

# Trigger user's Guide

version : V1.2

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# 1 What is the trigger

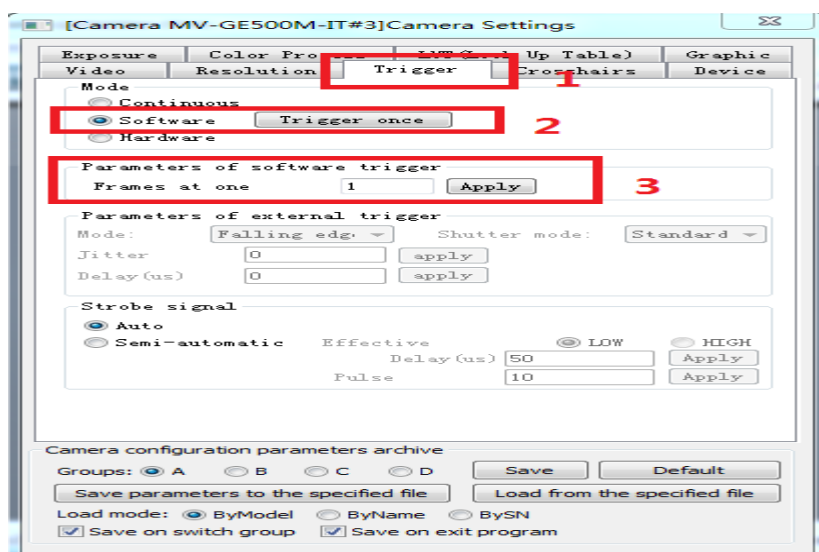
The camera supports two kinds of output modes, and continuous trigger mode, the trigger is a passive mode, Trigger mode, the camera enters standby mode, when the trigger occurs, the camera immediately start the exposure, then the output image, generally used in the trigger for time-critical situations, such as capture fast-moving objects.

## 2 How to generate a trigger signal

In trigger mode, the trigger signal is the only condition for the camera to start exposure, the trigger signal may be generated by the software, can also be generated by an external hardware (mechanical switch / electronic sensors). We call these two methods for the software trigger and hardware trigger.

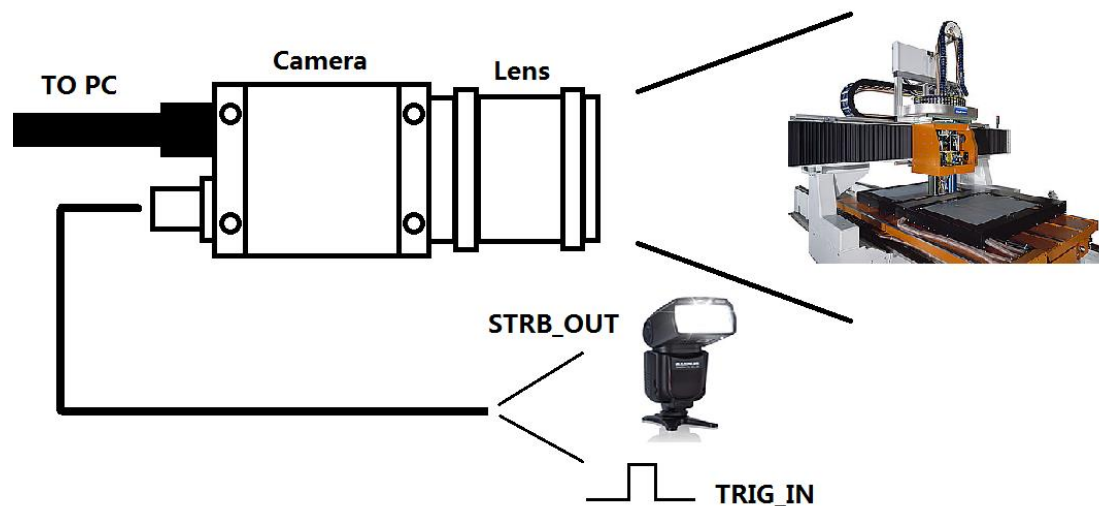
### 2.1 Software Trigger

In the SDK, a dedicated software interfaces for generating the trigger signal can also be set to trigger a number of frames, the following figure is an example of the use of trigger Demo



## 2.2 Hardware trigger

Aviation connector on the camera for connecting external switches and flash, external trigger typical application as shown below:



### Relevant external trigger and flash programming

examples, refer to the camera software installation

directory DEMO / TriggerAndStrobe routines.

