Special Features

- Touchless hall technology
- Electrical range 360°
- 2 part design, mechanically decoupled
- Wear-free
- High protection class IP67, IP68, IP69
- Resolution up to 14 bits
- Temperature range -40 °C to +85 °C
- Other configurations see separate data sheets

Applications

- Manufacturing Engineering (textile machinery, packaging machinery, sheet metal and wire machinery)
- Automation technology
- Medical Engineering

The 2 part design consisting of sensor and 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 - separate couplings are obsolete. Measurements can be made transmissively through any non-ferromagnetic material. The sensor is perfectly suitable for use in harsh environmental conditions through the completely encapsulated electronics.

Description

<table>
<thead>
<tr>
<th>Material</th>
<th>Housing: high grade, temperature resistant plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>With 2 pan head screws M4x20 (included in delivery)</td>
</tr>
<tr>
<td>Fastening torque of mounting</td>
<td>250 Nm</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Cable 5x 0.14 mm² (AWG 26), PUR, shielded</td>
</tr>
</tbody>
</table>

Mechanical Data

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>See dimension drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical travel</td>
<td>continuous</td>
</tr>
<tr>
<td>Weight (w/o connection)</td>
<td>approx. 50 g</td>
</tr>
</tbody>
</table>
Ordering Specifications

Preferred types printed in bold
- Delivery line up to 25 pcs. within 10 working days EXW
- Best low-volume pricing

<table>
<thead>
<tr>
<th>Series</th>
<th>Mechanical version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4801: Elongated hole mounting</td>
</tr>
<tr>
<td></td>
<td>4802: Round hole mounting</td>
</tr>
</tbody>
</table>

Interface
B: Serial Peripheral Interface (SPI)

Interface parameters
31: \( V_{bb} = 5 \) VDC, Binary code, rising edge

Electrical connection
302: Cable, 5-pole, shielded, \( L = 1 \) m
Cable versions and assembled connectors on request

Resolution
14: 14 bits

Accessories included in delivery
- 2x Pan head screws M4x20
When the marking of the position marker is pointing towards the cable, the sensor output is near the electrical center position.
## Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>RFC-48_ <em>-2</em> <em>-8</em> <em>-</em> _ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>SPI</td>
</tr>
<tr>
<td>Coding</td>
<td>Binary</td>
</tr>
<tr>
<td>Device SCLK, MOSI, /SS</td>
<td>TTL level (see manual Singleturn SPI Detail)</td>
</tr>
<tr>
<td>Update rate (internal)</td>
<td>5 kHz</td>
</tr>
<tr>
<td>Resolution (across 360°)</td>
<td>14 bits</td>
</tr>
<tr>
<td>Measuring range</td>
<td>360°</td>
</tr>
<tr>
<td>Independent linearity</td>
<td>±0.5 %FS</td>
</tr>
<tr>
<td>Repeatability</td>
<td>typ. ±0.1°</td>
</tr>
<tr>
<td>Hysteresis</td>
<td></td>
</tr>
<tr>
<td>Temperature error</td>
<td>±0.025 %FS</td>
</tr>
<tr>
<td>Supply voltage Ub</td>
<td>5 VDC (4.5 ... 5.5 VDC)</td>
</tr>
<tr>
<td>Current consumption w/o load</td>
<td>typ. 15 mA</td>
</tr>
<tr>
<td>Polarity protection</td>
<td>yes (supply lines)</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>yes (GND and supply voltage)</td>
</tr>
<tr>
<td>Max. clock rate</td>
<td>400 kHz</td>
</tr>
<tr>
<td>Insulation resistance (500 VDC)</td>
<td>≥ 10 MΩ</td>
</tr>
</tbody>
</table>

### Environmental Data

<table>
<thead>
<tr>
<th>Max. operational speed</th>
<th>Mechanically unlimited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration IEC 60068-2-6</td>
<td>20 g, 5 ... 2000 Hz, Amax = 0.75 mm</td>
</tr>
<tr>
<td>Shock IEC 60068-2-27</td>
<td>50 g, 6 ms</td>
</tr>
<tr>
<td>Protection class DIN EN 60059</td>
<td>IP67 / IP68 / IP69</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 ... +85°C</td>
</tr>
<tr>
<td>Life</td>
<td>Mechanically unlimited</td>
</tr>
<tr>
<td>Functional safety</td>
<td>If you need assistance in using our products in safety-related systems, please contact us</td>
</tr>
<tr>
<td>MTTF (IEC 60065)</td>
<td>2720 years</td>
</tr>
<tr>
<td>Traceability</td>
<td>Serial number on type labeling; production batch of the sensor assembly and relevant sensor components</td>
</tr>
<tr>
<td>Conformity/Approval</td>
<td>CE, UKCA see <a href="https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu-uk">link</a></td>
</tr>
<tr>
<td></td>
<td>WEEE see <a href="https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/">link</a></td>
</tr>
</tbody>
</table>

