

Piher is recognised as a world leader in custom controls and sensor solutions by the top Land Vehicle/Automotive and Appliance players.

In this catalogue you will find a selection of the most prolific of our rotary and linear controls for these applications.

The pursuit of the most cost-effective total solution for your needs is firmly embedded in our business philosophy, so whatever your requirements may be, be sure that Piher will deliver.

Two more catalogues are available depending on the technology used:

- Encoders & switches
- Sensors

Should you be interested in any of these catalogues or require further information please do not hesitate to contact you nearest Piher supplier.

	Series	MRA	ERA	Life	Lin	SMD	Op.Temp	Page
Rotary	PT-6 V/H	235 ±5	200 ±20	10K	-	N6	-25 to +70*	2
	PT-10V	235 ±5	220 ±20	10K	-	-	-25 to +70*	4
	PT-10H	235 ±5	220 ±20	10K	-	SOON	-25 to +70*	4
	PTC-10V	235 ±5	220 ±20	10K	-	-	-40 to +90	4
	PTC-10H	235 ±5	220 ±20	10K	-	-	-40 to +90	4
	PT-15V	265 ±5	240 ±20	up to 200K	±3	PS-15	-25 to +70*	6
	PT-15H	265 ±5	240 ±20	up to 200K	±3	-	-25 to +70*	6
	PTC-15V	265 ±5	240 ±20	10K	±2.5	-	-40 to +90	6
	PTC-15H	265 ±5	240 ±20	10K	±2.5	-	-40 to +90	6
	PS-15	265 ±5	240 ±20	10K	±3	YES	-40 to +85	8
	PT's w/detents	-	-	-	-	PS-15	-	10
	SM/SMC10	235 ±5	220 ±20	10K	-	-	-40 to +90	11
	SM/SMC15	265 ±5	240 ±20	up to 200K	±3	-	-40 to +90	13
	N-6RE	280 ±10	245 ±25	10K	±6.5	YES	-25 to +70*	16
	N-15	360	340 ±10	200K	±3**	YES	-40 to +120	18
	A-15	360	360	200K	±6°	YES	-40 to +120	18
	Z-15	360	110 ±10	2M	±3	YES	-40 to +120	20
	PC-16/PC16SC	300 ±5	280 ±20	25K	±3	-	-25 to +70*	21
	T-16	300 ±5	280 ±20	25K	-	-	-25 to +70*	26
	T-18	255 ±5	220 ±20	25K	-	-	-25 to +70*	28
	T-21	310 ±5	290 ±20	25K	-	-	-25 to +70*	30
CP-21	310 ±5	290 ±20	50K	-	-	-40 to +90	32	
Detented controls								34
Linear	PCR	up to 360	up to 360	1M	±2	-	-40 to +120	35
	NPL	7.25-12mm	6-12mm	50K	±2	-	-40 to +105	37
	PL-40	40 ±1	37 ±1	25K	-	-	-25 to +70*	39
AA (Variable attenuator, see page 41)								41

MRA: Mechanical rotation angle (degrees)
 ERA: Electrical rotation angle (degrees)
 Lin: Absolute linearity (percentage).
 Upon request

*up to +85°C depending on the application
 ** standard linearity

All models of this catalogue can be adapted to meet customer's requirements. Request full datasheets from your nearest Piher supplier or visit www.piher.net



NOTE: The information contained in this catalogue should be used for reference purposes only. Due to continuous product improvements, we reserve the right to make specification and/or product changes without prior notification. Please refer to www.piher.net for updated information.

PT-6

6mm potentiometer



Main features

Housing plastic material according to UL94V-0	upon request
Resistive element	carbon
Dust proof enclosure	yes
Supplied in magazines for automatic insertion	yes
Wiper positioned at 50% or fully clockwise	upon request
Special tapers	yes
Special switch option	SPDT switch
Crimped terminals available	yes
Standard knob and shaft available	yes
Ganged version available	yes
SMD version	see N6 series

Electrical specifications

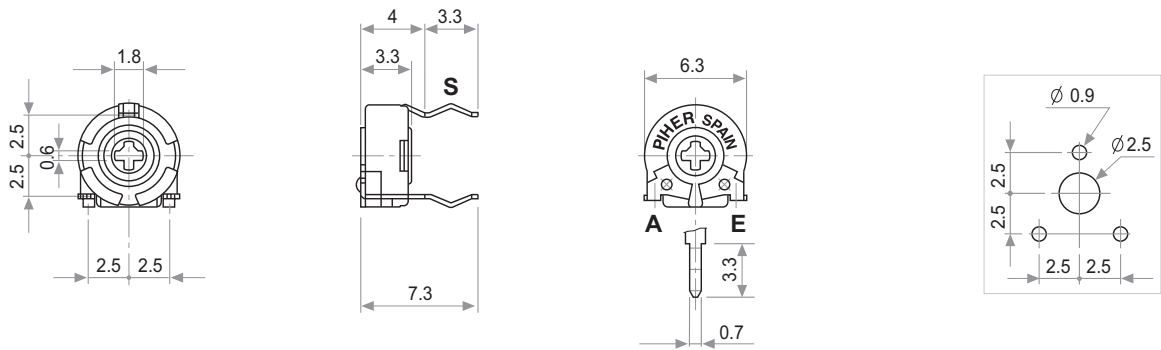
Range of values*	$220\Omega \leq R_n \leq 5M$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$220\Omega \leq R_n \leq 1M\Omega$ $\pm 20\%$ $1M\Omega < R_n \leq 5M\Omega$ $\pm 30\%$
Max. Voltage	100 VDC (lin), 50 VDC (no lin)
Nominal Power	50°C (122°F) 0.1 W (lin) 0.05 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n \geq 1k$)
Residual resistance*	$\leq 0.5\% R_n$ (5 Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature	-25°C + 70°C** (-13°F + 158°F)

(*) Others upon request (**) Up to +85°C depending on application

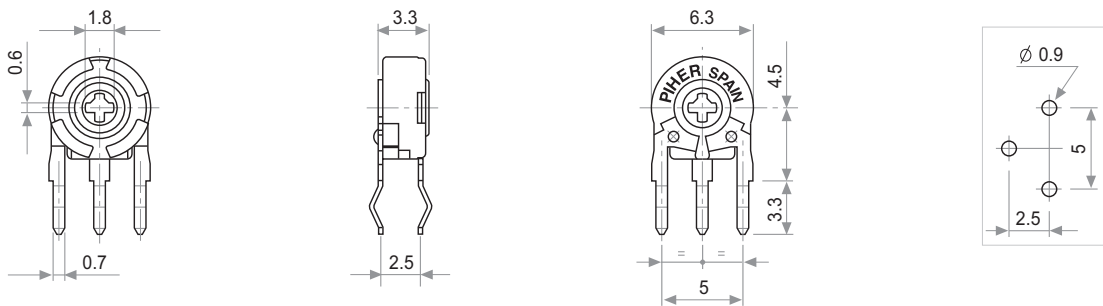
Mechanical specifications

Mechanical rotation angle	$235^\circ \pm 5^\circ$
Electrical rotation angle	$200^\circ \pm 20^\circ$
Torque	0.2 to 2 Ncm. (0.3 to 2.7 in-oz)
Stop torque	> 4 Ncm. (>5.6 in-oz)
Life	500 cycles, 10K cycles

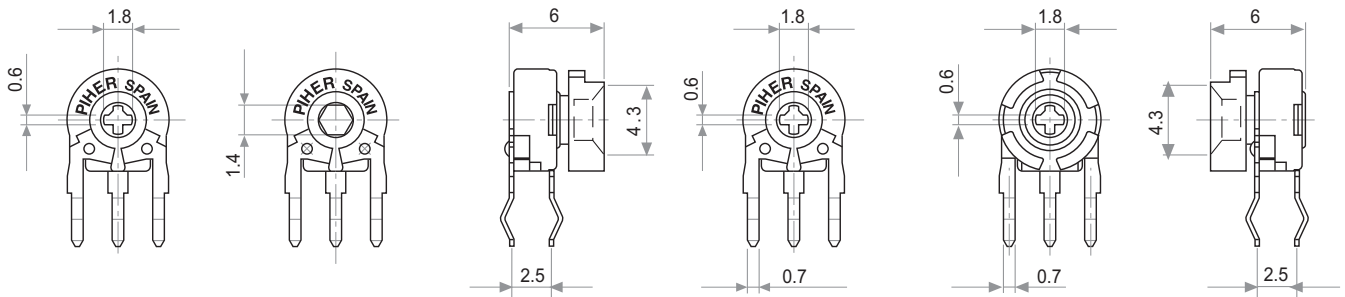
V = Horizontal mount / Vertical adjust



H = Vertical mount / Horizontal adjust



Rotors



K= Cross slot thru hole

M= Hexagonal thru hole

X = Adjustable from collector side

W= Adjustable from terminal side

Packaging

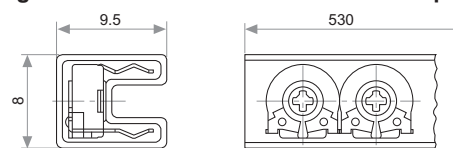
BOXES

Model	Units
All	1.000

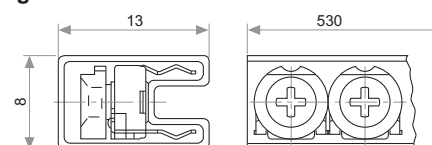
AUTOMATIC INSERTION

Magazines	Units per magazine
PT-6 V & PT-6 WV	80 Pieces

Magazines for PT-6 V with or without crimp.

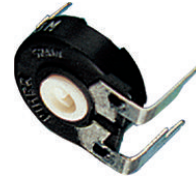


Magazines for PT-6 WV with or without crimp.



PT-10 & PTC-10

10mm rotary potentiometer



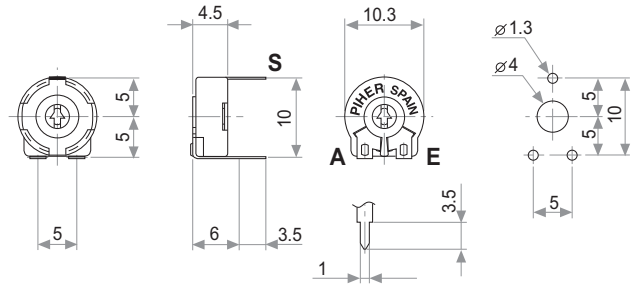
Main features	PT-10	PTC-10
Plastic material according to UL94V-0	upon request	yes
Resistive element	carbon	cermet
Dust proof enclosure	yes	yes
Supplied in magazines for automatic insertion	yes	yes
Wiper positioned at 50% or fully clockwise	yes	yes
Low & extra low torque versions	yes	yes
Mechanical detents	yes	yes
Special tapers	yes	yes
Cut track option	yes	upon request
Laser trimming for tighter tolerances	-	yes
Crimped terminals available	yes	yes
Switch version available (see Encoders & switches catalogue)	yes	yes

Electrical specifications	PT-10	PTC-10
Range of values*	100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)	
Tolerance*	100Ω ≤ Rn ≤ 1M Ω ± 20% 1MΩ < Rn ≤ 5M Ω ± 30%	
Max. Voltage	200 VDC (lin) 100 VDC (no lin)	
Nominal Power	50°C (122°F) 0.15 W (lin) 0.07 W (no lin)	70°C (158°F) 0.33 W (lin) 0.17 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only Rn≥1k)	
Residual resistance*	≤0.5% Rn (5Ω min.)	
Equivalent noise resistance	≤ 3% Rn (3 Ω min.)	
Operating temperature	-25°C + 70°C** (-13°F + 158°F)	-40°C + 90°C (-40°F + 194°F)

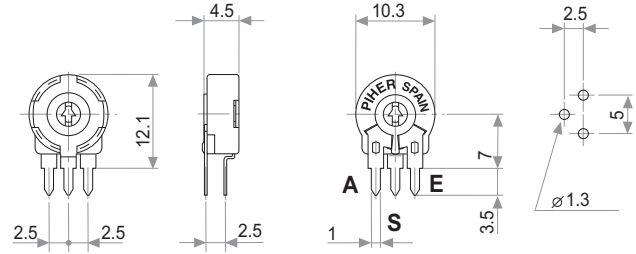
(*) Others upon request (**) Up to 85°C depending on application

Mechanical specifications	
Mechanical rotation angle	235° ± 5°
Electrical rotation angle	220° ± 20°
Torque	0.4 to 2 Ncm. (0.6 to 2.7 in-oz)
Stop torque	> 5 Ncm. (>7 in-oz)
Life	Up to 10K cycles. Others upon request

V(10)

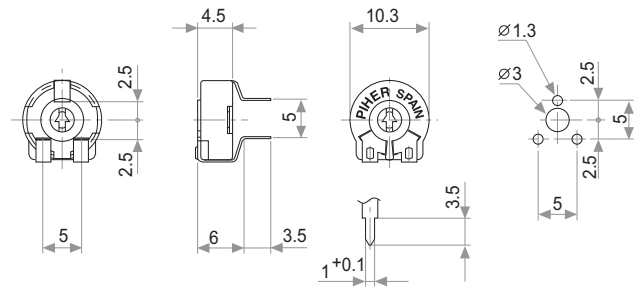


H(2.5)

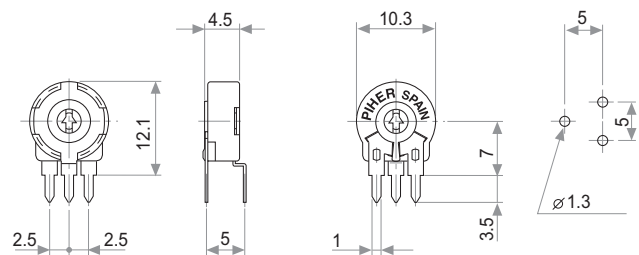


A = Initial S = Wiper E = Final

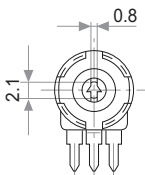
V(5)



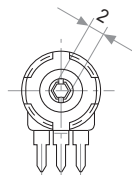
H(5)



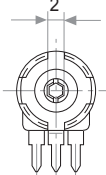
Rotors (wipers positioned at 50%)



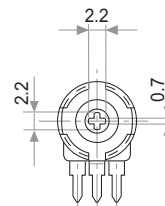
L = Screwdriver thru hole



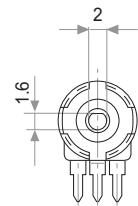
M = Hexagonal thru hole



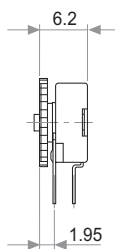
G = Hexagonal thru hole



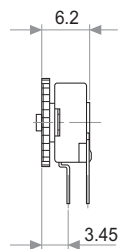
K = Cross slot thru hole



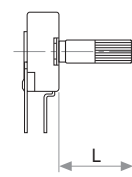
R



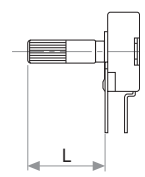
Y = Adjustable from terminal side



Z = Adjustable from collector side



Adjustable from collector side



Adjustable from terminal side

PT-15 & PTC-15 15mm rotary potentiometer



Main features	PT-15	PTC-15
Plastic material according to UL94V-0	upon request	yes
Resistive element	carbon	cermet
Dust proof enclosure	yes	yes
Long life model	yes	yes
Supplied in magazines for automatic insertion	yes	yes
Wiper positioned at 50% or fully clockwise	yes	yes
Low torque versions	yes	yes
Mechanical detents	yes	yes
Special tapers	yes	yes
Special switch option	upon request	SPDT switch
Cut track option	yes	upon request
Laser trimming for tighter tolerances	-	yes
Crimped terminals available	yes	yes
Special linearity	upon request	upon request
SMD version	yes (PS-15 series)	-
Switch version available (see Encoders & switches catalogue)	-	yes

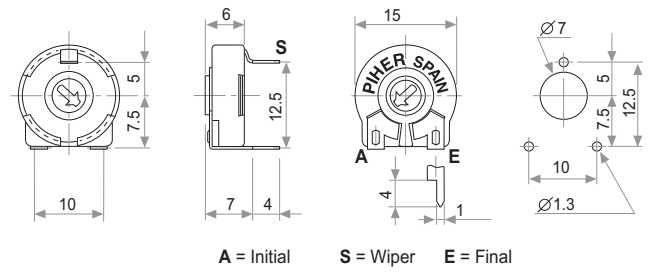
Electrical specifications	PT-15	PTC-15
Range of values*	100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)	
Tolerance*	100Ω ≤ Rn ≤ 1M Ω ± 20% 1MΩ < Rn ≤ 5M Ω ± 30%	
Max. Voltage	250 VDC (lin) 125 VDC (no lin)	
Nominal Power	50°C (122°F) 0.25 W (lin) 0.12 W (no lin)	70°C (158°F) 0.50 W (lin) 0.25 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only Rn≥1k)	
Residual resistance*	≤0.5% Rn (5Ω min.)	
Equivalent noise resistance	≤ 3% Rn (3 Ω min.)	
Operating temperature	-25°C + 70°C** (-13°F + 158°F)	-40°C + 90°C (-40°F + 194°F)