## 3 Hardware trigger (external trigger)

### 3.1 Trigger Mode

- Edge-triggered mode. You can select the upper edge or the lower edge in the interface for the trigger condition. When

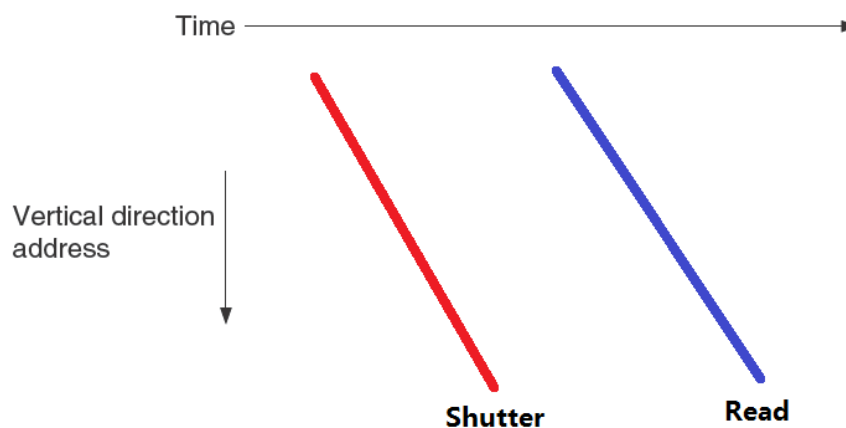
the trigger after the terminal receives a valid trigger signal, the camera starts to acquire an image, and transmitted to the host. Each corresponds to a valid edge trigger, an image output only. Before the image acquisition is not an end, repeating trigger signal will be ignored. For example, the camera's exposure time to 10 ms, valid trigger signal is set to rising edge, then in 10 ms, even if a plurality of signal rising, it will only trigger an image.

- Level-triggered mode. You can select high or low in the interface as a trigger condition. When the trigger signal is active level, the camera starts to acquire an image, and transmitted to the host, the frame acquisition is complete, if the signal is still active level, the camera began collecting the next frame and transmitted to the host until the trigger signal becomes inactive level.

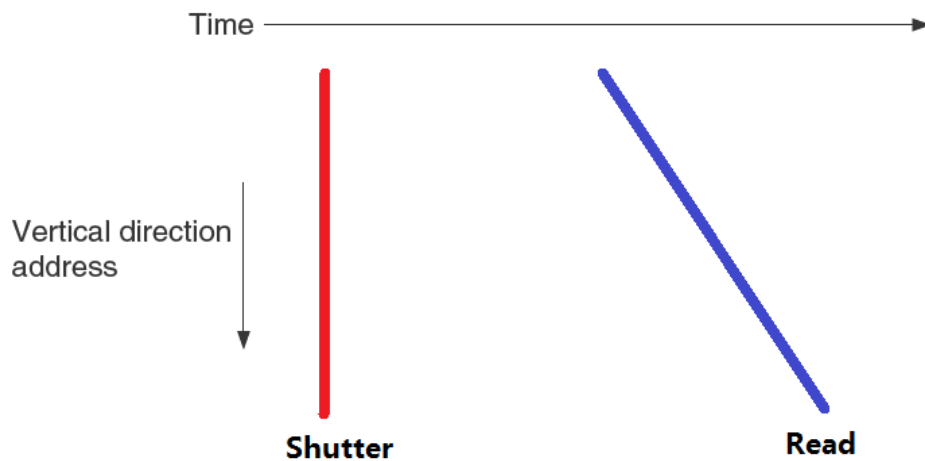
### 3.2 Shutter mode

There are three electronic shutter mode, namely ERS (rolling shutter), GRR (global reset), GS (global exposure).

