Application
Incremental rotation sensors are used wherever displacement, positions or speeds have to be measured accurately. They are therefore important interfaces between the mechanical and electronic parts of a machine.
Mechanically robust, electrically reliable and resistant to extreme ambient conditions; these are the outstanding properties offered by this sensor.
Typical applications include:
- Machine tools
- Wood and plastic machining
- Textile machines
- Lifts
- Door systems
- Paper machines
- Drive equipment
- Assembly and handling equipment
- Packaging machines
- Scales
- Test machines
- Conveying equipment
- Doors and gates

Description
Model 8821 rotation sensor generates rectangular electrical pulses when the shaft is turned. An encoder disk is coupled to the shaft which is carried on 2 ball bearings. The light from an infrared diode passes through the encoder disk and the diaphragm disk (which is only present on the angle sensors). The signals picked up by light-sensitive sensors are processed to yield rectangular signals.
The aperture disk generates an offset in the pulse sequences (only on angle sensors).

Angle sensor
The rectangular pulses are output from channels A and B with a displacement of a quarter of a pulse (90°). This displacement allows the evaluation electronics to detect the direction of rotation. Electrical faults and vibrations do not lead to incorrect counts.
An early warning output indicates that the light intensity is weakening. After this, the sensor can still be operated for some thousands of hours before it fails.
A reference pulse, N, is also output. This is a single pulse for each rotation.

Supply voltage 10 ... 30 V DC
Degree of protection IP65, all-around
Robust
High resistance to interference

Rotary speed sensor
- 60 pulses/turn (standard)
- Max. 8000 rpm

Angular displacement sensor
- 360 pulses/turn (standard)
- Detection of rotation direction (channels A and B)
- Reference pulse (channel N)

Special versions on request (higher pulse rate, TTL output etc.)
### Technical Data

#### Electrical values

- **Range of excitation voltage $U_e$:** standard 10 ... 30 V DC (optional 5 V DC, refer to order code)
- **Current consumption:** max. 100 mA

#### Outputs:

- **Channel A:** speed sensor pulse
- **Channel A and B:** angle displacement sensor pulse
- **Channel N:** reference pulse (angle displacement sensor)
- **Max current:** max. 40 mA
- **Pulse level:** $H > U_e - 2.5$ V DC, $L < 2.5$ V DC
- **Pulse frequency:** max. 200 kHz

**Protection against polarity reversal:**

The output is LOW, if the light source has lost approx. 90 % of its luminosity (NPN OC, max. 30 V, 10 mA).

#### Environmental conditions

- **Nominal temperature range:** -10 °C ... +70 °C
- **Storage temperature range:** -30 °C ... +80 °C

#### Mechanical values

- **Dimensions:** see drawing
- **Shaft:** material - stainless steel
  - axial load max. 120 N
  - radial load max. 220 N
  - break away torque 1 Ncm
- **Housing:** clamping flange - aluminium
  - rear side - covered aluminium
- **Bearing:**
  - model - 2 precision ball bearings
  - durability - 10⁶ cycles at 100 % bearing load
  - 10⁹ cycles at 40 % bearing load
  - 11¹ cycles at 20 % bearing load
- **Rotation speed:** max. 8000 RPM
- **Weight:** 250 g
- **Vibration:** 50 m/s² (20 Hz .... 1000 Hz)
- **Shock:** 1000 m/s² (11 ms)
- **Protection class:** acc. to EN 60529
  - shaft side IP65
  - rear side IP67

#### Electrical connection:

- **PG screw joint with shielded PVC cable, length 2 m, diameter approx. 6 mm, bending radius ≥ 20 mm, conductor cross section 0.14 mm².**

#### Wiring code:

- **Excitation voltage (-):** white
- **Excitation voltage (+):** brown
- **A:** green
- **B:** yellow
- **N:** grey
- **Output early warning:** pink
- **Shield:** strand

**Shield open at sensor.**

#### Optics

- **Light source:** infrared - LED
- **Durability:** typically 100 000 hours
- **Sampling:** differential

### Order Information

#### Version with excitation voltage 10-30 V DC (standard)

- **Rotation speed sensor**
  - model 8821-0060-V000
  - pulses / rotation channel A

- **Angle displ. sensor**
  - model 8821-0360-V100
  - pulses / rotation channels A, B and N

#### Version with excitation voltage 5 V

- **Angle displ. sensor**
  - model 8821-0360-V101
  - pulses / rotation channels A, B and N
  - excitation voltage 5 V
  - pulse level at 20 mA: $H > 2.5$ V DC, $L < 0.5$ V DC

### Accessories

- **Evaluation electronics with indication of rotation speed or angle displacement, like indicator model 9180-V5000**
  - (at rotational speed: minimum 1 pulse/s)
  - on request

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### Pulse diagram (angle displacement sensor)

- **A**
- **B**
- **N**

View to shaft, clockwise rotation