SEA LEVEL PRESSURE
Reference Guide

This reference guide is an excerpt from the Mintaka Duo™ / Mintaka Duo+™ / Mintaka Star ™ User's Guide, which can be viewed in its entirety at mintakainnovations.com/support.

Introduction: Station Pressure vs. Sea-Level Pressure (SLP)

Although other terms are often used, only two values of atmospheric pressure matter for most applications, station pressure and sea level pressure.

Station pressure is the value of the atmospheric pressure at the location and elevation of the instrument. It is the weight of the atmosphere (per unit area) from the instrument's elevation on up to the top of the atmosphere.

Sea level pressure, on the other hand, is a computed value of the pressure that is intended to represent what your instrument would read at this moment if it could (hypothetically) be lowered to sea level at your location. When inland at an elevation of 300 ft above sea level, it would be the pressure your instrument would read if you lowered it into a hole that was 300 ft deep. As you lower it down, there is more and more atmosphere above it, so the weight of the air above it and the corresponding pressure increases as it lowers. Sea level pressure is always higher than station pressure–unless your barometer happened to be located below mean sea level, which is possible at ground level at a few locations, and often the case in mining applications.

Depending on your application, you will want to display either sea-level pressure or station pressure on your Mintaka Duo™/Duo+™/Star™. Sea level pressure is commonly abbreviated SLP.

If your main interest in atmospheric pressure is related to weather, then you will most likely want to display sea level pressure (SLP), regardless of the location or elevation of your Mintaka Duo™/Duo+™/Star™. Essentially all broadcast or published weather reports are given in terms of SLP, and all weather maps identify the isobars of constant pressure in terms of SLP. Furthermore, if you are reporting your weather observations to another agency or broadcast station, they will expect your reported pressure to be SLP.

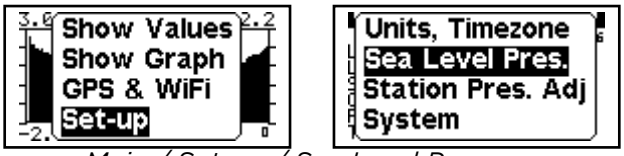
Thus if your application is weather related, you will want to adjust the instrument to show SLP. The step by step procedure is explained in the following section. It does not matter if you are in a boat with the instrument at 6 ft above sea level or in Sante Fe, NM at 7,000 ft above sea level. The procedure is the same for adjusting the instrument to display SLP.

Other applications of accurate atmospheric pressure do not care at all about SLP. They care only about the actual pressure right at the location of the instrument, which is the station pressure. If you are, for example, tuning an engine, or calibrating a medical instrument in a hospital, or setting controls on a sensitive air conditioner, or documenting life raft leak rates, or setting controls on a regional power station, it is the actual value of the pressure at the test site that matters. The weather causing it and changes introduced by instrument elevation above sea level do not matter. Station pressure applications require no change to the default.

Changing the Mintaka Duo™/Duo+™/Star™ to Display Sea Level Pressure

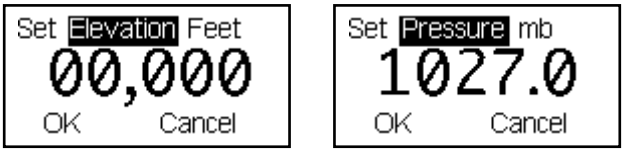
There are two ways to set the Duo™/Duo+™/Star™ to display Sea Level Pressure (SLP). You can use a known value of the SLP at the present time and location of the instrument, or you can use the known elevation of the instrument at its present location.

The sequence [EXIT] / [Set-up] / [Sea Level Pres]:



Main / Set-up / Sea Level Pressure

Displays the screen where you can choose between setting SLP by the known elevation of the instrument at its present location (Elevation) or a known value of the SLP at the present time and location of the instrument (Pressure):



Sea Level Pressure Options: Elevation or Pressure

The choice is made using the [±] buttons, which will change the mode in the highlighted area, then press [SELECT] to move the cursor where the data are entered.

In the examples above the default settings of Feet and mb is displayed. These can be changed on the Set-Up / Units, Timezone screen.

Set Sea Level Pressure by Elevation

After selecting Elevation, the first digit on the left of the elevation input will be highlighted and ready to change. Use the [±] buttons to set this digit correctly, and then press [Select]. After all digits are entered correctly, highlight OK and press [SELECT].

You can move the highlight with [SELECT] or [EXIT]. Likewise to cancel the operation, highlight Cancel and press [SELECT]. For example, from the above screen, to enter 130 ft, you would press [SELECT] twice to get to the hundreds digit, then press the [+] key once, then [SELECT], then [+] key three times, then [SELECT], and again [SELECT] to enter the final 0, and one more [SELECT] to highlight OK and a final [SELECT] to record your elevation.

The proper elevation to use would be the elevation of the ground at your location plus the additional height of the instrument above ground level. This additional height above the ground is called the Removal Correction. This will then correct the pressure to sea level, and store that elevation.

Once this elevation has been entered, your display screens will be labeled SLP, which is a reminder that you are reading the equivalent sea level pressure. To return to Station Pressure, repeat the process and enter all zeros for the elevation offset.

This correction can be entered when the instrument is at any location, but the displayed sea level pressure would only be correct when the instrument is located at the elevation entered and stored in the unit.

The accuracy of the displayed SLP depends on the accuracy of the elevation offset that is entered. The pressure changes at a rate of 0.44 mb per 12 ft, so an error of 6 ft would cause a display error of about 0.2 mb. Accurate ground elevations can be found from a topographic map (viewer.nationalmap.gov) or from online services like Google Earth.

If you are installing the instrument on a vessel at sea and wish to read SLP as accurately as possible, then you may be able to assume that mean sea level is indeed the level of the water and the Removal Correction is the distance from water level to the instrument installation, which is the only correction needed. If your vessel is in tidal waters, however, mean sea level may not coincide with the water level. Mean sea level is nearly equal to the mean tide level which is halfway between mean low water (MLW) and mean high water (MHW). The Removal Correction in this case would be the same Removal Correction (instrument to waterline) plus the MSL Correction of (Tide - MHW) + (MHW-MLW)/2. Full correction is: Removal Correction + MSL Correction.

Set Sea Level Pressure by Pressure Value

The alternative way to set the instrument to SLP is to set it directly to a known value of the SLP at your location at the time you choose to set it. The procedure for entering the digits is the same as described for entering an elevation, only the highlighted selection is Pressure.

Commercial weather broadcasts on radio or TV are a good starting point for obtaining accurate sea level pressure for your location, but they may not be as dependable as more primary sources. Online sources of accurate SLP are:

- Weather maps at http://www.opc.ncep.noaa.gov
- Metar reports at https://www.aviationweather.gov/adds/metars
- Buoys and Lighthouses at http://www.ndbc.noaa.gov

After entering a SLP, all other pressures reported in the instrument will be marked SLP as a reminder that you have entered this offset.

When you change the display from Station Pressure to SLP by entering the correct SLP, it is equivalent to entering the corresponding elevation for the instrument. Thus when you return to the Set SLP by Elevation menu you will see the equivalent elevation has been filled in. To return the instrument to reading Station Pressure, simply change that elevation back to all zeros.