

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 switches and incremental encoders 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:

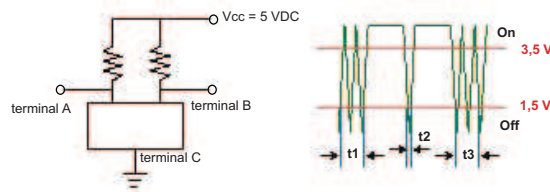
- Sensors
- Control potentiometers

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

|          | Series  | Size  | SMD |
|----------|---------|-------|-----|
| Encoder  | E-15    | 15    | YES |
|          | S-15    | 15    | YES |
|          | TS-1146 | 6     | YES |
| Switches | PTs     | 10/15 | -   |
|          | PCR     | -     | -   |

### TEST CIRCUIT DIAGRAM FOR ENCODERS

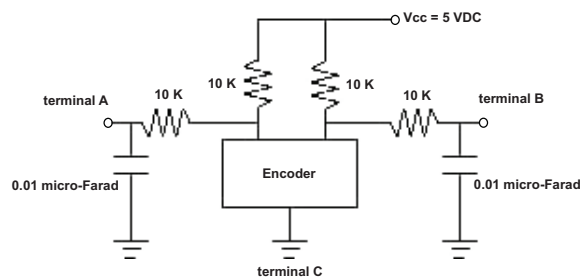
Measurements shall be made under the following conditions.  
 (1) Shaft rotational speed: 360 degrees/second  
 (2) Test circuit as follows:



On area: The area which the voltage is 3.5V or more  
 Off area: The area which the voltage is 1.5V or less

### R/C FILTER TEST CIRCUIT FOR ENCODERS

The R/C filter circuit as shown is recommended in the pulse count process design



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](http://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](http://www.piher.net) for updated information.

# E-15 15mm incremental encoder



## Main features

|  |   |
|--|---|
| Operating temperature range                  | -40°C to +120°C   |
| Contact current                              | 10µA – 100mA  |
| Pulse/Detents                                | 3 or 6 pulse / no detents version / others upon request |
| Low profile                                  | yes (4.4 mm)  |
| Hybrid variable resistor and pulse generator | under request   |
| Customisation possibilities                  | infinite  |
| Mounting                                     | SMD, through hole, horizontal adjust                    |
| Reflow Soldering capability                  | yes   |
| Shaft insertable from both sides             | yes   |
| All PT/ PTC 15 shafts compatible             | yes   |

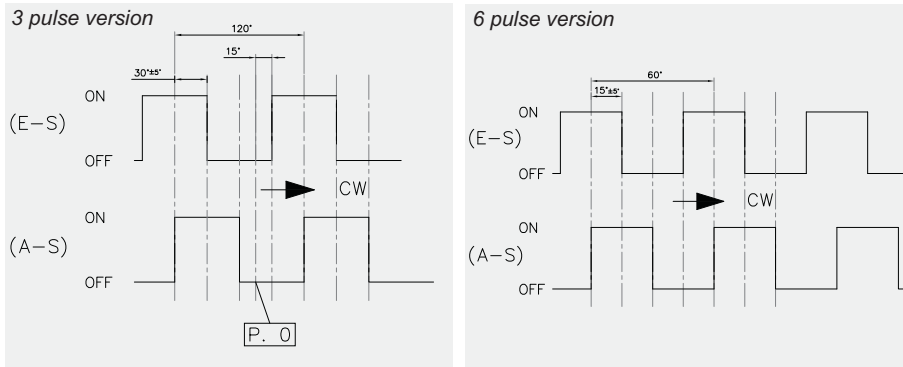
## Electrical specifications

|                           |       |
|---------------------------|-------|
| Closed contact resistance | <5Ω   |
| Open contact resistance   | >10MΩ |

