BEI Sensors’ Model 9960 Hall effect rotary position sensors are available in numerous standard configurations with fast, one week delivery. Available configurations include 7 termination options, single or dual outputs and 24 active electrical angles. With 360 degree turn capability, the 9960 can be used over a large range of rotary motion making it extremely versatile.

Packaged in a highly sealed (IP69K) housing and utilizing non-contacting Hall effect technology makes the 9960 an exceptionally rugged and reliable sensor. Model 9960 is ideal for a variety of applications in harsh environments, including steering and pedal positioning for construction, agriculture and mining vehicles, marine steering and speed control, wheel and throttle position for material handling equipment, and valve position for process control.

Product shown with flying lead. Multiple termination options available. See ordering options.

### Mechanical Specifications
- **Mechanical Travel:** continuous 360 degree and option for 180 degree mechanical stops
- **Operating Torque:** 0.11 N-m maximum
- **Weight:** 30 g (w/ 6” cable)
- **Mounting:** 38mm mounting center
- **Drive:** blade
- **Termination:** flying leads, wire harness w/connector or integral connector (see ordering options)

### Electrical Specifications
- **Active Electrical Angle:** 15-360° in 15° increments
- **Input Voltage:** 5VDC +/-5%, 9-30VDC or 15-30VDC
- **Input Current:** (per channel) 18mA maximum except for Current Loop option at 36mA max
- **Overvoltage:** 5V Input: 20VDC 9-30V Input: 70V per ISO 7637-2
- **Output Signal:** Analog: 1)ratiometric 5% to 95% or 10% to 90% 2) non-ratiometric 0-10VDC, 0-5VDC, 0.5-4.5VDC PWM: duty cycle 5% to 95% or 10% to 90%
- **Current:** 4-20 mA (3-wire)
- **Minimum Load Resistance:** 10kOhm resistive
- **Resolution:** 0.088 degrees (12-bit)
- **Accuracy:** +/-0.6% of Active Electrical Angle

### Environmental Specifications
- **Sealing:** IP67, IP69K
- **Side Load:** 1kg (1 million cycles)
- **Vibration:** 10G peak, 1-2000 Hz
- **Shock:** 50G’s, half sine pulse, 11 m sec duration
- **EMC:** 200 V/m
- **External Magnetic Susceptibility:** 20G
- **Operating Temperature:** -40°C to +125°C 4-20mA versions 9J, 9K, & 9X1: -40°C to 85°C
- **Storage Temperature:** -55°C to +150°C

### 9960 Series Ordering Options

Use this diagram, working from left to right to construct your model number (example: 9960-015-C-5EP1-SL150)

- **STANDARD ACTIVE ELECTRICAL ANGLES:** (enter angle in degrees) = Standard Angles:
- **SPRING/ ROTOR RETURN DIRECTION:**
  - C= CLOCKWISE SPRING RETURN*
  - CC = COUNTERCLOCKWISE SPRING RETURN*
  - NS = NO SPRING RETURN.
  - CONTINUOUS ROTATION
  - * Spring return: available for active electrical angles 15° to 165°, not available from 180° to 360°.

#### INPUT / OUTPUT (I/O):
- **INPUT VOLTAGE:**
  - 5VDC IN, Ratiometric Voltage Out
  - 5V Input: 20VDC
- **OVERVOLTAGE:**
  - 5V Input: 20VDC 9-30V Input: 70V per ISO 7637-2
- **OUTPUT SIGNAL:**
  - Analog: 1)ratiometric 5% to 95% or 10% to 90% 2) non-ratiometric 0-10VDC, 0-5VDC, 0.5-4.5VDC
  - PWM: duty cycle 5% to 95% or 10% to 90%
- **CURRENT:**
  - 4-20 mA (3-wire)
- **MINIMUM LOAD RESISTANCE:**
  - 10kOhm resistive
- **RESOLUTION:**
  - 0.088 degrees (12-bit)
- **ACCURACY:**
  - +/-0.6% of Active Electrical Angle

#### PWM FREQUENCY:
- (Used with 5E, 5F, 5G, 5H and 5X2 I/O options only; leave blank for other output options)
- **P1 = 100 Hz**
- **P2 = 200 Hz**
- **P3 = 500 Hz**
- **P4 = 1000 Hz**

#### CABLE LENGTH:
- **150 = 150mm (~6 inches)**
- **300 = 300mm (~12 inches)**
- **450 = 450mm (~18 inches)**

**NOTE:** Other lengths available, consult factory

#### NUMBER OF OUTPUTS AND TERMINATION OPTIONS:
- **SL = SINGLE OUTPUT, FLYING LEADS**
- **DL = DUAL OUTPUT, FLYING LEADS**
- **SA = SINGLE OUTPUT, CABLE W/ TYCO AMP SUPERSEAL 1.5 SERIES**
- **DA = DUAL OUTPUT, CABLE W/ TYCO AMP SUPERSEAL 1.5 SERIES**
- **SD = SINGLE OUTPUT, CABLE W/ IDEALEX DT04 SERIES**
- **DD = DUAL OUTPUT, CABLE W/ IDEALEX DT04 SERIES**
- **SM = SINGLE OUTPUT, CABLE W/ PACKARD ELECTRIC MTRIPACK 150 SERIES**
- **DM = DUAL OUTPUT, CABLE W/ PACKARD ELECTRIC MTRIPACK 150 SERIES**
- **SW = SINGLE OUTPUT, INTEGRAL 3-PIN WEATHERPACK CONNECTOR**
  - NO CABLE LENGTH NECESSARY
- *** SINGLE OUTPUTS= 3-PIN, DUAL OUTPUT= 6-PIN**

### Additional Information

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Product shown with flying lead. Multiple termination options available. See ordering options.
# 9960 Series
Hall Effect Rotary Position Sensor

## Dimensions

**Output Example**

![Output Example Graph]

**Dimensions in mm**

### Pin Out Drawings

1. (DD)
2. (SD)
3. (DA)
4. (SA)
5. (DM)
6. (SM)
7. (SW)

### Connector Pin Out

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<th>Dwg</th>
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### Connector Part Numbers and Mates

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<td>7</td>
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### Connector Pin Out Numbers

- **Dwg 1**: A 1 1 E A A
- **Dwg 2**: B 2 2 F B C
- **Dwg 3**: C 3 3 C C B
- **Dwg 4**: D 4 A
- **Dwg 5**: B 5
- **Dwg 6**: D 6

- **Pin Number**: A 1 1 E A A
- **Wire Color**: Brown GND 1
- **Function**: Orange Sensor 1 Output
- **Wire Color**: Blue Supply Voltage
- **Function**: Yellow Sensor 2 Output

- **Connector Part Numbers and Mates**
  - **Dwg 1**: Deutsch: DT04-6P
  - **Mates to**: DT06-6S
  - **Dwg 2**: Deutsch: DT04-3P
  - **Mates to**: DT06-3S
  - **Dwg 3**: Amp Superseal: 1.5/282108-1
  - **Mates to**: 282090-1
  - **Dwg 4**: Amp Superseal: 1.5/282105-1
  - **Mates to**: 282087-1
  - **Dwg 5**: Packard Electric Metripack 150.2
  - **Mates to**: 12162210
  - **Dwg 6**: Packard Electric Metripack 150.2
  - **Mates to**: 12162182
  - **Dwg 7**: Packard Electric Weather Pack
  - **Mates to**: 12015793