C

DESIGNED EXCLUSIVELY FOR SURFACE MOUNTING

SMT TP Series switches incorporate many desireable features that include:

- **Tape & reel packaging**
  This type of packaging is recommended for:
  - economy
  - suitability for automated placement
  - handling of large quantities of components per packaging unit
  - positive component positioning
  - protection of terminals against damage during handling
  - high static resistance

- **Reflow solderable**
  - High temperature plastic materials
  - Tin plated grounding brackets
  - Tin-lead alloy over nickel terminal plating
  - Terminals turned outward to prevent the shadow effect in infrared soldering and to permit visual inspection of the solder joints
  - .021" (0.55mm) air gap between p.c. board and switch case
  - End stackable with .400" (10.16mm) pitch
  - Available with positioning pins to assure correct switch orientation during the reflow process and provide additional mechanical integrity

- **Protected against electrostatic discharges (ESD) up to 10 KV.**

- **Washable**
  Switches are designed to withstand cleaning processes, including hot water under pressure.

Surface mount devices (SMD) are subject to more stringent constraints of temperature, solderability, sealing and space savings than through-hole components.

To meet these requirements, APEM has designed a family of tiny surface mount switches that include TL Series toggle switches, TP Series pushbutton switches, TR Series rocker switches & TG Series slide switches. See toggle, rocker & slide switch sections of catalog for TL, TR & TG Series respectively.



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

TP SERIES - SMT WASHABLE TINY PUSHBUTTON SWITCHES

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

ELECTRICAL SPECIFICATIONS

Contact ratings (resistive lds.):	0.4 VA at 20 V max. (AC or DC)
Minimum load:	10 mA at 50 mV or 10µA at 5 VD
Initial contact resistance:	50 milliohms maximum
Insulation resistance:	1000 MΩ min. at 500 VDC
Dielectric strength:	1000 V rms between terminals & frame. 500 V rms between terminals
Electrical life (at full load):	60,000 cycles
Static resistance:	10 KV (Schaffner equipment)

GENERAL SPECIFICATIONS

Travel:	ON-MOM .039" (1mm), OFF-MOM. .031" (0.8mm)
Operating temperature range:	-40°C to +85°C
Moisture resistance:	21 days per IEC 512-6 test 11c
Vibration resistance:	10-500 Hz/10g per IEC 512-4 test 6d
Shock resistance:	50 g per IEC 512-4 test 6c

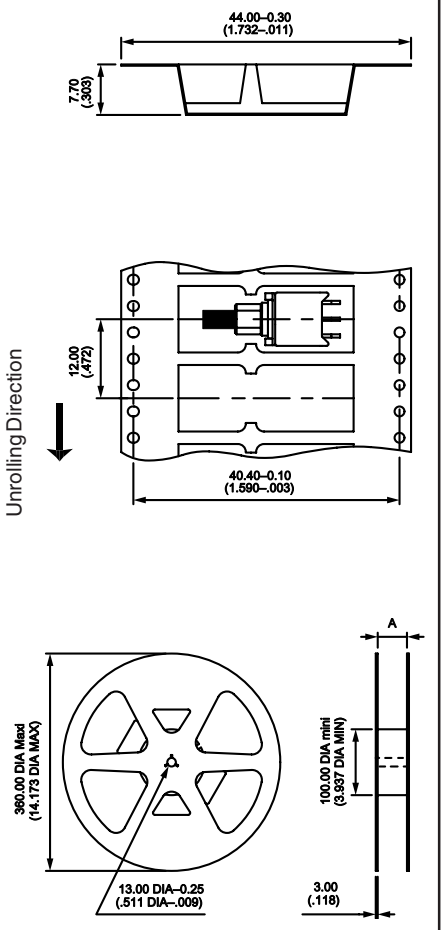
MATERIALS

Case:	High temperature plastic UL94V-0
Actuator:	High temperature plastic UL94V-0
Grounding brackets:	Tin plated steel (includes positioning pins)
Contacts:	Gold plated brass
Terminals:	Brass with tin-lead alloy over nickel plate
Terminal seal:	Epoxy

SOLDERING AND CLEANING

Reflow soldering:	Infrared, vapor phase and infrared convection
Washable:	Per IEA-RS448-2: water and detergent - preferred. Solvents.

