Special features

- fully touchless - no shaft or seals to wear
- measure directly through any non-ferromagnetic material
- electrical range up to 360°
- linearity ±0.5 %
- simple mounting
- lateral magnet offset up to ±1.5 mm
- protection class IP67, IP68, IP69
- single and redundant versions
- unlimited mechanical lifetime
- resolution 12 bit
- excellent price/performance ratio
- extremely flat 7 mm design

The RFD-4000 utilizes a separate magnet or magnetic position marker, attached to the rotating shaft to be measured.

The orientation of the magnetic field is measured and an analog voltage representing the angle is the output signal.

The very compact physical dimensions allows installation in small spaces. The housing is made of high grade temperature-resistant plastic material. The sensor is sealed and is not sensitive to dust, dirt, or moisture.

The two-part design, with the RFD sensor itself, and its magnetic position marker, offers great flexibility when mounting. The absence of shaft and bearing makes the assembly much less sensitive to axial and radial application tolerances. Measurements can be made transmissively through any nonferromagnetic material.

Electrical connection is made via lead wires.

### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>high grade, temperature resistant plastic,</td>
</tr>
<tr>
<td></td>
<td>Thermoplast with brass inserts</td>
</tr>
<tr>
<td>Electrical connections</td>
<td>lead wires 3 x 0.5 m (0.5 mm²) single</td>
</tr>
<tr>
<td></td>
<td>lead wires 4 x 0.5 m (0.5 mm²) partly redundant</td>
</tr>
<tr>
<td></td>
<td>lead wires 6 x 0.5 m (0.5 mm²), fully redundant</td>
</tr>
</tbody>
</table>
When the shaft marking points to the cable outlet, the sensor is in the electrical center position.

<table>
<thead>
<tr>
<th>Colour</th>
<th>single code 6</th>
<th>partly redundant code 7</th>
<th>fully redundant code 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Supply voltage +U_b</td>
<td>Supply voltage +U_b</td>
<td>Supply voltage +U_b 1</td>
</tr>
<tr>
<td>Brown</td>
<td>GND</td>
<td>GND</td>
<td>GND 1</td>
</tr>
<tr>
<td>White</td>
<td>Output</td>
<td>Output 1</td>
<td>Output 1</td>
</tr>
<tr>
<td>Red</td>
<td>-</td>
<td>-</td>
<td>Supply voltage +U_b 2</td>
</tr>
<tr>
<td>Black</td>
<td>-</td>
<td>-</td>
<td>GND 2</td>
</tr>
<tr>
<td>Yellow</td>
<td>-</td>
<td>Output 2</td>
<td>Output 2</td>
</tr>
</tbody>
</table>

CAD data see
www.novotechnik.de/en/download/cad-data/
Output characteristics single (code 6 _ _)

Output characteristics redundant (code 7 / 8 _ _)

Position marker examples

Position marker Z-RFC-P30 (accessories)

Position marker Z-RFC-P03 (accessories)

Position marker Z-RFC-P23 (accessories)

Position marker Z-RFC-P04 (accessories)

Technical data and further position markers see separate data sheet.
Novotechnik-approved magnets are used to achieve specified performance.
### Mechanical Data

<table>
<thead>
<tr>
<th>Type designations</th>
<th>RFD-4021- _ _ _ - 2 _ _ - 4 _ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>see dimension drawing</td>
</tr>
<tr>
<td>Mounting</td>
<td>with 2 M4 screws (included)</td>
</tr>
<tr>
<td>Mechanical travel</td>
<td>360 continuous</td>
</tr>
<tr>
<td>Maximum operational speed</td>
<td>unlimited</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 10</td>
</tr>
<tr>
<td>Cross-section lead wires</td>
<td>0.5 mm²</td>
</tr>
</tbody>
</table>

