

AKUSENSE

AS-35C Lidar User Manual



V 1.0

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1 Product Introduction

The AS-35C series is a single-line LiDAR product launched by AKUSENSE. This series uses Pulsed Time of Flight (Pulsed ToF) for distance measurement. Its internal structure adopts a rotating mirror design, where a high-speed rotating reflective mirror deflects the invisible infrared laser emitted by the distance measuring module to different angles, achieving 360° horizontal plane environmental contour scanning and measurement. Compared to similar products, the AS-35C series has the following features:

*Long measurement distance: by adopting the pulsed distance measurement principle and optimizing the photoelectric design, the AS-35C achieves a longer measurement distance for targets with the same reflectivity ($\geq 50\text{m}@90\%$ reflectivity), making it highly suitable for large space scenarios.

*High reliability: the rotating mirror design minimizes the moving parts inside the lidar, enhancing its lifespan and significantly reducing the impact of mechanical vibration on operation. Additionally, the Ethernet interface offers better reliability compared to other communication methods.

*Robust body: the lidar casing is made of high-stability molded materials, combined with key area protection, making it more suitable for the high durability requirements of industrial scenarios.

Based on these characteristics, this series of lidars can be widely used in various scenarios requiring distance scanning measurements, such as mapping, positioning, and navigation for industrial warehousing and transport robot platforms.

Specification

Model	AS-35C
Working principle	ToF
Light source	905 nm
Measuring range	0.2m~50m(90% reflectivity ¹),0.2~18m(10% reflectivity),0.2~6m(2% reflectivity)
Scanning angle	360°(Ranging performance in the area of 10° directly behind is about half of other positions)
Sampling frequency	60 kHz ²
Scanning frequency	10 Hz /15 Hz /20 Hz /30 Hz
Scanning angle resolution	0.06 ° / 0.09 ° / 0.12 ° / 0.18 °
Ambient Illumination	80000Lux
Measurement error	$\pm 2 \text{ cm}$ ³
Communication	Ethernet/RJ45
Communication protocol	TCP/UDP
Power supply	DC5521Standard Power Supply
Operating voltage	DC 9V ~ 24V
Power consumption	<5W/peak
	<2W/typical ⁴
Operating temperature	-10 ~ 50
Storage temperature	-20 ~ 60
Enclosure rating	IP65
Dimension	60mm(L)*60mm(W)*82.5mm(H)

1. Typical values under 90% reflectivity conditions;
2. Equivalent data sampling rate calculated with a 360° horizontal field of view;
3. Typical values within a 10-meter range under 10% to 90% reflectivity conditions;
4. At startup, the radar's power consumption reaches a peak value for a short period (<10s), then drops to the typical value.

3 Equipment Installation

3.1 Installation Environment

Lidar is a precision optoelectric sensing device. During installation, please keep the outer surface of the infrared cover's light-emitting area clean to avoid contamination and scratches, which may block the field of view or generate noise.

The laser emission and reception area of the AS-35C in the vertical direction is shown in Figure 1. When installing, please use the hatched area in Figure 1 as a reference, leaving at least 5 millimeters of vertical open space above and below to ensure that the laser emission and reception are not obstructed.

