Novoturn Multiturn Sensor
non-contacting
Series RSM2800
analog

Special features
- non-contacting, magnetic
- long life
- electr. angle 720° up to 5760° in 360°-steps available (equates 2 ... 16 turns)
- continuous analog output signal across the selected angle range
- True Power On System: detection also in unpowered state, position value is non-volatile
- available with push-on coupling or marked shaft
- easy mounting
- protection class IP54 up to IP67
- 1 or 2 outputs
- resolution 16 bit
- independent linearity up to ±0.03 %
- optional digital interfaces see separate data sheet

This sensor unites the ability to measure angles across multiple turns with the compactness and price attrac-tivity of multiple turn wirewound potentiometers.

By combining a single turn angle detection and a separate turn detection this sensor is able to measure angles across multiple turns providing high resolution and accuracy. Due to the facts that the sensor can detect turns in unpowered state and that the sensor does store turns non volatile, it is a real true power on angle sensor in a very compact size.

The sensor works internally magnetic and hereby contact-less and serves a very long life time. By using contactless technology the sensor has a high resistance against mechanical influences like shock, vibration etc.

The measurement range can be selected between 2 and 16 turns to 5760°. The output signal (1 or 2 channels) has a linear behaviour across the selected measurement range. This is how the output span is taken best use of.

The housing is made of a special high grade temperature resistant plastic material. Fixings are in the form of elongated slots which allow simplicity in mounting together with ease of mechanical adjustment.

The special backlash-free push-on coupling ensures extremely quick and easy installation. The transducer is not sensitive to either dirt or dampnes. Electrical connection is made via a shielded cable which is potted into the housing.

With the RSM2800 for the first time a compact and contactless solution can be provided that makes in many places actual costly solutions like gear drives and so this sensor can help to reduce total cost of systems.

Applications can be found in many areas like printing machines, drive and steering systems, wire length sensors, gate and door drives, in mobile applications such as lifts, in paper industry, in robotics and in common as a replacement for wirewound potentiometers or encoders.

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>high grade, temperature resistant plastic</td>
</tr>
<tr>
<td>Shaft</td>
<td>stainless steel</td>
</tr>
<tr>
<td>Bearings</td>
<td>bronze sleeve bearing</td>
</tr>
<tr>
<td>Electrical connections</td>
<td>shielded cable, 4 x AWG26</td>
</tr>
<tr>
<td></td>
<td>M12 connector with short cable</td>
</tr>
</tbody>
</table>

This sensor unites the ability to measure angles across multiple turns with the compactness and price attrac-tivity of multiple turn wirewound potentiometers.

By combining a single turn angle detection and a separate turn detection this sensor is able to measure angles across multiple turns providing high resolution and accuracy. Due to the facts that the sensor can detect turns in unpowered state and that the sensor does store turns non volatile, it is a real true power on angle sensor in a very compact size.

The sensor works internally magnetic and hereby contact-less and serves a very long life time. By using contactless technology the sensor has a high resistance against mechanical influences like shock, vibration etc.

The measurement range can be selected between 2 and 16 turns to 5760°. The output signal (1 or 2 channels) has a linear behaviour across the selected measurement range. This is how the output span is taken best use of.

The housing is made of a special high grade temperature resistant plastic material. Fixings are in the form of elongated slots which allow simplicity in mounting together with ease of mechanical adjustment.

The special backlash-free push-on coupling ensures extremely quick and easy installation. The transducer is not sensitive to either dirt or dampnes. Electrical connection is made via a shielded cable which is potted into the housing.

With the RSM2800 for the first time a compact and contactless solution can be provided that makes in many places actual costly solutions like gear drives and so this sensor can help to reduce total cost of systems.

Applications can be found in many areas like printing machines, drive and steering systems, wire length sensors, gate and door drives, in mobile applications such as lifts, in paper industry, in robotics and in common as a replacement for wirewound potentiometers or encoders.
Connection assignment

<table>
<thead>
<tr>
<th>Signal</th>
<th>M12 connector</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground</td>
<td>3</td>
<td>brown</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>1</td>
<td>green</td>
</tr>
<tr>
<td>Signal output 1</td>
<td>4</td>
<td>white</td>
</tr>
<tr>
<td>Signal output 2 / not assigned</td>
<td>2</td>
<td>yellow</td>
</tr>
</tbody>
</table>

Cable shielding connect to ground.

When the shaft marking points to the cable outlet, the sensor is in a full turn position.

Recommended dimensions of driving shaft for RSM2821 and RSM2841.
Parallel offset < 0.05 mm.

