**NOVOTURN**
**Multiturn Sensor**
**Non-contacting**

**RSM-2800**
**Voltage**
**Industrial**

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**Special Features**
- Non-contacting, magnetic
- Long life
- Measuring range 720° up to 5760° in 360°-steps (2 to 16 turns)
- True-Power-On system: counts turns even when not powered.
- Patented non-volatile technology does not require gears or batteries
- Available with push-on coupling or marked shaft
- Easy mounting
- Protection class IP54 up to IP67
- One or multi-channel versions
- Resolution 16 bits
- Linearity up to ±0,03 %
- Other configurations see separate data sheets

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**Applications**
- Mechanical engineering
- Mobile machinery
- Driveline or steering systems
- Wire-actuated encoders
- Gate drives
- Motor sports

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Multiturn sensors that use the GMR technology (giant magneto resistance), provide absolute position values, do not require any reference signals and need no power supply or buffer battery for detecting the revolutions. The fact that rotations are detected even unpowered and the sensor does not lose its position information during a power failure, makes the RSM-2800 with its diameter of only 28 mm an extremely compact real True-Power-On rotary sensor.

The sensor operates magnetically and thus contactless allowing an extremely long life.

The sensor is able to detect angular positions over 2 to 16 revolutions with a high resolution of 16 bits.

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**Description**

| Material               | Housing: high grade, temperature resistant plastic PPS-GF40/SF30 |
|                       | Shaft: SS X5CrNiS18-9 1.4305 / AISI 303                     |
| Mounting              | With 2 screws M4 and washers                                 |
| Fastening torque of mounting | max. 190 Ncm                                                 |
| Bearing               | Sintered bronze bushing                                      |
| Electrical connection | Cable 4x 0.5 mm² (AWG 20), TPE, shielded / Connector M12x1, A-coded with cable L = 0.15 m |

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**Mechanical Data**

| Dimensions              | See dimension drawing                                           |
|                        |                                                               |
| Mechanical travel       | 360° continuous                                                 |
| Permitted shaft load    | 20 N (axial / radial)                                          |
| static or dynamic       |                                                               |
| Torque                 | 0.15 Ncm (IP54), 0.5 Ncm (IP65), 1.0 Ncm (IP67)                |
| Weight                 | approx. 50 g                                                   |
Ordering Specifications

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

Supply voltage \( U_b \)
1: \( U_b = 24 \text{ VDC} \)

Interface parameters
1: 0.1 \( \ldots \) 10 VDC

Output characteristic
1: Rising characteristic cw
2: Rising characteristic ccw
3: Crossed outputs, channel 1 rising cw
Other output characteristics on request

Electrical connection
- 201: Cable, 4-pole, shielded, \( L = 0.5 \text{ m} \)
- 202: Cable, 4-pole, shielded, \( L = 1 \text{ m} \)
- 203: Cable, 4-pole, shielded, \( L = 3 \text{ m} \)
- 210: Cable, 4-pole, shielded, \( L = 5 \text{ m} \)
- 220: Cable, 4-pole, shielded, \( L = 10 \text{ m} \)
- 501: Connector M12x1, 4-pin, with cable, shielded, \( L = 0.15 \text{ m} \)
Cable versions and assembled connectors on request

Series

R S M - 2 8 3 2 - 0 1 0 - 1 1 1 - 2 0 2

Number of turns for output characteristic
- 002, 016: 2 up to 16 turns
- Increment 1 turn, \( X \) turns correspond to a measuring angle of \( X \times 360^\circ \)
- 003, 005, 010, 016: 3, 6, 10, 16 turns
Other measuring angles on request

Mechanical version
- 2801: 6 mm shaft with marking, IP54*
- 2831: 6 mm shaft with marking, IP65*
- 2861: 6 mm shaft with marking, IP67*
- 2802: 6 mm shaft with flattening, IP54
- 2802: 6 mm shaft with flattening, IP65
- 2802: 6 mm shaft with flattening, IP67
- 2821: push-on coupling, IP54
- 2841: push-on coupling, IP65
- 2871: push-on coupling, IP67
Other shaft configurations on request
* Not recommended for new designs
When the marking of the shaft is pointing towards the electrical outlet, the sensor output is located on an integer turn position.
Technical Data

Type RSM-28...11...

Output signal 0.1 ... 10 V
Load / burden ≥ 10 kΩ
Number of channels 1 / 2
Start-up time typ. 10 ms
Response time max. 2 ms
Measuring range 0 ... 720° up to 0 ... 5760° in 360°-steps
Independent linearity
2 turns: typ. ≤ ±0.25 %FS, max. ≤ ±0.35 %FS
3 turns: typ. ≤ ±0.107 %FS, max. ≤ ±0.267 %FS
6 turns: typ. ≤ ±0.083 %FS, max. ≤ ±0.183 %FS
10 turns: typ. ≤ ±0.067 %FS, max. ≤ ±0.157 %FS
16 turns: typ. ≤ ±0.031 %FS, max. ≤ ±0.131 %FS

Resolution
16 bits

Repeatability
≤ ±0.5°

Hysteresis
≤ ±1°

Temperature error
±0.31 %FS

Supply voltage Ub
24 VDC (18 ... 30 VDC)

