

# Floatless Level Switch (Ultra High-sensitivity Type) 61F-UHS/-HSL

CSM\_61F-UHS\_-HSL\_DS\_E\_4\_1

## Ideal for Detecting Ice, Pure Water, or Humidity

- Applicable for detecting ice, pure water steam, humidity, or other substances that conduct electricity poorly.
- Two types of model available: Ultra high-sensitivity and variable ultra high-sensitivity.

 Refer to *Safety Precautions for Floatless Level Controllers*.



## Ordering Information

| Type                   | Ultra high-sensitivity | Variable ultra high-sensitivity |
|------------------------|------------------------|---------------------------------|
|                        | Model                  | Model                           |
| Ultra high-sensitivity | 61F-UHS                | 61F-HSL                         |

**Note:** When ordering, specify the desired operating voltage at the end of the model number.

Example: 61F-UHS [220VAC]

Desired supply voltage

## Accessories (Order Separately)

| Connectable Level Switch | Type                    | Model |
|--------------------------|-------------------------|-------|
| 61F-UHS                  | Front Connecting Socket | 8PFA1 |
| 61F-HSL                  |                         | 8PFA  |

## Ultra High-sensitivity Models

Use these models for sensing objects such as ice, high-purity distilled water, moisture, or other objects with low electrical conductivity.

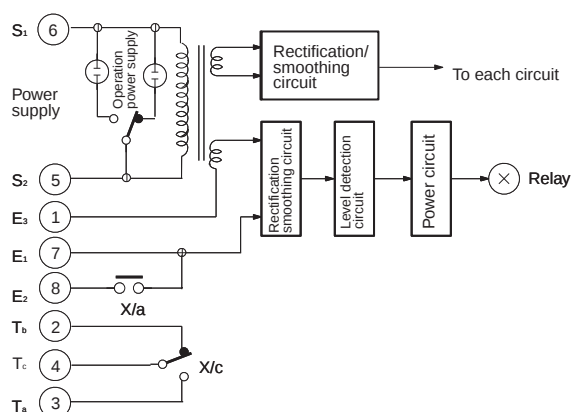
## Specifications

| Item                              | High-sensitivity 61F-UHS                                                            | Variable high-sensitivity 61F-HSL                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Supply voltage                    | 100, 200, or 220 VAC; 50/60 Hz                                                      | 24, 100, 110, 200, or 220 VAC; 50/60 Hz                                           |
| Operating voltage range           | 85% to 110% of rated voltage                                                        |                                                                                   |
| Interelectrode voltage            | 24 VAC                                                                              | 13 VDC max.                                                                       |
| Interelectrode current            | Approx. 1 mA AC max.                                                                | Approx. 1 mA DC max.                                                              |
| Power consumption                 | 3.2 VA max.                                                                         |                                                                                   |
| Interelectrode operate resistance | 0 to approx. 1 MΩ (see note 1)                                                      | 0 to approx. 5 MΩ (variable)                                                      |
| Interelectrode release resistance | Approx. 5 M to ∞ Ω                                                                  | Operate resistance + 2.5 MΩ max.                                                  |
| Cable length                      | 5 m (see note 2)                                                                    | (see note 3)                                                                      |
| Control output                    | 0.3 A, 220 VAC (Inductive load: $\cos\phi = 0.4$ )<br>1 A, 220 VAC (Resistive load) | 2 A, 220 VAC (Inductive load: $\cos\phi = 0.4$ )<br>5 A, 220 VAC (Resistive load) |
| Ambient temperature               | Operating: -10 to 55°C                                                              |                                                                                   |
| Ambient humidity                  | Operating: 45% to 85% RH                                                            |                                                                                   |
| Insulation resistance             | 100 MΩ max. (at 500 VDC)                                                            |                                                                                   |
| Dielectric strength               | 2,000 VAC, 50/60 Hz for 1 min                                                       |                                                                                   |
| Life expectancy                   | Electrical: 50,000 operations min.<br>Mechanical: 5,000,000 operations min.         | Electrical: 500,000 operations min.<br>Mechanical: 5,000,000 operations min.      |
| Weight                            | Approx. 380 g                                                                       | Approx. 240 g                                                                     |