#### Electrical Data

| Supply voltage Ub       | 5 (4.5 ... 5.5) V               |
| No-load supply current  | typ. 13 (8 on request) per channel mA |
| Reverse voltage         | yes, only supply lines          |
| Short circuit protection| yes, all outputs vs. GND and Ub |
| Measuring range         | 0 ... 30 up to 0 ... 360, in 10° steps |
| Resolution              | 12 bit                         |
| Number of channels      | 1 / 2                          |
| Update rate             | 2500 Hz                        |
| Repeatability           | 0.1 %                          |
| Independent Linearity   | ±0.5 (at RL = 10 kΩ vs. GND)  |

**Output signal**
- ratiometric to supply voltage Ub:
  - 0.25 V ... 4.75 V (5 ... 95 %)
  - 0.5 ... 4.5 V (10 ... 90 %)
  - (load > 10 kΩ)

**Temperature error**
- at stroke angle 30 up to 170°: ±0.875 % FS
- at stroke angle 180 up to 360°: ±0.6 % FS

**Environmental Data**

| Operating temperature  | -40...+125 °C |
| Vibration (IEC 60068-2-6) | 5...2000 Hz |
| Amax = 0.75 mm |
| amax = 20 g |

**Shock (IEC 60068-2-27)**
- 50 (5 ms) g

**MTTF (DIN EN ISO 13849-1)**
- 675 (single) years
- 512 (per channel) partly redundant years
- 516 (per channel) fully redundant years

**Functional Safety**
- If you need assistance in using our products in safety-related systems, please contact us.

**Protection class DIN EN 60529 / DIN 40050**
- IP67 / IP68 / IP69

**EMC compatibility**
- ISO 11452-2 Radiated EM HF-Fields, Absorber Hall 200 V/m
- ISO 11452-5 Radiated EM HF-Fields, Stripline 200 V/m
- ISO 2100005 Packaging and Handling + Component Test 8/15 kV
- CISPR 25 Radiated Emission (conducted / field) class 5
- EN 61000-4-4 Immunity against fast transient disturbance (Burst) 1kV
- EN 61000-4-6 Immunity against conducted disturbances induced by HF Fields 10V/m eff.
- EN 61000-4-8 Immunity against Power Frequency Magnetic Fields 30 A/m

**Working distance A / magnet constant**
- see data sheet position marker

**Lateral magnet offset**
- see data sheet
### Ordering specifications

**Operating voltage** \( U_b \)

- **2:** \( U_b = 5 \) VDC (4.5 VDC – 5.5 VDC)

**Measuring range**

- 03: angle 0° ... 30° min.
- 06, 12, 18, 24, 36
- 36: angle 0° ... 360° max.

**Number of channels**

- 6: single output (three wires, one output)
- 7: partly redundant (four wires, two outputs)
- 8: fully redundant (six wires, two outputs)

**Output signal range**

- 1: 0.25 ... 4.75 V ratiometric to supply voltage
- 2: 0.5 ... 4.5 V ratiometric to supply voltage

**Output characteristics**

- 1: rising cw
- 2: rising ccw
- 3: crossed outputs, channel 1 rising cw (partly redundant)
- 4: crossed outputs, channel 1 rising cw (fully redundant)

**Electrical connection**

- 401: lead wires 3 x 0.5 m, single
- 411: lead wires 4 x 0.5 m, partly redundant
- 421: lead wires 6 x 0.5 m, fully redundant

Other cable lengths and assembled connectors on request.

**Preferred types printed in bold:**

- reduced delivery time for up to 25 pcs EXW
- best low volume pricing

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### Required accessories

- Position marker Z-RFC-P30, Art.No. 056086;
- Position marker Z-RFC-P03, Art.No. 005658;
- Position marker Z-RFC-P04, Art.No. 005659;
- Position marker Z-RFC-P23, Art.No. 056074

(further position markers see separate data sheet Positionmarker_rotary)

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### Recommended accessories

- MAP process control indicators with display

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### Available on request

- SPI or PWM interface