

Safety Door Switch



SFD Series PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Main Features

- Available to change the direction of inserting the operation key by rotating head
: Inserting the operation key from 5 directions in the top and side
- Various kinds of contact composition
: 1 N.O.+1 N.C., 2 N.C., 1 N.O.+2 N.C., 3 N.C.
- Selectable between connector type which reduces working process and terminal type which is useful for maintenance
- Selectable head material between metal and plastic

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. Do not connect, repair, inspect, or replace the unit while connected to a power source.**
Failure to follow this instruction may cause the external devices connected to the product may unexpectedly operate.
- 08. 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.
- 09. 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.
- 10. 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.
- 11. 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.
- 12. Check 'Connections' before wiring. And make sure that there are no safety problems.**
Failure to follow this instruction may result in personal injury or fire due to loss of safety function.

⚠ 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.

- 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













- Product
- Instruction manual

- Operation key: SFD-K□□
- M12 Connector Cable: C□DH4-□-□

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

<p>① Head materials No mark: Plastic M: Metallic</p> <p>② Contact composition AB: 1 N.O., 1 N.C. 2B: 2 N.C. A2B: 1 N.O., 2 N.C. 3B: 3 N.C.</p>	<p>③ Connection outlet No mark: 1 2: 2</p> <p>④ Connection outlet specification M20: M20 thread G1/2: G1/2 thread C: M12 connector</p>
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Contact composition represents the locked status with the operation key inserted.
 ■: ON, □: OFF

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

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) Mechanical: ≥ 1,000,000 operations		
Vibration (malfunction)	0.75 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min		
Shock	1,000 m/s ² (≈ 100 G) in each X, Y, Z direction for 3 times		
Shock (malfunction)	300 m/s ² (≈ 30 G) in each X, Y, Z direction for 3 times		
Ambient temperature	-30 to 70°C, storage: -40 to 70°C ^(a) (no freezing or condensation)		
Ambient humidity	35 to 90 %RH, storage: 35 to 90 %RH (no freezing or condensation)		
Protection structure	IP67 ^(a) (IEC standard, except for head)		
Material	Plastic head · polyamide 6, metallic head · zinc case: polyamide 6, operation key: stainless steel 304		
Approval	(TUV NORD)		
Connection type	M20 connector cable	G1/2 connector cable	M12 plug connector
Unit weight (packaged)	<ul style="list-style-type: none"> • 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.

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

Technical drawing of a mechanical part, showing two views: a front view (top) and a side view (bottom).

Front View (Top):

- Overall width: 50
- Overall height: 7.5
- Central slot width: 30
- Slot depth: 16.8
- Four circular features (possibly holes or mounting points) are located at the corners of the block.
- Dimension 4 is indicated on the right side, likely representing the thickness of the part.

Side View (Bottom):

- Overall width: 49
- Overall height: 45
- Distance from the left edge to the start of the central slot: 37
- Distance from the start of the central slot to the right edge: 30
- Distance from the left edge to the center of the central slot: 7.2
- Dimension 4.4 is indicated on the right side, likely representing the thickness of the part.

- 1 connection outlet

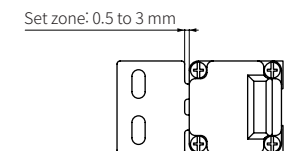
- 2 connection outlet

() is installing spot of protrusion for fixing the switch firmly.

The diagram illustrates three different terminal connector designs. The first two are labeled 'Terminal type (1 connection outlet)' and the third is 'Terminal type (2 connection outlet)'. The first connector has a 'Cable connector' at the bottom. The second and third connectors have a 'Cable gland port' on the side. Common components labeled across the designs include the 'Operation key hole', 'Head', 'Switch body', and 'Terminal cover'.

Installation

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- | Operation key | Minimum radius | |
|---------------|----------------|--------|
| | R1 | R2 |
| SFD-KH | 300 mm | 300 mm |
| SFD-KL | | |
| SFD-KHR | | |
| SFD-KLR | | |
| SFD-KLF | 50 mm | 300 mm |
| SFD-KLF2 | | |
- Inspect the inserted operation key remains within the set zone (0.5 to 3 mm).
 - Install the operation key within ± 1 mm from the center of the operation key hole.



- | 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

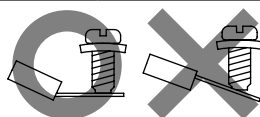
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- A diagram of a 4-pin connector. The pins are arranged in two columns. The left column has pins labeled 11, 21, and 31/33. The right column has pins labeled 12, 22, and 32/34. The connector is shown with a central block and four pins extending outwards.

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

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



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- (unit: mm)

- | Thread spec | MFR | Model | Cable Ø |
|-------------|-----------|------------------------|-----------|
| G1/2 | CP SYSTEM | FCGL-G12B | 4 - 8 mm |
| M20 | LAPP | ST-M20X1.5 / 5311-1020 | 6 - 13 mm |

- Do not use metallic duct. Using metallic duct can result in electric shock due to the damage on the service entrance.

