



Multi Target Bayonet Radar

User's Manual



Foreword

General






This manual introduces the functions and operations of the multi target bayonet radar (hereinafter referred to as the "Radar").

Models

DHI-ITARD-024MA-S

Safety Instructions

The following signal words might appear in the manual.

Signal Words	Meaning
 DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a medium or low potential hazard which, if not avoided, could result in slight or moderate injury.
 CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, reductions in performance, or unpredictable results.
 TIPS	Provides methods to help you solve a problem or save time.
 NOTE	Provides additional information as a supplement to the text.

Revision History

Version	Revision Content	Release Time
V1.0.1	Added notes for testing the Radar function.	September 2021
V1.0.0	First release.	September 2021

Privacy Protection Notice

As the device user or data controller, you might collect the personal data of others such as their face, fingerprints, and car plate number. You need to be in compliance with your local privacy protection laws and regulations to protect the legitimate rights and interests of other people by implementing

measures which include but are not limited: Providing clear and visible identification to inform people of the existence of the surveillance area and provide required contact information.

About the Manual

- The manual is for reference only. Slight differences might be found between the manual and the product.
- We are not liable for losses incurred due to operating the product in ways that are not in compliance with the manual.
- The manual will be updated according to the latest laws and regulations of related jurisdictions. For detailed information, see the paper user's manual, use our CD-ROM, scan the QR code or visit our official website. The manual is for reference only. Slight differences might be found between the electronic version and the paper version.
- All designs and software are subject to change without prior written notice. Product updates might result in some differences appearing between the actual product and the manual. Please contact customer service for the latest program and supplementary documentation.
- There might be errors in the print or deviations in the description of the functions, operations and technical data. If there is any doubt or dispute, we reserve the right of final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- All trademarks, registered trademarks and company names in the manual are properties of their respective owners.
- Please visit our website, contact the supplier or customer service if any problems occur while using the device.
- If there is any uncertainty or controversy, we reserve the right of final explanation.

Important Safeguards and Warnings

This section introduces content covering the proper handling of the Radar, hazard prevention, and prevention of property damage. Read carefully before using the Radar, comply with the guidelines when using it, and keep the manual safe for future reference.

Operation Requirements



- Make sure that the power supply of the Radar works properly before use.
- Do not pull out the power cable of the Radar while it is powered on.
- Only use the Radar within the rated power range.
- Transport, use and store the Radar under allowed humidity and temperature conditions.
- Prevent liquids from splashing or dripping on the Radar. Make sure that there are no objects filled with liquid on top of the Radar to avoid liquids flowing into it.
- Do not disassemble the Radar.

Installation Requirements



WARNING

- Connect the Radar to the adapter before power on.
- Strictly abide by local electrical safety standards, and make sure that the voltage in the area is steady and conforms to the power requirements of the Radar.
- Do not connect the Radar to more than one power supply. Otherwise, the Radar might become damaged.



- Observe all safety procedures and wear required protective equipment provided for your use while working at heights.
- Do not expose the Radar to direct sunlight or heat sources.
- Do not install the Radar in humid, dusty or smoky places.
- Install the Radar in a well-ventilated place, and do not block the ventilator of the Radar.
- Use the power adapter or case power supply provided by the Radar manufacturer.
- The power supply must conform to the requirements of ES1 in IEC 62368-1 standard and be no higher than PS2. Note that the power supply requirements are subject to the Radar label.
- Connect class I electrical appliances to a power socket with protective earthing.
- Make sure there are no objects in front of the Radar.
- Install the Radar horizontally on a stable surface to prevent it from falling.
- Do not install the Radar in an environment that has large amount of metal, advertising boards, walls or electromagnetic interference. Otherwise, the performance of the Radar might be affected.

- Do not install 2 devices with the same frequency in the same environment. Otherwise, the Radar might not work properly.

Table of Contents

Foreword	I
Important Safeguards and Warnings	III
1 Product Introduction	1
1.1 Overview	1
1.2 Features	1
2 Structure	2
2.1 Appearance	2
2.2 Dimensions.....	2
3 Radar Installation	4
3.1 Installation Requirements.....	4
3.2 Installation Position.....	4
3.2.1 Adjusting Azimuth Angle	4
3.2.2 Adjusting Elevation Angle of Radar	4
3.3 Installing the Radar	5
3.4 Cables	7
4 Software Configuration	9
4.1 Starting the Software	9
4.2 Setting Radar Parameters	11
4.2.1 Setting Sensitivity and Lane Direction.....	11
4.2.2 Setting Installation Parameters	12
4.2.3 Reading Angle Alignment	12
4.2.4 Setting Velocity Shift	13
4.2.5 Configuring Lane Parameter	13
4.2.6 Exporting Log.....	14
5 Radar Debugging	15
5.1 Calibrating Azimuth.....	15
5.1.1 Calibrating Azimuth Automatically.....	15
5.1.2 Calibrating Azimuth Manually	16
5.2 Configuring Lane Location	18
5.3 Changing Status	20
6 Program Update	21
7 Web Configuration	22
7.1 Connecting the Camera.....	22
7.2 Triggering Capture by the Radar	23
7.3 Configuring Speed Measurement by the Radar.....	24
7.4 Checking Radar Status	25
7.5 Testing Radar Configuration	26
8 FAQ	27
Appendix 1 Cybersecurity Recommendations	29

1 Product Introduction

1.1 Overview

Aiming at traffic applications, the Radar adopts brand-new software and hardware technologies to measure the distance, speed, angle and range of multiple targets. Based on the measured information, the Radar reports accurate trigger signals to the camera.

With FMCW and MIMO technologies, the Radar realizes faster and more accurate measurement of distance, speed and angle. In addition, the embedded tracking algorithm makes the Radar especially suitable for scenarios with heavy traffic flow, such as multiple-lane check points and traffic information collection, ensuring effective triggers of all targets.

1.2 Features

- Center mount and side mount available.
- Covers up to 4 lanes horizontally.
- Reports triggering information including lane number, vehicle speed and vehicle length.
- Detects and keeps track of vehicles within the range from 15 m–100 m.
- Adjustable trigger distance from 20 m–55 m with the accuracy of 1 m.
- Configurable lower limit of trigger speed.
- Advanced MIMO/DBF signal processing technology.
- 100 Mbps Ethernet and RS-485 communication ports.
- Automatic azimuth angle calibration makes installation and debugging easy.

