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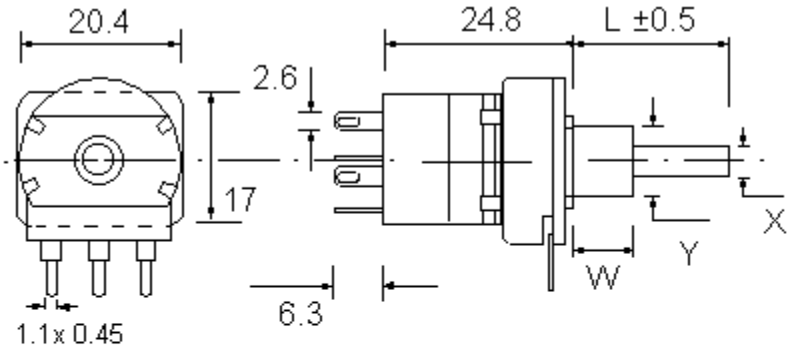
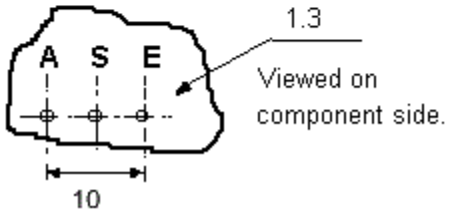
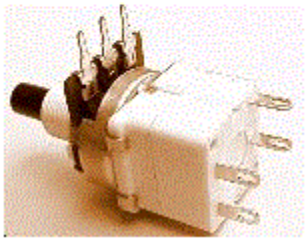
PC20BU/B4OW2S

B4OW1S – 4 Amp Double Pole (Single Throw) Switch
PC – For Printed Circuit
OW – Ordinary Wiring (recommended for soldering)







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

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

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Switch Technical Data

4A Contact Rating:

- 4A/250Vac 10A/12Vdc
- Surge rating (0.01 seconds): 80A
- Switch contacts: Silver tin oxide
- Contact gap: 2mm (Micro disconnection of switch - micro separation of contacts)

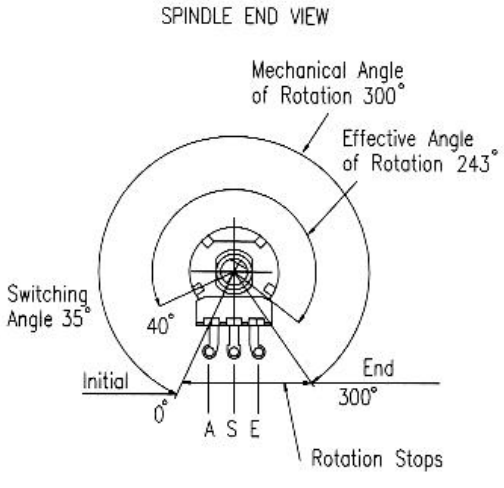
Common Features:

Housing material: Glass filled polyester (UL 94 VO)
Initial contact resistance: 20 milliohms
Insulation resistance: 50,000 Megohms
Life (operations at full load): 10,000 minimum
Operating temperature: -25°C to +70°C
Operating torque for SPST/SPDT: 1.5 - 3 cNm
Operating torgue for DPST/DPDT: 3.0 - 6 cNm
Mechanical rotation: 300°
Proof voltage: 3kV minimum

Certification:

The rotary switch module is Certified by UL International Demko A/S to EN61058-1 with Cenelec Certification Agreement (CCA) and the 1A contact rating is only available when mounted on the ECO potentiometer. ***NOTE*** This is a European and NOT an American certification.

Please note the 'Change Over' rotary switches are not certified.



Total mechanical and effective electrical angles of rotation of potentiometers with rotary switch

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Technical Data

Rated Power Dissipation @40°C for P20 potentiometers:
0.4W linear law
0.2W nonlinear law
Conductive polymer (plastic) track (over twice the life of carbon tracks)
Effective rotation: 243° nominal
Operating Torque: 0.4 – 1.5 cN.m

Permissible Axial Spindle Load: 100 N (5 Sec. maximum)
Permissible Torque at End Stop: 80 cN.m
Rotation angle: 300° ±5°
Rotational torque of spindle can be made high or low
The potentiometer terminals are marked A, S and E.

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 (±10%)
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

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ROTARY SWITCH TERMINALS

Layout

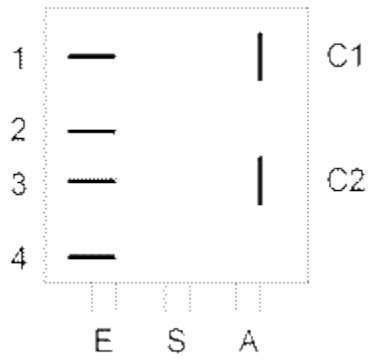
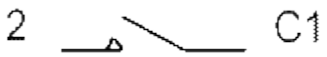
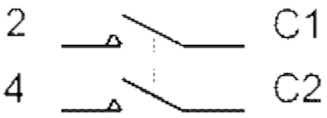


