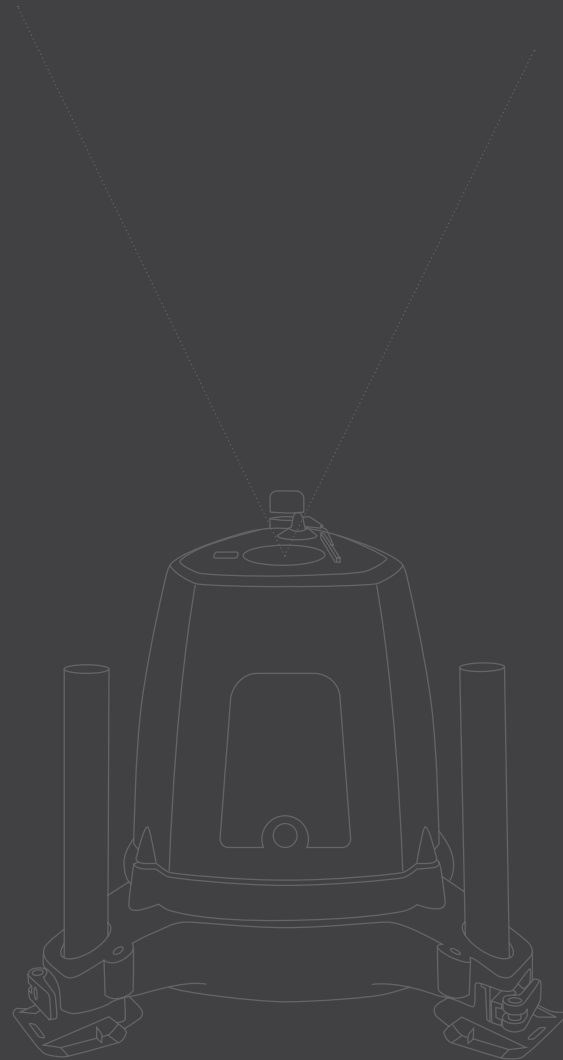


# ZephIR Lidar

wind speed at  
light speed



- world-leading lidar innovation
- finance-grade, 'bankable' wind data sets
- unparalleled data availability at all heights
- accurate, proven measurements in all terrains
- 650+ deployments and 3 million hours operation

[zephirlidar.com](http://zephirlidar.com)

# ZephIR 300

ZephIR 300 measures wind characteristics onshore and on fixed or floating platforms offshore from just 10 metres (33 feet) up to 200 metres (656 feet) from installed position to inform wind regime and quality studies during the development and operation of wind farms onshore and offshore.

ZephIR 300 is accurate, reliable and affordable, adding value to your wind energy project at every stage - from pre-planning, through development and on

to operation. Every system is uniquely subjected to an industry approved validation process ensuring repeatable, finance-grade data.

With our extensive experience in the industry, we are able to support you with a range of Support Packages designed to make wind data collection both simple and user-friendly - read on to find out more.



## THE ZEPHIR ADVANTAGE

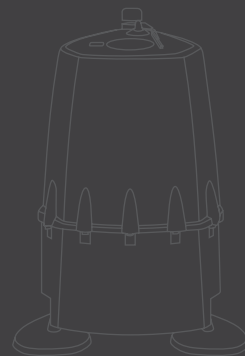
- ▷ **REMOTE WIND PROFILING**  
across 10 user-defined heights from 10 metres (33 feet) to 200 metres (656 feet)
- ▷ **UNPARALLELED EXPERIENCE**  
borne across 650+ deployments, 3 million hours of operation and a decade of wind lidar experience globally
- ▷ **FINANCE-GRADE WIND DATA**  
accepted by Banks' Engineers as part of the formal energy assessment of a wind project
- ▷ **PROVEN EXTREME OPERATION**  
from -40°C to +50°C across more than 650 lidar deployments globally
- ▷ **TECHNICAL SUPPORT**  
with local service engineers across Europe, North America, South America and Asia Pacific
- ▷ **INDUSTRY APPROVED VALIDATIONS**  
including IEC equivalent power performance measurements, extensive onshore / offshore campaigns and tall met mast verifications

# ZephIR DM

ZephIR DM is a Dual Mode variation of the successful 300 system. ZephIR DM measures wind characteristics in front of or behind a turbine from just 10 metres (33 feet) out to 200 metres (656 feet) situated inside the spinner or on top of the nacelle, during the operation of wind farms onshore and offshore.

