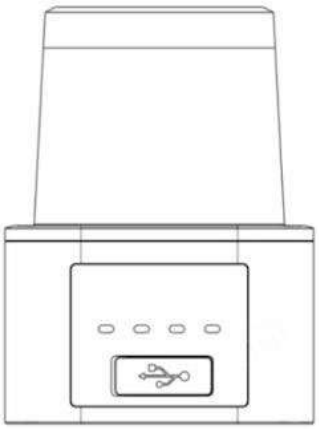
SDLD-05A LiDAR - User Manual



The SDLD-05A intelligent collision avoidance and warning LiDAR is ideal for AGVs, RGVs, robots, and other indoor and outdoor equipment for obstacle avoidance and area detection. Typical examples of obstacle avoidance applications include automated guided vehicles (AGVs) and rail-guided vehicles (RGVs).

1. Product features

The SDLD-05A obstacle-avoidance LiDAR uses a TOF solution, capable of 270-degree two-dimensional scanning. It boasts a wide operating range and allows for detailed perception of the surrounding environment.

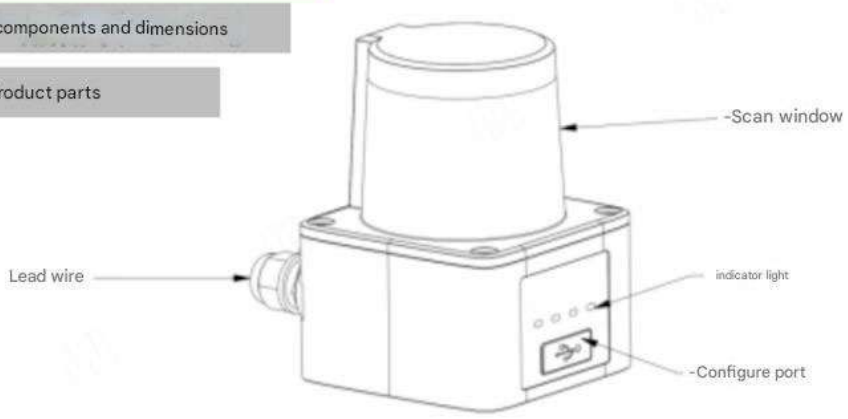
- The 14m measurement range has a ranging accuracy of up to ±30mm and an angular resolution of 0.5°, effectively identifying obstacles and ensuring the radar's obstacle avoidance performance.
- Support multi-area monitoring, each area can be independently set up with three small areas to achieve all-round and accurate monitoring!
- Powerful performance, fast, accurate and efficient data processing ensures high availability in applications such as AGVs.
- It supports multi-area precise monitoring and is equipped with 16 quick-configuration area group settings, making the loading process faster and more convenient.

2. Technical parameters

Specification	parameter	Remark
Launch caliber (mm)	f5	
Lens diameter (mm)	f30	
Laser divergence angle (mrad)	12	
Distance measurement laser (nm)	905	
Spot shape	trapezoidal spot	
Scanning angle range (°)	270	
Body material	Aluminum alloy (body, black cover is plastic) standard product is red body WELLRAY brand	
Maximum range (m) 90% target Reflectivity	0.1~14	
Maximum range (m) 10% target Reflectivity	0.1~8	
Measurement accuracy(mm)	± 30	
Repeat accuracy (mm)	≤20	
Scanning frequency (Hz)	20	
Angular resolution(°)	0.5	
Transmit repetition rate (HZ)	140K	
Sampling frequency (Hz)	14.4K	
distance resolution	mm	
response time	50ms	
Number of obstacle avoidance channels	16	
Indicator function	White power/fault light: Steady on (power on) Off (no power) Blue indicator light (OUT1): On (there is an obstacle invading the protection zone 1) Off (there is no obstacle invading the protection zone 1) Yellow indicator light (OUT2): On (there is an obstacle invading the protection zone 2) Off (there is no obstacle invading the protection zone 2) Red indicator light (OUT3): On (there is an obstacle invading the protection zone 3) Off (there is no obstacle invading the protection zone 3)	
interface	Ethernet port + NPN + USB (TYPE-C) Multiple outputs: 4 NPIN Multiple outputs: 4 NP N	
Power consumption of the whole machine (W)	≤2.5	
Power supply voltage(V)	DC9~36 (typical value 12)	
10 output port load capacity	<10mA	
Regional free editing function	Free editing function for each of the 3 levels of areas	
Protection level	IP54	
Impact resistance	Shock resistance: 196m/s² (20G) 10 times in X, Y, and Z directions.	
Anti-vibration	10 to 55 Hz 1.5 mm double amplitude, 2 hours each in X, Y and Z directions. (with packaging) Operating: 55 to 150 Hz 19.6 m/s² scan for 2 minutes, 30 minutes each in X, Y and Z directions Clock (without packaging)	
Operating temperature range (°C)	-10~50	
Storage temperature range (°C)	-20~55	
Working humidity(%)	<85 RH without condensation or frost	
Laser level	EN 61000-6-2:2005; EN 61000-6-4:2007+AI	
Weight(g)	374 (including line)	
Dimensions(mm)	61×61×82	

2. Product components and dimensions

1. Product parts



2. LED light indicator

Indicator light description		
LED color	status type	illustrate
white	Power indicator light	Steady on: Power on Off: No power
blue	OUT1 indicator light	Steady on: An obstacle has invaded protected area 1 Off: No obstacles intruding into protected area 1
yellow	OUT2 indicator light	Steady on: An obstacle has invaded protected area 2 Off: No obstacles intruding into protected area 2
red	OUT3 indicator light	Steady on: An obstacle has invaded protected area 3 Off: No obstacles intruding into protected area 3

2. Output interface

The lead wire has 14 core wires (except the black and red power wires, the others are spare wires for obstacle avoidance function).

Lead wire color definition			
Wire core color	Model type	Signal definition	Signal description
black		VCC	(external power supply)
brown		GND	(land)
pink	enter	IN1	(Input port 1)
orange		IN2	(Input port 2)
yellow		IN3	(Input port 3)
green		IN4	(Input port 4)
blue	output	OUT4	(reserved)
purple		OUT1	(When the outermost blue light is on, the output here is low level)
gray		OUT2	(When the yellow light in the middle layer is on, the output here is low level)
		OUT3	(When the innermost red light is on, the output here is low level)
red	power supply		(positive pole of power supply)
black	power		(negative pole of power supply)

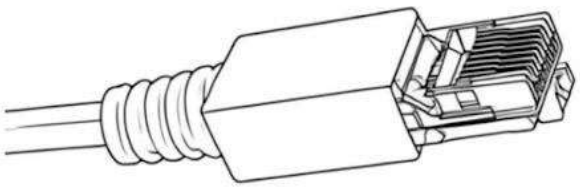
2. Dimensions and installation

The description of the configuration area of input lines IN1, IN2, IN3, and IN4 is as follows:

Input line configuration area description

input signal				regional group
IN4	IN3	In2	IN1	
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	0	13
0	0	0	1	14
0	0	0	0	15

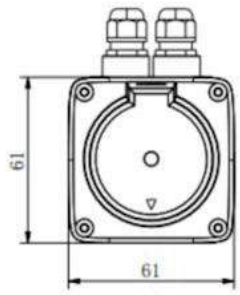
3. Network port output line configuration

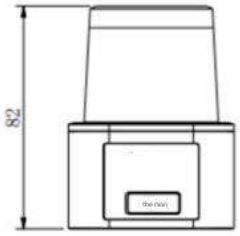


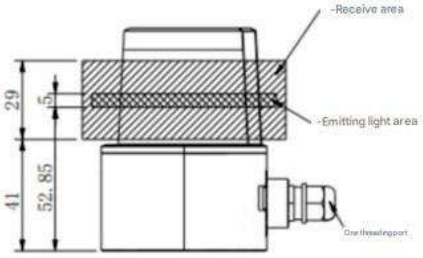
Network connection interface

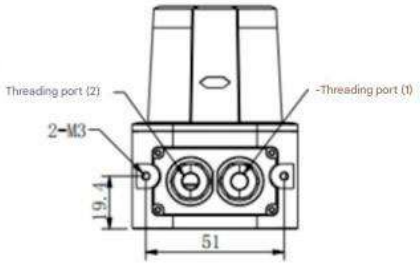
color	Signal
orange white	TX+
orange	TX-
Green and white	RX+
green	RX-

