


Basic Building-block Controllers That Mount Directly to Panels for Easier Maintenance

- Easy maintenance with building-block Relay Units.
- Easy identification of operating status with LED operation indicator.
- Lineup includes models for tropical regions and for high temperatures. Achieve stable detection even in high-temperature environments.

 Refer to *Safety Precautions for Floatless Level Controllers.*



Model Number Structure

61F-□□
1 2

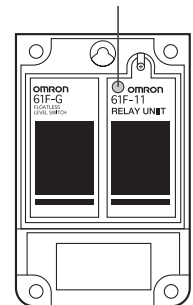
1. Control Application

- G: Automatic water supply and drainage
- G1: Automatic water supply with idling prevention or water shortage alarm
- G2: Automatic water supply and drainage with abnormal water increase alarm
- G3: Automatic water supply and drainage with full tank and water shortage alarm
- G4: Automatic water supply with water level indicator for water supply tank and water receiving tank and prevention of idling due to water shortage
- I: Liquid level indication and alarm (no two-wire models)

2. Type

- Blank: General-purpose
- L 2KM: Long-distance (for 2 km)
- L 4KM: Long-distance (for 4 km)
- H: High-sensitivity
- D: Low-sensitivity
- R: Two-wire
- T: High-temperature

Position of LED indicator



Ordering Information

Type	General-purpose	Long-distance, 2 km	Long-distance, 4 km	High-sensitivity
	Model	Model	Model	Model
Application G	61F-G	61F-GL 2KM	61F-GL 4KM	61F-GH
Application G1	61F-G1	61F-G1L 2KM	61F-G1L 4KM	61F-G1H
Application G2	61F-G2	61F-G2L 2KM	61F-G2L 4KM	61F-G2H
Application G3	61F-G3	61F-G3L 2KM	61F-G3L 4KM	61F-G3H
Application G4	61F-G4	61F-G4L 2KM	61F-G4L 4KM	61F-G4H
Application I	61F-I	61F-IL 2KM	61F-IL 4KM	61F-IH
Relay Unit	61F-11	61F-11L 2KM	61F-11L 4KM	61F-11H

Type	Low-sensitivity	2-wire	Tropical environments	High-temperature
	Model	Model	Model	Model
Application G	61F-GD	61F-GR	61F-G-TDL	61F-GT
Application G1	61F-G1D	61F-G1R	61F-G1-TDL	61F-G1T
Application G2	61F-G2D	61F-G2R	61F-G2-TDL	61F-G2T
Application G3	61F-G3D	61F-G3R	61F-G3-TDL	61F-G3T
Application G4	61F-G4D	61F-G4R	61F-G4-TDL	61F-G4T
Application I	61F-ID	---	61F-I-TDL	61F-IT
Relay Unit	61F-11D	61F-11R	---	61F-11T

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

Example: 61F-G [110/220 VAC]

_____ Desired supply voltage

Specifications

■ Standard Models

Specifications

Items	General-purpose Controller 61F-□ (TDL) (see note 1 and 2)	High-temperature Controller 61F-□T (see note 1)	Long-distance Controllers 61F-□L 2KM (for 2 km) 61F-□L 4KM (for 4 km) (see note 1)	High-sensitivity Controllers 61F-□H (see note 1)	Low-sensitivity Controller 61F-□D (see note 1)	Two-wire Controller 61F-□R (see note 1)
Controlling materials and operating conditions	For control of ordinary purified water or sewage water	For control of ordinary purified water or sewage water in cases where the ambient temperature is high.	For control of ordinary purified water in cases where the distance between sewage pumps and water tanks or between receiver tanks and supply tanks is long or where remote control is required.	For control of liquids with high specific resistance such as distilled water	For control of liquids with low specific resistance such as salt water, sewage water, acid chemicals, alkali chemicals	For control of ordinary purified water or sewage water used in combination with Two-wire Electrode Holder (incorporating a resistor of 6.8 kΩ)
Supply voltage	100, 110, 120, 200, 220 or 240 VAC; 50/60 Hz					
Operating voltage range	85% to 110% of rated voltage					
InterElectrode voltage	8 VAC			24 VAC	8 VAC	
InterElectrode current	Approx. 1 mA AC max.					
Power consumption	61F-G□: 3.5 VA max.; G1F-G1□, G1F-G2□, or G1F-I□: 5.5 VA max.; G1F-G3□: 7.5 VA max.; G1F-G4□: 14.5 VA max.					
InterElectrode operate resistance	0 to approx. 4 kΩ	0 to approx. 5 kΩ	0 to approx. 1.8 kΩ (for 2 km) 0 to approx. 0.7 kΩ (for 4 km)	Approx. 15 kΩ to 70 kΩ (see note 5)	0 to approx. 1.8 kΩ	0 to approx. 1.1 kΩ
InterElectrode release resistance	Approx. 15 k to ∞ Ω	Approx. 15 k to ∞ Ω	4 k to ∞ Ω (for 2 km) 2.5 k to ∞ Ω (for 4 km)	Approx. 300 k to ∞ Ω	Approx. 5 k to ∞ Ω	Approx. 15 k to ∞ Ω
Cable length (see note 3)	1 km max.	600 m max.	2 km max. 4 km max.	50 m max.	1 km max.	800 m max.
Control output	2 A, 220 VAC (Inductive load: $\cos\phi = 0.4$) 5 A, 220 VAC (Resistive load)					
Ambient temperature	Operating: -10 to 55°C (-10 to 70°C for 61F-□T)					
Ambient humidity	Operating: 45% to 85% RH					
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)					
Dielectric strength (see note 4)	2000 VAC, 50/60 Hz for 1 min.					
Life expectancy	Electrical: 500,000 operations min. Mechanical: 5,000,000 operations min.					
Weight	61F-G□: Approx. 380 g, G1F-G1□, G1F-G2□, or G1F-I□: Approx. 750 g; G1F-G3□: Approx. 930 g; G1F-G4□: Approx. 1,710 g					

