



# LoRa Controller Specification

Version: 2.1.1

Model: LR-101-A3

June 2020

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# 1. Functional overview

1. whole LoRa cloud control system consists of three important components: LoRa cloud control platform, LoRa control and LoRa control. The main object of this specification is LoRa sub-control (subsequent sub-control, model is LR-101);
2. the built-in LoRa module, using the LoRa spread spectrum communication technology to access the main control, so that the whole project through the main control synchronization control;
3. TTL and RS485 signal compatible single output control lamp signal, according to the lamp transmission signal self-selection;
4. effect animation data through SD card update and save in the sub-control of the Flash chip;
5. attached to the professional effect production software, users can make any effect update to the sub-control.

# 2. Technical parameters

Shell Material: Aluminum alloy

Input voltage: DC 12V~24 V

Output port: Single Green Wiring

Post (RS485+TTL) Support Control:

SW MCU: D\*\*S、D\*\*J;

Single line: TM180\*-400K/800K、UCS19\*\*、UCS29\*\*、TLS3001(1Mhz), SM167\*\*;

DMX512: DMX chips with multiple SW/UCS/SM/TM, market standard DMX512;

Breakpoint continuation: UCS5603、WS2818、GS8206、P9883、TM1914、XT1506S.

Channels with load: SW MCU lamp :2880 channel;

Single line lamps :3072 channels;

Standard DMX512

lamps :512 channels;

extended DMX lamps :1024

channels; breakpoint

continuation :2160

channels;.

Output power: W <3

Operating temperature:

-15°C~60°C

Relative humidity:

RH ≤50

per cent

Protection rating: IP20(prevent human fingers from touching parts inside the appliance, prevent intrusion of objects larger than 12.5 mm in diameter, and have no special protection against water or moisture. )

Use environment: 1. do not install this control box in a magnetic or high pressure or high temperature and high humidity environment ;2. To reduce the risk of fire and damage caused by short circuit, please grounding safely;  
3. Confirm the use of the AC100-240V power supply and ensure that the transformer and the control box are connected with the same

polarity to ensure the appropriate supply voltage;

4. Control system has no waterproof function, please pay attention to rain, waterproof installation.

Communications: uplink: LoRa

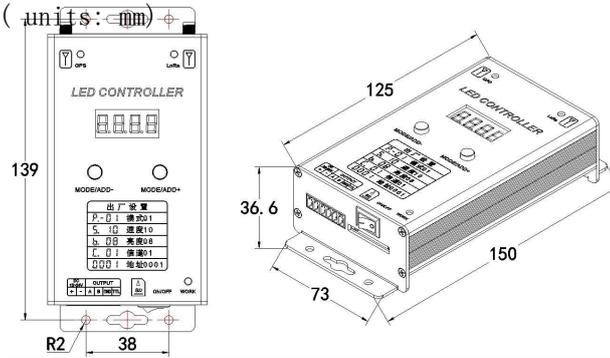
System availability: 10

Maximum number of individual works controlled: 2000 units

Distance from master: Within 500 metres

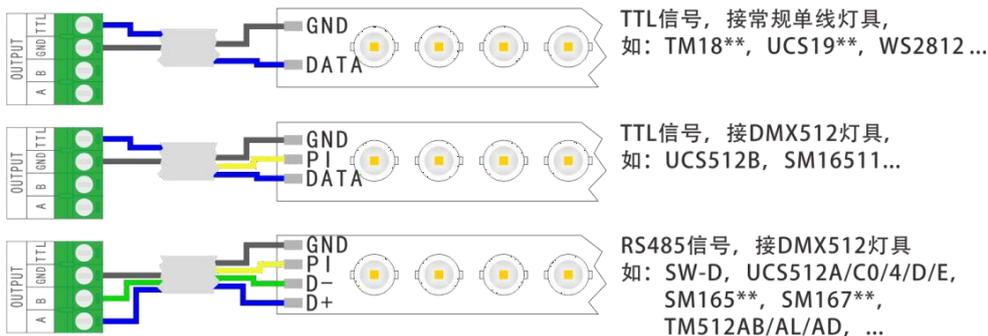
Size hole chart:

L125\*W73\*H36.6 (units: mm)



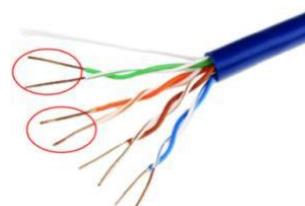
### 3. Wiring Mode

Please connect according to the lamp screen printing.



