

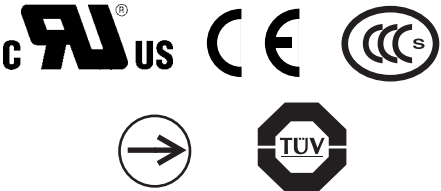
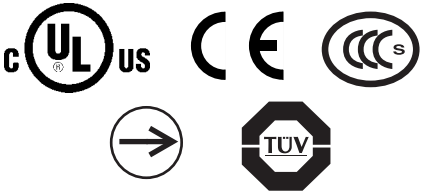



Selection Guide












**A1: Safe Break E-Stops: 16mm XA & 22mm XW Series**

Switches & Pilot Devices

World's Safest Emergency Switches		
Series Model	XA	XW
<b>Appearance</b>	<p>NEW</p> 	<p>NEW</p> 
<b>See Page</b>	<b>A1-14</b>	<b>A1-14</b>
<b>Operator Type</b>	Non-illuminated E-Stops: Pushlock/Turn Reset, Push-Pull	Illuminated & Non-Illuminated E-Stops: Pushlock/Turn Reset, Push-Pull
<b>Reset Action</b>	Pushlock Pull or Turn Reset (both actions available in each switch)	
<b>Contact Configuration</b>	1NO - 1NC, 2NC, 1NO-3NC, 4NC	1NO - 1NC, 2NC, 1NO-3NC, 4NC
<b>Electrical Life</b>	100,000 Minimum 250,000 or more (24V AC/DC 100mA)	
<b>Mechanical Life</b>	250,000 Minimum	
<b>Termination</b>	PCB & Solder Terminals	Screw Terminals
<b>Degree of Protection</b>	IP65 (IEC60529)	
<b>Approvals</b>		


 XA series UL recognized.

## A2: Ø16mm Switches & Pilot Devices - A6 Series

Series Model	AL6	AB6	AL6	AB6	AB6-V	AS6	AS6-K
<b>Appearance</b>							
<b>See Page</b>	<b>A2-20</b>	<b>A2-18</b>	<b>A2-20</b>	<b>A2-18</b>	<b>A2-18</b>	<b>A2-24</b>	<b>A2-24</b>
<b>Operator Type</b>	Illuminated Pushbuttons: • Momentary • Maintained • Pilot Lights	Non-Illuminated Pushbuttons: • Momentary • Maintained	Oversize Lens Illuminated Pushbuttons: • Momentary • Maintained	Oversize Button Non-illuminated Pushbuttons: • Momentary • Maintained	Emergency Stop: • Pushlock / Turn Reset	Selector Switches: • 2 or 3-Position • Maintained or Spring Return	Keylock Switches: • 2 or 3-Position • Maintained or Spring Return • Key removable options
<b>Bezel/Lens Shape &amp; Size</b>	Round: 18mm Square: 18mm Rectangular: 18 x 24mm		Round: 23.5mm Square: 23.5mm Rectangular: 17.5 x 23.5mm		Round: 23.5mm	Round: 18mm Square: 18mm Rectangular: 18 x 24mm	
<b>Light Source</b>	LED	—	LED	—	—	—	—
<b>Lens/Button Colors</b>	Amber, Green, Red, White, Yellow, Blue	Black, Blue, Green, Red, White, Yellow	Amber, Green, Red, White, Yellow, Blue	Black, Blue, Green, Red, White, Yellow	Red	Black	—
<b>Contact Configuration</b>	SPDT or DPDT (Gold-Clad Silver Contact)						
<b>Contact Ratings</b>	120V AC/1A, 24V DC/1A (Resistive) (Minimum applicable load reference value: 5V AC/DC, 1mA)						
<b>Electrical Life</b>	Momentary: 100,000 operations minimum Maintained: 50,000 operations minimum				100,000 operations	100,000 operations minimum (at 1,200 operations/hour)	
<b>Mechanical Life</b>	Momentary: 1,000,000 operations minimum Maintained: 100,000 operations minimum				100,000 operations	250,000 operations minimum	
<b>Degree of Protection</b>	Enclosed/Dustproof: IP40 Waterproof/Oiltight/Corrosion Resistant: IP65						
<b>Termination</b>	.110" Solder/Quick Connect						
<b>Approvals</b>	 UL Recognized File No. E55996		 CSA Certified File No. LR48366				Certificate No. 2030010305027380

A

Switches & Pilot Devices









































-  1. LED lamps contain a built-in current-limiting resistor and reverse polarity protection diode.  
2. Available as assembled or sub-assembled components.

