# M6D

Manual V1.1

2020.05

ToolkitRC

www.toolkitrc.com

ToolkitRC Technology (Shenzhen) Co.. Ltd



@ ToolkitRC 2020

# Introduction

Thank you for purchasing the ToolkitRC M6D multi-function charger, please read this manual carefully before use.

# Key Points

Tips Important Information

# Further information

To ensure you have the best experience with this product please scan the QR code below to stay up to date with news, information and firmware updates for your charger. Or visit www.toolkitrc.com

Applications

Video teaching

Product purchase

WeChat QR Code



@ ToolkitRC 2020

# Safety

1, M6D allows input voltage of 7-28V. Please ensure that the power supply voltage is in line with this range. Pay attention to the positive and negative polarities of the power supply when connecting.

2, Do not use this product in a hot area or near a heat source. Do not use this product in a damp, flammable or explosive gas environment.

3, Only use this product while under direct supervision. No not leave charging batteries unattended.

4, When not using this product, please unplug the input power in time.

5, When using the charging function, please set the current matching with the battery. Don't set excessive current charging, so as not to damage the battery.


@ ToolkitRC 2020

# Contents

Introduction..... 2

Key Points..... 2

Further information..... 2

Safety..... 3

Contents..... 4

M6D Layout..... 8

Quick start..... 9

Charge and discharge settings..... 11

1，Battery type..... 11

2，Number of cells..... 14

3，Mode..... 15

4，Discharge mode..... 16

5，Input MaxVoltage..... 17

6，End voltage（TVC）..... 18

7，Current setting..... 20

8，NiMH setting (PeakV)..... 21



@ ToolkitRC 2020

9，Loop setting..... 22
10，Power mode setting.....24
11，Smart battery..... 24
Charge and discharge work..... 27
System settings..... 32
other functions.....36
Specification..... 38


@ ToolkitRC 2020

# Product description

M6D is a dual-channel balanced charger product. Small size, high power density, innovative design, charging accuracy can be as low as 5mV..

- Charge, discharge and balance management of LiPo, LiHV, LiFe Lion 1-6S, NiMh 1-16S, PB 1-10S batteries.
- Charging current:

  Synchronous mode maximum 25A@MAX500W

  Asynchronous mode maximum 15A@MAX250W
- Discharge current:

  Recycle mode maximum 15A @250W *2

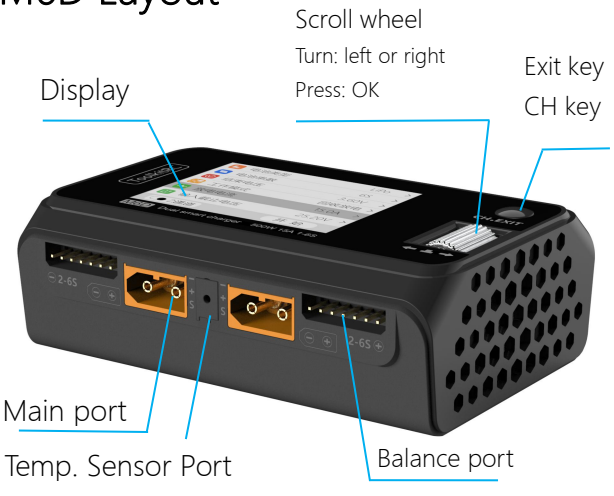
  Normal mode maximum 3A @12W *2
- Lithium battery cut-off voltage can be set (TVC function).
- Constant current and constant voltage output, customizable 1-28V constant voltage, 1-15A constant current.
- Can be adapted to mainstream UAV batteries, automatically activated and charged.
- Multi-language system, can arbitrarily upgrade the required language.


@ ToolkitRC 2020

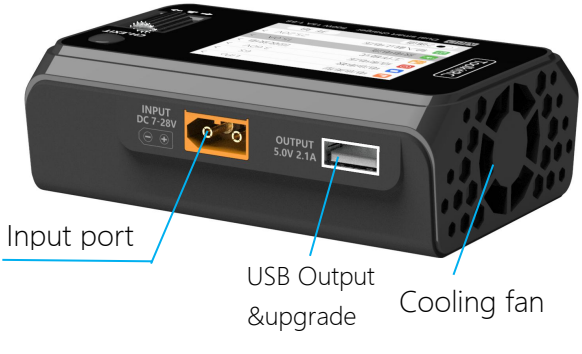
- USB 2.1A@5.0V output, rechargeable mobile device.
- The device connects to PC like a USB drive for easy firmware upgrades. Simply copy and paste new firmware files to update.


@ ToolkitRC 2020

# M6D Layout




Front




Back



@ ToolkitRC 2020

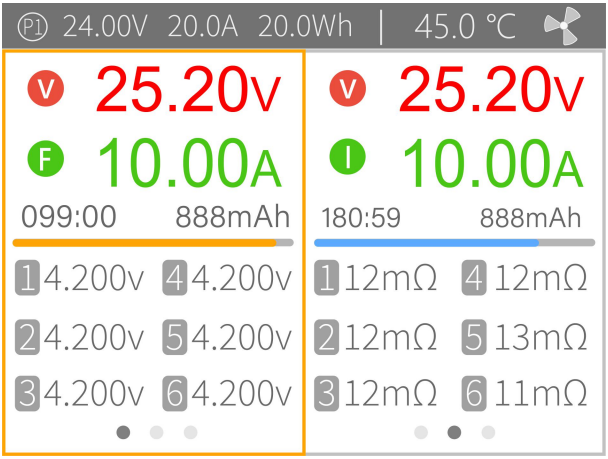
# Quick start

1，Connect a 7-28V power supply or input battery to the input port on the back of the M6D.