2 Structure

2.1 Appearance

Figure 2-1 Product appearance



2.2 Dimensions

Figure 2-2 Radar dimensions (mm [inch])

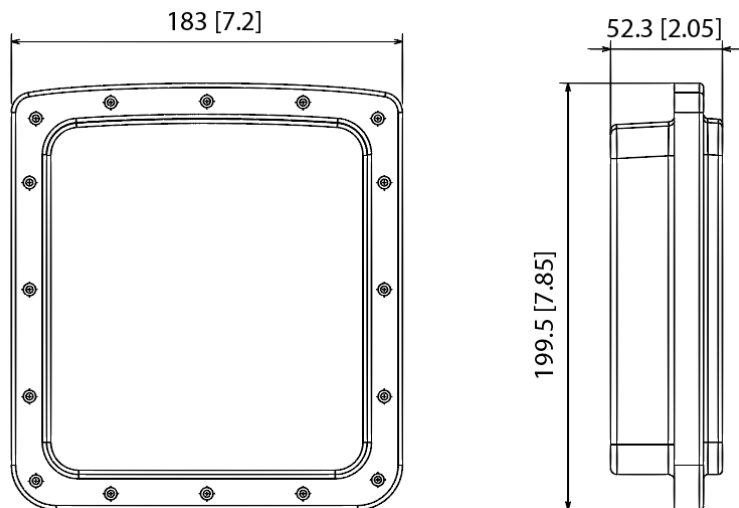
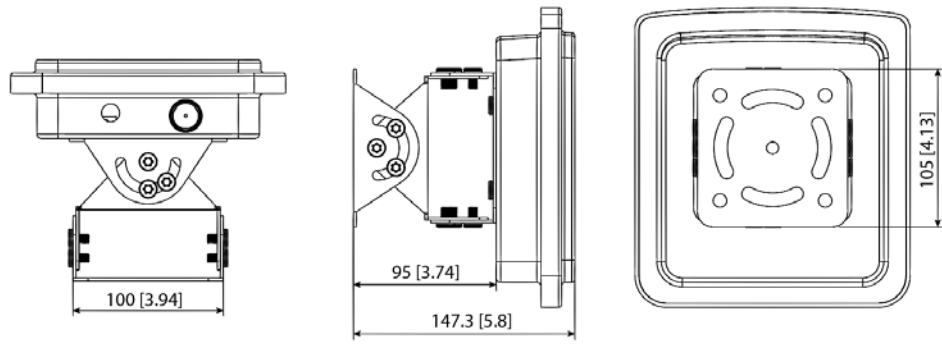


Figure 2-3 Bracket dimensions (mm [inch])



3 Radar Installation

3.1 Installation Requirements

- Make sure that the installation environment is free of blockage and electromagnetic interference.
- Do not install 2 devices that share the same frequency (or same model) at one place.
- Avoid metal reflective objects, for example, advertising board, in the FoV of the Radar.
- The recommended installation height is 4 m–8 m.

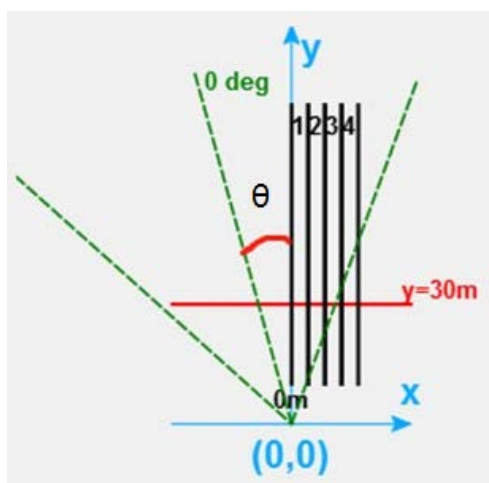
3.2 Installation Position

3.2.1 Adjusting Azimuth Angle

The azimuth angle refers to the angle between the normal line (0 deg) of the Radar and the direction of moving vehicles.

When the normal line (0 deg) is on the left side of the lane line (axis y), the azimuth angle is positive; when the normal line is on the right side, the angle is negative.

Figure 3-1 Azimuth angle

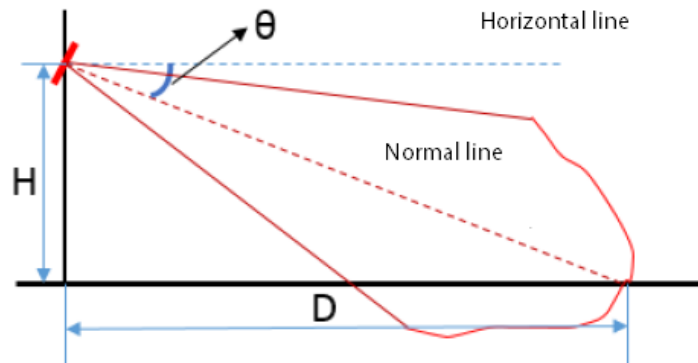


The Radar supports 4 lanes at most.

3.2.2 Adjusting Elevation Angle of Radar

The elevation angle refers to the angle between the normal line of the Radar and the horizontal line (road surface).

Figure 3-2 Elevation angle



When the Radar is facing down, the elevation angle is negative; when the Radar is facing up, the angle is positive.

Refer to below table for actual installation.

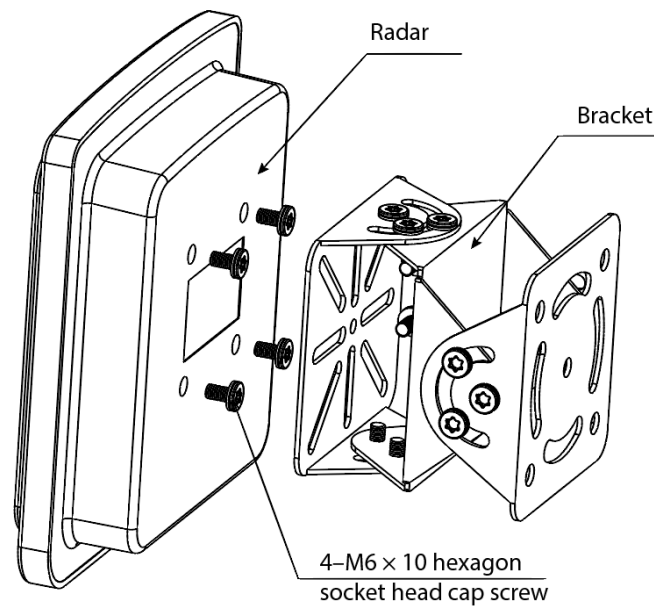
Table 3-1 Recommended elevation angle (m (ft))

Trigger Distance	Installation Height				
	4 (13.12)	5 (16.40)	6 (19.70)	7 (22.97)	8 (26.25)
20 (65.62)	-6.3°	-9.0°	-11.7°	-14.3°	-16.8°
25 (82.02)	-4.1°	-6.3°	-8.5°	-10.6°	-12.7°
30 (98.43)	-2.6°	-4.5°	-6.3°	-8.1°	-9.9°
35 (114.83)	-1.5°	-3.1°	-4.7°	-6.3°	-7.9°
40 (131.23)	-0.7°	-2.1°	-3.5°	-4.9°	-6.3°
45 (147.64)	0°	-1.3°	-2.6°	-3.8°	-5.1°
50 (164.04)	0°	-0.7°	-1.8°	-3.0°	-4.0°
55 (180.45)	0°	0°	-1.2°	-2.3°	-3.3°

