

# Fully Sealed Container Cermet Potentiometer Military and Professional Grade


**P12T**
**P12Q**
**P12O**

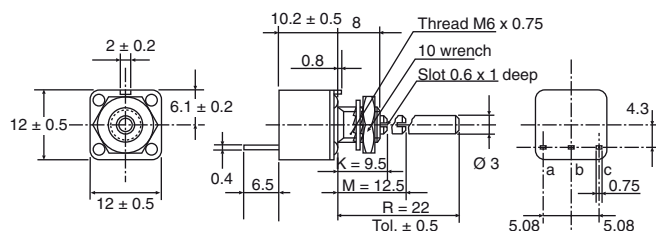
## FEATURES

- 1 W at 70 °C
- Cermet element
- Test according to CECC 41000 or IEC 60393-1
- Full sealing
- Mechanical strength
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

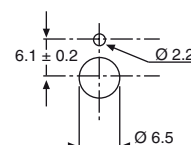
## DIMENSIONS in millimeters ± 0.5 mm

### P12T

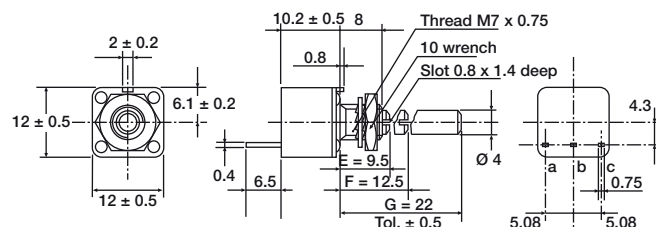


### Panel cutout

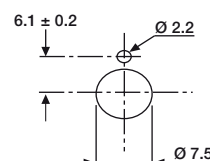
Panel thickness: 4 max.



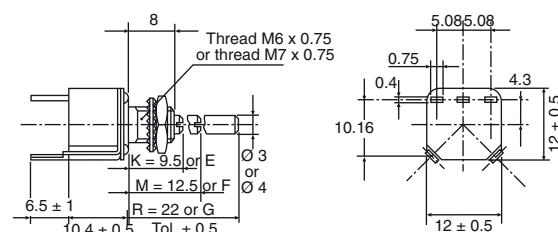
### P12Q



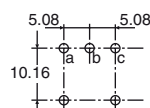
### Panel cutout



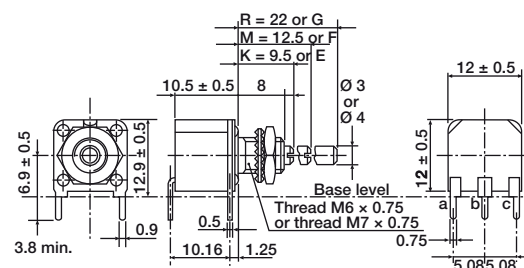
### Leads Y



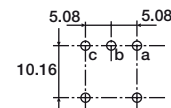
### Terminal spacing



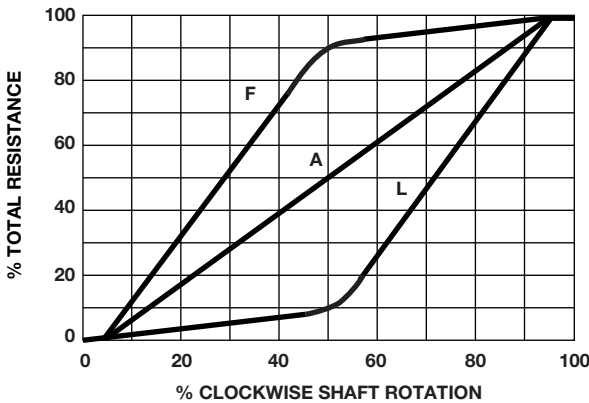
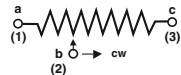
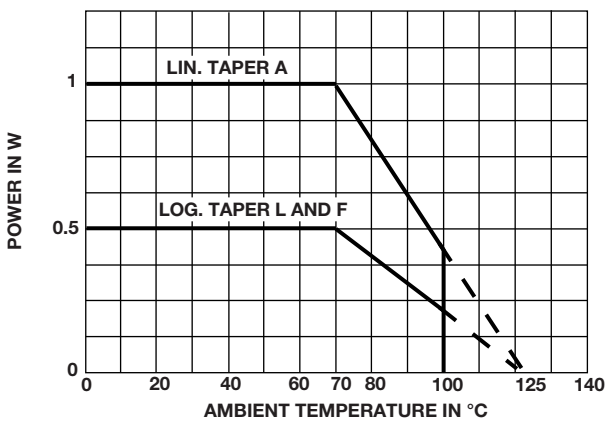
### Leads X



