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SPECIFICATION CONTROL DOCUMENT, SERIES 250, LIGHT-EMITTING DIODE (LED) LIGHTED PUSHBUTTON SWITCHES AND INDICATORS



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1.0 SCOPE

This Specification Control Document (SCD) defines the requirements for the Series 250 pushbutton switch assemblies and companion products. Companion products are covered by their respective SCD's.

The Staco Systems Series 250 is a complete product line of high brightness light-emitting diodes (HB LED) lighted pushbutton switches and indicators.

This product line conforms to the general requirements of MIL-PRF-22885, and, in matrix form, MIL-S-24317.

The high-brightness LED light source is qualified for NVIS under MIL-L-85762 (when applicable), MIL-STD-3009, and MIL-PRF-22885.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. Where specific paragraphs are called out, all subordinate paragraphs also apply. Where individual paragraphs are not specified, the document is applicable in its entirety.

2.1. Staco Systems Documents

Series 250 SCD	Specification Control Document, Series 250, Light-Emitting Diode (LED) Lighted Pushbutton Switches and Indicators
ICD-F250	Interface Control Drawing, Front Mount Matrix, S250
ICD-R250	Interface Control Drawing, Rear Mount Matrix, S250

2.2. Government Documents

Military Specifications

MIL-PRF-22885	General specification for switches and illuminated push button.
MIL-S-24317	General Specification for Switches, Multi-station, Pushbutton.
MIL-DTL-5541	Chemicals conversion coating on aluminum alloys (chemical-film).
MIL-A-8625	Anodic Coatings for Aluminum Alloys.
MIL-R-25988	Oil and Fuel Resistant for Rubber, Fluor silicone Elastomer.
MIL-G-45204	Gold Plating, Electrodeposited.
MIL-I-45208	Inspection Systems Requirements.
MIL-S-901	Requirements for Shock Tests, High Impact Shipboard Machinery, Equipment, and Systems.

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MIL-L-85762

Lighting, Aircraft, Night Vision Imaging System (NVIS) Compatible.

Military Standards

MIL-STD-202

Test Method for Electronic and Electrical Component Parts.

MIL-STD-108

Definitions of and Basic Requirements for Electric and Electronic Equipment Enclosure.

MIL-STD-454

General Requirements for Electronic Equipment.

MIL-STD-889

Dissimilar Metals.

MIL-STD-45662

Calibration System Requirements.

MIL-STD-3009

Lighting, Aircraft, Night Vision Imaging System (NVIS) Compatible.

3.0 THE SERIES 250 PRODUCT LINE

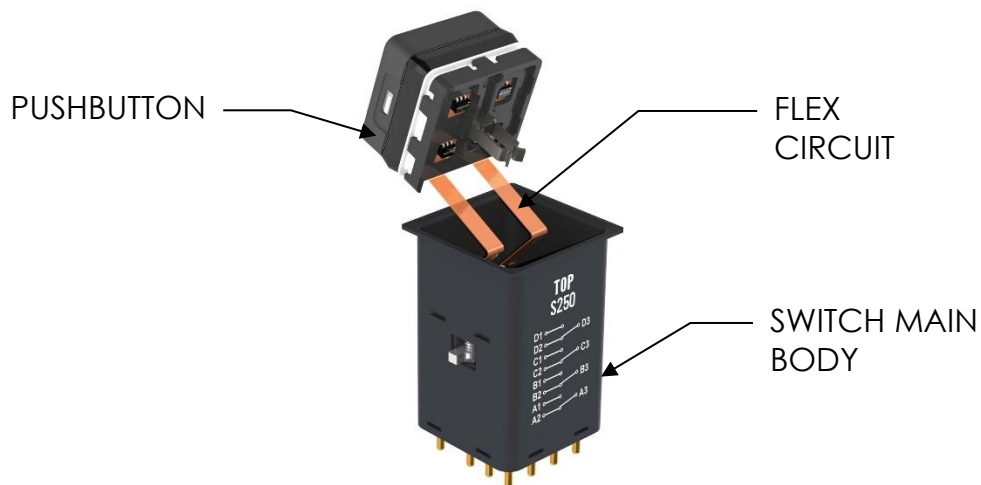


Figure 1: Pushbutton Switch – exploded view (Drip-Proof and PC Termination)

3.1. Coded Configuration

Coded configurations defined in this section are to identify various characteristics and options which are available with standard Series 250 switches.

3.1.1. Standard Coded Configuration

The following enclosure designs defined in MIL-PRF-22885 are available in the Series 250 product line, as shown in [Table XIII: Seal Options](#).

The coded part numbers for splash-proof (type I and III), watertight (type II and IV) are as follows:

250xxx-xx1xxxxxxx S250 splash-proof pushbutton switch / indicator.

250xxx-xx2xxxxxxx S250 watertight pushbutton switch / indicator.

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Figures 2 thru 5 depict a typical splash-proof and watertight enclosure designs, in various terminations.

Each switch or indicator assembly intended for individual mount application is provided with a set of mounting hardware, which consists of a panel spacer and two mounting sleeves. These are used in conjunction with the mounting screws and cam nuts (located on two opposite sides of switch's main body) to install the switch/indicator to the panel. Refer to [Figure 6: Drip Proof \(PCB Termination Version Shown\) Panel Spacers and Mounting Sleeves not shown for clarity](#)).

Each splash-proof pushbutton switch assembly is provided with a splash-proof panel seal to meet the splash-proof requirements of MIL-PRF-22885. Refer to [Figure 2: Drip-Proof \(PCB Termination Version Shown\)](#) and [Figure 4: Drip Proof \(Crimp Pin Termination\)](#)

Each watertight pushbutton switch assembly is provided with a watertight pushbutton seal assembly and panel seal, which prevents leakage of water, sand and dust. This system meets the watertight requirements of MIL-PRF-22885. Refer to [Figure 3: Splash Proof/ Watertight \(PCB Termination Version Shown\)](#) and [Figure 5: Splash Proof/ Watertight Details](#).

For extended mount applications, the panel spacer may be used. This feature is to enable the pushbutton to align with commonly used edge-lighted panels when applicable. For flushed mount application, the panel spacer can be discarded. Refer to [Figure 22: Drip-proof Design \(Flush Mount and Extended Mount \)](#), and [Figure 23: Splash Proof/ Watertight Design](#), for flushed and extended mounts outline dimensions.

The pushbutton is attached to the main body as an integral part of the flex circuit assembly. This ensures that the push button can only fit into the switch's main body one way. A snap-retainer mechanism is designed into the pushbutton to ensure that it cannot become separated from the body unexpectedly due to shock, vibration, or sudden hand movement, whatever the position of the pushbutton. See [Figure 7: Locking Mechanism \(Drip-Proof Version Shown\)](#) for snap-retainer mechanism.

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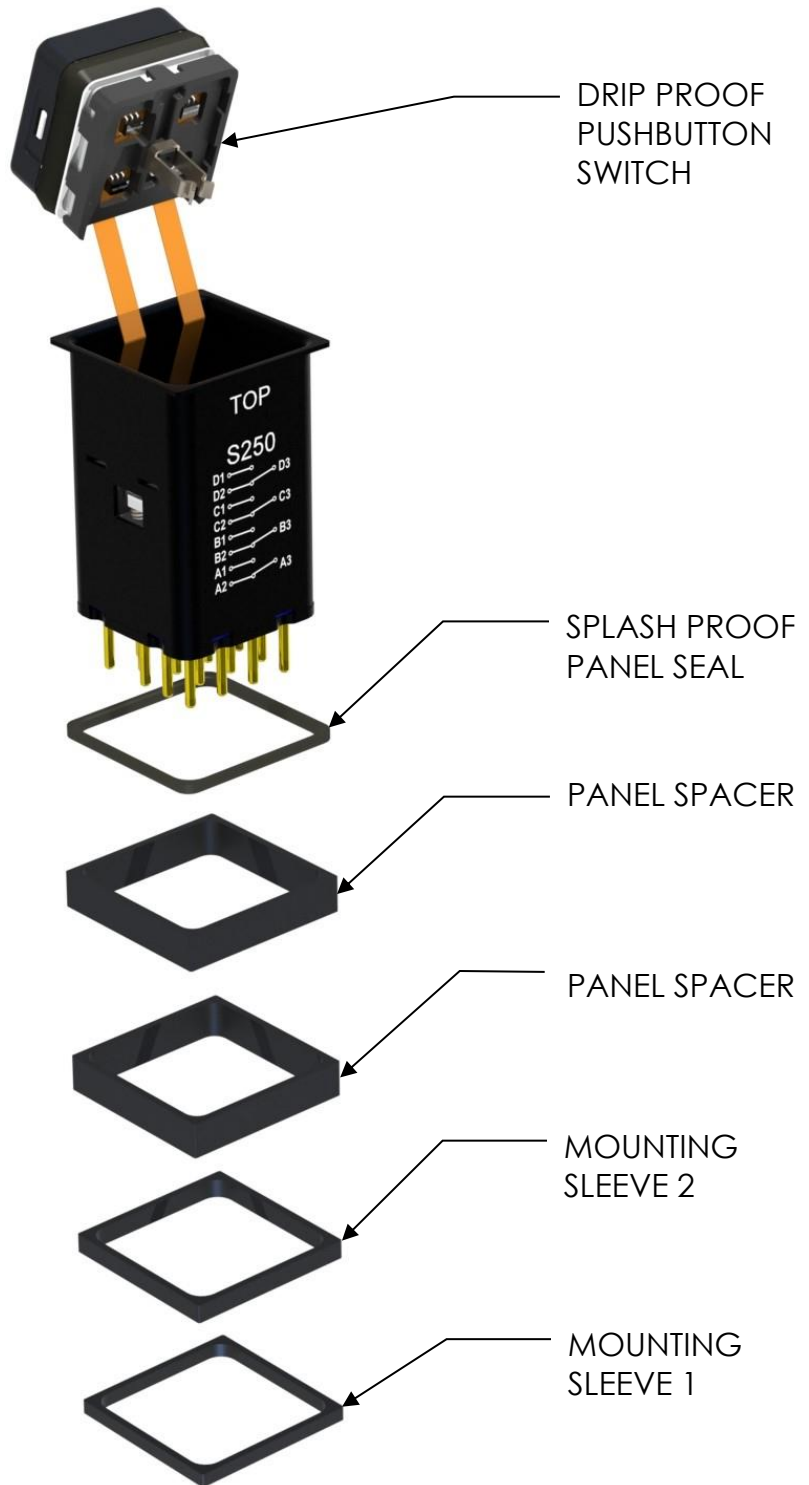


Figure 2: Drip-Proof (PCB Termination Version Shown)

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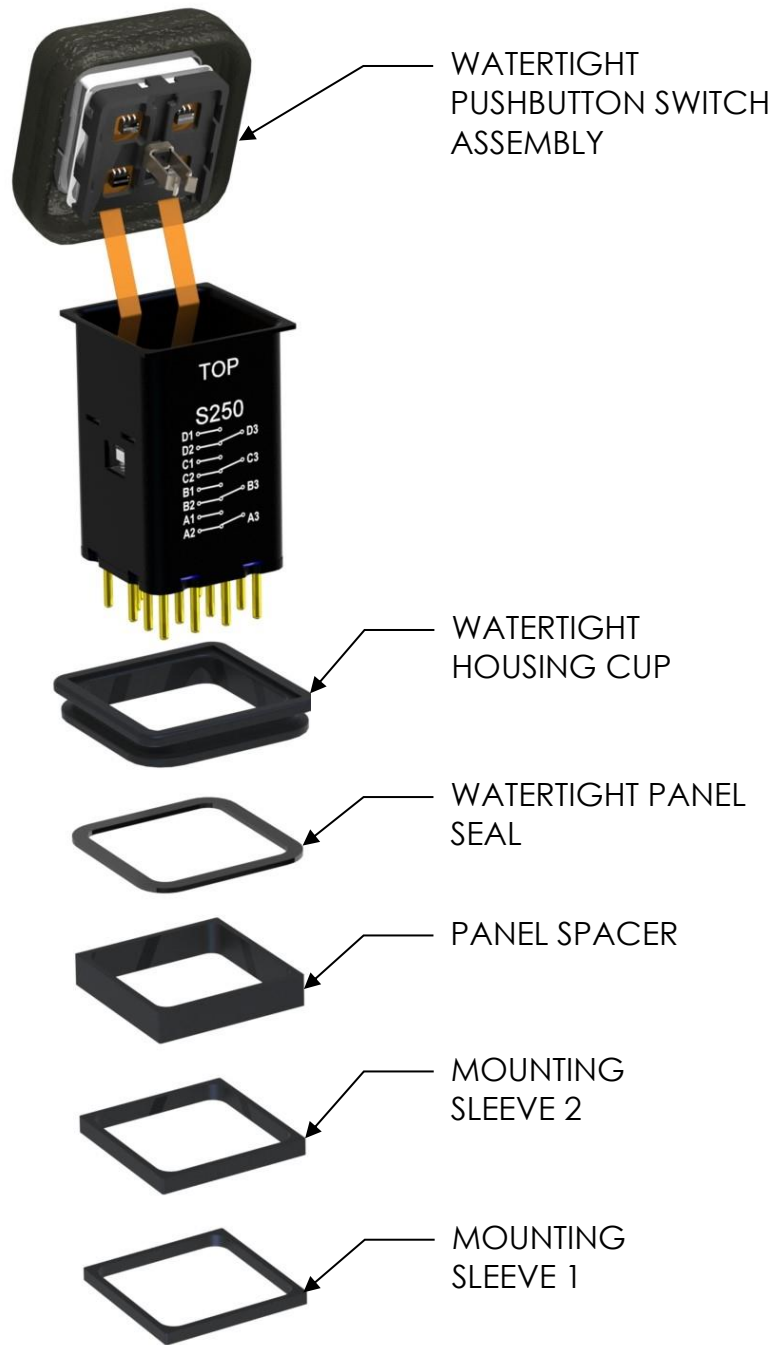


Figure 3: Splash Proof/ Watertight (PCB Termination Version Shown)

