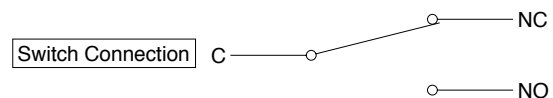


KH Miniature Lighted Pushbutton Switch

**Full-Face, Split-Face, Dual-Color with built-in resistor.
Oil and Water-Tight Version to IP65 available.**

■ FEATURES

- $\phi 16\text{mm}$ (.627") mounting hole.
- Depth behind panel : Only 22mm.
- Full-Face, Split-Face, Dual-Color illumination available.
- Built-in resistor for 5V, 12V, 24V use.
- Light Cartridge is removable from front panel.
- Button Size: 14.2mm square type, 14.2×20.2mm rectangular type.
- Precision-snap action switch movement with coil spring assures long life and outstanding tactile feedback.
- Silver Contact (Gold-Plated) and W/E Alloy #1 Cross-bar Contact provided.
- Accessories: Guard Cover, Mounting Wrench, Switch Unit Removal Tool.



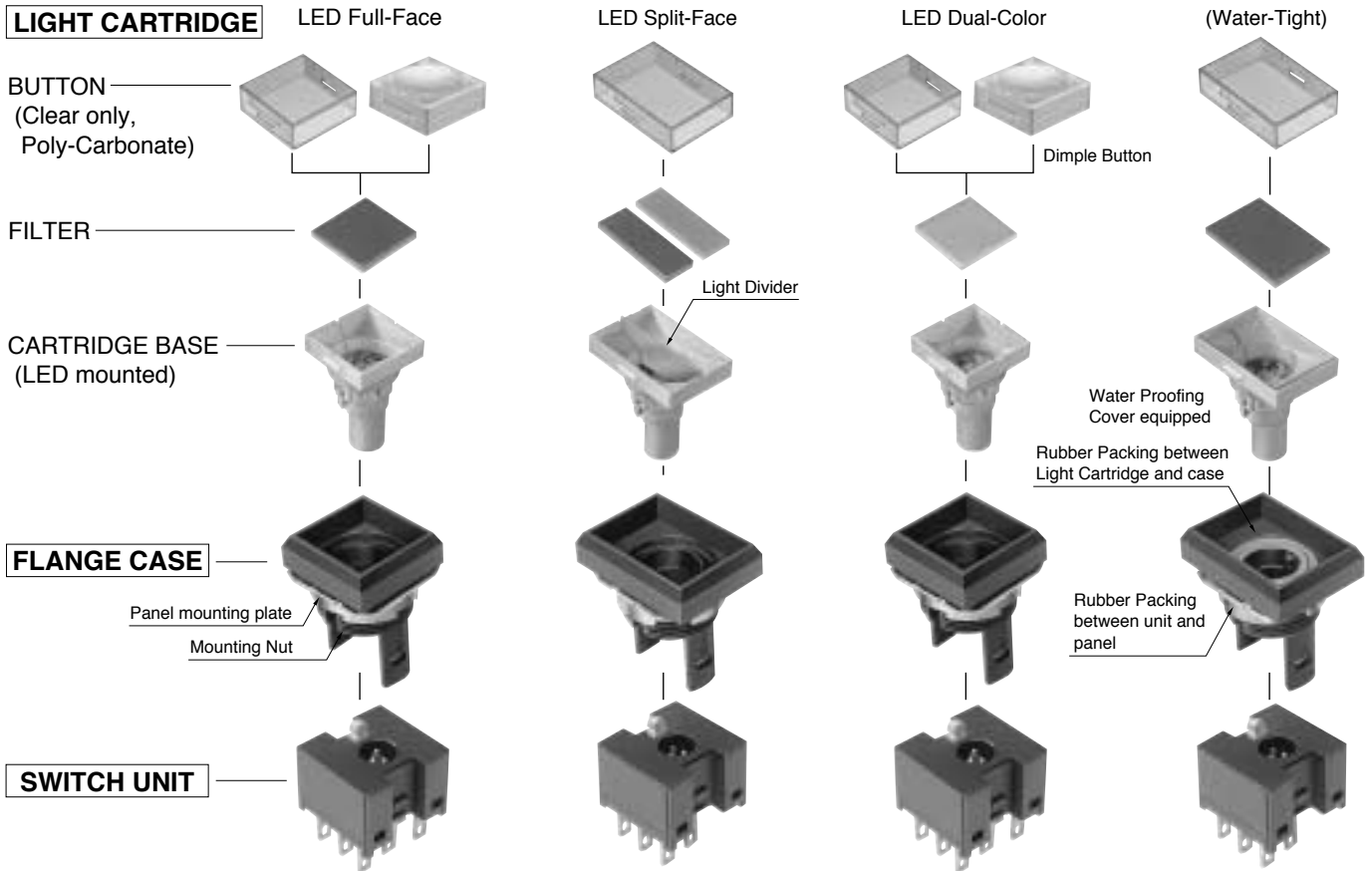
SPECIFICATIONS

| 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) |
| Insulation Resistance | More than 100M Ω 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 30m Ω (Initial) at DC6V 1A | Less than 50m Ω (Initial) at DC6V 0.1A |
| Mechanical Life | Momentary Action :more than 2,000,000 operations | Alternate Action : more than 200,000 operations |
| Electrical Life | More than 100,000 operations at max. rated load | |
| Ambient Temperature | -15°C to +50°C | |
| Ambient Humidity | 80% RH (max.) | |

OPERATING CHARACTERISTICS

