

# Highly reliable cam-operated switch pursuing size reduction and work efficiency



#### SPECIFICATIONS (RATINGS, PERFORMANCE, STANDARD OPERATING CONDITION)

STANDARD: NECA C 4520 (2002) NECA C 4522 (2002)

Item	FH					
Rated insulation voltage (Ui)	250V					
Rated current-carrying capacity (Ith)	15A					
Rated supply Voltage of LED part	100/110V DC (-20% to 30%)					
Circuit current of LED part	Red : 3mA or less Green : 5mA or less (Both at 110V DC, per lamp)					
Max. wire size	2mm <sup>2</sup>					
Terminal screw size	M3.5 × 8					
Insulation resistance	10MΩ or more (500V DC mega)					
	Between all circuit and ground : 2,000V AC / 1min.					
Withstand voltage	Between poles : 2,000V AC / 1min.					
	Between terminals : 2,000V AC / 1min.					
Potod impulse withstand voltage	Between all circuit and ground : ±4.5kV (1.2/50µs) 3 times					
(Ulimp)	Between poles : ±3kV (1.2/50µs) 3 times					
(omp)	Between terminals : ±3kV (1.2/50µs) 3 times					
Contact resistance	50m $\Omega$ or less (Initial)					
breaking capacity	1A (220V AC, Pf=0.3 ~ 0.4)					
breaking capacity	1A (110V DC, L/R=40ms) Contact series specifications : 5A					
Making canacity	10A (220V AC, Pf=0.3 ~ 0.4)					
Making capacity	1.4A (110V DC, L/R=40ms) Contact series specifications : 7A					
Minimum applicable load	AC5V 500mA, DC5V 100mA					
Electrical life	Single contact: 100,000 operations or more Double bridge contacts : 50,000 operations or more					
Mechanical life	Single contact : 100,000 operations or more Double bridge contacts : 50,000 operations or more					
Shock resistance	500m/s <sup>2</sup> 6 directions / 3 times each					
Vibration resistance	Vibration : 16.7Hz Vibration : 1.5mm Time : 3 directions / 1 hour					
Ambient air temperature	$-10{\sim}+55^{\circ}$ C (No freeze, no dew condensation)					
Storing temperature	-20~+60°C (No freeze, no dew condensation)					
Relative humidity	20 to 80%					
Altitude	2,000 m or less					

# FEATURES

# Improved wiring work efficiency

With the back terminal mechanism, the FH type enables easy mounting and removal of the operating unit body and wiring terminal unit. (Wiring is enabled with the wiring terminal unit only. This structure simplifies wiring work.)



# Four models of switches are available in product lineup.

- ① Manual switching type (2 or 3 notches) ② Handle removable type (2 or 3 notches)
- ③ Automatic return push type ④ Automatic return pull type





Manual switching type (2 or 3 notches) •Non-illuminated type

Handle removable type (2 or 3 notches) •Non-illuminated type

# Compact body for saving mounting space

Minimum mounting pitches are 42 mm (horizontal) and 65 mm (vertical). The FH type can be mounted in a miniaturized control panel.

Terminal cover as standard accessory.

preventing the user from accidentally touching live

Maximum applicable cable size: 2mm<sup>2</sup>

parts. (The handle cover is optionally available.)

The terminal cover is provided as standard,

Cable of up to 2 mm<sup>2</sup> can be connected.

(Screw size: M3.5)



Automatic return push type Automatic return pull type •LED illuminated type

# Two types of contact mechanisms

Two types of contact mechanisms are available: Single (standard) contact and double-bridge (highly reliable) contact. A desired type can be selected according to the purpose of use.

# Circuit indication can be checked at a glance.

Circular and square metal identification plates and bases (flanges) are available. Circuit condition can be directly indicated.





