Aerospace

Cockpit Controls and Displays

Technical Focus

Series 584
LED Pushbutton Switches

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Eaton Corporation is a diversified industrial manufacturer that is a global leader in fluid power systems; electrical power quality, distribution and control; automotive engine air management and fuel economy; and intelligent truck systems for fuel economy and safety. Eaton's more than 50,000 employees work in 29 countries on six continents.

Eaton's Aerospace group is made up of key innovative technology centers that have the ability to link key industry experts in fluid power, fuel/fluid transfer, fluid control and actuation, electromechanical control and actuation, electrical power and load management, cockpit switches, control panels and displays and fluid systems monitoring and diagnostics.

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Series 584 Four Pole LED Illuminated Pushbutton Switches

Introduction

The Series 584 is an LED Lighted Avionics Pushbutton Switch design for life-of-the aircraft service. It features five aviation and four NVIS (night vision imaging system) compatible colors and is available in momentary action, alternate action, alternate action holding coil and indicator only configurations. Three termination systems are available: Plug-in, Solder turret and IWTS (integrated wire termination system).

Pedigree

The Series 584 LED switch uses the proven four-pole pushbutton mechanism originally designed in 1986 and qualified to MIL-S-22885/110. The switch display is illuminated by surface mount Light Emitting Diodes (LEDs) mounted on a miniature circuit board within the lamp capsule.

As with all Series 584 pushbutton switches, the LED version provides short behind-panel depth and high reliability in a lightweight, sunlight readable package with options of night vision compatibility, spray-tight sealing, and plug-in mounting.

Switch Design

The Series 584 LED pushbutton switch is a four pole, snap action, Form C device available in momentary, indicating alternate, and indicator configurations. Eaton's use of its proprietary bi-stable switch contact system differentiates the Series 584 switch from all other four pole pushbutton switches. This bi-stable design ensures contact reliability and speed by enabling four switch contacts to be equally stable in both C-NC and C-NO states, unlike sub-miniature switches which require a balanced spring system to maintain them in an activated mode. As a result of this design, the 584 contact system provides superior contact stability during shock and vibration. Changes of state occur only by the positive movement of the Eaton "stored energy" actuator assembly. Total transfer time is less than 5 milliseconds, including bounce and simultaneity. The over-center snap actuator precludes contact tease by operators, and provides a tactile response. This is an important consideration in logic circuits or other applications where high speed switching is required.

The mechanical life rating for a standard Series 584 LED pushbutton switch is 200,000 cycles. The mechanical life rating for the "Millennium" version of the Series 584 LED pushbutton switch is in excess of 1,000,000 cycles.

LED Lighting

The Series 584 LED pushbutton switch accommodates 28-Volt or 5-Volt aircraft lighting power supply systems. Additionally, the LED switches have various dimming circuit options. Customers may choose designs that can provide linear dimming to an external current or voltage input. Alternatively, the switches can utilize "step" dimming by defining the desired daytime and night mode voltage levels.

Since heat and drive current influence LED life, Eaton Engineers optimized LED performance by managing heat within the switch and controlling the lighting current. The Series 584 LED pushbutton switch features light source life commensurate with mechanical and electrical switch life in aerospace applications.

Series 584 LED Switch Performance and Reliability

1. RELIABILITY

Switch life is based on three factors: Mechanical life, Electrical life of the switch contacts and Electrical life of the lighting circuitry.

Mechanical Life

The mechanical life of the Series 584 LED switch is measured by mechanical endurance testing of the switch itself. The rugged design of the switch mechanism assures a long life. Based on the robust characteristics of the unique bi-stable contact mechanism, the 584 switch is rated for 1,000,000 actuations.

Switch Electrical Life

Switch electrical life is dependent on electrical load. As electrical load decreases, switch life increases up to its mechanical potential of 1,000,000 cycles and beyond. At maximum electrical loads, contact materials degrade with each cycle until their operating geometry is impacted to a point of non-operation, which is consistent with all mechanical contact systems. At electrical loads below .001 amperes, contact degradation is minimal but the probability of electrical "make" reduces exponentially with current reduction due to the low energy available for burning off any contaminates on the mating contact surfaces. The optimum electrical load for maximum switch longevity is 0.01 to 0.1 amperes resistive.

Lighting Circuitry Life

As described above, the mechanical and electrical contact loading provides life in excess of 500,000 cycles within the specified current loads (at electrical loads less than 1.5 amperes, the lighting circuitry is the weak link and at electrical loads greater than 1.5 amperes the switch is the weak link).

While, as a semiconductor device, the life of an LED is significantly greater than that of incandescent light sources, in evaluating the various components in our electronic circuit, the LED's stand out as the shortest life electronic component. The Individual LED performance is dependent on the manufacturer, the current load and the temperature.

In order to validate the LED life expectancy, Eaton completed thermal mapping tests of the LED capsule to determine operating temperatures and compare these to LED manufacturer's life cycle charts. Based on this determination, the LED life is greater than 100,000 hours of continuous use at ambient temperature.

Reliability Prediction

The MTBF for the Series 584 LED pushbutton switch is predicted to be greater than 500,000 hours based on the following:

- MIL-STD217F was used for all the electronic components such as switches, connectors, semiconductors and LED's. The environment was assumed to be Airborne Inhabited Cargo (AIG) at an ambient temperature of 40°C. The electrical and electronic parts reliability calculation was based on the assumption of dormant or off 95% of the time during normal operational flight.
- The Non-Electronic Parts Reliability Data (NPRD), Revision 1995, Part Summary, was used to determine the failure rates for mechanical parts. The part failure rate was selected from the NPRD-1995 based on the component characteristics, operating environment, and similarity. Mechanical parts reliability calculation was based on the assumption of one operation cycle per flight.

2. PERFORMANCE CHARACTERISTICS

Polarity

LED's are polarity sensitive devices and therefore polarity is critical to the circuit design. Eaton provides polarity definition as part of the electronic circuit information marked on the side of the 584 LED switches. Additionally, the polarity can be marked on the connector to prevent incorrect wiring. The electronic circuit is protected from accidental application of power with the wrong polarity.

LED Chromaticity and Luminance

Eaton LED illuminated switches are manufactured with true color LED's to meet specific chromaticity values. The LED luminance or brightness is a function of the input current levels and can be tailored to specific customer requirements if the application necessitates a deviation from the performance of the standard product. Luminance levels for all LED capsule colors and legend configurations are derived for the specified bright and dim operating voltages. In Eaton's LED designs, only one voltage or current input is required to operate all LED's to their intended brightness levels. The selected voltage or current has minimal impact on legend colors. The LED color and luminance will operate consistently at the specified input voltages set for the bright and dim control voltages.

Low Power Consumption

The nominal power consumption for the 584 Series LED pushbutton switch is 1.68 Watts for the 28-Volt system and 0.60 for the 5-Volt system. This represents a power savings of 37% over a typical 28-Volt incandescent system and 74% over a typical 5-Volt incandescent system.

Low Touch Temperature

The touch temperature at the face of the Series 584 LED pushbutton switch operated at 28 volts in an ambient temperature of 24 degrees Celsius has been tested at 38 degrees Celsius. This temperature rise of 14 degrees Celsius is as much as 40 degrees Celsius cooler than an equivalent Series 584 switch using a 28 volt incandescent light source. The rise in touch temperature in a 5 volt system is 7 degrees Celsius, as much as 50 degrees cooler than a 5V incandescent switch.

LED Design Redundancy

The Series 584 LED pushbutton switch capsule design utilizes eight LED's. A full display is made up of 8 LED's, while a half display would have 4 LED's per each half.

Given the long life of the individual LED's, LED replacement is highly unlikely during the life of an aircraft; however individual LED's do sometimes fail prematurely. The loss of one or two LED's in a full display capsule would not result in a non-legible capsule legend. A half display will remain legible with one failed LED.

Qualification Data

The Series 584 LED pushbutton switch is based on Eaton's proven Series 584 high performance switch, which is qualified to MIL-PRF-22885/110, and features both the proprietary Bi-Stable contact system and the precision snap-action actuator. The LED upgrade to the 584 product does not impact the structural integrity of the switch, and the basic switch operating mechanism remains the same.

As an electronic component, the series 584 LED pushbutton switch is designed to meet the demanding environmental conditions for airborne equipment of RTCA/DO-160. The specific test methods used are listed under the detailed environmental specification in this catalog.

3. DESIGN AND PRODUCT FLEXIBILITY

Dimming Methods

Eaton offers two types of dimming capabilities for the Series 584 LED pushbutton switch. Eaton has chosen to refer to these two dimming methods as "linear dimming" and "step dimming".

Linear dimming uses external voltage input for providing the dimming control. In this method, the voltage input to the switch is varied from full rated voltage (bright mode) to a desired dim voltage level (dim mode). In this configuration, the LED current limiting resistors are located inside the switch body. These resistors are used to control current and subsequently tune the luminance value of the individual colored LED's.

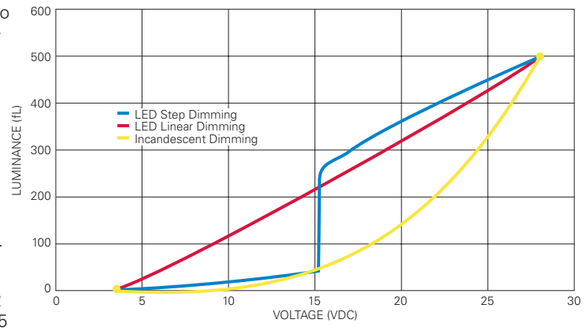
The luminance curves are linear except when the voltage values are near or below the rated minimum forward voltage (V_f) of the individual LED. The value of V_f for Red or Yellow LED's is approximately 2.0 Volts while the value of V_f for White, Green or Blue is approximately 3.5 Volts. To establish the dim mode luminance value, the appropriate voltage level must be selected.

