

Point Light Controller

DBS-65-P01C-05005-4

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-65-P01C-05005-4		1
Serial Cable	1.5M Male-to-Female		1
Terminal Block	3.81-8P		1
Power Cable	1.5M National Standard IEC 320 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 Examples	5
2.5 Manual Settings for NORMAL Operating Mode	7
2.6 Manual Settings for STROBE Operating Mode	10
2.7 Manual Settings for LOCK Mode	12
2.8 Manual Settings for UNLOCK Mode	12
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	15
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
- 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-05005-4	65W	0.5A

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	Optional	Maximum current per channel: 1A (factory-limited based on requirements); total output power shall not exceed the built-in power supply power
Overcurrent Protection	None	
Overvoltage Protection	None	
Operating Mode	5 Types	NORMAL: 0 (Constant off), 1 (Constant on), 2 (Steady on) STROBE: 0 (1~999ms strobe), 1 (10~999 μ s strobe)
Light Emitting Mode	Constant on / Constant off / Steady on / Strobe	External trigger is available for all modes except steady on mode
Trigger Mode	Edge + Level Trigger	Edge trigger for strobe mode; Level trigger for constant on/off modes
Constant On Brightness Level	255	255-level brightness adjustment
Millisecond-level Strobe Time	1~999	Unit: Milliseconds (ms)
Microsecond-level Strobe Time	10~999	Unit: Microseconds (μ s)
Communication Method	Serial Port / Ethernet Port	Serial port baud rate: 9600bps
Built-in Power Supply	65W	Optional power: 65W
Number of Channels	4	
Connected Light Source Type	5V Point Light Source	5V point light source

Operating Ambient Temperature	-5~50°C	
-------------------------------	---------	--

1.4 Function Modes

Table 2 Function Modes Table

Taking Channel 1 as an example:

Operating Mode Switch	Mode	Nixie Tube Display Format		Description
NORMAL	Brightness Setting	1. X	$0 \leq X \leq 255$	Adjust brightness
	Operating Mode	H1. X	X=0 Constant on mode	Light turns off when trigger signal is valid
			X=1 Constant off mode	Light turns on when trigger signal is valid
			X=2 Constant Brightness Mode	Light remains on regardless of trigger signal
STROBE	Millisecond-level Strobe	P1. 0	1. X $1 \leq X \leq 999$ Unit: ms	Light flashes once for millisecond duration when trigger signal is valid
	Microsecond-level Strobe	P1. 1	1. X $1 \leq X \leq 999$ Unit: μ s	Light flashes once for microsecond duration when trigger signal is valid
LOCK	Lock			Locks the controller
UNLOCK	Unlock			Unlocks the controller

