

Non-Contact Position Sensor

NSC 2 4

Bushing is a one-piece design with resin body case which is different from conventional ball bearing structured bushing. The structure provides lower priced sensors than ball bearing type. Inductance-method sensors through the use of coils assure excellent performance.



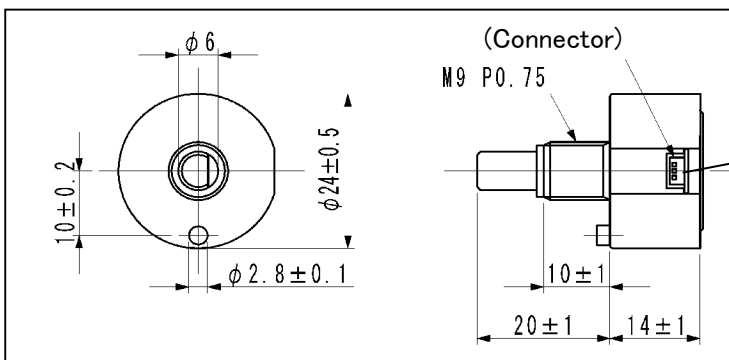
Features

1. Non-contact position sensors through the use of coils.
2. There is no sliding movement over resistive element.
Because of this, no sliding noise generation is expected and long life with no wear is assured.
3. Sensing position range: $\pm 60^\circ$ (120°)
Sensing range of $\pm 70^\circ$ ($<140^\circ$) type is also available.
4. Low-cost
5. Built-in temp. compensation circuit is suitable for applications where accuracy in sensing is necessary.

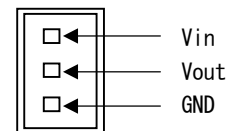
Applications

1. Rotational angle sensor for automotives
2. Joystick for amusements
3. Electronic musical instruments
4. Position sensor for robotics, building construction equip
5. Sensing degree of opens of valves
6. For any applications where angle detection with long life and long-term durability is required

Appearance



Pin layout



Using connector : SM03B-SRSS-TB
(J. S. T. Mfg. Co., Ltd.)

Compatible connectors : SHR-03V-S-B, SHR-03V-S
(J. S. T. Mfg. Co., Ltd.)

Electrical characteristics

Item	Condition	Criteria
Applied voltage	—	5VDC±5%
Current consumption	Applied voltage=5VDC, Non load	8mA Max.
Output voltage	—	10 - 90%Vin
Road resistance	—	10KΩ Min.
Effective electrical angle	Output voltage=10 - 90%Vin	120° ±10°
Independent linearity	Within the range of effective electrical angle.	±1.5%FS Max.
Temp. coefficient	Relative to 25°C, effective elec. angle Temp. range=-25 - +85°C	±2.5%FS Max
Insulation resistance	DC500V, 25°C, 60%RH	100MΩ Min.
Dielectric strength	AC500V, 25°C, 60%RH, 1 minute	No anomalies to be seen
Resolution	—	Infinitesimal (Analog output)

