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Opening a New Era of Safety

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The Key to Your Safety

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Safer Control System Operation

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## Your Safety is Our Top Priority

“Safety” is becoming an essential part in industrial automation, and the two parts are very closely associated. New safety standards have become mandatory in many industrial fields, to protect personnel from injury in potentially dangerous areas or situations. Automation technology is changing rapidly, with increased chance of injury from dangerous machinery.

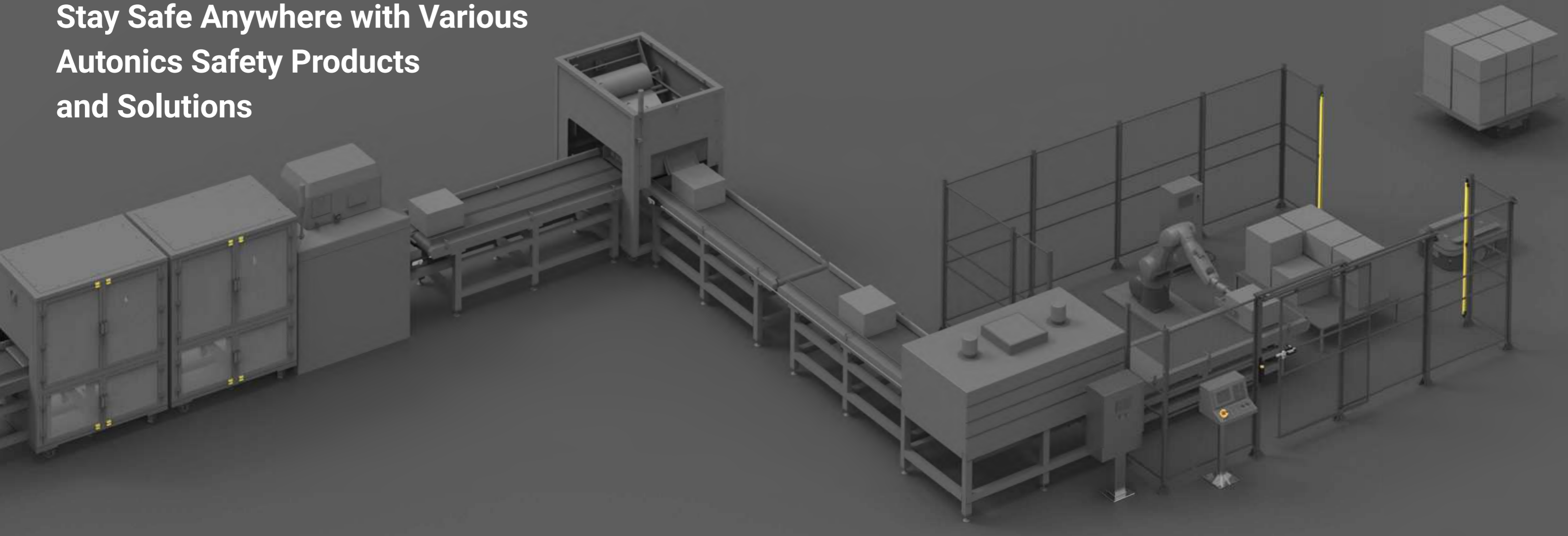
Safety system can be applied in almost all industrial fields where people and machines must co-exist. By implementing safety systems, companies can ensure safe environments for workers, reduce costs from health risks and increase work efficiency. Safety system is no longer a choice to make, it has become an essential requirement.

Autonics is proud to introduce various safety products to ensure safety in industrial sites. With automation technology and expertise which we have built for over 40 years, we now present new safety products that will protect you and your equipment.

Autonics safety solution promises to keep you safe and raise workplace efficiency with stable, reliable, flexible, and practical safety products and systems.



# Stay Safe Anywhere with Various Autonics Safety Products and Solutions



Safety is a top concern in industries where personnel and machines must work together. As a partner to keep you and your machines safe, Autonics offers various safety technology and solutions.

Autonics safety products feature high flexibility and practicality, with various product options and functions that can be applied in various different environments. Our products are developed to meet customer needs and demands in the industry and also to increase workplace efficiency.

With Autonics safety solutions, you can minimize various risks and prevent accidents by analyzing environmental and operational settings. Ensure peace of mind at your operation sites by choosing Autonics safety products. We will keep you safe.



### Safety Light Curtains

Standard Type **SFL Series**  
High Performance Type **SFLA Series**



### Safety Switches

Emergency Stop Button Switches **SF2ER Series**  
Grip Type Enabling Switches **SFEN Series**  
Key Selector Switches **SF2KR Series**



### Safety I/O Terminal Blocks

Relay Terminal Blocks **SFT Series**



### Safety Door Switches

Door Switches **SFD Series**  
Door Lock Switches **SFDL Series**  
Flat Type Door Lock Switches **SFDL2 Series**  
Non-Contact Door Switches **SFN Series**



### Safety Controllers

Standard Unit **SFC**  
High Performance Unit **SFC-A**  
Non-Contact Door Switch Unit **SFC-N**  
Expansion Relay Unit **SFC-ER**  
Relay Unit **SFC-R**

# Light the Way to Your Safety

## Safety Light Curtains

### SFL/SFLA Series

Safety light curtains are installed in potentially dangerous or hazardous areas or machines to safeguard personnel from injury. Operation of potentially dangerous machines are turned off when an object or person is detected between the emitter and receiver. The light curtains feature proven technology from Autonics area sensors and mapping sensors. The light curtains are built to meet international safety standards and regulations. Various detection models and safety functions are available to protect your safety diverse applications.

### Safety Standards

IEC/EN 61508 (SIL 3)

IEC/EN 62061 (SIL CL 3)

EN/IEC 61496-1/2 (Type 4, A.O.P.D., E.S.P.E.)

ISO 13849-1/2 (Cat. 4, PL e)

### Certifications




# Various Models Available for Flexible Applications


The SFL/SFLA series safety light curtains are available in various models for flexible application. The light curtains are available in various product heights, beam pitch size (9 mm/15 mm/25 mm) for installation in diverse environments. The light curtains can be expanded to 4 sets and 400 beams for application in larger scale industrial environments.

## 1. Various Detection Type Models


Finger detection, hand detection, hand-body detection models are available for application in diverse user environments.



**Finger detection type**  
- Beam pitch : 9 mm  
- Minimum detection size : Ø14 mm



**Hand detection type**  
- Beam pitch : 15 mm  
- Minimum detection size : Ø20 mm



**Body detection type**  
- Beam pitch : 25 mm  
- Minimum detection size : Ø30 mm

### SFL Series (Standard Type)

	Finger	Hand	Body
<b>Sensing distance (Long mode)</b>	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
<b>Detection capability</b>	Ø 14 mm	Ø 20 mm	Ø 30 mm
<b>Optical axis pitch</b>	9 mm	15 mm	25 mm
<b>Number of beams</b>	15 to 111 ea	12 to 68 ea	42 to 75 ea
<b>Protection height</b>	144 to 1,008 mm	183 to 1,023 mm	1,043 to 1,868 mm

### SFLA Series (High Performance Type)

	Finger	Hand	Body
<b>Sensing distance (Long mode)</b>	0.2 to 10 m	0.2 to 15 m	0.2 to 15 m
<b>Detection capability</b>	Ø 14 mm	Ø 20 mm	Ø 30 mm
<b>Optical axis pitch</b>	9 mm	15 mm	25 mm
<b>Number of beams</b>	15 to 199 ea	12 to 124 ea	9 to 75 ea
<b>Protection height</b>	144 to 1,800 mm	183 to 1,863 mm	218 to 1,868 mm

## 2. Various Protection Height

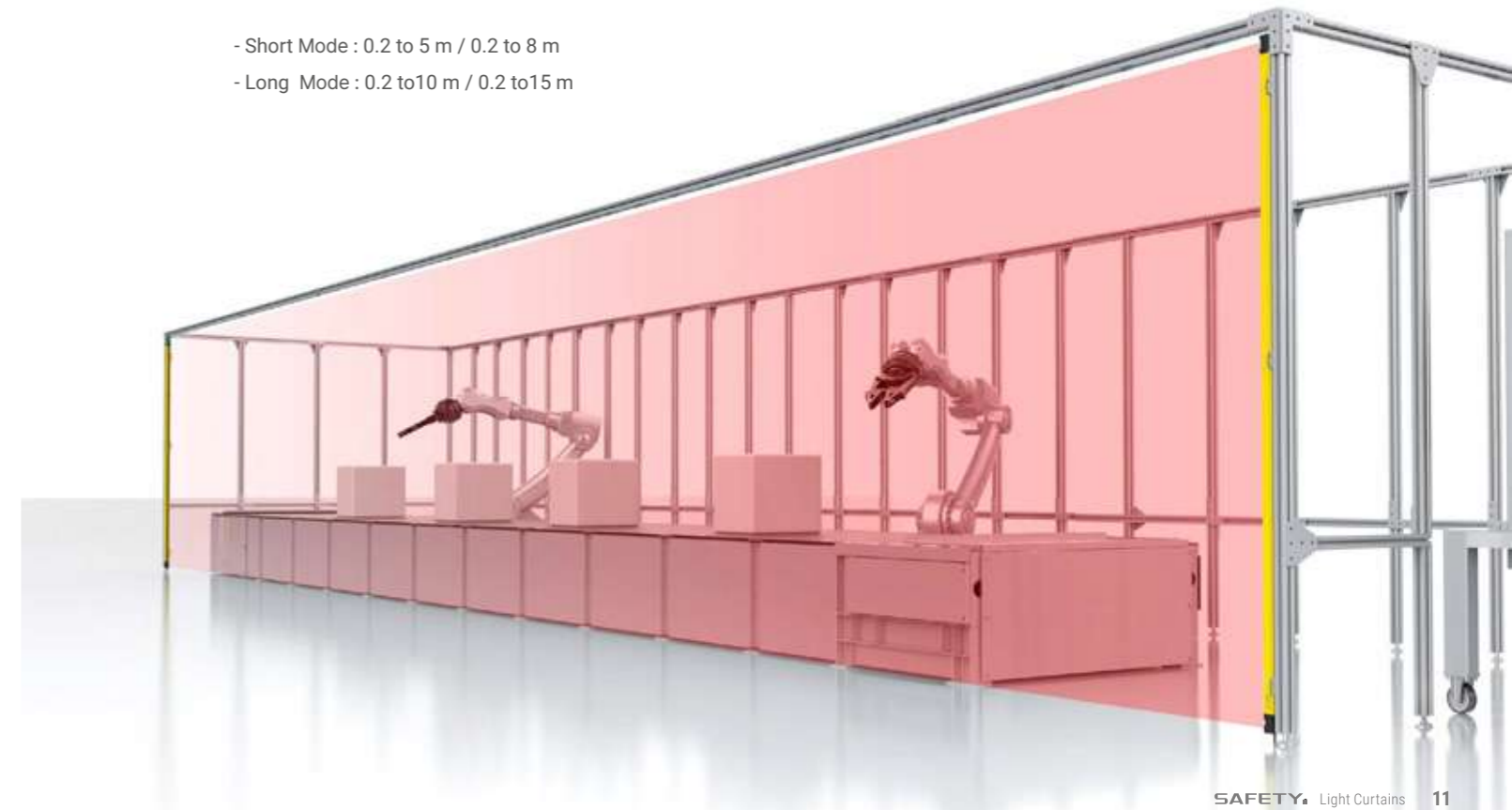
Various models are available by protection height (144 mm to 1,868 mm), offering options for diverse equipment sizes



## 3. Long Sensing Distance

Long sensing distance (15 m) allows wider area of detection. The sensors can be set to short/long mode depending on user needs.

- Short Mode : 0.2 to 5 m / 0.2 to 8 m
- Long Mode : 0.2 to 10 m / 0.2 to 15 m





## High Durability and Environmental Performance

The SFL/SFLA series is designed with hardened casing and screen protection for application in harsh conditions. The light curtains can be installed in environments with impact, dust, or moisture.

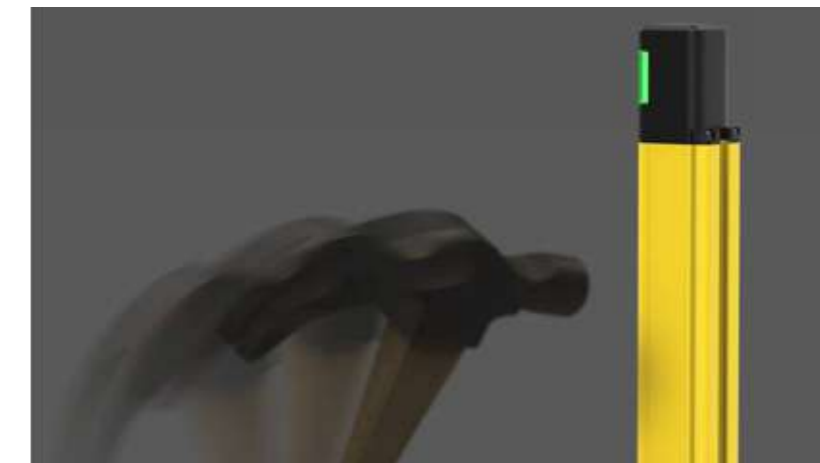
### 4. Expand up to 400 Beams

The SFLA series light curtains can be expanded up to 4 sets and 400 beams with serial expansion cables. Multiple light curtains can be controlled using a single connection line, offering easier wiring, installation, and design planning.

Also, the mutual interference protection ensures that there is no signal interference between the connected units. If an error is detected in a single unit, all connected units will enter into lockout state.

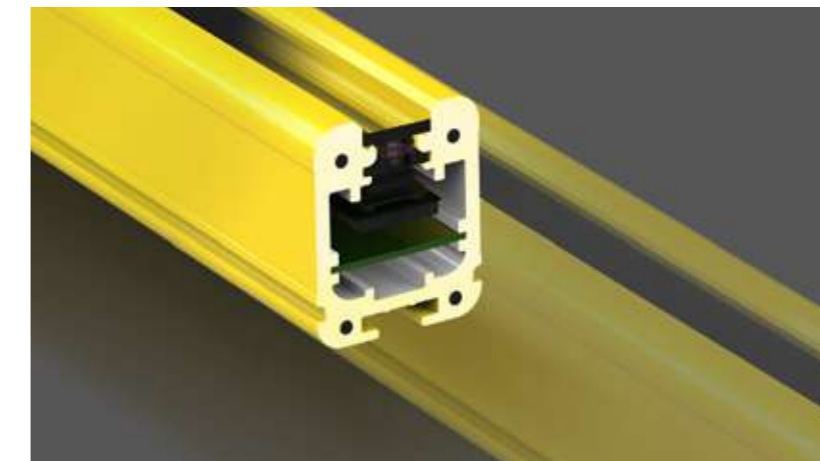
\* SFL series: expand up to 3 sets and 300 beams

#### Serial Expansion Connection (SFLA Series)



### 1. Robust Body Housing

The robust body housing allows stable operation in harsh conditions with sudden impact.



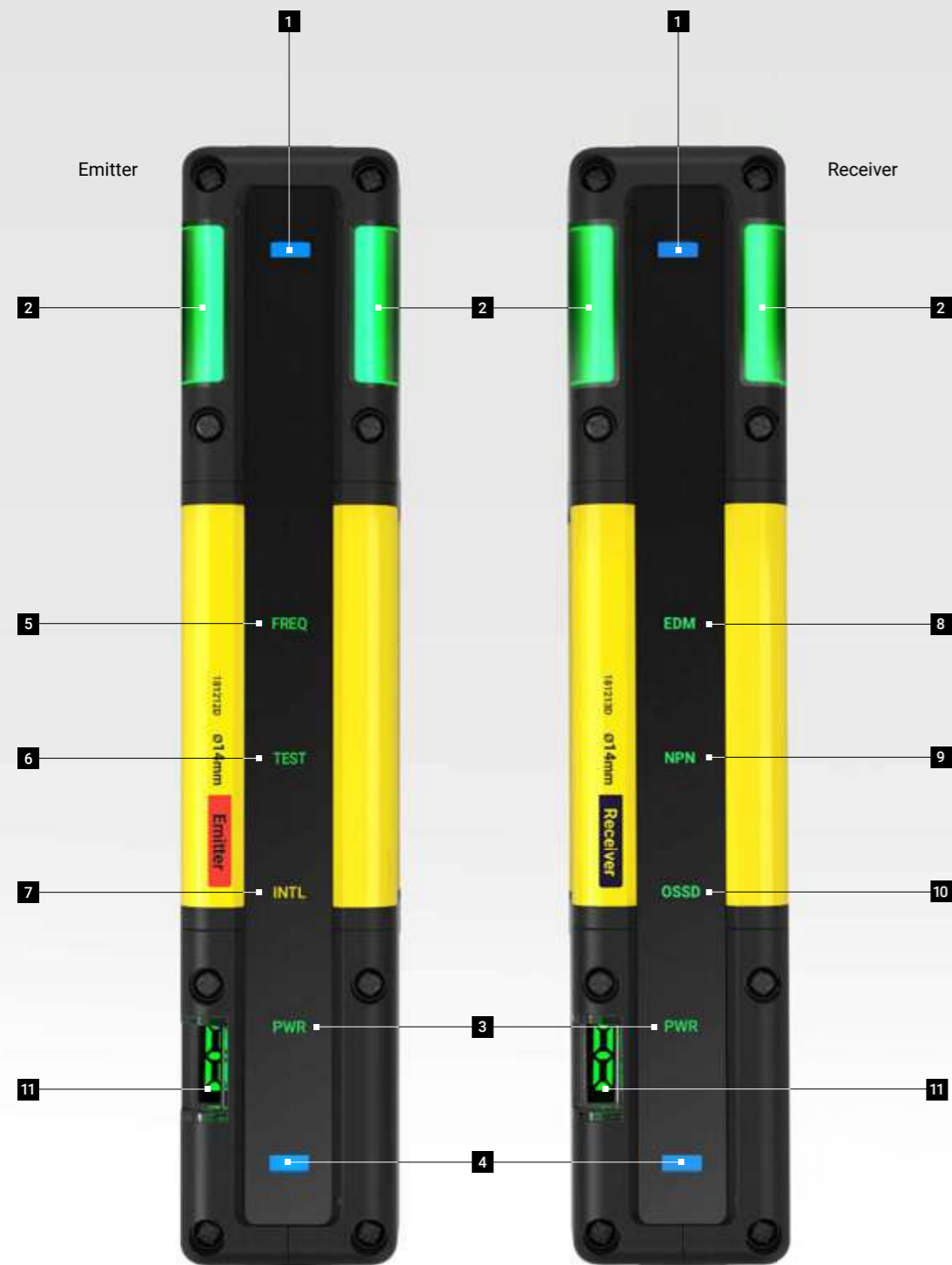
### 2. Window Screen Protection

The narrow window screen with protection minimizes the chance of impact to the sensing areas.



