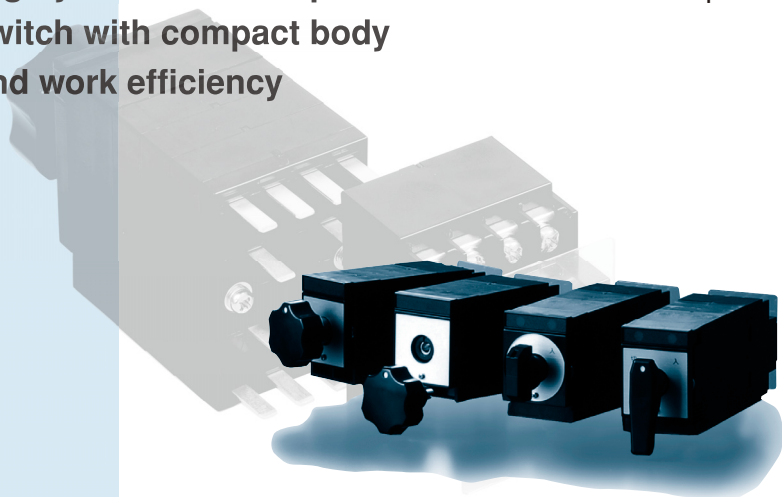


Highly reliable cam-operated switch with compact body and work efficiency

FH TYPE
Small-size cam-operated switch



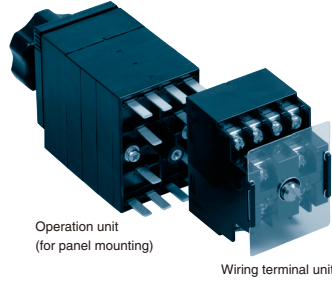
● SPECIFICATIONS

Item	FH
Rated insulation voltage (Ui)	250V AC / DC
Rated current-carrying capacity (Ith)	15A
Rated operating voltage (LED)	100 / 110V DC (-20% to +30%)
LED circuit current	Red: 3 mA max, Green: 5 mA max. (both at 110 V DC per LED)
Max. wire size	2mm ²
Terminal screw size	M3.5 × 8
Insulation resistance	10 MΩ or more (500 V DC Megger tester)
Rated Withstand voltage	Between electric circuit and ground: 2,000 V AC for 1 minute
	Between individual electric circuits: 2,000 V AC for 1 minute
	Between contacts: 2,000 V AC for 1 minute
Lightning impulse withstand voltage	Between electric circuit and ground: ±4,500 V (1.2 / 50 μs) 3 times
	Between individual electric circuits: ±3,000 V (1.2 / 50 μs) 3 times
	Between contacts: ±3,000 V (1.2 / 50 μs) 3 times
Contact resistance	50 mΩ max. (Initial value)
Breaking capacity	1A (220V AC, Pf=0.3 to 0.4)
	1A (110V DC, L / R=40ms) *For 2-contact series connections: 5 A
Closed circuit capacity	10A (220V AC, Pf=0.3 to 0.4)
	1.4A (110V DC, L / R=40ms) *For 2-contact series connections: 7 A
Min. operating condition	5V AC 500mA, 5V DC 100mA
Electrical life	100,000 operations or more
Mechanical life	100,000 operations or more
Shock resistance	500 m/s ² in 6-axis directions, 3 times each
Vibration resistance	Frequency: 16.7 Hz, Single amplitude: 1.5 mm, Vibration time: 1 hour in 3-axis directions each
Operating temperature	-10 to 55°C (no condensation, no freezing)
Storing temperature	-10 to 60°C (no condensation, no freezing)
Relative humidity	20 to 80%
Altitude	2,000 m max.

● FEATURES

Structure for efficient wiring work

With the back terminal mechanism, the wiring terminal unit can be separated from the operation unit body.
(This structure makes more efficient wiring work.)



4-type product lineup

The following four types of switches are available in the product lineup:

- 1) Manual return type (2-notch, 3-notch)
- 2) Handle removal type (2-notch, 3-notch)
- 3) Automatic return, push type
- 4) Automatic return, pull type



Manual return type
(2-notch, 3-notch)
Non-illuminated



Handle removal type
(2-notch, 3-notch)
Non-illuminated



Automatic return, push type
Automatic return, pull type
LED illuminated



Compact and space-saving

The minimum mounting pitch is 42 mm (horizontal) and 65 mm (vertical), enabling on-board wiring. It can be mounted in the increasingly limited space of control panels.