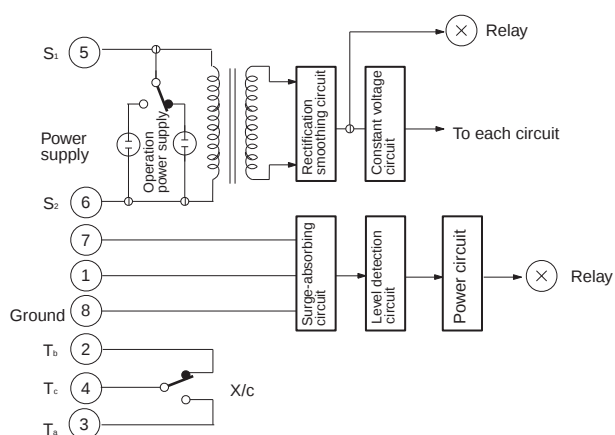
- Note:**
1. Use 61F-UHS for detecting water leakage with high specific resistance. Connect a sensor cable between terminals 1 and 7.
  2. Two Electrodes can be connected to the 61F-HSL. Use them for an alarm, not for creating a self-holding circuit.
  3. The length when using completely-insulated, 600-V, 3-conductor (0.75 mm<sup>2</sup>) cabtire cables. Usable cable lengths will become shorter as the cable diameter or number of conductors becomes larger. For more details, refer to *Safety Precautions for Floatless Level Controllers*.
  4. It is recommended that the cable length be kept as short as possible since the Electrode circuit current is at DC micro-current level. Moreover, the Electrodes will corrode rapidly if the current is allowed to constantly flow between the Electrodes. Be careful with the electrode polarity and grounding when wiring.

## Internal Circuit Diagrams

61F-UHS

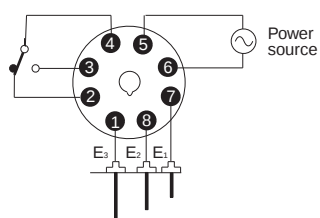


61F-HSL



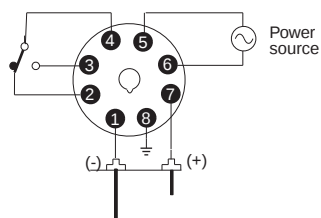
## External Circuit Diagrams (Example)

61F-UHS



Socket: 8PFA1 (track mounted)/  
PL08 (back connecting)

61F-HSL



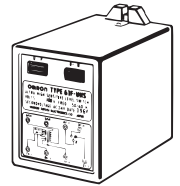
Socket: 8PFA (track mounted)/  
PL08 (back connecting)

## ■Connections

### Automatic Water Supply and Drainage Control

Ultra High-sensitivity  
Type

Dimensions:  
Page 4

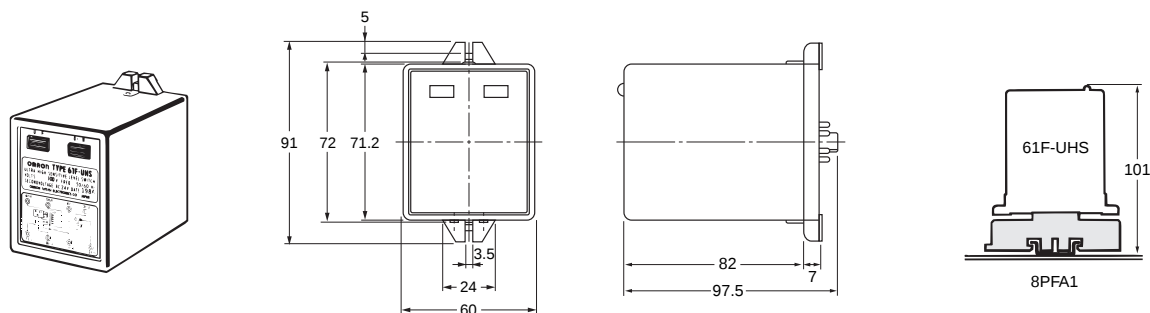


| Automatic Water Supply Control                                                                                                                                                                                                                                   | Automatic Drainage Control                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Connections</b></p> <p>Note: Be sure to ground the common Electrode E<sub>3</sub> (the longest Electrode).</p> <p>Connection Sockets<br/>8PFA1 (Front-connecting)<br/>PL08 (Read-connecting)</p> <p>Connect terminal 2 to the contactor coil terminal.</p> | <p><b>Connections</b></p> <p>Note: Be sure to ground the common Electrode E<sub>3</sub> (the longest Electrode).</p> <p>Connection Sockets<br/>8PFA1 (Front-connecting)<br/>PL08 (Read-connecting)</p> <p>Connect terminal 3 to the contactor coil terminal.</p> |
| <p><b>Principles of Operation</b></p> <ul style="list-style-type: none"> <li>When the water level reaches E<sub>1</sub>, the pump stops and, when the water level reaches E<sub>2</sub> or below, the pump starts.</li> </ul>                                    | <p><b>Principles of Operation</b></p> <ul style="list-style-type: none"> <li>When the water level reaches E<sub>1</sub>, the pump starts and, when the water level reaches E<sub>2</sub> or below, the pump stops.</li> </ul>                                    |

