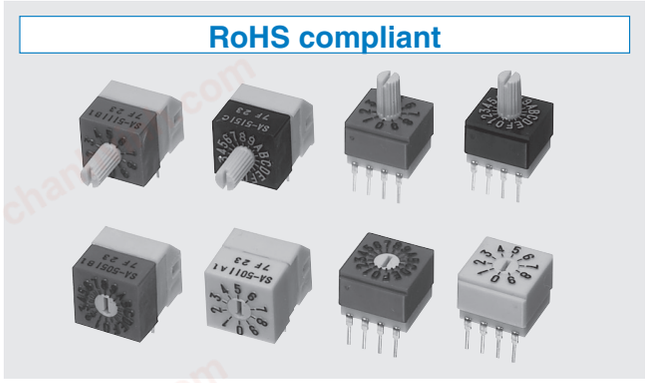
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ROTARY CODED SWITCHES SA-5000

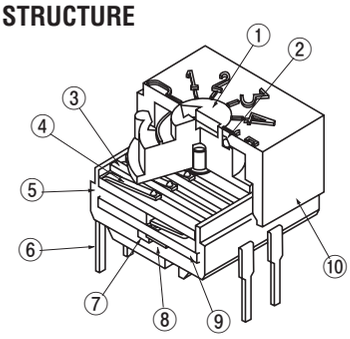
RoHS compliant



FEATURES

- RoHS compliant
- Washable
- Easy pulling-up or pulling-off (A & B type)
- PC board space saving due to contained resistor/diode
- No need of cross pattern P.C.B. design

INTERNAL STRUCTURE



Part name		Material	Flammability
①	Insert rotor	Rotor : Polyoxymethylene Pattern : Copper alloy, Gold-plated	UL94HB
②	"O" ring	Silicone rubber	
③	Contact holder	Polybutyleneterephthalate	
④	Contact	Copper alloy, Gold-plated	—
⑤	Base	Polybutyleneterephthalate	UL94HB
⑥	Terminal pin	Copper alloy, Sn-Cu-plated	—
⑦	Diode	—	
⑧	Resistor	Chip resistor	
⑨	Board	Gold-plated epoxy board, Gold-plated	
⑩	Housing	Polybutyleneterephthalate	UL94HB

The "SA-5000 Series" are divided into 3 types according to the kind of a built-in circuit.

- **A type: Built-in resistors (Housing color Yellow)**
  In order to use conventional code switches in a digital circuit, pull-up or pull-down resistors must be connected externally. This type contains these resistors.
- **B type: Pulling-up resistors and built-in diodes (Housing color Red)**
- **C and D type: Built-in diodes (Housing color Black)**
  When using more than one code switch arranged as a code of plural figures, the digital circuit makes a comparison of signals received through a line called a common bus line as its own method. For this, it is necessary to connect a diode for preventing reverse current to the middle of output terminal of each switch and a bus line. The product is a hybrid switch integrating such a diode. Diodes of C and D types are set in a reverse direction.

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SA-5000
ROTARY CODED SWITCHES

PART NUMBER DESIGNATION

S A - 5 0 1 0 A 1 E W

Series name

Shape of rotor
0 : Without knob
1 : With knob (extended shaft)

コード Code format
1 : 10 positions, real code
3 : 10 positions, complementary code
5 : 16 positions, real code
7 : 16 positions, complementary code

Setting position
0 : Top setting
1 : Side setting

Built-in circuit
A : Resistors
(Housing color Yellow)
B : Resistor and diodes
(Housing color Red)
C : Diodes
(Housing color Black)
D : Diodes
(Housing color Black)
(Polarity is for reverse with C)

Resistance value
1 : 10 k Ω
3 : 3.3 k Ω

Terminal pin
E : Sn-Cu (Lead-flee)

Form of packaging
W : Tray packaging
Blank : Plastic bag

STANDARD SPECIFICATIONS

Circuit type	BCD (Real code, complementary code) BCH (Real code, complementary code)
Operating temperature range	— 25 ~ 75 °C
Storage temperature range	
Sealing	Washable by “O” ring ※ Please refer to 150,151
Net weight	Approx. 1.5 g (Top setting) Approx. 2.0 g (Side setting) Approx. 1.6 g (Top setting with knob) Approx. 2.0 g (Side setting with knob)

