

FBG Blade Monitoring Series Products

Datasheet

Product Overview

The Fiber Bragg Grating (FBG) blade monitoring series includes the monitoring and data acquisition unit, FBG load sensor and FBG vibration sensor. *January 23, 2024
CN Rev.v1.0*

In wind turbine blade monitoring, FBG sensors can be used to monitor blade load, damage, dynamic balance, icing and other conditions. The working principle of FBG sensing is based on the wavelength modulation characteristic of fiber Bragg gratings. The variation of the measured physical quantity is derived by detecting the shift of the central wavelength of the FBG. These monitoring results can provide a basis for early warning, shutdown, inspection, maintenance, adjustment and design feedback, which is conducive to the timely discovery and resolution of potential problems and ensures the safe and stable operation of wind farms.

Main Features

- Corrosion resistant
- High sensitivity
- Real-time monitoring
- High reliability
- Electromagnetic interference immunity
- Light weight & compact size
- Strong scalability

Monitoring Data Acquisition Device

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The monitoring data acquisition unit is a fiber optic sensor acquisition and analysis device specially developed for the wind power industry. Based on wavelength scanning of narrow-linewidth tunable lasers and multi-channel parallel spectrum demodulation technology, it features compact size, strong compatibility and easy installation.

The unit is equipped with built-in FPGA and ARM modules, providing signal preprocessing, fault alarm and other functions. It is configured with industrial-grade LC/APC or FC/APC optical interfaces and RJ45 standard network interfaces complying with industrial communication requirements, enabling communication with the wind turbine main controller or turbine server. Communication protocols including Ethernet, RS485 and CAN are available. A wireless transmission module can be optionally equipped to support wireless data communication.

Technical parameters:

Parameter Name	Technical Requirement
Number of channels	16
Sampling frequency	Synchronous 100Hz
Wavelength range	1525~1565nm
Wavelength resolution	1pm
Optical interface	LC/APC
Supply voltage	220VDC
Peak power	< 30W
Communication Interface	10M/100M Ethernet, CANopen
Storage space	/
Dimensions	430*330*200mm
Weight	15KG



Monitoring Data Acquisition Device

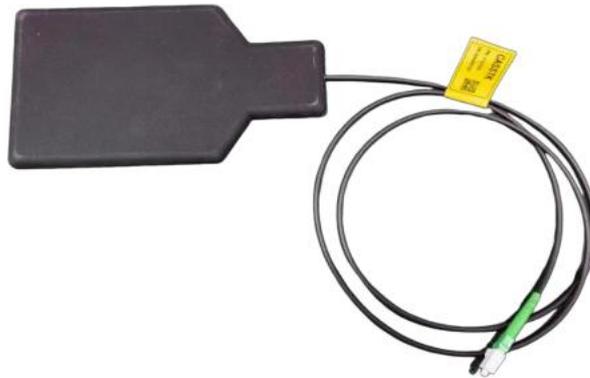
FBG Load Sensor

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The Fiber Bragg Grating (FBG) load sensor adopts fiber metallization laser welding technology and temperature self-compensation structure packaging. It is a dedicated FBG sensor for pitch force feedback and blade structural safety monitoring of wind turbines, used to monitor blade stress and load. With built-in temperature compensation, it features high measurement accuracy, long-term zero stability, negligible thermal drift, easy welding, good dynamic performance, intrinsic safety, long-term stability and fast response.

Technical parameters:

Parameter Name	Technical Requirement
Measuring range	±3000με
Central wavelength	1525~1565nm
Optical interface	LC/APC
Operating temperature	-40°C-85°C
Installation method	Adhesive bonding
Dimensions	180*100*10 (excluding pigtail)
Weight	50g



FBG Load Sensor

FBG Vibration ensor
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The FBG vibration sensor transmits acceleration changes to the FBG after proper packaging. Combined with high-speed FBG demodulation technology, it provides high resolution and wide frequency response. Acceleration is calculated by measuring the FBG wavelength shift.

Adopting state-of-the-art FBG sensing technology, the sensor is compact, highly sensitive and highly reliable, capable of long-term operation in harsh environments with high precision and stability. Through different structural assemblies, the sensor can be designed for 2D and 3D acceleration measurement. It is suitable for wind turbine vibration monitoring.

Technical parameters:

Parameter Name	Technical Requirement
Technical principle	Fiber Bragg Grating (FBG)
Measuring direction	Dual-axis (Y & Z)
Measuring range	±5g
Frequency range	0.1Hz~100Hz
Sensitivity coefficient	100pm/g
Central wavelength	1525nm ~ 1565nm
Optical interface	LC/APC or SC/APC
Operating temperature	-40°C-85°C
Installation method	Adhesive bonding
Dimensions	70mm*65mm*50mm
Weight	600g


FBG Vibration Sensor