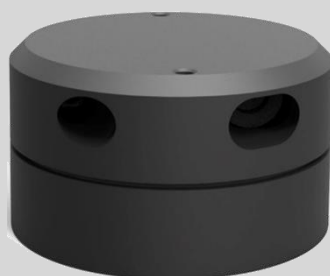


# **YDLIDAR G4 USER MANUAL**



Doc# : 01.13.000009

## Contents

<b>YDLIDAR G4 DEVELOPMENT KIT.....</b>	<b>2</b>
Development kit.....	2
<b>USAGE UNDER WINDOWS.....</b>	<b>3</b>
Device connection.....	3
Driver Installation.....	4
Evaluation software usage.....	6
<b>LINUX ROS OPERATION.....</b>	<b>11</b>
Document description.....	11
Device connection.....	11
ROS Driver Installation.....	11
RVIZ installation.....	12
RVIZ Check the scan results.....	12
Modify the scan angle problem.....	12
<b>USE CAUTION.....</b>	<b>12</b>
Ambient temperature.....	12
Ambient lighting.....	12
Power demand.....	13

## YDLIDAR G4 DEVELOPMENT KIT

The development kit of YDLIDAR G4 (hereafter abbreviated as G4) is an accessory tool provided to facilitate the performance evaluation and early rapid development of the G4. Through the G4 development kit, and with the matching evaluation software, you can observe point cloud data scanned by G4 on your environment or development on the SDK.

### Development kit

The G4 development kit has the following components:



G4 Lidar



USB Type-C



USB Adapter board

FIG 1 YDLIDAR G4 DEVELOPMENT KIT

### CHART 1 YDLIDAR G4 DEVELOPMENT KIT DESCRIPTION

Item	Qty	Description
G4 Lidar	1	Standard version of the G4 Lidar. The G4 has an integrated motor drive for motor control.
USB Type-C cable	1	Use with USB adapter board to connect G4 and PC. USB cable is both a power supply cable and a data cable.
USB adapter board	1	This component can realize USB to UART function, facilitating G4, PC fast interconnection. At the same time, support serial port DTR signal to G4 motor stop control. A USB Type-C Power Interface (PWR) for auxiliary power supply is also provided.

**Note:** USB adapter board has two USB Type-C interfaces: **USB\_DATA**, **USB\_PWR**.

**USB\_DATA:** Data-powered multiplex interface. In most cases, this interface can be used to meet power and communication requirements.

**USB\_PWR:** Auxiliary power supply interface. The USB interface of some development platforms has weak current drive capability. At this time, auxiliary power supply can be used.

## USAGE UNDER WINDOWS

### Device connection

When G4 is evaluated and developed under windows, G4 and PC need to be interconnected. The specific process is as follows:

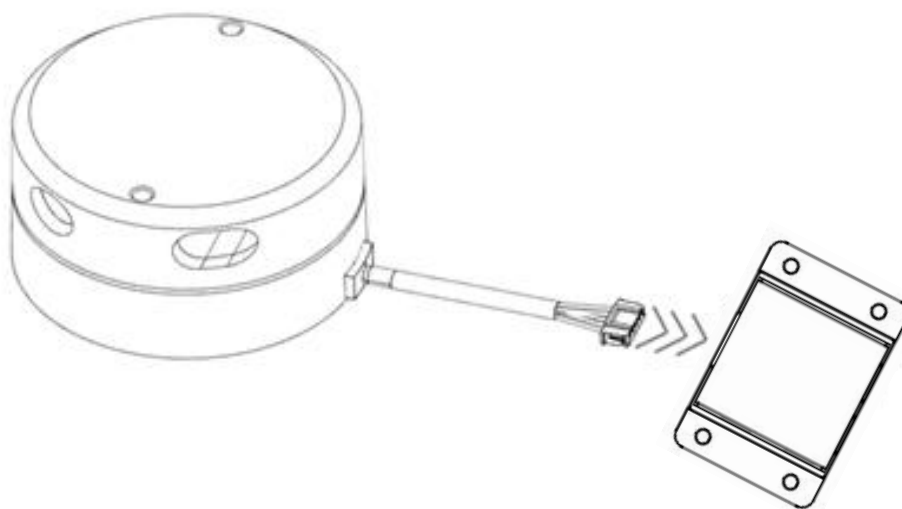


FIG 2 YDLIDAR G4DEVICE CONNECTION STEP 1

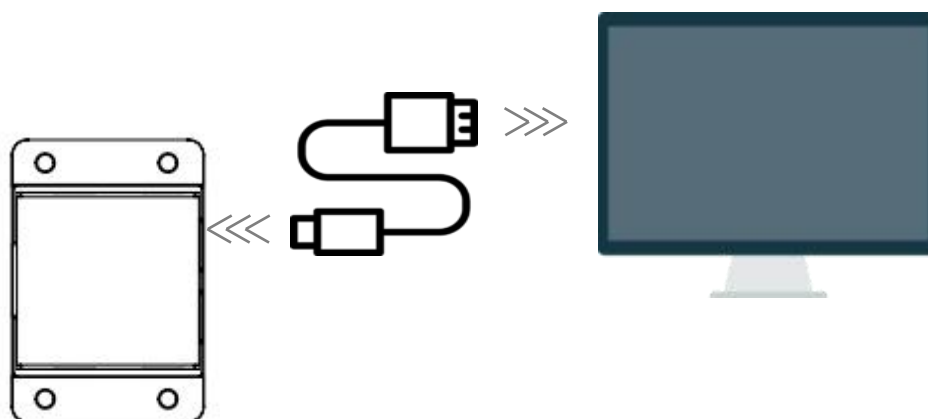


FIG 3 YDLIDAR G4DEVICE CONNECTION STEP 2

Connect the adapter board with G4 first, then connect the USB cable to the USB port of the adapter board and the PC. Note that the Type-C interface of the USB cable is connected to the USB\_DATA of the USB interface board, and the idle mode is used after G4 is powered on. The motor does not rotate.

Part of the development platform or PC USB interface drive current is weak, G4 need to access the +5 V auxiliary power supply, otherwise the Lidar works abnormally.

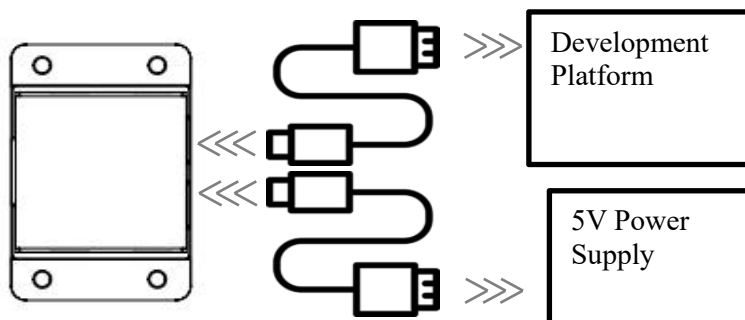


FIG 4 YDLIDAR G4 AUXILIARY POWER SUPPLY

## Driver Installation

To evaluate and develop the G4 under Windows, you need to install the serial port driver of the USB adapter board. The USB adapter board of this kit adopts CP2102 chip to realize serial port (UART) to USB signal conversion. Its driver can be downloaded from our official website or downloaded from the official website of Silicon Labs.

<http://ydlidar.com/>

<http://cn.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers>

After decompressing the driver package, run the CP2102's Windows driver installation file (exe file under CP210x\_VCP\_Windows). Please select the 32-bit version (x86) or 64-bit version (x64) installation program according to the version of the windows operating system.

x64	2013/10/25 11:39	文件夹	
x86	2013/10/25 11:39	文件夹	
CP210xVCPInstaller_x64.exe	2013/10/25 11:39	应用程序	1,026 KB
CP210xVCPInstaller_x86.exe	2013/10/25 11:39	应用程序	901 KB
dpinst.xml	2013/10/25 11:39	XML 文档	12 KB
ReleaseNotes.txt	2013/10/25 11:39	文本文档	10 KB
SLAB_License_Agreement_VCP_Windo...	2013/10/25 11:39	文本文档	9 KB
slabvcp.cat	2013/10/25 11:39	安全目录	12 KB
slabvcp.inf	2013/10/25 11:39	安装信息	5 KB

FIG 5 YDLIDAR G4 DRIVER VERSION SELECTION

Double-click the exe file and follow the prompts to install it.



FIG 6 YDLIDAR G4 DRIVER IS INSTALLING

After the installation is complete, you can right-click on My Computer and select Properties. On the Open System screen, select Device Manager from the left menu to access the Device Manager. Expand [Port] to see the serial port name corresponding to the identified USB adapter, that is, the driver installation is successful. The following figure shows COM3. (Note that the port must be checked in case of G4 and PC interconnection).

