

**NOVOTURN
Multiturn-Sensor
non-contacting**

Series RSM2800
digital SSI, SPI



Special features

- True Power On System: counts turns even when not powered. Patented non-volatile technology does not require gears or batteries
- non-contacting, magnetic
- long life
- 14 or 16 turn range (5040° or 5760°)
- continuous analog output signal across the selected angle range
- resolution 16 /18 bit
- independent linearity up to 0.031%
- protection class IP54, IP65 or IP67
- available with push-on coupling or marked shaft
- easy mounting
- see separate data sheet for analog interfaces

The RSM 2800 combines multiple-turn angle measurement, compact size, and attractive price. The patented NOVOTURN technology measures angles across multiple turns, providing high resolution and accuracy. This technology detects the turn count even while not powered. When powered up, the RSM2800 immediately reports the actual angular position, even if the input shaft was rotated while power was off.

The sensor utilizes contactless magnetic technology, providing a very long operational life time. It has excellent capabilities against mechanical shock and vibration.

The customer-selected measurement range is factory-programmed is either 14 or 16 turns.

The housing is made of a special high grade temperature resistant plastic material. The sensor is mounted with slots in the housing, which also provides for mechanical adjustment.

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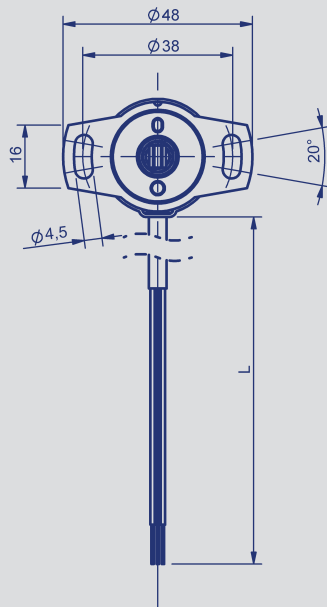
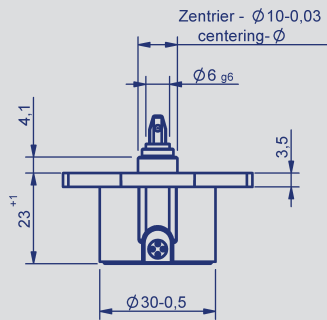
Three shaft types are offered, including D-shaped and Novotechnik's easy-to-mount „push-on“ coupling.

The sensor is insensitive to dirt and moisture (IP-rating dependent). A shielded cable of 0.5 m to 10 meters length is available.

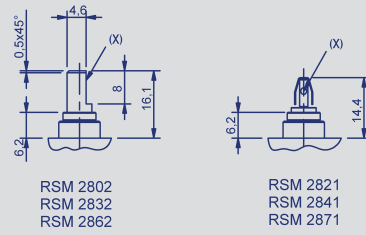
The RSM2800 provides a cost-effective alternative to conventional multi-turn encoders.

Applications for the RSM2800 exist in printing machines, drive and steering systems, wire length sensors, gate and door drives, fork-lifts, robotics, and many other areas.

Description	
Housing	high grade, temperature resistant plastic
Shaft	stainless steel
Bearings	bronze sleeve bearing
Electrical connection	shielded cable, AWG 24 (0.25 mm ²) SSI shielded cable, AWG 26 (0.14 mm ²) SPI