Step dimming provides dimming control internal to the switch and is generally designed to provide a "stair-step" response to bright and dim mode voltage inputs to achieve desired levels of luminance for day and night operation.

Using a 5-Volt input circuit; the internal dimming circuit must assure that operating voltages are above the forward voltage V_f of the LED. In this design, the circuit defines the current that is supplied to the LED for both bright and dim mode. This method allows LED Luminance to be adjusted precisely to the desired luminance level at 5 Volts and the desired dim input voltage.

In a 28-Volt system, an electrical circuit within the switch housing provides the voltage reduction and dimming circuitry to provide the desired day mode and night mode luminance at the desired voltages. The dimming circuit is attached to the switch body to remove heat from the LED capsule and thereby increase their operating life.

The figure shown compares the luminance versus voltage curve for a standard 28-Volt LED pushbutton switch with step dimming to that of a 28-Volt LED pushbutton switch with linear dimming and a typical 28-Volt incandescent switch. For custom applications the range of the dimming step can be pre-specified within 22 to 12 Volt for a 28-Volt system and 2.5 to 3.5 Volts for a 5-Volt system.



DIMMING COMPARISON

Legends

The legend and character sizes specified for the Series 584 LED pushbutton switch are the same as those offered for the standard Series 584. Eaton can provide legends to various standard fonts as well as custom legends and sizes. The limitations are stroke width greater than .008 inches and character height greater than .072 inches.

4. HANDLING

With the addition of semiconductor devices in the pushbutton switch, the switch has become an electronic as well as an electro-mechanical component. These semiconductor devices, and in particular the latest GaN white, blue and green LED's, are susceptible to damage from electrostatic discharge. Eaton strongly recommends that proper ESD handling procedures are used when working with the series 584 LED pushbutton switches.

Mechanical Specifications

The length of each unit is specified from the rear of the housing flange to the end of the switch body, not including terminals. Terminal length is 0.2 inches (5.1 mm) for solder and PCB units.

To calculate the actual behind panel depth for your application, subtract the thickness of the panel, the thickness of spacers used above panel and 0.030 inches for the drip-proof panel seal, if required, from the length of unit listed below.

	MAXIMUM LENGTH BEHIND HOUSING FLANGE	MAXIMUM WEIGHT
Basic Length, Solder & PCB Termination	2.27 inches (35.6 mm)	26 grams
Basic Length, Plug-in Termination	2.56 inches (52.3 mm)	27 grams
Basic Length, Solder & PCB Termination, Diaphragm Seal	2.00 inches (37.3 mm)	29 grams
Basic Length, Plug-in Termination, Diaphragm Seal	2.29 inches (46.2 mm)	30 grams
584-REL5 Plug-in Mount	See 584-REL5	14 grams
584 Switch Contacts	Fine silver plated with 50 millionth inches gold	
584 Millennium Switch Contacts	Fine silver plated with 100 millionths inches gold	

Switch Form	Form C single break
Actuation Travel	0.135 ± 0.010 inches (3.43 ± 0.25 mm)
Actuation Force	2 to 5 lbs (8.9 to 22.3 N)
Extraction Force	2 to 5 lbs (8.9 to 22.3 N)
Mounting Torque	18 ± 2 inch-oz. (0.127 ± 0.014 N•m)
Internal Seal	Drip-proof per MIL-S-22885
Diaphragm Seal	Spray-tight per MIL-STD-108
Mechanical Life	584: 200 000 cycles 584 Millennium: 1 000 000 cycles
Marking	MIL-STD-130

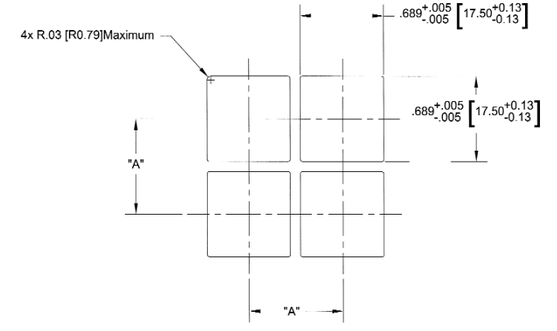


FIGURE 1
Recommended Panel Cutout

TYPE	DIMENSION "A"
Unsealed Switch	.780 [19.8]
Switch with Spray Tight Boot	.930 [23.62]

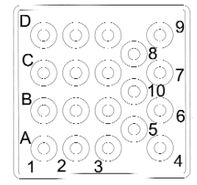


FIGURE 2
8 Amp IWTS Terminations

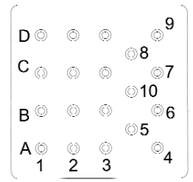


FIGURE 3
8 Amp Terminations
Styles: Solder, Plug-in, PCB *(shown)*

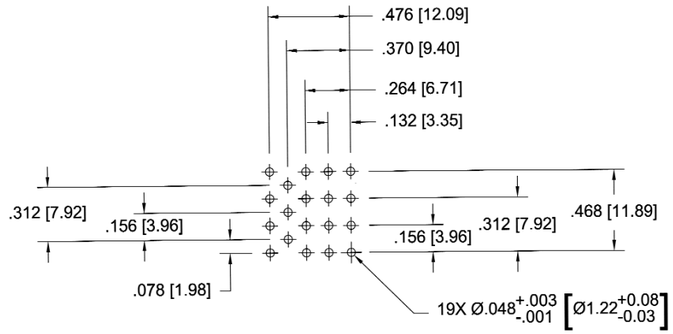


FIGURE 4
8 Amp Termination PCB Layout

Dimensional Specifications

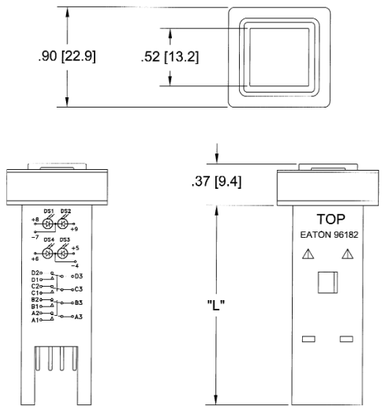


FIGURE 5
Spraytight Seal

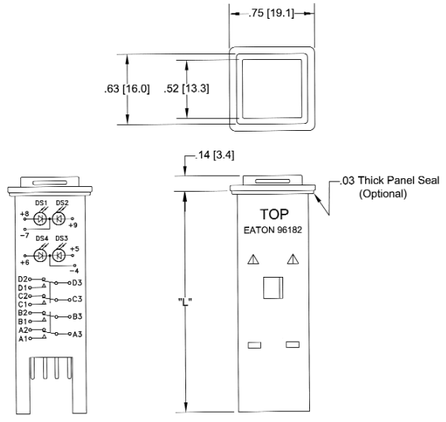
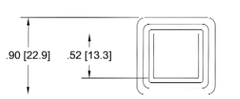


FIGURE 6
Dust Resistant or Dripproof Seal

Plug-in Termination



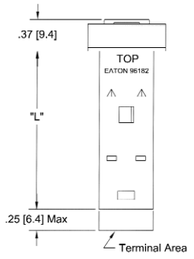
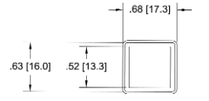


FIGURE 7
Spray Tight Seal



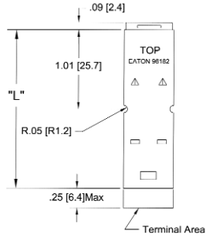
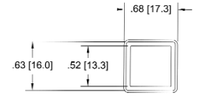


FIGURE 8
Dust Resistant or Dripproof Seal



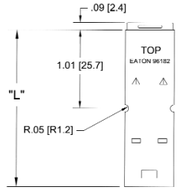


FIGURE 9
Rod Mount

Turret Terminal or PCB Termination

TERMINATION TYPE	DEVICE DESCRIPTION	DIM "L" UNSEALED OR DRIPPROOF	DIM "L" SPRAY TIGHT
Plug-in	Basic, Switch	2.56 [65.0]	2.29 [58.2]
	Basic, Holding Coil	3.10 [78.7]	2.83 [71.9]
Solder	Basic, Switch	2.27 [57.6]	2.00 [50.8]
Turret	Basic, Holding Coil	2.81 [71.4]	2.54 [64.5]
or PCB	Basic, Holding Coil, Rod Mtg.	2.85 [72.4]	not available

