



Guangzhou Qian Hui Information Technology Co., Ltd

MKS TFT28/32 Color touch screen instruction

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Firmware version update

Version	Modification time	Modification content
V1.1.3	2016.5	<p>1.Fixed the problem that TFT can't not communicate with controller board after firmware or baud rate updates.</p> <p>2.Fixed error bug of More Menu .</p>
V1.1.4	2016.6	<p>1.Available to set the Max temp of extruder and bed on config.</p> <p>2.Available to set value to trigger filament monitoring(high/low leveling).</p> <p>3.Fixed U dish frozen BUG.</p> <p>4.Bed leveling icon does not display by default.</p>
V1.1.5	2016.8	Available to set 'Auto Off After Printing Finishes' function on config and display it inside 'More' interface.
V1.2.0	2016.11	<p>1.Improved display speed and screen touching, faster and more sensitive.</p> <p>2.Available to switch title languages,including simplified Chinese,Chinese traditional,English.</p> <p>3.Fixed info error of wifi display.</p> <p>4.Fixed display error,that can't find sd card or u disk after reboots.</p> <p>5.Support manual leveling and filament change.</p> <p>6.Added "More" icon on printing operation interface for user-defined.</p> <p>7.Deleted screen calibration function.</p>
V2.0.0	2017.2	<p>1.Updated screen interface,added 3 different home pages for 3 different firmwares.</p> <p>2.Added 'print from breakpoint' function.(Continue button)</p> <p>3.Deleted Baud Rate 'connect' button,but available to set it on config.</p> <p>4.Updated leveling interface.</p> <p>5.Fixed E position error after printing pause and filament change.</p> <p>6.Available to see the z axis' height when moving or printing.</p>

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I. Overview

MKS-TFT28/32, color touch screen, is researched and developed by Makerbase developers, which is suitable for open sourced 3D printers. It can work with MKS Base, MKS Gen, MKS Sbase and so on. Compared to TFT32, TFT28 supports external DC 12V and works with Ramps1.4.

II. Features

2.8-inch color touch screen , support U disk and SD card.

Reserve WIFI interface , support WIFI function by adding WIFI module.

Three themes, two styles, provide the users with more choices.

Allowed to self-design the interface of booting logo and all buttons.

Allowed to add at most 13 customized function buttons.

Update the configuration and firmware by SD card, easily operate.

Support Marlin, Repetier and Smoothieware firmware, and don' t need to modify the master program.

Allowed to work with Ramps 1.4(TFT28) as well as MKS series controller board developed by Makerbase.

Support “print from breakpoint” function, “print from power outage” and “filament detect” function.

Support “auto off after printing finishes” function with “auto off after printing finishes” module.

