**Conductive Level Controller**

**61F-GP-N2**

Automatic Water Supply and Drainage Control

- Ideal for level control of any conductive liquid.
- Compact plug-in controller for single- or two-point control of conductive liquid level.
- 24/110/120/220/230/240 VAC operation possible.
- Easy installation on DIN rail.
- Low voltage (AC) electrodes.
- Full surge protection.

**Ordering Information**

> Compact plug-in conductive level controller 61F-GP-N2

When placing your order, be sure to specify the desired operating voltage.

Example: 61F-GP-N2 120 VAC

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**Accessories (Order Separately)**

**Selection Guide for Electrode Holders and Separators**

**Electrode Holders**

<table>
<thead>
<tr>
<th>Applications</th>
<th>For city water and other general-use electrodes. Easy-to-replace separate versions facilitate maintenance of electrodes.</th>
<th>When mounting space is limited. Special 3-pole holder of small size and light weight. Ideal for soft drink vendors, etc., where only limited space is available.</th>
<th>For low specific liquids. Used for sewage, sea water, etc., having a low specific resistance. In sewage use, electrode holders must be installed 10 to 20 cm apart from one another. For acids, alkalis and sea water, electrode holders may be as much as 1 meter apart to operate properly.</th>
<th>When resistance to high pressure is required. Ideal for use in tanks where temperature or pressure inside the tank is high, e.g. 250°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting style</td>
<td>Flange</td>
<td>Screw</td>
<td>Flange</td>
<td>Screw</td>
</tr>
<tr>
<td>Insulator material</td>
<td>Phenol resin</td>
<td>Phenol resin</td>
<td>Ceramics</td>
<td>Fluorine Resin</td>
</tr>
<tr>
<td>Max. temperature</td>
<td>70°C (without water drips or vapour on the surface of the electrode holder)</td>
<td>150°C (without water drips or vapour on the surface of the electrode holder)</td>
<td>250°C (without water drips or vapour on the surface of the electrode holder)</td>
<td></td>
</tr>
<tr>
<td>No. of electrodes</td>
<td>1</td>
<td>---</td>
<td>BF-1</td>
<td>BS-1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>PS-3S</td>
<td>PS-31</td>
<td>---</td>
</tr>
</tbody>
</table>

**Electrode Separators**

<table>
<thead>
<tr>
<th>No. of electrodes</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F03-14-1P</td>
</tr>
<tr>
<td>3</td>
<td>F03-14-3P</td>
</tr>
</tbody>
</table>
Selection Guide for Electrodes, Connecting and Lock Nuts

Application Example

- Level control in tanks, reservoirs, sewage plants, underground wells, mixing plants etc.
- Level control for element protection in pipes, channels, and irrigation systems.
- Flow detection in pipes, channels, and irrigation systems.
- Ice bank control in cold drink dispensers, ice makers, water chillers, bulk milk tanks, etc.
- Dispensing of liquids by volume.
- Indication of liquid buildup due to filter blockages.
- Pollution/foul water detection for rivers, drains, etc.
- Alarm control warning of abnormal or dangerously high or low levels.

Specifications

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>24, 110, 120, 220, 230, 240 VAC; 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage range</td>
<td>85% to 110% of rated voltage</td>
</tr>
<tr>
<td>Interelectrode voltage*</td>
<td>8 VAC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Approx. 3.2 VA</td>
</tr>
<tr>
<td>Operate resistance</td>
<td>Approx. 4 KΩ min. Between electrode E1 and E3</td>
</tr>
<tr>
<td>Release resistance</td>
<td>Approx. 15 KΩ max. Between electrode E2 and E3</td>
</tr>
<tr>
<td>Response time</td>
<td>Operate: 80 ms max., Release: 160 ms max.</td>
</tr>
<tr>
<td>Control output</td>
<td>10 A, 250 VAC (at 40°C)</td>
</tr>
<tr>
<td></td>
<td>3 A, 250 VAC (at 55°C)</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>100 MΩ max. (at 500 VDC) between power terminals and electrode terminals, and between electrode terminals and contact terminals</td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>2,000 VAC, 50/60 Hz for 1 min., between power terminals and electrode terminals, and between electrode terminals and contact terminals</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Operating: –10°C to 55°C</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>Operating: 45% to 85%</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>Mechanical: 10,000,000 operations min.</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 190 g</td>
</tr>
<tr>
<td>Approved standards</td>
<td>UL508, CSA C22.2 No.14,</td>
</tr>
<tr>
<td></td>
<td>EN61010-1, EN61326-1 Industrial electromagnetic environment</td>
</tr>
</tbody>
</table>

