

Point Light Controller

DBS-DC65-P03C-05020-4

User Manual



Thank you for choosing our company's product. Please read this user manual carefully before use.

Revised in April 2025, Version 1.3

Precautions:

 Warnings	
	This product requires an external power supply for power. Ensure the power switch of the controller is in the OFF position when plugging in or unplugging the power supply to prevent electric shock.
	Before using this product, please read this manual in detail; when using this product, follow the operations specified in this manual.
	In case of abnormal conditions, please contact our company. Do not disassemble or assemble the product by yourself.
	Ensure the product is properly grounded to prevent electric shock.
	When using the matching light source, do not look directly at the light emitted by the light source to avoid eye damage.

Document Version Description:

Version No.	Revision Date	Revision Description
V1.1	2024.Jun	New version release
V1.2	2024.Nov	1. Added precautions and document version description 2. Fixed known issues
V1.3	2025.Mar	Updated content and version format

Standard Shipping List

Product Name	Model	Type	Quantity
Light Source Controller	DBS-DC65-P03C-05020-4		1
Serial Cable	1.5M Male-to-Female		1
Terminal Block	3.81-8P		1
Power Cable	1.5M		1

Note: If you have other requirements for the shipping configuration, please contact the salesperson or distributor in a timely manner.

Contents

1. Product Introduction	1
1.1 Product Features	1
1.2 Product Selection	1
1.3 Main Parameters	1
1.4 Function Modes	2
2. User Instructions	3
2.1 Panel Description	3
2.2 Light Source Interface Definition	4
2.3 Serial Female Socket Interface Definition	4
2.4 Trigger Instructions	5
2.5.4 Setting of High-Level Trigger Mode	8
2.5.7 Setting of Key Lock	10
3. Communication Protocol	10
3.1 Programming Flow	10
3.2 Communication Settings	11
3.3 Frame Format Description	11
3.4 Communication Example	12
4. Prompt Command Index	14
5. Accessories	15

1. Product Introduction

1.1 Product Features

- Supports RS232 communication
- Built-in 5V switching power supply
- Low trigger response time
- Supports external trigger mode
- Switchable between constant-on and strobe modes (all-in-one design)
- Supports millisecond-level strobe
- Manual adjustment of brightness and mode
- 5~24V unidirectional trigger, adaptable to high/low level trigger modes
- Easy installation: screw mounting or C45 DIN rail mounting

1.2 Product Selection

Model	Built-in Power Supply Power	Maximum Current per Channel
DBS-DC65-P03C-05020-4	65W	2A

1.3 Main Parameters

Table 1 Main Parameters Table

Item	Parameter	Description
Input Voltage	AC220V	For built-in switching power supply
Output Voltage	5V	Voltage of built-in switching power supply
Output Current	2A	Maximum current per channel: 2A (factory-limited based on requirements)
Overcurrent Protection	None	
Overvoltage Protection	None	
Operating Mode	3 种	NOR: Steady On TRIG: 0: Constant Off; 1: 1~999ms Strobe
Light Emitting Mode	Constant Off/Steady On/Strobe	Except for Steady On mode, other modes support external trigger control
Trigger Mode	Edge + Level Trigger	Strobe mode: Edge Trigger; Constant Off mode: Level Trigger
Constant On Brightness Level	255	255-level brightness adjustment
Millisecond-level Strobe Time	1~999	Unit: ms (milliseconds)
Communication Method	Serial Port	Unit: ms (milliseconds)
Built-in Power Supply	65W	
Number of Channels	4	
Connected Light Source Type	5V Point Light	5V point light source (10mA~2A)
Operating Ambient Temperature	-5~50°C	
Dimensions	See Appendix for details	

1.4 Function Modes

Table 2 Function Modes Table

(Taking Channel 1 as an example)

Function	Nixie Tube Display Mode		Description
Brightness Setting	1. X	$0 \leq X \leq 255$	Adjust brightness
Operating Mode	H1. X	X=0 Constant Off Mode	Light source turns on when trigger signal is valid
		X=1 Millisecond-level Strobe	Light source flashes once in microseconds when trigger signal is valid
		X=2 Constant On Mode	Light source stays on, not affected by trigger signal
Long press the MENU button at "H1. X" to enter the following parameter editing modes			
Level Trigger Mode	LL. X	X=0 Low Level Valid	Trigger signal is valid at low level
		X=1 High Level Valid	Trigger signal is valid at high level
Trigger Mode	Lo. X	X=0	Edge Trigger
		X=1	Level Trigger
Debounce Time Parameter	dt. X	$0 \leq X \leq 99$	X is debounce time, Unit: μs (microseconds)

