

## Small, Single Output, Contact Angle/Position Sensors



### Features

- Small angle/position, single output, contact sensor with flatted shaft and tinned 3-wire flying leads
- Detection of objects through direct physical contact resulting in conversion to electrical signals for processing
- 360° (endless) CW mechanical rotational angle
- Potentiometric angle/position contact sensor with a long life of 5 million cycle
- Rated Voltage of 5VDC
- 0.18W power rating
- Operating temperature range of  $-10^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Dustproof and waterproof with an IP64 rating
- Overall size: 45mm width of flange, 18.4mm in length, and 32.4mm deep from back to end of flatted shaft
- Electrical rotational angle of  $240^{\circ} \pm 3^{\circ}$
- Resistance value of  $5\text{k}\Omega$ ; resistance tolerance of  $\pm 10\%$
- Insulation resistance of  $100\text{M}\Omega$  at 1,000VDC
- Screw mount flange with two elongated mounting slots for easier mounting and adjustment (hardware not included)
- Output linearity of  $\pm 3\%$
- Very low percentage changes in resistance after subjecting sensors to standardized environmental test procedures
- RoHS compliant

### Applications

- Electric vehicles where speed, steering, orientation, and other movements are controlled by contact sensors
- Angle/position detection by contact sensors for controlling movement found in various robotic systems
- Contact sensors for position and movement detection for commercial and recreational marine vessels
- Agricultural /construction vehicles where contact sensors under harsh conditions control operating functions
- Personal mobility vehicles utilizing contact sensors for maneuvering various electric wheelchairs and scooters
- Other applications where small, lightweight single output contact sensors prove cost-effective, reliable control

### Specifications

#### Basic Characteristics

Rated Voltage	5VDC	Electrical Rotational Angle	$240^{\circ} \pm 3^{\circ}$
Maximum Rated Voltage	30VDC	Mechanical Rotational Angle	360° (endless)
Power Rating	0.18W	Operating Temperature Range	$-10^{\circ}\text{C}$ to $+85^{\circ}\text{C}$
Total Resistance Value	$5\text{k}\Omega \pm 10\%$	Mounting Hole Pitch	34mm
Waterproof and Dustproof	IP64 rating	Environmental Load Substances	RoHS compliant

#### Significant Characteristics

Output Linearity	$\pm 3\%$	Operational Life	5 million cycles
Insulation Resistance	$100\text{M}\Omega$ at 1,000VDC	Rotational Torque	$1.96 \times 10^{-2}$ (200gf•cm) max.
Output Characteristics	See Figure 1	Electrical Schematic	See Figure 2

Specifications Continued

## Environmental Characteristics

<b>Vibration Test</b>	Acceleration 30G, 50-250Hz, X, Y, Z directions, 20 hours; resistance change $\Delta R/R \leq 2\%$
<b>Thermal Shock Test</b>	-40°C for 1 hour $\rightleftharpoons$ +120°C for 1 hour, 20 cycles; resistance change $\Delta R/R \leq 10\%$
<b>Low Temperature Exposure</b>	-40°C, 500 hours; resistance change $\Delta R/R \leq 5\%$
<b>High Temperature Exposure</b>	+120°C, 500 hours; resistance change $\Delta R/R \leq 10\%$
<b>Humidity Test</b>	60°C, 90-95%RH, 500 hours; resistance change $\Delta R/R \leq 13\%$
<b>Neutral Salt Spray Test</b>	JIS-C-60068-2-11; test at $35 \pm 2^\circ\text{C}$ in $5 \pm 1\%$ NaCl salt water solution for 96 hours, retain connector during test; after test, wash with water at normal temperature and dry at room temperature before electrical test; resistance change $\Delta R/R \leq 10\%$
<b>Oil Test</b>	Coat test sample with light oil (JIS 2 grade), place in an oven at +40°C for 72 hours; resistance change $\Delta R/R \leq 2\%$
<b>Waterproof Test</b>	Water temperature shall be 50°C higher than that of the test sample. Dip test sample into a water bath at a depth of 100mm for 10 minutes. There shall be no internal water intrusion after test.

