

Technical Data

Orange Pot : Hall Effect IC type contactless position sensors

Orange Pot is the general term that Midori has used for the Hall-IC contactless potentiometer. It is identified by orange-colored name plate attached to the part.

Hall-IC has combined the Hall-element and amplifier for amplifying the electrical potential change caused by the Hall effect principle. In comparing the Orange Pot to the other contactless potentiometers such as the Hall-element sensors or magneto resistive element sensors, output voltage range of the Orange Pot is wider. Moreover, since temperature compensating circuit was built into the IC, the temperature drift is smaller than any other contactless potentiometers.

Features

1. Electrically Noiseless

Due to contactless design, there is no sliding contacts between the magnet and Hall-IC. Therefore, there is no electrical noise in the output regardless of the displacement velocity (except for disturbance noise).

2. Wide Output Range

Output voltage range is wider than that of the conventional Hall-element sensors or Magneto Resistive element sensors.

3. Superb Temperature Characteristic

Small temperature drift due to built-in temperature compensating circuit.

4. Low Torque, Low Friction

Shaft torque and friction are very small due to the contactless design.

5. Long Life

There is no mechanical friction between the parts except at the shaft bearing. As the result, Orange Pot has superb long life.

6. Mass-Production Capacity

The use of integrated-circuit as electrical components can reduce the number of parts and make it easy in miniaturizing and mass producing parts.

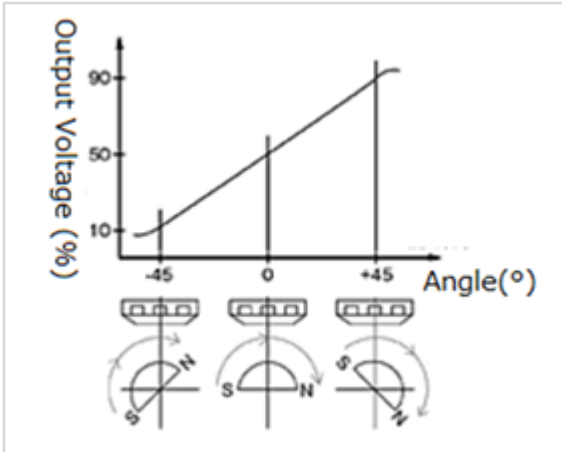
Technical Data

Principle

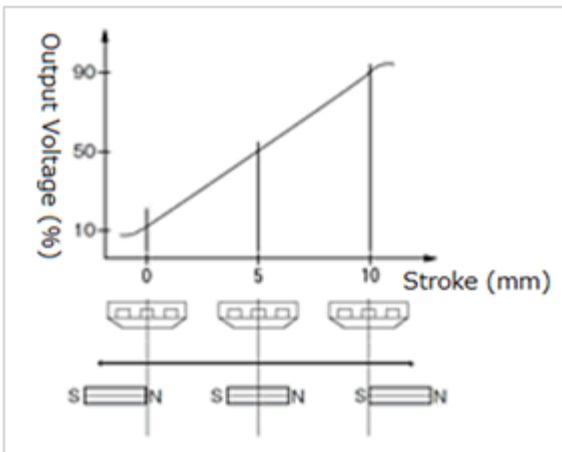
1. Sensing Method

Sensing part of Orange Pot consists of Hall-IC and magnet. There are following sensing methods:

(1) Create output voltage change by rotating a magnet near the Hall-IC.

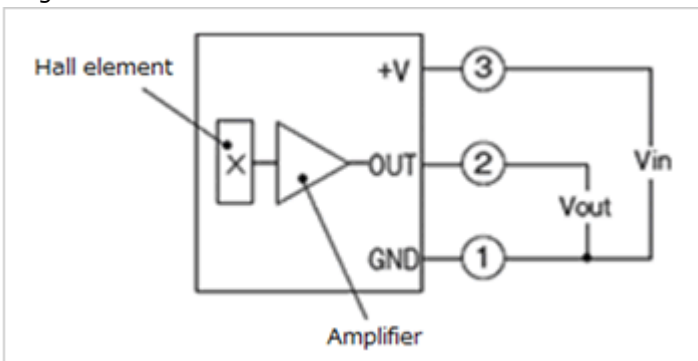


(2) Create output voltage change by moving the magnet horizontally near the Hall-IC.