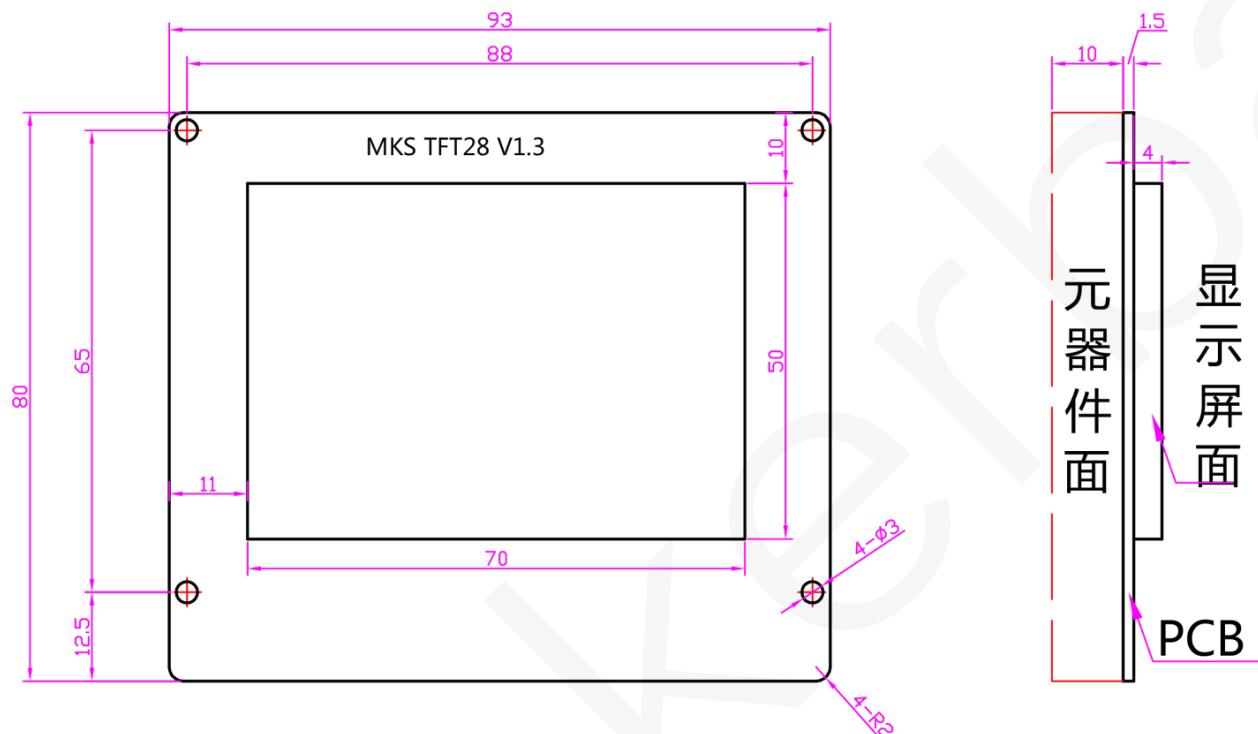
III. Connection and Dimension

a). MKS TFT28/32 Physical Map



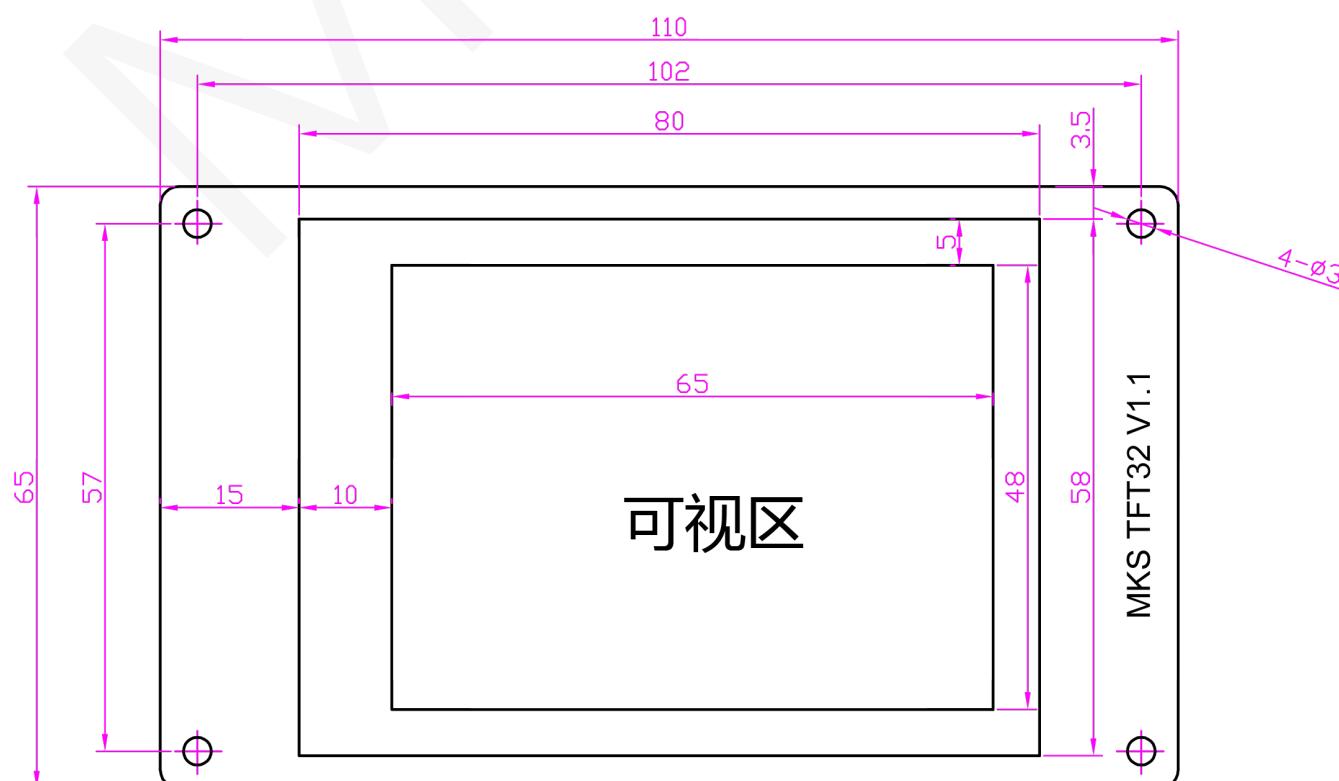


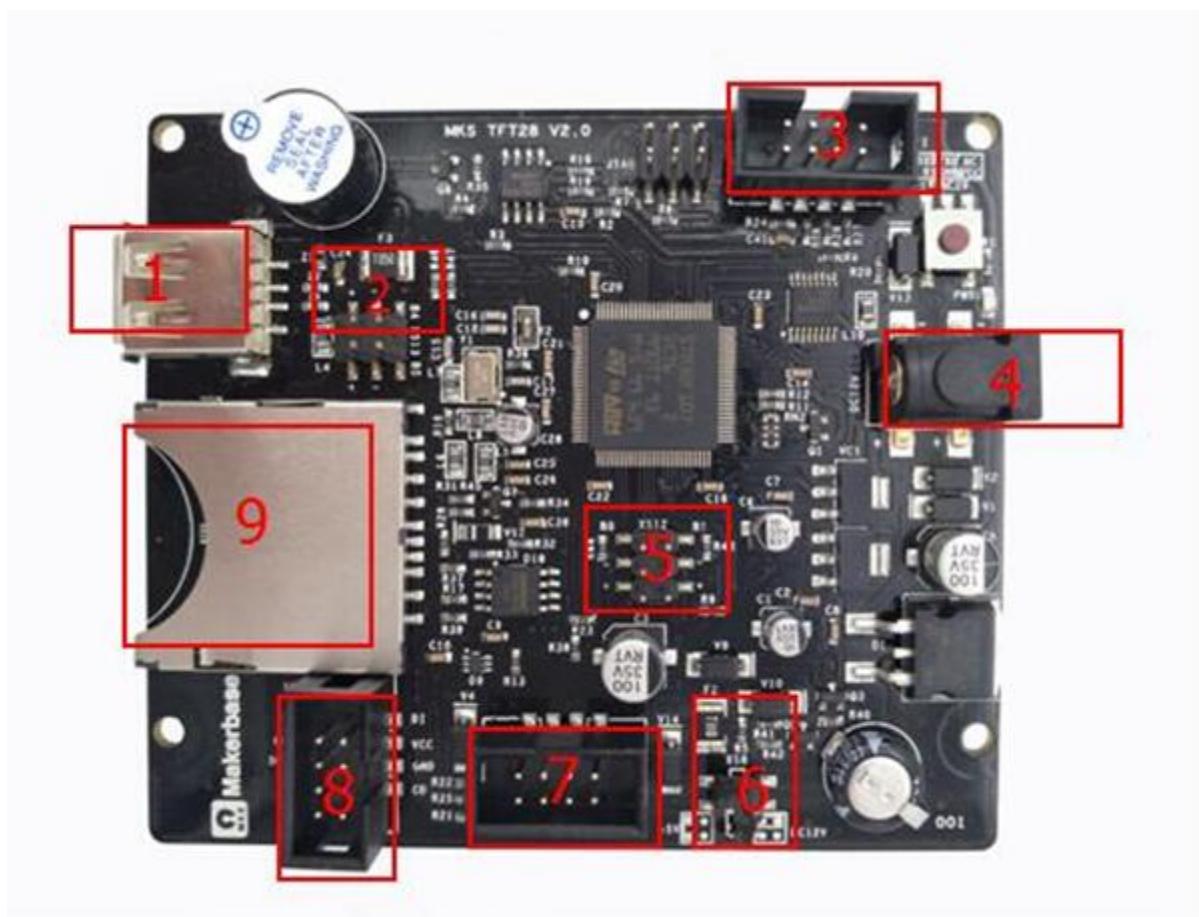
b). MKS TFT28 Installation Dimensional Drawing



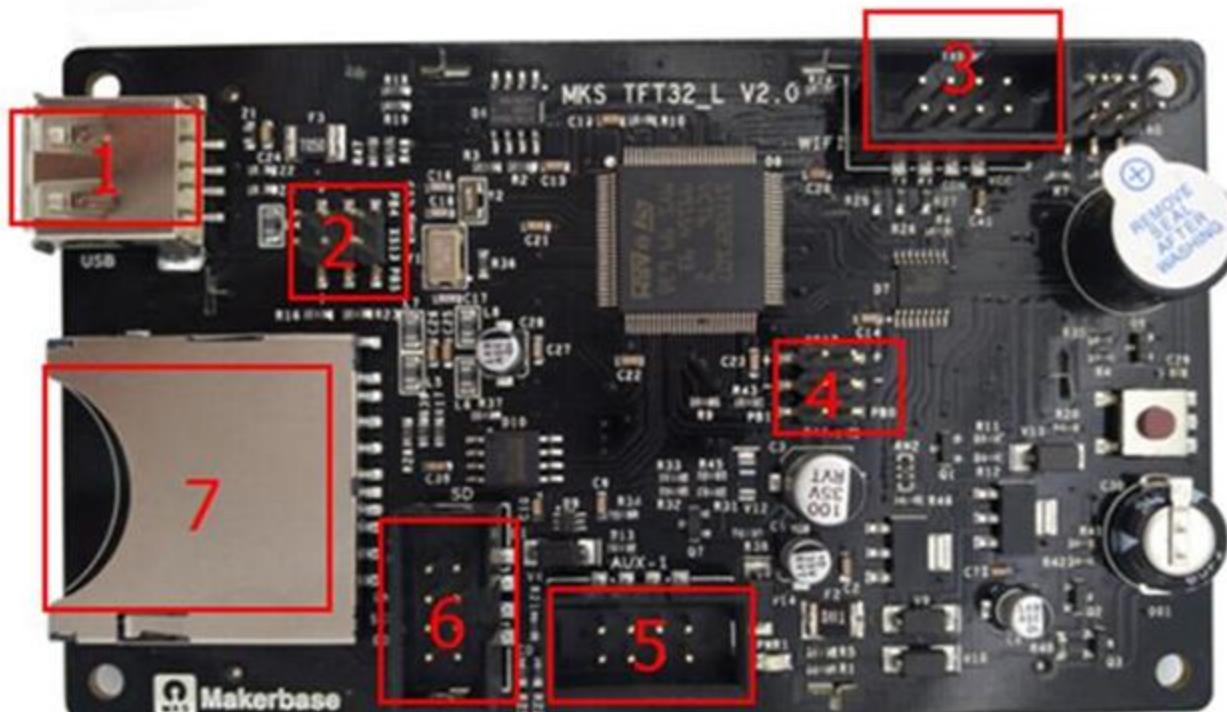
注意：单位为mm

c). MKS TFT32 Installation Dimensional Drawin



d). MKS TFT28 Interface Diagram

1	B4: Finish printing to turn off module interface	6	Mainboard interface
2	WIFI module interface	7	External SD card interface
3	Supply power interface	8	SD card
4	B0: Power outage module B1: Materials outage module	9	U disk
5	Power selection jumper		

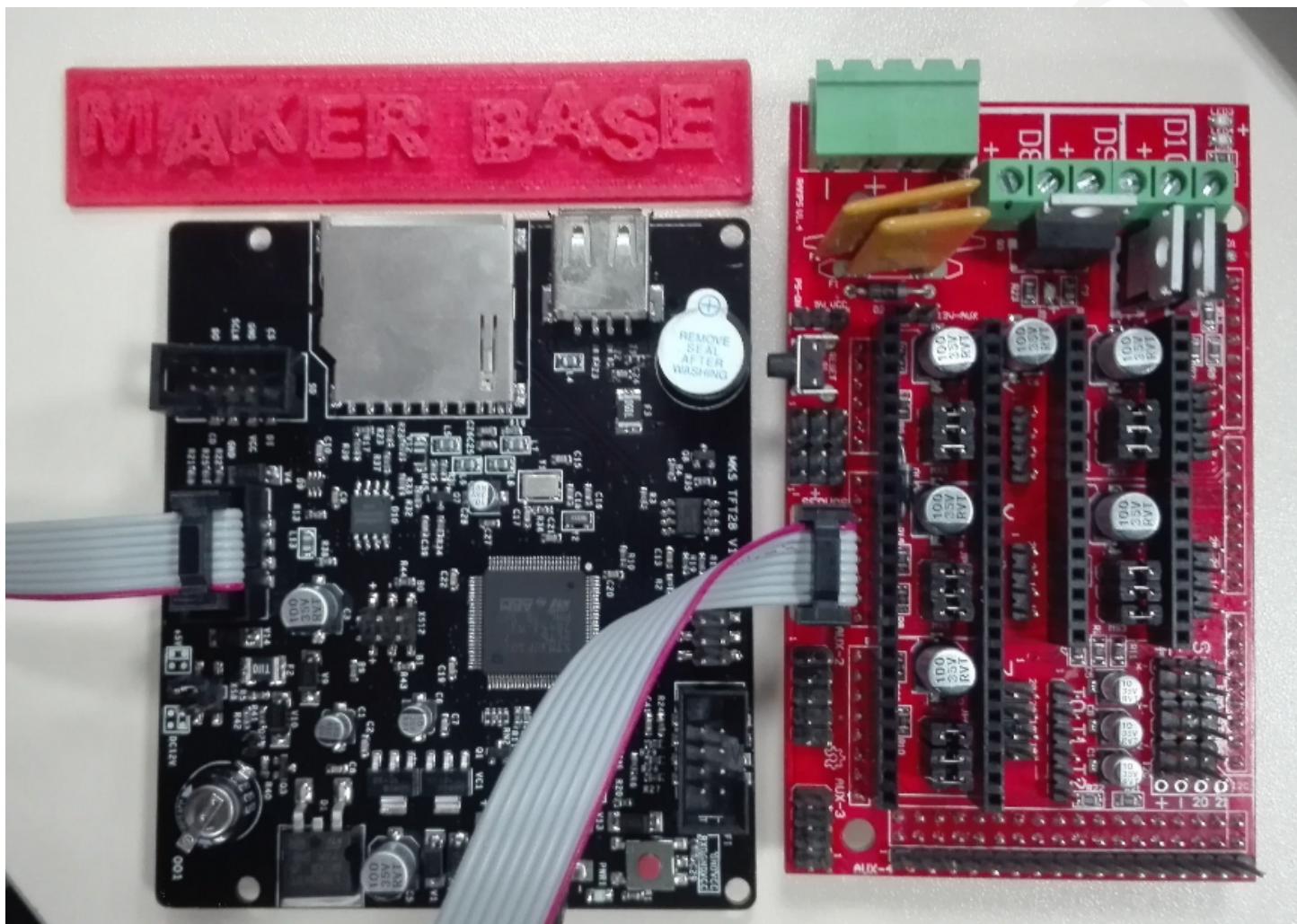
e). MKS TFT32 Interface Diagram

1	B4: Finish printing to turn off module interface	4	Mainboard interface
2	WIFI module interface	5	External SD card interface
3	B0: Power outage module	6	SD card
	B1: Materials outage module	7	U disk

