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The New Vaisala Ceilometer CL31

Since the introduction of the Laser Ceilometer CT12K in the 1980s, Vaisala has been the leading manufacturer of cloud height sensors. The recently launched Vaisala Ceilometer CL31 represents the latest expertise in ceilometer technology. Based on the second generation of tried and tested Vaisala single lens optics, it offers accurate cloud height and vertical visibility measurements in all weather conditions.

Since the Vaisala Ceilometer CT25K, introduced in 1995, single lens technology has established its position as the leading technology for laser ceilometers. Compared to the traditional two-lens design, the main advantage of a single lens ceilometer is the good overlap of the emitted laser beam and the receiver field of view even at the lowest altitudes. This enables reliable detection of even the lowest clouds and ground based obscurations, the most critical phenomena from the point of view of aviation safety. The new Vaisala Ceilometer CL31 is based on an enhanced version of the Vaisala single lens technology, providing an even more robust solution for cloud height measurement.

Robust design

The coaxial optics have been further developed in the new Ceilometer CL31. The lens has been divided into transmitting and receiving areas; the center of the lens is used for collimating the outgoing laser beam, whereas the outer part of the lens is used for focusing the backscattered light onto the receiver.

This solution significantly reduces the optical cross-talk between the transmitter and the receiver. Due to the lower level of optical cross-talk, the need for separate compensation mechanisms is avoided, leading to a simpler and more robust instrument design. Operational benefits of the new optical design include resistance against window contamination as well as improved performance in precipitation.

Benefits of fast measurement

The new Vaisala Ceilometer CL31's electronics are based on DSP (Digital Signal Processor) technology. Instead of separate gating logics and a microprocessor, a powerful DSP is used. The new technology provides much greater processing power than the traditional designs, enabling for example, a measurement cycle of 2 s, as opposed to the 12-30 s of other ceilometers.

Fast measurement provides better detection of the fine structure of the cloud base. One practical benefit of this is the detection of thin stratus cloud patches below a solid cloud base. Figure 1. shows how the CL31 detects a developing cloud layer below a solid upper layer well before the CT12K or CT25K ceilometers.

Easy to use and maintain

Special attention has been paid to the CL31's ease of use. It includes various comprehensive self-monitoring features with automatic fault analysis. Automatically monitored parameters include laser power, receiver sensitivity, internal voltages, various temperatures, window contamination, and optical alignment. In problem situations, the CL31 informs the user about the suspected module in the data and status messages, as well as with LEDs on the main electronics board.

The receiver, transmitter, and the electronics boards can be easily replaced on site without the need for recalibration. Alternatively, the complete light weight measurement unit can be quickly replaced on site or taken indoors for inspection.

The requirements of existing systems have also been taken into account. The CL31 fits to the foundation of previous Vaisala ceilometers. It also includes the emulation of CT12K, CT25K, LD-25/40 messages, enabling easy installation to existing systems. ●

Figure 1. Detection of thin cloud patches below a solid cloud base.