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SPECIFICATION FOR SUPPLIED PRODUCT

ROTARY POSITION SENSOR SV01C103BJAA1 TYPE

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1. Scope

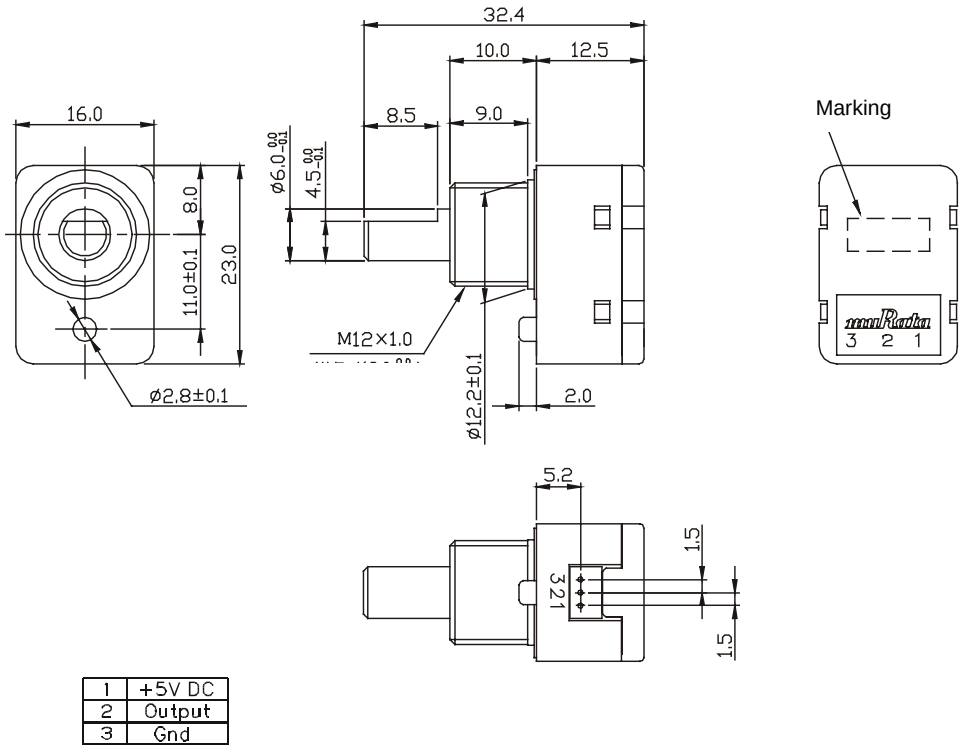
This specification is applied to Murata made Rotary Position Sensor **SV01C103BJAA1** type.

2. Part Number

SV01C103BJAA1B00 Bulk : 50pcs./pack

Note) Fill in your part number on the cross-reference table.

3. Outline Dimensions and Marking



1	+5V DC
2	Output
3	Gnd

(Unit : mm)
(Tolerance : ±0.3)

The shaft position in this drawing shows 0 deg.angle.
Connector : J.S.T.Mfg Co.,Ltd. Model No. : S3B-ZR-SM2

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4. Characteristics

4.1 Electrical characteristics

ITEM	SPECIFICATION	TEST METHOD
Standard total resistance range	10k ohm	-
Standard total resistance tolerance	±30% of standard total resistance value	-
Rated voltage	5Vdc	-
Dielectric strength	250Vac, 1 minute, Leakage current less than 50μA	-
Operating temperature range	-40°C ~ +85°C	-
Linearity	±3%	5.1
Insulation resistance	100Mohm min. (250Vdc)	-
Temperature coefficient of resistance (TCR)	±500ppm/°C	5.2

4.2 Mechanical characteristics

ITEM	SPECIFICATION	TEST METHOD
Electrical rotational angle	(Ref. : 333.3°)	-
Rotational torque	4mN·m (Ref.; 40gf·cm) max.	-
Vertical strength of the shaft	No mechanical deformation and damage	5.3
Edgewise strength of the shaft	No mechanical deformation and damage	5.4

4.3 Environmental characteristics

ITEM	SPECIFICATION		TEST METHOD
	Total Resistance Change	Linearity	
Temperature cycle (Thermal shock)	±20%	±4%	5.5
Humidity	±20%	±4%	5.6
Vibration	±10%	±4%	5.7
Shock	±10%	±4%	5.8
Humidity load life	±20%	±4%	5.9
High temperature exposure	+5/-30%	±4%	5.10
Low temperature exposure	±20%	±4%	5.11
Rotational life	±20%	±4%	5.12
Resistance to soldering heat	±20%	±4%	5.13