2，The display shows the boot logo and stays for 2 seconds.

3，At the same time accompanied by do-re-mi's boot sound.

4，After booting, the display will enter the main interface and display as follows:




5，Short press [Exit], the cursor switches between the left and right channels.

6，Press and hold [EXIT] to start testing the internal resistance of the corresponding channel. After the test, the internal resistance will be displayed.

7，Scroll [Scroll Wheel] to switch the pages in the


@ ToolkitRC 2020

corresponding channel.

8，Short press [OK], can select the charging task when the channel is idle and can adjust and end the work when the channel is working.

9，Press and hold [OK] to enter the system setting interface when both channels are idle.

10，Press [Exit], to end the modification or return to the previous interface.

==========

1，Short press [Scroll Wheel] once， to confirm the key function

2，Press and hold [Scroll Wheel] for 2 seconds， to delete the key function

3，If any key is operated successfully, there will be a di-di prompt tone.

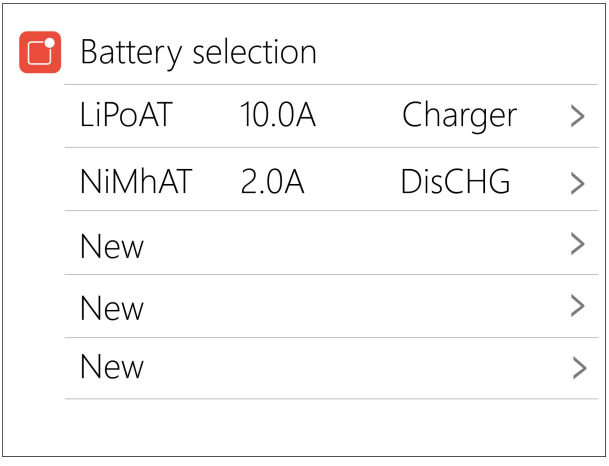
==========



@ ToolkitRC 2020

# Charge and discharge settings

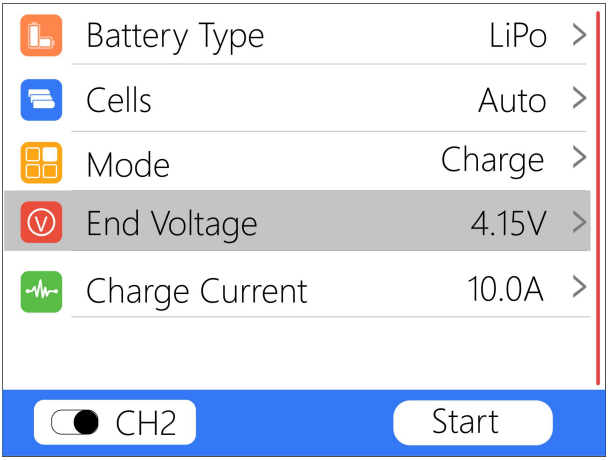
Short press [OK] on the main interface to enter the charging function, the following interface is displayed.



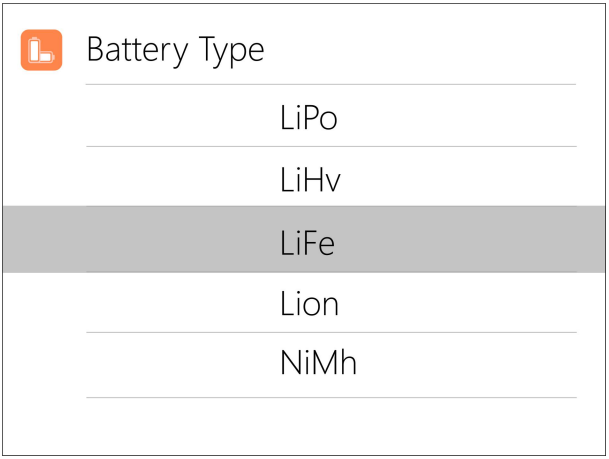

## 1, Battery type

Scroll [Scroll Wheel], move the cursor, select the stored battery type, or create a new battery, press [Enter] to enter the battery setting interface, the display is as follows:


@ ToolkitRC 2020




Move the cursor to [Battery Type] and press [OK] to modify the battery type, as shown below:




The charger supports charging and discharging of 6 types of batteries: Lipo, LiHV, LiFe, Lion, NiMh, and PB. And two modes of power supply and the smart battery


@ ToolkitRC 2020

can be also selected. After selecting a battery that matches the actual battery. Short press [OK] and [Exit] to take effect and return to the previous interface.

==========

Warning

1, Choosing the wrong battery type to charge may damage the battery, the charger, and the risk of burning, so please choose carefully.

2, Do not use this product to charge batteries that do not indicate the battery type.

==========

Glossary of battery terms explanation

**1, Lipo:** often referred to as a lithium polymer battery with a nominal voltage of 3.70V and a fully charged battery of 4.20V.

**2, LiHV:** often referred to as a high-voltage lithium battery with a nominal voltage of 3.85V and a fully charged battery of 4.35V.

**3, LiFe:** often referred to as iron-lithium battery, with a nominal voltage of 3.30V and a fully charged battery of 3.60V.

**4, Lion:** often referred to as a lithium-ion battery with a nominal voltage of 3.60V and a fully charged battery of 4.10V.

