

Product user manual

Product Introduction | Camera Installation | Software Operation Instructions |
FAQ and Handling | Terms

VSensor_V3.04.02



www.mvstek.com



Wuxi VSensor Technology Co., LTD



6th Floor, Buiding 5,Ruiyun, Xishan Science and Technology
Park,Wuxi

Catalogue

Summary	1
1. product presentation	2
1.1 VSensor 3D Camera Introduction	2
1.2 Working environment	4
1.3 Maintenance and maintenance	4
1.4 Safe use specifications	6
2. Camera installation	7
2.1 Camera mounting instructions	7
2.2 Power supply interface usage	10
2.3 External trigger usage	10
2.4 Anti-spatter usage	11
2.5 Software installation	12
2.6 Demonstration process of camera installation and debugging	15
3. VSensor software operation instructions	17
3.1 Interface description	17
3.2 Menu	21
3.3 Quick operation introduction	22
3.4 Parameter setting module (Area Mode)	24
3.4.1 User mode	24
3.4.2 Camera list	25
3.4.3 Parameter Settings	26
3.4.3.1 Exposure time setting	28
3.4.3.2 Use of HDR	29
3.4.4 Filter Settings	30
3.4.4.1 Remove discrete points	32
3.4.4.2 Down sampling	32
3.4.4.3 Compensation	33
3.4.4.4 Filter	33
3.4.5 ROI Settings	35
3.4.6 Brightness Contrast	35

3.4.7 Z-axis Range Adjustment	36
3.5 Parameter setting module (Line Mode)	37
3.5.1 Reconstruction mode	37
3.5.2 Mode setting	38
3.5.3 Parameter Settings	39
3.5.4.1 Exposure time setting	40
3.5.4.2 Point cloud recording	41
3.5.4 Filter Settings	44
4. Common problems and treatment	46
5. Term	49

Summary

1. The VSensor software is the supporting software for the PDN, PPN, PMR and PDR series of 3D cameras. It is used to configure the 3D camera, generate and display point clouds.
2. The software automatically identifies multiple devices and connects them to the computer. After connecting the devices, it can collect and generate 3D point clouds. Users can zoom in, rotate, and measure distances on the point clouds. The software supports operations such as filtering, mapping, adjusting brightness and contrast, along with features like automatic exposure, exposure value settings, and point cloud saving.
3. Provide C#, C++, Linux, Python, and QT5 environment application interfaces and examples to meet users' secondary development needs.

VSensor_V3.04.02 supports devices

Camera model	software support	SDK support
PDN0700GB/GC1/GD	√	√
PPN0700G	√	√
PPN1200G	√	√
PDR0700G	√	√
PMR0700	√	√

Before using the VSensor 3D camera, read this manual carefully to ensure that the camera is used correctly and safely.

Caution



1. product presentation

1.1 VSensor 3D Camera Introduction

The VSensor PDN, PPN, PDR, and PMR series 3D structured light depth cameras utilize proprietary visual algorithms. By employing binocular image restoration algorithms, they reconstruct accurate 3D point cloud data of objects, fulfilling industrial-grade high-resolution, sub-hundred-micron measurement requirements for 3D vision applications. These devices are applicable in fields such as biometric identification, industrial automation, robotics, and 3D object reconstruction.

☛ Main models of face array cameras

Photo by camera	model	characteristic
	PDN0700GB	The second generation MEMS structured light 3D camera, High accuracy, small size, low power consumption, Large depth of field, long service life welding special machine
	PDN0700GC1/GD	New MEMS structured light 3D camera, Faster and smaller, One line, one plane
	PPN1200G	DLP Blu-ray industrial-grade, high resolution Medium and long distance high precision
	PDR0700G	Ultra-thin volume and high precision, Low power infrared gray/ color dual output

	PMR0700	Line scan and surface scan dual mode, Adapt to strong light, reflection and light absorption environment
---	---------	--

This manual mainly introduces 3D array camera, for more product details, please consult the sales staff, or log on to the website for relevant information

www.mvstek.com

1.2 Working environment

work environment

Before shooting, it is necessary to choose the right shooting environment. Generally, indoor shooting should be selected in a place with sufficient light and clean environment. Avoid shooting in strong or weak light environment, so as to avoid missing the point cloud due to overexposure or excessive darkness.

working temperature

Do not use in high or low ambient temperature, the working temperature of the camera is 0-50°C.

working process

Keep the camera stable to avoid shaking or vibration. Take care to protect important parts such as the lens, camera body, splash-proof cover and connection cable from damage or loss.

Special scenarios

For high current applications (such as welding), it is recommended to install an insulating pad between the camera and the bracket when installing the camera, so as to prevent the internal circuit board from being burned by external high current.

1.3 Maintenance and maintenance

Clean regularly

Clean the camera lens, housing and other components regularly to keep them clean and tidy. After completing the point cloud collection, close the anti-spray cover plate immediately before processing operations to avoid lens dirt affecting the point cloud collection effect.

periodic inspection

Check the adapter, power cord, and data cable regularly to ensure that there is no short circuit, open circuit, or broken line.

Storage environment

Store the camera in a dry, well-ventilated and out of direct sunlight to prevent

moisture or damage.

software update

Update your camera's firmware and drivers regularly for better performance and stability.

1.4 Safe use specifications

Check before use

Before using the camera, check whether the power cord and data cable are connected properly and whether the battery is fully charged to ensure the safety of the use process.

Pay attention to personal safety during use

In the process of use, attention should be paid to the surrounding environment and other personnel to ensure the safety of themselves and others.

This product uses high brightness optical machine projection, do not look directly at the camera when working, otherwise it may cause eye discomfort or injury.

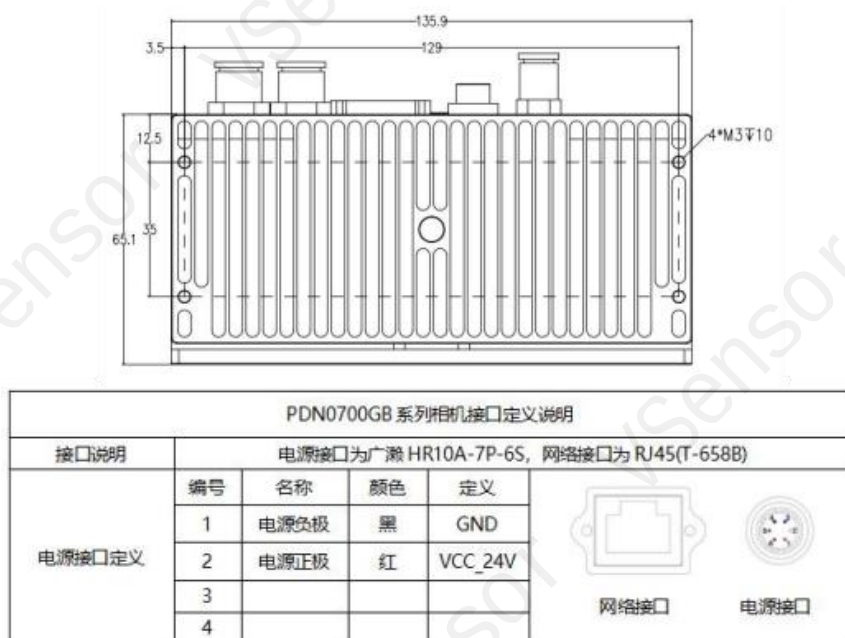
Danger



2. Camera installation

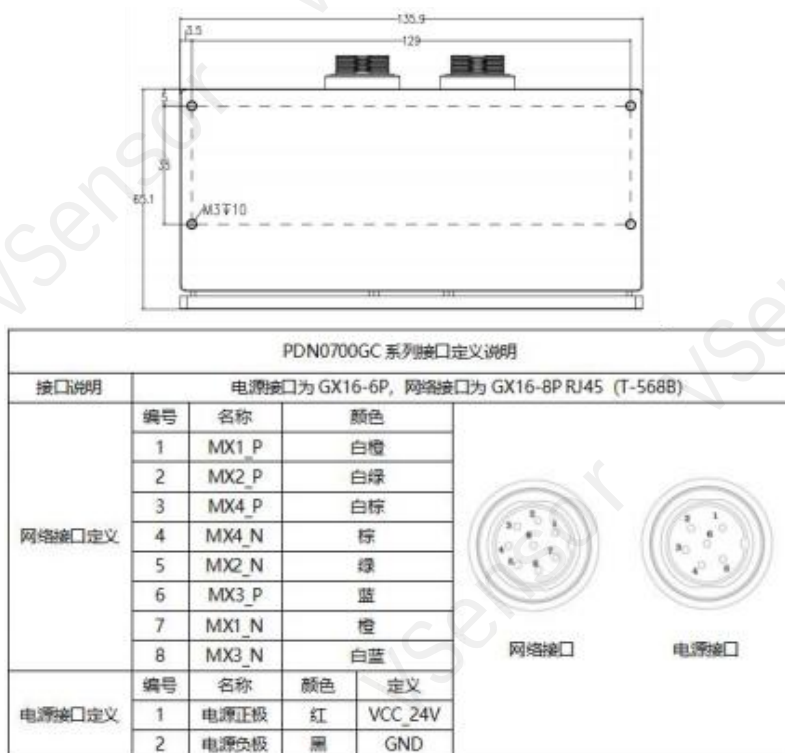
2.1 Camera mounting instructions

VS-PDN0700GB series



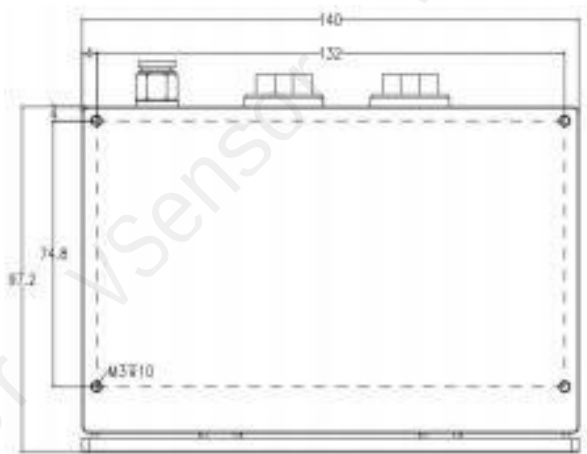
graph 2-1

VS-PDN0700GC and GD series



graph 2-2

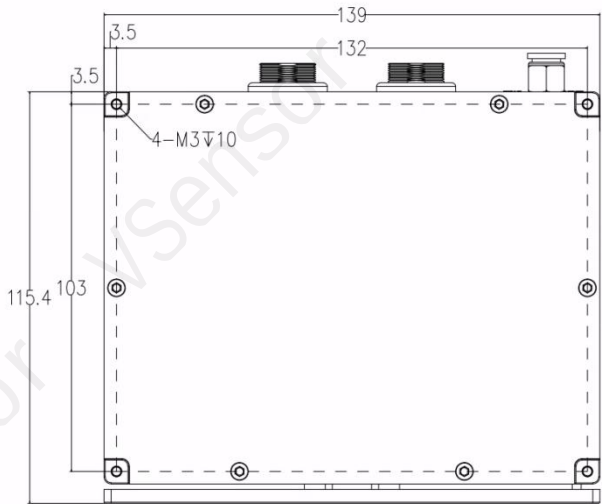
VS-PPN1200G series

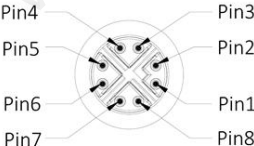
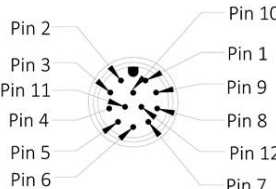


