

Point Light Controller

DBS-65-P01C-05005-12

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-65-P01C-05005-12		1
Serial Cable	1.5M Male-to-Female		1
Terminal Block	3.81-5P		3
Power Cable	1.5M National Standard IEC 60320 C13 Plug		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 Connector Interface Definition	4
2.4 Trigger Description	5
2.4.1 Trigger Interface	5
2.4.2 Trigger Interface Wiring Example	5
2.4.3 Trigger Timing Diagram	6
2.5 Manual Settings for NORMAL Operating Mode	8
2.5.1 Brightness Setting	8
2.5.2 Mode Setting	9
2.5.3 Trigger Level Setting	10
2.5.4 Debounce Time Setting	11
2.6 Manual Settings for STROBE Operating Mode	11
2.6.1 Strobe Time Setting	11
3. Communication Protocol	13
3.1 Programming Flow	13
3.2 Communication Settings	13
3.2.1 Serial Communication Settings	13
3.3 Frame Format Description	13
3.4 Communication Examples	14
4. Prompt Command Index	16
5. Accessories	17

1. Product Introduction

1.1 Product Features

- Supports RS232 communication;
- Built-in 5V switching power supply;
- Low trigger response time ($\leq 10\mu\text{s}$);
- Supports external trigger mode;
- Switchable between constant-on and strobe modes;
- Supports millisecond-level and microsecond-level strobe;
- 5~24V bidirectional trigger, adaptable to high/low level trigger modes;
- Easy to install (screw installation or C45 DIN rail installation);

1.2 Product Selection

Model	Built-in Power Supply Power	Maximum Current per Channel
DBS-DC65-P01C-05008-12	65W	0.8A

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	0.8A	Maximum current per channel: 0.8A (factory-limited based on requirements)
Overcurrent Protection	None	
Overvoltage Protection	None	
Operating Mode	5 types	NORMAL: 0: Constant On; 1: Constant Off; 2: Steady On STROBE: 0: 1~999ms Strobe; 1: 10~999 μs Strobe
Light Emitting Mode	Constant On/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 On/Off mode: Level Trigger
Constant On Brightness Level	255	255-level brightness adjustment
Millisecond-level Strobe Time	1~999	Unit: ms
Microsecond-level Strobe Time	1~999	Unit: μs
Communication Method	Serial Port	Serial port baud rate: 9600
Built-in Power Supply	65W	
Number of Channels	12	
Connected Light Source Type	5V Point Light	5V point light source

Operating Ambient Temperature	-5~50°C	
Dimensions	See Appendix for details	

1.4、Function Modes

Table 2 Function Modes Table

Operating Mode Switch	Mode	4-Digit Display Format	Description
NORMAL	All Channels Constant On	H. 0	All channels are in Constant On mode; light turns off when trigger signal is valid
	All Channels Constant Off	H. 1	All channels are in Constant Off mode; light turns on when trigger signal is valid
	All Channels Steady On	H. 2	All channels are in Steady On mode; trigger signal is invalid; light remains on
	Single Channel Setting Enabled	H. 3	Each channel's mode can be set individually
	Channel 1 Constant On	H1. 0	Channel 1 is in Constant On mode; light turns off when trigger signal is valid
	Channel 1 Constant Off	H1. 1	Channel 1 is in Constant Off mode; light turns on when trigger signal is valid
	Channel 1 Steady On	H1. 2	Channel 1 is in Steady On mode; trigger signal is invalid; light remains on
STROBE	All Channels Millisecond-level Strobe	H. 0	All channels are in millisecond-level strobe mode; light flashes once (in ms) when trigger signal is valid
	All Channels Microsecond-level Strobe	H. 1	All channels are in microsecond-level strobe mode; light flashes once (in μ s) when trigger signal is valid
	Channel 1 Millisecond-level Strobe	H1. 0	Channel 1 is in millisecond-level strobe mode; light flashes once (in ms) when trigger signal is valid
	Channel 1 Microsecond-level Strobe	H1. 1	Channel 1 is in microsecond-level strobe mode; light flashes once (in μ s) when trigger signal is valid
LOCK	The controller is locked, parameters cannot be modified and can only be viewed through the MENU button.		