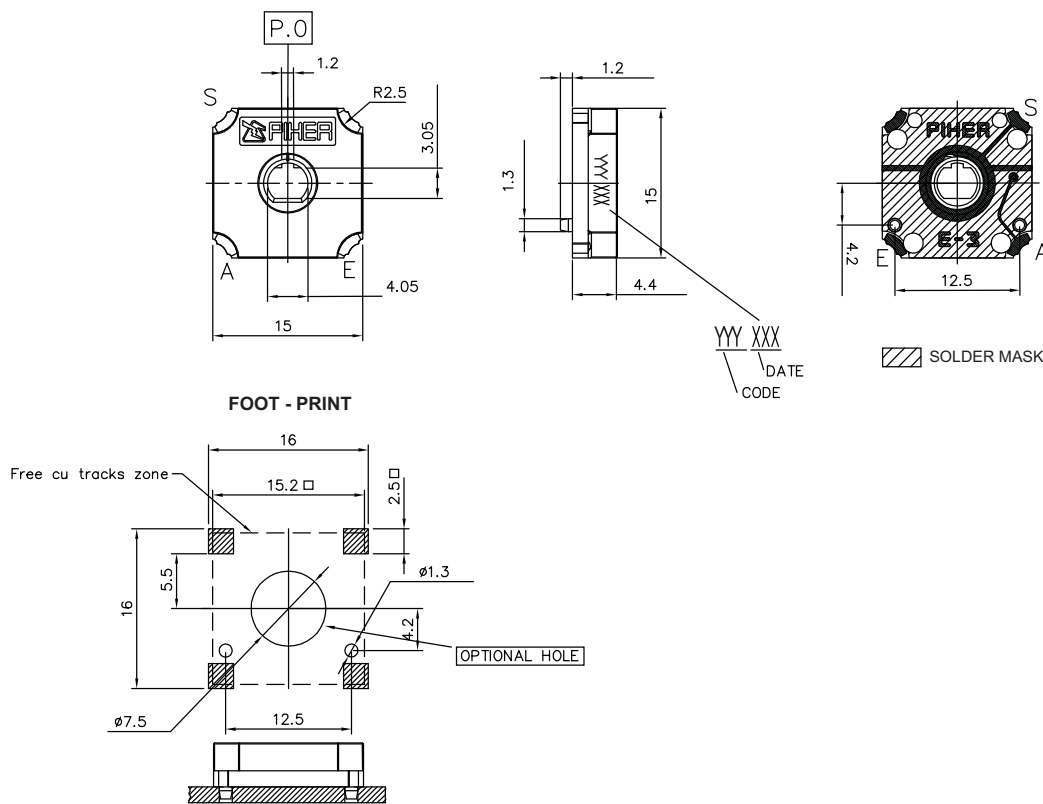
## Mechanical specifications

|                              |   |
|------------------------------|---|
| Rotational torque            | <2Ncm   |
| Rotational life              | 3 pulse version: 36K cycles;<br>6 pulse version: 10K cycles |
| Resistance to soldering heat | see drawings  |

## Graph code

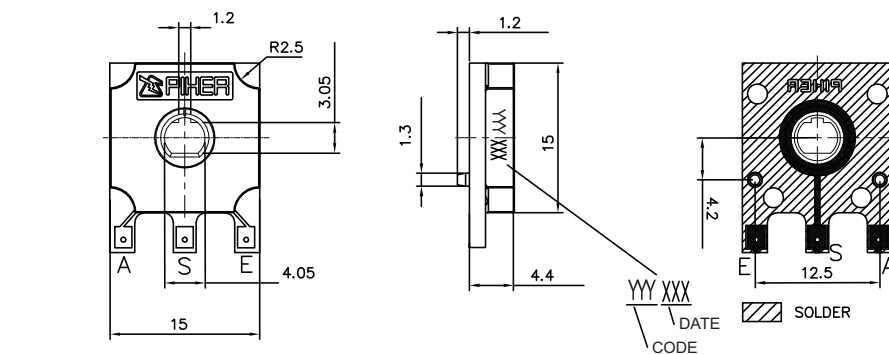


## Standard dimensions (SMD)

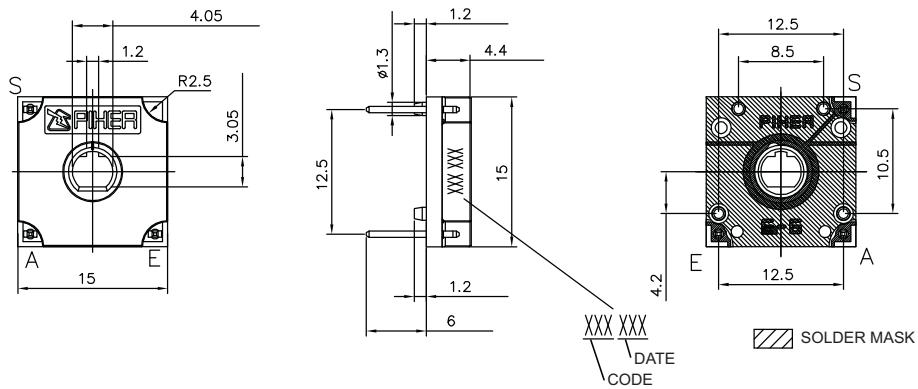


## Standard dimensions (horizontal adjust)

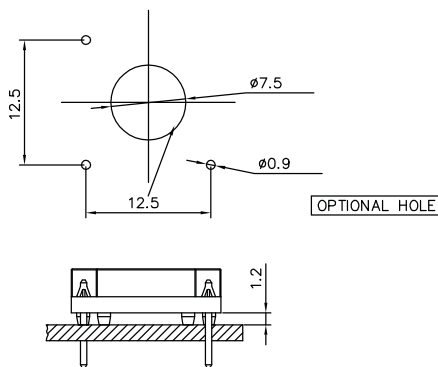
\* This drawing is just an example, horizontal adjust versions will be studied case by case



## Standard dimensions (through hole)



PCB HOLE LAYOUT



## Packaging

### BULK

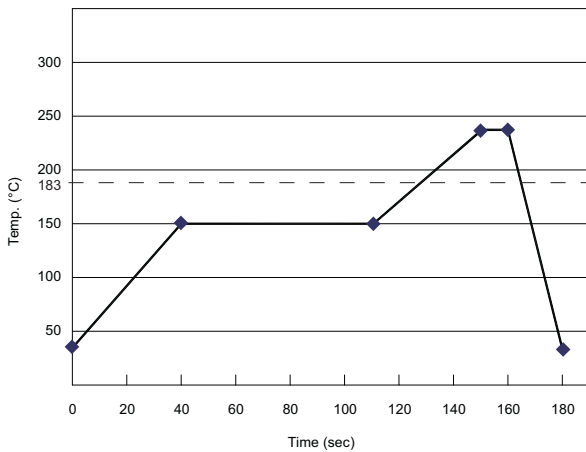
150 Units per box.  
Through hole version only.

