



HEIGHT ALTITUDE FLIGHT LEVEL

1. Definition

There are several ways to indicate the vertical position of aircraft and/or obstacles, each has another meaning and is used in a particular situation:

- height
- altitude
- flight level

2. Units

In general, vertical positions are expressed in **FEET (ft)**.

In some parts of the World, such as in the Russian Federation and China, vertical positions are expressed in **METERS (m)**.

ft (feet) is sometimes abbreviated by the sign ' (for instance 1000' = 1000 ft).

Depending on the aircraft equipment, the **pressure altimeter** will only accept a sub-setting:

- in **hecto Pascal (hPa)**
- **Inches of Mercury (in Hg)**.



Example of an altimeter with the setting displayed in inches of Mercury



Example of an altimeter showing both units of setting: (red = inHg ; blue = hPa)

Most altimeters in hPa don't show decimals. In that case, select the nearest value. If not able to select 1013,25 then, select 1013 hPa.

Some pressure altimeters show a millibar (mB) setting instead of hPa. This is not a problem since 1 mB = 1 hPa.

Height Altitude Flight level	Version 1.3	January 9, 2015	Page 1
© IVAO HQ training department	Training Documentation Manager Erwan L'hotellier		

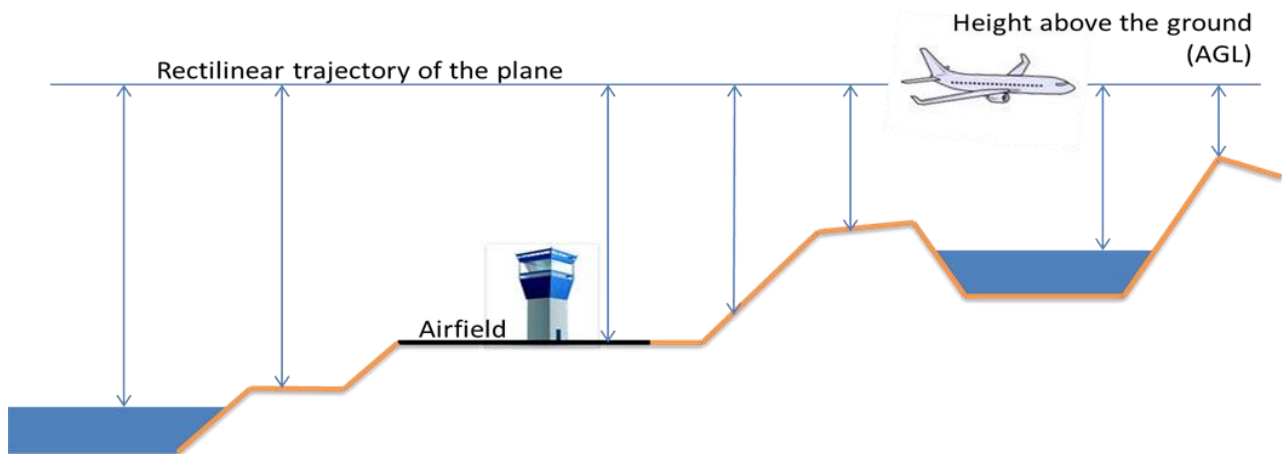
3. Height, altitude, flight level

3.1. Height and QFE

The **HEIGHT** is the vertical distance of an aircraft above whatever SURFACE (buildings, mountains, a lake, etc.).

QFE is the atmospheric pressure at a specified datum such as an airfield runway threshold. When set, the altimeter reads the height above the specified datum.

HEIGHT is expressed in **feet AGL** (Above Ground Level).



