

ø16 H6 Series Miniature Control Units

Designed to ensure ease of operation and safety
Ideal for heavy duty applications such as machine tools

- Separate contact block makes installation and removal easy.
- Large operators; bezel size (ø24 mm, 24×24 mm)
- High operating force and long stroke prevent inadvertent operation.
- Contact blocks can be removed when units are mounted collectively.
- Shock- and vibration-resistant rugged design
- IP65
- UL recognized, CSA certified
- EN compliant
 (EN 60947-1, EN 60947-5-1, TÜV approved)

 Emergency stop switches are DEMKO-approved.



Contact Ratings

Except for emergency stop switches (see page 720).

• Gold Contact

Rated Insulation Voltage	250V	
Rated Thermal Current	3A	
Rated Operating Voltage	125V AC	30V DC
Rated Operating Current (resistive load)	0.1A	0.1A
Contact Material	Gold-clad silver	

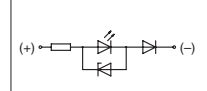
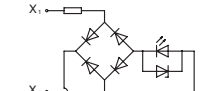
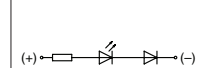
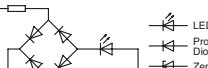
Minimum applicable load (reference value): 5V AC/DC, 1 mA
 (Applicable range is subject to the operating condition and load.)

• Silver Contact

Rated Insulation Voltage	250V			
Rated Thermal Current	5A			
Rated Operating Voltage	30V	125V	250V	
Rated Operating Current	AC 50/60 Hz	Resistive Load	—	3A
		Inductive Load	—	2A
	DC	Resistive Load	2A	0.4A
		Inductive Load	1A	0.2A
Contact Material	Silver			

AC inductive load: PF = 0.6 to 0.7, DC inductive load: L/R = 7 ms maximum

Built-in LED Lamp Ratings

Type No.	LFTD-5②	LFTD-6②	LFTD-1②	LFTD-2②
Lamp Base	SX6S/8×5.4			
Rated Voltage	5V DC	6V AC/DC	12V AC/DC	24V AC/DC
Operating Voltage	5V DC ±5%	6V AC/DC ±10%	12V AC/DC ±10%	24V AC/DC ±10%
Current Draw	A, G, PW, R, S, W, Y	A, R, W, Y	G, PW, S	A, G, PW, R, S, W, Y
	AC	—	9 mA	10 mA
	DC	8 mA	7 mA	8 mA
Color Code ②	Specify a color code in place of ② in the Type No. A (amber), G (green), PW (pure white), R (red), S (blue), W (white), Y (yellow)			
Lamp Base Color	Same as illumination color			
Voltage Marking	Die stamped on the lamp base			
Life (reference value)	Approx. 50,000 hours (When used on complete DC, luminance reduces to 50% of the initial intensity.)			
Internal Circuit	A, G, PW, R, S, W		A, G, PW, R, S, W	
				
	Y		Y	
				

Specifications

Operating Temperature	−25 to +55°C (no freezing)
Storage Temperature	−30 to +80°C
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 part and ground: 2,500V, 1 minute Between terminals of different poles: 2,500V, 1 minute Between terminals of the same pole: 1,000V, 1 minute
	Illumination Unit
	Between live part and ground: 2,500V, 1 minute
Vibration Resistance	Operating extremes: 5 to 55 Hz, amplitude 0.5 mm
Shock Resistance	Operating extremes: 100 m/s ² (10G) Damage limits: 1,000 m/s ² (100G)
Mechanical Durability (minimum operations)	Momentary: 1,000,000
	Maintained: 200,000
	Selector switch: 250,000
	Key selector switch: 250,000 Illuminated selector switch: 250,000 Selector pushbutton: 250,000
Electrical Durability (minimum operations)	Momentary: 100,000
	Maintained: 100,000
	Selector switch: 100,000
Degree of Protection	IP65 (IEC 60529)
Terminal Style	Solder/tab terminal #110 PC board terminal
Weight (approx.)	HA1L-M1C24: 18g
	HA1P-1C04: 17g
	HA1P-14: 13g
	HA1B-M1C2: 16g
	HA1S-2C2: 18g
	HA1K-2C2A: 33g HA1F-2C24: 20g

HA1L/HA2L Illuminated Pushbuttons

Style	Operation	Contact Material	Operating Voltage	Contact	Type No.		② Illumination Color Code
					Solder/Tab Terminal	PC Board Terminal	
Round HA1L   Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.)	Momentary	Gold	5V DC ±5%	SPDT	HA1L-M1C11②	HA1L-M1C11V②	Specify a color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow
				DPDT	HA1L-M1C21②	HA1L-M1C21V②	
			12V AC/DC ±10%	SPDT	HA1L-M1C13②	HA1L-M1C13V②	
				DPDT	HA1L-M1C23②	HA1L-M1C23V②	
			24V AC/DC ±10%	SPDT	HA1L-M1C14②	HA1L-M1C14V②	
				DPDT	HA1L-M1C24②	HA1L-M1C24V②	
		Silver	5V DC ±5%	SPDT	HA1L-M1C51②	—	
				DPDT	HA1L-M1C61②		
			12V AC/DC ±10%	SPDT	HA1L-M1C53②		
				DPDT	HA1L-M1C63②		
			24V AC/DC ±10%	SPDT	HA1L-M1C54②		
				DPDT	HA1L-M1C64②		
	Maintained	Gold	5V DC ±5%	SPDT	HA1L-A1C11②	HA1L-A1C11V②	
				DPDT	HA1L-A1C21②	HA1L-A1C21V②	
			12V AC/DC ±10%	SPDT	HA1L-A1C13②	HA1L-A1C13V②	
				DPDT	HA1L-A1C23②	HA1L-A1C23V②	
			24V AC/DC ±10%	SPDT	HA1L-A1C14②	HA1L-A1C14V②	
				DPDT	HA1L-A1C24②	HA1L-A1C24V②	
		Silver	5V DC ±5%	SPDT	HA1L-A1C51②	—	
				DPDT	HA1L-A1C61②		
12V AC/DC ±10%			SPDT	HA1L-A1C53②			
			DPDT	HA1L-A1C63②			
24V AC/DC ±10%			SPDT	HA1L-A1C54②			
			DPDT	HA1L-A1C64②			
Square HA2L   Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.)	Momentary	Gold	5V DC ±5%	SPDT	HA2L-M1C11②	HA2L-M1C11V②	
				DPDT	HA2L-M1C21②	HA2L-M1C21V②	
			12V AC/DC ±10%	SPDT	HA2L-M1C13②	HA2L-M1C13V②	
				DPDT	HA2L-M1C23②	HA2L-M1C23V②	
			24V AC/DC ±10%	SPDT	HA2L-M1C14②	HA2L-M1C14V②	
				DPDT	HA2L-M1C24②	HA2L-M1C24V②	
		Silver	5V DC ±5%	SPDT	HA2L-M1C51②	—	
				DPDT	HA2L-M1C61②		
			12V AC/DC ±10%	SPDT	HA2L-M1C53②		
				DPDT	HA2L-M1C63②		
			24V AC/DC ±10%	SPDT	HA2L-M1C54②		
				DPDT	HA2L-M1C64②		
	Maintained	Gold	5V DC ±5%	SPDT	HA2L-A1C11②	HA2L-A1C11V②	
				DPDT	HA2L-A1C21②	HA2L-A1C21V②	
			12V AC/DC ±10%	SPDT	HA2L-A1C13②	HA2L-A1C13V②	
				DPDT	HA2L-A1C23②	HA2L-A1C23V②	
			24V AC/DC ±10%	SPDT	HA2L-A1C14②	HA2L-A1C14V②	
				DPDT	HA2L-A1C24②	HA2L-A1C24V②	
		Silver	5V DC ±5%	SPDT	HA2L-A1C51②	—	
				DPDT	HA2L-A1C61②		
12V AC/DC ±10%			SPDT	HA2L-A1C53②			
			DPDT	HA2L-A1C63②			
24V AC/DC ±10%			SPDT	HA2L-A1C54②			
			DPDT	HA2L-A1C64②			

- See page 95 for marking plate size and engraving area.
- One LED lamp is installed in an illuminated pushbutton.

Flush Silhouette

Control Units

Display Lights

Display Units

Safety Products

Terminal Blocks

Comm. Terminals

AS-Interface

Relays & Timers

Sockets

Circuit Protectors

Power Supplies

PLCs & SmartRelay

Operator Interfaces

Sensors

Control Stations

Explosion Protection

References

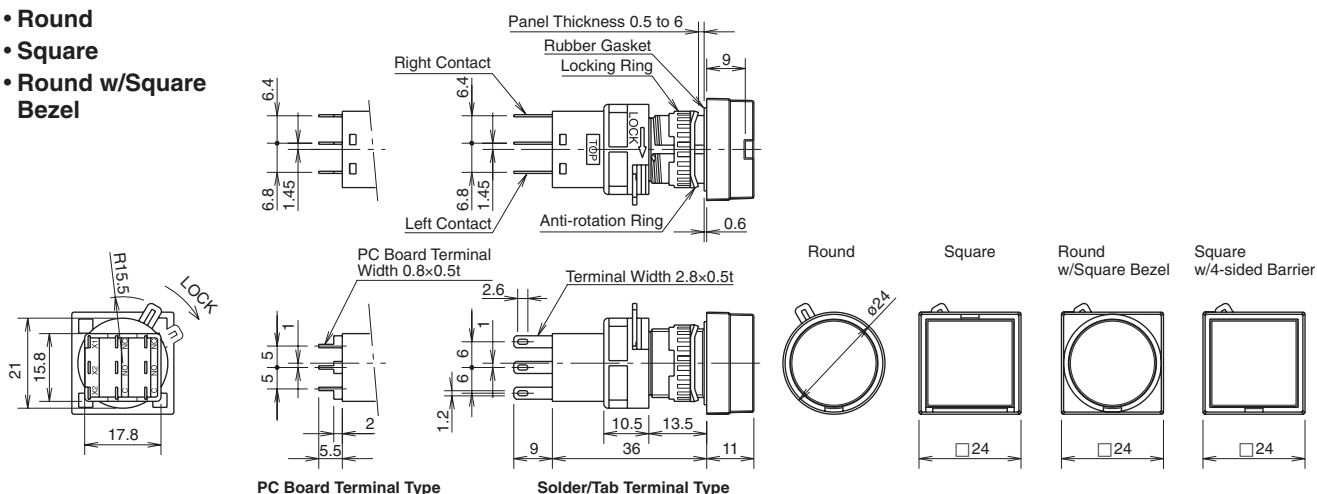
HA3L/HA4L/HA1L-M3/A3 LED Illuminated Pushbuttons

