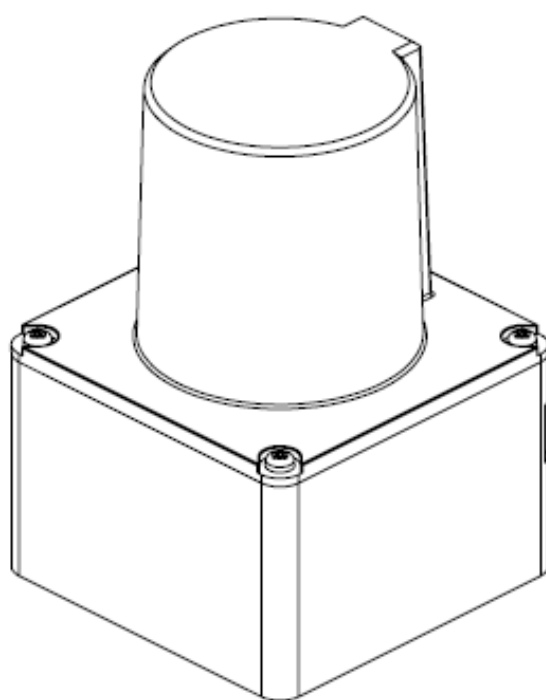


# LTME-02 SERIES 2D LIDARS

## User Guide



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## 1 Overview

The LTME-02 series are the latest generation of 2D LiDARs from Litra Technology. Equipped with a high performance optical measurement engine, the sensor constantly scans the encompassing environment through an internal deflecting mirror in steady rotation, making high frequency distance measurements along the course, and outputs measurement results through Ethernet connection. Such data can be interpreted to reconstruct a map regarding obstacles and their positions in the scan plane, and is well suited for any application requiring real-world geometric information in a maximum of tens of meters' range. Some of the more common usage scenarios are:

- **Mobile platform navigation:** Measurement data from the sensor can be directly converted to 2D occupancy map and consumed by mobile base controller to aid in localization, navigation and obstacle avoidance.
- **Immersive interaction:** For large immersive interaction installations seen in exhibitions and art museums, the sensor can be utilized to turn walls or floor ground into virtual touch screens, providing ample interaction options to create vivid effects.
- **Optical non-contact profiling:** Mostly relevant to logistics and mining, pile of packages or ores can be scanned by the sensor to obtain detailed profiling, facilitating computation of volume in a quick and contactless manner.

This product is highlighted in the following aspects:

- **High performance:** The core optical measurement engine of LTME-02A series is geared towards long range and high repetition rate. As a result, the detection range of targets with 70% reflectivity is guaranteed to be more than 20 meters, and the device is able to carry out 30,000 measurements per second, making it an ideal solution for mobile platforms operating in openness and moving at a higher speed.
- **Dependable reliability:** LTME-02 series are engineered with reliability in mind. The mechanical subsystem is carefully constructed to minimize moving parts, making the overall design more resilient to mechanical vibration or shocking. Electrical components are similarly designed to provide standard-compliant ESD protection and EMC compatibility.
- **Miniature in size:** Benefiting from the rotating deflection mirror design and compact internal arrangement, LTME-02 series are small in size, featuring a height of less than 9 centimeters and each side of the base no more than 6 centimeters. This size can easily fit in situations where installation space is limited, making the sensor more adaptable to various usage scenarios.