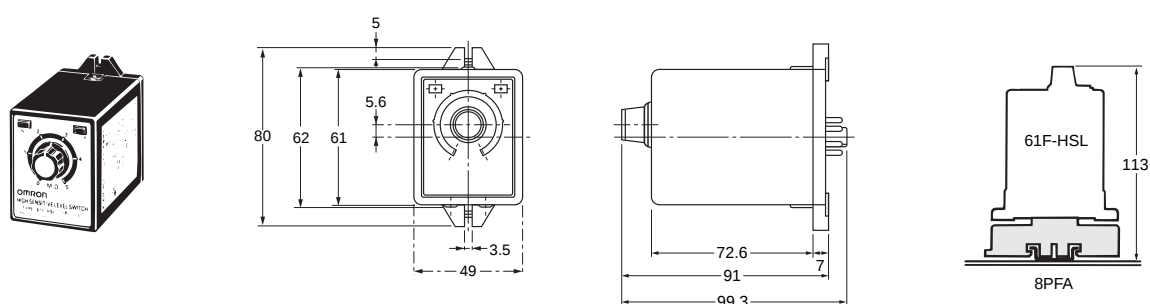
## Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

### 61F-UHS

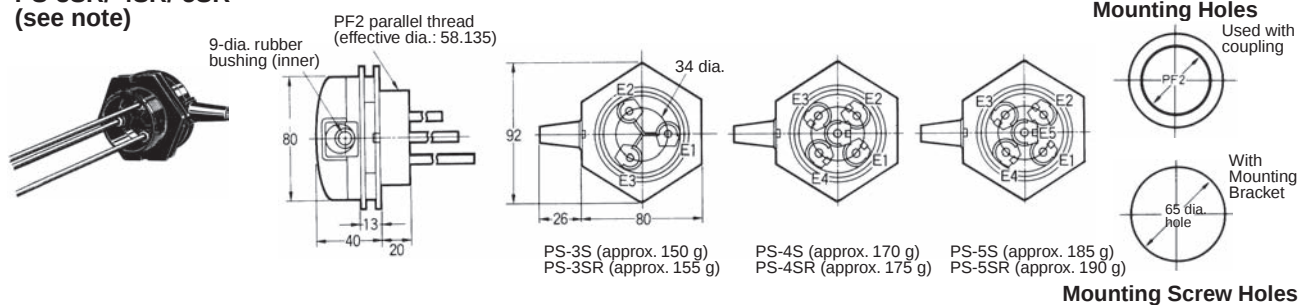


### 61F-HSL



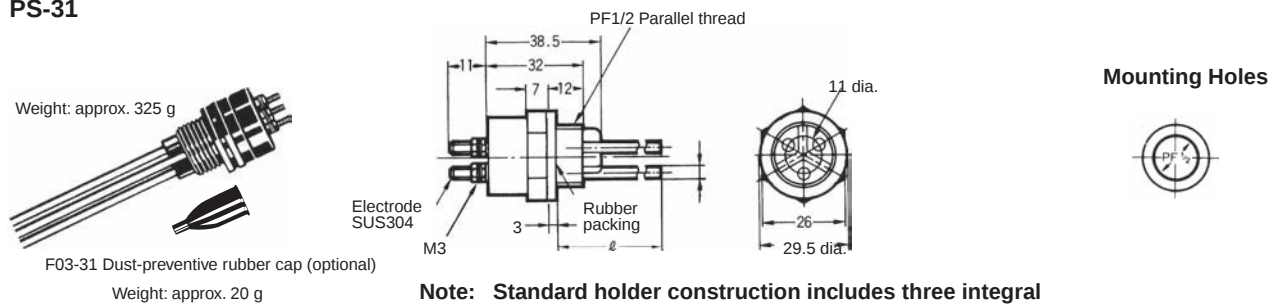
## Electrode Holders

### PS-3S/-4S/-5S PS-3SR/-4SR/-5SR (see note)



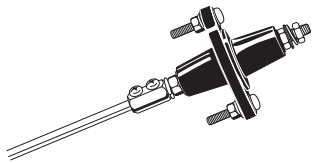
**Note:** The PS-3SR, PS-4SR, and PS-5SR have built-in resistor of 6.8 kΩ and used for the two-wire 61F models.