Unit : mm

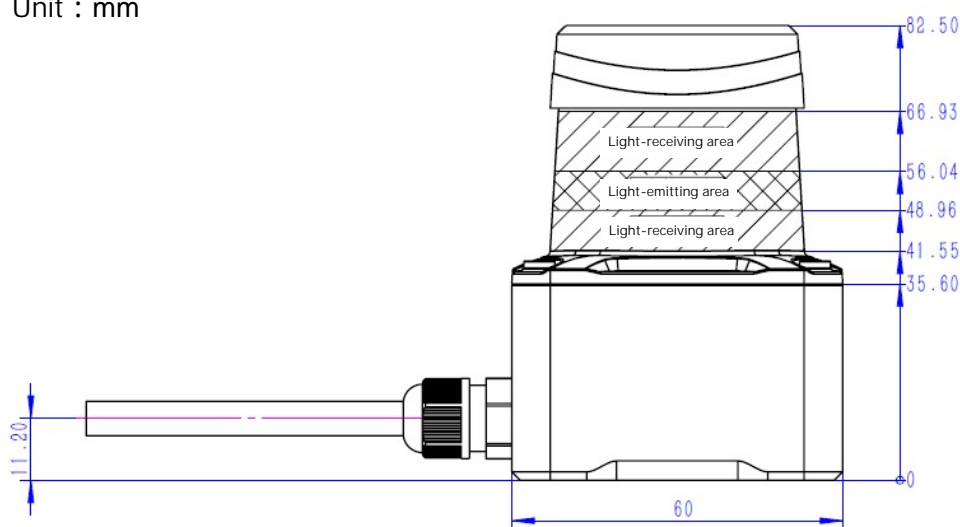


Figure 1. Position of the Laser Emission and Reception Area

The AS-35C's operational area in the horizontal direction is 360°, with the front facing 0° and 180° on each side. Looking down from the top of the lidar's infrared cover, the internal components rotate counterclockwise, with the first data point located at the rear of the radar at -180°, as shown in Figure 2.

Internal components rotate counterclockwise

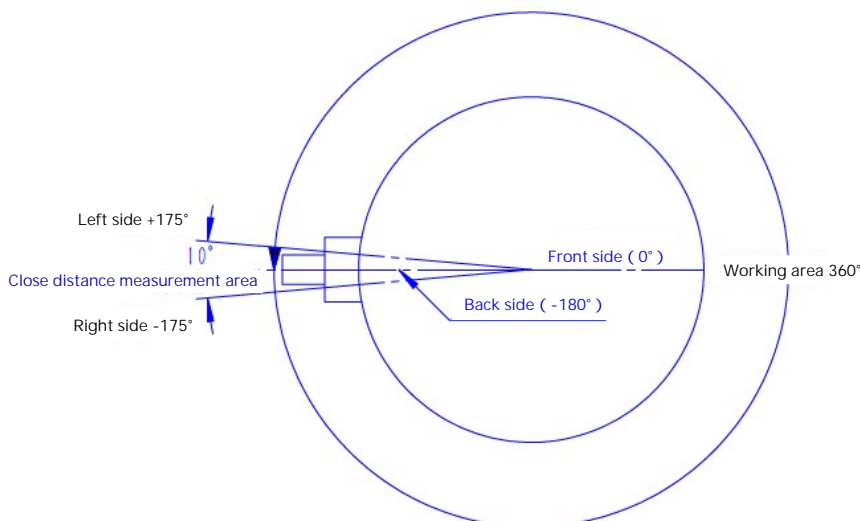


Figure 2. Lidar's field of view (top view)

3.2 Fixing Method

AS-35C has threaded mounting holes at the bottom of the casing, with specific dimensions as shown in Figure 3.