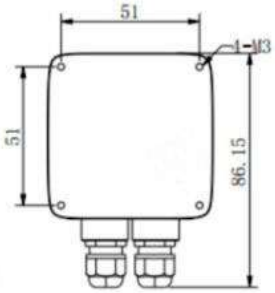
3. Dimensions and installation

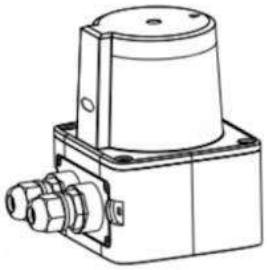




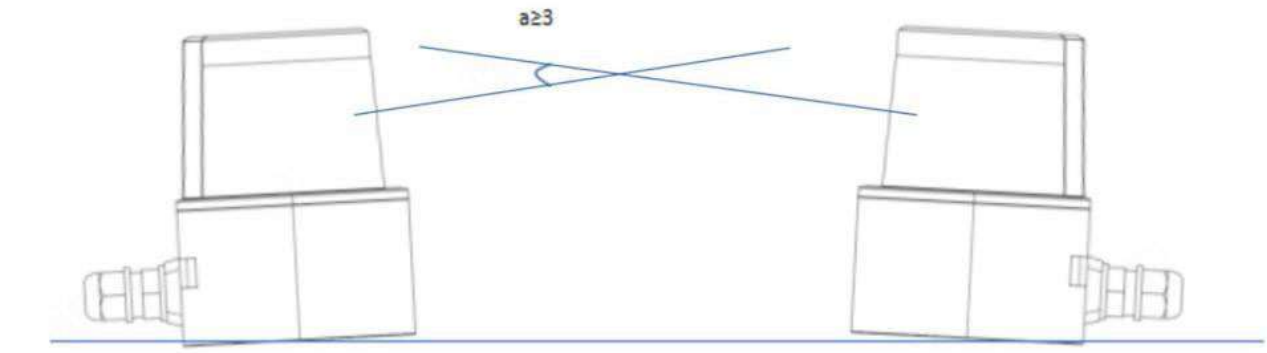


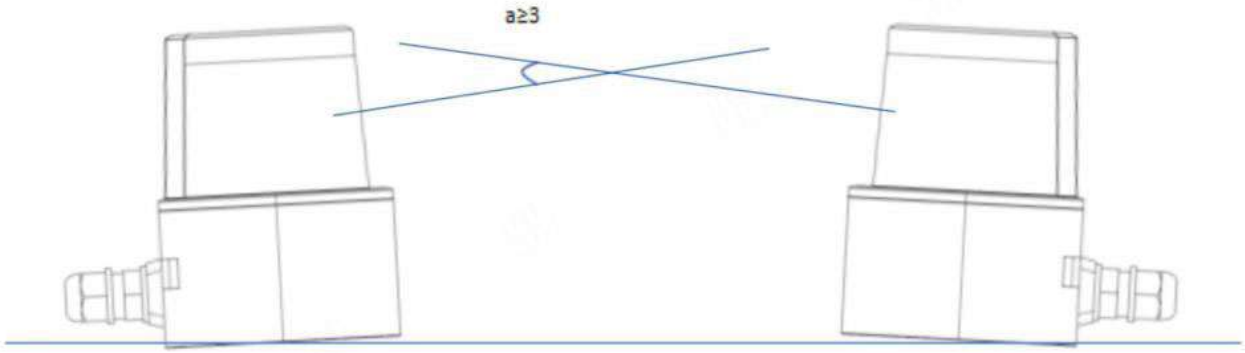




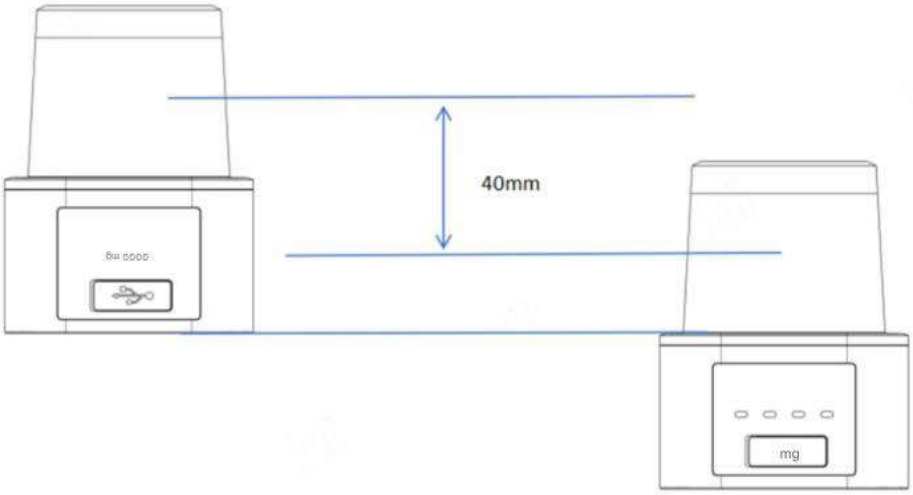


4. Installation requirements

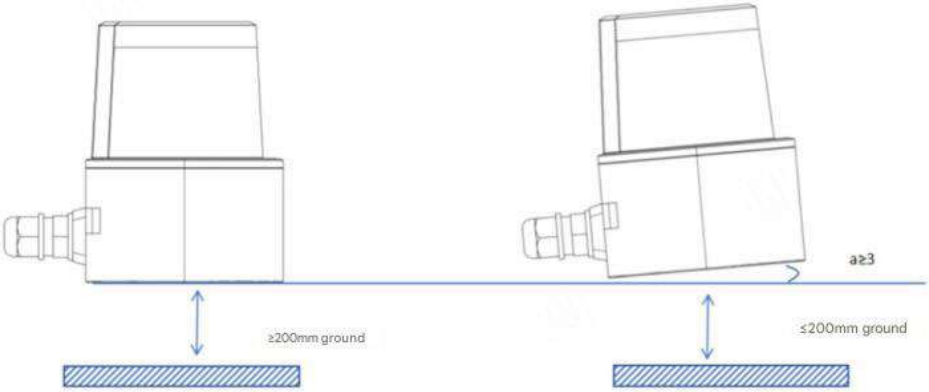




When two or more sensors are installed crosswise, it is recommended that the inclination angle be above 3° to prevent mutual interference.



When two or more sensors are installed crosswise, it is recommended to stagger them by more than 40mm to prevent mutual interference.



Due to the conical divergence of the sensor spot, the laser scanning sensor should be installed at a height of ≥200mm from the ground. If the installation height is less than 20mm, please move the laser scanning sensor to the ground.

The sensor is tilted upward 1-3 degrees

3. Host computer connection

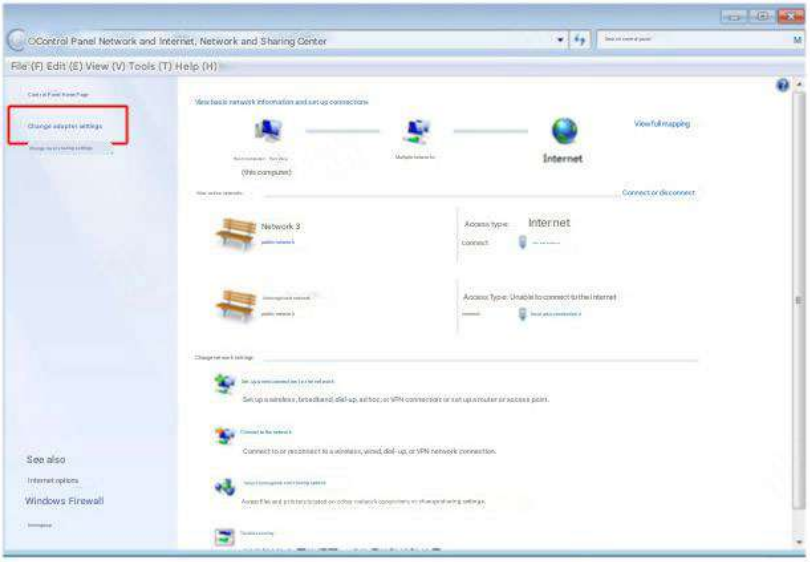
1. IP address settings

Set the computer's IP address, then connect the radar to the computer via a network cable. Configure the IP address as follows: IP address 192.168.1.100, subnet mask 255.255.255.0, default gateway 192.168.1.1.

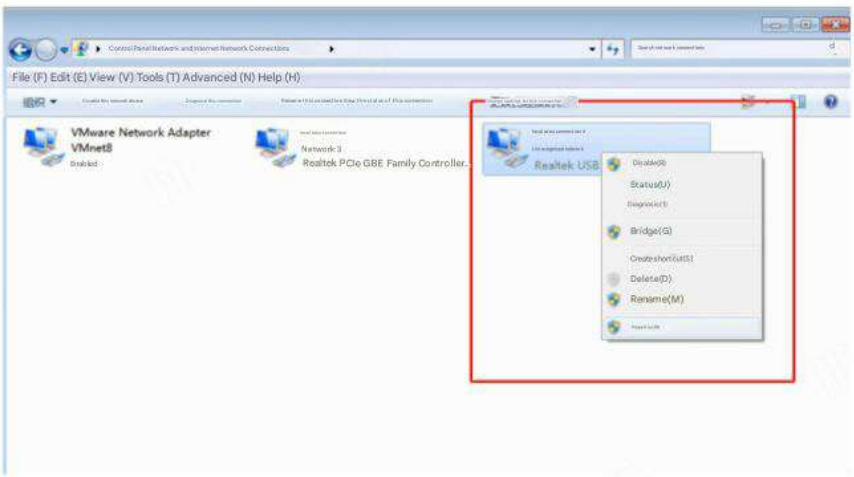
2. Example of computer Win7 configuration IP

The first step is to find the network connection and right-click to open the "Network and Sharing Center", as shown in the figure.

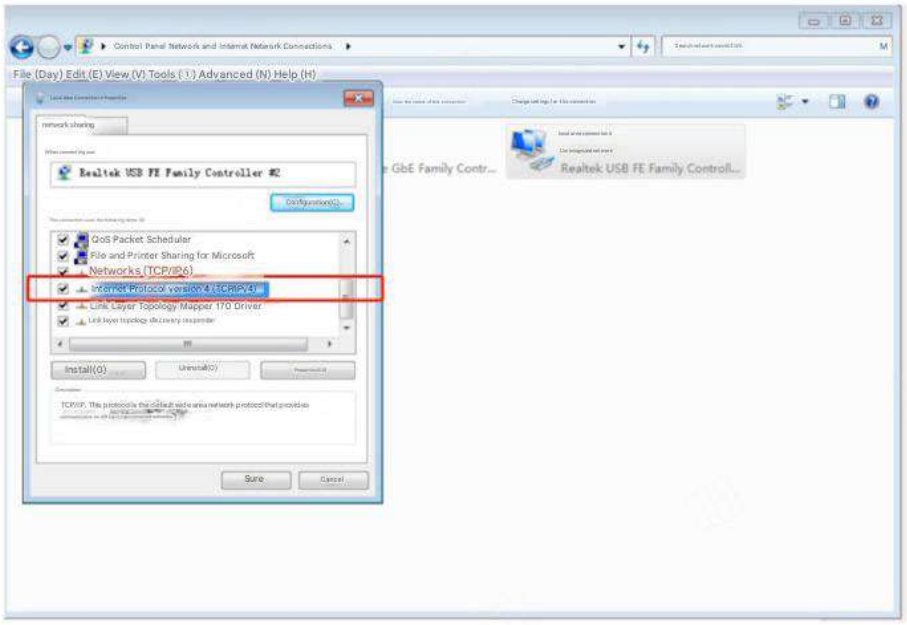
In the second step, find "Change adapter settings" and double-click to enter, as shown in the figure, change the adapter settings.



