Floatless Level Controller (Basic Type)

61F-G□

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

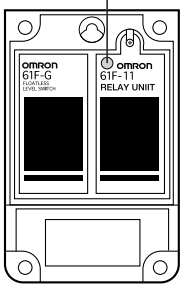
1. Control Application

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: Ask your OMRON representative about power supply voltages.

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: cosϕ = 0.4) 5 A, 220 VAC (Resistive load)					
Ambient temperature	Operating: –10°C to 55°C (–10°C 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: 1. The □ in the model name represents G, G1, G2, G3, G4, and I.

2. The suffix "TDL" attached to the model name represents models designed for tropical regions (storage humidity of 45 to 90% RH).

3. The length when using completely-insulated, 600-V, 3-conductor (0.75 mm^2) cabtire cables. Usable cable lengths will become shorter as the cable diameter or number of conductors becomes larger.

4. 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.

5. Possible to use with 15 kΩ or less, however, this may cause reset failure.

6. High-sensitivity Controllers use advanced operation.

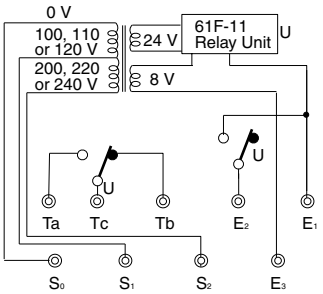
• Advanced Operation

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.

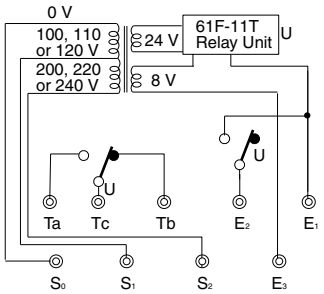
Internal Circuit Diagrams

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.

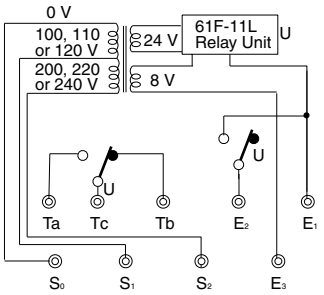
61F-G



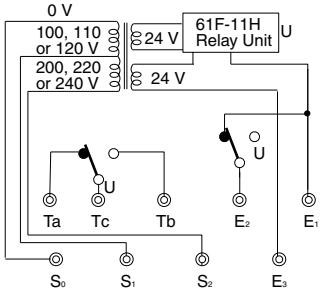
61F-GT



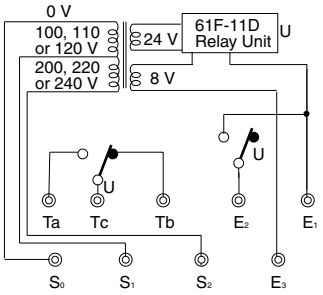
61F-GL



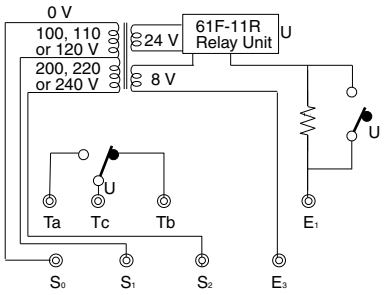
61F-GH (See note.)



61F-GD



61F-GR

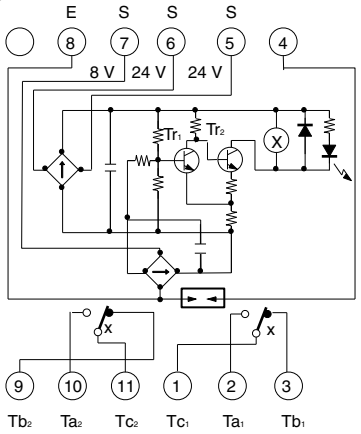


Note: The 61F11H relay deenergizes when there is water present across the Electrodes, whereas the 61F relay energizes when there is water present across the Electrodes.
Also, the terminal connections of those Controllers provided with LED indicators differ from those which have no indicators.

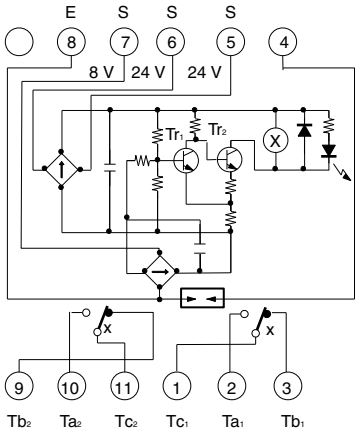
61F-11 Relay Units

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

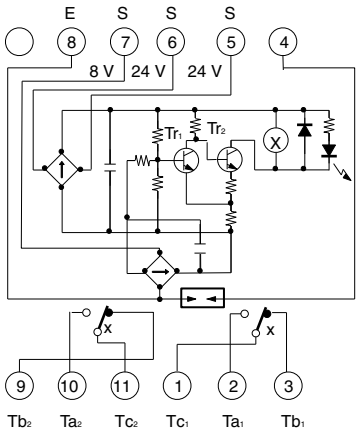
61F-11



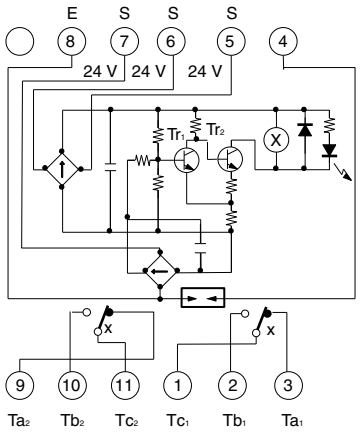
61F-11T



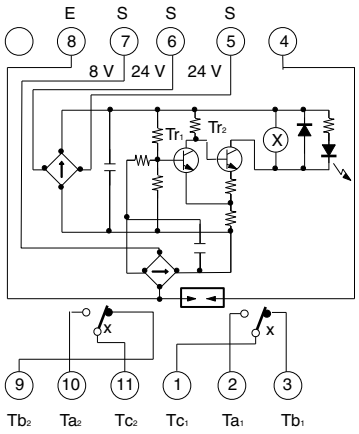
61F-11L



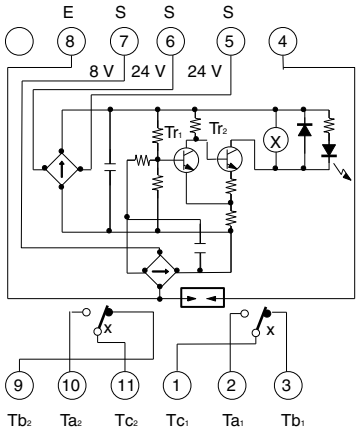
61F-11H (see note)



