More Precision

eddyNCDT // Inductive sensors based on eddy currents
Measuring principle
A coil integrated in the sensor housing is energized by a high-frequency alternating current. The emerging electromagnetic field changes when approaching a turbo charger blade. This is how every blade generates a pulse. The controller identifies the rotational speed (analog 0 - 5 V) by considering the number of blades.

Robust miniature controller
As the entire electronics is in a sealed miniature housing and designed for ambient temperatures up to 115 °C, the controller is easy to integrate into the engine compartment. The turboSPEED DZ140 offers excellent interference resistance for increased EMC requirements as well as in test cells and road tests.

Engine compartment application
The DZ140 eddy current measuring system is resistant to oil and dirt. This is a key advantage especially compared to optical speed measuring systems, as this immunity helps to achieve high precision measurements on a continuous basis.

Ease of use
A tri-color ‘status’ LED on the controller indicates when the sensor has reached the ideal distance from the turbocharger blades. This simple feature enables greatly reduced installation time. As the sensor is connected with the electronics via a special BNC connector, it is therefore downward compatible with all previous sensor models. An industrial push-pull connector guarantees a reliable connection between the electronics and the power supply as well as the analog outputs.

Measuring aluminum and titanium blades
The DZ140 measures both aluminum and titanium blades. The sensors can be mounted at a relatively large distance from the blade. The maximum distance of 2.2 mm enables reliable operation.
## Controller DZ140

### Model Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>10 bits</td>
</tr>
<tr>
<td>Speed range (measuring range)</td>
<td>200 … 400,000 rpm</td>
</tr>
<tr>
<td>Linearity</td>
<td>&lt; ± 0.2 % FSO</td>
</tr>
<tr>
<td>Target material</td>
<td>aluminum or titanium</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>9 … 30 VDC (short-term up to 36 VDC)</td>
</tr>
<tr>
<td>Max. current consumption</td>
<td>50 mA</td>
</tr>
<tr>
<td>Digital output</td>
<td>TTL level (1 pulse / blade with variable pulse duration or 1 pulse / rotation with 100 µs pulse duration)</td>
</tr>
<tr>
<td>Analog output</td>
<td>0 … 5 V (1)</td>
</tr>
<tr>
<td>Connection</td>
<td>Sensor: triaxial connector; Supply/signal: 10-pole connector, raw signal: coaxial connector (cable see accessories)</td>
</tr>
<tr>
<td>Mounting</td>
<td>Screw connection with 4 through-holes</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Storage -40 … +125 °C</td>
</tr>
<tr>
<td></td>
<td>Operation -40 … +125 °C</td>
</tr>
<tr>
<td>Protection class (DIN-EN 60529)</td>
<td>IP65 (plugged)</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 85 g</td>
</tr>
<tr>
<td>Number of blades</td>
<td>adjustable via rotary switch accessible from outside for 1 to 16 blades</td>
</tr>
</tbody>
</table>

### Pin Assignment for Power Supply and Signal

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>Color (cable: PC140-x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analog output for rotational speed 0 … +5 V</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>reserved, not connected</td>
<td>Yellow</td>
</tr>
<tr>
<td>3</td>
<td>TTL pulses, digital</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>reserved, not connected</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>reserved, not connected</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Supply</td>
<td>White</td>
</tr>
<tr>
<td>8</td>
<td>Supply voltage +9 … 30 VDC</td>
<td>Brown</td>
</tr>
<tr>
<td>9</td>
<td>Not assigned</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Not assigned</td>
<td>-</td>
</tr>
</tbody>
</table>