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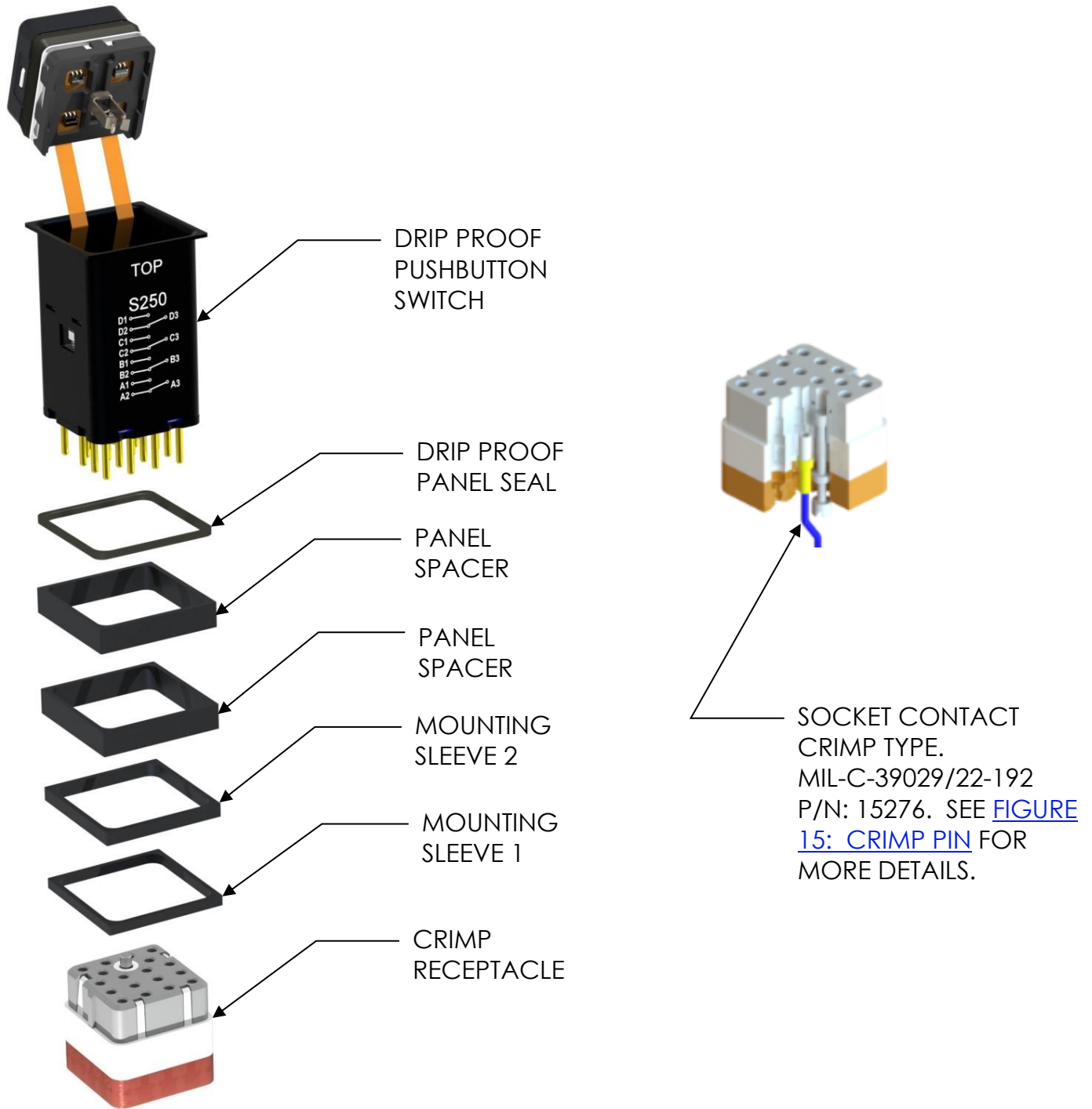


Figure 4: Drip Proof (Crimp Pin Termination)

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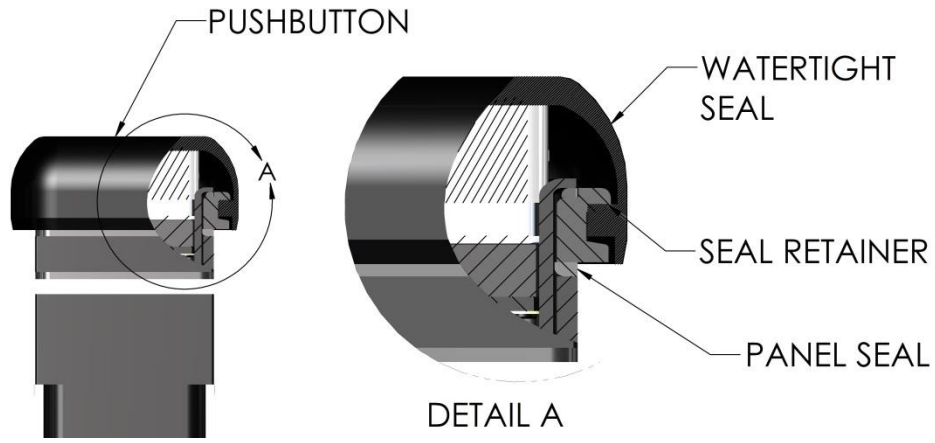


Figure 5: Splash Proof/ Watertight Details

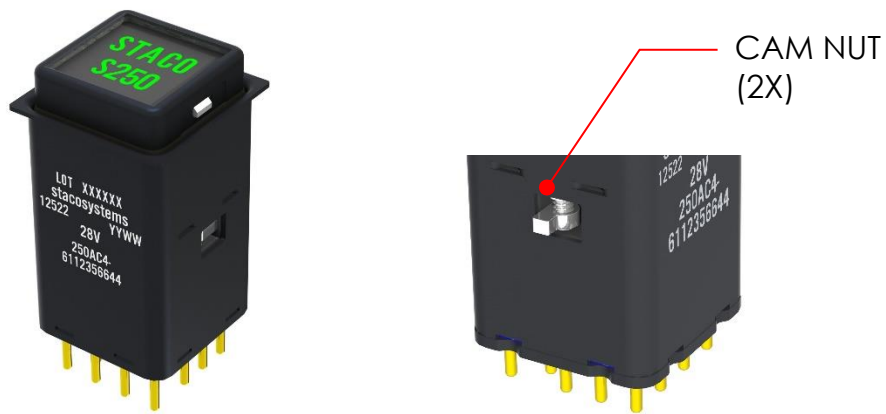


Figure 6: Drip Proof (PCB Termination Version Shown, Panel Spacers and Mounting Sleeves not shown for clarity)

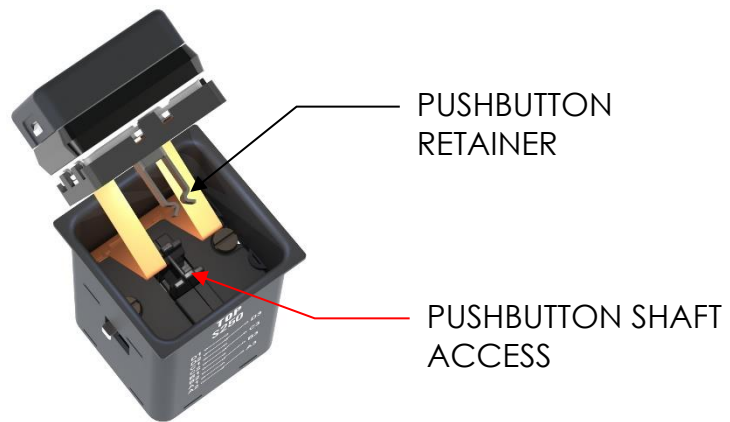


Figure 7: Locking Mechanism (Drip-Proof Version Shown)

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3.1.2. Customized Configurations

Customized configurations are unique in which they conform to a specific customer-defined configuration and/or have unique requirements for performance, marking, or both.

Customized configurations shall be designed and manufactured to meet the general requirements of MIL-PRF-22885 whenever possible. However, specific customer-invoked design requirements may compromise certain performance characteristics and thus prevent total compliance with the details of the mentioned specification.

25XXXX-TAB numbers shall be used when define non-standard pushbutton switch assembly. Such as:

- a. Customized artworks; and/or
- b. Customized form, fit, and / or function; and/or
- c. Customized marking; and/or
- d. When the customers/sales require that a non-coded part number to be used

The XXXX in this model number is a 4-digit, sequentially assigned number. All of these numbers are tabulated and have a three-digit or, under special circumstances, a 3-digit sequential TAB number (Typical example would be 250123-123).

3.2. Matrix Frame Assembly

The pushbutton switch assemblies are available in matrix frames. The matrix frames are available in the following configurations:

ICD F250 – Front dress bezel matrix in solder, PCB, and crimp pin terminations.

ICD R250 – Rear mount flange matrix in solder, PCB, and crimp pin terminations.

Details of matrix frames and specifications are found in Interface Control Drawings ICD-F250 and ICD-R250.

Matrix assemblies are designed, tested and qualified in accordance to the requirements of MIL-S-24317

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4.0 General Specifications

This section provides an overview of the S250 outline dimensions plus mechanical, electrical, display, and optical specifications.

4.1. Outline Dimension

Outline dimensions of splash-proof and watertight switches in various configurations are shown in Figures 9-11. All dimensions are in inches [millimeters].

*Extended housing, lens retainer and lens jacket for improved lighting.

[Figure 12: Solder Termination](#), [Figure 13: PC/Crimp Termination](#) and [Figure 15: Crimp Pin](#) for termination details. Mounting hardware location and dimension are shown in and [Figure 17: Hardware \(Splash-Proof and Watertight\)](#).

4.1.1. Pushbutton Switch and Mounting Hardware

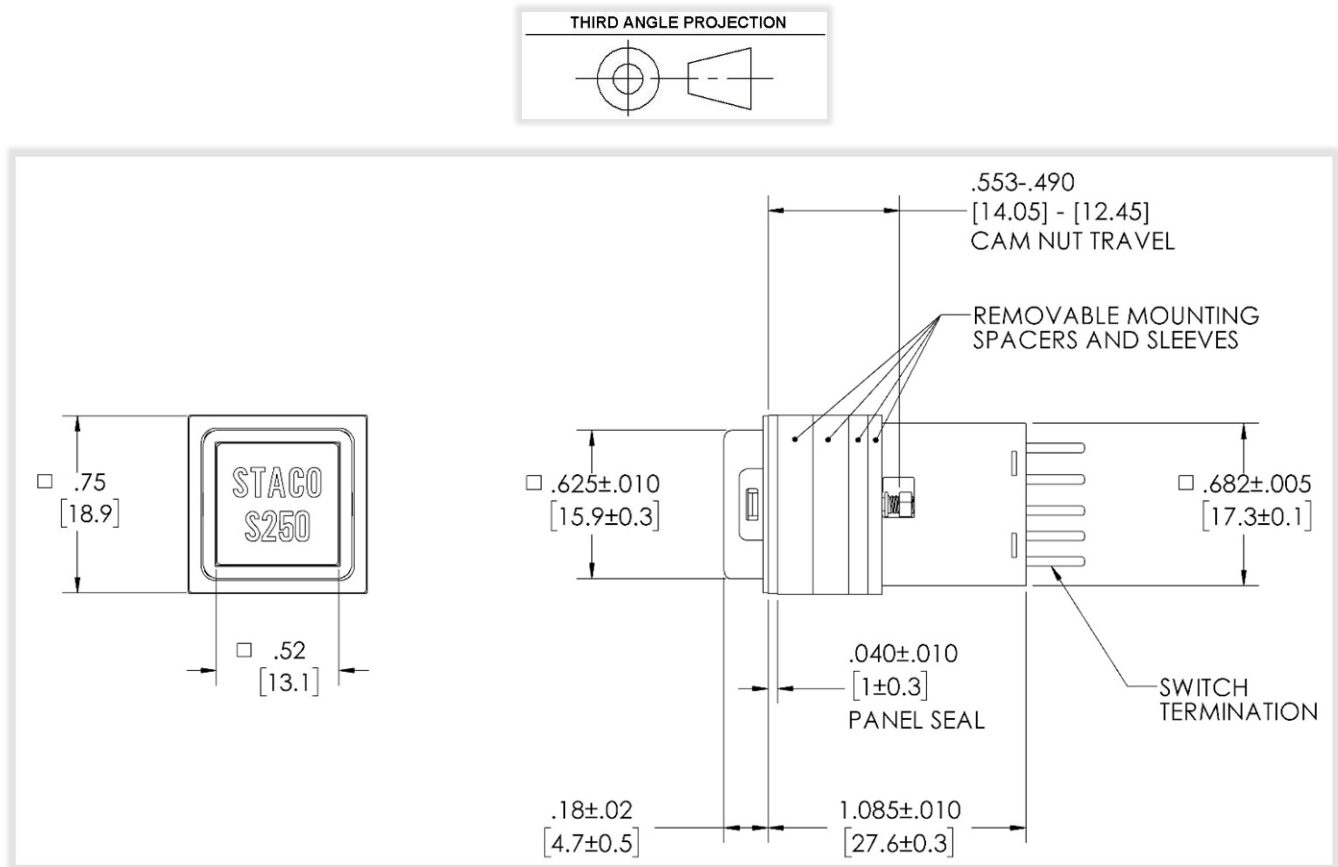


Figure 8: Standard, Drip-Proof Switch Dimensions

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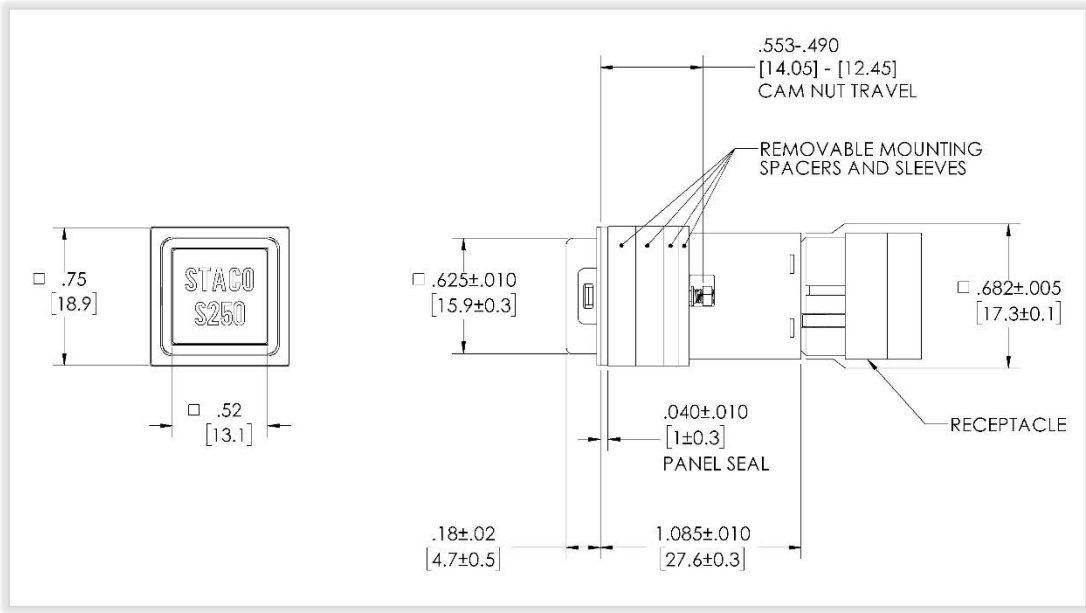
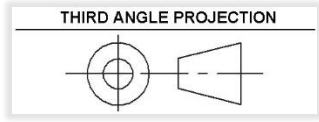