- Note:**
- The □ in the model name represents G, G1, G2, G3, G4, and I.
 - The suffix "TDL" attached to the model name represents models designed for tropical regions (storage humidity of 45% to 90%). For details, refer to *Safety Precautions for Floatless Level Controllers*.
 - The length when using completely-insulated, 600-V, 3-conductor (0.75 mm²) cable. Usable cable lengths will become shorter as the cable diameter or number of conductors becomes larger. For details, refer to *Safety Precautions for Floatless Level Controllers*.
 - The insulation resistance and dielectric strength indicate values between power terminals and Electrode terminals, between power terminals and contact terminals, and between Electrode terminals and contact terminals.
 - Possible to use with 15 kΩ or less, however, this may cause reset failure.
 - High-sensitivity Controllers use advanced operation.
When the power supply voltage is applied, if there are some liquids between the electrodes (ground and operation electrodes), the internal relay will not operate.
When the power supply voltage is applied, if there are no liquids between the electrodes (ground and operation electrodes), the internal relay will operate.

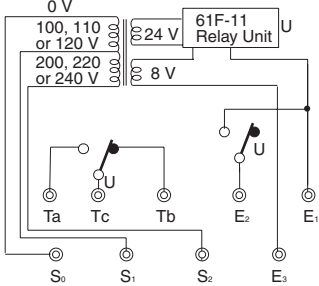
- Advanced Operation

With advanced operation, the internal relay operates as soon as control power is supplied to the G1F and is reset when current flows between the poles. Wiring is the same as for models with sequential operation.

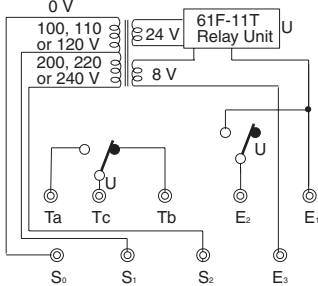
Internal Circuit Diagrams

The schematic diagrams shown below typify the internal connections of the various 61F models. The designations Ta, Tb, and Tc (sometimes referred to collectively as "U") may occur more than once in a product, however, the "a" terminal is always an NO contact, a "b" terminal is an NC contact, and the "c" terminal is the common terminal.

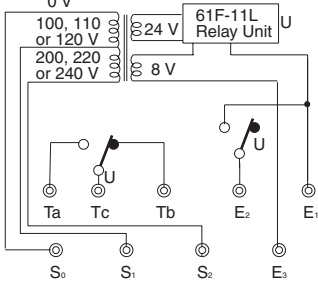
61F-G



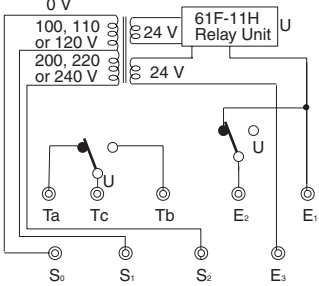
61F-GT



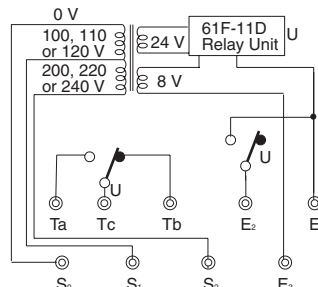
61F-GL



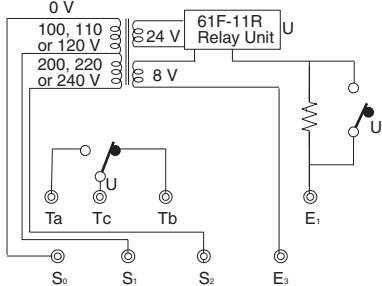
61F-GH (See note.)



61F-GD



61F-GR

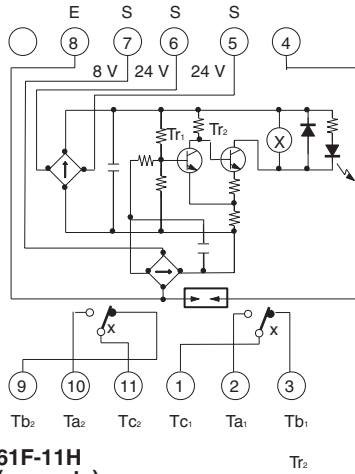


Note: The 61F11H relay deenergizes when there is water present across the Electrodes, whereas the 61F relay energizes when there is water present across the Electrodes.
Also, the terminal connections of those Controllers provided with LED indicators differ from those which have no indicators.

