# 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<br>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-P01CE-05005-2 |  | 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 |
| Network 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 Product Features

- Supports RS232 communication
- Supports 100Mbps Ethernet 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 and microsecond-level strobe
- Manual adjustment of brightness and mode
- 5~24V bidirectional trigger, adaptable to high/low level trigger modes
- Easy to install (screw installation or C45 DIN rail installation)

## 1.4 Function Modes

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

| Operating Mode Switch | Mode | 4-Digit Display Format | | Description |
|---|---|---|---|---|
| NORMAL | Brightness Setting | 1. X | 0≦X≦255 | used to 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 Steady On Mode | Trigger signal is invalid; light remains on |
| STROBE | Millisecond-level Strobe | P1. 0 | 1. X<br>1≦X≦999 Unit: ms | Light flashes once (in ms) when trigger signal is valid |
| | Microsecond-level Strobe | P1. 1 | 1. X<br>1≦X≦999 Unit: μs | Light flashes once (in μs) when trigger signal is valid |
| LOCK | Lock | | | Locks the controller |
| UNLOCK | Unlock | | | Unlocks the controller |

## 1.2 Product Selection

| Model | Built-in Power Supply Power | Maximum Current per Channel |
|---|---|---|
| DBS-DC65-P01CE-05008-2 | 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<br>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 (milliseconds) |
| Microsecond-level Strobe Time | 10~999 | Unit: μs (microseconds) |
| Communication Method | Serial Port/Ethernet Port | Serial port baud rate: 9600; Ethernet port: 100Mbps |
| Built-in Power Supply | 65W | |
| Number of Channels | 2 | |
| Connected Light Source Type | 5V Point Light | 5V point light source |
| Operating Ambient Temperature | -5~50℃ | |
| Dimensions | See Appendix for details | |

# 2. User Instructions

## 2.1 Panel Description

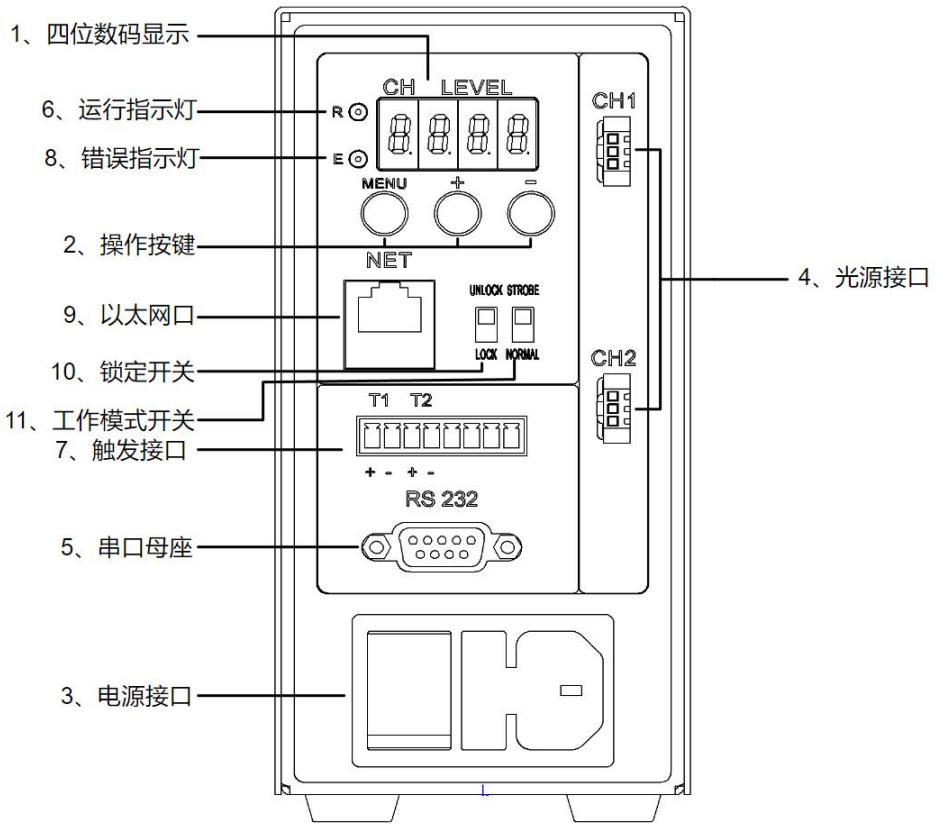



Figure 1: Front Panel

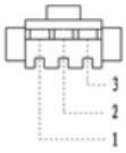
Table 3: Panel Interface Definition Table

