

## EH Miniature Lighted Pushbutton Switch

# EH-Gseries +FLAT

The EH series, with its proven reliability,  
now includes a long-awaited unit with the flat configuration.



## FEATURE

The flat configuration with its sophisticated design is now included in the lineup of the EH series, which has withstood the test of time and which is highly regarded for its reliability. With its enhanced visual appeal, the unit with the flat configuration expands the scope of application even further.

### ● Design-oriented

- The objective of the development was to create a switch with a graceful design.
- A sophisticated switch with enhanced visual appeal was created in the quest to achieve a small, flat profile and an easy-to-operate button size.

### ● Reliability-oriented

- The EH-switch mechanism, which has withstood the test of time, was adopted for its reliability and long lifespan.
- Superior contact reliability was obtained by improving the dust resistance.
- The supply system is dependable because it is made domestically.

### ● Functionality-oriented

- The flat profile is the optimum configuration for preventing operation errors.
- It helps to reduce space because the body is just 25.3 mm long and the depth behind the panel is only 22.5 mm.
- The unit helps to reduce costs because it is an all-in-one product incorporating the main body and switch part, thereby reducing the assembly work.
- A unit that uses connectors instead of wiring is available.

### ● Applications

- Chip-manufacturing equipment, machine tools, communication devices, monitors and control equipment, broadcasting equipment, etc.



Easy-to-attach thanks to its short body



Its flat profile enhances the sophisticated appeal of the panel.

## SPECIFICATIONS

Contact	Silver Contact (Gold-Plated)	W/E Alloy #1 Cross-bar Contact
Electrical Rating	AC125V, 250V 3A(Resistive)	AC125V 0.1A, DC30V 0.1A(Resistive)
Electrical Life	More than 60,000 operations at max. rated load	More than 100,000 operations at max. rated load
Insulation Resistance	More than 100MΩ at 500V DC	
Dielectric Strength	1000V AC RMS between NC and NO terminal 1500V AC RMS between terminals and ground 50/60Hz for 60sec. at normal ambient temperature and humidity	600V AC RMS between NC and NO terminal 1500V AC RMS between terminals and ground 50/60Hz for 60sec. at normal ambient temperature and humidity
Contact Resistance	Less than 30mΩ (Initial) at DC6V 1A	Less than 50mΩ (Initial) at DC6V 0.1A
Vibration	Frequency of vibration 10 to 55 Hz, Amplitude 1.5 mm (operating limit)	
Shock resistance	30G (operating limit), 50G (sustained)	
Mechanical Life	Momentary Action : more than 2,000,000 operations    Alternate Action : more than 200,000 operations	
Ambient Temperature	-15°C to +50°C	
Ambient Humidity	80% RH (max.)	

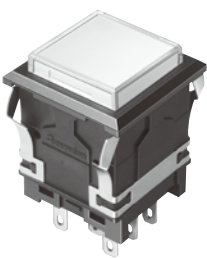
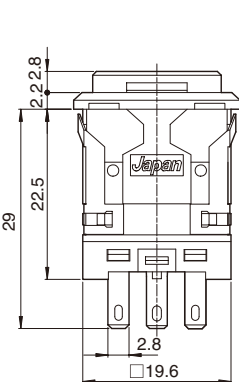
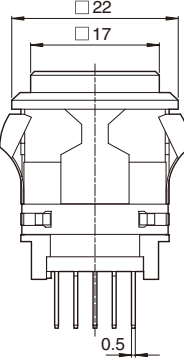
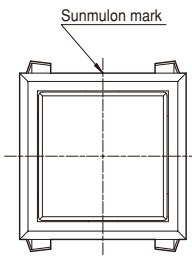
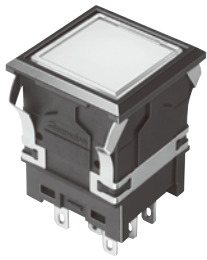
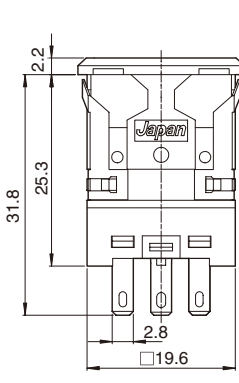
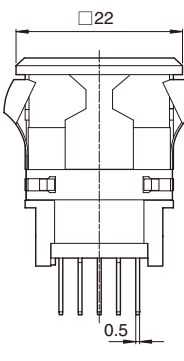
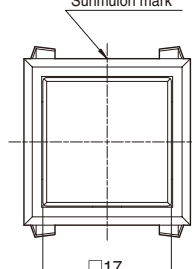
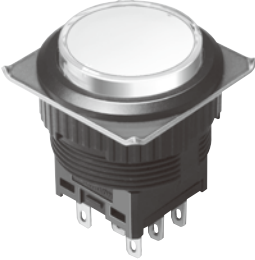
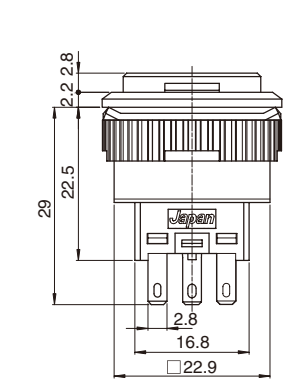
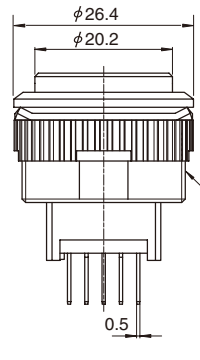
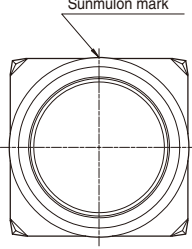
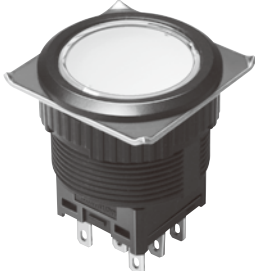
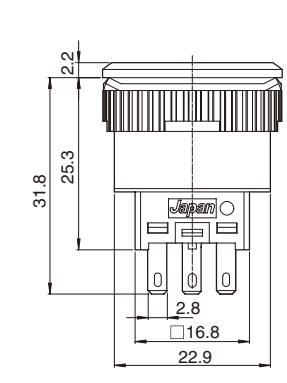
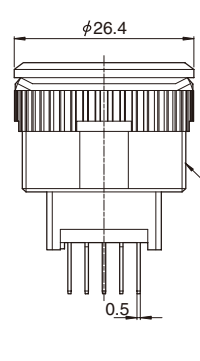
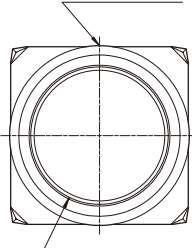
### DC Rated (Silver Contact)

