

Malaysia

9 mm Square Multi-ganged Rotary Potentiometers with Metal Shaft

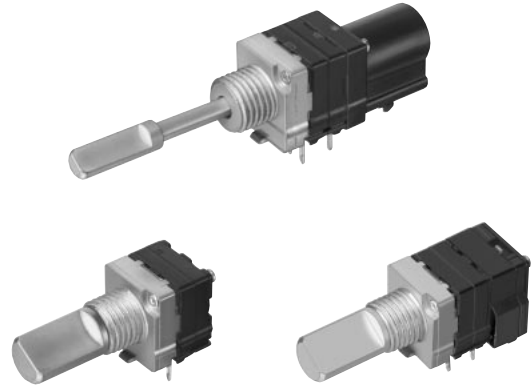
Type: **EWV/EVU**

■ Features

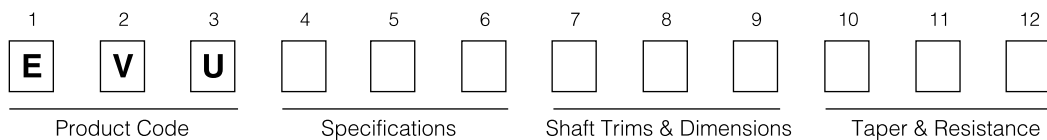
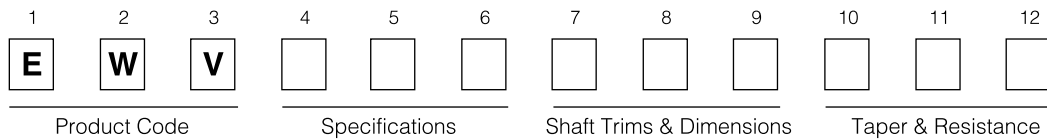
- Front square: 9.5 mm×11.3 mm
- Flexible and reliable combination of functional units
- Wave-soldering available

■ Recommended Applications

- Car Audio Equipment:
for Volume control, Tone control, Balance control and Fader control, for Power switches and Signal switches
- Audio Visual Equipment
for Volume control or Picture control



■ Explanation of Part Numbers



■ Product Chart

Construction			Rotation angle	Detent(s)	Additional functions			
					Rotary Switch	Push Switch	Push On Switch	Push lock mechanism
Type								
Single			300° 120°	Midpoint	○	○	○**	○*
Dual			300° 120°	Midpoint 41	○	○	○**	○*
2-shaft 2-gang		Outer shaft	300°, 120°	Midpoint	○	○	○**	-----
		Inner shaft	300°	Midpoint				
2-shaft 3-gang		Outer shaft	300°, 120°	Midpoint	○	○	○**	-----
		Inner shaft	300°, 120°	Midpoint, 41				
2-shaft 4-gang		Outer shaft	300°, 120°	Midpoint	○	○	○**	-----
		Inner shaft	300°, 120°	Midpoint, 41				
With clutch	1-shaft 4-gang	Normal position	300°	Midpoint	○	○	○**	○*
		Pull position	300°	Midpoint	-----	-----	-----	-----
	2-shaft 5-gang	Outer shaft	300°, 120°	Midpoint	○	○	○**	-----
		Inner shaft	Normal position	300°				
		Pull position	300°, 120°	Midpoint	-----	-----	-----	