PACKAGING



Standard packaging unit:
700 pieces
Tape meeting international standard IEC Publication 286-3 (EIA481A)
Start leader: 15.7" (400mm) min.
Dimension 'A': 1.748" (44.40mm)

TP SERIES - SMT WASHABLE TINY PUSHBUTTON SWITCHES

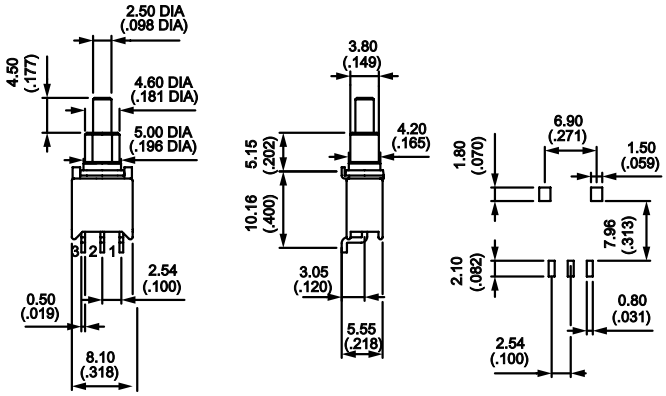
C

Single pole momentary pushbutton switches



MODEL NO.	CIRCUIT	
TP32WS83500	ON	MOM
TP33WS83500	OFF	MOM
Handle position:		

Function 2 shown

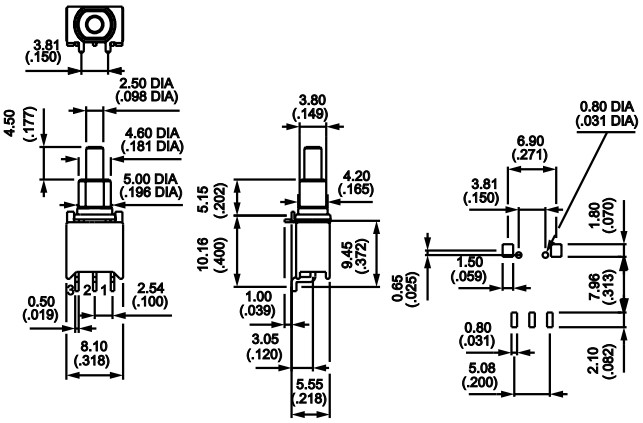


Single pole momentary pushbutton switches with positioning pins

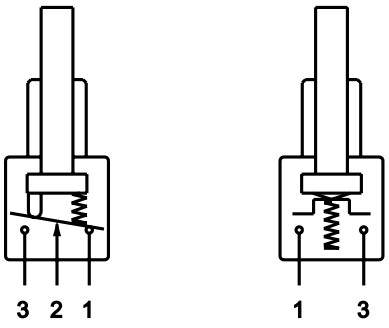


MODEL NO.	CIRCUIT	
TP32WS83565	ON	MOM
TP33WS83565	OFF	MOM
Handle position:		

Function 2 shown

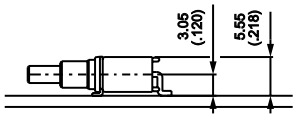


SWITCH ACTION



Function 2 Function 3

P.C. BOARD DIMENSIONS



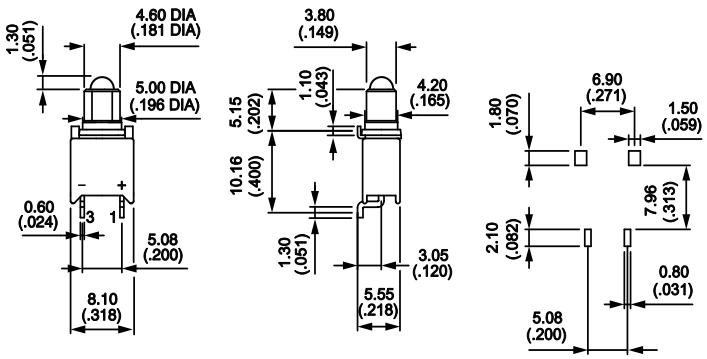
LED INDICATOR IN TINY PUSHBUTTON PKG.

ELECTRICAL SPECIFICATIONS

Forward voltage:	Red; 3.0 volts at 10 milliamps (2V typical) Green; 3.0 volts at 20 milliamps (2.2V typical) Yellow; 3.0 volts at 10 milliamps (2.1V typical)
Reverse voltage:	5.0 volts minimum
Viewing angle (total):	90°
Wavelength:	Red; 635 nm Green; 565 nm Yellow; 585 nm
PACKAGING	Tape & reel