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

STRUCTURE



DIMENSIONS

| | | | |
|--------------------------|--|--|---|
| 14.2mm Square Button | | | <p>MULON mark</p> <p>Top View</p> <p>*3.9 for Dimple Button</p> |
| 14.2×20.2mm Rect. Button | | | <p>MULON mark</p> <p>Top View</p> |

INTERNAL CONNECTION ARRANGEMENTS

●LED (Red, Green, Yellow)

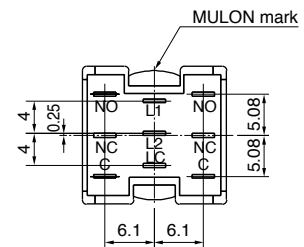
| | (V) | Full-Face | Dual-Color | Split-Face |
|-----------------------------|----------|-----------|------------|---|
| LED Full-Face (Square) | 5V | | | |
| | 12V, 24V | | | <p>*Cannot apply built-in resistor type for 24V. *Please inquire when cathode common type needed.</p> |
| LED Full-Face (Rectangular) | 5V | | | |
| | 12V, 24V | | | <p>*Cannot apply built-in resistor type for 24V. *Please inquire when cathode common type needed.</p> |

TERMINALS

●TERMINALS LAYOUT (Square, Rectangular)

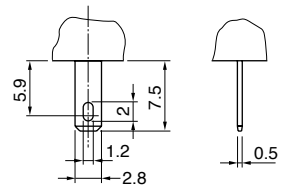
| | STDP | DTDP | INDICATOR |
|------------------------|------|------|-----------|
| Full-Face | | | |
| Dual-Color, Split-Face | | | |

●TERMINALS DIMENSIONS (BOTTOM VIEW)



*Full Face type has no L2 terminal.

●TERMINAL SHAPE



110 TAB, Soldering Terminal

Tolerance : $\pm 0.4\text{mm}$

LED DATA

* Red=R, Yellow=Y, Green=G,

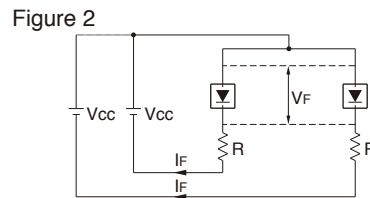
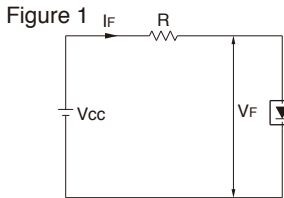
LED RATINGS

