OPT-3D Sensor hardware specification

V3.1.0.1

Preamble

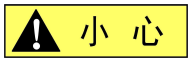
The purpose of this section is to ensure that the user can use the product correctly through this manual to avoid danger or property damage during operation.Before using this product, please read the product manual carefully and keep it for future reference .

Summarize

This manual is applicable to our OPT-3D sensor.

Symbolic convention .

For symbols that appear in the document, the description is as follows.

Symbol	Explain
	Represents that failure to comply with the precautions will result in casualties.
	Indicates that failure to follow these precautions may result in injury or death.
	Indicates that failure to comply with such precautions may result in minor or moderate injury.
	Show that any failure to comply with the precautions will cause damage to the product and property damage.
	Indicate the precautions and use restrictions that must be observed during the use process.

Notes for safe use

* Read the manual before use.
* Do not tear up the label.
* Disassembling the sensor may cause an inadequate IP rating.
* Incorrect operation may cause sensor damage.

Universal safety precautions

Symbol	Explain
危 险	● Do not use this product for the protection of human body or any part of human body. ● This product is used in non-explosion-proof areas, so do not use it in explosion-proof areas.
小 心	● Before starting work or operation, please make sure that the function and performance of the product are running normally. ● Should a product fail, please implement comprehensive safety measures to prevent all kinds of damage. ● Please do not use all related equipment, including peripheral equipment, sharp temperature changes, otherwise, condensation may cause equipment failure.
注 意	● Please note that the company does not guarantee the functionality or performance of modified products for use beyond the demonstration limits specified in the specifications. ● When this product is used in combination with other equipment, it may not be fully filled due to the use conditions and environment ● Sufficient function and performance, so please pay full attention before use.

Safety precautions for laser products

Symbol	Explain
	● If the control or adjustment device is not used in accordance with this regulation, or if the steps are performed, it may cause harmful radiation exposure, which may harm the human body (eyes, skin, etc.), so it is important to observe the following. About 2M laser products ● Do not stare at laser and specular light. ● Please do not deliberately point the laser at people. ● Please pay full attention to the laser path. The laser will be reflected by the mirror, diffuse reflection, if there is a danger of being illuminated by the reflected light, please use a baffle etc to cover its reflected light. ● Do not set the laser path to adult eye level. ● Do not allow the beam of light to enter areas where telescopic optical instruments (e.g., telescopes and binoculars) may be used. Using a telescopic optical device to observe the laser output may harm your eyes. About Class 2 laser products ● Please do not stare at laser and specular light. ● Please do not deliberately point the laser at people. ● Please pay full attention to the laser path. The laser will be reflected by the mirror, diffuse reflection, if there is a danger of being illuminated by the reflected light, please use a baffle etc to cover its reflected light. ● Do not set the laser path to adult eye level. ● This product does not have the mechanism to turn off the laser irradiation when disassembling, please do not disassemble.

Notes required when using it

Symbol	Explain
警 告	● Please use the correct power supply voltage. Otherwise, fire, electric shock and failure. ● Please do not break down or modify the unit privately. Otherwise, it may lead to a fire and an electric shock.
小 心	● Please install the sensor on the thermal conductive metal plate for use, otherwise, the surface temperature of the sensor will increase, which may lead to the deformation of the fixation piece and abnormal imaging.
注 意	● Before you remove or plug in the sensor data cable, ensure that the controller and the device to which the controller is connected are powered off. Otherwise, damage may result. ● Do not connect or disconnect the monitor from the controller while it is powered on. Otherwise, damage may result. ● Do not turn off the power in the middle of writing data to memory while setting the project. Otherwise, some or all of the Settings may be lost. ● USB connector, VGA connector, serial connector, sensor cable connector, and USB connector ● The DC24V (-) terminal of the power supply is not insulated. Do not cause potential difference between non-insulated terminals due to the positive grounding environment or the potential difference of the device. Otherwise, peripheral devices such as connected sensors or computers will fail. ● In case of failure, it is recommended to back up the Settings on the software in advance. ● Changes in ambient temperature may cause measurement errors. So make sure the temperature is stable at all times. When the ambient temperature changes by 10 ° C, it takes about 60 minutes for the device to achieve a uniform internal temperature distribution. ● After powering on the device, wait about 30 minutes before using the device. The circuit does not stabilize immediately after the power is turned on, and the measured value sometimes shifts slowly. ● Please avoid using this device near lighting equipment. If this cannot be avoided, use light shades, etc., so that the equipment will not be affected. ● If the measurement object vibrates, the measured value may be incorrect. In this case, increasing the average number of contours or the average number of measured values can make the measurement relatively accurate. ● Sometimes due to the slow flow of air, the measured value may be biased. In this case, the following measures can be taken: ● Protect the measuring part with a protective cover.

	● Use a fan to stir the air between the measuring part and the working part more forcefully.

Precautions when abnormal

Symbol	Explain
注 意	When the following phenomenon occurs, turn off the power immediately. If you continue to use the device in an abnormal state, the device will fail. Equipment maintenance contact the company's after-sales department. ● Water or foreign bodies are inside the controller. ● The shell is dropped or damaged. ● The controller is smoking or has an abnormal odor.

Notes as required during the installation

Symbol	Explain
注 意	● For normal and safe use of this product, do not install it in the following places. Otherwise, a fault may occur. ● Sites with high humidity, dusty sites, and poor ventilation. ● Direct sunlight, high temperature places. ● Places where corrosive or flammable gases are present. ● Places that are directly subjected to vibration, impact, etc. ● A place where droplets such as water, oil, and chemicals are sprayed. ● Places prone to static electricity. If the device is installed near interference sources such as power plants or high voltage lines, the device may run incorrectly or fail due to interference. Use interference filters, avoid identical wiring, or insulate controllers and sensors. In addition, use a single-core shielded cable for analog output. ● In the following cases, the influence of garbage, dust, water, or oil may cause measurement errors. ● Attached to the glass cover: Please use clean air to blow the dirt off the glass cover. If the dirt is serious, wipe it clean with a soft cloth impregnated with alcohol. ● Attached to the object surface: Please use clean air to blow away the dirt, or wipe away the dirt. ● Floating into the optical axis area causes dirt to invade or into droplets: Install a protective cover or take air purification ● And other measures.

Notes when saving

Symbol	Explain
注 意	Please do not use damp cloth, volatile oil, diluent to wipe. Otherwise, discoloration or deformation of the product. When the dirt is serious, please dip a cotton cloth in the diluted neutral cleaning

	agent, wring dry and wipe, and then wipe clean with a soft cloth.

Catalogue

Chapter 2: Overview

1. 1. Brief introduction

The integrated light source of OPT series 3D sensor can manually and automatically adjust the brightness setting without external light source. And 405nm was used the blue laser can achieve all of the measurements.

