LBC Series

Laser Blade Counters

The LBC Series laser blade counters are primarily used for detecting and counting the vanes or blades of turbochargers and fans.

The high scanning frequency and the standardized data evaluation of the laser sensor allow its application with objects of different color and speeds of up to 30000 rpm.

The visible laser spot and the automatic power correction feature facilitate sensor alignment to the respective objects. An analog signal (0 ... +10V) and a digital signal (0V/+24V) are available as outputs.

Functional principle of the sensor

The laser sensors of LBC Series operate according to the shadowing principle, i.e. a laser spot that is projected onto the vanes is viewed from two different angles.

The viewing angle of receiver A is almost identical to the emitted laser beam, the viewing angle of receiver B, however, is angular with respect to the laser beam. Receiver A is used to keep the laser power constant. Viewed from receiver B, the laser spot now completely covered in a certain rotation angle range, which guarantees a highly reliable detection of the impeller vanes.

In order to avoid double or multiple counting, a special algorithm is applied that locks the laser sensor for a certain time (the so-called dead time) after a vane is detected. Furthermore, standardized (intensity-independent) evaluation and automatic laser power correction almost completely suppress surface influences.

The special geometry of the sensor allows it to work in a distance range of 150 mm to 300 mm from the impeller. Speeds of up to 30000 rpm. are displayed both in a digital (0V+/24V) and analog (0V .. +10V) way.

Parameterisation under Windows® with software LBC-Scope V1.0

The sensors can easily be set with the help of a Windows® user interface in which the sensor signals are displayed in numerical and graphical form;

<table>
<thead>
<tr>
<th>SIGNAL A</th>
<th>SIGNAL A</th>
<th>SIGNAL B</th>
<th>SIGNAL B</th>
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Parameters such as e.g.
- Threshold (sensitivity)
- Hysteresis
- Laser power mode (static or dynamic)
- Output pulse lengthening
- Dead time (static or dynamic)

can be set with the software.
Laser blade counter with a reference distance of 200 mm (working range 150 mm ... 250 mm):

<table>
<thead>
<tr>
<th>Product name</th>
<th>LBC-200</th>
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**Product Overview**

- **Laser**: Semiconductor laser, 670 nm, AC-operation, 1mW max. opt. power, laser class 2 (DIN EN 60825-1)
- **Optical filter**: Interference filter + red light filter
- **Reference distance**: typ. 200 mm
- **Working range**: typ. 150 mm ... 250 mm
- **Digital output (OUT0)**: pnp bright-switching/npn dark-switching or pnp dark-switching/npn bright-switching
- **Analog output**: 0 ... +10V
- **Voltage supply**: +12VDC ... +32VDC
- **Sensitivity setting**: adjustable under Windows®
- **Laser power correction**: adjustable under Windows®
- **Current consumption**: typ. 150 mA
- **Dead time**: adjustable under Windows®
- **Dead time mode**: static or dynamic, adjustable under Windows®
- **Scan frequency**: typ. 15 kHz (without averaging)
- **Switching state indication**: Visualization by means of a yellow LED
- **Operation indication**: Visualization by means of a green LED
- **Potentiometer**: for adjustment of analog value (0 ... +10V)
- **Dyn. output (pulse lengthening)**: adjustable under Windows®
- **Modulation frequency**: typ. 100 kHz
- **Max. rotation speed**: typ. 30000 RPM
- **Enclosure rating**: IP54
- **Operating temperature range**: -20°C ... +50°C
- **Housing material**: Aluminum, anodized in blue
- **Housing dimensions**: LxWxH approx. 175 mm x 40 mm x 40 mm
- **Interface**: RS232, parameterizable under Windows®
- **Type of connector**: Connection to PLC: 8-pole female connector Binder 712
  - Connection to PC (RS232-interface): 5-pole female connector Binder 702
- **Connecting cables**:
  - to PLC: cab-las8/SPS (different cable lengths available)
  - to PC: cab-las5/PC, cab-las5/USB, or SI-RS232/Ethernet-5 (different cable lengths available)
- **Max. switching current**: 100 mA, short-circuit-proof
- **EMC-test acc. to**: DIN EN 60947-5-2

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(2013-01-14) LBC Series / Page 2 of 5
Laser blade counter with a reference distance of 230 mm (working range 180 mm ... 280 mm):