**A2: Ø16mm Switches & Pilot Devices - L6 Series**

Switches & Pilot Devices

Series Model	LAΔB/HAΔB	LAΔP/HAΔP	LAΔL/HAΔL	HA1B-V/ HA1E-V	LAΔS/HAΔS	LAΔK/HAΔK	LAΔF/HAΔF	LA3Z/LA1T/ HA1R
Appearance				 Direct Opening Action				
See Page	A2-30	A2-34	A2-36	A2-33	A2-38	A2-40	A2-42	A2-33, A2-44
Operator Types	Non-illuminated: • Momentary • Maintained	Pilot Light • LED/Incan.	Illuminated: • Momentary • Maintained • LED/Incan.	E-Stop • Pushlock/ Turn Reset	Selector Switch • 2 pos/ 3pos • Spring/Maint	Key Switch • 2pos/3pos • Spring/Maint • Key Remove Option	Illuminated Selector • 2 pos/ 3pos • Spring/Maint • LED/Incan.	Piezo Buzzer Lever Switch • 2 pos/ 3pos • Spring/Maint PB/ Selector • 2 pos/ 3pos
Bezel Shape and Size	Rnd: 18mm Sq: 18mm Rect: 18 x 24mm Ovrsize Rnd: 24mm Ovrsize Sq: 24mm	Rnd: 18mm Sq: 18mm Rect: 18 x 24mm Ovrsize Rnd: 24mm Ovrsize Sq: 24mm	Rnd: 18mm Sq: 18mm Rect: 18 x 24mm Ovrsize Rnd: 24mm Ovrsize Sq: 24mm	Rnd: 25mm		Rnd: 18mm Sq: 18mm Rect: 18 x 24mm Ovrsize Rnd: 24mm		BZR: 18 x 24mm Lvr: 18mm PB/Selector: 25mm
Light Source	-	LED: 5VDC/6V, 12V, 24V AC/DC Incan: 5V/6V, 12V, 24V AC/DC	LED: 5VDC/6V, 12V, 24V AC/DC Incan: 5V/6V, 12V, 24V AC/DC	-	-	-	LED: 5VDC/6V, 12V, 24V AC/DC Incan: 5V/6V, 12V, 24V AC/DC	-
Lens/Button Colors	Amber, Green, Red, Blue, White, Yellow	Amber, Green, Red, Blue, White, Yellow	Amber, Green, Red, Blue, White, Yellow	Red	Black/White	Black/Silver	Amber, Green, Red, Blue, White, Yellow	-
Contact Configuration	SPDT, DPDT	-	SPDT, DPDT	DPST-NC (positive action)		DPDT		DPDT
Electrical Life	100,000 operations min (at full rated load)	Incan: 2000 hrs LED: 50,000 hrs			100,000 operations min (at full rated load)			-
Mechanical Life	Momentary: 2,000,000 Maintained: 250,000	-	Momentary: 2,000,000 Maintained: 250,000	250,000 operations		Momentary: 2,000,000 Maintained: 250,000		-
Degree of Protection	IP65							
Termination	0.110" solder/quick connect, PCB pins							
Approvals	UL Recognized File No. E55996	CSA Certified File No. LR21451	TÜV Rheinland	Reg.No. R9551089 Reg. No. J9551458 Reg. No. J9650511			HA1B-V, HA1E only	

