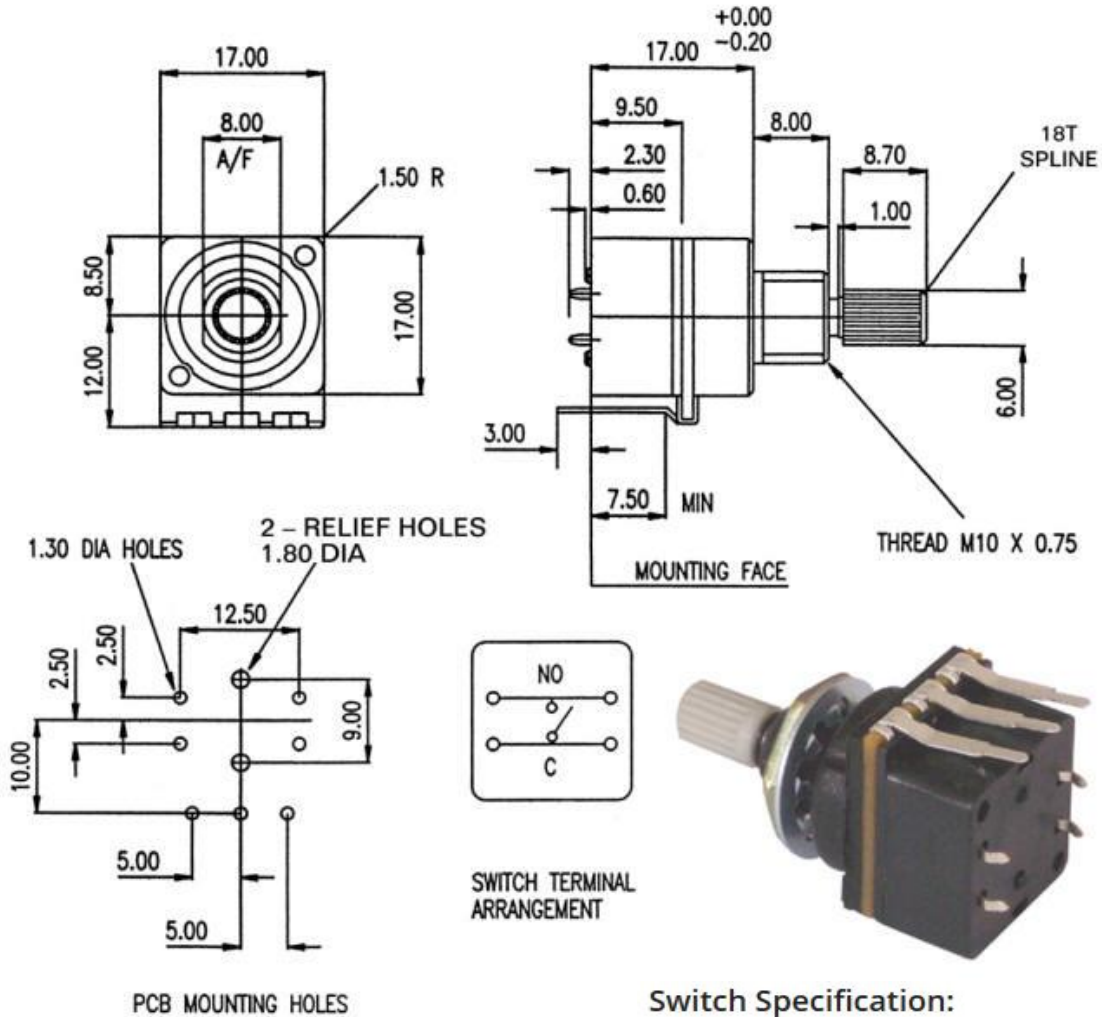


XA16ECO/MS

MS – Momentary Switch XA – Extra Long Terminals bent away from spindle



- W Mounting Height
- Y Mounting Diameter
- X Spindle Diameter
- L Spindle Length

- A Initial Termination
- S Wiper (or moving contact) termination
- E End Termination

Switch Specification:

- Contact rating: 5 to 24VDC, 1 to 50mA resistive load
- Insulation voltage: 30VDC
- Contact Resistance: 100m ohm max. (rated 5VDC, 1mA)
- Insulation Resistance: 100M ohm min. (at 250VDC)
- Dielectric strength: 500VAC 50/60 Hz for 1 min.
- Bounce time: 5 ms max.
- Life expectancy: 1,000,000 operations
- Operating temperature: -25°C to +70°C
- Spindle Travel: 0.8mm (switch actuation 0.25mm)

Technical Data

Rated Power Dissipation @40°C for ECO potentiometers:

0.25W linear law

0.12W nonlinear law

Conductive polymer (plastic) track (over twice the life of carbon tracks)

Effective rotation: 265° nominal

Operating Torque: 0.4 – 1.5 cN.m

Permissible Axial Spindle Load: 50 N (5 Sec. maximum)

Permissible Torque at End Stop: 35 cN.m

Rotation angle: 300° ±5°

Optional Click stop (indents) for rotational tactile feedback

Rotational torque of spindle can be made high or low

Life Expectancy of >20,000 cycles (tested at 30 times per minute)

Insulation Resistance: >= 4 Gohms

Rated Resistance: E3 Series

Optional: E6 Series

Linear Law: 1K – 1M

Nonlinear Law: 4K7 – 470K

ELECTRICAL SPECIFICATION COMMON TO ALL POTENTIOMETERS

Conductive polymer (plastic) track (over twice the life of carbon tracks)

Life Expectancy of >20,000 cycles (tested at 30 times per minute)

Insulation Resistance: >= 4 Gohms

Rated Resistance: E3 Series

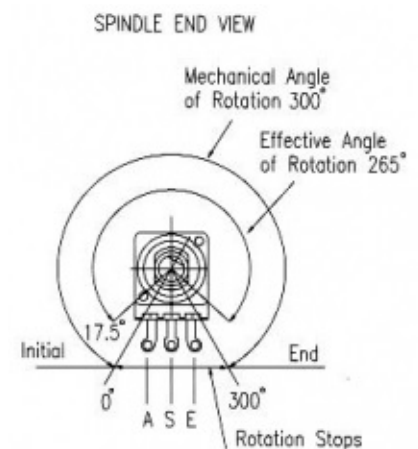
- Optional: E6 Series
- Linear Law: 1K - 1M
- Nonlinear Law: 4K7 - 470K

Tolerance on Rated Resistance: ± 20%

- Optional Tolerance on 1K - 1M: ± 10%

Resistance Laws (Taper):

- Linear: A
- Nonlinear: B - Log (Audio) or C - Antilog (Reverse Audio)
- Other laws: Please refer to Sales office



Total mechanical and effective electrical angles of rotation of potentiometers

ELECTRICAL SPECIFICATION UNIQUE TO ECO POTENTIOMETERS

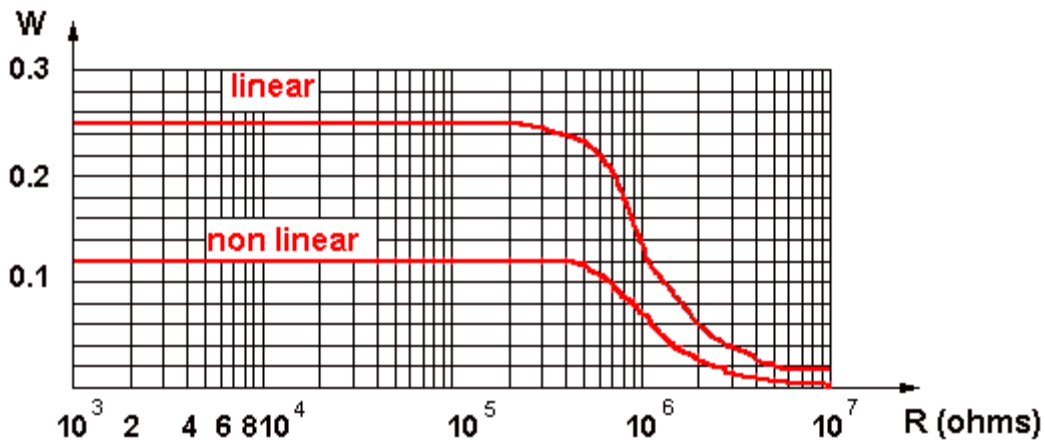
Effective rotation:

- Without a switch: 265° nominal
- With push push switch (/10APP, /MS): 265° nominal
- With rotary switch: 242° nominal

Rated Power Dissipation @40°C for ECO potentiometers:

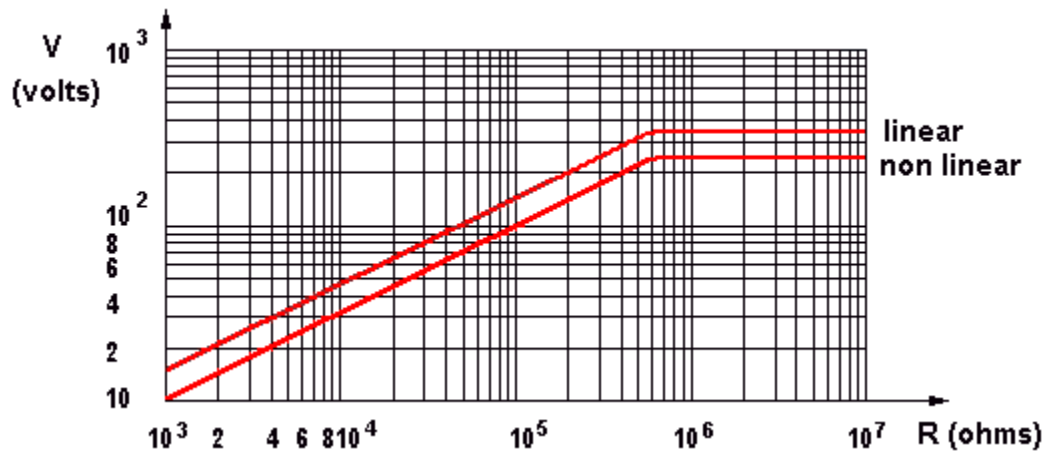
- 0.25W linear law
- 0.12W nonlinear law

ECO, P16 power dissipating curve



Limiting Element Voltage: 350 V DC for 16mm potentiometers

ECO, P16 maximum working voltage curve



Insulating Voltage: 500 V AC for ECO potentiometers

Resistance law A - Linear



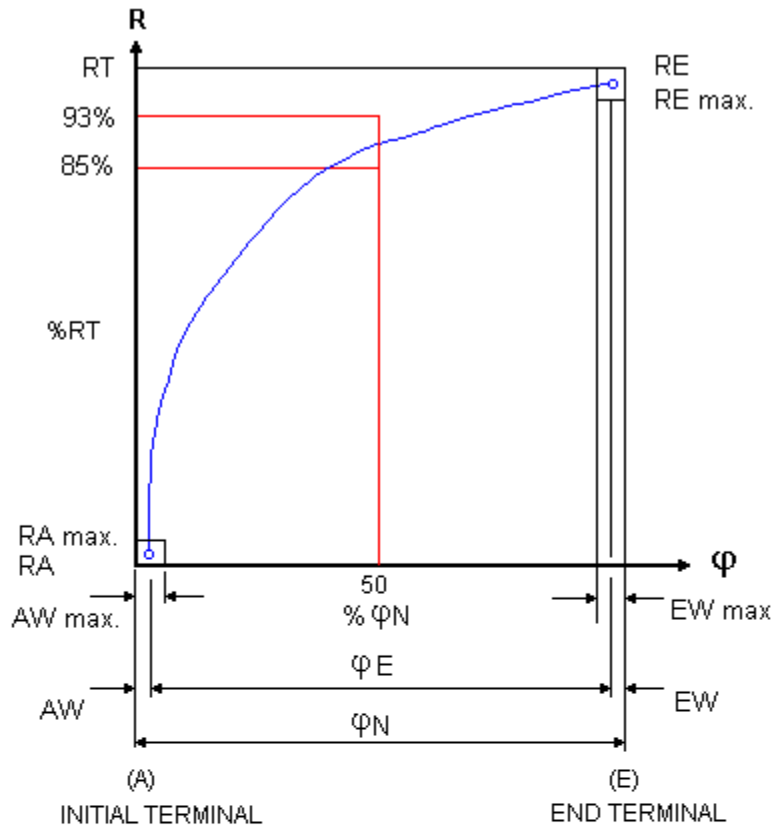
- AW Initial Path AW max. 12% φ_N
- EW Final Path EW max. 12% φ_N
- Ra Initial Stop Value $\leq 1 \cdot 10^{-3} RN$ (Minimum 2 ohms)
- RA Hop-on Resistance $\leq 1\% RN$
- Re End Stop Value $\leq 1 \cdot 10^{-3} RN$ (Minimum 2 ohms)
- RE Hop-off Resistance $\leq 1\% RN$
- RN Rated Resistance
- RT Effective Resistance
- φ Rotation Angle
- φE Effective Electrical Angle of Rotation
- φN Effective Mechanical Angle of Rotation