ZephIR DM provides valuable advanced wind data for the optimised performance and alignment of wind turbines, for in-situ power performance measurements, to reduce wind loading on turbine components and for specific troubleshooting applications.

ZephIR DM is supported by a range of Support Packages to make wind data collection both simple and user-friendly - read on to find out more.



## THE ZEPHIR ADVANTAGE

- ▷ **REMOTE WIND PROFILING**  
across 10 user-defined ranges from 10 metres (33 feet) to 200 metres (656 feet)
- ▷ **PERFORMANCE OPTIMISATION**  
through in-situ forward / rear measurements of wind flow, ground based measurements of wind flow, correction of turbine yaw misalignment and control parameter optimisation
- ▷ **CONTINUOUS WAVE LIDAR**  
measuring both average wind speed and shear across the full rotor swept diameter, and specific hub height wind speed and direction
- ▷ **INDUSTRY-RECOGNISED VALIDATIONS**  
including IEC equivalent power performance measurements, extensive onshore / offshore campaigns and tall met mast verifications
- ▷ **TRUE 'DUAL MODE' OPERATION**  
both ground and nacelle based, with a single common platform consisting just two easily manoeuvrable modules - system and frame

# THE ORIGINAL WIND LIDAR

In 2003 we released the first commercial wind lidar, ZephIR®, exploiting decades of research at UK government Research & Development establishment QinetiQ. Designed specifically for the wind industry ZephIR has paved the way for many of the remote sensing devices seen in the market today. Our original lidar technology continues to innovate with world firsts such as taking measurements from a wind turbine spinner and being the first to deploy an offshore wind lidar, both fixed and floating. ZephIR has also now amassed more than 3 million hours of operation across 650+ deployments globally spanning a decade of commercial experience.

To find out how ZephIR can improve your wind energy project, and how our user-friendly support packages can meet your every requirement, read on.



**2003**  
World first turbine mounted wind lidar with Nordex



**2006**  
World first offshore deployment, certification program with Germanischer Lloyd (GL)



**2011**  
New ZephIR 300 launched with optimised original, proven core technology at the heart



**2007**  
ZephIR released to wind community through international consultancy Natural Power

**2009**  
World first offshore deployment on a floating platform

**2004**  
Ground based ZephIR wind lidar is released to the world

**2010**  
450 deployments globally



**the future**  
The ZephIR Lidar team continues to innovate in the area of wind lidar. With some of the world's leading lidar R&D community within the company we continue to push the boundaries of lidar technology in the application of wind energy. Through a combination of strategic development, customer insight and passion for innovation, we deliver world firsts and solutions to complex problems.

This is true **Lidar Innovation**.

# OUR UNIQUE OFFERING

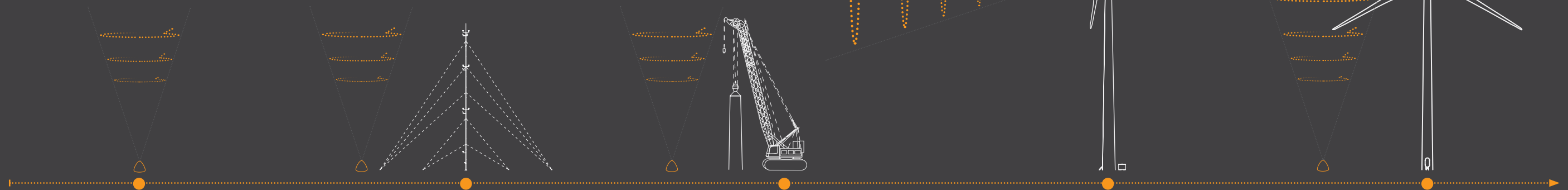
ZephIR is a continuous wave lidar system, and this core technology was chosen specifically during the original design of the product due to its unique benefits listed below. Many of these features are as a result of the absolute simplicity in system design and add real benefit to the end user.

