General Digital Light Source Controller
DBS-DV65-N01C-24012-2
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-DV65-N01C-24012-2		1
Serial Cable	1.5M 公对母		1
Terminal Block	3.81-8P		1
Power Cable	1.5M		1

Note: If you have other requirements for the shipping configuration, please contact the salesperson or distributor in a timely manne

Contents

1. Product Introduction

1.1 Product Features

- Supports RS232 communication;
- Built-in 24V switching power supply;
- Low trigger response time (≤10μs);
- Supports external trigger mode;
- Supports millisecond-level and microsecond-level strobe;
- Manual adjustment of brightness and mode;
- 5~24V bidirectional triggering, adaptable to high/low-level trigger modes.

1.2 Product Selection

Model	Built-in Power Supply Power	Maximum Current per Channel
DBS-DV120-N01C-24012-2	120W	1.2A

1.3 Main Parameters

Table 1 Main Parameters Table

Item	Parameter	Description
Input Voltage	AC220V	Used by the built-in switching power supply
Output Voltage	24V	Voltage of the built-in switching power supply
Output Current	1.2A	Maximum current per channel
Overcurrent Protection	None	
Overvoltage Protection	None	
Operating Modes	4 Types	0: Constant Off; 1: Constant On; 2: Millisecond-level Strobe; 3: Microsecond-level Strobe
Light Emitting Modes	Constant On/Constant Off/Strobe	External trigger is available for Constant Off and Strobe modes
Trigger Modes	Edge + Level Trigger	Edge trigger in Strobe mode; Level trigger in Constant On/Constant Off modes
Constant On Brightness Level	255	255-level brightness adjustment
Millisecond-level Strobe Time	1~99	Unit: ms (millisecond)
Microsecond-level Strobe Time	10~990	Unit: μs (microsecond)
Communication Baud Rate	9600bps	
Built-in Power Supply	120W	
Number of Channels	2	
Compatible Light Source Type	24V Light Source	10mA~1.2A 24V light source
Operating Ambient Temperature	-5~50℃	
Dimensions	69×128×70mm	See Appendix for details

1.4 Function Modes

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

Mode	Nixie Tube Display Format	Description
Constant Off Mode	H1. 0	Light source turns on when the trigger signal is valid
Constant On Mode	H1. 1	Light source turns off when the trigger signal is valid
Millisecond-level Strobe Mode	H1. 2	Light source flashes once (for millisecond-level duration) when the trigger signal is valid
Microsecond-level Strobe Mode	H1. 3	Light source flashes once (for microsecond-level duration) when the trigger signal is valid

2.User Instructions

2.1 Panel Description

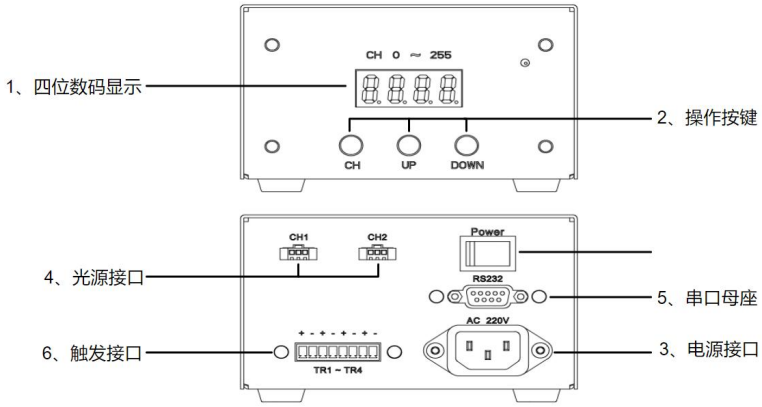


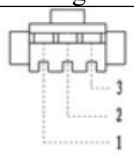
Figure 1 Front Panel

Table 3 Panel Interface Definition Table

No.	Name	Description
1	Digital tube display - 4 digits	The first digit (from the left) indicates the current operating channel; the last three digits represent 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~3A 24V light sources
5	Serial Female Connector	Connects to devices with RS232 interface
6	Trigger Interface	Connects to external signals for trigger switch operation

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	Empty	No function
3	Light-	Negative pole of light source output

2.3 Serial Female Connector Interface Definition

The interface definition of the serial female connector is shown in Figure 2.

