

High-Power Controller

DBS-DV500-N05C-24063-2

User Manual



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

Revised in May 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-DV500-N05C-24063-2		1
Terminal Block	3.81-8P		1
Power Cable	1.5m National Standard IEC 320 C13 Plug		1
Serial 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 Main Parameters	1
1.3 Function Modes	2
2. User Instructions	3
2.1 Panel Description	3
2.2 Light Source Interface Definition	3
2.3 Serial Port Female Connector Definition	4
2.4 Trigger Description	4
2.4.1 Trigger Interface	4
2.4.2 Trigger Interface Wiring Example	5
2.4.3 Trigger Timing Diagrams	6
2.5 Manual Settings	7
2.5.1 Brightness Setting	7
2.5.3 Constant Off Mode Setting	8
2.5.4 Constant On Mode Setting	8
2.5.5 Millisecond-level Strobe Mode Setting	9
2.5.6 Microsecond-level Strobe Mode Setting	9
2.5.7 High Level Trigger Mode Setting	10
2.5.8 Debounce Time Parameter Setting	10
3. Communication Protocol	11
3.1 Programming Flow	11
3.2 Communication Settings	11
3.3 Frame Format Description	11
3.4 Communication Examples	12
4. Prompt Command Index	14
5. Accessories	15

1. Product Introduction

1.1 Product Features

- Supports RS232 communication
- Built-in high-power 24V switching power supply
- Capable of driving high-power light sources
- Low trigger response time
- Supports external trigger mode
- Supports millisecond-level strobe and microsecond-level strobe
- Allows manual setting of brightness and mode
- 5~24V bidirectional triggering, adaptable to high/low level trigger modes
- Easy installation: screw mounting or C45 DIN rail mounting

1.2 Main Parameters

Table 1 Main Parameters Table

Item	Parameter	Description
Input Voltage	AC220V	For built-in switching power supply
Output Voltage	24V	Voltage of built-in switching power supply
Output Current	6.3A	Maximum current per channel
Overcurrent Protection	None	-
Overvoltage Protection	None	-
Operating Modes	4 Types	0: Constant Off; 1: Constant On; 2: Millisecond-level Strobe; 3: Microsecond-level Strobe
Light Emitting Modes	Constant On / Constant Off / Strobe	External triggering is available in Constant Off and Strobe modes
Trigger Modes	Edge + Level Trigger	Edge trigger in strobe mode; level trigger in Constant On/Off mode
Constant On Brightness Level	255	255 levels of brightness adjustment
Millisecond-level Strobe Time	0~99	Unit: ms (milliseconds)
Microsecond-level Strobe Time	0~99	Unit: μ s (microseconds)
Communication Method	Serial Port	Serial port baud rate: 9600bps
Built-in Power Supply	500W	-
Number of Channels	2	-
Connected Light Source Type	24V Light Source	10mA~6.3A 24V light source
Operating Ambient Temperature	-5~50°C	-
Dimensions	See Appendix for details	

1.3 Function Modes

Table 2 Function Modes Table(Taking Channel 1 as an example)

Function	Digital Tube Display Mode		Description
Brightness Setting	1. X	$0 \leq X \leq 255$	Adjust brightness
Operating Mode	H. X	X=0 Constant Off Mode	Light source turns on when trigger signal is valid
		X=1 Constant On Mode	Light source turns off when trigger signal is valid
		X=2 Millisecond-level Strobe Mode	Light source flashes once (in milliseconds) when trigger signal is valid E1.X ($0 \leq X \leq 99$, Unit: ms)
		X=3 Microsecond-level Strobe Mode	Light source flashes once (in microseconds) when trigger signal is valid E1.X ($0 \leq X \leq 99$, Unit: μ s)
Debounce Time Parameter	dt. X	$0 \leq X \leq 99$	X = debounce time, Unit: μ s
Level Trigger Mode	LL. X	X=0 Low Level Active	Trigger signal is valid at low level
		X=1 High Level Active	Trigger signal is valid at high level