The 3D sensor has a super-high dynamic range, about 100 times that of a normal camera. From lower reflectivity black, or inclined to higher reflectivity metals, can be accurate measurement simultaneously.

Simple installation, integrated design, no on-site adjustment, no on-site calibration, the exit design is optimized to the best state.

1. 2. Characteristic

- 3D sensor works independently without external controller; convenient system integration; Gigabit Ethernet interface, maximum transmission distance up to 100m.
- Equipped with high dynamic range high speed CMOS, adapted to different materials and colors, and can achieve ultra-high speed scanning speed by squeezing the field of view.
- Equipped with adaptive high power blue light laser module, 3200 effective pixels, real restore contour information.
- After the factory calibration, and with the external installation and calibration, greatly improve the detection accuracy.
- Smart3 Visualization process of visual software, through graphical programming, non-programmers can also quickly and calmly complete the visual application, to achieve a very short project implementation cycle.
- Comply with the GigE Vision V2.0 protocol and the GenICam standards;
- Compliance with EMC, RoHS certification.

1. 3. Demonstration of the type

OPT -LP F2-006-01
① ② ③ ④ ⑤

① Company brand name: OPT
② Product name: LP (Laser Profiler wire laser)
③ Series name: F2
④ Model Name:
006: Installation height is 60mm
050: Installation height is 500mm
⑤ On-product information:
01: Blue light
02: Red light

Chapter 2: Quick Use

2. 1. Install supporting facilities

Table 2-1Supporting items are recommended

Order number	Name	Quantity	Explain
1	The 3D sensor	1	Equipment referred to in this manual.
2	parvicostellae	1	M12-8pin to GigE Super Type 5 cable, General / high soft, 3 / 5 / 7 / 10 m length is optional, need to be purchased separately.
3	IO line	1	M12-17pin interface to open, General / high soft, 3 / 5 / 7 / 10 m length is optional, need to be purchased separately.
4	direct current switch power supply	1	The DC switch power supply above 24V and 1A shall be purchased separately.

2. 2. Installation environment

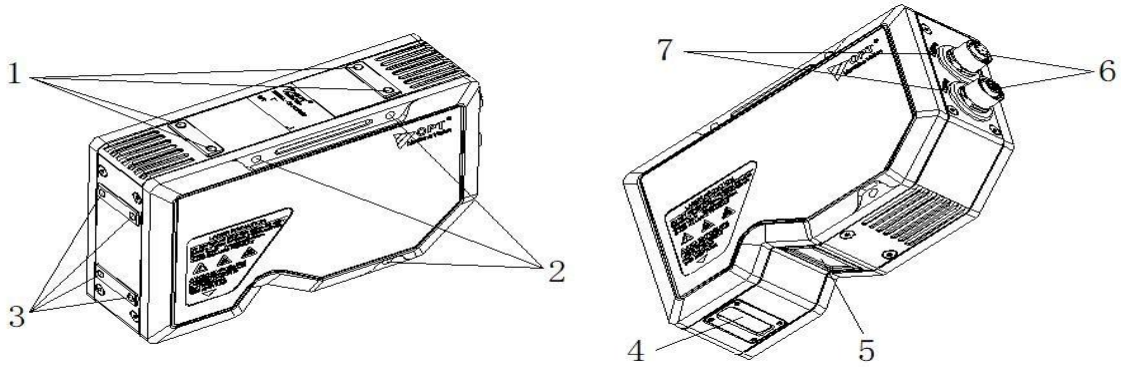
- Avoid installing the product in vibration, shock or impact environment, and keep the product away from strong electromagnetic interference environment, away from high-power electrical appliances.
- Do not use the product in extremely hot, extremely cold, dusty, corrosive or high humidity. refer to the product specification table for specific temperature and humidity.
- Avoid laying sensor cables parallel to strong current or voltage switching.
- Avoid sharing the power supply with high-power electrical appliances.

2. 3. Dead work

Before installing, please prepare the following items:

- M12-8pin-GigE interface cable;
- M12-17pin-open interface cable;
- multimeter;
- connection cover cutting pliers;
- Press wire clamp;
- One set of inner hexagonal wrenches.

2. 4. Description of each part



graph 2-1 The overall appearance

2. 4. 1. Description of each sensor component

Table 2-2 Description of each component of the sensor

Order number	Name	Function declaration
1	Install the special screw holes	This screw hole is used when installing the sensor.
2	Mounting hole	Install the sensor with the attached inner hexagonal cylindrical bolt.
3	Accessory installation hole	When installing accessories (such as shading metal plate, etc.) to the sensor make use of. Be careful not to secure the sensor.
4	Sensor laser emission window	The laser light used for the emission measurement. Pay attention to avoid hand contact, protect the glass and cause dirt and affect the performance of the sensor.
5	Sensor sensor window	Receiving the laser light used for the measurement. Pay attention to avoid hand contact, protect the glass and cause dirt, shadow Sound-sensor performance.
6	Sensor cable interface connector	Connect the sensor cable.
7	Work indicator light	Exses the operating state of the sensor.

2. 4. 2. I/O interface specification

Table 2-3 Description of the I / O interface

Pin	Signal	Explain
1	ENC_B-	Differential encoder B phase input negative electrode, light isolation
2	ENC_A-	Differential encoder A phase input negative electrode, light isolation
3	ENC_A+	Differential encoder A phase input positive electrode, light isolation
4	OPT_OUT2	Universal digital signal output 2, light isolation
5	OPT_OUT1	Universal digital signal output 1, light isolation
6	OPT_OUT0	Universal digital signal output 0, light isolation

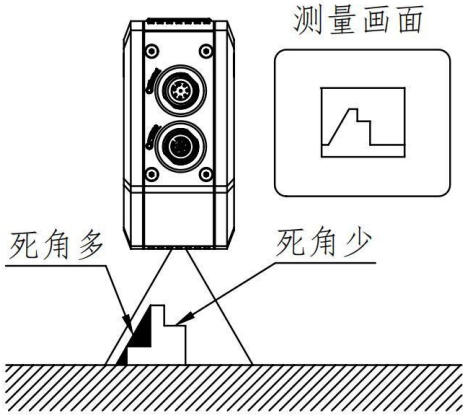
7	OPT_IN0	Universal digital signal input 0, light isolation
8	ENC_Z-	Differential encoder Z phase input negative electrode, light isolation
9	ENC_Z+	Differential encoder Z phase input positive electrode, light isolation
10	ENC_B+	Differential encoder B phase input positive electrode, light isolation
11	24V_IN_GND	Power supply (0V) GND
12	24V_IN	Power supply (+ 24V)
13	OPT_OUT_GND	Universal digital signal output, GND
14	OPT_IN_GND	Universal digital signal input ground, the GND
15	OPT_IN1	Universal digital signal input 1, light isolation
16	ENC_GND	Differential-encoded signal ground, the GND
17	Continue to have	NC