f). Hardware Connection Instruction

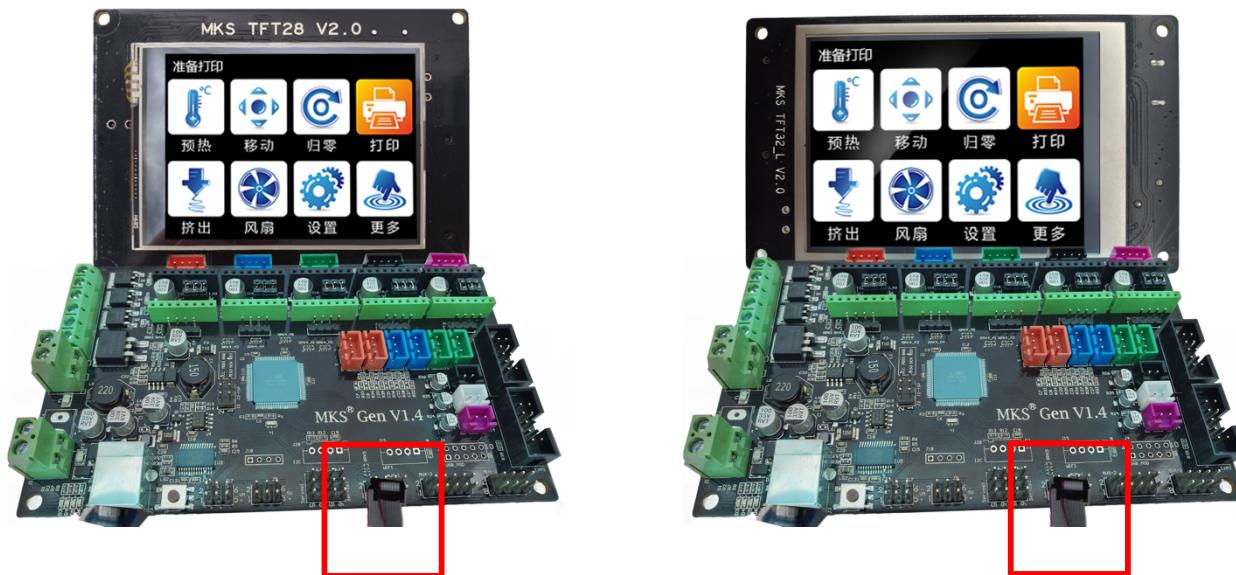
6.1 Connect to Ramps 1.4, only TFT28 can work with Ramps 1.4.

1. The touch screen interface connects to the Aux-1 of Ramps 1.4;
2. The power of touch screen jumps to 12V position.
- 3.. The power of touch screen inputs 12V.



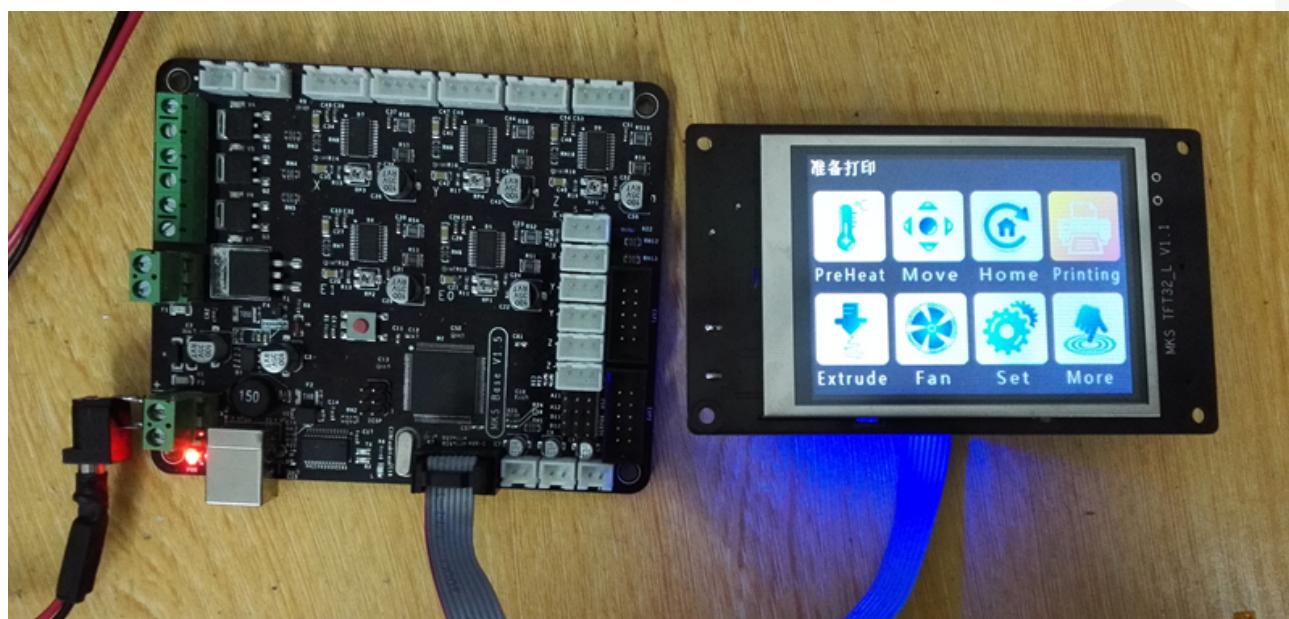
6.2 Connect to MKS Gen

1. The touch screen interface connects to the Aux-1 of MKS Gen. It is not necessary to connect external 12V power supply



6.2 Connect to MKS Base, MKS MINI and MKS Base

1. The touch screen interface connects to the Aux-1 of MKS series controller board. It is not necessary to connect external 12V power supply.



g). Function Instruction

7.1 The way to get the latest firmware

- A. Ask the customer services for the latest firmware.
- B. Login this website to download: <https://github.com/makerbase-mks?tab=repositories>

7.2 The ways to update the TFT firmware

7.2.1 Copy the latest program to the the root directory of the SD card, including:



Notice: Do not change the file name.

7.2.2 Plug the SD card into the SD card slot of the TFT, power up again. The screen will show the updating progress when hearing di ~~, a short sound, then the update is finish after about 30 seconds.

7.2.3 View the current firmware version through clicking “Set>About”.

7.2.4 Suggest deleting the picture file  mks_pic to avoid re-updating the picture when booting again.

Notice: when using Ramps 1.4, you must connect external 12V power supply before updating

7.3 Boot Settings(must do)

It's necessary to configure the printer type settings when getting the configuration.

```
#-----
#####Printer type setting#####
#mainboard firmware setting(marlin:1; repetier:2; smoothie:3)
>cfg_firmware_type:1

#machine setting (Normal:1; Delta:2)
>cfg_machine_type:1

#baud rate setting(1:9600;2:57600;3:115200;4:250000)
>cfg_baud_rate:4

#language (Simplified Chinese:1; traditional Chinese:2; English:3)
>cfg_language_type:3

#extruder number(one:1; dual:2)
>cfg_sprayer_counter:1

#whether has heated bed(YES:1; NO: 0)
>cfg_custom_bed_flag:1

..
```

Notice:

- 1. The baud rate between the configuration and controller board must be same, otherwise, they can't communicate with each other.**
- 2. To avoid the conflict with the USB interface, it is not allowed to connect the USB when connecting the touch screen because both the touch screen and USB use serial communication. Similarly, remove the touch screen interface when flashing the firmware for the controller board.**
- 3. Click “set>File Sys>U disk” when using U disk, only on this way can the touch screen shows U disk file.**

7.4. Automatic Leveling and Manual Leveling

1. The 3D printers with the leveling device can be used to select the automatic leveling in the configuration file.

You just need to click “set>Leveling”, then it is finished.

2. Manual leveling can be used to the common printers, such as MB and I3.

You just need to set the three points, four points or five points that are needed to level on the heated bed in the TFT configuration. As shown below,

```
#The point number of manual leveling:(3, 4, 5 point available)
>cfg_point_number:4

#the coordinates of 5 point on manual leveling
>cfg_point1:50,50
>cfg_point2:180,50
>cfg_point3:180,180
>cfg_point4:50,180
>cfg_point5:150,150

#the moving speed of leveling(mm/min)
>cfg_leveling_z_speed:1500
>cfg_leveling_xy_speed:3000
```

7.5 Filament Replacing Function

Filament replacing function helps you replace the filament more conveniently. Also, while printing, click the “pause”, then replace the filament. You can set the moving speed and min temperature of the extruder while replacing the filament in the TFT configuration. As shown below,

```
#the speed of filament replacing(mm/min)
>cfg_filament_change_speed:1200

#the length of filament replacing(mm)
>cfg_filament_change_step:5

#the min temperature of filament replacing
>cfg_filament_limit_temperature:175
```

7.6. Print from the Breakpoint Function

Undoubtedly, you must feel crazy when you mistake the operation to stop the printing which costs you a lot of time. Take it easy, the printing from the breakpoint function would help you save your beloved model . The operations are as followed,

1. Click “pre-heat”  , set the target temperature of the extruder and heated bed . (picture1, picture2)

(No heated bed, you can ignore the target temperature of the heated bed.)