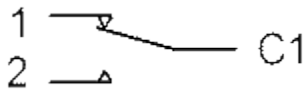
Diagram as viewed on the rear of the switch module:
(Potentiometer terminals at the bottom)



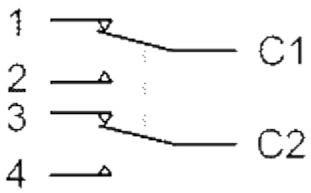
SPST - Single pole (1S), Single throw (On-Off)



DPST - Double pole (2S), Single throw (On-Off)



SPDT - Single pole (1S), Double throw (CH)
(***NOT*** certified)



DPDT - Double pole (2S), Double throw (CH)
(***NOT*** certified)

Notes
1. Moving contact(s) shown when the potentiometer shaft is in a counterclockwise (CCW) position.
2. 'Ordinary Wiring'(OW) or 'Printed Circuit'(PC) terminals can be requested on the switch.
3. Terminals 1 and 3 are only fitted for the Double Throw ('CH' or Changeover) versions which are ***NOT*** approved nor certified.

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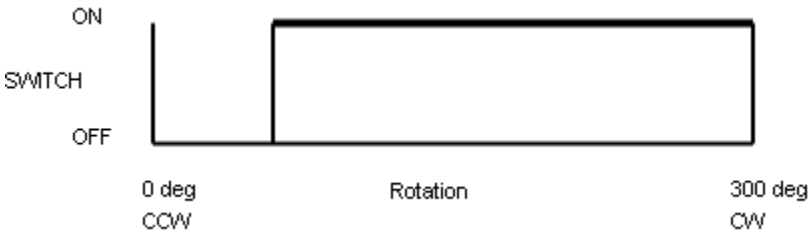
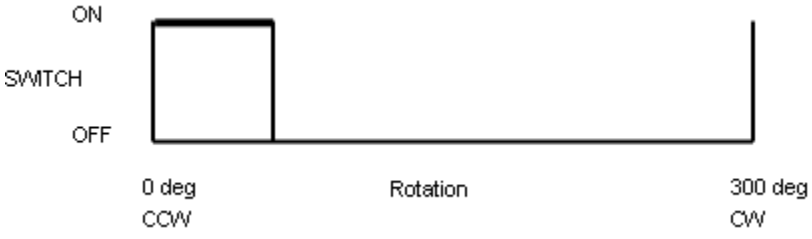
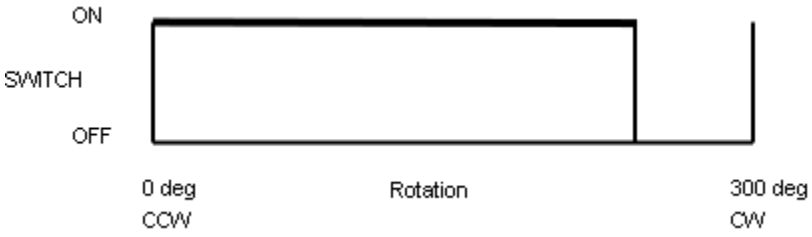
ROTARY SWITCH FUNCTIONS



Standard (1A or 4A contact ratings)
N/O normally OPEN Switch
Contacts normally OPEN;
CLOCKwise rotation to CLOSE contacts



Option 1 (4A contact rating only)
N/C normally CLOSED Switch
Contacts normally CLOSED;
CLOCKwise rotation to OPEN contacts



Option 2 (4A contact rating only)
REVERSED N/O normally OPEN Switch
Contacts normally OPEN at fully clockwise position;
ANTI-clockwise rotation to CLOSE contacts

Option 3 (4A contact rating only)
REVERSED N/C normally CLOSED Switch
Contacts normally CLOSED at fully clockwise position;
ANTI-clockw

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ELECTRICAL SPECIFICATION
UNIQUE TO P20 POTENTIOMETERS

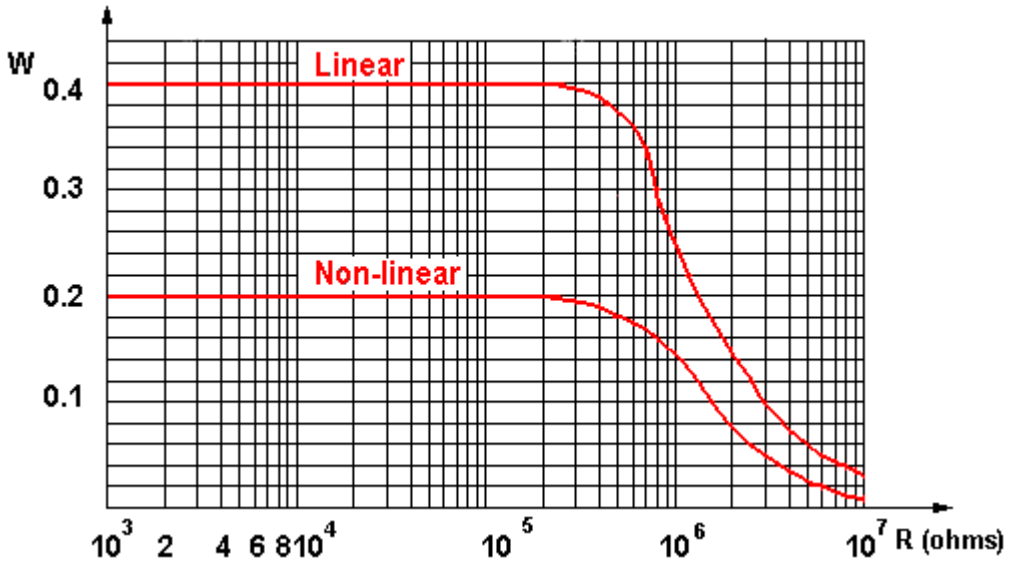
Effective rotation:

