

Miniature Switches and Pilot lights

**Ø12 A2 Series**

**Ø10 A1 Series**

**Ø8 A8 Series**



A2 Series



A1 Series









A8 Series

Bright illumination face and snap-action switching.



• See website for details on approvals and standards.

Hole Size	Model	Function	Degree of Protection
Ø12	 AL2	Illuminated Pushbuttons Momentary Maintained Pilot Light	IP65 IP40 (IEC60529)
	 AB2	Pushbuttons Momentary Maintained	
Ø10	 AL1	Illuminated Pushbuttons Momentary Maintained Pilot Light	IP40 (IEC60529)
	 AB1	Pushbuttons Momentary Maintained	
Ø8	 AL8	Illuminated Pushbuttons Momentary Maintained Pilot Light	IP40 (IEC60529)
	 AB8	Pushbuttons Momentary Maintained	

# ø12 A2/ø10 A1/ø8 A8 Series Miniature Pilot Lights

Bright illumination face and snap-action switching. 22 mm short body.

## Contact Ratings (Contact Block)

Rated Insulation Voltage	250V			
Rated Thermal Current	3A			
Operating Voltage (AC/DC)	24V	110V	220V	
AC 50/60 Hz	Resistive Load	—	1.0A	0.5A
	Inductive Load	—	0.7A	0.5A
DC	Resistive Load	1.0A	0.2A	—
	Inductive Load	0.7A	0.1A	—
Contact Material	Silver			

- Minimum applicable load: 5V AC/DC, 3 mA (applicable range may vary with operating conditions and load types)

## Weight (Example)


Weight (approx.)	A2 Series	4g (AL2M-M11, AL2M-P1, AB2M-M1)
	A1 Series	3g (AL1M-M11, AL1M-P1, AB1M-M1)
	A8 Series	2g (AL8M-M11, AL8M-P1, AB8M-M1)

## Specifications

Operating Temperature	-25 to +55°C (no freezing)	
Storage Temperature	-30 to +80°C (no freezing)	
Operating Humidity	45 to 85% RH (no condensation)	
Contact Resistance	50 mΩ maximum (initial value)	
Insulation Resistance	100 MΩ minimum (500V DC megger)	
Dielectric Strength	Switch Unit	Between live and dead metal parts: 2,000V AC, 1 minute Between terminals of different poles: 2,000V AC, 1 minute Between terminals of the same pole: 1,000V AC, 1 minute Between contact and lamp terminals: 1,500V AC, 1 minute
	Illumination Unit	Between live part and ground: 2,000V AC, 1 minute
Vibration Resistance	Damage limits, Operating extremes: 5 to 55 Hz, amplitude 0.75 mm	
Shock Resistance	Damage limits: 500 m/s <sup>2</sup> (50G) Operating extremes: 200 m/s <sup>2</sup> (20G)	
Mechanical Durability (minimum operations)	Momentary: 200,000 operations Maintained: 100,000 operations	
Electrical Durability (minimum operations)	Momentary: 100,000 operations Maintained: 50,000 operations (Switching frequency 1200 operations/h)	
Degree of Protection (*1)	IP40, IP65 (IEC 60529)	

\*1) IP65: A2 series only

## LED Lamp Ratings (LAD-S)

Built-in LED Part No.	LAD-SA	LAD-SG	LAD-SR	LAD-SY
Lamp Base	Exclusive for A series			
Forward Current (If)	20 mA			
Forward Voltage (Vf) (nominal)	2.2V	2.1V	1.7V	2.2V
Reverse Voltage (Vr)	4V			
Illumination Color	A	G	R	Y
LED Lamp Color	Amber Clear	Yellow Diffused	Red Clear	Yellow Clear
Applicable Lens Color	Amber	Green	Red	Yellow and White
Base Plastic Color	Red			
LED Lamp Life (reference value)	Approx. 50,000 hours (The illuminance reduces to 50% of the initial intensity when used on complete DC.)			
Operating Voltage & External Current-limiting Resistor (recommended value) (Note)	5V DC: 150Ω, 1/2W 6V DC: 200Ω, 1/2W 12V DC: 510Ω, 1W 24V DC: 1.1 kΩ, 1W			
Internal Circuit				