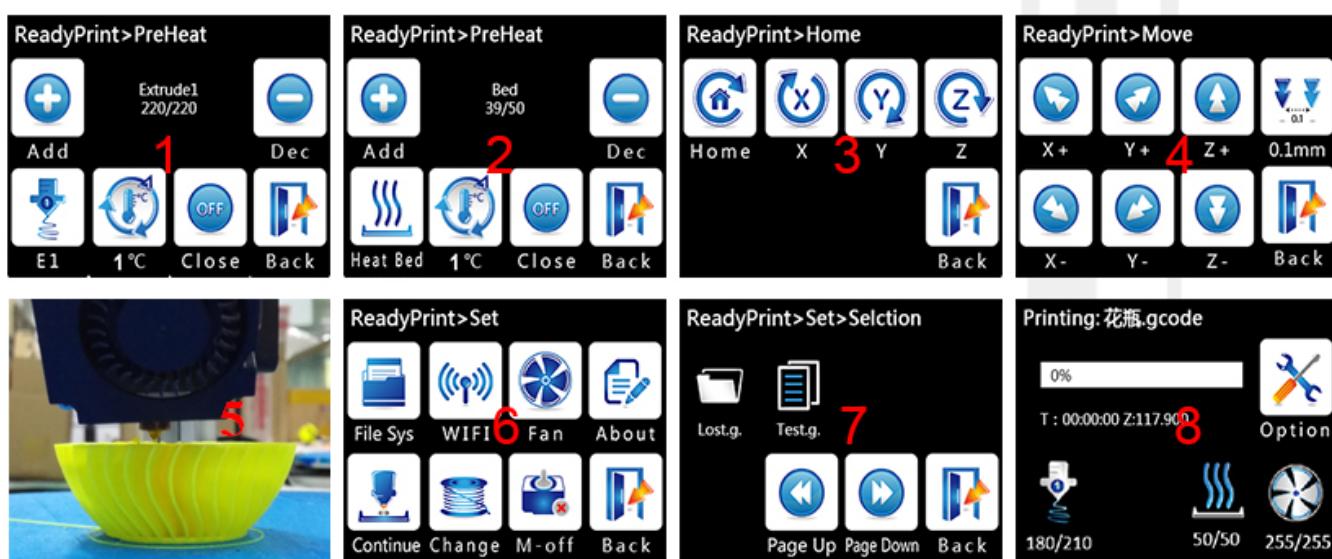
2. Click “Home” when the temperature reaches to the target temperature. Choose homing, let every axis back to the zero point. (picture 3)

Notice: The moment between model printing failed to choose the printing from the breakpoint, if there is power outage in the halfway, you must must perform a homing operation, if not, it's allowed not to perform a homing operation.

3. After every axis returning back to the zero point, move the z axis to move the nozzle to the layer where stops printing.(You can select the allowable error in the TFT configuration.) (picture4, picture5) As shown below,

```
#Breakpoints continued playing Z-axis error setting
>cfg_breakpoint_z_error:0.2
```

4. Click “Set”  , then click the printing from the breakpoint, choose the file that print from the breakpoint.(picture6, picture7)
5. After choosing the file, just wait to print. (picture8) (After choosing the file, the larger and more complicated the model is, the longer time you need to wait.)



7.7. Power Outage to Save

The printer is allowed to directly turn off if enters the pause state while printing. The printing will be continued from the pause when restarting next time.(Remember to delete the updated file from the SD card to avoid updating firmware again when booting next time, otherwise, it may result to lose the Power Outage to Save Function.)

7.8. Power Outage to Continue(only above MKS TFT28 V1.1 can support this function)

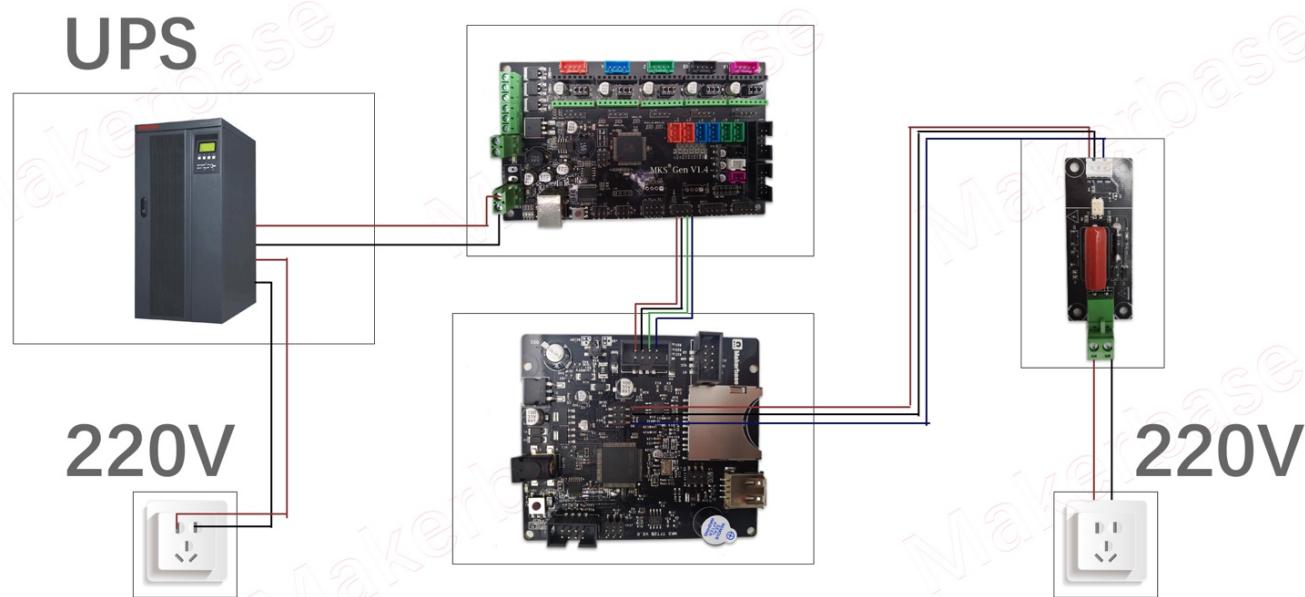
1. Don't connect UPS

The printer will continue printing from the pause when restarting, if it suddenly powers out.(The motor can not be driven due to power failure, so the extruder still stay on the model, which may cause defects in the model. If you need a more complete way to deal with such situation, a power detection module and UPS is necessary.

2. Connect UPS

2.1 Power detection module signal line S connects PB0, negative and positive connects “-“ and “+” two pin below PB0 .

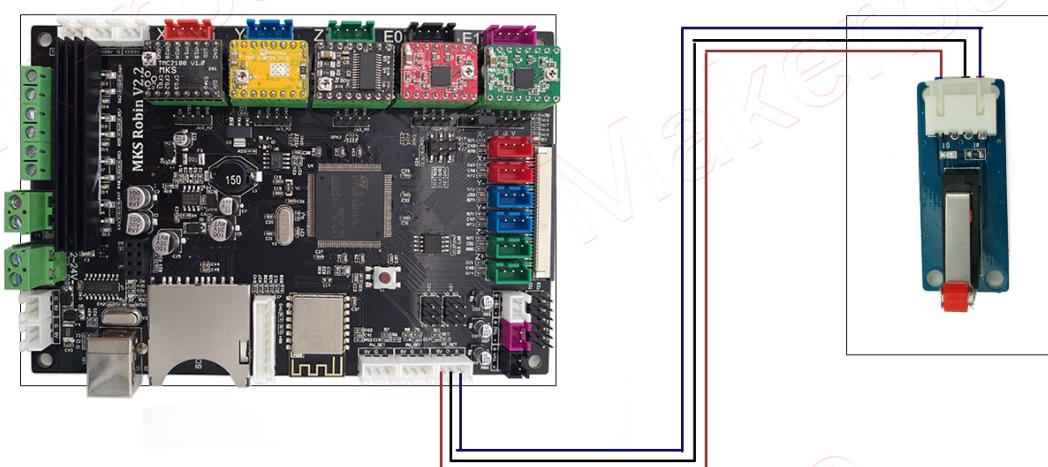
2.2 Power detection module will inform the touch screen to enter the printing pause state when the system powers out, then the UPS will provide the power for the extruder to leave the model.



7.9 Filament Outage Detection function(only above MKS TFT28 V1.1 can support the function)

One end of MKS DET connects to the PB1, another end connects to the “-“ or “+“ of the PB1.(If Low Level effective, it connects to “-“, if High Level effective, it connects “+“.) Choose the Low Level effective or High Level effective in the configuration.

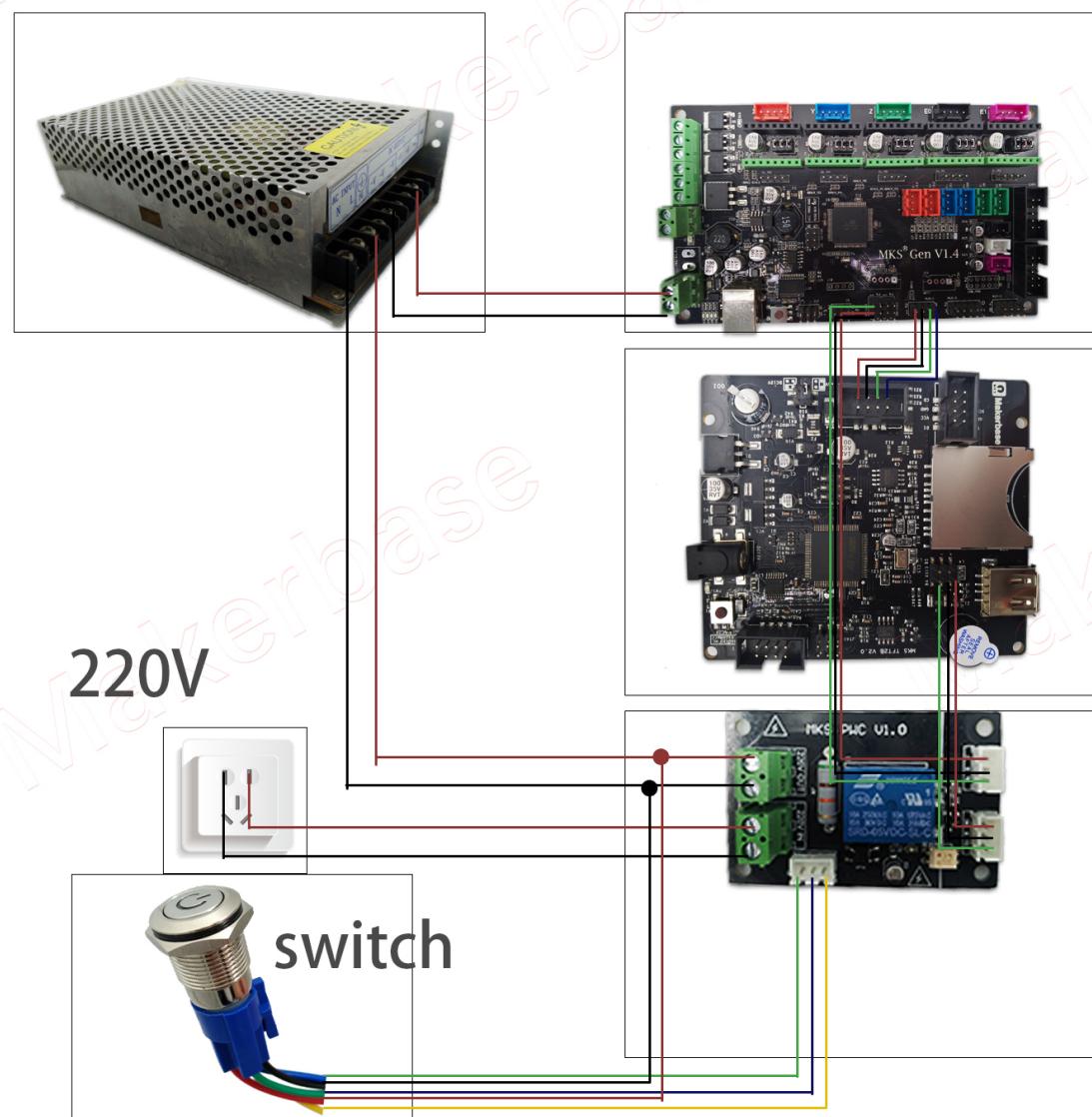
```
#the level signal of outage detection module PB1(low level:0; high level:1)
>cfg_PB0_PB1_Level:1
```



7.10 Printer Auto-off after Printing Finishes Function (only above MKS TFT28 V1.1 can support the function)

With MKS PWC module, open the printer auto-off after printing finishes function in the configuration, then you can use this function.