2. User Instructions

2.1 Panel Description

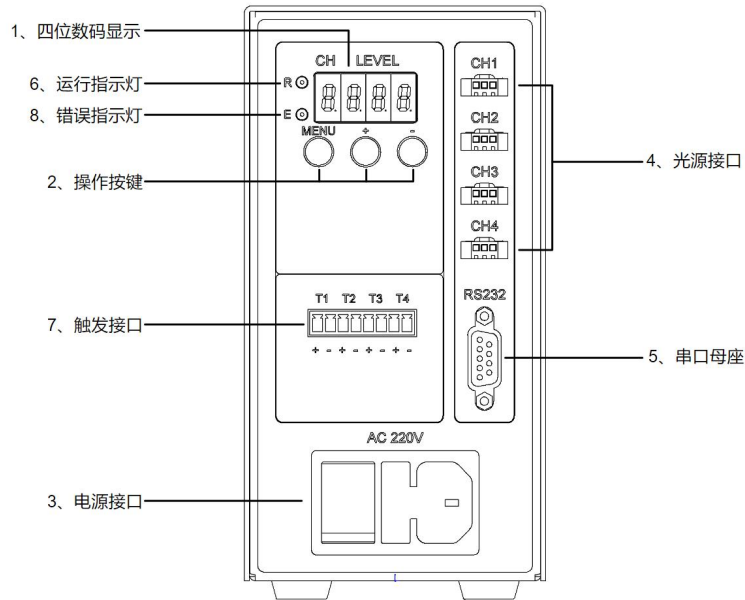


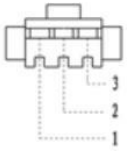
Figure 1: Front Panel

Table 3: Panel Interface Definition Table

No.	Name	Description
1	4-Digit Display	The first digit (from the left) is the current operating channel; the last three digits are the corresponding value of the current operating channel
2	Operation Buttons	MENU is the function switching button; "+" is for increasing the value; "-" is for decreasing the value.
3	Power Interface	DC24V input interface.
4	Light Source Interface	Used to connect a 24V light source with a current range of 10mA - 4A.
5	Serial Female Socket	Used to connect devices with an RS232 interface.
6	Operation Indicator Light	The indicator light flashes when the controller is in operation.
7	Trigger Interface	Connected to an external signal to trigger the switch operation.
8	Error Indicator Light	The indicator light turns on when the controller malfunctions.

2.2 Light Source Interface Definition

Table 4: Light Source Interface Definition Table

	Position	Definition	Description
	1	Light+\fan+	Positive output for light source / Positive output for fan
	2	Light-	Negative output for light source
	3	\fan-	Negative output for fan

2.3 Serial Female Socket Interface Definition

The interface definition of the serial female socket is shown in Figure 2, and it is connected to the 9-pin serial port of the computer host using a parallel cable.

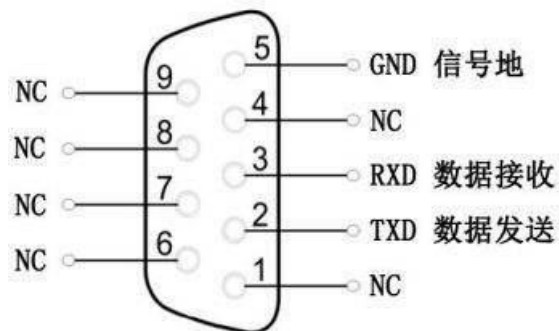


Figure 2: Serial Female Socket Interface Definition

Table 5: Serial Female Socket Interface Definition Table

Pin No.	Name	Description
1	NC	Not connected
2	TXD	Controller RS232 data transmission (RS232 level)
3	RXD	Controller RS232 data reception (RS232 level)
4	NC	Not connected
5	GND	RS232 signal ground
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected

2.4 Trigger Instructions

2.4.1 Trigger Interface

The external trigger input interface is shown in Figure 3:

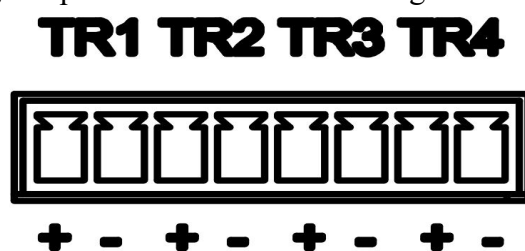


Figure 3: External Trigger Input Interface

There are 4 channels for the external trigger input interface. Each channel has two input terminals marked "+" and "-" Tx (where x represents the channel number). Internally, a unidirectional optocoupler is installed, and its electrical diagram is shown in Figure 4:

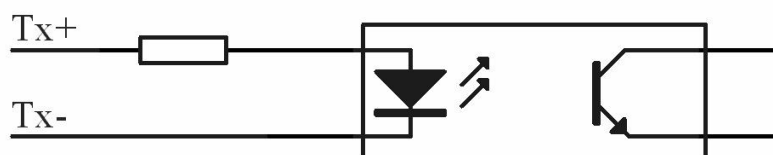


Figure 4: Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Example

When the valid trigger signal is edge - rising or high - level active, the wiring is as shown in Figure 5:

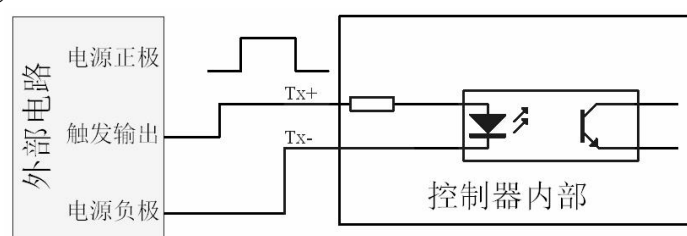


Figure 5: Wiring Example for Edge - Rising or High - Level Active

The trigger output of the external control circuit is connected to Tx+, and the negative pole of the power supply is connected to Tx-. When there is an edge - rising or high - level signal at the trigger output terminal, the controller controls the output.

When the valid trigger signal is edge - falling or low - level active, the wiring is as shown in Figure 6:

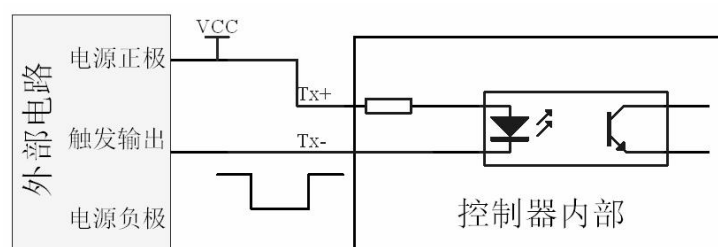


Figure 6: Wiring Example for Edge - Falling or Low - Level Active

The trigger output of the external control circuit is connected to Tx-, and the positive pole of the power supply is connected to Tx+. When there is an edge - falling or low - level signal at the trigger output terminal, the controller controls the output.

2.4.3 Trigger Timing Diagram

Constant Off Mode: In Constant Off Mode, the light source turns on when the trigger input signal of the controller is a valid signal. Taking the high-level active signal as an example, the timing relationship is shown in Figure 7:

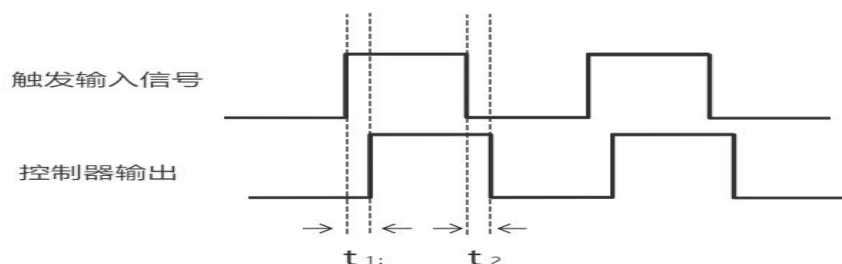


Figure 7: Timing Diagram of Constant Off Mode

Parameter	Time
t_1	$\cong 3\text{ms}$
t_2	$\cong 3\text{ms}$

Strobe Mode: When the controller is set to millisecond-level strobe or microsecond-level strobe, the light source turns on when the trigger input signal of the controller is a valid signal. Taking the high-level active signal as an example, the timing relationship is shown in Figure 8:

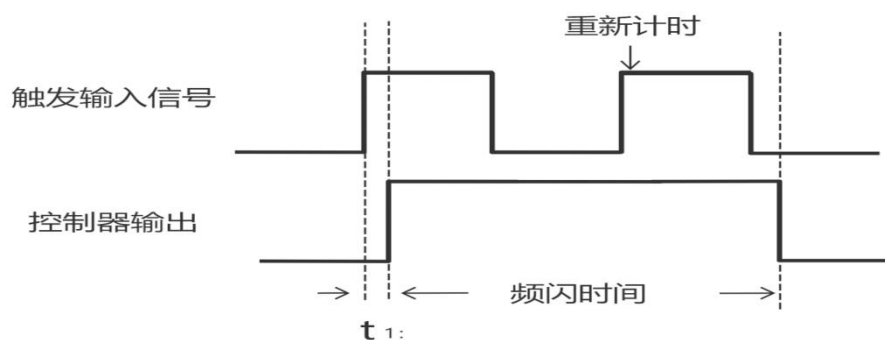


Figure 8: Timing Diagram of Strobe Mode

Parameter	Time
t_1	$\cong 3\text{ms}$

2.5 Manual Setting of Working Modes

2.5.1 Setting of Constant Off Mode

The flow chart for setting the Constant Off Mode of Channel 2 is shown in Figure 9.