2. User Instructions

2.1 Panel Description

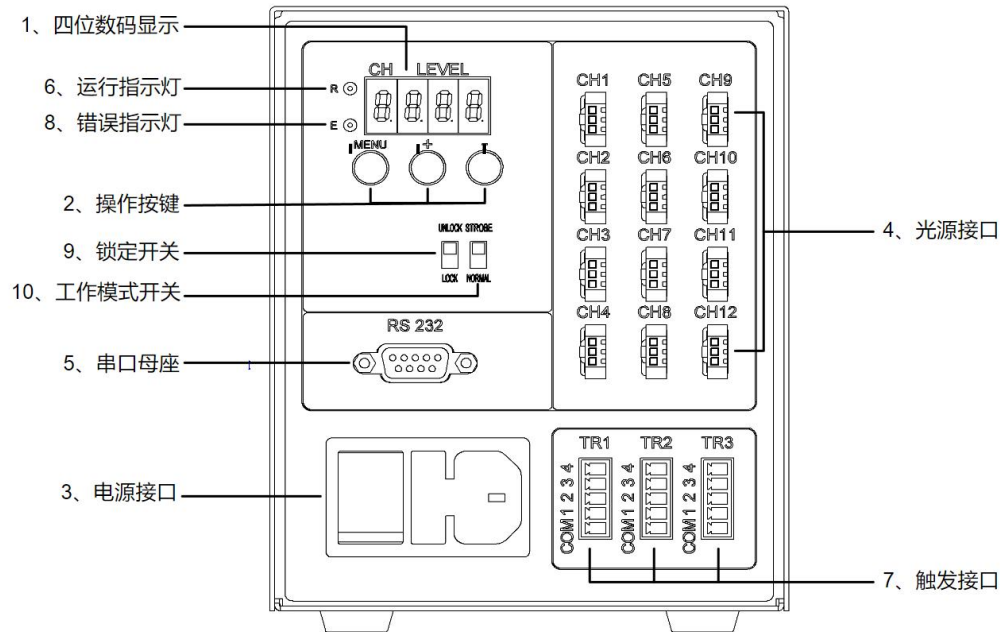


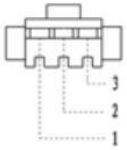
Figure 1: Front Panel

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: Function switching button; "+": Increase value; "-": Decrease value
3	Power Interface	AC220V interface
4	Light Source Interface	Connects to 10mA~0.8A 5V point light source
5	Serial Female Connector	Connects to devices with RS232 interface
6	Run Indicator Light	Flashes when the controller is running
7	Trigger Interface	Connects to external signals for trigger switching
8	Error Indicator Light	Turns on when the controller malfunctions
9	Lock Switch	LOCK: Locks panel operations; UNLOCK: Allows panel operations
10	Operating Mode Switch	STROBE: Strobe mode; NORMAL: General digital mode

2.2 Light Source Interface Definition

Table 4 Light Source Interface Definition Table

	位置	定义	说明
	1	Light+	Positive pole of light output
	2	Light-	Negative pole of light output
	Empty	Empty	Empty

2.3 Serial Female Connector Interface Definition

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

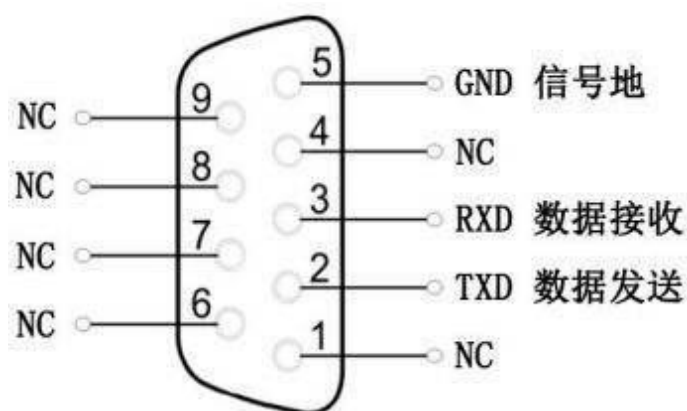


Figure 2 Serial Female Connector Interface Definition

Table 5 Serial Female Connector 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 Description

2.4.1 Trigger Interface

The external trigger input interface is shown in Figure 3:

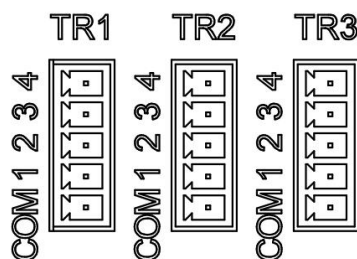


Figure 3 External Trigger Input Interface

There are 12 channels for the external trigger input interface. Each channel has a trigger port TR_x (x represents the channel number), and COM is the common port (can be connected to either the positive or negative pole of the power supply). The internal structure is a bidirectional optocoupler, and its electrical diagram is shown in Figure 4:

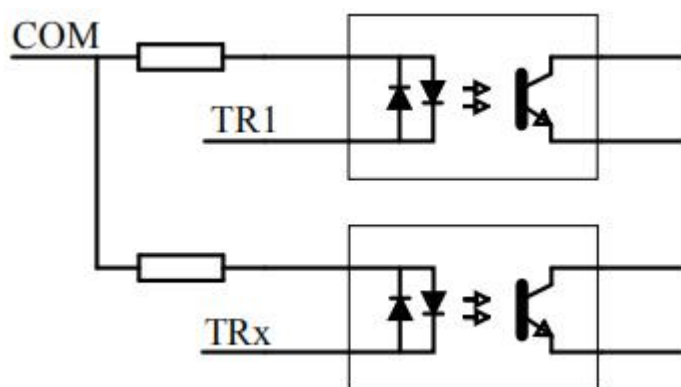


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Example

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

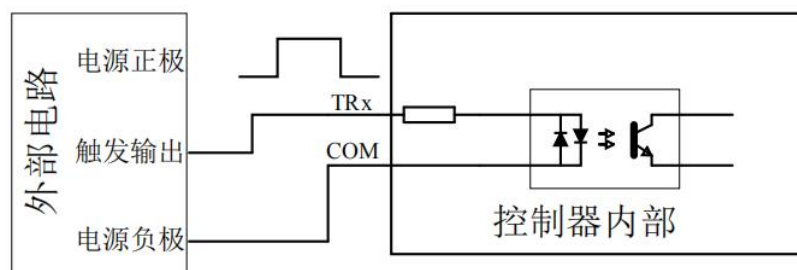


Figure 5 Wiring Example for Rising Edge or High Level Validity

Connect the trigger output of the external control circuit to TR_x, and the negative pole of the power supply to COM. When there is a rising edge or high level at the trigger output terminal, the controller controls the output.

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

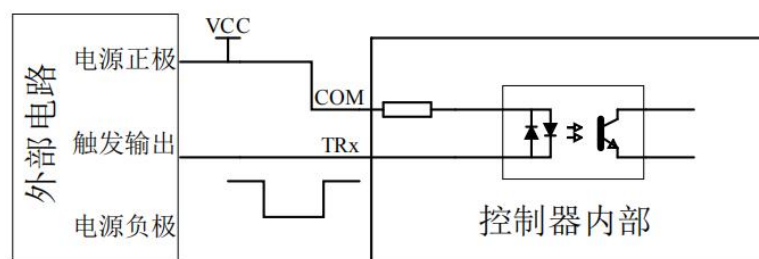


Figure 6 Wiring Example for Falling Edge or Low Level Validity

Connect the trigger output of the external control circuit to TRx, and the positive pole of the power supply to COM. When there is a falling edge or low level at the trigger output terminal, the controller controls the output.

2.4.3 Trigger Timing Diagram

Trigger signal: The valid level of the controller's external trigger signal and the valid edge in strobe mode can be set. For example, to set the valid level to high level (in non-strobe mode) and the valid signal to rising edge (in strobe mode): Enter the engineer mode via serial communication (refer to the Communication Protocol chapter). After entering the engineer mode, the 4-digit display on the controller's front panel shows "LL. X" (X is 0 or 1). Use the "+" and "-" buttons to set X to 1: the trigger signal will be high level and rising edge valid.

If X is set to 0: the trigger signal will be low level and falling edge valid.

