M7

Manual V1.0

2021.01

ToolkitRC

www.toolkitrc.com

ToolkitRC Technology (Shenzhen) Co., Ltd

@ToolkiRC 2021

Introduction

Thank you for purchasing the M7 model tool chain product, please read this manual carefully before using it.

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

@ToolkiRC 2021

Safety

1, M7 allows an input voltage of 7-28V, to ensure that the power supply voltage is consistent, pay attention to the positive and negative polarity of the power supply when connecting.

2, Do not use this product in the environment of heat, humidity, flammable and explosive gas.

3, Please use this product when someone is guarded to prevent accidents

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

5, When using the charging function, please set a current that matches the battery. Do not set an excessive current for charging to avoid damage to the battery.

@ToolkiRC 2021

Contents

Introduction..... 2

Key Points..... 2

Further information..... 2

Safety..... 3

Contents.....4

M7 Layout.....8

Quick Start..... 9

Charge and discharge settings..... 11

1, Battery type setting..... 11

2, The Cellfs Setting..... 14

3, Work Mode..... 15

4, Discharge mode.....15

5, Input MaxVoltage·····17

6, End voltage setting (TVC)·····18

7, Current setting·····19

8, NiMh setting (PeakV).....20

9, Cycle setting.....221
10, External load setting.....23
11, Smart battery setting..... 23
Charge and discharge work····· 25
Accessibility·····30
1, Measure resistance.....30
2, Measure signal·····30
3, Signal output.....33
4, ESC test.....15
5, Power..... 17
System settings..... 39
Other functions.....43
Specifications.....45

@ToolkiRC 2021

Product description

M7 is a multifunctional tool chain product that integrates functions such as a balanced charger and discharger, an electric display, a signal measuring device, and a signal source.

- Can charge and discharge and balance management of LiPo, LiHV, LiFe Lion 1-6S, NiMh 1-16S, PB 1-10S batteries
- Charge current：MAX 10A @MAX200W
- Discharge current：Recycle mode Max 10A @200W
  External mode Max 10A @200W
  Inter mode Max 3A @10W
- Lithium battery cut-off voltage can be set (TVC function)
- Can measure battery voltage, battery internal resistance, lithium battery balance management
- Can measure the signal value of PWM/PPM/SBUS, with an accuracy of 1 microsecond
- Can output PWM/PPM/SBUS standard signals with an accuracy of 1 microsecond

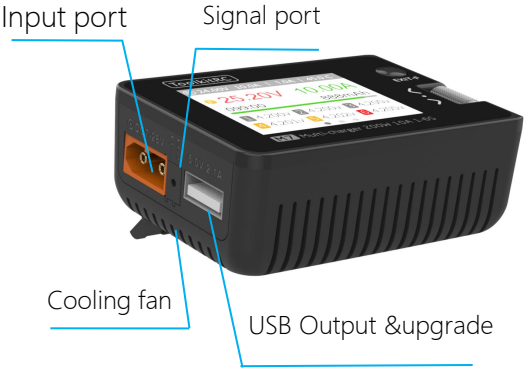
@ToolkiRC 2021

- Constant current and constant voltage source output, customizable 1-28V constant voltage, 1-10A constant current
- Can be adapted to mainstream drone batteries, automatically activated and charged
- Multi-language system, you can upgrade any language you need
- USB 2.1A@5.0V output, rechargeable mobile devices
- The device is simulated as a U disk, and the upgrade file is copied to realize the product firmware upgrade

@ToolkiRC 2021

M7 Layout

Front



Back

@ToolkiRC 2021

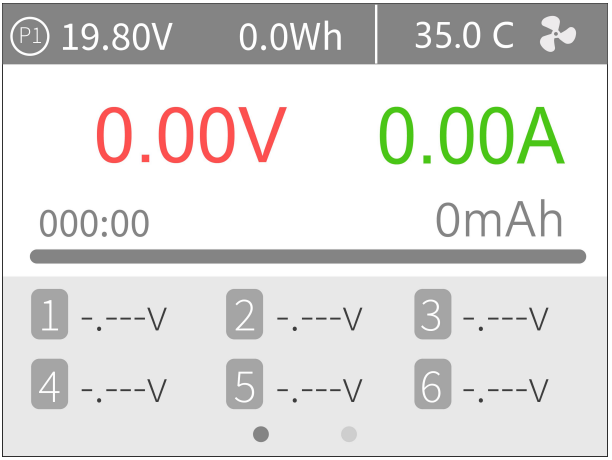
Quick start

1，Connect the 7-28V power supply to the input port on the back of the M7.

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

3，Simultaneously with do-re-mi boot sound.

4，After the boot is completed, the screen enters the main interface and displays as follows:



5，Long press [Exit] to enter the auxiliary function interface.

6，Scroll [Scroll Wheel] to switch the page below.

7，Short press [OK] to select the charging task when the charger is idle. You can adjust and finish the work when the charger is working.

8，Long press [OK] to enter the system setting interface

@ToolkiRC 2021

when the charger is idle.

9，Short press [Exit] to end the modification or return to the previous interface.

==========

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

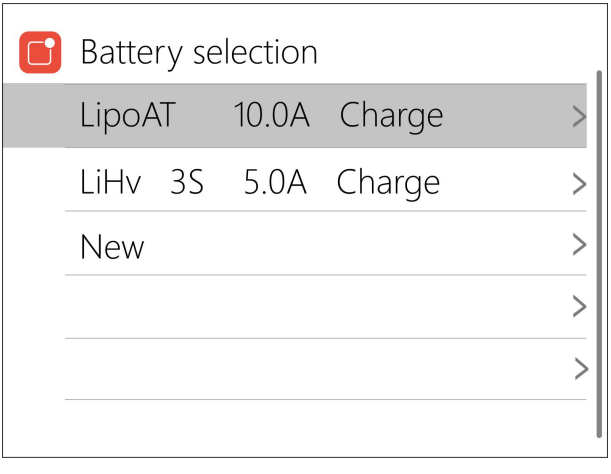
2. Long press [Scroll Wheel] for 2 seconds, it is the delete key function

