NANOMV1 Smart Camera Specification

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ZHIJINTECH

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1 Overview

ZhijinTech NanoMV1 is a series of smart cameras with ultra-small form factor, powerful processing capabilities and rich IO.   NanoMV1 is the world's first smart camera using XILINX ZYNQ™. With high-performance ARM+FPGA architecture powered by ZYNQ™, NanoMV1 delivers great efficient image capturing and processing capabilities. NanoMV1 is standing out for compact machine vision systems and mobile robot platform in industrial automation areas because of its form factors, low-power consumption and flexible IO configurations. Its designed powerful processing capability and open development environment make it also very suitable for traditional machine inspection and measuremnt.

NanoMV1 is equipped with CMOS/CCD sensor with global exposure in different resolution and a variety of industrial field-bus standard, such as CAN/RS485. Its software development environment is based on Eclipse open environment. Users are free to develop their own code and vision processing algorithms and application in this environment. At the same time, users are powered with using matured transplanted OpenCV/QT and other mainstream 3rd party vision libraries.

2 Key features

- ■ Small form factors (20*20*55)
- ■ Low power consumption
- ■ Up to 4 Programmable IO
- ■ Industrial field bus CAN/RS485/Ethernet
- ■ Up to 1G ARM-CORTEX A9
- ■ Up to 1GB DDR3
- ■ Up to 16GB FLASH
- ■ Flexible triggering
- ■ Build-in LED driver
- ■ Linux/OpenCV/3rd image libraries

3 Applications

- Industrial Automation
- Motion Control
- Machine Vision
- Robot
- AGV

company proprietary and confidential   5
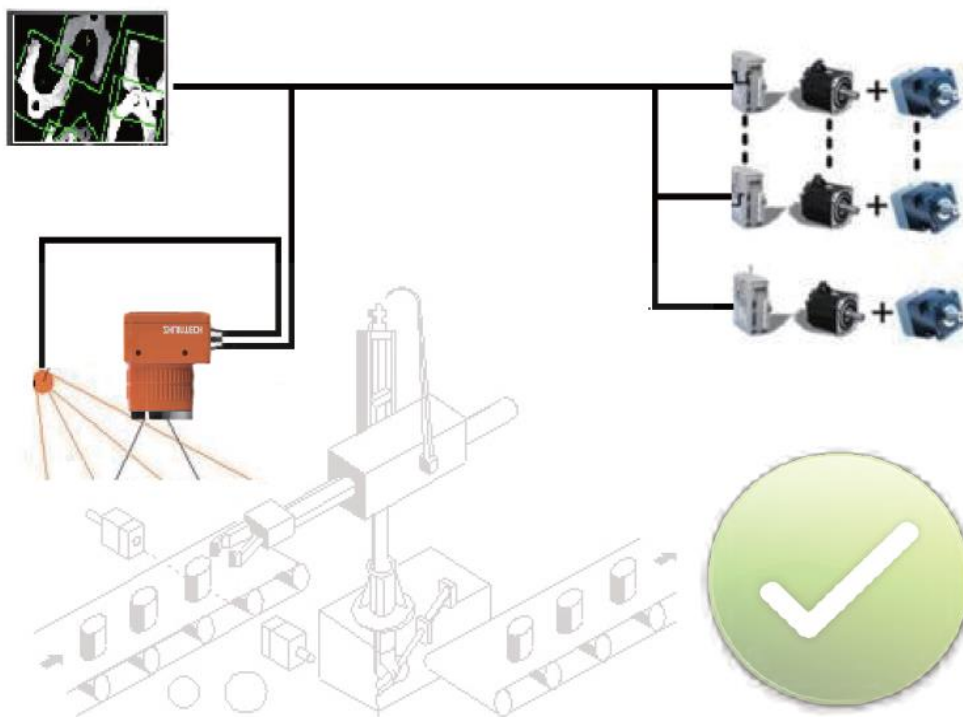
4 Specification

4.1 Product specification

Processor	CPU	800MHz DUO ARM COTEX A9
	OS	Linux 3.6
	RTC	√
Memory	DDR3	512MB
	FLASH	4 GB,8GB,16GB
Image Sensor	Resolution	1280 x 960
	Pix size	3.75 x 3.75 μ m
	Image type	1/3 CMOS
	Pixel depth	8/12-bit
	Acquisition rate	45fps
	dynamic range	63dB
	Color	M/C
IO *	Programmable I/O	2/2
	Ethernet	10/100M
	CAN/ RS-485	NC
Lighting	Integrated light	350mA MAX
	External light control	√
power supply		9~ 30VDC
		2W
Operation Range		-20 ~ +55°C
Mechanical	Size	20X20X55
	Mount	C
	Material	Metal
	IP	IP-65
	Weight	80g
Application Development	OPENCV	2.3
	QT	4.8
UI	Config	Web interface
	Display	OVER VNC