### 3. IP65/IP67/IP67G/IP69K Protection Rating

IP65/IP67/IP67G/IP69K protection structure allows the units to be safely applied in environments with dust or water.



- 1 **Top beam indicator** lights up top beam is received
- 2 **Top control output indicator** lights up or flashes depending on control output
- 3 **Power/lockout indicator** lights up when powered on or normal operation
- 4 **Bottom beam indicator** lights up when bottom beam is received
- 5 **Frequency indicator** lights up with frequency B setting / turned off with frequency A setting
- 6 **External test indicator** lights up when external test signal is applied
- 7 **Interlock indicator** lights up when during interlock state
- 8 **EDM indicator** lights up with EDM input
- 9 **NPN/PNP indicator** lights up with NPN setting/turned off with PNP setting
- 10 **Control output indicator** green light when output ON, red light when output OFF
- 11 **Status display** indicates operation status

## Easy Status Check with Indicators

The SFL/SFLA series is designed to provide a sense of safety to users. The large operation indicators offer minimal blind spots, and operators can easily check the status of the light curtains in real-time, ensuring safety of both personnel and machines.

### 1. Top Control Output Indicator

The top control output indicator shows various output status including output ON/OFF, muting/override status, lockout status etc. The indicator is located on the top corner of the unit, which make it highly visible from any angle.



### 2. Status Display

The 7-segment status display shows various operation status of the unit using alphabet or numbers. Users can check various status including error status, communication status, warning conditions, etc.



#### Status Display Description

Location	Operation	Display	Description	
Emitter / Receiver	PC connection (download)	P	Flashing	Flashes when downloading the setting information.
	Communication error	C	Flashing	Flashes when RS485 communication error occurs.
	Error condition	E	Flashing	Flashes when entering the lockout condition.
	Warning condition	W	Flashing	Flashes when in a warning condition.
Emitter	Default condition	0	ON	Displays when function is deactivated.
	Blanking	b	ON	Displays when the blanking function is activated.
	Muting	m	ON	Displays when in the muting state.
	Override	o	ON	Displays when in the override state.
	Reset-hold	H	ON	Displays when waiting for reset-hold input.
	Reduced resolution	r	ON	Displays when the reduced resolution function is activated.
Receiver	Light incident	0-9	ON	Displays the sensitivity level of beams with the lowest light incident (0 to 9).

### 3. Beam Indicator

The LED beam indicator turns blue when the beam is received normally, and turns off when the light is blocked.  
The LED turns red when ambient light is received. The indicator allows easy installation and setting, and also provides users with visual indication of errors.

#### 1) Check Installation

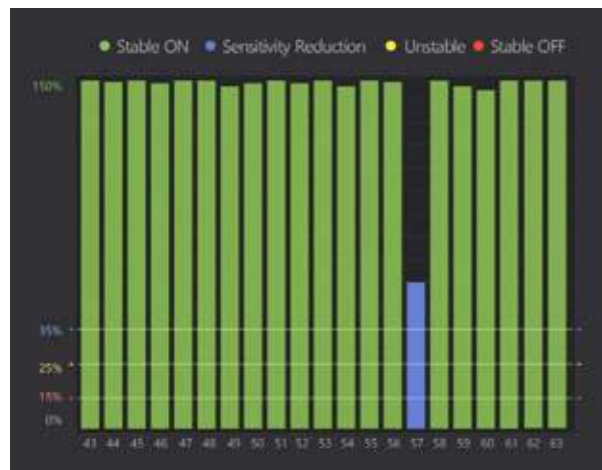
The indicator can detect misalignment of emitter and receiver in real-time, allowing easier installation and setting.



- ❶ Align the top beam
- ❷ Align the bottom beam
- ❸ If the LED indicator turns blue, the beams have been aligned normally.

#### 2) Check Light Sensitivity

The sensitivity reduction alarm is activated if the amount of light received changes due to vibration, heating, distortion, or other factors preventing problems in advance.



\* Light level over 30%: blue LED ON / light level over 15%: blue LED flashing / light level under 15%: blue LED OFF

#### 3) Check Ambient Light

Ambient light alarm is activated if external ambient light is detected or if emitter/receiver operation timing is affected. (Ambient light algorithm)



## Easy Installation

The SFL/SFLA series features easy installation. Standard and adjustable brackets are available and can be installed on top, bottom, or middle of the units. The adjustable brackets can be adjusted by 15 degrees to right or left for easier installation.

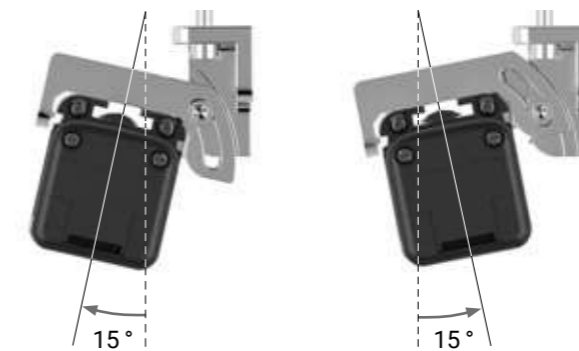
#### One-Touch Bracket

The push-to-install one-touch method allows easier installation.



#### Adjustable Brackets

The adjustable brackets can be adjusted by 15 degrees to right or left after installation for easier setting.



#### Brackets by Light Curtain Length

Brackets	Length	
	Max. 1 m	Min. 1 m
Top/Bottom adjustable bracket (BK-SFL-TBA)	Requires 2 brackets	Unavailable
Top/Bottom bracket (BK-SFL-TBF)		
Side adjustable bracket (BK-SFL-SA)	Requires 2 brackets	Requires 3 brackets
Side bracket (BK-SFL-SF)		



# Safety Light Curtain Software, atLightCurtain

atLightCurtain is a dedicated software for SFL/SFLA series safety light curtains to monitor operation status and set functions. Users can set various safety-related functions including muting, blanking from the parameter menu and monitor various operation status including light amount, connection, and errors.

\* Detailed settings and features may not be available on standard type SFL series.



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2019

PIN UP  
DESIGN AWARDS  
2019

## 1. User-Oriented Graphic Interface

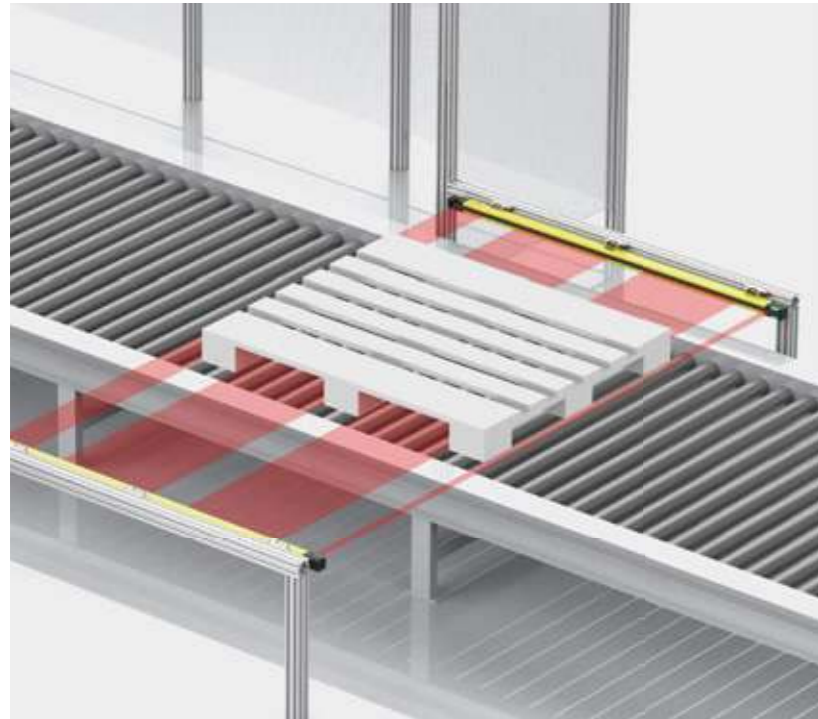
The atLightCurtain software screen features ribbon menus with status display, monitoring, and setting screens.

The intuitive icons and user-oriented interface allows even novice users to easily operate the software. The setting and monitoring screens can be expanded to show diverse range of information.

- 1 **Ribbon menu** main software functions
- 2 **Status display screen** product information and operation status
- 3 **Monitoring and setting screen** product connection and monitoring information, safety functions
- 4 **Monitoring** light level by beam, connection, errors/alarms, etc.
- 5 **Safety-related functions** model settings, muting, blanking, and other settings

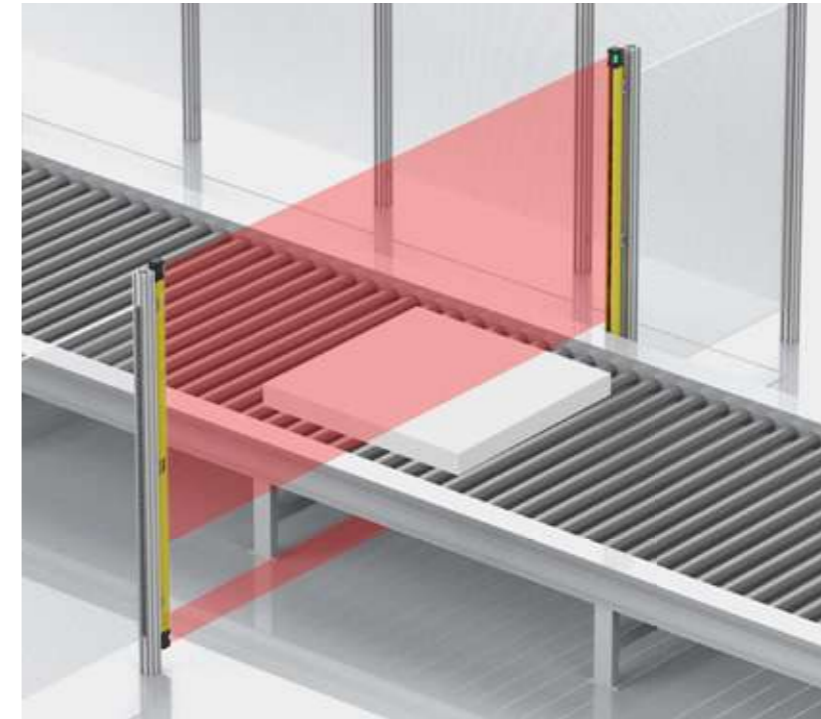
## 2. Various Safety-Related Functions

Industrial settings vary greatly by size and type, and potential dangers can occur from various environmental factors. Users can set muting, blanking, and other safety-related functions on the SFLA series with the atLightCurtain software.



### 1) Reduced Resolution

Reduced resolution is a function for changing the detection capability of the light curtain. It prevents the control output from turning OFF when an object moving through the light curtain is smaller than the designated size. Reduced resolution can be set for all areas within the detection area, and up to 3 beams can be set to be ignored.

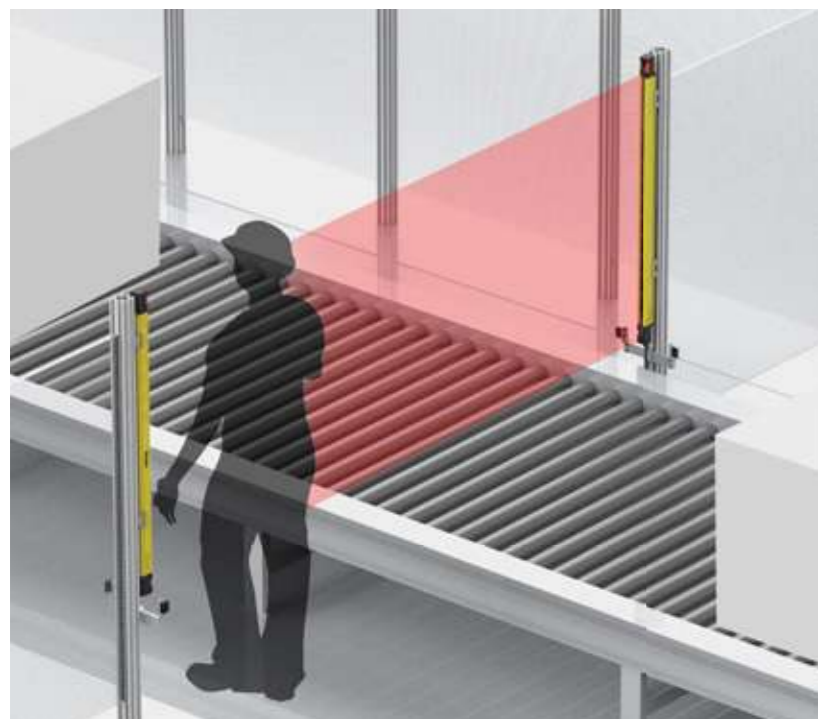


### 3) Blanking

Blanking function allows users to set selected beams blanking zones, preventing detection of objects in the blanking zone. This function can be used if an object or machine is located within the detection area, partially blocking some beams.

#### Blanking Function Types

<b>Fixed Blanking</b>	Used when an object or machine is continuously blocking certain beams.
<b>Floating Blanking</b>	Used when an fixed-sized object is moving. The blanking area changes with the moving object.

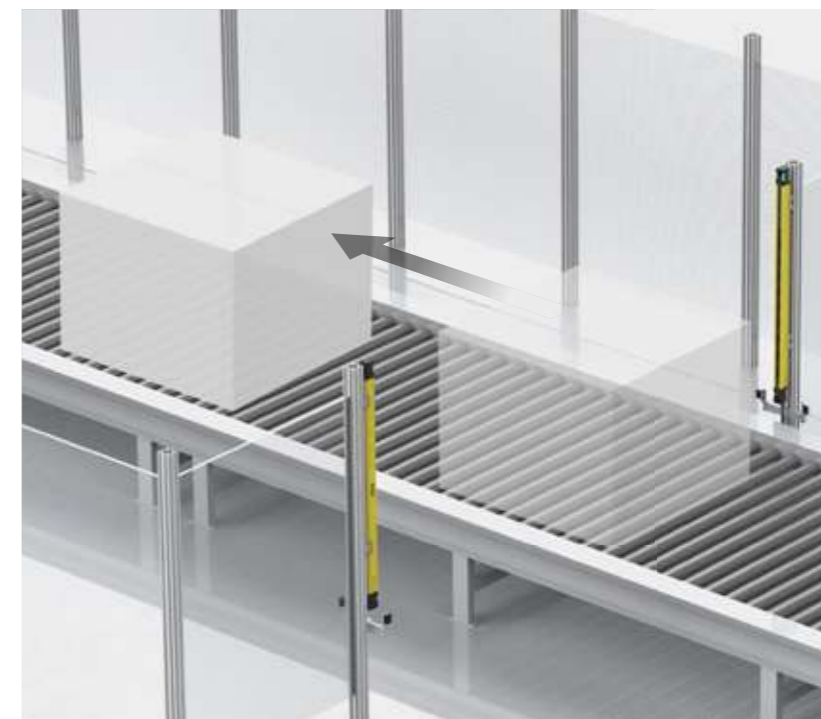


### 2) Muting

Muting function is a function to prevent the control output from turning OFF when an object is detected moving through the curtain. The light curtains can be set so that machines will stop operation only when a person is detected by muting the beams where objects may pass. The muting area can be set for the entire detection area or only for selected areas.

#### Muting Function Types

<b>Standard Mode</b>	Default muting function that starts and ends muting status by the set conditions.
<b>Exit-Only Mode</b>	Maintains muting status until object has completely cleared the area.



### 4) Override

Override function is used when the muting function ends and operation resumes, but the object is still within the detection area. The override function can be used to turn output ON to remove the object in the moving direction.

# Light Curtain Selection Guide

Choose the correct light curtain model by following the directions below.

## Step 1. Select model by purpose of use.



### 1 Select type

Select standard or high performance type depending on required needs.

Classification	Function	SFL Series (Standard type)	SFLA Series (High performance type)
General functions	Mode and status	○	○
	Self-test		
	RS485 communication (between emitter and receiver)		
	Monitor light incident level		
	OSSD output		
	Mutual interference prevention		
Safety-related functions	Interlock	○	●
	Lockout reset	○	○
	External device monitoring (EDM)	○	●
	Muting	○	●
	Override	○	●
	Blanking (Fixed blanking and floating blanking)	X	●
	Reduced resolution	X	●
Other functions	Series connection	○	○
	Select sensing distance		
	Select NPN or PNP		
	External test (light emission stops)	○	●
	Auxiliary output (AUX)	○	●
	Lamp output (Lamp)	○	●
	PC connection	○	●
<b>Type</b>		<b>No-mark</b>	<b>A</b>

### 2 Select detection capability

Select the detection capability type. (finger, hand, body)

Detection type	Detection object size		Tag
Finger	ø14mm		□□□(□)14
Hand	ø20mm		□□□(□)20
Body	ø30mm		□□□(□)30

\* ● : Supported (detailed settings available) / ○ : Supported (detailed settings unavailable) / X : Not supported

### 3 Select number of beams




Select the number of beams by detection capability.

