Sunmulon

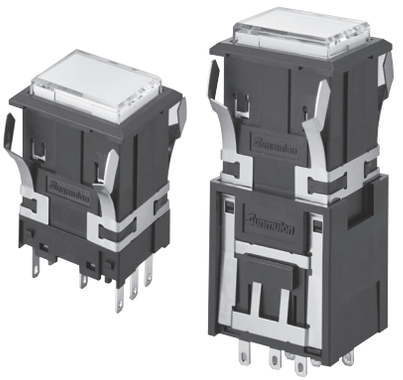
SP Illuminated Pushbutton Switch

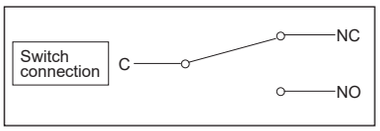
SP

High reliability, 5 million mechanical lifetimes.

DC110V Direct input compliant
Same as the panel cut-out size of Series 2 using barriers.

- Depth behind panel：Only 37 mm
- Ambient Temperature：−20℃ to +60℃
- LED Full-Face, Dual-Color, Multi-Color, 2-3-4-Split-Face illumination available.
- Also available AC lighting type (Full-Face & 2-Split-Face only).
- DC110V Unit enables illumination with input voltage DC 88 V to 143 V.
  Separate, Anode (+) Common, Cathode (−) Common wiring.
- Conform to the “CE marking” safety standard of Europe.





CHARACTERISTICS

Button Size		Rectangle：18.4×24.4 mm					
Contact Material		Silver contact				Gold-clad contact	
Rated Insulation Voltage (Ui)		250 V				250 V	
Rated Operational Voltage (Ue)		AC 125 V	AC 250 V	DC 125 V	DC 30 V	AC 125 V	DC 30 V
Rated Operational Current (Ie)		3 A	3 A	0.4 A	2 A	0.1 A	0.1 A
Limiting Continuous Current		3 A				0.1 A	
Insulation Resistance		More than 100 MΩ at DC 500 V					
Dielectric Strength		AC 1000 V RMS between NC and NO terminal AC 2000 V RMS between terminals and ground 50/60 Hz for 60 sec. at normal ambient temperature and humidity					
Contact Resistance		Less than 30 mΩ (Initial value)				Less than 50 mΩ (Initial value)	
Vibration Resistance		10 to 55 Hz, Amplitude 1.5 mm					
Shock Resistance		300 m/s² max. (Malfunction)　500 m/s² max. (Destruction)					
Mechanical Life	Momentary	More than 5,000,000 operations					
	Alternate	More than 2,500,000 operations					
Electrical Life (Resistive Load)		More than 100,000 operations at max. rated load					
Operating Force		8 N　max.					
Total Travel		4 mm　max.					
Weight		26.5 g					
Ambient Operating Temperature		−20℃ to +60℃　(No Freeze, No Condensation)					
Ambient Operating Humidity		80%RH max.　(No Condensation)					
Ambient Storage Temperature		−25℃ to +65℃　(No Freeze, No Condensation)					
Ambient Storage Humidity		80%RH max.　(No Condensation)					
IP Code		IP40　(Subject to the panel surface when fixed to the panel.)					
Pollution Degree		3　(2 : In case using in combination with SP-5080-□ or SP-5234.)					

https://www.sunmulon.co.jp/english/products/switch_e/sp.html

◇Dimensions：page SP-4　◇Accessories：page SP-5　◇Ordering code：page SP-6～17
◇Internal connection arrangements：page SP-19～21　◇LED specifications：page SP-22～25　◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28　◇Accessories' dimensions：page SP-29～31

SPECIFICATIONS

		DC Lighting type	DC110V Unit	AC Lighting type
Illumination type	Full-Face	A	A	A
	Dual-Color	A	A	N/A
	Multi-Color	A	N/A	N/A
	2-Split-Face	A	A	A
	3-Split-Face	A	N/A	N/A
	4-Split-Face	A	N/A	N/A
	Non-illumination	N/A	N/A	N/A
Supply voltage to LED	DC5V	A	N/A	N/A
	DC12V	A	N/A	N/A
	DC24V	A	N/A	N/A
	AC12V	N/A	N/A	A
	AC24V	N/A	N/A	A
	DC110V	N/A	A	N/A
Contact	SPDT	A	N/A	A
	DPDT	A	A	A
	3PDT	A	N/A	A
Terminal	#110 Tab Soldering	A	A	A
	PCB	A	N/A	N/A

A : Applicable N/A : Not applicable

STANDARDS

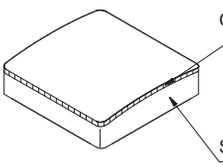
CE marking	
Low Voltage Directive	2014/35/EU
RoHS Directive	2011/65/EU

Approved standards
EN 60947-5-1 : 2017
IEC 60947-5-1 : 2016

CONTACT RATINGS

Utilization category	Contact	
	Silver	Gold-clad
AC-12	125 V 3 A 250 V 3 A	125 V 0.1 A
DC-12	30 V 2 A 125 V 0.4 A	30 V 0.1 A

● Gold-clad contact



Gold alloy

High reliable and durable contact using a gold alloy plate that is thicker than gold plating.

Silver alloy

Minimun applicable load of Gold-clad silver contact : DC 5 V 1 m A.

Feasible area may fluctuate depending on usage conditions and load type.

ILLUMINATION RATINGS

Illumination type	Rated voltage (V) ±5%	
	AC	DC
Full-Face	12	5 12 24
2-Split-Face	24	
3-Split-Face	–	
4-Split-Face		
Dual-Color		
Multi-Color		

Rated current : Please refer to the page 22 - 25 “LED specifications”.

STRUCTURE

LIGHT CARTRIDGE

BUTTON

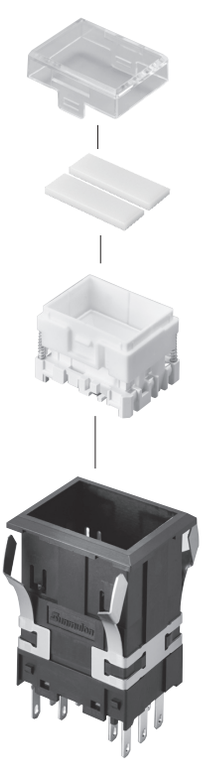
FILTER

LED UNIT

HOUSING

Full-Face
Dual-Color
Multi-Color

2-3-4 Split-Face



ILLUMINATION TYPES

LED color symbol	70 Red	90 Yellow	14 Super Blue	16 Super White	18 Super Green	22 Multi-Color

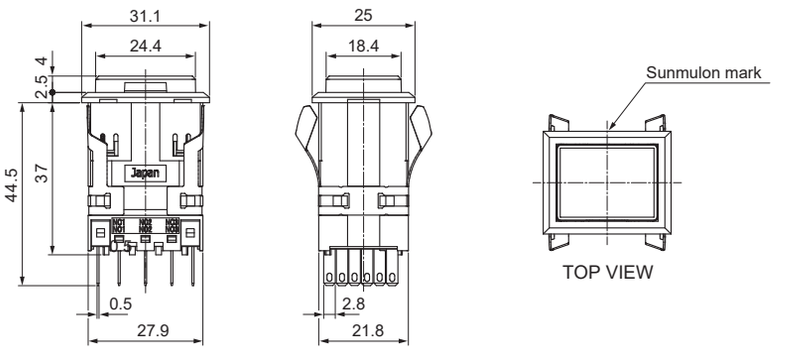
※ Yellow (90) is actually “ORANGE Yellow” not Lemon Yellow.

Full-Face	70 90 14 16 18
Dual-Color	70•14 70•16 70•18 90•70 90•14 90•16 90•18 14•16 16•18 18•14
Multi-Color	22
2-Split-Face	All combinations of LEDs are available except for Multi-color.  2-Split-Face (Vertical)  2-Split-Face (Horizontal)
3-Split-Face	All combinations of LEDs are available except for Multi-color.  3-Split-Face (Vertical) Right  3-Split-Face (Vertical) Left  3-Split-Face (Horizontal) Upside  3-Split-Face (Horizontal) Downside
4-Split-Face	All combinations of LEDs are available except for Multi-color.  4-Split-Face

DIMENSIONS

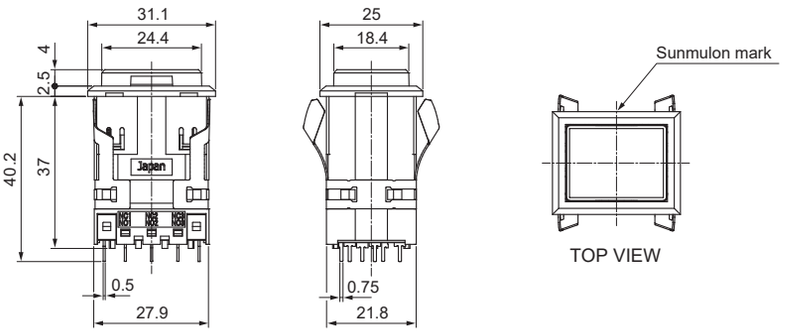
● #110 Tab・Soldering Terminal

3D
DXF



● PCB Terminal

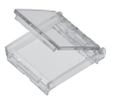
3D
DXF



3D・DXF data download site ： **https://www.sunmulon.co.jp/download/**

Tolerance : ± 0.4 mm

ACCESSORIES

Name	Appearance	Classification		Part no.		Precautions for use
Barrier 3D DXF		Short center barrier		Black	SP-5043-K	- Can be used with guard cover.
				Gray	SP-5043-H	
		Short side barrier		Black	SP-5042-K	
				Gray	SP-5042-H	
		Long center barrier		Black	SP-5045-K	- Cannot be used with guard cover.
				Gray	SP-5045-H	
		Long side barrier		Black	SP-5044-K	
				Gray	SP-5044-H	
Guard cover 3D DXF		For rectangle button		SP-5070		- Cannot be used with long barrier. - The cover to be opened 180° and returned by spring force.
Socket 3D DXF		#110 Tab・ Soldering terminal		Black	SP-5234	- Only contact of switch unit DPDT and Indicator can be specified. - Be used for Full-Face, Dual-Color and 2-Split-Face. (For AC lighting type, only Full-Face is applicable.) - Be used for single unit mounting, consecutive horizontal mounting. - Be used for #110 Tab ・ Soldering terminal type of switch unit.
DC110V unit 3D DXF		Full-Face	for Separate	Black	SP-5080-D	- Only contact of switch unit DPDT and Indicator can be specified. - Be used for Full-Face, Dual-Color and 2-Split-Face. - Specify supply voltage to LED 24V(3) for switch. - Simultaneous lighting is impossible for Dual-Color and 2-Split-Face. - Be used for single unit mounting, consecutive horizontal mounting. - Cannot emitted LED at AC110V. - Be used for #110 Tab ・ Soldering terminal type of switch unit.
			for Cathode common	Black	SP-5080-K	
		Dual-Color	for Anode common	Black	SP-5080-A	
			for Cathode common	Black	SP-5080-K	
		2-Split-Face	for Anode common	Black	SP-5080-A	
			for Cathode common	Black	SP-5080-K	
Removing tool		For removal light cartridge		SJ-0001		- Be used to remove light cartridge from housing.

