

12000X778 series

High performance toggle switches •
threaded bushing Ø 11.9 mm



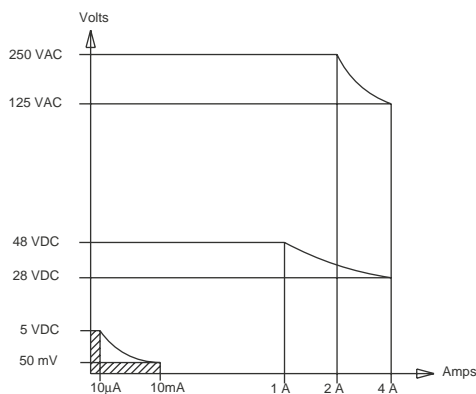
DISTINCTIVE FEATURES

- 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 µA 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 mΩ max. (50 mΩ max. for function 4)
- Insulation resistance: 1,000 MΩ 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

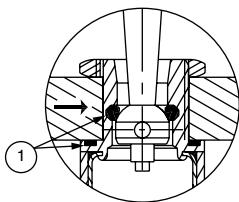
- Torque: 1.50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness: 8 mm (.314) max. - 3 mm (.118) min.



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.



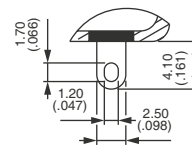
MATERIALS

- Case: diallyphthalate (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

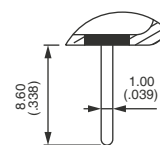
APEM products may be recycled at end-of-life for the re-claiming of valuable metal components.



TERMINALS



Solder lugs

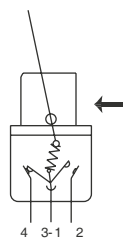


Straight PC

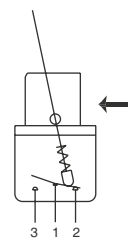


ELECTRICAL FUNCTIONS

→ FLAT



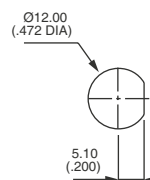
Function 6



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 | <p>1 Solder lug terminals</p> <p>2 Straight PC terminals</p> <p>All models with threaded bushing Ø 11.9 (15/32)</p> | <p>4 Double pole</p> <p>5 Three pole</p> <p>6 Four pole</p> | <p>6 ON - ON</p> <p>9 ON OFF ON</p> <p>7 MOM OFF MOM</p> <p>8 ON OFF MOM</p> <p>4 ON ON ON ON ON MOM Δ MOM ON MOM Δ</p> <p>5 - ON MOM</p> | <p>1R ON ON MOM</p> <p>2R MOM ON MOM</p> <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 |
|--|---|--|---|
| <p>Blank None</p> <p>-038 White fluorescent tip to lever</p> | <p>Blank Standard lever</p> <p>-12 Short lever</p> <p>LOCKING LEVERS</p> <p>-1V 1 locked position</p> <p>-2V 2 locked positions</p> <p>-3V 3 locked positions</p> <p>Other : see following pages.</p> | <p>High performance fully sealed black switches.</p> | <p>CECC Availability: Consult factory for details of approved models.</p> |



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 |

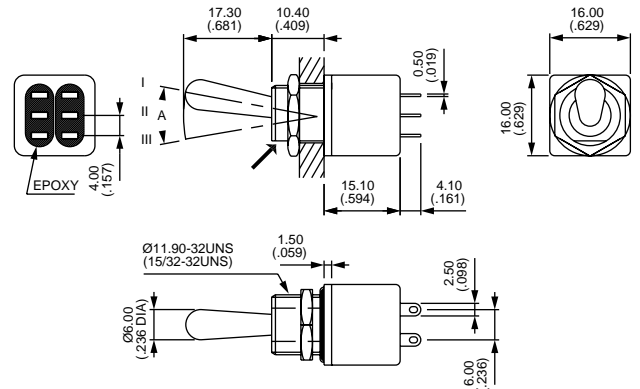
STRAIGHT PC TERMINALS - DOUBLE POLE ▲



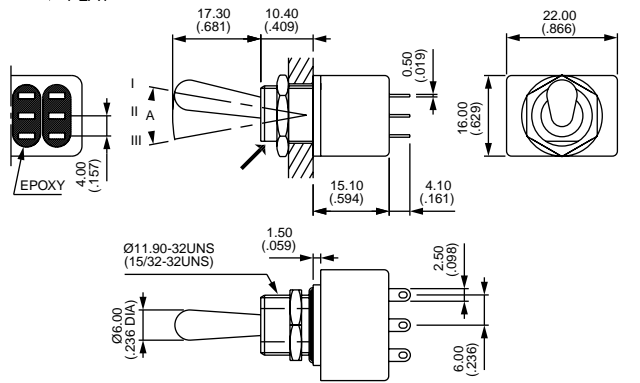
| BASIC P/N | Angle of throw (A) | I | II | III |
|------------|--------------------|----|----|-----|
| 12246 X778 | 26° | ON | - | ON |