Finger detection type			Hand detection type			Body detection type		
No. of beams	Protection height (mm)	Tag	No. of beams	Protection height (mm)	Tag	No. of beams	Protection height (mm)	Tag
15	144	□□□(□)14-15	12	183	□□□(□)20-12	9	218	□□□□30-9
23	216	□□□(□)14-23	16	243	□□□(□)20-16	12	293	□□□□30-12
31	288	□□□(□)14-31	20	303	□□□(□)20-20	15	368	□□□□30-15
39	360	□□□(□)14-39	24	363	□□□(□)20-24	18	443	□□□□30-18
47	432	□□□(□)14-47	28	423	□□□(□)20-28	21	518	□□□□30-21
55	504	□□□(□)14-55	32	483	□□□(□)20-32	24	593	□□□□30-24
63	576	□□□(□)14-63	36	543	□□□(□)20-36	27	668	□□□□30-27
71	648	□□□(□)14-71	40	603	□□□(□)20-40	30	743	□□□□30-30
79	720	□□□(□)14-79	44	663	□□□(□)20-44	33	818	□□□□30-33
87	792	□□□(□)14-87	48	723	□□□(□)20-48	36	893	□□□□30-36
95	864	□□□(□)14-95	52	783	□□□(□)20-52	39	968	□□□□30-39
103	936	□□□(□)14-103	56	843	□□□(□)20-56	42	1,043	□□□(□)30-42
111	1,008	□□□(□)14-111	60	903	□□□(□)20-60	45	1,118	□□□(□)30-45
119	1,080	□□□14-119	64	963	□□□(□)20-64	48	1,193	□□□(□)30-48
127	1,152	□□□14-127	68	1,023	□□□(□)20-68	51	1,268	□□□(□)30-51
135	1,224	□□□14-135	72	1,083	□□□□20-72	54	1,343	□□□(□)30-54
143	1,296	□□□14-143	76	1,143	□□□□20-76	57	1,418	□□□(□)30-57
151	1,368	□□□14-151	80	1,203	□□□□20-80	60	1,493	□□□(□)30-60
159	1,440	□□□14-159	84	1,263	□□□□20-84	63	1,568	□□□(□)30-63
167	1,512	□□□14-167	88	1,323	□□□□20-88	66	1,643	□□□(□)30-66
175	1,584	□□□14-175	92	1,383	□□□□20-92	69	1,718	□□□(□)30-69
183	1,656	□□□14-183	96	1,443	□□□□20-96	72	1,793	□□□(□)30-72
191	1,728	□□□14-191	100	1,503	□□□□20-100	75	1,868	□□□(□)30-75
199	1,800	□□□14-199	104	1,563	□□□□20-104			
			108	1,623	□□□□20-108			
			112	1,683	□□□□20-112			
			116	1,743	□□□□20-116			
			120	1,803	□□□□20-120			
			124	1,863	□□□□20-124			

## Step 2. Select cables by condition.

Name	Shape	Model		Length (m)
		Emitter (black)	Receiver (black)	
Power I/O cables (connector type)		SFL-BCT	SFL-BCR	0.3
Power I/O cables (cable connector type)		SFL-C3T	SFL-C3R	3
		SFL-C7T	SFL-C7R	7
		SFL-C10T	SFL-C10R	10
		SFL-C15T	SFL-C15R	15
M12 Connector cables (socket type)		CID8-3T	CID8-3R	3
		CID8-5T	CID8-5R	5
		CID8-7T	CID8-7R	7
		CID8-10T	CID8-10R	10
M12 Connector cables (socket-plug type)		C1D8-3T	C1D8-3R	3
		C1D8-5T	C1D8-5R	5
		C1D8-7T	C1D8-7R	7
		C1D8-10T	C1D8-10R	10
		C1D8-15T	C1D8-15R	15
		C1D8-20T	C1D8-20R	20
Serial expansion cables		SFL-EC03T	SFL-EC03R	0.3
		SFL-EC3T	SFL-EC3R	3
		SFL-EC7T	SFL-EC7R	7
		SFL-EC10T	SFL-EC10R	10
Lamp output cable		SFL-LC		3
Y type connector cable (connector cable for reducing wires)		SFL-YC		0.5
Y type connector cable (reset switch connector cable)		SFL-YCR		0.5
USB to Serial communication converter		SCM-SFL		1.5

## Step 3. Select installation brackets.

Type	Top/bottom brackets	Mid-area brackets
Adjustable type	<b>Top/bottom adjustable brackets</b> BK-SFL-TBA 	<b>Mid-area adjustable brackets</b> BK-SFL-SA 
	<b>Top/bottom brackets</b> BK-SFL-TBF 	<b>Mid-area brackets</b> BK-SFL-SF 

### \* Safety Light Curtains Accessory (Sold Separately)

#### LOTO (Lockout-Tagout) Device, SFL-LT / SFL-LT2

SFL-LT protects worker safety through a lockout function that forcibly blocks the optical axis to maintain the interlock condition of the light curtains.



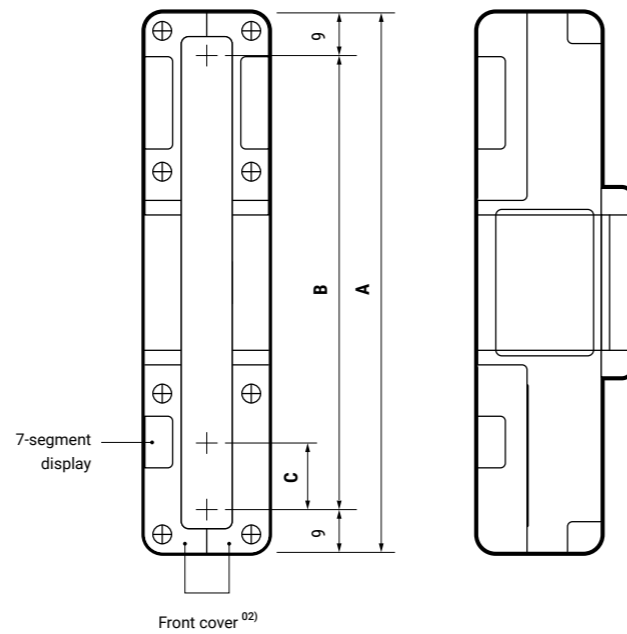
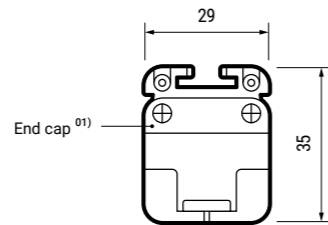
# Light Curtains

## SFL/SFLA Series

### Technical Overview

### Dimensions

Unit: mm, For the detailed dimensions of the product, follow the Autonics web site. This dimension is based on the SFL(A) 14 model. The appearance varies depending on the detection capability.



01) When removing the end cap, there is the lamp output terminal (top) or the power supply terminal (bottom).

02) When removing the front cover, there is the setting switch (on the emitter and the receiver) or the PC communication port (on the receiver).

Detection capability	Models	Number of beams	A (protective height)	B (sensing height)	C (optical axis pitch)
Ø 14 mm (finger)	Standard	15 to 111	144 to 1,008	126 to 990	9
	Advanced	15 to 199	144 to 1,800	126 to 1,782	
Ø 20 mm (hand)	Standard	12 to 68	183 to 1,023	165 to 1,005	15
	Advanced	12 to 124	183 to 1,863	165 to 1,845	
Ø 30 mm (hand-body)	Standard	42 to 75	1,043 to 1,868	1,025 to 1,850	25
	Advanced	9 to 75	218 to 1,868	200 to 1,850	

### Ordering Information

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



#### 1 Type

No-mark: Standard type  
A: High performance type

#### 2 Detection capability

14: Ø 14 mm, finger  
20: Ø 20 mm, hand  
30: Ø 30 mm, hand-body

#### 3 Number of optical axes

Number: Number of optical axes

#### 4 Korea safety certification

No-mark: S-mark  
A: KCs (industrial robot protection device)

#### \* Sold Separately

- Power I / O cable : SFL-BCT(R), SFL-C□T(R)
- M12 connector cable: CID8-□T(R), C1D8-□T(R)
- Y type connector cable: SFL-YC, SFL-YCR
- Series connector cable: SFL-EC□T(R)
- Lamp output cable: SFL-LC
- Bracket: BK-SFL-□□
- SFL / SFLA dedicated USB to Serial communication converter: SCM-SFL
- Test piece: SFL-T□
- LOTO (Lockout-Tagout) device: SFL-LT□

### Specifications

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

01) It may differ depending on the models. For more information, see the "SFL/SFLA User Manual."

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

<b>Power supply</b>	24 VDC±20 % (Ripple P-P: ≤ 10 %)
<b>Current consumption <sup>01)</sup></b>	Emitter: ≤ 106 mA, receiver: ≤ 181 mA
<b>Response time <sup>01)</sup></b>	T <sub>OFF</sub> (ON → OFF): ≤ 19.9 ms, T <sub>ON</sub> (OFF → ON): ≤ 49.7 ms
<b>Safety related output : OSSD output</b>	NPN or PNP open collector Load voltage <sup>02)</sup> : ON - 24 VDC± (except for the residual voltage), OFF - 0 VDC±, Load current <sup>03)</sup> : ≤ 300 mA, Residual voltage <sup>04)</sup> : ≤ 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
<b>Auxiliary output (AUX 1/2) <sup>05)</sup></b>	NPN or PNP open collector Load voltage: ≤ 24 VDC±, Load current: ≤ 100 mA, Residual voltage: ≤ 2 VDC± (except for voltage drop due to wiring)
<b>Lamp output (LAMP 1/2) <sup>05)</sup></b>	NPN or PNP open collector Load voltage: ≤ 24 VDC±, Load current: ≤ 300 mA
<b>External input</b>	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
<b>Protection circuit</b>	Reverse power polarity, reverse output polarity, output short-circuit over-current protection
<b>Safety-related functions</b>	Interlock (reset hold), external device monitoring (EDM), muting/override, Blanking (fixed blanking, floating blanking), reduced resolution
<b>General functions</b>	Self-test, alarm for reduction of incident light level, mutual interference prevention
<b>Others functions</b>	Change of sensing distance, switching to NPN or PNP, external test (light emission stops), auxiliary output (AUX 1, 2), lamp output (LAMP1, 2)
<b>Synchronization type</b>	Timing method by RS485 synchronous line
<b>Insulation resistance</b>	≥ 20MΩ (at 500 VDC± megger)
<b>Noise immunity</b>	± 240 VDC± the square wave noise (pulse width: 1µs) by the noise simulation
<b>Dielectric strength</b>	1,000 VAC~ 50/60 Hz for 1 minute
<b>Vibration <sup>06)</sup></b>	10 mm double amplitude at frequency of 5 to 150 Hz, 10 sweeps in each X, Y, Z direction
<b>Shock <sup>06)</sup></b>	250 m/s2 (≈ 25 G), pulse width 6 ms in each X, Y, Z direction for 100 times
<b>Ambient illumination (receiver)</b>	Incandescent lamp: ≤ 3,000 lx, sunlight: ≤ 10,000 lx
<b>Ambient temperature</b>	-30 to 60 °C, storage: -30 to 70 °C (no freezing or condensation)
<b>Ambient humidity</b>	35 to 85 %RH, storage: 35 to 95 %RH (no freezing or condensation)
<b>Protection rating <sup>07)</sup></b>	IP65, IP67 (IEC standard), IP67G (JEM Standard), IP69K (DIN standard)
<b>Material</b>	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), Top / Bottom adjustable bracket and Top / Bottom bracket: SUS304, Side adjustable bracket and Side bracket: nickel plated Zn
<b>Approval</b>	CE TÜV NORD (industrial robot protection device) <sup>08)</sup>
<b>International standards</b>	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) Testing according to IEC 61496-1 standards.

07) Approved certification protection ratings are IP65 and IP67.

08) The certified models for S-mark and KCs (industrial robot protection device) have the same functional basis.

## Opening a New Era of Safety

# Safety Door Switches

### SFD Series

The SFD series safety door switches can detect opening and closing of doors in machines. The head can be rotated to change the insert direction of the operation key from 5 directions, with 6 available operation key types. Also, the door switches are available in terminal type and connector type models, making it easier for installation in diverse application settings.

### Safety Standards

IEC/EN 60947-5-1  
EN ISO 14119  
GB/T 14048.5

### Certifications



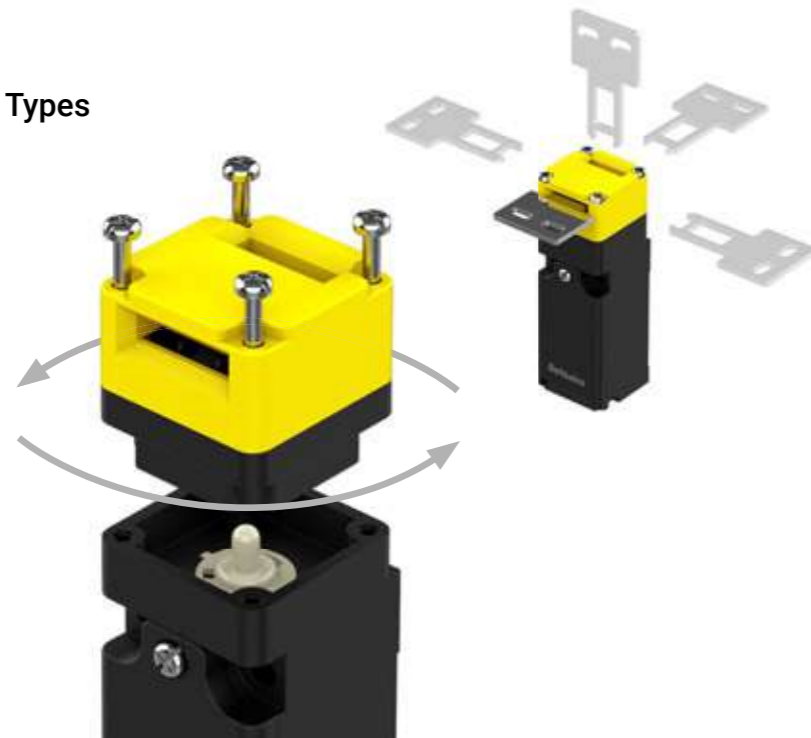
## Various Models Available for Flexible Installation

The SFD series door switches are available in terminal type and connector types for easy application and installation in diverse environments.

### 1. Head Rotation & 6 Operation Key Types

The SFD series offers diverse installation methods for flexible installation. The head can be rotated to change the insert direction of operation keys.

#### 6 Operation Key Types



### 2. Two Model Types

Connector type and terminal type models are available for application in various environments. Both types can be detached easily from the body, for easier installation and maintenance.



Connector Type



Terminal Type

## Slim and Compact Size

The door switches are slim and compact in size (H 92 x D 30 mm), allowing installation in tight or limited spaces.



## Switches with up to 3 Contacts

2-contact or 3-contact switches are built in, with 4 types of contact configurations for easier application in any environment.

Model	Contact	Contact composition	Contact operation
SFD-□AB-□□	1 N.C.,	⊖ 11 — 12	Operation key complete insertion: 11-12 (ON), 33-34 (OFF)
	1 N.O.	33 — 34	Operation key extraction: 11-12 (OFF), 33-34 (ON)
SFD-□2B-□□	2 N.C.	⊖ 11 — 12 31 — 32	Operation key complete insertion: 11-12 (ON), 31-32 (OFF)
	2 N.C., 1 N.O.	⊖ 11 — 12 ⊖ 21 — 22 33 — 34	Operation key complete insertion: 11-12 (ON), 21-22 (OFF), 33-34 (OFF)
SFD-□3B-□□	N.C. 3	⊖ 11 — 12	Operation key complete insertion: 11-12 (ON), 21-22 (OFF), 31-32 (OFF)
		⊖ 21 — 22	Operation key complete insertion: 11-12 (OFF), 21-22 (ON), 31-32 (OFF)
		⊖ 31 — 32	Operation key complete insertion: 11-12 (OFF), 21-22 (OFF), 31-32 (ON)

\* Contact composition represents the locked status with the operation key inserted. ( ■ ON, □ OFF )



Side type (SFD-LT)



Upper type (SFD-LT2)

#### \* Sold separately :

##### Group lock device, connecting cable

Group lock device is an accessory for safety door and door lock switches, to prevent actuator operation from unauthorized access by physically blocking switch insertion area.

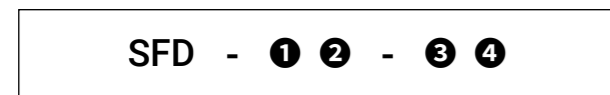
# Door Switches

## SFD Series

### Technical Overview

#### Ordering Information

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



#### 1 Head materials

No mark: Plastic  
M: Metallic

#### 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.

#### 3 Connection outlet

No mark: 1  
2: 2

#### 4 Connection outlet specification

M20: M20 thread  
G1/2: G1/2 thread  
C: M12 connector

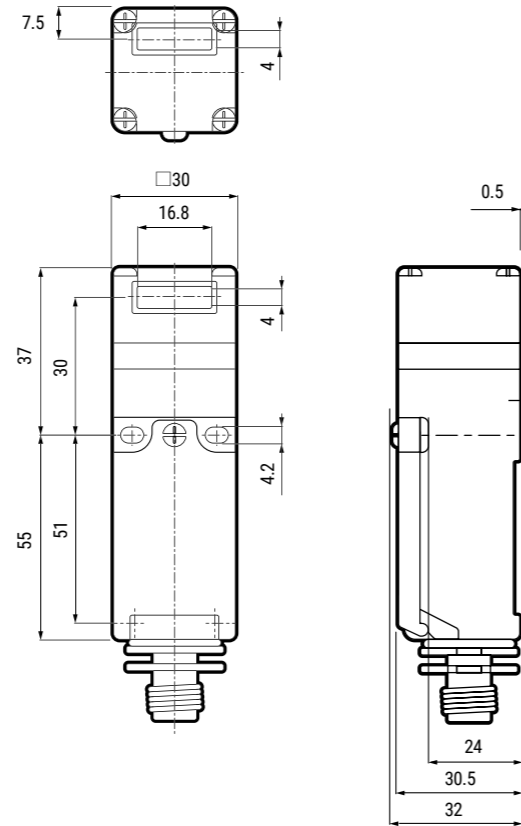
#### \* Sold Separately

- Operation key: SFD-K□
- M12 Connector cable: C□DH4-□-□
- Group lock device: SFD-LT□ / connecting cable: SFD-LT-C□