PPN1200GC 系列接口定义说明				
接口说明	电源接口为 GX16-6P, 网络接口为 GX16-8P RJ45 (T-568B)			
网络接口定义	编号	名称	颜色	
	1	MX1_P	白橙	
	2	MX2_P	白绿	
	3	MX4_P	白棕	
	4	MX4_N	棕	
	5	MX2_N	绿	
	6	MX3_P	蓝	
	7	MX1_N	橙	
电源接口定义	8	MX3_N	白蓝	
	编号	名称	颜色	定义
	1	电源正极	红	VCC_24V
	2	电源负极	黑	GND

graph 2-3

VS-PMR0700 series



PMR0700系列接口定义说明					
接口说明	PMR0700系列接口定义如下表所示				
网络接口定义	编号	名称	颜色		
	1	PIN1	白/橙		
	2	PIN2	橙		
	3	PIN3	白/绿		
	4	PIN4	绿		
	5	PIN5	白/棕		
	6	PIN6	棕		
	7	PIN7	白/蓝		
	8	PIN8	蓝		
电源接口定义	编号	名称	颜色	定义	
	1、8、9	电源正极	棕、灰、红	VCC_24V	
	2、3、4	电源负极	蓝、白、深绿	GND	
	5	外部触发光耦输入负极	粉	TRIG-	
	6	外部触发光耦输入正极	黄	TRIG+	
	7、10 11、12	预留	黑、紫 橙、浅绿		
	备注	触发输入，输出信号均采用光耦隔离，上升沿触发输入，电压范围5~24V。			

graph 2-4

2.2 Power supply interface usage

☛ Hirose HR10A-7P-6S interface

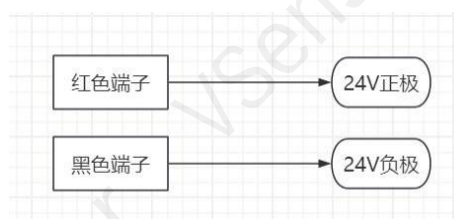
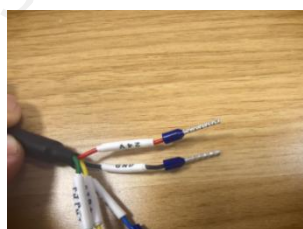
The power interface camera provides a power adapter that can be plugged directly into the power supply.

☛ GX16-6 connector interface

PDN0700GC/GD series and PPN1200G series use GX16-6 aviation plug interface.

No power adapter is provided. The usage method is as follows:

The red terminal is connected to the positive pole of 24V power supply, and the black terminal is connected to the negative pole of 24V power supply. The rated current is 24V/2A (as shown in Figure 2-5).



graph 2-5

☛ M12A interface

The PMR0700 series camera uses the M12A code-12pin interface and does not provide a power adapter. The usage is as follows:



graph 2-6

2.3 External trigger usage

☛ External trigger signal input

The PMR0700 series cameras support External triggering. In software configuration mode, the External trigger is activated by connecting the yellow terminal to the positive output of the encoder or signal generator and the pink terminal to the negative output. The trigger signal operates within a voltage range of 5-24V with a current

limit of 5mA, triggering on the falling edge (as shown in Figure 2-7).



graph 2-7

2.4 Anti-spatter usage



graph 2-8

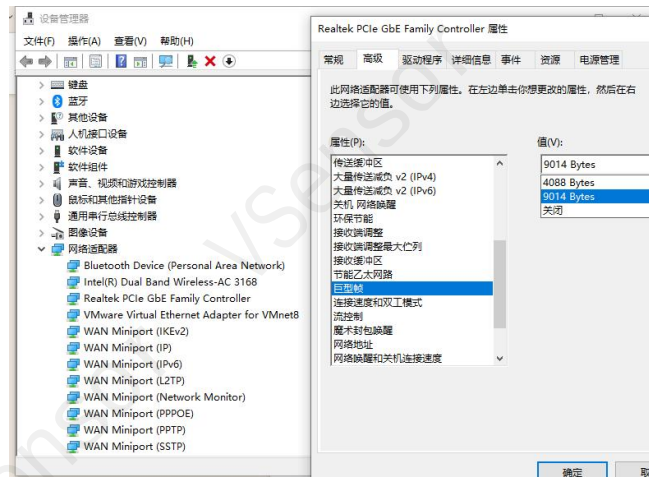
2.5 Software installation

☛ System configuration recommendations

Item	Recommended configuration
operating system	VSensor software supports 64-bit Windows 10/Windows 11, and SDK synchronously supports Ubuntu18.04 and above
RAM	4GB or above * PMR series cameras require 8GB or above
Network card configuration	A Gigabit network port or higher

☛ The giant frame is opened

To open it: Device Manager → Network Configurator → Realtek PCIe Gbe Family Controller → Advanced → JumboPacket → 9014 Bytes (select the maximum number item), as shown in the schematic diagram below:

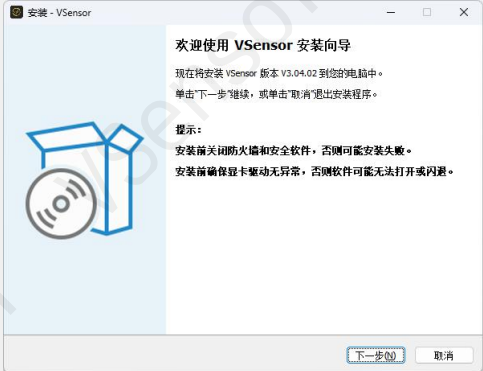
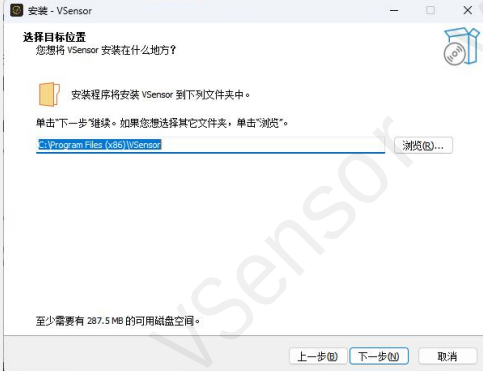
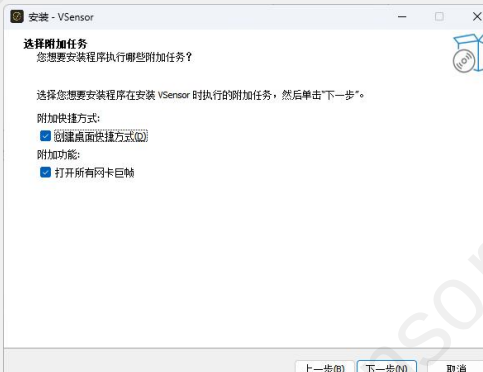


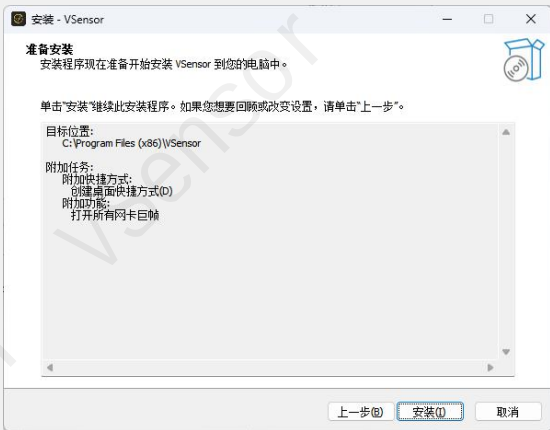
graph 2-9

☛ Installation steps

Contact customer service or sales staff for the latest VSensor installation package. The latest version is V3.04.02, which is suitable for Win10 (64-bit) system and above. The installation steps are as follows:

step	explain
Step 1	Double-click the executable file VSensor V3.04.XX.exe to install  VSensor_V3.04.02.exe

Step 2	Open the installation wizard, read the prompt message, and click "下一步(N)": 
Step 3	Select the installation path, by default C disk, select complete and click "下一步(N)": 
Step 4	Select whether to create a desktop shortcut and open all network card giant frames (note that only the built-in network port is opened here, except the external one. Click "下一步(N)": 

Step 5	Displays the current installation information. Click "安装(I)": 
Step 6	Complete the installation and run the software 
Step 7	After the installation, VSensor appears on the desktop. Double-click to open the software interface. 

Before installing the software, please close the firewall, 360 Antivirus software, and other VSensor series software.

Caution



2.6 Demonstration process of camera installation and debugging

☛ Step 1

Connect the power supply, network and air pressure valve of the camera. When the indicator light stays on for a long time, the connection is successful.



graph 2-10

☛ Step 2

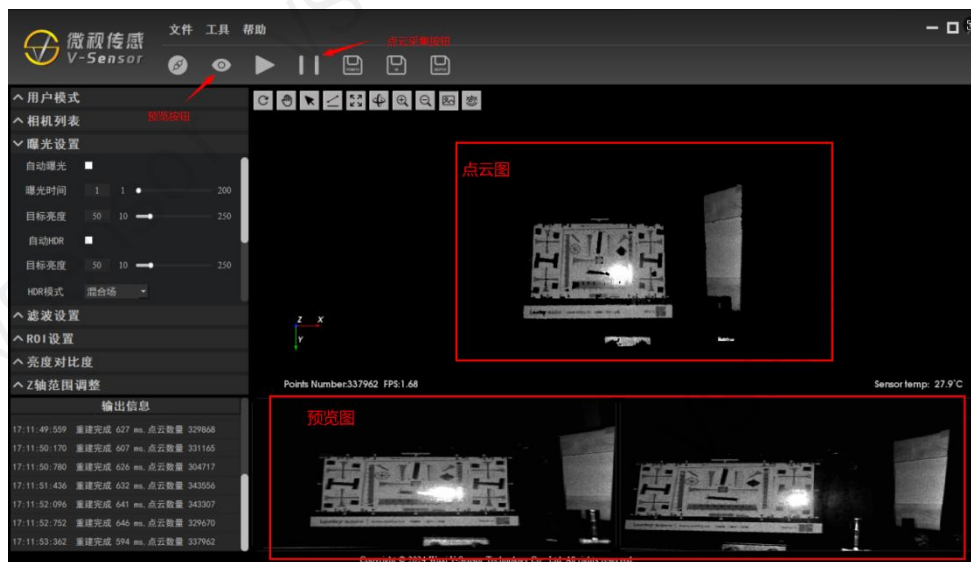
Open the V-Sensor software, find the camera in the camera list bar and click Connect. At this time, the device status bar becomes "connected".



