
SFC-R212-R23
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D1. Safety Sensors

Safety sensors are comprised of emitters and receivers. Operation of potentially dangerous machines are turned off when an object or person is detected between the emitter and receiver.

Safety
Light Curtains
(Standard Type /
Advanced Type)

SFL / SFLA Series

Features

- Select the light curtain suitable for the environmental condition with three detection capabilities: finger, hand, and hand-body
- Variable height for protection: 144 to1868 mm
- Expend up to 4 sets of 400 beams with series connection
- Built-in various safety-related functions to deal with the field conditions: interlock, lockout, EDM, muting, override, blanking, and reduced resolution, etc.
- SFLA Series supports various functions via the dedicated software (atLightCurtain)
  : Monitoring for real-time incident light level (SFL Series also supports it.)
  : Provide a variety of functions to set including automatic setting for muting and blanking zone
  : Save setting information of light curtain and apply the same settings to multiple light curtains
- Four mounting brackets (BK-SFL-□, sold separately) support various installation environments
- Select the sensing distance suitable for installation environment: Long or short mode
- Easy beam adjustment with the indicators at the top and bottom of the light curtain

Specifications

Type	Standard type		
Models	**SFL14-□-□**	**SFL20-□-□**	**SFL30-□-□**
Sensing type	Through-beam		
Light source	Infrared LED (855 nm)		
Effective aperture angle (EAA)	Within ± 2.5 ° when the sensing distance is greater than 3 m for both emitter and receiver.		
Sensing distance	Short - Long mode (setting switch)		
Short mode	0.2 to 5 m	0.2 to 8 m	0.2 to 8 m
Long mode	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
Detection capability	Ø 14 mm (finger)	Ø 20 mm (hand)	Ø 30 mm (hand-body)
Detection object	Opaque object		
Number of optical axes 01)	15 to 111	12 to 68	42 to 75
Protective height	144 to 1,008 mm	183 to 1,023 mm	1,043 to 1,868 mm
Optical axis pitch	9 mm	15 mm	25 mm
Series connection	Max. 3 SET (≤ 300 optical axes)		

Type	Advanced type		
Models	**SFLA14-□-□**	**SFLA20-□-□**	**SFLA30-□-□**
Sensing type	Through-beam		
Light source	Infrared LED (855 nm)		
Effective aperture angle (EAA)	Within ± 2.5 ° when the sensing distance is greater than 3 m for both emitter and receiver.		
Sensing distance	Short - Long mode (setting switch or atLightCurtain)		
Short mode	0.2 to 5 m	0.2 to 8 m	0.2 to 8 m
Long mode	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
Detection capability	Ø 14 mm (finger)	Ø 20 mm (hand)	Ø 30 mm (hand-body)
Detection object	Opaque object		
Number of optical axes 01)	15 to 199	12 to 124	9 to 75
Protective height	144 to 1,800 mm	183 to 1,863 mm	218 to 1,868 mm
Optical axis pitch	9 mm	15 mm	25 mm
Series connection	Max. 4 SET (≤ 400 optical axes)		

View product detail

Standard Type

Advanced Type

- Easy switching NPN or PNP output via switch or dedicated software (atLightCurtain)
- Excellent visibility for the status of the light curtain with 7-segment display
- Built-in self-diagnosis function such as mutual interference prevention and disturbance light detection
- Easy to identify the operating status with the upper OSSD indicator without an additional device
- Four kinds of non-safety outputs for a variety of environmental conditions: AUX 1 / 2, and Lamp 1 / 2
- The product structure conforms with international safety regulations and standards: Type 4 ESPE (AOPD), SIL3, SIL CL3, Cat. 4, PL e, CE, UL Listed, S Mark and KCs (some of the models)
- Protection rating: IP65, IP67 (IEC standard), IP67G (JEM standard), IP69K (DIN standard)