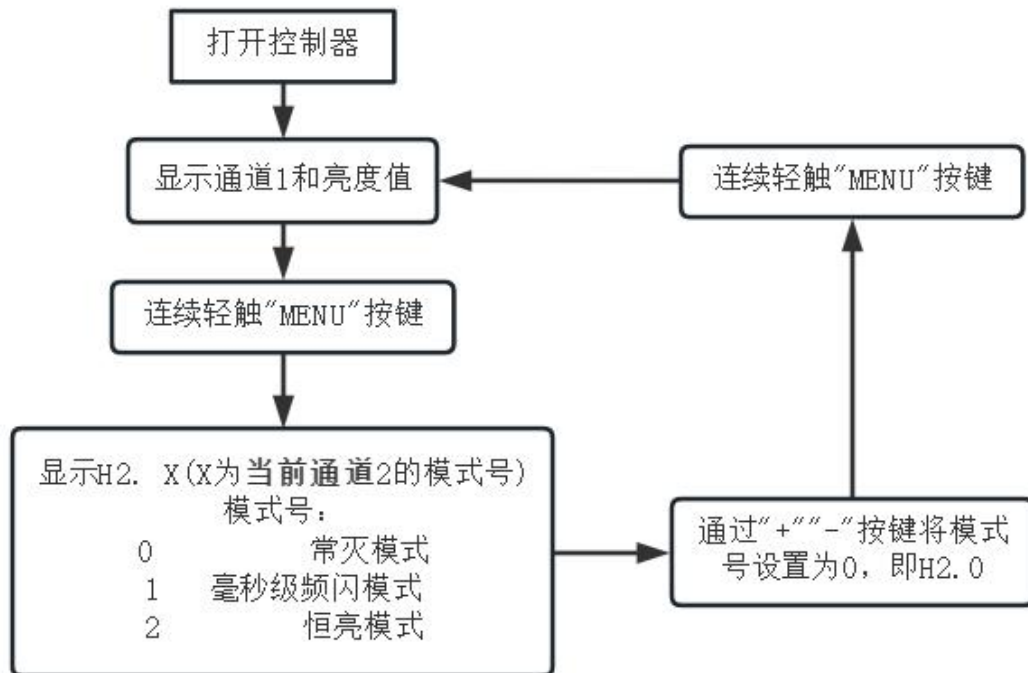


Figure 9: Flow Chart for Setting Constant Off Mode

2.5.2 Setting of Millisecond-Level Strobe Mode

The flow chart for setting the millisecond-level strobe mode and the strobe time of Channel 2 is shown in Figure 10.

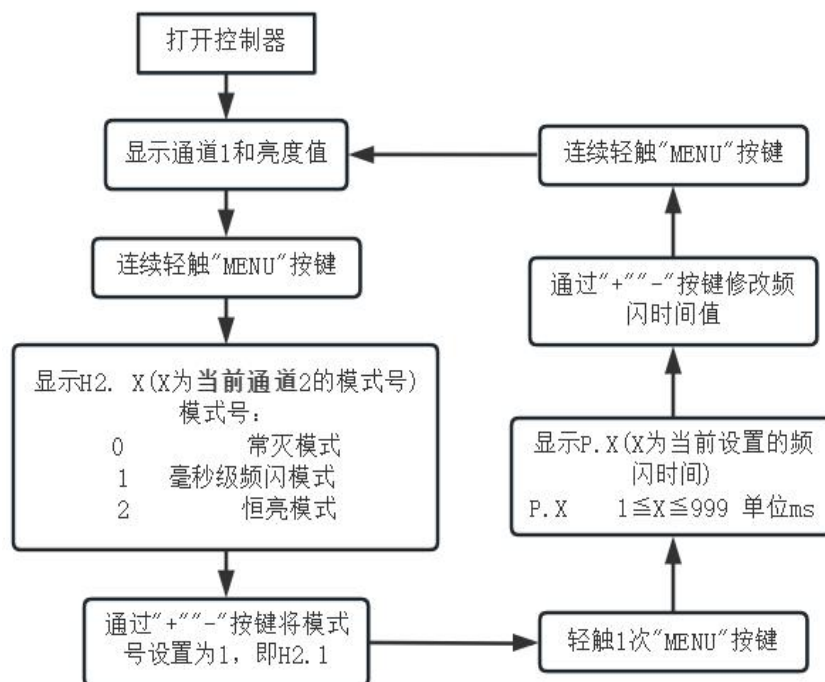


Figure 10: Flow Chart for Setting Millisecond-Level Strobe Time

2.5.3 Setting of Constant On Mode

The flow chart for setting the Constant On Mode is shown in Figure 11.

