

OPT-DPH20048E-4

Light Source Controller User Manual



OPT Machine Vision Tech Co.,Ltd.

Revised in August 18,2020 V1.0.1

Copyright Reserved

1. All the logos and names of hardware and software products mentioned in this manual belong to OPT.
2. The copyright of this manual belongs to OPT Machine Vision Tech Co.,Ltd. Replication and distribution of the contents in any form, anywhere without permission from our company is straightly prohibited. The contents of this manual are subject to change without prior notice.

Caution and Warning

 Caution and Warning	
	This product should be connected to AC100- 240V power supply. Please ensure that the power switch controller is off when plugging in/out the power to prevent against electric shock.
	Please read the manual carefully in advance and strictly follow the instructions when operating the product.
	In case of any abnormal situation, please contact us and never disassemble the product by yourself.
	Please ensure that this product is well grounded to prevent electric shock.
	Do not stare directly into the light emitted from the LED since it does harm to your eyes. If a matched object is used, please take care not to let reflected light to enter your eyes.

Document Version Description

Version		Modification Date	Modification Explanation
V1.0.0		2017.10.15	First release
V1.0.1		2020.8.18	1. Revise the Software Operation Instructions chapter as the OPTControllerDEMO V3.4 description. 2. Add the Document Version Description paragraph

Contents

1. Product Introduction.....	1
1.1 Overview.....	1
1.2 Selection Guide.....	1
1.3 Notice For Accessories Selection.....	2
1.4 Shipping standard list.....	2
1.5 Performance Parameters.....	3
1.6 Error Code Description.....	4
1.7 Mode switch setting.....	4
2.Operation Instructions.....	5
2.1 Panel Description.....	5
2.2Connection Steps.....	6
2.3 Setting Pulse Width.....	6
2.4 Trigger Function.....	7
2.4.1 Trigger Mode Description.....	7
2.4.2 Sequence Reference Diagram Of Respond Time.....	9
2.4.3 Trigger Wiring Diagram.....	9
3. Software Operation Instructions.....	11
3.1 Software Function Description.....	11
3.2 Programmable Trigger Software Operating Instructions.....	14
3.3 User Programming Manual.....	16
4.Installation Instructions.....	17
4.1 DIN Rail Mounting Way.....	18
4.2 Screw Hole Mounting Way.....	18
4.3 Mounting Dimensions.....	18
5.Dimension Diagram.....	19
Mechanical Parameters.....	19

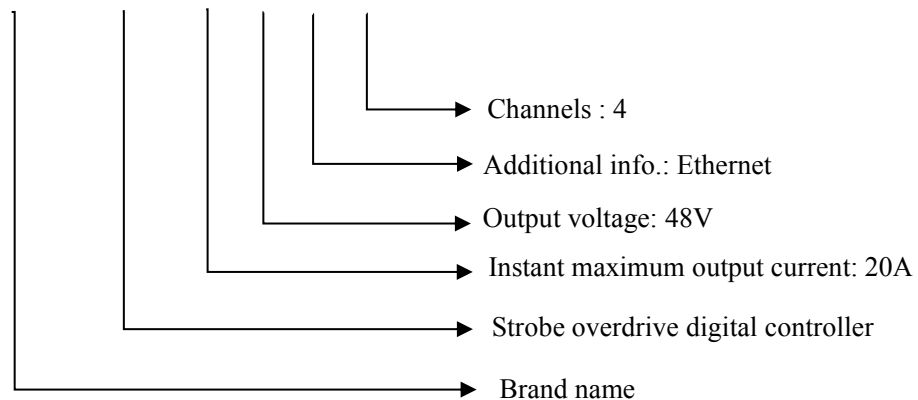
1. Product Introduction

1.1 Overview

First of all, thank you for choosing OPT products. The model of this controller is: OPT-DPH20048E-4, which is a brightness-increasing digital controller with an output voltage of 48V and an instant maximum output current of 20A. It has the following functions: instant brightening, trigger pulse width can be set, software trigger, external trigger, internal self-trigger, programmable trigger, 100M Ethernet communication and RS232 communication.

1.2 Selection Guide

OPT - DPH 200 48 E - 4



1.3 Notice For Accessories Selection

1. Network Cable Selection

Shipped standard network cable: six types, pure copper, 3 meters in length

Precautions for self-purchased network cable: Category 6 (including Category 6) and above, made of pure copper; length within 50 meters

2. Precautions for buying a switch or router

choose a well-known brand such as Netgear, the best rate is 100Mbps (Including 100Mbps) and above ,The following models are available:

Router: Netgear WGR614 (150Mbps)

Switch: Netgear FS308 (8-port 100M)

1.4 Shipping standard list

Item	Model specifications	Image	Quantity
Light Source Controller	DPH20048E-4		1
Power cord	National standard L = 1.8 m		1
Serial cable	Direct connection L = 1.8 m		1
Network cable	Six pure copper L = 3m		1
Trigger terminal	3.81-5PIN		1

