

# CB 3D-10K 三維掃描型測風雷射雷達

## CB 3D-10K Three-dimensional Scanning Wind Lidar

### 1. 產品說明

#### 1. Products Description

- 三維掃描型測風雷射雷達 CB 3D-10K 基於光學脈衝相干多普勒頻移檢測原理，可實現中下層對流層（包括大氣邊界層）三維風場的精細化探測
- Based on the principle of optical coherence Doppler frequency shift detection, the CB 3D-10K the 3D scanning wind lidar can realize the fine detection of three-dimensional wind field in atmospheric boundary layer.
- 配置高指向精度光學掃描轉鏡，可實現 3D 掃描探測功能（DBS/VAD/PPI/RHI/CAPPI/定點等掃描模式），探測半徑最大可達 10km。
- With high pointing precision optical scanning rotating mirror, the 3D scanning detection function (DBS / VAD / PPI / RHI / CAPPI / fixed point scanning mode) can be realized, and the maximum detection radius can reach 10 km.
- 專門研發了雷達三維立體掃描、虛擬測風塔、多雷達協同等多種探測模式，滿足複雜地形風場、風機尾流、海上遠程虛擬測風塔、大氣污染物立體分佈等複雜測風需求，為用戶提供全方位的定制化解決方案和服務。
- Special research and development of lidar three-dimensional slice scanning, glide path scanning, virtual wind tower, multi-lidar collaboration and other detection modes, to meet the complex terrain wind measurement, wake turbulence detection, offshore long-range virtual wind tower, and other complex wind requirements such as wind shear detection and wake vortex provide users with a full range of customized solutions and services.



### 2. 產品展示

#### 2. Products Display

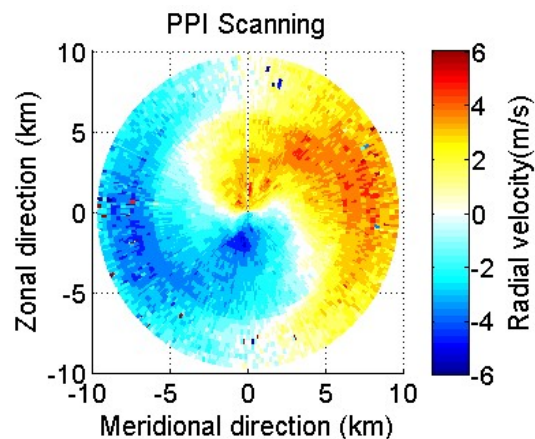
##### 2.1 功能特點及優勢

##### 2.1 Functional Features and Advantages

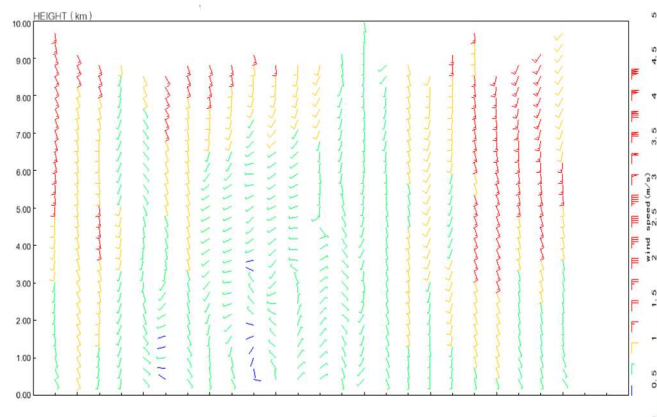
- 三維風場探測：遠距離、三維立體風場探測系統
- Three-dimensional wind field detection: Remote and three-dimensional wind field detection