Note: When LED lamps are used on voltages other than the above, external resistor value R is determined by the following formula:

$$R = (\text{operating voltage} - V_f) / I_f$$

- LED lamps do not have a current-limiting resistor, and external resistors of recommended values for each voltage must be provided. Connect a current-limiting resistor in series, otherwise LED lamps will be damaged. Because no protection diode is contained, ensure the correct polarity is observed.
- The base plastic color for all LEDs are red.

APEM

Switches & Pilot Lights

Control Boxes

Emergency Stop Switches

Enabling Switches

Safety Products

Explosion Proof

Terminal Blocks

Relays & Sockets

Circuit Protectors

Power Supplies

LED Illumination

Controllers

Operator Interfaces

Sensors

AUTO-ID

Flush Silhouette

ø16

ø22

ø30

Miniature

Pilot Lights

HW1Z

AP22




A Series

LD6A

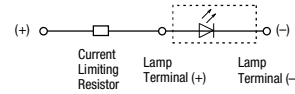


ø12 A2 Series Illuminated Pushbuttons & Pilot Lights

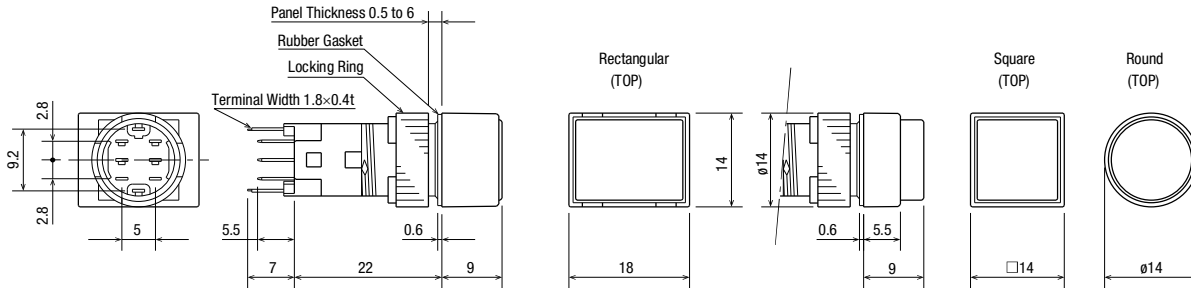
Package Quantity: 1

Shape	Operation	Contact	Part No.		② Lens Color Code	LED Lamp
			IP40	IP65		Part No., Rated Current (External Resistor Recommended Value)
Round AL2M  	Momentary	SPDT	AL2M-M11②	AL2M-M11P②	Specify a color code in place of ② in the Part No.  A: amber G: green R: red W: white Y: yellow	A: LAD-SA G: LAD-SG R: LAD-SR W/Y: LAD-SY  Rated Current: 20 mA  5V DC: 150Ω, 1/2W 6V DC: 200Ω, 1/2W 12V DC: 510Ω, 1W 24V DC: 1.1 kΩ, 1W
		DPDT	AL2M-M21②	AL2M-M21P②		
	Maintained	SPDT	AL2M-A11②	AL2M-A11P②		
		DPDT	AL2M-A21②	AL2M-A21P②		
	Pilot Light	—	AL2M-P1②	AL2M-P1P②		
	Square AL2Q  	Momentary	SPDT	AL2Q-M11②		
DPDT			AL2Q-M21②	AL2Q-M21P②		
Maintained		SPDT	AL2Q-A11②	AL2Q-A11P②		
		DPDT	AL2Q-A21②	AL2Q-A21P②		
Pilot Light		—	AL2Q-P1②	AL2Q-P1P②		
Rectangular AL2H  		Momentary	SPDT	AL2H-M11②	AL2H-M11P②	
	DPDT		AL2H-M21②	AL2H-M21P②		
	Maintained	SPDT	AL2H-A11②	AL2H-A11P②		
		DPDT	AL2H-A21②	AL2H-A21P②		
	Pilot Light	—	AL2H-P1②	AL2H-P1P②		