Figure 9: Standard, Drip-Proof Switch with Crimp Receptacle

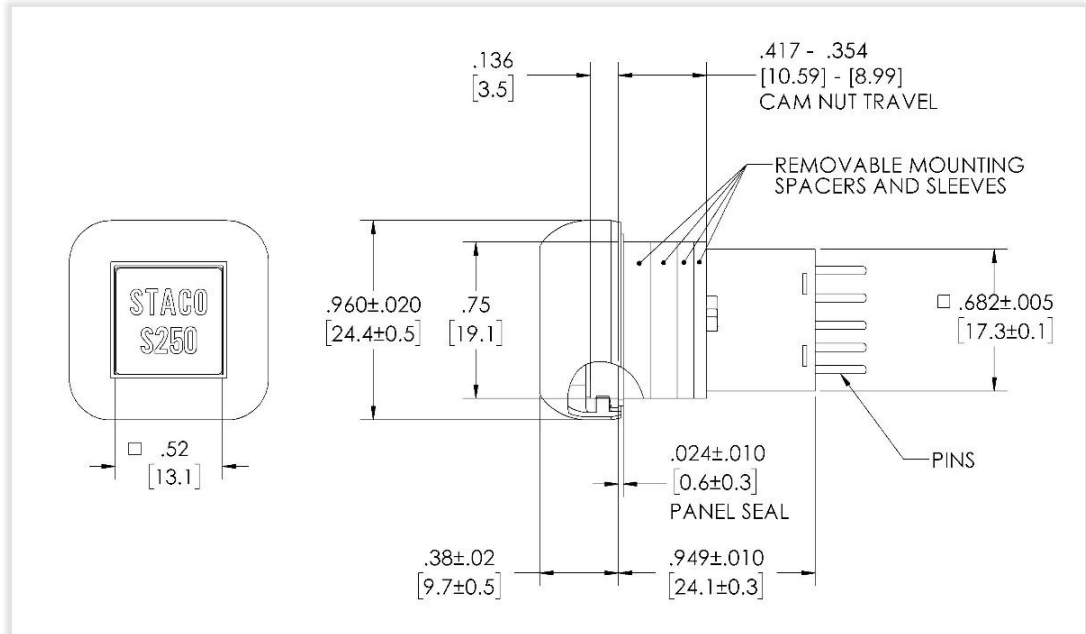
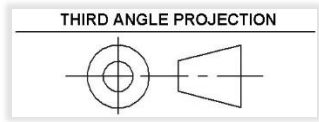


Figure 10: Water-Tight, Splash-Proof Switch

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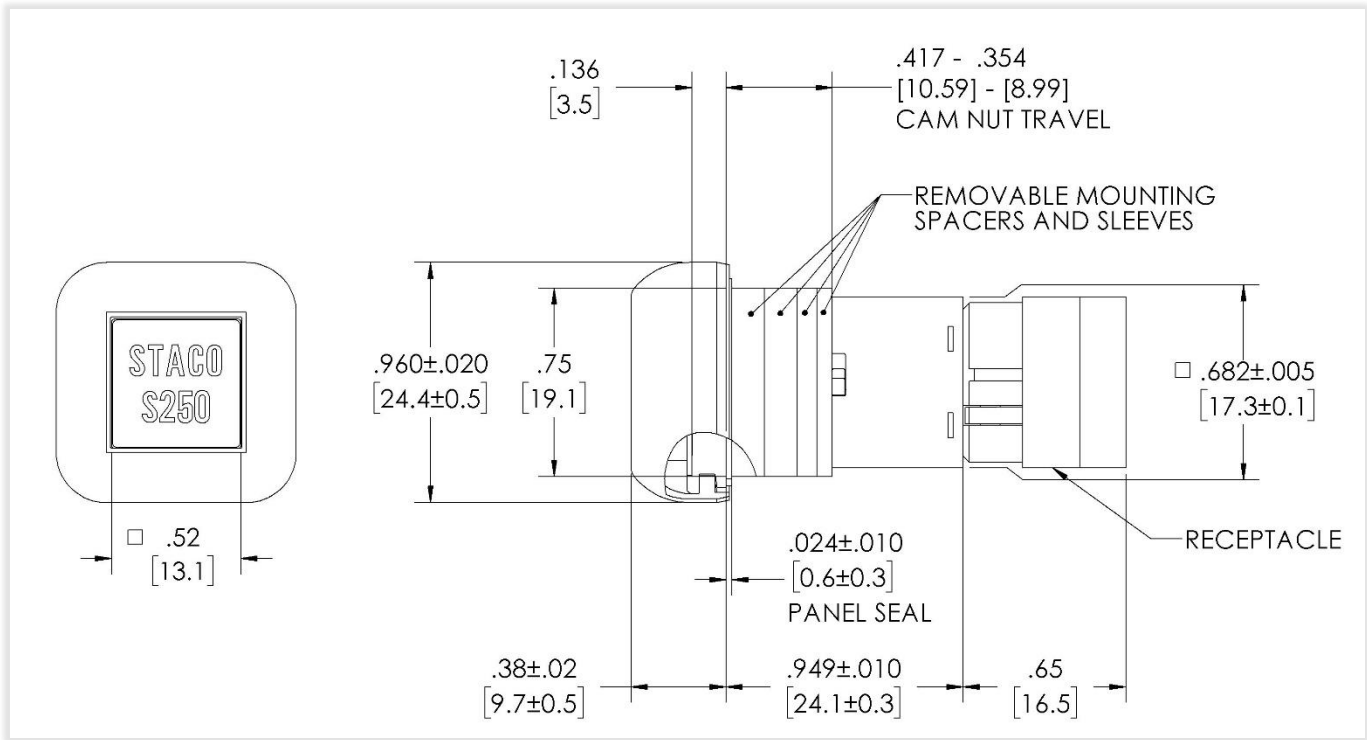
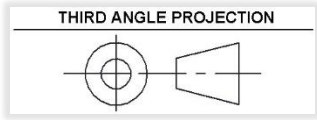


Figure 11: Water-Tight, Splash-Proof Switch with Crimp Receptacle

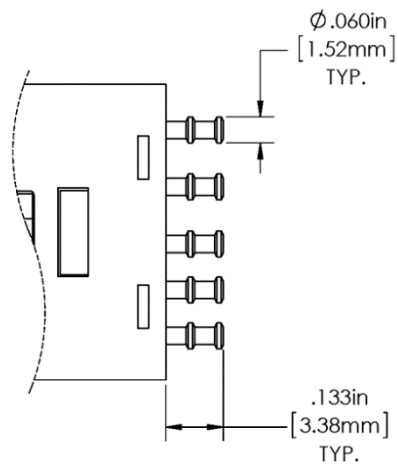


Figure 12: Solder Termination

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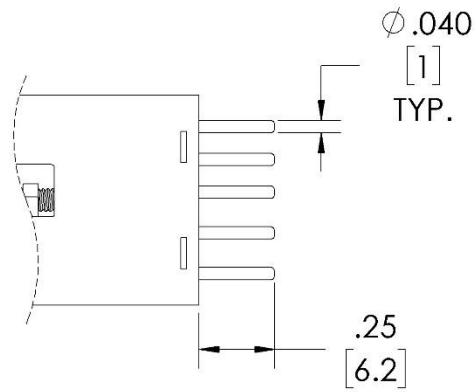


Figure 13: PC/Crimp Termination

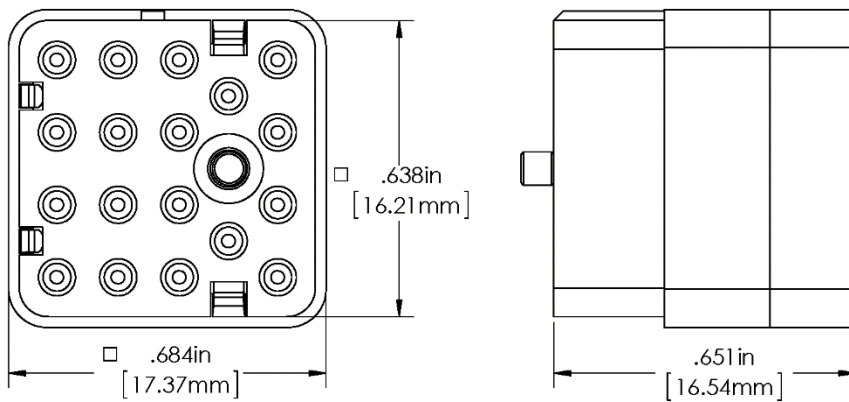
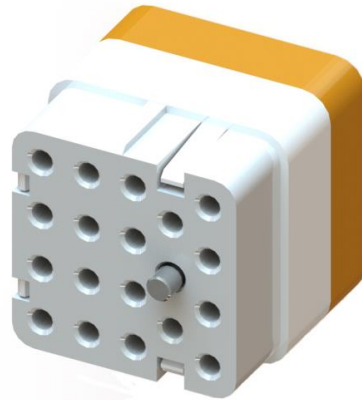


Figure 14: Crimp Termination

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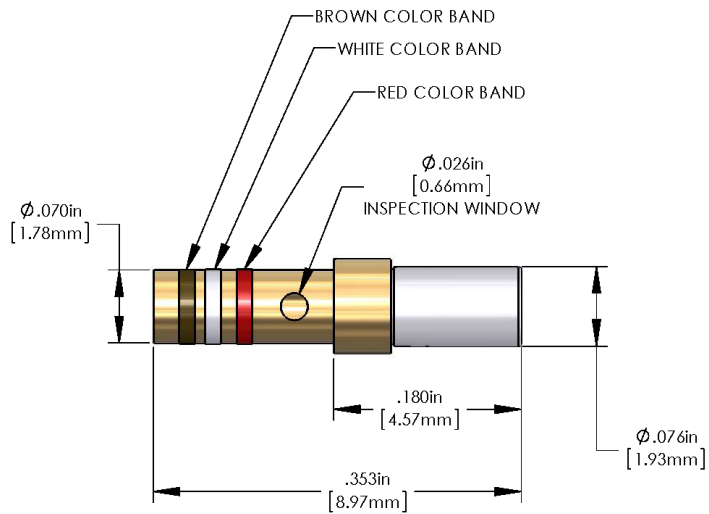


Figure 15: Crimp Pin (MIL-C-39029/22-192, Staco Systems P/N: 15276)

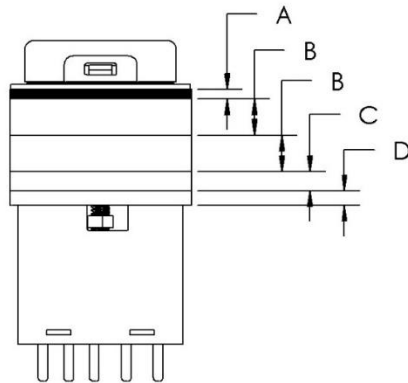


Figure 16: Hardware (Drip-Proof)

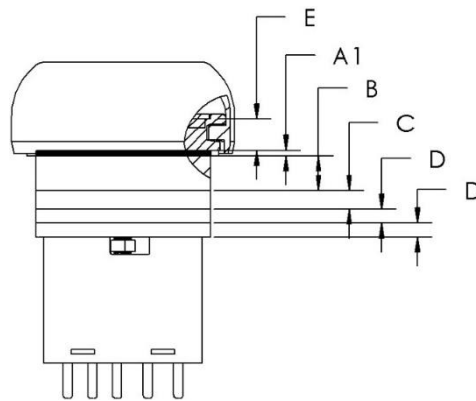


Figure 17: Hardware (Splash-Proof and Watertight)

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Table I: Mounting Hardware Dimension

Symbol	Description	Dimension
A	Drip-Proof Panel Seal*	0.040" [1.02 mm]
A1	Splash-Proof/Watertight Panel Seal*	0.024" [0.61 mm]
B	Panel Spacer	0.150" [3.81 mm]
C	Mounting Sleeve 1	0.080" [2.03 mm]
D	Mounting Sleeve 2	0.060" [1.52 mm]
E	Splashproof/Watertight Spacer	0.136" [3.45 mm]

