

Digital Intelligent Constant Current Controller

DBS-DCXXX-I07C-48XXX-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-48XX X-X (See 1.2 Model Selection 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: Constant current output with no brightness flicker
- Maximum output current per channel: Multiple options ranging from 2A to 7A
- Low trigger response time
- Real-time parameter storage: No need to reconfigure parameters every time the device is powered on
- Remote parameter setting via RS-232 serial port
- Configurable trigger level (adapts to different trigger modes) and trigger debounce filtering for stronger anti-interference capability
- Easy installation: Screw mounting or C45 DIN rail mounting

1.2 Model Selection

Model	Built-in Power Supply Power	Maximum Current per Channel	Light Source Interface Type
DBS-DC120-I07C-48025-1	120W	2.5A	4-pin aviation connector (WS16-4)
DBS-DC200-I07C-48040-1	200W	4A	4-pin aviation connector (WS16-4)
DBS-DC200-I07C-48020-2	200W	2A	4-pin aviation connector (WS16-4)
DBS-DC350-I07C-48070-1	350W	7A	4-pin aviation connector (WS16-4)
DBS-DC350-I07C-48035-2	350W	3.5A	4-pin aviation connector (WS16-4)
DBS-DC350-I07C-48020-4	350W	2A	4-pin aviation connector (WS16-4)

1.3 Main Parameters

Table 1 Main Parameters

Item	Parameter	Description
Input Voltage	AC100~240V	For built-in switching power supply
Output Voltage	48V	Voltage of built-in switching power supply
Output Current	2~7A	Maximum current per channel varies by model
Overcurrent Protection	Yes	-
Overvoltage Protection	Yes	-
Operating Modes	4 types	0: Constant Off; 1: Constant On; 2: Stroboscopic; 3: Trigger Delay-off
Light Emitting Modes		Constant On / Constant Off / Stroboscopic
Trigger Modes	Edge + Level Trigger	Edge trigger in stroboscopic mode; Level trigger in constant on/off modes

Constant On Brightness Level	255	0~255 adjustable brightness levels
Stroboscopic Time	1~999	Unit: ms
Communication Baud Rate	9600bps	Optional: 9600/19200/57600/115200bps
Built-in Power Supply	Varies by model	120W~500W
Number of Channels	1/2/4	-
Compatible Light Source Type	48V light source	$\leq 2\sim 7A$ (varies by model); 48V light source
Operating Ambient Temperature	-5~50°C	-
Dimensions	See Appendix for details	

1.4 Function Modes

Table 2 Function Display (Taking Channel 1 as an Example)

Function	Nixie Tube Display Mode		Description
Brightness Setting	1. X	$0 \leq X \leq 255$	Adjusts brightness
Operating 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 Stroboscopic 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 a 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 Valid	Trigger signal is valid at low level
		X=1 High Level Valid	Trigger signal is valid at high level
Trigger Mode	Lo. X	X=0	Edge Trigger
		X=1	Level Trigger
Controller Cooling Fan Start Temperature Setting	FS.X	$20 \leq X \leq 60$ Unit: °C	Displays internal temperature via temperature sensor and sets cooling fan start temperature (default: 55°C)
Press and hold the MENU button at "tp.X" to enter the setting interface			
Controller Internal Temperature Display	tp.X		Unit: °C
Press and hold the MENU button at "H1. X" to enter the following parameter editing modes			
Time Coefficient	LF.X	$1 \leq X \leq 99$	Stroboscopic time or delay-off time = Time Coefficient $\times$ 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	$1 \leq X \leq Y$ (Y = selected maximum current)	Maximum current output limit setting

2. User Instructions

2.1 Panel Description

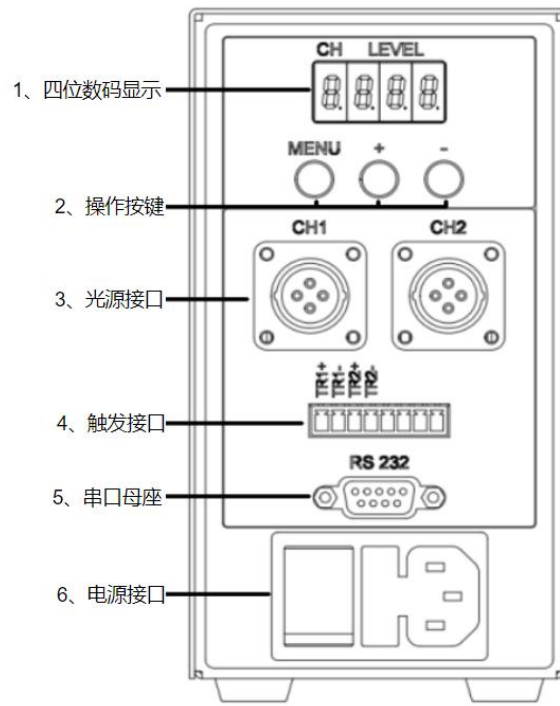


Figure 1 Front & Rear Panels

Table 3 Panel Interface Definition

No.	Name	Description
1	4-digit Nixie Tube	1st digit (leftmost): Current operating channel; Last 3 digits: Value of the current channel
2	Operation Buttons	MENU = function switching button; "+" = increase value; "-" = decrease value
3	Light Source Interface	Connects to 48V light source ($\leq 2\sim 7A$, varies by model)
4	Trigger Interface	Connects to external signal for trigger switching
5	Serial Port Female Connector	Connects to devices with RS232 interface
6	Power Interface	AC 220V interface

2.2 Light Source Interface Definition

Table 4 Light Source Interface Definition

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. Connect it to the 9-pin serial port of a computer using a straight-through cable.