FEATURE	BENEFIT	ZephIR	Met Mast	SODAR	Other Lidar
Range focussing system	<b>High data availability at all heights; no extrapolation required; continuous data sets; lower uncertainty</b>	●	○	○	○
	<b>Optimised probe measurement length at low heights / close ranges where air flow is rapidly changing; more accurate wind analysis</b>	●	matched performance	○	○
10 metre (33ft) low height measurement	<b>Correlations with low level instruments; in-situ performance checks; low level measurements even in thick fog for continuous data sets</b>	●	●	○	○
Industry recognised validation process on all systems against an IEC compliant met mast	<b>Proven repeatable performance; traceability for finance-grade data sets; alignment to GL Garrad Hassan / Natural Power remote sensing best practice guidelines</b>	●	matched performance	○	○
Up to 50 wind data points collected at each height / range interval with up to 1 second sampling	<b>More accurate capture of data in complex terrain where air flow is rapidly changing</b> <b>Less sensitivity to obscuration / incomplete view of sky from fixed objects; greater redundancy of sample points</b>	●	○	○	○

- Feature of system
- Not a feature of system

# YOUR ONSHORE WIND ENERGY PROJECT

ZephIR Lidar applies more than a decade of experience in wind energy to ensure ZephIR 300 and ZephIR DM can be utilised effectively at every stage of your wind energy project - from pre-planning through to re-powering.



## PRE-PLANNING

### Research / Academia

Wind profiling, turbine experiments, calibration of wind sensors, bespoke lidar configurations

### Complement to Met Mast

From low 10 metre (33ft) masts up to world-class 200 metre (656ft) research masts

### Wind Shear Verification

Across the entire turbine rotor diameter including measurements above and below down to just 10 metres (33ft)

### Turbulence

## PLANNING

### Wind Resource Assessment, Site Classification and Micro-Siting

Accurate siting of wind turbines for optimised energy production

### Wind Model Verification

In-situ measurements to verify and adjust wind models such as WASP® and VENTOS®

### Fixed Reference / Long Term

A continuous data set across measurement heights ranging 10 metres (33ft) to 200 metres (656ft)

## CONSTRUCTION / FINANCE

### Safe operation

Real-time wind speed measurements at hub height during WTG component lifting and assembly

### Energy Yield Analysis

Finance-grade wind data for the purpose of Energy Yield reporting and analysis

## OPERATION

### WTG Condition Monitoring

Nacelle-mounted measurements to monitor condition of WTG against measured wind speed and for performance trouble shooting

### Power Performance Testing & Performance Optimisation

Nacelle-mounted and / or ground based measurements to monitor performance of WTG against measured wind speed

### Wind Model Verification

In-situ measurements to verify and adjust wind models

### Forecasting

Real-time wind measurements to support site energy forecasting

## RE-POWERING

# YOUR OFFSHORE WIND ENERGY PROJECT



## EXISTING FIXED PLATFORM

Utilising existing fixed platforms in, or close to sites of interest is a cost-effective method for gathering wind data for your wind energy project.

Examples of existing fixed platforms include electrical substations, lighthouses and research or landing platforms.

ZephIR is subject to extensive EMC testing to ensure no interference with other equipment sited on these platforms. To view the full set of EMC standards, visit [zephirlidar.com](http://zephirlidar.com)



## NEW FIXED PLATFORM

Installing a purpose-built offshore meteorological station allows for a range of additional equipment to be installed including a ZephIR for wind measurements. Bespoke communications and power solutions can also be integrated within the overall solution.



## FLOATING PLATFORM

### SeaZephIR®

Marine engineering and contracting sister company SeaRoc deliver finance-grade metocean data in a cost-effective safe manner. SeaZephIR integrates the proven ZephIR 300 wind lidar system with a bottom moored tension leg buoy to provide a stable sensor platform for the collection of offshore wind data.

### Other floating platforms

We are able to integrate ZephIR in to other floating platforms and have a track record of providing this service on a range of solutions for clients.

## OFFSHORE TRACK RECORD

ZephIR was the world's first wind lidar to be deployed offshore - both on a fixed platform and floating. More recently, ZephIR has been used in over twenty offshore campaigns around the world, including:

Talisman Energy   Beatrice platform, North Sea	2005
Risø DTU   Horns Rev, North Sea	2006
GL WindTest   Fino I, North Sea	2006
NaiKun   Hecate Strait, BC Canada	2006
Cleveland Crib, Great Lakes	2009
Fino 3, North Sea	2010
E.ON UK   Robin Rigg, Solway Firth	2010
Forewind Consortium   Dogger Bank, North Sea	2011

## MARINE SURVIVABILITY

ZephIR 300 is specifically designed for marine environments. Careful component and material selection provide maximum protection against saline ingress and corrosion, whilst the enclosure is fully certified to IP67. There are no exposed cables to be concerned with or any on site set-up requirements, so the unit can be deployed in the most challenging sea conditions with minimal effort. The unit can be protected against local wildlife with additional bird spikes that can be easily fixed to any exposed surface.