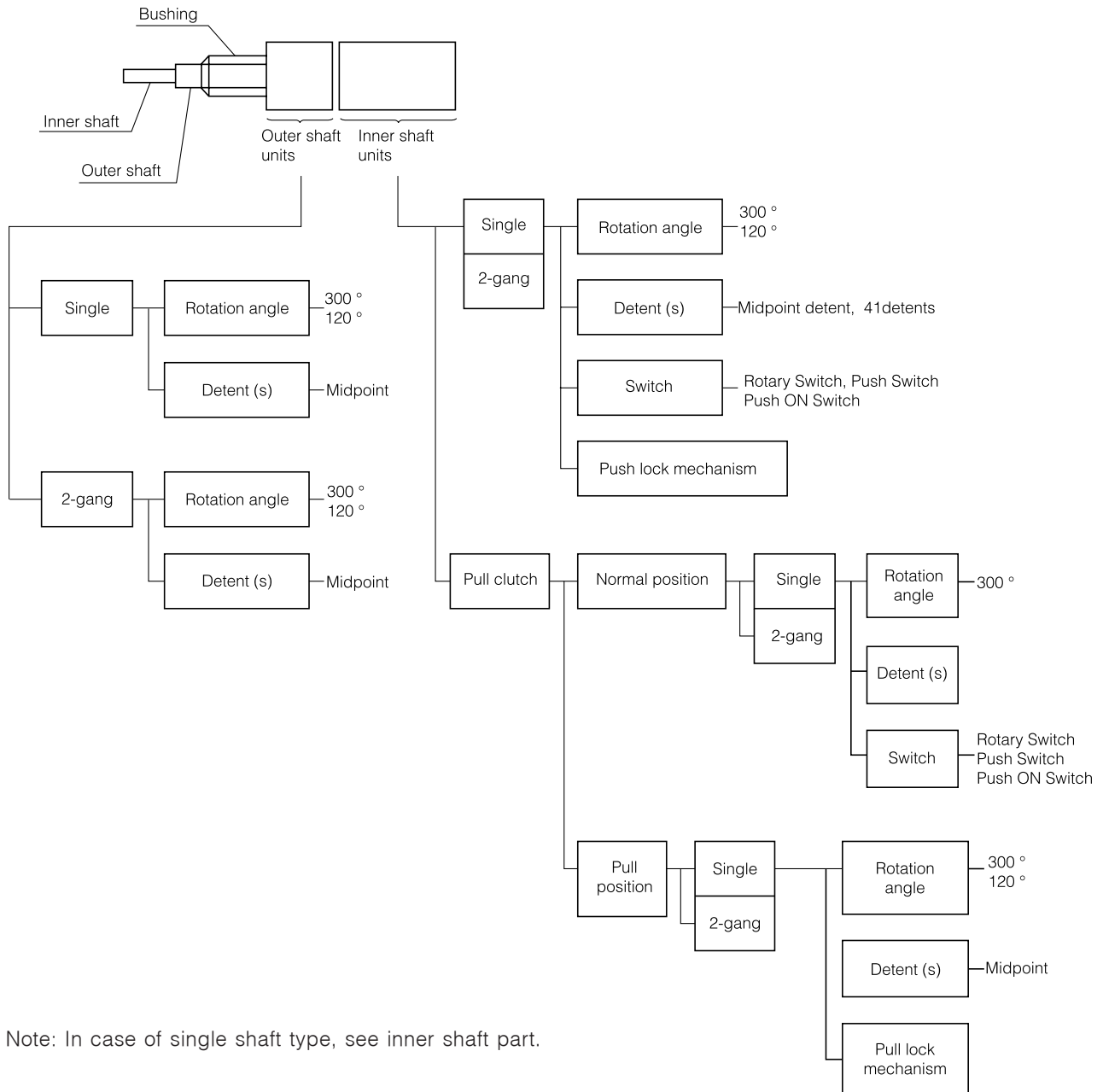
○ : In production

* Indicate the travel of the push lock mechanism. (9.0 mm - 8.0 mm type is standard, 11.0 mm - 10.0 mm type is also available.)

** Advise the push travel of the push-on switch (0.4 mm is standard, long travel 1.5 mm is also available.)


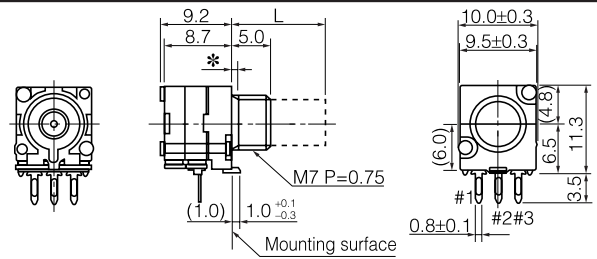
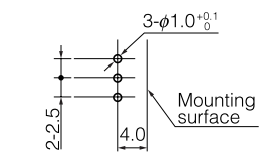
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use. Should a safety concern arise regarding this product, please be sure to contact us immediately.

■ Construction and Operation Chart


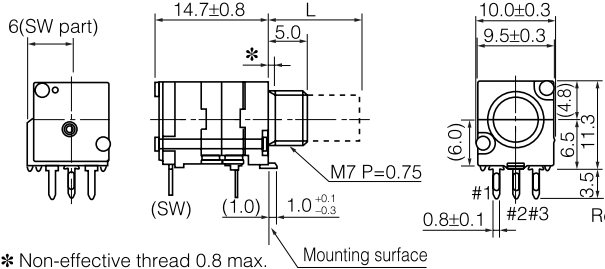
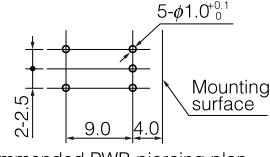


■ Dimensions in mm (not to scale)


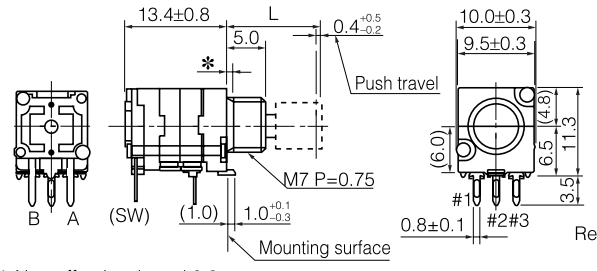
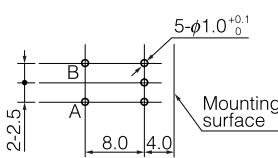
● 1-shaft EVUL□□

<p>No. 1</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p>	 <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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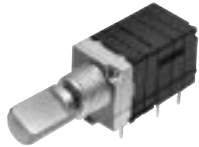
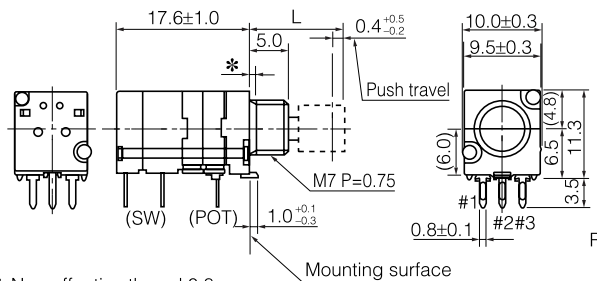
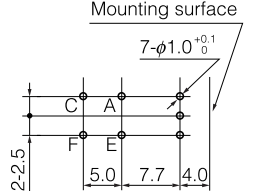
● 1-shaft, with Rotary Switch EVUK□□

<p>No. 2</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p>	 <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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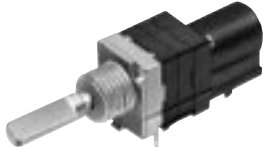
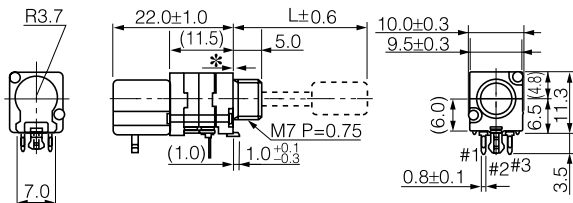
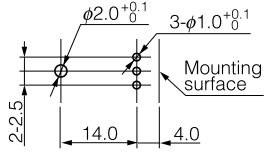
● 1-shaft, with Push-ON Switch (Short Travel) EWVA□□