MODEL NO.	COLOR
TV01WS00100	Red
TV02WS00100	Green
TV03WS00100	Yellow



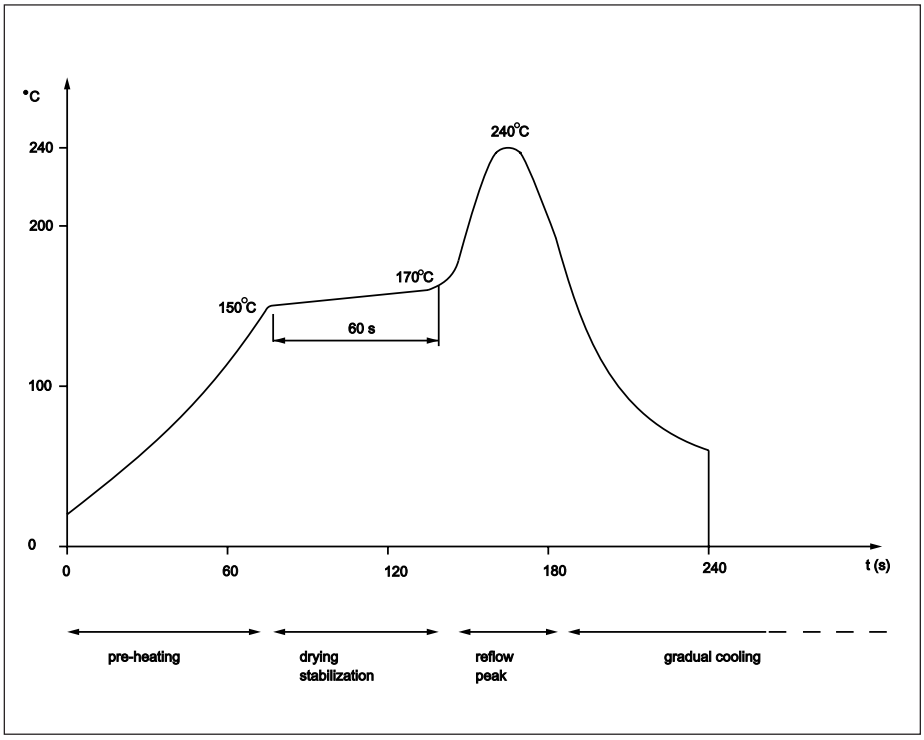
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

REFLOW SOLDERING - STANDARD PROFILE

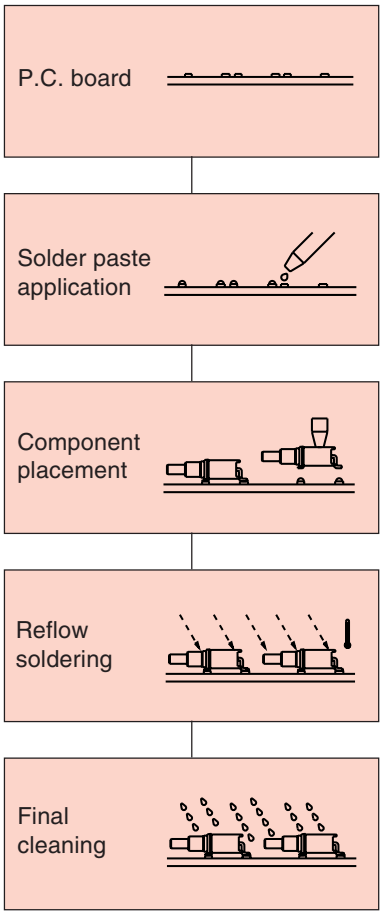
The printed circuit board, carried by a conveyor belt,travels through the reflow soldering oven and experiences the following programmed cycles:

a. pre-heat to a maximum of 200°C for 30 seconds
b. reflow at a maximum of 245°C for 10 seconds
c. final cleaning

TEMPERATURE/TIME PROFILE (typical)

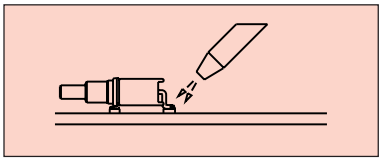


PROCESSING STEPS



P.C. BOARD REWORK RECOMMENDATIONS

Hot air reflow technique is preferred. Avoid the use of a soldering iron.



Caution: Excessive and/or repeated high temperature exposure may affect switch performance & reliability.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

C

New! ZP SERIES - TINY PUSHBUTTON SWITCHES, PANEL & P.C. MTG.



