

NOBLE '85

● ELECTRONIC COMPONENTS



TEIKOKU TSUSHIN KOGYO CO., LTD.

KB-BF2 Type



KB-BF1 Type



FEATURES

- Full stroke, membrane type keyboards.
- Noble's original printing technology is employed for the contacts and matrix pattern, ensuring high reliability.
- The carbon printed contacts give excellent environmental characteristics and endurance.
- Keytop legends are all printed on a sheet, eliminating the possibility of key misarrangement.
- Keytop typeface and graphic pattern are freely designed.
- Completely made in our factory, from the production of components involving contact printing and top-layer formation, to the final assembly.
- Patent pending

SPECIFICATIONS

Full stroke	$3 \pm 0.5\text{mm}$
Operating force	$80 \pm 30\text{g}$
Max. rating	5VDC 0.2mA
Contact resistance	Less than $1\text{k}\Omega$
Bounce	Less than 5msec.
Operating life	3,000,000

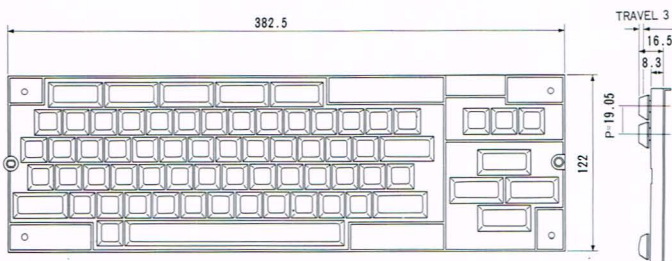
APPLICATION

Home computer, personal computer, etc.

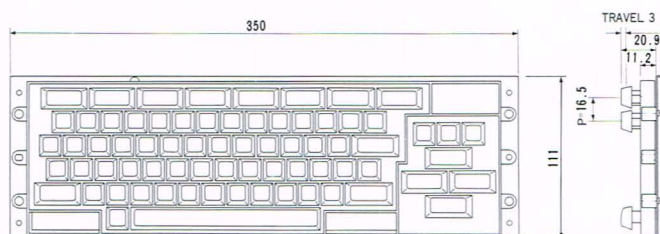
Switching position



KB-BF2 Type

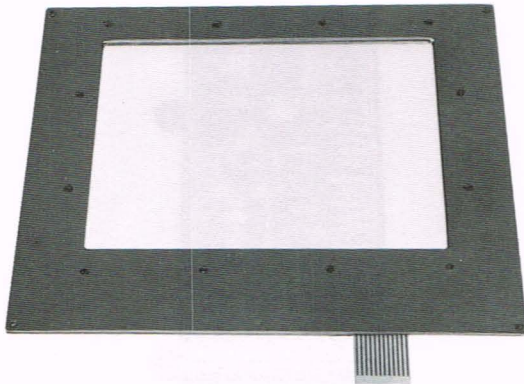


KB-BF1 Type

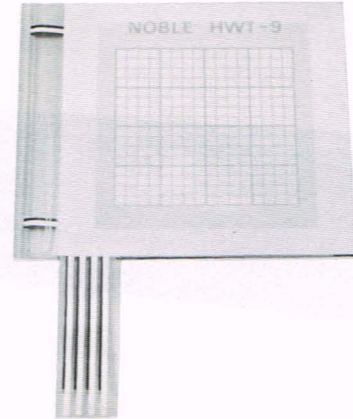


Hand Writing Tablet (HWT)

HWT22B



HWT9



The HWT (Hand Writing Tablet) is a device for sensing a position on the coordinates, permitting input of hand-written characters and graphics.

ter and graphics.

TYPES AND FEATURES OF HWT

I. Air Gap Type

- Suitable for small-size inputting.
- Responds to a very small pressure; the light touch of a fingertip can cause the cursor to move (similar to a mouse).
- Cost-saving, simple construction.

II. Pressure-Sensitive Conductive Rubber Type

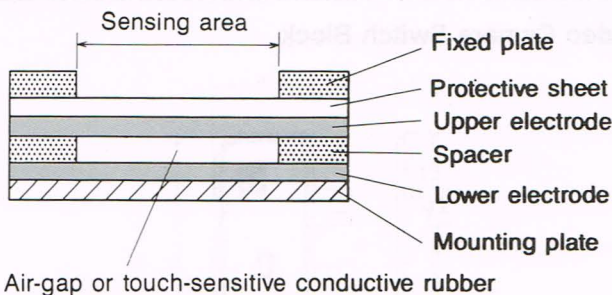
- Suitable for large-area inputting.
- Ideal for inputting of graphics and characters drawn with a ball point pen, etc.
- Hand-support is unnecessary despite the large input area.

SPECIFICATIONS

Sensing area	Air-gap type: B9 size or smaller Pressure-sensitive conductive rubber type: A4 size or smaller
Resistance	100Ω-10kΩ/□
Linearity	Within ±3%
Max. input load	Withstands a load of 300g applied with a ball-point pen.
Sliding life	After applying a sliding load of 300g with a ball point pen 100,000 times, the change in resistance shall be less than ±20%.
Temperature range	-10°C to +60°C

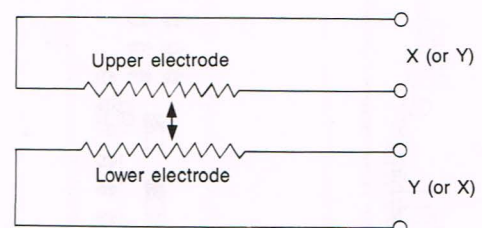
Consult us for size of the input area and input method.

Construction



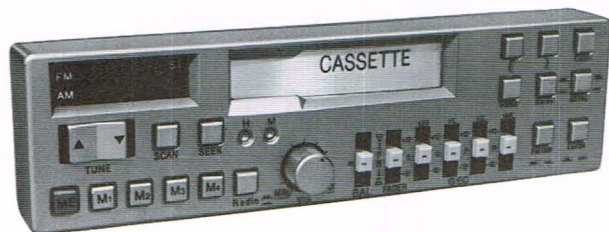
Operating Principle and Equivalent Circuit

The upper and lower electrodes come in contact and become conductive with each other when pressure is applied with pen or finger. The upper electrode is for determining the X (or Y) coordinate, and the lower electrode for the Y (or X) coordinate.



Integrated Control Blocks

Car Stereo Control Block



Video Camera Control Block



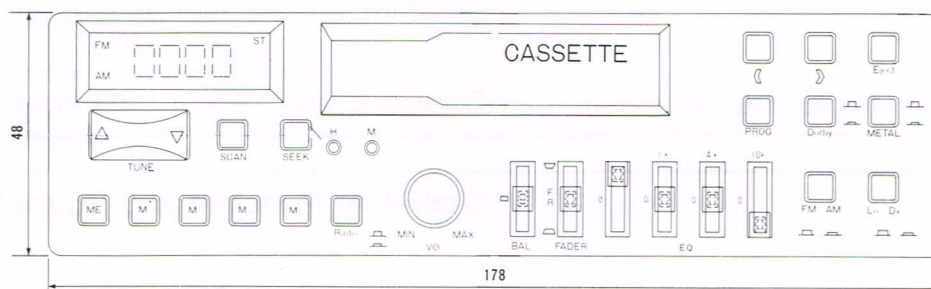
ICB

Noble has developed various kinds of control blocks to meet new demands for electronic parts. The Integrated Control Block (ICB) incorporates various functions in a small package. Unlike an assembly of discrete parts, the single modular design gives positive personality to a set and achieves overall cost saving.

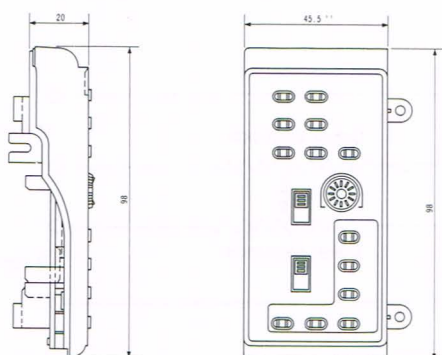
FEATURES

- Various functions are available in a single modular design.
- Two-sided phenolic circuit board utilizing carbon contacts, silver jumper, silver through-holes.
- Contacts for potentiometer element, tactile switch, or slide switch can be made on the circuit board.
- Entirely processed in our factory—precision cutting, forming, plating and the final assembly.

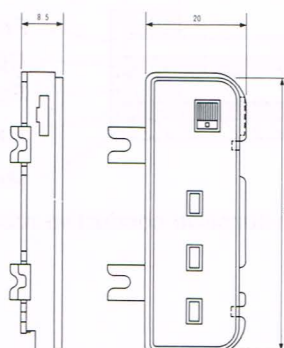
Car Stereo Control Block



Video Camera Control Block



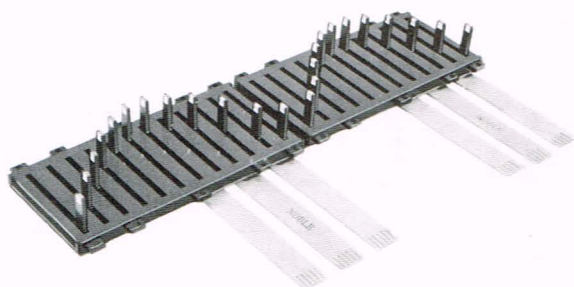
Video Camera Switch Block



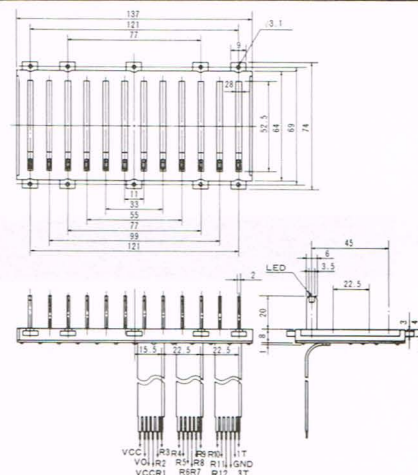
Photos and drawings show examples only. Consult us about specific designs and combinations.

Control Block for Graphic Equalizer VJK Series

New Product



VJK 45



FEATURES

- Designed specially for installation in graphic equalizer.
- Block design permits uniform element performance and easy, cheaper installation.
- Block design allows greater accuracy in aligning knobs, and facilitates mounting.
- Use of circuit board with patterns on both sides, and cable lead-out method make p-c board unnecessary for mounting.
- Optional one-piece knob/shaft, plated resin shaft, and shaft with LED.
- Choice of center-click or multi-point click type.
- Designed with flexibility to accommodate particular set design, or specific combination of band number and operating stroke.
- UL standard can be met as p-c board.
- Patent pending.

APPLICATION

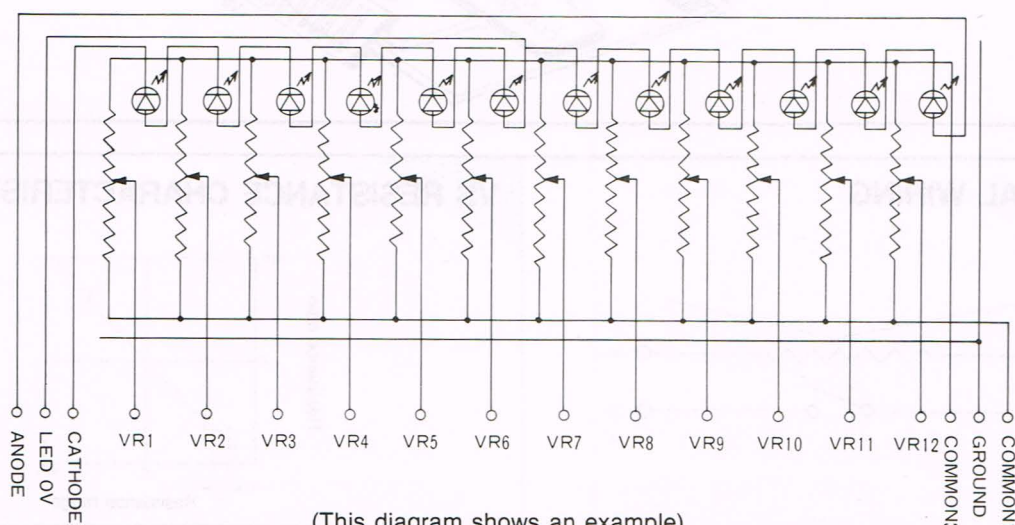
Graphic equalizer, radio-cassette recorder, etc.

SPECIFICATIONS

Operating stroke	10, 15, 20, 30, 45, 60 mm
Operating force	50-350g
Nominal total resistance (per element)	2k Ω to 1M Ω (B)
Resistance tolerance	$\pm 20\%$
Residual resistance	Less than 50 Ω across terminals 1-2 Less than 50 Ω across terminals 2-3
Others	In accordance with customer specifications

Photos and drawings show examples only. A combined design with printed circuit board, or a modular design with various control functions is possible. A standard type lever is available. Consult us about details.

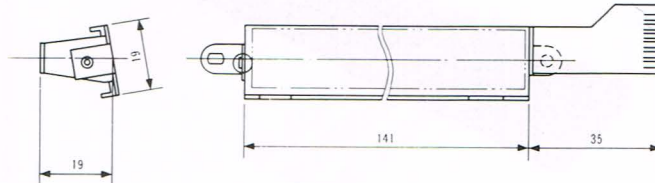
VJK INTERNAL WIRING



(This diagram shows an example)

Direct Access Volume Control VS Series

VS-115



FEATURES

- Direct access volume control system permitting one-touch volume setting.
- Light surface touch on the desired point causes the system to read the resistance at the point.
- To make a system incorporating the direct access volume control, A/D conversion and other provisions are needed.

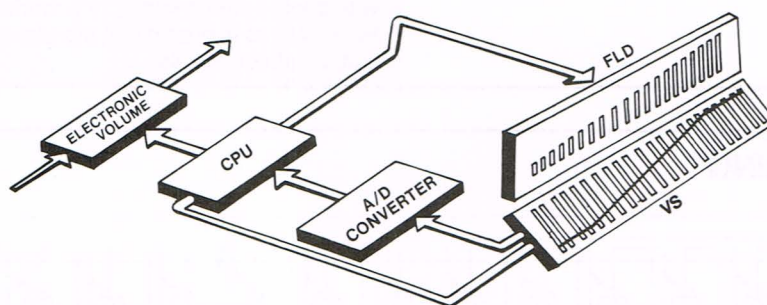
APPLICATION

Volume control for premain amplifier, cassette deck, CTV; controller for air conditioner, etc.

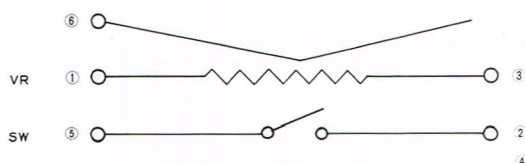
SPECIFICATIONS

Temperature range	− 10°C to +60°C
Nominal total resistance	10kΩ to 250kΩ
Resistance tolerance	± 20%
Residual resistance	Less than 50Ω across terminals 1-2 Less than 50Ω across terminals 2-3
Resistance taper	Taper B
Switch rating	10V DC, 1mA (load impedance)

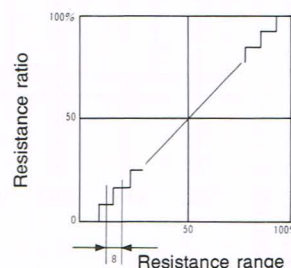
DIRECT ACCESS VOLUME CONTROL OPERATION



VS INTERNAL WIRING



VS RESISTANCE CHARACTERISTICS



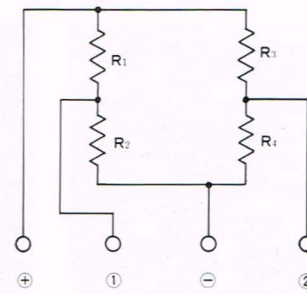
Drawings and specifications given above are examples. For specific design and specifications, consult us.

Thin Film Magnet-resistor Sensor TDM Series

New Product



EQUIVALENT CIRCUIT



FEATURES

- Element to induce thin-film magnetic field effect resistance.
- Excellent low-magnetic sensitivity. Very low drive current.
- Compact with high resolution.
- Little affected by contamination. Almost no degradation in performance.

APPLICATION

For controlling motor rotation speed, sensing position, or sensing distance of travel.

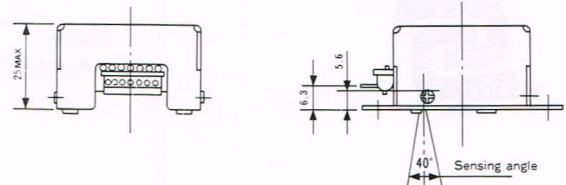
SPECIFICATIONS

Element resistance	1k Ω –3k Ω
Resistance change	More than 2.6% (150 oersted)
Offset voltage	Within $\pm 60\text{mV}$
Temperature change at offset	Less than 3mV
Frequency response	0–200kHz
Insulation resistance	More than 100M Ω

Pyroelectric Type Infrared Temperature Sensor Block MG1



MG1



FEATURES

- Senses wide wavelength range, from 1 to 20 μm .
- Pyroelectric type permitting operation under normal room temperature.
- Highly accurate temperature measurement helped by the built-in sensing element for ambient temperature correction.
- Small step motor is used for the chopper, giving small fluctuation and low power consumption.

APPLICATION

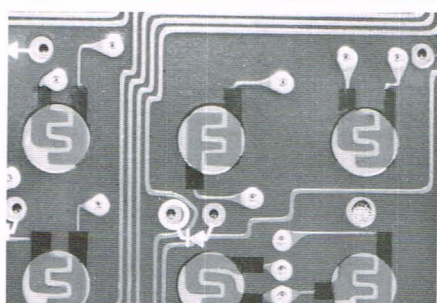
For copying machine, electronic range, burglary alarm device, fire sensing device, various kinds of analyzing devices, etc.

