



Ceilometer CL31

for cloud height detection



Vaisala Ceilometer CL31 is a compact and lightweight instrument for cloud base height and vertical visibility measurements. It detects 3 cloud layers simultaneously. CL31 uses a pulsed diode laser LIDAR (light detection and ranging) technology. CL31 is ideal for aviation and meteorological applications.

Measurement starts from ground level

The enhanced single-lens technology applied in CL31 ensures excellent performance starting at a height of virtually zero. This is due to the strong and stable signal over the whole measurement range. The single-lens technology provides unsurpassed reliability during precipitation, low clouds and ground based obscurations, which are the most critical phenomena in aviation safety.

Fast measurement

Fast measurement helps to detect thin cloud patches below a solid cloud base. CL31 provides a full backscatter profile for data visualization and research purpose.

The CL31 beam can be directed either vertically or tilted. The tilting option together with the novel optics design provides enhanced performance during precipitation by improving the protection given by the shield. In the measurement unit, a tilt angle sensor automatically corrects the measured cloud distance reading to vertical cloud base height.

Extensive self-diagnostics

CL31 is fully automatic. In addition to cloud height data, the messages contain instrument status information based on comprehensive self-diagnostic routines.

In case of malfunction, the diagnostics help users to identify the failed module. CL31 features practical modularity and its easy-access door ensures fast servicing and high data availability.

Easy installation and maintenance

CL31 is easy to install. It has a radiation shield that protects the unit during precipitation and against excessive heat or cooling in extreme temperatures. The automatic window blower with heater improves performance by keeping the window clean and dry. In cold conditions heating prevents frost generation on the window.

Features

- Measurement range from 0 to 7.6 km (from 0 to 25 000 feet)
- Modular design for easy installation and maintenance
- Second-generation, advanced single-lens optics provides excellent performance also at low altitudes
- Fast measurement enables detection of thin cloud layers below a solid cloud base
- Reliable operation in all weather; unsurpassed performance in vertical visibility and cloud detection during precipitation
- Latest technology from the world-leading manufacturer - based on the experience from more than 5000 installed Vaisala ceilometers worldwide
- Extensive self-diagnostics with fault analysis

Data messages

- Cloud hits (up to 3 layers) and status information
- Cloud hits, status, and backscatter profile
- Emulation of CT12K, CT25K, LD-25/40
- Sky condition (optional)

Technical data

Operating environment

Operating temperature	-55 ... +60 °C (-67 ... +140 °F),
Operating humidity	0 ... 100 %RH
Wind tolerance	Up to 55 m/s (123 mph)
Vibration	Lloyds Register / IEC 60068-2-6 5 ... 13.2 Hz, ±1.0 mm 13.2 ... 100 Hz, ±0.79 g 9.1 ... 150 Hz, ±0.5 g
Pollution degree	2
Maximum operating altitude	3000 m (approx. 9800 ft)
IP rating	IP65 (measurement unit) IPX6 (with radiation shield)

Inputs and outputs

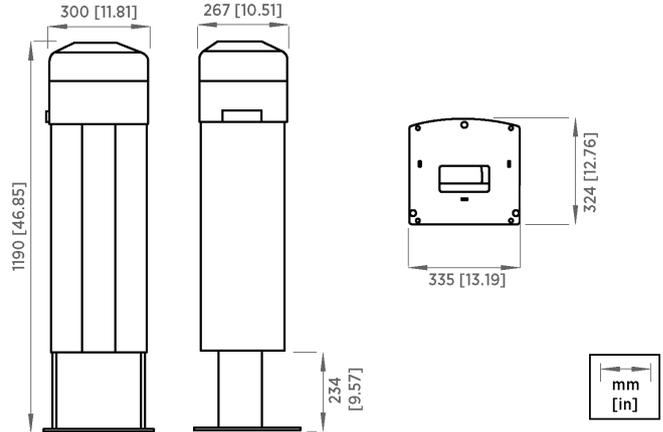
Operating voltage	115/230 V AC 100 – 127 V AC, 207 – 253 V AC
Power consumption	
Power consumption (typical)	310 W
Measurement unit	15 W
Internal heater	100 W
Window conditioner heater	175 W
Window blower	20 W
Frequency (min/max)	50/60 Hz
No-break power supply	12 V sealed lead-acid battery, 2 Ah
Backup battery	12 V internal, 2 Ah
Overvoltage protection	Low-pass filter, VDR
Overvoltage category	II
Interfaces	
Data	<ul style="list-style-type: none"> RS-232 RS-485, multidrop, 2-wire DXL421 modem module LAN (Ethernet) interface option
Maintenance	RS-232
Baud rate	
RS-232 / RS-485	300 ... 57 600 bps
Modem V.21, V.22	300 ... 1200 bps