1.5 Performance Parameters

Item	Parameter	Description
Input Voltage	AC100-240V 50/60Hz	
Input Current	3.6 / 115VAC 2A / 230VAC	
Output Voltage	48V	
Lighting Mode	Strobe	
Internal Self-Triggering	Yes.	Switch through the DIP switch on the panel, at this time the external trigger is invalid
Internal Self-Trigger Period	15- 1000ms	Set via DEMO software
External trigger	Level trigger	Trigger on rising edge by default
External Trigger Output Pulse Width	1- 1023 μ s	Adjusted via front panel encoder or DEMO software
Programmable Trigger	Support up to 64 programmable steps	Pulse width, and trigger source can be set
Response Time	$\leq 10\mu$ s	
External Trigger Frequency Upper Limit	1 - 900Hz can be set	Default 40HZ
Short Circuit Protection	Yes.	When the controller output is short-circuited, the corresponding channel short-circuit protection is started, the corresponding channel is closed and the digital tube displays Err2 error message
Instant Maximum Output Current	20A/CH	
Communication	RS232 / Ethernet	
Standby Power	≤ 3.4 W	
Hi-Pot Test	AC1500V 1Min	Leakage current<10mA
Insulation	DC500V	Insulation resistance>20M Ω
Operating Temperature	-5 $^{\circ}$ C- 50 $^{\circ}$ C	
Dimensions (L $\times$ W $\times$ H)	91 $\times$ 133 $\times$ 171 mm	See dimension diagram for details
Weight (Kg)	1.1	

1.6 Error Code Description

Code	Description	Display	Solution
Err2	Short Circuit Protection	"Err2"	Remove the error and restart
Err4	Communication error between driver board and main board	"Err4"	Return to OPT for repair
Err5	Communication error between display board and main board	"Err5"	Return to OPT for repair

Note: The digital tube displays "----" when the controller is turned on, and the corresponding value will be displayed after the controller is turned on.

1.7 Mode switch setting

Working mode switch	Mode
EXT TRIG	External trigger mode
INT TRIG	Internal self-triggering mode

2.Operation Instructions

2.1 Panel Description

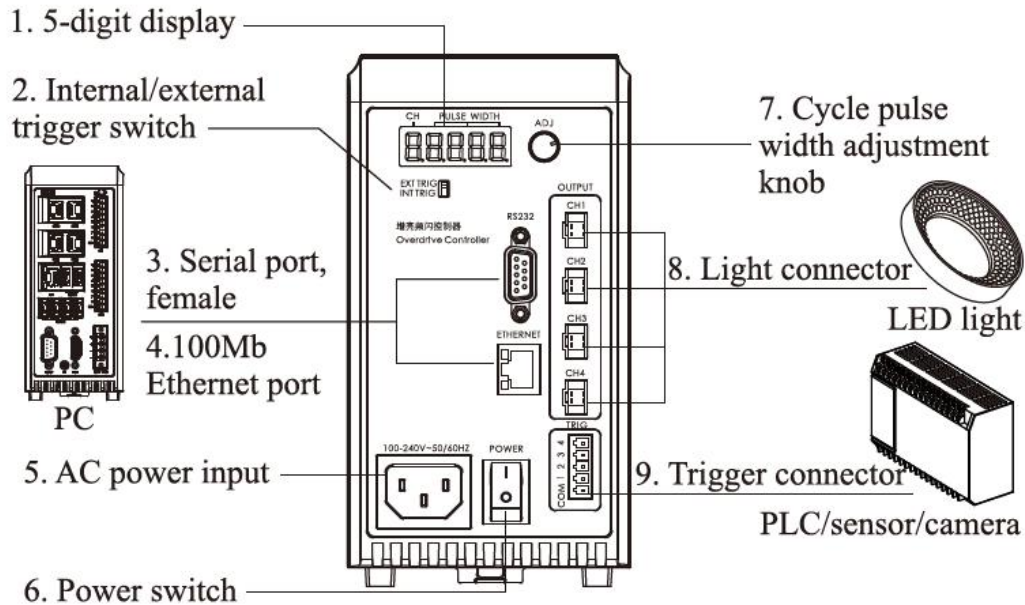


Figure 2.1 Panel Description Diagram

No.	Item	Description
1	5-digit display	The first digit from the left is the current operation channel, and the last four digits are the corresponding values of the current operation
2	Working mode switch	Function switching, refer to the "1.7 Mode Switch Setting" chapter for details
3	Serial port ,female	Communicate with PC equipment via RS232
4	100Mb Ethernet port	Communicate via Ethernet and PC devices
5	AC power input	Input AC100 - 240V 50 / 60Hz
6	Power switch	Power on/off the controller
7	Cycle pulse width adjustment knob	Adjust the value of each channel, press the encoder, the digital tube flashing bit is the selected bit, then press it to select the next, clockwise rotation increases the value, counterclockwise rotation decreases the value.
8	Light connector	A total of 4 light sources output, each channel can be independently controlled
9	Trigger connector	Connect external trigger signal source for synchronous strobe work,trigger pulse width can be set

2.2 Connection Steps

Step 1 Connect the light source to the controller (refer to Figure 2.1)

Step 2 If external trigger control is required, please connect the external trigger signal source to the trigger port of the controller.