SPECIFICATIONS

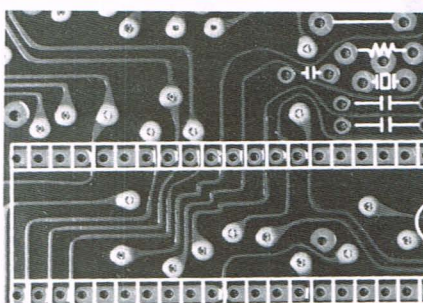
Power supply voltage	12VDC
Chopper frequency	1Hz
Sensing angle	40°
Output impedance	10k Ω
Sensitivity	More than 45V/W
Response wavelength range	1–20 μm
Temperature range	5–80°C

Multi-Function 2-Sided Printed Circuit Board

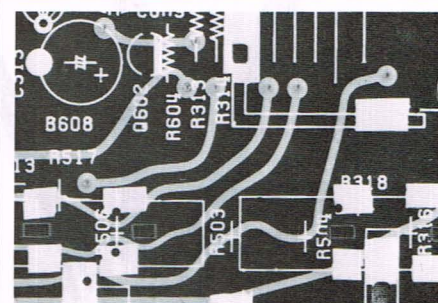
Carbon Contact



Ag(Silver) Through-Hole



Ag(Silver-Printed) Jumper



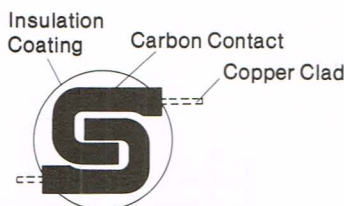
FEATURES

- Superior overall performance combining NOBLE's advanced technology in carbon printing, silver printing, and mechanical parts design.
- Carbon print contacts allows integration with keyboard VA.
- Ag through-hole cuts cost of p-c board with patterns on both sides, and facilitates high-density packaging.
- Ag jumper reduces number of assembly steps, saving overall costs.
- Fixed resistor can be printed as necessary.
- Slide potentiometer, slide switch, or other mechanical parts can be incorporated into one circuit board.
- UL standard can be met.

APPLICATION

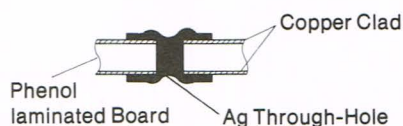
Radio-cassette recorder, audio equipment, electronic equipment, remote control unit, portable VCR, video camera, personal computer, copying machine, etc.

Carbon Contact



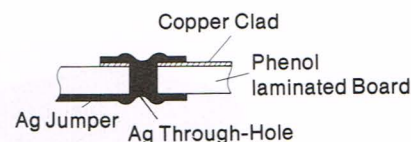
- Economical compared with conventional gold plated contacts.
- Has excellent environmental characteristics.
- Highly reliable switch can be built by combining with rubber contact switch.

Ag(Silver) Through-Hole



- Phenol laminated board allows high-density packaging.
- Unique Ag through-hole method insures high reliability.
- More economical than with glass epoxy substrate.

Ag(Silver-printed) Jumper



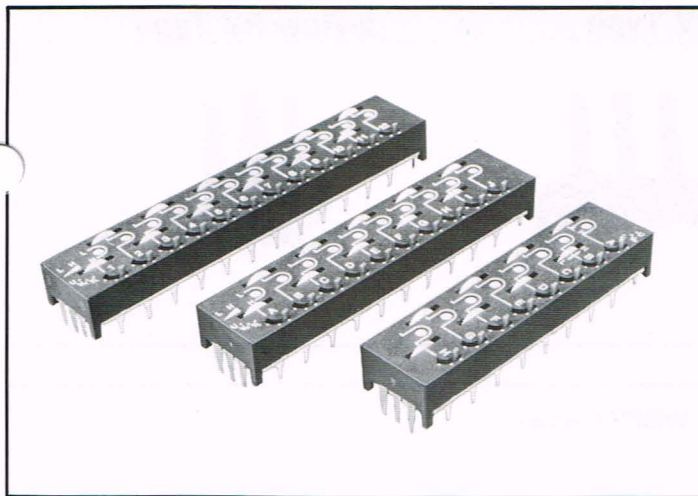
- Number of assembly steps much smaller than in wire-jumper.
- Possibility of organized pattern.
- Jumper formed on the part mounting surface allows more freedom in design of pattern.

Contact resistance	Less than 500Ω (using conducting rubber)
Rating	20V DC, 2mA
Operating life	200,000 cycles/150g (20V DC, less than 20mA)

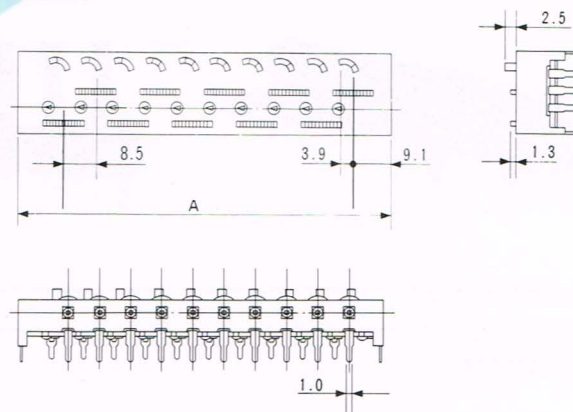
Through-hole resistance	Less than 200mΩ
Through-hole current capacity	200mA
Through-hole pitch	3.2 (min.)

Jumper resistance	0.15Ω/□
Jumper current capacity	50mA/0.8mm
Migration	More than 10 ⁴ MΩ (40°C, 90-95%RH, 500hr., 20V)

Electronic Tuning Potentiometer Block VPUS20



VPUS20



FEATURES

- Small-size potentiometer with width of 21mm.
- Incorporates presetting knob and rough indicator.
- Band switches with smooth operating levers.
- Potentiometers with absolutely minimum backlash.
- Meets UL standards.

SPECIFICATIONS

1. Potentiometer Section

Nominal total resistance	20k, 50k, 100k Ω
Voltage rating	35VDC
No. of rotation	21 $\pm$ 3 (voltage variable range)

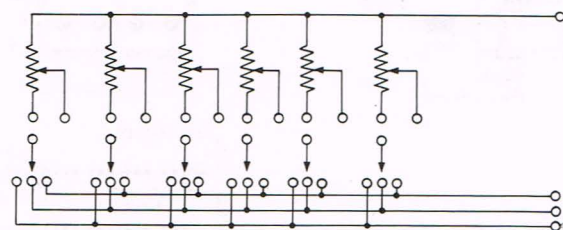
2. Band Switch Section

Rating	35VDC, 20mA
Operating force	30-500g

TYPES AND DIMENSIONS

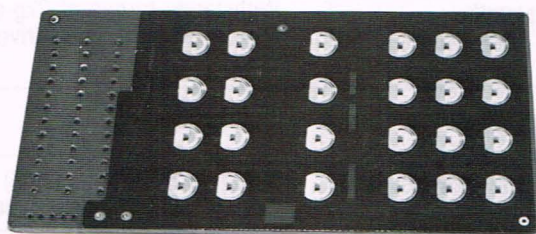
Stations	Model	A ± 0.5
6	VPUS20-6	64.5
8	VPUS20-8	81.5
10	VPUS20-10	98.5
12	VPUS20-12	115.5
14	VPUS20-14	132.5

CIRCUIT



Potentiometer Block for CATV, Satellite Receiver

VPU27



CIRCUIT

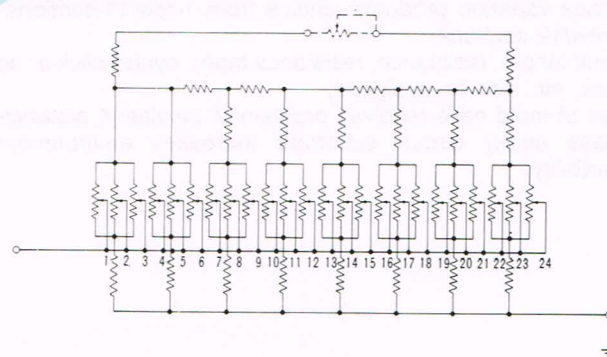
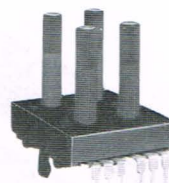
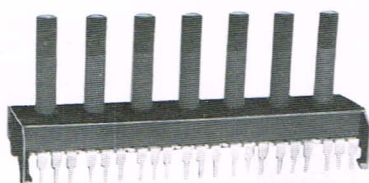
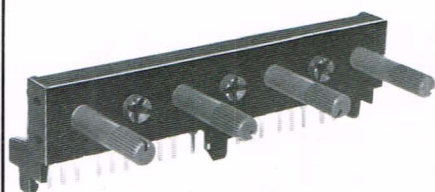


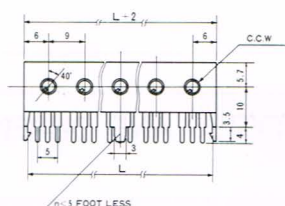
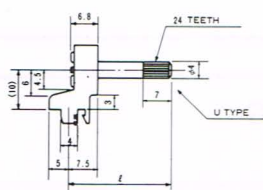
Photo and circuit diagrams show example only.

New Product

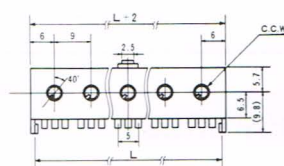
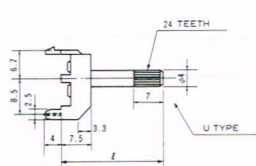
2-Row PV Type



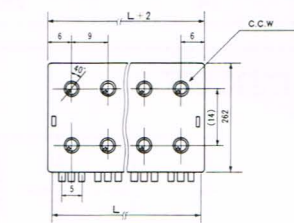
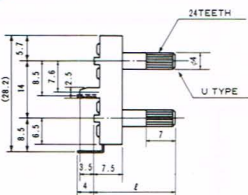
VK8PV (1-row)



Section	4	5	6	7	8	9	10	11
L (mm)	37	46	55	64	73	82	91	100

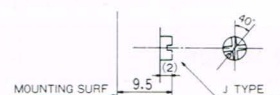
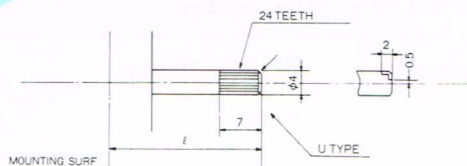


Section	4	5	6	7	8	9	10	11
L (mm)	37	46	55	64	73	82	91	100



Section	2 x 2	3 x 2	4 x 2	5 x 2	6 x 2
L (mm)	19	28	37	46	55

Shaft Shape and Length (Standard)



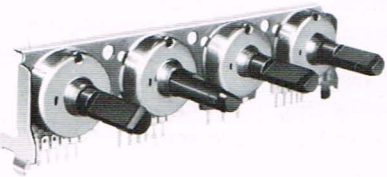
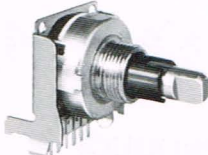
Type	U					J
ℓ (mm)	15	20	25	30	35	9.5

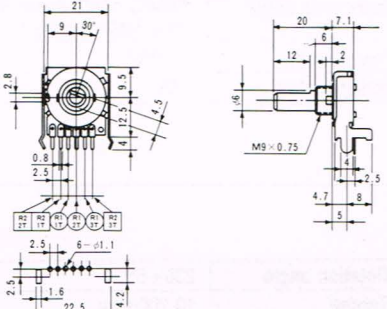
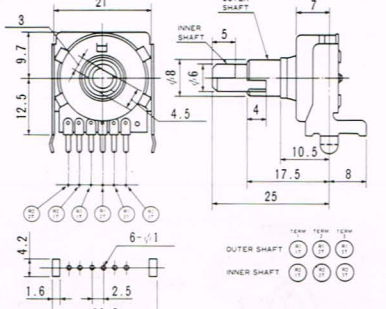
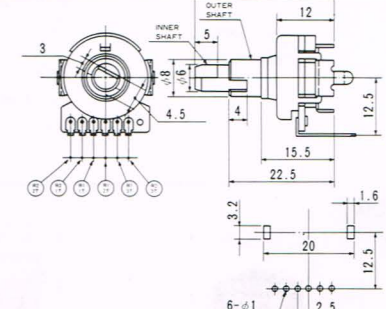
SPECIFICATIONS

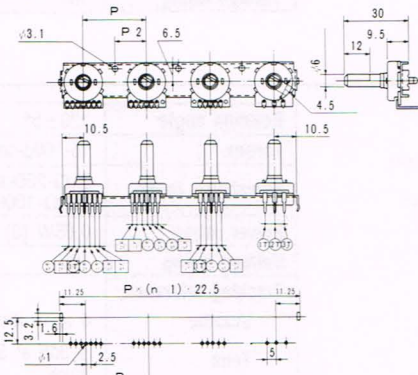
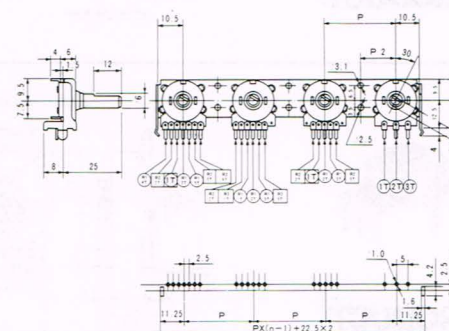
- High-density block with shaft-pitch at 9mm.
- Series variation products: choice from 1-row/11-sections to 2-row/12 sections.
- Shaft length, resistance, resistance taper, center-click or non-click, etc. can be designed.
- Use of mold case resolves problem of insulation distance.
- Glass epoxy circuit substrate increases environmental durability.

Total rotation angle	280 $\pm$ 5°
Stop strength	Withstands torque of 2kg-cm. 1kg-cm when a screwdriver is used.
Rotational torque	10-60g-cm (5-35°C)
Total resistance range	500Ω to 500kΩ (taper B) 2kΩ to 500kΩ (other taper)
Resistance tolerance	$\pm$ 20%
Power rating	B taper: 0.1W Other tapers: 0.05W

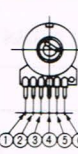
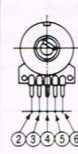
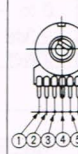
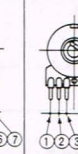
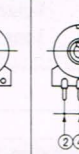
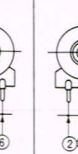
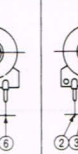
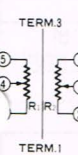
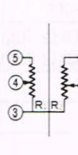
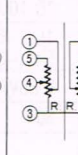
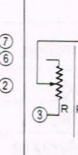
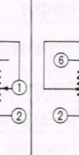
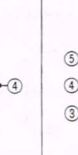
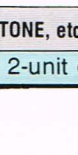
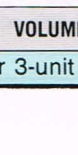
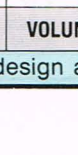
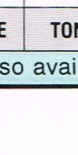
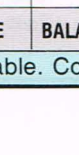
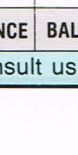
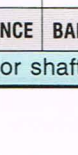
Side-by-Side Potentiometer Block VK161 Series

VK161 (4R) PH	V0161GPH	VB161DPH
		

VB161GPH (Single-shaft/Double-track with mounting screw) 	V0161DPH (Dual-shaft/Double-track) 	V0161DPV (Dual-shaft/Double-track) 
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VK161 (4R) PV 	VK161 (4R) PH 
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SPECIFICATIONS

Standard Terminal Configuration							Total rotation angle	300±5°
2-TRACK	2-TRACK	2-TRACK	2-TRACK	1-TRACK	1-TRACK	1-TRACK	Click	Clickless, center click, 11-click
							Rotational torque	30-300g-cm
							Resistance range	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)
							Rated power	0.06W
							Tracking tolerance	Class I: 0 to -40dB±3dB Class II: 0 to -60dB±3dB -60 to -70dB±5dB
TONE, etc.	VOLUME	VOLUME	TONE	BALANCE	BALANCE	BALANCE	Insulation resistance	More than 100MΩ, 250VDC

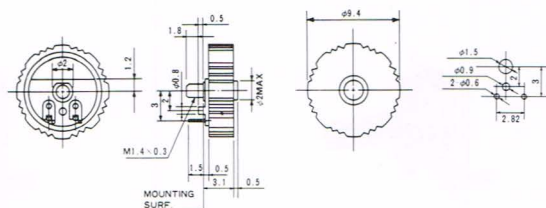
2-unit or 3-unit design also available. Consult us for shaft-shaft pitch. Various options available.

Low-Profile Type Potentiometers

V72N



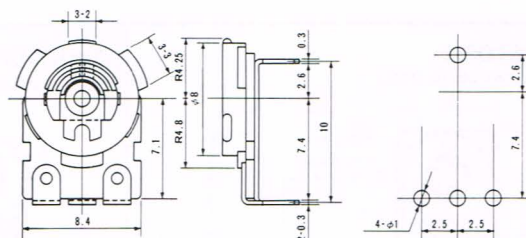
NEW PRODUCT



Rotation angle	200 $\pm$ 5°
Torque	5-50g-cm
Resistance range	5k Ω -100k Ω (taper B) 10k Ω -50k Ω (other taper)
Power rating	0.02W
Voltage rating	10V

Note: Knob shown is an example.

