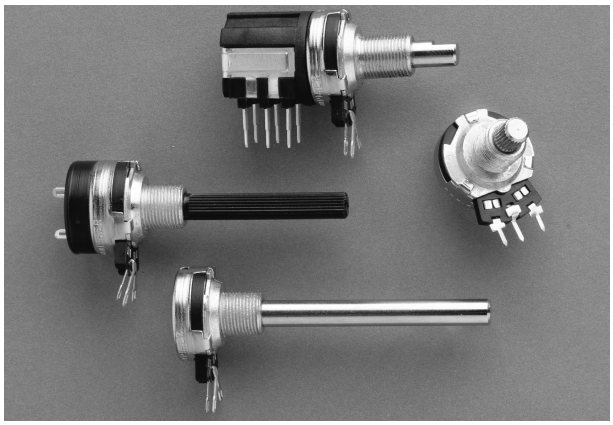
PIHER

T-21 21mm Carbon Potentiometer



FEATURES

– Carbon resistive element.
– High mechanical endurance.
– Upon request:
  • Detents.
  • Stereo matching.
  • Switch.
  • Nut & washer.
  • Custom assemblies with wires and connectors.

MECHANICAL SPECIFICATIONS

– Mechanical rotation angle: 310° ± 5°
– Electrical rotation angle: 290° ± 20°
– Torque: 0.5 to 1.5 Ncm. (0.7 to 2.1 in-oz)
– Stop torque: > 80 Ncm. (> 112 in-oz)

ELECTRICAL SPECIFICATIONS

– Range of values*
100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
– Standard tolerance*: 100Ω ≤ Rn ≤ 1M ------ ± 20%
1MΩ < Rn ≤ 5M ------ ± 30%
– Max. Voltage: 250 VDC (lin) 150 VDC (no lin)
– Nominal Power 50°C (122°F) (see power rating curve)
0.25 W (lin) 0.12 W (no lin)
– Taper* (Log. & Alog. only Rn > 1K) Lin ; Log; Alog.
– Residual resistance*: ≤ 0.5% Rn (5 Ω min)
– Equivalent Noise Resistance: ≤ 3% Rn (3 Ω min.)
– Operating temperature**: –25°C + 70°C (–13°F + 158°F)

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

HOW TO ORDER

STANDARD

T-21	A	C	M06	07	223	A	2020

OPTIONAL EXTRAS

0				

Series
T-21

Terminals
C= Solder Lugs
H= Horiz. PCB
L= Horiz. in Line PCB
V= Vert. PCB

Bushings

Code	Shaft ØA	Bushing Ø B	Length C
07	6	M10 x 0.75	9
08	6	M10 x 0.75	12
09	6	M10 x 0.75	19
11	6 "U"	3/8" x 32 h.	9
12	6 "U"	3/8" x 32 h.	12
13	6.35 "U"	3/8" x 32 h.	9
14	6.35	M10 x 0.75	9
00	For models pot. X,W, S		

(See note 3)

Taper
A= linear
B= Log.
C= Alog.
(See note 10)
Other tapers on request

Shafts spec. length
XX.X
(See note 6)

Stereo matching
3D = 3dB
4D = 4dB
6D = 6dB
(See note 8)

Detents
01P= 1 detent
11P= 11 detents
41P= 41 "
(See note 7)

Models

Metal shaft	Plastic shaft
A	X
D	W
T	Y
S	Z

(See note 1)

Shafts

Metal	Plastic
M06	P01
M07	⋮
M08	P12
M11	
⋮	
M16	

(See note 2)

Value
101 = 100 Ω
⋮
223 = 22 K
⋮
504 = 500 K
⋮
505 = 5M
(See note 4)

Tolerance
1010= ± 10%
2020= ± 20%
3030= ± 30%
(See note 5)

Switch
F01 = Mod. F1
112 = Mod. F2
⋮ " "
744 = Mod. F2
(See note 9)

Nut & washer
-TA = Loose nut & washer
MTA= Assembled nut & washer
MT- = Assembled nut
-T- = Loose nut

NOTES:

(1) MODELS : Models D y T are not available with "V" terminals.
(2) SHAFTS: The codes indicate diameter and length. M08: Code for the double potentiometer.
(3) BUSHINGS ; The codes types 11, 12 and 13 have an antirotation lug (at 90°CW). Plastic shaft and double model are only available with Ø6 bushing.
(4) VALUE:
  • Code: 10 1 = 100 Ω
    Number of zeros
    2 first digits of the value.
  • In models "D" and "T" with different values, order under special drawing number.
(5) Tolerance (special), upon request. Example : +7% -5% Code : 07 05
    negative tolerance
    positive tolerance
(6) Shafts special length:
  • Only for special length and plain shafts (not knurled). Example: Shaft Ø6 L= 24.5
  • Flatted and slotted shafts, etc. will need drawing.
  • Shaft M08 (T-21D) with other length, order under special drawing number.
    Recomendation : Shaft L > 60 ..... bushing C = 19
    M06 ..... 24.5
    special length shafts
(7) DETENTS : - Not available in models with plastic shaft X, W, Y, Z.
- Detents and switch are not compatible.
(8) Stereo matching: Only available in tandem models and upon request.
(9) SWITCHES : Two types of switches are offered: F1 and F2.
  • F1 = The code is "F01"
    Plastic shafts are only available if they are code P10, P11 or P12
  • F2 = (Only with metal shaft) Indicate the corresponding I-21 switch code.
(10) Switch option not available with antilog taper.

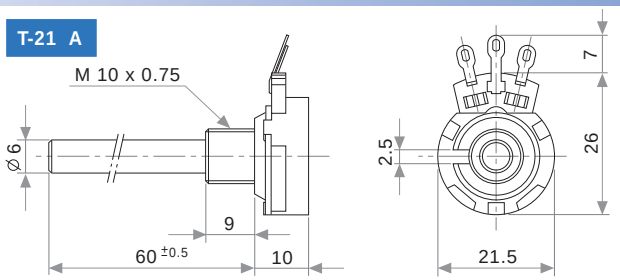
STANDARD OPTIONS

Shaft length ..... 0 standard
Detents ..... Without
Stereo matching ..... Only for model "T" and upon request

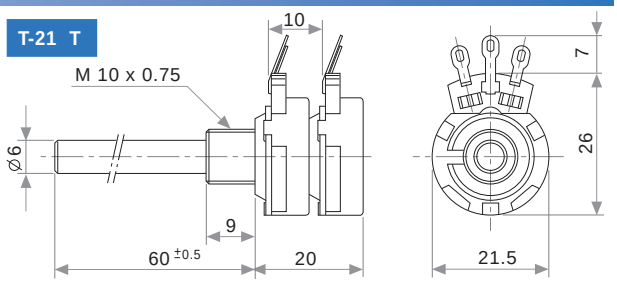
Switch ..... No switch
Nut & washer ..... Without nut and washer
Wiper position ..... Initial

