

## MECHANICAL SPECIFICATIONS

- Mechanical rotation angle: $310^{\circ} \pm 5^{\circ}$
- Electrical rotation angle:
- Torque:
- Stop torque:
$290^{\circ} \pm 20^{\circ}$
0.5 to 1.5 Ncm .
( 0.7 to 2.1 in-oz)
> 80 Ncm. ( > 112 in-oz)


## FEATURES

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


## ELECTRICAL SPECIFICATIONS

- Range of values (*)
$100 \Omega \leq \mathrm{Rn} \leq 5 \mathrm{M}$ (Decad. 1.0-2.0-2.2-2.5-4.7-5.0)
- Tolerance (*): $100 \Omega \leq \mathrm{Rn} \leq 1 \mathrm{M} \quad-\ldots-. \pm \pm 20 \%$ $1 \mathrm{M} \Omega<\mathrm{Rn} \leq 5 \mathrm{M} \quad \ldots-\ldots \pm 30 \%$
- Max. Voltage: 250 VDC (lin) 150 VDC (no lin)
- Nominal Power $50^{\circ} \mathrm{C}\left(122^{\circ} \mathrm{F}\right)$ (see power rating curve) 0.25 W (lin) 0.12 W (no lin)
- Taper (*) (Log. \& Alog. only Rn > 1K) Lin ; Log; Alog.
- Residual resistance(*): $\leq 0.5 \% \operatorname{Rn}(5 \Omega \mathrm{~min})$
- Equivalent Noise Resistance: $\leq 3 \% \operatorname{Rn}(3 \Omega \mathrm{~min}$.)
- Operating temperature**: $-25^{\circ} \mathrm{C}+70^{\circ} \mathrm{C}\left(-13^{\circ} \mathrm{F}+158^{\circ} \mathrm{F}\right)$
* Others upon request
** Up to $85^{\circ} \mathrm{C}$ depending on application


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 $90^{\circ} \mathrm{CW}$ ). Plastic shaft and double model are only available with $\varnothing 6$ bushing.
(4) VALUE: - Code: $10 \quad 1=100 \Omega$
$\xrightarrow{=}$ Number of zeros

- In models " D " and " T " with different values, order under special drawing number.
(5) Tolerance (special), upon request. Example: ${ }_{-5 \%}^{+7 \%}$ Code: $\xrightarrow{07} \xrightarrow{05}$ negative tolerance
(6) Shafts special length:
- Only for special length and plain shafts (not knurled). Example: Shaft $\varnothing 6 \mathrm{~L}=24.5$
- 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
(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.

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

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.

Shaft length
Detents
Stereo m
Stereo matching
Nut \& washer

0 standard
Without
Only for model "T" and upon request
No switch
Without nut and washer

## MODELS WITH METALIC SHAFTS



MODELS WITH PLASTIC SHAFTS


## TERMINALS



## PLASTIC SHAFTS

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


| T-21Y w/Sw F01 |  |  |  |
| :---: | :---: | :---: | :---: |
| Knurling length | T-21 Y | CODE |  |
| $K=5$ | $\mathrm{L}=16$ | P10 |  |
| $K=14.6$ | $\mathrm{L}=25$ | P11 |  |
| $K=35$ | $L=46$ | P12 |  |
| T-21 | W/Z w | ,out S | vitch |
| Knurling length | T-21 W | T-21 Z | CODE |
| $K=12$ | $\mathrm{L}=26$ | $\mathrm{L}=26$ | P07 |
| $K=12$ | $L=36$ | $\mathrm{L}=.36$ | P08 |
| $K=12$ | $\mathrm{L}=46$ | $\mathrm{L}=46$ | P09 |

## METALIC SHAFTS



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


| $L$ | $A$ | $B$ | $C$ | $C O D E$ |
| :---: | :---: | :---: | :---: | :---: |
| 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 | $M 16$ |



SLOTtED SHAFT


## BUSHINGS

STANDARD


## DETENTS



TAPERS


POWER RATING CURVE

TESTS

| ELECTRICAL LIFE | $1.000 \mathrm{~h} .50^{\circ} \mathrm{C} ; 0.25 \mathrm{~W}$ | TYPICAL VARIATIONS |
| :--- | :--- | :--- |
| MECHANICAL LIFE*: | $25.000(10-15 \mathrm{CPM})$ | $\pm 5 \%$ |
| TEMPERATURE COEFFICIENT | $-25^{\circ} \mathrm{C} ;+70^{\circ} \mathrm{C}$ | $\pm 3 \%(\mathrm{Rn}<1 \mathrm{M})$ |
| THERMAL CYCLING | $16 \mathrm{~h} . @ 85^{\circ} \mathrm{C} ; 2 \mathrm{~h} . @-25^{\circ} \mathrm{C}$ | $\pm 300 \mathrm{ppm}(\mathrm{Rn}<100 \mathrm{~K})$ |
| DAMP HEAT | $500 \mathrm{~h} .40^{\circ} \mathrm{C} 95 \% \mathrm{HR}$ | $\pm 2.5 \%$ |
| VIBRATION (for each plane X,Y,Z) | $2 \mathrm{~h} . @ 10 \mathrm{~Hz}-55 \mathrm{~Hz}$. | $\pm 2 \%$ |

[^0]${ }^{(*)}$ ) only applicable to values $\geq 1 \mathrm{~K}$. For lower values please consult.

## PACKAGING

Boxes of $150 / 200$ pieces ( $160 \times 110 \times 85 \mathrm{~mm}$.


| MECHANICAL \& ELECTRICAL <br> SPECIFICATIONS | F 1 |
| :--- | :--- |
| OPERATING ANGLE | $50^{\circ} \pm 5^{\circ}$ |
| OPEAATING TORQUE | $3-7 \mathrm{Ncm}(4.2-9.8$ in-oz) |
| MAXIMUM AXIAL CHARGE | $80 \mathrm{~N} ; 17$ pounds |
| NOMINAL CURRENT | $1 \mathrm{~A} ; 250 \mathrm{VAC}$ |
| CONTACT RESISTANCE | $\leq 25 \mathrm{~m} \Omega$ |
| TEST VOLTAGE (DIELECTRIC STRENGTH) | $2000 \mathrm{~V}(50 \mathrm{~Hz})$ |

## SWITCH F2

| ELECTRICAL SPECIFICATIONS | F 2 |
| :--- | :--- |
| SWITCH RATING | 2 or $4 \mathrm{~A} ; 250 \mathrm{VAC}$ |
| CONTACT RESISTANCE | $\leq 25 \mathrm{~m} \Omega$ |
| DIELECTRIC STRENGTH | 2000 V |
| INSULATION RESISTANCE | $100 \mathrm{M} \Omega$ |
| MECHANICAL SPECIFICATIONS | F 2 |
| OPERATING ANGLE (ROTARY) | $35^{\circ} \pm 5^{\circ}$ |
| PUSH / PUSH OPERATING TRAVEL | 4 mm. |
| PUSH / PULL OPERATING TRAVEL | 2.5 mm. |
| OPERATING TORQUE (ROTARY) | 2 to $9 \mathrm{Ncm} .(2.8 \mathrm{to} 12.7 \mathrm{oz} / \mathrm{in})$ |
| OPERATING FORCE (Push/Push ; Push/Pull) | 4 to $7 \mathrm{~N} \mathrm{(14} \mathrm{to} 27 \mathrm{oz})$ |
| MECHANICAL LIFE | 10.000 cycles |
| STOP TORQUE | $>100 \mathrm{Ncm} .(142 \mathrm{oz} / \mathrm{in})$ |



(See note 1)


Nut \& washer

- TA = Loose nut \& washer

MTA = Assembled nut \& washer
MT - = Assembled nut

- T - = Loose nut

| 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 |
| :---: | :---: | :---: |
| 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:

(3) Only for special length and plain shaft (not knurled).

Example: E: Ø6 L=24.5 M06 24.5
Flatted and slotted shafts, etc. will need drawing.

## HOW TO ORDER CUSTOM DRAWING

$$
\text { I-21 + DRAWING NUMBER (Max. } 16 \text { digits) }
$$

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 $\qquad$ See note 2
Nut \& washer Without nut and washer


## NUT \& WASHER



PACKAGING
Boxes of 100 pieces ( $160 \times 110 \times 85 \mathrm{~mm}$.).

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[^0]:    NOTE: Out of range values may not comply these results

