



LL Series Liquid Level Controllers

Operating Instruction Manual



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LL Series Liquid Level Controller Operating Manual

1.0 GENERAL INFORMATION

The AquaMetrix LL Series Liquid Level Controllers operate on the principal of electrolytic conductivity. All aqueous solutions conduct electricity. The degree of conductivity is directly related to the amount of dissolved particles in the solution. The purer the water, the less conductive the solution will be. These controllers are suitable for use in solutions having a conductivity of 15 $\mu\text{S}/\text{cm}$ or greater.

By placing two electrodes into a solution and applying voltage across them, the controller can detect when the solution rises to make contact with both electrodes, completing the circuit. The completed circuit sends enough current back to the controller to trigger the relay on or off, like a light switch. The relay in turn may be wired to auxiliary devices such as pumps, alarms and actuators.

The instrument has a sensitivity adjustment, which enables it to adjust to a more or less conductive process. For example, since foam is less conductive than liquid, sensitivity could be increased to suit this application.

2.0 SPECIFICATIONS

POWER REQUIREMENTS:

120 VAC 50/60 HZ (240VAC also available, please contact manufacturer to order LL7-220)

NUMBER OF ELECTRODES:

Three electrode terminals included on all models. These may not all be used depending on the situation.

Single Level Service – E2 is the level electrode. If using a metallic tank, E1 can be grounded to the tank. If tank is non conductive, E1 must be an additional electrode which is always in contact with liquid.

Differential Level Service - E2 and E3 are the high and low level electrodes, respectively. If tank is metallic, E1 can be grounded to the tank. If tank is non conductive, E1 must be an additional electrode which is always in contact with liquid.

Electrodes must be metallic.
(i.e. 316SS or Titanium rods)

RELAY CONTACT:

DPDT Form C 10A resistive at 250VAC 1/3HP
Standard 12-pin plug in relay with durable screw terminals

MAX. INTERCONNECT LENGTH:

100 Meters (323 ft)

SENSING CIRCUIT RESISTANCE:

LL3, 4, 7 – 40k Ω maximum (Adjustable)
LL7H – 1M Ω maximum (Adjustable)

HOUSING:

Black ABS NEMA 1 Enclosure

PUMP RELAY CONNECTIONS:

Normal open or normal closed.

AUXILLARY RELAY CONNECTIONS:

LL3 – Normal open or normal closed
LL4 – None
LL7 – Normal open only
LL7H – Normal open only

ADDITIONAL FEATURES:

LL3 – LED relay indicator light.
LL7H – Includes terminal for NW, used to neutralize capacitance effect of cable. If controller is more then 20 meters from tank, attach a three conductor cable and connect a one wire to NW and leave unconnected at tank. Do not use the shield for this purpose.

HOUSING:

Clear ABS NEMA 1 Enclosure

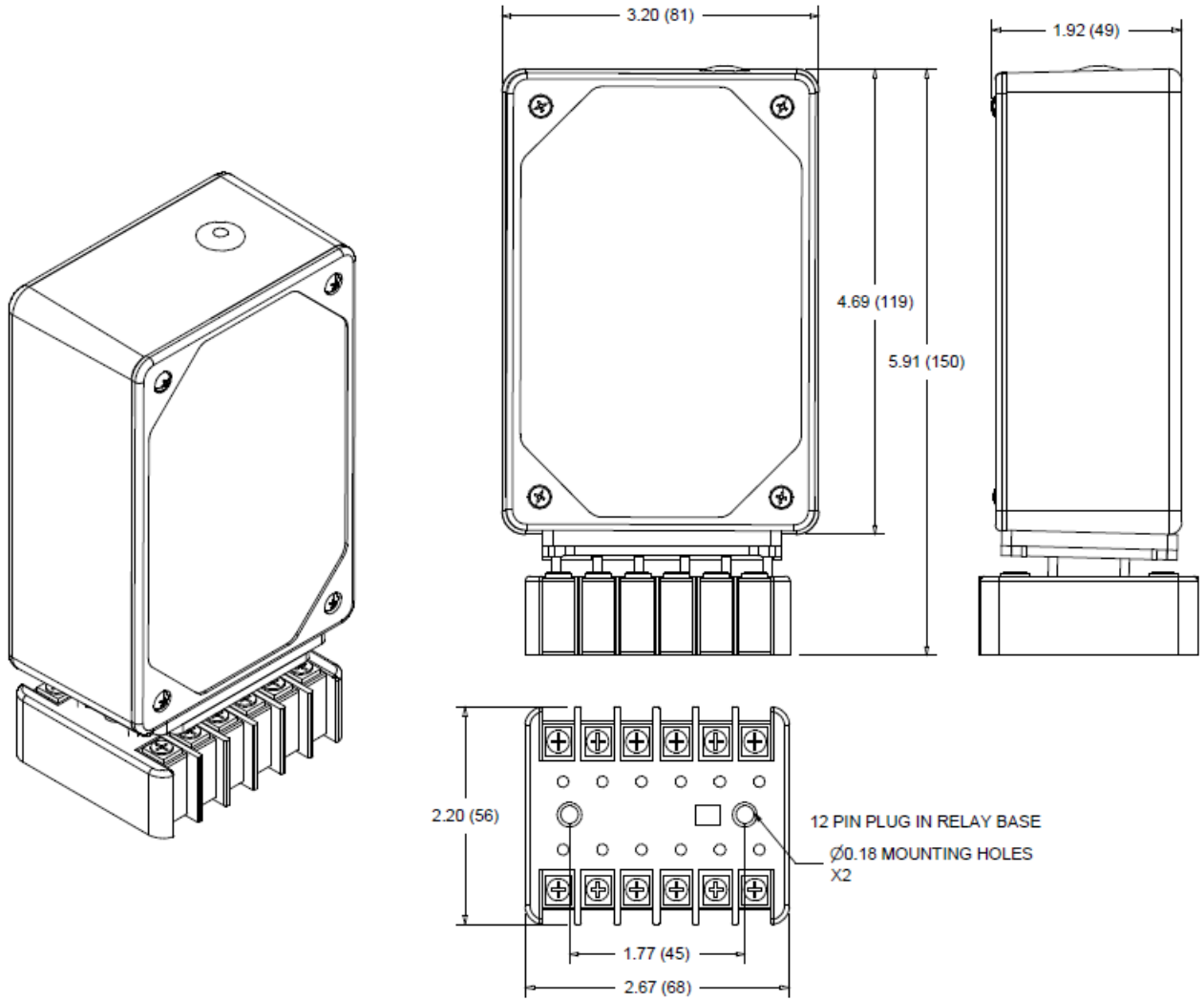


Figure 1. Dimensions of LL Series Controllers.

3.0 INSTALLATION

3.1 Location

3.1.1 Select an installation site which is:

- Free of mechanical vibrations
- Reasonably clean and dry
- Protected from falling corrosive fluids
- Remote from high voltage relay and power switches

3.2 Electrical Connections

CAUTION: The instrument operates from line voltage. This constitutes a possible shock hazard. Ensure that line power is removed before attempting connections.

NOTE: Both pump and auxiliary terminals need to be externally powered. If not externally powered, they may be wired into terminals 2 and 3 with the controller power. However, it is recommended that both the pump and auxiliary connections have a separate power source.

3.2.1 The LL Series Controllers are inserted into a 12-pin pre-wired mounted base, (part A26-22) to establish all electrical connections. Figures 2 through 5 show the connections at the base for all models, and Section 4.1.2 describes operation and level control.

NOTE: If the tank is metallic and grounded, connect E1 to the tank. For ungrounded tanks connect E1 to an electrode that is constantly submerged.