MODELS WITH METALIC SHAFTS

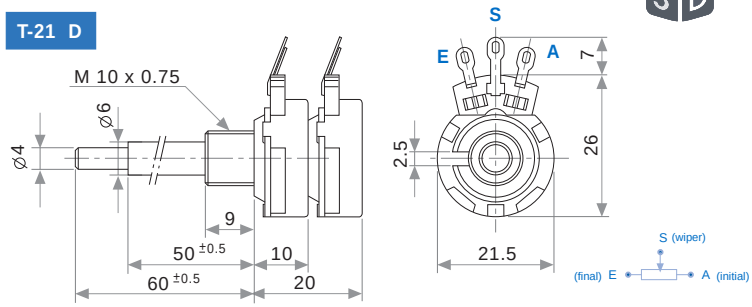
T-21 A



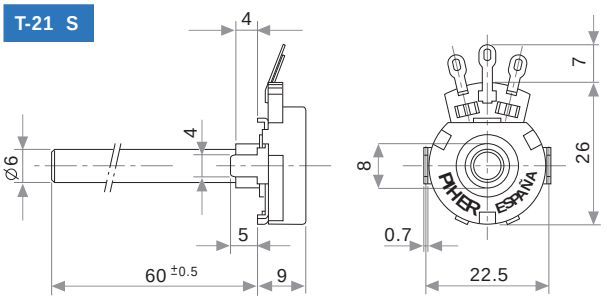
T-21 T



T-21 D

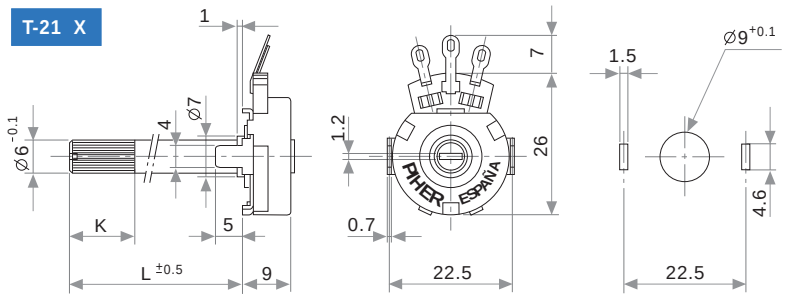


T-21 S

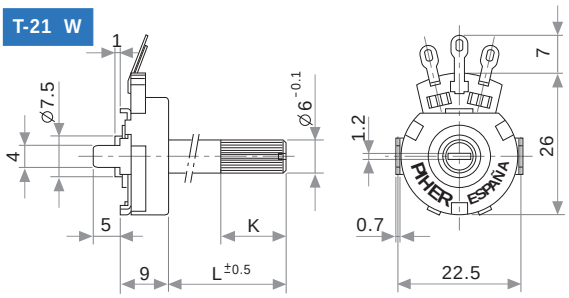


MODELS WITH PLASTIC SHAFTS

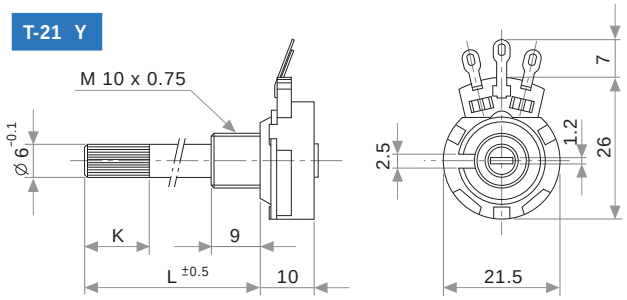
T-21 X



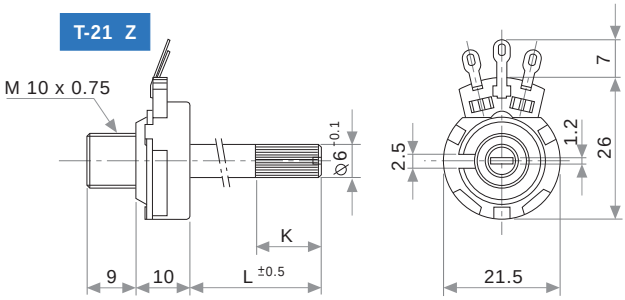
T-21 W



T-21 Y

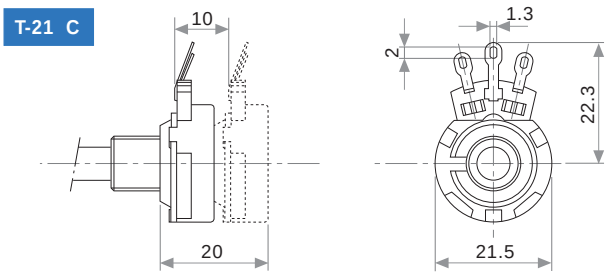


T-21 Z

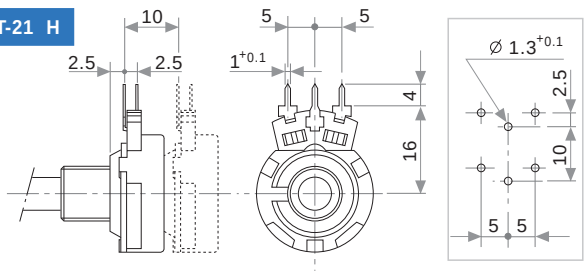


TERMINALS

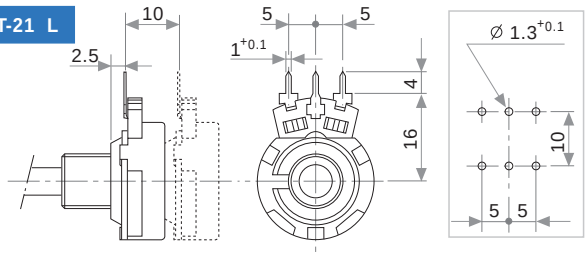
T-21 C



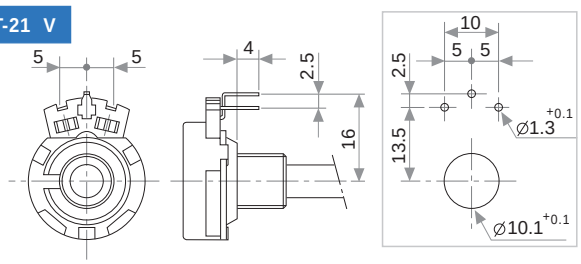
T-21 H



T-21 L



T-21 V



PLASTIC SHAFTS

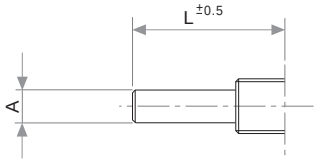
T-21 X/Y without Switch			
Knurling length	T-21 X	T-21 Y	CODE
K = 0	L = 2	/	P01
K = 6	L = 10	/	P02
K = 12	L = 16	L = 15	P03
K = 12	L = 26	L = 25	P04
K = 12	L = 36	L = 35	P05
K = 35	L = 46	L = 45	P06