| 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 | Ethernet Interface | 100Mbps Ethernet interface |
| 10 | Lock Switch | LOCK: Locks panel operations; UNLOCK: Allows panel operations |
| 11 | Operating Mode | STROBE: Strobe mode; NORMAL: General digital mode |

| | | |
|---|---|---|
| | Switch | |

## 2.2 Light Source Interface Definition

Table 4 Light Source Interface Definition Table




| Position | Definition | Description |
|---|---|---|
| 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.

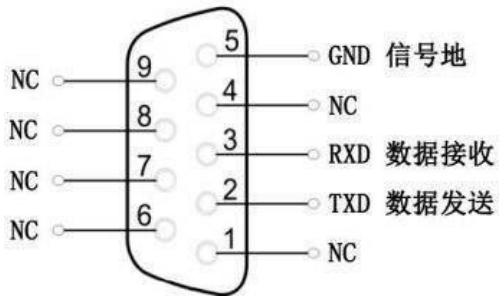



Figure 2 Serial Female Connector Interface Definition

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:

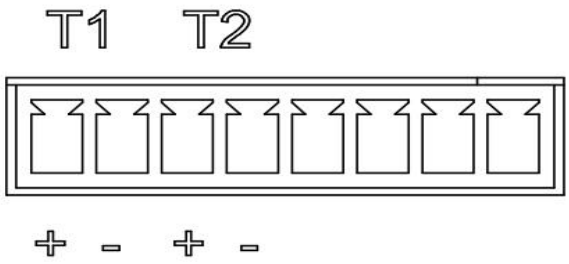



Figure 3 External Trigger Input Interface

There are 2 channels for the external trigger input interface. Each channel has two input terminals: “+” and “-” Tx (x represents the channel number). The internal structure is a bidirectional optocoupler, and its electrical diagram is shown in Figure 4:

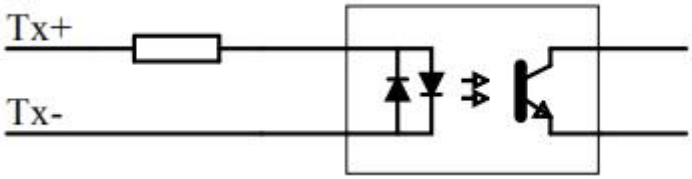



Figure 4 Internal Electrical Diagram of External Trigger

**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:

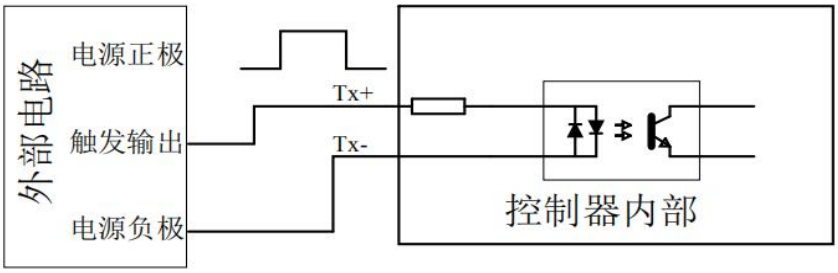



Figure 5 Wiring Example for Rising Edge or High Level Validity

Connect the trigger output of the external control circuit to Tx+, and the negative pole of the power supply to Tx-. 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:

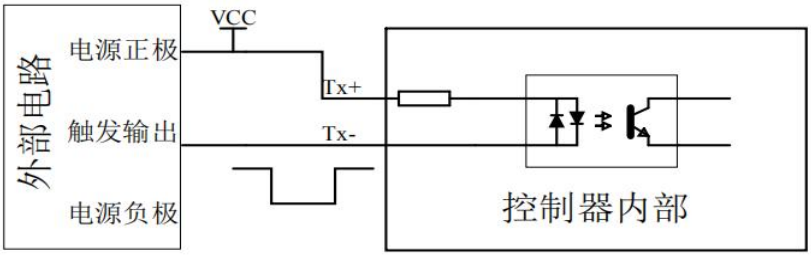



Figure 6 Wiring Example for Falling Edge or Low Level Validity

Connect the trigger output of the external control circuit to Tx-, and the positive pole of the power supply to Tx+. 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:

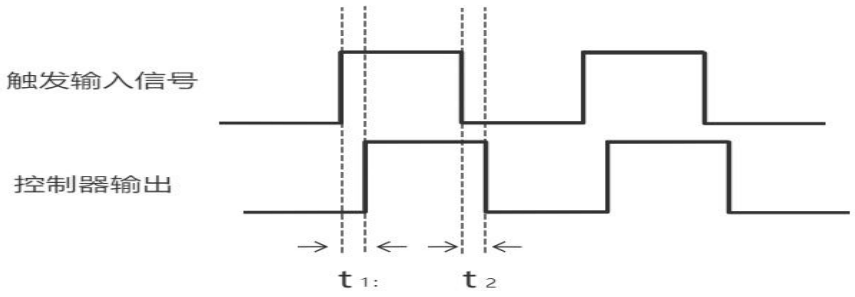



Figure 7 Timing Diagram for Constant Off Mode

| Parameter | Time |
|---|---|
| $t_1$ | ≦15us |
| $t_2$ | ≦200us |

**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:

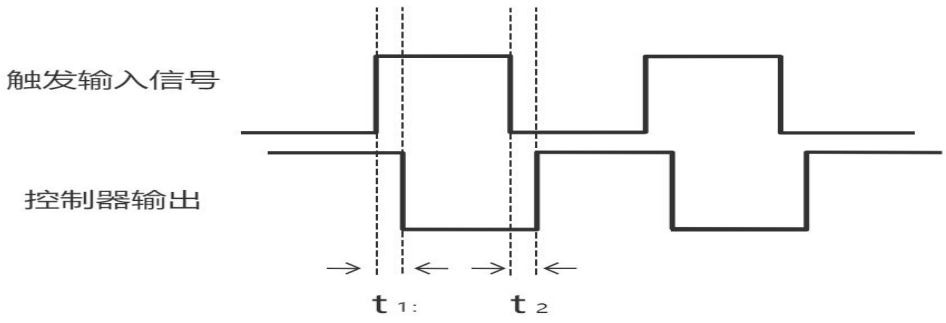


Figure 8 Timing Diagram for Constant On Mode

| Parameter | Time |
|---|---|
| $t_1$ | ≦15us |
| $t_2$ | ≦200us |

**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:

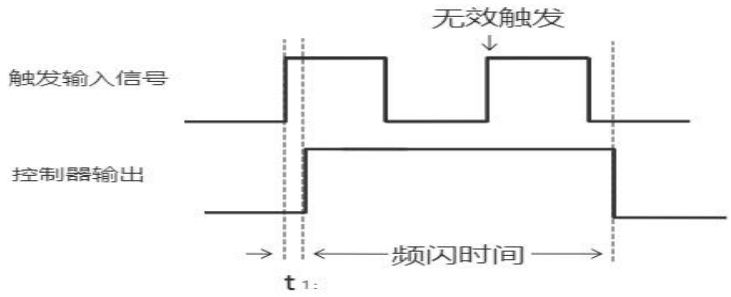



Figure 9 Timing Diagram for Strobe Mode

| Parameter | Time |
|---|---|
| $t_1$ | ≦15us |

## 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.

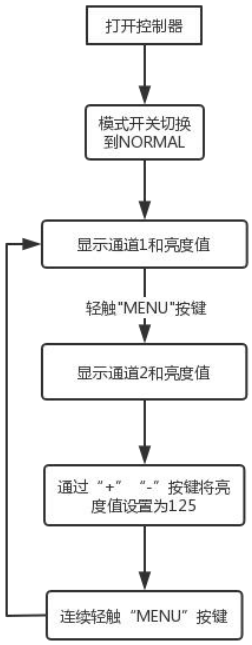



Figure 10 Brightness Setting Flow Chart

**2.5.2 Operating 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. 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 Channel 2 to Constant Off mode is shown in Figure 11.