(* Others upon request (**) Up to 85°C depending on application

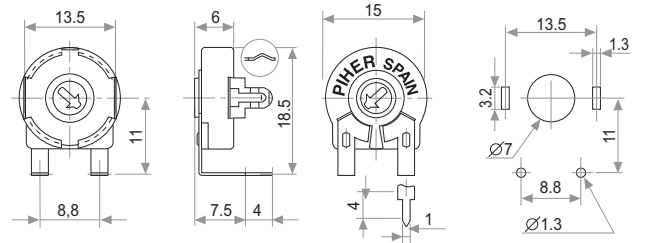
Mechanical specifications	PT-15	PTC-15
Mechanical rotation angle	265° ± 5°	
Electrical rotation angle	240° ± 20°	
Torque	0.5 to 2.5 Ncm. (0.7 to 3.4 in-oz)	
Stop torque	> 10 Ncm. (>14 in-oz)	
Life*	Up to 200K cycles	Up to 10K cycles

(* Others upon request

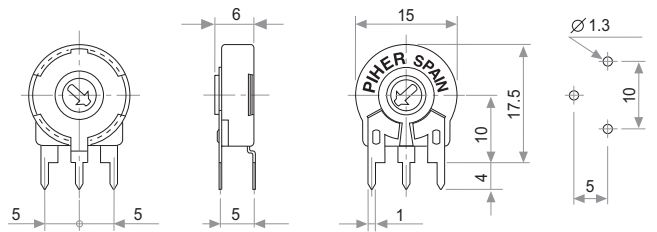
V(12.5)



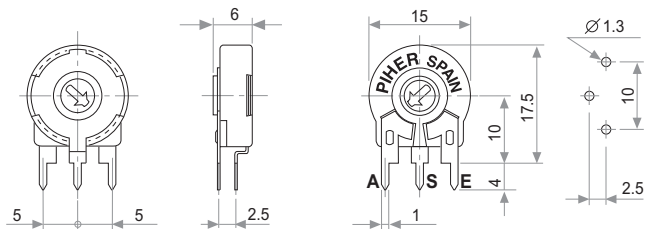
VD



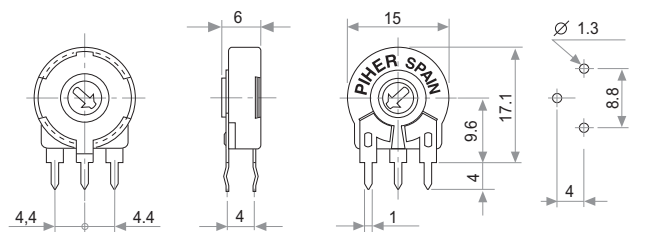
H(5)



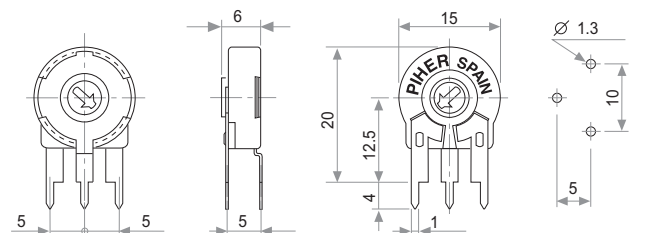
H(2.5)



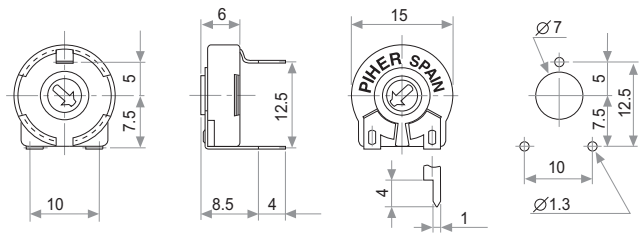
HB



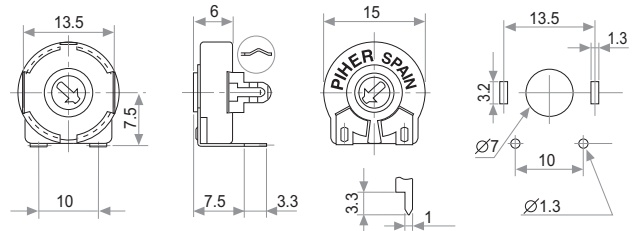
Hc5 (only PT15)



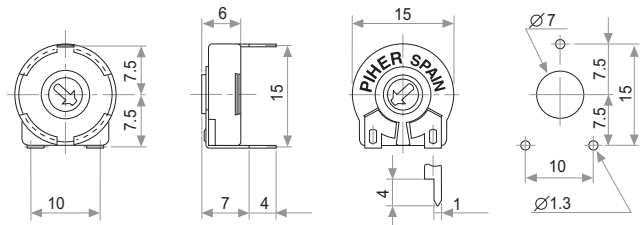
va(12.5)



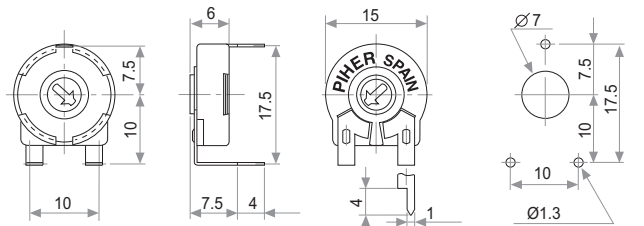
VD(15) (only PT15)



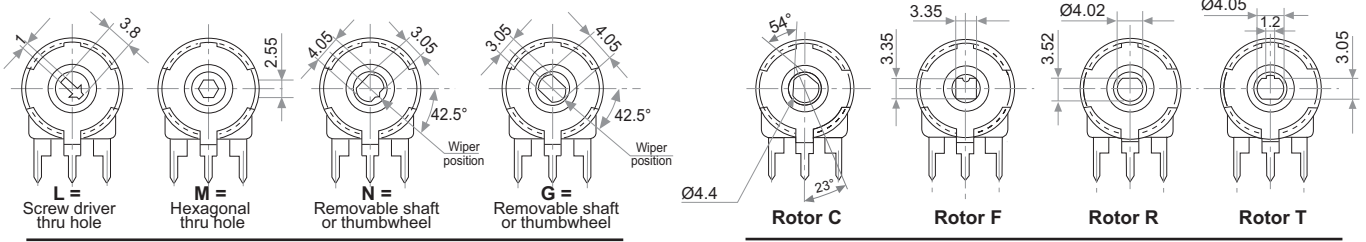
V(15)



V(17.5)



Rotors



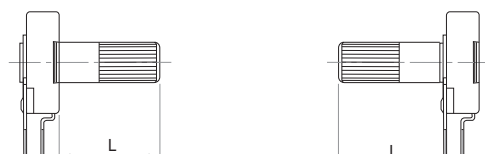
wipers positioned at initial

wipers positioned at 50%



Y = Adjustable from terminal side

Z = Adjustable from collector side



X = Adjustable from collector side

W = Adjustable from terminal side

PS-15

15mm SMD rotary potentiometer



Main features

Leadfree reflow soldering compatible	yes
Plastic material according to UL94V-0	yes
Resistive element	carbon
Dust proof enclosure	yes
Wiper positioned at 50% or fully clockwise	yes
Mechanical detents	yes
Special tapers	yes
Absolute linearity	3% (upon request)
Embossed tape option	yes

Electrical specifications

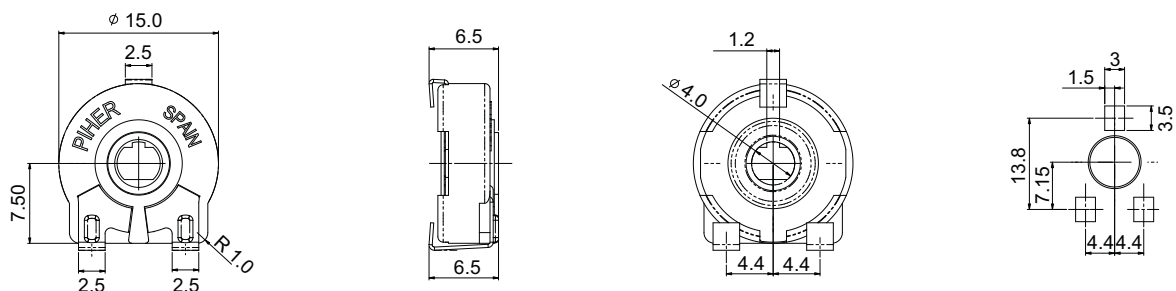
Range of values*	1K Ω to 1M Ω
Tolerance*	$\pm 30\%$
Nominal Power	0.25W @ 50°C (122°F)
Taper*	Linear
Residual resistance*	$\leq 0.5\%$ Rn (5 Ω min.)
Equivalent noise resistance	$\leq 3\%$ Rn (3 Ω min.)
Operating temperature	-40°C + 85°C

(*) Others upon request

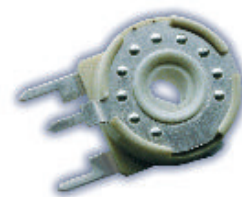
Mechanical specifications

Mechanical rotation angle	265° \pm 5°
Electrical rotation angle	240° \pm 20°
Torque	0.5 to 2.5 Ncm. (0.7 to 3.4 in-oz)
Stop torque	> 10 Ncm. (>14 in-oz)
Mechanical life	Up to 10K cycles. Others upon request

DIMENSIONS



PT's with detents Special design series



This innovative PT's with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the majority of the 10 & 15 mm. PT/PTC potentiometer series.

This detent design not only adds a "click" sensation of position, but also offers enormous savings in both cost and space for any given application.

PT's with detents also lend themselves perfectly to Industrial and Domestic Power Tool applications where the detents prevent accidental movement of the potentiometer under vibration.

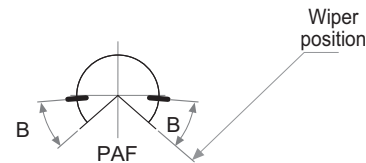
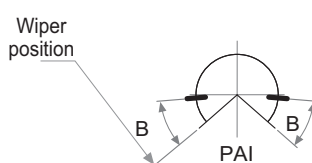
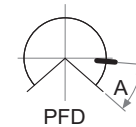
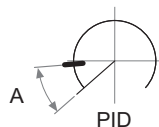
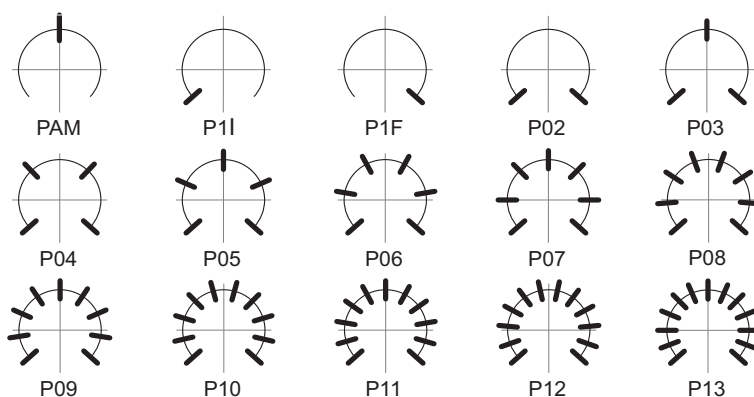
All the PT's with detents series maintain the original specification & features of the chosen potentiometer.

Detent configurations

Relative detent positions along the total mechanical travel. Unless otherwise specified the detents are evenly spaced (using the end points as reference)

- Max. number of detents:
- PT-10, PTC-10 10
- PT-15, PTC-15 13

PT/PTC-10: A= 26°
B= 27.5°
PT/PTC-15: A= 32.625°
B= 34.5°



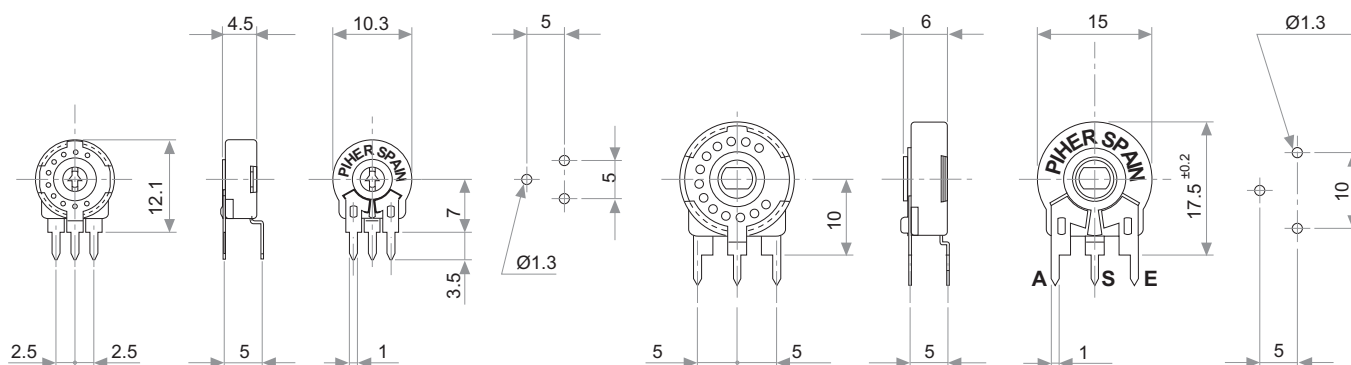
(wiper positioned at initial)

(wiper positioned at final)

Detent details

PT/PTC-10 P10 ...

PT/PTC-15 P13 ...



A = Initial S = Wiper E = Final

NOTE = Please note relative terminal positions when ordering non linear tapers. Special configurations to be studied upon request.

SM/SMC-10

10mm carbon/cermet potentiometer



Main features

- Available in Carbon (SM-10) and Cermet (SMC-10)
- Based on the PT-10 / PTC-10 series.
- Enclosed in plastic housing.
- Excellent low price control potentiometer.

Electrical specifications	SM-10	SMC-10
Range of values*	100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)	
Tolerance*	100Ω ≤ Rn ≤ 1M Ω ----- ± 20% 1MΩ < Rn ≤ 5M Ω ----- ± 30%	
Max. Voltage	200 VDC (lin) 100 VDC (no lin)	
Nominal Power	50°C (122°F) 0.15 W (lin) 0.07 W (no lin)	70°C (158°F) 0.33 W (lin) 0.17 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only Rn ≥ 1k)	
Residual resistance*	≤ 0.5% Rn (5Ω min.)	
Equivalent noise resistance	≤ 3% Rn (3 Ω min.)	
Operating temperature	-25°C + 70°C** (-13°F + 158°F)	-40°C + 90°C (-40°F + 194°F)

(*) Others upon request. No linear tapers; values higher than 1KΩ

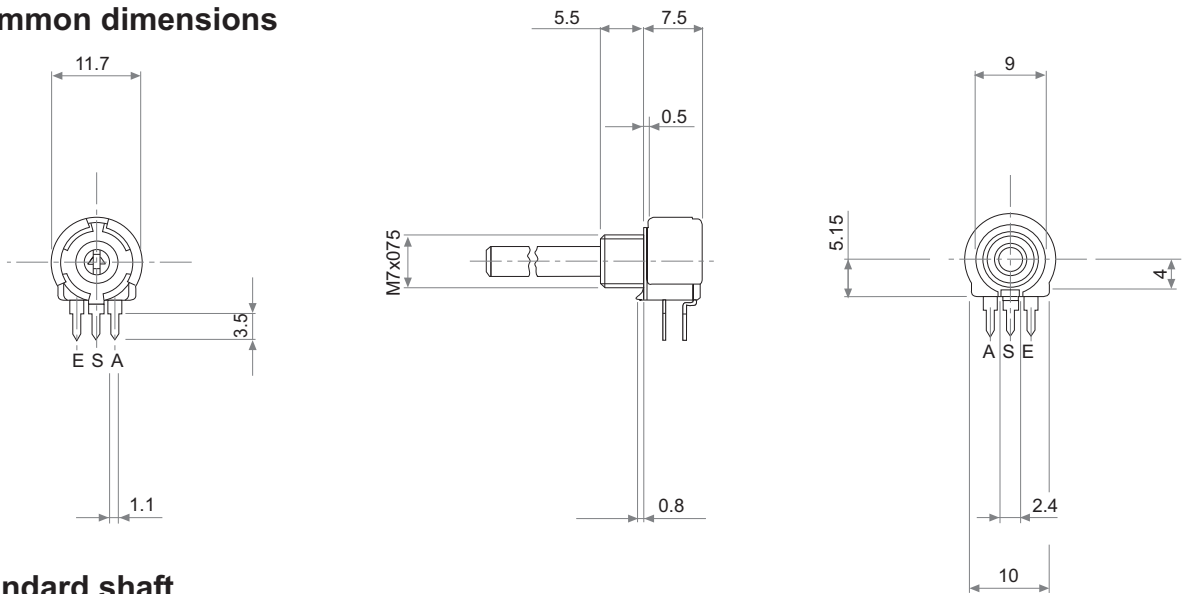
(**) Up to 85°C depending on application

Mechanical specifications

Mechanical rotation angle	235° ± 5°
Electrical rotation angle	220° ± 20°
Torque	0.5 to 2.5 Ncm. (0.7 to 3.4 in-oz)
Stop torque	> 25 Ncm. (>35.5 in-oz)
Nut torque	> 80 Ncm. (>113.6 in-oz)
Mechanical life*	≥ 10K cycles

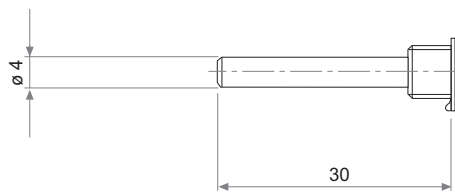
(*) For Ohmic values ≥ 1 K Ω. Lower values upon request

Common dimensions



Standard shaft

The standard option is E4 L30 black colour.