T-21Y w/Sw F01		
Knurling length	T-21 Y	CODE
K = 5	L = 16	P10
K = 14.6	L = 25	P11
K = 35	L = 46	P12

T-21 W/Z without Switch			
Knurling length	T-21 W	T-21 Z	CODE
K = 12	L = 26	L = 26	P07
K = 12	L = 36	L = 36	P08
K = 12	L = 46	L = 46	P09

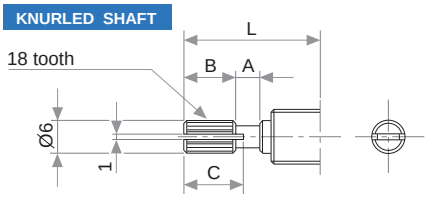
METALIC SHAFTS

PLAIN SHAFT



A	L	CODE
6	60	M06
6.35	60	M07
4/6	50/60	M08

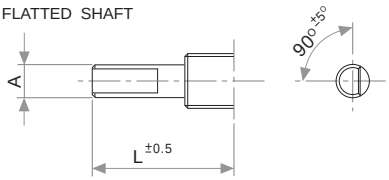
KNURLED SHAFT



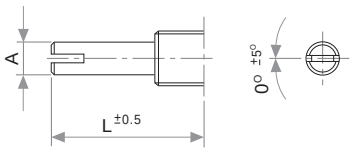
L	A	B	C	CODE
15	2	6	7	M11
20	2	10	11	M12
25	4	12	14	M13
30	4	12	14	M14
35	4	12	14	M15
40	4	12	14	M16

UNDER DRAWING

FLATTED SHAFT

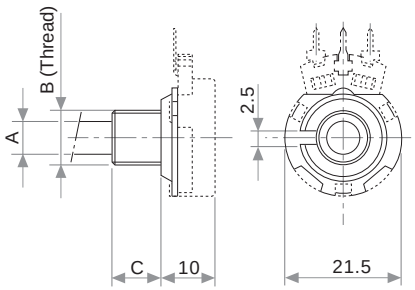


SLOTTED SHAFT



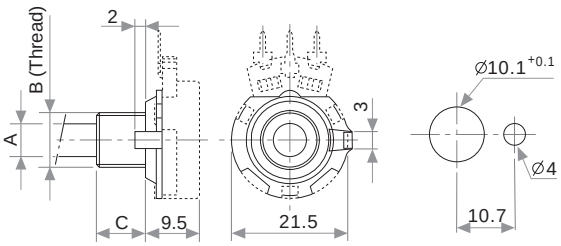
BUSHINGS

STANDARD



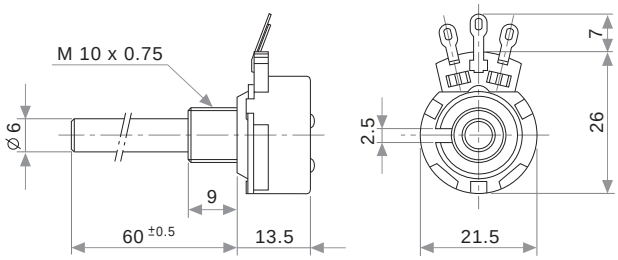
CODE	A	B	C
07	6	M10 x 0.75	9
08	6	M10 x 0.75	12
09	6	M10 x 0.75	19
14	6.35	M10 x 0.75	9