Style	Operation	Contact Material	Operating Voltage	Contact	Type No.		② Illumination Color Code
					Solder/Tab Terminal	PC Board Terminal	
Round w/Square Bezel HA3L   Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.)	Momentary	Gold	5V DC ±5%	SPDT	HA3L-M1C11②	HA3L-M1C11V②	Specify a color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow
				DPDT	HA3L-M1C21②	HA3L-M1C21V②	
			12V AC/DC ±10%	SPDT	HA3L-M1C13②	HA3L-M1C13V②	
				DPDT	HA3L-M1C23②	HA3L-M1C23V②	
		24V AC/DC ±10%	SPDT	HA3L-M1C14②	HA3L-M1C14V②		
			DPDT	HA3L-M1C24②	HA3L-M1C24V②		
		Silver	5V DC ±5%	SPDT	HA3L-M1C51②	—	
				DPDT	HA3L-M1C61②		
	12V AC/DC ±10%		SPDT	HA3L-M1C53②			
			DPDT	HA3L-M1C63②			
	Maintained	Gold	5V DC ±5%	SPDT	HA3L-A1C11②	HA3L-A1C11V②	
				DPDT	HA3L-A1C21②	HA3L-A1C21V②	
			12V AC/DC ±10%	SPDT	HA3L-A1C13②	HA3L-A1C13V②	
				DPDT	HA3L-A1C23②	HA3L-A1C23V②	
		24V AC/DC ±10%	SPDT	HA3L-A1C14②	HA3L-A1C14V②		
			DPDT	HA3L-A1C24②	HA3L-A1C24V②		
Silver		5V DC ±5%	SPDT	HA3L-A1C51②	—		
			DPDT	HA3L-A1C61②			
	12V AC/DC ±10%	SPDT	HA3L-A1C53②				
		DPDT	HA3L-A1C63②				
Square w/Four-sided Barrier HA4L   Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.)	Momentary	Gold	5V DC ±5%	SPDT	HA4L-M1C11②	HA4L-M1C11V②	
				DPDT	HA4L-M1C21②	HA4L-M1C21V②	
			12V AC/DC ±10%	SPDT	HA4L-M1C13②	HA4L-M1C13V②	
				DPDT	HA4L-M1C23②	HA4L-M1C23V②	
		24V AC/DC ±10%	SPDT	HA4L-M1C14②	HA4L-M1C14V②		
			DPDT	HA4L-M1C24②	HA4L-M1C24V②		
		Silver	5V DC ±5%	SPDT	HA4L-M1C51②	—	
				DPDT	HA4L-M1C61②		
	12V AC/DC ±10%		SPDT	HA4L-M1C53②			
			DPDT	HA4L-M1C63②			
	Maintained	Gold	24V AC/DC ±10%	SPDT	HA4L-M1C54②	—	
				DPDT	HA4L-M1C64②		
			5V DC ±5%	SPDT	HA4L-A1C11②		HA4L-A1C11V②
				DPDT	HA4L-A1C21②		HA4L-A1C21V②
		Silver	12V AC/DC ±10%	SPDT	HA4L-A1C13②	HA4L-A1C13V②	
				DPDT	HA4L-A1C23②	HA4L-A1C23V②	
24V AC/DC ±10%			SPDT	HA4L-A1C14②	HA4L-A1C14V②		
			DPDT	HA4L-A1C24②	HA4L-A1C24V②		
ø30 Mushroom HA1L-□3   Marking plate size: ø14.8mm Engraving area: ø12.8mm (Depth: 0.5mm max.)	Momentary	Gold	5V DC ±5%	SPDT	HA1L-M3C11②	HA1L-M3C11V②	
				DPDT	HA1L-M3C21②	HA1L-M3C21V②	
			12V AC/DC ±10%	SPDT	HA1L-M3C13②	HA1L-M3C13V②	
				DPDT	HA1L-M3C23②	HA1L-M3C23V②	
		24V AC/DC ±10%	SPDT	HA1L-M3C14②	HA1L-M3C14V②		
			DPDT	HA1L-M3C24②	HA1L-M3C24V②		
		Silver	5V DC ±5%	SPDT	HA1L-M3C51②	—	
				DPDT	HA1L-M3C61②		
	12V AC/DC ±10%		SPDT	HA1L-M3C53②			
			DPDT	HA1L-M3C63②			
	Maintained	Gold	24V AC/DC ±10%	SPDT	HA1L-M3C54②	—	
				DPDT	HA1L-M3C64②		
			5V DC ±5%	SPDT	HA1L-A3C11②		HA1L-A3C11V②
				DPDT	HA1L-A3C21②		HA1L-A3C21V②
		Silver	12V AC/DC ±10%	SPDT	HA1L-A3C13②	HA1L-A3C13V②	
				DPDT	HA1L-A3C23②	HA1L-A3C23V②	
24V AC/DC ±10%			SPDT	HA1L-A3C14②	HA1L-A3C14V②		
			DPDT	HA1L-A3C24②	HA1L-A3C24V②		

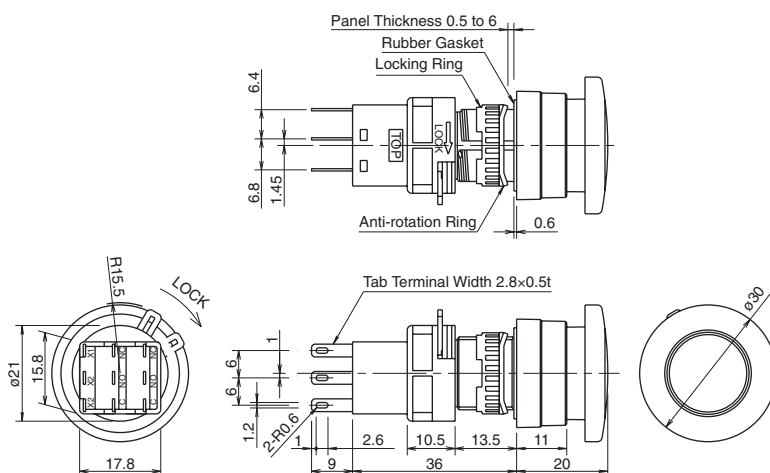
- See page 95 for marking plate size and engraving area.
- One LED lamp is installed in an illuminated pushbutton.

Dimensions (Illuminated Pushbuttons)

- Round
- Square
- Round w/Square Bezel

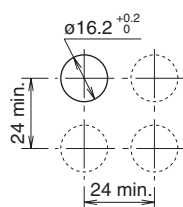


- Mushroom

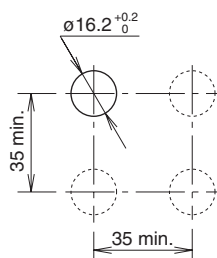


Mounting Hole Layout Mounting Centers

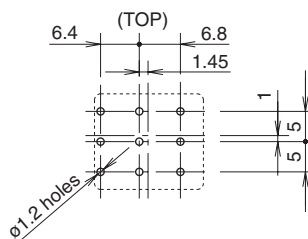
- Round
- Square
- Round w/Square Bezel



- Mushroom

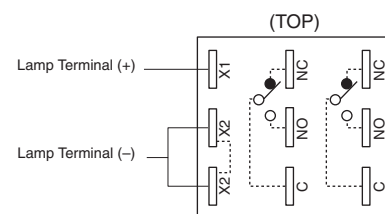


PC Board Drilling Layout (Bottom View)



- See Single Board Mounting on page 95 for details about PC boards.

Terminal Arrangement (Bottom View)



- SPDT has C, NO, and NC on the right only.
- X2 and X2 are wired internally.

Note: Determine mounting centers to ensure easy operation.

All dimensions in mm.

HA1P/HA2P/HA3P/HA4P LED Illuminated Pilot Lights

Separate Type

Shape	Operating Voltage	Type No.		② Illumination Color Code
		Solder/Tab Terminal	PC Board Terminal	
Round HA1P  Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.) 	5V DC ±5%	HA1P-1C01②	HA1P-1C01V②	Specify a color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow
	12V AC/DC ±10%	HA1P-1C03②	HA1P-1C03V②	
	24V AC/DC ±10%	HA1P-1C04②	HA1P-1C04V②	
Square HA2P  Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.) 	5V DC ±5%	HA2P-1C01②	HA2P-1C01V②	
	12V AC/DC ±10%	HA2P-1C03②	HA2P-1C03V②	
	24V AC/DC ±10%	HA2P-1C04②	HA2P-1C04V②	
Round w/Square Bezel HA3P  Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.) 	5V DC ±5%	HA3P-1C01②	HA3P-1C01V②	
	12V AC/DC ±10%	HA3P-1C03②	HA3P-1C03V②	
	24V AC/DC ±10%	HA3P-1C04②	HA3P-1C04V②	
Square w/Four-sided Barrier HA4P  Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.) 	5V DC ±5%	HA4P-1C01②	HA4P-1C01V②	
	12V AC/DC ±10%	HA4P-1C03②	HA4P-1C03V②	
	24V AC/DC ±10%	HA4P-1C04②	HA4P-1C04V②	

- See page 77 for dimensions.
- See page 95 for marking plate size and engraving area.
- One LED lamp is installed in an illuminated pilot light.

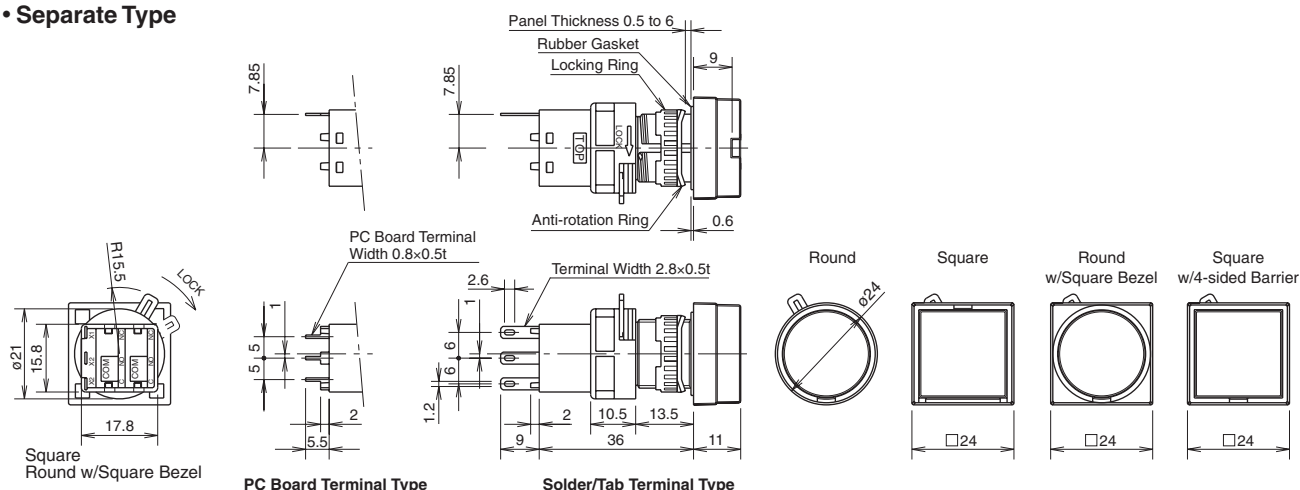
Unibody Type

Shape	Operating Voltage	Type No.		② Illumination Color Code
		Solder/Tab Terminal	PC Board Terminal	
Round HA1P  Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.) 	5V DC ±5%	HA1P-11②	—	Specify a color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow
	12V AC/DC ±10%	HA1P-13②	—	
	24V AC/DC ±10%	HA1P-14②	—	
Square HA2P  Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.) 	5V DC ±5%	HA2P-11②	—	
	12V AC/DC ±10%	HA2P-13②	—	
	24V AC/DC ±10%	HA2P-14②	—	
Round w/Square Bezel HA3P  Marking plate size: ø18.4mm Engraving area: ø16.8mm (Depth: 0.5mm max.) 	5V DC ±5%	HA3P-11②	—	
	12V AC/DC ±10%	HA3P-13②	—	
	24V AC/DC ±10%	HA3P-14②	—	
Square w/Four-sided Barrier HA4P  Marking plate size: □18.4mm Engraving area: □16.4mm (Depth: 0.5mm max.) 	5V DC ±5%	HA4P-11②	—	
	12V AC/DC ±10%	HA4P-13②	—	
	24V AC/DC ±10%	HA4P-14②	—	