3. If any key is successfully operated, there will be a didi sound

==========

Charge and discharge settings

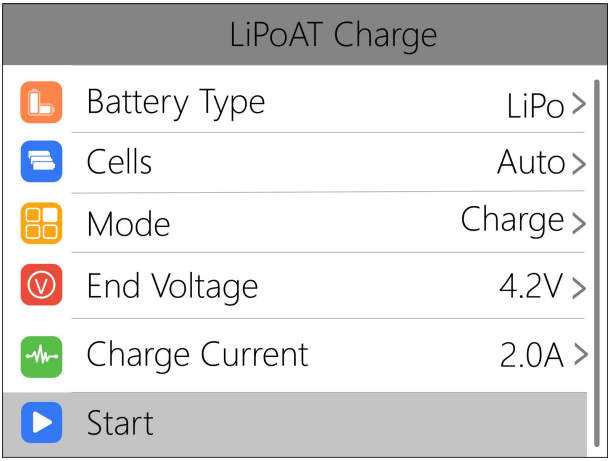
In the main interface, select and short press [OK] to enter the charging function, open the battery selection option in the system settings, and the following interface will be displayed.



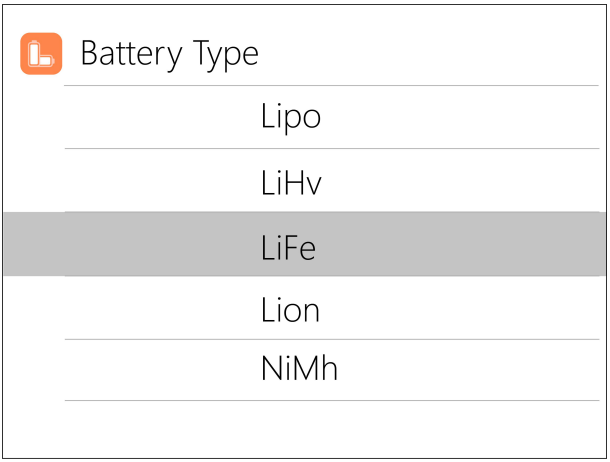
1. Battery type setting

Scroll [Scroll Wheel], move the cursor, select the battery that has been set, or create a new battery, up to 32 batteries can be created. Press [Enter] to enter the battery setting interface of this group, the display is as follows:

@ToolkiRC 2021



Move the cursor to [Battery Type] and press [OK] to modify the battery type, the display is as follows:



The charger supports charging and discharging of 6 types of batteries: Lipo, LiHV, LiFe, Lion, NiMh, and PB. There is also a smart battery mode to choose from.

After selecting the 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 cause burns, etc. Please choose carefully.

2. Please do not use this product to charge the battery that is not marked with 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.

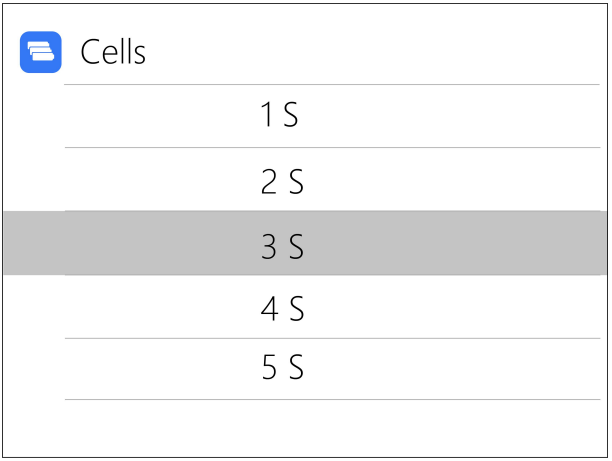
5, NiMh: often called NiMH battery, nominal voltage 1.20V.

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

==========

2. The Cells Setting

Move the cursor to the position of [Battery Section], press [OK] to modify the cells of battery. The display is as follows:



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

==========

Tips:

1. The connected battery is over-discharged or over-charged, which may cause incorrect identification of the battery cells, so you need to manually set the correct cells.

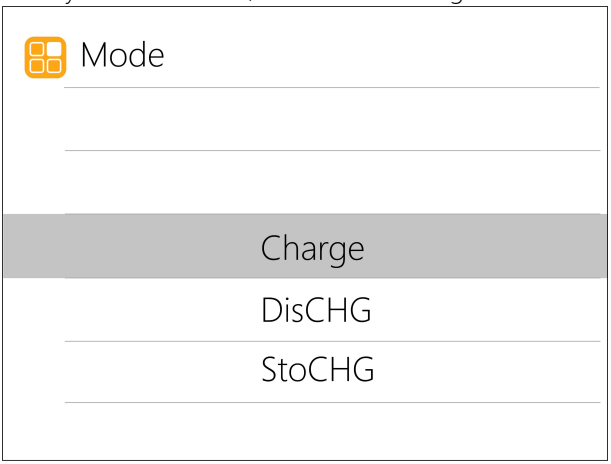
2. The Cells is set incorrectly, it may be unsatisfactory, or overcharge may damage the battery, please set it carefully.

3. After Lixx batteries are connected to the balance port, the battery cells can be more accurately identified.

==========

3. Work Mode

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

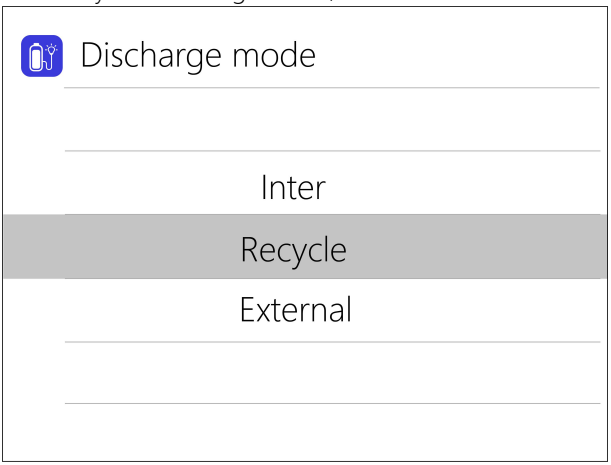


Lipo, LiHV, LiFe, Lion batteries can be charged, discharged, and stored. **NiMh** battery can choose to charge, discharge, cycle. **PB** battery can choose to charge and discharge. Short press [OK] and [Exit] to take effect and return to the previous interface.

4. Discharge mode

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

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



The charger supports three discharge modes.