V08LPV

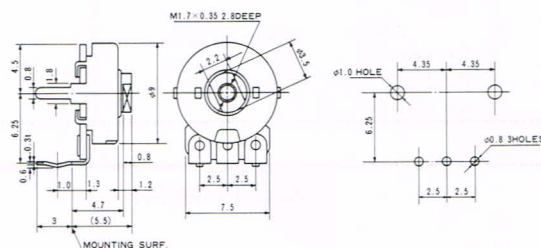


Rotation angle	230 $\pm$ 5°
Torque	20-100g-cm
Resistance range	500k Ω -1M Ω (taper B) 1k Ω -500k Ω (other)
Power rating	0.025W
Voltage rating	10V

V09L



NEW PRODUCT

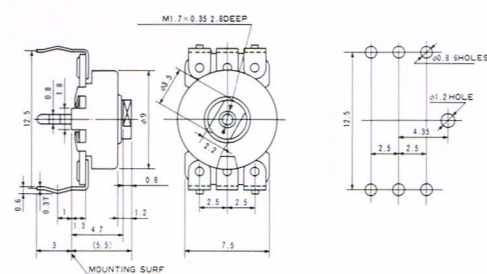


Rotation angle	230 $\pm$ 5°
Torque	10-200g-cm
Resistance range	5k Ω -250k Ω (taper B) 10k Ω -100k Ω (other taper)
Power rating	0.05W (B)
Voltage rating	10V

V09LG



NEW PRODUCT

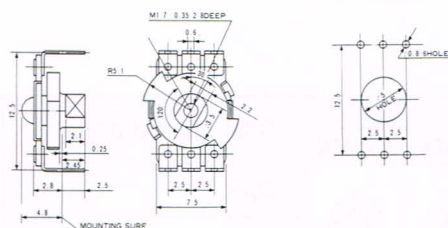


Rotation angle	120 $\pm$ 5°
Torque	15-100g-cm
Resistance range	2k Ω -250k Ω (taper B) 10k Ω -100k Ω (other taper)
Power rating	0.05W (B)
Voltage rating	10V
Tracking tolerance	
Volume	0 to -40dB $\pm$ 4dB
Tone	$\pm$ 3dB at 50% point of total travel

V09L2GPVF



NEW PRODUCT

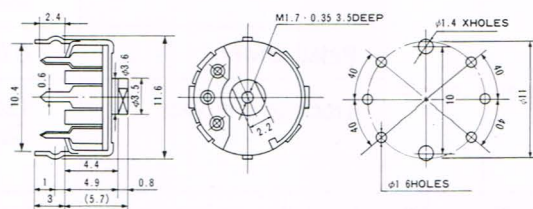


Rotation angle	120 $\pm$ 5°
Torque	10-100g-cm
Resistance range	10k Ω -200k Ω (taper B) (other taper)
Voltage rating	10V
Tracking tolerance	
Volume	0 to -40dB $\pm$ 4dB
Tone	$\pm$ 3dB at 50% point of total travel

V10L2G3



NEW PRODUCT



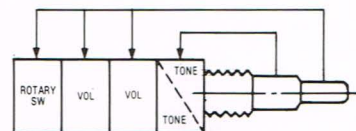
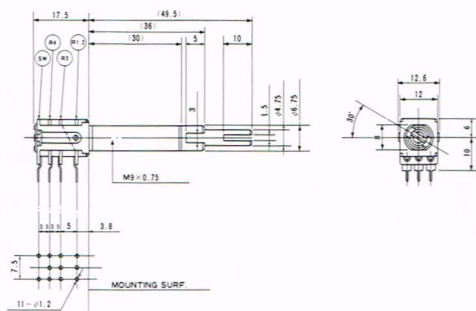
Rotation angle	230 $\pm$ 5°
Torque	10-100g-cm
Resistance range	1k Ω -500k Ω (taper B) 5k Ω -500k Ω (other taper)
Power rating	0.05W
Voltage rating	30V
Tracking tolerance	
Volume	0 to -40dB $\pm$ 4dB
Tone	$\pm$ 3dB at 50% point of total travel

Small-Size Potentiometers for Car-Audio V12L5 Series

V12L5(120X)DG9S (C42)



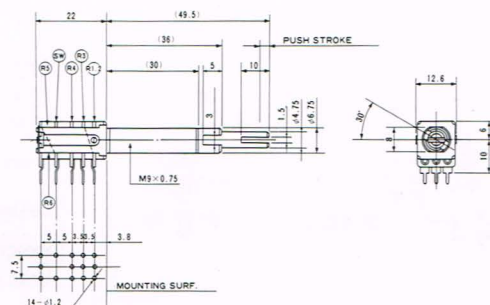
09C



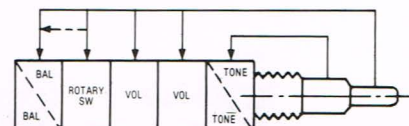
V12L5(120X)(120K)DGM2-3S(C41)



17B



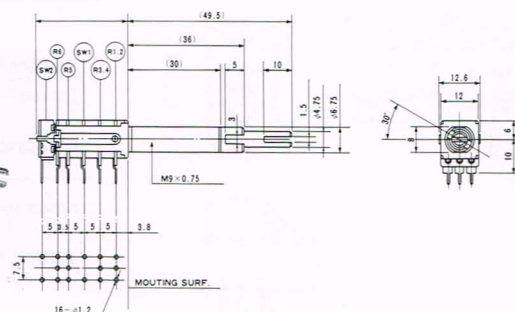
Push-balance



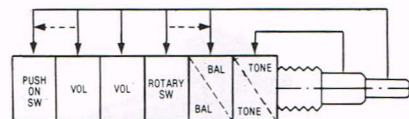
V12L5(120X)(120K)DGM3-2S(C41 + C90)



14F



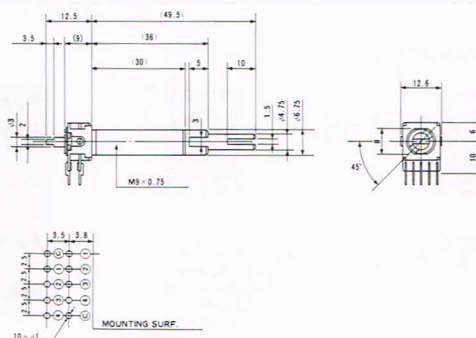
Pull-balance



SD12L5DQ1S



82L



With Band Switch and Tuning Shaft

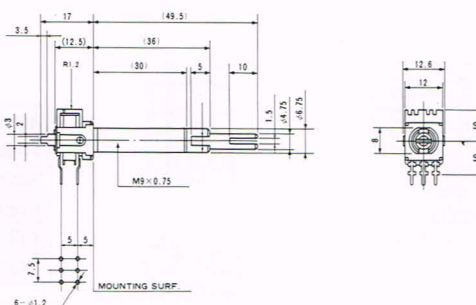
Switching angle	30±5°
Torque	500±250g-cm
Circuits	2, 3 or 4/step
Rating	16VDC, 0.2A
Contact resistance	50mΩ

VM12L5DGQN Fader Control



64A

NEW PRODUCT



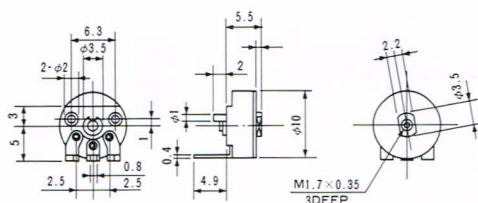
Metal Glazed Element With Tuning Shaft

Rotation angle	180±5°
Torque	30-350g·cm
Resistance range	20Ω-200Ω
Power rating	2.5WDC (8Ω load)
Voltage rating	9VDC

Combinations of functions other than the above are available; consult us.

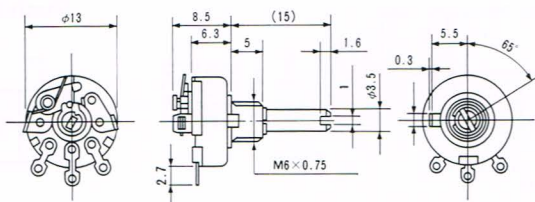
Potentiometers

V105-4PVN



Rotation angle	200±10°
Torque	20-150g-cm
Resistance range	500Ω-500kΩ (taper B)
Power rating	0.07W (taper B) 0.03W (other taper)
Voltage rating	100V (taper B) 70V (other taper)

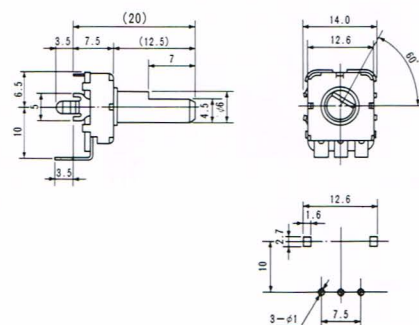
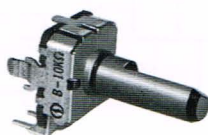
V12M4-1S (with Switch)



Rotation angle	230±10°
Torque	20-200g-cm
Resistance range	500Ω-1MΩ (taper B)
Power rating	0.08W (taper B) 0.04W (other taper)
Voltage rating	150V (taper B) 100V (other taper)
Switch	12VDC, 0.5A

Units without switch also available.

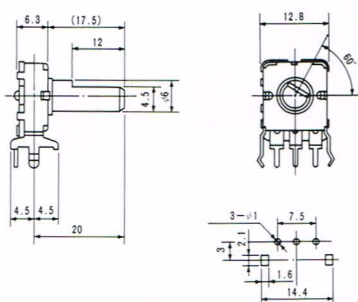
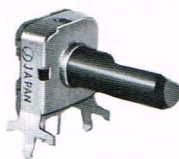
V012LPV (Insulated Shaft)



Rotation angle	300±5°
Torque	30-200g-cm
Resistance range	500Ω-500kΩ (B taper) 2kΩ-500kΩ (other taper)
Power rating	0.15W (taper B) 0.08W (other taper)
Voltage rating	150V (taper B) 100V (other taper)

NEW PRODUCT

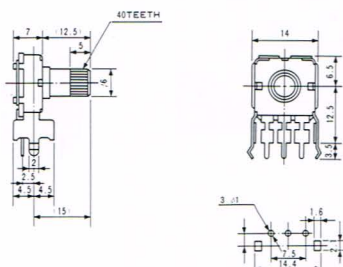
V012LPH (Insulated Shaft)



Rotation angle	300±5°
Torque	30-200g-cm
Resistance range	500Ω-500kΩ (B taper) 2kΩ-500kΩ (other taper)
Power rating	0.15W (taper B) 0.08W (other taper)
Voltage rating	150V (taper B) 100V (other taper)

NEW PRODUCT

VM012LPH (Metal Glazed Element)

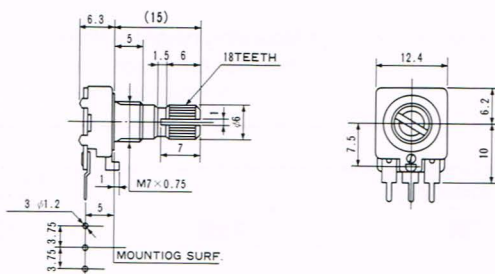


Rotation angle	300±10°
Torque	30-200g-cm
Resistance range	20Ω-5kΩ (taper B)
Power rating	2W
Voltage rating	100V
Shaft	Insulated shaft

NEW PRODUCT

Potentiometers

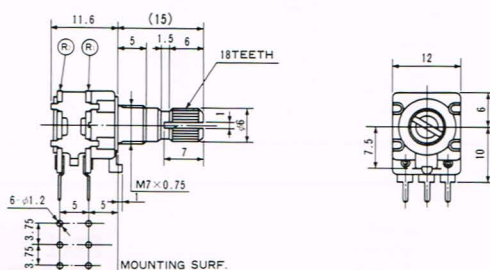
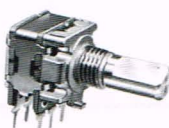
VB12LPHN



Rotation angle	300±5°
Torque	20-250g-cm
Resistance range	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)
Power rating	0.05W
Voltage rating	30V

Units with center click, 11 or 31 clicks available.

V12LG3PHN

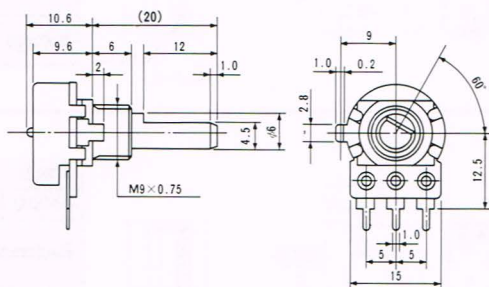
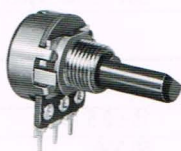


Two-Section, Single-Shaft

Rotation angle	300±5°
Torque	20-250-cm
Resistance range	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)
Power rating	0.05W
Voltage rating	30V

Units with center click, 11 or 31 clicks, or with tap available

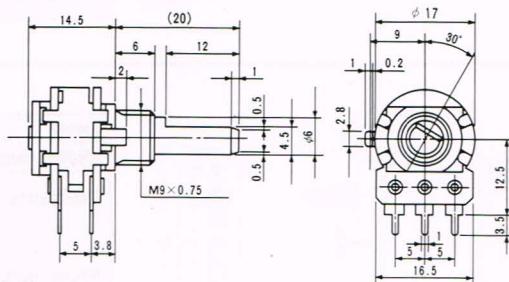
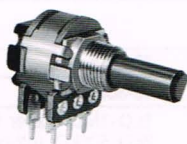
VB16L43PHN (Insulated Shaft)



Rotation angle	300±5°
Torque	30-200g-cm
Resistance range	500Ω-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.15W (taper B) 0.1W (other taper)
Voltage rating	200V (taper B) 150V (other taper)

NEW PRODUCT

VB16L43G3-2PHN (Insulated Shaft)

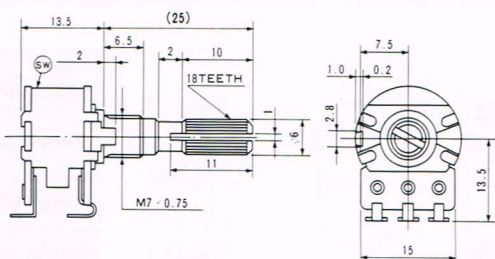


Two-Section, Single-Shaft

Rotation angle	300±5°
Torque	30-200g-cm
Resistance range	500Ω-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.125W (taper B) 0.06W (other taper)
Voltage rating	200V (taper B) 150V (other taper)
Click	Center or 11-position

NEW PRODUCT

V16L4S(C26) (with Switch)



Rotation angle	300±5°
Torque	30-200g-cm
Resistance range	500Ω-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.2W (taper B) 0.1W (other taper)
Voltage rating	200V (taper B) 150V (other taper)
Switch rating	12V DC, 1A

Low Profile Slide Type Potentiometers 13, 23 Series

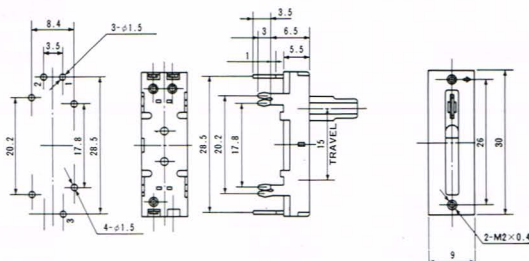
FEATURES

- Low-profile potentiometer series: 13 Series (mold lever type) and 23 Series (metal lever type).
- Mounting height is 8mm (-1 type) or 6.5mm (-2 type). Both have free-standing legs with orientation to insure unit is not installed in reverse direction.

13 Series (Mold Lever)				*23 Series (Metal Lever)	
10C	15C	5B	15B	10CP	15CP

VJ1513-2PVN

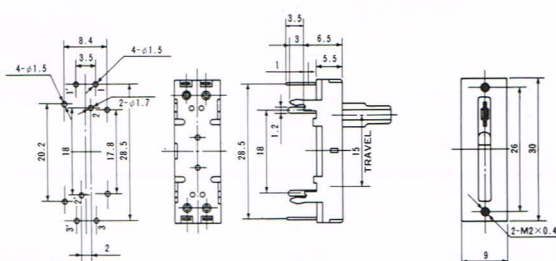
*VJ1523-2PVN



Travel	15±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 2kΩ-500kΩ (other taper)
Power rating	0.05W (taper B) 0.025 W (other taper)
Voltage rating	100V (taper B) 50V (other taper)

VJ1513-2GPVN (Two-section)

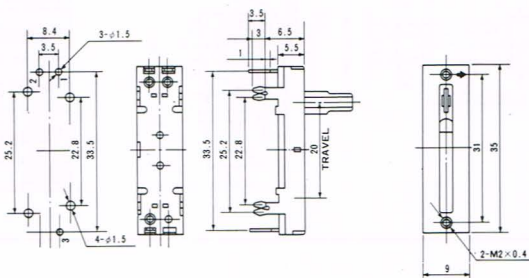
*VJ1523-2GPVN (Two-section)



Travel	15±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 2kΩ-500kΩ (other taper)
Power rating	0.05W (taper B) 0.025W (other taper)
Voltage rating	100V (taper B) 50V (other taper)

VJ2013-2PVN

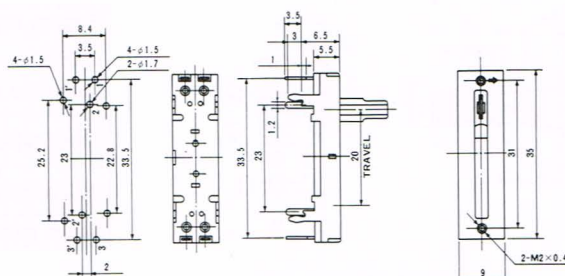
*VJ2023-2PVN



Travel	20±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 2kΩ-500kΩ (other taper)
Power rating	0.06W (taper B) 0.03W (other taper)
Voltage rating	150V (taper B) 100V (other taper)

VJ2013-2GPVN (Two-section)

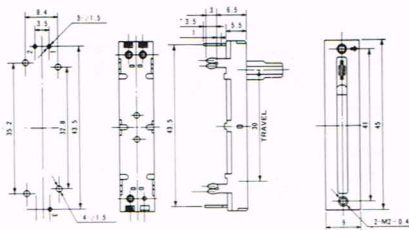
*VJ2023-2GPVN (Two-section)