Rated Voltage (V)	Resistance Load	Electrical Life
DC 8	3	More than 100,000 operations
14	3	
30	2	
125	0.4	

## OPERATING CHARACTERISTICS

Operating Force (max.)	4.41N	Total Travel (max.)	3mm
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DIMENSIONS

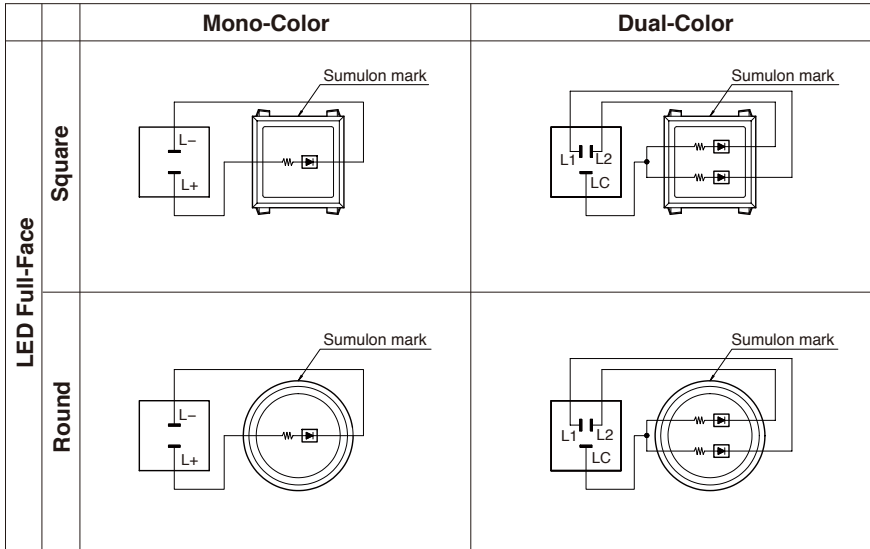
<p>Square Button</p> <p>17 Square Standard Button (Full-Face LED)</p>				 <p>Top View</p>
<p>17 Square Flat Button (Full-Face LED)</p>				 <p>Top View</p>
<p>Round Button</p> <p>20.2 Round Standard Button (Full-Face LED)</p>				 <p>Top View</p>
<p>20.2 Round Flat Button (Full-Face LED)</p>				 <p>Top View</p>

☆ The depth of the flat button is different from that of a standard button.