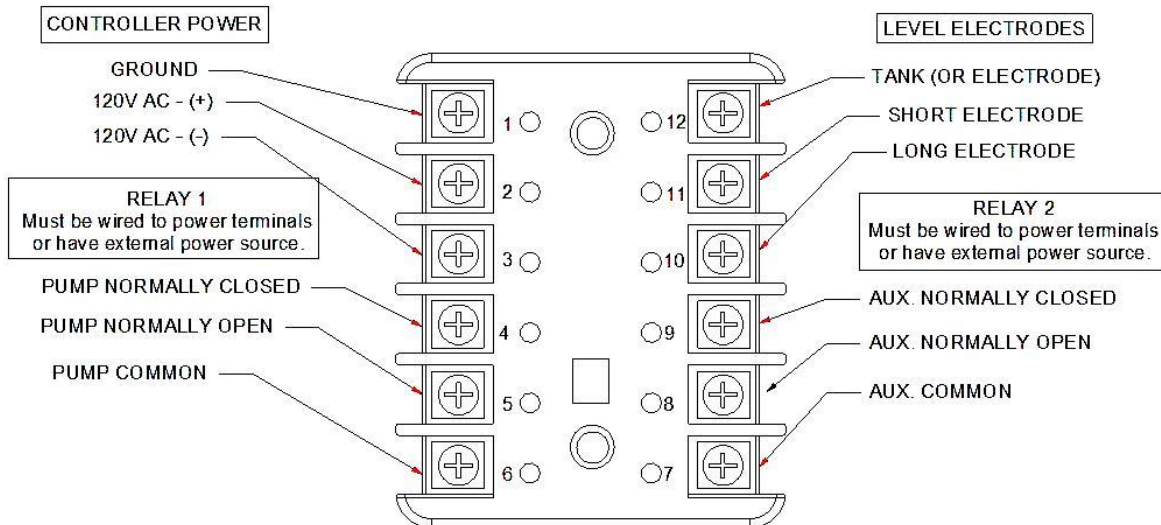


Figure 2. 12-pin Base Terminal Connections for LL3.

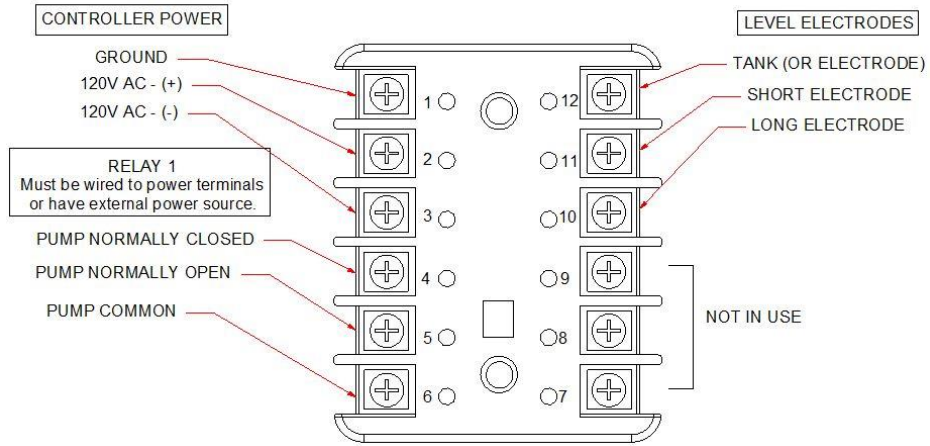


Figure 3. 12-pin Base Terminal Connections for LL4.

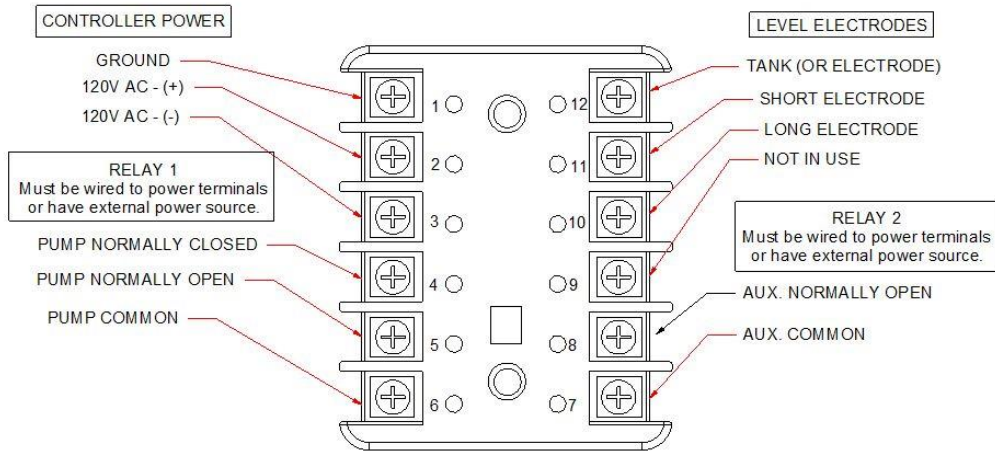


Figure 4. 12-pin Base Terminal Connections for LL7.

