

OPT-DPA6024ES-X Series LED Light Controller User Manual



OPT Machine Vision Tech Co.,Ltd.

Revised in March 20,2023 V1.0

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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	2023.3.15	First release

Contents

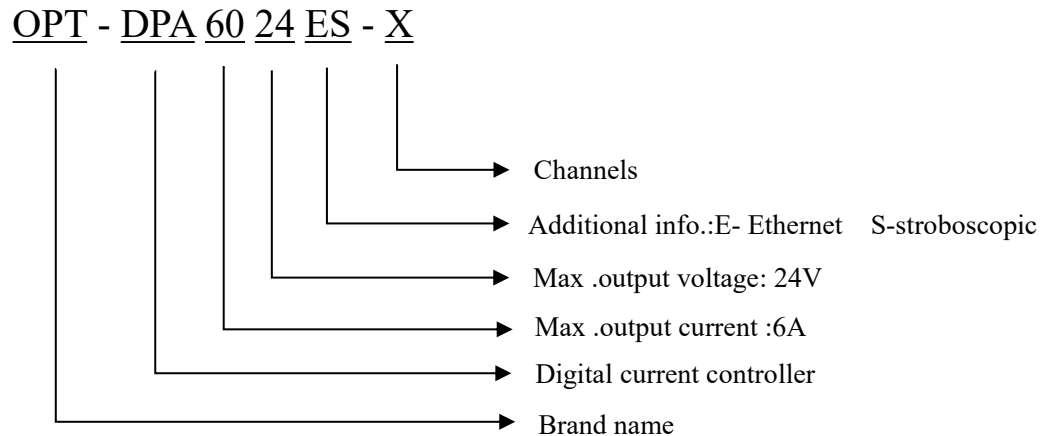
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1. Product Introduction

1.1 Overview

First of all, thank you for choosing the OPT product. The model of this series of controllers is : OPT-DPA6024ES-X (X=4,8,16) , is a Line-scan type digital current controller which is applied to the OPT 24V LED light . It has the following functions: 256-level brightness adjustment,multi-channel simultaneous communication,normal trigger,high intensity trigger,programmable trigger,Frequency multiplication, Frequency division,number of line-scan rows,isolated differential outputs,pulse width trigger can be set, manual setting of maximum output current, 100M Ethernet communication , RS232 communication.

1.2 Selection Guide



1.3 Model Classification

Model	Channels	Compatible Light
OPT-DPA6024ES-4	4	OPT 24V LED light
OPT-DPA6024ES-8	8	OPT 24V LED light
OPT-DPA6024ES-16	16	OPT 24V LED light

1.4 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)

1.5 Shipping Standard List

Item	Model specifications	Image	Quantity
Controller	DPA6024ES-X		1
Power cord	National standard L=1.8m 16A		1
Serial cable	Direct connection L = 1.8 m		1
Network cable	Six pure copper L = 3m		1
Trigger connector	2.54-8PIN		3
Trigger connector	2.54-9PIN		3
Trigger connector	2.54-12PIN		1

1.6 Performance Parameters

Item		Parameter	Description
Input voltage		AC100 - 240V 50/60Hz	
Input current	4CH/8CH	9A/115VAC 4A/230VAC	
	16CH	16A/115VAC 8A/230VAC	
Lighting mode		Continuous /Strobe	Set via the working mode switch or DEMO software
Setting for max.output current		25mA-6A	Set via DEMO software
Intensity Control		256 levels	Set via function button or DEMO software
Short-circuit Protection		Yes	The related channel is shut down and “Er2” displays.It is enabled by default
Normal trigger		256 intensity levels settable	
Normal trigger time unit		1μs/10μs /1ms/100ms	Set via DEMO software
Normal trigger pulse width		1μs - 30s	Set via function button or DEMO software
High intensity trigger		6A output per channel	Maximum output voltage: no more than 24V
High intensity trigger pulse width time unit		1μs/10μs /1ms	Set via DEMO software
High intensity trigger pulse width		1μs-500ms	Set via function button or DEMO software
Programmable trigger		Support up to 64 processes	The intensity, pulse width of each step can be set
Number of line-scan rows		1-65000	Set via DEMO software
Frame signal filtering parameter		0~65000	=0, frame signal edge is valid; > 0, the unit of time is μs. After the edge is captured, it takes effect for a period of time
DI input		4CH: 4 isolated differential inputs	Low level: 0-2V; high level: 5-24V
		8/16CH: 8 isolated differential inputs	
		AB phase, Line, Frame signal input	
DO input		4CH: 4 isolated differential outputs	5V 100mA
		8/16CH: 8 isolated	

Item		Parameter	Description
		differential outputs	
		Line, Frame signal output	
Frequency multiplication		1、2、4、8、16、32	Set via DEMO software
Frequency division		0~200	Set via DEMO software
Trigger response time		$\leq 5\mu s$	See the Table 2.2 “Reference Table for Trigger Response Time” for details
Trigger response frequency		80kHz	
Trigger delay time unit		1 μs /10 μs /1ms	Set it via DEMO software
Trigger delay		1 μs ~6500ms	Set it via DEMO software
Output power		144W/CH	4CH/8CH total output $\leq 700W$; 16CH total output $\leq 1450W$;
Communication		RS232/ Ethernet	
Standby power consumption	4CH	$\leq 16.2W$	Input 220V
	8CH	$\leq 18.5W$	
	16CH	$\leq 22.5W$	
Hi-Pot test		AC1500V 1Min	Leakage current $< 10mA$
Insulation		DC500V	Insulation resistance $> 20M\Omega$
Operating temperature		-5°C~50°C	
Dimensions (mm ³) (L×W×H)	4CH	234*357.5*176	See the dimensional drawing
	8CH	234*357.5*176	
	16CH	189*381.3*309.5	
Weight (Kg)	4CH	3.2	
	8CH	4.48	
	16CH	8.9	

1.7 Error Code Description

Code	Description	Display	Solution
Er0	No LED connected	"Er0"	Connect an LED light
Er2	Short Circuit Protection	"Er2"	Remove the error and restart

Notes:

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

2. DPA6024ES controller can connect OPT 24V LED light .
3. Never connect the controller to the lighting with current lower than the maximum output current. Otherwise, it may damage the lighting because of current mismatch.

1.8 Mode switching settings

Mode	Indicator Status
Continuous	CON indicator ON
Normal trigger	NTR indicator ON
High intensity trigger	HTR indicator ON
/	LOC indicator ON, panel locked and the function button is invalid when the software sets the working mode. When the working mode is set to panel mode, the button will be unlocked