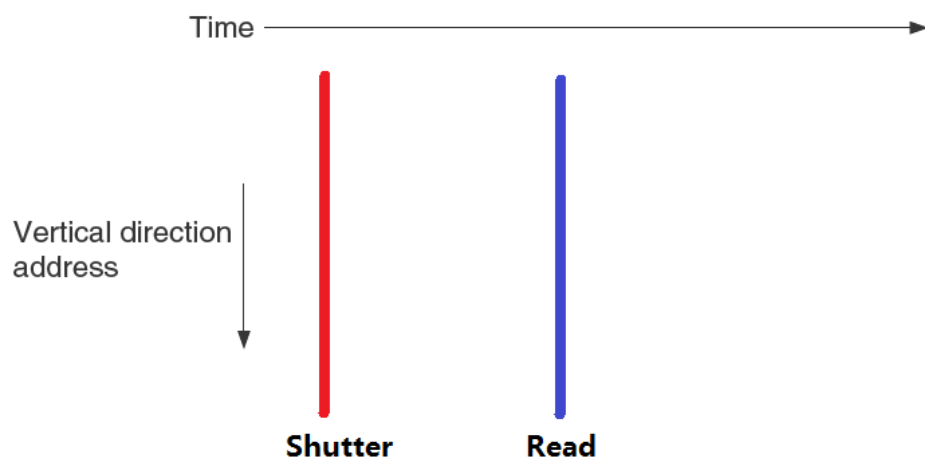
ERS: shutter exposure.



GRR: global reset and start the exposure, shutter readout.



GS: the global exposure, and exposure simultaneously reading



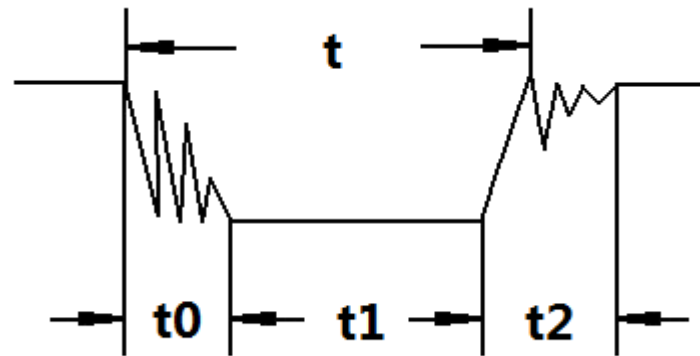
### 3 .3 Trigger Delay

Trigger delay means that when the external trigger signal is generated, the camera does not immediately start the exposure, but some time delay before starting exposure, when the delay is set to 0, which means no delay.

### 3 .4 Eliminate trigger jitter

When connected to a mechanical switch on the external trigger terminal TRIG\_IN, since the contact jitter may cause false

triggering, hardware filter circuit within the camera can be set to filter out debounce time jitter, as shown in  $t_0$  and  $t_2$  Jitter:



When connected to an electronic switch, no debounced, debounce time can be set to 0.