3D・DXF data download site ： **https://www.sunmulon.co.jp/download/**

◇Accessories' dimensions ：page SP-29～31

ORDERING CODE 【Full-Face】

Assembled Part (Light cartridge and Housing)

SP□ — □W0□C□□□□□□□

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W0	Rectangle

● LED COLOR

70	Red	
90	Yellow	※1)
14	Super-Blue	
16	Super-White	※2)
18	Super-Green	
X	Without LED	

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● LED CIRCUIT

D	Separate	※3)
K	Cathode common	※3)
X	Without LED	

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor
X	Without LED	

For Non-resistor type,
use external protective resistor.

● TERMINAL

P	#110 Tab・Soldering
C	PCB

● FILTER COLOR

1	Red	
2	Green	
3	Yellow	※1)
4	Milk-white	
6	Blue	
8	Lemon Yellow	※2)
X	Without filter	

● NOTES

※1) The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.

※2) When using Lemon Yellow filter (8), specify LED color Super-White (16).

※3) Separate LC1 : Anode L3 : Cathode
Cathode common LC1 : Cathode L3 : Anode

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-19
◇LED specifications：page SP-22
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories’ dimensions：page SP-29～31

ORDERING CODE 【Full-Face】

LIGHT CARTRIDGE

SP— W0 □ C □ □ □ □

● BUTTON SHAPE

W0	Rectangle

● LED COLOR

70	Red	
90	Yellow	※1)
14	Super-Blue	
16	Super-White	※2)
18	Super-Green	
X	Without LED	

● BUTTON COLOR

C	Clear

● FILTER COLOR

1	Red	
2	Green	
3	Yellow	※1)
4	Milk-white	
6	Blue	
8	Lemon Yellow	※2)
X	Without filter	

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor
X	Without LED	

For Non-resistor type,
use external protective resistor.

● OPERATION

L	Indicator
N	Momentary・Alternate

● LED CIRCUIT

D	Separate	※3)
K	Cathode common	※3)
X	Without LED	

● NOTES

※1) The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.

※2) When using Lemon Yellow filter (8), specify LED color Super-White (16).

※3) Separate LC1 : Anode L3 : Cathode
Cathode common LC1 : Cathode L3 : Anode

HOUSING

SP □ — □ W □ □ □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W	Rectangle

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● TERMINAL

P	#110 Tab・Soldering
C	PCB

● HOUSING COLOR

K	Black
H	Gray

ORDERING CODE 【Dual-Color】

Assembled Part (Light cartridge and Housing)

SP□ — □ W3 12 C □ □ □ □ □ □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W3	Rectangle

● LED COLOR

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green

Put the color numbers into frame 1, 2.
(Dual-Color combination)
7014・7016・7018・9070・9014
9016・9018・1416・1618・1814

Yellow (90) is actually "ORANGE Yellow" not Lemon Yellow.

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● FILTER COLOR

4	Milk-white
X	Without filter

● TERMINAL

P	#110 Tab・Soldering
C	PCB

● LED CIRCUIT

D	Separate
A	Anode common (+)
K	Cathode common (−) ※1)

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor

For Non-resistor type,
use external protective resistor.

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● NOTES

※1) This Cathode common (−) is an Anode common (+) type of LED mounted in reverse.
For Cathode common (−) in Separate (D) type, please contact us.

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-19
◇LED specifications：page SP-22
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories' dimensions：page SP-29～31

ORDERING CODE 【Dual-Color】

LIGHT CARTRIDGE

SP—W3 1 2 C □ □ □ □

● BUTTON SHAPE

W3	Rectangle

● LED COLOR

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green

Put the color numbers into frame 1, 2.
(Dual-Color combination)
7014・7016・7018・9070・9014
9016・9018・1416・1618・1814

Yellow (90) is actually "ORANGE Yellow" not Lemon Yellow.

● BUTTON COLOR

C	Clear

● FILTER COLOR

4	Milk-white
X	Without filter

● OPERATION

L	Indicator
N	Momentary・Alternate

● LED CIRCUIT

D	Separate
A	Anode common (+)
K	Cathode common (−) ※1)

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor

For Non-resistor type,
use external protective resistor.

● NOTES

※1) This Cathode common (−) is an Anode common (+) type of LED mounted in reverse.
For Cathode common (−) in Separate (D) type, please contact us.

HOUSING

SP □ — □ W □ □ □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W	Rectangle

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● TERMINAL

P	#110 Tab・Soldering
C	PCB

● HOUSING COLOR

K	Black
H	Gray

ORDERING CODE 【Multi-Color】

Assembled Part (Light cartridge and Housing)

SP□ — □ W022C□ 4 □□□□

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W0	Rectangle

● LED COLOR

22	Multi-color

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● FILTER COLOR

4	Milk-white

● TERMINAL

P	＃110 Tab・Soldering
C	PCB

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor

For Non-resistor type,
use external protective resistor.

● LED CIRCUIT

A	Anode common (＋)
K	Cathode common (－) ※1)

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● NOTES

※1) This Cathode common (－) is an Anode common (＋) type of LED mounted in reverse.
For internal connection arrangements, refer to “Multi-color combination” table on page SP-20.

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-20
◇LED specifications：page SP-23
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories’ dimensions：page SP-29

ORDERING CODE 【Multi-Color】

LIGHT CARTRIDGE

SP— W0 22 C □ □ □ □

● BUTTON SHAPE

W0	Rectangle

● LED COLOR

22	Multi-color

● BUTTON COLOR

C	Clear

● FILTER COLOR

4	Milk-white
X	Without filter

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor

For Non-resistor type,
use external protective resistor.

● LED CIRCUIT

A	Anode common (＋)
K	Cathode common (－) ※1)

● OPERATION

L	Indicator
N	Momentary・Alternate

● NOTES

※1) This Cathode common (－) is an Anode common (＋) type of LED mounted in reverse.
For internal connection arrangements, refer to “Multi-color combination” table on page SP-20.

HOUSING

SP □ — □ W □ □ □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W	Rectangle

● HOUSING COLOR

K	Black
H	Gray

● TERMINAL

P	＃110 Tab・Soldering
C	PCB

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

ORDERING CODE 【2・3・4-Split-Face】

Assembled Part (Light cartridge and Housing)

SP□ — □□ 1234 C □ 1234 □□□□

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE・ILLUMINATION TYPE

W1	Rect. 2-Split-Face (Vertical)
W2	Rect. 2-Split-Face (Horizontal)
W4	Rect. 3-Split-Face (Vertical) Right
W5	Rect. 3-Split-Face (Vertical) Left
W6	Rect. 3-Split-Face (Horizontal) Upside
W7	Rect. 3-Split-Face (Horizontal) Downside
W8	Rect. 4-Split-Face

● LED COLOR ※1)

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green
X	Without LED

2-Split-Face : Put the color numbers into frame 1, 2.
3-Split-Face : Put the color numbers into frame 1, 2, 3.
4-Split-Face : Put the color numbers into frame 1, 2, 3, 4.

For Non-illuminated
2-Split-Face : Put XX into frame 1, 2.
3-Split-Face : Put XXX into frame 1, 2, 3.
4-Split-Face : Put XXXX into frame 1, 2, 3, 4.

The combination of With LED and Without LED cannot be specified.

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● FILTER COLOR ※1)

1	Red
2	Green
3	Yellow
4	Milk-white
6	Blue
8	Lemon Yellow
X	Without filter

2-Split-Face : Put the color numbers into frame 1, 2.
3-Split-Face : Put the color numbers into frame 1, 2, 3.
4-Split-Face : Put the color numbers into frame 1, 2, 3, 4.

For Without filter
2-Split-Face : Put XX into frame 1, 2.
3-Split-Face : Put XXX into frame 1, 2, 3.
4-Split-Face : Put XXXX into frame 1, 2, 3, 4.

The combination of With filter and Without filter cannot be specified.

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● LED CIRCUIT ※2)

D	Separate
A	Anode common (+)
K	Cathode common (−)
X	Without LED

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor
X	Without LED	

For Non-resistor type, use external protective resistor.

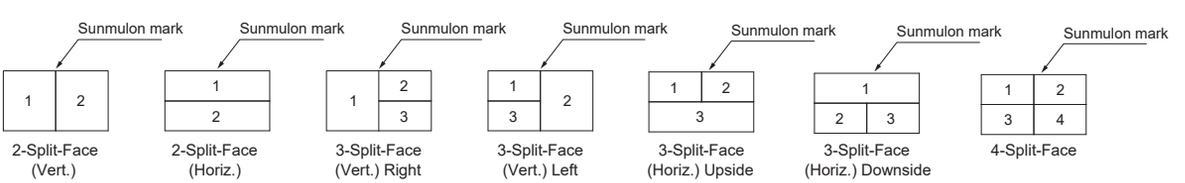
● TERMINAL

P	#110 Tab・Soldering
C	PCB

● NOTES

※1) How to specify the color of LED and filter

Select the color symbols listed in the ordering code, and put them into the frame 1, 2, 3 and 4, referring to the figure below.
The numbers in the figure match the location specified in the ordering code.
The color of "Yellow" for LED (90) and filter (3) is actually "Orange Yellow" not Lemon Yellow.
When using Lemon Yellow filter (8), specify LED color Super-White (16).



※2) Separate type (D) is not available for 3-Split-Face and 4-Split-Face.
This Cathode common (−) is an Anode common (+) type of LED mounted in reverse.
For Cathode common (−) in Separate (D) type, please contact us.

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-20
◇LED specifications：page SP-23～24
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories' dimensions：page SP-29～31

ORDERING CODE 【2・3・4-Split-Face】

LIGHT CARTRIDGE

SP— □ 1 2 3 4 C 1 2 3 4 □ □ □

● BUTTON SHAPE・ILLUMINATION TYPE

W1	Rect. 2-Split-Face (Vertical)
W2	Rect. 2-Split-Face (Horizontal)
W4	Rect. 3-Split-Face (Vertical) Right
W5	Rect. 3-Split-Face (Vertical) Left
W6	Rect. 3-Split-Face (Horizontal) Upside
W7	Rect. 3-Split-Face (Horizontal) Downside
W8	Rect. 4-Split-Face

● BUTTON COLOR

C	Clear

● OPERATION

L	Indicator
N	Momentary・Alternate

● LED CIRCUIT ※2)

D	Separate
A	Anode common (＋)
K	Cathode common (－)
X	Without LED

● LED COLOR ※1)

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green
X	Without LED

2-Split-Face : Put the color numbers into frame 1, 2.
3-Split-Face : Put the color numbers into frame 1, 2, 3.
4-Split-Face : Put the color numbers into frame 1, 2, 3, 4.

For Non-illuminated
2-Split-Face : Put XX into frame 1, 2.
3-Split-Face : Put XXX into frame 1, 2, 3.
4-Split-Face : Put XXXX into frame 1, 2, 3, 4.

The combination of With LED and Without LED cannot be specified.

