RPA011 Series

TOCOS SENSORS

Low Profile, Single Output, Contact Angle/Position Sensors

Features

- Thin 11mm angle/position contact sensor with 3-wire harness and connector offered as a standard assembly
- Detection of objects through direct physical contact resulting in conversion to electrical signals for processing
- Long life of 5 million cycles
- Waterproof as standard with an IP66 rating
- 0.05W power rating
- Spring return function within mechanical rotational angle of 0° to 130°
- Total resistance values of 2kΩ or 5kΩ; resistance tolerance of ±20%
- Blind shaft-fitting design for front insertion of a blade shaft
- Optional customizable angle/position setting within the 60° to 120° range
- Optional CW rotational direction of rotor is available
- Popular screw mount flange with two oval mounting holes (hardware not included)
- RoHS compliant

Applications

- Electric vehicles where speed, steering, orientation, and other movements are controlled by contact sensors
- Agricultural /construction vehicles where contact sensors under harsh conditions control operating functions
- Personal mobility vehicles utilizing contact sensors for maneuvering electric wheelchairs and scooters
- Contact sensors for controlling various operations in off-road vehicles, i.e. golf carts, ATVs, and snowmobiles

Specifications

Basic Characteristics

Rated Voltage	5VDC	**Output Guaranteed Range**	96° (0.5V to 4.5V)
Maximum Rated Voltage	16VDC	**Electrical Rotational Angle**	120°
Power Rating	0.05W	**Mechanical Rotational Angle**	130°
Output Characteristics	See *Figure 1*	**Operating Temperature Range**	−40°C to +135°C
Measurement Circuit	See *Figure 2*	**Storage Temperature Range**	−40°C to +140°C
Rotor Stopper Strength	≧0.294N•m (≧3kgf•cm)	**Mounting Hole Pitch**	36mm

Significant Characteristics

Total Resistance	5kΩ±20% before test; ±20% max. resistance change from initial value after test, when measuring between connector pins Vcc and GND
Output Linearity	Initial value of (1) ±75mV at reference point −25° and (2) ±100mV at +25°-100.8° before test followed by ±50mV voltage change max. from initial value at reference point 100.8° after test; where deviation of output voltage from referenced straight line (inclination) falls between 0.5V to 4.5V guaranteed range (see *Figure 1*)
Hysteresis	±30mV before test; ±50mV after test; results based on difference of output voltage from hysteresis loop (origin curve and return curve) between reference point (0.5V) and 100.8°
Output Smoothness	50mVp-p max. noise component at 5 rpm measurement speed (see *Figure 3*)
Operating Torque	4.90-58.8mN•m (50-60gf•cm) before test; 1.00-88.3mN•m (10-900gf•cm) after test; (see *Figure 4*)
Insulation Resistance	100MΩ min. before test; 10MΩ min. after test; 500VDC, MEGA between each lead and shaft fitting