TABLE 1
8 Amp Plug-in, Turret and PCB Terminations

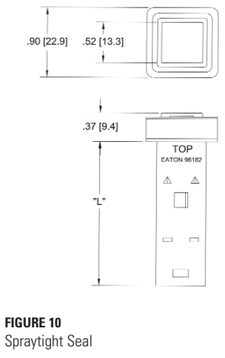


FIGURE 10
Spraytight Seal

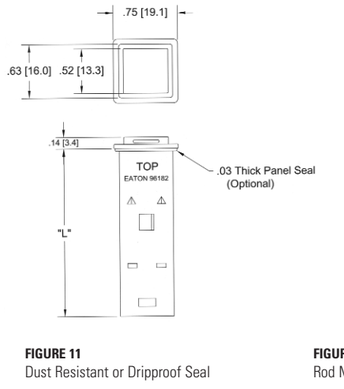


FIGURE 11
Dust Resistant or Dripproof Seal

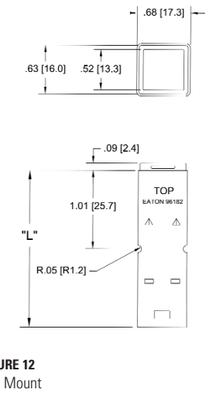


FIGURE 12
Rod Mount

IWTS Termination

TERMINATION TYPE	DEVICE DESCRIPTION	DIM "L" UNSEALED OR DRIPPROOF	DIM "L" SPRAY TIGHT
IWTS	Basic, Switch	2.74 [69.6]	2.47 [62.7]
	Holding Coil, Basic	3.28 [83.3]	3.01 [76.4]
	Holding Coil, Basic, Rod Mtg.	3.32 [84.3]	not available

TABLE 2
8 Amp IWTS

Environmental Specifications

Operating Temperature	-40°C to + 71°C
Storage Temperatures	-55°C to + 85°C
Thermal Shock	MIL-STD-202, Method 107, Condition A
Moisture	MIL-STD-202, Method 106
Salt Spray	MIL-STD-202, Method 101, Condition A, 96 hours
Sand and Dust	MIL-STD-202, Method 110
Fungus	MIL-STD-810, Method 508, All materials used are non-nutrient to fungus
Vibration	MIL-STD-202, Method 204, Condition B, for single channel mount. For multiple channel matrix mount, contact the factory for information.
Shock	MIL-STD-202, Method 213, Condition B
Explosion	MIL-STD-202, Method 109
Magnet Effect	RTCA/DO-160D, Section 15, Class Z
Power Input	RTCA/DO-160D, Section 16, Category Z
Voltage Spike	RTCA/DO-160D, Section 17, Category B
Audio Frequency Conducted Susceptibility	RTCA/DO-160D, Section 18, Category Z
Induced Signal Susceptibility	RTCA/DO-160D, Section 19, Category Z
Emission of Radio Frequency Energy	RTCA/DO-160D, Section 21, Category M

Electrical Specifications

584 and 584 Millenium Current Ratings[1]

LOAD	SEA LEVEL 28 VDC MAX	SEA LEVEL 115 VAC MAX	50 000 FT 28 VDC MAX	50 000FT 115 VAC MAX	LIFE
Resistive	8.0 A	8.0 A	5.0 A	5.0 A	25 000 cycles
Resistive	5.0 A	5.0 A	3.0 A	3.0 A	100 000 cycles
Inductive	4.0 A	4.0 A	2.5 A	2.5 A	25 000 cycles
Inductive	0.5 A	0.5 A	0.3 A	0.3 A	100 000 cycles
Lamp	1.0 A	1.0 A	–	–	50 000 cylces

TABLE 3 Other application values can be identified on the switch life graph shown in figure 13.

584 and 584 Millenium Logic Level Ratings[1]

LOGIC LEVEL	SEA LEVEL 5 VDC MAX	LIFE
Resistive	0.01 A	50 000 cycles

584 Low Level Rating[1]

LOW LEVEL	SEA LEVEL 0.03 VDC MAX	LIFE
Resistive	0.01 A	200 000 cycles

584 Millenium Low Level Rating[1]

LOW LEVEL	SEA LEVEL 0.01 VDC MAX	LIFE
Resistive	0.003 A	1 000 000 cycles

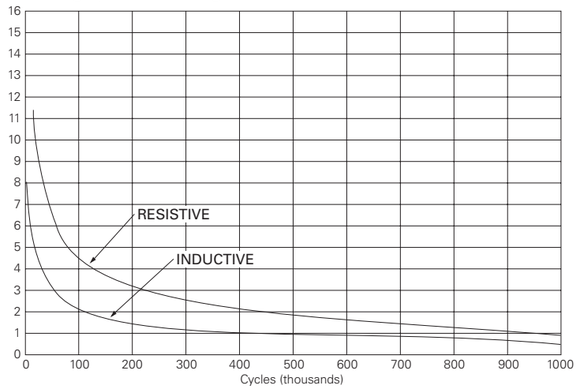


FIGURE 13 Typical 584 Switch Life vs. Electrical Load

Note 1. Contacts subjected to currents over 100 mA are no longer useable for low current applications.

Contact Resistance: Initial contact resistance at 6 VDC, 100 mA is 25 mΩ maximum. Post application resistance is 1% of the electrical circuit when measured during the operation of that circuit. Since the switch contacts are not hermetically sealed, actual contact resistance will vary based upon the cleanliness of the operating environment.

Electrical Specifications (cont'd)

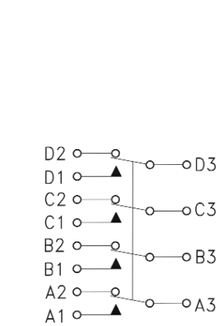


FIGURE 14
4PDPT Switch

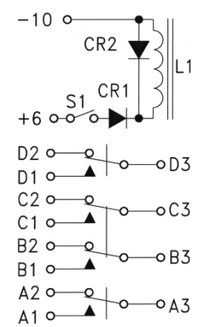


FIGURE 15
4PDPT Switch with Alternate Holding Coil

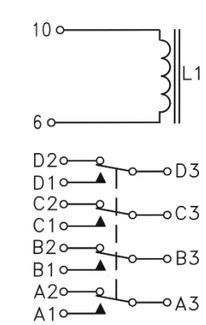


FIGURE 16
4PDPT Switch with Momentary Holding Coil

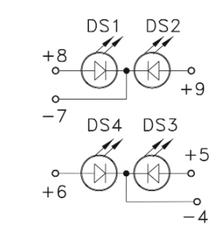


FIGURE 17
C1 Four Lamp Separate Power & Ground
Not available with holding coil devices (see C2 or C3).

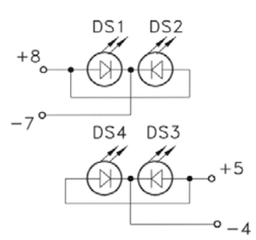


FIGURE 18
C2 Two Lamp Common Power & Ground

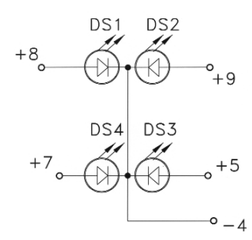


FIGURE 19
C3 Four Lamp Separate Power & Common Ground

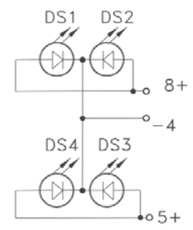


FIGURE 20
C5 Two Lamp Common Power & Four Lamp Common Ground

Note: Lamp positions are as viewed from the front of the display.

Display Type Specifications

The Series 584 is available with a variety of display screens. The most common types are listed below, for special requirements, contact the factory customer service center.

	WITH LIGHT SOURCE NOT ENERGIZED		WITH LIGHT SOURCE ENERGIZED		
DISPLAY TYPE	LEGEND	BACKGROUND	LEGEND	BACKGROUND	DESCRIPTION
1	White	Black	Color	Black	White legend lights in color when energized.
2	Black	White	Black	Color	White background lights in color when energized.
5	Black	Black	Color	Black	Hidden legend lights in sunlight readable color when energized.
6	Black	Color	Black	Color	Colored background lights in color when energized.
8	Black	Black	Black	Color	Hidden background lights in sunlight readable color when energized.
9	White	Black	White	Color	Hidden background lights in sunlight readable color when energized. Legend is white at all times.
12	White Black	Black Black	Color Color	Black Black	Top half: White legend lights in color when energized and is specifically designed for low ambient light conditions. Bottom half: Hidden legend lights in sunlight readable color when energized.
35	Gray	Black	Color	Black	Slightly visible gray legend lights in sunlight readable color when energized.
36	Black White	Black Black	Color Color	Black Black	Top half: Hidden legend lights in sunlight readable color when energized. Bottom half: White legend lights in color when energized and is specifically designed for low ambient light conditions.
40	White	Black	Color	Black	White legend lights in color when energized. Designed for low ambient light conditions.
48	Black Black	Black Black	Black Color	Color Black	Top half: Hidden background lights in sunlight readable color when energized. Color may be visible in the unenergized condition. Bottom half: Hidden legend lights in sunlight readable color when energized.
72	Black Black	Black Black	Color Black	Black Color	Top half: Hidden legend lights in sunlight readable color when energized. Bottom half: Hidden background lights in sunlight readable color when energized. Some color may be visible in the unenergized condition.

TABLE 4

Optical Specifications

Sunlight Readable Display Types

All sunlight readable displays meet or exceed the requirements of MIL-S-22885/110.

DISPLAY COLOR	LUMINANCE @ FULL RATED VOLTAGE	CONTRAST @10,000 fC $\varnothing_1 = 0°$ ON	CONTRAST @10,000 fC $\varnothing_2 = 45°$ OFF	BRIGHT/ DIM RATIO (Note 1)	CHROMATICITY BOUNDRY LIMITS 1931 CIE x,y COORDINATES				
Red	≥250 fl	≥0.6	≥0.1	30	x y	.665 .335	.665 .320	.695 .290	.710 .290
Amber	≥250 fl	≥0.6	≥0.1	30	x y	.540 .459	.540 .445	.610 .375	.625 .374
Green	≥250 fl	≥0.6	≥0.1	20	x y	.150 .808	.150 .640	.300 .640	.300 .694
White	≥250 fl	≥0.6	≥0.1	20	x y	.290 .315	.330 .285	.400 .390	.360 .420
Blue	≥200 fl	≥0.6	≥0.1	20	x y	.175 .005	.175 .175	.077 .175	– –

TABLE 5

Note 1. Applicable to switches and indicators with step dimming.