- Without a switch: 256° nominal
- With switch: 243° nominal
- With rotary switch: 243° nominal

Rated Power Dissipation @40°C for P20 potentiometers:

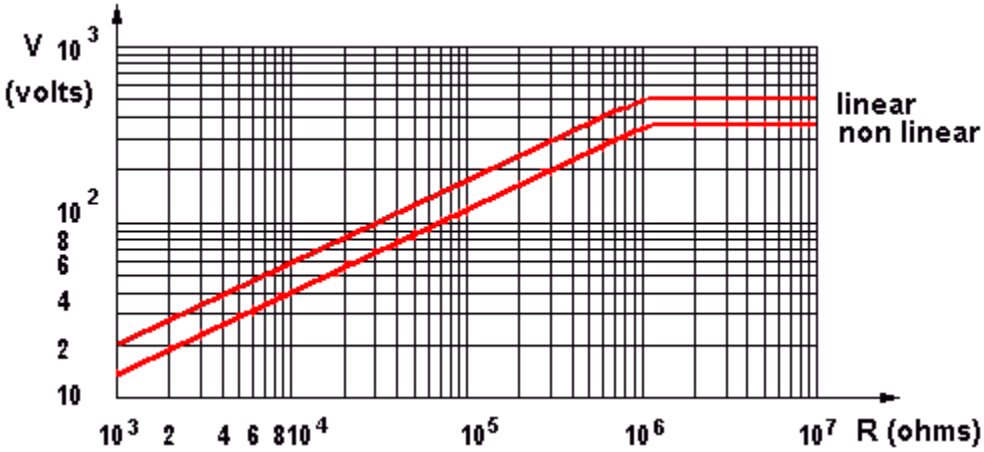
- 0.4W linear law
- 0.2W nonlinear law

P20 power dissipating curve



Limiting Element Voltage: 500 V DC for 20mm potentiometers

P20 maximum working voltage curve



Insulating Voltage: 1000 V AC for 20mm potentiometers

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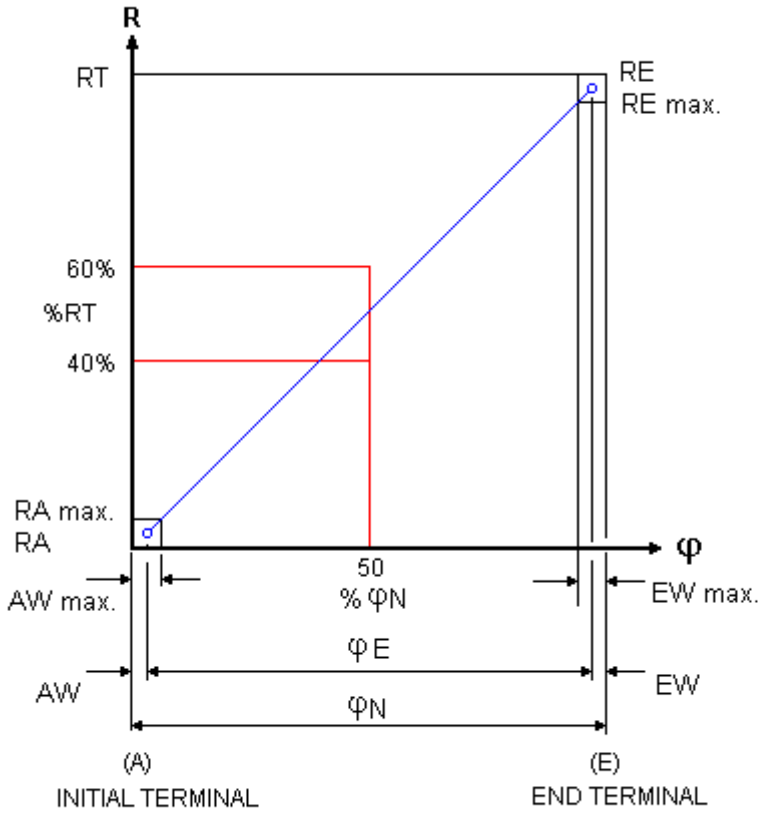
Resistance law A - Linear



