Floatless Level Switch (Compact, Plug-in Type)

61F-GP-N□

Cat. No. N42I-E-01

Space-saving Design Ideal for Control Panel Downsizing. Easy Maintenance.

- Compact: 49.4 × 38 × 84 mm (H×W×D).
- Easy identification of operating status with LED operation indicator.
- Independent DPDT contacts on 11-Pin Models.
- CE marking and UL/CSA compliance.

⚠ Refer to *Safety Precautions for Floatless Level Controllers*.

■ Model Number Legend

61F-GP-□□
1 2

1. No. of Pins
- N: 11 pins
- N8: 8 pins

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 (for 2 km)	Long-distance (for 4 km)
	Model	Model	Model
11-pin	61F-GP-N	61F-GP-NL 2KM	61F-GP-NL 4KM

Type	High-sensitivity	Low-sensitivity	Two-wire
	Model	Model	Model
11-pin	61F-GP-NH	61F-GP-ND	61F-GP-NR

Type	Tropical environments	High-temperature
	Model	Model
8-pin	61F-GP-N-TDL	61F-GP-NT

Type	General-purpose	Long-distance (for 2 km)	Long-distance (for 4 km)
	Model	Model	Model
8-pin	61F-GP-N8	61F-GP-N8L 2KM	61F-GP-N8L 4KM

Type	High-sensitivity	Low-sensitivity	Two-wire
	Model	Model	Model
8-pin	61F-GP-N8H 61F-GP-N8HY	61F-GP-N8D	61F-GP-N8R

Note: When ordering, specify the desired operating voltage at the end of the model number.
Example: 61F-GP-N [220 VAC]
Desired supply voltage

■ Compact Plug-in Models (11-pin Type)

Specifications

Item	General-purpose Controller 61F-GP-N	High-temperature Controller 61F-GP-NT	Long-distance Controllers 61F-GP-NL 2KM (for 2 km) 61F-GP-NL 4KM (for 4 km)	High-sensitivity Controller 61F-GP-NH (see note 4)	Low-sensitivity Controller 61F-GP-ND	Two-wire Controller 61F-GP-NR
Controlling materials and operating conditions	For control of ordinary purified water or sewage water	For control of ordinary purified water or sewage where operating 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	24, 100, 110, 120, 200, 220, 230 or 240 VAC; 50/60 Hz					
Operating voltage range	85% to 110% of rated voltage					
Interelectrode voltage	8 VAC					
Interelectrode current	Approx. 1 mA AC max.			Approx. 0.12 mA AC max.	Approx. 1 mA AC max.	
Power consumption	Approx. 3.5 VA max.					
Interelectrode operate resistance	0 to approx. 4 kΩ	0 to approx. 4 kΩ	0 to approx. 1.3 kΩ (for 2 km) 0 to approx. 0.5 kΩ (for 4 km)	Approx. 10 kΩ to approx. 40 kΩ (see note 3)	0 to approx. 1.3 kΩ	0 to approx. 2 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. 100 k to ∞ Ω	Approx. 4 k to ∞ Ω	Approx. 15 k to ∞ Ω
Response time	Operate:80 ms max. Release:160 ms max.					
Cable length (see note 1)	1 km max.	600 m max.	2 km max. 4 km max.	50 m max.	1 km max.	800 m max.
Control output	1 A, 250 VAC (Inductive load: cosϕ = 0.4) 3 A, 250 VAC (Resistive load)					
Ambient temperature	Operating:–10 to 55°C (–10 to 70°C for high-temperature controller)					
Ambient humidity	Operating:45% to 85% RH					
Insulation resistance (see note 2)	100 MΩ min. (at 500 VDC)					
Dielectric strength (see note 2)	2000 VAC, 50/60 Hz for 1 min.					
Life expectancy	Electrical: 100,000 operations min. Mechanical: 5,000,000 operations min.					
Weight	Approx. 155 g					
Accessories	Hold-down clip PFC-N8					

Note: 1. 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*.

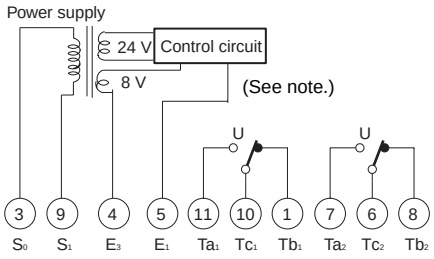
2. The insulation resistance and dielectric strength indicate values between power terminals and Electrode terminals, between power terminals and contact terminals, and between Electrode terminals and contact terminals. For details, refer to *Safety Precautions for Floatless Level Controllers*.

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

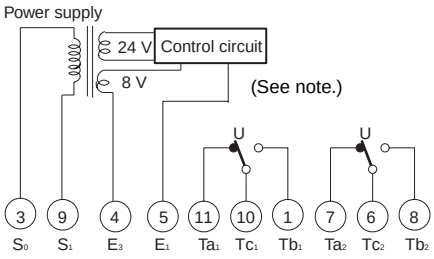
4. 61F-GP-NH High-sensitivity Controller uses advanced operation.
When the power supply voltage is applied, if there are some liquids between the electrodes (ground and operation electrodes), the internal relay will not operate.
When the power supply voltage is applied, if there are no liquids between the electrodes (ground and operation electrodes), the internal relay will operate.
If the advanced operation does not satisfy applications, consider using 61F-N8HY controller which uses sequential operation.