NON ROTARY PAWL

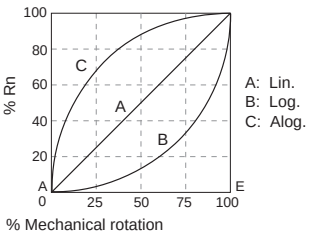


CODE	A	B	C
11	6	3/8" x 32 h.	9
12	6	3/8" x 32 h.	12
13	6.35	3/8" x 32 h.	9

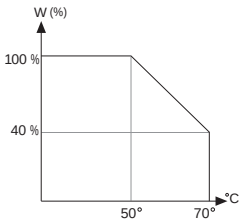
DETENTS



TAPERS



POWER RATING CURVE



TESTS

TYPICAL VARIATIONS

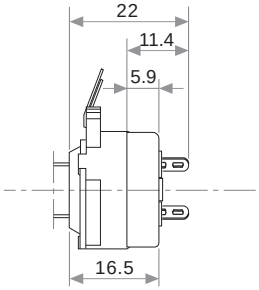
ELECTRICAL LIFE	1.000 h. 50°C; 0.25 W	±5 %
MECHANICAL LIFE* :	25.000 (10-15 CPM)	±3 % (Rn < 1 M)
TEMPERATURE COEFFICIENT	–25°C; +70°C	±300 ppm (Rn <100 K)
THERMAL CYCLING	16 h. @ 85°C; 2h. @ –25°C	±2.5 %
DAMP HEAT	500 h. 40°C 95% HR	±5 %
VIBRATION (for each plane X,Y,Z)	2 h. @ 10 Hz – 55 Hz.	±2 %

NOTE: Out of range values may not comply these results.
(*) only applicable to values ≥1K. For lower values please consult.

PACKAGING

Boxes of 150 / 200 pieces (160 x 110 x 85 mm.)

SWITCH F1



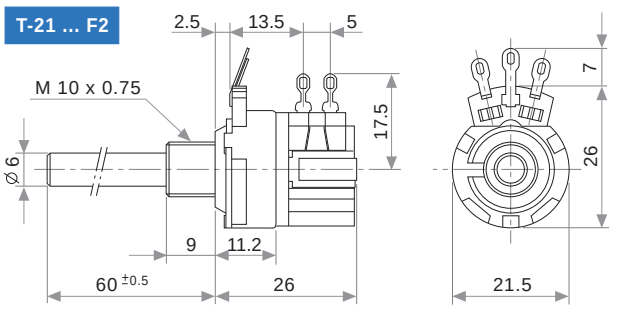
MECHANICAL & ELECTRICAL SPECIFICATIONS	F 1
OPERATING ANGLE	50° ±5°
OPERATING TORQUE	3-7 Ncm (4.2-9.8 in-oz)
MAXIMUM AXIAL CHARGE	80 N; 17 pounds
NOMINAL CURRENT	1A; 250 VAC
CONTACT RESISTANCE	≤ 25mΩ
TEST VOLTAGE (DIELECTRIC STRENGTH)	2000 V (50 Hz)

SWITCH F2

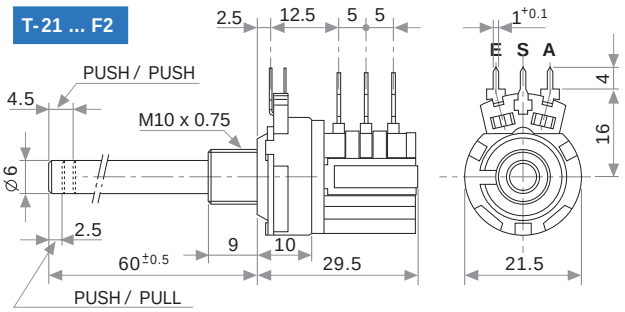
ELECTRICAL SPECIFICATIONS	F 2
SWITCH RATING	2 or 4A; 250 VAC
CONTACT RESISTANCE	≤ 25 mΩ
DIELECTRIC STRENGTH	2000 V
INSULATION RESISTANCE	100 MΩ

