

Digital Intelligent Constant Current Controller

DBS-DCXXX-I07C-24XXX-X

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-DCXXX-I07C-24XX X-X See 1.2 Product Selection below for details		1
Terminal Block	3.81-8P		1
Power Cable	1.5m National Standard IEC 60320 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.

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1. Product Introduction

1.1 Product Features

- Digital constant current controller
- Maximum output current per channel up to 2~12A depending on model selection
- Constant current output with no brightness flicker
- Low trigger response time
- Real-time parameter storage, no need to reconfigure parameters on each startup
- Remote parameter configuration via RS-232 serial port
- Configurable trigger level to adapt to different trigger modes
- Trigger debounce filtering for stronger anti-interference capability
- Easy installation: screw mounting or C45 DIN rail mounting

1.2 Product Selection

Model	Built-in Power Supply Power	Maximum Current per Channel	Light Source Interface Type
DBS-DC65-I07C-24025-1	65W	2.5A	4-Pin Aviation Connector (WS16-4))
DBS-DC65-I07C-24025-2	65W	2.5A	4-Pin Aviation Connector (WS16-4))
DBS-DC120-I07C-24040-1	120W	4A	4-Pin Aviation Connector (WS16-4))
DBS-DC120-I07C-24040-2	120W	4A	4-Pin Aviation Connector (WS16-4))
DBS-DC200-I07C-24080-1	200W	8A	4-Pin Aviation Connector (WS16-4))
DBS-DC200-I07C-24050-2	200W	5A	4-Pin Aviation Connector (WS16-4))
DBS-DC200-I07C-24020-4	200W	2A	4-Pin Aviation Connector (WS16-4))
DBS-DC350-I07C-24120-1	350W	12A	4-Pin Aviation Connector (WS16-4))
DBS-DC350-I07C-24120-2	350W	12A	4-Pin Aviation Connector (WS16-4))

1.3 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	2A~12A	Maximum current per channel (varies by model)
Overcurrent Protection	Yes	-
Overvoltage Protection	Yes	-
Working Modes	4 Types	0: Constant Off; 1: Constant On; 2: Strobe; 3: Trigger Delay Off
Lighting Mode		Constant On / Constant Off / Strobe
Trigger Mode	Edge + Level Trigger	Edge trigger for strobe mode; Level trigger for Constant On/Off modes
Constant On Brightness Level	255	0~255-level brightness adjustment

Strobe Time	1~999	Unit: ms
Communication Baud Rate	9600bps	Optional: 9600/19200/57600/115200
Built-in Power Supply	Varies by model	65W~500W
Number of Channels	1/2/4	-
Connected Light Source Type	24V Light Source	$\leq 2A\sim 12A$ (varies by model) 24V light source
Dimension	See Appendix for details	

1.4 Function Modes

Table 2 Function Display Table (taking Channel 1 as an example)

Function	7-Segment Display Mode		Description
Brightness Setting	1. X	$0 \leq X \leq 255$	Adjust brightness
Working Mode	H1. 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 P. X ($1 \leq X \leq 999$, Unit: ms)
		X=3 Trigger Delay Off Mode	Light source turns on when trigger signal is valid; turns off after delay when signal is invalid P. X ($1 \leq X \leq 999$, Unit: ms)
Debounce Time Parameter	dt. X	$0 \leq X \leq 99$	X = Debounce time (Unit: μs)
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
Trigger Mode	Lo. X	X=0	Edge Trigger
		X=1	Level Trigger
Controller Cooling Fan Activation Temperature Setting	FS.X	$20 \leq X \leq 60$ Unit: Celsius ($^{\circ}C$)	Display the internal temperature of the controller through a temperature sensor and set the starting temperature for the cooling fan (default $55^{\circ}C$)
Press and hold the menu button at tp.X to enter the temperature settings for the controller's cooling fan startup.			
Controller Internal Temperature Display	tp.X		Unit: Celsius ($^{\circ}C$)
Press and hold the MENU button at "H1. X" to enter the following parameter editing modes			
time factor	LF.X	$1 \leq X \leq 99$	Flicker time or delayed switch-off time = time factor $\times$ P. X
Long press the menu button at brightness level 1.XXX to enter the maximum current limit setting for controller channel 1.			
Maximum Current Limit Setting	A. X.X	$1 \leq X \leq Y$ (Maximum current of selected mode)	Maximum current output limit setting

2. User Instructions

2.1 Panel Description

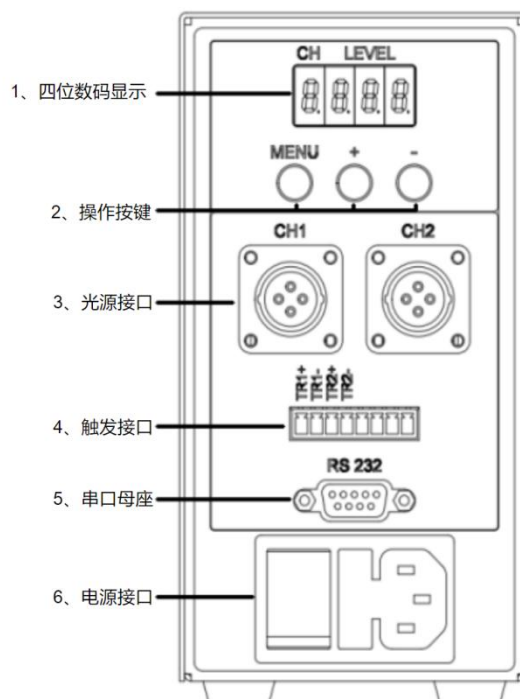


Figure 1 Front & Rear Panels

Table 3 Panel Interface Definition Table

No.	Name	Description
1	4-Digit 7-Segment Display	1st digit (leftmost): Current operating channel; Last 3 digits: Corresponding value of the current operating channel
2	Operation Buttons	MENU: Function switching button; "+": Increase value; "-": Decrease value
3	Light Source Interface	Connect to $\leq 2.5\sim 12A$ 24V light source (varies by model)
4	Trigger Interface	Connect to external signal for trigger switch operation
5	Serial Port Female Connector	Connect to devices with RS232 interface
6	Power Interface	AC 220V interface

2.2 Light Source Interface Definition

Table 4 Light Source Interface Definition Table

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

2.3 Serial Port Interface Definition

The definition of the serial port female connector is shown in Figure 2. Use a straight cable to connect to the 9-pin serial port of a computer host.