FEATURES

- **Wave solderable.**
- **Metal bushing, threaded with flat, or plain.**
- **Ultra-compact case size.**
- **SP momentary models with epoxy sealed terminals.**

SPECIFICATIONS

Contact ratings (resistive loads):	Gold plated brass; 0.4 Volt-Amps max. at 20 V max. Silver plated brass; 0.5 Amps at 48 V max.
Minimum load:	10 mA at 50 mV - 10µA at 5 VDC
Initial contact resistance:	50 milliohms maximum
Insulation resistance:	1000 megohms minimum at 500 VDC
Dielectric strength:	1000 V rms minimum between terminals and frame. 500 V rms between terminals..
Electrical life:	Gold contacts: 2 positions, 60,000 cycles min. 3 positions, 30,000 cycles min. Silver contacts: 2 positions, 20,000 cycles min. 3 positions, 10,000 cyclesmin.
Operating temperature range:	-30°C to +85°C
Moisture resistance:	21 days 95% (NFC 20-603 - IEC 8-2-3)
Travel:	ON-MOM: 1.2mm ±0.3 (.047" ±.011) OFF-MOM: 1mm ±0.3 (.039" ±.011)
Terminal strength:	Pull out force 10N (2.24 lbs.)
Torque:	1Nm (0.96 ft-lbs) max. applied between 2 nuts
Panel thickness (max.):	1.5mm (.059") with 2 nuts - 3mm (.118") with 1 nut
Hardware:	Threaded models supplied with 2 hex nuts 7mm (.275") across flats, 1 locking ring and 1 lockwasher. See hardware section of catalog.

MATERIALS

Contacts & Terminals:	Gold or silver plated brass
Actuator:	Glass filled polyamide UL94-VO
Bushing:	Tin plated zamac
Bracket:	Tin plated steel
Case:	UL94-VO thermoplastic
Terminal seal:	Epoxy

ABOUT THIS SERIES

The material in this series is organized in the following sequence:

a. Completely specified switch models
b. 'build your own switch' order format
c. Option drawings

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

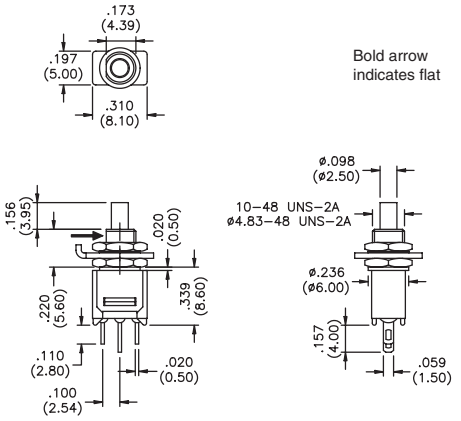
New! ZP SERIES - TINY PUSHBUTTON SWITCHES, PANEL & P.C. MTG.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Solder lug terminals - silver contacts - threaded bushing



MODEL NO.	ON	MOM
ZP32S0101	ON	MOM
ZP33S0101	OFF	MOM

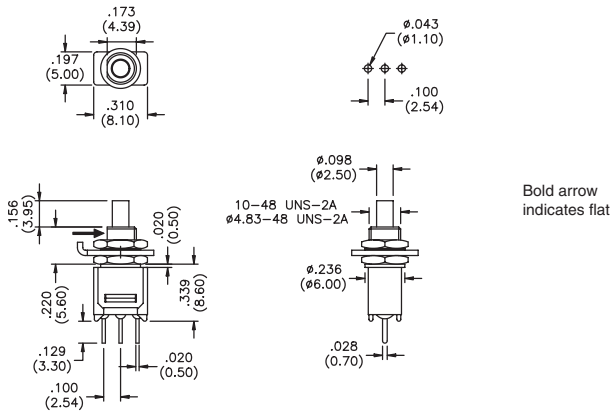


Straight p.c. terminals - gold contacts - threaded bushing



MODEL NO.	ON	MOM
ZP32P0001	ON	MOM
ZP33P0001	OFF	MOM

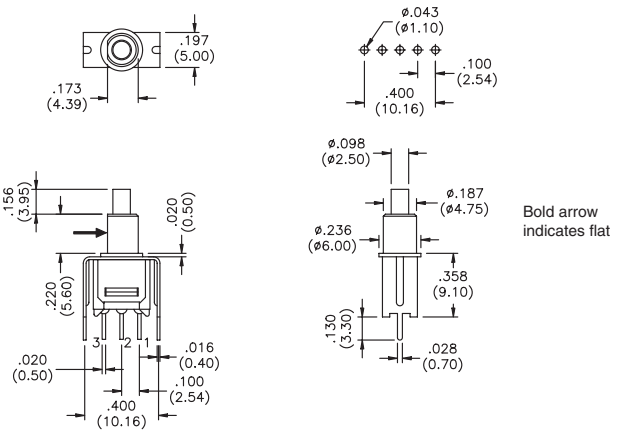
15.20mm (.598") wire-wrap terminals also available - to specify substitute **MW** for **P0** in above model numbers.