Travel	20±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 2kΩ-500kΩ (other taper)
Power rating	0.06W (taper B) 0.03 W (other taper)
Voltage rating	150V (taper B) 100V (other taper)

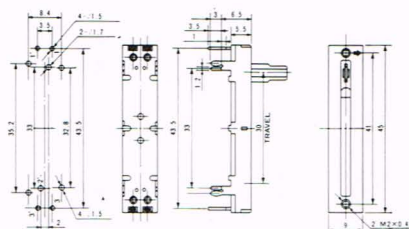
Low Profile Slide Type Potentiometers 13, 23 Series

VJ3013-2PVN
*VJ3023-2PVN



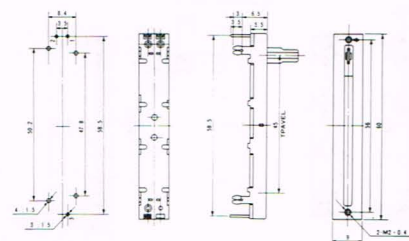
Travel	30±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 3kΩ-1MΩ (other taper)
Power rating	0.1W (taper B) 0.05W (other taper)
Voltage rating	200V (taper B) 150V (other taper)

VJ3013-2GPVN (Two-section)
*VJ3023-2GPVN (Two-section)



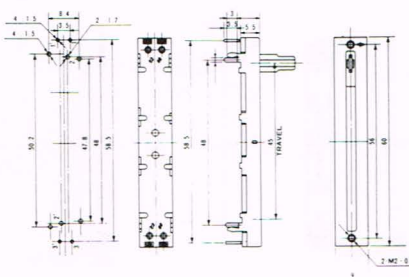
Travel	30±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 3kΩ-1MΩ (other taper)
Power rating	0.1W (taper B) 0.05W (other taper)
Voltage rating	200V (taper B) 150V (other taper)

VJ4513-2PVN
*VJ4523-2PVN



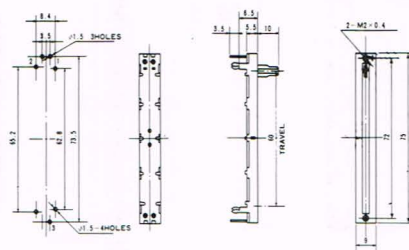
Travel	45±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.1W
Voltage rating	200V (taper B) 150V (other taper)

VJ4513-2GPVN (Two-section)
*VJ4523-2GPVN (Two-section)



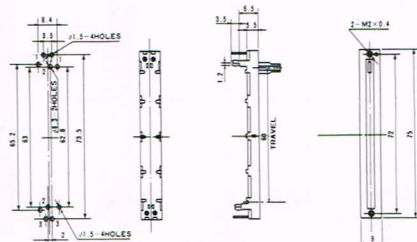
Travel	45±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.1W
Voltage rating	200V (taper B) 150V (other taper)

VJ6013-2PVN
*VJ6023-2PVN



Travel	60±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.1W
Voltage rating	250V (taper B) 180V (other taper)

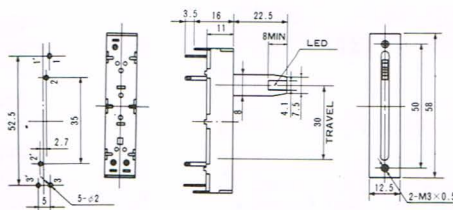
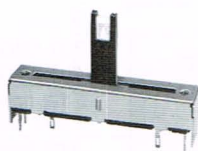
VJ6013-2GPVN (Two-section)
*VJ6023-2GPVN (Two-section)



Travel	60±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.2W
Voltage rating	250V (taper B) 180V (other taper)

Slide Type Potentiometers

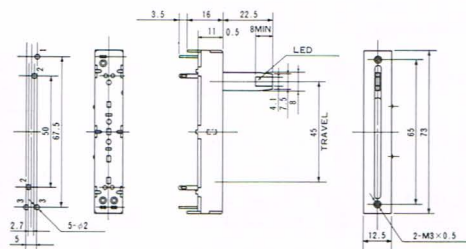
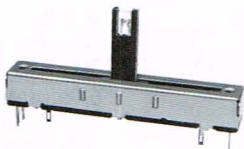
VJ3012-2PVN (with LED)



Travel	30±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 3kΩ-1MΩ (other taper)
Power rating	0.2W (taper B) 0.1W (other taper)
Voltage rating	250V (taper B) 180V (other taper)

Without LED. Two-section type available.

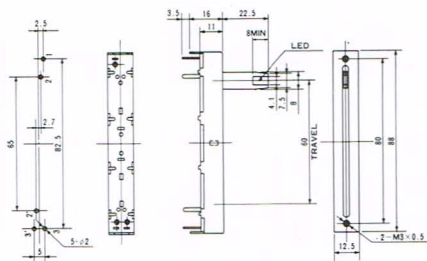
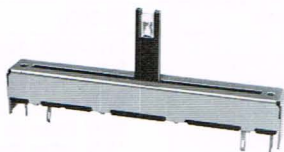
VJ4512PVN (with LED)



Travel	45±0.5 mm
Sliding force	50-350g
Resistance range	1kΩ-1MΩ (taper B) 3kΩ-1MΩ (other taper)
Power rating	0.25W (taper B) 0.125W (other taper)
Voltage rating	300V (taper B) 200V (other taper)

Without LED. Two-section type available.

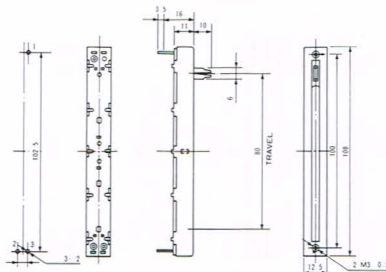
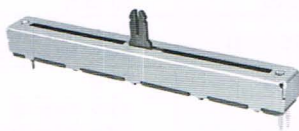
VJ6012-2PVN (with LED)



Travel	60±0.5 mm
Sliding force	50-350g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.4W (taper B) 0.2 W (other taper)
Voltage rating	350V (taper B) 250V (other taper)

Without LED. Two-section type available.

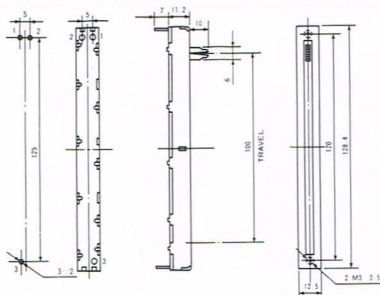
VJ8012 PVN



Travel	80±0.5 mm
Sliding force	50-300g
Resistance range	2kΩ-1MΩ (taper B) 5kΩ-1MΩ (other taper)
Power rating	0.5W (taper B) 0.25W (other taper)
Voltage rating	350V (taper B) 250V (other taper)

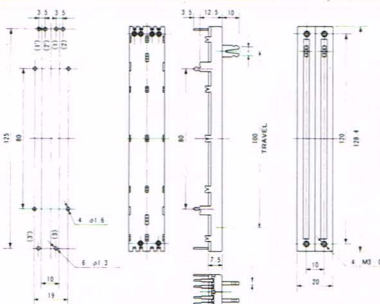
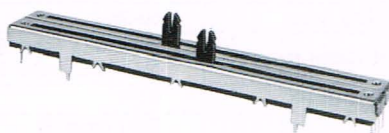
With LED. Two-section type available.

VJ100N



Travel	100±1 mm
Sliding force	20-100g
Resistance range	5kΩ-500kΩ (taper B) 10kΩ-500kΩ (other taper)
Power rating	0.25W
Voltage rating	150V

VJ10014DPVN (Dual-shaft/Dual-section)



Travel	100±1 mm
Sliding force	20-100g
Resistance range	5kΩ-500kΩ (taper B) 10kΩ-500kΩ (other taper)
Power rating	0.25W
Voltage rating	150V
Tracking tolerance	0 to -40 dB±2 dB

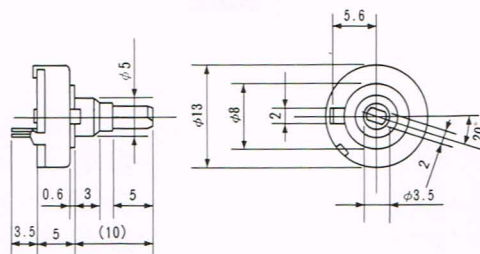
60mm stroke possible.

Long Operating Life Potentiometers

TR133

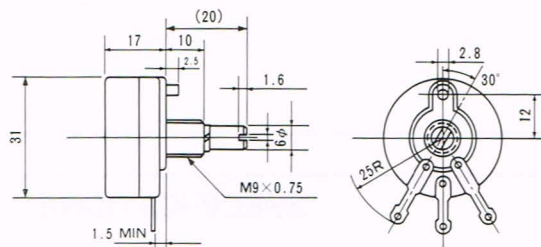


NEW PRODUCT



Operating life	500,000 cycles
Rotation angle	$220 \pm 5^\circ$
Torque	40g-cm or less
Resistance range	5k Ω -100k Ω
Resistance tolerance	$\pm 20\%$
Resistance taper	Taper B only
Power rating	0.125W

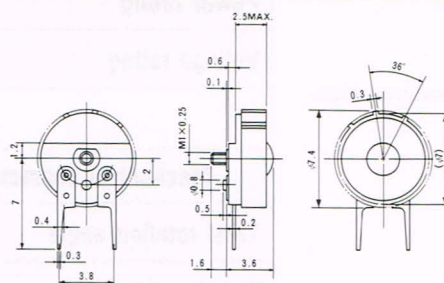
TR303N



Operating life	1,000,000 cycles
Rotation angle	$300 \pm 5^\circ$
Torque	50-300g-cm
Resistance range	10k Ω -1M Ω
Resistance tolerance	$\pm 20\%$
Resistance taper	Taper B only
Power rating	0.6W (10k Ω to 50k Ω) 0.4W (over 50k Ω)

Miniature Potentiometers for Hearing Aid

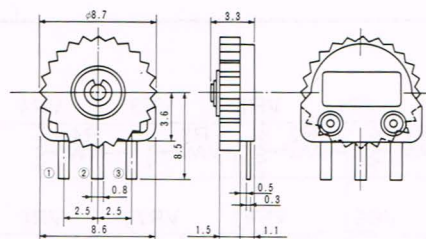
V7N



Sweat-proof type

Rotation angle	$200 \pm 10^\circ$
Torque	3-25g-cm
Resistance range	500 Ω -200k Ω (taper B)
Power rating	0.02W
Operating life	5,000 cycles

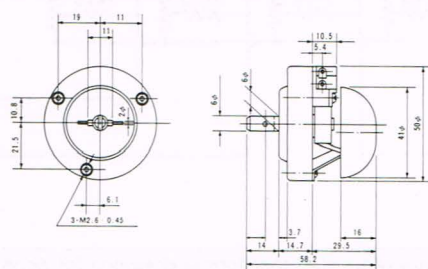
V82N



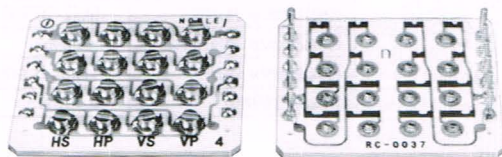
Rotation angle	$260 \pm 10^\circ$
Torque	3-50g-cm
Resistance range	500 Ω -200k Ω (taper B)
Power rating	0.04W
Operating life	2,000 cycles

Timer

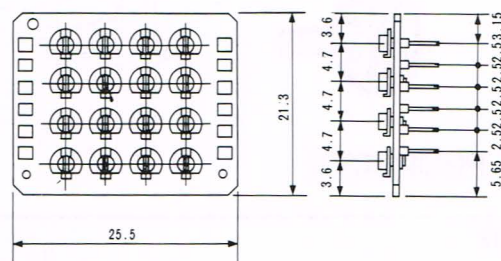
ME1101



Preset angle	$185 \pm 3^\circ$
Bell	Single-strike type
Time accuracy	15 ± 2 minutes when preset at 180°
Winding torque	1-3.2kg-cm
Rating	125V, 8A, p.f. 0.9-1



BME



FEATURES

- Compact modular block containing trimmer potentiometers and fixed resistors.
- Helps reduce number of parts and assembly processes for efficient set design and saving on overall processes.
- Metal glazed elements are deposited on a ceramic substrate, increasing reliability and stability.

APPLICATION

Video-camera, tape deck, and adjustment of various electronic circuits.

SPECIFICATIONS

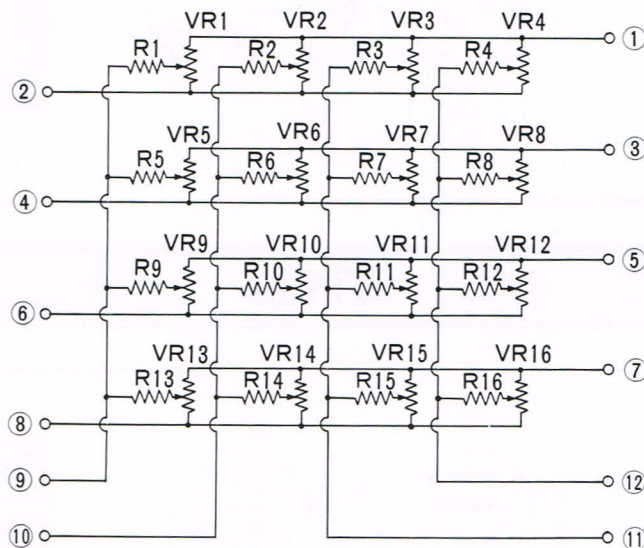
Electrical characteristics

Total resistance value:	
Trimmer potentiometer	100k Ω -1M Ω
Fixed resistor	10 Ω -1M Ω
Power rating	0.03W
Voltage rating	Less than 9V per element

Mechanical characteristics (trimmer potentiometer)

Total rotation angle	180 $\pm$ 20 $^\circ$
Rotational torque	10-100g-cm

EXAMPLE OF CIRCUIT



• This catalog is for reference purpose only. It is therefore requested that formal drawings for approval be exchanged before you place order.

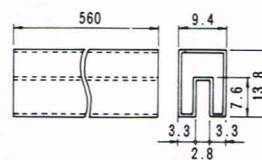
Type 6 Series Carbon Film Trimmer Potentiometers V6EK

FEATURES

- Trimmer potentiometer with carbon film resistor formed on glass epoxy substrate.
- Ideal for equipment requiring strong environmental durability, especially temperature and humidity resistance.
- Automatic installation and adjustment possible. Compact, space-saving design.

Stick-shape for automatic insertion

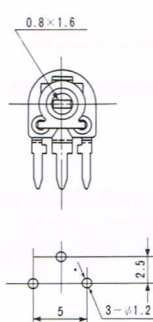
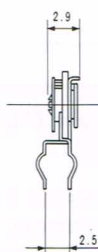
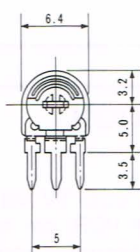
V6EK-PV(1S)



Storing no.

80

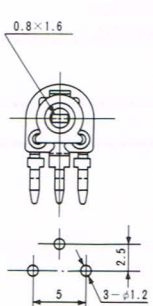
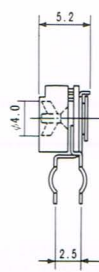
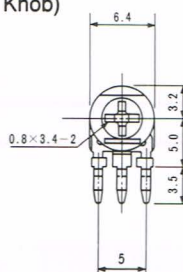
V6EK-PH



Rotation angle	200±10°
Torque	30-300g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	50V

Presetting from either side possible

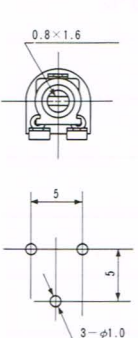
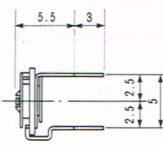
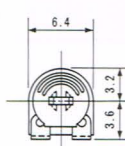
V6EK-PH(1S) (with Dust-proof Knob)



Rotation angle	200±10°
Torque	30-300g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	50V

Presetting from either side possible

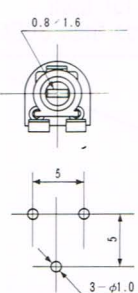
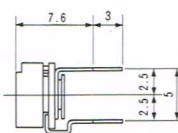
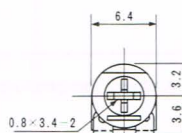
V6EK-PV



Rotation angle	200±10°
Torque	30-300g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	50V

Presetting from either side possible

V6EK-PV(1S) (with Dust-proof Knob)



Rotation angle	200±10°
Torque	30-300g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	50V

Presetting from either side possible

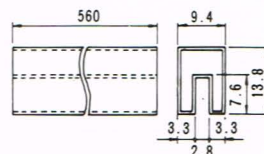
Type 6 Series Cermet Trimmer Potentiometers VM6CK

FEATURES

- Metal glaze resistor element with ceramic substrate as a base.
- Highly stable trimmer potentiometer with temperature coefficient of $\pm 200\text{ppm}$ (500Ω to $100\text{k}\Omega$).
- Automatic installation and adjustment possible. Compact, space-saving design.

Stick-shape for automatic insertion

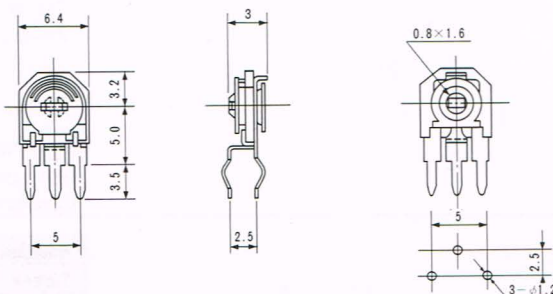
VM6CK-PV(1S)



Storing no.