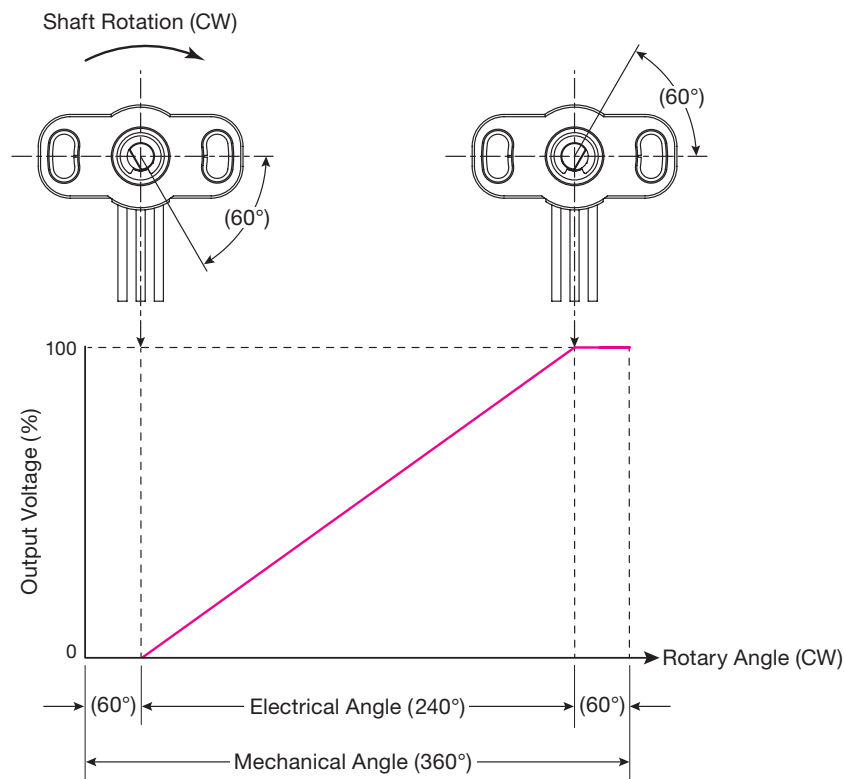
## Precautions

1. In a circuit where resistance undergoes electrical output, set the connecting impedance over 100 times greater than the total resistance value of the sensor ( $1\text{M}\Omega$  recommended value). See *Figure 2* for circuit schematic.
2. All items except the general specifications shall not be covered under warranty.
3. Do not use materials that generate hazardous gas (chloride gas, sulfide gas, etc.) when assembling components in sensor.