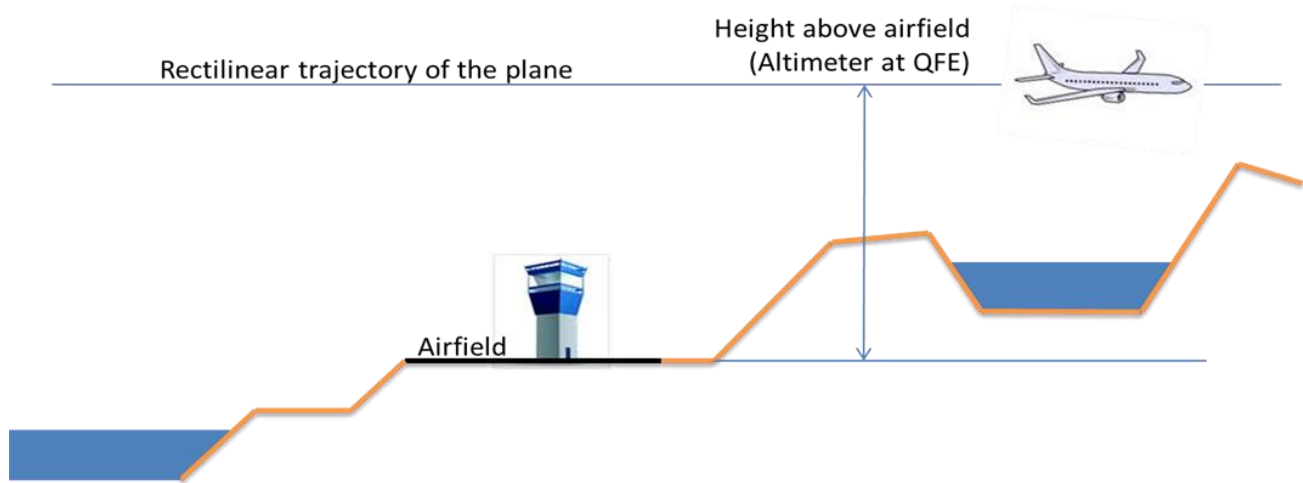
A **radio-altimeter** indicates the **HEIGHT** above whatever you are flying at that moment, not just the airport!



Example of radio altimeter

By setting the **QFE** value of an airport, the **altimeter** will show, all the time, the **HEIGHT above that airfield**. On the ground at the airfield, the altimeter will show **0 ft** (zero). The higher is the airport elevation, the lower is the QFE.

Height Altitude Flight level	Version 1.3	January 9, 2015	Page 2
© IVAO HQ training department	Training Documentation Manager Erwan L'hotellier		



Disadvantages:

Because an airfield is often located lower or higher than the surrounding airfields, the QFE for each airfield will be quite different, even if they are a few miles apart.

Each time a pilot flies over another airfield, he has to change his altimeter sub-setting to the QFE of that airfield - not very practical solution!

Be careful, QFE is never used to separate aircraft vertically!

3.2. Altitude, QNH and elevation

An ALTITUDE (ALT) is the vertical distance of an aircraft above the MEAN SEA LEVEL (MSL).

For objects and obstacles on the surface of the earth, the word ELEVATION (ELEV) is used instead of altitude.

QNH is the atmospheric pressure at mean sea level (may be either a local, measured pressure or a regional forecast pressure (RPS)). When set on the altimeter it reads altitude.

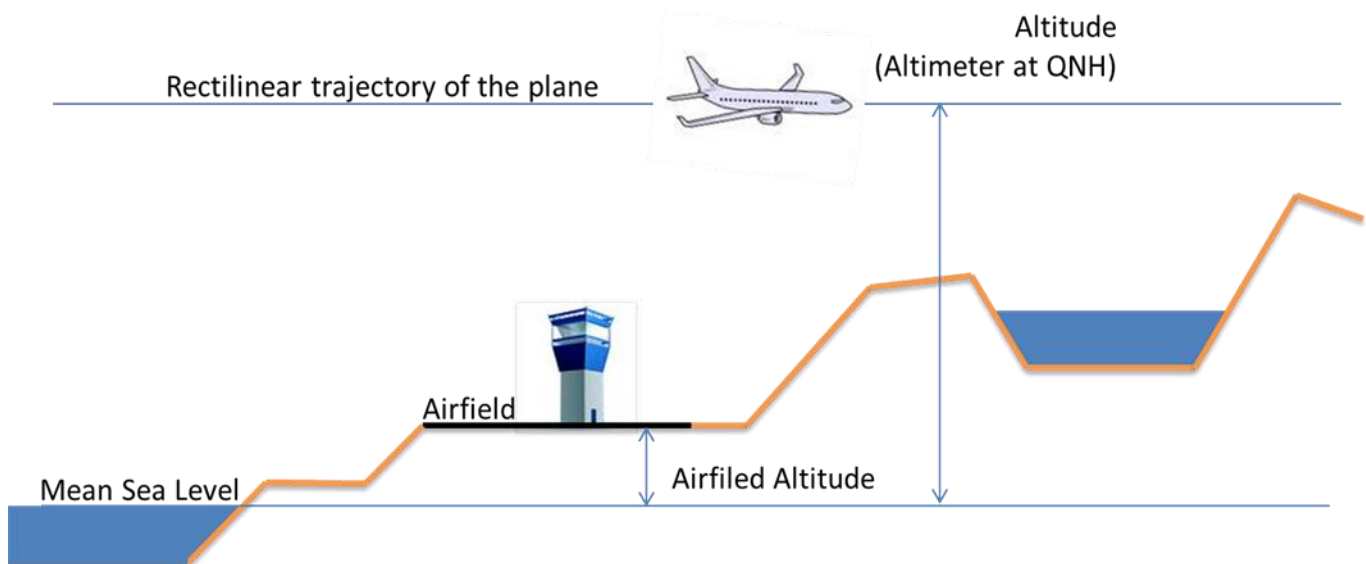
ALTITUDES and ELEVATIONS are expressed in **feet AMSL** (Above Mean Sea Level).