Power supply	24 VDC⎓ ± 20 % (Ripple P-P: ≤ 10 %)
Current consumption [01]	Emitter: ≤ 106 mA, receiver: ≤ 181 mA
Response time [01]	T_{OFF} (ON → OFF): ≤ 32.3 ms, T_{ON} (OFF → ON): ≤ 76.6 ms
Safety related output : OSSD output	NPN or PNP open collector Load voltage [02]: ON - 24 VDC⎓ (except for the residual voltage), OFF - 0 VDC⎓, Load current [03]: ≤ 300 mA, Residual voltage [04]: ≤ 2 VDC⎓ (except for voltage drop due to wiring), Load capability: ≤ 2.2 μF, Leakage current: ≤ 2.0 mA, Wire resistance of load: ≤ 2.7 Ω
Auxiliary output (AUX 1/2) [05]	NPN or PNP open collector Load voltage: ≤ 24 VDC⎓, Load current: ≤ 100 mA, Residual voltage: ≤ 2 VDC⎓ (except for voltage drop due to wiring)
Lamp output (LAMP 1/2) [05]	NPN or PNP open collector Load voltage: ≤ 24 VDC⎓, Load current: ≤ 300 mA, Residual voltage: ≤ 2 VDC⎓ (except for voltage drop due to wiring), Incandescent lamp: 24 VDC⎓ / 3 to 7 W, LED lamp: Load current ≤ 10 to 300 mA (V_F: ≤ 1.5 VDC⎓)
External input	Reset input, mute 1/2 input, EDM, external test
	When setting NPN output ON: 0 - 3 VDC⎓, OFF: 9 - 24 VDC⎓ or open, short-circuit current: ≤ 3 mA When setting PNP output ON: 9 - 24 VDC⎓, OFF: 0 - 3 VDC⎓ or open, short-circuit current: ≤ 3 mA
Protection circuit	Reverse power polarity, reverse output polarity, output short-circuit over-current protection
Safety-related functions	Interlock (reset hold), external device monitoring (EDM), muting/override, Blanking (fixed blanking, floating blanking), reduced resolution
General functions	Self-test, alarm for reduction of incident light level, mutual interference prevention
Others functions	Change of sensing distance, switching to NPN or PNP, external test (light emission stops), auxiliary output (AUX 1, 2), lamp output (LAMP 1, 2)
Synchronization type	Timing method by RS485 synchronous line
Insulation resistance	≥ 20MΩ (at 500 VDC⎓ megger)
Noise immunity	± 240 VDC⎓ the square wave noise (pulse width: 1μs) by the noise simulation
Dielectric strength	1,000 VAC~ 50 / 60 Hz for 1 minute
Vibration	0.7 mm double amplitude at frequency of 10 to 55 Hz (for 1 min), 20 sweeps in each X, Y, Z direction
Shock	100 m/s^2 (≈ 10 G), pulse width 16 ms in each X, Y, Z direction for 1,000 times
Ambient illumination (receiver)	Incandescent lamp: ≤ 3,000 lx, sunlight: ≤ 10,000 lx
Ambient temperature	-10 to 55 °C, storage: -20 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 95 %RH (no freezing or condensation)
Protection rating [06]	IP65, IP67 (IEC standard), IP67G (JEM Standard), IP69K (DIN standard)
Material	Case: Aluminum, Front cover and sensing part: Polymethyl methacrylate, End cap: polycarbonate, Power I/O cable and connector cable: polyurethane (PUR) or polyvinyl chloride (PVC), Y type connector cable: polyvinyl chloride (PVC), lamp output cable and series connector cable: polyurethane (PUR)
Approval	(INDUSTRIAL ROBOT PROTECTION DEVICE) [07]
International standards	UL 508, CSA C22.2 No. 14, ISO 13849-1 (PL e, Cat. 4), ISO 13849-2 (PL e, Cat. 4), UL 61496-1 (Type 4, ESPE), UL 61496-2 (Type 4, AOPDs), IEC/EN 61496-1 (Type 4, ESPE), IEC/EN 61496-2 (Type 4, AOPDs), IEC/EN 61508-1~-7 (SIL 3), IEC/EN 62061 (SIL CL 3)

01) It may differ depending on the models. For more information, refer to the "SFL/SFLA User Manual."
02) The values of load voltage were drawn with PNP output, and in case of NPN output, apply these in reverse.
03) Be sure that the load current should be greater than 6 mA.
04) The residual voltage was drawn with 300 mA of load current.
05) It is the non-safety output. Do not use it for safety purposes.
06) Approved certification protection ratings are IP65 and IP67.
07) Refer to the "SFL/SFLA User Manual" for certified by model. The certified models for S-Mark and KCs (industrial robot protection device) have the same functional basis.

Software

Download the installation file and the manuals from the Autonics website.

[atLightCurtain]

It is that provides configuration and monitoring of light curtain.
In case of SFL (Standard type), only monitoring function is supported, and in case of SFLA (advanced type), all functions such as parameter setting are available.

D2. Safety Door Switches

Safety door switches can detect opening and closing of doors in machines, and also keep the door locked during potentially dangerous operation.

