LS74A

User Manual

V1.0.0   2024.10
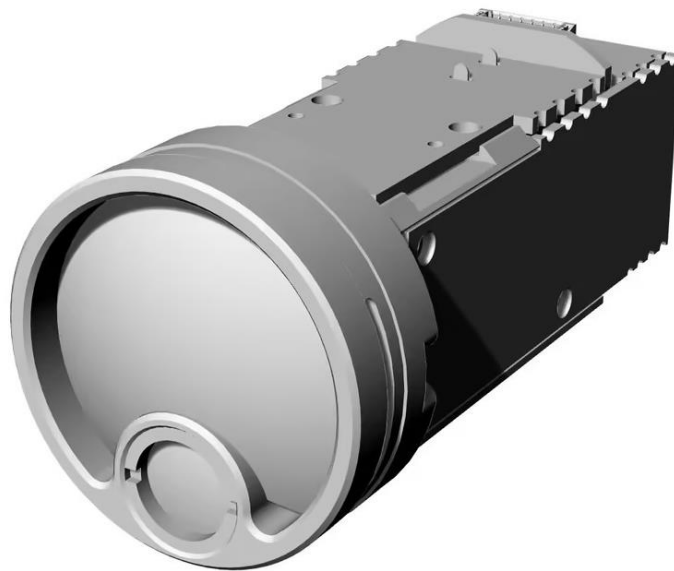
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Safety Instruction

Before using the product, please read and follow the instructions of this manual carefully, and refer to relevant national and international safety regulations.

ΔAttention

Please do not disassemble or modify the sensor privately. If you need special instructions, please consult our technical support staff.

ΔLaser Safety Level

The laser safety of this product meets the following standards:
- IEC 60825-1:2014
- 21 CFR 1040.10 and 1040.11 standards, except for the deviations (IEC 60825-1, third edition) stated in the Laser Notice No. 56 issued on May 8, 2019. Please do not look directly at the transmitting laser through magnifying devices (such as microscope, head-mounted magnifying glass, or other forms of magnifying glasses).

Eye Safety

The product design complies with Class 1 human eye safety standards. However, to maximize self-protection, please avoid looking directly at running products.

ΔSafety Warning

In any case, if the product is suspected to have malfunctioned or been damaged, please stop using it immediately to avoid injury or further product damage.

Housing

The product contains high-speed rotating parts, please do not operate unless the housing is fastened. Do not use a product with damaged housing in case of irreparable losses. To avoid product performance degradation, please do not touch the photomask with your hands.

Operation

This product is composed of metal and plastic, which contains precise circuit electronic components and optical devices. Improper operations such as high temperature, drop, puncture or squeeze may cause irreversible damage to the product.

Power Supply

Please use the connecting cable and matching connectors provided with the sensor to supply power. Using cables or adapters that are damaged or do not

meet the power supply requirements, or supply power in a humid environment may cause abnormal operation, fire, personal injury, product damage, or other property loss.

Light Interference

Some precise optical equipment may be interfered with by the laser emitted by this product, please pay attention when using it.

Vibration

Please avoid product damage caused by strong vibration. If the product's mechanical shock and vibration performance parameters are needed, please contact us for technical support.

Radio Frequency Interference

The design, manufacture and test of this product comply with relevant regulations on radiofrequency energy radiation, but the radiation from this product may still cause other electronic equipment to malfunction.

Deflagration and Other Air Conditions

Do not use the product in any area with potentially explosive air, such as areas where the air contains high concentrations of flammable chemicals, vapours or particles (like fine grains, dust or metal powder). Do not expose the product to the environment of high-concentration industrial chemicals, including near evaporating liquefied gas (like helium), so as not to impair or damage the product function.

Maintenance

Please do not disassemble the LiDAR without permission. Disassembly of the product may cause its waterproof performance to fail or personal injury

1. Foreword

This manual describes the ranging mechanism, specification parameters, dimensions of mechanical structures and data format of LS74A. The product manual is updated with product technology upgrades. For the latest version, please contact the technical support of LSLiDAR.

1.1. Overview

The LS74A utilizes the TOF (Time of Flight) method and it can perform distance ranging at a fixed angle. It is designed to achieve a ranging accuracy of ± 1 m and a maximum ranging distance up to 1200 m. With such high performance, the LS74A mainly applies to scenarios such as building surveying, topographic mapping, environmental detection and military applications that require accurate distance measurement.

1.2. Mechanism

Based on the TOF (time of flight) methodology, the LS74A measures the distance between a target object and the sensor, by calculating the difference between the emission and return times of modulated laser. The laser emitter sends out the modulated pulse laser, and an internal timer starts timing(t_1). The laser encounters the target object, part of the energy returns. When the LS74A receives the return laser signal, the timer will stop timing(t_2). The formula for distance between the LS74A and the target object:
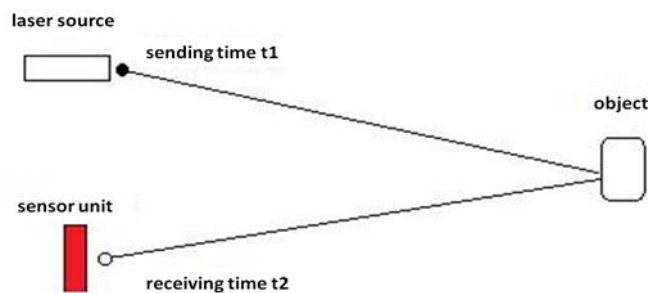
$$\text{Distance} = \text{Speed of Light}*(t_2 - t_1)/2$$

Figure 1.1 Mechanism of LS74A

1.3.   Specifications

Table 1.1 Specifications of LS74A

Module	Parameters	
Optical Properties	Ranging Distance	10~1200 m (@30%)
	Ranging Accuracy	± 1 m (1 σ)
	Frame Frequency	1 ~ 10 Hz (adjustable)
	Wavelength	905 nm
Electrical Properties	Power Consumption	≤1.5 W
	Operating Voltage	5~12 V
	Dimensions (L*W*H)	24*24*47 mm
	Weight	About 20 g
	Interface	Serial port-TTL
Operating Properties	Operating Temperature	-20℃~65℃
	Storage Temperature	-20℃~85℃

1.4.   Dimensions

Installation Requirements:

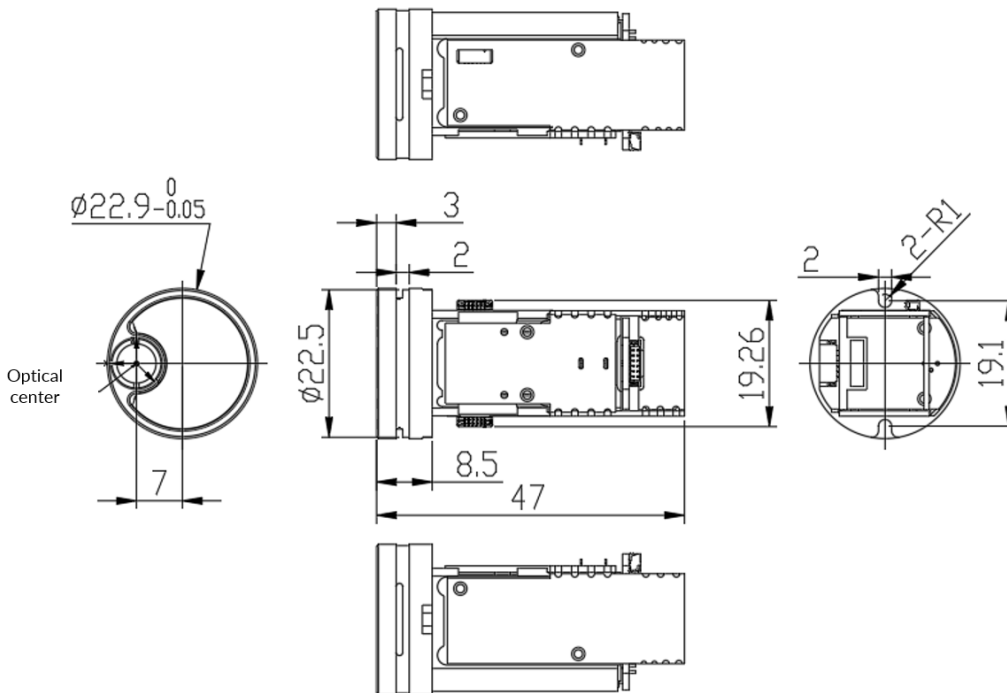It is required to install the LS74A through the holes on both sides.

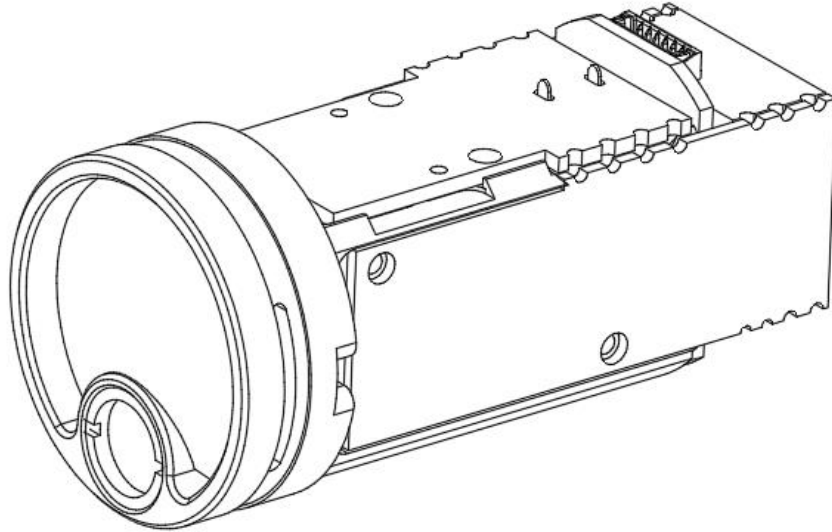Figure 1.2 LS74A Dimensions (unit: mm)

Figure 1.3 LS74A External View

2. Electrical Interface
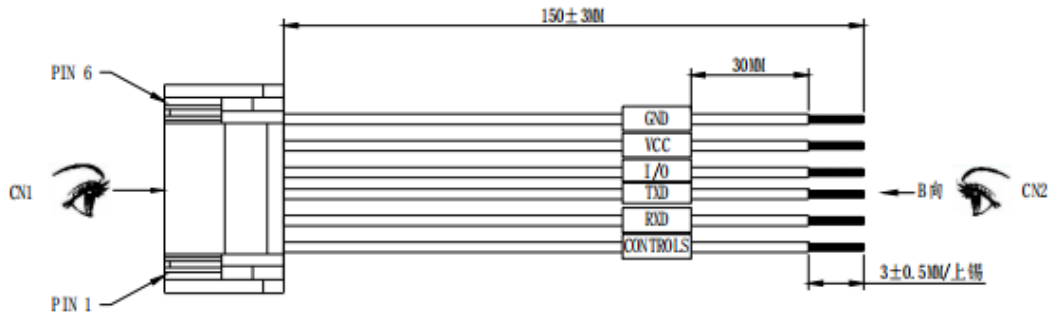
The model of the connector on the LS74A is XH-4P.

Figure 2.1 LS74A Connector Interface

Table 2.1 Definition of LS74A's Connector Interface

CN 1	Wiring Definitions	Color	CN 2	Note
1	CONTROLS	Brown	Tinned	-
2	RXD	Blue	Tinned	-
3	TXD	Green	Tinned	-
4	I/O	Yellow	Tinned	-
5	VCC	Red	Tinned	-
6	GND	Black	Tinned	-

3. Communication Protocol

The LS74A adopts serial port to TTL communication, baud rate is 115200. You can connect this product to an external system and follow the system's communication protocols to obtain real-time distance ranging data, device information, status, and to setup work modes.

Data Output Format

Table 3.1 LS74A Lidar Configuration and Data Output Format

No.	Info	Offset	Length (Byte)	Descriptions
0	Header	0	2	0xA5,0x5A
1	Flag bit	2	1	0x01: configure lidar parameters; 0x03: lidar output data
2	Reserved	3	2	Reserved
3	Echo information	5	1	0x0: work mode; configuration valid when flag bit is 0x01
4	Distance info information	6	3	The high 2 bytes are the integer part, whose unit is cm; and the last byte is the decimal part, whose unit is 1/256 cm. To analyze the distance value, for example, the distance value in the obtained data packet is represented by the hexadecimal number 0x02, 0x18, 0x32, and the first two bytes are 0x0218, which is converted to decimal distance value: 536 cm. The last byte is the decimal part, 0x32 equals 50 in decimal, that is, 50*1/256 cm=0.1953125 cm. Then the two parts add up to 536. 1953125 cm.
5	Intensity information	9	1	Fixed value: 0xff, that is 255
6	Reserved	10	4	Reserved
7	High voltage settings	14	1	If the user want to issue his own configuration, this byte should be configured as the lidar readback value
8	Output frequency	15	1	Lidar data output frequency, range: 1~150 Hz; configuration valid when flag bit is 0x01
9	High voltage read-back	16	2	Lidar actual output high voltage value, unit: v
10	Reserved	18	2	Reserved
11	APD temperature	20	2	Lidar APD temperature value, unit: ℃
12	Reserved	22	6	Reserved
13	ADC data enable	28	1	If the user want to issue his own configuration, this byte should be configured as the lidar readback value

14	Reserved	29	19	Reserved
15	Version No.	48	6	Starting from the 48th byte, the combination of 1st and 2nd bytes indicates the year, the 3rd byte indicates the month, the 4th byte indicates the day, and the 5th and 6th bytes indicates the version number, e.g., 0x07 0xE8 0x0A 0x0F 0x11 0x01 means October 15, 2024, v1.1.1
16	Tail	54	2	0xFA, 0xFB

Note:

The 7th "high voltage settings" and the 13th "ADC data enable" cannot be changed without authorization otherwise the data output would be abnormal.
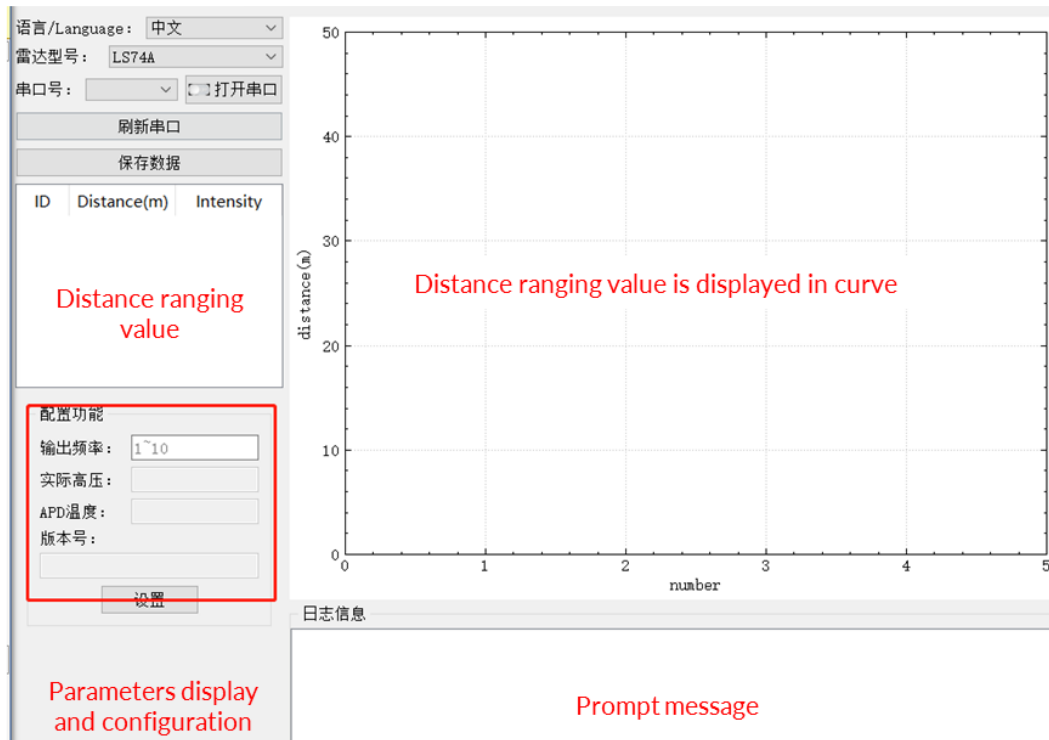
4. Data Display Software

Figure 4.1 Data Display Software Interface

The software mainly consist of four parts:

1) Distance ranging value display area: it displays the distance ranging value of the lidar in real time;

2) Distance ranging value curve display area: it displays the distance ranging value in the form of changing curve which is more intuitive;

3) Parameters display and configuration area: it display the parameters information which are configurable in real time;

4) Prompt message area: it prompts the messages of the software.

Note: output frequency setting range: 1~10

Other functions:

1) Language switch: switch the language from the language drop-down box;

2) Save data: click it and input the number to save lidar's distance ranging value information.

5. Maintenance

Shipping Requirements

This product is packed with the packaging materials specially customized by our company, which can resist certain vibrations and impacts. For long-distance transportation, special packaging materials must be used to avoid irreversible damage during transportation.

Installation Requirements

Please use screws that meet the specifications to fix the base, and make sure the base has good heat dissipation. Wear powder-free clean gloves during installation to avoid optical cover contamination and mechanical damage.

Storage Conditions

It is recommended to store the products in a ventilated and dry place where the temperature is 23 ±5 °C, and the relative humidity is 30% ~ 70%. Do not store in environments where the humidity, pH, etc. exceed the protection level.

Dirt Treatment

If the sensor's mask is dirty during use, such as with fingerprints, muddy water, dry leaves or insect corpses, etc., the sensor's ranging effect will be directly affected. Please clean it according to the following steps:

Tools: PVC gloves, clean cloth, absolute ethanol (99%)

Environment: ventilated and dry, away from fire

1) Put on PVC gloves and fix the base with your fingers; if it is not stubborn stains, use a dust-free cloth or dry air to gently remove the stains;

2) For stubborn stains, evenly spray the ethanol in the spray bottle on the location to be cleaned and wait for the stain to be dissolved. Then use a dustless cloth dipped in ethanol solvent, and gently wipe the mask. If the cloth is contaminated, please replace it in time. After cleaning the stain, use a new dustless cloth to remove any remaining liquid.

Revision History

Ver.	Revision Data	Revision Content	Issued/Revised By
V1.0.0	2024-10-25	Initial Version	Leishen

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