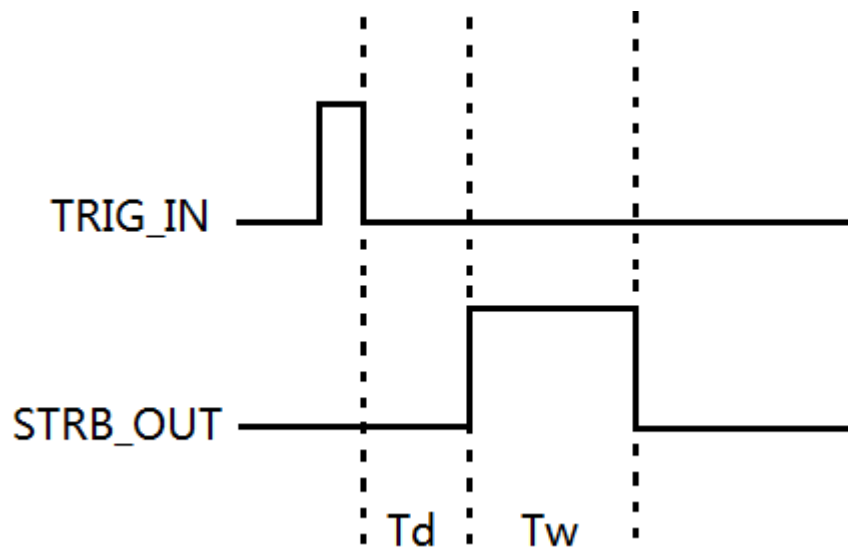
## 4 Flash sync mode

### 4.1 Automatic

In automatic mode, the flash and exposure synchronization when sensor starts exposure, flash lights, when the sensor end of the exposure, the flash is turned off by default, use this mode.

### 4.2 Semiautomatic

Semi-automatic mode, the flash timing controlled entirely by software programming, it needs to set the delay and width, when the external signal, flash signal output began a cycle timing diagram below (assuming trigger and flash output are active high):



$T_d$  is the delay time,  $T_w$  is pulse width.

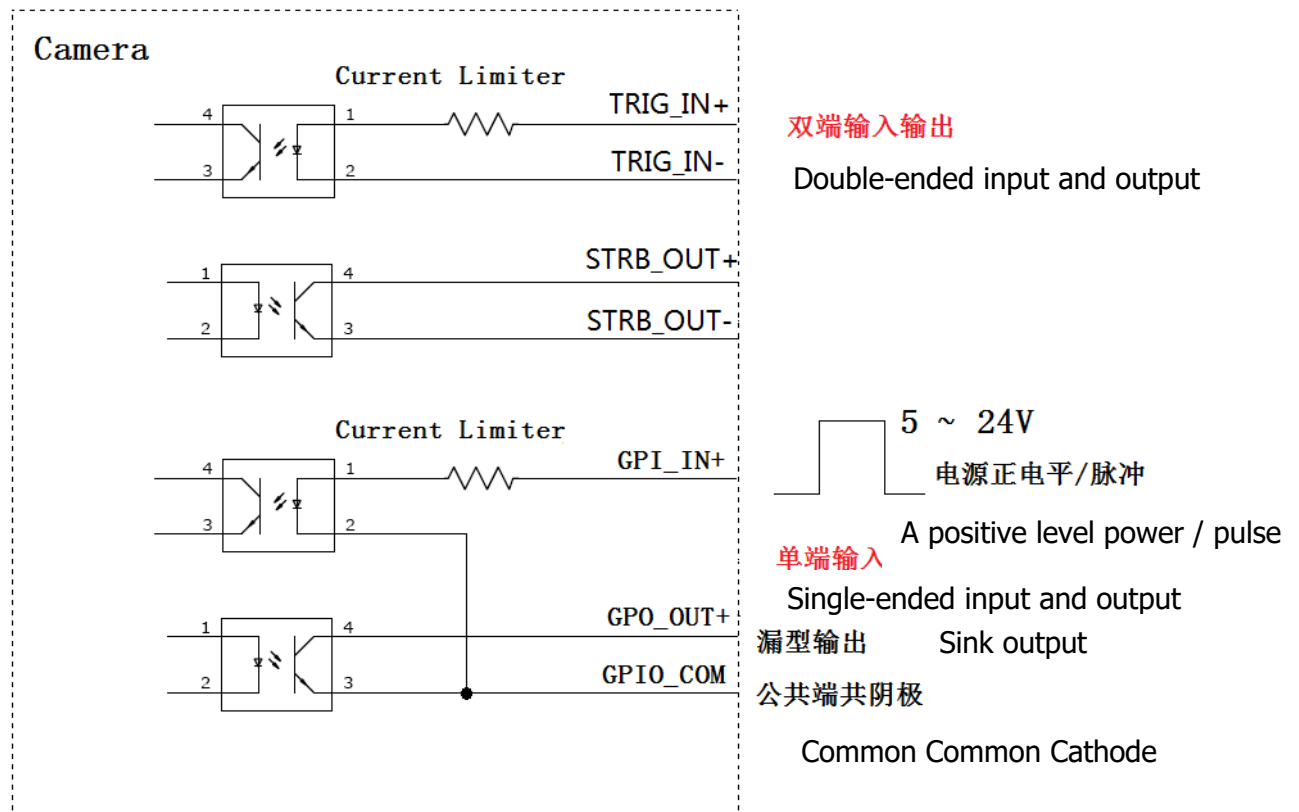
## 5 Trigger and GPIO principle and wiring

