

OPTONICA

USER MANUAL - SKU: 7144 / K-4000C



I. Features of K-4000C system:

1. Support 32-65536 level grayscale, correcting with software Gamma.
2. Support various point, line and area light sources, various rules and special-shaped processing.
3. Support 4 output ports, each can carry a maximum of 512/1024 lamps (DMX lamps with a maximum of 512 pixels take three channels as an example).
4. The play content can be stored in SD card, which can store up to 32 effect files. The SD card capacity supports 128MB-32GB.
5. The controller can be used alone or in cascade. The cascade adopts the photoelectric isolation method, featuring anti-interference and better stability. The cascade distance between two controllers can reach 150m by using pure copper power cord of 0.5 mm².
6. The controller with a loaded chip can be locked in the software with the loaded IC, or can be not locked and adjust the controller's "CHIP" button to select the loaded IC, which is more flexible and convenient.
7. The IC controller for DMX lamps has its own address writing function; in addition, with our 2016 LedEdit-K V3.26 software or above version, you can set the one-key address writing function.
8. Support 4-channel (RGBW) pixels or single-channel pixels for loading lamps.
9. The built-in effect of the controller supports three channels (RGB) and four channels (RGBW).
10. The controller supports MODBUS third-party control.
11. Support enhanced TTL and 485 differential (DMX) signal output.
12. The controller has 22 test effects and DMX512 channel test function.

- Note: 1. The speed of 512 pixels of lamps on the controller can reach 30 frames/second, the speed of 768 pixels can reach 25 frames/second, and the speed of 1024 pixels can reach 22 frames/second
(The above parameters take the IC data of 1903 protocol as an example, and the data may be different for different ICs)
2. A maximum of 512 pixels of international standard DMX512 (1990 protocol) can be loaded. When the load is the international standard 170 pixels, the speed can reach 30 frames/second, the speed of 340 pixels is about 20 frames/second, and the speed of 512 pixels is about 12 frames/second.
3. If timing (holidays) play, Beidou WiFi synchronization and console channel distributor functions are required, please contact the sales personnel or the technical support personnel for details

