Safety Door Switch

SFD Series

INSTRUCTION MANUAL

DRW190180AC

Autonics

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly before using the product.
For your safety, read and follow the below safety considerations before using.
For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
Keep this instruction manual in a place where you can find easily.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.
Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
    Failure to follow this instruction may result in personal injury, economic loss or fire.
02. **System manager means followings;**
    - a personnel who is fully aware of installation, setting, operation, and maintenance of the product
    - a personnel who well observes standard/regulation/statute on the product by type of machine the product installed in and nation/region the product used in Machine user means a personnel who is appropriately trained about using machine by the system manager, so that machine user can operate the machine correctly.
    System manager has duty to train the machine user about operation of the product. Machine user has to report directly to the system manager when unusual status has been found while system is operating.
    Failure to follow this instruction may result in personal injury, economic loss or fire.
03. **The product has to be installed, set, and combined with machine control system by the qualified system manager.**
    Failure to follow this instruction may result in personal injury due to unintended operation and unstable detection.
04. **Before using the product, check that function of the product operates as intended while machine is turned off after installation.**
    Failure to follow this instruction may result in personal injury due to unintended operation and unstable detection.
05. **Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, salinity, moisture, or steam, or dust may be present.**
    Failure to follow this instruction may result in explosion or fire.
06. **Do not disassemble or modify the unit.**
    Failure to follow this instruction may result in personal injury or fire due to loss of safety function.
07. **Be cautious about the installing place of the operation key in order to protect worker from hitting the operation key when the door is opened.**
    Failure to follow this instruction may result in personal injury.
08. **Do not use a head of the door lock switch (SFDL Series).**
    Failure to follow this instruction may result in personal injury or fire due to loss of safety function.
09. **Install separate safety device to fix door closed, or door can be opened because of vibration or weight of the door.**
    Failure to follow this instruction may result in personal injury.
10. **Check the installed status of the switch, operating status of the switch, and signs of damage, modification, tampering of the switch at the following situation and on a weekly basis.**
    - when operating the safety system at first
    - when replacing component of the system
    - when the system has not been operated for a long time
    Failure to follow this instruction may result in personal injury due to malfunction of the product and safety function.
11. **Check 'Connections' before wiring.**
    Failure to follow this instruction may result in fire.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. **Use the unit within the rated specifications.**
    Failure to follow this instruction may result in fire or product damage.
02. **Use a dry cloth to clean the unit, and do not use water or organic solvent.**
    Failure to follow this instruction may result in fire.
03. **Keep the door switch away from debris and tighten the screw securely when replacing the head.**
    Failure to follow this instruction may result in malfunction.
04. **Keep the product away from metal chip, dust, and wire residue which might flow into the unit.**
    Failure to follow this instruction may result in fire, product damage or malfunction.
05. **Do not use the switch as a guard door stopper. Install separate mechanical stopper.**
    Failure to follow this instruction may result in product damage.
06. **Carefully manage the spare operation key in order to prevent use of the key without permission.**
    Failure to follow this instruction may result in loss of safety function due to insertion of the spare operation key.
07. **Use only Autonics operation key.**
    Failure to follow this instruction may result in product damage.
08. **Install the operation key tightly within the range written in 'Installation' with welding, rivet, or special bolt in order not to be easily released from the switch.**
    Failure to follow this instruction may result in product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Use the switch with the dedicated controller. Do not use the switch with another controller randomly.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000m
  - Pollution degree 3
  - Installation category III
  - Enclosure Type I

Sold Separately

- Operation key
- M12 Connector cable

Ordering Information

This is only for reference.
For selecting the specific model, follow the Autonics web site.

SFD - ❶ ❷ - ❸ ❹

❶ Head materials
No mark: Plastic
M: Metallic

❷ Contact composition
AB: 1 N.O., 1 N.C.
2B: 2 N.C.
A2B: 1 N.O., 2 N.C.
3B: 3 N.C.