### TAPE ON REEL

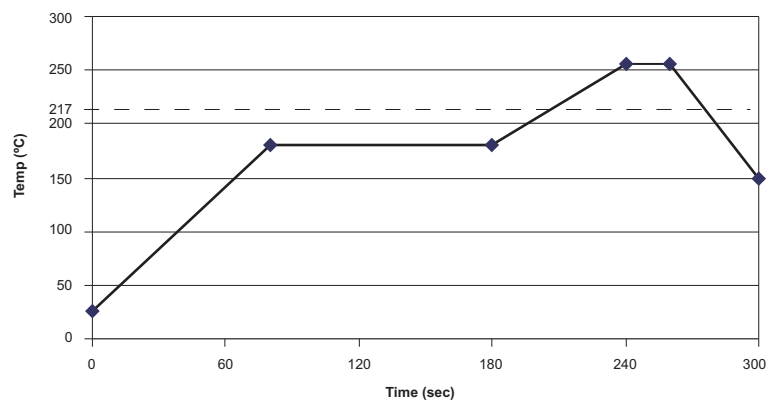
500 Units per reel.  
SMD type only.

## Recommended reflow profile (SMD)

SnPb Reflow Profile

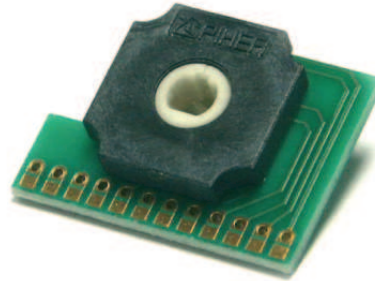


Lead Free Reflow Profile



# S-15

## 15mm rotary switch



### Main features

|                                  |                                      |
|----------------------------------|--------------------------------------|
| Number of positions (standard)   | 2, 6, others upon request            |
| Operating temperature range      | -40°C to +85°C                       |
| Customisation possibilities      | infinite                             |
| Low profile                      | yes (4.4 mm)                         |
| Mounting                         | SMD, through hole, horizontal adjust |
| Reflow Soldering capability      | yes                                  |
| Shaft insertable from both sides | yes                                  |
| All PT/ PTC 15 shafts compatible | yes                                  |