4.2 AVAILABLE PART NUMBER

Part Number	Orderable Product Attribute Description
NANOMVMP124	Normal IO version
NANOMVMP124S	Serial Communication version

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4.3 Hardware function blocks
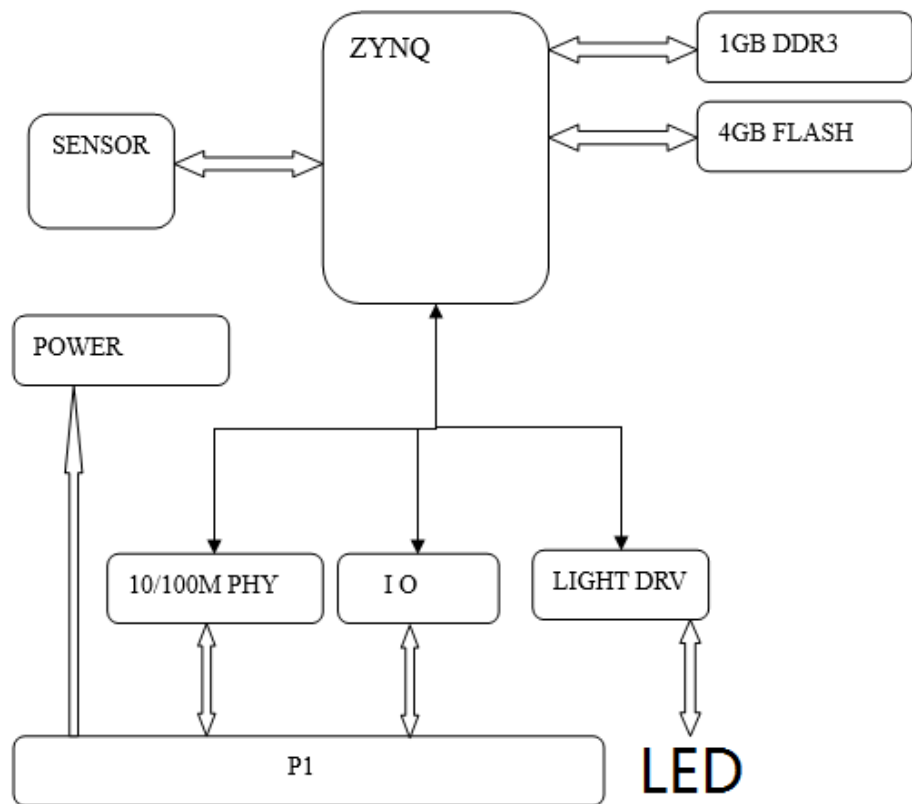
5 Interface description

LED0:   POWER
LED1:   CMOS TRIGER / Software control

	Pin	Signal	Default	Note
	1	V24+		8 – 30V DC+
	2	V24-		8 – 30V DC-
	3	LAN_T+		
	4	LAN_T-		
	5	LAN_R+		
	6	LAN_R-		
P1	7	O-PO1		Output 1
(Male)	8	O-PO2		Output 2 / *TxD
	9	ISO_GND		ISO_GND
	10	O-PI1		Input 1
	11	O-PI2		Input 2 / *RxD
	12	COMMON		ISO 24V+

5.1 Pins description

5.1.1 Power Supply

NanoMV1 power supply can be within a wide range from 8-30VDC.   Its power consumption is about 4W.   In a typical use scenario it's consuming 300mA@12Volt.

Power Supply Volt：8 – 30VDC   (24V recommended）
Maximum Ripple Allowed：50mV AC
Power Supply Maximum Current：1A

NANOMV1 power pins:

	Pin	Signal	Note
P1	6	V24+	8 – 30V DC
(Male)	9	V24-	Power ground

Note：1. Power supply pins must be connected as above table required, it must be within required voltage range.

      2. The Camera has internal self-recover fuse. When there is an issue, camera may be recovered by powered off and then powered on. If it still cannot function, camera needs to be returned to manufacturer for a repair.

5.1.2 Ethernet

NanoMV1 has equipped with an adaptive 10/100M Ethernet port. This port can automatically detect TX/RX, so it allows RX+/RX- and TX+/TX- exchanging with each other. It can use direct or cross connect type 5 Ethernet cable.