<p>No. 3</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p>	 <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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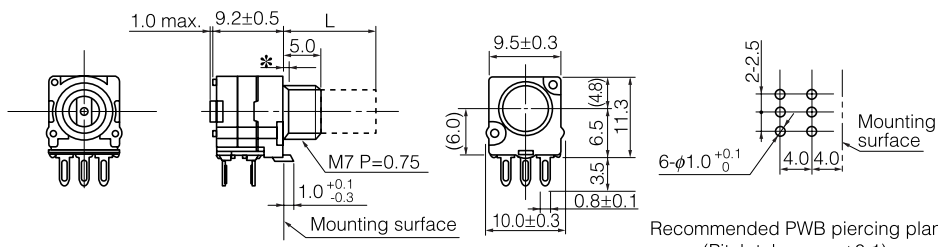
● 1-shaft, with Push Switch EWVA□□

<p>No. 4</p>  <p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 500 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p>	 <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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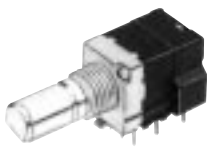
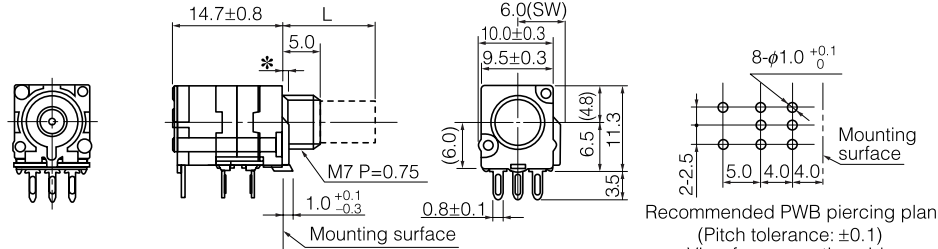
● 1-shaft, with Push-lock Mechanism (9.0 – 8.0 mm Travel) EVUK□□

<p>No. 5</p>  <p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 250 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p>	 <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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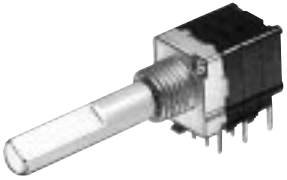
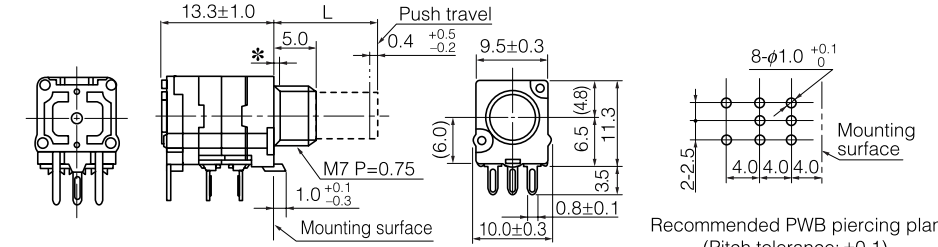
● 1-shaft Dual EVUN□□

<p>No. 6</p> 	 <p>* Non-effective thread 0.8 max.</p>
<p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	<p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>


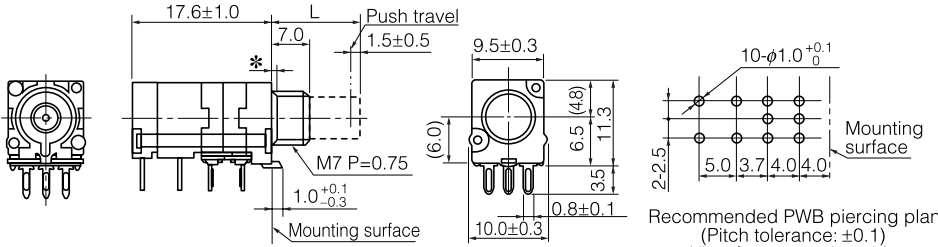
● 1-shaft Dual, with Rotary Switch EVUR□B

<p>No. 7</p> 	 <p>* Non-effective thread 0.8 max.</p>
<p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	<p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>

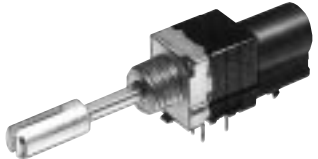
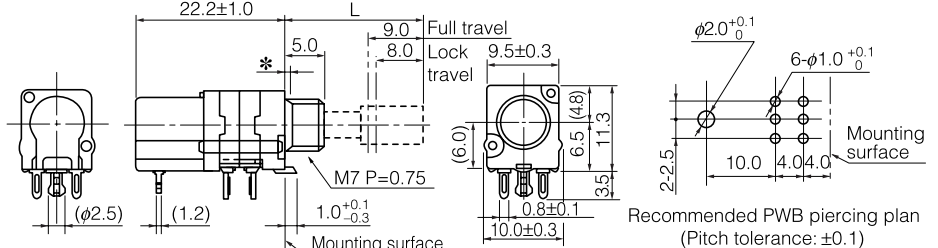
● 1-shaft Dual, with Push-ON Switch (Short Travel) EWVB□□

<p>No. 8</p> 	 <p>* Non-effective thread 0.8 max.</p>
<p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	<p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>