2. Operation Instructions

2.1 Panel Instructions

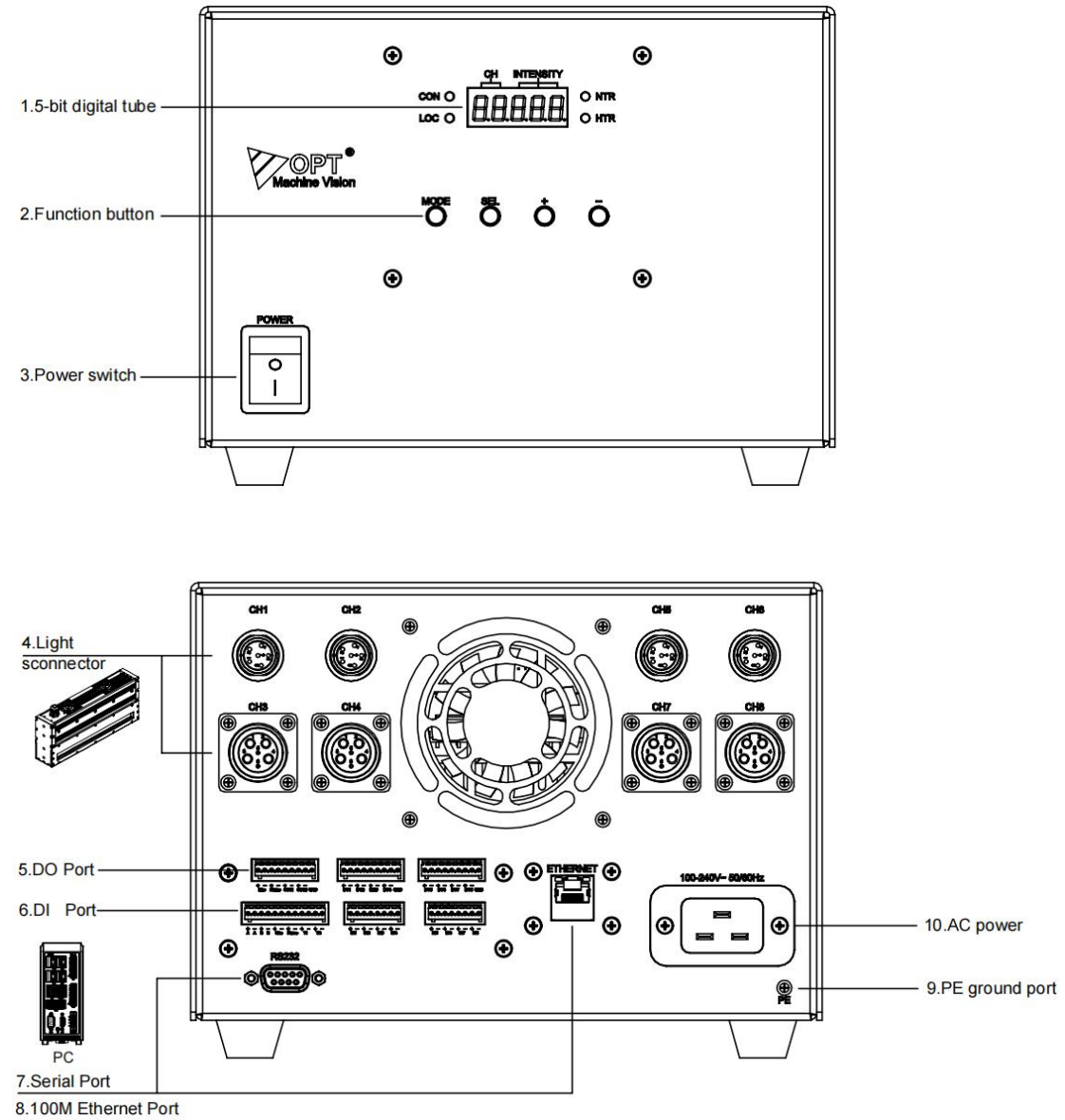
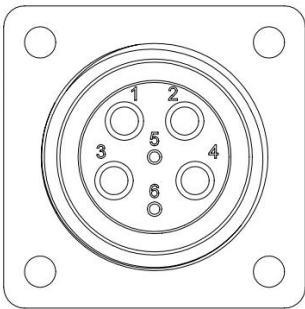
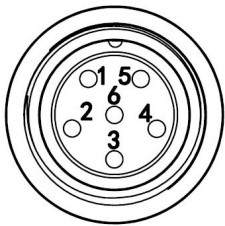


Figure 2.1 Panel Description Diagram

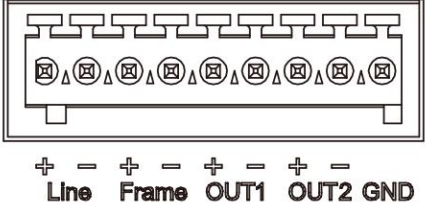
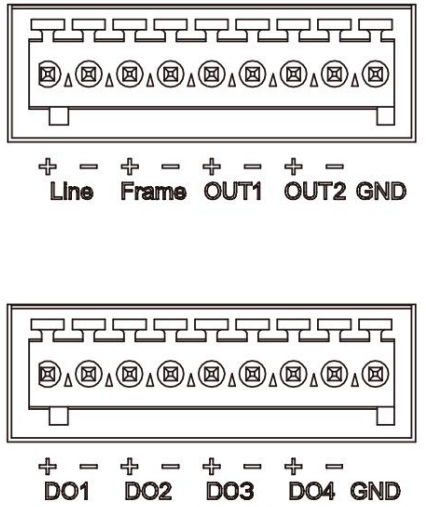
No.	Interface	Description
1	5-bit digital tube	Seen from the left, the first bit represents the tens digit of the number of channels, the second bit represents the ones digit of the number of channels, and the last three bits represent the value corresponding to the current operation.
2	Function button	“MODE” is used to set the working mode. Users can press this button for about 1s in the panel control status to enable the normal mode, normal trigger mode or High intensity trigger mode, and the corresponding working mode indicator will be ON. “SEL” used to set parameters. Users can press this button in the panel control status to select the corresponding bit on the digital tube. “+” is used to increase a value, while “-” is used to decrease a value.
3	Power switch	Power on/off the controller
4	Light connector	4/8/16 independent and controllable light source outputs
5	DO Port	Isolated differential output
6	DI Port	Connect external trigger signal source for synchronous strobe work, trigger pulse width can be set
7	Serial port	Communication with PC via the RS232 interface
8	100M Ethernet port	Communication with PC via the Ethernet interface
9	PE ground port	For connection to safety ground wire
10	AC power input	100~240V AC, 50/60Hz

2.2 Interface definition

2.2.1 Light Connector

	Location	Definition	Description
	1	Fan+	Fan voltage +
	2	Fan-	Fan voltage -
	3	Light-	LED Light output -
	4	Light+	LED Light output +
	5	Nc	
	6	Nc	
	1	Light+	LED Light output +
	2	Light-	LED Light output -
	3	Fan+	Fan voltage +
	4	Fan-	Fan voltage -
	5	Nc	
	6	Nc	

2.2.2 Definition of trigger terminal interface

	Location	Definition	Description
	1	Line+	Connect to the camera/ acquisition card row signal (+)
	2	Line-	Connect to the camera/ acquisition card row signal (-)
	3	Frame+	Connect to the camera/ acquisition card frame signal (+)
	4	Frame-	Connect to the camera/ acquisition card frame signal (-)
	5	GND	Grounding
	6	OUT1-OUT2	Custom interface
	Location	Definition	Description
	1	A+	Connect to the A phase signal (+) of encoder
	2	A-	Connect to the A phase signal (-) of encoder
	3	B+	Connect to the B phase signal (+) of encoder
	4	B-	Connect to the B phase signal (-) of encoder
	5	Line+	Connect to row signal (+)
	6	Line-	Connect to row signal (-)
	7	Frame+	Connect to frame signal (+)
	8	Frame-	Connect to frame signal (-)
	9	T1、T2	Custom interface
	10	DI1-DI8	High-speed input interface

2.3 Connection Steps

Step1: Connect the LED light to controller (See Figure 2.1).

Step2: If the external trigger control is necessary, connect the external trigger source to the trigger port of controller.

Step3: Connect power source (AC100-240V) and turn on the power source. If the display shining index the power is on.

If once needs to adjust the intensity through software, please connect the controller with power off to PC device via RS232 or Ethernet. Run our Control Software or one's own program (i.e., SDK also available). The parameters for channels can still be overridden manually via front panel while communicating through serial port or Ethernet (i.e., both host computer and the controller panel can be individually adjusted).

2.4 Brightness Setting

1. Manual mode

(1) Press the "MODE" button: select the corresponding mode. When the CON light is on, it means continuous mode; when the NTR light is on, it means normal trigger mode; when the HTR light is on, it means high intensity trigger mode; when the LOC light is on, it means it is in DEMO control mode and the panel is not adjustable.

(2) Press "SEL" button: Under the continuous mode, normal trigger mode, and high intensity trigger mode, press "SEL" button to operate the five-digit of the digital tube. From left to right, the first two digits represent the tens and ones digits of the number of channels (CHx);

(3) In the continuous mode, from left to right back three digital tube represents the brightness value of the hundred, ten, one digit, press the "+" button or "-" button, can add or subtract the brightness value operation;

(4) In the normal trigger mode, and high intensity trigger mode, the last three digits of digital tube from left to right indicate the pulse width value of hundreds, ten and one. When pressing the "+" button or "-" button, you can add or subtract the pulse width value.

(5) After adjusting the parameter value of each channel, press "SEL" button again. If the nixie tube stops blinking, the value has been set and saved.

2. DEMO software setting method

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

2.5 Trigger Function

Controllers of this series have three trigger modes: normal trigger, High intensity trigger and programmable trigger modes. It has four trigger polarities: rising edge trigger, falling edge trigger, Positive follow trigger and Negative follow trigger. The default trigger mode is rising edge trigger. For details, see the table below:

Trigger Mode	Trigger Polarity
Normal trigger Mode	Rising Edge Trigger
	Falling Edge Trigger
	Positive follow trigger
	Negative follow trigger
High Intensity Trigger Mod	Rising Edge Trigger
	Falling Edge Trigger
Programmable Trigger Mode	Rising Edge Trigger
	Falling Edge Trigger

2.5.1 Trigger Mode Description

1. Normal trigger Mode

The channel corresponding to the trigger port of controller will output a fixed signal which consists of intensity level and trigger pulse width. The range of the adjustable intensity level is 0 ~ 255. The trigger pulse width can be set from 1 μ s to 30S. See “2.1 Panel Instructions ” section for more detail operation instruction.

