ Description of Button Function

Battery Status	Button Operation	Function
Power Off	Short press	Check remaining power
Power Off	Short press+long press(≥2s)	Power on, LED shows the remaining power
Power On	Short press+long press(≥2s)	Power off
Power Off	long press(≥5s)	Shows battery lifetime

### ④ Definition of Balancing Port



## 3. Operation Guide

### ① Check Battery Remaining Power

- 4 LED lights on battery, divided into 8 classes indicator.

Remaining Power	LED1	LED2	LED3	LED4
0%~12%	Blink	Off	Off	Off
13%~24%	On	Off	Off	Off
25%~37%	On	Blink	Off	Off
38%~49%	On	On	Off	Off
50%~62%	On	On	Blink	Off
63%~74%	On	On	On	Off
75%~94%	On	On	On	Blink
95%~100%	On	On	On	On

## 4. Sleeping Mode

- ① 10 minutes after battery power on, BMS will enter sleep mode to reduce self-consumption. The battery can be activated by charging and discharging.
- ② When any cell voltage is lower than 3.65V, in order to ensure battery safety, BMS will enter second class energy saving mode. In this mode, the battery pack can safely stand for 3~4 months. If this time is exceeded, it is suggested to check the voltage of each cell. If the voltage difference is greater than 30mV, it is suggested to balance charge and discharge the battery for 2 cycles, and charge the battery with storage mode if user plans to store the battery again. If the cells couldn't be balanced, please report to the manufacturer for further guidance.
- ③ If the battery voltage is seriously low and the storage time is too long, battery will enter deep sleep mode. In this mode, the battery needs to be turned on manually to wake up and charged immediately.

## 5. Self-balancing Function

- ① When the battery is left more than 6 hours, if BMS detected that the voltage difference of each cell reaches the preset value, the Self-balancing function will be activated.

## 6. Smart Storage mode

- ① If battery is not used for more than 5 days, please discharge the battery to 40%~70%, it will be helpful to extend the battery life. If the battery is fully charged, the battery will automatically turn on the intelligent storage mode (discharge from full power to a suitable storage voltage, the battery temperature may increase during the discharge process, which is normal). In order to prevent the battery over-discharge and causing the battery to be damaged, It is recommended to store the battery in a dedicated battery box. Do not store the battery for long periods of time after it has been completely discharged, be sure to recharge the battery to storage level or approximately 3.8V per cell.

## 7. Software Upgrade

- ① BMS has a software upgrade feature, which can be upgraded by a dedicated upgrade communication module, and the CAN port can be converted into a USB port to connect to the computer and then the battery software is upgraded through host computer.

## 8. Battery Logging Function (this function can be activated by specific request)

- ① The BMS is designed with a logging function that records and stores data for the entire life of the battery. The battery log information includes the cell voltage, current, battery temperature, number of cycles, number of abnormal states, etc. The user can connect the battery through the Grepow Software for checking.

## 9. Common Failures And Troubleshooting Methods

- ① Charging overcurrent warning: When the battery charging current exceeds the design value, check if the charger current setting is correct. Disconnect the connector between the charger and the battery, the warning will be released;
- ② Charging overvoltage warning: The battery is full/over-voltage, activating the overcharge alarm but does not stop charging automatically. The charger needs to be disconnected. After the battery voltage drops to 4.18V/cell, the alarm will be released;
- ③ Low temperature warning of the battery: The battery temperature is too low for charging, activating the battery low temperature warning. When the battery temperature rises above 15 °C, the alarm will be released;
- ④ Battery high temperature warning: The battery temperature is too high for charging, activating battery high temperature warning. The battery is cooled below 45 °C and the warning will be released.

### ② Check Battery Lifetime

- When power off, long press button (≥5s), LED shows remaining battery lifetime

Remaining Lifetime	LED1	LED2	LED3	LED4
88 %~100%	On	On	On	On
75 %~87%	On	On	On	Blink
63 %~74%	On	On	On	Off
50 %~62%	On	On	Blink	Off
38 %~49%	On	On	Off	Off
25 %~37%	On	Blink	Off	Off
13 %~24%	On	Off	Off	Off
Below 12%	Blink	Off	Off	Off

### ③ Charging

- Full charging when power on, all the battery indicator lights on and off after 10 minutes;
- Full charging when automatic wake-up, all the battery indicator lights on and off after 10 seconds.

