

EX-F70 SERIES EX-F60 SERIES

Related Information

General terms and conditionsP.1

Sensor selection guideP.11~ / P.727~

General precautionsP.986~



* Passed the UL 991 Environment Test

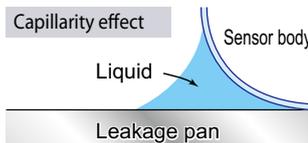
* UL 61010C-1 compatible, Passed the UL 991 Environment Test based on SEMI S2-0200. [Category applicable for semiconductor manufacturing: TWW2, Process Equipment] [Applicable standards: UL 61010C-1] [Additional test / evaluation standards as per intended use: UL 991, SEMI S2-0200]

High-speed detection even a little liquid leak

EX-F70 SERIES

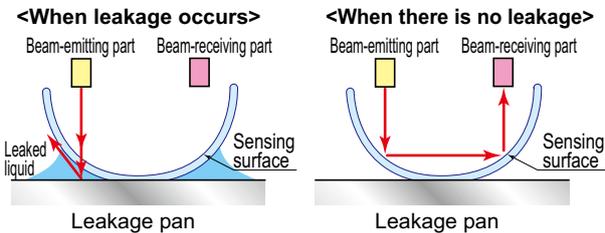
Reliable detection

The unique effect of capillarity enables reliable detection of small leaks and viscous liquids.



New type of detection method

When a leak occurs, the beam from the beam-emitting part scatters through the leaked liquid and is not transmitted to the beam-receiving part.

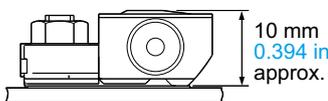


The beam from the beam-emitting part scatters through the leaked liquid and is not transmitted to the beam-receiving part.

The beam from the beam-emitting part reflects off of the surface of the sensor and is transmitted to the beam-receiving part.

Compact, space-saving

This slim (10 mm 0.394 in) side-mounting sensor is especially good for use in confined spaces.



SUS mounting bracket type EX-F71 □



PVC mounting bracket type EX-F72 □

No need for sensitivity adjustment

No need for sensitivity adjustment with adjuster, so initial mounting is easy.

Easy operation check

This sensor is equipped with a NORMAL indicator (green) which lights up when mounting correctly, and a FAULT indicator (red) which lights up when sensing the leaked liquid or when mounted incorrectly (forgetting to mount exclusive mounting bracket). So, the operation can be checked easily.

Safe design

If the sensor is not mounted correctly, if the cable is cut or disconnected, or if the sensor is not operating correctly, the output is the same as when the beam is not received (LEAK). Design deals with human errors such as, forgetting to mount, etc.

Easy installation & reset

Facilitates easy installation: the SUS mounting bracket type can be installed using only a single screw and the PVC mounting bracket type can be installed using only two screws or an adhesive. No component replacement required for resetting after leak detection. The simple shape makes it easy to wipe off the leaked liquid.

PVC mounting bracket available

EX-F72 ☒

A mounting bracket made of PVC (polyvinyl chloride) is available. This type of mounting bracket can be utilized without problems within environments that would corrode normal metal brackets.

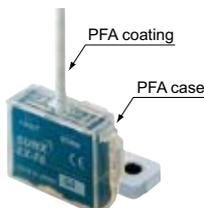
Selection Guide
Wafer Detection
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HD-T1
Liquid Leak Detection
EX-F70 / EX-F60
Liquid Level Detection
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EX-F60 SERIES

PFA enclosure gives excellent chemical resistance

The sensor enclosure and the cable sheath are made from PFA which is highly resistant to chemicals. Accurate sensing can be obtained even if there are leaks of chemicals such as sulfuric acid, hydrochloric acid or ammonia.

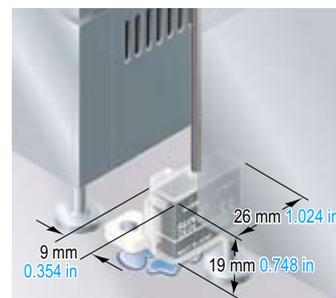


Easy installation & reset

The simplified shape makes it easy to clean up after liquid leaks, simply by wiping off the liquid, and no parts need to be replaced.