A SWITCH

# ELECTRONIC DEVICES

Square type (Y)

Circular type (Z)



# **HOW TO ORDER**

FH	- 5	SP	10	01	-	0	0	S	В	Ζ	000	) _	WS
1		2		3		4	5	6	$\overline{\mathcal{O}}$	8	9		12

No.	Item	Code						
1	Basic type	FH						
		Manual switching type (Non-illuminated type)	B A H 2 notches (90°-2)	A B HB <sup>2</sup> notches (90°-2)	B HA 2 notches (90°-2)	B A T T 3 notches (45°-3)	B TB <sup>2 notches</sup> (45°-2)	B TA <sup>2 notches</sup> (45°-2)
2	Operation method (Notch	Handle removable type (Non-illuminated type)	B A HC 2 notches (90°-2)	A B HBC <sup>2</sup> notches (90°-2)	B HAC 2 notches (90°-2)	B A T TC 3 notches (45°-3)	B TBC <sup>2 notches</sup> (45°-2)	B TAC 2 notches (45°-2)
	contiguration)	Automatic return push type (LED illuminated type)	Push at center → Manual turn by 45° (CW/CCW) → Automatic return to center SP → Automatic return to non-push status				(CW/CCW)	
		Automatic return pull type (LED illuminated type)	Pull at center → Manual turn by 45° (CW/CCW) → Automatic return to center → Automatic return to non-pull status					CW/CCW)
3	Contact arrangement	Circuit No. (Combinatio	on format) Pl	ease see p	bage A78 to	80 for contact	arrangen	nent diagram.
4	LED circuit	0: Without LED indication 1: Standar	d (Independent circu	it) 2: N-common	3: P-common * For	LED circuit diagram,	see page A80.	For Nos. ④ and ⑤, only the LED
(5)	Supply voltage of LED display part	0: Without LED indicati	on 3: 100/11	0V DC 4:	125V DC			illuminated type can be specified.
6	Handle code	S: Knob shape P: Stick See the accessories of	k shape (Exc n page A81.	ept on the	SP notch) E	): Rose shape	e	
$\bigcirc$	Color of handle	B: Black						
8	Flange	Y: Square type Z: Rou	nd type					
9	Nameplate	Nameplate No. * For te	ext on each p	olate, see p	age A81.			
10	Handle removal position	1: Position B 2: Positio 5: Positions B and T 6 * For symbol of each 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 (0), only the handle					For Nos. (1) and (1), only the handle removable type
1	Type of handle key	Handle key No. (See th	e combinatio	on diagram	on page A7	6.)		can be specified.
(12)	Contact spec	No code: Single contac	t WS: Doubl	e - bridge ·	Silver contac	t WG: Double	e - bridge	Gold contact

A SWITCH

PILOT LAMP & INDICATOR

# **OUTLINE AND DIMENSIONS**





#### FH-DC type (Handle removable type, Non-illuminated type)



\* The key shaft (keyhole) has a roll pin (pinhole) for handle removal position

99.7

L (mm)

77.7 88.7



# **OUTLINE AND DIMENSIONS**

#### FH-SP type (Automatic return push type, LED illuminated type) \* Except on the SP notch



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



No. of units	1	2
L (mm)	105.7	116.7

# **CONTACT ARRANGEMENT DIAGRAM**

For non-illuminated type, 6 contacts (12 terminals) are provided. For LED illuminated type, 4 contacts (8 terminals) are provided. (CAUTION) For other contact specifications, please contact us.

#### 2-position changeover



Α

#### 2 contacts (1 unit)

Туре	1001	1002	1003
Detail	2A	2B	1B1A
Contact arrangement		3 4 4 1 4 2 B A	

#### •4 contacts (2 unit)

Туре	2001	2002	2003	2004	2005	2006
Detail	4A	4B	1B3A	3B1A	2B2A	1B1A1BL1AL
Contact arrangement	7     8       5     6       3     4       1     2	7	7     8       5     6       3     4       1     2       B     A	7     8       5     6       3     4       1     2       B     A	7 + 8 5 6 3 4 1 2 B A	7 5 6 3 4 4 1 8 8 4