Tolerance : ±0.4mm

## INTERNAL CONNECTION ARRANGEMENTS

### ● LED (Red, Green, Yellow)



### ● Combination of dual-color LEDs (common to all voltages)

LC-L1	Red	Green	Yellow
LC-L2	Green	Yellow	Red

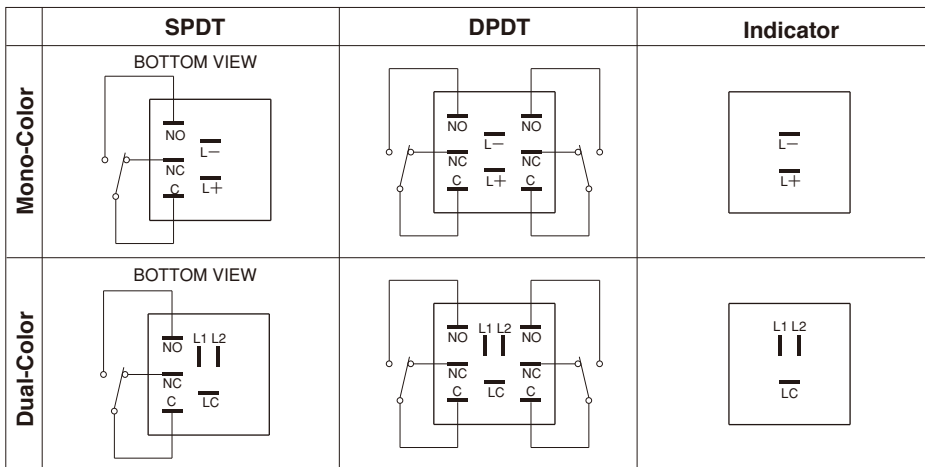
LC-L1	Super Blue	Super White	Super Green
LC-L2	Super White	Super Green	Super Blue

LC-L1	Red	Red	Red	Yellow
LC-L2	Super Blue	Super White	Super Green	Super Blue

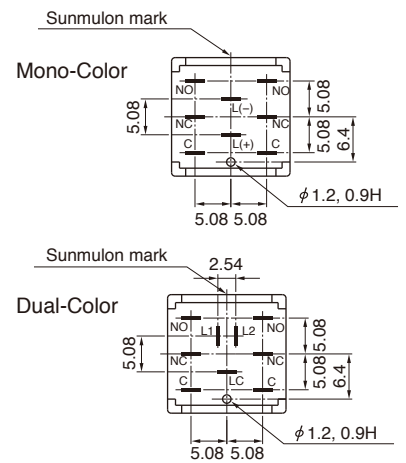
\* Units with common cathodes (-) are also available. Please feel free to contact us.

## TERMINALS

### ● TERMINALS LAYOUT (Square, Round)

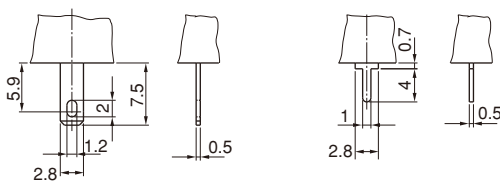


### ● TERMINALS DIMENSIONS (BOTTOM VIEW)



## TERMINAL SHAPE / PCB HOLE CUT-OUT

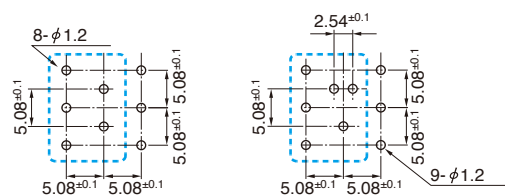
### ● TERMINAL SHAPE



#110 TAB Soldering Terminal

PCB Terminal

### ● PCB HOLE CUT-OUT (BOTTOM VIEW)



Mono-Color

Dual-Color

※ Inside blue dotted line is STDP.

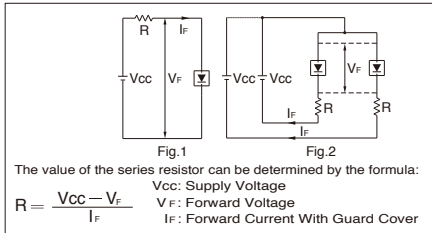
Tolerance : ±0.4mm

## LED RATINGS

\* Red=R, Yellow=Y, Green=G, Super Blue=SB, Super White=SW, Super Green=SG

### ● LED RATINGS

ITEM	LED Full-face					
	Mono-Color, Dual-Color			Hi-Bright Mono Color		
	Current Rating (mA)					
DC Supply Voltage (V)	R	G	Y	SB, SW	SG	
5(±5%)	30			32		16
12(±5%)	15			16		8
24(±5%)	9					8



### ● EXTERNAL RESISTOR

Switches are normally fitted with internal resistors to operate on 5,12,24V DC supply. In case of non-resistor type, suitable external current limiting resistors must be installed as shown by the table and formula.