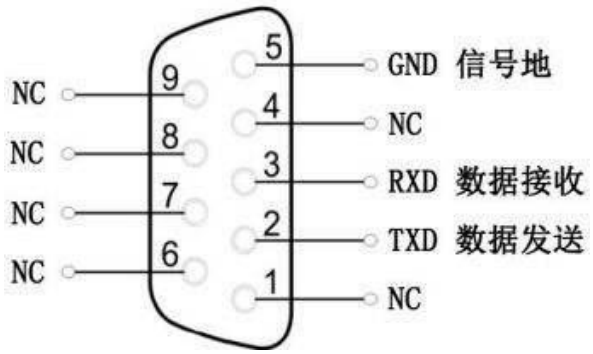


Figure 2 Serial Female Connector Interface Definition

Table 5 Serial female 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:

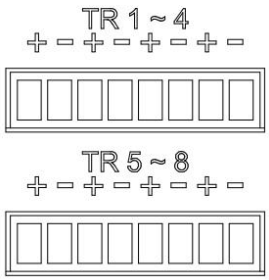


Figure 3 External Trigger Input Interface

The external triggering input interface has 8 channels, each with two input terminals: " " and "-" Tx (where x represents the channel number). Internally, there is a bidirectional optocoupler, as shown in Figure 4.

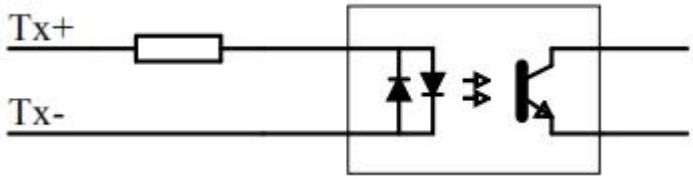


Figure 4 Internal Electrical Diagram of External Trigger

2.4.2 Trigger Interface Wiring Examples

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

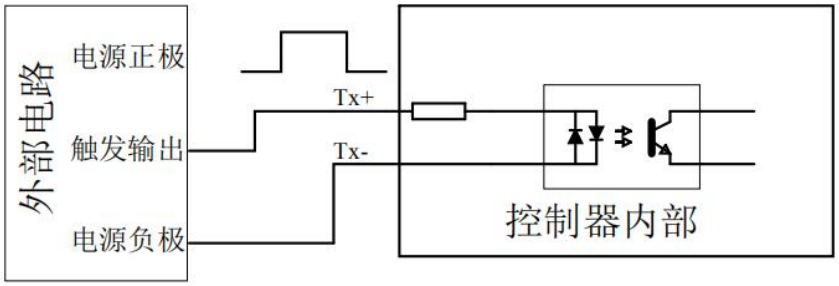


Figure 5 Wiring Example for Rising Edge or High-Level Validity

The trigger output of the external control circuit is connected to Tx, and the negative terminal of the power supply is connected 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 a falling edge or low level, the wiring is as shown in Figure 6:

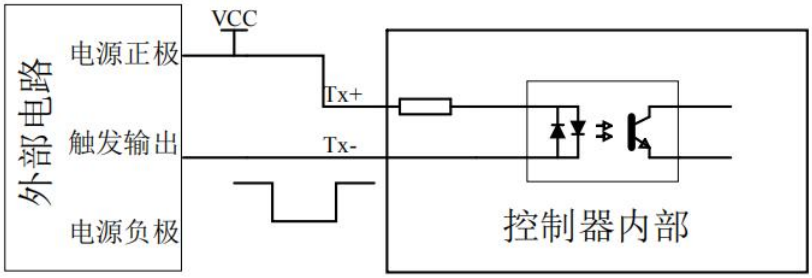


Figure 6 Wiring Example for Falling Edge or Low-Level Validity

The trigger output of the external control circuit is connected to Tx-, and the positive terminal of the power supply is connected 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 Diagrams