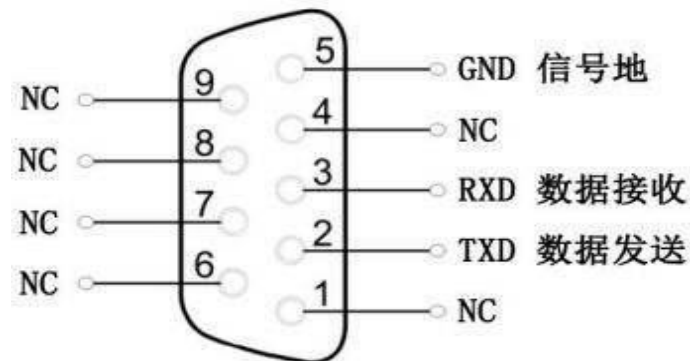


Figure 2 Serial Port Female Connector Definition

Table 5 Serial Port Female Connector Definition

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:

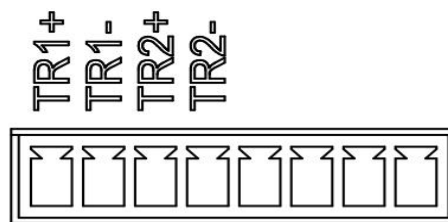


Figure 3 External Trigger Input Interface

There are 2 channels of external trigger input interfaces. 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:

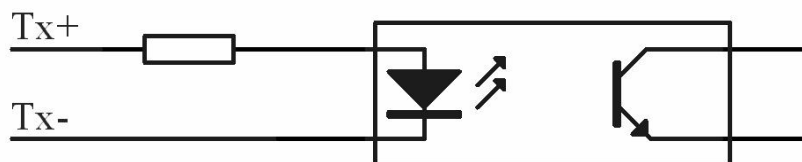


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Example

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

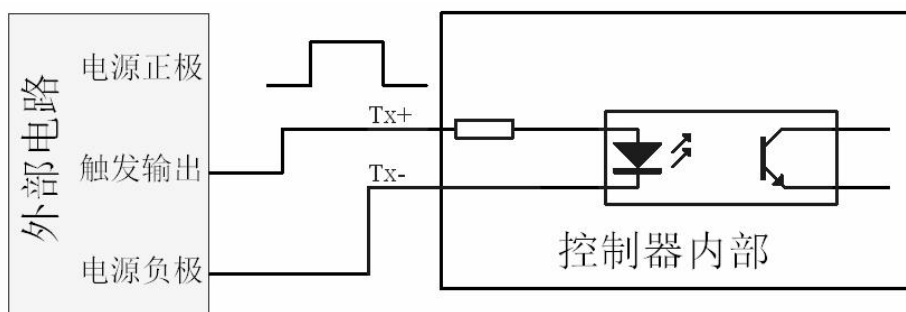


Figure 5 Wiring Example for Rising Edge or High Level Validity

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 a rising edge or high level is present at the trigger output terminal.

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

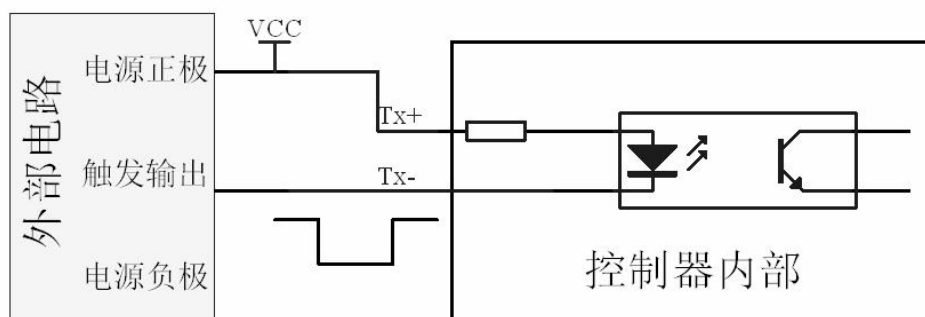


Figure 6 Wiring Example for Falling Edge or Low Level Validity

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 a falling edge or low level is present at the trigger output terminal.