* Uncompressed height

Mounting Panel

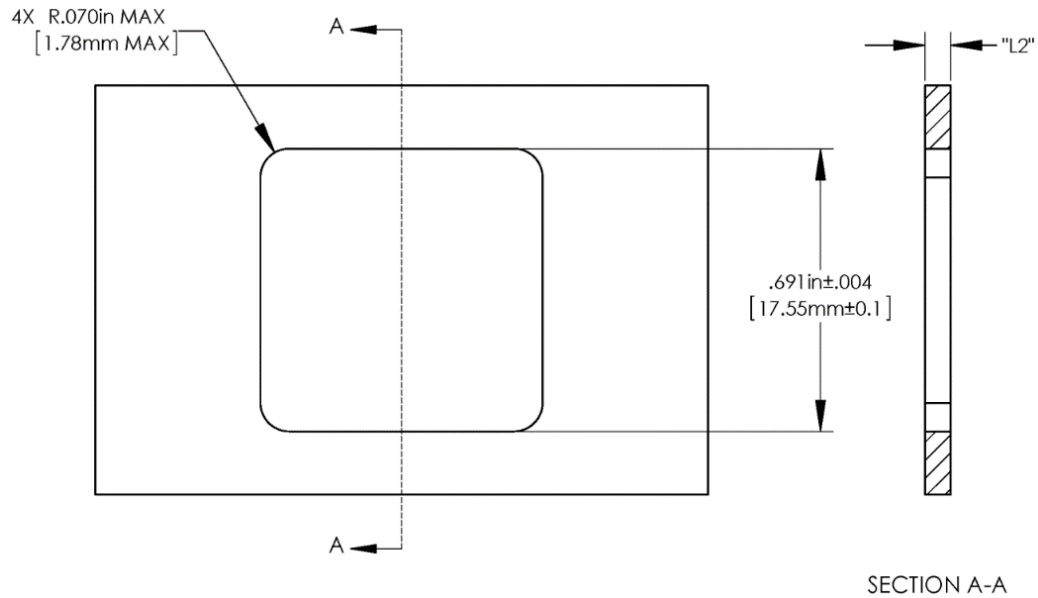


Figure 18: Panel Cutout and Thickness

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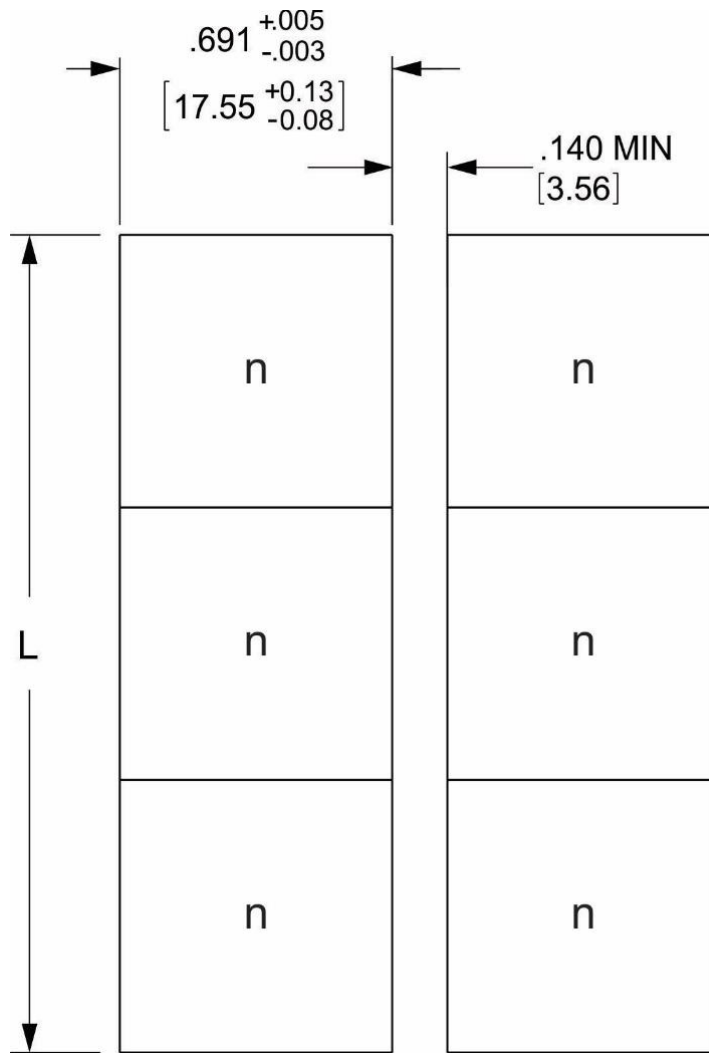


Figure 19: Slot Mount for Type I & III

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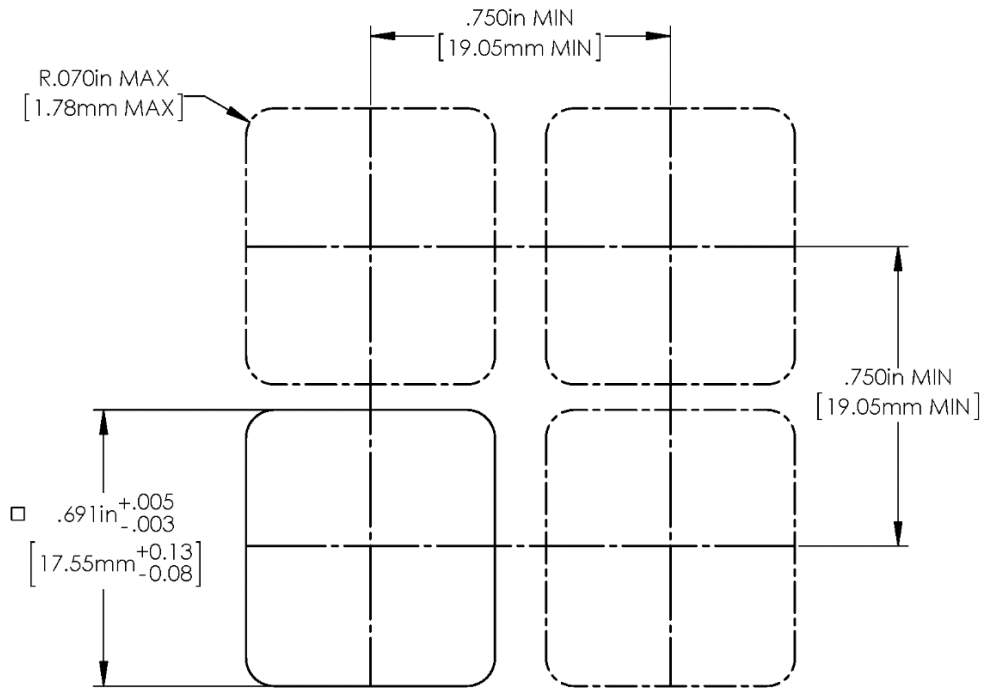


Figure 20: Matrix Mount for Drip-Proof Type

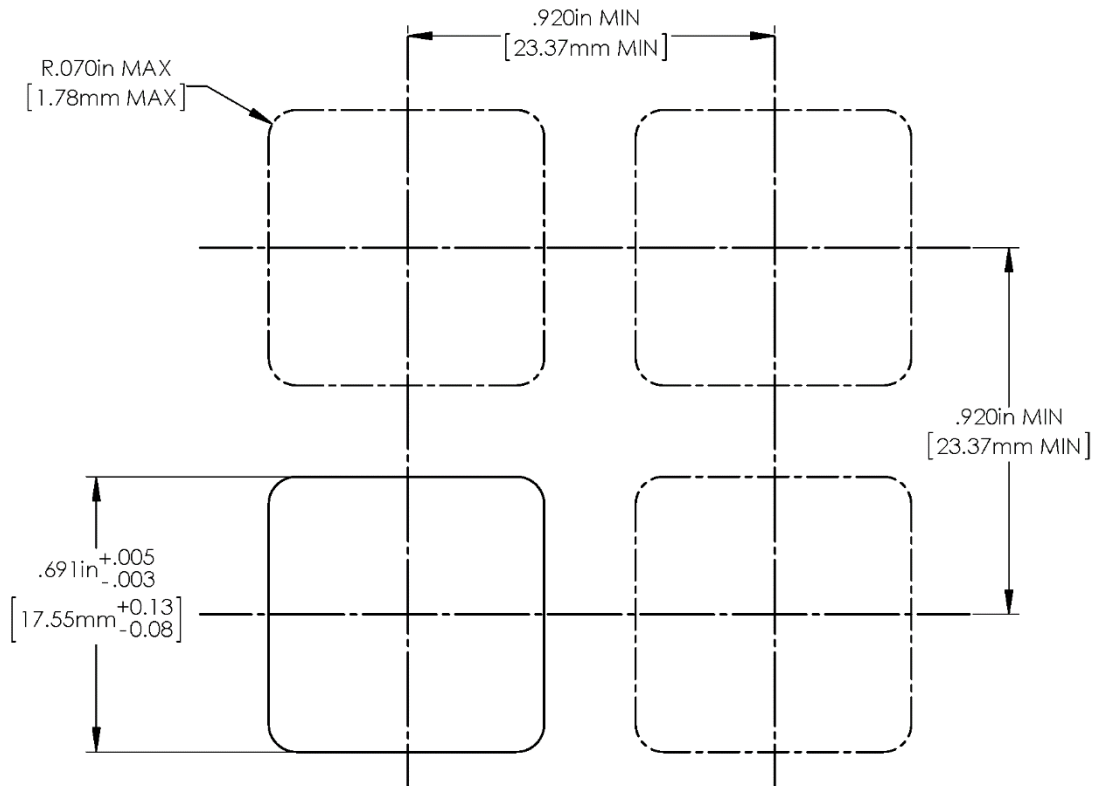


Figure 21: Matrix Mount for Splash-Proof/ Watertight Type

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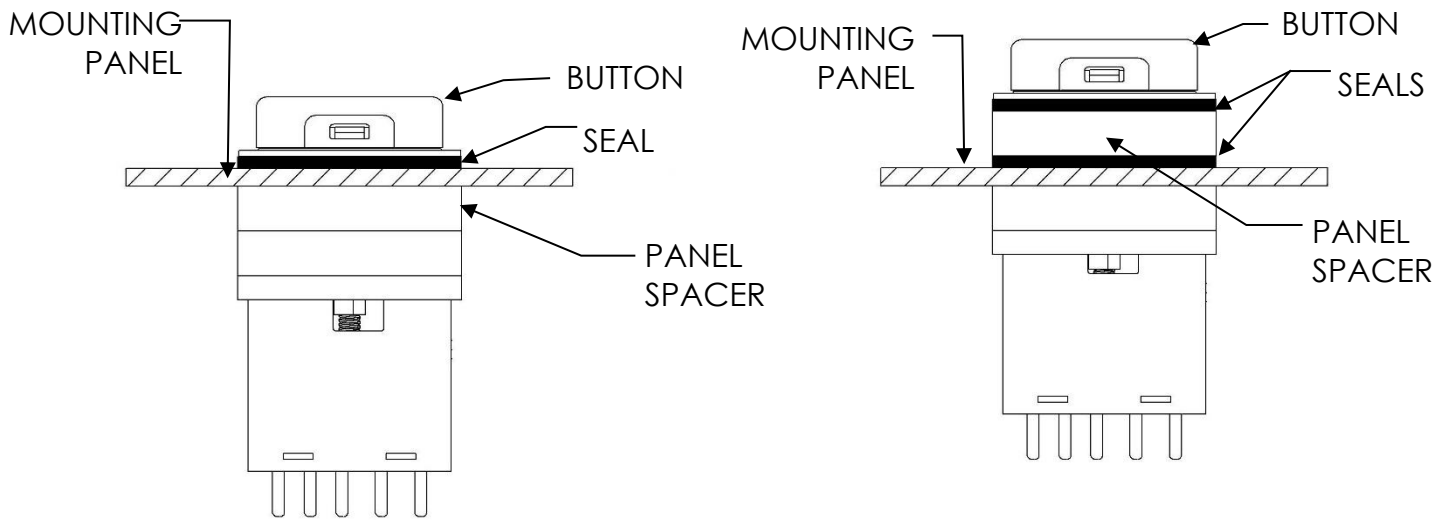


Figure 22: Drip-proof Design (Flush Mount and Extended Mount)

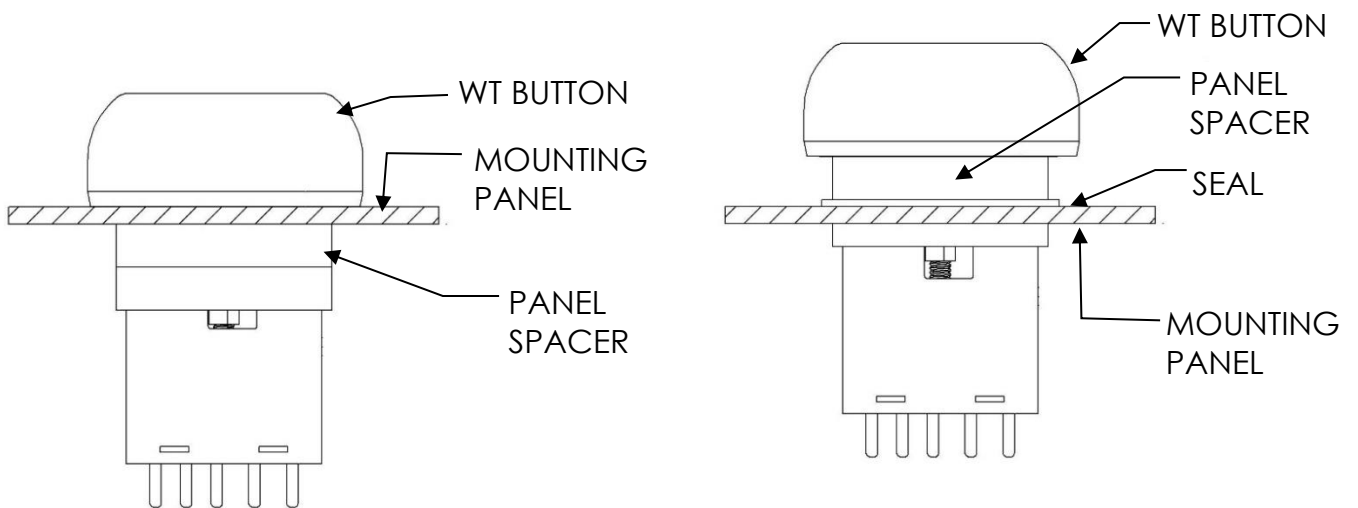


Figure 23: Splash Proof/ Watertight Design (Flush Mount and Extended Mount)

Indicator - Functions as lighted display only. No switch contacts required.

Momentary - Switches on applying pressure to the pushbutton. The switch contacts return to their normally closed position when the pushbutton is released.

Alternate - Switches on applying pressure to the pushbutton. Switch contacts remain in latch down position when released, and return to their normally closed position when the pushbutton is pressed again.

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Below are actuation force, pushbutton travel and alternate action displacement as shown in [Table II: Actuation Force and Pushbutton Travel](#) and [Figure 24: Alternate Action Displacement for Drip-Proof Pushbutton Switches](#).