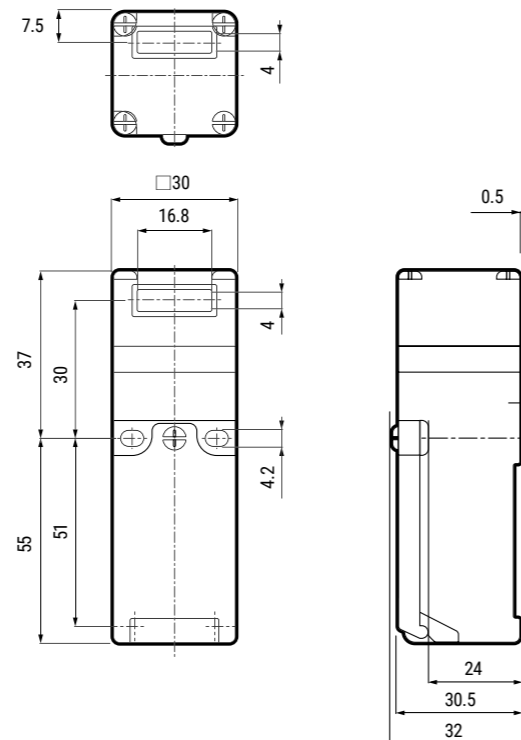
### Dimensions

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

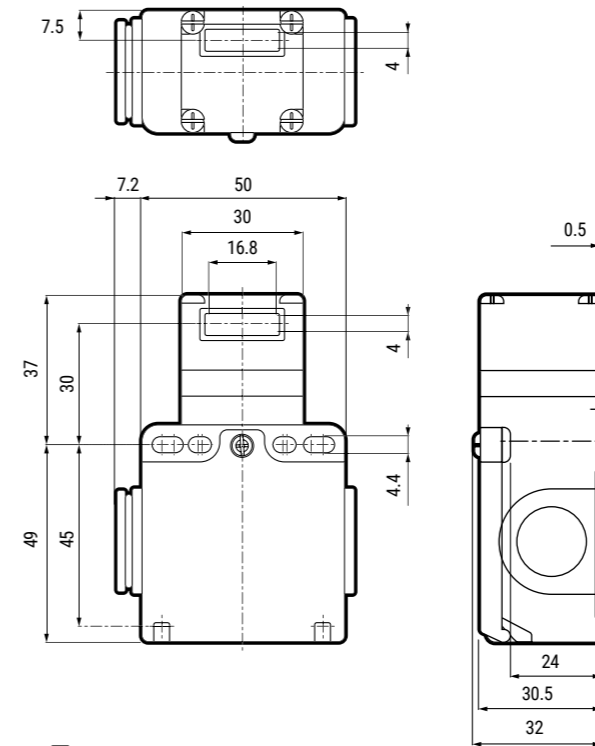
#### Connector type



#### 1 connection outlet terminal type

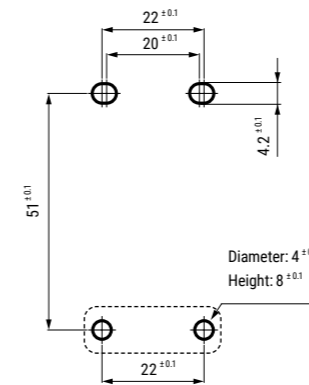


#### 2 connection outlet terminal type

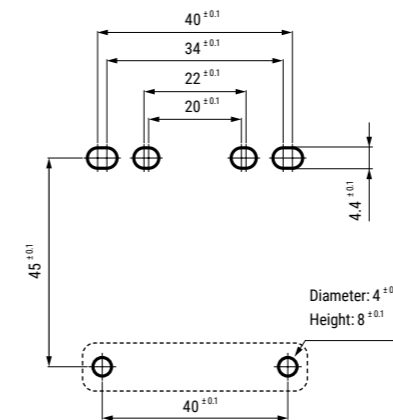


#### Mounting hole cut-out

• 1 connection outlet



• 2 connection outlet



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

### 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 in each X, Y, Z direction for 10 min		
Shock	1,000 m/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times		
Shock (malfunction)	300 m/s <sup>2</sup> (≈ 30 G) in each X, Y, Z direction for 3 times		
Ambient temperature	-30 to 70°C, storage: -40 to 70 °C <sup>01)</sup> (no freezing or condensation)		
Ambient humidity	35 to 90 %RH, storage: 35 to 90 %RH (no freezing or condensation)		
Protection structure	IP67 <sup>02)</sup> (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)		
Connection type	M20 connector cable	G1/2 connector cable	M12 plug connector
Unit weight (packaged)	<ul style="list-style-type: none"> <li>• 1 connection outlet plastic: ≈ 80 g (≈ 120 g)</li> <li>metallic: ≈ 110 g (≈ 150 g)</li> </ul>		<ul style="list-style-type: none"> <li>plastic: ≈ 85 g (≈ 130 g)</li> <li>metallic: ≈ 115 g (≈ 160 g)</li> </ul>

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.



## The Key to Your Safety

# Safety Door Lock Switches

### SFDL Series

The SFDL series safety door lock switches can detect opening and closing of doors in machines, and also keep the door locked during potentially dangerous operation. The head can be rotated to change the insert direction of the operation key from 5 directions, with 6 available operation key types. Various types of connection and release keys are also available, making it easier for installation in diverse application settings.

### Safety Standards

IEC/EN 60947-5-1  
EN ISO 14119  
GB/T 14048.5

### Certifications



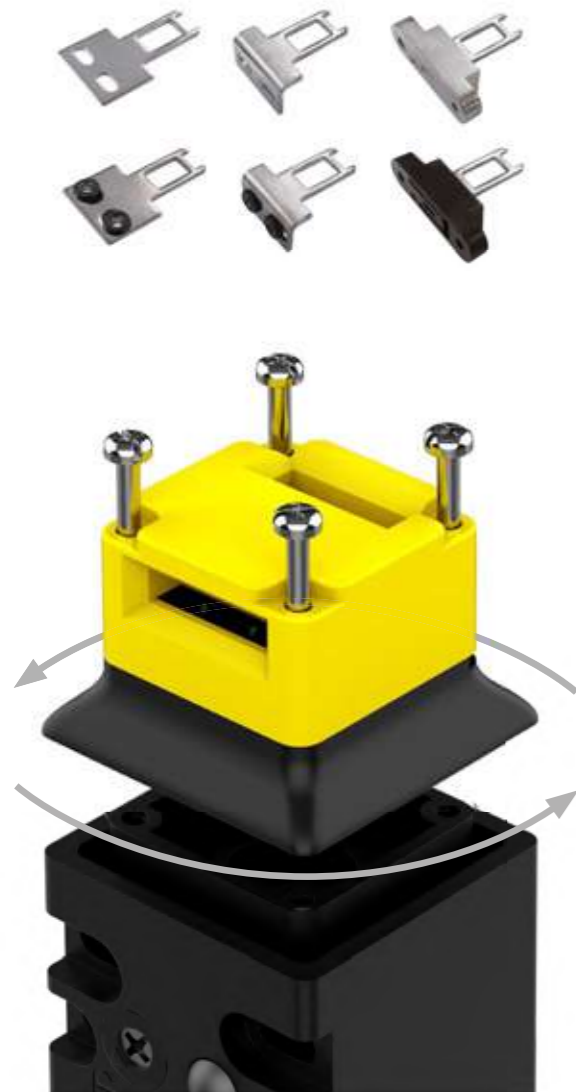
# Various Models Available for Flexible Installation

The SFDL series door lock switches are available in terminal type and connector types for easy application and installation in diverse environments.

## 1. Head Rotation & 6 Operation Key Types

The SFDL series offers diverse installation methods for flexible installation. The head can be rotated to change the insert direction of operation keys.

### 6 Operation Key Types



## 2. Two Model Types

Terminal type and connector type models are available for application in various environments. Both types can be detached easily from the body, for easier installation and maintenance.

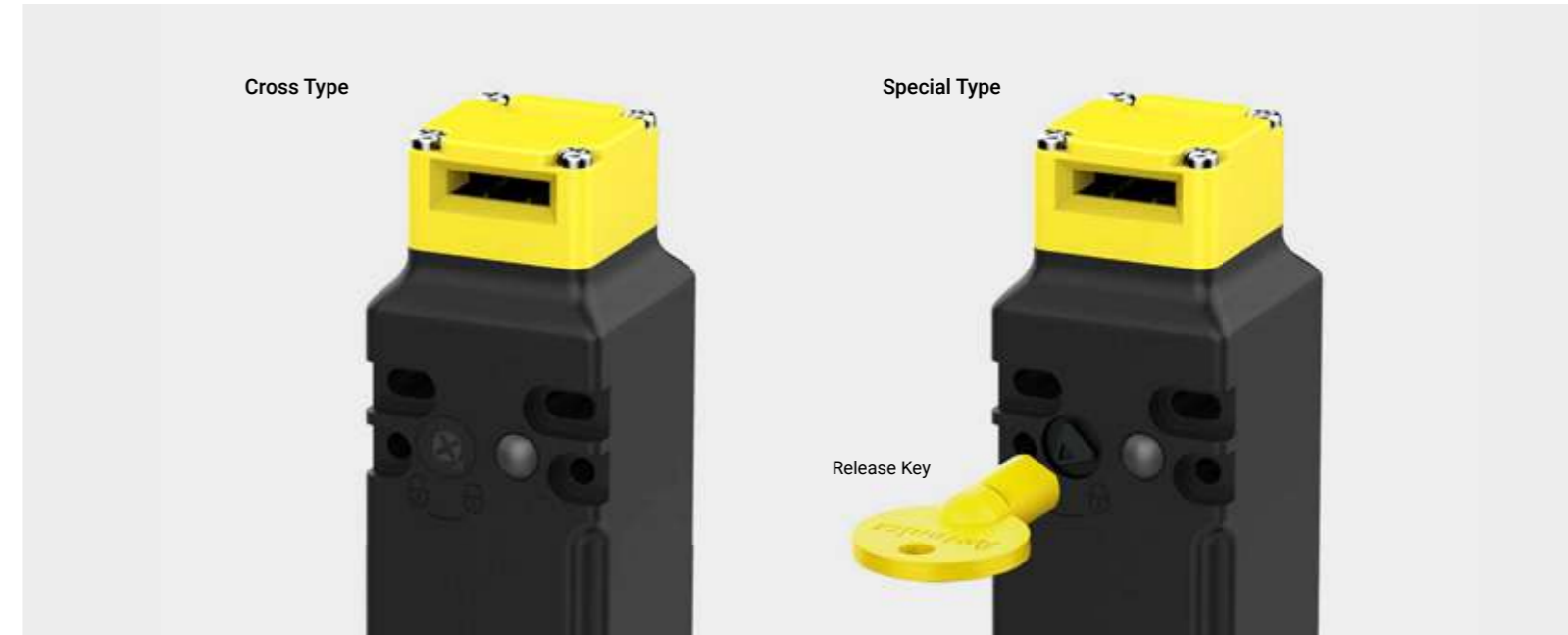
### Terminal Type



### Connector Type



Connector cable  
(sold separately)



## 3. Release Keys Available

Cross type and special type release keys are available for wider options. Release keys can be used to manually unlock the units during emergency or product malfunction. The metallic release levers offer high durability.

## 4. Two Types of Lock/Release Methods

Two types of lock/release methods are available (Mechanical lock & solenoid release / solenoid lock & mechanical release). The mechanical lock remains locked when the operation key is inserted and unlocks with solenoid power. The solenoid lock remains locked with solenoid power and unlocks when solenoid power is cut off.

### Release Key

Release key type	Normal position	Manual unlock position
Cross type		
Special type		

### Lock/Release Method

	Mechanical Lock	Solenoid Lock
Power ON	UNLOCK	LOCK
Power OFF	LOCK	UNLOCK



### 5. Powerful Lock Strength

Powerful lock strength of 1,300 N ensures that the unit will remain locked under most conditions.

### 6. Slim and Compact Size

The door lock switches are slim and compact in size (H 155 x D 39 mm), allowing installation in tight or limited spaces.

\* Connector type (H155 x D39 mm), Terminal blocks type (H180 x D39 mm)



### Slide Unit (Sold Separately)

The slide unit (SFDL-SD) is an accessory to prevent being locked when entering the fence using safety flat type door lock switches.

## Switches with up to 6 Contacts

4-contact, 5-contact, or 6-contact switches are built in, with 16 types of contact configurations for easier application in any environment.

Model	Contact (lock monitor+ door monitor)	Connection diagram		Contact operation
		Lock monitor	Door monitor	
				Operation key complete insertion Operation key extraction Lock position
SFDL-□A-□□□	1NC./1N.O.+1NC./1N.O.			42-11, 34-33, 64-63
SFDL-□B-□□□	2NC.+1NC./1N.O.			42-11, 34-33, 62-61
SFDL-□C-□□□	1NC./1N.O.+2NC.			42-11, 32-31, 64-63
SFDL-□D-□□□	2NC.+2NC.			42-11, 32-31, 62-61
SFDL-□CA-□□□	1NC./1N.O.+1NC./1N.O.			42-41, 22-21, 34-33, 64-63
SFDL-□CB-□□□	2NC.+1NC./1N.O.			42-41, 22-21, 34-33, 62-61
SFDL-□CC-□□□	1NC./1N.O.+2NC.			42-41, 22-21, 32-31, 64-63
SFDL-□CD-□□□	2NC.+2NC.			42-41, 22-21, 32-31, 62-61
SFDL-□5A-□□□	1NC./1N.O.+2NC./1N.O.			42-11, 22-21, 34-33, 64-63
SFDL-□5B-□□□	2NC.+2NC./1N.O.			42-11, 22-21, 34-33, 62-61
SFDL-□5C-□□□	1NC./1N.O.+3NC.			42-11, 22-21, 32-31, 64-63
SFDL-□5D-□□□	2NC.+3NC.			42-11, 22-21, 32-31, 62-61
SFDL-□6A-□□□	2NC./1N.O.+2NC./1N.O.			42-11, 52-21, 34-33, 64-63
SFDL-□6B-□□□	3NC.+2NC./1N.O.			42-11, 52-21, 34-33, 62-61
SFDL-□6C-□□□	2NC./1N.O.+3NC.			42-11, 52-21, 32-31, 64-63
SFDL-□6D-□□□	3NC.+3NC.			42-11, 52-21, 32-31, 62-61

\* Connection diagram represents the locked status with the operation key inserted. (■ ON, □ OFF)

### \* Sold separately :

#### Group lock device, connecting cable

Group lock device is an accessory for safety door and door lock switches, to prevent actuator operation from unauthorized access by physically blocking switch insertion area.



Side type (SFD-LT)

Upper type (SFD-LT2)

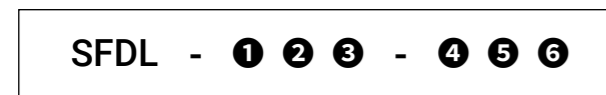
# Door Lock Switches

## SFDL Series

### Technical Overview

#### Ordering Information

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



#### 1 Lock/Release method

M: Mechanical Lock/  
Solenoid Release  
S: Solenoid Lock/  
Mechanical Release

#### 2 Contact

No-mark: 4-contact  
(connected)  
C: 4-contact (not connected)  
5: 5-contact  
6: 6-contact

#### 3 Contact composition

	4-contact	5-contact	6-contact
<b>A</b>	Lock 1 N.C. / 1 N.O. + Door 1 N.C. / 1 N.O.	Lock 1 N.C. / 1 N.O. + Door N.C. 2 / N.O. 1	Lock 2 N.C. / 1 N.O. + Door 2 N.C. / 1 N.O.
<b>B</b>	Lock N.C. 2 + Door N.C. 1 / N.O. 1	Lock N.C. 2 + Door N.C. 2 / N.O. 1	Lock N.C. 3 + Door N.C. 2 / N.O. 1
<b>C</b>	Lock N.C. 1 / N.O. 1 + Door N.C. 2	Lock N.C. 1 / N.O. 1 + Door N.C. 3	Lock N.C. 2 / N.O. 1 + Door N.C. 3
<b>D</b>	Lock N.C. 2 + Door N.C. 2	Lock N.C. 2 + Door N.C. 3	Lock N.C. 3 + Door N.C. 3

#### 4 Connection type

No-mark: Terminal type  
C: Connector type

#### 5 Connection outlet specification

M20: M20 thread  
G1/2: G1/2 thread

#### 6 Release key type

No-mark: Cross type  
K: Special type

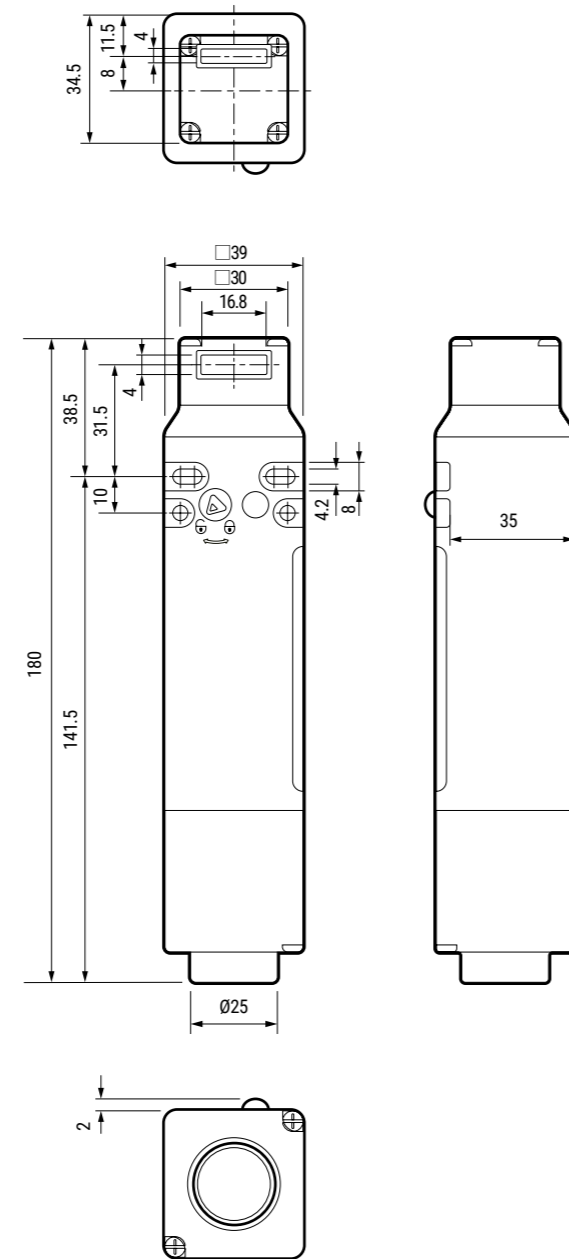
#### \* Sold Separately

- Operation key: SFD-K □
- Connector cable: SFDL-CND10-□
- Safety door lock slide key unit: SFDL-SDK
- Safety door lock slide unit: SFDL-SD
- Group locking device: SFD-LT □ / Connecting cable: SFD-LT-C □