### EMC Compatibility

- **EN 61000-4-2 ESD (contact/air discharge)**: 4 kV, 8 kV
- **EN 61000-4-3 Electromagnetic fields (RF)**: 10 V/m
- **EN 61000-4-4 Fast transients (burst)**: 1 kV
- **EN 61000-4-6 Cond. disturbances (HF fields)**: 10 V eff.
- **EN 61000-4-8 Magnetic fields**: 3 A/m
- **EN 55011 Noise radiation**: Class B

FS = Full scale: Signal span according to electrical measuring range

### Connection Assignment

<table>
<thead>
<tr>
<th>Signal</th>
<th>Cable code 3_ _ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>GN</td>
</tr>
<tr>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>MOSI / MISO</td>
<td>YE</td>
</tr>
<tr>
<td>SCLK</td>
<td>GY</td>
</tr>
<tr>
<td>/SS (slave select)</td>
<td>WH</td>
</tr>
</tbody>
</table>
Position Markers

Z-RFC-P02
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock) or with locking pin (both included in delivery).
Material PF
Max. permitted radial offset ± 3 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
400050661 1
400050660 25

Z-RFC-P08
Position marker for fixation with threaded pin M5 (included in delivery).
Material PF
Max. permitted radial offset ± 3 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
400050670 1
400050664 25

Z-RFC-P41
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock) or with locking pin (both included in delivery).
Material PF
Max. permitted radial offset ± 3 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
400105037 1
400105038 25

Z-RFC-P47
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock) or with threaded pin M5 (both included in delivery).
Material PF
Max. permitted radial offset ± 3 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
400105039 1
400105040 25
**Position Markers**

**Z-RFC-P23**
Position marker for fixation with threaded pin M4 (included in delivery)
Caution: For orientation of the output characteristic please follow the user manual of the position marker!
Material: PA6-GF
Max. permitted radial offset: ±3 mm
Operating temp.: -40°C ... +125°C
P/N | Pack. unit [pcs]
---|---
400056074 | 1
400056085 | 25

**Z-RFC-P43**
Position marker for fixation with threaded pin M4 (included in delivery)
Caution: For orientation of the output characteristic please follow the user manual of the position marker!
Material: PA6-GF
Max. permitted radial offset: ±3 mm
Operating temp.: -40°C ... +125°C
P/N | Pack. unit [pcs]
---|---
400105041 | 1
400105042 | 25

**Z-RFC-P30**
Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).
Material: PBT-GF
Max. permitted radial offset: ±1.5 mm
Operating temp.: -40°C ... +125°C
P/N | Pack. unit [pcs]
---|---
400056086 | 1
400056087 | 25

**Z-RFC-P31**
Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).
Material: PBT-GF
Max. permitted radial offset: ±3 mm
Operating temp.: -40°C ... +125°C
P/N | Pack. unit [pcs]
---|---
400056088 | 1
400056089 | 25
Position Markers

Z-RFC-P18  
Screw position marker M10 x 25 mm, similar DIN 933, magnet potted  
Material: Aluminium, anodized  
Max. permitted radial offset: ± 3 mm  
Operating temp.: -40 ... +125°C  
P/N  | Pack. unit [pcs]  
--- | ---  
400104756 | 1  
400104757 | 25

Z-RFC-P28  
Screw position marker M10x1 x 20 mm, similar DIN 933, magnet potted  
Material: Aluminium, anodized  
Max. permitted radial offset: ± 3 mm  
Operating temp.: -40 ... +125°C  
P/N  | Pack. unit [pcs]  
--- | ---  
400108462 | 1  
400108463 | 25

Z-RFC-P19  
Screw position marker M8 x 25 mm, similar DIN 933/ISO 4017, magnet potted  
Material: Aluminium, anodized  
Max. permitted radial offset: ± 1.5 mm  
Operating temp.: -40 ... +125°C  
P/N  | Pack. unit [pcs]  
--- | ---  
400104754 | 1  
400104755 | 25