### PS-31

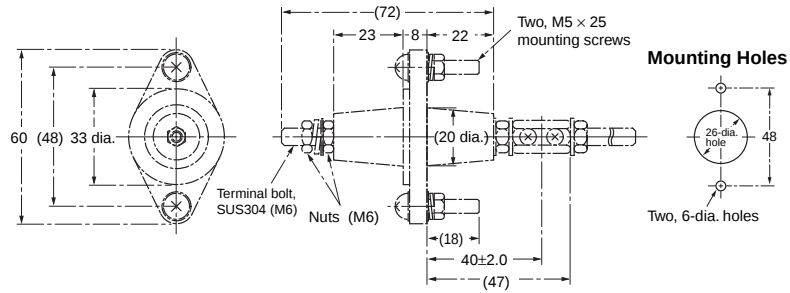


**Note:** Standard holder construction includes three integral 300-mm-long Electrodes. However, a model having 1,000-mm-long Electrodes is available on request.

## BF-1



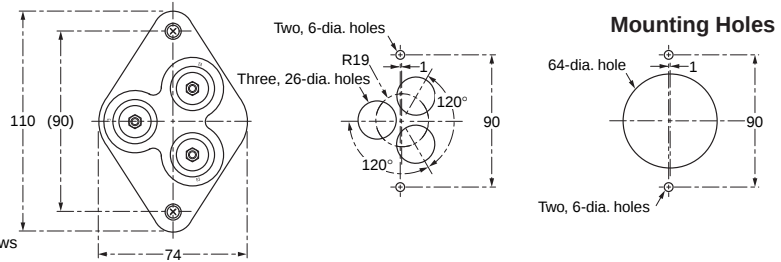
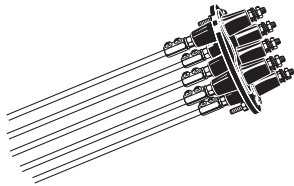
Weight: approx. 75 g



## BF-3/-3R BF-5/-5R

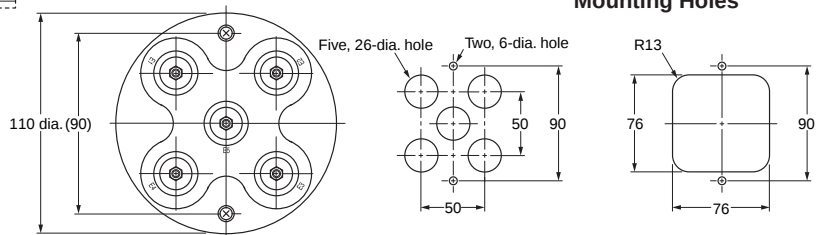
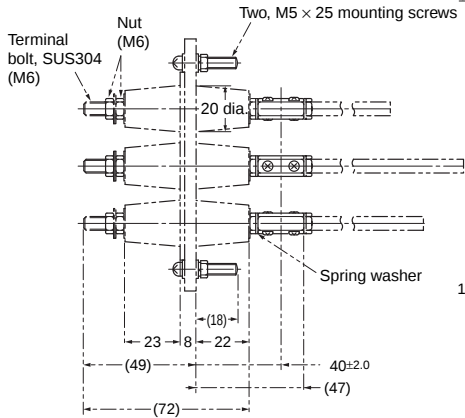
### BF-3(R)

Weight  
BF-3: approx. 210 g  
BF-3R: approx. 215 g



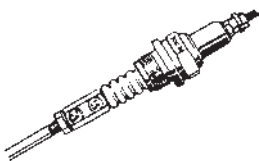
### BF-5(R)

Weight  
BF-5: approx. 360 g  
BF-5R: approx. 365 g

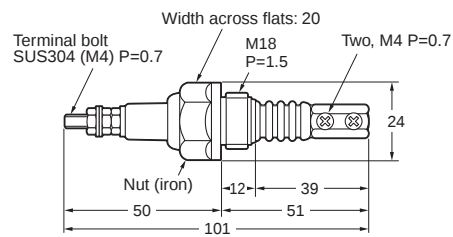
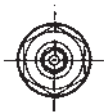