## SUPPORT PACKAGES

Your ZephIR is complemented by a complete set of [ZephIR Support Packages](#) designed to make wind data collection as simple as pushing a button - working with you to understand your project, we can define a bespoke set of Support Packages to meet your needs.

ZephIR Support Packages have been created with more than a decade of practical lidar experience and help to cover your wind energy project from establishing a reliable power solution to your ZephIR in off-grid locations, to providing on-site performance checks with low-cost, low-height met masts.

This is [wind data, now™](#)

POWER™

CONNECT™

DYNAMICS™

VALIDATE™

EXPERT™



ZephIR 300 installed with the **POWER™** package - autonomous power solution



## POWER™

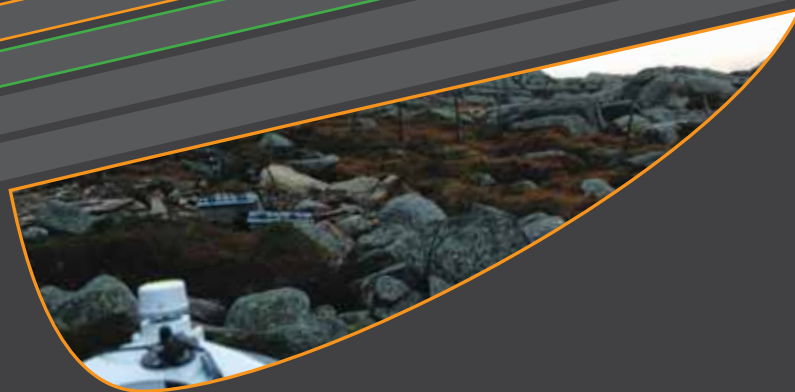
### REMOTE AREA POWER SOLUTIONS

We provide power solutions for the range of scenarios encountered by our customers, with a track record of successful deployments in varying territories, environmental conditions and accessibility restrictions. Our **POWER** package provides you with a stand-alone or remote area power supply for off-grid electricity including hydrogen fuel cells, wind, PV, and LPG or diesel generators.

We have teamed up with power experts Ampair® to provide renewable and hybrid backup power solutions. Ampair has been manufacturing high quality energy power systems in the UK for nearly forty years. These solutions do not require fuel or refuelling, which provides a considerable saving each year and over the lifetime of the ZephIR.

Renewable power supplies also benefit from having a reduced impact on the environment.

**POWER ensures the highest possible system availability for your ZephIR solution in off-grid locations where the power supply is a fundamental requirement of secure autonomous operation.**



## CONNECT™

### GLOBAL COMMUNICATIONS SOLUTIONS

We provide communications solutions for the range of scenarios encountered by our customers with a track record of successful deployments in varying territories and communications-restricted locations. Our **CONNECT** package caters for satellite communications, local mobile / cell phone networks through to more bespoke options.

ZephIR's are fitted with an internal GlobalSIM as standard that provides improved connectivity across a wide range of mobile / cell networks and data is emailed daily, removing the need to "dial in". Users are able to check on the operational status of

their ZephIR, execute remote operations and alter system settings, further removing the need for site visits. For sites where no mobile signal exists, an external Iridium satellite modem can be provided that allows for true remote communications anywhere in the world.

**CONNECT ensures highest possible uptime for connection to your ZephIR so your collected wind data is always transmitted safely and securely.**



## DYNAMICS™

### COMPLEX TERRAIN MADE SIMPLE

In complex onshore sites, all wind lidar measurements can become biased by terrain-induced flow distortions. Rather than deliver a "black box" solution to resolve this bias, we provide an easy to use, proven, transparent tool based on sound scientific principles used widely across the industry through techniques such as Computational Fluid Dynamics.