Recommended hole pattern
2 x φ 4.3 oder 2 x M

Recommended dimensions of driving shaft for RSM2821 and RSM2841.
Parallel offset < 0.05 mm.

Shaft versions

Recommended hole pattern
2 x φ 4.3 oder 2 x M
Output signals measurement range 2 ... 14 cycles

Output signals measurement range 15 ... 16 cycles
### Technical Data

#### 1-channel output

<table>
<thead>
<tr>
<th>RSM - 28</th>
<th>RSM - 28</th>
<th>RSM - 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratio meteric</td>
<td>Analog voltage</td>
<td>Analog current</td>
</tr>
</tbody>
</table>

#### Mechanical Data
- **Dimensions**: see dimension drawing
- **Mounting**: 2 M4 fillister-head screws and washer
- **Torque of mounting screws on housing flange**: 180 Ncm
- **Mechanical travel**: 360 continuous °
- **Permitted shaft load (axial and radial)**
  - static or dynamic force: 20 N
- **Torque**: 0.15 (IP54), 0.5 (IP65), 1.0 (IP67) Ncm
- **Permitted operational speed**: 800 min⁻¹
- **Weight**: ca. 50 g

#### Electrical Data
- **Supply voltage**: Ub 5 ±0.5 VDC, 24 ±6 VDC
- **Output signal**: ratiometric 0.1...10 V, 4...20 mA, burden > 500 Ω
- **Load supply current**: 30 typical mA
- **Reverse voltage**: yes
- **Short circuit protection**: yes (signal to Ub and ground)
- **Measuring range**: 0...720°, 0...5760 (360° steps) °
- **Resolution**: 16 bit
- **Repeatability**: ±0.1 %
- **Independent linearity**: 0.25...0.05 (s. table below) %
- **Ripple**: no ripple definable in case of ratiometric output
- **TC of output signal**: < 25 ppm/K
- **Insulation resistance (500 VDC)**: ≥ 10 MΩ
- **Wire diameter**: ca. 0.14 mm² (AWG26)

#### Environmental Data
- **Temperature range**: -40...+85 °C
- **Insensibility against magnetic DC fields**: < 15 mT
- **Vibration (IEC 68000-2-6)**
  - A_max = 0.75
  - A_range = 20 Hz
- **Shock (IEC 68000-2-6)**: 50 (6 ms) g
- **Life**: > 50 x 10⁶ (mechanical) movements
- **Protection class (DIN 40050 / IEC 529)**: IP54 / IP65 / IP67
- **EMC specifications**: EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-6, EN 61000-4-8, EN 55011

### Linearities
- **Measuring range**: 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 turns
- **Linearity typ.**: 0.250 0.167 0.125 0.100 0.083 0.071 0.063 0.056 0.050 0.045 0.042 0.038 0.036 0.033 0.031 %
- **Linearity max.**: 0.350 0.267 0.225 0.200 0.183 0.171 0.163 0.156 0.150 0.145 0.142 0.138 0.136 0.133 0.131 %
### Technical Data

#### 2-channel output

| RSM - 28 | - | - | - | 2 | 3 | - | - | RSM - 28 | - | - | - | 113 | - | - |
|----------|---|---|---|---|---|---|---|---|----------|---|---|---|---|---|---|

#### Ratiometric

#### Mechanical Data

- **Dimensions**: see dimension drawing
- **Mounting**: 2 M4 flatter-head screws and washer
- **Torque of mounting screws on housing flange**: 180 Ncm
- **Permitted shaft load (axial and radial)**
  - **Static or dynamic force**: 20 N
- **Permitted operational speed**: 800 min⁻¹
- **Weight**: ca. 50 g

#### Electrical Data

- **Supply voltage** $U_b$: 5 ±0,5 VDC
- **Output signal** ratiometric ($U_b = 5$ V) $0.1...10$ V
- **Load supply current**: 30 typical mA
- **Reverse voltage**: yes
- **Short circuit protection**: yes (signal to $U_b$ and ground)
- **Measuring range**: $0...720°$, $0...5760$ ($360°$ steps)
- **Resolution**: 16 bit
- **Repeatability**: ±0,1 %
- **Independent linearity**: 0,25...0,05 % (s. table below)
- **Ripple**
  - **In case of ratiometric output**: ±25 %
  - **TC of output signal**: $\leq 25$ ppm/K
- **Insulation resistance (500 VDC)** $\geq 10$ MΩ
- **Wire diameter**: ca. 0.14 mm² (AWG26)

