

Lufft Ceilometer Series

Lufft CHM 15k and CHM 8k

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 **Lufft**



Lufft Ceilometers

CHM Series

A ceilometer is a device which uses a laser or other light source to determine the height of a cloud ceiling or cloud base. Ceilometers can also be used to measure the aerosol concentration within the atmosphere. When based on laser, it is a variant of atmospheric Lidars which send short laser pulses into the atmosphere and measure the backscattering of molecules and aerosols. From the backscatter signal, such ceilometers determine cloud bases and aerosol layer heights.

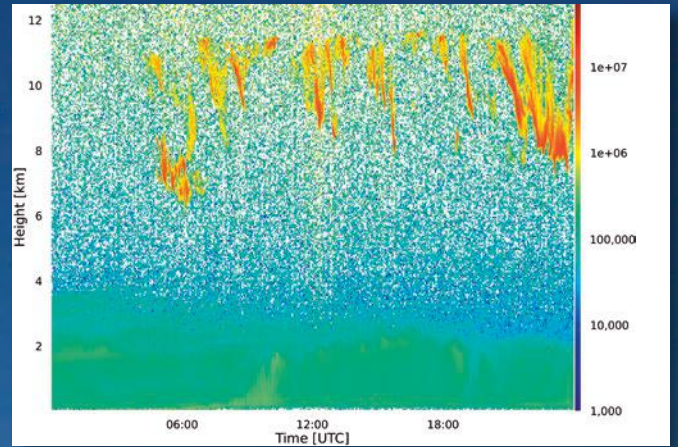
Using the single-wavelength, backscatter Lidar technology the Lufft ceilometers deliver cloud base heights, cloud penetration depths, aerosol layer heights like the boundary layer, vertical visibility and the sky condition index.

They have a double-walled housing combined with integrated fan and automatic heating system and provide reliable protection against misting, precipitation, freezing or overheating. They deliver exact results due to high sensitivity. Reliable and accurate results at any time of the day or night are ensured by the use of long-life laser sources, filters with narrow bandwidth and highly sensitive photo-detectors. The CHM 8k and the CHM 15k are equipped with an integrated controller offering a fully embedded real-time calculation of all target parameters. Moreover, Lufft offers comfortable user web interfaces for data monitoring.

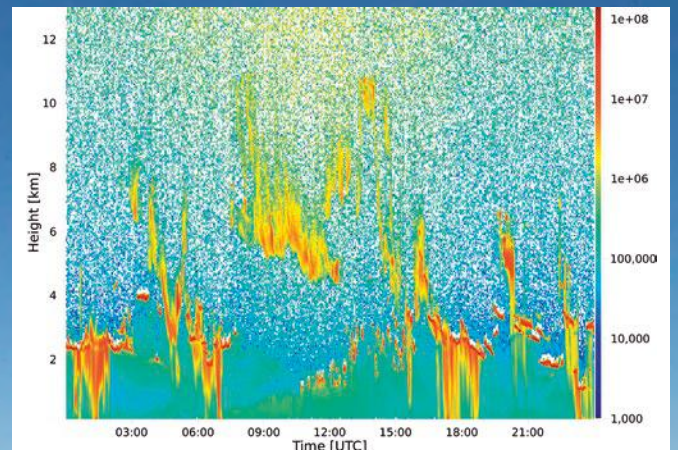
The CHM 8k is the latest ceilometer from Lufft has an operating range of up to 10,000m (32,800ft) and the tried-and-tested Lufft CHM 15k has an range of 15km (50,000ft).

Measurement Examples

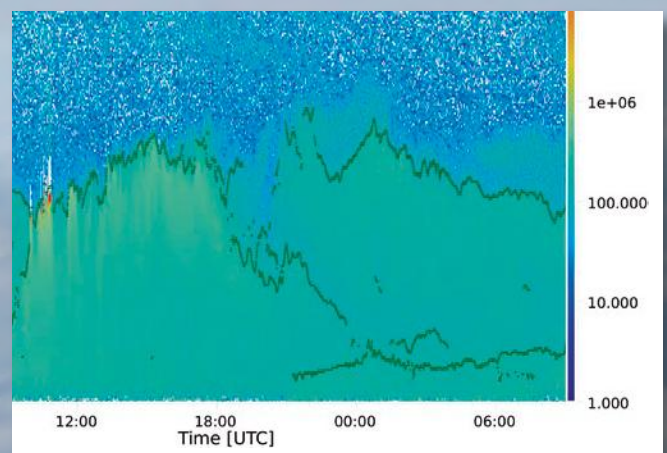
Measurement of Cirrus Clouds



Cirrus Clouds: The graphical view for backscatter intensity shows a cirrus cloud structure over the day between 6 and 12km and an aerosol layer structure up to 2km altitude. The related height profile at 9pm is shown in the right diagram.