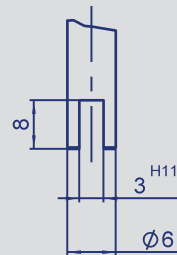


Shaft versions

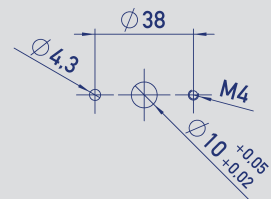


(X) = Wellenmarkierung / shaft marking

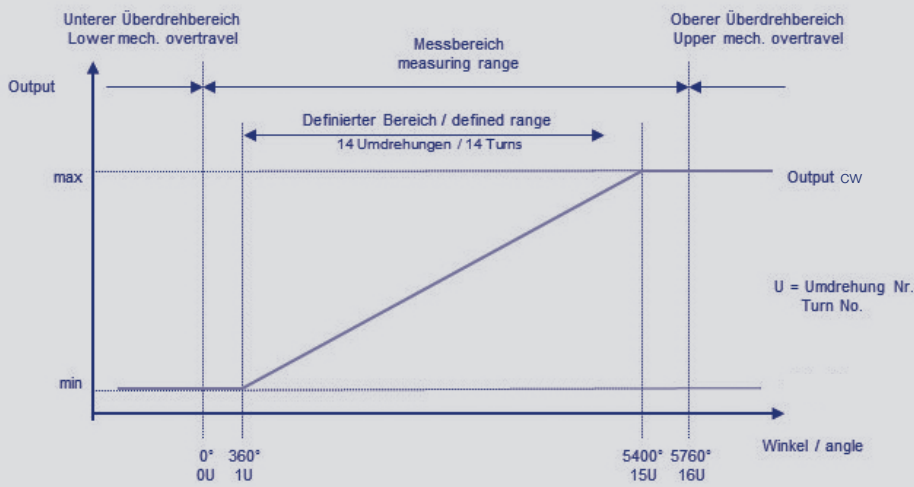
Recommended dimensions of driving shaft
for RSM2821 / RSM 2841 / RSM2871.
Parallel offset < 0.05 mm.



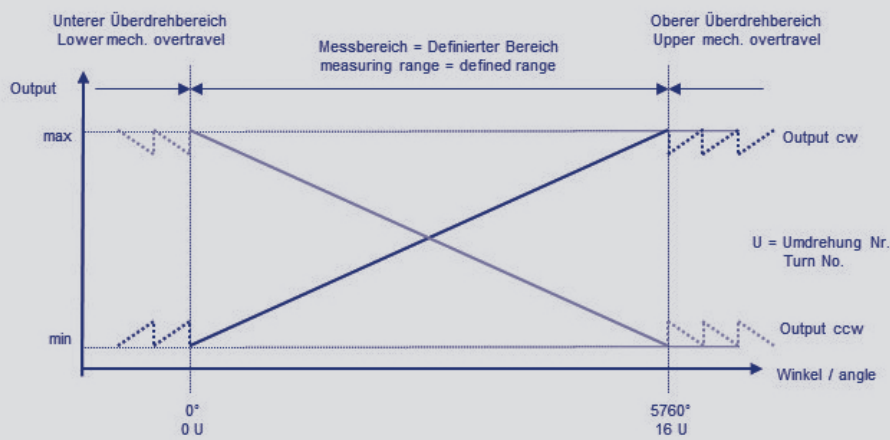
Recommended hole pattern
2 x $\text{Ø } 4.3$ oder 2 x M4



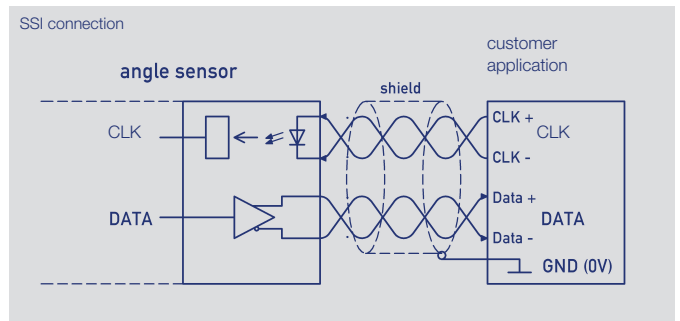
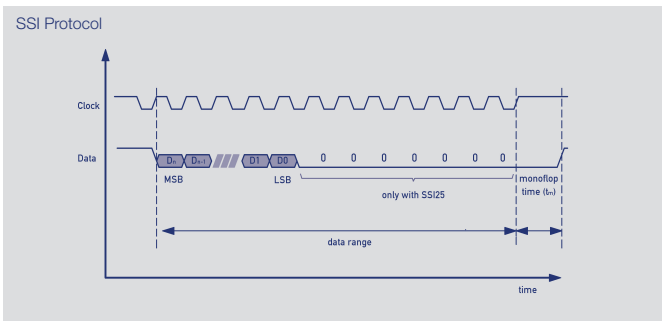
Ausgangssignal bei definiertem Bereich 14 Umdrehungen
Output Signal with defined range 14 turns



Ausgangssignal wenn definierter Bereich 16 Umdrehungen
Output Signal when defined range is 16 turns