Straight p.c. terminals - mtg. bracket - gold contacts - plain bushing



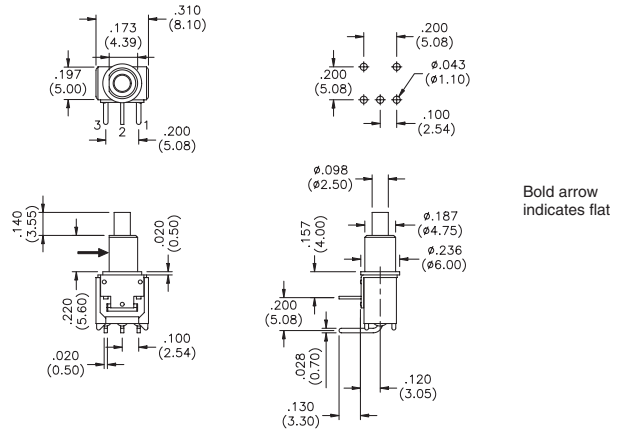
MODEL NO.	ON	MOM
ZP32Y0000	ON	MOM
ZP33Y0000	OFF	MOM



Horizontal right angle terminals - gold contacts - plain bushing



MODEL NO.	ON	MOM
ZP32W0000	ON	MOM
ZP33W0000	OFF	MOM



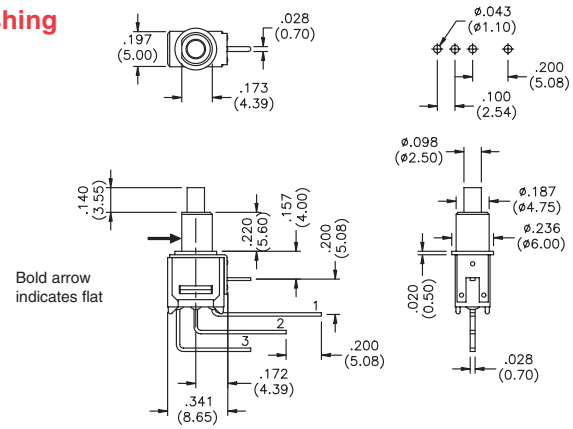
New! ZP SERIES - TINY PUSHBUTTON SWITCHES, PANEL & P.C. MTG.

C

Vertical right angle terminals - gold contacts - plain bushing



MODEL NO.		
ZP32WW000	ON	MOM
ZP33WW000	OFF	MOM



Additional ordering information: Commonly ordered models are shown above with complete model numbers and specifications. Below is an order format that enables you to 'build your own switch' and specify the correct switch model number by simply selecting from all available options shown and filling in the boxes.

'BUILD YOUR OWN SWITCH' ORDER FORMAT

Fill in boxes with selections shown for complete model number.
(Allowable options are shown below each respective box).

Series	Single pole	Electrical functions	Terminals	Contact & terminal mat'ls.	Bushings
Z P	3				

Electrical functions

2	ON	MOM
3	OFF	MOM

Terminals

S	**0**	Solder lug
P	**0**	Straight p.c.
Y	**0**	Straight p.c. with bracket
W	**0**	Horizontal right angle
W	**W**	Vertical right angle
M	**W**	Wire-wrap

Contact & terminal mat'ls.

0	Brass, gold plated
1	Brass, silver plated
3	Brass, gold plated - (1.27 microns gold)

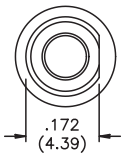
Bushings

0	**0**	Plain
0	**1**	Threaded with flat

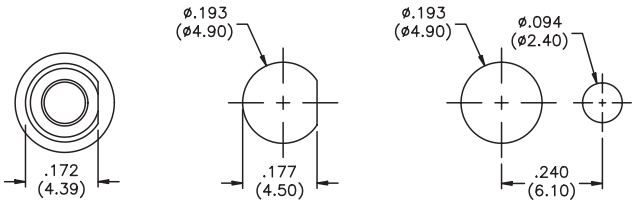
Example of completely specified model number: **ZP32S0001**

Although most combinations of options are available, some may result in incompatibilities. Consult factory if there is any question.

BUSHINGS

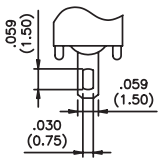


00 Plain, with flat (for models **YO**, **WO** and **WW**)

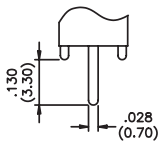


01 Threaded, with flat (for models **P0** and **S0**)

TERMINALS

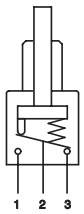


Solder lug

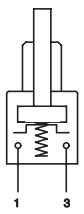


Printed circuit

CROSS SECTIONS



Function 2



Function 3

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

APEM, PO BOX 8288, HAVERHILL, MA USA 01835-0788 TOLL FREE: (877) 246-7890 FAX: (781) 245-4531 E-mail: info@apem.com