Safety

Door Lock Switches

SFDL Series

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:
  4-contact (connected), 4-contact (not connected), 5-contact, 6-contact
- Selectable between connector type which reduces working process and separable terminal type which is useful for maintenance
- Manual unlock function to handle the emergency:
  Cross type / special type release key line-up
- Minimized solenoid heat with stable current supply
- Excellent solidity / durability of metallic head
- Applicable to various applications using the slide key unit accessory

Specifications

Model	SFDL-□□□-□□	SFDL-□□□-C□□
Directing opening force	≥ 80 N	
Directing opening distance	≥ 10 mm	
Locking pullout strength	≥ 1,300 N	
Operating speed	0.05 to 1 m/s	
Operating frequency	≤ 20/min	
Machanical life cycle	≥ 1,000,000 operations (20/min)	
Vibration (malfunction)	0.35mm amplitude at frequency of 10 to 55 Hz (for 1 min) 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)	80 m/s^2 (≈ 8 G) in each X, Y, Z direction for 3 times	
Ambient temperature	-10 to 55°C [01], storage: -25 to 65 °C (a non freezing or condensation environment)	
Ambient humidity	35 to 85 %RH , storage: 35 to 85 %RH (a non freezing or condensation environment)	
Protection structure	IP67 [02] (IEC standard, except for head)	
Material	Head: zinc, case: polyamide 66, operation key: stainless steel 304	
Approval	CE (TUV NORD) cULus LISTED KC EAC	
Accessory	SFDL-□□□-□□K (Special type release keyse key) : rotating key	
Applicable cable	AWG22	–
Connection type	Terminal type	Connector type
Unit weight (packaged)	≈ 375 g (≈ 440 g)	≈ 325 g (≈ 395 g)

01) UL approved ambient temperature: 50°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.

Contact block	
Rated voltage/current for load	Resistive load: 1 A/120 VAC∼, 0.22 A/125 VDC⎓ Inductive load (IEC): AC-15 1 A/120 VAC∼, DC-13 0.22 A/125 VDC⎓ Inductive load (UL): C150, R150
Impulse dielectric strength	Between the terminals of same polarity: 1.5 kV Between the terminals of different polarity: 1.5 kV Between each terminal and non-live part: 2.5kV
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Contact resistance	≤ 200 mΩ
Electrical life cycle	≥ 100,000 operations (125 VAC∼/1 A)
Conditional short-circuit current	100 A
Solenoid	
Rated voltage	24 VDC⎓, class 2
Current consumption	Supplying power: 0.26A Normal: max. 0.2A (approx. 3 seconds after supplying power)
Insulation class	Class E

View product detail

Safety

Flat Type
Door Lock Switches

SFDL2 Series

Features

- Slim size W 90 x H 105 x D 35.5 mm
- Head unit can be rotated to change insert direction of operation key:
  Operation key can be inserted from 4 directions (top / sides)
- Various contact types (up to 6-contacts):
  Lock N.C. 2 / N.O. 1 + Door N.C. 2 / N.O.1
  Lock N.C. 3 + Door N.C. 2 / N.O.1
  Lock N.C. 2 / N.O. 1 + Door N.C. 3
  Lock N.C. 3 + Door N.C. 3
- Manual unlock function (release key) for emergencies during installation or testing:
  Standard (cross) type and special type release keys, rear release button
- Two lock-release methods:
  Mechanical lock-solenoid release, solenoid lock-mechanical release models
- Different installation types depending on operation key insertion position:
  Front / rear installation models
- Excellent strength and durability with metal head model

Specifications

Model	SFDL2-□□□-□□ -□ SFDL2-□□□-□□K-□	SFDL2-□□□-□□ B-□ SFDL2-□□□-□□KB-□
Directing opening force	≥ 80 N	
Directing opening distance	≥ 10 mm	
Locking pullout strength	≥ 1,300 N	
Operating speed	0.05 to 1 m/s	
Operating frequency	≤ 20/min	
Mechanical life cycle	≥ 1,000,000 operations (20/min)	
Indicator	Solenoid status or contact status (orange, depending on connection)	-
Vibration (malfunction)	0.35mm amplitude at frequency of 10 to 55 Hz (for 1 min) 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)	80 m/s^2 (≈ 8 G) in each X, Y, Z direction for 3 times	
Ambient temperature	-10 to 55°C, storage: -25 to 65 °C (a non freezing or condensation environment)	
Ambient humidity	35 to 85 %RH , storage: 35 to 85 %RH (a non freezing or condensation environment)	
Protection structure	IP67 [01] (IEC standard, except for head)	
Material	Head: zinc or PA, case: PA	
Approval	CE (TUV NORD)	
Accessory	SFDL2-□□□-□□K/KB-□ (Special type release key): rotating key	
Unit weight (packaged)	Normal type: ≈ 400 g (≈ 490 g), rear release button type:≈ 395 g (≈ 485 g)	

01) 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.