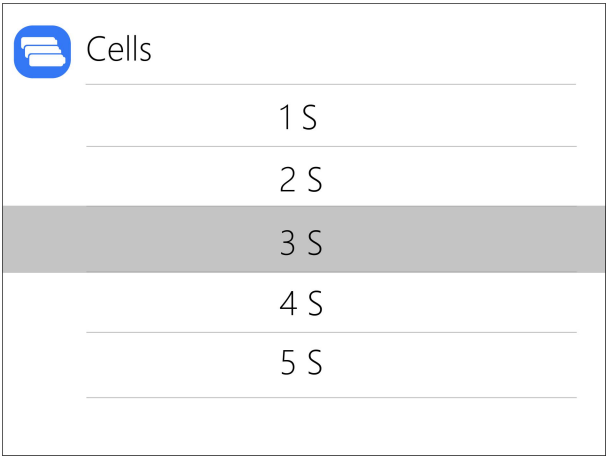
**5, NiMh:** often called NiMH battery, nominal voltage 1.20V.

**6, PB:** often called lead-acid battery, nominal voltage 2.00V.

==========

## 2，Number of cells

Move the cursor to the position of [Battery cell Number] and press [OK] to modify the number of battery cells. The display is as follows.




Turn [Scroll wheel] to adjust the value. When set to [Auto], the charger will automatically recognize the number of connected battery cells according to the battery voltage connected to the output port. Short press [OK] and [Exit] to take effect and return to the previous interface.


@ ToolkitRC 2020

==========

Tips

1, Over-discharging or over-charging of the connected battery may lead to incorrect recognition of the battery cell number, and it is necessary to manually set the correct cell number.

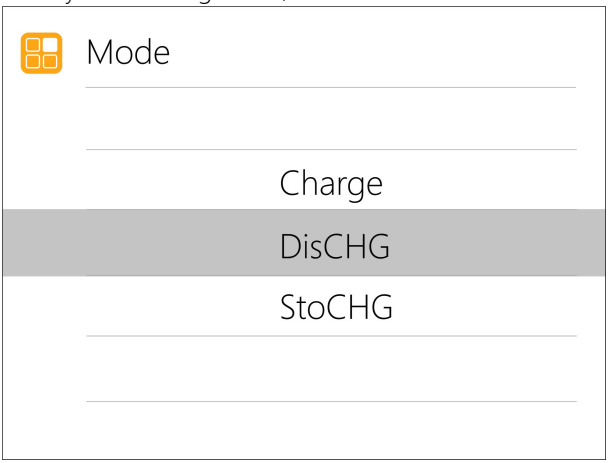
2, If the cell number is set incorrectly, it may not be fully charged, or the battery may be damaged by overcharging. Please set it carefully.

3, After Lixx battery is connected to the balance port, the number of battery cells can be more accurately identified.

==========

## 3, Mode

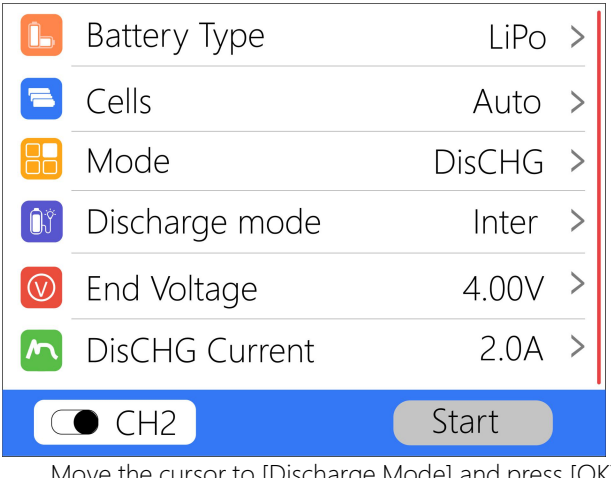
Move the cursor to [Mode] and press [OK] to modify the working mode, as shown below:



**Lipo, LiHV, LiFe, Lion** batteries can be charged, discharged, and stored. **NiMh** battery can choose to charge, discharge, cycle. **PB** battery can choose to charge and discharge. Short press [OK] and [Exit] to take effect and return to the previous interface.

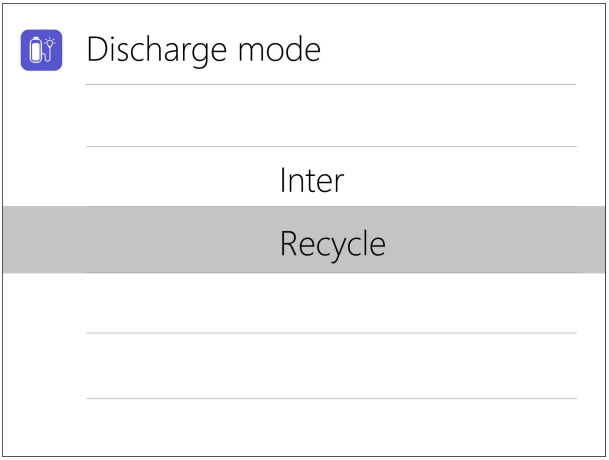
## 4，Discharge mode

When the working mode selects discharge, storage, and cycle mode, the battery setting interface will increase the discharge mode. As shown below.




Move the cursor to [Discharge Mode] and press [OK] to modify the discharge mode, as shown below.


@ ToolkitRC 2020




M6D supports two discharge modes.