80

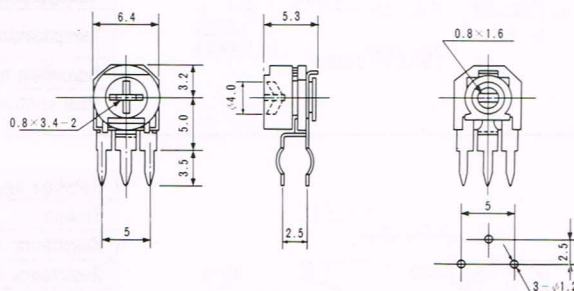
VM6CK-PH



Rotation angle	$200 \pm 10^\circ$
Torque	30-300g-cm
Resistance range	200Ω - $1\text{M}\Omega$ (taper B)
Temperature coefficient	$\pm 200\text{ppm}/^\circ\text{C}$ (500Ω - $100\text{k}\Omega$)
Power rating	0.3W
Voltage rating	100V

Presetting from either side possible

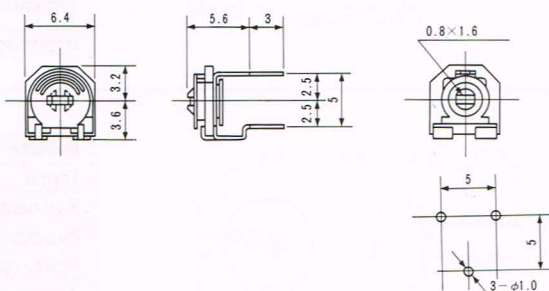
VM6CK-PH(1S) (with Dust-proof Knob)



Rotation angle	$200 \pm 10^\circ$
Torque	30-300g-cm
Resistance range	200Ω - $1\text{M}\Omega$ (taper B)
Temperature coefficient	$\pm 200\text{ppm}/^\circ\text{C}$ (500Ω - $100\text{k}\Omega$)
Power rating	0.3W
Voltage rating	100V

Presetting from either side possible

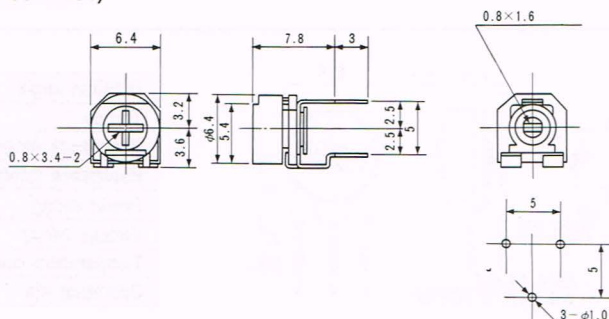
VM6CK-PV



Rotation angle	$200 \pm 10^\circ$
Torque	30-300g-cm
Resistance range	200Ω - $1\text{M}\Omega$ (taper B)
Temperature coefficient	$\pm 200\text{ppm}/^\circ\text{C}$ (500Ω - $100\text{k}\Omega$)
Power rating	0.3W
Voltage rating	100V

Presetting from either side possible

VM6CK-PV(1S) (with Dust-proof Knob)

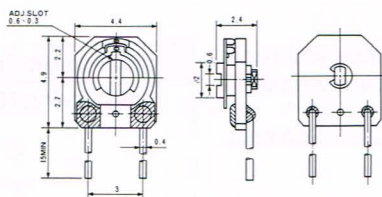


Rotation angle	$200 \pm 10^\circ$
Torque	30-300g-cm
Resistance range	200Ω - $1\text{M}\Omega$ (taper B)
Temperature coefficient	$\pm 200\text{ppm}/^\circ\text{C}$ (500Ω - $100\text{k}\Omega$)
Power rating	0.3W
Voltage rating	100V

Presetting from either side possible

Cermet Trimmer Potentiometers

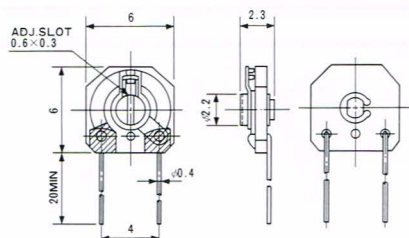
TM4K5-2



Rotation angle	240°
Torque	10-100g·cm
Resistance range	50Ω-500kΩ (taper B)
Resistance tolerance	±30%
Power rating	0.05W
Voltage rating	12V
Temperature coefficient	±200ppm/°C (500Ω-100kΩ)
Operating life	20 cycles

TF4K type is available for resistance less than 500Ω.

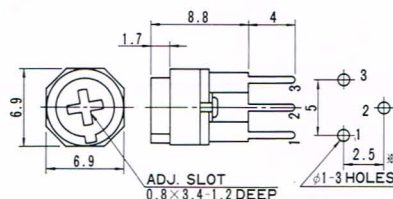
TM6K3-2



Rotation angle	230°
Torque	20-150g·cm
Resistance range	50Ω-500kΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	50V
Temperature coefficient	±200ppm/°C (500Ω-100kΩ)
Operating life	50 cycles

TF6K type is available for resistance less than 500Ω.
Three-terminal type also available (TM6K3-3)

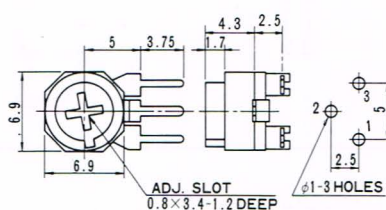
TM64K2PV (with Dust-proof Knob)



Rotation angle	200 ± 10°
Torque	30-250g·cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	± 20%
Power rating	0.3W
Voltage rating	100V
Temperature coefficient	± 200ppm/°C (500Ω-100kΩ)
Operating life	50 cycles

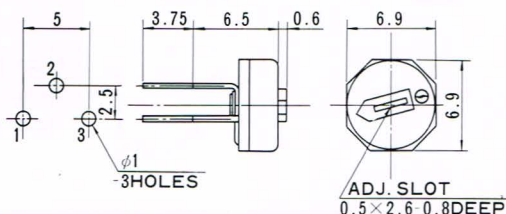
Rear-control types available.

TM64K2PH (with Dust-proof Knob)



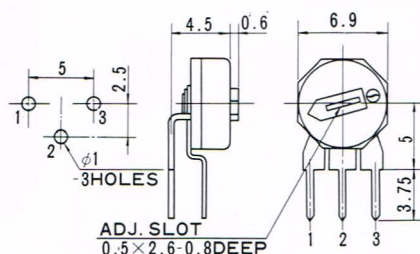
Rotation angle	200 ± 10°
Torque	30-250g·cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	± 20%
Power rating	0.3W
Voltage rating	100V
Temperature coefficient	± 200ppm/°C (500Ω-100kΩ)
Operating life	50 cycles

TM62KPV (with Dust-proof Knob)



Rotation angle	200±10°
Torque	20-200g·cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.3W
Voltage rating	100V
Temperature coefficient	±150ppm/°C
Operating life	50 cycles

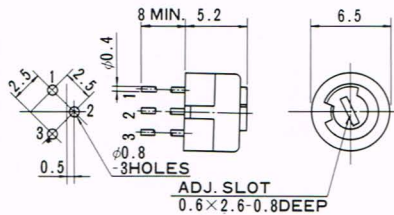
TM62KPH (with Dust-proof Knob)



Rotation angle	200±10°
Torque	20-200g·cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.3W
Voltage rating	100V
Temperature coefficient	±150ppm/°C
Operating life	50 cycles

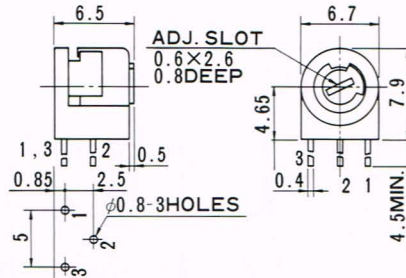
Cermet Trimmer Potentiometers

TM065PV (Enclosed Type)



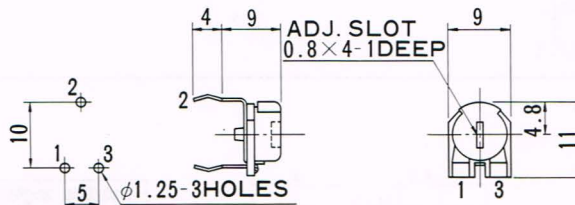
Rotation angle	230±10°
Torque	20-200g-cm
Resistance range	50Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	200V
Temperature coefficient	±100ppm/°C (100Ω-100kΩ)
Operating life	100 cycles

TM065PH (Enclosed Type)



Rotation angle	230±10°
Torque	20-200g-cm
Resistance range	50Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	200V
Temperature coefficient	±100ppm/°C (100Ω-100kΩ)
Operating life	100 cycles

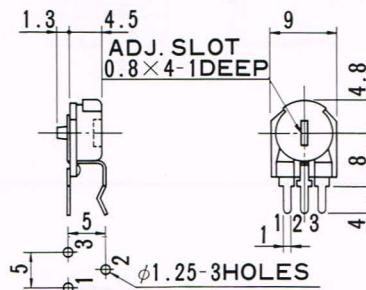
TM8KPV2 (with Dust-proof Knob)



Rotation angle	260±10°
Torque	30-300g-cm
Resistance range	200Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	250V
Temperature coefficient	±200ppm/°C (200Ω-100kΩ)
Operating life	100 cycles

6mm long shaft type also available.

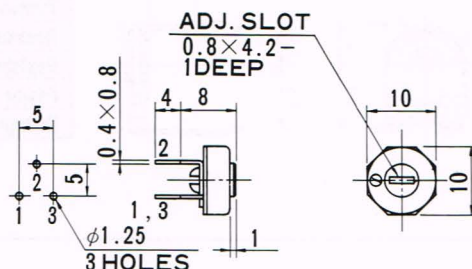
TM8KPH1 (with Dust-proof Knob)



Rotation angle	260±10°
Torque	30-300g-cm
Resistance range	200Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	250V
Temperature coefficient	±200ppm/°C (200Ω-100kΩ)
Operating life	100 cycles

6mm long shaft type also available.

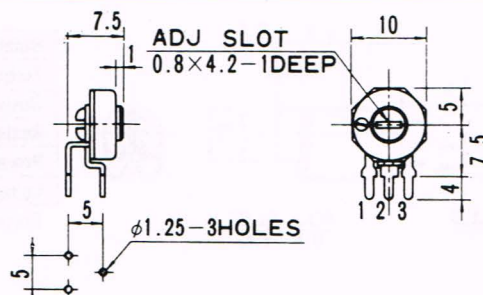
TM10KPV (with Dust-proof Knob)



Rotation angle	200±10°
Torque	30-350g-cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	200V
Temperature coefficient	±200ppm/°C
Operating life	100 cycles

8mm long shaft type also available.

TM10KPH (with Dust-proof Knob)

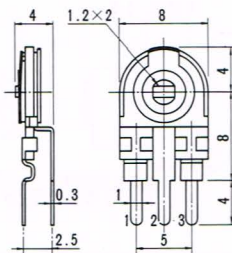
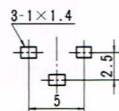


Rotation angle	200±10°
Torque	30-350g-cm
Resistance range	100Ω-1MΩ (taper B)
Resistance tolerance	±20%
Power rating	0.5W
Voltage rating	200V
Temperature coefficient	±200ppm/°C
Operating life	100 cycles

8mm long shaft type also available.

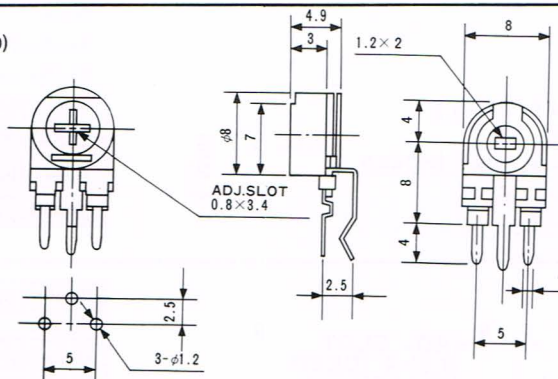
Carbon Film Trimmer Potentiometers

V8K1-1



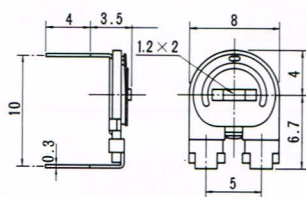
Rotation angle	280±10°
Torque	50-350g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	100V

V8K1-11(1S) (with Dust-proof Knob)



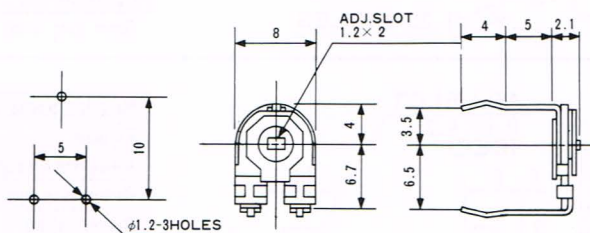
Rotation angle	280±10°
Torque	50-350g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	100

V8K4-1



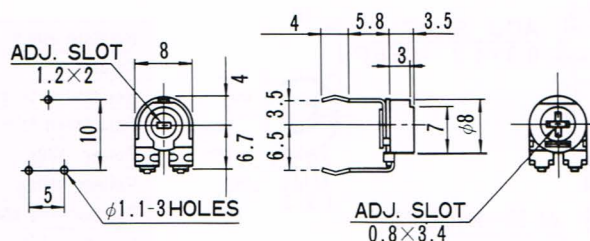
Rotation angle	280±10°
Torque	50-350g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	100V

V8K4-11



Rotation angle	280±10°
Torque	50-350g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	100

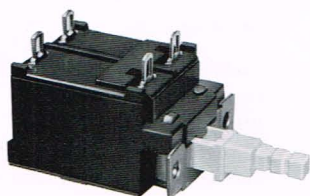
V8K4-11 (1S) (with Dust-proof Knob)



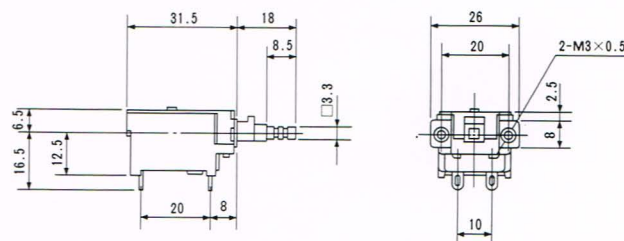
Rotation angle	280±10°
Torque	50-350g-cm
Resistance range	500Ω-1MΩ (taper B)
Resistance tolerance	±30%
Power rating	0.1W
Voltage rating	100V

Presetting from either side possible.

2mm Stroke Mains Switch SY13-4 (U95D2)



SY13-4 (U95D2)



FEATURES

- Small, short-stroke (2mm) type.
- With the 4A/128A large capacity switch of European standards the switch alone is compatible with Class I; the switch incorporated with equipment is compatible with Class II.
- Switch for electronic circuit used for remote control, etc. can be incorporated (for 2 circuits).
- Crisp operational feeling.

SPECIFICATIONS

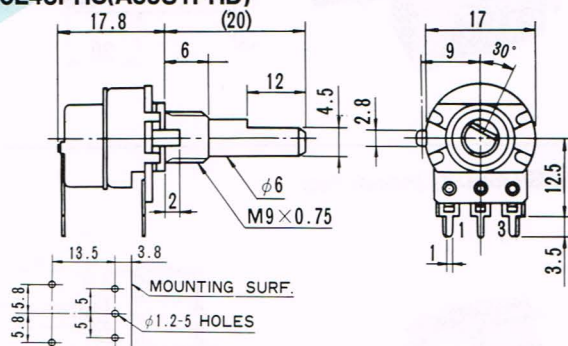
Rating	4A/128A, 250VAC
Circuit	DPST
Operating force	550 $\pm$ 150g 100g
Stroke	2.1 $\pm$ 0.5mm (full stroke 3.2mm)
Applicable standards	SEMKO, VDE, BS Class I

Mains Switches with Potentiometer VB16L43S (A39S1), (B39S1)

Rotary Type



VB16L43PHS(A39S1PHD)



FEATURES

- Small mains switch to meet compact size units.
- Complies with TV-3 of UL and CSA, and widely used in TV, electric carpet, humidifier, dimmer, drier and other consumer electric appliances.
- Solder lug terminal and PCB mounting terminal available.

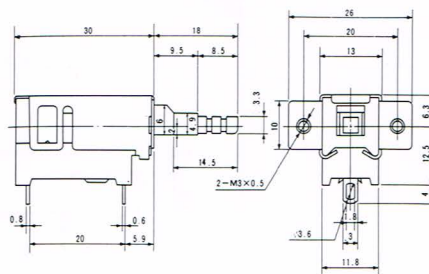
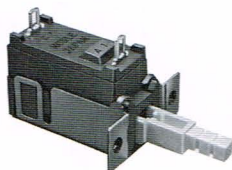
Note: See VB16L43PHN for potentiometer rating on page 15.

SPECIFICATIONS

Rating	A39S1: TV-3 B39S1: 125VAC, max. 5A
Circuit	SPST
Operating angle	50 $\pm$ 10°
Operating torque	Less than 800g-cm
Applicable standards	A39S1: UL, CSA B39S1: Satisfies Separate Table 4, Appliance Rating of Japan's Electric Appliance Regulations.