ELECTRICAL CHARACTERISTICS

Contact rating Non-switching Switching	 DC50 V 100 mA DC5 V 100 mA
Contact resistance	1 Ω maximum
Insulation resistance	1000 M Ω (DC100 V) minimum
Dielectric strength	AC250 V, 60 s

MECHANICAL CHARACTERISTICS

No. of positions	16, 10
Adjustment torque	10 ~ 35 mN·m {102 ~ 357 gf·cm}
Stepping angle	22.5° (16 positions) 36° (10 positions)
Terminal strength	10 N {1.02 kgf} minimum
Solderability	245 ± 3 °C, 2 ~ 3 s
Soldering heat	フロー Flow : 260 ± 3 °C, 5 ~ 6 s, two times maximum
	Manual soldering : 380 ± 10 °C, 3 ~ 4 s

{ } : Reference only

ENVIRONMENTAL CHARACTERISTICS

Vibration	(Amplitude) 1.5 mmor (Acceleration) 98 m/s^2, 10-500-10 Hz, 3 directions for 2 h each
Shock	490 m/s^2, 11 ms 6 directions for 3 times each
Load life	10000 steps minimum DC5 V, 100 mA
Humidity (Steady state)	40 °C, Relative humidity 90 ~ 95 %, 240 h
High temperature exposure	75 °C, 16 h
Low temperature exposure	— 25 °C, 16 h
Thermal shock	— 25 (0.5 h) ~ 75 °C (0.5 h), 5 cycles

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SA-5000
ROTARY CODED SWITCHES

LIST OF PART NUMBERS

Shape		Internal circuit	Resistance value	Form of packaging	Binary coded decimal		Binary coded hexadecimal		Pieces in package
					Real code	Complementary code	Real code	Complementary code	
Top setting	Without knob	Built-in resistor	10 k Ω	Tray packaging	SA-5010A1EW	SA-5030A1EW	SA-5050A1EW	SA-5070A1EW	50 pcs./tray
				Plastic bag	SA-5010A1E	SA-5030A1E	SA-5050A1E	SA-5070A1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5010A3EW	SA-5030A3EW	SA-5050A3EW	SA-5070A3EW	50 pcs./tray
				Plastic bag	SA-5010A3E	SA-5030A3E	SA-5050A3E	SA-5070A3E	25 pcs./pack
		Built-in resistor and diode	10 k Ω	Tray packaging	SA-5010B1EW	SA-5030B1EW	SA-5050B1EW	SA-5070B1EW	50 pcs./tray
				Plastic bag	SA-5010B1E	SA-5030B1E	SA-5050B1E	SA-5070B1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5010B3EW	SA-5030B3EW	SA-5050B3EW	SA-5070B3EW	50 pcs./tray
				Plastic bag	SA-5010B3E	SA-5030B3E	SA-5050B3E	SA-5070B3E	25 pcs./pack
		Built-in diode	—	Tray packaging	SA-5010CEW	SA-5030CEW	SA-5050CEW	SA-5070CEW	50 pcs./tray
				Plastic bag	SA-5010CE	SA-5030CE	SA-5050CE	SA-5070CE	25 pcs./pack
			—	Tray packaging	SA-5010DEW	SA-5030DEW	SA-5050DEW	SA-5070DEW	50 pcs./tray
				Plastic bag	SA-5010DE	SA-5030DE	SA-5050DE	SA-5070DE	25 pcs./pack
	With knob	Built-in resistor	10 k Ω	Tray packaging	SA-5110A1EW	SA-5130A1EW	SA-5150A1EW	SA-5170A1EW	50 pcs./tray
				Plastic bag	SA-5110A1E	SA-5130A1E	SA-5150A1E	SA-5170A1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5110A3EW	SA-5130A3EW	SA-5150A3EW	SA-5170A3EW	50 pcs./tray
				Plastic bag	SA-5110A3E	SA-5130A3E	SA-5150A3E	SA-5170A3E	25 pcs./pack
		Built-in resistor and diode	10 k Ω	Tray packaging	SA-5110B1EW	SA-5130B1EW	SA-5150B1EW	SA-5170B1EW	50 pcs./tray
				Plastic bag	SA-5110B1E	SA-5130B1E	SA-5150B1E	SA-5170B1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5110B3EW	SA-5130B3EW	SA-5150B3EW	SA-5170B1EW	50 pcs./tray
				Plastic bag	SA-5110B3E	SA-5130B3E	SA-5150B3E	SA-5170B3E	25 pcs./pack
		Built-in diode	—	Tray packaging	SA-5110CEW	SA-5130CEW	SA-5150CEW	SA-5170CEW	50 pcs./tray
				Plastic bag	SA-5110CE	SA-5130CE	SA-5150CE	SA-5170CE	25 pcs./pack
			—	Tray packaging	SA-5110DEW	SA-5130DEW	SA-5150DEW	SA-5170DEW	50 pcs./tray
				Plastic bag	SA-5110DE	SA-5130DE	SA-5150DE	SA-5170DE	25 pcs./pack