**DYNAMICS allows data from ZephIR in complex terrain to be obtained seamlessly with converted data being provided either automatically or manually. Conversion factors applied are clearly shown allowing for further wind analysis whilst also providing a clear audit trail for project financing and / or due diligence.**



## VALIDATE™

### 90 METER MAST AND ON-SITE 10 METER MAST VALIDATIONS



All ZephIR systems are offered with a Performance Verification certificate demonstrating that the performance is equivalent to or greater than a Class 1 cup anemometer specification. All comparisons are undertaken at the UK's Lidar and Sodar Test Site comprising a 90 meter tall met mast constructed to conform fully with the recommendations for mast anemometry in IEC 61400-12-1, designed and specified by Natural Power and approved for use by GL Garrad Hassan. Validations can be provided by ourselves or independently by Banks Engineers including Natural Power and GL Garrad Hassan.

ZephIR can measure as low as 10m and therefore can be compared to a very short mast. Should the design of the measurement campaign require the in-situ verification of the ZephIR's measurements then a very low temporary mast can be used.

This low measurement height can also allow the use of a low mast as the long-term fixed reference point on a site, with the ZephIR returning to the mast periodically and then roaming reducing uncertainties around the site and at height above the mast.

**VALIDATE provides the necessary traceability back to undisputed and accepted reference measurements forming a key element of ZephIR data being accepted in finance-grade wind analysis campaigns**



## EXPERT™

### CONSULTANCY SERVICES FOR CAMPAIGN DESIGN

Benefit from 20 years of wind engineering experience within our sizeable technical services team. We can provide assistance with every element of your wind lidar data campaign, from initial design and methodology, through to equipment provision, deployment, ongoing support, and data management and analysis. Our many experts can help optimise your data collection, management and reporting, ensuring an effective and validated campaign. Using our in-house suite of wind lidar data tools developed through over 650 deployments, our science and engineering experts can provide in-depth assistance on the full range of simple, complex, and offshore site locations.



## TRUSTED SERVICE PROVIDERS

ZephIR **Trusted Service Providers** are listed below having worked closely with ZephIR to provide worldwide lidar services to local resource assessment projects. We are able to put you in touch with these companies who can provide services including:

- ▷ ZephIR installations, configuration, commissioning, relocations and home transportation
- ▷ Wind data monitoring, analysis, and reporting
- ▷ Other ZephIR lidar consulting services
- ▷ Local field support as required

### Global

Natural Power  
GL Garrad Hassan  
AWS Truepower  
DNV KEMA

### US

Campbell Scientific  
Estian Technologies  
Chinook Wind

### South Africa

NETELEK

### Asia-Pacific

BNET  
Interdomain

### Europe

New Energy Scout  
INEGI  
Meteotest  
Triventus  
Istos Renewables  
CRES  
Estia Consulting  
DTU Wind Energy (Risø)  
Barlovento  
TEKWILD  
Oldbaum Services  
Windhunter  
Meventus



Since 1974 Campbell Scientific Inc. has created a substantial heritage of introducing new data acquisition systems and the company is committed to satisfying the instrumentation needs of customers, especially those who are working to advance science and technology for the benefit of humankind.

Campbell Scientific data acquisition systems are used worldwide in the wind energy industry and are known for their versatility, precision, and dependability – even in harsh, remote environments. As measurement technologies continue to evolve and progress, CSI has chosen to offer the ZephIR 300 Lidar as its remote sensing solution for wind energy applications.

### ZephIR 300 and Campbell Scientific Dataloggers

Campbell Scientific Dataloggers, including the CR800, CR850, CR1000, or CR3000 can be used to integrate and synchronise ZephIR 300 lidar data with data from other instruments, such as instrumentation from a traditional meteorological tower.

Using a Campbell Scientific datalogger to gather data from the ZephIR 300 also enables integrated tower and lidar data collection through a single gateway via an external cell phone modem, radio, or direct connection. Campbell Scientific dataloggers support multiple protocols such as Modbus, Pakbus, and DNP3, giving users the maximum in flexibility and customization of data retrieval methods.



Established in 1995, Natural Power provides renewable energy consultancy services internationally. Having pioneered the use of ZephIR through the industry for the past 5 years the company now provides key consulting services - from campaign design and wind data analysis through to finance-grade energy yield reporting.