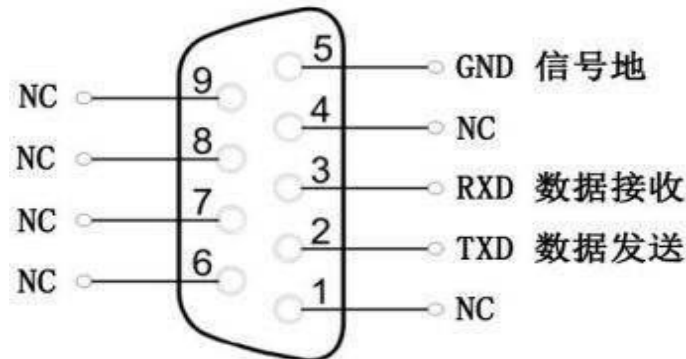


Figure 2 Serial Port Female Connector Definition

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

The external trigger input interface is shown in Figure 3:

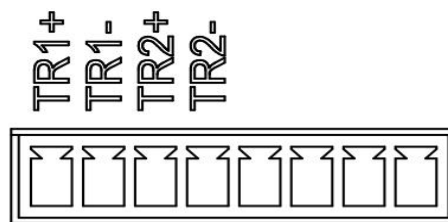


Figure 3 External Trigger Input Interface

There are 2 channels for the external trigger input interface. Each channel has two input terminals: "+" and "-" (where "x" represents the channel number). A unidirectional optocoupler is built inside, and its electrical diagram is shown in Figure 4:

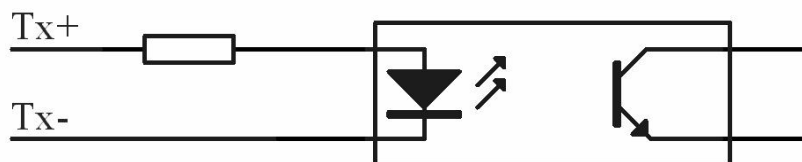


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Examples

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

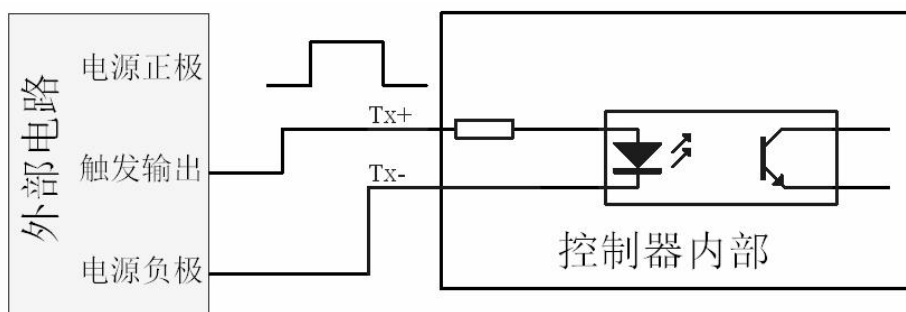


Figure 5 Wiring Example for Rising Edge or High Level Validity

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:

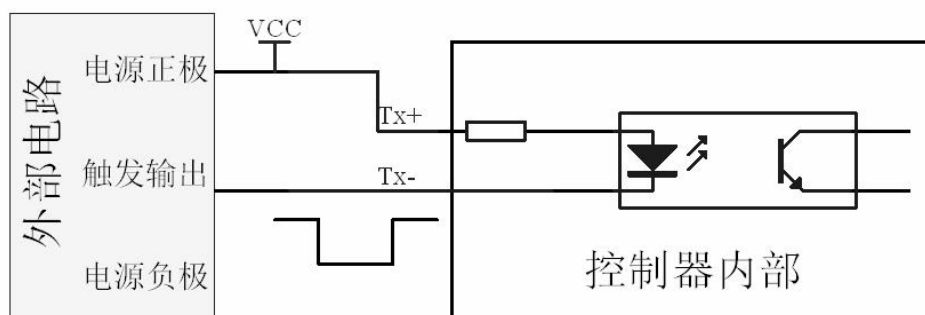


Figure 6 Wiring Example for Falling Edge or Low Level Validity

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 trigger input signal of the controller is valid, the light source turns on. Taking high level validity as an example to explain the timing relationship, see Figure 7:

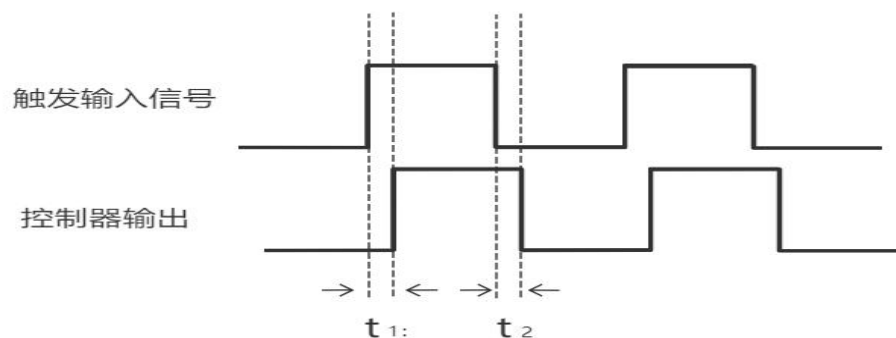


Figure 7 Timing Diagram of Constant Off Mode

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

Constant On Mode: When the trigger input signal of the controller is valid, the light source turns off. Taking high level validity as an example to explain the timing relationship, see Figure 8:

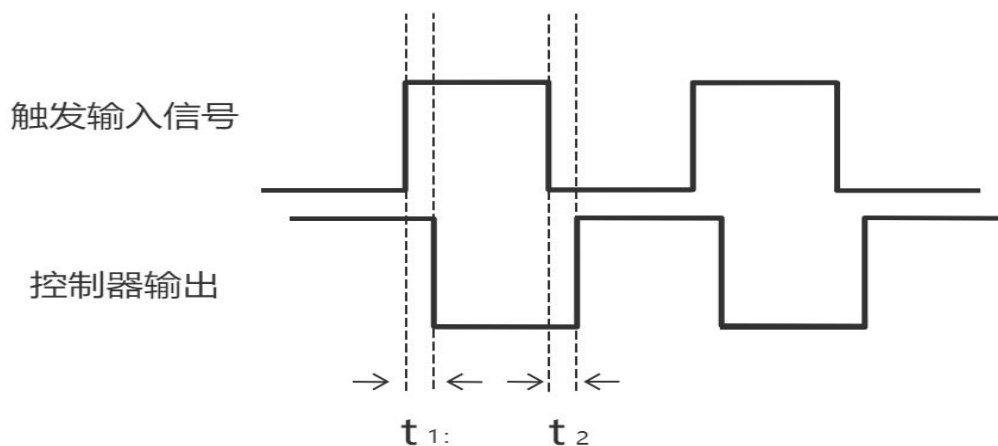


图 8 常亮模式时序图

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

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

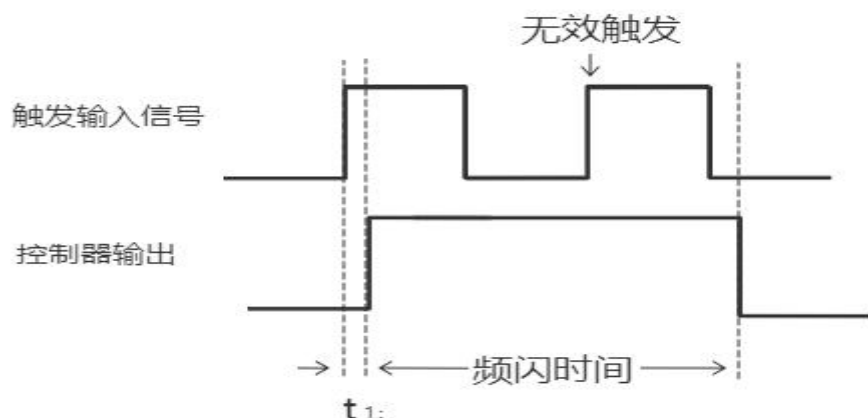


Figure 9 Timing Diagram of Strobe Mode

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

Trigger Delay Off Mode: When the controller is set to Delay Off mode, the light source turns on when the trigger input signal is valid, and turns off after a delay when the signal is invalid. The delay time is determined by the P.XXX parameter (configurable 1~999ms). If the time coefficient is not 1, the actual delay time = Time Coefficient $\times$ Delay Time Setting. Example: Time Coefficient = 10, Delay Time Setting = 500 $\rightarrow$ Actual Delay Time = $10 \times 500 = 5000\text{ms}$. Taking high level validity as an example to explain the timing relationship, see Figure 10:

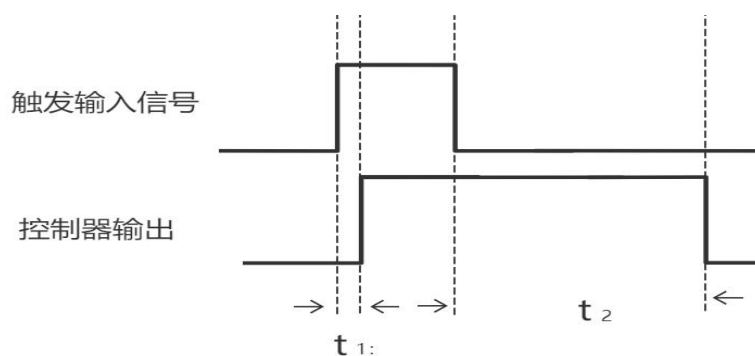


Figure 10 Timing Diagram of Trigger Delay Shutdown Mode

Parameter	Time
t_1	$\leq 3\text{ms}$
t_2	Delay Time

2.5 Manual Settings

2.5.1 Brightness Setting

After turning on the controller, the 4-digit 7-segment display shows "Channel

Number + Brightness Value". It initially 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 uses "setting Channel 1 brightness to 125" as an example. Its flow chart is shown in Figure 11:

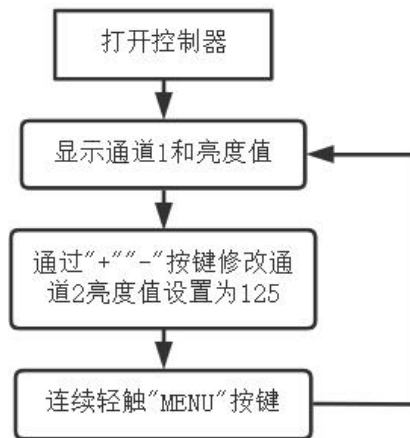


Figure 11 Brightness Setting Flow Chart

2.5.2 Mode Setting

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

The following uses "setting Channel 1 mode" as an example.

2.5.3 Constant Off Mode Setting

The flow chart for setting Channel 1 to Constant Off Mode is shown in Figure 12:

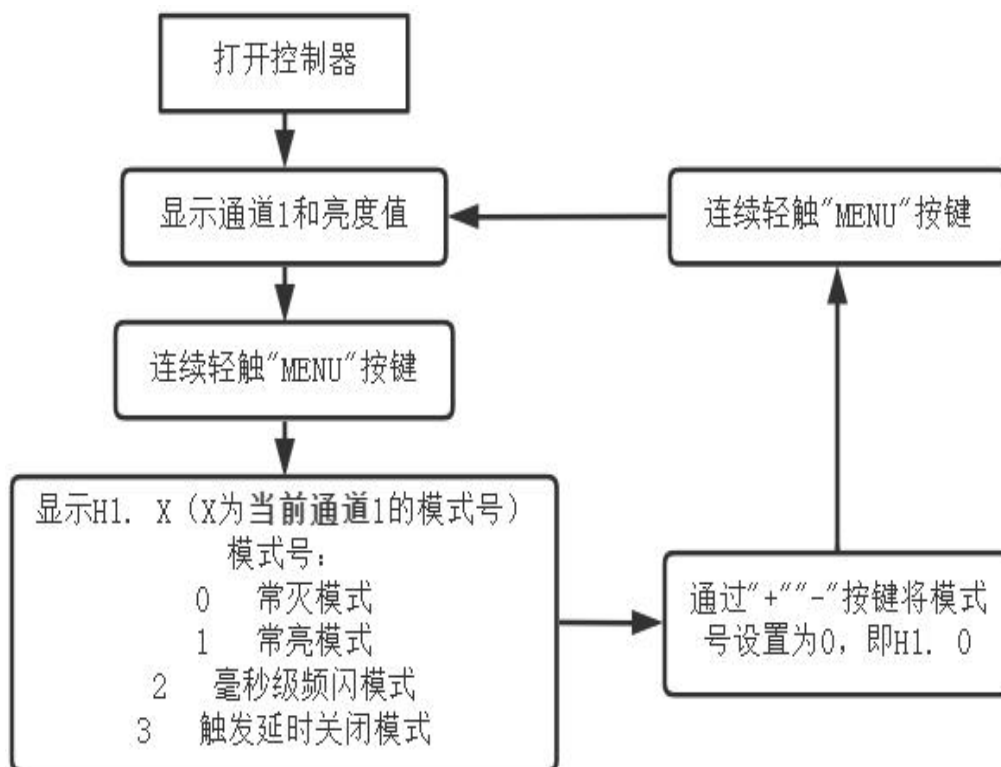


Figure 12 Constant Off Mode Setting Flow Chart

2.5.4 Constant On Mode Setting

The flow chart for setting Channel 1 to Constant On Mode is shown in Figure 13:

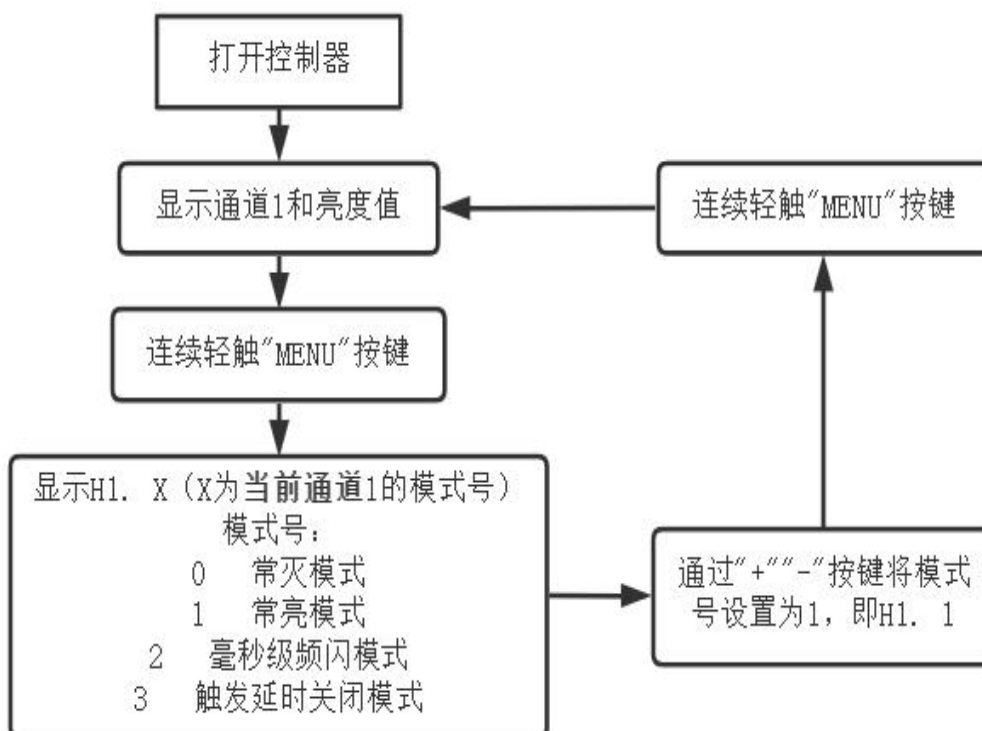


Figure 13 Constant On Mode Setting Flow Chart

2.5.5 Millisecond-level Strobe Mode Setting

The flow chart for setting Channel 1 to Millisecond-level Strobe Mode and configuring the strobe time is shown in Figure 14:

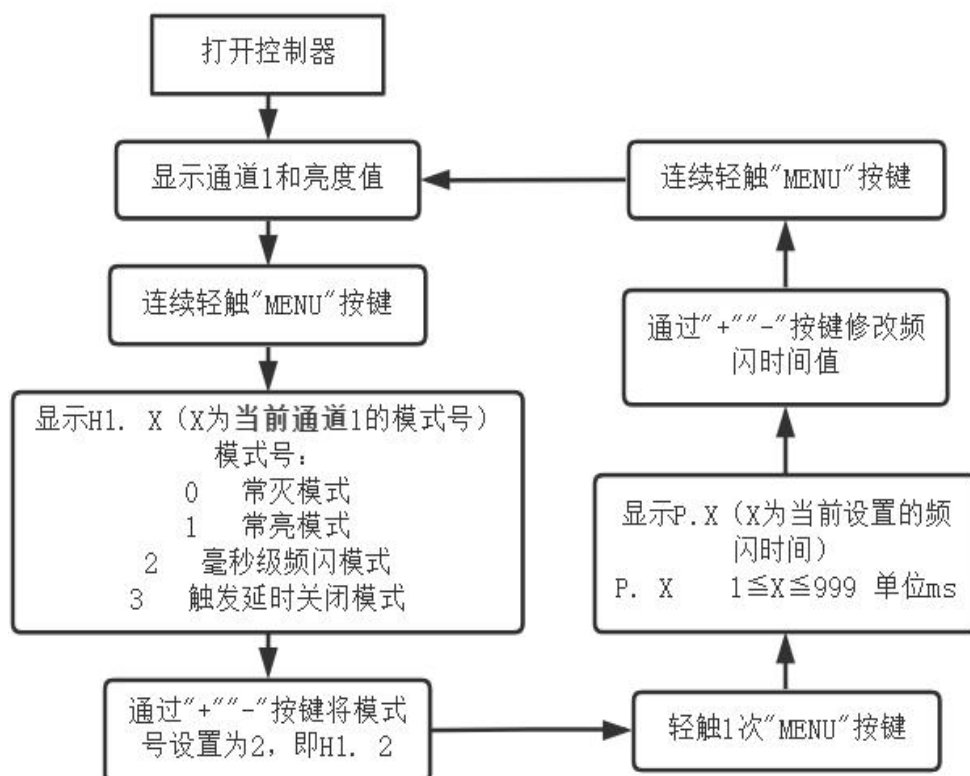


Figure 14 Millisecond-level Strobe Mode & Strobe Time Setting Flow Chart

2.5.6 Trigger Delay Off Mode Setting

The flow chart for setting Channel 1 to Trigger Delay Off Mode and configuring the delay time to 500ms is shown in Figure 15:

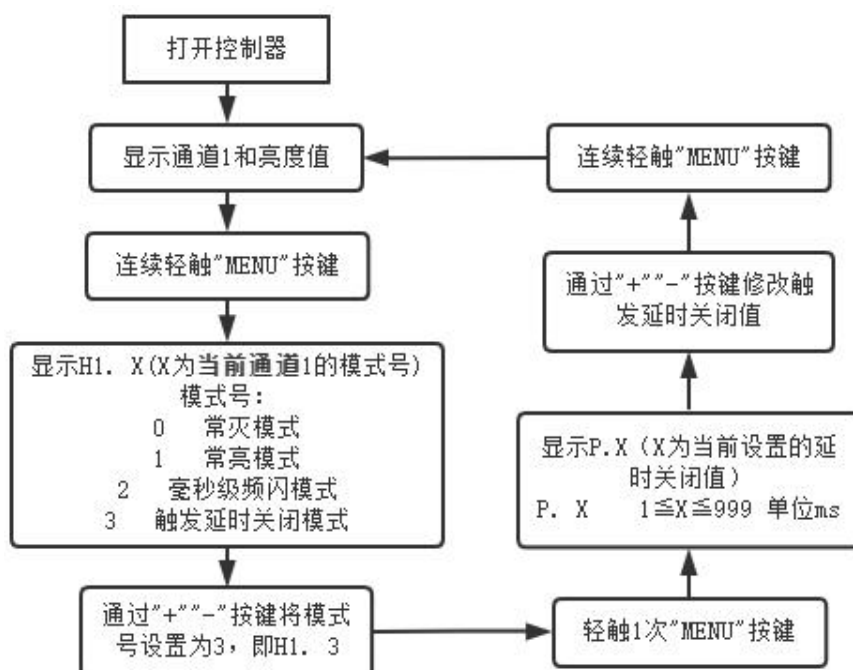


Figure 15 Trigger Delay Off Mode & Delay Time (500ms) Setting Flow Chart

2.5.7 Debounce Time Setting

In environments with strong interference signals, interference may cause false triggers. To eliminate the impact of interference signals, set the debounce time to filter out interference. The setting flow is shown in Figure 16:

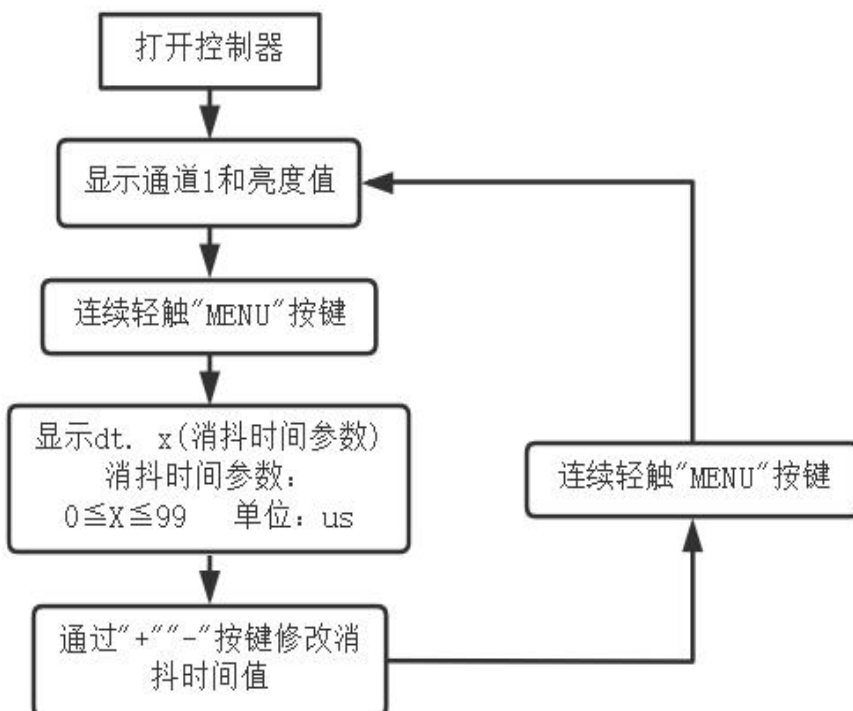


Figure 16 Debounce Time Setting Flow Chart

2.5.8 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 configured as needed. The setting flow (taking "High Level Active" as an example) is shown in Figure 17:

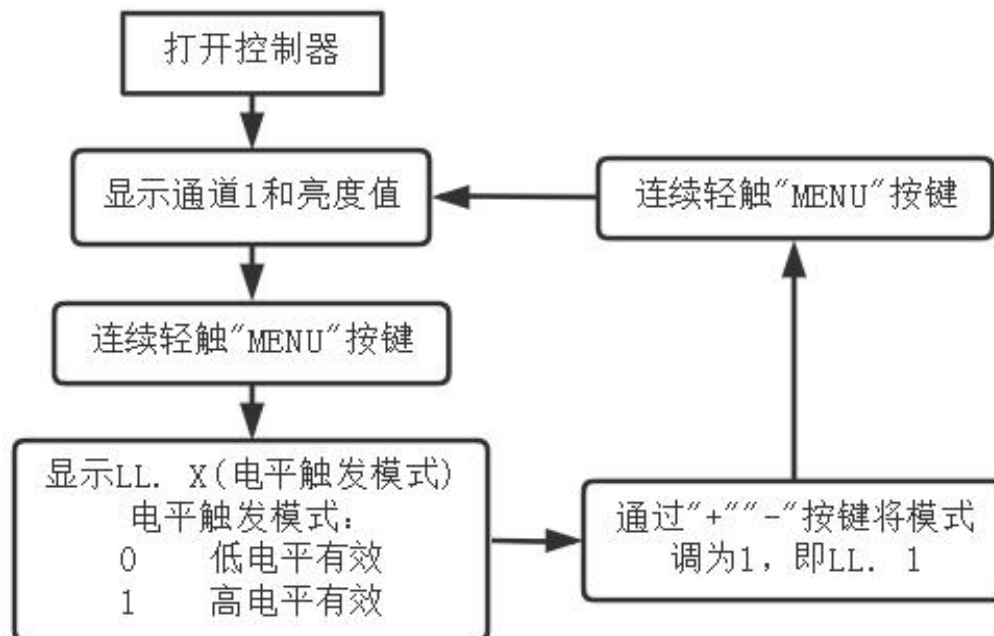


Figure 17 Trigger Level Setting Flow Chart

2.5.9 Edge Trigger Mode Setting

The flow chart for setting all channels to Edge Trigger Mode is shown in Figure 18:

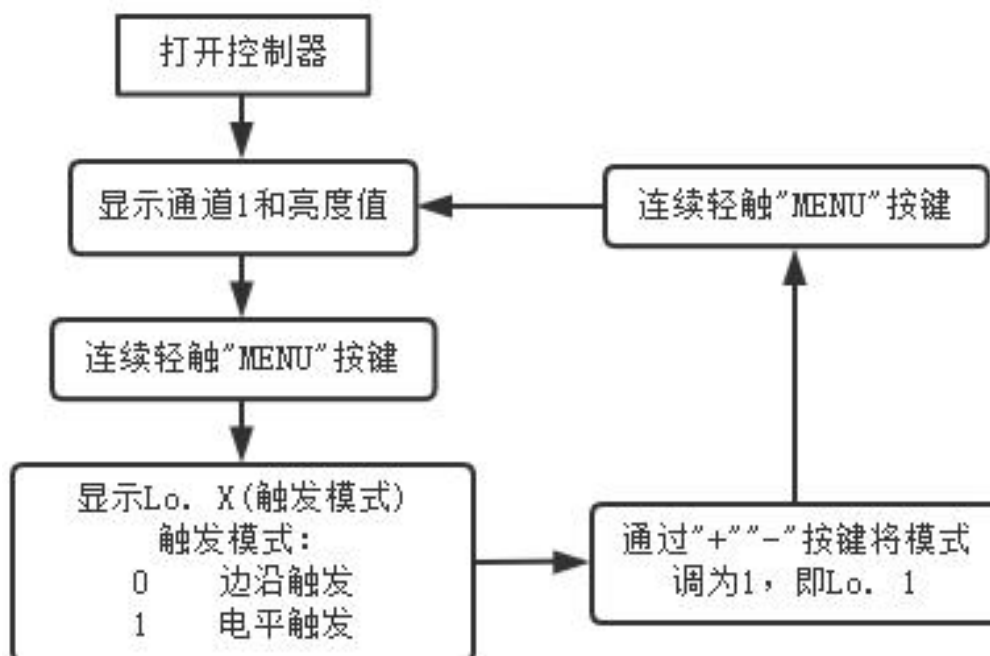
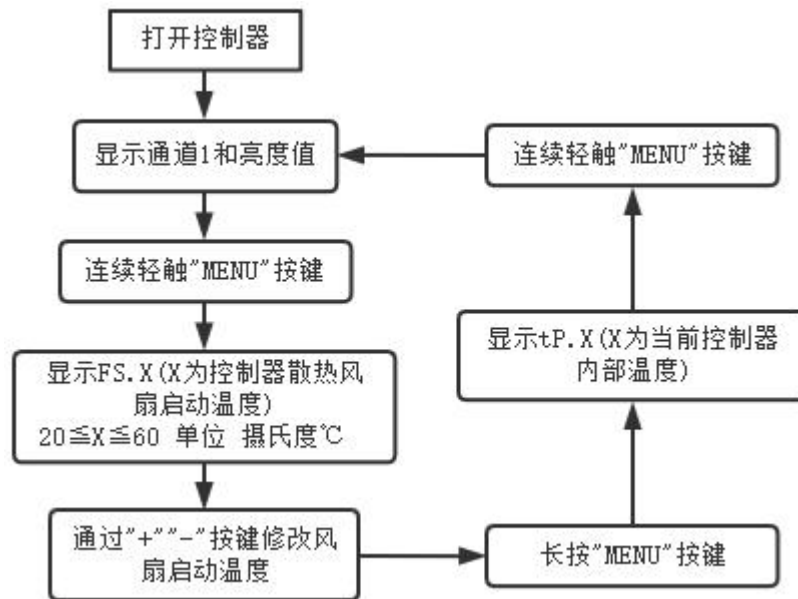


Figure 18 All-Channels Edge Trigger Mode Setting Flow Chart

2.5.10 Fan Temperature Display & Setting

The flow chart for setting the fan activation temperature is shown in Figure 19:



The flow chart for setting the fan activation temperature is shown in Figure 19:

2.5.11 Time Coefficient Setting

The default value of the time coefficient is 1. In practical applications, if the required strobe time or delay time exceeds 999ms, the time can be extended by modifying the time coefficient. The final time is calculated as Time Coefficient × Time Setting Value (i.e., P.xxx). The time coefficient setting process is shown in Figure 20, with an example of setting the time coefficient to 10.