Attention to ★ Signal Line Connection

1. use of super five types of network cable (100 meters resistance  $<10\Omega$ ), inferior network cable, telephone line, copper wire is basically not.
  2. use one group of twisted-pair wires, green + green or orange + orange. The quality and color of the wire is very important, blue and brown have a great impact on signal transmission, do not use several groups of twisted-pair wires together.
  3. control box signal output GND must be directly connected to the lamp input end GND, can not be connected to the lamp through the negative switch power supply.
- After 4. connect all hardware signal lines and power lines, turn on the control box power. Do not plug the signal line live, lest the current recoil burn out the output protection circuit or components.

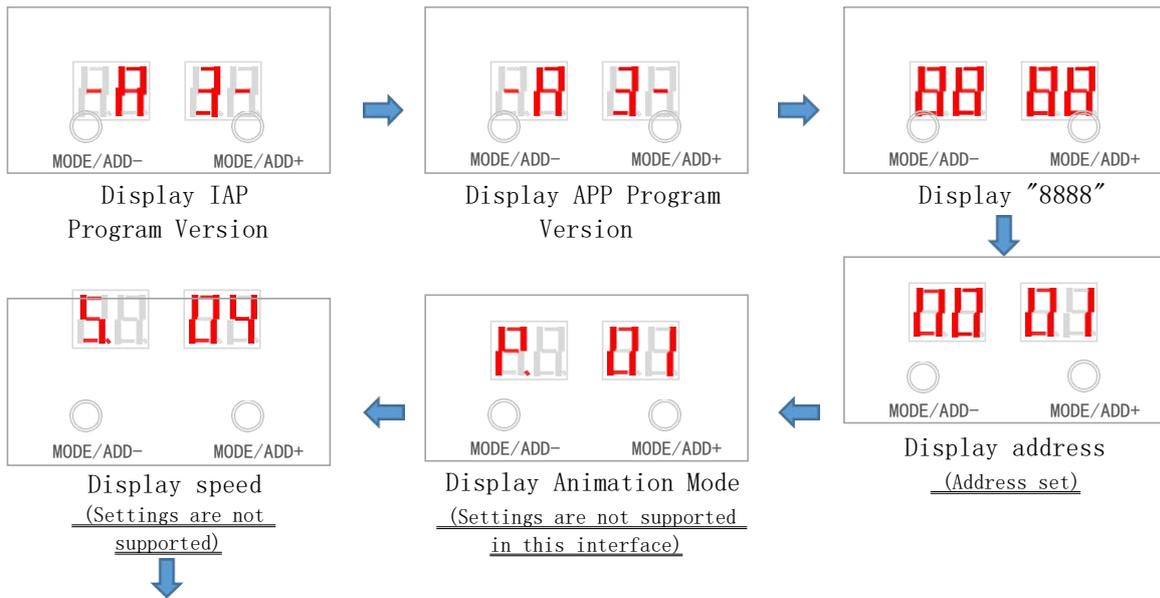


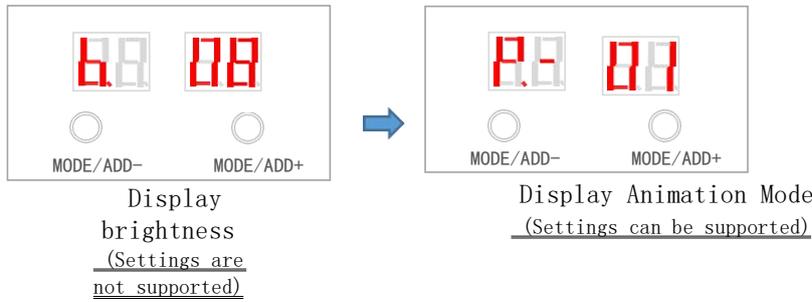
Wire and transmission distance

Transmission mode	Transmission signal	Transmission medium	Reference length	Remarks
Separate control →DMX lamps DMX lamps →DMX lamps	RS-485	Super five unshielded network cables	30-50 m	Line length more than 5 meters, the number of controlled lights reduced (Address line not exceeding 5 m)
		Three-core copper wire	1-20 m	
		Four-core copper wire	1-20 m	
Single → lamps DMX lamps →DMX lamps	TTL	Super five unshielded network cables	5-20 m	
		Two-core copper wire	1-5 m	
		Three-core copper wire	1-5 m	
Single line lamps → single line lamps	TTL	Super five unshielded network cables	1-2 m	Line length more than 1 meter, the number of controlled lights reduced
		Two-core copper wire	0.1-1 m	