ITEM	LED Full-face													
	Mono-Color, Dual-Color			Hi-Bright			Hi-Bright Dual-Color							
	DC5V	DC12V,24V		DC5V	DC12V,24V		DC5V	DC12V,24V	DC5V	DC12V,24V	DC5V	DC12V,24V		
R, G, Y	R, G, Y		SB,SW	SG		SB	SW	SG	SB	SW	SG	SB	SW	SG
Max. operating current $I_{FM}$ (mA)	40	20		50	50	25	25		40	40	40	20	20	20
DC reverse voltage V (V)	8	16		5	5	10	10		5	5	5	10	10	10
Forward voltage $V_f$ (V)	4	8		3.6	3.5	7.2	7		3.1	3.1	3.2	6.2	6.2	6.4
Recommended operating current $I_f$ (mA)	30	15		32	16	16	8		32	32	16	16	16	8
Current Reduced Factor(Over 25°C working Temperature)	0.66	0.33		1.6		0.4			0.56	0.5	0.56	0.28	0.25	0.28
	mA/°C	mA/°C		mA/°C		mA/°C			mA/°C	mA/°C	mA/°C	mA/°C	mA/°C	mA/°C
Pulse Lighting	Pulse Width PW ( $\mu$ S)	100			$\leq 10^4$						$\leq 10^4$	100	$\leq 10^4$	
	Duty Ratio $D_R$				$10^{-1}$						$10^{-1}$	100	130	
	$I_{FM}$ (mA)				120			80			130	100	130	
Wiring diagram	Fig.1	Fig.2		Fig.1					Fig.2					

## Panel Layout/Panel Cut Dimensions

### ● 17mm Square / 20.2mm Round

Panel thickness: 1.0~3.2mm

	Panel Layout	Panel Cut Dimensions
Square Button		
Round Button		

\* When an exterior finish, such as coating, is applied to a cut panel, please ensure that the dimensions after the finishing are the same as the cut dimensions of the panel. If the dimensions of the cut panel are too small, it causes malfunctions.

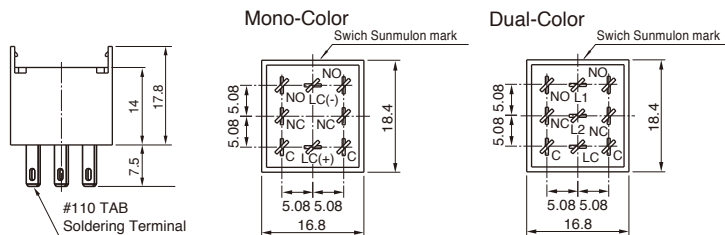
n : number of switches  
Tolerance : ±0.4mm

## ACCESSORIES

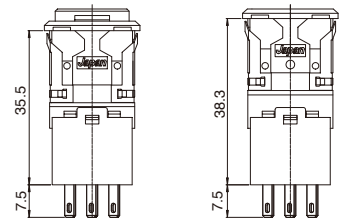
### Sockets

Convenient sockets that reduce the labor in terms of assembly, wiring and maintenance are available in both the square and round configurations.

● For soldering tab terminal (unit without resistance and unit with built-in resistance)



### Switch + socket assembly dimensions



Unit with standard button    Unit with flat button

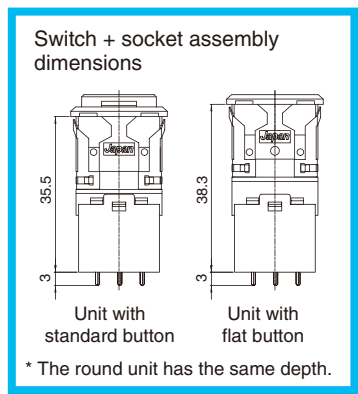
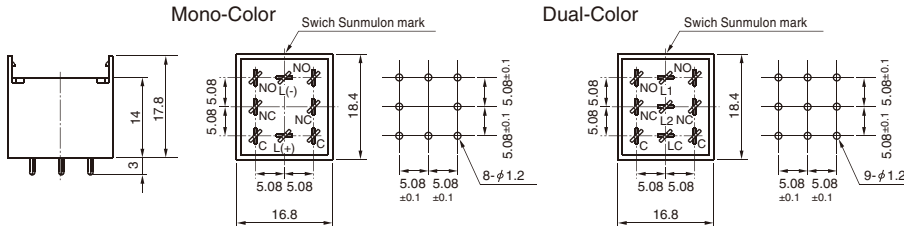
\* The round unit has the same depth.

PART No.			
Application	Resistance	Part No.	Note
Mono-Color	0Ω	EH-1088-1	Use for built-in resistor type
Dual-Color	0Ω	EH-1088-2	
Dual-Color 5V	36Ω 1/4W	EH-3210-2C	Use for non-resistor type *Simultaneous lighting is possible.
Dual-Color 12V	270Ω 1/4W	EH-3210-2D	
Dual-Color 24V	1.1kΩ 1/2W	EH-3210-2E	

Tolerance : ±0.4mm

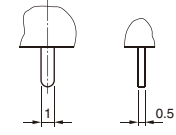
## ACCESSORIES

### ● PCB type (no-register)



PART No.			
Application	Resistance	Part No.	Remarks
Mono-Color	0Ω	EH-1196-1	Please select the soldering terminal type according to the terminal shape of the main body.
Dual-Color	0Ω	EH-1196-2	