When an airfield QNH value is set on the aircraft's pressure altimeter, this altimeter shows ALTITUDE.



Example of pressure altimeter

Height Altitude Flight level	Version 1.3	January 9, 2015	Page 3
© IVAO HQ training department		Training Documentation Manager Erwan L'hotellier	

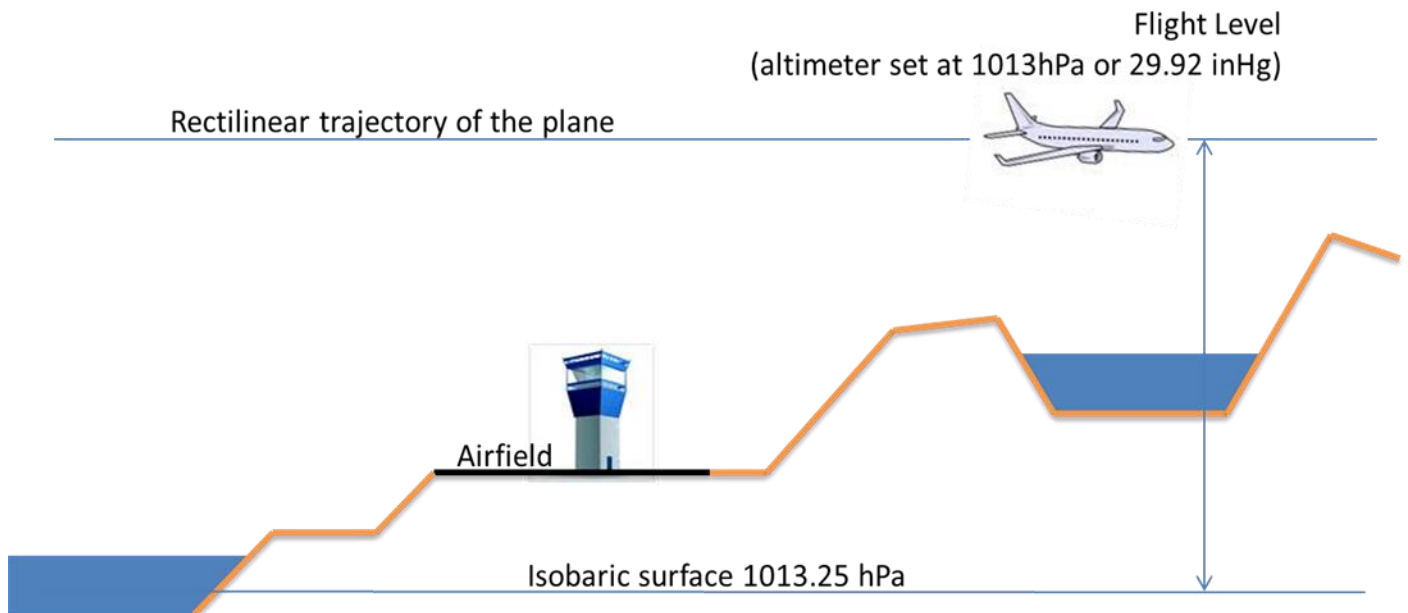


On the ground at an airport, the altimeter will (approximately) show that airfield altitude or elevation, when the aerodrome QNH is set on the aircraft's altimeter.

Commonly, the QNH altimeter setting is used worldwide at or below the transition altitude (TA) or below 3000ft AGL.

3.3. Flight level and standard pressure

A Flight Level (FL) is the vertical distance of an aircraft **above the ISOBARIC SURFACE of 1013.25hPa** (hecto Pascal) **or 29.92 in Hg** (inches of Mercury).