Terminal cover comes as a standard accessory

The terminal cover is provided as a standard accessory which prevents accidental contact with live parts. (The handle cover is optionally available.)

Easy-to-see circuit condition

Round and square type metal nameplates and flange nameplates are available. The circuit condition can be directly indicated on the nameplate.

FH-B-SP type



Square (Y)



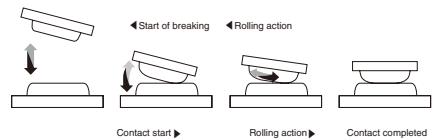
Round (Z)

Maximum wire size: 2 mm²

Wire of up to 2 mm² can be connected. (Terminal screw size: M3.5)

Highly-reliable contact mechanism

The contact operates with a rolling action mechanism: First, the movable contact touches the fixed contact at one point and gradually increases the contact area while sliding on the contact surface. This mechanism can minimize the area exposed to arc during first contact and breaking.



● TYPE CODING

FH - SP 1001(1B1A) - 1 3 S B Z 001

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

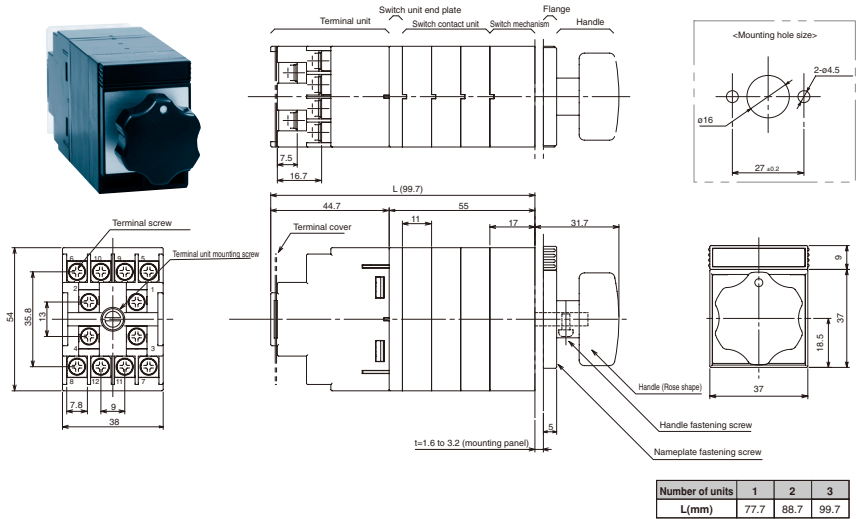
No.	Item	Symbol
①	Basic type	FH
②	Operation mode (Notch diagram)	Manual return type (non-illuminated)
		Handle removal type (non-illuminated)
		Automatic return, push type (LED illuminated) Push the the handle at center position → Manually turn the switch right / left by 45° → Automatically returns to center position → Automatically returns to the initial position (● position)
		Automatic return, pull type (LED illuminated) Pull the the handle at center position → Manually turn the switch right / left by 45° → Automatically returns to center position → Automatically returns to the initial position (● position)
③	Contact arrangement	Circuit No. (Combination type) * See the standard development diagrams on p. N52 to p. N54.
④	LED circuit	1: Standard type (Independent circuit), 2: N common type, 3: P common type * See the LED circuit diagram on p. N54.
⑤	LED indicator power supply voltage	3: 100 / 110V DC
⑥	Handle shape	S: Knob shape P: Stick shape D: Rose shape * See "ACCESSORIES" on p. 55.
⑦	Handle color	B: Black
⑧	Flange shape	Y: Square, Z: Round
⑨	Indication on nameplate	Nameplate No. * See "Indicated characters" on p. N55.
⑩	Handle removal position	1: Position B, 2: Position A, 3: Position T, 4: Positions B and A, 5: Positions B and T, 6: Positions A and T, 7: Positions B, A and T * For the position symbols, see the above notch diagram (2 Operation mode: Handle removal type).
⑪	Handle key type	Handle key No. * See the combination table on p. 50.

Designations of Nos. ④ and ⑤ are exclusively for the LED illuminated type.

