

WIND ENERGY SOLUTIONS



Dc Disconnect Switches

Arc-Flash Relays

Surge Protective Devices

High-Speed Semiconductor Fuses

Temperature Sensors

Wind Turbine Control, Sensing and Circuit Protection Solutions

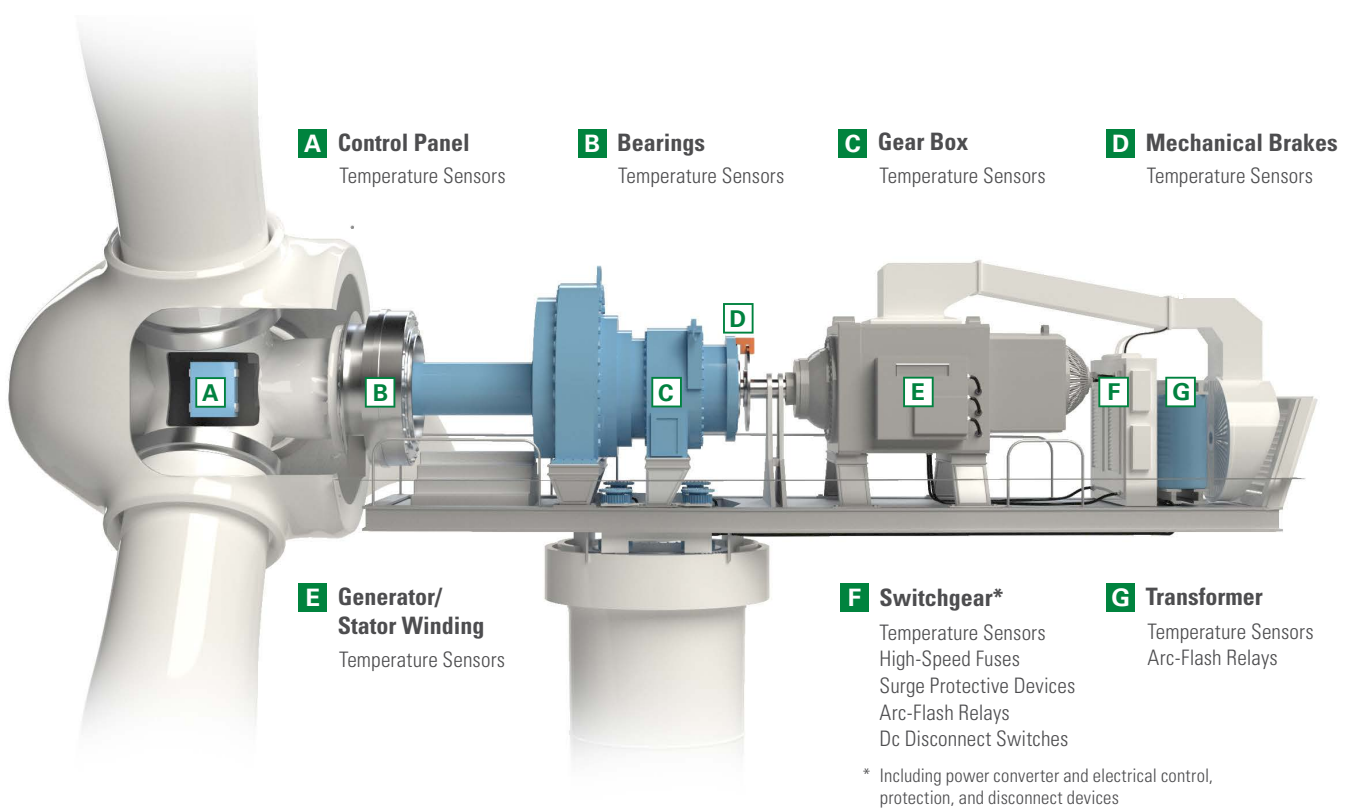
Wind energy or wind power is a fast growing form of clean energy and the second largest renewable energy source for power generation. It takes the kinetic energy of the moving air, recovered by the turbine from the wind-propelled blades, and converts it into electrical energy. Wind power is cost-effective, sustainable, and has fewer effects on the environment than many other energy sources.

Littelfuse sensing and monitoring components as well as circuit protection products help keep wind turbines turning. A wind turbine can take as many as 8,000 parts to operate and has a typical lifespan of 20 to 25 years with proper maintenance and protection. Some key challenges include running 24/7, operating under vibration, and adapting to extreme temperature changes. Because wind farms are located in isolated or off-shore locations, keeping systems up and running contributes directly to safety, efficiency and productivity.