The third step is to find "Local Area Connection", right-click it, and click "Properties" (as shown in the figure, local properties).

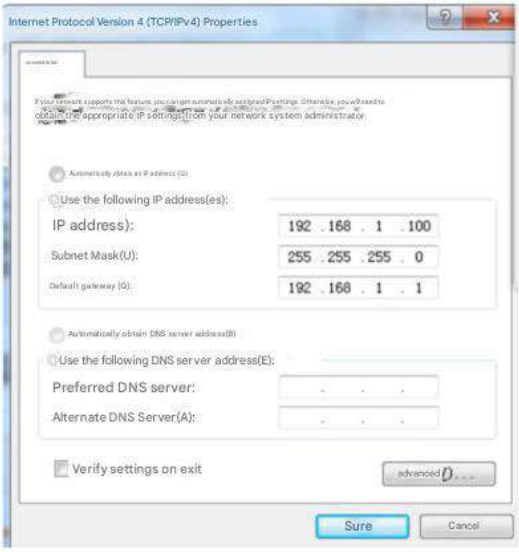


Step 4. Find Internet IPv4 Protocol and double-click to enter (as shown in the figure, 12IPv4 Protocol).



Step 5: Configure the IP address (as shown in the figure).

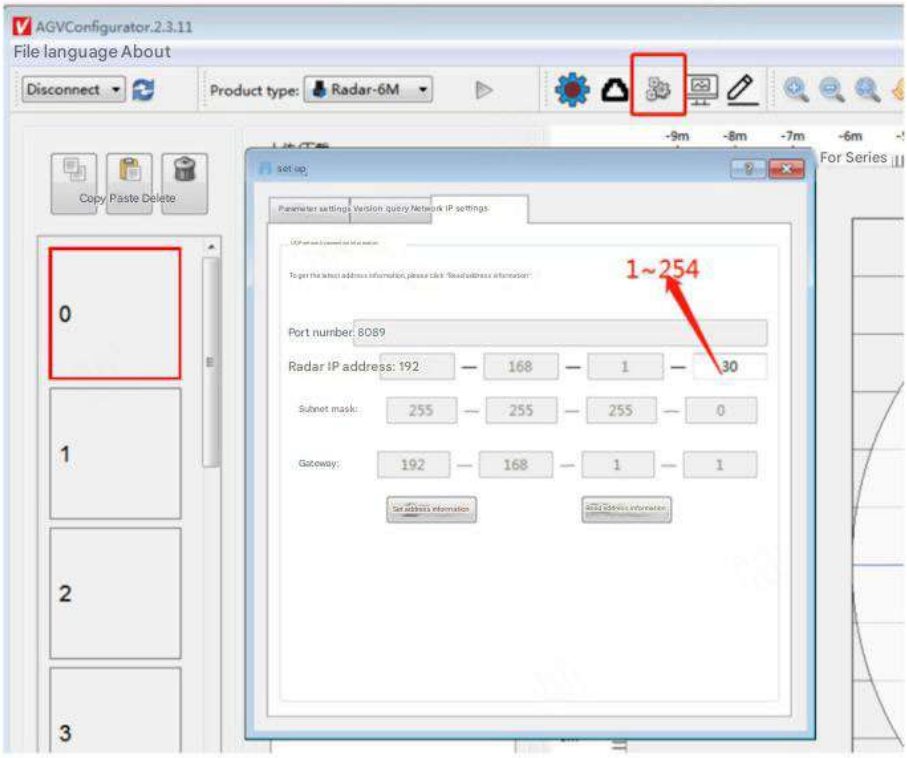
After the settings are completed, click Connect Device to connect the device. The successful display of the point cloud indicates that the radar is connected successfully.



4. Radar IP modification

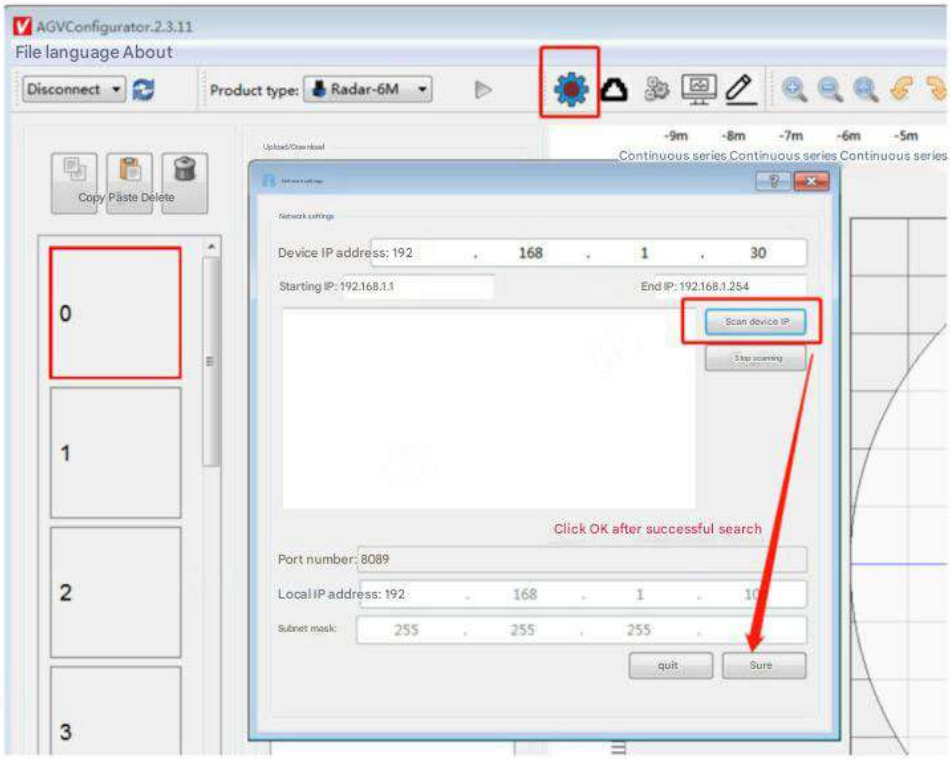
1. IP address modification

The radar IP address can be modified, and the radar IP address can be modified in the range of 1 to 254. As shown in the figure below.



2. IP search

The default radar IP address of the host computer is 192.168.1.10. After the radar IP address is changed, the IP search function can be used to identify the radar IP address. Only after the IP address is successfully identified can the radar device be connected. As shown in the figure.



5. Software configuration

This LiDAR is an obstacle avoidance radar and requires host computer software for operation. This software allows you to read and configure radar parameters, visualize and analyze point cloud data, and facilitate user experience. You can download the relevant host computer software from www.wellraysensor.com or contact your Wellray sales representative to obtain it.

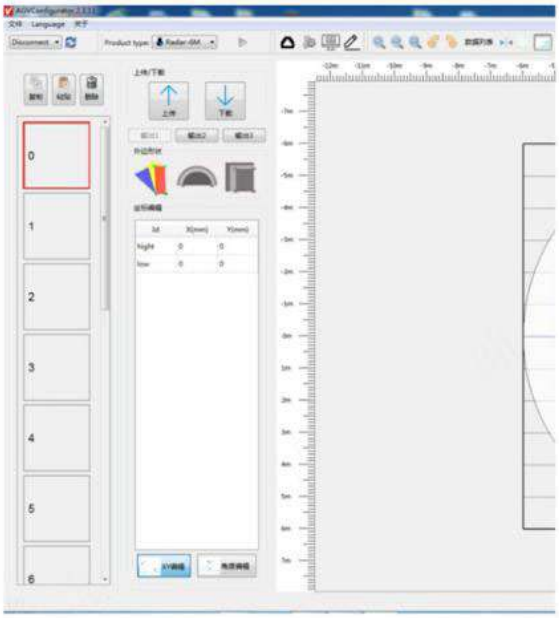
6. Obstacle Avoidance Host Computer Operation

1. Interface introduction

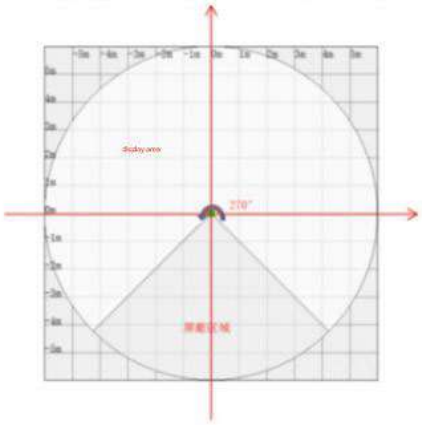
1).Open the software

When you get the software compressed package, decompress it directly, find the AGVConfigurator program in the decompressed directory, and double-click to open the software, as shown in the figure below.