Z-RFC-P20  
Screw position marker M10 x 25 mm, similar DIN 933  
Material: Aluminium, anodized  
Max. permitted radial offset: ± 3 mm  
Operating temp.: -40 ... +125°C  
P/N  | Pack. unit [pcs]  
--- | ---  
400104758 | 1  
400104759 | 25
Position Markers

Z-RFC-P03
Magnet for direct application onto customer's shaft (see user manual).
We recommend mounting on non-magnetizable materials, otherwise the specified working distances will vary (e.g. reduction of approx. 20% with axial mounting on a magnetizable shaft).
Max. permitted radial offset ± 1.5 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
400005658 1
400056081 50

Z-RFC-P04
Magnet for direct application onto customer's shaft (see user manual).
We recommend mounting on non-magnetizable materials, otherwise the specified working distances will vary (e.g. reduction of approx. 20% with axial mounting on a magnetizable shaft).
Max. permitted radial offset ± 3 mm
Operating temp. -40 ... +125°C
P/N Pack. unit [pcs]
300005659 1
400056082 50

Z-RFC-S01/S02/S03
Shaft adapter for fixation at position marker Z-RFC-P02/P41 with locking pin
Material SS 1.4305 / AISI 303
P/N Type ØB / A [mm]
400056206 Z-RFC-S01 6 / 4.5
400056207 Z-RFC-S02 8 / 6.5
400056208 Z-RFC-S03 10 / 8.5
Position Markers

Working Distances Position Markers [mm] - Single-channel Versions

<table>
<thead>
<tr>
<th>Z-RFC-P02 / P04 / P08</th>
<th>Z-RFC-P41 / P43 / P47</th>
<th>Z-RFC-P03 / P30</th>
<th>Z-RFC-P18 / P28</th>
<th>Z-RFC-P19</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 4</td>
<td>0 ... 2.7</td>
<td>0 ... 1.5</td>
<td>0 ... 4.5</td>
<td>0 ... 2.2</td>
</tr>
</tbody>
</table>

Lateral Magnet Offset

Lateral magnet offset will cause additional linearity error. The angle error, which is caused by radial displacement of sensor and position marker depends on the used position marker or magnet.

Additional Linearity Error at Radial Displacement - Single-channel Versions

<table>
<thead>
<tr>
<th>Z-RFC-P02 / P04 / P08</th>
<th>Z-RFC-P41 / P43 / P47</th>
<th>Z-RFC-P03 / P30</th>
<th>Z-RFC-P18 / P28</th>
<th>Z-RFC-P19</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mm: ±0.4°</td>
<td>0.5 mm: ±0.4°</td>
<td>0.5 mm: ±1.4°</td>
<td>0.5 mm: ±0.7°</td>
<td>0.5 mm: ±1.3°</td>
</tr>
<tr>
<td>1.0 mm: ±1.1°</td>
<td>1.0 mm: ±1.1°</td>
<td>1.0 mm: ±3.7°</td>
<td>1.0 mm: ±1.3°</td>
<td>1.0 mm: ±2.6°</td>
</tr>
<tr>
<td>2.0 mm: ±3.5°</td>
<td>2.0 mm: ±3.5°</td>
<td>2.0 mm: -</td>
<td>2.0 mm: ±3.3°</td>
<td>2.0 mm: -</td>
</tr>
</tbody>
</table>
Connecting Options on request

**M12 connector**
- Customized lengths
- 3-, 4-, 6- and 6-pole versions
- Protection class IP68
- Ordering codes of standard versions see ordering specifications

**Tyco AMP Super Seal**
- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pole versions
- Protection class IP67
- On request

**Deutsch DTM 04**
- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pole versions
- Protection class IP67
- On request

**ITT Cannon Sure Seal connector**
- Customized lengths
- 3-, 4- and 6-pole versions
- Protection class IP67
- On request

**Molex Mini Fit jr.**
- Customized length and lead wires
- 3-, 4- and 6-pole versions
- On request
The specifications contained in our datasheets are intended solely for informational purposes. The documented specification values are based on ideal operational and environmental conditions and can vary significantly depending on the actual customer application. Using our products at or close to one or more of the specified performance ranges can lead to limitations regarding other performance parameters. It is therefore necessary that the end user verifies relevant performance parameters in the intended application. We reserve the right to change product specifications without notice.