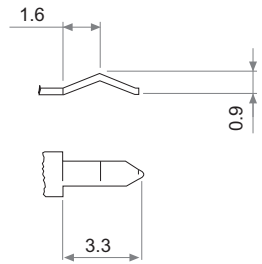
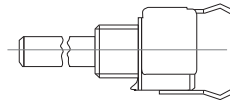


Terminals

NOT CRIMPED

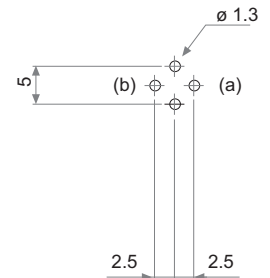
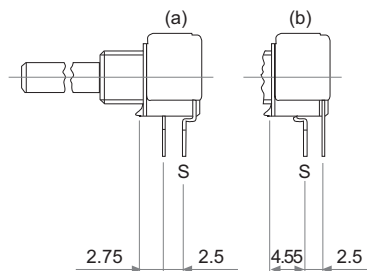
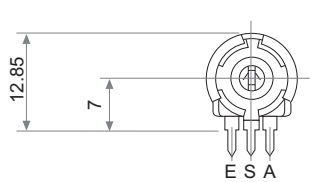


CRIMPED

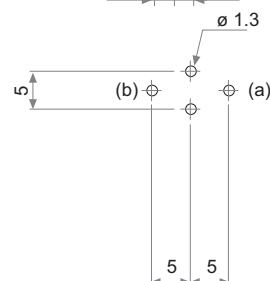
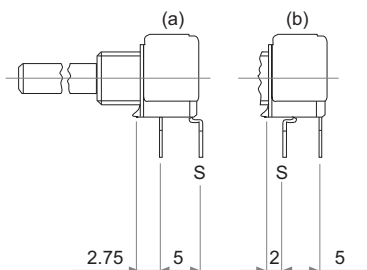
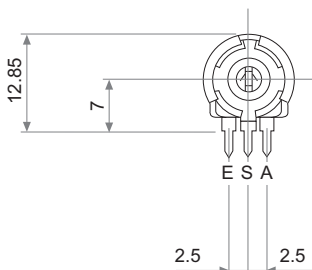


Mounting method

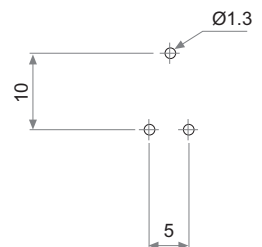
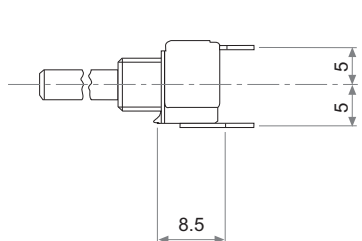
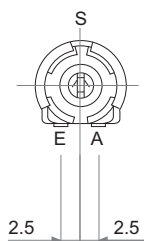
h 2.5



h 5



v 10



SM/SMC-15

15mm carbon/cermet potentiometer



Main features

Available in Carbon (SM-15) and Cermet (SMC-15)
Based on the PT-15 / PTC-10 series.
Enclosed in plastic housing.
Excellent low price control potentiometer.

Electrical specifications	SM-15	SMC-15
Range of values*	100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)	
Tolerance*	100Ω ≤ Rn ≤ 1M Ω ± 20% 1MΩ < Rn ≤ 5M Ω ± 30%	
Max. Voltage	250 VDC (lin) 125 VDC (no lin)	
Nominal Power	50°C (122°F) 0.25 W (lin) 0.12 W (no lin)	70°C (158°F) 0.5 W (lin) 0.25 W (no lin)
Taper*	Lin, Log, Alog	
Residual resistance*	≤0.5% Rn (5Ω min.)	
Power derating	0 Watt. a 100°C	
Operating temperature	-25°C + 70°C** (-13°F + 158°F)	-40°C + 90°C (-40°F + 194°F)

(*) Others upon request. No linear tapers; values higher than 1KΩ

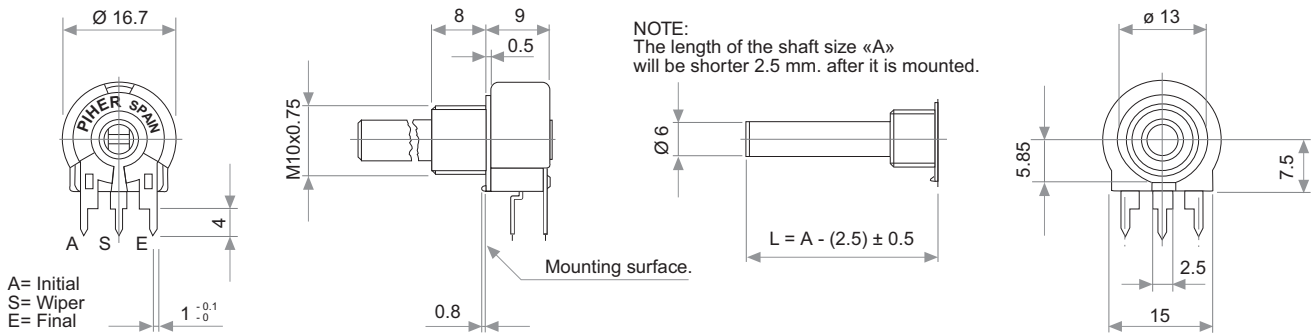
(**) Up to 85°C depending on application

Mechanical specifications

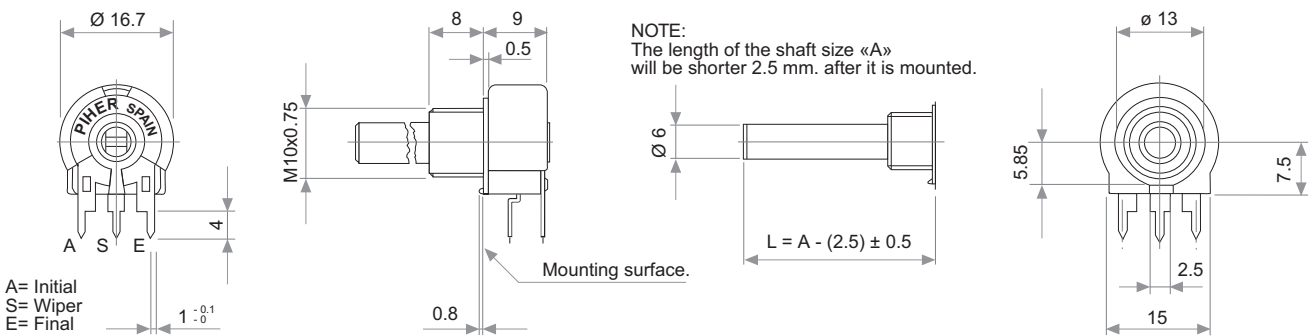
Mechanical rotation angle	265° ± 5°
Electrical rotation angle	240° ± 20°
Torque	0.5 to 2.5 Ncm. (0.7 to 3.4 in-oz)
Stop torque	> 10 Ncm. (>14 in-oz)
Mechanical life*	≥10K cycles

(*) For Ohmic values ≥ 1 KΩ. Lower values upon request

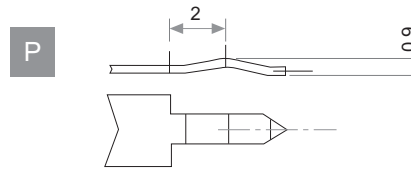
Common dimensions



Shafts

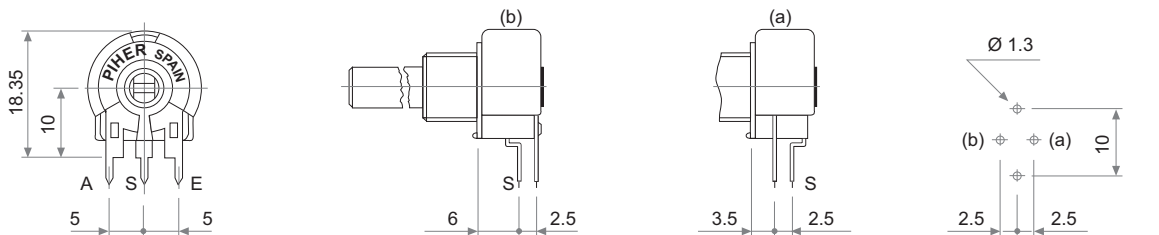


Snap in terminal

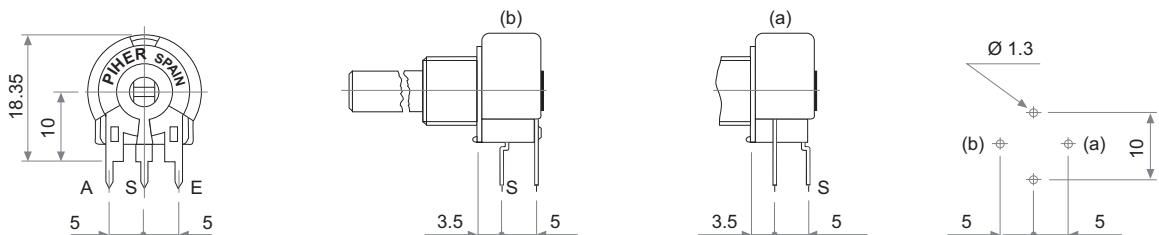


Terminal styles

h 2.5

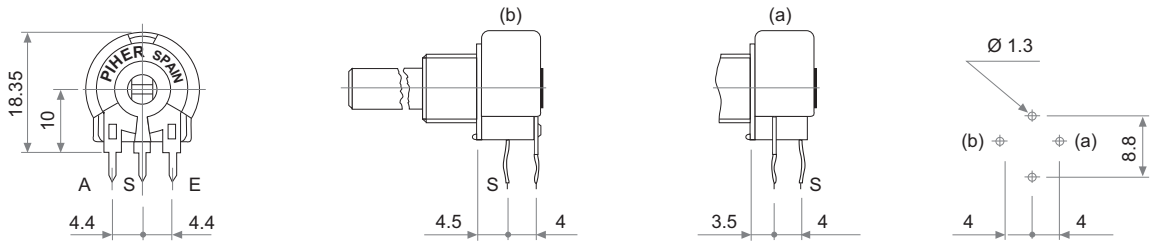


h 5



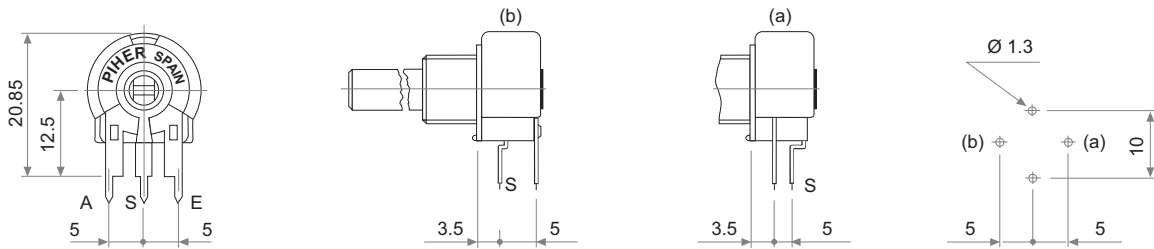
Terminal styles

B



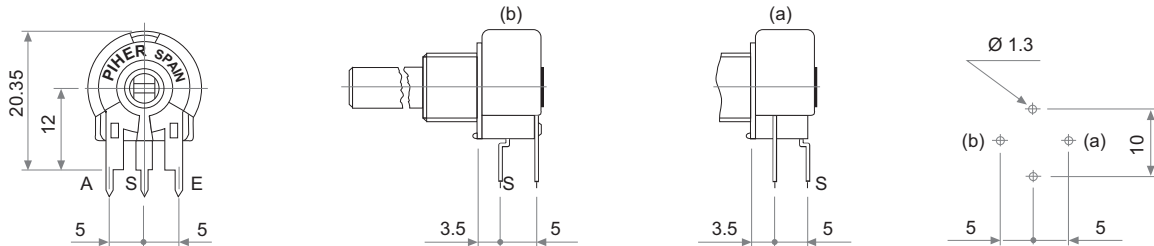
h C 5

Only SM-15

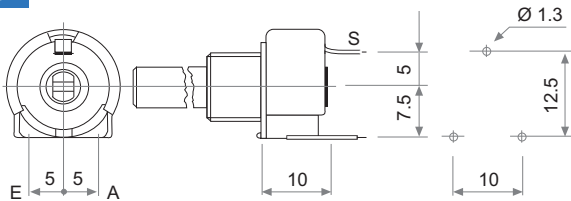


h A 5

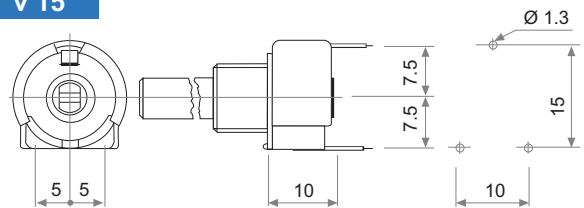
Only SMC-15



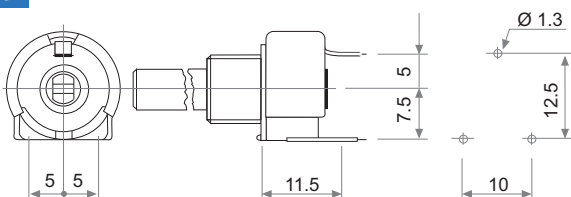
v 12.5



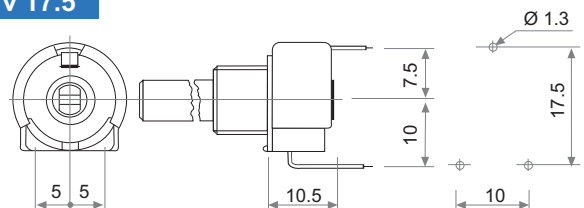
v 15



va 12.5

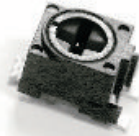


v 17.5



N6RE

6mm miniature control potentiometer



Main features

RoHS compliant materials	yes
RoHS reflow soldering capable	yes
Manufacturing technique	Over-moulding
Both sides cross slot easy adjustment	yes
Accidental rotor movement protected	yes
Traceability through date code marking	yes
Standard shaft available	yes
Endless rotation	upon request
Trimmer version available	yes

Electrical specifications

Range of values*	$100\Omega \leq R_n \leq 1M\Omega$ (1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance	$\pm 30\%$
Max. Voltage	100 VDC
Nominal Power	50°C (122°F)
Taper	Linear
Residual resistance	$\leq 2\% R_n$ (10 Ω min.)
Equivalent noise resistance	$\leq 5\% R_n$
Operating temperature**	-25°C + 70°C (-13°F + 158°F)
Linearity*	6.5% (upon request)

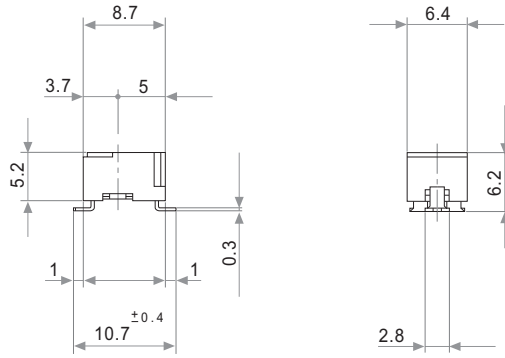
(*) Others upon request

(**) Up to 85°C depending on application

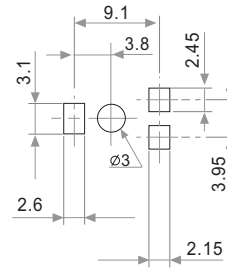
Mechanical specifications

Mechanical rotation angle	$280^\circ \pm 10^\circ$
Electrical rotation angle	$245^\circ \pm 25^\circ$
Torque	0.2 to 3 Ncm. (0.28 to 4.2 in-oz)
Stop torque	> 7.5 Ncm. (>10.5 in-oz)
Life	10K cycles

Dimensions (N-6 L 50 T0 S)



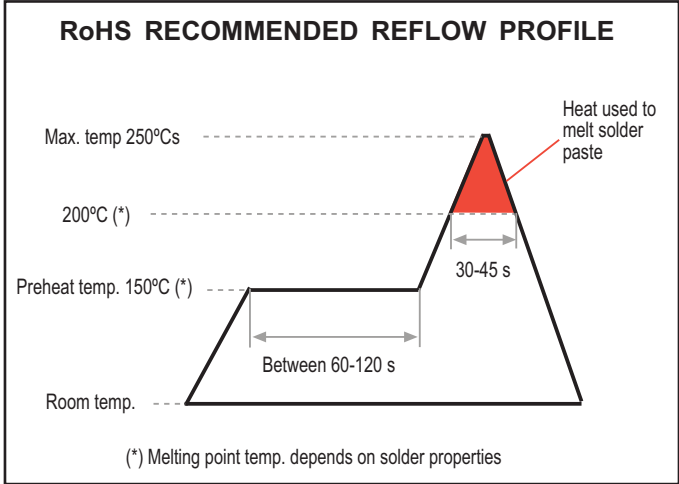
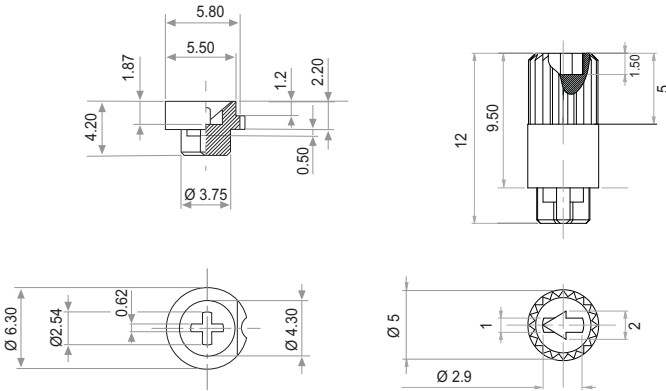
FOOT PRINT



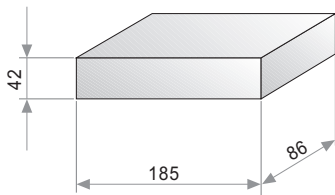
KNOB Ref.: 5680

SHAFT Ref.: 6133

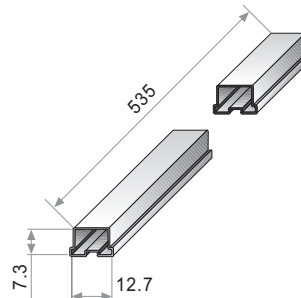
Please order both Knob and Shaft separately. They should be inserted after the reflow process



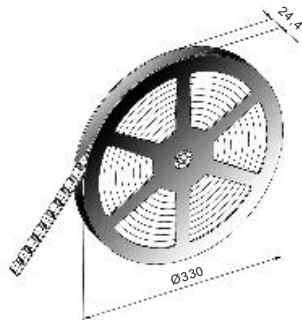
Packaging



BULK
500 Units per box.