61F-11D



61F-11R



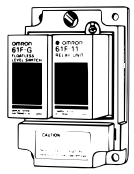
■ Connections

Automatic Water Supply and Drainage Control

Basic Type

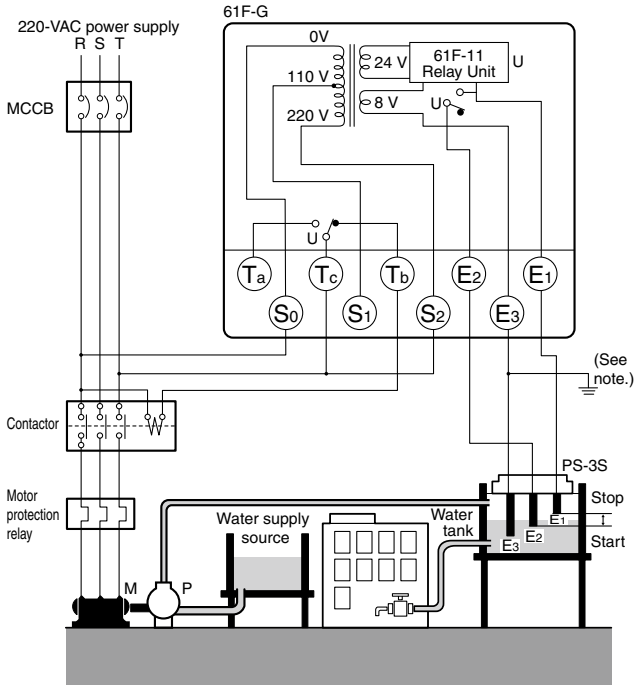
61F-G

Dimensions: page 13



Automatic Water Supply

Connections

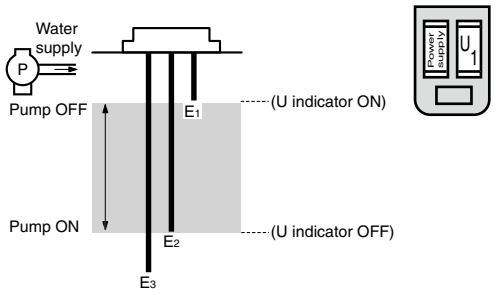


Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Tb to the contactor's coil terminal.
- Power Supply Connections (for models with 110/220-V power)
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation

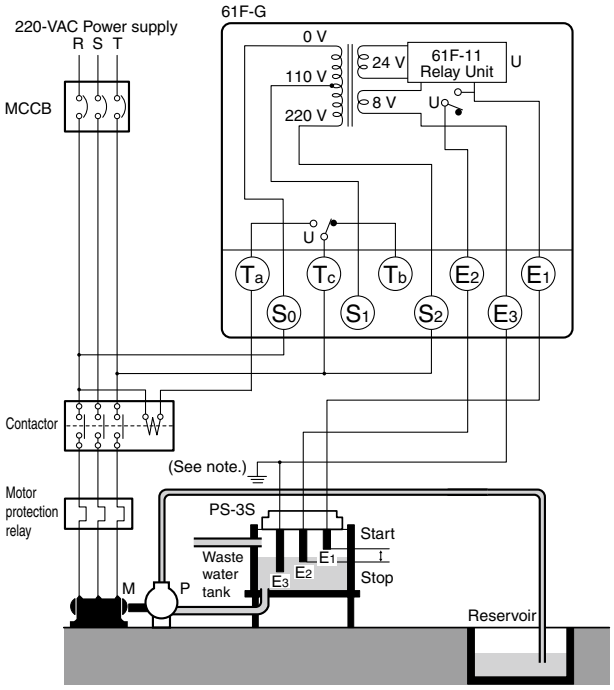
Relay Unit Location



The pump stops (indicator ON) when the water level reaches E_1 and starts (indicator OFF) when the water level drops below E_2.

Automatic Drainage

Connections

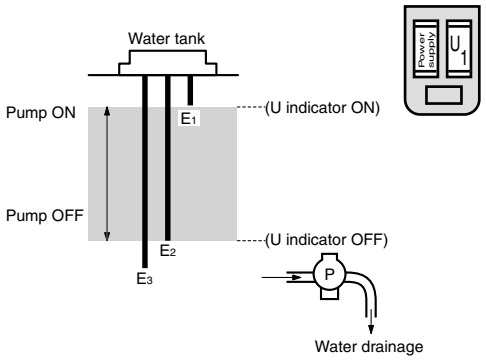


Note: Be sure to ground the common Electrode (the longest Electrode).

- 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 S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation

Relay Unit Location

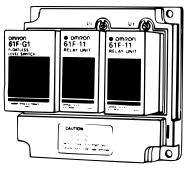


The pump starts (indicator ON) when the water level reaches E_1 and stops (indicator OFF) when the water level drops below E_2.