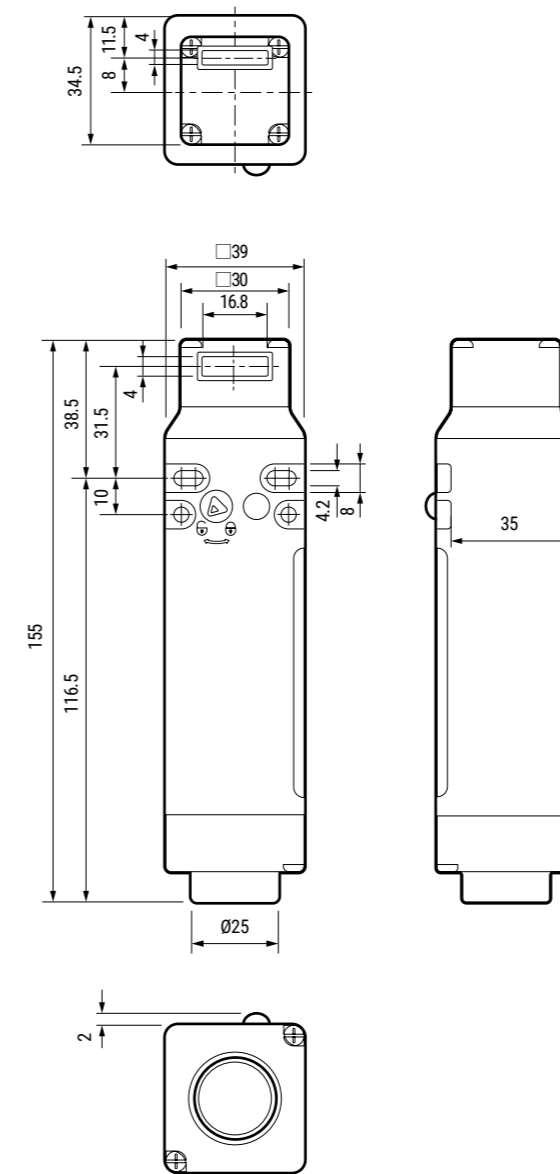
#### Dimensions

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

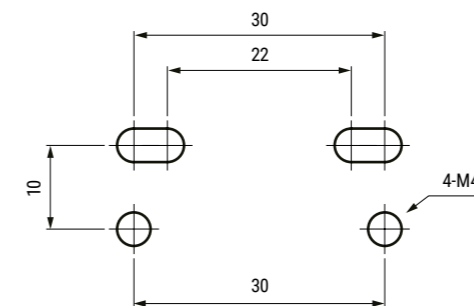
#### Terminal type



#### Connector type



#### Panel cut out



#### 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	
Mechanical life cycle	≥ 1,000,000 operations (20/min)	
Vibration (malfunction)	0.35 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min	
Shock	1,000 m/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s <sup>2</sup> (≈ 8 G) in each X, Y, Z direction for 3 times	
Ambient temperature	-10 to 55°C <sup>01)</sup> , 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 <sup>02)</sup> (IEC standard, except for head)	
Material	Head: zinc, case: polyamide 66, operation key: stainless steel 304	
Approval	CE (TUV NORD) ENEC (UL) ENEC (UL) ENEC (UL)	
Accessory	SFDL-□□□-□□K (Special type release 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

## The Key to Your Safety

# Flat Type Door Lock Switches

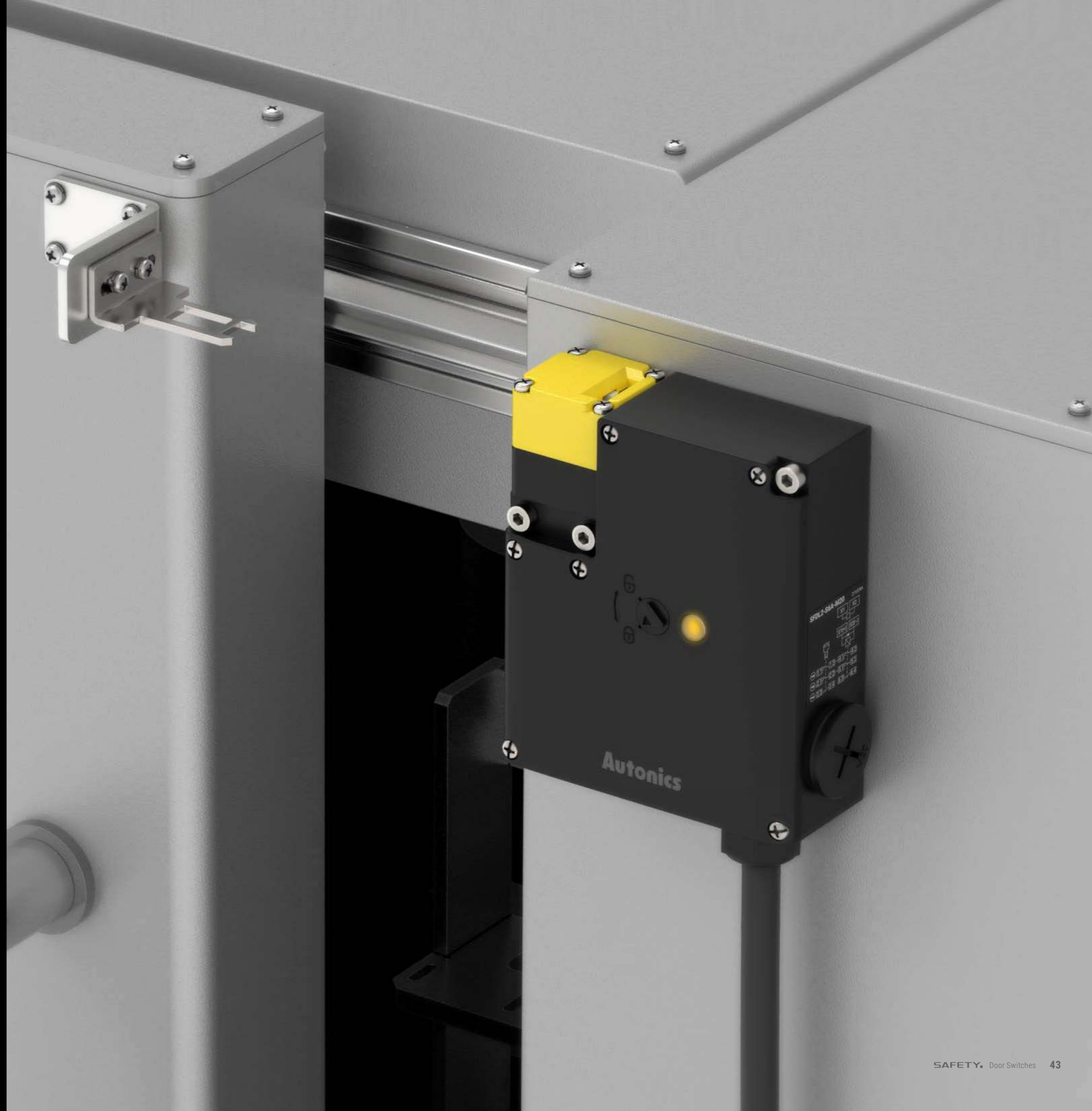
### SFDL2 Series

The SFDL2 series safety flat type door lock switches can detect opening and closing of doors in machines, and also keep the door locked during potentially dangerous operation. The door lock switches feature slim size and front/rear installation for flexible installation in diverse application settings. The switches are also available in release button models for additional safety.

### Safety Standards

IEC/EN 60947-5-1  
EN ISO 14119  
GB/T 14048.5

### Certifications



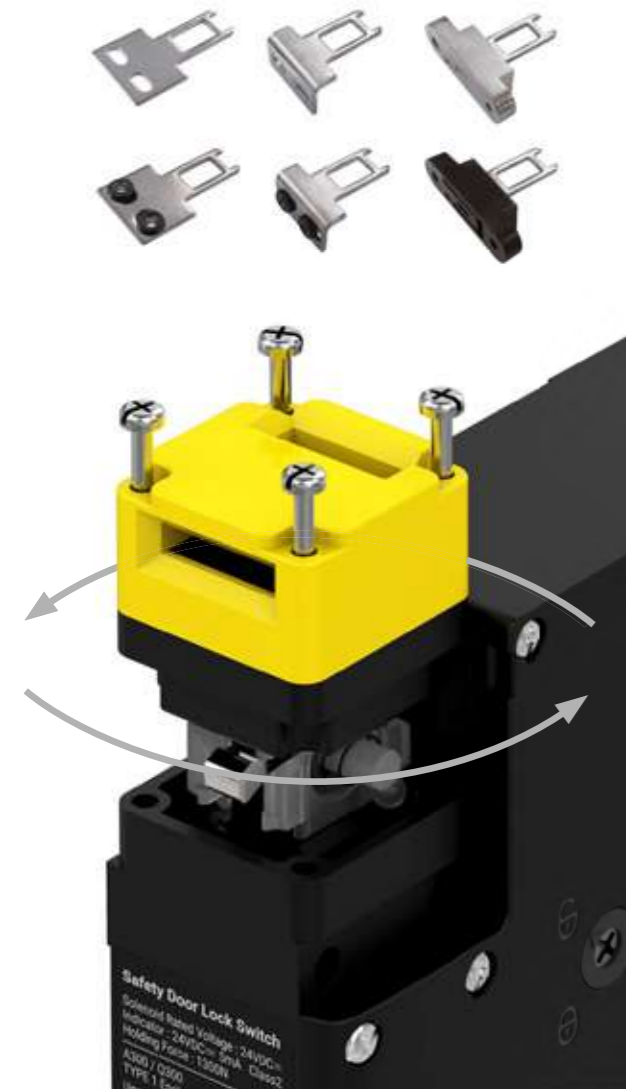
# Various Models Available for Flexible Installation

The SFDL2 series flat type door lock switches are available in various models and operation key types for flexible installation.

## 1. Head Rotation & 6 Operation Key Types

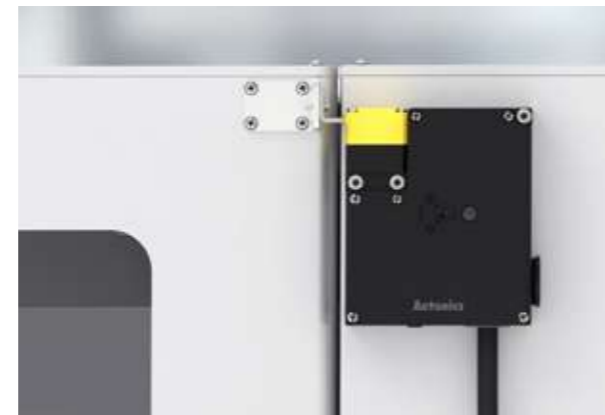
The SFDL2 series offers diverse installation methods for flexible installation with 6 operation key types. The head can be rotated to change the insert direction of operation keys.

### 6 Operation Key Types



## 2. Front / Rear Installation Types Available

The switches are available in front / rear installation models depending on installation requirements. Release button models are also available, allowing operators to unlock the unit manually while inside the operating area.



Front Installation



Rear Installation

### Release Key



Standard Type (Cross)



Special Release Key Type

### Rear Release Button



Front Installation Type

## 3. Release Keys Available

Release keys can be used to unlock the device during power outages or emergency. Standard cross type and special type release keys are available.

\* This function can not be used to stop machine operation.

### Release key

Release key	Normal	Manual unlock
Cross type		
Special type		

## 4. Two Types of Lock/Release Methods

Two types of lock/release methods are available (Mechanical lock & solenoid release / solenoid lock & mechanical release). The mechanical lock remains locked when the operation key is inserted and unlocks with solenoid power. The solenoid lock remains locked with solenoid power and unlocks when solenoid power is cut off.

### Lock/ Release Method

	Mechanical Lock	Solenoid Lock
Power ON	UNLOCK	LOCK
Power OFF	LOCK	UNLOCK



### 5. Powerful Lock Strength

Powerful lock strength of 1,300 N ensures that the unit will remain locked under most conditions.

### 6. Slim and Compact Size

The door lock switches are slim and compact in size (W90 X H105 X D30 mm), allowing installation in tight or limited spaces.

\* Rear Installation



### Slide Unit (Sold Separately)

The slide unit (SFDL2-SD) is an accessory to prevent being locked when entering the fence using safety flat type door lock switches.

## Switches with up to 6 Contacts

6-contact switches are built-in, with 4 types of contact configurations for easier application in any environment.

**\* Sold separately :**  
**Group lock device, connecting cable**

Group lock device is an accessory for safety door and door lock switches, to prevent actuator operation from unauthorized access by physically blocking switch insertion area.

Model	Contact (lock monitor + door monitor)	Connection diagram		Contact operation
		Door monitor	Lock monitor	
				Operation key complete insertion 
SFDL2-□□6A-□□□□□□	2NC/1NO. + 2NC/1NO.			Lock position 
SFDL2-□□6B-□□□□	3NC. + 2NC/1NO.			Lock position 
SFDL2-□□6C-□□□□	2NC/1NO. + 3NC.			Lock position 
SFDL2-□□6D-□□□□	3NC. + 3NC.			Lock position 

\* Connection diagram represents the locked status with the operation key inserted. (■ ON, □ OFF)



Side type (SFD-LT)



Upper type (SFD-LT2)

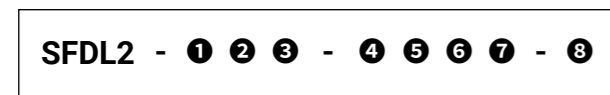
# Flat Type Door Lock Switches

## SFDL2 Series

### Technical Overview

#### Ordering Information

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



#### 1 Head material

No mark: Metallic  
P: Plastic

#### 2 Lock/Release method

M: Mechanical Lock/Solenoid Release  
S: Solenoid Lock/Mechanical Release

#### 3 Contact composition

6A: Lock 2 N.C./  
1 N.O. + Door 2 N.C./  
1 N.O.  
6B: Lock 3 N.C. + Door 2  
N.C./1 N.O.  
6C: Lock 2 N.C./  
1 N.O. + Door 3 N.C.  
6D: Lock 3 N.C. + Door 3 N.C.

#### 4 Installation direction

No-mark: Front installation  
B: Rear installation

#### 5 Connection outlet specification

M20: M20 thread  
G1/2: G1/2 thread

#### 6 Release key type

No-mark: Cross type  
K: Special type

#### 7 Rear release button

No-mark: None  
B: Exist

#### 8 Release key position

No-mark: Front  
T: Bottom

#### \* Sold Separately

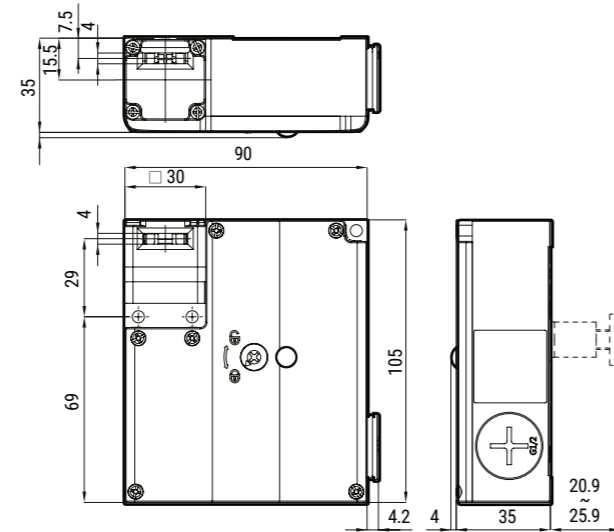
- Operation key: SFD-K
- Rear release extension button (SFDL2-RE )
- Safety door lock slide unit: SFDL2-SD
- Group locking device: SFD-LT  / Connecting cable: SFD-LT-C

#### Dimensions

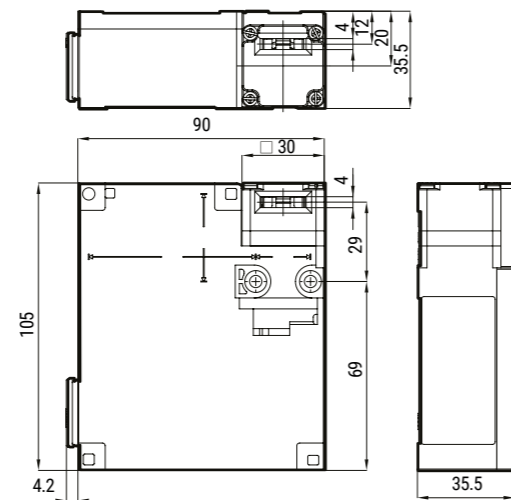
Unit: mm, For the detailed dimensions of the product, follow the Autonics web site.

##### Front installation

The parts marked with a dotted line are dimensions applicable only to the rear release button existing type.



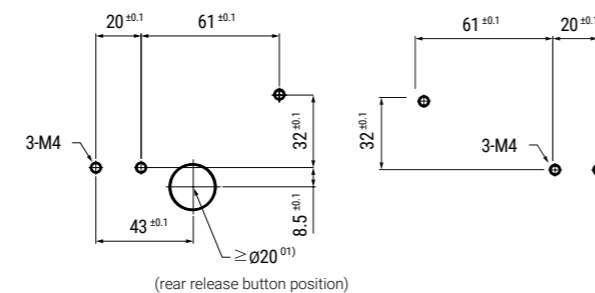
##### Rear installation



##### Panel cut-out

• Front installation

• Rear installation



01) Equipped with the rear release extension button (sold separately) : ≥Ø25

#### 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 in each X, Y, Z direction for 10 min	
Shock	1,000 m/s <sup>2</sup> (≈ 100 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	80 m/s <sup>2</sup> (≈ 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 <sup>01)</sup> (IEC standard, except for head)	
Material	Head: zinc or PA, case: PA	
Approval	CE (TUV NORD) VDE TÜV SÜD	
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

Ensuring Stable and  
Reliable Safety

## Safety Non-Contact Door Switches

### SFN Series

The SFN series safety non-contact door switches utilize magnetic type detection to monitor opening and closing of doors. The dedicated controller allows multiple connection of up to 30 units. The switches can be installed vertically or horizontally, and can also be installed from both sides which allow application in various types of doors.

### Safety Standards

IEC/EN 60947-5-3  
IEC/EN 61000-6-2/4  
EN ISO 14119

### Certifications





## Easy Expansion

Up to 30 SFN series units can be connected to a single dedicated controller, and various connection types and connectors are available for easy expansion.

### 1. Connect Up to 30 Units

Connect up to 30 units to a single dedicated controller to save cost and installation time.



### 2. Two Connection Types

Users can select between cable type and cable connector type models depending on user requirements.



### 3. Various Connectors

The cable connector type models can be connected to various connectors and extension cables for flexible installation and maintenance.



Y-Shaped

Cross Shaped

Loop Connector

## Flexible Installation

The units can be installed in right/left, front/rear, and top/bottom directions, allowing flexible installation in various door types.



Sliding Door



Swinging Door



Removable Cover Doors

## Operation Indicator

The U-shaped operation indicator allows users to identify operation status from various directions.



## IP67 Protection Rating

IP67 protection structure allows stable and error-free operation even in wet or dusty environments.