Compact, space-saving

Even with its built-in amplifier, the size is compact at $W26 \times H19 \times D9$ mm $W1.024 \times H0.748 \times D0.354$ in, so that it can be used even in narrow spaces.



EX-FC1

Wire-saving unit made especially for connecting leak detection sensors!

Saves wiring! Now connects up to 8 leak detection sensors

EX-FC1 is a simple wire-saving unit for exclusive use with EX-F71/72, EX-F61/F62 leak detection sensors. (It can be used with general sensors as well.)

EX-FC1 integrates the outputs from up to 8 leak detection sensors into a single OR output, yielding significant wiring and space savings.

* Even with only one leak detection sensor connected, an OFF signal is output if the sensor detects liquid leakage, or if the unit has been installed incorrectly.

Slim & compact

Space savings are significant, as the ultra-thin & compact EX-FC1 has main unit body dimensions of only $W20 \times H80 \times D52$ mm $W0.787 \times H3.150 \times D2.047$ in.

Connects easily with one-touch connector

Connections are made by simply inserting the leak detection sensor cable leads into the snap male connector SL-CP1, then crimp until the connector snap-locks! This saves the user the time and the trouble of stripping the insulation from each lead before attaching the leads to terminals.



ORDER GUIDE

Leak detection sensors

Type		Appearance	Sensing object	Cable length	Model No.	Output		
General purpose	SUS mounting bracket type		Water, Fluorinert™ (Note 1, 2)	2 m 6.562 ft	EX-F71	NPN open-collector transistor		
	PVC mounting bracket type				EX-F71-PN	PNP open-collector transistor		
	Chemical-resistant	PFA mounting bracket type				3 m 9.843 ft	EX-F72	NPN open-collector transistor
		PVC mounting bracket type					EX-F72-PN	PNP open-collector transistor
Chemical-resistant	PFA mounting bracket type		Agent, such as Sulfuric acid, Hydrochloric acid, Phosphoric acid or Ammonia etc. (Note 1, 3)	EX-F61	NPN open-collector transistor			
	PVC mounting bracket type			EX-F61-PN	PNP open-collector transistor			
EX-F62				NPN open-collector transistor				
EX-F62-PN	PNP open-collector transistor							

Notes: 1) Highly viscous liquid may not be detected stably.
2) Fluorinert™ is the world wide trademark of 3M.
3) The agents mentioned above are examples.
For details, please contact our office.

5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft or 3 m 9.843 ft) is also available.
When ordering this type, suffix "-C5" to the model No.
(e.g.) 5 m 16.404 ft cable length type of EX-F71-PN is "EX-F71-PN-C5".