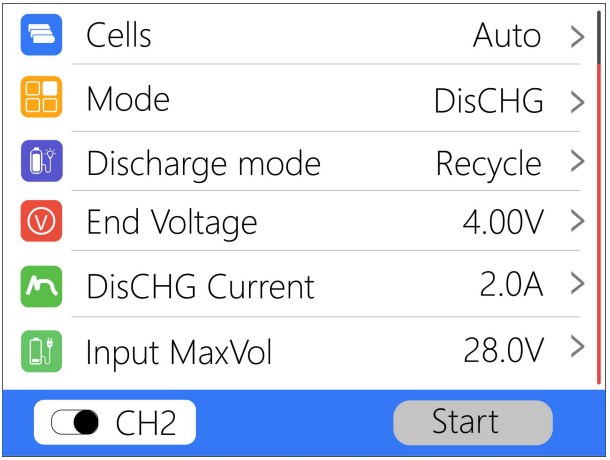
1. Inter (Internal) Mode, discharge through internal heat consumption, maximum support 3.0A@12W discharge.

2. Recycle mode, when the input is a suitable battery, this function can recover the electric energy from the discharging battery to the input battery, the maximum support is 15.0A@250W discharge.

## 5，Input MaxVoltage

When the discharge mode is selected to recycle, the battery setting interface will increase the input MaxVol setting. As shown below.


@ ToolkitRC 2020




Move the cursor to [Discharge Mode] and press [OK] to adjust the input MaxVol. If the input voltage reaches this voltage during discharge, the discharge will stop.

==========

Tips:

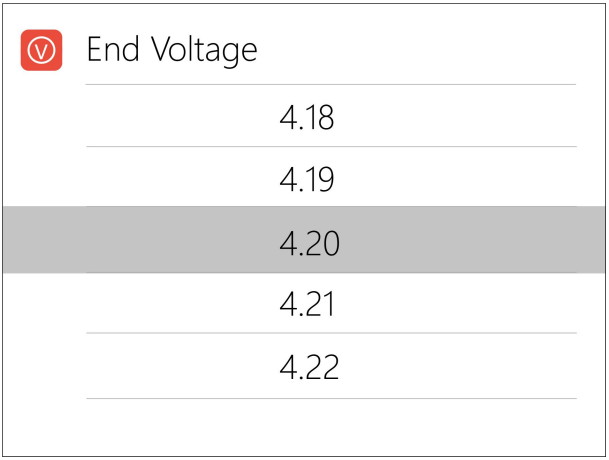
Please set the input cut-off voltage withing the safe voltage range of the power supply battery. After the voltage is reached, the charger will automatically stop recycling and discharging. Setting a high over-voltage may damage the input power battery.

==========

## 6, End voltage (TVC)

Move the cursor to [End Voltage] and press [OK] to modify the end voltage of the single battery. When the working mode is charging, it is the charging cut-off

voltage, and the range is plus or minus 50mV of the full voltage. When the working mode is discharge, it is the discharge cut-off voltage. Scroll the [Scroll Wheel] to adjust the value in steps of 0.01V.




==========

1, Only LiPo, LiHV, LiFe batteries can set the end voltage.

2, If not familiar with battery characteristics, please do not modify the cut-off voltage.

3, The charging cut-off voltage can be set to a range of plus or minus 50mV of full voltage.

4, **Glossary explanation:**

TVC: English abbreviation for terminal voltage control

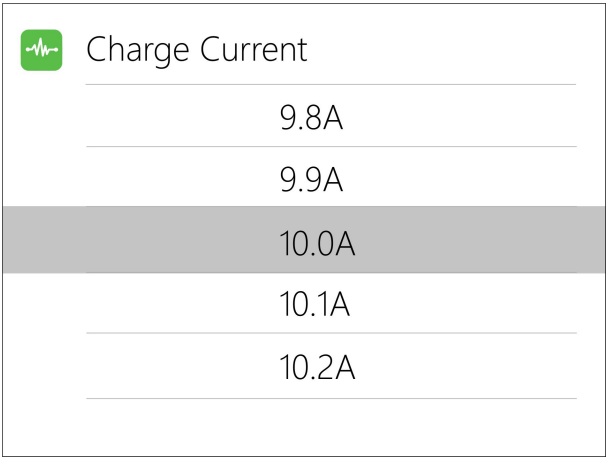
==========



@ ToolkitRC 2020

## 7，Current setting

Move the cursor to the position of [Charge Current] or [Discharge Current] and press [OK] to modify the current. Rotate the [Scroll Wheel] to adjust the value and step 0.1A. Quickly scroll [Scroll Wheel] to quickly increase or decrease. The charger supports up to 15.0A. In synchronous mode, maximum support 25A.




==========

Tips:

1. Please set the charging rate of 1-2C according to the battery capacity.

For example: For a battery with a capacity of 2000mAh, please set the charging current to 2.0-4.0A as appropriate.