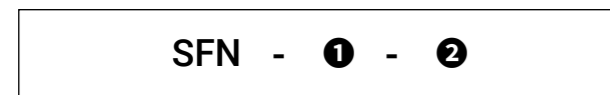
# Non-contact Door Switches

## SFN Series

### Technical Overview

#### Ordering Information

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



#### ① Sensing type

M: Magnetic type

#### ② Cable

020: Cable type (2 m)

050: Cable type (5 m)

W: cable connector type

#### \* Sold Separately

• Safety controller non-contact door switch unit: SFC-N322

• M12 Connector cable: C1D5-□, CID5-□, CID5-□P

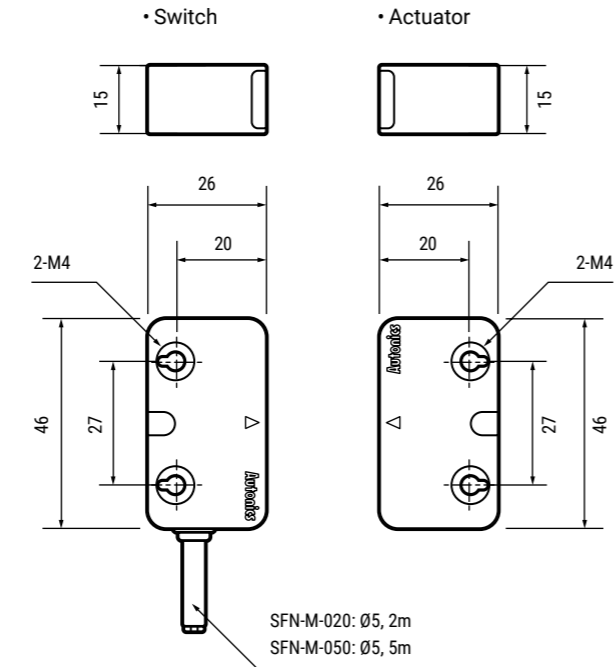
• Branch connector: CCD5-SFN, CYD5-SFN

• Loop connector: CND5-SFN

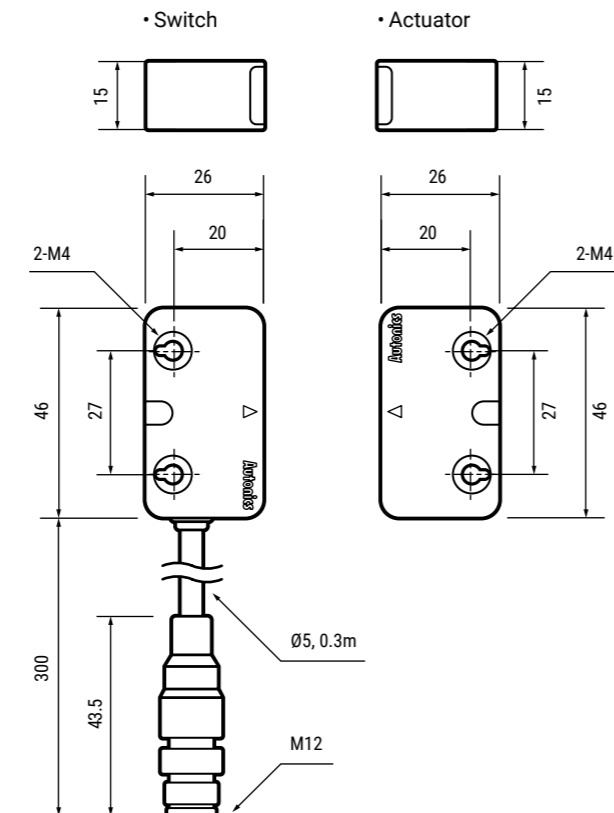
#### Dimensions

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

#### ■ Cable Type



#### ■ Cable Connector Type



#### Specifications

Model	SFN-M-□	
Operating distance	OFF→ON	≥ 5 mm
	ON→OFF	≤ 15 mm
Approval	CE (TUV NORD)	
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)	
Power supply	24 VDC (± 10 %)	
Operating frequency	100 Hz	
Power consumption <sup>01)</sup>	≤ 0.8 W	
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 in each X, Y, Z direction for 2 hours	
Vibration (malfunction)	1.0 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes	
Shock	300 m/s <sup>2</sup> (≈ 30 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	300 m/s <sup>2</sup> (≈ 30 G) 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	

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

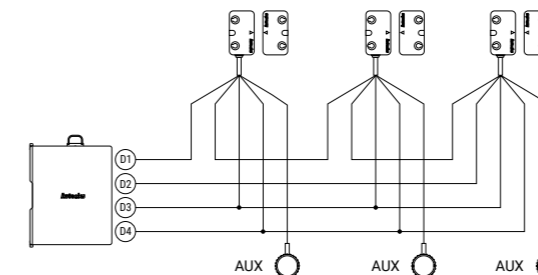
<sup>01)</sup> Power to the load is not included.

Characteristic level / Safety category (with SFC-N322)	IEC 61508 SIL 3, IEC 62061 SIL CL 3, ISO 13849-1 PL e 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 can not maintain a safety status in the event of error. Error recognition is processed in the connected controller (SFC-N322).

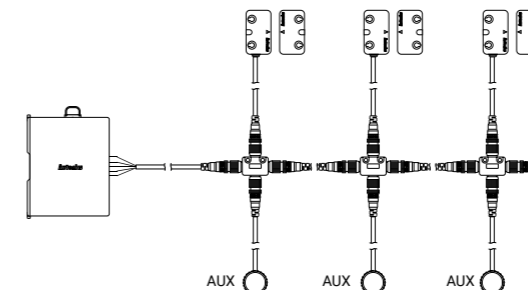
#### Example of Multiple Connection with Safety Controller (SFC-N322)

##### ■ Cable type

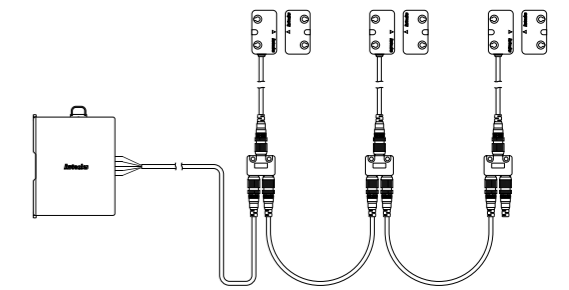


##### ■ Cable connector type

• Connection example of branch connector cross type (CCD5-SFN)



• Connection example of branch connector Y type (CYD5-SFN)



# One Stop Solution for Your Safety Emergency Stop Button Switches

## SF2ER Series

The SF2ER series emergency stop button switches are used to stop operation of machines during emergency situations and prevent injuries or hazards. The switches are push-lock / turn-reset methods and are available in various head sizes.

### Safety Standards

IEC/EN 60947-5-1/5  
EN ISO 13850  
GB/T 14048.5

### Certifications



## Various Head Sizes

Users can select various head sizes for diverse application settings.



D30



D40



D60

## EMS/EMO Buttons

Button head markings are available so that users can select whether to stop operation entirely or partially depending on the situation.

- EMS (Emergency Machine Stop) = stop power supply of dangerous operations
- EMO (Emergency Machine Off) = stop main power supply



EMS

Emergency Machine Stop



EMO

Emergency Machine Off



No Mark

## Various Accessories (Sold Separately)

Various accessories are available, including guard rings, nameplates, and radial support.



### Guard ring

Standard type	Circle type	Lock type	Metal type	Embedded type (no spacer)	Embedded type (spacer×1)	Embedded type (spacer×2)
 Color: ○○	 Color: ○○	 Color: ●	 Color: ●	 Color: ●	 Color: ●	 Color: ●
GUARD-SF2ER(W)	GUARD2-SF2ER(W)	This guard ring is sold only as protection guard ring + name plate set. * single metal latch sold separately: GUARD3-SF2ER-L	GUARD2-SF2ER-M	GUARD4-SF2ER	GUARD41-SF2ER	GUARD42-SF2ER



### Name plate

Ø 90, STOP	Ø 90, OFF	Ø 60, STOP	Ø 60, OFF
			
SF2ER-B	SF2ER-B2	SF2ER-B3	SF2ER-B4

### Radial support

Rubber packing	Radial support
	
BK-SF2ER-RP	BK-SF2ER-P

### Contact block

A contact (Normally Open)	B contact (Normally Closed)
	
SFEA-CA	SFEA-CB

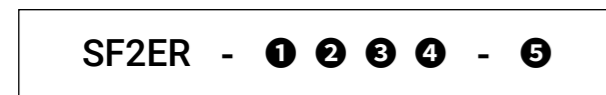
# Emergency Stop Switches

## SF2ER Series

### Technical Overview

#### Ordering Information

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



#### 1 Operation

E: Push-lock, turn-reset

#### 2 Button

- 1: D30 (short head, non-illuminated)
- 2: D40 (short head, non-illuminated)
- 3: D60 (short head, non-illuminated)

#### 3 Color

R: Red

#### 4 Contact block

- B: B contact: 1
- AB: A contact: 1, B contact: 1
- 2B: B contact: 2
- A2B: A contact: 1, B contact: 2
- 3B: B contact: 3

#### 5 Mark

- No-mark: No-mark
- A: EMO
- S: EMS

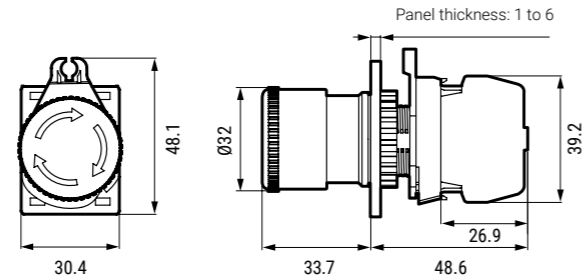
#### \* Sold Separately

- Protection guard ring
- Name plate
- Contact block
- Protection guard ring + Name plate set
- Radial support rubber packing / Radial support
- Switch nut fixing handle

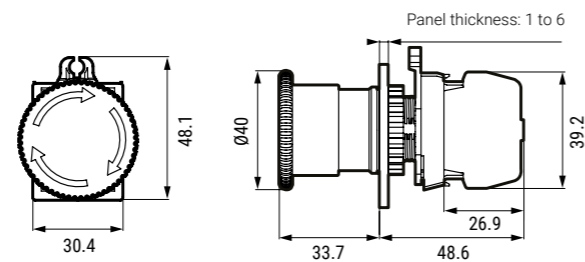
### Dimensions

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

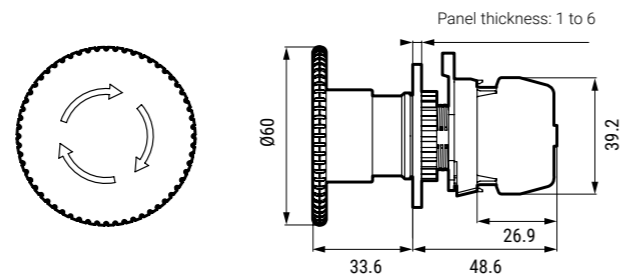
#### ■ D30 (short head, non-illuminated)



#### ■ D40 (short head, non-illuminated)

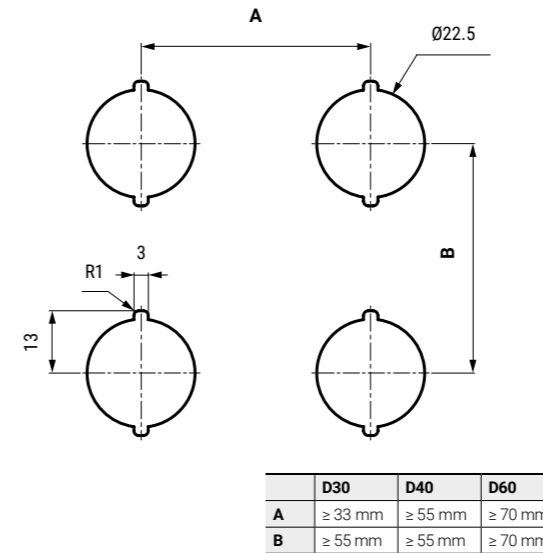


#### ■ D60 (short head, non-illuminated)

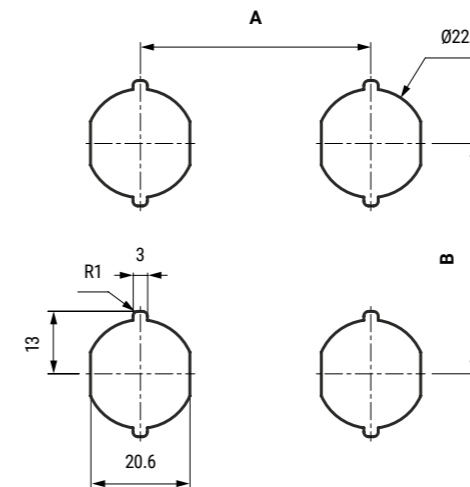


### ■ Panel cut-out

• General



• For anti-rotation



	General	With guard ring <sup>01)</sup>	With radial support
Panel thickness	1 to 6 mm	1 to 2.3 mm	1.5 to 6 mm

01) For the panel thickness when using embedded-type guard rings, refer to the product manual.

### 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		

### Guard ring + Name plate set (Sold Separately)

Guard ring	Name plate	Model
Standard type	Ø 60, STOP	GUARD-SF2ER-S
	Ø 60, OFF	GUARD-SF2ER-A
Standard type white	Ø 60, STOP	GUARD2-SF2ER-S-W
Circle type	Ø 60, STOP	GUARD2-SF2ER-S
	Ø 60, OFF	GUARD2-SF2ER-A
Circle type white	Ø 60, STOP	GUARD2-SF2ER-S-W
Lock type	Ø 60, STOP	GUARD3-SF2ER-S
	Ø 60, OFF	GUARD3-SF2ER-A
Metal type	Ø 60, STOP	GUARD2-SF2ER-S-M
	Ø 60, OFF	GUARD2-SF2ER-A-M

### 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	30 to 40 W / 1 contact
Operation distance	4.7 mm ± 0.5
Contact operating angle	CW (clock wise) 33 to 37°
Rotation torque	0.04 to 0.05 N m
Allowable operation frequency	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 <sup>2</sup> )
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 in each X, Y, Z direction for 2 hours
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes
Shock	1,000 m/s <sup>2</sup> (≈ 100 g) in each X, Y, Z direction for 3 times
Shock (malfunction)	250 m/s <sup>2</sup> (≈ 25 g) in each X, Y, Z direction for 3 times
Ambient temperature	-20 to 65°C, 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 (oil resistant, IEC standards)
Material	Button: PC, body: PA6, lever in fixing unit: PA6
Approval	CE (TUV NORD) ENEC (TUV NORD) S ENEC (TUV NORD) ENEC (TUV NORD)
Weight	≈ 69.3 g

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.



Additional Safety for  
Operation Control

## Grip Type Enabling Switches

### SFEN Series

The SFEN series safety grip type enabling switches can be used to manually control operation within a hazardous area during maintenance in order to prevent personal injury in the event of unexpected machine operation.

The switches feature high operation sensitivity and various lineup models for diverse applications.

### Safety Standards

IEC/EN 60947-5-1

IEC/EN 60947-5-8

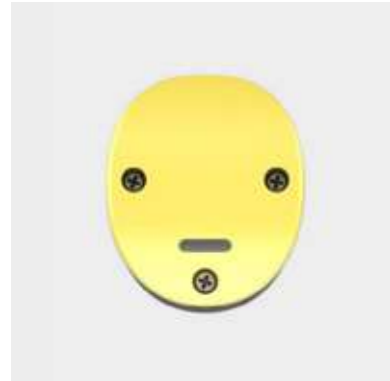
GB/T 14048.5

### Certifications



## Various Model Lineup

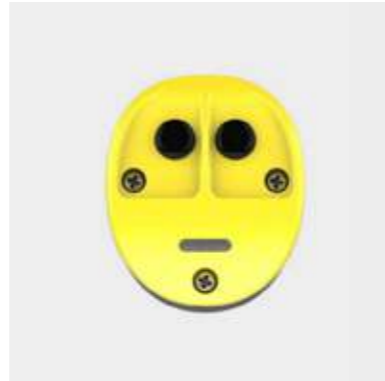
Enabling switches are available in various models including standard,  $\phi 16$  stop button and momentary button types for diverse user applications.



**Standard Type**  
SFEN Series



**Stop button type**  
SFEN-B Series

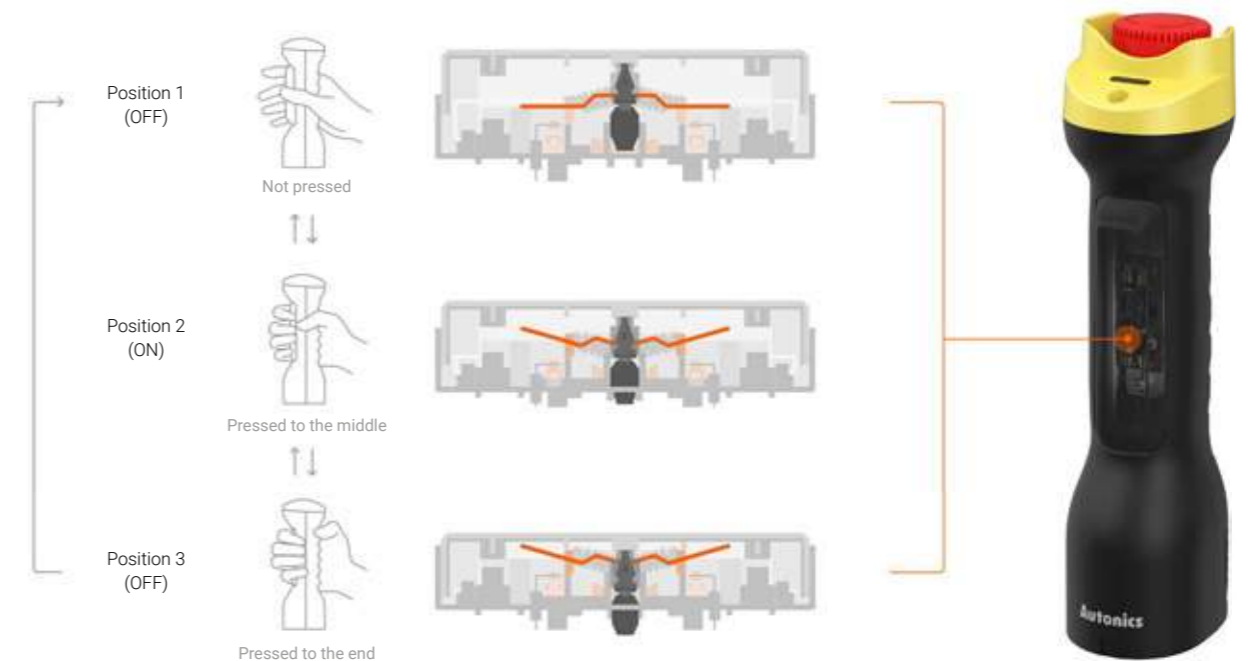


**Momentary button type**  
SFEN-M Series



## High Operation Sensitivity with 3-Position Snap Action

Enabling switches offer high operation sensitivity with 3-position snap action and the ergonomic design allows easy single-hand operation.



## Operation Indicator

The operation indicator (green LED) allows users to easily identify operation status.