AW ..... Initial Path ..... AW max. 12% φN
EW ..... Final Path ..... EW max. 12% φN
Ra ..... Initial Stop Value ..... ≤ 1. 10^{-3}RN (Minimum 2 ohms)
RA ..... Hop-on Resistance ..... ≤ 1% RN
Re ..... End Stop Value ..... ≤ 1.10^{-3}RN (Minimum 2 ohms)
RE ..... Hop-off Resistance ..... ≤ 1% RN
RN ..... Rated Resistance
RT ..... Effective Resistance
φ ..... Rotation Angle
φE ..... Effective Electrical Angle of Rotation
φN ..... Effective Mechanical Angle of Rotation

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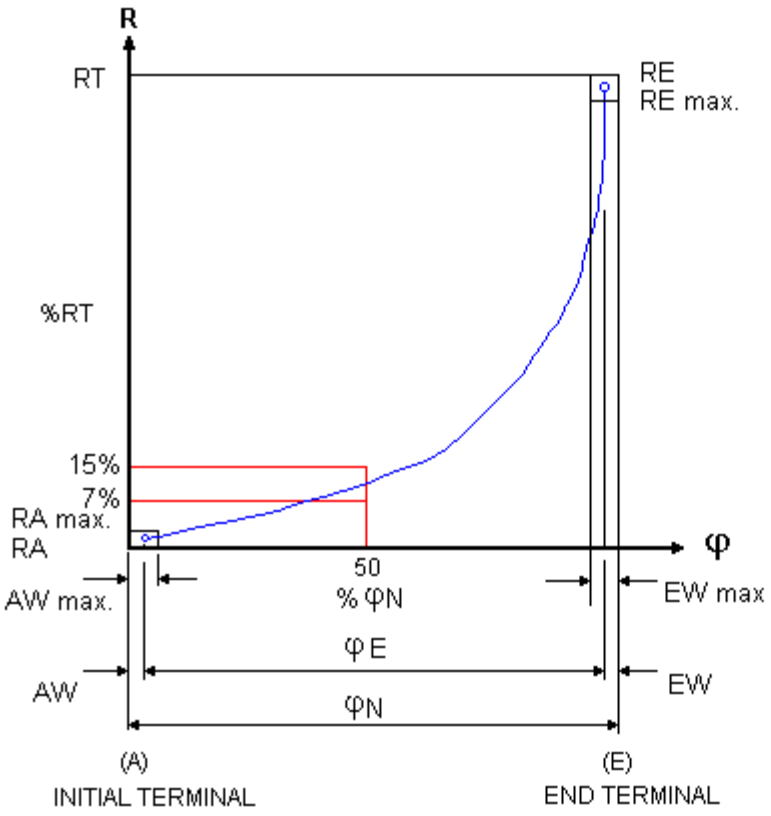
Resistance law B – Log (Audio)



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	
φ E	Effective Electrical Angle of Rotation	
φN	Effective Mechanical Angle of Rotation	

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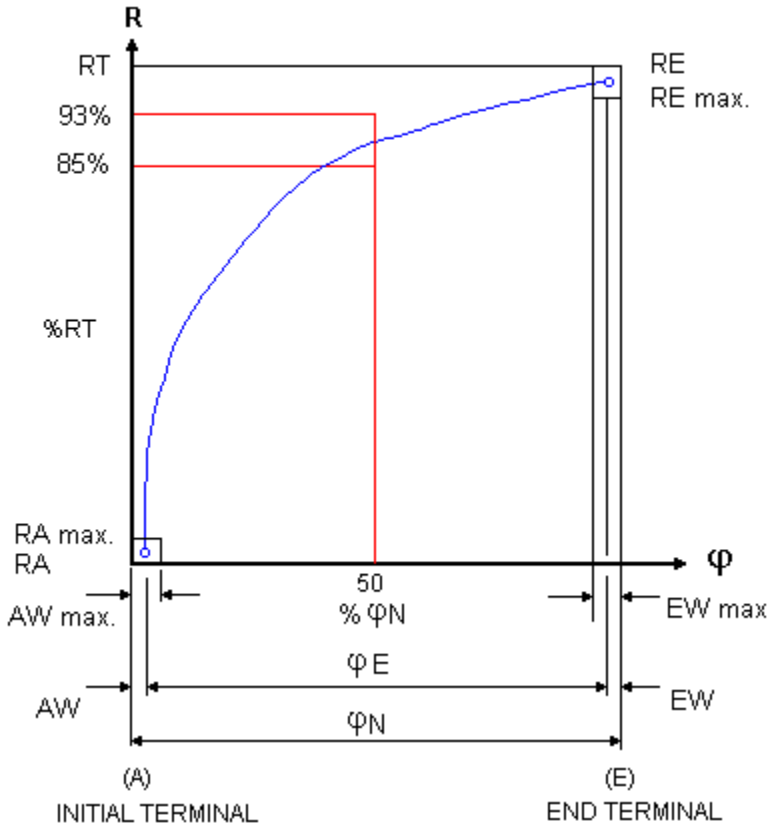
Resistance law C – Antilog (Reverse Audio)



