Millimeter Wave Radar

User Manual

Thank you for purchasing our product. This user manual is a reference for using our radar product. Please read the following safeguards and warnings carefully before using this series product and keep this user manual well for future reference.

Electrical Safety

- All installation and operation should conform to local electrical safety standard.
- The power supply shall conform to the Safety Extra Low Voltage (SELV) standard, and DC 12 V power supply shall meet requirements of IEC60950-1. Please note that power supply shall subject to the require ment specified on radar label.
- Make sure the power electrical safety before operating the device.
- A readily accessible dissembling disconnect device shall be incorporated in the wiring of the building.
- Prevent the power cable from being trampled or pressed, especially the plug, power socket and the device adaptor.
- We assume no liability or responsibility for all the fires or electrical shock caused by improper handling or installation.

Environment
- Hard ground is the best choice for detection area, such as cement ground.As for the ground covered with vegetation, make sure the height of vegetation is less than 20cm.
- Make sure the detection area is not blocked by any vegetation, trees, buildings or vehicles etc.
- Make sure there is no electromagnetic interference around the installa-tion area and in the radar detection area, such as air conditioner external unit, high-tension transformer and so on.
- Please transport, use and store the device within the range of allowed humidity and temperature.
- Do not place the device in a damp or dusty environment, extremely hot or cold temperatures, or the locations with strong electromagnetic rad-

iation or lighting.
- Pack the device with standard factory packaging or the equivalent material during the shipment.

Safeguards

- Make sure the antenna surface of radar is clean without any dirt.
- Do not dismantle the device because there is no component that can be fixed by users themselves. Otherwise, it might cause water leakage or bad performance due to unprofessional dismantling.
- Use the dry soft cloth to clean the device. If the dust is difficult to be removed, please wipe it away with a clean cloth wetted slightly by the mild detergent, and then use dry cloth to clean the device. Do not use volatile solvents like alcohol, benzene, thinner, or abrasive detergent , which will damage the surface coating or reduce the working performance of the device.

Warnings

- Use the standard provided by manufacturer and make sure the device is installed and fixed by professional engineers.
- Do not provide two or more components (differ from the which provided by manufacturer)for the device, otherwise it might damage the device.

Disclaimer

- This manual is for reference only. Please refer to the specified product user manual for more details.
- All the software and user manual will be regularly updated according to the product upgrade without prior announcement on the official website.
- The company is not liable for any loss caused by the operation that does not comply with the manual.
- If there is any uncertainty or controversy, please refer to our final explanation.

Content

1. Open -Package Inspection

Please check if there is any obvious damage to the device appearance and confirm if the accessories are in accordance with those on the packing list when opening the outer packing container. Please refer to packing list for details with exact model for actual configuration

2. Device Structure

2.1 Port Definition

Note：
● The following structure fig. is for reference only. It shows the functions of device external ports
● There might be minor differences between different devices, please refer to the actual product you purchased.
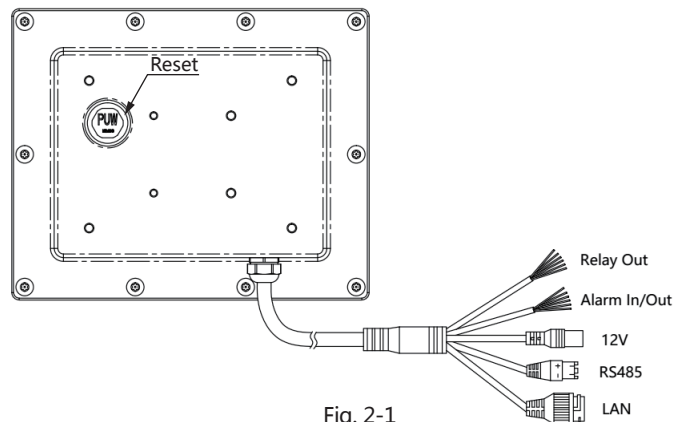

Fig. 2-1

Table 2-1 External port definition and description

Table 2-1

No.	Cable Port	Port Name	Function Description
1	LAN	Network Port	Connect to standard Ethernet and power the PoE
2	Power	Power input port	Input DC 12V **Note :** Equipment may be damaged if power is not supplied in accordance with the instructions.
3	Signal line	RS485	Transmit radar data(object information) via RS485

