

**NOVOHALL  
Rotary Sensor  
non-contacting**

Series RSC2800  
digital  
SSI, SPI, Incremental



**Special features**

- non-contacting, magnetic
- measuring range 360°
- SSI, SPI and Incremental output
- available with push-on coupling or marked shaft
- simple mounting
- protection class IP54, IP65, IP67
- long life
- very small hysteresis
- resolution 9 - 14 bit
- linearity  $\leq \pm 0.5\%$
- analog interface versions - see separate data sheet

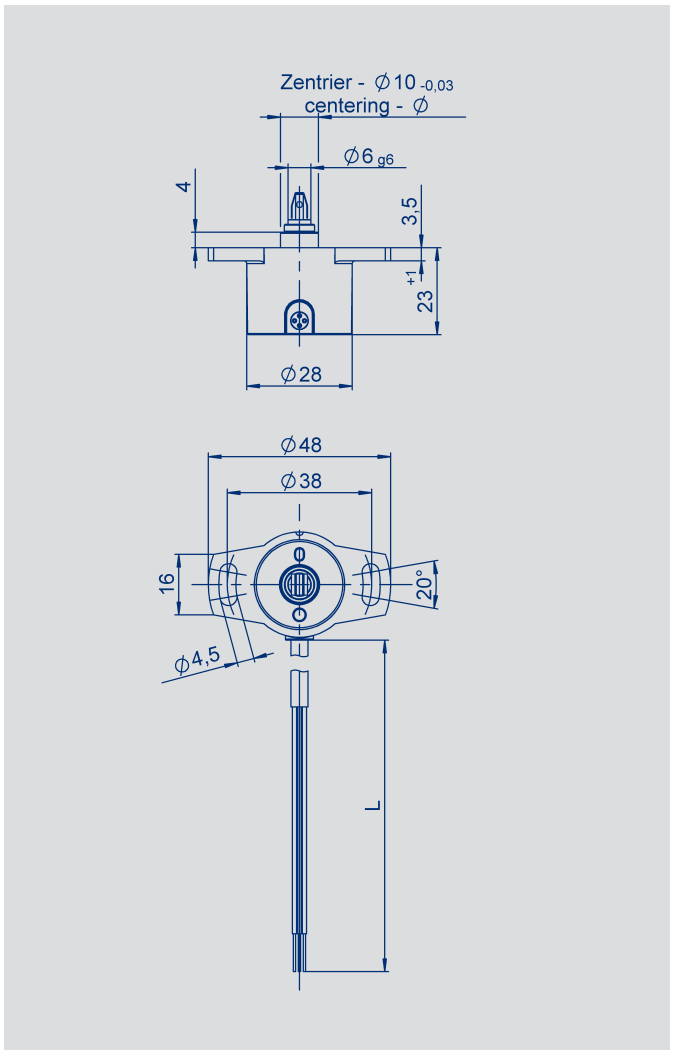
The RSC 2800 sensor utilizes a contactless magnetic measurement technology to determine the measured angle. Unlike conventional Hall sensors, the orientation of the magnetic field is measured. The output is available as either analog voltage or current.

The housing is made of a special high grade temperature-resistant plastic material. Elongated slots allow simplicity in mounting together with ease of mechanical adjustment.

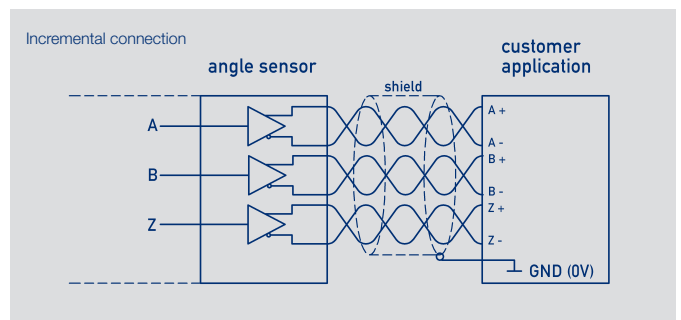
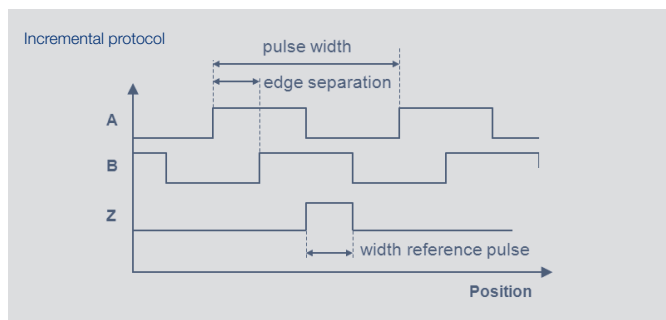
Three shaft options are available, including a push-on coupling option that ensures fast and simple installation. The transducer is not sensitive to either dirt or humidity.