2. User Instructions

2.1 Panel Description

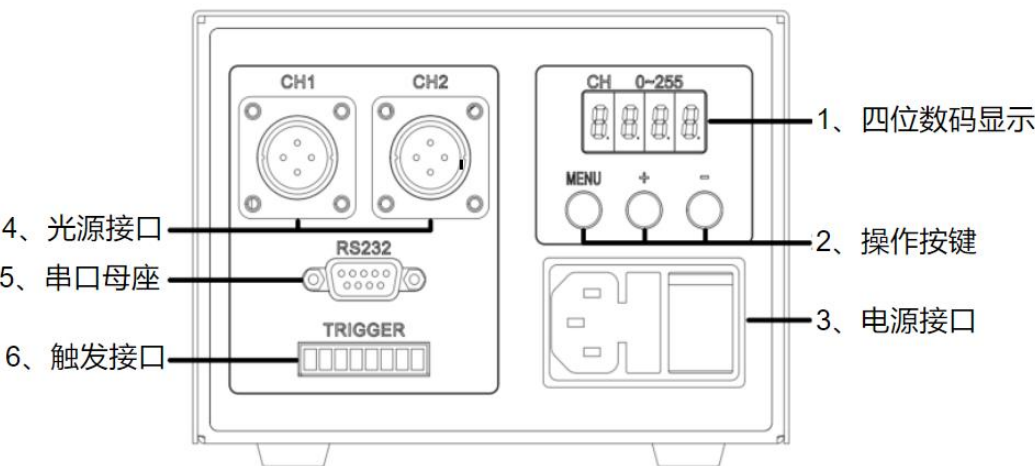


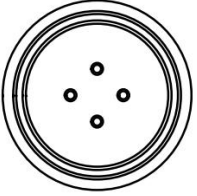
Figure 1 Front Panel

Table 3 Panel Interface Definition Table

No.	Name	Description
1	4-digit Digital Tube	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 = function switch button; "+" = increase value; "-" = decrease value
3	Power Interface	AC220V interface
4	Light Source Interface	Connect to 10mA~6.3A 24V light source
5	Serial Port Female Connector	Connect to devices with RS232 interface
6	Trigger Interface	Connect to external signals for trigger switch operation

2.2 Light Source Interface Definition

Table 4 Light Source Interface Definition Table

	Position	Definition	Description
	1	Light+	Positive pole of light source output
	2	Light-	Negative pole of light source output
	3	FAN+	Positive pole of fan
	4	FAN-	Negative pole of fan

2.3 Serial Port Female Connector Definition

The definition of the serial port female connector is shown in Figure 2. Connect it to the 9-pin serial port of a computer using a straight-through cable.

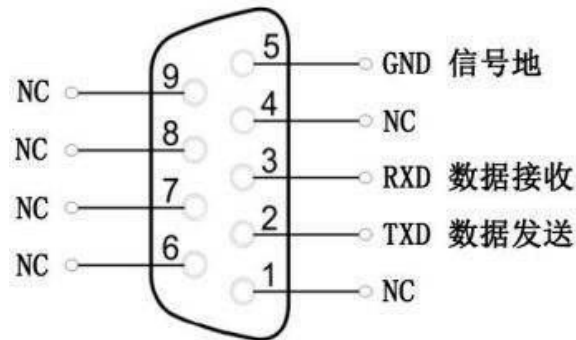


Figure 2 Serial Port Female Connector Definition

Table 5 Serial Port Female Connector Definition Table

No.	Name	Description
1	NC	No Connection
2	TXD	Controller RS232 data transmission (RS232 level)
3	RXD	Controller RS232 data reception (RS232 level)
4	NC	No Connection
5	GND	RS232 signal ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

2.4 Trigger Description

2.4.1 Trigger Interface

When viewing the TRIGGER interface from the front, the leftmost pin is Pin 1, and the pins are numbered sequentially to the rightmost (Pin 8), as shown in Figure 3.