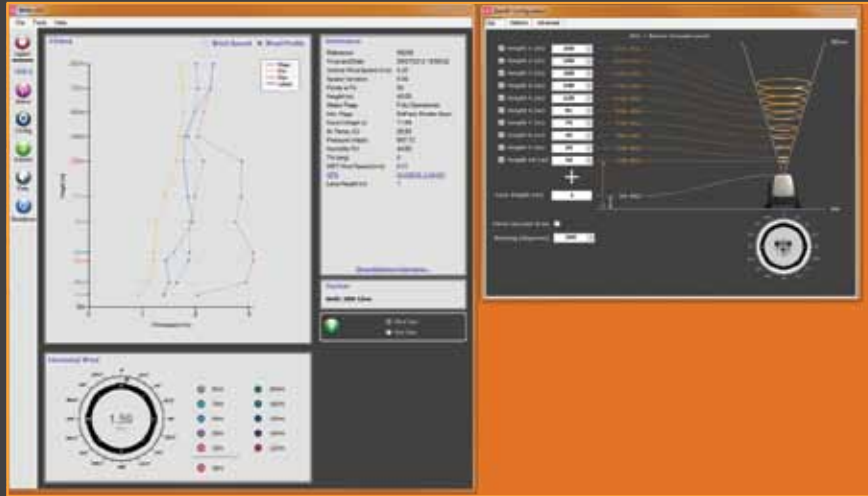
Natural Power's ability to design the entire wind regime assessment campaign for clients is founded on an extensive technical services portfolio of over 40GW of client wind plant globally, combined with a consenting track record of more than 2GW of wind farms onshore and offshore for development clients.

## PARTNERS

## USER INTERFACE

Wind speed history and wind shear graphs show users the wind field live or from recorded data giving insight into the windfield as it evolves.

Users are able to define heights of interest from just 10m to 200m either locally or remotely, covering the entire rotor swept diameter, above and below.



Waltz software allows users to easily configure all ZephIR models and automatically adjusts available options to the type of unit.

Uncluttered wind speed and direction displays give the user a quick glance into the current or recorded wind field.

**ADDITIONAL FEATURES**  
Detailed status outputs are available both live and in recorded data giving you feedback on the ZephIR system and its environment.

A simple download interface gives access to data wherever ZephIR is deployed, over ethernet, wifi, GSM or satellite comms links.

Live and recorded data is available at your finger-tips with simple controls to export recorded data into other formats.

## SYSTEM FEATURES

**AUTOMOTIVE MOISTURE SENSOR** for activating wiper arm, designed to operate in exhaustive automotive applications

**MARINE METEOROLOGICAL STATION** providing temperature, pressure and humidity measurements, designed to operate in harsh marine environments and includes a GPS device for data timestamp & location facilitating synchronisation with other devices

**SMALLEST POSSIBLE TOP PROFILE** ensuring lowest possible surface area to avoid snow build up in cold conditions, with radius on edges to allow for natural snow fall-off

**INSULATED BODY PODS** manufactured in twin-skin Polyethylene, operating across all temperature ranges (-40°C to +50°C) and with IP seals across all surfaces and connector panels

**MARINE WIPER SYSTEM** with silicone wiper blade for extended operation, keeping window surface clear of moisture and debris, designed to operate in the harshest of environments fed by industrial specification screen wash capable of operation in sub-zero temperatures

**CARBON FIBRE LEGS** resistant to horizontal wind loading while keeping overall weight minimised

**QUICK RELEASE HANDLES** for simple levelling adjustments and designed for gloved operation

**WIDE SPREAD FEET** for stable footing in all terrains and all ground surfaces with security bolt through apertures

**MARINE GRADE ROPE** at three locations around waist of product for ease of lifting across uneven terrain

## SYSTEM QUALITY

We recognise that genuine commitment to understanding the present and future needs of our clients are realised in the quality of the services we provide. One of our key objectives is to always monitor our clients' evolving needs in order to increase the range of services and products we can offer, and also to strive to exceed expectations. Our Quality Management System has been developed accordingly and is achieved through meeting the requirements of ISO 9001:2008, in the following application:

ZephIR Lidar innovations:

**Provision of continuous wave lidar equipment supplied to provide wind measurements during the assessment, development and operation of wind farm projects and related meteorological industries, including design, manufacture, engineering, research & development, certification, communications, power and global logistics.**



**CE marking** (also known as the CE mark) is a mandatory conformance mark on products sold or distributed in the European Economic Area (EEA) - consisting of the 27 Member States of the EU and EFTA countries Iceland, Norway, Switzerland and Liechtenstein

ZephIR 300 is a CE Marked product, which guarantees that the product is in conformity with the essential requirements of the applicable EC directives.