TP SERIES - WASHABLE TINY MOMENTARY PUSHBUTTON SWITCHES

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

C



FEATURES

- **Wave solderable.**
- **Fully sealed for process compatibility.**
- **Ultra-compact case size.**
- **Case color options - blue or black (with black actuator).**
- **SPST, SPDT, DPST & DPDT p.c. mounting models.**

SPECIFICATIONS

Contact ratings (resistive loads):	Gold plated brass: 0.4 Volt-Amps max. at 20 V max. Silver plated brass: 0.5 Amps at 48 V max.
Minimum load:	10 mA at 50 mV - 10µA at 5 VDC
Initial contact resistance:	50 milliohms maximum
Insulation resistance:	1000 megohms minimum at 500 VDC
Dielectric strength:	1000 V rms min. between terminals and frame. 500 V rms between terminals.
Electrical life:	Gold contacts: 60,000 cycles min. at full load. Silver contacts: 20,000 cycles
Operating temperature range:	-30°C to +85°C
Plunger travel:	'ON MOM' - .039" (1mm) 'OFF MOM' - .031" (0.8mm)
Washing:	Permissible with water, detergents and solvents.

MATERIALS

Contacts & Terminals:	Gold or silver plated brass
Actuator:	Polyamide (UL94V-O),glass filled
Bracket:	Tin plated steel
Case:	PBT (UL94V-O)
Terminal seal:	Epoxy

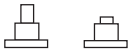
AGENCY LISTINGS

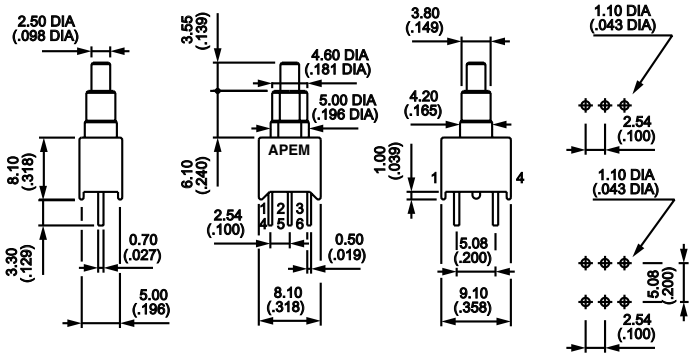
GAM T1 (military). Availability: consult factory for details of listed models.

Note: drawings show switches with 3 terminals (function 2). Function 3 switches have only 2 terminals. See switch cross-sections at end of section.

Straight p.c. terminals - gold plated brass contacts



SINGLE POLE MODEL NO.	CIRCUIT	
TP32P003000	ON	MOM
TP33P003000	OFF	MOM
DOUBLE POLE MODEL NO.	**CIRCUIT**	
TP42P003000	ON	MOM
TP43P003000	OFF	MOM
Handle position:		



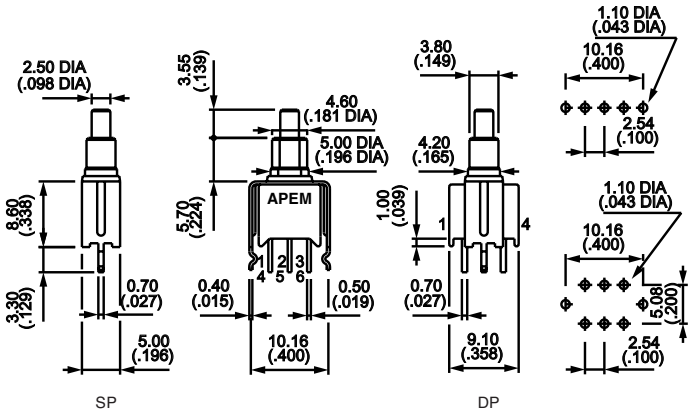
TP SERIES - WASHABLE TINY MOMENTARY PUSHBUTTON SWITCHES