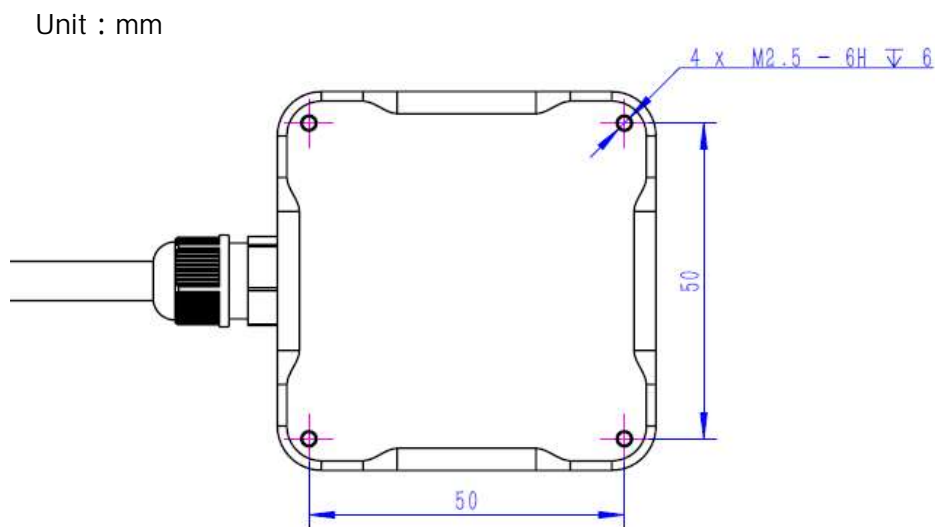


Figure 3. threaded mounting holes at the bottom of the casing

3.3 Electrical Connections

The AS-35C unit's data cable end is equipped with power and communication interfaces, including a DC5521 female power socket (specification 5.5 mm/2.1 mm) and an RJ45 Ethernet connector (as shown in Figure 4). Users should use a power adapter with an output capacity of 1 A (or higher) to supply power to the AS-35C. Once powered and connected to a computer or switch via Ethernet cable, data communication with the AS-35C can be established.

Please note:

1. AS-35C does not support PoE (Power over Ethernet). Connecting a PoE Ethernet cable will only enable communication.
2. Ensure input voltage is between DC 9 V to 24 V, with less than 5% ripple. Excessive voltage may damage the radar unit.

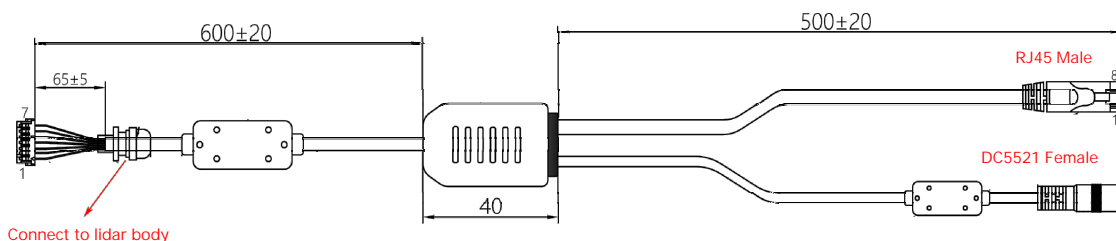


Figure 4. AS-35C Power and Communication Interface

4 User Guide

4.1 System Setup

AS-35C uses TCP and UDP protocols for communication. The system running the client software can read the scan data as long as it has a standard TCP/IP protocol stack.

In addition, since AS-35C allows users to modify the lidar's IP address and other network parameters, in order to facilitate the location of lidar devices that are connected to the network but have unknown IP addresses in the local area network, AS-35C supports the mDNS/DNS-SD device automatic discovery protocol. In order to use this function, the service component that supports the protocol needs to be installed on the computer running the client software:

The Windows system does not provide native support for the mDNS/DNS-SD protocol. You can enable the system to support the protocol by installing `bonjoursetup.exe` provided with the software. Enable the system to support the protocol.

In Linux systems, the system component used to support the mDNS/DNS-SD protocol is Avahi. Most Linux distributions have this component installed by default, if it is not installed, you can install it through the package manager of the corresponding distribution.

4.2 Network Settings

AS-35C uses Ethernet to transmit scan data. By default, the lidar's IP address is 192.168.10.160 with a subnet mask of 255.255.255.0. To establish a connection with the radar, users need to adjust their computer's network settings:

① Change Computer's IP Address:

Modify the computer's IP address to 192.168.10.X (where X is any number between 2 and 254, ensuring it doesn't conflict with other devices on the local network).

② Set the subnet mask to 255.255.255.0.

③ Or keep the current network settings unchanged and add an additional IP address within the same range (192.168.10.X) to avoid disrupting existing network applications.

④ Firewall Configuration:

If you are using software to view real-time scan images outputted by the lidar (refer to section "4.3 Viewing Scanned Images"), adjust your computer's firewall settings.

Add the software to the firewall's list of permitted applications. Refer to the user manual of your operating system or firewall software for detailed instructions.