### ● TERMINAL SHAPE

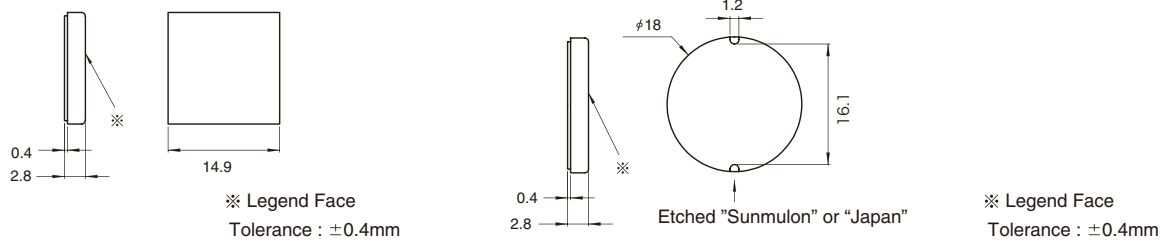


Tolerance : ±0.4mm

## ETCHING THE BUTTON/FILTER

We are able to etch the buttons and filters. Please specify character font, size and color.

### FILTER DIMENSIONS

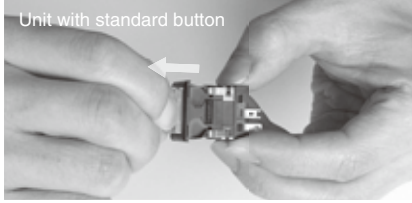


## REPLACEMENT PARTS

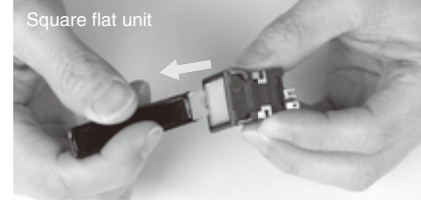
Item \ color	Red	Green	Yellow	Blue	Milk-White	Clear
17mm Square Button	EH-4146-1LR	EH-4146-1LG	EH-4146-1LY	EH-4146-1LB	EH-4146-1LM	EH-4146-2CC
20.2mm Round Button	EH-4147-1LR	EH-4147-1LG	EH-4147-1LY	EH-4147-1LB	EH-4147-1LM	EH-4147-2CC
Square Full-Face Filter	EH-4148-LR	EH-4148-LG	EH-4148-LY	EH-4148-LB	EH-4148-LM	—
Round Full-Face Filter	EH-4149-LR	EH-4149-LG	EH-4149-LY	EH-4149-LB	EH-4149-LM	—

## ASSEMBLY & DISASSEMBLY

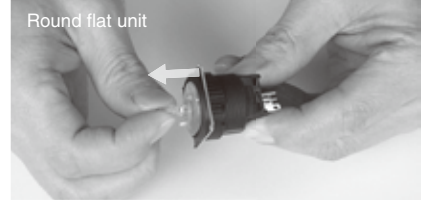
### ● Removing the illuminating parts



Pull out the part by inserting one's fingernails in the recesses on both sides of the button.



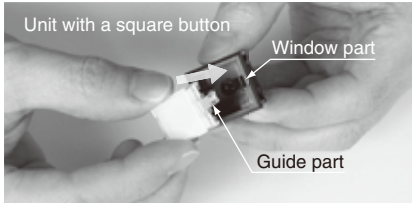
Be sure to use the extraction tool (SJ-0009) to remove the square flat unit.



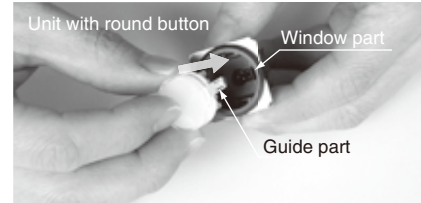
Use the extraction tool (SJ-0002-1) to remove the round flat unit.

\* In the case of the alternate unit, remove the lock before pulling it out.

### ● Attaching the illuminating parts



Adjust the guide part on the button to the window part on the body case and push it inside until it reaches the operating limit and clicks.



Adjust the guide part on the button to the window part on the body case and push it inside until it reaches the operating limit and clicks.

### ● Screw tightening jig

Use this jig to attach the body of the round unit to the panel. It improves operability and makes it possible to tighten the screws so they don't rattle.

Type name: EH-4195



**Connector Type**

**Reduce wiring**

Without soldering, mounting and maintenance is a connector type available.

There are dedicated connectors for SPDT and Indicator and for DPDT.  
Wire harness is also dedicated to each contact.  
Please refer to ACCESSORIES for details.

