



### FEATURES

- Carbon resistive element.
- High mechanical endurance.
- Upon request:
  - Detents
  - Stereo matching
  - Switch
  - Nut & washer

### 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)

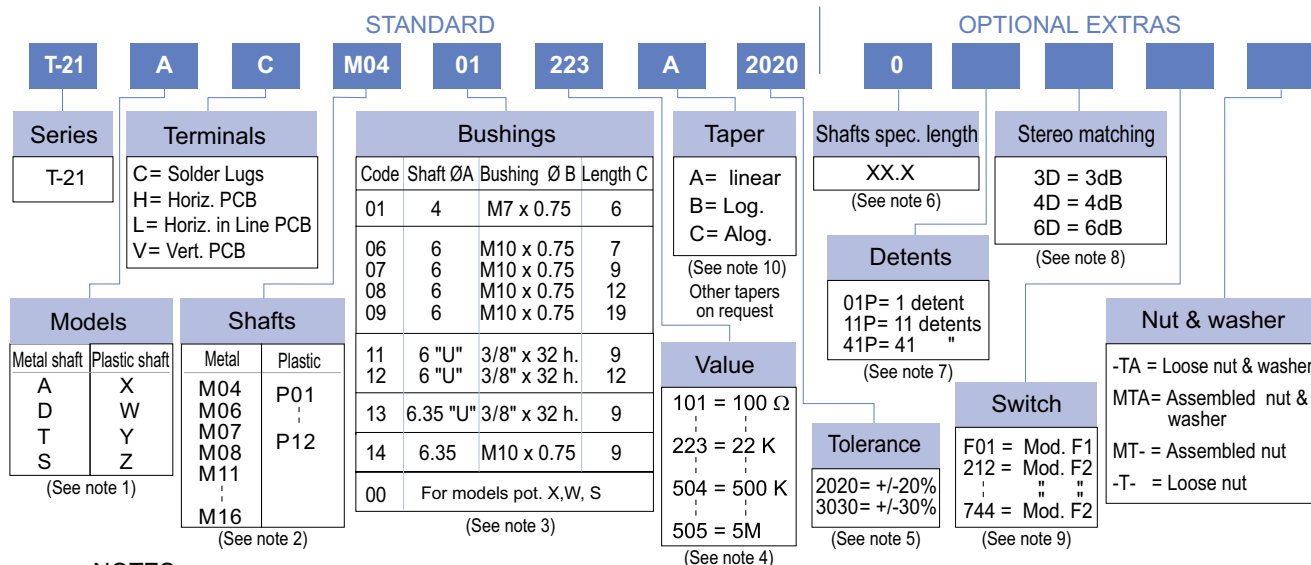
### ELECTRICAL SPECIFICATIONS

- 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 (\*):  $100\Omega \leq R_n \leq 1\text{M}$  .....  $\pm 20\%$   
 $1\text{M}\Omega < R_n \leq 5\text{M}$  .....  $\pm 30\%$
- Max. Voltage: 250 VDC (lin) 150 VDC (no lin)
- Nominal Power  $50^\circ\text{C}$  ( $122^\circ\text{F}$ ) (see power rating curve)  
0.25 W (lin) 0.12 W (no lin)
- Taper (\*) (Log. & Alog. only  $R_n > 1\text{K}$ ) Lin ; Log; Alog.
- Residual resistance:  $\leq 0.1\% R_n$  (2  $\Omega$  min)
- Equivalent Noise Resistance:  $\leq 3\% R_n$  (3  $\Omega$  min.)
- Operating temperature\*\*:  $-25^\circ\text{C}$  +  $70^\circ\text{C}$  ( $-13^\circ\text{F}$  +  $158^\circ\text{F}$ )

