

► Safe and efficient monitoring

Wind turbines

Wind turbines are exposed to the most varied weather and environmental influences during long-term use. They need to work efficiently and high availability must be guaranteed. Protecting the plant against overload is absolutely essential to achieve low downtimes.



Investing in the safety of wind turbines not only brings economic benefits, it also guarantees that maintenance staff are protected. Wind turbines are subject to internationally applicable standards and directives, such as the Machinery Directive (2006/42/EC) and IEC 61400.

Safe automation – a worthwhile investment:

- Implement scalable, safe automation solutions for new and existing wind turbines.
- Manufacture in compliance with standards and certification requirements.
- Achieve optimum standardisation in the automation of both on and offshore turbines.
- Reduce accident risk during operation and during maintenance and installation work.

Use a safety and automation solution that's tailored specifically to your wind turbine. We can help you create your individual safety concept.



► Safe and standard-compliant automation

Pilz as your safety partner can offer reliable components and solutions, which are tried and tested in the wind energy sector. That means you benefit from the simple integration of our safety systems, the possibility of remote diagnostics and rugged product types.

We offer certified solutions (TÜV/BG/CE/UL/CCC/GOST) for worldwide use and safety systems for wind turbines in accordance with international regulations such as the Machinery Directive (2006/42/EC), IEC 61400 and the guideline published by Germanischer Lloyd.

Pilz solutions have clear benefits, particularly in the case of standard-compliant speed monitoring.

We can offer a range of options for implementing standard-compliant speed monitoring on wind turbines. Our control systems are scalable for various encoder combinations, achieving a safety level up to PL e.

Safe automation technology

Safe automation technology from Pilz enables a differentiated reaction to interactions and stress limits, contributing to a longer wind turbine service life.



