


## A Wide Variety of Electrodes for Long Lasting Reliability

- Standard Electrodes are made of stainless steel (SUS 304) and can be used in applications for purified water.
- SUS316 Electrodes can be used in applications where resistance to corrosion is required. Titanium and Hastelloy Electrodes can be used in applications where resistance to acid is required.
- For applications where long electrodes are required, a connection nut and two Lock Nuts can be used to extend the electrodes 1 m at a time.



 Refer to *Safety Precautions for Electrodes and Electrode Holders*.

## Ordering Information

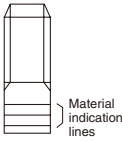
Material indications are provided on all OMRON electrodes, connection nuts, and Lock Nuts.

### Electrodes

Select an electrode appropriate for the type of liquid. Refer to *Technical Guide for Level Controllers*.

Model	Material	Weight (g)	Material indication lines
F03-01 SUS304	SUS304	Approx. 170	1 line
F03-01 SUS316	SUS316		2 lines
F03-01 HAS B	N10665 (See note.)	Approx. 195	3 lines
F03-01 HAS C	N10276 (See note.)	Approx. 190	4 lines
F03-01 TITANIUM	Titanium	Approx. 100	5 lines

Electrodes



**Note:** UNS No. (Unified Numbering System No.) is an international metal designation system that specifies a unique number for each material.

### Insulated Electrodes

Electrodes are insulated with a plastic sheath to prevent them from touching each other and to isolate them from debris in the liquid. Before application, strip back about 10 cm of the sheath at the end to ensure sufficient conductivity.

Model	
F03-01 SUS304	Vinyl Tubing
F03-01 SUS304	Fluororesin Tubing
F03-01 SUS316	Vinyl Tubing
F03-01 SUS316	Fluororesin Tubing

**Note:** Tubing comes in 1-m lengths with a sheath thickness of 0.5 mm.

### Connecting Nuts

Model	Material	Weight (g)	Material indication
F03-02 SUS304	SUS303 (Equivalent to SUS304)	Approx. 12	Blank
F03-02 SUS316	SUS316		6
F03-02 HAS B	N10665 (See note.)	Approx. 20	B
F03-02 HAS C	N10276 (See note.)		C
F03-02 TITANIUM	Titanium	Approx. 6	T

**Note:** UNS No. (Unified Numbering System No.) is an international metal designation system that specifies a unique number for each material.

## Electrode Sets

An Electrode Set consists of an electrode, a connecting nut, and two Lock Nuts.

Set model	Components	No. of parts in an set	Weight (g)
F03-60 SUS304	F03-01 SUS304	1	Approx. 190
	F03-02 SUS304	1	
	F03-03 SUS304	2	
F03-60 SUS316	F03-01 SUS316	1	Approx. 190
	F03-02 SUS316	1	
	F03-03 SUS316	2	

**Note:** Hastelloy and titanium Electrodes do not come in sets.



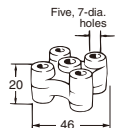
## Lock Nuts

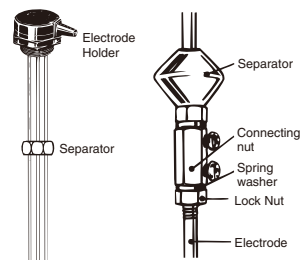
Model	Material	Weight (g)	Material indication
F03-03 SUS304 (See note 1.)	SUS303 (Equivalent to SUS304)	Approx. 2	Blank
F03-03 SUS316 (See note 1.)	SUS316		6
F03-03 HAS B	N10665 (See note 2.)	Approx. 5	B
F03-03 HAS C	N10276 (See note 2.)		C
F03-03 TITANIUM	Titanium	Approx. 2	T

- Note:**
- SUS304 and SUS316 Lock Nuts come with spring washers made of the same material.
  - UNS No. (Unified Numbering System No.) is an international metal designation system that specifies a unique number for each material.

## Electrode Separators

When long electrodes are required, use Separators at each joint (every 1 m) to prevent the Electrodes from touching each other. Use a 1-pole Separator with BF Electrode Holders. The five-pole model can be used with PS-5S and PS-4S Electrode Holders. Separators cannot be used with PS-31 Electrode Holders.

Model	No. of Electrodes	Dimensions	Applicable Electrode Holder	Weight (g)	Material	Operating Temperature
F03-14 1P	1	6.5 dia. 	BF-□(R)	Approx. 15	Ceramic	250°C max.
F03-14 3P	3	Three, 7-dia. holes 	PS-3S(R)	Approx. 30	Ceramic	250°C max.
F03-14 5P	5	Five, 7-dia. holes 	PS-4S(R) PS-5S(R)			



## Accessories (Order Separately)

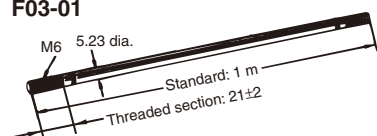
Application	Model
Protective Cover (for PS-□S and BF-3/-5)	F03-11
Mounting Frame (for PS-□S)	F03-12
Mounting Frame for Installing in Concrete (for PS-□S)	F03-13
Dust-proof Rubber Cap (for PS-31)	F03-31

