

# AUTOMATION

PRODUCTS  
GROUP, INC.

**Operator's Manual**

## **RCU-7000 Series**

### **Power Relay Unit for Pump Control**

Rev. A1, 4/07



**Automation Products Group, Inc.**

***APG...Providing tailored solutions for measurement applications***

Tel: 1/888/525-7300 • Fax: 1/435/753-7490 • [www.apgsensors.com](http://www.apgsensors.com) • E-mail: [sales@apgsensors.com](mailto:sales@apgsensors.com)

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## • **Warranty and Warranty Restrictions**

APG warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair any equipment found defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within 24 months from date of shipment from factory.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

No representation or warranty, express or implied, made by any sales representative, distributor, or other agent or representative of APG which is not specifically set forth herein shall be binding upon APG. APG shall not be liable for any incidental or consequential damages, losses or expenses directly or indirectly arising from the sale, handling, improper application or use of the goods or from any other cause relating thereto and APG's liability hereunder, in any case, is expressly limited to the repair or replacement (at APG's option) of goods.

Warranty is specifically at the factory. Any on site service will be provided at the sole expense of the Purchaser at standard field service rates.

All associated equipment must be protected by properly rated electronic/electrical protection devices. APG shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.

Returns and allowances must be authorized by APG in advance. APG will assign a Return Material Authorization (RMA) number which must appear on all related papers and the outside of the shipping carton. All returns are subject to the final review by APG. Returns are subject to restocking charges as determined by APG's "Credit Return Policy".

- **Introduction**

This relay unit, model RCU-7000 series, may be used with any APG level sensor, such as models ELS, FL, FT, SLS and LF. If the level sensing float switch has dry contacts, the RCU-7000 will increase the contact rating capacity. The RCU-7000 is used for control functions such as latching for pump operation or alarm setpoints.

## • Specifications

### Operation Versions

RCU-7000:	Standard
RCU-7100:	High Sensitivity

### Characteristics

Power Supply:	90 -132 VAC/180 - 264 VAC, 50/60 Hz
Power Consumption:	1.5 VA max.
Output Signal:	SPDT relay contact
Contact Rating:	240 VAC, 5 A; 30 VDC, 5 A
Power Source to Sensor:	8 VAC, 5 mA max.
Cable Length between Sensors and Relay Units:	RCU-7000 - 3,000 ft. (max.); RCU-7100 - 300 ft. (max.)
Operation Resistance:	See Table 1 and 2
Reset Resistance:	See Table 1 and 2
Alarm Indicator:	Red LED
Power Indicator:	Green LED

### Environmental

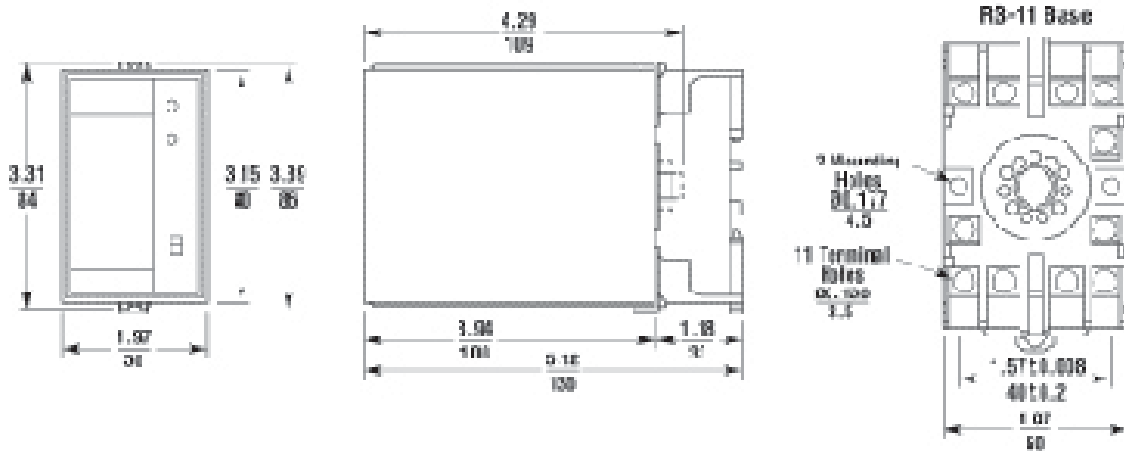
Temperature:	32 to 120°F (0 to 50°C)
Storage Temperature:	-4 to 160°F (-20 to 70°C)
Humidity	85% RH max.

### Physical Attributes

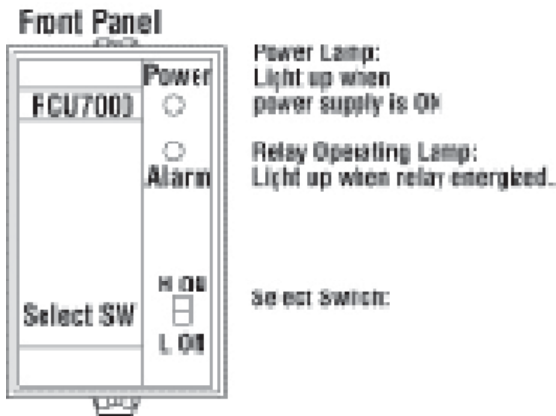
Housing:	ABS
Dimensions:	2 in. x 3 1/8 in. x 4 in.
Mounting Method:	11 pin socket
Weight:	0.62 lb. (280 g)

Specifications are subject to change without notice for improvement.

• Dimensions - in./mm



• Description of Controls



## • Operating Characteristics of Relay Units

### Table 1 Relay Actuation

RCU-7000 (Standard)	Select Switch Mode	
	H. ON side	L. ON side
Operating resistance (between E0 and E2) 4 K $\Omega$ or less	energize	de-energize
Reset resistance (between E0 and E2) 15 K $\Omega$ or more	de-energize	energize

RCU-7100 (High Sensitivity)	Select Switch Mode	
	H. ON side	L. ON side
Operating resistance (between E0 and E2) 50 K $\Omega$ or less	energize	de-energize
Reset resistances (between E0 and E2) 100 K $\Omega$ or more	de-energize	energize

### Table 2 Relay Actuation of Latch

RCU-7000 (Standard)	Operating/Reset Resistance		Select Switch Mode	
	Between E0 and E1	Between E0 and E2	H. ON side	L. ON side
1	15 K $\Omega$ or more	15 K $\Omega$ or more	de-energize	energize
2	4 K $\Omega$ or less	15 K $\Omega$ or more	de-energize	energize
3	4 K $\Omega$ or less	4 K $\Omega$ or less	energize	de-energize
4	4 K $\Omega$ or less	15 K $\Omega$ or more	energize	de-energize
5	15 K $\Omega$ or more	15 K $\Omega$ or more	de-energize	energize

RCU-7000 (High Sensitivity)	Operating/Reset Resistance		Select Switch Mode	
	Between E0 and E1	Between E0 and E2	H. ON side	L. ON side
1	100 K $\Omega$ or more	100 K $\Omega$ or more	de-energize	energize
2	50 K $\Omega$ or less	100 K $\Omega$ or more	de-energize	energize
3	50 K $\Omega$ or less	50 K $\Omega$ or less	energize	de-energize
4	50 K $\Omega$ or less	100 K $\Omega$ or more	energize	de-energize
5	100 K $\Omega$ or more	100 K $\Omega$ or more	de-energize	energize

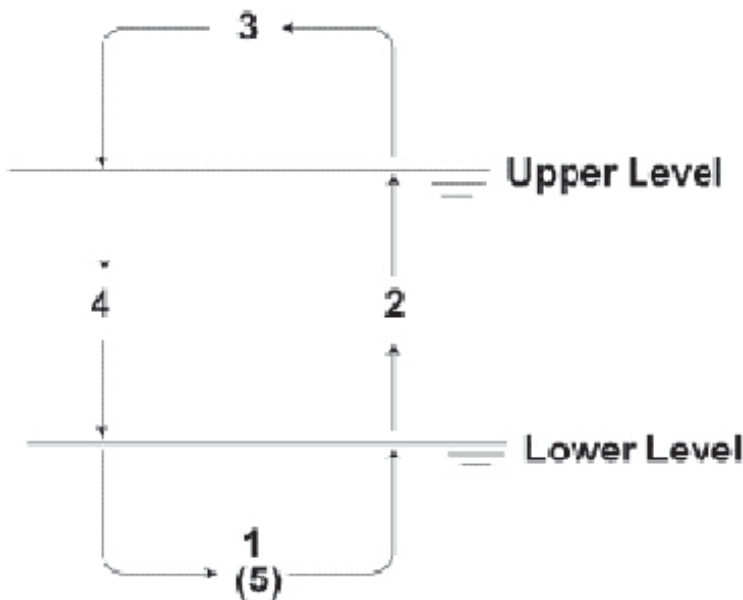


Figure 3: Relay Action

• Principle of Operation

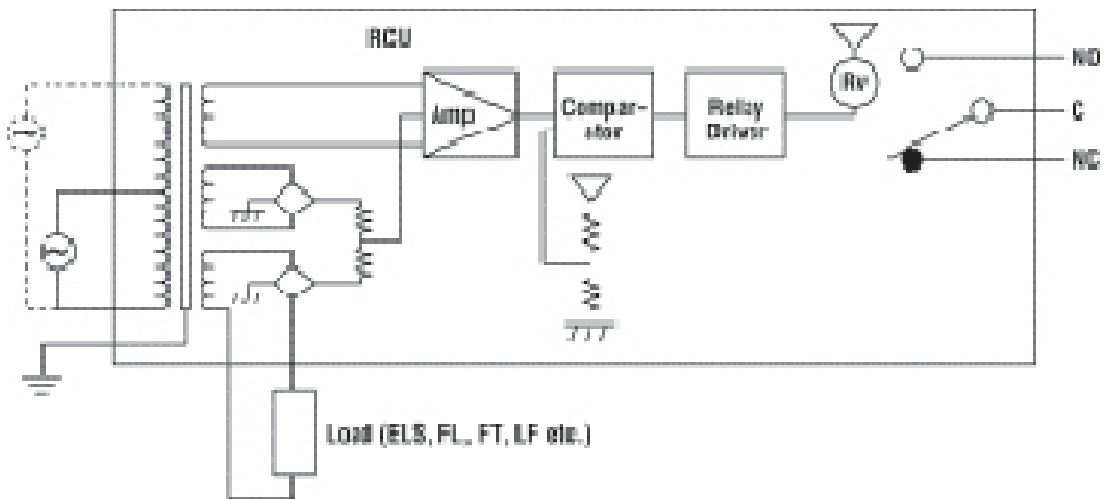


Figure 4: Wiring Schematic

The RCU-7000 is designed to replace the dry contact rating of the level sensing float switch. The RCU-7000 can also input two point levels for pump control either for filling or emptying.



## • Installation

After unpacking, open shipping cartons of unit and inspect the units for shipping damage. If there is evidence of damage, notify the carrier immediately. Also verify the contents for properly ordered units.

## Unpacking

This relay unit has been thoroughly inspected and carefully packed at the factory to prevent from damage during shipment. When unpacking, care must be taken not to damage the instrument with mechanical shock. After unpacking, visually check the instrument exterior for damage.

Note the following points:

- Remove the relay unit from the package carefully. Also, take out the socket from the package if ordered.
- Model number of the relay is indicated on the nameplate. Check it to be sure if it is as required.
- Check exterior for damage. If there is, contact APG.

## Installation Location

This relay unit should be installed in an area with the following conditions:

1. Provide ample space for maintenance/inspection.
2. Low relative humidity and no exposure to moisture.
3. No corrosive gases. (Such as  $\text{HN}_3$ ,  $\text{SO}_2$ ,  $\text{Cl}_2$ , etc)
4. No excessive vibration.

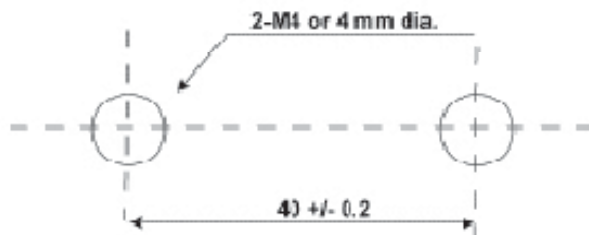
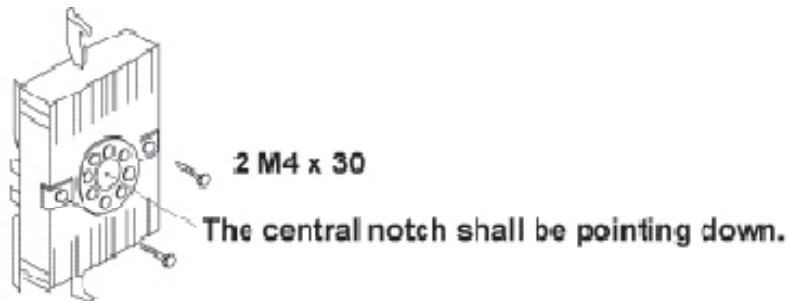
## Installation of Relay Unit

This relay unit installation method depends on the mounting type, either 11 pin socket or DIN rail.

The socket (Omron 11PFA) for relay unit is optional.

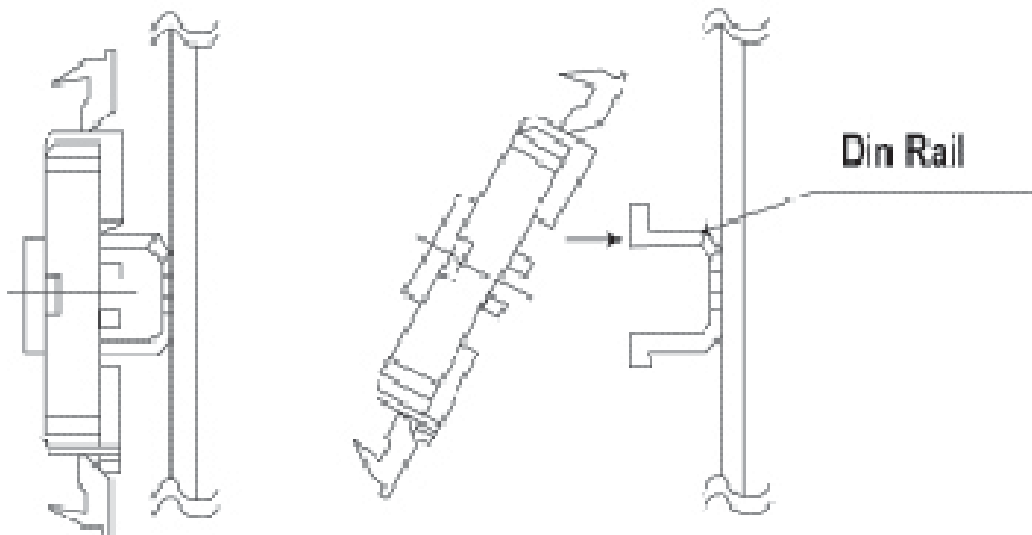
### Surface Mounting with Socket

Drill 2-4.5 dia. mounting holes with 15 mm deep or tap A-M4 threads. See drawing.



Surface Mounting Method

### Rail Mounting with DIN Rail (35 mm)



DIN Rail Mounting Method

- **Electrical Connection and Adjustment**

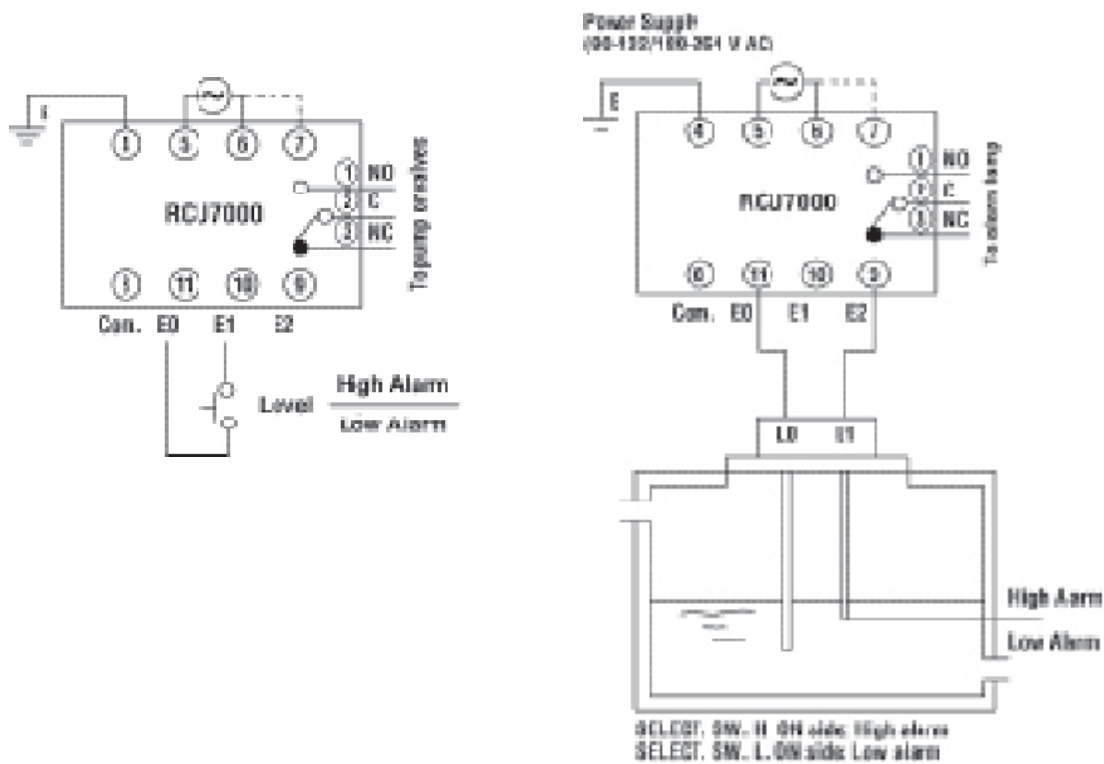
### Wiring Diagram for High or Low Level Alarm

High level alarm (Select SW: H.ON side)

- When the  $I_1$  switch actuate, relay energize.
- When the  $I_1$  switch de-actuate, relay de-energize.

Low level alarm (Select SW: L. ON side)

- When the  $I_1$  switch actuate, relay de-energize.
- When the  $I_1$  switch de-actuate, relay energize.



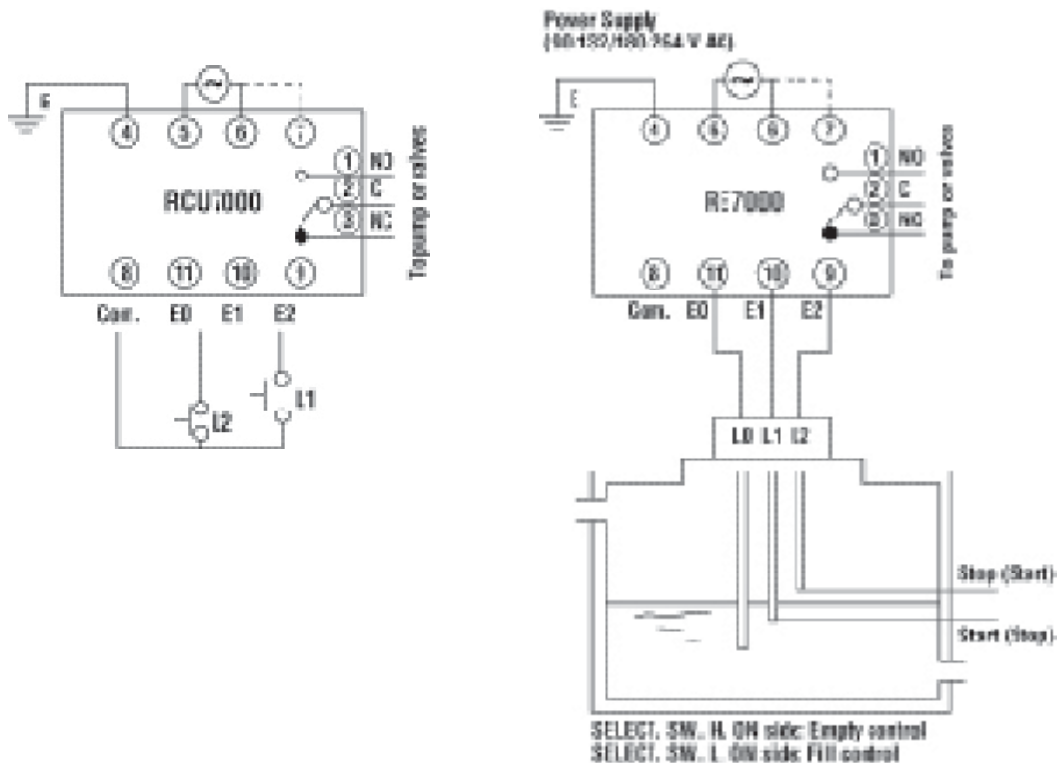
## Wiring Diagram for Dual Level Empty/Fill

Outflow control (Select Sw: H. ON side)

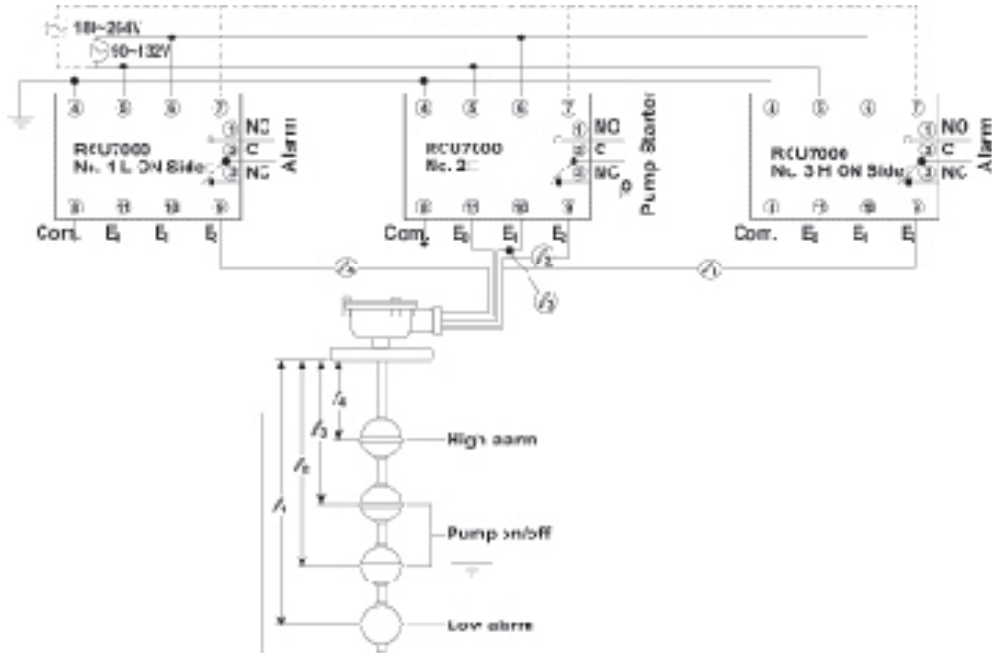
- When the  $I_1$  switch actuate as level falls, relay energize.
- When the  $I_1$  switch de-actuate as level rises, relay energize.
- When the  $I_2$  switch de-actuate as level rises, relay de-energize.
- When the  $I_2$  switch actuate as level falls, relay de-energize.

Inflow control (Select Sw: L. ON side)

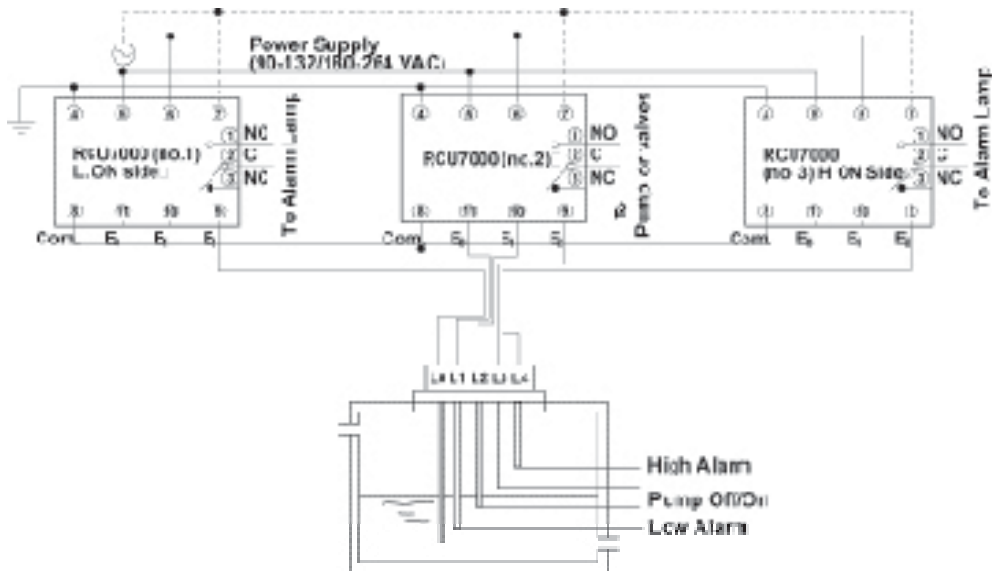
- When the  $I_2$  switch actuate as level falls, relay energize.
- When the  $I_2$  switch de-actuate as level rises, relay energize.
- When the  $I_1$  switch de-actuate as level rises, relay de-energize.
- When the  $I_1$  switch actuate as level falls, relay de-energize.



### Pump Control Wiring Diagram with Low and High Level Alarms (FL Sensor)



### Pump Control Wiring Diagram with Low and High Alarms (ELS Sensor)



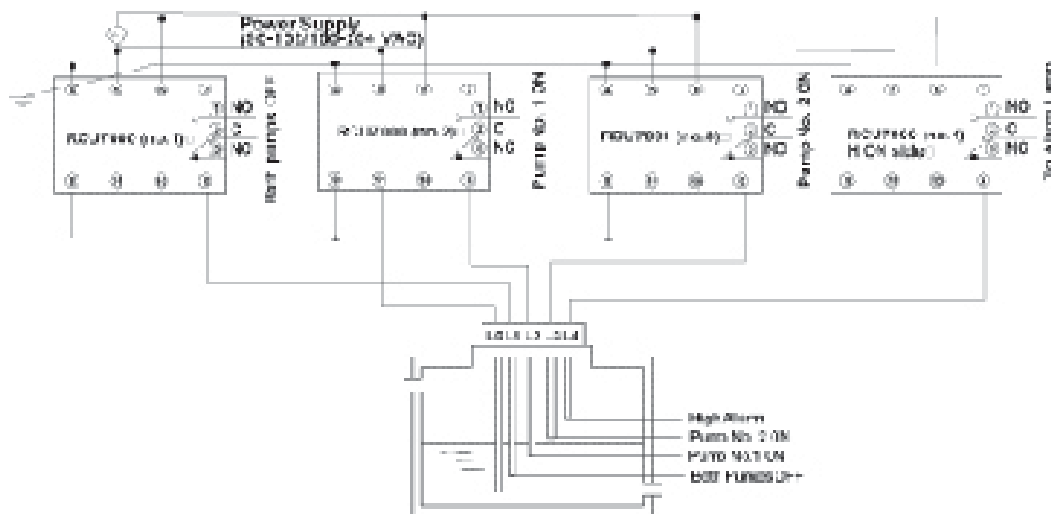
Caution: To avoid malfunction, the E1 contact must be connected to lower switch. Actuation direction of switch must be set same direction.

- (a) When the  $I_4$  switch actuate as level rises, relay (no. 3) energize.
- (b) When the  $I_1$  switch de-actuate as level falls, relay (no. 1) energize.
- (c) Relay (no. 2) may be used for control functions such as latching for pump control.

Caution: Actuation direction of all switches must be “upper ON” (NO)

WARNING: Earth terminal “4” shall be grounded. If it is not grounded, you will get an electric shock.

### Wiring Diagram for Dual Pumps Emptying with High Alarm (ELS Sensor)



Note the following points:

- Do not connect the multiple relay units to same level switch. Relay units will malfunction.
- Power supply must be connected in phase
- (• To avoid malfunction, the wiring distance should be used within specifications. (Refer to Specifications). If the wiring distance exceed specifications, the relay unit may be malfunction by tray capacitance between cables or noise.

- **Maintenance and Inspection**

The following annual servicing tasks should be carried out on the sensor and relay unit.

- (1) Remove the sensor from tank carefully.
- (2) Ensure there is no damage.
- (3) If sediment or other foreign matters are stained on sensor, clean the sensor.
- (4) Make contact between E0 and E2, and check the relay unit operation.
- (5) Spare parts should be ordered from APG, whose address appears on the title page.

- **Troubleshooting**

**Problem**

Relay unit de-energize with level change

**Possible Causes**

- Miswiring between sensor and relay unit
- Set for improper select switch (Select SW) mode of relay unit

**Remedies**

- Ensure the wiring is correct.
- Change the select switch mode (H ON/L ON).

**Problem**

Relay unit energize with level changes

**Possible Causes**

- Miswiring between sensor and relay unit
- Set for improper select switch (Select SW) mode of relay unit
- Affection by stray capacitance

**Remedies**

- Ensure the wiring is correct.
- Change the select switch mode (H ON/L ON).
- Rewire as short as possible

**Problem**

Relay Chatter

**Possible Causes**

- Miswiring between sensor and relay unit

**Remedies**

- Ensure the wiring is correct.



## Notes

## Notes

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1/435/753-7300

Fax: 1/435/753-7490

e-mail: [sales@apgsensors.com](mailto:sales@apgsensors.com)

[www.apgsensors.com](http://www.apgsensors.com)

Automation Products Group, Inc.

1025 W. 1700 N.

Logan, UT 84321