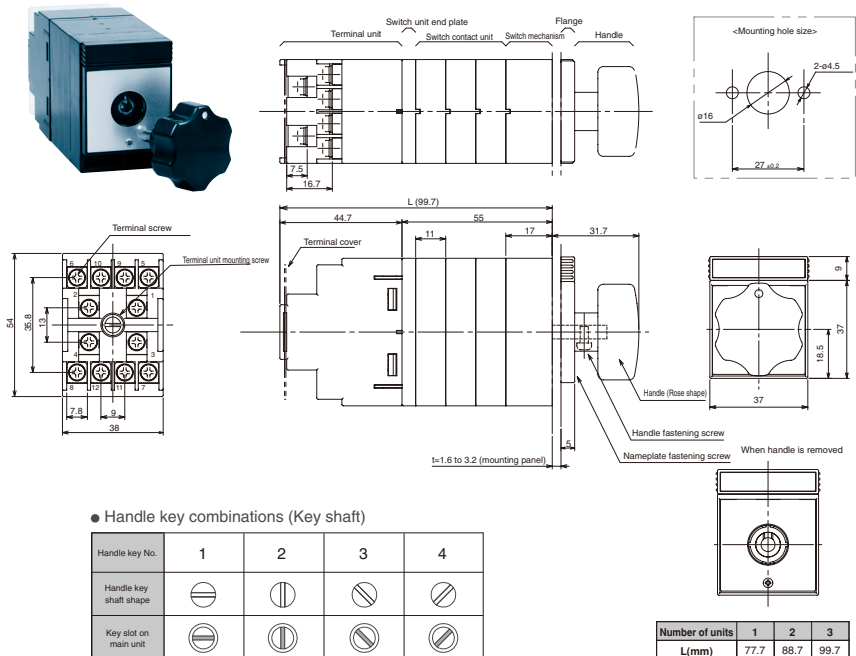
Designations of Nos. ⑩ and ⑪ are exclusively for the handle removal type.

STANDARD PRODUCTS

FH-□ type (Manual return, non-illuminated type)



FH-□C type (Handle removal, non-illuminated type)



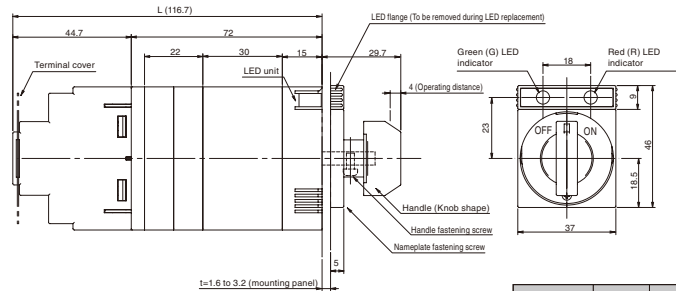
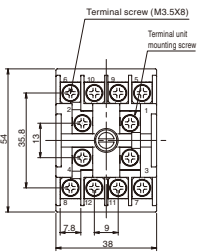
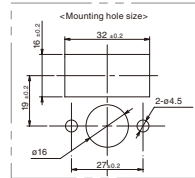
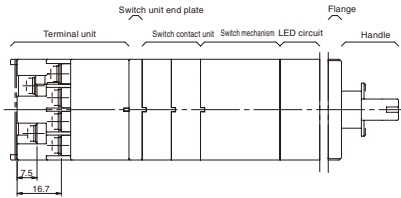
● Handle key combinations (Key shaft)

Handle key No.	1	2	3	4
Handle key shaft shape				
Key slot on main unit				

*The key shaft (key hole) has a roll pin (pin hole) depending on handle removing position.