2. User Instructions

2.1 Panel Description

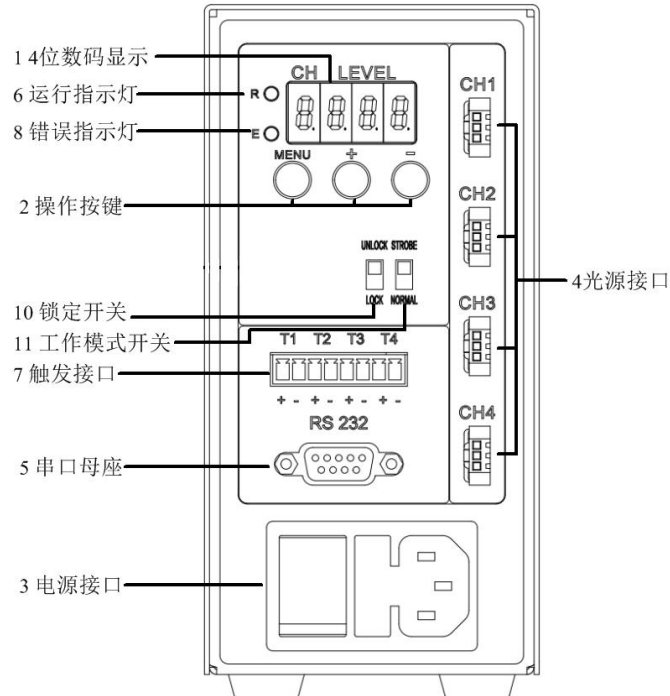


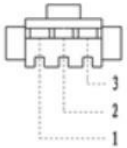
Figure 1: Front Panel

Table 3: Panel Interface Definition Table

No.	Name	Description
1	4-Digit Nixie Tube Display	The first digit from the left is the current operating channel; the last three digits are the corresponding values of the current operating channel.
2	Operation button	MENU: Function switching key; "+": Value increase; "-": Value decrease
3	Power Interface	AC220V input interface
4	Light Source Interface	For connecting 10mA~0.5A 5V point light sources
5	Serial Female Connector	For connecting devices with RS232 interface
6	Running Indicator Light	Flashes when the controller is running
7	Trigger Interface	For connecting external signals to trigger switching operations
8	Error Indicator Light	Turns on when the controller malfunctions
10	Lock Switch	LOCK: Locks panel operations; UNLOCK: Allows panel operations
11	Operating Mode Switch	STROBE: Strobe mode; NORMAL: General digital mode

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
	Empty	Empty	No connection

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 a computer host using a straight-through cable.

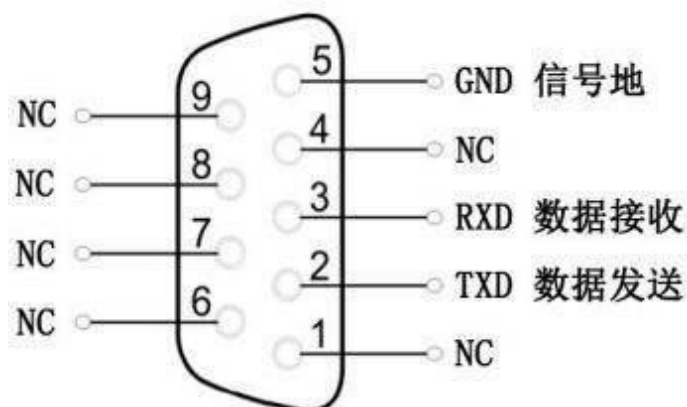


Figure 2 Serial Female Connector Interface Definition

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:

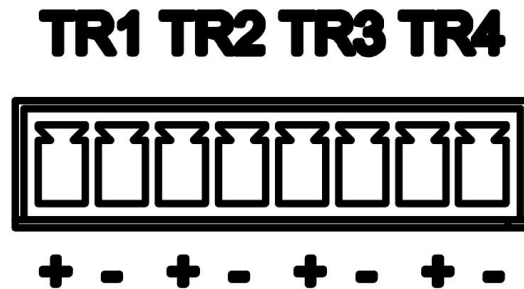


Figure 3 External Trigger Input Interface

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

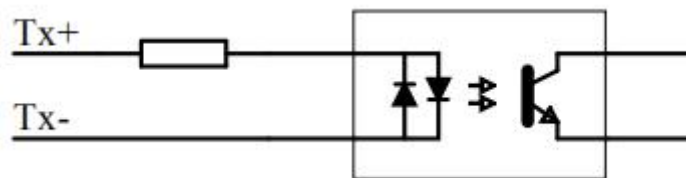


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Examples

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

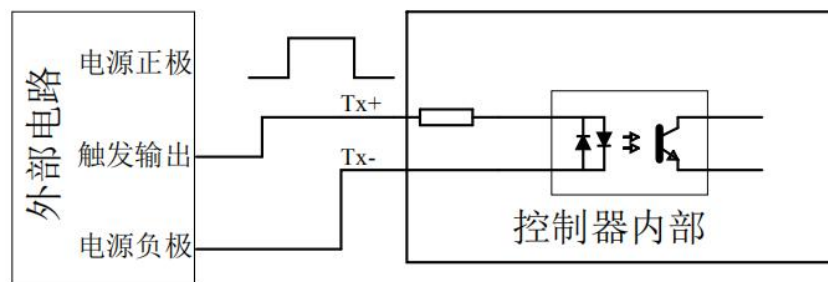


Figure 5 Wiring Example for Rising Edge or High Level Validity

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

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

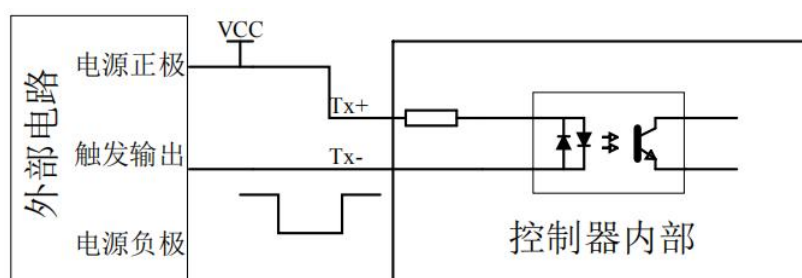


Figure 6 Wiring Example for Falling Edge or Low Level Validity

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

2.4.3 Trigger Timing Diagrams

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

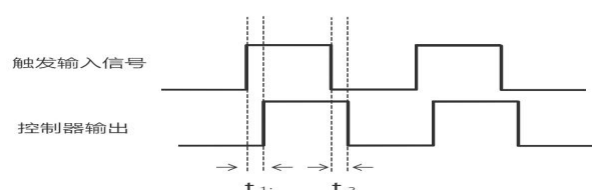


Figure 7 Constant Off Mode Timing Diagram

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

Constant On Mode: When the controller receives a valid trigger input signal, the light source turns off. Taking high-level validity as an example, the timing relationship is shown in Figure 8:

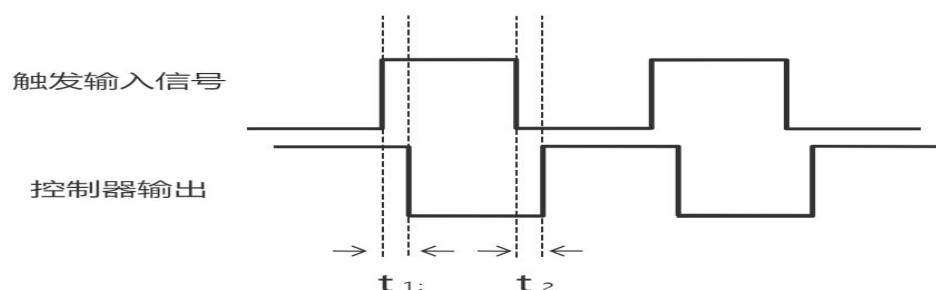


Figure 8 Constant On Mode Timing Diagram

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

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

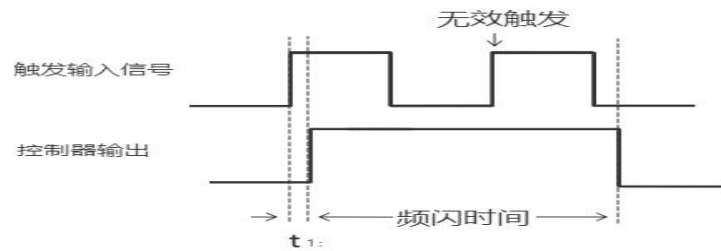


Figure 9 Strobe Mode Timing Diagram

Parameter	Time
t_1	$\leq 15\mu s$

2.5 Manual Settings for NORMAL Operating Mode

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

2.5.1 Brightness Setting

In general digital operating mode, when the controller is powered on, the 4-digit nixie tube displays "Channel Number + Brightness Value". Initially, it shows Channel 1 and its brightness value. For example, if the previously set brightness of Channel 1 is 10, the display will show "1.010". The following takes setting the brightness of Channel 2 to 125 as an example; the flow chart is shown in Figure 10.