Step 3 Connect the power (AC100- 240V), press the red power switch button. When the light is on and the digital tube displays the channel value, it means that it is powered on.

Step 4 If you need to control the controller with a PC device, please use the RS232 data cable or network cable to connect to the PC device in the shutdown state, and then use the DEMO program provided by our company or the program written by your company to control it. When operating in RS232 mode/Ethernet mode, the parameters of each channel can still be set manually, that is, both the host computer and the controller can set the parameters without the need for mode conversion.

2.3 Setting Pulse Width

1. Manual Mode

(1) Press the encoder switch, the first digit tube starts flashing, indicating that you can select the channel where the pulse width needs to be set. Rotate the encoder channel clockwise increases the channel position, rotate the encoder channel counterclockwise decreases the channel position.

(2) After selecting the channel position, press the encoder switch again and the second digit tube starts flashing, indicating that the current channel pulse width value can be adjusted to thousands. Rotate the encoder clockwise increases the value, rotate the encoder counterclockwise decreases the value.

(3) After adjusting the thousands of pulse width value, press the encoder switch again. The third digit tube starts flashing, indicating that the hundredth digit of the current channel pulse width value can be adjusted. Rotate the encoder clockwise increases the value, rotate the encoder counterclockwise decreases the value

(4) After adjusting the hundredth of pulse width value, press the encoder switch again. The forth digit tube starts flashing, indicating that the tenth digit of the current channel pulse width value can be adjusted. Rotate the encoder clockwise increases the value, rotate the encoder counterclockwise decreases the value

(5) After adjusting the tenth digit of pulse width value, press the encoder switch again. The fifth digit tube starts flashing, indicating that the single digit of the current channel pulse width value can be adjusted. Rotate the encoder clockwise increases the value, rotate the encoder counterclockwise decreases the value.

After adjusting the single digit of pulse width value, press the encoder switch again. The digital tube stop flashing indicates that the pulse width value has been set and saved.

2. DEMO software setting method

Refer to the " 3.Software Operation Instructions" chapter for more details.

2.4 Trigger Function

The trigger function of the controller has three trigger modes: internal self-trigger, external trigger and programmable trigger and two trigger polarities: rising edge trigger and falling edge trigger. The default is rising edge trigger. See the following table for details:

Trigger mode	Trigger polarity
Internal self-triggering mode	Automatic trigger
External trigger mode	Rising edge trigger
	Falling edge trigger
Programmable trigger mode	Rising edge trigger
	Falling edge trigger

2.4.1 Trigger Mode Description

1. Internal self-triggering mode

This mode does not require external input trigger signal, the controller will automatically strobe according to the setting of internal self-trigger cycle, and the output pulse width is consistent with the setting of trigger pulse width value. The internal self-trigger period can be set from 15 to 1000ms, and can be set by the encoder or DEMO software.

2. External trigger mode

In this mode, the light source flashes once when a trigger signal is input to the controller. The trigger pulse width time can be set from 1 to 1023 μ s, which can be set by adjusting the encoder or DEMO software.

3. Programmable trigger mode

Switch to programmable trigger mode via DEMO. Programmable trigger mode uses the idea of programming to allow the trigger mode to write a trigger process according to actual needs. Each step in the trigger process can set the brightness and pulse width trigger of each channel to different values, and there is only one trigger source can trigger this step. The controller will cycle through the steps in the flow chart. Before using the programmable trigger mode, the flow chart must be set in advance. The flow chart needs to set the trigger signal source and trigger pulse width, in which the trigger signal source is selected from 1 to 4, and the trigger pulse width can be set from 0 to 1023 μ s.

For example, in a product inspection occasion, the camera needs to take pictures in 4 times, and the light source output parameters required for each picture are different. Among them, the light source output parameters required for each picture are shown in Table 2.1, and the corresponding timing diagram is shown in the figure 2.2 If the traditional trigger mode is used for control, the brightness level and pulse width trigger of the light source of each channel need to be reset each time a picture is taken, which greatly increases the response time of the controller. In the same situation, in the programmable mode, you can divide 4 shots into 4 steps. In each step, the output parameters of each channel light source are set according to the conditions in the table, and each step only needs a trigger source to control 4 channel output, the controller cyclically executes each step according to the preset light source output parameters. Since the light source

output parameters required for each step of taking pictures by the camera are pre-set, the time required for setting the parameters is saved, and the response time of the controller is greatly reduced.