※ Verify the above part numbers when placing orders.
Tray version can be supplied only in tray units.

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SA-5000
ROTARY CODED SWITCHES

■ LIST OF PART NUMBERS

Shape		Internal circuit	Resistance value	Form of packaging	Binary coded decimal		Binary coded hexadecimal		Pieces in package
					Real code	Complementary code	Real code	Complementary code	
Side setting	Without knob	Built-in resistor	10 k Ω	Tray packaging	SA-5011A1EW	SA-5031A1EW	SA-5051A1EW	SA-5071A1EW	50 pcs./tray
				Plastic bag	SA-5011A1E	SA-5031A1E	SA-5051A1E	SA-5071A1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5011A3EW	SA-5031A3EW	SA-5051A3EW	SA-5071A3EW	50 pcs./tray
				Plastic bag	SA-5011A3E	SA-5031A3E	SA-5051A3E	SA-5071A3E	25 pcs./pack
		Built-in resistor and diode	10 k Ω	Tray packaging	SA-5011B1EW	SA-5031B1EW	SA-5051B1EW	SA-5071B1EW	50 pcs./tray
				Plastic bag	SA-5011B1E	SA-5031B1E	SA-5051B1E	SA-5071B1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5011B3EW	SA-5031B3EW	SA-5051B3EW	SA-5071B3EW	50 pcs./tray
				Plastic bag	SA-5011B3E	SA-5031B3E	SA-5051B3E	SA-5071B3E	25 pcs./pack
		Built-in diode	—	Tray packaging	SA-5011CEW	SA-5031CEW	SA-5051CEW	SA-5071CEW	50 pcs./tray
				Plastic bag	SA-5011CE	SA-5031CE	SA-5051CE	SA-5071CE	25 pcs./pack
			—	Tray packaging	SA-5011DEW	SA-5031DEW	SA-5051DEW	SA-5071DEW	50 pcs./tray
				Plastic bag	SA-5011DE	SA-5031DE	SA-5051DE	SA-5071DE	25 pcs./pack
	With knob	Built-in resistor	10 k Ω	Tray packaging	SA-5111A1EW	SA-5131A1EW	SA-5151A1EW	SA-5171A1EW	50 pcs./tray
				Plastic bag	SA-5111A1E	SA-5131A1E	SA-5151A1E	SA-5171A1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5111A3EW	SA-5131A3EW	SA-5151A3EW	SA-5171A3EW	50 pcs./tray
				Plastic bag	SA-5111A3E	SA-5131A3E	SA-5151A3E	SA-5171A3E	25 pcs./pack
		Built-in resistor and diode	10 k Ω	Tray packaging	SA-5111B1EW	SA-5131B1EW	SA-5151B1EW	SA-5171B1EW	50 pcs./tray
				Plastic bag	SA-5111B1E	SA-5131B1E	SA-5151B1E	SA-5171B1E	25 pcs./pack
			3.3 k Ω	Tray packaging	SA-5111B3EW	SA-5131B3EW	SA-5151B3EW	SA-5171B3EW	50 pcs./tray
				Plastic bag	SA-5111B3E	SA-5131B3E	SA-5151B3E	SA-5171B3E	25 pcs./pack
		Built-in diode	—	Tray packaging	SA-5111CEW	SA-5131CEW	SA-5151CEW	SA-5171CEW	50 pcs./tray
				Plastic bag	SA-5111CE	SA-5131CE	SA-5151CE	SA-5171CE	25 pcs./pack
			—	Tray packaging	SA-5111DEW	SA-5131DEW	SA-5151DEW	SA-5171DEW	50 pcs./tray
				Plastic bag	SA-5111DE	SA-5131DE	SA-5151DE	SA-5171DE	25 pcs./pack

※ Verify the above part numbers when placing orders.
Tray version can be supplied only in tray units.

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SA-5000
ROTARY CODED SWITCHES

■ DIODE CHARACTERISTICS

Material	Silicone diode
Structure	Epitaxial planar type
Maximum rating	DC reverse voltage V_R 40 V Peak reverse voltage (peak) V_{RM} 40 V DC forward current I_F 100 mA Peak forward current I_{FM} 225 mA
V_F Forward voltage	1.2 V maximum I_F=100 mA 0.6 V standard I_F=1 mA
V_R Reverse voltage	V_R=40 V 100 μ A
I_R Reverse current	I_R=100 nA 35 V

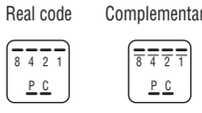
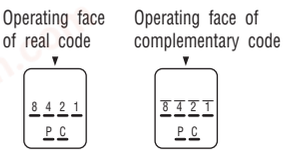
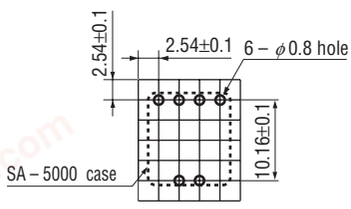
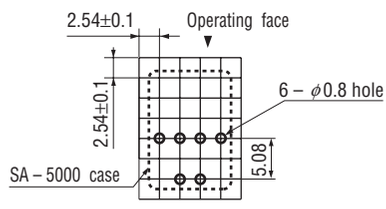
■ CODE FORMAT

No. of positions			16 positions															
			10 positions															
Position			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Code	Real code	8									●	●	●	●	●	●	●	●
		4					●	●	●	●					●	●	●	●
		2			●	●			●	●			●	●			●	●
		1		●		●		●		●		●		●		●		●
	Complementary code	$\overline{8}$	●	●	●	●	●	●	●	●								
		$\overline{4}$	●	●	●	●					●	●	●	●				
		$\overline{2}$	●	●			●	●			●	●			●	●		
		$\overline{1}$	●		●		●		●		●		●		●		●	

● ···Contact closed

■ TERMINAL CONNECTION / P.C.B. THROUGH HOLE DIMENSIONS

(Unit: mm)

	Top setting	Side setting
Terminal pin layout (Bottom view)		
P.C.B. dimensions (Bottom view)		

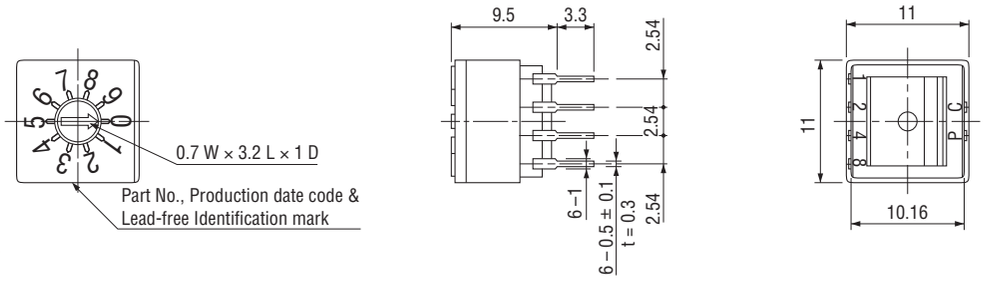
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ROTARY CODED SWITCHES

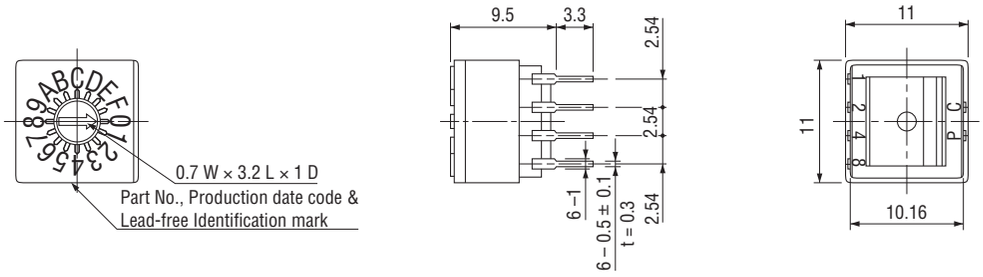
■ OUTLINE DIMENSIONS

Unless otherwise specified, tolerance: ± 0.3 (Unit: mm)

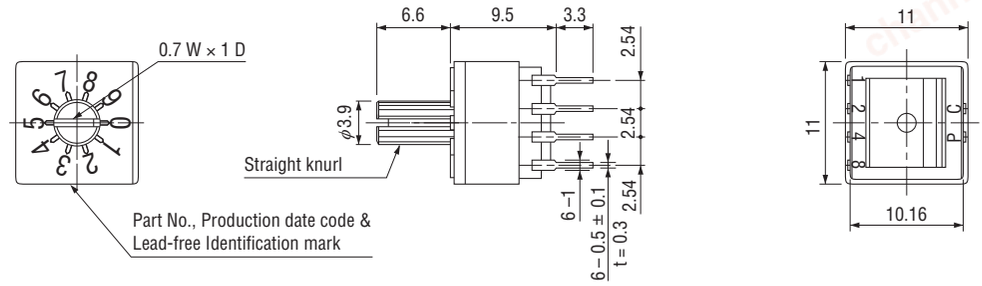
● SA-5010AE~DE
● SA-5030AE~DE
Top setting



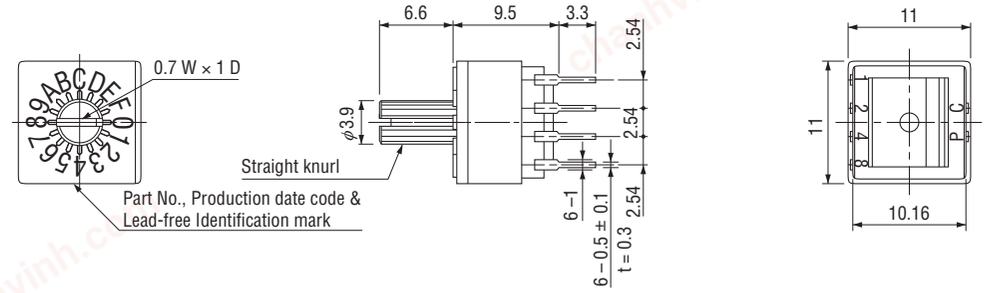
● SA-5050AE~DE
● SA-5070AE~DE
Top setting



● SA-5110AE~DE
● SA-5130AE~DE
Top setting



● SA-5150AE~DE
● SA-5170AE~DE
Top setting



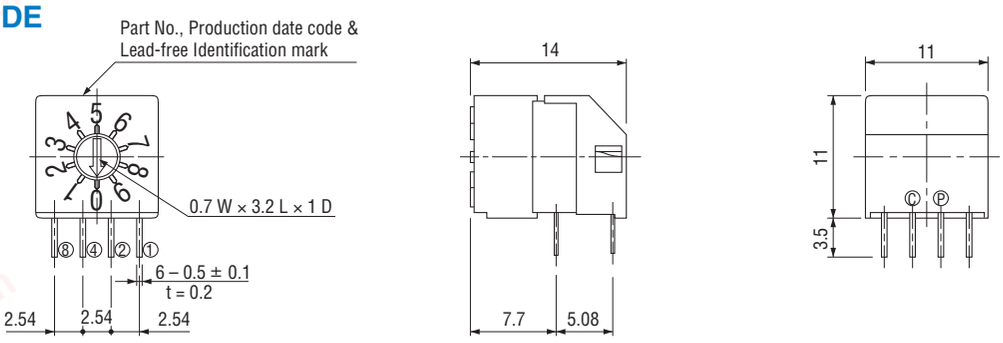
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ROTARY CODED SWITCHES

