ø16 A6 Series Miniature Control Units

Light duty in short 22mm body length.

- Features IDEC's original mechanism for snap-action switching. Suitable for a wide variety of office and factory aplications.
- The LED lamp contains a current-limiting resistor and a diode for protection against reverse connection.
- Degree of protection: IP40 and IP65 (IEC 60529)
- UL recognized, CSA certified, EN compliant, and CCC approved.

Applicable Standards	Mark	File No. or Organization
UL508		UL Recognition File No. E55996
CSA C22.2 No.14		CSA File No. LR 21451
EN60947-5-1		EU Low Voltage Directive
GB14048.5		CCC 2003010305027381 (switches) 2008010304288772 (pilot lights)

Contact Ratings (Contact Block)

Rated Insulation Voltage		250V			
Rated Thermal Current		3A			
Operating Voltage (AC/DC)		12V	24V	110V	220V
AC 50/60 Hz	Resistive Load	–	–	1.0A	0.5A
	Inductive Load	–	–	0.7A	0.5A
DC	Resistive Load	1.0A	1.0A	0.2A	–
	Inductive Load	0.7A	0.7A	0.5A	–
Contact Material		Gold-clad silver			

- Minimum applicable load: 5V AC/DC, 1 mA (applicable range may vary with operating conditions and load types)

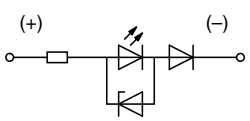
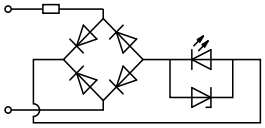
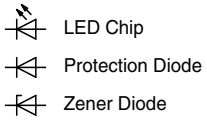
Weight (example)

Weight (approx.)	AL6M-M24:	8g
	AL6M-M221:	46g
	AL6M-P4:	6g
	AL6M-P21:	45g
	AB6M-M2:	7g
	AS6M-2Y2:	9g
	AS6M-2KT2A:	21g

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		Operating extremes: 5 to 55 Hz, amplitude 0.75 mm
Shock Resistance		Damage limits: 500 m/s² (50G) Operating extremes: 200 m/s² (20G)
Mechanical Durability (minimum operations)		Momentary: 1,000,000 operations Maintained: 100,000 operations Pushlock Turn Reset: 100,000 operations Selector Switch: 250,000 operations Key Selector Switch: 250,000 operations
Electrical Durability (minimum operations)		Other than Maintained: 100,000 operations Maintained: 50,000 operations (Switching frequency 1200 operations/h)
Degree of Protection		IP40, IP65 (IEC 60529)

LED Lamp Ratings (LATD)

Part No.		LATD-5②	LATD-1②	LATD-2②
Lamp Base		Exclusive for A series control units		
Voltage Range		5V DC ±5%	12V AC/DC ±10%	24V AC/DC ±10%
Rated Voltage		5V DC	12V AC/DC	24V AC/DC
Current Draw	AC	—	9 mA	9 mA
	DC	8 mA	8 mA	8 mA
Color Code ②		A (amber), G (green), JW (pure white), R (red), S (blue), W (white), Y (yellow)		
Lamp Base Color		Same as illumination color (except JW - gray base)		
Voltage Marking		Die stamped on the base		
Life (reference value)		Approx. 50,000 hours (The luminance is reduced to 50% of the initial intensity when used on complete DC.)		
Internal Circuit				

- Specify a color code in place of ② in the Part No.
  A (amber), G (green), JW (pure white), R (red), S (blue), W (white), Y (yellow)

Illuminated Pushbuttons

Package Quantity: 1

Shape	Operation	Operating Voltage	Contact	Part No. IP40	Part No. IP65	② Illumination Color Code
Round AL6M 	Momentary	5V DC ±5%	SPDT	**AL6M-M11②**	**AL6M-M11P②**	Specify a color code in place of ② in the Part No. A: amber G: green JW: pure white R: red S: blue W: white Y: yellow
			DPDT	**AL6M-M21②**	**AL6M-M21P②**	
		12V AC/DC ±10%	SPDT	**AL6M-M13②**	**AL6M-M13P②**	
			DPDT	**AL6M-M23②**	**AL6M-M23P②**	
		24V AC/DC ±10%	SPDT	**AL6M-M14②**	**AL6M-M14P②**	
			DPDT	**AL6M-M24②**	**AL6M-M24P②**	
	Maintained	5V DC ±5%	SPDT	**AL6M-A11②**	**AL6M-A11P②**	
			DPDT	**AL6M-A21②**	**AL6M-A21P②**	
		12V AC/DC ±10%	SPDT	**AL6M-A13②**	**AL6M-A13P②**	
			DPDT	**AL6M-A23②**	**AL6M-A23P②**	
		24V AC/DC ±10%	SPDT	**AL6M-A14②**	**AL6M-A14P②**	
			DPDT	**AL6M-A24②**	**AL6M-A24P②**	
Square AL6Q 	Momentary	5V DC ±5%	SPDT	**AL6Q-M11②**	**AL6Q-M11P②**	
			DPDT	**AL6Q-M21②**	**AL6Q-M21P②**	
		12V AC/DC ±10%	SPDT	**AL6Q-M13②**	**AL6Q-M13P②**	
			DPDT	**AL6Q-M23②**	**AL6Q-M23P②**	
		24V AC/DC ±10%	SPDT	**AL6Q-M14②**	**AL6Q-M14P②**	
			DPDT	**AL6Q-M24②**	**AL6Q-M24P②**	
	Maintained	5V DC ±5%	SPDT	**AL6Q-A11②**	**AL6Q-A11P②**	
			DPDT	**AL6Q-A21②**	**AL6Q-A21P②**	
		12V AC/DC ±10%	SPDT	**AL6Q-A13②**	**AL6Q-A13P②**	
			DPDT	**AL6Q-A23②**	**AL6Q-A23P②**	
		24V AC/DC ±10%	SPDT	**AL6Q-A14②**	**AL6Q-A14P②**	
			DPDT	**AL6Q-A24②**	**AL6Q-A24P②**	
Rectangular AL6H 	Momentary	5V DC ±5%	SPDT	**AL6H-M11②**	**AL6H-M11P②**	
			DPDT	**AL6H-M21②**	**AL6H-M21P②**	
		12V AC/DC ±10%	SPDT	**AL6H-M13②**	**AL6H-M13P②**	
			DPDT	**AL6H-M23②**	**AL6H-M23P②**	
		24V AC/DC ±10%	SPDT	**AL6H-M14②**	**AL6H-M14P②**	
			DPDT	**AL6H-M24②**	**AL6H-M24P②**	
	Maintained	5V DC ±5%	SPDT	**AL6H-A11②**	**AL6H-A11P②**	
			DPDT	**AL6H-A21②**	**AL6H-A21P②**	
		12V AC/DC ±10%	SPDT	**AL6H-A13②**	**AL6H-A13P②**	
			DPDT	**AL6H-A23②**	**AL6H-A23P②**	
		24V AC/DC ±10%	SPDT	**AL6H-A14②**	**AL6H-A14P②**	
			DPDT	**AL6H-A24②**	**AL6H-A24P②**	
Rectangular w/three-sided barrier AL6G 	Momentary	5V DC ±5%	SPDT	**AL6G-M11②**	**AL6G-M11P②**	
			DPDT	**AL6G-M21②**	**AL6G-M21P②**	
		12V AC/DC ±10%	SPDT	**AL6G-M13②**	**AL6G-M13P②**	
			DPDT	**AL6G-M23②**	**AL6G-M23P②**	
		24V AC/DC ±10%	SPDT	**AL6G-M14②**	**AL6G-M14P②**	
			DPDT	**AL6G-M24②**	**AL6G-M24P②**	
	Maintained	5V DC ±5%	SPDT	**AL6G-A11②**	**AL6G-A11P②**	
			DPDT	**AL6G-A21②**	**AL6G-A21P②**	
		12V AC/DC ±10%	SPDT	**AL6G-A13②**	**AL6G-A13P②**	
			DPDT	**AL6G-A23②**	**AL6G-A23P②**	
		24V AC/DC ±10%	SPDT	**AL6G-A14②**	**AL6G-A14P②**	
			DPDT	**AL6G-A24②**	**AL6G-A24P②**	

• See page 136 for dimensions.
• See page 149 for marking plate size and engraving area.
• When using white lens unit (clear lens + white marking plate) with color codes A, G, R, or S, specify “W” before ② in the Part No. (without CCC marking)
Example: **AL6H-M24W②**

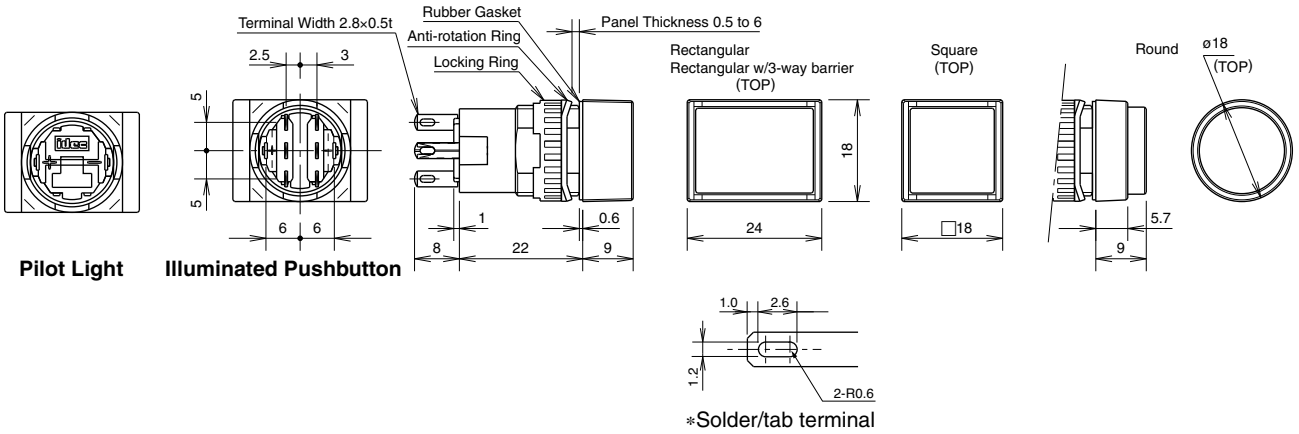
Pilot Lights

Package Quantity: 1

Shape	Operating Voltage	Part No.		② Illumination Color Code
		IP40	IP65	
Round AL6M-P 	5V DC ±5%	**AL6M-P1**②	**AL6M-P1P**②	Specify a color code in place of ② in the Part No. A: amber G: green JW: pure white R: red S: blue W: white Y: yellow
	12V AC/DC ±10%	**AL6M-P3**②	**AL6M-P3P**②	
	24V AC/DC ±10%	**AL6M-P4**②	**AL6M-P4P**②	
Square AL6Q-P 	5V DC ±5%	**AL6Q-P1**②	**AL6Q-P1P**②	
	12V AC/DC ±10%	**AL6Q-P3**②	**AL6Q-P3P**②	
	24V AC/DC ±10%	**AL6Q-P4**②	**AL6Q-P4P**②	
Rectangular AL6H-P 	5V DC ±5%	**AL6H-P1**②	**AL6H-P1P**②	
	12V AC/DC ±10%	**AL6H-P3**②	**AL6H-P3P**②	
	24V AC/DC ±10%	**AL6H-P4**②	**AL6H-P4P**②	
Rectangular w/three-sided barrier AL6G-P 	5V DC ±5%	**AL6G-P1**②	**AL6G-P1P**②	
	12V AC9DC ±10%	**AL6G-P3**②	**AL6G-P3P**②	
	24V AC/DC ±10%	**AL6G-P4**②	**AL6G-P4P**②	

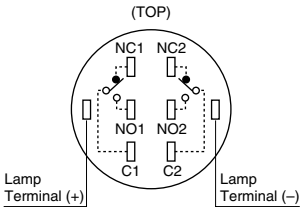
• See page 136 for dimensions.
• See page 149 for marking plate size and engraving area.
• When using white lens unit (clear lens + white marking plate) with color codes A, G, R, or S, specify "W" before ② in the Part No. (without CCC marking)
Example: **AL6H-M24W**②

Dimensions (Illuminated Pushbuttons & Pilot Lights)

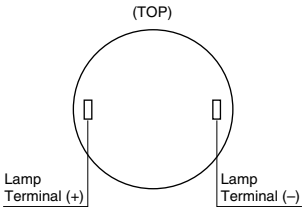


Terminal Arrangement (bottom view)

Illuminated Pushbutton

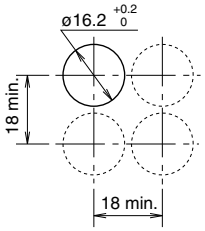


Pilot Light

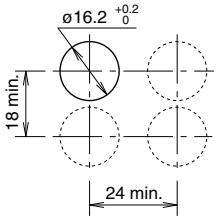


Mounting Hole Layout

Round/Square



Rectangular
Rectangular w/3-way barrier



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

Pushbuttons

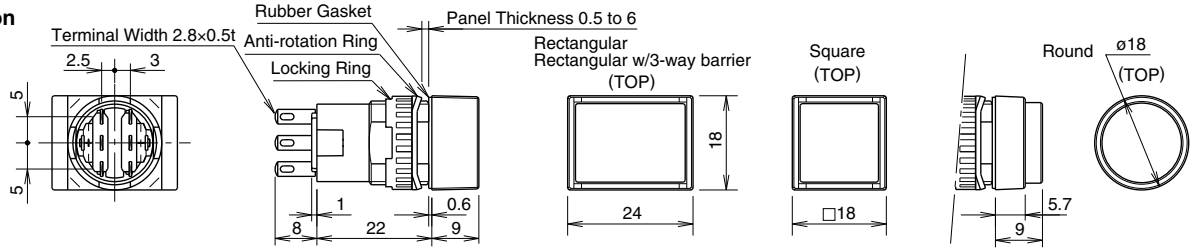
Package Quantity: 1

Shape	Button Style	Operation	Contact	Part No. IP40	Part No. IP65	Color Code ①②
Round AB6M 	Button	Momentary	SPDT	**AB6M-M1**①	**AB6M-M1P**①	B black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6M-M2**①	**AB6M-M2P**①	
		Maintained	SPDT	**AB6M-A1**①	**AB6M-A1P**①	
			DPDT	**AB6M-A2**①	**AB6M-A2P**①	
	Lens	Momentary	SPDT	**AB6M-M1L**②	**AB6M-M1PL**②	A: amber G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6M-M2L**②	**AB6M-M2PL**②	
		Maintained	SPDT	**AB6M-A1L**②	**AB6M-A1PL**②	
			DPDT	**AB6M-A2L**②	**AB6M-A2PL**②	
Square AB6Q 	Button	Momentary	SPDT	**AB6Q-M1**①	**AB6Q-M1P**①	B black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6Q-M2**①	**AB6Q-M2P**①	
		Maintained	SPDT	**AB6Q-A1**①	**AB6Q-A1P**①	
			DPDT	**AB6Q-A2**①	**AB6Q-A2P**①	
	Lens	Momentary	SPDT	**AB6Q-M1L**②	**AB6Q-M1PL**②	A: amber G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6Q-M2L**②	**AB6Q-M2PL**②	
		Maintained	SPDT	**AB6Q-A1L**②	**AB6Q-A1PL**②	
			DPDT	**AB6Q-A2L**②	**AB6Q-A2PL**②	
Rectangular AB6H 	Button	Momentary	SPDT	**AB6H-M1**①	**AB6H-M1P**①	B black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6H-M2**①	**AB6H-M2P**①	
		Maintained	SPDT	**AB6H-A1**①	**AB6H-A1P**①	
			DPDT	**AB6H-A2**①	**AB6H-A2P**①	
	Lens	Momentary	SPDT	**AB6H-M1L**②	**AB6H-M1PL**②	A: amber G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6H-M2L**②	**AB6H-M2PL**②	
		Maintained	SPDT	**AB6H-A1L**②	**AB6H-A1PL**②	
			DPDT	**AB6H-A2L**②	**AB6H-A2PL**②	
Rectangular w/three-sided barrier AB6G 	Button	Momentary	SPDT	**AB6G-M1**①	**AB6G-M1P**①	B black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6G-M2**①	**AB6G-M2P**①	
		Maintained	SPDT	**AB6G-A1**①	**AB6G-A1P**①	
			DPDT	**AB6G-A2**①	**AB6G-A2P**①	
	Lens	Momentary	SPDT	**AB6G-M1L**②	**AB6G-M1PL**②	A: amber G: green R: red S: blue W: white Y: yellow
			DPDT	**AB6G-M2L**②	**AB6G-M2PL**②	
		Maintained	SPDT	**AB6G-A1L**②	**AB6G-A1PL**②	
			DPDT	**AB6G-A2L**②	**AB6G-A2PL**②	

