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Floatless Level Switch (Basic Type)
61F-G□

CSM_61F-G__DS_E_4_3

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*.**



Some specifications for 61F-G□ Series products in this catalog have been discontinued at the end of March 2018.

Model Number Structure

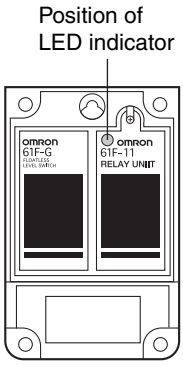
61F-□□
1 2

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



Ordering Information

Type	Set contents	General-purpose	Long-distance, 2 km	Long-distance, 4 km	High-sensitivity
		Model	Model	Model	Model
Application G	61F-G Base x 1 61F-11□ Units x 1	61F-G ✻	61F-GL 2KM ✻	61F-GL 4KM ✻	61F-GH ✻
Application G1	61F-G1 Base x 1 61F-11□ Units x 2	61F-G1 ✻	61F-G1L 2KM	61F-G1L 4KM	61F-G1H ✻
Application G2	61F-G2 Base x 1 61F-11□ Units x 2	61F-G2 ✻	61F-G2L 2KM ✻	61F-G2L 4KM ✻	61F-G2H ✻
Application G3	61F-G3 Base x 1 61F-11□ Units x 3	61F-G3 ✻	61F-G3L 2KM	61F-G3L 4KM	61F-G3H ✻
Application G4	61F-G4 Base x 1 61F-11□ Units x 5 MK3P Relay x 1	61F-G4 ✻	61F-G4L 2KM	61F-G4L 4KM ✻	61F-G4H ✻
Application I	61F-I Base x 1 61F-11□ Units x 2	61F-I ✻	61F-IL 2KM	61F-IL 4KM	61F-IH
Relay Unit	61F-11□ Units x 1	61F-11	61F-11L 2KM	61F-11L 4KM	61F-11H

Type	Set contents	Low-sensitivity	2-wire	Tropical environments	High-temperature
		Model	Model	Model	Model
Application G	61F-G Base x 1 61F-11□ Units x 1	61F-GD	61F-GR	61F-G-TDL ✻	61F-GT ✻
Application G1	61F-G1 Base x 1 61F-11□ Units x 2	61F-G1D	61F-G1R	61F-G1-TDL ✻	61F-G1T
Application G2	61F-G2 Base x 1 61F-11□ Units x 2	61F-G2D	61F-G2R	61F-G2-TDL ✻	61F-G2T ✻
Application G3	61F-G3 Base x 1 61F-11□ Units x 3	61F-G3D	61F-G3R	61F-G3-TDL ✻	61F-G3T
Application G4	61F-G4 Base x 1 61F-11□ Units x 5 MK3P Relay x 1	61F-G4D	61F-G4R	61F-G4-TDL ✻	61F-G4T
Application I	61F-I Base x 1 61F-11□ Units x 2	61F-ID ✻	---	61F-I-TDL ✻	61F-IT
Relay Unit	61F-11□ Units x 1	61F-11D	61F-11R	---	61F-11T

Note: 1. When ordering, specify the desired operating voltage at the end of the model number.

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

└──── Desired supply voltage

2. If you order with a standard model number, the corresponding Relay Units are also delivered as part of a set.
If you order the 61F-G, one 61F-11 Relay Unit is included in the set.

✻ Orders will not be accepted after March 31, 2018. Refer to the following table for the discontinued power supply voltages.

Discontinued at the end of March 2018

61F-G	G	G1	G2	G3	G4	I
Voltage	Model	Model	Model	Model	Model	Model
120/240 V	61F-G 120/240 VAC	61F-G1 120/240 VAC	61F-G2 120/240 VAC	61F-G3 120/240 VAC	61F-G4 120/240 VAC	61F-I 120/240 VAC
115/230 V			61F-G2 115/230 VAC	61F-G3 115/230 VAC	61F-G4 115/230 VAC	61F-I 115/230 VAC
200/220 V	61F-G 200/220VAC					61F-I 200/220 VAC
220/380 V	61F-G 220/380 VAC	61F-G1 220/380 VAC	61F-G2 220/380 VAC	61F-G3 220/380 VAC	61F-G4 220/380 VAC	61F-I 220/380 VAC
120/240 V	61F-GL 120/240 VAC 2KM		61F-G2L 120/240 VAC 2KM			
120/240 V	61F-GL 120/240 VAC 4KM		61F-G2L 120/240 VAC 4KM		61F-G4L 120/240 VAC 4KM	
120/240 V	61F-GH 120/240 VAC	61F-G1H 120/240 VAC	61F-G2H 120/240 VAC	61F-G3H 120/240 VAC	61F-G4H 120/240 VAC	
115 V						61F-ID 115 VAC
120/240 V	61F-GT 120/240 VAC					
120/240 V			61F-G2T 120/240 VAC			
100/200 V	61F-G-TDL 100/200 VAC	61F-G1-TDL 100/200 VAC	61F-G2-TDL 100/200 VAC	61F-G3-TDL 100/200VAC	61F-G4-TDL 100/200 VAC	61F-I-TDL 100/200 VAC
110/220 V	61F-G-TDL 110/220 VAC	61F-G1-TDL 110/220 VAC	61F-G2-TDL 110/220 VAC	61F-G3-TDL 110/220 VAC	61F-G4-TDL 110/220 VAC	

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) It is possible to wire with less than one wiring against general 61F's wiring.
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 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: 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%). For details, refer to *Safety Precautions for Floatless Level Controllers*.

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. For details, refer to *Safety Precautions for Floatless Level Controllers*.

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.
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.

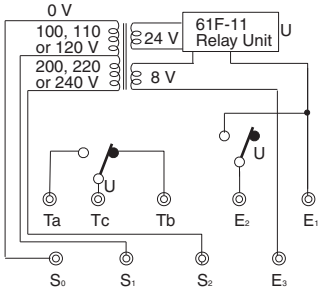
• Advanced Operation

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.