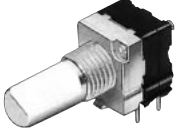
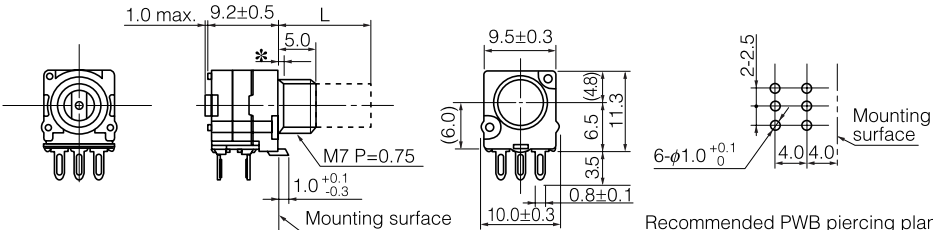
● 1-shaft Dual, with Push Switch EWVBB7

<p>No. 9</p> 	 <p>* Non-effective thread 0.8 max.</p>
<p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 500 pcs.</p>	<p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>

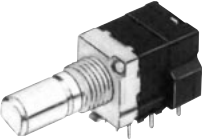
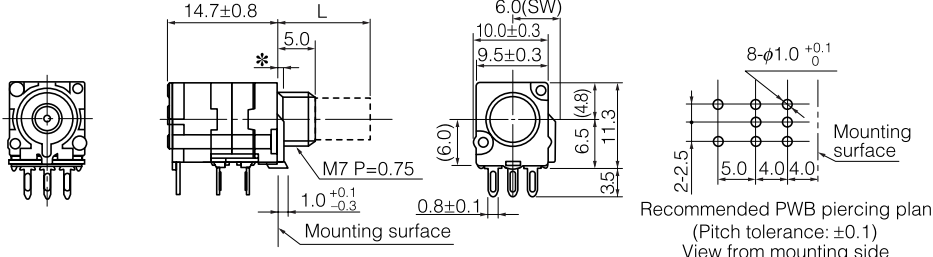
● 1-shaft Dual, with Push-lock Mechanism EWVR□A

<p>No. 10</p> 	 <p>* Non-effective thread 0.8 max.</p>
<p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 250 pcs.</p>	<p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>

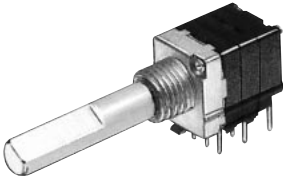
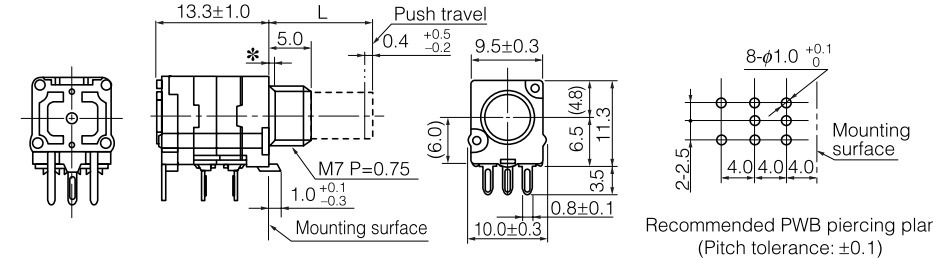
● Dual EVUN□□

<p>No. 6</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p> <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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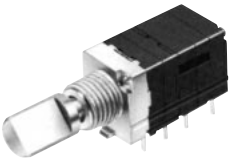
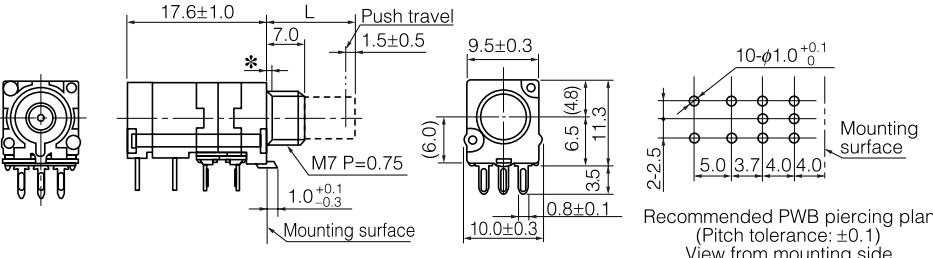
● Dual, with Rotary Switch EVUR□B

<p>No. 7</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p> <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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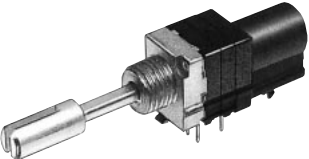
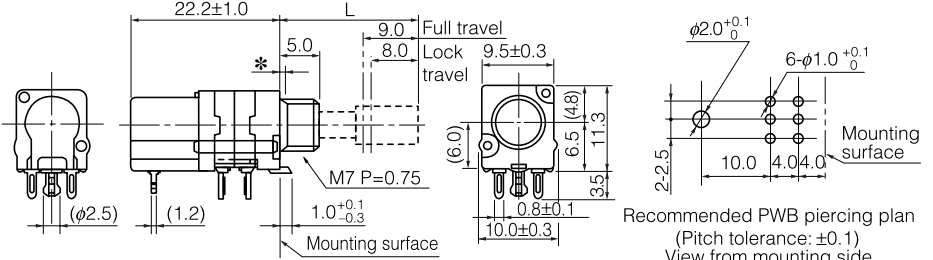
● Dual, with Push-ON Switch (Short Travel) EWVB□□

<p>No. 8</p>  <p>Min.Q'ty/Packing Unit : 100 pcs.(Tray Pack) Quantity/Carton : 1000 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p> <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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● Dual, with Push Switch EWVBB7