Table 2.1

Steps	Trigger source	Brightness level				Pulse width trigger			
		CH 1	CH 2	CH3	CH4	CH1	CH 2	CH3	CH4
1	1	0	0	0	0	400	100	400	100
2	2	0	0	0	0	300	200	300	200
3	3	0	0	0	0	200	300	200	300
4	4	0	0	0	0	100	400	100	400

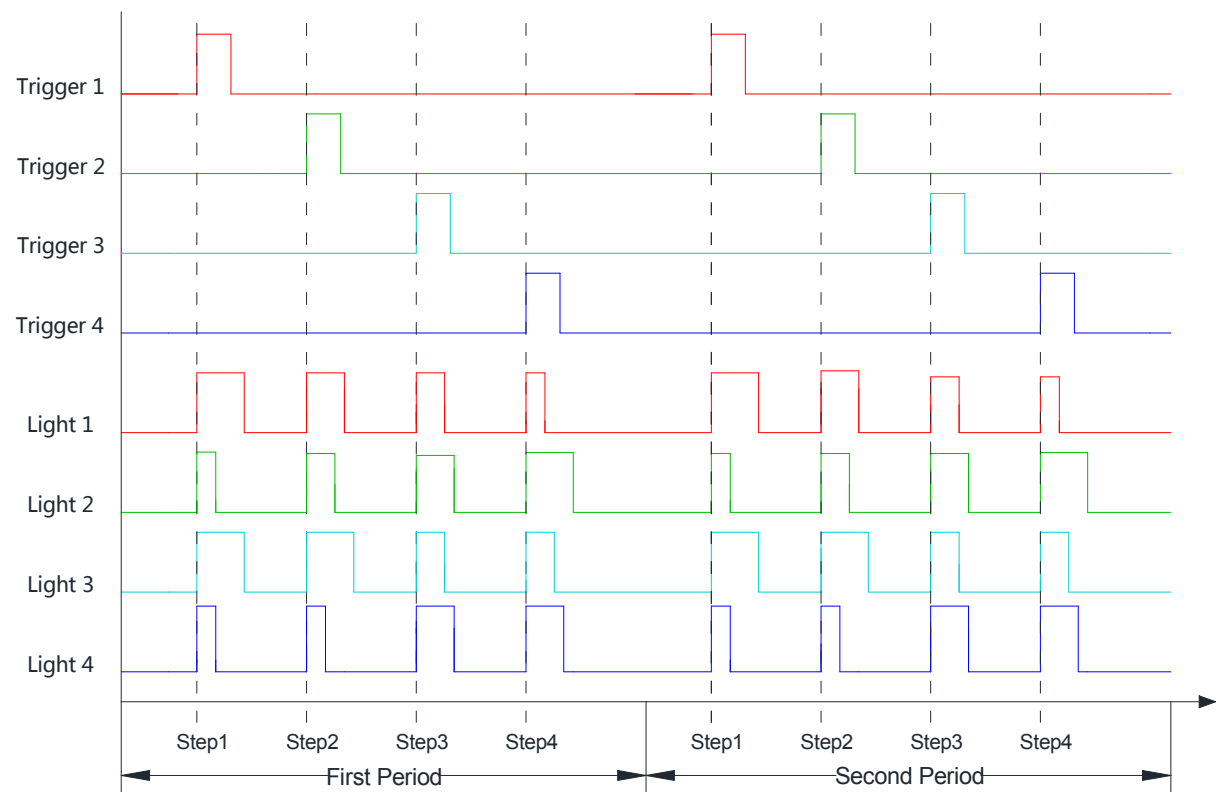


Figure 2.2

Notes:

- (1) Trigger is the trigger signal, Light is the light source output signal;
- (2) Programmable trigger mode can set up to 32 processes, the above figure is a timing diagram of 4 processes, the trigger signal source is Trigger1, Trigger2, Trigger3, Trigger4 in sequence;
- (3) Trigger pulse width 1- 1023 μ s can be set in 4 processes.

2.4.2 Sequence Reference Diagram Of Respond Time

1. Rising Edge Trigger

Illuminating time is equal to the set trigger pulse width. Trigger pulse width set via DEMO or adjustment key. Refer to Figure 2.3.

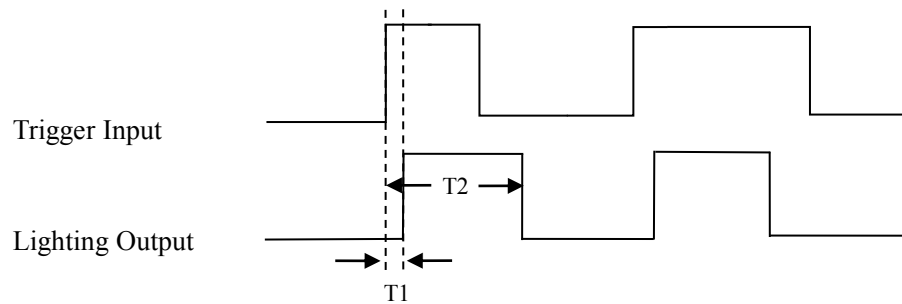


Figure 2.3

2. Falling Edge Trigger

Illuminating time is equal to the set trigger pulse width. Trigger pulse width set via DEMO or adjustment key. Refer to Figure 2.4.