2.4.3 Trigger Timing Diagrams

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

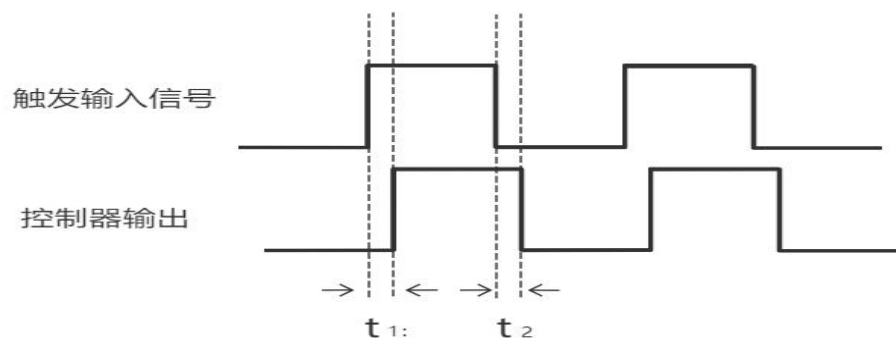


Figure 7 Constant Off Mode Timing Diagram

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

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

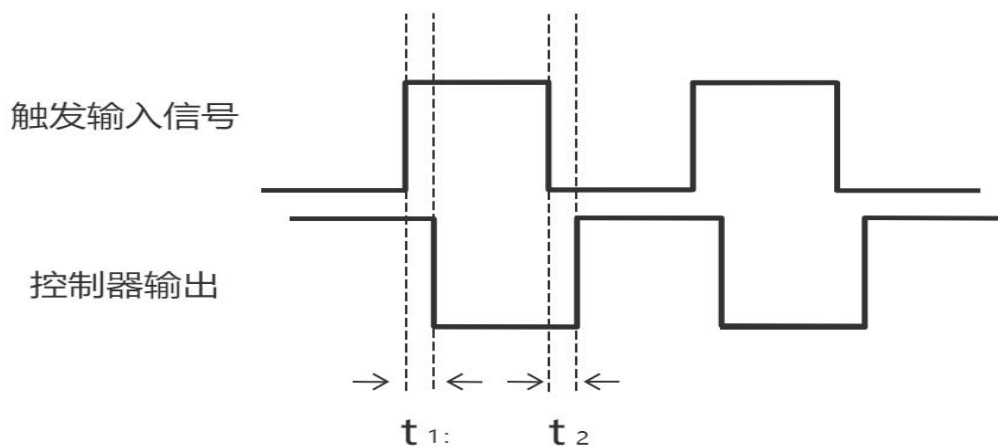


Figure 8 Constant On Mode Timing Diagram

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

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

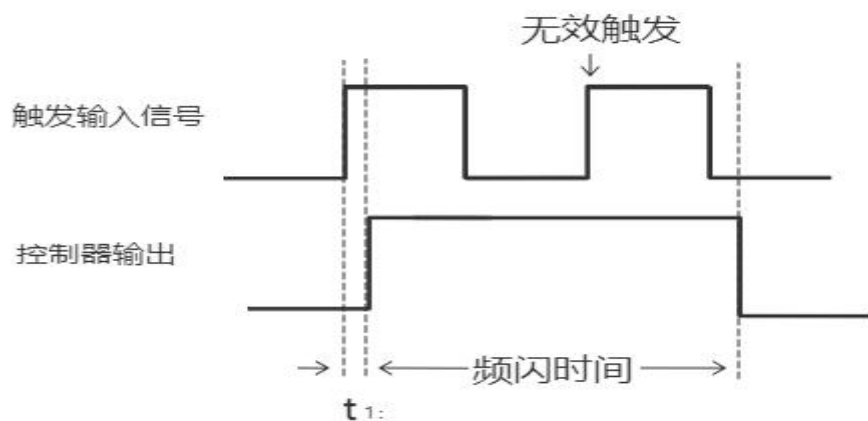


Figure 9 Stroboscopic Mode Timing Diagram

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 a valid trigger input signal is received, and turns off after a delay when the signal becomes invalid. The delay time is determined by the P.XXX parameter (adjustable from 1 to 999ms). If the time coefficient is not 1, the actual delay time = Time Coefficient $\times$ Delay Time Setting Value. Example: If the time coefficient is set to 10 and the delay time is set to 500, the actual delay time = $10 \times 500 = 5000\text{ms}$. The timing relationship (taking high level validity as an example) is shown in Figure 10:

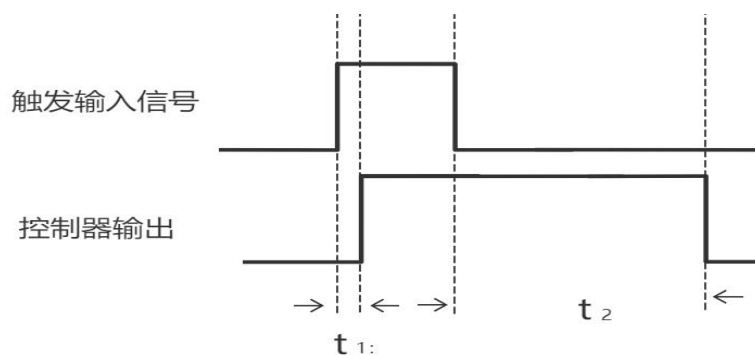


Figure 10 Trigger Delay-off Mode Timing Diagram

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 nixie tube displays "Channel Number + Brightness Value". Initially, it shows Channel 1 and its brightness value. For example, if the previous brightness setting for Channel 1 was 10, the display will be "1.010". The following takes setting the brightness of Channel 1 to 125 as an example; the flowchart is shown in Figure 11.

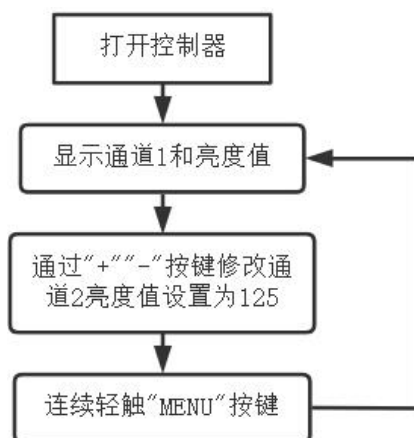


Figure 11 Brightness Setting Flowchart

2.5.2 Mode Setting

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

The following takes setting the mode of Channel 1 as an example.

2.5.3 Constant Off Mode Setting

The flowchart for setting Constant Off Mode of Channel 1 is shown in Figure 12.