# Grip Type Enabling Switches

## SFEN Series

### Technical Overview

#### Ordering Information

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



#### 1 Type

No mark: Standard type	B: Stop button type	M: Momentary button type

#### \* Sold Separately

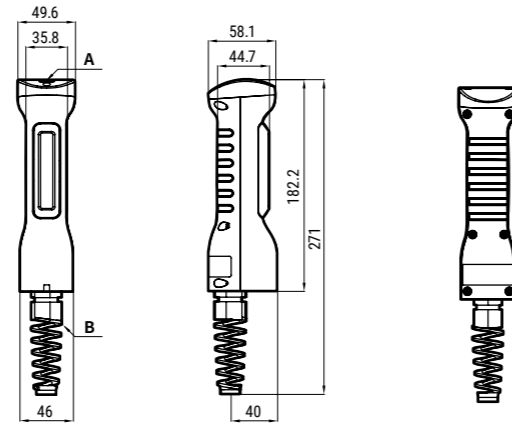
- Mounting bracket: BK-SFEN
- Holding key: SFEN-HK

#### Dimensions

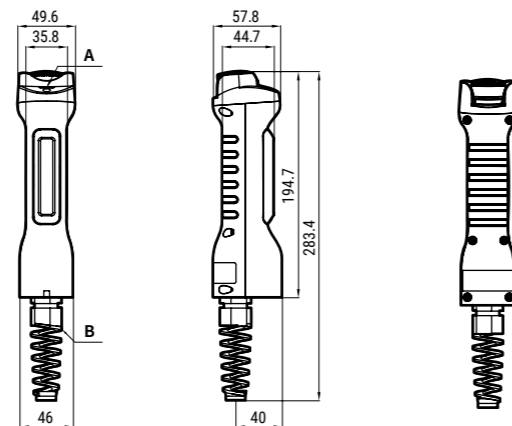
Unit: mm, For the detailed dimensions of the product, follow the Autonics web site.

<b>A</b>	Enable operation indicator (green)	<b>B</b>	Cable grand
<b>C</b>	Push button B	<b>D</b>	Push button A

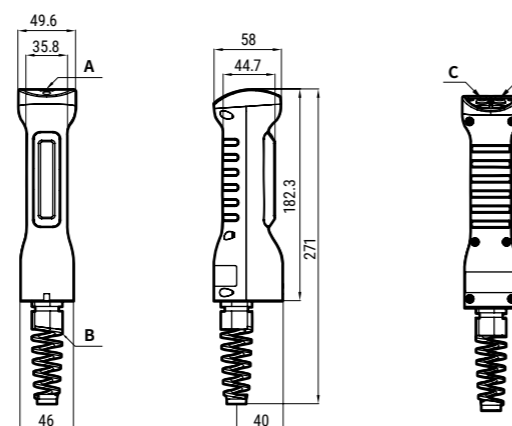
#### ■ SFEN



#### ■ SFEN-B



#### ■ SFEN-M



#### Specifications

##### • Enable switch

<b>Rated Insulation Voltage</b>	250 VAC~
<b>Rated through current</b>	2.5 A
<b>Rated inductive load</b>	AC-15 (0.75 A / 240 VAC~), DC-13 (0.55 A / 125 VDC=)
<b>Rated resistive load <sup>01)</sup></b>	0.75 A / 240 VAC~, 0.55 A / 125 VDC=
<b>Controller strength <sup>02)</sup></b>	Operation direction: 200 N, for 1 min
<b>Operating frequency</b>	Electrical: ≤ 20 / min, Mechanical: ≤ 20 / min
<b>Dielectric strength</b>	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)
<b>Electrical life cycle</b>	≥ 100,000 operations (rated load)
<b>Mechanical life cycle</b>	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

<b>Rated Insulation Voltage</b>	250 VAC~
<b>Rated through current</b>	3 A
<b>Rated resistive load <sup>01)</sup></b>	AC-12 (3 A / 250 VAC~), DC-12 (3 A / 30 VDC=)
<b>Controller strength <sup>02)</sup></b>	Operation direction: 400 N, for 1 min (operation direction: 0.5 N m, for 1 min)
<b>Operating frequency</b>	Electrical: ≤ 10 / min, Mechanical: ≤ 10 / min
<b>Dielectric strength</b>	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.
<b>Electrical life cycle</b>	≥ 100,000 operations (rated load) (Push / Release 1 time)
<b>Mechanical life cycle</b>	≥ 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 switch more than the controller strength. Failure to follow this instruction may result in product damage.

##### • Momentary button

<b>Rated Insulation Voltage</b>	125 VAC~
<b>Rated through current</b>	0.1 A
<b>Rated resistive load <sup>01)</sup></b>	AC-12 (0.1 A / 125 VAC~), DC-12 (0.1 A / 30 VDC=)
<b>Controller strength <sup>02)</sup></b>	Operation direction: 10 N, for 1 min
<b>Operating frequency</b>	Electrical: ≤ 25 / min, Mechanical: ≤ 60 / min
<b>Dielectric strength</b>	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.
<b>Electrical life cycle</b>	≥ 100,000 operations (rated load)
<b>Mechanical life cycle</b>	≥ 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.

#### ■ Common spec.

<b>Conditional short circuit current</b>	100 A
<b>Min. applied load</b>	DC24 V 4 mA
<b>Directing opening force</b>	30 N ± 10
<b>Directing opening distance</b>	4.8 mm ± 0.5
<b>Insulation resistance</b>	≥ 100 MΩ (500 VDC= megger)
<b>Vibration (malfunction)</b>	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 min
<b>Shock (malfunction)</b>	150 m/s <sup>2</sup> (≈ 15 G) in each X, Y, Z direction for 3 times
<b>Ambient temperature</b>	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)
<b>Ambient humidity</b>	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
<b>Insulation class</b>	Class II (double insulation)
<b>Indicator</b>	Enable operation indicator (green)
<b>Protection structure</b>	SFEN: IP66 (IEC standard) SFEN-B, SFEN-M: IP65 (IEC standard)
<b>Applicable wire</b>	AWG 20 to 18 (0.5 to 0.75 mm <sup>2</sup> )
<b>Connection type</b>	M20 connector cable grand
<b>Material</b>	Cover: PA66, button: PC, rubber grip: Silicone
<b>International standards</b>	IEC 60947-5-1, IEC 60947-5-8, UL 60947-5-1
<b>Approval</b>	CE (TUV NORD) UK (UKCA) S
<b>Unit weight (package)</b>	SFEN: ≈ 238 g (≈ 363 g) SFEN-B: ≈ 268 g (≈ 388 g) SFEN-M: ≈ 252 g (≈ 376 g)

#### ■ Contact composition

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



## Flexible System Configuration

# Key Selector Switches

### SF2KR Series

The SF2KR series safety key selector switches are installed in safety fences or industrial equipment doors to control operation of machines, offering additional safety during maintenance in potentially dangerous environments.

#### Safety Standards

IEC/EN 60947-5-1

GB/T 14048.5

#### Certifications



## Ensure Additional Safety with Shared Key

The same key can be used with other key selector switches within or outside the fence, offering additional safety. Operators can enter potentially dangerous areas while possessing the key, preventing key loss or entrapment within the hazardous area.



\* Inside the fence (SF2KR-□)  
Outside the fence (SF2KR-M□)

## 240 Different Models Available

The switches are available in various models including 4 types of key release direction, 3 types of N.C. contact powered location, and 10 types of keys depending on the general/lockable models for diverse applications.

Key lock function	Key free location	N.C. contact powered location	Lock location	Contact block	Key
General type	↖	↖	-	N.O.1 + N.C.2 N.C.3 N.O.2 + N.C.2	No mark: Basic key 01 to 09: Key number 1 to 9
	↗	↖	-		
	↖	↗	-		
	↗	↗	-		
Lockable type	↗	↖	↗		
	↗	↗	↗		
	↗	↖	↖↗		

## Key Lock Function Available

Key selector switches are available in single direction and bi-directional lock types with mechanical/solenoid release methods, preventing unintended mode switching during maintenance.



## Front Operation Indicator

Front operation indicator (green LED) allows users to easily identify solenoid operation status.

\* Lock type models only: SF2KR-M□



LED OFF



LED ON

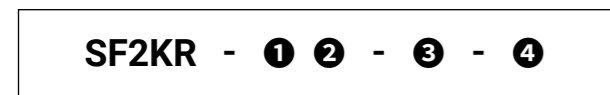
# Key Selector Switches

## SF2KR Series

### Technical Overview

#### Ordering Information

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



#### ① Key lock function

No mark: General type  
M: Lockable type

#### ② Operation direction

##### General type

	Key free location	N.C. contact powered location
LL	↖	↖
RL	↗	↖
LR	↖	↗
RR	↗	↗

##### Lockable type

	Key free location	N.C. contact powered location	Lock location
RLR	↗	↖	↗
RLL	↗	↖	↖
RRR	↗	↗	↗
RLB	↗	↖	↗↖

#### ③ Contact block

A2B: N.O. 1 + N.C. 2  
3B: N.C. 3  
2A2B: N.O. 2 + N.C. 2

#### ④ Key

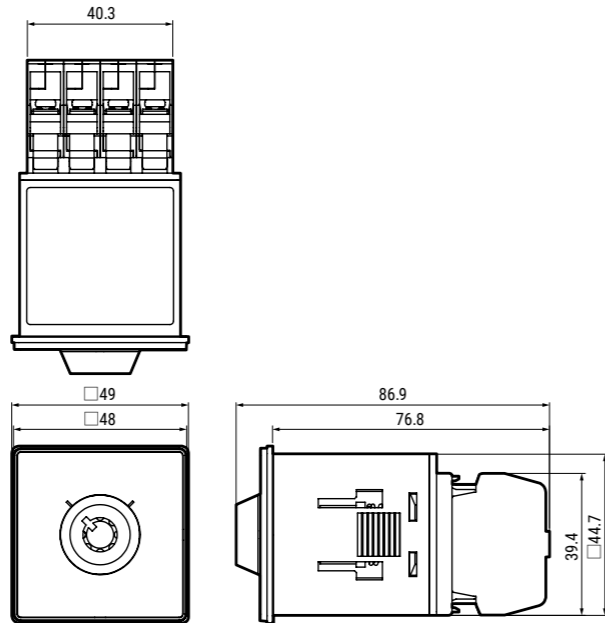
No mark: Basic key  
01 to 09: Key number 1 to 9

#### \* Sold Separately

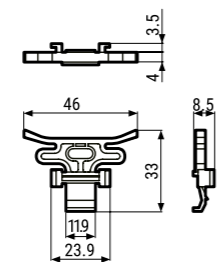
- Name plate: SF2KR-□-NP□
- Contact block: SFEA-C□

### Dimensions

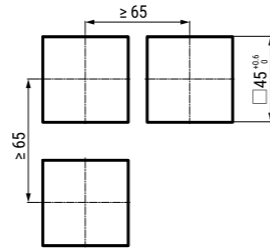
Unit: mm, For the detailed dimensions of the product, follow the Autonics web site.



#### ■ Bracket



#### ■ Panel cut-out



### 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 <sup>2</sup> )	Solenoid power: AWG 24 - 18 Contact: AWG 18 (0.823 mm <sup>2</sup> )
Allowable operation frequency <sup>01)</sup>	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 in each X, Y, Z direction for 2 hours	
Vibration (malfunction)	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes	
Shock	300 m/s <sup>2</sup> (≈ 30 g) in each X, Y, Z direction for 3 times	
Shock (malfunction)	150 m/s <sup>2</sup> (≈ 15 g) in each X, Y, Z direction for 3 times	
Ambient temperature	-20 to 70°C <sup>02)</sup> , storage: -40 to 70 °C (at no freezing or condensation)	-10 to 55°C <sup>02)</sup> , 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) VDE TÜV SÜD	
Unit weight (packaged) <sup>03)</sup>	≈ 130 g (≈ 192 g)	≈ 152 g (≈ 213 g)

01) Rotating and returning once is counted as one operation.  
02) UL approved ambient temperature: 55 °C  
03) It is switch with 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	Making	Breaking Making
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	Making	Breaking Making
DC125 V	2.5 A	0.55	0.55	69	69
DC250 V		0.27	0.27		



# Take Control of Your Safety Safety Controllers

## SFC/SFC-R Series

The SFC series safety controllers are used together with safety input devices (switches, sensors, etc.) to provide safe working environments. The controllers feature self-diagnosis function and safety integrity to meet international safety standards.

### Safety Standards

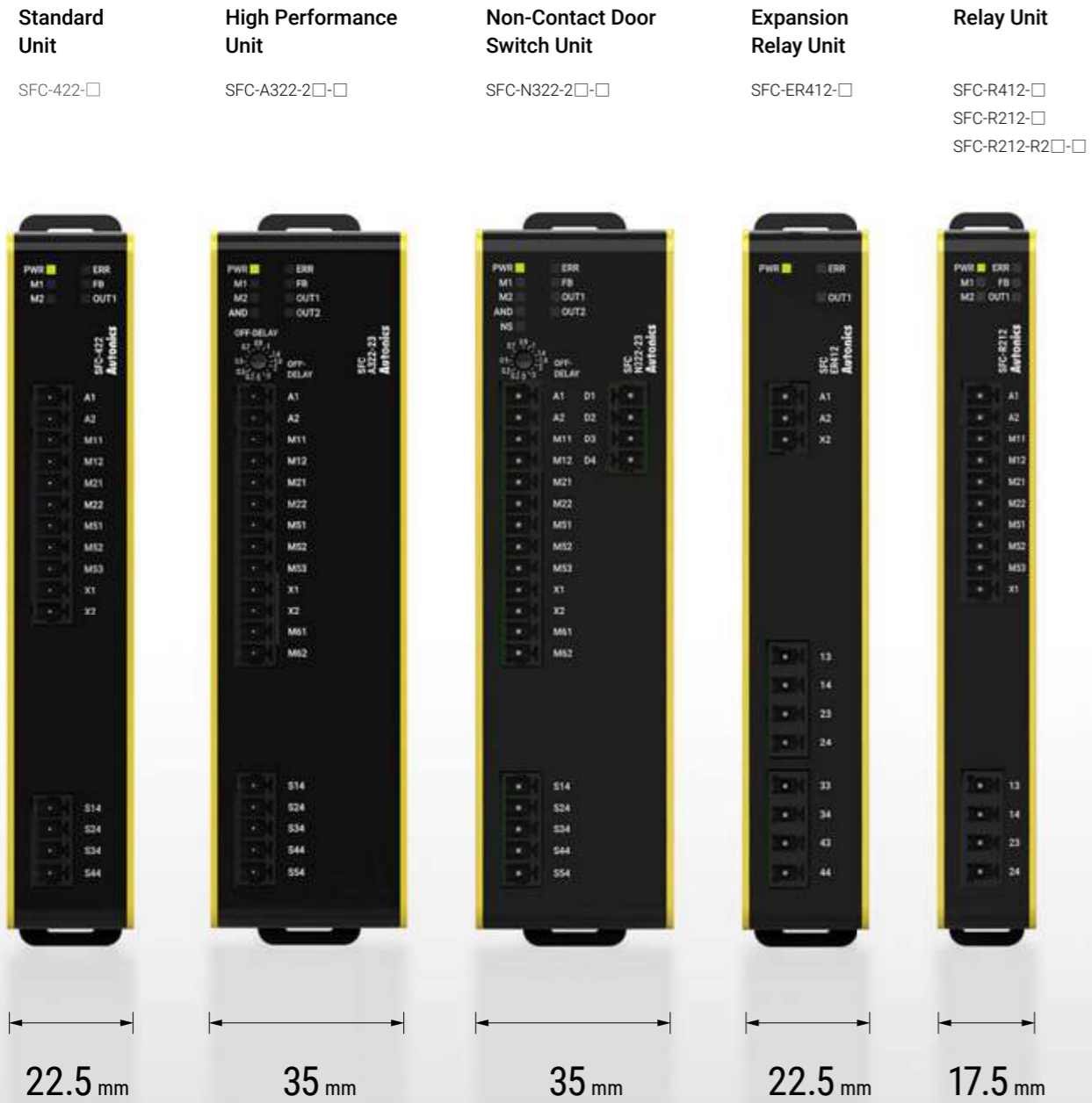
- IEC/EN 61508 (SIL 3)
- IEC/EN 62061 (SIL CL 3)
- ISO 13849-1/2 (Cat. 4, PL e)
- IEC/EN 60947-5-1 (SRC-R)
- IEC/EN 61000-6-2/4 (SFC, SFC-A/N)
- EN 50178

### Certifications



# Various User-Friendly Features

The SFC series features various user-friendly features including slim size, operation indicators, front facing terminals, multiple logic inputs and more.



## 1. Slim Space-Saving Design

The slim space-saving design (minimum width 17.5 mm) allows flexible installation in tight or limited spaces.



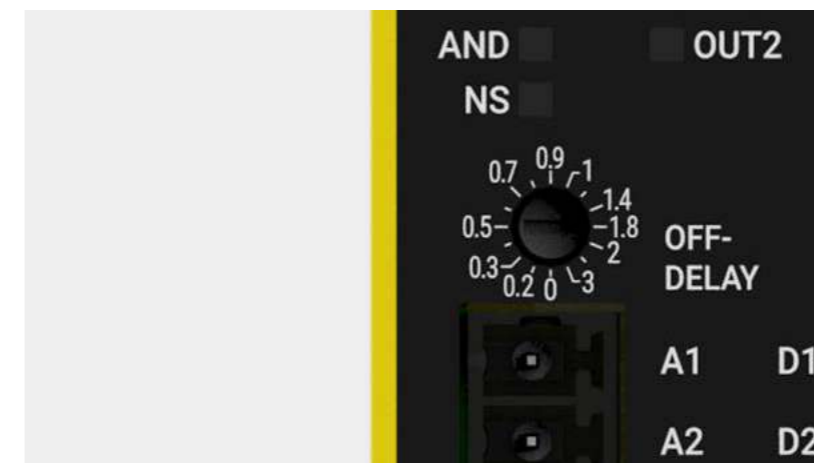
## 2. Operation Indicators

Users can easily check various operation and connection status with the operation indicators.



## 3. Front Terminal Design

Socket type terminal is located on the front for easy wiring and maintenance.



## 4. 16-Level Time Setting

The OFF-delay output models allow up to 16 different OFF-delay time settings.

\* Available models : 0 to 3 s / 0 to 30 s / 0 to 300 s

# Safety-Oriented Product Design

The SFC series utilizes force guided contact relays to protect from contact welding and ventilation holes are present to reduce heating.



## 5. Flexible OFF-Delay Output

On high performance units (SFC-A) and non-contact door switch units (SFC-N), users can set to 1 instantaneous output and 4 OFF-delay outputs using the DIP switch (default: 3 instantaneous, 2 OFF-delay). Auxiliary output is also available to check various error status.

\* 4 safety outputs are available on standard unit controllers.