The interface after opening the software (as shown in the figure, software interface)



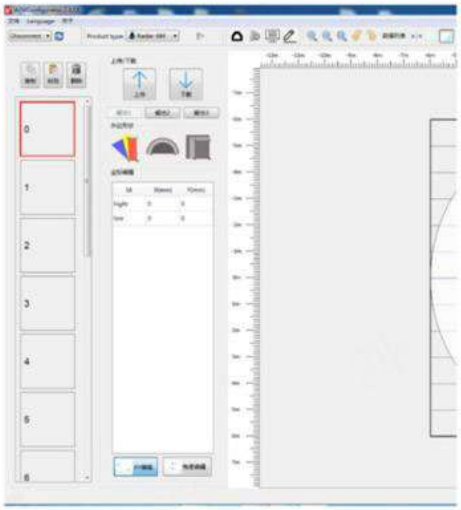
The radar scanning range is 270°, and the rest of the range is shielded. The point cloud is displayed in the display area within 270°. (As shown in the figure below, the coordinate system).



2).Communication connection

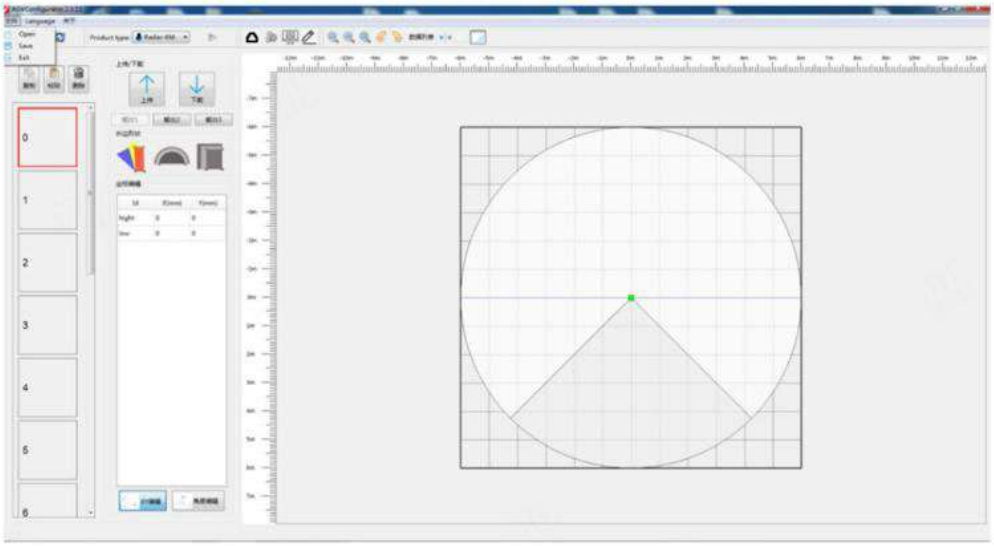
The host computer can communicate using either a serial port or UDP. To open the serial port: Select the serial port number. Once selected, the serial port will automatically open. The serial port list will only refresh the first time you open it. If you don't see your device's serial port number, try refreshing the serial port or reopening the software. To disconnect the serial port, select "Disconnect."

(As shown below, software interface)

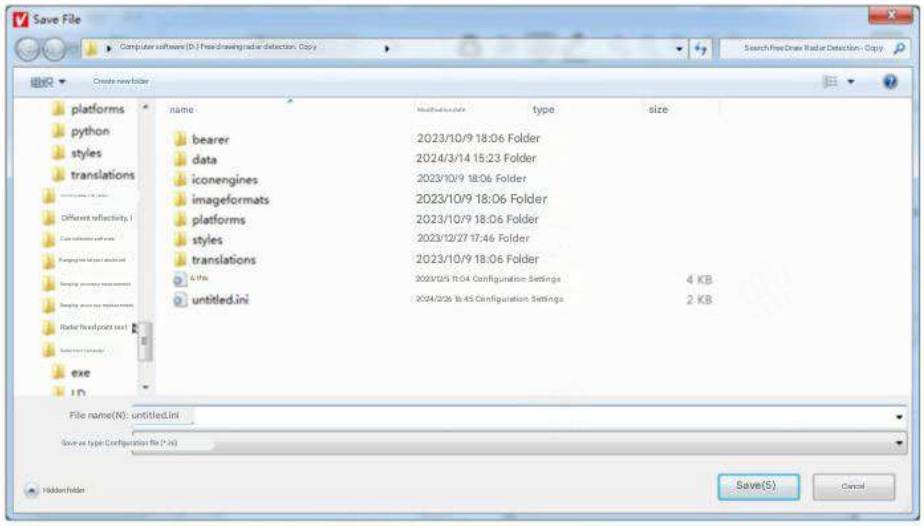


3).Open and save

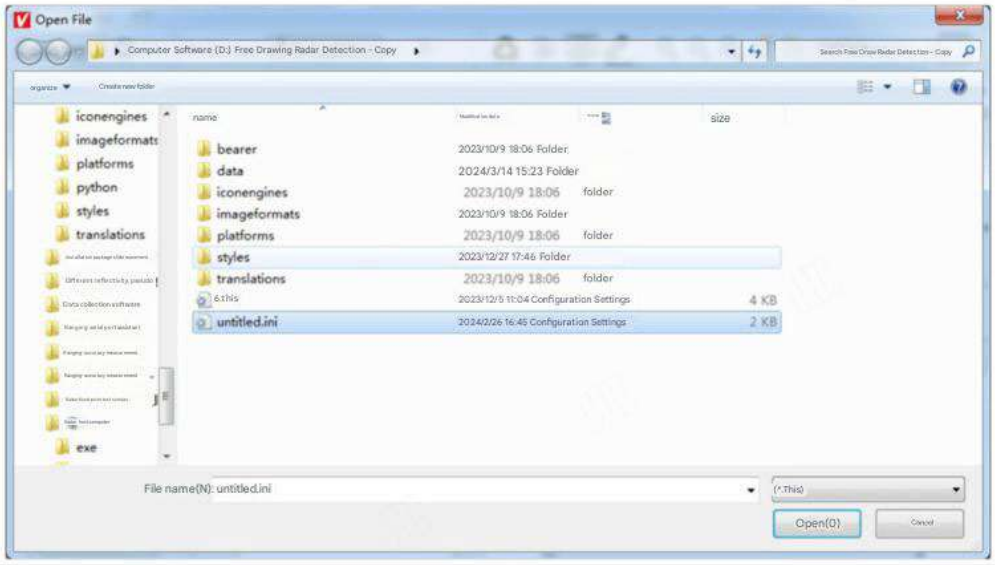
The software can save the configuration area as a file. You can open the configured configuration area file and use "Open" and "Save" in "File" to open and save the file. Then, use "Exit" to exit the software. (As shown in the figure, file operation).



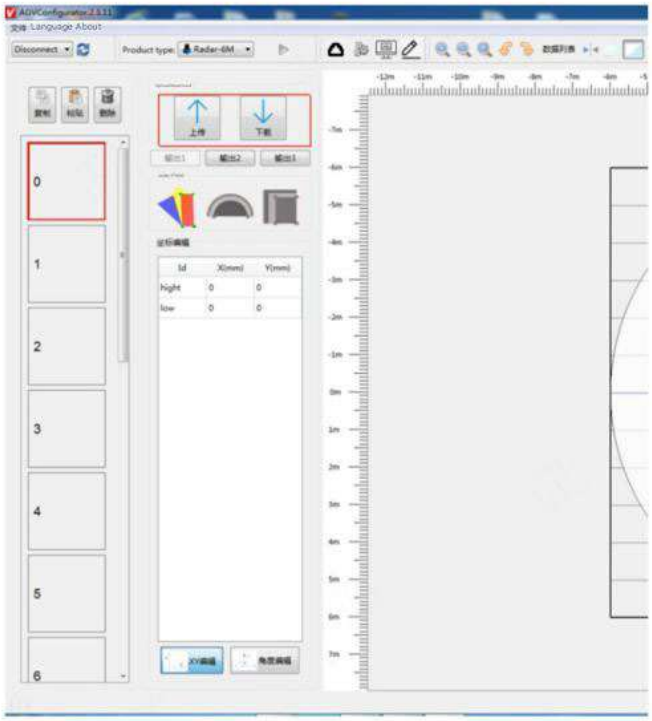
Configuration information file, the configuration file format is .ini file. Clicking "Save" will write all the currently configured 16 zones to the file and save the file to the selected current path. (As shown in the figure, the zone configuration file is saved).