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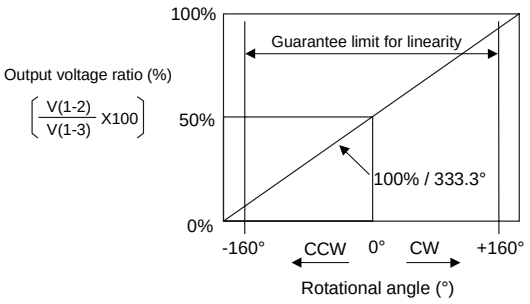
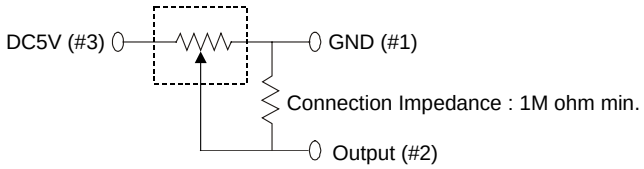
5. Test Method

The tests and measurements shall be conducted under the condition of 15~35°C of temperature 25~75% of relative humidity and 86~106 k pa of atmospheric pressure unless otherwise specified. In case when entertained a doubt in judgment obtained from results measured in accordance with the above mentioned conditions, the tests and measurements shall be conducted under the condition of 25±2°C of temperature and, 50±2% of relative humidity and 86~106 k pa of atmospheric pressure. When the potentiometer is tested after soldering on PCB .,it shall be tested after being kept in a room (15~35°C, 25~75%RH) over 24 hours except "Resistance to soldering heat ".

5.1 Linearity

Independent linearity should vary no more than ±2% within ±160° to 50% voltage ratio.
Taper : linear, 100%/333.3° Measured with the circuit as below.





5.2 Temperature coefficient of resistance (TCR)

The rotary position sensor should be subjected to each of the following temperatures for 30~45 minutes.

[Table 1]

Sequence	*1	2	*3	4
Temp. (°C)	+25	-40	+25	+85

Note* : Reference temperature

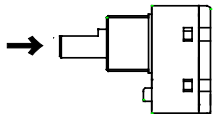
Temperature coefficient of resistance should be applied to the following formula.

$$TCR = \frac{R_2 - R_1}{R_1 (T_2 - T_1)} \times 10^6 \text{ (ppm / °C)}$$

T_1 : Reference temperature in degrees celsius
T_2 : Test temperature in degrees celsius
R_1 : Resistance at reference temperature in ohm
R_2 : Resistance at test temperature in ohm

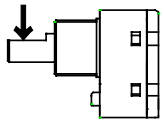
5.3 Vertical strength of the shaft

The static force of 50N(Ref.;5.1kgf) should be applied to the shaft invertical direction of the shaft for 10 seconds.



5.4 Edgewise strength of the shaft

The bending moment of 50 mN • **m**(Ref.; 510gf) should be applied to shaft in the position of a tip of a shaft to 5mm.



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5.5 Temperature cycle (Thermal shock)

The rotary position sensor should be subjected to Table 2 temperature for 5 cycles. Then, the rotary position sensor should be kept in the dry box for 1~2 hours.

[Table 2]

Sequence	1	2	3	4
Temp.(°C)	-40±3	+25±2	+85±3	+25±2
Time (min.)	30	5 max.	30	5 max.

5.6 Humidity

The rotary position sensor should be stored in a chamber at temperature of 60±2°C and relative humidity of 90~95% for 250±8 hrs. After removing from the chamber, the rotary position sensor should be kept in the dry box for 5±1/6 hours.

5.7 Vibration

The rotary position sensor should be tested under the condition of the amplitude of 1.5mm, the frequency range from 10 to 55Hz (should be traversed in approximately one minute) and 2 hours in each of 3 mutually perpendicular directions(total 6 hours). Then, the rotary position sensor should be kept in the dry box for 1~2 hours.

5.8 Shock

The rotary position sensor should be tested under the condition of the peak acceleration 20G max. in half-sine wave and 5 shocks in each of 3 mutually perpendicular directions(total 15 shocks). Then, the rotary position sensor should be kept in the dry box for 1~2 hours.

5.9 Humidity load life

Full rated continuous working voltage not exceeding 5Vdc should be applied intermittently between terminal #1 and terminal #3 of the rotary position sensor, 1.5 hours on and 0.5 hours off, for 96±4 hours in total in a chamber at a temperature of 40±2°C and the relative humidity of 90~95%.
After removing from the chamber, the rotary position sensor should be kept in the dry box for 5±1/6 hours.

5.10 High temperature exposure

The rotary position sensor should be stored in a chamber at a temperature of 85±2°C without loading for 250±8 hours. After removing from the chamber, the rotary position sensor should be kept in the dry box for 1~2 hours.