Current consumption w/o load
typ. 30 mA

Polarity protection
yes (supply lines and outputs)

Short circuit protection
yes (vs. GND and supply voltage)

Insulation resistance (500 VDC)
≥ 10 MΩ

Environmental Data
Max. operational speed
800 rpm

Vibration IEC 60068-2-6
20 g, 5 ... 2000 Hz, Amax = 0.75 mm

Shock IEC 60068-2-27
50 g, 6 ms

Protection class DIN EN 60529
IP54 / IP65 / IP67

Operating temperature
-40 ... +85°C
-25 ... +85°C (connector M12)

Insensitivity to magnetic DC fields
< 15 mT

Life
> 50 Mio. movements (mechanically)

MTTF (IEC 60050)
184 years (per channel)

EMC Compatibility
EN 61000-4-2 ESD (contact/air discharge)
4 kV, 8 kV

EN 61000-4-3 Electromagnetic fields (RFI)
10 V/m

EN 61000-4-4 Fast transients (burst)
1 kV

EN 61000-4-6 Conduct. disturbances (HF fields)
10 V/m

EN 61000-4-8 Magnetic fields
30 A/m

EN 55011 Noise radiation
Class B

Connection Assignment

<table>
<thead>
<tr>
<th>Signal</th>
<th>Cable code 2_ _</th>
<th>Connector code 5_ _</th>
<th>Cable code 2_ _</th>
<th>Connector code 5_ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>GN</td>
<td>Pin 1</td>
<td>GN</td>
<td>Pin 1</td>
</tr>
<tr>
<td>GND</td>
<td>BN</td>
<td>Pin 3</td>
<td>BN</td>
<td>Pin 3</td>
</tr>
<tr>
<td>Signal output 1</td>
<td>WH</td>
<td>Pin 2</td>
<td>WH</td>
<td>Pin 2</td>
</tr>
<tr>
<td>Signal output 2</td>
<td>YE</td>
<td>Pin 4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Do not connect / not assigned</td>
<td>YE</td>
<td>Pin 4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Connect cable shielding to GND
Technical Data
Output
Characteristics

Output characteristic

Output characteristic
Sensor Mounting

**Z-106-G-**
Backlash-free, double cardanic shaft coupling for Ø6 mm to Ø6 mm, Ø6.35 mm or Ø10 mm, mounting via 2 threaded pins with internal hexagon.

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminium, PEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temp.</td>
<td>-40 ... +160°C</td>
</tr>
<tr>
<td>Transferable</td>
<td>≤ 1 Nm</td>
</tr>
<tr>
<td>Displacement</td>
<td>rad. ≤ 0.1 mm, angl. ≤ 0.45°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>ØA / ØB [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>400103910</td>
<td>Z-106-G-6</td>
<td>6 / 6</td>
</tr>
<tr>
<td>400103912</td>
<td>Z-106-G-6,35</td>
<td>6 / 6,35</td>
</tr>
<tr>
<td>400103913</td>
<td>Z-106-G-10</td>
<td>6 / 10</td>
</tr>
</tbody>
</table>

**Z-104-G-6**
Fork coupling with low backlash for Ø6 mm. Mounting with 2 cylinder head screws M3 with internal hexagon. Angle screwdriver DIN 911 AF 1.5 included in delivery.

<table>
<thead>
<tr>
<th>Material</th>
<th>SS, ground driving pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td>≤ 1 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>ØA / ØB [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>400005690</td>
<td>Z-104-G-6</td>
<td>6 / 6</td>
</tr>
</tbody>
</table>

**Z-105-G-6**
Backlash-free fork coupling for Ø6 mm. Mounting with 1 cylinder head screw M3 with internal hexagon. Angle screwdriver DIN 911 AF 2.5 included in delivery.

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminium, anodized (black) Driving pin and spring hardened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferable</td>
<td>≤ 5 Ncm</td>
</tr>
<tr>
<td>Displacement</td>
<td>≤ 1 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>400005691</td>
<td>Z-105-G-6</td>
</tr>
</tbody>
</table>
Connector System
M12

M12×1 Mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

Plug housing: PA
Cable sheath: PUR, Ø = max. 6 mm,
-25 ... +80°C [moved]
-50 ... +80°C [fixed]
Lead wires: PP, 0.34 mm²

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>400056600</td>
<td>EEM-33-32</td>
<td>2 m</td>
</tr>
<tr>
<td>400056609</td>
<td>EEM-33-62</td>
<td>5 m</td>
</tr>
<tr>
<td>400056650</td>
<td>EEM-33-97</td>
<td>10 m</td>
</tr>
</tbody>
</table>

IP67
Very good Electromagnetic Compatibility (EMC) and shield systems

IP68
Very good resistance to oils, coolants and lubricants

UL - approved

Suited for applications in dragchains

CAN-Bus

Protection class IP67 EN 60529

Protection class IP68 EN 60529
Signal Processing

MAP-4000
Multifunctional measuring device with digital display for direct connection of potentiometric and normalized signals.

- Supply voltage 10...30 VDC, 80...250 VDC or AC
- High accuracy up to 0.1%
- Adjustable supply voltage for sensors 5...24 V
- Temperature coefficient 100 ppm/K
- Optional RS 232, RS 485, analog output, limited switch
- Complete data see separate data sheet
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.