The software can open the saved regional configuration file through "Open". (as shown in the figure, the regional configuration file is opened)

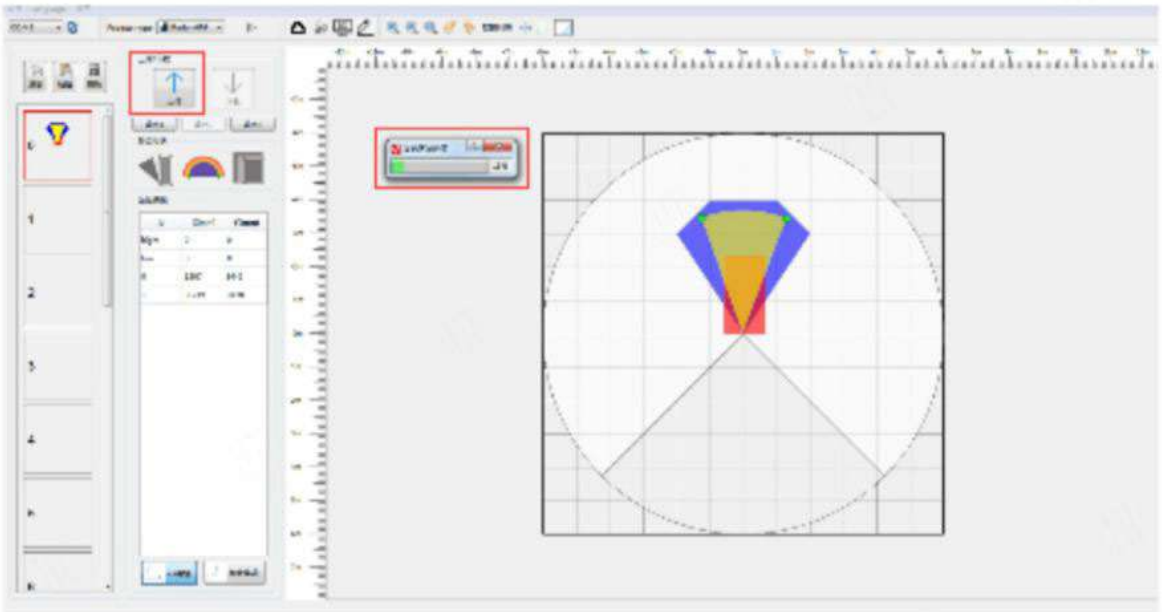


Upload and Download: Once the software and device have completed communication, you can use the "Download" and "Upload" buttons to perform functions similar to opening and saving files. Here, you can download and save the regional configuration information to the obstacle avoidance radar device, and upload and read the current device regional configuration information from the device and display it on the interface (as shown in the figure, Upload and Download).

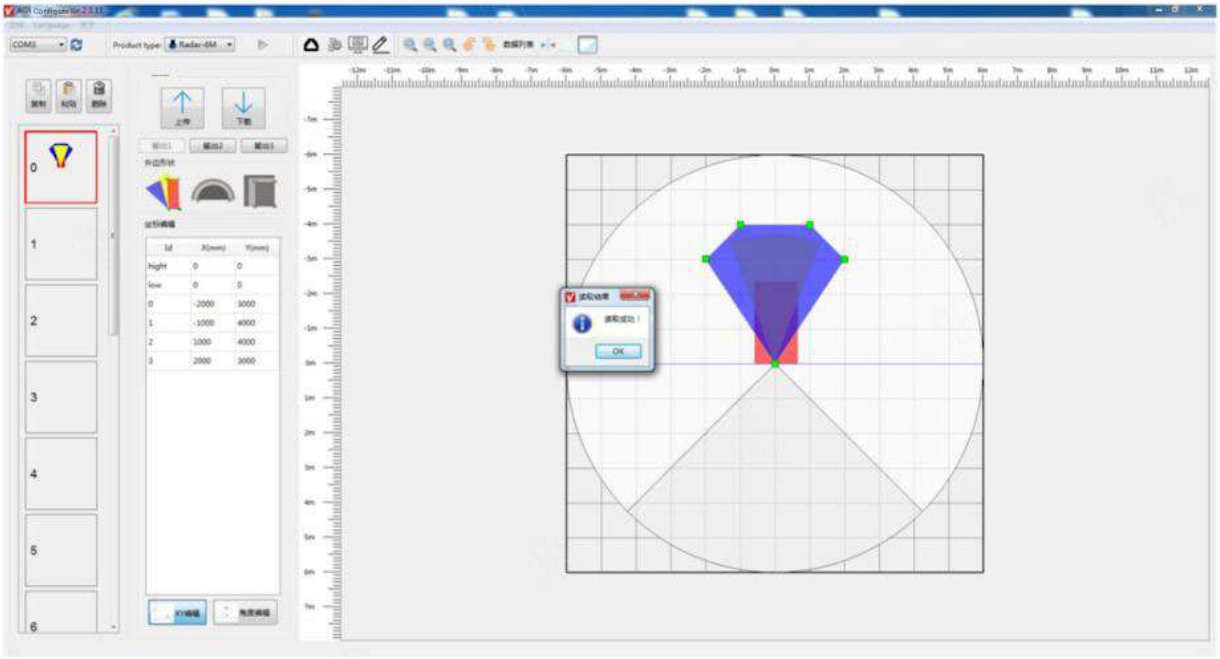


Download: This process writes the configured 16 zones to the obstacle avoidance radar device. Once the download is complete, the zone information will take effect immediately. When downloading, select the correct radar model; otherwise, the zone information will not be available.

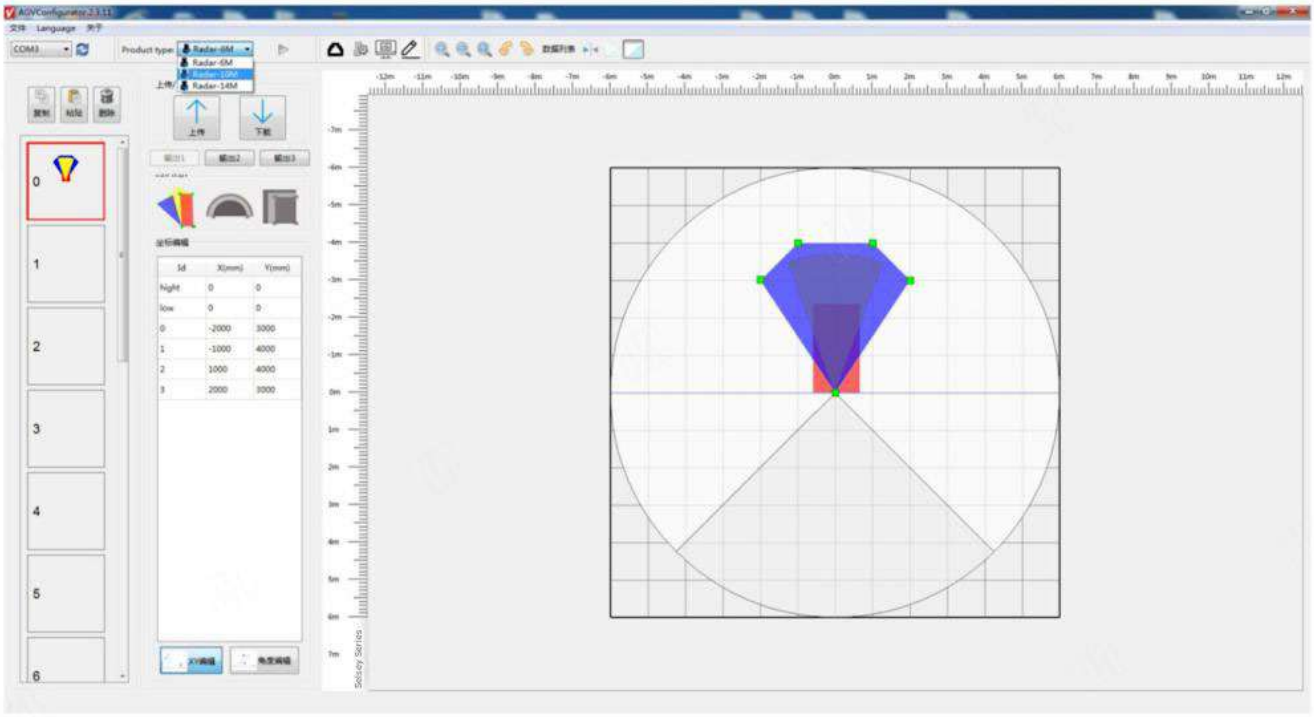
(As shown in the figure, download and write).



Upload: Reads and displays the 16 zones in the device. If you need to view the zone configuration information in the radar, connect the radar to the radar device via the serial port or network port to read the zone information (as shown in the figure, upload and read).

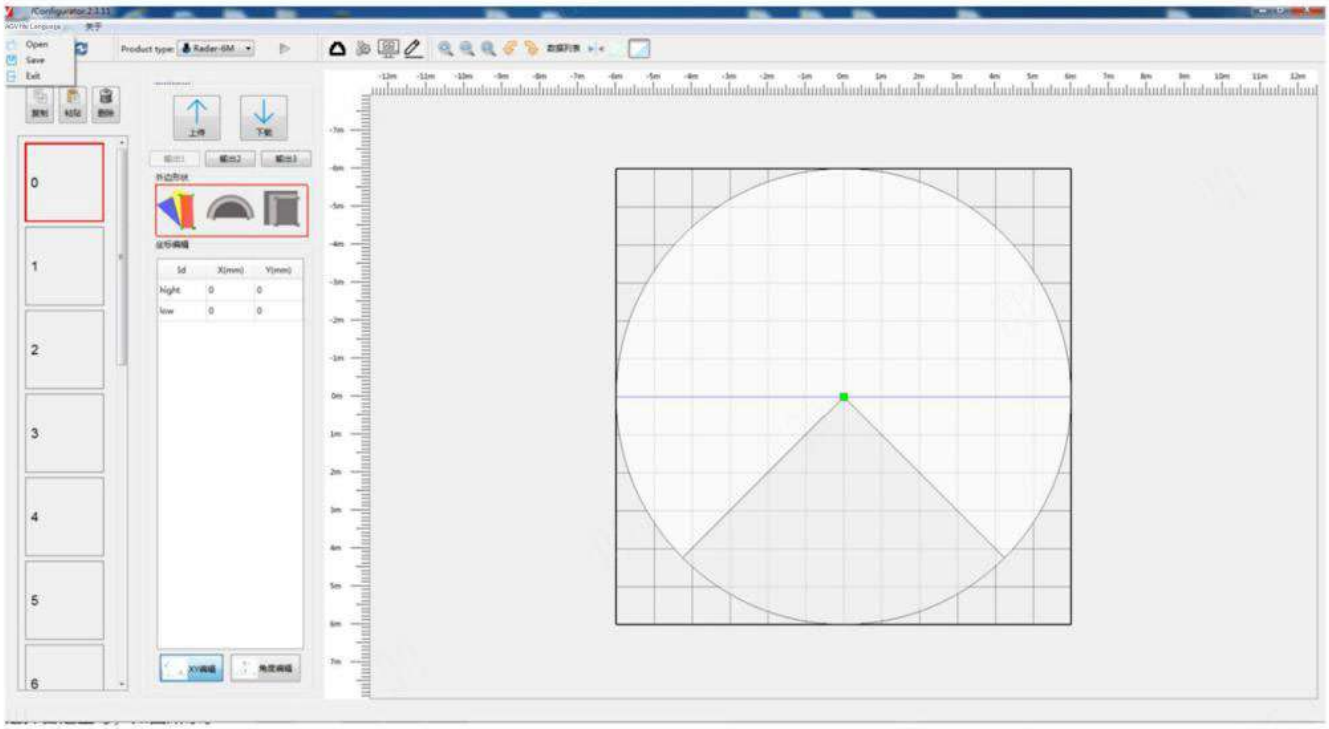


Select the radar model as shown in the figure.