# Dimensions of Electrodes and Accessories

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

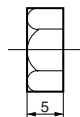
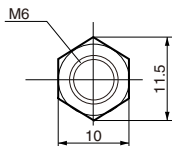
## Electrode

F03-01

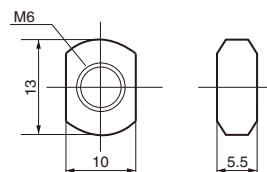


## Lock Nut

F03-03  
SUS304  
SUS316  
Titanium

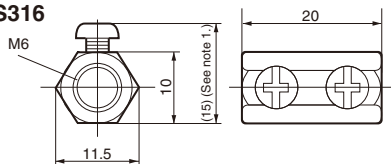


F03-03  
HAS B  
HAS C

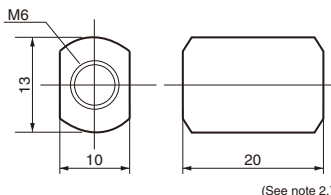


## Connecting nut

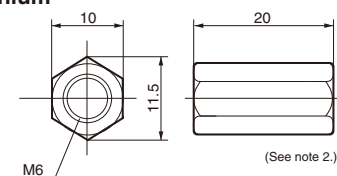
F03-02  
SUS304  
SUS316



F03-02  
HAS B  
HAS C



F03-02  
Titanium



**Note:** 1. Dimension when mounting Electrodes.

2. Clamp screws are not provided for Hastelloy B, Hastelloy C, or titanium models. F03-03 Lock Nuts are used to mount Electrodes.

## ■ Safety Precautions

Refer to *Safety Precautions for All Level Controllers*.

## ■ Precautions for Correct Use

### Cleaning Electrodes

Electrodes are clean when they are dispatched. In the rare occasion that they become dirty during transit or storage, such as forming an oil film on the surface, clean them again before using them.

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.

# Safety Precautions for Electrodes and Electrode Holders

## ⚠ WARNING

Do not touch the terminals while power is being supplied. Doing so may possibly result in electric shock.



Do not attempt to disassemble, repair, or modify the Controller while power is being supplied. Doing so may occasionally result in electric shock.



## Precautions for Safe Use

Do not use the Controller in locations subject to explosive or combustible dust, combustible gas, flammable vapors, corrosive gas, excessive dust, salt-water spray, or water drops.

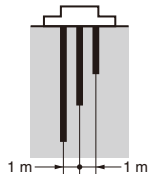
## Electrode Precautions

### Precautions for Correct Use

- Always disconnect the 61F when a tester to perform insulation resistance tests on the Electrode circuit.
- If the Electrodes are to be cut, bevel the cut surface.

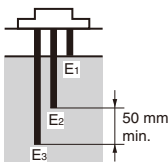
#### ● Be careful of the distances between Electrodes.

Allow a sufficient distance (normally 1 m) between Electrodes if they are used in seawater or sewage. Use a low-sensitivity 61F-□D(-□ND) Level Controller if sufficient distance cannot be obtained.



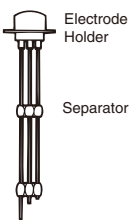
#### ● Make the common (ground) Electrode longer.

For a group of three Electrodes consisting of a short, a medium, and a long Electrode, connect the shortest Electrode to E<sub>1</sub>, the medium Electrode to E<sub>2</sub>, and the long Electrode to E<sub>3</sub>. The long Electrode (E<sub>3</sub>) must be at least 50 mm longer than the other Electrodes.



#### ● Be careful of the operating level.

Changes in the type of liquid or the power supply voltage may cause the operating position to fluctuate somewhat even when the tip of the Electrode reaches the level of the liquid.



#### ● Use separators.

When the required length of the Electrode is 1 m or more, use a Separator at each joint between two Electrodes to prevent the Electrodes from coming into contact each other in the water.

#### ● Be careful of suspended matter causing Electrodes to come into contact with each other.

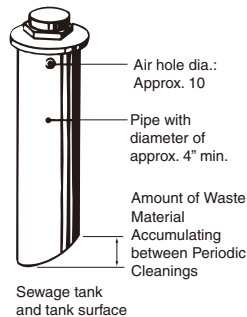
Use Tubing Electrodes if factors such as suspended matter cause Electrodes to come into contact with each other. To ensure conductivity, strip off at least 100 mm from the end of the Tubing and do not use Tubing on the common (earth) Electrode.

#### ● Mount Electrodes vertically.

Water scum can easily accumulate on insulated parts and may cause insulation failure. Mount the Electrodes vertically.

#### ● Electrodes must be cleaned.

- At about six months after installation, remove the Electrodes and use fine sandpaper to remove film from the surface. After that, clean the Electrodes once or twice a year. If the Electrodes are used in liquid with a lot of dirt or scum, insulating film may form, particularly on the surfaces of the Electrodes, and result in operating failures. Remove the insulating film once every three months or so. For sewage tanks, sewage, oil film, or other applications with a lot of waste material, use a pipe such as the one shown at the right.

