

Low Profile E-STOP Switches
Only 13.6mm Behind-Panel
Shortest E-Stop Switch in its Class



FF01 Series
Low Profile E-STOP Switches

NKK SWITCHES CO., LTD.

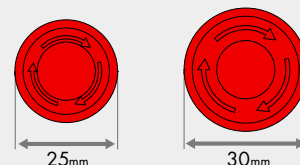
Only 13.6mm Behind-Panel Depth - Shortest E-Stop Switch in its Class*

Sliding Latch Mechanism

Our original sliding latch mechanism features an inclined switch center section for the latch to maintain secure current contact. When the contact is in ON position, this mechanism permits only forces in the contact connecting direction. When OFF, the mechanism permits only forces in the contact releasing direction. In the event of vibration or impact, the contact will resist movement in the connecting direction, thereby maintaining the OFF state for added safety. (Patent pending)

Actuator Size Just 25 mm in Diameter

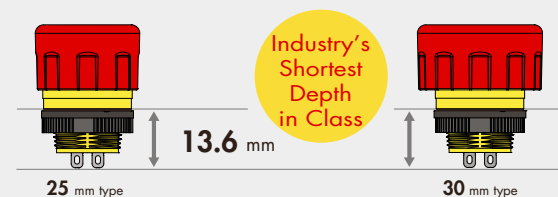
Measuring only 25 mm in diameter, the small actuator allows installation on a densely embedded panel. Actuators are available in 25 mm or 30 mm diameter to enable low-profile equipment and space-saving installation.



Behind-Panel Depth of 13.6 mm

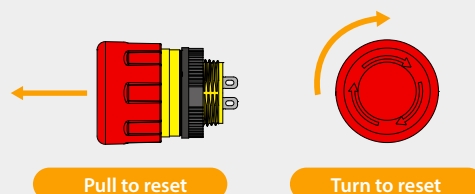
The sliding latch mechanism achieves the industry's shortest behind-panel depth in its Class.* The low-profile housing enables high density behind-panel layouts.

* (Industry's shortest body length including terminals as of November 2019, based on in-house research)



Two Reset Methods: Pull or Turn

Switch can be reset either by pulling or turning.



Front Panel Seal Structure

The front panel sealing mechanism meets the IEC 60529 IP65 requirements.

Rating

24 V DC, 0.5 A

• UL, C-UL (UL508)



• EN60947-5-1, EN60947-5-5



Type Approved
Safety
Regular Production
Surveillance



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ID: 1419078444

If you need further information on standards or certifications, please contact our sales department.

► Applications

Portable equipment and handheld devices, including compact remote controls (teaching pendants)

► Sale Start Date

May 12, 2020

► General Specifications

General Specifications			
Rated Operating Voltage Rated Operating Current	Resistive load: 24 V DC, 0.5 A * UL, TÜV certified rating	Nominal Operating Force	15 N
Rated Insulation Voltage	36 V DC	Pretravel	3 mm
Rated Withstand Impulse Voltage	2.5 kV	Total Travel	Approx. 4.5 mm
Sealing	Front panel: IP65	Contact Resistance	50 mΩ maximum (initial value)
Pollution Degree	3	Insulation Resistance	100 MΩ (at 500 V DC)
Short-circuit	gG 10 A	Overvoltage Category	II
Conditional Short-circuit Current	1000 A	Operation Frequency	10 times/min.
Operating Temperature Range	-25 to 60°C	Shock Resistance	Durability: 1,000 m/s ² Malfunction: 150 m/s ²
Storage Temperature Range	-45 to 80°C		
Operating Force (Initial Value)	Push to lock: 10.8 N Pull to reset: 8.5 N Turn to reset: 0.13 N·m	Vibration Resistance	Durability: 10 to 500 Hz, half amplitude: 0.35 mm, acceleration: 50 m/s ² Malfunction: 10 to 500 Hz, half amplitude: 0.35 mm, acceleration: 50 m/s ²
Contact Point	N/C	Mechanical /Electrical Life	Mechanical, electrical: 100,000 operations minimum (resistive load), 6,050 times minimum (inductive load (DC-13))
Soldering	Soldering: 390°C maximum, within 4 seconds	Recommended fixing nut mounting torque	785 mN·m

* UL, TÜV certified rating

- UL certified rating: 24 V DC, 0.5 A (inductive load)
- TÜV certified rating: 24 V DC, 0.5 A (inductive load)

* Minimum applicable load (reference value): 5 V DC, 1 mA

(Usage conditions and load types may affect the allowable operating range.)