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

Basic Type

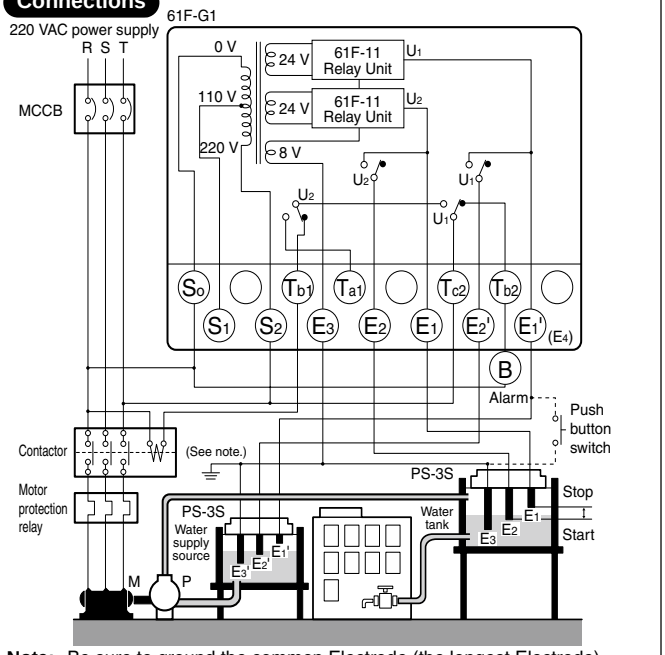
61F-G1



Dimensions: page 13

Automatic Water Supply Control with Pump Idling Prevention

Connections



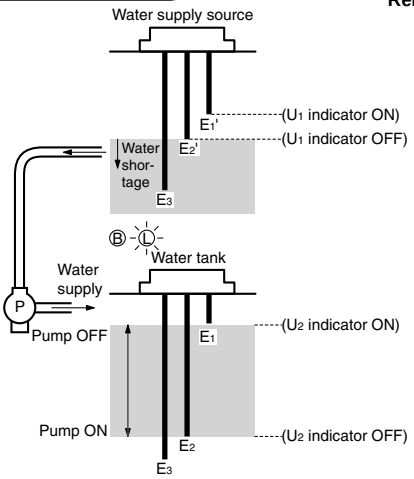
Note: Be sure to ground the common Electrode (the longest Electrode).

- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- Insert a pushbutton switch (NO) between E_1' and E_3, 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 (U_1 indicator ON, water below E_2').

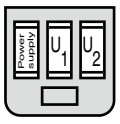
Test Operation/Recovering from Power Interruptions

If the supply water level is below E_1' when starting operation or when recovering from a power interruption, press the pushbutton to momentarily close the circuit (U_1 indicator turns ON) to start the pump.

Principles of Operation



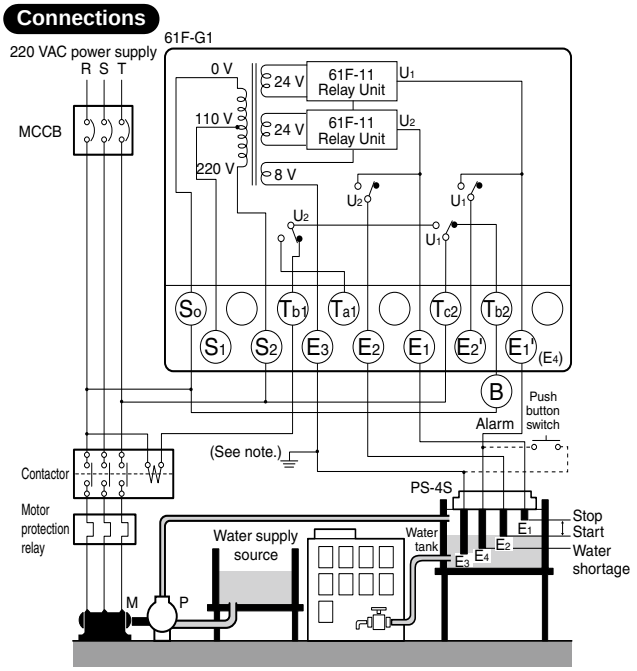
Relay Unit Location



- The pump starts (U_2 indicator OFF) when the water level drops below E_2 and stops (U_2 indicator ON) when the water level reaches E_1.
- When the level of the water supply source drops below E_2', the pump stops (U_1 indicator OFF). Pump idling is prevented and the alarm sounds.

Automatic Water Supply Control with Abnormal Water Shortage Alarm

Connections



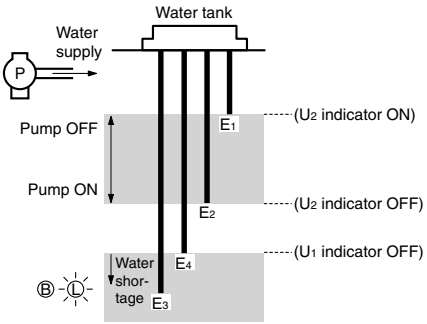
Note: Be sure to ground the common Electrode (the longest Electrode).

- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- Insert a pushbutton switch (NO) between E_3 and E_4.
- If the pump stops when the pushbutton switch is released, press it again.

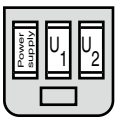
Test Operation/Recovering from Power Interruptions

If the supply water level is below E_4 when starting operation or when recovering from a power interruption, press the pushbutton to momentarily close the circuit (U_1 indicator turns ON) to start the pump.

Principles of Operation



Relay Unit Location

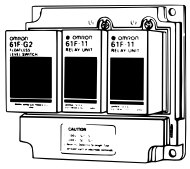


- The pump stops (U_2 indicator ON) when the water level reaches E_1 and starts (U_2 indicator OFF) when the water level drops below E_2.
- If the water level drops below E_4 for any reason, the pump stops (U_1 indicator OFF) and the alarm sounds.

Automatic Drainage Control and Water Supply with Abnormal Water Increase Alarm

Basic Type

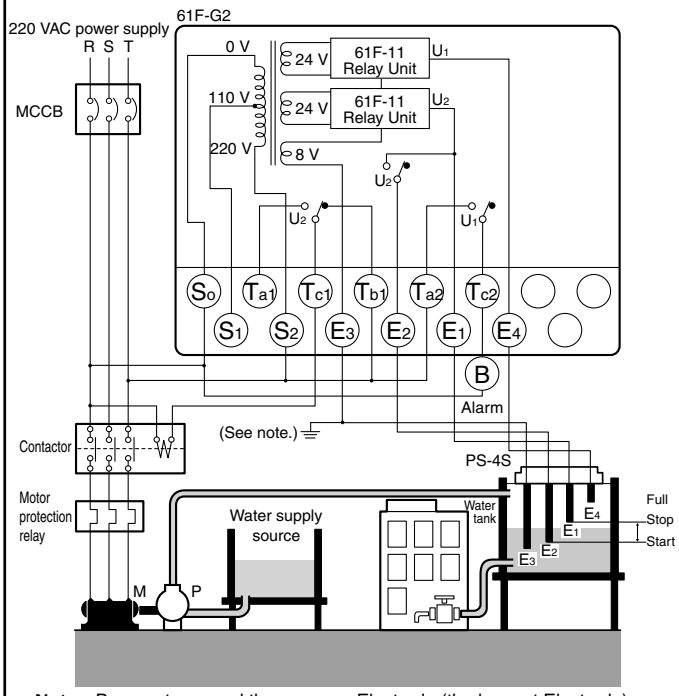
61F-G2



Dimensions: page 13

Automatic Water Supply with Abnormal Water Increase Alarm

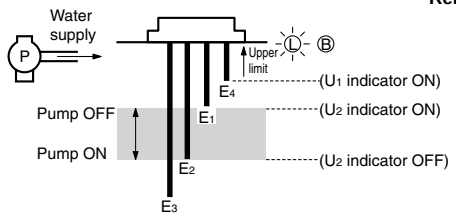
Connections



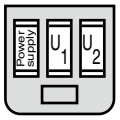
Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Tb_1 to the power supply.
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation



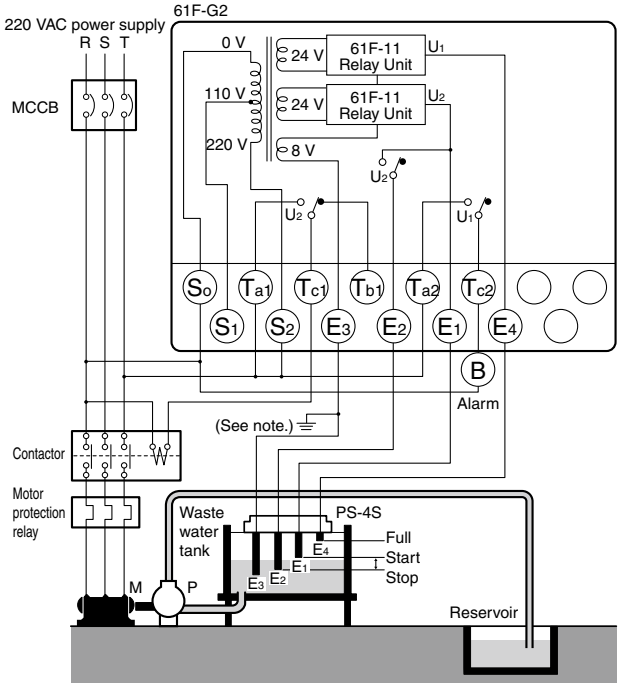
Relay Unit Location



- The pump starts (U_2 indicator OFF) when the water level drops below E_2 and starts (U_2 indicator ON) when the water level reaches E_1.
- If the water level reaches E_4 for any reason, the alarm sounds (U_1 indicator ON).

Automatic Drainage Control with Abnormal Water Increase Alarm

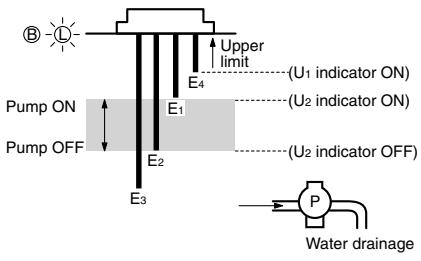
Connections



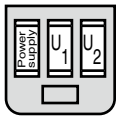
Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Ta_1 to the power supply.
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation



Relay Unit Location

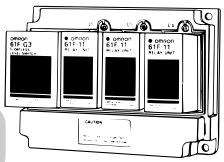


- The pump starts (U_2 indicator OFF) when the water level reaches E_1 and stops (U_2 indicator ON) when the water level drops below E_2.
- If the water level reaches E_4 for any reason, the alarm sounds (U_1 indicator ON).

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

Basic Type

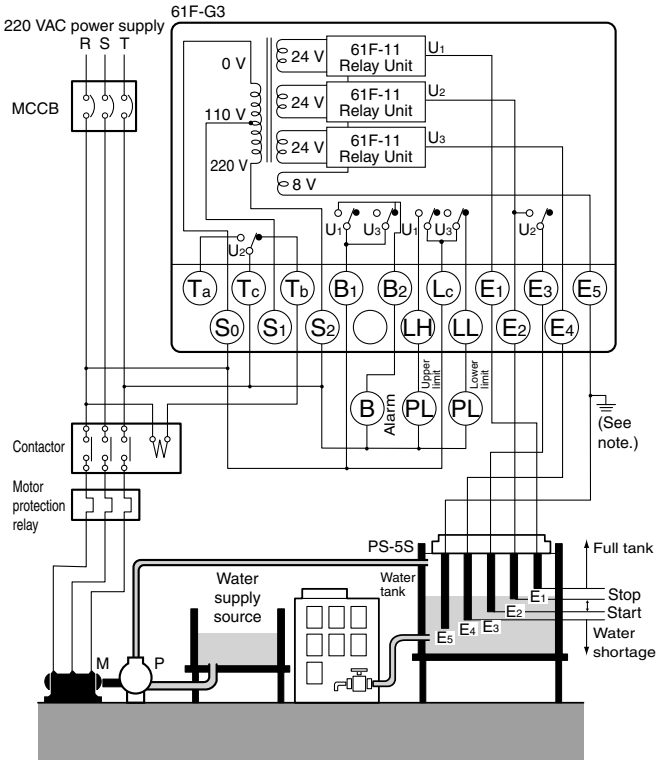
61F-G3



Dimensions: page 13

Automatic Water Supply with Abnormal Water Increase and Water Shortage Alarms

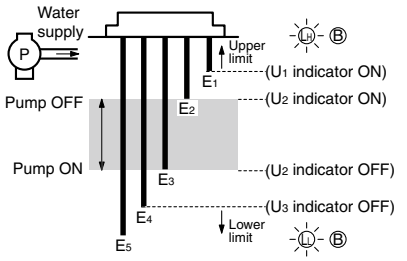
Connections



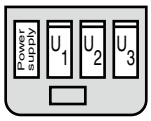
Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Tb to the contactor's coil terminal.
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation



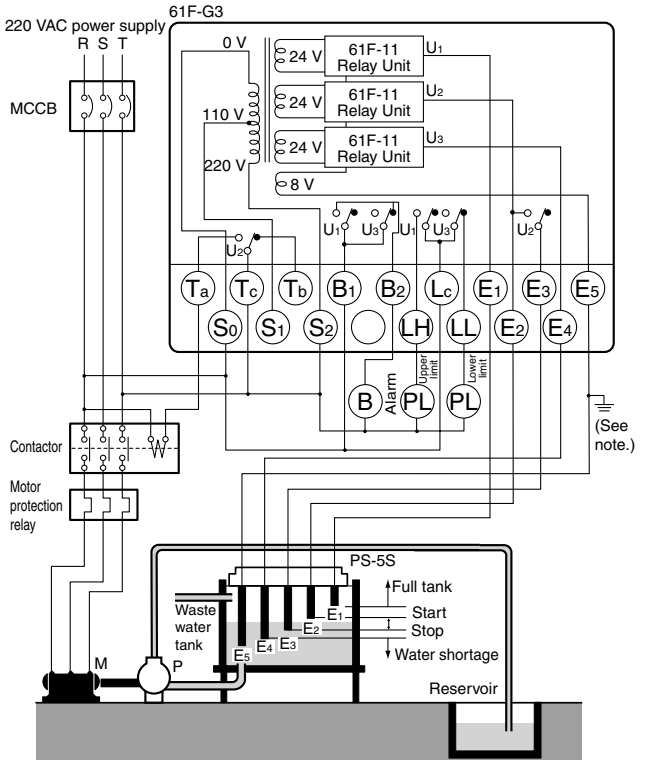
Relay Unit Locations



- The pump stops (U_2 indicator ON) when the water level reaches E_2 and starts (U_2 indicator OFF) when the water level drops below E_3.
- If the water level rises to E_1 for any reason, the upper-limit indicator turns ON and the alarm sounds (U_1 indicator ON). If the water level drops below E_4 for any reason, the lower-limit indicator turns ON and the alarm sounds (U_3 indicator OFF).

Automatic Drainage Control with Abnormal Water Increase and Water Shortage Alarms

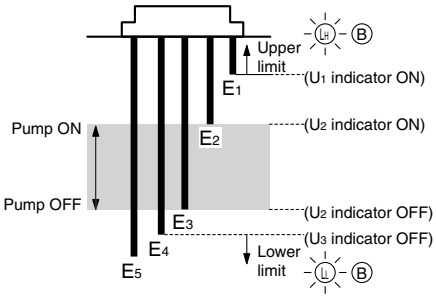
Connections



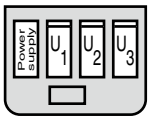
Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Ta to the contactor's coil terminal. (Do not connect Tb.)
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.

Principles of Operation



Relay Unit Locations



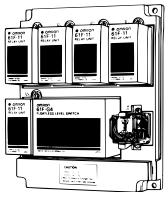
- The pump starts (U_2 indicator ON) when the water level reaches E_2 and stops (U_2 indicator OFF) when the water level drops below E_3.
- If the water level rises to E_1 for any reason, the upper-limit indicator turns ON and the alarm sounds (U_1 indicator ON). If the water level drops below E_4 for any reason, the lower-limit indicator turns ON and the alarm sounds (U_3 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



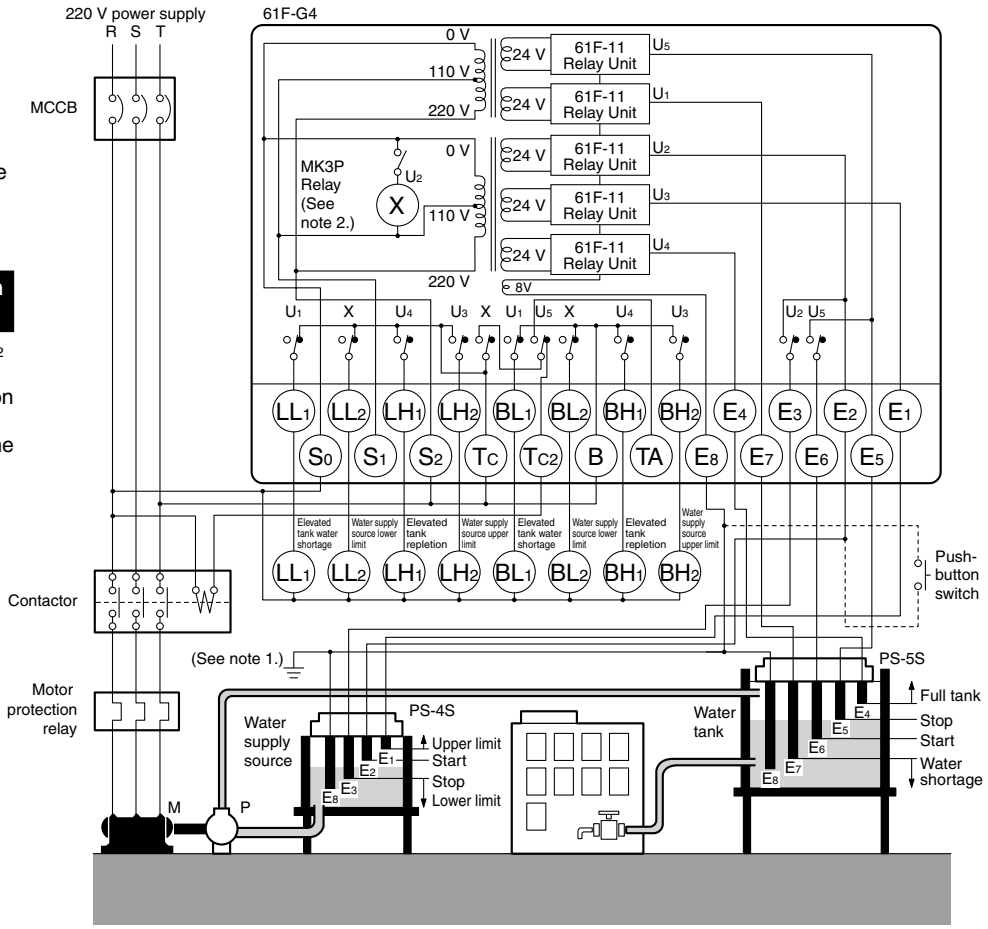
Automatic Water Supply Control with Water Source Level Indication, Prevention of Pump Idling Due to Water Shortage, and Indication of Water Level in Tank

Connections

- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- Insert a pushbutton switch (NO) between E_2 and E_8, 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 E_3).

Test Operation/Recovering from Power Interruptions

If the supply water level is below E_2 when starting operation or when recovering from a power interruption (U_2 indicator OFF), press the pushbutton to momentarily close the circuit to start the pump.

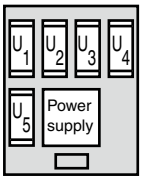


Note: Be sure to ground the common Electrode (the longest Electrode).

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 E_3 (U_2 indicator OFF).
- When the water level rises to E_2, the lower-limit indicator turns OFF (U_2 indicator ON) and the pump is ready for operation.
- The upper-limit indicator in the water supply source lights when the water level reaches E_1 (U_3 indicator ON).
- The water-shortage indicator for the elevated tank remains ON while the water level in the elevated tank is below E_7. The indicator turns OFF (U_1 indicator ON) when the water level rises to E_7.
- The pump stops (U_5 indicator ON) when the water level reaches E_5 and starts (U_5 indicator OFF) when the water level drops below E_6.
- If the water level reaches E_4 for any reason, the abnormal water increase indicator for the elevated tank turns ON (U_4 indicator ON).