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

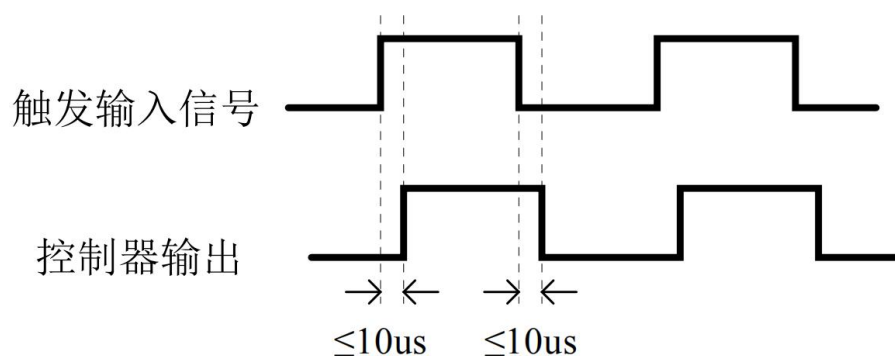


Figure 7 Timing Diagram for Constant Off Mode

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

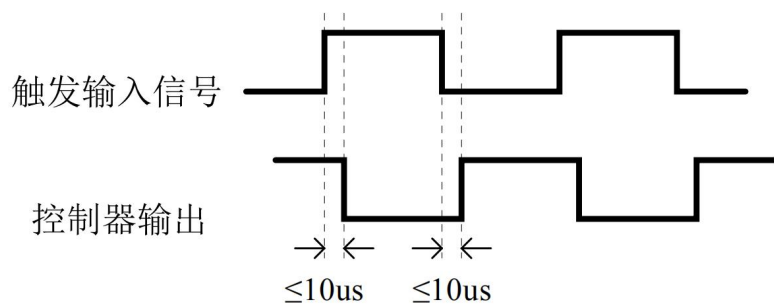


Figure 8 Timing Diagram for Constant On Mode

Strobe Mode: When the controller is set to millisecond-level or microsecond-level strobe, the light turns on when the trigger input signal is valid. The timing relationship (taking high level validity as an example) is shown in Figure 9:

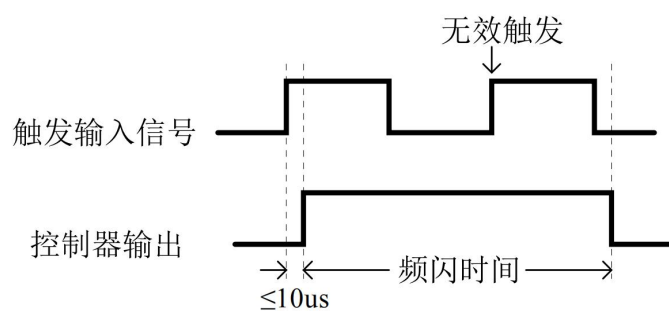


Figure 9 Timing Diagram for Strobe Mode

2.5 Manual Settings for NORMAL Operating Mode

Switch the operating mode switch to NORMAL; the controller will work in general digital mode.

2.5.1 Brightness Setting

In general digital operating mode, when the controller is turned on, the 4-digit display shows “Channel Number + Brightness Value”. Initially, it displays Channel 1 and its brightness value. For example, if the previous brightness setting for Channel 1 was 10, the display will show “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.

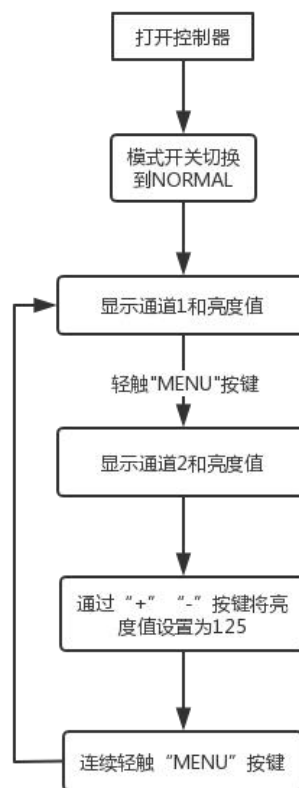


Figure 10 Brightness Setting Flow Chart

2.5.2 Mode Setting

This model supports 3 light-emitting modes in NORMAL operating mode, which can be set via manual buttons or communication (see Table 2 for the 3 modes).

Each channel's mode can be set individually or uniformly for all channels. The following takes setting the mode of Channel 2 individually as an example (the setting method for other channels is similar).

The flow chart for setting Channel 2 to Constant Off mode is shown in Figure 11.