- Specify a color code in place of ① or ② in the Part No.
- See page 138 for dimensions.
- See page 149 for marking plate size and engraving area.
- Black is available for lens style buttons. Black lens consists of a clear lens and a black marking plate. Specify “B” in place of ② in the Part No.
  Example:**AB6H-M2LB**

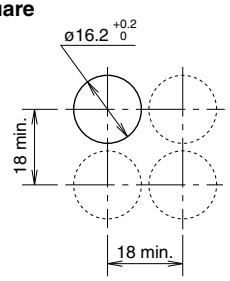
Dimensions

Pushbutton

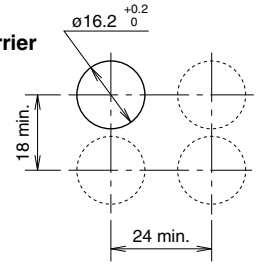


Mounting Hole Layout

Round/Square



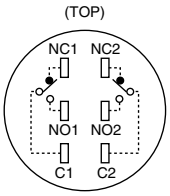
Rectangular
Rectangular w/3-way barrier



Note: Determine mounting centers to ensure easy operation.

Terminal Arrangement
(bottom view)

Pushbutton



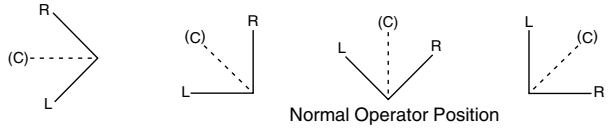
Note: SPDT has only NC1, NO1, and C1 terminals.

All dimensions in mm.

Selector Switches

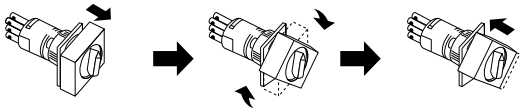
Operator position can be changed by IDEC's original bezel rotating and locking system. The bezel can be locked at every 45° and bezel rotation is prevented while mounting on a panel.

Example: 3-position



Normal Operator Position

How to change the operator position



Pull out the bezel to release the lock. Rotate the bezel, and push it in at 45° intervals to lock the bezel.

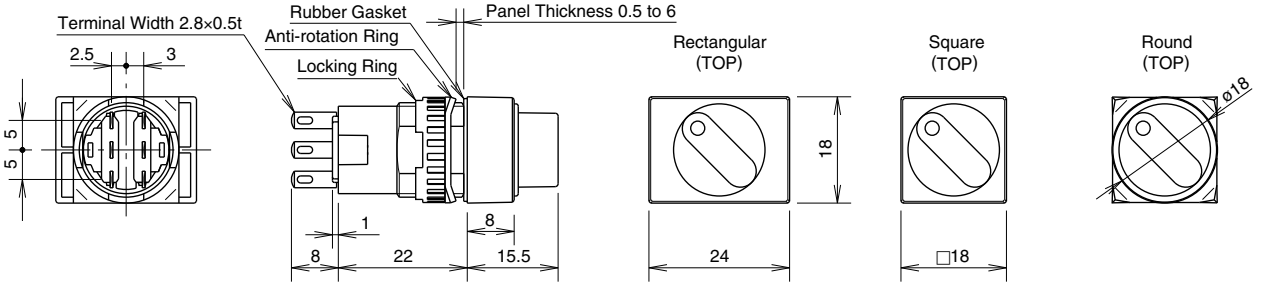
Package Quantity: 1

Shape	Position		Contact	Part No. IP40	Part No. IP65
Round AS6M-□Y 	90° 2-position	Maintained	SPDT	**AS6M-2Y1**	**AS6M-2Y1P**
			DPDT	**AS6M-2Y2**	**AS6M-2Y2P**
		Spring return from right to left	SPDT	**AS6M-21Y1**	**AS6M-21Y1P**
			DPDT	**AS6M-21Y2**	**AS6M-21Y2P**
	45° 3-position	Maintained	DPDT	**AS6M-3Y2**	**AS6M-3Y2P**
		Spring return from right to center	DPDT	**AS6M-31Y2**	**AS6M-31Y2P**
		Spring return from left to center	DPDT	**AS6M-32Y2**	**AS6M-32Y2P**
		Spring return two-way	DPDT	**AS6M-33Y2**	**AS6M-33Y2P**
Square AS6Q-□Y 	90° 2-position	Maintained	SPDT	**AS6Q-2Y1**	**AS6Q-2Y1P**
			DPDT	**AS6Q-2Y2**	**AS6Q-2Y2P**
		Spring return from right to left	SPDT	**AS6Q-21Y1**	**AS6Q-21Y1P**
			DPDT	**AS6Q-21Y2**	**AS6Q-21Y2P**
	45° 3-position	Maintained	DPDT	**AS6Q-3Y2**	**AS6Q-3Y2P**
		Spring return from right to center	DPDT	**AS6Q-31Y2**	**AS6Q-31Y2P**
		Spring return from left to center	DPDT	**AS6Q-32Y2**	**AS6Q-32Y2P**
		Spring return two-way	DPDT	**AS6Q-33Y2**	**AS6Q-33Y2P**
Rectangular AS6H-□Y 	90° 2-position	Maintained	SPDT	**AS6H-2Y1**	**AS6H-2Y1P**
			DPDT	**AS6H-2Y2**	**AS6H-2Y2P**
		Spring return from right to left	SPDT	**AS6H-21Y1**	**AS6H-21Y1P**
			DPDT	**AS6H-21Y2**	**AS6H-21Y2P**
	45° 3-position	Maintained	DPDT	**AS6H-3Y2**	**AS6H-3Y2P**
		Spring return from right to center	DPDT	**AS6H-31Y2**	**AS6H-31Y2P**
		Spring return from left to center	DPDT	**AS6H-32Y2**	**AS6H-32Y2P**
		Spring return two-way	DPDT	**AS6H-33Y2**	**AS6H-33Y2P**

Contact Operation				
Position	Operation	↖ Left	↑ Center	↗ Right
90° 2-position	Maintained	SPDT: NO NC / C	—	SPDT: NO NC / C
	Spring return from right	DPDT: Left Contact NO NC / C; Right Contact NO NC / C	—	DPDT: Left Contact NO NC / C; Right Contact NO NC / C
45° 3-position	Maintained	DPDT: Left Contact NO NC / C; Right Contact NO NC / C	DPDT: Left Contact NO NC / C; Right Contact NO NC / C	DPDT: Left Contact NO NC / C; Right Contact NO NC / C
	Spring return from right			
	Spring return from left			
	Two-way return			

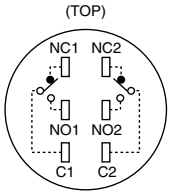
• Bezel: black • Knob: black

Dimensions



Terminal Arrangement (bottom view)

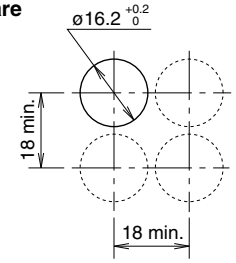
(Selector Switch)



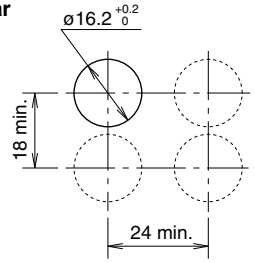
SPDT has NC1, NO1, and C1 only.

Mounting Hole Layout

Round/Square



Rectangular



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

Key Selector Switches

Package Quantity: 1

Shape	Position	Operation	Key Retained at ●		Contact	Part No. IP40	Part No. IP65
Round AS6M	90° 2-position	Maintained	A	Ⓛ Ⓡ	SPDT	**AS6M-2K□1A**	**AS6M-2K□1PA**
					DPDT	**AS6M-2K□2A**	**AS6M-2K□2PA**
			B	Ⓛ ●	SPDT	**AS6M-2K□1B**	**AS6M-2K□1PB**
					DPDT	**AS6M-2K□2B**	**AS6M-2K□2PB**
			C	● Ⓡ	SPDT	**AS6M-2K□1C**	**AS6M-2K□1PC**
					DPDT	**AS6M-2K□2C**	**AS6M-2K□2PC**
		Spring return from right	B	Ⓛ ●	SPDT	**AS6M-21K□1B**	**AS6M-21K□1PB**
					DPDT	**AS6M-21K□2B**	**AS6M-21K□2PB**
	45° 3-position	Maintained	A	Ⓛ Ⓒ Ⓡ	DPDT	**AS6M-3K□2A**	**AS6M-3K□2PA**
			B	Ⓛ Ⓒ ●	DPDT	**AS6M-3K□2B**	**AS6M-3K□2PB**
			C	● Ⓒ Ⓡ	DPDT	**AS6M-3K□2C**	**AS6M-3K□2PC**
			D	● Ⓒ ●	DPDT	**AS6M-3K□2D**	**AS6M-3K□2PD**
			E	Ⓛ ● Ⓡ	DPDT	**AS6M-3K□2E**	**AS6M-3K□2PE**
			G	Ⓛ ● ●	DPDT	**AS6M-3K□2G**	**AS6M-3K□2PG**
			H	● ● Ⓡ	DPDT	**AS6M-3K□2H**	**AS6M-3K□2PH**
		Spring return from right	B	Ⓛ Ⓒ ●	DPDT	**AS6M-31K□2B**	**AS6M-31K□2PB**
			D	● Ⓒ ●	DPDT	**AS6M-31K□2D**	**AS6M-31K□2PD**
			G	Ⓛ ● ●	DPDT	**AS6M-31K□2G**	**AS6M-31K□2PG**
		Spring return from left	C	● Ⓒ Ⓡ	DPDT	**AS6M-32K□2C**	**AS6M-32K□2PC**
			D	● Ⓒ ●	DPDT	**AS6M-32K□2D**	**AS6M-32K□2PD**
			H	● ● Ⓡ	DPDT	**AS6M-32K□2H**	**AS6M-32K□2PH**
		Spring return two-way	D	● Ⓒ ●	DPDT	**AS6M-33K□2D**	**AS6M-33K□2PD**

Disc tumbler key

Wave key

- Specify the key code in place of □ in the Part No.: T (disc tumbler key), S (wave key)
- For contact operation, see page 143.
- Key is retained at ● positions and removable at ○ positions.
- Two keys are supplied.
- The front of key cylinder is made of metal.
- For disc tumbler key, only one type of key is available.
- For wave key, besides the standard key (key number 0H), six other keys are also available. To order other keys, specify the key number as shown below:

Example: **AS6M-2KS1PA-1H**

(blank):	Standard key (0H)	Note:
1H to 2H:	Reversible key	Key number is indicated on the key cylinder.
3H to 6H:	Non-reversible key	Standard keys do not have a key number indication.

Key Selector Switches

Package Quantity: 1

Shape	Position	Operation	Key Retained at ●		Contact	Part No. IP40	Part No. IP65
Square AS6Q	90° 2-position	Maintained	A	Ⓛ Ⓡ	SPDT	**AS6Q-2K□1A**	**AS6Q-2K□1PA**
					DPDT	**AS6Q-2K□2A**	**AS6Q-2K□2PA**
			B	Ⓛ ●	SPDT	**AS6Q-2K□1B**	**AS6Q-2K□1PB**
					DPDT	**AS6Q-2K□2B**	**AS6Q-2K□2PB**
			C	● Ⓡ	SPDT	**AS6Q-2K□1C**	**AS6Q-2K□1PC**
					DPDT	**AS6Q-2K□2C**	**AS6Q-2K□2PC**
		Spring return from right	B	Ⓛ ●	SPDT	**AS6Q-21K□1B**	**AS6Q-21K□1PB**
					DPDT	**AS6Q-21K□2B**	**AS6Q-21K□2PB**
	45° 3-position	Maintained	A	Ⓛ Ⓒ Ⓡ	DPDT	**AS6Q-3K□2A**	**AS6Q-3K□2PA**
			B	Ⓛ Ⓒ ●	DPDT	**AS6Q-3K□2B**	**AS6Q-3K□2PB**
			C	● Ⓒ Ⓡ	DPDT	**AS6Q-3K□2C**	**AS6Q-3K□2PC**
			D	● Ⓒ ●	DPDT	**AS6Q-3K□2D**	**AS6Q-3K□2PD**
			E	Ⓛ ● Ⓡ	DPDT	**AS6Q-3K□2E**	**AS6Q-3K□2PE**
			G	Ⓛ ● ●	DPDT	**AS6Q-3K□2G**	**AS6Q-3K□2PG**
			H	● ● Ⓡ	DPDT	**AS6Q-3K□2H**	**AS6Q-3K□2PH**
		Spring return from right	B	Ⓛ Ⓒ ●	DPDT	**AS6Q-31K□2B**	**AS6Q-31K□2PB**
			D	● Ⓒ ●	DPDT	**AS6Q-31K□2D**	**AS6Q-31K□2PD**
			G	Ⓛ ● ●	DPDT	**AS6Q-31K□2G**	**AS6Q-31K□2PG**
		Spring return from left	C	● Ⓒ Ⓡ	DPDT	**AS6Q-32K□2C**	**AS6Q-32K□2PC**
			D	● Ⓒ ●	DPDT	**AS6Q-32K□2D**	**AS6Q-32K□2PD**
			H	● ● Ⓡ	DPDT	**AS6Q-32K□2H**	**AS6Q-32K□2PH**
		Spring return two-way	D	● Ⓒ ●	DPDT	**AS6Q-33K□2D**	**AS6Q-33K□2PD**

Disc tumbler key

Wave key

- Specify the key code in place of □ in the Part No.: T (disc tumbler key), S (wave key)
- For contact operation, see page 143.
- Key is retained at ● positions and removable at ○ positions.
- Two keys are supplied.
- The front of key cylinder is made of metal.
- For disc tumbler key, only one type of key is available.
- For wave key, besides the standard key (key number 0H), six other keys are also available. To order other keys, specify the key number as shown below:

Example: **AS6M-2KS1PA-1H**

(blank): Standard key (0H)
1H to 2H: Reversible key
3H to 6H: Non-reversible key

Note:
Key number is indicated on the key cylinder.
Standard keys do not have a key number indication.