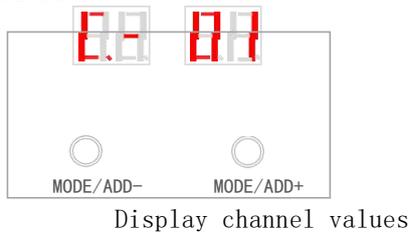
### 4. Interface Description

## 4.1 Boot





## 4.2 Other interface notes



## 4.3 Normal communication decision

1. main control and sub-control installation distance within 500 meters, and power on;
2. when the main control settings GPS synchronized and ensure that the main control has been acquired satellite signal up to 4 stars, observe the upper right corner of the LoRa indicator light 1

Minutes without going out,

If the main control set a single synchronization, is also observed LoRa the indicator light

05 Speed :03  
Patter  
n:  
01 Channel :01  
Bright



for 1 minute and not extinguished;

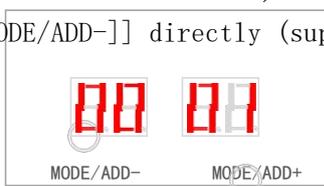
Control works and GPS up to 5 stars The indicator light is always on, that is, the normal communication with the main control

If the LoRa indicator lights flicker or not, the sub-control is not within the controlled range of the main control, please ensure that the distance from the main control is less than 500 meters, consistent with the communication channel.

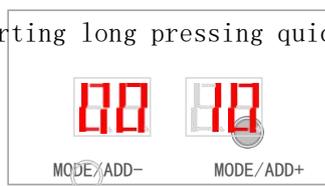
## 5. Basic operations

### 5.1 Address settings

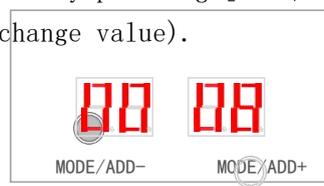
The sub-control power is turned on and stays at the address numerical interface within 15 seconds. At this time, the sub-control address can be set by pressing [MODE/ADD+] or [MODE/ADD-] directly (supporting long pressing quick change value).



Address =0001



Click MODE/ADD+, address increment



Click MODE/ADD-, address decrement

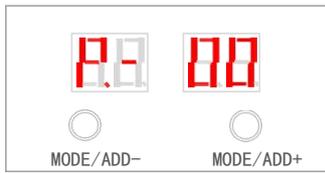
When setting addresses, be sure to note the following:

1. All sub-control addresses of the whole project must be incremented one by one from 1 and different;
2. After setting the address, please record yourself;
3. After setting the address, please update the corresponding effect animation.

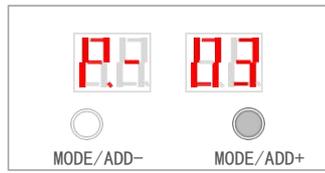
## 5.2 Animation Mode Settings

After the power on, do not operate any keys waiting for 15 seconds, when the interface completely stays in "animation mode "(display P-\*\*), you can press

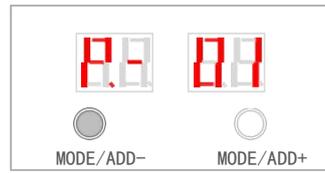
The animation can be set by [MODE/ADD+] or [MODE/ADD-]](support long by quick change value).



