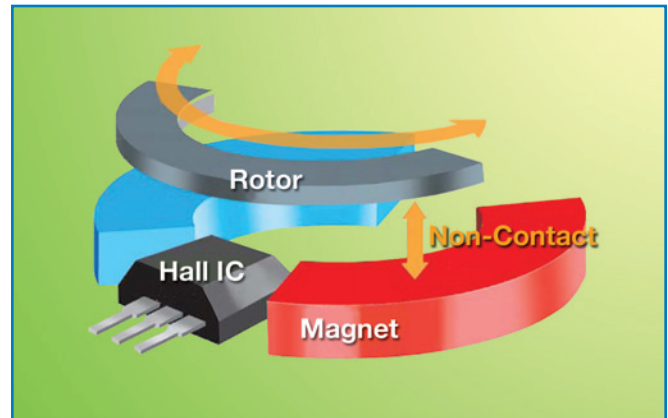


## Miniature Board Mount, Single Output, Non-Contact Angle Sensors



### Features

- Lightweight board mount, single output, non-contacting angle/position sensors
- Square unit: 11.8 x 13.3mm, low profile: 4.3mm high
- Long life of 20 million cycles
- 360° (endless) mechanical rotational angle
- 140° ( $\pm 70^\circ$ ) electrical rotational angle
- Hall IC effect sensor and proprietary magnetic circuit realize high reliability and durability performance
- Through-hole shaft fitting allows shaft insertion from top or bottom of the sensor
- Programmable setting for angle/position detection
- 0.05W power rating
- PCB horizontal through-hole mounting for 3 electrical terminals and 4 offset support pins
- Excellent linearity
- RoHS compliant

### Applications

- Personal mobility vehicles utilizing sensors for regulating such operations as speed, braking, and fluid levels
- Actuators where output signals activate control systems for opening/closing valves or conveyor operations
- Factory systems such as robotics, measurement controls, and tooling parameters
- Other applications where PCB miniature Hall effect sensors are ideal devices for angle/position detection

### Specifications

#### Electrical Characteristics

|                             |   |
|-----------------------------|---|
| Input Voltage (Vin)         | 5VDC $\pm 10\%$   |
| Supply Current              | 11mA max. where Vin = 5VDC, rated voltage applied   |
| Output Voltage Range        | 0.5V to 4.5V where Vin = 5VDC, electrical travel range of 140° ( $\pm 70^\circ$ )                           |
| Power Rating                | 0.05W   |
| Electrical Rotational Angle | 140° ( $\pm 70^\circ$ )   |
| Independent Linearity       | $\pm 3\%$ Full Scale max. for electrical travel range of 140° ( $\pm 70^\circ$ ) at +25°C                   |
| Accuracy                    | $\pm 1\%$ Full Scale max. initial value; $\pm 4\%$ Full Scale max. after life cycle; at -70°, +70° at +25°C |
| Temperature Characteristics | $\pm 2\%$ Full Scale max. -60°, 0 (center), +60°<br>-40°C to +125°C (reference +25°C)                       |
| Output Current              | $\pm 1$ mA max.   |
| Load Resistance             | 4.5k $\Omega$ min.  |
| Load Capacitance            | 0.33nF to 1 $\mu$ F   |
| Insulation Resistance       | 100M $\Omega$ min. at 500VDC $\pm 50$ V, 1 minute   |
| Withstand Voltage           | No dielectric insulation breakdown after 500VAC $\pm 50$ V, 1 minute  |

Specifications Continued

## Specifications Continued

### Mechanical Characteristics

|                              |  |
|------------------------------|--|
| Mechanical Rotational Angle  | 360° (endless)                                       |
| Rotational Torque            | 1.96mN·m (20gf·cm) max.                              |
| Weight                       | 1.5g approximately                                   |
| Shaft Strength-Top Adjust    | 9.8N (1kgf), 10 second max.                          |
| Shaft Strength-Bottom Adjust | 4.9N (0.5kgf), 10 second max.                        |
| Rotational Life              | 20 million cycles min. at 140° rotational angle, 4Hz |

### Environmental Characteristics

\*Satisfies electrical specifications after environmental testing.