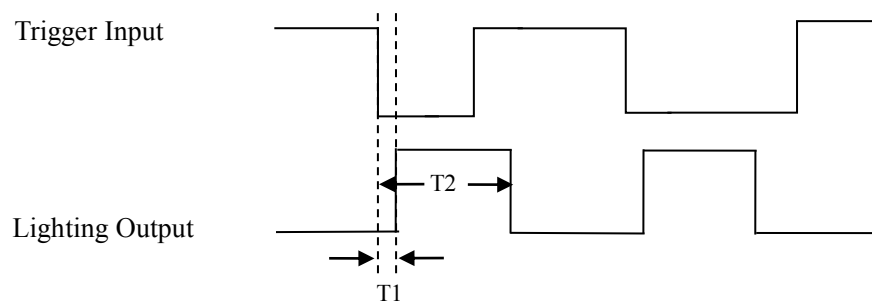


Figure 2.4

Notes:

- (1) T1 is the open response time, and T2 is the trigger pulse width.
- (2) $T1 \leq 10\mu s$; T2 can be set, the range is between 1- 1023 μs .

2.4.3 Trigger Wiring Diagram

The trigger port of the controller has 4 channels, COM is the common terminal (as shown in the figure below), and it contains two-way optocoupler isolation. It is low level when the input voltage is 0- 2V, and is high level when the input voltage is 5- 24V.

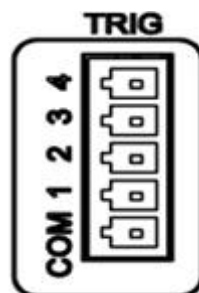
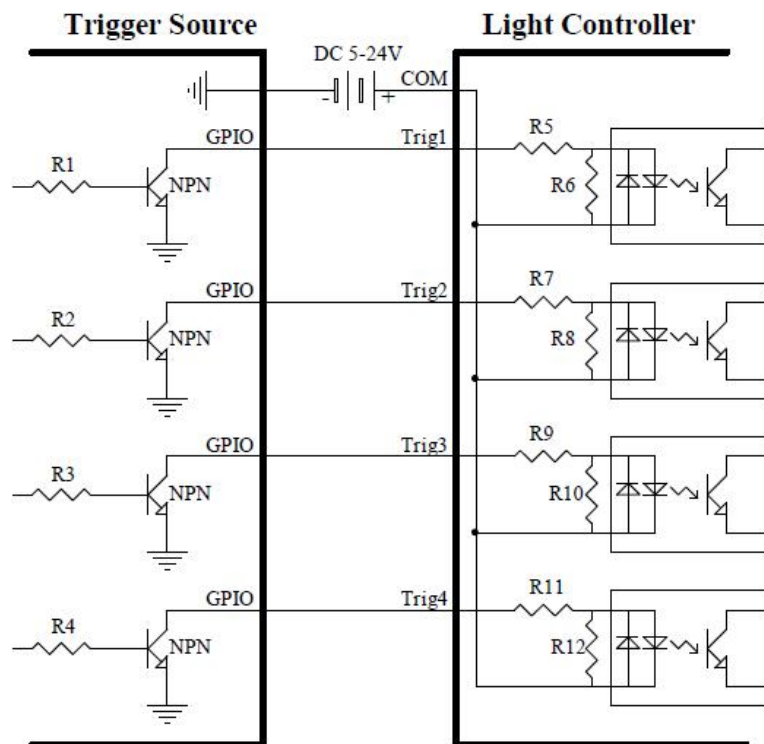


Figure 2.5

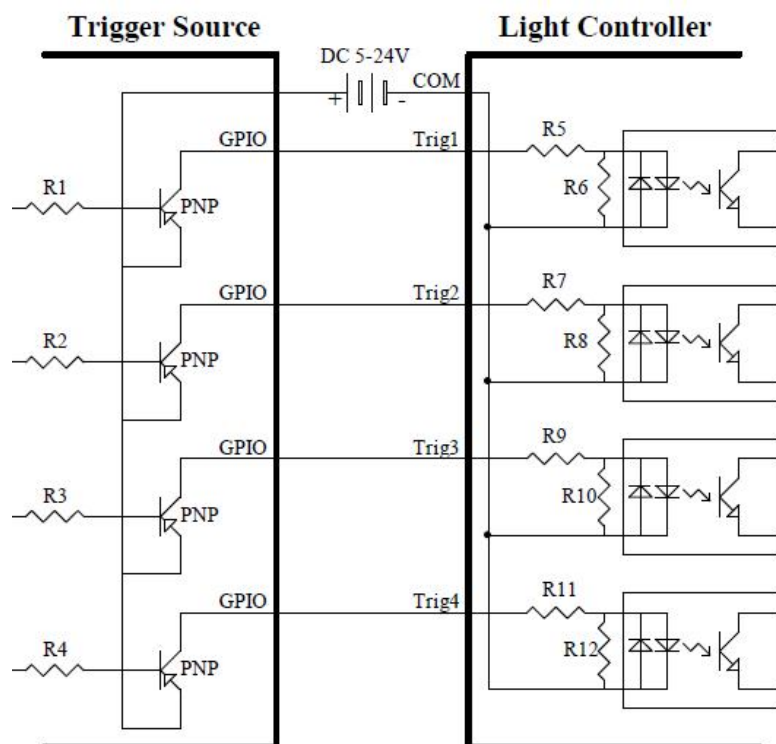
The following two figures show the trigger wiring diagrams that commonly used:

1. NPN trigger type



Trig Input Circuit for NPN Type Trigger

2. PNP trigger type



Trig Input Circuit for PNP Type Trigger

3. Software Operation Instructions

3.1 Software Function Description

No.	Function	Description	The Corresponding Interface
1	Turn On Channel(s)	Function: Turn on the corresponding channel Channel: The channel that needs to be opened (parameter 0 means all channels) Parameter:None	Short / long command function
2	Set Normal Trigger Width	Function: set the output pulse width of normal trigger Channel: The channel for which the pulse width trigger needs to be set (parameter 0 represents all channels) Parameter: 1-1023(unit μ s)	Short / long command function
3	Read Normal Trigger Width	Function: read the output pulse width of normal triggers Channel: channel that needs pulse width trigger reading Parameter:None	Short command function
4	Software Trigger	Function: each time a command is sent, the time the light source is on is the set value. Channel: channel that needs software trigger (parameter 0 means all channels) Parameter: 1-1023(unit μ s)	Short / long command function
5	Set Trigger Delay	Function: Set trigger delay for corresponding channel Channel: The channel that need to be set trigger delay (0 means total channels) Parameters: 0 - 65000 (unit 1 μ s)	Short / long command function
6	Read Trigger Delay	Function: Read trigger delay for corresponding channel Channel: The channel that need to be read trigger delay Parameter:None	Short command function
7	Read Property	Function: Read corresponding property for controller Channel:None Parameter: 1:Read Model 2:Read Firmware Version	Advanced setting function

No.	Function	Description	The Corresponding Interface
8	Read Serial Number	Function: Read serial number for controller Channel:None Parameter:None	Advanced setting function
9	Read IP Config	Function: Read IP configuration which will return message with IP address, sub-net mask and default gateway. Channel:None Parameter:None	Advanced setting function
10	Set Outer Trigger Frequency Upper Bound	Function: set the maximum external trigger frequency of the controller Channel: The channel that need to be set trigger delay (0 means total channels) Parameters: 1-900(Hz)	Advanced setting function
11	Read Outer Trigger Frequency Upper Bound	Function: read the maximum trigger frequency outside the controller Channel: the corresponding channel that need external trigger frequency reading Parameters: None	Advanced setting function
12	Set Internal Trigger Period	Function: set the controller internal self-trigger period Channel: the corresponding channel that need internal self-trigger period setting Parameters: 15-1000 (unit 1ms)	Advanced setting function
13	Read Internal Trigger Period	Function: reads the internal self-triggering period of the controller channel Channel: the corresponding channel that needs internal self-trigger period reading Parameters: None	Advanced setting function
14	Set Trigger Polarity	Function: setup controller trigger polarity Channel: the corresponding channel that need controller trigger polarity setup (parameter 0 means all channels) Parameter: 2. Falling edge trigger 3: Rising edge trigger	Advanced setting function

No.	Function	Description	The Corresponding Interface
15	Read Trigger Polarity	Function: Controller trigger polarity reading Channel: need to read the corresponding channel trigger polarity Parameters: None	Advanced setting function
16	Enable CheckSum	Function: Enable checksum Channel:None Parameter: 0:Disable 1:Enable	Advanced setting function
17	Enable Respond	Function: Enable return value Channel:None Parameter: 0:Disable 1:Enable.	Advanced setting function
18	Enable Power Off Backup	Function: Enable power off backup, the data will be saved when the power is turned off. Channel:None Parameter: 0:Disable 1:Enable	Advanced setting function
19	Enable DHCP	Function: Enable DHCP Channel:None Parameter: 0:Disable 1:Enable	Advanced setting function
20	Set Keepalive Parameters	Function: Set keep-alive parameter Channel:None Parameter0:KeepAlive_time Parameter1:KeepAlive_interval. Parameter2:KeepAlive_probes.	Advanced setting function
21	Enable Keepalive	Function: Enable keep-alive Channel:None Parameter: 0:Disable 1:Enable	Advanced setting function
22	Read Keepalive Switch States	Function: Read the keep-alive switch state for Ethernet communication Channel:None Parameter:None	Advanced setting function
23	Read Continuous Keepalive Time	Function: Read continuous keep-alive time for Ethernet communication Channel:None Parameter:None	Advanced setting function