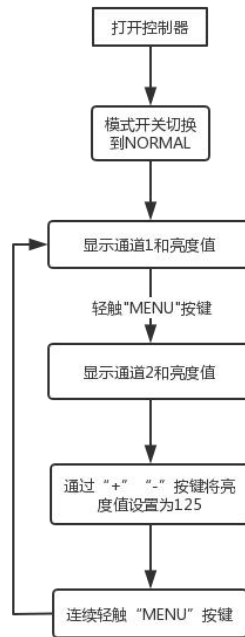


Figure 10 Brightness Setting Flow Chart

2.5.2 Operating Mode Setting

In NORMAL operating mode, this controller supports 3 light-emitting modes, which can be set via manual keys or communication. For details of the 3 modes, refer to Table 2.

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

2.5.3 Constant Off Mode Setting

The flow chart for setting Channel 2 to constant off mode is shown in Figure 11.

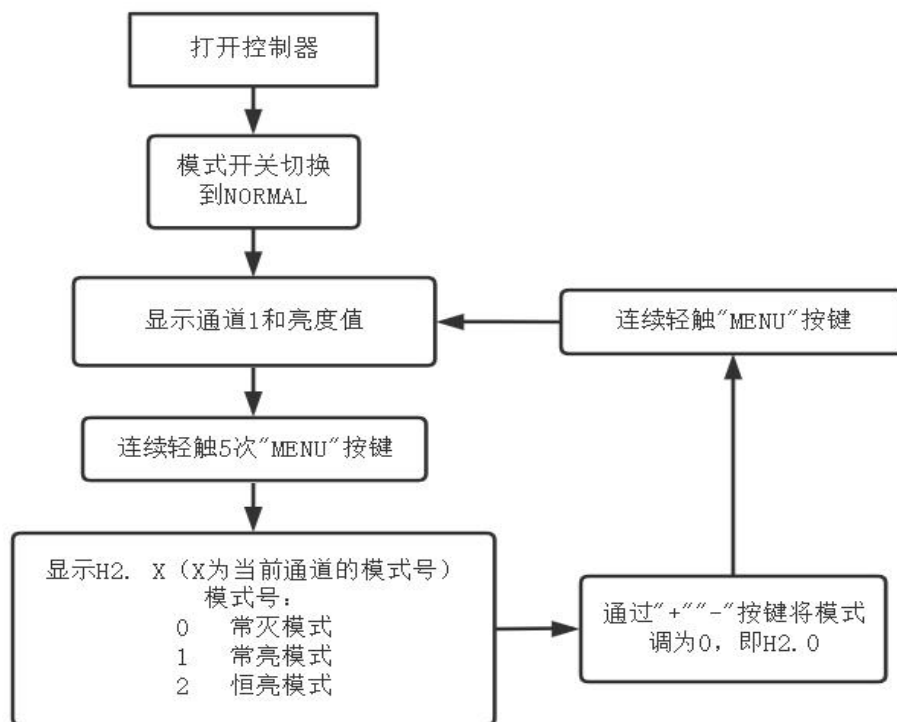


Figure 11 Common Extinguishing Mode Setting Process

2.5.4 Constant On Mode Setting

The flow chart for setting Channel 2 to constant on mode is shown in Figure 12.