2. 5. Install sensor

Notes for installation:

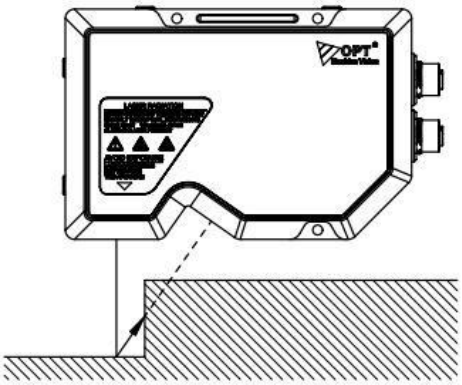
- Install the sensor correctly after confirming the precautions during installation. Install in the use environment to ensure that the product is firmly fixed.
- Depending on the shape of the object, the measurement range creates a dead end. Please confirm that the dead corner affects the measurement.

This machine uses a fan diffusion laser and photosensitive optical system. Therefore, the X-axis measurement range is near the central position, with fewer dead corners.



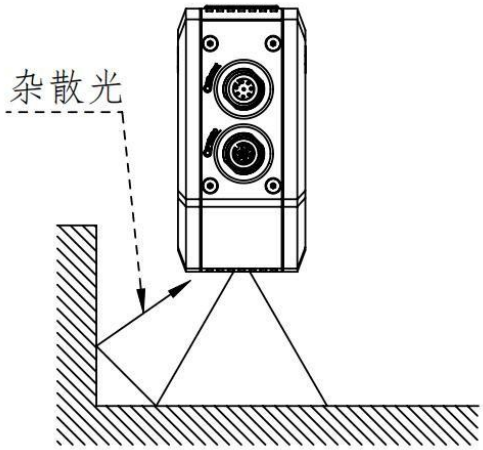
graph 2-2 The dead corners produce a schematic diagram

When installing the sensor, please avoid the laser that radiates the object and the laser that reflects from the object into the photosensitive window being blocked by the wall.

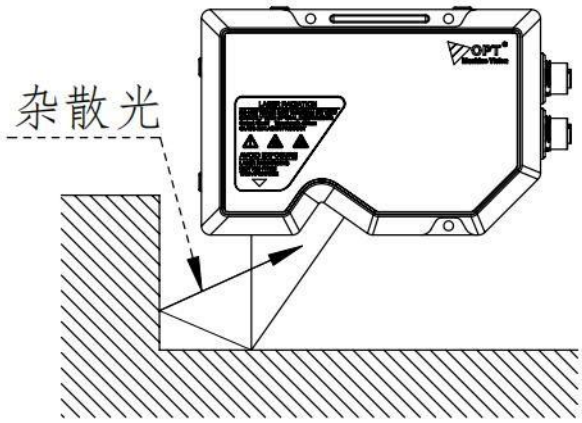


graph 2-3 Schematic diagram of the optical path

The laser reflected on the wall will become a stray light. Please see if it has an impact on the measurement, and then use it.

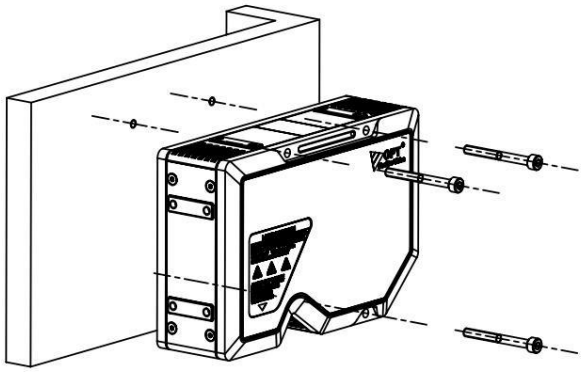


graph 2-4 Schematic representation of the stray light generation a



graph 2-5 Schematic representation of the stray light production b

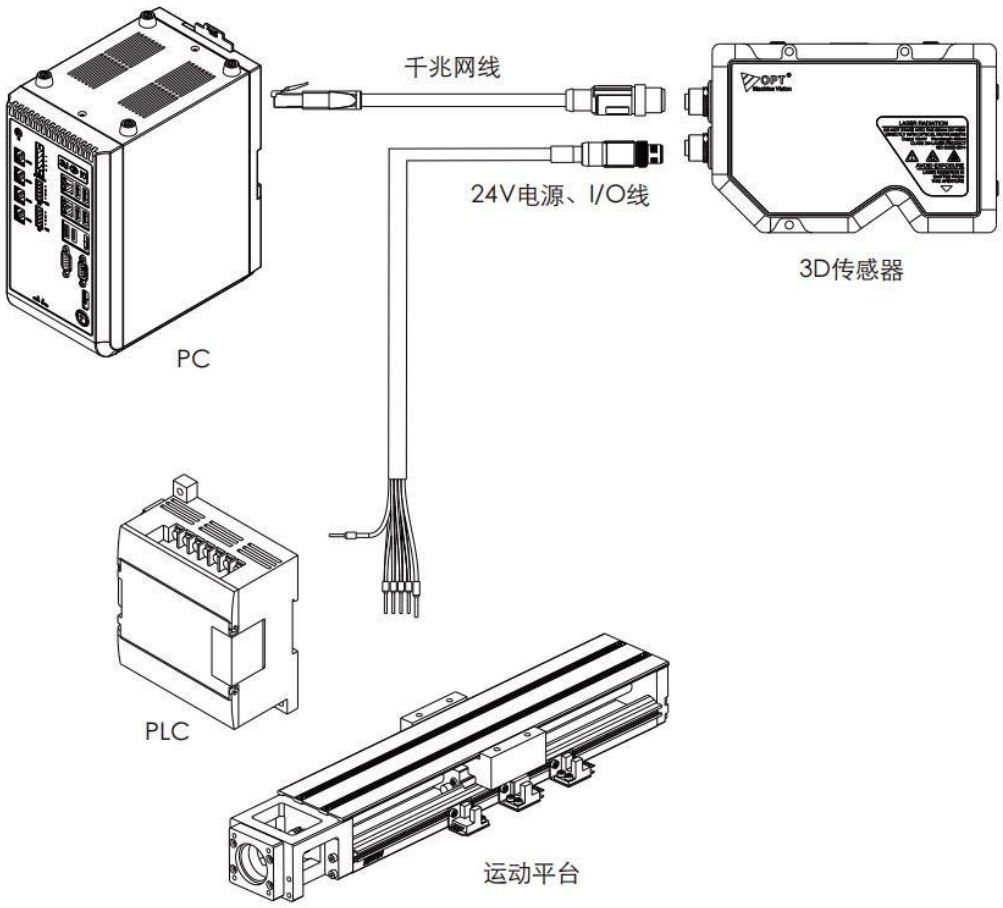
Install the sensor with screws. Refer to the 5.2 dimensional drawing for installation dimensions. It is recommended that the sensor be mounted on metal plates to facilitate positioning and heat dissipation.