Note 2. Character to Character Brightness Uniformity <2.0:1 For all display types.

Non-Sunlight Readable Displays

For applications that do not have sunlight readability requirements, a line of commercial display screens is available. Minimum values are in fL.

COLOR	DISPLAY TYPE 1 STD	DISPLAY TYPE 2 & 6 STD	DISPLAY TYPE 40 STD
White	250	250	3.0 ± 1.0
Blue	200	200	3.0 ± 1.0
Yellow	250	250	3.0 ± 1.0
Green	250	250	3.0 ± 1.0
Red	250	250	3.0 ± 1.0

TABLE 6

NVIS Display Types

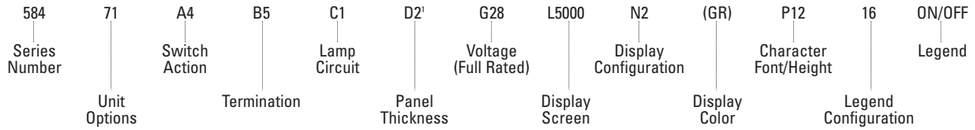
NVIS displays comply to the radiance and chromaticity requirements of MIL-L-85762A.

NVIS COLOR	NVIS CLASS	LUMINANCE @ FULL RATED VOLTAGE	NVIS LUMINANCE	CONTRAST @10,000 fC $\varnothing_1 = 0°$ ON	CONTRAST @10,000 fC $\varnothing_2 = 45°$ OFF	CHROMATICITY BOUNDRY LIMITS 1976 UCS COORDINATES u′	v′	r	NVIS RADIANCE NRa OR NRb MIN.	MAX.
Red	B	>150	15±5 fL	≥0.6	≥0.1	.450	.550	.060	$4.7x10^{-8}$	$1.4x10^{-7}$
Yellow	B	>200	15±5 fL	≥0.6	≥0.1	.274	.622	.083	$4.7x10^{-8}$	$1.4x10^{-7}$
Yellow	A	>200	15±5 fL	≥0.6	≥0.1	.274	.622	.083	$5.0x10^{-8}$	$1.5x10^{-7}$
Green B	A	>200	0.1±0.05 fL	≥0.6	≥0.1	.131	.623	.057	N/A	$1.7x10^{-10}$
Green A	A	>200	0.1±0.05 fL	≥0.6	≥0.1	.088	.543	.037	N/A	$1.7x10^{-10}$

TABLE 7

How to Use this Catalog

This catalog describes the standard and optional features of the Series 584. To determine the correct part number, refer to the following pages. Samples of a typical part number are shown on each page to aid your selection.



Note 1. The panel thickness call-out is only required for solder and PCB part numbers where the mounting hardware is supplied with the unit. Plug-in termination mounting hardware is identified by separate part numbers listed in the rear of the catalog.

Series Codes

58471A4B5C1D2G28L5000N2(GR),P12,16 ON/OFF

The Series number is identified by the first three or four digits of the part number.

SERIES	CODE
584	**584**
584 with QA per M22885/110	**584H**
584 Millennium	**584M**

Option Codes

584**71**A4B5C1D2G28L5000N2(GR),P12,16 ON/OFF

Several product options are identified by the next two digits of the part number. Use the table below to select the lighting option, sealing level.

LIGHTING OPTION	FOURTH DIGIT
LED w/ Step Dimming	**7**
LED w/ Linear Dimming	**8**
LED-NVIS w/ Step Dimming	**9**

SEAL OPTION	FIFTH DIGIT
Dust Resistant	**0**
Drip-proof, w/ Panel Seal	**1**
Spraytight, w/ Diaphragm Seal	**2**

Switch Action Codes

58471**A4**B5C1D2G28L5000N2(GR),P12,16 ON/OFF

The letter "A" and the digit immediately following it identify the switch action.

BASIC UNIT	CODE
Indicator	**A0**
4PDT Momentary Switch	**A1**
4PDT Alternate Switch	**A2**
4PDT Momentary Holding Coil Switch	**A3**
4PDT Alternate Holding Coil Switch	**A4**

Termination and Mounting Codes

58471A4**B5**C1D2G28L5000N2(GR),P12,16 ON/OFF

The Letter "B" and the digit following it identify the termination and mounting method.

TERMINATION	MAXIMUM CURRENT CARRYING CAPACITY	COMPATIBLE CONNECTOR PINS	WIRE SIZE	CODE
Plug-in	8A	M39029/22-192	20-24 AWG	**B5**
Solder Turret	8A	N/A	20-24 AWG	**B2**
PCB	8A	N/A	20-24 AWG	**B3**
IWTS	8A	M39029/1-100 M39029/1-100	22-26 AWG 22-24 AWG	**B4** **B4**
Solder Turret w/ Rod Mount	8A	N/A		**B7**
PCB w/ Rod Mount	8A	N/A		**B8**
IWTS w/ Rod Mount	8A	M39029/1-100 M39029/1-101	22-26 AWG 22-24 AWG	**B9**

Lamp Circuit Codes

58471A4B5**C1**D2G28L5000N2(GR),P12,16 ON/OFF

The letter "C" and the digit following it designate the lamp circuit. For information on custom circuits, contact the factory customer service center.

LAMP CIRCUIT	CODE
Dual Ground, 4 Way Split	**C1**
Dual Ground, 2 Way Split	**C2**
Common Ground, 4 Way Split	**C3**
Common Ground, 2 Way Split	**C5**

Mounting Hardware Codes

58471A4B5C1**D2**G28L5000N2(GR),P12,16 ON/OFF

The letter "D" and the digit following it identify the mounting hardware requirements for IWTS, solder and PCB units. This code is omitted if a plug-in mount unit is specified. Plug-in hardware is specified by separate part numbers listed later in this catalog. Custom mounting hardware is available by request. Contact the factory customer service center for information.

SPACER	SPACER HEIGHT[1]	PANEL THICKNESS RANGE	CODE
No Spacer	–	0.030 – 0.149 (0.76 – 3.79 mm)	**D25**
Black	0.100 (2.5 mm)	0.030 – 0.149 (0.76 – 3.79 mm)	**D1**
No Spacer	–	0.150 – 0.269 (3.80 – 6.83 mm)	**D26**
Black	0.100 (2.5 mm)	0.150 – 0.269 (3.80 – 6.83 mm)	**D2**

Note 1. When a drip-proof unit is specified, the spacer provided will be 0.070 (1.8 mm) to accommodate the panel seal and panel seal retainer. Total spacing above panel will remain at 0.100 (2.5 mm).

Voltage Codes

58471A4B5C1D2**G28**L5000N2(GR),P12,16 ON/OFF

The letter "G" and the digit(s) following identify the lighting system input voltage.

VOLTAGE TYPE	CODE
5-VDC	**G5**
28-VDC	**G28**

Note: For AC applications please contact customer service center

Display Screen Codes

58471A4B5C1D2G28**L5000**N2(GR),P12,16 ON/OFF

The letter "L" and the digits immediately following it identify the display screen. Display screens vary by the light source specified. To select the proper display screen code, identify the display type listed in the left column and the light source listed across the top row. Display screen types are described in the Optical Specification section see page 10.

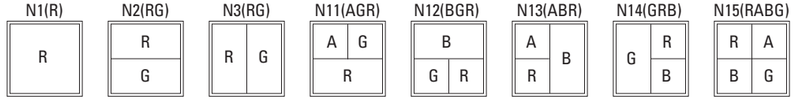
Display Screen Codes

DISPLAY TYPE	NVIS	NON-NVIS
1		L5001
2		L5002
5	L5060	L5000
6		L5006
7		L5007
8	L5061	L5008
9		L5009
12	L5062	L5012
35	L5064	L5035
36	L5065	L5036
40	L5066	L5040
48	L5063	L5048
72	L5067	L5072

Display Configuration Codes

58471A4B5C1D2G28L5000**N2**(GR),P12,16 ON/OFF

The letter "N" and the number following it designate the lens configuration as follows. Color callouts are shown for orientation.



Color Codes

58471A4B5C1D2G28L5000N2**(GR)**,P12,16 ON/OFF

The letters in parentheses following the lens configuration identify the lighted colors of the unit. In split displays, multiple letters are used to designate the colors of individual sections, in order from left to right and top to bottom. For example, in a four way split device, the designation (RWBG) would identify a red upper left quadrant, white upper right, blue lower left and green lower right.