NANOMV1 Ethernet pins:

	Pin	**Signal**	Note
	3	LAN_T+	
	4	LAN_T-	Twisted-pair
P1	5	LAN_R+	
(Male)	6	LAN_R-	Twisted-pair

5.1.3 Integrated lighting

NanoMV1 has integrated lighting function , the driving current maximum can reach 350mA. Current can be programmable set to 0% - 100%. Lighting power can be supplied from P1 connector.
Integrated lighting has short circuit protection.
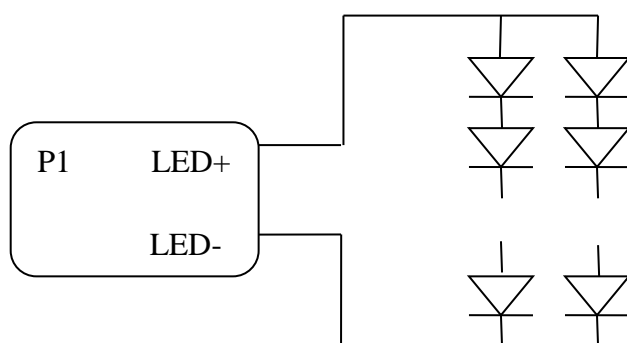
NANOMV1 Integrated lighting pins:

	Pin	**Signal**	Note
P1	2	LAN_T+	
(Male)	10	LAN_T-	Twisted-pair

Note：1.   LED+ shall not connect with 24V+/GND pin
        2.   LED- shall not connect with 24V+/GND pin

5.2 Programmable IO

NanoMV1 camera has 4 programmable IOs(2 inputs,2 outputs). The following diagram describes the Input/ Output features of the camera and how they are related.

Note：1.   All Programmable IO has 1500V ESD protection
2.   All Programmable IO has 300mA over current protection
3.   All Programmable IO output pins can be configured as OC. In OC state, it can drive up-to 300mA load including relay and other inductive load.

5.3 INPUT Module

NanoMV1 provides 10 input signals. All works in the way of Opto-input. The input Diagram shows in below.
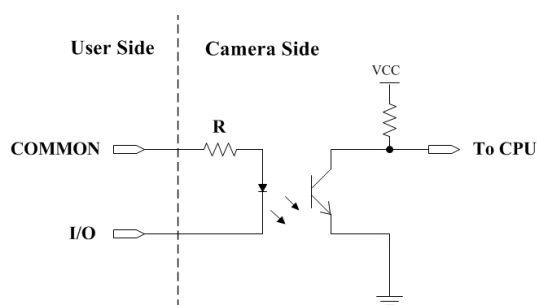
Figure: Simplified General purpose Input Diagram

The 10 opto-input IOs connected each other in the common anode way.10 input ports share one COMMON interface.

5.4 OUTPUT Module

All NanoMV1 smart camera Output pins work in the way of Open Collector(OC).
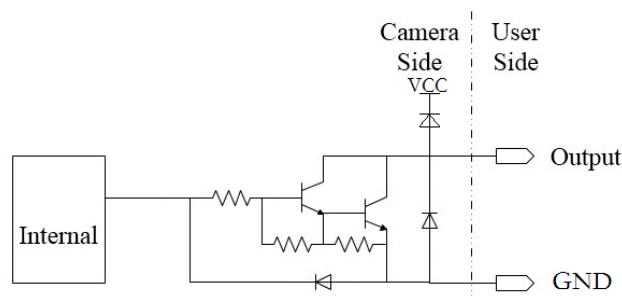**OC Mode:**

Figure : Simplified OC Output Mode Diagram

In OC Mode, the outputs are unpowered devices and require external power. Usually it needs a pull-up resistor when using the outputs. The max OC driver current is 300mA.
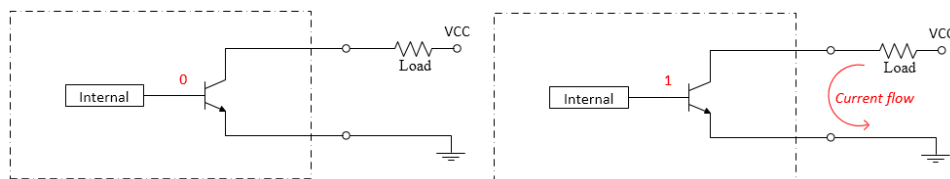
Figure：Simplified General Purpose Output Diagram

External Power supply voltage cannot exceed 30V, as the high voltage will damage the camera interface.

