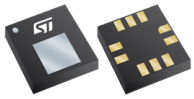
ALTIMETER

databot™ Sensor Starters

Meet the Altimeter



The Altimeter calculates your current **altitude** based on **air pressure**. Altimeters are important navigation instruments for aircraft and spacecraft pilots who monitor their height above the Earth's surface! Altimeters are also used by skydivers and mountaineers to pinpoint their location in the sky or on the ground.

Grades: 6 & Up
Time: 15 Minutes - PDQ 1 & 2
Subject: Physics, Technology
Topics: Altitude, **Air Pressure**, **Sea Level**, and **Calibration**

What Does it Measure?

The Altimeter measures **altitude**, how high you are above **sea level**. This is different from height, which is relative, like the height from the floor to the ceiling. **Altitude** is the distance from mean **sea level** to the point being measured. For example, the **altitude** of an aircraft is its height above **sea level**, not from the ground.

How Does it Work?

databot™'s altimeter determines **altitude** by measuring the force of **air pressure** on a pressure sensitive area in the sensor. As the **altitude** increases, **air pressure** decreases as there is less air above you.

High Altitude, Low Pressure

What Are the Units for Altitude?

The meter (m) is a unit for **altitude**. The most widely used unit of measurement in aviation is feet. Areas are considered "high-altitude" if they reach at least 2,400 meters (7,800 feet) into the atmosphere.

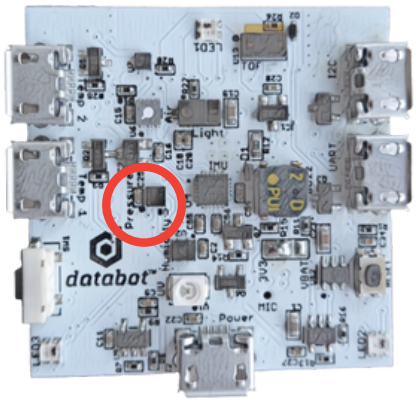
Location	Altitude	Range
Mount Everest	High altitude Point on Earth	8,850 meters above sea level
El, Alto, Bolivia	High altitude City on Earth	4,150 meters above sea level
The Dead sea	Low altitude Point on Earth	414 meters below sea level
Jericho, Palestinian	Low altitude City on Earth	258 meters below sea level

What You Will Need/Prep

- databot™ 2.0 & a smart device (iOS or Android).
- Read the Vizeey™ Fast Start Guide and install Vizeey™ if you haven't already.
- Scan the QR code for Calibration: Altitude and Altitude if you don't have it already.

Where Does it Live?

The **air pressure** (altimeter) sensor is a black square chip with a tiny silver square in it. Look closely near the Temp1 port on databot™ for the Pressure label and you will see it!



Important Terms

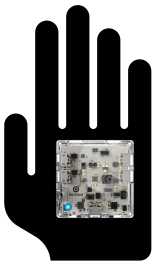
Air Pressure: The air around you has weight, and it presses against everything it touches. That pressure is called atmospheric pressure, or **air pressure**. It is the force exerted on a surface by the air above it as gravity pulls it to Earth.
Altitude: Distance above **sea level**.
Calibration: The process of matching your test instrument to a known measured quantity.
Sea level: The average level of the sea compared to land. For example, mountain heights are based on height above **sea level**.

ALTIMETER

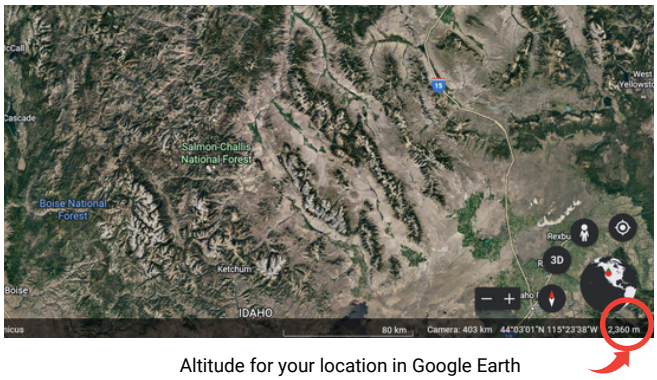
PDQ1 : Let's Get Adjusted!