Internal Circuit Diagrams

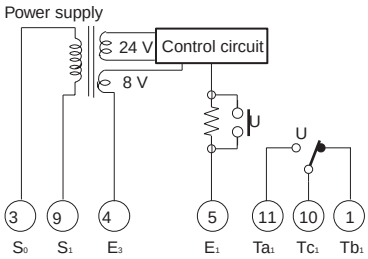
61F-GP-N/-NT/-NL/-ND



61F-GP-NH



61F-GP-NR



Note: When applying a self-holding circuit, short between terminals 5 and 6 and use terminal 7 as E_2.

■ Connections

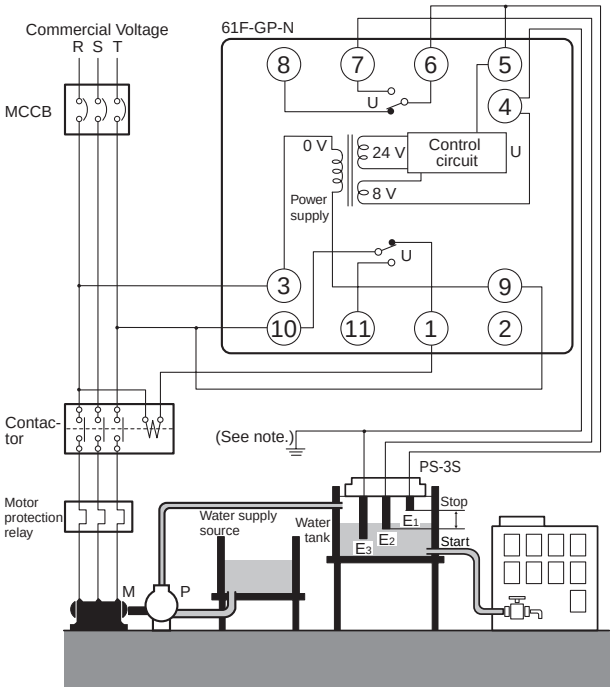
Automatic Water Supply and Drainage Control

Compact, Plug-in Type
61F-GP-N

Dimensions:
page 14

Automatic Water Supply Control

Connections



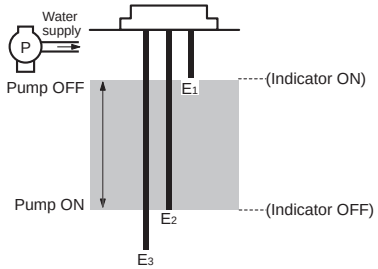
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

Connection Sockets
PF113A (Front-connecting)
PL11 (Rear-connecting)

Connect terminal 1 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

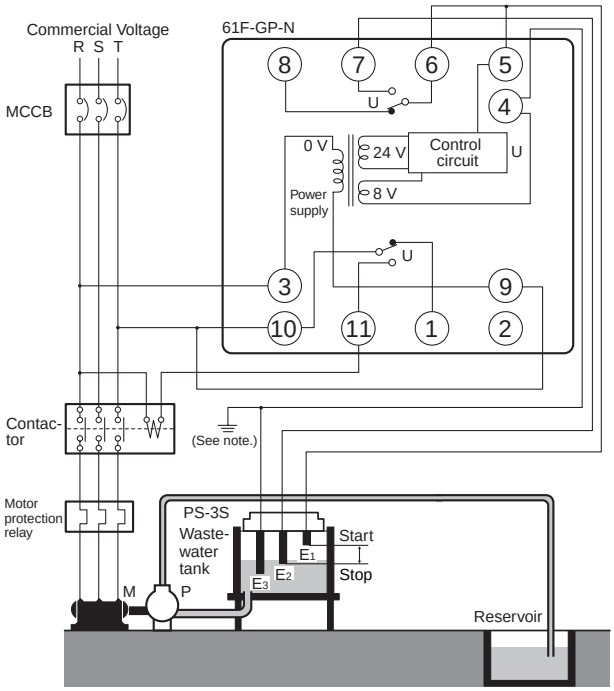
Principles of Operation



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

Automatic Drainage Control

Connections



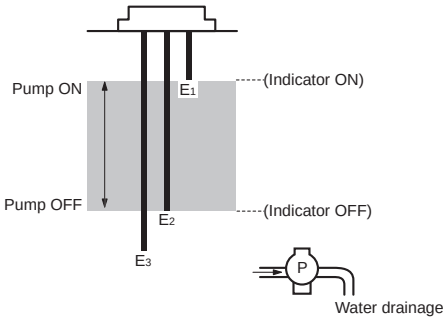
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

Connection Sockets
PF113A (Front-connecting)
PL11 (Rear-connecting)