5.5 Trigger Mode

NanoMV1 camera supports trigger input, the two user-defined I/Os can be configured to Trigger Mode.
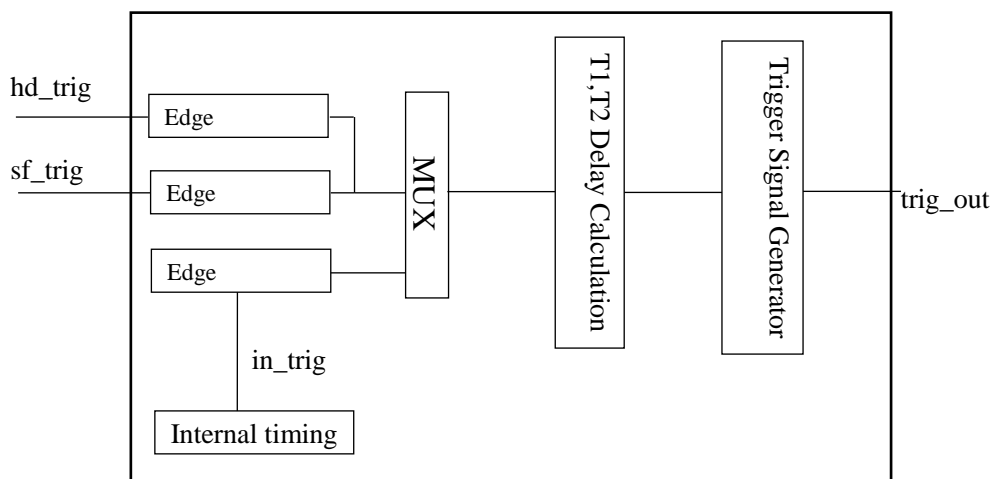
The Trigger Block Diagram is shown as below.

Figure: Trigger Mode Block Diagram

NanoMV1 camera has three trigger source: External Trigger, Software trigger and Internal timing trigger. The camera can only be configured to one trigger mode at one time. These triggering modes are described as below.

Internal timing trigger: The camera internal timing mode has a programmable internal timer (32bit,timing unit:100ns). The timing length can be set by internal register: **Tstrgdt.** When it gets to the preset timing, the trigger block sends a trigger signal: in_trig, and clear the timer and restart timing simultaneously.
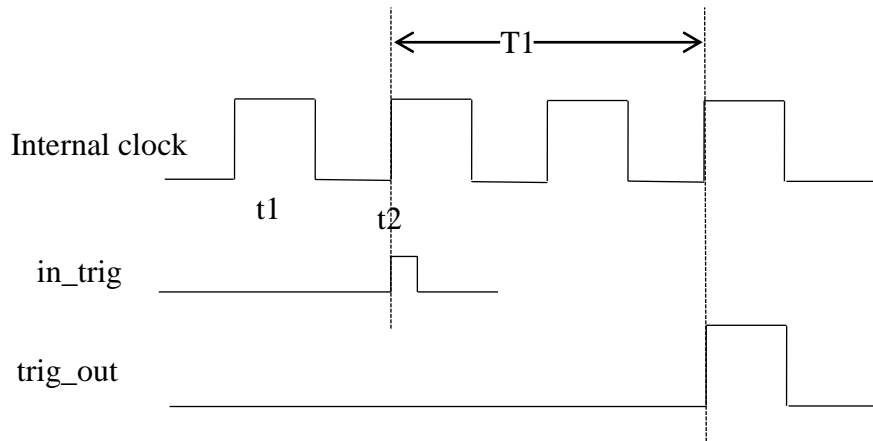
Figure :Internal timing trigger timing diagram

External trigger: External trigger signal comes from a general purpose input. And the signal width cannot be less than 16us. Trigger timing T1 can be set by internal register: **Trt**. In external trigger mode, the timing source can be either internal clock or external clock. Exposures are controlled by the external trigger signal.
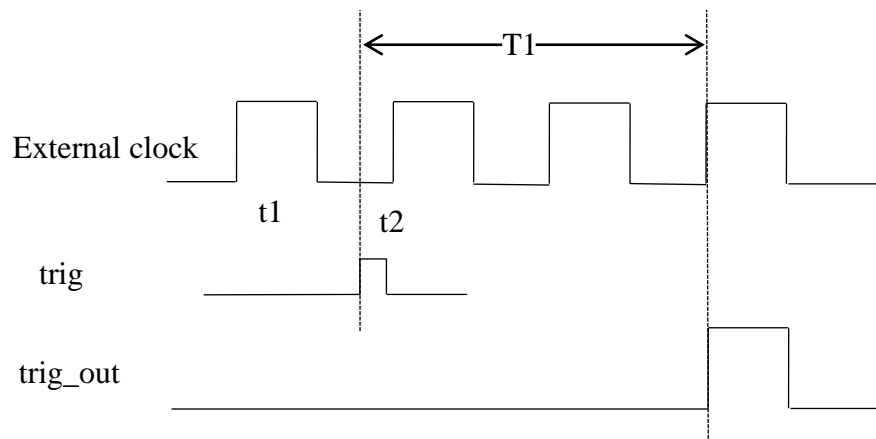