1. Normal mode: discharge through internal heat consumption, maximum support 3.0A@10W discharge.

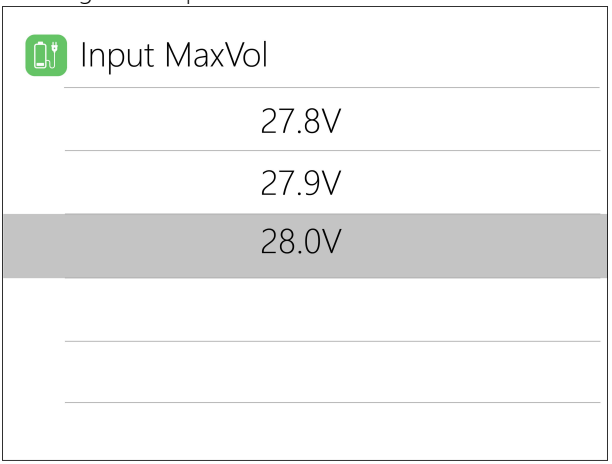
2. Recycle mode: when the input is battery power, the power is recovered to the input battery through this function, and the maximum support is 10.0A@200W discharge.

3. External mode: when the input port is connected to the discharge load and the output port is connected to the battery, it can be discharged through this function, and the maximum support 10.0A@200W discharge.

@ToolkiRC 2021

5. Input MaxVoltage

When the discharge mode is selected to recycle, the battery setting interface will increase the input Max Voltage setting. Move the cursor to [Input MaxVol] and press [OK] to adjust the input Max voltage. If the input voltage reaches this voltage value during discharge, the discharge will stop. As shown below:



==========

Tips:

Please set the input Max voltage to the highest protection voltage of the power supply. After the voltage is reached, the charger will automatically stop recycling discharging. Setting high overvoltage may damage the input power

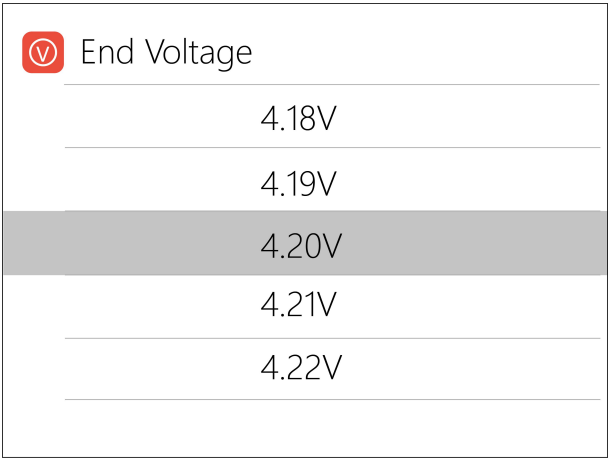
==========

@ToolkiRC 2021

6. End voltage setting (TVC)

Move the cursor to [End Voltage] and press [OK] to modify the end voltage of the single-cell battery.

When the work mode is charge, it is the charge 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 [Scroll wheel] to adjust the value, step 0.01V.



==========

1. Only LiPo, LiHV, LiFe batteries can set the cut-off voltage.

2. Do not modify the cut-off voltage when you are not familiar with the battery characteristics.

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

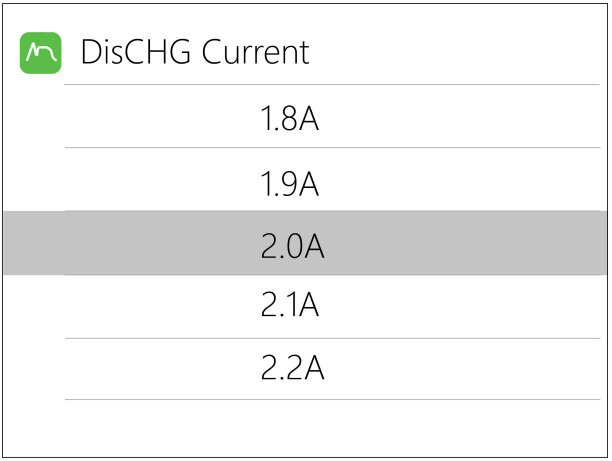
4. **Glossary explanation:**

TVC: English abbreviation for terminal voltage control

==========

7. Current setting

Move the cursor to the [Charge Current] or [DisCHG Current] position, and press [OK] to modify the current. Rotate [Scroll Wheel] to adjust the value, step by 0.1A. Scroll [Scroll Wheel] quickly to increase or decrease. The charger supports up to 10.0A.



==========

Tips:

1. Please set the charging rate of 1-2C according to the battery capacity. For example, if the battery capacity is 2000mAh, please set the charge current to 2.0-4.0A.

2. The charge and discharge current is only valid

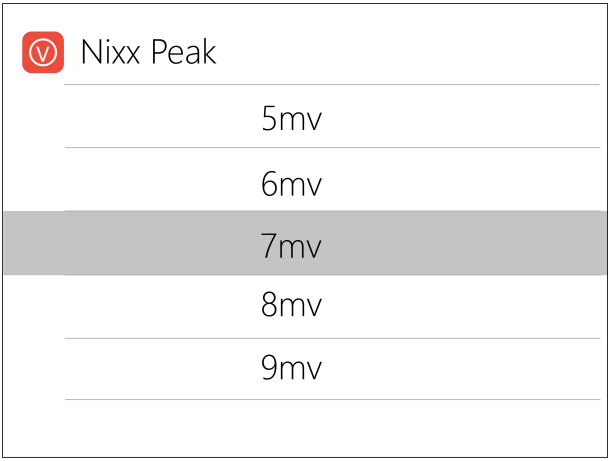
in the corresponding work mode.

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

==========

8. NiMh setting (PeakV)

When the battery type is **NiMh**, the negative pressure value when the battery is fully charged can be set, the range of which can be set is 5mV-15mV, as shown below:



==========

Tips:

1, Only NiMh battery can set negative battery voltage.