No.	Cable Port	Port Name	Function Description		
4	Signal line	Optocouple output: Switch output(dry cont-act):Normally on, able to withstand current<50mA	2 sets of switch quantities, line definition as below:Grey-black=Alarm out1_M; Orange-black=Alarm out1_N; Yellow-white=Alarm out2_M; Yellow-black=Alarm out2_N.		
5	Signal line	Relay output: Switch output(dry contact): Able to withstand current (Resistive load)：2A@30V、 0.5A@125V AC(Full load el-ectrical durability:100000 times) If the tolerance, sen-sibilityLoad, please keep the current allowance in place.	2 sets of switch quantities, line definition as below:Pink=NC1; Light green=COM1; Brown=NO1;Purple=NC2; Brown-black=COM2; Gray=NO2 NC: Normal close; COM: Public port; NO: Normal open		
6	Signal line	High and low level input: It's the optocoupler drive end, which requires driving Current 0.3~20 mA. Related parameters desc-ription: light-emitting dio-des (leds) pressure drop 1.2 V, radar board built-in 200 Ω current-limiting resistor.	The radar can receive an external input trigger signal, so that the radar performs a corresponding response action; Line sequence definition: white = signal input + ; white/black = signal input - ;		
7	LED indicator light	Red-green LED statue Indicator light, show the working state of the equi-pment	Green breath flashing	Radar works normal	
			Green flashing	Radar works normal and connected with PC software	
			Red and green always ON	Radar access system protec-tion	
			Red breath flashing	Radar works abnormal, please check if radar out-put objects normally.	
			Radar flashing	Radar is detecting the movi-ng target	
			Red and green always OFF	①Radar input power abno-rmal, radar not power on. ②If the power is normal, radar was broken.	
8	Reset	Reset key	The device reset button enables the device to resto-re factory Settings. Open the valve on the device and press the reset button frequently with the stylus until the device restarts.		

2.2 Dimension

Note：
● The following dimension figures are for reference only. Unit: mm. Fig2-2 is for SMWR21A-P
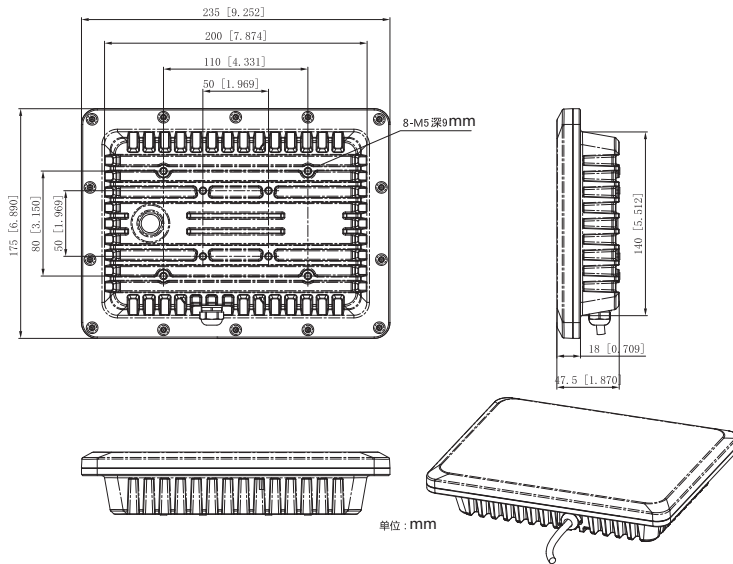

Fig. 2-3

2.3 Radar Installation Direction

The installation direction of radar is crucial to measurement accuracy Please make sure the installation direction is correct. The lateral view of the radar installation is shown in Figure 2-3.
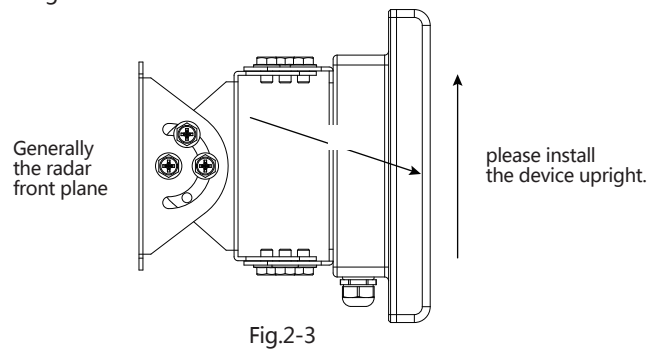

Generally the radar front plane

please install the device upright.

Fig.2-3

2.4 Installation Guide

① Radar is installed in front of the detection area and aligns with the center of alert area, as shown in Fig. 2-4.