Our product solutions deliver:

- Improved safety with protection from arc flash, surges and overcurrents
- Enhanced system efficiencies through temperature monitoring and fault identification
- Minimized downtime, reduced operating costs, and maximized output

Littelfuse Control, Sensing and Circuit Protection Solutions for Wind Turbines



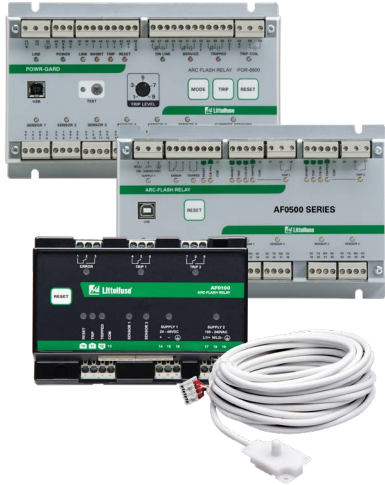
High-Speed Semiconductor Fuses

Wind energy systems contain very sensitive power semiconductor devices that are vulnerable to overcurrent conditions. These conditions include overload faults that cause over heating or short-circuit faults when the current bypasses the normal load and takes a shorter path, often caused by an insulation breakdown, misfiring of power semiconductor devices, or a faulty connection.

The POWR-SPEED® High-speed Semiconductor Fuses are designed for modern day sensitive power electronics devices that require superior protection against overcurrent. They offer extreme current-limiting protection, balanced performance for longevity, and are available in various designs to meet the needs of wind energy systems.

POWR-SPEED High-Speed Semiconductor Fuses protect these applications:

- Switchgear including power converter



Arc-Flash Relays

An arc flash is an intense discharge of electrical energy across a typically insulating barrier, resulting in extreme heat, pressure, and light that can destroy equipment and cause temporary blindness. Causes of an arc flash in a nacelle include insulation breakdown, loose connections, or mechanical damage that generates phase-to-phase or phase-to-ground faults. To help mitigate these events, the FM Global Property Loss Prevention Data Sheet for Wind Turbines specifies arc protection for switchgear.

Arc-flash relays are microprocessor-based devices that use optical sensors to detect the onset of a flash. Installing an arc-flash relay—which can respond in less than 1 ms to rapidly detect developing arc flashes—greatly reduces the total clearing time and the amount of energy released through an arcing fault. In turn, there is less damage to equipment, less downtime and most importantly, fewer fatalities and less severe injuries to nearby personnel.

Arc-Flash Relays protect these applications:

- Transformer
- Switchgear including the cabinets with power converter equipment, interrupting devices and cable or bus terminations



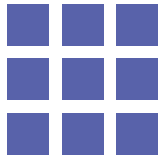
Surge Protective Devices

Surges may be caused by indirect lightning or equipment being turned on or off. These surges damage components costing money to repair or replace as well as create unplanned downtime resulting in lost energy, unreliable systems and/or dangerous situations.

The Littelfuse Surge Protective Device (Type 2) SPD2 series for branch circuits safeguards components from transient overvoltage or surges by limiting the fault current to a load or the unit being protected. With a globally-compliant, pluggable design, this easy-to-install and cost-effective SPD has higher nominal and total discharge current protection to help mitigate costly equipment damage and downtime.

SPD2 Series products protect these applications:

- Switchgear including power converter, protection and electrical control devices



Temperature Sensors

Wind turbines have thousands of parts—many of which are in motion generating heat caused by friction. However, some of these parts are built to run at specific temperatures. If a component runs too hot it can burn out or cause a fire. If it runs too low, its efficiency or capacity may be reduced or limited.

A temperature sensor detects and measures the average heat or thermal energy in a medium. Based on their response time, Negative Temperature Coefficient (NTC) thermistors are the most common sensors used for temperature measurement and control applications. Resistance Temperature Detectors (RTDs) precisely measure a very wide range of temperatures—especially on the high side—and are ideal for extreme environmental conditions or where accuracy is critical.

Temperature Sensors monitor these applications:

- Bearings
- Control panel
- Gear box
- Generator/Stator winding
- Mechanical brakes
- Switchgear (ambient temperature around power converter)
- Transformer



Dc Disconnect Switches

When a fault occurs, a turbine component breaks and repairs are needed. The circuit containing the faulted component needs to be isolated and turned off properly to eliminate equipment damage and protect personnel.

The Littelfuse Dc Disconnect Switch series are energy-efficient, compact disconnect switches that quickly break or resume the flow of current safely to prevent shock hazards when trying to isolate circuits or repair wind systems.

Dc Disconnect Switches protect these applications:

- Switchgear including disconnect devices

For more information visit: [Littelfuse.com/RenewableEnergy](https://www.littelfuse.com/RenewableEnergy)

Disclaimer Notice—Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/product-disclaimer.