### Terminal spacing





| ELECTRICAL SPECIFICATIONS                    |                                                     |                                                                                     |
|----------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------|
| Resistive element                            |                                                     | Cermet                                                                              |
| Electrical travel                            |                                                     | $270^\circ \pm 10^\circ$                                                            |
| Resistance range                             | Linear taper                                        | 22 $\Omega$ to 10 M $\Omega$                                                        |
|                                              | Logarithmic taper                                   | 100 $\Omega$ to 2.2 M $\Omega$                                                      |
| Standard series E3                           |                                                     | 1 - 2.2 - 4.7 and on request 1 - 2 - 5                                              |
| Tolerance                                    | Standard                                            | $\pm 20\%$                                                                          |
|                                              | On request                                          | $\pm 10\%$                                                                          |
| Taper                                        |                                                     |   |
| Circuit diagram                              |                                                     |  |
| Power rating                                 | Linear 1 W at +70 °C<br>Logarithmic 0.5 W at +70 °C |  |
| Temperature coefficient                      |                                                     | See Standard Resistance Element Data                                                |
| Limiting element voltage (linear taper)      |                                                     | 350 V                                                                               |
| Contact resistance variation (typical)       |                                                     | 3 % or 3 $\Omega$                                                                   |
| End resistance (typical)                     |                                                     | 1 $\Omega$                                                                          |
| Dielectric strength (RMS)                    |                                                     | 2000 V                                                                              |
| Insulation resistance (500 V <sub>DC</sub> ) |                                                     | 10 <sup>6</sup> M $\Omega$                                                          |

| MECHANICAL SPECIFICATIONS  |                               |                            |
|----------------------------|-------------------------------|----------------------------|
| Mechanical travel          |                               | $300^\circ \pm 5^\circ$    |
| Operating torque (typical) |                               | 2 Ncm max.                 |
| End stop torque            | Bushing O<br>Bushings T and Q | 15 Ncm max.<br>35 Ncm max. |
| Tightening torque          |                               | 150 Ncm max.               |
| Unit weight                |                               | 7.6 g to 10 g max.         |

**ENVIRONMENTAL SPECIFICATIONS**

|                   |                               |
|-------------------|-------------------------------|
| Temperature range | -55 °C to +125 °C             |
| Climatic category | 55/100/56                     |
| Sealing           | Fully sealed - Container IP67 |

**PERFORMANCE**

| TESTS                   | CONDITIONS                                                                                        | TYPICAL VALUES AND DRIFTS |                              |                                                                                           |
|-------------------------|---------------------------------------------------------------------------------------------------|---------------------------|------------------------------|-------------------------------------------------------------------------------------------|
|                         |                                                                                                   | $\Delta R_T/R_T$ (%)      | $\Delta R_{1-2}/R_{1-2}$ (%) | OTHER                                                                                     |
| Electrical endurance    | 1000 h at rated power<br>90°/30° - ambient temp. 70 °C                                            | ± 1 %                     | -                            | Contact res. variation: < 3 % Rn                                                          |
| Climatic sequence       | Phase A dry heat 125 °C<br>Phase B damp heat<br>Phase C cold -55 °C<br>Phase D damp heat 5 cycles | ± 0.5 %                   | ± 1 %                        | -                                                                                         |
| Damp heat, steady state | 56 days<br>40 °C 93 % RH                                                                          | ± 0.5 %                   | ± 1 %                        | Dielectric strength: 1000 V <sub>RMS</sub><br>Insulation resistance: > 10 <sup>4</sup> MΩ |
| Change of temperature   | 5 cycles<br>-55 °C at +125 °C                                                                     | ± 0.5 %                   | -                            | -                                                                                         |
| Mechanical Endurance    | 25 000 cycles                                                                                     | ± 3 %                     | -                            | Contact res. variation: < 2 % Rn                                                          |
| Shock                   | 50 g's at 11 ms<br>3 successive shocks<br>in 3 directions                                         | ± 0.1 %                   | ± 0.2 %                      | -                                                                                         |
| Vibration               | 10 Hz to 55 Hz<br>0.75 mm or 10 g's<br>during 6 h                                                 | ± 0.1 %                   | -                            | $\Delta V_{1-2}/V_{1-3} \leq \pm 0.2$ %                                                   |

**Note**

- Nothing stated herein shall be construed as a guarantee of quality or durability.

