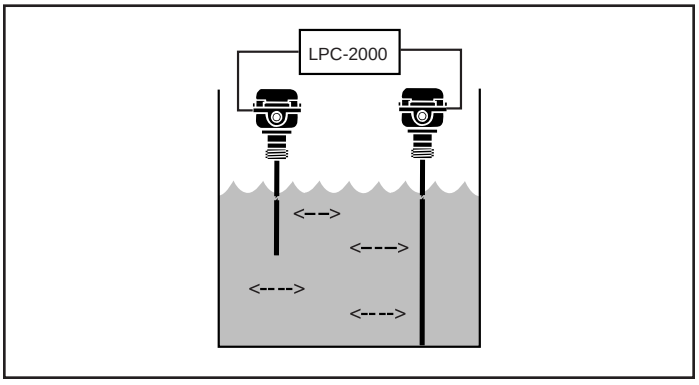
LPC-2000

OPERATION AND SELECTION

The LPC-2000 is a conductance-type control that will sense liquids up to 60,000 ohms resistivity. It can be used to activate a low level alarm, high level alarm, pumps to fill/drain a tank or any combination thereof. Typical applications include, but are not limited to, cooling towers, storage tanks, water fountains and condensate receivers.

The control utilizes the conductivity of a liquid to make or break circuits. Some liquids may be more resistive than the control can sense (above 60,000 ohms). The resistive and conductive properties of a liquid depend on several factors, including the amount of soluble material, temperature of the liquid, and placement of the probes. A TDS tester, which can be purchased from a supply house carrying boiler chemicals, is required to accurately measure a liquid's resistivity.



For many applications, water is the liquid being sensed. Raw or tap water usually has naturally occurring salts, chlorides and minerals that make it conductive enough to operate the control. Condensate receiver and cooling tower water are also very conductive due to evaporation. Ultrapure water (RO, deionized, demineralized, etc.) is highly resistive and is not able to conduct the current needed to operate the control.

Refer to the following charts to determine the resistivity of the liquid in an application. If it is above the 60,000 ohm rating, another type of control will be required.

Conductivity Values of Water

Liquid	Resistivity (Ohms/cm)	Conductivity (Micromhos/cm)	LPC Can Be Used
Water - Deionized	2,000,000	0.5	
Water - Distilled	450,000	2	
Water - Condensate	18,000	50	X
Water - Chlorinated	5,000	200	X
Water - Hard/Natural	5,000	200	X
Water - Sewage	5,000	200	X
Water - Salt	2,200	450	X

Converting Total Dissolved Solids to Resistivity and Conductivity

Total Dissolved Solids (ppm)	Resistivity (Ohms/cm)	Conductivity (Micromhos/cm)
0.0277	18,000,000	0.056
0.0417	12,000,000	0.084
0.0833	6,000,000	0.167
0.500	1,000,000	1.00
1.25	400,000	2.50
10.0	50,000	20.0
100	5,000	200
1,000	500	2,000
10,000	50	20,000

LPC-2000

Operation and Selection

Each control is able to perform 3 separate functions. The following is a description of each of the functions.

- The high alarm contact (terminals 3 and 4) closes when a liquid comes in contact with the probe connected to terminal P5.
- The low alarm contact (terminals 5 and 6) closes when the liquid is no longer in contact with the probe connected to terminal P2.
- Differential control contacts (terminals 7 and 8) open or close depending on whether water is or is not in contact with the probes connected to terminals P3 and P4. Tank fill or drain is determined by the position of switch 2. There must be two probes of different lengths to do differential control with the shorter (pump hi) probe wired to P4 and the longer (pump lo) probe to P3.

The material of the tank or vessel determines if an additional probe is required for grounding. Metal tanks do not require an additional probe because the tank is the ground path needed to complete the current path. Plastic, concrete and lined metal tanks will require a ground probe for use to complete the current path. It is highly recommended that a ground probe be added on all installations. The less distance the current has to travel to complete the path the better the control operates, especially in liquids with high resistance.

The following tips can be useful when selecting a control for an application.

- An alarm point or contact should not be used to operate a valve or pump. Because the contact opens/closes whenever the liquid is/is not in contact with the probe, wave action of the liquid can cause short cycling.
- There should be a difference in the length of the probes to prevent short cycling due to wave action of the liquid.
- The alarm and pump contacts are isolated dry contact connections. They can be used in circuits of any voltage.
- Wires from the remote sensor to the control should be in their own conduit. If run in conduit with other wires, there may be interference that can affect the controls operation. The wire should be a minimum of 18ga stranded control type wire.
- Length of wires from remote sensor to control should not exceed 50 ft. Whenever feasible, the distance should be as short as possible.
- A LPC-2000 **SHOULD NOT** be used with oil, gasoline, diesel fuel, or other carbon based liquids. They are typically non-conductive and because of their flammability require the use of intrinsically safe controls.