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

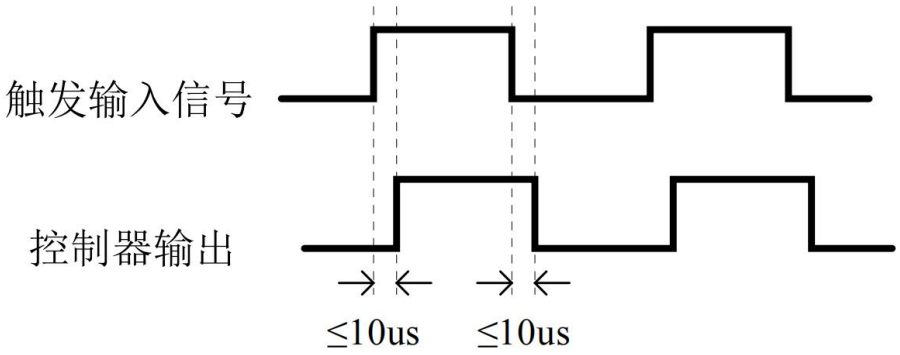


Figure 7 Constant Off Mode Timing Diagram

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

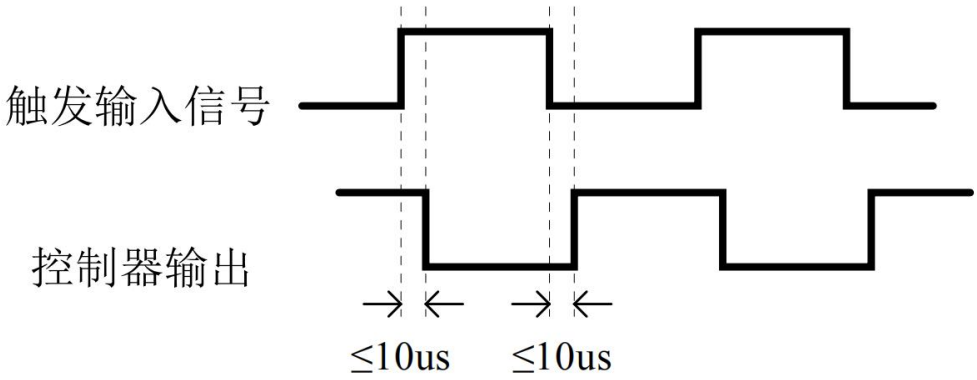


Figure 8 Constant On Mode Timing Diagram

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. The timing relationship (taking high-level validity as an example) is shown in Figure 9.

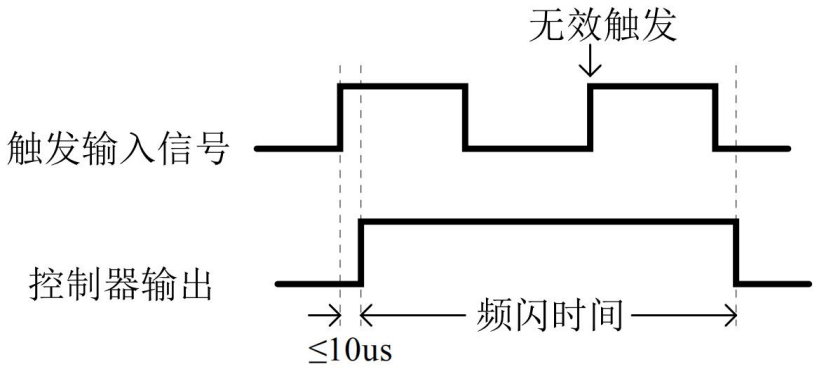


Figure 9 Strobe Mode Timing Diagram

2.5 Manual Settings

2.5.1 Brightness Setting

When the controller is turned on, the 4-digit 7-segment display shows "Channel Number + Brightness Value". Initially, it displays Channel 1 and its brightness value. For example, if the brightness value of Channel 1 was set to 10 last time, 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.

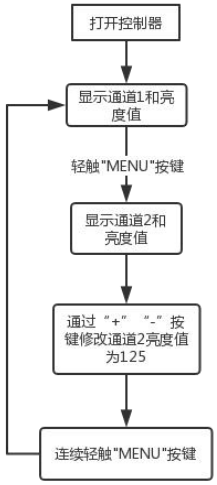


Figure 10 Brightness Setting Flow Chart

2.5.2 Mode Setting

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

The mode of each channel can be set individually. The following takes "setting the mode of Channel 2" 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.