00(automatic sequential cycle)  
MODE/ADD-], mode



MODE/ADD- MODE/ADD+

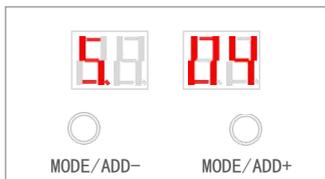


Click MODE/ADD+, mode increment Decrease by

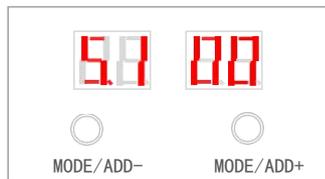
### 5.3 Speed settings (sub-control does not support settings, only controlled by the main control)

Only show the output speed of the sub-control lamp, the larger the value, the slower the effect speed.

Parameters	Response value																	
	2	3	4	5	6	7	8	9	10	11	12	15	20	30	50	80	100	
Interface Display																		
Frame Speed (ms)	20	30	40	50	60	70	80	90	100	110	120	150	200	300	500	800	1000	
Number of frames per second (fps)	50	33.3	25	20	16.6	14.2	12.5	11.1	10	9.1	8.3	6.6	5.0	3.3	2.0	1.2	1.0	



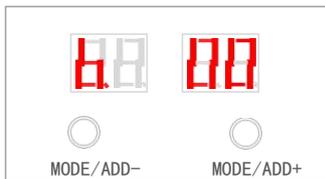
Velocity =4



Speed =100 per cent

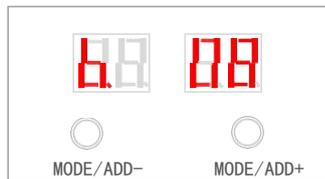
### 5.4 Brightness settings (sub-control does not support settings, only controlled by the main control)

Display only the brightness of the output of the control lamp belt. 00 is black and 08 is



brightest;

Lamp black status

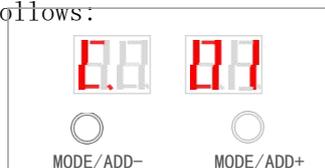
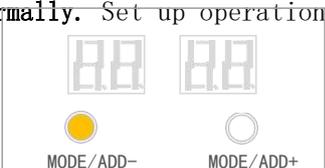


Lighting state

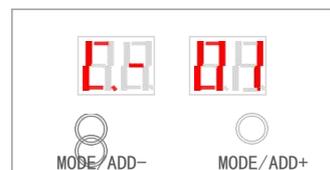
### 5.5 Channel settings

Channel refers to the communication channel between main control and sub-control.

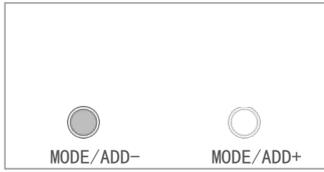
The main control and sub-control must set the same channel in order to communicate normally. Set up operations as follows:



MODE/ADD-] power on

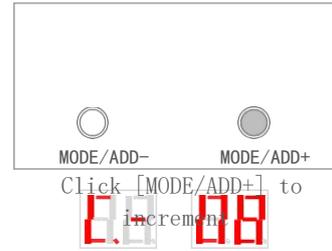


Displays the current channel



Decrease by MODE/ADD-], value

Access Channel  
Setup Interface  
(2 digit digital  
display "-" )1

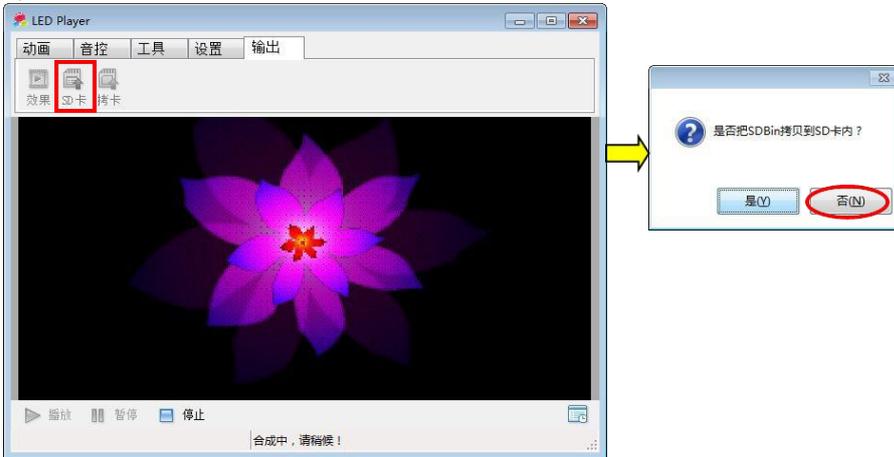


10 channels can be used, after setting up, the upper right corner LoRa indicator lights flash to indicate that the setting is successful. Shutdown restart sub-control can work according to the newly set channel.