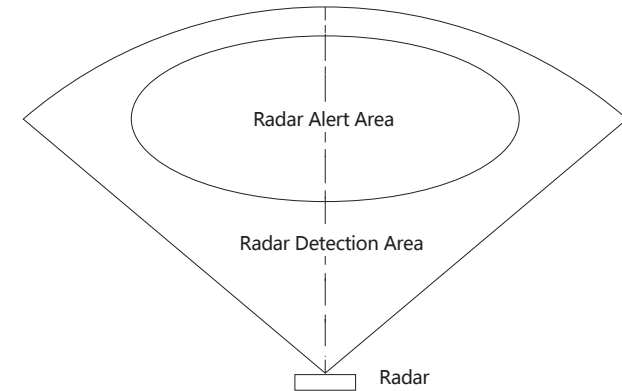Radar Alert Area

Radar Detection Area

Radar

Fig.2-4

② Generally, the radar antenna plane shall be installed vertical to alert area in order to guarantee the precision of the radar; besides, it needs to be installed at a certain height, which normally is recommended to be 1~3m.
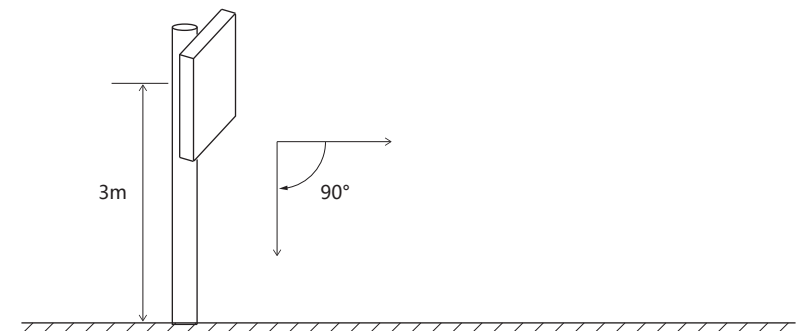

3m   90°

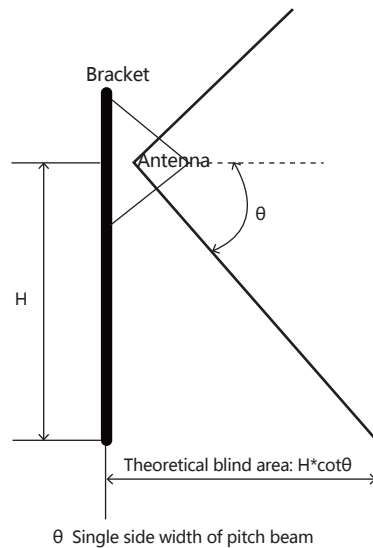Fig.2-5

Theoretical blind zone calculation formula：

θ Single side width of pitch beam

Fig.2-6

Measured blind area data：

Installation Height		Average Value		Remark
1.5m	Away	2.0	2.0	
	Near	1.5	1.5	
2m	Away	3.0	3.0	
	Near	1.5	1.5	
3m	Away	9.0	9.0	People with a height of 1.75m walk at normal speed
	Near	7.0	7.0	
4m	Away	16.0	16.0	
	Near	10.0	10.0	
5m	Away	20.0	20.0	
	Near	17.0	17.0	
6m	Away	24.0	24.0	
	Near	21.0	21.0	

Table2-2

③ Scene 1: Scene of the perimeter of the channel.like figure 2-7.
   ● Radar installation in the tested area ahead, radar normal alignment warning area center.
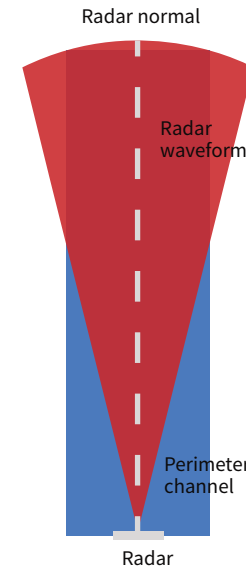