Connect terminal 1 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

Principles of Operation



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

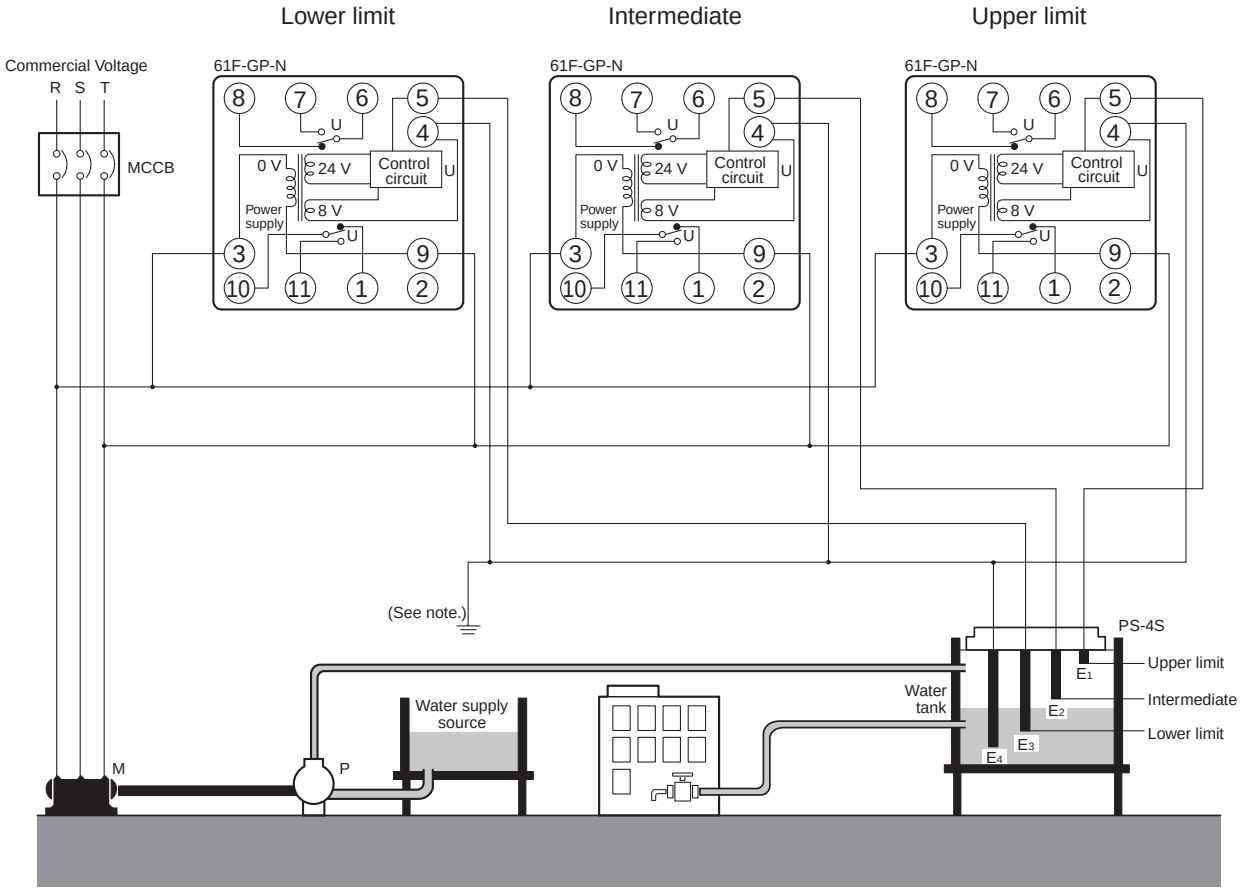
Liquid Level Indication (Connection Example)

Compact, Plug-in Type
61F-GP-N

Dimensions:
page 14

Liquid Level Indication

Connections



Note: The power supply phases (terminals 3 to 9) can be matched to use the same ground for the common Electrode (the longest Electrode, terminal 4).

Principles of Operation

- Terminals 6 and 7, and terminals 10 and 11 on the lower -limit 61F-GP-N are shorted when the water level reaches E_3 (indicator ON).
- Terminals 6 and 7, and terminals 10 and 11 on the intermediate 61F-GP-N are shorted when the water level reaches E_2 (indicator ON).
- Terminals 6 and 7, and terminals 10 and 11 on the upper-limit 61F-GP-N are shorted when the water level reaches E_1 (indicator ON).

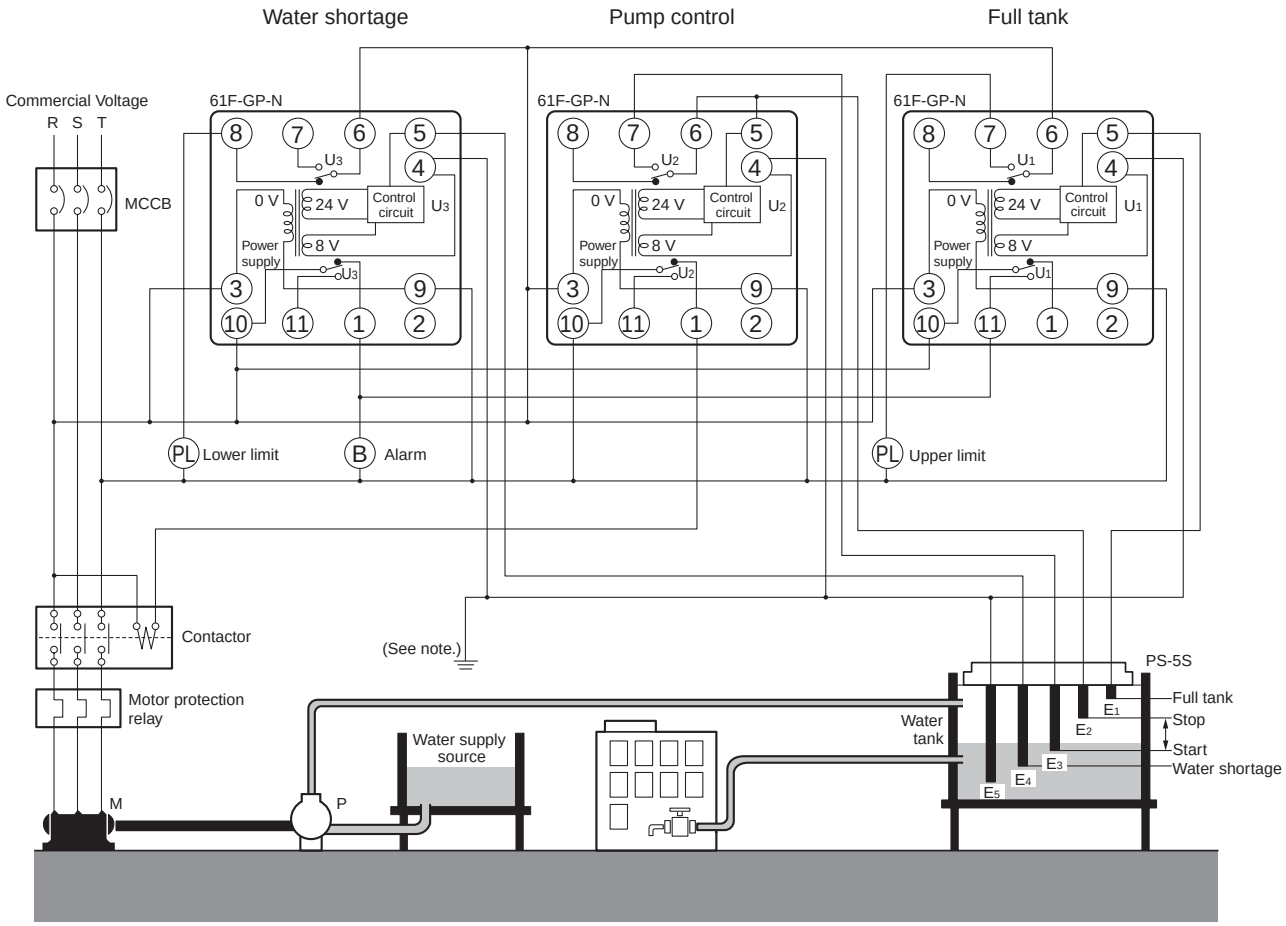
Replacing 61F-G3N Functions (Automatic Water Supply Control with Abnormal Water Increase and Water Shortage Alarms)