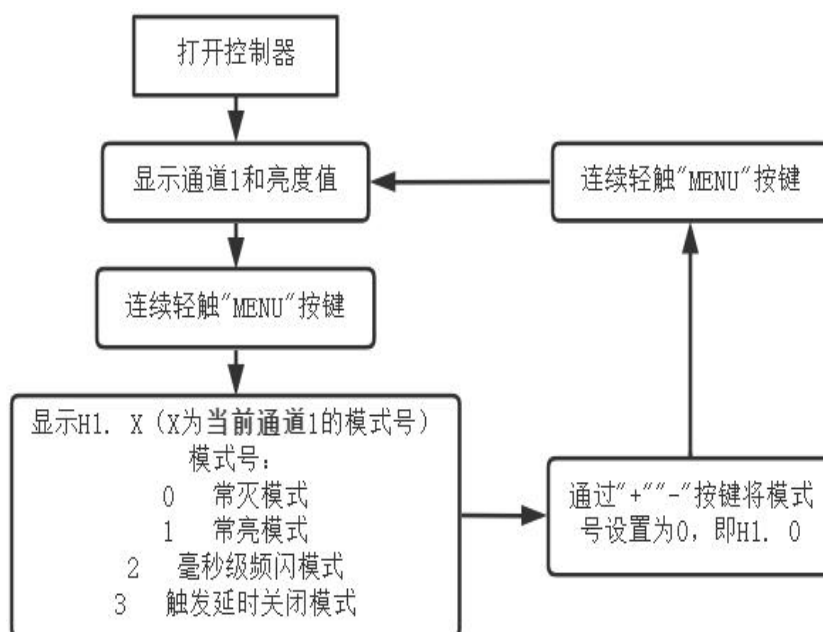


Figure 12 Constant Off Mode Setting Flowchart

2.5.4 Constant On Mode Setting

The flowchart for setting Constant On Mode of Channel 1 is shown in Figure 13.

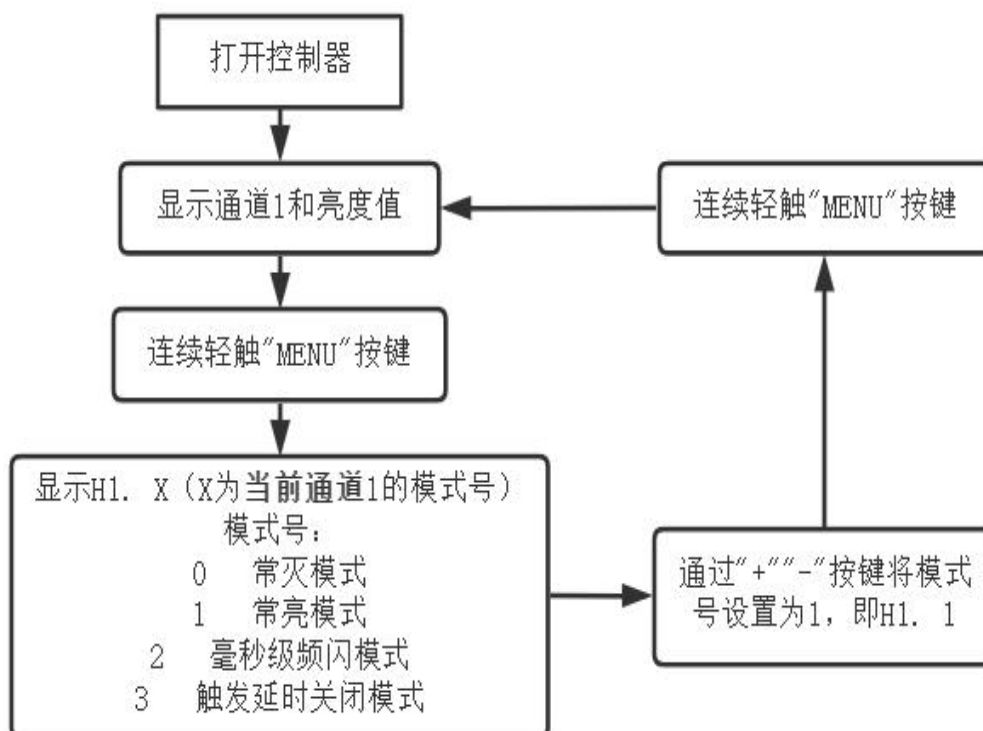


Figure 13 Constant On Mode Setting Flowchart

2.5.5 Millisecond-level Stroboscopic Mode Setting

The flowchart for setting Millisecond-level Stroboscopic Mode and stroboscopic time of Channel 1 is shown in Figure 14.

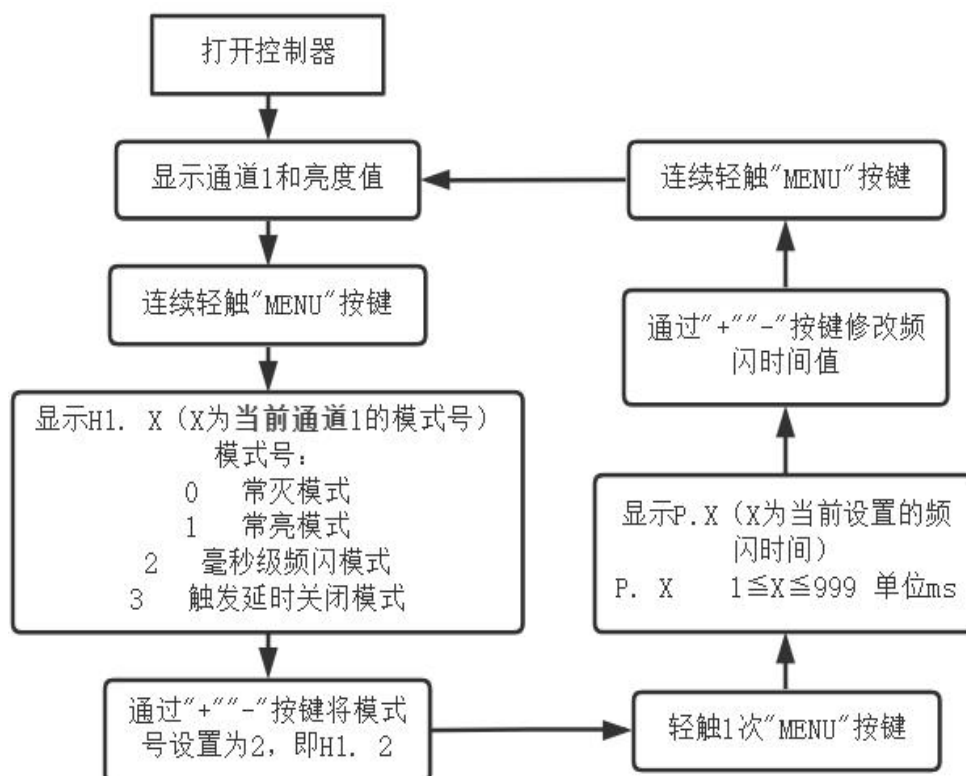


Figure 14 Millisecond-level Stroboscopic Mode and Time Setting Flowchart

2.5.6 Trigger Delay-off Mode Setting

The flowchart for setting Trigger Delay-off Mode and delay time (set to 500) of Channel 1 is shown in Figure 15.