Table II: Actuation Force and Pushbutton Travel

Actuation force	2 to 5 pounds (9 to 22.2N)	Pushbutton travel and alternate action displacement is shown in Figure 24: Alternate Action Displacement for Drip-Proof Pushbutton Switches .
Pushbutton Travel	0.12 inches [3.0MM]	
Alternate displacement	0.07 inch [1.8MM] (latched)	

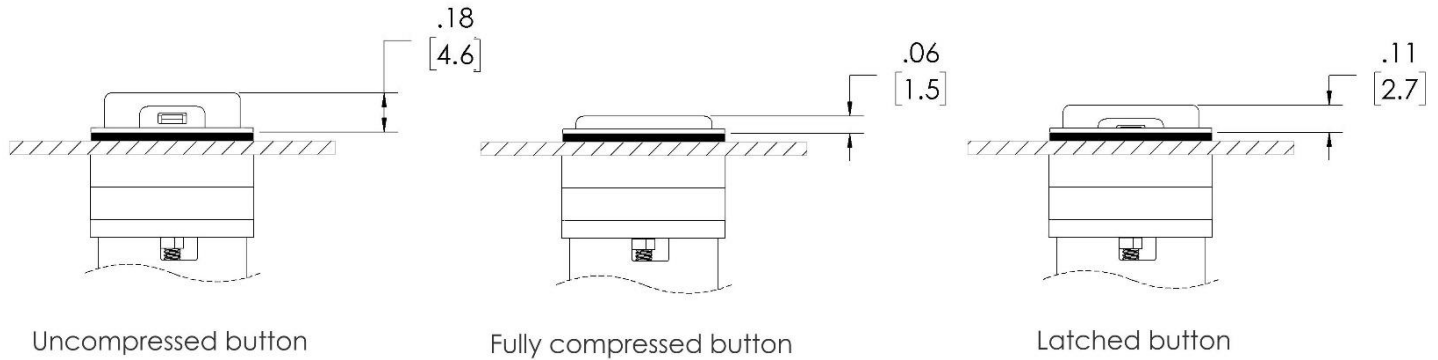


Figure 24: Alternate Action Displacement for Drip-Proof Pushbutton Switches

4.1.2. Pushbutton Switch Weight

The typical weight of the switch or indicator, including mounting hardware and the pushbutton, are given in [Table III: Pushbutton Switch Weight](#).

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Table III: Pushbutton Switch Weight

Description	Termination	Ounces (max.)	Grams (max.)
Drip-Proof Switch Assembly 4PDT	Solder / PC	0.39	11
	Crimp Pin	0.60	17
Drip-Proof Indicator Assembly	Solder / PC	0.39	11
	Crimp Pin	0.60	17
Splash-Proof/Watertight Switch Assembly 4PDT	Solder / PC	0.49	14
	Crimp Pin	0.74	21
Splash-Proof/Watertight Indicator Assembly	Solder / PC	0.42	12
	Crimp Pin	0.63	18
Mounting Hardware	Panel Seal, Panel	0.07	2

4.1.3. Mounting Provision

The location of the mounting screws within the switch body is shown in [Figure 25: Mounting Screw Location \(Drip-Proof Version Shown\)](#). Refer to Technical Bulletin 215 and 216 for pushbutton extraction and installation procedure for splash-proof and watertight designs, respectively.

The recommended panel cutout for individual and matrix mounting are shown in [Figure 18: Panel Cutout and Thickness](#), [Figure 19: Slot Mount for Type I & III](#), [Figure 20: Matrix Mount for](#) and [Figure 21: Matrix Mount for](#).

For applications where horizontal or vertical slot mounting of two or more individual mount switch/indicator is required, the following formula provides cut-out dimensions for the slot mounting (see [Figure 19: Slot Mount for Type I & III](#)). L (inches) = $0.752'' \times (n-1) + 0.690''$.

Where:

L = length of horizontal or vertical mounting slot.

N = number of units in a row or column.

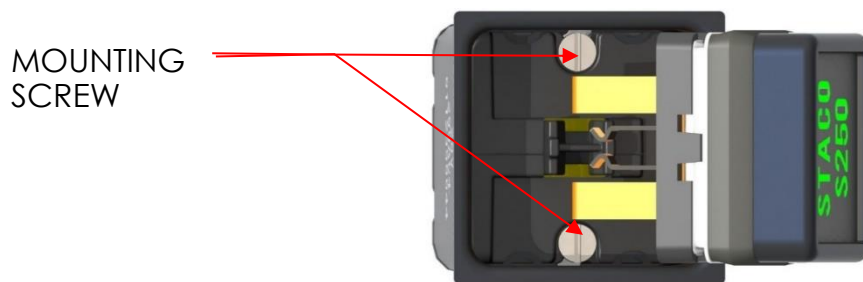


Figure 25: Mounting Screw Location (Drip-Proof Version Shown)

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4.2. Electrical Specifications

4.2.1. Schematics

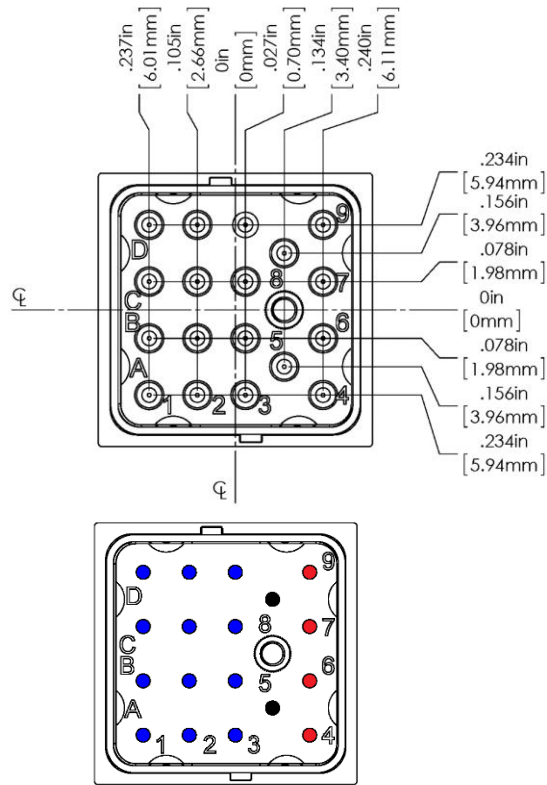


Figure 26: Switch Terminal Identification

Notes:

1. Rows A, B, C, D and columns 1, 2, and 3, identify switch contact terminations.
2. Pins 4, 6, 7, and 9, identify backlight circuit terminations.
3. Pins 5 and 8 identify common backlight circuit terminations.

Table IV: Switch and Termination Diagram

Indicator		None	None
Two pole double throw			C1 and C3 (NO) C2 and C3 (NC) B1 and B3 (NO) B2 and B3 (NC)

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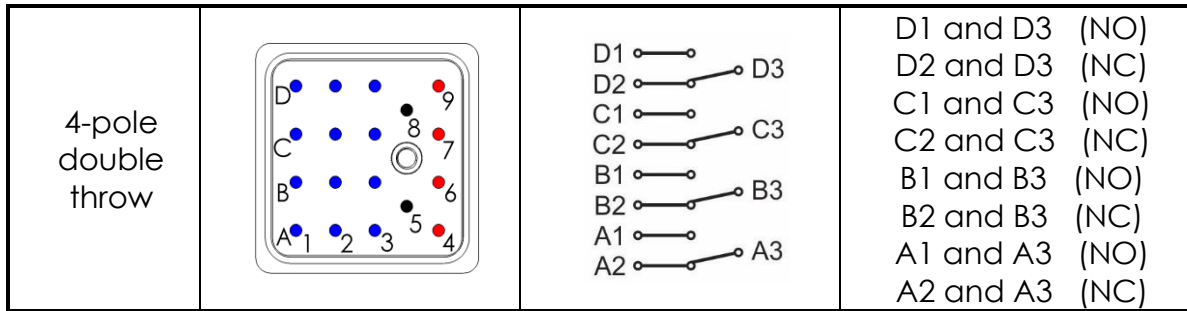
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Note: Shown in normally closed positions.

Refer to [Figure 26: Switch Terminal Identification](#) for terminal designations. Shown in normally closed positions

4.2.2. Common Circuitry

The following schematics are 5 VDC standard common, 28 VDC standard common and bussing circuitry diagrams.

A typical pushbutton switch could require up to six wires to illuminate all four quadrants of the display. To reduce the number of wire input, a selection of common and bussing option is available as shown in [Table V: Common Circuit Diagrams](#) and

[Table VI: Bussing Circuit Diagram](#).

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Table V: Common Circuit Diagrams

5/28 VDC Common Circuit Diagram - View from rear of switch		
Single Common	Horizontal Split Common	Vertical Split Common

Table VI: Bussing Circuit Diagram

Bussing Circuit Diagram – View from rear of switch			
1-input			
Display Style (Front View)	Circuit diagram (rear view)		
Single Common Bussed -1 Code (FULL SCREEN)			
2-inputs / 2-way split display			
Display Style (Front View)	Circuit diagram (rear view)	Display Style (Front View)	Circuit diagram (rear view)
Horizontal Bussed -2 Code		Vertical Bussed -3 Code	

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3-inputs / 3-way split display

Display Style (Front View)	Circuit diagram (rear view)	Display Style (Front View)	Circuit diagram (rear view)
Top Bussed		Bottom Bussed	
-4 Code		-7 Code	

3-inputs / 3-way split display

Display Style (Front View)	Circuit diagram (rear view)	Display Style (Front View)	Circuit diagram (rear view)
Left Bussed		Right Bussed	
-8 Code		-6 Code	

4-inputs / 4-way split display

Display Style (Front View)	Circuit diagram (rear view)
No Bussing, -5 Code	

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4.2.3. Operating Voltage

The Series 250 pushbutton switches offer two input voltages, 5 VDC and 28 VDC. Refer to [Table VII: Electrical Characteristics](#) for power consumption (all quadrants), faceplate temperature and electrical load range.

Table VII: Electrical Characteristics

Lamp Circuit Power Consumption	VDC	Watt
	28	1.2 max.
	5	0.5 max.

Lens face temperature: 10° C max. above ambient.

High-brightness Lighted-Emitted Diodes.

The Series 250 switch HB LED utilizes a bridge rectifier in each of its four lighting circuits to provide polarity insensitivity. This enables application in current sinking or current sourcing circuits.

4.2.4. Switch Contact Rating

The switch contacts shall be made and break the currents as listed in [Table VIII: Contact Rating](#).

Table VIII: Contact Rating

		Sea Level	50,000 feet
28 VDC	Resistive	9.0 Amperes	4.5 Amperes
	Inductive	4.5 Amperes	2.5 Amperes
115 VAC, 60Hz	Resistive	9.0 Amperes	
	Inductive	3.5 Amperes	
LOW LEVEL	Resistive	≤100 milliamps	
	Inductive		

Note: S250 contacts are designed for universal applications, 0 to 9A. However, contacts subjected to a high current (>100 mA) will have increased contact resistance at currents below 100mA.

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4.2.5. Dimming Control Circuit

Dimming the luminance to the desired level is accomplished by varying the applied voltage. The Series 250 switch has both linear and non-linear dimming circuits with built-in voltage control. 5 VDC switches are available with linear dimming circuits only. 28 VDC switches are available in either linear or non-linear dimming circuits. The output normalized luminance vs. input voltage of each voltage dimming circuit is shown in Figure 36, 37 and 38.

For 5 VDC linear dimming, visible luminance starts at about 3.6 VDC where LED current is approximately 0.0005 A and continues to 5 VDC where current reaches 0.011 A per quadrant. See [Figure 27: Typical 5 VDC Linear Dimming](#).

For 28 VDC linear dimming, visible luminance starts at about 3 VDC where LED current is approximately 0.0007 A and continues to 28 VDC where current reaches 0.010 A. See [Figure 28: Typical 28 VDC Linear Dimming](#).

For 28 VDC non-linear dimming, visible luminance starts at about 7 VDC where LED current is approximately 0.0001 A and continues to 28 VDC where current reaches 0.0125 A per quadrant. See [Figure 29: Typical 28 VDC Non-Linear Dimming](#).