Compact, Plug-in Type
61F-GP-N

Dimensions:
page 14

Replacing 61F-G3N Functions

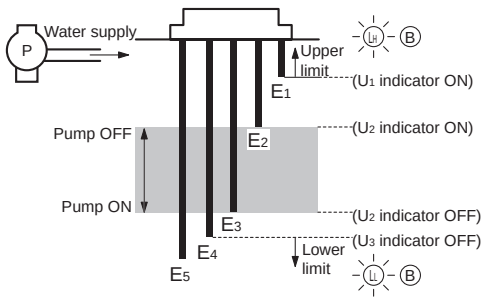
Connections



Note: The power supply phases (terminals 3 to 9) can be matched to use the same ground for the common Electrode (the longest Electrode, terminal 4).

Principles of Operation

- The pump stops when the water level reaches E_2 (U_2 indicator ON) and starts when the water level drops below E_3 (U_2 indicator OFF).
- 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).



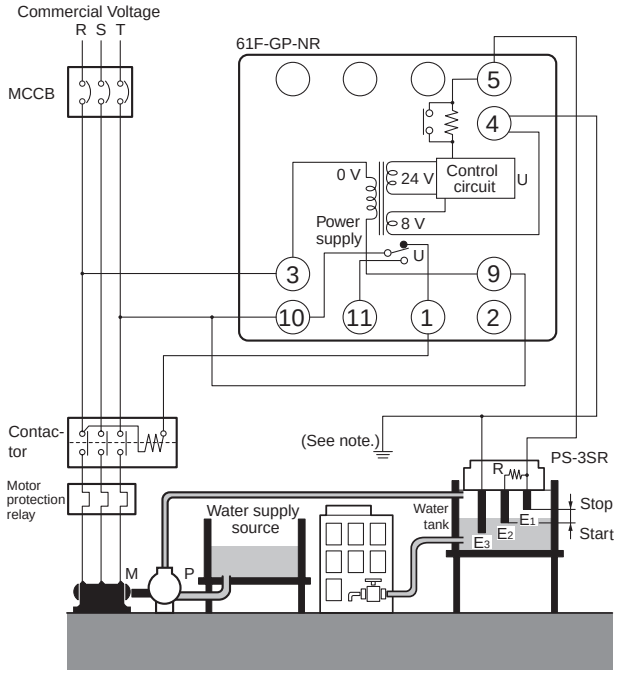
Two-Wire Connections
Automatic Water Supply and Drainage Control

Compact, Plug-in Type
61F-GP-NR

Dimensions:
page 14

Automatic Water Supply Control

Connections



Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

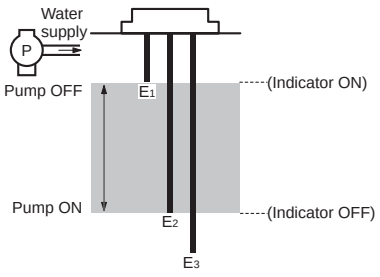
Connection Sockets
PF113 (Front-connecting)
PL11 (Rear-connecting)

- Connect terminal 1 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

- With 2-wire connections, only two wires are required between the 61F-GP-NR 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.)