C

Straight p.c. terminals - bracket mounting - gold plated brass contacts



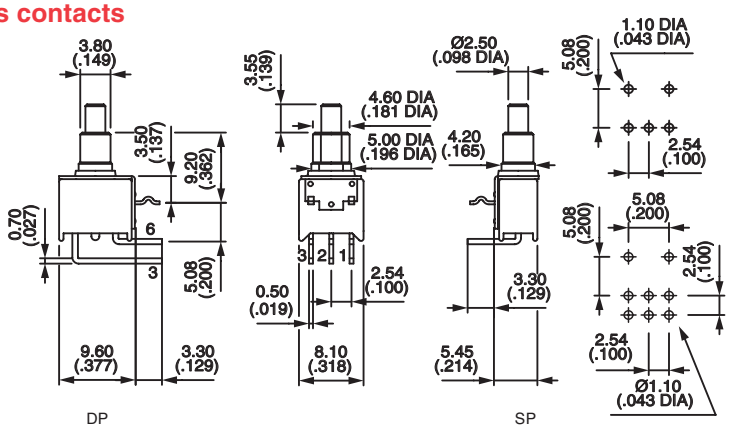
SINGLE POLE MODEL NO.	CIRCUIT	
TP32Y003050	ON	MOM
TP33Y003050	OFF	MOM
DOUBLE POLE MODEL NO.	**CIRCUIT**	
TP42Y003050	ON	MOM
TP43Y003050	OFF	MOM
Handle position:		



Horizontal right angle terminals - gold plated brass contacts



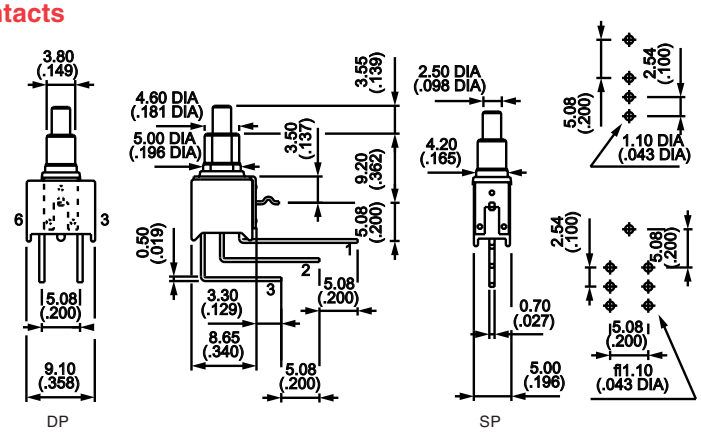
SINGLE POLE MODEL NO.	CIRCUIT	
TP32W003050	ON	MOM
TP33W003050	OFF	MOM
DOUBLE POLE MODEL NO.	**CIRCUIT**	
TP42W003050	ON	MOM
TP43W003050	OFF	MOM
Handle position:		



Vertical right angle terminals - gold plated brass contacts



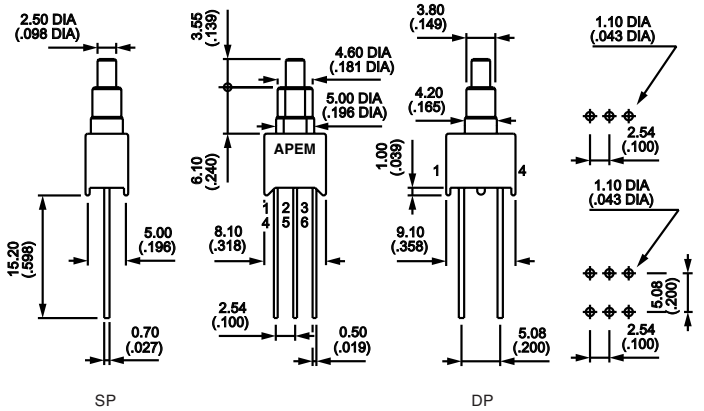
SINGLE POLE MODEL NO.	CIRCUIT	
TP32WW03050	ON	MOM
TP33WW03050	OFF	MOM
DOUBLE POLE MODEL NO.	**CIRCUIT**	
TP42WW03050	ON	MOM
TP43WW03050	OFF	MOM
Handle position:		



Wire-wrap terminals - gold plated brass contacts



SINGLE POLE MODEL NO.	CIRCUIT	
TP32MW03000	ON	MOM
TP33MW03000	OFF	MOM
DOUBLE POLE MODEL NO.	**CIRCUIT**	
TP42MW03000	ON	MOM
TP43MW03000	OFF	MOM
Handle position:		



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

TP SERIES - WASHABLE TINY MOMENTARY PUSHBUTTON SWITCHES

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Additional ordering information: Commonly ordered models are shown above with complete model numbers and specifications. Below is an order format that enables you to 'build your own switch' and specify the correct switch model number by simply selecting from all available options shown and filling in the boxes.

'BUILD YOUR OWN SWITCH' ORDER FORMAT

Fill in boxes with selections shown for **Model Structure**, then add **Options** selections for complete model number.
(Allowable options are shown under each respective box).

Model Structure:

Series	Number of poles	Electrical functions	Terminals
T P			
	3 Single pole	**2** ON MOM	**P 0** Straight p.c.
	4 Double pole	**3** OFF MOM	**Y 0** Straight p.c.with bracket
			W 0 Horizontal right angle
			W W Vertical right angle
			M W Wire-wrap

Options:

Contact & terminal mat'ls.