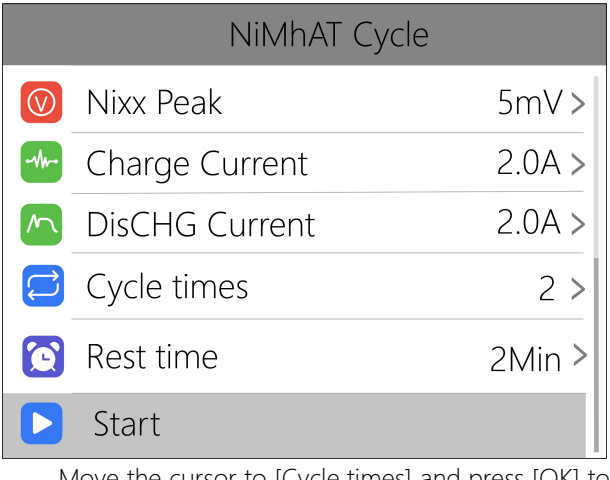
2, **Glossary explanation:**

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 cycle, the battery setting interface will increase Cycle times and Rest time setting. As shown below:



Move the cursor to [Cycle times] and press [OK] to set the range of cycle times to 2-12.

The charger will follow the pattern cycle of discharge->charge->discharge->charge....

"Discharge -> charge" is 2 times.

Cycle times

2

3

4

5

6

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

Rest time

2Min

3Min

4Min

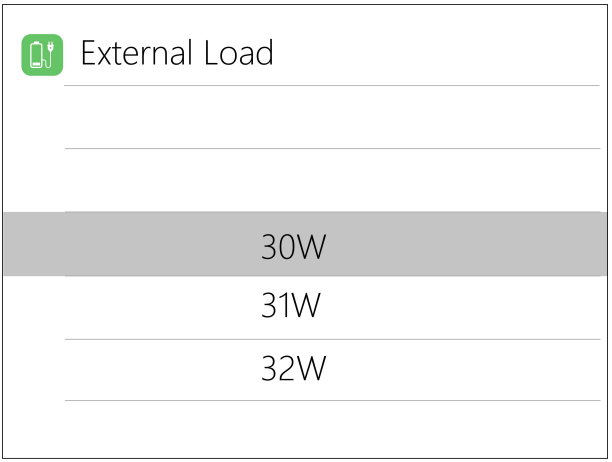
5Min

6Min

@ToolkiRC 2021

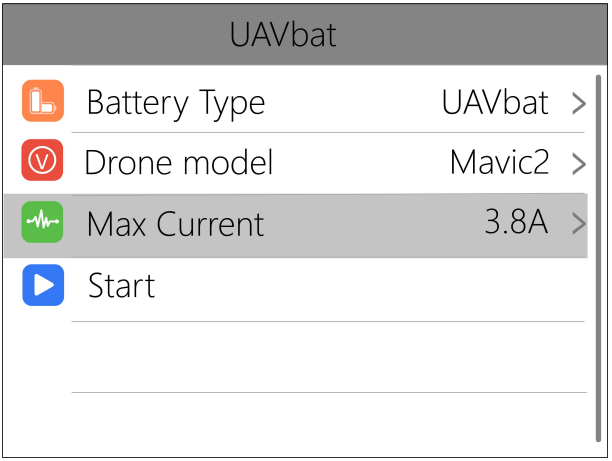
10. External load setting

When external discharge is selected as the discharge mode, the external load setting will be increased. Set the wattage according to the external load actually used. As shown below:

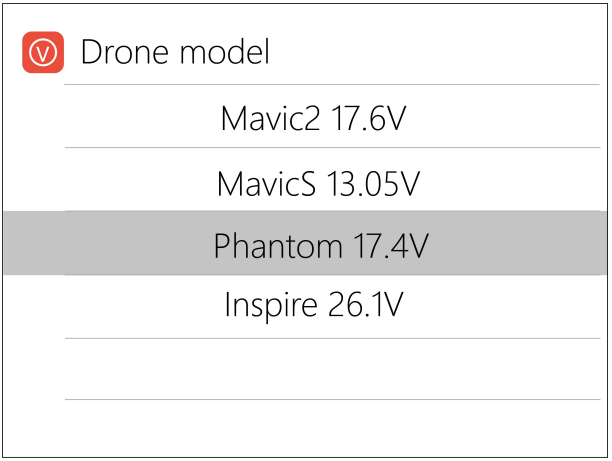


11. Smart battery setting

When UAV battery is selected for battery type, there are only two options for battery setting: drone type and Max current. As shown below:



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

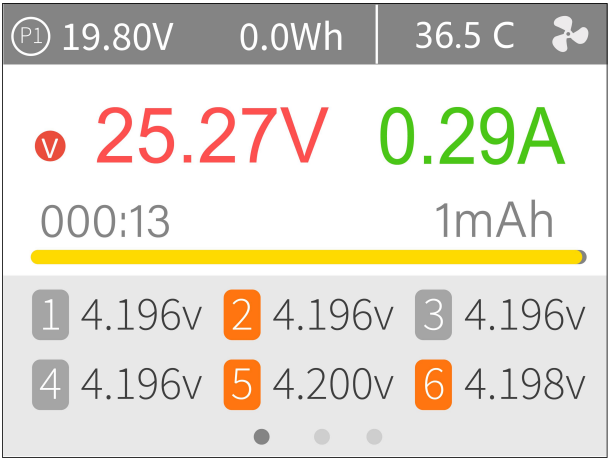


Move the cursor to [Max Current] and press [OK] to set the charge current. The range is 0.5A to 10A.

@ToolkiRC 2021

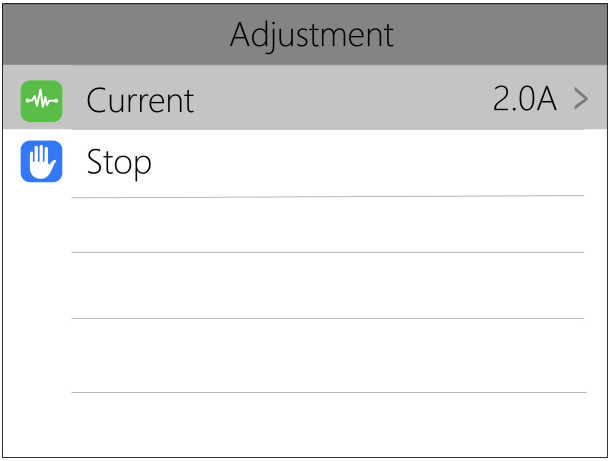
Charge and discharge work

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



Rotate [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:

@ToolkiRC 2021



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

When charge is complete or charge error occurs. A prompt box will pop up with a sound.