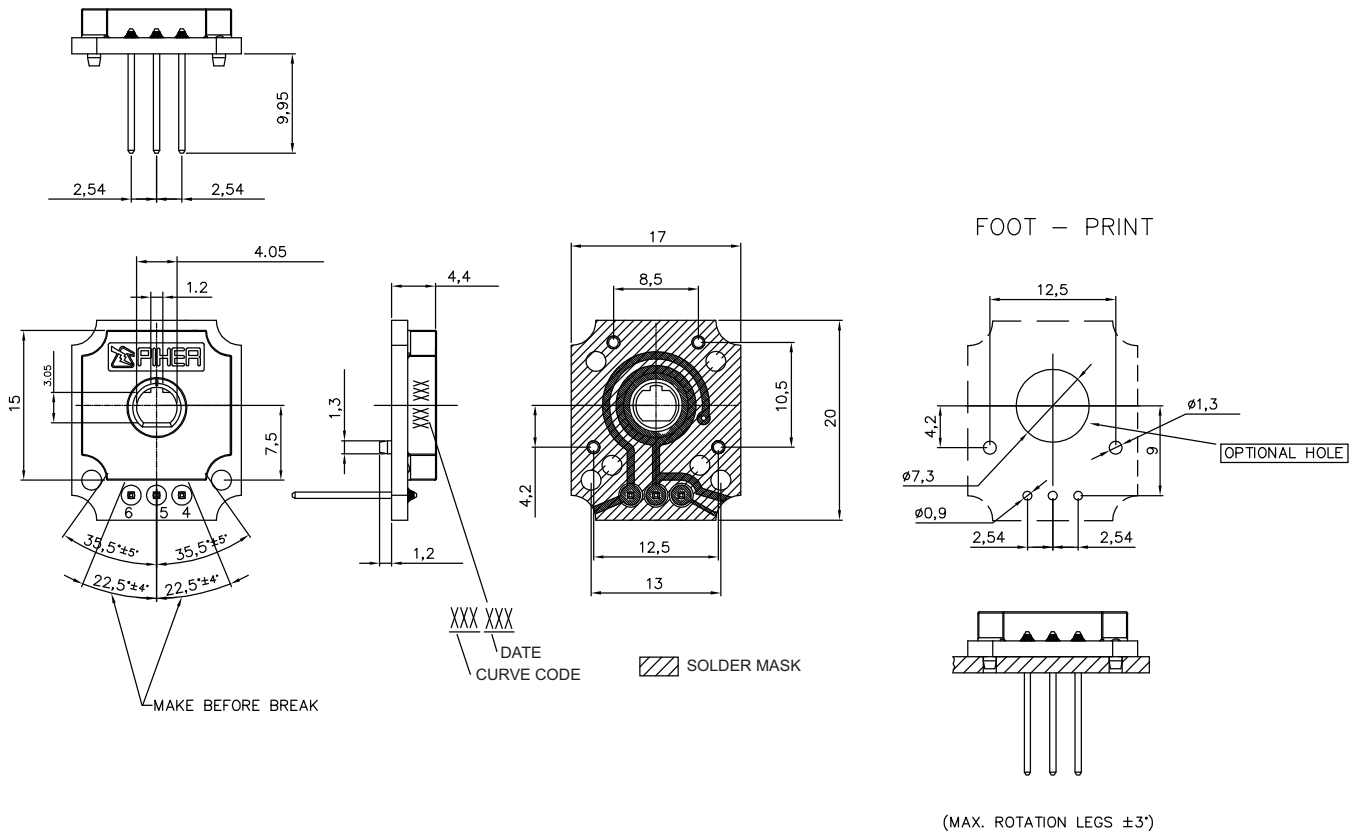
### Electrical specifications

|                           |  |
|---------------------------|--|
| Closed contact resistance | <5Ω  |
| Open contact resistance   | >10MΩ  |
| Contact current           | 10μA – 100mA                                     |
| Operating voltage         | 16 VDC (6 positions); 13.5±0.2 VDC (2 positions) |

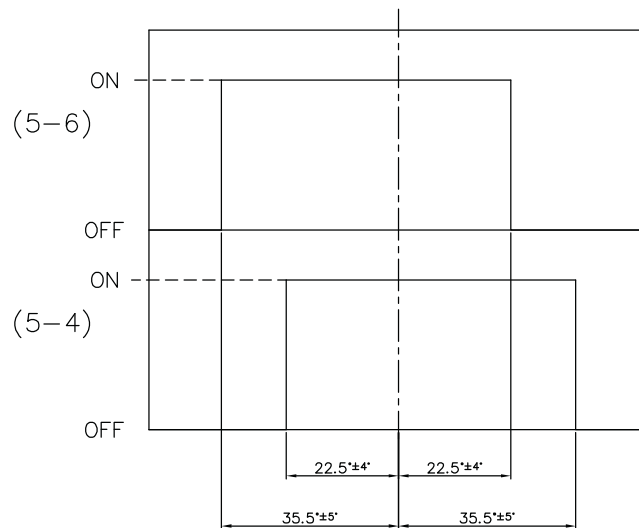
### Mechanical specifications

|                           |  |
|---------------------------|--|
| Rotational torque         | <2Ncm  |
| Rotational life           | 6 positions: 35K cycles; 2 positions: 15K cycles |
| Mechanical rotation angle | 360° (endless)                                   |

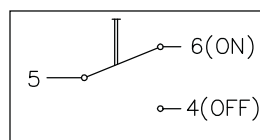
## Standard dimensions (2 positions)



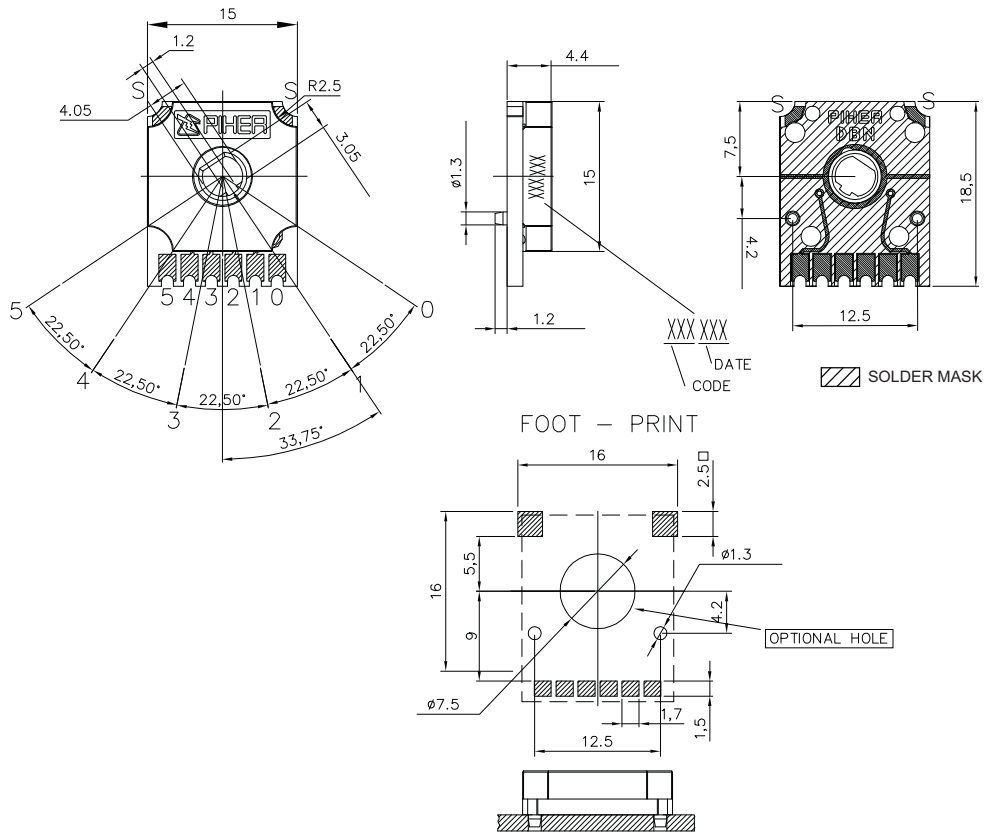
## Switch sequence (2 positions version)