<table>
<thead>
<tr>
<th>Product name</th>
<th>LBC-230</th>
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</table>

| Laser                        | Semiconductor laser, 670 nm, AC-operation, 1mW max. opt. power, laser class 2 (DIN EN 60825-1) |
| Optical filter               | Interference filter + red light filter |
| Reference distance           | typ. 230 mm |
| Working range                | typ. 180 mm ... 280 mm |
| Digital output (OUT0)        | pnp bright-switching/npn dark-switching or pnp dark-switching/npn bright-switching |
| Analog output                | 0 ... +10V |
| Voltage supply               | +12VDC ... +32VDC |
| Sensitivity setting          | adjustable under Windows® |
| Laser power correction       | adjustable under Windows® |
| Current consumption          | typ. 150 mA |
| Dead time                    | adjustable under Windows® |
| Dead time mode               | static or dynamic, adjustable under Windows® |
| Scan frequency               | typ. 15 kHz (without averaging) |
| Switching state indication   | Visualization by means of a yellow LED |
| Operation indication         | Visualization by means of a green LED |
| Potentiometer                | for adjustment of analog value (0 ... +10V) |
| Dyn. output (pulse lengthening) | adjustable under Windows® |
| Modulation frequency         | typ. 100 kHz |
| Max. rotation speed          | typ. 30000 RPM |
| Enclosure rating             | IP54 |
| Operating temperature range  | -20°C ... +50°C |
| Housing material             | Aluminum, anodized in blue |
| Housing dimensions           | LxWxH approx. 200 mm x 40 mm x 40 mm |
| Interface                    | RS232, parameterizable under Windows® |
| Type of connector            | Connection to PLC: 8-pole female connector Binder 712 |
| Connecting cables            | to PLC: cab-las8/SPS (different cable lengths available) |
| Max. switching current       | 100 mA, short-circuit-proof |
| EMC-test acc. to             | DIN EN 60947-5-2 |
Laser blade counter (split version), working range individually adjustable:

<table>
<thead>
<tr>
<th>Product name</th>
<th>LBC-CON1</th>
<th>LBC-FE-TR</th>
<th>LBC-FE-R</th>
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<tbody>
<tr>
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<td>(electronic control unit)</td>
<td>(transmitter-/receiver unit)</td>
<td>(receiver unit)</td>
</tr>
</tbody>
</table>

- **Laser**: Semiconductor laser, 670 nm, AC-operation, 1mW max. opt. power, laser class 2 (DIN EN 60825-1)
- **Optical filter**: Interference filter + red light filter
- **Digital output (OUT0)**: pnp bright-switching/npn dark-switching or pnp dark-switching/npn bright-switching
- **Analog output**: 0 ... +10V
- **Voltage supply**: +12VDC ... +32VDC
- **Sensitivity setting**: adjustable under Windows®
- **Laser power correction**: adjustable under Windows®
- **Current consumption**: typ. 150 mA
- **Dead time**: adjustable under Windows®
- **Dead time mode**: static or dynamic, adjustable under Windows®
- **Scan frequency**: typ. 15 kHz (without averaging)
- **Switching state indication**: Visualization by means of a yellow LED
- **Operating indication**: Visualization by means of a green LED
- **Dyn. output (pulse lengthening)**: adjustable under Windows®
- **Modulation frequency**: typ. 100 kHz
- **Max. rotation speed**: typ. 30000 RPM
- **Working range**: individually adjustable (max. 250 mm to the object)
- **Enclosure rating**: IP54
- **Operating temperature range**: -20°C ... +50°C
- **Housing material**: Aluminum, anodized in blue
- **Housing dimensions**:
  - Electronic control unit LBC-CON1: LxWxH approx. 205 mm x 40 mm x 40 mm
  - Transmitter/receiver unit: LBC-FE-TR: LxWxH approx. 40 mm x 32 mm x 24 mm
  - Receiver unit LBC-FE-R: LxWxH approx. 40 mm x 32 mm x 24 mm
- **Interface**: RS232, parameterizable under Windows®
- **Type of connector**:
  - Connection of LBC-CON1 to PLC: 8-pole female connector Binder 712
  - Connection of LBC-CON1 to PC (RS232-interface): 5-pole female connector Binder 702
  - Connection of LBC-CON1 to LBC-FE-TR: 8-pole connector Binder 712
  - Connection of LBC-CON1 to LBC-FE-R: 5-pole connector Binder 702
- **Connecting cables**:
  - LBC-CON1 to PLC: cab-las8/SPS
  - LBC-CON1 to LBC-FE-TR: cab-lcc-8, LBC-CON1 to LBC-FE-R: cab-lcc-5
- **Max. switching current**: 100 mA, short-circuit-proof
- **EMC-test acc. to**: DIN EN 60947-5-2
Measuring the speed of impellers (turbocharger or fan) with laser sensor LBC-200