Display content description:

P1: Power selection in system settings

19.80V: Input power supply voltage

0.0Wh: The accumulated power consumption of the input power

36.5℃: The internal temperature of the charger

V : Constant voltage sign C: Constant current sign

25.27V: Main port voltage

0.29A: Main port current

000:13: Working hours

@ToolkiRC 2021

1mAh: Cumulative capacity

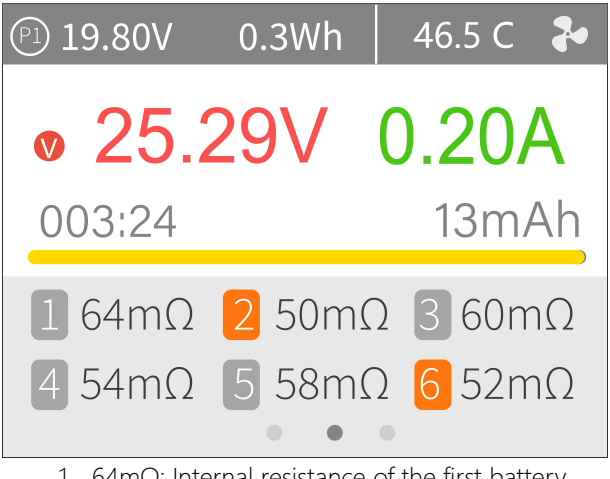
1 4.196V: The first battery voltage

.....

6 4.198V: The voltage of the sixth battery (this battery is under balance management)

-.---v : No battery connected

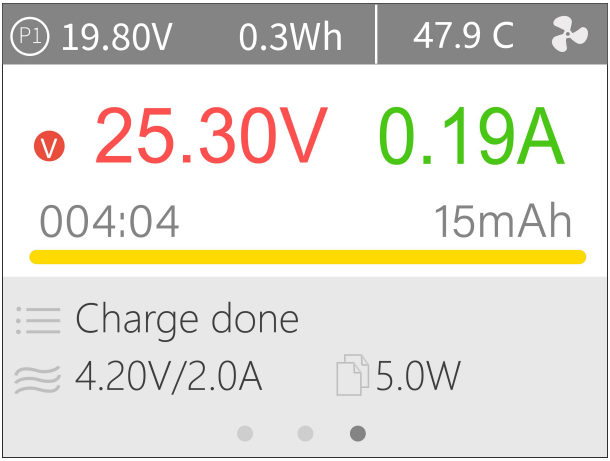
Scroll [Scroll Wheel] to switch to the second column, which is the internal resistance information. As shown below:



1 64mΩ: Internal resistance of the first battery

.....

Scroll [Scroll Wheel] to switch to the third column, which is the information column. As shown below:



Charge done: Indicates the current charging status

5.0W: The current charging power

4.20V/2.00A: end voltage/charge current

==========

Tips:

1. When charging and discharging work, please have someone on duty throughout the process to deal with abnormalities in time.
2. When charging and discharging lithium batteries, only connecting to the main port will not perform balance management. Please pay attention to the balance of the battery. After connecting to the balance port, it will automatically balance management.
3. After charging is completed, unplug the battery and insert a new battery, it will

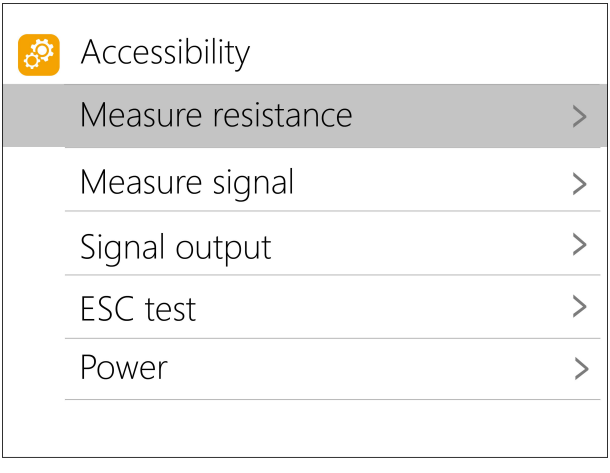
@ToolkiRC 2021

automatically continue to charge and discharge according to the set mode. When set to a fixed number of strings, batteries with the same number of strings need to be connected. When setting to automatically detect the battery string number, please pay attention to whether the detected string number matches the actual number.

==========

Accessibility

After selecting and long pressing [Exit] in the main interface, you can enter the auxiliary function interface when the charger is idle, as shown below:



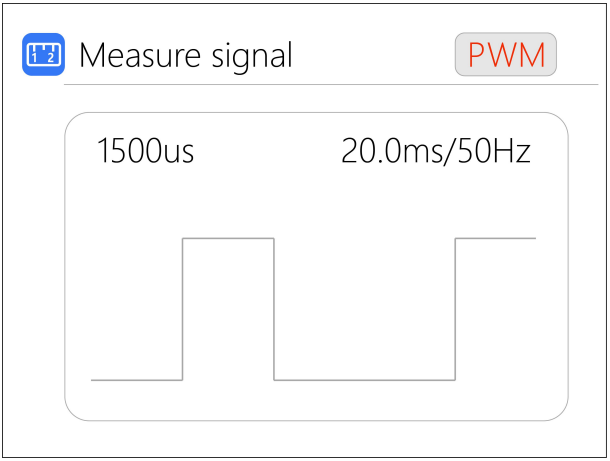
1. Measure resistance

Short press [OK] to test the internal resistance of the connected battery and return to the main interface display.

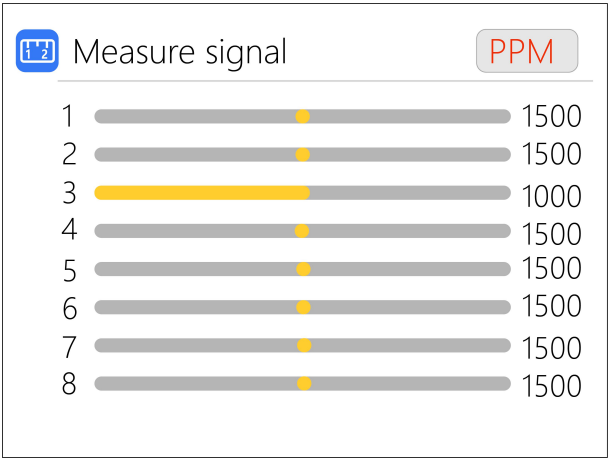
2. Measure signal

The cursor selects the measure signal, short press [OK] to enter the signal test interface.