Simple wire-saving unit for leak detection sensor

Appearance	Model No.	Output
	EX-FC1	Relay contact 1 a

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LASER SENSORS

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AREA SENSORS

SAFETY COMPONENTS

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M-DW1

HD-T1

Liquid Leak Detection

EX-F70 / EX-F60

Liquid Level Detection

EX-F1

Color Mark Detection

LX-100

FZ-10

Small / Slim Object Detection

NA1-11

Metal-sheet Double-head Detection

GD

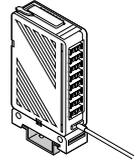
Other Products

OPTIONS

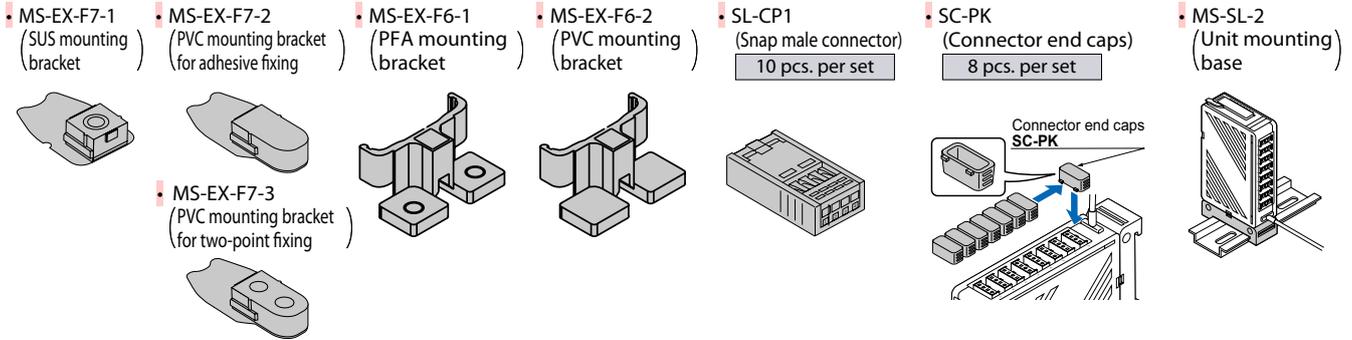
Designation	Model No.	Description
Unit mounting bracket	MS-DIN-3	Mounting bracket for EX-FC1

Unit mounting bracket

- MS-DIN-3



Accessories



SPECIFICATIONS

Sensors

Item	Model No.	Type	General purpose		Chemical-resistant	
			SUS mounting bracket type	PVC mounting bracket type	PFA mounting bracket type	PVC mounting bracket type
		NPN output	EX-F71	EX-F72	EX-F61	EX-F62
		PNP output	EX-F71-PN	EX-F72-PN	EX-F61-PN	EX-F62-PN
Sensing object			Water, Fluorinert™ (Note 2, 3)		Agent, such as Sulfuric acid, Hydrochloric acid, Phosphoric acid or Ammonia etc. (Note 2, 4, 6)	
Supply voltage			12 to 24 V DC ± 10 %		Ripple P-P 10 % or less	
Current consumption			10 mA or less (PNP output type: 15 mA or less)		15 mA or less	
Output			<NPN output type> NPN open-collector transistor <ul style="list-style-type: none"> Maximum sink current: 50 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 1.0 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current) 		<PNP output type> PNP open-collector transistor <ul style="list-style-type: none"> Maximum source current: 50 mA Applied voltage: 30 V DC or less (between output and +V) Residual voltage: 1.0 V or less (at 50 mA source current) 0.4 V or less (at 16 mA source current) 	
Utilization category			DC-12 or DC-13			
Output operation			In normal state: ON, When leak detected or the sensor is mounted improperly: OFF			
Short-circuit protection			Incorporated			
Response time			50 ms or less			
FAULT indicator			Red LED (lights up when the leak liquid is detected, or the sensor is mounted improperly)			
NORMAL indicator			Green LED (lights up when the sensor is mounted properly)			
Pollution degree			3 (Industrial environment)			
Protection			IP67 (IEC) (Refer to P.984 for details of standards.)			
Ambient temperature			-10 to +60 °C +14 to +140 °F (No dew condensation or icing allowed) Storage: -20 to +70 °C -4 to +158 °F (Note 5)			
Ambient humidity			35 to 85 % RH, Storage: 35 to 85 % RH			
Ambient illuminance			Incandescent light: 1,000 lx at the light-receiving face			
Emitting element			Infrared LED (non-modulated)			
Material			Enclosure: Polypropylene		Enclosure: PFA	
Cable			0.1 mm ² 3-core PVC cabtyre cable, 2 m 6.562 ft long		0.1 mm ² 3-core PFA cabtyre cable, 3 m 9.843 ft long	
Cable extension			Extension up to total 50 m 164.042 ft is possible with 0.3 mm ² , or more, cable.			
Weight			Net weight: 25 g approx.		Net weight: 60 g approx.	
Accessories			MS-EX-F7-1 (SUS mounting bracket) (Note 7): 1 pc.	MS-EX-F7-2, MS-EX-F7-3 (PVC mounting bracket) (Note 7): 1 pc. each for two-point-fixing and adhesive-fixing	MS-EX-F6-1 (PFA mounting bracket): 1 pc.	MS-EX-F6-2 (PVC mounting bracket): 1 pc.

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.