● Supply Voltage to LED

1	DC 5V	Built-in resistor
2	DC12V	Built-in resistor
3	DC24V	Built-in resistor
4	DC 5V	Non-resistor
5	DC12V	Non-resistor
6	DC24V	Non-resistor
X	Without LED	

For Non-resistor type, use external protective resistor.

● FILTER COLOR ※1)

1	Red
2	Green
3	Yellow
4	Milk-white
6	Blue
8	Lemon Yellow
X	Without filter

2-Split-Face : Put the color numbers into frame 1, 2.
3-Split-Face : Put the color numbers into frame 1, 2, 3.
4-Split-Face : Put the color numbers into frame 1, 2, 3, 4.

For Without filter
2-Split-Face : Put XX into frame 1, 2.
3-Split-Face : Put XXX into frame 1, 2, 3.
4-Split-Face : Put XXXX into frame 1, 2, 3, 4.

The combination of With filter and Without filter cannot be specified.

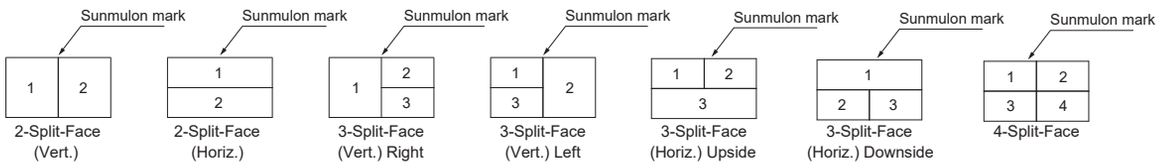
● NOTES

※1) How to specify the color of LED and filter

Select the color symbols listed in the ordering code, and put them into the frame 1, 2, 3 and 4, referring to the figure below.
The numbers in the figure match the location specified in the ordering code.

The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.

When using Lemon Yellow filter (8), specify LED color Super-White (16).



※2) Separate type (D) is not available for 3-Split-Face and 4-Split-Face.
This Cathode common (－) is an Anode common (＋) type of LED mounted in reverse.
For Cathode common (－) in Separate (D) type, please contact us.

HOUSING

SP □ — □ W □ □ □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W	Rectangle

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● TERMINAL

P	＃110 Tab・Soldering
C	PCB

● HOUSING COLOR

K	Black
H	Gray

ORDERING CODE 【AC lighting type / Full-Face】

Assembled Part (Light cartridge and Housing)

SP□ — □ W0□ C□ □ P□ D□ AC

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W0	Rectangle

● LED COLOR

70	Red	
90	Yellow	※1)
14	Super-Blue	
16	Super-White	※2)
18	Super-Green	

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● LED CIRCUIT

D	Separate

● Supply Voltage to LED

2	AC12V Built-in resistor
3	AC24V Built-in resistor

● TERMINAL

P	#110 Tab・Soldering

● FILTER COLOR

1	Red	
2	Green	
3	Yellow	※1)
4	Milk-white	
6	Blue	
8	Lemon Yellow	※2)
X	Without filter	

● NOTES

※1) The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.

※2) When using Lemon Yellow filter (8), specify LED color Super-White (16).

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-21
◇LED specifications：page SP-25
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories’ dimensions：page SP-29～30

ORDERING CODE 【AC lighting type / Full-Face】

LIGHT CARTRIDGE

SP— W0 □ C □ □ D □ AC

● **BUTTON SHAPE**

W0	Rectangle

● **LED COLOR**

70	Red	
90	Yellow	※1）
14	Super-Blue	
16	Super-White	※2）
18	Super-Green	

● **BUTTON COLOR**

C	Clear

● **FILTER COLOR**

1	Red	
2	Green	
3	Yellow	※1）
4	Milk-white	
6	Blue	
8	Lemon Yellow	※2）

● **OPERATION**

L	Indicator
N	Momentary・Alternate

● **LED CIRCUIT**

D	Separate

● **Supply Voltage to LED**

2	AC12V	Built-in resistor
3	AC24V	Built-in resistor

● **NOTES**

※1) The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.

※2) When using Lemon Yellow filter (8), specify LED color Super-White (16).

HOUSING

SP □ — □ W □ P □

● **OPERATION**

L	Indicator
M	Momentary
A	Alternate

● **CONTACT**

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● **BUTTON SHAPE**

W	Rectangle

● **MOUNTING**

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● **TERMINAL**

P	#110 Tab・Soldering

● **HOUSING COLOR**

K	Black
H	Gray

ORDERING CODE 【AC lighting type / 2-Split-Face】

Assembled Part (Light cartridge and Housing)

SP□ — □□ 12 C□ 12 P□ D□ AC

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE・ILLUMINATION TYPE

W1	Rect. 2-Split-Face (Vertical)
W2	Rect. 2-Split-Face (Horizontal)

● LED COLOR ※1)

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green

Put the color numbers into frame 1, 2.

All combinations including same colors can be specified.

● BUTTON COLOR

C	Clear

● HOUSING COLOR

K	Black
H	Gray

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● LED CIRCUIT

D	Separate

● Supply Voltage to LED

2	AC12V Built-in resistor
3	AC24V Built-in resistor

● TERMINAL

P	#110 Tab・Soldering

● FILTER COLOR ※1)

1	Red
2	Green
3	Yellow
4	Milk-white
6	Blue
8	Lemon Yellow
X	Without filter

Put the color numbers into frame 1, 2.

For Without filter
Put XX into frame 1, 2.

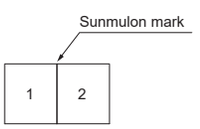
The combination of With filter and Without filter cannot be specified.

● NOTES

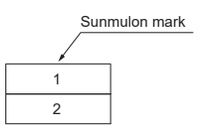
※1) How to specify the color of LED and filter

Select the color symbols listed in the ordering code, and put them into the frame 1 and 2, referring to the figure below.
The numbers in the figure match the location specified in the ordering code.

The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.
When using Lemon Yellow filter (8), specify LED color Super-White (16).



2-Split-Face
(Vert.)



2-Split-Face
(Horiz.)

◇Dimensions：page SP-4
◇Accessories：page SP-5
◇Internal connection arrangements：page SP-21
◇LED specifications：page SP-25
◇Terminals / PCB hole cutout：page SP-26～27
◇Mounting design / Panel cutout：page SP-28
◇Accessories’ dimensions：page SP-29

ORDERING CODE 【AC lighting type / 2-Split-Face】

LIGHT CARTRIDGE

SP— □ 12 C 12 □ D □ AC

● BUTTON SHAPE・ILLUMINATION TYPE

W1	Rect. 2-Split-Face (Vertical)
W2	Rect. 2-Split-Face (Horizontal)

● LED COLOR ※1)

70	Red
90	Yellow
14	Super-Blue
16	Super-White
18	Super-Green

Put the color numbers into frame 1, 2.

All combinations including same colors can be specified.

● BUTTON COLOR

C	Clear

● OPERATION

L	Indicator
N	Momentary・Alternate

● LED CIRCUIT

D	Separate

● Supply Voltage to LED

2	AC12V Built-in resistor
3	AC24V Built-in resistor

● FILTER COLOR ※1)

1	Red
2	Green
3	Yellow
4	Milk-white
6	Blue
8	Lemon Yellow
X	Without filter

Put the color numbers into frame 1, 2.

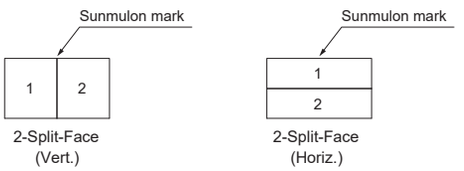
For Without filter
Put XX into frame 1, 2.

The combination of With filter and Without filter cannot be specified.

● NOTES

※1) How to specify the color of LED and filter

Select the color symbols listed in the ordering code, and put them into the frame 1 and 2, referring to the figure below.
The numbers in the figure match the location specified in the ordering code.
The color of “Yellow” for LED (90) and filter (3) is actually “Orange Yellow” not Lemon Yellow.
When using Lemon Yellow filter (8), specify LED color Super-White (16).



HOUSING

SP □ — □ W □ P □

● OPERATION

L	Indicator
M	Momentary
A	Alternate

● CONTACT

0	Indicator
1	SPDT・Silver
2	DPDT・Silver
3	3PDT・Silver
4	SPDT・Gold-clad
5	DPDT・Gold-clad
6	3PDT・Gold-clad

● BUTTON SHAPE

W	Rectangle

● MOUNTING

1	For Horizontal Mtg.
2	For Vertical Mtg.
X	Without Snap spring

● TERMINAL

P	#110 Tab・Soldering

● HOUSING COLOR

K	Black
H	Gray

REPLACEMENT PARTS

● BUTTON

Part no.	SP-5003-CC

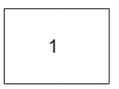
● FILTER

Full-Face

	No.	Red	Green	Yellow	Milk-White	Blue	Lemon Yellow
Part no.	1	SP-5004-R	SP-5004-G	SP-5004-Y	SP-5004-M	SP-5004-B	SP-5004-YY

Dual-Color・Multi-Color

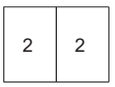
	No.	Milk-White
Part no.	1	SP-5004-M



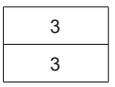
Full-Face
Dual-Color・Multi-Color

Split-Face

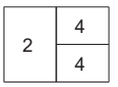
	No.	Red	Green	Yellow	Milk-White	Blue	Lemon Yellow
2・3-Split (Vert.)	2	SP-5006-R	SP-5006-G	SP-5006-Y	SP-5006-M	SP-5006-B	SP-5006-YY
2・3-Split (Horiz.)	3	SP-5005-R	SP-5005-G	SP-5005-Y	SP-5005-M	SP-5005-B	SP-5005-YY
3・4-Split	4	SP-5007-R	SP-5007-G	SP-5007-Y	SP-5007-M	SP-5007-B	SP-5007-YY



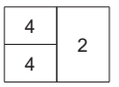
2-Split-Face
(Vert.)



2-Split-Face
(Horiz.)

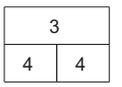


3-Split-Face
(Vert.) Right



3-Split-Face
(Vert.) Left

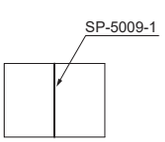
3-Split-Face
(Horiz.) Upside



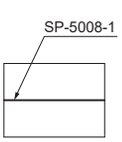
3-Split-Face
(Horiz.) Downside

4-Split-Face

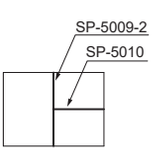
● DIVIDER



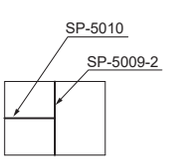
2-Split-Face
(Vert.)



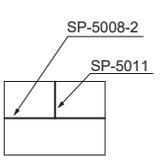
2-Split-Face
(Horiz.)



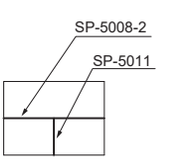
3-Split-Face
(Vert.) Right



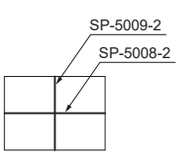
3-Split-Face
(Vert.) Left



3-Split-Face
(Horiz.) Upside



3-Split-Face
(Horiz.) Downside



4-Split-Face

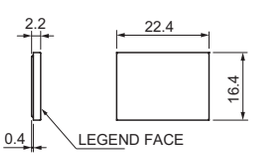
Place divider in the groove inside the LED unit, referring to the figure's position above.