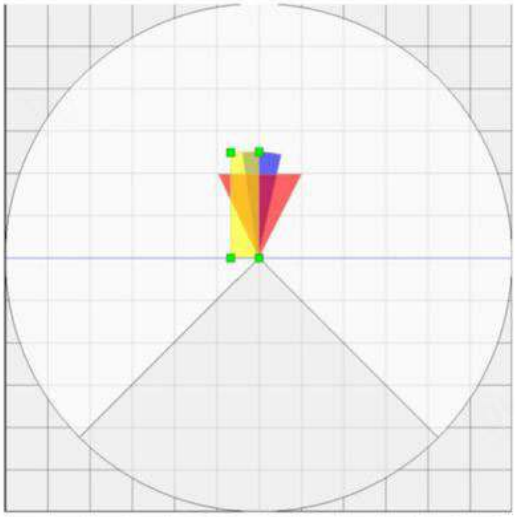


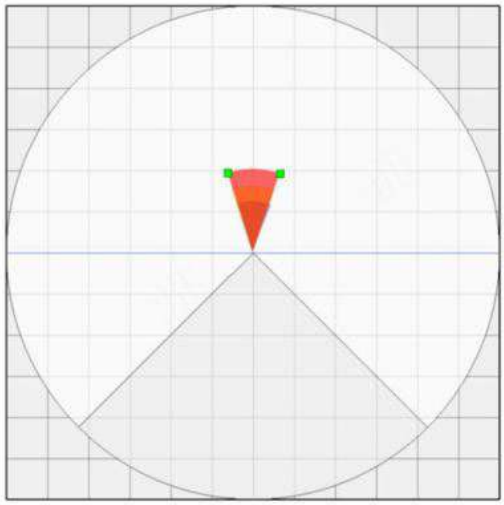
3).Delete and edit

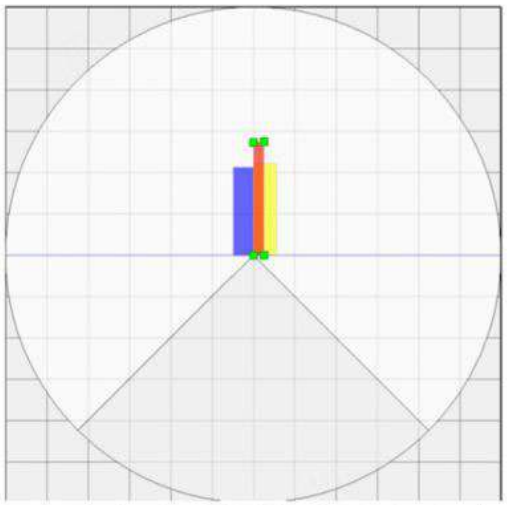
After opening the software, you can modify and edit it according to your needs. There are three outputs: Output 1 corresponds to IO Output 2, Output 2 corresponds to IO Output 1, and Output 3 corresponds to IO Output 0. Each output has three shape editing modes: polygon, sector, and rectangle, as shown in the figure.

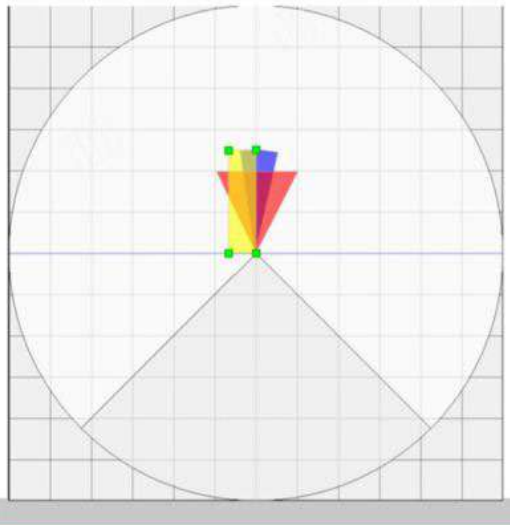


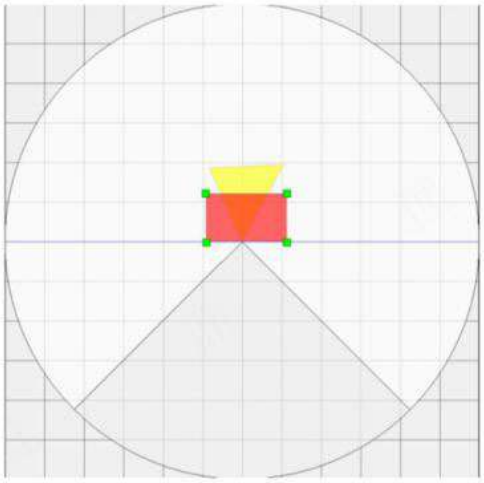
Editing example: Polygon, sector, rectangle, can be freely combined and edited. (As shown in the figure, editing example).

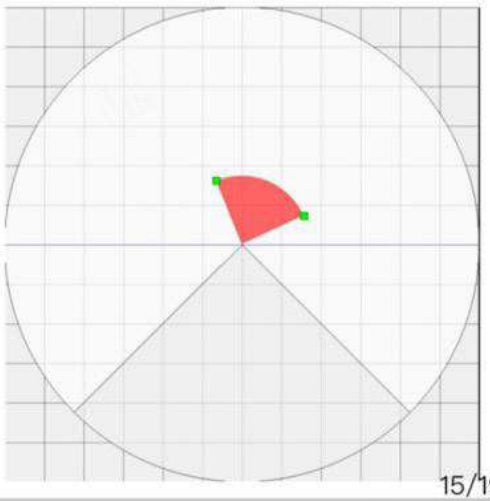






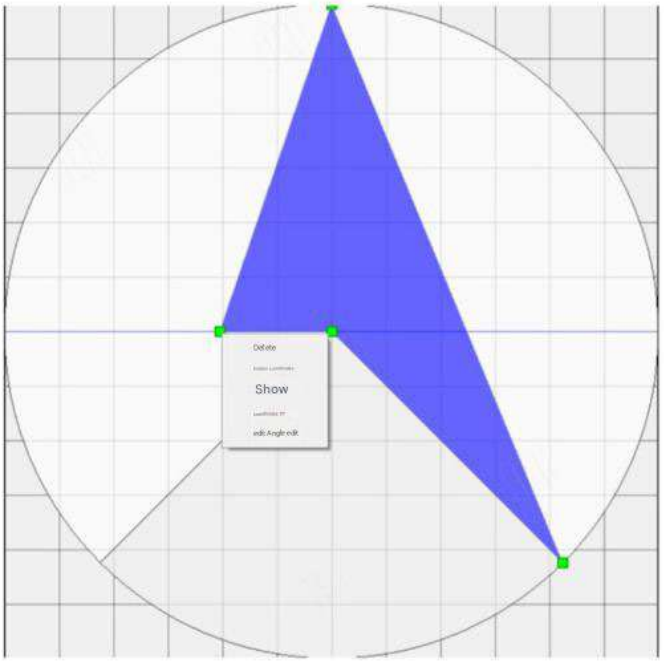




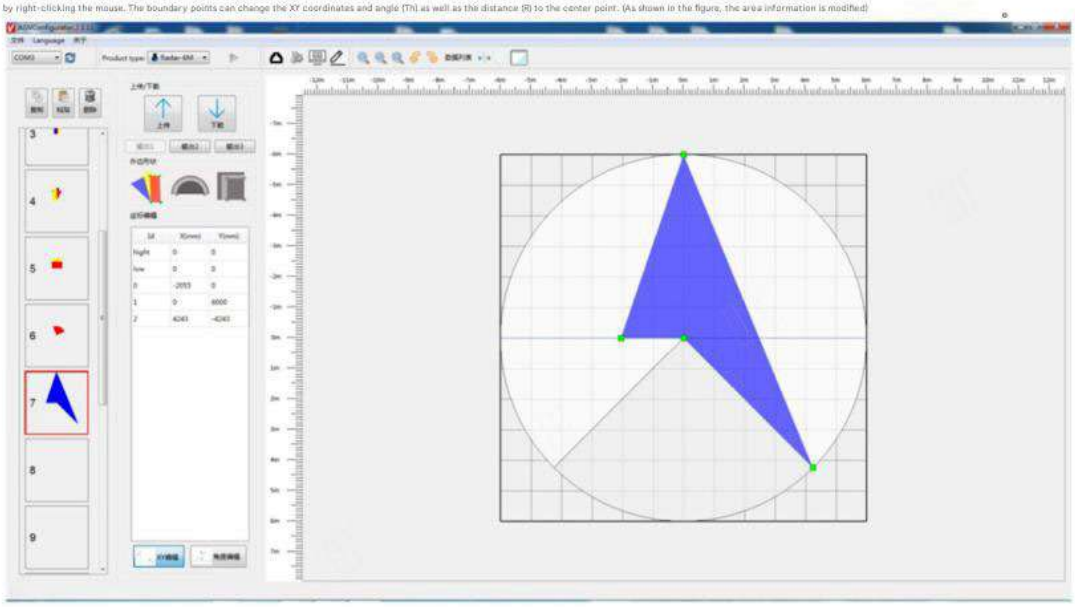


Setting Boundary Points: As shown in the figure below, a polygon supports up to 15 boundary points. When the mouse cursor is positioned over a small green rectangle and not moved, it changes to a cross and displays the point ID, indicating that the rectangle can be dragged and edited.