Contact block	
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
Impulse dielectric strength	Between the terminals of same polarity: 2.5 kV Between the terminals of different polarity: 4 kV Between each terminal and non-live part: 6 kV
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Contact resistance	≤ 100 mΩ
Electrical life cycle	≥ 100,000 operations (250 VAC~/6 A)
Conditional short-circuit current	100 A
Solenoid	
Rated voltage	24 VDC⎓, class 2
Current consumption	Supplying power: 0.26A Normal: max. 0.2A (approx. 3 seconds after supplying power)
Insulation class	Class E
Indicator LED	
Rated voltage	24 VDC⎓
Current consumption	2.2 mA

View product detail

Safety
Door Switches

SFD Series

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

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) Mechanical: ≥ 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/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 [01] (no freezing or condensation)		
Ambient humidity	35 to 90 %RH , storage: 35 to 90 %RH (no freezing or condensation)		
Protection structure	IP67 [02] (IEC standard, except for head)		
Material	Plastic head - polyamide 6, metallic head - zinc case: polyamide 6, operation key: stainless steel 304		
Approval	CE (TUV NORD) cULus LISTED S EAC		
Connection type	M20 connector cable	G1/2 connector cable	M12 plug 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.

View product detail

Safety

Non-Contact Door Switches

SFN Series

Features

- Vertical / Horizontal installation supported
- Available to install at back-forth, up-down, right-left moving door
- Connectible maximum 30 units to one controller
- Easy notification of operation status with an operation indicator (ON: green, OFF: red)

Specifications

Model		SFN-M-□
Operating distance [01]	OFF→ON	≥ 5 mm
	ON→OFF	≤ 15 mm
Approval		CE (TUV NORD) cULus LISTED
Unit weight (packaged)		Cable type (2 m): ≈ 100.5 g (≈ 113.8 g) Cable type (5 m): ≈ 199.5 g (≈ 214.8 g) Cable connector type: ≈ 58.1 g (≈ 71.6 g)

01) It is rated at 23°C of ambient temperature, and it may be differed up to ± 20 % by ambient temperature.

Power supply	24 VDC⎓ (± 10 %)
Operating frequency	100 Hz
Power consumption [01]	≤ 400 mA
Auxiliary output	PNP open collector output - 24 VDC⎓, 10 mA
Operation indicator	ON: green, OFF: red
Life expectancy	≥ 20,000,000 times (with low load)
Insulation resistance	≥ 50 MΩ (500 VDC⎓ megger)
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection circuit
Dielectric strength	1,500 VAC~ 50/60Hz for 1 minute
Vibration	1.0 mm amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Vibration (malfunction)	1.0 mm amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 min
Shock	300 m/s^2 (≈ 30 G) in each X, Y, Z direction for 3 times
Shock (malfunction)	300m/s^2 (≈ 30G) in each X, Y, Z direction in output ON/OFF status for 3 times
Ambient temperature	-10 to 55 °C, storage : -20 to 60 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage : 35 to 85 %RH (no freezing or condensation)
Protection structure	IP67 (IEC standard)
Connection	Cable type / cable connector type model
Cable	Ø 5 mm, 5-wire, cable type: 2 m / 5 m, cable connector type: 0.3 m
Wire	AWG26 (0.08 mm), 28-core, core diameter: Ø 0.74 mm
Connector spec.	M12 plug connector
Material	Body/CAP: PC

01) Power to the load is not included.

Characteristic level / Safety category (with SFC-N322)	IEC 61508 SIL 3 IEC 62061 SIL CL 3 ISO 13849-1 PLe Cat.4 - HFT = 1 - Diagnostic Coverage : 99 % (high) - MTTFd = 100 year (high) - Mission time = 20 year - PFH = 3.88E-09

Safety status in case of error: the switch does not have an internal error recognition function, so it cannot maintain a safety status in the event of error. Error recognition is processed in the connected controller (SFC-N322).

View product detail

D3. Safety Switches

Safety switches safeguard personnel from injury and protect equipment from damage in potentially dangerous areas.