AW	Initial Path	AW max. 10% φN
EW	Final Path	EW max. 10% φN
Ra	Initial Stop Value	RN ≤100K ≤ 2.10^{-2} RN
		RN >100K ≤ 1.10^{-2} RN
RA	Hop-on Resistance	RN ≤10K <1% RN
		RN >10K 0.5% RN
Re	End Stop Value	RN ≤10K ≤ 1.10^{-3} RN (Minimum 2 ohms)
		RN >10K ≤ 2.10^{-4} RN (Minimum 10 ohms)
RE	Hop-off Resistance	RN ≤10K 5% RN
		RN >10K 0.15% RN

RN ..... Rated Resistance

RT ..... Effective Resistance

φ ..... Rotation Angle

φ E ..... Effective Electrical Angle of Rotation

φN ..... Effective Mechanical Angle of Rotation

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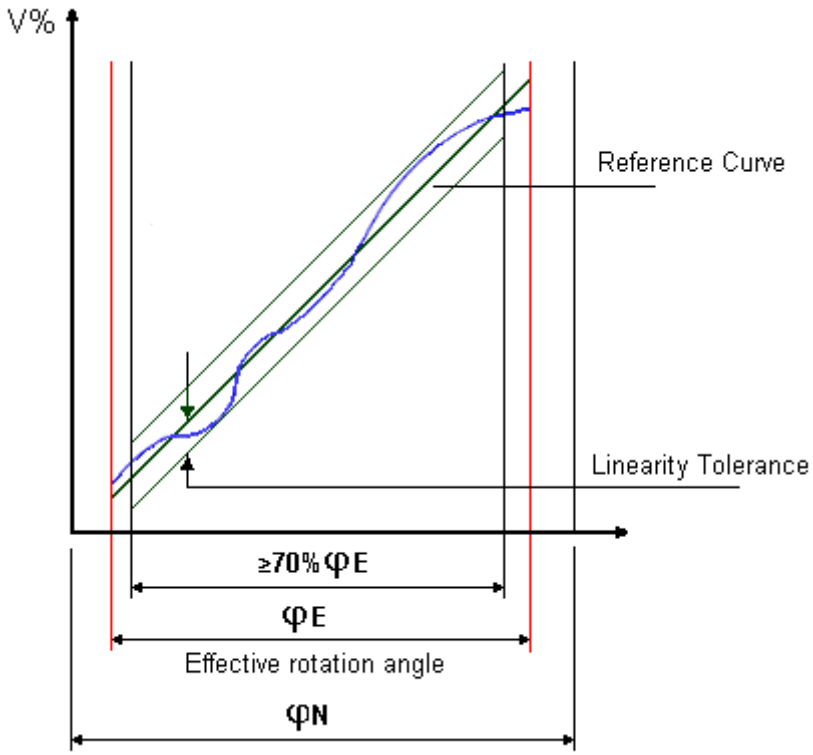
Linearity

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 1K0 to 1M0. 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

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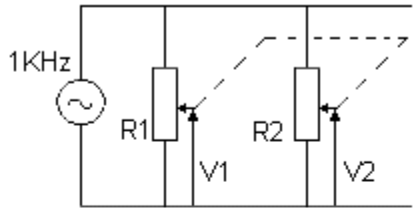
Matched Tolerance for Stereo

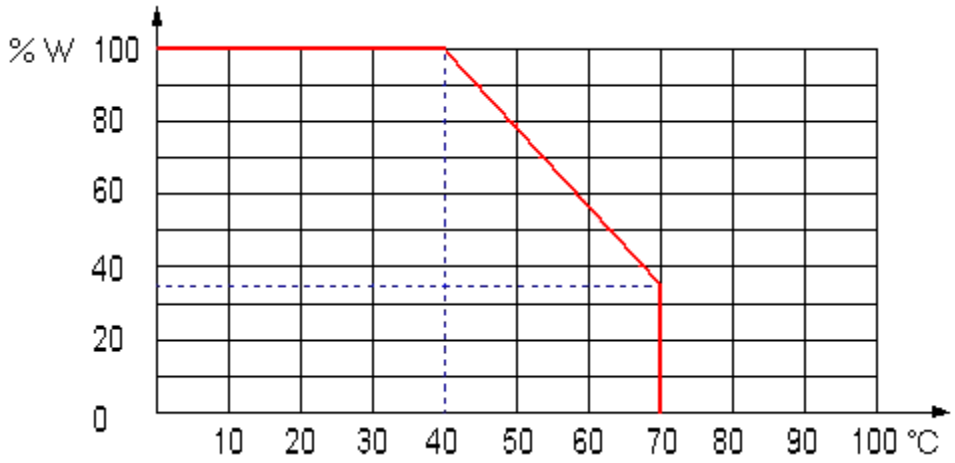


LAW	ATTENUATION RANGE	MATCHING TOLERANCE *
A	0 - 20dB	4dB
B & C	0 - 20dB	3dB

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

Operating Temperature: -25°C to +70°C

Temperature Derating Curve



Temperature Coefficient of Resistance: +300 -500 ppm

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Components

P20 Bush Housing (Mounting)

