Just what you asked for: our operating software.

Wishes are meant to be granted. That's why our operating and configuration software also meets the high standards of the Perfect Pitch System. In addition to our many years of experience with pitch systems, it is also your wishes and the feedback of our service technicians working in the field that have led to the design of our software. Those capable of listening, have the information they need to make meaningful improvements.

From customer wishes to concrete features:

- Secure transfer of settings into the data memory
- Intuitive, user-friendly interface
- Excellent diagnostic possibilities
  - Clear display of the device status as well as error history
  - Fast oscilloscope function with access to all converter data
- Cross-device functionality
- Bootload functionality for easy, safe firmware updates
- Compatible with standard operating systems
- Browser-based interface (in development)

Individually or as a system: it's your choice.

Our new system offers you maximum freedom to choose. You can select individual components, engineering support or the very best of both as a complete system solution. We are available to advise you at every step in order to create the perfect solution to your needs:

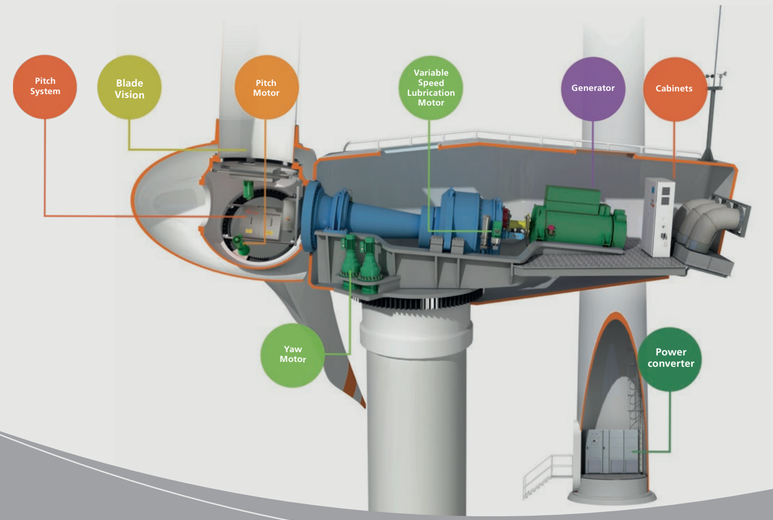
- Perfectly aligned motor-inverter combinations
- Added value due to our engineering services: perfectly adapted to your turbine as a whole
- Perfect as always: our comprehensive system solutions – turnkey/pre-finished for your turbine

System building

Technical integration solution (Components + engineering)

Components

Everything that spins and moves.



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Nidec
All for dreams

SSB Wind Systems®
Be consistent.

Benefits as far as the eye can see. The SSB Perfect Pitch.

Pitch systems

Switch and control cabinets

Service

Perfectly in tune:
your wishes and our solutions.

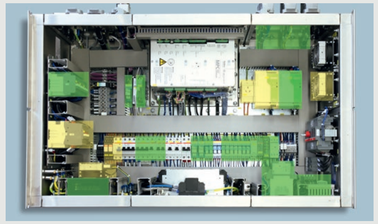
Drives, motors, sensors… Which do you need? We can deliver all of them, but we're convinced it's not really individual parts you are seeking but rather a whole solution. A perfect combination of components, harmonized to deliver a complete solution: The SSB Perfect Pitch. Tailored to your individual needs and requests for all standard rotor sizes in onshore and offshore. Key aspects of our solutions include the Perfect Pitch Drive converter and the Perfect Pitch Interface application module.

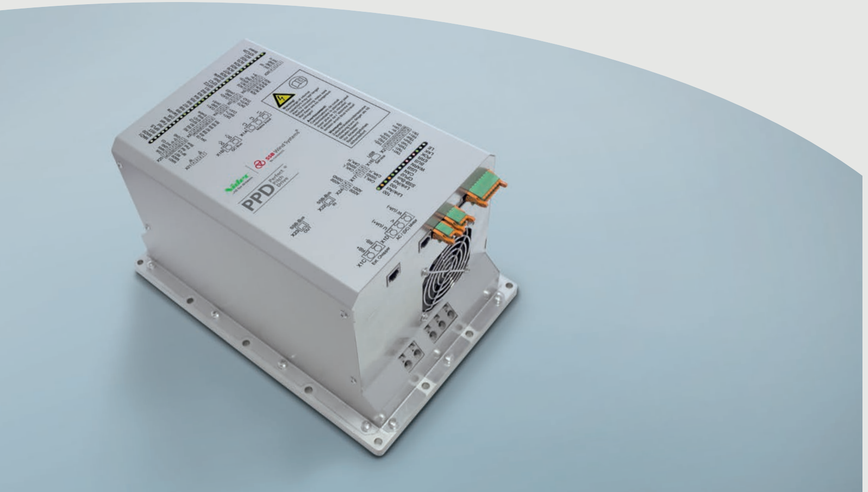
Perfect Pitch Drive:
less space, more room for ideas.

When we eliminate something it's only so that you can benefit more. The integration of numerous functions within the Perfect Pitch Drive halves the total area of the pitch drive in the nacelle. We not only offer proof in black and white but also in green and yellow.