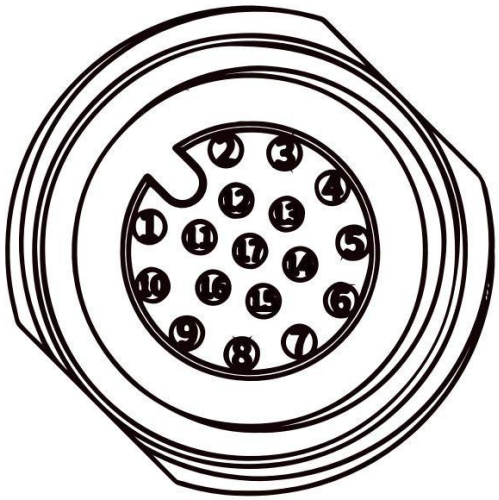
graph 2-6 Schematic diagram of the sensor installation

OPT Machine Vision

Chapter 3 Cable and sports platform connection



graph 3-9 Schematic diagram of connecting the cable with the sports platform



graph 3-10 A Schematic diagram of the I / O interface

Table 3-1 I/O definition

Pin	Signal	Explain
1	ENC_B-	Differential encoder B phase input negative electrode, light isolation
2	ENC_A-	Differential encoder A phase input negative electrode, light isolation
3	ENC_A+	Differential encoder A phase input positive electrode, light isolation
4	OPT_OUT2	Universal digital signal output 2, light isolation
5	OPT_OUT1	Universal digital signal output 1, light isolation
6	OPT_OUT0	Universal digital signal output 0, light isolation
7	OPT_IN0	Universal digital signal input 0, light isolation
8	ENC_Z-	Differential encoder Z phase input negative electrode, light isolation
9	ENC_Z+	Differential encoder Z phase input positive electrode, light isolation
10	ENC_B+	Differential encoder B phase input positive electrode, light isolation
11	24V_IN_GND	Power supply (0V) GND
12	24V_IN	Power supply (+ 24V)
13	OPT_OUT_GND	Universal digital signal output, GND
14	OPT_IN_GND	Universal digital signal input ground, the GND
15	OPT_IN1	Universal digital signal input 1, light isolation
16	ENC_GND	Differential-encoded signal ground, the GND
17	Continue to have	NC

Table 3-2 Connecconnection between cable and motion platform

Cable	Terrace
A-	A-
A+	A+

B-	B-
B+	B+
24V	24V
Source GND	GND
IN0/IN1	Trigger line
GPIO_GND	GND

Note: The connection relationship here corresponds to a high-level trigger signal.

Chapter 4 Indicator light definition

Table 4-1 LED status description

Indicator lamp type	Indicator lamp status	Description of the sensor status
Green light	The green light is always bright	Sensor initialization is in the process.
	The green light flashes slowly for 1 second	The sensor does not find the upper computer.
	Green light 0.5, seconds slow flash	The sensor has found the upper computer, but not the acquisition Set and transfer.
	The green light flash	The sensor is collecting and transmitting the images.
Orange lamp	Orange lights are often destroyed	The object profile does not exist on the Z-axis detection range.
	Orange lamp flashing	The object contour exists near the detection center of the Z-axis.
	Orange lights are often bright	The outline of the object falls on the Z-axis detection center (± 5% range).

Chapter 5 Appendix

5. 1. technical parameter

5. 1. 1. system parameter

Table 5-1 OPT-LPF 2 series 3D sensor technical parameters

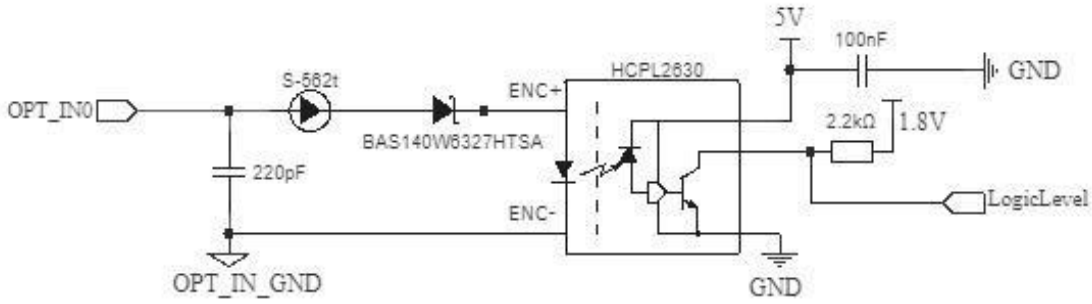
Parameter	The OPT-LPF 2 Series 3D Sensor					
Model	OPT-LPF2-002	OPT-LPF2-006	OPT-LPF2-010	OPT-LPF2-018	OPT-LPF2-030	OPT-LPF2-050
Reference Distance (CD)	20mm	60mm	100mm	180mm	300mm	500mm
Z-axis height (FS)	5.474mm	20.418mm	44.132mm	86.768mm	174.643mm	429.902mm
Z-axis repeat accuracy	0.1μm	0.2μm	0.4μm	0.5μm	1μm	5μm
X axis width	13.493-14.596mm	29.383-35.338mm	51.656-72.653mm	77.817-121.655mm	107.263-202.690mm	176.592-425.555mm
Laser grade	2M	2M	2M	2M	2M	2M
Light source wavelength	405nm	405nm	405nm	405nm	405nm	405nm
Laser output rate	10mW	10mW	10mW	10mW	10mW	10mW
Z-axis degree	± 0.02% of the total FS	± 0.02% of the total FS	± 0.02% of the total FS	± 0.02% of the total FS	± 0.02% of the total FS	± 0.02% of the total FS
The X-axis repetition accuracy	1.5μm	5μm	8μm	10μm	15μm	30μm
The X-axis data interval	5μm	11μm	22μm	35μm	60μm	120μm
Number of X-axis contour points	3200	3200	3200	3200	3200	3200
Scanning speed	3000~18000Hz					
I/O joggle	2 photocoupled inputs and 3 photocoupled outputs					
Encoder input	Support for single-end, differential encoder					
IO	The 1000Base-T Ethernet interface					
Working temperature	0～50℃					
Storage	-20～70℃					

temperature						
Working humidity	From 35% to 85% without condensation					
ESD protect	Contact discharge 4kV, air discharge 8kV, comply with IEC 61000-4-2 standard					
EFT protect	Power port 2kV / 5 or 100kHz, signal port 1kV / 5 or 100 kHz, comply with IEC 61000-4-4 standard					
Vibrate	Frequency 1-2500 Hz, maximum amplitude ±25.5mm, maximum velocity ± 2 m/s, maximum acceleration ± 3g, 2 hours random vibration in X, Y and Z					
Case protection grade	IP55					
Size	180.50x 112.00x58 .00 (mm)	171.00x1 14.00x58. 00 (mm)	199.35x 101.00x58 .00 (mm)	211.35x98 .00x58.00 (mm)	218.50x10 3.00x58.0 0 (mm)	252.35x96 .00x58.00 (mm)
Weight	1.398kg	1.313kg	1.276kg	1.288kg	1.345kg	1.419kg