Electrical connection is made via a shielded cable which is sealed into the housing. An M12 connector is available as an option.

| Description            |   |
|------------------------|---|
| Housing                | high grade, temperature resistant plastic   |
| Shaft                  | stainless steel   |
| Bearings               | bronze sleeve bearing   |
| Electrical connections | shielded cable, AWG 24 (0.25 mm <sup>2</sup> ) SSI, INC<br>shielded cable, AWG 26 (0.14 mm <sup>2</sup> ) SPI |

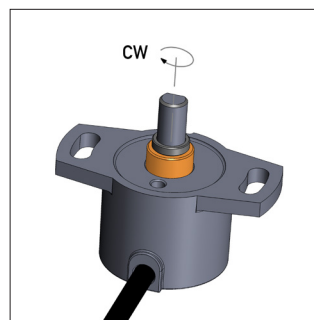


## Incremental Interface



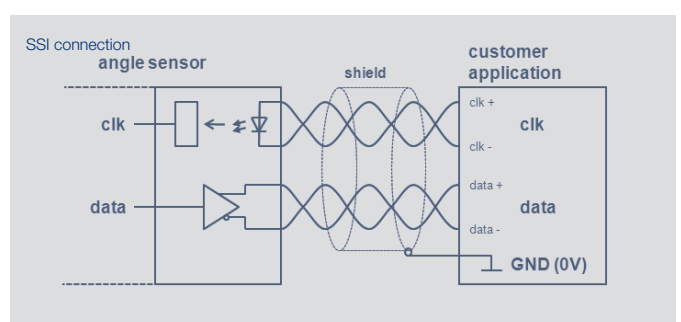
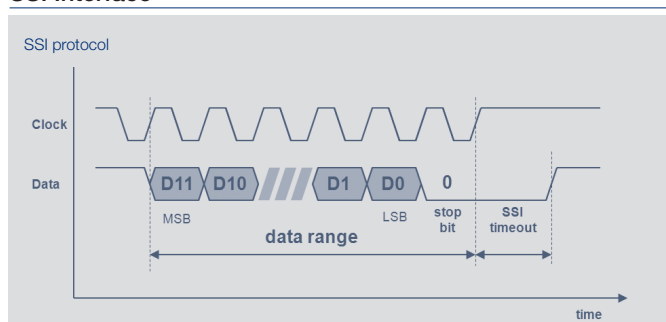
## Connections Incremental

| Signal               | Wire colour |
|----------------------|-------------|
| Supply voltage $U_b$ | White       |
| GND                  | Brown       |
| A+                   | Yellow      |
| A-                   | Green       |
| B+                   | Pink        |
| B-                   | Grey        |
| Z+                   | Blue        |
| Z-                   | Red         |



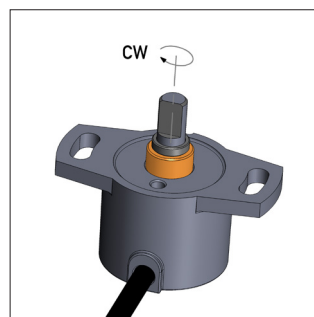
When the shaft marking is pointing away from the cable outlet, the sensor is located at the reference pulse (Z).