Fig.2-7   Fig.2-8
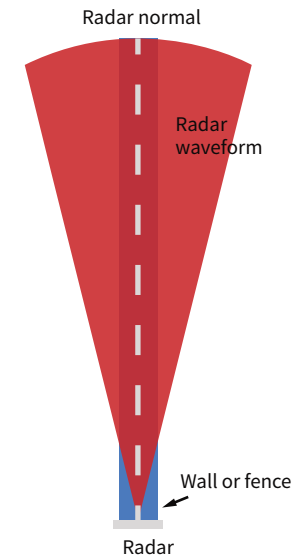
④ Scenario II: perimeter protection scenario (airport, terminal, etc.)like figure 2-8.
   ● Radar set up against the side of the fence, above position close to the wall or fence is best (above).
   ● The radar installation height is recommended to be 2 meters, which can be adjusted according to actual needs but not to exceed 6m.
Radar detection blind area is different for different installation heights, generally radar installation height no more than 3m or 4m is recommended; If the radar is installed directly above the fence, it is recommended that the radar installation height be between 0.5 and 1 meters directly above the fence.
The camera installation height be 3 to 6 meters.
   ● Radar installation of normal and parallel to the wall:
If the monitoring focus is on the inner side of the fence, shift the radar horizontal angle to the inner side of the fence by ≤5°.
If the monitoring focus is on the outside of the fence, shift the radar horizontal angle to the outside of the fence by ≤5°.

2.5 Bootup Description

Please refer to the Installation Guide to use the radar, connect the cable well according to port definition after completing installation. The radar will generate brief signal of the di sound fourth after powering on the system, which means the system is normally launched. Then you can read the protocol data from the Ethernet port.

3. Device Wiring and Connection

3.1 Device Wiring

Note：
●   The following figure which shows the device installation is for reference only. Please refer to the actual device wiring instruction for more details.
●   Please refer to below operation if network waterproof connector need to be installed(optional)
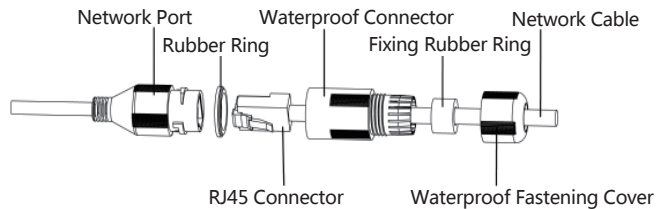Waterproof network connector(optional) is shown as Fig. 3-1

Fig.3-1

① Keep the convex groove outward and install the rubber ring into the network port
② with the smaller hole outward and install the fixing rubber ring into the main body of the waterproof connector.
   After pulling the network cable without crystal head through main body of waterproof connector, fixing rubber ring and fastening waterproof cover, make the crystal connector of network cable and then insert it into the network cable.
③ Rotate the waterproof connector to lock it with network port and well connected.
④ Rotate the waterproof cover to lock with waterproof connector to make sure they are firmly connected.

3.2 Device Connection

Before your radar connection:
①Make sure your radar and computer are connected to the same LAN.
②Make sure your computer and device are on the same subnet (192.168.10.xx).
③Radar factory default IP: 192.168.10.123, web client radar login user name: admin; password: admin
CMS Management software" provided is able to acquire and parse the SMWR21A-P sensor data with intuitive parameters and tracking path, which is great help for the sensor operation.
Please contact supplier customer service for CMS SETUP(PC test software) and its user manual. Installation and configuration of the software shall subject to the user manual.
Test steps as follows:
① Test equipment required is shown as table 3-1 :

No.	Device Name	Qty
1	SMWR21A-P radar sensor	1
2	PC	1
3	12V DC	1
4	CMS	1

Table3-1

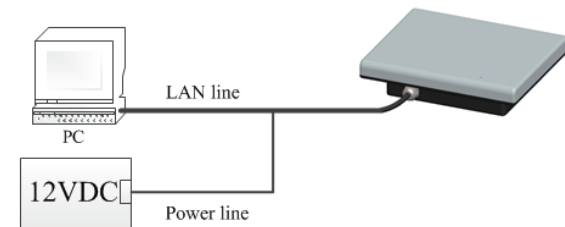② Connect PC and SMWR21A-P radar sensor as shown in figure3-2:

Fig.3-2

After power on, SMWR21A-P will generate sounds like "di" for two times and "didi" after 30s, which means the radar sensors are ready to work. The radars also supports PoE power supply.

③ Start Test

Please correctly connect SMWR21A-P network cable with PC, and connect 12V DC, then bootup NSM Tools Management System User Manual for IP configuration details(Help).

3.3   Strobe Siren Connection

Strobe siren signal wires are to connect to radar alarm signal output, as the diagram 3-4:

Note：

● Radar alarm output is I/O relay type, please choose the right model & type strobe siren.