The P20 bushes are available in metal or nylon; with three thread options; and with or without a locating feature:

- Diecast Zinc Alloy
  - M10 x0.75mm pitch (Type C)
  - M10 x0.75mm pitch, ***with locator*** (Type CEBS)
  - 9.52mm x32tpi (Type CBS)
  - 9.52mm x32tpi, ***with locator*** (Type CBSL)
  - M7 x0.75mm pitch (Type CG)
- Glass Filled Nylon
  - M10 x0.75mm (Type CP)

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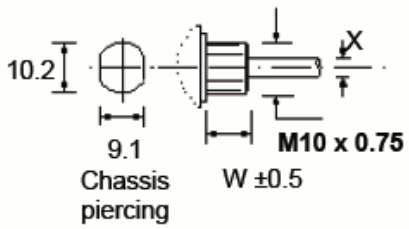
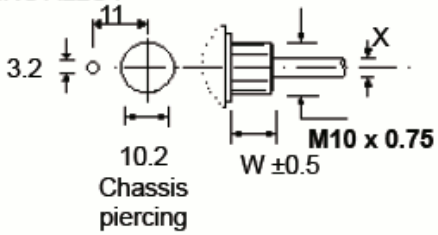
DIECAST ZINC ALLOY



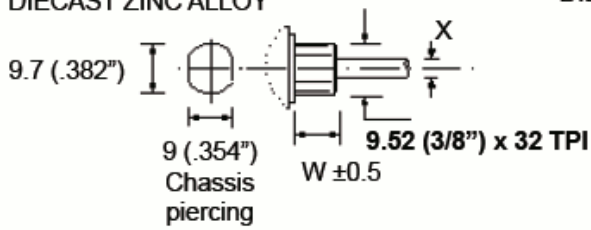
Type C (without locator)	
X (mm)	6
W (mm)	9

DIECAST ZINC ALLOY



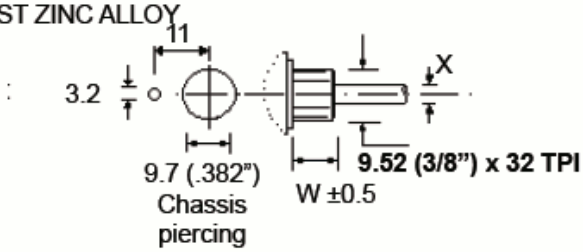
Type CEBS (with locator)	
X (mm)	6
W (mm)	9

DIECAST ZINC ALLOY



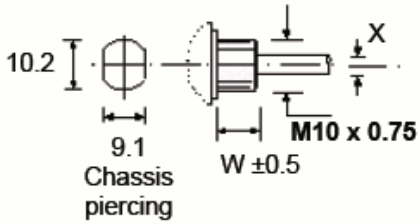
Type CBS (without locator)		
X (mm)	6	6.35
W (mm)	8 or 12	8 or 12

DIECAST ZINC ALLOY



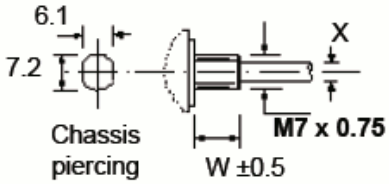
Type CBSL (with locator)		
X (mm)	6.35	6.35
W (mm)	8	12

GLASS FILLED NYLON



Type CP (GFN)		
X (mm)	6	6.35
W (mm)	7 or 10	7 or 10

DIECAST ZINC ALLOY



Type CG (without locator)	
X (mm)	4
W (mm)	6

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P20 Spindles

The P20 spindles are plastic and fixed i.e. not removable, unless otherwise stated and they are available in three diameters:

- 6.0mm Diameter
  - Cylindrical (Type F1)
  - 4.0 x 12mm Flat (Type F2)
  - 5.0 x 15mm Flat (Type F3)
  - 5.0 x 10mm Flat (Type F4)
  - 4.6mm x 15mm Flat (Type F11)
- 4.0mm Diameter
  - Cylindrical (Type F21)
  - 3.0 x 8.5mm Flat (Type F22)
  - 3.0 x 13.5mm Flat (Type F23)
  - Cylindrical (Type M21 - Metal)
  - 3.0 x 8.5mm Flat (Type M22 - Metal)
  - 3.0 x 13.5mm Flat (Type M23 - Metal)
- 6.35mm Diameter
  - Cylindrical (Type F41)
  - 5.5 x10mm Flat (Type F42)
  - 5.5 x 15mm Flat (Type F43)
- Splined Spindle - 6.0mm dia. 18 teeth
- Dual Concentric
  - Flatted/Slotted (Type M15 - Metal)
  - Cylindrical (Type M16 - Metal)