3.3 Installing the Radar

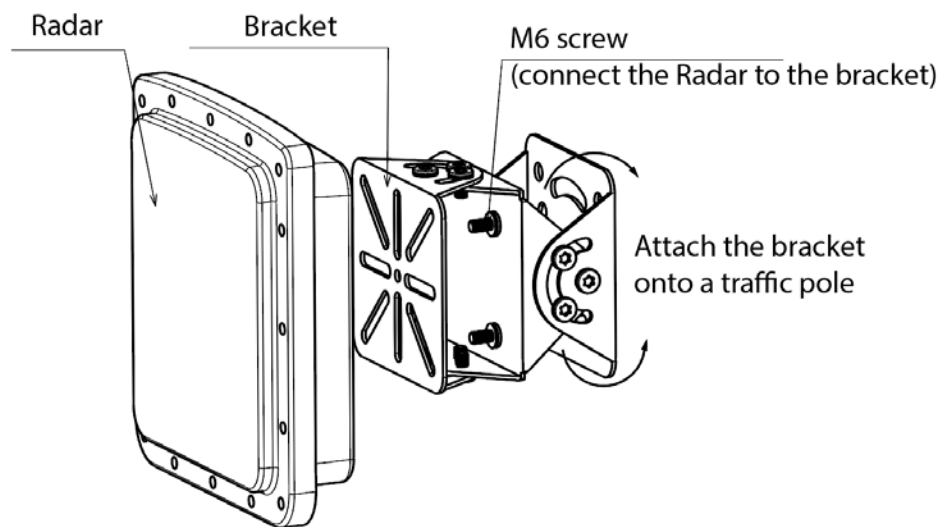
Step 1 Install the universal bracket.

Figure 3-3 Bracket



Step 2 Use pole mount bracket to attach the Radar onto a traffic pole.

Figure 3-4 Attach the Radar



Step 3 Refer to Table 3-1 for recommended values to adjust the elevation angle manually through adjusting the bracket.

Step 4 Adjust the azimuth angle manually.

Install the Radar facing the center of the monitoring road and make sure it can cover all the monitoring area.

- Make sure the side with cables faces down.
- Make sure the upside of the Radar is horizontal.

Figure 3-5 Center mount (recommended)

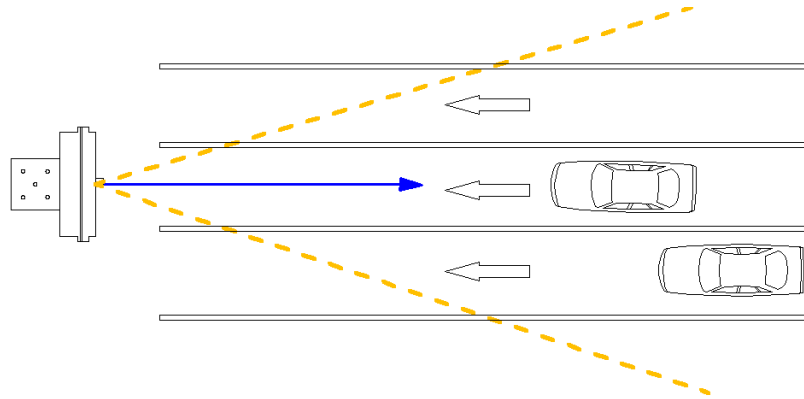
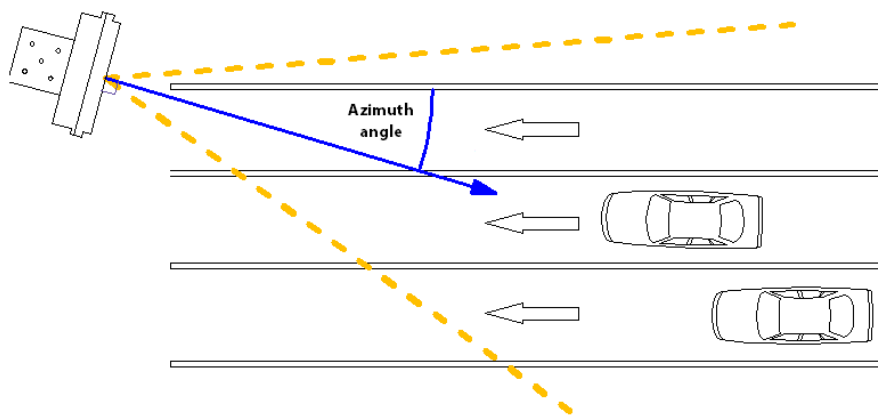


Figure 3-6 Side mount (recommended)



3.4 Cables

Figure 3-7 Cables of the Radar

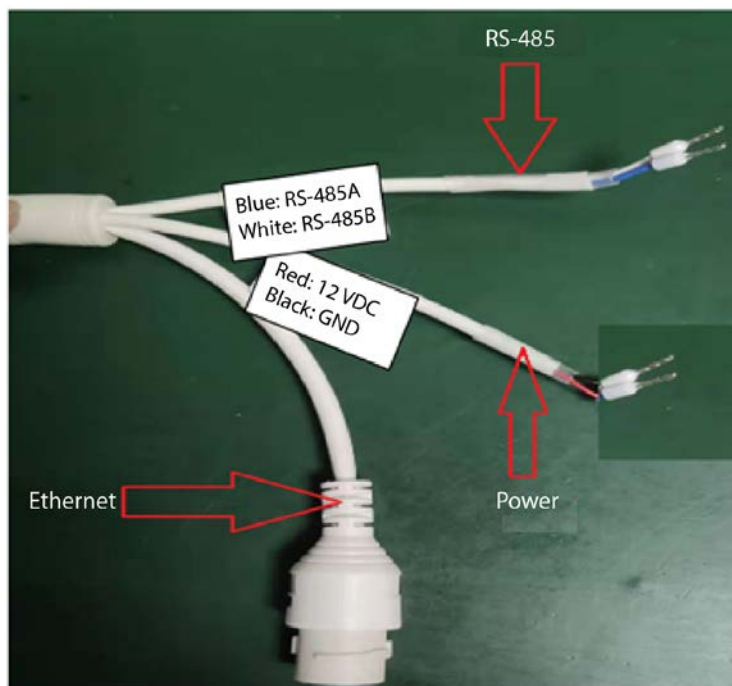


Table 3-2 Cable descriptions

Port	Description
12 VDC (red)	12 V+
GND (black)	12 V-
RS-485A (blue)	Connects to the camera RS-485A port
RS-485B (white)	Connects to the camera RS-485B port
Ethernet port	Used for debugging the Radar

4 Software Configuration

You can configure and adjust the parameters of the Radar by using the attached software.

4.1 Starting the Software

Step 1 Double-click "Multiple_Target_Radar_Setting_Tool.exe" to start the software.

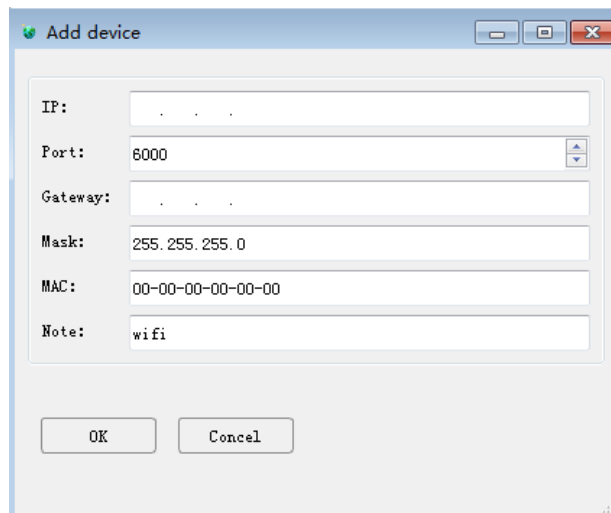
Step 2 On the main interface of the software, click **Search** at the lower-left corner to search for radars on the same network segment as the software.