## BS-1(S)

Weight: approx. 70 g



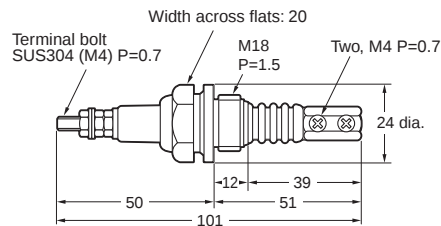
### BS-1

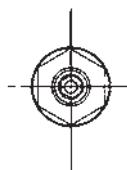
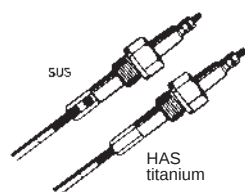


### Mounting Holes

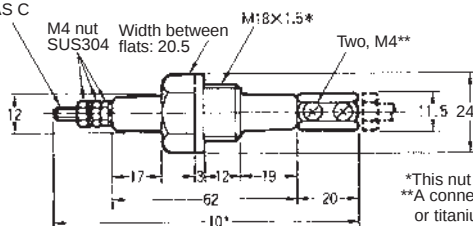
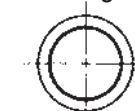


### BS-1S BS-1S-1 BS-1S2



**BS-1T**

Terminal bolt  
SUS304  
SUS316  
Titanium  
HAS B  
HAS C

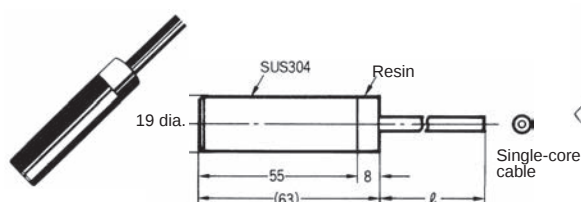
**Mounting Holes**

\*This nut is made of Fluorine Resin  
\*\*A connecting nut made of HAS B, HAS C, or titanium is not supplied with two M4 screws and thus has no holes for such screws.

| Material | SUS304       | SUS316       | Titanium     | HAS B        | HAS C        |
|----------|--------------|--------------|--------------|--------------|--------------|
| Weight   | Approx. 55 g | Approx. 55 g | Approx. 45 g | Approx. 65 g | Approx. 60 g |

**PH-1**

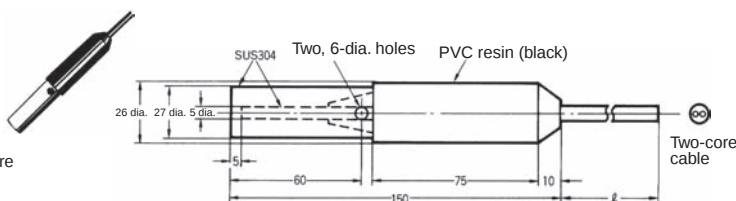
(Approx. 140 g with a 1-m cord)



Cable OD: Vinyl 5.0 dia., Hypalon 6.5 dia.

**PH-2**

(Approx. 235 g with a 1-m cord)



Cable OD: Vinyl, Hypalon 6.8 dia.

**Note:** Cable is supplied in lengths of 1, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, or 100 meters.

## ■ Electrode Separators

| F03-14 1P for one pole | F03-14 3P for three poles | F03-14 5P for five poles |
|------------------------|---------------------------|--------------------------|
|                        |                           |                          |

## ■ Safety Precautions

Refer to *Safety Precautions for All Level Controllers*.

### Precautions for Correct Use

#### Short Wiring in Electrode Circuit

- Keep the wires connecting the Controller to Electrode Holders as short as possible. If long leads are used, the floating capacity of the leads, and abnormal surges or noise in the Electrode circuit can cause malfunctions.
- The thicker the cables, the shorter the permitted wiring length. The length of the cable connecting the Controller and Electrode is specified in the Controller datasheet as a guideline assuming that a 600-V VCT 0.75-mm<sup>2</sup>, 3-core cable is used. Test results indicate that the actual wiring length using VCT 3.5-mm<sup>2</sup>, 3-core cable laid over the ground is 50% of the specified length for general-purpose applications and 80% of the specified length for long-distance applications. When selecting cable specifications, remember that the wiring length is further decreased for underground cables and larger diameter cables because of the increased floating capacity with the ground.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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