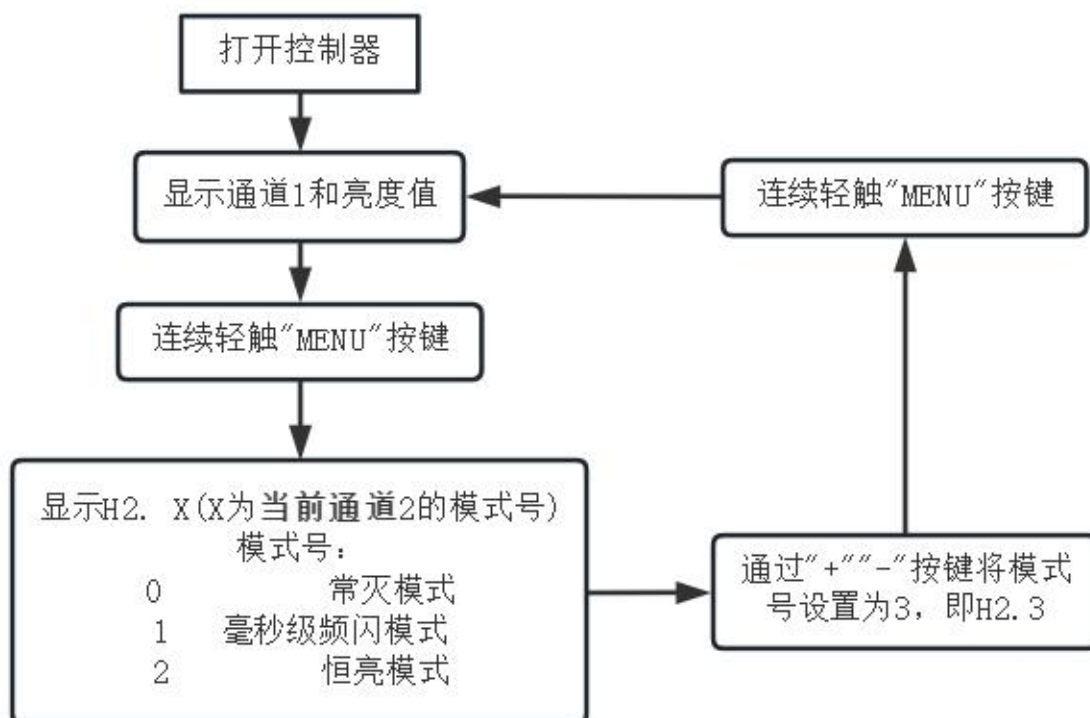


Figure 11: Flow Chart for Setting Constant On Mode

2.5.4 Setting of High-Level Trigger Mode

The flow chart for setting the High-Level Trigger Mode is shown in Figure 12.