## A3: Ø22mm Oiltight Switches and Pilot Devices - HW Series




















Series Model	HWΔB-	HWΔP-	HWΔL-	HW1B, HW1E	HW1S, HW1K, HW1F-	HW7D, HW1M, HW1R -
<b>Appearance</b>	Flush 		Flush 	Push-Pull 		
	Extended 		Flush (metal bezel) 	Pushlock Turn Reset 	Knob Operator 	<b>NEW</b> Dual Pushbutton 
	Extended (metal bezel) 	Dome Lens 	Flush (metal bezel) 	Pushlock Turn Reset (metal bezel) 	Knob Operator (metal bezel) 	Mono-Lever 
	40mm Mushroom 	Dome Lens (metal bezel) 	Extended 	Pushlock Turn Reset (metal bezel) 	Key Operator 	
	Square Flush 	Flush Lens 	Extended/Shroud 	Pushlock Key Reset 	Key Operator (metal bezel) 	Pushbutton Selector 
	Square Extended 	Square Flush 	40mm Mushroom 	Jumbo Pushlock Turn Reset 		
	Jumbo Mushroom 		Square Extended 	Unibody E-Stop 	Illuminated 	
				Illuminated Unibody E-Stop 		
<b>See Page</b>	<b>A3-54</b>	<b>A3-61</b>	<b>A3-64</b>	<b>A3-52</b>	<b>A3-68, A3-71, A3-74</b>	<b>A3-84, A3-89, A3-91</b>
<b>Operator Types</b>	Non-illuminated Pushbuttons: • Momentary • Maintained	Pilot Lights • LED/Incandescent	Illuminated Pushbuttons: • Momentary • Maintained • LED/Incandescent	E-Stops: • Modular or Unibody • Non-Illuminated • Illuminated (unibody only) • key reset (all units meet EN418)	Selector Switches • Non-Illuminated • Illuminated • LED/Incandescent • 2, 3, 4, 5- position (key & illum. 2 or 3-position only)	<b>HW7D</b> Dual Pushbutton <b>HW1M</b> Monolever • 2 or 4 position <b>HW1R</b> Selector Pushbutton
<b>Contact Configuration</b>	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)	—	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)	2NC, 1NO/1NC (Unibody)	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)
<b>Electrical Reliability</b>	MTBF < 1 fault in 10 million operation cycles (3V DC, 5mA)					
<b>Mechanical Life</b>	Momentary Pushbuttons: 5,000,000 operations minimum (900 operations per hour) All other switches: 500,000					
<b>Degree of Protection</b>	IP65 (from front of the panel), IP20 (type HW-F contact blocks) (conforming to IEC60529) NEMA Type 1, 2, 3, 3R, 3S, 4, 4X, 5, 12, 13 (conforming to NEMA ICS-110)					HW1R: IP65, IP20 NEMA 1, 2, 3, 3R, 3S, 4, 4x, 5, 12, 13 HW1M: IP40, IP20
<b>Termination</b>	M3.5 screw terminals (fingersafe/spring-up/exposed screw) with captive sems plate					
<b>Approvals</b>	 UL Listed File No. E68961	 CSA Certified File No. LR92374		 TÜV Rheinland Reg No. R9551089 (E-stops) Reg No. J9551458 (all other switches) Reg No. J9650511 (Pilot Lights)	 Direct Opening Action (NC contacts only)	 Certificate No. 2005010305145656


**A**  
Switches & Pilot Devices

**A3: Ø22mm Oiltight Switches and Pilot Devices - LW Series**



























**A**

**Switches & Pilot Devices**

Series Model	LWΔB-	LWΔL-	LW1S-	LW1F	LW1K	LWΔP-
<b>Appearance</b>	Flush  Extended  Square Flush  Square Extended  Mushroom 	Round  Square  Mushroom 				Round  Square  Round Unibody  Square Unibody 
<b>See Page</b>	<b>A3-110</b>	<b>A3-112</b>	<b>A3-116</b>	<b>A3-116</b>	<b>A3-116</b>	<b>A3-114</b>
<b>Operator Type</b>	Non-Illuminated Pushbuttons • Momentary • Maintained	Illuminated Pushbuttons: • Momentary • Maintained • LED/Incan.	Selector Switch: • 2 or 3- position	Illuminated Selector: • 2 or 3- position • LED/Incan.	Key Selector: • 2 or 3- position • Key removable options	Pilot Light • LED/Incan. • Standard/Unibody
<b>Contact Configuration</b>	SPDT, DPDT, 3PDT					—
<b>Contact Ratings</b>	Gold-clad crossbar contacts 30VDC/1A, 125VAC/1A resistive Silver Contacts 30VDC/2A, 125VAC/3A, 250VAC/2A resistive 30VDC/1A, 125VAC/2A, 250VAC/1.5A inductive					—
<b>Mechanical Life</b>	Momentary: 1,000,000 operations minimum, Maintained: 500,000 operations, Selectors: 250,000 operations minimum					—
<b>Electrical Life (at rated load)</b>	Momentary: 100,000 (1800 operations/hour) Maintained: 100,000 (900 operations/hour)					—
<b>Degree of Protection (conforming to IEC529)</b>	Oiltight/watertight: IP65					IP65
<b>Termination</b>	• .110" solder/quick connect • PCB (gold contacts only) • M3 screw (2 pole only)					—
<b>Approvals</b>	 UL Recognized File No. E55996	 CSA Certified File No. LR21451	 TÜV Rheinland	Reg. No. J9551801		—