You can also manually add devices by clicking **Manual** next to **Search** and enter the Radar IP.



Leave the rest of the parameters as default.

Figure 4-1 Add radar manually



Step 3 Click  to connect the Radar. When it turns to green, the Radar is connected.



- Click  next to the Radar to delete it.
- Click  to disconnect the Radar.

Figure 4-2 Connect the Radar automatically

Connect Settings Update

Language: English

Connect

↓ Click to connect device !

Index	IP	Port	Mask	Gateway	MAC	Note	
0						wifi	-
1						wifi	-

Search Manual

Restart

Restart

Config IP

Step 4 Optional operations.

- You can restart the Radar remotely by clicking **Restart**. Restart takes about 1.5 seconds. You need to reconnect the Radar after restart.
- You can configure the connected Radar IP by clicking **Config IP**.
 1. Click **Read** to obtain information of the current Radar.
 2. Change parameters as needed, and then click **Write** to synchronize them to the Radar.



After changing radar information, you need to search or manually add the Radar and connect it again.

Figure 4-3 Configure the Radar IP

Restart

Restart

Config IP

IP Config

Tip:Device should be reconnected after IP configuration.

IP: . . .

Port: 8000

Mask: . . .

Gateway: . . .

MAC: . . .

Read Write Clear

4.2 Setting Radar Parameters

You can set the parameters of the Radar through the software.

General operations:

- Click **Read** to get the current parameter value.
- Change the value and click **Write**, then the value you set will be synced to the Radar.
- Click **Default** to restore the value on the software window to default.

Figure 4-4 Homepage of radar software

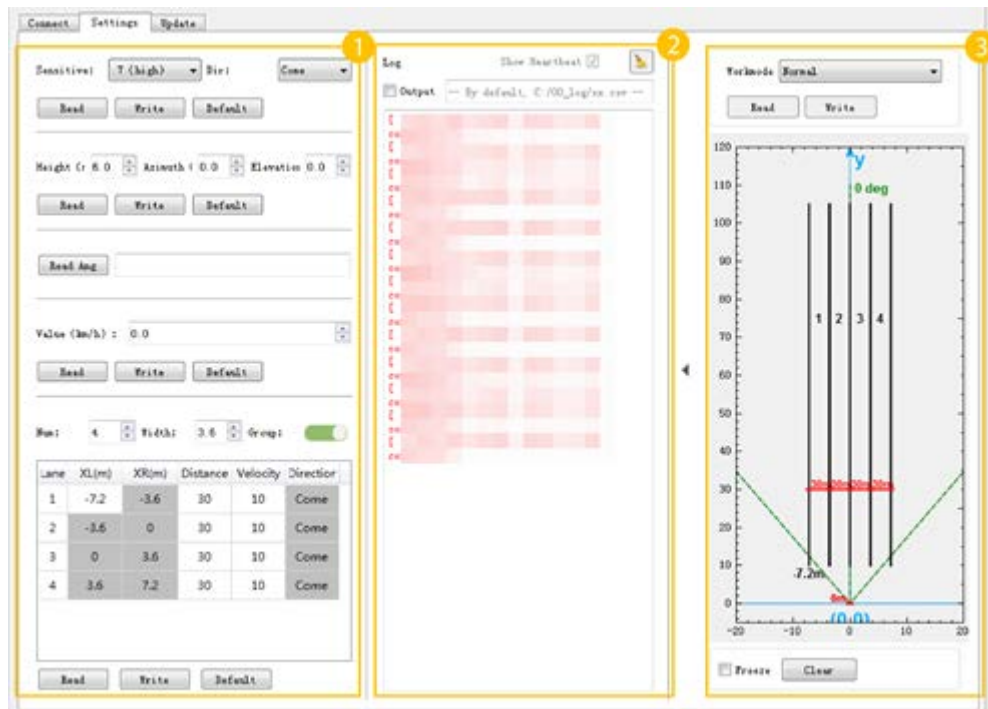


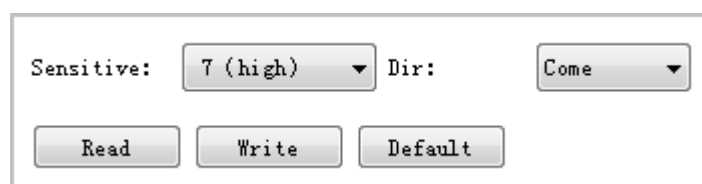
Table 4-1 Homepage description

No.	Description
1	Functions.
2	Operation logs.
3	Vehicle simulation.

4.2.1 Setting Sensitivity and Lane Direction

You can set the sensitivity of the Radar and lane direction.

Figure 4-5 Set sensitivity and lane direction



- **Sensitivity:** The detection sensitivity of the Radar. 7 (default) is the highest level.
- **Dir:** Select the lane direction from **Come, Go** and **Double**.

- ◇ There is no need to set the lane direction again under the lane parameter when setting **Dir** to **Come** or **Go**.
- ◇ You need to set the lane direction again under the lane parameter when setting **Dir** to **Double**. Refer to "4.2.5 Configuring Lane Parameter" for details.

4.2.2 Setting Installation Parameters

Set the installation parameters based on the actual installation position of the Radar.

Figure 4-6 Installation parameters

- Height: The distance between the Radar and the ground. Set according to the actual installation.
- Azimuth: Azimuth angle configuration. It can be automatically or manually calibrated. For details, see "3.2.1 Adjusting Azimuth Angle".



The deviation between the set value and the actual value cannot exceed 10 deg. Otherwise, the automatic calibration will fail.

- Elevation: Set according to the actual installation. For details, see "3.2.2 Adjusting Elevation Angle of Radar".

4.2.3 Reading Angle Alignment

When a vehicle travels normally inside the lane, the Radar collects the vehicle course angle and calculates horizontal angle alignment data.

You can get the data by clicking **Read** under **Setting > Read Ang.**

Figure 4-7 Angle alignment

To get the data under different situations, you can do one of the following:

- Test during normal traffic flow
When there are about 50 vehicles passing by, the software can calculate the angle alignment value. Click **Read**, if the returned data is 0, wait for more vehicles to pass and then check again.
- Test when the road is closed
When a road is closed, you can test the Radar by driving towards it in each lane more than 5 times. Ensure to maintain a speed over 30 km/h, and cover a distance of 100 meters to the Radar. Multiple vehicles can be driven at the same time.



- The angle alignment data can be affected by traffic flow and vehicle track. Low traffic flow or too many vehicles changing lanes can impact the result.
- Angle alignment reading is mainly used in situations where the Radar is installed on the road center. If the Radar is installed on sides, we recommend calibrating manually.

4.2.4 Setting Velocity Shift

To eliminate deviations between the measured speed and the actual speed, you can adjust the **Velocity Shift**. It is 0 by default.

For example, the speed measured by the Radar is 62 km/h, and the **Velocity Shift** is -2 km/h, the final speed is 60 km/h.