MAGAZINE
Units per magazine: 80



EMBOSSED TAPE
Units per reel: 750

N-15 / A-15

15 mm low profile rotary potentiometer



Main features	N-15	A-15
Mouting methods	SMD, through hole, horizontal	
Resistive element	carbon	
Dust proof enclosure	yes	
Packaging	embossed tape, bulk	
Low profile	yes (4.4 mm)	
Linearity/precision	±3% (absolute)	±7° (up to ±6°)
Shaft insertable from both sides	yes	
Rotor	"T" polarised	
Long life version	yes	
Endless rotation	yes	
Fully customisable	yes	
Leadfree reflow soldering compatable	yes	
Incremental encoder version available	yes (E15 series, see Encoders & Rotary switches catalogue)	
Rotary switch version available	yes (S15 series, see Encoders & Rotary switches catalogue)	
Hybrid pulse generator-potentiometer version	yes (contact PIHER for detailed information)	

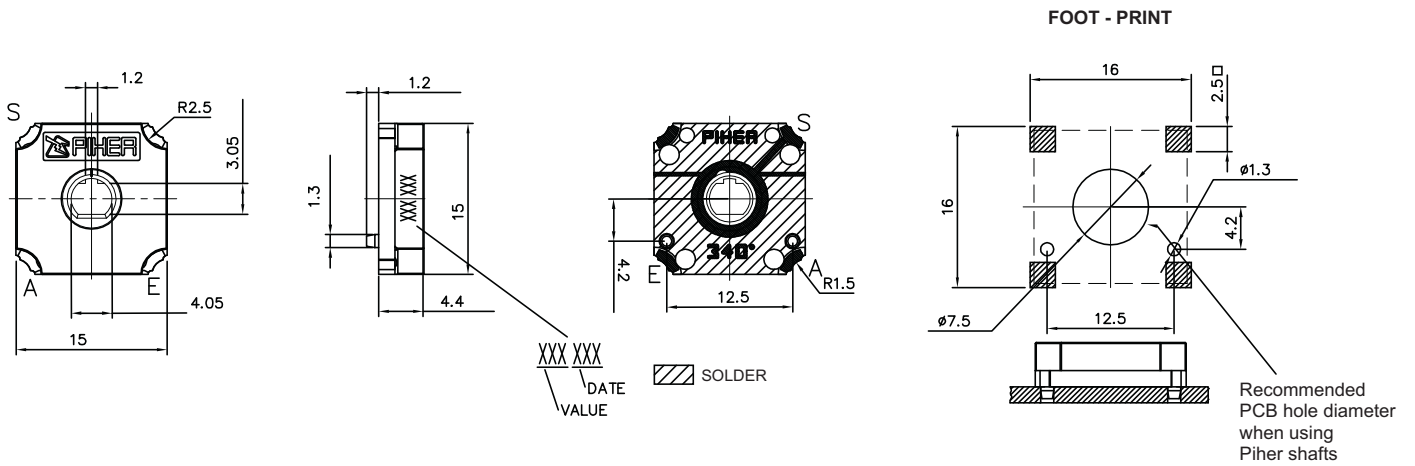
Electrical specifications	N-15	A-15
Range of values*	5k, 10k, 100k	5k, 10k
Tolerance*	± 30%	± 40%
Max. Voltage	250 VDC	
Nominal Power	0.15 W @ 50°C	
Taper	Linear	special
Operating temperature	-40°C + 120°C	

(*) Others upon request

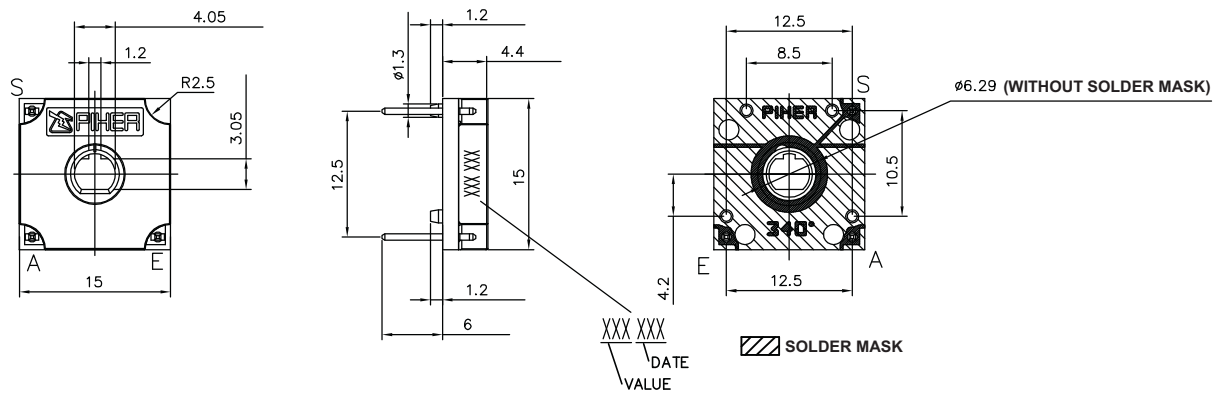
Mechanical specifications	N-15	A-15
Mechanical rotation angle	360°	
Electrical rotation angle	340° ± 10°	360° ± 7°
Torque	≤ 20 mN.m	
Mechanical life*	100K cycles	

(*) 200K cycles upon request
Z-15 series: up to 2M cycles

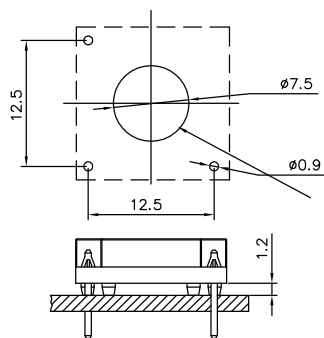
SMD version



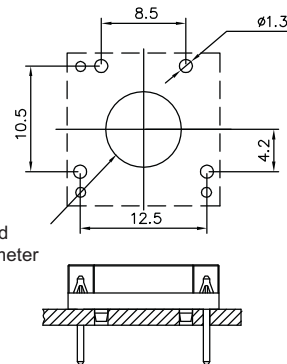
Through hole version



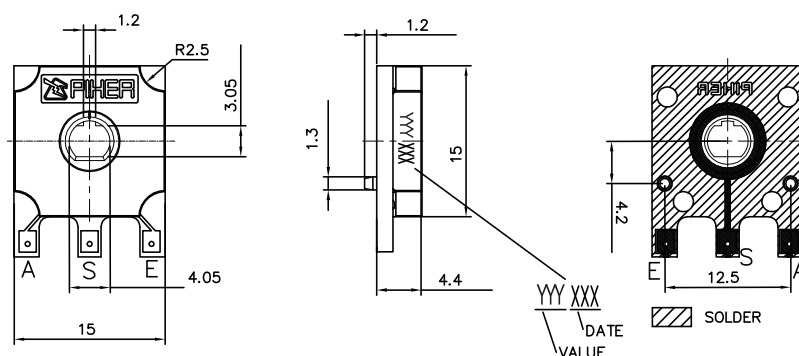
PCB HOLE LAYOUT 1



PCB HOLE LAYOUT 2



Horizontal adjust version (will be studied case by case)



Z-15 (long life) 15 mm low profile potentiometer



Main features

Mouting methods	SMD, through hole (see N15 datasheet)
Resistive element	carbon
Dust proof enclosure	yes
Packaging	embossed tape, bulk (see N15 datasheet)
Low profile	yes (4.4 mm)
Linearity/precision	±3% (absolute)
Shaft insertable from both sides	yes
Rotor	"T" polarised
Long life version	yes
Endless rotation	yes
Fully customisable	yes
Leadfree reflow soldering compatible	yes

Electrical specifications

Value*	5K
Tolerance*	± 30%
Max. Voltage**	27 VDC (5K value)
Nominal Power	0.15 W @ 50°C
Taper	Linear
Operating temperature	-40°C + 120°C

(*) Others upon request

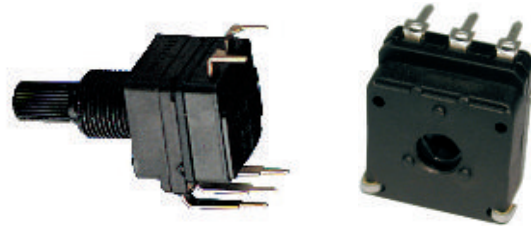
(**) Max. voltage is dependent on nominal power and resistance value.
Max. voltage can not exceed 250VDC

Mechanical specifications

Mechanical rotation angle	360°
Electrical rotation angle	110° ± 10°
Torque	≤ 20 mN.m
Mechanical life	up to 2M cycles

PC16 & PC16 SC

16mm rotary potentiometer



Main features

Plastic material according to UL94V-0	yes
Resistive element	carbon
Dust proof enclosure	yes
Modular gang type (up to 4)	yes
Stereo matching	upon request
Nut & washer	upon request
Special tapers	yes
Switch option	yes
Shafts available	yes (plastic, metallic)
Bushings available	yes
Bushless version available	yes
10A/250V switch rating available	yes (PC17 series)

Electrical specifications

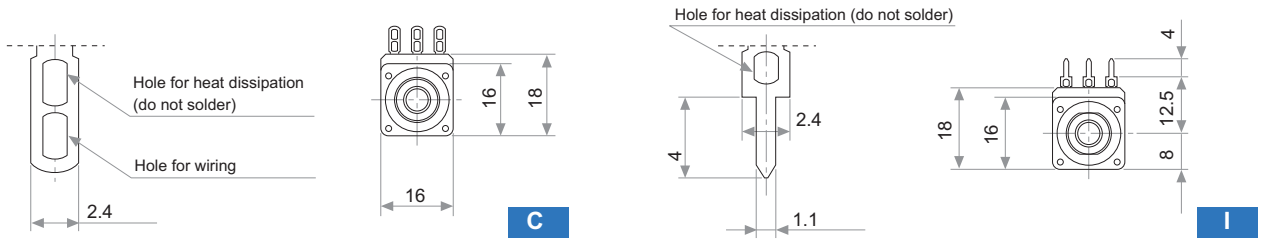
Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	250 VDC (lin) 125 VDC (no lin)
Nominal Power	50°C (122°F) 0.2 W (lin) 0.1 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n > 1\text{k}$)
Residual resistance*	$\leq 0.5\% R_n$ (5 Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature	-25°C + 70°C** (-13°F + 158°F)

(*) Others upon request (**) Up to 85°C depending on application

Mechanical specifications

Mechanical rotation angle	$300^\circ \pm 5^\circ$
Electrical rotation angle	$280^\circ \pm 20^\circ$
Torque	0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
Stop torque	> 40 Ncm. (>56 in-oz)
Max. torque nut (binding out)	< 80 Ncm. (112 in-oz)
Thrust and pull in the shaft	> 25 N
Life	25K cycles

Terminals



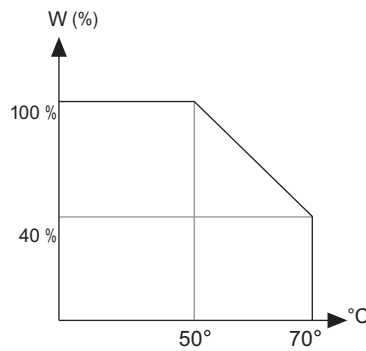
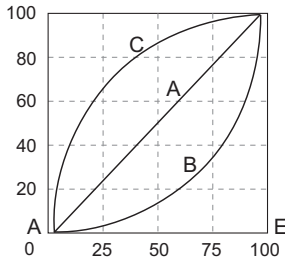
TAPERS

POWER RATING CURVE

NUTS & WASHERS

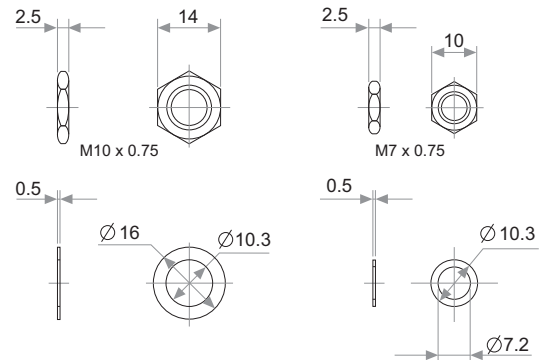
Standard

A = Linear
B = Log.
C = Alog.



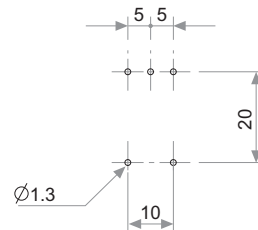
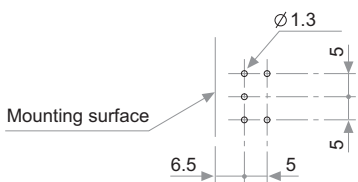
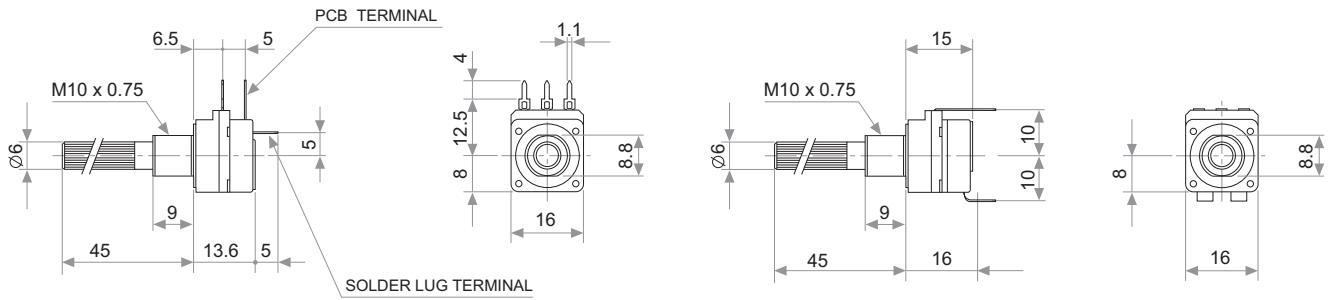
Bushing 10

Bushing 07



NOTE = Please note relative terminal positions when ordering non linear tapers.

Switch



PC-16S ... H ... I / C

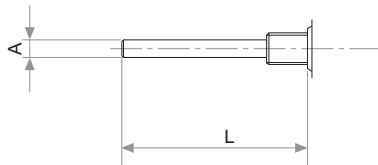
PC-16SV ... I

Packaging

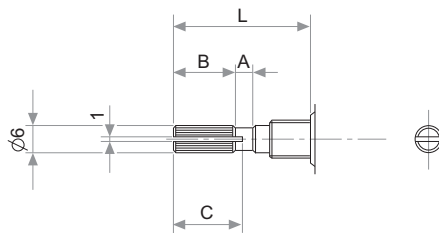
Boxes of 50 pieces (160 x 110 x 85 mm.)