Key Selector Switches

Package Quantity: 1

Shape	Position	Operation	Key Retained at ●		Contact	Part No. IP40	Part No. IP65
Rectangular AS6H	90° 2-position	Maintained	A	Ⓛ Ⓡ	SPDT	**AS6H-2K□1A**	**AS6H-2K□1PA**
					DPDT	**AS6H-2K□2A**	**AS6H-2K□2PA**
			B	Ⓛ ● Ⓡ	SPDT	**AS6H-2K□1B**	**AS6H-2K□1PB**
					DPDT	**AS6H-2K□2B**	**AS6H-2K□2PB**
			C	● Ⓡ	SPDT	**AS6H-2K□1C**	**AS6H-2K□1PC**
					DPDT	**AS6H-2K□2C**	**AS6H-2K□2PC**
		Spring return from right	B	Ⓛ ●	SPDT	**AS6H-21K□1B**	**AS6H-21K□1PB**
					DPDT	**AS6H-21K□2B**	**AS6H-21K□2PB**
	45° 3-position	Maintained	A	Ⓛ Ⓒ Ⓡ	DPDT	**AS6H-3K□2A**	**AS6H-3K□2PA**
			B	Ⓛ Ⓒ ●	DPDT	**AS6H-3K□2B**	**AS6H-3K□2PB**
			C	● Ⓒ Ⓡ	DPDT	**AS6H-3K□2C**	**AS6H-3K□2PC**
			D	● Ⓒ ●	DPDT	**AS6H-3K□2D**	**AS6H-3K□2PD**
			E	Ⓛ ● Ⓡ	DPDT	**AS6H-3K□2E**	**AS6H-3K□2PE**
			G	Ⓛ ● ●	DPDT	**AS6H-3K□2G**	**AS6H-3K□2PG**
			H	● ● Ⓡ	DPDT	**AS6H-3K□2H**	**AS6H-3K□2PH**
		Spring return from right	B	Ⓛ Ⓒ ●	DPDT	**AS6H-31K□2B**	**AS6H-31K□2PB**
			D	● Ⓒ ●	DPDT	**AS6H-31K□2D**	**AS6H-31K□2PD**
			G	Ⓛ ● ●	DPDT	**AS6H-31K□2G**	**AS6H-31K□2PG**
		Spring return from left	C	● Ⓒ Ⓡ	DPDT	**AS6H-32K□2C**	**AS6H-32K□2PC**
			D	● Ⓒ ●	DPDT	**AS6H-32K□2D**	**AS6H-32K□2PD**
			H	● ● Ⓡ	DPDT	**AS6H-32K□2H**	**AS6H-32K□2PH**
		Spring return two-way	D	● Ⓒ ●	DPDT	**AS6H-33K□2D**	**AS6H-33K□2PD**

Disc tumbler key

Wave key

- Specify the key code in place of □ in the Part No.: T (disc tumbler key), S (wave key)
- For contact operation, see page 143.
- Key is retained at ● positions and removable at ○ positions.
- Two keys are supplied.
- The front of key cylinder is made of metal.
- For disc tumbler key, only one type of key is available.
- For wave key, besides the standard key (key number 0H), six other keys are also available. To order other keys, specify the key number as shown below:

Example: **AS6M-2KS1PA-1H**

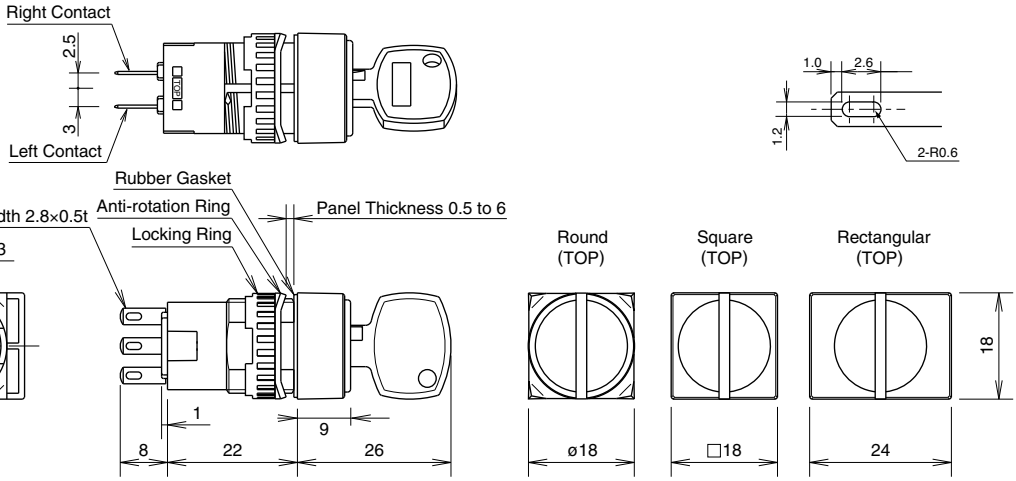
(blank):	Standard key (0H)	Note:
1H to 2H:	Reversible key	Key number is indicated on the key cylinder.
3H to 6H:	Non-reversible key	Standard keys do not have a key number indication.

Contact Operation

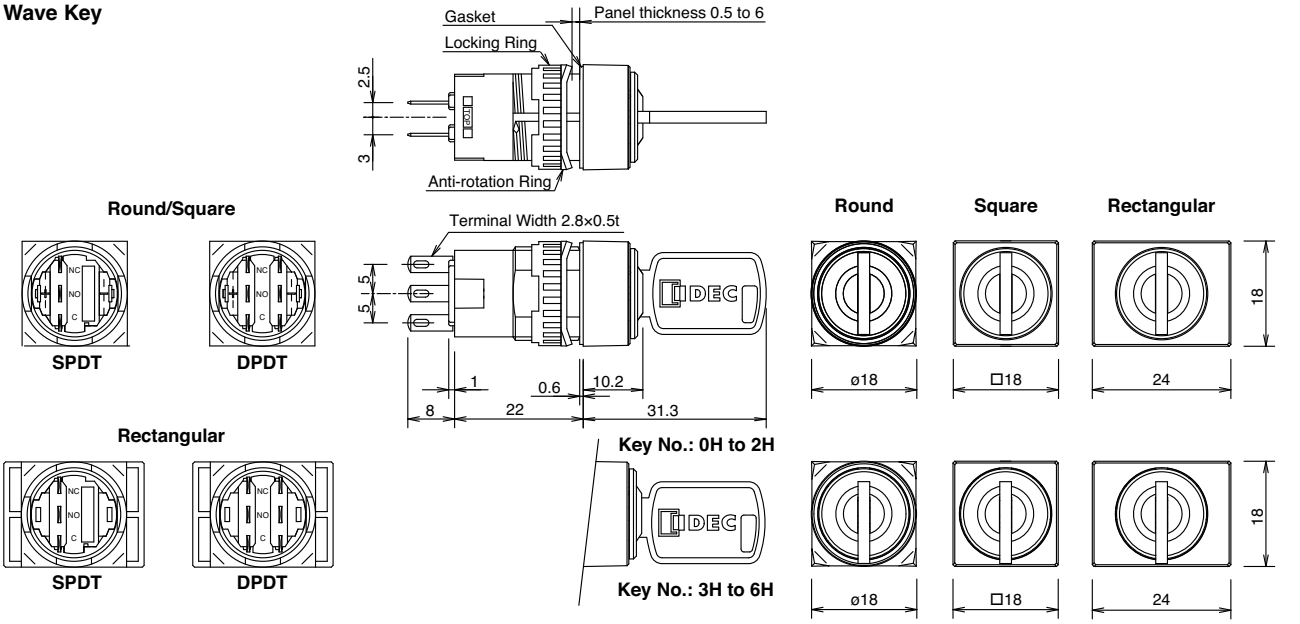
Operator Position & Contact Operation (Top View)					
Positions		Contact	↖ Left	↑ Center	↗ Right
90° 2-position	L R Maintained; L R Spring return from right	SPDT	NO NC C	—	NO NC C
		DPDT	Left Contact NO NC; Right Contact NO NC; C C	—	Left Contact NO NC; Right Contact NO NC; C C
45° 3-position	C L R Maintained; Spring return from right; Spring return from left; Spring return two-way	DPDT	Left Contact NO NC; Right Contact NO NC; C C	Left Contact NO NC; Right Contact NO NC; C C	Left Contact NO NC; Right Contact NO NC; C C

Dimensions

Disc Tumbler Key

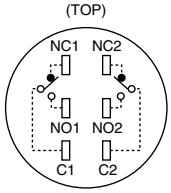


Wave Key



Terminal Arrangement (bottom view)

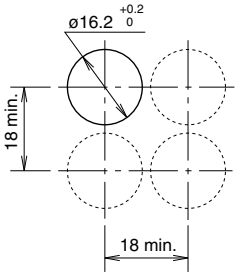
(Key Selector Switch)



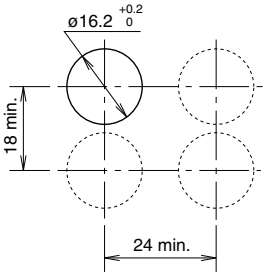
SPDT has NC1, NO1, and C1 only.

Mounting Hole Layout

Round/Square



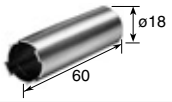
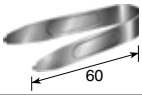
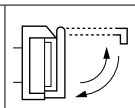
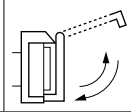
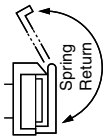
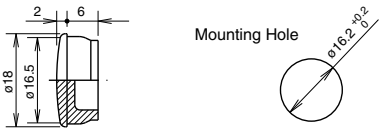
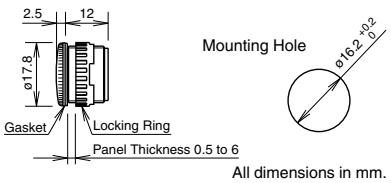
Rectangular



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

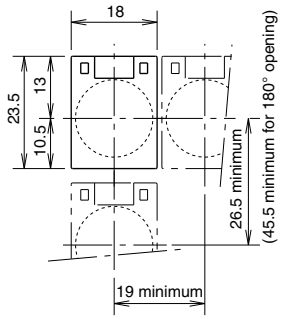
Accessories

Shape			Material	Part No.	Ordering No.	Package Quantity	Remarks
Locking Ring Wrench 			Metal (nickel-plated brass)	**MT-001**	**MT-001**	1	• Used to tighten the locking ring when installing A6 control units into a panel.
Lamp Holder Tool 			Rubber	**OR-77**	**OR-77**	1	• Used to install and remove the LED lamps.
Lens Removal Tool 			Stainless Steel	**MT-101**	**MT-101**	1	• Used to install and remove lenses and buttons.
Switch Guard  	For round/ square units (remains 90° open)		Guard (polyarylate) Base (polyacetal) See page 145 for dimensions.	**AL-K6**	**AL-K6**	1	• Degree of protection: IP40 • Used to protect pushbuttons from inadvertent operation.
	For rectangular units (remains 110° open)			**AL-KH6**	**AL-KH6**	1	
	For round/ square units (180° spring return)			**AL-K6S**	**AL-K6S**	1	
				AL-K6SP	**AL-K6SP**	1	• Degree of protection: IP65 (when used with IP65 control units) • Used to protect pushbuttons from inadvertent operation.
	For rectangular units (180° spring return)			**AL-KH6S**	**AL-KH6S**	1	• Degree of protection: IP40 • Used to protect pushbuttons from inadvertent operation.
				AL-KH6SP	**AL-KH6SP**	1	• Degree of protection: IP65 (when used with IP65 control units) • Used to protect pushbuttons from inadvertent operation.
Dust Cover 	For round units		Translucent cover: elastomer Black part: polypropylene	**AL-D6**	**AL-D6**	1	• When mounting the control units with the dust covers installed, refer to mounting hole layout on page 146. • Operating temperature: –10 to +55°C
	For square units			**AL-DQ6**	**AL-DQ6**	1	
	For rectangular units			**AL-DH6**	**AL-DH6**	1	
Terminal Cover 			Polyamide (white) See page 146 for dimensions.	**AL-V6**	**AL-V6PN10**	10	• When wiring the terminals, insert the lead wires into the terminal cover holes before soldering. • Terminal cover is not attached and must be ordered separately.
Socket 	Solder Terminal		See page 146 for dimensions.	**AL-C6**	**AL-C6**	1	• Plugs on the rear of the A series control units.
	PC Board Terminal			**AL-C6V**	**AL-C6V**	1	
Mounting Hole Plug 	Rubber		Nitryl rubber (black)	**AL-B6**	**AL-B6PN05**	5	• Degree of protection: IP65 
Mounting Hole Plug 	Metal		Plug: metal (diecast) Locking ring: polyacetal Gasket: nitrile	**AL-BM6**	**AL-BM6**	1	• Degree of protection: IP65 • Tightening torque: 0.1 to 0.29 N·m.  All dimensions in mm.