Ø 22 / 25 mm
Round Mount
Emergency Stop Switches

SF2ER Series

Features

- Easy mounting and removing of Contact Units using a lever
- Adoptable maximum three contact units in series to improve wiring efficiency
- Available to install using either round or forked crimp terminals
- Oil resistant to IP65 protection structure
- Circuit interruption function with a direct opening mechanism for the occurrence of error such as contact weld
- Supplying a various kind of accessories for improving usability
  - Ø 22 / 25 mm guard ring for emergency stop switches
  - Ø 22 / 25 mm name plate for emergency stop switches
  - Ø 22 / 25 mm contact block for emergency stop switches

View product detail

Specifications

Model	SF2ER-□□□□-□
Rated voltage / current	IEC: AC-15 (220 VAC~, 3 A), DC-13 (220 VDC⎓, 0.2 A) UL: A300, Q300
Contact operating power	3.0 to 8.0 N/ 1 contact
Operation distance	5.0 mm (0/-0.5)
Rotation angle	CW (clock wise) 52°
Allowable operation frequency [01]	Mechanical: 20 times/minute, electrical: 20 times/minute
Life cycle	Mechanical: ≥ 250,000 times, electrical: ≥ 100,000 times
Applicable wire	AWG 18 (0.823 mm^2)
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Dielectric strength	2,500 VAC~ 50/60 Hz for 1 minute
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 minutes
Shock	1,000 m/s^2 (≈ 100 g) in each X, Y, Z direction for 3 times
Shock (malfunction)	250 m/s^2 (≈ 25 g) in each X, Y, Z direction for 3 times
Ambient temperature	-20 to 65°C [02], storage : -40 to 70 °C (at no freezing or condensation)
Ambient humidity	35 to 85 %RH , storage : 35 to 85 %RH (at no freezing or condensation)
Protection structure	IP65 [03] (oil resistant, IEC standards)
Material	Button: PC, body: PA6, lever in fixing unit: PA6
Approval	CE (TUV NORD)
Weight [04]	≈ 66g

01) Setting and resetting once is counted as one operation.
02) UL approved ambient temperature: 55 °C
03) It is only for part from front of the panel. Protection structure is guaranteed only when the switch is installed on flat and smooth surface with mounting holes Ø22mm.
04) It is switch with three contact blocks.

[Contact capacity]

IEC (EN60947-5-1)

Rated current		10 A			
Rated voltage		24 V	110 V	220 V	380 V
AC	Resistive load (AC-12)	10 A	10 A	6 A	3 A
	Inductive load (AC-15)	10 A	5 A	3 A	2 A
DC	Resistive load (DC-12)	10 A	2 A	0.6 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.2 A	0.1 A

UL / CSA (UL508, CSA C22.2 No. 14)

A300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
AC120 V	10 A	60	6	7,200	720
AC240 V		30	3		

Q300

Rated voltage	Through current	Current (A)		Volt ampere (VA)	
		Making	Breaking	Making	Breaking
DC125 V	2.5 A	0.55	0.55	69	69
DC250 V		0.27	0.27		

Safety

Grip Type Enabling Switches

SFEN Series

Features

- Models: Standard / Stop button / Momentary button type
- High operation sensitivity with 3-position snap action
- Enable operation indicator (green LED)
- Various contact types
  : Standard type N.O. 2 + N.C. 1
  : Stop button type N.O. 2 + N.C. 2
  : Momentary button type N.O. 2 + N.O. 2
- Secure connection with cable gland
- Holding key SFEN-HK (sold separately): for connection with safety door switch (SFD Series)

Specifications

[Enable switch]

Rated Insulation Voltage	250 VAC~
Rated through current	2.5 A
Rated inductive load	AC-15 (0.75 A / 240 VAC~), DC-13 (0.55 A / 125 VDC⎓)
Rated resistive load [01]	0.75 A / 240 VAC~, 0.55 A / 125 VDC⎓
Controller strength [02]	Operation direction: 200 N, for 1 min
Operating frequency	Electrical: ≤ 20 / min, Machanical: ≤ 20 / min
Dielectric strength	Between terminals of same polarity, between terminals of different polarity, between terminal and non-live part : 2,500 VAC~ 50 / 60 Hz for 1 min (impulse dielectric strength)
Electrical life cycle	≥ 100,000 operations (rated load)
Machanical life cycle	OFF → ON → OFF: ≥ 100,000 operations / OFF → ON: ≥ 1,000,000 operations

01) Use a 10 A fuse gl or gG conforming to IEC60269 as short-circuit protection. The body does not have a built-in fuse.
02) Do not use the switch more than the controller strength. Failure to follow this instruction may result in product damage.