graph 2-11

☞ Step 3

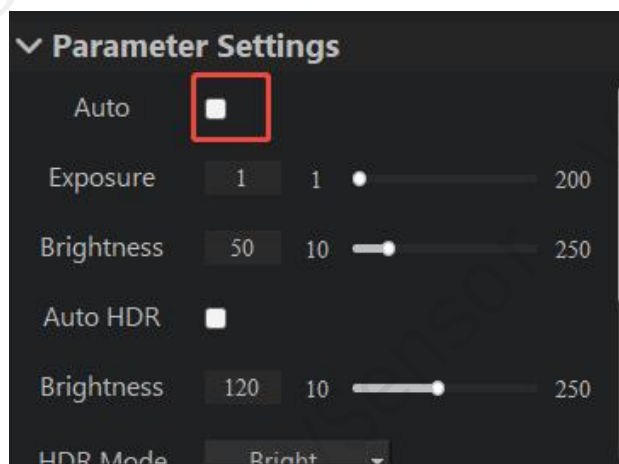
Adjust the camera to the required shooting position, then open the preview screen to observe the shooting Angle and position of the camera, and click point cloud collection to obtain the point cloud map of the object.



graph 2-12

☞ Step 4

The initial default is automatic exposure mode. If the point cloud is missing or the number of point clouds is small, you can check off automatic exposure and manually adjust the exposure time.



graph 2-13

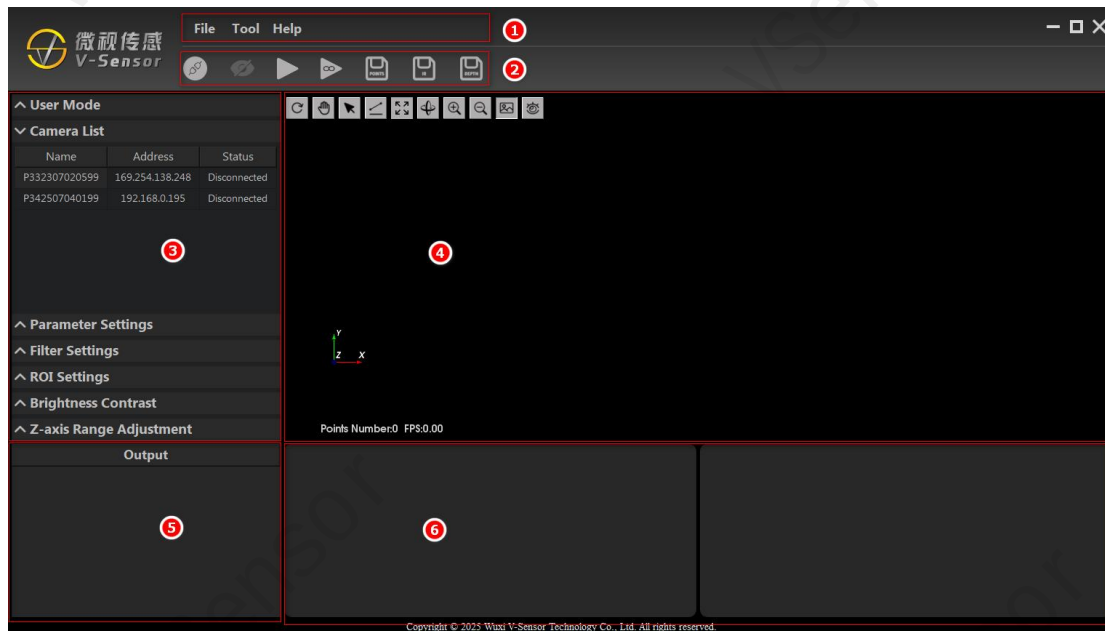
3. VSensor software operation instructions

3.1 Interface description

☛ Main operation interface

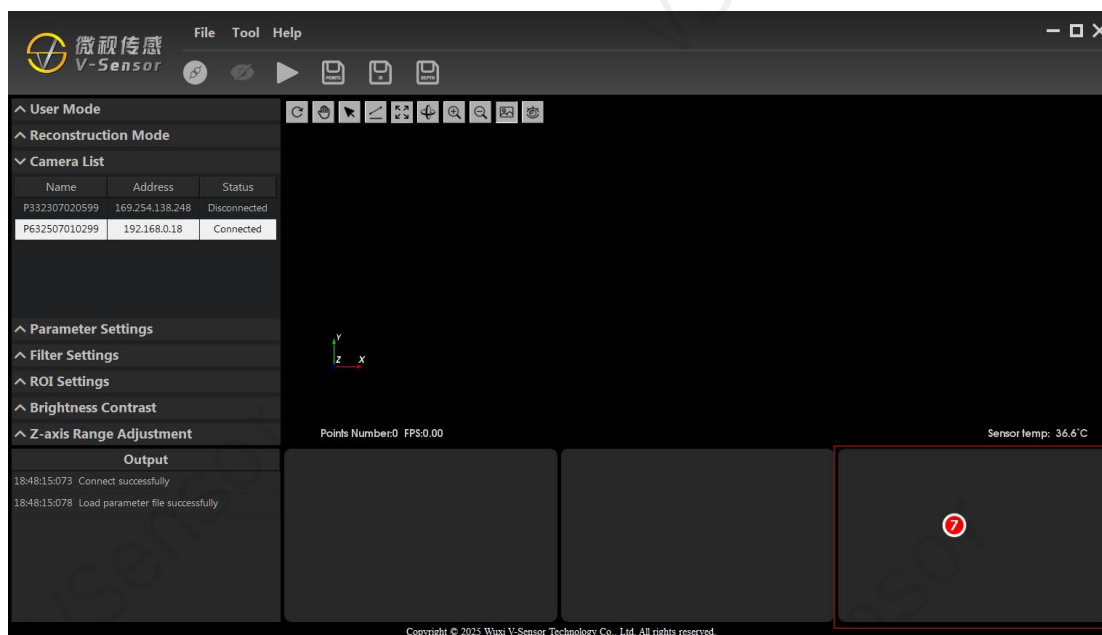
The operation interface mainly contains the basic functions of the software, which are used to control camera connection, collection, data viewing and saving.

1. Start VSensor software and enter the camera interface of PDN series and PPN series:



graph 3-1

2. PDR/PMR series camera interface:



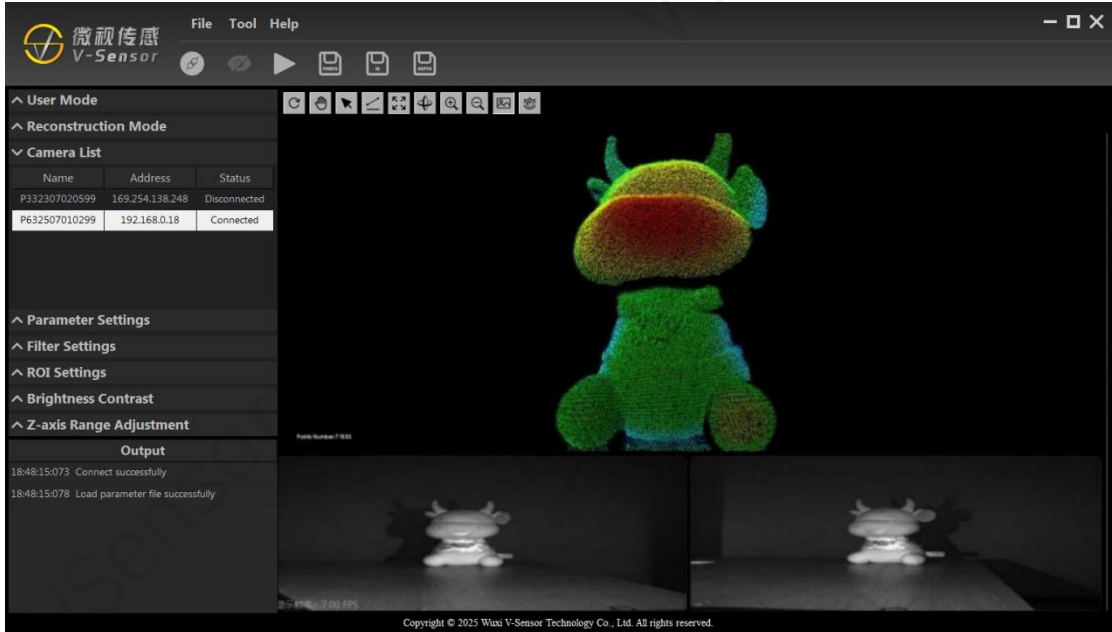
graph 3-2

☞ The main interface functions are as follows:

NO.	Name	Functional Description
1	Menu	Includes File, Tool, and Help
2	Quick operation	Includes connecting/disconnecting devices, opening/closing preview views, single/continuous point cloud acquisition, saving point clouds, depth maps and grayscale (or color) images
3	Parameter setting module	Including user mode, camera list, exposure Settings, filter Settings, ROI Settings, brightness contrast, and Z-axis range adjustment
4	Point cloud display area	Display the 3D point cloud captured by the camera, as well as simple operation tools
5	OutPut	Display the operation and operation time, operation results
6	Camera preview	Display the gray video data captured by the camera in real time
7	RGB preview	Suitable for PDR/PMR series cameras, display the color video data captured by the camera in real time

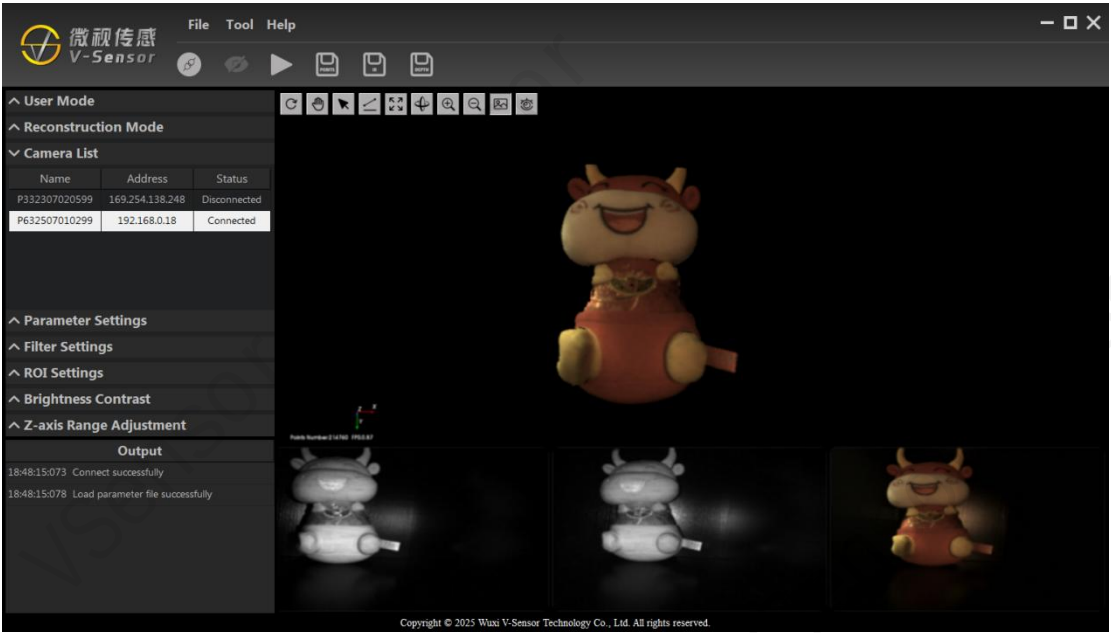
☞ Display of interface acquisition effect:

PDN and PPN series cameras



graph 3-3

PDR/PMR series cameras



graph 3-4

3.2 Menu

 In the main interface, the menu bar functions are as follows:

menu bar	submenu	functional description
File	Open Point Cloud	Supports importing point cloud files in.pcd and.ply formats for display in the point cloud display area
	Log	Open the log folder. The computer saves error logs when it encounters a fault to help locate the problem
	Profile	Open the configuration folder. It is used to store the camera configuration information saved by the user and can be loaded directly
	Exit	Click to exit the current application
Tool	Path Settings	Set the saving path and format of point cloud, recorded point cloud, grayscale image, depth map and color image
	Profile Settings	You can save the current software Settings as a configuration file, or you can import a saved configuration file. You can view the saved file in the Configuration File option under the File menu bar
	IP Settings	To modify the device IP address after connecting the network port camera: Select the IP settings in the toolbar, choose the corresponding device name, enter the desired IP address, subnet mask, and default gateway. After clicking OK, restart the device. At this point, the PC's IP address needs to be updated to match the corresponding network segment
	Parameter Reset	The current camera parameters are reset to preset values, which vary slightly between different camera models
Help	Usage manual	Open the user manual folder. It contains the following documents: user manual, SDK description, and face structured light camera conversion relationship description
	SDK	Open the SDK path. Currently supports C#, C++, Linux, Python, and Qt5. For Linux and Python usage, please refer to readme.txt in their respective folders
	Language	You can switch between Chinese and English, which will take effect after the software restarts
	About	Display the model of the equipment, working platform, software, SDK version and other relevant information

3.3 Quick operation introduction

 The function of the shortcut operation button on the main interface is as follows:

Button	Name	Functional Description
	Disconnected	The camera is not connected. Click to connect the selected camera in the list, and the icon becomes connected
	Connected	The camera is connected. Click to disconnect the connected camera, and the icon becomes disconnected
	Preview closed	After clicking, the camera preview area of the home screen shows the preview view, and the icon becomes open
	Preview opened	Click to close the preview view, the icon becomes closed
	Single Capture	Click to collect point cloud data and display it once
	Pause/Continuous Capture	After clicking, the point cloud data is collected and displayed in real time
	Save Point cloud as	After clicking, a point cloud saving dialog box will pop up. Select the path of point cloud saving through "Tools" - "Save Path Settings", and the point cloud data can be saved to local in three optional formats: PCD, PLY and TXT. If no path is selected, it will be saved to desktop by default
	Save Gray/Rgb image as	After clicking, the grayscale/color image will be automatically saved. Select the path to save the grayscale/color image through the menu bar "Tools" - "Save Path Settings", and the image can be saved to local in three optional formats: JPG, BMP and PNG. If no path is selected, it will be saved to desktop by default
	Save Depth image as	After clicking, the depth map will be automatically saved. Select the path to save the depth map by "Tools" - "Save Path Settings" in the menu bar. The depth map can be saved to local in PNG and TIF formats. If no path is selected, it will be saved to the desktop by default
	Reset	Click to reset the point cloud image display perspective
	Move	After clicking, you can move the point cloud display position by manipulating the mouse
	Coordinate	Click to select a single point of the point cloud and print the coordinates of that point
	Distance	Select two points in the point cloud, calculate and print the coordinates of the two points and the distance between them
	Maximize	After clicking, the interface only displays the current point cloud picture

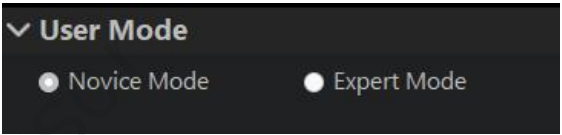
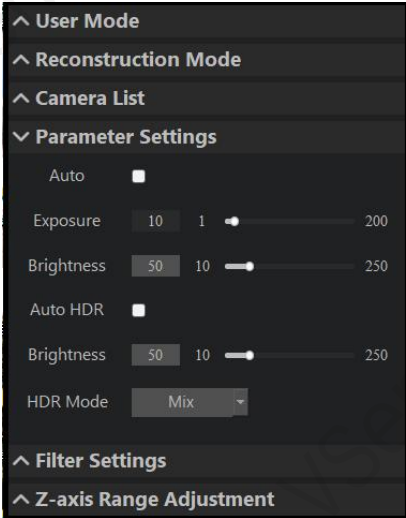
	Axes	After clicking, the coordinate axis of the point cloud area is displayed and the display Angle can be adjusted
	Amplify	Click to zoom in on the point cloud image displayed in the display interface
	Reduce	Click to zoom out the point cloud image displayed in the point cloud display interface
	Cancel/Show Map	You can cancel or display the sticker after clicking
	Switch	After clicking, you can switch the display position of 3D point cloud image and camera video

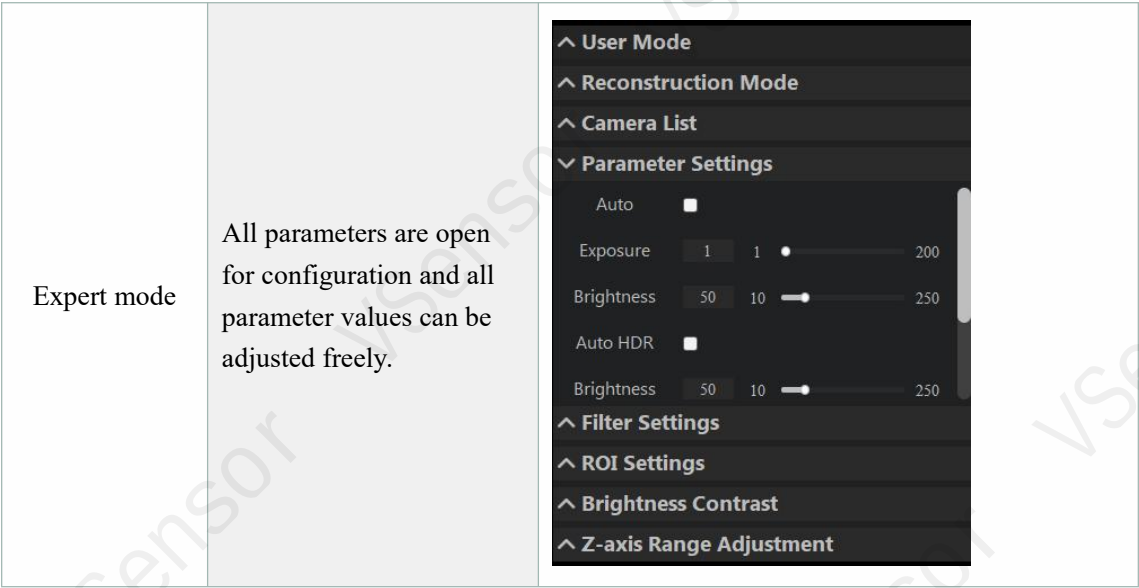
3.4 Parameter setting module (Area Mode)

This chapter applies to the area mode of both face array cameras and line and face integrated cameras.

3.4.1 User mode

When using the equipment, you can choose between user mode and expert mode. In novice mode, some uncommon functions are hidden and some parameters are preset to facilitate user operation, while in expert mode, all parameters can be modified freely.

function	description	instance
User mode selection	Optional Novice Mode, Expert Mode	
Novice Mode	Open some parameter configuration: Parameter Settings, Filter Settings, Z-axis Range Adjustment. Some parameter values are preset and cannot be adjusted.	



3.4.2 Camera list

This list shows the Name, Address and Status. Double-click the corresponding camera line to connect or disconnect the camera. Only one device can be connected in the same window. If you need to connect multiple cameras, you can open multiple Windows to connect.

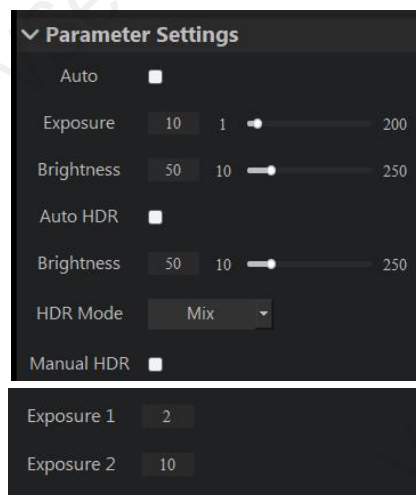
Camera List		
Name	Address	Status
P332307020599	169.254.138.248	Disconnected
P342507040199	192.168.0.195	Disconnected

graph 3-5

3.4.3 Parameter Settings

The module setting includes camera exposure time setting, automatic exposure function, automatic HDR mode and manual HDR mode:

PDN series



graph 3-6

PMR series



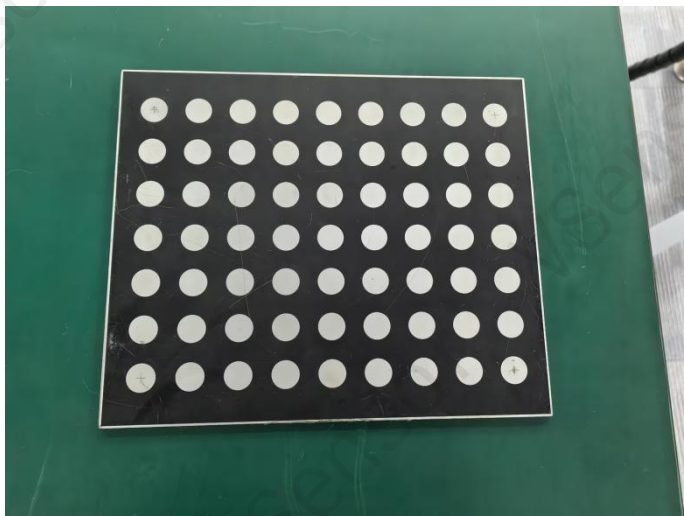
graph 3-7

Name	Functional Description
Exposure	The default adjustment range is 1-200ms. When automatic exposure is enabled, the exposure cannot be manually adjusted
Brightness	The target brightness is an auto-exposure parameter with a range of 10 to 250. This parameter serves as the basis for automatic exposure control, where lower values correspond to shorter exposure times. It's crucial not to