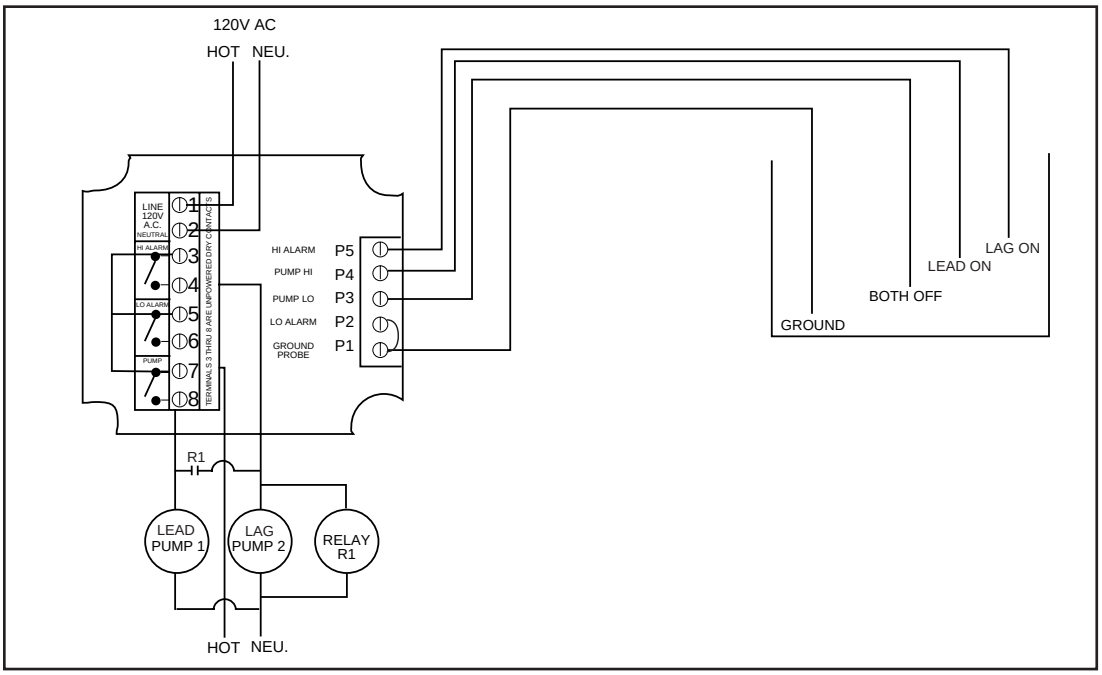
LPC-2000

WIRING DIAGRAMS

(No alarms required)

The LPC-2000 can be used to control two pumps in either a pump down or pump up application. If no alarms are required, a single control can be used with the installation of an auxiliary relay. The following diagrams show how to wire controls for these applications.