[Stop button]

Rated Insulation Voltage	250 VAC~
Rated through current	3 A
Rated resistive load [01]	AC-12 (3 A / 250 VAC~), DC-12 (3 A / 30 VDC⎓)
Controller strength [02]	Operation direction: 400 N, for 1 min (operation direction: 0.5 N m, for 1 min)
Operating frequency	Electrical: ≤ 10 / min, Machanical: ≤ 10 / min
Dielectric strength	Between terminals of same polarity: 1,000 VAC~ 50 / 60 Hz for 1 min. between terminals of different polarity, between terminal and non-live part : 2,000 VAC~ 50 / 60 Hz for 1 min.
Electrical life cycle	≥ 100,000 operations (rated load) (Push / Release 1 time)
Mechanical life cycle	≥ 100,000 operations (Push / Release 1 time)

01) Use a 10 A fuse gl or gG conforming to IEC60269 as short-circuit protection. The body does not have a built-in fuse.
02) Do not use the button more than the controller strength. Failure to follow this instruction may result in product damage.

[Momentary button]

Rated Insulation Voltage	125 VAC~
Rated through current	0.1 A
Rated resistive load [01]	AC-12 (0.1 A / 125 VAC~), DC-12 (0.1 A / 30 VDC⎓)
Controller strength [02]	Operation direction: 10 N, for 1 min
Operating frequency	Electrical: ≤ 25 / min, Machanical: ≤ 60 / min
Dielectric strength	Between terminals of same polarity: 600 VAC~ 50 / 60 Hz for 1 min. between terminals of different polarity, between terminal and non-live part : 1,000 VAC~ 50 / 60 Hz for 1 min.
Electrical life cycle	≥ 100,000 operations (rated load)
Machanical life cycle	≥ 1,000,000 operations

01) Use a 10 A fuse gl or gG conforming tAo IEC60269 as short-circuit protection. The body does not have a built-in fuse.
02) Do not use the button more than the controller strength. Failure to follow this instruction may result in product damage.

View product detail

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[Common spec.]

Conditional short circuit current	100 A
Min. applied load	DC24 V 4 mA
Directing opening force	30 N ± 10
Directing opening distance	4.8 mm ± 0.5
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 min
Shock (malfunction)	150 m/s² (≈ 15 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Insulation class	Class II (double insulation)
Indicator	Enable operation indicator (green)
Protection structure	SFEN: IP66 (IEC standard) SFEN-B, SFEN-M: IP65 (IEC standard)
Applicable wire	AWG 20 to 18 (0.5 to 0.75 mm²)
Connection type	M20 connector cable grand
Material	Cover: PA66, button: PC, rubber grip: Silicone
International standards	IEC 60947-5-1, IEC 60947-5-8, UL 60947-5-1
Approval	CE (TUV NORD)
Unit weight (package)	SFEN: ≈ 238 g (≈ 363 g) SFEN-B: ≈ 268 g (≈ 388 g) SFEN-M: ≈ 252 g (≈ 376 g)

[Contact composition]

	SFEN	SFEN-B	SFEN-M
Enable switch	2 N.O.	2 N.O.	2 N.O.
Option output	1 N.C.	-	-
Stop button	-	2 N.C.	-
Momentary button	-	-	2 N.O.

Safety
Key Selector Switches

SF2KR Series

Features

- Easy to check the lock / unlock status by the front solenoid operation indicator (lockable model: SF2KR-M)
- Various line-up of key free location, N.C. contact powered location, and lock location depending on the general / lockable type
- Contact block option up to 4 contacts: N.O. 1 + N.C. 2, N.C. 3, N.O. 2 + N.C. 2
- 10 different types of keys
- Sold separately
  : Name plate (SF2KR-□-NP□)
  : Contact block (SFEA-C□)

Specifications

Model	SF2KR-□-□-□	SF2KR-M□-□-□
Solenoid input voltage	-	Non-polar 24 VDC⎓ (± 10%)
Solenoid current consumption	-	38.7 mA ± 5%
Conditional short circuit current	100 A	
Indicator	-	Solenoid operation (green)
Applicable wire	Contact: AWG 18 (0.823 mm^2)	Solenoid power: AWG 24 - 18 Contact: AWG 18 (0.823 mm^2)
Allowable operation frequency 01)	30 times/minute	
Life cycle	Mechanical: ≥ 100,000 times, electrical: ≥ 100,000 times	
Key pushing force	≥ 20 N	
Key rotating torque	0.2 to 1.8 N·m	
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)	
Dielectric strength	2,500 VAC~ 50/60 Hz for 1 minute	
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 minutes	
Shock	300 m/s^2 (≈ 30 g) in each X, Y, Z direction for 3 times	
Shock (malfunction)	150 m/s^2 (≈ 15 g) in each X, Y, Z direction for 3 times	
Ambient temperature	-20 to 70°C 02), storage: -40 to 70 °C (at no freezing or condensation)	-10 to 55°C 02), storage: -20 to 70 °C (at no freezing or condensation)
Ambient humidity	35 to 85%RH , storage: 35 to 85%RH (at no freezing or condensation)	
Protection structure	IP65 (front panel, IEC standard)	
Material	PC, POM	
Approval	CE (TUV NORD) cULus LISTED	
Unit weight (packaged) 03)	≈ 130 g (≈ 192 g)	≈ 152 g (≈ 213 g)

01) Rotating and retuning once is counted as one operation.
02) UL approved ambient temperature: 55 °C
03) It is switch with contact blocks.

