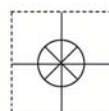


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LVCN-51 Series Continuous Relay Controller



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It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

The LVCN-51 Series Continuous Relay Controller is a general-purpose level controller which provides single tank level indication with dual relays and a repeater 4-20 mA output. The LVCN-51 Series features both a single 10A SPDT and a single 10A Latching SPDT relay. This package allows for a system that can perform automatic operations (fill or empty) and an alarm operation (high or low). The LVCN-51 Series can also be a controller that can perform dual alarms (2-high, 2-low or 1-high, 1-low). Package the controller with a transmitter that provides a 4-20 mA output and an enclosure to protect the controller from the elements.

Features

- 3.5 digit LED display indicates level in customer engineering units.
- Fail-Safe relay control of pumps, valves or alarms with a 0 to 60 second delay.
- Polypropylene enclosure can be DIN rail mounted or back panel mounted.
- Easy setup with push button calibration for display and relay settings.
- AC powered

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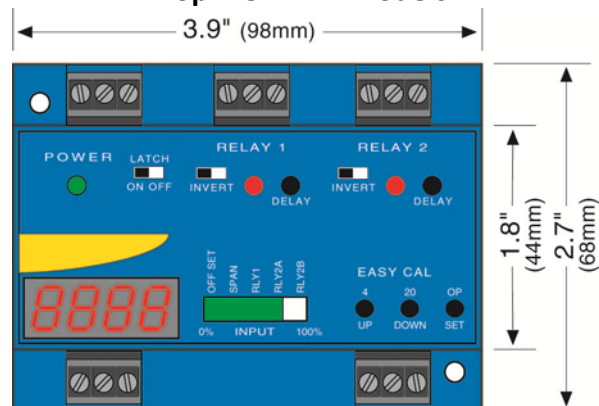
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SPECIFICATIONS/DIMENSIONS

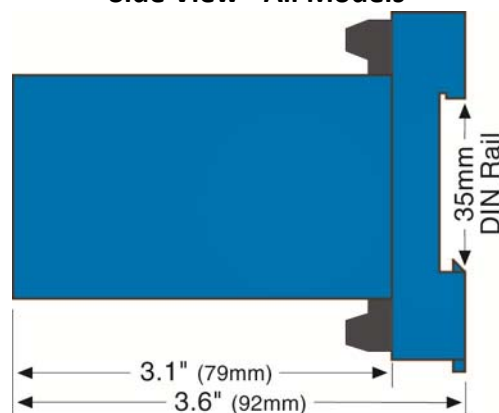
Step Two

Display type:	LED, 3.5 digit
Display units:	Engineering
Display output:	0 to 999 or 0.0 to 199.9
LED indicators:	Power and relay status
Bar graph display:	4-20 mA with set points
Configuration:	Push button
Alarm indication:	Amber: < 4 mA Red: > 20 mA
Security:	Lock out mode
Sensor input:	(1) 4-20 mA transmitter
Supply voltage:	Selectable 120 VAC / 240 VAC 50 - 60 Hz.
Consumption:	5 Watt maximum
Sensor supply:	24 VDC @ 1.5 Watts
Loop power:	4-20 mA, 18 VDC
Contact type:	(1) SPDT (1) Latched SPDT
Contact rating:	250 VAC, 10A
Contact output:	Selectable, NO or NC
Contact latch:	ON or OFF
Contact configuration:	1: High or low level alarm 2: High and low level alarm 3: Automatic fill or empty 4: Automatic fill or empty with alarm
Contact delay:	0-60 seconds
Fail safety:	Power fail-safe
Repeater output:	4-20 mA, 12-36 VDC
Ambient temperature:	F: -40° to 158° C: -40° to 70°
Enclosure type:	35 mm DIN (EN 50 022)
Enclosure material:	Polypropylene (U.L. 94 VO)
CE Compliance:	EN 50082-2 immunity EN 55011 emission EN 61010-1 Safety

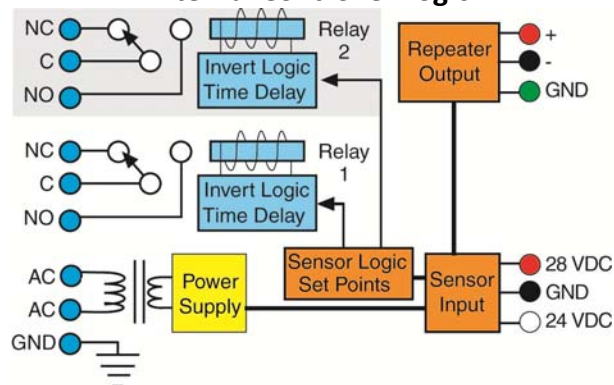
Top View - All Models



Side View - All Models



Internal Controller Logic



- ⚠ **About This Manual:** PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on the continuous relay controller from OMEGA ENGINEERING: LVCN-51 series.
- ⚠ **User's Responsibility for Safety:** OMEGA ENGINEERING 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:** *The LVCN-51 Series continuous relay 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 Omega Engineering representative for further information.
- ⚠ **Install In a Dry Location:** The controller housing is not designed to be immersed. When installed properly, it should be mounted in such a way that it does not normally come into contact with liquid. 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 10 amp 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 10 amp rating does not provide an ample margin for such inrush currents. 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.