→ FLAT

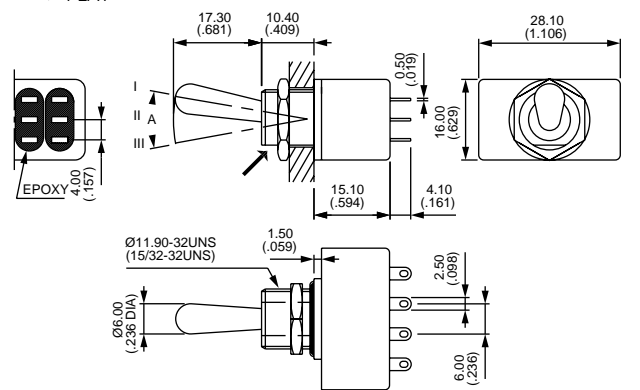
Shown with standard lever



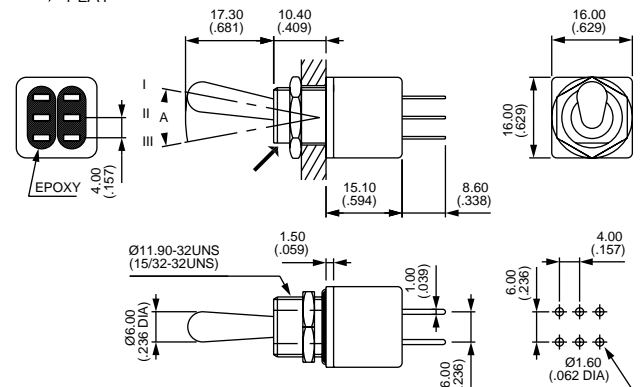
→ FLAT



→ FLAT



→ FLAT



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STRAIGHT PC TERMINALS - THREE POLE ▲



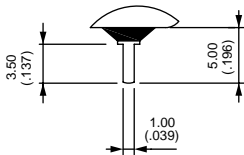
| BASIC P/N | Angle of throw (A) | I | II | III |
|------------|--------------------|----|----|-----|
| 12256 X778 | 26° | ON | - | ON |

STRAIGHT PC TERMINALS - FOUR POLE ▲

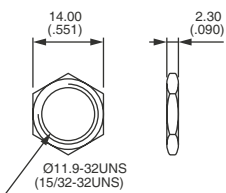


| BASIC P/N | Angle of throw (A) | I | II | III |
|------------|--------------------|----|----|-----|
| 12266 X778 | 26° | ON | - | ON |

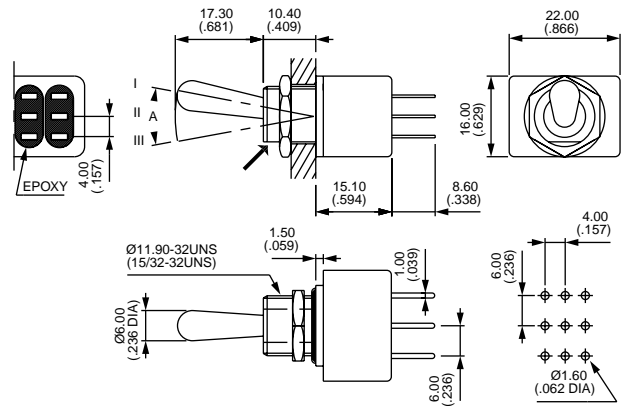
▲ 3.5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.



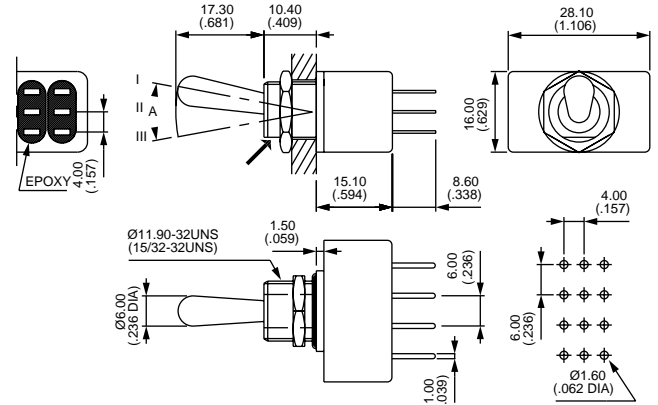
STANDARD HARDWARE - HEX NUT - U41 - BLACK



→ FLAT



→ FLAT



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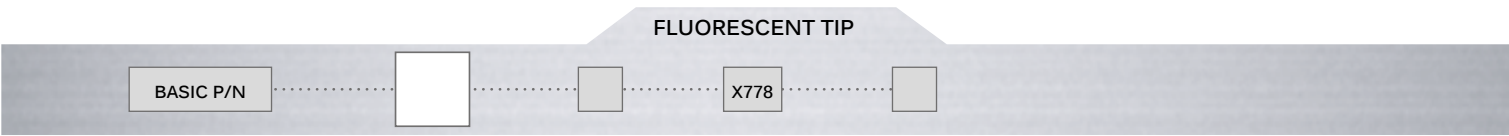