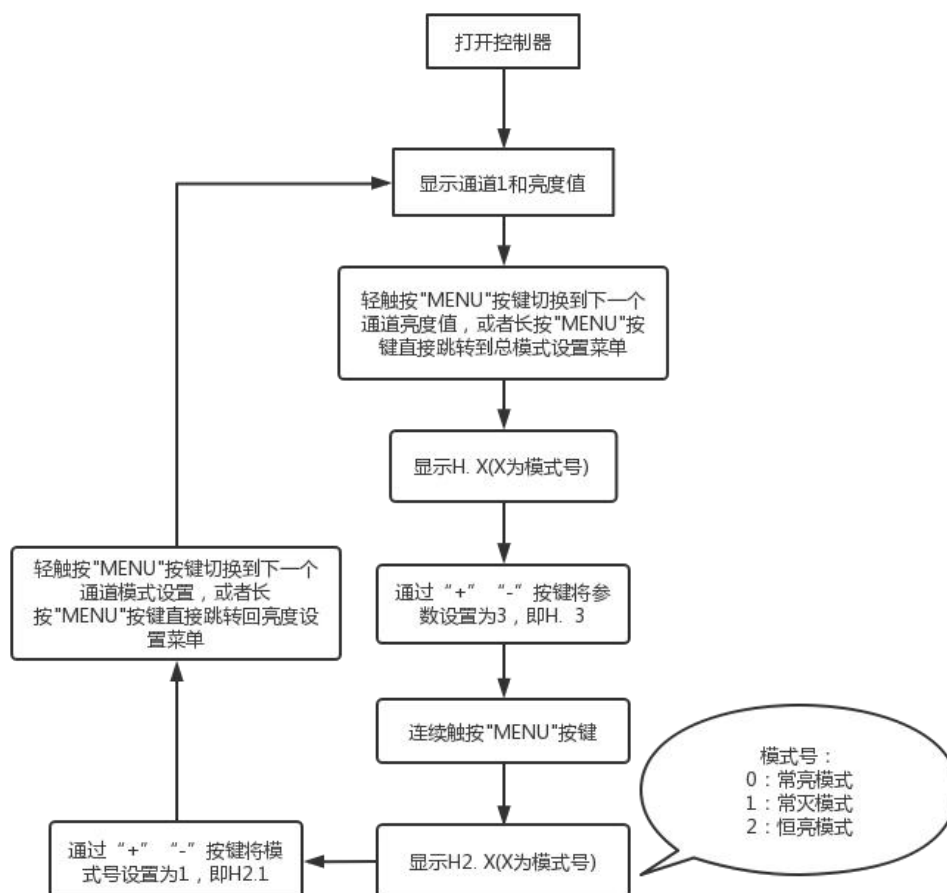


Figure 11 Flow Chart for Constant Off Mode Setting

The setting methods for Constant On mode and Steady On mode are similar to that of Constant Off mode; only the mode number needs to be changed.

2.5.3 Trigger Level Setting

In different application scenarios, the valid signals of sensors or control devices vary. To adapt to different trigger signal sources, the trigger level of this controller can be set as needed. The setting flow (taking high level validity as an example) is shown in Figure 12.

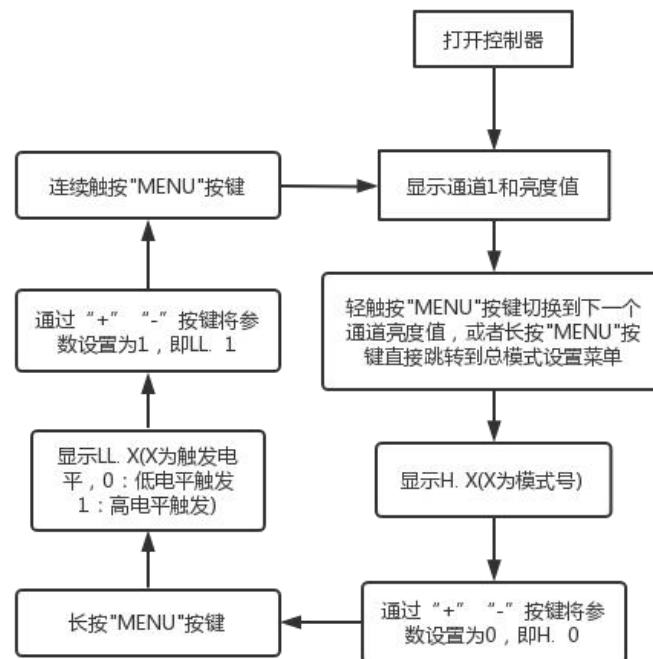


Figure 12 Flow Chart for Trigger Level Setting

2.5.4 Debounce Time Setting

In environments with strong interference signals, interference signals may cause false triggering of the controller. To eliminate the impact of interference signals, the debounce time can be set to filter out interference signals. The setting flow is shown in Figure 13.