Specifications Continued

Endurance Performance

Operating Endurance

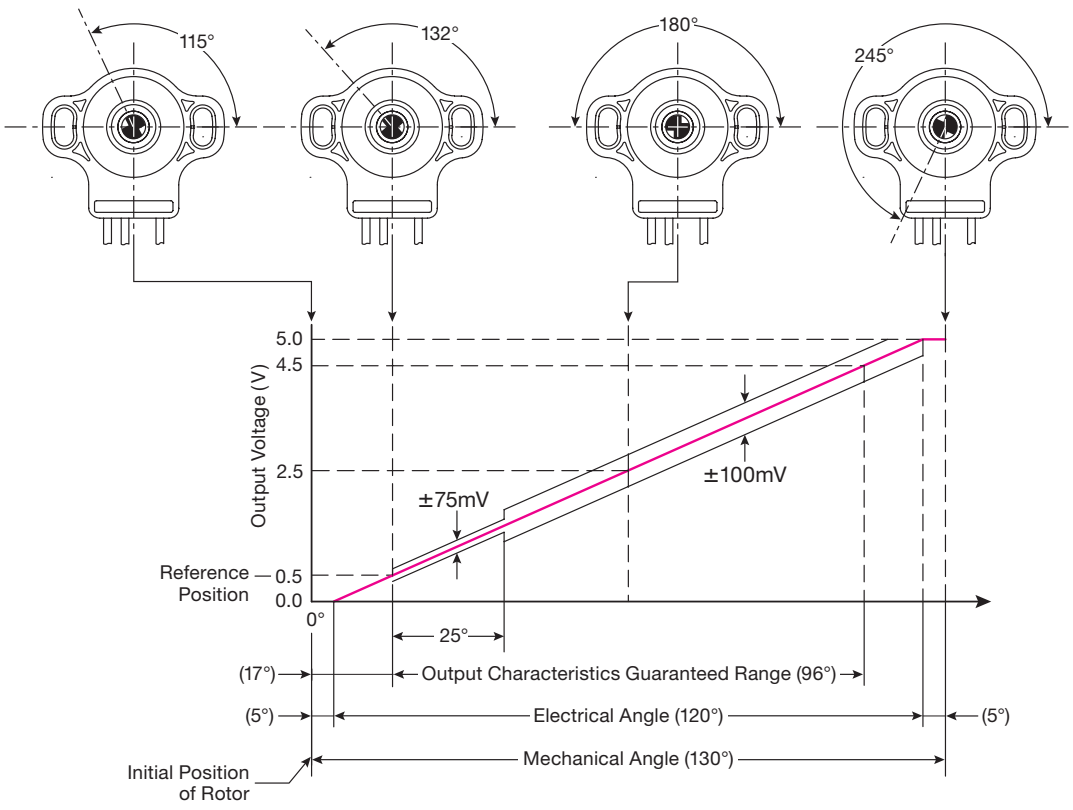
Operating Temperature (°C)	Tested Rotational Cycles	Tested Operating Angle	Output Voltage Range (V)	Frequency Rate (Hz)	Applied Voltage To Vcc Connector Pin
+25	5 million	96° (17° ⇄ 113°)	0.5 to 4.0	4	5V
+100	3 million	96° (17° ⇄ 113°)	0.5 to 4.0	4	5V
−30	2 million	96° (17° ⇄ 113°)	0.5 to 4.0	4	5V
+110	5 million	6° (62° ⇄ 68°)	2.4 to 2.6	30	5V

Constant Vibration	2.5V reference point at +25°C, 10G (O-P), 200 Hz, 100 hours (applied voltage to Vcc connector pin)
Humidity	80 ± 3°C, 95 ± 5% RH, 100 hours
Temperature Cycle	−30°C for 1 hour ⇄ +120°C for 1 hour, 100 cycles
Low Temperature Shelf Life	−30°C, 192 hours
High Temperature Shelf Life	+120°C, 192 hours
Drop Test	Drop height: 1m, landing area: concrete floor, X, Y, Z directions, 3 times each