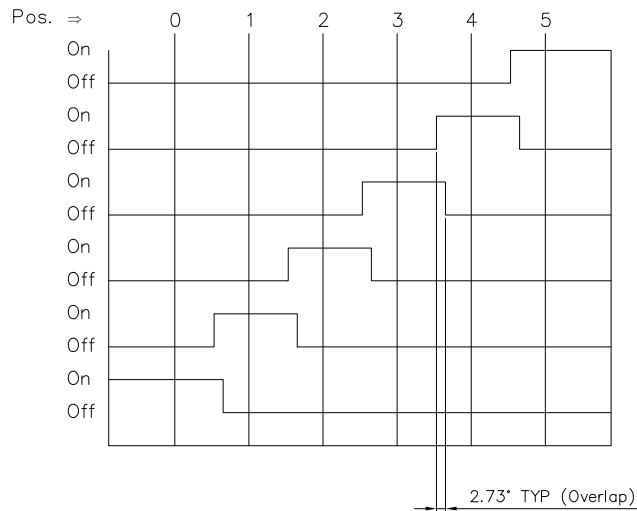
### CIRCUIT DIAGRAM



## Standard dimensions (6 positions)

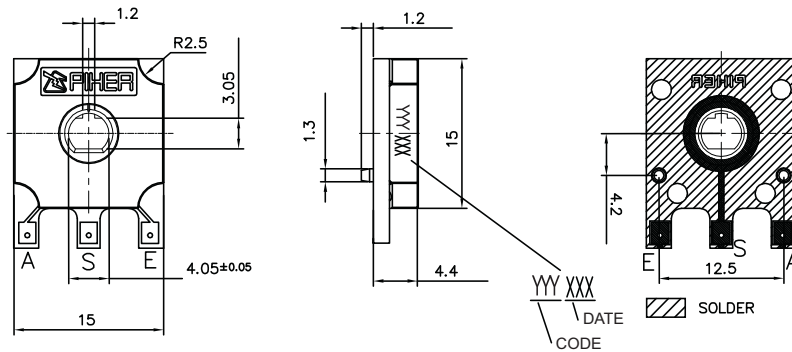


## Switch sequence (6 positions version)



| ALL ANGLES REFERRED TO SHIPPING POSITION |               |           |           |
|--|---------------|-----------|-----------|
| POSITIVE ANGLE INDICATES CW              |               |           |           |
| POS.                                     | INITIAL ANGLE | END ANGLE | TOLERANCE |
| 0  | -42.5         | -12       | ±5°       |
| 1  | -14.72        | 10.5      | ±5°       |
| 2  | 7.78          | 33        | ±5°       |
| 3  | 30.28         | 55.5      | ±5°       |
| 4  | 52.78         | 78        | ±5°       |
| 5  | 75.28         | 110       | ±5°       |

## Standard dimensions\* (horizontal adjust)



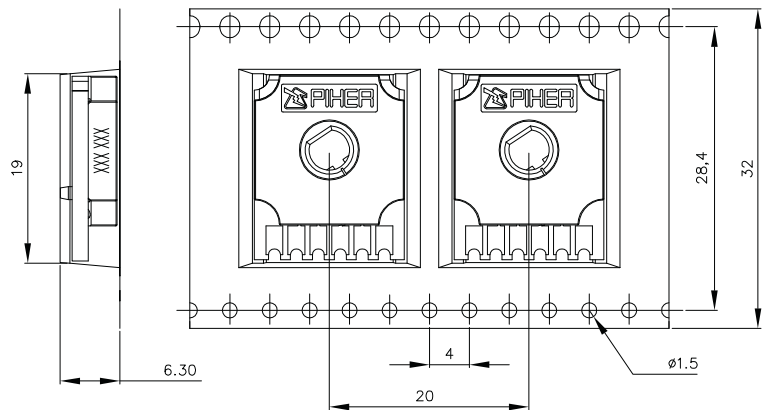
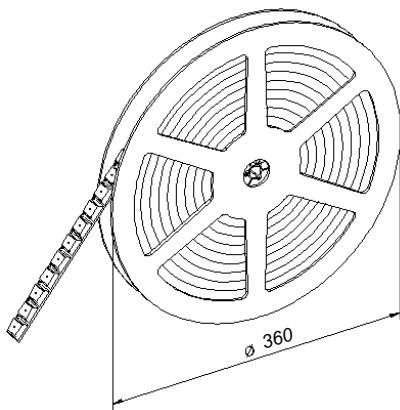
\* This drawing is just an example, horizontal adjust versions will be studied case by case

