

# 12000X778 series

High performance toggle switches •  
threaded bushing Ø 11.9 mm



## DISTINCTIVE FEATURES

CECC approved - conforms to MIL specifications

Highly reliable contacts

Pinned lever

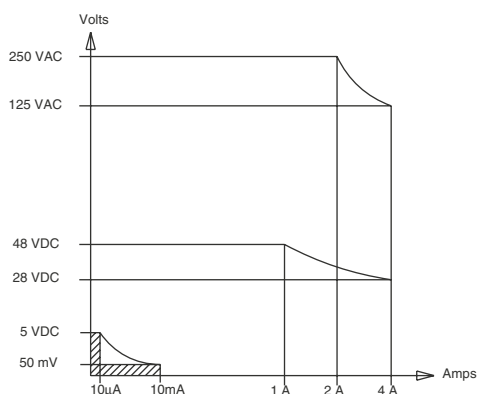
Double shell case for high mechanical strength and high electrical insulation

Compact size



## ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load: 4 A 28 VDC
- Minimum load: 10 mA 50 mV, 10  $\mu$ A 5 VDC  
When used above 300 mA 28 VDC, the gold plating is removed on contact areas and is considered only as a protection against oxidation during storage.
- Initial contact resistance: 10 m $\Omega$  max.
- Insulation resistance: 1,000 M $\Omega$  min. at 500 VDC
- Dielectric strength:  
1,000 Vrms 50 Hz min. between terminals  
2,000 Vrms 50 Hz min. between poles  
2,000 Vrms 50 Hz min. between terminals and frame
- Contact bounce: 2 ms max.
- Electrical life:
  - At 4 A 28 VDC : 20,000 cycles (10,000 for functions 5, 4-1R, 4-2R)
  - At low level (50 mV 10 mA):  
150,000 cycles (switches with 2 maintained positions)  
100,000 cycles (switches with 3 maintained positions)  
50,000 cycles (momentary functions 7, 8, 4-1R, 4-2R, 5)



The company reserves the right to change specifications without notice.



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## ENVIRONMENTAL SPECIFICATIONS

- Shock test: 50 g - 11 ms (IEC 68-2-27)
- Vibrations: 10-500 Hz - 10g (IEC68-2-6)
- Humidity test: 56 days, 93 % R.H., 40 °C (IEC 68-2-3)
- Salt spray test: 96 hours (IEC 68-2-11)
- Operating temperature: -40 °C to +85 °C (-40 °F to +185 °F)



## GENERAL SPECIFICATIONS

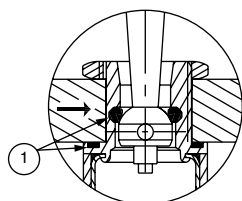
- Torque: 1.50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness: 8 mm (.314) max. - 3 mm (.118) min.



## SEALING

- Front panel sealing by two O-rings  
Flatted bush for precise orientation
- Panel seal withstands 1 bar pressure and remains sealed even when the switch is operated.
- Epoxy sealed terminals
- Splash-proof case

→ FLAT



① - O-rings

## AGENCY APPROVALS



CECC 96201-005  
CECC 96201-008

Designed to MIL specifications

**Availability** : consult factory for details of approved models.

**Marking** : to order switches marked CECC, complete appropriate box of ordering format.



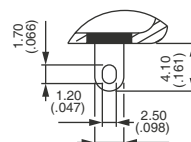
## MATERIALS

- Case: diallylphthalate (DAP) with plastic external shell (epoxy sealed)
- Actuator: brass, black chrome plated
- Bushing: brass, black chrome plated
- Contacts: solid rivet - gold plated silver/nickel alloy

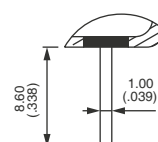
APEM products may be recycled at end-of-life for the re-claiming of valuable metal components.