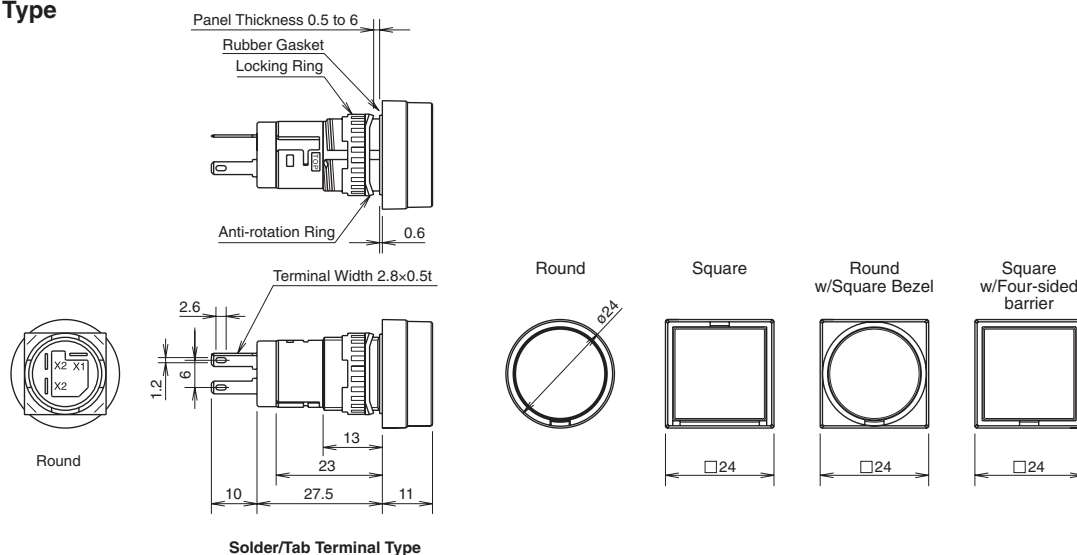
- See page 77 for dimensions.
- See page 95 for marking plate size and engraving area.
- One LED lamp is installed in an illuminated pilot light.

Dimensions (Pilot Lights)

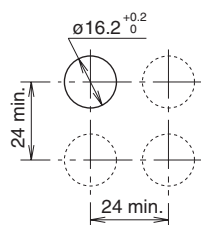
• Separate Type



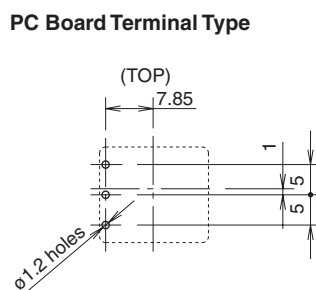
• Unibody Type



Mounting Hole Layout Mounting Centers

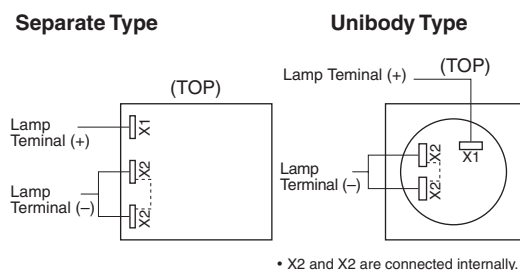


PC Board Drilling Layout (Bottom View)



- See Single Board Mounting on page 95 for details about PC boards.

Terminal Arrangement (Bottom View)



All dimensions in mm.

HA1B/HA2B/HA3B/HA4B Pushbuttons

Shape	Button Type	Operation Type	Contact	Type No.		Color Code ①②
				Solder/Tab Terminal	PC Board Terminal	
Round HA1B-□1  	Button	Momentary	Gold	SPDT HA1B-M1C1①	HA1B-M1C1V①	B: black G: green R: red S: blue W: white Y: yellow
				DPDT HA1B-M1C2①	HA1B-M1C2V①	
		Maintained	Silver	SPDT HA1B-M1C5①	—	
				DPDT HA1B-M1C6①	—	
			Gold	SPDT HA1B-A1C1①	HA1B-A1C1V①	
				DPDT HA1B-A1C2①	HA1B-A1C2V①	
	Illumination Lens	Momentary	Silver	SPDT HA1B-A1C5①	—	A: amber G: green R: red S: blue W: white Y: yellow
				DPDT HA1B-A1C6①	—	
		Maintained	Gold	SPDT HA1B-M1C1L②	HA1B-M1C1VL②	
				DPDT HA1B-M1C2L②	HA1B-M1C2VL②	
			Silver	SPDT HA1B-M1C5L②	—	
				DPDT HA1B-M1C6L②	—	
Square HA2B-□1  	Button	Momentary	Gold	SPDT HA2B-M1C1①	HA2B-M1C1V①	B: black G: green R: red S: blue W: white Y: yellow
				DPDT HA2B-M1C2①	HA2B-M1C2V①	
		Maintained	Silver	SPDT HA2B-M1C5①	—	
				DPDT HA2B-M1C6①	—	
			Gold	SPDT HA2B-A1C1①	HA2B-A1C1V①	
				DPDT HA2B-A1C2①	HA2B-A1C2V①	
	Illumination Lens	Momentary	Silver	SPDT HA2B-A1C5①	—	A: amber G: green R: red S: blue W: white Y: yellow
				DPDT HA2B-A1C6①	—	
		Maintained	Gold	SPDT HA2B-M1C1L②	HA2B-M1C1VL②	
				DPDT HA2B-M1C2L②	HA2B-M1C2VL②	
			Silver	SPDT HA2B-M1C5L②	—	
				DPDT HA2B-M1C6L②	—	
Round w/Square Bezel HA3B-□1  	Button	Momentary	Gold	SPDT HA3B-M1C1①	HA3B-M1C1V①	B: black G: green R: red S: blue W: white Y: yellow
				DPDT HA3B-M1C2①	HA3B-M1C2V①	
		Maintained	Silver	SPDT HA3B-M1C5①	—	
				DPDT HA3B-M1C6①	—	
			Gold	SPDT HA3B-A1C1①	HA3B-A1C1V①	
				DPDT HA3B-A1C2①	HA3B-A1C2V①	
	Illumination Lens	Momentary	Silver	SPDT HA3B-A1C5①	—	A: amber G: green R: red S: blue W: white Y: yellow
				DPDT HA3B-A1C6①	—	
		Maintained	Gold	SPDT HA3B-M1C1L②	HA3B-M1C1VL②	
				DPDT HA3B-M1C2L②	HA3B-M1C2VL②	
			Silver	SPDT HA3B-M1C5L②	—	
				DPDT HA3B-M1C6L②	—	
Square w/Four-sided Barrier HA4B-M1  	Button	Momentary	Gold	SPDT HA4B-M1C1①	HA4B-M1C1V①	B: black G: green R: red S: blue W: white Y: yellow
				DPDT HA4B-M1C2①	HA4B-M1C2V①	
			Silver	SPDT HA4B-M1C5①	—	
				DPDT HA4B-M1C6①	—	
	Illumination Lens	Maintained	Gold	SPDT HA4B-M1C1L②	HA4B-M1C1VL②	A: amber G: green R: red S: blue W: white Y: yellow
				DPDT HA4B-M1C2L②	HA4B-M1C2VL②	
			Silver	SPDT HA4B-M1C5L②	—	
				DPDT HA4B-M1C6L②	—	

- Specify a color code in place of ① or ② in the Type No.
- For dimensions, see page 80.
- Illuminated lenses cannot be installed on button type pushbuttons.

HA1B/HA2B/HA3B/HA4B Pushbuttons

Shape	Button Type	Operation Type	Contact		Type No.		Color Code ①	
					Solder/Tab Terminal	PC Board Terminal		
Extended	Button	Momentary	Gold	SPDT	HA1B-M2C1①	HA1B-M2C1V①	B: black G: green R: red S: blue W: white Y: yellow	
				DPDT	HA1B-M2C2①	HA1B-M2C2V①		
			Silver	SPDT	HA1B-M2C5①	—		
				DPDT	HA1B-M2C6①	—		
		Maintained	Gold	SPDT	HA1B-A2C1①	HA1B-A2C1V①		
				DPDT	HA1B-A2C2①	HA1B-A2C2V①		
			Silver	SPDT	HA1B-A2C5①	—		
				DPDT	HA1B-A2C6①	—		
		Momentary	Gold	SPDT	HA2B-M2C1①	HA2B-M2C1V①		
				DPDT	HA2B-M2C2①	HA2B-M2C2V①		
				Silver	SPDT	HA2B-M2C5①		—
					DPDT	HA2B-M2C6①		—
	Maintained		Gold	SPDT	HA2B-A2C1①	HA2B-A2C1V①		
				DPDT	HA2B-A2C2①	HA2B-A2C2V①		
			Silver	SPDT	HA2B-A2C5①	—		
				DPDT	HA2B-A2C6①	—		
	Momentary	Gold	SPDT	HA3B-M2C1①	HA3B-M2C1V①			
			DPDT	HA3B-M2C2①	HA3B-M2C2V①			
			Silver	SPDT	HA3B-M2C5①	—		
				DPDT	HA3B-M2C6①	—		
		Maintained	Gold	SPDT	HA3B-A2C1①	HA3B-A2C1V①		
				DPDT	HA3B-A2C2①	HA3B-A2C2V①		
			Silver	SPDT	HA3B-A2C5①	—		
				DPDT	HA3B-A2C6①	—		
	Momentary	Gold	SPDT	HA4B-M2C1①	HA4B-M2C1V①			
			DPDT	HA4B-M2C2①	HA4B-M2C2V①			
			Silver	SPDT	HA4B-M2C5①	—		
				DPDT	HA4B-M2C6①	—		
ø30mm Mushroom		Momentary	Gold	SPDT	HA1B-M3C1①	HA1B-M3C1V①		
				DPDT	HA1B-M3C2①	HA1B-M3C2V①		
			Silver	SPDT	HA1B-M3C5①	—		
				DPDT	HA1B-M3C6①	—		
	Maintained	Gold	SPDT	HA1B-A3C1①	HA1B-A3C1V①			
			DPDT	HA1B-A3C2①	HA1B-A3C2V①			
		Silver	SPDT	HA1B-A3C5①	—			
			DPDT	HA1B-A3C6①	—			

- Specify a color code in place of ① in the Type No.
- For dimensions, see page 80.

