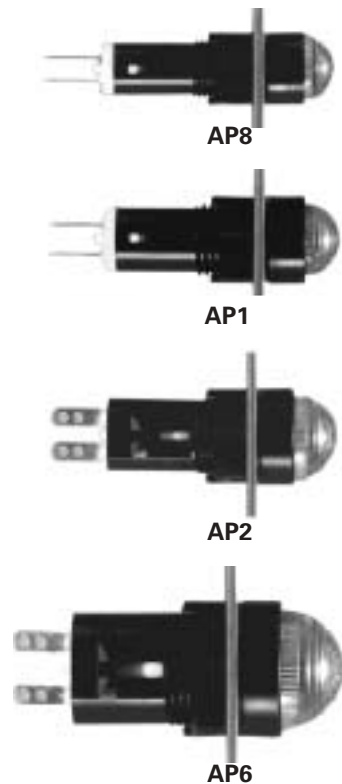
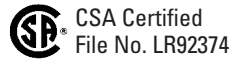


AP Series — Miniature Pilot Lights

Miniature Pilot Lights with Super Bright LEDs

Key features of AP series include:

- Long service life, low maintenance
- Space saving miniature style
- Dome or flat lens models
- Built-in current-limiting resistor and reverse polarity protection diode
- Five illumination colors: red, green, amber, yellow, and white
- AC adaptor (120V AC and 240V AC) and DC-DC Converter (110V DC) options on 12mm and 16mm units



Specifications	Lamp	Built-in LED with current limiting resistor
	Operational Voltage	6, 12, 24VDC (full voltage), 110/120, 220/240VAC, (transformer) 110VDC (with converter)
	Current Ratings	AP8: 6VDC/18mA, 12VDC/18mA, 24VDC/12mA AP1: 6VDC/18mA, 12VDC/18mA, 24VDC/12mA AP2: 6VDC/33mA, 12VDC/22mA, 24VDC/11mA AP6: 6VDC/33mA, 12VDC/22mA, 24VDC/11mA
	Operating Temp.	-20°C to +50°C
	Operating Humidity	45 to 85% RH
	Insul. Resistance	100MΩ min. (500V DC megger) Between live and dead parts
	Rev. Withstand Voltage	AP2: 100V Other Series: 200V
	Solder Terminal	Soldering 260°C maximum (5 sec.)
	Degree of Protection	AP8: IP40 (dustproof) Other Series: IP65 (oiltight)

Optional Adaptors/Converters		AC Adaptor	DC-DC Converter
	Applicable Units	AP2 & AP6 (with 6V LED only)	
	Operating Voltage	110/120VAC 50/60 Hz 220/240VAC 50/60 Hz	110V DC (90 to 140V DC)
	Power Consumption	1.6 VA maximum	1W maximum
	Insulation Voltage	250 V AC	140V DC
	Insulation Resistance	10MΩ min. (500V DC megger) Between live and dead parts	
	Dielectric Strength	2,000V AC, 1 minute Between live/dead parts 2,000V AC, 1 minute Between terminals	2,000V AC, 1 minute Between live/dead parts 1,500V AC, 1 minute Between terminals



Available as one piece only (LEDs are not available).

Miniature Pilot Lights (Assembled)

Part Numbers: AP Miniature Pilot Lights

Appearance	Lens Style	Operating Voltage	Part Numbers
<p>AP8 Series - Ø 8mm</p>	Dome	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP8M266-② AP8M211-② AP8M222-②
	Flat	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP8M166-② AP8M111-② AP8M122-②
<p>AP1 Series - Ø 10mm</p>	Dome	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP1M266-② AP1M211-② AP1M222-②
	Flat	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP1M166-② AP1M111-② AP1M122-②
<p>AP2 Series - Ø 12mm</p>	Dome	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP2M266-② AP2M211-② AP2M222-②
	Flat	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP2M166-② AP2M111-② AP2M122-②
<p>AP6 Series - Ø 6mm</p>	Dome	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP6M266-② AP6M211-② AP6M222-②
	Flat	6V DC +/- 5% 12V DC +/- 10% 24V DC +/- 10%	AP6M166-② AP6M111-② AP6M122-②

② Color Code

Color	Code
Amber	A
Green	G
Red	R
White	W
Yellow	Y





- 1. In place of ②, specify the color code.
- 2. For dimensions, see page A-33
- 3. For accessories, see page A-33.