 1. Lamps not included in assembled units.  
2. Available as assembled or sub-assembled components.

## A3: Ø22mm Oiltight Switches and Pilot Devices - TW Series

Series Model	AΔW...	AΔLW...	ASW...	ASLW...	APW...	
<b>Appearance</b>	Flush 	Extended 				
	Extended 	Extended/Shroud 	Knob Operator 		Dome Lens 	
	Mushroom 	Mushroom 	Lever Operator 	Knob Operator (w/transformer) 	Flush Lens 	
	Square Flush 	Square Extended 	Key Operator 		Square Flush 	
	Square Extended 	Push-Pull 			Square Flush (w/transformer) 	
	Pushlock Turn Reset 	Pushlock Turn Reset 				
<b>See Page</b>	<b>A3-128</b>	<b>A3-138</b>	<b>A3-142</b>	<b>A3-146</b>	<b>A3-135</b>	
<b>Operator Types</b>	Non-illuminated Pushbuttons: • Momentary • Maintained • E-Stop	Illuminated Pushbuttons: • Momentary • Maintained • E-Stop • LED/Incandescent	Selector Switches: • 2, 3, 4, 5-position • Maintained • Spring Return • Colored knobs/ inserts	Illuminated Selectors: • Full Voltage/ Transformer • LED/Incandescent	Pilot Lights: • Full Voltage/ Transformer • LED/Incandescent	
<b>Contact Configuration</b>	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)		See Contact Arrangement Charts page A3-150.		—	
<b>Contact Ratings</b>	10A thermal current/600V maximum					
<b>Electrical Life</b>	500,000 operations/min					
<b>Mechanical Life</b>	Momentary Pushbuttons: 5,000,000 operations minimum; Others: 500,000 operations minimum Selector Switches: 500,000 operations minimum					
<b>Degree of Protection</b>	NEMA Type 1, 2, 3, 3R, 4, 4X, 5, 12, 13; Waterproof/Oiltight/Corrosion Resistant: IP65					
<b>Termination</b>	M3.5 Screw Terminals with captive sems plate					
<b>Approvals</b>	 UL Listed File No. E70646	 CSA Certified File No. LR48366	 TUV Rheinland File No. 9561116E01		 Direct Opening Action (NC contacts only)	 Certificate No. 2030010305027380




























1. Illuminated units include lamp.
2. Available as assembled or sub-assembled components.

**A4: Ø30mm Oiltight Switches and Pilot Devices - TWTD Series**










**A**

**Switches & Pilot Devices**

Series Model	AΔD...	AΔLD...	ASD...	AΔLD...	APD...
<b>Appearance</b>	Flush 	Extended 	Knob Operator 	Knob Operator (full voltage) 	Dome Lens 
	Extended/ Neoprene Boot 	Extended/Shroud 	Lever Operator 	Knob Operator (with transformer) 	Dome Lens (w/transformer) 
	Mushroom 	Mushroom 	Key Operator 		
	Jumbo Mushroom 	Pushlock Turn Reset 	Key Operator 		
	Pushlock Turn Reset 	Push-Pull 			
	Push-Pull 				
<b>See Page</b>	<b>A4-168</b>	<b>A4-174</b>	<b>A4-179</b>	<b>A4-182</b>	<b>A4-174</b>
<b>Operator Type</b>	Non-illuminated Pushbuttons: • Momentary • Maintained • E-Stop	Illuminated Pushbuttons: • Momentary • Maintained • Special (E-Stop) • LED/Incandescent	Selector Switches: • 2, 3-position • Maintained • Spring return • Key removable options	Illuminated Selectors • LED/Incandescent • 2, 3-position • Maintained • Spring return	Pilot Lights • Full Voltage/Transformer • LED/Incandescent
<b>Contact Configuration</b>	Modular: NO, NC, NO-EM, NC-LB (maximum 6 contacts)		See Contact Arrangement Charts on page A4-185.		—
<b>Contact Ratings</b>	10A thermal current 600V maximum				—
<b>Electrical Life</b>	500,000 operations minimum (pushbuttons and selector switches) Operating Frequency: 30 operations/minute, Duty Rate 40%				—
<b>Mechanical Life</b>	Momentary Pushbuttons: 5,000,000 operations minimum; Others: 500,000 operations minimum				
<b>Degree of Protection</b>	NEMA Type 1, 2, 3, 3R, 4, 4X, 5, 12, 13 Waterproof/Oiltight/Corrosion Resistant: IP65				
<b>Termination</b>	M3.5 Screw Terminals with captive sems plate				
<b>Approvals</b>	 UL Listed File No. E70646	 CSA Certified File No. LR48366	 File No. DK95-00717		 Certificate No. 2005010305145656