View product detail

[Contact capacity]

IEC (EN60947-5-1)

Rated current		10 A			
Rated voltage		24 V	110 V	220 V	380 V
AC	**Resistive load (AC-12)**	10 A	10 A	6 A	3 A
	Inductive load (AC-15)	10 A	5 A	3 A	2 A
DC	**Resistive load (DC-12)**	10 A	2 A	0.6 A	0.2 A
	Inductive load (DC-13)	1.5 A	0.5 A	0.2 A	0.1 A

UL / CSA (UL508, CSA C22.2 No. 14)

A300

Rated voltage	**Through current**	**Current (A)**		**Volt ampere (VA)**	
		Making	**Breaking**	**Making**	**Breaking**
AC120 V	10 A	60	6	7,200	720
AC240 V		30	3		

Q300

Rated voltage	**Through current**	**Current (A)**		**Volt ampere (VA)**	
		Making	**Breaking**	**Making**	**Breaking**
DC125 V	2.5 A	0.55	0.55	69	69
DC250 V		0.27	0.27		

D4. Safety Controllers

Safety controllers are used to transmit input and output signals of safety devices and prevent dangerous situations.

Safety Controllers / **Safety** Relay Unit

SFC / SFC-R Series

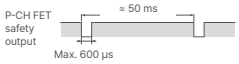
Features

- Slim size (17.5 / 22.5 / 35 mm) for saving installation space
- Various LED indicators for displaying status (power / input / logic input / error / feed back / output)
- Screw / Screwless connection models
- P channel FET / Relay contact safety output models
- Available off-delay output and time setting (advanced/non-contact door switch / relay output models)
- Available logic (AND) connection and extension relay unit connection (advanced / non-contact door switch models)
- The product structure conforms with international safety regulations and standards: SIL3, SIL CL3, PLe, CE, UL Listed, and S Mark

Specifications

Unit	Basic	Advanced	Non-contact door switch
Model	**SFC-422-□**	**SFC-A322-2□-□**	**SFC-N322-2□-□**
Power supply	24 VDC⎓		
Allowable voltage range	85 to 110% of rated voltage		
Power consumption [01]	≤ 2.5 W	≤ 3.0 W	≤ 3.5 W
Input	ON: ≥ 11 VDC⎓ ≥ 5 mA, OFF: ≤ 5 VDC⎓ ≤ 1 mA		
Input time	≥ 50 ms, feedback start (manual) : ≥ 100 ms		
Cable	≤ 100 m (≤ 100Ω, ≤ 10nF)		
Safety output	P channel FET [02]		
Instantaneous	4 ×	3 × [03]	3 × [03]
Off-delay [04]	-	2 × [03]	2 × [03]
Time accuracy	-	≤ ± 5%	≤ ± 5%
Load current	Below 2-point output: ≤ DC 1 A, Over 3-point output: ≤ DC 0.8 A		
Leakage current	≤ 0.1 mA		
Operating time (OFF → ON) [05]	Safety input: ≤ 50 ms		
	-	Logic input: ≤ 200 ms	
	-	-	Non-contact door switch input: ≤ 100 ms
Response (return) time (ON → OFF) [05]	≤ 15 ms, non-contact door switch input or logic input: ≤ 20 ms		
Auxiliary output	2 × PNP transistor: X1, X2 (error)		
Load current	≤ 100 mA		
Leakage current	≤ 0.1 mA		
Logical AND connections	No. of connections: max. 4 units, no. of total connections: max. 20 units No. of layers: max. 5 layers, cable length: ≤ 100 m		
SFN connections [06]	-	-	Max. 30 units
Approval	IEC/EN 61508 (SIL3), IEC/EN 62061 (SILCL3) IEC/EN 60947-5-1, EN ISO 13849-1 (Category 4, PLe) UL listed E249635		
Certification	CE, KC, cULus, EAC		
Unit weight (package)	≈ 70 g (≈ 120 g)	≈ 90 g (≈ 140 g)	≈ 100 g (≈ 150 g)

01) Not include the power consumption of loads.
(SFC-N exclude the power supplied to the non-contact door switch.)
02) Includes a diagnostic pulse (max. 600 µs). Be cautious when using the output signal as an input signal for the control device.



