LSD102A Laser Radar Manual

TIANJIN G-TEK SENSOR TECHNOLOGY CO.,LTD

V1.3

1、Product Summary

1.1 Features

- Aluminum alloy casting shell, strong structure and light weight, easy for installation;

- Grade 1 laser is safe to people eyes;

- 50Hz scanning frequency satisfy the high-speed detection demand;

- Internal integrated heater ensures the normal operation in low temperature;

- Self-diagnosis function ensures the normal operation of the laser radar;

- The longest detection range is up to 50 meters;

- The detection angle:190°;

- Dust filtering and anti-light interference, IP68, fit for outdoor use;

- Be independent of external light source and can keep good detection state at night;

- CE certificate

1.2 System components

The basis system of LSD1XXA is consisted of one LSD1XXA laser radar, one power cable（Y1）, one communication cable（Y3） and one PC with debugging software 。
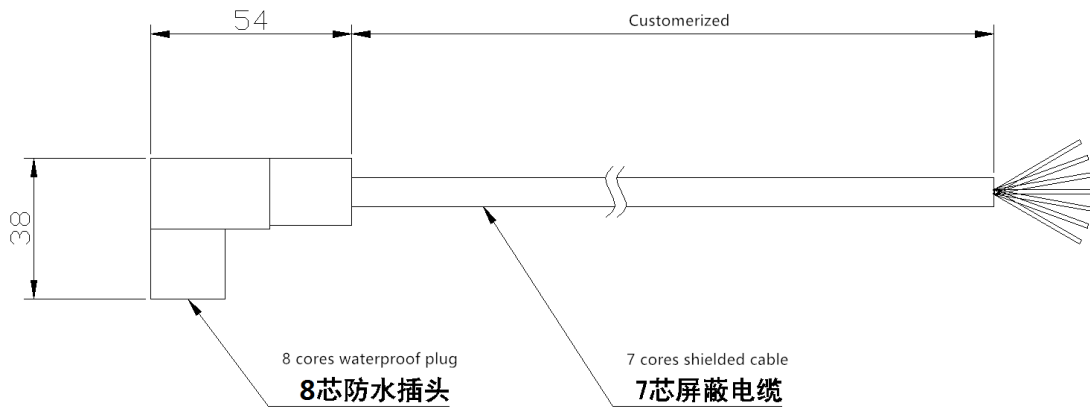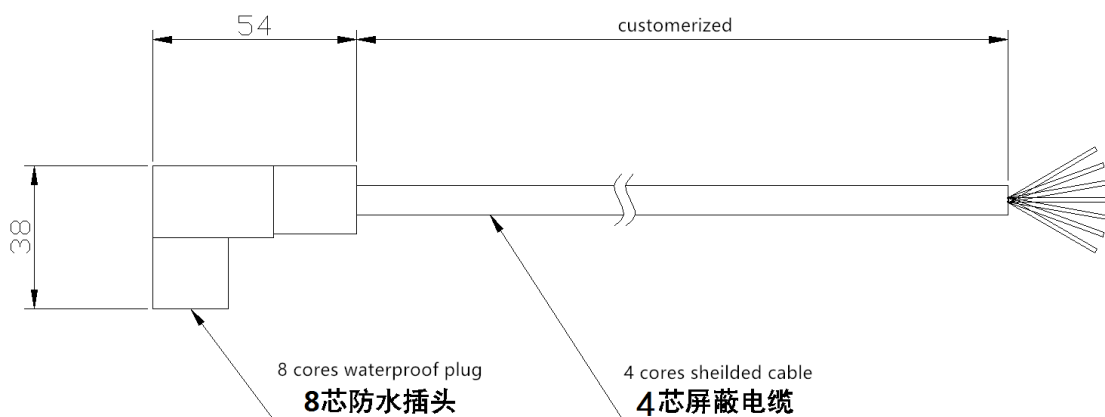
1.2.1 LSD1XXA
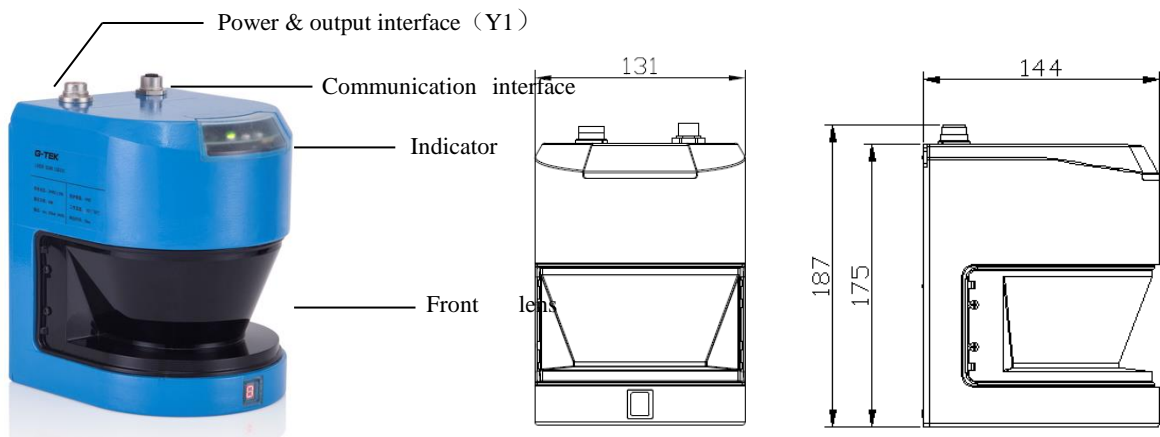
No	Components	Instruction
1	Logic interface（Y1）	Power and I/O input cables are connected with radar by this interface
2	Ethernet interface（Y3）	Ethernet communication cable are connected with radar by this interface
3	Indicator window	System operation, Fault alarm and system output three indicators
4	Front lens cover	Emitting and receiving light beams realize the scanning of objects by this lens cover

1.2.2 Power cable
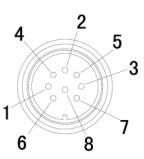
1.2.2.1 Cable diagram

8 cores waterproof plug
8芯防水插头

7 cores shielded cable
7芯屏蔽电缆

7 cores power cable

8 cores waterproof plug
8芯防水插头

4 cores sheilded cable
4芯屏蔽电缆

4 cores power cable

1.2.2.2 Cable definition
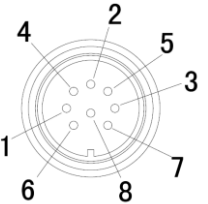
7-cores power cable：

Pin	Terminal No	Color	definition	Function
	1	Blue	24V-	Negative input of power supply
	2	Black	HEAT-	Negative input of heating power
	3	White	IN2/OUT1[1]	I/O input / NPN output port 1 （same to OUT1）
	4	Brown	24V+	Positive input of power supply
	5	Red	HEAT+	Positive input of heating power
	6	Green	NC/OUT3[1]	I/O input / NPN output port 3 （same to OUT1）
	7	Yellow	INI/OUT2[1]	I/O input / NPN output port2 （same to OUT1）
	8	NC	NC	-

Note[1]：For LSD102A、LSD131A、LSD151A, this port is NPN output port（open collector），there will be low lever output when object is detected at the detection area.

For LSD121A, LSD151A, this port is I/O input port, When the input is suspended or connected to low, it is identified as high level and output as "0" in the communication protocol.