## 2 Specifications

General	
Model	LTME-02A
Measurement Performance	
Ranging Principle	Pulsed ToF
Laser Wavelength	905 nm (infrared/invisible)
Working Range	≥20 m (70% reflectivity) ≥10 m (10% reflectivity) <sup>1</sup>
Field of View	270°
Repetition Rate	30 kHz
Scan Rate	10 Hz/15 Hz/20 Hz/25 Hz/30 Hz
Angular Resolution	0.12°/0.18°/0.23°/0.35°/0.35°
Distance Resolution	1 cm
Absolute accuracy	±2 cm <sup>2</sup>

Electrical Characteristics	
Operating voltage	12 V DC
Power Consumption	<4 W / Peak
	<2 W / Typical <sup>3</sup>
Mechanical Characteristics	
Dimensions	84.9(H) × 60(L) × 60(H) mm
Weight	Approx. 250 g
Ambient Conditions	
Operation Temperature	-10°C ~ 60°C
Storage Temperature	-25°C ~ 75°C
Enclosure rating	IP65
Ambient light limit	80,000 Lux
Interface	
Physical Interface	DC 5.5 mm × 2.1 mm (Power) RJ45, 10/100 Ethernet (Data)
Communication Protocol	Custom protocol over TCP/UDP, with ranges & intensities
Software	
SDK	C++: <a href="https://github.com/LitraTech/ldcp_sdk">https://github.com/LitraTech/ldcp_sdk</a>
ROS Driver	<a href="https://github.com/LitraTech/ltme_node">https://github.com/LitraTech/ltme_node</a>

<sup>1</sup> Typical value for targets with 10% reflectivity

<sup>2</sup> Typical value for target reflectivity from 10% to 70%, and ranges up to 10 meters

<sup>3</sup> Power consumption reaches peak upon startup for approx. 10 s, then drops down to typical value

### 3 Safety Notes

- LTME-02 series comply with laser safety Class I (eye-safe). **However, users are still advised to observe safety regulations as per IEC 60825-1;**



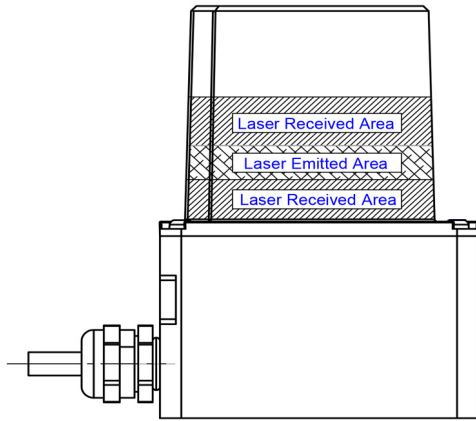
- LTME-02 series don't constitute Personal Protection Equipment (PPE) in accordance with respective applicable safety standards for machines;
- Repairs should only be carried out by qualified Litra Technology service personnel.

### 4 Device Installation

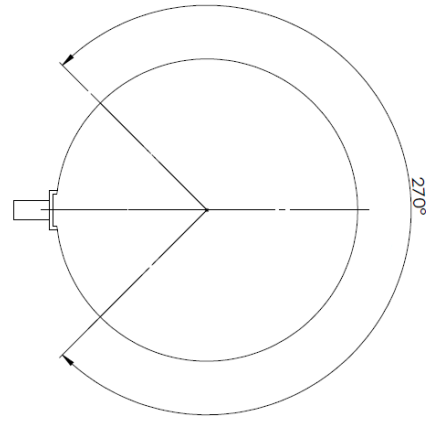
#### 4.1 Planning

As LTME-02 works by making optical distance measurements, it should be mounted such that a clear field-of-view is maintained. Figure 1 shows the part of the device's protective cover where internal sensor's optical window is located (transmission & reception, shaded area). Host platform

should leave an opening at least of the same height, plus an additional margin of 5 mm on each side, for emitted/reflected light to pass through. Likewise, LTME-02's horizontal field-of-view is  $270^\circ$  as shown in Figure 2, and the region to be scanned within this aperture should not be blocked by the mounting structure.