Flush
Silhouette

Control
Units

Display
Lights

Display
Units

Safety
Products

Terminal
Blocks

Comm.
Terminals

AS-Interface

Relays &
Timers

Sockets

Circuit
Protectors

Power
Supplies

PLCs &
SmartRelay

Operator
Interfaces

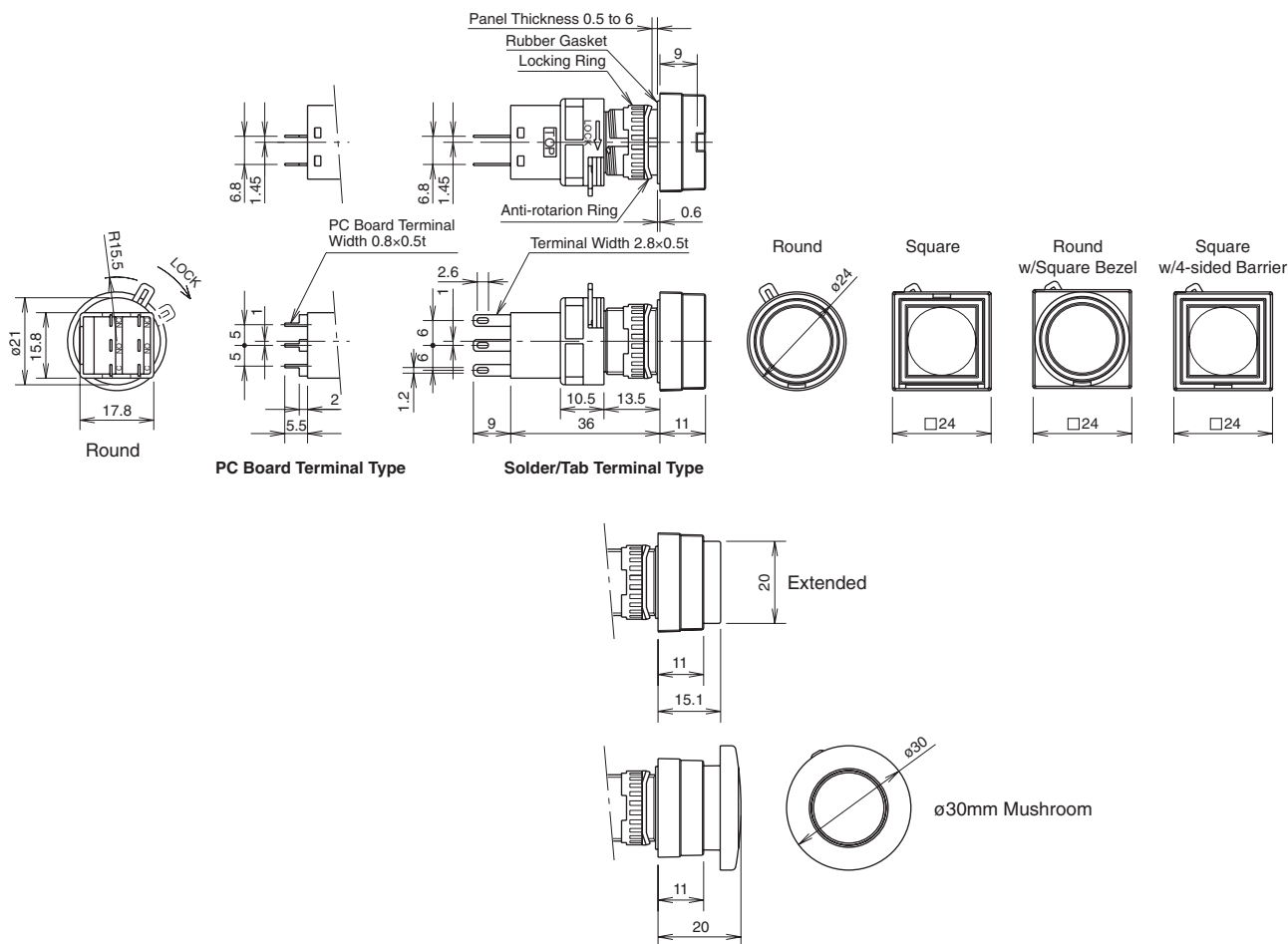
Sensors

Control
Stations

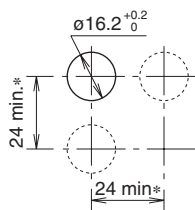
Explosion
Protection

References

Dimensions (Pushbuttons)



Mounting Hole Layout Mounting Centers

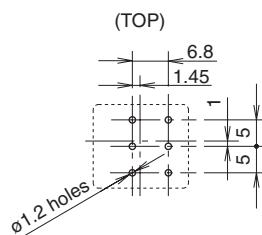


* 35 min. for mushroom type

Note: Determine mounting centers to ensure easy operation.

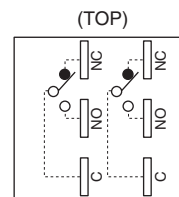
PC Board Drilling Layout (Bottom View)

PC Board Terminal Type



- See Single Board Mounting on page 95 for details about PC boards.

Terminal Arrangement (Bottom View)



- SPDT has C, NO, and NC on the right only.

All dimensions in mm.

HA1S/HA3S Selector Switches

Shape	Operator Position		Operation Type	Contact		Type No.	
						Solder/Tab Terminal	PC Board Terminal
Round HA1S  	90° 2-position	Maintained		Gold	SPDT	HA1S-2C1	HA1S-2C1V
					DPDT	HA1S-2C2	HA1S-2C2V
				Silver	SPDT	HA1S-2C5	—
					DPDT	HA1S-2C6	—
		Spring return from right		Gold	SPDT	HA1S-21C1	HA1S-21C1V
					DPDT	HA1S-21C2	HA1S-21C2V
	Silver		SPDT	HA1S-21C5	—		
			DPDT	HA1S-21C6	—		
	45° 3-position	Maintained		Gold	DPDT	HA1S-3C2	HA1S-3C2V
				Silver	DPDT	HA1S-3C6	—
		Spring return from right		Gold	DPDT	HA1S-31C2	HA1S-31C2V
				Silver	DPDT	HA1S-31C6	—
		Spring return from left		Gold	DPDT	HA1S-32C2	HA1S-32C2V
				Silver	DPDT	HA1S-32C6	—
Spring return two-way			Gold	DPDT	HA1S-33C2	HA1S-33C2V	
			Silver	DPDT	HA1S-33C6	—	
Round w/Square Bezel HA3S  	90° 2-position	Maintained		Gold	SPDT	HA3S-2C1	HA3S-2C1V
					DPDT	HA3S-2C2	HA3S-2C2V
				Silver	SPDT	HA3S-2C5	—
					DPDT	HA3S-2C6	—
		Spring return from right		Gold	SPDT	HA3S-21C1	HA3S-21C1V
					DPDT	HA3S-21C2	HA3S-21C2V
	Silver		SPDT	HA3S-21C5	—		
			DPDT	HA3S-21C6	—		
	45° 3-position	Maintained		Silver	DPDT	HA3S-21C6	—
					DPDT	HA3S-3C2	HA3S-3C2V
		Spring return from right		Gold	DPDT	HA3S-31C2	HA3S-31C2V
				Silver	DPDT	HA3S-31C6	—
		Spring return from left		Gold	DPDT	HA3S-32C2	HA3S-32C2V
				Silver	DPDT	HA3S-32C6	—
Spring return two-way			Gold	DPDT	HA3S-33C2	HA3S-33C2V	
			Silver	DPDT	HA3S-33C6	—	

Flush Silhouette

Control Units

Display Lights

Display Units

Safety Products

Terminal Blocks

Comm. Terminals

AS-Interface

Relays & Timers

Sockets

Circuit Protectors

Power Supplies

PLCs & SmartRelay

Operator Interfaces

Sensors

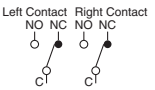
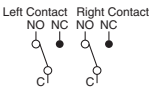
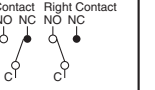
Control Stations

Explosion Protection

References

- Bezel: black
- Knob: black with white indicator
- See page 82 for dimensions.

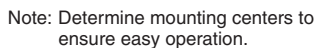
Contact Operation

Operator Position & Contact Operation (Top View)					
Positions		Contact	Left	Center	Right
90° 2-position	Maintained 	SPDT		—	
	Spring return from right 	DPDT		—	
45° 3-position	Maintained 	DPDT			
	Spring return from right 				
	Spring return from left 				
	Spring return two-way 				

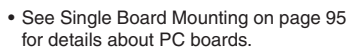
Dimensions (Selector Switch)



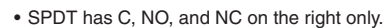
Mounting Hole Layout Mounting Centers



PC Board Drilling Layout (Bottom View)



Terminal Arrangement (Bottom View)



All dimensions in mm.

HA1K Key Selector Switches

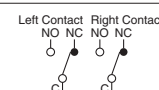
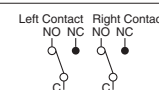
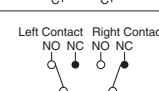
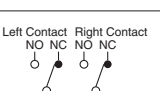
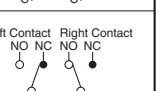
Shape	Operator Position		Keys Retained at ●		Contact		Type No.			
							Solder/Tab Terminal	PC Board Terminal		
Round HA1K  	90° 2-position	Maintained	A		Gold	SPDT	HA1K-2C1A	HA1K-2C1VA		
					DPDT	HA1K-2C2A	HA1K-2C2VA			
				Silver	SPDT	HA1K-2C5A	—			
					DPDT	HA1K-2C6A	—			
			B		Gold	SPDT	HA1K-2C1B	HA1K-2C1VB		
					DPDT	HA1K-2C2B	HA1K-2C2VB			
				Silver	SPDT	HA1K-2C5B	—			
					DPDT	HA1K-2C6B	—			
		C		Gold	SPDT	HA1K-2C1C	HA1K-2C1VC			
				DPDT	HA1K-2C2C	HA1K-2C2VC				
			Silver	SPDT	HA1K-2C5C	—				
				DPDT	HA1K-2C6C	—				
		Spring return from right	B		Gold	SPDT	HA1K-21C1B	HA1K-21C1VB		
					Silver	DPDT	HA1K-21C2B	HA1K-21C2VB		
					Gold	SPDT	HA1K-21C5B	—		
					Silver	DPDT	HA1K-21C6B	—		
	45° 3-position	Maintained	A		Gold	DPDT	HA1K-3C2A	HA1K-3C2VA		
					Silver	DPDT	HA1K-3C6A	—		
				B		Gold	DPDT	HA1K-3C2B	HA1K-3C2VB	
						Silver	DPDT	HA1K-3C6B	—	
				C		Gold	DPDT	HA1K-3C2C	HA1K-3C2VC	
						Silver	DPDT	HA1K-3C6C	—	
				D		Gold	DPDT	HA1K-3C2D	HA1K-3C2VD	
						Silver	DPDT	HA1K-3C6D	—	
			E		Gold	DPDT	HA1K-3C2E	HA1K-3C2VE		
					Silver	DPDT	HA1K-3C6E	—		
			G		Gold	DPDT	HA1K-3C2G	HA1K-3C2VG		
					Silver	DPDT	HA1K-3C6G	—		
			H		Gold	DPDT	HA1K-3C2H	HA1K-3C2VH		
					Silver	DPDT	HA1K-3C6H	—		
			Spring return from right	B		Gold	DPDT	HA1K-31C2B	HA1K-31C2VB	
						Silver	DPDT	HA1K-31C6B	—	
					D		Gold	DPDT	HA1K-31C2D	HA1K-31C2VD
							Silver	DPDT	HA1K-31C6D	—
				G		Gold	DPDT	HA1K-31C2G	HA1K-31C2VG	
						Silver	DPDT	HA1K-31C6G	—	
				Spring return from left	C		Gold	DPDT	HA1K-32C2C	HA1K-32C2VC
							Silver	DPDT	HA1K-32C6C	—
			D				Gold	DPDT	HA1K-32C2D	HA1K-32C2VD
							Silver	DPDT	HA1K-32C6D	—
H			Gold		DPDT	HA1K-32C2H	HA1K-32C2VH			
			Silver		DPDT	HA1K-32C6H	—			
Spring return two-way		D			Gold	DPDT	HA1K-33C2D	HA1K-33C2VD		
					Silver	DPDT	HA1K-33C6D	—		

• Two keys are supplied.