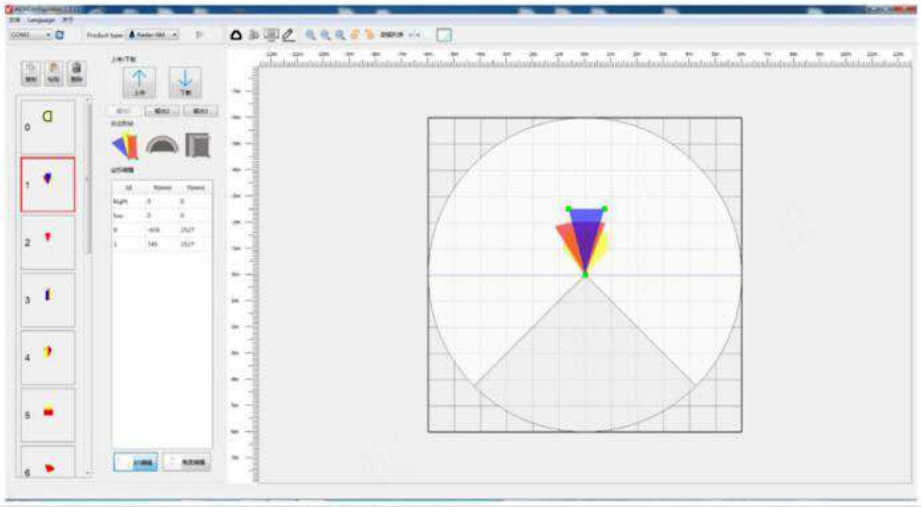
This is limited to the display area. Pressing and holding the left mouse button allows dragging, while right-clicking allows editing. (As shown in the figure, setting boundary points).



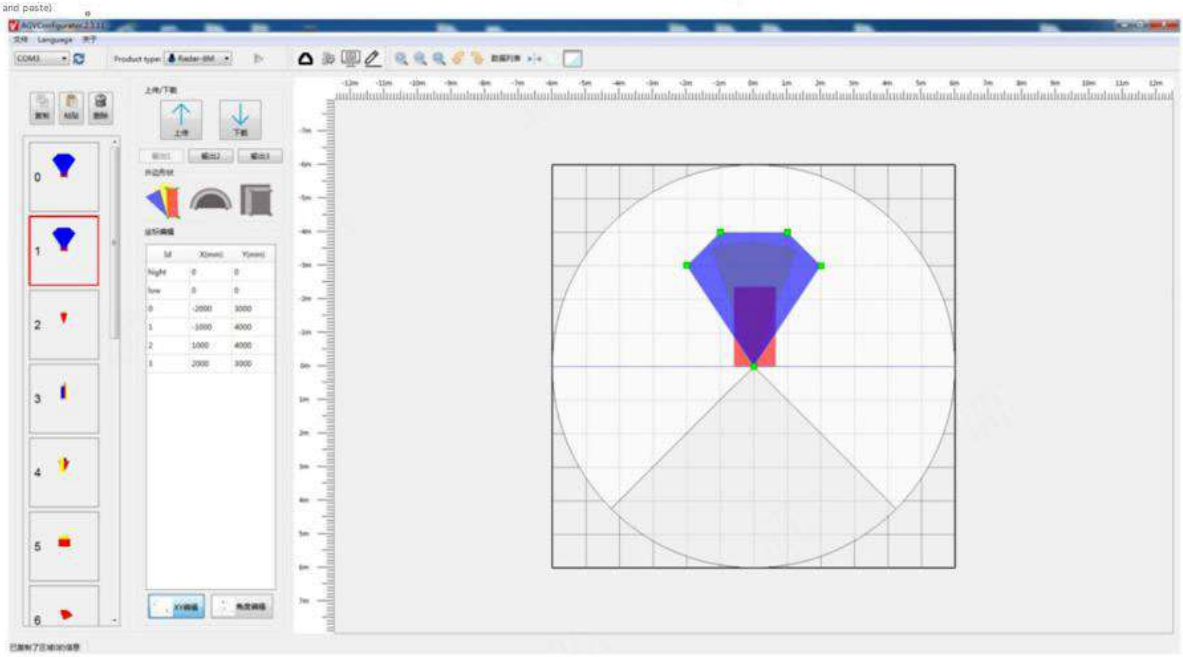
Modify the area information: You can modify it by dragging the red arrow or green rectangle using the above method. You can also modify it by using the specific values in the table. The data on both sides are synchronized. As shown in the figure below, you can edit it by double-clicking it. You can also edit the boundary points directly by right-clicking the mouse. The boundary points can change the XY coordinates and angle (Th) as well as the distance (R) to the center point. (As shown in the figure, the area information is modified)



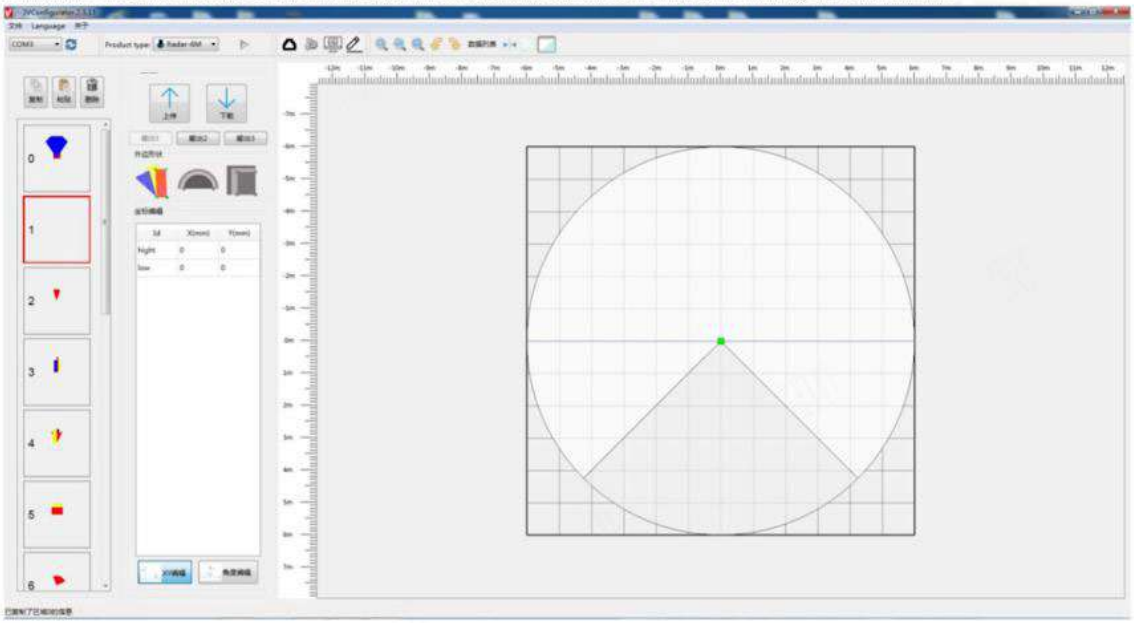
Switch to different areas for editing: For example, after editing area 0, you can edit it by selecting area 1 (as shown in the figure, select area).



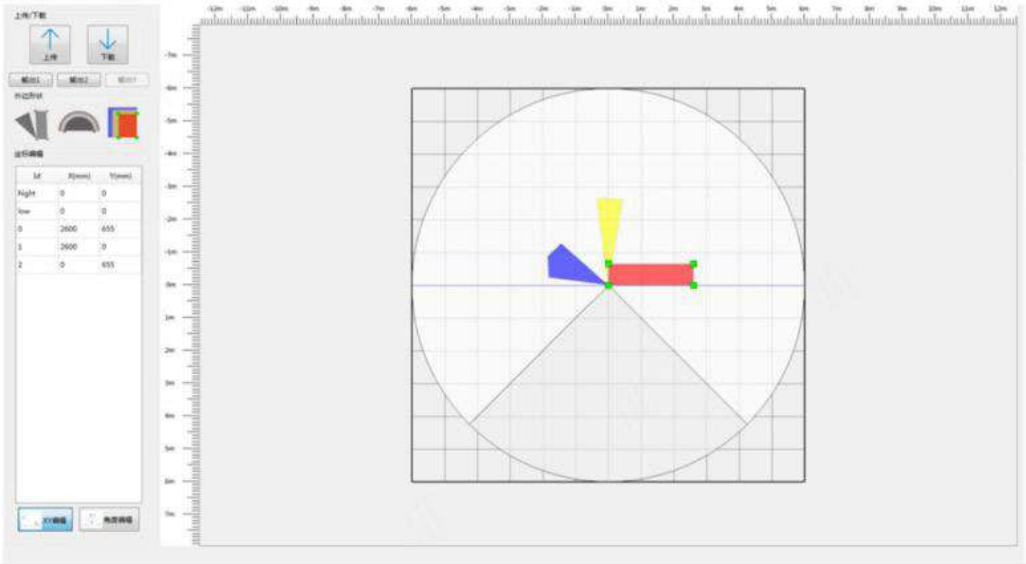
The software can copy the information of the current area by pressing the "Copy" key, select another area, and click "Paste" to paste the copied area into the currently selected area. If the selected area already has information, pasting will overwrite it. (As shown in the figure, copy and paste)