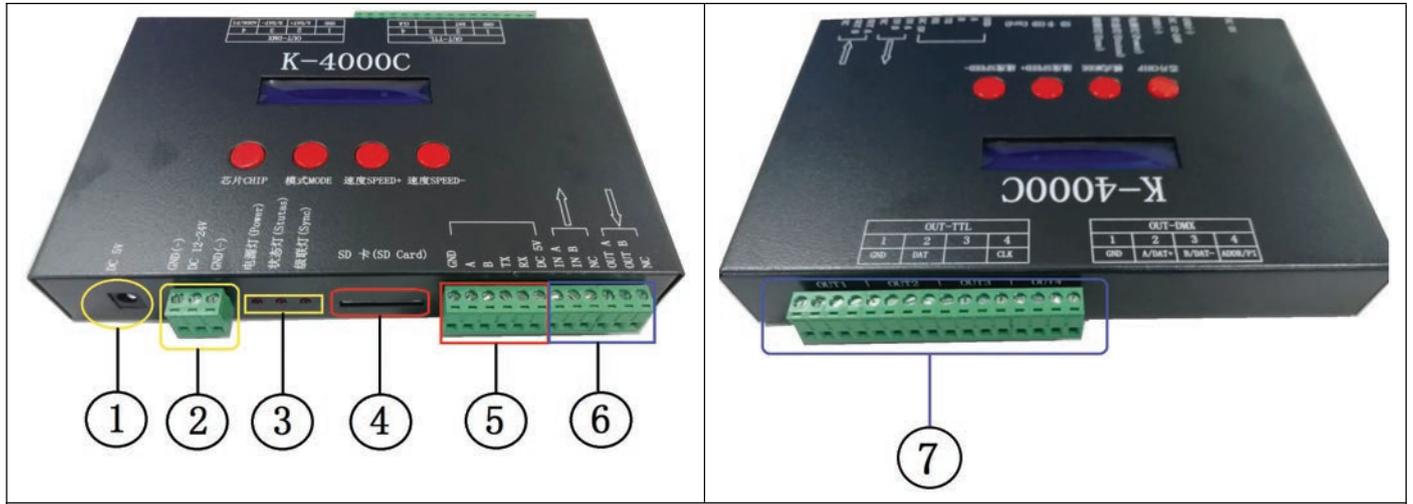
II. Support chip

- 00: UCS19**,UCS29**,TM18*,SM167**,WS28**,GS82**,SK6812 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 01: SM16716,16726 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 02: P9813 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 03: LPD6803 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 04: LX1003,1203 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 05: WS2801 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 06: LPD1886 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 07: TM1913 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 08: TM1914 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 09: P9883,P9823 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 10: DMX (support up to 512*4=2048 pixels, suggest to load $\leq 320*4=1280$ pixels)
- 11: DMX 500K (support up to 512*4=2048 pixels, suggest to load $\leq 320*4=1280$ pixels)
- 12: DMX 250K-CZF (support up to 512*4=2048 pixels, suggest to load $\leq 320*4=1280$ pixels)
- 13: DMX 500K-CZF (support up to 512*4=2048 pixels, suggest to load $\leq 320*4=1280$ pixels)
- 14: UCS5603-Test (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 15: UCS5603A (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 16: UCS5603B (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 17: TM1814 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 18: INK1003 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 19: APA102 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 20: UCS8904 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 21: SM16714 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 22: SM16813 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 23: GS8512 (support up to 512*4=2048 pixels, suggest to load $\leq 320*4=1280$ pixels)
- 24: QED3110 (NA)
- 25: WS2816 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 26: UCS9812 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 27: SM16803 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 28: SM16804 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 29: UCS2603-T (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)
- 30: UCS2603 (support up to 1024*4=4096 pixels, suggest to load $\leq 512*4=2048$ pixels)

Note:

1. The maximum pixel of the lamps in the brackets above takes RGB three-channel as an example.
2. Lamps of RGBW four channels should select K-8000-RGBW, and of more than four channels should select K-8000-RGBWYA.
3. Lamps of single channel should select K-8000-W. At this time, one channel represents one pixel, and the software effect is white light.

III. Controller image:



① DC5V power input port ② DC12-24V input port ③ POWER/STATUS/SYNC indicator
 ④ SD card slot ⑤ MODBUS signal input port ⑥ Cascade IN A/B (satellite sync signal input port)/cascade OUT A/B ⑦ Signal output port OUT1-OUT4

四、 Marking meaning:

1. Key meaning:

Key	Normal operation	Key function	Key combination function
CHIP	Switch the chip	Press "CHIP" to power on and enter the MODBUS address editing interface.	First press " CHIP " and then " MODE " to enter the <u>Write Address</u> interface; after writing, press " CHIP " and then " MODE " to exit the interface.
MODE	Switch the file	In the play interface, press and hold " MODE " to enter the DMX one-key address writing interface.	Press " SPEED+ "/" SPEED- " at the same time to power on, and then read the controller UID.
SPEED+	Speed up	Press " SPEED+ " to power on and enter the built-in effect channel setting interface.	Press " SPEED+ "/" SPEED- " simultaneously to enter the effect file cycle mode. If the screen displays *, it means the file cycle mode is entered.
SPEED-	Slow down	Press " SPEED- " to power on and enter the DMX channel testing interface.	

2. Indicators and ports

POWER	Power indicator	Normally on
SYNC	Cascade indicator	The slave controller flashes during cascading
STATUS	Status indicator	Off if normal/On if error
Power supply	DC5V power input/DC12-24V input	
SD CARD	SD card slot	
GND/A/B/TX/RX/5V	MODBUS control port (5V supplies power to ports or devices)	
IN A/B	Cascade input port/Beidou satellite sync signal input port	
OUT A/B	Cascade output port	

3. Signal output (OUT 1-4)

TTL output			DMX512 output		
Serial No.	Marking	Definition	Serial No.	Marking	Definition
1	GND	GND (negative electrode)	1	GND	GND (negative electrode)
2	DAT	Data	2	A/DAT+	Signal+
3	/	/	3	B/DAT-	Signal-
4	CLK	Clock	4	ADDR	Write address

4. Description of display content

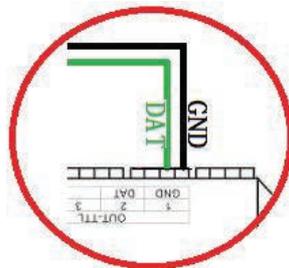
Display		Definition
	SD Test ...	Test and read SD card
	K-8000 SD Error!	Card reading error
	Writing Addr...	Writing address
	Writing OK!	Address successfully written
	Set UCS512C4	Set lamp chip parameters
	Writing...	Write lamp chip parameters
	BY No.1 control	Cascade synchronous control