### 5.1 Schematic

Hardware, all inputs and outputs are optically isolated input voltage is 5 ~ 24V; open-drain output, the maximum current must not exceed 50mA.

Schematic is as follows:

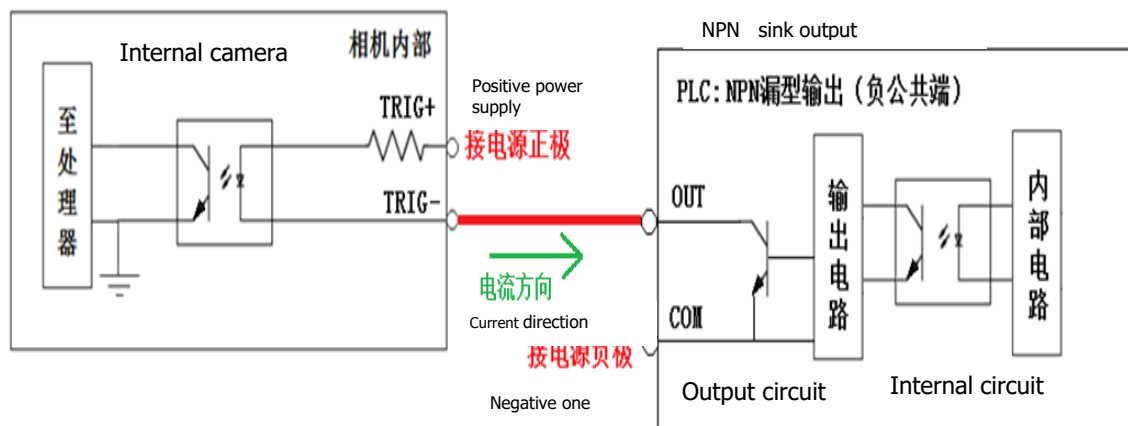




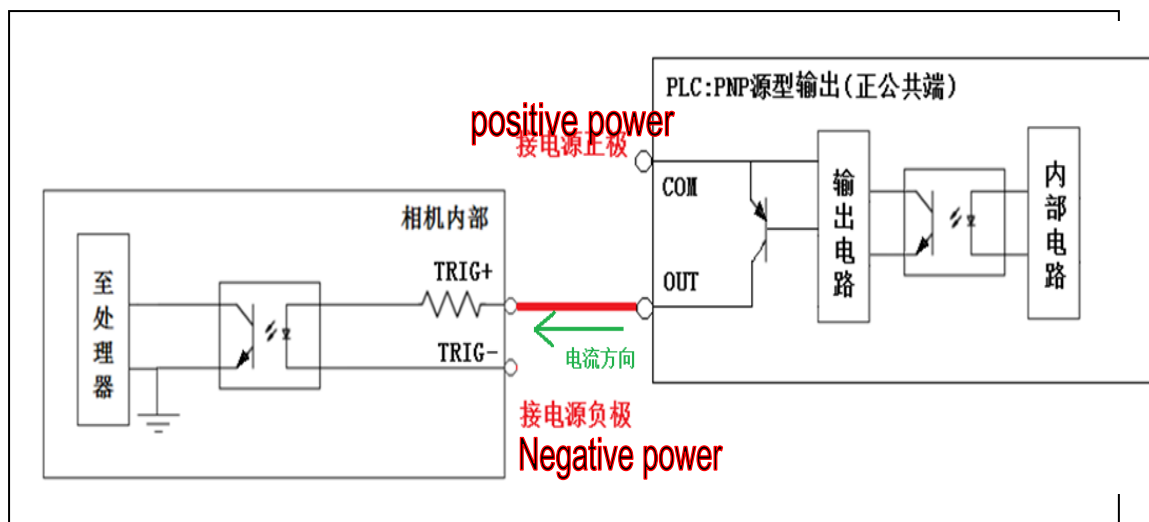
## 5.2 Refer to Figure

Camera input and output terminal connected NPN type PLC

To the CPU



To the CPU

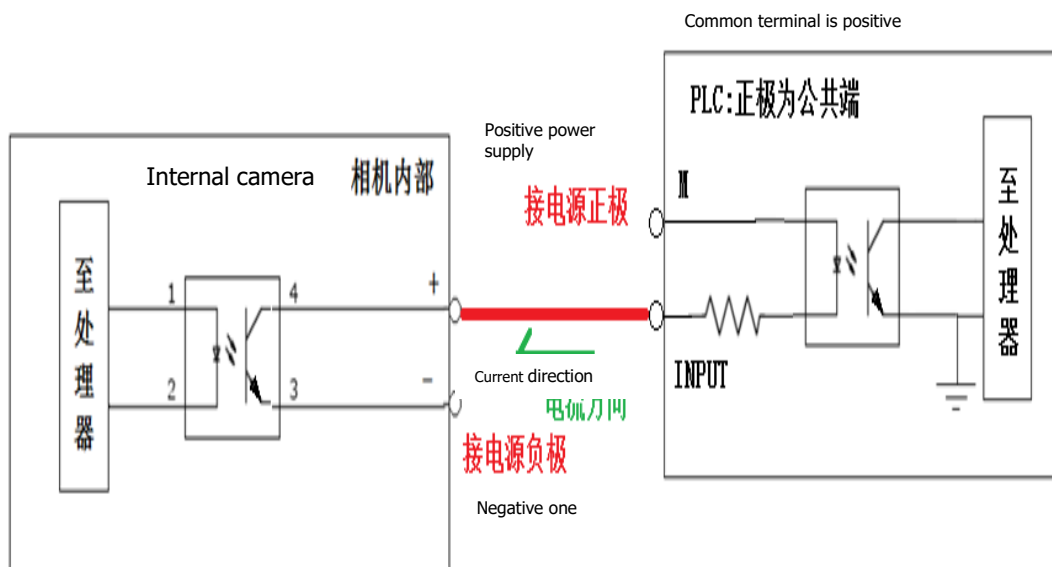


NPN output SourceCamera input and output terminal connected PNP type PLC

Camera output terminal and common anode PLC input connected

Internal camera

To the CPU

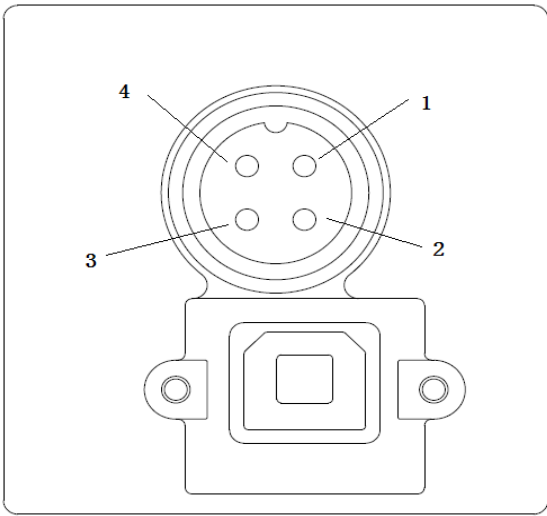