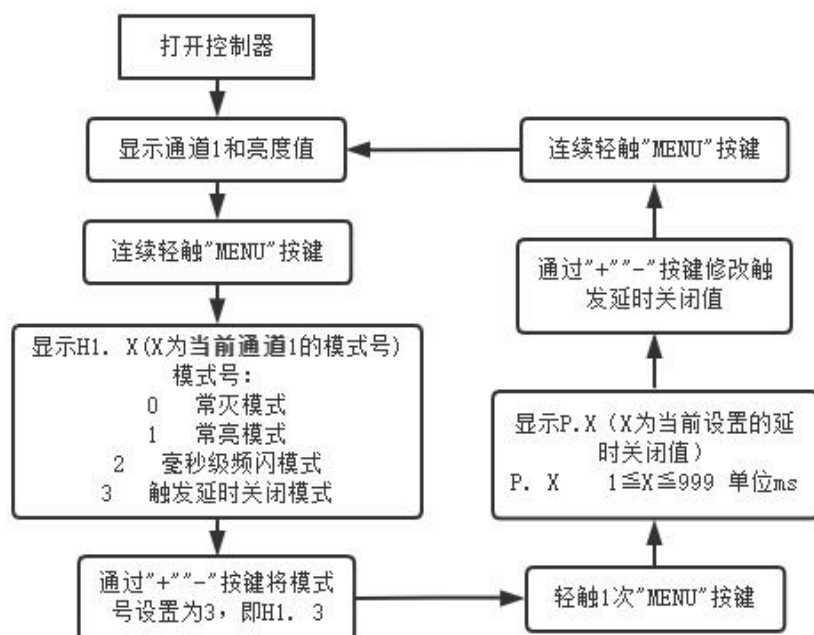


Figure 15 Trigger Delay-off Mode and Delay Time Setting Flowchart

2.5.7 Debounce Time Setting

In environments with strong interference signals, interference often causes false triggering of the controller. To eliminate the impact of interference signals, set the debounce time to filter out such signals. The setting flowchart is shown in Figure 16.

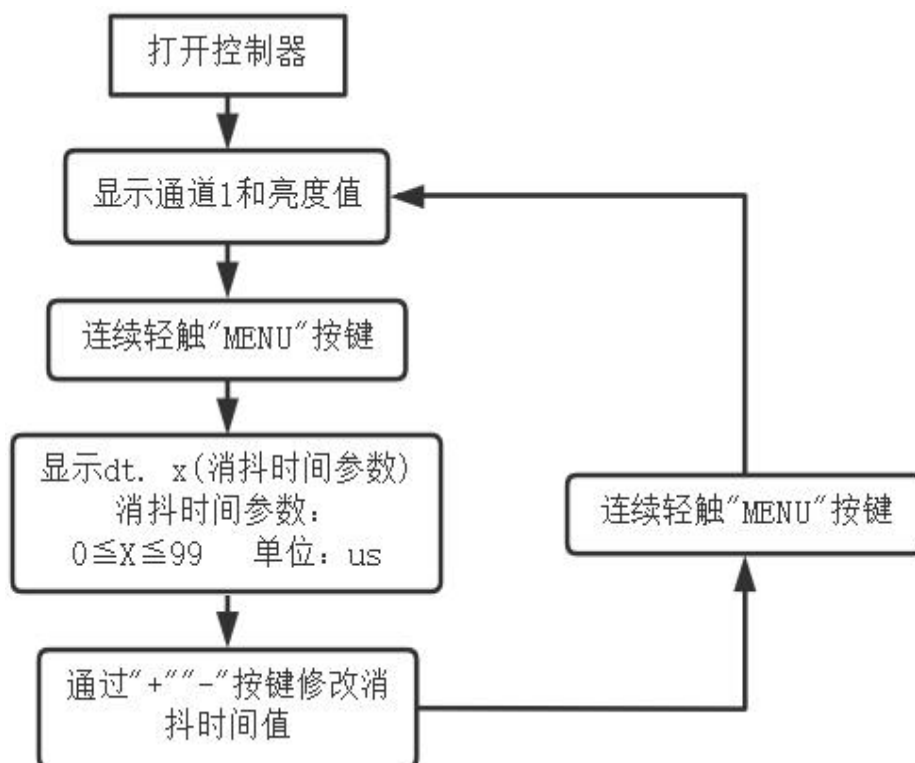


Figure 16 Debounce Time Setting Flowchart

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 set as needed. The setting flowchart is shown in Figure 17, with the example of setting high-level validity.