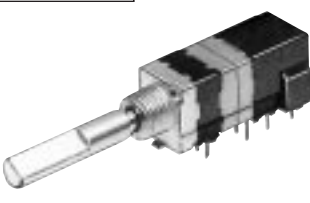
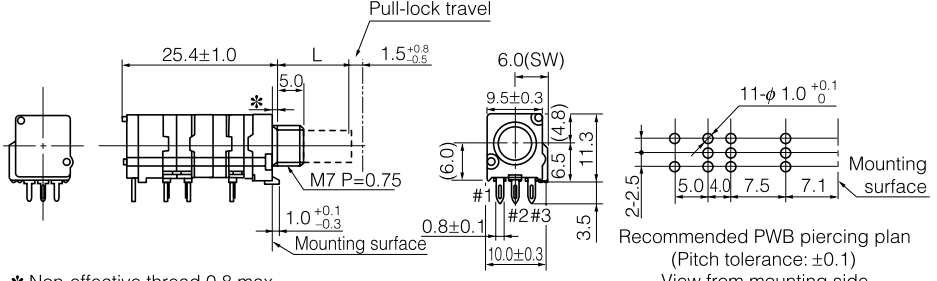
<p>No. 9</p>  <p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 500 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p> <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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● Dual, with Push-lock Mechanism EWVR□A

<p>No. 10</p>  <p>Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack) Quantity/Carton : 250 pcs.</p>	 <p>* Non-effective thread 0.8 max.</p> <p>Recommended PWB piercing plan (Pitch tolerance: ±0.1) View from mounting side</p>
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- 1-shaft 3-gang, with Pull-lock Clutch, Rotary Switch EVUX□□

No. 11

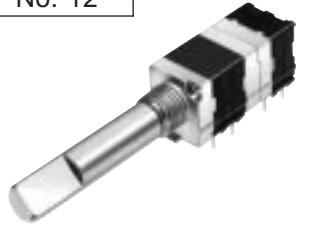
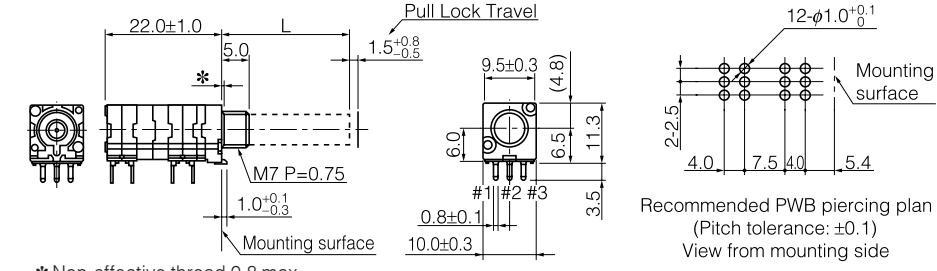
Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack)
Quantity/Carton : 250 pcs.

* Non-effective thread 0.8 max.

Recommended PWB piercing plan (Pitch tolerance: ±0.1)
View from mounting side

- 1-shaft 4-gang, with Pull-lock Clutch EVUS□□

No. 12

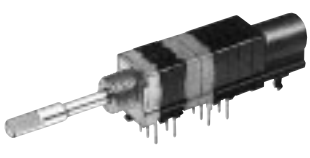
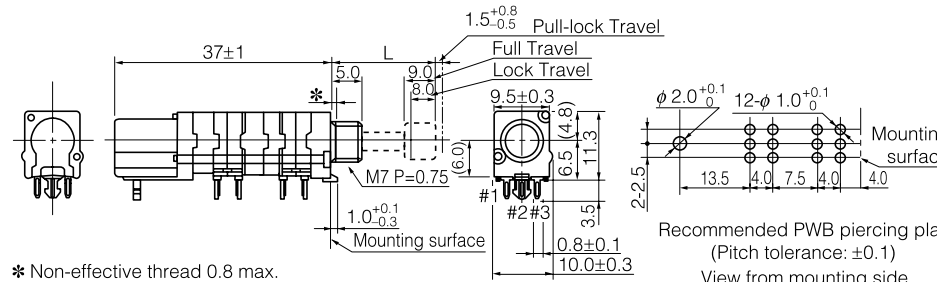
Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack)
Quantity/Carton : 250 pcs.

* Non-effective thread 0.8 max.

Recommended PWB piercing plan (Pitch tolerance: ±0.1)
View from mounting side

- 1-shaft 4-gang, with Pull-lock Clutch, Push-lock Mechanism EVUX□□

No. 13

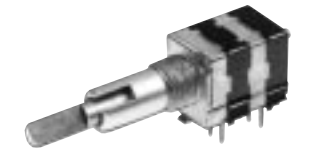
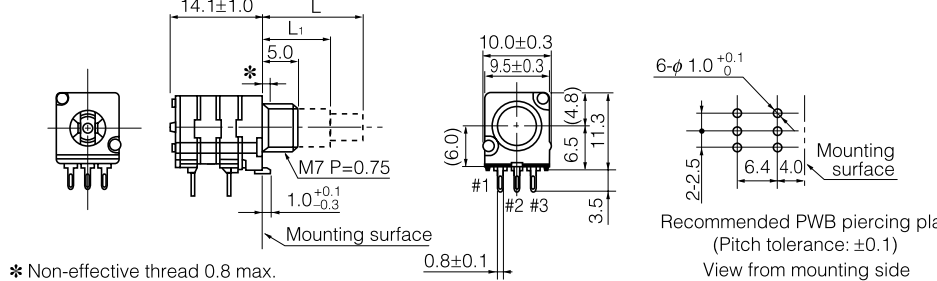
Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack)
Quantity/Carton : 250 pcs.