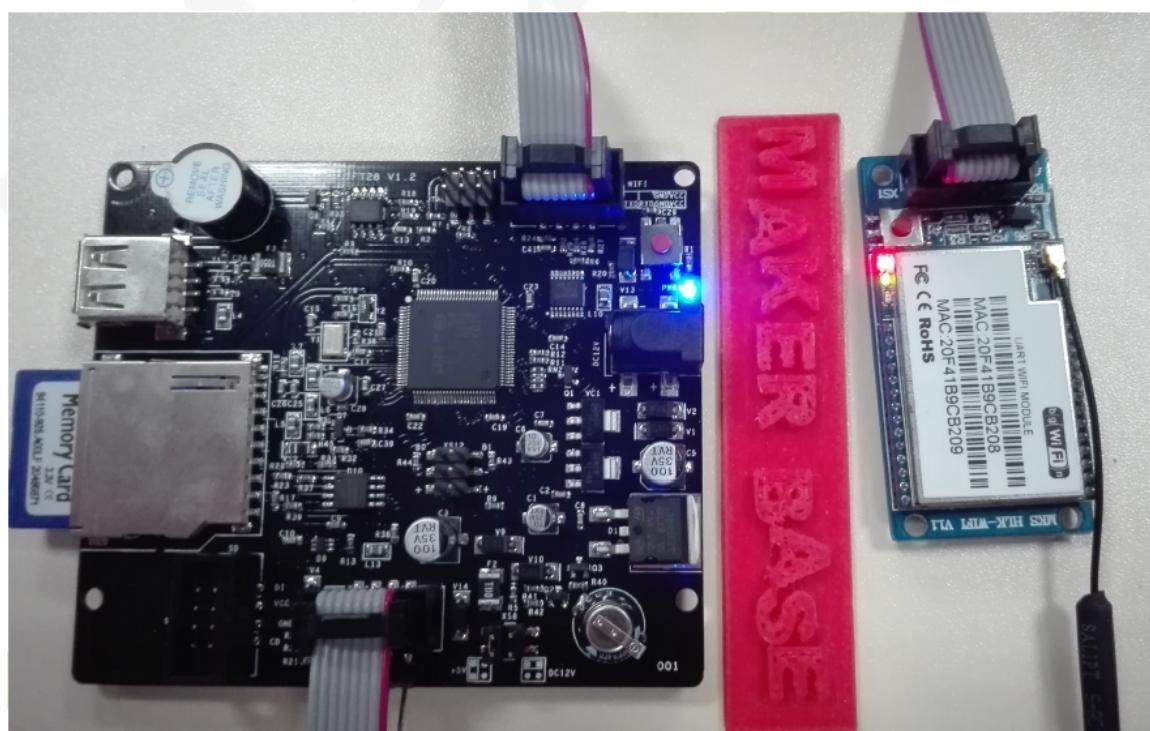
power supply



```
#whether set machine auto-off after print finishes(auto-off:1; NO:0)
>cfg_print_finish_close_Machine:0
```

h). MKS WIFI Module Connection (only above MKS TFT28 V1.1 can support the function)

1. MKS TFT can support MKS WIFI module, which can be modified in the configuration:



```
#wifi mode(AP:1; STA:2)
>cfg_wifi_mode:1

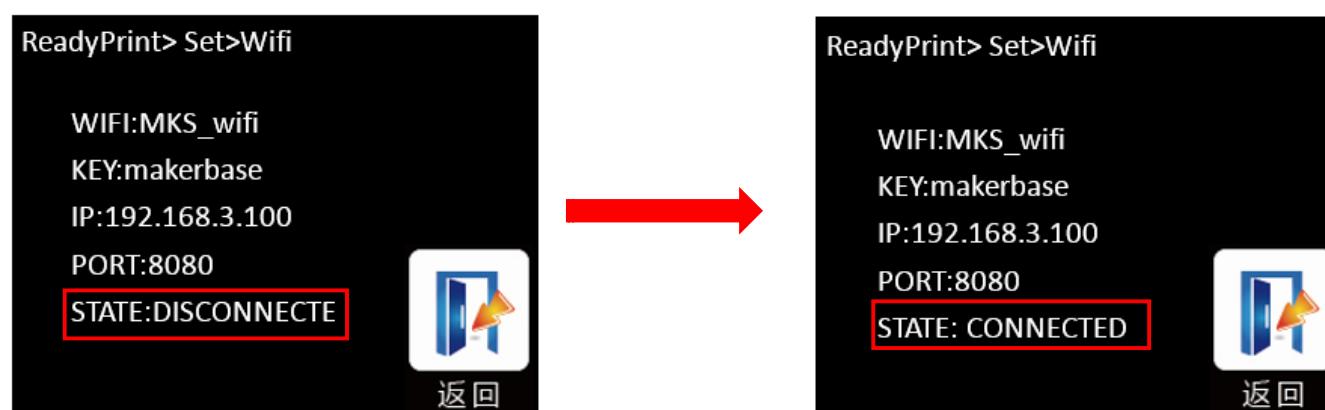
#wifi name and password
>cfg_wifi_ap_name:MKS_wifi
>cfg_wifi_key_code:makerbase

#Dynamic access IP
>cfg_ip_dhcp_flag:1

#IP/mask/gateway
>cfg_ip_address:192.168.3.100
>cfg_ip_mask:255.255.255.0
>cfg_ip_gate:192.168.3.1
```

2. WIFI module connection

3. View the network settings, disconnect state has become connected stated.



IV. Special Function Button Customization



1 : function_btn1_cmd

2 : function_btn2_cmd

```
#user-defined function1 and 2.
(disable: 0; enable: 1)
>cfg_function_btn1_display:1
>cfg_function_btn2_display:0
```

```
#command of user-defined
function
>function_btn1_cmd:M84;
>function_btn2_cmd:M81;
```

```
#edit command for 1~7 "More"
button, each command must be
separated by semicolon ","
>moreitem_button1_cmd:G28 X0;
```

```
>moreitem_button2_cmd:G28 X0;
>moreitem_button3_cmd:G28 Y0;
>moreitem_button4_cmd:G28 Y0;
>moreitem_button5_cmd:G28 Z0;
>moreitem_button6_cmd:G28 Z0;
>moreitem_button7_cmd:G28;
```

```
#set number of "More" button
>moreitem_pic_cnt:0
```

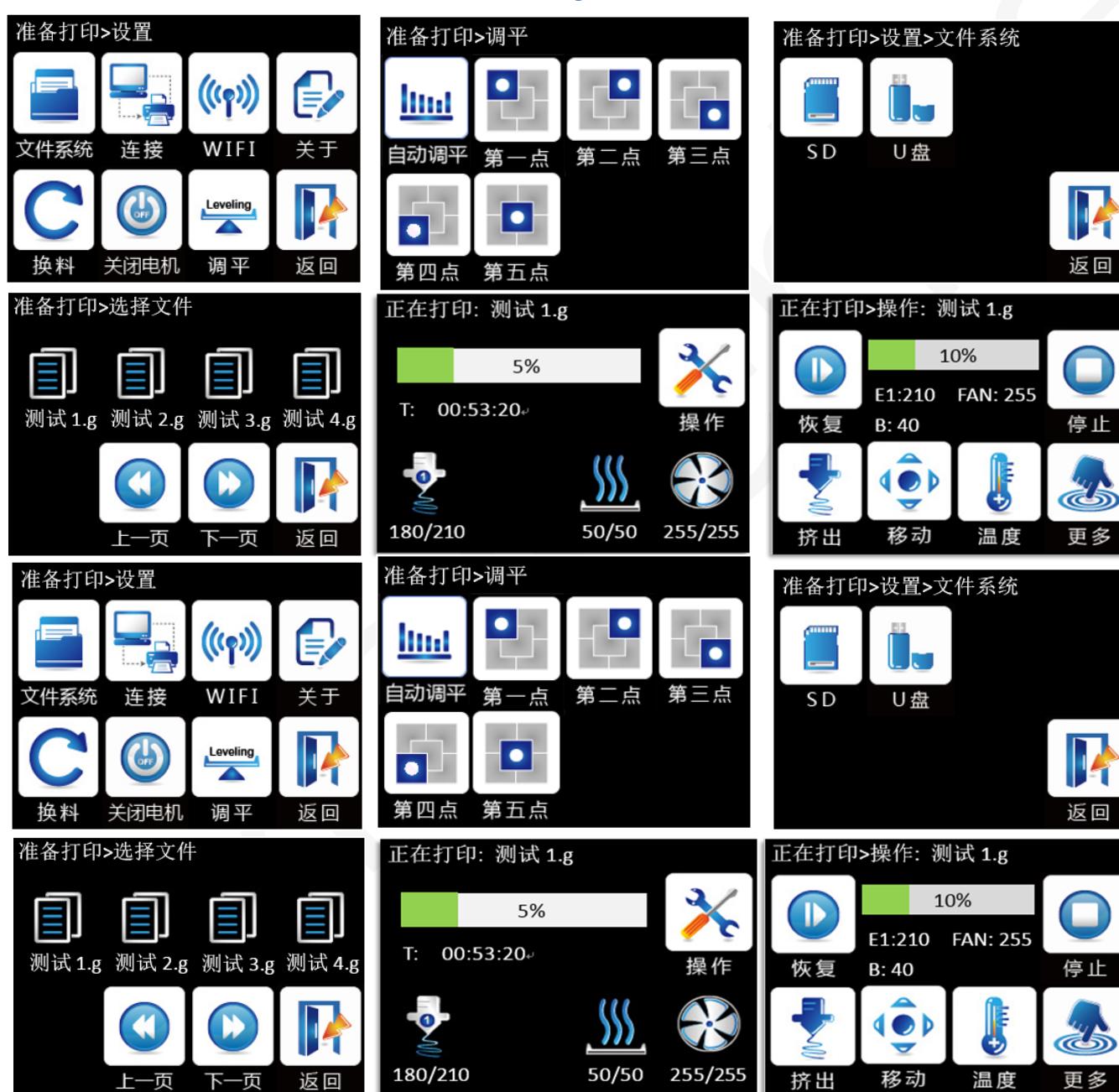
```
#edit command for 1~7 "More"
button, each command must be
separated by semicolon ","
>moreitem_button1_cmd:G28 X0;
>moreitem_button2_cmd:G28 X0;
>moreitem_button3_cmd:G28 Y0;
>moreitem_button4_cmd:G28 Y0;
>moreitem_button5_cmd:G28 Z0;
>moreitem_button6_cmd:G28 Z0;
>moreitem_button7_cmd:G28;
```

