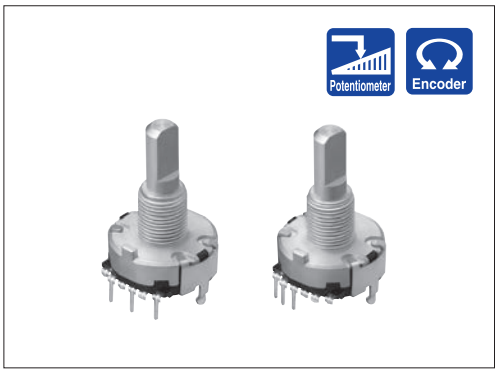
RK203
EC20A

20mm Size Metal Shaft Type

Heavy rotation torque and good operational feel, available in potentiometer and encoder types



Typical Specifications

Items	Specifications	
	Potentiometer	Encoder
Rating	0.05W	1mA 5V DC
Total resistance tolerance	±20%	—
Maximum operating voltage	50V AC, 30V DC	—
Detent torque	40±20mN·m	
Operating life	30,000 cycles	
Operating temperature range	−40℃ to +85℃	−30℃ to +80℃

Products Line

Potentiometer

Number of resistor elements	Mounting directio	Operating section	Length of operating section (mm)	Number of positions	Rotational angle	Total resistance (k Ω)	Resistance taper	Minimum order unit (pcs.)		Products No	Drawing No.
								Japan	Expert		
Single-unit	Vertical type	Flat	30	17	220°	10	B	400	800	**RK203111000V**	1

Encoder (Incremental Type)

Mounting directio	Shaft configuration	Length of operating section (mm)	Number of detent	Number of pulse	Travel of push-on switch (mm)	Minimum order unit (pcs.)		Products No	Drawing No.
						Japan	Expert		
Vertical type	Flat	30	18	18	—	400	800	**EC20A1820401**	2
					1.5			**EC20A1824401**	3

Note

1. Only the encoder type can be supplied with a push-on switch.
2. Shaft design and other features are customizable.

Packing Specifications

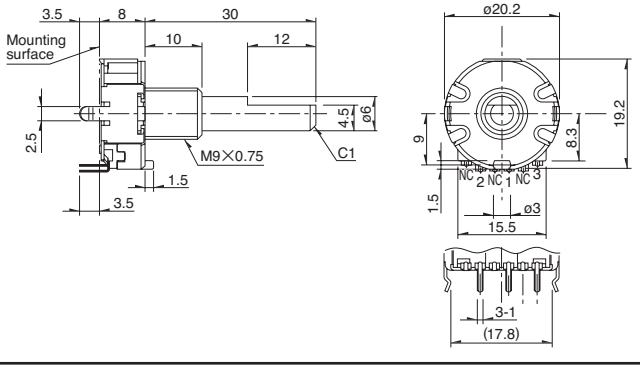
Tray

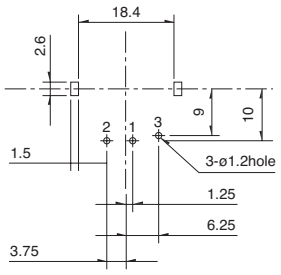
Number of packages (pcs.)		Export package measurements (mm)
1 case /Japan	1 case /export packing	
400	800	374×508×272

Dimensions

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1	**RK203** **Without switch type** **Potentiometer type**		





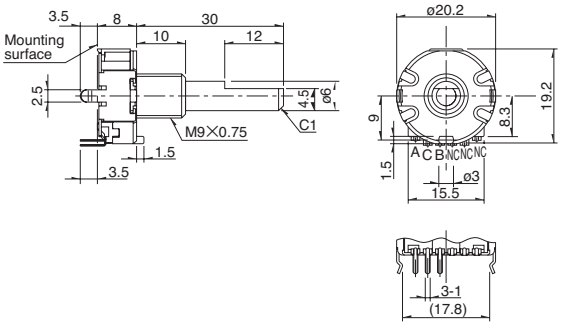
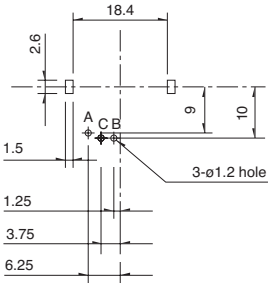
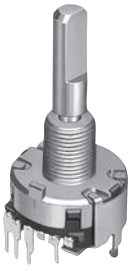
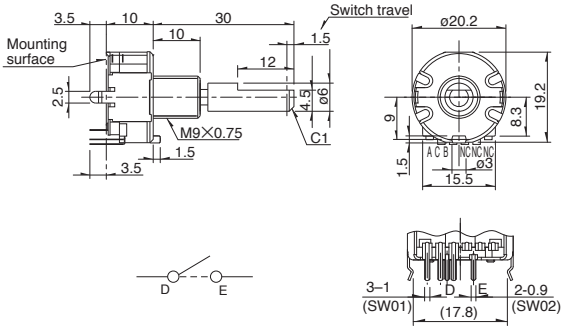
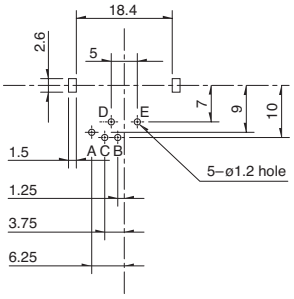


Refer to P.339 for for encoder switch specifications..
Refer to P.339 for attached parts.
Refer to P.349 for soldering conditions.

