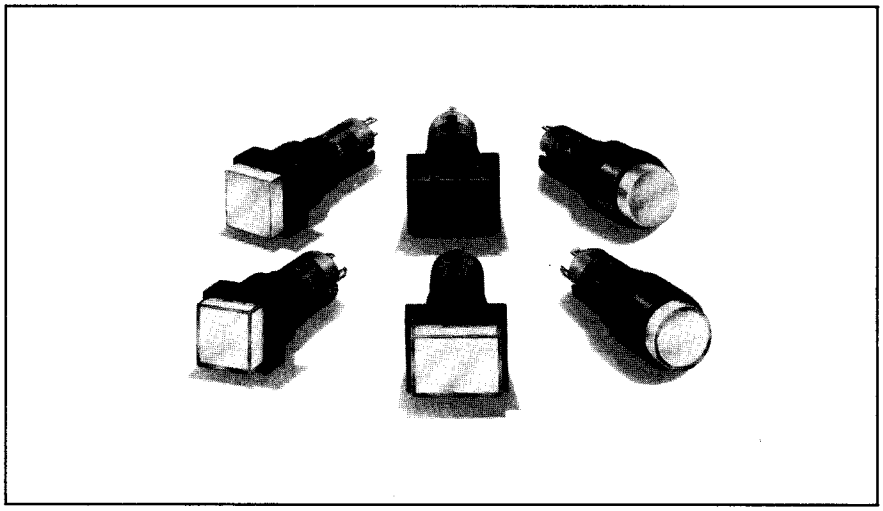
Short body miniature control unit series with a bright LED illumination face and snap switching.

- Available in illuminated pushbuttons, pilot lights and pushbuttons.
- LED or incandescent illuminated types.
- Enclosed Type (IP40).
- Rear terminals for increased serviceability.
  All series have terminals on the same plane.
- Many types of accessories are available.



CONTACT RATINGS

Maximum Voltage			250V AC/DC		
Thermal Current			3A		
Operating Voltage			24V	110V	220V
Operating Current	AC 50/60Hz	Resistive	–	1.0A	0.5A
		Inductive	–	0.7A	0.5A
	DC	Resistive	1.0A	0.2A	–
		Inductive	0.7A	0.1A	–
Contact Material			Silver		

Note: AC Inductive Load PF = 0.6-0.7
DC Inductive Load L/R = 7 msec.

- Minimum applicable load (reference value): 5V, 1mA AC/DC (Applicable range is subject to the operating condition and load.)

SPECIFICATIONS

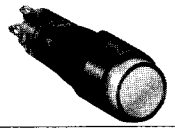
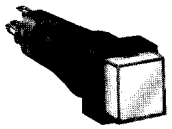
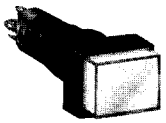
Operating Temperature		–25 to +55°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Contact Resistance		50mΩ maximum (initial value)
Insulation Resistance		100MΩ minimum (500V DC megger)
Dielectric Strength	Switch Unit	Between live and dead parts: 2,000V AC, 1 minute Between terminals 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		10 to 55Hz, Amplitude 1.5mm p-p
Shock Resistance		Damage limits: 500m/sec² (Approx. 50G) Operating extremes: 200m/sec² (Approx. 20G)
Mechanical Life (minimum operations)		Momentary: 200,000 Alternate: 100,000
Electrical Life (minimum operations)		Alternate: 50,000 Others: 100,000 (at 1,200 operations/hour)
Degree of Protection (IEC Pub. 529)		IP40 (Enclosed Type)

LED ILLUMINATED UNIT RATINGS

Lens Color	Built-in LED Lamp		Forward Current If	Forward Voltage Vf (Nominal)	Reverse Voltage VR	Operating Voltage & External Current Limiting Resistor (Recommended Value)	LED Lamp Life (Reference Value)	Equivalent Circuit
	Color	Type No.						
Red	Red	LAD-SR	20mA	1.7V	4V	5V DC: 150Ω, 1/2W 6V DC: 200Ω, 1/2W 12V DC: 510Ω, 3/4W 24V DC: 1.1kΩ, 3/4W	Approx. 50000 hours (The luminance reduces to 50% the initial intensity when used on complete DC.)	(+) o—▷|—o (–)
Green	Green	LAD-SG	20mA	2.1V	4V			
Amber	Amber	LAD-SA	20mA	2.2V	4V			
Yellow	Yellow	LAD-SY	20mA	2.2V	4V			
White								