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.

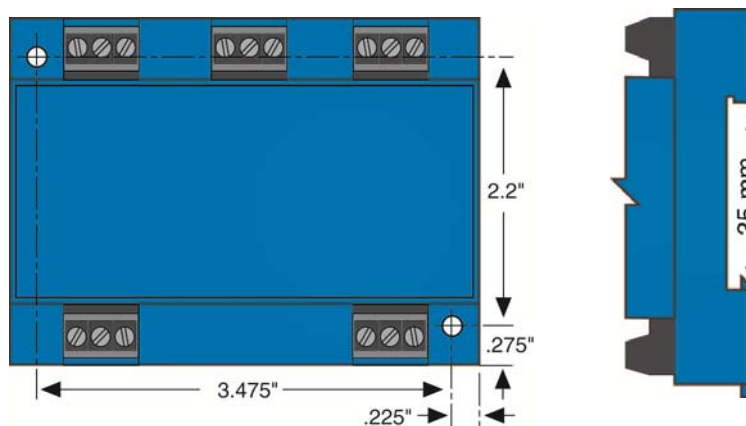
While the internal relay is reliable, over the course of time relay failure is possible in two modes: under a heavy load the contacts may be “welded” or stuck into the energized position, or corrosion may buildup on a contact so that it will not complete the circuit when it should. In critical applications, 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 OMEGA ENGINEERING products, such examples are for information only and are not intended as a complete guide to installing any specific system.

Components:

- LVCN-51 - Single input with dual relays, 3.5 digit LED display and repeater output.
- LVCN-51-CE - Single input with dual relays, 3.5 digit LED display and repeater output with CE approval.
- Owner's Manual

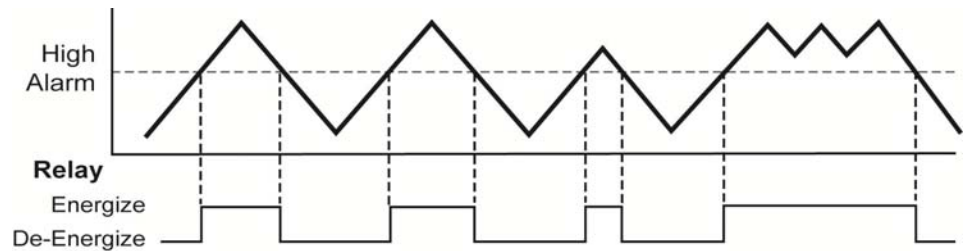
Panel DIN Rail Mounting: The controller may be mounted by either a back panel using two screws through mounting holes located at the corners of the controller or by snapping the controller on 35 mm DIN Rail.



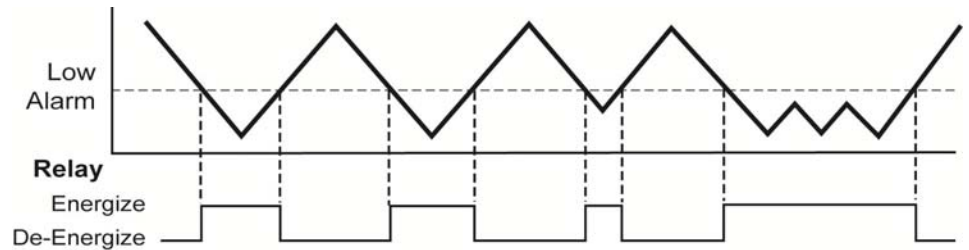
Note: Always install the controller in a location where it does not come into contact with liquid.

Features of a Single Input High or Low Relay: Single Input Relays (Relay 1 or Relay 2 w/ latch turned OFF) are designed to switch from a single set-point. 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 level rises above the high alarm setting and will de-energize when it drops below the high alarm setting.



Low Alarm: Invert is ON. Relay will energize when the level drops below the low alarm setting and will de-energize when it rises above the low alarm setting.

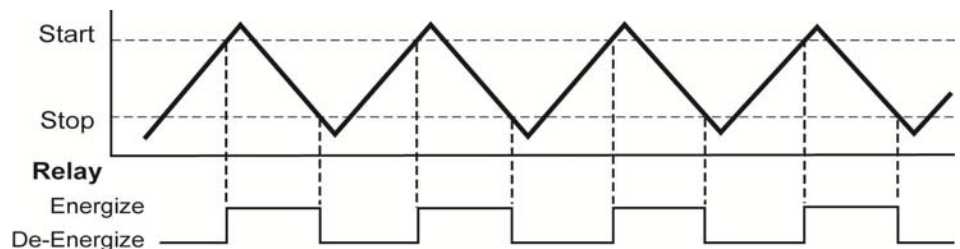


Single input high or low relays may be used with any device that outputs a 4-20 mA signal. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. A time delay from 0 to 60 seconds can be set before the relay responds to the sensor input. Typical applications for single input relays are high level or low level switch/alarm operations (opening a drain valve whenever liquid level rises to a set-point) and over-flow protection (turning off a pump or sounding an alarm when a high level is reached).