Mechanical specifications

Tilt positions	Vertical or 12° tilted
Dimensions	
Measurement unit	620 × 235 × 200 mm (24.41 × 9.25 × 7.87 in)
Height with radiation shield	1190 mm (47 in)
Total	1190 × 335 × 324 mm (46.85 × 13.19 × 12.76 in)
Weight	
Measurement unit	12 kg (26.5 lb)
Radiation shield and blower	19 kg (41.8 lb)
Total	31 kg (68 lb)
Plywood transport container	
Container size	1400 × 490 × 450 mm (55 × 19.30 × 17.72 in)
Container weight	47 kg (103.6 lb)

Measurement performance

Measurement range	0 ... 7.6 km (0 ... 25 000 ft)
Measurement resolution	10 m (33 ft) or 5 m (16 ft), selectable
Reporting interval	Programmable 2 ... 120 s, or polling
Measurement interval	2 s default
Distance measurement accuracy against a hard target	Greater of ±1 % or ±5 m (16 ft)

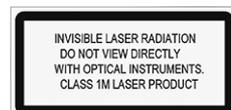


Spare parts and accessories

Cable termination box with extra transient protection	Termbox-1200
PC maintenance cable	QMZ101
Shock absorbing mounting pad for ship installations	CT35022
Modem	DXL421
Attachment mechanics for radio modem antenna	CLRADIOKIT
Graphical User Interface for Ceilometers	CL-VIEW
Boundary Layer View Software for Ceilometers	BL-VIEW
Bird deterrent	CL31BIRDKIT
Air Quality Plug and Play Package for Ceilometer with laptop and pre-installed BL-View	CLAQPACKAGE

Compliance

EU directives and regulations	LVD, EMC, RoHS
EMC immunity	IEC/EN 61326-1, industrial environment
EMC emissions	CISPR 32 / EN 55032, Class B EN 61000-3-2 EN 61000-3-3
Electrical safety	IEC/EN 60950
Environmental	IEC/EN 63000
Eye safety	IEC/EN 60825-1:2014
Compliance marks	CE, RCM, China RoHS, UKCA





Ceilometer CL51

for high-range cloud height detection

Vaisala Ceilometer CL51 is designed to measure high-range cirrus cloud heights without surpassing the low and middle layer clouds, or vertical visibility in harsh conditions.

CL51 employs a pulsed diode laser LIDAR (light detection and ranging) technology, where short, powerful laser pulses are sent out in a vertical or near-vertical direction. The reflection of light (backscatter) caused by clouds, precipitation or other obscuration is analyzed and used to determine the cloud base height.

Measurement from ground level

The enhanced single lens technology applied in CL51 ensures excellent performance starting at a height of virtually zero. The signal is strong and stable over the whole measurement range.

CL51 is able to detect 3 cloud layers simultaneously. If the cloud base is obscured due to precipitation or ground-based fog, CL51 reports vertical visibility. CL51 is able to provide the backscatter profile over the full measurement range. This information provides a possibility for an advanced boundary layer and atmospheric analysis.

Designed for harsh weather

CL51 has a shield with a blower and heater, which allows steady operation in precipitation and under extreme temperatures. Reliable solar protection is ensured by optical filters. A tiltable shield further protects the instrument from precipitation and specular reflection from ice crystals. The tilt angle measurement and correction is automatic.

Self-diagnostics

In addition to cloud height data, the fully automatic CL51 outputs messages with information on the instrument status. The information is based on comprehensive self-diagnostic routines. In case of a malfunction the diagnostics help the user to identify the failed module.

Maintenance

Periodic maintenance of CL51 is normally limited to window cleaning. There is no need for adjustments in the field. The automatic window blower with heater improves performance by keeping the window clean and dry. In cold conditions heating prevents frost generation on the window. Any malfunction is automatically reported in the data and status messages.

Data messages

- Cloud hits and internal monitoring data
- Cloud hits, status, and backscatter profile
- Emulation of CL31 and LD-40
- Sky condition (optional)

Features

- Cloud reporting range up to 13 km (43 000 ft)
- Backscatter profiling over full range up to 15 km (49 200 feet)
- Second-generation, advanced single-lens optics with excellent performance also at low altitudes
- Field-proven, fully automatic 24/7 operation in all weather conditions
- Modular design for easy installation and maintenance
- Extensive self-diagnostics with fault analysis
- Reliable operation in all weather: unsurpassed performance in precipitation
- Based on robust and affordable laser diode technology
- Detection of cirrus clouds
- Latest technology from the world leading manufacturer - over 5000 ceilometer installations worldwide



Technical data

Measurement performance

Measurement range	0 ... 13 km (0 ... 43 000 ft)
Backscatter profiling range	0 ... 15 km (0 ... 49 200 ft)
Reporting resolution	10 m (30 ft), units selectable
Reporting cycle	6 ... 120 s, or polling
Distance measurement accuracy against a hard target	Greater of $\pm 1\%$ or ± 5 m (16 ft)

Inputs and outputs

Operating voltage	115/230 V AC 100 - 127 V AC, 207 - 253 V AC
Power consumption (typical)	310 W
Backup battery	12 V internal, 2 Ah
Overvoltage category	II

Interfaces

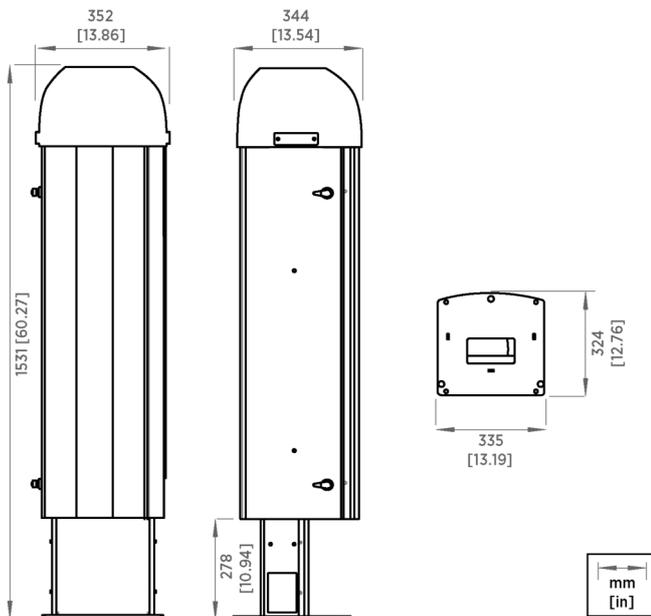
Data	<ul style="list-style-type: none"> RS-232 RS-485, multidrop, 2-wire DXL421 modem module LAN (Ethernet) interface option
Maintenance	RS-232

Baud rate

RS-232 / RS-485	300 ... 115 200 bps
Modem V.21, V.22	300 ... 1200 bps

Operating environment

Operating temperature	-55 ... +60 °C (-67 ... +140 °F)
Operating humidity	0 ... 100 %RH
Wind tolerance	Up to 55 m/s (123 mph)
Vibration	Lloyds Register / IEC 60068-2-6 5 ... 13.2 Hz, ± 1.0 mm 13.2 ... 100 Hz, ± 0.7 g 9.1 ... 150 Hz, ± 0.5 g
Pollution degree	2
Maximum operating altitude	3000 m (approx. 9800 ft)
IP rating	IP65 (measurement unit)



Mechanical specifications

Dimensions

Measurement unit	834 × 266 × 264 mm (32.83 × 10.47 × 10.40 in)
Height with radiation shield	1531 mm (60.28 in)
Total	1531 × 335 × 324 mm (60.28 × 13.19 × 12.76 in)

Weight

Measurement unit	18.6 kg (41 lb)
Radiation shield and blower	27.4 kg (60.4 lb)
Total	46 kg (101.41 lb)

Plywood transport container

Container size	1650 × 540 × 480 mm (65 × 21.26 × 18.90 in)
Shipping weight	Typically 75 kg (165.3 lb)

Spare parts and accessories

Cable termination box with extra transient protection	Termbox-1200
PC maintenance cable	QMZ101
Shock absorbing mounting pad for ship installations	CT35022
Modem	DXL421
Attachment mechanics for radio modem antenna	CL51RADIOKIT
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Environmental	IEC/EN 63000
Eye safety	IEC/EN 60825-1:2014
Compliance marks	CE, RCM, China RoHS, UKCA



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