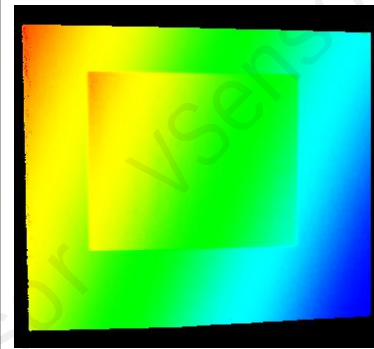
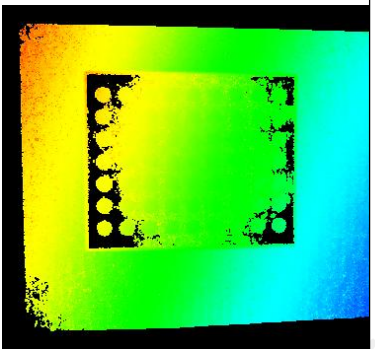
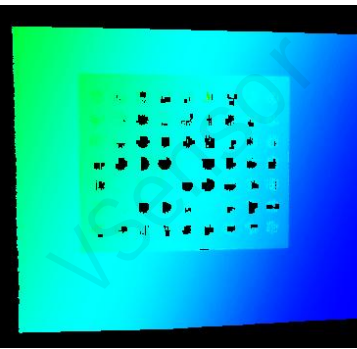
	set this value too high or too low – excessive highs can cause overexposure, while excessively low values result in dim images that compromise adjustment effectiveness. Both extremes negatively impact point cloud quality
Auto	When checked, the system automatically adjusts the exposure time during each point cloud acquisition, with the updated settings taking effect during subsequent reconstructions. Through repeated measurements of the same object, the exposure time stabilizes at its optimal level, yielding high-quality point clouds. When unchecked, data collection follows the manually set exposure time values
Analog gain	The analog gain is used to adjust the camera's image analog gain value. The default range is 5 to 10
Auto HDR	When checked, the system automatically calculates two exposure times based on the selected target brightness and HDR mode on the interface, and the reconstruction process will be reconstructed according to these two exposure times. It is suitable for objects with both bright and dark areas
Manual HDR	When checked, manually enter two different exposure times, and the reconstruction process will be reconstructed based on these two exposure times. It is suitable for objects that have both bright and dark areas
Scan Time	For PMR: Time used to start and end the line laser scan. The longer the scanning time, the denser the point cloud and the larger the data volume. The default value is 1000ms, and you can choose 500ms, 1500ms, 2000ms, 2500ms and 3000ms.
Grayscale/color	With the R series camera parameters, the exposure time of the gray camera and the color camera can be adjusted after selection
white balance	With the R series camera parameters, after setting the color exposure time, click to automatically adjust the tone and keep the white balance; you can also manually adjust the red, green and blue gain as needed

3.4.3.1 Exposure time setting

- The missing point cloud is observed during the shooting, and the blank area in the point cloud represents the missing point cloud.
- Objects with different reflectivity need to set different exposure time. Low reflectivity requires high exposure, while high reflectivity requires low exposure. It is necessary to adjust the appropriate exposure time for point cloud collection. The following calibration plate collection effect is used for reference:



graph 3-8

Take pictures normally	underexposure	overexposure
		

- When the exposure is insufficient, increase the exposure time/simulated gain; when overexposure occurs, decrease the exposure time/simulated gain. You can also adjust the automatic exposure function to lower the target brightness with high reflectivity and increase the target brightness with low reflectivity.

3.4.3.2 Use of HDR

- When the acquisition scene contains both high reflectivity and low reflectivity objects, the collection of high exposure and low exposure cannot be satisfied at the same time for two objects. In this case, HDR function can be used to effectively improve the point cloud quality.
- Exposure 1 refers to low exposure, while Exposure 2 denotes high exposure. When uncertainty exists, the automatic HDR function can assist in adjustments. The automatic HDR offers three modes: Highlight, Dark Field, and Hybrid Field. A background with higher grayscale values and an object with lower grayscale values are classified as Highlight, whereas the opposite scenario is categorized as Dark Field.
- The following is the HDR acquisition effect of high and low reverse scenarios:



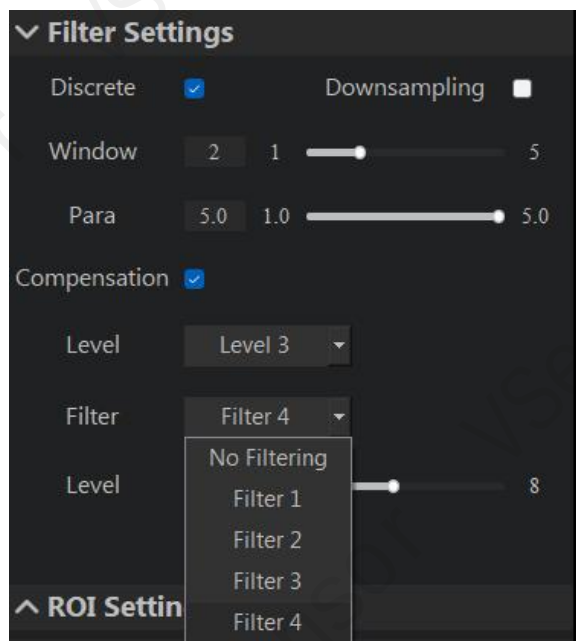
graph 3-9

HDR take	Low exposure	High exposure

3.4.4 Filter Settings

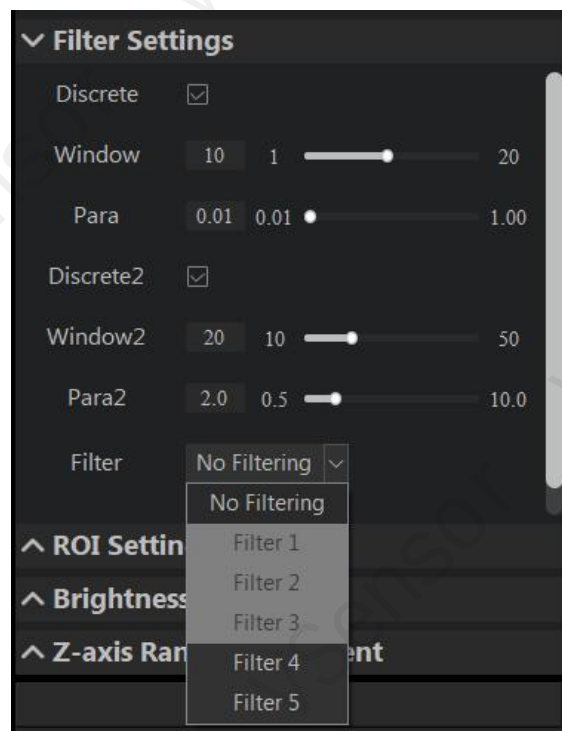
The module is mainly set for point cloud preprocessing, including Discrete, Down sampling, Compensation and different filtering methods:

PDN 、 PPN series



graph 3-10

PMR series

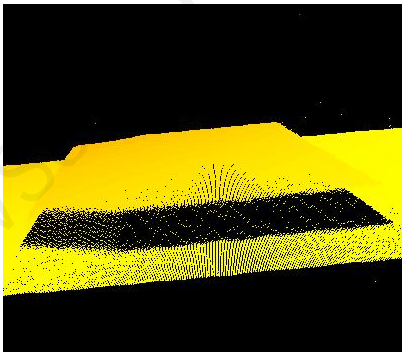
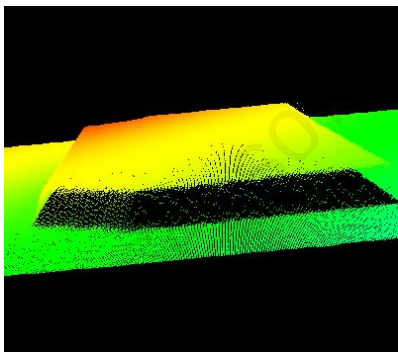


graph 3-11

Name	Functional Description
Discrete	To configure the discrete operation on the collected point cloud data: The window ranges from 1 to 5. A smaller value (e.g., 2) results in weaker point removal, while a larger value (e.g., 5) leads to stronger point removal. * For PMR: The function of removing discrete points for single linear point cloud: The range of discrete window is 1-20, the smaller the value, the weaker the removal of discrete points, it is recommended to 10; the range of discrete parameter is 0.01-1.00, the smaller the value, the stronger the removal of discrete points, it is recommended to 0.01.
Discrete2	FOR PMR: Discrete function for the whole point cloud: Discrete window range 10-50, smaller value means weaker removal of discrete points, recommended 2; Discrete parameter range 0.5-10, smaller value means stronger removal of discrete points, recommended 2.
Downsampling	Reduce the number of point cloud collection and improve the collection speed.
Compensation	Algorithmic hole compensation is applied to the collected point cloud data, with compensation levels ranging from 1 to 5, where level 1 is recommended. Note: Levels 1-2 ensure accurate point filling, while levels 3-5 relax filling criteria and may cause abnormal boundary filling. Levels 3-4 increase compensation for large holes, whereas level 5 results in the highest error during hole filling. The precision decreases progressively as the compensation level increases, while the number of filled points grows accordingly.
Filter	The point cloud data collection undergoes four filtering stages: Filter 1 through Filter 4. [Filter 1] Window Range: 1-15, Parameter Range: 1-10. Typically, the filter window size is 4-6 times the filter parameter value. Larger window sizes and parameters result in smoother point clouds. [Filter 2] Parameter Range: 1.0-10.0. Higher parameter values achieve smoother results. [Filter 3] Parameter Range: 1.0-10.0. Larger parameter values improve smoothing. [Filter 4] Filter Level: 0-8. Lower levels reduce discrete point removal. * PMR0700 Series: Only Filter 4 and 5 are available. [Filter 4] Filter Level: 2-7. Higher parameters enhance smoothing. [Filter 5] Filter Level: 4-10. Larger values improve smoothing but slow processing. Recommended value: 6

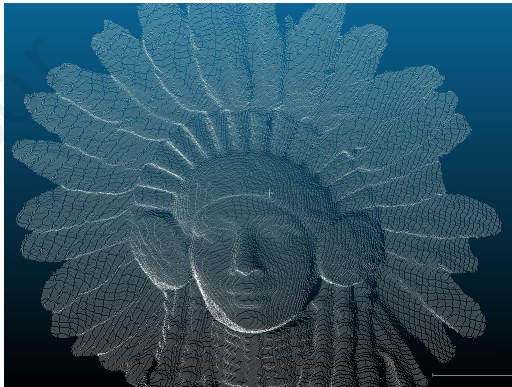
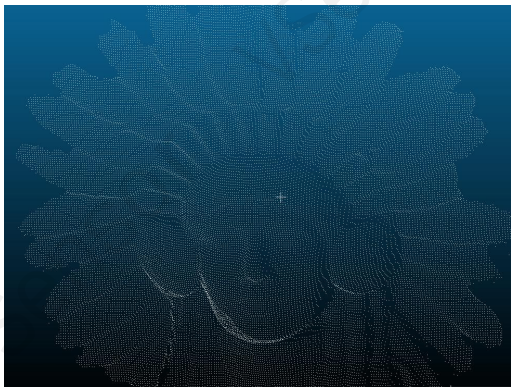
3.4.4.1 Remove discrete points

After opening the discrete points, invalid discrete points can be effectively removed to obtain better point cloud effect. The following is the comparison of the effect of removing discrete points. It can be seen that stray points other than the workpiece are effectively removed:

Before going into the discrete	After the departure of the discrete ones
	

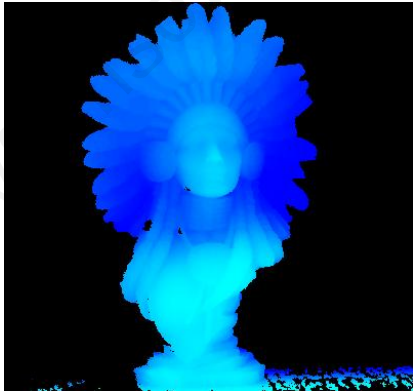
3.4.4.2 Down sampling

Reduce the number of point cloud collection and improve the collection speed. The following is the effect of enabling down-sampling, and the point cloud density is reduced:

Normal collection	Enable down-sampling
	

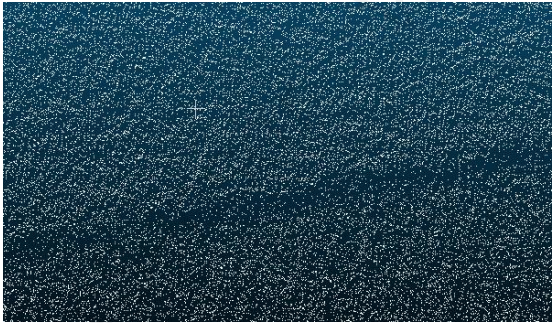
3.4.4.3 Compensation

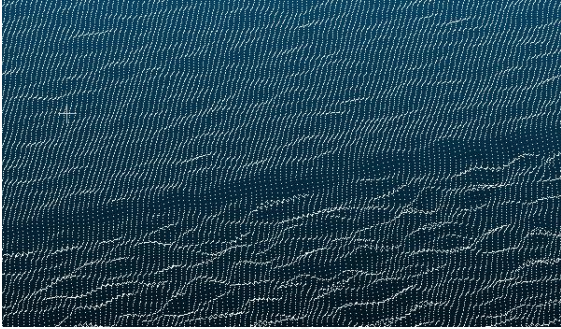
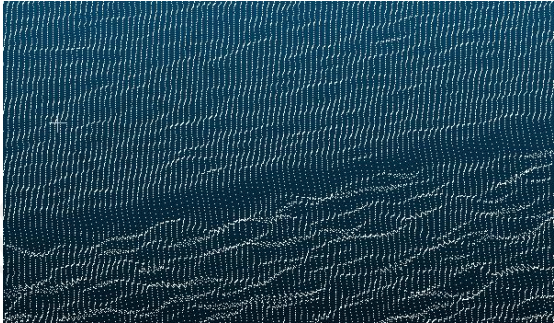
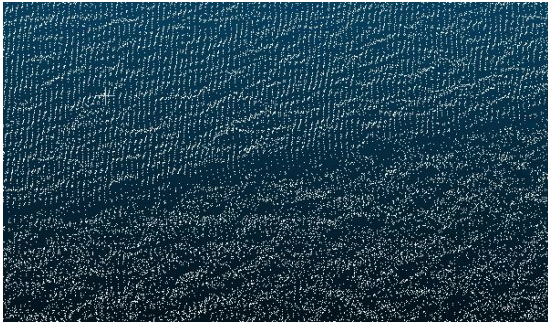
The algorithmic level of hole compensation is carried out on the collected point cloud data. The higher the selected compensation level, the larger the area of the filled hole. The following is the effect of compensation:

Before compensation	After compensation
	

3.4.4.4 Filter

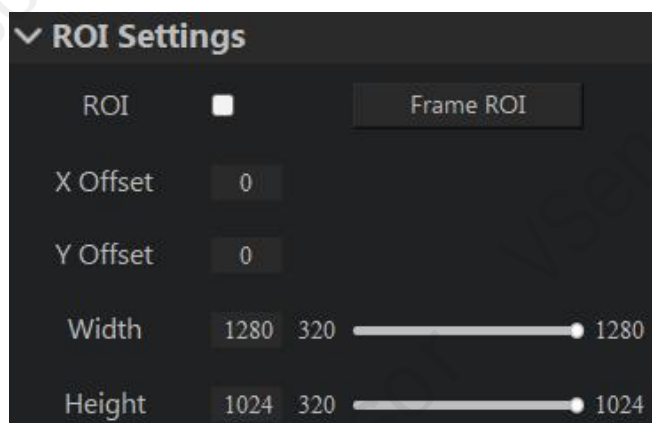
Filtering operations are selected for the acquired point cloud data. Different filtering methods are required for different scenarios. The following is the filtering effect when shooting a plane, and users can choose appropriate filtering methods according to actual application scenarios:

No filter	
-----------	--

Filter 1	
Filter 2	
Filter 3	
Filter 4	

3.4.5 ROI Settings

To enhance processing efficiency and accuracy, the ROI (Region of Interest) function can be utilized. By selecting the target area through a box selection, unnecessary computations are minimized while improving processing speed and matching precision. Parameters can be configured via settings or by clicking the "Select ROI Area" button. Once activated, the system will collect point cloud data only from the selected region (measured in pixel values).



graph 3-12

3.4.6 Brightness Contrast

The brightness adjustment range is -100 to 100, and the default value is 0. The contrast adjustment range is 1 to 20, and the default value is 10. You can adjust the brightness and contrast of the acquired point cloud image by sliding the brightness rail and contrast rail.



graph 3-13

3.4.7 Z-axis Range Adjustment

The sliding Zmin rail can adjust the minimum range of the Z-axis, and the sliding Zmax rail can adjust the maximum range of the Z-axis. After clicking "Set", the Z-axis range will take effect. The Z-axis range varies with different cameras, please refer to the specification sheet of the corresponding model for details.



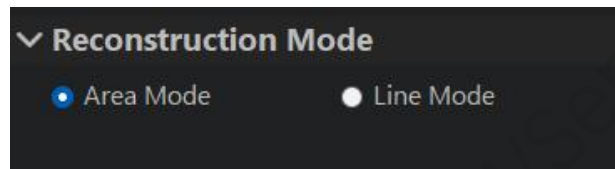
graph 3-14

3.5 Parameter setting module (Line Mode)

This chapter applies to the line mode of a line-plane integrated camera.

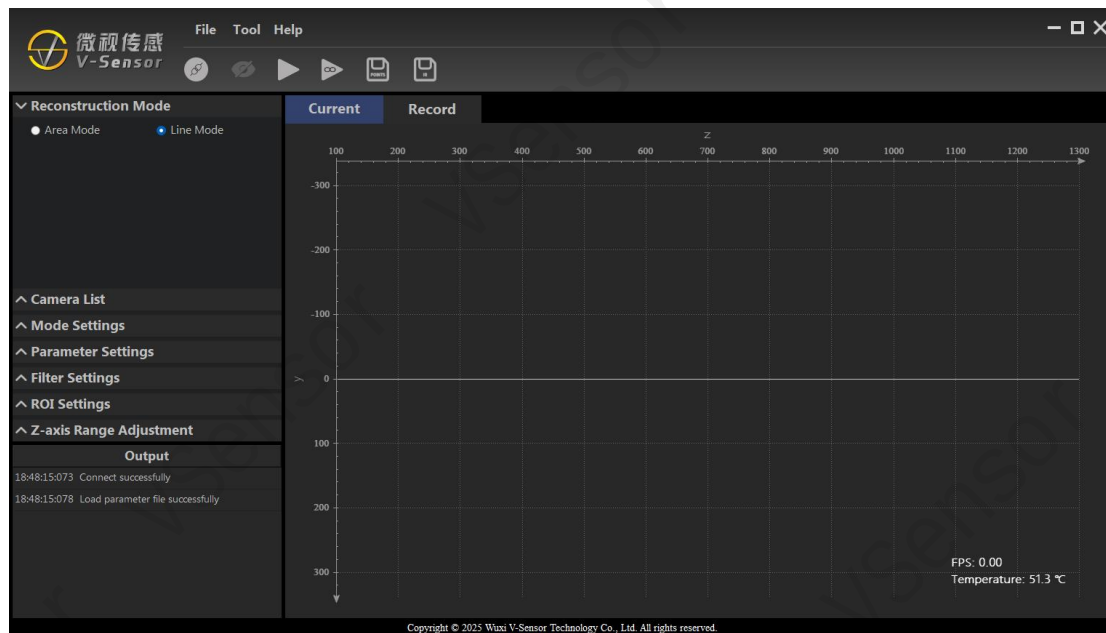
3.5.1 Reconstruction mode

The PMR0700 series and PDN0700GC/GD series support both area scanning and line scanning modes. After connecting to the software, the display shows "Reconstruction Mode" settings, including "Area Mode" and "Line Mode". Click the corresponding button to switch to the mode.



graph 3-15

Line mode interface:

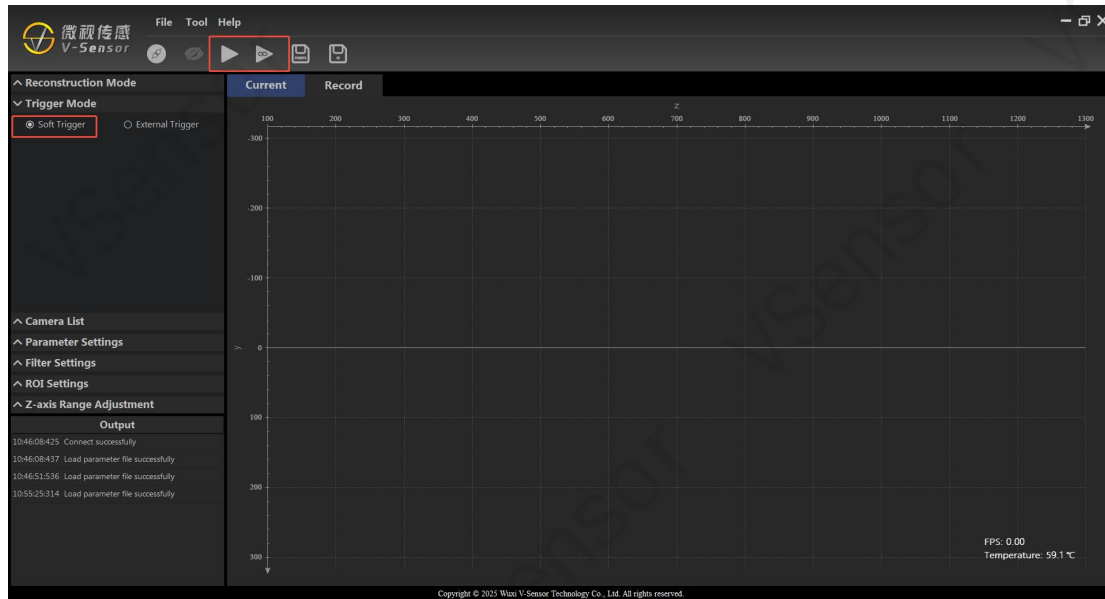


graph 3-16

Camera List, ROI Settings, Z-axis Range Adjustment, the function is the same as the Area Mode.

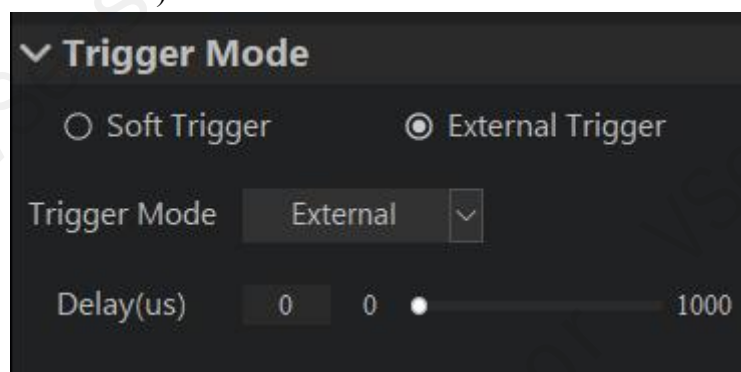
3.5.2 Mode setting

The PMR0700 series supports multiple triggering modes in line mode, including both software and hardware triggering, with software triggering being the default option. When software triggering is activated, users can use Single Capture or Continuous Capture.