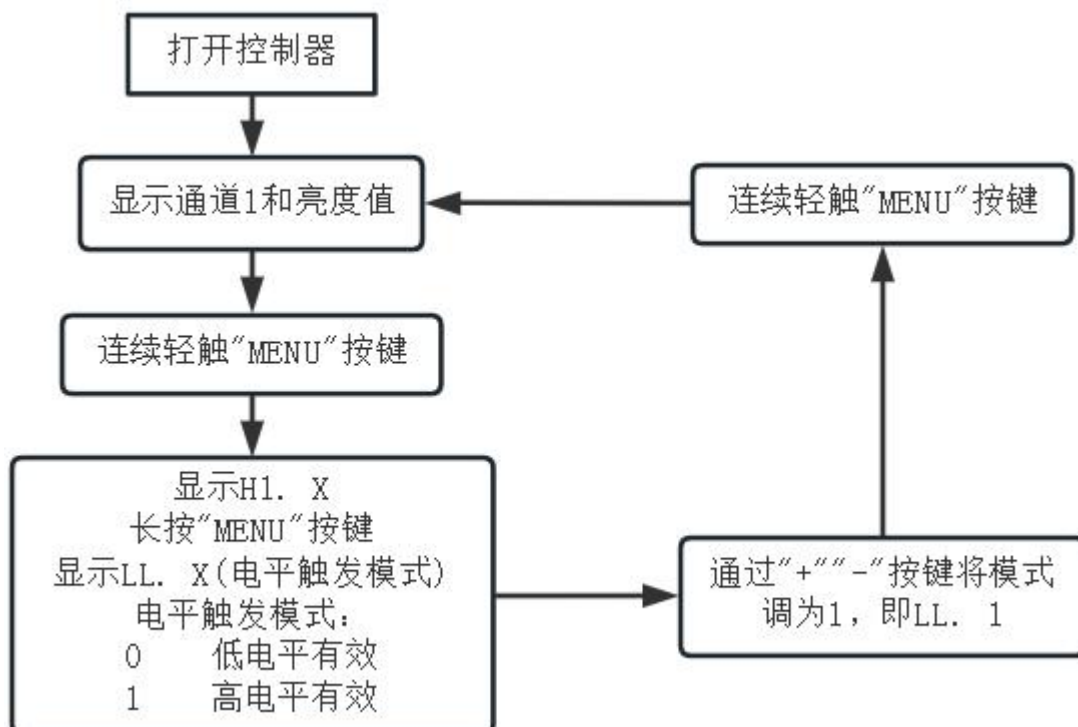


Figure 12: Flow Chart for Setting High-Level Trigger Mode

2.5.5 Setting of Edge Trigger Mode

The flow chart for setting the Edge Trigger Mode for all channels is shown in Figure 13.

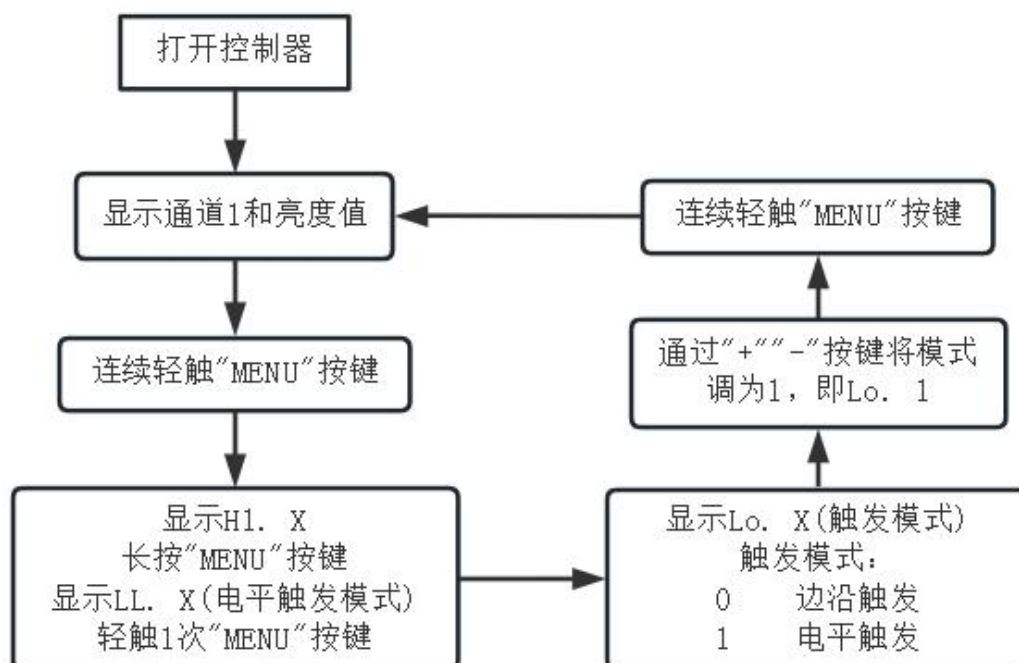


Figure 13: Flow Chart for Setting Edge Trigger Mode for All Channels

2.5.6 Setting of Debounce Time

In environments with strong interference signals, interference signals often cause false triggering of the controller. To eliminate the impact of interference signals, the debounce time can be set to filter out the interference signals. The setting flow is shown in Figure 14.