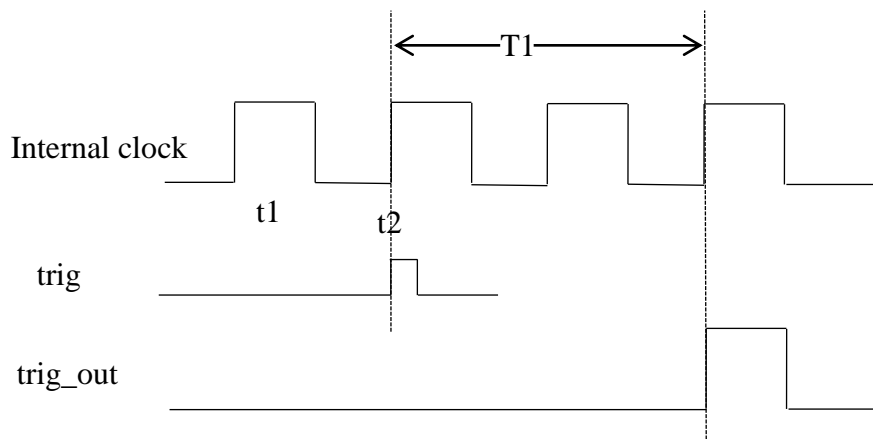Figure :External trigger timing diagram(external clock input)

Figure :External trigger timing diagram(internal clock)

Software trigger: The software trigger signal is generated by the software.

Trigger Mode IO Function

| I/O Port	Configuration Register	Function Select	State level
Input/Output 1	Rio1	External trig	lvttl input
		External clk	lvttl input
		trig_out	lvttl output
			OC output
Input/Output 2	Rio2	External trig	lvttl input
		External clk	lvttl input
		trig_out	lvttl output
			OC output

Note: Trigger mode can be configured by below function:

int configure_trigger (int fd, int count, int trigger_mode, int clk_source,
int clk_mode, int delay, int interval);

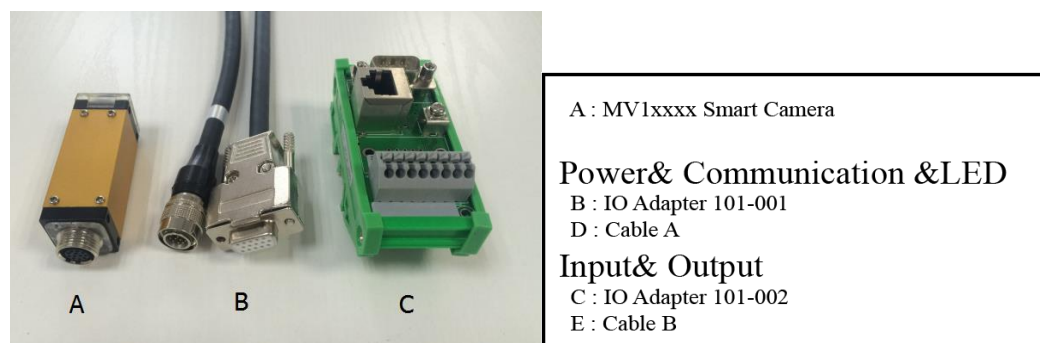Refer to the document NANOMV1 Smart Camera Programming Manual for detailed usage of the function.

6 Mechanical Specification

Below shows the mounting holes in the 4 sides of Camera. The size of mounting thread is M3.