**Note:** Users can also choose Type-C on G4 to get started quickly. Connect the PC and G4 directly with Type-C data cable and download the vcp serial port driver of G4 on the [www.ydlidar.com](http://www.ydlidar.com). After that, start the PCV to scan the map and observe the data.

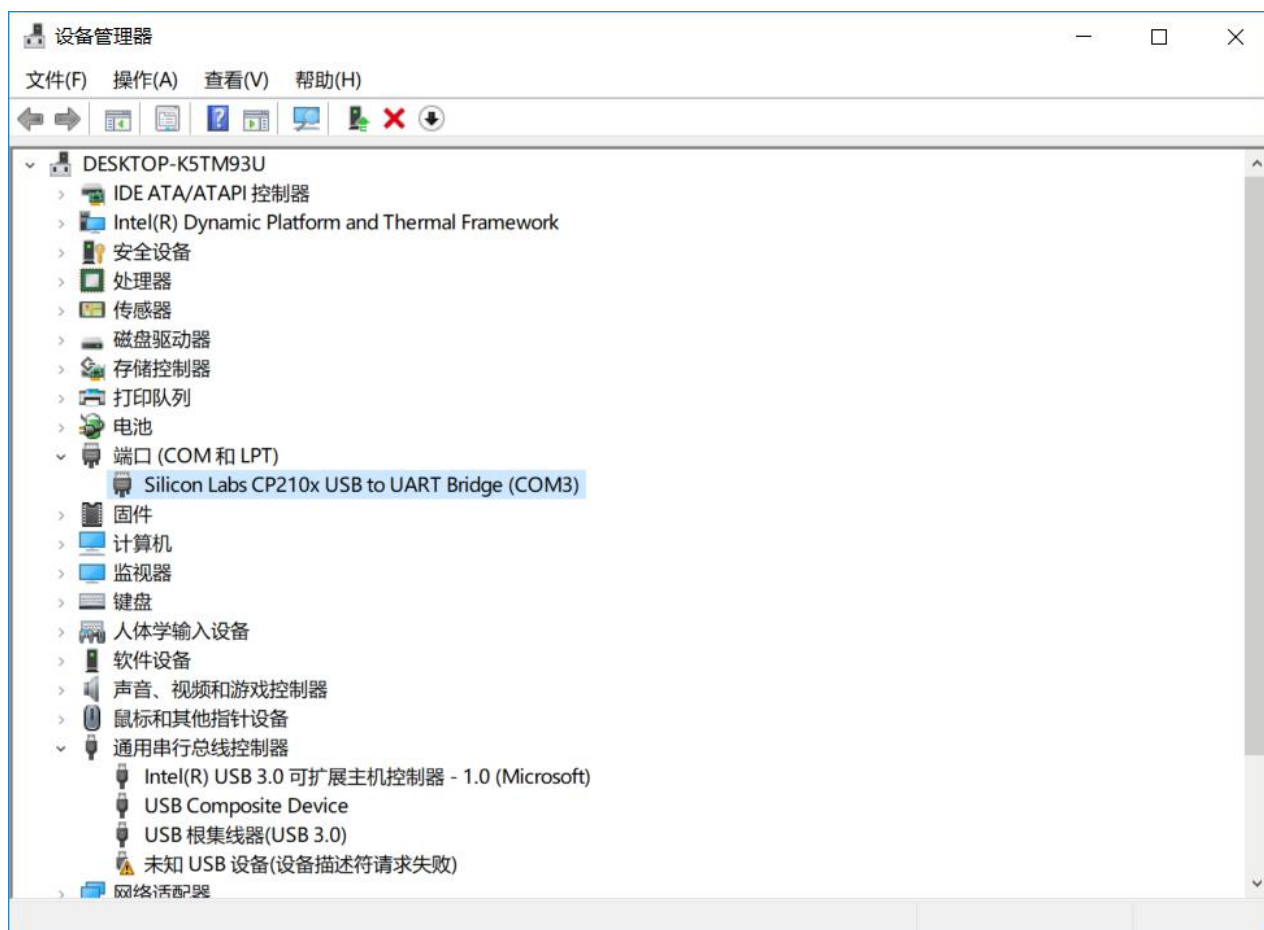


FIG 7 YDLIDAR G4 DRIVE INSTALLATION CHECK

## Evaluation software usage

YDLIDAR provides Point Cloud Viewer, a point cloud data visualization software for G4 real-time scanning. Users can intuitively observe the G4 scanning effect chart. GDL real-time point cloud data and real-time scanning frequency are provided on YDLIDAR. At the same time, the version information of G4 can be read, and the scan data can be saved offline to an external file for further analysis.