2. Charging and discharging current are only valid


@ ToolkitRC 2020

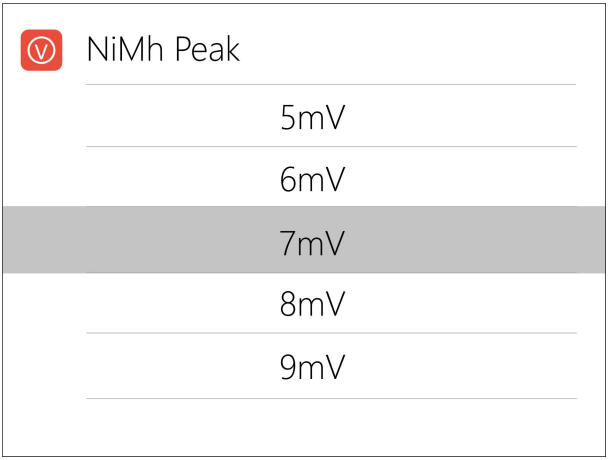
in the corresponding working mode

3. For the setting of discharge mode, please refer to the chapter of <System Settings> in this manual

==========

## 8，NiMH setting (PeakV)

When the battery type is NiMh, can set the negative pressure value when the battery is fully charged, the range is 5mV-15mV, as shown below.




==========

Tips:

1, Only NiMh battery can set negative battery voltage.

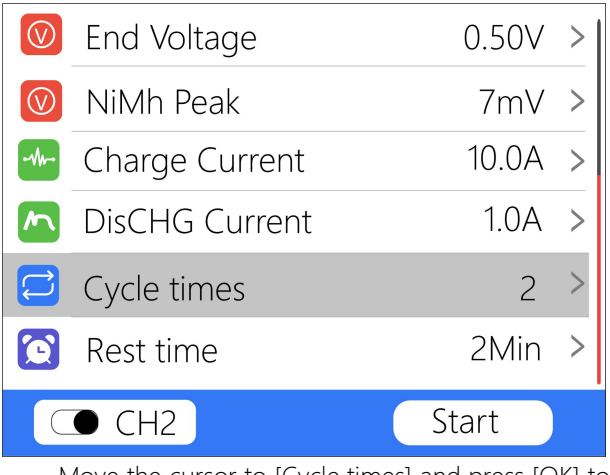
2，Glossary explanation:

PeakV: When the nickel-metal hydride battery is fully charged, the voltage drop of each piece peaks.

==========

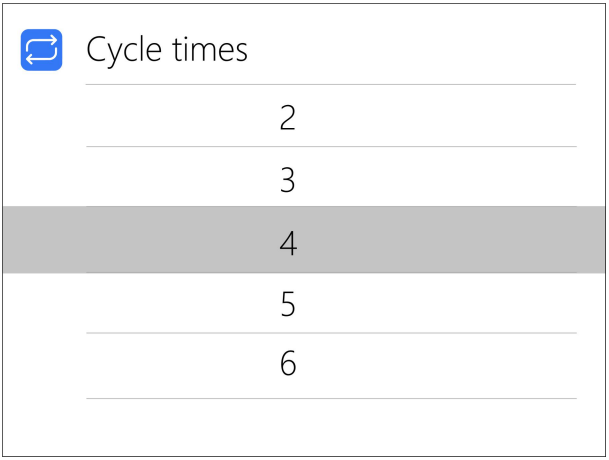
## 9，Cycle setting

When the battery type is NiMh, and the work mode is selected to cycle, the battery setting interface will increase the number of cycles and the rest time setting. As shown below.




Move the cursor to [Cycle times] and press [OK] to set the cycle times to 2-12. The charger will follow the pattern cycle of discharging-> charging-> discharging-> charging ... "Discharge-> Charge" is 2 times.


@ ToolkitRC 2020

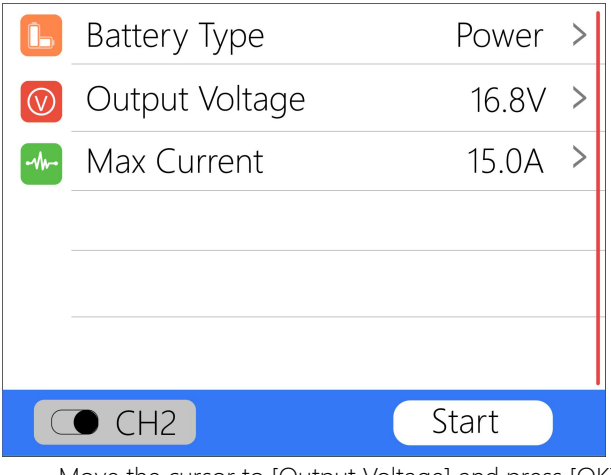



Move the cursor to [Rest time] and press [OK] to set the interval time of the cycle charging. The range is 2 to 10 minutes. As shown below.

@ ToolkitRC 2020

## 10，Power mode setting

When the battery type is power, the battery setting interface only has two options: output voltage and maximum current. As shown below.

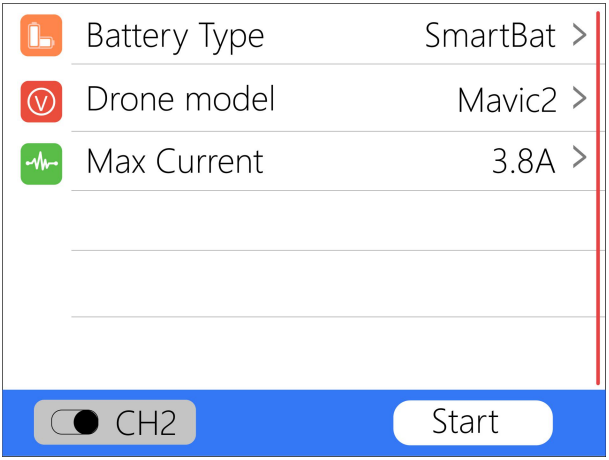



Move the cursor to [Output Voltage] and press [OK] to modify the output voltage. The voltage range is 1V to 28V. Move the cursor to [Max Current] and press [OK] to modify the maximum current, which is the maximum current of the output power supply. The range is 0.5A to 15A.