Relay Unit Location

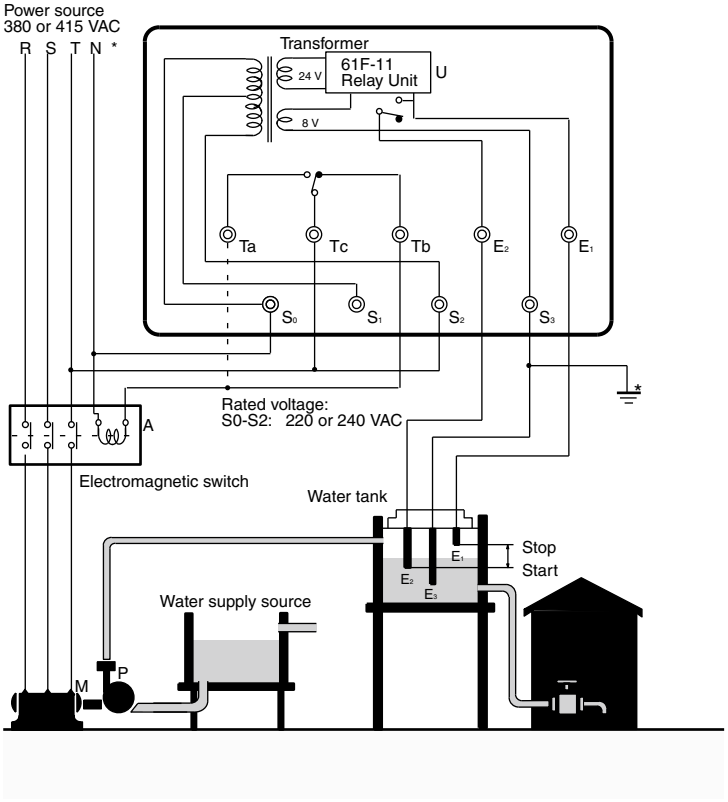


■ Connection with Three-phase Four-line Circuit

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



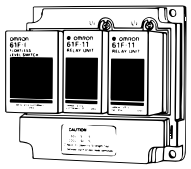
Note: Be sure to ground terminal E3.

Liquid Level Indication and Alarm

Basic Type

61F-I

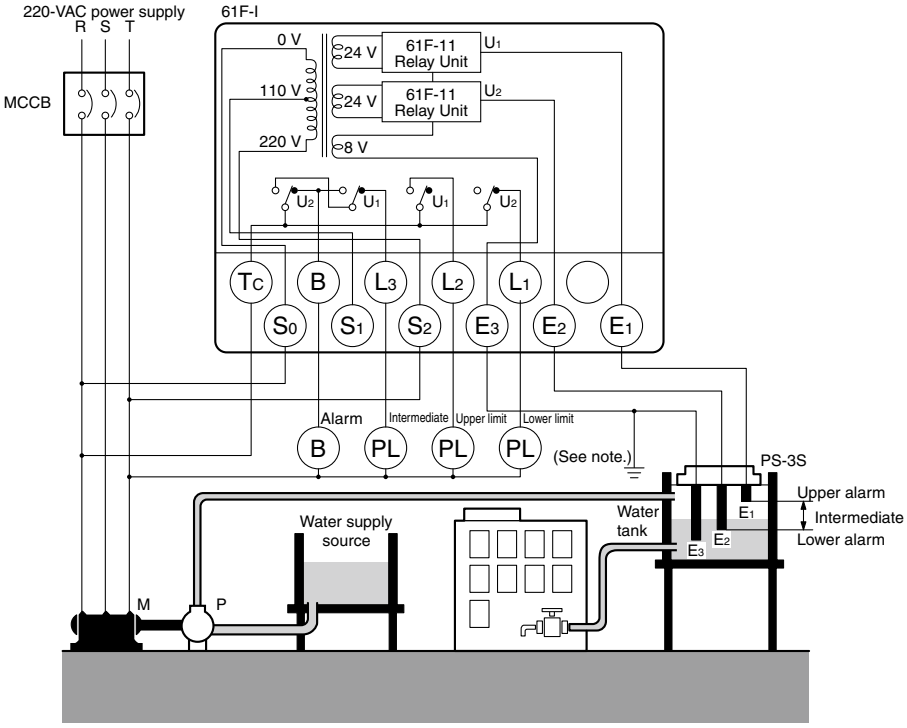
Dimensions: page 13



Liquid Level Indication and Alarm

Connections

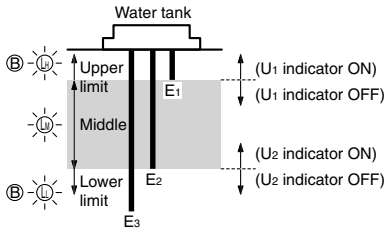
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.



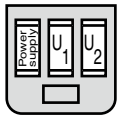
Note: Be sure to ground the common Electrode (the longest Electrode).

Principles of Operation

- When the water level drops below E_2, the lower-limit indicator turns ON and the alarm sounds (U_2 indicator OFF).
- When the water level reaches E_2, the alarm turns OFF and the intermediate indicator turns ON (U_2 indicator ON).
- When the water level rises to E_1, the upper-limit indicator turns ON and the alarm sounds (U_1 indicator ON).



Relay Unit Location

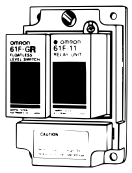


■ Two-Wire Connections

Automatic Water Supply and Drainage Control

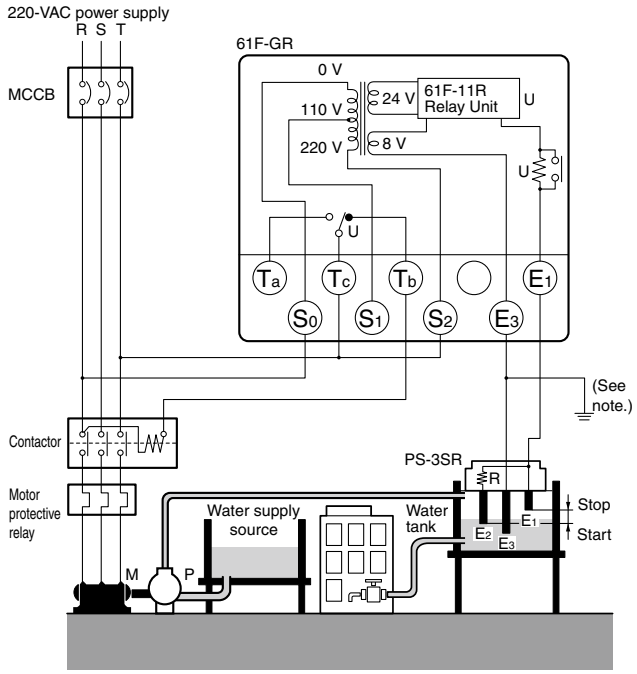
Basic Type

61F-GR



Automatic Water Supply Control

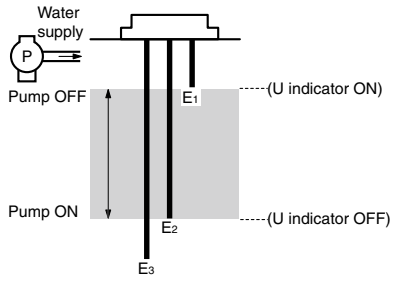
Connections



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

- Connect Tb to the contactor's coil terminal.
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- 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.

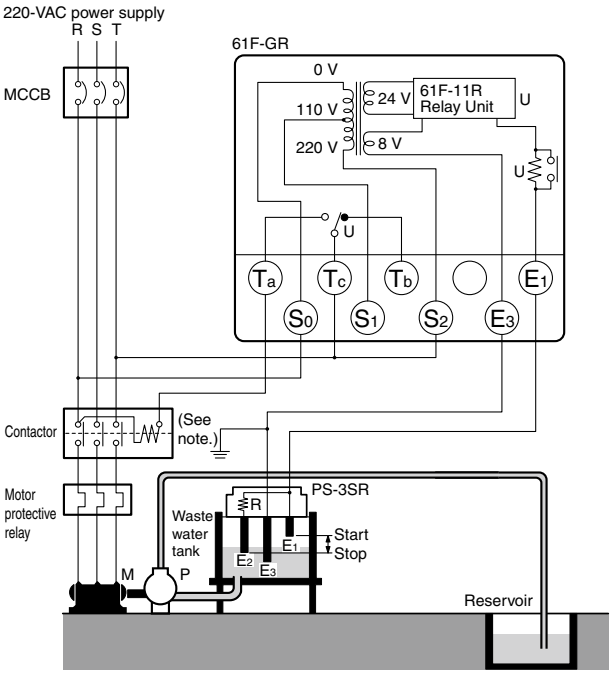
Principles of Operation



The pump stops (U indicator ON) when the water level reaches E_1 and starts (U indicator OFF) when the water level drops below E_2.

Automatic Drainage Control

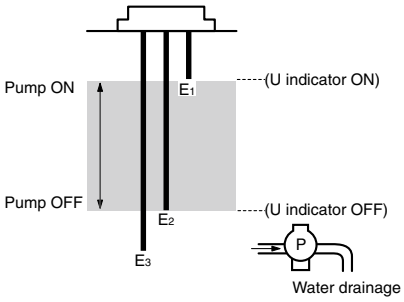
Connections



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 S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- 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.

Principles of Operation



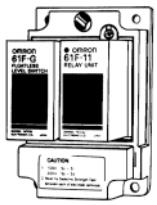
The pump starts (U indicator ON) when the water level reaches E_1 and stops (U indicator OFF) when the water level drops below E_2.

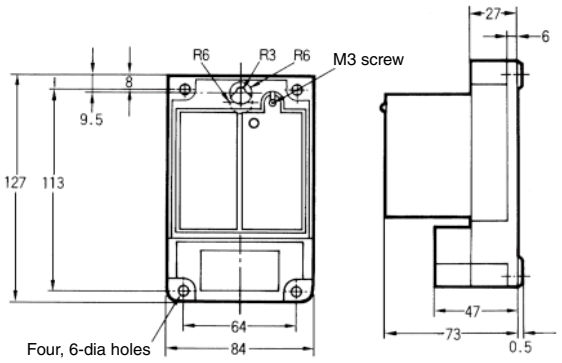
Dimensions

Note: All units are in millimeters unless otherwise indicated.

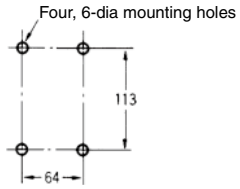
■ Standard Models

61F-G

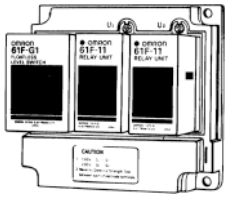


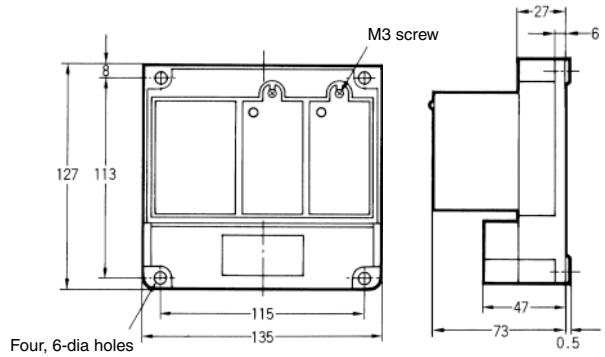


Mounting Holes

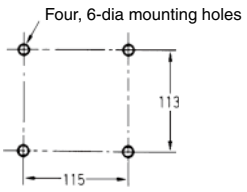


61F-G1
61F-G2
61F-I

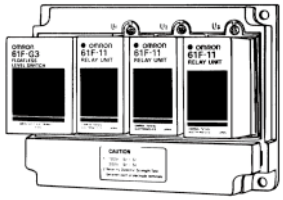


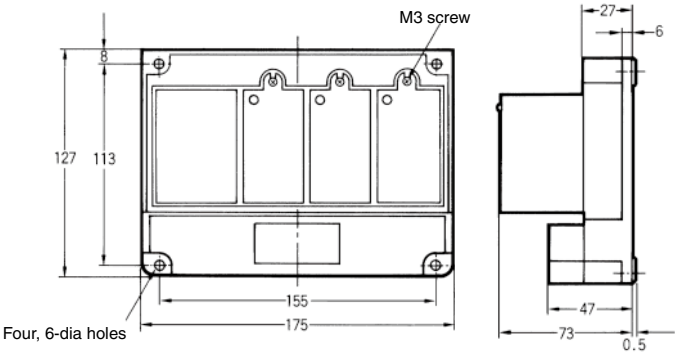


Mounting Holes



61F-G3





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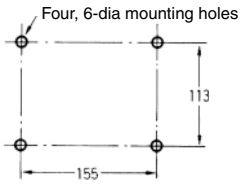
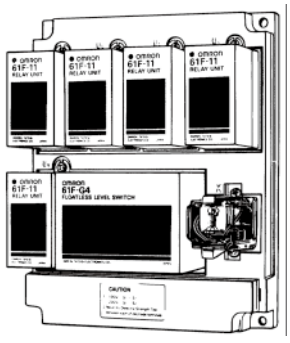
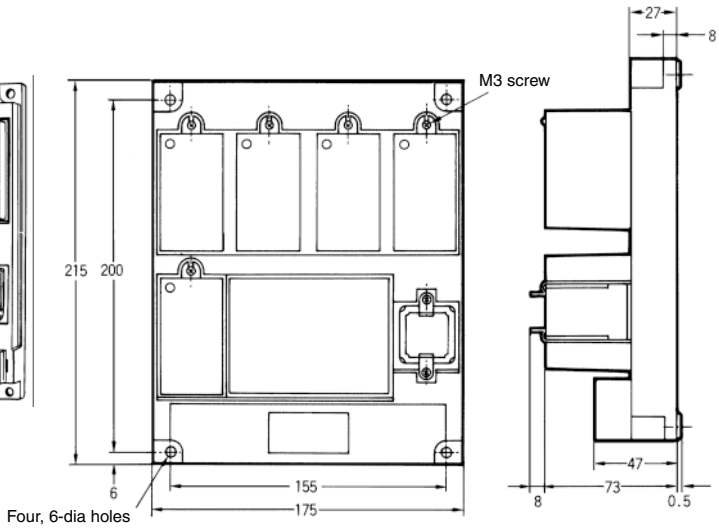
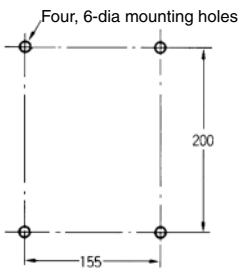


61F-G4





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.

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

Safety Precautions for Floatless Level Controllers

⚠ WARNING

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

Do not attempt to disassemble, repair, or modify the product while the 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.

Precautions for Correct Use

● Operating Environment

- Use and store the Controller within the rated ambient operating temperature, ambient operating humidity, and storage temperature ranges specified for individual models.
- Use the Controller according to the characteristics specified for individual models for vibration, shock, exposure to water, and exposure to oil.
- Install the Controller as far as possible from devices that generate strong high-frequency noise (such as high frequency welders or sewing machines).

● Tighten Terminal Screws to the Specified Torque

When fitting crimping terminals to terminal screws, use a tightening torque of between 0.45 and 0.6 N·m

● Use a Power Supply with Minimal Voltage Fluctuation

Avoid connection to a power supply with a voltage fluctuation greater than or equal to +10% or −15%.

● Consider the Ambient Temperature

Do not install the Controller where it may be exposed to a temperature of 55°C or higher or a humidity of 85% or higher. In particular, install the Controller away from heat-generating equipment incorporating coils or windings. Do not use the Controller outdoors or in locations subject to high humidity, corrosive gases, or direct sunlight.

● Avoid Vibration and Shocks

Do not subject the Controller to vibration or shocks which can cause chattering problems. Do not install the Controller near contactors that generate severe shocks while the contactors are in operation.

● Do Not Test with a Megaohmmeter

During insulation resistance measurements, never apply the megaohmmeter across the Electrode terminals.

● Use Self-holding Electrodes

- Use Self-holding (E2) Electrodes when contactor open/close control is carried out. If E1 Electrodes are used, ripples on the liquid surface can cause incorrect contactor operation and damage to the contacts.
- Be sure to turn OFF the power supply before replacing the plug-in models.

● 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^2, 3-core cabtire cable is used. Test results indicate that the actual wiring length using VCT 3.5-mm^2, 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.

● Keep Power Cables Separate from the Electrode Circuit

Do not pass the leads for the Electrode circuit through the same duct, or near to, high-tension cables or power cables. This can cause noise which leads to malfunctions.

● Ground Correctly

Ground the common Electrode terminal to reduce the effects of noise.

● Use a Surge Suppressor

Connect a 61F-03B(-04B) Surge Suppressor with the Controller's Electrode terminals to protect the circuit from surges. This is particularly important in lightning-prone areas. To further improve protection, install a commercial surge suppressor in the power supply to eliminate surges in the power system.
(Refer to *61F-03B/-04B*.)

● Consider the Response Times

The Controller requires a response time not exceeding 80 ms for operation or 160 ms for reset. Take these response times into account in cases where precise sequence control is required.

● Consider the Liquids to Be Controlled

- The Controller cannot be used for any liquid that has almost no conductivity such as sewage containing oil.
- The Controller cannot be used for any flammable liquid such as gasoline, kerosene, or heavy oil.

● Do Not Share Electrodes

Do not connect a single Electrode to more than one Controller. If the phases of the 8-VAC Electrode-circuit power supplies are opposite to each other, as shown in Fig. 1, an internal close circuit (return circuit) is created (indicated by the arrows). The Controller may malfunction regardless of the liquid level when the Controller power is turned ON. This problem can be overcome by matching the power supply phases, as shown in Fig. 2, but in this configuration the internal impedance of the Controller calculated from the Electrode will be approximately half as large as the internal impedance of a single Controller. Maintain sufficient clearance between Electrodes connected to separate Controllers so that they do not interfere with each other. Common leads, however, can be connected to the ground Electrode.

Fig. 1 Internal Closed Circuit

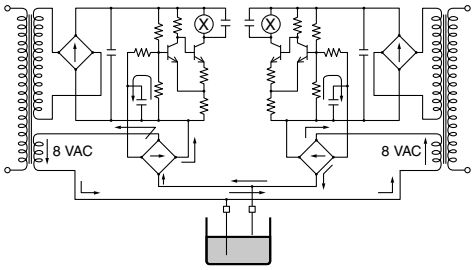
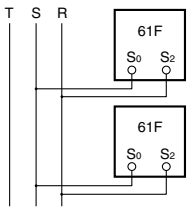


Fig. 2 Match Phases



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Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

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OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS
Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS
Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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