**STANDARD RESISTANCE ELEMENT DATA**

| STANDARD<br>RESISTANCE<br>VALUES | LINEAR TAPER              |                            |                          | LOGS TAPER                |                            |                          | TYPICAL<br>TCR<br>-55 °C<br>+125 °C |
|----------------------------------|---------------------------|----------------------------|--------------------------|---------------------------|----------------------------|--------------------------|-------------------------------------|
|                                  | MAX.<br>POWER AT<br>70 °C | MAX.<br>WORKING<br>VOLTAGE | MAX.<br>WIPER<br>CURRENT | MAX.<br>POWER AT<br>70 °C | MAX.<br>WORKING<br>VOLTAGE | MAX.<br>WIPER<br>CURRENT |                                     |
| Ω                                | W                         | V                          | mA                       | W                         | V                          | mA                       | ppm/°C                              |
| 22                               | 1                         | 4.69                       | 213.2                    |                           |                            |                          | ± 150                               |
| 47                               | 1                         | 6.85                       | 145.8                    |                           |                            |                          |                                     |
| 100                              | 1                         | 10                         | 100                      |                           |                            |                          |                                     |
| 220                              | 1                         | 14.8                       | 67.4                     |                           |                            |                          |                                     |
| 470                              | 1                         | 21.6                       | 46.1                     |                           |                            |                          |                                     |
| 1K                               | 1                         | 31.6                       | 31.6                     | 0.5                       | 22.4                       | 22.4                     |                                     |
| 2.2K                             | 1                         | 46.9                       | 21.3                     | 0.5                       | 33.2                       | 15.1                     |                                     |
| 4.7K                             | 1                         | 63.5                       | 14.5                     | 0.5                       | 48.5                       | 10.3                     |                                     |
| 10K                              | 1                         | 100                        | 10                       | 0.5                       | 79.7                       | 7.07                     |                                     |
| 22K                              | 1                         | 148.3                      | 6.7                      | 0.5                       | 105                        | 4.77                     |                                     |
| 47K                              | 1                         | 216.7                      | 4.6                      | 0.5                       | 153                        | 3.26                     |                                     |
| 100K                             | 1                         | 316.2                      | 3.16                     | 0.5                       | 224                        | 2.24                     |                                     |
| 220K                             | 0.56                      | 350                        | 1.59                     | 0.5                       | 332                        | 1.51                     |                                     |
| 470K                             | 0.26                      | 350                        | 0.75                     | 0.26                      | 350                        | 0.74                     |                                     |
| 1M                               | 0.12                      | 350                        | 0.35                     | 0.12                      | 350                        | 0.35                     |                                     |
| 2.2M                             | 0.05                      | 350                        | 0.16                     | 0.05                      | 350                        | 0.16                     |                                     |
| 4.7M                             | 0.02                      | 350                        | 0.07                     |                           |                            |                          |                                     |
| 10M                              | 0.01                      | 350                        | 0.01                     |                           |                            |                          |                                     |

## MARKING

- Vishay trademark
- Part number (including ohmic value and tolerance code)
- Manufacturing date
- Marking of terminals: 1 or a

## PACKAGING

- For shafts AJ, EJ: In box of 15 pieces (code B1)
- For other shafts: In box of 25 pieces (code B2)

## OPTIONS

### SPECIAL FEATURES

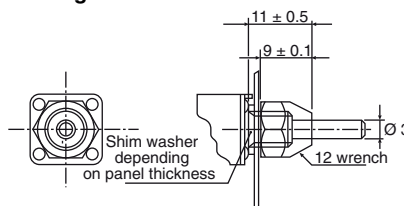
#### Shafts

Lengths are measured from the mounting surface to the free end of shaft. Shaft slot is aligned with the wiper within  $\pm 10^\circ$ . Special shafts are available, in accordance with drawings supplied by customers. We recommend customers not to machine shafts, in order to avoid damage. Bending or torsion of terminals should be avoided.