Sold Separately: Operation Key (SFD-K)

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- Technical drawing of a mechanical part. The drawing includes a front view and a side view. The front view shows a part with a total width of 30, a top flange width of 15, and a total height of 28. The bottom flange has a width of 20 and a thickness of 10. The central section has a height of 22 and a width of 15. The side view shows a part with a total height of 28 and a width of 2.

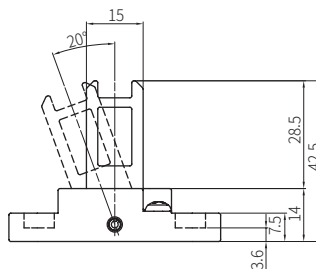
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- Technical drawing of a mechanical part, showing a side view and a top view. The side view shows a profile with a total width of 15, a central rectangular cutout with a width of 10 and a height of 28, and a base thickness of 10. The top view shows a rectangular footprint with overall dimensions of 30 by 16. It features two circular holes, each with a diameter of 10, spaced 20 units apart. The distance from the center of each hole to the nearest edge is 8.5. A dimension of 4.3 is shown for the distance from the center of the holes to the top edge of the part.

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- Technical drawing of a mechanical part showing front and side views with dimensions.
- Front View Dimensions:**
- Overall width: 30
 - Top flange width: 15
 - Top flange height: 28
 - Distance between hole centers: 20
 - Distance from left edge to first hole center: 10
 - Distance from bottom edge to hole centers: 22
 - Distance from hole center to right edge: 15
 - Top hole diameter: $\varnothing 10$
 - Bottom hole diameter: $\varnothing 8$
- Side View Dimensions:**
- Overall height: 5
 - Distance from bottom edge to hole center: 2
 - Hole diameter: $\varnothing 9$

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- The technical drawing shows three views of a mechanical component:
- Front View (Top):** Shows a T-shaped profile. The total width is 15. The height of the vertical stem is 10. The height of the horizontal flange is 28.
 - Top View (Bottom Left):** Shows the plan view. The overall width is 30. There are two circular features spaced 20 apart, each with a diameter of 10. A central rectangular slot has a width of 8.5 and a depth of 4.2. The distance from the centerline of the circles to the right edge is 16.
 - Side View (Right):** Shows the profile of the component. It has a total thickness of 5. The main body has a thickness of 2. A small feature on the left has a thickness of 1. The bottom flange has a diameter of Ø9.

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- Technical drawing of a mechanical part with dimensions:
- Overall width: 56
 - Distance between mounting holes: 40
 - Distance between mounting holes (inner): 30
 - Overall height: 15
 - Mounting hole diameter: $\varnothing 8$
 - Central hole diameter: $\varnothing 4.5$
 - Feature A: A small circular feature on the right side of the part.

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- Inclination
- Door hinge



A	Angle adjusting screw
B	Base [Material] SFD-KLF: Polyamide SFD-KLF2: Zinc

Sold Separately: Connector Cable

- For detailed information, refer to the 'M8/M12 Connector Cable' manual.

Appearance	Power	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Socket-Female) 4-pin	4-wire	2 m	Oil resistant PVC	CIDH4-2
				3 m		CIDH4-3
				5 m		CIDH4-5
				7 m		CIDH4-7
	DC	M12 (Socket-Female) 4-pin	4-wire	2 m	Oil resistant PVC 	CIDH4-2-A
				3 m		CIDH4-3-A
				5 m		CIDH4-5-A
				7 m		CIDH4-7-A
	DC	M12 (Socket-Female), L Type 4-pin	4-wire	2 m	Oil resistant PVC	CLDH4-2
				3 m		CLDH4-3
				5 m		CLDH4-5
				7 m		CLDH4-7
	DC	M12 (Socket-Female), L Type 4-pin	4-wire	2 m	Oil resistant PVC 	CLDH4-2-A
				3 m		CLDH4-3-A
				5 m		CLDH4-5-A
				7 m		CLDH4-7-A
	DC	M12 (Socket-Female) 4-pin	M12 (Socket-Male) 4-pin	1 m	Oil resistant PVC	C1DH4-1
				3 m		C1DH4-3
				5 m		C1DH4-5
				7 m		C1DH4-7
	DC	M12 (Socket-Female), L Type 4-pin	M12 (Socket-Male), L Type 4-pin	1 m	Oil resistant PVC	C2DH4-1
				3 m		C2DH4-3
				5 m		C2DH4-5
				7 m		C2DH4-7
	DC	M12 (Socket-Female) 4-pin	M12 (Socket-Male), L Type 4-pin	1 m	Oil resistant PVC	C3DH4-1
				3 m		C3DH4-3
				5 m		C3DH4-5
				7 m		C3DH4-7
	DC	M12 (Socket-Female), L Type 4-pin	M12 (Socket-Male) 4-pin	1 m	Oil resistant PVC	C4DH4-1
				3 m		C4DH4-3
				5 m		C4DH4-5
				7 m		C4DH4-7