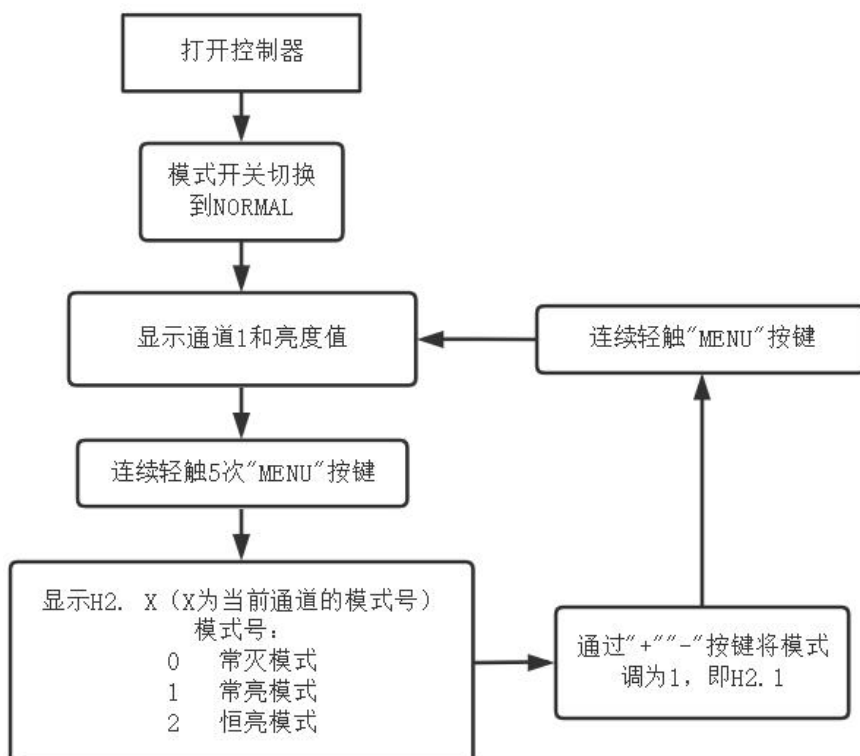


Figure 12 Constant On Mode Setting Flow Chart

2.5.5 Steady On Mode Setting

The flow chart for setting Channel 2 to steady on mode is shown in Figure 13.