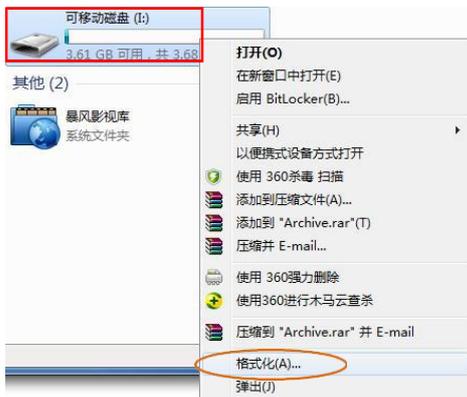
## 6. Effect document

### 6.1 Copy Card

1) Click [Output ]-[ SD card];



2) In the right-click pop-up menu, select "Format";



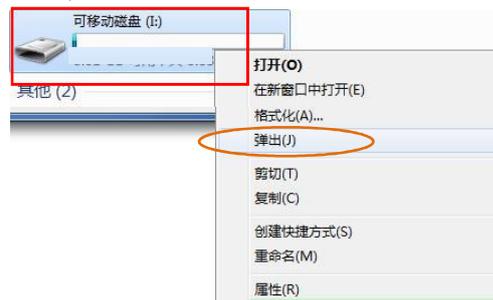
3) Sets "File System FAT "+ Fast Formatting ", click " Start "- " OK "- " OK ";



4) All SD\*(8888). selected Bin the file and right-click, select send to removable disk in the pop-up menu;



5) From the right-click pop-up menu, select Pop-up to safely pop up the SD card;



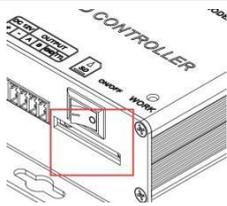
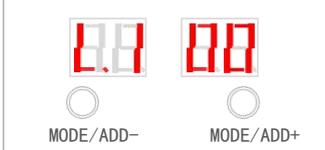
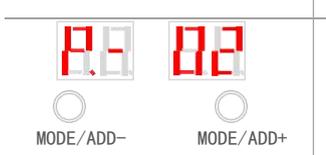
### 6.2 Relationship between the number of loaded points and the frame number of animation effect

Total frames of effect	16252	8076	5350	3988	3170	2625
Total number of loaded channels	1-504	505-1008	1009-1536	1537-2040	2041-2544	2547 cap

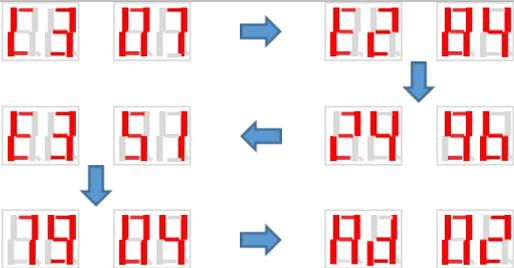
Three-channel light points (points)	1-168	169-336	337-512	513-680	681-848	849 cap
Four-channel light points (points)	1-126	127-252	253-384	385-510	511-636	637 cap

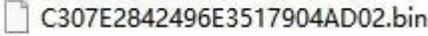
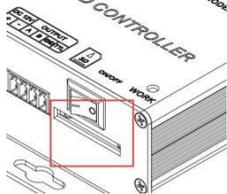
## 7. Update and upgrade

### 7.1 Effect update

Steps	Operation	Figure 1
1.	Insert the SD card copied into the effect file into the corresponding SD slot, as shown on the right.	
2.	Turn on, sub-control will read according to their own address SD card matching bin files, digital tube display program upgrade progress L.000-L.100. <b>Do not pull out the SD card during the update process.</b>	  <p style="text-align: center;">Update starts the update is complete</p> <p style="text-align: center;">A progress display, L.100</p> <p style="text-align: center;">WORK light flashes three times</p> <p style="text-align: right;">➔</p>
3.	WORK indicator lights stop flashing after pulling out the SD card, sub-control can be updated according to the effect of normal operation.	