**SPECIFICATIONS**

Contact	Silver Contact (Gold-Plated)	W/E Alloy #1 Cross-bar Contact
Electrical Rating	AC100V 1A, DC 30V 1A(Resistive)	AC100V 0.1A, DC30V 0.1A(Resistive)
Insulation Resistance	100M Ω at 500V DC	
Dielectric Strength	Connector part 800V AC ( Switch 1000V AC RMS between NC and NO terminal 1500V AC RMS between terminals and ground ) 50/60Hz for 60 sec. at normal ambient temperature and humidity	Connector part 800 VAC ( Switch 600 VAC RMS between NC and NO terminal 1500 VAC RMS between terminals and ground ) 50/60 Hz for 60 sec. at normal ambient temperature and humidity
Contact Resistance	40mΩ or less (initial) [Switch contact part 30mΩ or less (initial)] Using fall-of-potential method at DV6V 1A	60mΩ or less (initial) [Switch contact part 50mΩ or less (initial)] Using fall-of-potential method at DV6V 0.1A
No difference in other specifications		

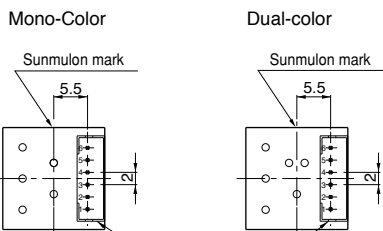
**DIMENSIONS**

● SPDT, Indicator

	Square	Round
<b>Standard Button</b>		
<b>Flat Button</b>		

**TERMINAL LOCATIONS**

● SPDT, Indicator



6	L2(L-)
5	L1(L-)
4	LC
3	NO
2	NC
1	COM
Connector pin No.	Terminal code

Connector in use  
Manufactured by  
JST Mfg. Co., Ltd  
B 6B-PH-K-S

**ACCESSORIES**

● SPDT, Indicator

Part No EH-5180 Connector (1 Housing & 9 contact Pins) to be appended.

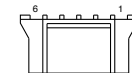
Connector (accessory)

If no connector is required because the wire harness is purchased or for other reasons, please specify the terminal code(N).

Wire harness

Wire rod: Equivalent to UL1061 AWG26

Part No EH-5180

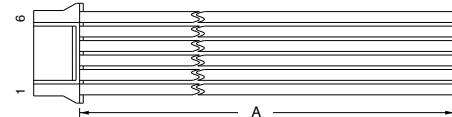


Housing (JST Mfg Co., Ltd. PHR-6)



Contact (JST Mfg Co., Ltd. SPH-002T-P0.5S)