03) Available changing via setting switch on the back side of the product.
04) Available to set Off-delay time (max. 3 sec. / 300 sec., depends on model)
05) The operation (response) time of each model. The time increases when a logical connection or expansion relay unit is connected.
06) SFC-N units can only be connected to Autonics non-contact door switch units SFN Series.

View product detail

Controllers

Relay Units

Unit	Expansion relay	Relay		
Model	**SFC-ER412-□**	**SFC-R412-□**	**SFC-R212-□**	**SFC-R212-R2□-□**
Power supply	24 VDC⎓			
Allowable voltage range	85 to 110% of rated voltage			
Power consumption [01]	≤ 2.5 W	≤ 4.0 W	≤ 4.0 W	≤ 6.0 W
Input	ON: ≥ 11 VDC⎓ ≥ 5 mA, OFF: ≤ 5 VDC⎓ ≤ 1 mA			
Input time	≥ 50 ms, feedback start (manual) : ≥ 100 ms			
Cable	≤ 100 m (≤ 100Ω, ≤ 10nF)			
Safety output	Relay (A contact)	Relay (A contact)		
Instantaneous	4 ×	4 ×	2 ×	2 ×
Off-delay [02]	-	-		2 ×
Time accuracy	-	-		≤ ± 5%
Capacity	240 VAC～ 5 A resistance load, 30 VDC⎓ 5 A resistance load			
Life expectancy	Mechanical: ≥ 10,000,000 operations, Malfunction: ≥ 50,000 operations			
Contact resistance	≤ 100 mΩ			
Inductive load switching	IEC60947-5-1: AC-15(230 V/2 A), DC-13(24 V/1.5 A), UL508: B300/R300			
Conditional short-circuit current	100 A [03]			
Operating time (OFF → ON) [04]	≤ 30 ms [05]	≤ 100 ms		
Response (return) time (ON → OFF) [04]	≤ 10 ms	≤ 15 ms		
Auxiliary output	1 × PNP transistor: X2 (error)	1 × PNP transistor: X1		
Load current	≤ 100 mA	≤ 100 mA		
Leakage current	≤ 0.1 mA			
Expansion units connections	Max. 5 units	-		
Approval	IEC/EN 61508 (SIL3), IEC/EN 62061 (SILCL3) IEC/EN 60947-5-1, EN ISO 13849-1 (Category 4, PLe) UL listed E249635			
Certification	CE cULus LISTED EAC	CE cULus LISTED EAC		
Unit weight (package)	≈ 100 g (≈ 150 g)	≈ 110 g (≈ 160 g)	≈ 80 g (≈ 130 g)	≈ 110 g (≈ 150 g)

01) Not include the power consumption of loads.
02) Available to set Off-delay time (max. 3 sec. / 30 sec., depends on model)
03) Use 6 A fast-blow fuse under the IEC 60127 standard as a short-circuit protection device.
04) The operation (response) time of each model. The time increases when a logical connection or expansion relay unit is connected.
05) Except operation time of advanced unit, non-contact door switch unit

Pollution	3
Overvoltage category	III
Impulse withstand voltage for relay unit (IEC/EN 60947-5-1)	Input terminals and relay output terminals: 6 kV Relay contacts between 13-14 / 23-24 and 33-34 / 43-44 (37-38 / 47-48): 6 kV between 13-14 and 23-24: 4 kV between 33-34 and 43-44 (37-38 and 47-48): 4 kV
Dielectric strength	[Basic / Advanced / Non-contact door switch unit] Between all terminals and case: 500 VAC～ 50/60 Hz for 1 min. [Expansion relay / Relay unit] Between all terminals and case: 1,500 VAC～ 50/60 Hz for 1 min. Between input terminals and output terminals [01]: 2,500 VAC～ 50/60 Hz for 1 min.
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)
Vibration [02]	0.75 mm amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 1 hour
Vibration (malfunc.) [02]	0.5 mm amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 10 minutes
Shock [02]	300 m/s^2 (≈ 30 G) in each X, Y, Z direction for 3 times
Shock (malfunc.) [02]	100 m/s^2 (≈ 10 G) in each X, Y, Z direction for 3 times
Protection rating	IP20 (IEC standard)
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)
Ambient humidity	25 to 85 %RH, storage: 25 to 85 %RH (no freezing or condensation)

01) In case of relay unit, output terminals between 13-14, 23-24 and 33-34, 43-44 (37-38, 47-48)
02) This data based on the product is mounted with bolts. When installing DIN rail, use the product in an environment with small vibration (condition: less than 0.4 mm double amplitude)