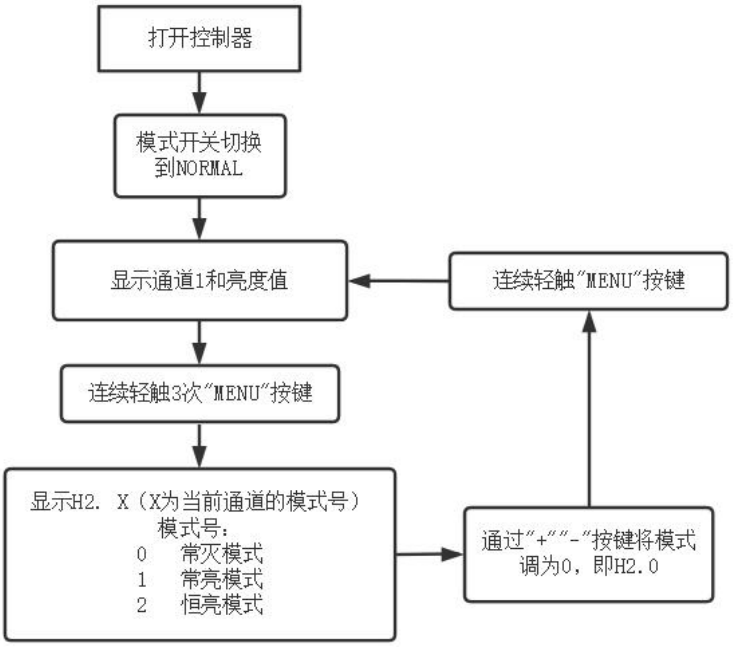



Figure 11 Flow Chart for Constant Off Mode Setting

### 2.5.4 Constant On Mode Setting

The flow chart for setting Channel 2 to Constant On mode is shown in Figure 12.

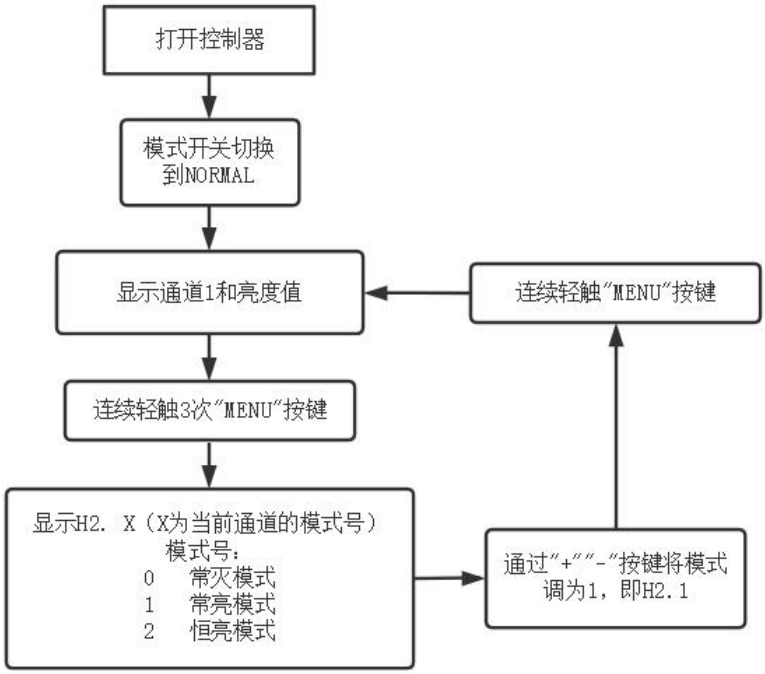



Figure 12 Flow Chart for Constant On Mode Setting

### 2.5.5 Steady On Mode Setting

The flow chart for setting Channel 2 to Steady On mode is shown in Figure 13.

