



## Ceilometer

### Cloud measurement with state-of-the-art signal processing

#### Overview

The Campbell Scientific CS135 LIDAR Ceilometer measures cloud height and vertical visibility for meteorological and aviation applications. Utilizing LIDAR (Light Detection And Ranging) technology, the instrument transmits fast, low-power laser pulses into the atmosphere and detects back-scattered returns from clouds and aerosols above the instrument.

The CS135 employs a single lens design to increase optical signal-to-noise ratio over other instruments. One half of the lens is used for the transmitter and the other for the receiver with total optical isolation between them. This allows it to have exceptional performance with low altitude overlap between the transmitter and receiver allowing lower altitude measurement and integrating larger optics into a compact package. The optics are also immune to damage from direct sunlight.

This approach, along with state-of-the-art electronics, provides a powerful and stable platform from which to measure cloud height and vertical visibility to high accuracy. With a rugged environmental enclosure that protects the instrument from the harshest conditions, the CS135 measures the atmosphere with high stability and repeatability.

The CS135 provides information on cloud height, sky condition (up to five layers) and raw backscatter profiles.

#### Benefits and Features

- › Single lens design for high signal-to-noise ratio, maximized detector sensitivity and extended range
- › Robust, reliable Campbell Scientific electronics
- › State-of-the-art signal processing
- › Competitive pricing
- › Integrated heater, blower and radiation shield as standard
- › In-built calibration capability
- › Exceptional laser life in excess of 10 years
- › Tilt angles to 24°
- › Two axis inclinometer for automatic correction of cloud height
- › Continuous comparison between two internal clocks for confidence in reliable operation

As an option Mixing Layer Height can be calculated within the CS135 and inserted in data messages.

It has a unique stratocumulus calibration capability for accurate measurements of scatter coefficients.

Reliable range measurement is assured by cross checking two internal clocks.

The CS135 can be tilted up to 24°. Cloud heights are automatically corrected. A small tilt is an important feature as it allows the CS135 to resist high levels of reflection from large raindrops and frozen particles that can impair a vertical sensor. Tilting to 24° means that it can be operated anywhere in the world without the sun shining into the lens and resulting in missing data.

The CS135 complies with ICAO and CAA guidance and meets or exceeds all recommendations and specifications (this includes ICAO 9837, ICAO Annex 3, CAP437 and CAP746).

## Specifications

### Instrument Performance

- › Reporting Range: 0-10 km / 32,800 ft
- › Minimum Reporting Resolution: 5 m / 15 ft
- › Hard Target Range Accuracy: +/- 0.05% +/- 4.6 m
- › Reporting Cycle: 2 to 600s
- › Cloud Layers Reported: Up to four layers reported
- › Sky condition: Up to five layers with cover in oktas according to WMO requirements for SYNOP and METAR codes
- › Vertical Visibility: Reported when there is obscuration but no clouds detected.
- › Laser Type: InGaAs
- › Laser Wavelength: 912 nm ± 5 nm
- › Eye Safety: Class 1M

### Electrical Specification

- › Power: 110/115/230 VAC ± 10%  
50-60 Hz  
470 W maximum
- › Battery: Internal 12V 2Ah battery back-up
- › Interfaces:
  - Data - RS-232 / RS-422 / RS-485/ Ethernet
  - Maintenance - USB 2.0 (USB 1.1 compatible)
  - Baud Rate - 300 - 115200
- › Laser safety compliance: EN60825-1:2001
- › Electrical safety compliance: EN61010-1
- › EMC compliance: BS EN 61326:2006

### Mechanical Specification

- › Dimensions (mm): 1000 x 327 x 281 including base
- › Weight:
  - 32 kg (total without cables)
  - 25 kg (without outer cowling and enclosure)
- › External parts manufactured from stainless steel, ABS and powder coated aluminium
- › Shipping weight: 58 kg
- › Shipping dimensions (mm): 1200 x 450 x 450
- › Maximum windspeed: 55 m/s

### Environmental Specification

- › Temperature Range excluding battery: -40°C to 60°C, -40°F to 140°F
- › Humidity: 0 - 100% RH
- › IP Rating: IP66 (NEMA 4x)

### Standard Features

- › Automated Reporting of Instrument Window Status
- › Internal Temperature and Humidity Measurement
- › Blower and Heater to keep optics window clear
- › Optics window tilted 30° to allow precipitation to run off
- › Integrated 2 axis inclinometer for highest range accuracy
- › Vertical, 6°, 12°, 18° and 24° tilt positions
- › Backscatter Profile Output
- › Extensive diagnostics information
- › Stratocumulus scatter coefficient calibration
- › Ceilometer calibration plate supplied as standard
- › Simple test procedure built in

### Optional Features

- › Mixing layer height algorithm
- › 'Viewpoint' display and logging software
- › 'Bird spike' kit to deter birds from perching on the CS135
- › Ethernet communication
- › Modems