- **0** Brass, gold plated
- **1** Brass, silver plated
- **3** Brass, gold plated - (1.27 microns gold)
- **8** Brass, gold plated contacts with tin plated terminals
- **9** Contacts brass, gold plated (1.27 microns gold) and tin plated terminals

Actuators & case colors

Specify **30, 35, 80, 82,** or **85**
See drawings with specifications and dimensions.

Example of completely specified model number: **TP32Y00305025**

Miscellaneous

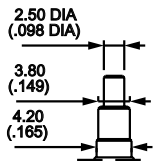
- **0 0** No special requirement
- **5 0** Crimped bracket terminals - specify for models with brackets. See additional listings on following page.

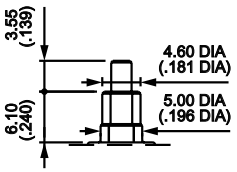
Caps (for long actuator only)

- **3 0***
- **4 0***
- * - Specify color - see caps below.

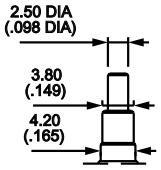
OPTION DRAWINGS

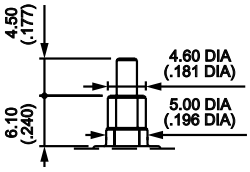
Actuators & case colors



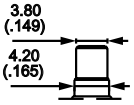


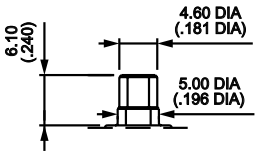
Short (standard) Blue case **30** Black case **80**





Long Blue case **35** Black case **85**

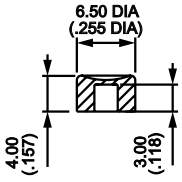




Flush Black case **82**

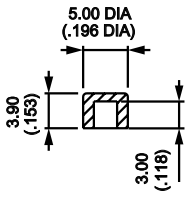
CAPS Note: replace last '0' in part numbers with color code.

For long actuator only



30
U4310 If ordered separately

For long actuator only



40
U4320 If ordered separately

Colors	
1	blue
2	black
3	green
4	grey
5	yellow
6	red
7/1	white
9	orange

C

SPECIAL OPTIONS & MISCELLANEOUS

SPECIAL OPTIONS

00 No special requirement.

07 Trimmed terminals for **WW** models only - .125" (3.2mm).

08 Extended terminals for **W0** models only.

18 **WW** models without mounting bracket.

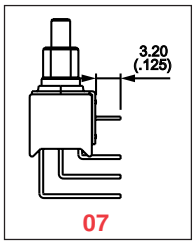
20 **WW** models with mounting bracket and p.c. board spacer tab.

25 Trimmed terminals for all models except **WW** - .196" (5mm).

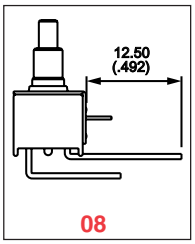
30 Wire-wrap terminals on models with **Y** bracket.

40 With cap **U3500** mounted over plunger and bushing. Provides additional protection during soldering & cleaning.

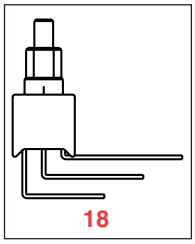
50 Crimped bracket terminals (retains switch on p.c. board during assembly and soldering). For models with **W0, WW** & **Y0** terminals.

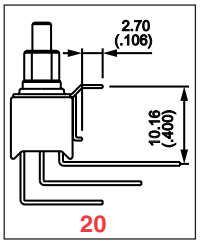


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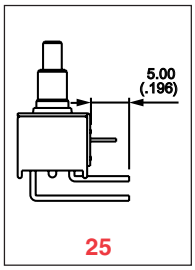


08

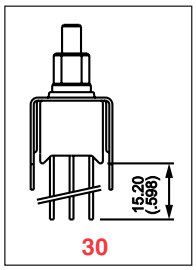

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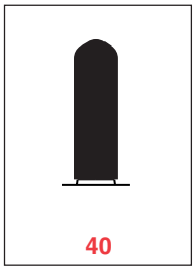
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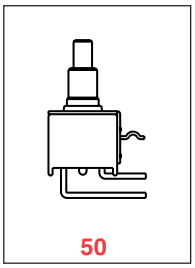


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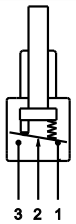


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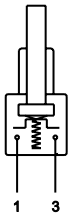

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50

Switch cross-sections



Function 2 (ON MOM)



Function 3 (OFF MOM)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE