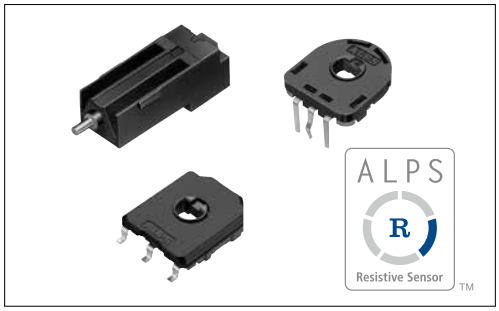
RDC40 RDC50 RDC90 Rotary Type

Rotary sensors catering to diverse position detection needs



Typical Specifications

Items	Specifications		
	RDC40	**RDC50**	**RDC90**
Rated voltage	5V DC		
Operating life	100,000 cycles	1,000,000 cycles	10,000,000 cycles
Total resistance	10kΩ		3.3kΩ (RDC9010006) 10kΩ (RDC9010007)
Operating temperature range	−30℃ to +80℃	−40℃ to +120℃	

Product Line

Mounting method	Linearity guarantee range	Linearity	Hollow shaft variation	Operating life (cycles)	Minimum order unit (pcs.) Japan	Minimum order unit (pcs.) Export	Model No.	Drawing No.
Connector type	13 rotations	±1%	–	100,000	770	770	**RDC401D07A**	1
Horizontal type	320°	±2%	ϕ3.5 dia	1,000,000	1,500	3,000	**RDC501051A**	2
			ϕ3.5 dia with radius				**RDC501052A**	3
Vertical type			ϕ3.5 dia		1,600	1,600	**RDC502012A**	4
Reflow type			ϕ3.5 dia		3,900	3,900	**RDC503051A**	5
			ϕ3.5 dia with radius				**RDC503052A**	6
Reflow type (Low-profile)			ϕ4 dia		3,600	3,600	**RDC506018A**	7
Reflow type (Long-life)	60°	±3%	ϕ3.5 dia	10,000,000	1,960	1,960	**RDC9010006**	8
	244°						**RDC9010007**	

Note

Other varieties are also available. Please inquire.

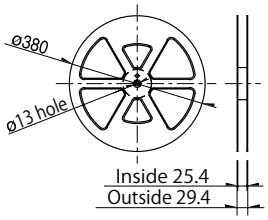
Packing Specifications

Tray / Taping

Series	Packing Specifications	Number of packages (pcs.) 1 case /Japan	Number of packages (pcs.) 1 case /export packing	Tape width (mm)	Export package measurements (mm)
RDC40	Tray	770	770	–	526×370×191
RDC501		1,500	3,000		
RDC502		1,600	1,600		370×280×92
RDC503	Taping	3,900	3,900	24	415×407×135
RDC506		3,600	3,600		
RDC90	Tray	1,960	1,960	–	300×240×270

Unit:mm

Reel size (Taping)



*Products marked with a ⚠ are not recommended for new designs

Refer to P.466 for product specifications.
Refer to P.467 for soldering conditions.

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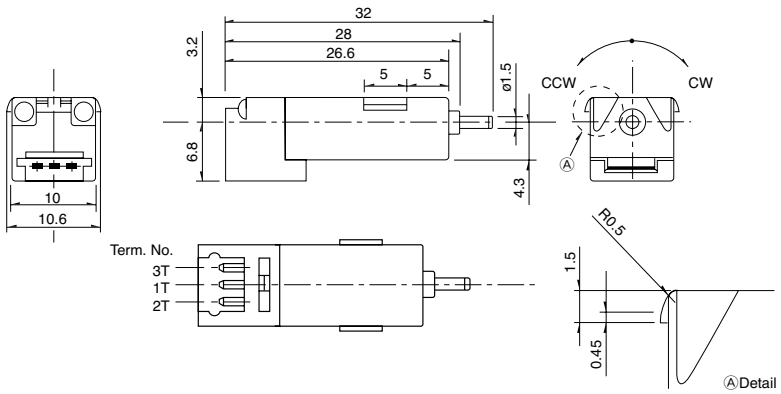
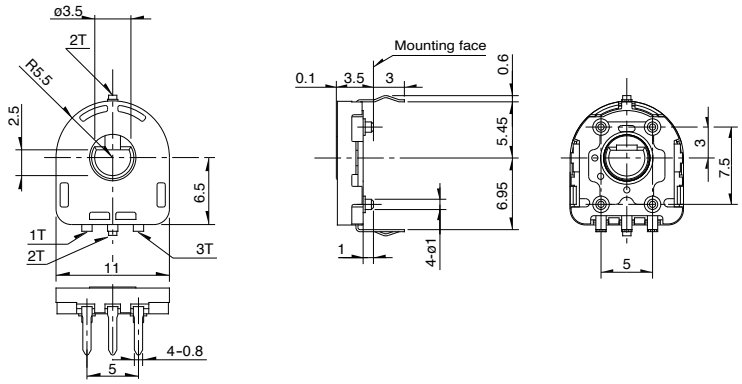
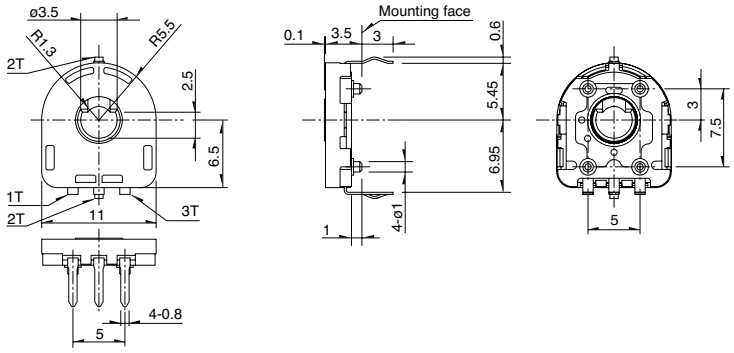
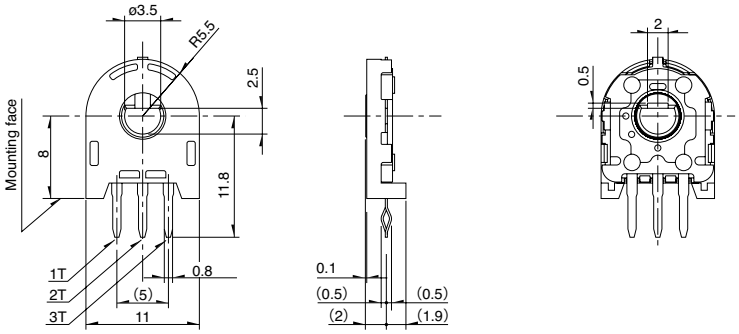
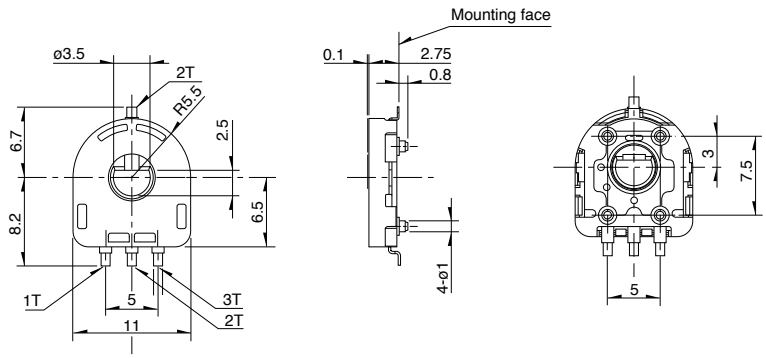
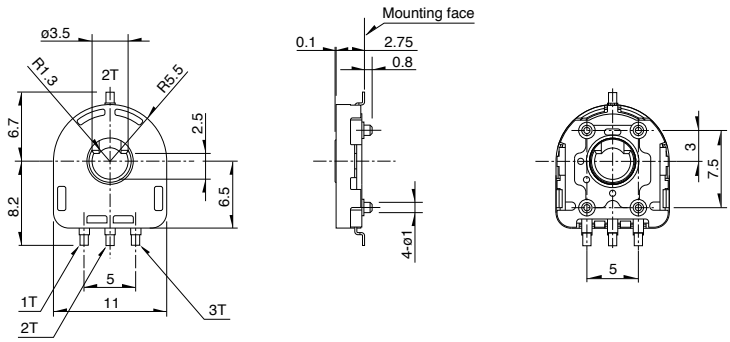
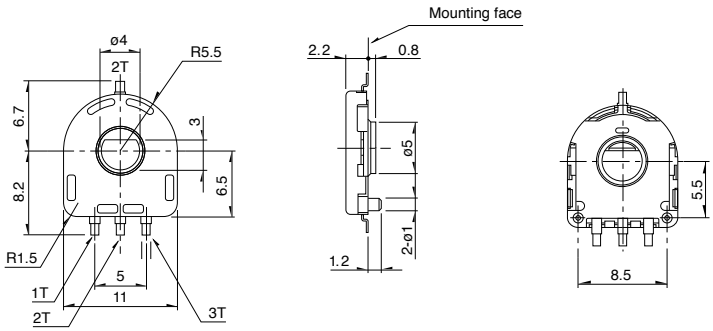
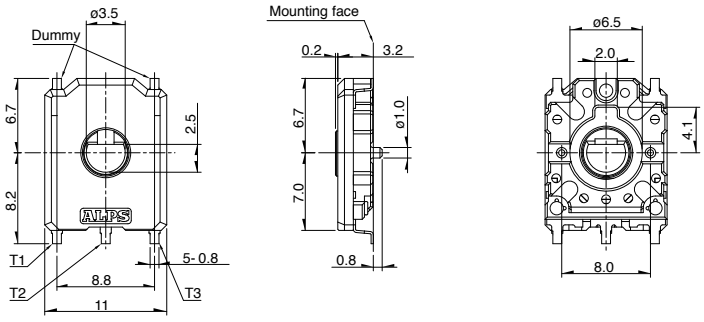
Dimensions

Unit:mm

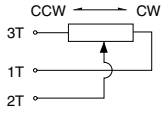
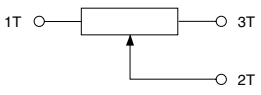
No.	Photo	Style
1	**RDC40 (Multiple turns type)** ⚠ 	
2	**RDC501 (Horizontal type)** 	
3	**RDC501 (Horizontal type, ϕ3.5 dia with radius)** 	
4	**RDC502 (Vertical type)** 	

Dimensions

Unit:mm

No.	Photo	Style
5	**RDC503 (Reflow type)** 	
6	**RDC503 (Reflow type, ϕ3.5 dia with radius)** 	
7	**RDC506 (Reflow type, low-profile)** 	
8	**RDC90 (Reflow type, Long-life)** 	

Circuit Diagram

RDC40	RDC50 / RDC90
	

Resistive Position Sensors

List of Varieties

Type		Rotary Type			
Series		**RDC40**	**RDC50**	**RDC90**	**RD6R1A**
Photo		⚠ 			
Direction of lever		Horizontal	Vertical Horizontal	Vertical	
Effective electrical angle (°)		5,400 (15 rotations)	333.3	80, 260	320
Linearity guarantee range (°)		4,680 (13 rotations)	320	60, 244	310
Travel		—	—	—	—
Operating temperature range		−30℃ to +80℃	−40℃ to +120℃		−40℃ to +85℃
Operating life		100,000 cycles	1,000,000 cycles	10,000,000 cycles	500,000 cycles
Available for automotive use		—	●	●	●
Life cycle (availability)		★2	★2	★2	★2
Mechanical performance	Operating force	—	—	—	—
	Rotational torque	1.96mN·m max.	2mN·m max.		100mN·m
Electrical performance	Total resistance tolerance	±30%			±20%
	Linearity (%)	±1	±2	±3	±2 (320°)
	Rated voltage (V DC)	5			
Environmental performance	Cold	−30℃ 240h	−40℃ 168h		
	Dry heat	80℃ 240h	120℃ 168h		85℃ 168h
	Damp heat	60℃, 90 to 95%RH 240h	60℃, 90 to 95%RH 96h		80℃, 90 to 95%RH 96h
Terminal style		Connector	Insertion / Reflow	Reflow	Connector
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Note

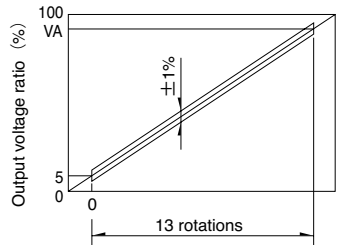
● Indicates applicability to all products in the series.