4-cores power cable：

Pin	Terminal No	Color	definition	Function
	1	Blue	24V-	Negative input of power supply
	2	White	HEAT -	Negative input of heating power
	3	NC	NC	Blank
	4	Brown	24V+	Positive input of power supply
	5	Yellow	HEAT+	Positive input of heating power
	6	NC	NC	Blank
	7	NC	NC	Blank
	8	NC	NC	Blank

1.3.3 Communication Cable

1.3.3.1 Communication cable
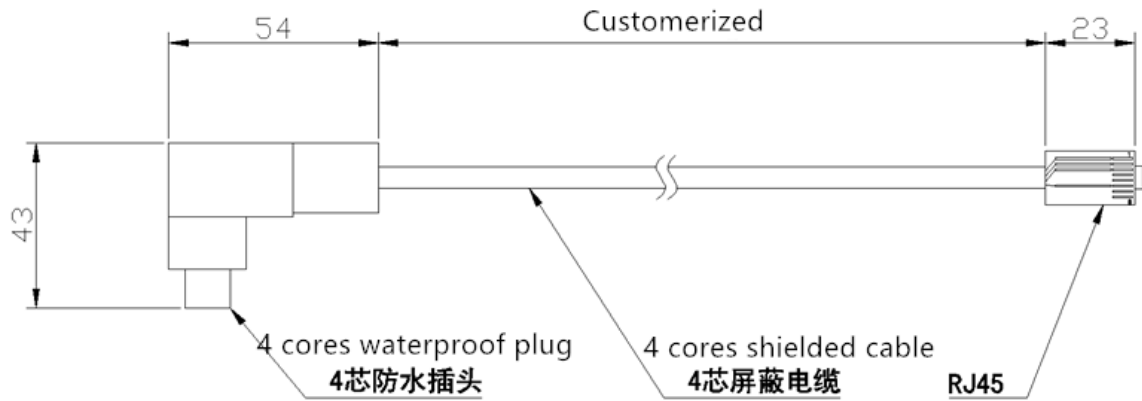
1.3.3.2 Cable definition

| Pin	No	Color	Definition	Function	No	RJ45
4 1 3 2	1	Orange white	TX+E	Ethernet data sending	1	1 8
	2	Green white	RX+E	Ethernet data receiving	3	
	3	Orange	TX-E	Ethernet data sending	2	
	4	Green	RX-E	Ethernet data receiving	6	

1.3.4 PC

The following figure is an example of PC test. For the specific operation o please refer to "LSD1xx PC instructions"
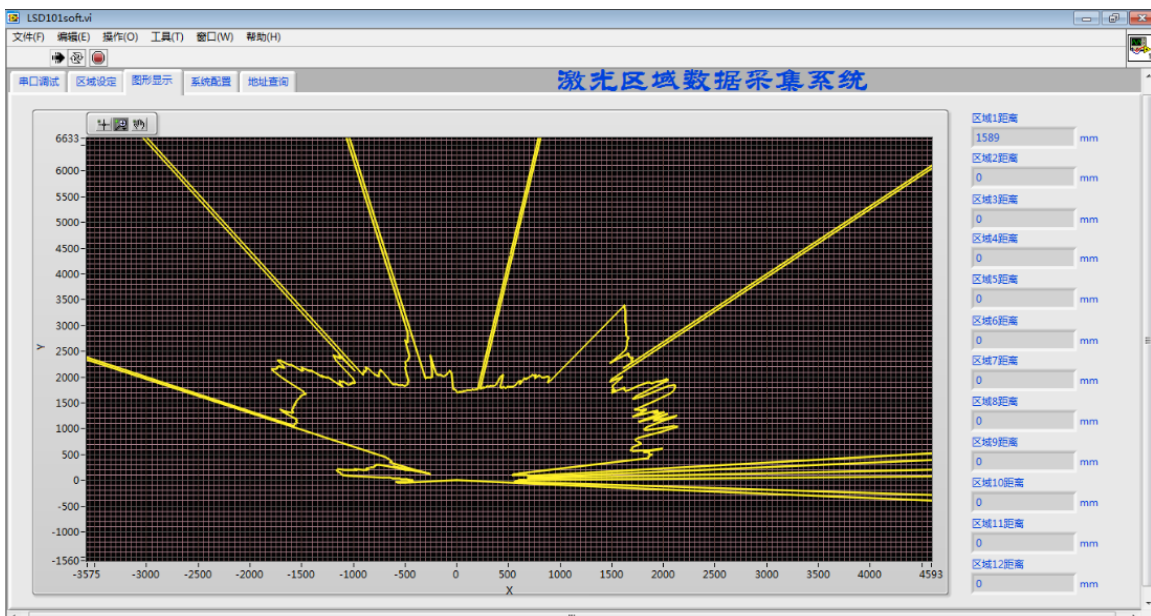
2、Product Specification

2.1 Model instruction

<div style="text-align:center">

L S D 1 X 1 X X

① ② ③ ④ ⑤ ⑥⑦ ⑧

</div>
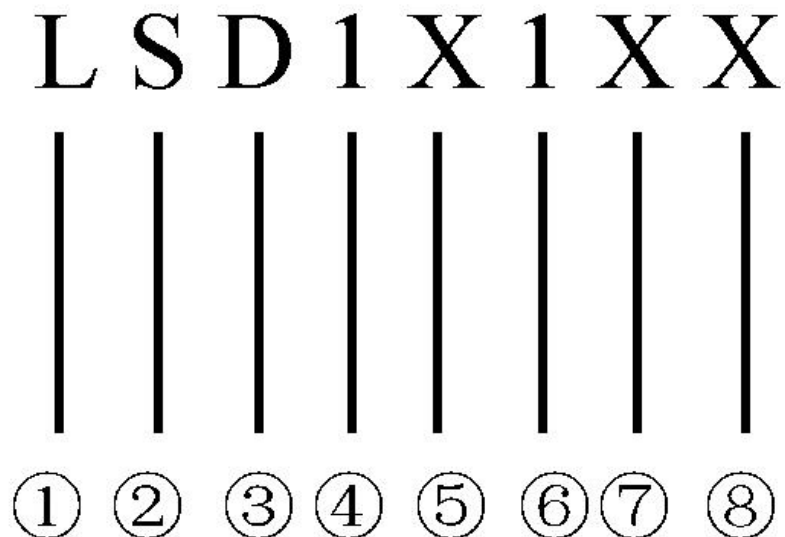
①、Laser

②、Scan

③、Detector

④、Product version

⑤、Function ：

　　0：Basic function

　　1：Axle recognition

　　2：Input function

　　3：Width & Height measurement

　　5：Long-distance

⑥、Firmware version

⑦、Communication interface：

　　A：Ethernet

　　B：Serial

⑧、Application：

　　1：Highway......

　　2：Source overload control......

2.2 Technical parameter

| Model	LSD102A
Supply voltage	24VDC±20%
Power	＜60W， Normal working current <1.5A，Heating <2.5A
Data interface □	Ethernet，10/100MBd，TCP/IP
Response time	20ms
Laser wave	905nm
Laser grade	Grade 1（safe to people eyes）
Anti-light interference	50000lux
Angle range	-5° ～ 185°
Angle resolution	0.25°
Distance	0~50m
Measurement resolution	5mm
Repeatability	±10mm
Output function	NPN 24V
Dimension	131mm × 144mm × 187mm
Protection rating	IP68
Work/storage temperature	-30℃ ～+60℃ /-40℃ ～+85℃

2.3 Characteristic curve
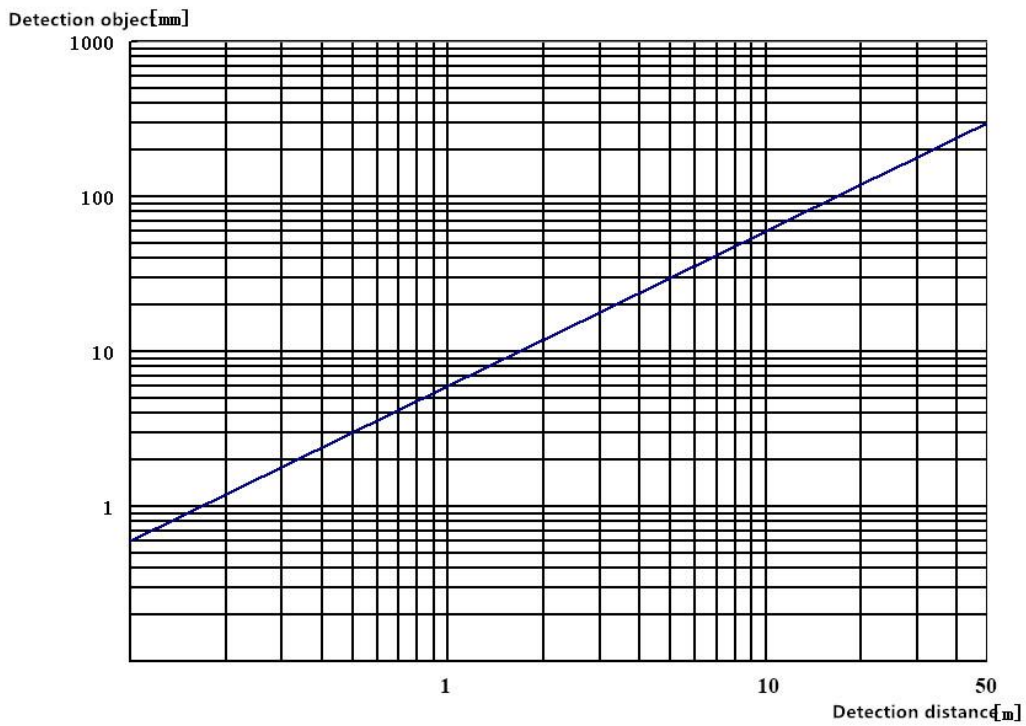
Relationship curve between detection object and distance
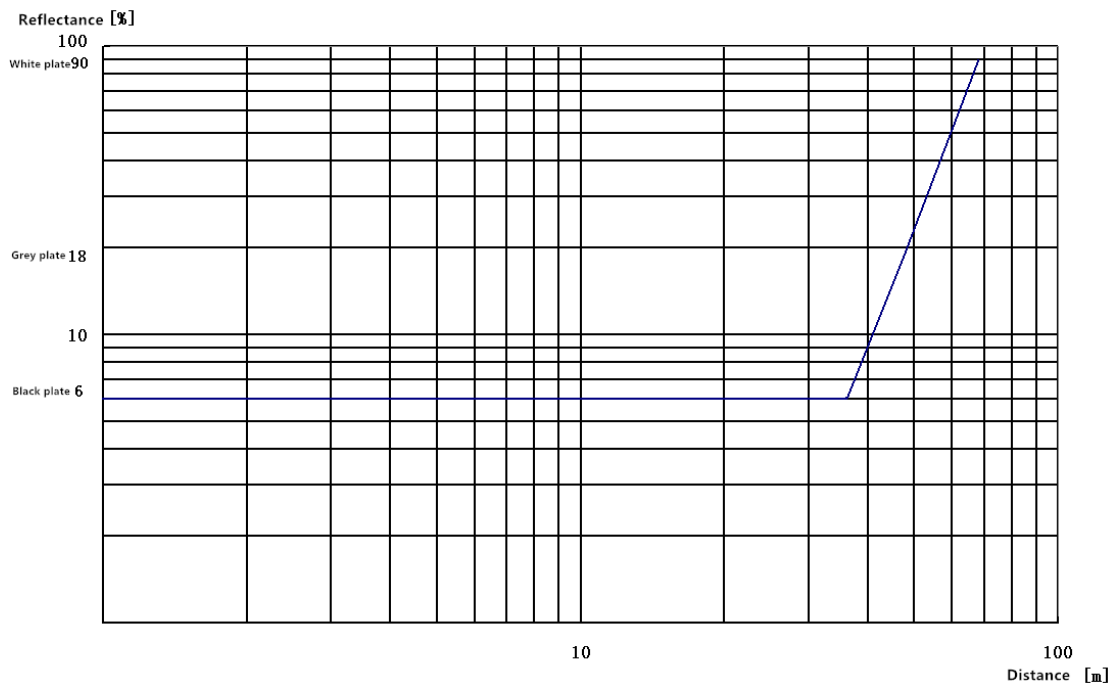
Relationship curve between detection object reflectance and distance
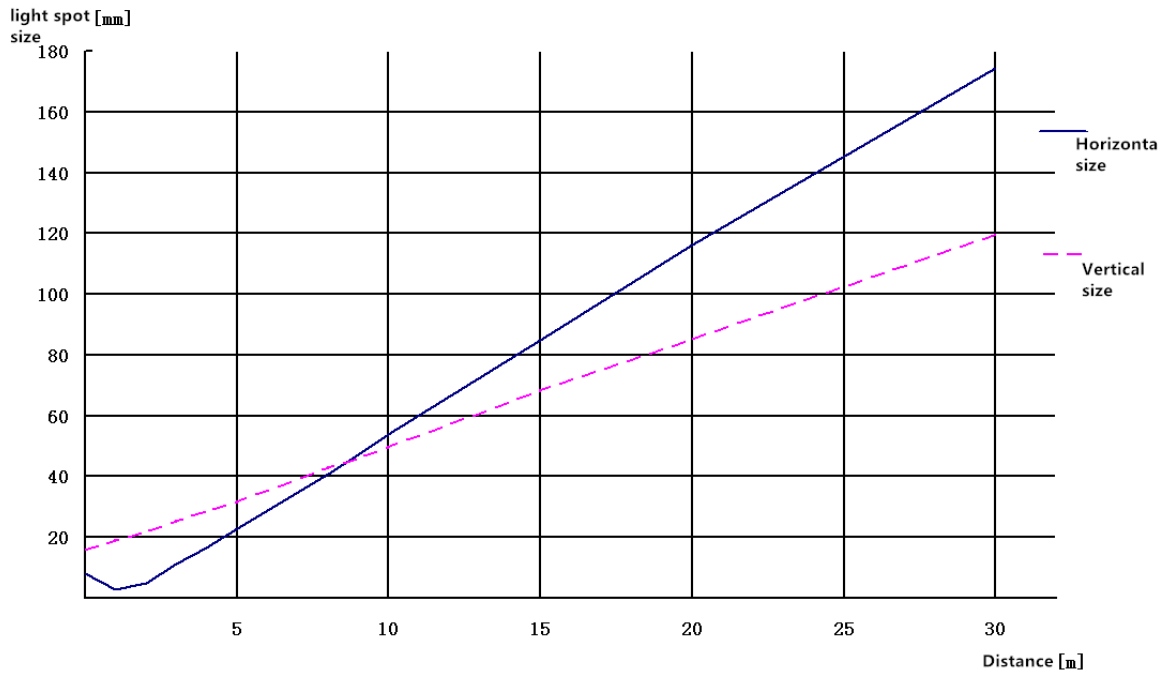
Relationship curve between light spot size and distance

3、Electrical connection

3.1 Output interface definition
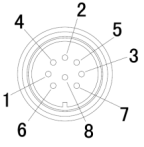
3.1.1 Function description

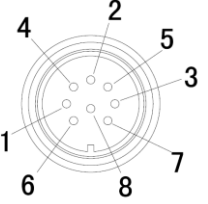| No	Interface	type	Function
1	Y1	8 pin sockets	Logical interface：1. Power supply 2. I/O input（apply toLSD121A） 3. Heating power
2	Y3	4 pin sockets	Ethernet interface： 1．Measurement data sending 2. Reading of sensor port setting, area setting and. fault information

3.1.2 Interface definition
3.1.2.1 Y1 interface
7-cores interface cable：
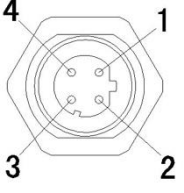
Pin	No	Color	Signal definition	Function

Pin	No	Color	Signal definition	Function
	1	Blue	24V-	Negative input of power supply
	2	Black	HEAT-	Negative input of heating power
	3	White	IN2/OUT1[①]	I/O input / NPN output port 1（same to OUT1）
	4	Brown	24V+	Positive input of power supply
	5	Red	HEAT+	Positive input of heating power
	6	Green	NC/OUT3[①]	I/O input / NPN output port 3（same to OUT1）
	7	Yellow	INI/OUT2[①]	I/O input / NPN output port2（same to OUT1）
	8	NC	NC	-

Note ①：For **LSD101A**   this port is NPN output port（open collector），there will be low lever output when object

is detected at the detection area.

4-cores interface cable：

Pin	No	Color	Signal definition	Function
	1	Blue	24V-	Negative input of power supply
	2	White	HEAT -	Negative input of heating power
	3	NC	NC	Blank
	4	Brown	24V+	Positive input of power supply
	5	Yellow	HEAT+	Positive input of heating power
	6	NC	NC	Blank
	7	NC	NC	Blank
	8	NC	NC	Blank

3.1.2.2   Y3 interface definition

Pin	No	Color	Signal definition	Function
	1	Orange white	TX+E	Ethernet data sending
	2	Green white	RX+E	Ethernet data receiving
	3	Orange	TX-E	Ethernet data sending
	4	Green	RX-E	Ethernet data receiving

3.2 Wiring

3.2.1 LSD102A Switching output wiring（7 cores power cable）
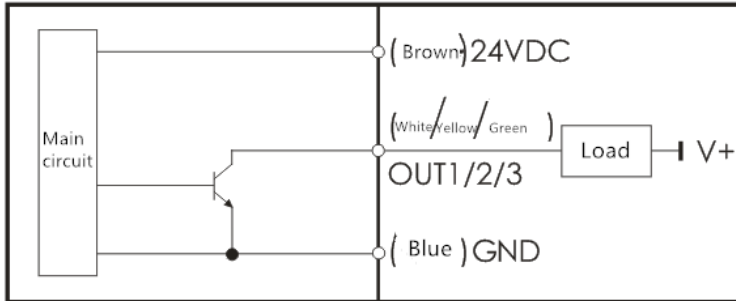
Note：

When the switch output line is not used, it shall be suspended or grounded, and it shall not be short circuited with the power supply directly；

●**V + is not more than 24VDC voltage, and must be grounded together with 24VDC.**

4、Function and application

4.1 Function

The main functions of LSD1XX A series products are distance measurement, input setting, and comprehensive judgment of vehicle entry and exit process and dynamic separation of vehicles by measuring vehicle width and height information. LSD1XX A series radar is connected to the upper computer through Ethernet cable, and the data graphs and measurement data can be displayed through the upper computer software.

4.2 Measurement

4.2.1 Distance measurement（Apply to LSD102A、LSD121A、LSD105A、LSD151A）

After the radar is powered on and passes the system self-test, it starts to measure the distance value of each point within the range of - 5 °～ 185 °, and output these values through the Ethernet interface. The default measurement data is 0-528 groups, corresponding to the distance value in the range of - 5 °～ 185 °, which is in hexadecimal format, and the unit is mm. For example:

Fault report

Receive data frame ： 02 05 00 FE 00 FE 19 FE DB FE 01 02 F9 02 DE 02 E5 02 DE 02 E5 02 E5 02

EC 02 EC 02 F3……..

Corresponding distance value：

Date：02 F9   02 DE   02 E5   02 DE   02 E5   02 E5   02 E5   02 EC   02 EC   02 F3。。。

Angle and distance information corresponding to data：-5°761mm，-4.64°734mm， -4.28°741mm ，

-3.92°734mm , -3.56°741，-3.20°741mm， -2.84°741mm，-2.48°748mm，

-2.12°748mm， 1.76°755mm。。。

5、Status indicator

Mark	Indicator	color	Description
(run)	Operation indicator	Green	Normally, the light flashes at a certain frequency; otherwise, the light keep on or off.
(⚠)	Fault alarm indicator	Yellow	In case of system failure, the light keep on; otherwise, the light is off.
(ossod)	System output	Red	When the power on is while not complete the background gathering, the light keep on ; when it is completed, the light turn off。

6、Communication Port setting

6.1 Default Port setting

LSD1XXA Ethernet interface factory default settings ：

IP ： 192.168.80.6   Interface No：6008

6.2 Port settings change

If you need to change the port IP address or port number, you can connect the upper computer with Ethernet and change it through the upper computer software. The login permission can only be changed when it is a technician (user name: admin, password: gtek2017).。

6.2.1 Change through system configuration

It can be modified in the [system configuration] dialog box in the upper computer software, and the specific. operation is shown below：

6.2.2 Change by sending command

You can also change the IP address and port number by sending a command, as follows：

The communication setting start character is：0x02，0x57，0x03，The command format is as follows：

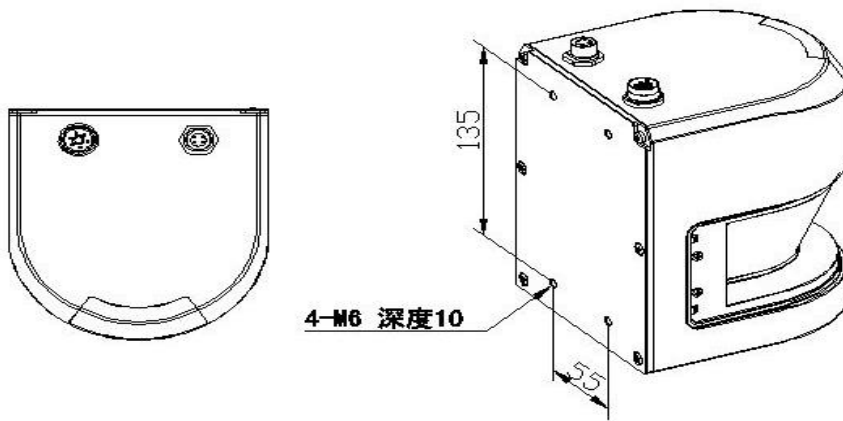| Description	Start	Ip1	Ip2	Ip3	Ip4	Port 1	Port 2	End
Bytes	4 bits	1	1	1	1	1	1	1
Value	0x02,0x43,0x54,0x20	Default 0xc0	Default 0xA8	Default 0x50	Default 0x06	Default 0x17	Default 0x78	0x03

6.3 Communication Protocol

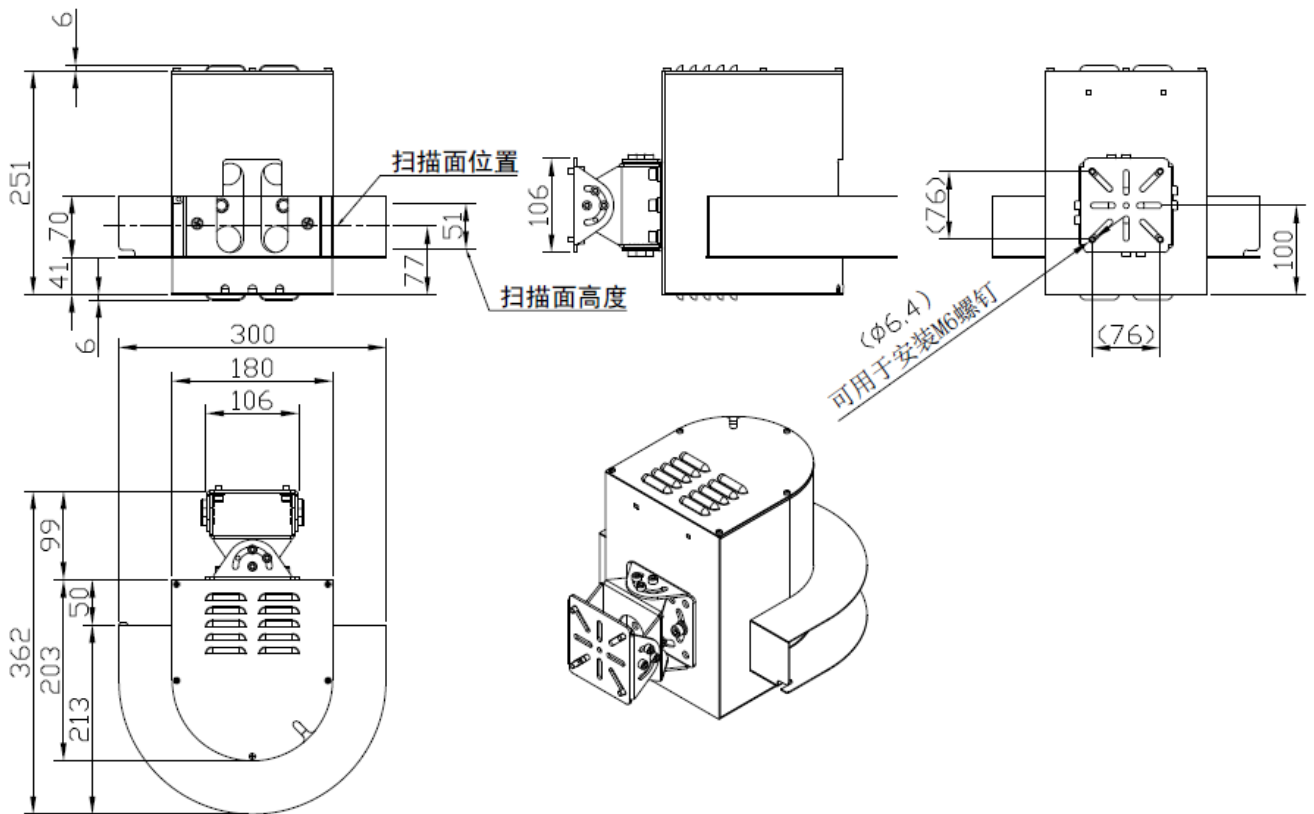See "LSD1xxA Ethernet communication protocol" for details.（AS per files）

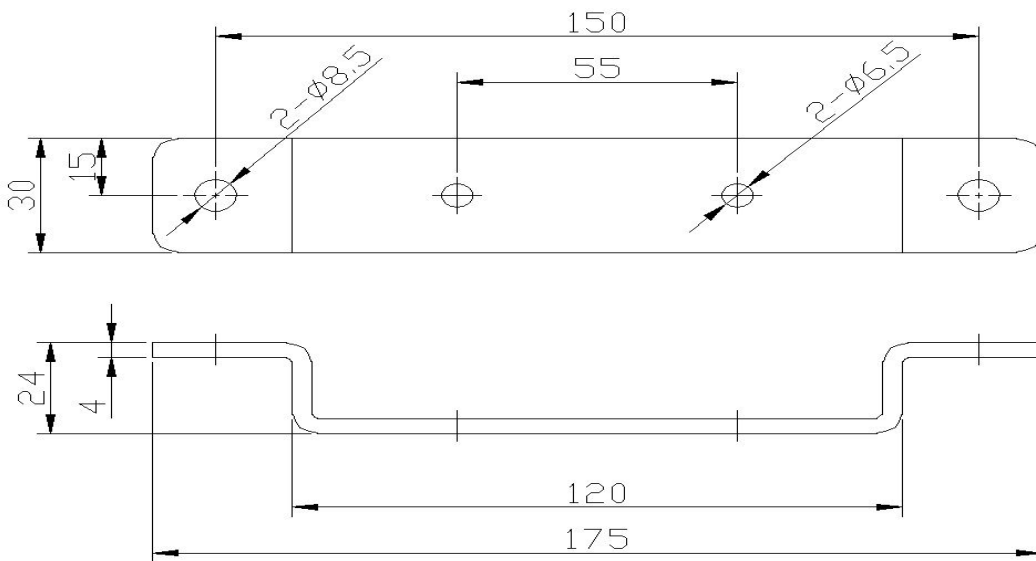## 7、Mechanical dimension

7.1 LSD 1xxA outline dimension drawing

4-M6 深度10
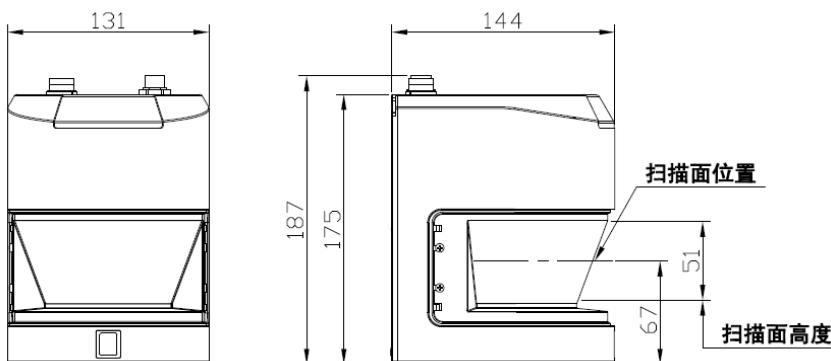
7.2 Overall dimension of protective cover

扫描面位置
扫描面高度
(φ6.4)
可用于安装M6螺钉

7.3 Outline dimension type B bracket
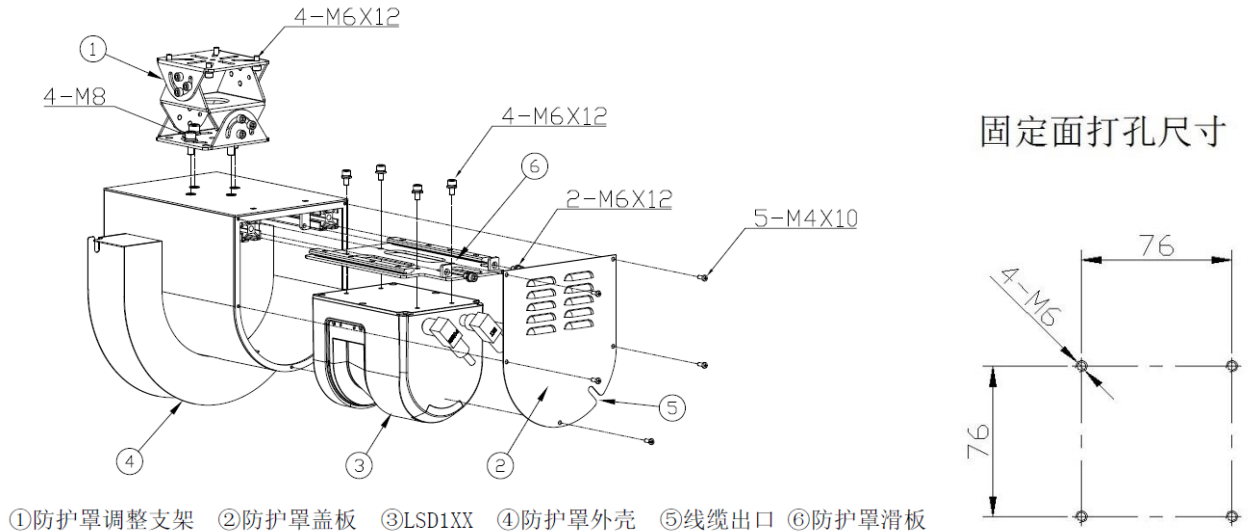

8、Installation

8.1 Installation precautions

- In the outdoor working environment, the lnd1xx should be installed with a protective cover to avoid the internal temperature of the sensor rising rapidly due to direct sunlight。

- Do not install the sensor with over vibrating or swinging objects。

- Lnd1xx shall be installed away from the environment with moisture, dirt and danger of sensor damage。

- In order to avoid external light source such as sunlight, incandescent lamp, fluorescent lamp, strobe lamp or other infrared light source, such external light source shall not be within ±5 °of the detection plane。

- When installing the protective cover, adjust the direction of the protective cover and ensure it is in face of the lane, otherwise it will affect the accuracy of measurement

- The rated current of single radar power supply shall be ≥ 3A（24VDC）。

- The same kind of light source interference shall be avoided. When multiple sensors are installed at the same time, the following installation methods shall be followed

  a. Install isolation plate between adjacent sensors。

  b. Adjust the installation height of each sensor so that the detection plane of each sensor is not within ±5 degrees of each other's detection plane。

c. Adjust the installation angle of each sensor so that the detection plane of each sensor is not within ±5 degrees of each other's detection plane。

8.2 Installation method

8.2.1 Installation method of A-bracket

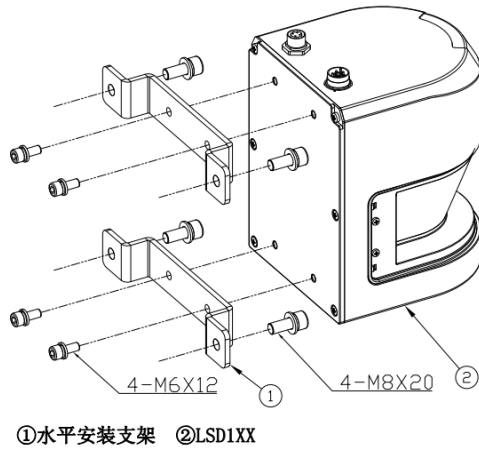①防护罩调整支架　②防护罩盖板　③LSD1XX　④防护罩外壳　⑤线缆出口　⑥防护罩滑板

8-1 **A-bracket installation**　　　8-2 **A-bracket fix surface drilling dimension**

Installation steps：

1、Use 4 M6 × 12 screws through 4 threaded holes on the back of ③ LSD1xxA to fix ③ LSD1xxA to ⑥ shield sliding plate.

2、Put the cable through the outlet of the ⑤ cable and the cover hole on the ④ protective cover shell, and reserve the appropriate length. Use the binding hole on the ④ protective cover shell to fix the cable with the binding wire。

3、Push the combination of ⑥ shield sliding plate and ③ LSD1xxA to the end along the chute in ④ shield housing, and fix the ⑥ shield sliding plate to ④ shield housing with two M6 × 12 screws。

4、After connecting the cable to ③ LSD1xxA, reel the cable。

5、Use 5 M4 × 10 screws to fix ② cover plate of protective cover to ④ shell of protective cover。

6、Use 4 M6 × 12 screws to install ① adjusting bracket of protective cover onto ④ housing of protective cover。

7、Use 4 M8 screws to install the ① protective cover adjusting bracket on the desired fixing surface, and see Fig. 8-2 for the drilling dimension。
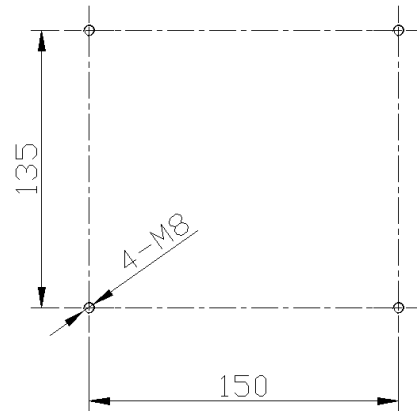
8、Loosen the adjusting bracket screw of ① protective cover, adjust the protective cover to the desired position, and then fasten the adjusting bracket screw of ① protective cover。

8.2.2 Installation method of B-bracket

固定面打孔尺寸

①水平安装支架 ②LSD1XX

8-3 **B-bracket installation**   8-4 **B-bracket fix surface drilling dimension**

Installation steps：

1、Use 4 M6 × 12 hexagon socket head cap screws (ammunition distribution and flat pad) to fix the ① horizontal mounting bracket to LSD1xxA through the 4 threaded holes on the back of LSD1xxA.

2、Use four M8 × 20 hexagon socket head cap screws (ammunition distribution and flat pad) to install the ① horizontal mounting bracket on the desired fixing surface. See 8-4 for the drilling dimension.

9 Trouble codes and troubleshooting

9.1 Trouble codes

No	Trouble	Description
001	Parameter configuration fault	Configuration of machine working parameters through upper computer is incorrect
002	Front lens cover fault	The cover is polluted or damaged
003	Measurement reference fault	The measurement data of bright and dark reflectors inside the machine is incorrect
004	Motor fault	The motor does not reach the set speed, or the speed is unstable
005	Communication fault	Ethernet communication, measurement data transmission blocked or disconnected

006	Output fault	Output short circuit or off

9.2 Troubleshooting

9.2.1 Parameter configuration fault

Reconfigure the working parameters of the radar through the upper computer and transmit them to the machine。

9.2.2 Front lens cover fault

The front mirror cover is an important part of LSD1xxA. If the front mirror cover is polluted, the measurement light will be affected, and the measurement error will be large if it is serious. Therefore, the front mirror cover must be kept clean. When the front mirror cover is found dirty, please use a soft cloth dipped with neutral detergent to wipe in the same direction. When there are particles on the front mirror cover, blow them off with gas first, and then wipe them to avoid scratching the mirror cover.

9.2.3 Measurement reference fault

The measurement reference is to verify whether the measurement data is valid. If there is a fault, it means that the measurement data of the machine is not accurate and cannot be used any more. It needs to be returned to the factory for maintenance.

9.2.4 Motor fault

Failure of the motor will cause the machine to fail to scan for measurement or result in inaccurate response time. Need to return to factory for maintenance。

9.2.5 Communication fault

Check the communication cable or machine failure

9.2.6 Output fault

Check the wiring or machine failure

Appendix I Instructions for testing upper computer

LSD test upper computer is used for communication between LSD laser area sensor and PC. The software is compatible with the data receiving, display and parameter setting functions of LSD102A, LSD121A, LSD131A, LSD151A and other models of products.

一、Communication instructions

Data transmission based on TCP / IP protocol

二、Installation steps

  1、Enter folder：volume；

  2、Click the setup file to install the LSD test upper computer software；

  3、 During the installation, you can specify the directory of the installation program, and then click next to start the installation。

三、Instructions

  1、Start the radar and connect the communication line to the PC；

  2、Turn on the software and select the product model. If you need to change the product model, please turn off the software and turn it on again；
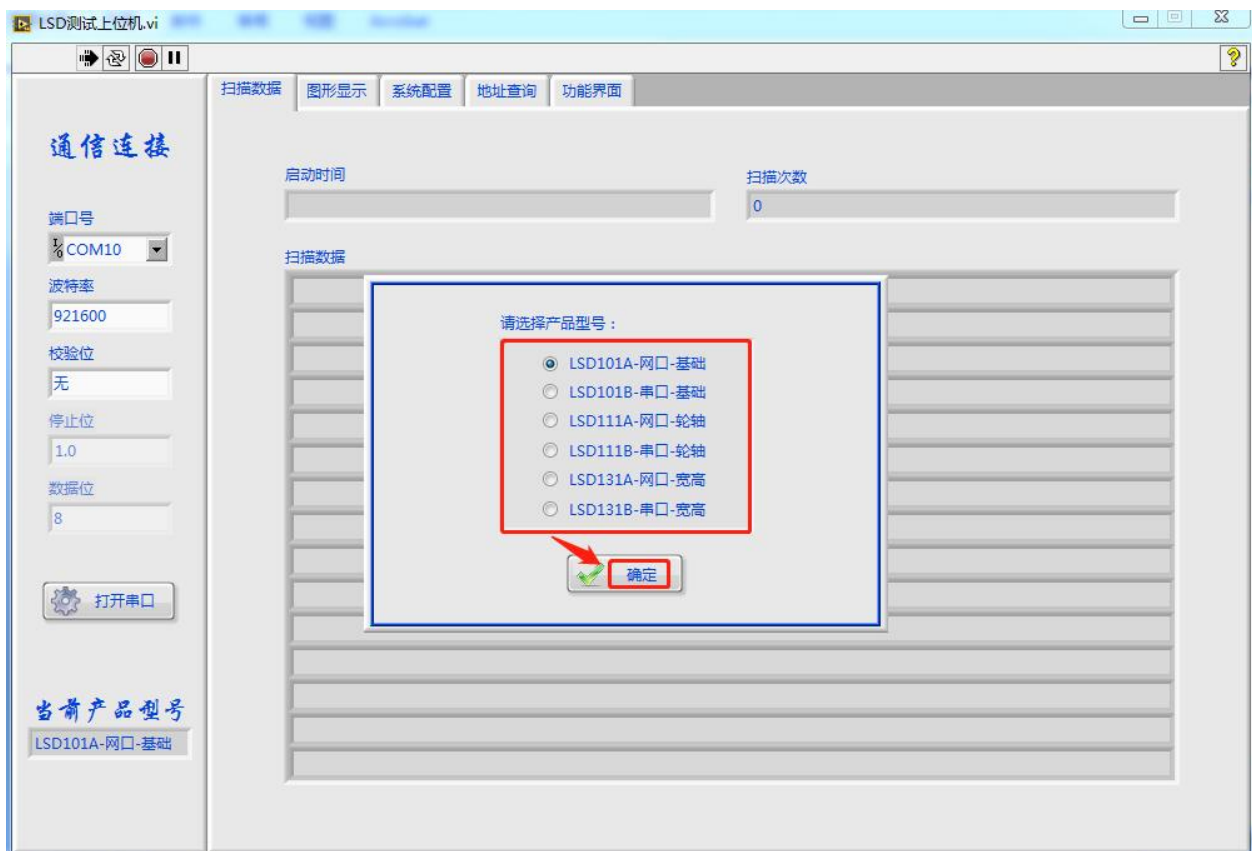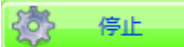

Diagram 1 Selecting product model

1)   Communication connection

    Change the first three segments of sensor IP address and the PC network port same as the sensor and establish

a communication connection, and if change is needed, click the upper left corner of the interface 🔴 or click

![⚙ 停止] to stop software, after revising the address or port No, click the upper left corner ⇨ to run the
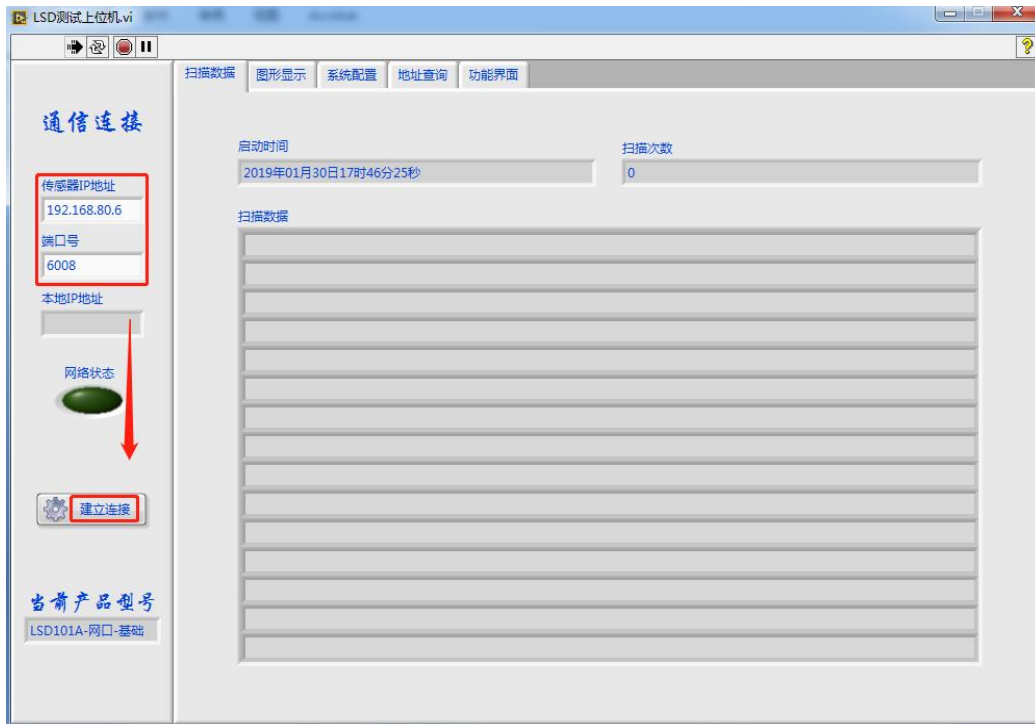
software

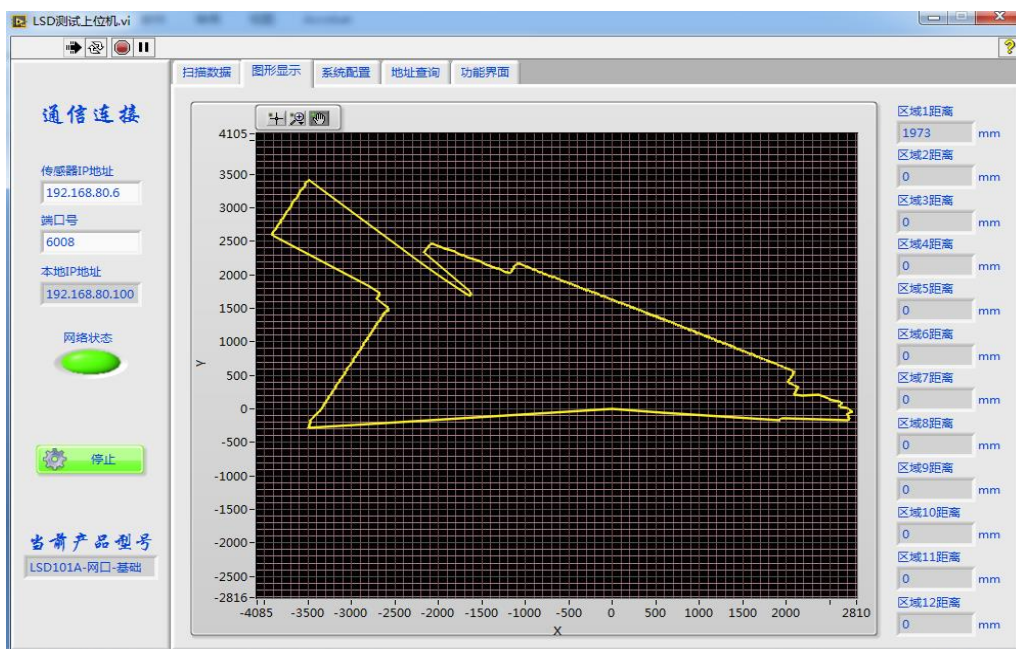Diagram 2 Network connection

2) Graphic display

Diagram 3 Graphic display

3) System configuration

Reading sensor address information: click "query system information" button to read the IP address, port number and MAC address of the sensor;

Modifying the sensor IP address: login user name "admin" and password "gtek2017" to modify the IP address and port number of the sensor, but after modifying the sensor address, you need to re-establish the communication connection between the PC and the sensor.
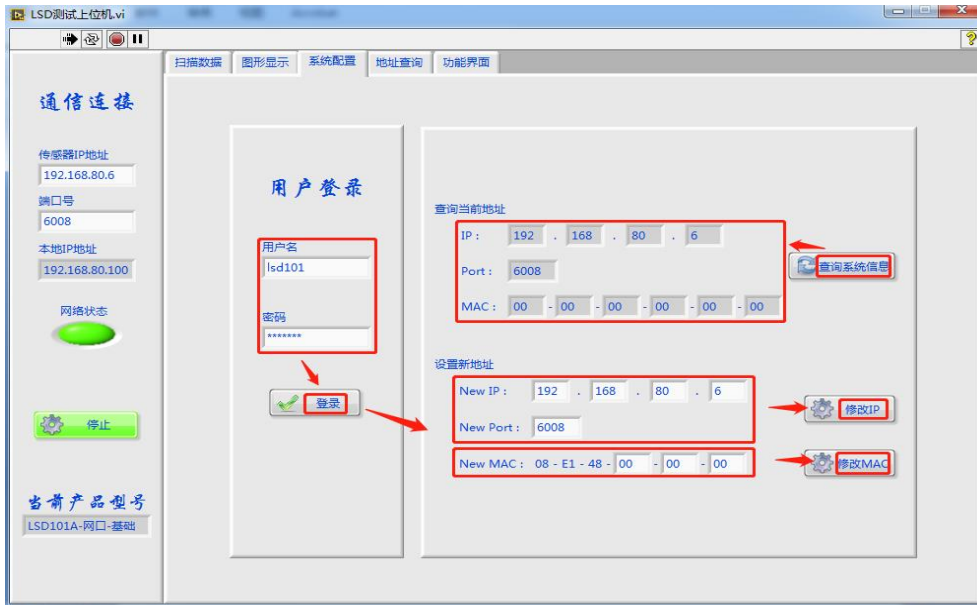

Diagram 4 Net port setting

4) Address query

When the fourth segment of the sensor IP address (for example, 123 in 192.168.0.123) is forgotten, click "address query" to quickly retrieve it.

Note: the IP address network segment and port number should be set in advance, and the PC network segment should be modified to be consistent at the same time.
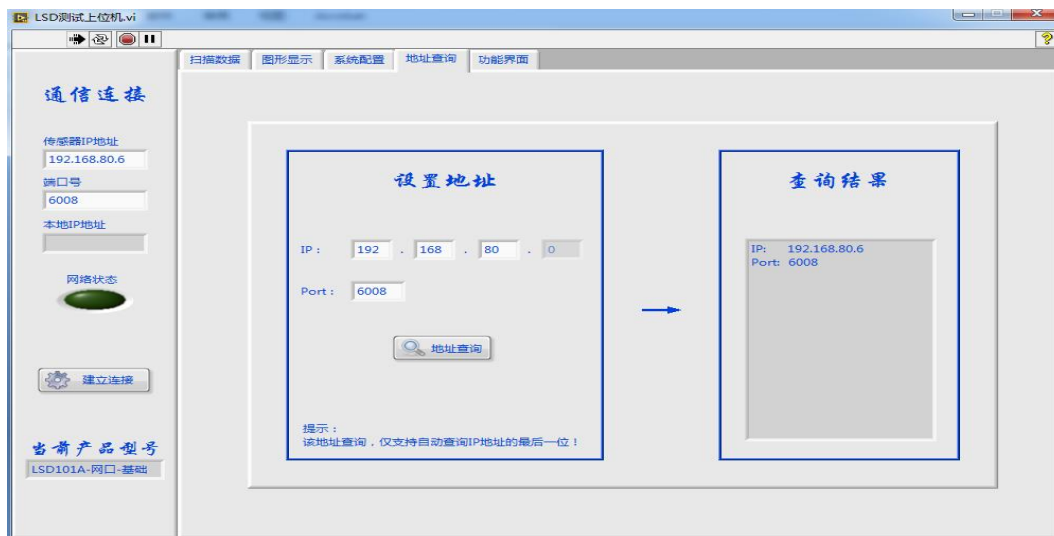

Diagram 5 Address query