❸ Connection outlet
No mark: 1
2: 2

❹ Connection outlet specification
M20: M20 thread
G1/2: G1/2 thread
C: M12 connecter

Contact Composition and Operation

Contact composition represents the locked status with the operation key inserted.
■: ON, □: OFF

Model	Contact	Contact composition	Contact operation
			Operation key complete insertion / Operation key extraction
SFD-□AB-□□	1 N.C., 1 N.O.	11–12, 33–34	11-12, 33-34
SFD-□2B-□□	2 N.C.	11–12, 31–32	11-12, 31-32
SFD-□A2B-□□	2 N.C., 1 N.O.	11–12, 21–22, 33–34	11-12, 21-22, 33-34
SFD-□3B-□□	N.C. 3	11–12, 21–22, 31–32	11-12, 21-22, 31-32

Specifications

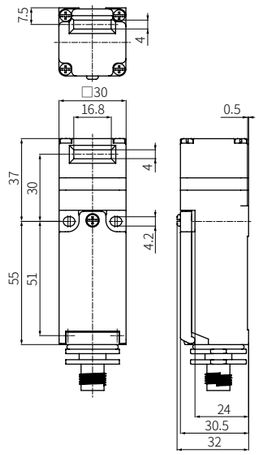
Model	SFD-□□-□M20	SFD-□□-□G1/2	SFD-□□-C
Rated voltage/current for load	Resistive load: 6 A/250 VAC∼, 0.6 A/250 VDC⎓ Inductive load (IEC): AC-15 3 A/240 VAC∼, DC-13 0.27 A/250 VDC⎓ Inductive load (UL): A300, Q300		
Directing opening force	≥ 80 N		
Directing opening distance	≥ 10 mm		
Operating speed	0.05 to 1 m/s		
Operating frequency	≤ 20/min		
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)		
Contact resistance	≤ 50 mΩ (initial value)		
Impulse dielectric strength	Between the terminals: 2 kV (IEC 60947-5-1) Between each terminal and non-live part: 5 kV (IEC 60947-5-1)		
Conditional short circuit current	100 A		
Life cycle	Electrical: ≥ 100,000 operations (240 VAC∼ 6 A) Machanical: ≥ 1,000,000 operations		
Vibration (malfunction)	0.75 mm amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 min		
Shock	1,000 m/s² (≈ 100 G) in each X, Y, Z direction for 3 times		
Shock (malfunction)	300 m/s² (≈ 30 G) in each X, Y, Z direction for 3 times		
Ambient temperature	-30 to 70°C, storage: -40 to 70 °C 01) (a non freezing or condensation environment)		
Ambient humidity	35 to 90 %RH , storage: 35 to 90 %RH (a non freezing or condensation environment)		
Protection structure	IP67 02) (IEC standard, except for head)		
Material	Plastic head - polyamide 6, metallic head - zinc case: polyamide 6, operation key: stanless steel 304		
Approval	CE cULus EAC KC		
Connection type	M20 connector cable	G1/2 connector cable	M12 connector
Unit weight (packaged)	• 1 connection outlet plastic: ≈ 80 g (≈ 120 g) metallic: ≈ 110 g (≈ 150 g) • 2 connection outlet plastic: ≈ 110 g (≈ 140 g) metallic: ≈ 130 g (≈ 170 g)		plastic: ≈ 85 g (≈ 130 g) metallic: ≈ 115 g (≈ 160 g)

01) UL approved ambient temperature: 65°C
02) Rated protection structure is for the switch body. Be cautious about preventing the head part from entering the foreign materials such as dust and water.

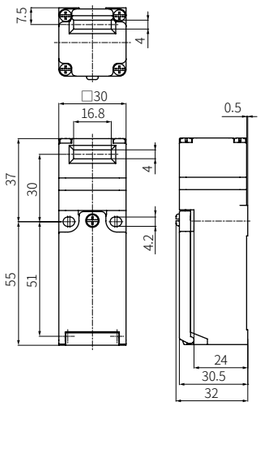
Dimensions

- Unit: mm, For the detailed dimensions of the product, follow the Autonics web site.

