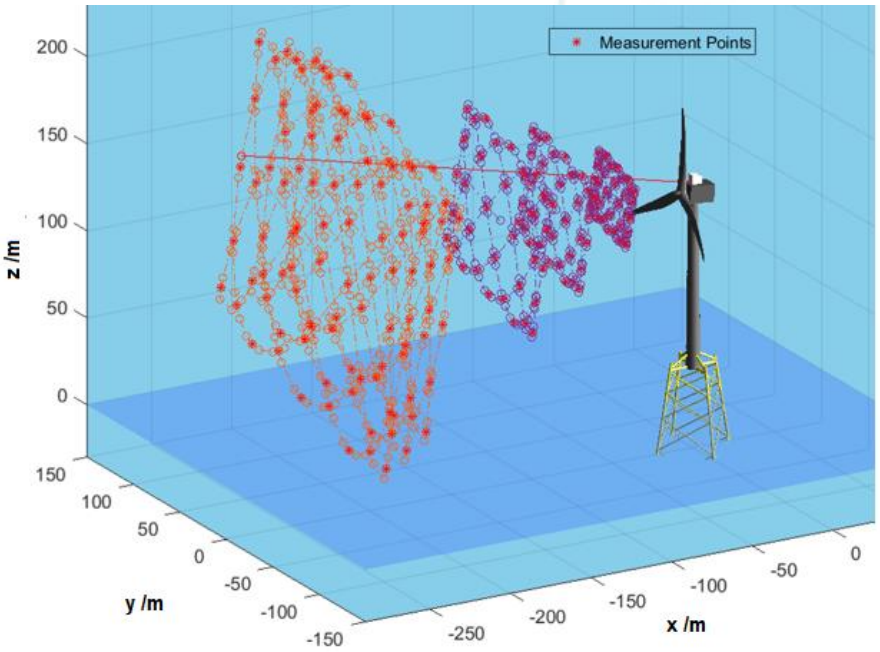
OpticSense GmbH

Your Partner in Photonics

Whirlwind Laser Scanner

Measuring Wind Speeds in three dimensions with Lidar

Environmental properties, among them the wind speed, can be measured remotely from great distances using *Light Detection and Ranging* (Lidar). Lidar mounted into the rotor hub or on the nacelle of wind turbines enables wind profiles to be measured and hence, a prognosis of the wind field, before it reaches the rotor blades. The resulting data can be advantageously used for controlling the operation of wind turbines and their blade pitch.



The *Whirlwind* Laser Scanner utilizes eye-safe infrared fibre laser pulses for measuring wind speeds of up to 85 m/s in the beam direction. Its scanning mechanism extends the possibilities of the static *Whirlwind 1* to a three-dimensional detection of wind fields: freely selectable scanning angles of up to ±26° in any direction are set with powerful stepper motors. In this way, predefined or user-defined complex scan patterns can be scanned quickly. The scanner registers wind data on a freely selectable number of planes with selectable distances and in the range of 60 m to approx. 555 m (with suitable visibility).

Installation on the nacelle allows seamless spatial recording of incoming wind fields across the rotor cross-section or even the wind wake of a wind turbine. Versions for measurements on the ground or on buoys are suitable for site analyses of wind farms. The data quality is independent of daylight and is only slightly affected by rain.

All components are integrated into a single compact stainless steel enclosure and are very robust.

The *Whirlwind* Laser Scanner was developed on behalf of the Chair of Wind Energy (SWE) at the University of Stuttgart with funding from the Federal Ministry for Economic Affairs and Energy, Berlin.

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OpticSense GmbH

OpticSense GmbH is a spin-off company from University of Oldenburg, Germany. Nature and purpose of the business is the development, production and marketing of instruments for environmental research and renewable energy technology.

CARL VON OSSIETZKY universität OLDENBURG

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Whirlwind Laser Scanner: Specifications

Size, weight and materials

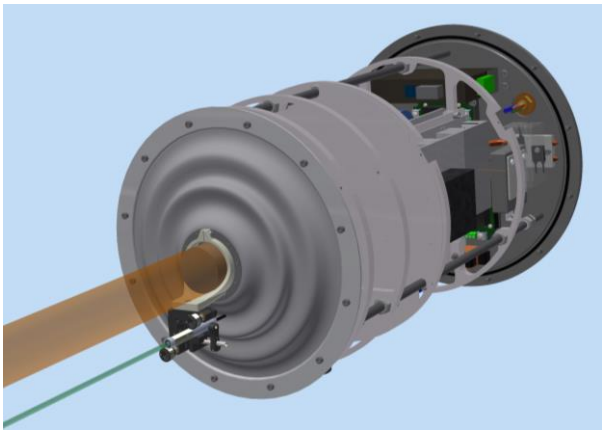
Concept:	**all in one box**
Dimensions:	**L=650 mm, Ø=350 mm**
Mass:	**34 kg**
Housing:	**AISI 316 Ti and 316 L**
Mount:	**Tripod with arbitrary orientation**

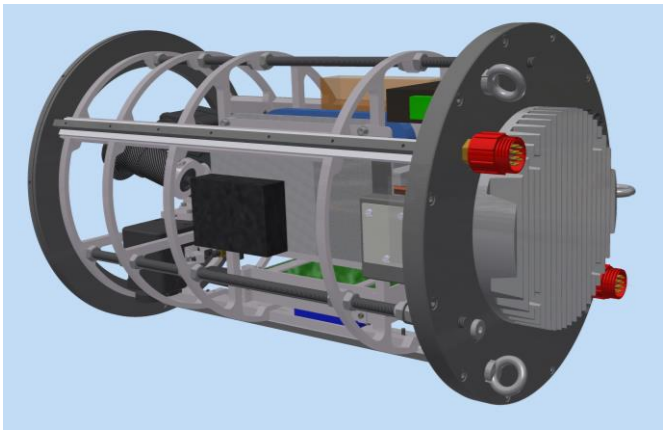
Scanner

Swath width:	**±26,6°**
Pattern:	**pre-programmed or selectable by user**

Power requirements

Voltage:	**24 (18…36) V DC**
Current:	**2.5 A typ., 3 A max.**
Power consumption:	**75 W typ., 100 W max.**





Environmental conditions

Operating temperature:	**-10°C – 50°C**
Storage temperature:	**-40°C – 50°C**
Protection classification:	**IP68**
Vibration:	**4 g, 25-100 Hz, amplitude 1.6 mm, max. 1 octave / minute**

PC

Type:	**Industrial PC with Windows 10 IoT, 8 GB RAM, 256 GB SSD**
Data formats:	**CSV, tdms, HDF5**

Electrical connectors

Power and ethernet:	**SubConn DBH13M Power Ethernet Circular, 13 contacts**
For additional sensors:	**SubConn BH4M, 4 contacts**
Option:	**Ethernet via optical fibers and bridging converters for use in harsh electromagnetic environments**

Cable

Power:	**3 × 2.5 mm^2 rubber cable, 30 m long**
Ethernet:	**RJ45 patchcord rubber cable or fibre cable, 30 m long**

Specifications are subject to change without notice.