2) Highly viscous liquid may not be detected stably.

3) Fluorinert™ is the world wide trademark of 3M.

4) The agents mentioned above are examples. For details, please contact our office.

5) Liquid being detected should also be kept within the rated ambient temperature range.

6) PVC mounting bracket may not be used depending on type or viscosity etc. of the agent. For details, please contact our office.

7) The mounting bracket for EX-F71(-PN) is not interchangeable with that of EX-F72(-PN) due to the different sensitivity settings of each sensor.

SPECIFICATIONS

Simple wire-saving unit

Designation		Simple wire-saving unit for leak detection sensor	
Item	Model No.	EX-FC1	
Applicable connector		SL-CP1	
Supply voltage		12 to 24 V DC \pm 10 % Ripple P-P 10 % or less	
Current consumption		50 mA or less (for the unit itself), 135 mA or less (including the sensor input current when all outputs of sensors are ON)	
Output		Relay contact 1a <ul style="list-style-type: none"> Switching capacity: 30 V 1 A DC (resistive load) Min. applied load: 10 mV 10 μA DC Electrical lifetime: 100,000 switching operations or more (rated load, switching frequency 20 operations/min.) Mechanical lifetime: 50 million switching operations or more (switching frequency 180 operations/min.) 	
		Utilization category	DC-12 or DC-13
		Output operation	The output relay is ON when the input signal from the sensor is ON (Note 2)
Response time		5 ms or less (excluding the response time of the sensor)	
Input No.		8 Nos.	
Indicators	Normal	Green LED \times 8 (light up when the sensor is connected to each channel and the connection setting switch is set to ON)	
	Error	Red LED \times 8 (light up when the leak liquid is detected by a sensor connected to each channel or a sensor is mounted improperly)	
	Output	Orange LED [lights up when the output relay is ON (normal)]	
Pollution degree		3 (Industrial environment)	
Ambient temperature		-10 to +60 °C +14 to +140 °F (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F	
Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH	
Material		Enclosure: ABS, Unit mounting base: POM, Terminal part: PBT	
Cable		0.2 mm ² 4-core cabtyre cable, 2 m 6.562 ft long	
Cable extension		Extension up to total less than 10 m 32.808 ft is possible, with 0.3 mm ² , or more, cable.	
Weight		Net weight: 85 g approx.	
Accessories		SL-CP1 (Snap male connector): 8 pcs., MS-SL-2 (Unit mounting base): 1 pc., SC-PK (Connector end cap) : 8 pcs.	

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.

2) Even with only one leak detection sensor connected, an OFF signal is output if the sensor detects liquid leakage, or if the unit has been installed incorrectly.

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HD-T1

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EX-F70 / EX-F60

Liquid Level Detection

EX-F1

Color Mark Detection

LX-100

FZ-10

Small / Slim Object Detection

NA1-11

Metal-sheet Double-head Detection

GD

Other Products

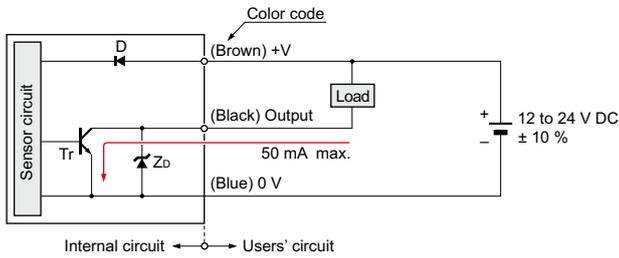
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I/O CIRCUIT AND WIRING DIAGRAMS

EX-F70 EX-F60

NPN output type

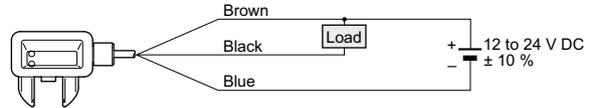
I/O circuit diagram



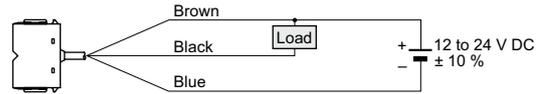
Symbols ... D : Reverse supply polarity protection diode
 Zd: Surge absorption zener diode
 Tr : NPN output transistor