2. High intensity trigger mode

The channel corresponding to the trigger port of the controller will output a fixed signal, which is output as a single channel 6A, and the pulse width trigger can be set from 1 μ s~999ms. Refer to the "2.1 Panel Instructions" and "3.1 Software Function Description" chapters for specific setting methods.

2.5.2 Sequence Reference Diagram Of Response Time

1. Rising Edge Trigger

When the trigger signal is the rising edge, the lighting time will be consistent with the set trigger pulse width. The trigger pulse width can be set by DEMO software and function buttons. See the figure 2.2 below:

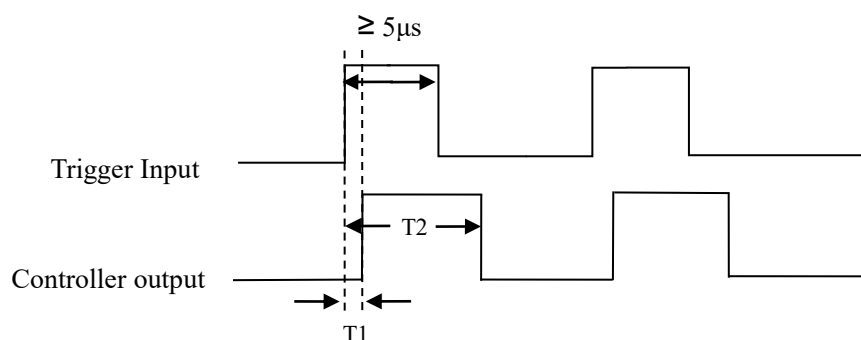


figure 2.2

2. Falling edge trigger

When the trigger signal is the falling edge, the lighting time will be consistent with the set trigger pulse width. The trigger pulse width can be set by DEMO software and function buttons. See the figure 2.3 below:

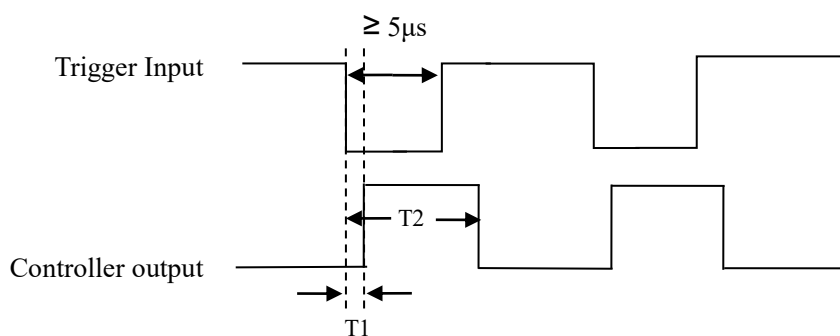


Figure 2.3

3.Positive follow trigger

When the trigger signal is high level, the lighting time will be consistent with the high-level pulse with of the trigger signal. See the figure 2.4 below:

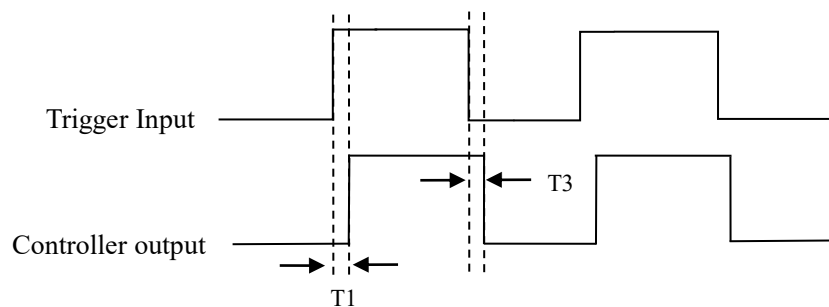


Figure 2.4

4.Negative follow trigger

When the trigger signal is low level, the lighting time will be consistent with the low-level pulse with of the trigger signal. See the figure 2.5 below:

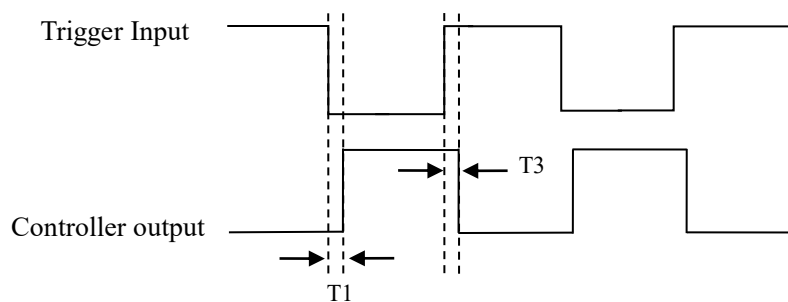


Figure 2.5

Description:

- (1)T1 is the time with response, T2 is the trigger pulse width, and T3 is the time without response.
- (2)T2 range: 1μs to 30s. For T1 and T3 settings, see the “Table 2.2 Trigger Respond Time Table”.

Table 2.2 Trigger Respond Time Table

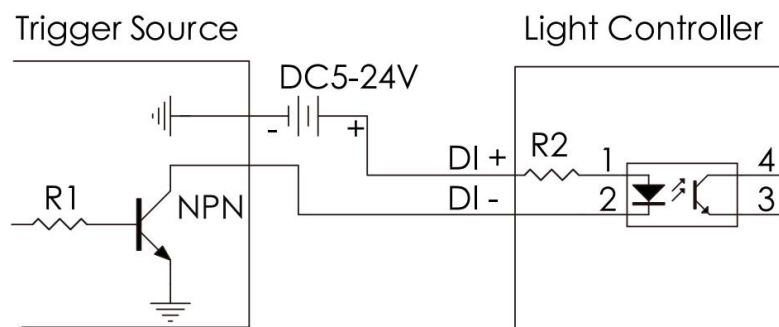
Output current (A) Trigger voltage (V)	0.5		1		3		6	
	T1 (μs)	T3 (μs)	T1 (μs)	T3 (μs)	T1 (μs)	T3 (μs)	T1 (μs)	T3 (μs)
5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5
24	5	5	5	5	5	5	5	5

2.5.3 Trigger Wiring Diagram Reference

Controllers of this series have two wiring modes: DI high-speed input and fixed interface, both of which are high-speed optocoupler isolation inputs., The input voltage of 0-2V corresponds to low level, while the input voltage of 5-24V corresponds to high level.

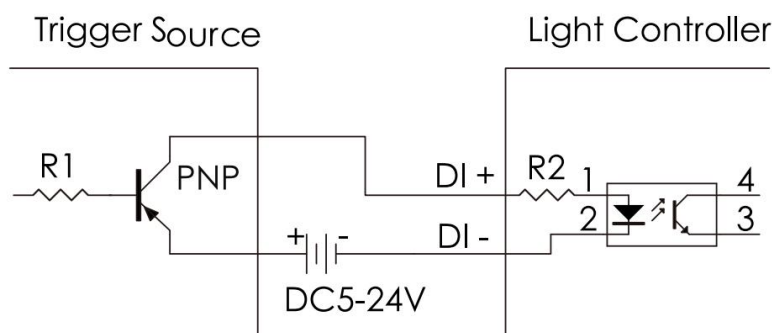
There are three kinds of trigger wiring diagram, as follows:

1. NPN type trigger:



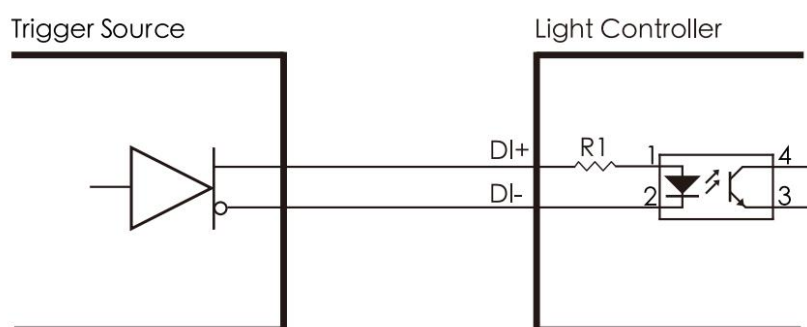
Trig Input Circuit for NPN Type Trigger

3. PNP type trigger:



Trig Input Circuit for PNP Type Trigger

4. Differential type trigger:



2.5.4. Programmable trigger mode

Switch to programmable trigger mode by software to select type line sweep controller. The programmable trigger mode uses the idea of programming to write the trigger process according to the actual needs. Each step in the trigger process can set the number of steps, brightness and trigger pulse width of each channel, and there is only one trigger source that can trigger the step.