Туре	2007	2008	2101
Detail	2BL2AL	1BL3AL	2AL2B
Contact arrangement	7 5 6 3 4 1 B A	7 5 6 3 4 4 1 B A	7 5 6 3 4 0 B A

#### 6 contacts (3 unit)

Туре	3001	3002	3003	3004	3005
Detail	6A	6B	3B3A	1B5A	2B4A
Contact arrangement	11	1)2 910 78 56 34 12 B A	1) 9 7 6 6 6 6 6 1 7 8 6 6 6 6 6 8 6 6 6 8 6 8 6 9 10 10 10 10 10 10 10 10 10 10	1)	1 + 2 9 + 10 7 + 8 6 - 6 3 - 6 1 + 2 B A

Туре	3006	3007	3008	3009
Detail	4B2A	5B1A	2BL4AL	3BL3AL
Contact arrangement	1)	1) 9 7 6 6 6 3 4 1 1 2 8 8 4	1) 9 7 6 6 6 6 6 6 7 8 6 1 9 7 8 8 6 9 8 6 9 8 6 9 8 6 9 8 8 8 6 9 8 8 8 8	10 9 7 -0 6 5 -0 6 5 -0 6 5 -0 6 5 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0



# **OUTLINE AND DIMENSIONS**

#### **3**-position changeover

#### 2 contacts (1 unit)

			(45°-3)		
Туре	1001	1002	1003	1004	1101
Detail	1A1T	1B1A	1B1T	1BA1AT	1AT1T
Contact arrangement			3 + 4 1 + 2 B A T		3 + + 4 0 + 2 B A T

T TC 3 notch

в

#### •4 contacts (2 unit)

Туре	2001	2002	2003	2004	2005
Detail	2A2T	2B2A	1B1A2T	1B2A1T	2B2T
Contact arrangement	7 5 6 3 4 4 1 B A T	7 8 5 6 3 4 1 2 B A T	7 5 6 3 4 4 1 B A T	7 5 6 3 4 4 0 B A T	7 5 6 3 6 3 6 4 1 8 8 7 8 7
Туре	2006	2007	2008	2009	2010
Type Detail	2006 2B1A1T	2007 3B1T	2008 1B1A1T1BA	2009 1A1T2AT	2010 1BL1AL2TL

Туре	2101	2102	2103
Detail	2 (1T1B)	1B1T1BA1AT	2BA2AT
Contact arrangement	7 + 8 5 6 3 4 1 + 2 B A T	7 + 8 5 - 6 3 - 4 1 - 2 B A T	7 5 6 3 1 8 4 1 2 8 4 1

#### ●6 contacts (3 unit)

Туре	3001	3002	3003	3004	3005
Detail	2A4T	1B1A4T	1B3A2T	1B4A1T	2B2A2T
Contact arrangement	10 9 0 0 0 0 0 0 0 0 0 0 0 0 0	10 9 0 7 6 6 6 6 6 6 6 6 6 6 6 6 6	10 9 0 0 0 0 0 0 0 0 0 0 0 0 0	10 9 7 8 6 3 4 1 4 1 B A T	10 9 0 7 8 6 3 4 1 8 A T

Туре	3006	3007	3008	3009	3010	
Detail	2B4T 2B4A		2B1A3T	3B3A	3B3T	
Contact arrangement	1)	1)		1)	1	

Туре	3011	3012	3101	3102	
Detail	2A2T2AT	2BL2AL2TL	2 (1T1A1B)	2B1A1T1BA1AT	
Contact arrangement	10 9 7 8 6 6 6 6 7 8 6 10 7 8 6 10 7 8 6 10 7 10 10 7 10 10 10 10 10 10 10 10 10 10	1) 9 7 8 5 6 3 6 3 4 1 B A T	1)	1) 9 7 8 6 9 8 8 6 9 8 8 9 8 8 9 8 8 9 8 8 9 8 9	