Wiring diagram

EX-F70



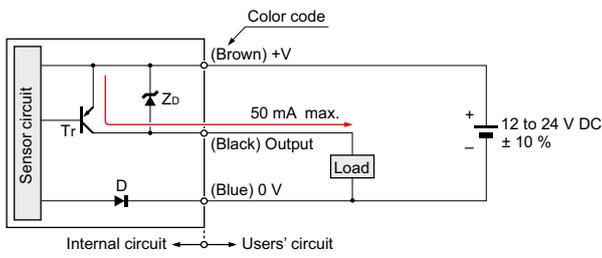
EX-F60



EX-F70-PN EX-F60-PN

PNP output type

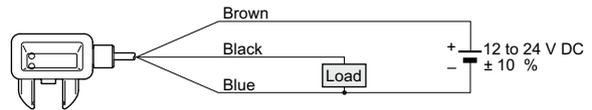
I/O circuit diagram



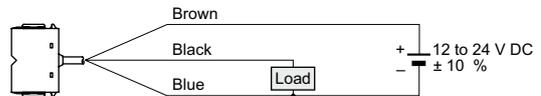
Symbols ... D : Reverse supply polarity protection diode
 Zd: Surge absorption zener diode
 Tr : PNP output transistor

Wiring diagram

EX-F70-PN



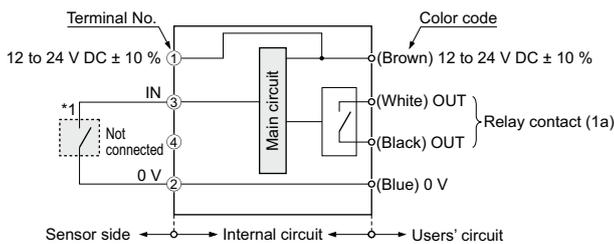
EX-F60-PN



EX-FC1

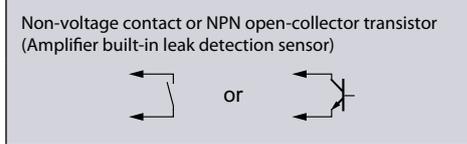
Simple wire-saving unit for leak detection sensor

I/O circuit diagram (for one channel)



Note: The output does not incorporate a short circuit protection circuit.
 Do not connect it directly to a power supply or a capacitive load.

* 1



PRECAUTIONS FOR PROPER USE

Refer to p.986~ for general precautions.

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Liquid Level
Detection

EX-F1

Color Mark
Detection

LX-100

FZ-10

Small / Slim
Object Detection

NA1-11

Metal-sheet
Double-head Detection

GD

Other
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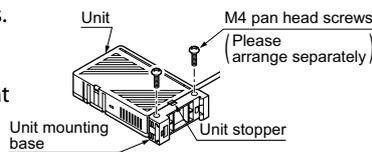
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

EX-FC1

Mounting

<In case of using screws>

- Mount using M4 pan head screws with a tightening torque of 0.8 N·m or less. However, in case of side mounting, make sure to mount the unit such that the unit stopper faces front.

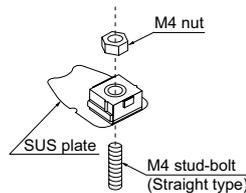


EX-F71(-PN) EX-F72(-PN)

Mounting

EX-F71(-PN)

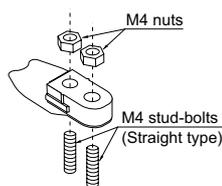
- Insert the M4 stud-bolt (length 10 mm 0.394 in or more) welded on the user's facilities into the mounting hole of the SUS mounting bracket and screw with an M4 nut (please arrange separately). The tightening torque should be 0.98 N·m or less.



EX-F72(-PN)

<In case of using the two-point-fixing PVC mounting bracket>

- Insert M4 stud-bolts (length 10 mm 0.394 in or more) welded on the user's facilities into the mounting holes of the two-point-fixing mounting bracket and screw with M4 nuts (please arrange separately). The tightening torque should be 0.49 N·m or less.

