NOVOHALL
Rotary Sensor
Non-contacting
RSX-7900
Heavy Duty
CANopen
Mobile Applications

Special Features
• Very robust design for extreme environmental conditions
• High shaft load 300 N
• Non-contacting, magnetic encoder
• Measuring angles up to 360° in one and multi-channel versions
• Enhanced corrosion protection due to anodized aluminum housing and stainless steel shaft, salt spray resistant
• Excellent linearity
• High resolution to 14 bit
• Unlimited mechanical rotation
• Absolutely impermeable to splash-water IP69K
• High temperature resistance to -40...+105°C
• Long life > 100 million movements, even in vibration mounting positions
• For highest EMC requirements such as ISO pulses and interference fields according to ISO 11452 and ECE directive

Applications
• Position measurement in steering systems
• Pivotable vehicle bracings
• Transport systems with several steered axes
• Construction and agricultural machinery

The angle sensor RSX-7900 is designed for use in mobile applications under extreme environmental conditions. The sensor is suitable for a continuously ambitious operating.

The robust full metal housing with a double ball bearing stainless steel shaft and a superior seal concept protects the sensor against various environmental influences.

The high accuracy and reliability of the magnetic angle measurement are further features.

The robust but compact design allows direct mounting of the sensor without additional protective measures.
A variety of shaft versions allows guidance via lever arm or other driving elements.

Description

Material
Housing: aluminium, anodized, AlMgSi1, salt spray resistant
Shaft: SS X10CrNiS18-9 1.4305 / AISI 303

Mounting
With 4 screws M6, screw-in depth 15 mm min.

Fastening torque of mounting
80 ± 10 Ncm

Bearing
Double angular ball bearing

Electrical connection
Connector M12x1, A-coded / Cable with cable screw connection, 4x 0.5 mm² (AWG 20), TPE, shielded

Mechanical Data

Dimensions
See dimension drawing

Mechanical travel
continuous

Permitted shaft load
static or dynamic
300 N (axial / radial)

Torque
≤ 4 Ncm
Depending on the environmental temperature and standstill time, the necessary force for the initial operating of the shaft may increase

Weight
approx. 500 g
### Ordering Specifications

*Preferred types printed in bold*

#### Interface

**6: CANopen**

- **Interface parameters**
  - **Single-channel version**
    1: 1x position, 1x speed
    5: 1x position, 1x speed with bus termination 120 Ω
  - **Dual-channel version**
    2: 2x position, 2x speed
    6: 2x position, 2x speed with bus termination 120 Ω

- **Baud rate**
  1: 1000 kBit/s
  2: 800 kBit/s
  3: 500 kBit/s
  4: 250 kBit/s
  5: 125 kBit/s
  7: 50 kBit/s

- **Electrical connection**
  1 Output
  - 201: 1x cable 4-pole 1.0 m, shielded
  - 511: 1x connector M12, 5-pole, shielded
  2 Outputs (CAN IN/OUT)
  - 301: 2x cable 4-pole 1.0 m, shielded
  - 611: 2x connector M12 (male), 6-pole, shielded

- **Cable versions and assembled connectors on request**

<table>
<thead>
<tr>
<th>R</th>
<th>S</th>
<th>X</th>
<th>1</th>
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<th>1</th>
<th>2</th>
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<th>4</th>
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#### Shaft

1: Ø 13x12 mm with cross hole Ø 4.1 mm
3: Ø 10x16 mm with countersink Ø 4.5x90°
7: Ø 13x12 mm with mounted driving plate 2-IP65-M21

- Other shaft configurations on request

#### Housing

1: Centering shaft side
4: Centering shaft and cover side

#### Model / size

70: 70 x 35 mm
When the flattening of the shaft points towards the indexing hole, the sensor is near the electrical center position.
## Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>RSX-79 ..-214.6 ..- ..</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured variables</td>
<td>Position and speed</td>
</tr>
<tr>
<td>Measuring range</td>
<td>360°</td>
</tr>
<tr>
<td>Number of channels</td>
<td>1 / 2</td>
</tr>
<tr>
<td>Protocol</td>
<td>CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2 Encoder Class C2, LSS services to CiA DS-305 V1.1.2</td>
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<tr>
<td>Programmable parameters</td>
<td>Position, speed, cams, working areas, rotating direction, scale, offset, node ID, baud rate</td>
</tr>
<tr>
<td>Node ID</td>
<td>1 ... 127 (default 127)</td>
</tr>
<tr>
<td>Baud rate</td>
<td>50 ... 1000 kbit/s</td>
</tr>
<tr>
<td>Update rate</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Resolution position (360°)</td>
<td>14 bits</td>
</tr>
<tr>
<td>Resolution speed</td>
<td>360° / 2^14 ≈ 0.022°/ms</td>
</tr>
<tr>
<td>Absolute linearity</td>
<td>1 Channel: ±0.5 %FS, 2 Channels: ±0.85 %FS</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.1°</td>
</tr>
<tr>
<td>Temperature error</td>
<td>±0.2 %FS</td>
</tr>
<tr>
<td>Supply-voltage Ub</td>
<td>12/24 VDC (8 ... 34 VDC)</td>
</tr>
<tr>
<td>Current consumption at Power-on</td>
<td>±50 mA</td>
</tr>
<tr>
<td>Power drain w/o load</td>
<td>&lt; 0.4 W</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>45 VDC (permanent)</td>
</tr>
<tr>
<td>Polarity protection</td>
<td>yes (supply lines)</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>yes (output vs. GND and supply voltage up to 40 VDC)</td>
</tr>
<tr>
<td>Isolation resistance (500 VDC)</td>
<td>≥ 10 MΩ</td>
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<tr>
<td>Cross section</td>
<td>0.5 mm² (AWG 20)</td>
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<tr>
<td>Bus termination internal</td>
<td>120°Ω (optionally)</td>
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</tbody>
</table>

### Environmental Data

- **Max. operational speed**: 50 rpm
- **Vibration (IEC 60068-2-6)**: 20 g, 5 ... 2000 Hz, $A_{\text{max}} = 0.75$ mm
- **Shock (IEC 60068-2-27)**: 50 g, 6 ms
- **Protection class ISO 20653**: IP67 / IP69K (connector M12: IP67)
- **Operating temperature**: -40 ... +105°C
- **Life**: > 100 Mio. movements
- **Functional safety**: If you need assistance in using our products in safety-related systems, please contact us
- **MTTF (IEC 60601)**: 413 years (one-channel) or 303 years (two-channel, per channel)
- **Traceability**: Serial number on type labeling; production batch of the sensor assembly and relevant sensor components

### EMC Compatibility

- **ISO 10555 ESD (handling/Component)**: 8 kV
- **ISO 11452-2 Radiated HF-fields**: 100 V/m
- **ISO 11452-5 Radiated HF-Fields, stripline**: 200 V/m
- **EN 55011 Radiated emission**: Level 4
- **ISO 7637-2 Transient Emissions**: Level 3
- **ISO 7637-2 Pulses on supply lines**: Level 1, 2a, 2b, 3a, 3b, 4, 5
- **ISO 7637-3 Pulses on output lines**: Level 4
- **EN 13309 Construction machinery**: Emission/Immunity E1 acc. to ECE-R10

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

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector code</th>
<th>Cable code</th>
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<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>Pin 2</td>
<td>BN</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 3</td>
<td>WH</td>
</tr>
<tr>
<td>CAN_H</td>
<td>Pin 4</td>
<td>GN</td>
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<tr>
<td>CAN_L</td>
<td>Pin 5</td>
<td>YE</td>
</tr>
<tr>
<td>CAN_SHLD</td>
<td>Pin 1</td>
<td>Shield</td>
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</tbody>
</table>

- Connect cable shielding to GND
Sensor Mounting

Z-IPX-M01
Lever arm 165 x 20 mm for pivot head drive. Mounted to shaft D = 13 mm with locking pin and screw (both included in delivery).

- Material: Aluminium, anodized
- P/N: 400105430
- Type: Z-IPX-M01

Z-IPX-M11
Lever arm 185 x 20 mm for lever arm drive, clamp connection on dimension 20 mm. Mounted to shaft D = 13 mm with locking pin and screw (both included in delivery).

- Material: Aluminium, anodized
- P/N: 400105431
- Type: Z-IPX-M11

Z-IPX-M21
Driving plate D = 55 mm for lateral shaft drive with locking pin. Mounted to shaft D = 13 mm with locking pin (included in delivery).

- Material: Aluminium, anodized
- P/N: 400105433
- Type: Z-IPX-M21

Z-IPX-M31
Mounting plate for adjustable mounting on screw-hole circle 100 mm. Assembly material (4 x cylinder head screws) included in delivery.

- Material: Aluminium, anodized
- P/N: 400105432
- Type: Z-IPX-M31
EEM-33-41/42/43
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus
Plug housing
Cable sheath PUR
Cable Ø = 7.2 mm,
-25 ... +85°C (fixed)
Lead wires PP, 2x0.25 mm²+2x0.34 mm²
P/N Type Length
400056141 EEM-33-41 2 m
400056143 EEM-33-43 10 m

EEM-33-52
M12x1 Mating female/male connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), CAN-Bus
Plug housing
Cable sheath PUR
Cable Ø = 6.7 mm,
-25 ... +90°C (plug/socket)
-20 ... +80°C (cable)
Lead wires PE, 2x0.25 mm²+2x0.34 mm²
P/N Type Length
400106373 EEM-33-52 5 m

EEM-33-73
M12x1 Mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus
Plug housing Metal, -40 ... +85°C
For wire gauge 6 ... 8 mm, max. 0.75 mm²
P/N Type
400005645 EEM-33-73

EEM-33-75
M12x1 mating female connector, 5-pin, angled, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus, turning and fixing of contact carrier in 90° positions possible.
Plug housing Metal, -40 ... +85°C
For wire gauge 6 ... 8 mm, max. 0.75 mm²
P/N Type
400005646 EEM-33-75
Connector System
M12

**EEM-33-45**
M12x1 splitter / T-connector, 5-pin, A-coded, IP69, 1:1 connection, female - male - female, CAN-Bus
Plug housing: PUR, -25 ... +85°C

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<th>P/N</th>
<th>Type</th>
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<tr>
<td>400056145</td>
<td>EEM-33-45</td>
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**EEM-33-47**
M12x1 terminating resistor, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-Bus
Plug housing: PUR, -25 ... +85°C

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<th>Type</th>
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<td>EEM-33-47</td>
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**Protection classes**
- IP67: Protection class IP67 DIN EN 60529
- IP68: Protection class IP68 DIN EN 60529

**Common attributes**
- Very good Electromagnetic Compatibility (EMC) and shield systems
- Very good resistance to oils, coolants and lubricants
- Suited for applications in drag chains
- CAN: CAN-Bus
- UL: UL - approved
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.