## Packaging

2 positions version is only available in BULK packaging

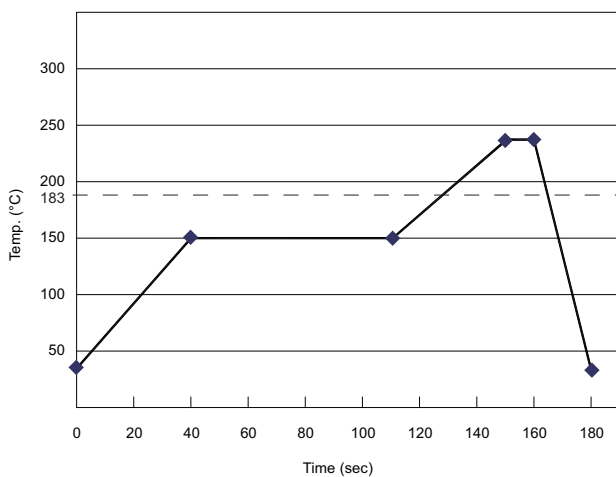
Tape on reel (6 positions version)

Units per reel: 650

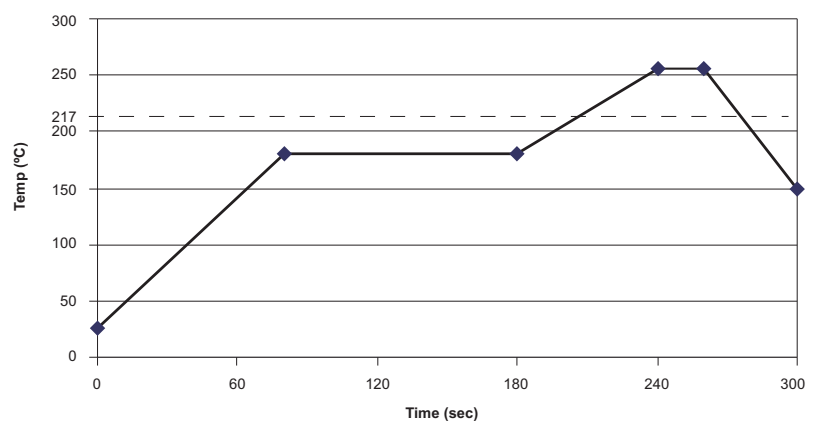


## Recommended reflow profile (SMD)

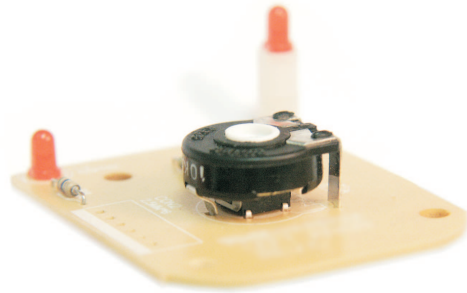
SnPb Reflow Profile



Lead Free Reflow Profile



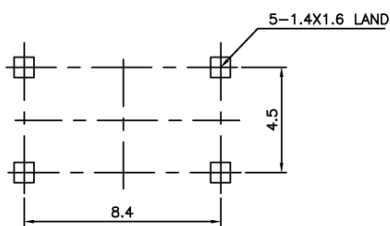
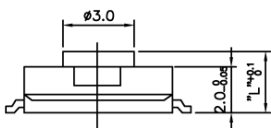
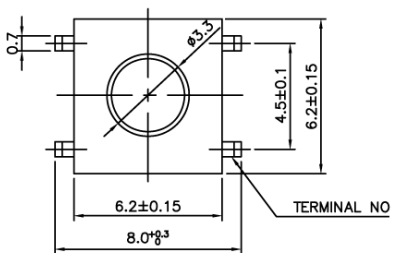
# TS SERIES tact switches



|                       |                      |
|-----------------------|----------------------|
| Operating temperature | -20°C to +70°C       |
| Operating life        | 100K cycles          |
| Rating                | 12V D.C. 50mA        |
| Contact resistance    | 100 mΩ max.          |
| Insulation resistance | 100 MΩ min.          |
| Dielectric strength   | 250 VAC for 1 minute |
| Switch travel         | 0.25 ± 0.1 mm        |
| Bounce                | less than 100 msec.  |
| Mounting              | SMD, with terminals  |
| Crimping option       | yes                  |

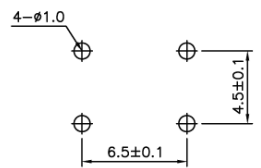
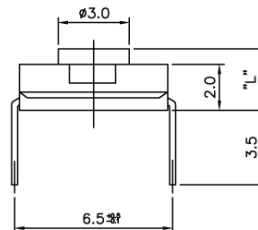
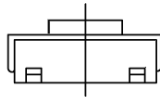
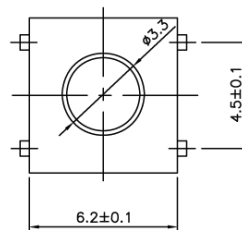
## Standard dimensions