*Products marked with a ⚠ are not recommended for new designs

Method for Regulating the Linearity

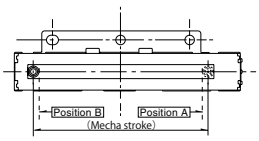
Model RDC40

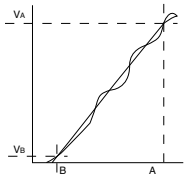
1. Reference taper : 90%/13rotations
2. VA is measured output value



Model RDC10 / RD7

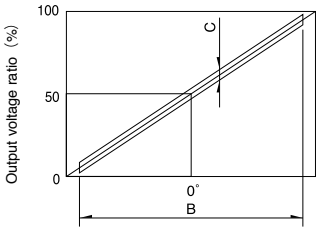
With rated voltage applied between terminals 1 and 3, the straight line which connects the measured output values VB and VA at specified reference positions B and A is assumed to be an ideal straight line, so that deviation against the ideal straight line when the voltage applied between terminals 1 and 3 is assumed to be 100% can be expressed as a percentage.





Model RDC50 / RDC90 / RD6R1A / RDCC0

1. Reference taper : 100%/A
2. Index point (0°) is 50% output point (RDC50/RDC90/RDCC0)
   The center (0°) is in the configuration diagram condition (RD6R1A)



Series	A	B	C
RDC50	333.3°	±160°	±2%
RDC90	80°	±30°	±3%
	260°	±122°	
RD6R1A	320°	±155°	±2%
RDCC0	30°	±15°	±2%

Resistive Position Sensors / Measurement and Test Methods

Resistive Position Sensor

(Total Resistance)

The total resistance, with the shaft (lever) placed at the end of terminal 1 or 3, shall be determined by measuring the resistance between the resistor terminals 1 and 3 unless otherwise specified.

(Rating Voltage)

The rating voltage corresponding to the rated power shall be determined by the following equation. When the resulting rated voltage exceeds the maximum operating voltage of a specific resistor, the maximum operating voltage shall be taken as the rated voltage.

$$E=\sqrt{P \cdot R}$$

E : Rated voltage (V)
P : Rated power (W)
R : Total nominal resistance (Ω)

Reference for Manual Soldering

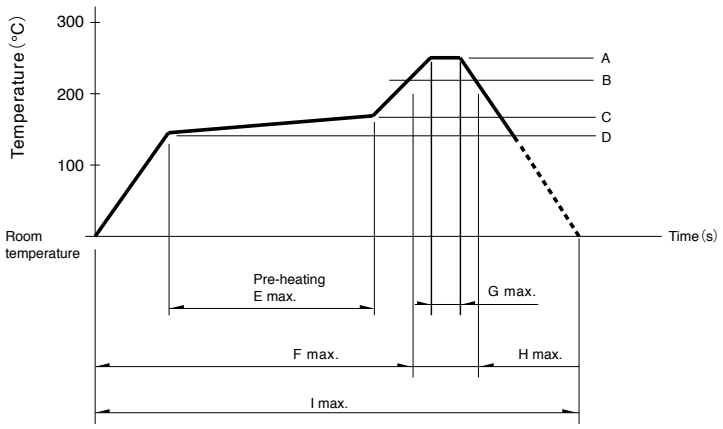
Series	Tip temperature	Soldering time
RDC50, RDC90	350±5℃	3^{+1}_{0}s
RDC10, RD7	350℃ max.	3s max.

Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
RDC501, RDC502	100 to 150℃	1minute max.	260±5℃	10±1s	1 time
RD7	100℃ max.	1minute max.	260℃ max.	5s max.	1 time

Example of Reflow Soldering Condition

1. Cleaning sensors should not be attempted.
2. Type of solder to be used Use cream solder that contains 10 to 15 %wt flux.
3. Number of solder applications - apply solder only once
4. Recommended reflow conditions



Series	A	B	C	D	E	F	G	H	I	No. of reflows
RDC503 RDC506	250℃	230℃	180℃	150℃	2min.	—	5s	40s	4min.	1 time
RDC90	255℃	230℃	—	—	—	2min.	10s	1min.	4min.	1 time

Notes

1. When using an infrared reflow oven, solder may not always be applied as intended.
   Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
2. The temperatures given above are the maximum temperatures at the terminals of the sensor when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the sensor may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the sensor does not rise to 250℃ or greater.
3. Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.

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