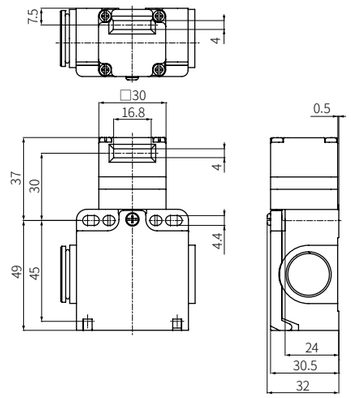
■ **Connector type**



■ **1 connection outlet terminal type**

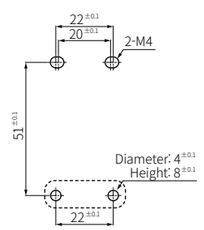


■ **2 connection outlet terminal type**

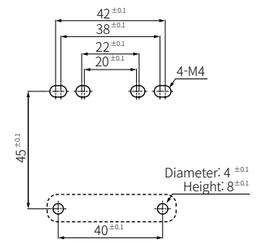


■ **Mounting hole cut-out**

- 1 connection outlet

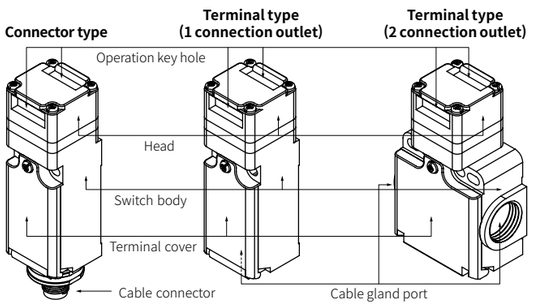


- 2 connection outlet



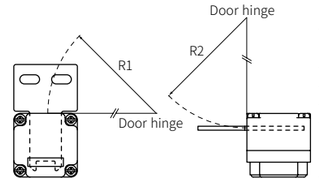
: is installing spot of protrusion for fixing the switch firmly.

Unit Description



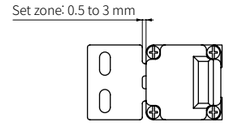
Installation

- The head of the switch can be rotated by loosening the four screws from the corners of the head and reinstalling the head in the desired orientation.
- Be sure to install the switch with the minimum radius at a hinged door as shown in the table.

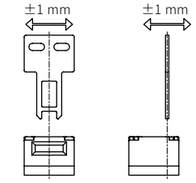


Operation key	Minimum radius	
	R1	R2
SFD-KH	300 mm	300 mm
SFD-KL	300 mm	300 mm
SFD-KHR	300 mm	300 mm
SFD-KLR	300 mm	300 mm
SFD-KLF	50 mm	300 mm
SFD-KLF2	50 mm	300 mm

- Inspect the inserted operation key remains within the set zone (0.5 to 3 mm).



- Install the operation key within ±1mm from the center of the operation key hole.

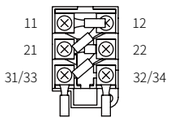


- Recommended screw tightening torque

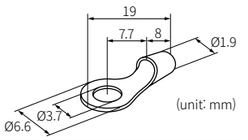
Screw	Tightening torque
Terminal screw (M3.5)	0.6 to 0.8 N·m
Terminal block screw (M3)	0.3 to 0.5 N·m
Terminal cover screw (M3)	0.4 to 0.6 N·m
Head mounting screw (M3)	0.7 to 0.9 N·m
Cable gland	2.7 to 3.3 N·m
M22 NUT, G1/2 NUT	1.3 to 1.5 N·m

Connections

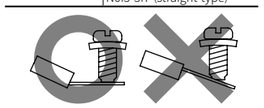
- When wiring with the ring crimp terminal, connect the terminals as shown in figure for the cable not to override to the case and cover.



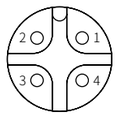
- Use the UL approved ring crimp terminal listed in below. Bend the terminal as following figure to use.



Manufacturer	Model
JST	FN0.5-3.7 (flared type) N0.5-3.7 (straight type)

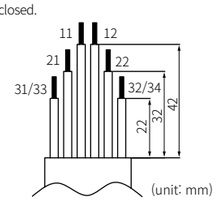


- M12 connector pin arrangement



Pin	Contact
1	12
2	11
3	31/33
4	32/34

- Use lead wire sizes AWG20 (0.518 mm²) and prepare lead wires using the length given in the following diagram. If lead wires are too long or short, the cover may not be properly closed.



- Cable gland specification and recommended product

Thread spec	MFR	Model
G1/2	LAPP	ST-PT1/2 5380-1002
M20	LAPP	ST-M20X1.5 5311-1020

- In case of using the cable gland with the 9 mm screw thread or longer, a gap between the switch and cable may affect the protection structure.
- Do not use metallic duct. Using metallic duct can result in electric shock due to the damage on the service entrance.

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