Output Analysis

Figure 1: **Output Characteristics**

Unit: mm

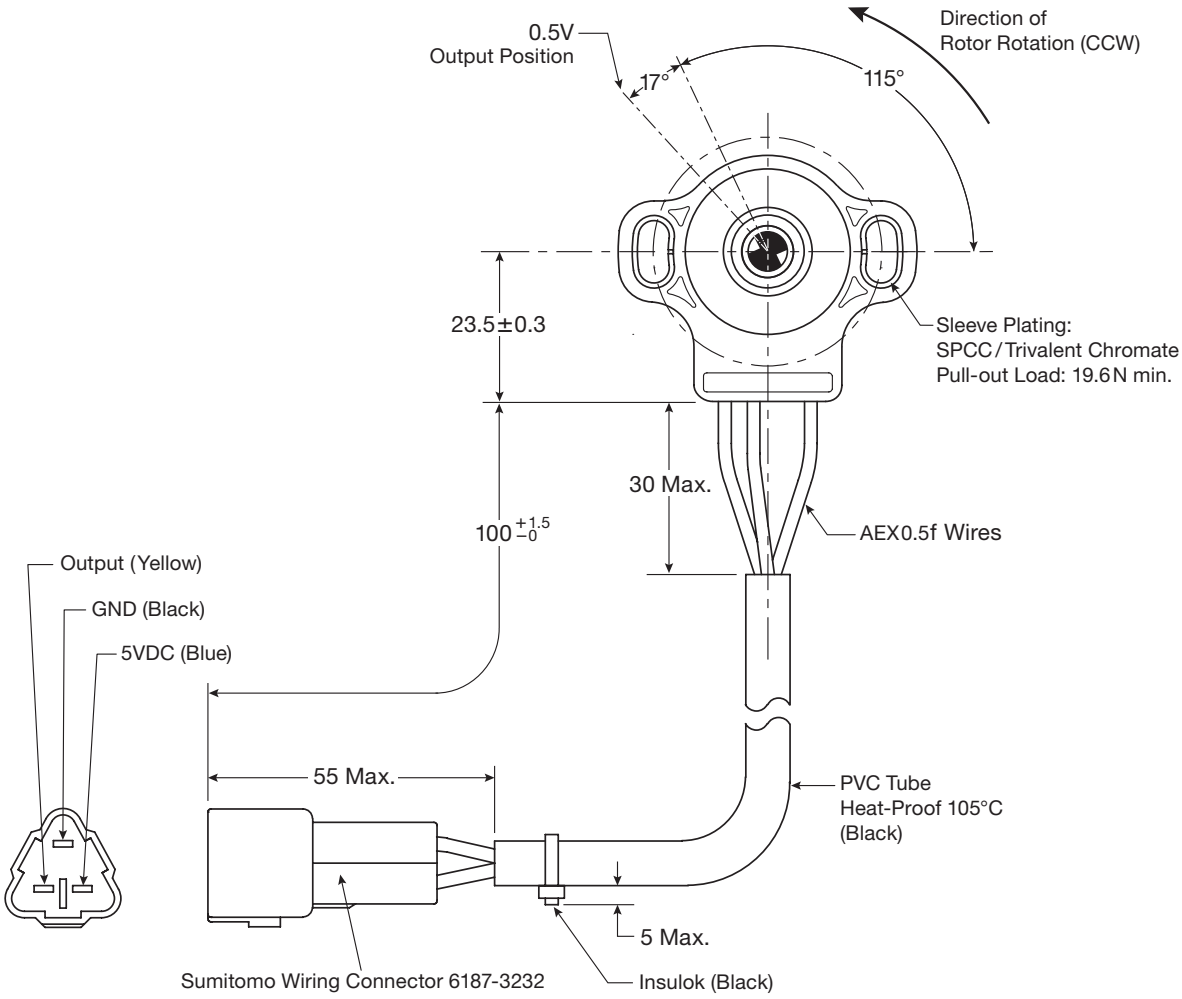


Note: The electrical rotational angle can be changed as an option (60° to 120°).
The standard CCW rotational direction can be changed to CW as an option.

TOCOS AMERICA, INC.
1177 East Tower Road, Schaumburg, IL 60173 Tel: 847-884-6664 Fax: 847-884-6665 E-mail: sales@tocos.com www.tocos.com