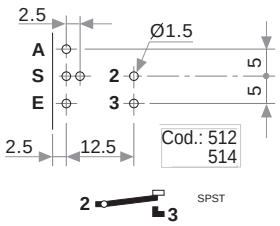
MECHANICAL SPECIFICATIONS	F 2
OPERATING ANGLE (ROTARY)	35° ± 5°
PUSH / PUSH OPERATING TRAVEL	4 mm.
PUSH / PULL OPERATING TRAVEL	2.5 mm.
OPERATING TORQUE (ROTARY)	2 to 9 Ncm. (2.8 to 12.7oz/in)
OPERATING FORCE (Push/Push ; Push/Pull)	4 to 7 N (14 to 27oz)
MECHANICAL LIFE	10.000 cycles
STOP TORQUE	> 100 Ncm. (142 oz/in)

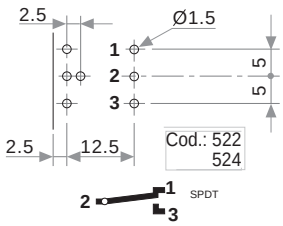
ROTARY

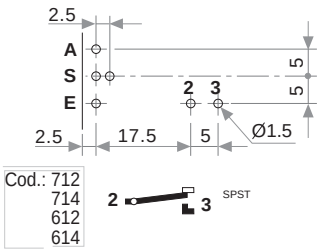


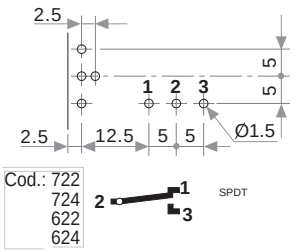
PUSH

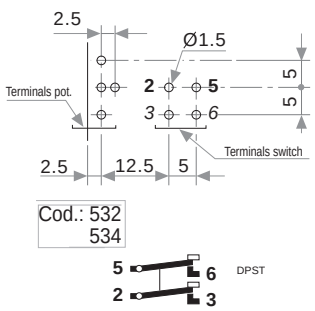


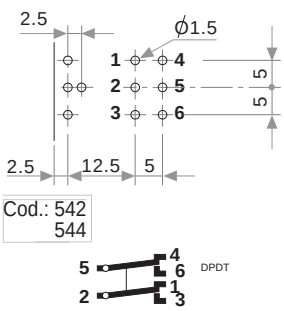


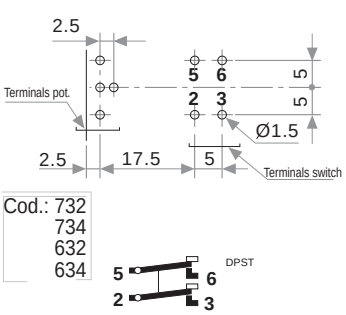


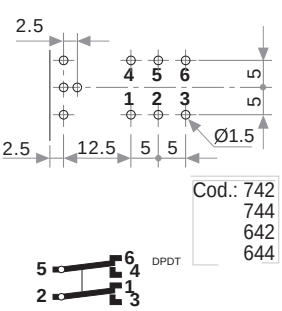












I-21 HOW TO ORDER (only switch)

STANDARD

OPTIONAL

I-21 | 2 | 3 | 4 | M06 | 0 | _____

Series

I-21

(See note 1)

Code / Switch model / Circuits

Code	Switch model	Circuits
1	1	1
2	2	1
3	1	2
4	2	2

Shafts

M04; L= 40 M06; L= 60

(See note 2)

Shaft spec. length

XX.X

(See note 3)

Nut & washer

- TA = Loose nut & washer MTA = Assembled nut & washer MT - = Assembled nut - T - = Loose nut

Code / Switch model / Terminals

Code	Switch model	Terminals
1	rotary switch	Solder lugs
2	push/ push switch	Solder lugs
3	push/ pull switch	Solder lugs
5	rotary switch	PCB
6	push/ push switch	PCB
7	push/ pull switch	PCB

Code / Current / Voltage

Code	Current	Voltage
2	2 A	250 V
4	4 A	250 V

NOTES:

(1) When only the switch is ordered (without potentiometer), it will be called "I -21" followed by the respective code.

(2) The shaft and bushing for "I -21" is:

COD.	A	B	L
M06	6	M10 x 0.75	60

(3) Only for special length and plain shaft (not knurled).
Example: E: Ø6 L= 24.5 M06 24.5 → special length
Flatted and slotted shafts, etc. will need drawing.