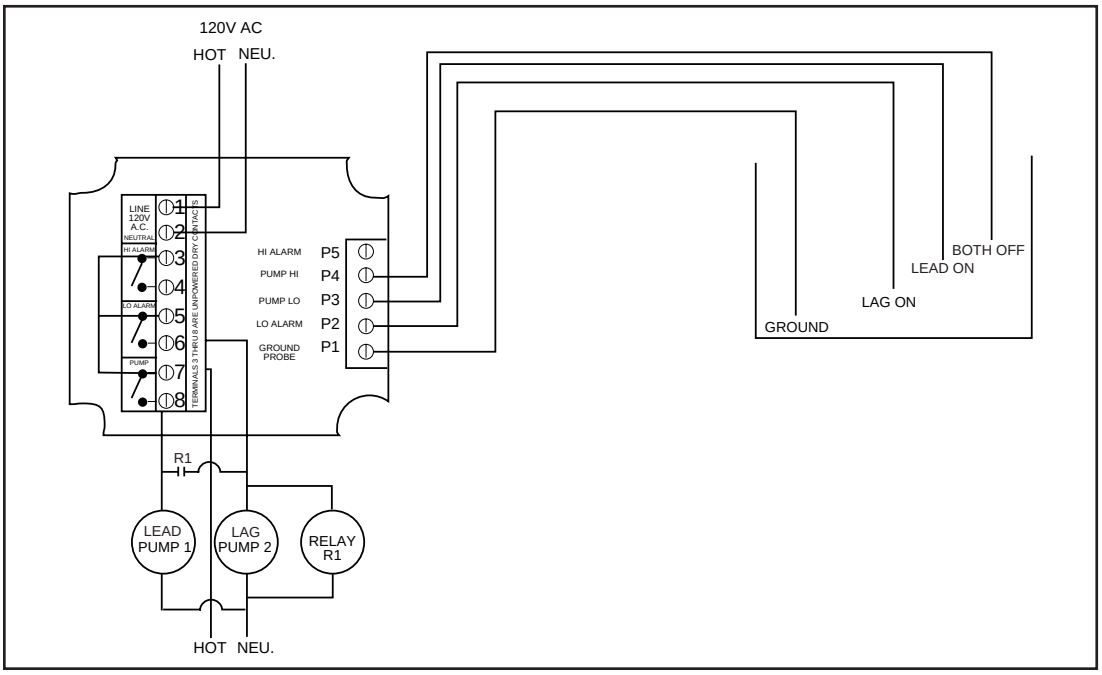
Pump Down or Tank Drain Application



The lead pump will operate to drain the tank between probes connected to P4 and P3. If the lead pump is unable to drain the tank, the lag pump will be turned on when the level covers the probe connected to P5. Both pumps will operate until the level uncovers the probe connected to P3. The normal cycle of pump operation will be restored with the lead pump operating to maintain the level between the probes connected to P3 and P4.

Note: LPC-2000 has the switches set in Multi level and pump down. Leave shorting bar in place.

Pump Up or Tank Fill Application



The lead pump will operate to fill the tank between probes connected to P4 and P3. If the lead pump is unable to fill the tank, the lag pump will be turned on when the level uncovers the probe connected to P2. Both pumps will operate until the level covers the probe connected to P4. The normal cycle of pump operation will be restored with the lead pump operating to maintain the level between the probes connected to P3 and P4.

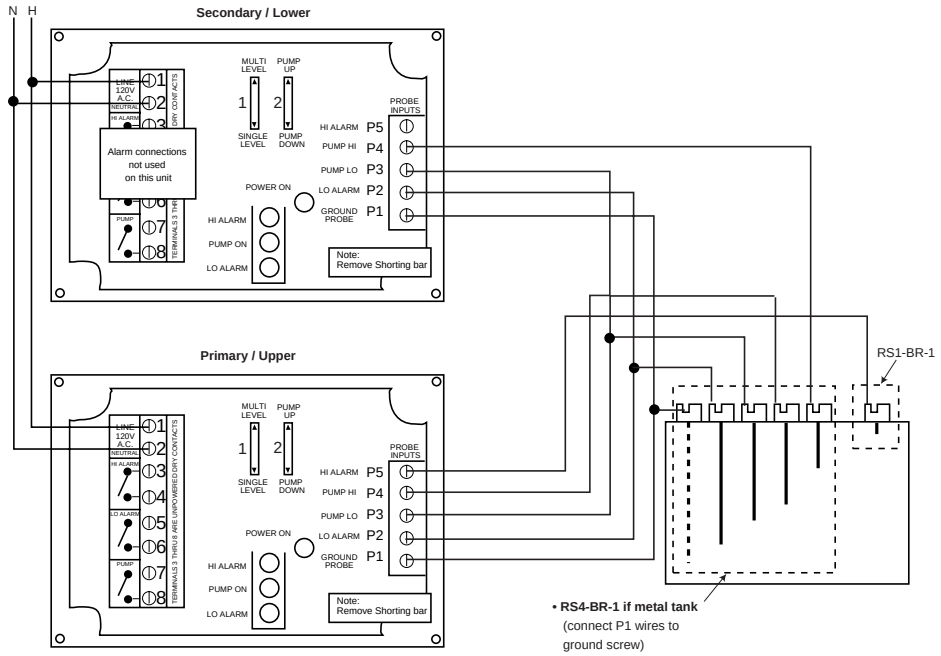
LPC-2000

WIRING DIAGRAMS
(Alarms required)

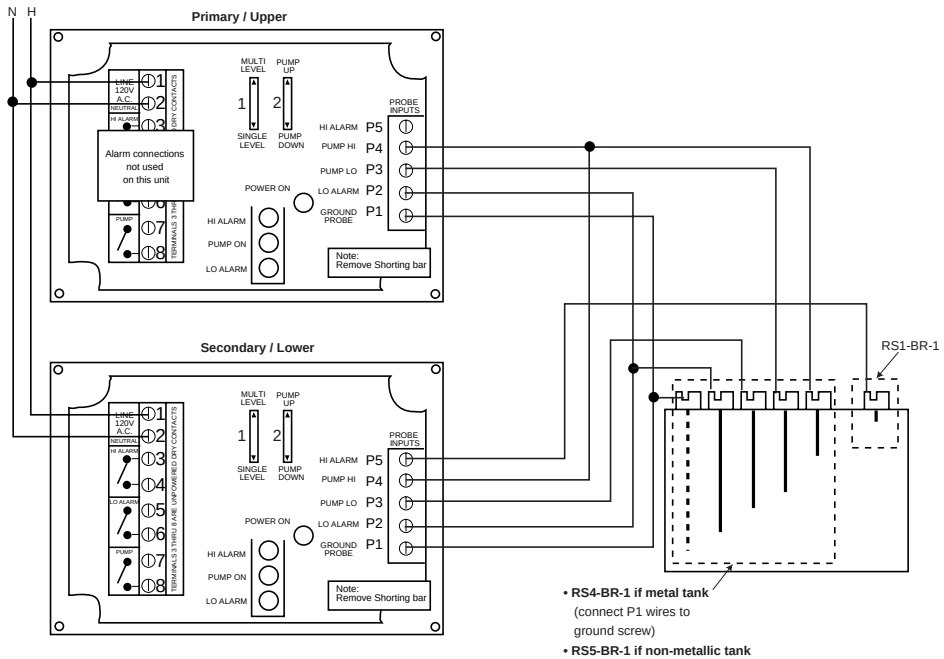
The LPC-2000 can be used to control two pumps in either a pump down or pump up application. If alarms are required, two controls will need to be installed.