* Non-effective thread 0.8 max.

Recommended PWB piercing plan (Pitch tolerance: ±0.1)
View from mounting side

- 2-shaft 2-gang EWVF□□

No. 14


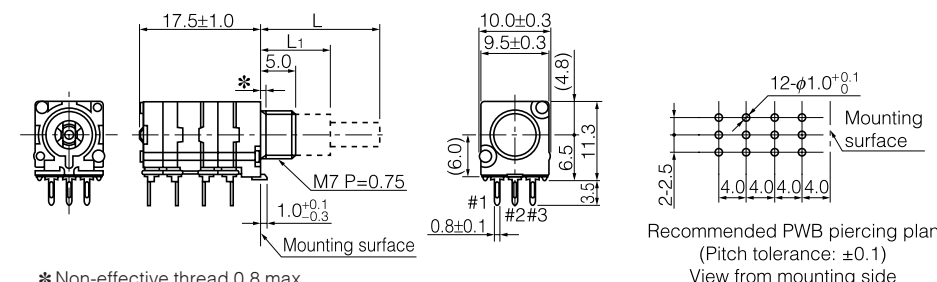
Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack)
Quantity/Carton : 250 pcs.

* Non-effective thread 0.8 max.

Recommended PWB piercing plan (Pitch tolerance: ±0.1)
View from mounting side

- 2-shaft 4-gang EVUQDA


No. 15

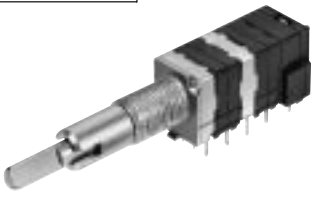
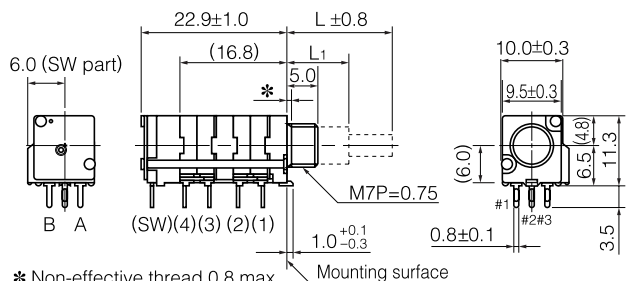
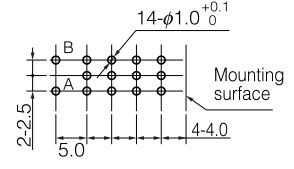
Min.Q'ty/Packing Unit : 50 pcs.(Tray Pack)
Quantity/Carton : 250 pcs.

* Non-effective thread 0.8 max.

Recommended PWB piercing plan (Pitch tolerance: ±0.1)
View from mounting side


- 2-shaft 4-gang, with Rotary Switch  Dual Rotary Switch EVUQ□□

No. 16

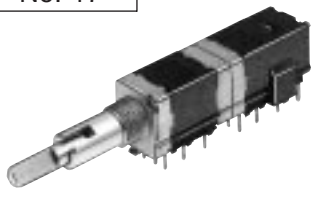
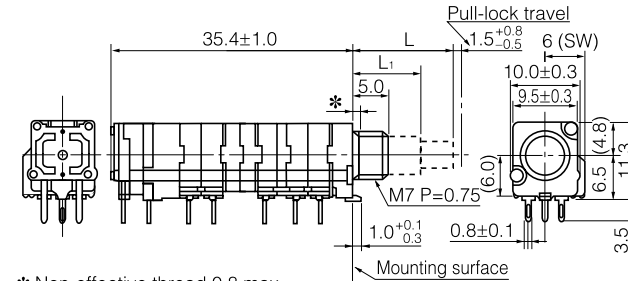
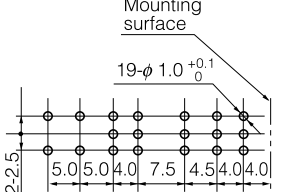




Min. Qty/Packing Unit : 50 pcs. (Tray Pack)
Quantity/Carton : 250 pcs.

Recommended PWB piercing plan
(Pitch tolerance: ±0.1)
View from mounting side

- 2-shaft 5-gang, Inner Shaft with Pull-lock Clutch, Rotary Switch, Push-ON Switch (Short Travel)  Dual / Pull-lock / Rotary Switch / Push-ON Switch EVUX□□

No. 17

Min. Qty/Packing Unit : 50 pcs. (Tray Pack)
Quantity/Carton : 250 pcs.

Recommended PWB piercing p
(Pitch tolerance: ±0.1)
View from mounting side

Major Specifications

Electrical Specifications

1. Total Resistance and Tolerance

Nominal Total Resistance	Rotation Angle	Tolerance
5 kΩ to 250 kΩ max.	300 °	±20 %
	180 °, 120 °	±30 %

2. Taper

Measuring Method		Out-put Voltage between Terminal 1 & 2 Operating Voltage between Terminal 1 & 3 × 100(%)			Out-put Voltage between Terminal 2 & 3 Operating Voltage between Terminal 1 & 3 × 100(%)		
Taper		Effective rotation angle					
Nominal	Panasonic	30 %	50 %	60 %**	30 %*	50 %*	60 %**
15A	A	—	10 to 25	15 to 30	—	—	—
1B	B	—	40 to 60	—	—	—	—
15C	C	—	—	—	—	10 to 25	15 to 30
10A	D	—	6 to 15	—	—	—	—
4B	G	[(5 to 15)]	40 to 60	—	[5 to 15]	—	—
H	BH	See item 8.2.					