 1. Illuminated units include lamp.  
2. Available as assembled or sub-assembled components.

## A4: Ø30mm Switches - Cam and Mono-Lever

Series Model	ACSNO	ACSNK	UCSQO	UCSQM	ARN
<b>Mounting Hole Diameter</b>	Ø 1-13/64" (30mm)		5 hole panel cutout		Ø 1 13/64" (30mm)
<b>Appearance</b>					Standard Knob (ARNO)  Short Knob (ARNSO)  Interlock knob (ARNLO) 
<b>See Page</b>	<b>A4-195</b>				<b>A4-202</b>
<b>Operator Types</b>	Cam Switch w/knob selector	Cam Switch w/key selector	Cam Switch w/knob & mechanical indicator.	Cam Switch 3-pos, spring-return	Mono-lever Switch
<b>Cam Angles and/or Positions</b>	30° Up to 12 positions 45° Up to 8 positions 60° Up to 6 positions 90° Up to 4 positions			Spring-return 45° 3 position only	<ul style="list-style-type: none"> <li>Center + 2, 3, or 4 position</li> <li>Maintained</li> <li>Spring return</li> </ul>
<b>Contact Ratings</b>	10A thermal current 600V insulation voltage				
<b>Electrical Life:</b>	500,000 operations minimum (at full rated load)				
<b>Mechanical Life</b>	500,00 operations minimum				
<b>Degree of Protection</b>	IP65, NEMA 4, 13	IP40	IP65, NEMA 4, 13		IP40
<b>Termination</b>	M3.5 Screw Terminals with captive sems plate				
<b>Approvals</b>	 UL Listed File No. E68961		 CSA Certified File No. LR48366		








1. Cam switches available only as assembled units.
2. Mono-lever switches available as assembled or sub-assembled components.













**A5: Miniature Switches and Pilot Devices - Ø8mm A8 Series**

**Switches & Pilot Devices**

Series Model	AL8	AB8
<b>Appearance</b>		
<b>See Page</b>	<b>A5-205</b>	<b>A5-205</b>
<b>Operator Type</b>	Illuminated Pushbuttons: <ul style="list-style-type: none"> <li>• Momentary</li> <li>• Maintained</li> <li>• Pilot Lights</li> </ul>	Non-Illuminated Pushbuttons: <ul style="list-style-type: none"> <li>• Momentary</li> <li>• Maintained</li> </ul>
<b>Lens Shape and Size</b>	Round: Ø 0.351 (9mm) Square: □ 0.351 (9mm) Rectangular: 0.351 x 0.468 (9 x 12mm)	
<b>Light Source</b>	LED	—
<b>Lens/Button Colors</b>	Amber, Green, Red, White, Yellow	Black, Blue, Green, Red, White, Yellow
<b>Contact Configuration</b>	SPDT (Gold-Clad Silver Contact)	
<b>Contact Ratings</b>	120V AC/1A, 24V DC/1A, (Resistive), Minimum applicable load reference value: 5V AC/DC, 1mA	
<b>Electrical Life</b> (at full rated load)	Momentary: 100,000 operations minimum Maintained: 50,000 operations minimum	
<b>Mechanical Life</b>	Momentary: 200,000 operations minimum Maintained: 100,000 operations minimum	
<b>Degree of Protection</b>	Enclosed/Dustproof: IP40	
<b>Termination</b>	Solder Tab Terminal	
<b>Approvals</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>UL Recognized File No. E55996</p> </div> <div style="text-align: center;">  <p>CSA Certified File No. LR21451</p> </div> </div>	

-  1. LED lamps require an external current limiting resistor.  
 2. Available as assembled units only (replacement LED lamps available).