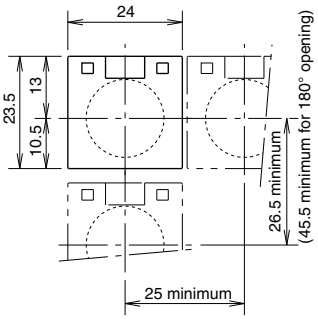
Dimensions

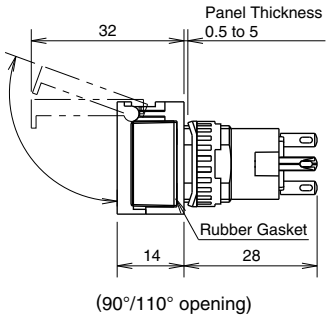
Switch Guard (Degree of protection: IP40)

For Round/Square Units (AL-K6)



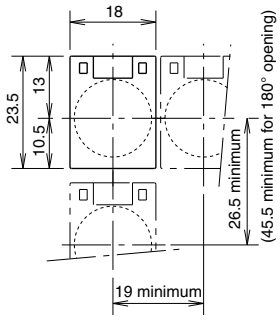
For rectangular Units (AL-KH6)



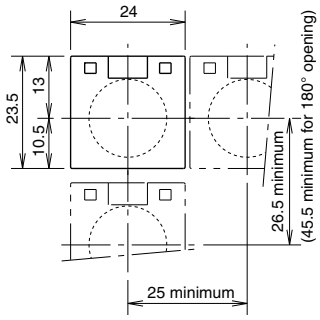


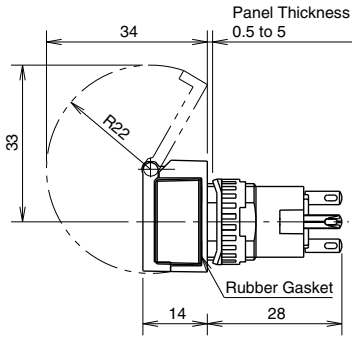
(90°/110° opening)

(AL-K6S)



(AL-KH6S)

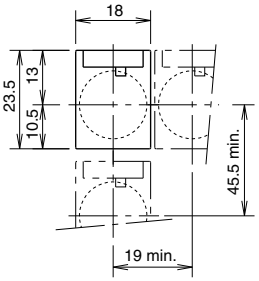




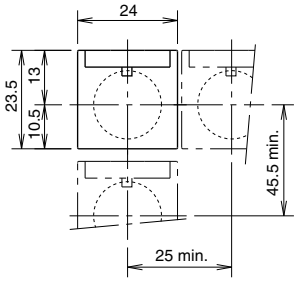
(180° opening)

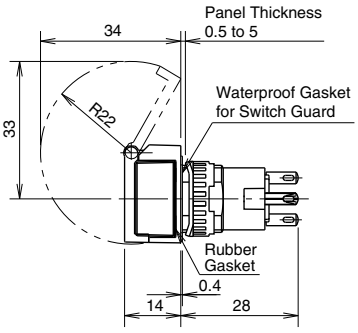
Switch Guard (Degree of protection: IP65)

For Round/Square Units (AL-K6SP)



For Rectangular Units (AL-KH6SP)

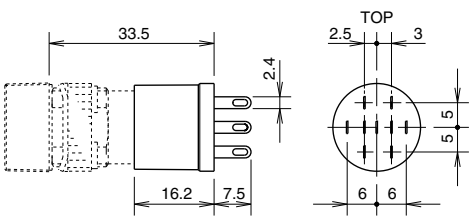




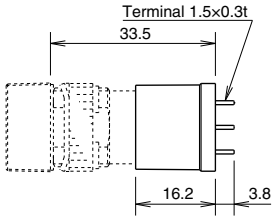
All dimensions in mm.

ø16 A6 Series Accessories

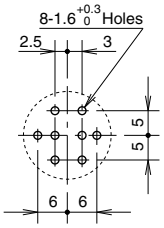
Socket



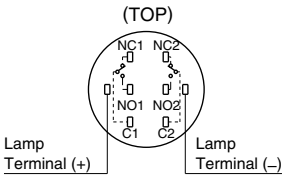
Solder Terminal (AL-C6)



PC Board Terminal (AL-C6V)

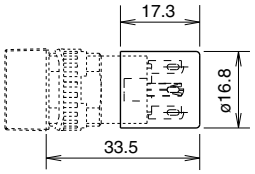


PC Board Mounting Hole Layout (Bottom View)



Terminal Arrangement (Bottom View)

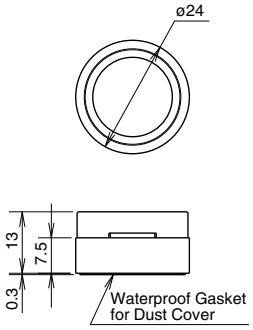
Terminal Cover



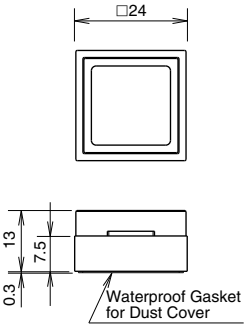
Note: When wiring the terminals, insert the lead wires into the terminal cover holes before soldering.

Dust Cover

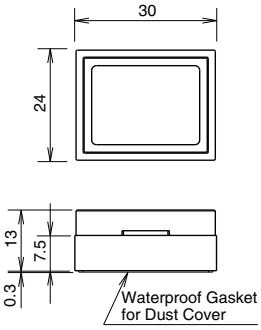
For Round Units (AL-D6)



For Square Units (AL-DQ6)

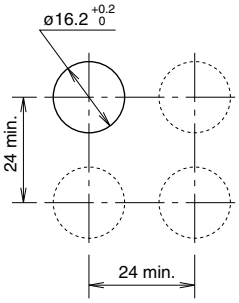


For Rectangular Units (AL-DH6)

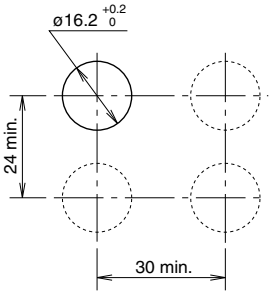


Mounting Hole Centers

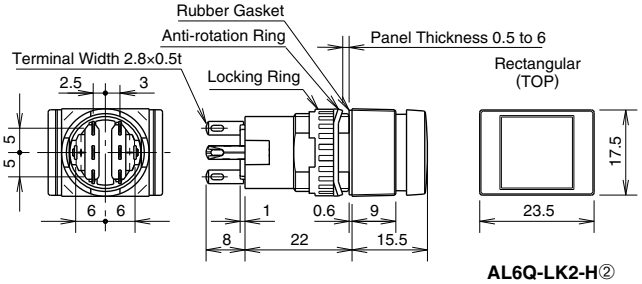
Round/Square Units

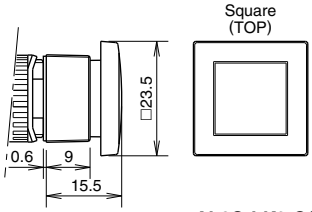


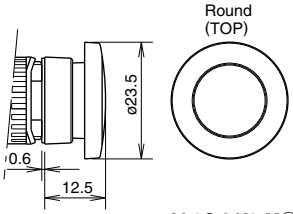
Rectangular Units



Large Lens and Large Button







AL6Q-LK2-H②
AB6Q-BK2-H②

AL6Q-LK2-Q②
AB6Q-BK2-Q②

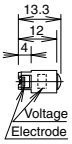
AL6Q-LK2-M②
AB6Q-BK2-M②

All dimensions in mm.

Maintenance Parts

Shape		Specification		Part No.	Ordering No.	Package Quantity	Remarks
Lens 	Round	Polyarylate		**AL6M-L②**	**AL6M-L②PN05**	5	Specify a color code in place of ② in the Part No. A (amber), C (clear), G (green) R (red), S (blue), Y (yellow) • Use a C (clear) lens for W (white) and JW (pure white) illumination.
	Square			**AL6Q-L②**	**AL6Q-L②PN05**		
	Rectangular			**AL6H-L②**	**AL6H-L②PN05**		
Button 	Round	Polyarylate		**AB6M-B①**	**AB6M-B①PN05**		Specify a color code in place of ① in the Part No. B (black), G (green), R (red) S (blue), W (white), Y (yellow)
	Square			**AB6Q-B①**	**AB6Q-B①PN05**		
	Rectangular			**AB6H-B①**	**AB6H-B①PN05**		
Marking Plate 	Round	Acrylic	White	**AL6M-W**	**AL6M-WPN05**		
			Black	**AL6M-B**	**AL6M-BPN05**		
	Square		White	**AL6Q-W**	**AL6Q-WPN05**		
			Black	**AL6Q-B**	**AL6Q-BPN05**		
	Rectangular		White	**AL6H-W**	**AL6H-WPN05**		
			Black	**AL6H-B**	**AL6H-BPN05**		
Large Lens Unit   	Round (installed on round units)	Translucent color lens		**AL6M-LK2-M②**	**AL6M-LK2-M②**	1	• Specify a color code in place of ② in the Part No. • Degree of protection: IP65 **② Color Code** Translucent Color Lens: A (amber), G (green), R (red), S (blue), W (white), Y (yellow) Opaque Button: B (black), G (green), R (red), S (blue), W (white), Y (yellow) • See page 146 for dimensions.
		Opaque button		**AB6M-BK2-M②**	**AB6M-BK2-M②**		
	Square (installed on square units)	Translucent color lens		**AL6Q-LK2-Q②**	**AL6Q-LK2-Q②**		
		Opaque button		**AB6Q-BK2-Q②**	**AB6Q-BK2-Q②**		
	Rectangular (installed on square units)	Translucent color lens		**AL6Q-LK2-H②**	**AL6Q-LK2-H②**		
		Opaque button		**AB6Q-BK2-H②**	**AB6Q-BK2-H②**		
Locking Ring 		Polyacetal		**HA9Z-LN**	**HA9Z-LNPN10**	10	• Black
Anti-rotation Ring 		Stainless Steel		**AL6-LP**	**AL6-LPPN10**		
Spare key 	Key selector (disc tumbler key)	Brass with nickel plating		**AS6-SK-132**	**AS6-SK-132PN02**	2	• Thickness 1.8 mm
Spare Key  Reversible  Non-reversible	Key selector (wave key)	Diecast zinc alloy (nickel-plated)		**LA9Z-SK-□**	**LA9Z-SK-□PN02**	2	• Specify a key number in place of □ in the Part No. 0H: Standard key (reversible) 1H to 2H: Reversible key 3H to 6H: Non-reversible key
Gasket 		Rubber		**AP6M-WM**	**AP6M-WMPN10**	10	

LED Lamps

Dimensions	Operating Voltage	Current Draw		Part No.	Ordering No.	② Illumination Color Code	Package Quantity	Base
		AC	DC					
 	5V DC ±5%	—	8 mA	**LATD-5**②	**LATD-5**②	Specify a color code in place of ② in the Ordering No. A: amber G: green JW: pure white R: red S: blue W: white Y: yellow	1	Exclusive for A6 series
					LATD-5②**PN10**		10	
	6V DC ±5%	7 mA (G, S, JW) 8 mA (A, R, W, Y)	5 mA (G, S, JW) 6 mA (A, R, W, Y)	**LATD-6**②	**LATD-6**②		1	
					LATD-6②**PN10**		10	
	12V AC/ DC ±10%	9 mA	8 mA	**LATD-1**②	**LATD-1**②		1	
					LATD-1②**PN10**		10	
	24V AC/ DC ±10%	9 mA	8 mA	**LATD-2**②	**LATD-2**②		1	
					LATD-2②**PN10**		10	

Safety Precautions

- Turn off the power to A series control units before starting installation, removal, wiring, maintenance, and inspection of the control units. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid a burn on your hand, use the lamp holder tool when replacing lamps.
- For wiring, use wires of a proper size to meet the voltage and current requirements. Failure to tighten terminal screws may cause overheating and create a fire hazard.

Operating Instructions

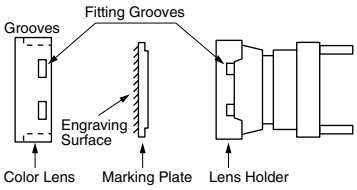
Replacement of Lens and Marking Plate

Removal

Remove the lens assembly (color lens, marking plate, lens holder, and spring) by holding the color lens recesses with the Lens Removal Tool (MT-101) and pulling it out. Remove the marking plate by disengaging the latches between the color lens and lens holder.

The marking plate must be engraved on the front side as shown at right.

When using a color film, insert it between the color lens and marking plate.



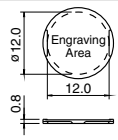
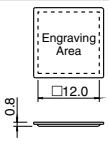
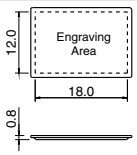
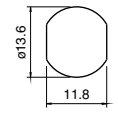
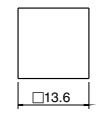
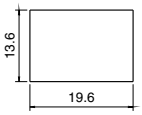
Installation

Place the marking plate on the lens holder in the correct direction, and press the color lens onto the lens holder to engage the latches. Put the spring on the lens holder and insert the lens holder into the housing in the correct direction.

Marking

For A series illuminated pushbuttons, legends and symbols can be engraved on the built-in marking plates, or printed film can be inserted under the lens for labelling purposes.

Marking Plate & Engraving Area

	Round	Square	Rectangular
Built-in Marking Plate and Engraving Area			
	• Engraving must be made on the engraving area within 0.5mm deep. • The marking plate is made of white acrylic resin.		
Applicable Marking Film (not supplied)			
	• Thickness = 0.1 mm × 1 film • Recommended film material: polyester		

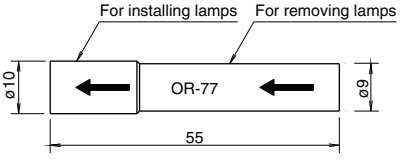
Replacing the LED Lamp

Removal

Use the lamp holder tool (OR-77) to remove lamps. Do not use pliers.

Installation

Use the lamp holder tool (OR-77) to install lamps. Note the correct side of the tool for removal or installation.



All dimensions in mm.

Panel Mounting

When mounting the control units into a panel, use the optional locking ring wrench (MT-001) to tighten the locking ring. Do not use pliers. Tightening torque must not exceed 0.88 N·m. Excessive tightening will damage the locking ring.

Wiring

Solder the terminal at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu is recommended when using lead-free solder. When soldering, do not touch the control unit with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or apply excessive force to the terminal. Use a non-corrosive rosin flux.

Installing the Socket

Install the socket on the control unit with the TOP markings on the control unit and the socket placed in the same direction.

Switch Guard

IP65 (IEC 60529) switch guards must be used with IP65 (IEC 60529) control units only. Even if IP65 type switch guards are installed, enclosed type (IP40) control units are not made waterproof.

Item		Switch Guard	
		IP65 (IEC 60529)	IP40 (IEC 60529)
Control Unit	IP65	IP65	IP40
	IP40	IP40	IP40

Operating Voltage of LED Lamps

The operating voltage of 5V DC is measured at complete DC.