**TS-1110**

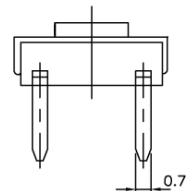


P.C.B. Hole Detail

**TS-1126S**



P.C.B. Hole Detail



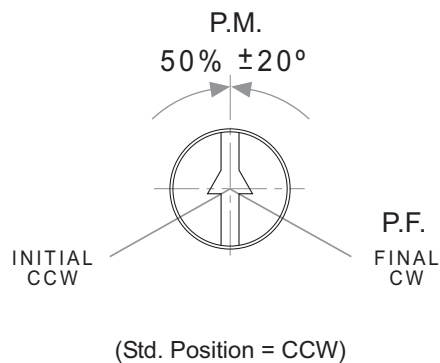
# Rotary switches

## 10/15mm rotary switches

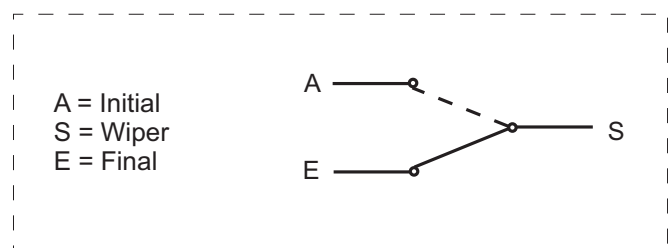
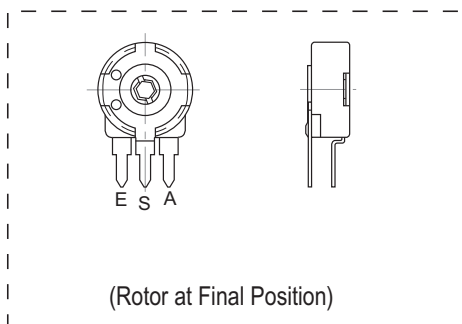


|   |                   |
|---|-------------------|
| Power rating  | 24V / 15mA        |
| ON position resistance                                | $\leq 5 \Omega$   |
| Insulation Resistance                                 | $\geq 30 M\Omega$ |
| Resistive element                                     | carbon or cermet  |
| Dust proof enclosure                                  | yes               |
| Mechanical detents available                          | yes               |
| Supplied in magazines for automatic insertion         | upon request      |
| Customisation according to customer's needs           | yes               |
| Pb-Free according to ELV 2000/53/EC / RoHS 2002/95/EC | yes               |
| Plastic material according to UL94V-0                 | upon request      |
| Long life model PT-10 (10K cycles)                    | upon request      |
| Wiper positioned at 50% or fully clockwise            | upon request      |