To the CPU

# 6 External trigger line sequence

## defined

### 6.1 Four core air head line sequence defined (UB Series)

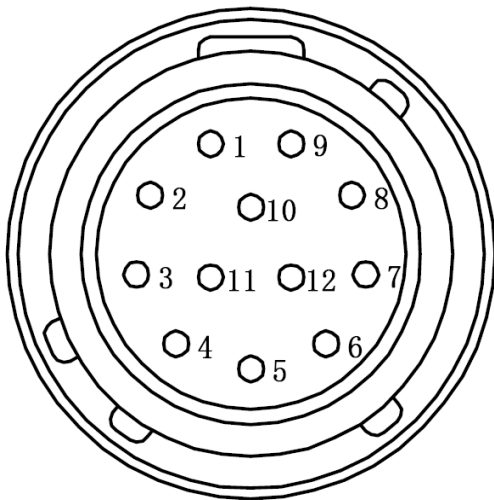


Pin Number	Line Color	Signal names	Explanation
1	black	TRIG_IN-	Negative external trigger signal input terminal
2	blue	TRIG_IN+	Positive external trigger signal input terminal
3	Palm	STRB_OUT-	Flash output negative terminal
4	gray	STRB_OUT+	Flash output positive terminal

**NOTE:** Wire colors may change, if the line labeled, should prevail on the label

**6.2 Twelve core aviation head line sequence defined**

**(UB Series)**

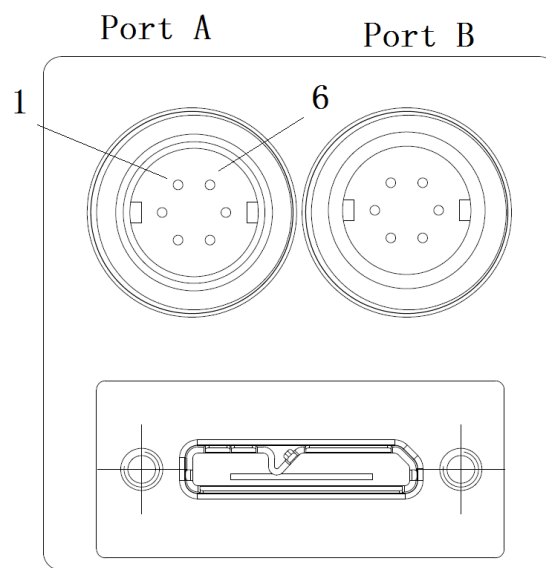


Pin Number	Line Color	Signal names	Explanation
1	res	OUT1+	Output 1 positive terminal
2	Red and white	IN2-	2 negative input terminal
3	black	OUT2-	2 negative output terminal
4	Black and white	OUT2+	2 positive output terminal
5	green	TRIG+	Positive external trigger signal input terminal
6	Green and white	TRIG-	Negative external trigger signal input terminal
7	yellow	STRB-	Flash output negative terminal
8	Yellow	STRB+	Flash output positive terminal
9	Palm	IN1-	1 negative input terminal

10	Brown white	OUT1-	1 negative output terminal
11	blue	IN2+	2 positive input terminal
12	Blue	IN1+	1 positive input terminal

