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.

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
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.
**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.

**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.

**ORDER GUIDE**

Leak detection sensors

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Sensing object</th>
<th>Cable length</th>
<th>Model No.</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUS mounting bracket type</td>
<td>[Image]</td>
<td>Water, Fluorinert™ (Note 1, 2)</td>
<td>2 m 6.562 ft</td>
<td>EX-F71-PN</td>
<td>PNP open-collector transistor</td>
</tr>
<tr>
<td>PVC mounting bracket type</td>
<td>[Image]</td>
<td></td>
<td></td>
<td>EX-F72-PN</td>
<td>PNP open-collector transistor</td>
</tr>
<tr>
<td>PFA mounting bracket type</td>
<td>[Image]</td>
<td>Agent, such as Sulfuric acid,</td>
<td>3 m 9.843 ft</td>
<td>EX-F61-PN</td>
<td>PNP open-collector transistor</td>
</tr>
<tr>
<td>PVC mounting bracket type</td>
<td>[Image]</td>
<td>Hydrochloric acid, Phosphoric</td>
<td></td>
<td>EX-F62-PN</td>
<td>PNP open-collector transistor</td>
</tr>
</tbody>
</table>

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 "-CS" to the model No. (e.g.) 5 m 16.404 ft cable length type of EX-F71-PN is "EX-F71-PN-CS".

Simple wire-saving unit for leak detection sensor

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model No.</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image]</td>
<td>EX-FC1</td>
<td>Relay contact 1 a</td>
</tr>
</tbody>
</table>

Compact, space-saving

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

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.
### OPTIONS

<table>
<thead>
<tr>
<th>Designation</th>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit mounting bracket</td>
<td>MS-DIN-3</td>
<td>Mounting bracket for EX-FC1</td>
</tr>
</tbody>
</table>

### Accessories

- **MS-EX-F7-1** (SUS mounting bracket)
- **MS-EX-F7-2** (PVC mounting bracket for adhesive fixing)
- **MS-EX-F6-1** (PFA mounting bracket)
- **MS-EX-F6-2** (PVC mounting bracket)
- **SL-CP1** (Snap male connector) 10 pcs. per set
- **SC-PK** (Connector end caps) 8 pcs. per set

### SPECIFICATIONS

#### Sensors

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>General purpose</th>
<th>Chemical-resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>12 to 24 V DC ± 10 %</td>
<td>Residual voltage: 1.0 V or less (at 50 mA sink current)</td>
<td>Agent, such as Sulfuric acid, Hydrochloric acid, Phosphoric acid or Ammonia etc. (Note 2, 4, 6)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>10 mA or less (PNP output type: 15 mA or less)</td>
<td>Applied voltage: 30 V DC or less (between output and +V)</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>Residual voltage: 0.4 V or less (at 16 mA sink current)</td>
<td>Maximum sink current: 50 mA</td>
<td></td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12 or DC-13</td>
<td>Maximum source current: 50 mA</td>
<td></td>
</tr>
<tr>
<td>Output operation</td>
<td>In normal state: ON, When leak detected or the sensor is mounted improperly: OFF</td>
<td>Applied voltage: 30 V DC or less (between output and +V)</td>
<td></td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Incorporated</td>
<td>Residual voltage: 0.4 V or less (at 50 mA source current)</td>
<td></td>
</tr>
</tbody>
</table>

#### Utilization category

- **IP67 (IEC)** (Refer to P.984 for details of standards.)

#### Mechanical properties

- **Dimensions:** 97.0 x 58.0 x 38.0mm
- **Weight:** 115 g approx.

#### Environmental conditions

- **Temperature:** –10 to +60 °C
- **Humidity:** 35 to 85 % RH

#### Protection

- **Pollution degree:** 3 (Industrial environment)
- **Protection:** IP67

#### Emission element

- **Material:** Infrared LED (non-modulated)
- **Cable:** 0.1 mm² 3-core PVC cable, 2 m 0.562 ft long
- **Cable extension:** Extension up to total 50 m 164.042 ft is possible with 0.3 mm², or more, cable.
- **Weight:** Net weight: 25 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., 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-FC1-PN is not interchangeable with that of EX-FC2-PN due to the different sensitivity settings of each sensor.

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*SUNX*
## SPECIFICATIONS

### Simple wire-saving unit

<table>
<thead>
<tr>
<th>Designation</th>
<th>Simple wire-saving unit for leak detection sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>EX-FC1</td>
</tr>
<tr>
<td>Applicable connector</td>
<td>SL-CP1</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>12 to 24 V DC ± 10 % Ripple P-P 10 % or less</td>
</tr>
<tr>
<td>Current consumption</td>
<td>50 mA or less (for the unit itself), 135 mA or less (including the sensor input current when all outputs of sensors are ON)</td>
</tr>
</tbody>
</table>
| Output | Relay contact 1a  
- Switching capacity: 30 V 1 A DC (resistive load)  
- Min. applied load: 10 mA 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 × 8 (light up when the sensor is connected to each channel and the connection setting switch is set to ON)  
- Error: Red LED × 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 mm² 4-core 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 mm², 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.
I/O CIRCUIT AND WIRING DIAGRAMS

### EX-F7□ PN EX-F6□ PN

#### I/O circuit diagram

Symbols … D : Reverse supply polarity protection diode  
Zo: Surge absorption zener diode  
Tr : PNP output transistor

#### Wiring diagram

- **EX-F7□ PN**:  
  - Brown (Load)  
  - Black (OUT)  
  - Blue (OUT)

- **EX-F6□ PN**:  
  - Brown (Load)  
  - Black (OUT)  
  - Blue (OUT)

### EX-FC1

#### 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.

#### Wiring diagram

- **EX-F7□-PN** EX-F6□-PN
  - Color code:  
    - (Brown)  
    - (Black)  
    - (Blue)
  - Load:  
    - 12 to 24 V DC ± 10%

- **EX-F7□** EX-F6□
  - Color code:  
    - (Brown)  
    - (Black)  
    - (Blue)
  - Load:  
    - 12 to 24 V DC ± 10%

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

Non-voltage contact or NPN open-collector transistor (Amplifier built-in leak detection sensor)
[PRECAUTIONS FOR PROPER USE]

- 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)
- 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.

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.
- 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-F70(-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.

Refer to p.986 – for general precautions.
**DIMENSIONS (Unit: mm in)**

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

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

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

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

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

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)

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)

Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Selection Guide
Water Detection
M-DW1
HD-T1
Liquid Leak Detection
EX-F70/EX-F60
EX-F70/EX-F60
Liquid Level Detection
EX-F1
Color Mark Detection
LX-100
FZ-10
Tabletennis Object Detection
NA1-11
Metal/NonMetal Detection
GD
Other Products