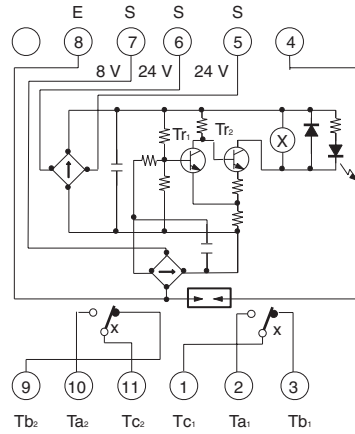
61F-11 Relay Units

Item	61F-11	61F-11T	61F-11L	61F-11H	61F-11D	61F-11R
Interchangeable with general-purpose model (61F-11)	---	Provided	Provided	Not provided	Provided	Not provided
Color of band on name plate	---	Red	Yellow	Blue	Black	Green

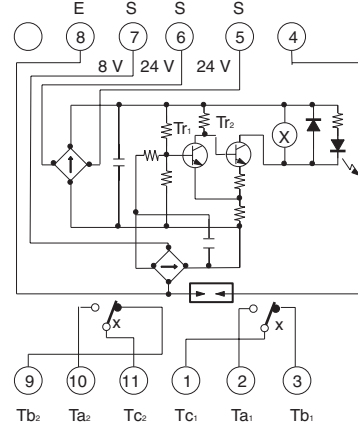
61F-11



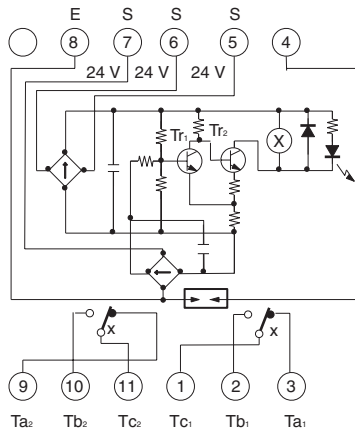
61F-11T



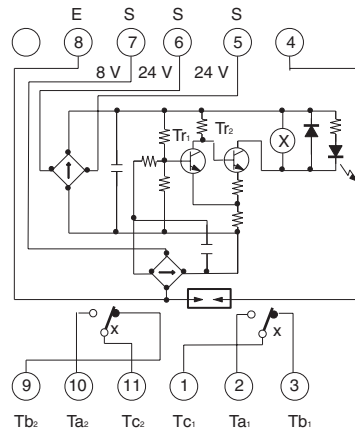
61F-11L



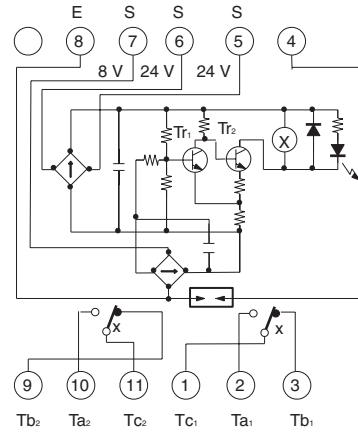
61F-11H
(see note)



61F-11D



61F-11R

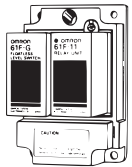


■ Connections

Automatic Water Supply and Drainage Control

Basic Type
61F-G

Dimensions:
page 13



Automatic Water Supply Control

Connections

(See note.)

Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Tb to the contactor's coil terminal.
- Power Supply Connections (for models with 110/220-V power)
110 VAC: Connect S₀ and S₁.
220 VAC: Connect S₀ and S₂.

Automatic Drainage Control

Connections

(See note.)

Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Ta to the contactor's coil terminal. (Do not connect Tb.)
- Power Supply Connections (for models with 110/220-V power)
110 VAC: Connect S₀ and S₁.
220 VAC: Connect S₀ and S₂.

Principles of Operation

Relay Unit Location

The pump stops (indicator ON) when the water level reaches E₁ and starts (indicator OFF) when the water level drops below E₂.

Principles of Operation

Relay Unit Location

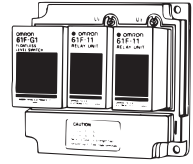
The pump starts (indicator ON) when the water level reaches E₁ and stops (indicator OFF) when the water level drops below E₂.

Automatic Water Supply Control with Pump Idling Prevention and Automatic Water Supply Control with Abnormal Water Shortage Alarm