STANDARD PRODUCTS

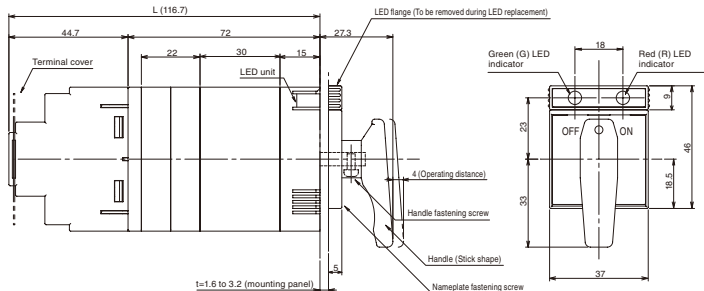
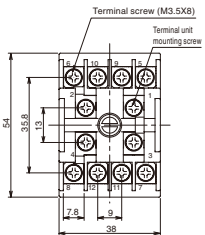
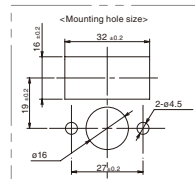
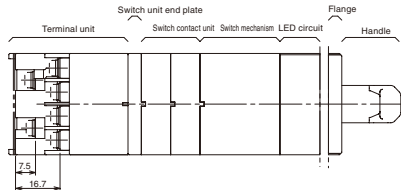
FH-SP type (Automatic return, push, LED illuminated type)



t=1.6 to 3.2 (mounting panel)

Number of units	1	2
L (mm)	105.7	116.7

FH-SB type (Automatic return, pull, LED illuminated type)



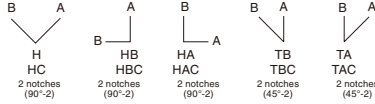
t=1.6 to 3.2 (mounting panel)

Number of units	1	2
L (mm)	105.7	116.7

STANDARD DEVELOPMENT DIAGRAM

(Note) With the non-illuminated type, max. 6 contacts (12 terminals) are available. With the LED illuminated type, max. 4 contacts (8 terminals) are available. If you need other contact arrangement, contact us for more information.

2-notch switching



2 contacts (1 unit)

Type	1001	1002	1003	1004
Combination type	2A	2B	1B1A	1B1AL
Contact arrangement				

4 contacts (2 units)

Type	2001	2002	2003	2004	2005	2006
Combination type	4A	4B	1B3A	3B1A	2B2A	1B1A1B1AL
Contact arrangement						

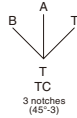
Type	2007	2008	2101
Combination type	2BL2AL	1BL3AL	2AL2B
Contact arrangement			

6 contacts (3 units)

Type	3001	3002	3003	3004	3005
Combination type	6A	6B	3B3A	1B5A	2B4A
Contact arrangement					

Type	3006	3007	3008	3009
Combination type	4B2A	5B1A	2BL4AL	3BL3AL
Contact arrangement				

3-notch switching



2 contacts (1 unit)

Type	1001	1002	1003	1004	1101
Combination type	1A1T	1B1A	1B1T	1BA1AT	1AT1T
Contact arrangement					

4 contacts (2 units)

Type	2001	2002	2003	2004	2005
Combination type	2A2T	2B2A	1B1A2T	1B2A1T	2B2T
Contact arrangement					

Type	2006	2007	2008	2009	2010
Combination type	2B1A1T	3B1T	1B1A1T1BA	1A1T2AT	1BL1AL2TL
Contact arrangement					

Type	2101	2102	2103
Combination type	2(1T1B)	1B1T1BA1AT	2BA2AT
Contact arrangement			

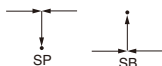
6 contacts (3 units)

Type	3001	3002	3003	3004	3005
Combination type	2A4T	1B1A4T	1B3A2T	1B4A1T	2B2A2T
Contact arrangement					

Type	3006	3007	3008	3009	3010
Combination type	2B4T	2B4A	2B1A3T	3B3A	3B3T
Contact arrangement					

Type	3011	3012	3101	3102
Combination type	2A2T2AT	2BL2AL2TL	2(1T1A1B)	2B1A1T1BA1AT
Contact arrangement				

■ Automatic return type



● 2 contacts (1 unit)

Type	1001	1002	1003	1004	1005	1101
Combination type	1C1A	1B1A	1M1N	1N1B	1N1A	1A1B
Contact arrangement						

● 4 contacts (2 units)

Type	2001	2002	2003	2004	2005	2006
Combination type	1C1B2A	2C1B1A	2B2A	1N1B2A	1N1C1B1A	1M1N1B1A
Contact arrangement						

Type	2007	2008	2009	2010	2011	2101
Combination type	1M1N2A	2N1B1A	2N2B	2N2A	2M2N	2(1A1B)
Contact arrangement						