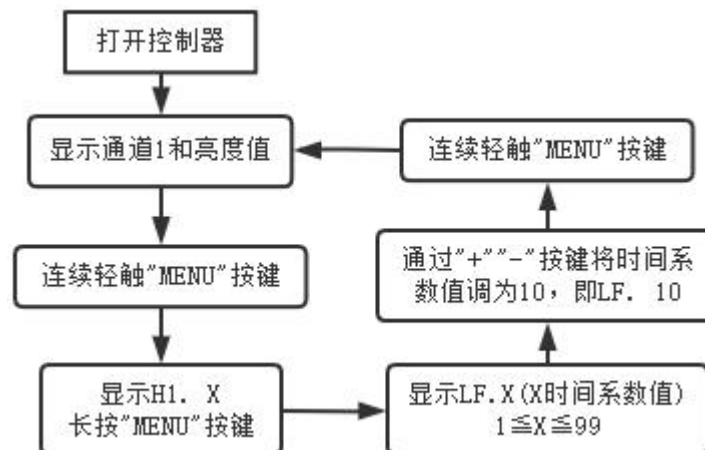


Figure 20 Time Coefficient Setting Flow Chart

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 21:

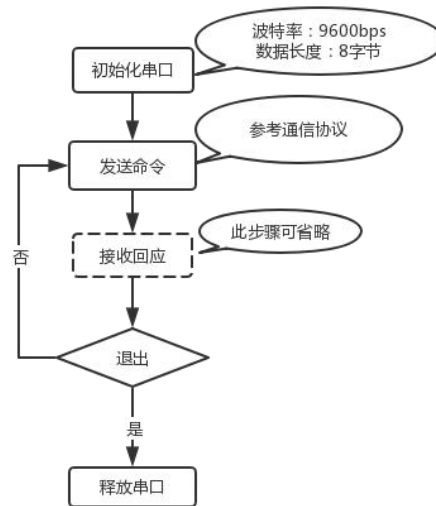


Figure 21 Communication Programming Flow Chart

3.2 Communication Settings

3.2.1 Serial Port Communication Settings

The communication format settings for the serial port are shown in Table 5.

Table 5 Serial Port Settings Table

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

3.3 Frame Format Description

The communication frame format 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 code.
- 2、 The signature character is: \$.
- 3、 The command characters are as listed in Table 7.
- 4、 When the command character is "3", "7", "8", or "9": If the controller receives the command successfully, it returns the signature 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 character "1" represents Channel 1.

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

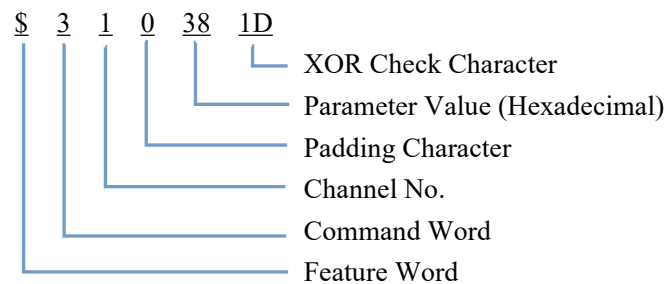
8、XOR checksum = XOR result of all bytes except the checksum bytes (including: signature character, command character, channel character, and data). The ASCII code of the high 4 bits of the checksum comes first, followed by the ASCII code of the low 4 bits.

Table 7 Command Character Function Table

Character	Function	Description
"3"	" Set brightness parameter of the corresponding channel	The corresponding channel is determined by the channel character; the brightness parameter is Data 1~Data 3
"4"	Read brightness parameter of the corresponding channel	The corresponding channel is determined by the channel character; the return format is the same as the sending format
"7"	Trigger strobe of the corresponding channel	The corresponding channel is determined by the channel character; this function is invalid in non-strobe modes
"8"	Set mode of the corresponding channel	The corresponding channel is determined by the channel character
"9"	Set strobe time of the corresponding channel	The corresponding channel is determined by the channel character; this function is invalid in non-strobe modes

3.4 Communication Examples

To set the brightness of Channel 1 to 56, write the ASCII code string: "\$310381D"



	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	1	49	31	0011 0001
Data	0	48	30	0011 0000
	3	51	33	0011 0011
	8	56	38	0011 1000
XOR Sum				0001 1101
XOR Checksum Word				1 D

Note: For the three functions of "turning on the corresponding channel", "turning off the corresponding channel", and "reading the corresponding channel parameter", the values of the 3 data bytes have no impact on the XOR result during the XOR checksum calculation. It is only necessary to ensure the format is 0XX (XX is any value between 00 and FF).

Example: Reading data from Channel 2: \$4200011

	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	1	49	31	0011 0001
Data	0	48	30	0011 0000
	0	48	30	0011 0000
	0	48	30	0011 0000
XOR Sum				0001 0001
XOR Checksum Word				1 1