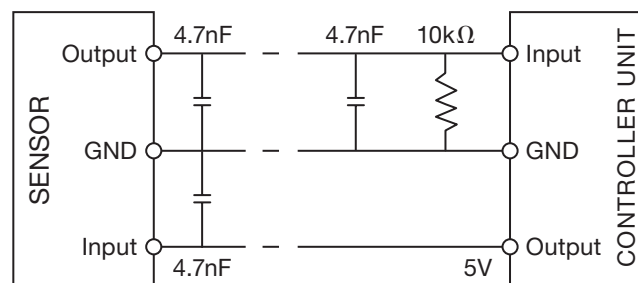
|                                |  |
|--------------------------------|--|
| Operating Temperature Range    | -40°C to +125°C  |
| Vibration*                     | 10-55Hz (1.5mm amplitude) ⇄ 56-500Hz (196m/s <sup>2</sup> ), 15 minutes to reciprocate once between frequency ranges, X, Y, Z directions, 2 hours each |
| Low Temperature Exposure*      | -40°C, no load, for 120 hours, (confirm shaft rotation)  |
| Load Life*                     | +125°C with rated voltage applied (1.5 hours on, 0.5 hours off) for 1,000 hours  |
| Moisture Resistance Load Life* | +40°C, 90-95% RH (no condensation) with rated voltage applied (1.5 hours on, 0.5 hours off) for 1,000 hours  |
| Thermal Shock*                 | -40°C for 30 minutes ⇄ +125°C for 30 minutes, 100 cycles   |

### Precautions

1. TOCOS recommends that special attention be paid to the sensor selection and specifications when designing any products requiring high reliability such as transportation equipment (trains, cars, marine vessels, etc.), signal transmission equipment, medical equipment, aerospace equipment, electric and gas appliances, disaster prevention and security equipment. Prior examinations or testing of the finished product are necessary to prevent any product failure. Use of a fail-safe design, fire spread prevention design, and redundant design are recommended.
2. Never attempt to reconfigure or disassemble the sensor. Sensor failure or performance deterioration may result.
3. This sensor product contains a semi-conductor component; please avoid using it in a strong electric field.
4. Do not place magnets near the sensor or expose it to a strong magnetic field because the sensor characteristics will change or fluctuate.
5. It is the customer's responsibility to verify the appropriate use and installation of the sensor. TOCOS is not responsible for any damages to the customer, third parties, or equipment resulting from use of the sensor.

## Electrical Schematic

### Connection Circuit

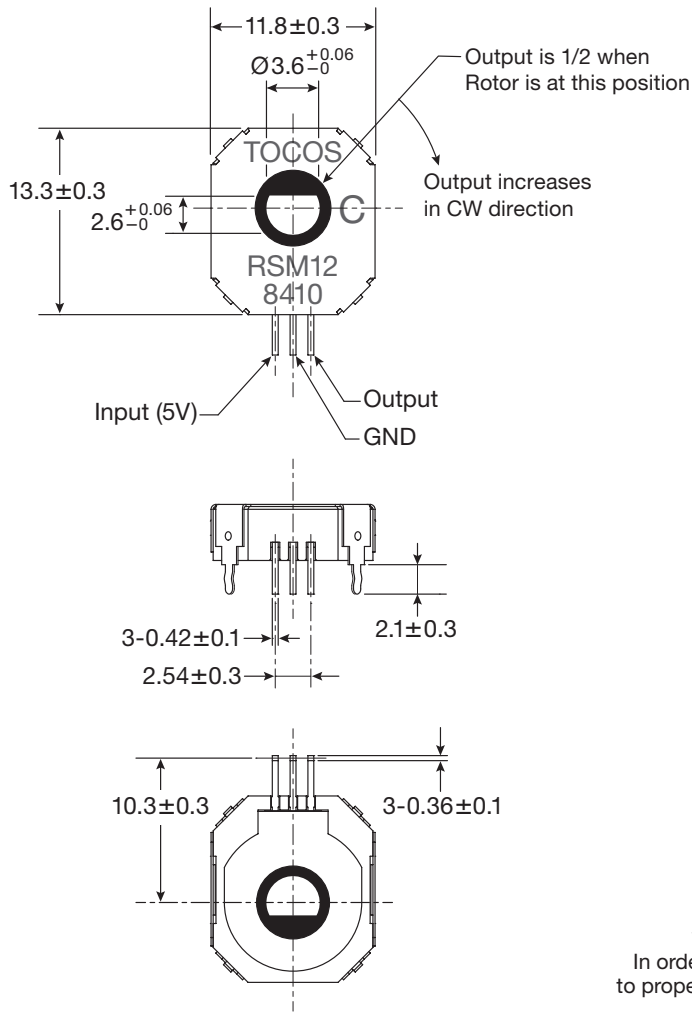


**For Sensor:** For EMC protection, please connect a 4.7nF ceramic capacitor near the sensor terminals in between sensor output and ground and also in between sensor input and ground.