► TYPICAL SWITCH ORDERING EXAMPLE

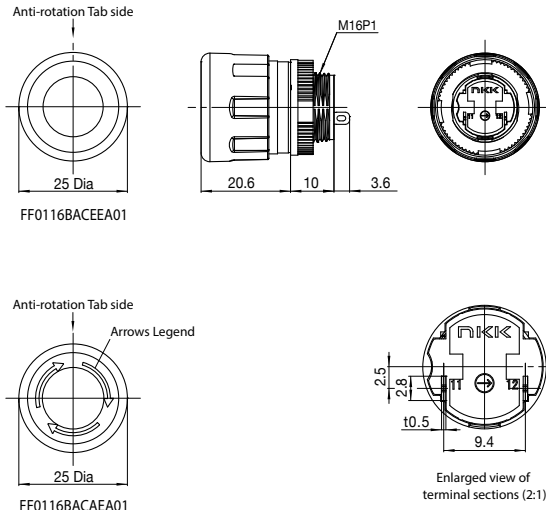
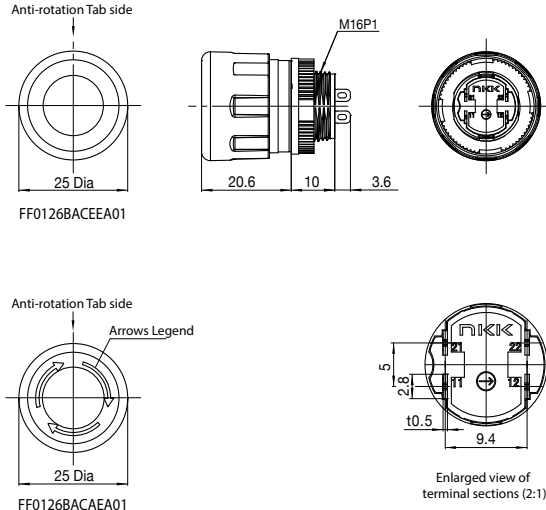
FF01												1	6	B	A	C	A	E	A01
Poles		Circuit		Contact Point		Actuator Size		Actuator Color		Actuator Legend		Housing		Contact /Terminal Shape					
1	SPST	6	Latchdown	B	N/C	A	25mm	C	Red	A	Arrows	E	Yellow	A01	Gold over Silver /Solder Lug				
2	DPST					B	30mm			E	No Legend								

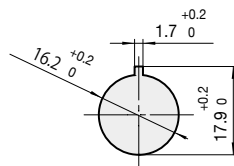
	25mm Actuator		30mm Actuator	
Poles	No Legend	Arrows Legend	No Legend	Arrows Legend
SPST	FF0116BACEEA01	FF0116BACAEA01	FF0116BBCEEA01	FF0116BBCAEA01
DPST	FF0126BACEEA01	FF0126BACAEA01	FF0126BBCEEA01	FF0126BBCAEA01
External view				

Plunger Position			Model		Connected Terminals	
Poles			No Legend	Arrows Legend		
SPST	ON	OFF	FF0116BACEEA01	FF0116BACAEA01	11-12	-
DPST	ON	OFF	FF0126BACEEA01	FF0126BACAEA01	11-12 21-22	-

► The switch can be reset in two different ways (push to lock, pull or turn to reset).