## SSI Interface



## Connections SSI

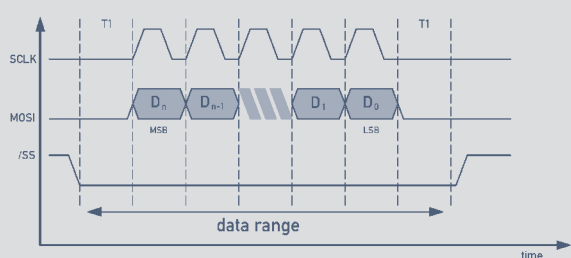
| Signal                        | Wire colour |
|-------------------------------|-------------|
| Supply voltage U <sub>b</sub> | White       |
| GND                           | Brown       |
| Signal output SSI Data+       | Pink        |
| Signal output SSI Data-       | Grey        |
| Clock input SSI Clk+          | Yellow      |
| Clock input SSI Clk-          | Green       |
| Not assigned                  | Blue        |
| Not assigned                  | Red         |



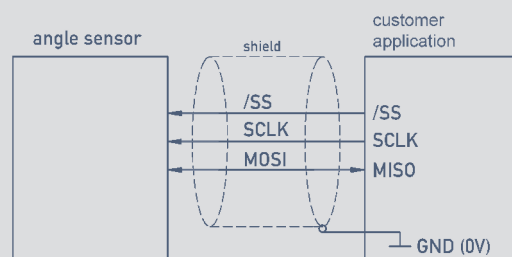
When the shaft marking points towards the cable outlet, the sensor is located in the electrical center position.

## SPI Interface

SPI Protocol

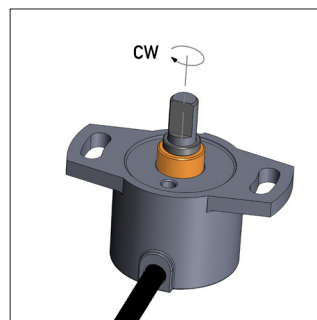


SPI connection



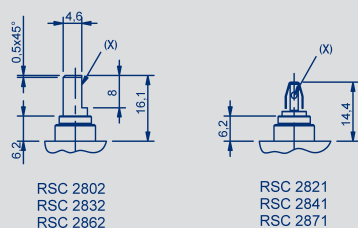
Connections SPI

| Signal               | Wire colour |
|----------------------|-------------|
| Supply voltage $U_b$ | Green       |
| GND                  | Brown       |
| MOSI / MISO          | Yellow      |
| SCLK                 | Grey        |
| /SS (slave select)   | White       |



When the shaft marking points toward the cable outlet, the sensor is located in the electrical center position.

Shaft designs

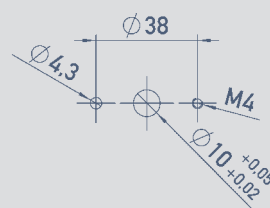


RSC 2802  
RSC 2832  
RSC 2862

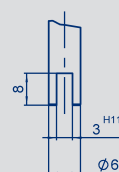
RSC 2821  
RSC 2841  
RSC 2871

(X) = Wellenmarkierung / shaft marking

Recommended hole pattern  
2 x Ø 4.3 or 2 x M4



Recommended dimensions of driving shaft  
for RSC2821 / RSC2841 / RSC2871  
Parallel offset < 0.05 mm



## Technical Data - SSI Interface

| Type   | RSC - 28 _ _ _ - 2 _ _ _ - 4 _ _ _ - _ _ _<br>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   | 1.0 (IP67); 0.5 (IP65); 0.15 (IP54)  | Ncm           |
| Maximum operational speed  | 800  | RPM           |
| Weight   | ~ 50   | g             |
| Electrical Data  |  |               |
| Supply voltage Ub  | 5 (4.5 ... 5.5)  | VDC           |
| Current consumption (w/o load)                                     | typ. 27  | mA            |
| Reverse voltage  | yes, supply lines  |               |
| Short circuit protection   | yes (vs. GND and supply)   |               |
| Measuring range  | 360  | °             |
| Max. Clock rate  | 1  | MHz           |
| Inputs   | RS422 compatible, CLK lines electrically isolated via optocouplers   |               |
| Protocol   | SSI 13 bit (12 bit data + 1 stop bit)  |               |
| Ohmic load at outputs  | ≥ 120  | Ω             |
| Encoding   | Gray code  |               |
| Update rate (internal)   | 2000   | kHz           |
| Monoflop time (tm)   | 16   | µs            |
| Resolution across 360°   | 12   | bit           |
| Repeatability  | 0.1  | °             |
| Hysteresis   | Standard 0.7   | °             |
| Independent linearity  | typ. 0.5   | ± % FS        |
| Temperature error  | ±0.375   | % FS          |
| Insulation resistance (500 VDC)                                    | ≥ 10   | MΩ            |
| Cross-section cable  | AWG 24, 0.25   | mm²           |
| Environmental Data   |  |               |
| Temperature range  | -40...+85  | °C            |
| Vibration IEC 60068-2-6  | 5...2000<br>Amax = 0.75<br>amax = 20   | Hz<br>mm<br>g |
| Shock IEC 60068-2-27   | 50 (6 ms)  | g             |
| Life   | > 50x10 <sup>6</sup>   | movements     |
| MTTF (DIN EN ISO 13849-1<br>parts count method, w/o load)          | 148  | years         |
| Functional safety  | If you need assistance in using our products in safety-related systems,<br>please contact us.  |               |
| Protection class (DIN EN 60529)                                    | IP54 / IP65 / IP67   |               |
| EMC compatibility  | EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV<br>EN 61000-4-3 electromagnetic fields 10V/m<br>EN 61000-4-4 electrical fast transients (Burst)1kV<br>EN 61000-4-6 conducted disturbances, induced by RF fields 10 V/m eff.<br>EN 55011/EN 55022/a1 Radiated disturbances class B |               |

## Technical Data - Incremental Interface

|  |  |           |
|--|--|-----------|
| Type   | RSC - 28 _ _ - 2 _ _ - 5 _ _ - _ _ _<br>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   | 1.0 (IP67); 0.5 (IP65); 0.15 (IP54)  | Ncm       |
| Maximum operational speed  | 800  | RPM       |
| Weight   | approx 50  | g         |
| Electrical Data  |  |           |
| Supply voltage Ub  | 5 (4.5 ... 5.5)  | VDC       |
| Current consumption (w/o load)                                     | typ. 20  | mA        |
| Reverse voltage  | yes, supply lines and outputs  |           |
| Short circuit protection   | yes (vs. GND and Ub)   |           |
| Measuring range  | 360  | °         |
| Outputs  | A+ / A-<br>B+ / B-<br>Z+ / Z-  |           |
| Level  | RS-422, TTL compatible   |           |
| Length Z-pulse   | = distance between 2 edges A / B   |           |
| Ohmic load at outputs  | ≥ 120 per channel A / B / Z  | Ω         |
| Resolution across 360° (with 4 times interpolation)                | 12 (11 / 10 / 9)   | bit       |
| Repeatability  | 0.1  | °         |
| Hysteresis   | Standard 0.7   | °         |
| Independent linearity  | typ. 0.5   | ± % FS    |
| Temperature error  | ±0.375   | % FS      |
| Insulation resistance (500 VDC)                                    | ≥ 10   | MΩ        |
| Cross-section cable  | AWG 24, 0.25   | mm²       |
| Environmental Data   |  |           |
| Temperature range  | -40...+85  | °C        |
| Vibration IEC 60068-2-6  | 5...2000   | Hz        |
|  | Amax = 0.75  | mm        |
|  | amax = 20  | g         |
| Shock IEC 60068-2-27   | 50 (6 ms)  | g         |
| Life   | > 50x10 <sup>6</sup>   | movements |
| MTTF (DIN EN ISO 13849-1 parts count method, w/o load)             | 246  | years     |
| Functional safety  | If you need assistance in using our products in safety-related systems, please contact us.   |           |
| Protection class (DIN EN 60529)                                    | IP54 / IP65 / IP67   |           |
| EMC compatibility  | EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV<br>EN 61000-4-3 electromagnetic fields 10V/m<br>EN 61000-4-4 electrical fast transients (Burst) 1kV<br>EN 61000-4-6 conducted disturbances, induced by RF fields 10 V/m eff.<br>EN 61000-4-8 Power frequency magnetic fields 3A/m<br>EN 55011/EN 55022/a1 Radiated disturbances class B |           |