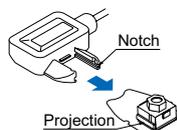


<In case of using the PVC mounting bracket for adhesive fixing>

- Use adhesive to stick fast the mounting bracket on the mounting surface. Please note that if the adhesive sticks out from the bottom surface of the mounting bracket or is 0.5 mm 0.020 in, or more thick, the sensor body cannot be fitted to the mounting bracket.

How to fit the sensor body to the exclusive mounting bracket

- Match the notch in the sensor body with the projection of the exclusive mounting bracket and slide till a click is felt.
- When mounting, make sure to use the brackets included with the unit in order to eliminate human error (such as forgetting to install). If the included brackets are not used, stable sensing is rendered impossible. Also, because sensitivity settings differ between the EX-F71(-PN) and the EX-F72(-PN), their brackets cannot be interchanged.

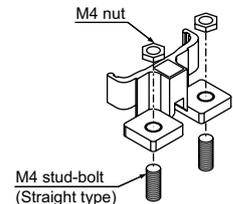


EX-F61(-PN) EX-F62(-PN)

Mounting

EX-F61(-PN)

- Insert the M4 stud-bolt (length 10 mm 0.394 in or more) welded on the user's facilities into the mounting hole of the PFA mounting bracket and screw with an M4 nut (please arrange separately). The tightening torque should be 0.98 N·m or less.

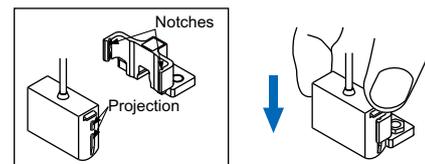


EX-F62(-PN)

- Please note that if the excess adhesive from the bottom surface of the exclusive mounting bracket is remained, the sensing capability may be affected. Use adhesive for vinyl chloride (PVC).

How to fit the sensor body to the exclusive mounting bracket

- Align the projections in the sensor body with the notches of the exclusive mounting bracket and slide till a click is felt.



How to remove the sensor body from the exclusive mounting bracket

- Pinch the projections of the sensor body and pull the body upwards. Never pull the cable, since it may cause a cable break.



All models

Others

- Avoid using the product in an explosive atmosphere because this product does not have an explosive-proof protective construction.
- In case air bubbles are drawn into the sensing part, take care that it may take some time for sensing to stabilize, or sensing may even become unstable.
- When conducting maintenance after operation, wipe all liquid from the sensor and mounting bracket with a soft cloth. If there is liquid remained or scratch on the sensing surface or the exclusive mounting bracket, normal operation can not be performed.
- Do not use during the initial transient time (leak detection sensor: 30 sec. approx., EX-FC1: 0.5 sec. approx.) after the power supply is switched on.
- Since this sensor employs non-modulated infrared LED, take sufficient care against extraneous light. Do not expose the sensing part directly to the extraneous light.
- Take care that EX-F7(-PN) and EX-FC1 does not come in direct contact with oil, grease or organic solvents, such as, thinner, etc.
- In case this sensor is used where electrostatic charge is present, use a metal leak pan, which should be connected to an actual ground.

DIMENSIONS (Unit: mm in)

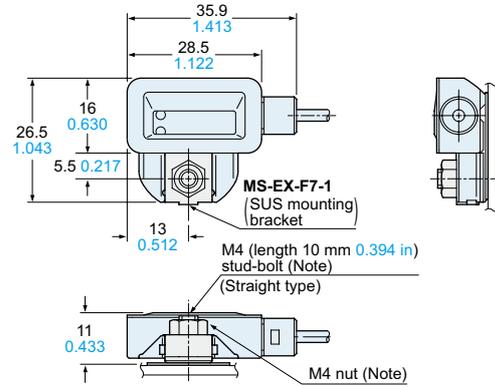
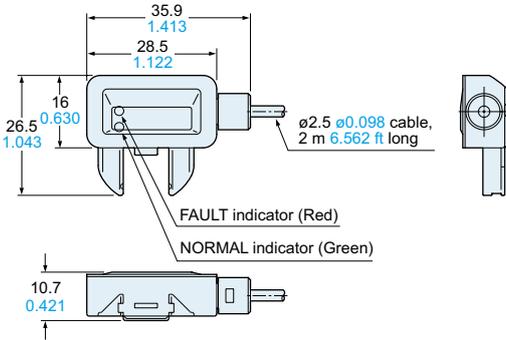
The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.com>