	Test DMX Address	Test DMX lamp address
	Chip: UCS512-C Ch.: 03	Manual address writing interface: CHIP: Chip model CH.: Interval channel (00-99)
	Chip: 10 Speed: 16 Mode: 01/01* SD	Play interface: Chip: Chip code (00-23) Speed: Play speed (01-16) Mode: Play program (01-32) *: The program is cycling SD: Play with the SD card

5. Frame frequency of speed level:

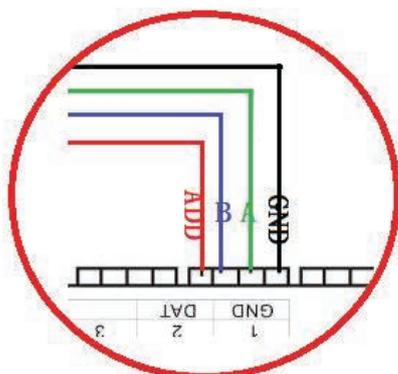
Speed	Frame frequency /sec						
1	4 frames	5	8 frames	9	14 frames	13	23 frames
2	5 frames	6	9 frames	10	16 frames	14	25 frames
3	6 frames	7	10 frames	11	18 frames	15	27 frames
4	7 frames	8	12 frames	12	20 frames	16	30 frames

V. Wiring method of general IC lamps and cascade diagram (DAT/ GND)

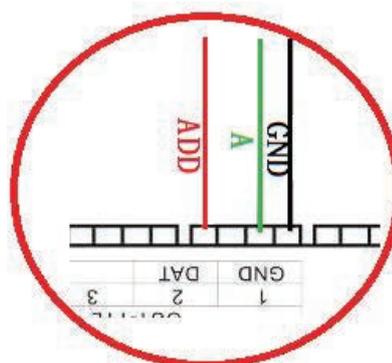


VI. Wiring method of DMX512IC lamps:

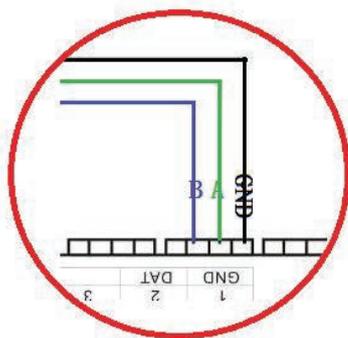
1. Wiring diagram of DMX512 differential signal line



2. Wiring diagram of DMX512 single signal line

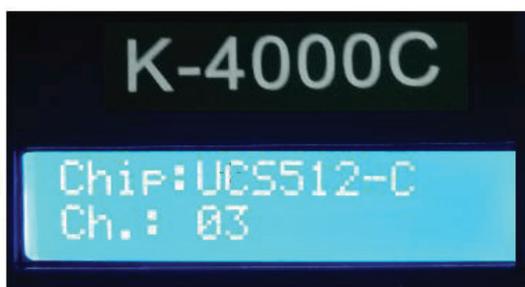


Note: For the installation of some DMX512 lamps, the controller output ports do not need to connect with the ADDR writing line of the lamps, but only to connect with the A/B/GND, and the data bus will automatically write the address (for details, refer to the IC specifications of DMX512 lamps).



VII. Address writing and channel test for DMX512 lamps

1. After connecting the wires as shown in the above figure and starting the controller, first press "CHIP" and then "MODE" to switch to the "Write Address" mode.



2. Press "CHIP" to switch the DMX512 IC model, and "SPEED+/" "SPEED-" to adjust the interval channels, as shown in the following figure:

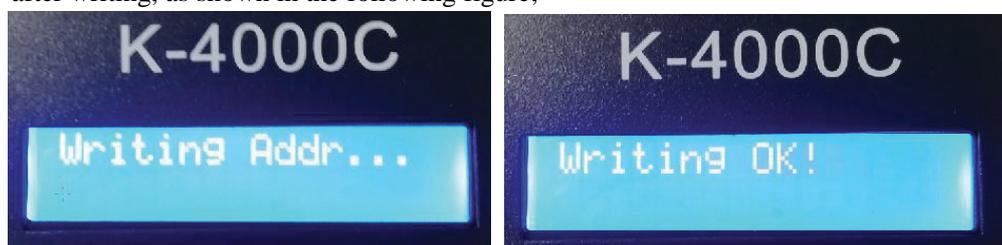
Appendix: DMX512IC code table			
UCS512A*/B*,TM512A L1/AB	WS2821	DMX512AP	UCS512C*, TM512AC*
SM1651*-3	SM1651*-4	UCS512D*/TM512AD*	UCS512-E
SM17512*	SM17522*	UCS512-F	TM512AC*
SM17500	SM17500-AW (write address after the channel number)	GS8512	GS8512-SGAL (write single address)
GS8512-NA (set to no address)	QED512P	HI512D	SM1852*
UCS512-G			