► Typical Switch Dimensions

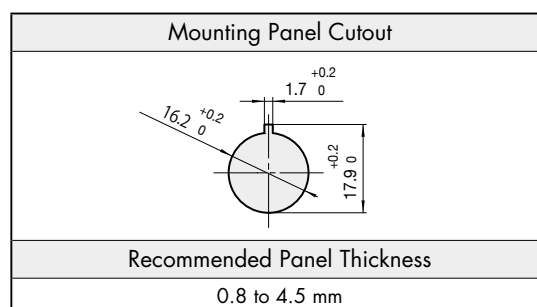
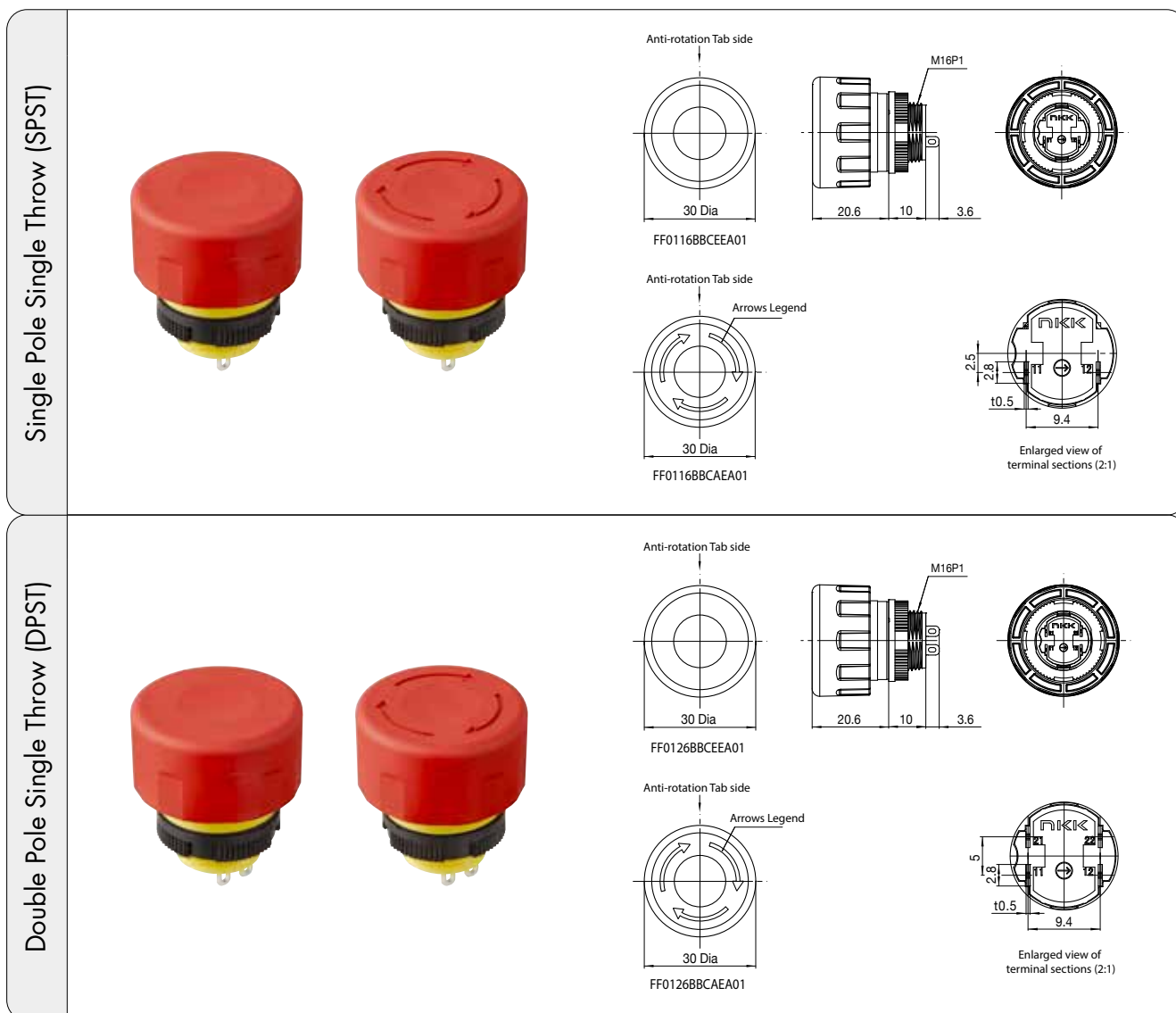
	Single Pole Single Throw (SPST)	Double Pole Single Throw (DPST)
		