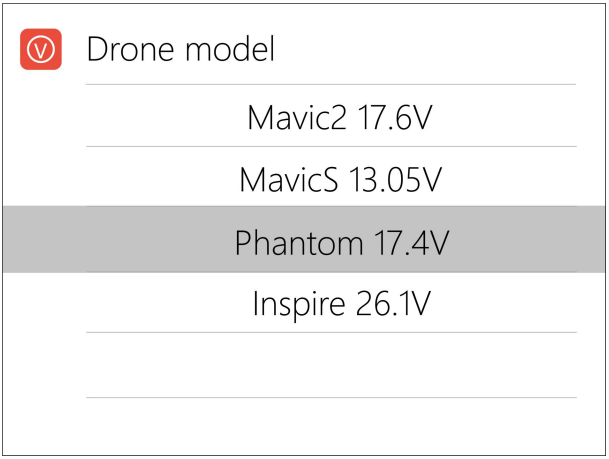
## 11，Smart battery

When the battery type is smart battery, the battery settings are only the drone type and maximum current. As shown below.


@ ToolkitRC 2020




Move the cursor to [Drone model] and press [OK] to select different drone models. As shown below.

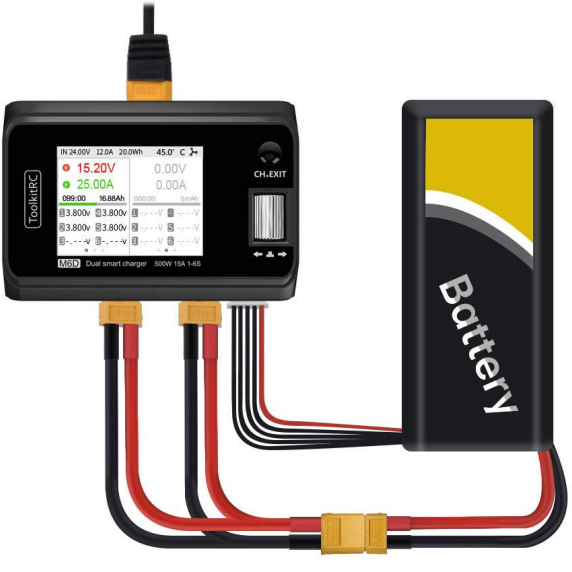



Move the cursor to [Max Current] and press [OK] to set the charging current. The range is 0.5A to 15A.


@ ToolkitRC 2020

12. Synchronous mode

In the settings menu, when the synchronization function is turned on. The M6D will allow two channels to charge the same battery with a total current of 25A. Connect as shown below.

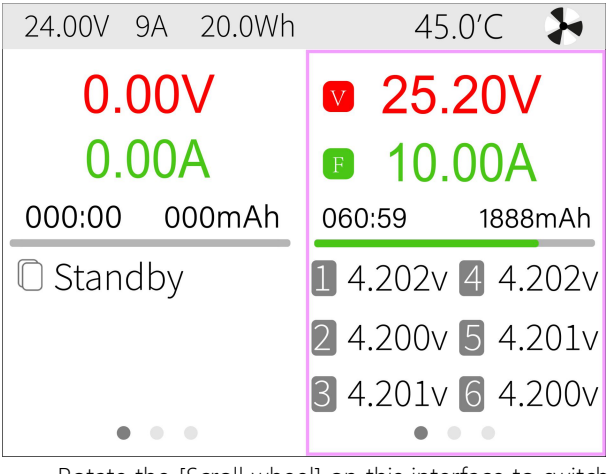





@ ToolkitRC 2020

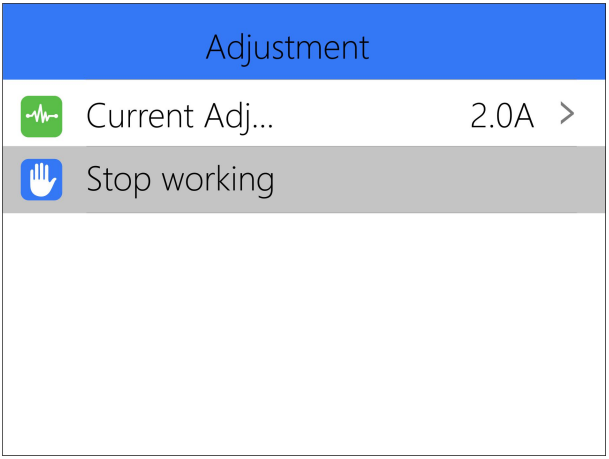
# Charge and discharge work

When charging and discharging starts, the charger enters the working interface as shown below.




Rotate the [Scroll wheel] on this interface to switch the bottom status information and internal resistance voltage value. Short press [OK] to dynamically set the working current or stop working. As shown below.


@ ToolkitRC 2020




To end the charge and discharge work, short press [OK], move the cursor to [Stop working], short press [OK], stop work and return to the main interface.

When charging is completed or an error occurs during charging, a prompt box pops up and a tone sounds.

Display content description:

**24.00V**：Input power supply voltage

**9A**：Input power current

**20.0Wh**：Total power consumption of input power

**45.0℃**：Charger internal temperature.

: Constant pressure sign. ： Constant current sign.

: Current limit sign. : power, : Input overcurrent, : Maximum current, : Activate charging, : The main port is full voltage or a single chip is full voltage.