ZephIR has been subject to rigorous environmental, EMC and safety testing at a UKAS accredited test house. Test results, combined with real world experience demonstrate the real maturity of the system in some particularly challenging scenarios. These tests can be found at [zephirlidar.com](http://zephirlidar.com)

## PERFORMANCE RESULTS

### Pre-deployment performance validations

Before ZephIR systems are deployed on projects in either complex terrain or simple sites, they are assessed against a 91.5m mast in flat terrain at UK's Lidar and Sodar test site as part of an industry-approved and well-documented performance validation. The mean and standard deviation of the mast correlation parameters, gradient and  $R^2$ , have been calculated from a batch of more than 40 ZephIR 300 units to investigate consistency of lidar performance, pre-deployment (Table 1). The regression slopes show a standard deviation for the ZephIRs of <1% at all heights, with current IEC standards for cup anemometers allowing for almost double that variation, at <2%. The comparisons also include any effects of differing weather conditions in addition to lidar and cup calibration effects.

HEIGHT (m)	GRADIENT		$R^2$	
	Mean	StDev	Mean	StDev
91	1.00	0.0066	0.99	0.0061
70	1.00	0.0062	0.99	0.0041
45	1.00	0.0046	0.99	0.0058
20	1.00	0.0046	0.99	0.0047

Table 1: Batch comparison of more than 40 ZephIR 300 systems

### Calibrated wind tunnel testing

In addition to the pre-deployment performance validations, batch comparisons and demonstrable performance in all terrains, in an experimental investigation by LM Windpower, DTU Wind Energy (Risø) and NKT Photonics, a ZephIR 300 system was configured to stare directly along the flow in a high-performance wind tunnel. The world-first results showed unprecedented performance at the theoretical limit when compared against the wind tunnel instrumentation across a speed range of 5 to 75m/s.

**The correlation was extremely high with  $R^2 > 0.9999$ , and the gradient of the comparison plot differs from unity by less than 0.5%, comparable to the expected accuracy of the pitot sensor used to calibrate the tunnel itself.**



# QUICK START GUIDE



## 1 | SITE

ZephIR is used across a range of sites both onshore and offshore. When assessing the best location to install your system consider access, power, communications and security. Our Support Packages are design to assist in all areas.



## 2 | LEVEL

Once on site, ZephIR can be easily levelled due to its tripod configuration. Quick-release handles with security fittings ensure both a rapid and secure deployment. Additional holes in each wide-spread foot allow for pins through to the ground, and a sure footing in all terrains.

Simply orientate ZephIR to North and you are ready to power-up.



5 minutes



## 3 | ON

Easily attach any of ZephIR's core or ancillary equipment using the Amphe-Lite™ IP67 connectors which provide the highest levels of performance capability for severe environment applications across signal, power and RF communications.

Push the ON | OFF button and ZephIR will power-up and begin recording wind data.



## 4 | COLLECTING DATA

ZephIR will now begin recording your wind data to the on board memory - there is capacity for up to 36 months worth of data.

Connecting either remotely or locally, wind data can be downloaded or emailed to you directly.

## AVAILABLE WHITE PAPERS

### ▷ CALIBRATION OF ZEPHIR USING WIND TUNNEL TESTING

With world first wind tunnel tests proving the absolute accuracy of ZephIR, evidence is provided from theory through to practice of the reliable, repeatable calibration of ZephIR wind lidars

### ▷ THE ECONOMIC BENEFITS OF USING ZEPHIR

Evidence supporting the use of ZephIR wind lidar over traditional anemometry in the context of wind energy projects

### ▷ THE WIND ENGINEER'S GUIDE TO ZEPHIR

Leveraging Best Practice guidelines issued by Natural Power and GL Garrad Hassan focusing on the use of ZephIR wind lidar in finance-grade Energy Yield Analysis reports

### ▷ GETTING THE MOST FROM YOUR ZEPHIR IN COMPLEX TERRAIN

Providing insight in to the use of ZephIR in partnership with dynamics to convert volume ZephIR wind lidar data in to single point measurement data representative of a traditional met mast

### ▷ USING ZEPHIR TO MEASURE TURBULENCE

ZephIR provides 50 data points per second to measure rapidly changing wind flow environments such as complex terrain and turbulence

### ▷ LIDAR CALIBRATION & PERFORMANCE VALIDATION PROCESS

With more than 3 million hours of operation, evidence is provided of ZephIR's high level of repeatable calibration across multiples units alongside an industry-accepted performance validation process applied to all units giving the necessary audit trail for financing wind energy projects