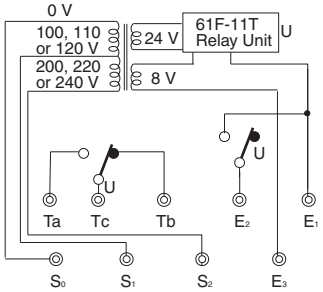
Internal Circuit Diagrams

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.

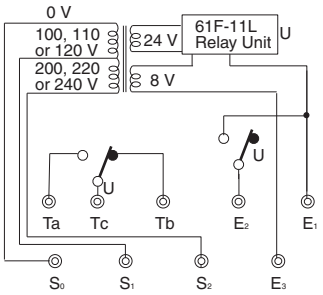
61F-G



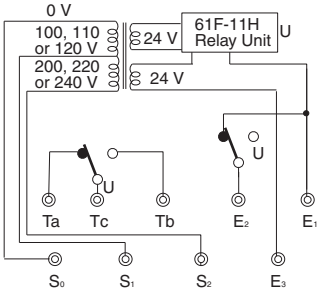
61F-GT



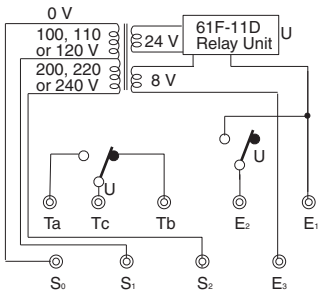
61F-GL



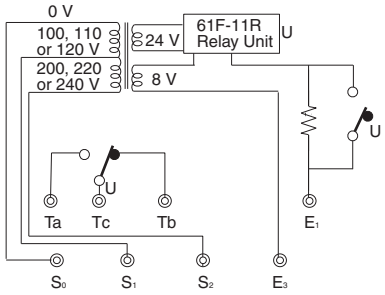
61F-GH (See note.)



61F-GD



61F-GR

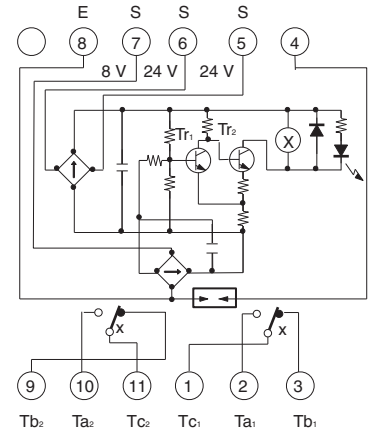


Note: The 61F11H relay deenergizes when there is water present across the Electrodes, whereas the 61F relay energizes when there is water present across the Electrodes.
Also, the terminal connections of those Controllers provided with LED indicators differ from those which have no indicators.

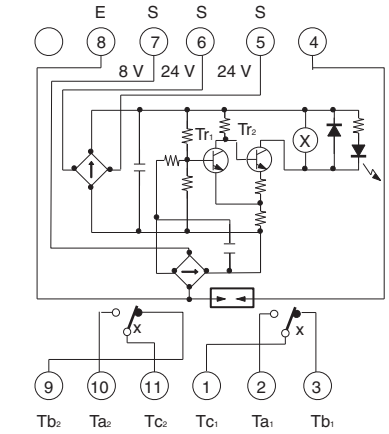
61F-11 Relay Units

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

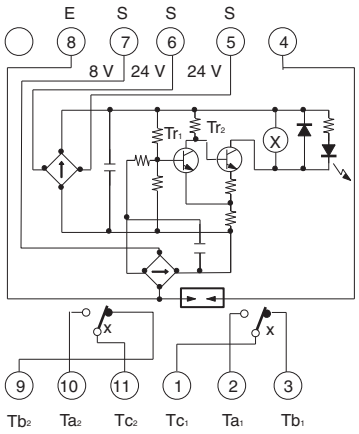
61F-11



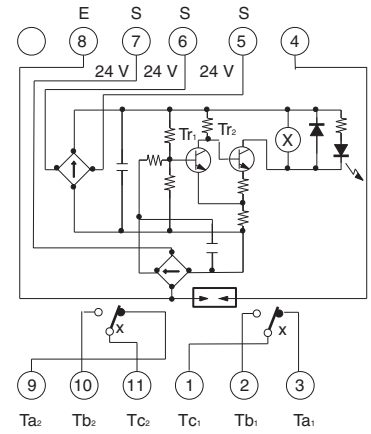
61F-11T



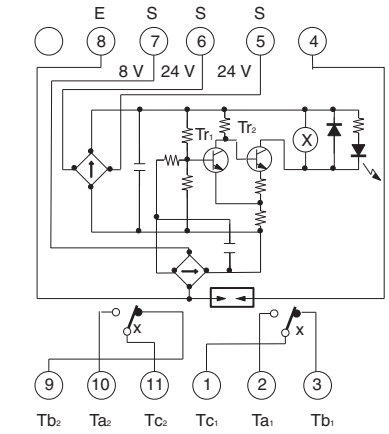
61F-11L



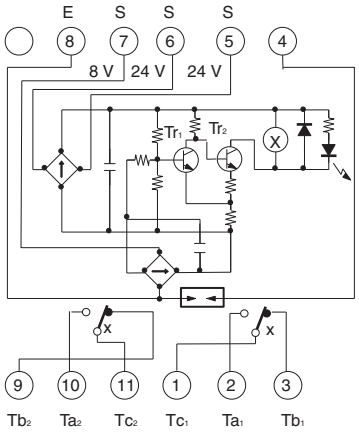
61F-11H (see note)