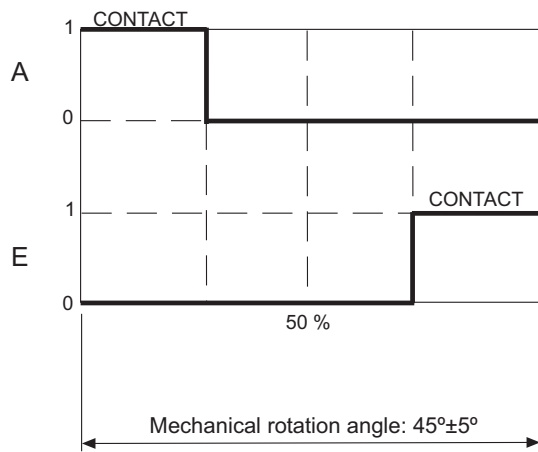
### Positioning



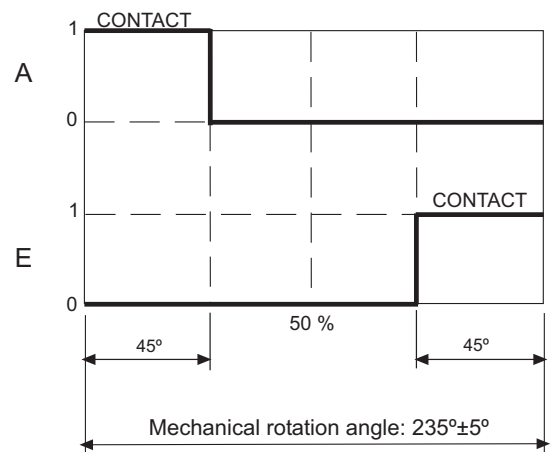
### Standar configurations



Standard configuration for PT10 model

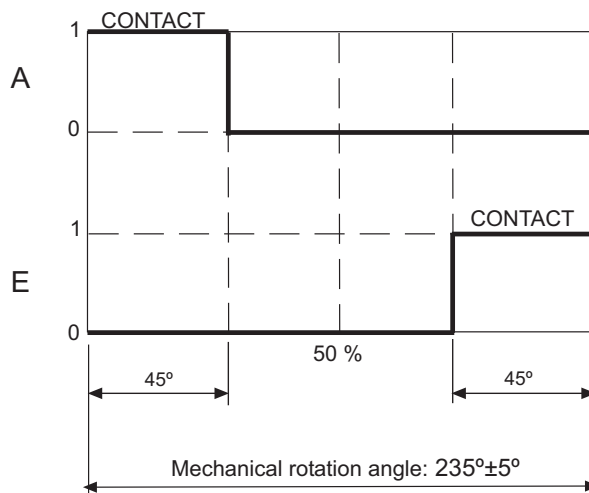


D48 Switch code (Housing colour: green)  
PT-10LH01-CONMUTADOR-000D48

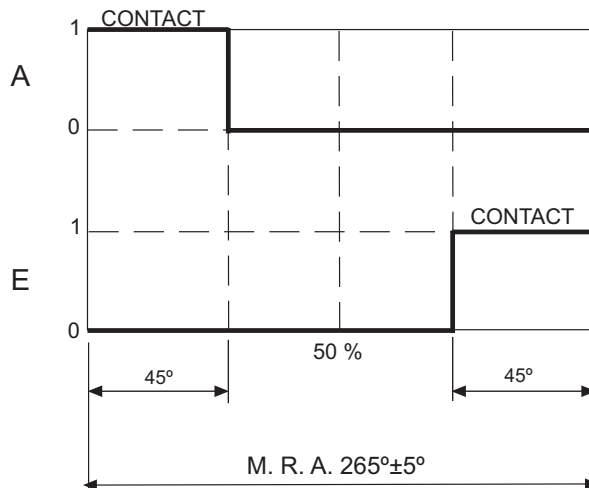


A80 Switch code  
PT-10LH01-CONMUTADOR-000A80

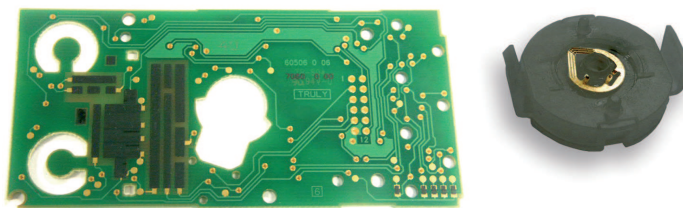
Standard configuration for PTC10 model (PTC-10LH01-000)



Standard configuration for PTC15 model (PTC-15LH01-000)



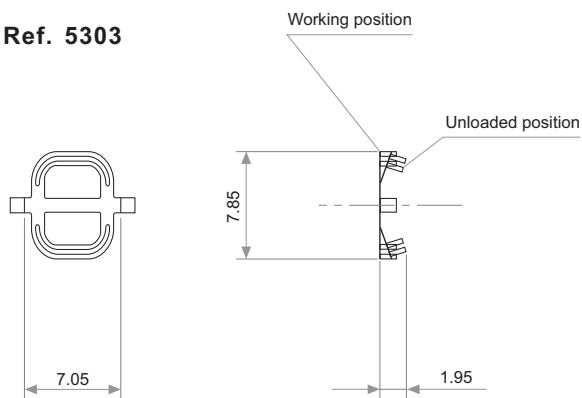
# PCR Printed circuit resistors



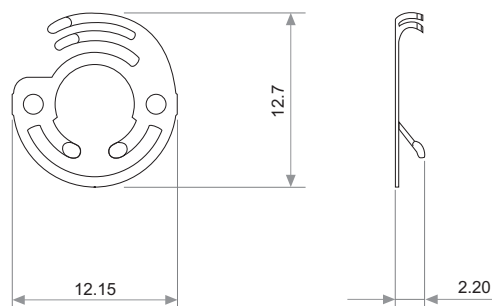
|  |   |
|--|---|
| Description  | PCB based / screen printed encoders, switches and potentiometers  |
| Resistance range   | 10Ω to 1MΩ  |
| TCR  | Better than 300 ppm/°C  |
| Ohmic value tolerances<br>(others upon request)                  | -Non-trimmed resistors: ± 30%, ±20%<br>(depending on values, shapes and substrates)<br>-Trimmed resistors: ±5%<br>-Matching capability: ±2% |
| Voltage ratio tolerances   | - Non-trimmed resistors: ±10%<br>- Trimmed resistors: ±2%, ±3%, ...   |
| Mechanical life (voltage dividers only)<br>(others upon request) | From 10 thousand to 100 thousand cycles<br>(depending on each individual case)  |

## Wiper examples (technical specifications upon request)

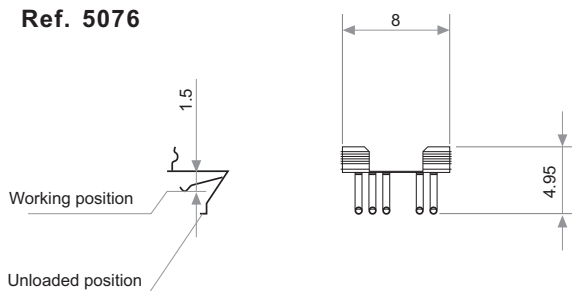
Ref. 5303



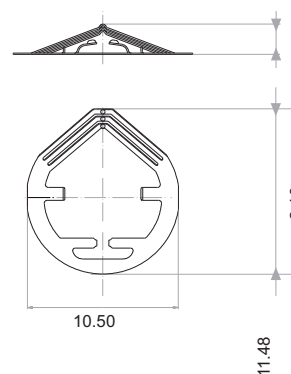
Ref. 5382



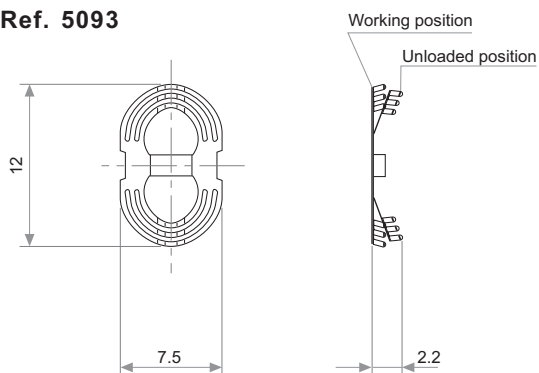
Ref. 5076



Ref. 5738



Ref. 5093



Ref. 5184