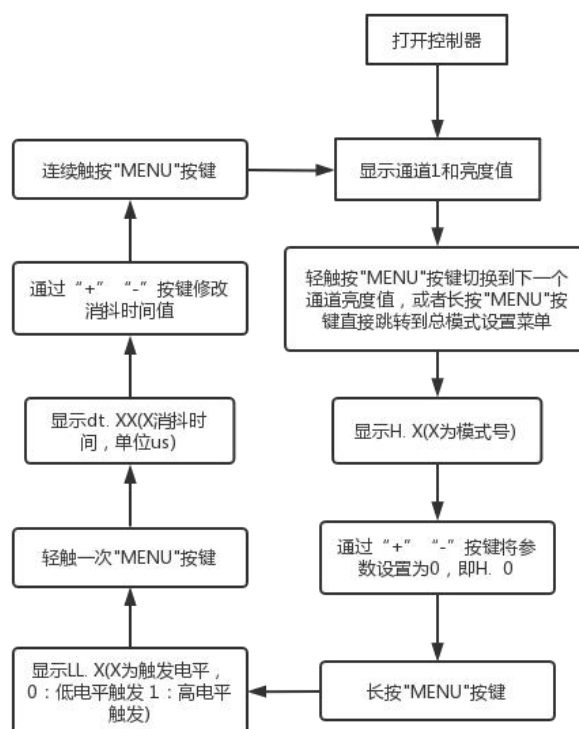


Figure 13 Flow Chart for Debounce Time Setting

2.6 Manual Settings for STROBE Operating Mode

Switch the operating mode switch to STROBE; the controller will work in strobe mode.

2.6.1 Strobe Time Setting

The following takes setting all channels to millisecond-level strobe and the time of Channel 2 to 10ms as an example, and its flow chart is shown in Figure 14.

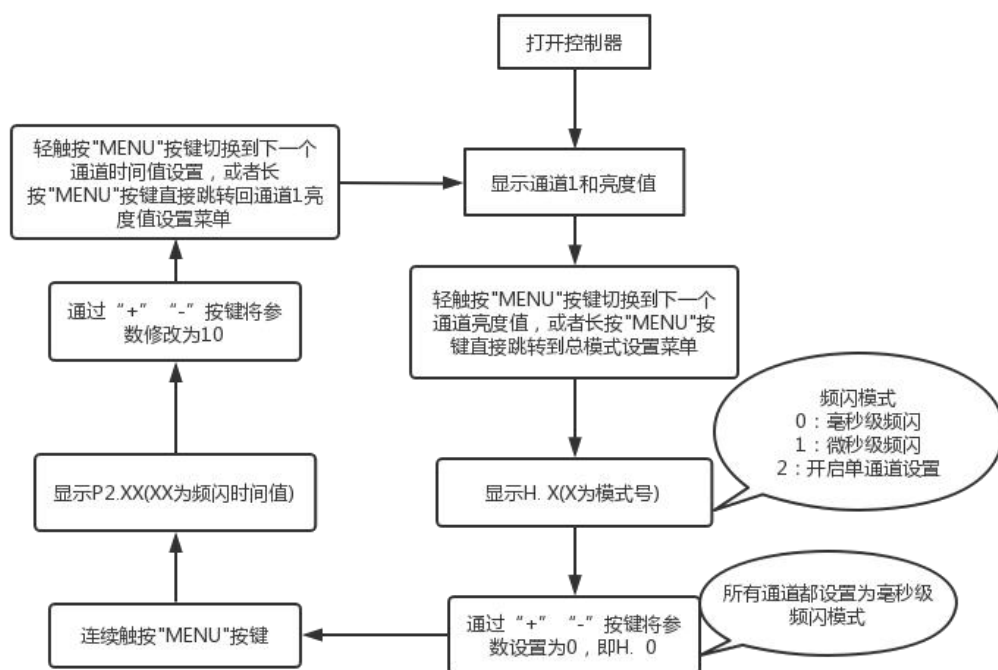


Figure 14 Flow Chart for Strobe Time Setting

The setting method for other channels is similar to that of Channel 2. To set to microsecond-level strobe, simply refer to the flow in Figure 14 and change the strobe mode number to 1.