M12X0.5
20.00
20.00
外螺纹M16X0.5▽3.5

M3▽3
50.00
14.00

通孔M2
60.80
20.00
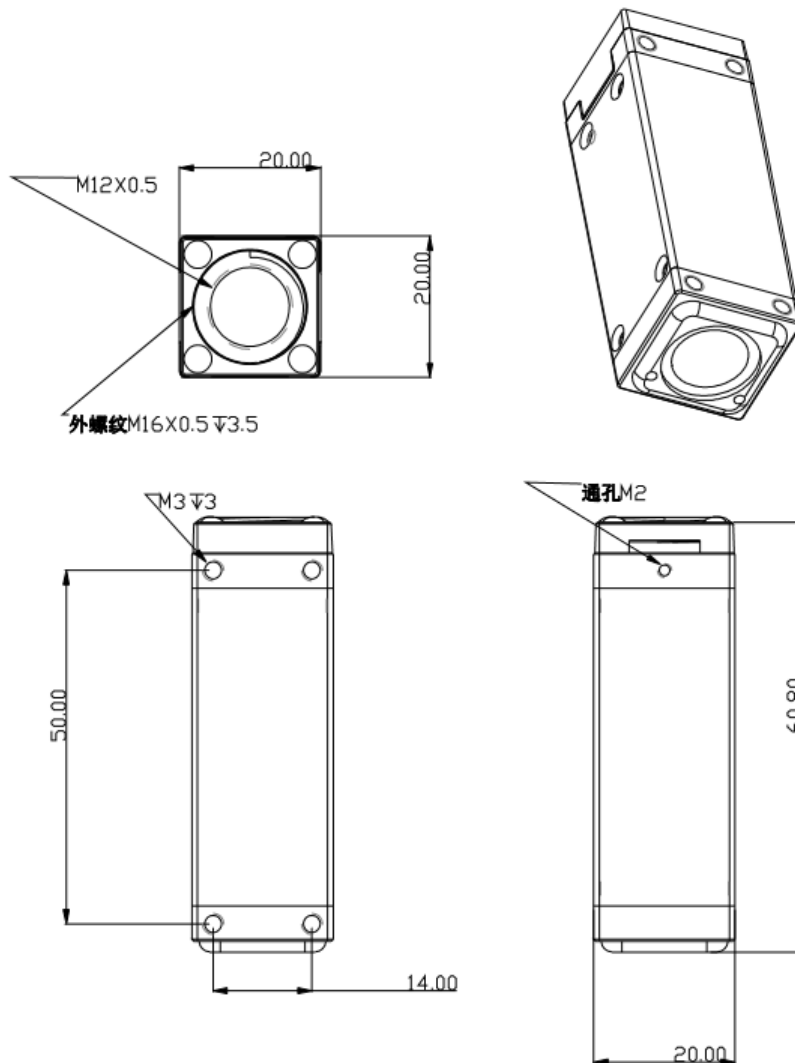
7 NanoMV1 Camera Installation

The NanoMV1 Camera Kit includes the cable and IO adapters shown below：

A : MV1xxxx Smart Camera

Power& Communication &LED
B : IO Adapter 101-001
D : Cable A

Input& Output
C : IO Adapter 101-002
E : Cable B

Camera Plug

NanoMV1 smart camera has one 12-pins circular plug-in connector (female). As shown in below figure.

P1-Circular Male Plug		
Pin	Signal	Description
1	V24+	Voltage Supply Positive Pole
2	V24-	Voltage Supply Negative Pole
3	LAN_T+	Ethernet T+
4	LAN_T-	Ethernet T-
5	LAN_R+	Ethernet R+
6	LAN_R-	Ethernet R-
7	O-PO1	Output 1
8	O-PO2	Output 2 / *TxD
9	ISO_GND	Output Isolated GND
10	O-PI1	Input 1
11	O-PI2	Input 2 / *RxD
12	COMMON	COMMON Pole (24V Supply)