## Technical Data - SPI Interface

|   |   |           |
|---|---|-----------|
| Type  | RSC - 28 _ _ - 214 - 8 _ _ - _ _ _<br>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 dynamnic force | 20  | N         |
| Torque  | 1.0 (IP67); 0.5 (IP65); 0.15 (IP54)   | Ncm       |
| Maximum operational speed   | 800   | RPM       |
| Weight  | approx. 50  | g         |
| Electrical Data   |   |           |
| Supply voltage Ub   | 5 (4.5 ... 5.5)   | VDC       |
| Current consumption (w/o load)                                      | typical 15  | mA        |
| Reverse voltage   | yes, supply lines   |           |
| Short circuit protection  | yes (vs. GND and Ub)  |           |
| Measuring range   | 360   | °         |
| Max. Clock rate   | 400   | kHz       |
| Level SCLK,MOSI,/SS   | TTL level (see application note SPI protocol)   |           |
| Protocol  | SPI   |           |
| Update rate (internal)  | 5   | kHz       |
| Resolution  | 14  | bit       |
| Repeatability   | 0.1   | °         |
| Hysteresis  | < 0.1   | °         |
| Independent linearity   | ≤ 0.5   | ± % FS    |
| Temperature error   | ±0.625  | % FS      |
| Insulation resistance (500 VDC)                                     | ≥ 10  | MΩ        |
| Cross-section cable   | AWG 26, 0.14  | mm²       |
| Environmental Data  |   |           |
| Temperature range   | -40...+85   | °C        |
| Vibration IEC 60068-2-6   | 5...2000  | Hz        |
|   | Amax = 0.75   | mm        |
|   | amax = 20   | g         |
| Shock IEC 60068-2-27  | 50 (6 ms)   | g         |
| Life  | > 50x10 <sup>6</sup>  | movements |
| MTTF (DIN EN ISO 13849-1 parts count method, w/o load)              | 316   | years     |
| Functional safety   | If you need assistance in using our products in safety-related systems, please contact us.  |           |
| Protection class (DIN EN 60529)                                     | IP54 / IP65 / IP67  |           |
| EMC compatibility   | EN 61000-4-2 electrostatic discharges (ESD) 4kV, 8kV<br>EN 61000-4-3 electromagnetic fields: 10V/m<br>EN 61000-4-4 electrical fast transients (Burst) 1kV<br>EN 61000-4-6 conducted disturbances, induced by RF fields 10 V/m eff.<br>EN 61000-4-8 Power frequency magnetic fields 3A/m<br>EN 55011/EN 55022/a1 Radiated disturbances class B |           |

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## Ordering specifications

Preferred types printed in bold:

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

### Interface

**4: Synchronous-Serial Interface (SSI)**

**5: Incremental Interface A / B / Z**

**8: SPI Interface**

Interface parameter for SSI Interface (4 \_ \_)

**11: 5 V (4.5 ... 5.5 V) supply, output RS422 comp., Gray code, rising cw**

**12: 5 V (4.5 ... 5.5 V) supply, output RS422 comp., Gray code, rising ccw**

Interface parameter for Incremental Interface (5 \_ \_)

**15: 5 V (4.5 ... 5.5 V) supply, output RS422 comp., rising cw**

On request: high side and low side outputs

UVW signals instead of ABZ signals for motor commutation

Absolute position at Power On (Power on burst)

Interface parameter for SPI Interface (8 \_ \_)

**31: 5 V (4.5 V ... 5.5 V) supply, Binary code, rising cw**

### Electrical connection

**302: Round cable 5-pol. 1 m (0.14mm<sup>2</sup>; shielded) SPI**

**432: Round cable 8-pol. 1 m (0.25 mm<sup>2</sup>; shielded) SSI INC**

Cable versions and assembled connectors on request.

**R S C - 2 8 3 2 - 2 1 2 - 4 1 1 - 4 3 2**

Series

### Resolution (SSI interface)

**12: 12 bit - 4096 steps**

other resolutions on request

### Resolution (Incremental interface)

**12: 1024 ppr - 4096 increments resolution (at 4-fold interpolation)**

11: 512 ppr - 2048 increments resolution (at 4-fold interpolation)

10: 256 ppr - 1024 increments resolution (at 4-fold interpolation)

09: 128 ppr - 512 increments resolution (at 4-fold interpolation)

other resolutions on request

### Resolution (SPI interface)

**14: SPI 14 bit**

### Model

**2: digital interface**

### 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