• The front of key cylinder is made of black plastic.

• See page 85 for dimensions.

Contact Operation

Operator Position & Contact Operation (Top View)					
Positions		Contact	Left	Center	Right
90° 2-position	Maintained 	SPDT		—	
	Spring return from right 	DPDT		—	
45° 3-position	Maintained 	DPDT			
	Spring return from right 				
	Spring return from left 				
	Spring return two-way 				

HA3K Key Selector Switches

Shape	Operator Position		Keys Retained at ●		Contact		Type No.					
							Solder/Tab Terminal	PC Board Terminal				
Round w/Square Bezel HA3K  	90° 2-position	Maintained	A		Gold	SPDT	HA3K-2C1A	HA3K-2C1VA				
					DPDT	HA3K-2C2A	HA3K-2C2VA					
				Silver	SPDT	HA3K-2C5A	—					
					DPDT	HA3K-2C6A	—					
			B		Gold	SPDT	HA3K-2C1B	HA3K-2C1VB				
					DPDT	HA3K-2C2B	HA3K-2C2VB					
				Silver	SPDT	HA3K-2C5B	—					
					DPDT	HA3K-2C6B	—					
		C		Gold	SPDT	HA3K-2C1C	HA3K-2C1VC					
				DPDT	HA3K-2C2C	HA3K-2C2VC						
			Silver	SPDT	HA3K-2C5C	—						
				DPDT	HA3K-2C6C	—						
	Spring return from right	B		Gold	SPDT	HA3K-21C1B	HA3K-21C1VB					
				Silver	DPDT	HA3K-21C2B	HA3K-21C2VB					
				Gold	SPDT	HA3K-21C5B	—					
				Silver	DPDT	HA3K-21C6B	—					
	45° 3-position	Maintained	A		Gold	DPDT	HA3K-3C2A	HA3K-3C2VA				
					Silver	DPDT	HA3K-3C6A	—				
					Gold	DPDT	HA3K-3C2B	HA3K-3C2VB				
						Silver	DPDT	HA3K-3C6B	—			
				C		Gold	DPDT	HA3K-3C2C	HA3K-3C2VC			
						Silver	DPDT	HA3K-3C6C	—			
				D		Gold	DPDT	HA3K-3C2D	HA3K-3C2VD			
						Silver	DPDT	HA3K-3C6D	—			
			E		Gold	DPDT	HA3K-3C2E	HA3K-3C2VE				
					Silver	DPDT	HA3K-3C6E	—				
			G		Gold	DPDT	HA3K-3C2G	HA3K-3C2VG				
					Silver	DPDT	HA3K-3C6G	—				
			H		Gold	DPDT	HA3K-3C2H	HA3K-3C2VH				
					Silver	DPDT	HA3K-3C6H	—				
			Spring return from right	B		Gold	DPDT	HA3K-31C2B	HA3K-31C2VB			
						Silver	DPDT	HA3K-31C6B	—			
						Gold	DPDT	HA3K-31C2D	HA3K-31C2VD			
						Silver	DPDT	HA3K-31C6D	—			
				D		Gold	DPDT	HA3K-31C2G	HA3K-31C2VG			
						Silver	DPDT	HA3K-31C6G	—			
						Spring return from left	C		Gold	DPDT	HA3K-32C2C	HA3K-32C2VC
									Silver	DPDT	HA3K-32C6C	—
			Gold	DPDT	HA3K-32C2D				HA3K-32C2VD			
			Silver	DPDT	HA3K-32C6D				—			
		H		Gold	DPDT		HA3K-32C2H	HA3K-32C2VH				
				Silver	DPDT		HA3K-32C6H	—				
				Spring return two-way	D			Gold	DPDT	HA3K-33C2D	HA3K-33C2VD	
								Silver	DPDT	HA3K-33C6D	—	

• Two keys are supplied.

• The front of key cylinder is made with black plastic.

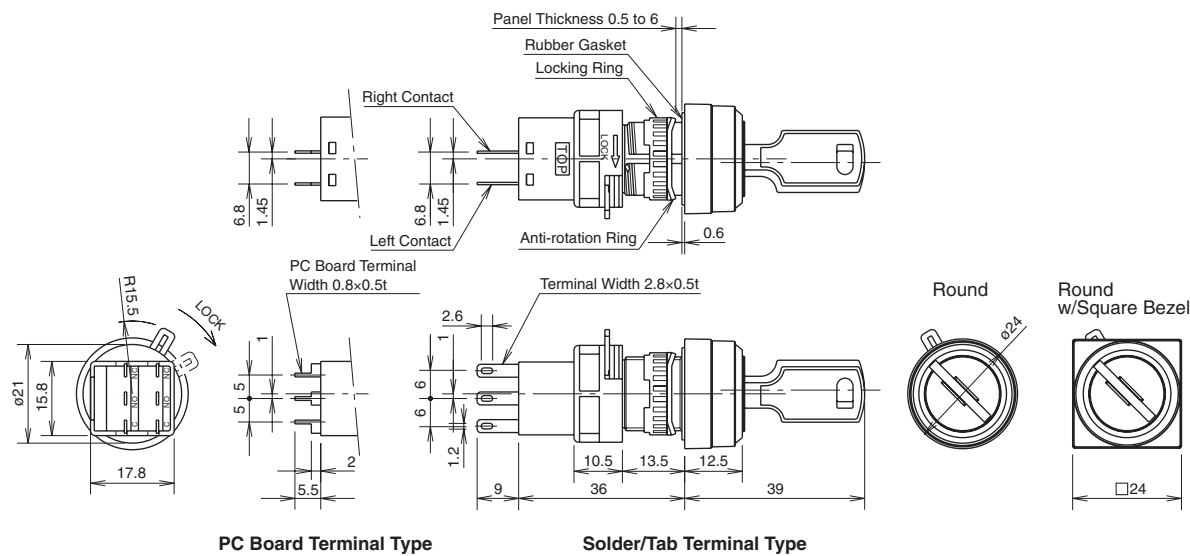
• See page 85 for dimensions.

Contact Operation

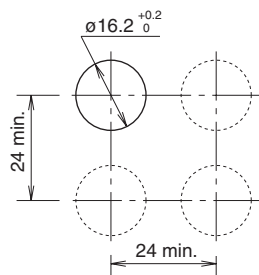
Operator Position & Contact Operation (Top View)					
Positions		Contact	Left	Center	Right
90° 2-position	Maintained	SPDT	NO NC C1	—	NO NC C1
	Spring return from right	DPDT	Left Contact NO NC Right Contact NO NC C1 C1	—	Left Contact NO NC Right Contact NO NC C1 C1
45° 3-position	Maintained	DPDT	Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1
	Spring return from right		Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1
	Spring return from left		Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1
	Spring return two-way		Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1	Left Contact NO NC Right Contact NO NC C1 C1

Flush Silhouette
Control Units
Display Lights
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

Dimensions (Key Selector Switch)

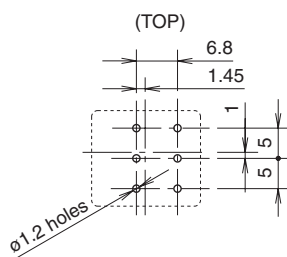


Mounting Hole Layout
Mounting Centers



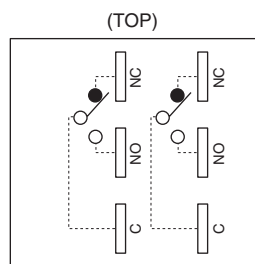
Note: Determine mounting centers to ensure easy operation.

PC Board Drilling Layout
(Bottom View)



- See Single Board Mounting on page 95 for details about PC boards.

Terminal Arrangement
(Bottom View)



- SPDT has C, NO, and NC on the right only.

All dimensions in mm.

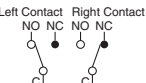
HA1F LED Illuminated Selector Switches

Shape	Operator Position	Contact Material	Operating Voltage	Contact	Type No.		Color Code ②		
					Solder/Tab Terminal	PC Board Terminal			
Round HA1F  	90° 2-position	Maintained 	Gold	5V DC ±5%	SPDT	HA1F-2C11②	HA1F-2C11V②	Specify a lens color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow	
					DPDT	HA1F-2C21②	HA1F-2C21V②		
				12V AC/DC ±10%	SPDT	HA1F-2C13②	HA1F-2C13V②		
					DPDT	HA1F-2C23②	HA1F-2C23V②		
				24V AC/DC ±10%	SPDT	HA1F-2C14②	HA1F-2C14V②		
					DPDT	HA1F-2C24②	HA1F-2C24V②		
			Silver	5V DC ±5%	SPDT	HA1F-2C51②	—		
					DPDT	HA1F-2C61②			
				12V AC/DC ±10%	SPDT	HA1F-2C53②			
					DPDT	HA1F-2C63②			
				24V AC/DC ±10%	SPDT	HA1F-2C54②			
					DPDT	HA1F-2C64②			
		Spring return from right 	Gold	5V DC ±5%	SPDT	HA1F-21C11②	HA1F-21C11V②		
					DPDT	HA1F-21C21②	HA1F-21C21V②		
				12V AC/DC ±10%	SPDT	HA1F-21C13②	HA1F-21C13V②		
					DPDT	HA1F-21C23②	HA1F-21C23V②		
				24V AC/DC ±10%	SPDT	HA1F-21C14②	HA1F-21C14V②		
					DPDT	HA1F-21C24②	HA1F-21C24V②		
			Silver	5V DC ±5%	SPDT	HA1F-21C51②	—		
					DPDT	HA1F-21C61②			
				12V AC/DC ±10%	SPDT	HA1F-21C53②			
					DPDT	HA1F-21C63②			
				24V AC/DC ±10%	SPDT	HA1F-21C54②			
					DPDT	HA1F-21C64②			
	45° 3-position	Maintained 	Gold	5V DC ±5%	DPDT	HA1F-3C21②	HA1F-3C21V②		
				12V AC/DC ±10%	DPDT	HA1F-3C23②	HA1F-3C23V②		
				24V AC/DC ±10%	DPDT	HA1F-3C24②	HA1F-3C24V②		
				Silver	5V DC ±5%	DPDT	HA1F-3C61②		—
					12V AC/DC ±10%	DPDT	HA1F-3C63②		
					24V AC/DC ±10%	DPDT	HA1F-3C64②		
			Spring return from right 	Gold	5V DC ±5%	DPDT	HA1F-31C21②		HA1F-31C21V②
					12V AC/DC ±10%	DPDT	HA1F-31C23②		HA1F-31C23V②
					24V AC/DC ±10%	DPDT	HA1F-31C24②		HA1F-31C24V②
				Silver	5V DC ±5%	DPDT	HA1F-31C61②		—
					12V AC/DC ±10%	DPDT	HA1F-31C63②		
					24V AC/DC ±10%	DPDT	HA1F-31C64②		
		Spring return from left 	Gold	5V DC ±5%	DPDT	HA1F-32C21②	HA1F-32C21V②		
				12V AC/DC ±10%	DPDT	HA1F-32C23②	HA1F-32C23V②		
				24V AC/DC ±10%	DPDT	HA1F-32C24②	HA1F-32C24V②		
				Silver	5V DC ±5%	DPDT	HA1F-32C61②		—
					12V AC/DC ±10%	DPDT	HA1F-32C63②		
					24V AC/DC ±10%	DPDT	HA1F-32C64②		
			Spring return two-way 	Gold	5V DC ±5%	DPDT	HA1F-33C21②		HA1F-33C21V②
					12V AC/DC ±10%	DPDT	HA1F-33C23②		HA1F-33C23V②
					24V AC/DC ±10%	DPDT	HA1F-33C24②		HA1F-33C24V②
				Silver	5V DC ±5%	DPDT	HA1F-33C61②		—
					12V AC/DC ±10%	DPDT	HA1F-33C63②		
					24V AC/DC ±10%	DPDT	HA1F-33C64②		

• See page 88 for dimensions.