Features of a Latching Relay (automatic fill or empty): The latching relay (relay 2 only) is designed to switch a relay on and off at two different levels. It turns its internal relay ON or OFF (as set by the invert switch) in response when the level is above the high setting or below the low setting. The relay will not change its state when the level is between the high and low setting.

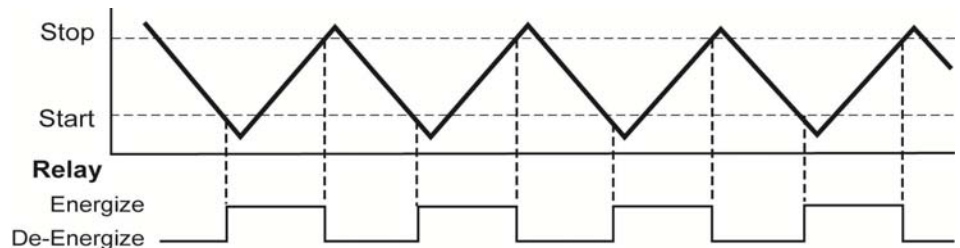
Automatic Empty:

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



Automatic Fill:

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



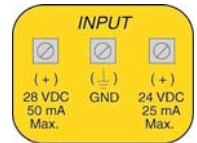
The Latching Relay (Automatic Fill/Empty) may be used with any device that outputs a 4-20 mA signal. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. Typical applications for Latching Relays are automatic 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:



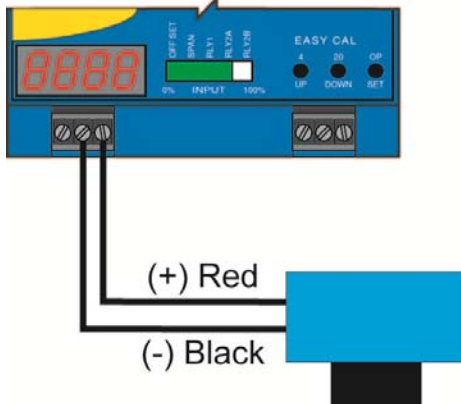
1. **Power indicator:** This Green LED lights when AC power is ON.
2. **Relay indicator:** This Red LED will light whenever the controller energizes the relay, in response to the transmitter input and after the time delay.
3. **AC Power terminals:** Connection of 120 VAC power to the controller. The 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 10 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 switch reverses the logic of the relay control in response to the switch(es): conditions that used to energize the relay will now de-energize the relay and vice versa.
6. **Time delay:** Sets delay from 0 to 60 seconds. Hold Delay button to increase delay in 5 second increments.
7. **Digital display:** Shows the current 4-20 mA signal in engineering units.
8. **Input terminals:** Connect the transmitter wires to these terminals: A 24 VDC power is provided for current loop with an additional 28 VDC power terminal if required.
9. **Latch switch (relay 2):** This switch determines how the relay will be energized in response to the two set points. When LATCH is OFF, the relay responds to set point RLY2A only; when LATCH is ON, the relay will energize or de-energize only when both set points (RLY2A and RLY2B) are in the same condition (both wet or both dry). The relay will remain latched until both set points change conditions.
10. **Bar Graph:** Displays 4-20 mA signal as a percentage of the range.
11. **OP / SET:** Used to scroll between set points during programming.
12. **20 / Down:** Used to decrease display value during programming and for EasyCal™ Span set up.
13. **4 / Up:** Used to increase display value during programming and for EasyCal™ Offset set up.
14. **Repeater Output:** Isolated terminal which reproduces the input 4-20 mA signal. Terminal requires 12-36 VDC power for operation.

Wiring to Input Terminals: Signal input is always through the 24 VDC terminal. The 28 VDC terminal is used as an alternative power supply for three-wire devices. Please note a difference between 2-wire and 3-wire level transmitters and sourcing and sinking modes below. Below is a quick review of wiring the LVCN-51 Series to common 4-20 mA transmitters.



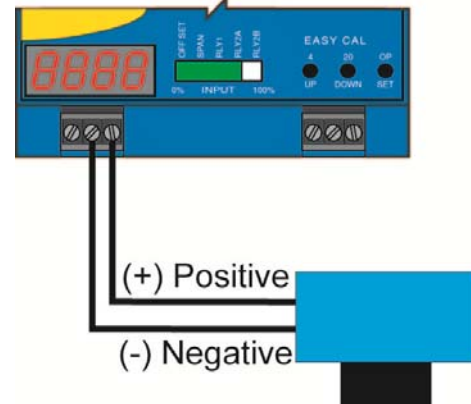
LVCN-2700 Series (LVU2710, LUV2718, LVU2726 & LVU2732) & **LVCN414 Series** (LVCN414, LNCV414-I, LVCN210 & LVCN318)

Sourcing mode (Factory Setting)

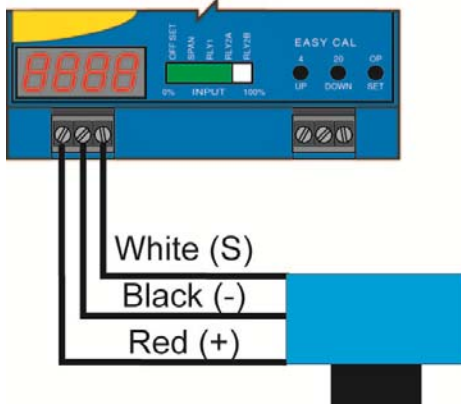


LVU800 Series (LVU809, LVU816, LVU826 & LVU832)