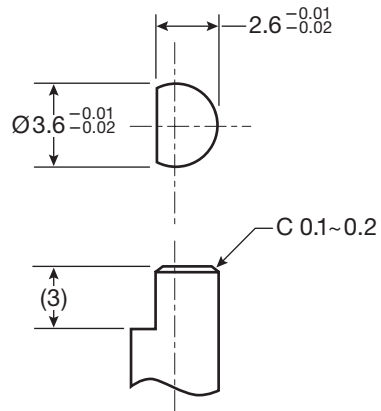
**For Controller Unit:** Please connect a 10kΩ resistor and a 4.7nF ceramic capacitor in between controller-unit input and ground for EMC protection also.

Dimensional Drawings of Top, Side, and Bottom Views

Unit: mm



Recommended Shaft Dimensions

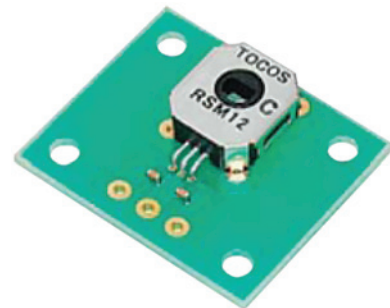
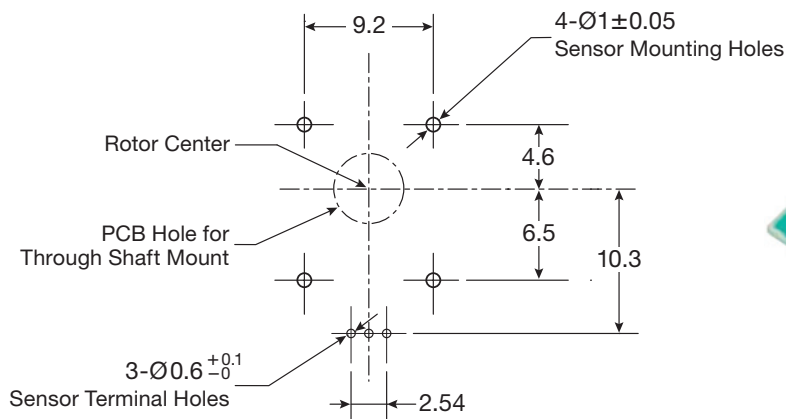


Shaft must be non-magnetic material.  
In order to detect the correct angle, it is necessary to properly engage the shaft with the hole of the rotor.

PCB Mounting

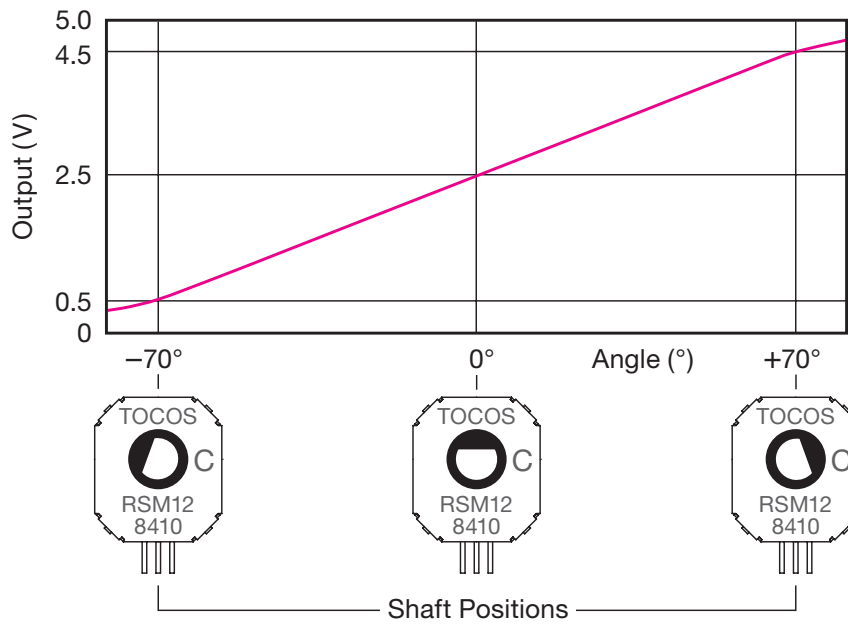
Mounting Hole Dimensions

Unit: mm



Output Voltage at Shaft Positions

Unit: mm



# TOCOSAMERICA, INC.

1177 East Tower Road, Schaumburg, IL 60173

Tel: 847-884-6664 Fax: 847-884-6665 E-mail: sales@tocos.com www.tocos.com

TocosAmerica, Inc.  
is affiliated with



The information in this publication is believed to be accurate and reliable with no guarantee as to its completeness. The components described herein are designed, tested and manufactured to meet and or exceed the specifications for each product. TOCOS reserves the right to make changes to the specifications without notice. It is the buyer's responsibility to determine suitable use and should test actual performance of TOCOS products in or for their specific application before final purchase agreement.