Note 1: GS8512 writes single address. It is used for loading IC GS8512 and write the same address to multiple lamps at the same time.

Note 2: GS8512 is set to no address mode. It is used for loading IC GS8512 and set to use in TLL/SPI mode.

Note 3: The lamps using UCS512-EC and SM17500 chips should write the number of channel by computer or SD card (this should be set by the manufacturer or professionals)

3. After selecting, press the "MODE" key to write the address, and the screen will display "Writing Addr..." and then "Writing OK" after writing, as shown in the following figure;



4. After writing the address, the controller will automatically enter the DMX512 lamp channel test mode, and the digital screen displays as shown in the following figure:



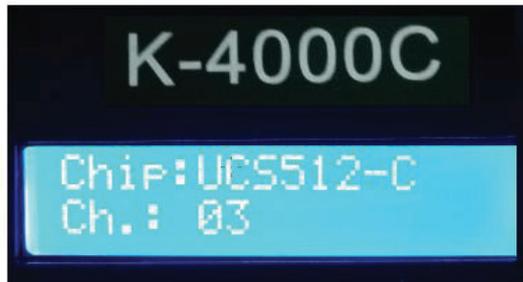
5. Press "MODE" again to enter "AC" test mode and the lamps automatically light up; the controller displays as shown in the following figure (when the interval channel is address writing, the setting cannot be adjusted)



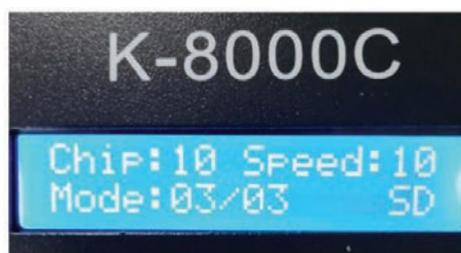
6. Press "MODE" again to enter the "MC" test mode, and "SPEED+"/"SPEED-" to adjust the pixel (press and hold "SPEED+" or "SPEED-" to rapidly increase or decrease), and lamps will light up one by one; the controller display is as shown in the following figure:



7. After completing the test, press "CHIP" to exit the channel test; return to the "Write Address" interface



8. After writing the address, first press "CHIP" and then "MODE" to switch to the play mode, and switch the chip to Chip: 10. At this time, it is DMX512 standard protocol and 250K play mode. You can press the "MODE" and "SPEED" keys to switch the play mode and adjustment speed, respectively, as shown in the figure below:



VIII. One-key address writing of DMX 512 lamps

1. One-key address: (as shown in the figure below: Step 1)

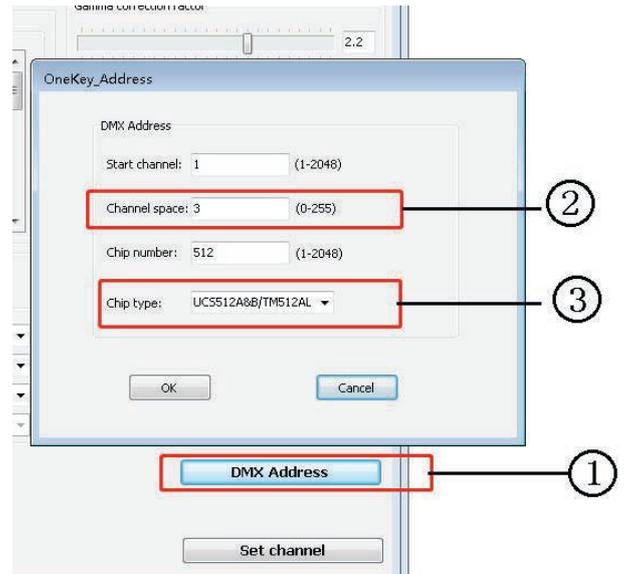
When the software writes the program output, click the key to enter the one-key address writing interface

2. Interval channel input (as shown in the figure below: Step 2)

The interval channel is input according to the actual number of the lamp, and the number is the number of channels occupied by a DMX512 IC control lamp pixel point.