5.11 Low temperature exposure

The rotary position sensor should be stored in a chamber at a temperature of -40±3°C without loading for 168±4 hours. After removing from the chamber, the rotary position sensor should be kept in the dry box for 1~2 hours.

5.12 Rotational life

The adjustment rotor should be continuously rotated within ±160° of effective electrical rotational angle, at the rate of one cycle for 6 seconds for 1 Million cycles under the condition of 25±2°C of temperature without loading. Then, the rotary position sensor should be kept in the dry box for 10±5 minutes.

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6. ⚠ Caution

(1) Please consult with Murata factory representative prior to using our products for the applications requiring especially high reliability what defects might directly cause damage to other party's life, body or property (listed below).

1) Aircraft equipment
2) Aerospace equipment
3) Undersea equipment
4) Nuclear control equipment
5) Medical equipment
6) Transportation equipment (automobiles, trains, ships, etc.)
7) Traffic signal equipment
8) Disaster prevention / crime prevention equipment
9) Data-processing equipment
10) Applications of similar complexity or with reliability requirements comparable to the applications listed in the above.

(2) Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by an abnormality or failure related to our product.

7. Caution for using

7.1 Installation and electrical connection of sensor

(1) When installing sensor, tighten the nut at the torque levels less than 1.0N.m (10kgf.cm as reference). The exceeded force might damage the screw thread of sensor.
(2) Please use the recommended connector which is " ZHR-3 series / J.S.T. made. When connectors other than this are used, poor contact and connector part destruction may occur.

7.2 Cleaning

Can not be cleaned by any solvents due to the open construction.

7.3 Operating environmental conditions

(1) Uncontrolled mechanical force except usual rotation on the shaft of product, may cause big change of electrical characteristic, big increase of rotational torque or mechanical damage of product. Therefore, please pay your attention on the following points for your design. Please design your coupler by holding shaft bush to avoid exceeded radial or thrust shaft force of sensor.

(2) Do not use the rotary position sensor under the conditions listed below. If you use the rotary position sensor in the conditions listed below, please consult with Murata factory representative prior to using.

1. Corrosive gasses atmosphere (Ex. Cl_2, H_2S, NH_3, SO_2, NOx, etc.)
2. In liquid (Ex. water, oil, medical liquid, organic solvent, etc.)
3. Dusty / dirty atmosphere
4. Direct sunlight
5. Static voltage nor electric/magnetic fields
6. Direct sea breeze
7. Other variations of the above

7.4 Storage conditions

(1) To ensure the solderability of the terminal, store that the temperature is -10°C~+40°C and the relative humidity is 30~85%RH, and use within six months after delivery. If you are going to use a product which has been stored for more than six months, please check its solderability beforehand.
(2) Do not store in or near corrosive gases.
(3) Do not store under direct sunlight.

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7.5 Circuit design and other

(1) Connecting impedance

The rotary position sensor is designed the condition shown on Fig-1, that is connecting the output terminal and A/D port of the microprocessor directly. In other words, connecting impedance presuppose certain M ohm and the contact resistance are set high. Therefore, please make sure the connecting impedance is not to be less than 10M ohm if you apply the circuit shown on fig-2.

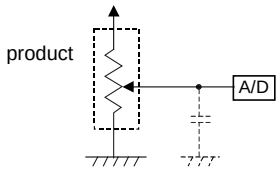

Fig.-1

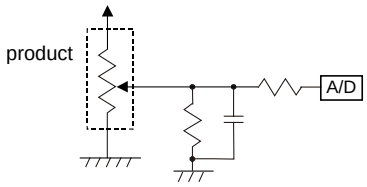

Fig.-2

(2) Noise Suppression

To minimize the processing error which occur in rare cases, when data is installed through the product and noise influence from wiper contact and/or outside, please note the following points and program your software.

1. Data install should be done plural times and applied the mean value.
2. Data considered as error should be invalid.
3. Data should be re-installed if quaere occurs.

(3) Cautions to use grease or oil

In case of using grease or oil on connecting shaft or gear which are connected to the rotary position sensor, please prevent grease or oil coming into the rotary position sensor. If grease or oil puts into the rotary position sensor, the rotary position sensor may deviate from the specified characteristics.

8. ⚠Notice

(1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
(2) You are requested not to use our product deviating from the agreed specifications.
(3) Please return one copy of this product specification with your signature of receipt. If the copy is not returned within three months, this product specification will be deemed to have been received.
(4) We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

9. Part number cross reference table

Bulk

Customer part No.	Murata part No.
	SV01C103BJAA1B00