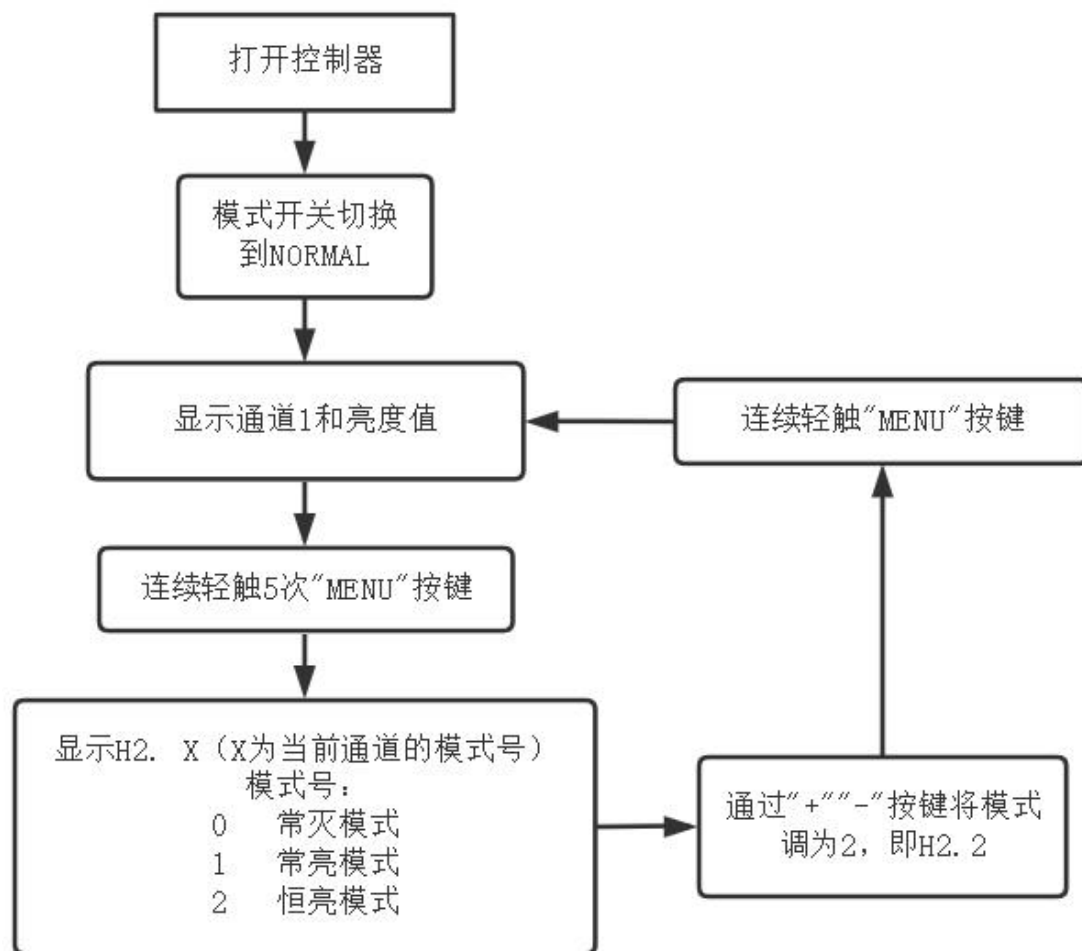


Figure 13 Steady On Mode Setting Flow Chart

2.6 Manual Settings for STROBE Operating Mode

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

2.6.1 Strobe Time Setting

In strobe operating mode, when the controller is powered on, the 4-digit nixie tube displays "Channel Number + Strobe Time Value". Initially, it shows Channel 1 and its strobe time value. For example, if the previously set strobe time of Channel 1 is 10: If the strobe mode is set to millisecond-level, this time represents 10ms; If the strobe mode is set to microsecond-level, this time represents 10 μ s.

2.6.2 Millisecond-level Strobe Mode Setting

The flow chart for setting Channel 2 to millisecond-level strobe mode and adjusting its strobe time is shown in Figure 14.

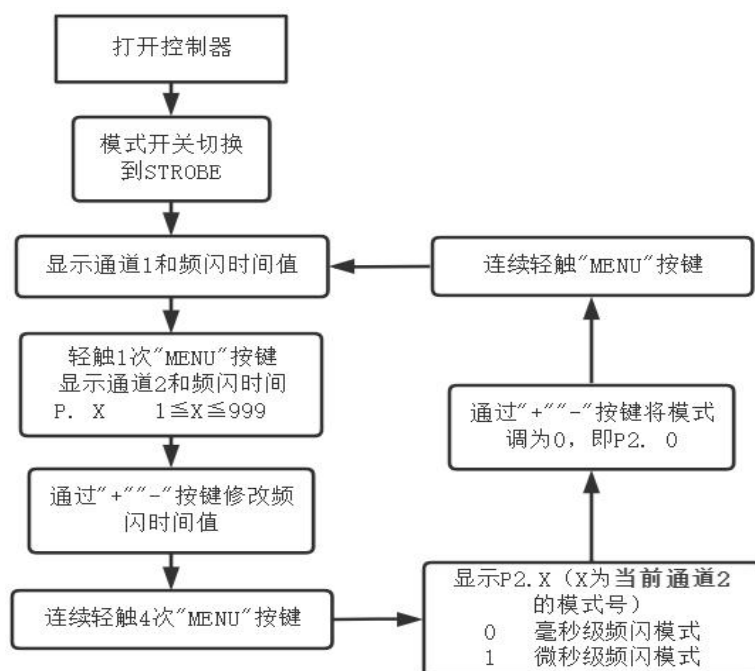


Figure 14 Millisecond-level Strobe Mode and Strobe Time Setting Flow Chart

2.6.2 Microsecond-level Strobe Mode Setting

The flow chart for setting Channel 2 to microsecond-level strobe mode and adjusting its strobe time is shown in Figure 15.