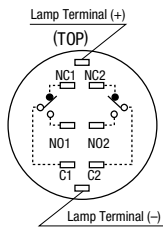
- LED lamps do not have a current-limiting resistor. Connect a current-limiting resistor in series, otherwise LED lamps will be damaged.
- External current-limiting resistor is not necessary when an optional socket with built-in resistor is used (see B-383).
- AP2M series pilot lights (round bezel only) with built-in current-limiting resistors are also available.
- Pilot lights are not CCC certified.



Dimensions

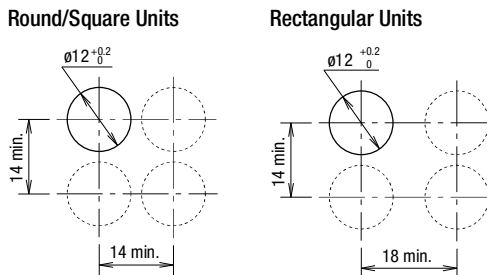


Terminal Arrangement



SPDT has NC1, NO1, and C1 only.

Mounting Hole Layout



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

## ø12 A2 Series Accessories

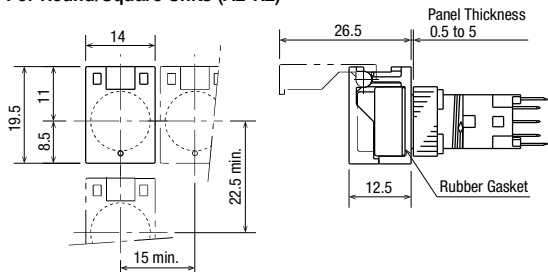
All dimensions in mm.

Shape	Material		Part No.	Ordering Part No.	Package Quantity	Remarks	
 Locking Ring Wrench	Metal (nickel-plated brass)		MT-002	MT-002	1	<ul style="list-style-type: none"> <li>Used to tighten the locking ring when installing the A2 series into a panel.</li> </ul>	
 Switch Guard	90° open	For round/ square unit	AL-K2	AL-K2	1	<ul style="list-style-type: none"> <li>Degree of protection: IP40</li> <li>Used to protect pushbuttons from inadvertent operation.</li> <li>See B-384 for dimensions.</li> </ul>  (remains 90° open)	
		For rectangular unit	AL-KH2	AL-KH2	1		
 Socket	Solder Terminal		AL-C2	AL-C2	1	<ul style="list-style-type: none"> <li>Snaps on the rear of the A2 series. (see B-384 for dimensions)</li> </ul>	
	PC Board Terminal		AL-C2V	AL-C2V	1		
 Socket with Built-in Resistor	Solder Terminal	5V DC	AL-C21	AL-C21	1	Socket Bottom Color <ul style="list-style-type: none"> <li>Blue</li> <li>Green</li> <li>Yellow</li> <li>Red</li> </ul> <ul style="list-style-type: none"> <li>A current limiting resistor is contained, eliminating the need for external resistors.</li> <li>When using the socket with a built-in resistor, make sure that the continuous current is 1A maximum and the operating temperature is -25 to +40°C. In collective mounting, keep center-to-center spacing of 20 mm or more between adjacent units in consideration of built-in resistor heating.</li> <li>See B-384 for dimensions.</li> </ul>	
		6V DC	AL-C22	AL-C22	1		
		12V DC	AL-C23	AL-C23	1		
		24V DC	AL-C24	AL-C24	1		
		PC Board Terminal	5V DC	AL-C21V	AL-C21V		1
			6V DC	AL-C22V	AL-C22V		1
			12V DC	AL-C23V	AL-C23V		1
			24V DC	AL-C24V	AL-C24V		1
 Terminal Cover	Nylon		AL-V2	AL-V2PN10	10	<ul style="list-style-type: none"> <li>When wiring the terminals, insert the lead wires into the terminal cover holes before soldering.</li> <li>Terminal cover is not attached and must be ordered separately.</li> </ul>	
 Dust Cover	① For round units	AL-D2	AL-D2	1	<ul style="list-style-type: none"> <li>When mounting the units with the dust covers installed, refer to mounting hole layout on B-384.</li> <li>Operating temperature: -10 to +55°C</li> <li>Material               <ul style="list-style-type: none"> <li>Front part: Elastomer (transparent)</li> <li>Rear part: Polypropylene (black)</li> </ul> </li> <li>See B-384 for dimensions and mounting hole layout.</li> </ul>		
	② For square units	AL-DQ2	AL-DQ2	1			
	③ For rectangular units	AL-DH2	AL-DH2	1			
 Mounting Hole Plug	Nitril rubber (black)		AL-B2	AL-B2PN05	5	<ul style="list-style-type: none"> <li>Degree of protection: IP65</li> </ul>	