#### Shaft and panel sealing hardware

The type P12T with AB (old code M) or AJ (old code R) shaft can be provided with an optional "DE" sealing hardware which ensures sealing of both the shaft and the mounting panel. DE sealing hardware can be supplied in a separate bag.

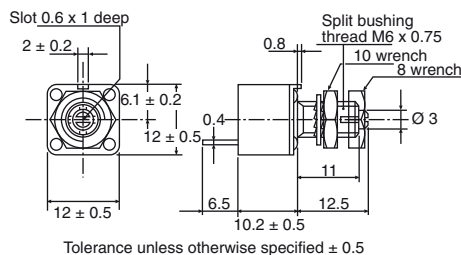
#### DE shaft and panel sealing hardware



#### Shaft locking

The shaft locking bushing is available only with P12O potentiometers. Torque applied to locking nuts should not exceed 15 Ncm.

#### P12OL with spindle locking nut



Tolerance unless otherwise specified  $\pm 0.5$

**ORDERING INFORMATION** (part number)

|       |         |   |           |       |    |              |                   |                                 |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|-------|---------|---|-----------|-------|----|--------------|-------------------|---------------------------------|----------------------------------------|---|-------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|---|--|--|
| P     | 1       | 2 | O         | A     | B  | S            | 4                 | 7                               | 2                                      | M | A                                   | B                                                                            | 2                                                                                  | D                                                                    | E |  |  |
| MODEL | BUSHING |   |           | SHAFT |    |              | LEADS             | OHMIC VALUE                     |                                        |   | TOLERANCE                           | TAPER                                                                        | PACKAGING                                                                          | SPECIAL                                                              |   |  |  |
| P12   | Ø       | L | Old codes | Ø     | L  | Old codes    | S = STD<br>X<br>Y | Linear<br>from 22 Ω<br>to 10 MΩ |                                        |   | M = 20 %<br>On request:<br>K = 10 % | A = linear<br>L = clockwise logarithmic<br>F = inverse clockwise logarithmic | Shafts<br>AJ and EJ:<br>B1 = box of 15 pieces<br>Other shafts:<br>box of 25 pieces | DE = Shaft and panel sealed hardware or special code given by Vishay |   |  |  |
|       | T       | 6 | 8         | T     | AA | 3            | 9.5               | K                               | Logarithmic<br>from 100 Ω<br>to 2.2 MΩ |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       | Q       | 7 | 8         | Q     | AB | 3            | 12.5              | L, M                            | 472 = 4.7 kΩ                           |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       | O       | 6 | 11        | H     | AJ | 3            | 22                | R                               |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       |         |   |           |       | EA | 4            | 9.5               | E                               |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       |         |   |           |       | EB | 4            | 12.5              | F                               |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       |         |   |           |       | EJ | 4            | 22                | G                               |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |
|       |         |   |           |       | AP | Custom shaft |                   |                                 |                                        |   |                                     |                                                                              |                                                                                    |                                                                      |   |  |  |

**PART NUMBER DESCRIPTION** (for information only)

|       |         |       |         |       |       |           |       |         |           |         |       |         |             |
|-------|---------|-------|---------|-------|-------|-----------|-------|---------|-----------|---------|-------|---------|-------------|
| P12   | H       |       |         | L     | 4K7   | 20 %      | A     |         | BO        | DE      |       |         | e3          |
| MODEL | BUSHING | LEADS | SPECIAL | SHAFT | VALUE | TOLERANCE | TAPER | SPECIAL | PACKAGING | SPECIAL | AP N° | SPECIAL | LEAD FINISH |

**RELATED DOCUMENTS****APPLICATION NOTES**

|                                                                   |                                                                        |
|-------------------------------------------------------------------|------------------------------------------------------------------------|
| Potentiometers and Trimmers                                       | <a href="http://www.vishay.com/doc?51001">www.vishay.com/doc?51001</a> |
| Guidelines for Vishay Sfernice Resistive and Inductive Components | <a href="http://www.vishay.com/doc?52029">www.vishay.com/doc?52029</a> |



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