NVIS Display Color Codes

COLOR	CLASS	u'	v'	r'	NVIS LUMINANCE	SUNLIGHT READABLE LUMINANCE	CODE
Green A	A	.088	.543	.037	0.1	>200 fL	**F**
Green B	A	.131	.623	.057	0.1	>200 fL	**H**
Yellow	B	.274	.622	.083	15.0	>200 fL	**J**
Red	B	.450	.550	.060	15.0	>150 fL	**K**
Yellow	A	.274	.622	.083	15.0	>200 fL	**T**

Color Codes (cont'd)

LED Display Color Codes

COLOR	DOMINANT WAVELENGTH	CODE
Blue	470 nm	**B**
White	6500 K CCT	**W**
Green	525 nm	**G**
Amber	590 nm	**A**
Red	615 nm	**R**

CCT = Correlated Color Temperature

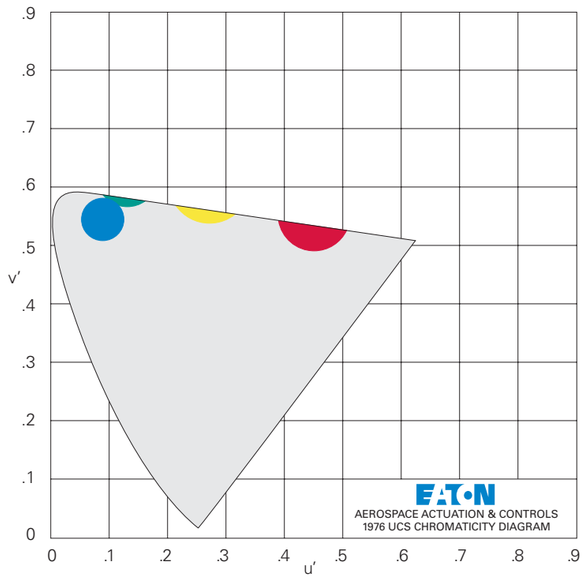


FIGURE 21
NVIS Compatible Display Chromaticity

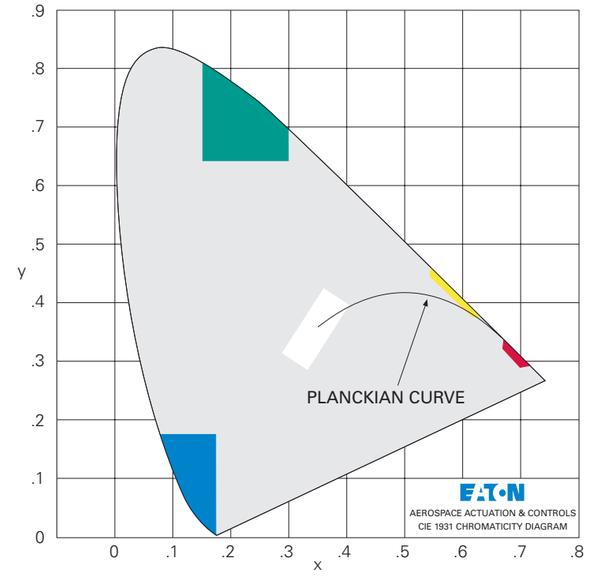


FIGURE 22
Standard Display Chromaticity

Character Font and Height Codes

58471A4B5C1D2G28L5000N2(GR),**P12**,16 ON/OFF

The letter "P" and the digits following it identify the font style and character height to be used for the legend nomenclature.

LETTER STYLE	FONT #	CHARACTER HEIGHT	LETTERS PER FULL ROW[2]	LETTERS PER HALF ROW[3]	CODE
Helvetica Medium[1]	1	0.093 (2.4 mm)[1]	7	3	**P11**
Helvetica Medium	1	0.125 (3.2 mm)	5	2	**P12**
Helvetica Medium Bold[4]	1	0.125 (3.2 mm)	5	2	**P12B**
Helvetica Medium Condensed	2	0.093 (2.4 mm)	8	3	**P14**
Helvetica Medium Condensed	2	0.125 (3.2 mm)	6	2	**P16**
Helvetica Med Condensed Bold[4]	2	0.125 (3.2 mm)	6	2	**P16**
DIN 1451/17	4	0.125 (3.2 mm)	4	2	**P18**
DIN 1451/17 Bold[4]	4	0.125 (3.2 mm)	4	2	**P18B**
DIN 1451/17 Condensed	5	0.125 (3.2 mm)	6	2	**P19**
DIN 1451/17 Condensed	5	0.125 (3.2 mm)	6	2	**P19B**
Futura Medium	7	0.125 (3.2 mm)	5	2	**P20**
Futura Medium Bold[4]	7	0.125 (3.2 mm)	5	2	**P20B**
Futura Medium Condensed	8	0.125 (3.2 mm)	6	2	**P21**
Futura Med Condensed Bold[4]	8	0.125 (3.2 mm)	6	2	**P21B**

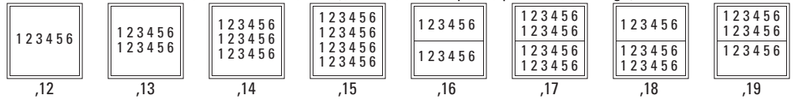
Note 1. Default letter style and height. Allows two rows of text per half (N2) display, larger heights only allow one row of text.
Note 2. Average for a full width N1 or N2 display. Each legend will vary based on the actual letters used.
Note 3. Average for a half width N3, N11, N12, N13, N14 or N15 display. Each legend will vary based on the actual letters used.
Note 4. 15% wider character stroke width. Recommended for better off-angle viewing.

Legend Configuration Codes

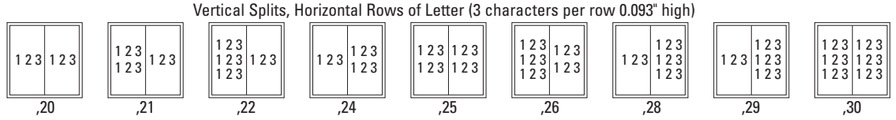
58471A4B5C1D2G28L5000N2(GR),P12,**16** ON/OFF

The two digits following the second comma identify the legend configuration. Legend configurations are listed below. The .093 inch (2.4 mm) character height is shown.

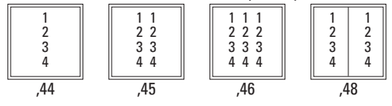
Horizontal Rows of Letters (6 characters or spaces per row 0.093" high)



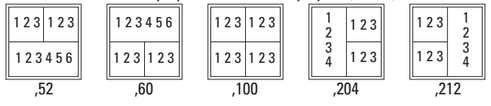
Vertical Splits, Horizontal Rows of Letter (3 characters per row 0.093" high)



Vertical Columns of Letters (4 characters or spaces per column 0.093" high)



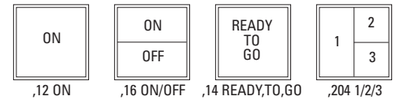
Three-way Splits and Four-Way Splits (0.093")



Legend Nomenclature

58471A4B5C1D2G28L5000N2(GR),P12,16 **ON/OFF**

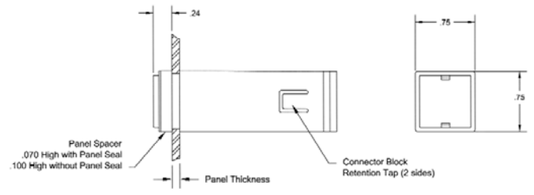
The legend nomenclature must be written out as part of the catalog part number when ordering a switch or indicator. The legend is appended to the catalog part number after the legend configuration code. Commas are used between rows of characters and a slash is used to identify legend splits. When specifying a legend with a split, the order for the nomenclature is upper left, upper right, lower left and lower right. Examples are listed below.



Series 584 Plug-In Mounting Sleeves with Connector Block

Basic Mounting Sleeve 584-RDL5-XXX, 584-REL5 for M39029/22-192 Connector Pins

After the switch has been inserted in the panel, this sleeve slides over the behind panel portion of the switch and is secured by tightening the pawl. When switch removal is necessary, access to both the front and rear of the panel is required.



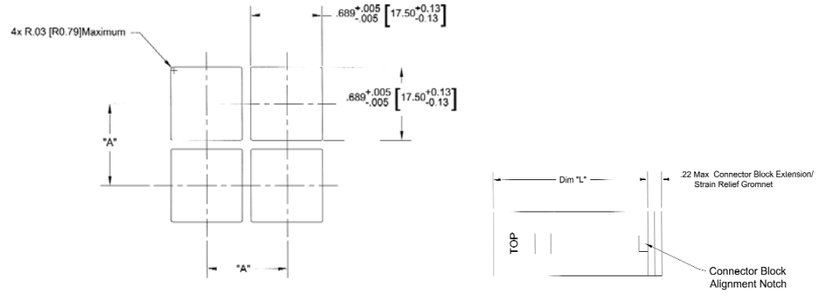


FIGURE 23
Plug-In Mounting Sleeve with Connector and Plug-In Mounting Sleeve

Mounting Sleeve Dash Numbers for Dust Resistant, Spraytight & Dripproof 8 Amp Devices

DEVICE DESCRIPTION	CODE	DIM "L" .032 [.813]	.063 [1.59]	.094 [2.39]	.125 [3.17]	.157 [3.99]	.188 [4.78]	.219 [5.56]	.250 [6.35]
Basic, Switch	584-REL5	-1	-2	-3	-4	-5	-6	-7	-8
Basic, Holding Coil	584-REHL5	-1	-2	-3	-4	-5	-6	-7	-8
Basic, Switch	584-REL5	-201	-202	-203	-204	-205	-206	-207	-208
Basic, Holding Coil	584-REHL5	-201	-202	-203	-204	-205	-206	-207	-208
Basic, Switch, Dripproof	584-REL5	-301	-302	-303	-304	-305	-306	-307	-308
Basic, Switch, Dripproof	584-REL5	-101	-102	-103	-104	-105	-106	-107	-108
Basic, H.C., Dripproof	584-REHL5	-101	-102	-103	-104	-105	-106	-107	-108
Basic, H.C., Dripproof	584-REHL5	-301	-302	-303	-304	-305	-306	-307	-308
Basic, Spray Tight	584-RDL5	-201	-202	-203	-204	-205	-206	-207	-208
Basic, H.C., Spray Tight	584-RDHL5	-201	-202	-203	-204	-205	-206	-207	-208

Note: The dash numbers shown are for applications without switch guards. For applications employing switch guards, please consult customer service.