+ Safe monitoring of the pitch drives and angles

+ Safe speed monitoring, up to PL e

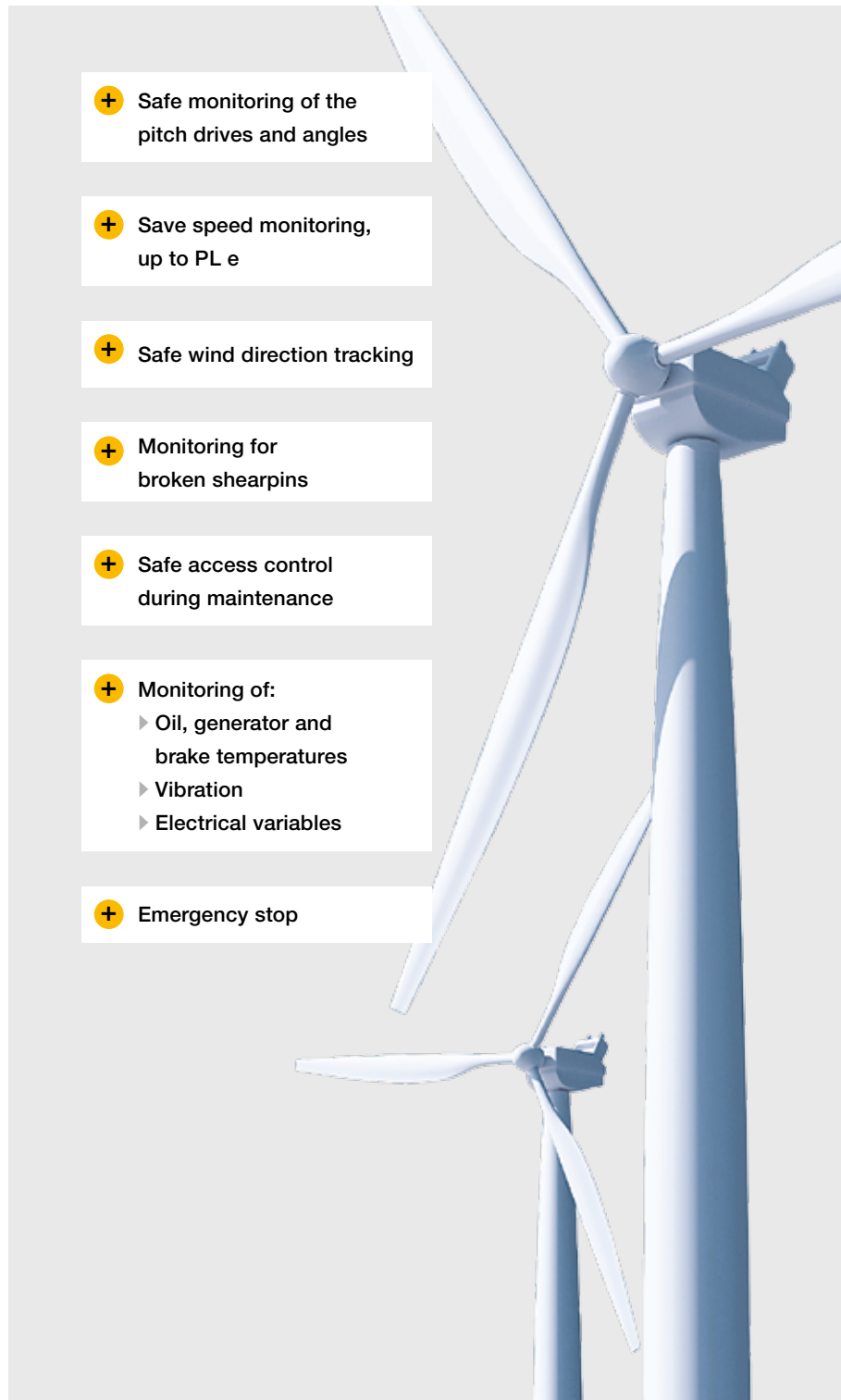
+ Safe wind direction tracking

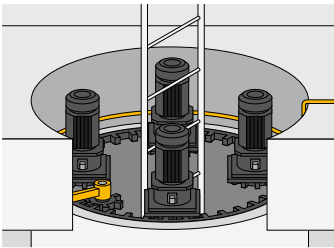
+ Monitoring for broken shearpins

+ Safe access control during maintenance

+ Monitoring of:
▶ Oil, generator and brake temperatures
▶ Vibration
▶ Electrical variables

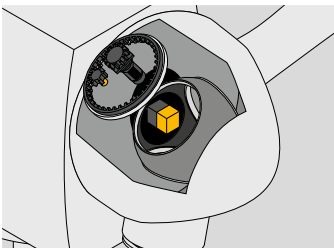
+ Emergency stop





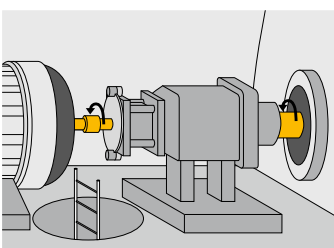
Nacelle wind direction tracking (yawing)

The wind turbine's output is greatest when the nacelle is oriented optimally relative to the wind. The automation system PSS 4000 and the servo amplifier PMCprotego D allow the safe control of the yaw motors. To avoid cable twisting, both the automation system PSS 4000 with the speed monitor PNOZ s30 and the configurable control system PNOZmulti monitor the absolute position and rotation direction, protecting your turbine if there is a malfunction and providing you with the benefits of a standard-compliant solution.



Pitch system control

For optimal energy production, the rotor blade angle must be precisely set. If necessary, the rotor blades can be turned away from the wind with the automation system PSS 4000 or the configurable control system PNOZmulti. Our robust components with the -T identifier are suitable for harsh environmental conditions. Analogue values such as mechanical rotor blade load can be read in with the automation system PSS 4000 and reliably processed further for calculations.



Drive train control

The speed monitor PNOZ s30, the configurable control systems PNOZmulti and the automation system PSS 4000 monitor standstill, (over)speed, position, shearpin breakage, speed range, and direction of rotation in accordance with EN ISO 13849-1 up to PL e. Other parameters, such as oil and generator temperature, vibration and electrical parameters, can also be reliably monitored. This allows you to prevent failure.



Safety in the tower

The PNOZsigma, the configurable control system PNOZmulti and the automation system PSS 4000 allow you to monitor the tower and the emergency stop.

► With our products your turbine is safe



Automation system PSS 4000

- ▶ Rugged modules (-T) for temperatures from -40 °C to +70 °C
- ▶ Scalable, decentralised hardware structures for safety and automation
- ▶ Simple software, programming in accordance with EN/IEC 61131-3
- ▶ Solutions for safe motion monitoring
- ▶ Monitoring of digital and analogue plant values
- ▶ Safe calculation of physical variables such as speed and acceleration
- ▶ Remote diagnostics via connection to various communication networks



Configurable control system PNOZmulti

- ▶ Rugged modules (-T) for temperatures from -25 °C to +60 °C
- ▶ Simple configuration with the configurator
- ▶ Solutions for safe motion monitoring
- ▶ Monitoring of digital and analogue plant values
- ▶ Remote diagnostics by means of various fieldbus modules



Safe speed monitor PNOZ s30


- ▶ Safe motion monitoring
- ▶ Increased productivity
- ▶ Convenient operation with rotary knob (push and turn)
- ▶ Suitable for all common motor feedback systems and proximity switches
- ▶ No additional programming software required