**Figure 1.** Optical Window Position



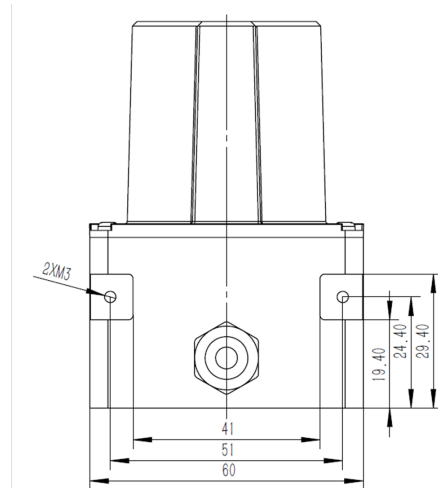
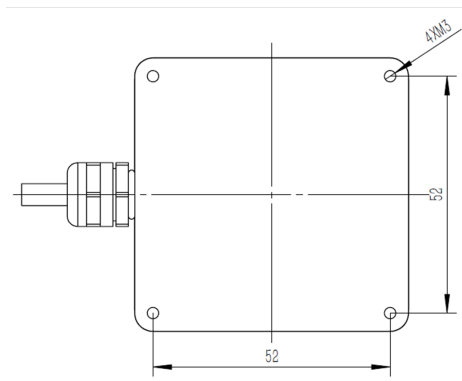
**Figure 2.** Horizontal Field-of-View (Top View)

For best performance, please keep the protective cover (especially laser transmission/reception area indicated in Figure 1) from heavy dusts or contact with rough surfaces, as contamination or scratches might block sensor's view and/or cause spurious measurement results.

## 4.2 Mounting

The device can be mounted in two ways:

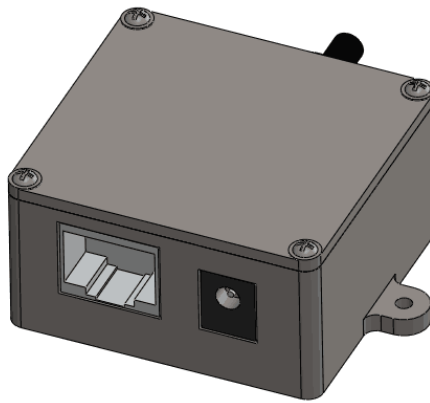
- Through 4 screw holes at the bottom of device housing (refer to left part of Figure 3);
- Through 2 screw holes to the back of device housing (refer to right part of Figure 3)



**Figure 3.** Screw Holes for Mounting

### 4.3 Electrical Connection

The cable attached to LTME-02 is terminated with an interface box, hosting a DC power socket (5.5 mm external / 2.1 mm internal, center positive) and a RJ45 socket as shown in Figure 4. The user should plug a 12 V power supply capable of 1 A or higher into the power jack, and attach an Ethernet cable (with the other end attached to a network switch or directly to computer) to access data from the device.



**Figure 4.** Interface Box

## 5 Usage Guides

### 5.1 System Requirements

The data interface of LTME-02 is based on Ethernet and employs a custom protocol on top of TCP/UDP. The only requirement for a host computer to interface with LTME-02 is properly configured TCP/IP stack.

LTME-02 allows the user to configure its network parameters, such as IP address and network mask. As a convenience feature, LTME-02 provides support for mDNS/DNS-SD to facilitate automatic device discovery in local network. To utilize this feature, host computer may need additional supporting software:

- Windows comes with no native support for mDNS/DNS-SD. Users are advised to install bonjour-sdksetup.exe bundled with LVS2D (visualization software for LTME-02) to enable device discovery;
- For Linux systems, the component for mDNS/DNS-SD is Avahi. Most Linux distributions install Avahi by default. If that is not the case, it can be installed manually through package manager of the corresponding distribution.

**Note :** Device discovery is an optional feature. It is mostly useful when a device's IP address is not known in advance. Client software on host computer may connect the device directly with its IP address; in this case, installation of mDNS/DNS-SD supporting software is not required.