Dimensional Drawings of Front View A with Wire Harness and Connector

Unit: mm



Electrical Schematics

Figure 2: **Evaluation Circuit**

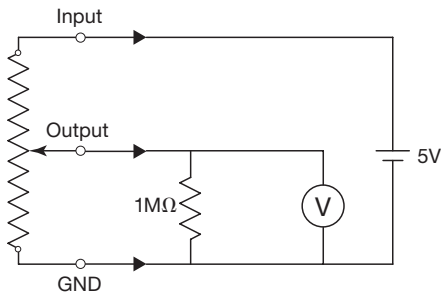
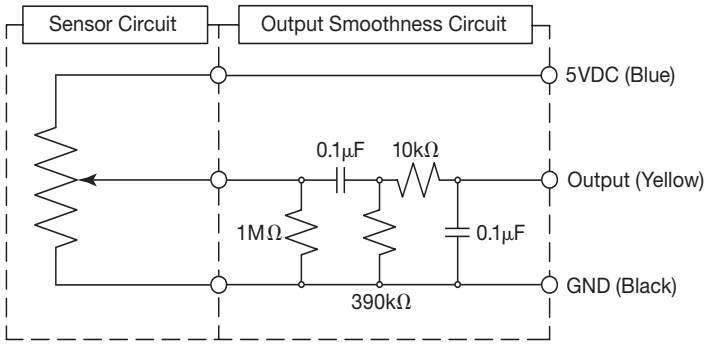
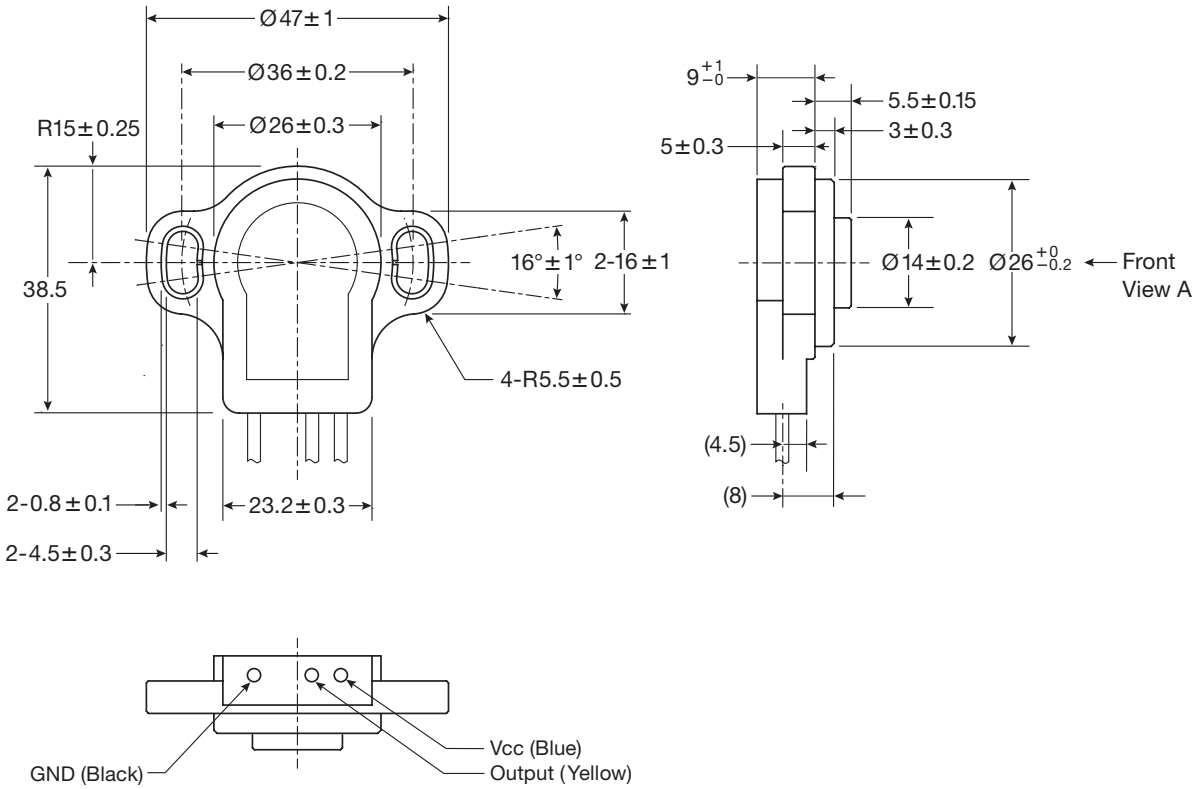