	 FF0116BACEEA01	 FF0126BACAEA01

Mounting Panel Cutout

Recommended Panel Thickness
0.8 to 4.5 mm

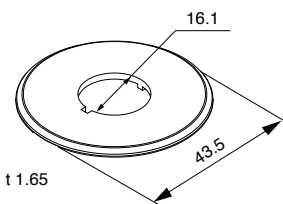
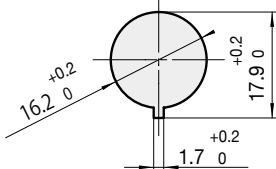
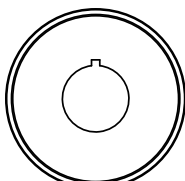
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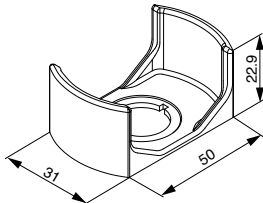
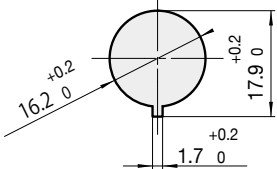
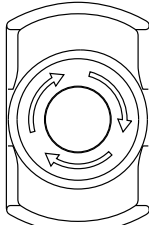
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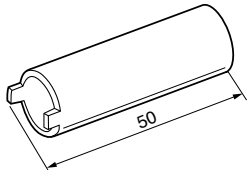
► Typical Switch Dimensions



► Accessories

Nameplate (Sold Separately)	Model	Specification	Mounting Panel Cutout
 Base Color: Yellow Legend Color: Black	AT221	No Legend	 Panel Thickness: 0.5 to 3.0 mm
	AT222	EMERGENCY STOP	
 AT221  AT222			Positional relationship between mounting hole (shown in above diagram) and Arrows Legend on actuator 

Protective Guard (Sold Separately)	Mounting Panel Cutout	Positional relationship between mounting hole (shown in left diagram) and Arrows Legend on actuator
AT220  Color: Yellow	 Panel Thickness: 0.5 to 3.0 mm	

Fixing Nut Wrench (Sold Separately)
AT119 

► Instructions for AT220 Protective Guard

The product conforms to SEMI S2 / ISO13850.

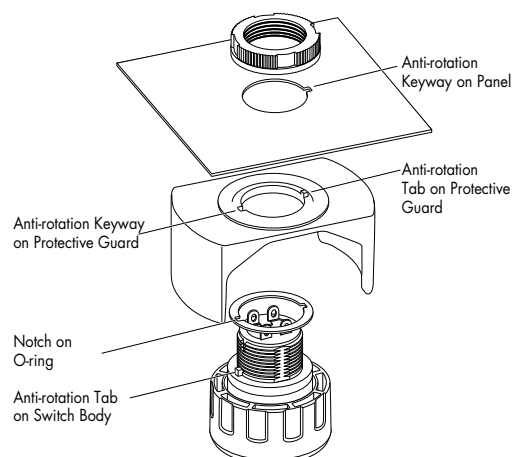
Please read the instructions carefully to ensure correct product use.

Safety Precautions

- The protective guard is made exclusively for use with NKK's FF01 Series and should not be used with other types of products.
- Read the FF01 Series Instruction Manual before switch installation, cable connection, operation, maintenance or inspection.
- Confirm power is off before installation, cable connection, maintenance, etc.
- When installing product on other equipment, be sure usage is in compliance with standards and regulations of your country or region, as required for your system, equipment or facility.

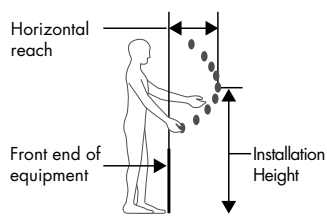
Installation to Panel

- (1) Remove the nut from the switch body.
- (2) Insert the switch body into the protective guard from the front of the guard, aligning notch on the O-ring with the anti-rotation tab on the switch body. Align the anti-rotation tab on the switch body with the keyway on the guard.
- (3) Align the anti-rotation tab on the back of the guard with the anti-rotation keyway on the panel.
- (4) Using the AT119 Fixing Nut Wrench, tighten the nut from the back of the panel (recommended torque 785mN•m).



Installation Height

The switch must be installed within 3 meters from the working position. (SEMI S2)
To install the switch with the protective guard onto semiconductor manufacturing equipment, the mounting height range should be 838 mm to 1,638 mm. The horizontal reach (maximum) should be between 178 mm and 254 mm. (SEMI S8)



Installation Height	Horizontal reach (max.)
1638 mm (64.5 in.)	254 mm (10.0 in.)
1524 mm (60.0 in.)	368 mm (14.5 in.)
1422 mm (56.0 in.)	432 mm (17.0 in.)
1321 mm (52.0 in.)	470 mm (18.5 in.)
1219 mm (48.0 in.)	483 mm (19.0 in.)
1118 mm (44.0 in.)	470 mm (18.5 in.)
1016 mm (40.0 in.)	394 mm (15.5 in.)
914 mm (36.0 in.)	292 mm (11.5 in.)
838 mm (33.0 in.)	178 mm (7.0 in.)