system

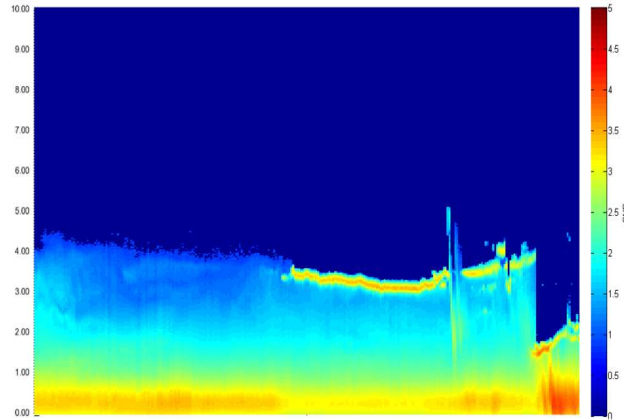
- 精度：風杯級測風精度 ( $<0.1\text{m/s}$ ), 通過 IEC61400-12-1:2017 國際標準檢驗
- Wind speed accuracy: Wind cup level accuracy ( $<0.1\text{m/s}$ ), and meet the international standard of IEC61400-12-1:2017
- 大量程：探測半徑 10km 以上 (可拓展)
- Wide range: Range of detection can reach up to more than 10km (expandable)
- 多掃描模式：DBS/VAD/RHI/PPI/CAPPI/虛擬測風塔等，支援雷達任務腳本編程功能
- Multi-scan modes: DBS/ VAD/ RHI/ PPI/ CAPP/ Virtual anemometer tower, etc., and can be programmed by script
- 高解析度：2Hz 數據刷新頻率，30m 距離解析度
- High resolution: 2 Hz of data update frequency, 30 m of range resolution
- 靈活部署：體積小、重量輕、功耗低，可方便地在野外建站及專場運輸
- Flexible deployment: Small size, light weight and low power consumption make it easy to build stations and transfer in the field
- 無人值守：遠程聯網數據獲取及設備監控
- Unattended operation: Remote networking data acquisition and equipment monitoring
- 高可靠性：陸上及海上嚴苛環境下持續穩定工作
- High reliability: continuously and stably operate in the harsh onshore and offshore environment



CB 3D-10K PPI 掃描 CB 3D-10K PPI scanning mode



風羽圖 Wind barb



雲和氣溶膠後向散射強度圖 Cloud and aerosol backscatter intensity

## 2.2 技術指標

### 2.2 Specifications

指標項 Specifications	參數 Parameter
雷射波長 Wavelength	1550nm, 人眼不可見且人眼安全 1550nm, not visible to the naked eye
探測範圍 Detection range	120m~10000m 120 m ~ 10000 m
距離解析度 Range resolution	30m/60m/用戶設定 30 m / 60 m / user settings
數據刷新率 Data updating time	0.5s~10s 0.5 s ~ 10 s (configurable)
風速測量範圍 Wind speed range	0~75m/s 0 ~ 75 m/s
風速測量精度 Wind speed accuracy	$\leq 0.1\text{m/s}$ $\leq 0.1 \text{ m/s}$
掃描伺服精度 Servo accuracy	$0.1^\circ$ $0.1^\circ$
掃描模式 Scanning mode	定點/DBS/VAD/PPI/RHI/CAPPI 腳本編程 Fixed point/ DBS/ VAD/ PPI/ RHI/ CAPPI/ programmed by script
數據產品 Data products	DBS/VAD 風廓線、垂直氣流、 RHI/PPI/CAPPI 徑向速度場及反演風場、虛 擬測風塔、風機尾流場、尾渦及風切變、雲 和氣溶膠後向散射強度、聯機協同觀測、 GNSS 位置時間、雷達狀態數據、地面大氣 溫度、濕度、氣壓數據等 DBS / VAD wind profile, vertical velocity, RHI / PPI / CAPPI radial velocity and wind field, virtual anemometer tower, wind turbine wake,