The controller loops through the steps in the process table. When using the programmable line sweep controller feature, the flow table is pre-set. The flow sheet needs to set the number of steps, brightness value, and trigger pulse width. In common trigger mode, the brightness value ranges from 0 to 255, and the trigger pulse width ranges from 0 μ s to 30s (the default unit is μ s). For details, see 3.2 Operation Description of the Programmable Trigger Software. For details, see Table 2.3 Line Scanning Process and Sequence Chart 1 of Line Scanning Process.

Programmable trigger mode	Description
Number of line-scan rows	In the programmable trigger mode, the controller will count the number of trigger source signals. If the number is greater than the set trigger value, subsequent trigger source signals will be invalid, and triggering will be suspended until a reset signal is received to clear the current value.
Frame signal filtering parameter	=0, frame signal edge is valid; > 0, the unit of time is μ s. After the edge is captured, it takes effect for a period of time
Frequency multiplication	The function of DO frequency multiplication can be applied to multiply the frequency of trigger signal, and the multiple is adjustable.
Frequency division	Frequency division can be performed after frequency multiplication. See the Frequency Division Sequence Chart 1 for Single-ended Input Process and Frequency Division Sequence Chart 2 for Double-ended Input Process.

2.5.5 Line-scan/Frame signal filtering Sequence Chart

Trigger source select rising edge trigger; Reset source select rising edge trigger; Write the flow table 2.3 "Line Scanning Process". Open the line sweep signal count switch, frame signal reset, frame signal output pulse width, frame signal filtering parameter value can be set. When the line signal count reaches the set value, if the reset signal is received, the count starts from 1. If there is no reset signal, the signal beyond the set value has no output and the light source is not bright. See Chart 1 "Line Scanning Process Sequence".

Step	Trigger Source	Brightness				Pulse width			
		CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH4
1	1	0	0	255	0	0	0	100	0
2	1	255	0	0	0	100	0	0	0
3	1	0	255	0	0	0	100	0	0
4	1	255	255	0	0	100	100	0	0
...	...	...	...	...	...	...	...	...	...
15	1	0	255	255	255	0	100	100	100
16	1	255	255	255	255	100	100	100	100

Table 2.3 Line Scanning Process

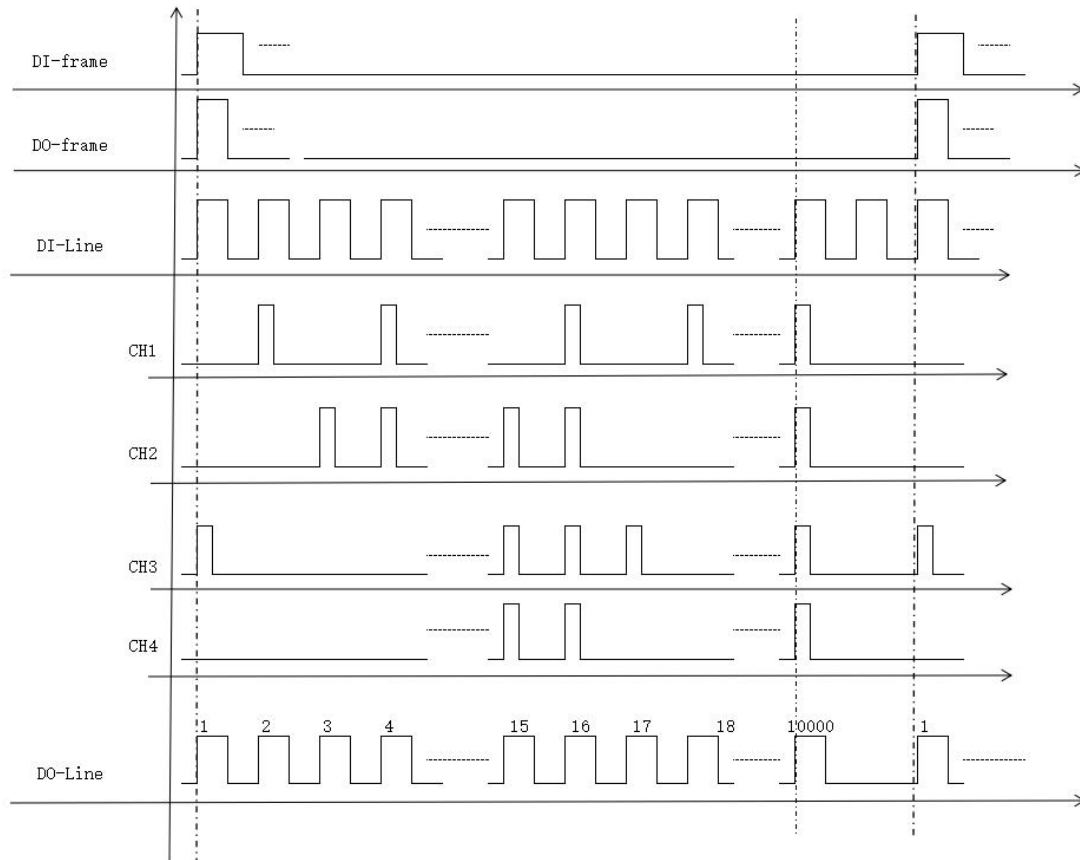


Chart 1 Line Scanning Process Sequence

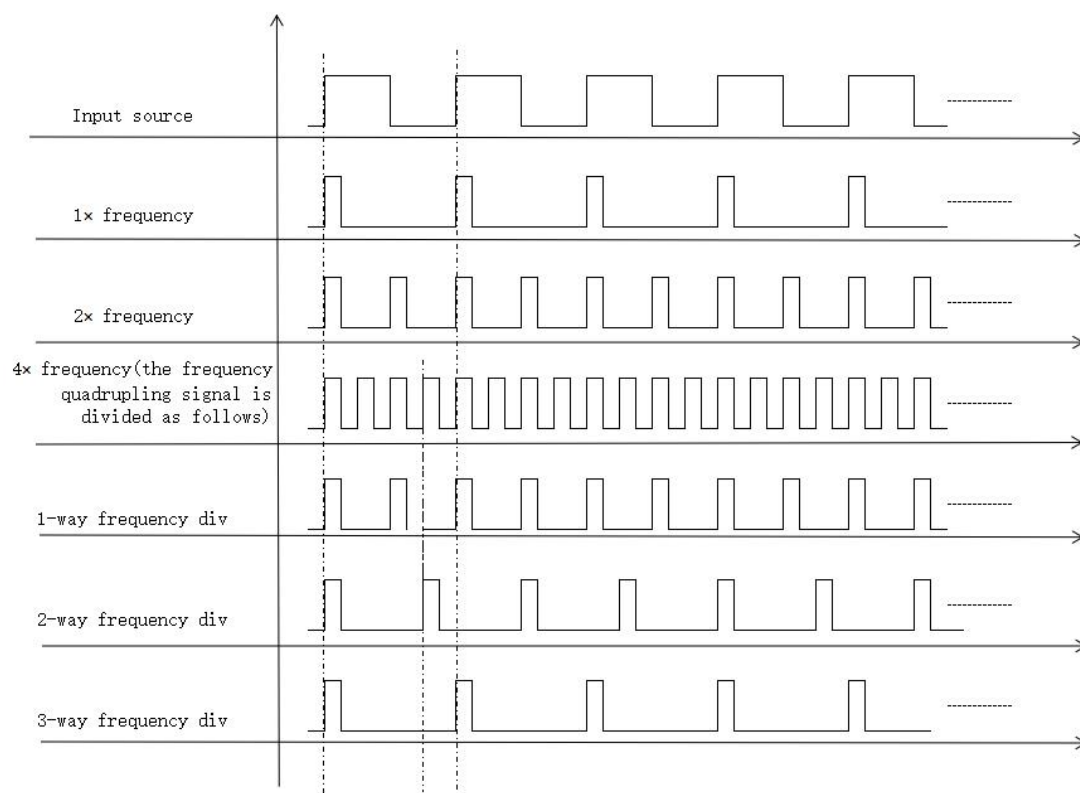
Explanation:

- (1) In programmable trigger mode, trigger source (DI-Line) and hardware reset source (DI-frame);
- (2) The number of steps in the flow table is set at 16, and the pulse width is less than that of the trigger source;
- (3) The line sweep signal count is set to 10000 (0~65000 can be set). When the trigger signal timing reaches 10000 times, the signal output light source will not be bright;
- (4) Line signal output (DO-Line) follows all light source channels;
- (5) Frame signal output (DO-frame);
- (6) Hardware reset When the source receives the signal, the line signal is reset, starting from step 1. When the line sweep signal receiving count switch is enabled, the trigger count starts from 1. (Hardware reset source and trigger source cannot set the same channel);
- (7) Follow all light sources in programmable trigger mode (set to follow light source or pulse width in control mode);
- (8) Reset the output signal in line sweep mode (set pulse width in control mode, no output signal if it is to follow the light source).

