

Position	Monitoring function	Significance	Monitoring Spec.	Key requirements
Tower Base	External vibration intensity	Base safety	Earthquake acceleration	50m waterproof, 120dB dynamic range, 2.5V/g sensitivity
Tower Tube	Tube inclination	uneven settlement foundation stability	Static inclinometer	2" resolution, $\pm 0.005^\circ$ accuracy, $0.006^\circ/\text{C}$ temperature drift
	Tower top motion	Stiffness and strength of tower structure	Dynamic inclinometer	$\pm 0.1^\circ$ accuracy, 200Hz refresh rate, 0.05° resolution
	Judgement of bolt looseness	Tightening degree of tower bolts	vibration acceleration	μg level resolution, 2.5V/g sensitivity, 120dB dynamic range
	Horizontal distortion	Risk degree of tower structure	angular acceleration	$0.001\text{rad}/\text{s}^2$ resolution, DC~200Hz bandwidth, $\pm 200\text{rad}/\text{s}^2$ measurement range
Turbine inside	Assembly damage	Fault diagnosis of generator assembly	vibration acceleration	\pm measurement range, DC~12kHz bandwidth, MEMS technology
Fan blade	Adjustable - pitch function effectiveness	Adjustable-pitch control system effectiveness	Fan blade pitch angle	0.05° resolution, shaftless installation, DC~200Hz bandwidth
	Adjustable - pitch ability	Adjustable-pitch control system effectiveness	Fan blade speed	0.01rpm resolution, shaftless installation, DC~200Hz bandwidth
Hub	Wind driven effectiveness	Identification of generation start-up threshold Brake system effectiveness	Hub rotation angle	0.05° resolution, shaftless installation, DC~200Hz bandwidth
	Wind driven ability	Utilization rate of wind power Brake system effectiveness	Hub rotation speed	0.01rpm resolution, shaftless installation, DC~200Hz bandwidth
Assembly	Yaw change degree of assembly following wind direction	Wind direction utilization Effectiveness of yaw control system	Yaw angle of wind	0.1° resolution, free from magnetic and optical interference, DC~10Hz bandwidth