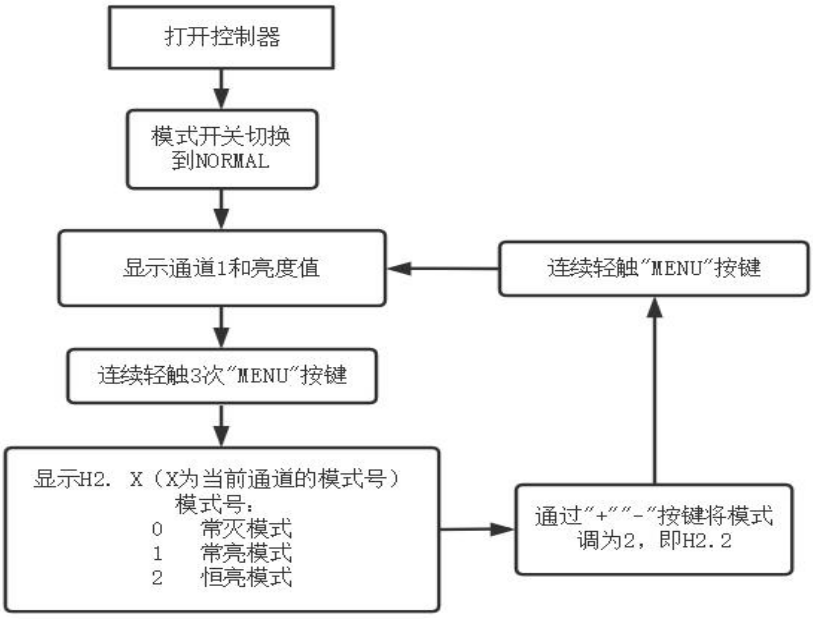



Figure 13 Flow Chart for Steady On Mode Setting

## 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

In strobe operating mode, when the controller is turned on, the 4-digit display shows “Channel Number + Strobe Time Value”. Initially, it displays Channel 1 and its strobe time value. For example, if the previous strobe time setting for Channel 1 was 10:If set to millisecond-level strobe, this value represents 10ms;If set to microsecond-level strobe, this value represents 10 μs.