2. Hall-IC

Hall-IC is composed of an integrated combination of Hall element, amplifier, and temperature compensating circuit. The operating principle of Hall-IC is creating amplified output voltage to deflect the direction of electric currents by magnetic field.

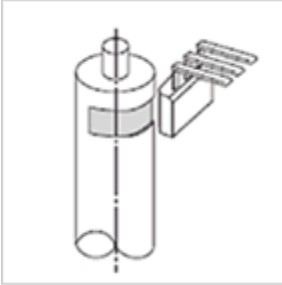


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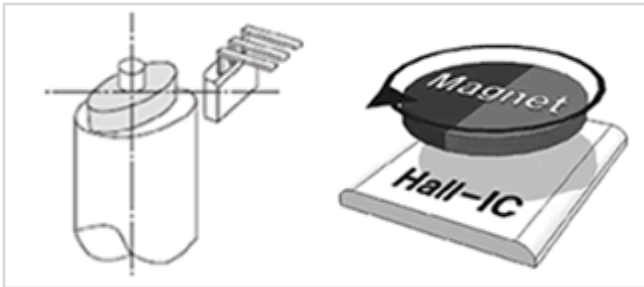
Signal Converting Method

(1) Angle Sensor

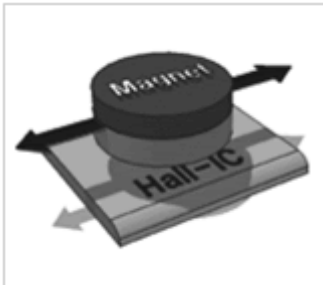
Place a Hall-IC on the side of a semicircular magnet to detect magnetic field change in the radial direction.



(2) Angle Sensor (Dual Output)



(3) Linear Sensor



Programmable Hall-IC

Hall-IC's output is programmable to the correct linearity and output sensitivity. By programming the output, it is feasible to set up particular effective electrical travel and also output range.

Hall-IC in Orange Pot is locked before shipment; therefore, the end user shall not be able to change the program after shipment.

Output Resolution

Hall-IC has output resolution that is unlike MR-element. Orange Pot products use the Hall-IC that has output resolution of more than 12bit ($/V_{in}$).

Temperature Compensation

Hall-element can easily be affected by ambient temperature. As the result, the integrated IC would compensate output characteristic within a preset temperature range in the IC.

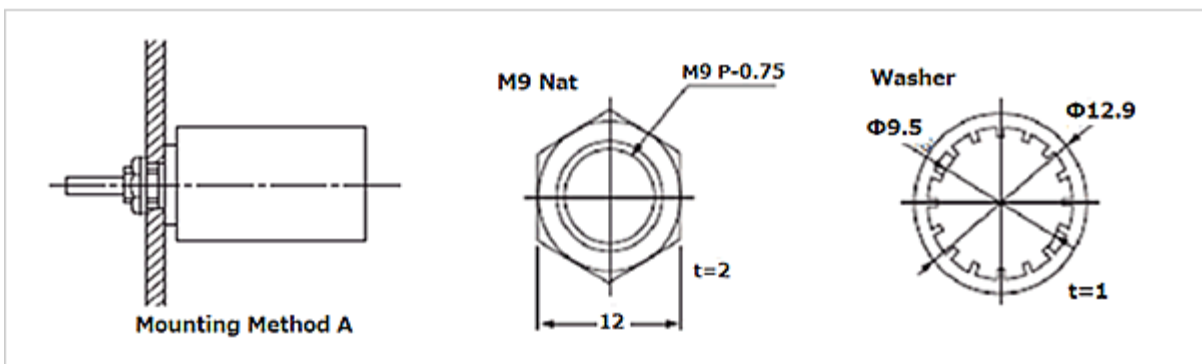
Technical Data

Mounting Instruction

Mounting Method

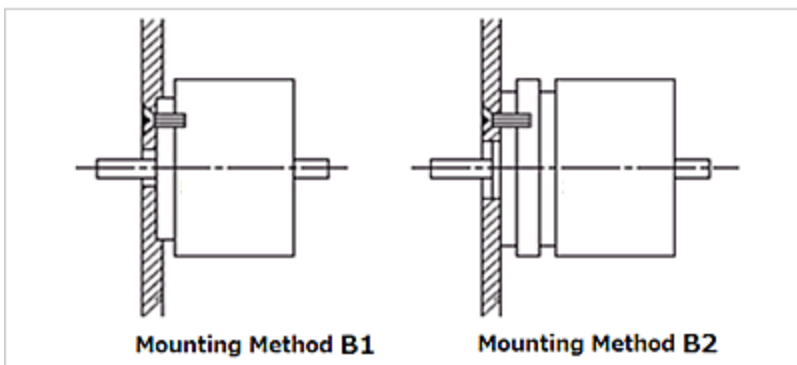
(1) Bushing Mount (Mounting Method A)