@ ToolkitRC 2020

**25.20V**：Second channel main port voltage.

**10.00A**：Second channel main port current.

**060:59**：Second channel working time.

**1888mAh**：Cumulative capacity of the second channel.

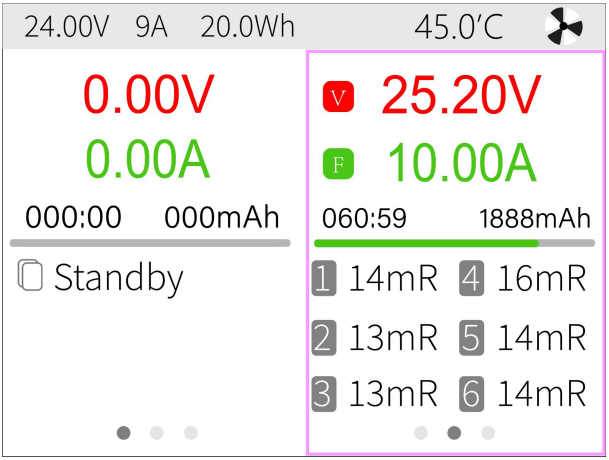
**1 4.202V**：1st battery voltage

.....

**4.200V**：4th battery voltage(this cell is in balance management)

**-.--V** ：No battery connected

Scroll [Scroll Wheel] to switch to the second column of the second channel, which is the internal resistance information. As shown below.

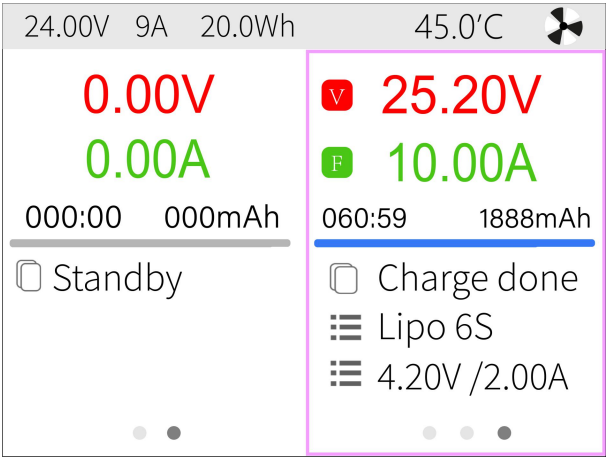



**1 14mΩ**：Internal resistance of the first battery

.....

Scroll [Scroll Wheel] to switch to the third column of the second channel, which is the information bar. As

shown below.




**Charge done:** indicates the current charging status.

**Lipo 6S:** the current rechargeable battery type and battery number.

**4.20V/2.00A:** Current battery end voltage and charging current.

==========

Tips:

1. When charging and discharging, please directly supervise throughout the process to deal with the abnormality in time. Do not leave charging or discharging batteries unattended.
2. When charging and discharging lithium batteries, only connecting to the main port will not perform balance management. Please pay


@ ToolkitRC 2020

attention to the balance of the battery. Connecting the balance lead is recommended and will automatically begin balance management.

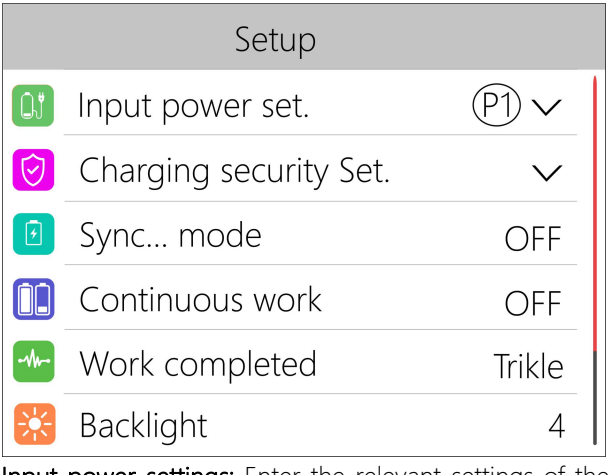
3. After the charging is completed, unplug the battery and connect a new battery, it will automatically continue to charge and discharge according to the set mode (if continuous work mode is selected). When set to a fixed number of cells, you need to connect the batteries of the same cells and capacity. When set to automatically detect the number of battery cells, please pay attention to whether the detected number of cells is consistent with the actual battery.

==========


@ ToolkitRC 2020

# System settings

After long-pressing [OK] on the main interface, you can enter the system setting interface when both channels are idle, as shown below.




**Input power settings:** Enter the relevant settings of the power supply. After long-pressing, can select power supply 1, power supply 2, and power supply 3. Short press to expand settings. As shown below.


@ ToolkitRC 2020

| Setup | |
|---|---|
| Input power set. | P1 |
| Power type | Battery |
| Max power | 560W |
| Max current | 30.0A |
| Voltage range | 7.0-28.0V |
| Charging security Set. | |

**Power type:** Battery and adapter (PSU). A battery can be used to recover energy when discharging batteries (Recycle mode). This mode also provides greater current draw than internal resistance discharging. Recycle mode can not be used with a Power Supply Unit (PSU) or any form of mains power adapter

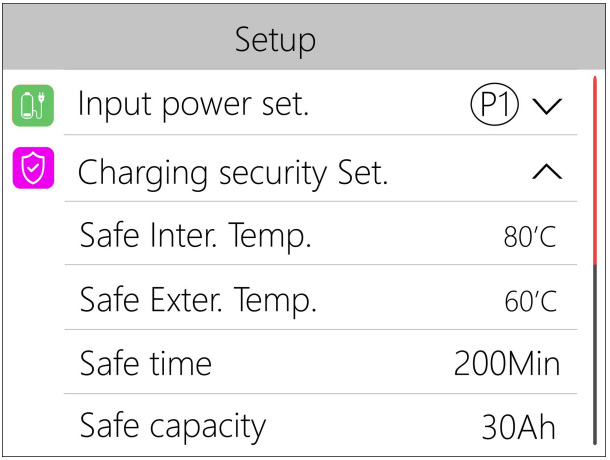
**Max power:** the maximum power absorbed from the input port when charging.