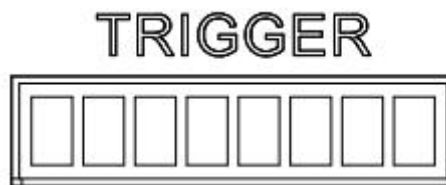


Figure 3 External Trigger Input Interface

Table 6 Trigger Terminal Interface Definition

Terminal Pin No.	Signal Name	Signal Definition
1	T1+	Channel 1 Trigger Signal +
2	T1-	Channel 1 Trigger Signal -
3	T2+	Channel 2 Trigger Signal +
4	T2-	Channel 2 Trigger Signal -
5	Empty	Not connected
6	Empty	Not connected
7	Empty	Not connected
8	Empty	Not connected

There are 2 channels of external trigger input interfaces: T1 and T2. Each channel has two input terminals: "+" and "-" (Tx represents the channel number). A bidirectional optocoupler is built inside, and its electrical diagram is shown in Figure 4:

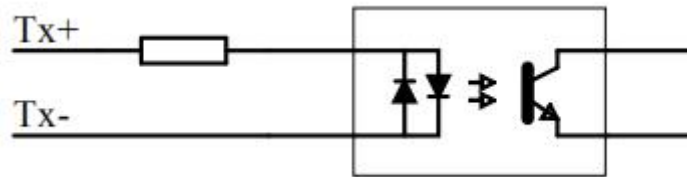


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Example

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

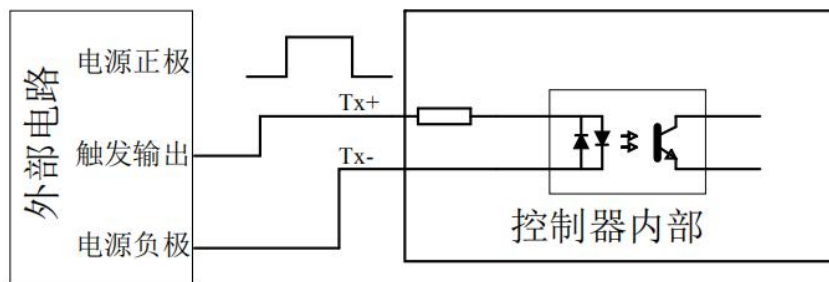


Figure 5 Wiring Example for Rising Edge or High Level Validity

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

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

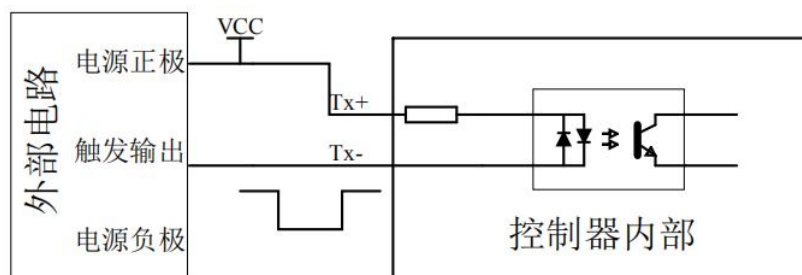


Figure 6 Wiring Example for Falling Edge or Low Level Validity

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

2.4.3 Trigger Timing Diagrams

Constant Off Mode: When the controller's trigger input signal is valid, the light source turns on. The timing relationship is illustrated with high-level validity as an example, as shown in Figure 7:

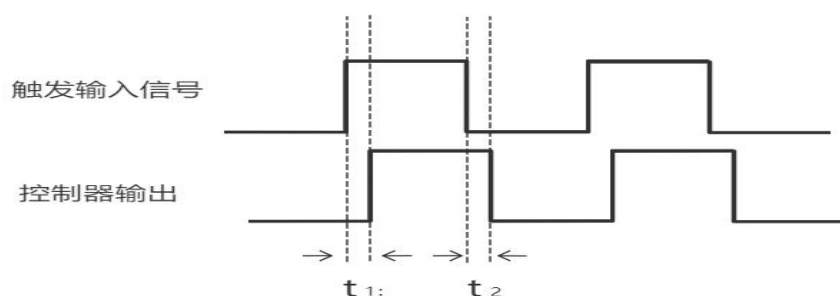


Figure 7 Constant Off Mode Timing Diagram

Parameter	Time
t_1	$\cong 15\mu s$
t_2	$\cong 200\mu s$

Constant On Mode: When the controller's trigger input signal is valid, the light source turns off. The timing relationship is illustrated with high-level validity as an example, as shown in Figure 8:

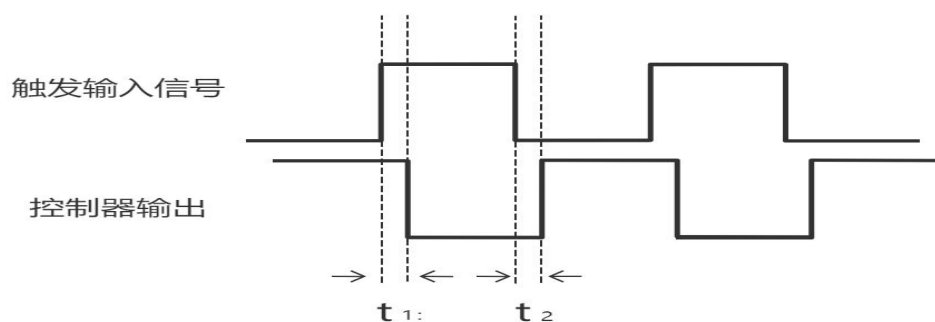


Figure 8 Constant On Mode Timing Diagram

Parameter	Time
t_1	$\leq 15\mu s$
t_2	$\leq 200\mu s$

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 is valid. The timing relationship is illustrated with high-level validity as an example, as shown in Figure 9:

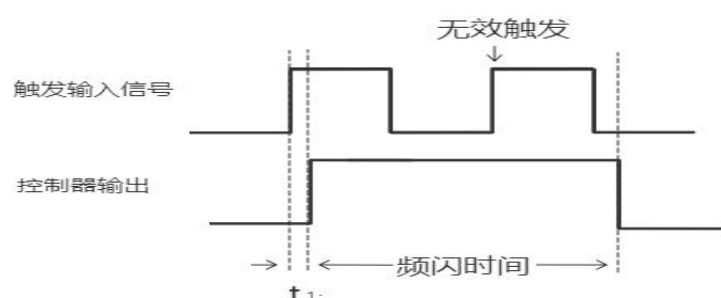


Figure 9 Strobe Mode Timing Diagram

Parameter	Time
t_1	$\leq 15\mu s$

2.5 Manual Settings

2.5.1 Brightness Setting

After turning on the controller, the 4-digit digital tube displays the channel number + brightness value. Initially, it shows Channel 1 and its brightness value. For example, if the brightness of Channel 1 was set to 10 last time, the display will be "1.010".

The following takes setting the brightness of Channel 2 to 125 as an example, and its flow chart is shown in Figure 10:

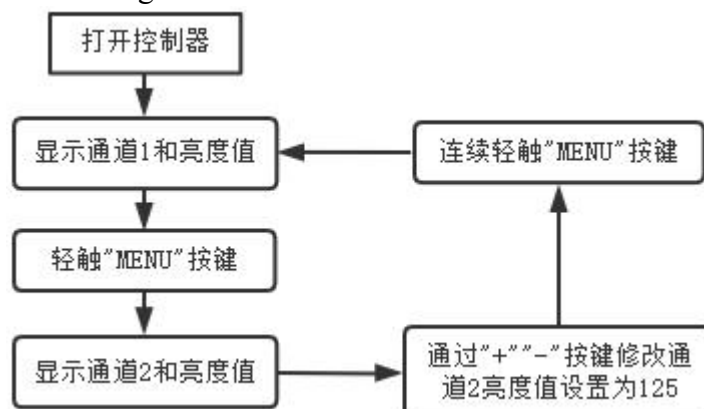


Figure 10 Brightness Setting Flow Chart

2.5.2 Operating Mode Setting

This model of controller has 4 operating modes, which can be set manually via buttons or through communication. For the 4 modes, please refer to Table 2.

The mode of each channel can be set independently. The following takes setting the mode of Channel 2 as an example; the setting method for other channels is similar.