The following diagrams show how to wire controls for these applications.

Pump Down or Tank Drain Application



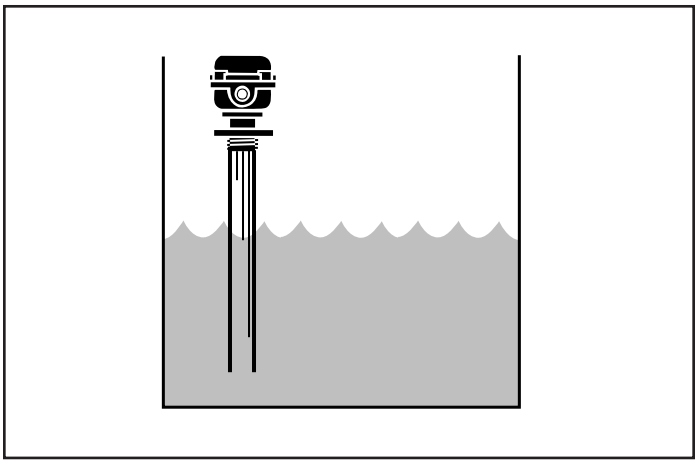
Pump Up or Tank Fill Application



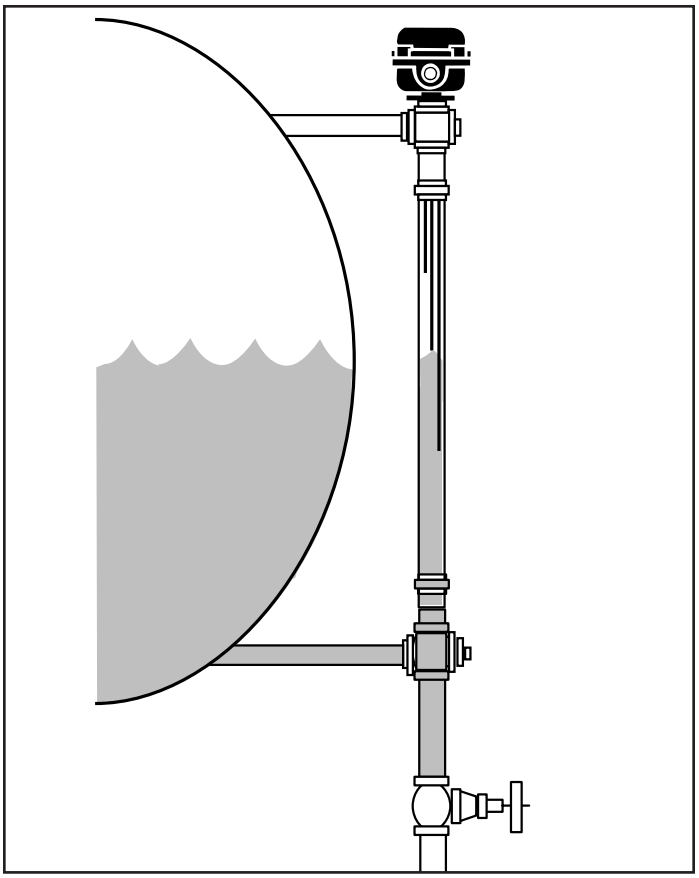
LPC-2000

REMOTE SENSOR LOCATION

The location of the remote sensor is not limited to mounting on top of a tank. Depending on the application, it may be decided to mount the remote sensor in a stillwell or equalizing line. The following diagrams show typical locations for several applications.



Open tanks or vessels will probably require mounting the remote sensor on a stillwell to dampen the liquids' wave action. Use 3” or 4” perforated plastic drain pipe with a flange to thread connection at the top. The stillwell can rest on the bottom of the tank or be suspended and secured with brackets.



Mounting the remote sensor in an equalizing pipe is an alternative to top mounting. The equalizing pipe should be at least a 2” pipe and have a drain valve at the bottom for flushing.