**NOTE: Wire colors may change, if the line labeled, should prevail on the label**

### 6.3 Six-cell aviation head line sequence defined (USB and USB series)

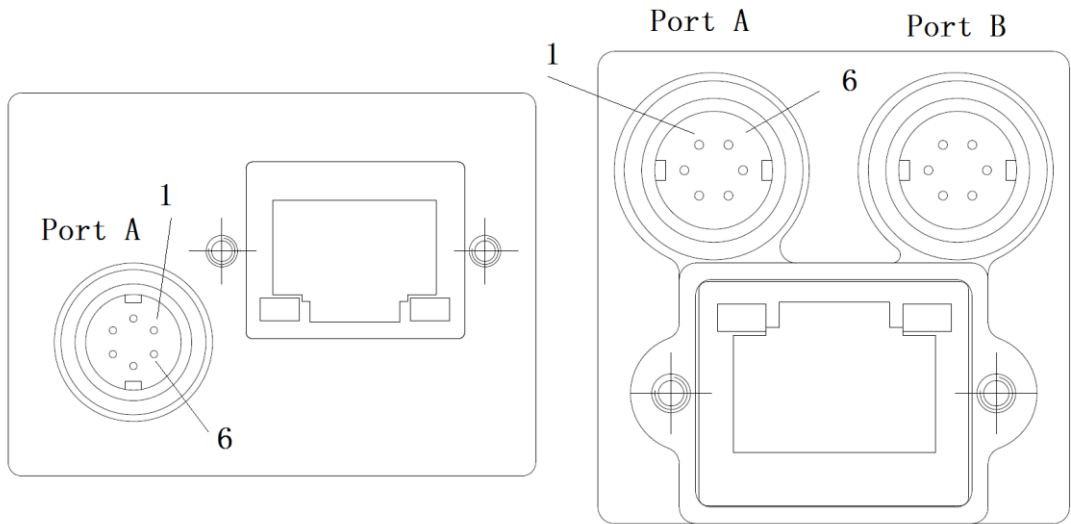


port	Pin Number	Line Color	Signal names	Signal Description	Remark
Port A	1	green	GPO1+/STRB_OUT+	GPO1 positive terminal / flash output positive terminal	The default is the flash output
	2	yellow	GPO1-/STRB_OUT-	GPO1 negative terminal / flash output negative terminal	The default is the flash output
	3	White	GPI1+/TRIG_IN+	GPI1 positive terminal / trigger input positive terminal	The default trigger input
	4	Palm	GPI1-/TRIG_IN-	GPI1 negative terminal / negative trigger input terminal	The default trigger input

	5	red	GPO2+	GPO2 positive output terminal	
	6	black	GPO2-	GPO2 negative output terminal	
Port B	1	green	GPO3+	GPO 3 output positive terminal	
	2	yellow	GPO4+	GPO4 positive output terminal	
	3	White	GPO5+	GPO5 positive output terminal	
	4	Palm	GPI2+	GPI2 positive input terminal	
	5	red	GPI3+	GPI3 positive input terminal	
	6	black	GPIO_COM	GPIO common	

**NOTE: Wire colors may change, if the line labeled, should prevail on the label**

### 6.4 Six-cell aviation head line sequence defined (GE series)



port	Pin Numb	Line Color	Signal names	Signal Description	Remark
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	er				
Port A	1	green	GPO1+/STRB_OUT+	GPO1 positive terminal / flash output positive terminal	The default is the flash output
	2	yellow	GPO1-/STRB_OUT-	GPO1 negative terminal / flash output negative terminal	The default is the flash output
	3	White	GPI1+/TRIG_IN+	GPI1 positive terminal / trigger input positive terminal	The default trigger input
	4	Palm	GPI1-/TRIG_IN-	GPI1 negative terminal / negative trigger input terminal	The default trigger input
	5	red	PWR12V	Camera power input positive terminal	
	6	black	PWRGND	Camera power input negative terminal	
Port B	1	green	GPO2+	GPO2 positive output terminal	
	2	yellow	GPO3+	GPO 3 output positive terminal	
	3	White	GPO4+	GPO4 positive output terminal	
	4	Palm	GPI2+	GPI2 positive input terminal	
	5	red	GPI3+	GPI3 positive input terminal	
	6	black	GPIO_COM	GPIO common	

**NOTE: Wire colors may change, if the line labeled, should prevail on the label**