HOW TO ORDER CUSTOM DRAWING

I-21 + DRAWING NUMBER (Max. 16 digits)

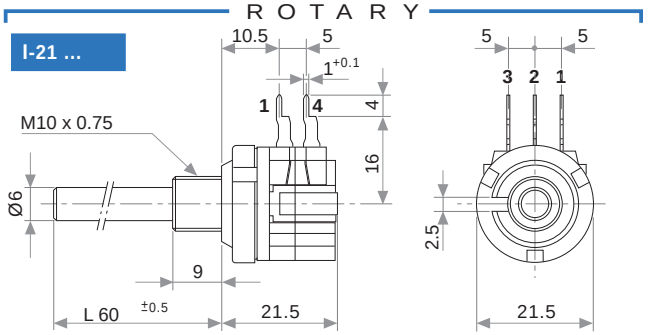
This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

STANDARD OPTIONS

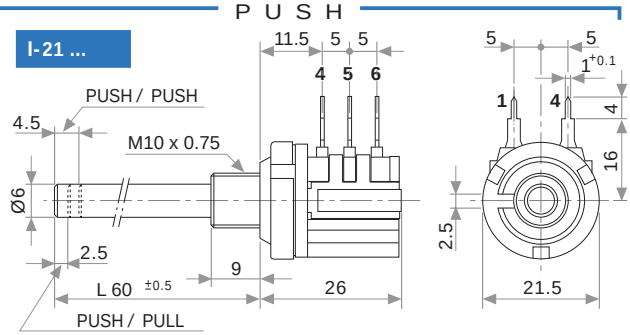
Shaft length ..... See note 2

Nut & washer ..... Without nut and washer

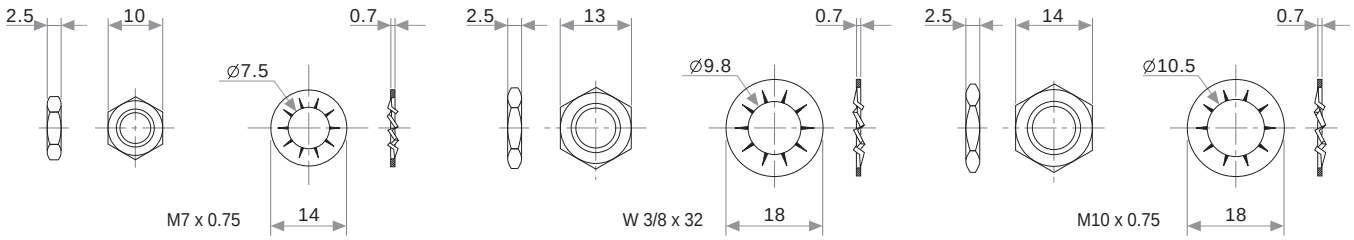
ROTARY



PUSH



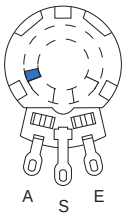
NUT & WASHER



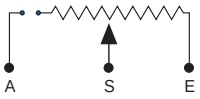
PACKAGING

Boxes of 100 pieces (160 x 110 x 85 mm.).

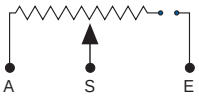
OPEN CIRCUIT FEATURE (CUT TRACK)

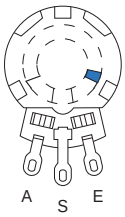


PCI
Cut track at the beginning of the travel.



PCF
Cut track at the end of the travel





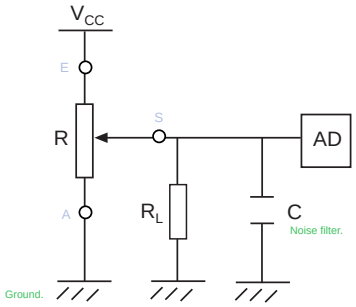
CCW on-off (A)

CW on-off (E)

A = Initial S = Wiper E = Final.
PCI, PCF and other configurations available upon request. Check the ordering code with Piher.

RECOMMENDED CONNECTIONS

Piher potentiometer's recommended connection circuit for a position sensor or control application.
(voltage divider circuit electronic design).



$R_L \simeq 100 \times R$

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