V. Themes Interface Display

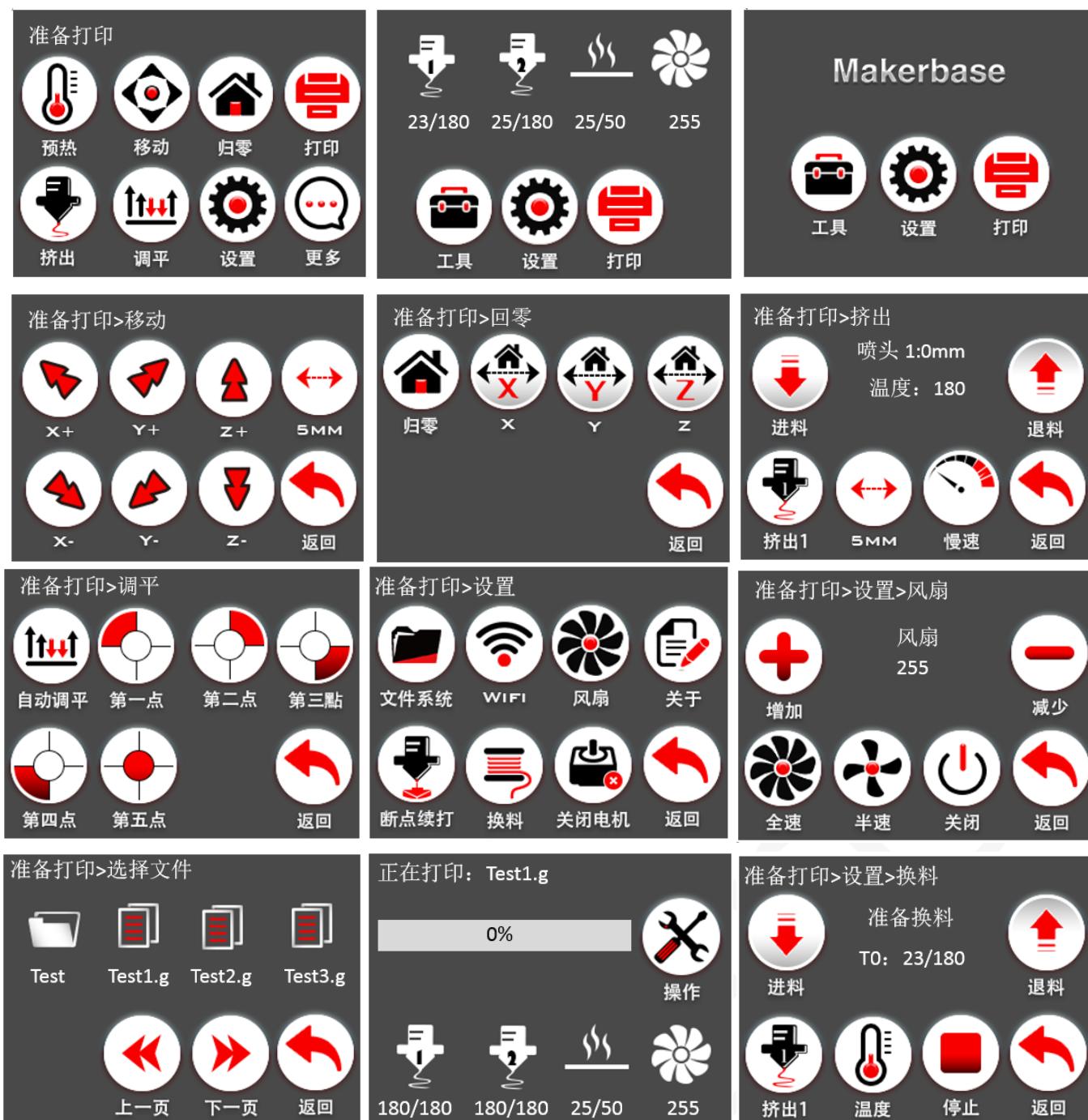
Three themes



Blue style



Red style



Special explanation :

The red style is modified from the UI designed by Isaac Norris, which provides the users with more choice. The following is the designer Isaac Norris words:

"Hello and thank you for downloading my modified version of the MKS TFT User Interface.

Instructions-

1. copy the contents of the firmware folder to an SD card then insert the card into the reader on the MKS TFT Display. I am using the 3.2" variant and that is all that will work with this OS.
2. Power on the board, it will automatically install the firmware.
3. Once it powers on you are ready to go!

This interface took a lot of design time and effort to put together so I hope that you all appreciate it as a step forward in User Interfaces for 3D Printers.

All Credit for this UI's Design and assembly goes to me, Isaac Norris, the owner and operator of Dimension 3 Fabrication in Asheville NC.

I hope that you all get the best from this user interface and share it freely, but I do not want this UI sold as it is Copywritten under the Creative Commons Copywrite.

The purpose for designing this UI was for the custom Delta 3D Printers that my company, DImension 3, will be manufacturing and the reason that I am sharing this with all of you is that I believe in sharing information,

as the only way to make the world better is to help the spread of ideas.

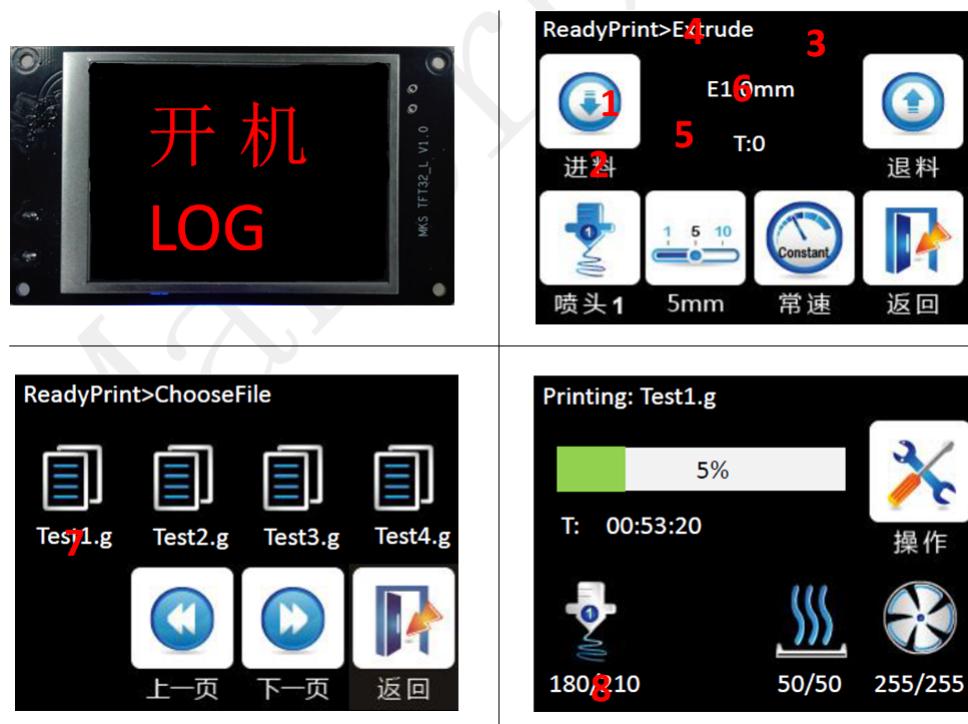
Thanks everyone for your support and if you have any questions email me at Dimension3fab@gmail.com or personally at Flightfixit@gmail.com.

If you want to find me online search FlightFixit for my 3D modeling and Dimension 3 Fabrication for the Delta 3D Printers.

Hope you all get the best out of my UI.

VI. Booting Logo and Button Pictures Customization Function

1. Customized range
 - A. Booting interface logo.
 - B. Button pictures (Figure 1 and 2).
 - C. The screen background color (Figure 3, the default color is black).
 - D. The title text color (Figure 4, the default color is white).
 - E. The background color that shows temperature, ect, status (Figure 5, the default color is blue).
 - F. The text color that shows temperature, ect, status (Figure 6, the default color is white).
 - G. The text color of file name in the “ChooseFile” interface (Figure 7, the default color is white).
 - H. The text background color of file name in the “ChooseFile” interface.
 - I. The text background color of printing status in the “Printing” interface.
 - J. The text color of printing status the “Printing” interface.
 - K. Whether the buttons need 3D effect, it is required by default.