20mm Size Metal Shaft Type

Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
2	**EC20A** **Without switch type, Incremental type** 		
3	**EC20A** **With push-on switch (travel 1.5mm), Incremental type** 		

Output wave (EC20A)

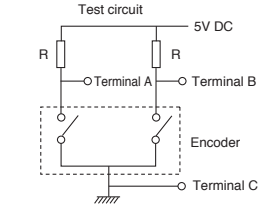
Shaft rotational Direction	Signal	Output
Clockwise	A (Terminal A–C)	OFF / ON
	B (Terminal B–C)※	OFF / ON
Counter-clockwise	A (Terminal A–C)	OFF / ON
	B (Terminal B–C)※	OFF / ON

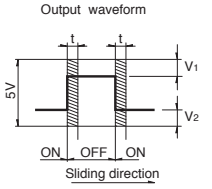
The dotted lines indicate detent positions

※ Signal B output at detent positions is not specified

Sliding noise (EC20A)

V_1=V_2=2.5V max.



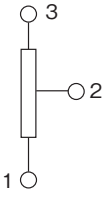


Measurement condition : Rotation speed 360°/s

t : Masking time to avoid chattering

At R = 5kΩ
Chattering : 8ms max., Bounce : 5ms max.

Circuit Diagram (RK203)



ALPS

20mm Size Metal Shaft Type / Switch Specifications

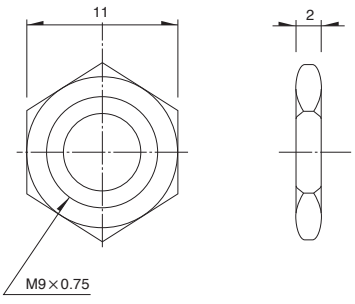
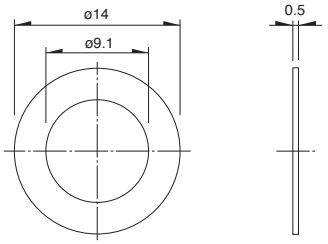
The attached switch can be used with only encoder types.

Switch type		Momentary push switch
Contact arrangement		Single pole and single throw (Push-on)
Travel (mm)		1.5±0.5
Operating force		4±2N
Operating life		20,000times
Electrical performance	Rating	0.5A 16V DC (1mA 5V DC min. rating)
	Contact resistance	100mΩ max. for initial period, 200mΩ max. after operating life.
	Insulation resistance	100MΩ min. 250V DC
	Voltage proof	300V AC for 1 minute or 360V AC for 2s

20mm Size Metal Shaft Type / Attached Parts

The following parts are included with the product.