- Insert threaded part of pot through from the back side of mounting board and fasten the pot by a nut with washer.
- Be sure to place a washer behind of the nut.
- As for the pot with a stopper pin, make a hole for a stopper pin on a mounting board.
- Do not rotate the pot itself when tightening the nut. This may cause malfunction of the sensor.
- Do not over tighten the nut. This may damage the threaded part of the pot.
- In case of installing the pot at places where there is a lot of vibration, the mounting screws can be locked by adhesive.



(2) Screw Mount (Mounting Method B1 and B2)

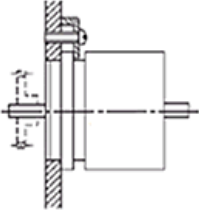
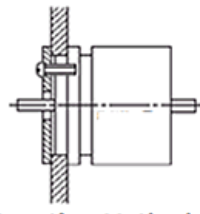
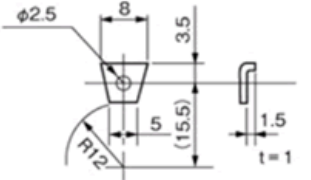
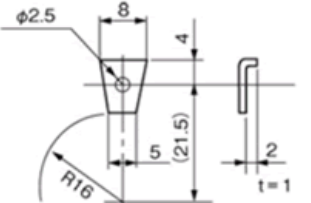
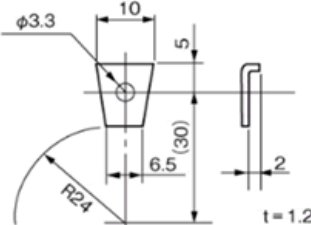
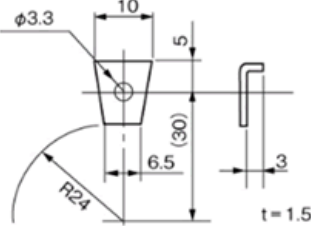
- Fasten the pot with screws into the tapped holes which is on the mounting surface of the Pot.
- Please use certain length of screw.
- In case of selecting mounting method 'B1', create a shaft hole on the mounting board which diameter is larger than the pot shaft diameter.



Technical Data

(3) Servo Mount (Mounting Method C1 and C2)

- Install a pot on the mounting board using mounting cleats.
- Make hole to fit diameter of matching flange.
- Do not tighten the screws for the mounting cleats until pot body is fixed at the desired position.
- Gears or couplings on the shaft smaller than diameter of mounting hole may be more convenient for installation.
- In case of using mounting method 'C1', place a few mounting cleats equally spaced by mounting hole.
- If there is no space to place the mounting cleats, it is recommended to use mounting method 'C2'.

 <p>Mounting Method C1</p>	 <p>Mounting Method C2</p>
① CP-2F	
② Abolishment	
③ CPP-35 CPP-35B	
④ CP-45H CPP-45 CPP-45B CPP-5S	
⑤ CPP-60	

Operating Suggestion

Measurement of Resistance Value

Resistance value of Orange Pot is not measurable because Hall-IC contains a built-in operational amplifier. As the result, please make sure to measure the output voltage of pot with the prescribed input voltage.

Technical Data

Regard to Static Electricity

Because Orange Pot uses CMOS IC, it has the characteristic of being sensitive to static discharge.

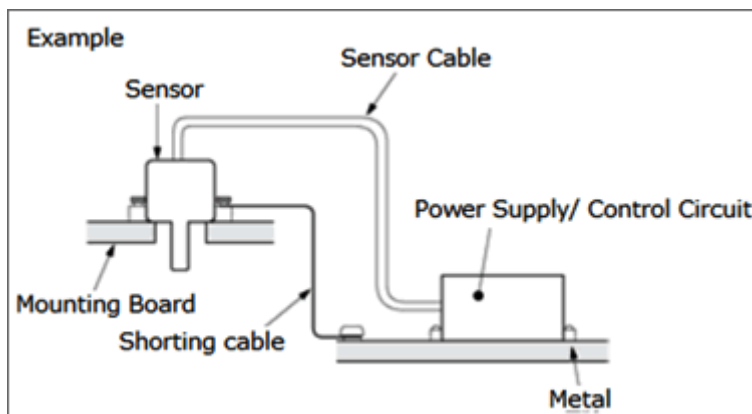
Please consider the followings in handling Orange Pot products.