### 7.2 Firmware upgrade

Steps	Operation	Figure 1
4.	Insert SD card.   According to the separate control [MODE/ADD+] power on.	  <p style="text-align: center;">Press [MODE/ADD+] to turn on</p> <p style="text-align: center;">Display "----"</p> <p style="text-align: right;">➔</p>
5.	The digital tube is divided into 6 sections to display the unique code and copy the ID into the UID.txt file of the SD card. The work indicator light of the control indicates that the UID has been correctly written into the SD card.	 <p style="text-align: center;">C307E284: This control unique code 2496E351 7904Ad02</p>

	<p>Note that the ID of each master is different, please be sure to correspond one by one.</p>	
<p>6.</p>	<p><b>Separate control shutdown, take out the SD card; SD card format;</b></p> <p>Copy the program files of the corresponding control ID into SD the card.</p>	
<p>7.</p>	<p>Insert the SD card copied into the program file into the corresponding SD slot, as shown on the right.</p>	

Steps	Operation	Figure 1
8.	At the same time press MODE/ADD1] and [MODE/ADD+] Boot into the program upgrade interface.	<p>The old version on the left and the new version on the right</p>
9.	Short press [MODE/ADD-] to determine the upgrade user program, digital tube display program upgrade progress L.00 to L.100; If you do not need to upgrade, press [MODE/ADD+] Return. <b>Do not pull out the SD card during the update process.</b>	<p>Progress shows that L.100 upgrade is complete</p>
10.	After pulling out the SD card, the sub-control can work normally.	

## 8 antenna installation

Equipped with LoRa antenna length of 3 meters.

We can customize the antenna length of appropriate specifications according to site requirements.

Please connect the antenna to the control box

correctly as shown below, and place all antennas above 1.5 meters above the ground vertically to ensure that the perimeter is open and there is no larger occlusion.



## 9. Frequently Asked Questions and Solutions

Serial number	Issues	Solutions
1.	Separate control is not controlled.	a. Clear the main control and sub-control channel consistent; b. Clear control antenna has been tightened and more than 1.5 meters from the ground.
2.	Division control in the LoRa cloud control platform	a. Clear sub-control normal power, antenna has been tightened, channel and main control consistent, and in the main control range, and the sub-control address and LoRa cloud control

	display "offline".	platform display sub-control address consistent.	
3.	Separate control is not synchronized.	a. Clear main control GPS signal intensity above 4 stars; b. Clear that all sub-control models are consistent.	
4.	Display ER10. on boot	Too many lights cause speed over 100 ms, please modify the software wiring and re-output BIN files and copy cards.	
5.	Display ER21. while working	LoRa module failure, please return to the factory maintenance.	
6.	When reading the BIN file of the SD card, the error message is displayed.	Information	
		Erro r	
		ER03	SD card doesn't have BIN files that match the sub-control address, please check the software wiring New copy card, at the same time clear sub-control address is correct.
		ER11	SD card does not have animation effect data, please re-output the BIN file and copy card.
		ER12	Patterns/ Spectrum/Motion Any animation effect is over 250, please delete the animation effect and Re-output BIN files and copy cards.
		ER14	The size of the BI N file matching the S D card and the sub-control address has exceeded 8 M, please delete it on the software Reduce part of the animation effect and recompose the card.
ER15	There is no animation effect data in the sub-control, please copy the card and copy to the sub-control.		

Serial number	Issues	Solutions	
7.	Error message is displayed when firmware is upgraded.	Error	Information
		ER16	User program check error, please copy into the upgrade program and upgrade.
		ER17	The top address of the user program stack is illegal. Please copy to the upgrade program and upgrade.
		ER18	The user program entry address is illegal, please copy to the upgrade program and upgrade.
		ER19	FLASH there is no user program on the chip, please copy the upgrade program and upgrade.
		ER20	SD card does not have a user program, please copy to the upgrade program and upgrade.

## 10. List of accessories

Picture	Name of name	Quantity
	LoRa antenna	1
	4P terminals (with lamps)	1
	2P terminal (with power supply)	1
	Hoop straps	1
	Antenna bracket	1

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