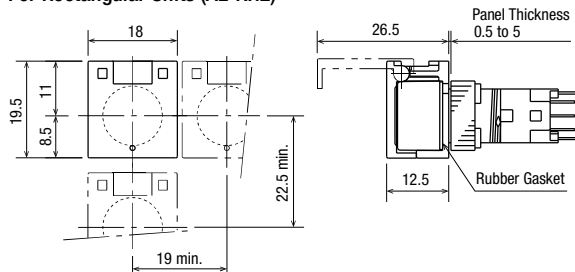
**ø12 A2 Series Dimensions** All dimensions in mm.

**Switch Guard**

For Round/Square Units (AL-K2)

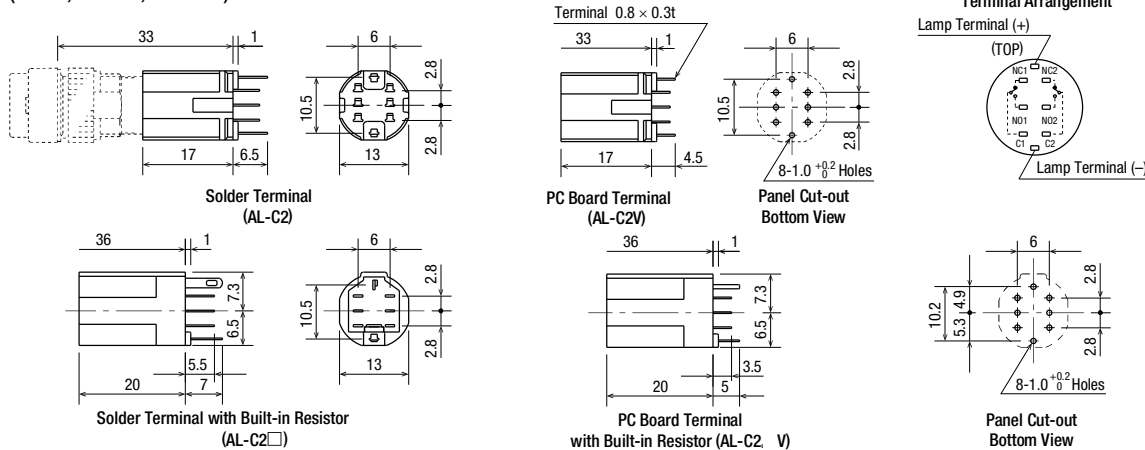


For Rectangular Units (AL-KH2)



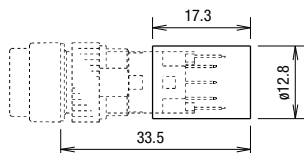
**Socket**

(AL-C2, AL-C2V, AL-C2□)



**Terminal Cover**

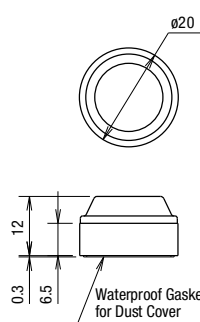
(AL-V2)



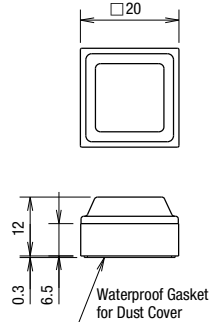
Note: When wiring the terminals, insert the lead wires into the terminal cover holes before soldering.