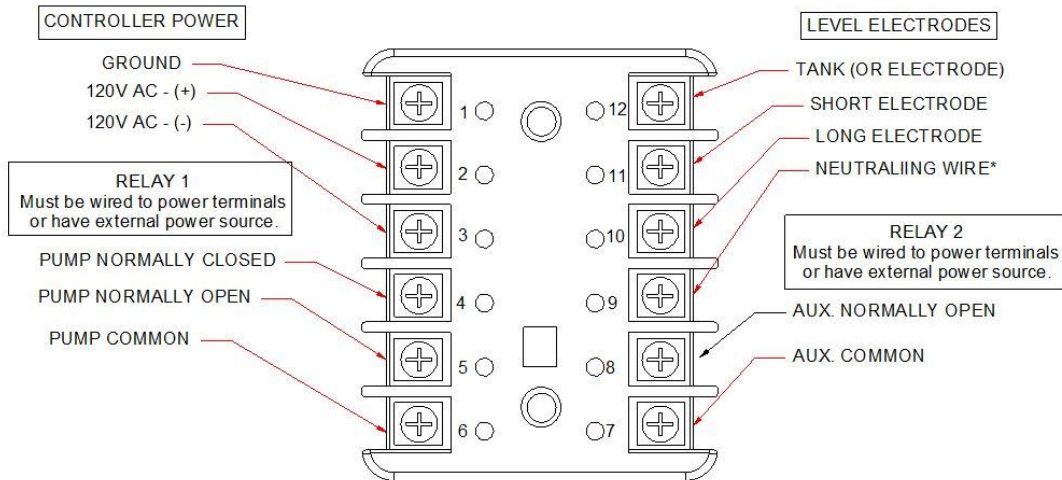


Figure 5. 12-pin Base Terminal Connections for LL7H.

4.0 DESCRIPTION OF FUNCTIONS

4.1 Overview

4.1.1 The LL Series liquid level controllers operate on the principal of electrolytic conductivity.

4.1.2 The controller is wired in two common configurations:

i. Single Level Service (Refer to Figure 6)

This method uses one level electrode, E2, and one ground (electrode or tank) Begin by connecting ground and line power (120VAC). Connect tank ground and level electrode to terminals 12 and 11, respectively. Next, connect pump common to terminal no.6. Pump can either be normally off or normally on, depending on application. For normally off, attach the second pump wire to terminal no.5, the normally open terminal. For normally on, attach to terminal no.4, the normally closed terminal. As soon as the liquid reaches the level electrode, this will make a circuit with the ground electrode or the tank, and activate the relay switch. For model LL4, these are the only connections required. For the LL3, LL7, and LL7H, there is an auxiliary relay that may also be used. First, attach one auxiliary line to terminal no.7, the auxiliary common. For models LL7 and LL7H, attach the other wire to terminal no.8, the normal open contact. If an alarm is used, for example, the alarm will sound when the level is low and the pump turns on. For the LL7, more versatile operation is available, with both a normal closed and normal open auxiliary contact.

ii. Differential Level Service (Refer to Figure 7)

This method uses two level electrodes, E2 and E3, and one ground (electrode or tank) As the liquid falls below the long electrode, the relay is activated, and it is again tripped when the liquid rises to the short electrode. This leaves a neutral region in between the long and short electrode where the liquid is at an acceptable level. The pump will not turn on or off as long as the level remains in the acceptable range. Use of this configuration allows a certain level tolerance that can be adjusted by changing the distance between E2 and E3. Single level, however, keeps the liquid at a discrete level. Differential level service might be used for a tank with significant fluctuation in level to keep level relatively constant about a certain height. Single level service may be used with a slowly changing level to keep a very exact height.

4.1.3 The controller includes a sensitivity adjustment, which enables it to detect either foam or liquid. This may also act as a time delay for the relay, from zero to 5 seconds pump on or pump off.