5. 1. 2. Universal digital input signal electrical parameters

Table 5-2 Universal digital signal input to the electrical parameters of channel 1

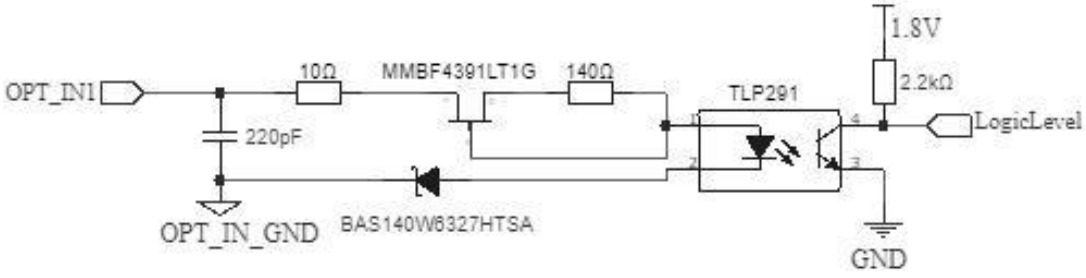
Parameter	Symbol	Nominal value
Universal digital signal safe voltage input range	Vin	-40V ～ +40V
Logical "1" voltage input	VIT+	> 1.6V
Logical "0" voltage input	VIT-	0V ～ 1V
Minimum input pulse width hold time	Ts	0.1us



graph 5-1 Internal diagram of the universal digital signal input 1

Table 5-3 Universal digital signal input to the electrical parameters of the 2-channel

Parameter	Symbol	Nominal value
Universal digital signal safe voltage input range	Vin	-40V ～ +7.5V
Logical "1" voltage input	VIT+	> 2V
Logical "0" voltage input	VIT-	0V ～ 1V
Minimum input pulse width hold time	Ts	100us

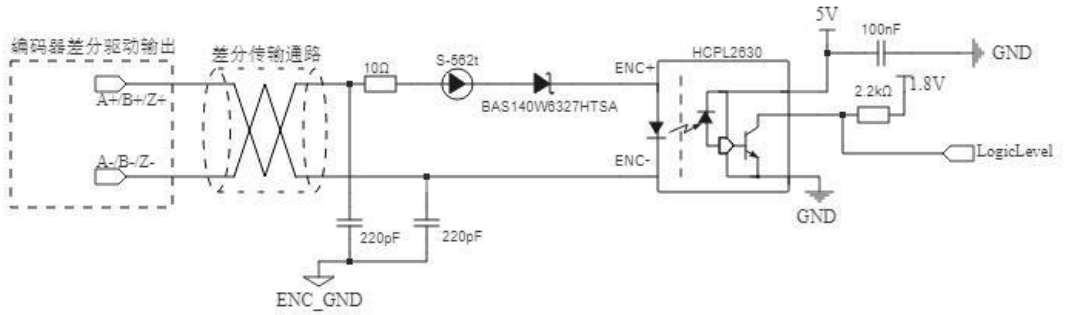


graph 5-2 Internal diagram of the 2-channel of the universal digital signal input

5. 1. 3. Differential encoder input signal electrical parameters

Table 5-4 Differential encoder input signal electrical parameters

Parameter	Symbol	Nominal value
Differential signal difference-mode voltage safety input range	Vdiff	-40V ～ +40V
Logical "1" differential voltage input	VIT+	> 1.8V
Logical "0" differential voltage input	VIT-	< 1V
Minimum differential voltage holding time	Ts	0.1us



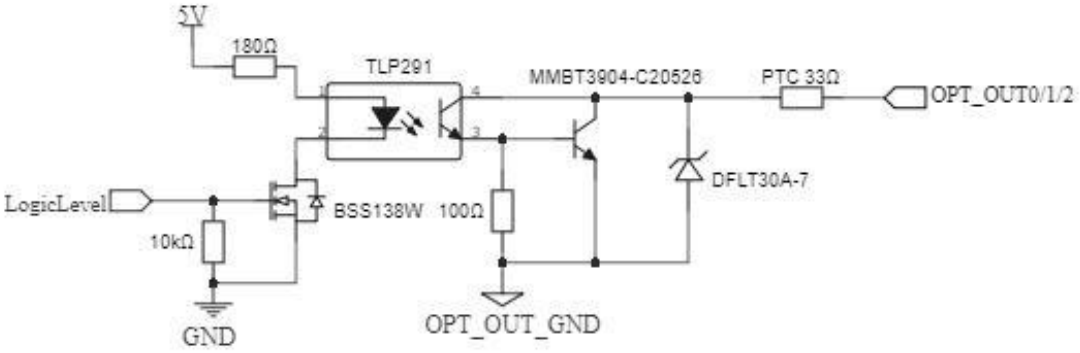
graph 5-3 Signal input wiring and internal drawing of the differential encoder