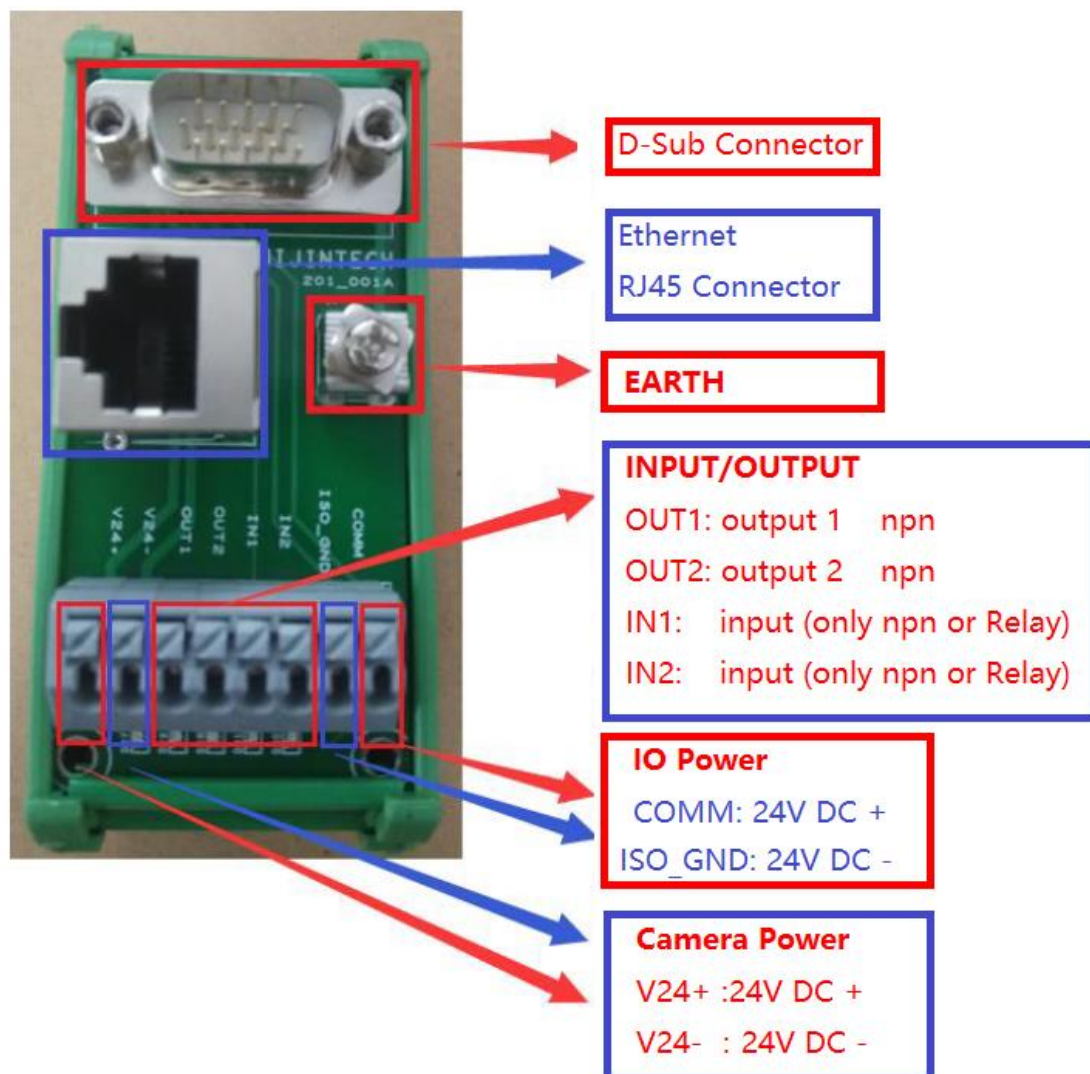Note: *TxD and *RxD must be used with IO Adapter(MB-006/MB-007)
    This function only NanoMV Serial Version support.(Part NO.NanoMVMP124S)

IO Adapter

To facilitate the users to connect the NanoMV1 camera, we provide the IO&Communication adapters，

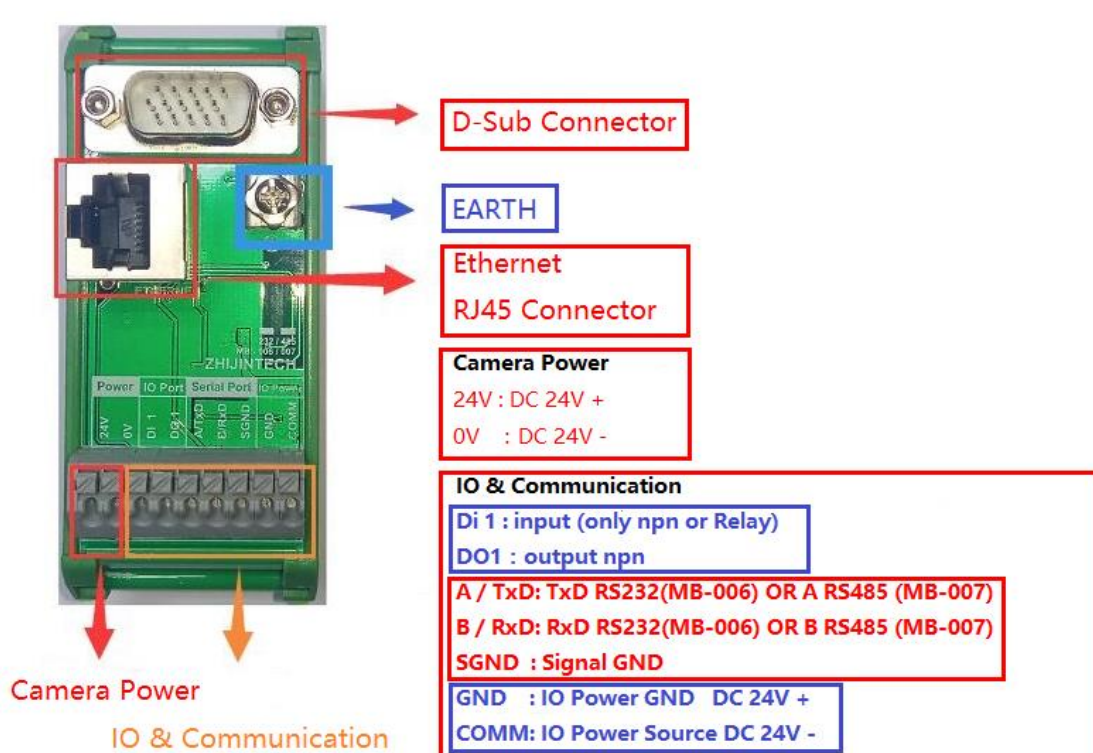### IO Adapter(MB-005)