\* Others upon request

\*\* Up to  $85^\circ\text{C}$  depending on application

### HOW TO ORDER



#### NOTES:

- MODELS : Models D y T are not available with "V" terminals.
- SHAFTS : The codes indicate diameter and length. M08: Code for the double potentiometer.
- BUSHINGS : The codes types 11, 12 and 13 have an antirotation lug (at  $90^\circ\text{CW}$ ). Plastic shaft and double model are only available with Ø6 bushing.
- VALUE :
  - Code:  $\frac{10}{1} = 100\Omega$
  - Number of zeros
  - 2 first digits of the value.
  - In models "D" and "T" with different values, order under special drawing number.
- Tolerance (special), upon request. Example:  $\frac{07}{05}$  negative tolerance positive tolerance
- 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.
  - Recommendation : Shaft L > 60 ..... bushing C = 19
- DETENTS :
  - Not available in models with plastic shaft X, W, Y, Z.
  - Detents and switch are not compatible.
- Stereo matching: Only available in tandem models and upon request.
- 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.
- Switch option not available with antilog taper.

NOTE: The information contained here should be used for reference purposes only.

## HOW TO ORDER CUSTOM DRAWING

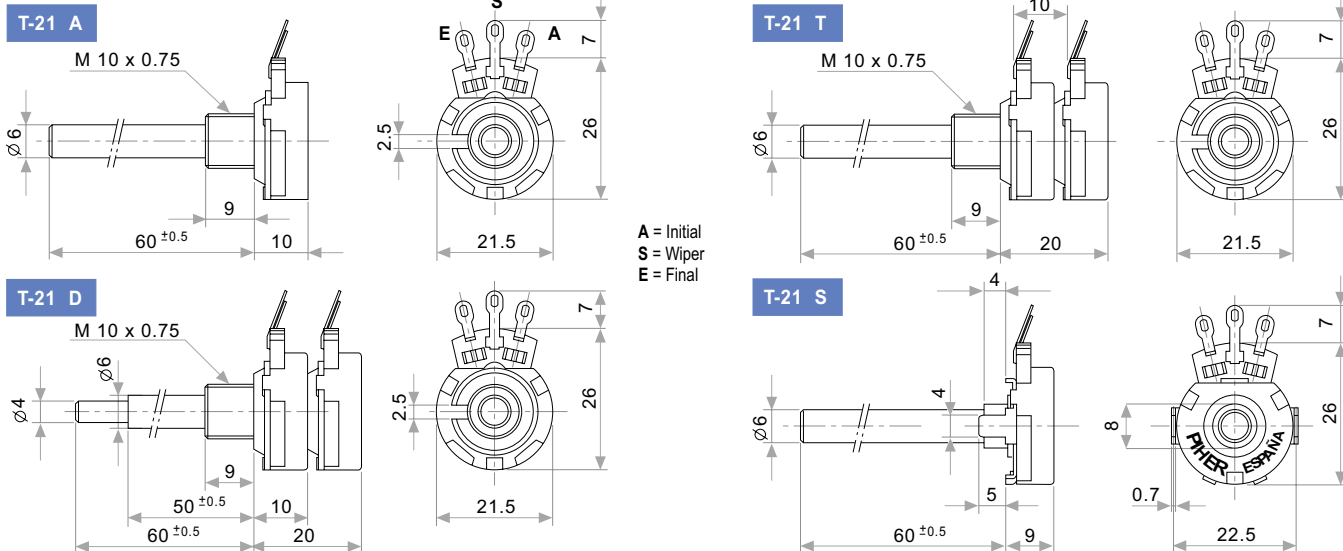
T-21 A C + DRAWING NUMBER (Max. 16 digits)

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

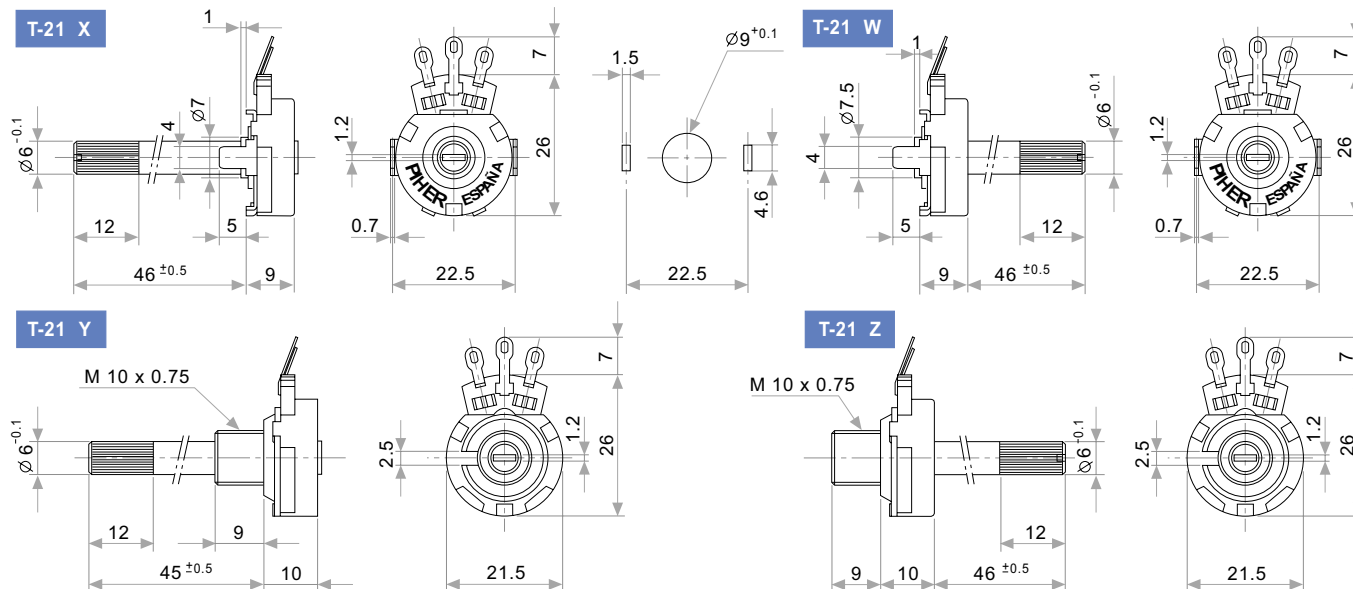
## STANDARD OPTIONS

Shaft length ..... 0 standard  
 Detents ..... Without  
 Stereo matching ..... Only for model "T" and upon request  
 Switch ..... No switch  
 Nut & washer ..... Without nut and washer

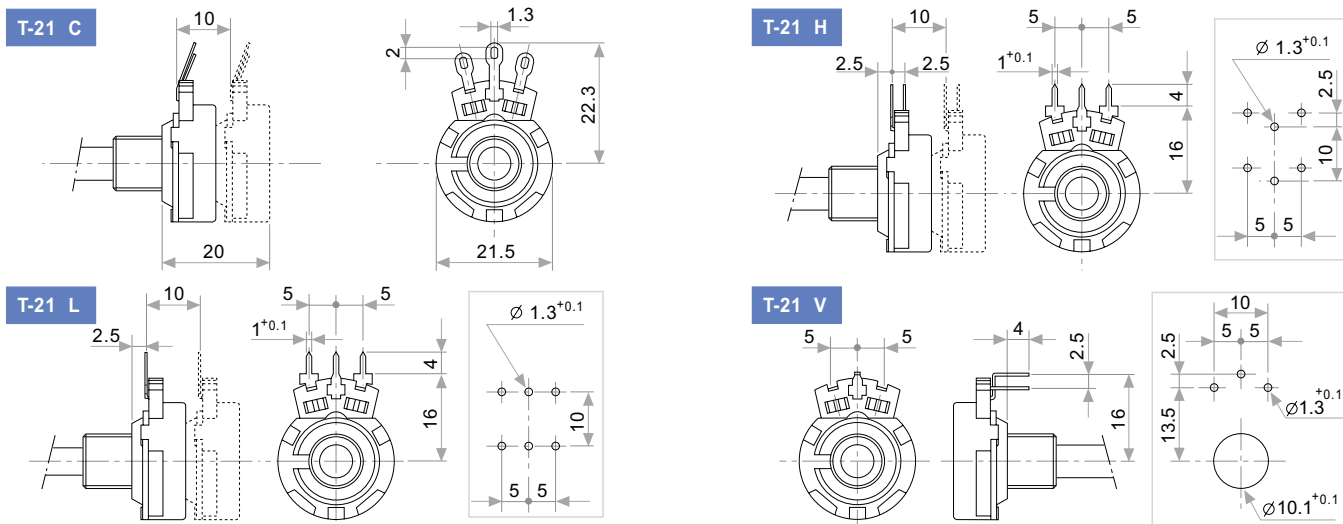
## MODELS WITH METALIC SHAFTS



## MODELS WITH PLASTIC SHAFTS



## TERMINALS



## PLASTIC SHAFTS

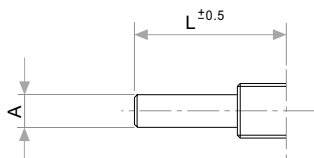
| T-21 X | T-21 Y | CODE |
|--------|--------|------|
| L = 2  | /      | P01  |
| L = 10 | /      | P02  |
| L = 16 | L = 15 | P03  |
| L = 26 | L = 25 | P04  |
| L = 36 | L = 35 | P05  |
| L = 46 | L = 45 | P06  |

| T-21 Y | CODE |
|--------|------|
| L = 16 | P10  |
| L = 25 | P11  |
| L = 46 | P12  |

| T-21 W | T-21 Z | CODE |
|--------|--------|------|
| L = 26 | L = 26 | P07  |
| L = 36 | L = 36 | P08  |
| L = 46 | L = 46 | P09  |

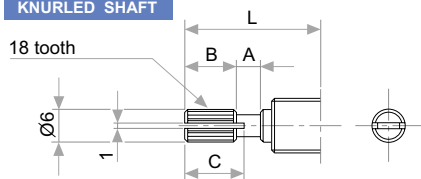
## METALIC SHAFTS

### PLAIN SHAFT



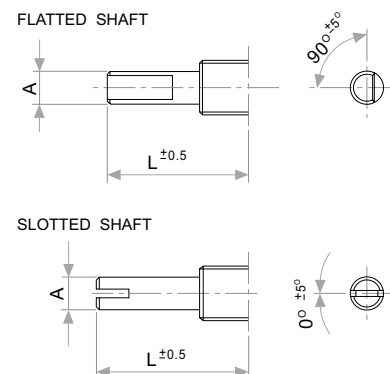
| A    | L     | CODE |
|------|-------|------|
| 4    | 40    | M04  |
| 6    | 60    | M06  |
| 6.35 | 60    | M07  |
| 4/6  | 50/60 | M08  |

### KNURLED SHAFT



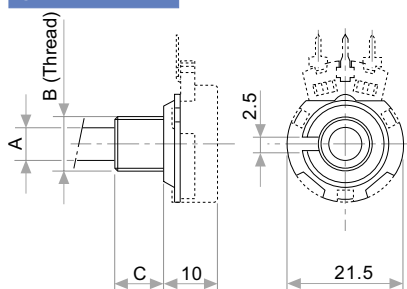
| L  | A | B  | C  | CODE |
|----|---|----|----|------|
| 15 | 2 | 6  | 7  | M11  |
| 20 | 2 | 10 | 11 | M12  |
| 25 | 4 | 12 | 14 | M13  |
| 30 | 4 | 12 | 14 | M14  |
| 35 | 4 | 12 | 14 | M15  |
| 40 | 4 | 12 | 14 | M16  |

### UNDER DRAWING



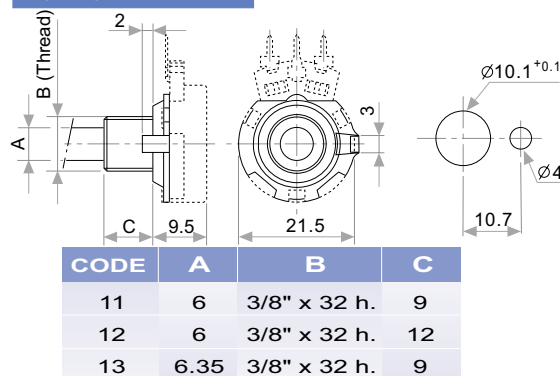
## BUSHINGS

### STANDARD



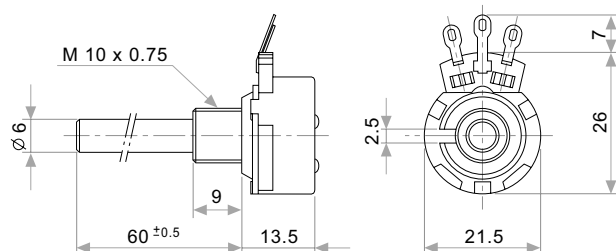
| CODE | A    | B          | C  |
|------|------|------------|----|
| 01   | 4    | M7 x 0.75  | 6  |
| 06   | 6    | M10 x 0.75 | 7  |
| 07   | 6    | M10 x 0.75 | 9  |
| 08   | 6    | M10 x 0.75 | 12 |
| 09   | 6    | M10 x 0.75 | 19 |
| 14   | 6.35 | M10 x 0.75 | 9  |

### NON ROTARY PAWL

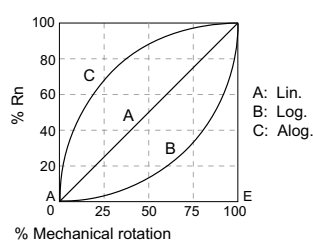


| CODE | A    | B            | C  |
|------|------|--------------|----|
| 11   | 6    | 3/8" x 32 h. | 9  |
| 12   | 6    | 3/8" x 32 h. | 12 |
| 13   | 6.35 | 3/8" x 32 h. | 9  |

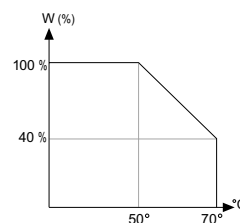
## DETENTS



## 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 %                  |

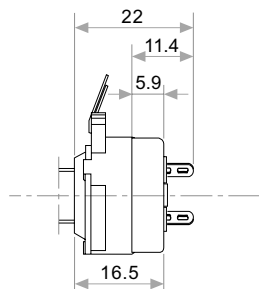
NOTE: Out of range values may not comply these results.

(\*) only applicable to values ≥1K. For lower values please consult.

## PACKAGING

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

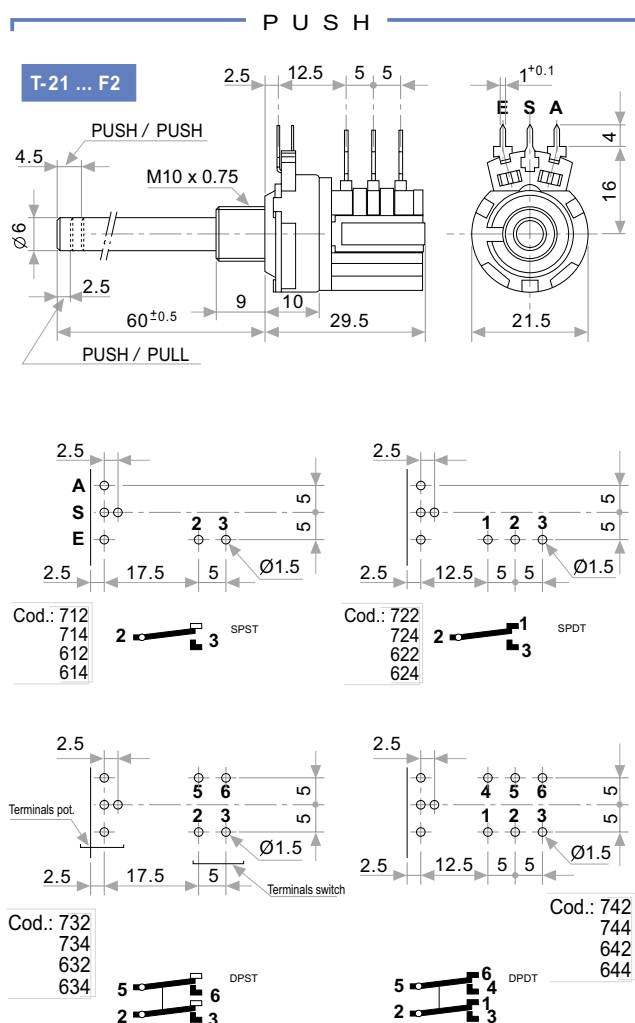
## SWITCH F1



| 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)         |



## I-21 HOW TO ORDER (only switch)

| STANDARD      |             |                     | OPTIONAL        |                              |
|---------------|-------------|---------------------|-----------------|------------------------------|
| <b>I-21</b>   | <b>2</b>    | <b>3</b>            | <b>4</b>        | <b>M06</b>                   |
| <b>Series</b> | <b>Code</b> | <b>Switch model</b> | <b>Circuits</b> | <b>Shafts</b>                |
| I-21          | 1           | 1                   | 1               | M04; L= 40                   |
| (See note 1)  | 2           | 2                   | 1               | M06; L= 60                   |
|               | 3           | 1                   | 2               | (See note 2)                 |
|               | 4           | 2                   | 2               |                              |
|               |             |                     |                 | <b>Shaft spec. length</b>    |
|               |             |                     |                 | XX.X                         |
|               |             |                     |                 | (See note 3)                 |
|               |             |                     |                 | <b>Nut &amp; washer</b>      |
|               |             |                     |                 | - TA = Loose nut & washer    |
|               |             |                     |                 | MTA = Assembled nut & washer |
|               |             |                     |                 | MT - = Assembled nut         |
|               |             |                     |                 | - T - = Loose nut            |

| Code | Switch model      | Terminals   |
|------|-------------------|-------------|
| 2    | push/ push switch | Solder lugs |
| 3    | push/ pull switch | Solder lugs |
| 6    | push/ push switch | PCB         |
| 7    | push/ pull switch | PCB         |

| 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 bushings for "I-21" are:

| COD. | A | B          | L  |
|------|---|------------|----|
| M04  | 4 | M7 x 0.75  | 40 |
| 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

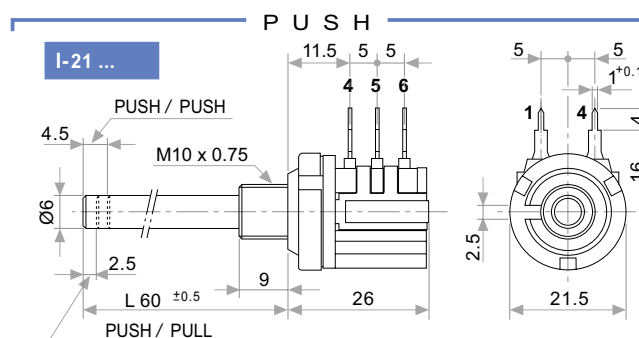
I-21 + DRAWING NUMBER (Max. 16 digits)

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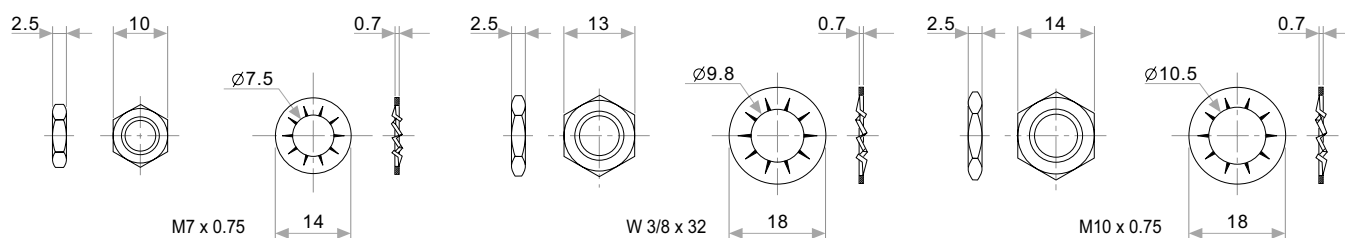
## STANDARD OPTIONS

Shaft length ..... See note 2

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



## NUT & WASHER



## PACKAGING

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