Resistance law B – Log (Audio)



AW	Initial Path	AW max. 10% φN
EW	Final Path	EW max. 10% φN
Ra	Initial Stop Value	RN ≤ 10K ≤ 1.10 ⁻³ RN (Minimum 2 ohms) RN > 10K ≤ 2.10 ⁻⁴ RN (Minimum 10 ohms)
RA	Hop-on Resistance	RN ≤ 10K 5% RN RN > 10K 0.15% RN
Re	End Stop Value	RN ≤ 100K ≤ 2.10 ⁻² RN RN > 100K ≤ 1.10 ⁻² RN
RE	Hop-off Resistance	RN ≤ 10K < 1% RN RN > 10K 0.5% RN
RN	Rated Resistance	
RT	Effective Resistance	
φ	Rotation Angle	
φE	Effective Electrical Angle of Rotation	
φN	Effective Mechanical Angle of Rotation	

Resistance law C – Antilog (Reverse Audio)



AW	Initial Path	AW max. 10% ϕ_N
EW	Final Path	EW max. 10% ϕ_N
Ra	Initial Stop Value	$R_N \leq 100K \leq 2 \cdot 10^{-2} R_N$ $R_N > 100K \leq 1 \cdot 10^{-2} R_N$
RA	Hop-on Resistance	$R_N \leq 10K < 1\% R_N$ $R_N > 10K 0.5\% R_N$
Re	End Stop Value	$R_N \leq 10K \leq 1 \cdot 10^{-3} R_N$ (Minimum 2 ohms) $R_N > 10K \leq 2 \cdot 10^{-4} R_N$ (Minimum 10 ohms)
RE	Hop-off Resistance	$R_N \leq 10K 5\% R_N$ $R_N > 10K 0.15\% R_N$
RN	Rated Resistance	
RT	Effective Resistance	
ϕ	Rotation Angle	
ϕE	Effective Electrical Angle of Rotation	
ϕN	Effective Mechanical Angle of Rotation	