61F-11D



61F-11R



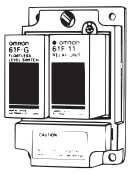
■ Connections

Automatic Water Supply and Drainage Control

Basic Type

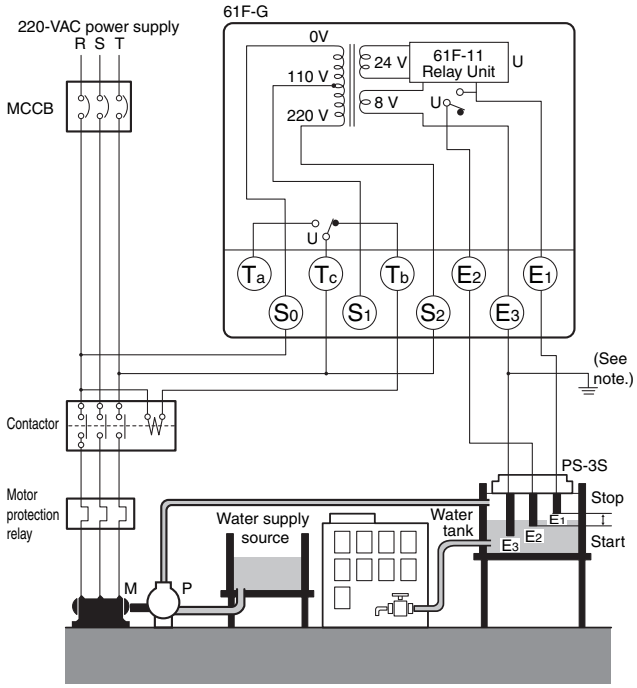
61F-G

Dimensions: page 14



Automatic Water Supply Control

Connections

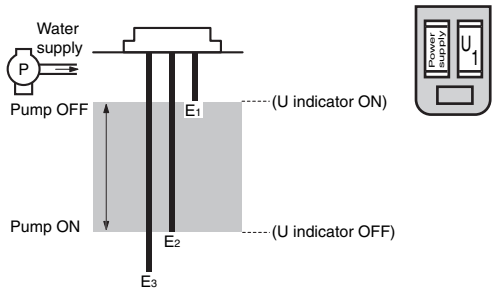


Note: Be sure to ground the common Electrode (the longest Electrode).

- Connect Tb to the contactor's coil terminal.
- Power Supply Connections (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

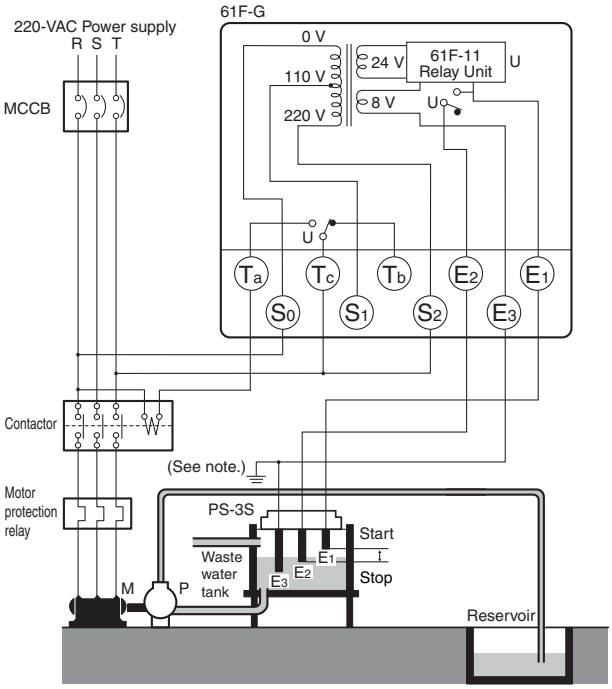
Relay Unit Location



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 Control

Connections

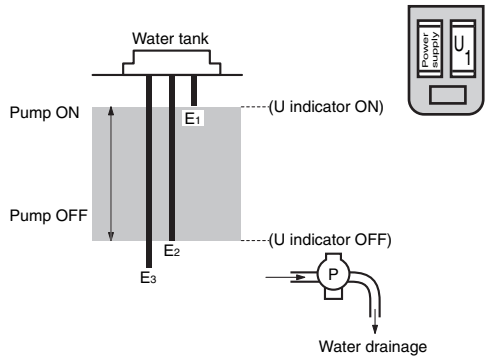


Note: Be sure to ground the common Electrode (the longest Electrode).

- 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.

Principles of Operation

Relay Unit Location

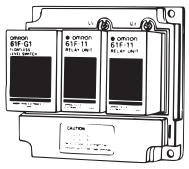


The pump starts (indicator ON) when the water level reaches E_1 and stops (indicator OFF) when the water level drops below E_2.

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

Basic Type

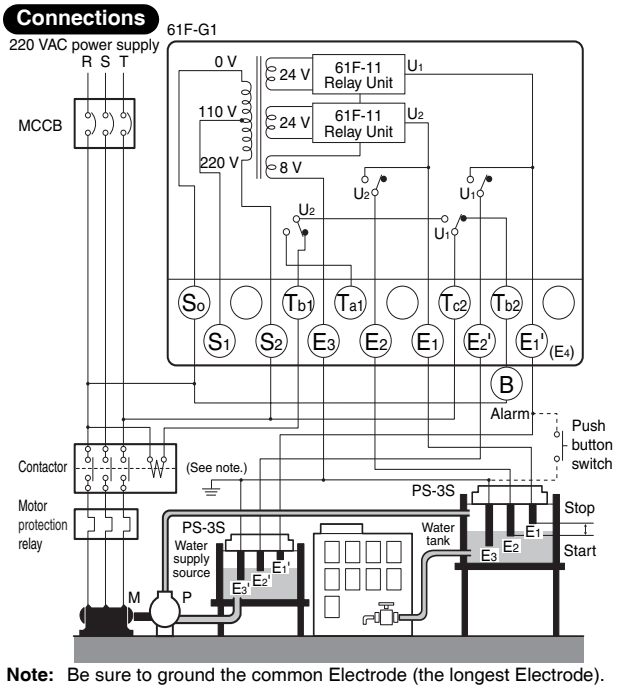
61F-G1



Dimensions: page 14

Automatic Water Supply Control with Pump Idling Prevention

Connections



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

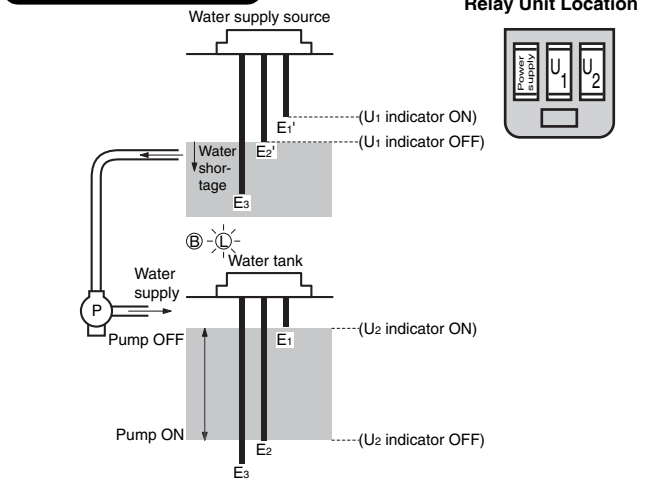
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- Insert a pushbutton switch (NO) between E_1' and E_3, as shown by the dotted lines above.
- Do not press the pushbutton if the low-water alarm sounds and the pump stops during normal operation (U_1 indicator 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