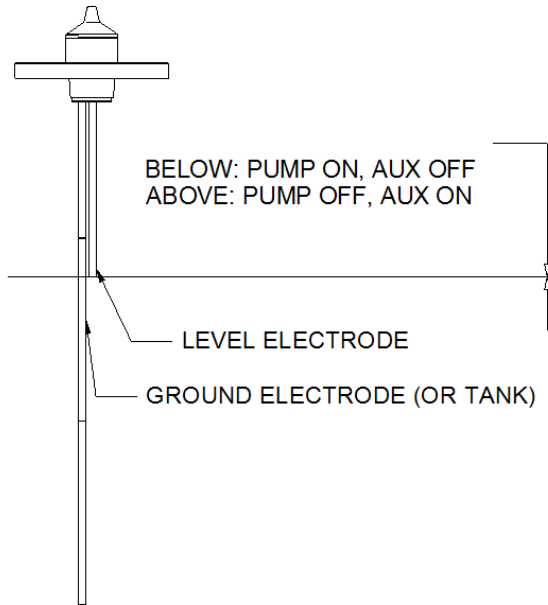


Figure 6. Single level service (pump normal closed, aux normal open)

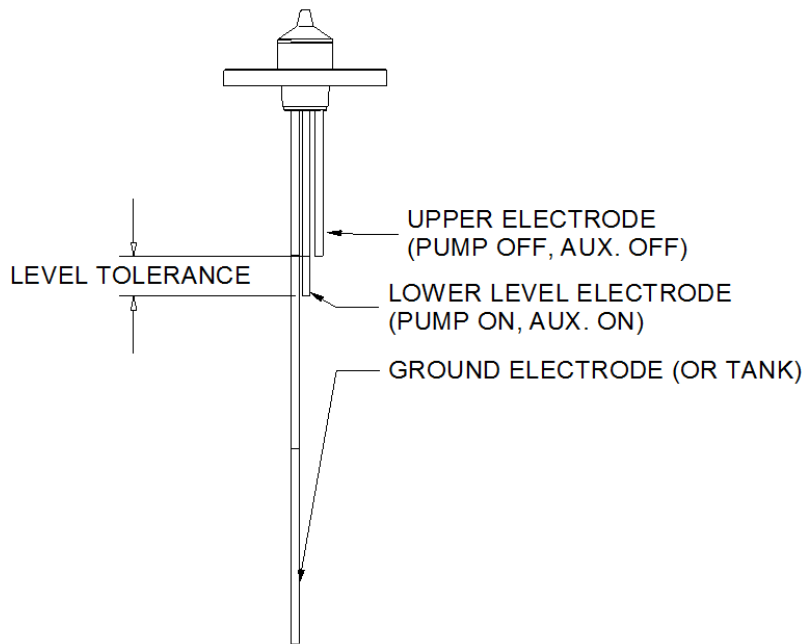


Figure 7. Differential level service (pump normal closed, aux. normal open)

4.2 Sensitivity Calibration (LL3 only)

4.2.1 To calibrate the LL3J445 to detect the process liquid or foam, perform the following steps:

- i. Set the sensitivity potentiometer to the maximum resistance by setting it in the maximum clockwise position. The LED will illuminate.
- ii. Immerse the electrode(s) in the process.
- iii. Slowly adjust the sensitivity potentiometer in a counter-clockwise motion until the LED turns OFF. The sensitivity potentiometer is now set.
- iv. Remove process electrode(s) from liquid, the LED will turn ON, indicating that the relay is now OFF.
- v. Re-insert electrode(s) in process, to ensure switch that sensitivity is at correct setting. If the LED does not turn OFF when the electrodes are placed in the process, return to step (i) and set the sensitivity once again.

5.0 SERVICE

5.1 Customer Service

5.1.1 If a problem has not been resolved with the above procedures, a telephone consultation with your AquaMetrix representative, or directly with AquaMetrix will provide the answer.

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5.2 Parts and Accessories

5.2.1 The major parts are listed below. When ordering parts please use the complete part number.

Description Part #
LL Series Base - A26-22
LL Series Electrode Holder - LP3

5.3 Instrument Return

5.3.1 If you are returning the instrument for service, please enclose a written description of the problem and a purchase order to cover the repair. Be sure to pack the instruments adequately because AquaMetrix will not be responsible for shipping damage. For safety reasons, AquaMetrix cannot accept instruments and sensors for repair that have not been thoroughly cleaned of process materials.

STATEMENTS OF CONFORMITY FROM THE MANUFACTURER

U.S.A.

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.