● SNAP SPRING

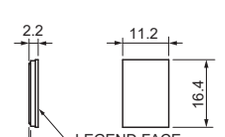
	For Horizontal mounting	For Vertical mounting
Part no.	SP-5023	SP-5024

※Two snap springs are required per unit.

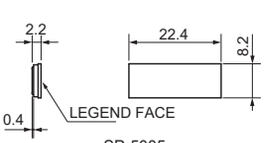
FILTER DIMENSIONS



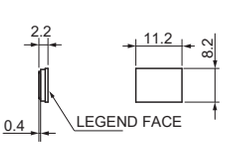
SP-5004



SP-5006



SP-5005

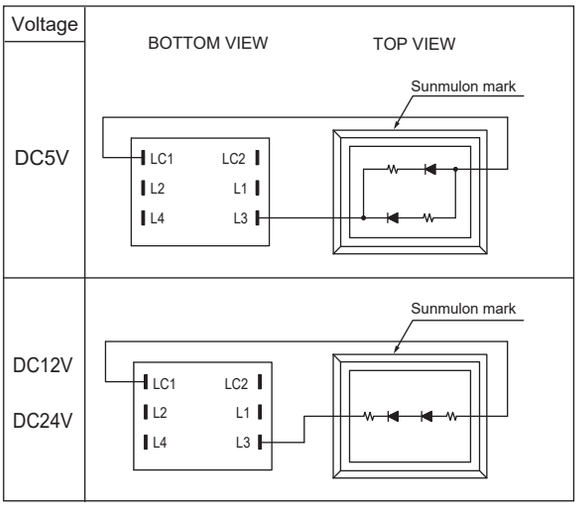


SP-5007

Tolerance : ± 0.4 mm

INTERNAL CONNECTION ARRANGEMENTS

● Full-Face

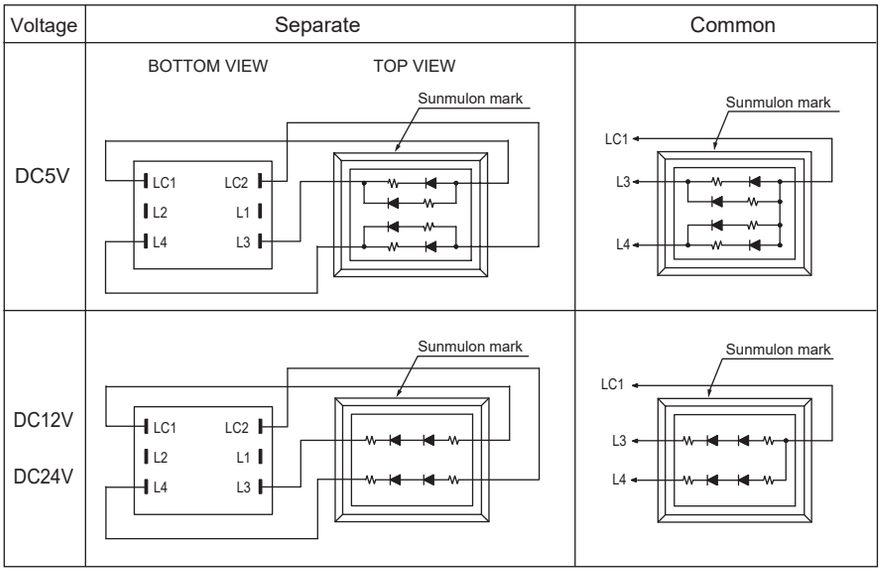


※ These are all internal connection diagrams for built-in resistor type.

※ For Non-resistor type, the resistor part in the diagram should be short- circuited.

※ The common diagram is for Anode Common type.
For Cathode Common type, LED polarity (current flow direction) is opposite.

● Dual-Color



● Dual-Color combination (Common for each voltage)

Separate

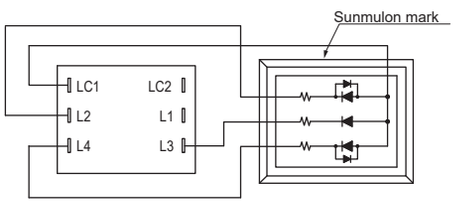
Terminals	LED Color									
LC1-L3	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Super Blue	Super White	Super Green
LC2-L4	Super Blue	Super White	Super Green	Red	Super Blue	Super White	Super Green	Super White	Super Green	Super Blue

Common

Terminals	LED Color									
LC1-L3	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Super Blue	Super White	Super Green
LC1-L4	Super Blue	Super White	Super Green	Red	Super Blue	Super White	Super Green	Super White	Super Green	Super Blue

INTERNAL CONNECTION ARRANGEMENTS

● Multi-Color

Voltage	Common
DC5V DC12V DC24V	BOTTOM VIEW TOP VIEW 

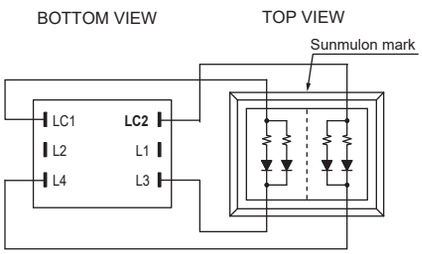
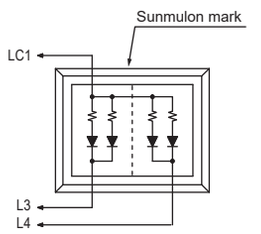
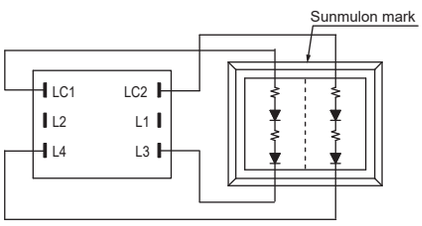
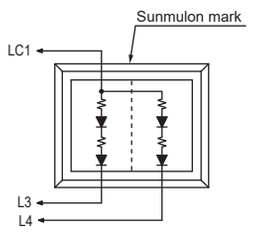
● Multi-Color combination (Common for each voltage)

Terminals	LED Color	
	Anode Common (+)	Cathode Common (−)
LC1-L2	Super-Blue	Red
LC1-L3	Red	Super-Blue
LC1-L4	Super-Green	Super-Green

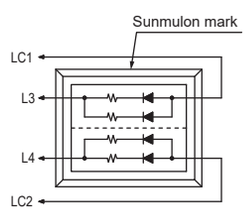
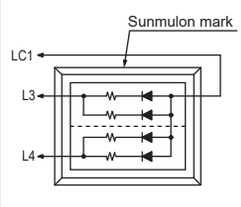
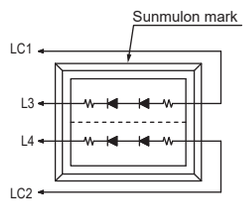
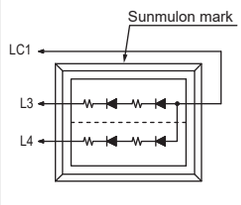
Multi-Color Super-Blue and Super-Green have built-in protection circuit.

● 2・3・4-Split-Face

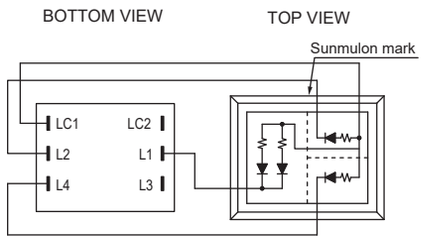
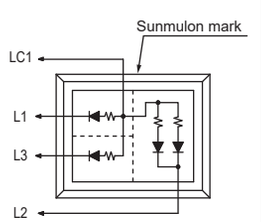
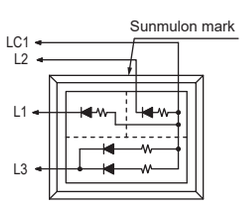
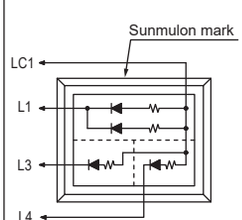
2-Split-Face (Vertical)

Voltage	Separate	Common
DC5V	BOTTOM VIEW TOP VIEW 	
DC12V DC24V		

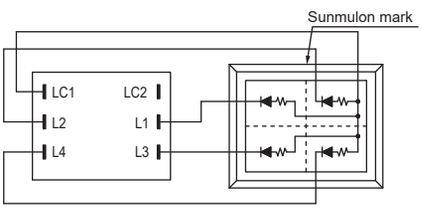
2-Split-Face (Horizontal)

Separate	Common
	
	

3-Split-Face (Common type only)

Voltage	3-Split-Face (Vert.) Right	3-Split-Face (Vert.) Left	3-Split-Face (Horiz.) Upside	3-Split-Face (Horiz.) Downside
DC5V DC12V DC24V	BOTTOM VIEW TOP VIEW 			

4-Split-Face (Common type only)

Voltage	4-Split-Face
DC5V DC12V DC24V	BOTTOM VIEW TOP VIEW 

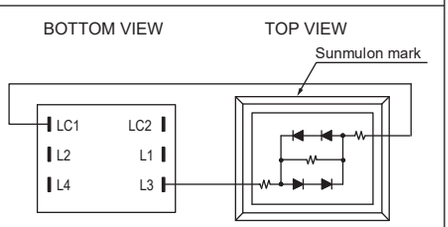
※ These are all internal connection diagrams for built-in resistor type.

※ For Non-resistor type, the resistor part in the diagram should be short- circuited.

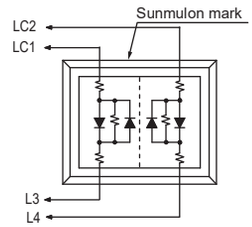
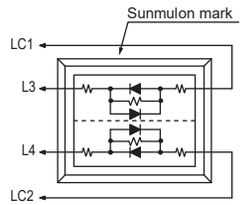
※ The common diagram is for Anode Common type.
For Cathode Common type, LED polarity (current flow direction) is opposite.