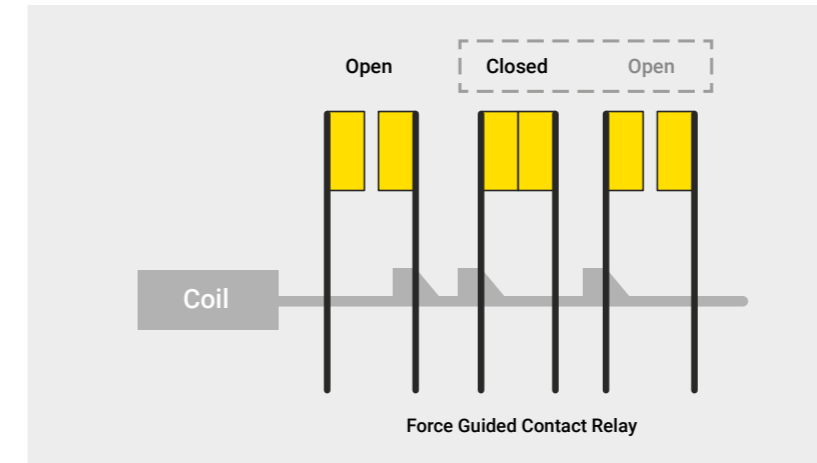


## 6. Expansion Relay Unit

The expansion relay units (SFC-ER) can be connected to high performance units (SFC-A) and non-contact door switch units (SFC-N) to increase the number of relay type safety output. (Connect up to 5 expansion relay units per 1 controller)

## 7. Up to 20 Logic Inputs

The SFC series can be expanded up to 20 units using logic input offering wider control of safety devices. Safer operation is possible with multiple logic connections.



## 1. Safety Circuit Design

TUV SIL certified force guided contact relays are used to detect failures including contact welding and circuit damage.

\* Contact welding: welding of contacts due to high inrush current or overload.



## 2. Ventilation Holes

Ventilation holes are located on the top and bottom of the product to reduce heating.

# Controllers

## SFC Series

### Technical Overview

#### Ordering Information

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

SFC - ① ② ③ ④ - ⑤ ⑥ ⑦ - ⑧

#### ① Function

No-mark: Basic unit  
 A: Advanced unit  
 N: Non-contact door switch unit  
 (for Autonics SFN Series)  
 ER: Expansion relay unit  
 R: Relay unit

#### ② No. of safety instantaneous outputs

Number: Number of outputs

#### ③ No. of auxiliary outputs

Number: Number of outputs

#### ④ Power supply

2: 24 VDC

#### ⑤ Off-delay output elements

No-mark: P channel FET  
 R: Relay (Relay unit)

#### ⑥ No. of Off-delay outputs

No-mark: None  
 2: 2

#### ⑦ Max. Off-delay time

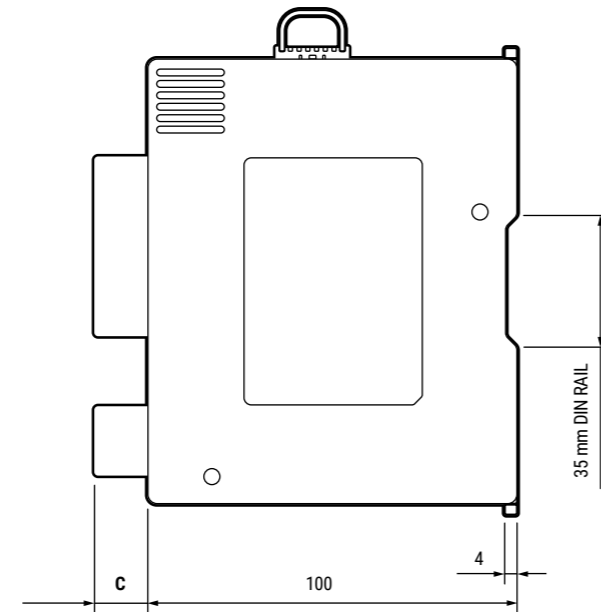
Number: Time (unit: sec)

#### ⑧ Terminal type

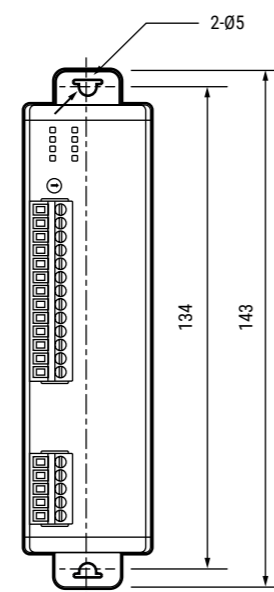
No-mark: Screw  
 L: Screwless

#### Dimensions

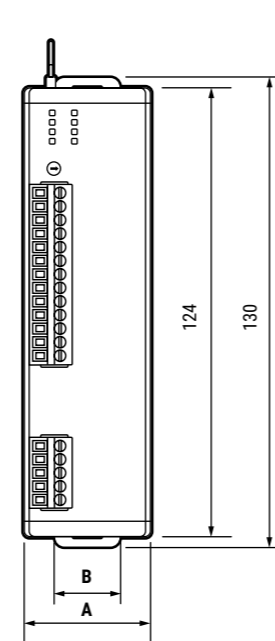
Unit: mm, For the detailed dimensions of the product, follow the Autonics web site. The below is based on SFC-A (screw type) model.



#### • Mounting with bolts

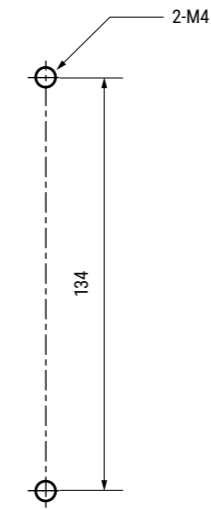


#### • Mounting on DIN rail



Model		A	B	C
Basic unit	SFC-422-□	22.5	18.3	Screw type: 15.3 Screwless type: 15.5
Advanced unit	SFC-A322-□-□	35	18.3	
Non-contact door switch unit	SFC-N322-□-□	35	18.3	
Expansion relay unit	SFC-ER412-□	22.5	18.3	
	SFC-R412-□	22.5	18.3	
Relay unit	SFC-R212-□	17.5	13.3	
	SFC-R212-R□-□	22.5	18.3	

#### ■ Panel cut-out



#### 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 <sup>01)</sup>	≤ 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 <sup>02)</sup>		
Instantaneous	4 X	3 X <sup>03)</sup>	3 X <sup>03)</sup>
Off-delay <sup>04)</sup>	-	2 X <sup>03)</sup>	2 X <sup>03)</sup>
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) <sup>05)</sup>	Safety Input : ≤ 50 ms		Non-contact door switch input: ≤ 100 ms
	-	Logic input: ≤ 200 ms	
Response (return) time (ON → OFF) <sup>05)</sup>	≤ 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 <sup>06)</sup>	-	-	Max. 30 units
Approval	IEC/EN 61508 (SIL3), IEC/EN 62061 (SILCL3) IEC/EN 60947-5-1, EN ISO 13849-1 (Category 4, PLc) UL listed E249635		
Certification	CE (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD)		
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.

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 <sup>01)</sup>	≤ 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 X	4 X	2 X	2 X
Off-delay <sup>02)</sup>	-	-	-	2 X
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: AC15: 230V~ 3A, DC13: 24V≒ 3A, UL508: B300/R300			
Conditional short-circuit current	100 A <sup>03)</sup>			
Operating time (OFF → ON) <sup>04)</sup>	≤ 30 ms <sup>05)</sup>	≤ 100 ms		
Response (return) time (ON → OFF) <sup>05)</sup>	≤ 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, PLc) UL listed E249635			
Certification	CE (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD) ENEC (TUV NORD)			
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. / 300 sec., depends on model)  
 03) Use 6A 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 <sup>02)</sup>	0.75 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 1 hour
Vibration (malfunc.) <sup>01)</sup>	0.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 10 minutes
Shock <sup>01)</sup>	300 m/s <sup>2</sup> (≈ 30 G) in each X, Y, Z direction for 3 times
Shock (malfunc.) <sup>01)</sup>	100 m/s <sup>2</sup> (≈ 10 G) in each X, Y, Z direction for 3 times
Protection structure	IP20 (IEC standard)
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (rated at no freezing or condensation)
Ambient humidity	25 to 85 %RH, storage: 25 to 85 %RH (rated at 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).



## Safer Control System Operation

# Safety I/O Terminal Blocks

### SFT Series

The SFT series safety relay terminal blocks allow safer control system operation with redundant circuits and signal feedback. The relay terminal blocks utilize force guided contacts to prevent contact welding and the compact size allows space-saving installation.

### Safety Standards

IEC/EN 61010-1

UL 61010-1

### Certifications



## System Configuration

Safety relay terminal blocks can be used to control various loads with input signals from safety light curtains and switches. It can also be used for feedback signals to offer safer control systems.



## Force Guided Contacts and Feedback Signals

SFT series utilize relays with force guided contacts to prevent contact welding, in accordance with IEC 61810-3. The status of output contacts can be sent with feedback signals to safety controllers or other devices, allowing safer operation of control systems.

Category	Safety Relay	Standard Relay
Standard Operation	<p>ON      OFF</p>	<p>ON      OFF</p>
Contact Welding	<p>Force guided contact</p> <p>Prevent contacts closing at the same time</p>	<p>Contacts closed at the same time</p>

## Screw Type, Screwless Type Models Available

The SFT series is available in screw type and screwless type wiring models.

The screwless push-in type connection provides easy wiring, reduced installation time, and even tightening.



Screwless Type



Screw Type

## Flexible Mounting Methods

The SFT series supports both DIN rail mount and screw mount methods, for application in diverse environments.



DIN Rail Mount



Screw Mount

\* Screwless type does not support screw mount method.

# I/O Terminal Blocks

## SFT Series

### Technical Overview

#### Ordering Information

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



#### 1 Terminal type

S: Screw type  
L: Screwless type

#### 2 Number of pole

4P: 4-pole  
6P: 6-pole

#### 3 Power supply

24V: 24 VDC

#### 4 Relay Contact

2A2B: 2A2B (4-pole)  
3A1B: 3A1B (4-pole)  
4A2B: 4A2B (6-pole)  
5A1B: 5A1B (6-pole)  
3A3B: 3A3B (6-pole)

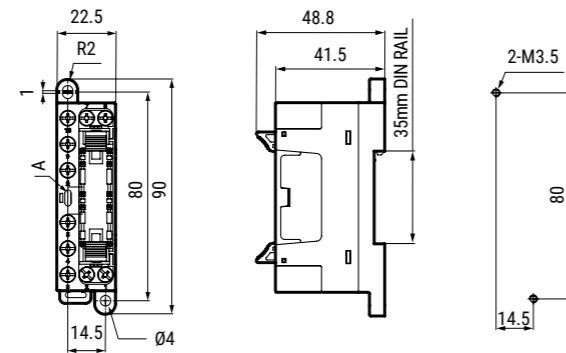
### Dimensions

Unit: mm, For the detailed drawings, follow the Autonics website.

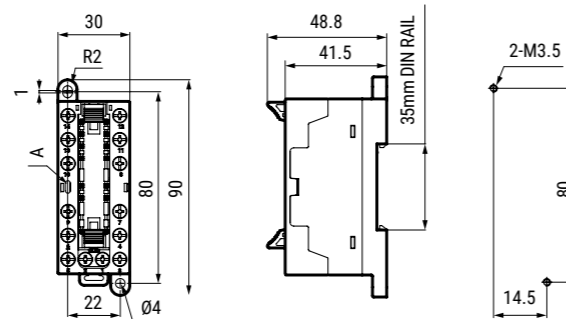
<b>A</b>	Operation indicator (green)
----------	-----------------------------

#### ■ Screw type

• 4-pole

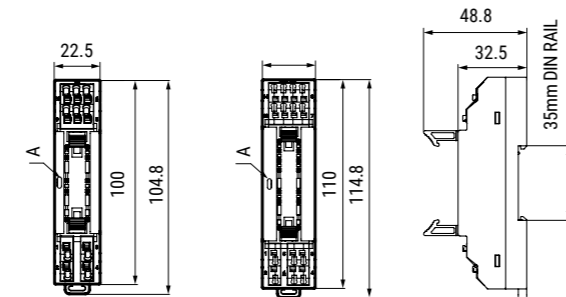


• 6-pole



#### ■ Screwless type

• 4 -pole



• 6-pole

### Specifications

Model	SFTS-4P-24V-□	SFTS-6P-24V-□	SFTL-4P-24V-□	SFTL-6P-24V-□
No. of pole	4	6	4	6
Applied relay <sup>01)</sup>	4-pole - SFS2-DC24V: 2A2B, SFS3-DC24V: 3A1B 6-pole - SFS4-DC24V: 4A2B, SFS5-DC24V: 5A1B, SFS6-DC24V: 3A3B			
Power supply	24 VDC ±10 %			
Rated load voltage	250 VAC ~ 50/60 Hz, 30 VDC ≒			
Continuous current	6 A <sup>02)</sup>			
Indicator	Operation indicator: green			
Terminal type	Screw		Screwless	
Applicable wire - solid	Ø 0.3 to Ø 1.2 mm		Ø 0.6 to 1.25 mm <sup>03)</sup>	
Applicable wire - stranded	AWG 22-16 (0.30 to 1.25 mm <sup>2</sup> )		AWG 22-18 (0.30 to 0.80 mm <sup>2</sup> ) <sup>03)</sup> <sup>04)</sup>	
Crimp terminal connection tensile strength	≥ 30 N		-	
Tightening torque	0.5 to 0.6 N m		-	
Stripped length	-		8 to 10 mm	
Insulation resistance	≥ 1,000 MΩ (500 VDC ≒ megger)			
Dielectric strength (coil-contact)	4,000 VAC ~ 50/60 Hz for 1 minute			
Dielectric strength (different poles contact)	2,500 VAC ~ 50/60 Hz for 1 minute			
Dielectric strength (same polarity contact)	2,500 VAC ~ 50/60 Hz for 1 minute			
Vibration	0.75 mm amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours			
Vibration (malfunction)	0.75 mm amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 10 minutes			
Shock	300 m/s <sup>2</sup> (≒ 30 G) in each X, Y, Z direction for 3 times			
Shock (malfunction)	150 m/s <sup>2</sup> (≒ 15 G) in each X, Y, Z direction for 3 times			
Ambient temperature	-25 to 70 °C, storage: -30 to 80 °C (no freezing or condensation)			
Ambient humidity	25 to 85 % RH, storage: 25 to 85 % RH (no freezing or condensation)			
Protection structure	IP20 (IEC standard)			
Material	CASE, BASE, COVER: PC Terminal: C2680		CASE, BASE: PC, Terminal: PA66, Copper, Stainless Steel	
Certification	CE, RoHS, REACH			
Unit weight (packaged)	≈ 37.8 g (≈ 85.8 g)	≈ 51.2 g (≈ 99.2 g)	≈ 39.8 g (≈ 88 g)	≈ 51.2 g (≈ 99.2 g)

01) For the detailed specification, refer to the materials from the manufacturer (PANASONIC).  
02) Continuous current is the maximum current at each contact and must not exceed the total current depending on the number of contacts.  
03) Use the cable of copper conductor in 60°C temperature class.  
04) When using the stranded wire, use End Sleeve (Ferrule Terminal).

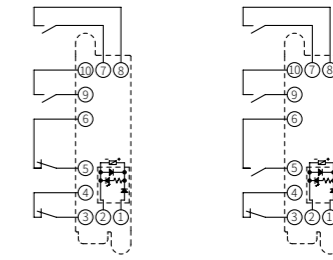
### Safety Relay

- Safety relays provided by the model are different.
  - It is possible to purchase the safety relay separately.
- For the detailed specification, refer to the materials from the manufacturer (PANASONIC).

Model	SFS2-DC24V	SFS3-DC24V	SFS4-DC24V	SFS5-DC24V	SFS6-DC24V
No. of pole	4		6		
Contact arrangement	2A2B	3A1B	4A2B	5A1B	3A3B
Applied models	SFTS-4P-24V-□ SFTL-4P-24V-□		SFTS-6P-24V-□ SFTL-6P-24V-□		

### Relay Installed Wire Connection

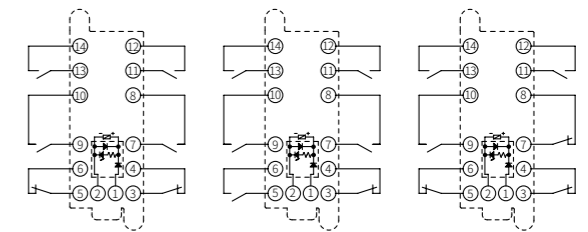
#### ■ Screw type: 4-pole



SFS2-DC24V(2a2b)

SFS3-DC24V(3a1b)

#### ■ Screw type: 6-pole

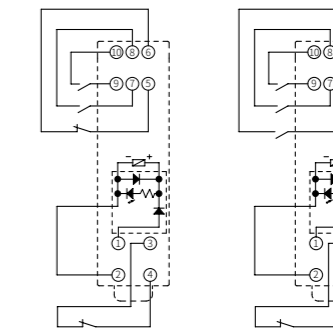


SFS4-DC24V(4a2b)

SFS5-DC24V(5a1b)

SFS6-DC24V(3a3b)

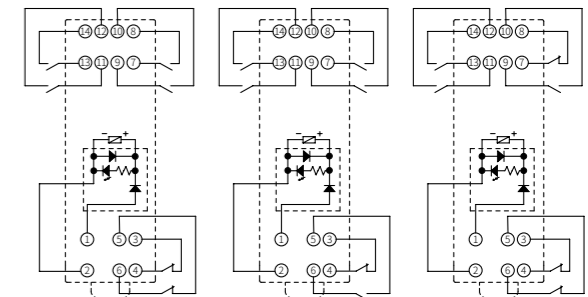
#### ■ Screwless type: 4-pole



SFS2-DC24V(2a2b)

SFS3-DC24V(3a1b)

#### ■ Screwless type: 6-pole



SFS4-DC24V(4a2b)

SFS5-DC24V(5a1b)

SFS6-DC24V(3a3b)

# SAFETY.

SAFETY is the safety product brand of Autonics that protects workers from the risk of accidents in industry sites. In the brand design concept, the meaning of this safety protection is visualized using a square as a basic element.



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## Products

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- Area Sensors • Proximity Sensors • Linear Positioning Sensors • Rotary Encoders • Temperature Sensors • Temperature Transmitters
- Pressure Sensors • Pressure Transmitters • Smart Camera • Vision Sensors • Safety Light Curtains • Safety Door Switches • Safety Switches
- Safety Controllers • Safety I/O Terminal Blocks • Temperature Controllers • Solid State Relays • Power Controllers • Counters • Timers
- Digital Panel Meters • Digital Display Units • Sensor Controllers • SMPS • Industrial PC • HMIs • Recorders • Indicators • Network Converters
- Closed Loop Stepper Motor System • 5-Phase Stepper Motor & Drivers • 2-Phase Stepper Motor Drivers • Motion Controllers
- Industrial Networking • I/O Terminal Blocks • Distribution Boxes • Cables • Control Switches / Pilot Lights / Buzzers • Software

\* The dimensions or specifications on this product guide may change and some models may be discontinued without notice.

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