Servo amplifier PMCprotego D

- ▶ Drive-integrated safety functions up to PL e
- ▶ Supports numerous fieldbuses, feedback devices and motor types
- ▶ Highly dynamic, short reaction times
- ▶ Fast commissioning
- ▶ Easy-to-use software tool

Further information
on the subject of
wind energy:

 Webcode:
web1075

Online information
at [www.pilz.com/
windenergy](http://www.pilz.com/windenergy)

► Services for wind turbines

Pilz has many years of experience in the field of consultancy services for machinery safety – you too can trust the expert! We can provide support with services that are specifically tailored to wind turbines:

- Risk assessment
- Safety concept
- Safety validation
- Support with CE marking



Risk assessment

Together with you, we will undertake a technical inspection of your wind turbine in accordance with applicable national and/or international standards and directives. The aim of the risk assessment is to identify and assess existing hazards and to define risk reduction measures. This is how we proceed:

- Identify the applicable standards and regulations
- Define the machine's limits
- Identify all the risks in each of the machine's lifecycle phases
- Estimate and assess the risk
- Recommend an approach for reducing risk



Safety concept

The Pilz concept is aimed at combining functional safety and productivity. We optimise implementation costs, interaction between operator and machine, productivity and scope of maintenance work. The services we provide as part of the safety concept:

- Develop mechanical, electrical and other engineering solutions for the safety of your wind turbine
- Apply state-of-the-art standards and directives
- Determine the Safety Integrity Level (SIL) and Performance Level (PL) if safety-related control systems are used
- Consider machine availability and productivity when integrating safety systems



Safety validation

Validation of the selected safety functions is essential for proving that your wind turbine is safe. International standards such as ISO 13849 and IEC 62061 require validation of safety systems, irrespective of the functional design. Whether it's a new installation, conversion, retrofit or upgrade – we'll inspect your wind turbine for compliance with the necessary safety requirements. As part of validation we will:

- Inspect your wind turbine for compliance with the necessary safety requirements
- Determine whether compliance with regulations such as the Machinery Directive (2006/42/EC) and comparable national standards is given
- Carry out function check and fault simulation on the safety system
- Perform measurements
- Produce a test report with detailed information about the results

▶ Support

Technical support is available from Pilz round the clock.

Americas

Brazil

+55 11 97569-2804

Canada

+1 888-315-PILZ (315-7459)

Mexico

+52 55 5572 1300

USA (toll-free)

+1 877-PILZUSA (745-9872)

Asia

China

+86 21 60880878-216

Japan

+81 45 471-2281

South Korea

+82 31 450 0680

Australia

+61 3 95600621

Europe

Austria

+43 1 7986263-0

Belgium, Luxembourg

+32 9 3217575

France

+33 3 88104000

Germany

+49 711 3409-444

Ireland

+353 21 4804983

Italy, Malta

+39 0362 1826711

Scandinavia

+45 74436332

Spain

+34 938497433

Switzerland

+41 62 88979-30

The Netherlands

+31 347 320477

Turkey

+90 216 5775552

United Kingdom

+44 1536 462203

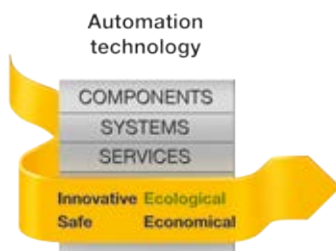
You can reach our

international hotline on:

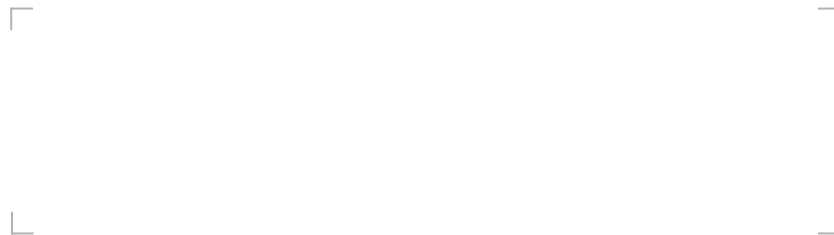
+49 711 3409-444

support@pilz.com

Pilz develops environmentally-friendly products using ecological materials and energy-saving technologies. Offices and production facilities are ecologically designed, environmentally-aware and energy-saving. So Pilz offers sustainability, plus the security of using energy-efficient products and environmentally-friendly solutions.



Presented by:



We are represented internationally. Please refer to our homepage www.pilz.com for further details or contact our headquarters.

Headquarters: Pilz GmbH & Co. KG, Felix-Wankel-Straße 2, 73760 Ostfildern, Germany
Telephone: +49 711 3409-0, Telefax: +49 711 3409-133, E-Mail: info@pilz.com, Internet: www.pilz.com