| DC Supply Voltage (V) | Current Rating (mA) | | |
|-----------------------|---------------------|------------|------------|
| | Full-Face | Split-Face | Dual-Color |
| 5 (±5%) | 32 | 16 | 32 |
| 12 (±5%) | 16 | 16 | 16 |
| 24 (±5%) | 12 | | 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 | Full-Face | | | | | | Split-Face | | | Dual-Color | | | |
|--|-----------|-----|-----|-----------|-----|-----|--------------|-----|-----|------------|-----|-----------|-----|
| | DC5V | | | DC12V,24V | | | DC5V,12V,24V | | | DC5V | | DC12V,24V | |
| | R | G | Y | R | G | Y | R | G | Y | R | G | R | G |
| Max. operating current I_{FM} (mA) | 40 | 40 | 40 | 20 | 20 | 20 | 20 | 20 | 20 | 50 | 40 | 25 | 20 |
| DC reverse voltage V_R (V) | 10 | 10 | 10 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | 10 | 20 | 20 |
| Forward voltage V_F (V) | 3.6 | 4.3 | 4.0 | 7.1 | 8.6 | 8.0 | 3.6 | 4.3 | 4.0 | 3.8 | 4.2 | 7.6 | 8.4 |
| Recommended operating current I_F (mA) | 32 | 32 | 32 | 16 | 16 | 16 | 16 | 16 | 16 | 7 | 26 | 4 | 14 |
| Wiring diagram | Fig. 1 | | | | | | Fig. 2 | | | | | | |



The value of the series resistor can be determined by the formula:

$$R = \frac{V_{CC} - V_F}{I_F}$$

V_{CC} : Supply Voltage
 V_F : Forward Voltage
 I_F : Forward Current

Panel Layout / Panel Cut Dimensions

14.2mm Square

Panel thickness: 0.5 ~ 3.2mm

| | Panel Layout | Panel Cut Dimensions |
|---------------------|--------------|----------------------|
| Without Guard Cover | | |
| With Guard Cover | | |

14.2x20.2mm Rect. Button

| | Panel Layout | Panel Cut Dimensions |
|---------------------|--------------|----------------------|
| Without Guard Cover | | |
| With Guard Cover | | |

n : number of switches (horizontal) m : number of switches (vertical)

*Panel Cut Dimension should be after panel paintings.

Note : Panel thickness: 0.5~2.2mm for Guard Cover use
 Panel thickness: 0.5~2.7mm for Oil and Water-Tight Version

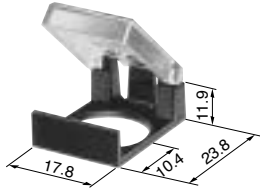
Tolerance : ±0.4mm

ACCESSORIES

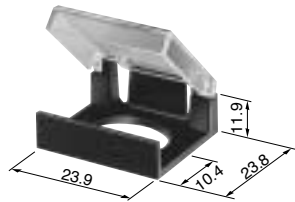
GUARD COVER

Guard Cover prevents inadvertent and unintentional operations.

● 14.2mm Square Button



● 14.2×20.2mm Rect. Button



| PART NO. | | |
|----------|-----------|-------------|
| Color | Squre | Rectangular |
| Black | KH-1565-K | KH-1566-K |
| Gray | KH-1565-H | KH-1566-H |

*The cover to be opened 90° and stopped.

MOUNTING WRENCH

Recommended tool for mounting KH series.



PART NO. MH-448

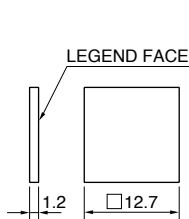
SWITCH UNIT REMOVING TOOL

Recommended for removing switch unit from flange case.

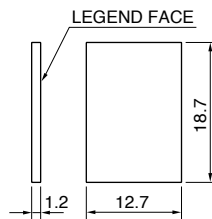


PART NO. KH-1496

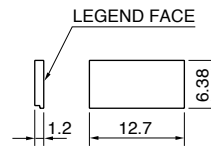
FILTER DIMENSIONS



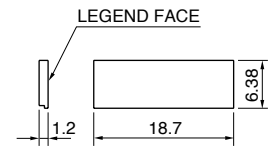
KH-1491



KH-1494



KH-1492



KH-1495

REPLACEMENT PARTS

● Button

| ITEM | PART NO. |
|----------------------|----------|
| Square Button | KH-1490 |
| Rect. Button | KH-1493 |
| Square Dimple Button | KH-1597 |

● Filter

| ITEM | Color | Red | Green | Yellow | Milk-White |
|--------------------------|-------|------------|------------|------------|------------|
| Square Full-Face Filter | | KH-1491-LR | KH-1491-LG | KH-1491-LY | KH-1491-LM |
| Rect. Full-Face Filter | | KH-1494-LR | KH-1494-LG | KH-1494-LY | KH-1494-LM |
| Square Split-Face Filter | | KH-1492-LR | KH-1492-LG | KH-1492-LY | KH-1492-LM |
| Rect. Split-Face Filter | | KH-1495-LR | KH-1495-LG | KH-1495-LY | KH-1495-LM |