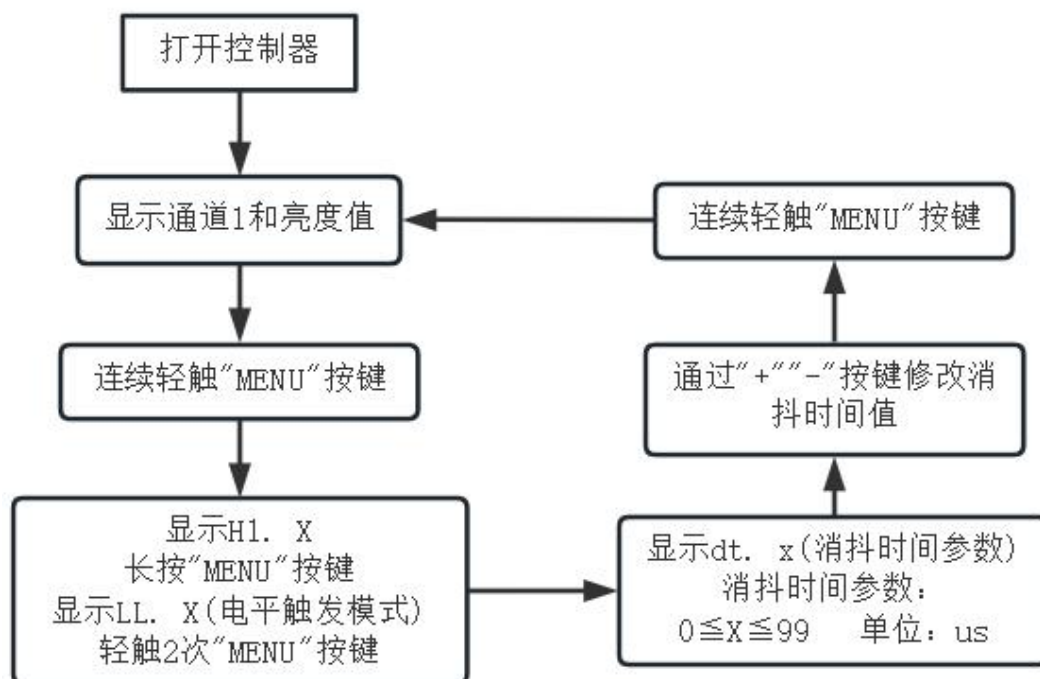


Figure 14: Flow Chart for Setting Debounce Time

2.5.7 Setting of Key Lock

Press and hold the MENU key when the channel and brightness value are displayed to lock the keys. After locking, you can switch the data of each channel but cannot modify it.

3. Communication Protocol

3.1 Programming Flow

When controlling the light source controller through the serial port, the communication programming flow is shown in Figure 15:

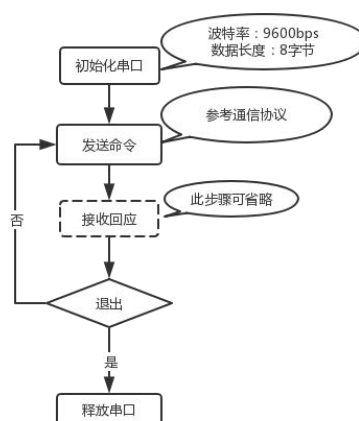


Figure 15: Communication Programming Flow (Serial Port Control)

When controlling the light source controller through the network port, the communication programming flow is shown in Figure 16:

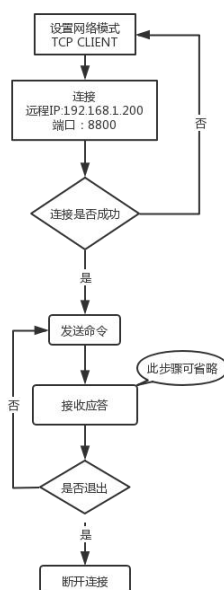


Figure 16: Communication Programming Flow (Network Port Control)

3.2 Communication Settings

3.2.1 Serial Communication Settings

The communication format settings of the serial port are shown in Table 6.

Table 6: Serial Port Setting Table

Baud Rate	Parity Bit	Data Bit	Stop Bit
9600	None	8	1

3.3 Frame Format Description

The frame format of communication is shown in Table 7.

Table 7: Frame Format

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Feature Character	Command Character	Channel Character	Data 1	Data 2	Data 3	XOR Check Character 1	XOR Check Character 2

- 1、 All communication bytes use ASCII codes.
- 2、 The feature character is: \$.
- 3、 The command characters are as shown in Table 7.
- 4、 When the command characters are "1", "2", "3", "7", "8", "9", "A":If the controller receives the command successfully, it returns the feature character \$.If the controller fails to receive the command, it returns &.
- 5、 When the command character is "4":If the controller receives the command successfully, it returns the brightness setting parameter of the corresponding channel (the return format is the same as the sending format).If the controller fails to receive the command, it returns &.
- 6、 The channel characters are "1", "2", "3", "4", which represent 4 channels respectively.
- 7、 Data = 0XX (XX can be any value from 00 to FF), which corresponds to the setting parameter of the channel. The high byte comes first, and the low byte comes after.
- 8、 XOR check character = XOR checksum of all bytes except the check characters (including the feature character, command character, channel character, and data). The ASCII code of the high 4 bits of the checksum comes first, and the ASCII code of the low 4 bits comes after.