#### Environmental Data

- **Temperature range**: -40...+85 °C
- **Insensitivity against magnetic DC fields**: < 15 mT
- **Vibration** (IEC 68000-2-6)
  - **5...2000 Hz**
  - $A_{max} = 0.75$ dB
  - $R_{max} = 20$ g
- **Shock** (IEC 68000-2-6)
  - 50 (6 ms) mm
- **Protection class (DIN 40050 / IEC 529)**: IP54 / IP65 / IP67
- **Life**: > 50 x $10^6$ (mechanical) movements

#### EMC specifications

- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-6
- EN 61000-4-8
- EN 55011

#### Linearties

- **Measuring range**: 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 turns
- **Linearity typ.**: 0,250 0,167 0,125 0,100 0,083 0,071 0,063 0,056 0,050 0,045 0,042 0,038 0,036 0,033 0,031 %
- **Linearity max.**: 0,350 0,267 0,225 0,200 0,183 0,171 0,163 0,156 0,150 0,145 0,142 0,138 0,136 0,133 0,131 %
### Ordering specifications

<table>
<thead>
<tr>
<th>R</th>
<th>S</th>
<th>M</th>
<th>2801</th>
<th>010</th>
<th>111</th>
<th>201</th>
</tr>
</thead>
<tbody>
<tr>
<td>S8</td>
<td>M1</td>
<td>010</td>
<td>111</td>
<td>201</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Supply Voltage \( U_b \)
1: \( U_b = 24 \text{ VDC} \) (18 VDC ... 30 VDC)
2: \( U_b = 5 \text{ VDC} \) (4.5 VDC ... 5.5 VDC)

#### Output signal \( U_b = 24 \text{ VDC} \) (1 _ _)
1: 0 ... 10 V
2: 4...20 mA

#### Output signal \( U_b = 5 \text{ VDC} \) (2 _ _)
1: 0.25 ... 4.75 V ratiometric to \( U_b \)
2: 0.5 ... 4.5 V ratiometric to \( U_b \)

#### Output configuration
1: rising curve CW
2: rising curve CCW
3: 2 crossed outputs, Ch1 rising CW, Ch2 rising CCW
   only \( U_b = 5 \text{ V} \) (2 _ _) and \( U_b = 24 \text{ V} \) and output 0...10 V (1 _ _)

#### Electrical connection
- 201: Round cable 4-pol., shielded, \( L = 0.5 \text{ m} \)
- 202: Round cable 4-pol., shielded, \( L = 1 \text{ m} \)
- 206: Round cable 4-pol., shielded, \( L = 3 \text{ m} \)
- 210: Round cable 4-pol., shielded, \( L = 5 \text{ m} \)
- 220: Round cable 4-pol., shielded, \( L = 10 \text{ m} \)
- 501: M12 x 1 connector shielded, straight; \( L = 0.15 \text{ m} \)

#### Series RSM

<table>
<thead>
<tr>
<th>Mechanical version</th>
</tr>
</thead>
<tbody>
<tr>
<td>2801: 6 mm shaft with marking, IP54</td>
</tr>
<tr>
<td>2831: 6 mm shaft with marking, IP65</td>
</tr>
<tr>
<td>2861: 6 mm shaft with marking, IP67</td>
</tr>
<tr>
<td>2902: 6 mm shaft with flattening, IP54</td>
</tr>
<tr>
<td>2932: 6 mm shaft with flattening, IP65</td>
</tr>
<tr>
<td>2962: 6 mm shaft with flattening, IP67</td>
</tr>
<tr>
<td>2921: push-on-coupling, IP54</td>
</tr>
<tr>
<td>2941: push-on-coupling, IP65</td>
</tr>
<tr>
<td>2971: push-on-coupling, IP67</td>
</tr>
</tbody>
</table>

#### Number of turns output characteristics
- from 002 = 2 turns to 016 = 16 turns, increment 1 turn

- \( X \) turns correspond to an electrical angle of \( X \times 360^\circ \)

### Recommended accessories
Process-controlled indicators MAP300/400/4000 with display.

### Available on request
- alternative measuring ranges
- alternative output configurations
- various assembled plugs
- alternative shaft types

---

**Novotechnik Messwertaufnehmer OHG**
Postfach 4220
73745 Ostfildern (Ruit)
Horbstraße 12
73760 Ostfildern (Ruit)

Telefon +49 711 44 89-0
Telefax +49 711 44 89-118
info@novotechnik.de
www.novotechnik.de

© 07/2011
Art.-Nr.: 062 718
Subject to changes
Printed in Germany