TABLE 8

Basic Mounting Sleeve 584-RDL5-XXX, 584-REL5 for M39029/22-192 Connector Pins (cont'd)

MOUNTING SLEEVE LENGTHS FOR DUST RESISTANT, SPRAYTIGHT & DRIPPROOF 8 AMP DEVICES

Note: Dash 1 thru dash 8 include a .100 thick spacer for use with edgelit panels.
Dash 101 thru dash 108 include a .070 thick spacer for use with edgelit panels.
Dash 201 thru 208 and dash 301 thru 308 do not include spacers.

	CODE			
	RDL5	RDHL5	REL5	REHL5
-1 or -101	–	–	2.52	3.06
-2 or -102	–	–	2.49	3.03
-3 or -103	–	–	2.47	3.01
-4 or -104	–	–	2.43	2.97
-5 or -105	–	–	2.40	2.94
-6 or -106	–	–	2.37	2.91
-7 or -107	–	–	2.34	2.88
-8 or -108	–	–	2.31	2.85
-201	2.36	2.90	2.63	3.17
-202	2.32	2.86	2.59	3.13
-203	2.30	2.84	2.57	3.10
-204	2.25	2.80	2.53	3.07
-205	2.23	2.77	2.50	3.04
-206	2.20	2.74	2.47	3.01
-207	2.17	2.71	2.44	2.98
-208	2.14	2.68	2.41	2.95
-301	–	–	2.59	3.13
-302	–	–	2.57	3.10
-303	–	–	2.53	3.07
-304	–	–	2.50	3.04
-305	–	–	2.47	3.01
-306	–	–	2.44	2.98
-307	–	–	2.41	2.95
-308	–	–	2.38	2.92

TABLE 9

Series 584 Plug-In Mounting Sleeves with Connector Block (cont'd)

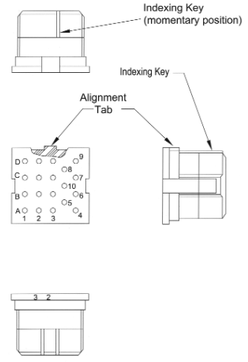


FIGURE 24
Plug-In Mounting Sleeve Connector Block

Note: Polarity markings available upon request.

KEY SLOT POSITION	TYPE OF DEVICE
1	Momentary Switch
2	Alternate Switch
3	Indicator
1 & 2	Alternate Switch w/Holding Coil
2 & 3	Not Used

TABLE 10

Series 584 Snap-On Mounting Sleeves with Connector Block

Snap-On Mounting Sleeves 584-REL6-XXX, for M39029/22-192 Connector Pins

In the snap-on version, the 584-REL5 sleeve is modified to provide a positive stop above panel, leaving part of the sleeve protruding above the panel. The sleeve is installed and retained by a snap-on clip assembled from the rear of the panel. The sleeve assembly remains loosely attached to the panel until the switch is inserted and tightened, creating a rigid mounting. The switch is removable from the front of the panel, rear access is not required. Not available for use with the diaphragm seal switches.

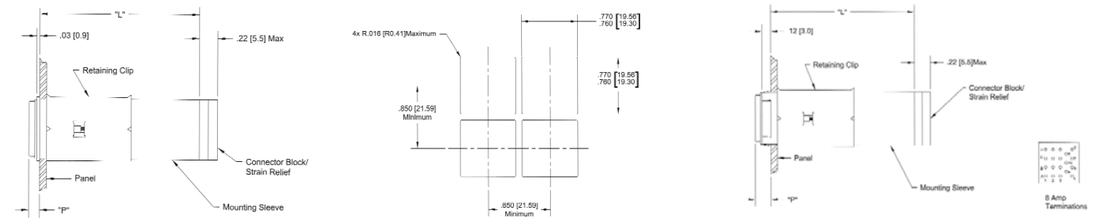


FIGURE 25
Panel Cutout Snap-On Mounting Sleeve
Flush Mount (left) and Panel Mount (right)

Panel Cutout Snap-on Mounting Sleeve

DESCRIPTION	DIM "P"	DIM "L"	CODE	PANEL THICKNESS ± .010 [.25] & DASH NO. .030 [0.76] .250 [6.35]	.060 [1.52] .220 [5.58]	.090 [2.28] .190 [4.82]	.125 [3.17] .150 [3.81]
Flush Mt., Basic	.269 [4.29]	2.64 [53.7]	584-REL6	-001	-002	-003	-004
Flush Mt., Basic, w/HC	.169 [4.29]	3.18 [67.4]	584-REHL6	-001	-002	-003	-004
Panel Mt., Basic	.253 [6.43]	2.34 [51.6]	584-REL6	-101	-102	-103	-104
Panel Mt., Basic, with HC	.253 [6.43]	3.08 [65.3]	584-REHL6	-101	-102	-103	-104

TABLE 11

Series 584 matrices are modular units in which switches and indicators can be mounted. The maximum square matrix is 5 x 5 and the maximum rectangular matrix is 5 x 10. Contact factory customer service center for information on other configurations. Wire terminals and installation tools are listed on page 24.

Bezel Matrix 584-RELWYxxxx-1

The bezel matrix has a black colored bezel and is inserted through the front of the panel. Matrix selection must be coordinated with switch length. Fasteners are inserted into slots in the matrix after the matrix has been inserted into the panel and are tightened to secure the unit. Switches are removable from the front of the panel, rear access is not required after being mounted in the panel. Not available with the diaphragm seal version.

CODE	IDENTIFIES	CODES
584-**RELWY**0203-1	Matrix length	Use **RELWY** for basic units
584-RELWY**02**03-1	No. of units per horizontal row	Two digits
584-RELWY02**03**-1	No. of units per vertical column	Two digits
584-RELWY0203-**1**	Connector M39029/22-192	One digit

Bezel Matrix Dimensions

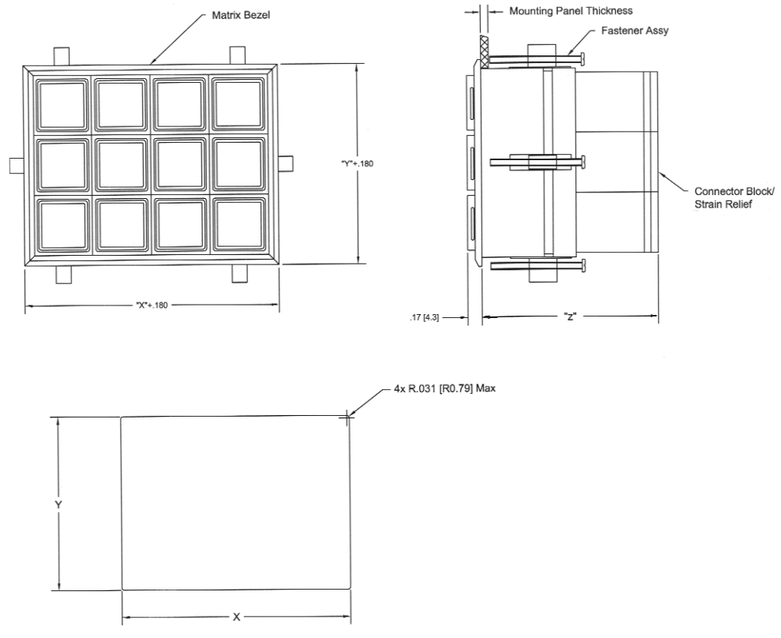


FIGURE 26
Bezel Matrix

Bezel Matrix Dimensions (continued)