POSITIONS AND CONNECTIONS

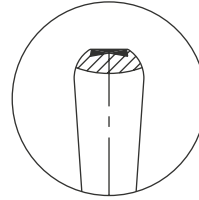
| FUNCTION | LEVER POSITION AND CONNECTIONS | | | TERMINAL IDENTIFICATION | WIRING FOR 3-WAY SWITCHES (FUNCTION 4) |
|------------------------------------|--|--|--|-------------------------|---|
| | I | II | III (FLAT) | | |
| 12146 | ON (1-3)-4 (5-7)-8 | - | ON (1-3)-2 (5-7)-6 | | <p>→EXTERNAL JUMPER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

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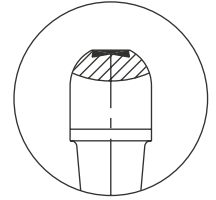
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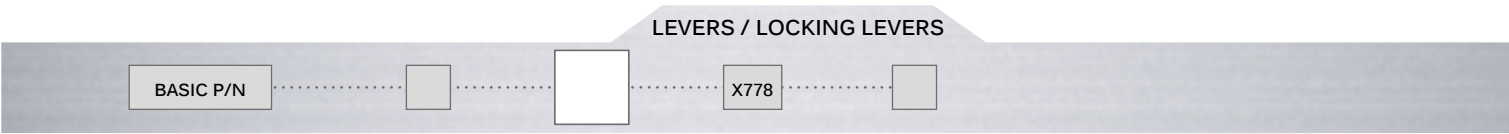
Blank None
038 White fluorescent tip. Becomes luminous when submitted to ultra-violet rays.



Standard lever

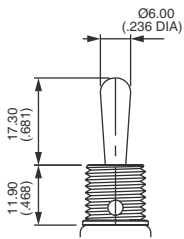


Locking lever

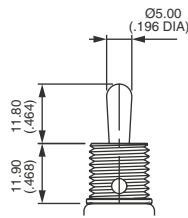


Dash compulsory before lever code.
 Switch guards and sealing boot: see "Switch Guards" and "Sealing boots" sections of website.

LEVERS

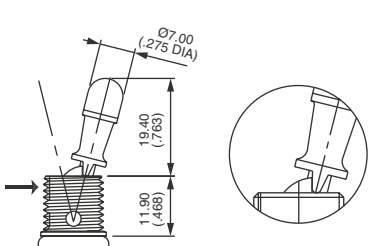


Blank Standard

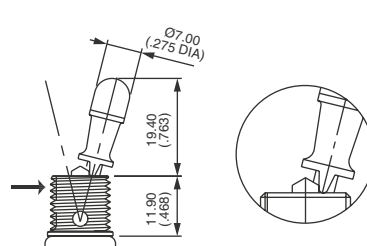


-12 Short lever

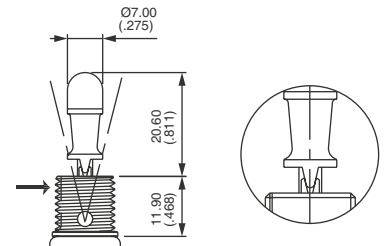
LOCKING LEVERS



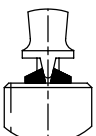
-1V
 1 locked position (function 6)
 Typical angle of throw : 26°



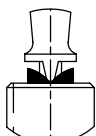
-2V
 2 locked positions (function 6)
 Typical angle of throw : 26°



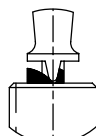
-3V
 3 locked positions (functions 9 and 4)
 Typical angle of throw : 20°



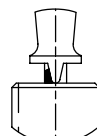
-4V
 Functions 9 & 4



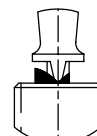
-5V
 Functions 7 & 442R



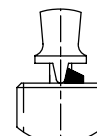
-7V
 Function 8



-8V
 Functions 9, 44 & 441R



-9V
 Function 8

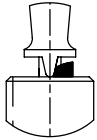
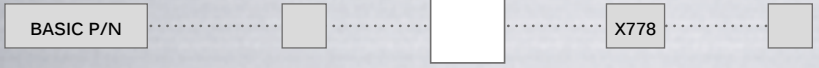


-11V
 Functions 8, 9 & 44

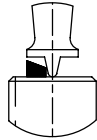
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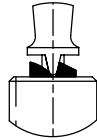
LOCKING LEVERS (CONTINUED)



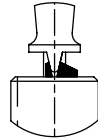
-12V
Functions 7, 8 & 441R



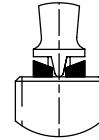
-13V
Funct 5, 7 & 442R



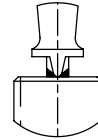
-15V
Function 8



-16V
Functions 4 & 9



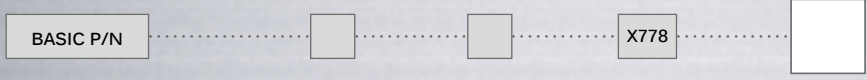
-17V
Functions 7 & 442R



-20V
Functions 9 & 44

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

AGENCY APPROVAL



- 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.