+ 2-contact series connection type

LED CIRCUIT DIAGRAM

Standard type (Independent circuit)	N common type	P common type
<p>Terminal No. G (Green) Terminal No.</p> <p>P N</p> <p>11 12</p> <p>R (Red)</p> <p>P N</p> <p>9 10</p>	<p>Terminal No. G (Green) Terminal No.</p> <p>P N</p> <p>11 12</p> <p>R (Red)</p> <p>P N</p> <p>9 10</p>	<p>Terminal No. G (Green) Terminal No.</p> <p>P N</p> <p>11 12</p> <p>R (Red)</p> <p>P N</p> <p>9 10</p>

● ACCESSORIES

■ Handle



FH-HD-S-B
(Knob shape)

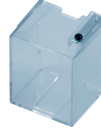


FH-HD-P-B
(Stick shape)



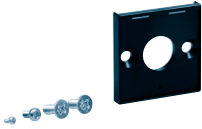
FH-HD-D-B
(Rose shape)

■ Handle cover

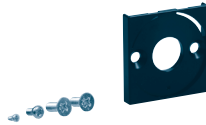


FH-HCV-A

■ Flange



FH-FL-Y-B-SET
(Square)



FH-FL-Z-B-SET
(Round)

■ LED flange set



FH-FL-LED-B-SET

■ LED replacement lamp



FH-LED-R



FH-LED-G

■ LED remover



FH-LED-Q

■ Handle remover



FH-HD-Q

■ Nameplate



Y: Square



Z: Round

FH-NP- $\begin{matrix} Y \\ Z \end{matrix}$
Nameplate No.

Nameplate No.	Indicated characters
000	Blank

(For 2-notch type)

201	OFF	ON
202	OUT	IN
203	MANUAL	AUTO
204	OPEN	CLOSE
205	STOP	RUN

(For 3-notch type)

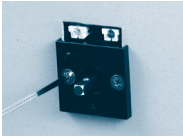
301	OFF	AUTO	MANUAL
302	CLOSE	STOP	OPEN

*If you need any other indication characters, contact us.

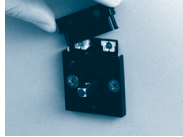
● Handling procedure

(1) Mounting a switch to a panel

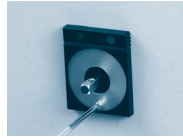
To mount a switch to a panel, follow the procedure below.
(To remove the switch, perform the same procedure in reverse.)



1) Mount the switch body on the back of a mounting panel, and the switch body flange on the front of the panel, and fasten them with the supplied flat head screw (M4 x 10).



2) Mount the flange by sliding it obliquely from the upper front position of the panel. (For switches with LED indicators)



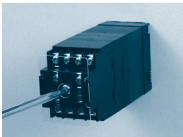
3) After hooking the aluminum nameplate to the inner groove of the switch body flange, fasten the nameplate with the supplied tapping screw (M2 x 4) from the front of the nameplate.



4) After inserting the handle into the shaft, fasten the bottom of the handle with the supplied flat head screw (M3 x 6).

(2) Mounting / removing the terminal unit

The terminal unit can be separated from the switch body. To remove the terminal unit, follow the procedure below.
(To mount the terminal unit, perform the same procedure in reverse.)



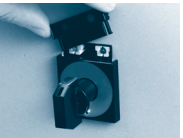
1) Loosen the center screw at the back of the switch body with a flat-blade screwdriver.



2) You can remove the terminal unit by pulling it backward lightly. (When the terminal unit is mounted, the proper tightening torque of the fastening screw should be 0.5 N•m.)

(3) LED element replacement

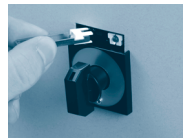
To replace the LED element, follow the procedure below. For LED replacement, use the dedicated tool (FH-LED-Q).



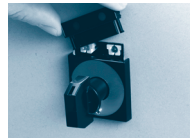
1) Remove the LED flange by sliding it obliquely toward the upper front position of the panel.



2) Hold the existing LED with the dedicated tool lightly, and remove the LED by pulling it forward.



3) Hold a new LED with the dedicated tool lightly, and insert the LED into the socket in the switch.



4) Mount the LED flange by sliding it obliquely from the upper front position of the panel.

(Note) The switch and terminal unit mounting / removing procedures and the LED replacement procedure must be conducted when there is no electric current.