INTERNAL CONNECTION ARRANGEMENTS【AC lighting type】

● Full-Face (Separate type only)

Voltage	Full-Face
AC12V AC24V	

● 2-Split-Face (Separate type only)

Voltage	2-Split-Face (Vert.)	2-Split-Face (Horiz.)
AC12V AC24V		

LED SPECIFICATIONS 【Full-Face】

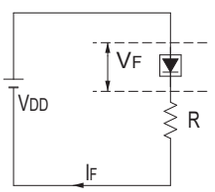
● BUILT-IN RESISTOR

Voltage	Rated Current (mA)				
	Red	Yellow	Super Blue	Super White	Super Green
DC 5V ±5%	7	16	13	11	4
DC12V ±5%	4	8	7	6	2
DC24V ±5%	4	8	7	6	2

● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage		DC5V		DC12V・24V		DC5V			DC12V・24V		
LED Color		Red	Yellow	Red	Yellow	Super Blue	Super White	Super Green	Super Blue	Super White	Super Green
Max. Forward Current I_{FM} (mA)		60	60	30	30	60	60	60	30	30	30
Power Dissipation (mW)		126	126	126	126	183	174	183	183	174	183
DC Reverse Voltage V_R (V)		4	4	8	8	4	4	4	8	8	8
Forward Voltage V_F (Typ.) 【IF=20mA】 (V)		2	2	4	4	2.8	2.8	2.8	5.6	5.6	5.6
Derating (Operating temperature) (over 40℃ working temperature) (mA/℃)		0.76		0.38		0.84	0.9	0.84	0.42	0.45	0.42
Pulse Lighting	Pulse Width PW (μS)	100									
	Duty Ratio DR	10^{-1}									
	Allowable forward current I_{FP} (mA)	200	200	100	100	136	200	136	68	100	68

● Wiring Diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

LED SPECIFICATIONS 【Dual-Color】

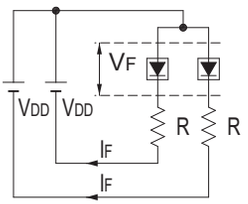
● BUILT-IN RESISTOR

Voltage	Rated Current (mA)				
	Red	Yellow	Super Blue	Super White	Super Green
DC 5V ±5%	7	16	13	11	4
DC12V ±5%	4	8	7	6	2
DC24V ±5%	4	8	7	6	2

● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage		DC5V		DC12V・24V		DC5V			DC12V・24V		
LED Color		Red	Yellow	Red	Yellow	Super Blue	Super White	Super Green	Super Blue	Super White	Super Green
Max. Forward Current I_{FM} (mA)		60	60	30	30	60	60	60	30	30	30
Power Dissipation (mW)		126	126	126	126	183	174	183	183	174	183
DC Reverse Voltage V_R (V)		4	4	8	8	4	4	4	8	8	8
Forward Voltage V_F (Typ.) 【IF=20mA】 (V)		2	2	4	4	2.8	2.8	2.8	5.6	5.6	5.6
Derating (Operating temperature) (over 40℃ working temperature) (mA/℃)		0.76		0.38		0.84	0.9	0.84	0.42	0.45	0.42
Pulse Lighting	Pulse Width PW (μS)	100									
	Duty Ratio DR	10^{-1}									
	Allowable forward current I_{FP} (mA)	200	200	100	100	136	200	136	68	100	68

● Wiring Diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

For resistance value calculation
https://www.sunmulon.co.jp/english/products/led.html
The resistance value can be calculated just by entering the items.

LED SPECIFICATIONS 【Multi-Color】

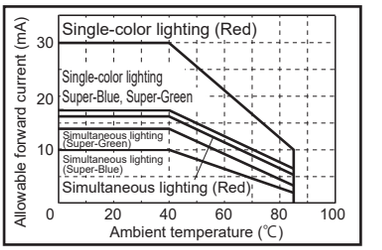
● BUILT-IN RESISTOR

Voltage	Rated Current (mA)		
	Red	Super Green	Super Blue
DC 5V ±5%	5	4	4
DC12V ±5%	5	4	4
DC24V ±5%	5	4	4

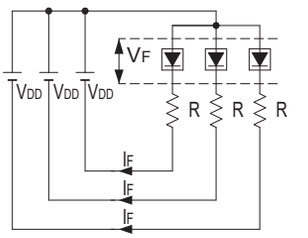
● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage			DC5V・12V・24V		
LED Color			Red	Super Green	Super Blue
Max. Forward Current I_{FM}		(mA)	50	35	25
Power Dissipation		(mW)	127	124	89
			150 (at simultaneous lighting)		
DC Reverse Voltage V_R		(V)	5	—	—
Forward Voltage V_F (Typ.) 【IF=20mA】		(V)	2.2	3.2	3.2
Derating (Operating temperature) (over 40℃ working temperature)		(mA/℃)	Refer to the graph on right		
Pulse Lighting	Pulse Width PW	(μS)	10^4		
	Duty Ratio DR		10^{-1}		
	Allowable forward current I_{FP}	(mA)	150	110	80

● Allowable forward current



● Wiring diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

LED SPECIFICATIONS 【2-Split-Face】

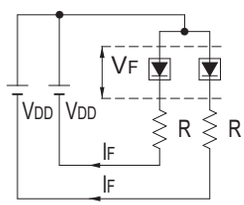
● BUILT-IN RESISTOR

Voltage	Rated Current (mA) (per 1-Screen)				
	Red	Yellow	Super Blue	Super White	Super Green
DC 5V ±5%	8	10	8	8	6
DC12V ±5%	4	5	4	4	3
DC24V ±5%	4	5	4	4	3

● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage			DC5V		DC12V・24V		DC5V			DC12V・24V		
LED Color			Red	Yellow	Red	Yellow	Super Blue	Super White	Super Green	Super Blue	Super White	Super Green
Max. Forward Current I_{FM}		(mA)	60	60	30	30	60	60	60	30	30	30
Power Dissipation		(mW)	126	126	126	126	183	174	183	183	174	183
DC Reverse Voltage V_R		(V)	4	4	8	8	4	4	4	8	8	8
Forward Voltage V_F (Typ.) 【IF=20mA】		(V)	2	2	4	4	2.8	2.8	2.8	5.6	5.6	5.6
Derating (Operating temperature) (over 40℃ working temperature)		(mA/℃)	0.76		0.38		0.84	0.9	0.84	0.42	0.45	0.42
Pulse Lighting	Pulse Width PW	(μS)	100									
	Duty Ratio DR		10^{-1}									
	Allowable forward current I_{FP}	(mA)	200	200	100	100	136	200	136	68	100	68

● Wiring diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

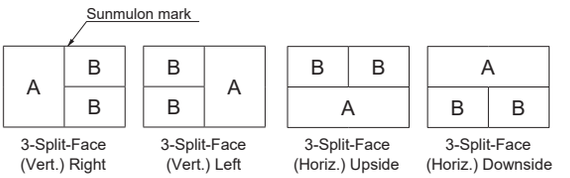
For resistance value calculation
https://www.sunmulon.co.jp/english/products/led.html
The resistance value can be calculated just by entering the items.

LED SPECIFICATIONS 【3-Split-Face】

● BUILT-IN RESISTOR

Voltage	Rated Current (mA) (per 1-Screen)									
	Red		Yellow		Super Blue		Super White		Super Green	
	A	B	A	B	A	B	A	B	A	B
DC 5V ±5%	8	4	10	5	8	4	8	4	6	3
DC12V ±5%	8	4	10	5	8	4	8	4	6	3
DC24V ±5%	8	4	10	5	8	4	8	4	6	3

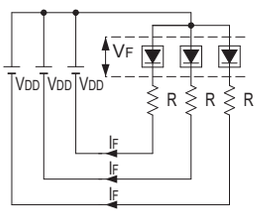
● 3-Split-Face screen positions



● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage		DC5V・12V・24V									
LED Color		Red		Yellow		Super Blue		Super White		Super Green	
		A	B	A	B	A	B	A	B	A	B
Max. Forward Current I_{FM} (mA)		60	30	60	30	60	30	60	30	60	30
Power Dissipation (mW)		126	63	126	63	183	91.5	174	87	183	91.5
DC Reverse Voltage V_R (V)		4	4	4	4	4	4	4	4	4	4
Forward Voltage V_F (Typ.) 【IF=20mA】 (V)		2	2	2	2	2.8	2.8	2.8	2.8	2.8	2.8
Derating (Operating temperature) (over 40℃ working temperature) (mA/℃)		0.76	0.38	0.76	0.38	0.84	0.42	0.9	0.45	0.84	0.42
Pulse Lighting	Pulse Width PW (μS)	100									
	Duty Ratio DR	10^{-1}									
	Allowable forward current I_{FP} (mA)	200	100	200	100	136	68	200	100	136	68

● Wiring diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

LED SPECIFICATIONS 【4-Split-Face】

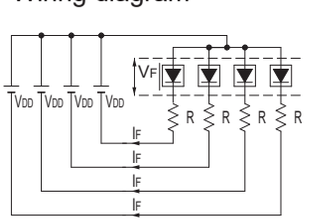
● BUILT-IN RESISTOR

Voltage	Rated Current (mA) (per 1-Screen)				
	Red	Yellow	Super Blue	Super White	Super Green
DC 5V ±5%	4	5	4	4	3
DC12V ±5%	4	5	4	4	3
DC24V ±5%	4	5	4	4	3

● NON-RESISTOR (EXTERNAL RESISTOR)

Supply Voltage		DC5V・12V・24V				
LED Color		Red	Yellow	Super Blue	Super White	Super Green
Max. Forward Current I_{FM} (mA)		30	30	30	30	30
Power Dissipation (mW)		63	63	92	87	91.5
DC Reverse Voltage V_R (V)		4	4	4	4	4
Forward Voltage V_F (Typ.) 【IF=20mA】 (V)		2	2	2.8	2.8	2.8
Derating (Operating temperature) (over 40℃ working temperature) (mA/℃)		0.40	0.40	0.40	0.45	0.42
Pulse Lighting	Pulse Width PW (μS)	100				
	Duty Ratio DR	10^{-1}				
	Allowable forward current I_{FP} (mA)	100	100	68	100	68

● Wiring diagram



Refer to the following formula
to calculate external resistance values.

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

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

IF (Forward Current) : Refer to the Rated Current of BUILT-IN RESISTOR type, and be sure to set less than IFM (Max. Forward Current).

For resistance value calculation
https://www.sunmulon.co.jp/english/products/led.html
The resistance value can be calculated just by entering the items.

LED SPECIFICATIONS 【AC lighting type / Full-Face】

● BUILT-IN RESISTOR

Voltage	Rated Current (mA)				
	Red	Yellow	Super Blue	Super White	Super Green
AC12V（± 5%）	4	8	7	6	2
AC24V（± 5%）	4	8	7	6	2

LED SPECIFICATIONS 【AC lighting type / 2-Split-Face】

● BUILT-IN RESISTOR

Voltage	Rated Current (mA) (per 1-Screen)				
	Red	Yellow	Super Blue	Super White	Super Green
AC12V（± 5%）	4	5	4	4	3
AC24V（± 5%）	4	5	4	4	3

LED (Reference Values)

● LED Lifetime

About 50,000 hours (Lights at the rated voltage at 25℃ until the luminance is halved.)

● Emission color

【Ta=25℃ ,IF=20mA】

Color	Dominant wavelength λd（nm）
Red	620
Yellow	590
Super-Blue	470
Super-Green	525
Multi-color Red	623
Multi-color Green	532
Multi-color Blue	465

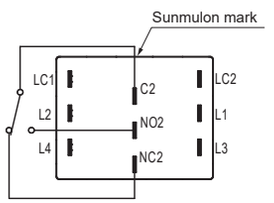
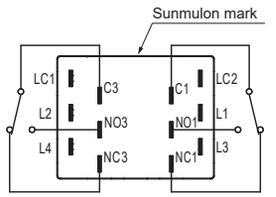
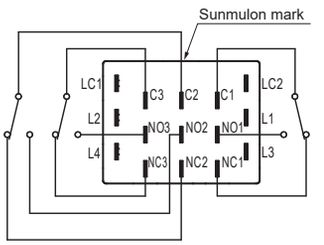
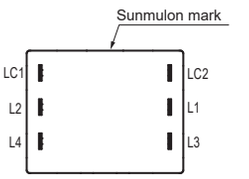
Color	Correlated color temperature
Super-White	5700

※ Full-Face Yellow and Multi-Color
To reduce color tone variation, each packing box is ranked according to Sunmulon's internal standards and shipped.