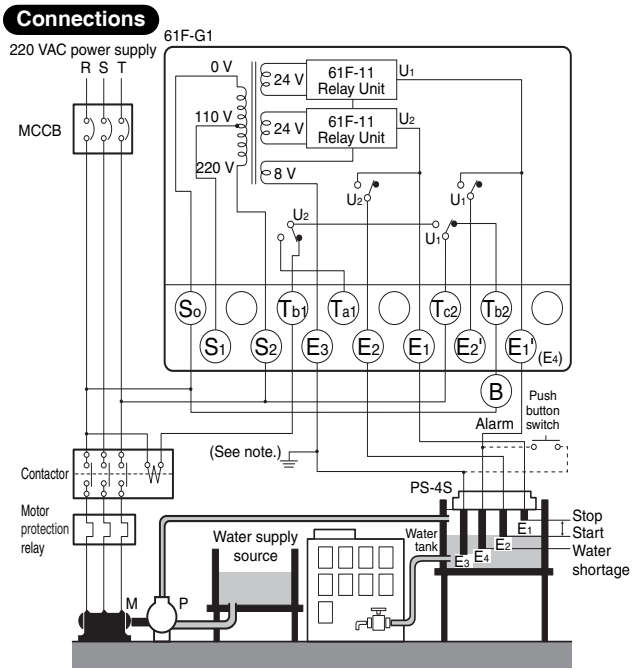
Relay Unit Location



- 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).

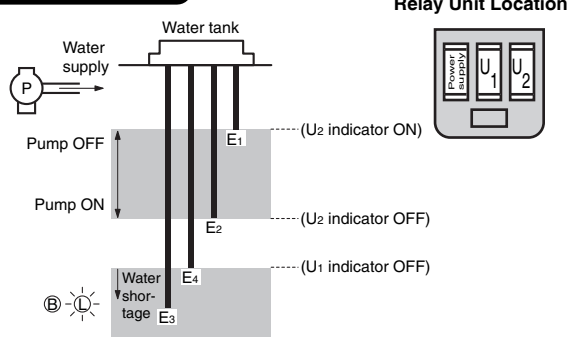
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.
- Insert a pushbutton switch (NO) between E_3 and E_4.
- If the pump stops when the pushbutton switch is released, press it again.

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



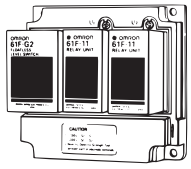
- The pump stops (U_2 indicator ON) when the water level reaches E_1 and starts (U_2 indicator OFF) when the water level drops below E_2.
- If the water level drops below E_4 for any reason, the pump stops (U_1 indicator OFF) and the alarm sounds.