*Secondary voltage of transformer

<table>
<thead>
<tr>
<th>Applicable liquids</th>
<th>Material</th>
<th>Models for individual electrode assembly components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purified city water, industrial water, sewage</td>
<td>SUS-304 (AISI-304)</td>
<td>Electrode (1m long), Indication mark, Connecting nut, Lock nut</td>
</tr>
<tr>
<td>Purified city water, industrial water, sewage, dilute alkaline solution</td>
<td>SUS316 (AISI-316)</td>
<td>F03-01-SUS304, 1 line, F03-02-SUS304, ---, F03-03-SUS304, ---</td>
</tr>
<tr>
<td>Purified city water, industrial water, sewage</td>
<td>SUS-316 (AISI-316)</td>
<td>F03-01-SUS316, 2 lines, F03-02-SUS316, 6, F03-03-SUS316, 6</td>
</tr>
</tbody>
</table>
Connections

Automatic Water Supply and Drainage Control

1. Water supply
   - Connect electromagnetic switch coil terminal A to Tb.
   - The pump stops when the water level reaches E1 and starts when
     the water level drops below E2.

2. Drainage
   - Connect the electromagnetic switch coil terminal A to Ta.
   - The pump starts when the water level reaches E1 and stops when
     the water level drops below E2.

Note: 1. The diagram shows the connections for water supply. When
       draining, change the connection Tb to Ta.
       2. The earth terminal must be grounded.

Operation

The conductive type level controller consists of a plug-in controller
connected to a set of stainless steel probes. These are cut to length
and inserted vertically into the liquid. A low voltage is applied
between these probes and the earth probe (or tank, if it is electrically
conductive). The water provides a current between the earth probe
and the high-level probe. The output relay in the controller is ener-
gized when the water level reaches the high-level probe and de-ener-
gized when the water level falls below it.

For two-point control a low-level probe is used as well. In this case
the relay does not de-energize until the water level falls below the
low-level probe. Using the low-level probe allows a wide differential
between switching a pump on and off, and can avoid excessive pump
operation during tank emptying or filling. If this differential is not
required, the low-level probe need not be connected.

Dimensions

Note: All units are in millimeters unless otherwise indicated.
### Electrode Holders

**PS-3S**

- 9 dia. rubber bushing (inner)
- PF2 parallel thread (effective dia.: 58.135)
- **Mounting Holes**
  - Used with coupling
- **Screw Holes**
  - Used with mounting bracket

**PS-31**

- Dust preventive rubber cap (optional)

**BF-1**

**BS-1(S)**

**BS-1**

- Terminal bolt SUS304 (M4) P=0.7
- Width across flats: 20
- M18 P=1.5
- P=0.7
- Two M4 24 dia.
- Two, 4 dia. holes

**BS-1S**

- Terminal bolt SUS304 (M4) P=0.7
- Width across flats: 20
- M18 P=1.5
- P=0.7
- Two, 4 dia. holes

**BS-1S-1**

**BS-1S2**

- Terminal bolt SUS304 (M4) P=0.7
- Width across flats: 20
- M18 P=1.5
- P=0.7
- Two, 4 dia. holes

* Standard holder construction includes three integral 300 mm length electrodes. However, a type having 1,000 mm length electrodes is available on request.
Electrode Separators

F03-14 1P (for Single Pole)

F03-14 3P (for Three Poles)

Precautions

How to Mount Electrodes

Connecting Electrodes to Electrode Holders

1. Spin a lock nut and a spring washer onto the electrode.
2. Fully fit the electrode into the connecting nut attached to the electrode holder.
3. Tighten the electrode with the two clamp screws.
4. Secure the connecting nut by tightening the lock nut and spring washer.

Connecting One Electrode to Another

1. Spin a lock nut and a spring washer onto the electrode.
2. Fully fit the electrode into the connecting nut attached to the electrode holder.
3. Tighten the electrode with the two clamp screws.
4. Secure the connecting nut by tightening the lock nut and spring washer.

Application

When using electrodes in sea water or sewage, provide a sufficient interval (normally 1 m) between the electrodes. If the sufficient interval cannot be provided, employ a low-sensitivity type Floatless Level Controller.

When taping one of the electrodes to prevent it from contacting the other electrodes in water, do not tape the electrode entirely but leave at least 100 mm of its end uncovered.

When the required length of the electrode is more than 1 m, use a separator at each joint of two electrodes so as to prevent the electrodes from contacting one another. (NOTE: Avoid use of the separators in dust-containing liquids.)

Usually, electrodes are used in a set of three: long, medium, and short. Connect the short electrode to E1, the medium electrode to E2, and the long electrode to E3. Make E3 at least 50 mm longer than E2.