2.5.6 Frequency multiplication/Frequency division sequence chart

The controller has the function of frequency multiplication and frequency division: DO is used as frequency multiplication output, synchronization signal, frequency division has two modes to choose, single input and double input mode. Frequency division parameter can be set. The frequency division mode is only effective for the signal after frequency multiplication.

1.Single-ended input mode: The single-end input interface is optional. When the rising edge of the input signal is detected, there will be the corresponding pulse signal output based on the frequency multiplication parameters, as shown in the table below. Sequence Chart of Single-ended Input Process.

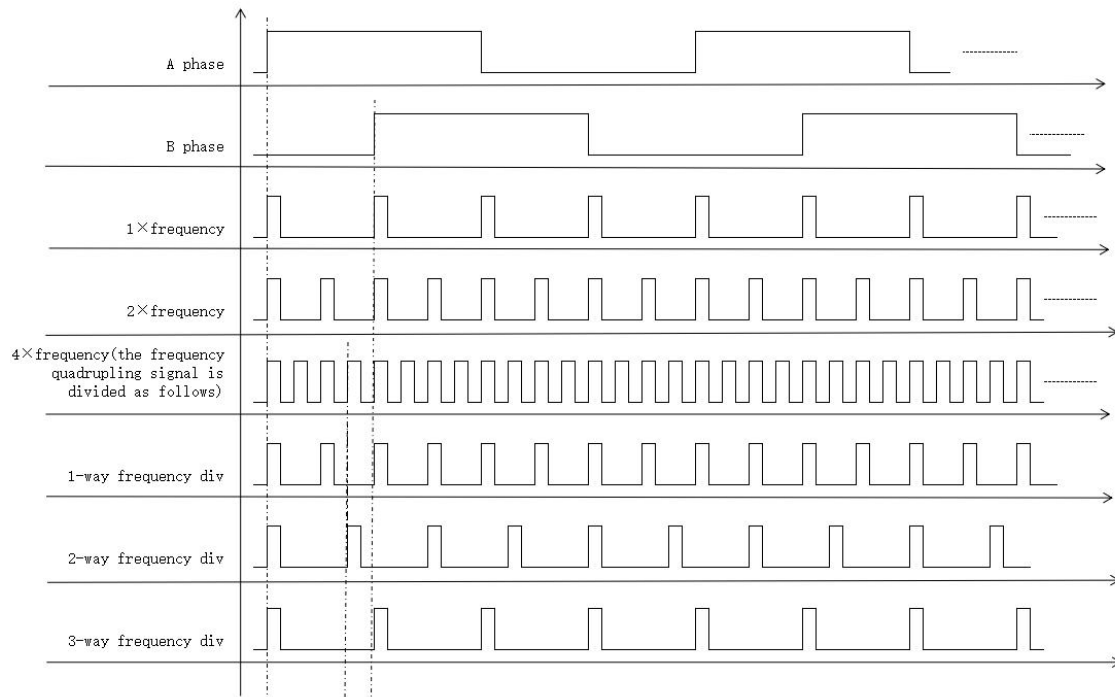


Sequence Chart of Single-ended Input Process

Single-ended input description:

- (1) When the frequency multiplication mode is single-ended input, the input interface can be selected as DI1-DI4, and the frequency multiplication output interface can be selected as DO1-DO4;
- (2) If the input source is 1kHz, the duty ratio is 50%, and the frequency multiplication parameter is 1, then the frequency after frequency multiplication is 1kHz; if the frequency multiplication parameter is 2, then the frequency after frequency multiplication is 2kHz; If the frequency multiplication parameter is 4, the frequency after the frequency multiplication is 4kHz, and so on (the frequency multiplication parameter can only be a multiple of 2, with a maximum frequency of 32).
- (3) The duty ratio after frequency multiplication can be set, and the pulse width of DO corresponding to the output interface of frequency multiplication can be changed. The value of DO pulse width is the time of high level, and the unit of time is μs .

2.Double-ended input mode:The double-ended input interface is fixed, and the DC encoder provides A/B phase input. In addition, the phase difference of 2 input signals should be 90° . When the edge of input signal is detected, there will be the corresponding pulse signal output based on frequency multiplication parameters, as show in the table below .Sequence Chart of Double-ended Input Process.



Sequence Chart of Double-ended Input Process

Double-ended input description:

- (1) When the frequency multiplication mode is double-ended input, the input interface is fixed, the frequency multiplication output interface can select DO1-DO4, and the phase difference of the double-ended input source needs to be 90° ;
- (2) If the input source is 1kHz, the duty ratio is 50%, and the frequency multiplication parameter is 1, then the frequency after frequency multiplication is 4kHz; if the frequency multiplication parameter is 2, then the frequency after frequency multiplication is 8kHz;
- (3) If the frequency multiplication parameter is 4, the frequency after frequency multiplication is 16kHz, and so on (the frequency multiplication parameter can only be a multiple of 2, with a maximum of 32 times the frequency);
- (4) The duty cycle after frequency multiplication can be set by changing the pulse width of the DO corresponding to the frequency multiplication output interface. The DO pulse width value is the time of the high level, and the time unit is μs .

Frequency division description:

- (1) Frequency division mode: only valid for the multiplication signal. By changing the frequency parameter, and then changing the duty cycle of the multiplication signal, the maximum number of frequency losses is 200;
- (2) When the frequency division parameter is 1, it indicates that when a rising edge of the signal is detected, the latter rising edge does not take effect and remains low until the next rising edge arrives;
- (3) When the frequency division parameter is 2, it indicates that when the rising edge of the signal is detected, the latter two rising edges will not take effect and remain at a low level until the next rising edge arrives;
- (4) When the frequency division parameter is 3, it indicates that when a rising edge of the signal is

detected, the last three rising edges will not take effect and remain at a low level until the next rising edge arrives.

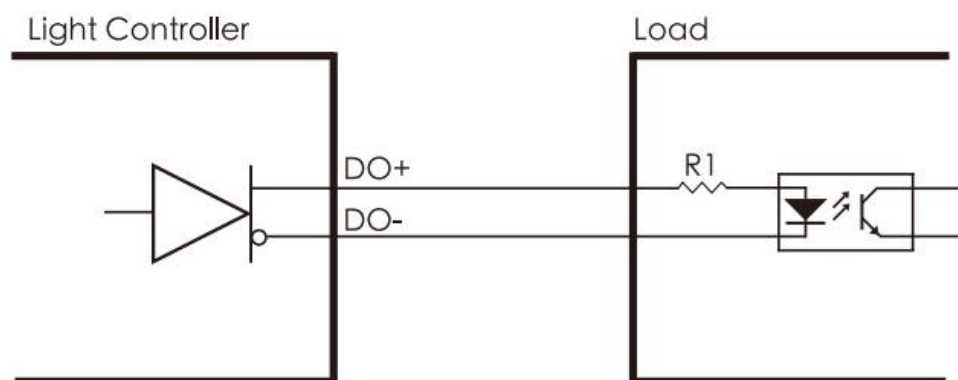
2.6 Differential DO

2.6.1 DO Description

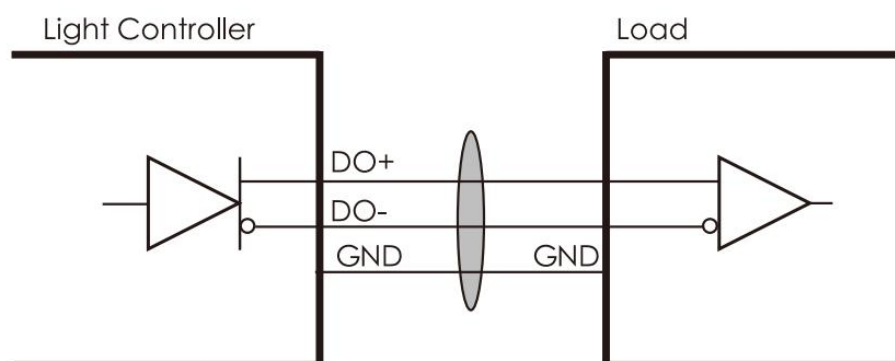
The Do output is differential isolation output, which can effectively isolate the influence of external interference signals on the controller and facilitate the connection of high-speed differential input devices. For example, the line-scan camera differential input and high-speed optocoupler input can be connected.