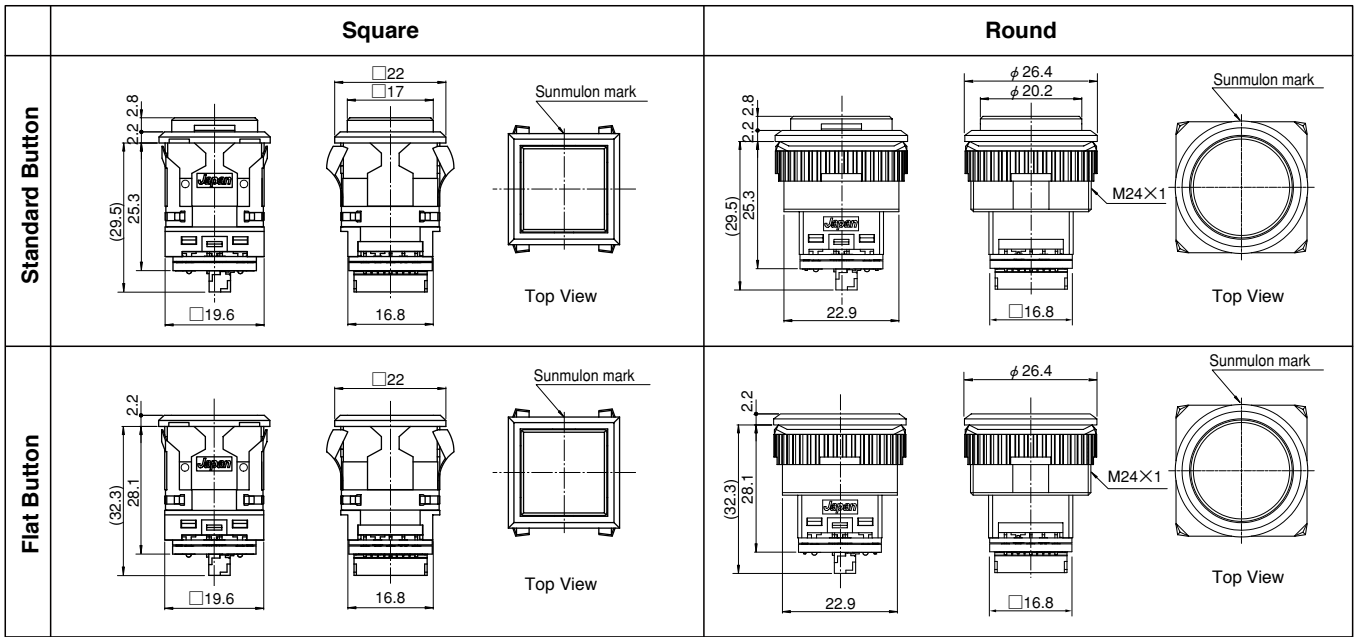
Suitable electric cable: AWG#30~#24



A dimension	Type
100cm	EH-3250-1
200cm	EH-3250-2

Pin No.	1	2	3	4	5	6
Color of cable	Brown	Red	Orange	Yellow	Green	Blue

## DIMENSIONS

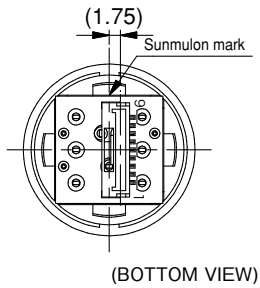


## TERMINAL LOCATIONS

### ● DPDT

9	NO2
8	NC2
7	COM2
6	L2
5	L1
4	LC
3	NO1
2	NC1
1	COM1
Pin No.	Terminal

Connector  
JST made  
BM09B-GHS-TBT

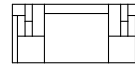


## ACCESSORIES

### ● DPDT

#### ● Connector

Part No **EH-5180** Connector (1 Housing & 9 contact Pins) to be appended.



Housing  
(JST made GHR-09V-S)

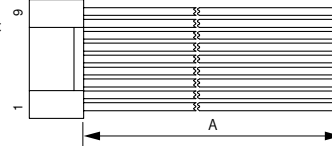


Contact Pin  
(JST made SSSL-002T-P02)

#### ● Wire Harness

Wire : UL1061, AWG26 equivalent

Applicable wire : AWG#30~#26



A length	Part No
100cm	EH-5177-1
200cm	EH-5177-2

Pin no.	1	2	3	4	5	6	7	8	9
Wire Color	Brown	Red	Orange	Yellow	Green	Blue	Purple	Gray	White



ORDERING CODE

LED Illumination **EH**  - **G**   **1:2**

● OPERATION

M	Momentary
A	Alternate
L	Indicator
F	Flat Indicator ※4)

● CONTACT

0	Indicator
3	SPDT Silver (Gold-Plated)
4	DPDT Silver (Gold-Plated)
5	SPDT W/E Alloy #1Crossbar
6	DPDT W/E Alloy #1Crossbar

● BUTTON SHAPE ILLUMINATION TYPE

L0	Square standard Full-face, Mono color	
F0	Square flat Full-face, Mono color	※4)
R0	Round standard Full-face, Mono color	
Y0	Round flat Full-face, Mono color	※4)
L3	Square standard Full-face, Dual colors	※1) ※2)
F3	Square flat Full-face, Dual colors	※1) ※2) ※4)
R3	Round standard Full-face, Dual colors	※1) ※2)
Y3	Round flat Full-face, Dual colors	※1) ※2) ※4)

● LED COLOR

70	Red	Full-Face, Mono Color : Put color no. into the frame 1
80	Green	
※ 90	Yellow	Full-Face, Dual color : Put color no. into the frame 1,2 ( 70 / 80 , 80 / 90 , 90 / 70 ) Combination only
14	Super Blue	
16	Super White	
18	Super Green	
X	Without LED	

● Supply Voltage to LED ※2)

1	5V Built-in Resistor
2	12V Built-in Resistor
3	24V Built-in Resistor
4	5V Non-Resistor
5	12V Non-Resistor
6	24V Non-Resistor
X	Without LED

Note: The type without resistance has a different voltage depending on the wiring of the LED.

● TERMINAL

P	#110 Tab, Soldering
C	Printed Circuit
K	Connector
N	Without Connector ※5)

● FILTER COLOR ※1)

1	Red
2	Green
※ 3	Yellow
4	Milk White
6	Blue
X	Without Filter

● BUTTON COLOR ※3)

R	Red
G	Green
※ Y	Yellow
M	Milk White
B	Blue
C	Clear

\* Button, filter and LED are in orange-yellow.

● Housing

K	Black
H	Gray
S	Silver

● Precautions

- \*1) In the case of a full-face, dual-color LED consisting of three pieces, we recommend that you use a transparent button and a milky white filter. When it is made of a single piece, we recommend using a milky white button.
- \*2) In the case of a unit with built-in resistance, a full-face and dual-color LED, it is impossible to illuminate the two colors at the same time in the case of all voltages including 5V, 12V and 24V. To illuminate the two colors at the same time, it is necessary to choose usage voltage code, 4, 5 or 6.
- \*3) If you do not require a button, please order the illuminating parts and main body separately.
- \*4) Flat Indicator button level is Flat.(locked position) Therefore, Flat Indicator cannot be selected button shape code (F0, Y0, F3, Y3). Please specify (L0, R0, L3, R3).
- \*5) If you purchase a wire harness separately, please specify N(without connector).