No.	Function	Description	The Corresponding Interface
24	Read Delivery Interval Time Of Prop Packet	Function: Read delivery interval time of Probe Packet for Ethernet communication Channel:None Parameter:None	Advanced setting function
25	Read Delivery Time Of Prop Packet	Function: Read delivery times of Probe Packet for Ethernet communication Channel:None Parameter:None	Advanced setting function
26	Read Keepalive Switch States	Function: Read the keep-alive switch state for Ethernet communication Channel:None Parameter:None	Advanced setting function
27	Read Output Board Version	Function: Read the output board vision of controller Channel:None Parameter:None	Advanced setting function

3.2 Programmable Trigger Software Operating Instructions

No.	Function	Operation Instruction	The Corresponding Interface
1	Read Step Count	Click the "Programmable Trigger Setting" button, select the corresponding channel group, select "Read Step Count" in the function option, and then click the "Apply" button.	Programmable Trigger Function
2	Set Trigger Mode	Click the “Programmable Trigger Setting” button, select the corresponding channel group, and select “Set Trigger Mode” in the function option. Then, select corresponding trigger mode in the parameter and click “Apply” button; the parameter include two trigger modes: General Trigger Mode and Programmable Trigger Mode.	Programmable Trigger Function
3	Read Trigger Mode	Click the “Programmable Trigger Setting” button, select the corresponding channel group, select “Read Trigger Mode” in the function option and then click “Apply” button. Status bar will return the corresponding trigger mode.	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
4	Set Current Step Index	Click the “Programmable Trigger Setting” button, select corresponding channel group, select “Set Current Step Index” in the function option, write the step number parameter in the parameter options (the range is greater than or equal to 1 and less than or equal to the total number of steps in the programmable trigger table), and then click the "Apply" button.	Programmable Trigger Function
5	Read Current Step Index	Click the “Programmable Trigger Setting”, select corresponding channel group, select “Read Current Step Index” in the function option, and then click the “Apply” button.	Programmable Trigger Function
6	Reset Current Step Index	Click the "Programmable Trigger Setting" button, select the corresponding channel group, select "Reset Current Step Index" in the function option, and then click the "Apply" button.	Programmable Trigger Function
7	Add Programmable Trigger Step	Click the "Programmable Trigger Setting" button, select the corresponding channel group, select the position where the programmable trigger step needs to be inserted, click the "+" button on the interface, and insert a programmable trigger step in the upper line of the selected programmable trigger option, and then set the trigger source and trigger pulse width parameter.	Programmable Trigger Function
8	Delete Programmable Trigger Step	Click the "Programmable Trigger Setting" button, select the corresponding channel group, select the position where the programmable trigger step needs to be deleted, and click the "-" button on the interface to delete the selected programmable trigger step.	Programmable Trigger Function
9	Write Programmable Trigger Table	Click the "Programmable Trigger Setting" button, select the corresponding channel group, set the programmable trigger table to be written, and click the "write" button.	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
10	Read Programmable Trigger Table	Click the "Programmable Trigger Setting" button, select the corresponding channel group, and then click the "Read" button.	Programmable Trigger Function
11	Import Programmable Trigger Table	Click the "Programmable Trigger Setting" button, select the corresponding channel group, click the "Import" button, select the file location where the programmable trigger table needs to be uploaded, and click "Open" to import the selected programmable trigger table.	Programmable Trigger Function
12	Export Programmable Trigger Table	Click the "Programmable Trigger Setting" button, select the corresponding channel group, click the "Export" button, select the file location where the programmable trigger table needs to be saved, modify the name of the programmable trigger table, and click "Save".	Programmable Trigger Function
13	Clear Status Bar	Click the "Programmable Trigger Setting" button, select the corresponding channel group, and then click the "Clear" button.	Programmable Trigger Function