Height Altitude Flight level	Version 1.3	January 9, 2015	Page 4
© IVAO HQ training department	Training Documentation Manager Erwan L'hotellier		

An **ISOBARIC SURFACE** is the **invisible landscape** that connects all points with the same atmospheric pressure. In aviation, 1013.25hPa (hector Pascal) / 29.92 in Hg (inches of Mercury) are referred to as **the STANDARD altimeter setting**.

The Flight Level is written using the two letters FL with the altitude (at standard QNH) in feet, without the two digits at the end:

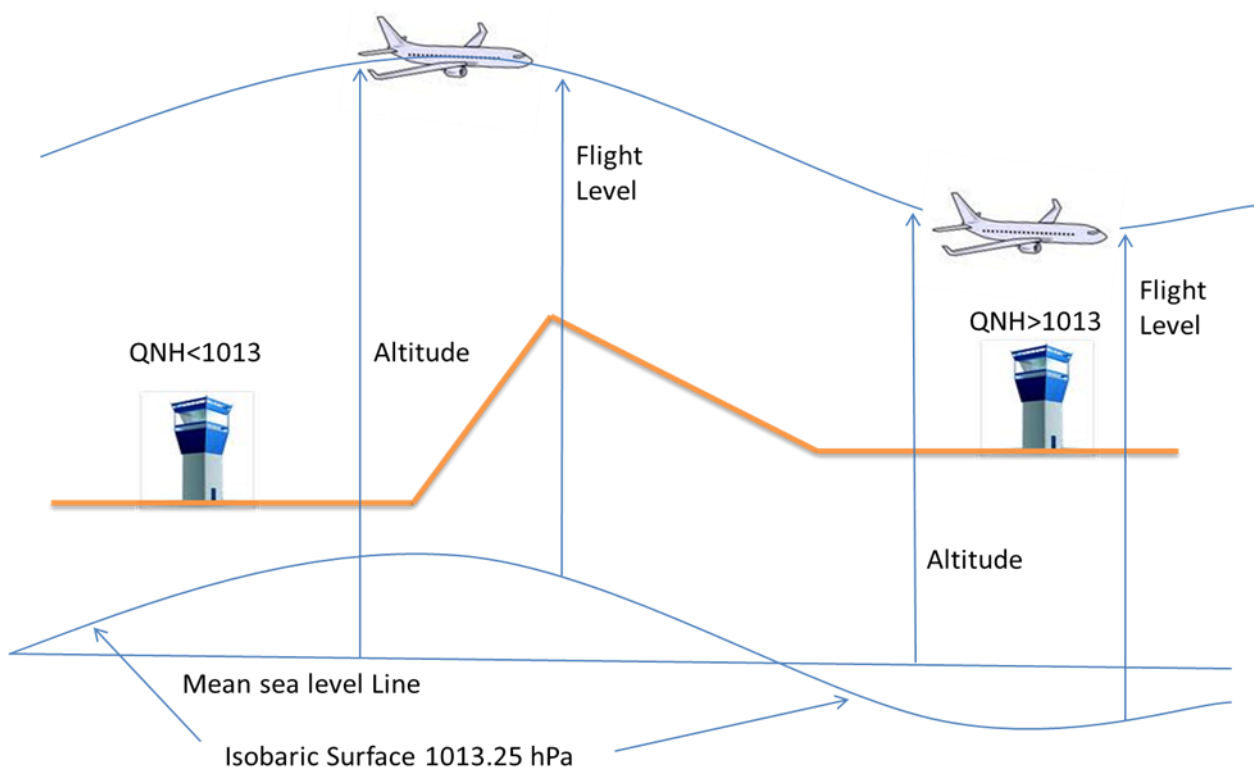
- 10000 feet becomes Flight Level 100 = FL100
- 6500 feet becomes Flight Level 65 = FL65

Commonly, the standard altimeter setting is used worldwide at or above the transition level (TL).

4. Isobaric surface curve

Because of differences in location, different airfields have different QNH values. Then, the 1013.25hPa isobaric surface is a fictive curve which can be greater or lower than the mean sea level fictive surface.

When maintaining a flight level, all aircraft have the same reference in order to maintain separation between them with that same reference, but you must know that the aircraft altitude (when following a flight level) changes slowly in conjunction with the local QNH.



Height Altitude Flight level	Version 1.3	January 9, 2015	Page 5
© IVAO HQ training department	Training Documentation Manager Erwan L'hotellier		