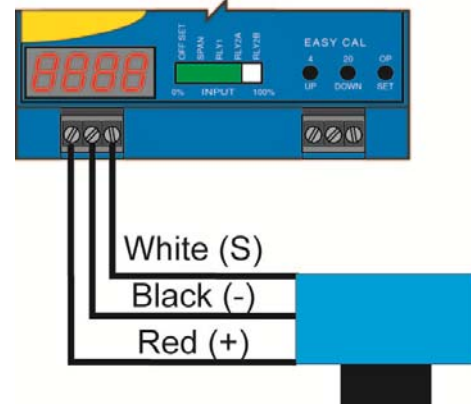
Sourcing Mode (Factory Setting)



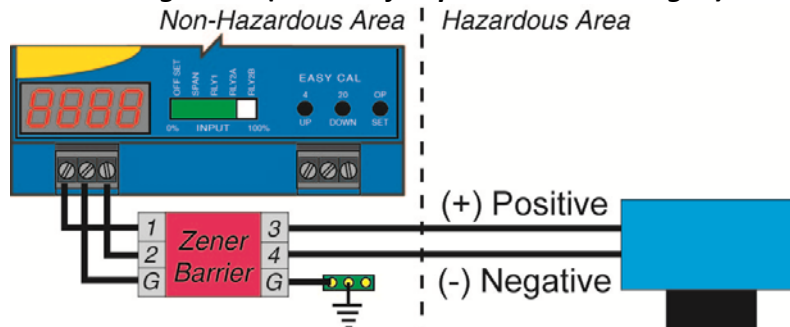
LVU-300 Series (LVU-301 only)
Sourcing Mode (Factory Setting)



LVU-300 Series (LVU-303 only)
Sinking mode (internal jumper must be changed)



Ultrasonic Level Transmitter (Intrinsically Safe) (LVU-201A only)
Sinking mode (internal jumper must be changed)

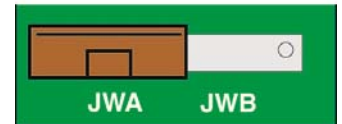


Setting Input Polarity (Sourcing vs. Sinking modes): The LVCN-51 Series can be set in one of two modes, sourcing and sinking. The LVCN-51 Series is shipped from the factory in the sourcing mode. This is compatible with any loop powered transmitter such as the **LVCN-2700 Series** (LVU2710, LUV2718, LVU2726 & LVU2732), **LVU800 Series** (LVU809, LVU816, LVU826 & LVU832), **LVCN414 Series** (LVCN414, LNCV414-I, LVCN210 & LVCN318) and the three-wire Ultrasonic **LVU-300 Series** (LVU-301 only) with no adjustment required. If using a **LVU-300 Series** (LVU-303 only) or **Ultrasonic Level Transmitter (Intrinsically Safe)** (LVU-201A only), follow the instructions below.

1. Remove the back panel of the controller and gently slide the printed circuit board (PCB) from the housing. Use caution when removing the PCB.
2. Locate jumpers JWA and JWB on the PCB.
3. To change from sourcing to sinking, remove jumper from JWA and place on JWB. The LVCN-51 Series is shipped from the factory in the sourcing mode (JWA active).
4. Gently return PCB into housing and replace back panel.

Note: Loop powered devices can operate in either the sourcing or sinking modes.

Sourcing Mode

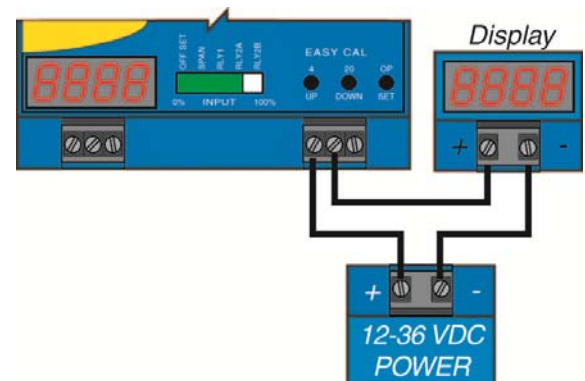


Sinking Mode

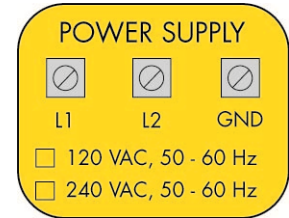
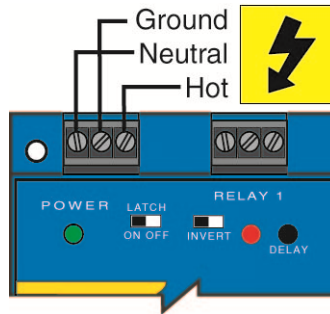
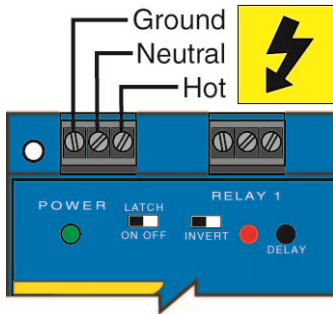


No Change Required	LVCN-2700 Series (LVU2710, LUV2718, LVU2726 & LVU2732), LVU800 Series (LVU809, LVU816, LVU826 & LVU832), LVCN414 Series (LVCN414, LNCV414-I, LVCN210 & LVCN318) and the three-wire Ultrasonic LVU-300 Series (LVU-301 only)	Sinking or Loop Devices
Change Required	LVU-300 Series (LVU-303 only) or Ultrasonic Level Transmitter (Intrinsically Safe) (LVU-201A only)	Sourcing Devices

Repeater Output: The isolated repeater output reproduces the input 4-20 mA current signal. This signal can be repeated to any other device that accepts a 4-20 mA input, such as a PLC, DCS, SCADA, chart recorder or another display. The repeated 4-20 mA signal is not an excited output. **An external power supply is required and should not exceed a maximum of 36 VDC.** See the wiring diagram to the right for instructions in wiring all three components (repeater output, power supply and the new device) in series with each other.



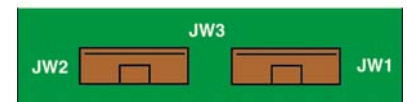
VAC Power Input Wiring: Observe the POWER SUPPLY label on the LVCN-51 Series. The label identifies the power requirement (120 or 240 VAC) and the terminal wiring. **Note:** Polarity does not matter with the AC input terminal.



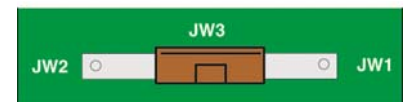
Changing from 120 to 240 VAC: The LVCN-51 Series is shipped from the factory configured as a 120 VAC powered device. To switch to 240 VAC, follow the instructions below.

1. Remove the back panel of the controller and gently slide the printed circuit board (PCB) from the housing. Use caution when removing the PCB.
2. Locate jumpers JWA and JWB on the PCB.
3. To change from sourcing to sinking, remove jumper from JWA and place on JWB. The LVCN-51 SERIES is shipped from the factory in the sourcing mode (JWA active).
4. Gently return PCB into housing and replace back panel.

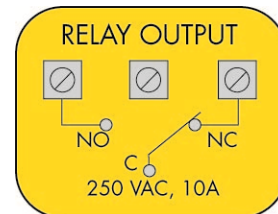
120 VAC Jumper Setting



240 VAC Jumper Setting



Relay Input Wiring: The relay is a single pole, double throw type rated at 250 Volts AC, 10 Amps. The two terminal NO and NC (normally open and normally closed) will be used in different applications. Remember that the "normal" state is when the relay coil is de-energized and the Red relay LED is Off / de-energized.

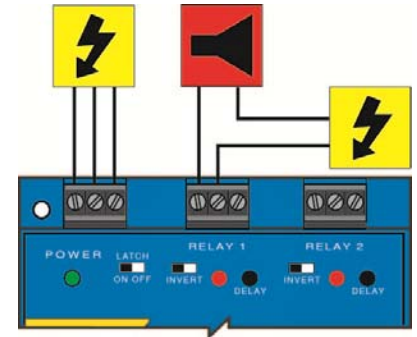


Low Level Alarm: The goal is to make sure that the liquid level does not fall below a certain point. If it does, an alarm is supposed to sound, alerting the operator of a low level condition.

If power is accidentally cut to the controller, the sensor's ability to notify the operator of a low level condition could be lost. The system must alert the operator not only to low liquid level, but to controller power loss.

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). The alarm circuit should have a non-interruptible power supply or some other indicator or backup alarm to warn of a power failure in the alarm circuit.

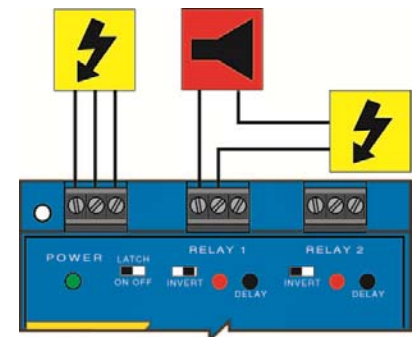
In this application, the normal status of the sensor at the bottom of the tank will be wet, and the relay will be energized holding the alarm circuit open. Both the relay LED and the Input LED will be on simultaneously, so for this application, Invert should be set to the OFF position.



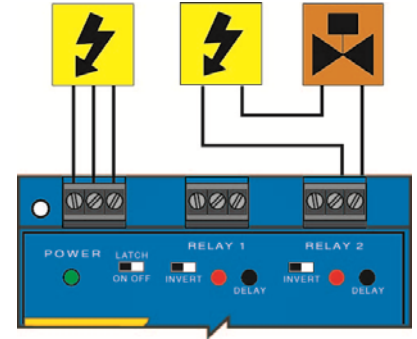
High Level Alarm: In the same manor, this system can be used to sound an alarm when fluid reaches a high level, with just a change in the location of the sensor and the setting of the Invert switch.

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.



Automatic Fill: This system consists of a tank with a valve controller by the LVCN-51 Series. At a low set point, the valve opens, filling the tank. At the high set point, the valve closes. 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 close. 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. The relay indicator will correspond directly to the Open/Close status of the valve.



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

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

- When the liquid level is below the low set point, the valve should open, starting to fill the tank.
- When the liquid is above the low set point, the valve will remain open.
- When the liquid reaches the high set point, the valve should close.

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

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

Automatic Empty: In the same manner, the controller can be used to automatically empty a tank with just a change to the setting of the INVERT switch:

- The valve is still connected to the NO side of the relay to allow for a power failure fail-safe condition.
- The normal state of the valve is closed. In this state, we want the relay to be energized at the high set point (opening valve to drain tank). The relay will de-energize at the low set point (closing valve).

Note: A fail-safe design is important. If the tank is being passively filled, and a valve must be used to actively empty it, a power failure to either the controller or the pump circuits will cause overflow.

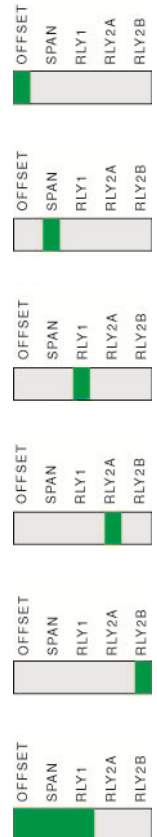
OFFSET: Equivalent to the 4 mA set point on the transmitter. Enter the value you would like to see when the LVCN-51 Series receives 4 mA.

SPAN: Equivalent to the 20 mA set point on the transmitter. Enter the value you would like to see when the LVCN-51 Series receives 20 mA.

RLY1, RLY2A, RLY2B: Set points for Relays. Values must be between OFFSET and SPAN.

Setting values: With the Latch Off, ignore steps 9 and 10. RLY2B will not show during the programming section with Latch Off.

1. Press the SET button once. Immediately, the LED bar graph will begin to flash one Green bar next to OFFSET.
2. Use UP / DWN buttons to change display to the desired OFFSET value.
3. Press the SET button again. Immediately, the LED bar graph will jump one Green bar to the right next to SPAN.
4. Use UP / DWN buttons to change display to the desired SPAN value.
5. Press the SET button again. Immediately, the LED bar graph will jump one Green bar to the right next to RLY1.
6. Use UP / DWN buttons to change display to the desired RLY1 value.
7. Press the SET button again. Immediately, the LED bar graph will jump one Green bar to the right next to RLY2A.
8. Use UP / DWN buttons to change display to the desired RLY2A value.
9. Press the SET button again. Immediately, the LED bar graph will jump one Green bar to the right next to RLY2B.
10. Use UP / DWN buttons to change display to the desired RLY2B value.
11. Press the SET button again. Immediately, the LED bar graph will return back to it normal operation of solid bars.

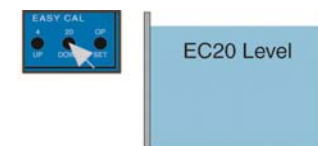


EasyCal Calibration: The Offset and Span points may be programmed directly to a specific level in the tank. These are the EasyCal 4 (Empty tank) and EasyCal 20 (Full tank) values. **Note:** *the level of the tank must physically be at its desired level when using EasyCal. If not, the EasyCal will accept the level and the values on the display will be incorrect. Use the factory reset to start over if this occurs.*

To calibrate EC4, set the tank to the new Offset level. Press [4] button once and [E] will appear in the display. Press [4] button again and [C] will appear in the display and EC4 is set.



To calibrate EC20, set the tank to the new Span level. Press [20] button once and [E] will appear in the display. Press [20] button again and [C] will appear in the display and EC20 is set.



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. **Bar Graph LED:** The bar graph LED on the controller will always indicate the proportional 4-20 mA input signal going to the LVCN-51 Series controller. i.e.: if the tank is 25% full, then 25% of the bar graph will be lit Green. If a single Amber bar appears, this indicates an input current of less than 4mA. If a single Red LED appears, this indicates an input current greater than 20 mA. Use this feature to confirm the input signal for the LVCN-51 Series.
3. **Relay LEDs:** The normal state of the relay is when the LED is OFF. When the relay becomes energized, the Red LED will light. If power is removed from the controller, the relay will return to the normal state (LED OFF).
4. **Display:** Will indicate the proportional level of the liquid based upon the 4-20 mA input. If EasyCal is used for either the empty tank level, full tank level or both, the display will ignore the 4-20 mA input signal and use the EasyCal setting as its empty and/or full position.

Relay Latch Logic Table (relay 2 only): The relay can either be an independent relay (high or low level alarm) or can be a latching relay (automatic fill or empty) with latch ON. With Latch OFF, the relay will only respond to the RLY 2A setting. RLY 2B will be ignored.

With Latch OFF, the setting for RLY 2B will be ignored. All changes to the relay's state will occur from the RLY 2A setting.

Invert OFF		Latch OFF
RLY 2A	RLY 2B	Relay
ON	No Effect	ON
OFF	No Effect	OFF

Invert ON		Latch OFF
RLY 2A	RLY 2B	Relay
ON	No Effect	OFF
OFF	No Effect	ON

With Latch ON, the relay will actuate when the level is above RLY 2A and RLY 2B. The relay will not change its condition if the level is between RLY 2A and RLY 2B. The relay will reverse its state when the level is below both RLY 2A and RLY 2B settings.

Invert OFF		Latch ON
RLY 2A	RLY 2B	Relay
ON	ON	ON
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	OFF

Invert ON		Latch ON
RLY 2A	RLY 2B	Relay
ON	ON	OFF
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	ON

Factory Reset: Returns the LVCN-51 Series to its original factory settings, including setting the OFFSET to 4 mA and the SPAN to 20 mA. To perform a Factory Reset, first remove power to the controller. Hold both the 4/UP and 20/DWN buttons while adding power to the LVCN-51 Series. An "F" for Factory Reset will appear in the display indication the Factory Reset was achieved. If an "E" for Error appears, the Factory Reset was not performed and you will need to try again. **Note:** make sure both buttons are pressed while adding power. The "E" will appear if only one of the buttons is pressed.

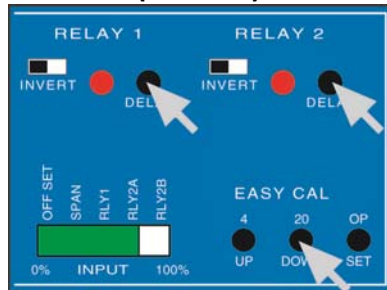


Factory Settings for LVCN-51 Series

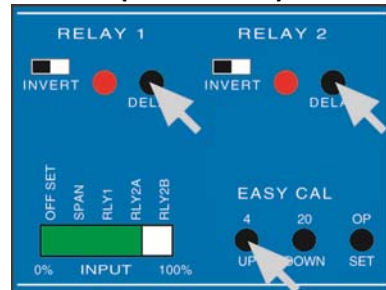
OFFSET	SPAN	RLY 1	RLY 2A	RLY 2B
4.0	20.0	6.0	18.0	8.0

Lock Out Function: The buttons on the face of the LVCN-51 Series can be disengaged or locked out. To lockout the buttons, press both delay buttons and the DWN button simultaneously (see below left). This will lockout all of the buttons and prevent an accidental changing of settings. To unlock the buttons, press both delay buttons and the UP button simultaneously (see below right).

**Lock Out ON
(LOCKED)**



**Lock Out OFF
(UNLOCKED)**



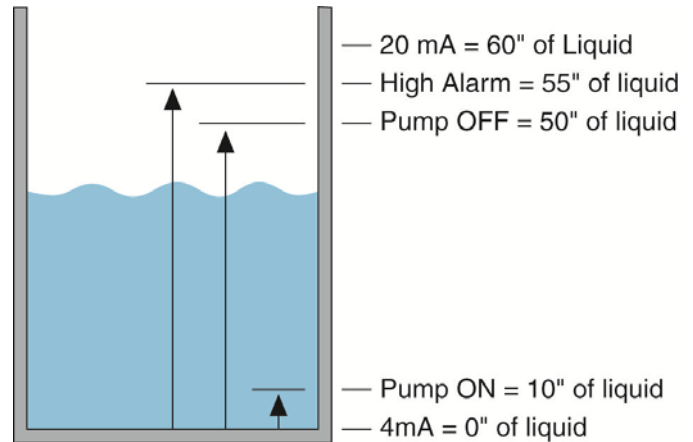
Troubleshooting

PROBLEM	SOLUTION
Display is not reading correct level.	First check the Bar Graph to make sure it is indicating the correct level. If not, check transmitter. If so, perform a factory reset on the LVCN-51 Series and reset values.
Bar Graph is not indicating the correct level.	Check the transmitter's 4-20 mA output making sure it is spanned correctly for the application.
Bar Graph shows a single Amber bar.	This indicates a current input less than 4mA. Check for loose or open wires between the transmitter and LVCN-51 Series and check the output of the transmitter.
Bar Graph shows a single Red bar.	This indicates a current input greater than 20mA. Remove power immediately. Check for a short in the wiring between the transmitter and LVCN-51 Series or for some other power source that is affecting the input loop.
RLY 2B does not appear.	Flip Latch switch to ON.
Relay switches only from RLY 2A (ignores RLY 2B).	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 bar graph is indicating the correct level. Next check the relay settings. Finally, 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 is seated correctly.

EXERCISE**Step Ten**

The following exercise demonstrates inventory control with automatic filling and a high level alarm. The usable range is 60 inches of liquid. The pump starts filling at 10 inches of liquid and stops filling at 50 inches of liquid. A high level alarm occurs at 55 inches of liquid.

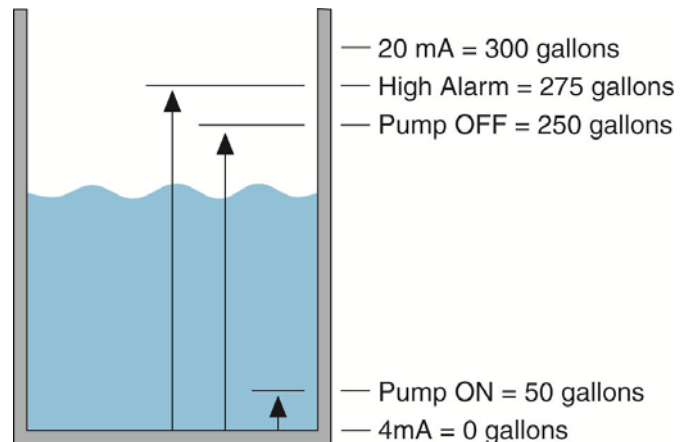
Enter all values into the LVCN-51 Series in inches. The OFFSET is the corresponding 4 mA setting in inches. The SPAN is the corresponding 20mA setting in inches. RLY2A and RLY2B is dedicated to the filling of the tank because RELAY2 is a latching relay. RLY1 is dedicated to the high level alarm because it is a single set point relay. Use the following values for programming the LVCN-51 Series.