Rain: The graphic shows a rain situation. A certain drop in cloud height and an increase in cloud mass and volume can easily be perceived in the graphical view by evaluation of the height profile (at 18:30 UTC) shown in the right sub-area of the graphical view, one can identify precipitation and estimate the intensity of a likely precipitation event.

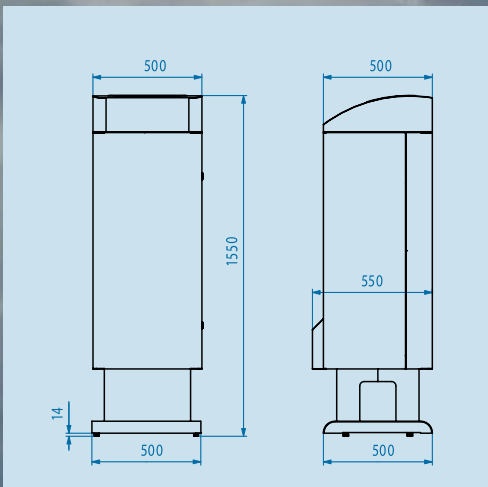


Planetary Boundary Layer: The planetary boundary layer (PBL) or atmospheric boundary layer (ABL) is the lowest part of the atmosphere. It's affected by heat, wind, moisture or momentum transfer from the ground. Within the PBL, the mixed layer (MXL) height is of interest, because all particles and gases arising from the Earth surface are first concentrated and mixed within it. Therefore, the ceilometer's measurement of the aerosol layer height gives valuable information on the particle concentration, e.g. on PM2.5 fine dust. The diagram to the right shows an aerosol profile for a typical mixing layer as it develops in the course of the day.

Product Description & Technical Data

The main difference between the two Lufft ceilometers is the laser source, the detection method (analog versus photon counting method) and the sensitivity at ground level. The field of view of the receiver is larger on the Lufft CHM 8k cloud height sensor.

Dimensions



Fields of Application

- > Weather services
- > ASOS systems, aviation market
- > EPA/ Universities: Environmental studies of fine dust, mixing layer
- > Renewable energy market
 - cloud cover → solar
 - cloud base → wind energy

Benefits

- > Rugged housing
- > Service-friendly operation
- > Easy installation
- > Self-diagnostics
- > High accuracy and simultaneous measurements of several parameters

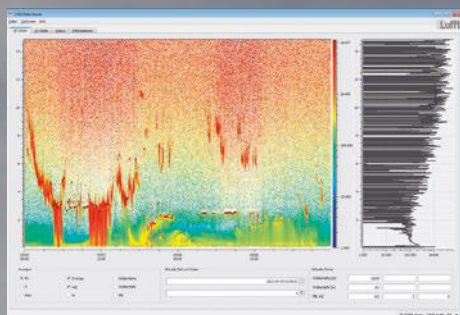
CHM 8k

- > Cloud Height Detection up to 8 km / 26,500 ft
- > Application focus on aviation and environmental services
- > Sophisticated housing, ventilation and heating withstands even extreme conditions
- > Low-maintenance through self-monitoring function
- > Data output in NetCDF format available
- > Various interfaces (LAN, serial)

CHM 15k

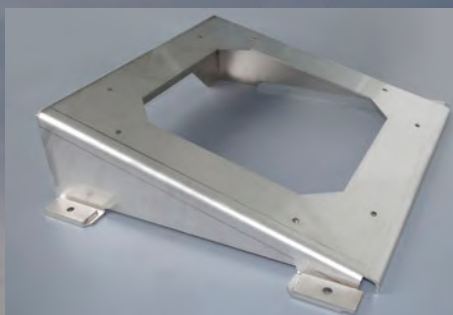
- > Cloud Height Detection up to 15 km / 50,000 ft
- > Application focus on meteorological and environmental services
- > Sophisticated housing, ventilation and heating withstands even extreme conditions
- > Based on micro chip laser
- > Data output in NetCDF format available
- > Various interfaces (LAN, serial)