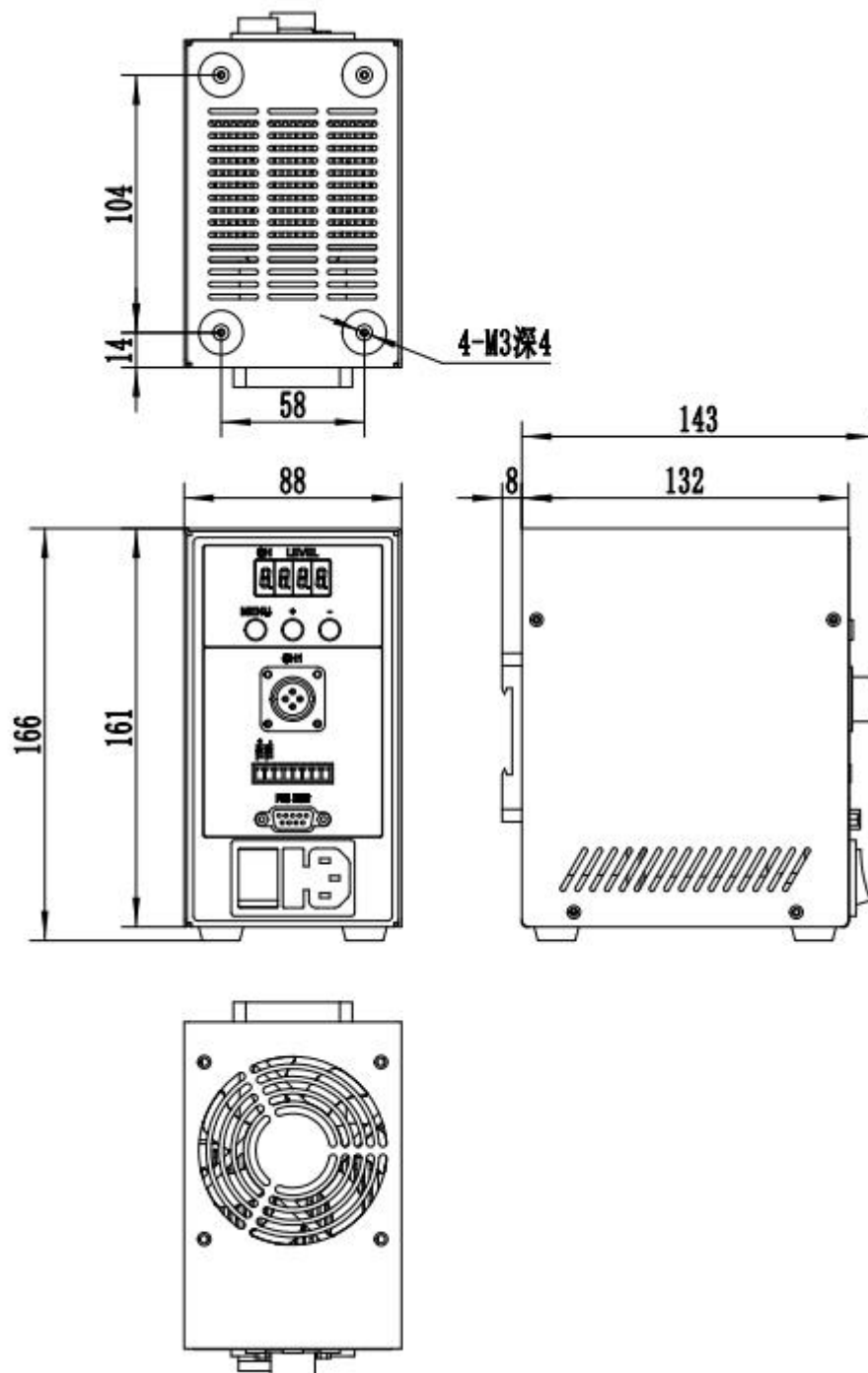
4. Prompt Command Index

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

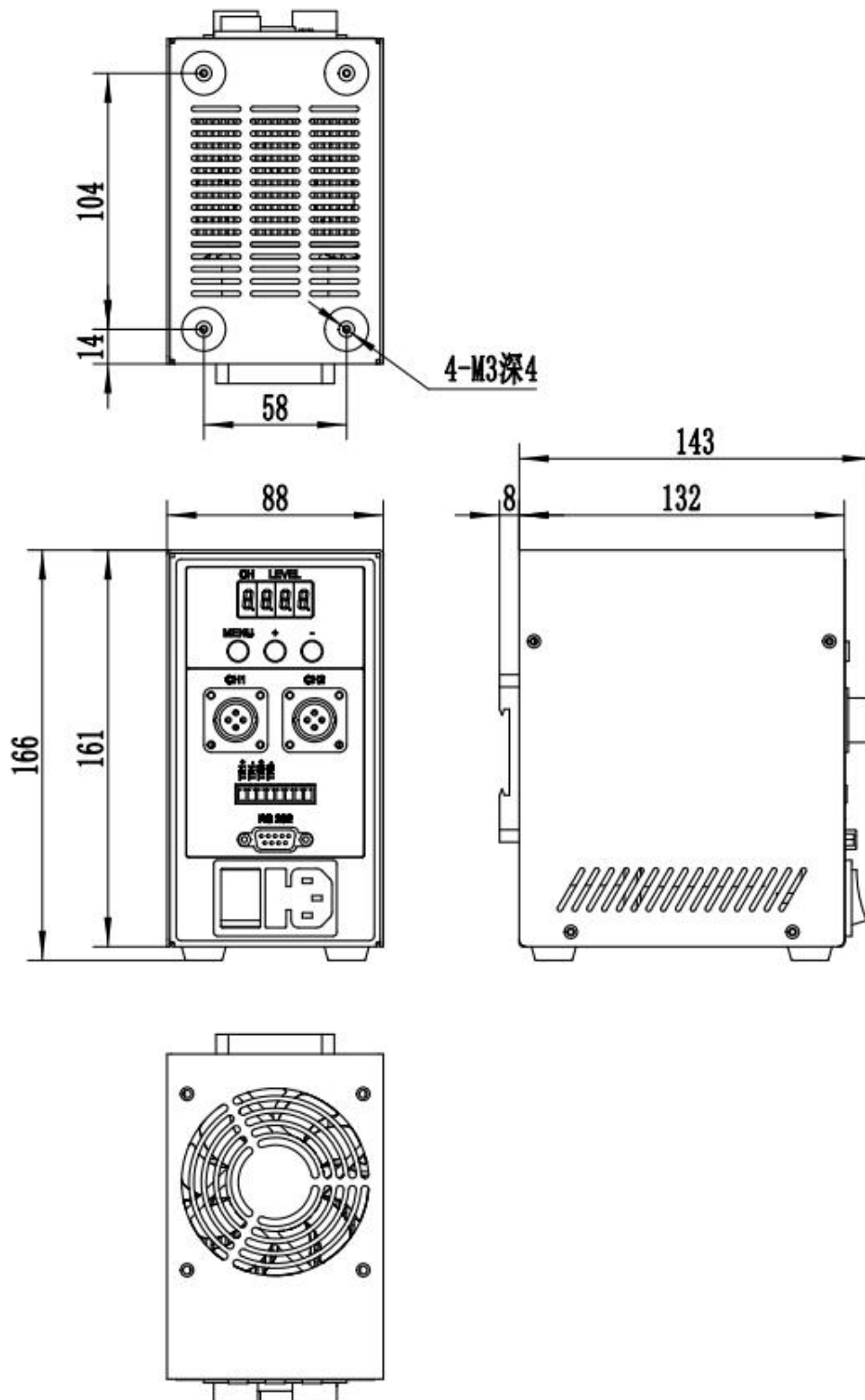
Command	Description	Troubleshooting Solution for Prompt Command
F.1	Unregistered	Re-register
F.2	Storage Chip Damaged	Need to return to the factory for repair
F.3	Exceeding Light Source Power, Short Circuit, Signal Interference	Check the light source power, whether the light source is short-circuited, 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

1-Channel Dimension Drawing



2-Channel Dimension Drawing



4-Channel Dimension Drawing

