

## Density Altitude Calculator

- using dew point -

To use the calculator, simply enter the elevation, air temperature, altimeter setting and dew point, select the units, and then click the calculate button.

Density Altitude Calculator				
Elevation	5055	<input checked="" type="radio"/> feet	<input type="radio"/> m	
Air Temperature	78.8	<input checked="" type="radio"/> deg F	<input type="radio"/> deg C	
Altimeter Setting	30.31	<input checked="" type="radio"/> in Hg	<input type="radio"/> hPa	
Dew Point	48.2	<input checked="" type="radio"/> deg F	<input type="radio"/> deg C	
<div>CalculateReset</div>				
Density Altitude	7170	feet	2185	m
Absolute Pressure	25.18	in Hg	852.7	hPa
Air Density	0.0617	lb/ft <sup>3</sup>	0.988	kg/m <sup>3</sup>
Relative Density	80.65	%	80.65	%
Estimated AWOS	7000	feet	2134	m
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### Additional Information:

(Click [here](#), for a version of this [calculator with metric defaults](#).)

Example calculations:

Example 1: at 5050 feet elevation, 95 deg F air temp, 29.45 inches-Hg barometric pressure and a dew point of 67 deg F, the Density Altitude is calculated as 9252 feet.

Example 2: at 1540 meters elevation, 35 deg C air temp, 997 hPa barometric pressure and a dew point of 19 deg C, the Density Altitude is calculated as 2821 meters.

The metric unit hPa (hectoPascal) is identical to the pressure unit called mb (milliBar).

Air density is affected by the air pressure, temperature and humidity. The density of the air is reduced by decreased air pressure, increased temperatures and increased moisture. A reduction in air density reduces engine horsepower, reduces aerodynamic lift and reduces drag.

Relative humidity and altimeter setting data in the USA is available from the National Weather Service (NWS) and the Federal Aviation Administration (FAA).

Drag racers and engine tuners... take a look at the features in the [Engine Tuner's Calculator](#). The engine tuner's calculator includes relative horsepower, air density, density altitude, virtual temperature, absolute pressure, vapor pressure, relative humidity and dyno correction factor.

### **Input Values:**

Elevation (also called Altitude) is the geometric elevation above mean sea level.

Air Temperature is the measured air temperature.

Altimeter Setting is the value in the altimeter's Kollsman window when the altimeter is set to correctly read a known elevation.

Note: For more information about ambient air pressure measurements see the [pressure measurement page](#).

Dew Point is the temperature at which the water vapor in the air will begin to condense into liquid water.

Note: Calculations using dew-point are often more accurate than those using relative humidity because the dew point is fairly constant for a given air mass and changes very little until another air mass arrives, while the relative humidity varies greatly as the ambient temperature changes.

### **Output Values:**

Density Altitude is the altitude in the International Standard Atmosphere which has the same density as the air being evaluated.

Note: The ICAO International Standard Atmosphere standard conditions for zero density altitude are zero meters (zero feet) altitude, 15 deg C (59 deg F) air temp, 1013.25 mb (29.921 in Hg) pressure and zero % relative humidity (no water vapor in the air).

Note: If the calculated air density is greater than the standard sea level air density, the calculator will show a negative altitude, that is, an altitude below sea level, which is merely the result of a mathematical extrapolation of the standard atmosphere, even though such an altitude may not exist in free-air.

Absolute Pressure is the actual air pressure, not corrected for altitude, and is also called the station pressure.

Air Density is the mass per unit volume of the air. For example, the standard air density at sea level is 1.225 kg/m<sup>3</sup> (0.076474 pounds/ft<sup>3</sup>).

Relative Density is the ratio of the actual air density to the standard sea level density, expressed as a percentage.

Estimated AWOS uses equations from the US National Weather Service to calculate approximately the same density altitude as reported by the current ASOS and AWOS-3 automated weather observation stations which

are in widespread use around the US, most commonly located at (or near) airports.

Note: Due to rounding of decimal values, the AWOS estimate on this page may occasionally differ from the ASOS/AWOS-3 reported density altitude, but is generally within  $\pm 100$  feet. The current ASOS/AWOS-3 reports apparently do not account for the moisture content of the air, and are therefore somewhat lower than the actual Density Altitude (as shown by this calculator) when the relative humidity is high. Also, note that ASOS/AWOS-3 stations only report density altitude when it is more than 1000 feet greater than the station elevation, and the reported value is rounded to the nearest 100 feet.

### Resources:

For more technical details about the calculations that determine density and density altitude, take a look at my [Density Altitude](#) page.

Also, there are several conversion calculators available from [El Paso NWS](#).

**Disclaimer:** This calculator is for educational purposes only and should not be relied upon for flight planning.

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