• One LED lamp is installed in illuminated selector switch.

Contact Operation

Operator Position & Contact Operation (Top View)					
Positions		Contact	Left	Center	Right
90° 2-position	 Maintained	SPDT		—	
	 Spring return from right	DPDT		—	
45° 3-position	 Maintained	DPDT			
	 Spring return from right				
	 Spring return from left				
	 Spring return two-way				

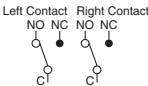
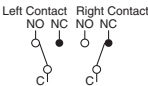
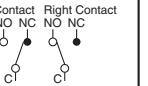
HA3F LED Illuminated Selector Switches

Shape	Operator Position	Contact Material	Operating Voltage	Contact	Type No.		Color Code ②		
					Solder/Tab Terminal	PC Board Terminal			
Round w/Square Bezel HA3F  	90° 2-position	Maintained 	Gold	5V DC ±5%	SPDT	HA3F-2C11②	HA3F-2C11V②	Specify a lens color code in place of ② in the Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow	
				DPDT	HA3F-2C21②	HA3F-2C21V②			
				12V AC/DC ±10%	SPDT	HA3F-2C13②	HA3F-2C13V②		
				DPDT	HA3F-2C23②	HA3F-2C23V②			
				24V AC/DC ±10%	SPDT	HA3F-2C14②	HA3F-2C14V②		
				DPDT	HA3F-2C24②	HA3F-2C24V②			
			Silver	5V DC ±5%	SPDT	HA3F-2C51②	—		
				DPDT	HA3F-2C61②				
				12V AC/DC ±10%	SPDT	HA3F-2C53②			
				DPDT	HA3F-2C63②				
				24V AC/DC ±10%	SPDT	HA3F-2C54②			
				DPDT	HA3F-2C64②				
		Spring return from right 	Gold	5V DC ±5%	SPDT	HA3F-21C11②	HA3F-21C11V②		
				DPDT	HA3F-21C21②	HA3F-21C21V②			
				12V AC/DC ±10%	SPDT	HA3F-21C13②	HA3F-21C13V②		
				DPDT	HA3F-21C23②	HA3F-21C23V②			
				24V AC/DC ±10%	SPDT	HA3F-21C14②	HA3F-21C14V②		
				DPDT	HA3F-21C24②	HA3F-21C24V②			
			Silver	5V DC ±5%	SPDT	HA3F-21C51②	—		
				DPDT	HA3F-21C61②				
				12V AC/DC ±10%	SPDT	HA3F-21C53②			
				DPDT	HA3F-21C63②				
				24V AC/DC ±10%	SPDT	HA3F-21C54②			
				DPDT	HA3F-21C64②				
	45° 3-position	Maintained 	Gold	5V DC ±5%	DPDT	HA3F-3C21②	HA3F-3C21V②		
				12V AC/DC ±10%	DPDT	HA3F-3C23②	HA3F-3C23V②		
				24V AC/DC ±10%	DPDT	HA3F-3C24②	HA3F-3C24V②		
				DPDT	HA3F-3C61②	—			
			Silver	12V AC/DC ±10%	DPDT		HA3F-3C63②		
				24V AC/DC ±10%	DPDT		HA3F-3C64②		
				Spring return from right 	Gold		5V DC ±5%	DPDT	HA3F-31C21②
						12V AC/DC ±10%	DPDT	HA3F-31C23②	HA3F-31C23V②
		24V AC/DC ±10%	DPDT			HA3F-31C24②	HA3F-31C24V②		
		DPDT	HA3F-31C61②			—			
		Silver	12V AC/DC ±10%		DPDT		HA3F-31C63②		
			24V AC/DC ±10%		DPDT		HA3F-31C64②		
			Spring return from left 		Gold		5V DC ±5%	DPDT	HA3F-32C21②
						12V AC/DC ±10%	DPDT	HA3F-32C23②	HA3F-32C23V②
		24V AC/DC ±10%		DPDT		HA3F-32C24②	HA3F-32C24V②		
		DPDT		HA3F-32C61②		—			
		Silver		12V AC/DC ±10%	DPDT		HA3F-32C63②		
				24V AC/DC ±10%	DPDT		HA3F-32C64②		
				Spring return two-way 	Gold		5V DC ±5%	DPDT	HA3F-33C21②
						12V AC/DC ±10%	DPDT	HA3F-33C23②	HA3F-33C23V②
		24V AC/DC ±10%	DPDT			HA3F-33C24②	HA3F-33C24V②		
		DPDT	HA3F-33C61②			—			
		Silver	12V AC/DC ±10%		DPDT		HA3F-33C63②		
			24V AC/DC ±10%		DPDT		HA3F-33C64②		

• See page 88 for dimensions.

• One LED lamp is installed in illuminated selector switch.

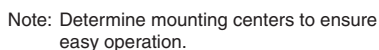
Contact Operation

Operator Position & Contact Operation (Top View)					
Positions		Contact	Left	Center	Right
90° 2-position	Maintained 	SPDT		—	
	Spring return from right 	DPDT		—	
45° 3-position	Maintained 	DPDT			
	Spring return from right 				
	Spring return from left 				
	Spring return two-way 				

Dimensions (Illuminated Selector Switch)



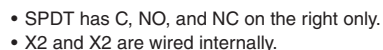
Mounting Hole Layout Mounting Centers



PC Board Drilling Layout (Bottom View)

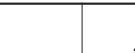


Terminal Arrangement (Bottom View)



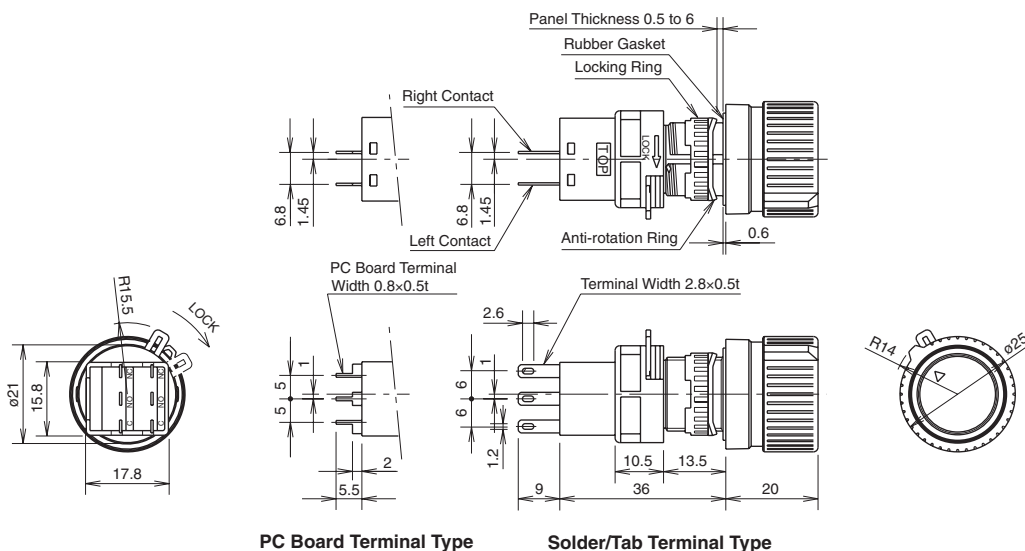
All dimensions in mm.

HA1R Selector Pushbuttons

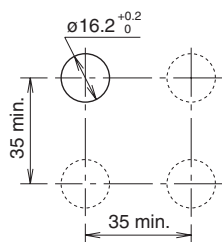
Shape	Operator Position		Contact Operation						Contact Material	Contact	Type No. Terminal Type	Color Code ①
			L		C		R					
			Normal	Push	Normal	Push	Normal	Push				
Round HA1R  UL Ⓢ CE	90° 2-position	Maintained	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Gold	DPDT	Solder Tab Terminal HA1R-2C2①	B: black G: green R: red S: blue Y: yellow
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Silver	DPDT	PC Board Terminal HA1R-2C2V①	
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Solder Tab Terminal HA1R-2C6①	
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	—	
	45° 3-position	Blocked	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Gold	DPDT	Solder Tab Terminal HA1R-3C2①	
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	PC Board Terminal HA1R-3C2V①	
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	—	—	Solder Tab Terminal HA1R-3C6①	
			Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Left Contact NO NC Right Contact NO NC	Silver	DPDT	—	

- Specify a button color code in place of ① in the Type No.

Dimensions

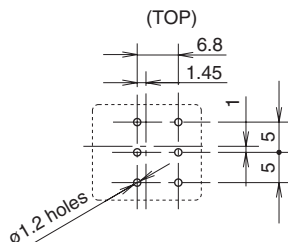


Mounting Hole Layout Mounting Centers



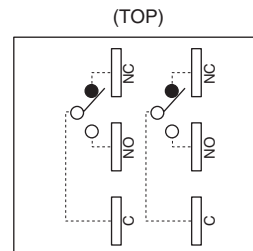
Note: Determine mounting centers to ensure easy operation.

PC Board Panel Cut-out (Bottom View)



- See Single Board Mounting on page 95 for details about PC boards.

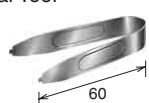
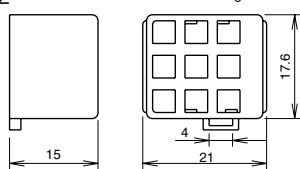
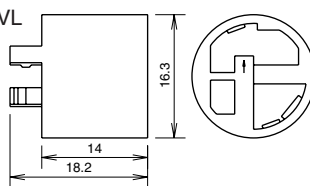
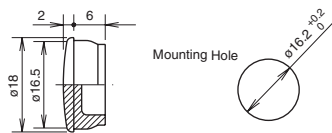
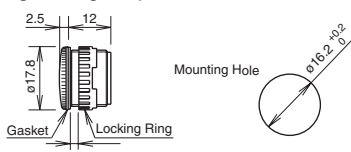
Terminal Arrangement (Bottom View)



All dimensions in mm.