(SEMI S8)

To install the switch with the protective guard on equipment such as machine tools or processing equipment, the recommended height range is between 600 mm and 1,700 mm from the floor or platform level (ISO13850).

- * To be in compliance with the SEMI standard, it is necessary that EMO (Emergency Off) is printed on the switch or on the inside of the guard.
- * To confirm that the switch and protective guard mounted on a device are ISO compliant, see requirements of ISO13850.

► Safety Precautions

- When the product is installed on other equipment, be sure usage is in compliance with all applicable standards and regulations in the country or region, as required for the system, machine, or facility.
- Be sure to read the instruction manual and catalog before installing, wiring, operating, maintaining, or inspecting the product.

► Caution in Use

Before using the product

- Do not use a power supply that exceeds the rated voltage or current indicated in the specifications. Using a power supply that exceeds ratings may cause overheating or fire.
- Use wires of appropriate rating. Use of improper wires may cause overheating and fire.
- Follow recommended "Mounting Panel Cutout" dimensions and installation instruction, or switch may be fixed loose and not operate properly.
- Remove dirt and dust from the switch mounting surface of the panel before installation.
- Do not disassemble the product as it may cause electric shock, fire, or malfunctions.
- Confirm power is off before installation, wiring, maintenance, or inspections. Failure to do so may cause electric shock, fire, or malfunctions.
- Operate the product by hand only. Do not operate using foot, tool, or other objects.
- Chattering and bouncing
Bouncing may occur during a reset operation (pull or turn to reset). Chattering may occur if the equipment the switch is mounted on is subjected to shock or vibration. Take appropriate measures to prevent chattering and bouncing on the equipment side.
- Safeguard against excessive shock or vibration, such as dropping. Excessive shock and vibration may result in deformation, damage, degraded performance, or failure.

Soldering

- After inserting the lead wire into the terminal hole, use a soldering iron to ensure a secure connection.
Incomplete soldering may cause overheating and fire during use.
- Note that if soldering is performed while the terminal is facing up, the flux may enter the interior of the switch. Perform soldering carefully.
- The solder resistant temperature is 390°C. Complete the soldering within four seconds.

► Usage Environment

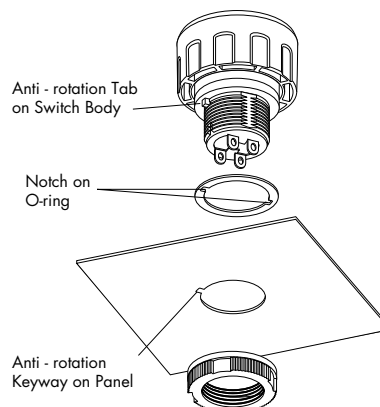
- The product is designed for indoor use.
- Do not install in locations subject to frequent splashing water.
- If the product becomes wet, wipe off with a dry cloth. Using a switch exposed to water may result in water entering inside. If the water freezes inside the switch, it may not function properly.
- When using the product in environments subject to accumulations of dust and dirt, remove such accumulations from the area around the switch before use. Accumulated dust and dirt, may affect switch function.

► Routine Care

- Use a dry cloth to wipe dirt from the actuator. If the actuator is very dirty, wipe with a cloth dampened with a small amount of neutral detergent, then wipe dry. (Actuator material: Fiber-reinforced PBT)

► Installing the Switch

- (1) Remove the round nut from the switch main body.
- (2) With the notch in the O-ring aligned with the anti-rotation tab on the switch main body, insert the switch body into panel. In this step, align the anti-rotation tab on the switch main body with the anti-rotation keyway on the panel.
- (3) Using the fixing nut wrench (AT119), tighten the round nut from the back side of the panel to the recommended tightening torque of 785 mN·m.



* The specifications in this document are subject to change without notice. For the latest specifications, please contact our local representative.

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