## A5: Miniature Pilot Lights - Ø8 to 16mm AP Series

Series Model	AP8M	AP1M	AP2M	AP6M
Mounting Hole Diameter	8mm	10mm	12mm	16mm
Appearance	Dome 	Dome 	Dome 	Dome 
	Flat 	Flat 	Flat 	Flat 
See Page	<b>A5-211</b>			
Operator Type	Pilot Lights			
Lens Shape and Size	Flat & Dome Ø 9.8mm	Flat & Dome Ø 12mm	Flat & Dome Ø 14mm	Flat & Dome Ø 18mm
Light Source	LED (with built-in current limiting resistor)			
Lens Colors	Amber, Green, Red, White, Yellow			
Voltages	6, 12, 24V DC (Full Voltage)		6, 12, 24V DC (Full Voltage); 120, 240V AC (with transformer); 110V DC (with DC-DC converter).	
Rated Current	6V DC/18mA 12V DC/11mA 24V DC/12mA	6V DC/18mA 12V DC/11mA 24V DC/12mA	6V DC/33mA 12V DC/22mA 24V DC/11mA	6V DC/33mA 12V DC/11mA 24V DC/11mA
Degree of Protection	Enclosed/ Dustproof: IP40		Waterproof/Oiltight/Corrosion Resistant: IP65	
Termination	Solder Tab			.110" Solder/Quick Connect
Approvals	 UL Recognized File No. E68961		 CSA Certified File No. LR48366	



1. Only AP6 accepts .110" quick-connect.
2. AP2 and AP6 compatible with snap-on transformers.
3. All units are one-piece pilot lights with non-replaceable LED lamp.
4. All units include built-in current limiting resistor and reverse polarity protection diode.



## General Information

### Information About LED Lamps

Light-emitting diodes (LEDs) are P–N junction semiconductors with mechanisms called “junction electro-luminescence.” Application of direct current results in radiation or emission of a monochromatic light.

Different semiconductor materials produce different wavelengths of light as shown below:

Specifications	Green	Gallium Phosphide (GaP)	5600 Å
	Yellow	Gallium Arsenide Phosphide (GaAsP)	5800 Å
	Amber	Gallium Arsenide Phosphide (GaAsP)	6300 Å
	Red	Gallium Arsenide Phosphide (GaAsP)	6600Å
	Infrared	Gallium Arsenide (GaAs)	9000 Å

#### Advantages of Using LEDs

- LEDs are used when heat generated by incandescent lamps would damage nearby equipment or interfere with a precision process. This is particularly advantageous when multiple lights are grouped.
- LEDs can operate at low temperatures which would cause incandescent lamps to fail, since glass cracks during rapid cooling.
- LEDs consume 50 times less power than incandescent lamps, thereby reducing energy consumption.
- LEDs last 500 times longer than incandescent lamps. LEDs average a million hours (114 years) while incandescent lamps average 2000 hours.
- LEDs do not generally “blow out” unless subjected to a severe overvoltage. They exhibit a half-life type dimishment in brightness over time. After 50,000 hours (6 years) of use, IDEC LEDs will retain approximately half of their original intensity.
- IDEC’s SUPERBRIGHT LEDs have high visibility.
- LEDs require little or no maintenance because of long life and high reliability.

#### IDEC Recommendations

For optimum results, especially when using switches and pilot lights in operating environments which are conducive to overheating, use IDEC LED illuminated units. Transformers are available for use with incandescent illuminated units, which operate at lower voltages to avoid overheating.

**When IDEC’s L-120L lamp is used, make sure ambient temperatures do not exceed 30°C (86°F). If a lamp from another supplier is used, it should be rated for less than 1.8 watts (15mA at 120V AC), with ambient temperatures as stated above.**

### Information About Incandescent Lamps

Filament-type incandescent lamps operate within the following parameters.

Light output and life expectancy depend on operating voltage. Light output varies to the 3rd or 4th power of the voltage. Life expectancy varies inversely to the 12th power of voltage. In other words, over-voltage of 5% reduces life expectancy by 50%. Under-voltage of 5% doubles life expectancy at the price of light output efficiency.