Ø16 H6 Series Miniature Control Units

Accessories

Shape		Material	Type No.	Ordering Type No.	Package Quantity	Remarks
Locking Ring Wrench 		Metal (nickel-plated brass)	MT-001	MT-001	1	- Used to tighten the locking ring when installing H6 control units into a panel. - Tighten the locking ring to a torque of 0.88 N·m.
Lamp Holder Tool 		Rubber (nitril)	OR-44	OR-44	1	Used to install and remove LED lamps.
Lens Removal Tool 		Stainless Steel	MT-101	MT-101	1	Used to remove the lens or buttons.
Switch Guard (180° spring return) 	Standard	Guard (Polyarylate) Base (polyacetal)	HA9Z-K1	HA9Z-K1	1	- Degree of protection: IP65 - Used to protect flush pushbuttons from inadvertent operation. 
	For single board (see page 95)		HA9Z-KW1	HA9Z-KW1	1	
Terminal Cover 	Standard	Nylon (white)	H6-VL2	H6-VL2PN10	10	- Terminal cover is not attached and must be ordered separately. - When wiring the terminals, insert the lead wires into the terminal cover holes before soldering. H6-VL2 TOP marking  H6-PVL 
	Exclusive for Unibody Pilot Light 		H6-PVL	H6-PVLPN10	10	
Mounting Hole Plug 	Rubber	Nitril Rubber (black)	AL-B6	AL-B6PN05	5	Degree of protection: IP65 
	Metal 	Plug: Metal (diecast) Locking ring: plastic Gasket: nitril	AL-BM6	AL-BM6	1	- Degree of protection: IP65 - Tightening torque: 0.1 to 0.29 N·m  Gasket Locking Ring Panel Thickness 0.5 to 6

Maintenance Parts

Shape		Specification	Type No.	Ordering Type No.	Package Quantity	Remarks
Lens 	Round, Round w/Square Bezel	Polyarylate	HA9Z-L11②	HA9Z-L11②PN05	5	Specify a color code in place of ② in the Type No. A (amber), G (green), R (red), S (blue), W (white), Y (yellow) Note: Use W (white) lens for PW (pure white) illumination.
	Square		HA9Z-L21②	HA9Z-L21②PN05		
	ø30mm Lens		HA9Z-L13②	HA9Z-L13②PN05		
Button 	Round Flush, Round w/Square Bezel	Polyacetal	HA9Z-B11①	HA9Z-B11①PN05		Specify a color code in place of ① in the Type No. B (black), G (green), R (red), S (blue), W (white), Y (yellow)
	Square Flush		HA9Z-B21①	HA9Z-B21①PN05		
	Round Extended, Round Extended w/Square Bezel		HA9Z-B12①	HA9Z-B12①PN05		
	Square Extended		HA9Z-B22①	HA9Z-B22①PN05		
	ø30mm Button		HA9Z-B13①	HA9Z-B13①PN05		
Marking Plate 	Round, Round w/Square Bezel	Acrylic	HA9Z-P1W	HA9Z-P1WPN05		- White - HA9Z-P1W (engraving area: ø16.4 mm, engraving depth: 0.5 mm max.) - HA9Z-P2W (engraving area: □16.4 mm, engraving depth: 0.5 mm max.)
	Square	Acrylic	HA9Z-P2W	HA9Z-P2WPN05		
Locking Ring 	For all types	Polyacetal	HA9Z-LN	HA9Z-LNPN10	10	
Anti-rotation Ring 	For all types except for HA1E	Stainless Steel	HA9Z-LP	HA9Z-LPPN10	5	
Lever Lock 	For all types except for collective mounting and HA1E	Polyacetal	HA9Z-LS	HA9Z-LSPN10		- Lever lock is not attached and must be ordered separately. - Yellow
Selector Color Insert 	For selector switch	Polyacetal	HA9Z-HC1①	HA9Z-HC1①PN05		Specify a color code in place of ① in the Type No. G (green), R (red), S (blue), W (white), Y (yellow)
Spare Key 	For key selector switches	Nickel-plated Brass	KG9Z-SK-231	KG9Z-SK-231PN02	2	- Thickness: 2.0mm - Two keys of the same number. Different key numbers are not available.
Illuminated Selector Knob 	For illuminated selector switch	Polyarylate (w/water-proof gasket)	HA1A-F②	HA1A-F②	1	Specify a color code in place of ② in the Type No. A (amber), G (green), R (red), S (blue), W (white), Y (yellow) Note: Use W (white) knob for PW (pure white) illumination.

Flush Silhouette

Control Units

Display Lights

Display Units

Safety Products

Terminal Blocks

Comm. Terminals

AS-Interface

Relays & Timers

Sockets

Circuit Protectors

Power Supplies

PLCs & SmartRelay

Operator Interfaces

Sensors

Control Stations

Explosion Protection

References

ø16 H6 Series Miniature Control Units

LED Lamps

Operating Voltage	Current Draw		Type No.	Ordering Type No.	② Illumination Color Code	Package Quantity	Base
	AC	DC					
5V DC ±5% 	—	8 mA	LFTD-5②	LFTD-5②	Specify a color code in place of ② in the Ordering Type No. A: amber G: green PW: pure white R: red S: blue W: white Y: yellow	1	SX6S/8x5.4
				LFTD-5②PN10		10	
6V AC/DC ±10% 	9 mA (A, R, W, Y) 10 mA (G, PW, S)	7 mA	LFTD-6②	LFTD-6②		1	
				LFTD-6②PN10		10	
12V AC/DC ±10% 	9 mA	8 mA	LFTD-1②	LFTD-1②		1	
				LFTD-1②PN10		10	
24V AC/DC ±10% 	9 mA	8 mA	LFTD-2②	LFTD-2②		1	
				LFTD-2②PN10		10	

Transformer

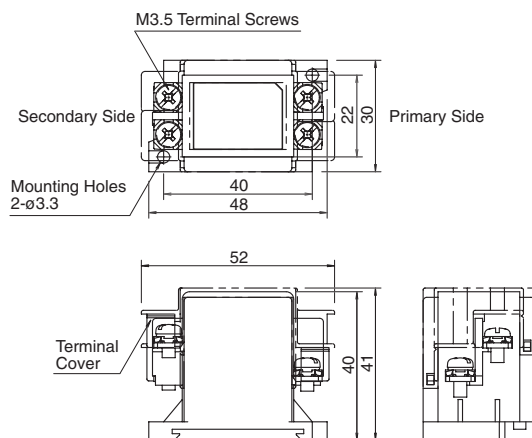
Shape	Primary Voltage	Secondary Voltage	Type No.	Applicable LED Lamp
Separate Mounting Type for 24V 	100/110V AC	24V AC, 0.5W	TWR512	LFTD-2②
	200/220V AC		TWR522	
	400/440V AC		TWR542	

- Terminal covers are supplied with separate mounting type transformers.
- Connect only one LFTD LED to separate mounting type transformers.
- Use plastic mounting clip BC9Z-E/NS35N when using 400/440V primary voltage.

Specifications

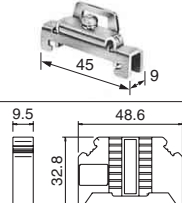
Operating Voltage		100/110V AC, 200/220V AC, 400/440V AC (50/60 Hz)
Power Consumption		2.4VA
Rated Insulation Voltage		600V
Insulation Resistance		100 MΩ minimum (500V DC megger)
Dielectric Strength		2500V AC, 1 minute
Standard Operating Condition	Operating Temperature	−30 to +60°C (no freezing)
	Relative Humidity	35 to 85% (no condensation)
Vibration Resistance	Operating Extremes	5 to 55 Hz, amplitude 0.5 mm
Shock Resistance	Damage Limits	1,000 m/s ² (100G)
Terminal Screw		M3.5
Applicable Wire		2 mm ² maximum, 2 wires maximum

Dimensions



All dimensions in mm.

Accessories

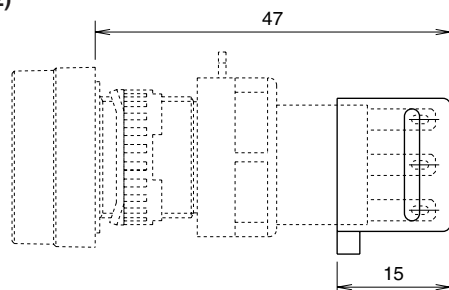
Description	Appearance	Description	Type No.	Ordering Type No.	Package Quantity
DIN Rail		Aluminum Weight: Approx. 200g	BAA1000	BAA1000PN10	10
		Steel Weight: Approx. 320g	BAP1000	BAP1000PN10	
Mounting Clip		Steel Weight: Approx. 15g	BNL6	BNL6PN10	
		Plastic Weight: Approx. 15g	BC9Z-E/NS35N	BC9Z-E/NS35NPN10	

- Use plastic mounting clip BC9Z-E/NS35N when using 400/440V primary voltage.

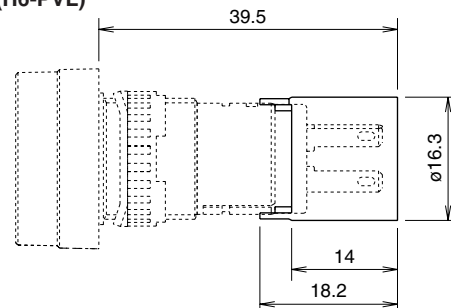
Dimensions

• Terminal Cover

For Separate Type (except for unibody type pilot lights)
(H6-VL2)

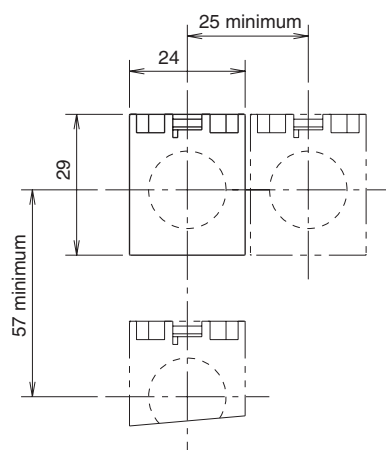


For Unibody Type Pilot Lights
(H6-PVL)

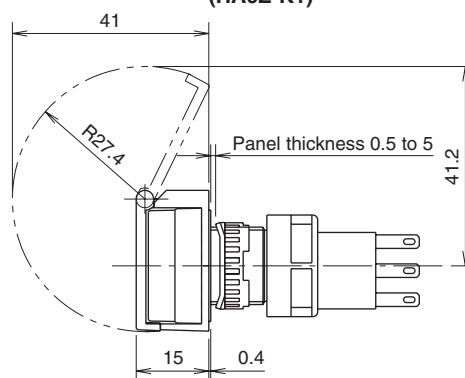


• Switch Guard

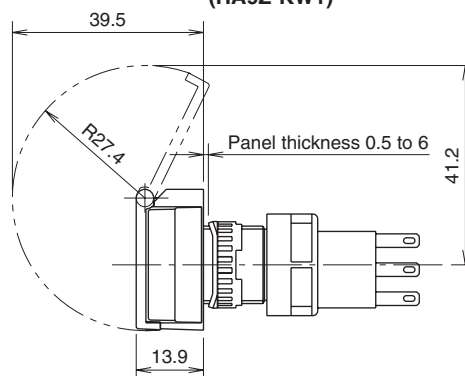
For Flush Pushbuttons and Illuminated Pushbuttons



(HA9Z-K1)



(HA9Z-KW1)



All dimensions in mm.

Flush Silhouette
Control Units
Display Lights
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

Safety Precautions

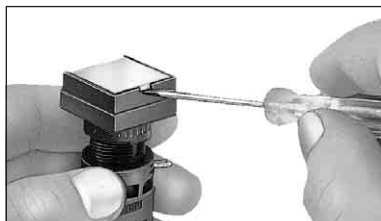
- Turn off the power to H6 series control units before installation, removal, wiring, maintenance, and inspection of the control units. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid burning your hand, use the lamp holder tool when replacing lamps.
- For wiring, use wires of a proper gauge to meet voltage and current requirements. Improper soldering may cause overheating and create a fire hazard.

