

LC10 and LC11 Series Manual

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The LC10 & LC11 Series Controllers are general-purpose level controllers offered in two configurations for pump and valve control. The LC10 Series features a single 16A SPDT relay output and can accept one level sensor as an input. This package has an optional flashing alarm and is ideal for high level or low level alarm/control. The LC11 Series features a single 16A SPDT latching relay output and can accept one or two level sensor(s) as an input. This package is ideal for the automatic filling or emptying of a tank. Package this level controller with our liquid level switch sensors and fittings.

FEATURES

- Fail-Safe relay control of pumps, valves or alarms with a 0 to 60 second delay
- Optional flashing alarm brings immediate attention to level alarm conditions.
- Polypropylene enclosure rated NEMA 4X with swivel base for conduit alignment.
- Easy setup with LED indicators for sensor(s), power and relay status.
- Invert switch changes relay state from NO to NC without rewiring.
- AC powered

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SPECIFICATIONS:

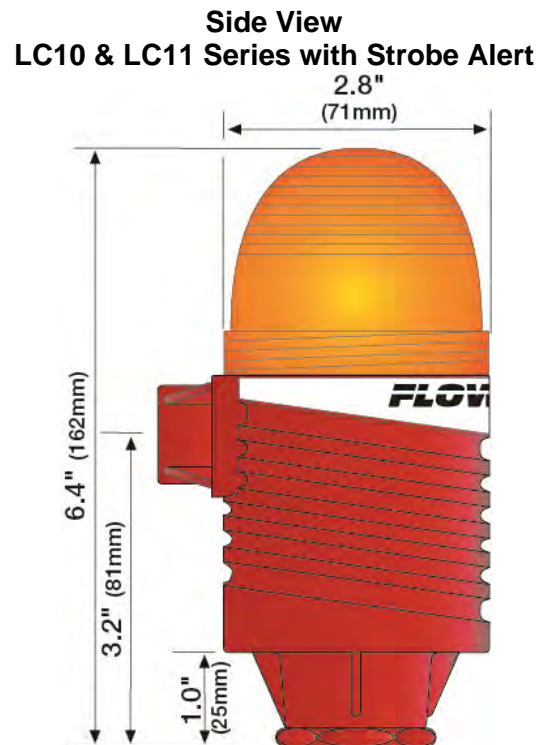
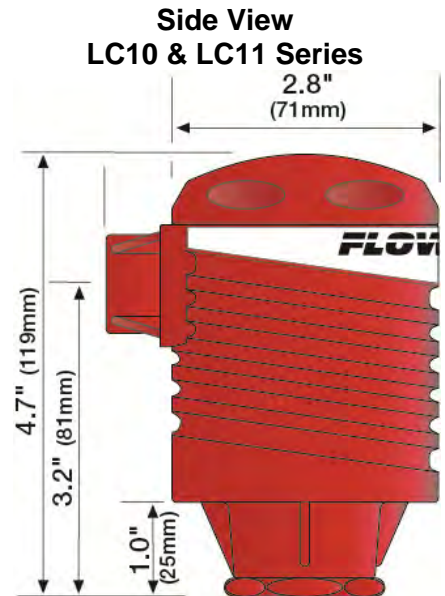
Controller

Supply voltage:	120 / 240 VAC, 50 - 60 Hz.
Consumption:	5 Watts max.
Sensor inputs:	LC10: (1) level switch LC11: (1 or 2) level switches
Sensor supply:	13.5 VDC @ 27 mA
LED indication:	Sensor, relay & power status
Contact type:	LC10: (1) SPDT Relay LC11: (1) SPDT Relay, Latched
Contact rating:	250 VAC, 16A – Non CE 250 VAC, 12A – CE version
Contact output:	Selectable NO or NC
Contact delay:	0 to 60 seconds
Contact latch:	Select On/Off – (LC11 series only)
Electronics temp.:	F: -40°to 158° C: -40°to 70°
Enclosure rating:	NEMA 4X (IP65)
Enclosure material:	-10_1: PP(U.L. 94 VO) -10_2: PP(U.L. 94 VO) & Polycarbonate
Enclosure mount.:	¾" NPT (¾" Rc)
Enclosure rotation:	300°swivel base
Conduit entrance:	Single, 1/2" NPT
Certificate number:	LR 79326-3
CE compliance*:	EN 61326 EMC EN 61010-1 Safety
* Non-CE versions will not have CE mark	

Strobe Alert

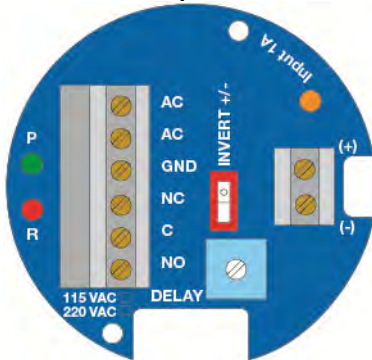
Flash type:	Xenon tube
Flash frequency:	1 per second
Strobe life:	10M cycles
Supply voltage:	120 VAC, 50-60 Hz.
Consumption:	3 Watts max.
Material:	Polycarbonate
Enclosure rating:	NEMA 4X (IP65)
Color:	Amber

DIMENSIONS:

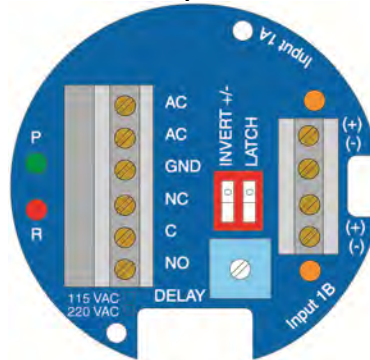


CONTROLLER LABELS

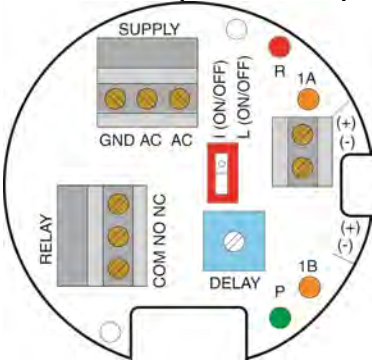
LC10 Series (Non CE Version)