Remaining power	LED1	LED2	LED3	LED4
0 %~12%	Blink	Blink	Blink	Blink
13 %~ 37 %	On	Blink	Blink	Blink
38 %~62%	On	On	Blink	Blink
63 %~94%	On	On	On	Blink
95 %~100%	On	On	On	On

### ④ Status LED Indicator

- Red LED: Battery is in warning state II, battery cannot continue to be used in this state;
- Orange LED: Low-power indicator light, indicating battery need to be charged;
- White LED: Battery is in warning state I, battery is not OK to use in this state;
- Error warning: Both red light and white light on.

Red LED5	Orange LED6	White LED7	Description
Blink			Over temperature warning II
On			Cells unbalanced warning II
	On		Battery in low-power state
		Blink	Over temperature warning I
		On	Cells unbalanced warning I
On		On	Battery error warning

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- ④ Battery high temperature warning: The battery temperature is too high for charging, activating battery high temperature warning. The battery is cooled below 45 °C and the warning will be released.

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## Cautions

- ① The battery protection board is not equipped with anti-sparking function. If anti-sparking function is required, please use a connector with anti-spark function;
- ② When using the charger to charge the battery, the balancing current shall not be above 1A;
- ③ The battery does not have the overcharge or over discharge protection function, and it is necessary to set the charge/discharge limit voltage on the charger or the device;
- ④ Do not short-circuit the connector, otherwise there is a safety risk;
- ⑤ The discharge cables shall be soldered well with connector, otherwise the power supply may be poor, and causing the aircraft to crash during the flight;
- ⑥ Do not pull on the battery cables under any circumstances.
  - ※ Please read the following instructions carefully before use;
  - ※ Lithium polymer batteries are active substances and it is easy to cause fire without proper use. If improper use without reading the instructions and cause personal injury or property damage, TATTU manufacturers, distributors and dealers will not be responsible for any liability.
  - ※ To purchase TATTU related products, the buyer must bear all risks related to the product;
  - ※ If you do not agree to this clause, please return the battery to us immediately before use.

### 1. Using

- ① Before using the battery, please check the battery's power and health status (see content No.3, Operation Guide 1)
- ② Please check if the battery is damaged, bulging or leaking. If any of the above, do not use it;
- ③ Do not let the battery contact metal and carbon fiber products to prevent short circuit;
- ④ Do not short or reverse the positive and negative electrode;
- ⑤ Do not pull the battery charge / discharge cables;
- ⑥ Do not assemble the battery by your own. Reassemble the old battery cell or reorganize one of the disassembled cells to another pack is dangerous (It's easy to cause short-circuit and cause fire);
- ⑦ In the low temperature environment (below 5 °C), it is recommended to preheat the battery by charging or discharging the battery with small current to above 5 °C before use. 20 °C is best, do not do heavy duty operations when first starting use of a cold pack. Allow the battery to reach normal operating temperatures before hard use.
- ⑧ Do not over-discharge the battery (single-cell voltage should not be lower than 3.3V), over-discharge will damage the battery easily, such as puffing, etc;
- ⑨ Do not splash the electrolyte on your eyes or skin. If this occurs flush with water and seek medical advice immediately.

### 2. Charging

- ① ONLY use a Li-Po battery type smart charger to charge
- ② It is recommended to charge in the temperature range of 10 °C to 45 °C;
- ③ When charging, only use a table or platform that is heat-resistant. It is recommended to use an explosion-proof LIPO battery bag.
- ④ Do not leave LiPo batteries unattended while charging

### 3. Storage

- ① Do not allow the battery to come close to liquid, and do not store the battery in a humid place;
- ② Do not place the battery near heat sources such as open flames or heaters;
- ③ Please Keep the battery out of the reach of children;
- ④ Store the battery in a temperature controlled environment of approximately 25°C;
- ⑤ Make sure that the battery has enough storage space (do not stack batteries in storage)
- ⑥ If the battery is not used for a long time, it is recommended to do a charge cycle. Charge and discharge the battery to storage level every 3 months. This will ensure the best service life of the battery.

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