Electrodes are in actual contact with the liquid. Standard electrodes are made of stainless steel and usable in purified water, sea water, sewage, acid (except acetic acid, sulfuric acid, etc.) and alkaline liquids, although they may corrode depending upon the temperature and working conditions.

Note that the Conductive Level Controller 61F-GP-N2 is capable of controlling liquids with specific resistances of up to 30 kΩ-cm when the controller employs a type PS-3S electrode holder with the electrode(s) submerged to a depth of 30 mm max.

<table>
<thead>
<tr>
<th>Kind of water</th>
<th>Specific resistance</th>
<th>Applicable type</th>
</tr>
</thead>
<tbody>
<tr>
<td>City water</td>
<td>5 to 10 kΩ-cm</td>
<td>General-purpose type</td>
</tr>
<tr>
<td>Well water</td>
<td>2 to 5 kΩ-cm</td>
<td>General-purpose type</td>
</tr>
<tr>
<td>Industrial water</td>
<td>5 to 15 kΩ-cm</td>
<td>General-purpose type</td>
</tr>
<tr>
<td>Rainwater</td>
<td>15 to 25 kΩ-cm</td>
<td>General-purpose type</td>
</tr>
<tr>
<td>Sea water</td>
<td>0.03 kΩ-cm</td>
<td>Low-sensitivity type</td>
</tr>
<tr>
<td>Sewage</td>
<td>0.5 to 2 kΩ-cm</td>
<td>Low-sensitivity type</td>
</tr>
<tr>
<td>Distilled water</td>
<td>100 kΩ-cm or less</td>
<td>High-sensitivity type</td>
</tr>
<tr>
<td></td>
<td>Over 100 kΩ-cm</td>
<td>Consult OMRON</td>
</tr>
</tbody>
</table>
### Safety Precautions

#### WARNING

Do not touch the terminals while power is being supplied. Doing so may possibly result in electric shock. Make sure that the terminal cover is installed before using the product.

#### CAUTION

Do not attempt to disassemble, repair, or modify the product. Doing so may occasionally result in minor or moderate injury due to electric shock.

### Precautions for Safe Use

1. **Precautions for the environment**
   - Use and preserve within the proper temperature and humidity described in the specifications.
   - Temperature of surroundings for preservation (including during transportation) and use: 
     -10°C to 55°C, humidity: 45% to 85%.
   - Do not install, among others, near heat devices such as coils or other devices having coils, etc.
   - Avoid preserving (including during transportation) and using in a humid place, in a corrosive gas environment, outdoors and in a place which receives direct sunlight.
   - Preserve and use without exposing to danger of explosion, flammable dust, gas and vapor, excessive dust, and saline spray or droplets.
   - Avoid preserving (including during transportation) and using in a place which is vulnerable to flooding or oil spillage.
   - Avoid preserving (including during transportation) and using in a place where vibrations and impacts are strong. Similarly, avoid using next to a high-capacity contactor which may impacts at operation. Doing so causes malfunctions such as chattering, etc.
   - Do not install the product near devices generating strong high-frequency waves or surges. When using a noise filter, check the voltage and current and install it as close to the product as possible.

2. **Cautions for Use**
   - Read the instruction manual and catalog before operating and maintaining the product.
   - Fit socket(s) and DIN rail(s) so that the screws are tight. If the screws are not tight, DIN rail(s), socket(s), the product and cable(s) may lead to come off.
   - Be sure to fit socket(s) to DIN rail(s) without fail.
   - Use metal strengthener(s) to maintain a firm connection between the product and socket(s).
   - Read the instructions manual and catalog before the operation and maintenance of the product.
   - When fitting crimping terminal(s) to terminal screw(s), use a tightening torque of between 0.45 and 0.6 N·m.
   - Use power supply of appropriate specifications to provide control source(s), inputs, etc., and to wire cables. [Recommended cable to wire between the model 61F and electrode(s) when using three-core cabtire cable(s) of completely insulated 600 V 0.75 mm VCT: 50 m max.]
   - Do not put power line(s), high-voltage cable(s) and wire(s) of electrode circuit(s) in the same duct nor wire closely. Doing so causes malfunctions by getting vulnerable to induction noise.
   - Shorten the distance for wiring between the model 61F and electrode holders as much as possible. Long distance for wiring may causes malfunctions because stray capacitance may influence operation, or abnormal surges or noise may run through electrode circuit(s).
   - Be sure to ground common electrode terminal(s). Doing so can reduce some effects of noise.
   - Use the product within the noted supply voltage and rated load.
   - Before using, recheck the application, wiring, power supply, etc.

   ![All dimensions shown are in millimeters.]

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

   In the interest of product improvement, specifications are subject to change without notice.
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