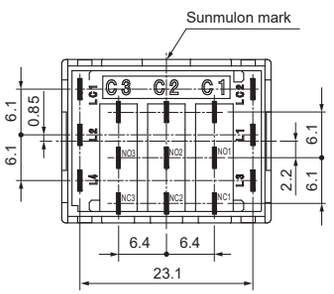
※ The above dominant wavelength is based on LED element.

TERMINALS／PCB HOLE CUTOUT

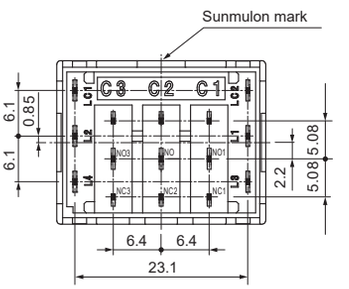
● TERMINALS LAYOUT (BOTTOM VIEW) (Common to all illumination types)

SPDT	DPDT	3PDT	INDICATOR
			

● TERMINALS DIMENSIONS (BOTTOM VIEW)

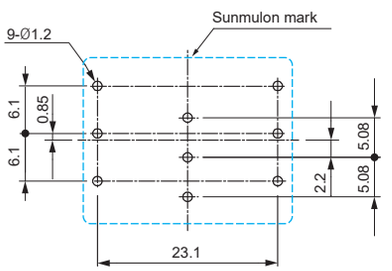


110 Tab Soldering Terminal

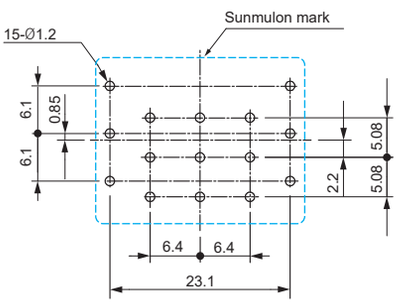


PCB Terminal

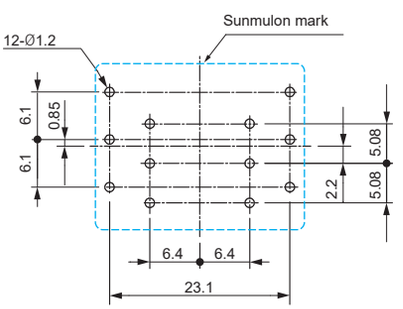
● PCB hole cut-out (TOP VIEW)



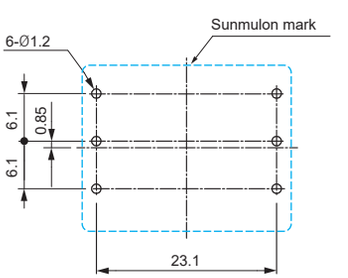
SPDT



3PDT



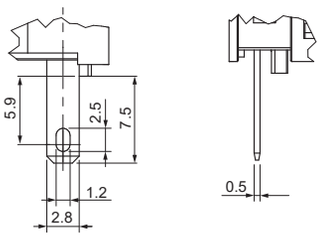
DPDT



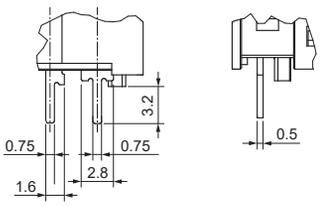
INDICATOR

Tolerance : ± 0.4 mm

TERMINAL SHAPE



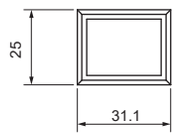
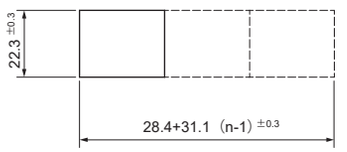
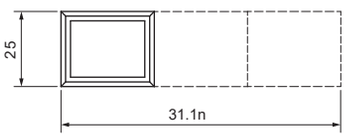
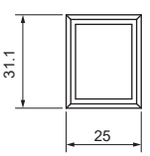
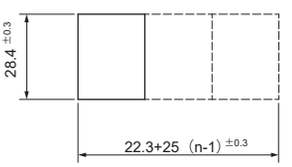
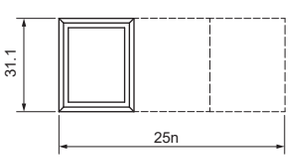
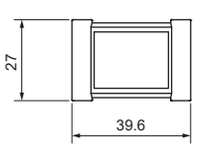
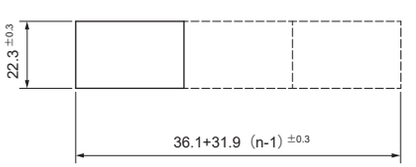
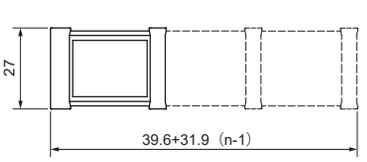
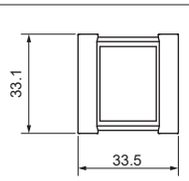
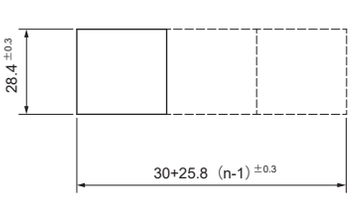
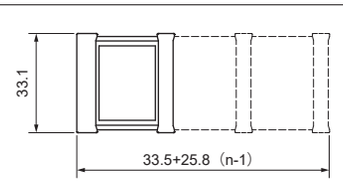
＃110 Tab・Soldering Terminal



PCB Terminal

Tolerance : ± 0.4 mm

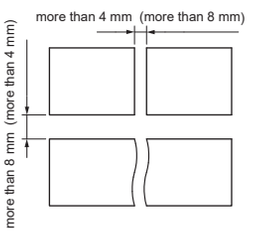
MOUNTING DESIGN／PANEL CUTOUT

	Mounting design	Panel cutout
Without Barriers	Individual (Horizontal) 	Recommended panel thickness : 1 to 5 mm 
	Multiple (Horizontal) 	n : Number of Units
	Individual (Vertical) 	Recommended panel thickness : 1 to 5 mm 
	Multiple (Vertical) 	n : Number of Units
With Barriers	Individual (Horizontal) 	Recommended panel thickness : 1 to 5 mm 
	Multiple (Horizontal) 	n : Number of Units
	Individual (Vertical) 	Recommended panel thickness : 1 to 5 mm 
	Multiple (Vertical) 	n : Number of Units

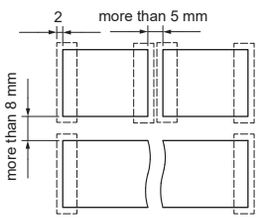
※ If the panel is to be finished (e.g. coated), make sure that the panel meets the specified dimensions after the coating.
In case the panel cut dimension is too small, it may cause malfunction.
※ After the panel-cutting process, make sure to remove burrs on the surface.

● Panel cut spacing dimensions for spaced individual mounting

Without Barriers and Guard Cover

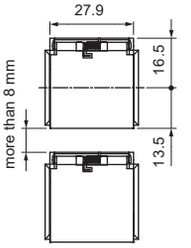


With Barriers



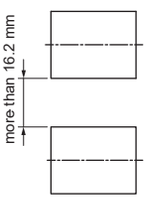
The figure above is for horizontal individual.
For vertical individual, the dimensions are shown in brackets.

Mounting design for With Guard Cover.



If the panel cut spacing dimension is 16.2 mm, the dimension between guard covers is 8 mm.

Panel cut spacing dimensions for With Guard Cover.



Tolerance : ± 0.4 mm

ACCESSORIES

● SHORT BARRIER

Color	Side	Center
Black	SP-5042-K	SP-5043-K
Gray	SP-5042-H	SP-5043-H

※ Can be used with guard cover.

Short side barrier

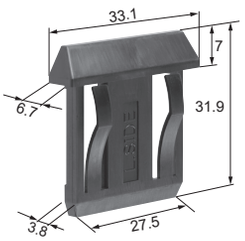
Short center barrier

3D
DXF

● LONG BARRIER

Color	Side	Center
Black	SP-5044-K	SP-5045-K
Gray	SP-5044-H	SP-5045-K

※ Cannot be used with guard cover.



Long side barrier

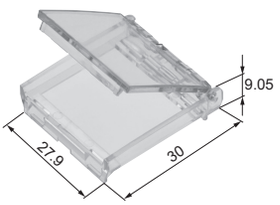
Long center barrier

3D
DXF

● GUARD COVER

Part no.	SP-5070

※ Cannot be used with long barrier.
※ The cover to be opened 180° and returned by spring force.



3D
DXF

3D・DXF data download site ： **https://www.sunmulon.co.jp/download/**

Tolerance : ± 0.4 mm

ACCESSORIES【SOCKET】

● SOCKET

Part no.	SP-5234

3D
DXF

■ ILLUMINATION TYPE / LED CIRCUIT / CONTACT

● DC lighting type

Illumination type	LED circuit	Indicator	SPDT	DPDT	3PDT
Full-Face	Separate (※)	A	N/A	A	N/A
	Cathode common (※)	A	N/A	A	N/A
Dual-Color	Separate	N/A	N/A	N/A	N/A
	Anode common	A	N/A	A	N/A
	Cathode common	A	N/A	A	N/A
2-Split-Face (Vertical)	Separate	N/A	N/A	N/A	N/A
	Anode common	A	N/A	A	N/A
	Cathode common	A	N/A	A	N/A
2-Split-Face (Horizontal)	Separate	N/A	N/A	N/A	N/A
	Anode common	A	N/A	A	N/A
	Cathode common	A	N/A	A	N/A
3-Split-Face (Vertical) ・3-Split-Face (Horizontal) 4-Split-Face ・Multi-Color		N/A	N/A	N/A	N/A

A : Applicable
N/A : Not applicable

(※) Separate LC1 : Anode L3 : Cathode Cathode common LC1 : Cathode L3 : Anode
(Not applicable for AC lighting type.)

● AC lighting type

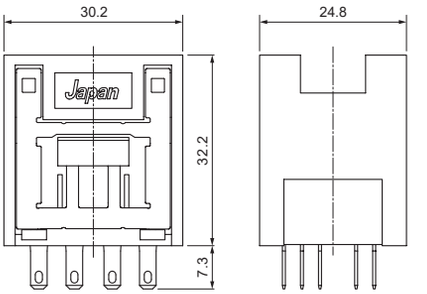
Illumination type	LED circuit	Indicator	SPDT	DPDT	3PDT
Full-Face	Separate	A	N/A	A	N/A
2-Split-Face (Vert. / Horiz.)	Separate	N/A	N/A	N/A	N/A

A : Applicable
N/A : Not applicable

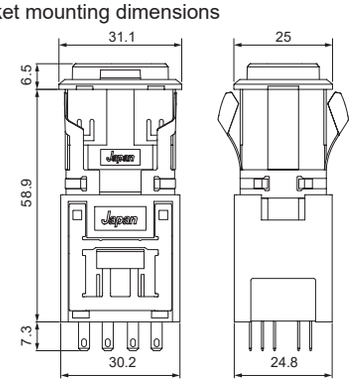
■ Limitations for using Socket

- Insertion durability : 20 cycles max.
- Removal force：More than 25N vertical direction
- Be used for single unit mounting or consecutive horizontal mounting.
  ※ Cannot be used for consecutive vertical mounting.
- Be used for #110 Tab・soldering terminal type of switch unit.