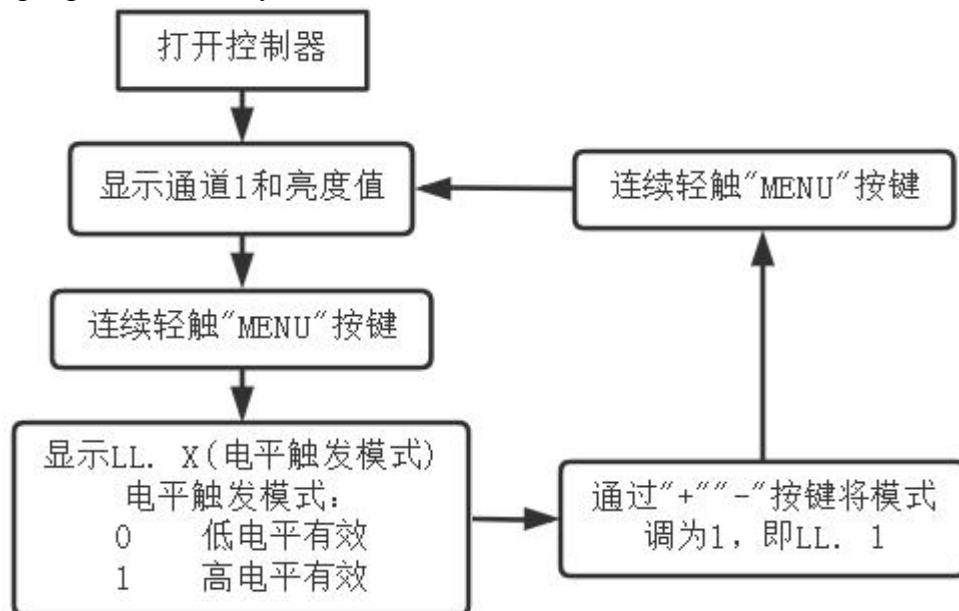


Figure 17 Trigger Level Setting Flowchart

2.5.9 Edge Trigger Mode Setting

The flowchart for setting the full-channel edge trigger mode is shown in Figure 18.

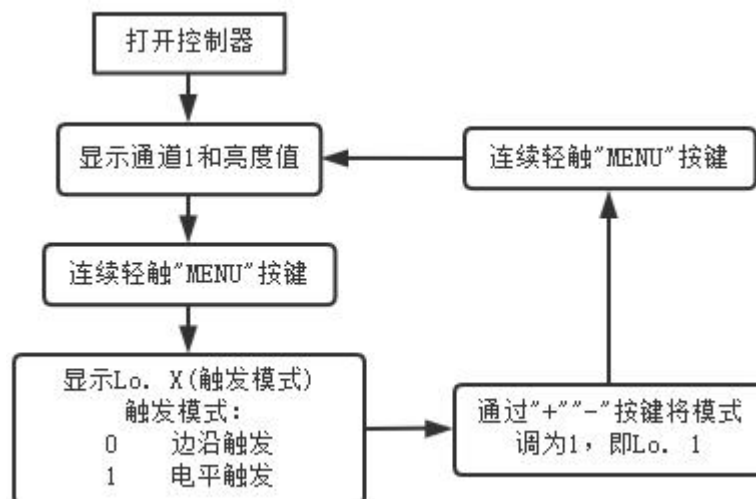


Figure 18 Full-channel Edge Trigger Mode Setting Flowchart

2.5.10 Fan Temperature Display and Setting

The flowchart for setting the fan start temperature is shown in Figure 19.

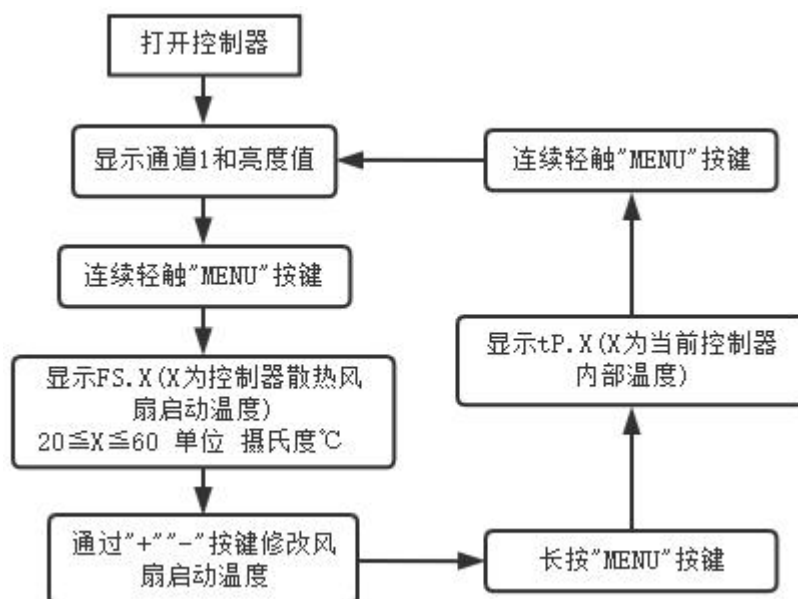


Figure 19 Fan Start Temperature Setting Flowchart

2.5.11 Time Coefficient Setting

The default value of the time coefficient is 1. If the required stroboscopic time or delay time exceeds 999ms in practical applications, 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 flowchart for setting the time coefficient is shown in Figure 20, with the example of setting the time coefficient to 10.