Scroll [Scroll wheel] to select the type of signal to be tested. Select PWM, as shown below:

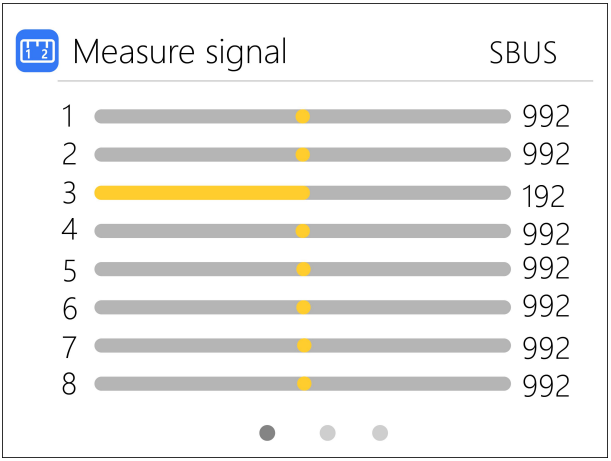


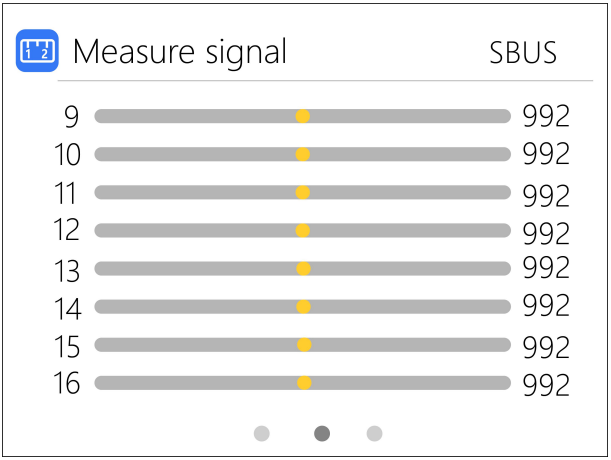
Select PPM, as shown below:



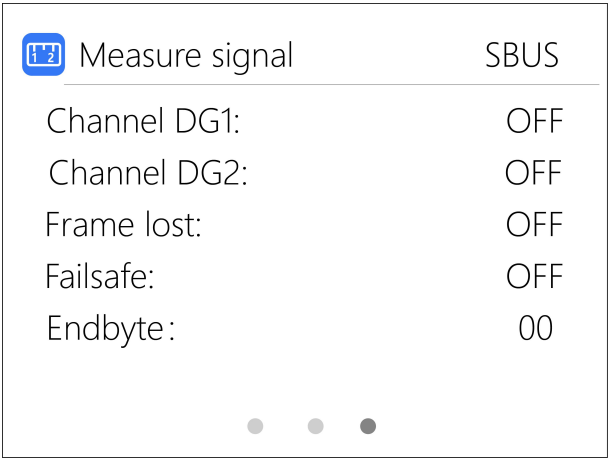
@ToolkiRC 2021

Select SBUS, scroll [Scroll wheel], can switch to display [1-8 channels], [9-16 channels], status bits. As shown below:





@ToolkiRC 2021



3. Signal output

The cursor selects signal output, short press [OK], you can enter the signal test interface.

Scroll [Scroll wheel] to select the type of signal to be tested. Choose PWM.

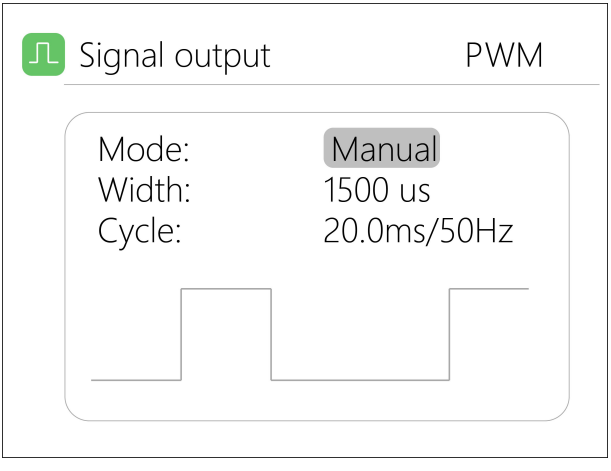
Scroll the [Scroll Wheel], move the cursor to the [Manual] item, press [OK] to set the output mode, which can be set to manual, auto 1, auto 2, and auto 3.

When the mode is manual, you can move the cursor to the pulse width and cycle items to set the signal value to be output.

When set to auto 1, 2, 3, the pulse width value of output PWM will automatically change at 3 different speeds.

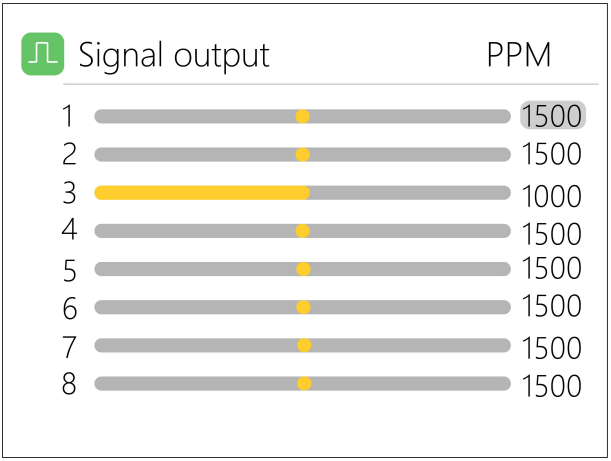
The width can be set from 800 to 2200us.