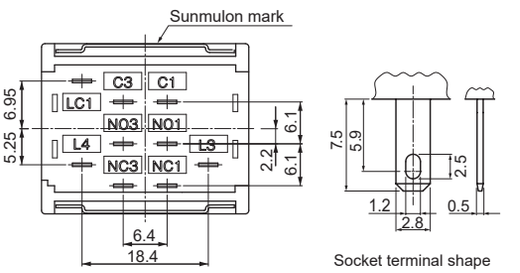
● DIMENSIONS



■ Socket mounting dimensions



● TERMINALS DIMENSIONS (BOTTOM VIEW)



3D・DXF data download site ： **https://www.sunmulon.co.jp/download/**

Tolerance：± 0.4 mm

ACCESSORIES【DC110V UNIT】

● DC110V UNIT

3D
DXF

- DC110V unit is detachable type that can be directly lighted up.
- External resistor is unnecessary, space efficiency improves.
- Luminance change is very small when the input voltage fluctuation is between −20% and +30%. (DC 88 V to DC 143 V)
- It corresponds widely ambient operating temperature −20℃ to +60℃.
- Dielectric strength specification is the same as for switch.

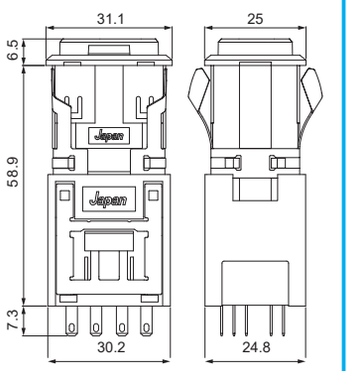
■ PART NO. (DC lighting type)

A : Applicable N/A : Not applicable

Illumination type	LED circuit	Part no.	Indicator	SPDT	DPDT	3PDT
Full-Face	Separate (※)	SP-5080-D	A	N/A	A	N/A
	Cathode common (※)	SP-5080-K	A	N/A	A	N/A
Dual-Color	Separate		N/A	N/A	N/A	N/A
	Anode common	SP-5080-A	A	N/A	A	N/A
	Cathode common	SP-5080-K	A	N/A	A	N/A
2-Split-Face (Vertical)	Separate		N/A	N/A	N/A	N/A
	Anode common	SP-5080-A	A	N/A	A	N/A
	Cathode common	SP-5080-K	A	N/A	A	N/A
2-Split-Face (Horizontal)	Separate		N/A	N/A	N/A	N/A
	Anode common	SP-5080-A	A	N/A	A	N/A
	Cathode common	SP-5080-K	A	N/A	A	N/A
3・4-Split-Face (Vert. Horiz.) ・Multi-Color			N/A	N/A	N/A	N/A

(※) Separate : LC1 : Anode L3 : Cathode Cathode common : LC1 : Cathode L3 : Anode

DC110V Unit mounting dimensions

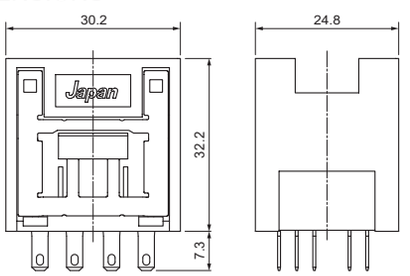


● CHARACTERISTICS

	SPECIFICATIONS	CONDITIONS
Rating	DC110 V	
Input Voltage Range	DC88 V～DC143 V	
Vibration Resistance	Contact resistance value less than 50 mΩ No electrical discontinuity less than 0.1 ms	Frequency 10-55 Hz, Amplitude modulation 1.5 mm, Cycle 3-5 min., 2 hours each in 3 axes
Shock Resistance	Contact resistance value less than 50 mΩ No electrical discontinuity less than 0.1 ms	Sine half-wave 300 m/s² max. 3 times each in 6 axes
Contact Resistance (※)	Silver contact : Less than 50 mΩ (Initial value)	at DC 6 V 1 A
	Gold contact : Less than 50 mΩ (Initial value)	at DC 6 V 0.1 A
Dielectric Strength (※)	AC 1000 V RMS between NC and NO terminal	50/60 Hz for 60 sec. at normal ambient temperature and humidity
	AC 2000 V RMS between terminals of different poles	
	AC 2000 V RMS between terminals and ground	
Insulation Resistance	More than 100 MΩ	at DC 500 V
Insertion Durability	Contact resistance value less than 50 mΩ	20 cycles
Removal Force	More than 25 N vertical direction	Apply vertical external force to DC110V unit from the SP body
Ambient Temperature	−20℃ to +60℃ (No Freeze, No Condensation)	
Ambient Humidity	80%RH max. (No Condensation)	

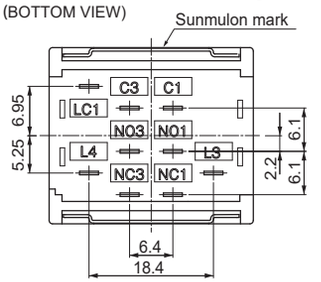
(※) The above is the specification with the SP body and the DC110V unit combined.

● DIMENSIONS

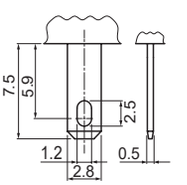


● TERMINALS DIMENSIONS

(BOTTOM VIEW)



● TERMINAL SHAPE



■ Limitations for using DC110V unit

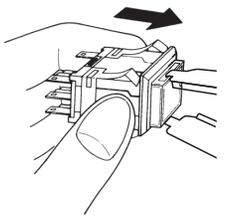
- Simultaneous lighting is impossible for Dual-Color and 2-Split-Face.
- Specify supply voltage to LED DC24V Built-in resistor (3) for switch.
- Cannot be used with AC lighting type. Cannot be used at AC110V.
- Be used for single unit mounting or consecutive horizontal mounting. ※Cannot be used for consecutive vertical mounting.
- For combinations with the switch unit, refer to the PART NO. table above.
- Be used for #110 Tab・Soldering terminal type of switch unit.

3D・DXF data download site : **https://www.sunmulon.co.jp/download/**

Tolerance : ± 0.4 mm

1. Removing Light cartridge

Be sure to remove with the removing tool (SJ-0001).
Hang the cartridge with the removing tool in the groove, and pull it straight out.

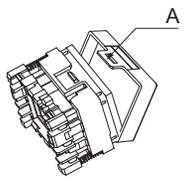


※ In case removing in any other way than the above, it may cause damage to the light cartridge.

※ Do not touch the other parts such as spring incorporated in the light cartridge.

2. Removing Button

Remove the part A by pushing it open.

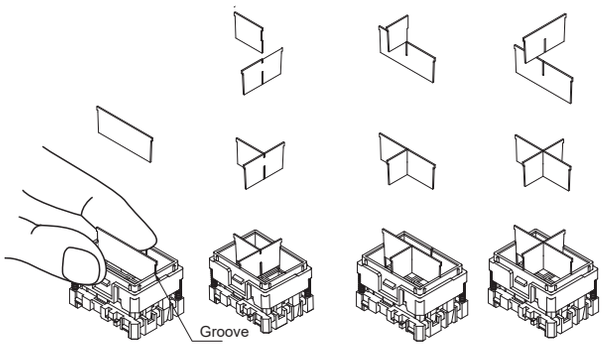


Do not reuse buttons that have been removed and deformed.

3. Fitting Divider (Split type)

Insert the divider into the groove inside the LED unit.

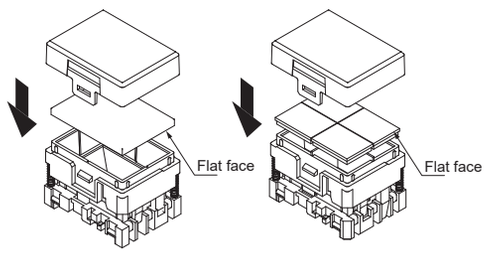
●2-Split-Face (Horiz.) ●3-Split-Face (Vert.) ●3-Split-Face (Horiz.) ●4-Split-Face



※ Do not push the divider in too hard when inserting it.

4. Fitting Filter

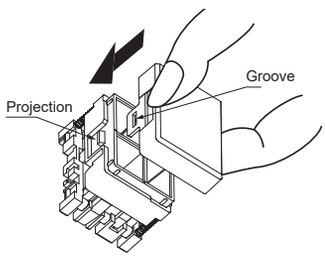
Place the filter with the flat face upward on to the LED unit, then put button on it.



5. Fitting Button

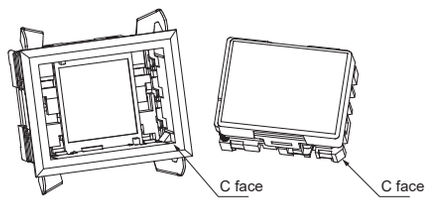
Align the groove on the button, the projection on the LED unit, and fit the button until click.

※If it is not assembled properly, it may cause malfunction.



6. Fitting Light cartridge

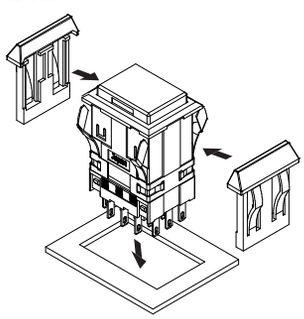
Be sure to check the correct orientation.
Align each C face and push in until click.
Insertion force should be 40 N or less.



※ Be sure not to insert strongly with the incorrect orientation as it may cause malfunction.

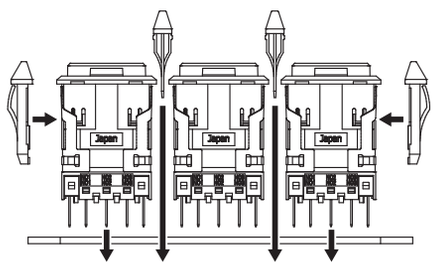
7. Installing Side Barriers

After setting the side barriers on the sides of the housing, insert it into the panel cut-out.



8. Installing Center Barriers

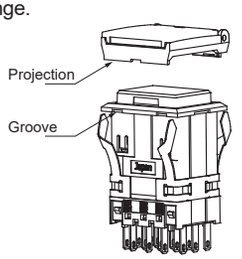
Insert the center barrier between the switches after mounting the switches with the side barriers into the panel cut-out.



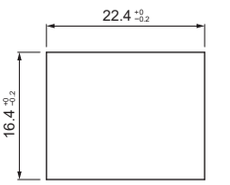
ASSEMBLY & DISASSEMBLY

9. Installing Guard Cover

Guard cover can be installed before or after attaching switch to the panel.
Fit the guard cover projection into the groove at the four corners of the switch flange.