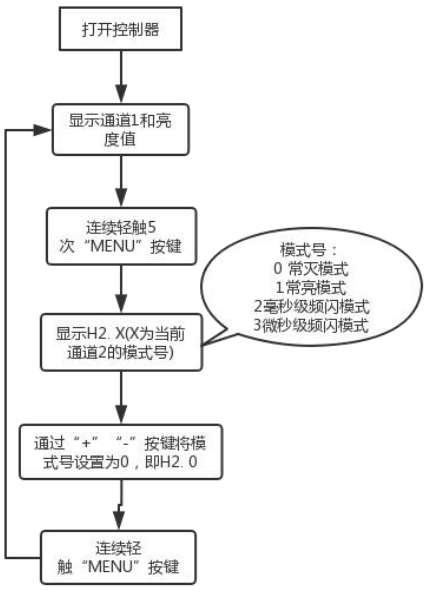


Figure 11 Constant Off Mode Setting Flow Chart

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

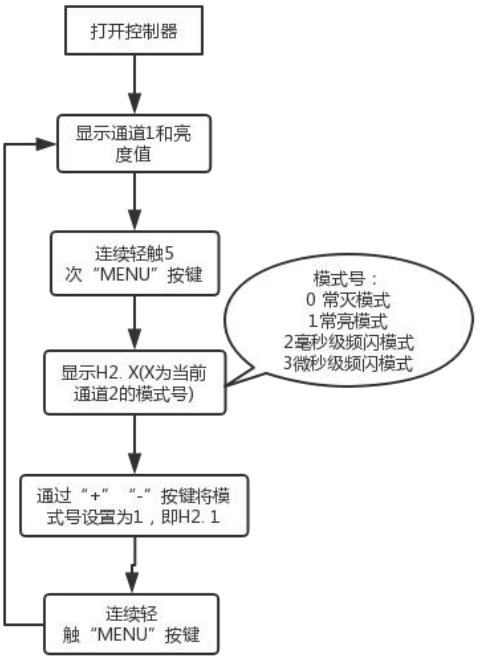


Figure 12 Constant On Mode Setting Flow Chart

The flow chart for setting Channel 2 to Millisecond-level Strobe mode and its strobe time is shown in Figure 13.

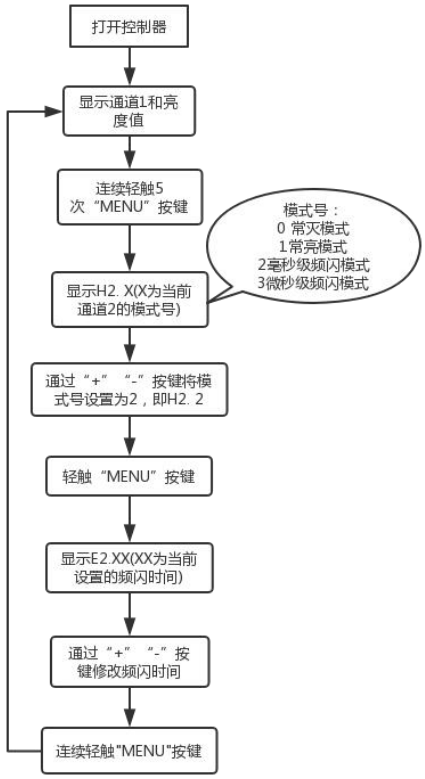


Figure 13 Millisecond-level Strobe Mode and Strobe Time Setting Flow Chart

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

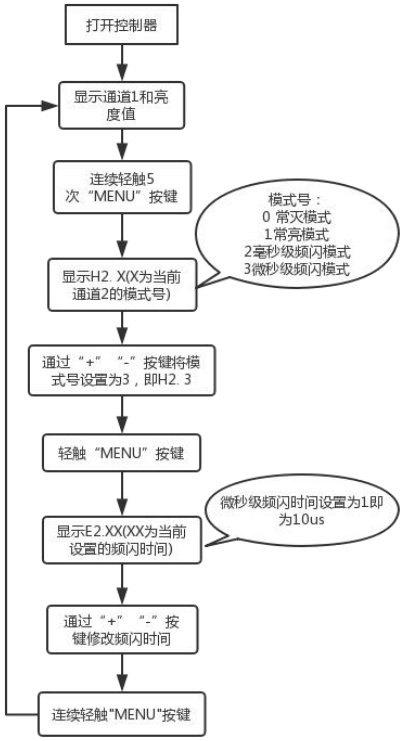


Figure 14 Microsecond-level Strobe Mode and Strobe Time Setting Flow Chart

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 15.