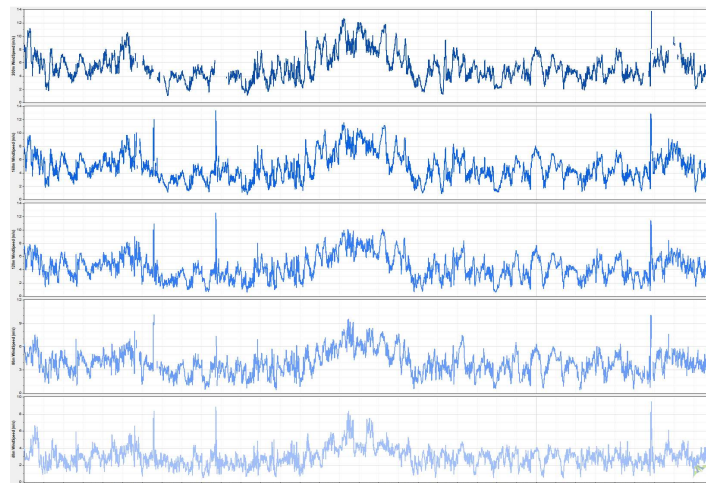
	aircraft wake vortex and glide path wind shear warning, aerosol backscattering intensity, multi-lidar collaborative observation, GNSS position-time, radar state data, temperature, humidity, and pressure, etc.
重量 Weight	< 150kg < 150 kg

## 2.3 海上風資源前期勘測

### 2.3 Preliminary Exploration of Offshore Wind Resources



海上虛擬測風塔 Virtual anemometer tower



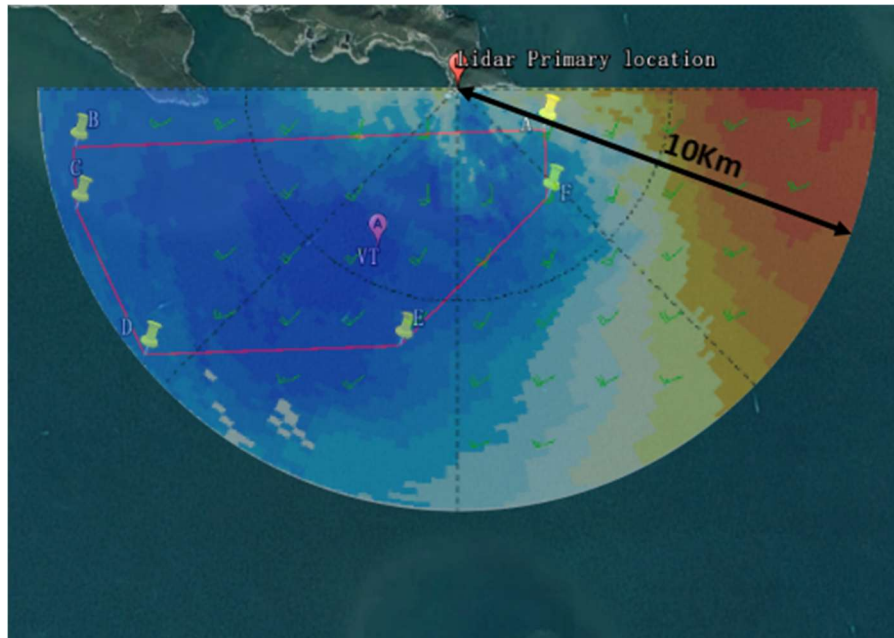
多高度風速探測結果 Multi-height wind speed

- CB 3D-10K 精度高，測量距離遠，方便靈活開展海上多高度風場測量，為海上風電場的前期風資源勘測提供有力支撐。
- CB 3D-10K has high precision and long measuring distance, which is convenient for flexible

measurement of offshore multi-height wind field, and provides strong support for Preliminary wind resource exploration of offshore wind farms.

## 2.4 風電場整場運維

### 2.4 Operation and Maintenance of Wind Farm



PPI 掃描模式水準風場 Horizontal wind field in PPI mode

- 通過掃描探測可獲取半徑 10km 範圍內的三維風場信息，特別是對風機尾流進行精細化探測，可優化風場尾流控制，提高整場發電效率，能夠對風電場的運維提供有效幫助。
- Three-dimensional wind field information within a radius of 10km can be obtained through scanning detection, especially the detection of the wind turbine wake, which can optimize the wind wake control, improve the power generation efficiency of the whole field, and provide effective help for the operation and maintenance of wind farms.