2. Customized logo picture: 16dpp, width=320 pixel, height=240 pixel.
 3. Small logo picture: 16dpp, width=320 pixel, height=135 pixel.(Only for Simple version)
 4. Customized button picture: 16dpp, width=78 pixel, height=104 pixel.
 5. The name of the customized picture must be same as the required name.
 6. The color value of the customized picture is hexadecimal, according to 3 primary colors -blue, green and red in the order.
 7. It's allowed to customize at most 7 function buttons in the "More" menu.
 8. It's allowed to customize at most 6 function buttons in the "Printing>More" menu.
2. Customize the pictures
- 2.1 Install "Image 2Lcd" software, modify the bmp format picture to the BIN file.
 - 2.2 Copy "mks_config.txt" and "mks_pic" to SD card root, plug the SD card to MKS TFT, restart, then the system will update automatically.
3. Name the pictures of LOGO and buttons

Picture naming requirements: some pictures are repeated, just one is required.

1. Booting cover LOGO



2. Small LOGO(Simple version)

bmp_iconlogo.lg

(The suffix is named .lg)

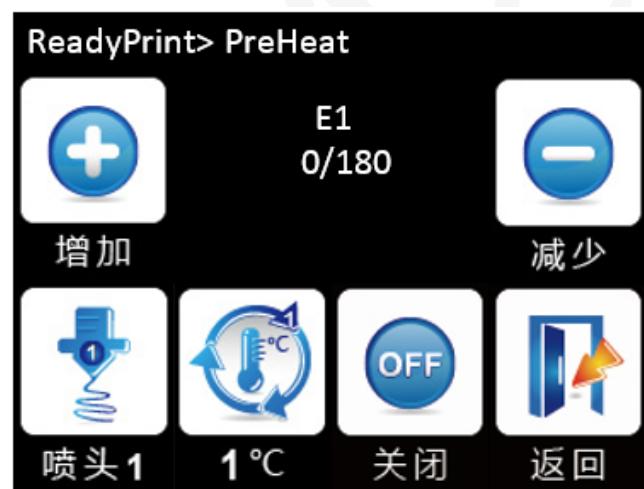


3“Printing” Interface



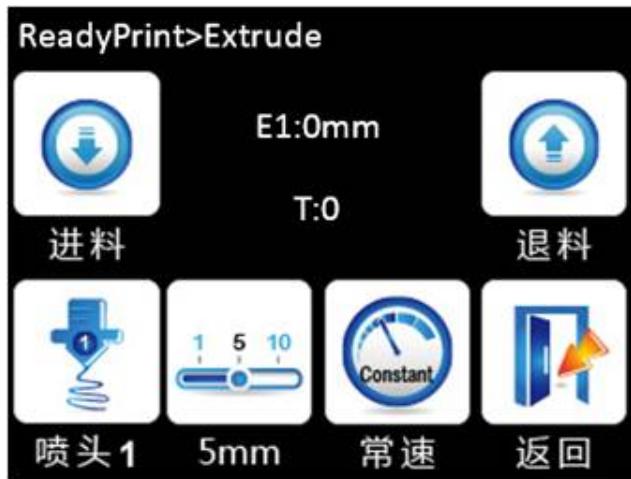
Preheat bmp_preHeat.bin	Move bmp_mov.bin	Home bmp_zero.bin	Printing bmp_printing.bin
Extrude bmp_extruct.bin	Leveling bmp_leveling.bin	Set bmp_set.bin	More bmp_more.bin

4. “Preheat” Interface



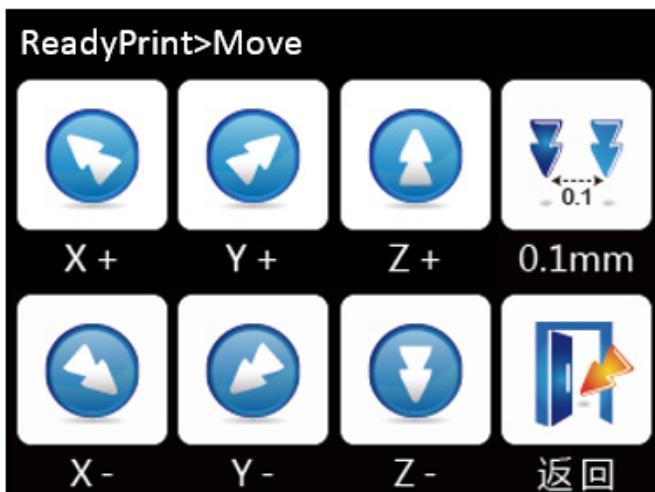
ADD : bmp_Add.bin			DEC : bmp_Dec.bn
Preheat Taget : Heated bed : E1 : E2 : OFF : 1°C : 喷头 1 : 增加 : 减少 : 关闭 : 返回 : Stepper : 1Degree : bmp_step1_Degree.bin 5Degree : bmp_step5_Degree.bin 10 Degree : bmp_step10_Degree.bin off : bmp_speed0.bn Back : bmp_return.bn	Stepper : 1Degree : bmp_step1_Degree.bin 5Degree : bmp_step5_Degree.bin 10 Degree : bmp_step10_Degree.bin	off : bmp_speed0.bn Back : bmp_return.bn	Back : bmp_return.bn

5. "Extruder" interface



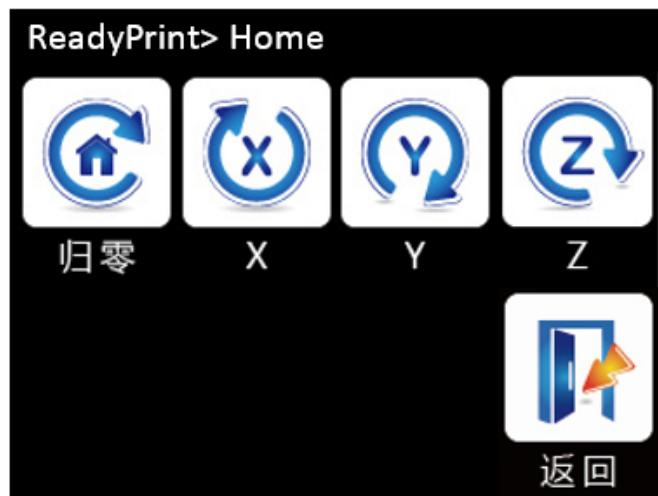
In :			Out :
bmp_in.bin			bmp_out.bin
E1 : E1 : bmp_ext ru1.bin E2: bmp_ext ru2.bin	Stepper : 1mm: bmp_step1 _mm.bin 5mm: bmp_step5 _mm.bin 10mm: bmp_step1 0_mm.bin	Speed : slow : bmp_speed_slo w.bin normal : bmp_speed_no ral.bin high : bmp_speed_hi gh.bin	Return : bmp_return. bin

6. "Move" Interface



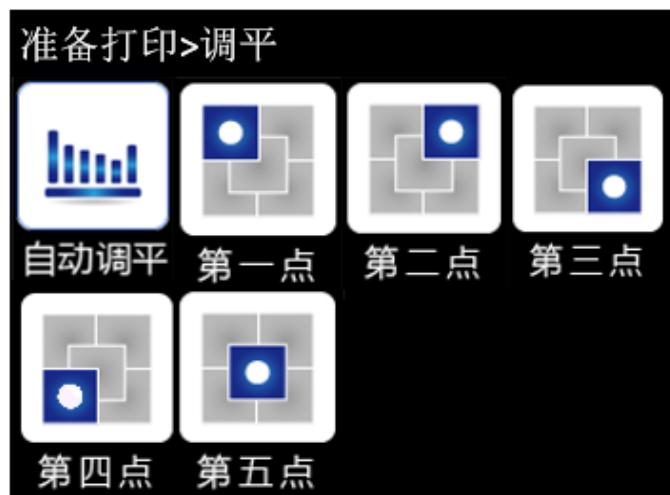
X+: bmp_xA dd.bin	Y+: bmp_y Add.bin	Z+: bmp_zAdd.bin	step : 0.1mm : bmp_step_move 0_1.bin 1mm : bmp_step_move 1.bin 10mm : bmp_step_move 10.bin
X-: bmp_xD ec.bin	Y- : bmp_y Dec.bin	Z- : bmp_zDec.bin	back : bmp_return.bin

7. "Home" Interface



Home :	X :	Y :	Z:
bmp_zeroA.bin	bmp_zer0X.bi n	bmp_zeroY. bin	bmp_zeroZ. .bin
			Back : bmp_return. .bin

8. "Leveling" Interface



Auto-leveling :	First point :	Second point :	Third point :
bmp_autoleveling.bin	bmp_leveling1.bin	bmp_leveling2.bin	bmp_leveling3.bin
Fourth point :	Fifth point :		
bmp_leveling4.bin	bmp_leveling5.bin		

9. "Set" Interface



fileSys :	wifi :	fan :	about :
bmp_fileSys.bin	bmp_wifi.bin	bmp_fan.bin	bmp_about.bin
breakpoint:	filament:	Motor-off:	back :
bmp_breakpoint1.bin	bmp_filament1.bin	bmp_motoroff1.bin	bmp_return1.bin

10. "Fan" Interface



add :			dec :
bmp_Add.			bmp_Dec
bin			.bin
full :	half :	close :	back :
bmp_spee	bmp_sp	bmp_sp	bmp_retu
d	eed	eed0	rnm.
255.bin	127.bin	.bin	bin

11. "Filament" Interface :