No longer required, it's integrated

Only required for added options, e.g. the backup battery





Perfect Pitch Drive:
pure joy with hard data.

Technical parameters.

Grid supply voltage range	$400V_{AC}$ -30 % / +15 %, +30 % for 6 s within 60 s 50/60 Hz ±10 %	
Backup-voltage range	$216V_{DC}$ … $408V_{DC}$	
Motorentypen	AC Asynchronous / AC Synchronous DC	
Continuous current	PPD 40: AC 40 A DC 60 A	PPD 65: AC 65 A DC 80 A
Peak current (ca. 3 s)	PPD 40: AC to 120 A DC to 180 A	PPD 65: AC to 180 A DC to 240 A
Digital In-/Output	10 x DI (configurable) 8 x DO (configurable)	
Analogue In-/Output	5 x Pt100 1 x PTC 1x ±10 V 1x 0… 20 mA	
Interfaces for communication	2 x SSB Bus optically (copper, optional fiber optics) 1 x CAN	
Interfaces for diagnosis/service	Interface for manual control unit/ Bluetooth dongle and smart phone app	
Interfaces for encoder	SSI motor encoder SSI blade encoder	

Functions.

Softstart	DC bus charging by controlled rectifier
DC 24 V supply	Integrated DC 24 V supply (10A), output to supply external components (2A) Optionally an external DC 24 V power supply (for redundancy) can be connected
Charging of backup Backup-System	Integrated charger for storage battery or Ultracaps
Grid power supply monitoring	Monitoring of the grid power supply ✓ Detection of under-/over voltage ✓ Detection of phase loss
Backup-voltage monitoring	Monitoring of the backup voltage
Control of the motor-brake	Transistor-based control of the motor brake (24V) – Monitoring function open/close behaviour brake
Motor speed feedback	Motor speed control by use of digital SSI encoder signal for max. reliability
Motor temperatur monitoring	Redundant monitoring of the motor temperature sensors PTC and Pt100
Panel temperature monitoring and control	Monitoring of the temperature inside the panels, control of heating and cooling by digital outputs
Motor heating control	Allows to heat up the motor (if not in operation)

Perfect Pitch Drive: maximum integration for maximum benefits.

Integrated Functions.

- DC intermediate circuit charge
- Actuating and monitoring of engine break
- 24 V power adaptor
- Backup charging device
- Mains voltage monitor
- Backup voltage monitor
- Motor temperature monitor
- Controlled temperature switch cabinet
- Direct 24 V contactor control

Increased

- Reliability of the turbine
- Increased synergy effects (scalable platform)
- Expanded condition monitoring (improved diagnosis and serviceability)
- Higher proportion of fully automated tests
- Battery Lifecycle Management
- Increased system efficiency through integration of BladeVision sensor technology
- Opportunity to integrate next-generation

- Reduction of system costs (material and labor costs)
- Less installation space required, e.g. lower system volume within the nacelle
- Reduced wiring expenditure
- Same functionality with less parts
- Reduction of external manual production and testing

Reduced

Perfect Pitch Interface:
open to your wishes.

Application module	Functions
Application-module as front-end	Interface of the pitch system to the turbine control
Adaptable to the customers fieldbus	Adjustment through modular interface ✓ CANopen ✓ Profinet IO ✓ Ethernet/IP ✓ DeviceNet ✓ EtherCAT ✓ RS485 ✓ Profibus ✓ Modbus ✓ Others
Ethernet-interface	Ethernet-interface for remote diagnosis and/or connection to a sensor system
USB	Interface for parameter setting
SD memory card	Memory to record condition monitoring data for evaluation
SSB Bus	A fast, pitch system specific bus
SSI-interface	To connect an encoder (rotor position), e.g. used for the SSB sensor system BladeVision

Our Perfect Pitch Interface is the central interface responsible for turbine control. It is not designed to create another bottleneck but as an open vessel awaiting your requirements:

- Coding platform for turbine specific functions
- Integrated, power-failure-proof data storage unit for data protocolling
- Overriding control and monitoring module to, e.g. program a customer-specified emergency operation profile
- Integrated web server
- Ethernet TCP/IT interface

First class safety:
our double Processor Solution.

A reduction of construction parts and components not only reduces space requirements. A component that no longer exists is also incapable of producing a system error. In this sense, safety increases in direct proportion to a decrease in components. On the other hand, it is also possible to increase safety even more by introducing a very particular component: namely, a second processor.

This so-called Posi Safe is independently programmed from the primary processor (main CPU) and has a pure emergency feathering function. The Posi Safe permanently monitors the main CPU. If it fails, the Posi Safe starts automatically. Furthermore, its PL d capacity according to IEC 13849 is an integral part of our safety concept.

Perfect, even when environmental influences are not.

- Supply voltage range: up to +30 %
- Self-protection of system during extreme voltage surges: > 30 %
- Protection against corrosion: up to C4
- Ambient temperature (in the nacelle) -30 °C to +55 °C
- Relative humidity: up to 95 %
- Degree of protection: IP54