Metal shafts

STANDARD

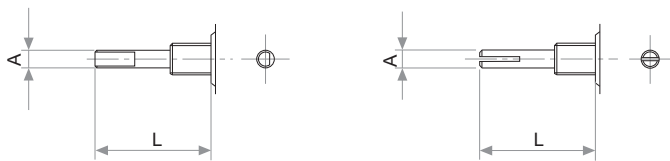


A	L	CODE
4	45	M04
6	45	M06
6.35	45	M07



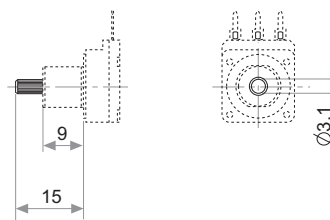
A	B	C	L	CODE
2	5	7	15	M11
2	10	11	20	M12
4	12	14	25	M13
4	12	14	30	M14
4	12	14	35	M15
4	12	14	40	M16
4	12	14	45	M17

SPECIAL



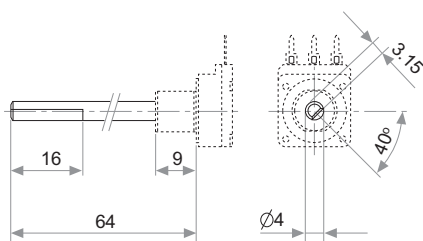
A
Ø 4
Ø 6
Ø 6.35

Plastic shafts Ø3.1

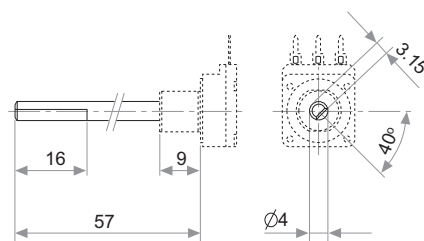


P09

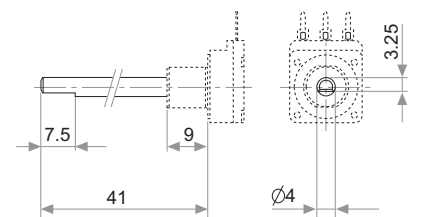
Plastic shafts Ø4



P01

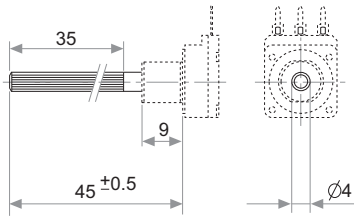


P02

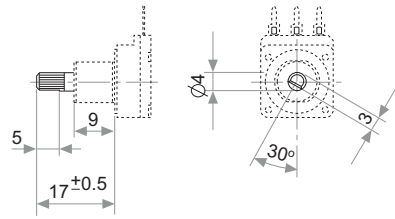


P03

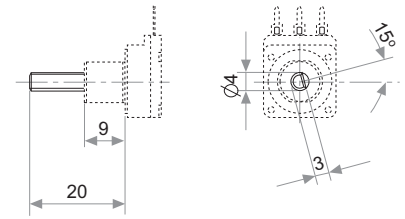
Plastic shafts Ø4



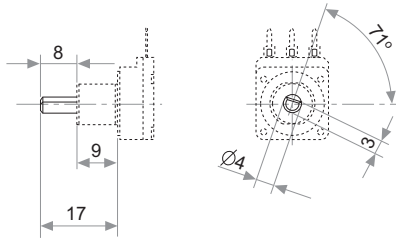
P04



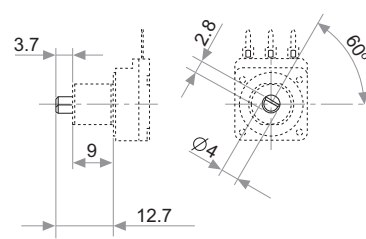
P07



P08

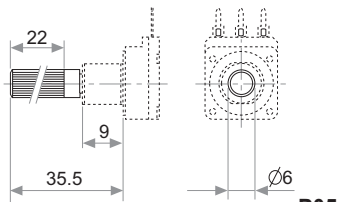


P10

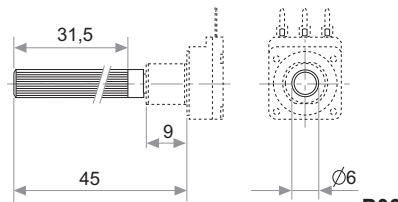


P21

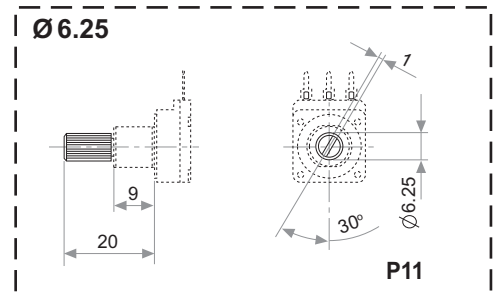
Plastic shafts Ø6



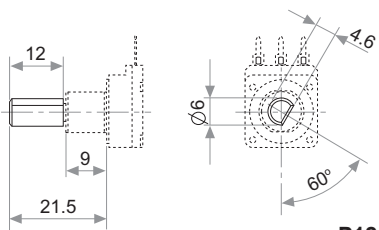
P05



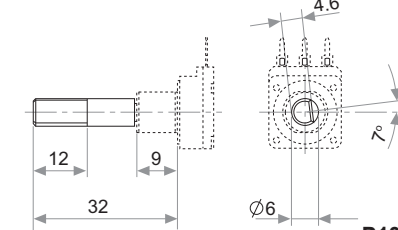
P06



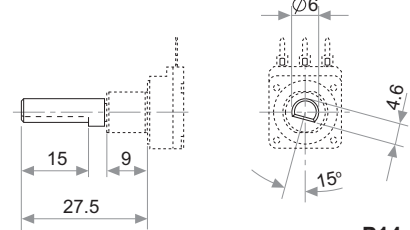
P11



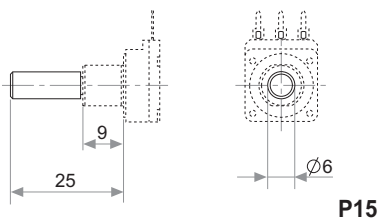
P12



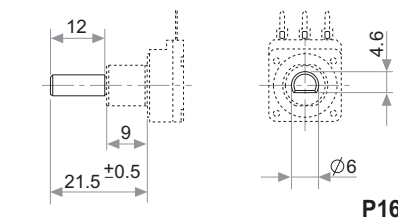
P13



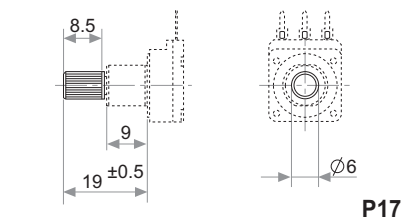
P14



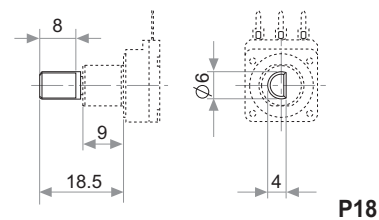
P15



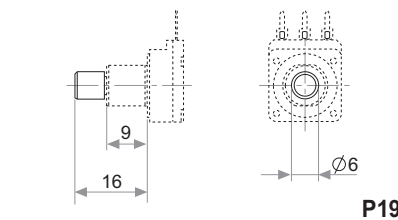
P16



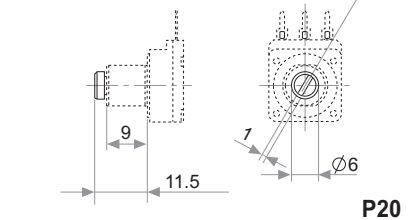
P17



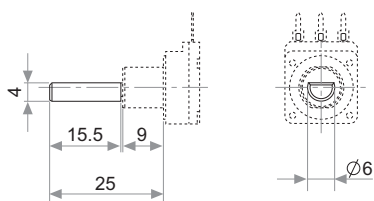
P18



P19



P20



P22

NOTE: Shaft position shown full CCW. Any other position for plastic shafts has to be shifted n times 24°
Other positions upon request.

T16

16mm control potentiometer



Main features

High mechanical endurance	yes
Stereo matching	upon request
Switch option	yes
Nut and washers	upon request
Shaft material	metallic or plastic
Detents option	yes

Electrical specifications

Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	250 VDC (lin) 125 VDC (no lin)
Nominal Power	50°C (122°F) 0.2 W (lin) 0.1 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n > 1\text{k}$)
Residual resistance*	$\leq 0.5\% R_n$ (5Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature	-25°C + 70°C** (-13°F + 158°F)
Switch nominal current	1A, 250 VAC
Switch contact resistance (initial)	10mΩ

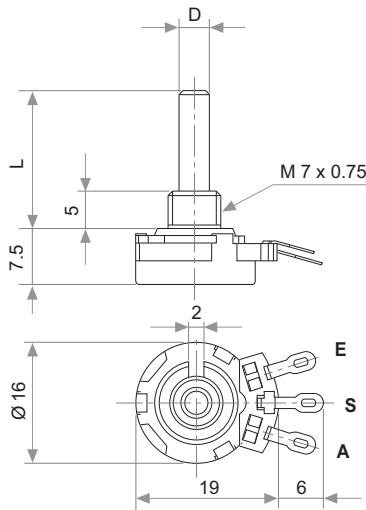
(*) Others upon request (**) Up to 85°C depending on application

Mechanical specifications

Mechanical rotation angle	$300^\circ \pm 5^\circ$
Electrical rotation angle	$280^\circ \pm 20^\circ$
Torque	0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
Stop torque	> 40 Ncm. (>56 in-oz)
Life (pot.)	25K cycles
Life (switch)	10K operations
Switch torque	1 to 3 Ncm (1.4 to 4.2 in-oz)
Switch operating angle	$30^\circ \pm 5^\circ$

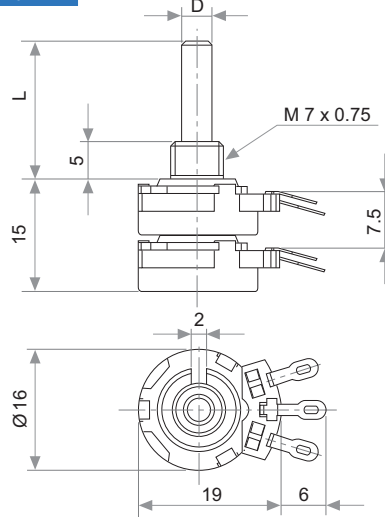
Metal shaft models

T-16 S ...

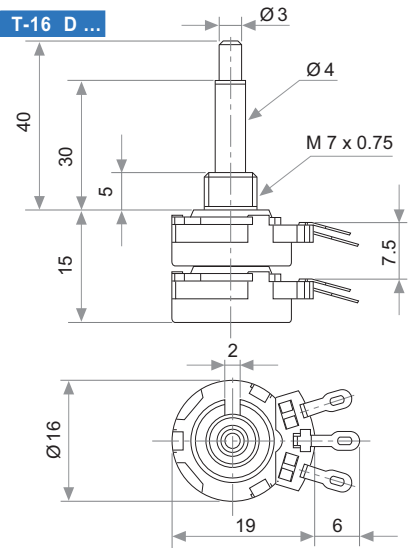


A = Initial
S = Wiper
E = Final

T-16 T ...

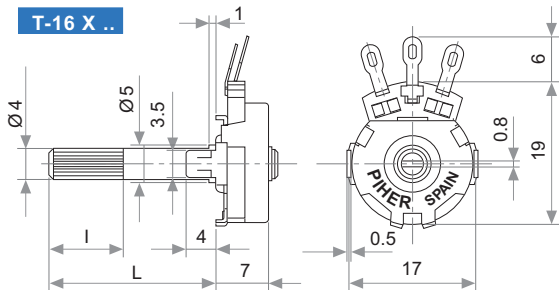


T-16 D ...

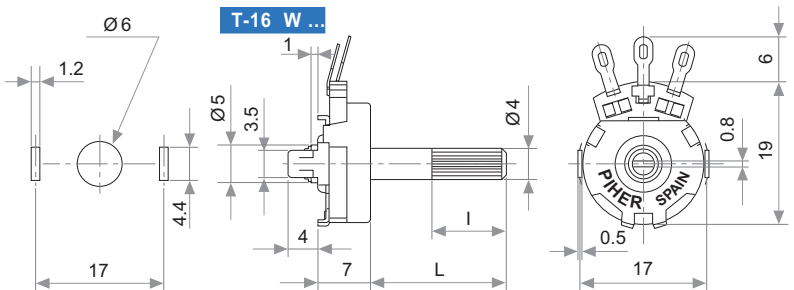


Plastic shaft models

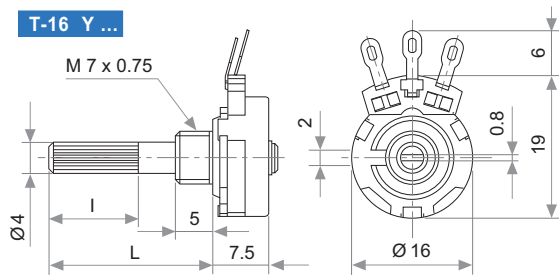
T-16 X ...



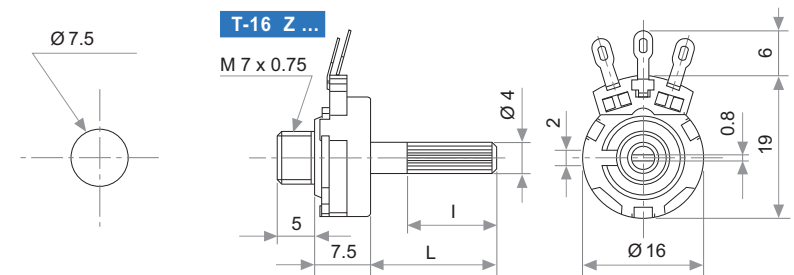
T-16 W ...



T-16 Y ...

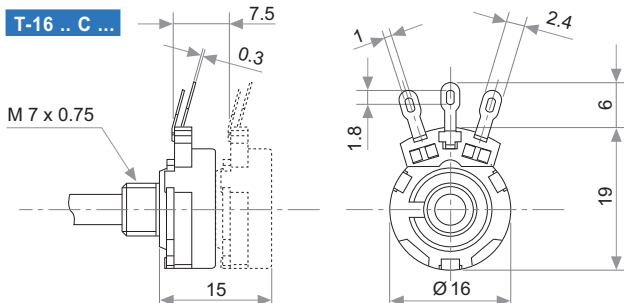


T-16 Z ...

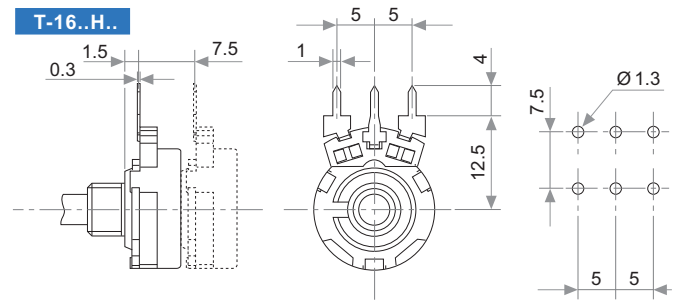


Terminals

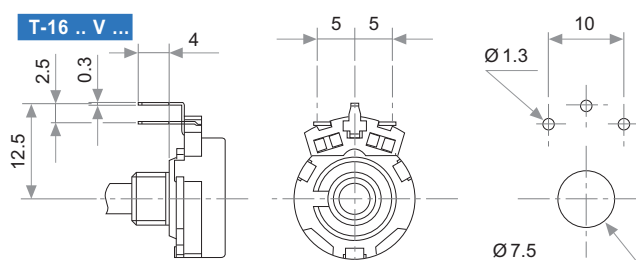
T-16 .. C ...



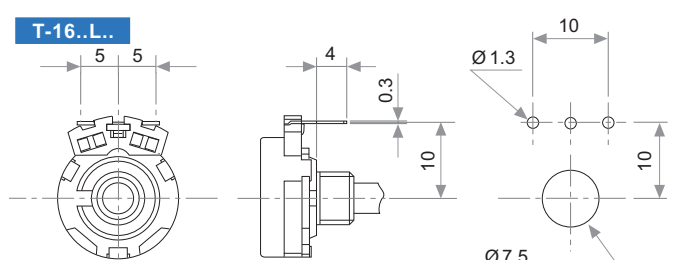
T-16..H..



T-16 .. V ...

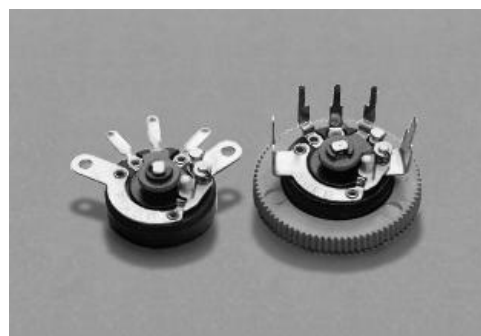


T-16..L..