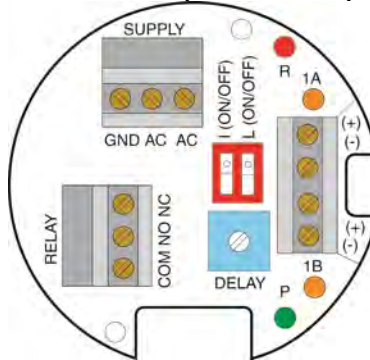
LC11 Series (Non CE Version)



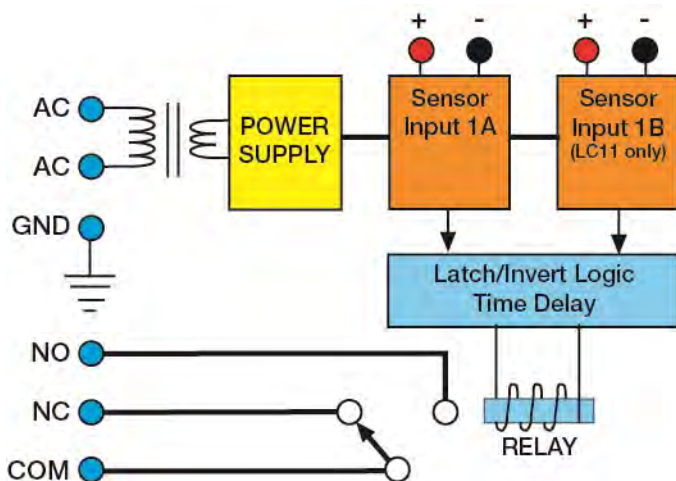
LC10 Series (CE Version)



LC11 Series (CE Version)



FUNCTIONAL DIAGRAM




- ⚠ About This Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on three different models of Compact Relay Controllers from Flowline: LC10 and LC11 Series. The LC10 series is a single-input controller with an optional Flash Alarm and the LC11 Series is a dual-input controller. Many aspects of installation and use are similar between the three models.
- ⚠ User's Responsibility for Safety:** FLOWLINE manufactures several models of controller, with different mounting and switching configurations. It is the user's responsibility to select a controller model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components.
- ⚠ Electrical Shock Hazard:** It is possible to contact components on the controller that carry high voltage, causing serious injury or death. All power to the controller and the relay circuit(s) it controls should be turned OFF prior to working on the controller. If it is necessary to make adjustments during powered operation, use extreme caution and use only insulated tools. Making adjustments to powered controllers is not recommended. Wiring should be performed by qualified personnel in accordance with all applicable national, state and local electrical codes.
- ⚠ Flammable or Explosive Applications:** *Sensor mount controllers should not be used with explosive or flammable liquids, which require an intrinsically safe or explosion proof rating.* If you are unsure of the suitability of a controller for your installation, consult your Flowline representative for further information.
- ⚠ Install In a Dry Location:** The LC10 & LC11 Series controller housing is liquid-resistant and made of Polypropylene (PP). When installed properly, the controller is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid. Refer to an industry reference to ensure that compounds that may splash onto the controller housing will not damage it. Such damage is not covered by the warranty.
- ⚠ Relay Contact Rating:** The relay is rated for a 16 amp (12 amp – CE version) resistive load. Many loads (such as a motor during start-up or incandescent lights) are reactive and may have an inrush current characteristic that may be 10 to 20 times their steady-state load rating. The use of a contact protection circuit may be necessary for your installation if the 16 amp rating does not provide an ample margin for such inrush currents.
- ⚠ Safety Cover:** Based upon the part number selected, a safety cover has been placed within the enclosure. Always replace the safety cover after any service.

Standard Version (Non-CE)



CE Version (LC1_-10_1-CE / LC1_-10_1-E-CE)



 **Make a Fail-Safe System:** Design a fail-safe system that accommodates the possibility of relay or power failure. If power is cut off to the controller, it will de-energize the relay. Make sure that the de-energized state of the relay is the safe state in your process. For example, if controller power is lost, a pump filling a tank will turn off if it is connected to the Normally Open side of the relay.

While the internal relay is reliable, over the course of time relay failure is possible in two modes: under a heavy load the contacts may be “welded” or stuck into the energized position, or corrosion may buildup on a contact so that it will not complete the circuit when it should. In critical applications, redundant backup systems and alarms must be used in addition to the primary system. Such backup systems should use different sensor technologies where possible.

While this manual offers some examples and suggestions to help explain the operation of FLOWLINE products, such examples are for information only and are not intended as a complete guide to installing any specific system.

COMPONENTS:

Part Number	CE Compliant	CSA Approval	Thread	Strobe Alert	Input(s)	Description
LC10-1001	NO	YES	NPT	No	Single	High Level, Low Level <u>or</u> Pump Protection Controller
LC10-1051			Rc			
LC10-1002		NO	NPT	Yes		
LC10-1052			Rc			
LC10-1001-CE	YES	NO	NPT	No		
LC10-1051-CE			Rc			
LC10-1002-CE	NO		NPT	Yes		
LC10-1052-CE			Rc			
LC11-1001	NO	YES	NPT	No	Dual	Automatic Fill, Automatic Empty, High Level, Low Level <u>or</u> Pump Protection Controller
LC11-1051			Rc			
LC11-1002		NO	NPT	Yes		
LC11-1052			Rc			
LC11-1001-CE	YES	NO	NPT	No		
LC11-1051-CE			Rc			
LC11-1002-CE	NO		NPT	Yes		
LC11-1052-CE			Rc			

- Owner's Manual

240 VAC OPTION:

When ordering any 240 VAC version of the LC10 series, the sensor will arrive configured for 240 VAC operation. If a Strobe Alert is included, then the Strobe Alert will also be configured for 240 VAC power.

240 VAC versions will include a –E to the part number (i.e. LC10-1001-E).

STROBE ALERT OPTION:

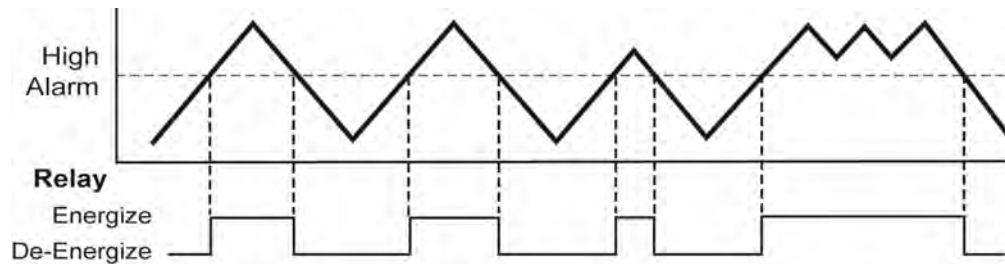
When ordering a version of the LC10 series with the Strobe Alert, strobe will require the same power as the controller. I.e. if you ordered the LC10-1002, the strobe will be powered from 120 VAC, just like the controller. If you ordered the LC10-1002-E, the strobe will be powered from 240 VAC, just like the controller.

FEATURES OF THE LC10 SERIES SINGLE INPUT CONTROLLER:

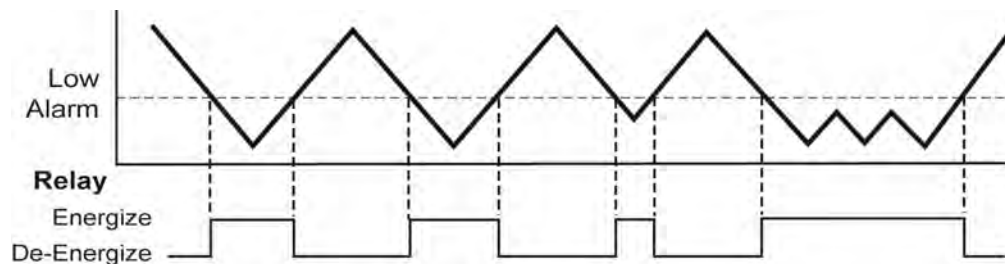
The LC10 Series are designed to receive a signal from a single liquid sensor. It turns its internal relay ON or OFF (as set by the invert switch) in response to the presence of liquid, and changes the relay status back again when the sensor is dry.

High Alarm:

Invert is OFF. Relay will energize when the switch becomes Wet and will de-energize when the switch becomes Dry (out of liquid).

**Low Alarm:**

Invert is ON. Relay will energize when the switch becomes Dry (out of liquid) and will de-energize when the switch becomes Wet.



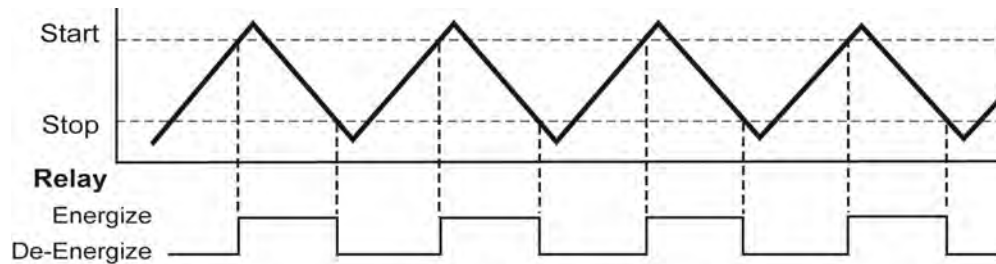
The LC10 Series may be used with almost any kind of sensor signal: current sensing or contact closure. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. A time delay from 0 to 60 seconds can be set before the relay responds to the sensor input. Typical applications for the LC10 Series are high level or low level switch/alarm operations (opening a drain valve whenever liquid level rises to a sensor point) and leak detection (sounding an alarm when a leak is detected, etc.).

FEATURES OF THE LC11 SERIES DUAL INPUT CONTROLLER:

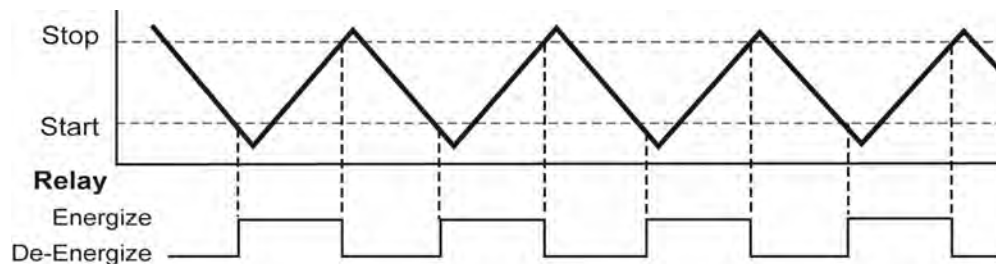
The LC11 Series is designed to receive signals from two liquid sensors. It turns its internal relay ON or OFF (as set by the invert switch) in response to the presence of liquid on both sensors, and changes the relay status back again when both sensors are dry.

Automatic Empty:

Latch is ON & Invert is OFF. Relay will energize when level reaches high switch (both switches are wet). Relay will de-energize when level is below the bottom switch (both switches are dry).

**Automatic Fill:**

Latch is ON & Invert is ON. Relay will energize when level is below the bottom switch (both switches are dry). Relay will de-energize when level reaches high switch (both switches are wet).

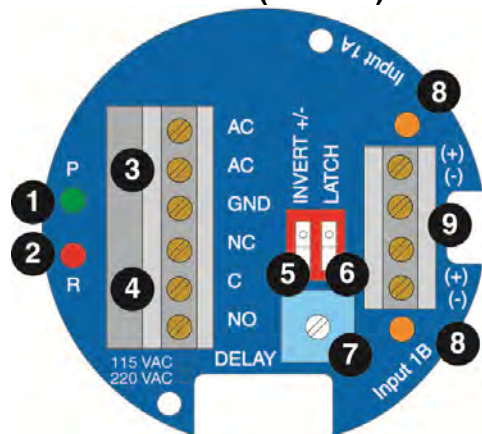


The LC11 Series may be used with almost any kind of sensor signal: current sensing or contact closure. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. A time delay from 0 to 60 seconds can be set before the relay responds to the sensor input. Typical applications for the LC11 Series are automatic filling (starting fill pump at a low level and stopping pump at a high level) or automatic emptying operations (opening a drain valve at a high level and closing valve at low level).

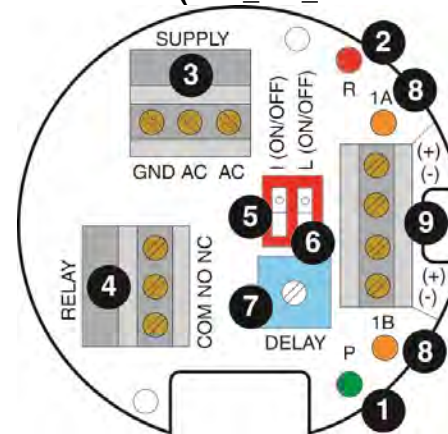
GUIDE TO CONTROLS:

Below is a listing and the location of the different components for the controller:

Standard Version (Non-CE)



CE Version (LC1_-10_1-CE / LC1_-10_1-E-CE)

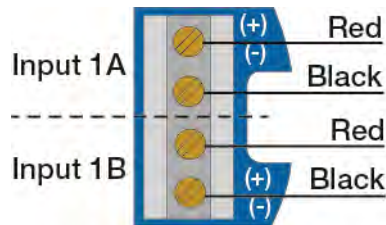


1. **Power indicator:** This green LED lights when AC power is ON.
2. **Relay indicator:** This red LED will light whenever the controller energizes the relay, in response to the proper condition at the sensor input(s) and after the time delay.
3. **AC Power terminals:** Connection of 120 VAC power to the controller. The setting may be changed to 240 VAC if desired. This requires changing internal jumpers; this is covered in the Installation section of the manual. Polarity (neutral and hot) does not matter.
4. **Relay terminals (NC, C, NO):** Connect the device you wish to control (pump, alarm etc.) to these terminals: supply to the COM terminal, and the device to the NO or NC terminal as required. The switched device should be a non inductive load of not more than 16 amps; for reactive loads the current must be derated or protection circuits used. When the red LED is ON and the relay is in the energized state, the NO terminal will be closed and the NC terminal will be open.
5. **Invert switch:** This DIP switch reverses the logic of the relay control in response to the sensor(s): conditions that used to energize the relay will make it turn off and vice versa.
6. **Latch switch (LC11 Series only):** This DIP switch determines how the relay will be energized in response to the two sensor inputs. When LATCH is OFF, the relay responds to sensor Input 1A only; when LATCH is ON, the relay will energize or de-energize only when both sensors (1A and 1B) are in the same condition (wet or dry). The relay will remain latched until both sensors change states.
7. **Time Delay:** After the input(s) change(s) state, this control sets a delay from 0.15 to 60 seconds before the relay will respond.
8. **Input 1A and 1B indicator:** These amber LEDs will light immediately whenever the appropriate sensor attached to the terminals detects liquid, and will turn off when it is dry.
9. **Input terminals:** Connect the wiring from the sensors to these terminals: A to the upper pair, B (LC11 Series only) to the lower pair. Note the polarity: (+) is a 13.5 VDC, 27 mA power supply (to be connected to the red wire of a Flowline sensor), and (-) is the return path from the sensor (to be connected to the black wire of a Flowline sensor). Do not reverse the polarity of the Red and Black wires, the sensors will not work.

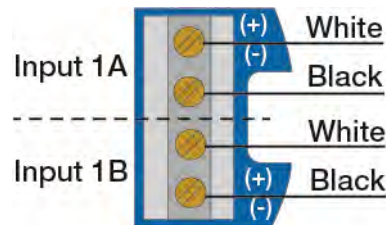
CONNECTING SWITCHES TO INPUT TERMINALS:

Please note a difference between FLOWLINE powered level switches and mechanical reed switches. All powered level switches (series LZ12, LU10, LP15, LP50 & LO10 series) will be wired with the Red wire to the (+) terminal and the Black wire to the (-) terminal. FLOWLINE mechanical reed switches (series LV10, LV2_, LV3_, LV4_, LH2_ & LH3_ series) will have a particular wiring based upon part number. See the illustration below to indicate wiring for your switch.

Note: the Shield wire will be used only for long cable runs or where excessive electrical noise is present.



Powered Level Switches:
LZ12, LU10
LP15, LP50
& LO10 Series



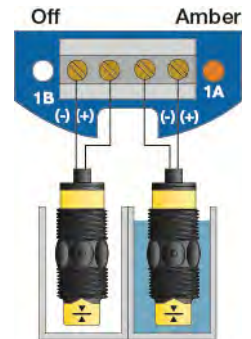
Mechanical Reed Switches:
LV10*, LV2_, LV3_,
LV4_, LH2_ &
LH3_ Series

* LV10 series can be wired using the White and Black wires for NO operations or the Red and Black wires for NC operations.

LED INDICATION:

Use LED's located above the input terminals to indicate whether the switch is in a wet or dry state. With most switch configurations, an Amber LED indicates the sensor is in contact with liquid (wet) and no LED indicates the sensor is out of the liquid (dry).

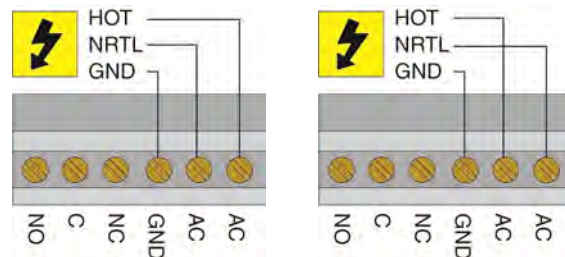
Note: Mechanical reed switches (LV10, LV20, LV30, LV40, LH20, LH30 series etc.) may be wired in reverse so that Amber indicates a dry state and no LED indicates a wet state.



VAC POWER INPUT WIRING:

Observe the labeling on the LC10 & LC11 series controller. The terminals for the power share the same terminal block as the relay.

Note: Polarity does not matter with the AC input terminal.

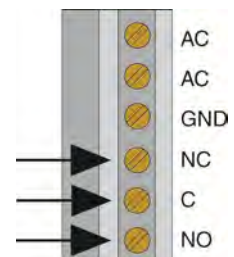


RELAY INPUT WIRING:

The relay is a single pole, double throw type rated at 250 Volts AC, 16A (12A CE version). The two terminals, NO and NC (normally open and normally closed), will be used in different applications.

Note: The relay contacts are true dry contacts. There is no voltage sourced within the relay contacts.

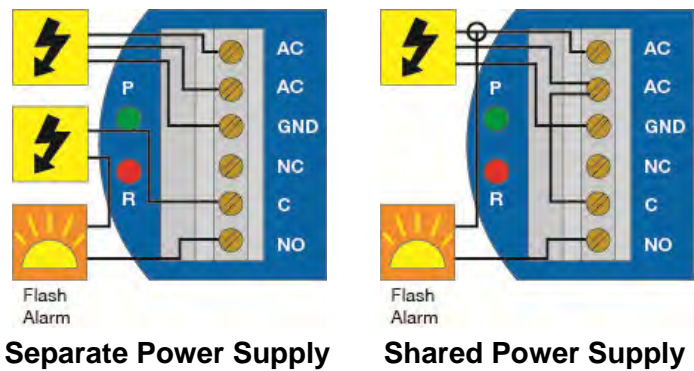
Note: The "normal" state is when the relay coil is de-energized and the Red relay LED is Off / de-energized.



STROBE ALERT OUTPUT:

While wired NO, Strobe Alert can be used as a high or low level alarm, depending on the setting for the invert switch. The Strobe Alert can also be wired NC.

Note: Strobe Alert needs to be powered. Since the relay is a true dry contact, power will need to be added. Power can be added via a separate power supply or shared from the supply powering the controller.



CHANGING FROM 120 TO 240 VAC:

- 1. Remove the two screws from the top of the printed circuit board (PCB) and gently slide the PCB from the housing. Use caution when removing the PCB.
- 2. Located jumpers JWA, JWB and JWC on the PCB.
- 3. To change to 240 VAC, remove jumpers from JWB and JWC and place a single jumper across JWA. To change to 120 VAC, remove jumper JWA and place jumpers across JWB and JWC.
- 4. Gently return PCB into housing and replace the two screws.

	120 VAC	240 VAC
Non-CE Version Controllers		
CE Version Controllers		

240 VAC OPTION:

When ordering any 240 VAC version of the LC10 series, the sensor will arrive configured for 240 VAC operation. If a Strobe Alert is included, then the Strobe Alert will also be configured for 240 VAC power.

240 VAC versions will include a –E to the part number (i.e. LC10-1001-E).

SENSOR-MOUNT CONTROLLERS:

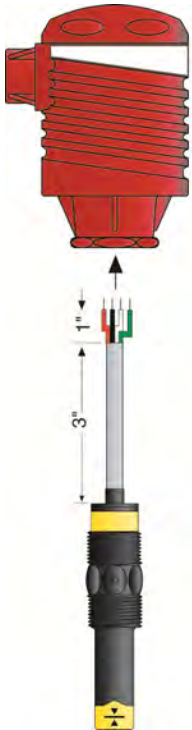
The LC10 & LC11 Series are a cost-effective, modular liquid level controller whose body incorporates a female 3/4" NPT (3/4" R) fitting, allowing it to be mounted directly onto any Flowline sensor or any 3/4" connection. Simply provide its required AC power and a controlled device such as a valve, pump, or alarm that can be switched by the controller's relay in response to the sensor input.

Sensor-mount controllers are particularly appropriate for simple processes such as high or low alarms. They can also be a useful part of more complicated systems, providing a fail-safe backup in case a centralized system fails.

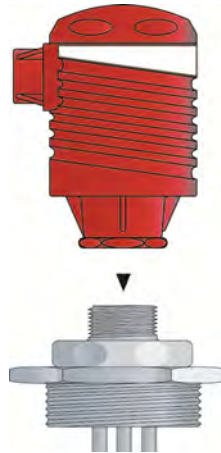
3/4" NPT MOUNTING THREAD:

Installation of the compact relay controller takes advantage of the 3/4" NPT thread located on its base. This makes the controller fully compatible with any of Flowline's level switches or Smart Trak™ or Switch Pak™ mounting systems.

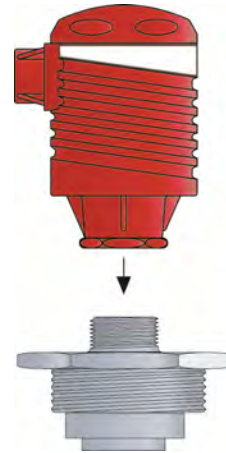
Mounting directly to a sensor



Mounting to Smart Trak Mounting System



Mounting to Switch-Pak Mounting System

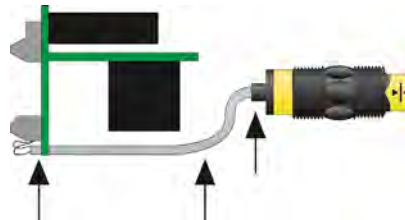


Note: Always tighten the controller from the wrench flat located on the swivel base. Never tighten from the body of the controller.



SWITCH CABLE:

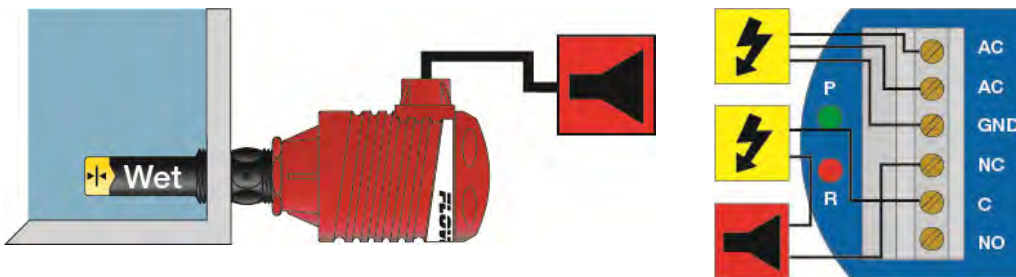
When installing a Flowline level switch, adjust the cable away from the printed circuit boards in the controller body. Avoid breaking the seal between the top of the level switch and the plastic coated cable.



LOW LEVEL ALARM:

The goal is to make sure that an operator is notified if the liquid level falls below a certain point. If it does, an alarm will sound, alerting the operator of a low level. A level switch must be mounted at the location where the alarm will sound.

In this application, the level switch will be Wet all the time. When the level switch becomes Dry, the relay contact will close causing the alarm to activate. Normal status for the application is for the controller to hold the relay open with the alarm wired through the Normally Closed contact. The Relay will be energized, the relay LED will be On and Invert will be Off. When the level switch becomes Dry, the relay will de-energize causing the contact to close allowing the alarm to activate.



To do this, connect the hot lead of the alarm to the NC side of the relay terminal of the controller. If power is lost, the relay will be de-energized, and the alarm will sound (if there is still power to the alarm circuit itself).

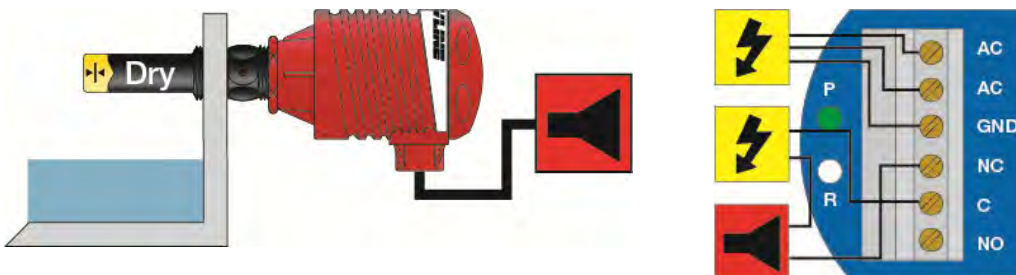
Note: If power is accidentally cut to the controller, the level switch's ability to notify the operator of a low level alarm could be lost. To prevent this, the alarm circuit should have a non-interruptible power supply or some other independent power source.

HIGH LEVEL ALARM:

In the same manor, this system can be used to sound an alarm when fluid reaches a high level, with just a change in the location of the sensor and the setting of the Invert switch.

The alarm is still connected to the NC side of the relay to allow for a power failure alarm.

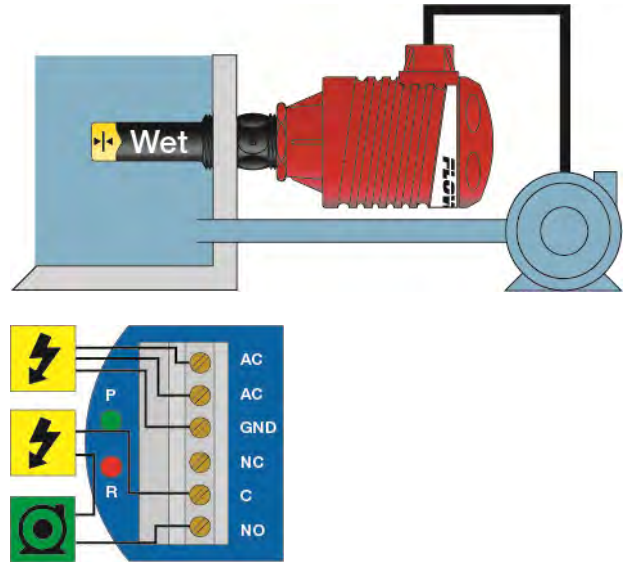
The sensor is normally dry. In this condition, we want the relay to be energized so the alarm does not sound: i.e., the Red relay LED should be on whenever the Input LED is Amber. So we turn Invert On. If the fluid level rises to the high sensor point, the sensor goes on, the relay de-energizes, and the alarm sounds.



PUMP PROTECTION:

The key here is to install a level switch just above the outlet to the pump. As long as the switch is Wet, the pump can operate. If the switch ever becomes Dry, the relay will open preventing the pump from running. To prevent relay chatter, add a small relay delay.

Note: In this application, the relay to the pump must be closed while the level switch is Wet. To do this, connect the relay through the NO side of the relay and set Invert to the OFF position. If power is lost to the controller, the relay will de-energize and keep the circuit open preventing the pump from running.



AUTOMATIC FILL:

This system consists of a tank with a high level sensor, a low level sensor, and a valve that is controlled by the controller. Part of a proper fail-safe design for this particular system is that if power is lost to the controller for any reason, the valve filling the tank must be closed. Therefore, we connect the valve to the NO side of the relay. When the relay is energized, the valve will open and fill the tank. In this case, Invert should be ON. The relay indicator will correspond directly to the open/close status of the valve.

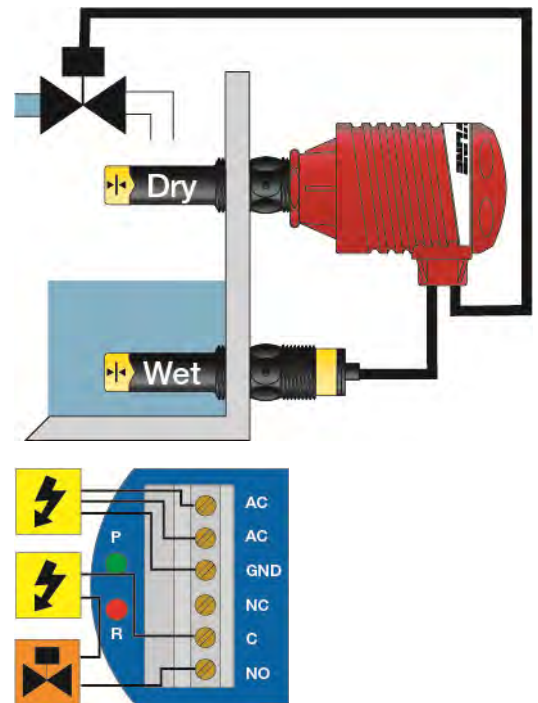
Determining the settings of LATCH and INVERT: This is the way the system must operate:

- When both the high and low sensors are dry, the valve will open (relay energized), starting to fill the tank.
- When the low sensor gets wet, the valve will remain open (relay energized).
- When the high sensor gets wet, the valve will close (relay de-energized).
- When the high sensor becomes dry, the valve will remain closed (relay de-energized).

Latch: In any two-sensor control system, LATCH must be ON.

Invert: Referring to the logic chart in Step Eight, we look for the setting that will de-energize the relay (start the pump) when both inputs are wet (Amber LEDs). In this system, Invert should be ON.

Determining A or B input connections: When LATCH is ON, there is no effective difference between Input A and B, since both sensors must have the same signal in order for status to change. When wiring any two-input relay section, the only consideration for hooking a particular sensor to A or B is if LATCH will be OFF.



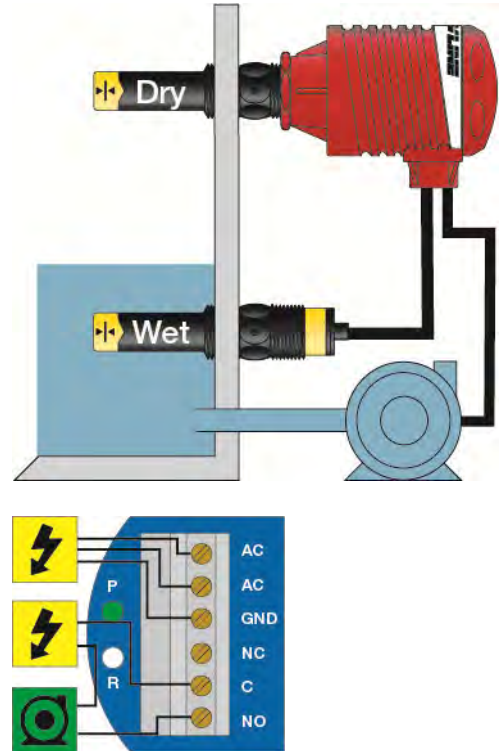
AUTOMATIC EMPTY:

Similar system logic can be used for an automatic empty operation. In this example, we will use a pump to empty a tank. The system still consists of a tank with a high level sensor, a low level sensor, and a pump that is controlled by the controller.

Note: Fail-safe design is critical in an application where the tank is passively filled. A power failure to the controller or the pump circuits may cause the tank to overflow. A redundant high alarm is critical to prevent an overflow.

Connect the pump to the NO side of the relay. In this case, Invert should be OFF, when the relay is energized, the pump will run and empty the tank. The relay indicator will correspond directly to the on/off status of the pump.

Note: If the pump motor load exceeds the rating of the controller's relay, a stepper relay of higher capacity must be used as part of the system design.

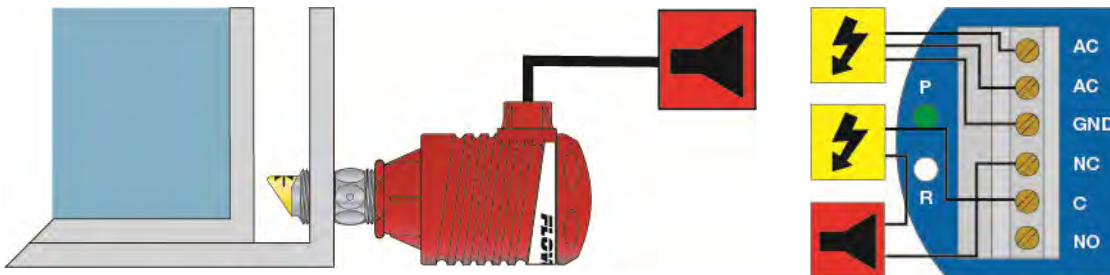


LEAK DETECTION:

A leak detection switch is installed either inside the interstitial space of the tank or through the outer wall. The switch will remain wet 99.99% of the time. Only when liquid comes into contact with the switch will the relay close to activate an alarm.

The alarm is connected to the NC side of the relay to allow for a power failure alarm.

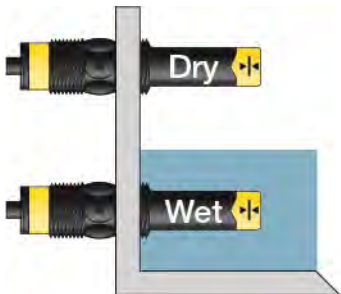
Note: The sensor is normally dry. In this condition, we want the relay to be energized so the alarm does not sound: i.e., the Red relay LED should be on whenever the Input LED is Amber. So we turn Invert On. If liquid comes into contact with the switch, the switch activates, the relay de-energizes, and the alarm sounds.



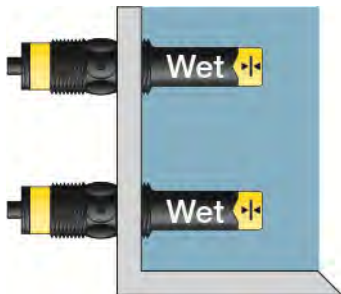
RELAY LOGIC – LATCHING RELAY

Latching relay will only switch when both level switches are in the same state.

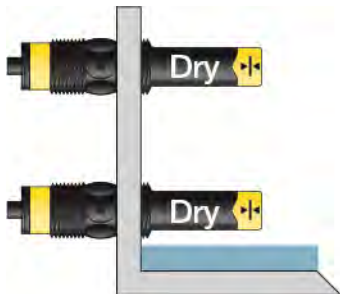
One Switch Dry, One Wet



Both Switches Wet



Both Switches Dry



In this state, the relay will never switch, regardless if this is an Auto Fill or Auto Empty application.	In this state, the relay will typically energize for an Auto Empty application and will typically de-energize for an Auto Fill application.	In this state, the relay will typically energize for an Auto Fill application and will typically de-energize for an Auto Empty application.
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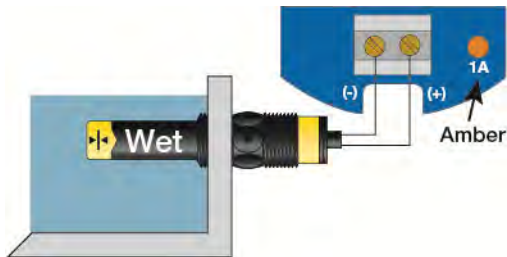
Note: The state of the application (either filling or emptying) can never be confirmed when one switch is Wet and the other is Dry. Only when both switches are in the same state (both Wet or both Dry) can confirmation of the relay status (energized or de-energized) occur.

Note: Always check the status of the level switches and compare that status against the Input LEDs. If the level switches state (Wet or Dry) corresponds to the input LEDs, proceed to the relay. If the level switches state (Wet or Dry) does not correspond to the input LEDs, then check the functionality of the level switches.

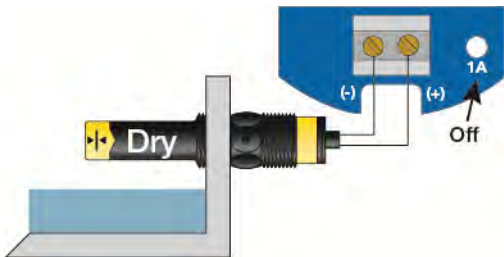
RELAY LOGIC – INDEPENDENT RELAY

Relay will act directly based upon the status of the level switch. When the level switch is Wet, the input LED will be ON (Amber). When the level switch is Dry, the input LED will be Off.

Single Switch Wet



Single Switch Dry



In this state, the relay can be energized with Invert in the OFF setting or can be de-energized with Invert in the ON setting.	In this state, the relay can be energized with Invert in the ON setting or can be de-energized with Invert in the OFF setting.
--	--

Note: Always check the status of the level switch and compare that status against the Input LED. If the level switch state (Wet or Dry) corresponds to the Input LED, proceed to the relay. If the level switch state (Wet or Dry) does not correspond to the input LED, then check the functionality of the level switch.

LATCH - ON VS OFF:

The relay can either be an independent relay (high level, low level or pump protection) with Latch OFF or can be a latching relay (automatic fill or empty) with Latch ON.

With Latch OFF, the relay will only respond to INPUT A. INPUT B will be ignored while Latch is OFF.

Invert OFF		Latch OFF
Input A*	Input B*	Relay
ON	No Effect	ON
OFF	No Effect	OFF

Invert ON		Latch OFF
Input A*	Input B*	Relay
ON	No Effect	OFF
OFF	No Effect	ON

With Latch ON, the relay will actuate when INPUT A and INPUT B are in the same condition. The relay will not change its condition until both inputs reverse their state.

Invert OFF		Latch ON
Input A*	Input B*	Relay
ON	ON	ON
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	ON

Invert ON		Latch ON
Input A*	Input B*	Relay
ON	ON	OFF
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	ON

Note: Some sensors (particularly buoyancy sensors) may have their own inverting capability (wired NO or NC). This will change the logic of the invert switch. Check your system design.

CONTROLLER LOGIC:

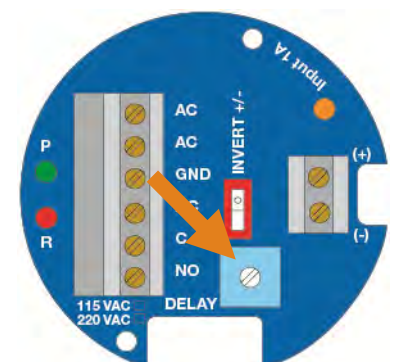
Please use the following guide to understand the operation of the controllers.

1. **Power LED:** Make sure the Green power LED is ON when power is supplied to the controller.
2. **Input LED(s):** The input LED(s) on the controller will be Amber when the switch(es) is/are wet and OFF when the switch(es) is/are dry. If the LED's are not switching the input LED, test the level switch.
3. **LC10 series only:** When the input LED turn OFF and ON, the relay LED will also switch. With invert OFF, the relay LED will be ON when the input LED is ON and OFF when the input LED is OFF. With invert ON, the relay LED will be OFF when the input LED is ON and ON when the input LED is OFF.
4. **LC11 series only:** When both inputs are wet (Amber LED's ON), the relay will be energized (Red LED ON). After that, if one switch becomes dry, the relay will remain energized. Only when both switches are dry (both amber LED's OFF) will the controller de-energize the relay. The relay will not energize again until both switches are wet. See the Relay Latch Logic Chart below for further explanation.

TIME DELAY:

The time delay can be adjusted from 0.15 seconds to 60 seconds. The delay applies to both the Make and Break side of the relay. The delay can be used to prevent relay chatter, especially when you have a liquid level that is turbulent. Typically, a slight rotation clockwise, from a position of all the way counter-clockwise, is enough to prevent relay chatter.

Note: The delay has stops on each end of its 270° rotation.

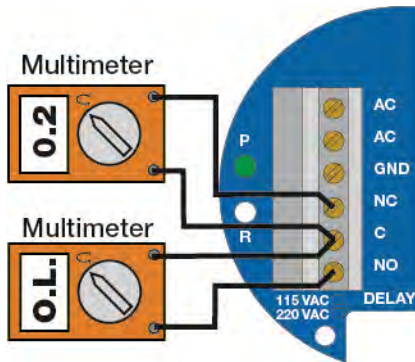


TROUBLESHOOTING

PROBLEM	SOLUTION
Relay switches only from input 1A (ignores input 1B)	Latch is turned OFF. Flip the latch switch to turn ON.
Level reaches alarm ON, but relay is OFF.	First, check to make sure the input LED is ON. If not, check wiring to sensor. Second, check status of Relay LED. If incorrect, flip the Invert switch to change the relay state.
Pump or Valve is supposed to stop, but it does not.	First, check to make sure the input LEDs are both in the sate state (both ON or both OFF). If not, check wiring to sensor each sensor. Second, check status of Relay LED. If incorrect, flip the Invert switch to change the relay state.
Controller is powered, but nothing happens.	First check the Power LED to make sure it is Green. If not, check the wiring, power and make sure the terminal block(s) is(are) seated correctly over the pins.

TESTING RELAYS:

Relay De-energized:



The relay contacts are true dry contacts with no voltage sourced within the relay contacts. To test, connect a Multimeter set to read Ohms.

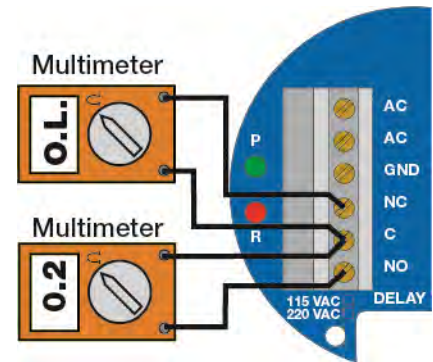
Relay De-energized

- Small amount of resistance across Common (C) and Normally Closed (NC).
- O.L. across Common (C) and Normally Open (NO)

Relay Energized

- O.L. across Common (C) and Normally Closed (NC).
- Small amount of resistance across Common (C) and Normally Open (NO).

Relay Energized:



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