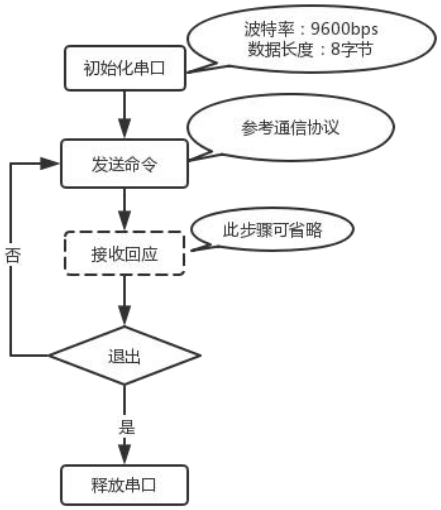


Figure 15 Communication Programming Flow Chart

3.2 Communication Settings

The communication format settings for the serial port are shown 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 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、Marker: "$" (dollar sign).

3、Command: Refer to Table 7 for specific command definitions.

4、When the command is "1", "2", "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 is "4":If the controller receives the command successfully, it returns the brightness setting parameters of the corresponding channel (the return format is the same as the send format).If the controller fails to receive the command, it returns "&".

6、Channel: "1", "2", "3", "4", "5", "6", "7", "8" (representing 8 channels respectively).

7、Data: "0XX" (XX is any value ranging from 00 to FF in hexadecimal), which corresponds to the setting parameters of the channel. The high byte comes first, and the low byte comes after.

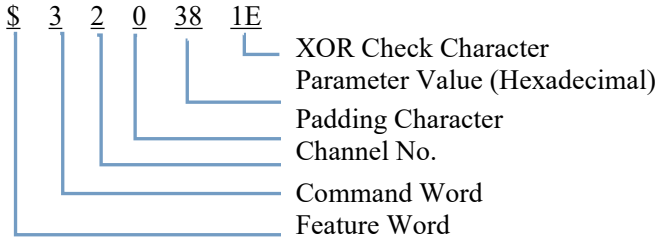
8、XOR Checksum: Calculated by XORing all bytes except the checksum bytes (including Marker, Command, Channel, and Data). The high 4 bits of the checksum (in ASCII code) come first, and the low 4 bits (in ASCII code) come after.

Table 7 Command Function Table

Character	Function	Description
“1”	Turn on the corresponding channel	The corresponding channel is determined by the Channel byte.
“2”	Turn off the corresponding channel	The corresponding channel is determined by the Channel byte.
“3”	Set brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel byte; brightness parameters are Data 1~Data 3.
“4”	Read brightness parameter of the corresponding channel	The corresponding channel is determined by the Channel byte; the return format is the same as the send format.
“7”	Trigger strobe for the corresponding channel	The corresponding channel is determined by the Channel byte; this function is invalid in non-strobe mode.
“8”	Set mode of the corresponding channel	The corresponding channel is determined by the Channel byte.
“9”	Set strobe time of the corresponding channel	The corresponding channel is determined by the Channel byte; this function is invalid in non-strobe mode.

3.4 Communication Examples

To set the brightness of Channel 2 to 56, send the ASCII string: "$320381E"



	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 value of the 3 Data bytes has no impact on the XOR result during the calculation of the XOR checksum. It is only required to ensure the data format is "0XX" (XX is any value ranging from 00 to FF in hexadecimal).

The following are additional sets of command data:

Turn off Channel 2: Command string = "$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: Command string = "$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: Command string = "$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 7-segment display of the controller shows a non-functional prompt command, troubleshoot according to the table below.

Command	Description	Troubleshooting Solution for Prompt Command
F.1	Unregistered	Re-register the device.
F.2	Storage chip damaged	Return the device to the factory for repair.
F.3	Exceeding light source power, short circuit, or signal interference	Check the light source power, check if the light source is short-circuited, and check for signal interference.
F.6	Over-temperature alarm (for some models)	The temperature is too high; check the controller's operating environment.
Loc	Button lock	Unlock via the DIP switch or long-press the "MENU" button.

5. Appendix