Basic Type

61F-G1

Dimensions:
page 13



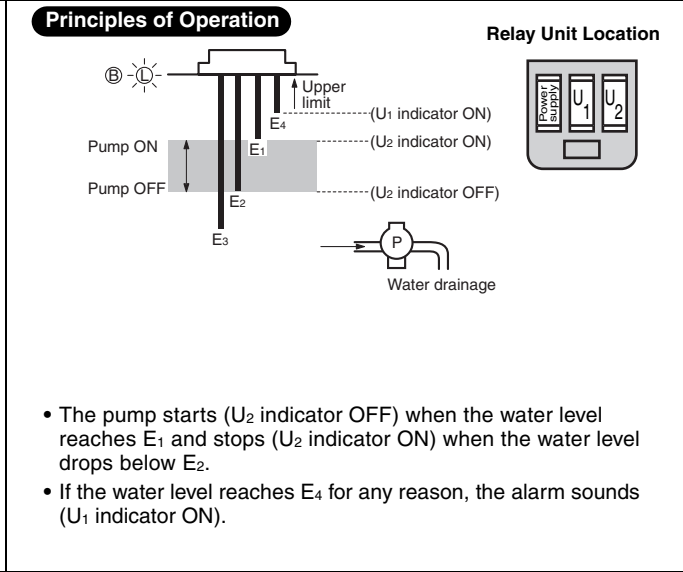
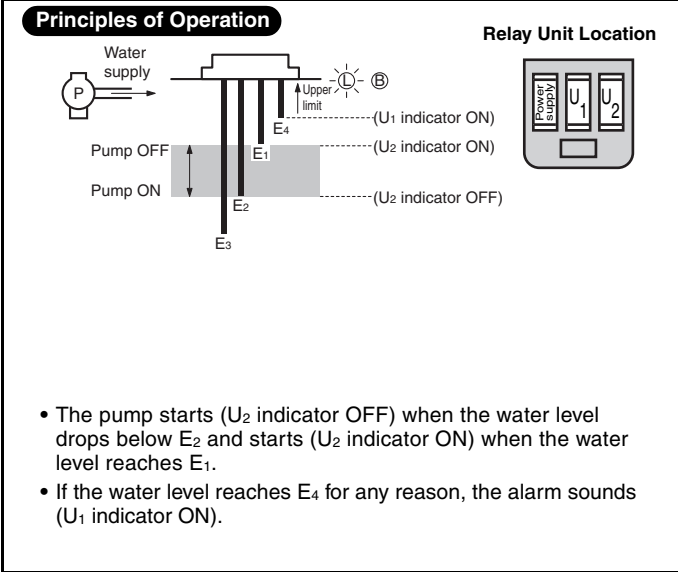
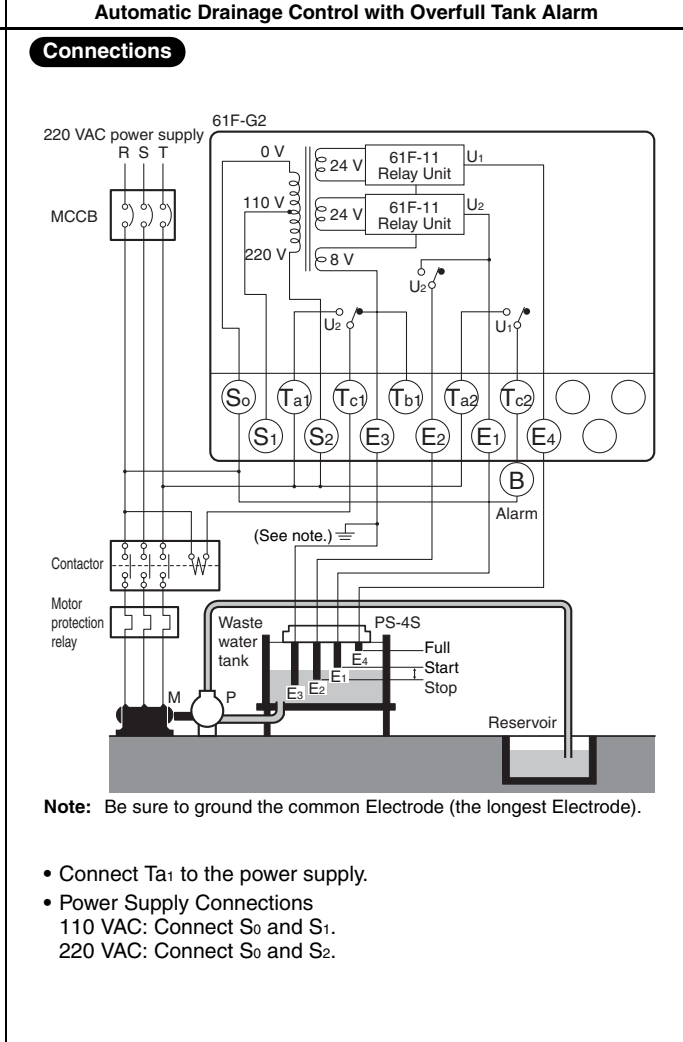
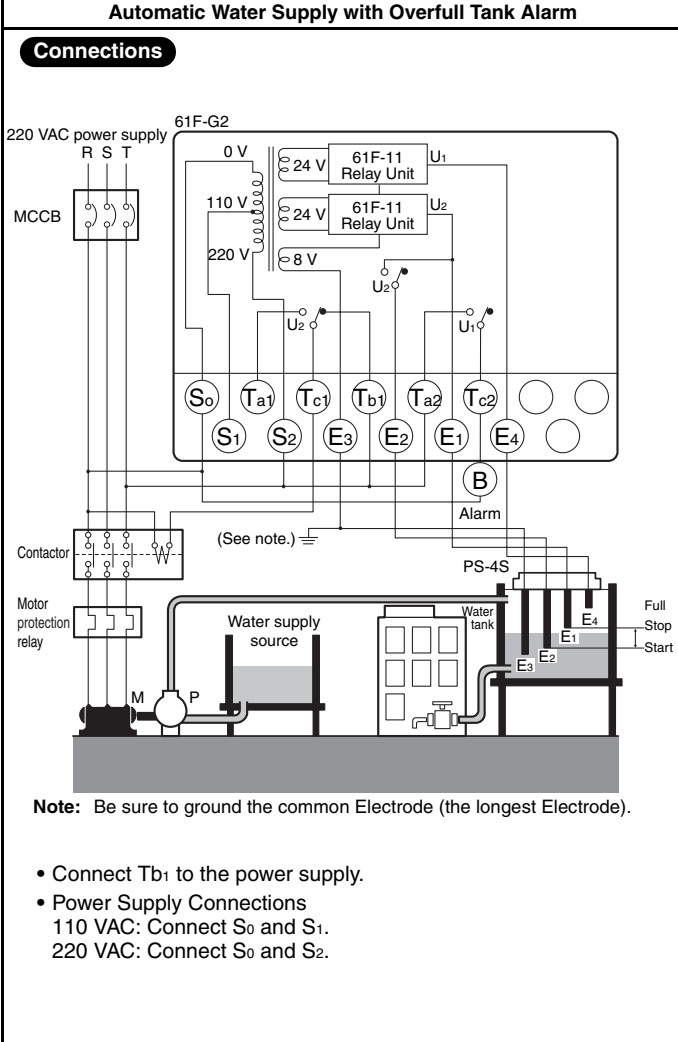
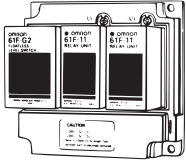
Automatic Water Supply Control with Pump Idling Prevention	Automatic Water Supply Control with Abnormal Water Shortage Alarm
<p>Connections</p> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> Power Supply Connections 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂. Insert a pushbutton switch (NO) between E₁' and E₃, as shown by the dotted lines above. Do not press the pushbutton if the low-water alarm sounds and the pump stops during normal operation (U₁ indicator ON, water below E₂'). <p>Test Operation/Recovering from Power Interruptions</p> <p>If the supply water level is below E₁' when starting operation or when recovering from a power interruption, press the pushbutton to momentarily close the circuit (U₁ indicator turns ON) to start the pump.</p>	<p>Connections</p> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> Power Supply Connections 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂. Insert a pushbutton switch (NO) between E₃ and E₄. If the pump stops when the pushbutton switch is released, press it again. <p>Test Operation/Recovering from Power Interruptions</p> <p>If the supply water level is below E₄ when starting operation or when recovering from a power interruption, press the pushbutton to momentarily close the circuit (U₁ indicator turns ON) to start the pump.</p>
<p>Principles of Operation</p> <ul style="list-style-type: none"> The pump starts (U₂ indicator OFF) when the water level drops below E₂ and stops (U₂ indicator ON) when the water level reaches E₁. When the level of the water supply source drops below E₂', the pump stops (U₁ indicator OFF). Pump idling is prevented and the alarm sounds. 	<p>Principles of Operation</p> <ul style="list-style-type: none"> The pump stops (U₂ indicator ON) when the water level reaches E₁ and starts (U₂ indicator OFF) when the water level drops below E₂. If the water level drops below E₄ for any reason, the pump stops (U₁ indicator OFF) and the alarm sounds.