**Dust Cover**

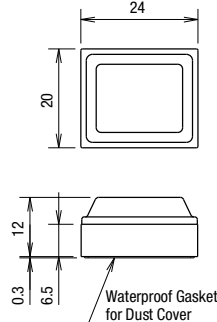
For Round Units (AL-D2)



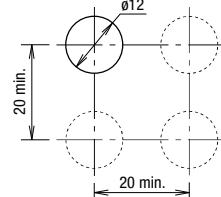
For Square Units (AL-DQ2)



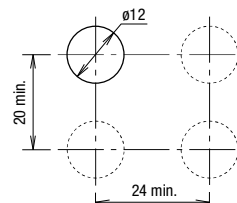
For Rectangular Units (AL-DH2)



Mounting Hole Centers (Round Units, Square Units)



(Rectangular Units)



Note: Determine mounting centers to ensure easy operation.







- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
- Circuit Protectors
- Power Supplies
- LED Illumination
- Controllers
- Operator Interfaces
- Sensors
- AUTO-ID

- Flush Silhouette
- ø16
- ø22
- ø30
- Miniature
- Pilot Lights

- HW1Z
- AP22
- A Series
- LD6A

## ø12 A2 Series Maintenance Parts

All dimensions in mm.

Shape	Specification		Part No.	Ordering Part No.	Package Quantity	Color Code ①②
	Round		AL2M-W	AL2M-WPN05	5	White
	Square		AL2Q-W	AL2Q-WPN05		
	Rectangular		AL2H-W	AL2H-WPN05		
	For IP40 units	Round	AL2M-LK1-②	AL2M-LK1-②PN02	2	<ul style="list-style-type: none"> <li>• Specify a color code in place of ② in the Part No.</li> <li>A: amber</li> <li>G: green</li> <li>R: red</li> <li>W: white</li> <li>Y: yellow</li> </ul>
		Square	AL2Q-LK1-②	AL2Q-LK1-②PN02		
		Rectangular	AL2H-LK1-②	AL2H-LK1-②PN02		
	For IP65 illuminated pushbuttons	Round	AL2M-LK2-②	AL2M-LK2-②	1	
		Square	AL2Q-LK2-②	AL2Q-LK2-②		
		Rectangular	AL2H-LK2-②	AL2H-LK2-②		
	For IP65 pilot lights	Round	AL2M-LK3-②	AL2M-LK3-②	1	
		Square	AL2Q-LK3-②	AL2Q-LK3-②		
		Rectangular	AL2H-LK3-②	AL2H-LK3-②		
	For IP40 pushbuttons	Round	AB2M-BK1-①	AB2M-BK1-①PN02	2	<ul style="list-style-type: none"> <li>• Specify a color code in place of ① in the Part No.</li> <li>B: black</li> <li>G: green</li> <li>R: red</li> <li>S: blue</li> <li>W: white</li> <li>Y: yellow</li> </ul>
		Square	AB2Q-BK1-①	AB2Q-BK1-①PN02		
		Rectangular	AB2H-BK1-①	AB2H-BK1-①PN02		
	For IP65 pushbuttons	Round	AB2M-BK2-①	AB2M-BK2-①	1	
		Square	AB2Q-BK2-①	AB2Q-BK2-①		
		Rectangular	AB2H-BK2-①	AB2H-BK2-①		

Flush Silhouette

ø16

ø22

ø30

Miniature

Pilot Lights

HW1Z

AP22

A Series

LD6A