Parameter	Lufft CHM 8k	Lufft CHM 15k
Measuring principle	LIDAR (optical, time of flight)	
Measuring parameter	Aerosol backscatter profile $\beta_{att}(r)$	Aerosol backscatter profile
Range (CBH)	5 m ... 8 km (16 ... 26.246 ft)	5 m ... 15.000 m (16 ft ... 50.000 ft)
Time resolution	2 ... 600 s	
Range resolution	5 m (16 ft)	
Sampling rate	30 MHz	100 MHz
Quality and auxiliary values	External and internal temperature, window status, laser status, receiver status	
Quantities given in layers	Cloud base height, cloud penetration depth, aerosol layer height	
Accuracy (measured on hard target in 10 km distance)	±5 m (±16 ft)	
Additional quantities	Cloud cover, vertical visibility, Sky Condition Index	
Standard interfaces	RS485 (ASCII communication); LAN (web interface, (S-)FTP, NetTools)	
Optional interfaces	DSL modem, RS232 for service	
Power supply	230 VAC or 115 VAC, ±10 %	
Power consumption	250 W (Standard) 450 W (in maximum heating mode)	250 W (Standard) 800 W (in maximum heating mode)
UPS functionality (opt.)	Internal backup battery for electronics, > 1 hrs	
Light source	Laserdiode	Nd:YAG solid - state laser
Wavelength	905 nm	1064 nm
Environmental compliance	ISO 10109 - 11	ISO 10109 - 11
Laser protection class	1M, DIN EN 60825 - 1:2015	
Protection level housing	IP65	
Electrical Safety	EN 61326 - 1 Class B	EN 61326 - 1
Certifications	CE	
Temperature range	-40 ... +55 °C	-40 ... +50 °C
Relative humidity	0 ... 100 %	
Wind	55 m/s	
Dimensions	500 x 500 x 1550 mm	
Weight	70 kg (130 kg incl. packaging)	
Accessories	CHM Cloud Height Simulator	
	CHM Data Viewer - Software	
	Adapter Bracket	



Software:

A special software developed by Lufft is available to visualize the data that were measured by the CHM.



Tilt Bracket:

Tilts the device at a certain angle (5° or 15° available).



CHM Cloud Height Simulator:

Simulates different cloud heights to check the proper functioning of the device.

Field of Application: Aviation



In Ukraine, thanks to Lufft partner Data-spektr, the state aviation administration certified that the Lufft ceilometers comply with the ICAO standards.



One important use of the ceilometer is to determine cloud ceilings at airports. CHM 8k can identify up to 9 cloud layers and is very sensitive even at ground level.

The CHM series is part of the Lufft Sensor Range for Airport Weather Observation Systems (AWOS) and Runway Ice Detection Systems (IDS). Further sensors of this range are:

Mobile Runway Sensor MARWIS



MARWIS is the first road and runway weather sensor detecting road conditions, temperatures, friction and other parameters mobile and in real time from driving vehicles...

Lufft ARS31 embedded runway sensors



The embedded active road weather sensor ARS31 detects freezing temperatures independently from de-icing materials and is easy to maintain due to its two parted housing

Lufft WS3000



All-in-one weather sensor to measure temperature and relative humidity with the highest possible accuracy.

Lufft VS100k visibility (MOR) sensor



Measures visual ranges (MOR) in distances of up to 100 km.

Field of Application: Research



Dutch Weather Service KNMI

A network of more than 40 Lufft ceilometers will support the Dutch Weather Service for precise and real-time monitoring of all aerosol and clouds activities over the Netherlands itself as well as on various offshore locations in the North Sea.



German Weather Service DWD

German weather service (DWD) station in Falkenberg: Lufft CHM 15k is combined with a microwave radiometer and a cloud radar. The DWD has a network of almost 100 CHM 15k for detecting aerosol layers and retrieving vertical profiles of particle backscatter coefficients. The large amount of installed ceilometers build a network to monitor aerosol particles and their movement as well as its vertical distribution in the troposphere.



MeteoSwiss Payerne

CHM 15k mounted with a tilt of 45°. It masters the challenge to measure in the Alps over the valley. Thanks to the special installation, the application has delivered stunning results.



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