## TERMINALS



Solder lugs

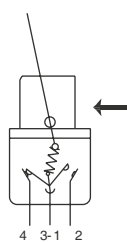


Straight PC

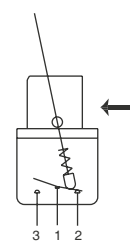


## ELECTRICAL FUNCTIONS

→ FLAT



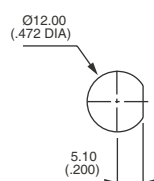
Function 6



Other functions



## PANEL CUT-OUT



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## BUILD YOUR PART NUMBER

**BASIC PART NUMBER**

| SERIES | TERMINALS AND BUSHINGS                                                                                                      | NUMBER OF POLES                                                         | ELECTRICAL FUNCTIONS                                                                                                                                                    | MOMENTARY FOR FUNCTION 4                                                                                      |
|--------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 12     | <div>1 Solder lug terminals</div> <div>2 Straight PC terminals</div> <p>All models with threaded bushing Ø 11.9 (15/32)</p> | <div>4 Double pole</div> <div>5 Three pole</div> <div>6 Four pole</div> | <div>6 ON - ON</div> <div>9 ON OFF ON</div> <div>7 MOM OFF MOM</div> <div>8 ON OFF MOM</div> <div>4 ON ON ON MOM Δ</div> <div>4 ON ON MOM Δ</div> <div>5 - ON MOM</div> | <div>1R ON ON MOM</div> <div>2R MOM ON MOM</div> <p>For function 4 only. Leave blank for other functions.</p> |

**Function 4**  
For 2 and 4 poles only.  
Δ Must not have blank in «momentary» box.

**OPTIONS**

| FLUORESCENT TIP                                                      | LEVERS                                                     | X778                                          | APPROVAL                                                                             |
|----------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------|
| <div>Blank None</div> <div>-038 White fluorescent tip to lever</div> | <div>Blank Standard lever</div> <div>-12 Short lever</div> | High performance fully sealed black switches. | <div>CECC</div> <p>Availability: Consult factory for details of approved models.</p> |

**LOCKING LEVERS**

|     |                    |
|-----|--------------------|
| -1V | 1 locked position  |
| -2V | 2 locked positions |
| -3V | 3 locked positions |

Other : see following pages.



## ABOUT THIS SERIES

- Notice:** please note that not all combinations of above numbers are available. Refer to the following pages for further information.
- Sealing boots** can be used to further protect the switches against dust and water. See "Sealing Boots" section of website.
- Mounting accessories:** standard hardware supplied with all models : 1 hex nut 14 mm (.551) across flats, part number U41.
- Switch guards** are available to prevent inadvertent lever operation. See "Switch Guards" section of website.

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## SOLDER LUG TERMINALS - DOUBLE POLE



| BASIC P/N     | Angle of throw (A) | I   | II  | III |
|---------------|--------------------|-----|-----|-----|
| 12146 X778    | 26°                | ON  | -   | ON  |
| 12149 X778    | 20°                | ON  | OFF | ON  |
| 12147 X778    | 20°                | MOM | OFF | MOM |
| 12148 X778    | 20°                | ON  | OFF | MOM |
| 12144 X778    | 20°                | ON  | ON  | ON  |
| 12144-1R X778 | 20°                | MOM | ON  | ON  |
| 12144-2R X778 | 20°                | MOM | ON  | MOM |
| 12145 X778    | 12°                | -   | ON  | MOM |

## SOLDER LUG TERMINALS - THREE POLE



| BASIC P/N  | Angle of throw (A) | I   | II  | III |
|------------|--------------------|-----|-----|-----|
| 12156 X778 | 26°                | ON  | -   | ON  |
| 12159 X778 | 20°                | ON  | OFF | ON  |
| 12157 X778 | 20°                | MOM | OFF | MOM |
| 12158 X778 | 20°                | ON  | OFF | MOM |

## SOLDER LUG TERMINALS - FOUR POLE



| BASIC P/N     | Angle of throw (A) | I   | II  | III |
|---------------|--------------------|-----|-----|-----|
| 12166 X778    | 26°                | ON  | -   | ON  |
| 12169 X778    | 20°                | ON  | OFF | ON  |
| 12167 X778    | 20°                | MOM | OFF | MOM |
| 12168 X778    | 20°                | ON  | OFF | MOM |
| 12164 X778    | 20°                | ON  | ON  | ON  |
| 12164-1R X778 | 20°                | ON  | ON  | MOM |
| 12164-2R X778 | 20°                | MOM | ON  | MOM |

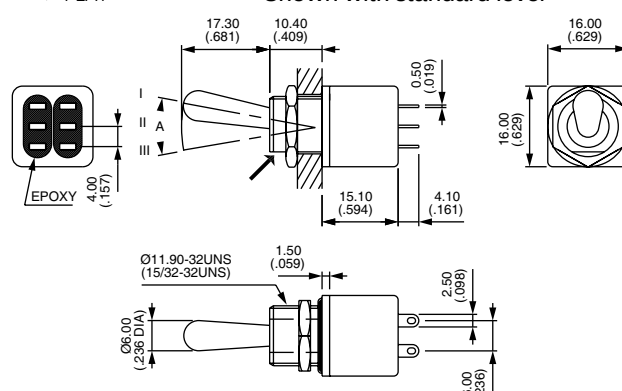
## STRAIGHT PC TERMINALS - DOUBLE POLE ▲