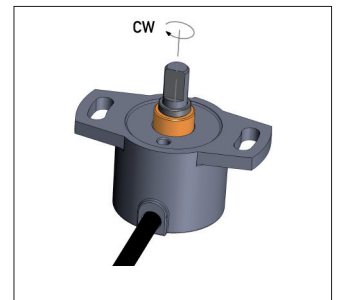
SSI Interface



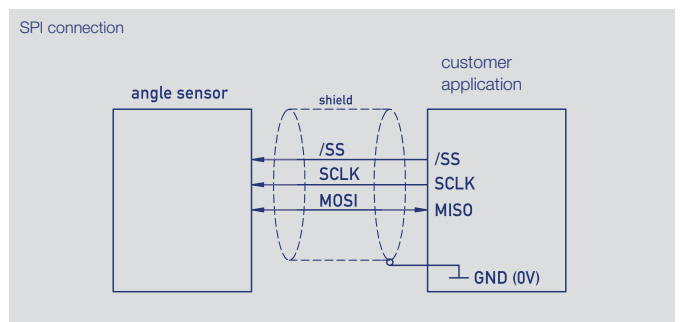
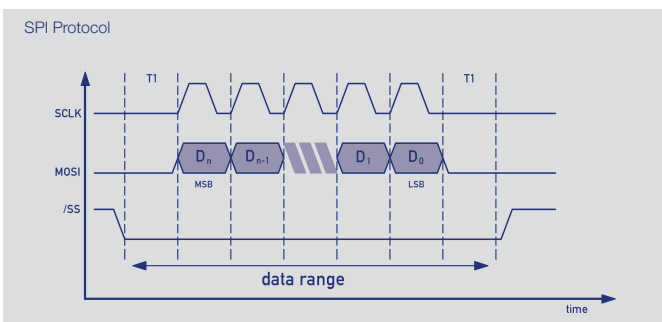
Connections SSI

Signal	wire colour
Supply voltage Ub	Green
Supply voltage GND	Brown
Signal output SSI Data+	Red
Signal output SSI Data-	Yellow
Clock input SSI Clk+	Pink
Clock input SSI Clk-	Blue
Not assigned	White
Not assigned	Grey

When the shaft marking points toward the cable outlet, the sensor is located on an integer turn position.



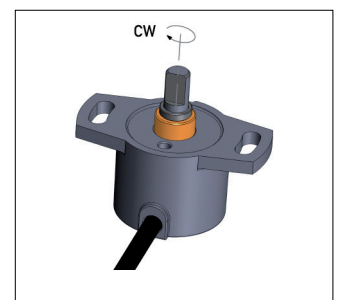
SPI Interface



Connections SPI

Signal	wire colour
Supply voltage Ub	Green
Supply voltage GND	Brown
MOSI / MISO	Yellow
SCLK	Grey
/SS (slave select)	White

When the shaft marking points toward the cable outlet, the sensor is located on an integer turn position.



Technical Data - SSI Interface

RSM - 28 _ _ - 2 _ _ - 1 4 _ - _ _ _		
Supply voltage 24 VDC		
Mechanical Data		
Dimensions	see dimension drawing	
Mounting	with 2 screws M4 and washer	
Starting torque of mounting screws at housing flange	180	Ncm
Mechanical travel	360 continuous	°
Permitted shaft loading (axial and radial) static or dynamic force	20	N
Torque	0.15 (IP54), 0.5 (IP65) 1.0 (IP67)	Ncm
Maximum operational speed	800	RPM
Weight	~ 50	g
Electrical Data		
Supply voltage U_b	24 (10 ... 32)	V
Current consumption (w/o load)	typical 10	mA
Reverse voltage	yes, supply lines and outputs	
Short circuit protection	yes (vs. GND und U_b)	
Measuring range	see ordering specifications	
Max. Clock rate	100	kHz
Inputs	RS-422 compatible, CLK lines electrically isolated via optocouplers	
Protocol	SSI	
Encoding	Gray code, Binary code	
Update rate	1	kHz
Monoflop time (t_m)	20 ± 1 (14/16 turns)	µs
Resolution	16 or 18 across the total measuring range	bit
Repeatability	0,5	°
Hysteresis	1	°
Absolute linearity	14 turns: max. 0.036 16 turns: max. 0.031	± % FS ± % FS
Temperature error	± 0,1	% FS
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 24, 0.25	mm ²
Environmental Data		
Temperature range	-40...+85	°C
Vibration IEC 68000-2-6	5...2000 $A_{max} = 0.75$ $a_{max} = 20$	Hz mm g
Shock IEC 68000-2-27	50 (6 ms)	g
Life	> 50 x 10 ⁶	movements
MTTF (DIN EN ISO 13849-1 parts count method, w/o load)	173	years
Functional safety	When using our products in safety-related systems please contact us	
Protection class (to DIN EN 60529)	IP54 / IP65 / IP67	
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV EN 61000-4-3 electromagnetic fields 10V/m EN 61000-4-4 electrical fast transients (Burst) 1kV EN 61000-4-6 conducted disturbances, induced by RF fields 10V/m eff. EN 61000-4-8 Power frequency magnetic fields 3A/m EN 55016-2-3 Radiated disturbances class B	