1. During installation or replacement of Orange Pot, keep eliminating static electricity by using static erasers.
2. Make sure static electricity is eliminated from your body before handling Orange Pot.
3. Do not touch the tip of the sensor cable by hand.
4. Before installing Orange Pot on the equipment, create equipotential between equipment and sensor body.
5. It is recommended that the end user creates equipotential between mounting portion of Orange Pot and power supply chassis.

Installation Environment Care in Regard to Static Electricity

If sensor body and mounting board are metal and mounting board is connected to earth or GND, it is seen as less influenced by static electricity. However, if the sensor is installed in the area where it is not connected with the earth or if mounting portion is isolated by resins, static electricity will charge on the sensor shaft and body depending on sensor usage and this will be a factor in malfunctioning the sensor.

If metal body sensor is used, avoid static electricity discharge into the sensor by connecting the sensor fixing screw to the earth or GND. If plastic (resins) body sensor is used, sufficient consideration is required to avoid discharge of static electricity from metal sensor shaft.



Technical Data

Handling Instruction

Potentiometers are precisely assembled and adjusted. Please handle them carefully as a precision device.

1.

- Do not disassembling the pot.
- Do not modify the Pot
(May effect the precision and cause malfunction.)

2.

- Do not drop the Pot.
- Do not strike one part against another
(May damage the terminals or cause wires to disconnect.)

3.

- Do not apply excessive voltage or current.
(May damage resistive element an electronic Components.)
- make sure to use digital tester.
(may damage resistive element and electronic components if analog tester is used.)

4.

- Mount without tapping or squeezing into a panel.
- Use suitable tools
(May break or cause failure.)

5.

- Use wire that has sufficient length for connection terminals.
- Use wire less than 0.3mm² (AWG22) in cross section.
(Insufficient length of wire or use of larger wire may cause damage to the terminals or disconnection inside the pot.)

6.

- Be sure to connect appropriately.
- Do not apply voltage on output terminals.
(May damage resistive element and electronic components.)

7.

- Solder no more than 5 seconds at 300°C MAX.
(High temperature may damage inside of pot.)

8.

- Do not apply excessive torque to the mechanical stopper of rotary type pot.
(may cause breakage of stopper. Stopper strength: 0.3-0.5N.m MAX. typical)

9.

- Do not immerse in water or pour water or chemicals on the pot.
(may cause output failure)

Technical Data

10.

- Observe precautions for handling electrostatic discharge sensitive devices.
(Orange Pot is using the electrostatic discharge sensitive semiconductor circuits.)

11.

Do not store pot in the following conditions.

- High humidity
- Dusty environment
- Place where salinity or corrosive gases are present.
- Vibrating place

Units

The units in the web site is the International System of Units (SI).

Torque	$1\text{kgf}\cdot\text{m} = 9.80655\text{N}\cdot\text{m}$, $1\text{N}\cdot\text{m} = 0.10197\text{kgf}\cdot\text{m} = 101.97\text{gf}\cdot\text{m}$
Force	$1\text{kgf} = 9.80655\text{N}$, $100\text{gf} = 980.655\text{mN}$, $1\text{N} = 0.10197\text{kgf} = 101.97\text{gf}$, $5\text{N} = \text{approx.}500\text{gf}$
Acceleration	$1\text{G} = 9.80655\text{m/s}^2$, $150\text{m/s}^2 = \text{approx.} 15\text{G}$, $500\text{m/s}^2 = \text{approx.} 51\text{G}$
Magnetic Flux Density	$1\text{G} = 1 \times 10^{-4} \text{ T}$

In addition to the Handling Instructions in this web site, please read the following guidelines with a good understanding of its contents:

- Manufacturing date indication (JEITA RC-0901)
- Precautions of potentiometer (JEITA RCR-2191A)
- Safety Application Guide on Components for Electric Devices and Electric Manufactures (JEITA RCR-1001B)

Guaranty

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