Mechanical specifications

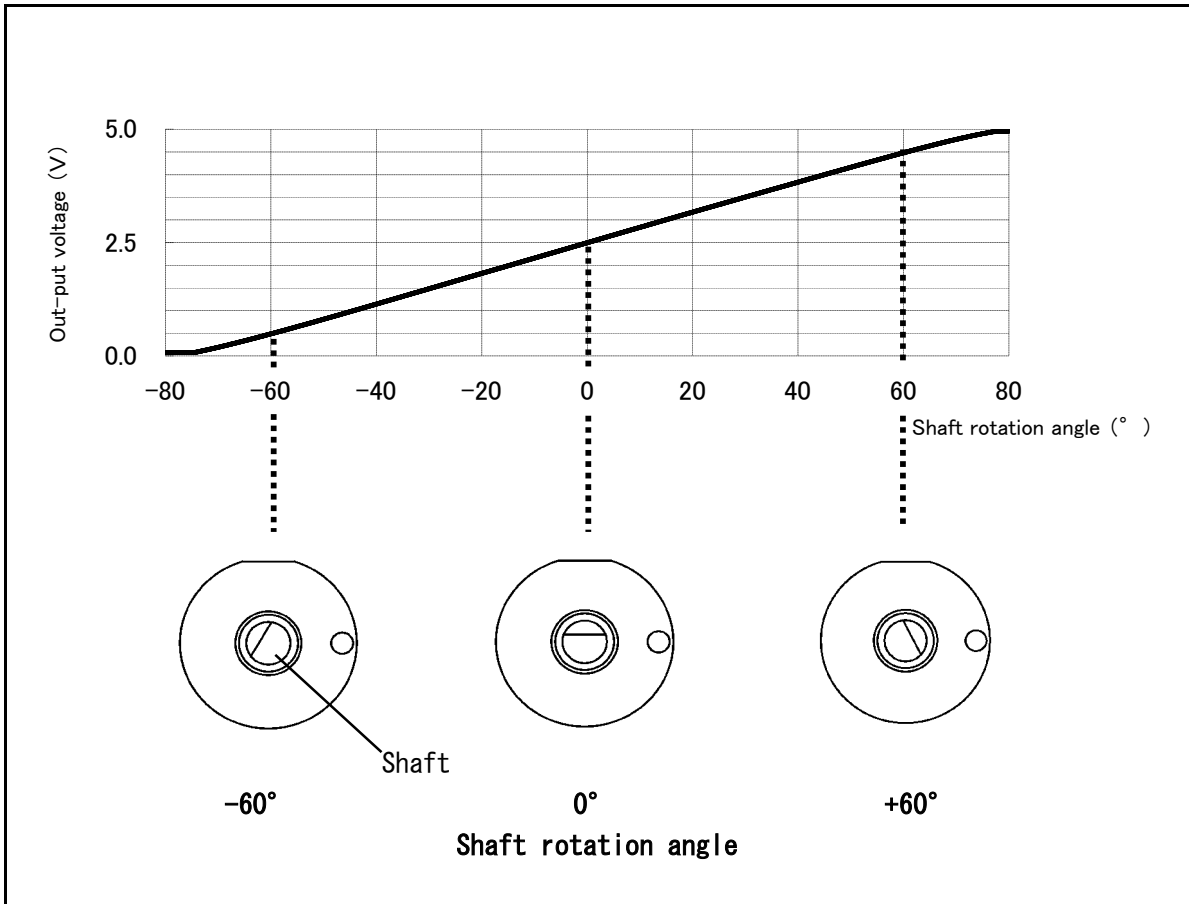
Item	Condition	Criteria
Rotation angle	—	160° ±5°
Rotation torque	25°C	9.8mN·m Max.
Mass	—	13.2g
Shaft stopper strength	—	147mN·m Max.
Shaft strength (Push)	Static load	29.4N Max.
Shaft strength (Pull)	Static load	29.4N Max.
Nut tightening torque	25°C	294mN·m Max.
Rotation life (Bushing life)	Room temp. rated load, Continuous 240 cycles/minute	20 million cycle Min.

Recommended nut tightening torque: 196mN·m

Environmental specifications

Item	Condition	Criteria
Operating Temp. range	—	-25 - +85°C
Operating moisture range	—	35 - 85%RH
Vibration	10 - 55Hz (1.5mm) 56 - 500Hz (20G) Cycles 15 min. XYZ each 2Hrs.	Satisfies elec. Specs.
Load life	85°C, 1000hrs Rated load (1.5hr ON, 0.5hr OFF)	Satisfies elec. Specs.
Moisture and load life	40°C, 90 - 95%RH (No condensation to occur), 1000hrs Rated load (1.5hr ON, 0.5hr OFF)	Satisfies elec. Specs.
Thermal shock	-25°C (30 minutes) → 85°C (30 minutes) 100 cycles	Satisfies elec. Specs.

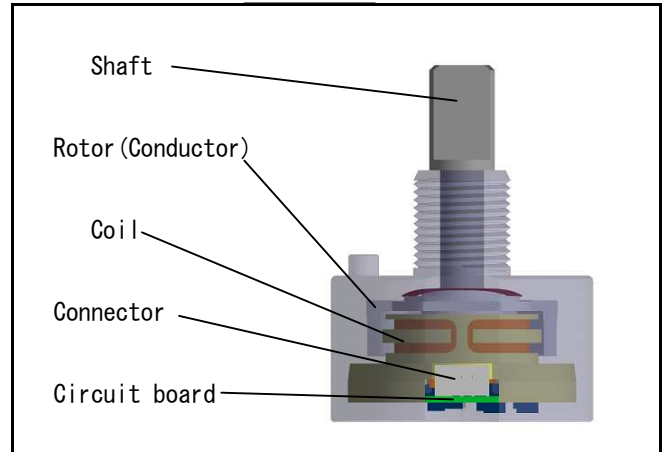
Rotation angle vs. output voltage characteristics