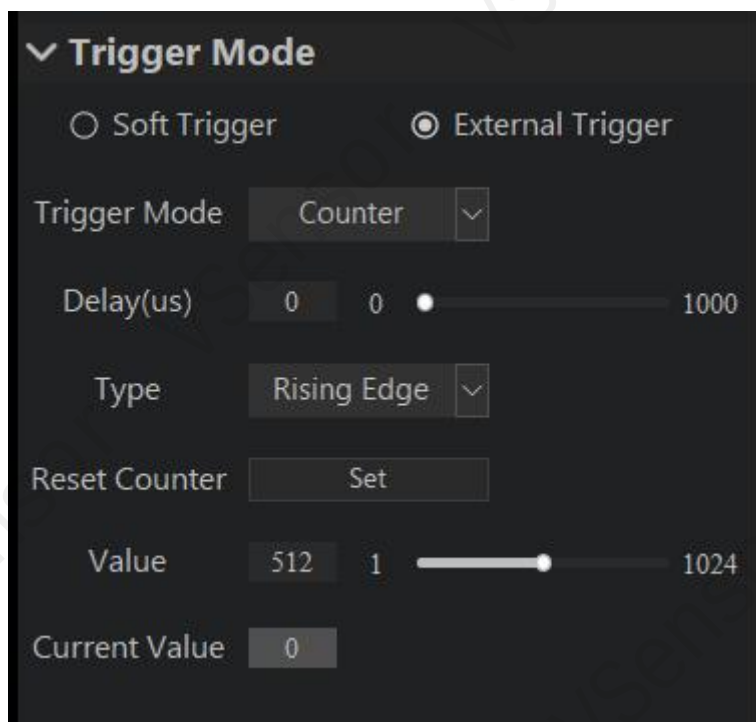
graph 3-17

For External Trigger, Two modes are available: "External" and "Counter". When selected for "External", the system displays point clouds after waiting for a hardware trigger signal. (Hardware-triggered interfaces are used, see Section 2.3 Hardware Trigger Usage for details.)



graph 3-18

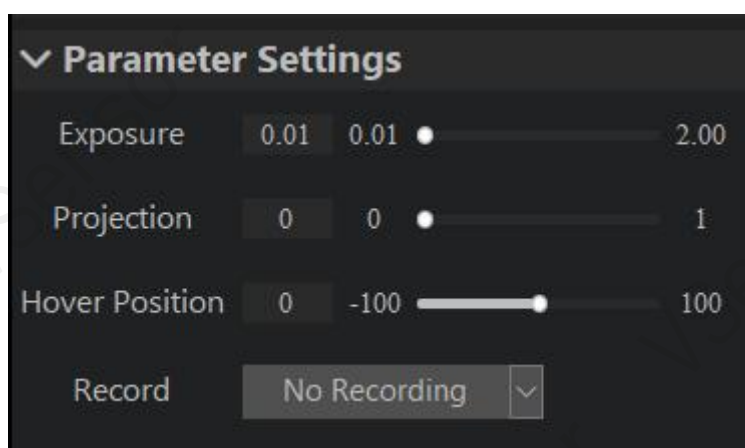
When selecting "Counter", you need to configure Type and Value. The default counter value is 512 (adjustable). During encoder operation, the current counter value increments with the encoder's movement, triggering a reset every time it reaches 512. Clicking the "Set" button after Reset Counter will clear its current value.



graph 3-19

3.5.3 Parameter Settings

The module setting includes camera exposure time setting, projection brightness and point cloud recording function:



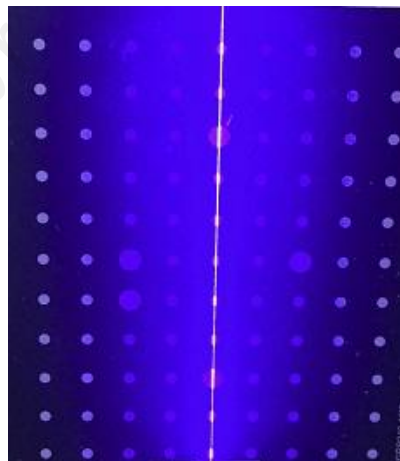
graph 3-20

Name	Functional Description
Exposure	The default adjustment range is 0.01-1.00ms.

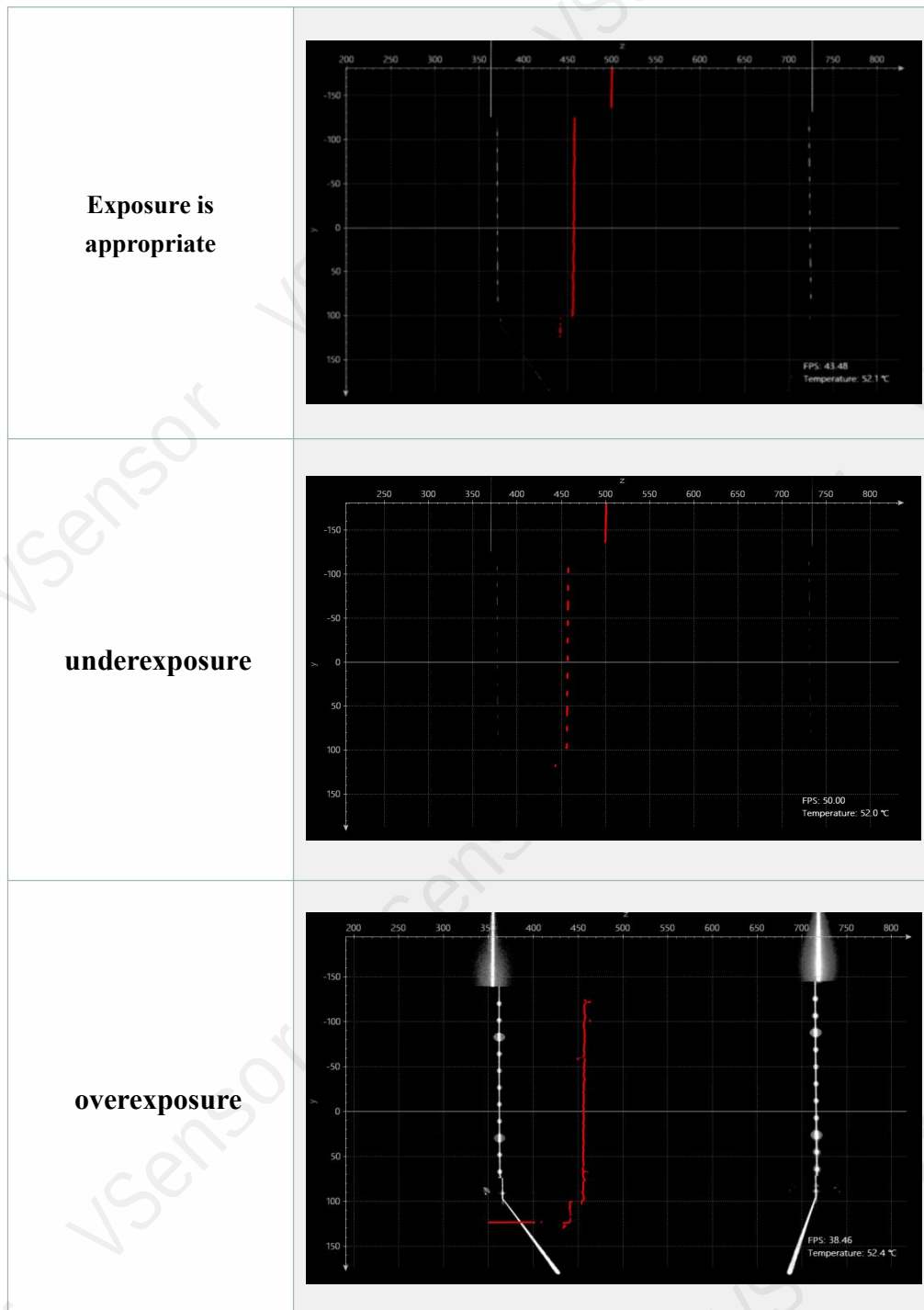
Projection	The projection range of PMR0700 camera is 0-1, where 0 is the closed state and 1 is the open state; PDN0700GC/GD camera can be adjusted from 0 to 100. The larger the parameter, the brighter the line laser.
Hover Position	For PMR: You can adjust the percentage of the laser hover position, which is default 0 and hover in the middle.
Record	This feature combines continuous data acquisition with hardware-triggered point cloud recording, offering two modes: fixed-distance recording and moving-speed recording. The adjustable ranges are (0-1000.0) mm and (0-1000.0) mm/s respectively, which determine the Y-axis offset during point cloud recording. Recorded files are automatically saved to the desktop by default, or users can configure a custom save path through "Tools"> "Save Path Settings".

3.5.4.1 Exposure time setting

- The missing point cloud is observed during the shooting, and the blank area in the point cloud represents the missing point cloud.
- Objects with different reflectivity need to set different exposure time. Low reflectivity requires high exposure, while high reflectivity requires low exposure. It is necessary to adjust the appropriate exposure time for point cloud collection. The following calibration plate collection effect is used for reference:



graph 3-21

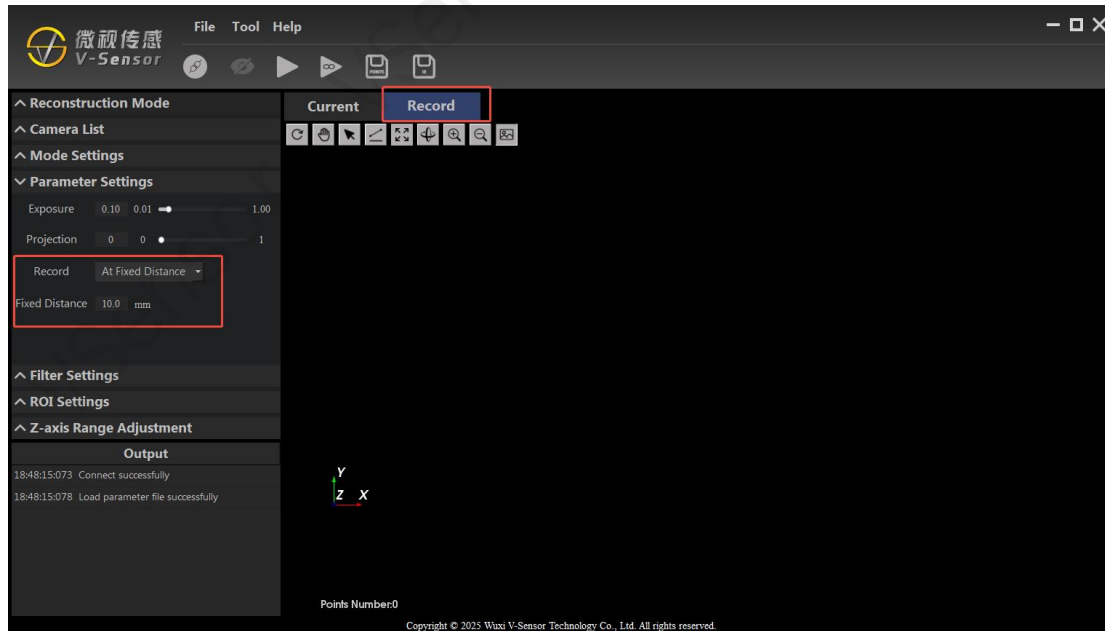


- When the exposure is insufficient, increase the exposure time, and when the exposure is excessive, reduce the exposure time.