Other Notes

Close Proximity Mounting

When mounting pilot lights or illuminated pushbuttons collectively or lighting them continuously, heat may cause the ambient temperature to rise above the rated operating temperature. When the mounting panel is not made of metal or when the control units are mounted in an enclosed panel, provide for ventilation or lower the operating voltage.

Replacement of Buttons (Illuminated/Non-illuminated)

Do not replace buttons of maintained action units while the button is in the locked position. Replacing the button in the locked position may damage the internal mechanism. Be sure to release the button before replacing.

Operating and Storage Environment

1. Make sure that the operating/storage temperature and humidity are within the ratings.
2. Do not use enclosed type units in an environment subject to oil, water or dust accumulation. In such an area, use the waterproof/oiltight units (IP65).

Microswitch Contacts

Do not connect NO and NC contacts of a microswitch to different voltages or different power sources to prevent a dead short-circuit.

IP65 Units

IP65 units are evaluated by conventional cutting and cooling oils, and can not be used with some special oils. Contact IDEC for resistance against specific oils.

ø12 A2 Series Miniature Control Units

Short 22-mm-long body miniature control unit series with bright LED illumination face and snap-action switching.

- Degree of protection: IP40 and IP65 (IEC 60529)
- All series have terminals on the same plane.
- UL recognized, CSA certified

Applicable Standards	Mark	File No. or Organization
UL508		UL Recognition File No. E55996
CSA C22.2 No.14		CSA File No. LR 21451

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

Weight (approx.)	AL2M-M11: 4g
	AL2M-P1: 4g
	AB2M-M1: 4g

Specifications

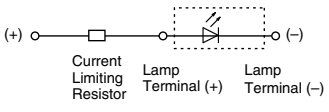
Operating Temperature		–25 to +55°C (no freezing)
Storage Temperature		–30 to +80°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Contact Resistance		50 mΩ maximum (initial value)
Insulation Resistance		100 MΩ minimum (500V DC megger)
Dielectric Strength	Switch Unit	Between live and 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/s² (50G) Operating extremes: 200 m/s² (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		IP40, IP65 (IEC 60529)

LED Lamp Ratings (LAD-S)

Built-in LED Part No.	LAD-SA	LAD-SG	LAD-SR	LAD-SY
Lamp Base	Exclusive for A series control units			
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 = (operating voltage – Vf) / If

- 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.



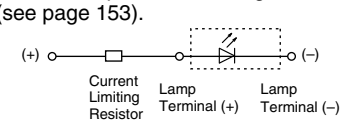
A2 Series Illuminated Pushbuttons & Pilot Lights ø12

Illuminated Pushbuttons & Pilot Lights

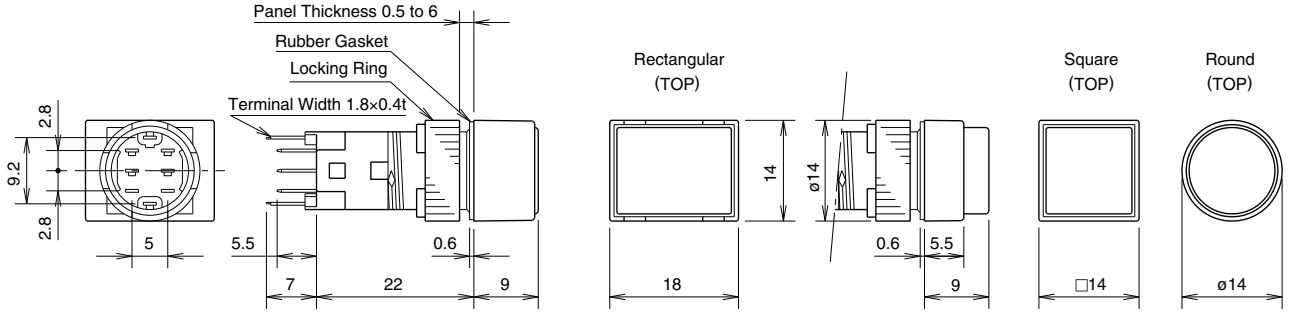
Package Quantity: 1

Shape	Operation	Contact	Part No. IP40	Part No. IP65	② Lens Color Code	LED Lamp Part No., Rated Current (External Resistor Recommended Value)
Round AL2M 	Momentary	SPDT	**AL2M-M11**②	**AL2M-M11P**②	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-M21**②	**AL2M-M21P**②		
	Maintained	SPDT	**AL2M-A11**②	**AL2M-A11P**②		
		DPDT	**AL2M-A21**②	**AL2M-A21P**②		
	Pilot Light	—	**AL2M-P1**②	**AL2M-P1P**②		
Square AL2Q 	Momentary	SPDT	**AL2Q-M11**②	**AL2Q-M11P**②		
		DPDT	**AL2Q-M21**②	**AL2Q-M21P**②		
	Maintained	SPDT	**AL2Q-A11**②	**AL2Q-A11P**②		
		DPDT	**AL2Q-A21**②	**AL2Q-A21P**②		
	Pilot Light	—	**AL2Q-P1**②	**AL2Q-P1P**②		
Rectangular AL2H 	Momentary	SPDT	**AL2H-M11**②	**AL2H-M11P**②		
		DPDT	**AL2H-M21**②	**AL2H-M21P**②		
	Maintained	SPDT	**AL2H-A11**②	**AL2H-A11P**②		
		DPDT	**AL2H-A21**②	**AL2H-A21P**②		
	Pilot Light	—	**AL2H-P1**②	**AL2H-P1P**②		

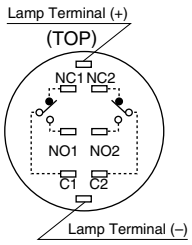
- LED lamps do not have a current-limiting resistor. Connect a current-limiting resistor in series, otherwise LED lamps will be damaged.
- External current-limiting resistor is not necessary when an optional socket with built-in resistor is used (see page 153).
- AP2M series pilot lights (round bezel only) with built-in current-limiting resistors are also available.



Dimensions



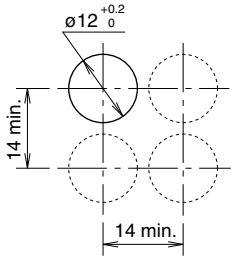
Terminal Arrangement



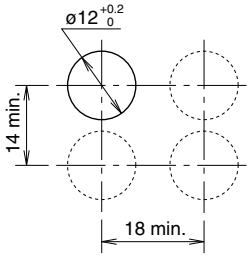
SPDT has NC1, NO1, and C1 only.

Mounting Hole Layout

Round/Square Units



Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

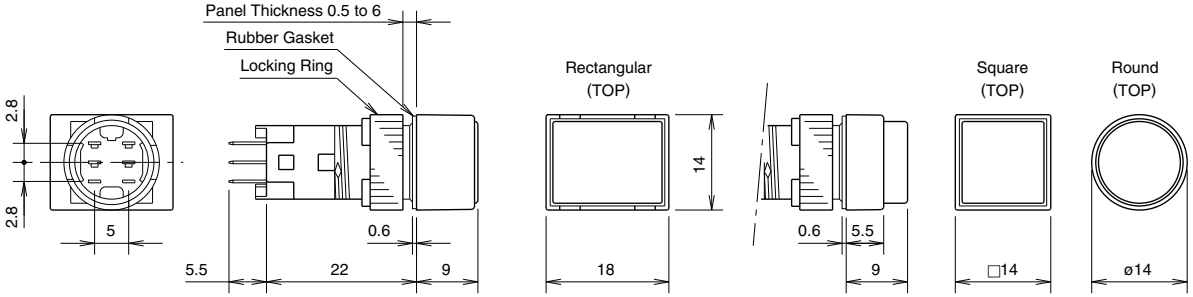
Pushbuttons

Package Quantity: 1

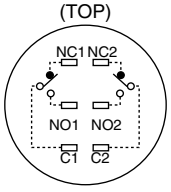
Shape	Button Style	Operation	Contact	Part No. IP40	Part No. IP65	Color Code ①②
Round AB2M 	Button	Momentary	SPDT	**AB2M-M1**①	**AB2M-M1P**①	B: black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB2M-M2**①	**AB2M-M2P**①	
		Maintained	SPDT	**AB2M-A1**①	**AB2M-A1P**①	
			DPDT	**AB2M-A2**①	**AB2M-A2P**①	
	Lens	Momentary	SPDT	**AB2M-M1L**②	**AB2M-M1PL**②	A: amber G: green R: red W: white Y: yellow
			DPDT	**AB2M-M2L**②	**AB2M-M2PL**②	
		Maintained	SPDT	**AB2M-A1L**②	**AB2M-A1PL**②	
			DPDT	**AB2M-A2L**②	**AB2M-A2PL**②	
Square AB2Q 	Button	Momentary	SPDT	**AB2Q-M1**①	**AB2Q-M1P**①	B: black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB2Q-M2**①	**AB2Q-M2P**①	
		Maintained	SPDT	**AB2Q-A1**①	**AB2Q-A1P**①	
			DPDT	**AB2Q-A2**①	**AB2Q-A2P**①	
	Lens	Momentary	SPDT	**AB2Q-M1L**②	**AB2Q-M1PL**②	A: amber G: green R: red W: white Y: yellow
			DPDT	**AB2Q-M2L**②	**AB2Q-M2PL**②	
		Maintained	SPDT	**AB2Q-A1L**②	**AB2Q-A1PL**②	
			DPDT	**AB2Q-A2L**②	**AB2Q-A2PL**②	
Rectangular AB2H 	Button	Momentary	SPDT	**AB2H-M1**①	**AB2H-M1P**①	B: black G: green R: red S: blue W: white Y: yellow
			DPDT	**AB2H-M2**①	**AB2H-M2P**①	
		Maintained	SPDT	**AB2H-A1**①	**AB2H-A1P**①	
			DPDT	**AB2H-A2**①	**AB2H-A2P**①	
	Lens	Momentary	SPDT	**AB2H-M1L**②	**AB2H-M1PL**②	A: amber G: green R: red W: white Y: yellow
			DPDT	**AB2H-M2L**②	**AB2H-M2PL**②	
		Maintained	SPDT	**AB2H-A1L**②	**AB2H-A1PL**②	
			DPDT	**AB2H-A2L**②	**AB2H-A2PL**②	

• Specify a color code in place of ① or ② in the Part No.

Dimensions



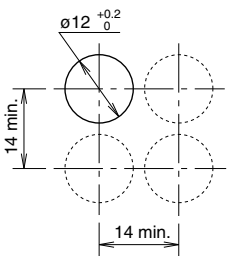
Terminal Arrangement



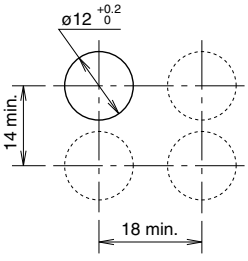
SPDT has NC1, NO1, and C1 only.

Mounting Hole Layout

Round/Square Units



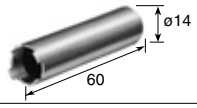
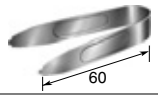
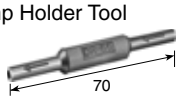
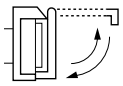
Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

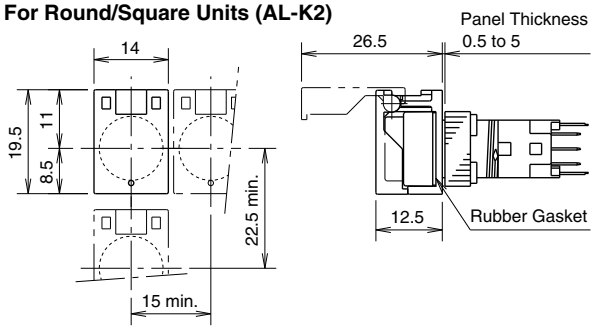
Accessories

Shape	Material		Part No.	Ordering Part No.	Package Quantity	Remarks
Locking Ring Wrench 	Metal (nickel-plated brass)		**MT-002**	**MT-002**	1	• Used to tighten the locking ring when installing the A2 control units into a panel.
Lens Removal Tool 	Stainless Steel		**MT-101**	**MT-101**	1	• Used to remove lens and button.
Lamp Holder Tool 	Rubber		**OR-66**	**OR-66**	1	• Used to remove and install LED lamps.
Switch Guard 	90° open	For round/ square unit	**AL-K2**	**AL-K2**	1	• Degree of protection: IP40 • Used to protect pushbuttons from inadvertent operation. • See page 154 for dimensions.  (remains 90° open)
		For rectangular unit	**AL-KH2**	**AL-KH2**	1	
Socket 	Solder Terminal		**AL-C2**	**AL-C2**	1	• Snaps on the rear of the A2 series control units. (see page 154 for dimensions)
	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: Blue • A current limiting resistor is contained, eliminating the need for external resistors. • 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. • See page 154 for dimensions.
		6V DC	**AL-C22**	**AL-C22**	1	Green
		12V DC	**AL-C23**	**AL-C23**	1	Yellow
		24V DC	**AL-C24**	**AL-C24**	1	Red
	PC Board Terminal	5V DC	**AL-C21V**	**AL-C21V**	1	Blue
		6V DC	**AL-C22V**	**AL-C22V**	1	Green
		12V DC	**AL-C23V**	**AL-C23V**	1	Yellow
		24V DC	**AL-C24V**	**AL-C24V**	1	Red
Terminal Cover 	Nylon		**AL-V2**	**AL-V2PN10**	10	• When wiring the terminals, insert the lead wires into the terminal cover holes before soldering. • Terminal cover is not attached and must be ordered separately.
Dust Cover 	For round units		**AL-D2**	**AL-D2**	1	• When mounting the control units with the dust covers installed, refer to mounting hole layout on page 154. • Operating temperature: –10 to +55°C • Material Front part: Elastomer (transparent) Rear part: Polypropylene (black) • See page 154 for dimensions and mounting hole layout.
	For square units		**AL-DQ2**	**AL-DQ2**	1	
	For rectangular units		**AL-DH2**	**AL-DH2**	1	
Mounting Hole Plug 	Nitryl rubber (black)		**AL-B2**	**AL-B2PN05**	5	• Degree of protection: IP65