### 5.2 Network Setup

LTME-02 features an Ethernet interface for data exchange. With factory default settings, the device's IP address is 192.168.10.160 and subnet mask 255.255.255.0. To interface with LTME-02, host

computer should be configured with an IP address of the same subnet (in the form 192.168.10.X, where X is an integer between 2 and 254 inclusive, and not to conflict with existing hosts in the network) and a subnet mask of 255.255.255.0.

If you'd like to view real-time plotting of scan results with LVS2D (see Section 5.3), there is an additional step to configure host computer's firewall and add LVS2D to the list of allowed applications. Please refer to the manual of your operating system or firewall software for detailed instructions.

### 5.3 Data Visualization

After proper configuration of host computer's network settings, you are now ready to power up the device, connect it to the local network, and view real-time plot of measurement data with LVS2D software, as shown in Figure 5.

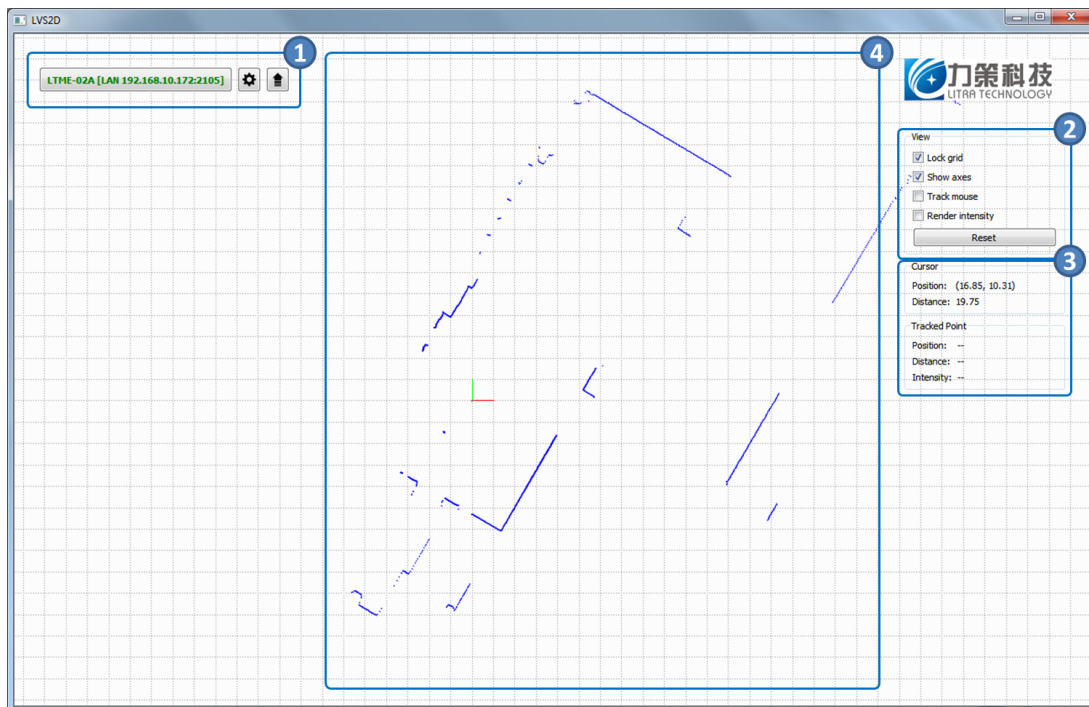


Figure 5. LVS2D User Interface

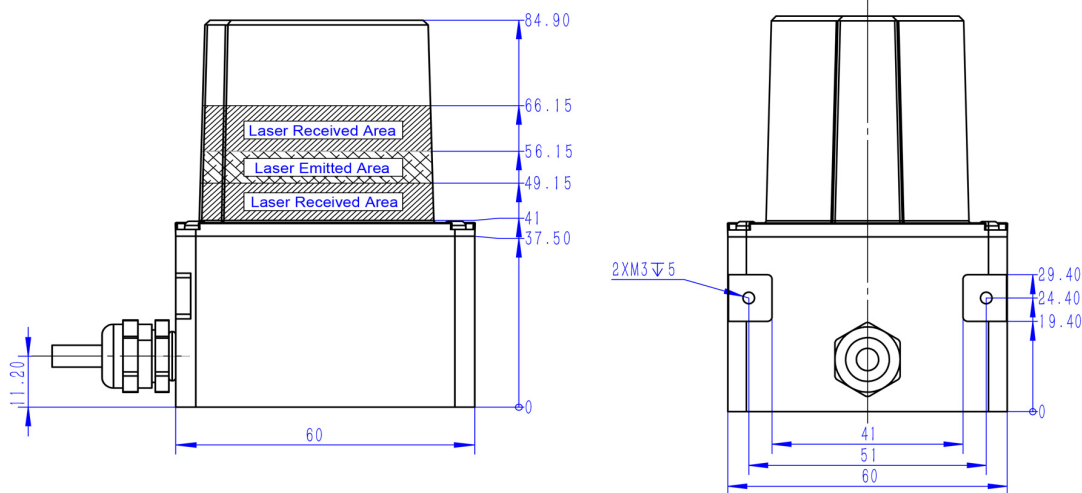
The interface consists of the following regions:

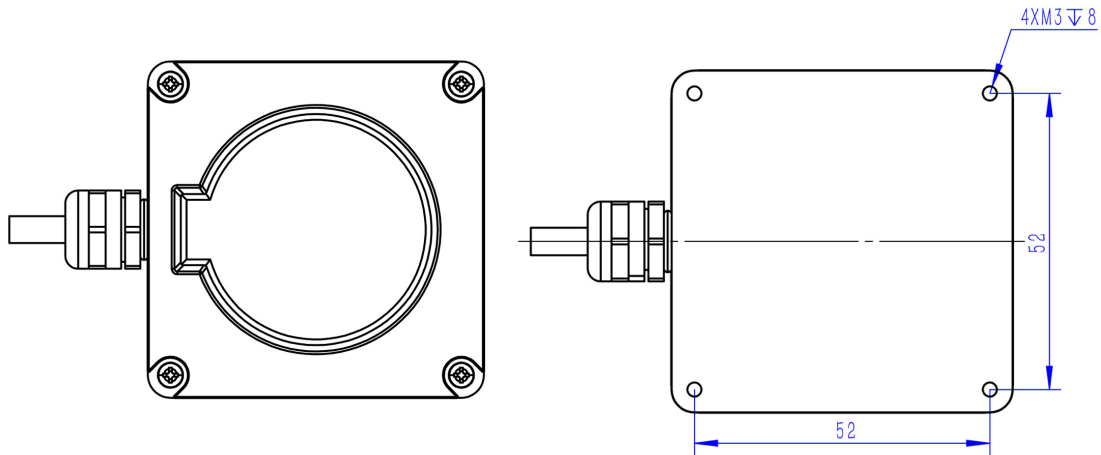
1. **Device list region:** This region displays all LTME-02 devices as found by the software. LVS2D supports automatic discovery of LTME-02; as long as the device functions properly and supporting software for mDNS/DNS-SD has been installed, LVS2D will detect the presence of newly connected LTME-02 and add it to the list. You may click on a list entry to switch between multiple attached devices. Currently opened device will be marked by bold green text, and its measurement data will be rendered on screen in real-time.
2. **View control region:** This region provides several options to control the way plot area is displayed, including:
  - **Lock grid:** If enabled, background grid lines will keep its horizontal/vertical orientation while user rotates the view by left clicking on the plot and dragging. Defaults to ON.
  - **Show axis:** If enabled, the coordinate axis of the plot will be displayed in the plot area, with X axis in red and Y axis in green. Defaults to ON.
  - **Track mouse:** If enabled, the point of plotted scatter series in the direction of mouse cursor will be enlarged and highlighted in red. Defaults to OFF.