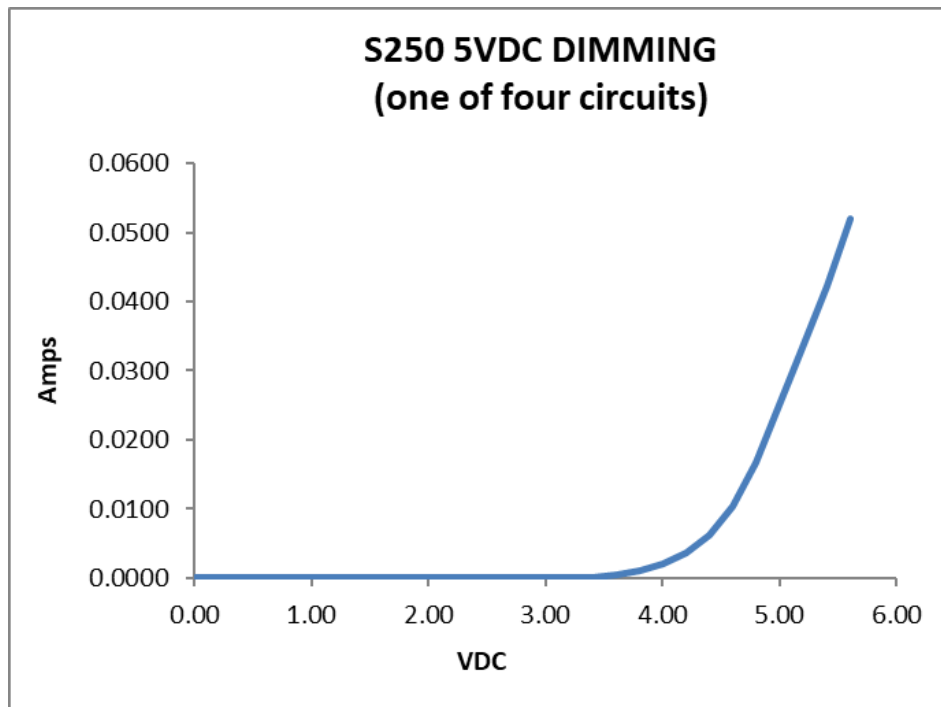


Figure 27: Typical 5 VDC Linear Dimming

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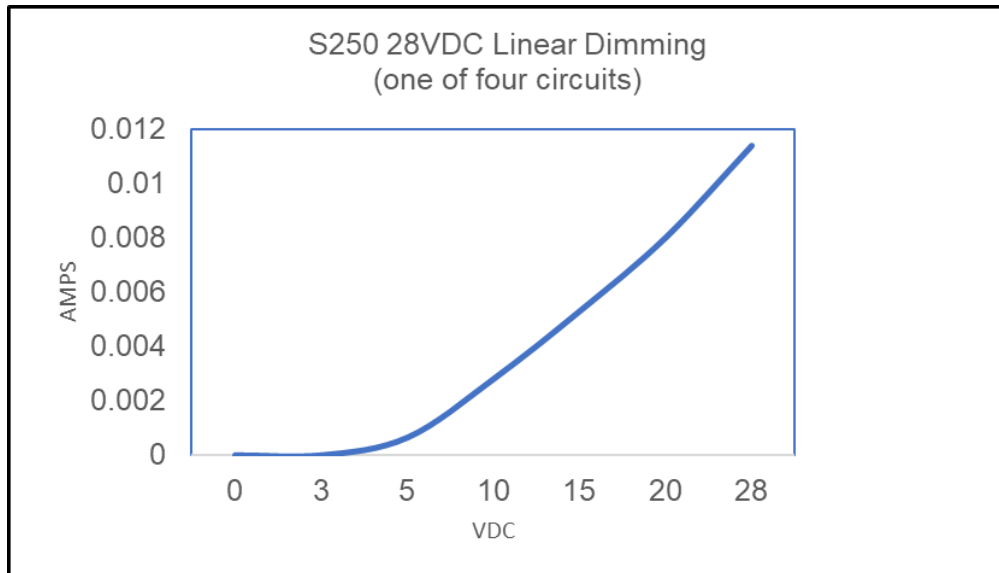


Figure 28: Typical 28 VDC Linear Dimming

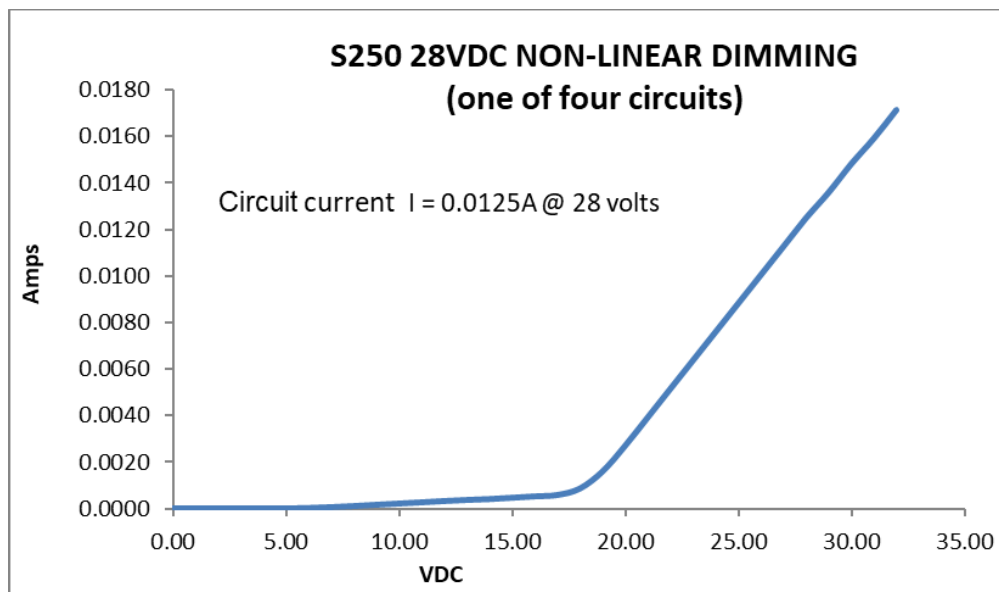


Figure 29: Typical 28 VDC Non-Linear Dimming

4.3. Display Specifications

4.3.1. Field of View

The pushbutton switch displays are tested in accordance to the requirements of MIL-PRF-22885.

Legend area and viewing dimensions are shown in [Figure 30: Legend Area](#) and [Table IX: Viewing Area](#).

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Drip-Proof

Splash-Proof/ Watertight

Figure 30: Legend Area

Table IX: Viewing Area

Viewing area	Splash-Proof dimensions - Inch [mm]	Watertight dimensions - Inch [mm]
Full screen	0.56" x 0.56" [14.22 mm x 14.22 mm]	0.50" x 0.50" [12.7 mm x 12.7 mm]
Half screen – horizontal	0.56" x 0.28" [14.22 mm x 7.11 mm]	0.50" x 0.25" [12.7 mm x 6.35 mm]
Half screen – vertical	0.28" x 0.56" [7.11 mm x 14.22 mm]	0.25" x 0.50" [6.35 mm x 12.7 mm]
Quarter screen	0.28" x 0.28" [7.11 mm x 7.11 mm]	0.25" x 0.25" [6.35 mm x 6.35 mm]

4.3.2. Legends

Standard Font Style & Size.

The standard font style is 'alternate gothic number 2' (AG2), available in capital letters and numeric, plus all the character and symbols which are available as shown in

[Figure 31: Standard Font Size and Style.](#)

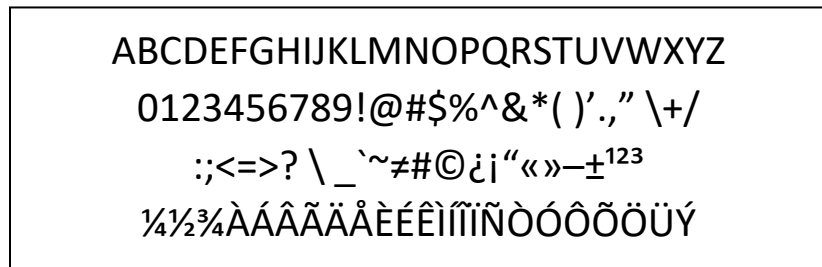
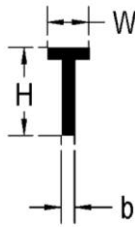


Figure 31: Standard Font Size and Style

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		NONE		SHEET 31 OF 45

Note: Lower case characters not available as standard option in this font.

Unless otherwise specified, all symbols will be proportional to the size of the AG2 font.



RECOMMENDED LETTER RATIO

HEIGHT TO WIDTH RATIO: $H/W=2$

HEIGHT TO STROKE WIDTH: $H/b =6$

Figure 32: Character Height

The character height, as defined in [Figure 32: Character Height](#) above, shall be the distance (in decimal inches) from the top to the bottom of a capital letter (no descender) in the standard font, AG2. The standard character heights are as follow: 0.072", 0.087", 0.100", 0.125", and 0.145".

The approximate number of AG2 characters of a given size which will fit into a display area is given in [Table XIV: Display Style and Character Size Option](#). Since AG2 characters are proportionally spaced (i.e., a character "M" or "W" is about three times as wide as the character "I") the actual number of characters will depend on the specific characters used. If the specific characters used in a given area exceed the space available, but by no more than 10%, the characters shall be condensed by 10%, using the same height but less width, in order to accommodate the legend as requested by the customer.

Optional Font Style and Size, Non-Roman Alphabets and Symbols.

By special order, other font styles and sizes may be ordered in their normal, condensed, bold, or expanded variations. These typefaces are available in either or both upper and lower cases. Depending on the character width of the chosen fonts, the number of characters per line may be different than of AG2.

Non-Roman Alphabets – Graphic representative is required from customers for non-roman alphabets such as Hebrew, Russian, Japanese, Korean, Chinese, Arabic, Sanskrit, etc.

Standard and Complex Shapes – It is recommended that the customers to provide graphic representative or drawings for standard and complex shapes such squares, rectangles, circles, icons, or graphic symbols.

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4.4. Optical Performance

The pushbuttons illuminated color is tested in accordance to the requirements of MIL-PRF-22885.

4.4.1. Luminance Performance

The pushbutton luminance is tested in accordance to the requirements of MIL-PRF-22885, for Non-NVIS colors and NVIS colors.

Table X: Standard Color Limits

Standard Color limits															
Red		Green		Aviation Yellow		White		Lemon Yellow		Lunar White		Blue		Aviation Green	
x	y	x	y	x	y	x	y	x	y	x	y	x	y	x	y
0.695	0.285	0.3	0.56	0.545	0.425	0.4	0.375	.450	.500	-	-	0.13	0.26	0.14	0.47
0.705	SL 1/	0.3	SL 1/	0.56	SL 1/	0.4	0.42	.475	SL 1/	-	-	0.13	0.32	0.29	0.47
0.65	0.33	0.365	0.56	0.59	0.382	0.48	0.375	.505	.445	-	-	0.22	0.26	0.03	SL 1/
0.66	SL 1/	0.365	SL 1/	0.604	SL 1/	0.48	0.42	.530	SL 1/	-	-	0.22	0.32	0.185	SL 1/

1/ The term "SL" indicates where intersections occur with the spectrum locus on the CIE1931 chromaticity diagram ([Figure 34: CIE 1931 Chromaticity Diagram](#)).

@ 14 Vdc non-linear dimming the luminance approximately 21 foot-lambert, @ 28 Vdc non-linear dimming the luminance approximately 505 foot-lambert ([Figure 33: Typical Luminance vs Voltage \(Non-Linear Dimming\)](#)).

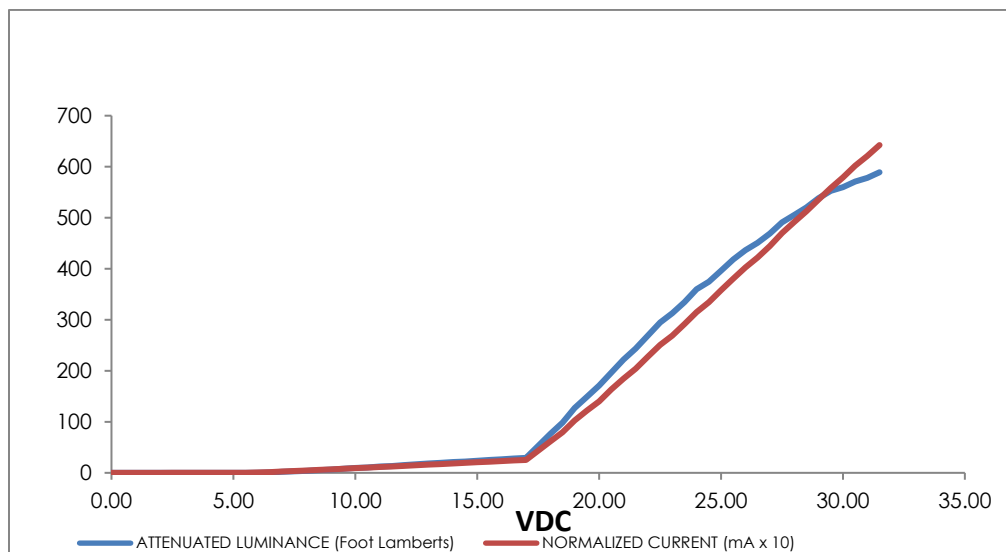


Figure 33: Typical Luminance vs Voltage (Non-Linear Dimming)

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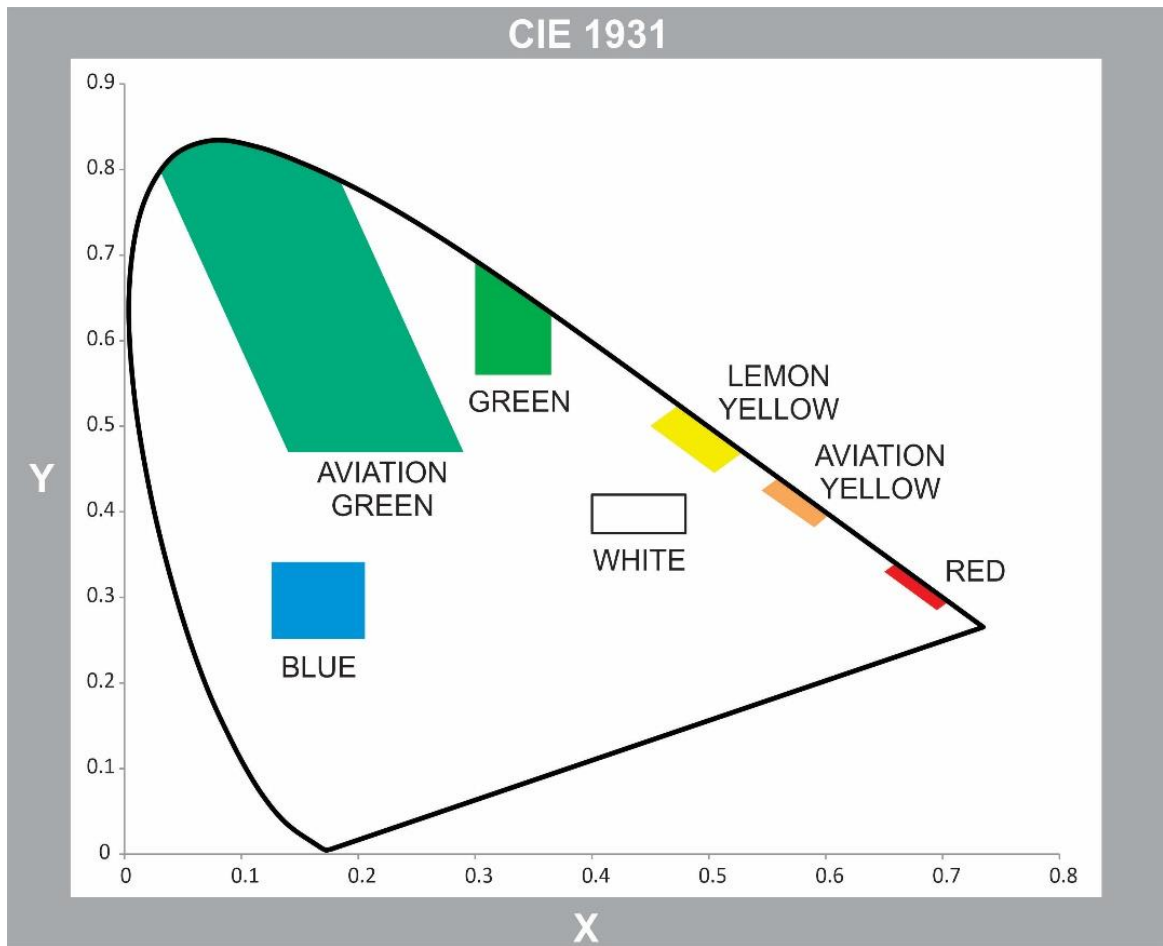


Figure 34: CIE 1931 Chromaticity Diagram

The colors are expressed as “x” and “y” coordinates on the standard 1931 CIE chromaticity diagram. Illuminated colors, measured as specified herein, shall be within the limits bounded by the coordinates listed for each color. Refer to [Figure 34: CIE 1931 Chromaticity Diagram](#) and [Table X: Standard Color Limits](#).