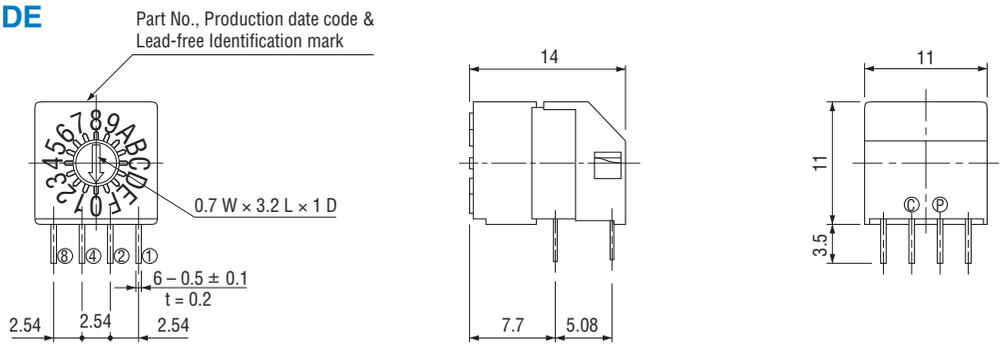
■ OUTLINE DIMENSIONS

Unless otherwise specified, tolerance: ± 0.3 (Unit: mm)

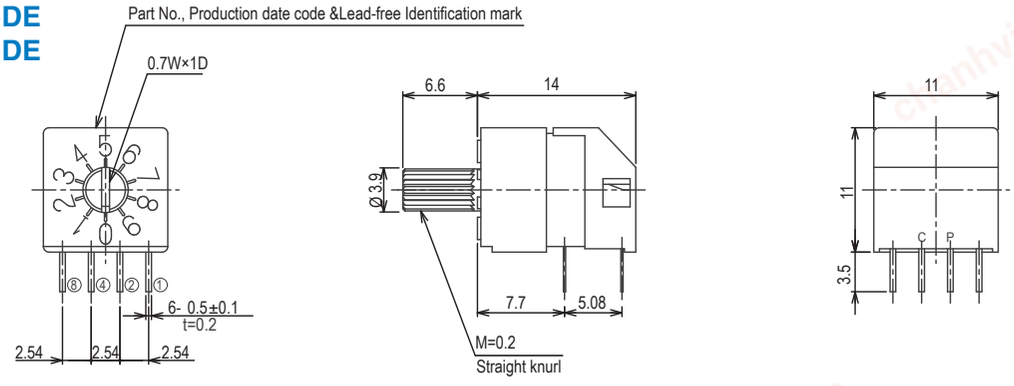
● SA-5011AE~DE
● SA-5031AE~DE
Side setting



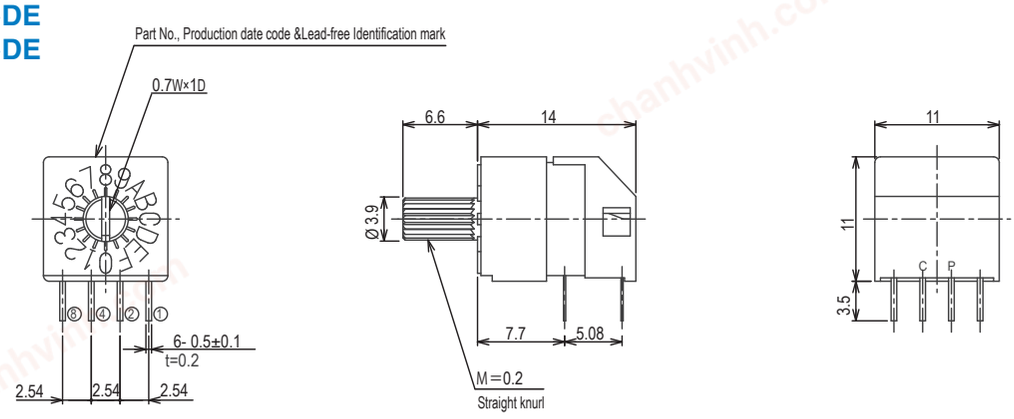
● SA-5051AE~DE
● SA-5071AE~DE
Side setting