Automatic Drainage Control and Water Supply with Abnormal Water Increase Alarm

Basic Type

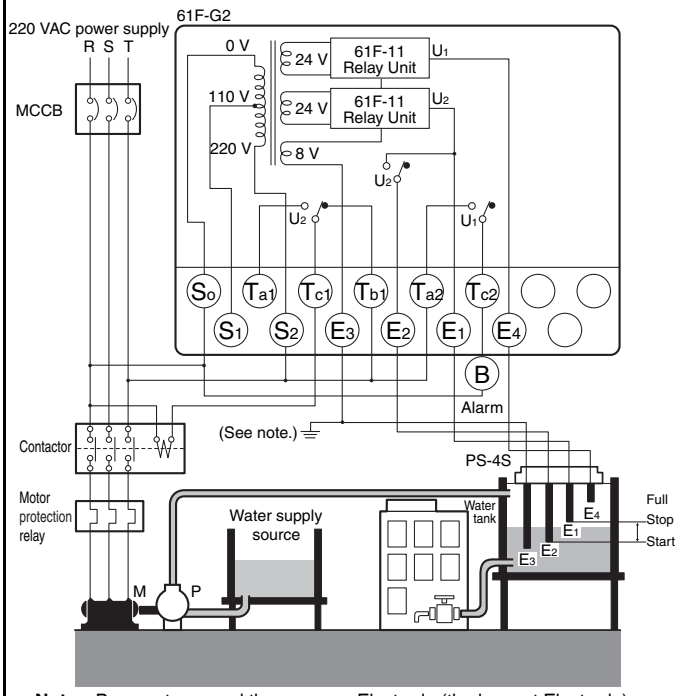
61F-G2

Dimensions: page 14



Automatic Water Supply with Overfull Tank Alarm

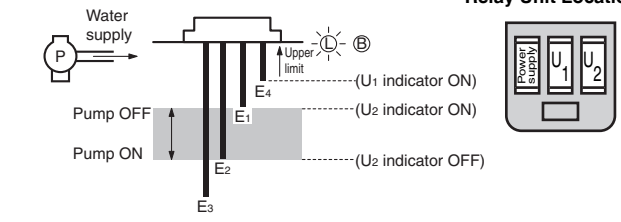
Connections



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

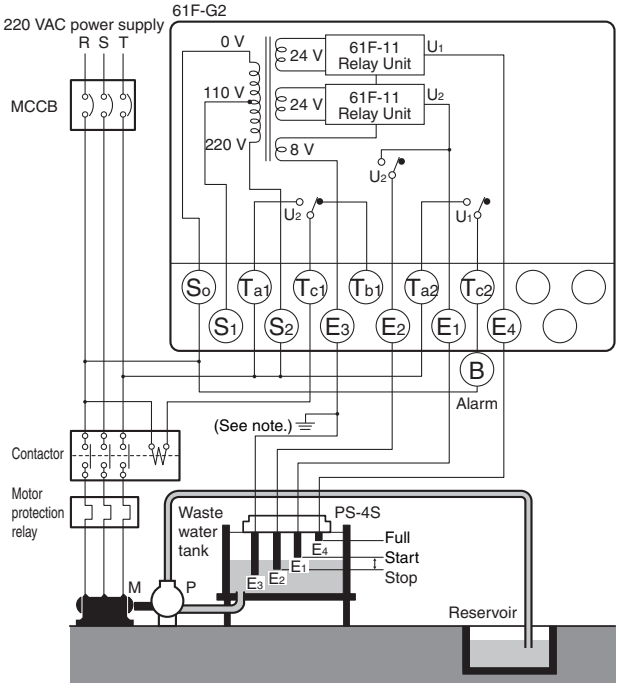


Relay Unit Location

- 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 Overfull Tank Alarm

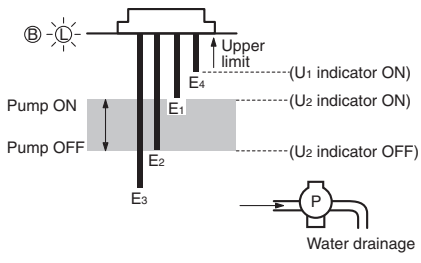
Connections



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

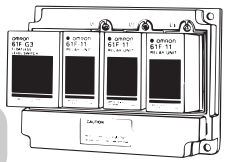


- The pump starts (U_2 indicator OFF) when the water level reaches E_1 and stops (U_2 indicator ON) when the water level drops below E_2.
- If the water level reaches E_4 for any reason, the alarm sounds (U_1 indicator ON).

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

Basic Type

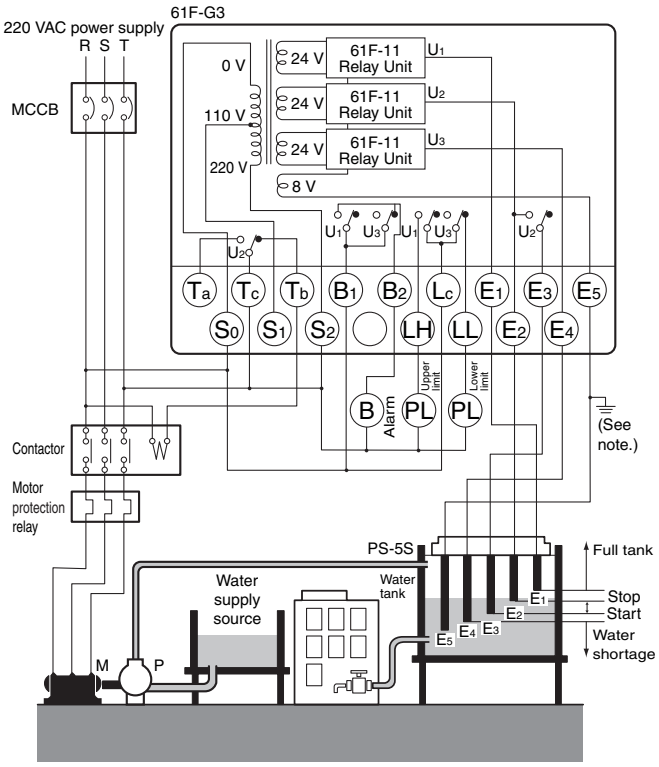
61F-G3



Dimensions: page 14

Automatic Water Supply with Abnormal Water Increase and Water Shortage Alarms

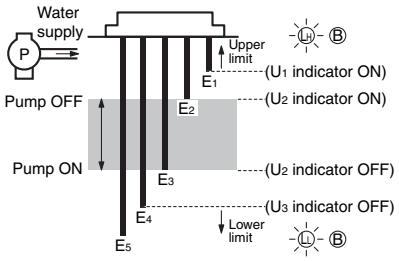
Connections



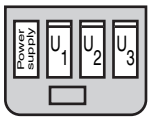
Note: Be sure to ground the common Electrode (the longest Electrode).

- 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



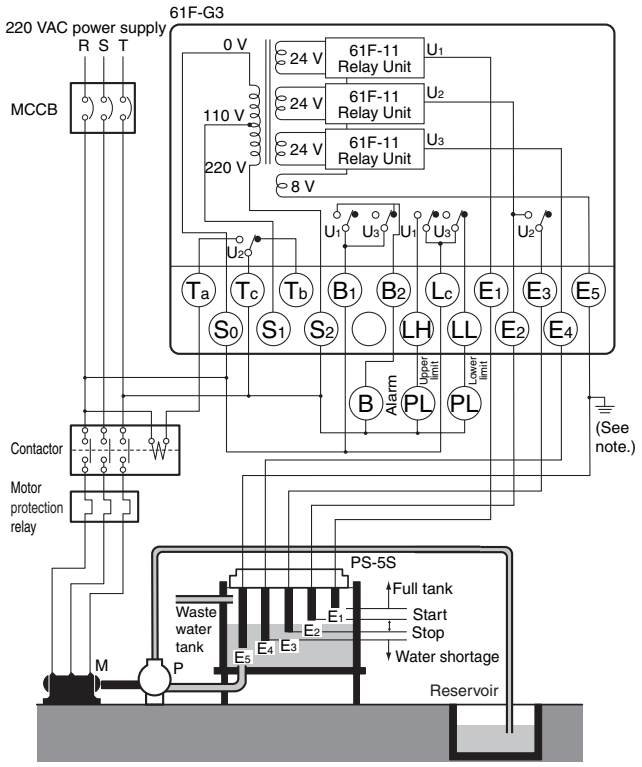
Relay Unit Locations



- 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

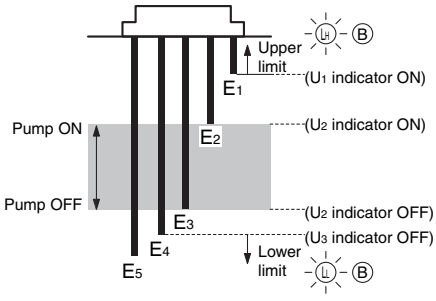
Connections



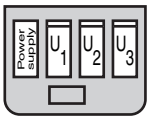
Note: Be sure to ground the common Electrode (the longest Electrode).