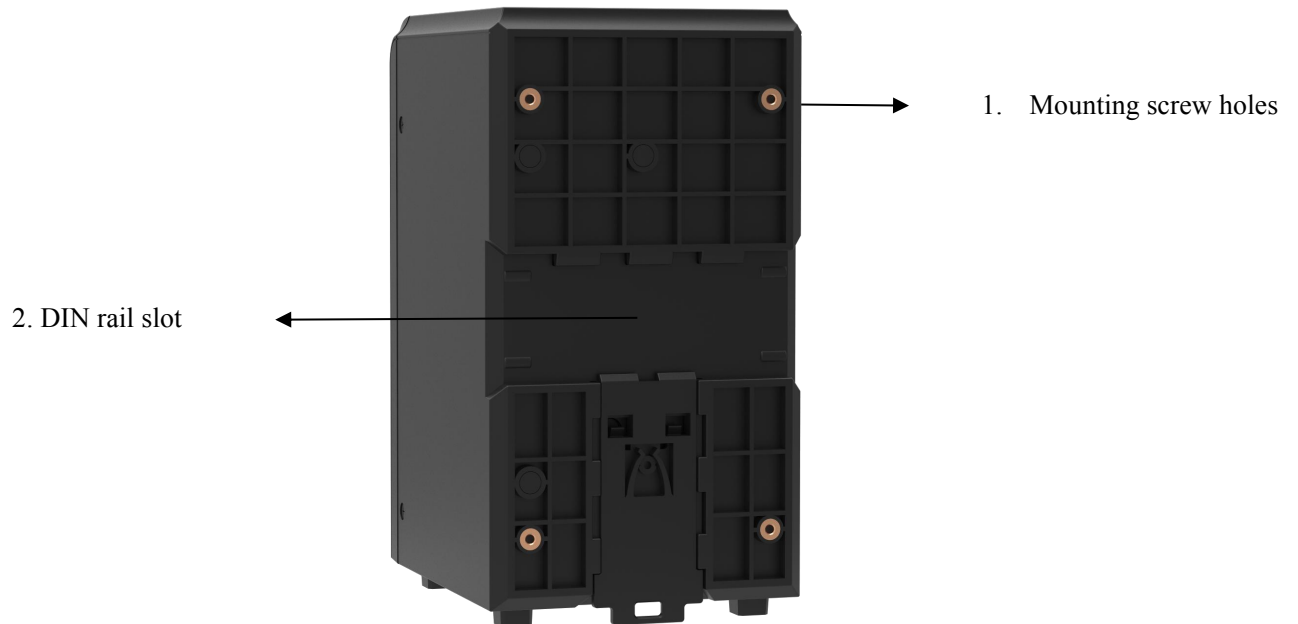
Note:

For specific software operation instructions, please refer to the "V3.4 Controller DEMO Operation Instructions" document

3.3 User Programming Manual

In order to facilitate the secondary development of customers, our company provides a program development package for this controller. For details on how to use this program development package, please read the user programming manual provided by our company in detail.

4.Installation Instructions



No.	Interface	Description
1	Mounting screw holes	Screw hole mounting
2	DIN rail slot	Standard DIN rail mounting

4.1 DIN Rail Mounting Way

Mounting steps (Figure 1):

- (1) First, snap the DIN rail slot position 1 on the back of the controller to the guide rail.
- (2) Then push the lower end of the controller hardly to make position 2 snap onto the rail.

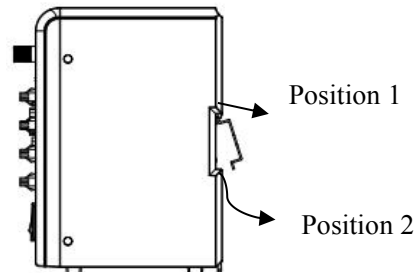


Figure 1 Mounting steps

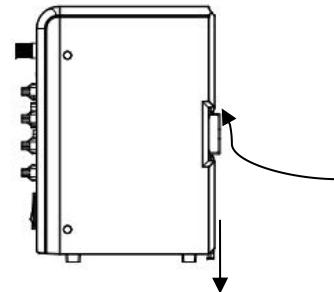


Figure 2 Removal steps

2, Removal steps (Figure 2):

- (1) First, pull the lower end of the controller.
- (2) Push up and remove the controller.

4.2 Screw Hole Mounting Way

Mounting steps (Figure 3):

1. First, lock the fixed plate on the controller.
2. Then fix the screws on the fixed plate to fix the controller.
3. Lock the fixed plate to the installed equipment or instrument.

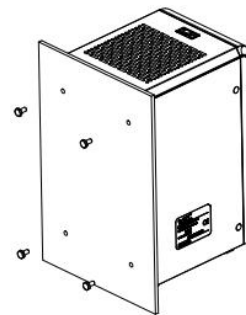


Figure 3 Screw Hole Mounting

4.3 Mounting Dimensions

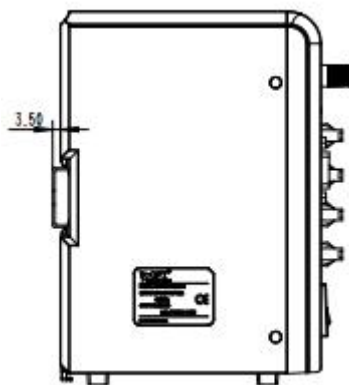


Figure 4 DIN Rail Mounting Dimensions

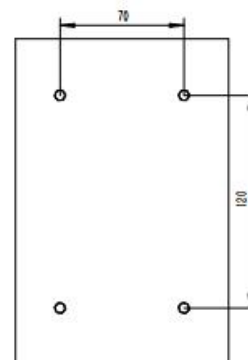


Figure 5 Screw Hole Mounting Dimensions

5. Dimension Diagram

Mechanical Parameters

DPH20048E-4