2.6.2 Differential DO wiring description

(1) The differential positive and negative terminals of the controller are connected to the positive and negative terminals of the optocoupler input of an external device. For example, the PLC acquisition card can be connected. See the table below.



(2) Differential positive and negative terminals of the controller are connected with the differential input positive and negative terminals of peripherals respectively. In order to prevent signal cables from external electromagnetic interference, the ground terminal of the differential DO signal should be connected to the signal shield layer of the external device, as shown below.



3. Software Operation Instructions

3.1 Software Function Description

No.	Function	Description	The Corresponding Interface
1	Set Intensity	Function: Set the output brightness level of the LED light Channel: The channel for which the brightness level needs to be set (parameter 0 represents all channels) Parameter: 0-255	Short / long command function
2	Read Intensity	Function: read the output brightness level of the LED light Channel: The channel that needs brightness level reading Parameter: None	Short command function
3	Turn On Channel(s)	Function: Turn on the corresponding channel Channel: The channel that needs to be opened (parameter 0 represents all channels) Parameter: None	Short / long command function
4	Turn Off Channel(s)	Function: Turn off the corresponding channel Channel: The channel that needs to be closed (parameter 0 represents all channels) Parameter: None	Short / long command function
5	Set Normal Trigger Time Unit	Function: set the time unit of normal trigger pulse width Channel: The channel for which the time units need to be set (parameter 0 represents all channels) Parameter: 0: 1 μ s 1: 10 μ s 2: 1ms 3: 100ms	Short command function
6	Read Normal Trigger Time Unit	Function: read the time unit of normal trigger Channel: The channel that needs to read the time unit Parameter: None	Short command function
7	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)	Short / long command function

No.	Function	Description		The Corresponding Interface
		Parameter: 1-999		
8	Read Normal Trigger Width	Function: read the output pulse width of normal triggers Channel: The channel that needs pulse width trigger reading Parameter: None		Short command function
9	Set High Intensity Trigger Width	Function: Set trigger width of the High Intensity Trigger Mode Channel: The channel that need to be set High intensity trigger width (parameter 0 represents all channels) Parameter: 1-999		Short / long command function
10	Read High Intensity trigger Width	Function: Read trigger width of the High Intensity Trigger Mode Channel: The channel that need to be read High intensity trigger width Parameter: None		Short command function
11	Set Maximum Current	Function: Set maximum current for corresponding channel Channel: The channel that need to be set maximum current (0 means total channels) Parameter: 1-240(unit 25mA)		Short/Long Command Function
12	Read Maximum Current	Function: Read maximum current for corresponding channel Channel: The channel that need to be read maximum current Parameter: None		Short Command Function
13	Read Channel State	Function: Get channel state for corresponding channel Channel: The channel that need to be get channel state Parameter: None		Short Command Function
14	Software Trigger	Function: each time a command is sent, the time the LED light is on is the set value. Channel: channel that needs software trigger (parameter 0 represents all channels) Parameter: 1-3000 (unit 10ms)	Continuous mode	Short/Long Command Function

No.	Function	Description		The Corresponding Interface
		Function: each time send a command trigger a controller, the time LED light is trigger pulse width value Channel : channel that needs to be triggered by software (0 represents all channels) Parameters: 1 - 65535	Normal trigger mode /High intensity trigger mode	
		Function: each time a command is sent, it will trigger the programmable trigger step Channel : 1-16, select the module to trigger (1-4: module 1, 5-8 Module 2,....,13-16: Module 4); Parameter: 1-64, select the programmable trigger step under the module (module) selected by the current channel value	Programmable trigger mode	
15	Set Trigger Delay	Function: Set trigger delay for corresponding channel Channel: The channel that need to be set trigger delay (0 means total channels) Parameter:0-65000		Short Command Function
16	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
17	Set High Intensity Trigger Mode Time Unit	Function: read the time unit of high intensity trigger mode Channel:The channel that need to be set High intensity trigger width (0 means total channels) Parameter:0: 1 μ s 1: 10 μ s 2: 1ms		Short Command Function
18	Read High Intensity Trigger Mode Time Uni	Function: read the time unit of high intensity trigger mode Channel: channel that needs to read the time unit Parameter:None		Short/Long Command Function
19	Set Trigger Delay Time Unit	Function: Set trigger delay time unit Channel: The channel that need to be set trigger		Short Command

No.	Function	Description	The Corresponding Interface
		delay time unit (0 means total channels) Parameter: 0: 1μs 1: 10μs 2: 1ms	Function
20	Read Trigger Delay Time Unit	Function: Read trigger delay time unit Channel: The channel that need to be read trigger delay time unit Parameter:None	Short Command Function
21	Read Property	Function: Read corresponding property for controller Channel:None Parameter: 1:Read Model 2:Read Firmware Version	Advance Settings Command
22	Read Serial Number	Function: Read serial number for controller Channel:None Parameter:None	Advance Settings Command
23	Read IP Config	Function: Read IP configuration which will return message with IP address, sub-net mask and default gateway. Channel:None Parameter:None	Advance Settings Command
24	Set Trigger Polarity	Function: Set trigger polarity for trigger mode Channel: 0-2 Parameter:0:Positive follow trigger mode 1:Negative follow trigger mode 2:Falling edge trigger 3:Rising edge trigger	Advance Settings Command
25	Read Trigger Polarity	Function: Read trigger method for trigger mode Channel: the corresponding channel that need trigger polarity reading Parameter:None	Advance Settings Command
26	Enable CheckSum	Function: Enable checksum Channel:None Parameter: 0:Disable 1:Enable	Advance Settings Command
27	Enable Respond	Function: Enable return value Channel:None Parameter: 0:Disable 1:Enable.	Advance Settings Command

No.	Function	Description	The Corresponding Interface
28	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	Advance Settings Command
29	Enable DHCP	Function: Enable DHCP Channel:None Parameter: 0:Disable 1:Enable	Advance Settings Command
30	Set Working Mode	Function: Set working mode Channel:None Parameter: 0:Continuous Mode 1:Normal trigger mode 2:High Intensity Trigger Mode 3:Set the working mode on panel	Advance Settings Command
31	Read Working Mode	Function: Read working mode Channel:None Parameter:None	Advance Settings Command
32	Set Keepalive Parameters	Function: Set keep-alive parameter Channel:None Parameter0:KeepAlive_time Parameter1:KeepAlive_interval. Parameter2:KeepAlive_probes.	Advance Settings Command
33	Enable Keepalive	Function: Enable keep-alive Channel:None Parameter: 0:Disable 1:Enable	Advance Settings Command
34	Read Channels	Function: Read channel amount Channel:None Parameter:None	Advance Settings Command
35	Read Keepalive Switch States	Function: Read the keep-alive switch state for Ethernet communication Channel:None Parameter:None	Advance Settings Command
36	Read Continuous Keepalive Time	Function: Read continuous keep-alive time for Ethernet communication Channel:None Parameter:None	Advance Settings Command

No.	Function	Description	The Corresponding Interface
37	Read Delivery Interval Time Of Prop Packet	Function: Read delivery interval time of Probe Packet for Ethernet communication Channel:None Parameter:None	Advance Settings Command
38	Read Delivery Time Of Prop Packet	Function: Read delivery times of Probe Packet for Ethernet communication Channel:None Parameter:None	Advance Settings Command
39	Read Output Board Version	Function: Read the output board vision of controller Channel:None Parameter:None	Advance Settings Command
40	Read Load Detection Mode	Function: Read load detection mode of controller Channel:The corresponding channel for reading load detection mode Parameter:None	Advance Settings Command
41	Set Boot State	Function: Set boot protection for corresponding channel output Channel: The corresponding channel for setting boot protection (0 means total channels). Parameter: 0:Set general light 1:Set general close	Advance Settings Command
42	Read Module Boot State	Function: Read model boot state for corresponding channel Channel: The corresponding channel for reading boot protection. Parameter:None	Advance Settings Command
43	Set DO control source	Function: Set DO control source Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0: software Settings 1:DI1 2:DI2 3:DI3 4:DI4 5: Follow all light sources in programmable trigger mode 6. Reset output signal in programmable trigger mode	Advance Settings Command