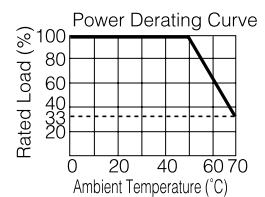
Notes:

- * Angle from terminal 3 side.
** Applied to only types with a rotary switch.
- () is per JIS (Japanese Industrial Standard). Unless otherwise specified, we consider it at 50 % rotation, however, upon request above JIS can be applied.
- [] is reference only.
- Taper G (4B) is assured at only 50 % point.

3. Power Rating

- 0.025 W (0 °C to 50 °C)

For potentiometers operated in ambient temperatures above 50 °C, Rating shall be derated in accordance with the figure at right.



4. Voltage Rating

$$E = \sqrt{P \cdot R} \text{ but } E \leq 70$$

(12 Vdc for dc applicable type only)

E=Voltage Rating (V)
P=Power Rating (W)
R=Nominal Total Resistance (Ω)

5. Insulation Resistance

50 MΩ min. at 250 Vdc

6. Dielectric Withstanding Voltage

300 Vac for 1 minute

7. Noise Level

100 mV max.

Apply 20 V (When Voltage Rating < 20 V, use the rated voltage.)
Rotate shaft at 30 r/min.

8. Residual Resistance

The resistance between terminal 1 and terminal 2 when wiper is at counterclockwise end, and the resistance between terminal 2 and terminal 3 when wiper is at clockwise end, is the residual resistance, as indicated below.

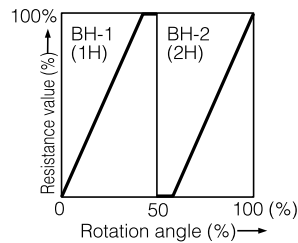
8.1 Standard Taper

Nominal Total Resistance	Type Taper & Terminal	For General Purpose (tone)				For Volume Control		With Rotary Switch	
		A, B, D, G	B, C, G	A, D	C	A, B, D	A, B, D	A, B, D	A, B, D
		1 & 2	2 & 3	2 & 3	1 & 2	1 & 2	2 & 3	1 & 2	2 & 3
$5\text{ k}\Omega < R \leq 50\text{ k}\Omega$		2 max.		25 max.		2 max.	25 max.	3 max.	25 max.
$50\text{ k}\Omega < R \leq 250\text{ k}\Omega$		25 max.		50 max.		5 max.	50 max.	50 max.	50 max.

Note: 120° rotation products and dc applicable products are not included.

8.2 BH (1H, 2H) Taper

In case of BH taper, minimum resistance on each resistive part shall be 50 Ω max.



8.3 For 120° Total Rotation Angle

Classification	Nominal Total	Residual Resistance	
		Term. 1 & 2	Term. 2 & 3
Standard	$R \leq 50\text{ k}\Omega$	25 Ω max.	25 Ω max.
	$50\text{ k}\Omega < R$	50 Ω max.	50 Ω max.

8.4 For dc Applicable Type (Single control)

Nominal Total Resistance	Switch Taper & Terminal	Without Switch				With Rotary Switch	
		A, B, D, G	B, C, G	A, D	C	A, B, D	A, B, D
		1 & 2	2 & 3	2 & 3	1 & 2	1 & 2	2 & 3
$5\text{ k}\Omega < R \leq 50\text{ k}\Omega$		5 Ω max.		25 Ω max.		10 Ω max.	25 Ω max.
$50\text{ k}\Omega < R \leq 250\text{ k}\Omega$		25 Ω max.		50 Ω max.		50 Ω max.	50 Ω max.

Note: Above specifications shall not be applied to dc applicable ganged type.

● Mechanical Specifications

1. Rotation Angle

Standard type	$300^{\circ} \pm 5^{\circ}$, $120^{\circ} \pm 5^{\circ}$
Pull/Push drive type	$300^{\circ} \begin{smallmatrix} +10^{\circ} \\ -5^{\circ} \end{smallmatrix}$, $120^{\circ} \begin{smallmatrix} +10^{\circ} \\ -5^{\circ} \end{smallmatrix}$

2. Rotation Torque

Temperature		at normal temperature (5 °C to 35 °C)
1-shaft		2 mN·m to 15 mN·m
2-shaft	Outer	2 mN·m to 20 mN·m
	Inner	2 mN·m to 15 mN·m

3. Shaft Stopper Strength

Standard type 0.5 N·m

Pull/Push drive type 0.4 N·m

4. Shaft Pull/Push Strength

Push strength 100 N

Pull strength 100 N

5. Shaft Angle

Shaft angle against mounting surface shall be 90 °.

Shaft bend and wobble shall be:

$$a \times L/30(\text{mm}) \text{ max.}$$

when moment M is applied to the measuring point of shaft.

Where:

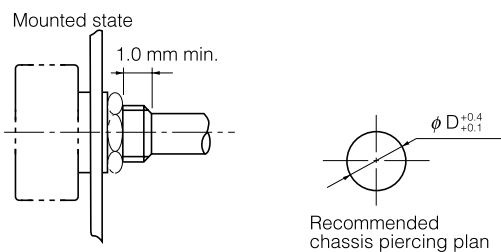
a= Constant one sided value as shown below
L= Distance between mounting surface and measuring point on the shaft
M= 50 mN·m

Style and Type		Shaft Wobble (a)	
Without switch or with rotary switch _h	1-shaft type	0.3 mm	
	2-shaft type	Outer shaft	0.3 mm
		Inner shaft	0.5 mm
With pull-push switch or push-push switch	2-shaft, outer shaft	0.3 mm	
	1-shaft & 2-shaft, Inner shaft	0.5 mm	

Note: Types with Push-lock Mechanism shall be consulted individually.