Figure 4-8 Velocity shift

Velocity Shift (km/h) :

4.2.5 Configuring Lane Parameter


Figure 4-9 Lane parameter

Num: Width: Group:

Lane	XL(m)	XR(m)	Distance	Velocity	Director
1	-7.2	-3.6	30	10	Come
2	-3.6	0	30	10	Come
3	0	3.6	30	10	Come
4	3.6	7.2	30	10	Come

Table 4-2 Description of lane parameters

Parameter	Description
Num	The number of lanes that the Radar actually detected (up to 4).
Width	Lane width. Only adjustable when Group mode is enabled.
Group	<ul style="list-style-type: none"> • Enable the function, the software calculates lane parameters automatically based on the start XL value, lane width and lane number. • Disable the function, you need to set the lane parameters manually.

Parameter	Description
XL(m)/XR(m)	Under the coordinate system of the Radar, the coordinates of the left/right lane line.  Negative value means the lane line is on the left side of the Radar and positive value indicates the lane line is on the right.
Distance	<ul style="list-style-type: none"> • Detection distance. Only when a vehicle passes the line, can the Radar detect it. • Recommended range: 20 m–55 m.
Velocity	The lower limit of the speed which the Radar can detect.
Direction	Select lane direction when the Dir is set to Double .

Group Configuration

When the lanes are distributed evenly with the same width, you can enable the **Group** function. You can only enter the lane width and the first XL value. The software will calculate the rest.

Single Configuration

When the lane width is not the same, or during other special situations where you need to enter the XL and XR value for each lane. Disable **Group**, and the **Width** value is invalid.

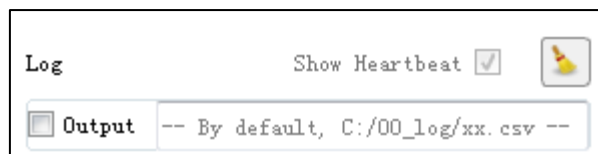


- We recommend enabling Group function when lane width meets the requirements.
- Vehicles within the monitoring range will trigger the Radar to report to the camera through RS-485 when both Distance and Velocity are exceeded.

4.2.6 Exporting Log

You can view the log and analyze the vehicle trigger information.

Figure 4-10 Operation log



- Select **Output**, and the software generates a .csv file containing vehicle triggering logs under the default path displayed next to **Output**.
- Clear **Output**, and vehicle triggering logs will not be saved to local.



Cancel selecting **Output** in advance. Otherwise you might not be able to view the logs in local storage.

5 Radar Debugging

This section introduces detailed methods for debugging the Radar.

5.1 Calibrating Azimuth

5.1.1 Calibrating Azimuth Automatically

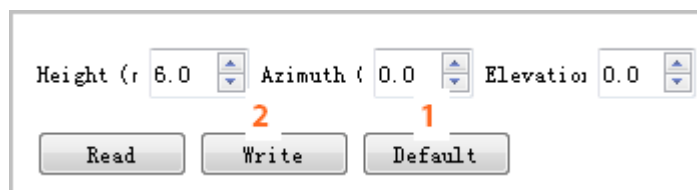
Automatic calibration requires busy traffic flow, simple road condition and center-mounted radar.



Make sure that the Radar software is in default status (**Workmode is Normal**).

Step 1 Set the **Height** and the **Elevation** angle according to the actual installation, and set the **Azimuth** angle to 0.

Figure 5-1 Synchronize installation parameters



Step 2 Wait for a while (refer to "4.2.3 Reading Angle Alignment" for details), and then click **Read Ang**.

Step 3 Copy the value from **Read Ang** to **Azimuth**.

Step 4 Click **Write** to synchronize azimuth data to the Radar.

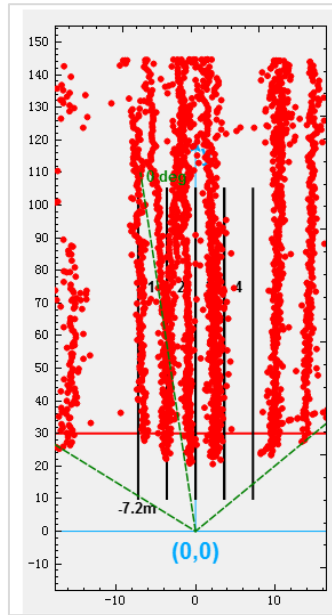


The software records every operation in logs. You can see whether the operation is complete.

Step 5 Set **Workmode** to **Debug**, and then click **Write**. Check the track again.

The track and the lane are basically parallel. If not, you need to adjust the azimuth angle manually.

Figure 5-2 Track after calibration

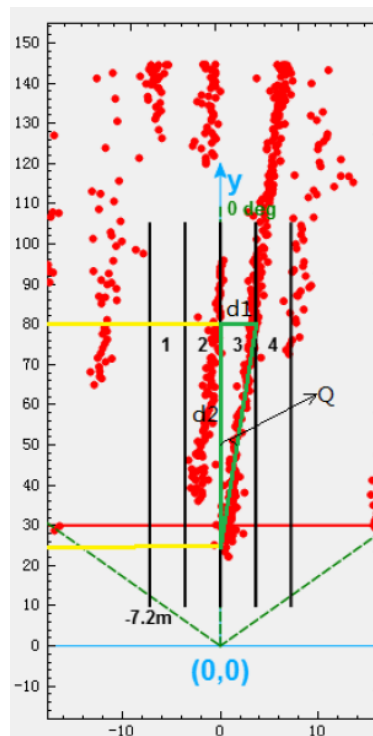


5.1.2 Calibrating Azimuth Manually

Step 1 Set **Workmode** to **Debug**, and then click **Write**.

Step 2 Select **Freeze** at the lower-right corner when the traffic flow is light (only one vehicle traveling straightly is best), and then draw a perpendicular triangle which contains the included angle Q, as shown in the following figure (the green triangle).

Figure 5-3 Draw a triangle



Step 3 Calculate the line length based on the coordinates.

Step 4 Use trigonometric formula to get the included angle Q.

- $d1 = 3.6 \text{ m}$

- $d2 = 55 \text{ m}$
- $Q = \arctan (d1/d2) \approx 4^\circ$



You can also calculate a rough value of the included angle, cancel selecting **Freeze**, and adjust the vehicle track repeatedly until it is in parallel with the lane line.

Step 5 Copy the value of Q to azimuth, and then click **Write**.

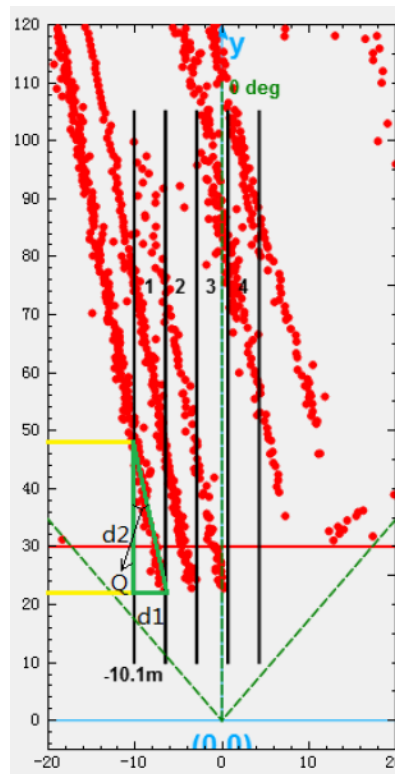
The software sends the configured parameters to the Radar and prints out operation logs.



The azimuth value can be a negative number according to the installation position of the Radar.

- When the triangle made of a lane line and a vehicle track is displayed as Figure 5-3, the azimuth value is positive or needs to be increased.
- When the triangle made of a lane line and a vehicle track is displayed as Figure 5-4, the azimuth value is negative or needs to be reduced (same calculation method as in Step 4).

Figure 5-4 Negative azimuth value

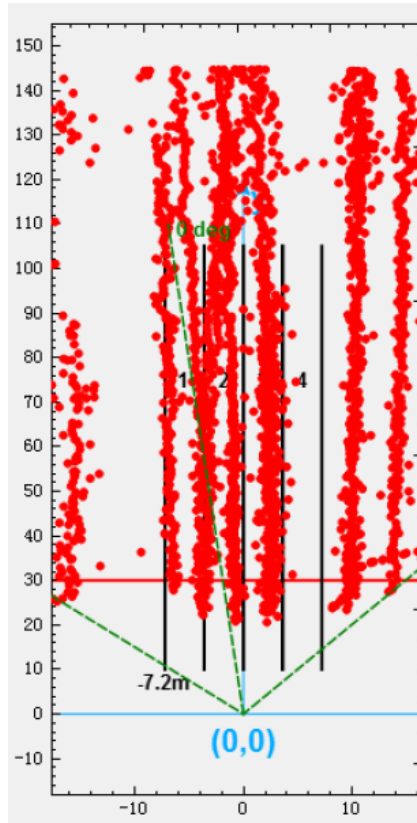


Step 6 Clear **Freeze** to check whether the vehicle track is basically in parallel with the lane line.



The criterion for both manual and automatic azimuth value adjustment is that the vehicle track and lane line must be parallel.

Figure 5-5 Cancel freeze



5.2 Configuring Lane Location

Step 1 Set the number of lanes and enter lane width according to the actual site (for example 4 lanes and lane width is 3.6 m).

Step 2 Enable **Group**.

Figure 5-6 Configure lane

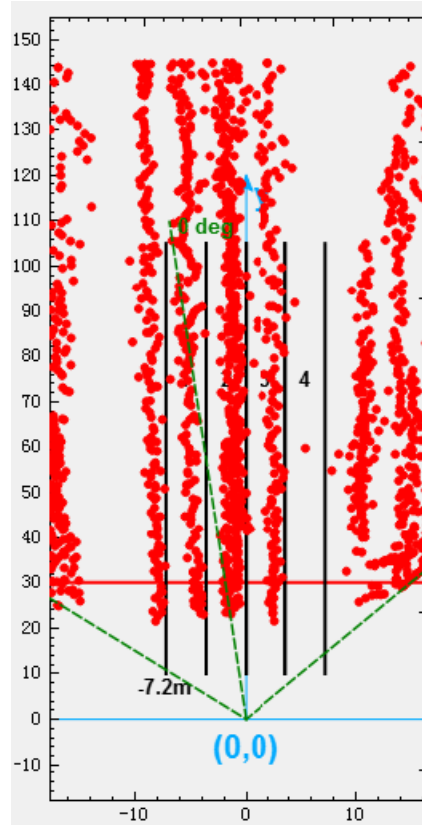
Num: Width: Group:

Lane	XL(m)	XR(m)	Distance	Velocity	Director
1	-7.2	-3.6	30	10	Come
2	-3.6	0	30	10	Come
3	0	3.6	30	10	Come
4	3.6	7.2	30	10	Come

Read Write Default

Step 3 Select **Freeze** when all 4 lanes have vehicles traveling on them. When there are tracks in all 4 lanes, lane adjustment is easier.

Figure 5-7 Adjust lanes



Step 4 Adjust the lane coordinates when the vehicle tracks are not in the right lane.


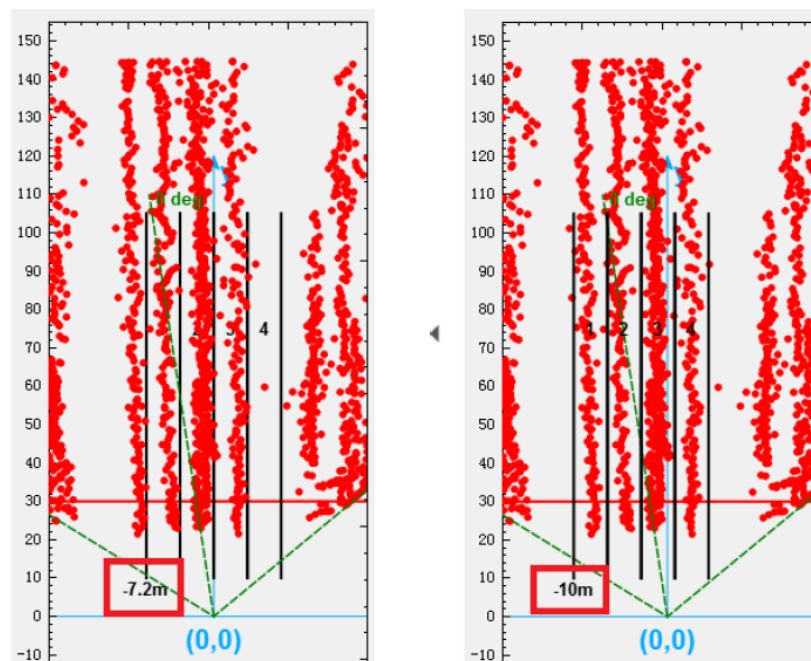
Click  next to XL value of the first lane to adjust all 4 lanes while **Group** is enabled. For example, you need to reduce the XL value of the first lane to move the lanes left until vehicle tracks are inside the right lane (from -7.2 m to -10 m).

Figure 5-8 Lane adjustment completes



Step 5 Click **Write** under changed lane parameters to synchronize them with the Radar.

Step 6 Clear **Freeze** and all tracks are inside the right lane lines.

5.3 Changing Status

Step 1 Change **Workmode** from **Debug** to **Normal** after all debugging.

Step 2 Click **Write**.

After successful configuration, the Radar reports to the camera when vehicles that meet the set requirements pass by.

6 Program Update

You can check the current firmware version and select update package to update.

Step 1 Click **Update**.

You can get the current version information through clicking **Read**. Different radar firmwares report different triggering messages, which allows you to distinguish whether the firmware is burned right based on the version information.

Figure 6-1 Firmware update

Step 2 Click **Browse** to select update files.

- The update files must be saved in one folder.
- Inside the folder, there cannot be any other folders.
- Inside the folder, there cannot be any other non-related files.



If there are files starting with **cali_speed_mea_application**, the Radar IP will be restored to the default value 192.168.1.108 after update.

Step 3 Click **Update**.

7 Web Configuration

Connect the Radar to the camera through RS-485, and then you can configure the Radar to trigger capture and measure speed.



- Refer to the user's manual of the camera for detailed configuration.
- Web configurations introduced in this section are mainly for ANPR events, and you can take them as reference for other events.
- Make sure you have set the **Intelligent Scheme** to **ANPR**.

7.1 Connecting the Camera

The Radar can connect to the camera through RS-485 to monitor multiple lanes, and you can configure the corresponding parameters on the camera web interface.

Step 1 Log in to the camera web client.

Step 2 Select **Setting > Peripheral > Serial Port Settings**.

Figure 7-1 Serial port settings

Type	Control Console	Radar	Go to	External Light	Transparency Serial
1(RT)	RS-232 <input checked="" type="checkbox"/>				
2(R1T1)	RS-232	<input type="checkbox"/>			<input type="checkbox"/>
3(R2T2)	RS-232	<input checked="" type="checkbox"/>			<input type="checkbox"/>
4(R3T3)	RS-232	<input checked="" type="checkbox"/>			<input type="checkbox"/>
5(GPS)	RS-232		<input checked="" type="checkbox"/>		
6(A1B1)	RS-485 <input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
7(A2B2)	RS-485			<input type="checkbox"/>	<input type="checkbox"/>

Step 3 Set **Type** to **RS-485** and select Radar for the corresponding serial port to enable multi-lane radar detection.

Figure 7-2 Radar configuration

6(A1B1)	RS-485 <input checked="" type="checkbox"/>
7(A2B2)	RS-485

Serial setup

Protocol:

Data Bit: Stop Bit:

Baud Rate: Check Mode:

Device Config

Start Lane: 1 2 3 4 5

Begin Lane: (1-5)

Default Refresh Confirm

Step 4 Select the protocol as shown in the above figure and configure other parameters as needed.

Step 5 Click **Confirm**.

7.2 Triggering Capture by the Radar

You can configure the Radar to trigger capture of the camera, and measure speed at the same time.

Step 1 Log in to the camera web client.

Step 2 Select **Setting > Event > ANPR Snap > Illegal Capture > Rule Config**.

Figure 7-3 Rule configuration

No.	<input type="checkbox"/>	Event Type	Number of Snapshots	Picture Parameter	Advanced Parameter
1	<input checked="" type="checkbox"/>	ANPR	1		
2	<input type="checkbox"/>	Wrong-way Driving	2		
3	<input type="checkbox"/>	Underspeed	2		
4	<input type="checkbox"/>	Speeding	2		

Buttons: Refresh, Confirm

Step 3 Select **ANPR** from **Event Type**, and set other parameters as needed.

Step 4 Click , and then configure the corresponding advanced parameters of **ANPR**.

Figure 7-4 Advanced parameters of ANPR event

Event Type: **ANPR(Lane 1)**

Trigger Source:

Loop Radar Video Analyse

Tip: When multiple trigger sources are selected at the same time, the previous one is preferred, and only the latter one is used when the previous one fails

Copy to: Same-type rule Copy

Rule Parameter:

Vehicle Optimization:

Capture Direction: Approaching Departing Two-way

Snap Car: NonMotor Licensed Motor Vehicle No Palte Motor

Period: Setup

Buttons: Cancel, Confirm

Table 7-1 Advanced parameter description

Name	Description
Radar	The system takes a violation snapshot of vehicles when the Radar detects it.
Video Analyse	The system analyzes the real-time video to detect traffic violations. Once a violation is detected, the system automatically captures pictures of the vehicle.
Copy to	Copy the current settings to the same-type rules or all the rules.

Step 5 Select **Radar** from **Trigger Source** and then click **Confirm**.

7.3 Configuring Speed Measurement by the Radar

The Radar can be configured to measure vehicle speed and overlay the speed information onto the snapshots captured by the camera.

Step 1 Log in to the camera web client.

Step 2 Select **Setting > Event > ANPR Snap > Illegal Capture > Rule Config.**

Figure 7-5 Rule configuration

No.	<input type="checkbox"/>	Event Type	Number of Snapshots	Picture Parameter	Advanced Parameter
1	<input checked="" type="checkbox"/>	ANPR	1		
2	<input type="checkbox"/>	Wrong-way Driving	2		
3	<input type="checkbox"/>	Underspeed	2		
4	<input type="checkbox"/>	Speeding	2		

Buttons: Refresh, Confirm

Step 3 Select **ANPR** from **Event Type**, and set other parameters as needed.

Step 4 Click , and then configure the corresponding advanced parameters of **ANPR**.

Step 5 Select **Video Analyse** from **Trigger Source** and then click **Confirm**.

Figure 7-6 Advanced parameters of ANPR event

Event Type: **ANPR(Lane 1)**

Trigger Source:

Loop Radar Video Analyse

Tip: When multiple trigger sources are selected at the same time, the previous one is preferred, and only the latter one is used when the previous one fails

Copy to:

Rule Parameter:

Vehicle Optimization

Capture Direction: Approaching Departing Two-way

Snap Car: NonMotor Licensed Motor Vehicle No Palte Motor

Period:

Step 6 Select **Setting > Event > ANPR Snap > Illegal Capture > Other Settings.**

Figure 7-7 Other settings

Table 7-2 Other settings description

Parameter	Description
Non-motor Category	Captures non-motor vehicles.
UnlicensedMotor Category	Captures unlicensed vehicles.
Radar Calc Speed	Use radar to measure vehicle speed.
Snap Match Mode	<ul style="list-style-type: none"> ● Common Mode: For ANPR snap mode. ● Priority Mode: For e-police mode.
Threshold Of Distance Between Vehicles In Line	Set the distance between vehicles when waiting in a line.
Max Speed	When the travelling speed exceeds this value, the system automatically changes the vehicle speed to a random value in the normal range.
Pixel Counter	Click Draw Target , and then draw a rectangular area on the image to show the pixel size of that area.

Step 7 Select **Radar Calc Speed** for speed measurement and configure other parameters as needed.

Step 8 Click **Confirm**.



For detailed configuration of video and snapshot OSD, see the user's manual of the camera.

7.4 Checking Radar Status

On the camera web client, select **Setting > Peripheral > Extra Device Status**, and then you can check whether the Radar is online.

Figure 7-8 Radar status

No.	Device Type	Device No.	Device Status	Match Status
1	Radar	1	Normal	-
2	GPS	-	Normal	-

7.5 Testing Radar Configuration

After all configurations on the camera web client, you can check the effect on the camera **Live** view.

Preparations

- Make sure that the Radar is online.
- When only selecting **Video Analyse** from **Trigger Source** for **ANPR** event, make sure that the capture triggering line of the camera and the report triggering line of the Radar are as close as possible.
- For capture triggered by the Radar, make sure that you have set **Trigger Source** to **Radar** when configuring capture rule.
- For speed measurement by the Radar, make sure that you have set **Trigger Source** to **Video Analyse**, and **Radar Calc Speed** is selected in **Other Settings**.

Procedures

Step 1 Log in to the camera web interface.

Step 2 Click **Live**, and then check whether the capture and the speed measurement data are correct.

8 FAQ

No radars found.

- Check whether the Radar is powered on.
- Check whether the network is connected correctly.
- Check whether the IP of the PC and the Radar is on the same network segment.
- Check whether there are other apps on your PC to connect the Radar.
- Check whether your PC has Wi-Fi and Ethernet enabled at the same time. Disable unnecessary adapters.



Make sure that the PC is restarted after changing network adapter information.

Cannot connect radars in the list.

- Check solutions in the first issue.
- Check whether the devices in the list are working properly.

Automatic disconnection of connected radars.

- Check whether the Radar is offline, powered off or during update.
- Connect to wireless adapter to check whether the connection is stable.

The read angle alignment value keeps changing.

- The angle is calculated by vehicle tracks, which changes along with the traffic flow and vehicle tracks.
- Check whether the traffic flow is small (< 50) or vehicles constantly change lanes.
- Check whether the initial angle is set wrong or has large deviation (larger than 10 deg).

The parameters of the actual Radar differ from that of the diagram.

The parameter diagram is set based on the actual parameters. When they are different, the actual values are correct.

During update, notice reads that no .srec file in the folder.

- Check whether there are folders in the update folder.
- Check whether there are more than 3 update files.

Operations to perform when being asked to wait during update.

Be patient and do not operate on power supply or any other modules on the interface. If any exceptions occur or the update is timed out, the Radar will exit update and provide possible solutions.

Update fails.

- Check whether the Radar is connected correctly before update.
- Check whether the update files meet the requirements.
- Check whether the power supply of the Radar is stable during update.
- Check whether the network is stable during update.
- Contact technical support when all above solutions fail.

Radars cannot be connected after update.

When the update package contains parameter file, the Radar parameter will be restored to default (192.168.1.108:6000). Connect the Radar again and configure parameters as before.

The radar shows error on the camera web interface.

- Check whether the power supply and input voltage of the Radar are normal.
- Check whether the RS-485 cable is connected correctly.
- Check whether the Radar protocol configured on the camera web interface is correct.

The Radar misses vehicles passing or no speed measured.

- Check whether the Radar is facing the center of the monitoring area (azimuth angle).
- Check whether the Radar is installed with the elevation angle within a reasonable range.
- Check whether the trigger distance of the Radar is configured within a reasonable range.
- Check whether the azimuth angle of the Radar and lane parameters are configured correctly (through the vehicle track on the software under debug mode).

The Radar measures speed when no vehicles pass.

- Check whether there is strong magnetic field or rotating objects around the Radar.
- Check whether there are objects with high reflection such as metal, advertising board and wall.

The vehicle tracks are abnormal under debug mode after commissioning the Radar.

- Read the installation and lane parameters and synchronize them to the Radar.
- Check whether the Radar is tightly installed.

Appendix 1 Cybersecurity Recommendations

Cybersecurity is more than just a buzzword: it's something that pertains to every device that is connected to the internet. IP video surveillance is not immune to cyber risks, but taking basic steps toward protecting and strengthening networks and networked appliances will make them less susceptible to attacks. Below are some tips and recommendations on how to create a more secured security system.

Mandatory actions to be taken for basic device network security:

1. Use Strong Passwords

Please refer to the following suggestions to set passwords:

- The length should not be less than 8 characters;
- Include at least two types of characters; character types include upper and lower case letters, numbers and symbols;
- Do not contain the account name or the account name in reverse order;
- Do not use continuous characters, such as 123, abc, etc.;
- Do not use overlapped characters, such as 111, aaa, etc.;

2. Update Firmware and Client Software in Time

- According to the standard procedure in Tech-industry, we recommend to keep your device (such as NVR, DVR, IP camera, etc.) firmware up-to-date to ensure the system is equipped with the latest security patches and fixes. When the device is connected to the public network, it is recommended to enable the "auto-check for updates" function to obtain timely information of firmware updates released by the manufacturer.
- We suggest that you download and use the latest version of client software.

"Nice to have" recommendations to improve your device network security:

1. Physical Protection

We suggest that you perform physical protection to device, especially storage devices. For example, place the device in a special computer room and cabinet, and implement well-done access control permission and key management to prevent unauthorized personnel from carrying out physical contacts such as damaging hardware, unauthorized connection of removable device (such as USB flash disk, serial port), etc.

2. Change Passwords Regularly

We suggest that you change passwords regularly to reduce the risk of being guessed or cracked.

3. Set and Update Passwords Reset Information Timely

The device supports password reset function. Please set up related information for password reset in time, including the end user's mailbox and password protection questions. If the information changes, please modify it in time. When setting password protection questions, it is suggested not to use those that can be easily guessed.

4. Enable Account Lock

The account lock feature is enabled by default, and we recommend you to keep it on to guarantee the account security. If an attacker attempts to log in with the wrong password several times, the corresponding account and the source IP address will be locked.

5. Change Default HTTP and Other Service Ports

We suggest you to change default HTTP and other service ports into any set of numbers between 1024~65535, reducing the risk of outsiders being able to guess which ports you are using.

6. Enable HTTPS

We suggest you to enable HTTPS, so that you visit Web service through a secure communication channel.

7. MAC Address Binding

We recommend you to bind the IP and MAC address of the gateway to the device, thus reducing the risk of ARP spoofing.

8. Assign Accounts and Privileges Reasonably

According to business and management requirements, reasonably add users and assign a minimum set of permissions to them.

9. Disable Unnecessary Services and Choose Secure Modes

If not needed, it is recommended to turn off some services such as SNMP, SMTP, UPnP, etc., to reduce risks.

If necessary, it is highly recommended that you use safe modes, including but not limited to the following services:

- SNMP: Choose SNMP v3, and set up strong encryption passwords and authentication passwords.
- SMTP: Choose TLS to access mailbox server.
- FTP: Choose SFTP, and set up strong passwords.
- AP hotspot: Choose WPA2-PSK encryption mode, and set up strong passwords.

10. Audio and Video Encrypted Transmission

If your audio and video data contents are very important or sensitive, we recommend that you use encrypted transmission function, to reduce the risk of audio and video data being stolen during transmission.

Reminder: encrypted transmission will cause some loss in transmission efficiency.

11. Secure Auditing

- Check online users: we suggest that you check online users regularly to see if the device is logged in without authorization.
- Check device log: By viewing the logs, you can know the IP addresses that were used to log in to your devices and their key operations.

12. Network Log

Due to the limited storage capacity of the device, the stored log is limited. If you need to save the log for a long time, it is recommended that you enable the network log function to ensure that the critical logs are synchronized to the network log server for tracing.

13. Construct a Safe Network Environment

In order to better ensure the safety of device and reduce potential cyber risks, we recommend:

- Disable the port mapping function of the router to avoid direct access to the intranet devices from external network.
- The network should be partitioned and isolated according to the actual network needs. If there are no communication requirements between two sub networks, it is suggested to use VLAN, network GAP and other technologies to partition the network, so as to achieve the network isolation effect.

- Establish the 802.1x access authentication system to reduce the risk of unauthorized access to private networks.
- Enable IP/MAC address filtering function to limit the range of hosts allowed to access the device.

ENABLING A SAFER SOCIETY AND SMARTER LIVING

ZHEJIANG DAHUA VISION TECHNOLOGY CO., LTD.

Address: No.1199 Bin'an Road, Binjiang District, Hangzhou, P. R. China | Website: www.dahuasecurity.com | Postcode: 310053

Email: overseas@dahuatech.com | Fax: +86-571-87688815 | Tel: +86-571-87688883