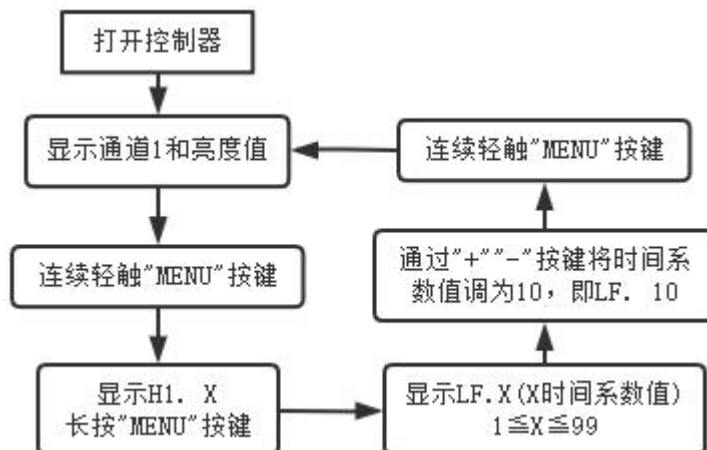


Figure 20 Time Coefficient Setting Flowchart

3. Communication Protocol

3.1 Programming Flow

When controlling the light source controller via the serial port, the communication programming flowchart is shown in Figure 21:

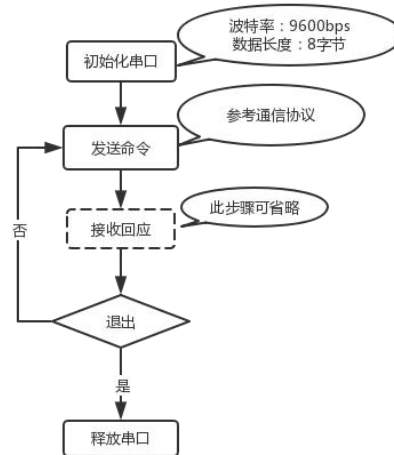


Figure 21 Communication Programming Flowchart

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 Setting 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 codes.
- 2、 Marker: \$.
- 3、 Command Word: As shown in Table 7.
- 4、 When the command word is "3", "7", "8", or "9": If the controller receives the command successfully, it returns the marker \$; 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 the same as the transmission format); If the controller fails to

receive the command, it returns &.

6、Channel Word: "1" represents Channel 1.

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

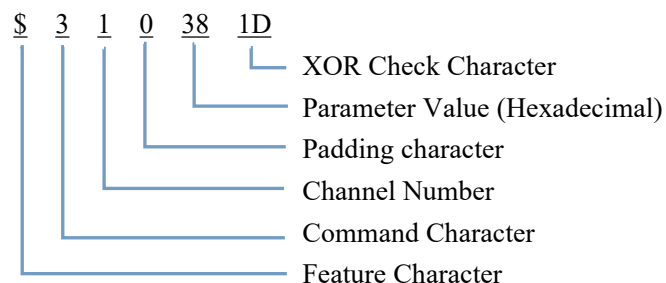
8、XOR Checksum: Calculated by XORing all bytes except the checksum (including the Marker, Command Word, Channel Word, and Data). The ASCII code of the high 4 bits of the checksum comes first, followed by the ASCII code of the low 4 bits.

Table 7 Command Word Function Table

Character	Function	Description
"3"	Set brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel Word; the brightness parameter is 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 the same as the transmission format
"7"	Trigger stroboscope of the corresponding channel	The corresponding channel is determined by the Channel Word; this function is invalid in non-stroboscopic mode
"8"	Set mode of the corresponding channel	The corresponding channel is determined by the Channel Word
"9"	Set stroboscopic time of the corresponding channel	The corresponding channel is determined by the Channel Word; this function is invalid in non-stroboscopic mode

3.4 Communication Examples

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

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 3-byte data values have no impact on the XOR result of the checksum. It is only necessary to ensure the format is 0XX (XX is any value within 00~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 Character	\$	36	24	0010 0100
Command Character	4	52	34	0011 0100
Channel Character	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 Check Character				1 1