**Pin Assignment Diagram**

- Dimensions in mm, not to scale.
- 10-pin cable connector
- View on solder side
- FSO = Full Scale Output (speed range)
- 1) Rotational speed adjustable via mode rotary switch
<table>
<thead>
<tr>
<th>Model</th>
<th>DS 05(03)</th>
<th>DS 05(04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>shielded</td>
<td>shielded</td>
</tr>
<tr>
<td>Connection</td>
<td>integrated cable, axial, length 0.5 m</td>
<td>integrated cable, axial, length 0.5 m</td>
</tr>
<tr>
<td>Mounting</td>
<td>Clamping/adapter</td>
<td>Clamping/adapter</td>
</tr>
<tr>
<td>Temperature range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>-40 ... +200 °C</td>
<td>-40 ... +200 °C</td>
</tr>
<tr>
<td>Operation</td>
<td>-40 ... +200 °C</td>
<td>-40 ... +200 °C</td>
</tr>
<tr>
<td>Special feature</td>
<td>curved housing</td>
<td>-</td>
</tr>
</tbody>
</table>

1 Length tolerance ± 0.15 m
<table>
<thead>
<tr>
<th>Model</th>
<th>Measurement direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 05(07)</td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>DS 05(14)</td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Model DS 05(07) DS 05(14)**

**Sensor type** shielded shielded

**Connection**

1) integrated cable, axial, length 0.5 m

**Mounting**

Cable gland (M5)

**Temperature range**

Storage: -40 ... +200 °C

Operation: -40 ... +200 °C

**Special feature**

- Length of housing: 42.5 mm
- Length tolerance: ± 0.15 m

**Sensor cable**

ø approx. 3.5 mm

Length: 0.5 m (± 0.15 m)

with BNC connector

M5

ø 3

approx.

10

46

58+1

67.8

12

SW4

**Measurement direction**

- Sensor cable length: 0.5 m (± 0.15 m)
  - with BNC connector
<table>
<thead>
<tr>
<th>Model</th>
<th>DS 05(15)</th>
<th>DS 1</th>
<th>DS 1(04)</th>
<th>DS 1/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>shielded</td>
<td>shielded</td>
<td>shielded</td>
<td>shielded</td>
</tr>
<tr>
<td>Connection</td>
<td>integrated cable, axial, length 0.5 m</td>
<td>integrated cable, axial, length 0.75 m</td>
<td>integrated cable, axial, length 0.8 m</td>
<td>integrated cable, axial, length 0.8 m</td>
</tr>
<tr>
<td>Mounting</td>
<td>Cable gland (M5)</td>
<td>Cable gland (M5)</td>
<td>Cable gland (M5)</td>
<td>Cable gland (M5)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Storage: -40 ... +200 °C</td>
<td>-40 ... +235 °C</td>
<td>-40 ... +235 °C</td>
<td>-40 ... +235 °C</td>
</tr>
<tr>
<td></td>
<td>Operation: -40 ... +200 °C</td>
<td>-40 ... +235 °C</td>
<td>-40 ... +235 °C</td>
<td>-40 ... +235 °C</td>
</tr>
<tr>
<td>Special feature</td>
<td>-</td>
<td>-</td>
<td>protective hose (stainless steel)</td>
<td>-</td>
</tr>
</tbody>
</table>

1) Length tolerance ± 0.15 m
Connection cables for DZ140 portfolio sensors

**Miniature coaxial cable for DS05(x) and DS1 models**
- Diameter: approx. 3.5 mm
- Sheathing: thermal protection fabric hose (polyolefin shrink hose)
- Temperature range: -50 °C to +200 °C (static)
- Minimum bending radius: static approx. 18 mm / dynamic approx. 35 mm
- Connection: BNC socket coaxial

**Miniature coaxial cable for DS1(04) models**
- Diameter: approx. 6 mm
- Sheathing: metallic protective hose (stainless steel)
- Temperature range: -50 °C to +200 °C (static)
- Minimum bending radius: static approx. 30 mm / dynamic approx. 60 mm
- Connection: BNC socket coaxial
- Protection class: IP 40

**Triaxial cable for the DS1/T models**
- Diameter: approx. 3.5 mm
- Sheathing: thermal protection fabric hose (polyolefin shrink hose)
- Temperature range: -50 °C to +200 °C
- Minimum bending radius: static approx. 18 mm / dynamic approx. 35 mm
- Connection: BNC socket triaxial
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