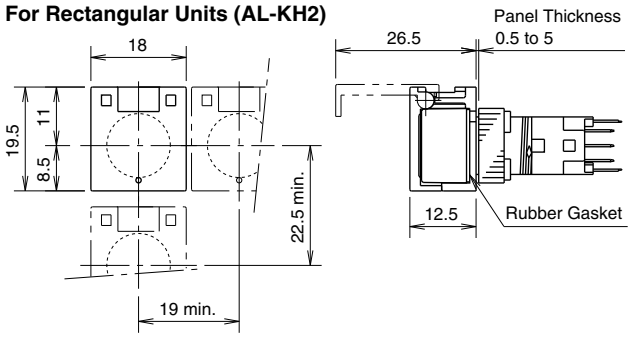
Dimensions

Switch Guard

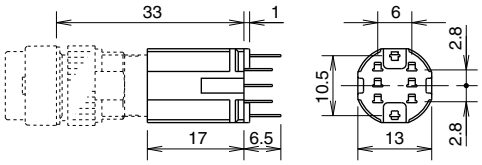
For Round/Square Units (AL-K2)



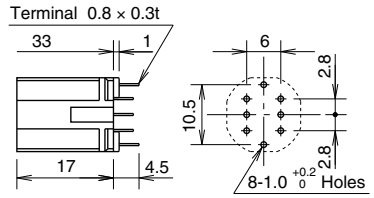
For Rectangular Units (AL-KH2)



Socket (AL-C2, AL-C2V, AL-C2□)



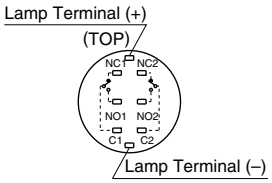
Solder Terminal (AL-C2)

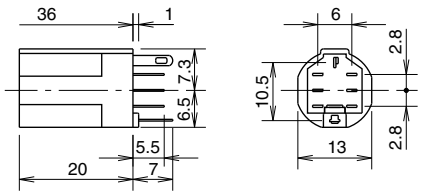


PC Board Terminal (AL-C2V)

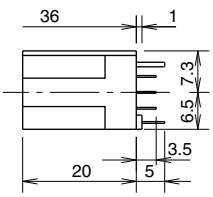
Panel Cut-out Bottom View

Terminal Arrangement

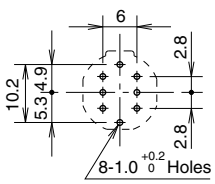




Solder Terminal with Built-in Resistor (AL-C2□)

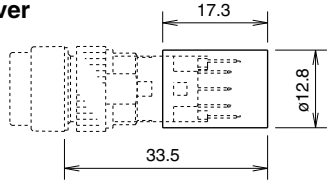


PC Board Terminal with Built-in Resistor (AL-C2□V)



Panel Cut-out Bottom View

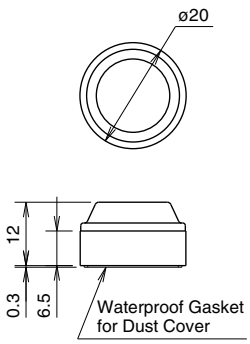
Terminal Cover (AL-V2)



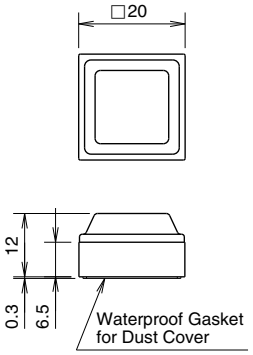
Note: When wiring the terminals, insert the lead wires into the terminal cover holes before soldering.

Dust Cover

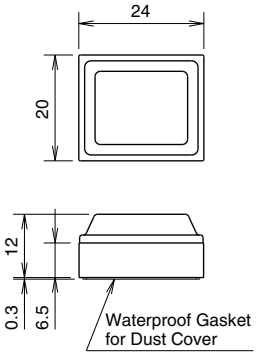
For Round Units (AL-D2)



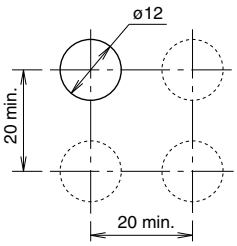
For Square Units (AL-DQ2)



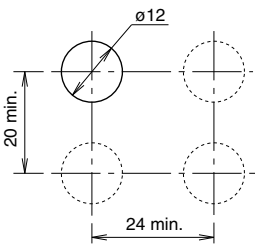
For Rectangular Units (AL-DH2)



Mounting Hole Centers (Round Units, Square Units)



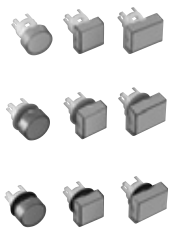
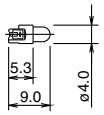
(Rectangular Units)



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

Maintenance Parts

Shape	Specification		Part No.	Ordering Part No.	Package Quantity	Color Code ①②		
Marking Plate 	Round		**AL2M-W**	**AL2M-WPN05**	5	White		
	Square		**AL2Q-W**	**AL2Q-WPN05**				
	Rectangular		**AL2H-W**	**AL2H-WPN05**				
Lens Unit 	For IP40 units	Round	**AL2M-LK1-②**	**AL2M-LK1-②PN02**	2	• Specify a color code in place of ② in the Part No. A: amber G: green R: red W: white Y: yellow		
		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**				
		Square	**AL2Q-LK3-②**	**AL2Q-LK3-②**				
		Rectangular	**AL2H-LK3-②**	**AL2H-LK3-②**				
Button Unit 	For IP40 pushbuttons	Round	**AB2M-BK1-①**	**AB2M-BK1-①PN02**	2	• Specify a color code in place of ① in the Part No. B: black G: green R: red S: blue W: white Y: yellow		
		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**				
LED Lamp  Current-limiting resistor is not contained.  All dimensions in mm.	Illumination color: amber		**LAD-SA**	**LAD-SA**	1	Lens color	Amber	LED color: amber clear
				LAD-SAPN10	10			
	Illumination color: green		**LAD-SG**	**LAD-SG**	1		Green	LED color: yellow diffused
				LAD-SGPN10	10			
	Illumination color: red		**LAD-SR**	**LAD-SR**	1		Red	LED color: clear red
				LAD-SRPN10	10			
	Illumination color: yellow		**LAD-SY**	**LAD-SY**	1		White/ Yellow	LED color: yellow clear
				LAD-SYPN10	10			

Safety Precautions

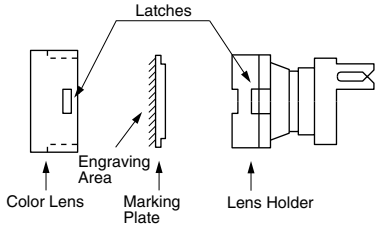
- Turn off the power to A series control units before starting installation, removal, wiring, maintenance, and inspection of the control units. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid burning your hand, use the lamp holder tool when replacing lamps.
- For wiring, use wires of a proper gauge to meet the voltage and current requirements. Failure to tighten terminal screws may cause overheating and create a fire hazard.

Operating Instructions

Replacement of Lens and Marking Plate

Removal

Remove the lens assembly (color lens, marking plate, lens holder, and spring) by holding the color lens recesses with the Lens Removal Tool (MT-101) and pulling it out. Remove the marking plate by disengaging the latches between the color lens and lens holder.
The marking plate must be engraved on the front side as shown below.



Installation

Place the marking plate on the lens holder in the correct direction, and press the color lens onto the lens holder to engage the latches. Put the spring on the lens holder and insert the lens holder into the housing in the correct direction.

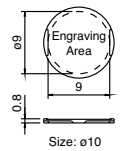
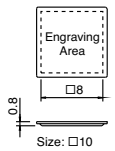
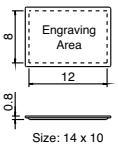
Installing Non-illuminated Button

Non-illuminated pushbuttons contain a marking plate like illuminated units. Be sure to install the marking plate when replacing the button.

Marking

For A series illuminated pushbuttons, legends and symbols can be engraved on the built-in marking plates, or printed film can be inserted under the lens.

Marking Plate & Engraving Area

Lens	Round	Square	Rectangular
Built-in Marking Plate	 Size: ø10	 Size: □10	 Size: 14 x 10
	• Engraving must be made on the engraving area less than 0.5mm deep. • The marking plate is made of white acrylic resin.		

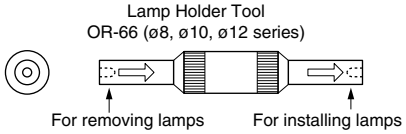
Replacing the LED Lamp

Removal

Use the lamp holder tool (OR-66) to remove lamps. Do not use pliers.

Installation

Use the lamp holder tool (OR-66) to install lamps. Note the correct side of the tool for removal or installation.



Panel Mounting

When mounting the control units onto a panel, use the optional locking ring wrench (MT-002) to tighten the locking ring. Do not use pliers. Tightening torque must not exceed 0.78 N·m. Excessive tightening will damage the locking ring.

Wiring

Solder the terminal at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu is recommended when using lead-free solder. When soldering, do not touch the control unit with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or apply excessive force to the terminal.
Use non-corrosive rosin flux.

Installing the Socket

Install the socket on the control unit with the TOP markings on the control unit and the socket placed in the same direction.

Operating Voltage of LED Lamps

The operating voltage is measured at complete DC. When using a pulsating voltage such as a full-wave rectification voltage, keep peak currents within the forward current If. Peak currents exceeding the If may shorten the LED lamp life.

Other Notes

Close Proximity Mounting

When mounting pilot lights or illuminated pushbuttons collectively or lighting them continuously, heat may cause the ambient temperature to rise above the rated operating temperature. When the mounting panel is not made of metal or when the control units are mounted in an enclosed panel, provide for ventilation or lower the operating voltage.

Replacement of Buttons (Illuminated/Non-illuminated)

Do not replace buttons of maintained action units while the button is in the locked position. Replacing the button in the locked position may damage the internal mechanism. Be sure to release the button before replacing.

Operating and Storage Environment

1. Make sure that the operating/storage temperature and humidity are within the ratings.
2. Do not use enclosed units (IP40) in an environment subject to oil, water or dust accumulation. In such an area, use the waterproof/oiltight units (IP65).

Microswitch Contacts

Do not connect NO and NC contacts of the microswitch to different voltages or different power sources to prevent a dead short-circuit.

IP65 Units

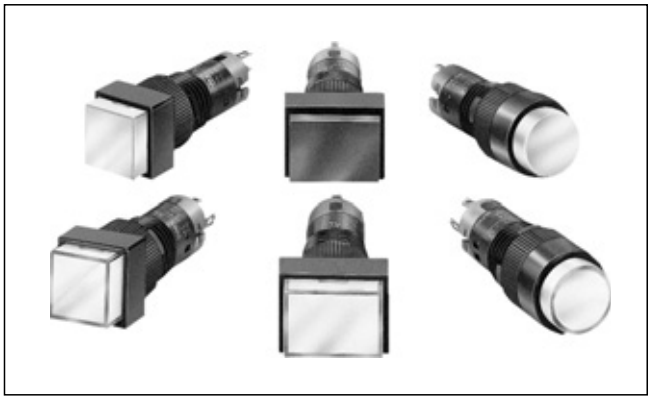
IP65 units are evaluated by conventional cutting and cooling oils, and can not be used with some special oils. Contact IDEC for resistance against special oils.

ø10 A1 Series Miniature Control Units

Short 22-mm-long body miniature control unit series with LED illumination face and snap-action switching.

- Bright and clear LED illumination.
- All series have terminals on the same plane.
- UL recognized, CSA certified

Applicable Standards	Mark	File No. or Organization
UL508		UL Recognition File No. E55996
CSA C22.2 No.14		CSA File No. LR 21451



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)

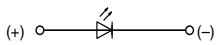
Weight

Weight (approx.)	AL1M-M11: 3g
	AL1M-P1: 3g
	AB1M-M1: 3g

Specifications

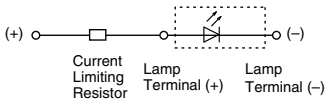
Operating Temperature		–25 to +55°C (no freezing)
Storage Temperature		–30 to +80°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Contact Resistance		50 mΩ maximum (initial value)
Insulation Resistance		100 MΩ minimum (500V DC megger)
Dielectric Strength	Switch Unit	Between live and 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/s² (50G) Operating extremes: 200 m/s² (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		IP40 (IEC 60529)

LED Lamp Ratings (LAD-S)

Built-in LED Part No.	LAD-SA	LAD-SG	LAD-SR	LAD-SY
Lamp Base	Exclusive for A series control units			
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 = (operating voltage – Vf) / If

- 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.

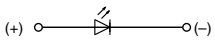


Illuminated Pushbuttons & Pilot Lights

Package Quantity: 1

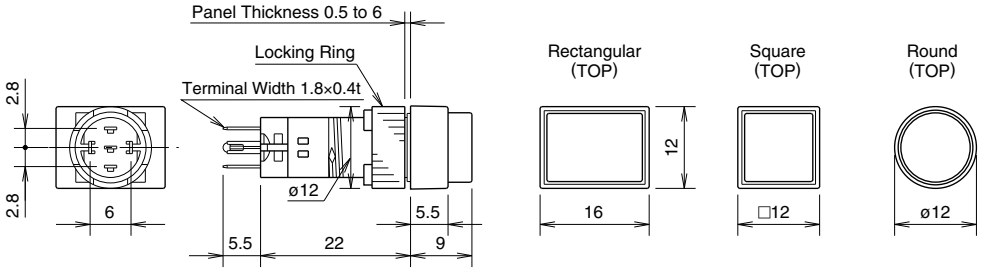
Shape	Operation	Contact	Part No. IP40	② Lens Color Code	LED Lamp Part No., Rated Current (External Resistor Recommended Value)
Round AL1M 	Momentary	**SPDT**	**AL1M-M11②**	Specify a color code in place of ② in the Part No. A: amber G: green R: red W: white Y: yellow	A: LAD-SA G: LAD-SG R: LAD-SR W/Y: 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
	Maintained	**SPDT**	**AL1M-A11②**		
	Pilot Light	—	**AL1M-P1②**		
Square AL1Q 	Momentary	**SPDT**	**AL1Q-M11②**		
	Maintained	**SPDT**	**AL1Q-A11②**		
	Pilot Light	—	**AL1Q-P1②**		
Rectangular AL1H 	Momentary	**SPDT**	**AL1H-M11②**		
	Maintained	**SPDT**	**AL1H-A11②**		
	Pilot Light	—	**AL1H-P1②**		

• LED lamps do not have a current-limiting resistor. Connect a current-limiting resistor in series, otherwise LED lamps will be damaged.

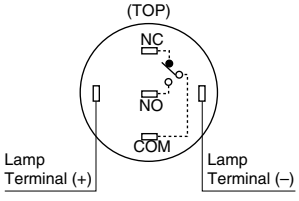


• AP1M series pilot lights (round bezel only) with built-in current-limiting resistor are also available.