Automatic Drainage Control and Water Supply with Abnormal Water Increase Alarm

Basic Type

61F-G2

Dimensions: page 13

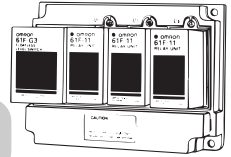


Automatic Water Supply and Drainage Control with Abnormal Water Increase and Water Shortage Alarms

Basic Type

61F-G3

Dimensions:
page 13



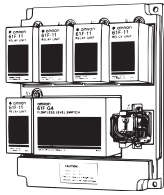
<p style="text-align: center; background-color: #f0f0f0; margin: -10px -10px 10px -10px;">Automatic Water Supply with Abnormal Water Increase and Water Shortage Alarms</p> <div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Connections</div> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> • Connect Tb to the contactor's coil terminal. • Power Supply Connections 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂. 	<p style="text-align: center; background-color: #f0f0f0; margin: -10px -10px 10px -10px;">Automatic Drainage Control with Abnormal Water Increase and Water Shortage Alarms</p> <div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Connections</div> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> • Connect Ta to the contactor's coil terminal. (Do not connect Tb.) • Power Supply Connections 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂.
<div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Principles of Operation</div> <div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Relay Unit Locations</div> <ul style="list-style-type: none"> • The pump stops (U₂ indicator ON) when the water level reaches E₂ and starts (U₂ indicator OFF) when the water level drops below E₃. • If the water level rises to E₁ for any reason, the upper-limit indicator turns ON and the alarm sounds (U₁ indicator ON). If the water level drops below E₄ for any reason, the lower-limit indicator turns ON and the alarm sounds (U₃ indicator OFF). 	<div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Principles of Operation</div> <div style="background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;">Relay Unit Locations</div> <ul style="list-style-type: none"> • The pump starts (U₂ indicator ON) when the water level reaches E₂ and stops (U₂ indicator OFF) when the water level drops below E₃. • If the water level rises to E₁ for any reason, the upper-limit indicator turns ON and the alarm sounds (U₁ indicator ON). If the water level drops below E₄ for any reason, the lower-limit indicator turns ON and the alarm sounds (U₃ indicator OFF).

Automatic Water Supply Control with Water Source Level Indication, Prevention of Pump Idling Due to Water Shortage, and Indication of Water Level in Tank

Basic Type

61F-G4

Dimensions:
page 13



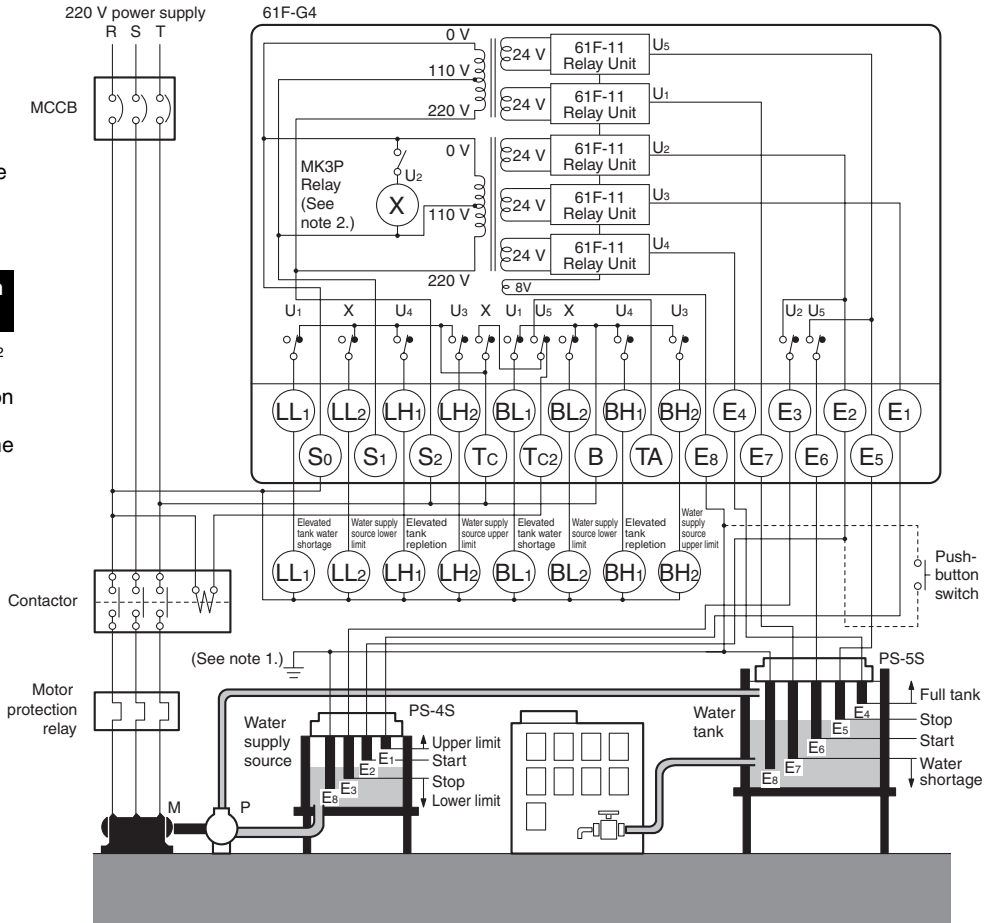
Automatic Water Supply Control with Water Source Level Indication, Prevention of Pump Idling Due to Water Shortage, and Indication of Water Level in Tank

Connections

- Power Supply Connections
110 VAC: Connect S₀ and S₁.
220 VAC: Connect S₀ and S₂.
- Insert a pushbutton switch (NO) between E₂ and E₈, as shown by the dotted lines above.
- Do not press the pushbutton if the low-water alarm sounds and the pump stops during normal operation (water below E₃).

Test Operation/Recovering from Power Interruptions

If the supply water level is below E₂ when starting operation or when recovering from a power interruption (U₂ indicator OFF), press the pushbutton to momentarily close the circuit to start the pump.

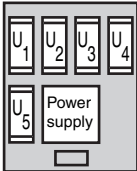


Note: Be sure to ground the common Electrode (the longest Electrode).

Principles of Operation

- Insert four Electrodes in the water supply source and five Electrodes in the elevated water tank.
- The lower-limit indicator for the water supply source remains ON while the water source level is below E₃ (U₂ indicator OFF).
- When the water level rises to E₂, the lower-limit indicator turns OFF (U₂ indicator ON) and the pump is ready for operation.
- The upper-limit indicator in the water supply source lights when the water level reaches E₁ (U₃ indicator ON).
- The water-shortage indicator for the elevated tank remains ON while the water level in the elevated tank is below E₇. The indicator turns OFF (U₁ indicator ON) when the water level rises to E₇.
- The pump stops (U₅ indicator ON) when the water level reaches E₅ and starts (U₅ indicator OFF) when the water level drops below E₆.
- If the water level reaches E₄ for any reason, the abnormal water increase indicator for the elevated tank turns ON (U₄ indicator ON).

Relay Unit Location



■ Connection with Three-phase Four-line Circuit

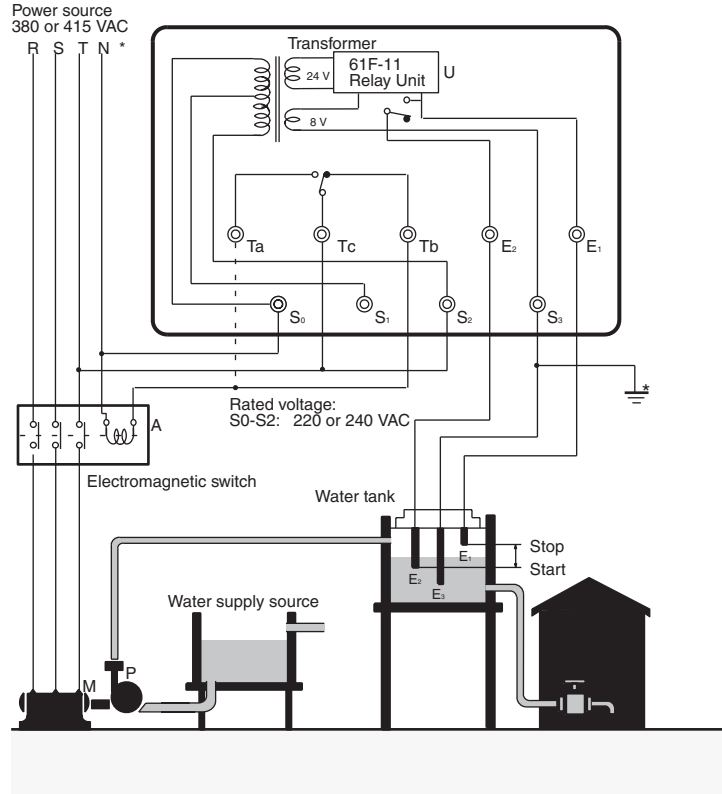
When supplying power from N-phase to the Controller in three-phase four-line circuit, refer to the following diagrams.