Calibration is the process of aligning (calibrating) a test instrument like databot™ with a known measurement. You may have calibrated a scale before using a known weight and setting the scale to match that weight. databot™ has Altitude that require a calibration to properly set it for your local environment:

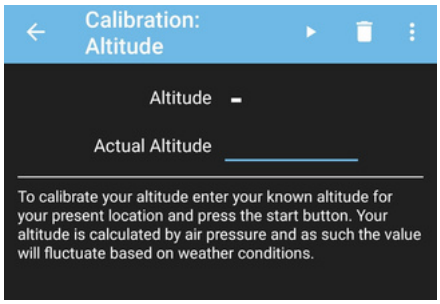
1. To calibrate your altitude, look up your altitude at a known location. You can use tools like **Google Earth** if you are not sure of your present altitude.
2. Tap on **Calibration: Altitude** in Vizeey™ to load the experiment.
3. Hold databot™ in the palm of your hand in the "home" position shown and enter the known altitude value (in meters)as input for **Actual Altitude**.
4. Hit the start ▶ button and wait for the value to update.
5. That's it. Unless you update your firmware and overwrite your databot™ firmware it will remember this setting. If you change locations you may wish to re-calibrate.



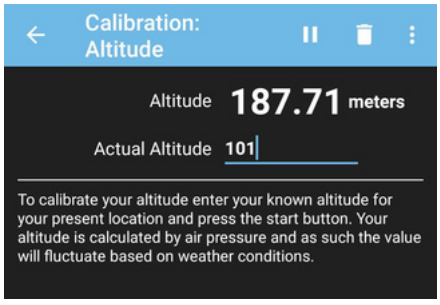
Home Position



Altitude for your location in Google Earth



Before entering the actual altitude value

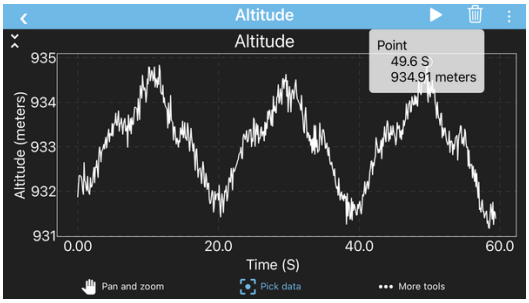


After entering the actual altitude value

PDQ2 : Climb Up! Measure Accuracy

databot™'s altimeter calculates current **altitude** based on **air pressure**. Since **air pressure** constantly fluctuates due to changes in temperature and other environmental conditions databot™'s **altitude** will be effected. Consequently, we don't recommend using the databot™ altimeter for hang-gliding, it is not intended for that type of mission critical use. How accurate do you think the altimeter is based on **air pressure**? Let's find out! Find a suitable staircase for you can climb to test databot™'s accuracy.

1. Tap on **Altitude** in Vizeey™ to load the experiment.
2. Hold databot™ in the palm of your hand in the "home" position, hold it level, and begin recording using: ▶ ⏸
3. Walk up and down the set of stairs three times while recording.
4. Stop the recording, expand the graph, and use the "Pick Data" tool, identify the highest and lowest points, and subtract to determine the height according to your data.
5. Now measure the staircase height with a tape measure. How close was your altimeter reading based on **air pressure**?



Find a suitable staircase and go up and down one flight of stairs three times. You will generate a graph similar to the one shown above. Subtract the low point from the high point to determine the height. Average the three values for more precision.

*Measure the height of the stairs and compare to your findings with databot™. How accurate is the altimeter based on **air pressure**?*