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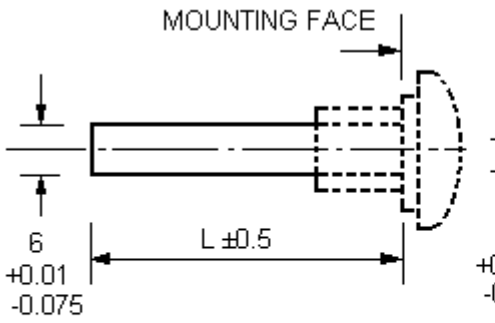
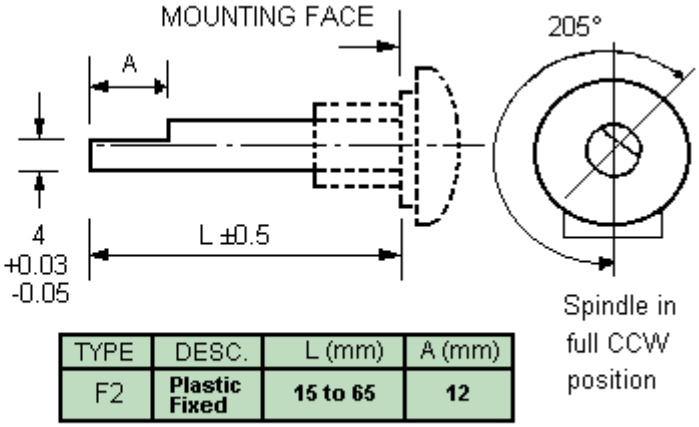
6.0mm Diameter Spindles

Note: *Specials to customer's specification up to 65mm.

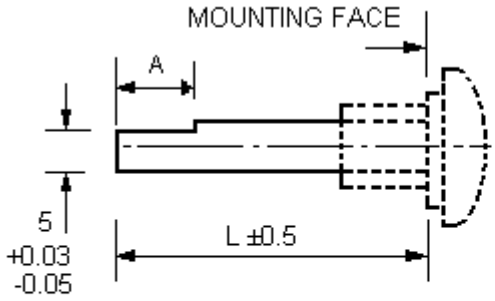
REMOVABLE SPINDLES, similar in specification to 'fixed'spindles are supplied seperate from the potentiometer. These can be indefinately taken in and out and their holding strength is >1kg.



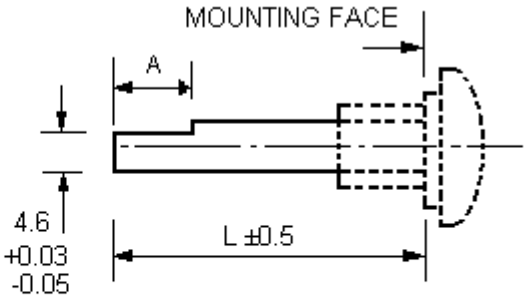
TYPE	DESC.	L (mm)
F1	**Plastic Fixed**	**15 to 65**



TYPE	DESC.	L (mm)	A (mm)
F2	**Plastic Fixed**	**15 to 65**	**12**



TYPE	DESC.	L (mm)	A (mm)
F3	**Plastic Fixed**	**15 to 65**	**15**
F4	**Plastic Fixed**	**15 to 20**	**10**



TYPE	DESC.	L (mm)	A (mm)
F11	**Plastic Fixed**	**15 to 60**	**15**

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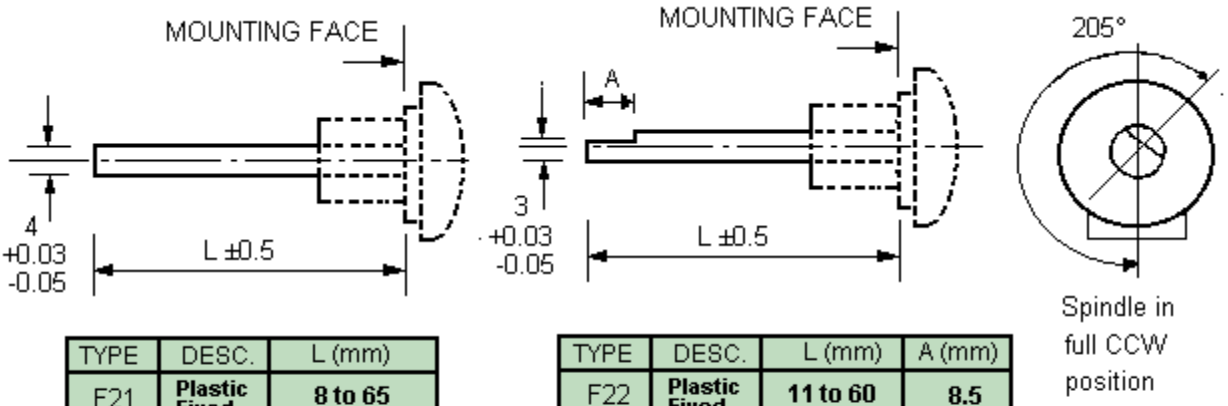
4.0mm Diameter Spindles

Note: The orientation of the flat as illustrated is for plastic spindles only.
For metal spindles, unless specified on the order, the orientation may be different on each potentiometer type.