● SA-5111AE~DE
● SA-5131AE~DE
Side setting



● SA-5151AE~DE
● SA-5171AE~DE
Side setting

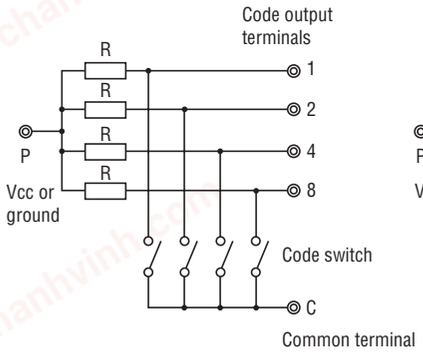


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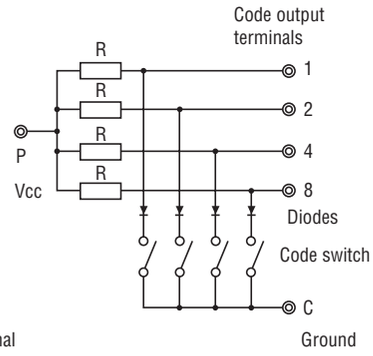
SA-5000
ROTARY CODED SWITCHES

■ SCHEMATIC DIAGRAMS

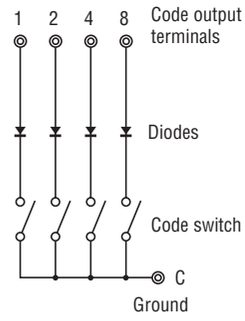
● A type
Built-in resistors
(Housing color Yellow)



● B type
Built-in pull-up resistors and built-in diodes
(Housing color Red)

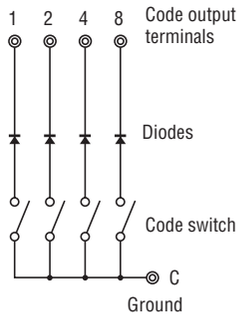


● C type
Built-in diodes
(Housing color Black)



The terminal P is a vacant terminal.

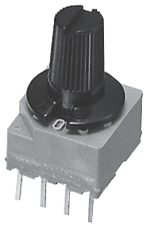
● D type
Built-in diodes
(Housing color Black)

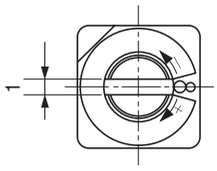


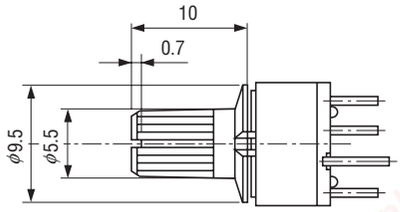
The terminal P is a vacant terminal.

■ SWITCHES WITH KNOB AS EXTENDED SHAFT

(Unit: mm)







The large knob is common to S-1000A, S-2000A, SA-5000 and SS-10 series.

※ Knob can't be dettached due to being fixed. Simple knob can't be sold.

■ PACKAGING SPECIFICATIONS

<Tray packaging specifications>
- Tray version is packaged in 50 pcs. per tray. Orders will be accepted for units of 50 pcs., i. e., 50, 100, 150 pcs. etc.
- Tray version is boxed with 10 trays.

<Bulk pack specifications>
- The smallest unit of bulk pack in a plastic bag is 10 pcs. per pack.
  Orders will be accepted for unit of minimum 10 pcs., i.e., 10, 20, 30 pcs., etc.
- Boxing of bulk in a plastic bag is performed with 10 pcs. (Top setting type is 50 pcs., side setting type is 25 pcs.) per box.