3. Chip model selection (as shown in the figure below: Step 3)

Click the drop-down button to select the IC model corresponding to the DMX512 IC carried by the lamp.



4. Completing one-key address settings

After confirming that the settings are correct, click "SET" to complete the program output.

5. One-key code writing of controller

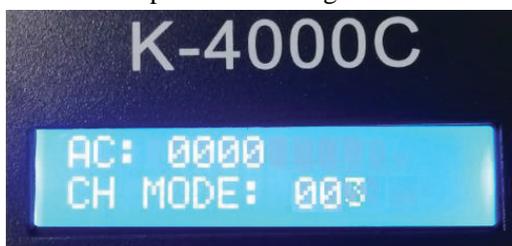
- ① Insert the SD card into the controller;
- ② Power on the controller;
- ③ Press and hold the "MODE" key for 5s, and the controller will display "Writing Addr..." and then "Writing OK" after writing;
- ④ After writing address, the controller will also enter the channel test mode (same as the channel test after manual address writing).
- ⑤ After completing channel testing, press "CHIP" to exit the test mode and return to the play mode for normal operation.

IX. DMX512 lamp test

1. Press the "SPEED-" key to power on and enter the lamp test interface, as shown in the figure below



2. After about 2s, the controller will enter the lamp address testing interface as shown in the figure below:



3. Press "MODE" to start testing (number starts counting); and press "CHIP" to switch between manual channel test



and auto channel test;

4. After starting testing, press "MODE" to switch the number of test channel.

Appendix: Description of lamp testing content			
Auto mode: AC	Definition	Manual mode: MC	Definition
AC: **** CH MODE: 001	Channel 1 AC	MC: **** CH MODE: 001	Channel 1 MC
AC: **** CH MODE:002	Channel 2 AC	MC: **** CH MODE: 002	Channel 2 MC
AC: **** CH MODE: 003	Channel 3 AC	MC: **** CH MODE: 003	Channel 3 MC
AC: **** CH MODE:004	Channel 4 AC	MC: **** CH MODE:004	Channel 4 MC
.....
AC: **** CH MODE:99	99-channel auto test	MC: **** CH MODE:99	99-channel manual test

Note 1: Switch between auto and manual test mode: AC is auto test mode, and MC is manual test mode, which can be switched by pressing "CHIP";

Note 2: Lamp channel switching. 001 is single-color single-channel lamp; 002 is dual-color dual-channel lamp; 003 is three-color lamp; 004 is four-color lamp, which can be switched by pressing "MODE";

Note 3: **** is lamp number. In auto test, the number will restart from 0001 for testing after automatically increasing to the maximum value; in manual test, the number is adjusted by pressing "SPEED+/" "SPEED-".

5. In manual test, press "SPEED+/" "SPEED-" to adjust the test lamp forward and backward.

6. After completing the test, restart the controller and it will enter the normal play mode.

X. Built-in effect channel settings

Most lamps use RGB and RGBW, i.e. Channel 3/4. For lamps with different channels, the **Built-in Play Effect** shall preset the effect channel.

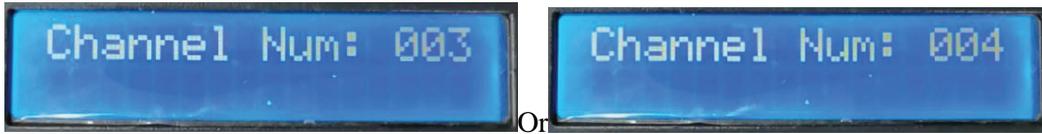
1. When the controller channel is started, it will display the current built-in effect channel, as shown in the following figure:



Channel 3 (RGB) or Channel 4 (RGBW)

2. If the lamps need to play the built-in effect, but the lamp channels are not the built-in effect channels, you can modify the channels manually.

3. Power off the controller and press "SPEED+" to power on it, and the controller will automatically change the channels;



If the controller displays Channel 3, it means the current channel changes to Channel 3 (the original channel is Channel 4)

If the controller displays Channel 4, it means the current channel changes to Channel 4 (the original channel is Channel 3)

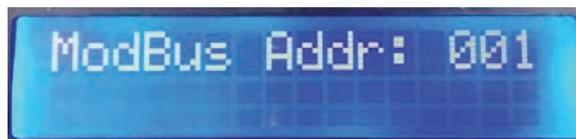
4. After completing settings, the controller will automatically return to the play interface.