4.4.2. NVIS Compatibility

NVIS compatibility is tested in accordance to the requirements of MIL-PRF-22885, MIL-STD-3009, and MIL-L-85762 (when applicable). Available NVIS colors are white, blue, red, green A, green B, yellow A and yellow B.

In general, NVIS Green A and Green B are used for illuminated controls, caution and advisory signals. NVIS Yellow is used for master caution and warning signals. NVIS Red is only applicable to Class B systems and is used as a warning signal. NVIS blue and white are used for advisory and identification.

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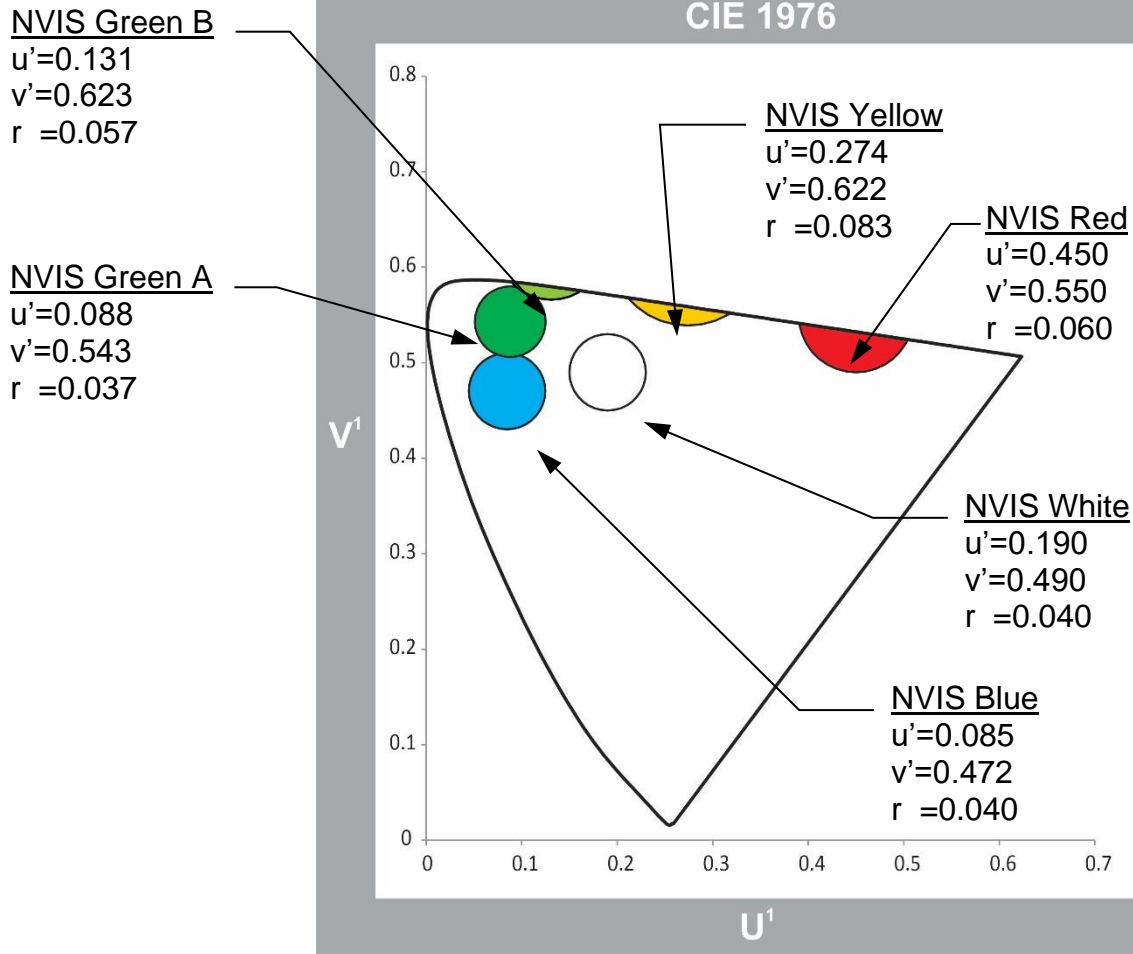
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[Figure 35: U.C.S. 1976 Chromaticity Diagram](#)

The colors are expressed as u' and v' coordinates on the U.C.S 1976 chromaticity diagram. See Figure 35: U.C.S. 1976 Chromaticity Diagram

4.5. Environmental Specifications

The pushbutton switches are tested in accordance to the requirements of MIL-PRF-22885.

4.6. Material Requirements

All components contained in S250 product lines are considered REACH and RoHS compliant. All other requirements are in accordance with MIL-PRF-22885.

Finish – Black anodize over aluminum alloy per MIL-A-8625, Type II, Class 2. Chemical film finishes per MIL-DTL-5541, Type II, Class 3.

Terminal Plating – Gold plating per MIL-G-45204. PC terminals are plated to facilitate hand, wave or flow soldering methods. Crimp pin terminals per MIL-G-45204.

Silicon Rubber – Silicone rubber per ZZ-R-765.

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Fungus – The pushbutton switches are analyzed in accordance to the requirements of MIL-STD-454, Requirement 4.

Fluor Silicone – Fluor Silicone Rubber and Elastomer, Oil and Fuel Resistant per MIL-R-25988.

4.7. Other Requirements

4.7.1. Marking

Permanency and legibility of markings shall conform to requirements of MIL-STD-202, Method 215 for resistance to solvents as shown in XXX with the following information:

- a. Staco Switch Series
- b. Staco Cage code (12522)
- c. Date code (YYWW; year year week week).
- d. Legend lamp voltage.
- e. Assembly part number.
- f. Switch schematic.
- g. Staco Lot Code
- h. Switch orientation
- i. Optional marking

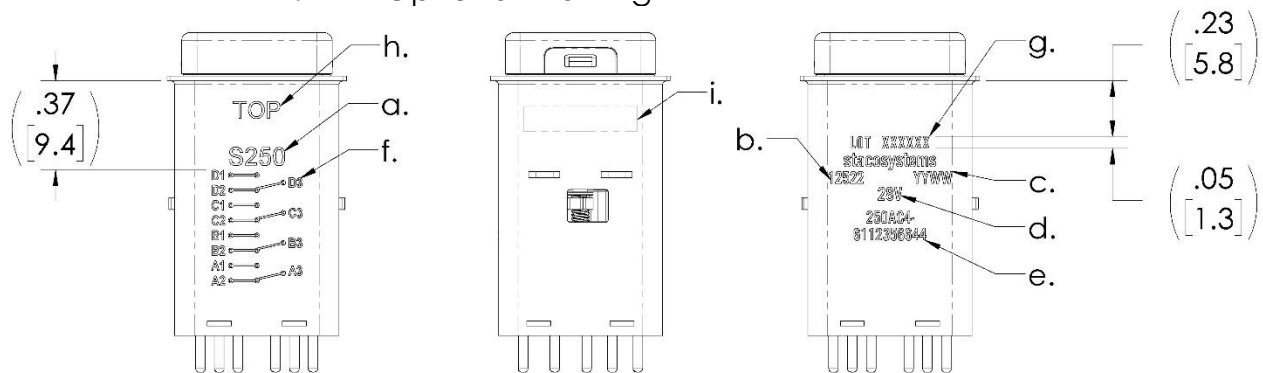


Figure 36: Part Marking (4 pole & PCB Version Shown)



Figure 37: Part Marking (4 pole & PC Version Shown)

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5.0 Ordering Information

This section contains the information necessary to order the standard Series 250 pushbutton switch configurations and its features described in this specification.

PART NUMBER MODEL

The Part Number Model (PNM) shall be constructed as illustrated in [Figure 38: Part Number Model](#). See, [Table XVI: Illuminating Color Option](#), [Table XIII: Seal Options](#), [Table XIV: Display Style and Character Size Option](#), [Table XV: Display Type Option](#) and [Table XVI: Illuminating Color Option](#).

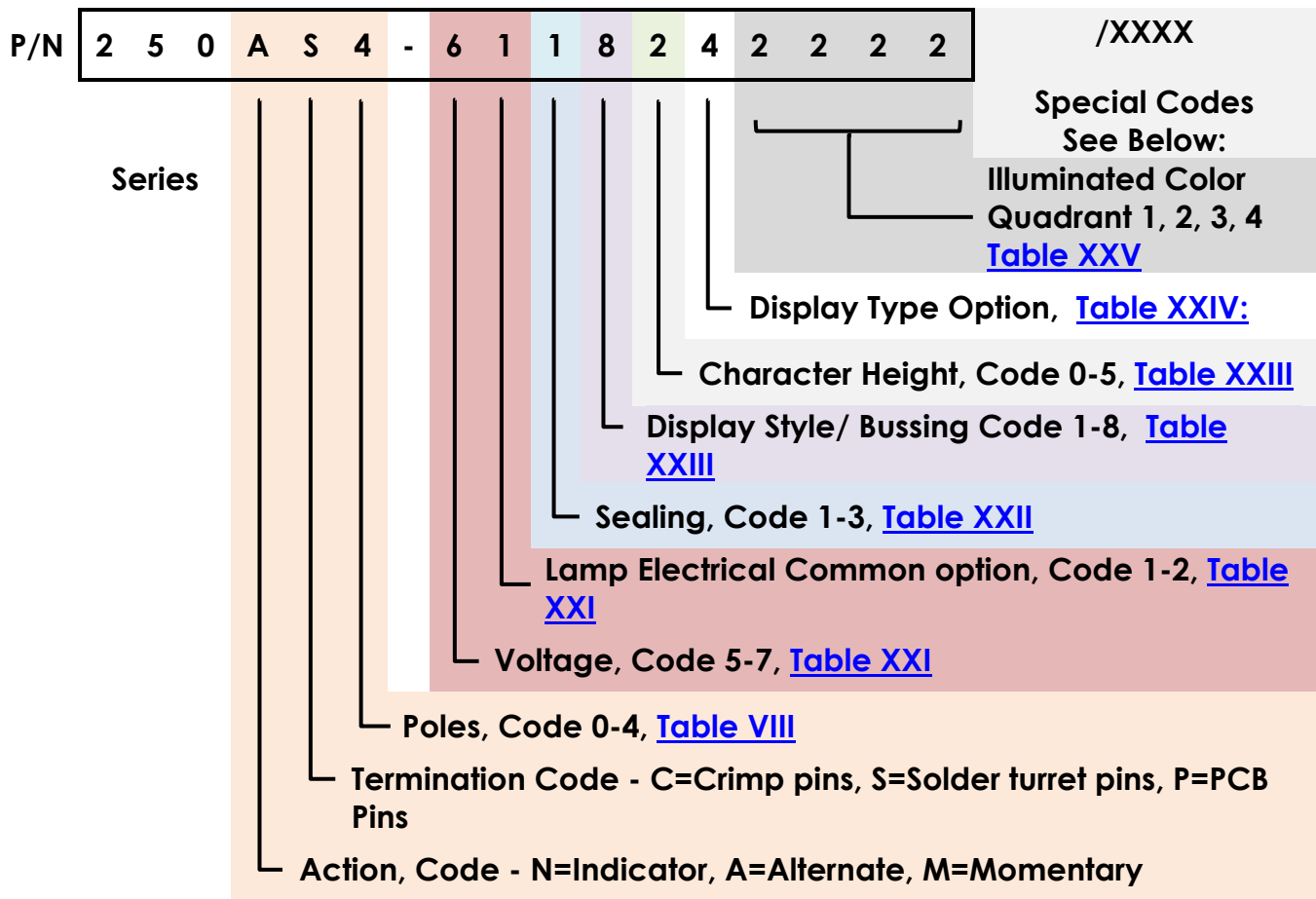


Figure 38: Part Number Model

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Table XI: Mechanical Options

Mechanical Option					
P/N Code	Action	P/N Code	Termination	P/N Code	Poles
N	No Action	S	Solder	0	Indicator
M	Momentary	P	PC	2	2-pole double throw
A	Alternate	C	Crimp pin	4	4-pole double throw

Table XII: Electrical Options

Electrical Options			
P/N Code	VOLTAGE	P/N Code	COMMON
5	5 VDC Linear Dimming	1	Common Lamp ground
6	28 VDC Linear Dimming	2	Split Lamp ground
7	28 VDC Non-Linear Dimming		

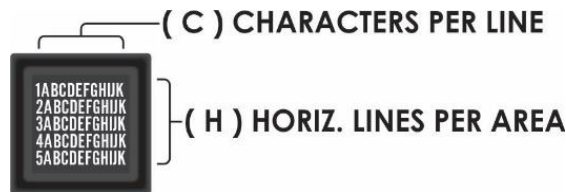
Table XIII: Seal Options

Seal Design		
P/N Code	MIL-PRF-22885	Seal Description/Option
1	2	Drip-Proof <u>1/</u>
2	3, 4	Splash-Proof <u>1/</u> , Watertight <u>1/</u>
3	3	Solvent Resistant <u>2/</u>

1/ In accordance to MIL-STD-108.

2/ In accordance to MIL-STD-810, method 504, procedure II.

