Liquid Level Controller

Cat. No. : **4411AD1**
4421AD1
4431AD1

CE RoHS

Features:

1. One/two level detection of liquid in a tank
2. One / two tank monitoring for draining or filling or draining and filling the liquid.
3. 2M Enclosure with Din rail/ base easy mounting
4. Supports to externally connected 2/3/6 Stainless steel sensor probes of 10cm length
5. Supports up to 1000m length cable for longer distance probe sensing
6. AC Modulated probe signal to prevent electrolytic corrosion.
7. High load switching capacity of output up to 8A
8. Adjustable sensitivity of liquid from 1K to 200Kohm
9. Power ON and relay ON status LED indicaton.
10. Manual Start Switch to allow manual pump start for filling while taking care of dry run condition and overfill conditions.
11. CE, RoHS Certified.

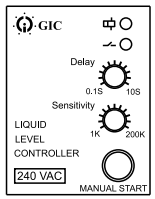
Description:

The Liquid Level Controller is used to detect the liquid level in a tank where liquids are electrically conducting and device controls the relay output according to the mode of operation. The mode of operation can be filling & draining, filling only one tank with dual levels monitoring, filling only one tank with single level monitoring, draining only one tank with dual level monitoring, draining only one tank with single level monitoring.
The signal completes the electrical path through liquid, the control circuit detects the signal and drives relay. The reference resistivity can be set by a potentiometer on the device from 1K to 200K to match liquid resistivity. The output of device can be used to turn ON & OFF pumps, solenoids or valves.

Sensitivity Setting:

Following are the steps to set and fix sensitivity according to the liquid conductivity with the help of sense potentiometer.

1. **Keep probes connected to CMN,P1 & P2 in conductive Liquid & sensitivity pot at minimum(1K) position.**
2. **Keep the delay pot at minimum position (0.1S position).**
3. **Rotate the sensitivity pot towards maximum (200K Ohm) side till the relay RED LED turns "ON". Keep sensitivity pot setting two divisions ahead from the position at which RED LED & Relay gets "ON".**
4. **Remove probe connected to P1 from conductive liquid & check whether the Relay RED LED switches "OFF".**



Note -1) Do not disturb sensitivity pot setting once fixed, because the position of sensitivity pot is adjusted according to conductivity level of Liquid.

Applications:

A din rail mounted Liquid level controller device is supplied with external 10cm stainless steel sensing probes. The device monitors the liquid level in the tanks and controls the actuation of Pumps or electric valves to regulate liquid levels in tank according to use of mode. It is also designed to protect submersible pumps against "Dry running" when lower tank is empty and against "Overflow" when upper tank is filled completely.

Device controlling mode:

1. Draining from lower tank and filling in upper tank.
2. Filling only one tank with 2 levels monitoring.
3. Filling only one tank with 1 level monitoring.
4. Draining only one tank with 2 levels monitoring.
5. Draining only one tank with 1 level monitoring.

Precautions:

1. This device is not used with pure water, Oils, corrosive liquids and flammable liquids.
2. For proper functionality /operation of device, it is recommended to keep sense pot arrow or value slightly at upper position or next to set position of sense Pot rather than actual set position of sense Pot.

Product Specifications:

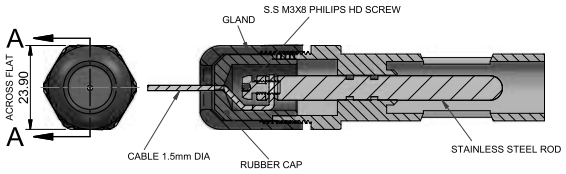
Catalogue Nos.	4411AD1	4421AD1	4431AD1
SUPPLY CHARACTERISTICS :			
Supply Voltage	110VAC, +/-20%	240VAC, +/-20%	415VAC, +/-20%
Supply Frequency	47Hz - 63Hz		
Power Consumption	3VA		
DEVICE CHARACTERISTICS :			
Conductive Sensor Probes	Stainless Steel SS304, 3 or 6Nos		
Probe Length	10 cm		
Sensitivity	1K to 200 K Ohm (Potentiometer adjustable)		
Settable ON & OFF Delay time	0.1 sec to 10 sec		
Probe Voltage & Current	12 Vp-p, 100 Hz,< 1 mA		
Probe cable	Cable gauge (Min):0.5 sqmm Tin coated,Cable dia(Min):1.5mm Max Cable Length-1000m (For set value of pot < 50%) Max Cable Length-300m (For set value of pot 100%) Max capacitances between common probe wire & signal probe wire- 80 nF / km		
Manual Start Switch	If the liquid level of lower tank is in between P1 and P2 probe then at power ON, relay remains OFF because tank is partially filled with liquid. But user can turn the relay ON to start motor pump or electric valve by pressing manual switch The relay will turn OFF when lower tank liquid level drops below P1 probe to avoid dry running and when upper tank liquid level reaches to P4 probe to avoid overflow.		
Output Control Mode	Relay ON/OFF		
Contact Ratings	1 C/O,8A@250VAC,Resistive,Terminal 15-Pole, Terminal 16-NC,Terminal 18-NO		
Utilization Category	AC-15: Rated Voltage (Ue):120/240V, Rated Current(Ie): 3.0/1.5A DC-13: Rated Voltage (Ue):24/125/250V, Rated Current(Ie): 2.0/0.22/0.1A		
Electrical Life	1 x 10^5 Operations		
Mechanical Life	1 x 10^7 Operations		
LED Indication	GREEN LED: Power ON, RED LED : Relay Output ON		
Operating Temperature	-10°C to +60°C		
Storage Temperature	-10°C to +70°C		
Weight Approx.(Packed)	260 gm		
Relative Humidity	5 to 95 % RH (non condensing)		
Mounting Type	Base/Din Rail Mounting		
EMI/EMC COMPLIANCE :			
Harmonic Current Emission	IEC 61000-3-2 Class A		
ESD	IEC 61000-4-2 Level II		
Radiated Susceptibility	IEC 61000-4-3 Level III		
Electrical Fast Transient	IEC 61000-4-4 Level IV		
Surge	IEC 61000-4-5 Level IV		
Conducted Susceptibility	IEC 61000-4-6 Level III		
Voltage Dips & Interruptions (AC)	IEC 61000-4-11 All seven Levels		
Conducted Emission	CISPR 14-1 Class B		
Radiated Emission	CISPR 14-1 Class B		
SAFETY COMPLIANCE :			
Voltage between I/P & O/P	IEC 60947-5-1 2.5 KV		
Impulse Voltage between I/P & O/P	IEC 60947-5-1 4 KV		
Single Fault Test	IEC 61010-1		
Insulation resistance	UL 508 >50K Ohm		
Leakage Current	UL 508 <3.5mA		
Degree of Protection	IP 20 for Terminal; IP-40 for Housing		
Pollution Degree	II		
Type of Insulation	Reinforced		
ENVIRONMENTAL COMPLIANCE :			
Cold Heat	IEC 60068-2-1		
Dry Heat	IEC 60068-2-2		
Vibration	IEC 60068-2-6 5g		
Non-Repetitive Shock	IEC 60068-2-27 30g, 15ms		

Delay significance:

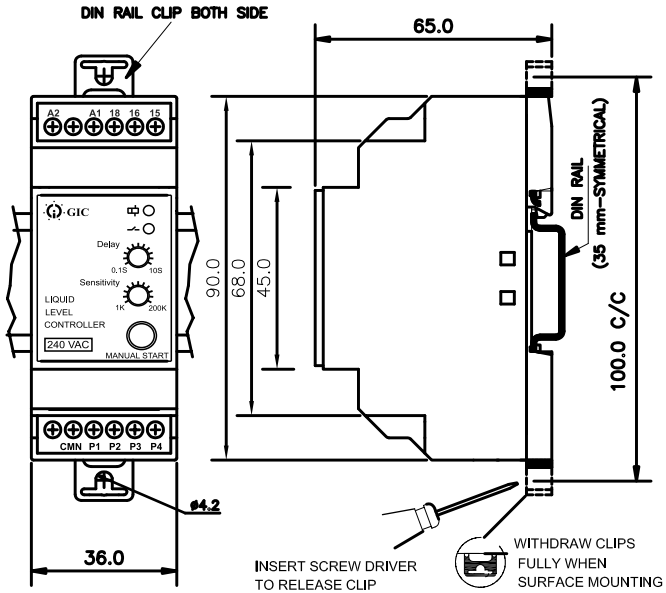
1. Liquid levels higher than the upper level probe can be obtained by setting an ON-OFF delay (Delay = 0.1 s...10 s), e.g. for filling tanks.
2. Liquid levels lower than the lower level probe can be obtained by setting an ON-OFF delay time (Delay = 0.1 s...10 s), e.g. for emptying tanks.

Probe Diagram:

A single pole electrode used for level control in wells or storage tanks. It comprises stainless steel probe with plastic holder and cable gland. A seal ring and the tightening of the cable gland prevent liquid from entering the cable terminal connector and causing its oxidation.
Maximum Operating Temperature -10°C to +65°C
Cable connection: Screw
The external cable diameter must be 1.5 mm to warrant perfect sealing.

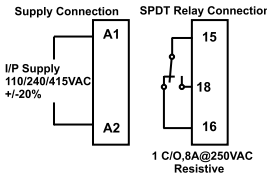


Product Diagram:



Terminal Details

Ø3.5 mm	0.54 N.m (6 Lb.In)
	1 x 2.5 mm² Solid/Stranded Wire
AWG	1 x 24 to 12



Ordering Code:

Sr. No.	Cat-ID	Description
1	4411AD1	110VAC +/-20%,50/60 Hz,1 C/O,1K to 200K SENSITIVITY,DRAINING & FILLING
2	4421AD1	240VAC +/-20%,50/60 Hz,1 C/O,1K to 200K SENSITIVITY,DRAINING & FILLING
3	4431AD1	415VAC +/-20%,50/60 Hz,1 C/O,1K to 200K SENSITIVITY,DRAINING & FILLING
4	44S0003	ACCESSORIES,SET OF 3 STAINLESS STEEL SENSORS
5	44S0006	ACCESSORIES,SET OF 6 STAINLESS STEEL SENSORS

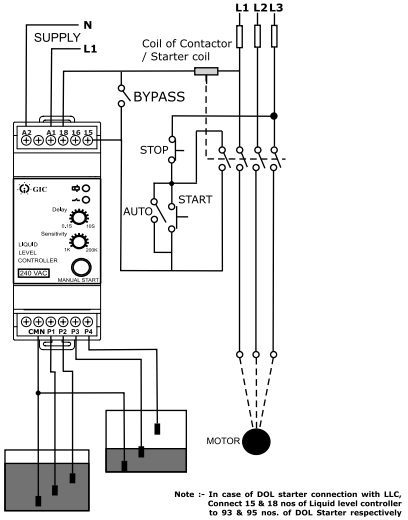
Note:

1. The technical information provided in this document is correct at the time of going to press.
2. Product innovation being a continuous process, we reserve the right to alter specifications without any prior notice.
3. Only qualified persons are authorized to install the device.

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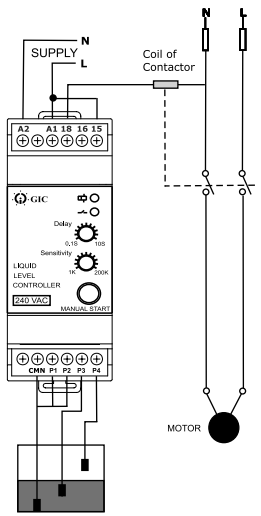
Operating Function diagram:

Draining from lower tank and filling in upper tank:

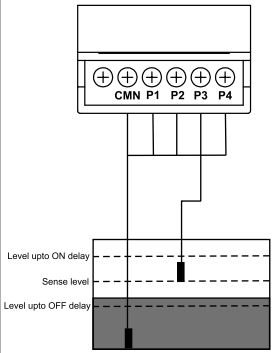


Note :- In case of DOL starter connection with LLC, Connect 15 & 18 nos of Liquid level controller to 93 & 95 nos. of DOL Starter respectively

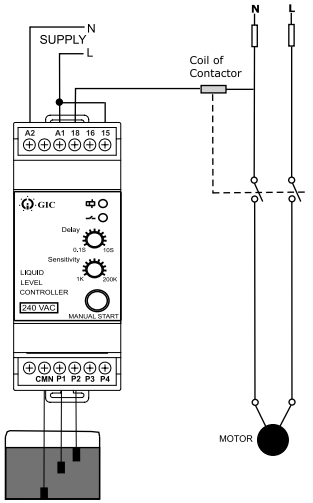
Filling only one tank with two levels monitoring:



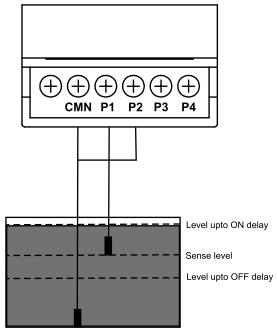
Filling only one tank with one level monitoring:



Draining only one tank with two levels monitoring:

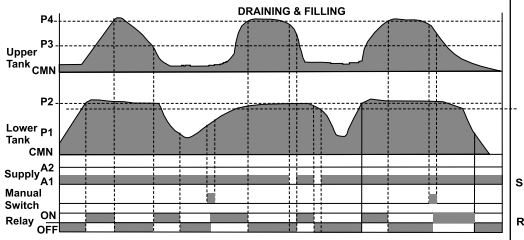


Draining only one tank with one level monitoring:



Draining from lower tank and filling in upper tank:

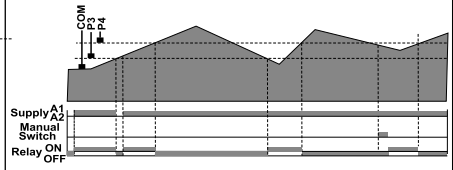
When lower tank is empty (liquid level is below P1) or partially filled (liquid level is below P2) or upper tank is filled completely (liquid level is above P4) at power ON then relay remains in OFF condition. If lower tank is completely filled (liquid level is above P2) with liquid and upper tank is empty (liquid level is below P3) or partially filled (liquid level is below P4) at power ON then relay turns ON. The relay turns OFF when upper tanks is completely filled or lower tank becomes empty. The relay can be turned ON by pressing Manual switch when lower tank is partially filled and upper tank is partially filled or empty. The relay will be OFF condition to avoid dry running condition of motor when the lower tank is empty and to avoid overflow when upper tank is completely filled. This mode requires 6 sensor probes, connected at each terminals P1, P2, P3, P4 and two at common terminal through wires



P1	P2	P3	P4	Relay & RED LED Indication	Relay Status after pressing Manual Switch
OUT	OUT	OUT	OUT	OFF	OFF
IN	OUT	OUT	OUT	OFF	ON
IN	IN	OUT	OUT	ON	ON
IN	IN	IN	OUT	ON	ON
IN	IN	IN	IN	OFF	OFF

Filling only one tank with two levels monitoring:

When tank is empty (liquid level is below the P3 probe), the relay turns ON and the relay turns OFF when tank is completely filled with liquid (liquid level reaches to P4 probe). In this mode, P1 & P2 terminals are connected to common terminal. This mode requires 3 sensor probes which are connected at P3, P4 and common terminals through wires.



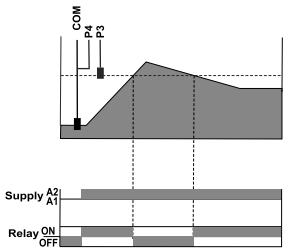
P3	P4	Relay & RED LED Indication	Relay Status after pressing Manual Switch
OUT	OUT	ON	ON
IN	OUT	ON	ON
IN	IN	OFF	OFF

Filling only one tank with one level monitoring:

When tank is partially filled or empty (liquid level is below P3 Probe) the relay turns ON and when tank is completely filled with liquid (liquid level reaches to P3 probe), relay turns OFF. In this mode P1, P2 & P4 terminals are connected to CMN terminal. This mode requires 2 sensors probe, one is connected to CMN terminal and second connected to P3 terminal through wire.

This operation is not recommended for pump controlling. But used for application like water purifier level controlling where water flow is controlled by electric valve.

Note:
Due to ON-OFF delay (0.1 s...10 s), it is possible to set up time dependent liquid level control using two probe (CMN, P3).
The integrated ON-OFF Delay also prevent frequently switching of load/motor in one tank for one level monitoring.

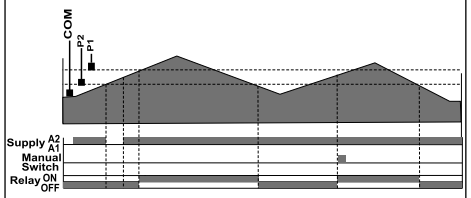


P3	Relay & RED LED Indication
OUT	ON
IN	OFF

NOTE: Manual Switch is not applicable for this Mode.

Draining only one tank with two levels monitoring:

When tank is completely filled with liquid (liquid level is above P2 probe), the relay turns ON. When tank is empty (liquid level drops below the P1 probe), the relay turns OFF. In this mode, P3 & P4 terminals are kept open. This mode requires 3 sensor probes which are connected at P1, P2 & common terminals through wires.



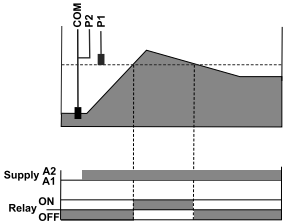
P1	P2	Relay & RED LED Indication	Relay Status after pressing Manual Switch
OUT	OUT	OFF	OFF
IN	OUT	OFF	ON
IN	IN	ON	ON

Draining only one tank with one level monitoring:

When tank is completely filled with liquid (liquid level is above P1 probe), the relay turns ON. When tank is empty (liquid level is below the P1 probe), the relay turns OFF. In this mode, P3 & P4 terminals are kept open and P2 terminal is connected to common terminal. This mode requires 2 sensor probe, one is connected at common terminal and second one is connected at P1 through wires.

This operation is not recommended for pump controlling. But used for application like water purifier level controlling where water flow is controlled by electric valve.

Note:
Due to ON-OFF delay (0.1 s...10 s), it is possible to set up time dependent liquid level control using two probe (CMN, P1).
The integrated ON-OFF Delay also prevent frequently switching of load/motor in one tank for one level monitoring.



P1	Relay & RED LED Indication
OUT	OFF
IN	ON

NOTE: Manual Switch is not applicable for this Mode.

NOTE:

P1,P3	Lower Tank probes
P2,P4	Upper Tank probes
IN	Probe is conducting
OUT	Probe is not conducting