T18

18mm control potentiometer



Main features

Switch option	yes
Dust proof	yes (without switch)
Actuating knob/thumbwheel option	yes

Electrical specifications

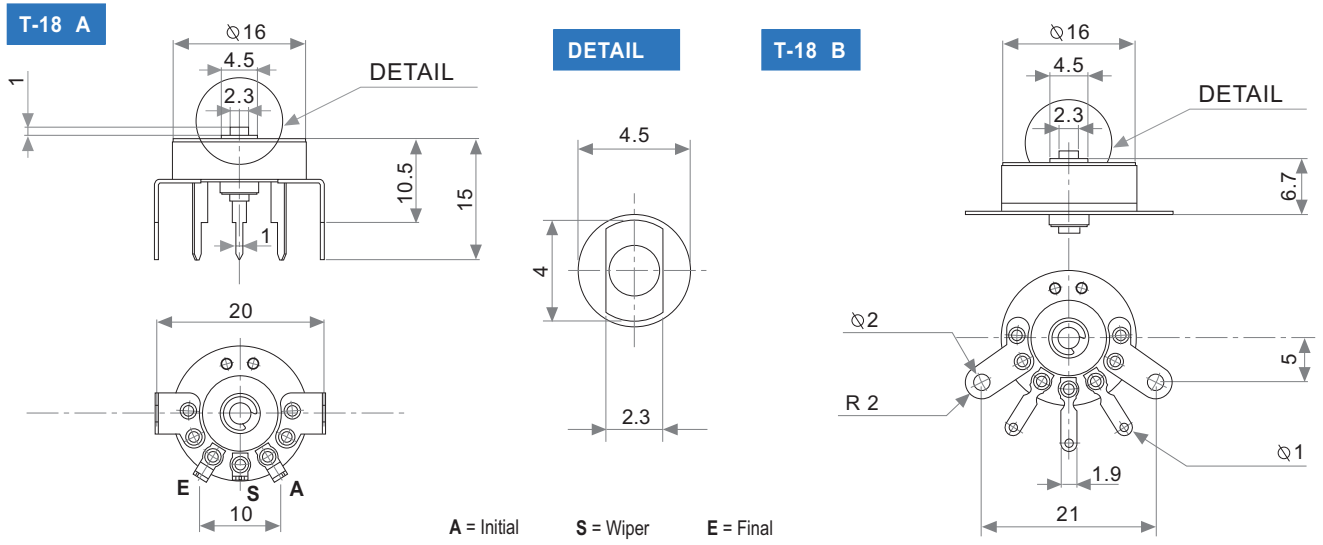
Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	200 VDC (lin) 100 VDC (no lin)
Nominal Power	50°C (122°F) 0.25 W (lin) 0.12 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n > 1\text{k}$)
Residual resistance*	$\leq 0.5\%$ R_n (5 Ω min.)
Equivalent noise resistance	$\leq 3\%$ R_n (3 Ω min.)
Operating temperature	-25°C + 70°C** (-13°F + 158°F)
Switch nominal current	1A, 12 V DC

(*) Others upon request (**) Up to 85°C depending on application

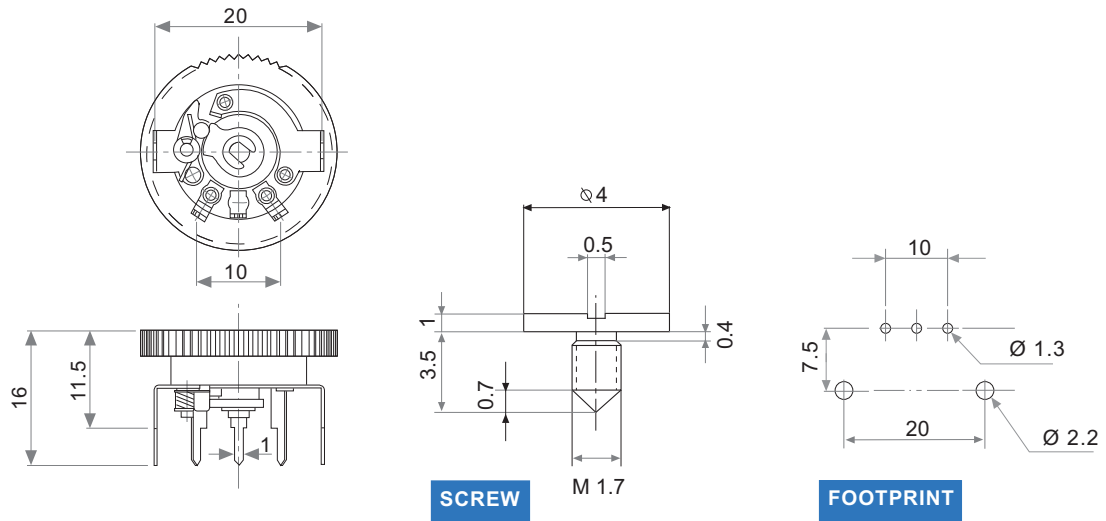
Mechanical specifications

Mechanical rotation angle	$255^\circ \pm 5^\circ$
Electrical rotation angle	$220^\circ \pm 20^\circ$
Torque	0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
Stop torque	> 40 Ncm. (>56 in-oz)
Life (pot.)	25K cycles
Life (switch)	10K operations
Switch operating angle	$25^\circ \pm 10^\circ$

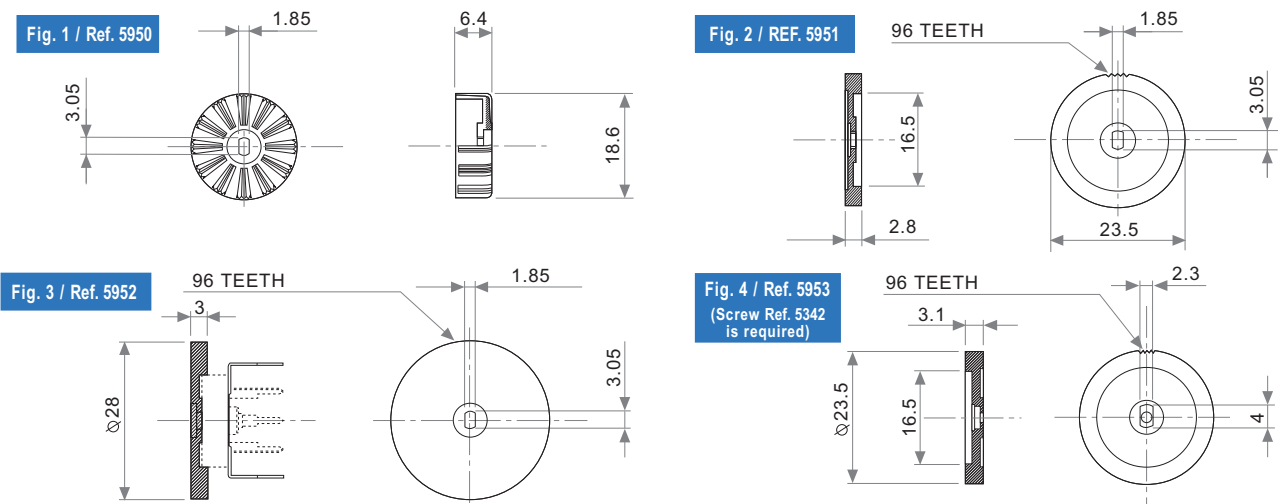
Terminals



Switch

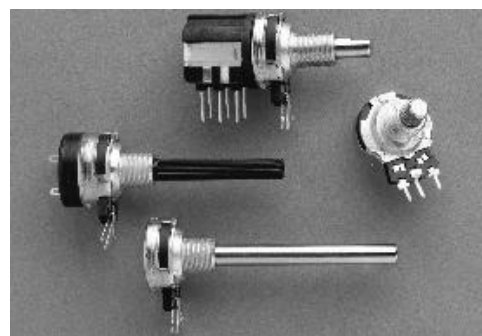


Thumbwheel



T21-I21

21mm control potentiometer



Main features

Switch option	yes (normal, push-pull, push-push)
Wide range of standard shafts lengths	yes (metallic and plastic)
Bushings available	standard, non rotary pawl
Stereo matching	upon request
Detents	upon request
Nut & washer	upon request (M7 x 0.75; W 3/8 x 32; M10 x 0.75)
Only switch possibility	yes (I21)

Electrical specifications

Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	250 VDC (lin) 150 VDC (no lin)
Nominal Power	50°C (122°F) 0.25 W (lin) 0.12 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n > 1\text{k}$)
Residual resistance*	$\leq 0.5\% R_n$ (5 Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature	-25°C + 70°C** (-13°F + 158°F)
Switch nominal current	1, 2 or 4A, 250 VAC

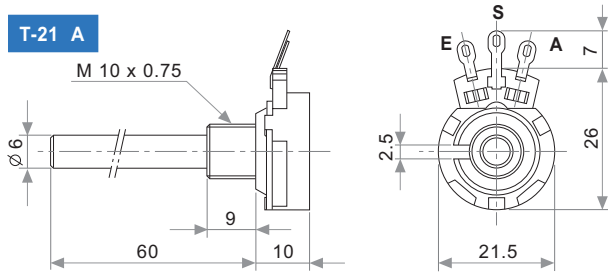
(* Others upon request (**) Up to 85°C depending on application

Mechanical specifications

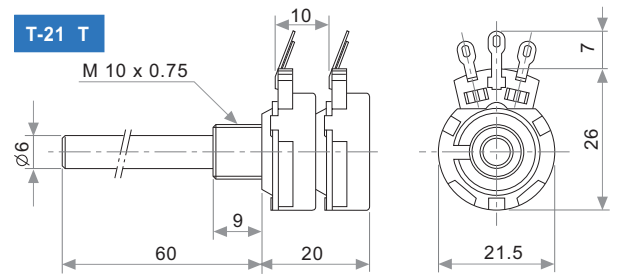
Mechanical rotation angle	$310^\circ \pm 5^\circ$
Electrical rotation angle	$290^\circ \pm 20^\circ$
Torque	0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
Stop torque	> 80 Ncm. (>112 in-oz)
Life (pot.)	25K cycles
Life (switch)	10K operations
Switch operating angle (rotary)	$50^\circ \pm 5^\circ$

Models with metallic shaft

T-21 A

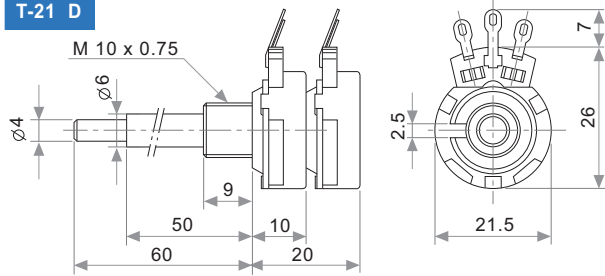


T-21 T

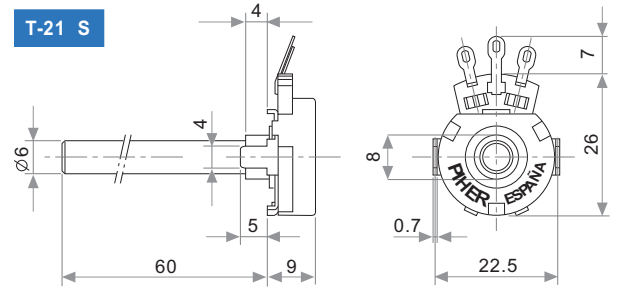


A = Initial
S = Wiper
E = Final

T-21 D

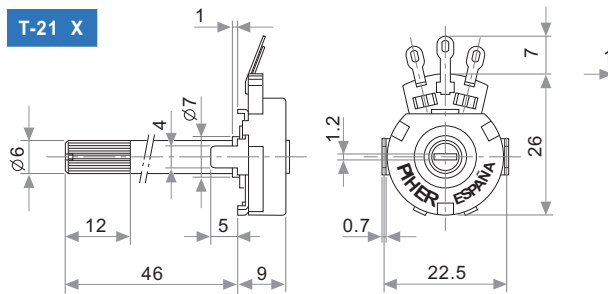


T-21 S

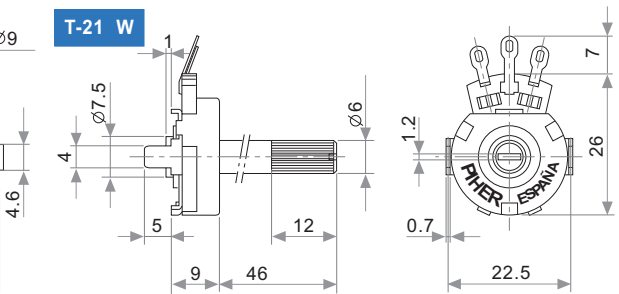


Models with plastic shaft

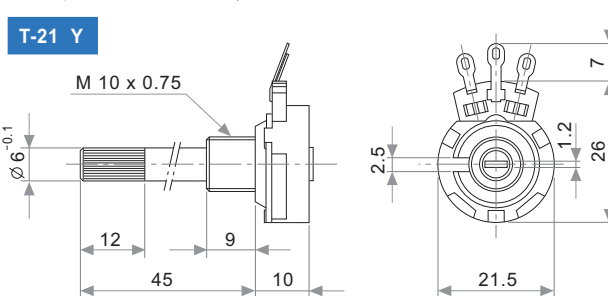
T-21 X



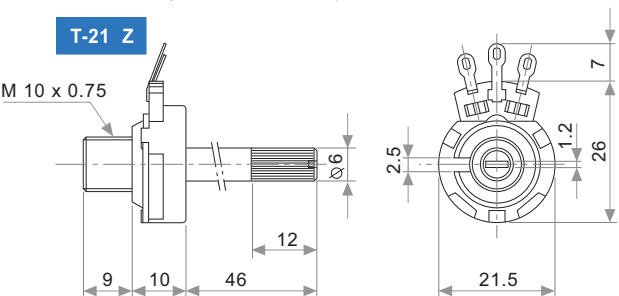
T-21 W



T-21 Y

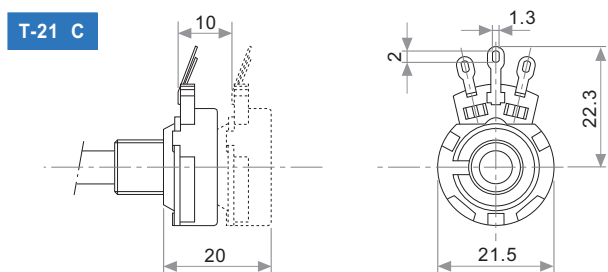


T-21 Z

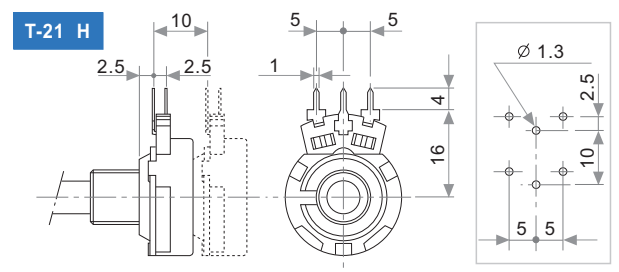


Terminals

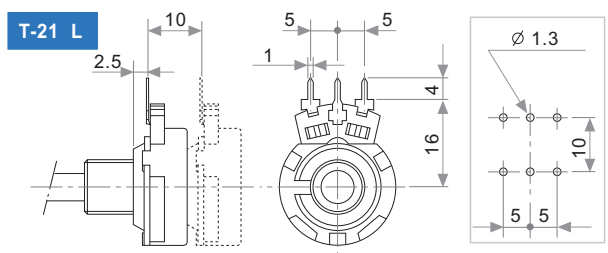
T-21 C



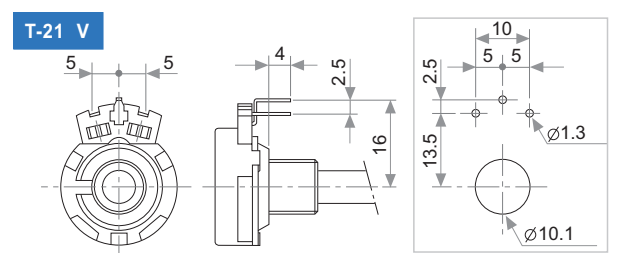
T-21 H



T-21 L



T-21 V



CP21

21mm cermet potentiometer



Main features

Resistive element	cermet
High power dissipation	yes
Adaptable switches	yes
Stereo matching	upon request

Electrical specifications

Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	500 VDC (lin) 250 VDC (no lin)
Nominal Power	70°C (158°F) 2 W (lin) 0.5 W (no lin)
Taper**	Lin, Log, Alog
Residual resistance*	$\leq 0.5\% R_n$ (5 Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature	-40°C + 90°C
Breakdown voltage	>750 VAC

(*) Others upon request.