● Panel Mounting Washer KH-1473



● Panel Mounting Nut KH-1474



● Rubber Packing for Panel Mounting KH-1475 (Water-Tight Type)



● Split-Face Divider

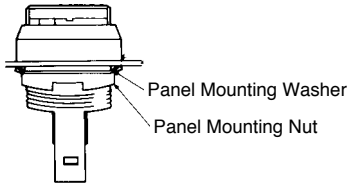
| | |
|-------------------|-----------|
| Square Split-Face | KH-1497-1 |
| Rect. Split-Face | KH-1498-1 |

Tolerance : ±0.4mm

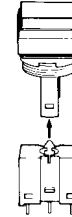
ASSEMBLY & DISASSEMBLY

1. Mounting Switch

(1) Insert Flange Case from front of panel, and fit the panel mounting washer from rear and tighten mounting nut with mounting wrench (MH-448).

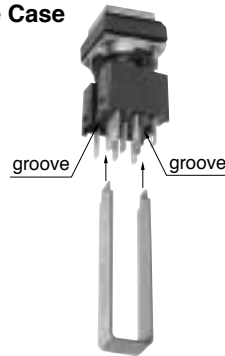


(2) Combine Flange Case and Switch Unit with right direction until click.



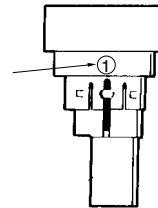
2. Removing Switch Unit from Flange Case with removing tool(KH-1496).

Insert nails into grooves as shown and push in until click. And remove carefully not to break legs of Flange Case.



3. Indicating supply voltage to LED

Indicating code number of voltage as shown.



| No. | Voltage |
|-----|-------------------------|
| 1 | 5V Built-in Resistor |
| 2 | 12V Built-in Resistor |
| 3 | 24V Built-in Resistor |
| 4 | 5V Non-Resistor |
| 5 | 21V, 24V Non-Resistor |
| 6 | Split-Face non resistor |
| | Without LED |

ORDERING CODE

LED Illumination



● **OPERATION**

| | |
|---|-----------|
| M | Momentary |
| A | Alternate |
| L | Indicator |

● **CONTACT**

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

● **BUTTON SHAPE, ILLUMINATION TYPE**

| | |
|------|---------------------------------|
| * S0 | Square Full-Face |
| W0 | Rect. Full-Face |
| S2 | Square Split-Face |
| W2 | Rect. Split-Face |
| S3 | Square Dual-Color |
| W3 | Rect. Dual-Color |
| K0 | Square Dimple Button Full-Face |
| K2 | Square Dimple Button Split-Face |
| K3 | Square Dimple Button Dual-Color |

● **LED COLOR**

| | | |
|---|-------------|--|
| 7 | Red | Full-Face : Put color no. into the frame 1 Split-Face : Put color no. into the frame 1,2 Dual-Color Put 7,8 . into the frame 1,2 |
| 8 | Green | |
| 9 | Yellow | |
| × | Without LED | |

● **PROTECTION**

| | |
|---|------------------------------------|
| A | No Protection |
| B | Oil and Water-tight (IP65) version |

● **Supply Voltage to LED**

| | |
|---|-------------------------|
| 1 | 5V Built-in Resistor |
| 2 | 12V Built-in Resistor |
| 3 | 24V Built-in Resistor |
| 4 | 5V Non-Resistor |
| 5 | 12V, 24V Non-Resistor |
| 6 | Non-Resistor Split-Face |
| × | Without LED |

● **HOUSING**

| | |
|---|-------|
| K | Black |
| H | Gray |

● **BUTTON COLOR**

| | |
|---|------------|
| C | Clear |
| × | W/O Button |

● **TERMINAL**

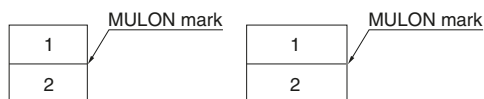
| | |
|---|---------------------|
| P | #110 Tab, Soldering |
| C | PCB |

● **FILTER COLOR**

| | | |
|---|----------------|--|
| 1 | Red | Full-Face : Put color no. into the frame 1 Split-Face : Put color no. into the frame 1,2 Dual-Color Put 4 . into the frame 1 |
| 2 | Green | |
| 3 | Yellow | |
| 4 | Milk-White | |
| × | Without-Filter | |

● **NOTES**

1) In case of Split-Face, LED and Filter color location should be specified as follow.