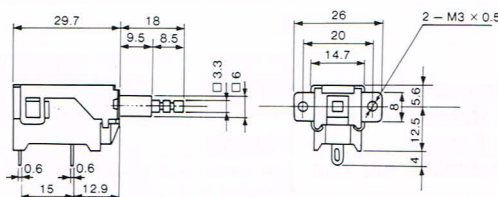
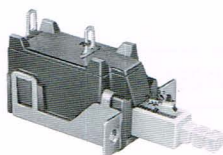
Mains Switches

SY13(U95S2) (Push-lock-push type)



Operating stroke	Lock stroke: 1.0mm Full stroke: 1.8mm
Operating force	400 $\pm$ 100g
Circuits	SPST
Rating	TV5
Standard	UL, CSA, Supplementary Table 4 of Japanese Elec- tronic Appliance Regulations

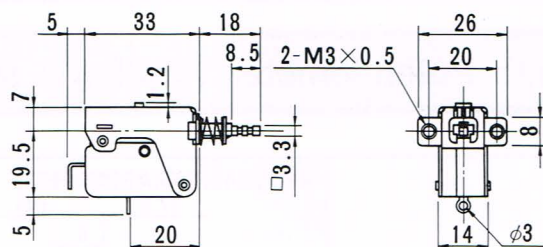
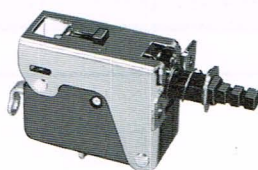
SY11-1(A91S2) (Push-lock-push type)



Operating stroke	Lock stroke: 2.5mm Full stroke: 3.5mm
Operating force	350 $\pm$ 100g
Circuit	SPST
Rating	TV3
Standard	UL, CSA, Supplementary Table 4 of Japanese Elec- tronic Appliance Regulations

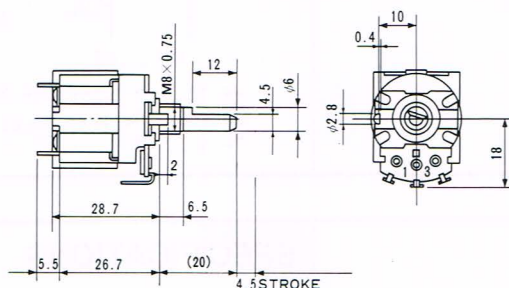
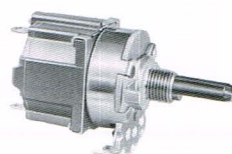
European appliance class — class I μ

SY10-1(U62S1) (Push-lock-push Type)



Operating stroke	Lock stroke 4mm or 2.5mm (SY10-3)
Operating force	300 $\pm$ 100g (stroke 4mm) 350 $\pm$ 150g (stroke 2.5mm)
Circuit	SPST
Rating	TV3, TV4, TV5
UL, CSA	250VAC, 4A/128V
SEMKO	Class II

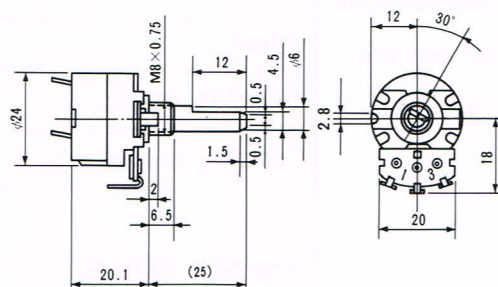
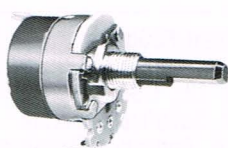
V24L5S(U85DV) (Pull-push Type)



Operating stroke	4.5mm
Operating force	150-800g
Circuit	SPST, DPST
Rating	VDE, SEMKO, BS
	250VAC, 2A/32A (class II), 250VAC, 6A/96A (class II)

UL, CSA (TV3, 4, 5) listed types available.

V24L5S(A9S1) (Rotary Type)

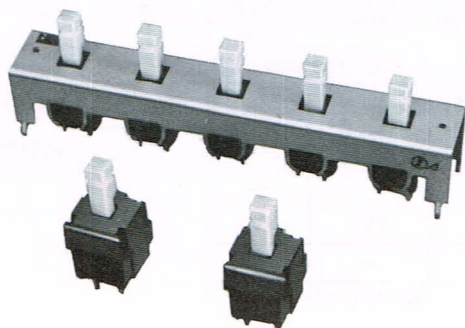


Operating angle	50°
Torque	150-1,000g-cm
Circuit	SPST, SPDT
Rating	TV3
UL	TV3
CSA	TV3

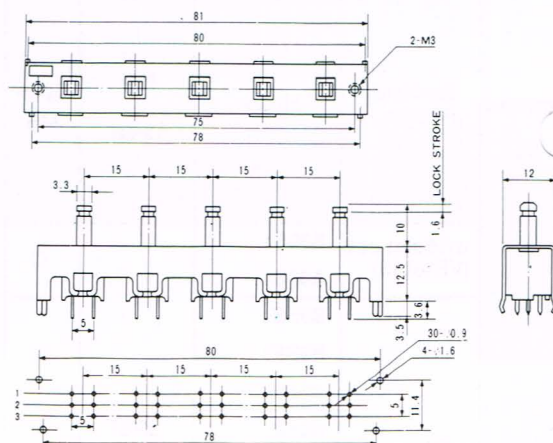
Applicable Standards of Mains Switches

Operation	Combined Function	Model	Pole & Throw	Solder Lug	PCB Lug	Listed Safety Standard (File No.)						
						Electric Appliance	General Appliance	UL (E35961)	CSA (27124) 45646	VDE	SEMKO	BS
						Applicable Load Life Test						
						Test B	Test A	Test C	Test C	Test D	Test D	Test D
						AC125V	(A)			AC250V		
Rotary Type	w/16mm pot. (VB16L43)	B39S1 A39S1	SPST	○	○	1	3	—	—	—	—	—
	w/24mm pot. (V24L5)	B9SE		○	○	3	5	TV3	TV3			
		B9SF				1	3	AC125V,3A	—			
		B9SM				2	4	—	—			
		U9S2				1	3	TV1	TV1			
		A9S1				3	6	TV3	TV3			
		U9SF				3	6	TV3	TV3			
		U9SM				5	8	TV5	TV5			
		U12SV	SPDT	○	—	—	—	—	—	4A/64A Class I	4A/64A Class I	4A/64A Class I
	w/o pot. (SD24L5)	B9ME		○	—	—	—	—	—	—	—	—
		B9MF				1	3	—	—			
		U9ME				1	3	TV1	—			
		U12MF		○	—	3	6	TV3	TV3			
		U12DE	DPST	○	○	1	3	—	—	—	—	—
		U12DF				3	6	TV3	TV3			
		U12DN				4	8	—	TV4			
		U12DV	DPDT	○	—	—	—	—	—	4A/64A Class I	4A/64A Class I	4A/64A Class I
		U12QE				—	—	—	—	—	—	—
		U12QF				—	—	TV3	TV3			
Pull-Push Type		U74SE	SPST	○	—	1	3	TV1	TV1	—	—	—
		U85SF		○	○	3	6	TV3	TV3			
		U85SN				4	8	TV4	TV4			
		U85SM				5	10	TV5	TV5			
		U74DE	DPST	○	○	1	3	TV1	TV1	—	—	—
		U85DF		○	—	3	6	TV3	TV3			
		U85DN				4	8	TV4	TV4			
		U85DM				5	10	TV5	TV5			
		U85DX				—	—	—	—			
		U85DV				—	—	—	—			
		U85DR				—	—	—	—			
		U87S	SPST	○	—	5	15	TV8	TV8	—	—	—
		U86D	SPST	○	—	—	—	—	TV10			
		U86D	SPST	○	—	5	16	—	—	—	—	—
Push-Lock Type	SY10	U62S1	SPST	○	—	—	—	TV3	TV3	—	4A/128A Class II	—
		U62S1 x 2	SPST x 2			—	—	TV4	TV4			
		U62S1 x 2	SPST x 2			—	—	TV5	TV5			
	SY11	A91S2	SPST	○	—	3	6	TV3	TV3	3A/48A Class I _μ	3A/48A Class I _μ	3A/48A Class I _μ
	SY13	U95S2	SPST	○	—	5	10	TV5	TV5	—	—	—
	SY13-4	U95D2	DPST	○	—	5	10	—	—	4A/128A Class I	4A/128A Class I	4A/128A Class I

Push Switches SF121 Series



SF121



FEATURES

- Self-cleaning type contacts for excellent contact stability.
- Stable performance within a wide temperature range from low to high.
- Type to prevent simultaneous locking available.
- Selectable from the single unit, lock-release, momentary ON and self-locking types.

APPLICATION

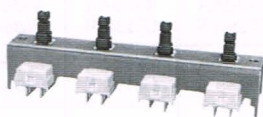
For car electric parts, audio equipment, measuring equipment, office automated equipment, etc.

SPECIFICATIONS

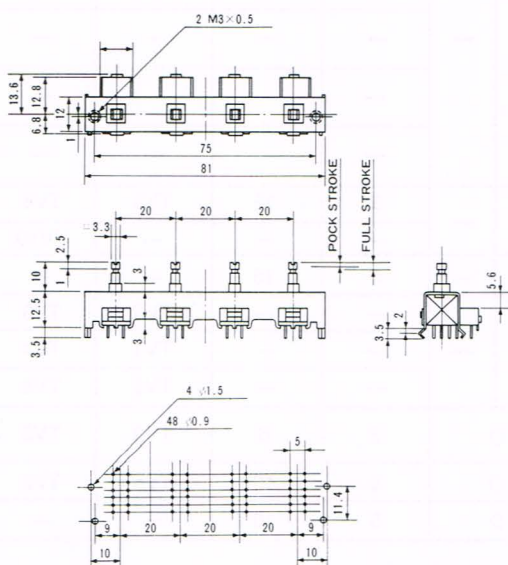
Stroke	Lock stroke: $1.6 \pm 0.3\text{mm}$ Full stroke: $2.5 \pm 0.3\text{mm}$
Operating force	$250 \pm 100\text{g}$
Circuit	2-circuit, 2-position/1-key
Rating	30VDC, 0.3A
Contact resistance	Less than $30\text{m}\Omega$
Operating temperature range	-30°C to $+80^{\circ}\text{C}$
Storage temperature range	-40°C to $+85^{\circ}\text{C}$

Push Switches SF12 Series, Vertical Mounting Type

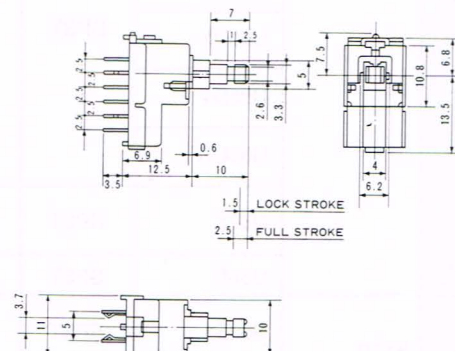
SF12



SF1202-04



SF1201-04



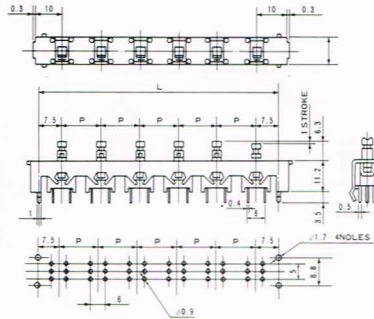
Rating	30VDC, 0.3A
Contact resistance	Less than 20mΩ
Circuit configuration	2 circuits/2 positions 4 circuits/2 positions
Operating system	Lock release or non-lock
Operating force	250±100g-cm
Operating stroke	1.5mm (lock stroke) 2.5mm (full stroke)

1mm Stroke New Tactile Switches SK Series

SK1100 (Self-lock)



NEW PRODUCT



Mounting Pitch (Size L)

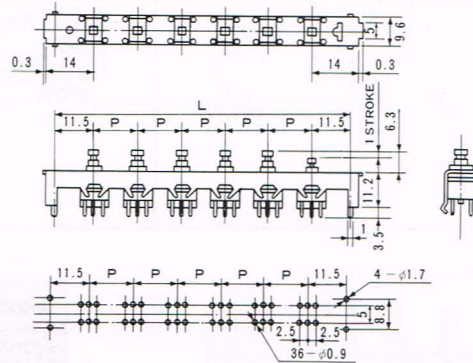
Unit: mm

Keys	2	3	4	5	6	7
Key pitch						
P=12.5	27.5	40.0	52.5	65.0	77.5	90.0
P=15	30.0	45.0	60.0	75.0	90.0	105.0

Keys	8	9	10	11	12
Key pitch					
P=12.5	102.5	115.0	127.5	140.0	152.5
P=15	120.0	135.0	150.0	—	—

Lock-release and non-lock can be combined.

SK1003 (Lock-release) SK1004 (Non-lock)



Mounting Pitch (Size L)

Unit: mm

Keys	2	3	4	5	6	7
Key pitch						
P=12.5	35.5	48.0	60.5	73.0	85.5	98.0
P=15	38.0	53.0	68.0	83.0	98.0	113.0

Keys	8	9	10	11	12
Key pitch					
P=12.5	110.5	123.0	135.5	148.0	160.5
P=15	128.0	143.0	158.0	—	—

Mounting Pitch (Size L)

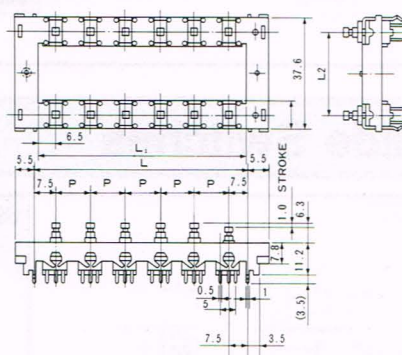
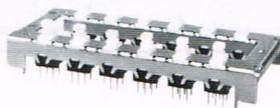
Unit: mm

Keys	2	3	4	5	6	7
Key pitch						
P=12.5	27.5	40.0	52.5	65.0	77.5	90.0
P=15	30.0	45.0	60.0	75.0	90.0	105.0

Keys	8	9	10	11	12
Key pitch					
P=12.5	102.5	115.0	127.5	140.0	152.5
P=15	120.0	135.0	150.0	—	—

Lock-release and non-lock can be combined.

SK2003 (Lock-release)



Mounting Pitch

Unit: mm

Keys	Key pitch P	Size L	Size L1
8 (4-key x 2)	12.5	52.5	50.5
12 (6-key x 2)	12.5	77.5	75.5
14 (7-key x 2)	12.5	90	88

Size L2 = 28
(L2 = 15 or 20mm available)

Characteristics

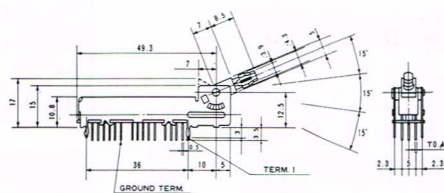
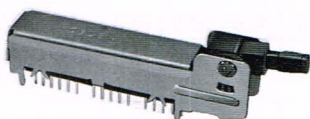
Operating force	Lock-release: 140±50g (return force more than 20g) Non-lock: 140±60g (return force more than 10g) Self-lock: 170±60g (return force more than 20g)
Operating Stroke	1±0.3mm (full-stroke of self-lock type: 1.7±0.3mm)
Rating	30V DC, 0.1A (load impedance)
Contact Resistance	Under 100mΩ when measured with 6V DC, 1A voltage drop method or 1kHz milliammeter

CAUTION:

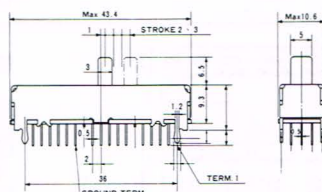
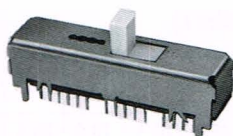
- Since this is a tactile switch with 1mm short stroke, it should be used with knob height of maximum 3 mm from front panel surface. Small-size knob should also be used. Before using

the parts, please be sure to submit application drawing for confirmation of design approvability.

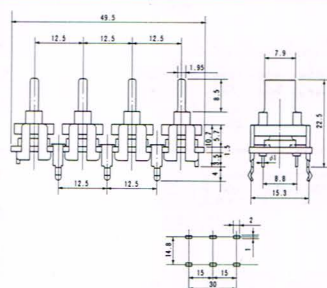
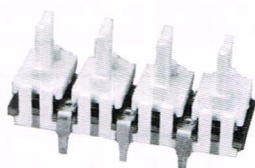
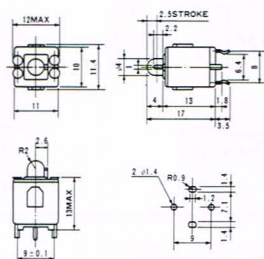
SXE22 (with Grounding Circuit)



SLE10 (with Grounding Circuit)



SM16 (Rubber Switch Block)

**SQ125** (Door Switch)

SPECIFICATIONS

1. Rating and Circuit

Switching circuit	30VDC, 0.3A
Grounding Circuit	30VDC, 0.1A
Circuit configuration	6-circuit 4-position

2. Mechanical Characteristics

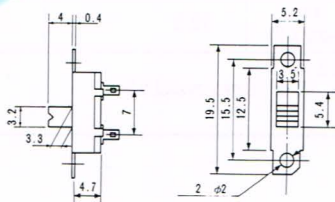
Lever type switching angle	15°
Slide type switching stroke	2.0mm

Operating stroke	ON stroke: 0.9mm Full stroke: 1.3mm
Operating force	60±20g
Rating	20VDC, 2mA
Insulation resistance	More than 1,000MΩ, 100VDC
Withstand voltage	500VAC, 1 min.