- 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



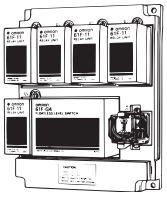
- The pump starts (U_2 indicator ON) when the water level reaches E_2 and stops (U_2 indicator OFF) when the water level drops below E_3.
- If the water level rises to E_1 for any reason, the upper-limit indicator turns ON and the alarm sounds (U_1 indicator ON). If the water level drops below E_4 for 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 14



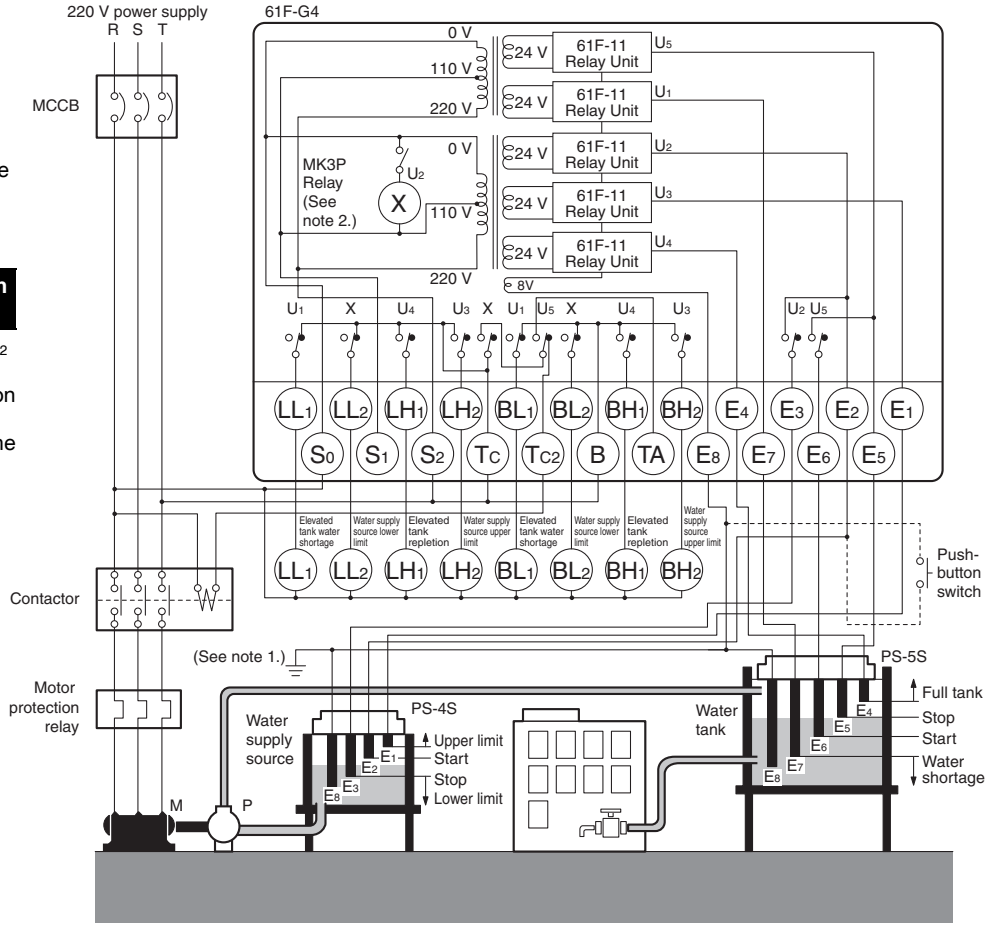
Automatic Water Supply Control with Water Source Level Indication, Prevention of Pump Idling Due to Water Shortage, and Indication of Water Level in Tank

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.

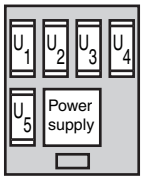


Note: Be sure to ground the common Electrode (the longest Electrode).

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

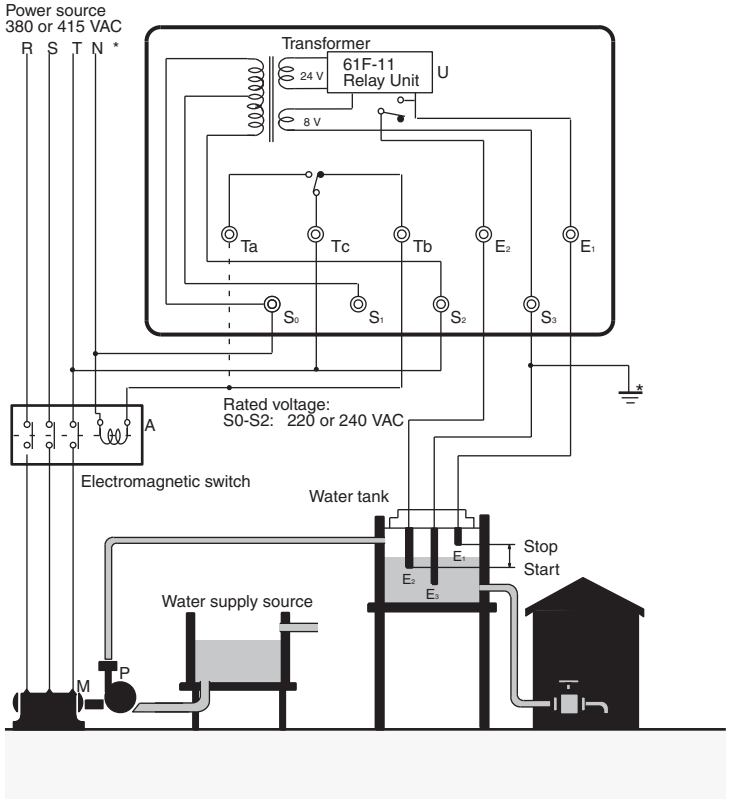


■ Connection with Three-phase Four-line Circuit

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



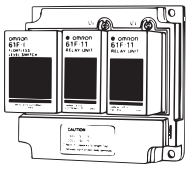
Note: Be sure to ground terminal E3.