Part Numbers: Optional AC Adaptors and DC-DC Converters (for AP2 and AP6 only)

Appearance	Style	Voltage	Part Numbers	
			Used with AP2 Series	Used with AP6 Series
<p>Secondary Voltage = 6V</p>	AC Adaptor	110/120V AC 220/240V AC	AP2-0126D AP2-0246D	AP6-0126D AP6-0246D
	DC-DC Converter	110V DC (90-140V DC)	AP2-016DD	AP6-016DD

- 1. Optional AC adaptors and DC-DC converters snap onto the back of AP2 or AP6 pilot lights.
- 2. AC Adaptors and DC-DC Converters step down to 6V.
- 3. For dimensions, see page A-28.

Accessories — AP Series

Appearance	Description	Used With	Part Number
Locking Ring Wrench 	Made of metal. Used for tightening plastic locking ring during installation. Tightening torque should not exceed 3kgf-cm	Ø 16mm units	MT-001
		Ø 12mm units	MT-002
		Ø 10mm units	MT-003
		Ø 8mm units	MT-004
Mounting Hole Plug 	Made of rubber. Fills unused mounting holes to provide IP65 protection	Unused 8mm panel cutouts	AL-B8
		Unused 10mm panel cutouts	AL-B1
		Unused 12mm panel cutouts	AL-B2
		Unused 16mm panel cutouts	AL-B6
Transformer Removal Tool		AP2 & AP6 snap on transformer & DC-DC converter	MT-100
Replacement Lenses 	Lenses (included with all units).	AP1M Flat	AP1M-L1-②
		AP1M Dome	AP1M-L2-②
		AP2M Flat	AP2M-L1-②
		AP2M Dome	AP2M-L2-②
		AP6M Flat	AP6M-L1-②
		AP6M Dome	AP6M-L2-②
Replacement Engraving Inserts 	Allow legends under flat lenses (included with all flat lens models).	AP1M Flat	AP1M-P1-W
		AP2M Flat	AP2M-P1-W
		AP6M Flat	AP6M-P1-W

Switches & Pilot Devices



In place of ②, specify the Lens Color Code.

② Lens Color Code

Color	Code
Amber	A
Green	G
Red	R
White	W
Yellow	Y

Dimensions — AP Series

Pilot Lights (AP Series)

Style	AP8		AP1		AP2			AP6		
	Flat	Dome	Flat	Dome	Flat	Dome	w/ Adaptor or Converter	Flat	Dome	w/ Adaptor or Converter
Panel Cut-out	Ø 0.319" (+0.0118, -0) 8.1mm (+0.3, -0)		Ø 0.398" (+0.0118, -0) 10.1mm (+0.3, -0)		Ø 0.480" (+0.0118, -0) 12.2mm (+0.3, -0)			Ø 0.638" (+0.0118, -0) 16.2mm (+0.3, -0)		
F Outside Dimension	Ø 0.386" (9.8mm)		Ø 0.472" (12mm)		Ø 0.551" (14mm)		□ 0.709" (18mm)	Ø 0.709" (18mm)		□ 0.709" (18mm)

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)	6600 Å
	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
Heat Dissipation	Very Low	High
Life Expectancy	Very Long	Short
Reliability	Very High	Low
Mechanical Strength	Not Susceptible	Susceptible to Shock/Vibration
Maintenance Required	Negligible	Frequent
Operation at Low Temps.	Possible	Not Possible
Inrush Current	Negligible	Very Large
Voltage Effects on Life	Insignificant	Significant
Brightness	Slightly Less	Slightly More



Switches & Pilot Devices

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 recommended 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. LW 7/8" (22mm), 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 as 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.