BEZEL MATRIX PANEL CUTOUT SIZES

X(HORIZ)➢	1		2		3		4		5		6		7		8		9		10	
NO. OF STATIONS	PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT	
Y(VERT) ↓	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y
1	.985	.985	1.740	.985	2.495	.985	3.250	.985	4.005	.985	4.760	.985	5.515	.985	6.270	.985	7.025	.985	7.780	.985
	[25.02]	[25.02]	[44.19]	[25.02]	[63.37]	[25.02]	[82.55]	[25.02]	[101.73]	[25.02]	[120.90]	[25.02]	[140.08]	[25.02]	[159.26]	[25.02]	[178.43]	[25.02]	[197.61]	[25.02]
2	.985	1.740	1.740	1.740	2.495	1.740	3.250	1.740	4.005	1.740	4.760	1.740	5.515	1.740	6.270	1.740	7.025	1.740	7.780	1.740
	[25.02]	[44.19]	[44.19]	[44.19]	[63.37]	[44.19]	[82.55]	[44.19]	[101.73]	[44.19]	[120.90]	[44.19]	[140.08]	[44.19]	[159.26]	[44.19]	[178.43]	[44.19]	[197.61]	[44.19]
3	.985	2.495	1.740	2.495	2.495	2.495	3.250	2.495	4.005	2.495	4.760	2.495	5.515	2.495	6.270	2.495	7.025	2.495	7.780	2.495
	[25.02]	[63.37]	[44.19]	[63.37]	[63.37]	[63.37]	[82.55]	[63.37]	[101.73]	[63.37]	[120.90]	[63.37]	[140.08]	[63.37]	[159.26]	[63.37]	[178.43]	[63.37]	[197.61]	[63.37]
4	.985	3.250	1.740	3.250	2.495	3.250	3.250	3.250	4.005	3.250	4.760	3.250	5.515	3.250	6.270	3.250	7.025	3.250	7.780	3.250
	[25.02]	[82.55]	[44.19]	[82.55]	[63.37]	[82.55]	[82.55]	[82.55]	[101.73]	[82.55]	[120.90]	[82.55]	[140.08]	[82.55]	[159.26]	[82.55]	[178.43]	[82.55]	[197.61]	[82.55]
5	.985	4.005	1.740	4.005	2.495	4.005	3.250	4.005	4.005	4.005	4.760	4.005	5.515	4.005	6.270	4.005	7.025	4.005	7.780	4.005
	[25.02]	[101.73]	[44.19]	[101.73]	[63.37]	[101.73]	[82.55]	[101.73]	[101.73]	[101.73]	[120.90]	[101.73]	[140.08]	[101.73]	[159.26]	[101.73]	[178.43]	[101.73]	[197.61]	[101.73]
6	.985	4.760	1.740	4.760	2.495	4.760	3.250	4.760	4.005	4.760	4.760	4.760	5.515	4.760	6.270	4.760	7.025	4.760	7.780	4.760
	[25.02]	[120.90]	[44.19]	[120.90]	[63.37]	[120.90]	[82.55]	[120.90]	[101.73]	[120.90]	[120.90]	[120.90]	[140.08]	[120.90]	[159.26]	[120.90]	[178.43]	[120.90]	[197.61]	[120.90]
7	.985	5.515	1.740	5.515	2.495	5.515	3.250	5.515	4.005	5.515	4.760	5.515	5.151	5.151	6.270	5.515	7.025	5.515	7.780	5.515
	[25.02]	[140.08]	[44.19]	[140.08]	[63.37]	[140.08]	[82.55]	[140.08]	[101.73]	[140.08]	[120.90]	[140.08]	[140.08]	[140.08]	[159.26]	[140.08]	[178.43]	[140.08]	[197.61]	[140.08]
8	.985	6.270	1.740	6.270	2.495	6.270	3.250	6.270	4.005	6.270	4.760	6.270	5.515	6.270	6.270	6.270	7.025	6.270	7.780	6.270
	[25.02]	[159.26]	[44.19]	[159.26]	[63.37]	[159.26]	[82.55]	[159.26]	[101.73]	[159.26]	[120.90]	[159.26]	[140.08]	[159.26]	[159.26]	[159.26]	[178.43]	[159.26]	[197.61]	[159.26]
9	.985	7.025	1.740	7.025	2.495	7.025	3.250	7.025	4.005	7.025	4.760	7.025	5.515	7.025	6.270	7.025	7.025	7.025	7.780	7.025
	[25.02]	[178.43]	[44.19]	[178.43]	[63.37]	[178.43]	[82.55]	[178.43]	[101.73]	[178.43]	[120.90]	[178.43]	[140.08]	[178.43]	[159.26]	[178.43]	[178.43]	[178.43]	[197.61]	[178.43]
10	.985	7.780	1.740	7.780	2.495	7.780	3.250	7.780	4.005	7.780	4.760	7.780	5.515	7.780	6.270	7.780	7.025	7.780	7.780	7.780
	[25.02]	[197.61]	[44.19]	[197.61]	[63.37]	[197.61]	[82.55]	[197.61]	[101.73]	[197.61]	[120.90]	[197.61]	[140.08]	[197.61]	[159.26]	[197.61]	[178.43]	[197.61]	[197.61]	[197.61]

TABLE 12

Flange Matrix 584-RELXxxxx-.xxx

The flange matrix mounts from the rear of the panel and is secured with screws (not included). Flange mount matrices are not supplied in drip-proof or diaphragm seal versions. Matrix selection must be coordinated with switch length. Switches are removable from the front of the panel, rear access is not required after being mounted in the panel.

CODE	IDENTIFIES	CODES
584-**RELX**0203-1-.125	Matrix length	Use **RELX** for basic units
584-RELX**02**03-1-.125	No. of units per horizontal row	Two digits
584-RELX02**03**-1-.125	No. of units per vertical column	Two digits
584-RELX0203-**1**-.125	Connector M39029/22-192	One digit
584-RELX0203-1-**.125**	Panel thickness	Std thicknesses: 0.063 (1.6), 0.090 (2.3), 0.125 (3.2), 0.190 (4.8)

Flange Matrix Dimensions

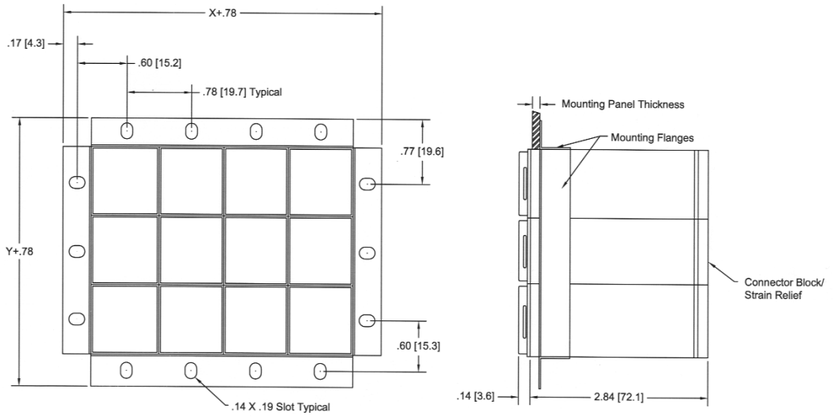


FIGURE 27
Flanged Matrix

FLANGE MATRIX PANEL CUTOUT SIZES

X(HORIZ)➢	1		2		3		4		5		6		7		8		9		10	
NO. OF STATIONS	PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT		PANEL CUTOUT	
Y(VERT)↓	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y	DIM X	DIM Y
1	.775	.775	1.530	.775	2.285	.775	3.040	.775	3.795	.775	4.550	.775	5.305	.775	6.060	.775	6.815	.775	7.570	.775
	[19.68]	[19.68]	[38.86]	[19.68]	[58.04]	[19.68]	[77.22]	[19.68]	[96.39]	[19.68]	[115.57]	[19.68]	[134.75]	[19.68]	[153.92]	[19.68]	[173.10]	[19.68]	[192.28]	[19.68]
2	.775	1.530	1.530	1.530	2.285	1.530	3.040	1.530	3.795	1.530	4.550	1.530	5.305	1.530	6.060	1.530	6.815	1.530	7.570	1.530
	[19.68]	[38.86]	[38.86]	[38.86]	[58.04]	[38.86]	[77.22]	[38.86]	[96.39]	[38.86]	[115.57]	[38.86]	[134.75]	[38.86]	[153.92]	[38.86]	[173.10]	[38.86]	[192.28]	[38.86]
3	.775	2.285	1.530	2.285	2.285	2.285	3.040	2.285	3.795	2.285	4.550	2.285	5.305	2.285	6.060	2.285	6.815	2.285	7.570	2.285
	[19.68]	[58.04]	[38.86]	[58.04]	[58.04]	[58.04]	[77.22]	[58.04]	[96.39]	[58.04]	[115.57]	[58.04]	[134.75]	[58.04]	[153.92]	[58.04]	[173.10]	[58.04]	[192.28]	[58.04]
4	.775	3.040	1.530	3.040	2.285	3.040	3.040	3.040	3.795	3.040	4.550	3.040	5.305	3.040	6.060	3.040	6.815	3.040	7.570	3.040
	[19.68]	[77.22]	[38.86]	[77.22]	[58.04]	[77.22]	[77.22]	[77.22]	[96.39]	[77.22]	[115.57]	[77.22]	[134.75]	[77.22]	[153.92]	[77.22]	[173.10]	[77.22]	[192.28]	[77.22]
5	.775	3.795	1.530	3.795	2.285	3.795	3.040	3.795	3.795	3.795	4.550	3.795	5.305	3.795	6.606	3.795	6.815	3.795	7.570	3.795
	[19.68]	[96.39]	[38.86]	[96.39]	[58.04]	[96.39]	[77.22]	[96.39]	[96.39]	[96.39]	[115.57]	[96.39]	[134.75]	[96.39]	[153.92]	[96.39]	[173.10]	[96.39]	[192.28]	[96.39]
6	.775	4.550	1.530	4.550	2.285	4.550	3.040	4.550	3.795	4.550	4.550	4.550	5.305	4.550	6.060	4.550	6.815	4.550	7.570	4.550
	[19.68]	[115.57]	[38.86]	[115.57]	[58.04]	[115.57]	[77.22]	[115.57]	[96.39]	[115.57]	[115.57]	[115.57]	[134.75]	[115.57]	[153.92]	[115.57]	[173.10]	[115.57]	[192.28]	[115.57]
7	.775	5.305	1.530	5.305	2.285	5.305	3.040	5.305	3.795	5.305	4.550	5.305	5.305	5.305	6.060	5.305	6.815	5.305	7.570	5.305
	[19.68]	[134.75]	[38.86]	[134.75]	[58.04]	[134.75]	[77.22]	[134.75]	[96.39]	[134.75]	[115.57]	[134.75]	[134.75]	[134.75]	[153.92]	[134.75]	[173.10]	[134.75]	[192.28]	[134.75]
8	.775	6.060	1.530	6.060	2.285	6.060	3.040	6.060	3.795	6.060	4.550	6.060	5.305	6.060	6.060	6.060	6.815	6.060	7.570	6.060
	[19.68]	[153.92]	[38.86]	[153.92]	[58.04]	[153.92]	[77.22]	[153.92]	[96.39]	[153.92]	[115.57]	[153.92]	[134.75]	[153.92]	[153.92]	[153.92]	[173.10]	[153.92]	[192.28]	[153.92]
9	.775	6.815	1.530	6.815	2.285	6.815	3.040	6.815	3.795	6.815	4.550	6.815	5.305	6.815	6.060	6.815	6.815	6.815	7.570	6.815
	[19.68]	[173.10]	[38.86]	[173.10]	[58.04]	[173.10]	[77.22]	[173.10]	[96.39]	[173.10]	[115.57]	[173.10]	[134.75]	[173.10]	[153.92]	[173.10]	[173.10]	[173.10]	[192.28]	[173.10]
10	.775	7.570	1.530	7.570	2.285	7.570	3.040	7.570	3.795	7.570	4.550	7.570	5.305	7.570	6.060	7.570	6.815	7.570	7.570	7.570
	[19.68]	[192.28]	[38.86]	[192.28]	[58.04]	[192.28]	[77.22]	[192.28]	[96.39]	[192.28]	[115.57]	[192.28]	[134.75]	[192.28]	[153.92]	[192.28]	[173.10]	[192.28]	[192.28]	[192.28]