● When radar alarm output is set and saved, power on the radar, and connect the siren to radar, even if there is no PC server connection, the radar still works to trigger the siren for intrusion protection.

LAN Line

PC

POWER

12VDC

RS485

Alarm In

Alarm Out

Relay Out   Alertor
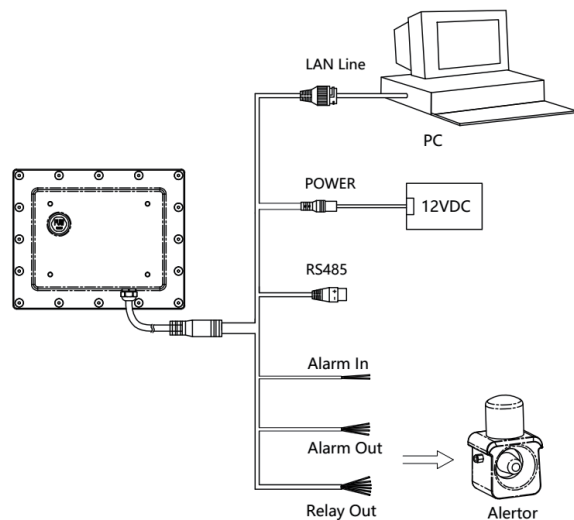
Note：
● Output channel 1=Alarm Ou 1、Output channel 2=Alarm Out2、
   Output channel 3=Alarm Out1、Output channel 4=Alarm Out2.
● Only in rusion inside the drawn alarm zone can trigger the strobe siren.
● Only when alarm zone is set up, the strobe siren will work, if no alarm zone is set

3.5 Strobe Siren

Please refer to siren operation manual.

4.   FAQ & Solutions

Table 4-1

Malfunction	Solution
No any response after power on	● Refer to the above radar LED indicator light status to check the radar working status. If it is abnormal, please report the problem description and LED status to the engineer of the manufacturer; ● Check if the buzzer gives off the sound "di" four times after power on. If not, please check if the polarity of radar power cable is correctly connected to 12V DC. The rada orking current SMWR21A-P is about 650mA.
Radar can't connect when power on	● Make sure the radar is normally powered on and the radar is normally activated, see above "No any response after power on"; ● Use THE NSM Tools tool to search the radar to find out if the device IP has been modified; ● Check if the PC local add radar IP segment; ● PC terminal ping radar IP, check whether can ping radar.
Normal power supply but fail to detect target.	● Please refer to chapter2.3 and check if radar installation direction is correct. ● Use designated FMCW simulator to check if radar output is normal.
No target in the detection area but there is target signal output	● Please check if the radar installation position aims at the target area, which may cause the radar to be disturbed by the surrounding objects: ● Confirm if there is any vibration of pole where radar installed and check if GND is normal.
No alarm output to strobe siren	● Check if the alarm zone is drawn. (When intrusion into the zone can trigger alarming, target outside the zone can not trigger siren alarming.) ● Check if the radar can cover the alarm zone in distance range. ● If two points above are correct, then use multi-functional meter to gauge the two I/O signal output wires, by checking if it will sound alarming on the buzzer mode. When there is intrusion target in pre-set alarm zone, the radar is in well condition if the meter sounds alarming. Then check the siren if it works or its type not matching. When there is intrusion target in pre-set alarm zone, the radar could has issue if the meter does not sound any alarming.

Note：   Fig.3-4
● Please make sure the installer conform to the radar instal ation instruction.

Maintenance Service

Dear Customer :

Thank you for using this product. To guarantee you perfect enjoying after-sales service support, please read the warranty certificate carefully after purchase.

1. Users enjoy free maintenance within the warranty time and maintenance services with discount out of warranty period under proof of this warranty certificate.

2. Replacement due to quality problems within 7 days since the purchase date is available. The warranty period is 1 years.

3. Priority to access for new product information or promotions opportunities.

4. Product failure resulted from following conditions is not covered by the warranty:
   - Can not show valid warranty certificate and purchasing invoice or payment receipt
   - Product failure resulted from application environment or conditions, such as power failure, improper ambient temperature, humidity, lightning,etc.
   - Product failure due to accident, negligence, disaster, improper operation, cyber attack, etc.
   - Failure or damage caused by the installation, repair, alteration or disassembling of maintenance - personnel not authorized by the supplier.
   - Product out of warranty period.

5. If any objection to the technical service provided by the distributor, user can complaint to the manufacturer's customer service center.

6. Warranty card is valid with stamp of maintenance agent.