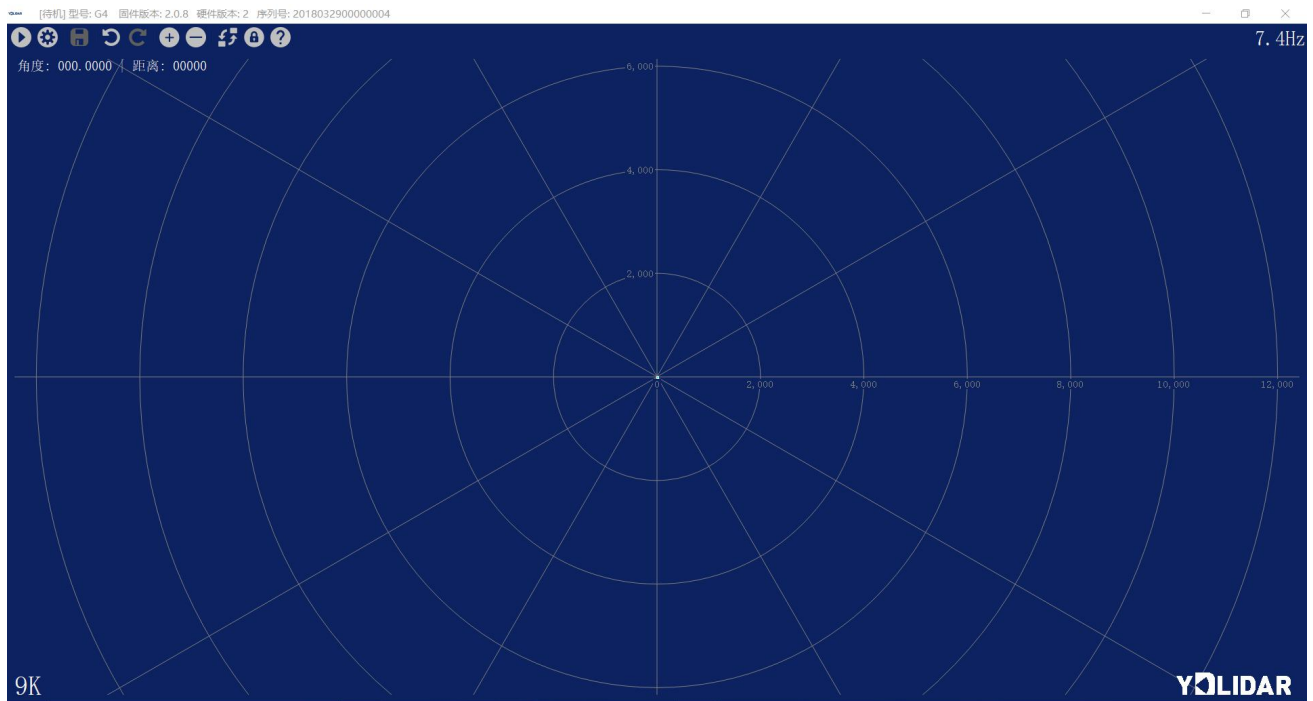
Before using the YDLIDAR software, make sure that the G4 USB adapter board serial port driver is installed successfully, and interconnect the G4 with the USB port of the PC. Run the evaluation software: PointCloudViewer.exe, select the corresponding serial port number and model number.




FIG 8 YDLIDAR G4 EVALUATION SOFTWARE


*Note: The Lidar does not turn on the heartbeat function by default. This function needs to send the scan command continuously to make it work normally. If the scanning frequency is stopped, the Lidar will stop scanning. Currently, G4 and F4 are compatible with this function, and G4 and G4 are not compatible.*

If the connection is correct, you will see the following screen:



### Start Scanning

Click  to start scanning and display the environment point cloud.

Clicking  to stop it, as shown below:



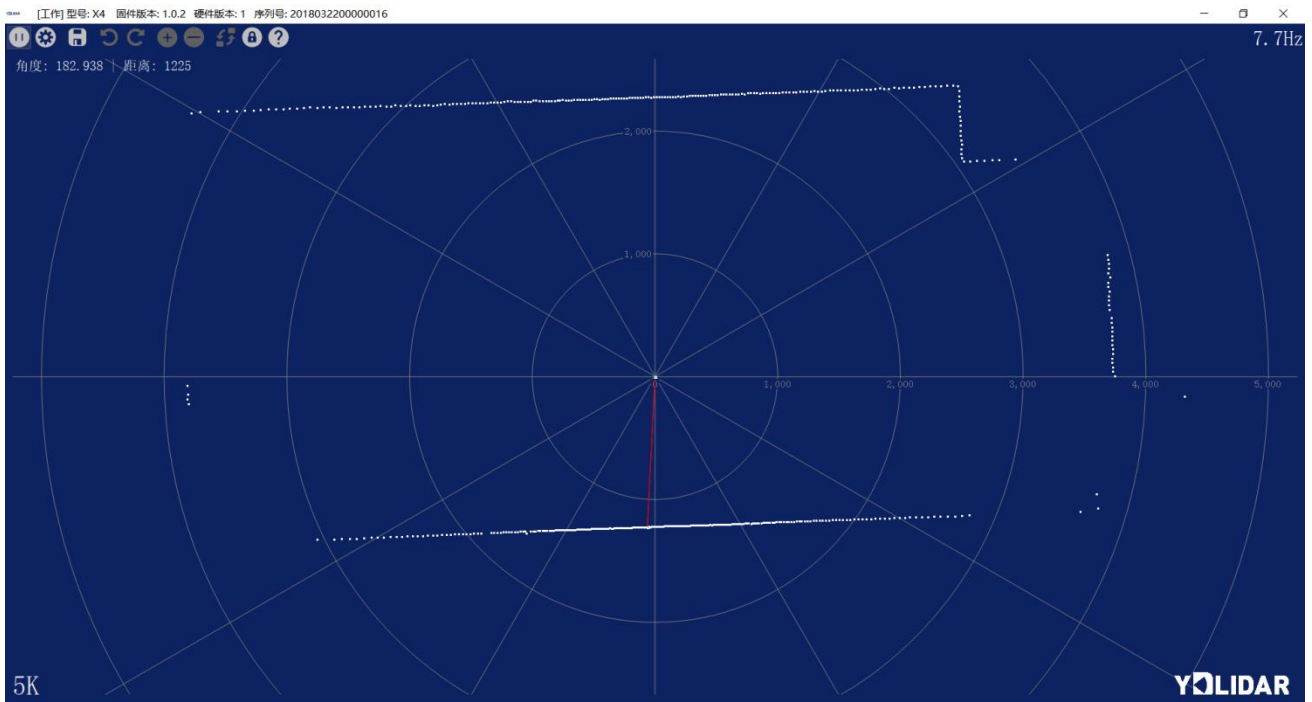



FIGURE10 LIDAR SCANNING POINT CLOUD DISPLAY

## System Settings

Click System Settings  and the following settings box will pop up:

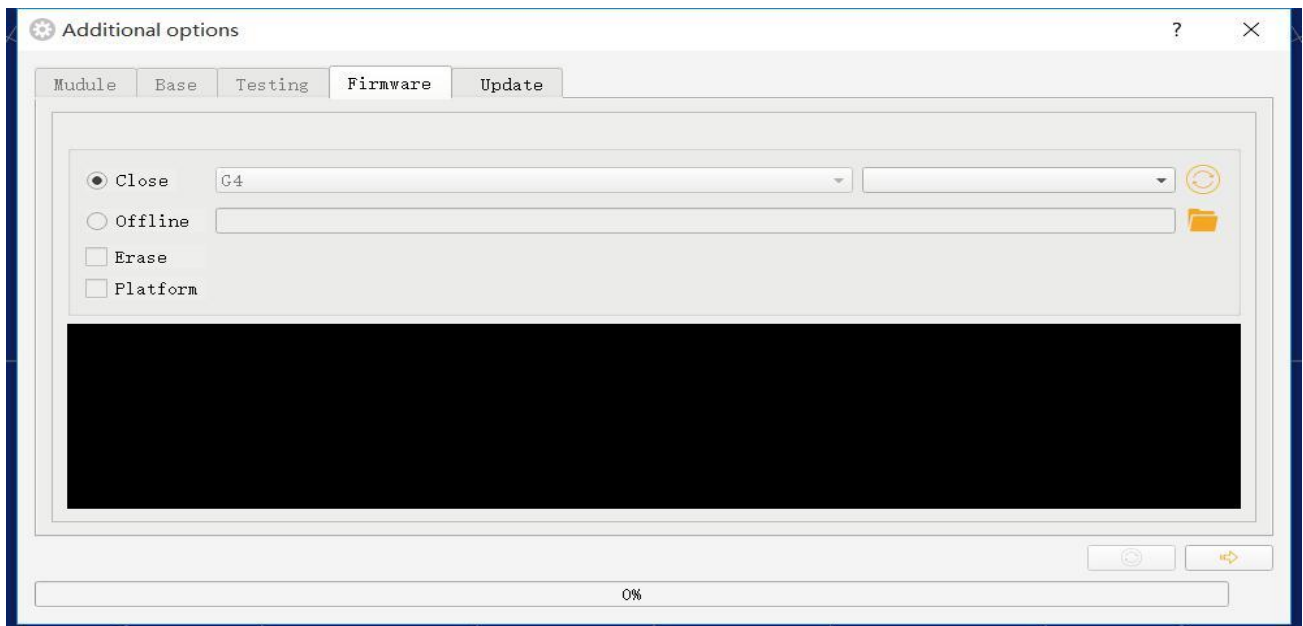



FIGURE 11 CLIENT SETTINGS BOX

As shown in the figure, you can configure and detect the Lidar on this setup page, as well as Lidar firmware upgrade, client software upgrade, etc.


## Save Data

During Lidar scanning, click , Save the point cloud data as prompted. The system will save the point cloud information scanned in a circle according to the following format.


angle:9.5469	,	distance:4654
angle:9.8125	,	distance:4709
angle:10.094	,	distance:4763
angle:10.625	,	distance:4947
angle:11.125	,	distance:6204
angle:11.203	,	distance:0
angle:11.391	,	distance:6253
angle:11.766	,	distance:0
angle:12.609	,	distance:0
angle:12.719	,	distance:7895

FIGURE 12 POINT CLOUD DATA SAVE FORMAT


## Scanning direction

The scanning direction (rotation direction) of the lidar can be adjusted by clicking . When the lidar is in the scanning state, you need to click the scan control again after switching the scanning direction.

## Scanning frequency

 is used to adjust the scanning frequency (motor speed) of the lidar. Click any one of them, the system will pop up the frequency setting bar, which can be adjusted automatically according to the demand. When the lidar is in the scanning state, you need to click the scan control again after adjusting the scanning frequency.







## Ranging frequency

 is used to switch the Lidar's ranging frequency. The G4 supports 4K, 8K, and 9K ranging frequency switching. Other versions of the Lidar do not support this function, and the click is invalid. When the Lidar is in the scanning state, you need to click the scanning control again after switching the ranging frequency.



## Angle Calibration

During the mechanical assembly of the Lidar, the user may have a deviation in the zero angle. In this case, the angle calibration function of the client can be used to calibrate according to actual needs. The specific operations are as follows:

### (1) Unlock calibration function

Click the unlock control  , the system will pop up the login box, the default password is eaibot. The effect of these controls      will change after unlocking.

### (2) setting the baseline

Click   and the system will provide a baseline of the appropriate size as a reference for the adjustment.







### (3) Adjusting the angle

Click   to adjust the angle to the appropriate position.

### (4) save configuration

After the adjustment is completed, click  the system will automatically save the calibration parameters, and the calibration will take effect after saving.

### (5) Lock calibration function

After the calibration is saved, click  again to lock the function to prevent misoperation. these      controls will return to normal functionality after being locked.

---

*Note: During the firmware upgrade process, keep the Lidar power supply, communication as well as network normal. Do not plug or unplug the serial port.*

---

## Software upgrade

The client software will be version-changed and users can update to the latest version for a better experience.

Click System Settings and select Update, as shown below:

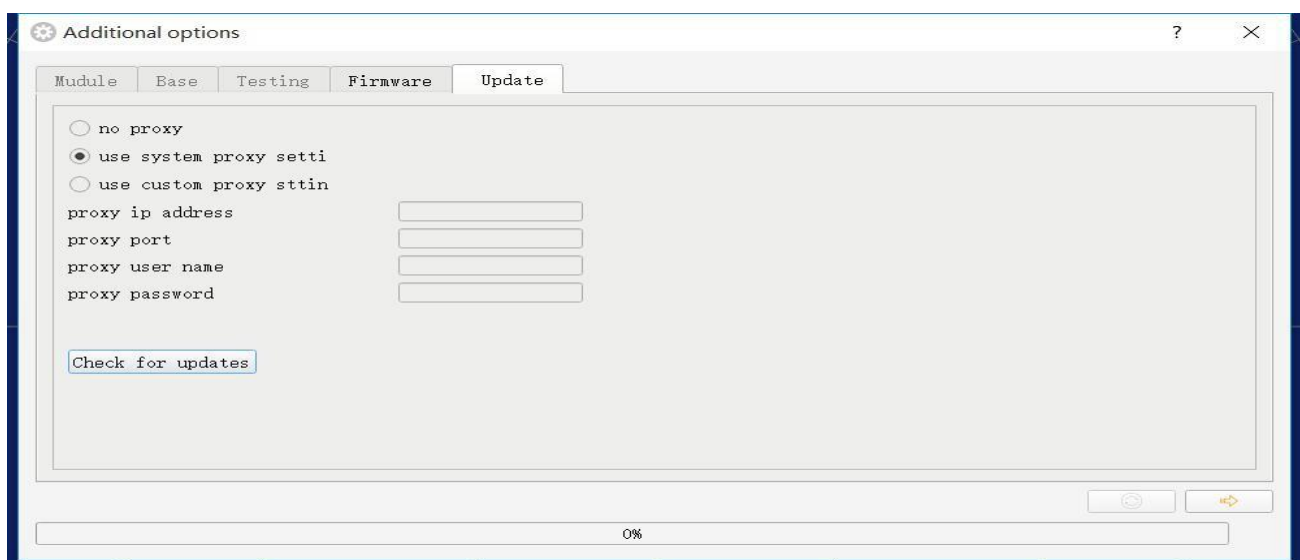


FIGURE 13 SYSTEM UPDATE PAGE

Select the configuration as shown above, click 'check for updates', if there is no new version, the system will prompt no update; when there is a new version, the software version information will be filled in the information box, click ➡ to update the client software.➡

## LINUX ROS OPERATION

Because there are many Linux versions, this article only uses Ubuntu 16.04, Kinetic version ROS as an example.

### Document description

Download the latest ROS driver package for YDLIDAR G4 on GitHub  
<https://github.com/YDLIDAR/ydlidar/tree/G4>;

### Device connection

Under Linux, the G4 and PC interconnect processes are consistent with those under Windows. See Device Connection under Window.

### ROS Driver Installation

Before doing the following, make sure that the Kinetic version ROS environment is installed correctly.

(1) Use the command to create the ydlidar\_ws workspace and copy the ROS driver package ydlidar in the G4 package to the ydlidar\_ws/src directory. Switch to the ydlidar\_ws workspace and compile again.

```
$ mkdir -p ~/ydlidar_ws/src  
  
$ cd ~/ydlidar_ws  
  
$ catkin_make
```

(2) After the compilation is complete, add the ydlidar environment variable to the ~/.bashrc file and make it effective.

```
$ echo "source ~/ydlidar_ws/devel/setup.bash" >> ~/.bashrc  
  
$ source ~/.bashrc
```

(3) Add a device alias /dev/ydlidar to the G4 serial port.

```
$ cd ~/ydlidar_ws/src/ydlidar/startup  
  
$ sudo chmod +x initenv.sh  
  
$ sudo sh initenv.sh
```

## RVIZ installation

### (1) Online installation

```
$ sudo apt-get install python-serial ros-kinetic-serial g++ vim \
ros-kinetic-turtlebot-rviz-launchers
```

### (2) If there is a problem with the installation, update the source cache and reinstall it.

```
$ sudo apt-get update
```

## RVIZ Check the scan results

Run the launch file and open rviz to view the G4 scan results, as shown in the following figure:

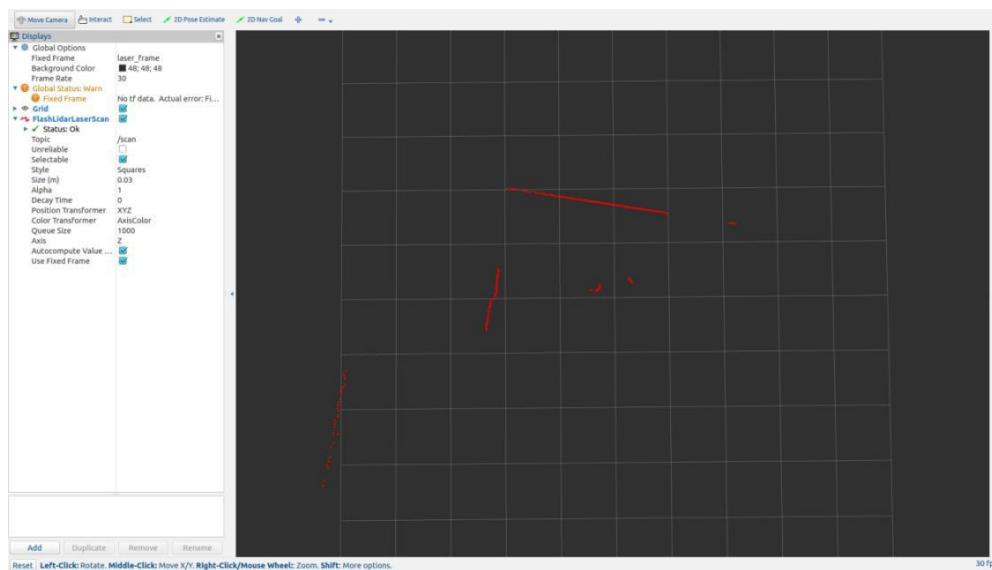


FIG14 YDLIDAR G4 RVIZ

## Modify the scan angle problem

The scanning data seen by running the launch file is displayed by default with 360- degree data. To modify the display range, you need to modify the configuration parameters in the launch file. The specific operation is as follows:

(1) Go to G4.launch's directory and use vim to edit G4.launch. The contents are as shown in the figure:

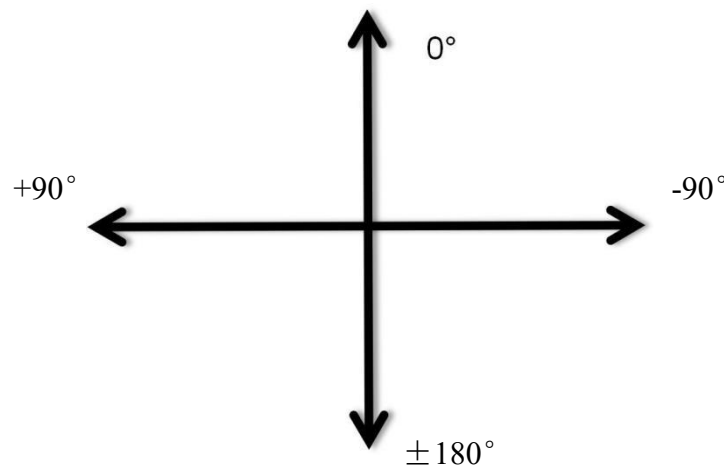
```
$ roscd ydlidar/launch
```

```
$ vim lidar.launch
```

```
<launch>
  <node name="ydlidar_node" pkg="ydlidar" type="ydlidar_node" output="screen">
    <param name="port" type="string" value="/dev/ydlidar"/>
    <param name="baudrate" type="int" value="115200"/>
    <param name="frame_id" type="string" value="laser_frame"/>
    <param name="angle_fixed" type="bool" value="true"/>
    <param name="intensities" type="bool" value="false"/>
    <param name="angle_min" type="double" value="-180" />
    <param name="angle_max" type="double" value="180" />
    <param name="range_min" type="double" value="0.08" />
    <param name="range_max" type="double" value="8.0" />
    <param name="ignore_array" type="string" value="" />
  </node>
  <node pkg="tf" type="static_transform_publisher" name="base_link_to_laser4"
    args="0.2245 0.0 0.2 0.12 0.0 0.0 /base_footprint /laser_frame 40" />
</launch>
```

FIG 15 LIDAR.LAUNCH FILE

- (2) The G4 lidar coordinates follow the right-hand rule within ROS, with an angle range of  $[-180, 180]$ . "angle\_min" is the start angle, and "angle\_max" is the end angle.  
The specific scope needs to be modified according to actual use.



## USE CAUTION

### Ambient temperature

When the working environment temperature of G4 is too high or too low, it will affect the accuracy of the distance measuring system. It may also damage the structure of the scanning system and reduce the life of the G4 lidar. Avoid use in high temperature ( $>50$  degrees Celsius) and low temperature ( $<0$  degrees Celsius) conditions.

### Ambient lighting

The ideal working environment for the G4 is indoor, indoor lighting (including no light) will not affect the G4 work. However, avoid using a strong light source (such as a high-power laser) to directly illuminate the G4's vision system.

If you need to use it outdoors, please avoid that the G4's vision system is directly facing the sun. This may cause permanent damage to the vision system's sensor chip, thus invalidating the distance measurement.

Please note that the G4 standard version is subject to interference in outdoor strong sunlight reflection environments.

## **Power demand**

During the development process, since the drive current of the USB interface of each platform or the USB interface of the computer may be too low to drive the G4, the external power supply of the +4V to the G4 needs to be provided through the USB\_PWR interface of the USB interface board. It is not recommended to use mobile phone power bank because the voltage ripple of some brands of power bank is too large.