Some notes about cloud detection and the CloudWatcher

Cloud detection is, unfortunately, not straightforward. Nobody has yet found a fail-proof way to determine the degree of cloudiness of the sky, other, of course, than the human eye—and then not always!

The CloudWatcher, like most devices, uses **IR measurement** as the basic tool to determine whether the sky is clear or not.

A clear sky has a lower IR reading than a cloudy one.

Other conditions, however, also affect the measurement, such as the ambient temperature, the humidity, the density and size of particles in the atmosphere... there is no good formula to quantify these contributions.

The traditional approach has been to subtract the ambient temperature from the infra-red reading, and use that to determine the cloudiness. The CloudWatcher improves this approach by adding some factors to further correct for local conditions (**the "K" factors**); the contribution of local temperature is not the same in a very cold climate versus in a coastal warm one, for example.

In our experience, there are two valid approaches to lead to very reliable cloud detection, depending on the conditions: frequent calibration, and good calibration.

—**Frequent calibration**: if you can see the sky above your observatory often, in person or via a good AllSky camera, you can then tweak the limits (the clear – cloudy – overcast thresholds). A very clear sky will be for sure at least 10°C colder than a slightly cloudy one, usually even more.

It's ideal to see the sky in the clear – cloudy transition, with light clouds, and use that as the limit.

For example: IR is reading 0°C and the sky is "just cloudy". We could use -2°C for the clear (so colder than -2°C will be deemed clear) and 5°C as the overcast limit (hotter than 5°C will be marked as overcast).

(the difference between cloudy and overcast is recommended to be in the 5°C to 10°C range).

—**Good calibration**: this involves finding the best K-factors for the local conditions. We'll need to observe the cloud conditions graph for the time between sunrise to sunset for a good clear day.

This procedure is more involved, and is explained in detail in the relevant section of the online manual.

In both cases, and specially with seasonal weather changes, one should expect the limits clear / cloudy / overcast to need attention.

In many climates—other than quite extreme ones—the default K-factors, and some adjustment to the limits a few times every year are quite enough.

Some other notes:

—it is important to install the unit as far from IR sources as possible. Over a roof, while convenient, is not the best idea.

—atmospheric phenomena (desert dust, high humidity, thin particles in the air...) do have an impact, increasing the IR readings.

—high, thin clouds can be very cold and extremely difficult to detect

—it is also worth reading this information to understand the rationale behind the CloudWatcher K-factors

—even with the best cloud detection, sometimes rain falls from a clear sky—especially in certain places—so the rain sensor is an absolute necessity.

The CloudWatcher is a reliable device that helps protect valuable equipment. If neglected, the result is wasted clear, dark nights or, even worse, equipment damage. Check the suitability of the settings from time to time.