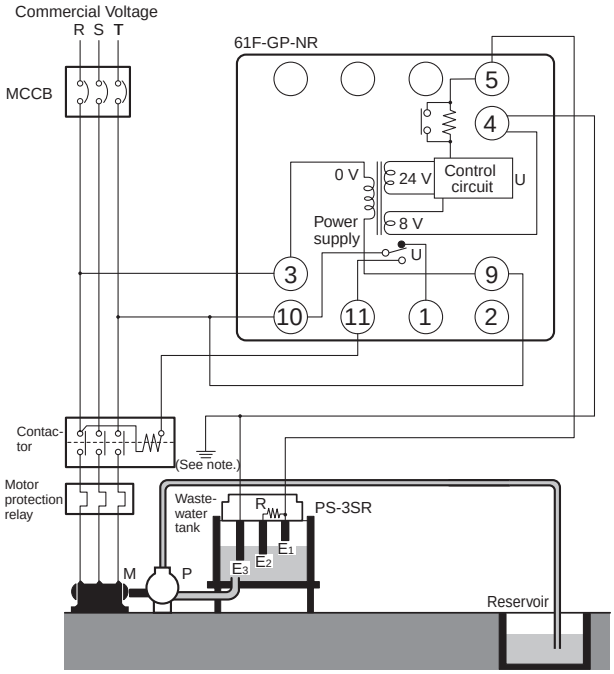
Principles of Operation



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

Automatic Drainage Control

Connections



Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

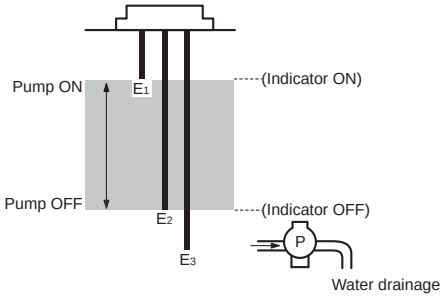
Connection Sockets
PF113 (Front-connecting)
PL11 (Rear-connecting)

- Connect terminal 11 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

- With 2-wire connections, only two wires are required between the 61F-GP-NR 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.)

Principles of Operation

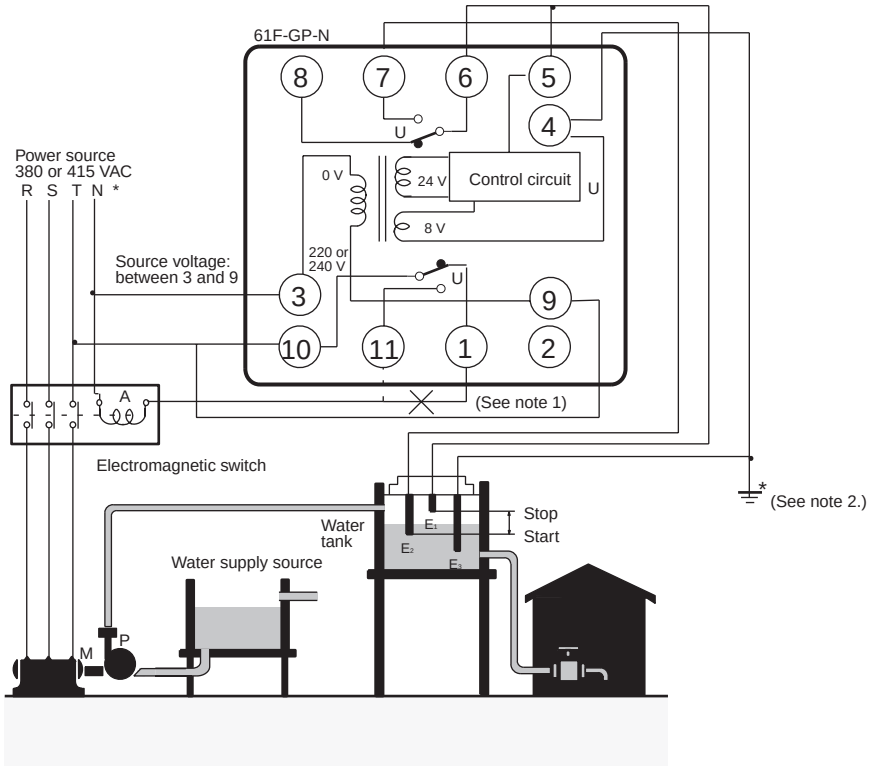


The pump starts when the water level reaches E_1 (indicator ON) and stops when the water level drops below E_2 (indicator OFF).

■ 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-GP-N□ 220 or 240 VAC



Note: 1. The diagram shows the connections for the water supply. When draining, change the connection from terminal 1 to terminal 11.
2. Be sure to ground terminal 4.

■ Compact Plug-in Models (8-pin Type)

Specifications

Item	General-purpose Controller 61F-GP-N8 61F-GP-N8Y (see note 4)	Long-distance Controllers 61F-GP-N8L 2KM (for 2 km) 61F-GP-N8L 4KM (for 4 km)	High-sensitivity Controllers 61F-GP-N8H 61F-GP-N8HY (see note 4)	Low-sensitivity Controller 61F-GP-N8D	Two-wire Controller 61F-GP-N8R	Variable Sensitivity Controller 61F-GP-N8-V50
Controlling materials and operating conditions	For control of ordinary purified water or sewage water	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)	For control of cases where variable sensitivity control is required such as detection of frothon the surface of a liquid, control of soil moisture content, or detection of degree of water pollution
Supply voltage	24, 100, 110, 120, 200, 220, 230 or 240 VAC; 50/60 Hz					24, 110, 220 or 240 VAC; 50/60 Hz
Operating voltage range	85% to 110% of rated voltage					
Interelectrode voltage	8 VAC		24 VAC	8 VAC		24 VAC
Interelectrode current	Approx. 1 mA AC max.		Approx. 0.4 mA AC max.	Approx. 1 mA AC max.		Approx. 3 mA AC max.
Power consumption	Approx. 3.5 VA max.					
Interelectrode operate resistance	0 to approx. 4 kΩ	0 to 1.3 kΩ (for 2 km) 0 to 0.5 kΩ (for 4 km)	Approx. 15 kΩ to approx. 70 kΩ (see note 3)	0 to approx. 1.3 kΩ	0 to approx. 2 kΩ	0 to 50 kΩ (Variable)
Interelectrode release resistance	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. 4 k to ∞ Ω	Approx. 15 k to ∞ Ω	Operating resistance +50 kΩ max.
Response time	Operate: 80 ms max. Release: 160 ms max.					
Cable length (see note 1)	1 km max.	2 km max. 4 km max.	50 m max.	1 km max.	800 m max.	50 m max.
Control output	1 A, 250 VAC (Inductive load: cosϕ = 0.4) 3 A, 250 VAC (Resistive load)					
Ambient temperature	Operating: –10 to 55°C					
Ambient humidity	Operating: 45% to 85% RH					
Insulation resistance (see note 2)	100 MΩ min. (at 500 VDC)					
Dielectric strength (see note 2)	2000 VAC, 50/60 Hz for 1 min.					
Life expectancy	Electrical: 100,000 operations min. Mechanical: 5,000,000 operations min.					
Weight	Approx. 155 g					
Accessories	Hold-down clip PFC-N8					

Note: 1. 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.