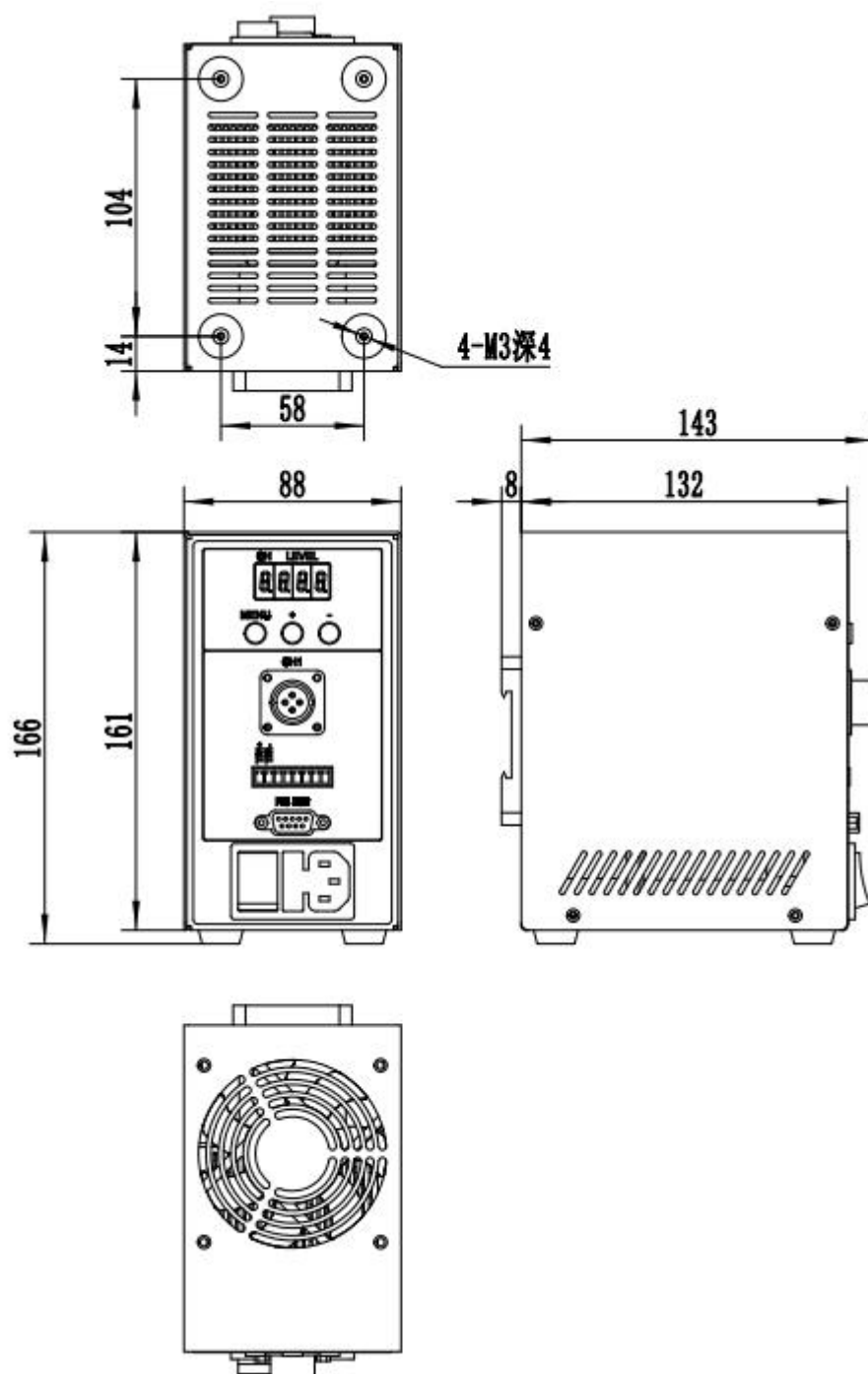
4. Prompt Command Index

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

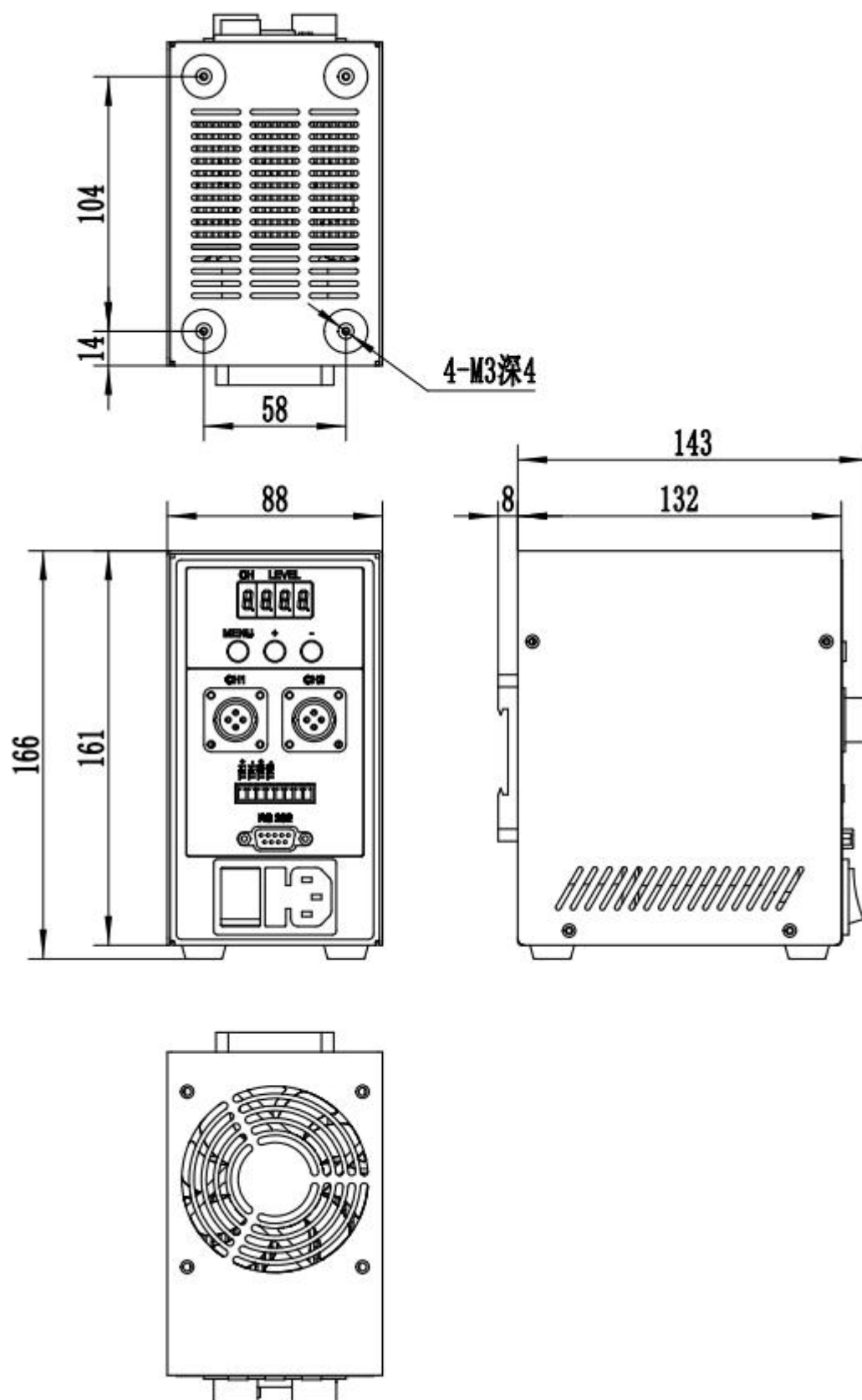
Command	Description	Troubleshooting Solution for Prompt Command
F.1	Unregistered	Re-register
F.2	Storage Chip Damaged	Need to return to the factory for repair
F.3	Exceeding Light Source Power, Short Circuit, Signal Interference	Check the light source power, whether the light source is short-circuited,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

Dimension Drawing of 1-Channel Controller



二通道尺寸图



四通道尺寸图