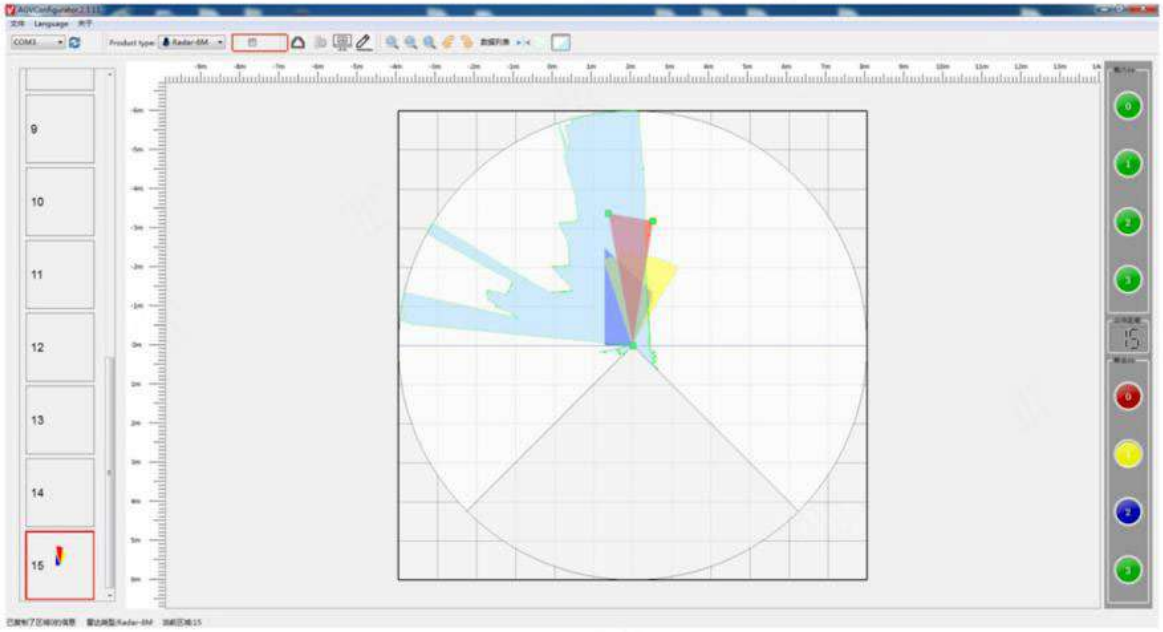
Delete the edited area: The "Delete" key deletes the currently edited area information. It can only delete the currently selected area and will not affect the other 15 areas. As shown in the figure, delete the area information.



Select the drawing mode: The default is polygon, the second is sector, and the third is rectangle. Select a different drawing mode, and the image drawing in the selected output mode will be installed in the new mode. As shown in the figure.

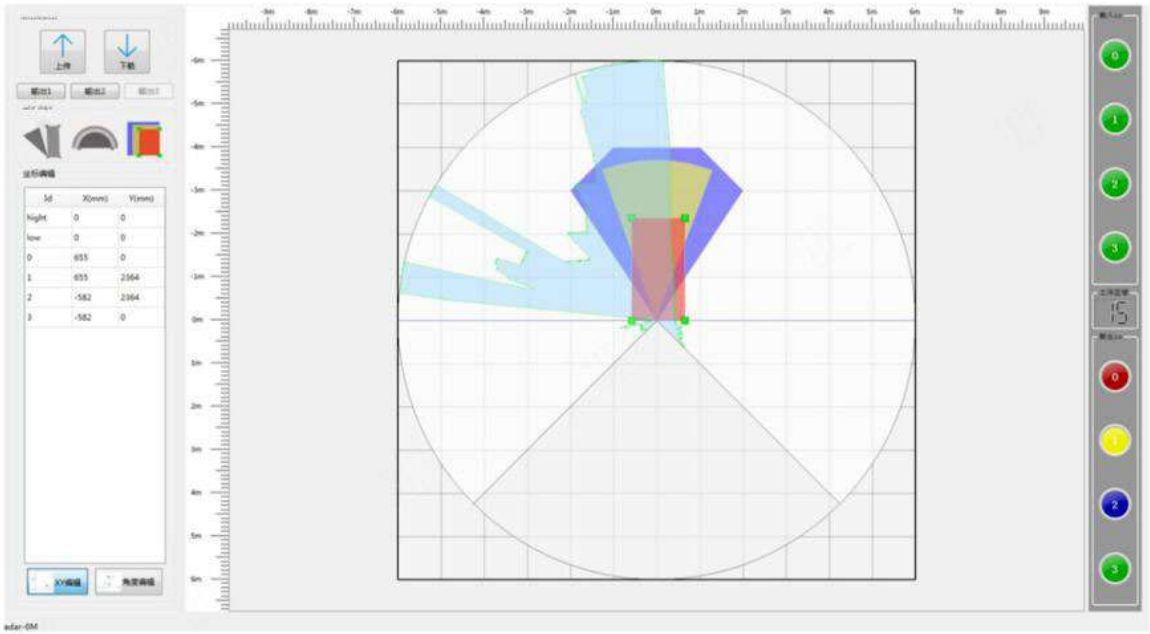


The software stops point cloud display by default. The point cloud display button can change the current radar area mode to point cloud display mode (as shown in the figure, point cloud display).



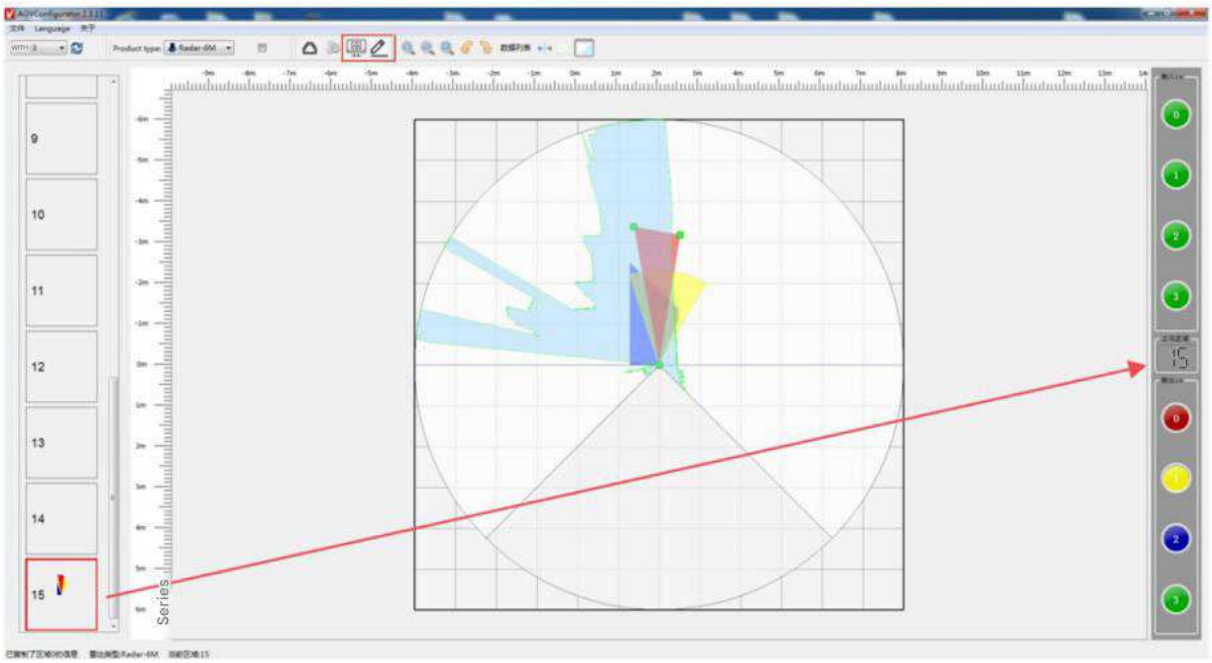
2. Edit Mode Point Cloud

After launching the software, connect your computer to the obstacle avoidance radar device via a communication link and select the current radar device model. Edit the configuration area information as needed until the required area information is complete. Once completed, "Download" the configuration area information to the radar. Then, click the Point Cloud Display button to display the point cloud. The point cloud display mode includes Edit Mode and Monitor Mode. Currently, in Edit Mode, you need to manually select an area to display the point cloud for that area (see the Edit Mode point cloud below).



3. Monitoring mode point cloud

After editing the region configuration information and successfully downloading it to the device, you can select monitoring mode to display the point cloud. You can also select monitoring mode while in edit mode. The software defaults to edit mode and must be manually switched to monitoring mode. Once monitoring mode is selected, the region information cannot be edited. Monitoring mode enables automatic monitoring of different regions, automatically displaying the corresponding point cloud. This eliminates the need to manually select the corresponding region, allowing for quick monitoring of each region's point cloud. (See Figure 31 below, monitoring mode point cloud).



4. Set parameters

The obstacle avoidance radar software allows for parameter settings, including the "hold time" and "response time." The response time specifies the minimum time an obstacle must remain within the detection area. If the response time is less than this, the radar will not issue an alarm. An alarm will only be issued if the time exceeds the set response time. The hold time specifies the maximum time an obstacle remains within the detection area. If the obstacle remains within the detection area for a longer time than the set hold time, the radar will not respond.

Obstacle size filtering allows for filtering out objects with fewer than five hit points. This can be used to eliminate interference from small objects.

Read the version number to query the current device firmware version number, as shown in the figure.