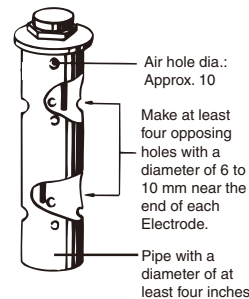


- Use a pipe with a diameter of at least four inches.
- Install the pipe with a diagonal cut at the end as shown in the figure at the right according to the estimated waste material accumulation.
- Provide an air ventilation hole with a diameter of approx. 10 mm on the upper part of the pipe.

#### ● Breakwater Pipe Mounting Precautions

Install a breakwater pipe as shown in the figure at the right for applications with large waves or fast flow, such as for water purification.

- Use a pipe with a diameter of at least four inches.
- To improve the circulation of liquid inside the pipe, make at least four opposing holes with a diameter of 6 to 10 mm near the end of each electrode.
- Provide an air ventilation hole with a diameter of approx. 10 mm on the upper part of the pipe.



- The procedures above also apply to using Electrode bands.

## ■ Electrode Holder Precautions

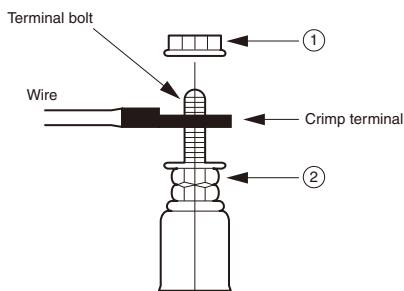
### Precautions for Correct Use

- Never mount the Electrode Holder horizontally. Mounting the Electrode Holder horizontally may cause liquid to leak from the Electrode Holder and result in 61F reset failure.
- The resin may become discolored after long-term use or storage. This is normal and does not present any problems in using the product.
- When wiring the BF, use M6 crimp terminals.
- Do not pull on the cable.
- Disconnect the wiring with the Level Controller before inspecting Electrode Holders.
- Use OMRON 61F Floatless Switches for control devices.
- Consult with your OMRON representative before using the BF in any liquid other than water.

### Precautions for Tightening Torque and Work

<b>BS-1</b> (See note 1.)	Wire installation section (M4) (See note 3.)	137.2 N-cm
	Electrode Holder installation section (M18) (See note 2.)	6500.0 N-cm
<b>BS-1T</b> (See note 1.)	Wire installation section (M4) (See note 3.)	137.2 N-cm
	Electrode Holder installation section (M18) (See note 2.)	196.1 N-cm

- Note: 1.** A gasket is supplied with the BS-1. A gasket is not required to mount the BS-1T. (One is not supplied.)
2. Wind commercially available sealing tape two or three times around the M18 screw section before tightening the screws.
  3. When installing the wiring, secure nut 2 with a wrench so that no force is applied to the terminal bolt, and complete the tightening with nut 1 (as in the following figure). If nut 2 is not secured, the load on the terminal bolt may cause leakage of steam and pressure.



- Always use an F03-11 Protective Cover if the BF-3 (-5) is used outdoors or in locations subject to water, dust, dirt, or other foreign matter. Foreign matter adhering to the electrode insulators may cause incorrect operation due to leaking.

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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# Safety Precautions for All Level Controllers

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Refer to the *Safety Precautions* section for each product for specific precautions applicable to that product.

## WARNING

Do not touch the terminals while power is being supplied. Doing so may possibly result in electric shock.

Do not attempt to disassemble, repair, or modify the product while power is being supplied. Doing so may occasionally result in electric shock.

## ■ Precautions for Safe Use

In order to ensure safe operation, be sure to observe the following points.

1. Use a power supply voltage within the specified range.
2. Do not use the Controller in locations subject to flammable gases or objects.
3. Insert the Socket until it securely clicks into place.
4. Do not short the load connected to the output terminals.
5. Do not connect the power supply in reverse.
6. Do not use the Controller in locations subject to explosive or combustible dust, combustible gas, flammable vapors, corrosive gas, excessive dust, salt water spray, or water drops.
7. Use the Level Controller within the specified ranges for ambient operating temperature, ambient operating humidity, and storage temperature (including during transportation).
8. Do not store, transport, or use the product in locations subject to high humidity or condensation, outdoors, or in direct sunlight.
9. Do not store, transport, or use the product in locations subject to excessive shock or vibration.
10. Recheck all wiring before using the product.
11. Read and understand the entire catalog before attempting to use or maintain the product.
12. Do not attempt to disassemble the product during use.
13. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
14. When discarding, properly dispose of the product as industrial waste.
15. Be careful not to get injured when taking apart the product for disposal.

## ■ Precautions for Correct Use

For details, refer to *Technical Guide for Level Controllers*.

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

## Read and Understand This Catalog

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- Systems, machines, and equipment that could present a risk to life or property.

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