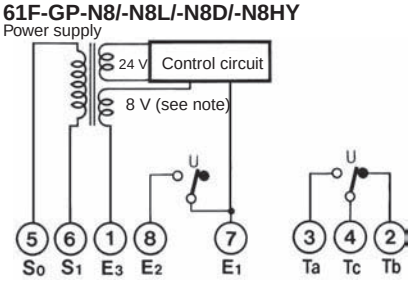
2. The insulation resistance and dielectric strength indicate values between power terminals and Electrode terminals, between power terminals and contact terminals, and between Electrode terminals and contact terminals.

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

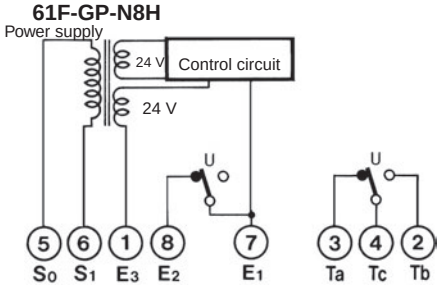
4. 61F-GP-N8H/-N8Y High-sensitivity Controllers use advanced operation.
When the power supply voltage is applied, if there are some liquids between the electrodes (ground and operation electrodes), the internal relay will not operate.
When the power supply voltage is applied, if there are no liquids between the electrodes (ground and operation electrodes), the internal relay will operate.
If the advanced operation does not satisfy applications, consider using 61F-N8HY controller which uses sequential operation.

Internal Circuit Diagrams

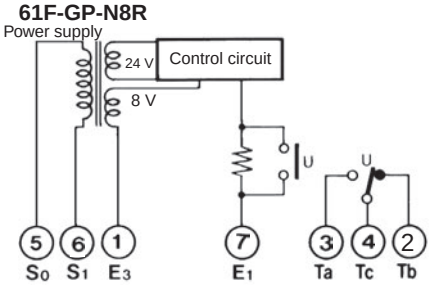
61F-GP-N8/-N8L/-N8D/-N8HY



61F-GP-N8H

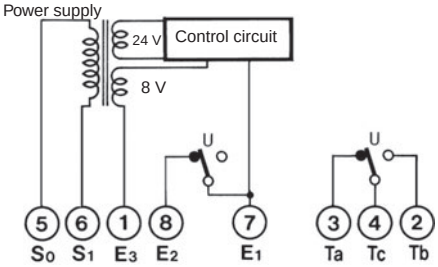


61F-GP-N8R

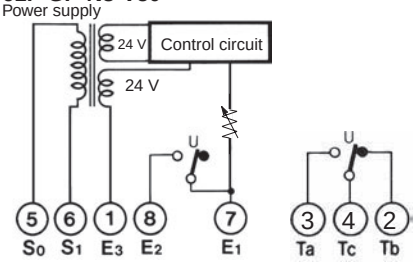


Note: 24 V for the 61F-GP-N8HY.

61F-GP-N8Y



61F-GP-N8-V50



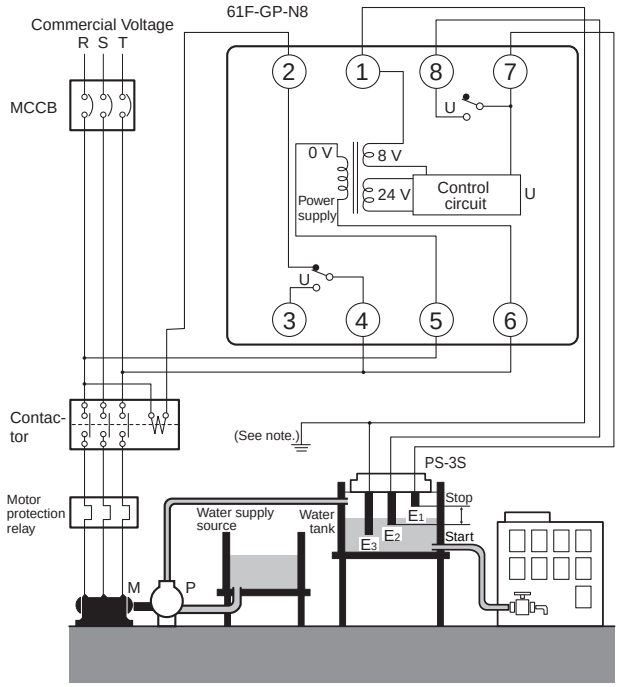
Automatic Water Supply and Drainage Control

Compact, Plug-in Type
61F-GP-N8

Dimensions:
page 14

Automatic Water Supply Control

Connections



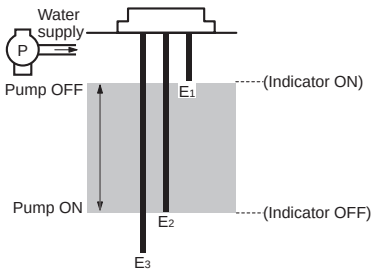
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