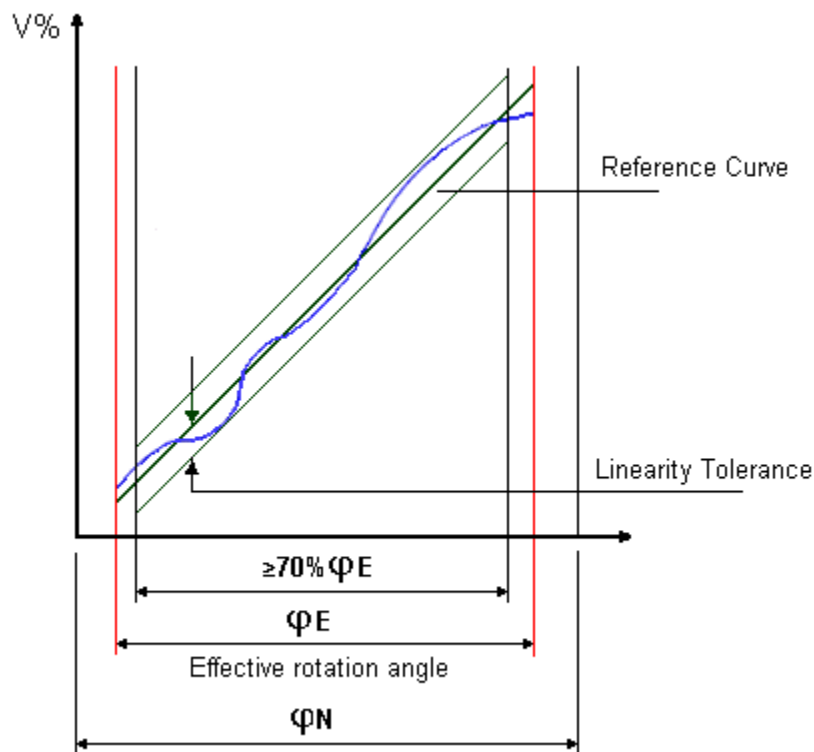
Linearity

As a basis of assessing Linearity Tolerance the independent method is the most practical, permitting as it does, the reference curve to be aligned as near as possible to the actual output curve. This avoids the use of the theoretical starting and finishing points, it is normal for the customer to realign the achieved curve with series trimmers at each end of the device if required.

Linearity Tolerance is 4% over the Nominal Resistance range of 1K Ω to 1M Ω . The Linearity Tolerance is measured on at least 70% of the effective rotation range.

Note. In the case of Terminal and Zero-based linearity, both present constraints which increase the manufacturing difficulty and in consequence have an adverse effect on the product's price and availability.

Potentiometer linearity

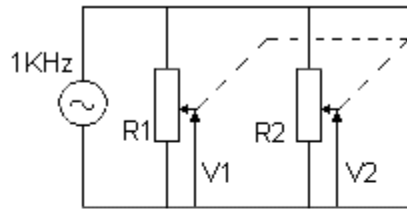


Matching Tolerance (For Tandem Stereo Potentiometers)

Tandem Potentiometers have two identical resistor units with the same variation law. The mismatching of the two resistor units, expressed in dB, is measured by the difference between the attenuations introduced by each resistor unit at various points of travel.

- Law A: 4 dB at Attenuation range 0 - 20 dB
- Law B and C: 3 dB at Attenuation range 0 - 20 dB

Matched Tolerance for Stereo

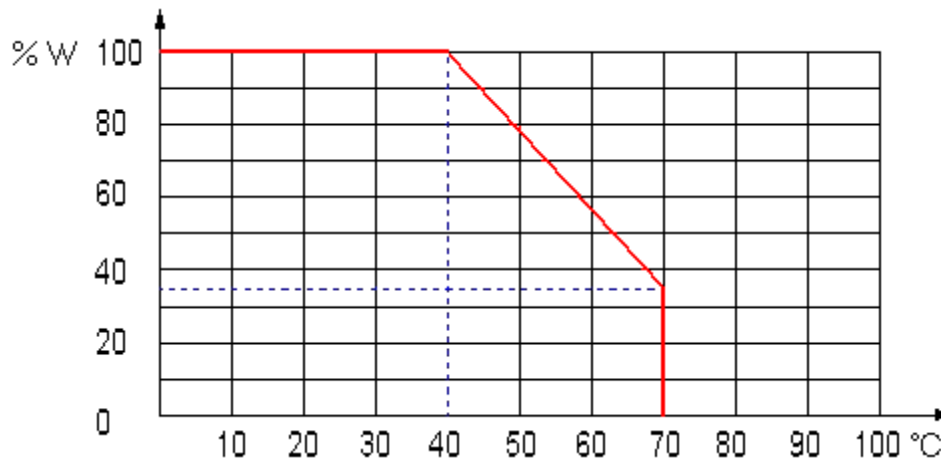


LAW	ATTENUATION RANGE	MATCHING TOLERANCE *
A	0 - 20dB	4dB
B & C	0 - 20dB	3dB

$$*Matching\ Tolerance = 20\ Log\ \frac{V1}{V2}$$

Operating Temperature: -25°C to +70°C

Temperature Derating Curve



Temperature Coefficient of Resistance: +300 -500 ppm