The cycle can be set in the range: 2.5ms (400hz) to 50.0ms (20hz). As shown below:

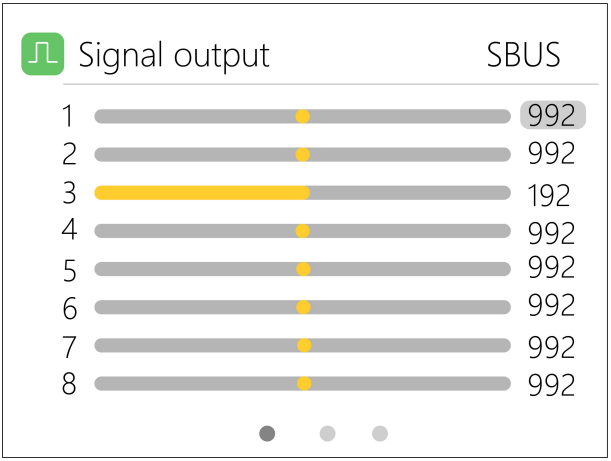


Select PPM, scroll [Scroll wheel] to move the cursor to the value of the channel to be modified. Press [OK] to modify the output pulse width value of this channel. As shown below:

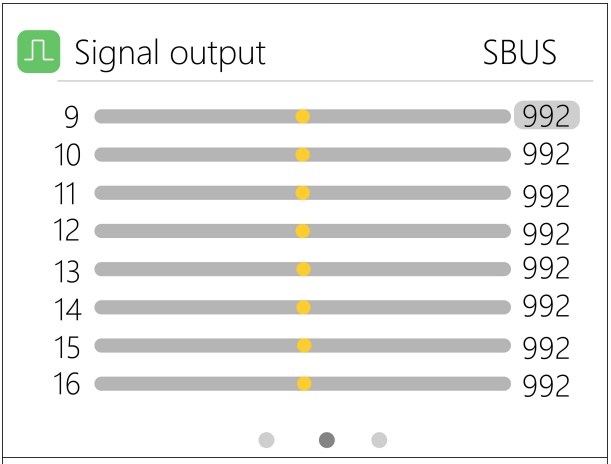
@ToolkiRC 2021

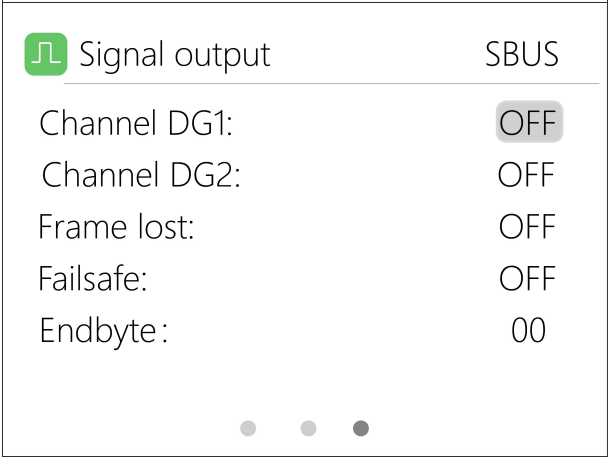


Select SBUS, scroll [Scroll wheel] to move the cursor to the value of the channel to be modified. Press [OK] to modify the output pulse width value of this channel. As shown the following 3 pictures:



@ToolkiRC 2021

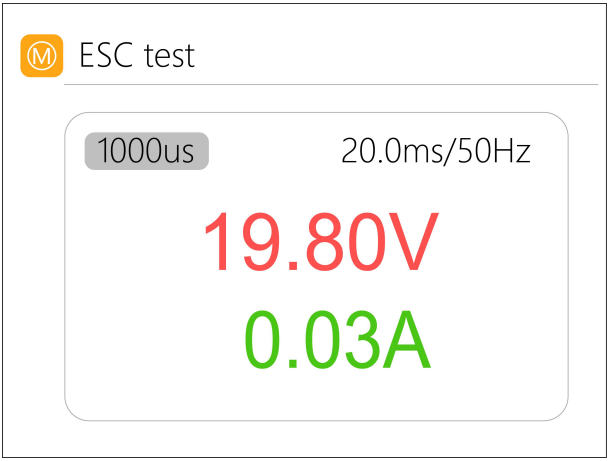




@ToolkiRC 2021

4. ESC test

Select ESC test with the cursor, short press [OK] to enter the ESC test, scroll [Scroll wheel], move the cursor to the pulse width and cycle, press [OK] to change the corresponding value. As shown below:

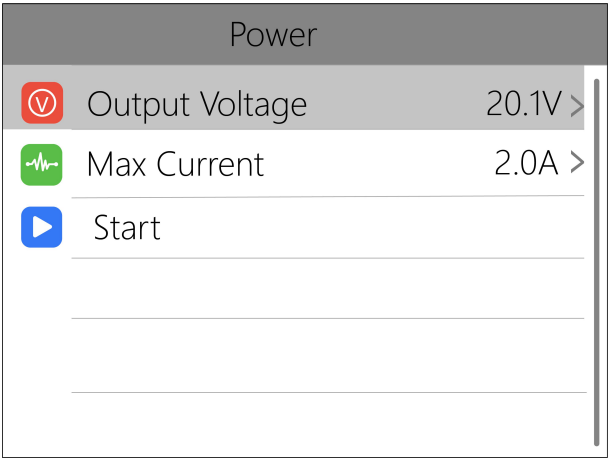


5. Power

Select the adjustable power supply with the cursor, and short press [OK] to enter the power.

The voltage and current of the output power supply can be set. Move the cursor to the beginning, short press [OK] to start power output and return to the main interface. As shown below:

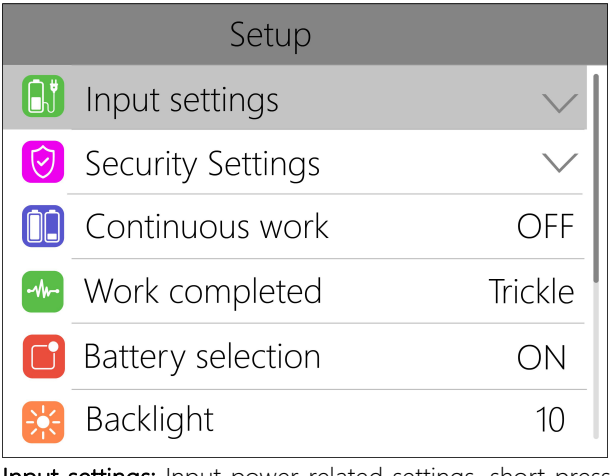
@ToolkiRC 2021



@ToolkiRC 2021

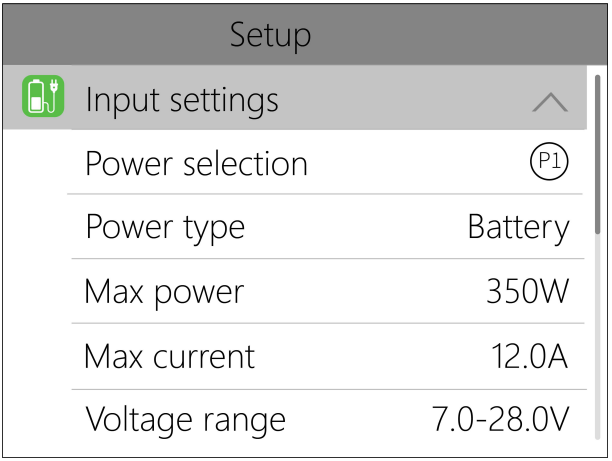
System settings

After selecting and long pressing [OK] in the main interface, you can enter the system setting interface when the charger is idle, as shown in the figure below



Input settings: Input power related settings, short press to expand the settings. As shown below:

@ToolkiRC 2021



Power selection: Can choose power 1, power 2, power 3

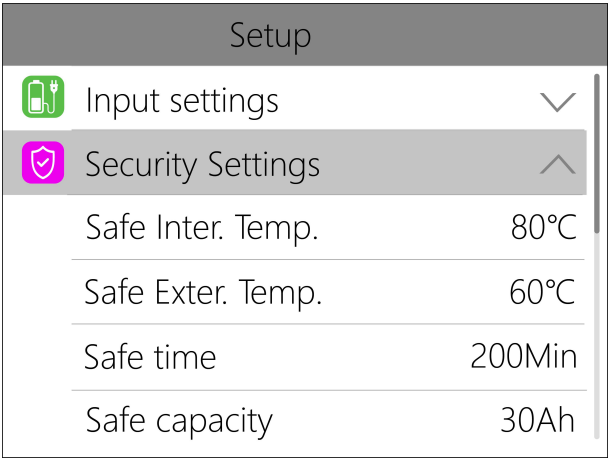
Power type: Can choose battery pack and adapter. The battery pack can choose to recycle discharge during discharge, but the adapter cannot

Max power: When charging, the maximum power absorbed from the input port

Max current: When charging, the maximum current drawn from the input port

Voltage range: Allowable input voltage range

Security Settings: Short press to expand settings. As shown below:



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 value, the device will stop the main port output

Safe time: The maximum time of continuous charging and discharging will stop working if exceeded

Safe capacity: The maximum capacity of continuous charging and discharging will stop working if exceeded

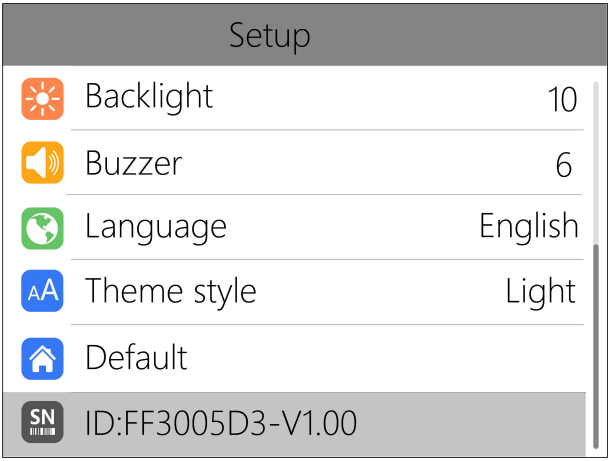
Continuous work: After charge and discharge, whether to continue charge and discharge after battery replacement

Work completed: Whether to stop or trickle charge after charge done

Battery selection: Option to open and close the battery

selection interface

Backlight: The backlight brightness level of the display can be set from 1-10



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

Language: System display language. English, Chinese, etc. can be selected

Theme style: Can be set to light and dark themes

Default: Restore all setting items to factory value

ID: Independent ID for each device

Other functions

1. Firmware upgrade

After connecting the M7 to the computer with the USB data cable in the box, the computer will recognize a U disk named Toolkit. Download the upgrade file app.upg on the official website and overwrite the files in the U disk to upgrade the firmware.

2. USB 5.0V output

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

3. Automatically continue charging and discharging

When a battery is fully charged, after unplugging the battery for 2 seconds, connect to the next battery, the device will automatically continue to charge and discharge, you can start and stop this function in the settings menu

4. Fan level

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

6. Manually calibrate the voltage

In the shutdown state, press and hold the [roller] without releasing, connect the power supply, and the system will enter the manual voltage calibration function. Use a voltmeter to measure the actual voltage of each battery, move the cursor to the corresponding voltage value, modify the voltage value to be consistent with the

@ToolkiRC 2021

voltmeter value, and achieve calibration. After the calibration is completed, move the cursor to save, short press once, the buzzer will beep once, the save is successful. Just exit or shut down

7, fully charged

When the lithium battery is fully charged, it will prompt "Fast charge is done". If the battery is not removed, the constant voltage trickle charge will be performed automatically to make the battery reach a more full state.

Specifications

Charging	Input	7-28V@MAX12A
	Battery type	LiPo LiHV LiFe Lion@1-6S NiMh @1-16S Pb @1-10S
	Balance	400mA @2-6S
	Accuracy	<0.005V
	Power	0.1-10A@200W
	Discharge power	0.1-10A@250W Recycle Mode 0.1-3A@12W Internal Mode
	USB	2.1A@5V upgrade@USB3.0
	Voltage	1.0V-5.0V @1-6S
	Internal resistance	1-100mR @1-6S
Measuring	PWM	880us-2200us@20-400hz
	PPM	880us-2200us*8 CH@20-50hz
	SBUS	880us-2200us*16 CH@20-100hz
Output	PWM	500us-2500us@20-1000hz
	PPM	880us-2200us*8 CH@50hz
	SBUS	880us-2200us*16 CH@74hz
	Power	1-10A@1-28V Mode: CC+CV
Display	LCD	IPS 2.0 inch 320*240 resolution
Product	Size	73mm*51mm*27mm
	Weight	90g
Individual packing	Size	84mm*79mm*39mm
	Weight	150g

@ToolkiRC 2021