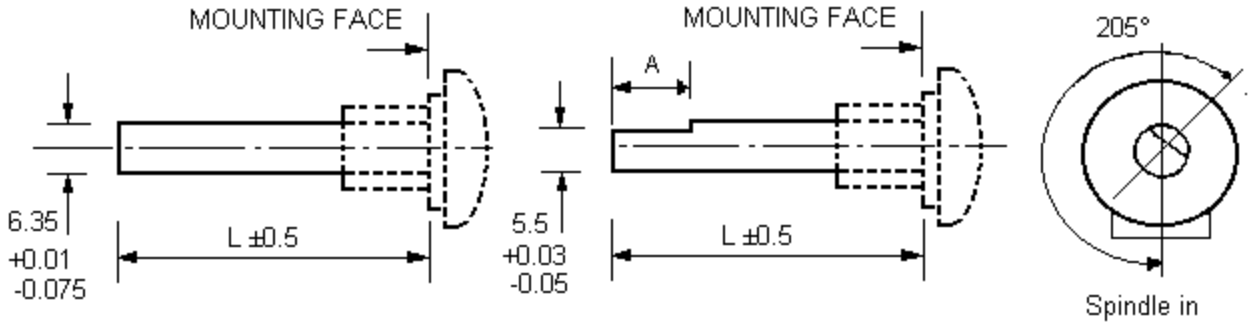


TYPE	DESC.	L (mm)
F21	**Plastic Fixed**	**8 to 65**
M21	**Metal Fixed**	**8 to 65**

TYPE	DESC.	L (mm)	A (mm)
F22	**Plastic Fixed**	**11 to 60**	**8.5**
M22	**Metal Fixed**	**11 to 60**	**8.5**
F23	**Plastic Fixed**	**16 to 60**	**13.5**
M23	**Metal Fixed**	**16 to 60**	**13.5**

6.35mm Diameter Spindles

Note: *Specials to customer's specification up to 65mm.



TYPE	DESC.	L (mm)
F41	**Plastic Fixed**	**15 to 65**

TYPE	DESC.	L (mm)	A (mm)
F42	**Plastic Fixed**	**15 to 20**	**10**
F43	**Plastic Fixed**	**20 to 60**	**15**

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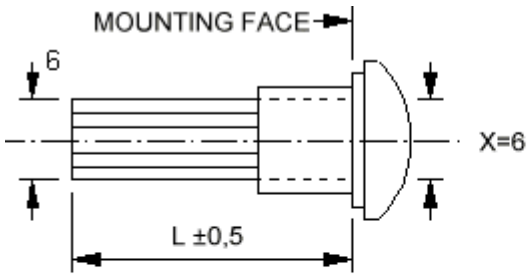
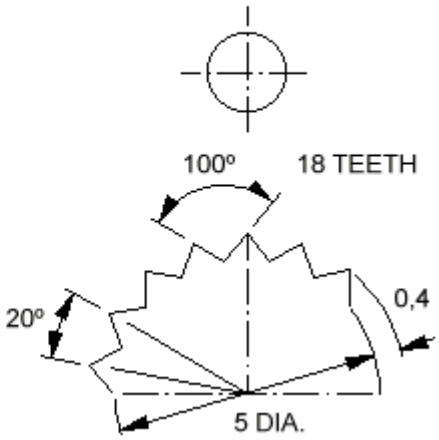
Splined Spindle - 6.0mm dia. 18 teeth

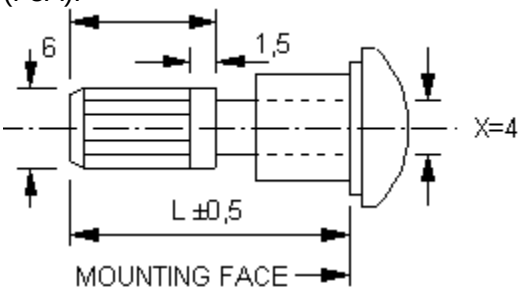
A splined form is available on the 6.0mm diameter P20 plastic spindle (F5) or alternatively a 6mm 'Splined Adaptor' (8,7mm long) can be fitted on a 4mm dia. Spindle

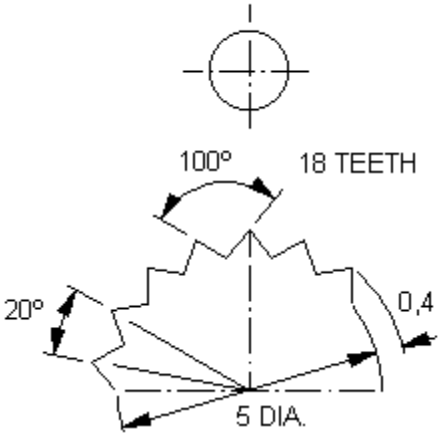




TYPE	DESC.	L (mm)
F5	Plastic Fixed	19

(F5A):





TYPE	DESC.	L (mm)
F5A	Plastic Fixed	16-36

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