Instructions

Replacement of Lens and Marking Plate

• Removing the Lens Assembly

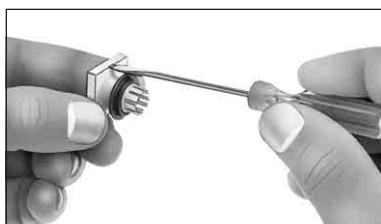
Remove the lens assembly (color lens, marking plate, and lens holder) by inserting a screwdriver into the recess of the lens through the bezel.



• Removing the Marking Plate

Remove the marking plate by pushing the lens from the rear to disengage the latches between the lens and the lens holder, using the screwdriver as shown below.

Note: The translucent filter in the lens holder cannot be removed because this filter is sealed to make the unit waterproof.



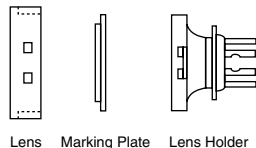
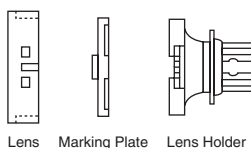
• Installing

For round lens types, place the marking plate on the lens holder with the projection engaged and press the lens onto the lens holder to engage the latches. For square lens types, insert the marking plate into the lens, and press the lens onto the holder to engage the latches.

Note: Make sure of correct orientation of the marking plate.

[Round Lens Type]

[Square Lens Type]



Replacement of Lamps

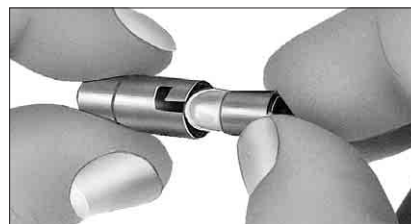
Lamps can be replaced using the lamp holder tool (OR-44) from the front of the panel, or by removing the contact block from the operator.

• Removing the Lamp

1. Slip the lamp holder tool onto the lamp head. Then push slightly, and turn the lamp holder tool counterclockwise.

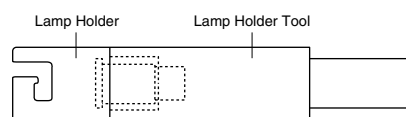


2. Push the bulb, and remove from the rear of the lamp holder.

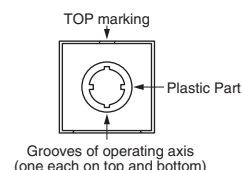


• Installing the Lamp

1. Insert the lamp into the lamp holder from the rear, and push in completely using the smaller end of the lamp holder tool.
2. Hold the bulb with the lamp holder tool as shown below.



3. Place the insertion guide of the lamp holder and the TOP marking side or the groove in the operator unit in the same direction. Insert the lamp holder into the housing with the lamp holder tool. Then push the lamp lightly and turn it clockwise to install.



Panel Mounting

Remove the contact block from the operator. Insert the operator into the panel cut-out from the front, then install the contact block to the operator.

• Removing the Contact Block

Turn the locking lever on the contact block in the direction opposite to the arrow on the housing. Then the contact block can be removed.



• Installing the Contact Block

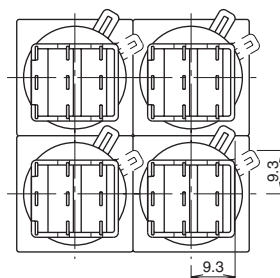
Insert the contact block with the TOP markings on the contact block and the operator placed in the same direction. Then lock the units, turning the locking lever in the direction of the arrow.

• Notes for Mounting

Use the optional Ring Wrench (MT-001) to mount the operator onto a panel. Tightening torque should not exceed 0.88 N·m. Do not use pliers. Do not tighten with excessive force, otherwise the locking ring will be damaged.

• Collective Mounting

As the locking lever can be turned easily from the rear of the units using a screwdriver, the contact blocks can be removed even when mounted collectively.

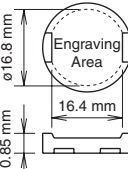
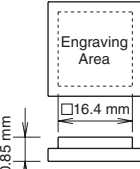
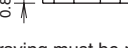
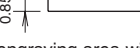


Instructions

Marking Plates and Films

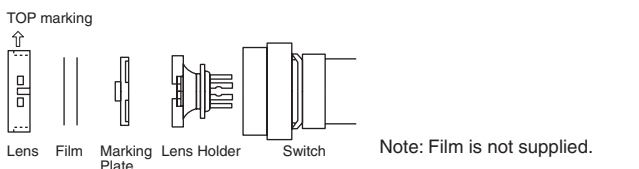
For H6 series illuminated pushbuttons and pilot lights, legends and symbols can be engraved on marking plates, or printed mylar film can be inserted under the lens for labelling purposes.

- **Marking Plate and Marking Film Size**

Lens	Round Lens (round, round w/square bezel)	Square Lens
Built-in Marking Plate	 - Engraving must be made on the engraving area within 0.5mm deep. - The marking plate is made of white acrylic resin.	
Applicable Marking Film	 - Two 0.1mm-thick films or one 0.2mm-thick film can be installed in the lens. - Marking film is not included. - Recommended marking film: Polyester film	

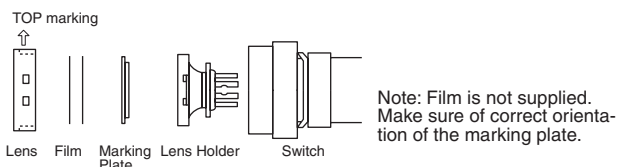
• Insertion Order of Marking Plate and Film

[Round Lens Type]



Note: Film is not supplied.

[Square Lens Type]



Note: Film is not supplied.
Make sure of correct orienta-
tion of the marking plate

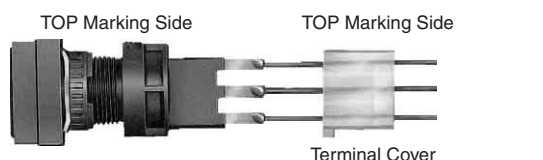
Wiring

1. Solder the terminals at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu type 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.
2. Use non-corrosive liquid flux.

Notes on Terminal Cover

Insert the terminal cover into the contact block with the TOP markings on the contact block and the terminal cover in the same direction.

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



Connection

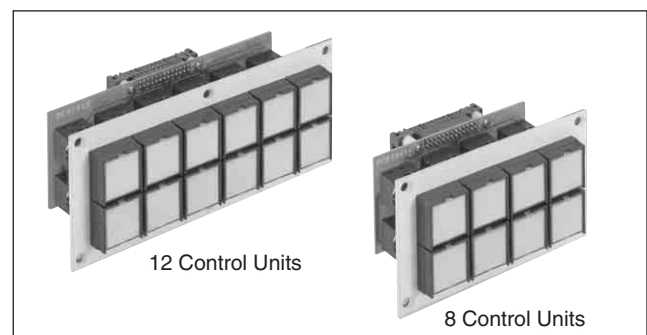
Positive-lock connector and easy-lock connector are applicable to tab terminals.

Recommended Connectors

Item	Positive-lock Connector (Tyco Electronics)		Easy-lock Connector (Nichifu Co., Ltd.)	
Terminal	0.2 to 0.5 mm ²	175412-1	0.2 to 0.3 mm ²	OSS-62852F3
	0.2 to 1.25 mm ²	174778-1	0.5 to 1.25 mm ²	OSS-62815F3
Housing	174779-1		NET1-28-1P	

Note: Positive-lock is a registered trademark of Tyco Electronics.

Single Board Mounting



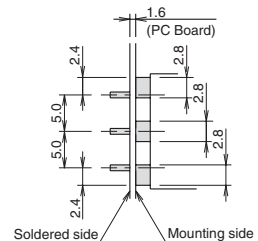
Mounting the PC board terminal type control units on a PC board offers the following features.

Features

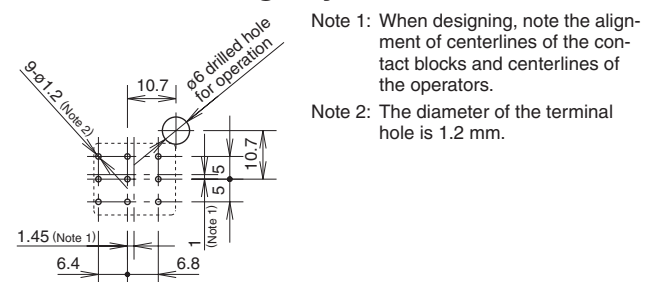
- Reduced installation labor, easy wiring, space saving, and standardization.
- Since the contact blocks on the PC board can be removed easily using a locking lever, the H6 series control units are easy to maintain.
- Because the H6 series control units require no studs for fastening the control unit to a PC board, special preparation of the control panel is not needed.
- Switch guard for single board mounting is also available (page 90).

Notes for Designing PC board and Circuit

- Use 1.6-mm-thick glass epoxy PC board with drilled holes.
- Design a circuit so that the H6 series control unit can operate within the rated voltage and current range. Make sure that inrush current and voltage do not exceed the rating.
- Minimum applicable load is 5V AC/DC, 1 mA on gold contacts. Applicable range is subject to the operating condition and load.
- Since the 2.8-mm-wide terminal touches the PC board as shown on the right, short circuit may occur with pattern lines. Design a circuit carefully to prevent short circuit.



PC Board Drilling Layout

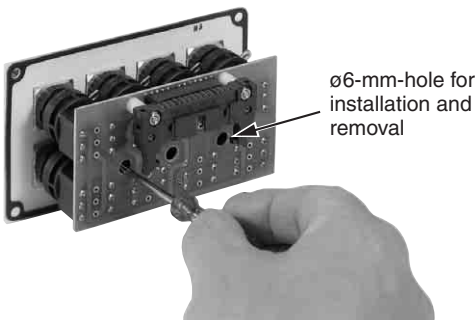


Note 1: When designing, note the alignment of centerlines of the contact blocks and centerlines of the operators.

Note 2: The diameter of the terminal hole is 1.2 mm.

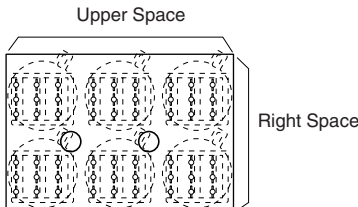
Installation and Removal of Contact Blocks

Turn the locking lever to install and remove the contact block on the PC board by using a screwdriver from a hole (ø6 mm) of the PC board.



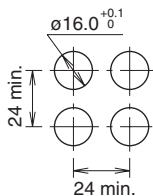
Hole diameter may vary to meet installation requirements. When the locking lever can be turned by using a screwdriver from the upper or right space, the holes are not necessary.

<Example>



Mounting Holes and Assembly Procedure

- Drill mounting holes in the panel as shown below. When the units are mounted collectively, provide adequate clearance.



• Assembly Procedure

1. Install the operator to the operation panel.
2. Insert the contact block to the operator from the rear.
3. Turn the lock lever to lock the contact block.
4. Insert the PC board to terminals and solder.

Note 1: Make sure that each terminal is inserted into the PC board correctly.

Note 2: Do not apply tensile force to the connector cable for extended period of time.

Note 3: Do not expose the contact block to water.

Note 4: Ensure to lock contact blocks when the contact blocks are installed on the operators.