



WindCube Offshore Vertical Profiler Lidar



Features

- Measurement from 40 meters to over 300 meters
- 20 range gates
- Pulsed lidar technology
- 4 inclined beams and 1 vertical beam
- 45 W nominal power
- Remote monitoring through WindCube Insights
- Multiple communication channels (wired, cellular, satellite)
- IP67 Casing + IP67 Internals
- Corrosion Resistant

WindCube® Offshore is a vertical profiler Lidar that measures accurate wind data up to over 300 meters. It is equivalent to a very tall met mast, collecting wind speed, direction, vertical wind speed, and turbulence intensity data at 20 different heights with limited installation constraints and high operational safety. For Offshore uses, on buoy or fix platform installation, Vaisala designed a marinized version of the WindCube Vertical Profiler Lidar. Both Casing plus internals are IP67 and specifically tested to resist harsh environment for years of sea operation.

Based on pulsed Doppler heterodyne laser principle, the WindCube sends a light pulse at a high frequency into the atmosphere and observes the signal backscattered by aerosols naturally present in the air. The time between the pulse and the detection of the backscattered signal is processed by the system thanks to the Doppler effect, and provides an accurate measure of the wind speed and direction.

Pulsed laser technology

Pulsed lidars send laser pulses at a very high frequency. To avoid confusing time delays and distance, the Doppler shift is analyzed before the next laser pulse is emitted. Therefore, the probe distance, or height, only depends on the time it takes for a pulse to be received after it has been emitted.

Multiple heights are measured simultaneously, and spatial resolution is constant throughout the entire wind profile. Also, measurement is not affected by clouds, fog, high density of dust, or obstacles.

Thanks to a vertical beam, the lidar allows a direct measurement of the vertical wind speed, and improves the turbulence intensity (TI) assessment.

Remote monitoring

The web-based WindCube Insights platform enables remote monitoring and control of the WindCube vertical profiler. Wind speed data and carrier-to-noise ratio (CNR) are displayed live, and the platform also provides the possibility to configure measurement heights and communication with the lidar.

Ease of installation and operations

The lidar is easy to handle and install. A couple of hours is enough to fully set up the lidar and start measuring. It is compatible with autonomous power solutions (power pack, solar panels), and its robustness supports operations continuity.

WindCube Offshore

The WindCube Offshore can be used offshore and onshore, according to your needs. A customized version of the WindCube has been designed for harsh offshore locations like floating buoys, substations and vessels. For Offshore wind farms located further away, the WindCube Offshore allows measuring accurately the wind on stable platforms located several kilometers from the shore, even in harsh offshore environments. In case of absence of platform, the measurement with a Lidar installed on a buoy/vessel, is the most effective way of performing a cost-effective wind resource assessment. The WindCube Offshore is based on the same technology than the standard WindCube Lidar with a marinized robust casing and base in order to stand harsh marine conditions, it has been reinforced to operate for extended periods in harsh sea conditions (saltwater, humidity and bird presence).

Technical data

Operating environment

Warranty	3 years standard, extendable twice (up to 9 years) after maintenance
Preventive maintenance	3 years cycle (factory or onsite maintenance)
Operating temperature	-20 °C to +40 °C (chamber conditions)
Maximum operation altitude	Maximum operation altitude : 3000m (2000m with provided AC-DC converter)
Operating humidity	0 to 100% RH (non-condensing)
Solar radiation protection	Sunshade
Housing classification	IP67 <i>Casing is designed and validated as per standard IEC 60529. Able to resist submersion at a depth of 1 meter, it is fully compliant with offshore requirements.</i>
Rain protection	Wiper
Marine atmosphere (Salt Atmosphere Compliance)	IEC 60068-2-52, (dry/wet salt spray) 30 cycles
Shocks and vibration	ISTA/FEDEX 6B

Mechanical specifications

System dimensions (height × width × depth)	677 mm × 585 mm × 592 mm
Weight	64 kg system only 42 kg shipping cases 108 kg total with accessories

Electrical and optical

Input Power Supply	24.5-27 VDC
Insulation class: class I (PE connected)	
Power Supply with the transformer provided by VAISALA	100-240 VAC 50/60 Hz
Power consumption ¹⁾	45W between -5°C and 30°C (23°F and 86°F) 110W below -5°C (23°F) 55W over +30°C (86°F)
LASER Safety Compliance	1M Class / EN 60825-1

¹⁾ Nominal power consumption taken from an initial state of the WindCube at 15°C.

Compliance

Compliance marks	CE, FCC, ICES
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Measurement parameters

Measurement range ¹⁾	40 ... > 300 m
Data sampling rate	1 Hz
Measuring distances	20 user-defined distances simultaneously
Radial Wind Speed range	-23 m/s to +23 m/s
Reconstructed Wind Speed range	0 m/s to 49 m/s
Reconstructed Wind Direction range	0 - 360°
Speed accuracy ²⁾	0.1 m/s
Speed uncertainty (for fixed installation) ²⁾	40 - 80 m: 1.4 % to 2.6 % 80 - 120 m: 0.6 % to 1.4 % 120 - 135 m: 0.6 % to 0.8 % <i>Installation on FLS may add uncertainty under validation</i>
Direction accuracy	2°
Beam geometry	4 inclined beams at 28° and 1 vertical beam

¹⁾ Height from WindCube feet. Data availability depends on environmental factors such as visibility, type of aerosols and variation of refractive index in the atmosphere.

²⁾ For 10-min averages, as assessed by several 3rd parties on multiple WindCube devices or in 2020 according to IEC 61400-12-1 Ed.2. Uncertainty figures are Final Accuracy Class divided by √3.

Data output

Output data	1 s / 1-, 2-, 5-, 10-minute averaged (user-defined) horizontal and vertical wind speed Standard deviation Direction CNR (carrier-to-noise ratio) GPS coordinates Data availability
Complex terrain measurements	FCR unlimited license, option only available for fixed installation
Motion compensation software	External reprocess software, option available for buoy installation, unlimited license
Geofencing	3 years license, option only available for fixed installation
Data storage	120 GB industrial disk (over 5 years storage of all data) WindCube Insights secured cloud-based server
Data format	RTD and STA (file), UTF-8 encoding
Communication	LAN, USB, 4G router (router availability depends on the region/country), Modbus RTU (gateways available), Wi-Fi, Satellite
Time synchronization	GPS, NTP



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