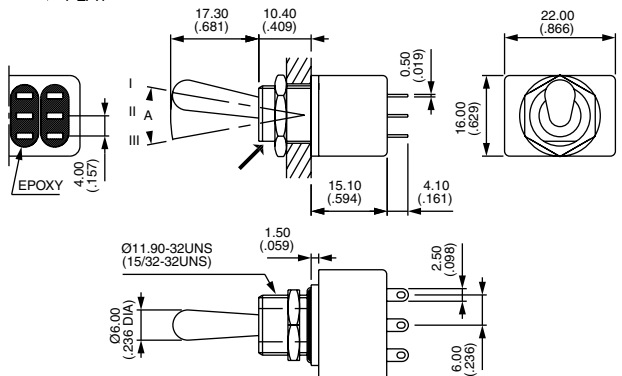
| BASIC P/N  | Angle of throw (A) | I  | II | III |
|------------|--------------------|----|----|-----|
| 12246 X778 | 26°                | ON | -  | ON  |

→ FLAT

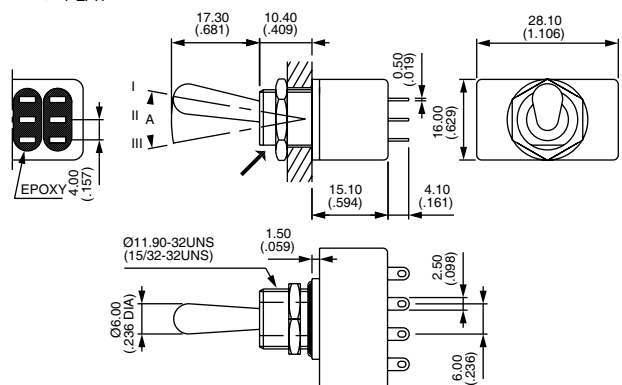
Shown with standard lever



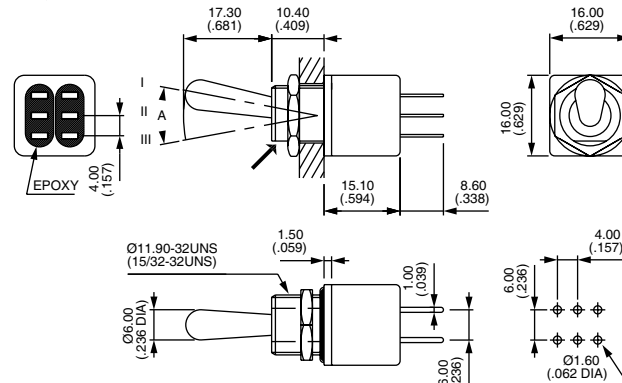
→ FLAT



→ FLAT



→ FLAT



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## STRAIGHT PC TERMINALS - THREE POLE ▲



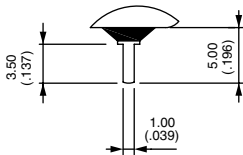
| BASIC P/N  | Angle of throw (A) | I  | II | III |
|------------|--------------------|----|----|-----|
| 12256 X778 | 26°                | ON | -  | ON  |

## STRAIGHT PC TERMINALS - FOUR POLE ▲

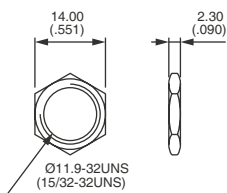


| BASIC P/N  | Angle of throw (A) | I  | II | III |
|------------|--------------------|----|----|-----|
| 12266 X778 | 26°                | ON | -  | ON  |

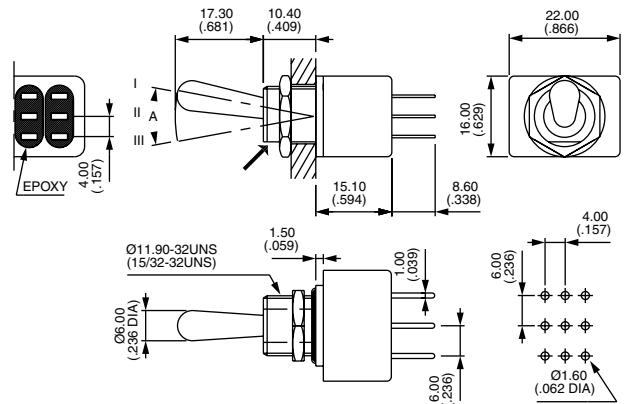
▲ 3.5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.