Line voltage (R-S, S-T, or R-T): 380 or 415 VAC

Phase voltage (N-R, N-S, or N-T): 220 or 240 VAC

61F-G□, 220 or 240 VAC

Water Supply



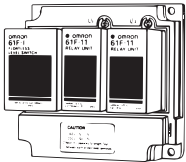
Note: Be sure to ground terminal E3.

Liquid Level Indication and Alarm

Basic Type

61F-I

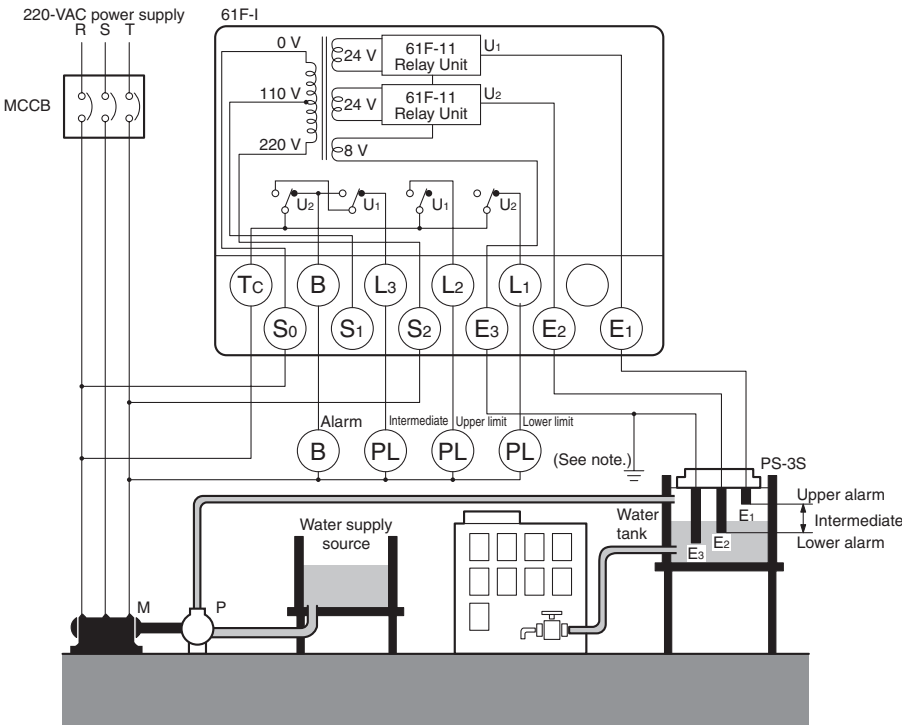
Dimensions:
page 13



Liquid Level Indication and Alarm

Connections

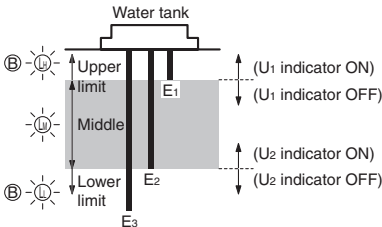
- Power Supply Connections
110 VAC: Connect S₀ and S₁.
220 VAC: Connect S₀ and S₂.



Note: Be sure to ground the common Electrode (the longest Electrode).

Principles of Operation

- When the water level drops below E₂, the lower-limit indicator turns ON and the alarm sounds (U₂ indicator OFF).
- When the water level reaches E₂, the alarm turns OFF and the intermediate indicator turns ON (U₂ indicator ON).
- When the water level rises to E₁, the upper-limit indicator turns ON and the alarm sounds (U₁ indicator ON).



Relay Unit Location

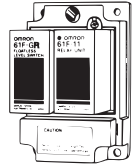


Two-Wire Connections

Automatic Water Supply and Drainage Control

Basic Type

61F-GR



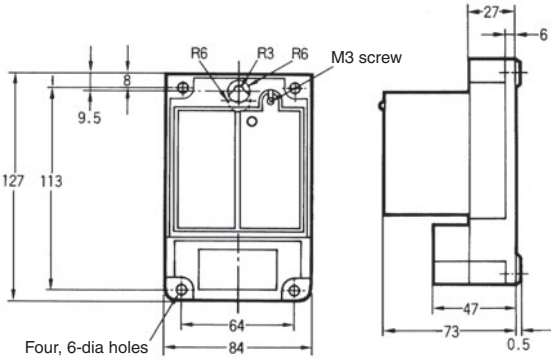
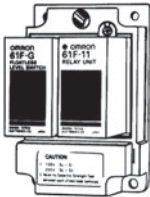
Automatic Water Supply Control	Automatic Drainage Control
<p>Connections</p> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> • Connect Tb to the contactor's coil terminal. • Power Supply Connections 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂. • With 2-wire connections, only two wires are required between the 61F-GR and Electrode Holder, but three wires are required for the Electrodes. • The Electrode Holder must be specified for 2-wire connections. (Resistance R is built into Electrode Holders for 2-Wire Connections.) • The Relay Unit must also be specified for 2-wire connections. 	<p>Connections</p> <p>Note: Be sure to ground the common Electrode (the longest Electrode).</p> <ul style="list-style-type: none"> • Connect Ta to the contactor's coil terminal. (Do not connect Tb.) • Power Supply Connections (for models with 110/220-V power) 110 VAC: Connect S₀ and S₁. 220 VAC: Connect S₀ and S₂. • With 2-wire connections, only two wires are required between the 61F-GR and Electrode Holder, but three wires are required for the Electrodes. • The Electrode Holder must be specified for 2-wire connections. (Resistance R is built into Electrode Holders for 2-Wire Connections.) • The Relay Unit must also be specified for 2-wire connections.
<p>Principles of Operation</p> <p>The pump stops (U indicator ON) when the water level reaches E₁ and starts (U indicator OFF) when the water level drops below E₂.</p>	<p>Principles of Operation</p> <p>The pump starts (U indicator ON) when the water level reaches E₁ and stops (U indicator OFF) when the water level drops below E₂.</p>