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EX-F71(-PN) EX-F72(-PN)

Sensor

Assembly dimensions with mounting bracket for EX-F71(-PN)

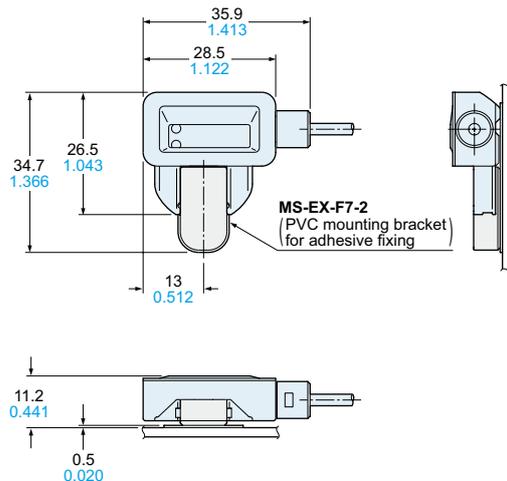
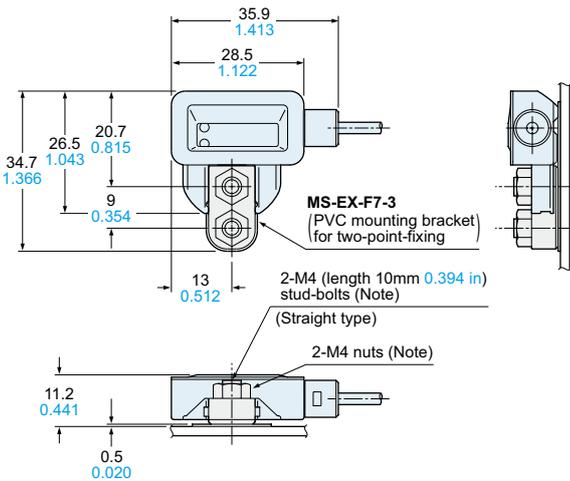


Note: A M4 stud-bolt has been welded to this unit.
M4 nut is not supplied with the sensor.
Please arrange it separately.

Assembly dimensions with mounting bracket for EX-F72(-PN)

MS-EX-F7-3 / For two-point-fixing

MS-EX-F7-2 / For adhesive fixing



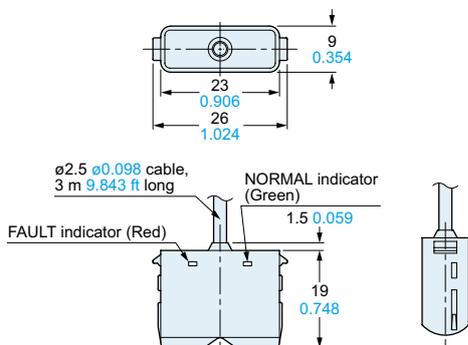
Note: M4 stud-bolts have been welded to this unit.
M4 nuts are not supplied with the sensor.
Please arrange it separately.

DIMENSIONS (Unit: mm in)

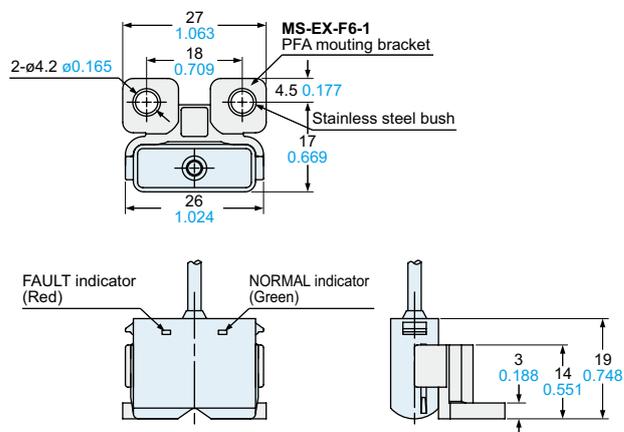
The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.com>

EX-F61(-PN) EX-F62(-PN)

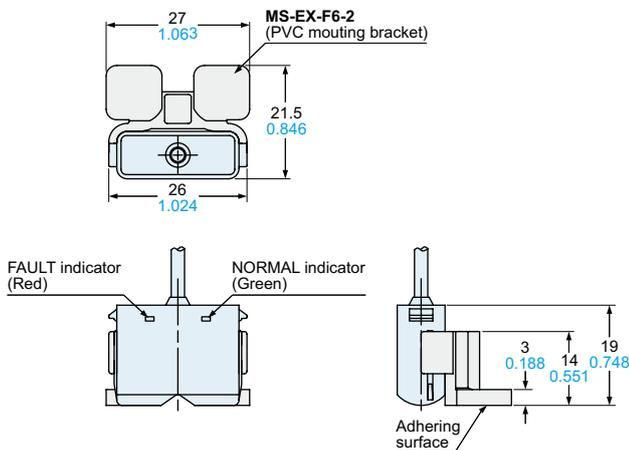
Sensor



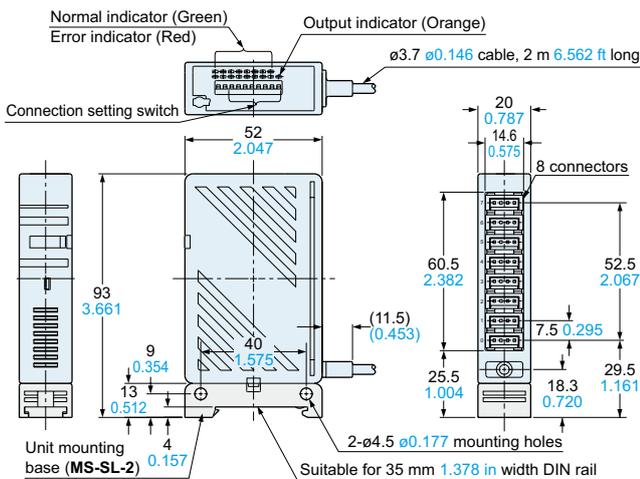
Assembly dimensions with mounting bracket for EX-F61(-PN)



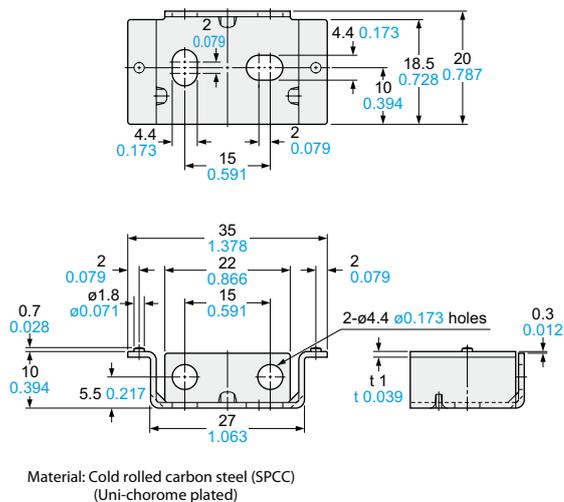
Assembly dimensions with mounting bracket for EX-F62(-PN)



EX-FC1 Simple wire-saving unit for leak detection sensor



MS-DIN-3 Amplifier mounting bracket (Optional)



- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS
- SAFETY COMPONENTS
- PRESSURE SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS

- Selection Guide
- Wafer Detection
- M-DW1
- HD-T1
- Liquid Leak Detection
- EX-F70 / EX-F60
- Liquid Level Detection
- EX-F1
- Color Mark Detection
- LX-100
- FZ-10
- Small / Slim Object Detection
- NA1-11
- Metal-sheet Double-Feed Detection
- GD
- Other Products