Inrush current (initial current through the filament) has an adverse effect on life expectancy. Cold resistance (room temperature) will have a more detrimental effect than hot resistance to inrush current. Life expectancy of incandescent lamps can be maximized by reducing occurrences of cold resistance to inrush current.

Continued intermittent flashing will significantly reduce life expectancy. When using an incandescent lamp with a tungsten filament, flashing will not reduce life expectancy as long as light output does not exceed that of steady burning.

When an incandescent lamp must withstand shock and vibration, use low voltage/high amperage (5–6V/60–120mA) lamps. These lamps have a short, thick filament with a high resonant frequency.

Provide cooling by using a heat sink, particularly when multiple incandescent lamps are grouped or when air circulation is limited. Make sure ambient temperatures do not exceed 100°C (212°F) for maximum life of incandescent lamps.

## Comparison: LED vs. Incandescent Lamps

		Superbright LEDs	Incandescent
<b>Characteristics</b>	<b>Heat Dissipation</b>	Very Low	High
	<b>Life Expectancy</b>	Very Long	Short
	<b>Reliability</b>	Very High	Low
	<b>Mechanical Strength</b>	Not Susceptible	Susceptible to Shock/Vibration
	<b>Maintenance Required</b>	Negligible	Frequent
	<b>Operation at Low Temps.</b>	Possible	Not Possible
	<b>Inrush Current</b>	Negligible	Very Large
	<b>Voltage Effects on Life</b>	Insignificant	Significant
	<b>Brightness</b>	Slightly Less	Slightly More



## Ordering Information

1. IDEC offers assembled and sub-assembled switches and pilot lights for your convenience. In some cases there is a cost difference, with sub-assembled units costing slightly less. Since assembled units are custom made to your order, a couple of days for assembly is added to delivery. To minimize delivery or inventory requirements, it is suggested that switches and pilot lights be ordered as sub-components.
2. When ordering pilot lights or illuminated pushbuttons, make sure to specify the color code in place of the asterisk in the part number, (LED or incandescent lamp included). Spare lamps can be ordered and are listed with sub-assembly components.
3. Accessories, such as locking ring wrench, lens removal tool, and lamp holder, are available to make installation and assembly easier. IDEC recommends using these accessories and is not responsible for damage as a result of using the wrong tool.
4. Marking plates are available for switches and pilot lights which feature a flat lens. Printed mylar (not included) can also be inserted under lens for labeling purposes.
5. Nameplates are available for TW, 7/8" (22mm), HW 7/8" (22mm), and TWTD series, Ø1-13/64" (30mm). For prompt delivery, order standard legends. Custom engraving is also offered for an additional charge.

## Installation and Operation

1. Use the appropriate lamp holder to remove or install LED or incandescent lamps. Using pliers will damage the lamp.
2. When mounting switches and pilot lights into a panel, use locking ring wrench. Using pliers or tightening excessively will damage the locking ring.
3. A series, 21/64" (8mm), can be mounted on a panel 0.019" (0.5mm) to 0.236" (6mm) thick.
4. TW, 7/8" (22mm) and TWTD series, Ø1-13/64" (30mm), feature an adjustment ring for mounting on a panel 0.038" (1mm) to 0.236" (6mm) thick. Using a nameplate or an anti-rotation ring adds 0.031" (0.8mm) to the panel thickness.
5. When applicable, solder terminals within 20W/5sec or 260°/3sec without exerting external force to the terminals. Use a non-corrosive resin liquid flux.
6. The operating voltage for LED units represents a complete DC value. When using a pulsing voltage, such a full-wave rectification, keep peak currents within the forward current  $I_f$ . Peak currents exceeding  $I_f$  may shorten the life of the LED lamp.
7. To avoid a short circuit, never connect NO and NC contacts to different voltages or power sources.
8. Optimum performance of TW and TWTD illuminated pushbuttons, selector switches, and pilot lights is obtained with IDEC LED and incandescent lamps.
9. For maximum life of incandescent lamps (approximately 2000 hours), use within the rated operating voltage. If it is necessary to use a higher voltage, keeping ambient temperature below 30°C (86°F) will help prolong the life of an incandescent lamp.



*If excessive voltage is applied (over 50V), the lamp may blow and the lens holder may pop out.*