Structure

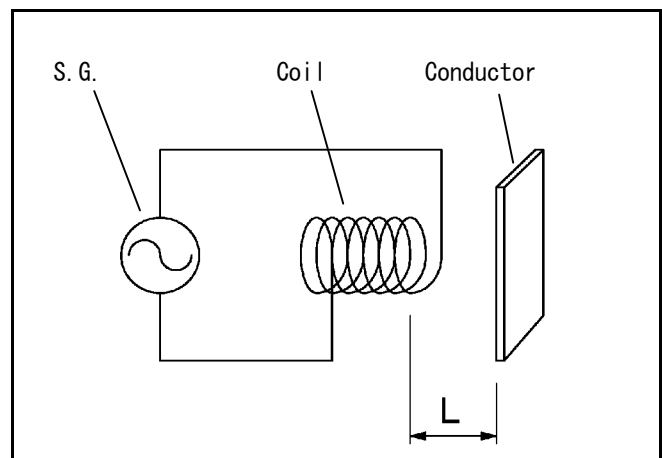
Rotation of conductive rotor brings inductance value changes of coils and this mechanical (Voltage) rotation angle can be converted to electrical signal.

Because of putting a fixed distance between rotor and coils, they never come into contact each other. Therefore, no wear of element caused by sliding noise or contacting will occur.

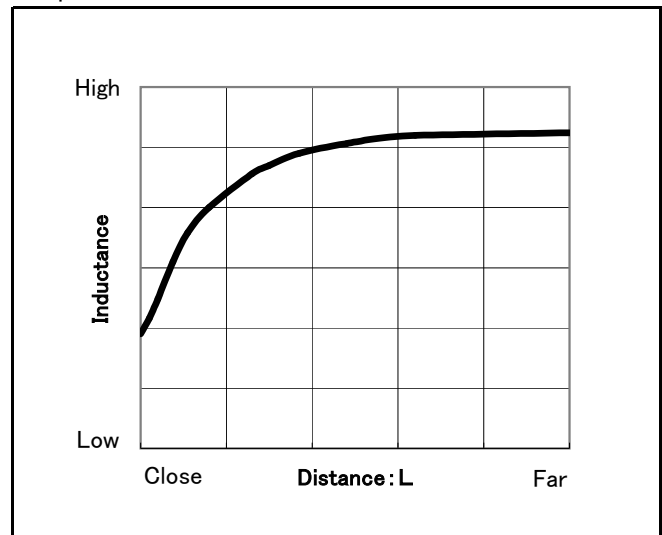


Principle

Input high frequency signals to coils. When conductor comes near the coils, AC magnetic field is generated to change inductance. Graph 1 shows the decrease of inductance as conductor comes near coils. The changes of inductance value of coils detects the angle. Inductance changes linearly to mechanical rotational angle. By the structure of non-contact sensors, accurate detection of rotational angle can be obtained.



Graph 1



Important! (Storage - Use environment)

1. Do not give a strong shock to sensors.
Or output level of sensors would fluctuate.
Particularly shock given to shaft would cause mal-function in rotation.
2. Do not store or use in corrosive gas or liquid existing environment.
3. No excessive force shall be applied to sensors.
SMD connectors are mounted to board.
Excessive force applied would cause in circuit-connection failure.
4. Do not store or use in environment where condensation would occur.

Important! (Mounting devices)

1. Do not wire when the power is on.
2. Wiring shall not be affected by power wire and high tension wire.
3. In the case of placing sensors very close to magnet source. Output level of sensors would vary. Please make evaluations in advance.
4. Nut tightening torque: Max. 294mN·m
No impact done by wrench shall be given for the tightening.
5. No stress shall be applied to shaft when mounting.
In the case of much stress applied to shaft, it would cause shaft locking or shaft wobble and may affect the characteristics.
Extra evaluation shall be made.

⚠ Important! (Handling precautions)

1. Keep the sensors away from a person who wears electronic medical devices.
Bringing the sensors closer to such devices would cause to malfunction.

TOKYO COSMOS ELECTRIC CO., LTD.