Technical Data - SPI Interface

RSM - 28 _ _ - 2 _ _ - 2 8 _ - _ _ _		
Supply voltage 5 VDC		
Mechanical Data		
Dimensions	see dimension drawing	
Mounting	with 2 screws M4 and washer	
Starting torque of mounting screws at housing flange	180	Ncm
Mechanical travel	360 continuous	°
Permitted shaft loading (axial and radial) static or dynamic force	20	N
Torque	0.15 (IP54), 0.5 (IP65) 1.0 (IP67)	Ncm
Maximum operational speed	800	RPM
Weight	~ 50	g
Electrical Data		
Supply voltage U_b	5 (4.5 ... 5.5)	V
Current consumption (w/o load)	typical 25	mA
Reverse voltage	yes, supply lines and outputs	
Short circuit protection	yes (vs. GND and U_b)	
Measuring range	see ordering specifications	°
Max. Clock rate	100	kHz
Level	TTL (see application note SPI protocol)	
Protocol	SPI	
Encoding	Binary code	
Update rate	1	kHz
Resolution	16 across the total measuring range	bit
Repeatability	0.5	°
Hysteresis	1	°
Absolute linearity	14 turns: max. 0.036 16 turns: max. 0.031	± % FS ± % FS
Temperature error	± 0.1	% FS
Insulation resistance (500 VDC)	≥ 10	MΩms
Cross-section cable	AWG 26, 0.14	mm ²
Environmental Data		
Temperature range	-40...+85	°C
Vibration IEC 68000-2-6	5...2000 $A_{max} = 0.75$ $a_{max} = 20$	Hz mm g
Shock IEC 68000-2-27	50 (6 ms)	g
Life	> 50 x 10 ⁶	movements
MTTF (DIN EN ISO 13849-1 parts count method, w/o load)	193	years
Functional safety	When using our products in safety-related systems please contact us	
Protection class (nach DIN EN 60529)	IP54 / IP65 / IP67	
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV EN 61000-4-3 electromagnetic fields 10V/m EN 61000-4-4 electrical fast transients (Burst) 1kV EN 61000-4-6 conducted disturbances, induced by RF fields 10V/m eff. EN 61000-4-8 Power frequency magnetic fields 3A/m EN 55016-2-3 Radiated disturbances class B	

Ordering specifications

Preferred types printed in bold:

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

Supply voltage

- 1: Ub = 24 V (10 ... 32 V)**
2: Ub = 5 V (4.5 ... 5.5 V)

Interface parameters for SSI Interface (1 _ _)

- 41: 24 V, SSI 16 bit, Gray code, rising cw**
42: 24 V, SSI 16 bit, Gray code, rising ccw
43: 24 V, SSI 25 bit (18 bit data), Gray code, rising cw
44: 24 V, SSI 25 bit (18 bit data), Gray code, rising ccw
45: 24 V, SSI 16 bit, Binary code, rising cw
46: 24 V, SSI 16 bit, Binary code, rising ccw
47: 24 V, SSI 25 bit (18 bit data), Binary code, rising cw
48: 24 V, SSI 25 bit (18 bit data), Binary code, rising ccw

Interface parameters for SPI Interface (2 _ _)

- 81: 5 V, SPI 16 bit, Binary code, rising cw**
82: 5 V, SPI 16 bit, Binary code, rising ccw

Electrical connection

- 302: Round cable 5-pol., 1,0 m (0.14 mm², shielded) SPI**
432: Round cable 6-pol., 1,0 m (0.25 mm², shielded) SSI
Cable versions and assembled connectors on request.

R S M - **2 8 3 2** - **2 1 4** - **2 8 1** - **3 0 2**

Series

Model

2: digital interface

Number of turns output characteristics

- 14: 14 turns, measuring range controlled**
16: 16 turns, measuring range not controlled

Mechanical version

- 2802: 6 mm shaft with flattening, IP54
2832: 6 mm shaft with flattening, IP65
2862: 6 mm shaft with flattening, IP67
2821: push-on coupling, IP54
2841: push-on coupling, IP65
2871: push-on coupling, IP67
other shaft versions on request