When ordering a unit with dual-color illumination:

Dual-color illumination

In the case of a unit with built-in resistance, it is impossible to illuminate the two colors at the same time in the case of all voltages, including 5V, 12V and 24V. To illuminate the two colors at the same time, it is necessary to choose usage voltage code, 4, 5 or 6 and to connect the series as follows. Code 4: 36, 1/4W; code 5: 270, 1/4W; code 6: 1.1k, 1/2W. Alternatively, use EH-3210-2C (for socket 5V), EH-3210-2D (for 12V) and EH-3210-2E (for 24V).

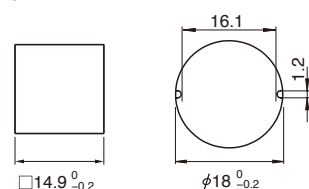
\* Since the dual-color non resistor type has different circuits for the 5V, 12V and 24V, please indicate that the unit is one without resistance, in addition to specifying the usage voltage code of 4, 5 or 6.

\* Even after following the above instructions, the two colors may not illuminate at the same time. However, there should be no problem if the failure lasts for only a short time (two to three minutes).

PRECAUTIONS

1. Solder the terminal at 380°C within three seconds. Please do not touch the switch with a soldering iron as it may deform the terminal part and cause a malfunction.
  2. Please do not move the terminal part while soldering or within one minute after soldering is complete.
  3. Check the rated voltage indicated on the side of the illuminating part.
  4. Character films are not included. When using a character film, please use a heat resistant film 0.1 mm thick or less. For the dimensions, please refer to the table on the right.
  5. Please use a torque of 1.0 N.m or less when tightening the screws to attach the panel.
- \* For precautions other than the above, please see pages 30 to 34 in the general catalogue.

Square Button      Round Button



## ORDERING CODE

### Light Cartridge

#### LED

EH - G  1 2

#### ● BUTTON SHAPE ILLUMINATION TYPE

L0	Square standard	Full-face, Mono color	
F0	Square flat	Full-face, Mono color	
R0	Round standard	Full-face, Mono color	
Y0	Round flat	Full-face, Mono color	
L3	Square standard	Full-face, Dual colors	※1) ※2)
F3	Square flat	Full-face, Dual colors	※1) ※2)
R3	Round standard	Full-face, Dual colors	※1) ※2)
Y3	Round flat	Full-face, Dual colors	※1) ※2)

#### ● LED COLOR

70	Red	Full-Face, Mono color : Put color no. into the frame 1 Full-Face, Dual color : Put color no. into the frame 1,2 ( 70 / 80 , 80 / 90 , 90 / 70 ) Combination only
80	Green	
※ 90	Yellow	
14	Super Blue	
16	Super White	
18	Super Green	
X	Without LED	

- \*1) In the case of a full-face, dual-color LED consisting of three pieces, we recommend that you use a transparent button and a milky white filter. When it consists of a single piece, please use a milky white button.
- \*2) In the case of a unit with built-in resistance with a full-face, dual-color LED, it is impossible to illuminate the two colors at the same time in the case of all voltages, including 5V, 12V and 24V. To illuminate the two colors at the same time, please choose voltage code, 4, 5 or 6.

#### ● Supply Voltage to LED ※2)

1	5V Built-in Resistor
2	12V Built-in Resistor
3	24V Built-in Resistor
4	5V Non-Resistor
5	12V Non-Resistor
6	24V Non-Resistor
X	Without LED

Note: The type without resistance has a different voltage depending on the wiring of the LED.

#### ● FILTER COLOR ※1)

1	Red
2	Green
※ 3	Yellow
4	Milk White
6	Blue
X	Without Filter

#### ● BUTTON COLOR

R	Red
G	Green
※ Y	Yellow
M	Milk White
C	Clear
B	Blue
X	Without Button

\* Button, filter and LED are in orange-yellow.

## ORDERING CODE

### Housing

EH  - G

#### ● OPERATION

M	Momentary
A	Alternate
L	Indicator
A	Flat Indicator

#### ● CONTACT

0	Indicator
3	SPDT Silver (Gold-Plated)
4	DPDT Silver (Gold-Plated)
5	SPDT W/E Alloy #1Crossbar
6	DPDT W/E Alloy #1Crossbar

#### ● BUTTON SHAPE ILLUMINATION TYPE

L0	Square standard	Full-face, Mono color
F0	Square flat	Full-face, Mono color
R0	Round standard	Full-face, Mono color
Y0	Round flat	Full-face, Mono color
L3	Square standard	Full-face, Dual colors
F3	Square flat	Full-face, Dual colors
R3	Round standard	Full-face, Dual colors
Y3	Round flat	Full-face, Dual colors

#### ● TERMINAL

P	#110 Tab, Soldering
C	Printed Circuit
K	connector
N	Without Connector

#### ● Housing

K	Black
H	Gray
S	Silver