Dimensions

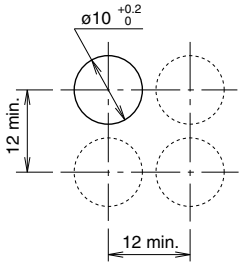


Terminal Arrangement (bottom view)

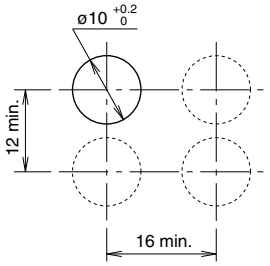


Mounting Hole Layout

Round/Square Units



Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

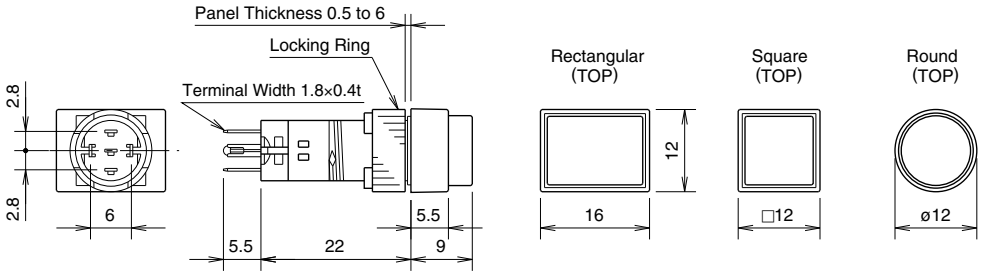
Pushbuttons

Package Quantity: 1

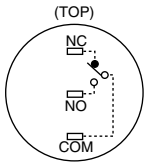
Shape	Button Style	Operation	Contact	Part No. IP40	Color Code ①②
Round AB1M 	Button	Momentary	SPDT	**AB1M-M1**①	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB1M-A1**①	
	Lens	Momentary	SPDT	**AB1M-M1L**②	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB1M-A1L**②	
Square AB1Q 	Button	Momentary	SPDT	**AB1Q-M1**①	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB1Q-A1**①	
	Lens	Momentary	SPDT	**AB1Q-M1L**②	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB1Q-A1L**②	
Rectangular AB1H 	Button	Momentary	SPDT	**AB1H-M1**①	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB1H-A1**①	
	Lens	Momentary	SPDT	**AB1H-M1L**②	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB1H-A1L**②	

• Specify a color code in place of ① or ② in the Part No.

Dimensions



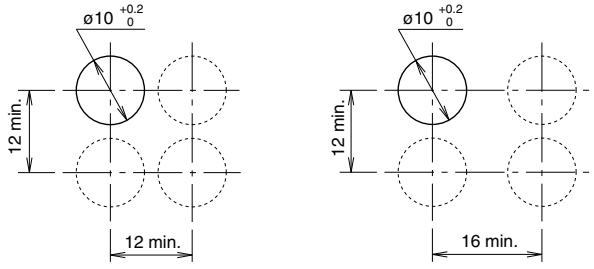
Terminal Arrangement (bottom view)



Mounting Hole Layout

Round/Square Units

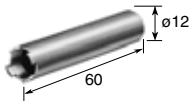
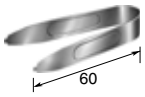
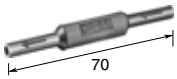
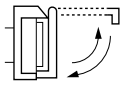
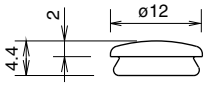
Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

Accessories

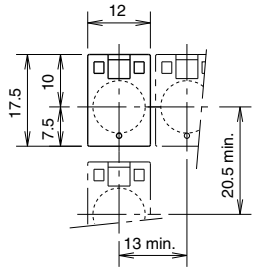
Shape	Material		Part No.	Ordering No.	Package Quantity	Remarks
Locking Ring Wrench 	Metal (nickel-plated brass)		**MT-003**	**MT-003**	1	• Used to tighten the locking ring when installing the A1 control units into a panel.
Lens Removal Tool 	Stainless Steel		**MT-101**	**MT-101**	1	• Used to remove lens and button.
Lamp Holder Tool 	Rubber		**OR-66**	**OR-66**	1	• Used to remove and install LED lamps.
Switch Guard 	90° open	For round/ square unit	**AL-K1**	**AL-K1**	1	• Used to protect pushbuttons from inadvertent operation. • See page 161 for dimensions.  (remains 90° open)
		For rectangular unit	**AL-KH1**	**AL-KH1**	1	
Socket 	Solder Terminal		**AL-C1**	**AL-C1**	1	• Snaps on the rear of the A1 series control units. (see page 161 for dimensions)
	PC Board Terminal		**AL-C1V**	**AL-C1V**	1	
Terminal Cover 	Nylon		**AL-V1**	**AL-V1PN10**	10	• When wiring the terminals, insert the lead wires into the terminal cover holes before soldering. • Terminal cover is not attached and must be ordered separately.
Mounting Hole Plug 	Nitryl rubber (black)		**AL-B1**	**AL-B1PN05**	5	• Degree of protection: IP65 

A1 Series Maintenance Parts ø10

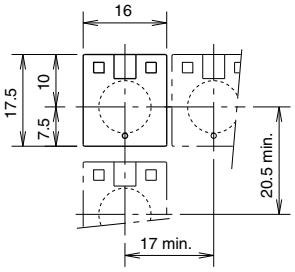
Dimensions

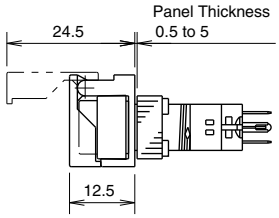
Switch Guard

For Round/Square Units (AL-K1)

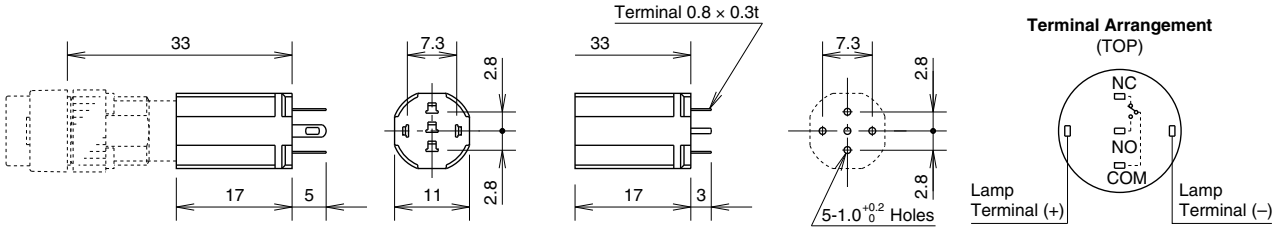


For Rectangular Units (AL-KH1)





Socket (AL-C1, AL-C1V)



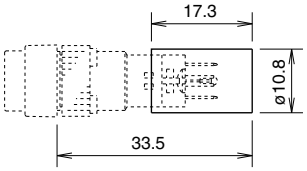
Solder Terminal (AL-C1)

PC Board Terminal (AL-C1V)

(PC Board Terminal Mounting Hole Layout)

(Bottom View)

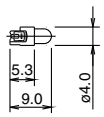
Terminal Cover



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

All dimensions in mm.

Maintenance Parts

Shape		Part No.	Ordering No.	Package Quantity	Color Code ①②		
Marking Plate 	Round	**AL1M-W**	**AL1M-WPN05**	5	• White		
	Square	**AL1Q-W**	**AL1Q-WPN05**				
	Rectangular	**AL1H-W**	**AL1H-WPN05**				
Lens Unit 	Round	**AL1M-LK1-②**	**AL1M-LK1-②PN02**	2	Specify a color code in place of ② in the Part No. A (amber), G (green), R (red) W (white), Y (yellow)		
	Square	**AL1Q-LK1-②**	**AL1Q-LK1-②PN02**				
	Rectangular	**AL1H-LK1-②**	**AL1H-LK1-②PN02**				
Button Unit 	Round	**AB1M-BK1-①**	**AB1M-BK1-①PN02**		Specify a color code in place of ① in the Part No. B (black), G (green), R (red) S (blue), W (white), Y (yellow)		
	Square	**AB1Q-BK1-①**	**AB1Q-BK1-①PN02**				
	Rectangular	**AB1H-BK1-①**	**AB1H-BK1-①PN02**				
LED Lamp  Current-limiting resistor is not contained.  All dimensions in mm.	Illumination color: amber	**LAD-SA**	**LAD-SA**	1	Lens color	Amber	LED color: amber clear
			LAD-SAPN10	10			
	Illumination color: green	**LAD-SG**	**LAD-SG**	1		Green	LED color: yellow diffused
			LAD-SGPN10	10			
	Illumination color: red	**LAD-SR**	**LAD-SR**	1		Red	LED color: clear red
			LAD-SRPN10	10			
	Illumination color: yellow	**LAD-SY**	**LAD-SY**	1		White/ Yellow	LED color: yellow clear
			LAD-SYPN10	10			

Safety Precautions

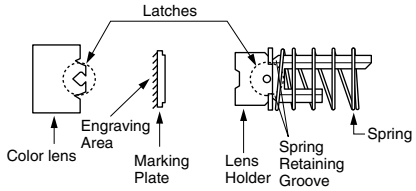
- Turn off the power to A series control units before starting installation, removal, wiring, maintenance, and inspection of the control units. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid burning your hand, use the lamp holder tool when replacing lamps.
- For wiring, use wires of a proper gauge to meet the voltage and current requirements. Failure to tighten terminal screws may cause overheating and create a fire hazard.

Operating Instructions

Replacement of Lens and Marking Plate

Removal

Remove the lens assembly (color lens, marking plate, lens holder, and spring) by holding the color lens recesses with the Lens Removal Tool (MT-101) and pulling it out. Remove the marking plate by disengaging the latches between the color lens and lens holder. The marking plate must be engraved on the front side as shown below.



Note: Make sure that the spring is inserted in the correct direction. The base of spring must fit the groove in the holder.

Installation

Place the marking plate on the lens holder in the correct direction, and press the color lens onto the lens holder to engage the latches. Put the spring on the lens holder and insert the lens holder into the housing in the correct direction.

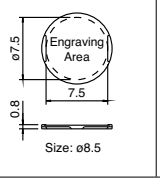
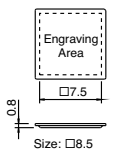
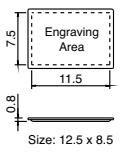
Installing Non-illuminated Button

Non-illuminated pushbuttons contain a marking plate like illuminated units. Be sure to install the marking plate when replacing the button.

Marking

For A series illuminated pushbuttons, legends and symbols can be engraved on the built-in marking plates, or printed film can be inserted under the lens.

Marking Plate & Engraving Area

Lens	Round	Square	Rectangular
Built-in Marking Plate			
	• Engraving must be made on the engraving area less than 0.5mm deep. • The marking plate is made of white acrylic resin.		

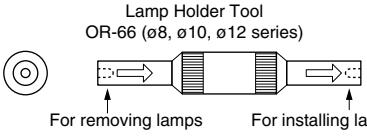
Replacing the LED Lamp

Removal

Use the lamp holder tool (OR-66) to remove lamps. Do not use pliers.

Installation

Use the lamp holder tool (OR-66) to install lamps. Note the correct side of the tool for removal or installation.



Panel Mounting

When mounting the control units into a panel, use the optional locking ring wrench (MT-003) to tighten the locking ring. Do not use pliers. Tightening torque must not exceed 0.29 N·m. Excessive tightening will damage the locking ring.

Wiring

Solder the terminal at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu is recommended when using lead-free solder. When soldering, do not touch the control unit with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or apply excessive force to the terminal.

Use non-corrosive rosin flux.

Installing the Socket

Install the socket on the control unit with the TOP markings on the control unit and the socket placed in the same direction.

Operating Voltage of LED Lamps

The operating voltage is measured at complete DC. When using a pulsating voltage such as a full-wave rectification voltage, keep peak currents within the forward current If. Peak currents exceeding the If may shorten the LED lamp life.

Other Notes

Close Proximity Mounting

When mounting pilot lights or illuminated pushbuttons collectively or lighting them continuously, heat may cause the ambient temperature to rise above the rated operating temperature. When the mounting panel is not made of metal or when the control units are mounted in an enclosed panel, provide for ventilation or lower the operating voltage.

Replacement of Buttons (Illuminated/Non-illuminated)

Do not replace buttons of maintained action units while the button is in the locked position. Replacing the button in the locked position may damage the internal mechanism. Be sure to release the button before replacing.

Operating and Storage Environment

1. Make sure that the operating/storage temperature and humidity are within the ratings.
2. Do not use enclosed type units in an environment subject to oil, water or dust accumulation.

Microswitch Contacts

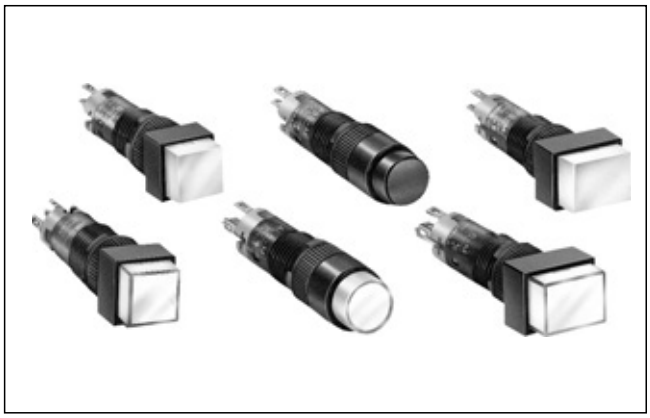
Do not connect NO and NC contacts of the microswitch to different voltages or different power sources to prevent a dead short-circuit.

ø8 A8 Series Miniature Control Units

Short 22-mm-long body miniature control unit series with LED illumination face and snap-action switching.

- Bright and clear LED illumination.
- All series have terminals on the same plane.
- UL recognized, CSA certified

Applicable Standards	Mark	File No. / Organization
UL508		UL Recognition File No. E55996
CSA C22.2 No.14		CSA File No. LR 21451



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)

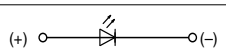
Weight

Weight (approx.)	AL8M-M11: 2g
	AL8M-P1: 2g
	AB8M-M1: 2g

Specifications

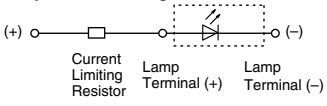
Operating Temperature		–25 to +55°C (no freezing)
Storage Temperature		–30 to +80°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Contact Resistance		50 mΩ maximum (initial value)
Insulation Resistance		100 MΩ minimum (500V DC megger)
Dielectric Strength	Switch Unit	Between live and 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/s² (50G) Operating extremes: 200 m/s² (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		IP40 (IEC 60529)

LED Lamp Ratings (LAD-S)

Part No.	LAD-SA	LAD-SG	LAD-SR	LAD-SY
Lamp Base	Exclusive for A series control units			
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 = (operating voltage – Vf) / If

- 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.