Liquid Level Indication and Alarm

Basic Type

61F-I

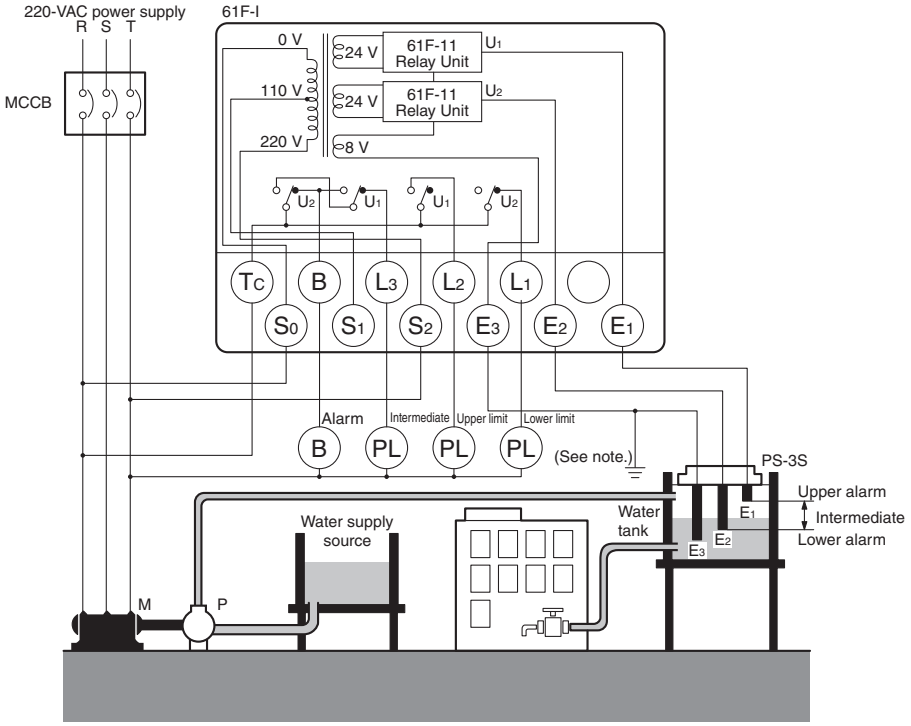
Dimensions: page 14



Liquid Level Indication and Alarm

Connections

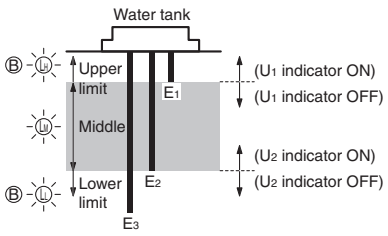
- Power Supply Connections
  110 VAC: Connect S_0 and S_1.
  220 VAC: Connect S_0 and S_2.



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

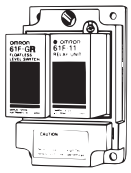


■ Two-Wire Connections

Automatic Water Supply and Drainage Control

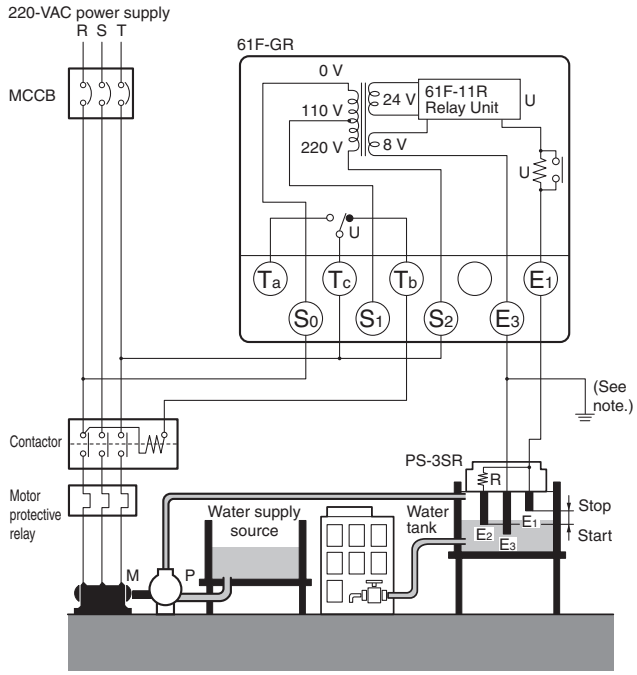
Basic Type

61F-GR



Automatic Water Supply Control

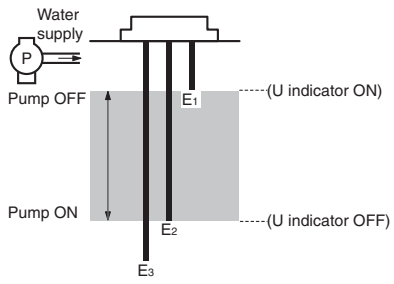
Connections



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.