Unit:mm

Nut	Washer
	

Metal Shaft Potentiometers

List of Varieties

Type		16mm size	20mm size	27mm size	50mm size	Rotary motor-driven
Series		**RK163**	**RK203/EC20A**	**RK271**	**RK501**	**RK168**
		Single-shaft				
Number of resistor elements		Single/dual	Single	Single/dual/quad	Dual/quad	Dual/quad/5-ganged/6-ganged
Photo						
Terminal mounting		Horizontal	Vertical	Horizontal		
Fixing method of bushing		Bushing screw clamp				
Operating temperature range		−10℃ to +70℃	RK203: −40℃ to +85℃ EC20A: −30℃ to +80℃	−10℃ to +70℃		
Operating life		15,000 cycles	30,000 cycles	15,000 cycles		
Available for automotive use		—	○	—	—	—
Life cycle (availability)		★2	★2	★2	★2	★2
Electrical performance	Total resistance (k Ω)	5, 10, 20, 50, 100, 200	10	5, 10, 20, 50, 100, 250	10, 20, 50, 100	
	Resistance taper	15A, 1B, 3B, 15C	B	15A, 3B		
	Rated Power	0.1W 0.05W (15A)	0.05W		0.1W	0.05W
	Residual resistance	R≦10kΩ 20Ω max. 10kΩ<R≦50kΩ 30Ω max. 50kΩ<R<3MΩ Nominal total resistance of 0.1% or less%	—	R≦10kΩ 20Ω max. 10kΩ<R<50kΩ 30Ω max. 50kΩ≦R Nominal total resistance of 0.1% or less%	—	—
	Maximum attenuation (Volume control)	5kΩ≦R< 10kΩ 70dB min. 10kΩ≦R< 50kΩ 80dB min. 50kΩ≦R<100kΩ 90dB min. 100kΩ≦R 100dB min.		5kΩ≦R< 10kΩ 70dB min. 10kΩ≦R< 50kΩ 80dB min. 50kΩ≦R<100kΩ 90dB min. 100kΩ≦R 100dB min.	120dB min.	5kΩ≦R< 10kΩ 70dB min. 10kΩ≦R< 50kΩ 80dB min. 50kΩ≦R<100kΩ 90dB min. 100kΩ≦R 100dB min.
	Gang error applicable to Dual-unit parts for audio volume control purposes	−40dB to 0dB 3dB max.	—	−70dB to −60dB 3dB max. −60dB to 0dB 2dB max.	−100dB to 0dB 2dB max.	−60dB to −40dB 5dB max. −40dB to 0dB 3dB max.
	Insulation resistance	100MΩ min. 500V DC	10MΩ min. 250V DC	100MΩ min. 500V DC		100MΩ min. 250V DC
	Voltage proof	500V AC for 1minute	300V AC for 1minute	500V AC for 1minute		300V AC for 1minute
	Center-taps	Without				
Mechanical performance	Detent	Without, Center, 21, 31, 41	17	Without, Center, 21, 31, 41	Without	
	Stopper strength	0.9	0.5	0.9	1.5	0.9
	Push-pull strength	100N max.			150N max.	100N max.
	Vibration	10 to 55 to 10Hz/min., the amplitude is 1.5mm for all the frequencies, in the 3 direction of X, Y and Z for 2 hours respectively				
Shaft style		Serrated type, Flat type, Slotted type	Flat type	Slotted type, Flat type	Slotted type	Flat type
Terminal style		Insertion, Lead	Insertion			
Attached switch		—	EC20A: Momentary push switch	—	—	—
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Potentiometers Measurement and Test Methods · · · · · 429
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Note

○ Indicates applicability to some products in the series.

Reference for Manual Soldering

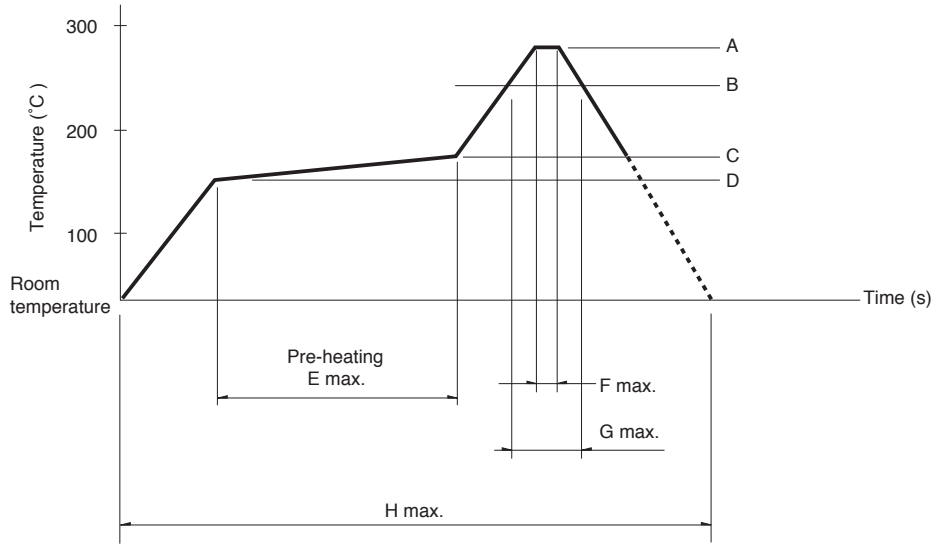
Series		Tip temperature	Soldering time	No. of solders
RK09L, RK097		350℃ max.	3s max.	1 time
RK203		300℃ max.	3s max.	1 time
RK119		350±10℃	$3\ ^{+1}_{0}$ s	1 time
RK271		350℃ max.	5s max.	1 time
RK501		350±10℃	$5\ ^{+1}_{0}$ s	1 time
RK163		350℃ max.	5s max.	1 time
RK168	**Potentiometer terminal**	300℃ max.	3s max.	1 time
	Motor terminal	350℃ max.	2s max.	1 time

Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
RK09L, RK097, RK203	100℃ max.	2 min. max.	260±5℃	5±1s	2 time max.
RK501	120±10℃	2 min. max.	260±5℃	5±1s	2 time

Example of Reflow Soldering Condition

Temperature profile



Series	A	B	C	D	E	F	G	H	No. of reflows
RK119	260℃	230℃	180℃	150℃	2 min.	3s	40s	4 min.	2 time max.

Notes

1. When using an infrared reflow oven, solder may sometimes not be applied. Be sure to use a hot air reflow oven or at type that uses infrared rays in combination with hot air.
2. The temperatures given above are the maximum temperatures at the terminals of the potentiometer when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the potentiometer may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the potentiometer 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.