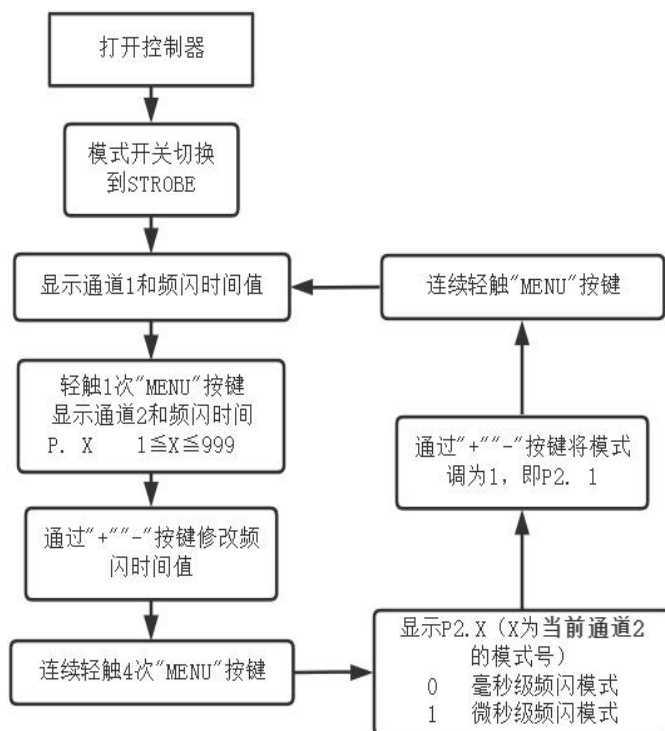


Figure 15 Microsecond-level Strobe Mode and Strobe Time Setting Flow Chart

2.7 Manual Settings for LOCK Mode

Switch the lock mode switch to LOCK; the controller will enter lock mode. You can switch between channel data but cannot modify any parameters.

2.8 Manual Settings for UNLOCK Mode

Switch the lock mode switch to UNLOCK; the controller will exit lock mode. You can switch between channel data and modify parameters.

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 13:

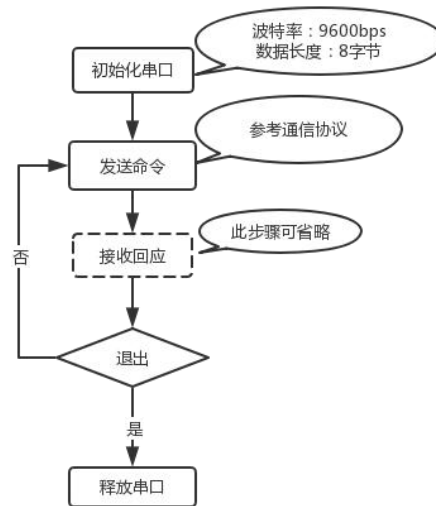


Figure 13 Communication Programming Flow Chart

3.2 Communication Settings

3.2.1 Serial Communication Settings

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

Table 6 Serial Port Settings Table

Baud Rate	Parity	Data Bits	Stop Bits
9600	None	8	1

3.3 Frame Format Description

The communication frame format is detailed 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.

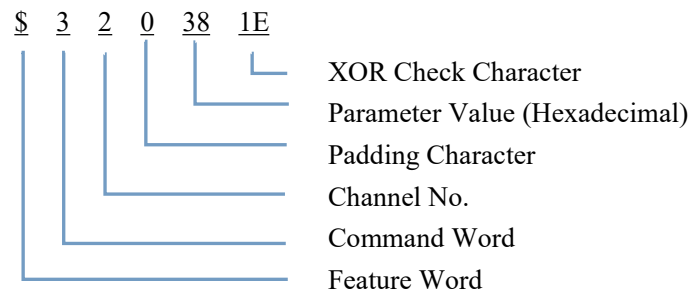
8、 XOR Checksum = XOR checksum of all bytes except the checksum itself (including the Feature Word, Command Word, Channel Word, and Data). The high 4 bits of the checksum's ASCII code are placed first, followed by the low 4 bits.

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