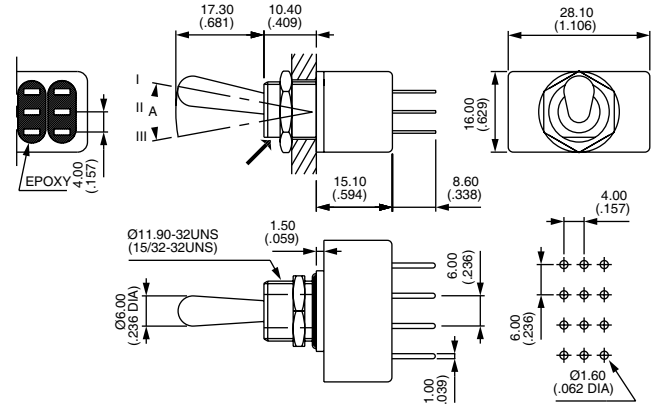
## STANDARD HARDWARE - HEX NUT - U41 - BLACK



→ FLAT



→ FLAT



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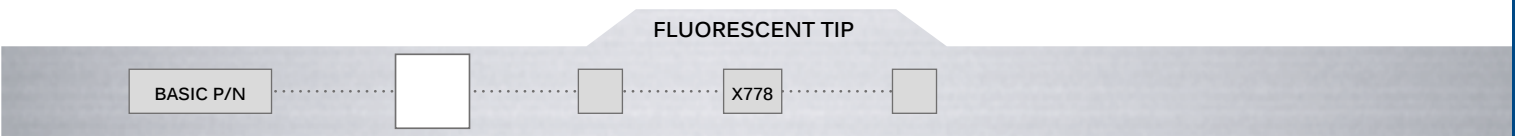


## POSITIONS AND CONNECTIONS

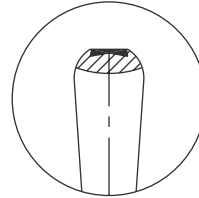
| FUNCTION                           | LEVER POSITION AND CONNECTIONS                     |                                          |                                                    | TERMINAL IDENTIFICATION | WIRING FOR 3-WAY SWITCHES (FUNCTION 4)                                                    |
|------------------------------------|----------------------------------------------------|------------------------------------------|----------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------|
|                                    | I                                                  | II                                       | III (FLAT)                                         |                         |                                                                                           |
| 12146                              | ON<br><br>(1-3)-4<br>(5-7)-8                       | -                                        | ON<br><br>(1-3)-2<br>(5-7)-6                       |                         | <p>→ EXTERNAL JUMPER (ADDED BY CUSTOMER)</p> <p>12144</p> <p>12144-1R</p> <p>12144-2R</p> |
| 12147<br>12148<br>12149<br>12148CT | MOM<br>ON<br>ON<br>MOM                             | OFF<br>OFF<br>OFF<br>OFF                 | MOM<br>MOM<br>ON<br>ON                             | <p>→ FLAT</p>           |                                                                                           |
| 12145                              | -                                                  | ON<br><br>1-2<br>4-5                     | MOM<br><br>1-3<br>4-6                              |                         |                                                                                           |
| 12144<br>12144-1R<br>12144-2R      | ON<br>MOM<br>MOM                                   | ON<br>ON<br>ON                           | ON<br>ON<br>MOM                                    |                         |                                                                                           |
| 12156                              | ON<br><br>(1-3)-4<br>(5-7)-8<br>(9-11)-12          | -                                        | ON<br><br>(1-3)-2<br>(5-7)-6<br>(9-11)-10          |                         | <p>12164</p>                                                                              |
| 12166                              | ON<br><br>1A - 3A<br>1C - 3C<br>1E - 3E<br>1G - 3G | -                                        | ON<br><br>1A - 2A<br>1C - 2C<br>1E - 2E<br>1G - 2G |                         |                                                                                           |
| 12164<br>12164-2R CT               | ON<br>MOM                                          | ON<br>ON                                 | ON<br>MOM                                          |                         |                                                                                           |
|                                    | 1A - 2A<br>1C - 2C<br>1E - 2E<br>1G - 2G           | 1A - 2A<br>1C - 3C<br>1E - 2E<br>1G - 3G | 1A - 3A<br>1C - 3C<br>1E - 3E<br>1G - 3G           |                         |                                                                                           |