Connection Sockets
PF083A (Front-connecting)
PL08 (Rear-connecting)

- Connect terminal 2 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

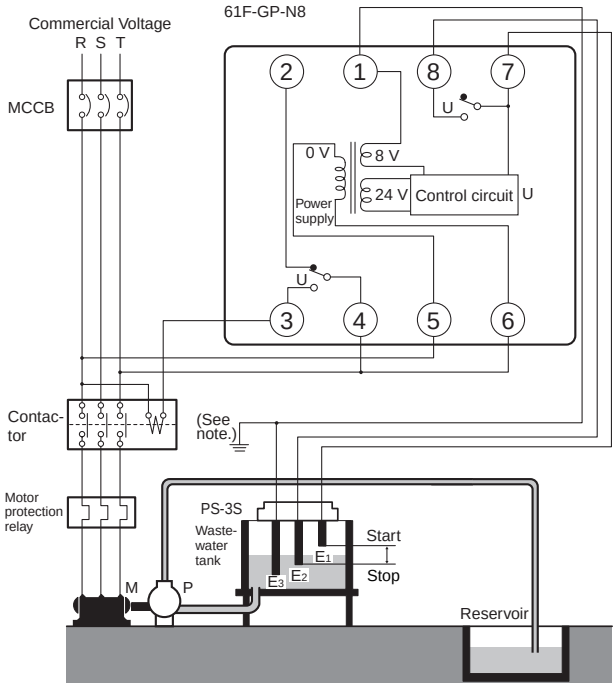
Principles of Operation



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

Automatic Drainage Control

Connections



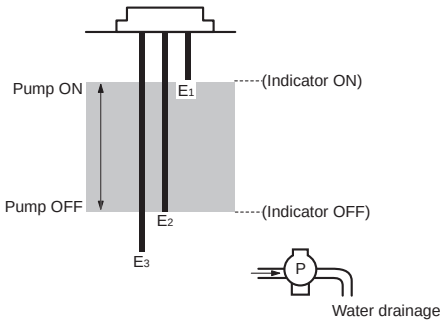
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

Connection Sockets
PF083A (Front-connecting)
PL08 (Rear-connecting)

- Connect terminal 3 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

Principles of Operation



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

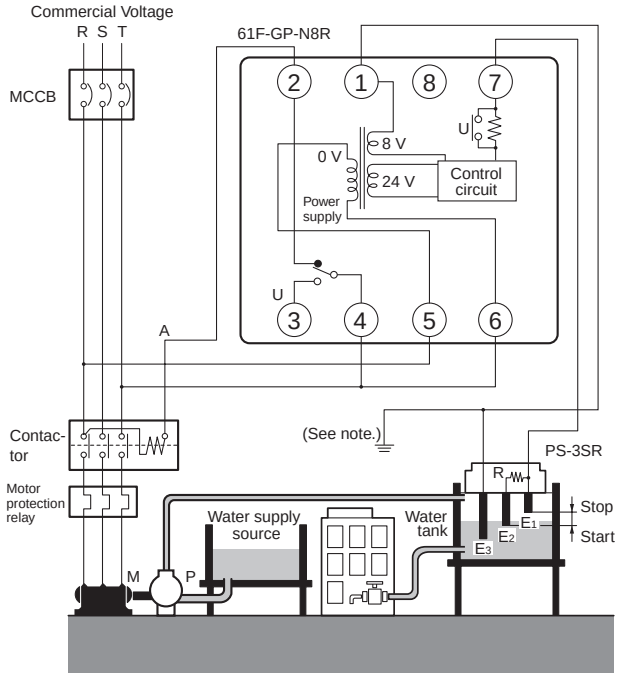
Two-Wire Connections
Automatic Water Supply and Drainage Control

Compact, Plug-in Type
61F-GP-N8R

Dimensions:
page 14

Water Supply

Connections



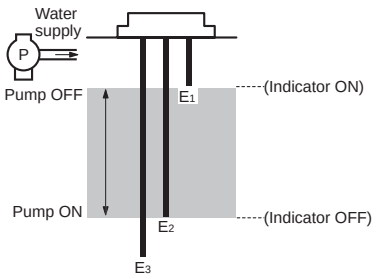
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

- Connect terminal 2 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

- With 2-wire connections, only two wires are required between the 61F-GP-N8R 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.)

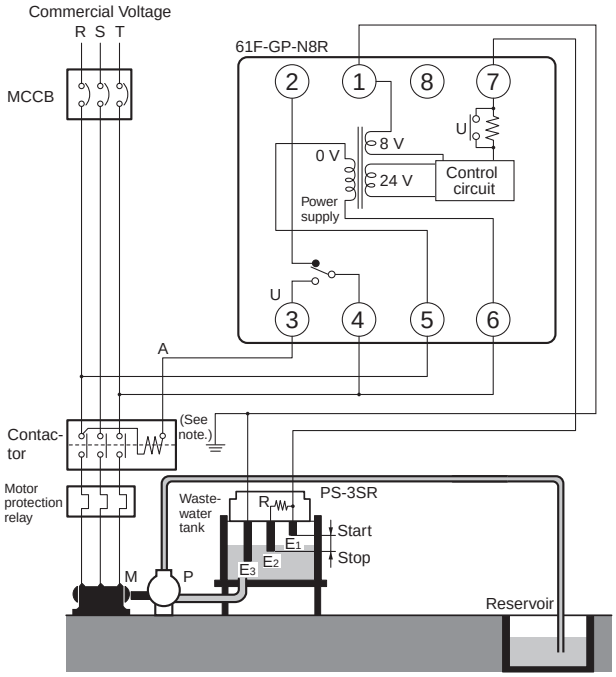
Principles of Operation



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

Automatic Drainage

Connections



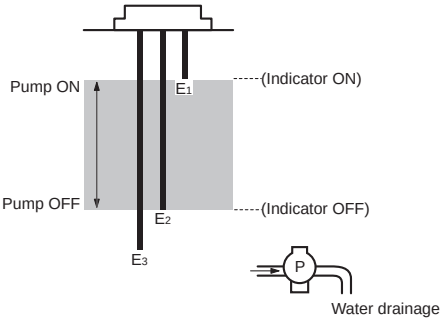
Note: Be sure to ground the common Electrode E_3 (the longest Electrode).

