Basic Sensor Setup

IP Address: 192.168.1.77

Ethernet

GPS

IP Address: 192.168.1.201

9-32 VDC

IP Address: 192.168.1.201

Ethernet

GPS

IP Address: 192.168.1.201

9-32 VDC
Connect the computer to the interface box with an Ethernet Cable

– A GPS connection is not necessary at this point.

Apply power to the sensor.

For now, disable the WiFi connection on your computer.

Configure your computer’s IP address on its Ethernet port to manual mode.

Set your computer’s IP address to 192.168.1.77

– “77” can be anything except 0,255, or 201

Set the subnet mask to 255.255.255.0

Pull up the sensor’s webserver interface by typing the sensor’s network address, 192.168.1.201, into the address bar in your web browser.
Configure the Ethernet connection on your computer (Windows 7)
1. Open the Control Panel
2. Select “Network and Internet”
3. Select “Network and Sharing Center”
4. Select Local Area Connection
Press “Properties”

2. Press “Properties”
1. Configure the IP address and Subnet mask as shown.

2. Press “OK”
Manual IP Configuration – Windows 5 of 6

Press “OK”
Press “Close”
Configure the Ethernet connection on your computer (Mac OS)
Manual IP Configuration – Mac

1. Go to System Preferences
2. Select “Network”
3. Select the Ethernet Connection
4. Configure the IP address as shown
5. Press “Apply”
6. Close window
To pull up the VLP-16 webservice user interface

Type “http://192.168.1.201”

into your web browser’s address bar
System Screen

![System Screen Image]

Velodyne LiDAR System Screen with details:
- Sensor Model: VLP-16
- S/N: AE02811163
- MAC: 60-76-88-10-2b-9b

**Update Firmware**
- File Name: Choose File
- Update

**Update Calibration**
- File Name: Choose File
- Update

**Configuration**
- Info
- Diagnostics

**GPS Position:** Absent
**PPS:** Absent
**Motor State:** On
**RPM:** 599
**Lock:** Off
**Phase:** 0

**Laser State:** On
# Info Screen

![Velodyne LiDAR Info Screen](image)

**Sensor Model:** VLP-16  
**S/N:** AE02811163  
**MAC:** 60-76-88-10-2b-9b

### VLP-16 User Interface

#### FPGA

<table>
<thead>
<tr>
<th>Board</th>
<th>Mode</th>
<th>Type</th>
<th>HW Version</th>
<th>SOPC SYSID</th>
<th>SW Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>Application, Watchdog: Enabled</td>
<td>1</td>
<td>3.0.26.0</td>
<td>hdltop(10)</td>
<td>3.0.26.0</td>
</tr>
<tr>
<td>Bottom</td>
<td>Application, Watchdog: Enabled</td>
<td>2</td>
<td>3.0.26.0</td>
<td>hdlbot(03)</td>
<td>3.0.26.0</td>
</tr>
</tbody>
</table>

#### Firmware

<table>
<thead>
<tr>
<th>Image</th>
<th>Version</th>
<th>SOPC SYSID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failsafe</td>
<td>3.0.15.0</td>
<td>boot(00)</td>
</tr>
<tr>
<td>Application</td>
<td>3.0.26.0</td>
<td>hdlbot(03)</td>
</tr>
</tbody>
</table>

**GPS Position:** Absent  
**Motor State:** On  
**RPM:** 598  
**Lock:** Off  
**Phase:** 0  
**Laser State:** On
Diagnostics Screen

[Image of a Velodyne LiDAR diagnostics screen showing sensor model details, voltage readings, and status info]
Changing Operating Parameters

To change operating parameters, press the “Set” button after typing in a change.

To write the operating parameters to non-volatile RAM, and retain the value over a power cycle, press the “Save Configuration” button.
Changing The Return Type

The user can chose between three return modes: **Strongest**, **Last**, and **Dual**.

If you choose Dual mode the data rate of the sensor doubles.
Changing The RPM

Valid values for the RPM are integer numbers in the range of 300 to 1200.
Some users are not interested in collected data from the complete 360° range of the sensor. To eliminate unwanted returns, the user can select their own field of view (FOV). Valid entries are integer numbers from 0 to 359.
Using the Phase Lock Feature

When using multiple sensors in proximity to one another, it may be advantageous to have the timing of the sensors offset by a fixed amount. The Phase Lock feature requires that the GPS PPS signal be present and locked.
Phase Lock Example

The blue arrow indicates the direction of the sensor’s laser firing at the moment it receives the rising edge of the PPS signal.

Physical 0° Position

Phase offset at 0°

Physical 0° Position

Phase offset at 45°

Physical 0° Position

Phase offset at 135°

Top View
Changing The Network Address

Be careful not to change the network address to a value that is unreachable from your computer.

Never set the Network (sensor) address to 255.255.255.255.

If you can’t reach your sensor via the web server interface, use a program like Wireshark to determine the network address of your sensor.

It’s best to operate the sensor on it’s own network segment. Due to the volume of data produced by the sensor, avoid using the sensor on a corporate network.
The goal of the GPS Synchronization is to match the time stamp from the sensor to UTC time.

Two things must occur for this to happen.
- The sensor must see a $GPRMC on its serial line.
- The sensor must receive a valid PPS signal.

To ensure synchronization, the user’s software should do two things:
- Check the PPS Synchronization Status field in the position packet (location offset 0x00F4)
- Check to see the Navigation Receiver Warning field in the $GPRMC message is “A,” indicating a valid fix (location offset 0x0106)
• The data at location offset 0x00F4 in the position packet indicates the status of the PPS lock.

• The possible states are:
  – 0: Absent
  – 1: Attempting to Synchronize
  – 2: Locked
  – 3: Error
GPS Synchronization

When there is no GPS connected, the position field will be empty and the PPS field will read “Absent.”
When a pre-programmed Garmin GPS (available from Velodyne) is connected, the Garmin provides its last known position, but if the GPS is not locked on the satellites, the PPS field will read absent.

The behavior of other GPS receivers may vary.
When a GPS is connected, and the PPS is present, the PPS status field will read “Locked.”

Note - this does not indicate the time is synchronized.
Position Packet Example – Not Sync’d

PPS Synchronization Status field = 0 indicates PPS absent

The “V” in the $GPRMC Navigation Receiver Warning field indicates the GPS receiver cannot guarantee the accuracy of the position fix.
PPS Synchronization Status Field = 2 indicates sensor has locked on the PPS.

For time synchronization to occur, the PPS field must be locked and the sensor must be receiving valid $GPRMC messages with an "A" in the Navigation Receiver Warning field.

It is the user’s responsibility to check that both conditions are met.

The “A” in the $GPRMC Navigation Receiver Warning field indicates a valid location fix and time.
Thank You!