6. Nut Tightening Torque

When nut is tightened as specified below, unevenness of shaft rotation shall not occur.



Bushing dia., etc.	Tightening strength
9.0 mm dia. metal shaft	1.5 N·m max.

● Other Specifications

1. Standard Shaft Trims and Dimensions in mm

1.1 1-shaft type

Type F (Flat)

Drawing at full CCW position

D	F	L ₁	L ₂	L
6.00	4.5	5.0 or	9.0 (7.0)	L ₁ +10.0
4.75	4.0	7.0 or	8.0	
3.50	2.5	10.0	(6.0)	

() : With Push Switch

Note:
Consult our salesmen regarding the shaft length for Push-lock mechanism.

Type S (Slotted)

Although shaft position is at random, it may be specified if necessary.

D	S	L ₁	L ₂	L
6.00	1.0	5.0 or 7.0	1.6	L ₁ +10.0
4.75	1.5	or 10.0	8.0 (6.0)	

() : With Push Switch

Note:
Consult our salesmen regarding the shaft length for Push-lock mechanism.

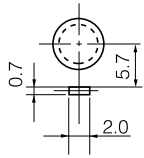
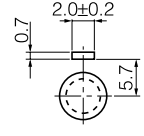
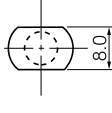
1.2 2-shaft type

Type S (Slotted)-Type F (Flat)

Drawing at full CCW position of total rotation angle 300°.

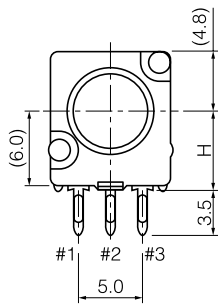
L	L ₁	L ₂
5.0	L+10.0	L ₁ +10.0
7.0		
10.0		

2. Standard Bushing Trim and Dimensions in mm

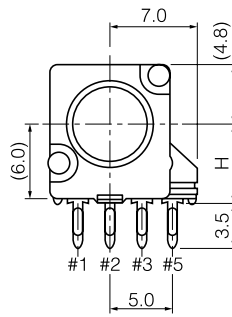
Screw dia.	6.0 mm dia. 7.0 mm dia.	7.0 mm dia.	9.0 mm dia.
Applications	All types	All types	2-shaft type
Recommended piercing plan of bushing and stopper			
Screw length	5.0 mm	○	○
	7.0 mm	○	△
	10.0 mm	○	○

Note:
Screw (M3 P=0.75 mm) mounting type also available as custom design. Contact us for more details.

3. Mounting Height and Standard Terminal Dimensions in mm



Outline drawing without tap



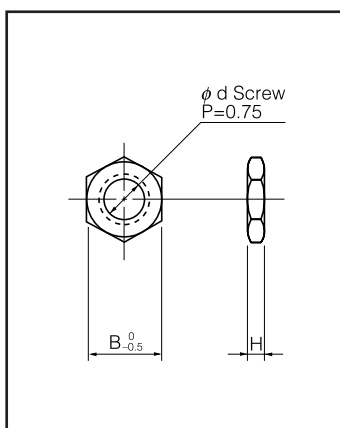
Outline drawing with tap

Notes:

- Available mounting height (H): 6.5 mm and 10.0 mm (8.0 mm also available upon request).
- Tap terminal available on terminal 3 side only.

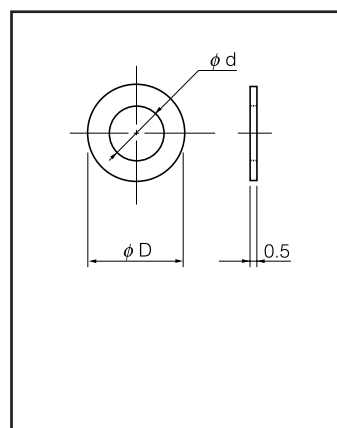
4. Nut and Washer Dimensions in mm

4.1 Nut



Bushing dia.	Actual d dia.	B	H
6.0	6.0	9.0	2.0
7.0	7.0	11.0	2.0
9.0	9.0	11.0	2.0

4.2 Washer



Bushing dia.	Actual d dia.	D dia.
6.0	6.2	11.0
7.0	7.2	12.0
9.0	9.2	14.0

Note: Inform us when nuts and washers are unnecessary.

● Switches for 9 mm Square Rotary Potentiometers with Metal Shaft

Type	Circuit Diagram	Rating	Operating Characteristics
Rotary Type	SPST	3 A 16 Vdc	Operating Angle: 50 ° max. Operating Force: 40 mN·m max.
Push-Push Type*	DPST	3 A 16 Vdc	Operating Travel: 1.5 mm Operating Force: 15 N max.
Push-on Type (Momentary)	SPST	20 mA 15 Vdc	Operating Travel: 0.4 mm, 1.5 mm Operating Force: 8 N max.
Self-returning Rotary-on Type	One step type	20 mA 12 Vdc	Operating Angle: 35 ° max. Operating Force: 100 mN·m max.

*Specify whether used in a circuit with inrush current or resistive load.

Electrical Characteristics

- Contact Resistance
The contact resistance measured by a 1 A 5 Vdc voltage drop method shall be 100 mΩ max.
- Insulation Resistance
The insulation resistance measured by a 250 Vdc megger should be 100 MΩ min.
- Dielectric Withstanding Voltage
300 Vac for 1 minute

Endurance

The switch under resistive load should be subjected to 10000 cycles of operation in total at a speed of 600 to 1000 cycles per hour. The contact resistance measured after testing shall be 200 mΩ max.

Note: Consult us if there is a flow of inrush current over rating.