5. 1. 4. Electrical parameters of the general digital output signal

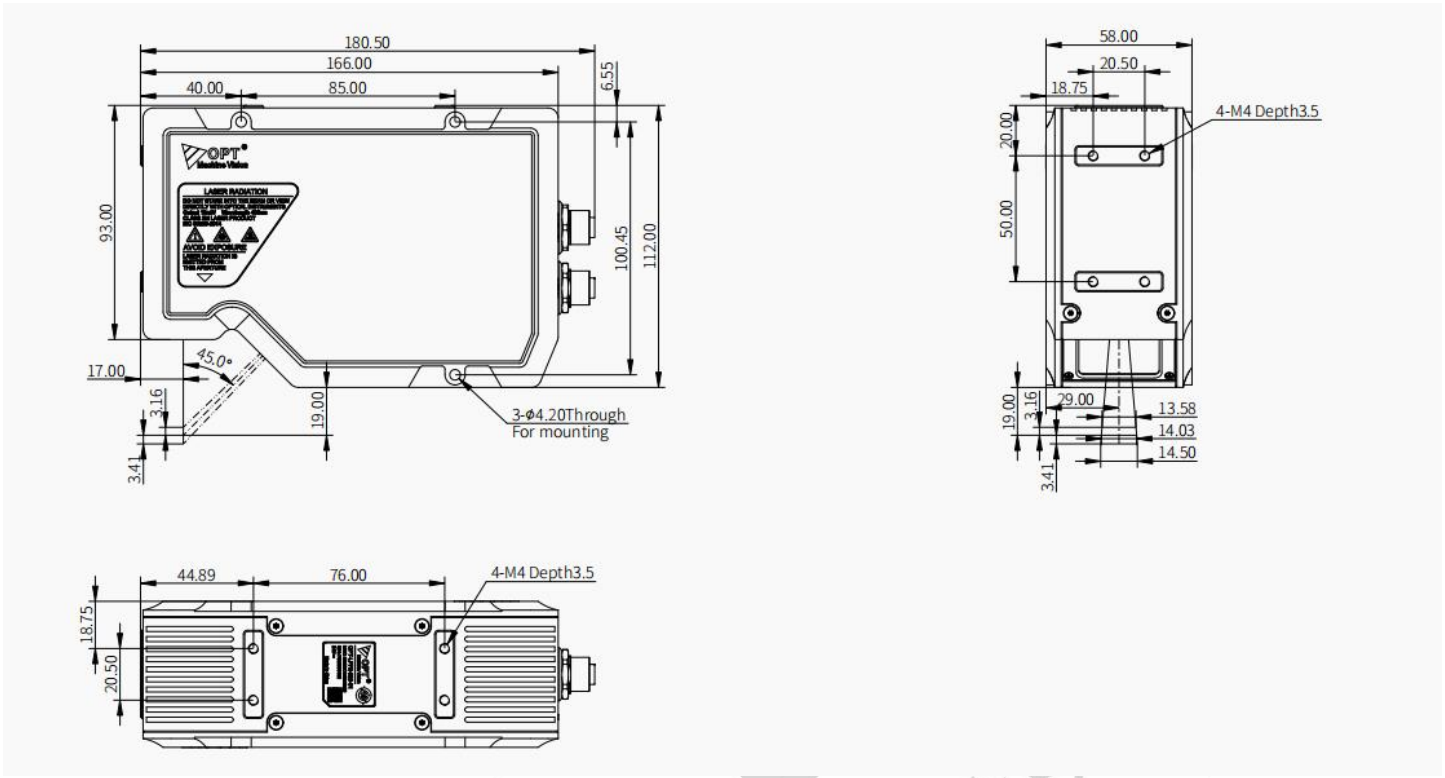
Table 5-5 Electrical parameters of the general digital output signal

Parameter	Symbol	Test mode	Nominal value
Open leakage output logic Leak current at "0"	Ioff	The external pull-up voltage is 24V	10uA
Voltage at open output logic "1"	Von+	/	<1V
The output interface is the largest Irrigation current	Iin（max）	/	50mA
Maximum pull voltage	Vup(max)	/	30V
Output time delay	Toutdelay	The external pull-up voltage is 24V, and the pull-up resistance is 5KΩ	<30us

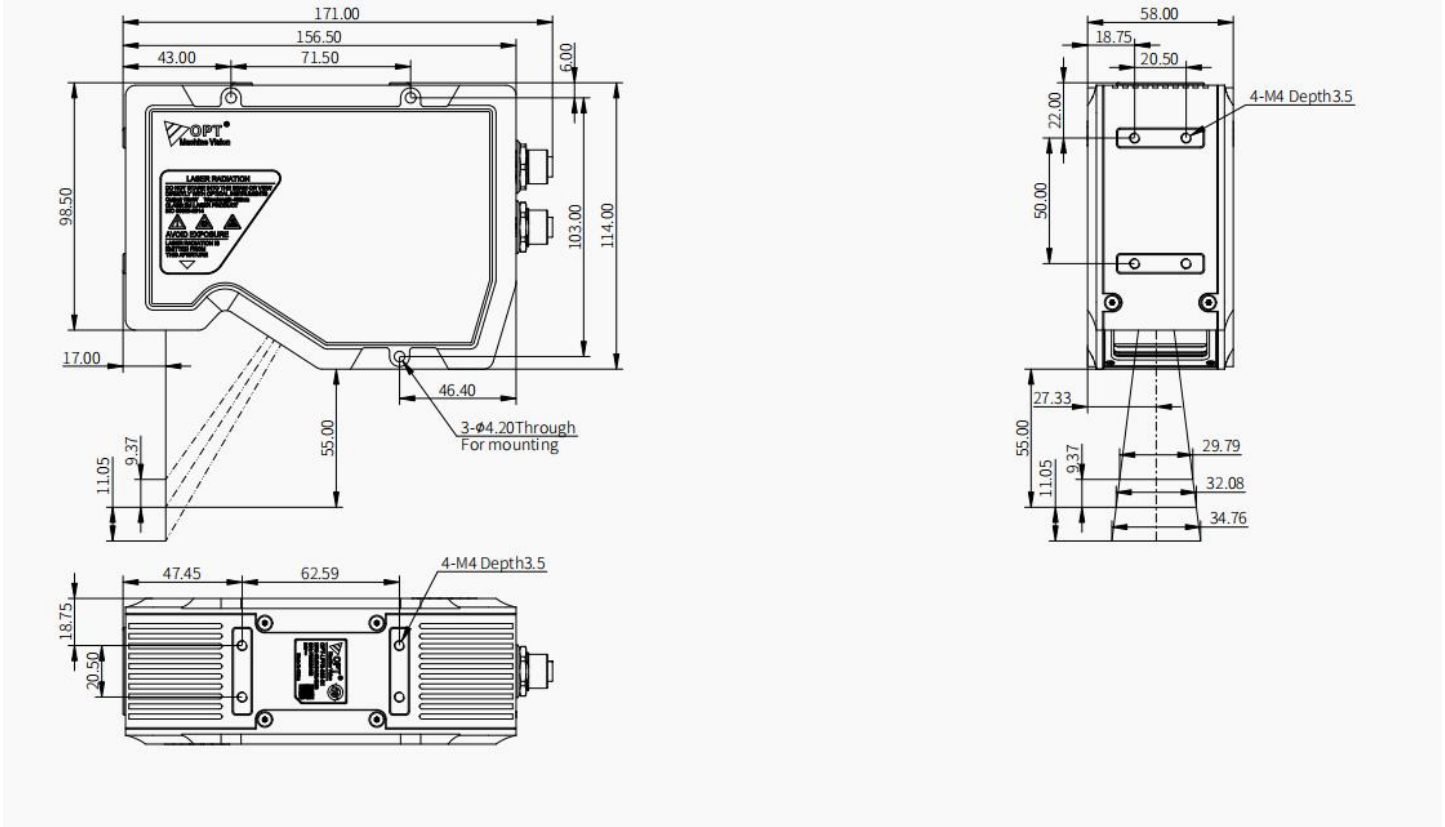
graph 5-4 Internal diagram of the universal digital output signal