Character size and Lines per area:



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Table XIV: Display Style and Character Size Option

See Table X for bussing diagrams

DISPLAY STYLE P/N CODE	CHARACTER HEIGHT P/N CODE	CHARACTER SIZE IN INCHES [MILLIMETERS]	DISPLAY AREA NO.	LEGEND AREA NO.				DISPLAY STYLE DESCRIPTION
				1 H x C	2 H x C	3 H x C	4 H x C	
1	0	NONE		NONE	NONE	NONE	NONE	FULL SCREEN DISPLAY
1	1	.072 [1.8]		5 x 11				
1	2	0.087 [2.2]		4 x 9				
1	3	0.100 [2.5]		4 x 8				
1	4	0.125 [3.2]		3 x 7				
1	5	0.145 [3.7]	2 x 5					
2	0	NONE		NONE	NONE	NONE	NONE	2-WAY HORIZONTAL SPLIT SCREEN DISPLAY
2	1	.072 [1.8]		2 x 11	2 x 11			
2	2	0.087 [2.2]		2 x 9	2 x 9			
2	3	0.100 [2.5]		1 x 8	1 x 8			
2	4	0.125 [3.2]		1 x 7	1 x 7			
2	5	0.145 [3.7]	1 x 6	1 x 6				
3	0	NONE		NONE	NONE	NONE	NONE	2-WAY VERTICAL SPLIT SCREEN DISPLAY
3	1	.072 [1.8]		5 x 5	5 x 5			
3	2	0.087 [2.2]		4 x 4	4 x 4			
3	3	0.100 [2.5]		4 x 3	4 x 3			
3	4	0.125 [3.2]		3 x 3	3 x 3			
3	5	0.145 [3.7]	2 x 2	2 x 2				
4	0	NONE		NONE	NONE	NONE	NONE	3-WAY SPLIT SCREEN DISPLAY HORIZONTAL TOP HALF
4	1	.072 [1.8]		2 x 11	2 x 5	2 x 5		
4	2	0.087 [2.2]		2 x 9	2 x 4	2 x 4		
4	3	0.100 [2.5]		1 x 8	1 x 4	1 x 4		
4	4	0.125 [3.2]		1 x 7	1 x 2	1 x 2		
4	5	0.145 [3.7]	1 x 6	1 x 2	1 x 2			
5	0	NONE		NONE	NONE	NONE	NONE	4-WAY SPLIT SCREEN DISPLAY
5	1	.072 [1.8]		2 x 5	2 x 5	2 x 5	2 x 5	
5	2	0.087 [2.2]		2 x 4	2 x 4	2 x 4	2 x 4	
5	3	0.100 [2.5]		1 x 4	1 x 4	1 x 4	1 x 4	
5	4	0.125 [3.2]		1 x 2	1 x 2	1 x 2	1 x 2	
5	5	0.145 [3.7]	1 x 2	1 x 2	1 x 2	1 x 2		
6	0	NONE		NONE	NONE	NONE	NONE	3-WAY SPLIT SCREEN DISPLAY VERTICAL LEFT HALF
6	1	.072 [1.8]		2 x 5	5 x 5	2 x 5		
6	2	0.087 [2.2]		2 x 4	4 x 4	2 x 4		
6	3	0.100 [2.5]		1 x 4	4 x 3	1 x 4		
6	4	0.125 [3.2]		1 x 2	3 x 3	1 x 2		
6	5	0.145 [3.7]	1 x 2	2 x 2	1 x 2			
7	0	NONE		NONE	NONE	NONE	NONE	3-WAY SPLIT SCREEN DISPLAY HORIZONTAL BOTTOM HALF
7	1	.072 [1.8]		2 x 6	2 x 6	2 x 12		
7	2	0.087 [2.2]		2 x 4	2 x 4	2 x 10		
7	3	0.100 [2.5]		1 x 4	1 x 4	1 x 9		
7	4	0.125 [3.2]		1 x 3	1 x 3	1 x 7		
7	5	0.145 [3.7]	1 x 2	1 x 2	1 x 6			
8	0	NONE		NONE	NONE	NONE	NONE	3-WAY SPLIT SCREEN DISPLAY VERTICAL RIGHT HALF
8	1	.072 [1.8]		2 x 5	2 x 5	2 x 11		
8	2	0.087 [2.2]		2 x 4	2 x 4	2 x 9		
8	3	0.100 [2.5]		1 x 4	1 x 4	1 x 8		
8	4	0.125 [3.2]		1 x 2	1 x 2	1 x 7		
8	5	0.145 [3.7]	1 x 2	1 x 2	1 x 6			

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Table XV: Display Type Option

Display type option				
P/N Code	MIL-PRF-22885 CROSS REFERENCE	Description	Non-Illuminated	Illuminated
1	C	Visible opaque black legends on translucent color background. When illuminated, the background appears in color while the legends remain opaque black.		
2	B	Obscure legends on opaque black background. When illuminated, the background appears in color while the legends remain opaque black.		
3	H	Obscure legends on opaque black background. When illuminated, the legends appear in color while the background remains opaque black.		
4	N	Visible trans-reflective white legends on an opaque black background. When illuminated, the legends appear in color while the background remains opaque black.		
5	W	Visible opaque black legends on trans-reflective white background. When illuminated, the background appears in color while the legends remain opaque black.		
6	S	Obscure legends on opaque black background. When illuminated, the legends are sunlight readable while the background remains opaque black.		
7	S	Obscure legends on opaque black background. When illuminated, the legends are NVIS compatible while the background remains opaque black.		

*** Contact Staco sales engineering for special display types**

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Table XVI: Illuminating Color Option

Illuminating Color Option		
PNM code	Non NVIS Illuminated Color	NVIS Illuminated Color
0	White	Blue
1	Red	Red
2	Green	Green B
3	Aviation yellow	Yellow B
4	Lunar White	White
5	Lemon Yellow	Yellow A
6	Blue	Green A
7	Aviation green	

6.0 Accessories

Accessories which apply to pushbutton switch assembly products are identified by 15XXX-TAB numbers. Following is the list of all standard accessory products and their part numbers.

6.1. Guards: See [Table XVII: Switch Guards](#).

Table XVII: Switch Guards

Switch Guard (enclosure types II,V)			
Transparent Guard		Metal Guard	
Cover color	Part number	Color	Part number
Clear	15089	Black anodize finish	15600-001
Red	15089-1	Red finish	15600-002
Clear with red border	15089-2	Figure 40: Metal Switch Guard	
Figure 39: Transparent Switch Guard			

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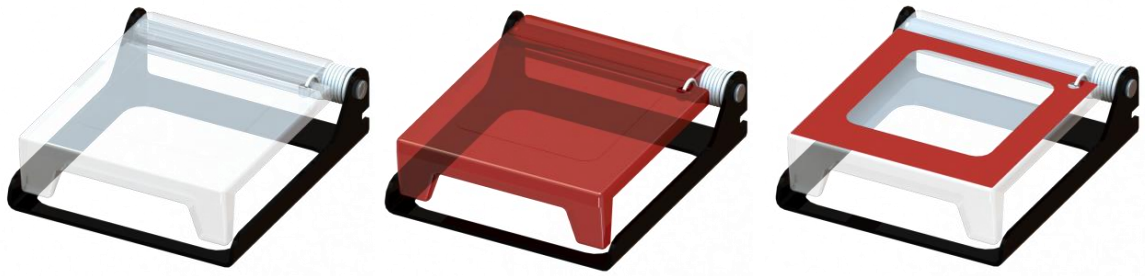
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15089

15089-1

15089-2

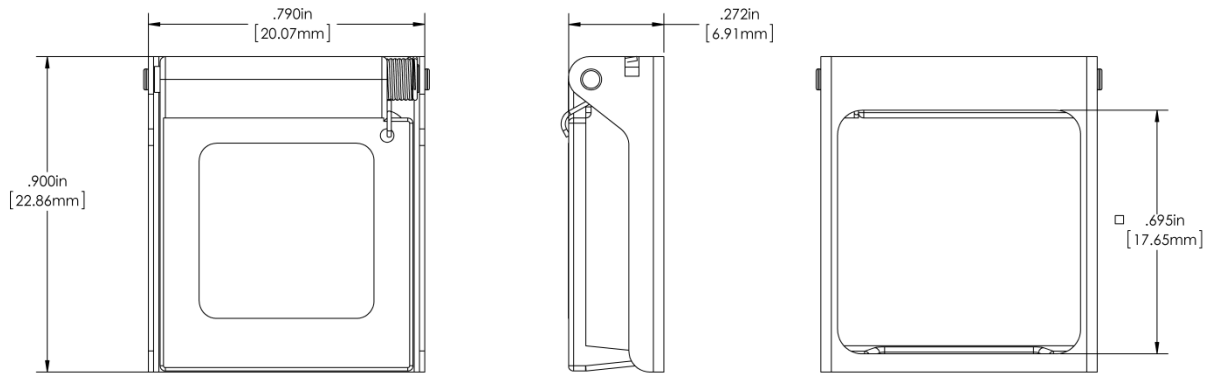


Figure 39: Transparent Switch Guard



15600-001 (black)



15600-002 (red)

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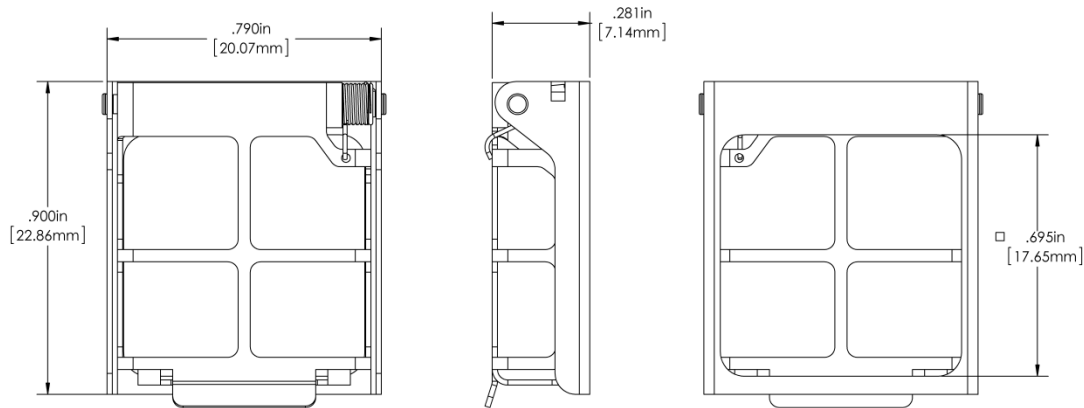


Figure 40: Metal Switch Guard

6.2. Tools

6.2.1. Pushbutton Extraction Tool (15193)

It facilitates the removal of display pushbuttons. See [Figure 41: Pushbutton Extraction Tool](#).



Figure 41: Pushbutton Extraction Tool

6.2.2. Insulator Plug (15177)

Unused terminal openings in termination receptacles of all crimp pins switches can be closed off by inserting standard MS27488- A20 plastic insulator plugs. The insulator plugs can be used with MIL-C-39029/22-192 compliant receptacles. See [Figure 42: Insulator Plug](#).

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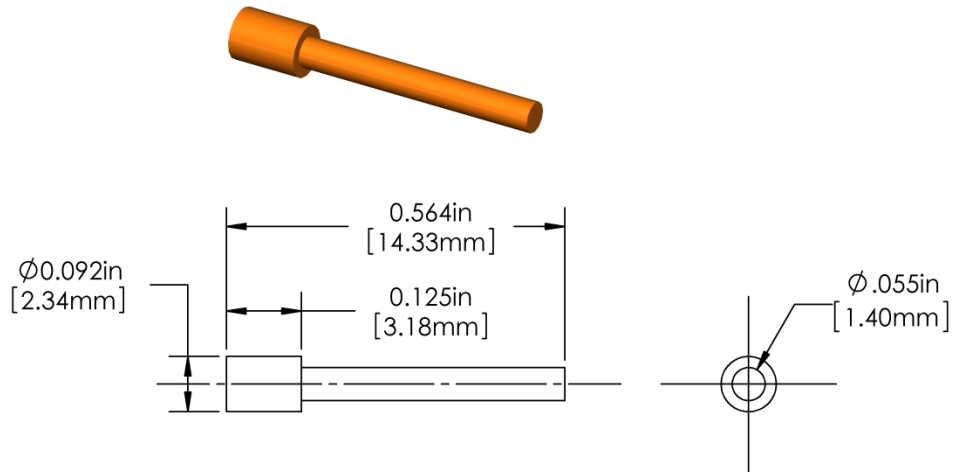


Figure 42: Insulator Plug

6.2.3. Crimp Pin Wire Termination Receptacle (156106)

Additional receptacles may be ordered separately as replacement parts for use with S250 crimp pin switches/ indicators. See [Figure 14: Crimp Termination](#).

6.2.4. Crimp Pin Wire Termination (15276)

Additional crimp pin wire termination can be ordered separately as replacement parts for use with crimp pin termination. See [Figure 15: Crimp Pin](#).

6.2.5. Panel Seals (15097)

Additional panel seals may be ordered separately as replacement parts or for use with extended mount applications. See [Figure 2: Drip-Proof \(PCB Termination Version Shown\)](#).

6.2.6. Watertight Panel Seals (12497)

Additional panel seals may be ordered separately as replacement parts or for use with extended mount applications. See [Figure 3: Splash Proof/ Watertight \(PCB Termination Version Shown\)](#).

6.2.7. Weight of Accessories

The typical weight of the switch accessories are given in [Table III: Pushbutton Switch Weight](#).

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Table XVIII: Accessories Weight

Description	Ounces (max.)	Grams (max.)
15089 Switch Guard	0.061	1.9
15089-1 Switch Guard	0.064	2.0
15089-2 Switch Guard	0.064	2.0
15600-001 Switch Guard	0.064	2.0
15600-002 Switch Guard	0.064	2.0
15177 Insulator Plug	0.002	.080
156106 Crimp Wire Termination Receptacle	0.16	5
15276 Crimp Pins	0.004	.130
15097 Panel Seals	0.002	.075
12497 Water Panel Seals	0.003	.100

7.0 Technical Bulletins

Table XIX: Technical Bulletins

Technical Bulletin Number	Description
TB-207	Receptacle assembly installation procedure
TB-230	Installation Procedure for Series 250 Pushbutton Switches
TB-231	Installation Procedure for Series 250 Watertight Switch
TB-232	Installation and Removal Procedure for Series 250 Pushbutton Switches, PCB Type, In a Sub-Assembly

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