4.3 Viewing Scanned Images

Once the AS-35C is connected to the computer and the system is properly configured, you can use the software to view real-time scan images outputted by the AS-35C. The main interface of the software is shown in Figure 5.

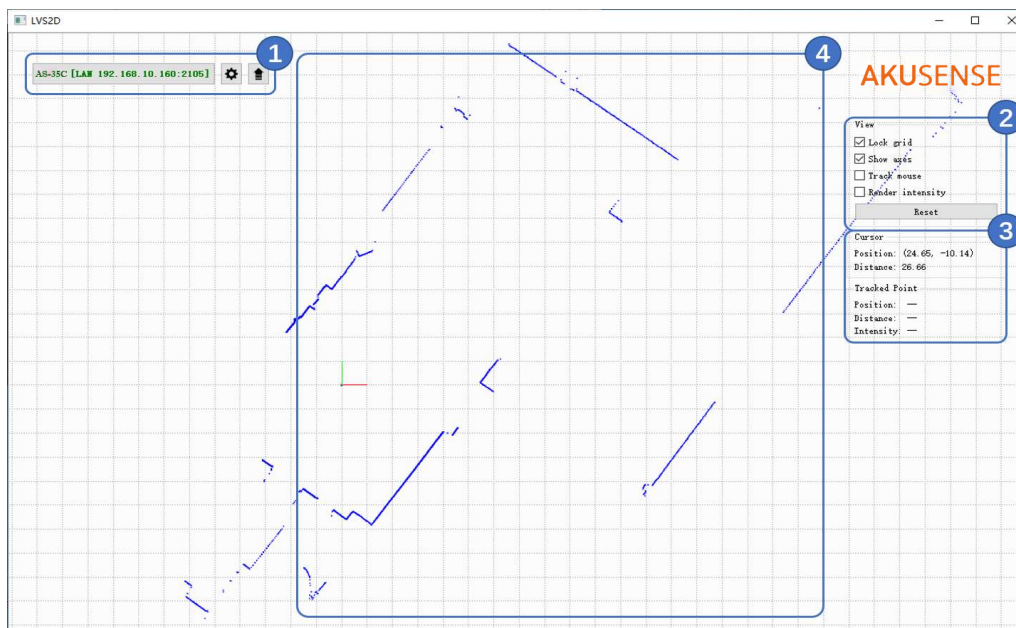


Figure 5. Software main interface (image for functional description reference only)

There are following functional areas:

1. Device List Area: displays all AS-35C devices connected to the computer. Supports automatic device discovery, detecting newly networked devices and displaying them in the list. Users can click on entries in the list to select and view scan images from a specific AS-35C device. The currently selected device is highlighted in bold green.

2. View Control Area: Controls how scan images are displayed. Control options include:

- **Lock grid** : When enabled, background grid lines remain horizontal/vertical and do not rotate when the user clicks and drags to rotate the scan image. This option is enabled by default.
- **Show axis** : Displays a two-dimensional coordinate system of the current AS-35C device in the scan image, with the X and Y axes shown in red/green, respectively. This option is enabled by default.
- **Track mouse** : Highlights points in the scan image along the direction from the origin to the current mouse pointer position in red. This option is disabled by default.
- **Renderintensity** : When enabled, uses different colors to represent the intensity of echo signals received during distance measurements. Points with stronger signals appear more red, while weaker signals appear more blue. This option is disabled by default.
- **Reset** : Resets the view of the scan image to its initial state, undoing any previous rotation, translation, or zoom operations.

3. Coordinate Display Area: Displays the current mouse pointer position and coordinates of highlighted scan points, in meters, referencing the AS-35C device coordinate system.

4. Scan Image Area: Displays real-time scan images from the currently selected device. Users can interact with this area using mouse actions:

- **Rotation**: Click and drag with the left mouse button.
- **Translation**: Hold down the Shift key and click and drag with the left mouse button, or click and drag with the middle mouse button (scroll wheel).

Zoom: Scroll the mouse wheel forward (zoom in) or backward (zoom out).

5 Dimension

5.1 Lidar Body

Unit:mm