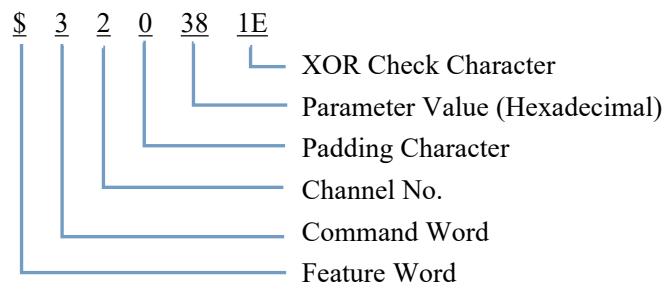
Table 8: Command Character Function Table

Character	Function	Description
"1"	Turn on the corresponding channel	The corresponding channel is determined by the channel character.
"2"	Turn off the corresponding channel	The corresponding channel is determined by the channel character.
"3"	Set the brightness parameter of the corresponding channel	The corresponding channel is determined by the channel character, and the brightness parameter is Data 1 - Data 3.
"4"	Read the brightness parameter of the corresponding channel	The corresponding channel is determined by the channel character, and the return format is the same as the sending format.

"7"	Trigger the strobe of the corresponding channel	The corresponding channel is determined by the channel character. This function is invalid in non-strobe mode.
"8"	Set the mode of the corresponding channel	The corresponding channel is determined by the channel character.
"9"	Set the strobe time of the corresponding channel	The corresponding channel is determined by the channel character. This function is invalid in non-strobe mode.
"A"	Enable the engineer mode	After enabling the engineer mode, the digital tube displays LL.X, and the trigger level can be adjusted through the buttons.

3.4 Communication Example

To set the brightness of Channel 2 to 56, write "\$320381E" in ASCII code.



	String	ASCII Code	ASCII Code (Hexadecimal)	Represent High 4 Bits and Low 4 Bits with 8421 Code Respectively
Feature Word	\$	36	24	0010 0100
Command Word	3	51	33	0011 0011
Channel Word	2	50	32	0011 0010
Data	0	48	30	0011 0000
	3	51	33	0011 0011
	8	56	38	0011 1000
XOR Sum				0001 1110
XOR Checksum Word				1 E

Note: In the XOR check character calculation process for the three functions of turning on the corresponding channel, turning off the corresponding channel, and reading the parameters of the corresponding channel, the values of the 3 data bytes have no impact on the XOR result. It is only necessary to ensure that the format is 0XX (XX is any value from 00 to FF).

The following are several groups of command data:

Turn off Channel 2: \$220381F

	String	ASCII Code	ASCII Code (Hexadecimal)	Represent High 4 Bits and Low 4 Bits with 8421 Code Respectively
Feature Word	\$	36	24	0010 0100
Command Word	2	50	32	0011 0010
Channel Word	2	50	32	0011 0010
Data	0	48	30	0011 0000
	3	51	33	0011 0011
	8	56	38	0011 1000
XOR Sum				0001 1111
XOR Checksum Word				1 F

Turn on Channel 2: \$120381C

	String	ASCII Code	ASCII Code (Hexadecimal)	Represent High 4 Bits and Low 4 Bits with 8421 Code Respectively
Feature Word	\$	36	24	0010 0100
Command Word	1	49	31	0011 0001
Channel Word	2	50	32	0011 0010
Data	0	48	30	0011 0000
	3	51	33	0011 0011
	8	56	38	0011 1000
XOR Sum				0001 1100
XOR Checksum Word				1 C

Read data from Channel 2: \$4200012

	String	ASCII Code	ASCII Code (Hexadecimal)	Represent High 4 Bits and Low 4 Bits with 8421 Code Respectively
Feature Word	\$	36	24	0010 0100
Command Word	4	52	34	0011 0100
Channel Word	2	50	32	0011 0010
Data	0	48	30	0011 0000
	0	48	30	0011 0000
	0	48	30	0011 0000
XOR Sum				0001 0010
XOR Checksum Word				1 0

4. Prompt Command Index

If the controller's nixie tube displays a non-functional prompt command, troubleshoot according to the following command table:

Command	Description	Troubleshooting Solution for Prompt Command
F.1	Unregistered	Re-register
F.2	Storage Chip Damaged	Need to return to the factory for repair
F.3	Exceeding Light Source Power, Short Circuit, Signal Interference	Check the light source power, whether the light source is short-circuited, and whether there is signal interference
F.6	Over-Temperature Alarm (Available for Some Models)	Excessively high temperature; check the controller's operating environment
Loc	Key Lock	Unlock via DIP switch or long-press the "MENU" button

5. Accessories