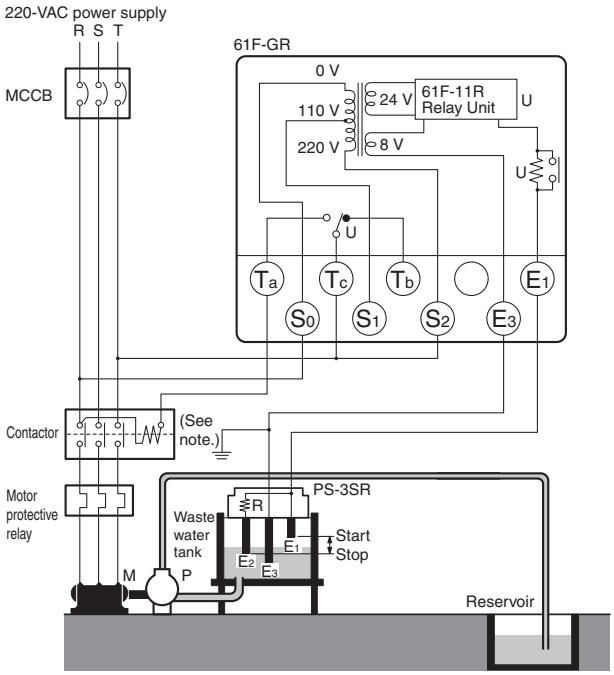
Principles of Operation



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

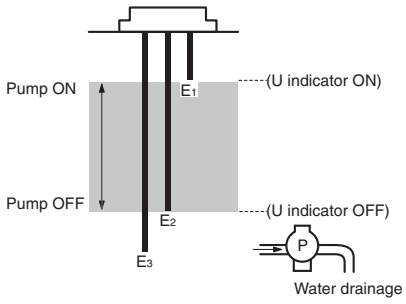
Connections



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



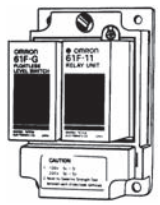
The pump starts (U indicator ON) when the water level reaches E_1 and stops (U indicator OFF) when the water level drops below E_2.

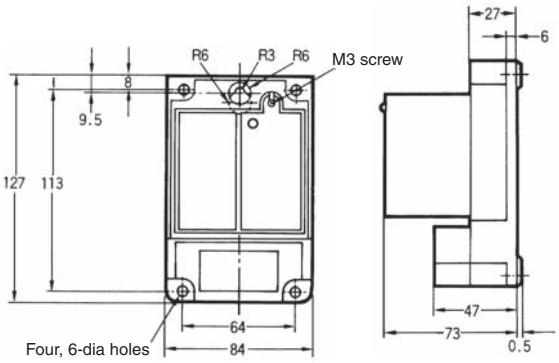
Dimensions

Note: All units are in millimeters unless otherwise indicated.

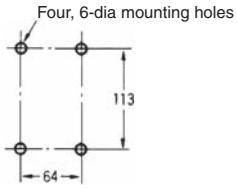
■ Standard Models

61F-G

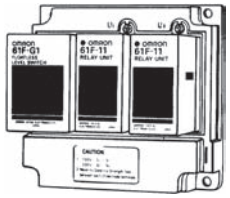


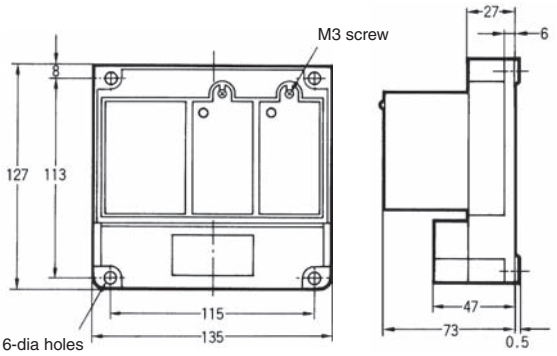


Mounting Holes

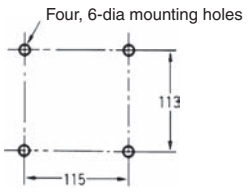


61F-G1
61F-G2
61F-I

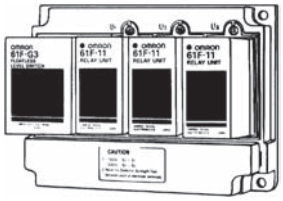


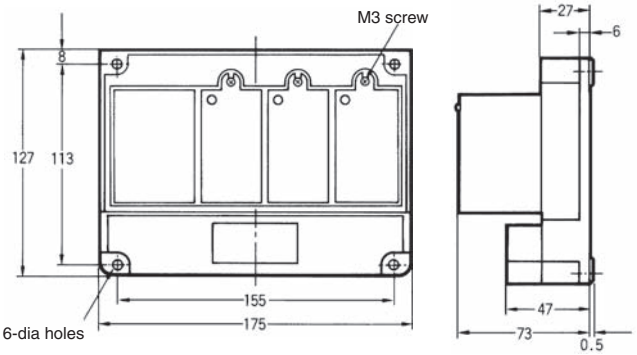


Mounting Holes

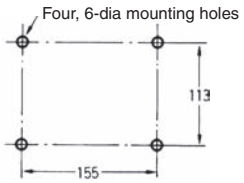


61F-G3

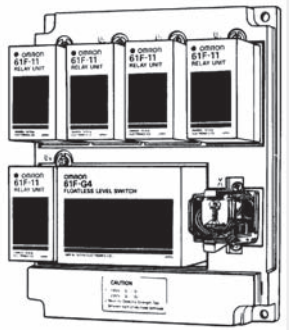


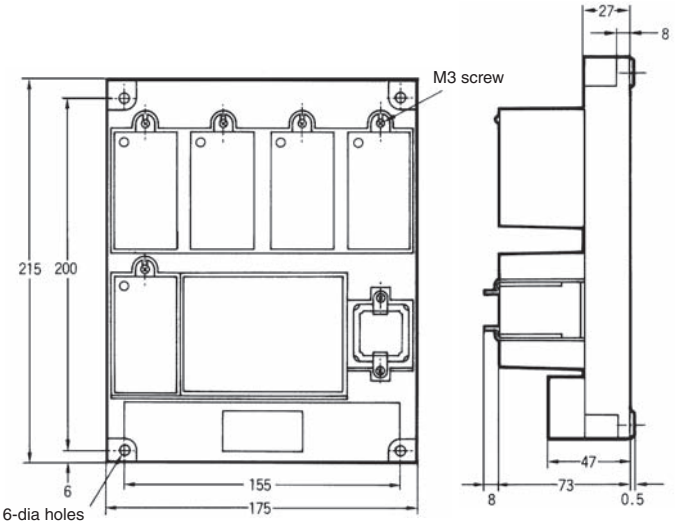


Mounting Holes

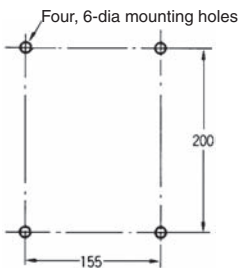


61F-G4





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.

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

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2018.4

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