3.5.4.2 Point cloud recording

To scan an entire Steel Member, the point cloud recording feature can be activated through continuous acquisition or hardware-triggered modes. The recording options

include "fixed distance" and "moving speed". When pausing continuous acquisition or disabling hardware-triggered mode, the system automatically saves the recorded point cloud data in a single file containing up to 3,000 frames. The data is simultaneously displayed in the stitched point cloud area (see Section 3.3 for button functionality).

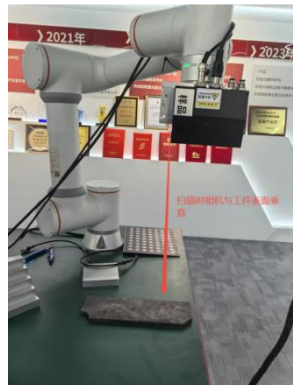


graph 3-22

☛ Point cloud recording camera installation method

● Step 1

The working mode is the same as that of the line laser camera. Taking PSN line scanning camera as an example, the camera is fixed on the mechanical arm, the front of the camera is perpendicular to the surface of the workpiece, and the scanning distance is within the recommended working range.



graph 3-23

● Step 2

Address: 6th Floor, Building 5, Ruiyun, Xishan Science and Technology Park, Wuxi

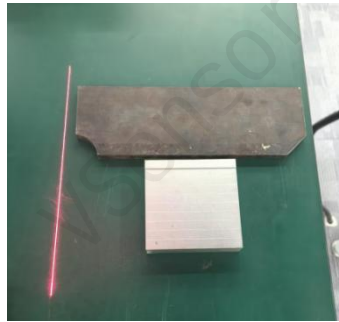
Adjust the position of the laser line, and make the laser line parallel to one side of the workpiece. Keep one end of the laser line on a line perpendicular to the laser line at the beginning and end of the movement.



Figure 3-13 Figure 3-24

● Step 3

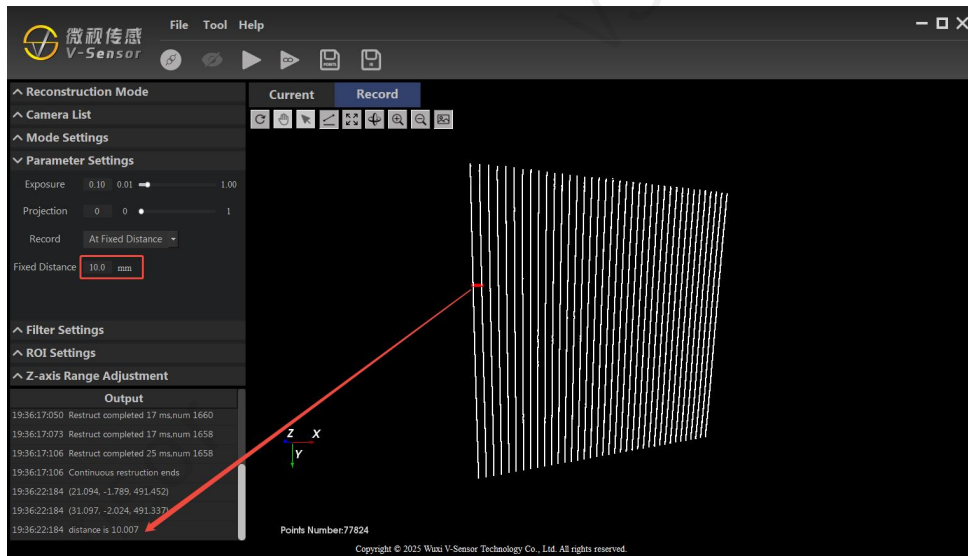
Select different recording modes, using continuous acquisition or hardware-triggered scanning for the following scenarios.



graph 3-25

☞ Record in "At Fixed Distance" manner

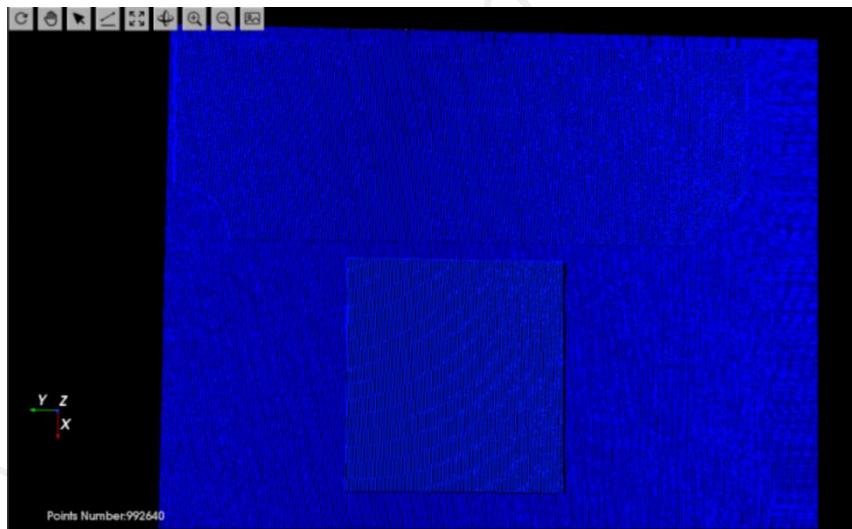
Select the "At Fixed Distance" mode, set the fixed distance 10.0mm. After continuous collection, the point cloud effect is shown in the figure. The interval between the two measurement data is 10mm. It can be set according to actual requirements.



graph 3-26

☞ Record in "At Moving Speed"

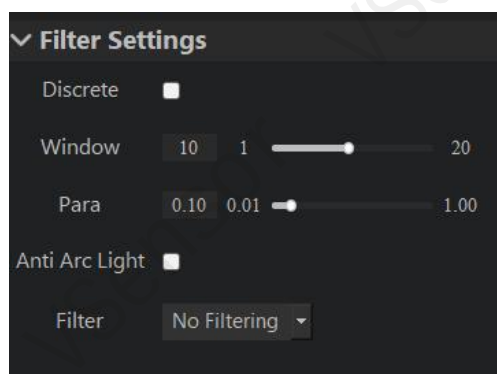
Select the "At Moving Speed" mode and set the mobile speed 10.0mm/s, which is the moving speed of the robotic arm. The recorded point cloud effect is shown in the figure:



graph 3-27

3.5.4 Filter Settings

The module is mainly used for point cloud preprocessing, including Discrete, Anti Arc Light, and Filter:



graph 3-28

Name	Functional Description
Discrete	Select whether to perform discrete on the collected point cloud data. The discrete window ranges from 1 to 20, with smaller values leading to weaker point removal (recommended value: 10). The discrete threshold ranges from 0.01 to 1.00, where lower values result in stronger point removal (recommended value: 0.10)
Anti Arc Light	The arc light resistant switch is selected to determine whether the point cloud data collected is processed by the arc light resistant algorithm
Filter	Filtering operations are selected for the collected point cloud data. The line mode supports Filter 4 and Filter 5. [Filter 4] Window range: 2-7, where larger parameters result in smoother point clouds. [Filter 5] Window range: 2-7, where larger values lead to smoother results but slower processing. The recommended value is 6.

4. Common problems and treatment

Problem 1: The software cannot be opened properly after installation

- Turn off the antivirus software and reinstall the firewall;
- VSensor The software requires OpenGL graphics card support, please make sure that the graphics card configuration is sufficient;
- Try upgrading your graphics card driver or changing your computer configuration.

Problem 2: The camera cannot start properly or fails

- First check whether the power cable and data cable are connected properly;
- Check whether the LED light can be green;
- If there is no problem above, please connect the client to check whether it can connect to the camera. If not, please contact our customer service staff in time and inform them of the fault and error code.

Question 3: The camera indicator light does not light up

- Check whether the power supply of the power cable is on, including the front and rear plugs of the adapter. Please unplug and replug the power supply, and check whether the LED lights up. If the above does not make the LED lights up, please contact our customer service personnel.

Question 4: The software cannot reconstruct the preview or obtain the point cloud

- Open the software to see if the camera is connected to the client;
- Help menu "Help" - "About" to view the client version, verify that the device and software version match;
- Check whether ROI is enabled or Z-axis range is set to ensure that the target reconstruction area is within the set parameters;
- You can try to click "Reset the point cloud" to refresh the point cloud;
- If the above tests are not a problem and the problem still exists, please contact our customer service personnel.

Question 5: The software cannot adjust the target brightness, discrete parameters, filter parameters and other Settings

- The new version of the software adds user mode, novice mode controls some parameters, and can be switched to expert mode for adjustment. If the problem cannot be solved, please contact our customer service personnel.

Question 6: Collection tips-109, -111

- Check whether the Ethernet speed is stable, 3D camera needs a stable gigabit network;
- Whether to use a switch, and whether it can be solved by trying to directly connect the computer network port;
- Use the hand-eye calibration software VSensorTool to connect to the camera and, if necessary, re-power the camera.

Question 7: Missing when shooting the surface of a highly reflective workpiece

- When shooting the surface of high reflection workpiece, it usually requires a lower exposure time, you can try to reduce the exposure;
- Try to avoid the camera facing the high reflective surface, you can shift the shooting Angle, tilt the Angle to shoot;
- If the ultra-high surface cannot improve the point cloud effect by changing the Angle, it is recommended to spray a developer to assist the shooting.

Question 8: The same exposure time cannot meet the shooting requirements when shooting complex scenes

- When there are high and low reflective workpiece surfaces in the shooting scene at the same time, HDR function can be used;
- Refer to Section 3.4.3.2 Use of HDR.

Question 9: Error message

- The software related error code has an exclamation mark after it. When the mouse is moved to the exclamation mark, the corresponding error information can be displayed.
- You can also click Help - Usage Manual to view the VSensorSDK_API_CHS.chm document: module-Macro Definition.

5. Term

depth map	An image or image channel that contains information about the distance from the surface of a scene object to the viewpoint, used to simulate or reconstruct 3D shapes. Each pixel value in the image represents the distance from a point in the scene to the camera.
HDR	High dynamic range imaging (High Dynamic Range Imaging) is used to achieve more than ordinary digital image technology A set of techniques that increase the dynamic range of exposure (i.e., the difference between light and dark). The principle is to photograph the same scene with different exposure settings, then combine the resulting images with varying exposures into a high-dynamic-range image. Images synthesized using HDR technology can capture scenes with a wider dynamic range, from dark shadows to bright light sources or high reflectance.
Reduce sampling	It can be generally understood as reducing the image and reducing the number of sampling points in the matrix. The most common method is to take values at alternate positions, that is, every k points in each row and column.
ROI	Interest area (Region of Interest) is the region selected from the processed image to be processed, which is the focus of image analysis.
white balance	White balance is the basis for the camera to determine color. It is based on 18% neutral gray to restore color and achieve color balance. [PDR/PMR series camera function]