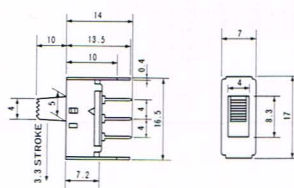
Rating	20VDC, 20mA
Contact resistance	Less than 50mΩ
Circuit configuration	Push-on type (SQ125-1) Push-off type (SQ125-2)
Operating force	80 ± 40g-cm
Return force	More than 10g
Operating stroke	2.5 ± 0.3mm

Slide Switches

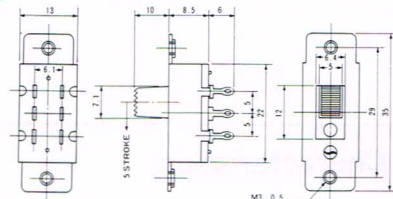
SL56



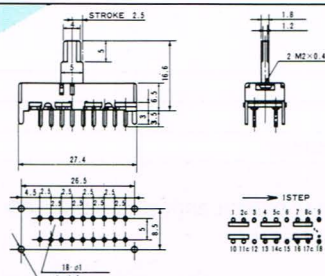
SL75



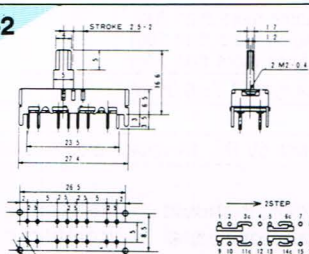
SL13-8



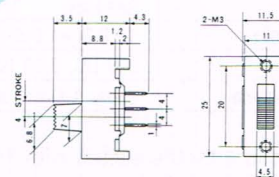
SL106-1



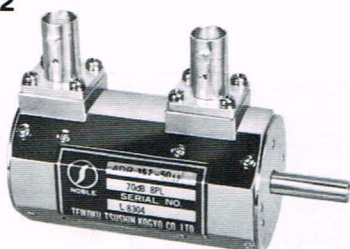
SL106-2



SL114



ADR352



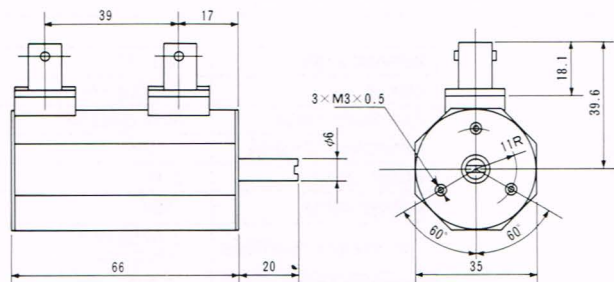
FEATURES

- High-performance, small-size.
- Operating frequency range: 1.5GHz (50Ω).
- Attenuation of 100dB.

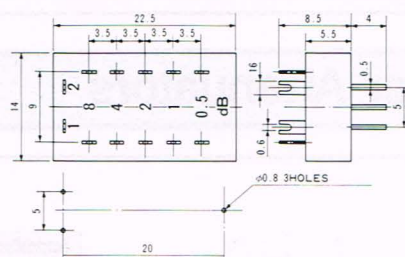
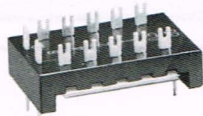
SPECIFICATIONS

Impedance	50Ω, 75Ω
Attenuation	0-100dB (50Ω, 11 steps) 0-80dB (75Ω, 9 steps) (0.1dB, 1dB steps possible)
Operating frequency range	DC — 1.5GHz (50Ω) DC — 1.2GHz (75Ω)
Power rating	500mW
VSWR	Less than 1.1: 1GHz (50Ω) Less than 1.2: 1.5GHz (50Ω)
Connector	50Ω BNC, SMA 75Ω BNC, KC

NEW PRODUCT

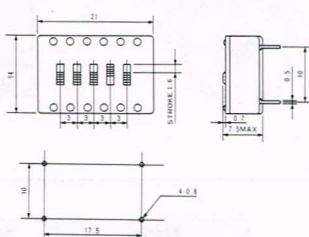


BNA2214



Impedance	600Ω ±3%
Circuit composition	Unbalanced T-type
Attenuation	Combination of 1/2, 1, 2, 4, 8dB; 15.5dB max. Combination of 1, 2, 4, 8, 16dB; 31dB max.
Frequency	DC-150kHz
Input power	50mW

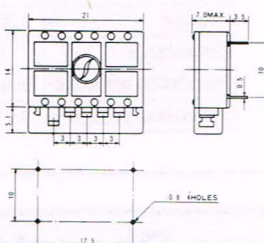
ASA2114



Impedance Balanced O-type Unbalanced T-type	600Ω ± 2.5% 600Ω ± 2%
Attenuation	Combination of 1/2, 1, 2, 4, 8dB; 15.5dB max. Combination of 1, 2, 4, 8, 16dB; 31dB max.
Frequency	DC-150kHz
Input Power	50mW

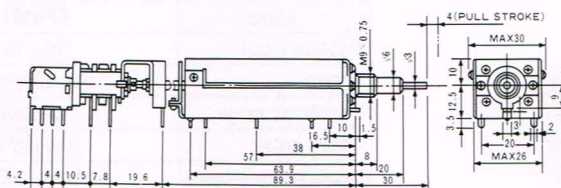
NEW PRODUCT

ASA2106PL



Impedance	
Balanced O-type	$600\Omega \pm 2.5\%$
Unbalanced T-type	$600\Omega \pm 2\%$
Attenuation	Combination of 1/2, 1, 2, 4, 8dB; 15.5dB max. Combination of 1, 2, 4, 8, 16dB; 31dB max.
Frequency	DC-150kHz
Input Power	50mW

ADR255

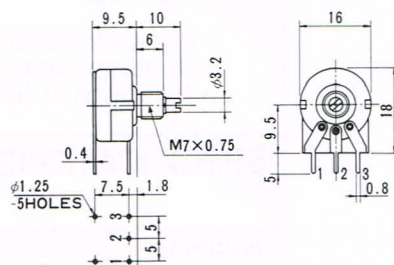
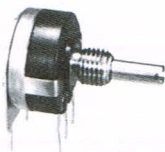


Operating frequency	DC-35, 50, 100, 200MHz
Attenuation ratio	1/1000-1/1
Input impedance	1M Ω
Input capacitance	5.5-22pF
Step angle	30°

NEW PRODUCT

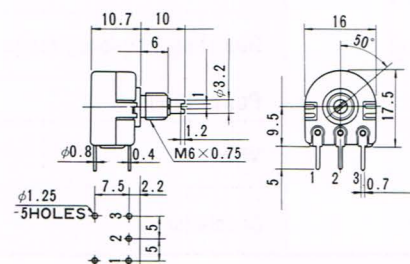
Industrial Use Potentiometers

RV16YP



Rotation angle	260 $\pm$ 10°
Torque	20-200g-cm
Resistance range	100 Ω -1M Ω (B)
Resistance tolerance	$\pm$ 10%
Power rating	0.1W
Voltage rating	200V

TF16P(PH)

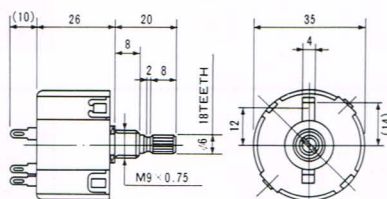


Rotation angle	260 $\pm$ 5°
Torque	30-430g-cm
Resistance range	30 Ω -20k Ω (B)
Resistance tolerance	$\pm$ 10%
Power rating	0.3W
Voltage rating	250V
Temperature coefficient	$\pm$ 200ppm/°C (100 Ω -10k Ω)
Operating life	15,000 cycles

Terminals for lead wiring available

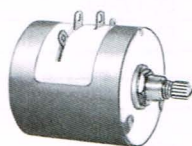
Speaker Attenuators

ACRW350



Impedance	8 Ω
Power rating	96 hour continuous load: 8W 1000 hour continuous load: 4W
Total rotation angle:	300 $\pm$ 5°

ACRW



ACRW40



ACRW403



ACRW406

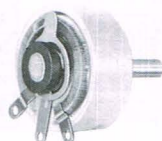
Model	ACRW40	ACRW403	ACRW406
Power rating	27W	15W	8W
	96 hours continuous load of sine wave		
Rotation angle	290 $\pm$ 10°	300 $\pm$ 5°	300 $\pm$ 5°
Torque	1000 $\pm$ 500g-cm	100-450g-cm	70-450g-cm
Impedance	8 Ω $\pm$ 30%	8 Ω $\pm$ 30%	8 Ω $\pm$ 30%
Insulation resistance	DC500V, 100M Ω	DC500V, 100M Ω	DC500V, 100M Ω
Withstand voltage	AC500V, 1 min.	AC500V, 1 min.	AC500V, 1 min.

Wire-Wound Power Rheostats

RPH



RPH101

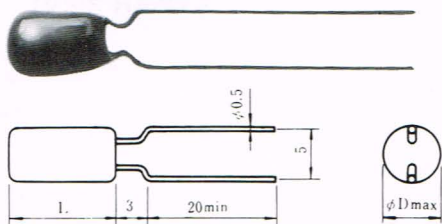


RPH25

Model	RPH101	RPH25
Rotation angle	280 $\pm$ 10°	290 $\pm$ 10°
Torque	100-500g-cm	100-800g-cm
Resistance range	1 Ω -500 Ω	5 Ω -1k Ω
Power rating	10W (25°C)	25W (25°C)
Insulation resistance	DC500V, 100M Ω	DC500V, 100M Ω
Withstand voltage	AC1500V, 1 min.	AC1500V, 1 min.
Remarks	RPH102 (3 ϕ shaft) and RPH15 (15W) types available.	

Polypropylene Capacitors

CQ15P



Capacitance range	100pF-0.1μF
Capacitance tolerance	±1% (F), ±2% (G), ±5% (J)
Voltage rating	50VDC
Operating temperature range	-25°C to +85°C
tan δ	≤ 0.001 for C ≥ 1000pF ≤ 0.002 for C < 1000pF

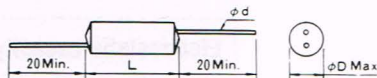
FEATURES

- Smaller than conventional polystyrene type. Capacitance range is wider: 100pF-0.1μF (standard series).
- Superior heat and solvent resistance. Processing can be done through automatic soldering machine and p-c boards with the units installed can be rinsed.
- Units meeting more stringent tolerance requirements (±1%, ±2%) available at low cost.
- Formed leads (straight or free-standing) or taped leads available for automatic insertion machine.

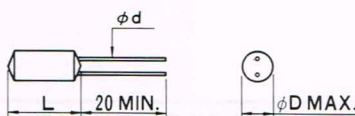
Capacitance Range	D φ max.	L (mm)
100pF - 1000pF	5.0	7±1
1100pF - 3300pF	6.0	7±1
3600pF - 0.01μF	7.0	9±1
0.011μF - 0.027μF	8.0	11±1
0.03μF - 0.047μF	9.0	13±1
0.051μF - 0.068μF	10.0	13±1
0.075μF - 0.1μF	11.0	13±1

Polystyrene Capacitors

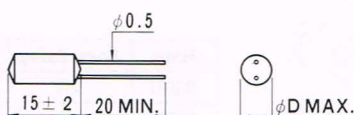
CQ08(S)



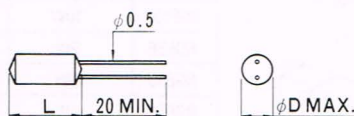
CQ09(S)



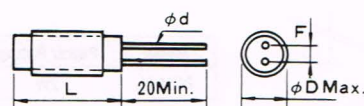
CQ09(T) Thermal shock proof type



CQ09(C) Copper foil



CQ09(X) Humidity and thermal shock proof type



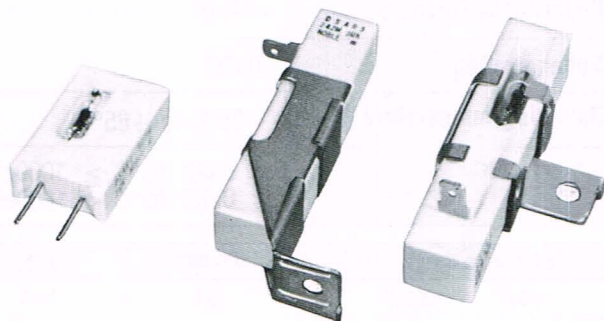
Length L (mm)	Voltage rating: 50V		
	Dimensions (mm)		Capacitance range
	D	d ±0.05	
8±1	5.6	0.4	10pF-180pF
9±1	5.6-6.3	0.4	200pF-750pF
10±2	6.3-9.0	0.4	820pF-4,700pF
16±2	—	—	—
18±2	8.0-9.0	0.5	5,100pF-0.01μF
20±2	—	—	—
25±2	10.0-11.2	0.5	0.015μF-0.033μF
31.5±2	12.5-16.0	0.5	0.047μF-0.1μF

Voltage rating: 50V	
Dim. (mm)	Capacitance range (E-24 series)
D	
6.3	100 to 680pF
7.1	750 to 1,000pF
8.0	1,100 to 2,200pF
9.0	2,400 to 3,300pF
10.0	3,600 to 4,700pF
11.2	5,100 to 6,800pF
12.5	7,500pF to 0.01μF

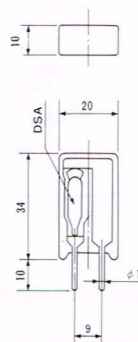
Length L (mm)	Voltage rating: 125V	
	Dim. (mm)	Capacitance range (E-12 series)
	D	
15±2	6.3	1-270pF
	7.1	330-1,000pF
	8.0	1,200-1,800pF
	9.0	2,200-2,700pF
20±2	10.0	3,300-3,900pF
	11.2	4,700-5,600pF
	12.5	6,800pF-0.01μF

Length L (mm)	Voltage rating: 50V		
	Dimensions (mm)		Capacitance range
	D	d ±0.05 F	
13±1	6.3-7.1	0.4 3.5	100pF-680pF
18±1	7.1-11.2	0.5 3.5, 5	820pF-0.01μF

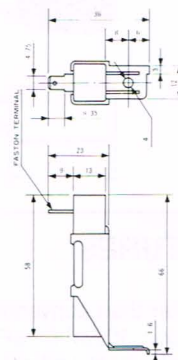
Surge Absorbers DSAR Series



DSAR 1



DSAR 3(FV)



FEATURES

- Uses open-mode, field-effect type discharge element.
- Large surge withstanding capacity and rapid response.
- Large insulation resistance and very small electrostatic capacity.
- Stable against repeated surge and changes in environmental conditions.
- Destruction mode is open, eliminating danger of short-circuit.
- Meets UL standards.

APPLICATION

Electronic ranges, hot water supply systems, telephones, office automated equipment, etc.

SPECIFICATIONS

Flashover voltage	180–3000V depending on model
Insulation resistance	More than $10^8 \Omega$
V-t characteristic	Less than $1 \mu\text{sec}$ ($1.2 \times 50 \mu\text{sec}$ waveform)
Electrostatic capacity	Less than 1pF
Internal connection	DSA Discharge element RGBS Continuous current breaking resistor

Cement-Filled Fixed Resistors

RGE-T

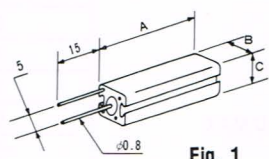


Fig. 1

RGE-P

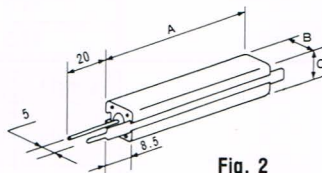
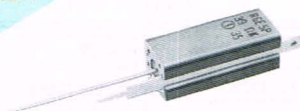


Fig. 2

RGE-B (Safety resistor with circuit breaker)

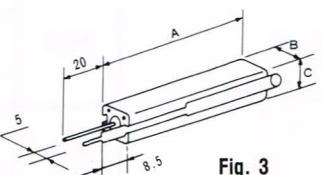
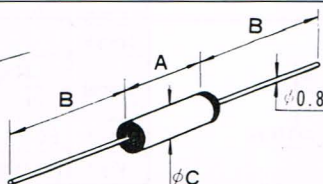
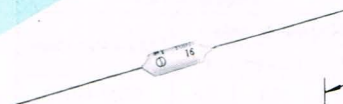


Fig. 3

RGM



Unit: mm

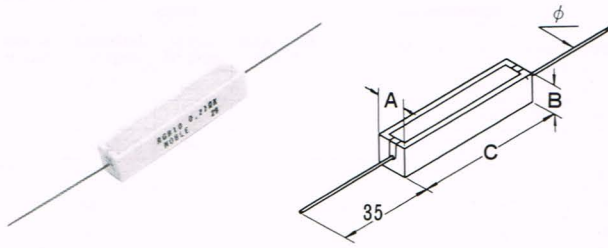
Model	Power Rating	A	B	C	Resistance Range	Figure
RGE2T	2W	20 ± 1.0	9 ± 1	7.5 ± 1	$0.22 \Omega - 270 \Omega$	Fig.1
RGE3T	3W	25 ± 1.0	9 ± 1	7.5 ± 1	$0.27 \Omega - 680 \Omega$	Fig.1
RGE5T	5W	25 ± 1.0	10.5 ± 1	9 ± 1	$0.27 \Omega - 680 \Omega$	Fig.1
RGE7T	7W	38 ± 1.5	10.5 ± 1	9 ± 1	$0.68 \Omega - 1,200 \Omega$	Fig.1
RGE2P	2W	20 ± 1.0	9 ± 1	7.5 ± 1	$0.22 \Omega - 270 \Omega$	Fig.2
RGE3P	3W	25 ± 1.0	9 ± 1	7.5 ± 1	$0.27 \Omega - 680 \Omega$	Fig.2
RGE5P	5W	25 ± 1.0	10.5 ± 1	9 ± 1	$0.27 \Omega - 680 \Omega$	Fig.2
RGE7P	7W	38 ± 1.5	10.5 ± 1	9 ± 1	$0.68 \Omega - 1,200 \Omega$	Fig.2
RGE10P	10W	50 ± 2.0	10.5 ± 1	9 ± 1	$1 \Omega - 1,800 \Omega$	Fig.2
RGE3B	2W	25 ± 1.0	9 ± 1	7.5 ± 1	$0.27 \Omega - 680 \Omega$	Fig.3
RGE5B	3W	25 ± 1.0	10.5 ± 1	9 ± 1	$0.27 \Omega - 680 \Omega$	Fig.3
RGE7B	4W	38 ± 1.5	10.5 ± 1	9 ± 1	$0.68 \Omega - 1,200 \Omega$	Fig.3
RGE10B	5W	50 ± 2.0	10.5 ± 1	9 ± 1	$1 \Omega - 1,800 \Omega$	Fig.3

Unit: mm

Model	Power Rating	A	B	C	Resistance Range
RGM-2L	2W	13 ± 1.0	35 ± 3	6.1 ± 0.5	$0.22 \Omega - 180 \Omega$

Cement-Filled Fixed Resistors

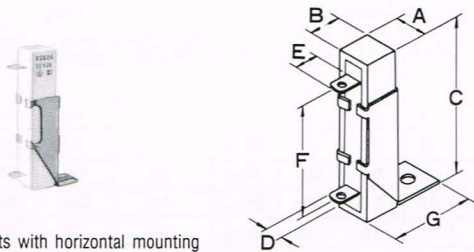
RGB-L RGU-L



Model		Watt	Ohm (Ω)	Dimensions (mm)			Weight (g)
				A/B	C	ϕ	
RGB2	RGU2	2	0.22-270	6.3±1	18±1	0.8±0.1	2.5
RGB3	RGU3	3	0.27-680	8±1	23±1	0.8±0.1	4
RGB5	RGU5	5	0.27-680	9.5±1	23±1	0.8±0.1	5
RGB7	RGU7	7	0.68-1,200	9.5±1	36±1	0.8±0.1	8
RGB10	RGU10	10	1-1,800	9.5±1	48±1.5	0.8±0.1	10
RGB15	RGU15	15	1.2-2,200	13±1	48±2	1.0±0.1	18
RGB20	RGU20	20	1.5-2,700	13±1	63.5±2	1.0±0.1	25

Note: Type RGU's are the UL recognized "fusing and temperature and limited resistors" (E62418)

RGB-HV RGU-HV

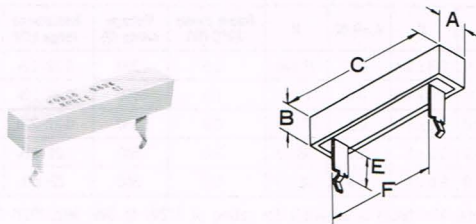


Also available units with horizontal mounting metal (HS).