- **Reset:** Clicking on this button will reset the whole view to its initial state, therefore undoing any previous rotation, panning or scaling. It will also reset all view options described above to their default values.
- 3. **Coordinate display region:** This region shows coordinates of the mouse cursor, as well as coordinates of highlighted point if “Track mouse” is enabled, in device coordinate frame, in meters.
- 4. **Plot graph region:** This region displays real-time plotting of scan frames from currently opened device. It supports the following user interactions:
  - **Rotation:** Left click and drag;
  - **Panning:** Press Shift, then left click and drag; or press mouse wheel and drag;
  - **Scaling:** Scroll mouse wheel forward (zoom in / enlarge plot) or backward (zoom out / shrink plot).

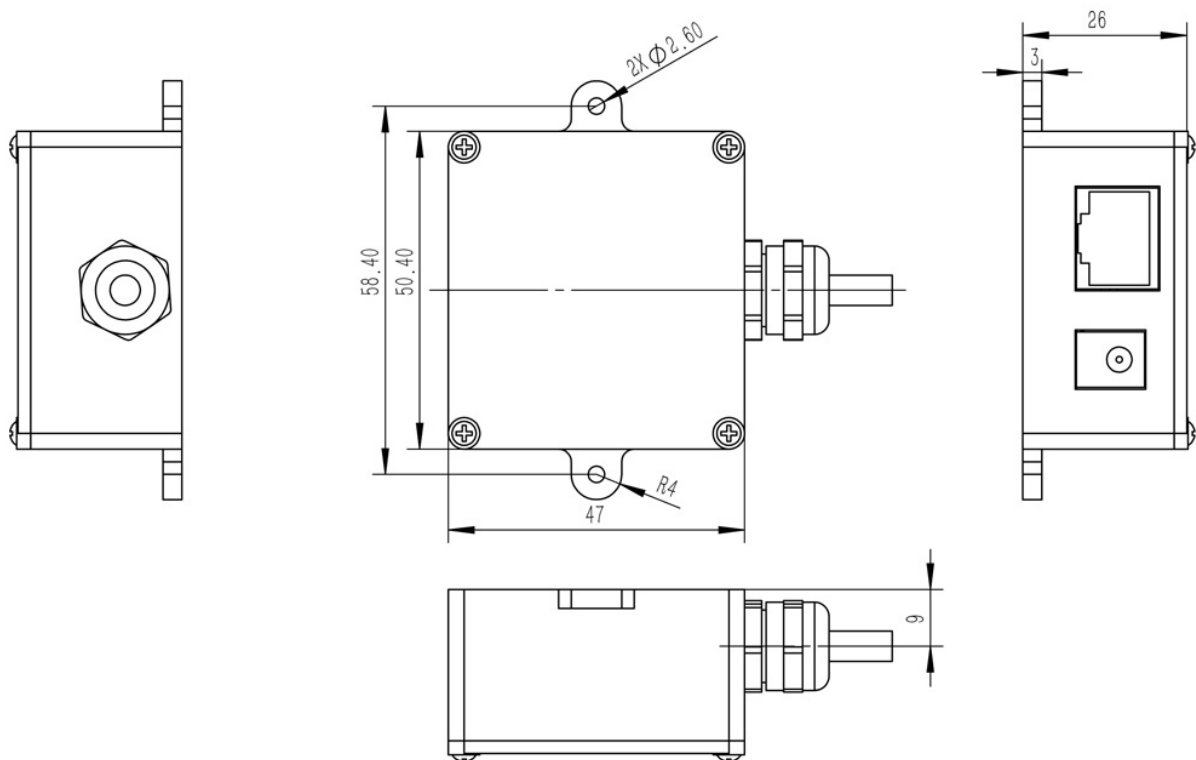
## 6 Assembly Drawings

### 6.1 Device Body





## 6.2 Interface Box



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