- 2) In case of Dual-Color, Red and Green combination only, filter color to be Milk-White.
- 3) Dimple Button type is only for Square button.
- 4) Please be noted that the color of "Yellow" for LED, Filter is actually "Orange Yellow" not Lemon Yellow.

Notes for Split-Face and Dual-Color Illumination type

In case of using Split-Face & Dual-Color, sometimes built-in resistor type cannot be used because of heating. Please note followings:

1. Split-Face

- (1) 5V use : Select 1 (5V built-in resistor). Simultaneous lighting is possible.
- (2) 12V use: Select 2 (12V built-in resistor). However in case of simultaneous lighting, please select 6 (Split-Face non resistor) and apply external resistor accordingly.
- (3) 24V use : Either do or not do simultaneous lighting, cannot select 3 (24V built-in resistor). Please select 6 (Split-Face non resistor) and apply external resistor accordingly. Simultaneous lighting is possible.

2. Dual Color

It is impossible to do simultaneous lighting with all 5V,12V,24V. In case of simultaneous lighting , please select 4,5, respectively and apply external resistor.

ORDERING CODE2

It is possible to order Light Cartridge, Flange Case, Switch Unit individually.

LIGHT CARTRIDGE

KH — 1 2 1 2

● BUTTON SHAPE, ILLUMINATION TYPE

| | |
|----|-------------------|
| S0 | Square Full-Face |
| W0 | Rect. Full-Face |
| S2 | Square Split-Face |
| W2 | Rect. Split-Face |
| S3 | Square Dual-Color |
| W3 | Rect. Dual-Color |

| | |
|----|--------------------------|
| K0 | Dimple B. Sq. Full-Face |
| K2 | Dimple B. Sq. Split-Face |
| K3 | Dimple B. Sq. Dual-Color |

● BUTTON COLOR

| | |
|---|----------------|
| C | Clear |
| × | Without Button |

● PROTECTION

| | |
|---|------------------------------------|
| A | No Protection |
| B | Oil and Water-tight (IP65) version |

● Supply Voltage to LED

| | |
|---|-------------------------|
| 1 | 5V Built-in Resistor |
| 2 | 12V Built-in Resistor |
| 3 | 24V Built-in Resistor |
| 4 | 5V Non-Resistor |
| 5 | 12V, 24V Non-Resistor |
| 6 | Non-Resistor Split-Face |
| × | Without LED |

● FILTER COLOR

| | | |
|---|------------|--|
| 1 | Red | Full-Face : Put color no. into the frame 1 Split-Face : Put color no. into the frame 1,2 Dual-Color Put 4 . into the frame 1 |
| 2 | Green | |
| 3 | Yellow | |
| 4 | Milk-White | |
| × | | Without Filter |

● LED COLOR

| | | |
|---|--------|--|
| 7 | Red | Full-Face : Put color no. into the frame 1 Split-Face : Put color no. into the frame 1,2 Dual-Color Put 7,8 . into the frame 1,2 |
| 8 | Green | |
| 9 | Yellow | |
| × | | Without LED |

ORDERING CODE2

FLANGE CASE

KH —

● OPERATION

| | |
|---|------------------------|
| S | Momentary or Alternate |
| L | Indicator |

● PROTECTION

| | |
|---|------------------------------------|
| A | No Protection |
| B | Oil and Water-tight (IP65) version |

● HOUSING

| | |
|---|--------|
| S | Square |
| W | Rect. |

● HOUSING COLOR

| | |
|---|-------|
| K | Black |
| H | Gray |

SWITCH UNIT

KH —

● OPERATION

| | |
|---|-----------|
| M | Momentary |
| A | Alternate |
| L | Indicator |

● TERMINAL

| | |
|---|---------------------|
| P | #110 Tab, Soldering |
| C | PCB |

● 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 |

● ILLUMINATION TYPE

| | |
|---|------------------------|
| D | FULL FACE |
| E | SPLIT FACE, DUAL-COLOR |
| × | WITHOUT LED |