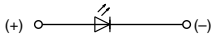


LED Illuminated Pushbuttons & Pilot Lights

Package Quantity: 1

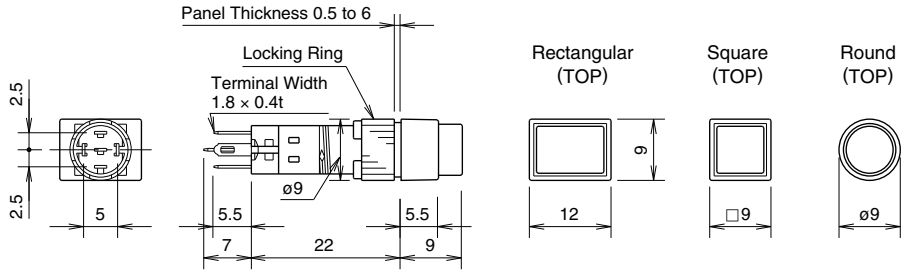
Shape	Operation	Contact	Part No. IP40	② Lens Color Code	LED Lamp Part No., Rated Current (External Resistor Recommended Value)
Round AL8M 	Momentary	SPDT	**AL8M-M11②**	Specify a color code in place of ② in the Part No. A: amber G: green R: red W: white Y: yellow	A: LAD-SA G: LAD-SG R: LAD-SR W/Y: LAD-SY Rated Current: 20 mA 5V DC: 150Ω, 1/2W 6V DC: 200Ω, 1/2W 12V DC: 510Ω, 1W 24V DC: 1.1 kΩ, 1W
	Maintained	SPDT	**AL8M-A11②**		
	Pilot Light	—	**AL8M-P1②**		
Square AL8Q 	Momentary	SPDT	**AL8Q-M11②**		
	Maintained	SPDT	**AL8Q-A11②**		
	Pilot Light	—	**AL8Q-P1②**		
Rectangular AL8H 	Momentary	SPDT	**AL8H-M11②**		
	Maintained	SPDT	**AL8H-A11②**		
	Pilot Light	—	**AL8H-P1②**		

• LED lamps do not have a current-limiting resistor. Connect a current-limiting resistor in series, otherwise LED lamps will be damaged.

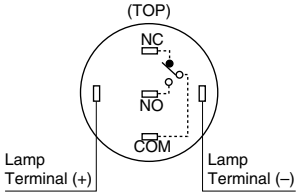


• AP8M series pilot lights (round bezel only) with built-in current-limiting resistor are also available.

Dimensions

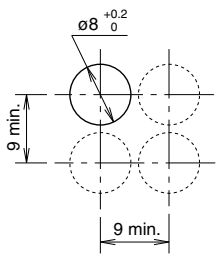


Terminal Arrangement

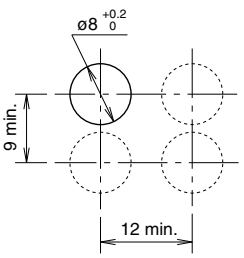


Mounting Hole Layout

Round/Square Units



Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

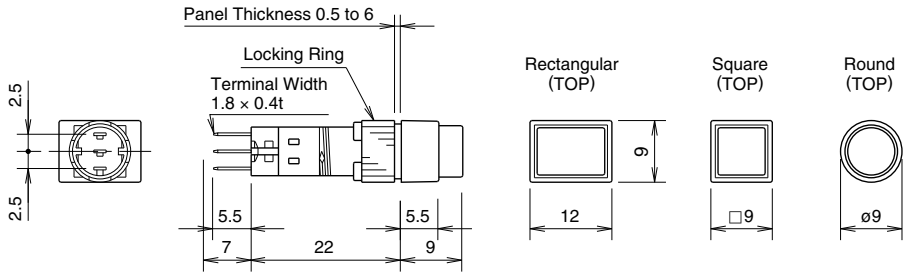
Pushbuttons

Package Quantity: 1

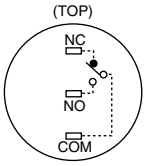
Shape	Button Style	Operation	Contact	Part No. IP40	Color Code ①②
Round AB8M 	Button	Momentary	SPDT	**AB8M-M1①**	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB8M-A1①**	
	Lens	Momentary	SPDT	**AB8M-M1L②**	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB8M-A1L②**	
Square AB8Q 	Button	Momentary	SPDT	**AB8Q-M1①**	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB8Q-A1①**	
	Lens	Momentary	SPDT	**AB8Q-M1L②**	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB8Q-A1L②**	
Rectangular AB8H 	Button	Momentary	SPDT	**AB8H-M1①**	B black G: green R: red S: blue W: white Y: yellow
		Maintained	SPDT	**AB8H-A1①**	
	Lens	Momentary	SPDT	**AB8H-M1L②**	A: amber G: green R: red W: white Y: yellow
		Maintained	SPDT	**AB8H-A1L②**	

- Specify a color code in place of ① or ② in the Part No.
- Lens style buttons can be used with marking plate and film.

Dimensions

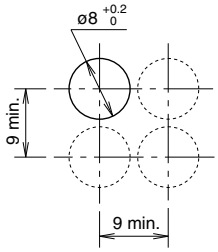


Terminal Arrangement (bottom view)

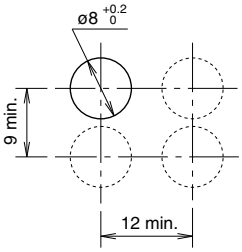


Mounting Hole Layout

Round/Square Units



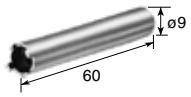
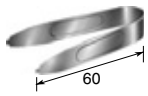
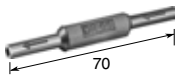
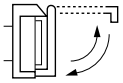
Rectangular Units



Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

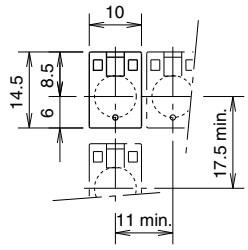
Accessories

Shape	Material		Part No.	Ordering Part No.	Package Quantity	Remarks
Locking Ring Wrench 	Metal (nickel-plated brass)		**MT-004**	**MT-004**	1	• Used to tighten the locking ring when installing the A8 series control units into a panel.
Lens Removal Tool 	Stainless Steel		**MT-101**	**MT-101**	1	• Used to remove the lens and button.
Lamp Holder Tool 	Rubber		**OR-66**	**OR-66**	1	• Used to remove and install the LED lamps.
Switch Guard 	90° open	For round/ square Unit	**AL-K8**	**AL-K8**	1	• Used to protect pushbuttons from inadvertent operation. • See page 167 for dimensions.  (remains 90° open)
		For rectangular unit	**AL-KH8**	**AL-KH8**	1	
Socket 	Solder Terminal		**AL-C8**	**AL-C8**	1	• Snaps on the rear of the A8 series control units. (see page 167 for dimensions)
	PC Board Terminal		**AL-C8V**	**AL-C8V**	1	
Terminal Cover 	Nylon		**AL-V8**	**AL-V8PN10**	10	• When wiring the terminals, insert the lead wires into the terminal cover holes before soldering. • Terminal cover is not attached and must be ordered separately.
Mounting Hole Plug 	Nitryl rubber (black)		**AL-B8**	**AL-B8PN05**	5	• Degree of protection: IP65

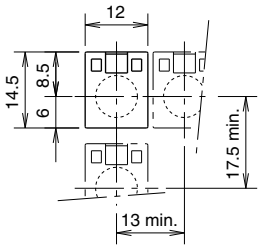
Dimensions

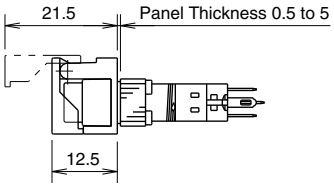
Switch Guard

For Round/Square Units (AL-K8)

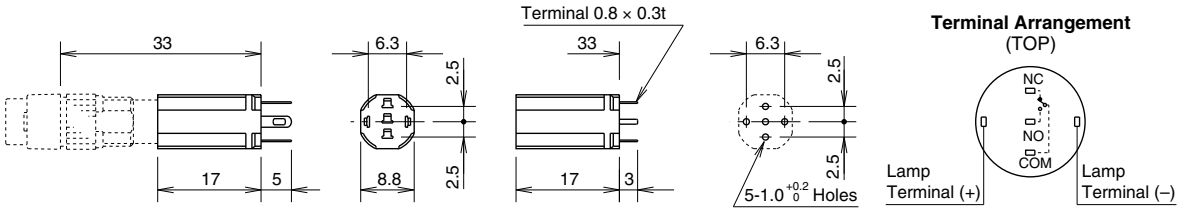


For Rectangular Units (AL-KH8)



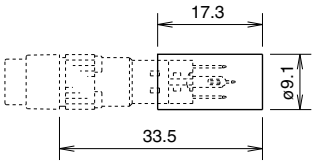


Socket (AL-C8, AL-C8V)



Solder Terminal (AL-C8) | **PC Board Terminal (AL-C8V)** | **(PC Board Terminal Mounting Hole Layout)** | **(Bottom View)**

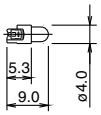
Terminal Cover (AL-V8)



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

All dimensions in mm.

Maintenance Parts

Shape		Part No.	Ordering Part No.	Package Quantity	Color Code ①②		
Marking Plate 	Round	**AL8M-W**	**AL8M-WPN05**	5	• White		
	Square	**AL8Q-W**	**AL8Q-WPN05**				
	Rectangular	**AL8H-W**	**AL8H-WPN05**				
Lens Unit 	Round	**AL8M-LK1-②**	**AL8M-LK1-②PN02**	2	Specify a color code in place of ② in the Part No. A (amber), G (green), R (red) W (white), Y (yellow)		
	Square	**AL8Q-LK1-②**	**AL8Q-LK1-②PN02**				
	Rectangular	**AL8H-LK1-②**	**AL8H-LK1-②PN02**				
Button Unit 	Round	**AB8M-BK1-①**	**AB8M-BK1-①PN02**		Specify a color code in place of ① in the Part No. B (black), G (green), R (red) S (blue), W (white), Y (yellow)		
	Square	**AB8Q-BK1-①**	**AB8Q-BK1-①PN02**				
	Rectangular	**AB8H-BK1-①**	**AB8H-BK1-①PN02**				
LED Lamp  Current-limiting resistor is not contained.  All dimensions in mm.	Illumination color: amber	**LAD-SA**	**LAD-SA**	1	Lens color	Amber	LED color: amber clear
			LAD-SAPN10	10			
	Illumination color: green	**LAD-SG**	**LAD-SG**	1		Green	LED color: yellow diffused
			LAD-SGPN10	10			
	Illumination color: red	**LAD-SR**	**LAD-SR**	1		Red	LED color: clear red
			LAD-SRPN10	10			
	Illumination color: yellow	**LAD-SY**	**LAD-SY**	1		White/ Yellow	LED color: yellow clear
			LAD-SYPN10	10			

Safety Precautions

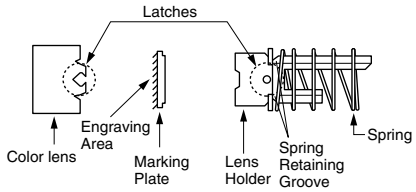
- Turn off the power to A series control units before starting installation, removal, wiring, maintenance, and inspection of the control units. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid burning your hand, use the lamp holder tool when replacing lamps.
- For wiring, use wires of a proper size to meet the voltage and current requirements. Failure to tighten terminal screws may cause overheating and create a fire hazard.

Operating Instructions

Replacement of Lens and Marking Plate

Removal

Remove the operator (color lens, marking plate, lens holder, and spring) by holding the color lens recesses with the Lens Removal Tool (MT-101) and pulling it out. Remove the marking plate by disengaging the latches between the color lens and lens holder. The marking plate must be engraved on the front side as shown below.



Note: Make sure that the spring is inserted in the correct direction. The base of spring must fit the groove in the holder.

Installation

Place the marking plate on the lens holder in the correct direction, and press the color lens onto the lens holder to engage the latches. Put the spring on the lens holder and insert the lens holder into the housing in the correct direction.

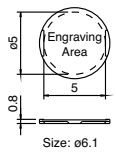
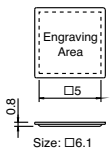
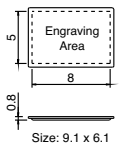
Installing Non-illuminated Button

Non-illuminated pushbuttons contain a marking plate like illuminated units. Be sure to install the marking plate when replacing the button.

Marking

For A series illuminated pushbuttons, legends and symbols can be engraved on the built-in marking plates, or printed film can be inserted under the lens.

Marking Plate & Engraving Area

Lens	Round	Square	Rectangular
Built-in Marking Plate	 Size: ø6.1	 Size: □6.1	 Size: 9.1 x 6.1
	• Engraving must be made on the engraving area less than 0.5mm deep. • The marking plate is made of white acrylic resin.		

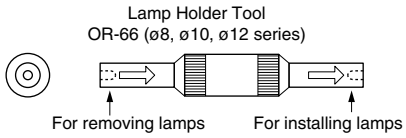
Replacing the LED Lamp

Removal

Use the lamp holder tool (OR-66) to remove lamps. Do not use pliers.

Installation

Use the lamp holder tool (OR-66) to install lamps. Note the correct side of the tool for removal or installation.



Panel Mounting

When mounting the control units onto a panel, use the optional locking ring wrench (MT-004) to tighten the locking ring. Do not use pliers. Tightening torque must not exceed 0.29 N·m. Excessive tightening will damage the locking ring.

Wiring

Solder the terminal at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu is recommended when using lead-free solder. When soldering, do not touch the enabling switch with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or apply excessive force to the terminal.
Use a non-corrosive rosin flux.

Installing the Socket

Install the socket on the control unit with the TOP markings on the control unit and the socket placed in the same direction.

Operating Voltage of LED Lamps

The operating voltage of 5V DC is measured at complete DC. When using a pulsating voltage such as a full-wave rectification voltage, keep peak currents within the forward current If. Peak currents exceeding the If may shorten the LED lamp life.

Other Notes

Close Proximity Mounting

When mounting pilot lights or illuminated pushbuttons collectively or lighting them continuously, heat may cause the ambient temperature to rise above the rated operating temperature. When the mounting panel is not made of metal or when the control units are mounted in an enclosed panel, provide for ventilation or lower the operating voltage.

Replacement of Buttons (Illuminated/Non-illuminated)

Do not replace buttons of maintained action units while the button is in the locked position. Replacing the button in the locked position may damage the internal mechanism. Be sure to release the button before replacing.

Operating and Storage Environment

1. Make sure that the operating/storage temperature and humidity are within the ratings.
2. Do not use enclosed type units in an environment subject to oil, water or dust accumulation.

Microswitch Contacts

Do not connect NO and NC contacts of the microswitch to different voltages or different power sources to prevent a dead short-circuit.