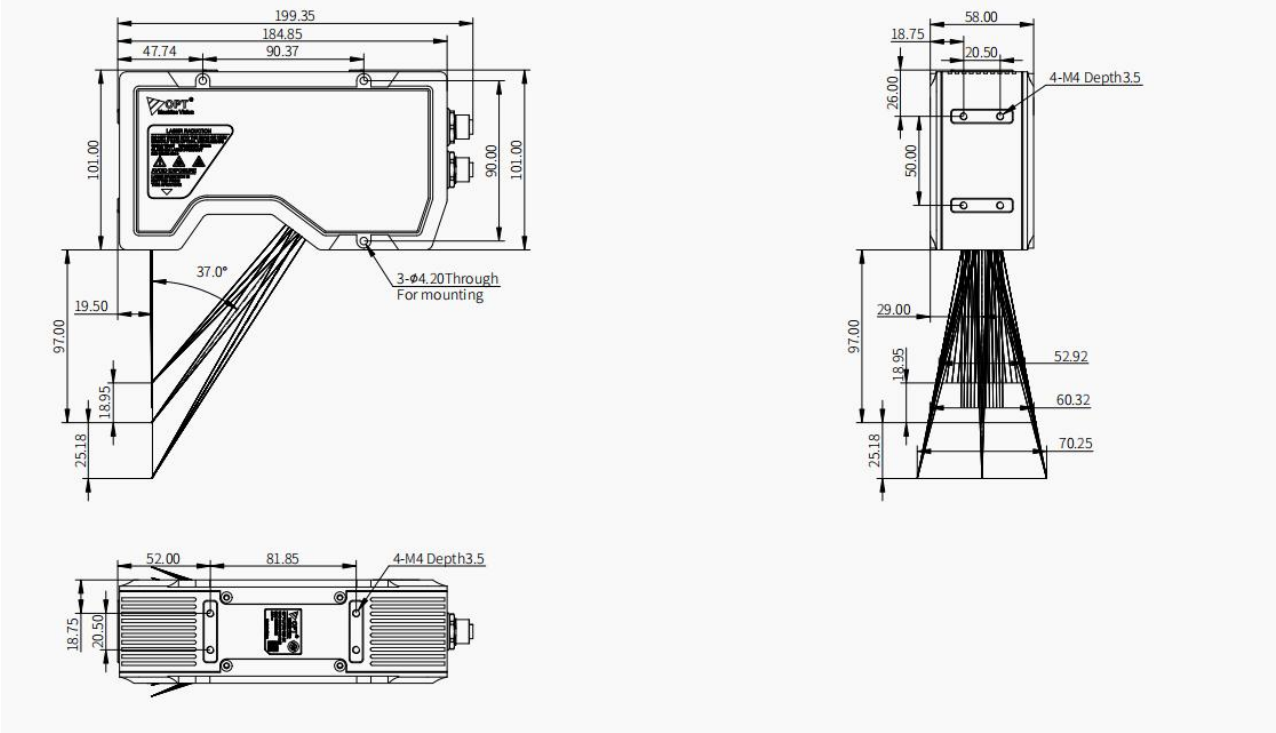
5. 2. dimensional drawing



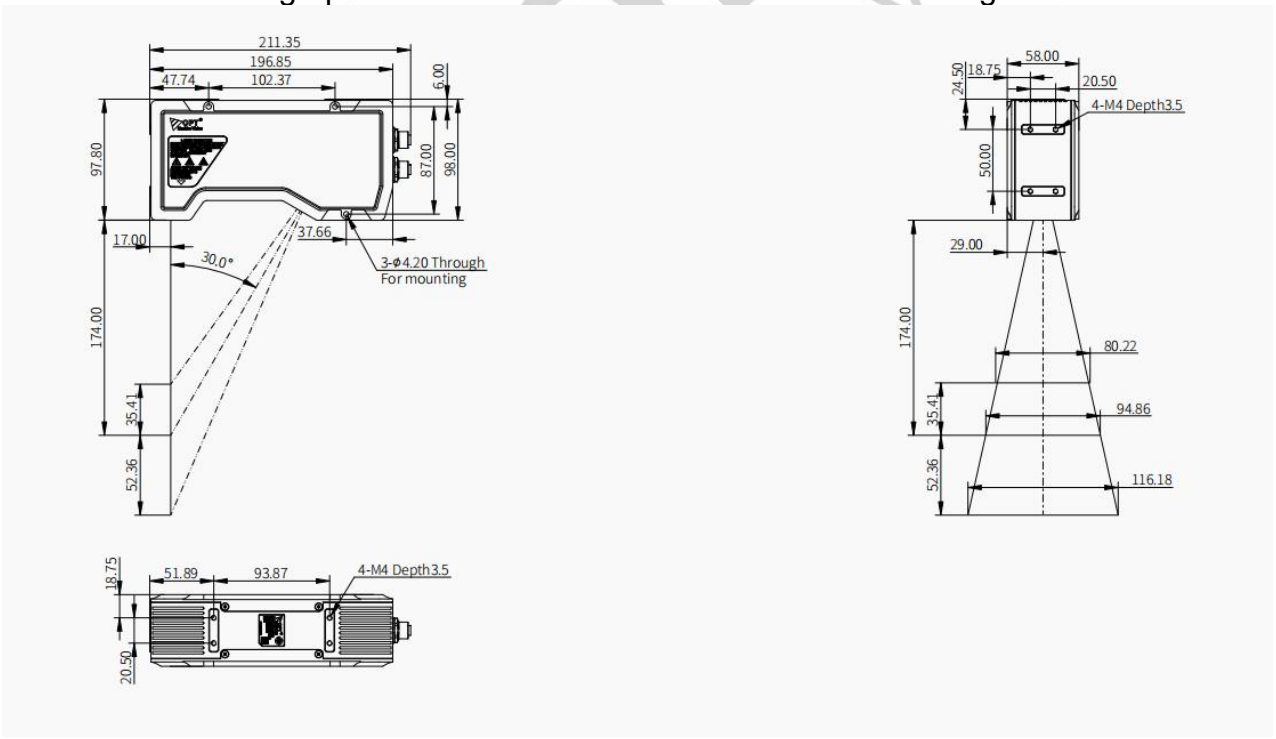
graph 5-5 OPT-LPF 2-002 dimensional diagram