- Connect terminal 3 to the contactor's coil terminal.

Note: The power supply depends on the specifications of the model.

- With 2-wire connections, only two wires are required between the 61F-GP-N8R 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.)

Principles of Operation

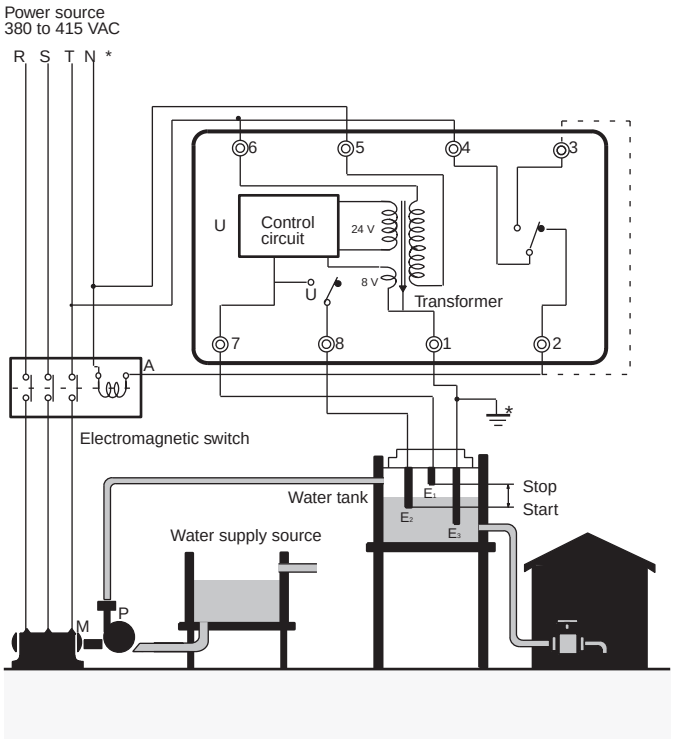


The pump starts when the water level reaches E_1 (indicator ON) and stops when the water level drops below E_2 (indicator OFF).

■ 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-GP-N8□, 220 or 240 VAC

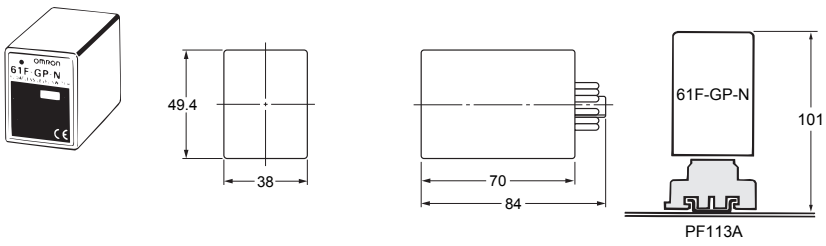


Note: Be sure to ground terminal 1.

Dimensions

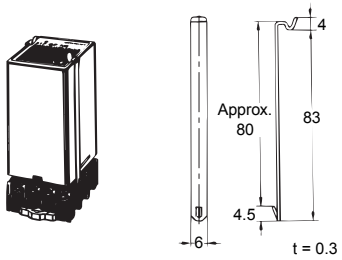
Note: All units are in millimeters unless otherwise indicated.

61F-GP-N, -NT, -NL, -NH, -ND, -NR, -N -TDL, -N14, -N15, -NH3



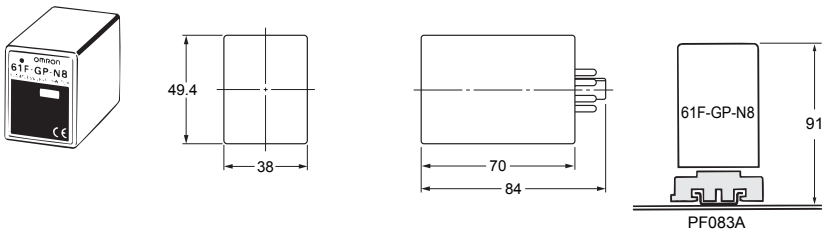
When mounting a Display Unit to a PF113A Surface-mounting Socket, secure the PF113A with the groove facing toward the bottom and then connect the 61F-GP-N the PFC-N8 accessory.

PFC-N8



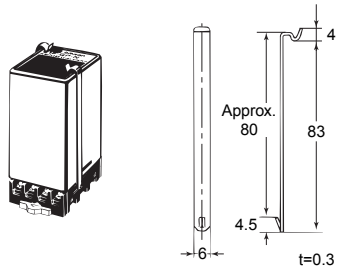
Note: PFC-N8 Mounting Bracket (provided with the Level Controller)

61F-GP-N8, -N8L, -N8H, -N8HY, -N8D, -N8R



Use a PFC-N8 Mounting Bracket to mount the Level Controller to a PF083A Rail-mounted Socket.

PFC-N8



Note: PFC-N8 Mounting Bracket (provided with the Level Controller)

■ Safety Precautions

Refer to *Safety Precautions for All Level Controllers*.

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.