PRECAUTIONS FOR CORRECT USE



1. Solder quickly and correctly at 350℃ max. and for 3 seconds or less.
   Be careful not to touch the soldering iron to the main body.
2. Wait for one minute during and after soldering before exerting any external force on the solder.
3. Character films are not included.
   If preparing the character film separately, use a heat-resistant film with a thickness of 0.1 mm.
   For dimensions, please refer to the figure on the right.
4. Do not touch the backside of the light cartridge with your hands and be careful not to attach dust.
5. Do not use in locations that are subject to dust, oil, or metal fillings as these may penetrate the interior of the switch and cause malfunction.
6. When open and close with inductive load, insert the contact protection circuit to prevent increase in contact resistance.
7. Always make sure that the power is turned OFF before mounting, removing or wiring the switch, or performing maintenance.
   Electric shock or fire may occur.
8. Be sure to use within the rated values, otherwise electric shock or fire may occur.
9. For wiring, use wires of proper size to meet the voltage and current requirements.
   Improper soldering may cause overheating and fire.
10. After wiring the switch, make sure that there is a suitable isolation distance.

※ For handling instructions and precautions other than the above, please refer to “Safety Precautions for All Illuminated Pushbutton Switches”.

Tolerance : ± 0.4 mm

As of September 2024

Safety Precautions for All Illuminted Pushbutton Switches

1. Notes on contents of Catalogs

(1) Rated values, performance values, and specification values of Sumulon products listed in this catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.

(2) The ambient operating temperature(humidity) is guaranteed by evaluation based on characteristics, and does not guarantee continuous use for a long period of time near the upper or lower limit of the ambient operating temperature(humidity) or permanent use at that temperature(humidity).

(3) Reference data and reference values listed in catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.

(4) The specifications / appearance and accessories of Sunmulon products listed in catalogs are subject to change or termination of sales without notice, for improvemnet or other reasons.

(5) The content of catalogs is subject to change without notice.

2. Note on applications

(1) If using Sunmulon products in combination with other products, confirm the following suitability by yourself. Sunmulon shall provide no guarantees regarding the combination suitability.
(a) Regulations, satndards, or laws to which your machinery, equipment, ect. must conform
(b) Functionality and safety of your machinery and equipment

(2) Wiring and installation that ensures the Sunmulon product used in your system, machine, device, or the like can perform and function according to its specifications.

(3) When using Sunmulon products, be cautious when implementing the following.
(a) Use of Sunmulon products with sufficient allowance for rating and performance.
(b) Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that Sumulon product fails.

(4) Sunmulon products are designed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use Sunmulon product for these applications, unless otherwise agreed upon between you and Sunmulon, Sunmulon shall provide no guarantees whatsoever regarding Sunmulon products.
(a) Safety devices intended for human body protection
(b) Direct control of transport equipmnt (railroads / airplanes / ships / vehicles / vehicle instruments, etc.)
(c) Space equipment, submarine equipment
(d) Nuclear power control equipment, radiation related equipment
(e) Combustion equipment, electric heat equipment
(f) Disaster prevention and security equipment
(g) Elevating equipment
(h) Amusement facilities
(i) Facilities subject to government or industry regulations
(j) Use in applications that require a high degree of safety, any other equipment, instruments, or the like that could endanger life or human health

3. Warranty

(1) The warranty period for Sunmulon products shall be 1 year after purchase or delivery to the specified location.

(2) Warranty scope should a failure occur in Sunmulon product during the above warranty period for reasons attributable to Sunmulon, then Sunmulon shall provide that product, free of charge, the same quantity. Further, in no event shall liability of Sunmulon exceed the individual price of the product on which liability is asserted.

(3) Failures cause by the following reasons shall be deemed outside the scope of this warranty.
(a) The product was handled or used deviating from conditions / environment listed in the catalogs
(b) The failure was caused by reasons other than Sunmulon product
(c) Modification or repair was performed by a party other than Sunmulon
(d) Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and catalogs
(e) The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from Sunmulon
(f) The failure was due to other causes not attributable to Sunmulon (including cases of force majeure such as natural disasters and other disasters)

(4) The warranty listed in this Safety Precautions is the full and complete warranty for Sunmulon products, and Sunmulon shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to Sunmulon product.

4. Handling precautions for switch

(1) Do not perform wiring with power supplied to the switch. Do not touch the terminals or other charged parts of the switch while power is being supplied. Doing so may result in electric shock.

(2) Be careful of electrostatic breakdown when handling.

(3) Do not drop or otherwise apply strong force to the switch.

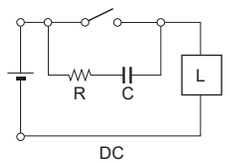
(4) Do not place heavy objects on the switch.

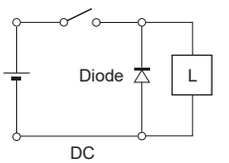
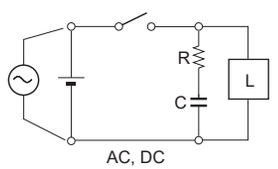
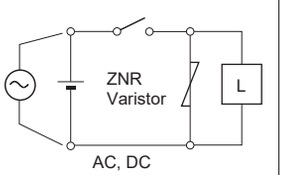
(5) Do not operate or use the housing (switch unit) by itself. Use the switch with assembled the illuminated part (LED module or button).

(6) Pushbutton switches are designed to be operated by fingertips. Operating the switch using a sharp object (screwdrivers, tweezers, etc.), hard object (metal, etc.), or with a large or sudden force, may cause deform or damage the switch.

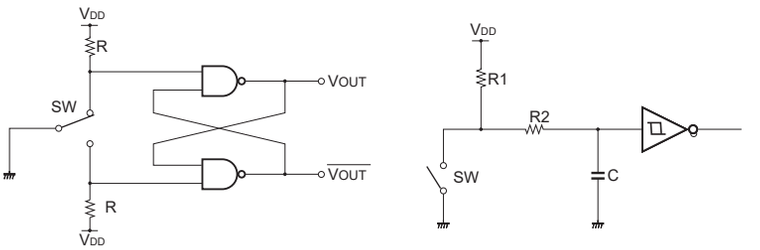
(7) Do not use the switch under loads that exceed the rated switching capacity or other contact ratings. Doing so may result in welding of the contact, or burnout accidents.

(8) For inductive load, the arc by back EMF may cause contact failure. Insertion of arc prevention circuit as the following is recommended.

<table>
<tr><th>Circuit</th><th>Element selection</th><th>Circuit</th><th>Element selection</th></tr>
<tr><td> 
</td><td rowspan="2">C：1 to 0.5 μF × switch current (A)
R：0.5 to 1 Ω × switch voltage (V)

The values may change according to the characteristics of the load. Determine ideal capacitance and resistance values through testing.</td><td> 
</td><td>The diode must withstand a peak inverse voltage 4 times higher than the power supply voltage and regarding a forward current must as high or higher than the load current.</td></tr>
<tr><td> 
</td><td> 
</td><td>Use a varistor that can withstand the power supply voltage sufficiently. (1.5 times or more)</td></tr>
</table>

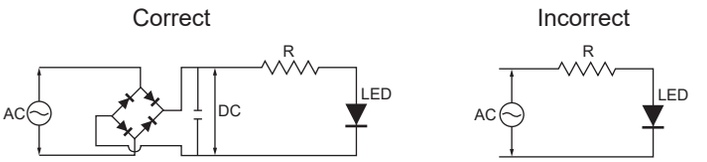
(9) Following circuits show examples of an anti-chattering circuit.



(10) Illumination

(a) Do not apply a voltage between the LED terminal that is greater than the rated voltage. Doing so may damage the LED, cause lighting failure.

(b) LEDs cannot be lit directly by AC circuit should be provided rectifier smoothing circuit for products other than AC input type.



(c) When wiring, pay attention to the polarity of the terminals.

(d) Simultaneous lighting may not be possible with Dual-Color illumination or Split-Face illumination (2, 3, or 4 split illumination), check the catalog.

(e) Apply voltage directly to LEDs of Non-built-in resistor type will damage the LEDs, so connect an appropriate external resistor.

(11) Wiring

(a) Do not apply a soldering iron to the switch housing. Doing so may deform the terminals and cause defects.

(b) See catalog for models compatible with flux prevention measures terminal. Be careful not to allow flux to panetrate sliding parts such as buttons. Use non-corrosive rosin solution as flux for dip soldering.

(c) For soldering other than flux-preventive models, hand solder with the terminals facing down to prevent flux from penetrating into the switch.

(d) The housing of KA, K2, and K9 series are designed for reflow soldering.

(e) Use the appropriate wire size for the applied voltage and current, and solder properly. Use of the product with incomplete soldering may cause abnormal heat generation, resulting in a fire hazard.

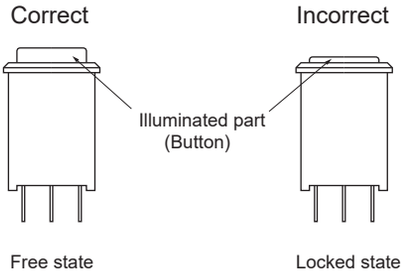
(f) After wiring is completed, maintain an appropriate insulation distance.

(12) Usage environment
(a) Do not use in the presence of flammable or explosive gases such as gasoline, thinner, LPG, etc.
(b) Avoid using the product in places where corrosive or silicon gas is generated, high temperature, high humidity, sea breeze or direct sunlight.
(c) Provide appropriate protection when using the product in places where it is exposed to water, oil, metal powder, or dust.
(d) Do not use the product in a place subject to vibration or shock. It may cause malfunction or damage.
(e) When installed in a close grouping or continuously lit, the ambient temperature may exceed the specified value due to heat generation. Take measures such as ventilation and lowering the operating voltage.
(f) When checking the actual equipment, load conditions and operating environment should be the same as the actual operating conditions.
(g) The ambient temperature for storage is －25℃ to 65 ℃ (No freeze, no condensation).

(13) When wiping off dirt on the exterior of the switch and accessories such as side plates, wipe lightly with a soft, dry cloth. Organic solvents such as thinner, benzene, alcohol, or other acidic chemicals may cause deformation, discoloration, or malfunction.

(14) Store the product away from malignant gases, dust, high temperature and high humidity, and keep it in our packing condition.

(15) When removing the illuminated part (or button) from the alternate switch housing, switch state should be in a free state.



Removal in a locked state may cause malfunction or damage to alternate switch.

(16) Periodic inspection and replacement
(a) Although mechanical and electrical durability are listed in the specifications column, deterioration of various parts (deterioration of resins and corrosion of metal parts) is possible due to the operating environment and method of use. We ask that you implement inspections for Sunmulon products to prevent accidents from occurring by conducting periodic inspections and replacements.
(b) When the switch is left unused or stored for long periods, contact reliability may deteriorate due to oxidation of contacts, which may cause continuity failure, etc. Therefore, it is necessary to check the operation before use.

(17) Service scope
The price of Sunmulon products do not include the cost of services, such as dispatching technicians.