Note: A maximum of 8 channels can be set to microsecond-level strobe mode.

3. Communication Protocol

3.1 Programming Flow

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

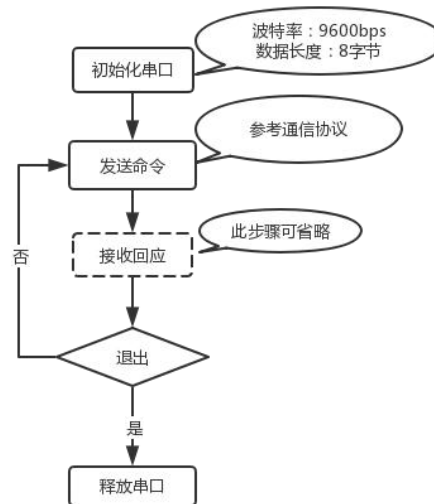


Figure 15 Communication Programming Flow Chart

3.2 Communication Settings

3.2.1 Serial Communication Settings

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

Table 6 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 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、 Feature Word: \$
- 3、 Command Words are as listed in Table 8.
- 4、 When the Command Word is "1", "2", "3", "7", "8", "9", or "A":If the controller receives the command successfully, it returns the Feature Word \$;If the controller fails

to receive the command, it returns &.

5、When the Command Word is "4":If the controller receives the command successfully, it returns the brightness setting parameter of the corresponding channel (the return format is identical to the transmission format);If the controller fails to receive the command, it returns &.

6、Channel Words are "1", "2", "3", "4", representing Channels 1 to 4 respectively.

7、Data = 0XX (XX is any value within 00 ~ FF), corresponding to the setting parameters of the channel. The high byte comes first, followed by the low byte.

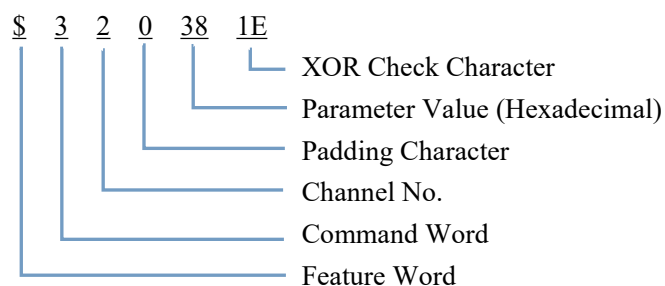
8、8、XOR Checksum = XOR checksum of all bytes except the checksum itself (including the Feature Word, Command Word, Channel Word, and Data). The high 4 bits of the checksum's ASCII code are placed first, followed by the low 4 bits.

Table 8 Command Word Function Table

Character	Function	Description
"1"	Turn on the corresponding channel	The corresponding channel is determined by the Channel Word
"2"	Turn off the corresponding channel	The corresponding channel is determined by the Channel Word
"3"	Set brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel Word; brightness parameters are Data 1~Data 3
"4"	Read brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel Word; the return format is identical to the transmission format
"7"	Trigger strobe for the corresponding channel	The corresponding channel is determined by the Channel Word; this function is invalid in non-strobe modes
"8"	Set mode of the corresponding channel	The corresponding channel is determined by the Channel Word
"9"	Set strobe time of the corresponding channel	The corresponding channel is determined by the Channel Word; this function is invalid in non-strobe modes
"A"	Enable Engineer Mode	Activates Engineer Mode; the nixie tube displays "LL. X", and the trigger level can be adjusted via keys

3.4 Communication Examples

To set the brightness of Channel 2 to 56, write the ASCII code "\$320381E" as follows:



	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: For the three functions (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 checksum calculation. It is only necessary to ensure the format is 0XX (where XX is any value within 00~FF).

The following are additional sets 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