Dimensions

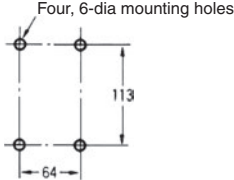
Note: All units are in millimeters unless otherwise indicated.

Standard Models

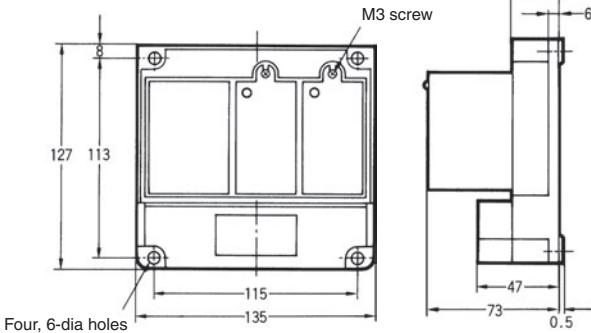
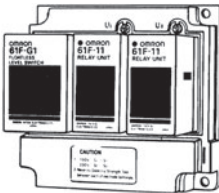
61F-G



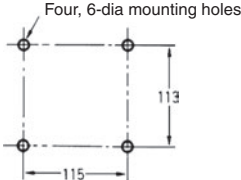
Mounting Holes



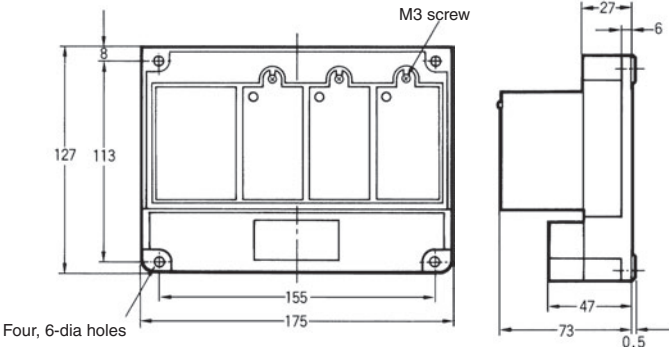
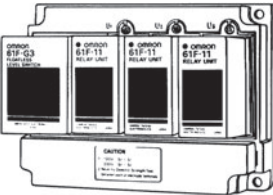
61F-G1 61F-G2 61F-I



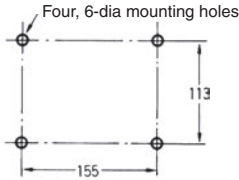
Mounting Holes



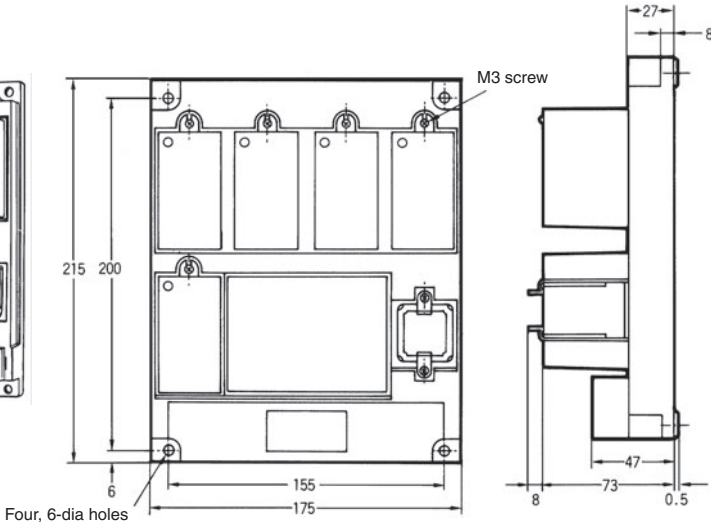
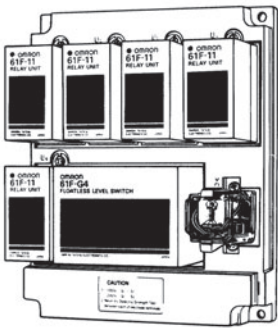
61F-G3



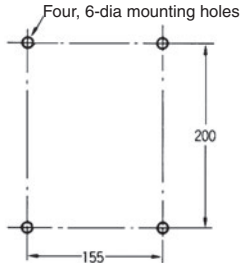
Mounting Holes



61F-G4



Mounting Holes



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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2009.9

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