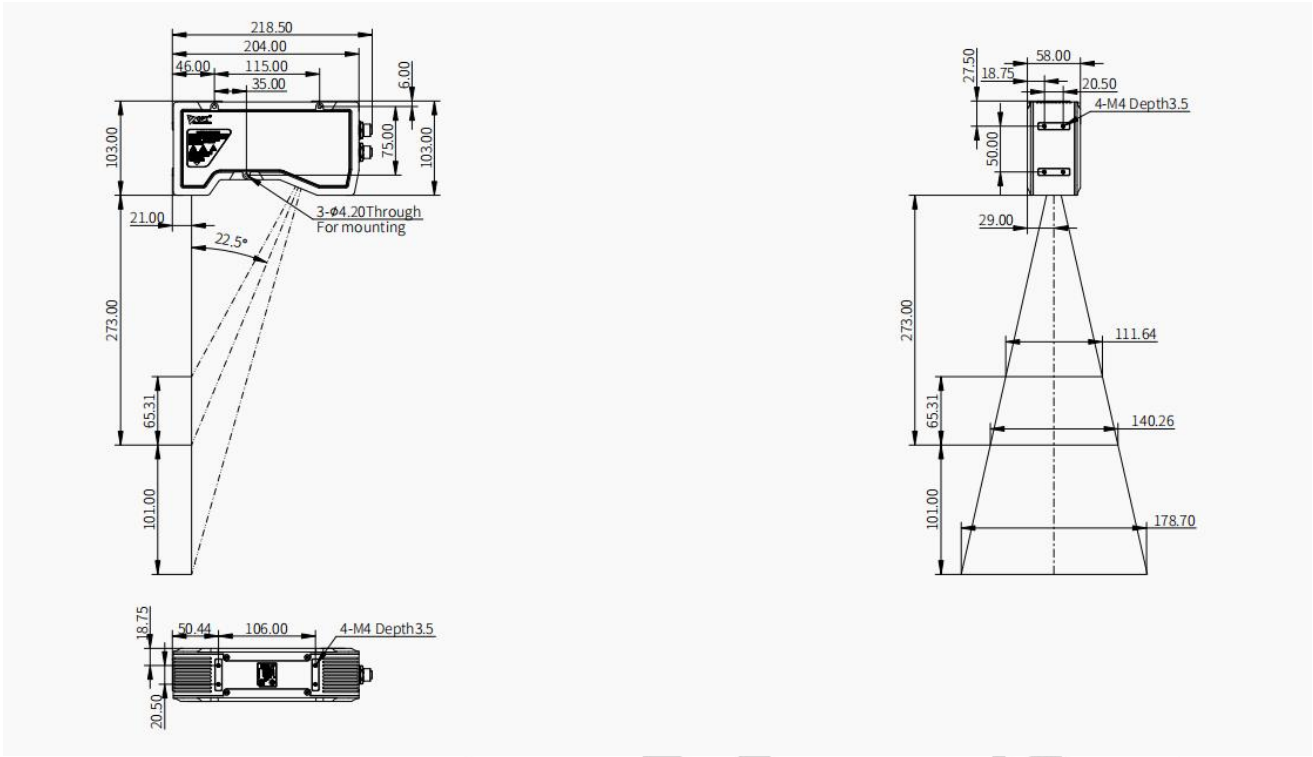
graph 5-6 OPT-LPF 2-006 dimensional diagram



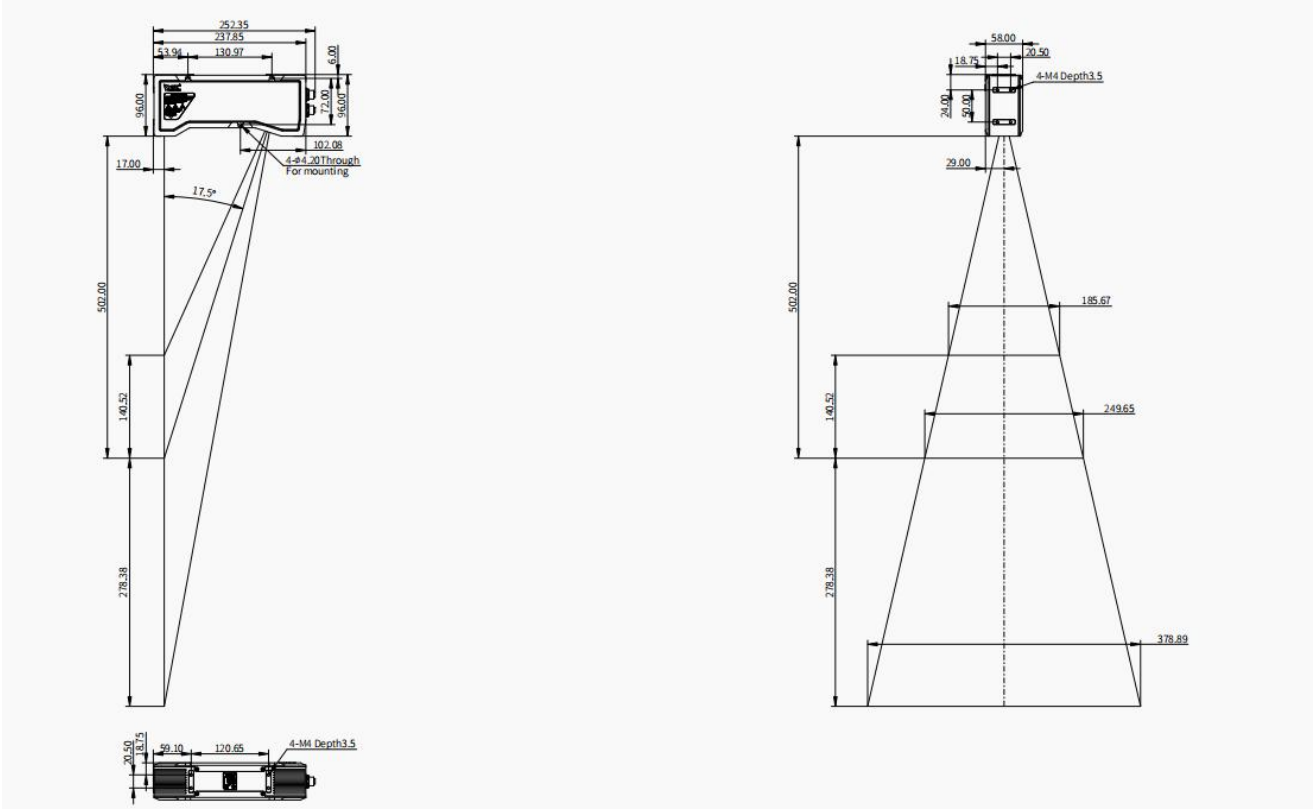
graph 5-7 OPT-LPF 2-010 dimensional drawing



graph 5-8 OPT-LPF 2-018 dimensional diagram



graph 5-9 OPT-LPF 2-030 dimensional drawing



graph 5-10 OPT-LPF 2-050 dimensional drawing

Chapter 6 Contact information

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