No.	Function	Description	The Corresponding Interface
44	Read DO control source	Function: Read DO control source Channel: The DO channel to read Parameter: None	Advance Settings Command
45	Set the DO control mode	Function: Set the DO control mode Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0: Follow LED light 1: Follow pulse width 2: Frequency division and multiplication mode (single signal input) 3: Frequency division and multiplication mode (AB phase dual signal input) 4: Follow the trigger source	Advance Settings Command
46	Read the DO control mode	Function: Read the DO control mode Channel: The DO channel to read Parameter: None	Advance Settings Command
47	Set DO polarity	Function: Set DO polarity Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0:Negative follow 1:Positive follow	Advance Settings Command
48	Read DO polarity	Function: Read DO polarity Channel: The DO channel to read Parameter: None	Advance Settings Command
49	Set DO standby value	Function: Set DO standby value Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0:Close 1:Open	Advance Settings Command
50	Read DO standby value	Function: Read DO standby value Channel: The DO channel to read Parameter: None	Advance Settings Command
51	Set DO software control electrical level	Function: Set DO software control electrical level Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0:0(close) 1:1(open)	Advance Settings Command
52	Read DO software control electrical level	Function: Read DO software control electrical level Channel: The DO channel to read Parameter: None	Advance Settings Command

No.	Function	Description	The Corresponding Interface
53	Read DO actual output level	Function: Read DO actual output level Channel: The DO channel to read Parameter: None	Advance Settings Command
54	Set DO delay	Function: Set DO delay Channel : DO channels to be set (parameter 0 represents all channels) Parameter:0-65000	Advance Settings Command
55	Read DO delay	Function: Read DO delay Channel: The DO channel to read Parameter: None	Advance Settings Command
56	Set DO delay unit	Function: Set DO delay unit Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0: 1μs 1: 10μs 2: 1ms	Advance Settings Command
57	Read DO delay unit	Function: Read DO delay unit Channel: The DO channel to read Parameter: None	Advance Settings Command
58	Set DO pulse width	Function: Set DO pulse width Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 1-999 (Refer to DO pulse width unit, max:30s)	Advance Settings Command
59	Read DO pulse width	Function: Read DO pulse width Channel: The DO channel to read Parameter: None	Advance Settings Command
60	Set DO pulse width unit	Function: Set DO pulse width unit Channel : DO channels to be set (parameter 0 represents all channels) Parameter: 0: 1μs 1: 10μs 2: 1ms 3: 100ms	Advance Settings Command
61	Read DO pulse width unit	Function: Read DO pulse width unit Channel: The DO channel to read Parameter: None	Advance Settings Command
62	Set user name	Function: Set user name Channel :None Parameter: User Name. ASCII only. (Max Length: 16)	Advance Settings Command

No.	Function	Description	The Corresponding Interface
63	Read user name	Function: Read user name Channel: None Parameter: None	Advance Settings Command
64	Set DO frequency multiplication parameters	Function: Set DO frequency multiplication parameters Channel :The DO channel to set DO frequency multiplication Parameter: 1, 2, 4, 8, 16, 32	Advance Settings Command
65	Read DO frequency multiplication parameters	Function: Read DO frequency multiplication parameters Channel :The DO channel to read DO frequency multiplication Parameter: None	Advance Settings Command
66	Set DO frequency division parameters	Function: Set DO frequency division parameters Channel :The DO channel to set DO frequency division Parameter: 0-200	Advance Settings Command
67	Read DO frequency division parameters	Function: Read DO frequency division parameters Channel :The DO channel to read DO frequency division Parameter: None	Advance Settings Command

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	Select the controller type "Line Scan Controller" button,select the corresponding channel group, select "Set Trigger Mode" from the function options, select the parameter button: "Programmable Trigger Mode", and click the "Apply" button.	Programmable Trigger Function
3	Read Trigger Mode	Select the controller type "Line Scan Controller" button, select the corresponding channel group, select "Read Trigger Mode" in the function option and then click "Apply" button. Status bar	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
		will return the corresponding trigger mode.	
4	Set Line Scan Trigger Source	Select the controller type "Line Scan Controller" button, select "Set Line Scan Trigger Source" in the function options, and click the "Apply" button. "Parameter items include DI1, DI2, DI3, DI4, DO1, DO2, DO3, DO4, Line Input, A-phase frequency multiplication single -ended input, AB -phase frequency multiplication double ended input"	Programmable Trigger Function
5	Set Current Step Index	Select the controller type "Line Scan Controller" button, select "Set Current Step Index" in the function options, and click the "Apply" button. Parameter item range "1-64".	Programmable Trigger Function
6	Reset Current Step Index	Select the controller type "Line Scan Controller" button, select "Reset Current Step Index" in the function option, and then click the "Apply" button.	Programmable Trigger Function
7	Set the hardware reset source	Select the controller type "Line Scan Controller" button, select "Set Hardware Reset Source" in the function options, and click the "Apply" button. Parameter item range : OFF, DI1, DI2, DI3, DI4, Frame.	Programmable Trigger Function
8	Set the row signal count switch	Select the controller type "Line Scan Controller" button, select "Set the row signal count switch" from the function options, click the parameter item to select "Close, Open", and click the "Apply" button.	Programmable Trigger Function
9	Set the row signal count value parameter	Select the controller type "Line Scan Controller" button, select "Set the row signal count value parameter" from the function options, and click the "Apply" button. Parameter:0-65000。	Programmable Trigger Function
10	Set encoder direction switch	Select the controller type "Line Scan Controller" button, select "Set encoder direction switch" from the function options, click the parameter item to select "Close, Open", and click the "Apply" button.	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
11	Set encoder direction	Select the controller type "Line Scan Controller" button, select "Set encoder direction" from the function options, click the parameter item to select "Forward, Reverse", and click the "Apply" button.	Programmable Trigger Function
12	Set Line output pulse width	Select the controller type "Line Scan Controller" button, select "Set Line output pulse width " from the function options,, and click the "Apply" button.Parameter:0-999.	Programmable Trigger Function
13	Set Line output pulse width time unit	Select the controller type "Line Scan Controller" button, select "Set Line output pulse width time unit " from the function options,, and click the "Apply" button.Parameter:1us、10us、1ms、100ms.	Programmable Trigger Function
14	Set Line output delay	Select the controller type "Line Scan Controller" button, select "Set Line output delay " from the function options,, and click the "Apply" button.Parameter:0-65000.	Programmable Trigger Function
15	Set Line output pulse delay time unit	Select the controller type "Line Scan Controller" button, select "Set Line output pulse delay time unit" from the function options,, and click the "Apply" button.Parameter:1us、10us、1ms、100ms.	Programmable Trigger Function
16	Set frame output pulse width	Select the controller type "Line Scan Controller" button, select "Set frame output pulse width " from the function options,, and click the "Apply" button.Parameter:0-999.	Programmable Trigger Function
17	Set frame output pulse width time unit	Select the controller type "Line Scan Controller" button, select "Set frame output pulse width time unit " from the function options,, and click the "Apply" button.Parameter:1us、10us、1ms、100ms.	Programmable Trigger Function
18	Set frame output delay	Select the controller type "Line Scan Controller" button, select "Set frame output delay " from the function options,, and click the "Apply" button.Parameter:0-65000.	Programmable Trigger Function
19	Set frame output pulse delay time unit	Select the controller type "Line Scan Controller" button, select "Set frame output pulse delay time unit" from the function options,, and click the "Apply" button.Parameter:1us、10us、1ms、100ms.	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
20	Set frequency doubling parameters of interface C	Select the controller type "Line Scan Controller" button, select "Set frequency doubling parameters of interface C" from the function options,, and click the "Apply" button.Parameter:1、 2、 4、 8、 16、 32.	Programmable Trigger Function
21	Set frequency division parameters of interface C	Select the controller type "Line Scan Controller" button, select "Set frequency doubling parameters of interface C" from the function options,, and click the "Apply" button.Parameter:0-200.	Programmable Trigger Function
22	Set frequency doubling pulse width of interface C	Select the controller type "Line Scan Controller" button, select "Set frequency doubling pulse width of interface C" from the function options,, and click the "Apply" button.Parameter:0-999.	Programmable Trigger Function
23	Set Line polarity control	Select the controller type "Line Scan Controller" button, select "Set Line polarity control" from the function options,, and click the "Apply" button.Parameter:Negative logic, positive logic.	Programmable Trigger Function
24	Set frame polarity control	Select the controller type "Line Scan Controller" button, select "Set frame polarity control" from the function options,, and click the "Apply" button.Parameter:Negative logic, positive logic.	Programmable Trigger Function
25	Set frame signal filtering time	Select the controller type "Line Scan Controller" button, select "Set frame signal filtering time" from the function options, and click the "Apply" button.Parameter:0-65000.	Programmable Trigger Function
26	Read line scan trigger source	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read line scan trigger source" from the parameter,and click the "Apply" button	Programmable Trigger Function
27	Read the total steps	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read the total steps" from the parameter,and click the "Apply" button	Programmable Trigger Function
28	Read the current step number	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read the current step number" from the parameter,and click the "Apply" button	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
29	Read line scan hardware reset source	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read line scan hardware reset source" from the parameter,and click the "Apply" button	Programmable Trigger Function
30	Read DO frequency doubling parameter	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read DO frequency doubling parameter" from the parameter,and click the "Apply" button	Programmable Trigger Function
31	Read DO frequency division parameter	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read DO frequency division parameter" from the parameter,and click the "Apply" button	Programmable Trigger Function
32	Read the row signal count switch	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read the row signal count switch" from the parameter,and click the "Apply" button	Programmable Trigger Function
33	Read the row signal count value parameter	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read the row signal count value parameter" from the parameter,and click the "Apply" button	Programmable Trigger Function
34	Read Encode direction switch	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Encode direction switch" from the parameter,and click the "Apply" button	Programmable Trigger Function
35	Read Encode direction	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Encode direction" from the parameter,and click the "Apply" button	Programmable Trigger Function
36	Read Line output pulse width	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Line output pulse width " from the parameter,and click the "Apply" button	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
37	Read Line output pulse width time unit	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Line output pulse width time unit " from the parameter,and click the "Apply" button	Programmable Trigger Function
38	Read Line output delay	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Line output delay " from the parameter,and click the "Apply" button	Programmable Trigger Function
39	Read Line output pulse width delay time unit	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Line output pulse width delay time unit " from the parameter,and click the "Apply" button	Programmable Trigger Function
40	Read Frame output pulse width	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read Frame output pulse width " from the parameter,and click the "Apply" button	Programmable Trigger Function
41	Read frame output pulse width time unit	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frame output pulse width time unit " from the parameter,and click the "Apply" button	Programmable Trigger Function
42	Read frame output delay	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frame output delay " from the parameter,and click the "Apply" button	Programmable Trigger Function
43	Read frame output pulse width delay time unit	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frame output pulse width delay time unit " from the parameter,and click the "Apply" button	Programmable Trigger Function
44	Read frequency doubling parameter of interface C	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frequency doubling parameter of interface C " from the parameter,and click the "Apply" button	Programmable Trigger Function