Note: When LED lamps are used at voltages other than the above, external resistor value R is determined by the following formula:
R = (Operating Voltage – Vf)/If

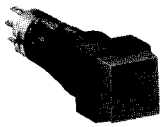
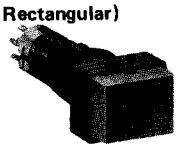
LED AL1 Illuminated Pushbuttons & Pilot Lights

Shape	Operation Type	Contact	Type No. (Enclosed Type)	Lens Color (Code)	Built-in LED Lamp		Operating Voltage & External Resistor (Recommended Value)
					Type No.	Current	
AL1M (Round) LED 	Momentary	SPDT	AL1M-M11*	Red (R) Green (G) Yellow (Y) Amber (A) White (W)	Red: LAD-SR Green: LAD-SG Yellow: LAD-SY Amber: LAD-SA	20mA	DC5V: 150Ω, 1/2W DC6V: 200Ω, 1/2W DC12V: 510Ω, 3/4W DC24V: 1.1kΩ, 3/4W
	Alternate	SPDT	AL1M-A11*				
	Pilot Light	—	AL1M-P1*				
AL1Q (Square) LED 	Momentary	SPDT	AL1Q-M11*				
	Alternate	SPDT	AL1Q-A11*				
	Pilot Light	—	AL1Q-P1*				
AL1H (Rectangular) LED 	Momentary	SPDT	AL1H-M11*	NOTE: White lens (W) is used with a yellow LED lamp.			
	Alternate	SPDT	AL1H-A11*				
	Pilot Light	—	AL1H-P1*				

●Specify the lens color code in place of * in the Type No.
An LED lamp is contained.

[Equivalent Circuit (+) ○—▶|—○ (−)]

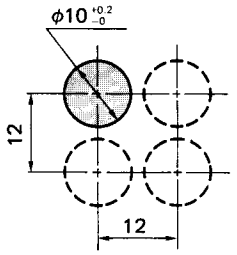
AB1 Pushbuttons

Shape	Operation Type	Contact	Type No. (Enclosed Type)	Button Color (Code)
AB1M (Round) 	Momentary	SPDT	AB1M-M1*	Black (B) Red (R) Green (G) Yellow (Y) Blue (S) White (W)
	Alternate	SPDT	AB1M-A1*	
AB1Q (Square) 	Momentary	SPDT	AB1Q-M1*	
	Alternate	SPDT	AB1Q-A1*	
AB1H (Rectangular) 	Momentary	SPDT	AB1H-M1*	
	Alternate	SPDT	AB1H-A1*	

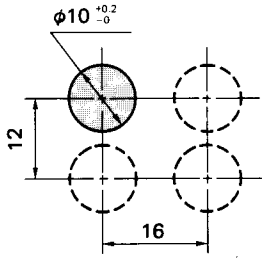
●Specify the button color code in place of * in the Type No.

PANEL CUT-OUT

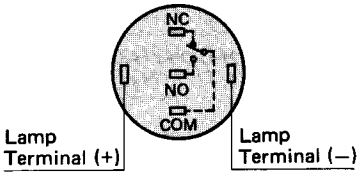
Round/Square



Rectangular

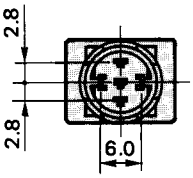


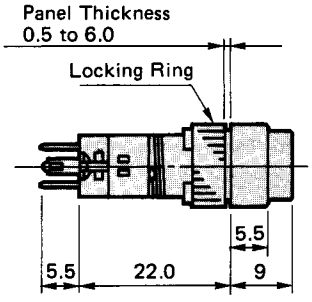
TERMINAL ARRANGEMENT

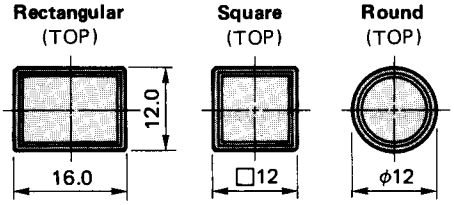


(Bottom View)