OFFSET	SPAN	RLY 1	RLY 2A	RLY 2B
0.0	60.0	55.0	50.0	10.0

The next exercise demonstrates the same inventory control with automatic filling and a high level alarm. However, the units have been changes from inches to gallons. Within the tank, 1" = 50 gallons of liquid. The usable range is now 300 gallons of liquid. The pump starts filling at 50 gallons of liquid and stops filling at 250 gallons of liquid. A high level alarm occurs at 275 gallons of liquid.

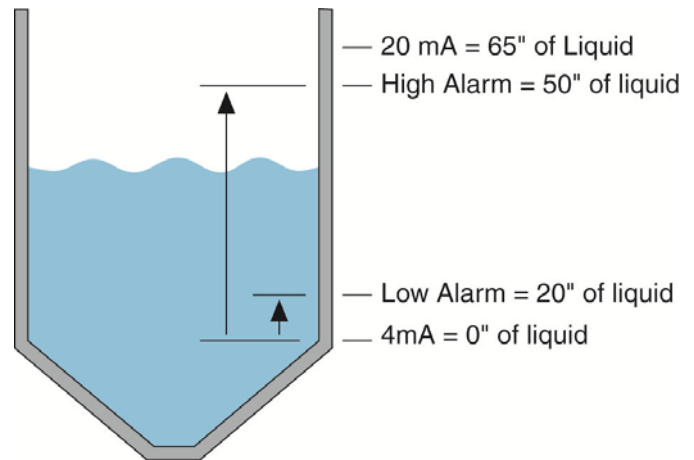
Enter all values into the LVCN-51 Series in gallons. The OFFSET is the corresponding 4 mA setting in gallons. The SPAN is the corresponding 20 mA setting in gallons. RLY2A and RLY2B is dedicated to the filling of the tank because RELAY2 is a latching relay. RLY1 is dedicated to the high level alarm because it is a single set point relay. Use the following values for programming the LVCN-51 Series.



OFFSET	SPAN	RLY 1	RLY 2A	RLY 2B
0	300	275	250	50

The following exercise demonstrates inventory control with a high and low level alarm. The usable range is between 16 and 56 inches of liquid. The high level alarm occurs at 50 inches of liquid and the low level alarm occurs at 20" of liquid.

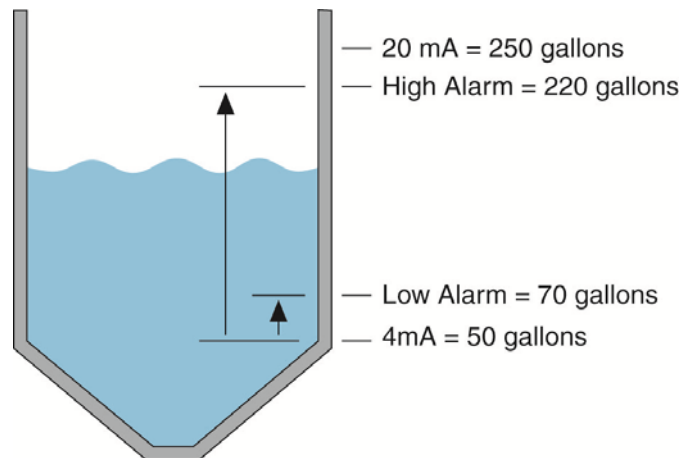
Enter all values into the LVCN-51 Series in inches. The OFFSET is the corresponding 4mA setting in inches. The SPAN is the corresponding 20mA setting in inches. RLY1 is dedicated to the high level alarm because it is a single set point relay. RLY2A is dedicated to the low level alarm because the latch is turned off on Relay 2. Use the following values for programming the LVCN-51 Series.



OFFSET	SPAN	RLY 1	RLY 2A	RLY 2B
0.0	65.0	50.0	20.0	N/A

The next exercise demonstrates the same inventory control with a high and low level alarm. However, the units have been changes from inches to gallons. Along the straight side of the tank, 1" = 50 gallons of liquid. The usable range is now from 50 to 250 gallons of liquid. The high level alarm occurs at 220 gallons of liquid. The low level alarm occurs at 70 gallons of liquid.

Enter all values into the LVCN-51 Series in gallons. The OFFSET is the corresponding 4mA setting in gallons. The SPAN is the corresponding 20mA setting in gallons. RLY1 is dedicated to the high level alarm because it is a single set point relay. RLY2A is dedicated to the low level alarm because the latch is turned off on Relay 2. Use the following values for programming the LC52-1001.



OFFSET	SPAN	RLY 1	RLY 2A	RLY 2B
0	250	220	70	N/A



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OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

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1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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