No.	Function	Operation Instruction	The Corresponding Interface
45	Read frequency division parameter of interface C	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frequency division parameter of interface C " from the parameter,and click the "Apply" button	Programmable Trigger Function
46	Read frequency doubling pulse width of interface C	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frequency doubling pulse width of interface C" from the parameter,and click the "Apply" button	Programmable Trigger Function
47	Read line polarity control	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read line polarity control " from the parameter,and click the "Apply" button	Programmable Trigger Function
48	Read frame polarity control	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frame polarity control " from the parameter,and click the "Apply" button	Programmable Trigger Function
49	Read frame signal filtering time	Select the controller type "Line Scan Controller" button, select "Read programmable parameter " from the function options, and select "Read frame signal filtering time" from the parameter,and click the "Apply" button	Programmable Trigger Function

Note:

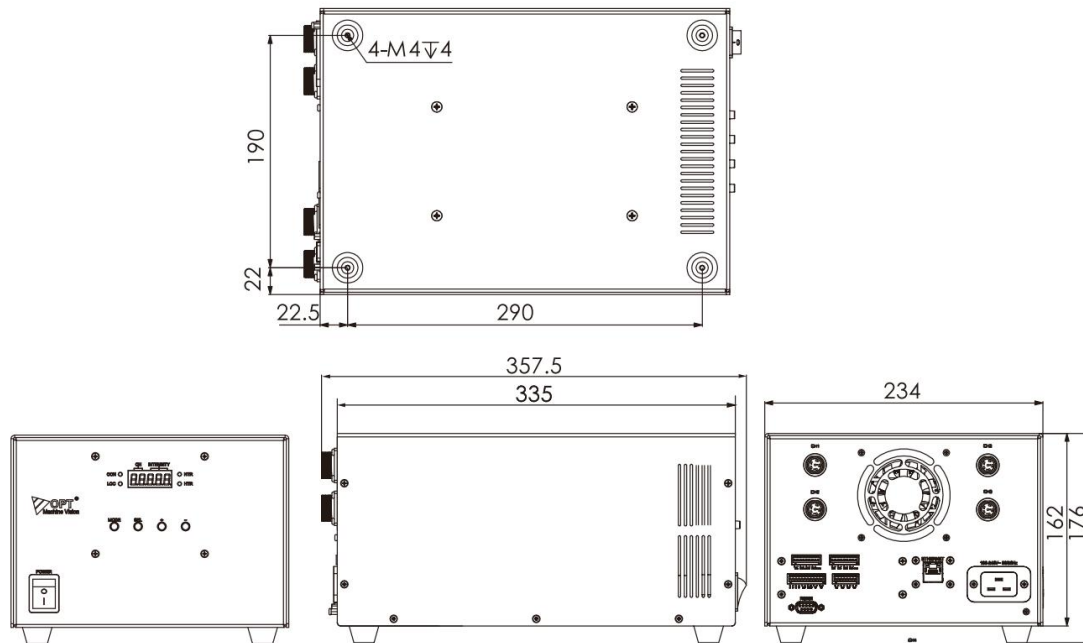
For specific software operation instructions, please refer to the "V3.7 Controller DEMO Operation Instructions" document

3.3 User Programming Manual

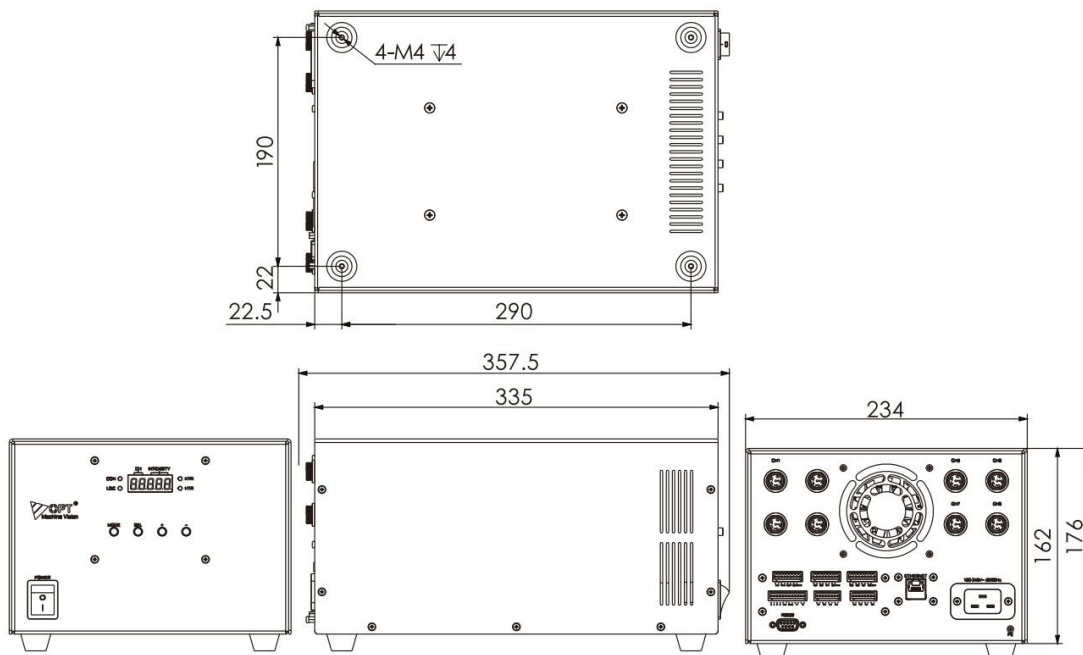
In order to facilitate the secondary development of customers, our company provides a program development package for this controller. For details on how to use this program development package, please read the user programming manual provided by our company in detail.

5. Dimension Diagram

OPT-DPA6024ES-4:



OPT-DPA6024ES-8:



OPT-DPA6024ES-16:

