

# WindCube

## VAISALA

WindCube® is a ground-based vertical profiler Lidar that measures accurate wind data up to 300 m. 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.

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 analysed 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 WindCube is compatible with ART's Premium and Essentials autonomous power trailer options for seamless deployment, and its robustness supports long term operations continuity. L1 training is required for all technicians deploying WindCube's and is now available free online.

### ART – Exclusive ANZ Sales and Service Partner

ART is the exclusive Australia and New Zealand sales and service partner for Vaisala WindCube v2.1 vertical profiler.

We also provide a range of autonomous custom designed stand-alone power solutions, providing power in remote and off-grid locations, providing a full turnkey solution for your WindCube.

ART has a team of specialist technicians trained to undertake all WindCube major and minor maintenance activities nationwide. Our comprehensive and rapid support will ensure that your monitoring campaign has maximum uptime with minimum disruption.

# Technical specifications

MEASUREMENT PARAMETERS	
Measurement range <sup>(1)</sup>	40 ... > 300 m Constant measuring probe (spatial resolution)
Data sampling rate	1 Hz 10.000 measurement pulses accumulated every 0,8 seconds
Measuring distances	20 user-defined distances simultaneously
Radial Wind Speed range	-23m/s to +23m/s
Reconstructed Wind Speed range	0m/s to 49m/s
Reconstructed Wind Direction range	0 – 360°
Speed accuracy <sup>(2)</sup>	0.1 m/s
Speed uncertainty <sup>(2)</sup>	40 – 80m: 1.4% to 2.6% 80 – 120m: 0.6% to 1.4% 120 – 135m: 0.6% to 0.8%
Direction accuracy <sup>(2)</sup>	2°
Beam geometry	4 inclined beams at 28° and 1 vertical beam
OPERATING ENVIRONMENT	
Warranty	5 years standard, extendable once (up to 10 years) after maintenance
Preventive maintenance	5 years cycle (factory or onsite maintenance)
Temperature range <sup>(3)</sup>	-30°C to +50°C / -22°F to 122°F (chamber conditions)
Maximum operation altitude	Maximum operation altitude : 3000m (2000m with provided AC-DC converter)
Operating humidity	0 to 95% RH (non-condensing)
Environmental Protection	Designed for installation in many kinds of weather and environmental conditions IP54 (Lidar Casing) IP66 & IP67 (Inner sub assemblies) Radiation +1000W/m <sup>2</sup> at +45°C
Rain protection	Wiper
Marine atmosphere (Salt Atmosphere Compliance) <sup>(4)</sup>	IEC 60068-2-11 (120 hours)
Shocks and vibration	ISTA/FEDEX 6B

ELECTRICAL AND OPTICAL	
Input Power Supply Insulation class: class I (PE connected)	24.5–27 VDC
Power Supply with the transformer provided by VAISALA	100–240 VAC 50/60 Hz
Power consumption <sup>(5)</sup>	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: 2014 + A11 : 2021
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
Data storage	120 GB industrial disk (over 5 years storage of all data) WindCube Insights secured cloud-based server
Data file format	RTD and STA (file), UTF-8 encoding
Communication	LAN, USB, 3G, or 4G router (router availability depends on the region/country), Modbus RTU (gateways available), Wifi
Time synchronisation	GPS, NTP
MECHANICAL SPECIFICATIONS	
Cube dimensions (L x W x H)	554 x 566 x 554 mm (21.81 x 22.28 x 21.81 in)
With feet and wiper	608 x 566 x 661 mm (23.94 x 22.28 x 26.02 in)
Weight	59kg (system only) 28kg (shipping case only) 91kg (total with accessories)
COMPLIANCE	
Compliance marks <sup>(6)</sup>	CE, FCC, IC

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  $\sqrt{3}$

3) Starting the system at low temperature (lower than -20°C) will require to have the WindCube equipped with an adapted protection

4) For an offshore usage Offshore product version is recommended

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

6) As verified on WindCube without Geofencing option

## About us

ART designs, manufactures, installs, and maintains turnkey infrastructure solutions for wind resource assessments, as well as for the broader renewables, resources and communications industries.