Model		Watt	Ohm (Ω)	Dimensions (mm)							Weight (g)
				A/B	C	D	E	F	G		
RGB10HV	RGU10HV	10	1-1,800	9.5±1	48±1.5	5	7	35±2	23.5±1.5	17	
RGB15HV	RGU15HV	15	1.2-2,200	13±1	57±2	6.5	8	33±2	27±1.5	27	
RGB20HV	RGU20HV	20	1.5-2,700	13±1	63.5±2	6.5	8	49±2	27±1.5	33	
RGB30HV	RGU30HV	30	1.8-3,300	19±1	83±2	7.5	10	55±2	36±2	90	
RGB40HV	RGU40HV	40	2.2-4,700	19±1	90±2	7.5	10	70±2	36±2	100	

Note: Type RGU's are the UL recognized "fusing and temperature and limited resistors" (E62418)

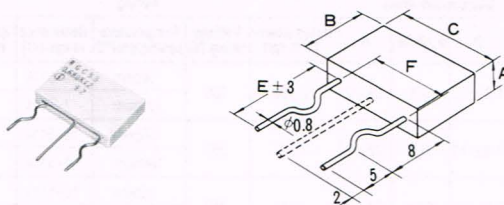
RGB-PH RGU-PH



Model		Watt	Ohm (Ω)	Dimensions (mm)				Weight (g)
				A/B	C	E	F	
RGB5PH	RGU5PH	5	0.27–680	9.5±1	23±1	10	10±1	5.5
RGB7PH	RGU7PH	7	0.68–1,200	9.5±1	36±1	10	22.5±1	8.5
RGB10PH	RGU10PH	10	1–1,800	9.5±1	48±1.5	10	35±1	11.5

Note: Type RGU's are the UL recognized "fusing and temperature limited resistors" (E62418).

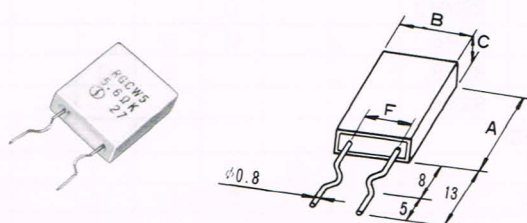
RGC



Model	Watt (W)	Ohm (Ω)	Dimensions (mm)					Weight (g)	Element
			A	B	C	E	F		
RGC2	2	0.1-1	5	9	14±1	13	9	1.3	Single
RGC3	3	0.1-1	5	13	14±1	13	9	2.3	
RGC5	5	0.1-1	5	17	14±1	13	9	3.0	
RGC22	2+2	0.1-1	5	9	26±1.5	13	20	2.5	Twin
RGC33	3+3	0.1-1	5	13	26±1.5	13	20	4.5	
RGC55	5+5	0.1-1	5	17	26±1.5	13	20	5.6	
RGC77	7+7	0.05-0.5	6	20	26±1.5	13	20	7.5	

Twin-type has two elements of very close resistance values and the same TCR and is best suited for a final-stage emitter load resistor in a push-pull power amplifier.

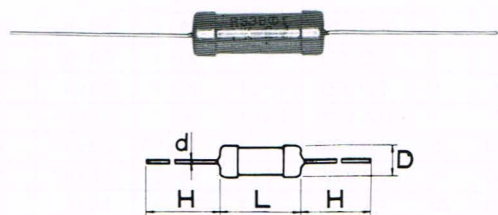
RGCW



Model	Watt (W)	Ohm (Ω)	Dimensions (mm)			
			A	B	C	F
RGCW2	2	1-50	10±1.0	15±1.0	6±0.5	9±0.5
RGCW3	3	1-50	13±1.0	15±1.0	6±0.5	9±0.5
RGCW5	5	2-100	18±1.0	15±1.0	6±0.5	9±0.5

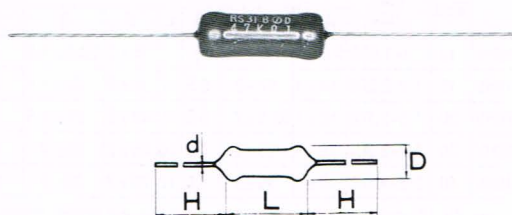
Metal-Oxide, Metal-Film Fixed Resistors

RSB: Protective Coating



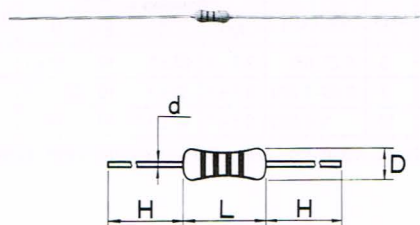
Model	Dimensions (mm)				Rating			
	L ±1	D	d ±0.05	H	Rated power 70°C (W)	Voltage rating (V)	Resistance range (Ω)	Resistance tolerance
RS1/2B	8.5	2.6 ± 0.5	0.6	27 min.	0.5	250	0.22-68k	Standard: ±5% (Code J) On request: ±2% (Code G)
RS1B	12	3.8 ± 0.5	0.8	27 min.	1.0	350	0.22-100k	
RS2B	15	5.0 ± 0.5	0.8	38 ± 3	2.0	350	0.22-120k	
RS3B	24	9.0 ± 0.5	0.8	38 ± 3	3.0	500	10-150k	
(RS4B)	(31)	(8.0 ± 0.5)	(0.8)	(38 ± 3)	(4.0)	(500)	(2.2-160k)	
RS5B	40	8.0 ± 0.5	0.8	38 ± 3	5.0	750	22-180k	

RSFB: Flame-Proof Coating



Model	Dimensions (mm)				Rating			
	L ±1	D ±1	d ±0.05	H	Rated power 70°C (W)	Voltage rating (V)	Resistance range (Ω)	Resistance tolerance
RS1/2FB	9	3.0	0.6	27 min.	0.5	250	0.22-68k	Standard: ±5% (Code J) On request: ±2% (Code G)
RS1FB	13	4.5	0.8	27 min.	1.0	350	0.22-100k	
RS2FB	16	6.0	0.8	38 ± 3	2.0	350	0.22-120k	
RS3FB	25	9.0	0.8	38 ± 3	3.0	500	10-150k	
(RS4FB)	(32)	(9.0)	(0.8)	(38 ± 3)	(4.0)	(500)	(22-160k)	
RS5FB	41	9.0	0.8	38 ± 3	5.0	750	22-180k	

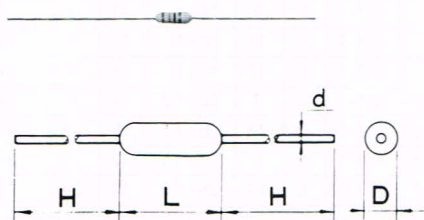
RSM: Compact Type (Flame-Proof Coating)



Model	Dimensions (mm)				Rating			
	L	D	d ±0.02	H	Rated power 70°C (W)	Voltage rating (V)	Resistance range (Ω)	Resistance tolerance
RSM1/2	6.4	2.3 ± 0.5	0.6	27 min.	0.5	250	0.22-22k	J
RSM1	9.0	2.8 ± 0.5	0.8	27 min.	1.0	350	0.22-22k	J
RSM2	12.0	4.0 ± 1	0.8	27 min.	2.0	350	0.22-22k	J
RSM3	15.0	5.5 ± 1	0.8	38 ± 3	3.0	500	0.22-22k	J
RSM5	25.0	9.0 ± 1	0.8	38 ± 3	5.0	500	22-22k	J

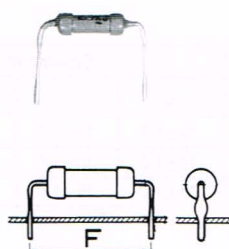
RNS type (metal film type) is available for rating of 1/2W to 3W, less than 10Ω.

RN: Metal Film



Model	Dimensions (mm)				Rating			
	L	D	d ±0.02	H	Rated power 70°C (W)	Voltage rating (V)	Temperature coefficient/°C	Resistance range (Ω)
RN1/6S	3.5	1.8 ± 1.5	0.5	28 ± 2	0.166	200	50ppm	10-511k
							100ppm	1-511k
RN1/4S	6.5	2.3 ± 0.2	0.6	28 ± 2	0.25	250	50ppm	10-511k
							100ppm	1-511k
RN1/2S	9.0	2.8 ± 0.2	0.65	28 ± 2	0.5	350	50ppm	10-511k
							100ppm	1-511k

Pre-forming Type

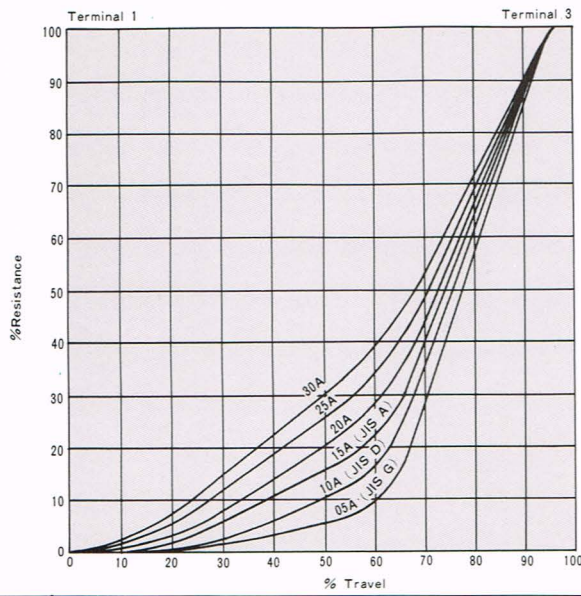


Taping can be made; consult us.

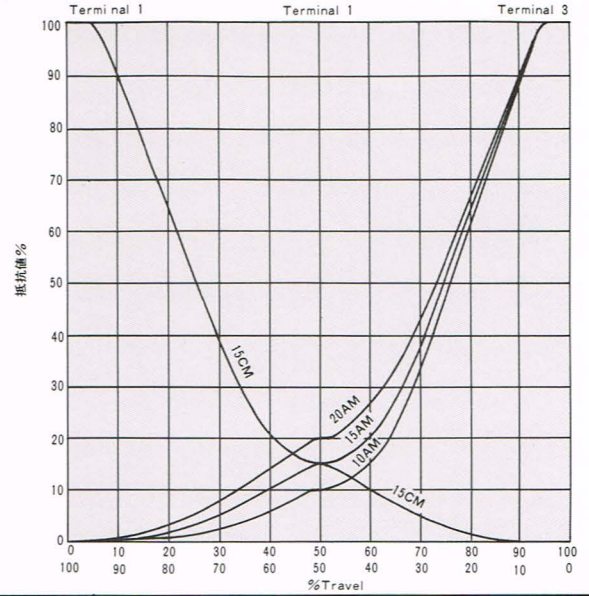
Model		Dimension F (mm)						
		10	12.5	15	20	25	30	35
RS1/2B	RS1/2FB			○				
RS1B	RS1FB			○	○			
RS2B	RS2FB				○	○		
RS3B	RS3FB						○	○
RSM1/2FB		○						
RSM1FB			○	○				
RSM2FB				○	○			
RSM3FB					○	○	○	
RSM5FB							○	○

Potentiometer Standard Resistance Tapers

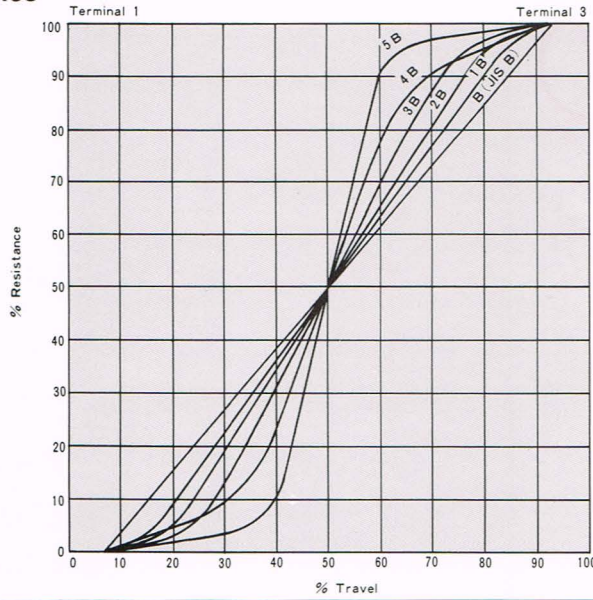
A Series



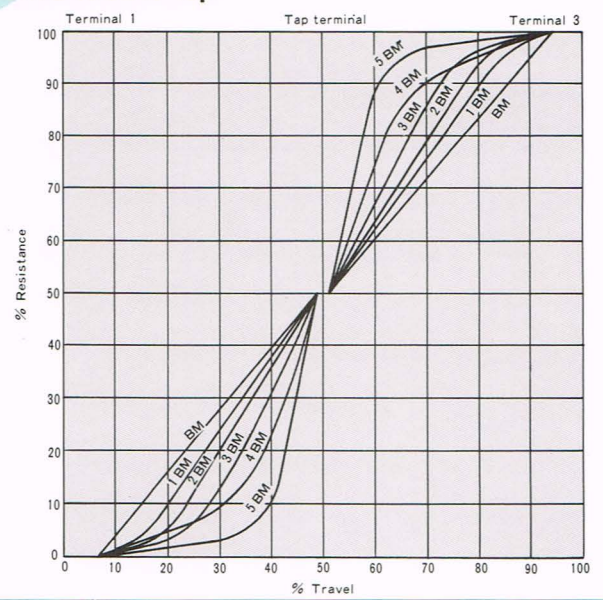
A, C Series w/50% Tap



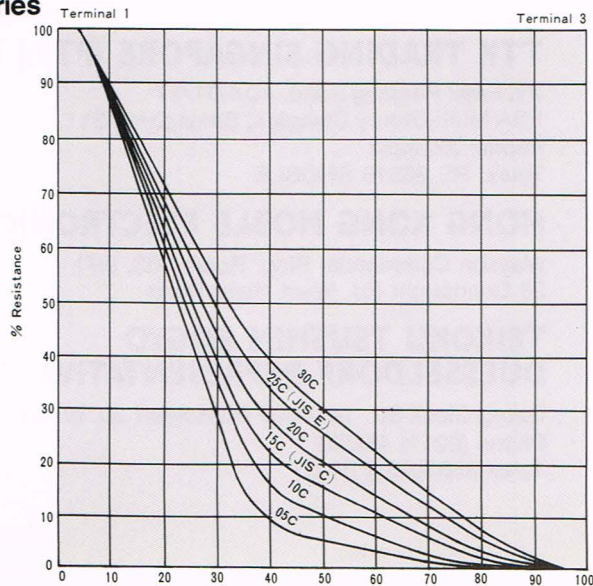
B Series



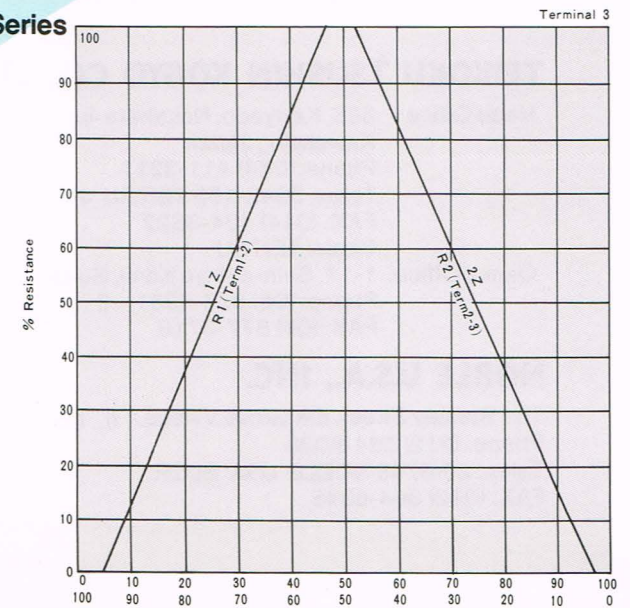
B Series w/50% Tap



C Series



Z Series





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