### 2.6.2 Millisecond-level Strobe Mode Setting

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

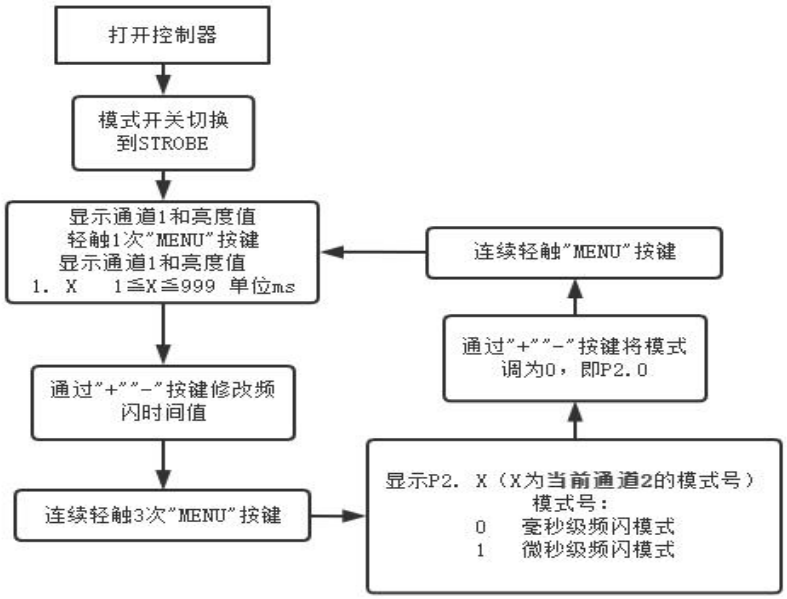



Figure 14 Flow Chart for Millisecond-level Strobe Time Setting

### 2.6.3 Microsecond-level Strobe Mode Setting

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

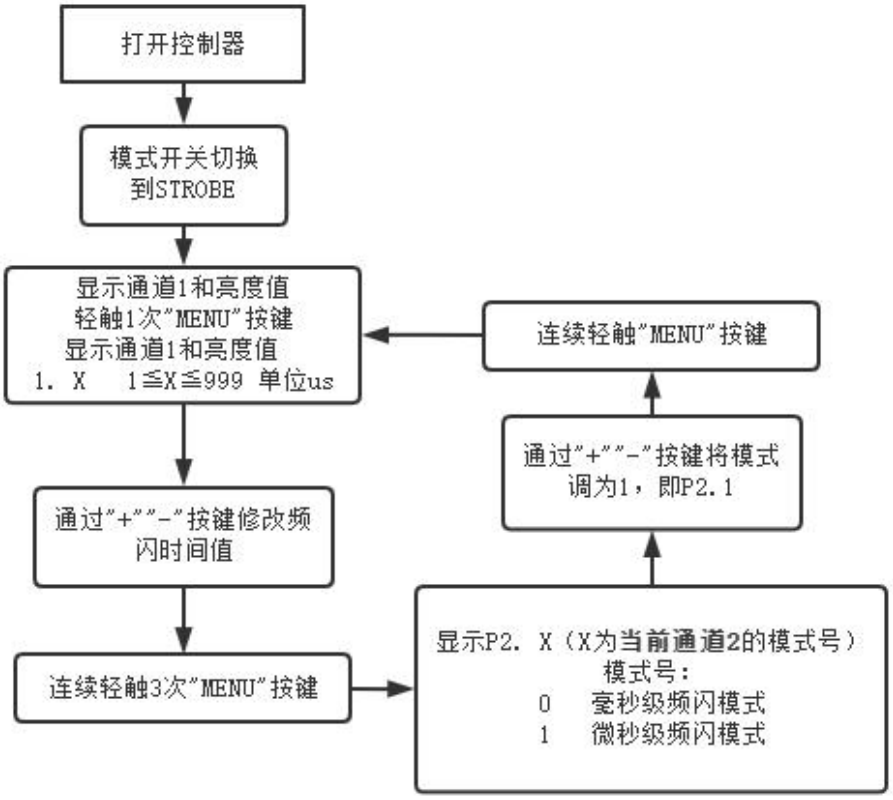



Figure 15 Flow Chart for Microsecond-level Strobe Time Setting

### 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 serial port, the communication programming flow is shown in Figure 16:

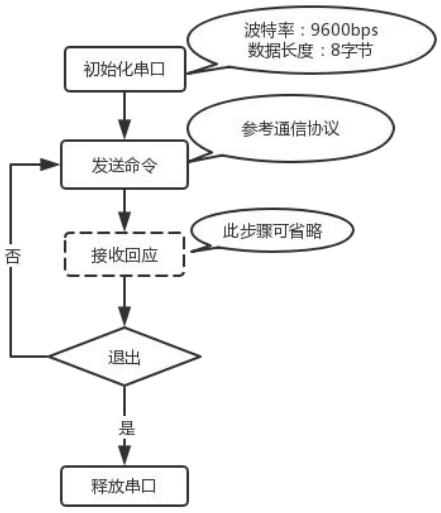



Figure 16 Serial Port Communication Programming Flow Chart

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

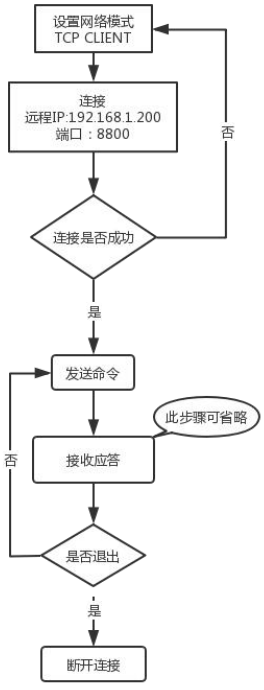



Figure 17 Ethernet Port Communication Programming Flow Chart

## 3.2 Communication Settings

### 3.2.1 Serial Port 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 |

### 3.2.2 Ethernet Port Communication Settings

The default communication configuration at factory shipment is as follows:

IP Address: 192.168.1.200

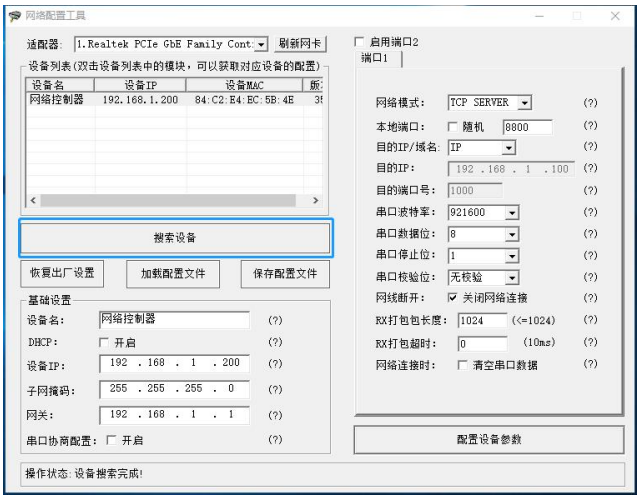
Operating Mode: TCP SERVER

Port: 8800

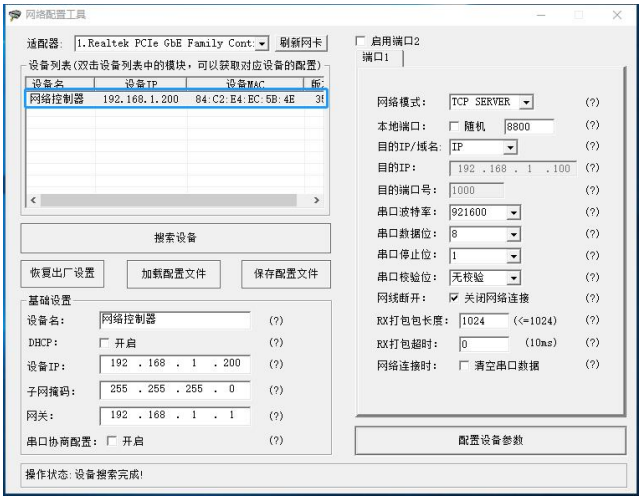
If you need to modify the communication configuration parameters, you can use the supporting configuration software NetModuleConfig.exe for setup.

The complete operation process of the configuration software is as follows:

1、Click "Search Devices"; the device list will display all controllers within the subnet.

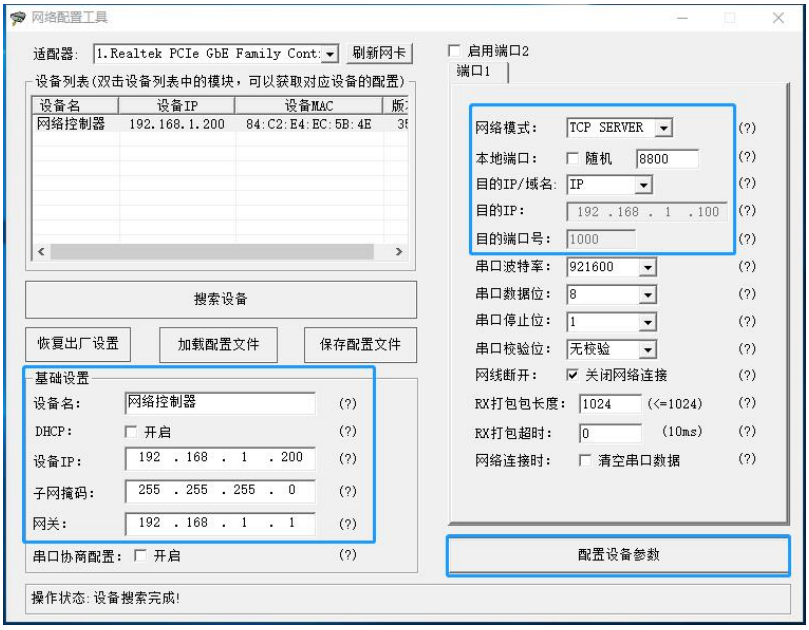



2、Double-click the searched device to retrieve its parameters.




3、Modify the module parameters according to actual needs: set the network mode to TCP SERVER, and ensure the destination IP and destination port match the IP and

port of the TCP CLIENT. Then click "Configure Device Parameters" to complete the setup.




## 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.

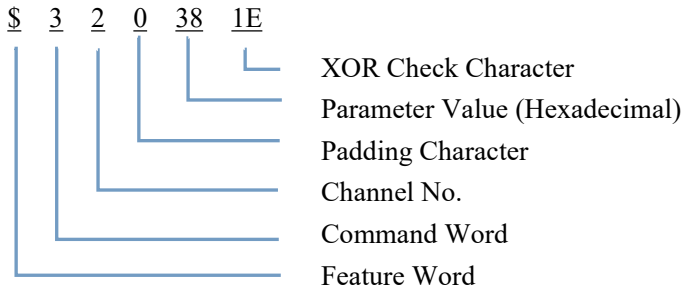
Table 8 Command Word Function Table

| 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