**Max current:** the maximum current drawn from the input port during charging.

**Voltage range:** the allowable input voltage range.

**Charging security Set.:** Short press to expand settings. As shown below.


@ ToolkitRC 2020




**Safe Inter. Temp.:** Above this temperature value, the device will stop the main port output.

**Safe Exter. Temp.:** If the external sensor detects a temperature higher than this temperature, the device will stop the main port output.

**Safe time:** the maximum time of continuous charge and discharge, beyond which it will stop working.

**Safe capacity:** the maximum capacity of continuous charge and discharge, beyond which it will stop working.

**Synchronization mode:** can be set to open or not. After opening, the two channels will work synchronously. Support more power.

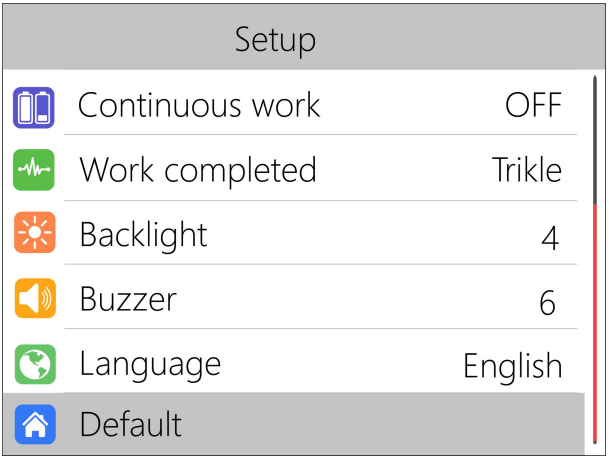
**Continuous work:** When selected the charger will automatically continue the same charging settings on the next connected battery. Ensure the next connected battery requires the same settings as the previous


@ ToolkitRC 2020

battery that was being charged.

**Work completed:** After charging, whether to stop or trickle charge.

**Backlight:** The backlight brightness level of the display can be set from 1 to 10 levels




**Buzzer:** The tone of the buzzer can be set to off.

**Language:** The system display language. English, Chinese, etc. can be selected.

**Default :** Restore all settings to factory defaults.



@ ToolkitRC 2020

# other functions

1，Firmware upgrade

After connecting the M6D to the computer with the USB cable in the box, the computer will recognize a USB disk named Toolkit, download the upgrade file app.upg on the official website Copy and Paste the new file to overwrite the previous files in the USB disk, and the firmware can be upgraded.

2，USB 5.0V output

In addition to the above upgrade function, the USB interface can also output 2.0A current to charge mobile devices.

3，Automatically continue to charge and discharge

When a battery is fully charged, unplug the battery for 2 seconds, connect the next battery, the device will continue to charge and discharge automatically, you can set the menu to start and stop this function (Continuous work mode)

4，Fan level

When the internal temperature of the device exceeds 45 ℃, the fan turns on half-speed airflow to reduce noise. When the internal temperature exceeds 53℃, the fan turns on full-speed airflow to enhance heat dissipation.

5，Manual voltage calibration

In the shutdown state, press and hold [Scroll Wheel] and do not release, connect the power supply, the system will enter the manual calibration voltage function. Measure the actual voltage of each battery with a voltmeter, move the cursor to the corresponding voltage


@ ToolkitRC 2020

value, modify the voltage value to be consistent with the voltmeter value, and achieve calibration. After the calibration is completed, move the cursor to save, short press once, the buzzer will beep once, and the save is successful. Just log out or shut down

6，Fully charged

When the lithium battery is charged, it prompts "Fast charging has ended". If the battery is not removed, constant voltage trickle charging will be performed automatically to make the battery more fully charged.


@ ToolkitRC 2020

# Specification

| | | |
|---|---|---|
| Charging | Input | 7-28V@MAX30A |
| | Battery Type | LiPo LiHV LiFe Lion@1-6S<br>NiMh @1-16S Pb @1-10S |
| | Bal Cur. | 800mA @2-6S |
| | Accuracy | <0.005V |
| | Charging Power | 0.1-15A@250W *2<br>(Asynchronous mode)<br>0.1-25A@500W<br>(Synchronous mode) |
| | Discharging Power | 0.1-15A@250W*2 Recycle Mode<br>0.1-3A@12W*2 Normal Mode |
| | USB | 2.1A@5V upgrade@USB3.0 |
| | Battery Voltage | 1.0V-5.0V @1-6S |
| | Battery Internal Resistance | 1-100mR @1-6S |
| Display | LCD | IPS 2.4 inch 320*240 resolution |
| Product | Size | 98mm*68mm*35mm |
| | Weight | 220g |
| Individual packing | Size | 108.5mm*80.5mm*46mm |
| | Weight | 300g |


@ ToolkitRC 2020