Note: The settings only apply to channel changes when playing the built-in effects.

XI. Modbus control (K-4000C)

K-4000C connects to third-party software through the RS485 port INA/B. If multiple controllers are controlled simultaneously, set Modbus Address numbers for the controllers.

1. Press the "CHIP" key to power on the controller and enter the Set Modbus Address Number interface.



2. Press "SPEED+/" "SPEED-" to adjust the ID of current controller.
3. Press "MODE" to confirm the selection.

As shown in the figure below: Modbus Addr: 002 is controller ID 2



4. Restart the controller. The controller will display the following during startup check:



5. Use a third-party software to control the operations of K-8000C by sending instructions.

XII. Specific parameters:

Physical parameters:

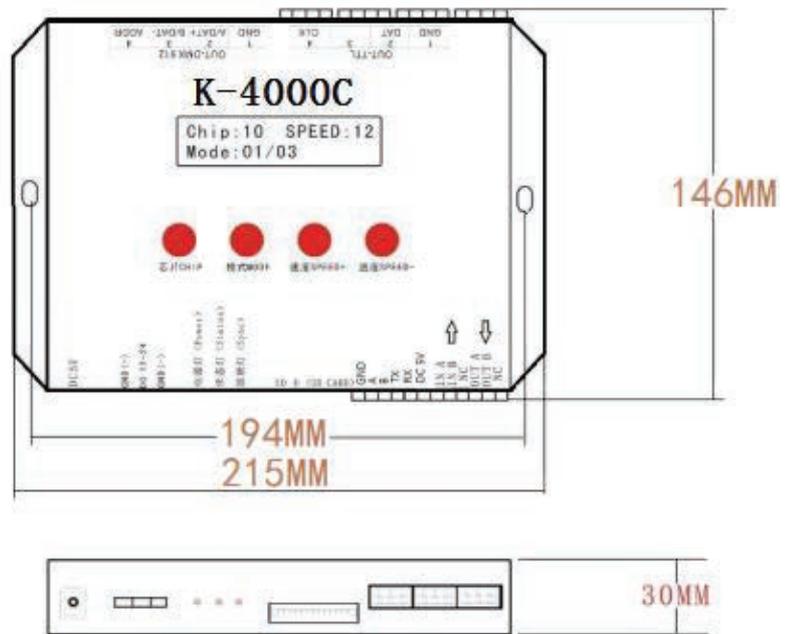
Operating temperature: -20°C-75°C

DC 5V or DC 12-24V input

Power consumption: 5W

Weight: 0.8Kg

Dimensions: L215mm * W146 mm* H30 mm



Memory card:

Type: SD card

Capacity: 128MB-32GB

Format: FAT or FAT32

Storage file: *.led

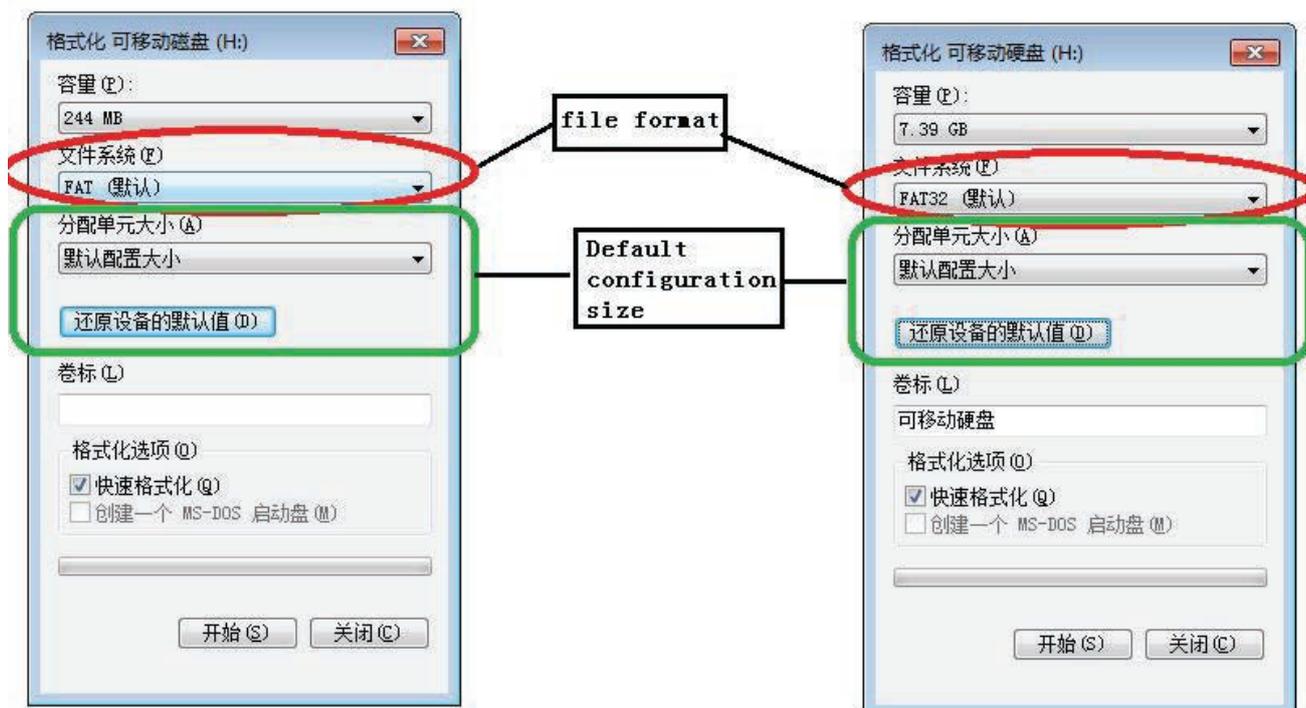
XIII. SD card formatting

1. Before copying files to the SD card, the SD card must be first formatted. (Note that it must be formatted before each copying).

2. Format program

- ① SD card settings - "File System", "FAT" (SD card capacity \leq 2G) or "FAT32" (SD card capacity \geq 4G).
- ② SD Card Settings - "Allocation Unit Size", click the drop-down button to select "Default configuration size" or click "Restore default value of device".
- ③ Start formatting.

As shown in the figure below:



3. The SD card cannot be hot swapped. It can only be plugged and removed after powering off the controller.

Attachment: Handling of common problems:

Question 1: After powering on, if the controller screen displays SD Error and has no effect output

Answer: If the screen displays SD Error, which means that the controller does not read the card correctly. The possible problems are:

- ① The SD card is empty, and there is no effect file.
- ② The effect file *.led file in the SD card does not match the controller model, please select the controller model and chip model correctly in the LedEdit2019, and recreate the effect file *.led.
- ③ Re-test after replacing the SD card to rule out the possibility of the SD card being damaged.

Question 2: After powering on, the controller outputs the built-in effects but not the effect in SD card

Answer: The controller cannot detect the SD card and automatically plays the built-in effect:

- ① No SD card is inserted. Insert the SD card.
- ② SD card is inserted but not inserted in place. Reinsert the SD card.
- ③ SD card is inserted but does not match the controller. Change the SD card.

Question 3: After powering on the controller, the indicator lights are normal, but the lamps have no effect.

A: This may be caused by the following reasons:

- ① Please check whether the signal line of the lamp and the controller are properly connected.
- ② The signal of conventional lamps is divided into in and out, and it is determined whether the control is the signal input of the first lamp.

Question 4: After the controller and the lamps are connected, the lamps flicker frequently, but the effect changes, and the indicator lights of the controller display normally.

Answer: ① The ground wire between the controller and the lamp is not connected.

- ② The effect in the SD card is wrong, and the lamp chip selected when doing the effect does not match the actual lamp chip.
- ③ If the chip is not locked when making the effect on the software, press the chip of the controller to the corresponding chip of the lamp. For details, please refer to IC sequence on the sticker on the controller.
- ④ The power supply voltage of the lamps is insufficient.

Question 5: SD card cannot be formatted.

Answer: ① First, confirm whether the protection switch on the side of SD card is unlocked. The unlocking direction is on the end of SD card gold pin.

- ② The protection lock has been designed as required, but it still cannot be formatted. If this happens, the SD card reader is mostly broken, please replace the SD card reader (it is recommended to use a card reader with better quality, and SSK card reader is recommended).
- ③ If the preceding operations fail to resolve the formatting problem, replace the SD card and test again.