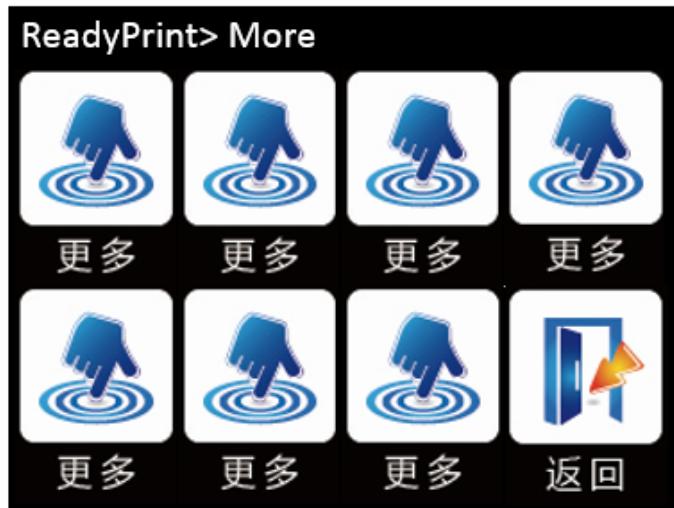
SD :	U 盘 (udisk) :		
unselected :	unselected :		
bmp_sd.bin	bmp_usb.bin		
selected :	selected :		
bmp_sd_sel.bin	bmp_usb_sel.bin		
			Back :
			bmp_return.
			bin

12. "Filesys" Interface



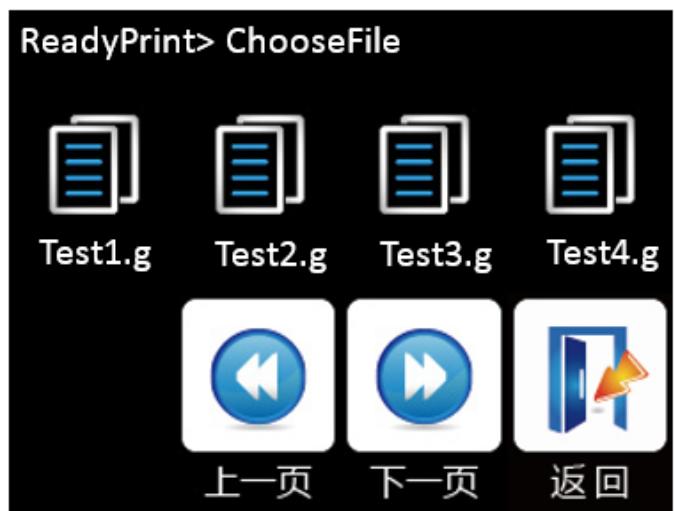
SD :	U 盘 (udisk) :		
unselected :	unselected :		
bmp_sd.bin	bmp_usb.bin		
selected :	selected :		
bmp_sd_sel.bin	bmp_usb_sel.bin		
			Back :
			bmp_return.
			bin

13. "More" Interface



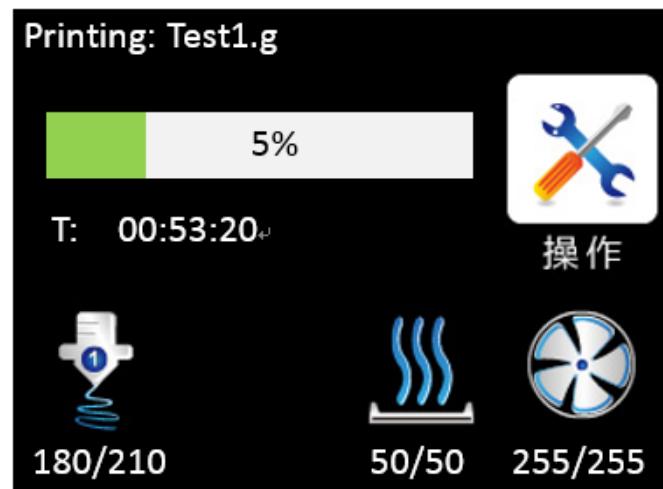
custom1 : bmp_ custom1. bin	custom 2 : bmp_ custom2. bin	custom 3 : bmp_ custom3. bin	custom 4 : bmp_ custom4. bin
custom 5 : bmp_ custom5. bin	custom 6 : bmp_ custom6. bin	custom 7 : bmp_ custom7. bin	back : bmp_ return. bin

14. "ChooseFile" Interface



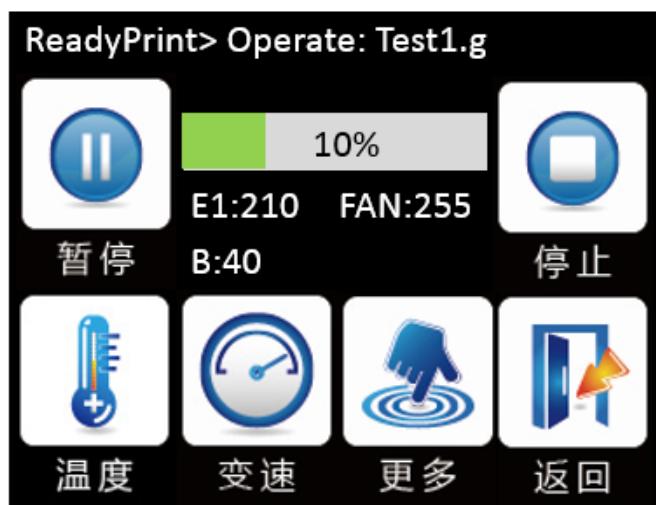
File : bmp_ file.bin			
Dir : bmp_dir.b in			
	Page up : bmp_ pageUp.bin	Page down : bmp_ page Down.bin	back : bmp_ return. bin

15. "Printing" Interface



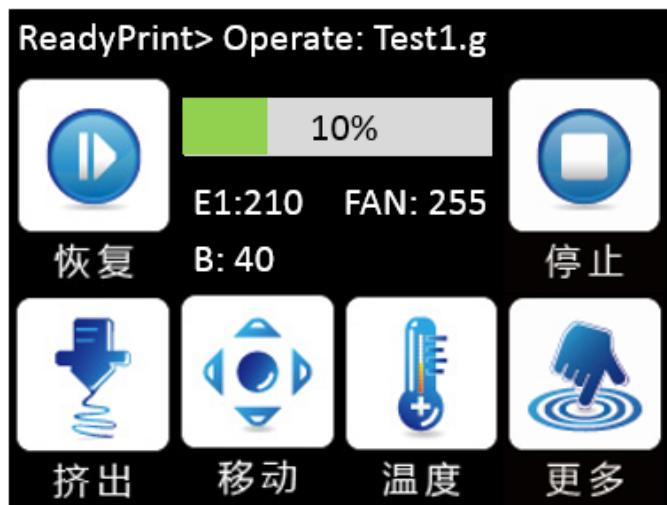
			option : bmp_menu. .bin
E1: bmp_ extru1_no _words. bin	E2: bmp_extru 2_no_words.b in	bed : bmp_bed_no_words.b in	fan : bmp_fan_no_words.b in fan moves : bmp_fan_move.bin

16. "Operate" Interface



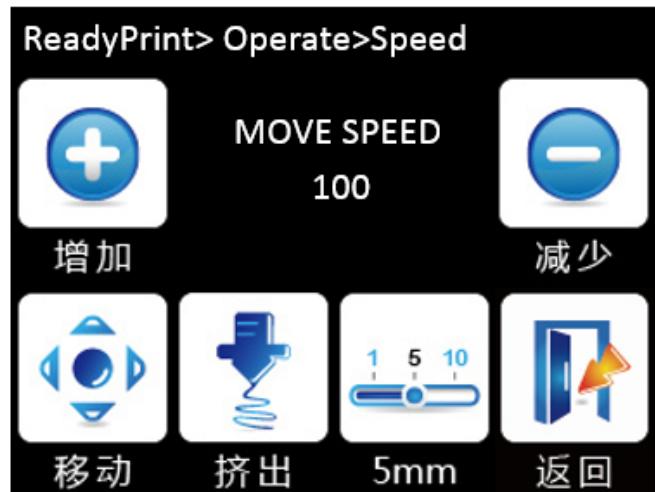
pause :			stop :
bmp_pause.bin			bmp_stop.p.bin
temperat ure :	speed: bmp_speed.bin	more :	back : bmp_return.bn
bmp_temp.bin		bmp_more.bin	

17. "Pause" Interface



resume :			stop :
bmp_resume.bin			bmp_stop.bn
Extrude:	move: bmp_extruct.bin	temperatur e :	more (more):
bmp_extruct.bin	bmp_mov.bn	bmp_temp.bn	bmp_more.bn

18. "Speed" Interface

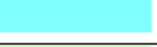
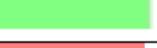
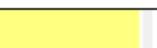
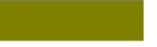


Add :			Adc :
bmp_Add.bn			bmp_De.c.bn
move :	extruct :	step :	back :
unselecte d :	unselected :	1mm :	bmp_return.bn
bmp_mov.bn	bmp_extruct.bn	bmp_step1_mm.bn	
selected :	selected :	5mm :	
bmp_mov_sel.bn	bmp_extruct_sel.bn	bmp_step5_mm.bn	
		10mm :	
		bmp_step10_m.m.bn	

19. "ReadyPrint>Operate>Pause>More" Interface

 风扇	 换料	 自动关机	 更多
 更多	 更多	 更多	 返回
Fan : bmp_fan.bin	Filament: bmp_fila mentchan ge.bin	Aoto: selected : bmp_auto_o ff.bin unselected : bmp_manua l_off.bin	More fuction1 : bmp_morefun c1.bin
More fuction2 : bmp_mor efunc2.bi n	More fuction 3 : bmp_mor efunc3.bi n	More fuction 4 : bmp_moref unc4.bin	Back : bmp_return.bi n

The hexadecimal value for the common color

blue		0xFF0000
green		0x00FF00
red		0x0000FF
yellow		0x00FFFF
light blue		0xFF8080
light green		0x80FF80
light red		0x8080FF
cyan-blue		0xFFFF00
light cyan-blue		0xFFFF80
light yellow		0x80FFFF
dark green		0x008000
dark red		0x000080
dark blue		0x800000
dark yellow		0x008080
black		0x000000
white		0xFFFFFFFF

1. Power test before delivery.
2. Ensure the normal use before delivery.
3. Any problems you can contact Miss Zhong:

king@makerbase.com.cn

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