DIMENSIONS (AL1/AB1)

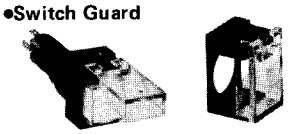
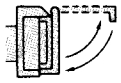






All dimensions in mm.

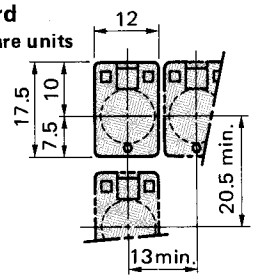
ACCESSORIES

Name & Shape	Specifications		Type No.		Remarks
Tool — •Ring Wrench 	Made of metal		MT-003		•Used for tightening the plastic locking ring when installing the ϕ10 A series unit on a panel. •Tightening torque should not exceed 3kgf-cm when tightening a locking ring.
Tool — •Lens Removal Tool 	Made of metal		MT-101		•Used for removing the lens or button from the housing.
Tool — •Lamp Holder Tool 	Made of rubber		OR-66		•Used for replacing LED lamps installed in illuminated pushbuttons and pilot lights.
•LED Lamp 	Luminous Color	Red	LAD-SR	Applicable Lens Color: Red	•An LED lamp is contained in every LED illuminated unit. When ordering additionally, specify the Type No.
		Green	LAD-SG	Green	
		Amber	LAD-SA	Amber	
		Yellow	LAD-SY	Yellow, White	
•Switch Guard 	90° open	For round/square units	AL-K1		•Used for preventing inadvertent operation of the button. (Remains 90° open) 
		For rectangular units	AL-KH1		
•Socket 	Solder Terminals		AL-C1		•Snaps onto the rear of A series units.
	PC Board Terminals		AL-C1V		
•Terminal Cover 	Made of translucent nylon		AL-V1		• When wiring the terminals, insert the lead wires into the terminal cover holes before soldering.
•Mounting Hole Rubber Plug 	Made of nitrile rubber		AL-B1		•Degree of protection: IP65

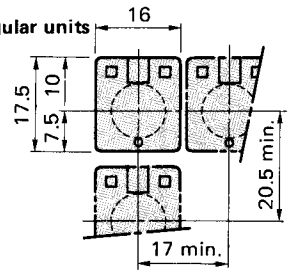
ACCESSORY DIMENSIONS

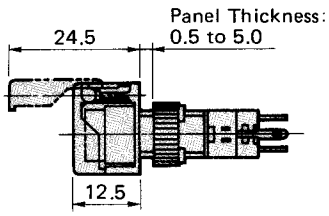
•Switch Guard

For round/square units (AL-K1)



For rectangular units (AL-KH1)

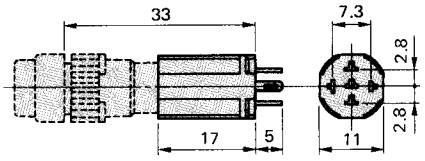




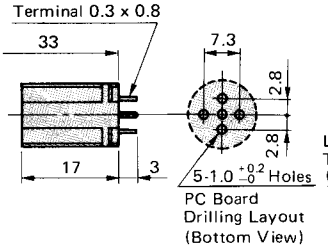
All dimensions in mm.

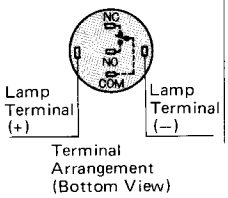
•Socket

Solder Terminal Type (AL-C1)



PC Board Terminal Type (AL-C1V)





•Terminal Cover (AL-V1)