# 12000X778 series

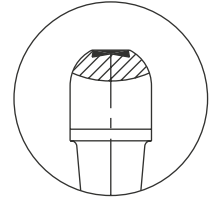
High performance toggle switches •  
threaded bushing Ø 11.9 mm



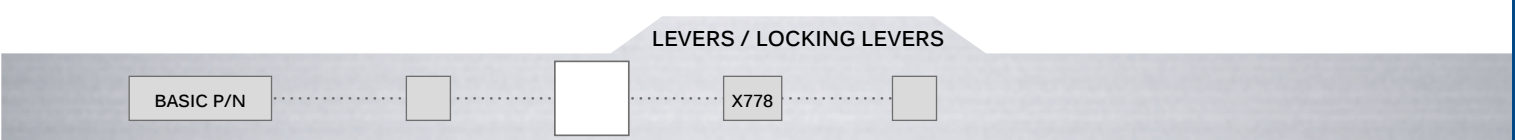
**Blank** None  
**038** White fluorescent tip. Becomes luminous when submitted to ultra-violet rays.



Standard lever

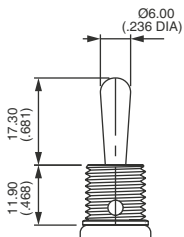


Locking lever

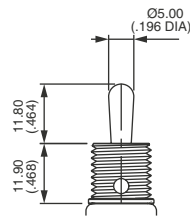


Dash compulsory before lever code.  
 Switch guards and sealing boot: see "Switch Guards" and "Sealing boots" sections of website.

## LEVERS

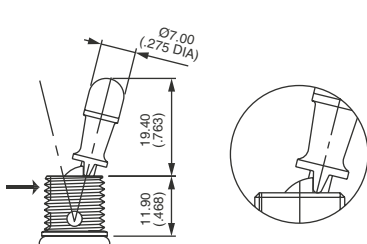


Blank Standard

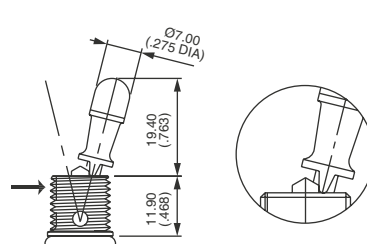


-12 Short lever

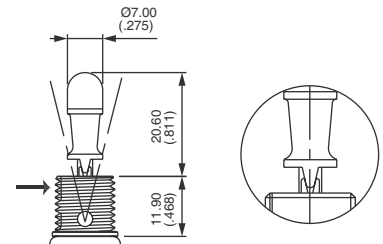
## LOCKING LEVERS



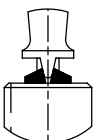
-1V  
 1 locked position (function 6)  
 Typical angle of throw : 26°



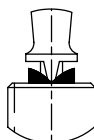
-2V  
 2 locked positions (function 6)  
 Typical angle of throw : 26°



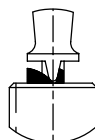
-3V  
 3 locked positions (functions 9 and 4)  
 Typical angle of throw : 20°



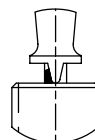
-4V  
 Functions 9 & 4



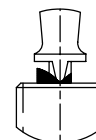
-5V  
 Functions 7 & 442R



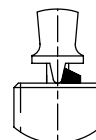
-7V  
 Function 8



-8V  
 Functions  
 9, 44 & 441R



-9V  
 Function 8



-11V  
 Functions  
 8, 9 & 44

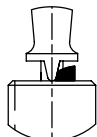
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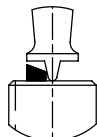
## LOCKING LEVERS (CONTINUED)

BASIC P/N

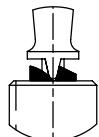
X778



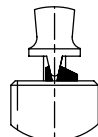
**-12V**  
Functions  
7, 8 & 441R



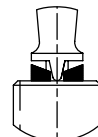
**-13V**  
Funct 5, 7 & 442R



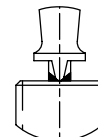
**-15V**  
Function 8



**-16V**  
Functions 4 & 9



**-17V**  
Functions 7 & 442R



**-20V**  
Functions 9 & 44

**Note:** -5V and -12V are not true locking levers: no pulling is required before actuation.

## AGENCY APPROVAL

BASIC P/N

X778

**CECC** CECC 96201-005 and CECC 96201-008

Availability: consult factory for details of approved models.

Marking: to order switches marked CECC, complete above box with "CECC".

**Blank** No agency approval required.



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Apem:](#)

[12245X778](#) [122462VX778](#) [122493VX778](#)