#### 2 contacts (1 unit)

Туре	1001	1002	1003	1004	1005	1101
Detail	1C1A	1B1A	1M1N	1N1B	1N1A	1A1B
Contact arrangement			3 1 B C A 3 B C A			

#### •4 contacts (2 unit)

Туре	2001	2002	2003	2004	2005	2006
Detail	1C1B2A	2C1B1A	2B2A	1N1B2A	1N1C1B1A	1M1N1B1A
Contact arrangement		7 5 6 6 6 6 6 6 6 6 6 6 6 0 9 6 6 0 9 6 6 0 9 6 0 9 6 9 6			7 5 6 3 6 6 3 6 4 0 8 5 4 4 0 9 6 4 0 1 8 6 7 4 9 8 6 9 7 8 8 6 9 8 8 9 8 9 8 9 8 9 8 9 9 9 9 9 9	
Туре	2007	2008	2009	2010	2011	2101
Type Detail	2007 1M1N2A	2008 2N1B1A	2009 2N2B	2010 2N2A	<b>2011</b> 2M2N	<b>2101</b> 2 (1A1B)

### LED CIRCUIT DIAGRAM





# ACCESSORIES

Handle				Hand	lle co	over (sell	ing separately)
6	r			51	12	57.4	57.4
FH-HD-S-B	FH-HD-P-B	FH-HD-D-B			FH-HC	> ~ :V-A	42 FH-HCV-B
(Knob shape)	(Stick shape)	(Rose shape)					
	<ul> <li>It cannot be installed on the SP notch</li> </ul>						
Flange				LEC	) Fla	inge se	et
	0.			•	••	l	•
FH-FL-Y-B- (Square ty	-SET /pe)	FH-FL-Z-B-SET (Round type)	FH-FL-LED-B-SET				
LED lamp	0	LED remov	al tool		Ha	andle r	emoval tool
S.							
FH-LED-R FH-LED-G		FH-LED-G	1	FH-HD-Q			
							_
Namepla	te	Nameplate No.		Ie	xt		=
		(For 2 potches	)	Fla	1111		
		201	, 切			入	
		202	外			付	
		203	手動			自動	
V: Square type	7: Bound type	204	開			閉	
r: Square type 2: Round type		204E	OPEN	PEN CLOSE			
FH-NP- Y		205	停止			運転	
- Nan	neplate No.	(For 3 notches	)				_
		301	切	自	動	手動	_
		302	閉	停	止	開	

\* For consideration of other text, please contact us.

## INSTRUCTIONS

#### (1) Panel mounting procedure

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



O Fasten the switch body from the back, and the switch body flange from the front via the mounting panel, and fasten them with the countersunk screws (M4  $\times$  10) included in the product.



②Mount the flange by sliding it diagonally from the front top of the panel. (For LED indication)



③After hooking the aluminum identification plate in the inner groove of the switch body flange, fasten the panel with the self-tapping screws (M2 × 4) included in the product.



④After passing the handle through the shaft, fasten it from the bottom with the pan head screws (M3 × 6) included in the product.

#### (2) Mounting and removal of the terminal

The terminal can be removed from the switch. Follow the procedure below.



①Loosen the screw at the back center of the switch with a flat head screwdriver.



②Pull the terminal lightly backward to remove it. (To mount the terminal, appropriate tightening torque for the fastening screw is 0.5 N·m.)

#### (3) LED element replacement

For replacement of the LED element, follow the procedure below. For replacement, use the dedicated tool.



(1)While sliding the LED flange diagonally to the front top of the panel, raise the panel by pinching it.



②Pinch the existing LED lightly with the dedicated tool, and pull it out to the front.



③Pinch a new LED lightly with the dedicated tool, and insert it into the socket of the switch.



④Mount the LED flange by sliding it diagonally from the front top of the panel.

CAUTION: During mounting and removal of the switch and terminal, and replacement of the LED element, make sure that the product is not alive.