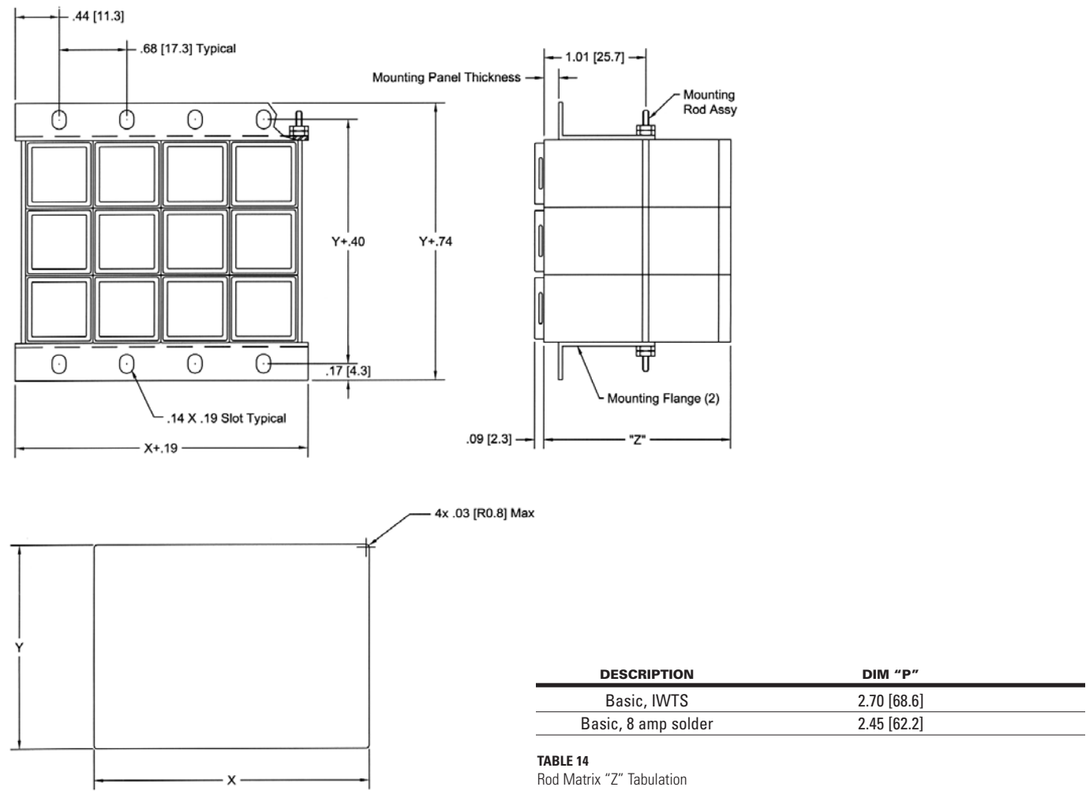
TABLE 13

The rod mount system allows for units to be mounted in the smallest allowable space by using a system of rods and plates to hold the switch/indicator units together and fasten them to the mounting panel.

584-RELMxxxx-.xxx

CODE	IDENTIFIES	CODES
584-**RELM**0303-.125	Matrix length	Use **RELM** for basic units
584-RELM**03**03-.125	No. of units per horizontal row	Two digits
584-RELM03**03**-.125	No. of units per vertical row	Two digits
584-RELM0303-**.125**	Panel thickness	Std sizes: 0.063 (1.6), 0.090 (2.3), 0.125 (3.2)

584-RELMxxxx-.xxx Dimensions



DESCRIPTION	DIM "P"
Basic, IWTS	2.70 [68.6]
Basic, 8 amp solder	2.45 [62.2]

TABLE 14
Rod Matrix "Z" Tabulation

FIGURE 28
Rod Mount Matrix

584-RELMxxxx-.xxx Dimensions (cont'd)

ROD MOUNT MATRIX PANEL CUTOUT SIZES

X(HORIZ)→	1	2	3	4	5	6
NO. OF STATIONS	PANEL CUTOUT	PANEL CUTOUT	PANEL CUTOUT	PANEL CUTOUT	PANEL CUTOUT	PANEL CUTOUT
Y(VERT) ↓	DIM X DIM Y	DIM X DIM Y	DIM X DIM Y	DIM X DIM Y	DIM X DIM Y	DIM X DIM X
1	.700 .700	1.380 .700	2.060 .700	2.740 .700	3.420 .700	4.100 .700
	[17.78] [17.78]	[35.05] [17.78]	[52.32] [17.78]	[69.60] [17.78]	[86.87] [17.78]	[104.14] [17.78]
2	.700 1.380	1.380 1.380	2.060 1.380	2.740 1.380	3.420 1.380	4.100 1.380
	[17.78] [35.05]	[35.05] [35.05]	[52.32] [35.05]	[69.60] [35.05]	[86.84] [[35.05]	[104.14] [35.05]
3	.700 2.060	1.380 2.060	2.060 2.060	2.740 2.060	3.420 2.060	4.100 2.060
	[17.78] [52.32]	[35.05] [52.32]	[52.32] [52.32]	[69.60] [52.32]	[86.87] [52.32]	[104.14] [52.32]
4	.700 2.740	1.380 2.740	2.060 2.740	2.740 2.740	3.420 2.740	4.100 2.740
	[17.78] [69.60]	[35.05] [69.60]	[52.32] [69.60]	[69.60] [69.60]	[86.87] [69.60]	[104.14] [69.60]
5	.700 3.420	1.380 3.420	2.060 3.420	2.740 3.420	3.420 3.420	4.100 3.420
	[17.78] [86.87]	[35.05] [86.87]	[52.32] [86.87]	[69.60] [86.87]	[86.87] [86.87]	[104.14] [86.87]
6	.700 4.100	1.380 4.100	2.060 4.100	2.740 4.100	3.420 4.100	4.100 4.100
	[17.78] [104.14]	[35.05] [104.14]	[52.32] [104.14]	[69.90] [104.14]	[86.87] [104.14]	[104.14][104.14]

TABLE 15

Spare Parts

Capsule	584 (See Pages 13-16)
Body	584 (See Pages 12-16)
Mounting Hardware	584 (See Page 13)
Panel Seal and Retainer, Black	584-515-1
Panel Seal and Retainer, Stainless Steel	584-515-2
Frame Matrix Fastener	584-526
8 amp, M39029/22-192 Connector Block w/ Strain Relief	584-527

Accessories

Connector Pin, 8A, M39029/22-192, Crimp Style, 1 ea.	58A-111-1
Connector Pin, 8A, M39029/22, 25 ct	58A-111-2
Connector Pin, 8A, M39029/1-100, Crimp Style, 1 ea.	58A-110-1
Connector Pin, 8A, M39029/1-100, 25 ct	58A-110-2
Connector Pin, 8A, M39029/1-101, Crimp Style, 1 ea.	58A-110-3
Connector Pin, 8A, M39029/1-101, 25 ct	58A-110-4
Clear Plastic Switchguard	58A-104
Wire Switchguard, Black	58A-105-1
Wire Switchguard, Red	58A-105-2

Installation and Removal Tools

Lamp Capsule Removal Tool	58T-101
Connector Pin Crimp Tool, for M39029/1	58T-109-1
Connector Pin Crimp Tool, for M39029/22	58T-109-2
Connector Pin Removal Tool	58T-104
Connector Block Removal Tool	58T-107
Torque Screwdriver	58T-106

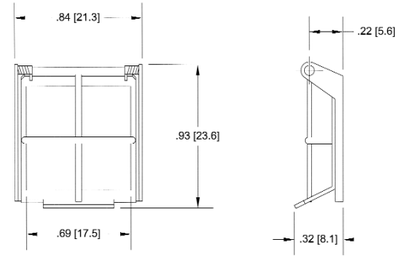


FIGURE 29
Wire Switch Guard
Not for use with Matrices

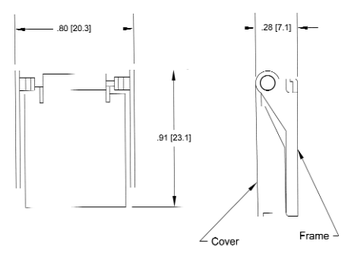


FIGURE 30
Clear Plastic Switch Guard
Not for use with Matrices

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