2.5.3 Constant Off Mode Setting

The flow chart for setting Constant Off Mode for Channel 2 is shown in Figure 11:

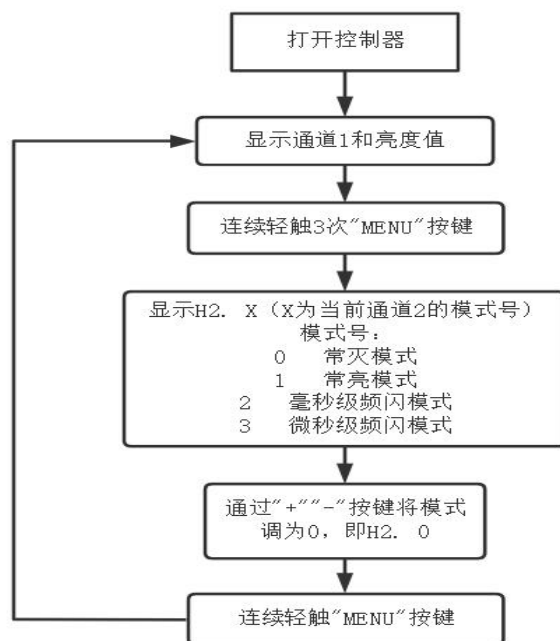


Figure 11 Constant Off Mode Setting Flow Chart for Channel 2

2.5.4 Constant On Mode Setting

The flow chart for setting Constant On Mode for Channel 2 is shown in Figure 12:

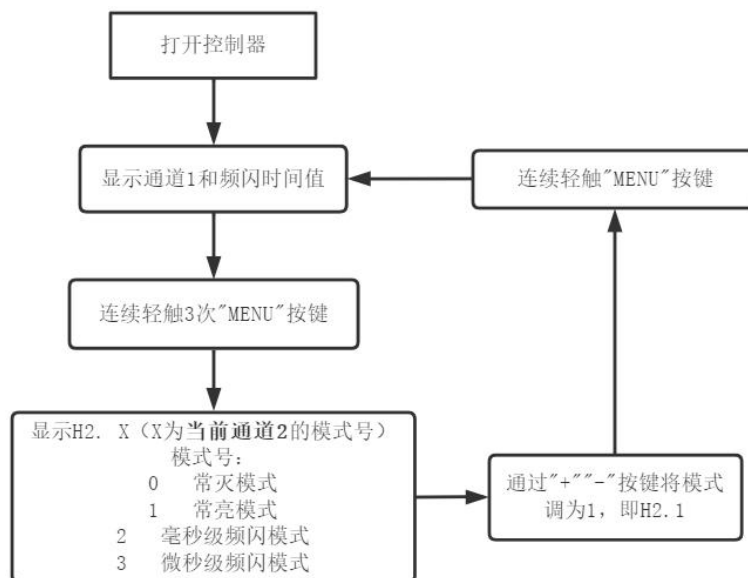


Figure 12 Constant On Mode Setting Flow Chart for Channel 2

2.5.5 Millisecond-level Strobe Mode Setting

The flow chart for setting Millisecond-level Strobe Mode and its strobe time for Channel 2 is shown in Figure 13:

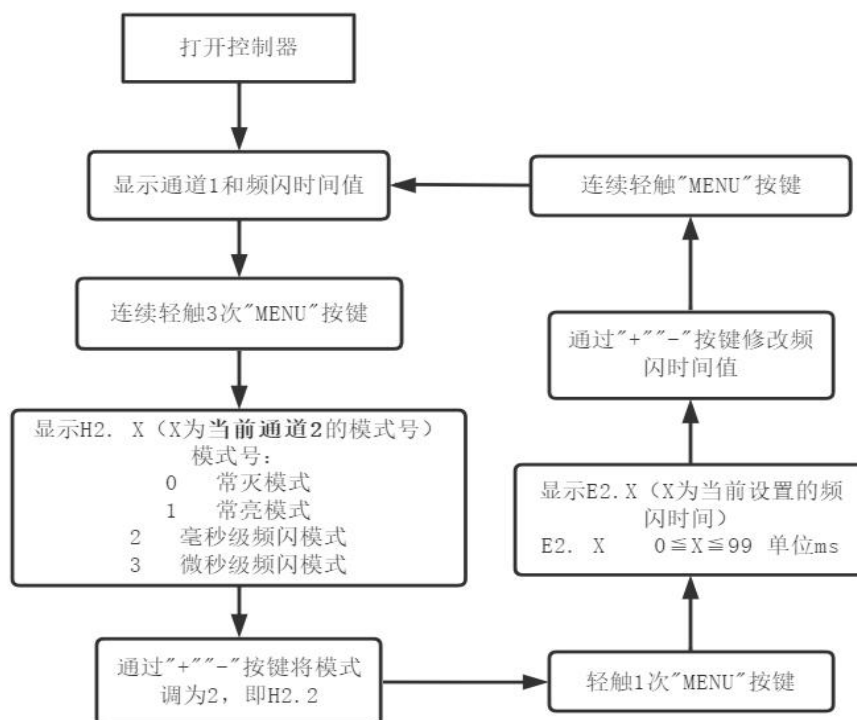


Figure 13 Millisecond-level Strobe Mode and Strobe Time Setting Flow Chart

2.5.6 Microsecond-level Strobe Mode Setting

The flow chart for setting Microsecond-level Strobe Mode and its strobe time for Channel 2 is shown in Figure 14:

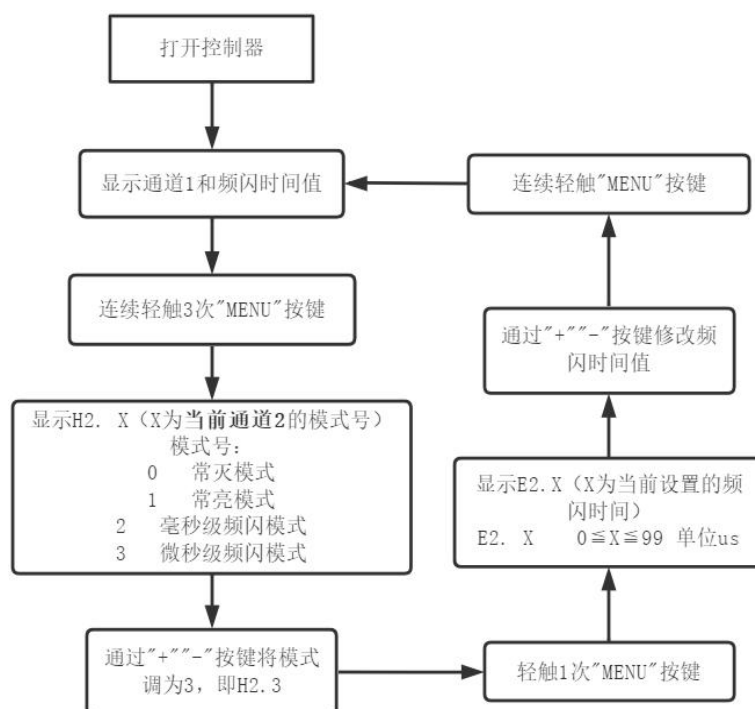


Figure 14 Microsecond-level Strobe Mode and Strobe Time Setting Flow Chart

2.5.7 High Level Trigger Mode Setting

The flow chart for setting High Level Trigger Mode for all channels is shown in Figure 15:

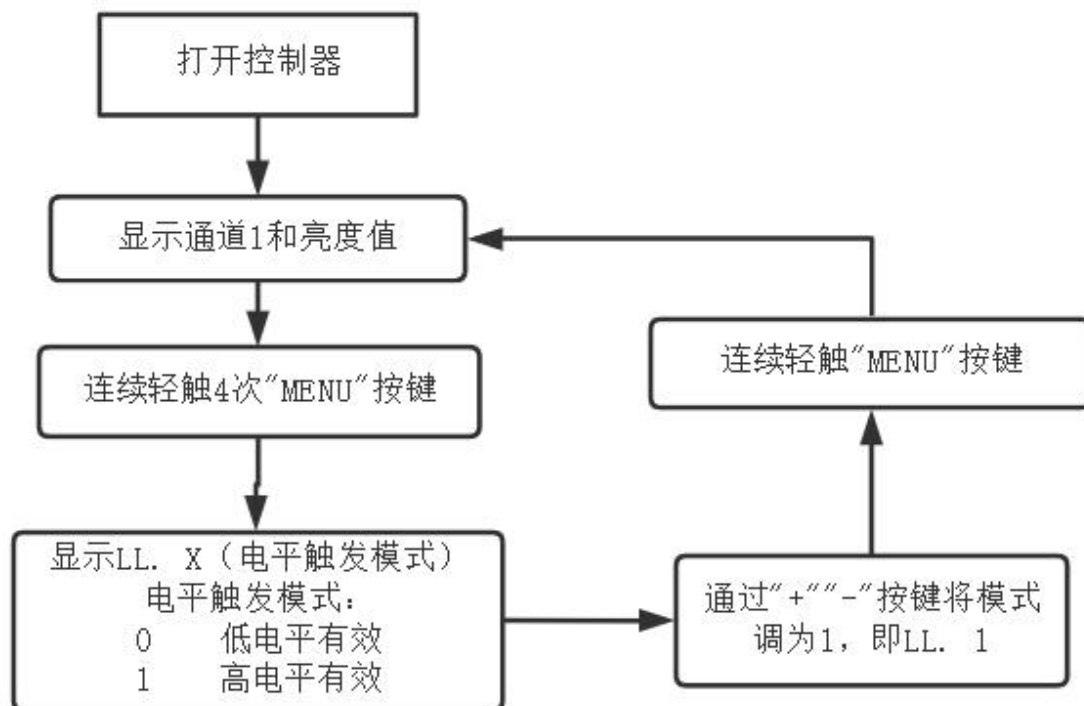


Figure 15 High Level Trigger Mode Setting Flow Chart for All Channels

2.5.8 Debounce Time Parameter Setting

The flow chart for setting the debounce time parameter for all channels is shown in Figure 16:

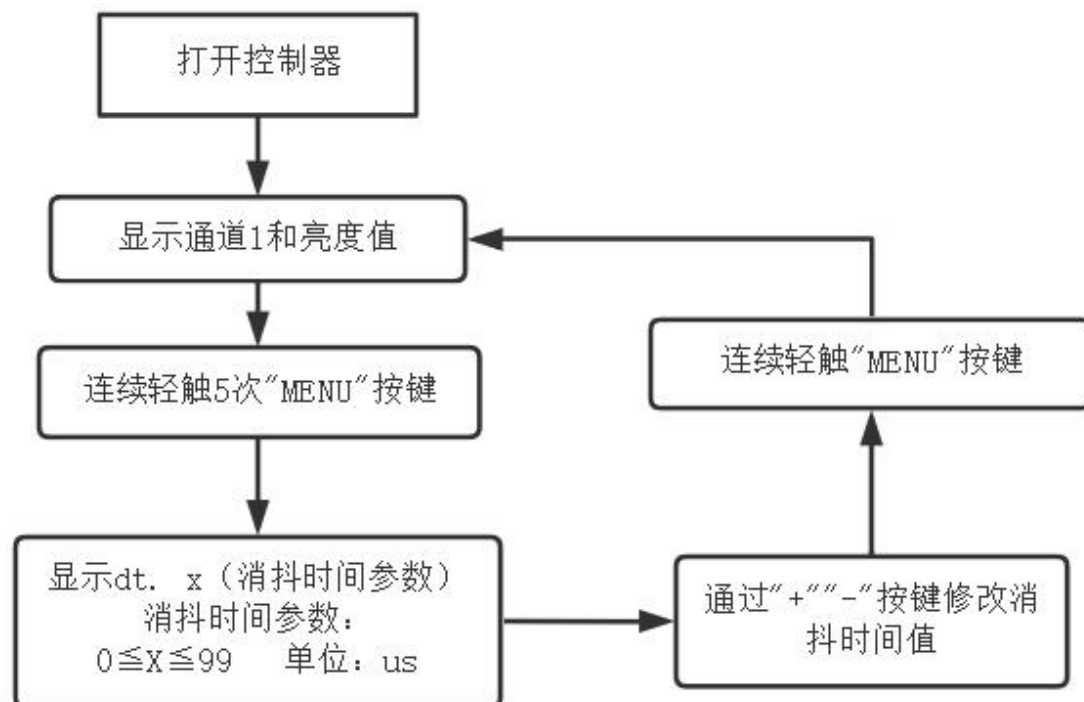


Figure 16 Debounce Time Parameter Setting Flow Chart for All Channels

3. Communication Protocol

3.1 Programming Flow

When controlling the light source controller via the serial port, the communication programming flow is shown in Figure 17:

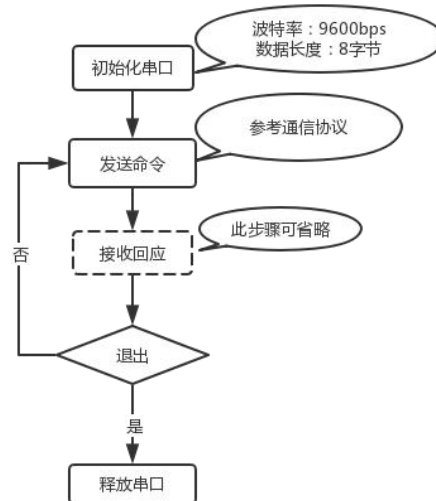


Figure 17 Communication Programming Flow Chart

3.2 Communication Settings

The communication format settings for the serial port are shown in Table 7.

Table 7 Serial Port Settings Table

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

3.3 Frame Format Description

The frame format for communication is shown in Table 8.

Table 8 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 code.
- 2、 Flag: "\$".
- 3、 Command Byte: See Table 7 (Command Byte Function Table).
- 4、 When the command byte is "1", "2", "3", "7", "8", or "9": If the controller receives the command successfully, it returns the flag "\$"; If the controller fails to receive the command, it returns "&".

5、When the command byte 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 transmission format);If the controller fails to receive the command, it returns "&".

6、Channel Byte: "1" and "2", representing Channel 1 and Channel 2 respectively.

7、Data = 0XX (XX is any value ranging from 00 to FF), which corresponds to the setting parameter of the channel. The high byte comes first, and the low byte comes after.

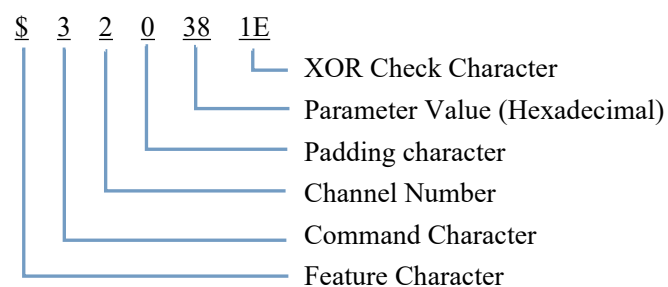
8、XOR Checksum = XOR check result of all bytes except the checksum bytes (including Flag, Command Byte, Channel Byte, and Data). The ASCII code of the high 4 bits of the checksum comes first, and the ASCII code of the low 4 bits comes after.

Table 7 Command Byte Function Table

Character	Function	Description
"1"	Turn on the corresponding channel	The corresponding channel is determined by the Channel Byte.
"2"	Turn off the corresponding channel	The corresponding channel is determined by the Channel Byte.
"3"	Set brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel Byte; the brightness parameter is Data 1~Data 3.
"4"	Read brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel Byte; the return format is the same as the transmission format.
"7"	Trigger strobe of the corresponding channel	The corresponding channel is determined by the Channel Byte; this function is invalid in non-strobe mode.
"8"	Set mode of the corresponding channel	The corresponding channel is determined by the Channel Byte.
"9"	Set strobe time of the corresponding channel	The corresponding channel is determined by the Channel Byte; this function is invalid in non-strobe mode.

3.4 Communication Examples

To set the brightness of Channel 2 to 56, write the ASCII code "\$320381E" (transmission direction: host to controller).



	String	ASCII Code	ASCII Code (Hexadecimal)	Represent High 4 Bits and Low 4 Bits with 8421 Code Respectively
Feature Character	\$	36	24	0010 0100
Command Character	3	51	33	0011 0011
Channel Character	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 Check Character				1 E

Note: 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 during the calculation of the XOR checksum. It is only necessary to ensure the format is 0XX (XX is any value ranging 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 Character	\$	36	24	0010 0100
Command Character	2	50	32	0011 0010
Channel Character	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 Check Character				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 Character	\$	36	24	0010 0100
Command Character	1	49	31	0011 0001
Channel Character	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 Check Character				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 Character	\$	36	24	0010 0100
Command Character	4	52	34	0011 0100
Channel Character	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 Check Character				1 2

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