(**) Others upon request. No linear tapers; values higher than 1K Ω

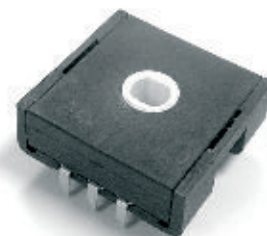
Mechanical specifications

Mechanical rotation angle	$310^\circ \pm 5^\circ$
Electrical rotation angle	$290^\circ \pm 20^\circ$
Torque	0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
Max. stop torque	>80 Ncm. (>112 in-oz)
Life (pot.)	>50K operations

Detented controls



DCM-PT15



DCM-AC01



DCM-AC04



DCM-PTT



DCM-N15

Main features

Plastic material according to UL94V-0	upon request
High & low torque detents can be freely mixed	yes
Resistive track dust proof enclosed	yes
Detents configurable to specific positions in complex tapers	yes
Special tapers	yes
Special switch option	upon request
Cut track option	yes
Crimped terminals available	yes
Special linearity	upon request
SMD version	DCM-PT15
Push-to-turn safety function	DCM-PTT
Endless rotation	DCM-AC01
∅ 6mm industrial standard shaft	DCM-AC01
Design for screen-printed potentiometer, encoders or switches	DCM-AC04

Electrical specifications for DCM-PT15 (for other models please contact PIHER)

Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M } \Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M } \Omega$ $\pm 30\%$
Max. Voltage	250 VDC (lin) 125 VDC (no lin)
Nominal Power	50°C (122°F) 0.25 W (lin) 0.12 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n \geq 1\text{k}$)
Residual resistance*	$\leq 0.5\% R_n$ (5Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature**	-25°C to +70°C (-13°F to +158°F)

(*) Others upon request (**) Up to +85°C depending on application

Mechanical specifications for DCM-PT15 (for other models please contact PIHER)

Mechanical rotation angle	$265^\circ \pm 5^\circ$
Electrical rotation angle	$240^\circ \pm 20^\circ$
Torque	fully customisable, up to 8.8 Ncm
Life*	up to 100K cycles

(*) Others upon request

Printed Circuit Resistors linear / rotary



Main features

Low profile	yes
Low cost	yes
No insertion costs	yes
No insertion errors	yes
No soldering problems	yes
Fixed & variable resistor combinations	unlimited
High frequency performance	excellent
Calibrated voltage dividers	yes
Special ohmic values	yes
Functional (in-circuit) trimming	yes
Laser trimming	yes

Electrical specifications

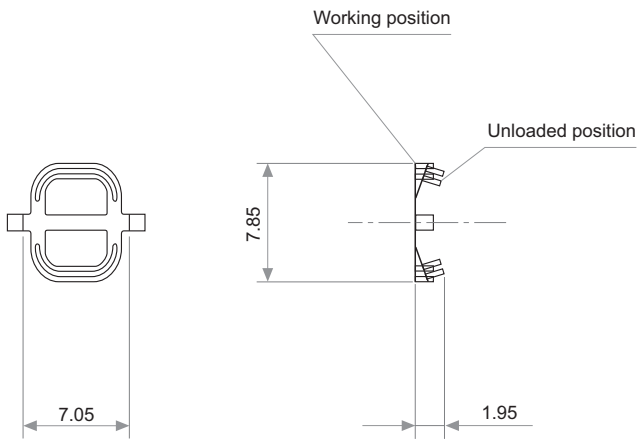
Resistance range	$10 \Omega \leq R_n \leq 1 M$
Tolerance	Non-trimmed resistors: $\pm 30\%$, $\pm 20\%$ Trimmed resistors: $\pm 5\%$
Matching capability	$\pm 2\%$
Voltage ratio	Non-trimmed resistors: $\pm 10\%$ Trimmed resistors: $\pm 2\%$
TRC	better than 300 ppm/°C

Mechanical specifications

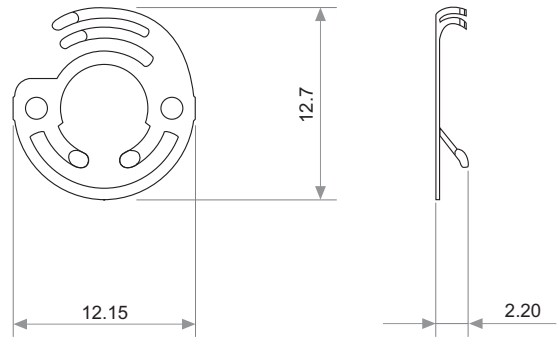
Mechanical life (voltage dividers)	from 10K to 5 million cycles (depending on each individual case)
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Wiper examples

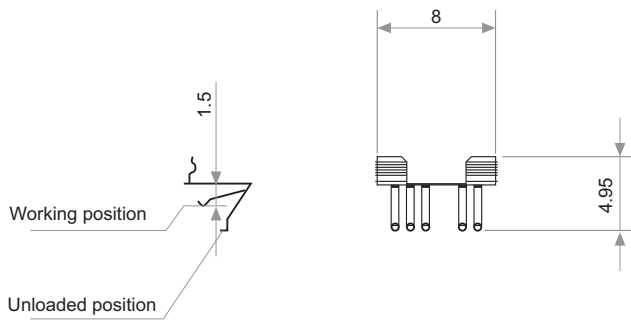
Ref. 5303



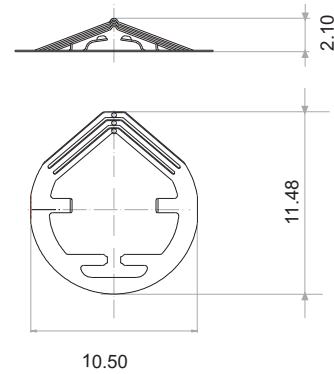
Ref. 5382



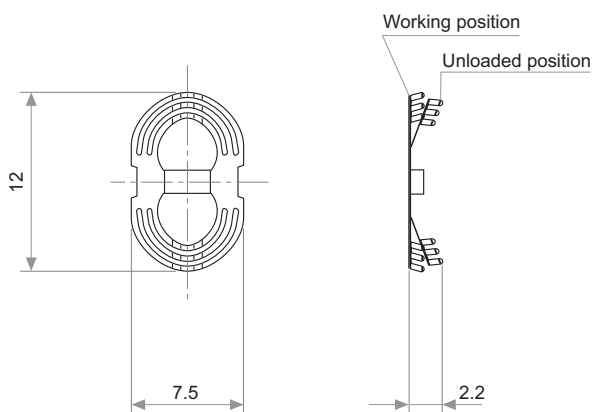
Ref. 5076



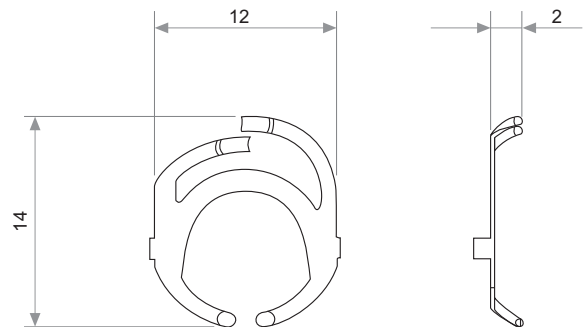
Ref. 5738



Ref. 5093



Ref. 5184



NPL linear potentiometer



Main features

Fixation methods / clip style	inward outward without clip straight crimped
Resistive element	carbon
Overmoulding technology	yes
Versions	metal & plastic

Electrical specifications

Range of values	1K to 100K ohms
Tolerance	± 30%
Max. Voltage**	50 VDC to 100 VDC
Nominal Power**	0.20 W @ 50°C
Taper*	Linear
Operating temperature	-40°C + 105°C
Relative linearity*	± 2%

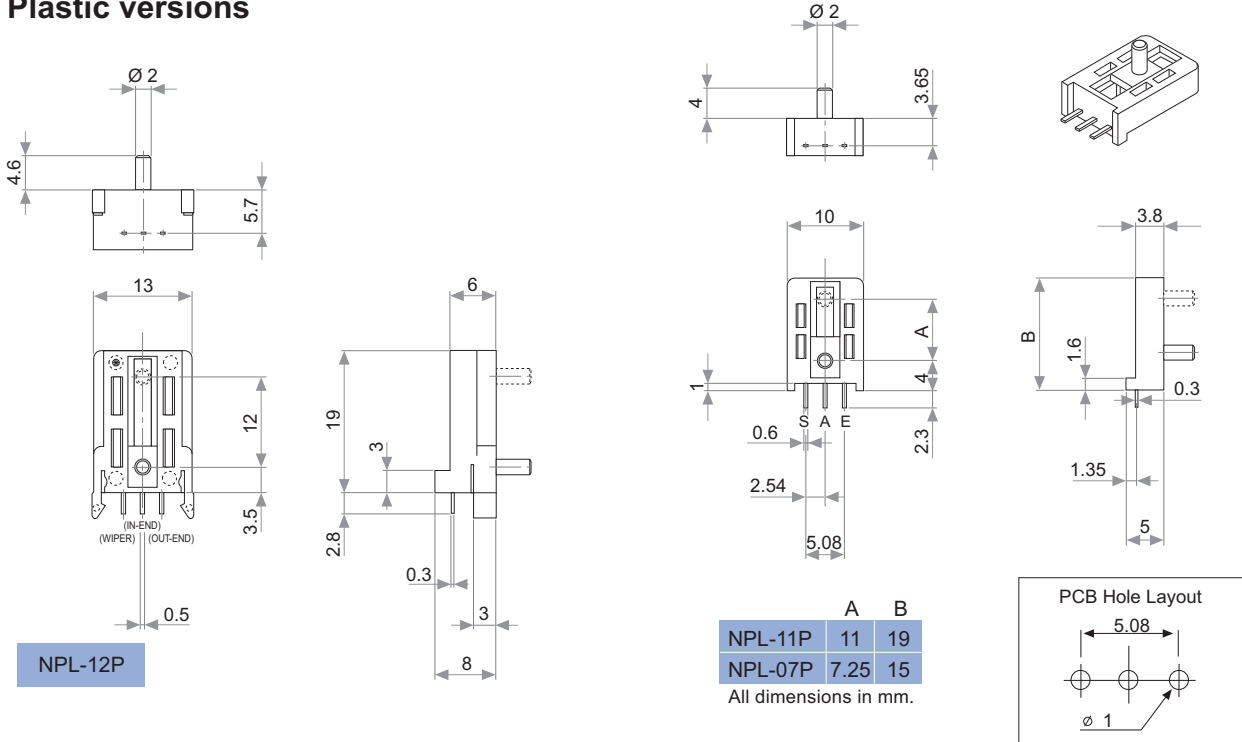
(*) Others upon request

(**) Depending on model

Mechanical specifications

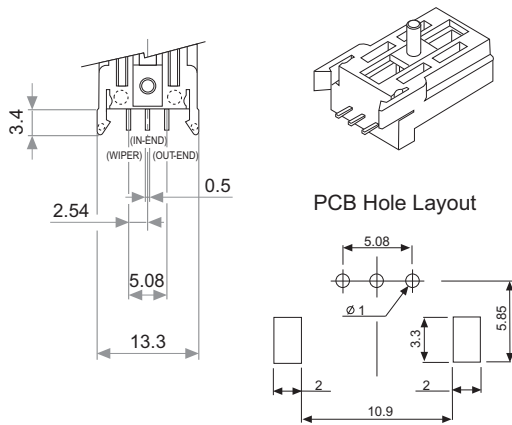
Mechanical travel	7.25, 8, 12 mm
electrical travel	6 to 12 mm
Sliding force	≤ 2N @ 10 mm/sec
Mechanical life	50K cycles
Stop strenght	30N for 5 secs

Plastic versions

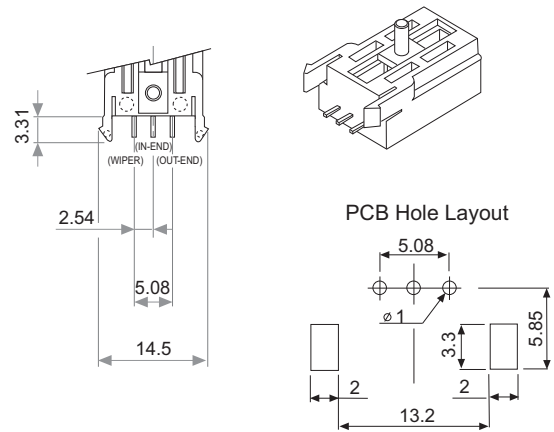


Clip style (NPL12P)

INWARD FACING CLIPS

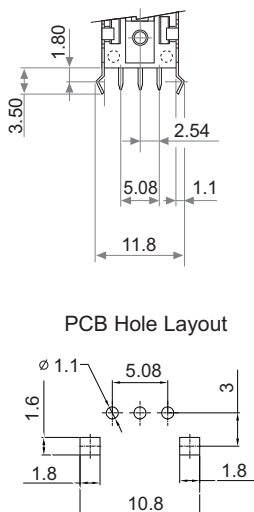


OUTWARD FACING CLIPS

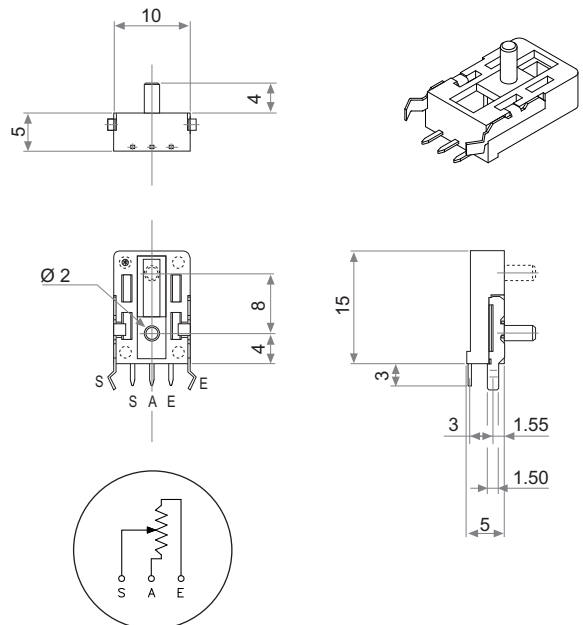
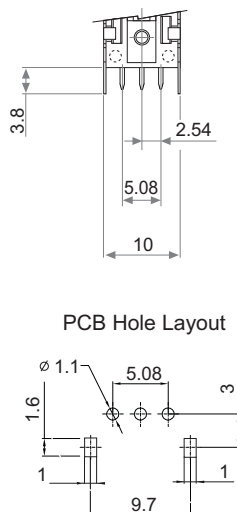


Metal version (NPL08M)

CRIMPED

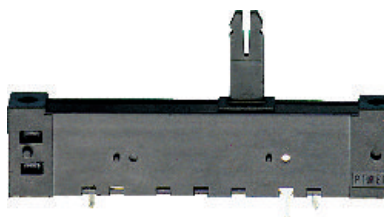


STRAIGHT



PL-40

Linear potentiometer



Main features

Dust proof enclosure	yes
Cut track	upon request (at initial of final position)
Resistive element	carbon
Shielded versions	yes
Stackable	yes

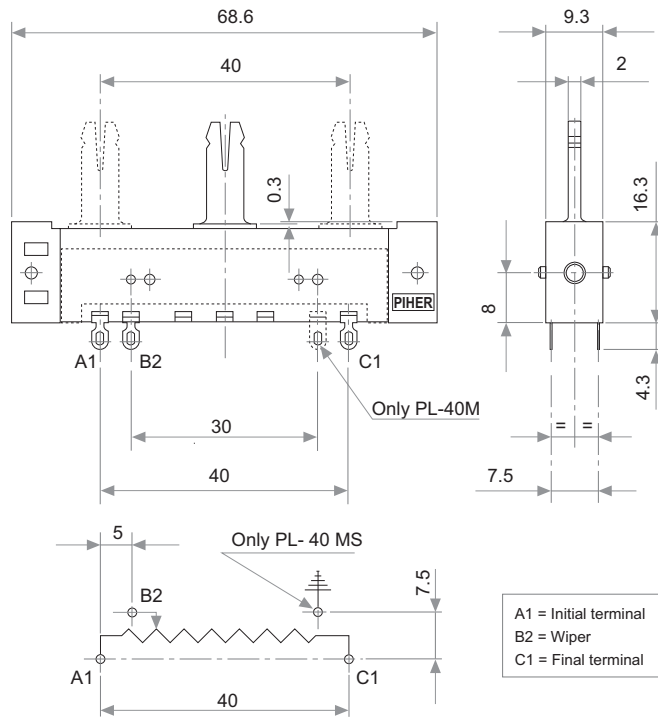
Electrical specifications

Range of values*	$100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
Tolerance*	$100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$ $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$ $\pm 30\%$
Max. Voltage	500 VDC (lin) 350 VDC (no lin)
Nominal Power	50°C (122°F) - 0.25 W (lin) 0.12 W (no lin)
Taper*	Lin, Log, Alog (Log & Alog only $R_n \geq 1\text{k}$)
Residual resistance	$\leq 0.5\% R_n$ (2 Ω min.)
Equivalent noise resistance	$\leq 3\% R_n$ (3 Ω min.)
Operating temperature**	-25°C + 70°C (-13°F + 158°F)

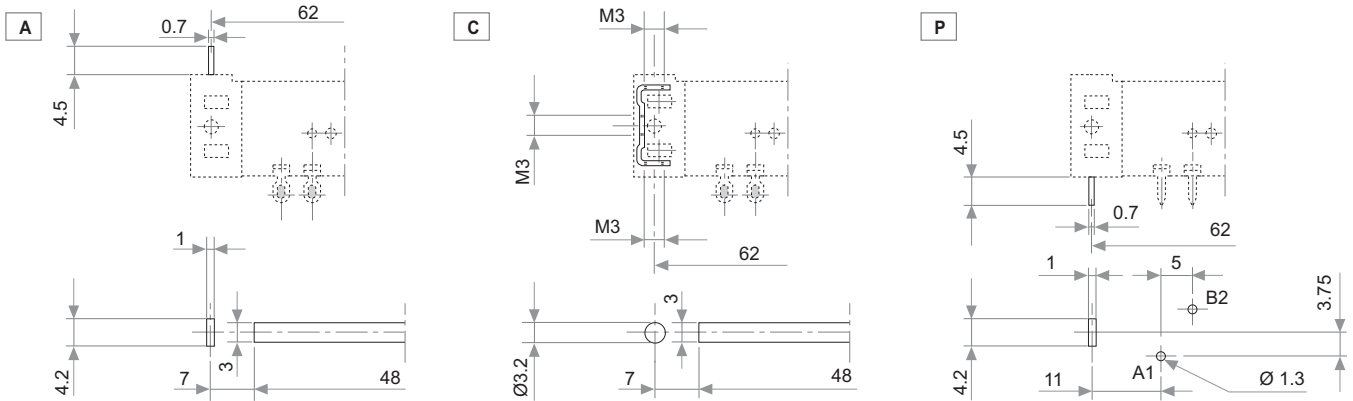
(*) Others upon request (**) Up to 85°C depending on application