## Output Analysis

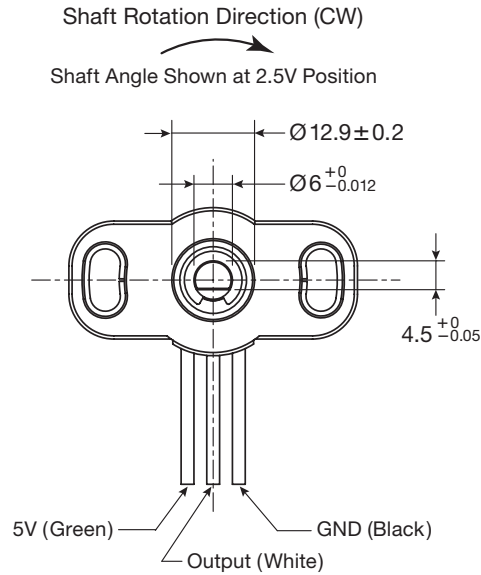
Figure 1: Output Characteristics

Unit: mm

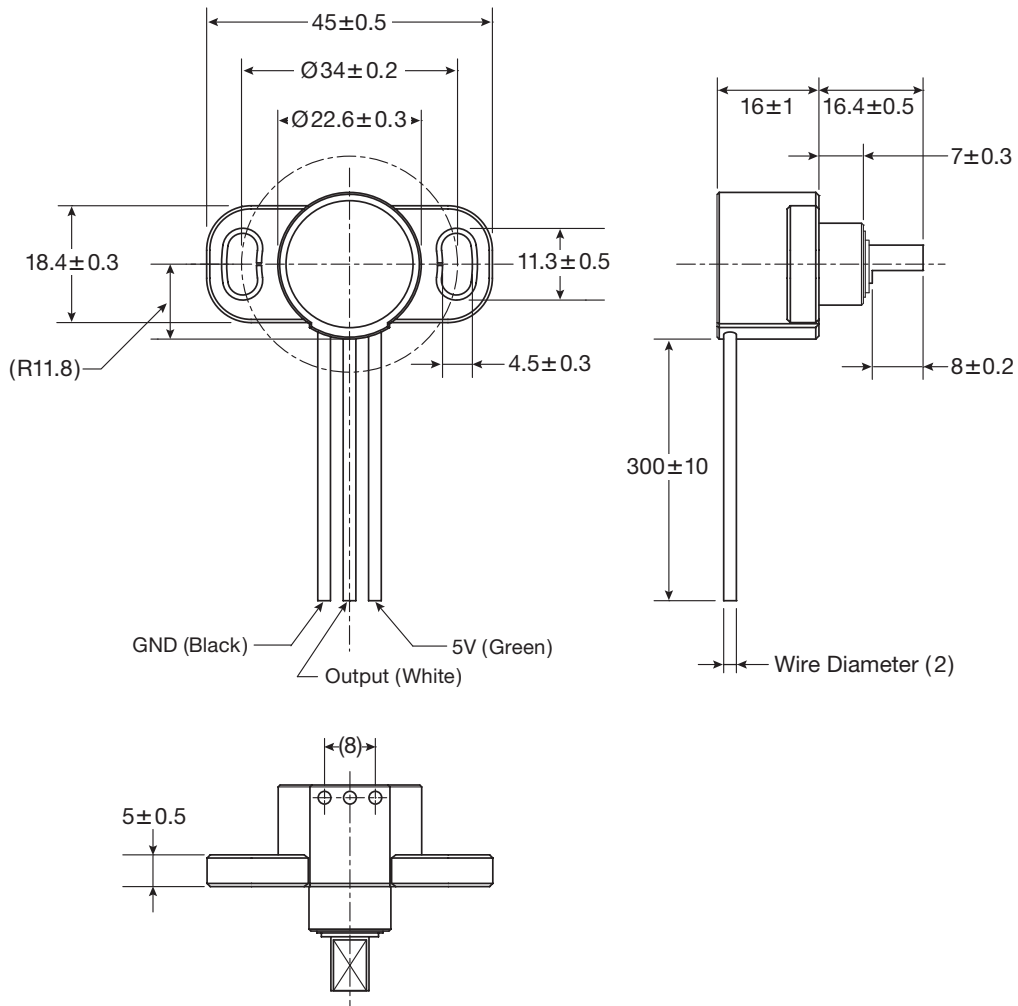


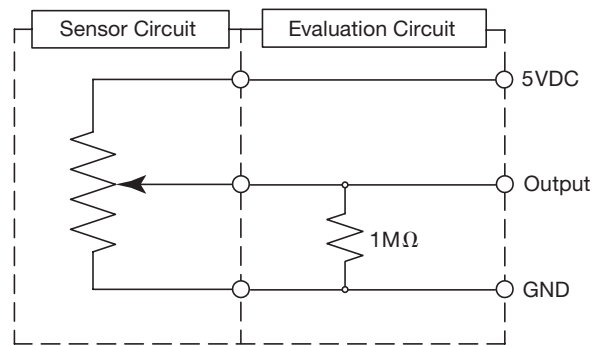
**Dimensional Drawing of Front View**

Unit: mm



**Dimensional Drawings of Back, Side, and Bottom Views**



**Figure 2: Circuit Structure and Evaluation Circuit**

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