

Decades of experience for your individual solution.

For more than 40 years, Lenord + Bauer has developed, manufactured and marketed high quality sensors and powerful control systems for your requirements. Together with you we analyse your automation tasks and both develop and implement appropriate solutions for you.



Redundant tandem encoder

The combination of incremental and absolute rotary encoders to form a tandem system supports the implementation of safety functions on modern wind turbines.

- ▶ Combination of incremental and absolute rotary encoders
- ▶ Electrically isolated sensor units
- ▶ Integrated fieldbus interfaces
- ▶ Insulated construction
- ▶ Best MTTFd-figures for achieving a high Safety Integrity Level (SIL) and Performance Level (PL)
- ▶ High resolution up to 266,240 pulses per turn

Contactless measurement of rotational movements

- ▶ The magnetic sensors do not age
- ▶ Contactless scanning of tooth wheels with large measuring distance up to 3 mm
- ▶ Temperature range -40 °C to +120 °C
- ▶ Measurement from 0 Hz (standstill)



Redundant multi-channel speed sensors

Electrically isolated outputs, pulse division factor, integrated temperature sensor and/or acceleration sensors optional

- ▶ Customer-specific measuring scales



▶ Proven in more than 15 years of use and in more than 20,000 turbines worldwide...

- ▶ The quality of the products employed is of special significance for onshore and offshore wind turbines. Our inspection scenarios in parallel with development and production are therefore critical success factors for the significant reduction of maintenance on these difficult to access systems. Lenord + Bauer's extensive experience and its close customer contact made it possible to develop practical test strategies.

Along with the usual norms, the emphasis at Lenord + Bauer is on the following parameters and standards:

- ▶ Electromagnetic compatibility
- ▶ Dew-point, shock and vibration resistance
- ▶ Salt mist and corrosion resistance
- ▶ Thermal stability from -40 °C to +120 °C
- ▶ Best MTTFd-figures for achieving a high Safety Integrity Level (SIL) and Performance Level (PL)

Of course, our quality management is certified in accordance with ISO 9001 and our environment management in accordance with ISO 14001.

In addition, the certification in accordance with the "International Railway Industry Standard" (IRIS) underlines our standards in relation to product reliability, adherence to schedule, quality and long-term availability.

▶ Robust solutions for wind power

Control and sensor solutions for:

- ▶ Blade pitch control
- ▶ Azimuth control
- ▶ Generator control
- ▶ Rotor position
- ▶ Rotor speed
- ▶ Customer-specific applications



► Wind Power Solution

More than 15 years of experience and satisfied customers in wind power

◉ Our "highlights":

- Automation solutions for the most extreme operating temperatures -40 °C to +120 °C
- High resolution, magnetic absolute rotary encoder
- Redundant magnetic tandem encoder
- Best MTTFd-figures for achieving a high Safety Integrity Level (SIL) and Performance Level (PL)



Compact controller GEL 8250

Proven over many years, in use in the tens of thousands worldwide

- Display, keyboard, fanless construction
- Temperature range -20 °C to +70 °C
- Shock and vibration resistant

- Programming environment CoDeSys
- Softmotion library
- PLCopen-compliant

- Comprehensive communication interfaces:
- RS232/422/485, digital and analogue
- inputs/outputs, PT100 inputs

- 6 x SSI position encoder inputs
- Fieldbus interfaces

Remote service WEB

- FTP, HTTP communication via WEB browser
- Condition monitoring of the current actual values
- Reading and writing parameters
- Reading saved faults
- Interface to a digital oscilloscope
- Remote update, online update of the firmware

Customer-specific control concepts

Tailor-made intelligence

Development of robust compact control systems for switch cabinet installation, top hat rails or as decentral overall control concept

- Customer-specific form factors/features
- 400 MHz PowerPC, 32-bit or 16-bit CPU
- Arbitrary configuration of the I/O
- CoDeSys and realtime operating systems
- Temperature range -40 °C to +85 °C

- Fieldbus systems
PROFIBUS-DP, CANopen, Ethernet, ModbusTCP, EtherCAT, DeviceNet, EtherNet/IP, ProfiNet

- Programming
Programming can be undertaken in the environment familiar to the automation engineer: IEC 61131-3 (AWL, KOP, FUP, AS, CFC, ST), C, C++



Pitch motor position / speed
GEL 2037 + resolver

Control technology
GEL 8250

Blade position
GEL 2037

Rotor position / rotor speed
GEL 292 / 235

Generator speed
GEL 293

Temperature management
GEL 8500

Azimuth position
GEL 235



Compact

Fieldbus terminal controller GEL 8500 for the extended temperature range

The fieldbus terminal controller GEL 8500 makes it possible to decentralise control tasks on the wind turbine, also in the most extreme locations.

- CANopen (DS301 + DS401)
- Operating temperature -40 °C ... +85 °C
- Storage temperature -50 °C ... +85 °C
- USB port
- Dew-point resistant
- Extended installation altitude 3000 m
- Digital outputs 230 V AC
- Digital inputs/outputs: 6/6
- PT100 inputs: 4
- Parameters for the special function set via Windows Service-Tool

Absolute rotary encoder series GEL 235

High resolution due to contour disk technology

With the rotary encoder GEL 235 it is possible to replace the optical absolute rotary encoder with a robust magnetic measuring system of superior resolution and accuracy.

- The magnetic sensors do not age
- 16-bit single turn, 12-bit multitrans
- Accuracy better than 0.09 °, high linearity
- Shock and vibration resistant
- Dew-point resistant
- Temperature range -40 °C to +105 °C (120 °C)
- High resolution per angular segment
- SSI, current or voltage interface (programmable)



Ø 58 mm



Ø 58 mm

Absolute rotary encoder with fieldbus interface Series GEL 235

- Modular fieldbus caps
- Integrated fieldbus interfaces
- Fieldbus interfaces: CANopen, PROFIBUS-DP, EtherCAT

CANopen

PROFIBUS

EtherCAT

Absolute rotary encoder series GEL 2035/2037

The robust versatility

- The magnetic sensors do not age
- Resolution up to 13 bits single turn, 14 bits multitrans
- Accuracy 0.8°
- Magnetic multitrans gear
- IP 67 and dew-point resistant
- Temperature range -40 °C to +85 °C
- Programmable interfaces SSI

Special design

Redundant construction

Due to the combination with a resolver, a very compact redundant system is realised. The complete electrical isolation of the resolver and the magnetic absolute encoder ensure true redundancy of the absolute position values.

Special design

Optimised bearing load

- Shaft load
350 N radial / 200 N axial



Ø 58 mm

25-bit