Mechanical specifications

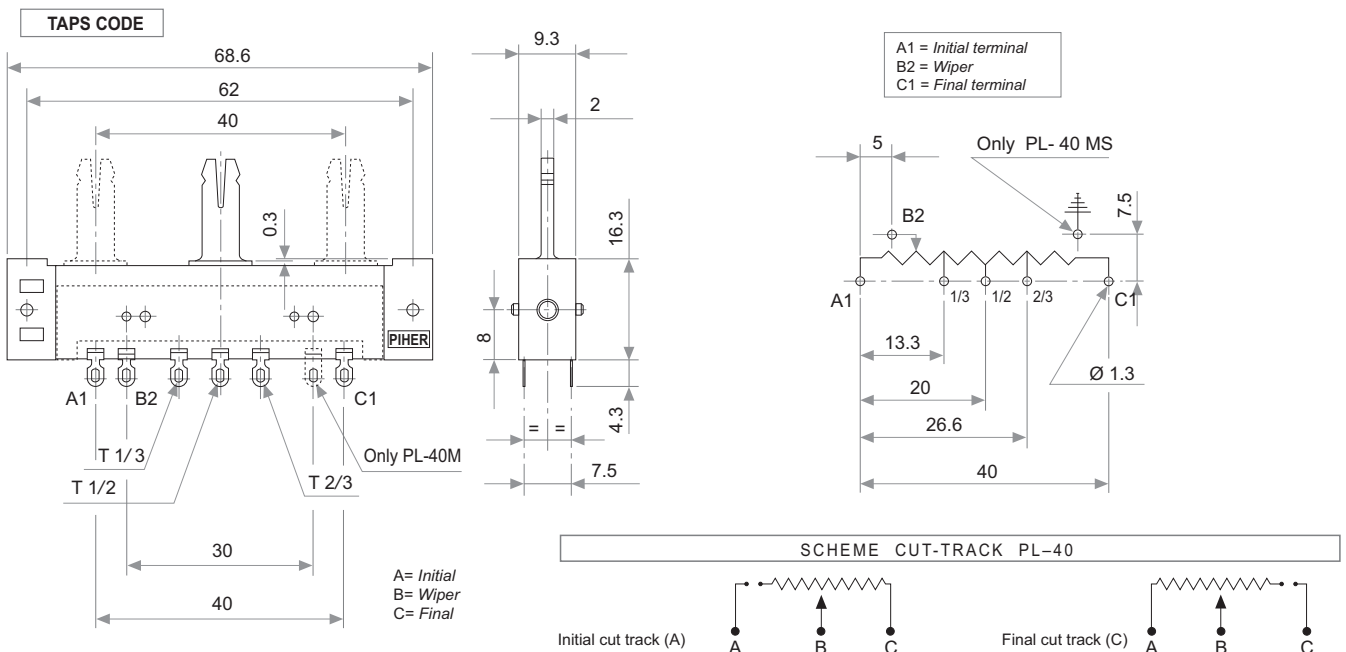
Mechanical travel	40mm \pm 1mm
electrical travel	37mm \pm 1mm
Sliding force	1 to 3 N (3.6 to 10 oz)
Mechanical life	25K cycles
Stop torque force	>50 N (>179 oz)



Fixation means

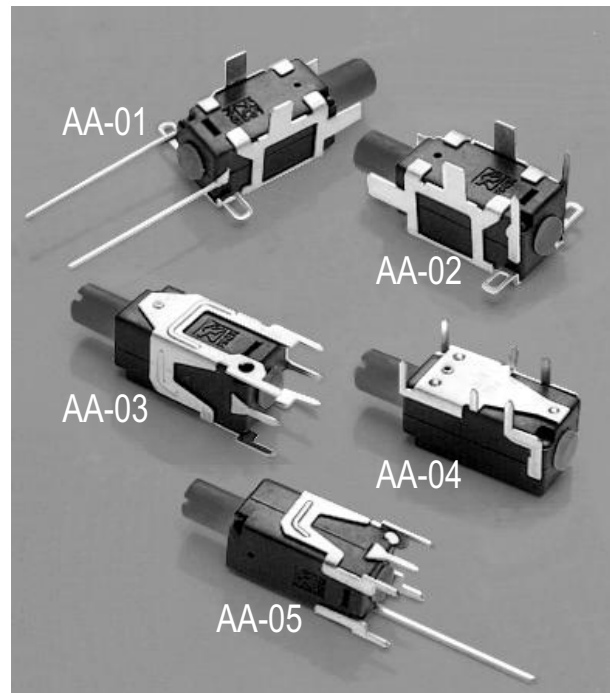


OPTIONS



AA

Variable attenuator



Electrical specifications

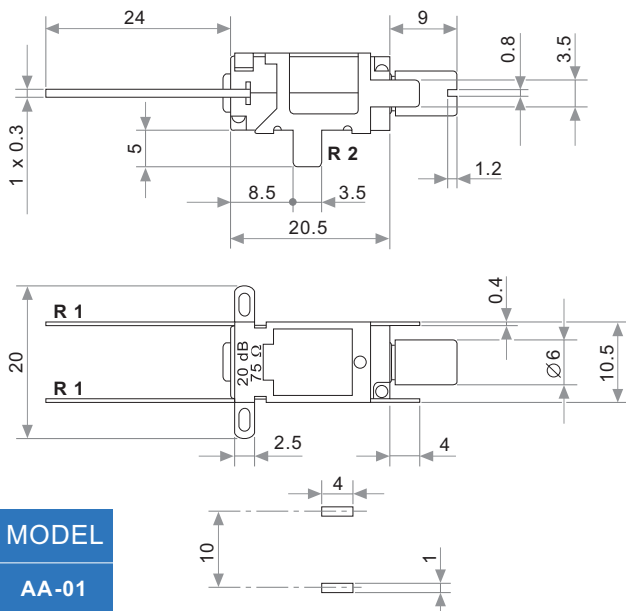
Impedance*	75Ω
SWR	F < 300Mhz: < 1.4 300Mhz F < 800Mhz: < 2
Operating freq.	800Mhz
Attenuation	10dB: < 0.5dB...10dB +4/-2 20dB: < 0.5dB...20dB +6/-4
Operating temperature**	-25°C + 70°C (-13°F + 158°F)
N° of turns	3 ^{-0.3}
Torque	0.5 to 3 Ncm.

(* Others upon request (** Up to 85°C depending on application)

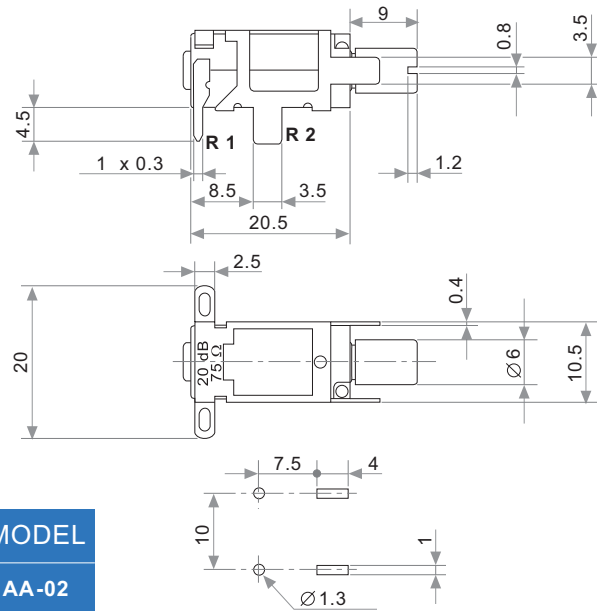
Packaging

AA-01 & AA-05: 400 pieces in box of 270 x 170 x 100
 AA-02, AA-03 & AA-04: 200 pieces in tray of 370 x 225 x 40

Models

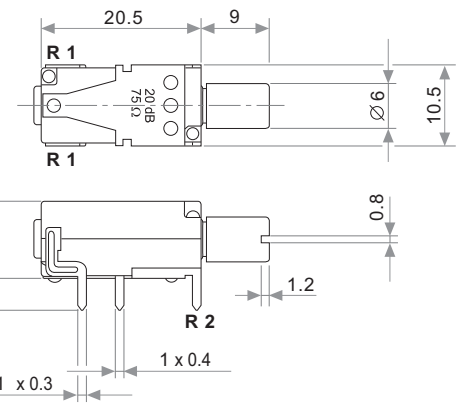
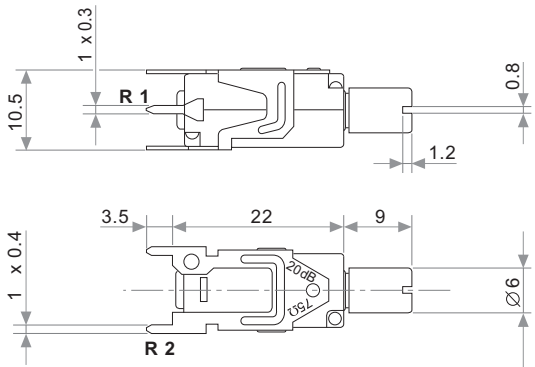


MODEL
AA-01

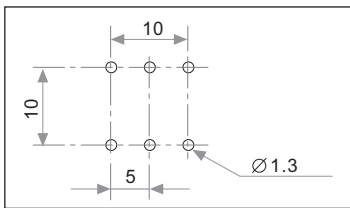


MODEL
AA-02

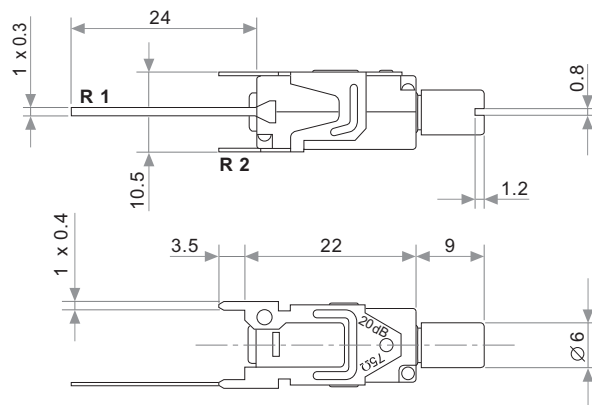
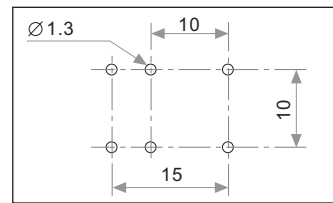
Models



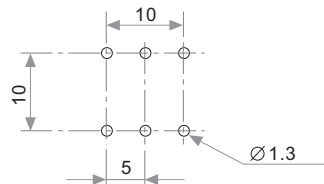
MODEL
AA-03



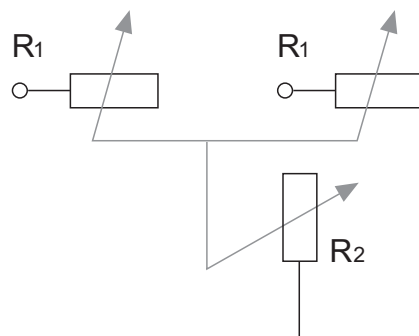
MODEL
AA-04



MODEL
AA-05



Common diagram



Carbon Potentiometer Specifications

TESTS	Piher typical test results 95% LOTS ΔR (%)	Value CEI 393-1 (formerly DIN std 41450) ΔR (%)	TEST METHOD CEI 393-1 (formerly DIN STD 41450)
Resistance to soldering heat	< $\pm 1\%$	< $\pm 2\%$	a) Subject component to a temperature of 55° C and $\leq 20\%$ RH for 24 hours, after recovery measure total R. b) Immerse terminals in a Sn/Pb(60/40) bath at 260° C to within 3mm of the body for 10 sec (potentiometer mounted on a p.c.b. of 1.5 mm thickness). c) Measure total R after 24 hours at normal ambient.**
Solderability	95% of treated surface covered with solder		Bath in flux (25% colophony) for 5 sec then immerse terminals in a Sn/Pb (60/40) batch at 235° C for 5 sec.
Temperature cycling	< $\pm 2.5\%$	< $\pm 5\%$	a) Precondition * for 24 h, measure total R. b) 16 h. at 85° C $\pm 2^\circ$ C c) Precondition * for 2 hours. d) 2 h. at -25° C $\pm 2^\circ$ C e) 16 h. at normal ambient. **
Temperature coefficient	100 Ω to 100 k Ω ± 300 ppm/ $^\circ$ C Rn > 100k +300 -500	100 Ω to 22 k Ω ± 1000 ppm/ $^\circ$ C > 22 k Ω to 4.7 M Ω +300/-1000 ppm/ $^\circ$ C	a) Subject component to a temperature of 55° C and $\leq 20\%$ RH for 24 h and recovery. b) Measure total R after 1/2 h. at -25° C, +70° C and normal ambient. ** (all at $\leq 50\%$ RH)
Damp Heat	< $\pm 5\%$	< $\pm 15\%$	a) Precondition * for 24 h, measure total R b) 500 h. at 40° C, 90-95% RH. c) Measure total R after 24 h. at normal ambient. **
Mechanical Life	> 100 Ω < $\pm 3\%$ > 1M Ω < $\pm 5\%$	100 Ω to 100 k Ω < $\pm 5\%$ > 100 k Ω to 4.7 M Ω < $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) Apply 500 complete turns at speed of 10-15 r.p.m. c) Measure total R.
Electrical Life	< $\pm 5\%$	< $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) 1000 h. at 50° C $\pm 2^\circ$ C applying W_R without exceed V_P 1.5h ON 0.5h OFF c) Measure total R.
Resistance to cleaning Fluids and Solvents	< $\pm 5\%$	< $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) Immerse for 10 minutes in each of the following fluids: alcohol, isopropyl alcohol and freon TMC. c) Measure total R after 24 h. at normal ambient. **
Vibration	< $\pm 2\%$	< $\pm 3\%$	2 hour cycles in each of the X, Y and Z planes (6 hours). The wiper is set at mid point (50%). Frequency 10 Hz. - 55Hz.
Storage	< $\pm 2.5\%$	< $\pm 5\%$	a) Preconditions * for 24 h, measure total R b) Store for 6 months at normal ambient. ** c) Precondition * for 24 h, measure total R at normal ambient. **

Notes: * Preconditioning: store the samples at 23° $\pm 2^\circ$ C and 50 $\pm 5\%$ RH.
** Normal ambient: temperature of 23° $\pm 2^\circ$ C and 45% to 70% RH.

Cermet Potentiometer Specifications

TESTS	Piher typical test results 95% LOTS ΔR (%)	Value CEI 393-1 (formerly DIN std 41450) ΔR (%)	TEST METHOD CEI 393-1 (formerly DIN STD 41450)
Resistance to soldering heat	< $\pm 1\%$	< $\pm 2\%$	a) Subject component to a temperature of 55° C and $\leq 20\%$ RH for 24 hours, after recovery measure total R. b) Immerse terminals in a Sn/Pb(60/40) bath at 260° C to within 3mm of the body for 10 sec (potentiometer mounted on a p.c.b. of 1.5 mm thickness). c) Measure total R after 24 hours at normal ambient.**
Solderability	95% of treated surface covered with solder		Bath in flux (25% colophony) for 5 sec then immerse terminals in a Sn/Pb (60/40) batch at 235° C for 5 sec.
Temperature cycling	< $\pm 2\%$	< $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) 16 h. at 105° C $\pm 2^\circ$ C c) Precondition * for 2 hours. d) 2 h. at -40° C $\pm 2^\circ$ C e) 16 h. at normal ambient. **
Temperature coefficient	< ± 100 ppm/ $^\circ$ C	100 Ω to 22 k Ω ± 1000 ppm/ $^\circ$ C > 22 k Ω to 4.7 M Ω +300/-1000 ppm/ $^\circ$ C	a) Subject component to a temperature of 55° C and $\leq 20\%$ RH for 24 h and recovery. b) Measure total R after 1/2 h. at - 40° C, 90 ° C and normal ambient. ** (all at $\leq 50\%$ RH).
Damp Heat	< $\pm 2\%$	< $\pm 15\%$	a) Precondition * for 24 h, measure total R b) 500 h. at 40° C, 90-95% RH. c) Measure total R after 24 h. at normal ambient. **
Mechanical Life	< $\pm 2\%$	100 Ω to 100 k Ω < $\pm 5\%$ > 100 k Ω to 4.7 M Ω < $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) Apply 500 complete turns at speed of 10-15 r.p.m. c) Measure total R.
Electrical Life	< $\pm 2\%$	< $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) 1000 h. at 70° C $\pm 2^\circ$ C applying W_R without exceed V_P 1.5h ON 0.5h OFF c) Measure total R.
Resistance to cleaning Fluids and Solvents	< $\pm 1\%$	< $\pm 10\%$	a) Precondition * for 24 h, measure total R. b) Immerse for 10 minutes in each of the following fluids: alcohol, isopropyl alcohol and freon TMC. c) Measure total R after 24 h. at normal ambient. **
Vibration	< $\pm 2\%$	< $\pm 3\%$	2 hour cycles in each of the X, Y and Z planes (6 hours). The wiper is set at mid point (50%). Frequency 10 Hz. - 55 Hz.
Storage	< $\pm 2\%$	< $\pm 5\%$	a) Preconditions * for 24 h, measure total R b) Store for 6 months at normal ambient. ** c) Precondition * for 24 h, measure total R at normal ambient. **

Notes: * Preconditioning: store the samples at 23° $\pm 2^\circ$ C and 50 $\pm 5\%$ RH.
** Normal ambient: temperature of 23° $\pm 2^\circ$ C and 45% to 70% RH.

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