IO Adapter as shown below.

.
Note: If use IO ，IO Power Port Must Connect to DC 24V
    ISO_GND port Connect to DC 24V-
    COMM port Connect to DC 24V+

Communction Adapter(MB-006/MB-007)

MB-006 Support RS-232 Communication
MB-007 Support RS-485 Communication

Note: If use IO or Serial Communication IO Power Port Must Connect to DC 24V
 GND port Connect to DC 24V-
COMM port Connect to DC 24V+

Ethernet Connector

The camera IO Adapter use one RJ45 as Ethernet interface.

Power/IO Connector

The user can connect Power,User I/O through the bottom WAGO connector. The detailed connection information is marked by screen printing in IO Adapter.

8 Additon Function

8.1 motor control

MV1xxxx series smart camera provides motor control function, can be directly connected with the step motor or the servo motor driver, called the motor control module, to complete the direct control of the motor.

Tthe camera is connected with the driver mode as shown below:
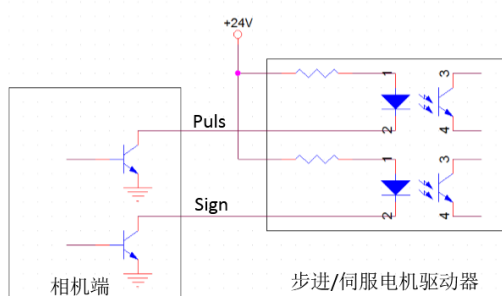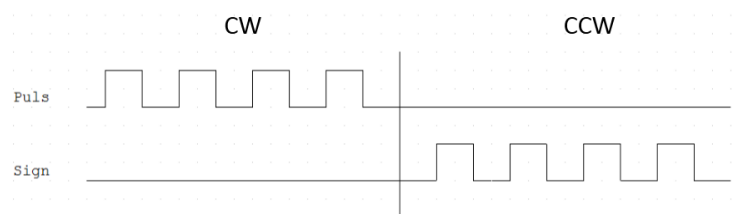

The control module support two instruction pulse output: positive and negative direction of pulse sequence output and output pulse sequence + symbols. Pulse sequence as shown below:

"Pulse + symbol" command output form:
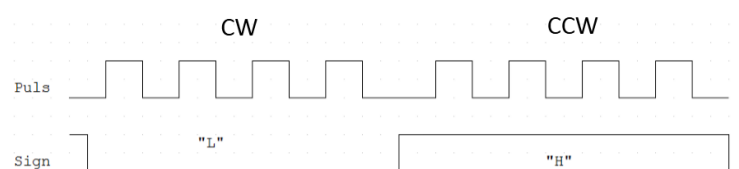
"Positive and negative pulse output form" instruction：

The camera can also configure up to 5 motor control module, and the 5 motor drive to work. You need to configure the following parameters in the use of module:

1, the minimum operating speed (starting velocity) of corresponding frequency

2, the maximum operating speed of corresponding frequency

3, the acceleration / deceleration stage, before and after the

two pulse frequency increasing (acceleration) anddescending (deceleration) frequency

4, the modular model

5, the total number of pulses movement process

9 Support

Get Support

you can get the support of all the information from www.zhijintech.com .

company proprietary and confidential