Figure 3: **Output Smoothness Measurement Circuit**



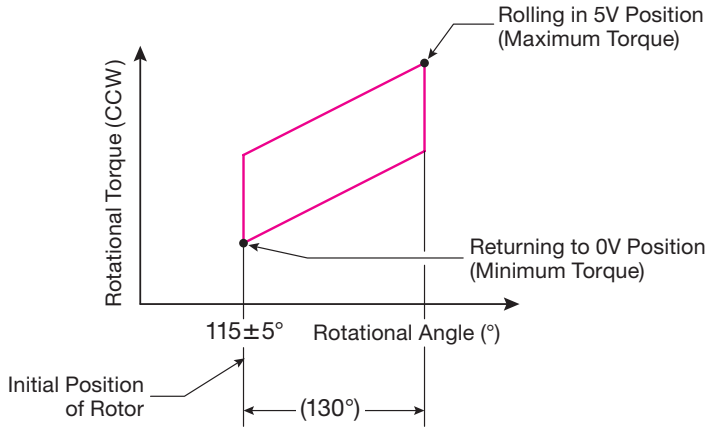
Dimensional Drawings of Back, Side, and Bottom Views

Unit: mm



Rotational Torque

Figure 4: **Operating Torque**



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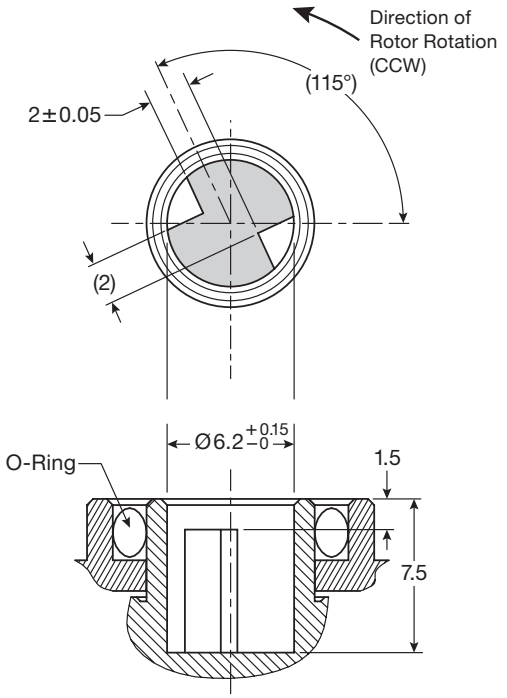
RPA011 Shaft Fitting

Blind Shaft Fitting
Detail from Front View A

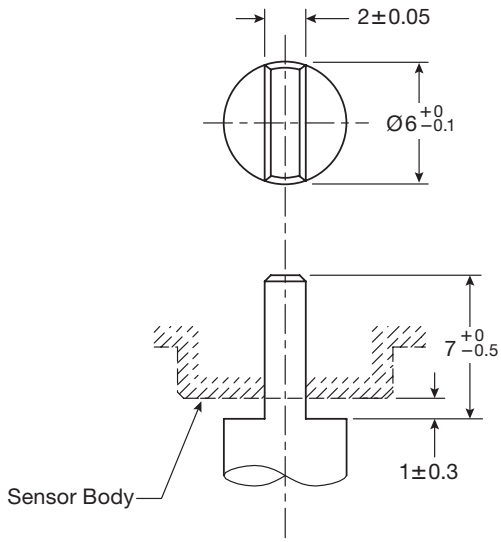
Unit: mm



RPA011 Shaft Style

Recommended Blade Shaped Shaft

Unit: mm



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