## WIND DATA & TECHNICAL SPECIFICATION

DATA HEADING	UNIT	EXPLANATION
Reference	-	Numerical reference of each record
Time and date	-	In text format, to the nearest second
Timestamp	Seconds	Time and date of the reading as numerical value in seconds
Horizontal wind speed	Metres per second	Horizontal wind speed measured by ZephIR
Vertical wind speed	Metres per second	Vertical wind speed measured by ZephIR
Horizontal wind direction	Degrees	Horizontal wind direction measured by ZephIR
Horizontal min / max	Metres per second	Minimum / maximum horizontal wind speeds measured by ZephIR
TI	-	Turbulence Intensity
Generator	Volts	External supply voltage, if present
Upper temp / lower temp	Degrees Celsius	Pod temperature
Pod humidity	Percent	Internal ZephIR humidity
GPS	Decimal Degrees	GPS location (lat and long)
ZephIR bearing	Degrees	Direction of the ZephIR wrt True North
Tilt	Degrees	Pitch and roll away from vertical
Air Temp.	Degrees Celsius	Ambient temperature
Pressure	Millibar / Hectopascals	Ambient pressure
Humidity	Percent	Ambient humidity
MET wind speed	Metres per second	Horizontal wind speed measured by the MET station
MET direction	Degrees	Wind direction measurement by the MET station
Raining	-	Rain sensor detects rain

PERFORMANCE	ZephIR
Range (min.) Range (max.)	10 metres 200 metres
Probe length @ 10 m Probe length @ 100 m	± 0.07 metres ± 7.70 metres
Heights measured	10 (user-configurable)
Sampling rate	50Hz
Averaging period	user configurable (1 second as standard)
Scanning cone angle	30° (other angles available)
Speed accuracy variation*	< 0.5%
Speed range	< 1 m/s to 70 m/s
Direction accuracy variation*	< 0.5°

OPERATIONS	ZephIR
Temp range (min.) Temp range (max.)	-40°C +50°C
Power consumption	69 Watts**
Power input	12 V
Weight (excluding flight casing)	55 kg
Service interval	24 months

DATA	ZephIR
10 minute averaging	90Kb / day
1 second data	3MB / day
On board storage	36 months
Data transfer	LAN; MODBUS; WiFi; Global SIM; Iridium Sat Comms
Timestamp / Location	GPS

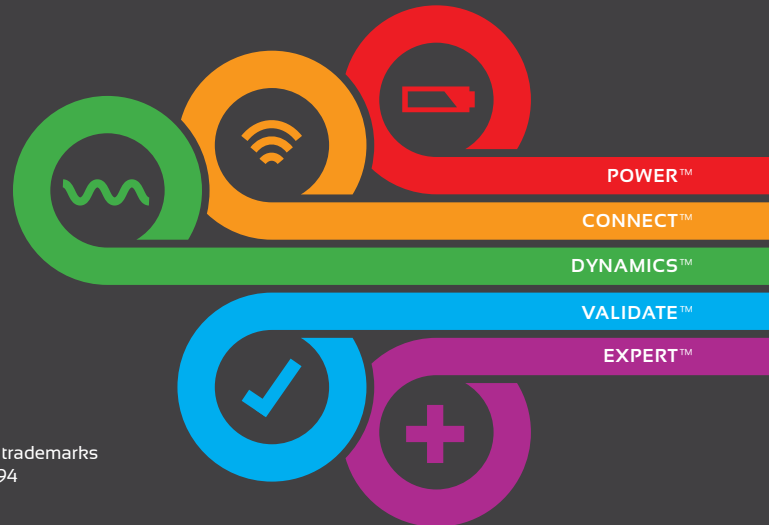
SAFETY	ZephIR
Laser classification	Class 1
Eye safety standard	IEC 60825-1
IP Rating	IP67
Compliance	Full CE accreditation

\* As measured against a calibrated moving target. \*\* In off-grid, DC power situations, excluding any convertor losses and in standard climates. Always refer to manufacturers guidelines on power before specifying 3<sup>rd</sup> party power solutions. Alternatively use the ZephIR **POWER** Support Package.

To discuss your wind energy projects with the world's most experienced wind lidar company, please get in touch:

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**E** sales@zephirlidar.com  
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The Old Barns • Fair Oaks Farm  
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