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Ashcroft® Switches

PIP #: SW-PI-50

Applicable to:

PRESSURE SWITCHES: A FRIENDLY ALTERNATIVE TO LEVEL MONITORING AND CONTROL

Instrument and Maintenance engineers have long had to deal with a myriad of problems concerning level instrumentation. Because of unfriendly process and environmental conditions that are common in these applications, specifying reliable instruments has, historically, been difficult. For example, the level sensing mechanism is usually wetted by the process fluid, where it often hangs up or wears out under normal process conditions. In addition, level switches are often customized for each application. For an easy, reliable and low cost solution to many of the most unfriendly level control applications, take a look at a standard pressure switch. There are several advantages.

Ease of Installation – Pressure switches may be piped into existing tank drains or access fittings easily. Level switches usually require costly connections at each level that is to be monitored. With the pressure switch approach, multiple points can be monitored from a single pressure connection.

Ease of Use – Once the pressure switch installation is complete, setpoints can be changed easily to accommodate different operating conditions. With level switches, such changes may require costly tank modifications and draining the tank.

Reliability – Most simple level switches must be in the process fluid to work. Floats and linkages often jam up and corrode. They could also interfere with baffles or stirrers that are required in many process tank applications. Rework or replacement is difficult. Pressure switches are mounted outside the tank, and can even be isolated further with diaphragm seals. Replacement or maintenance is easy.

Low Cost – Ashcroft pressure switches are available in many standard variations to meet the most difficult process and environmental conditions. Virtually any liquid can be monitored with standard switches. Most level controls for such applications must be custom made at a premium price. This is especially true where explosion-proof enclosure are required.

Quick Delivery – Since standard product is nearly always available for even the most difficult applications, many level control applications can be satisfied by pressure switches

Operation – The pressure switch senses the weight of liquid column, which is proportional to level. This is independent of the tank or piping configuration, just as pressure in any container is the same at all points at the same level.

For most applications, the pressure switch is connected to the tank anywhere below the level at which switching is desired, and can then be adjusted to trip precisely under operating conditions.

For tanks where only top access is available, a bubbler system is used. In this approach, instrument air is piped through a tube to the bottom of the tank and allowed to bubble up through the process fluid. A regulator adjusts pressure to keep flow to a minimum, and a pressure switch monitors back pressure, which is proportional to the height of fluid above the bottom of the tube.

This method has been used successfully on applications in the world's plants and mills for many years. For many level control requirements, the ease of use and reliability of pressure switches is truly user friendly!

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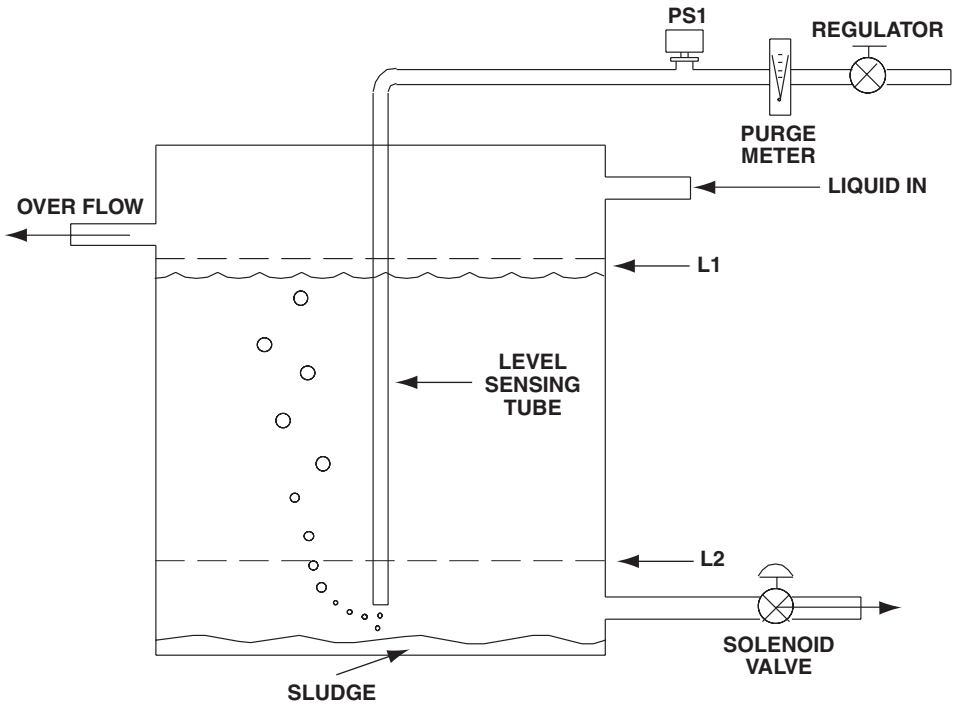
PRESSURE SWITCH LEVEL CONTROL USING BUBBLER SYSTEM



OPERATION:

For slurries or where side or bottom connections are difficult, the bubbler system is ideal. The purge meter adjusts flow to keep bubbles to a minimum. Back pressure is monitored by PS1. Back pressure equals the head, or liquid level.

PS1 may be used to open the solenoid valve on the high level (L1), or to let liquid in when level falls to L2.

Virtually any level alarm or control function can be handled by this low cost approach.

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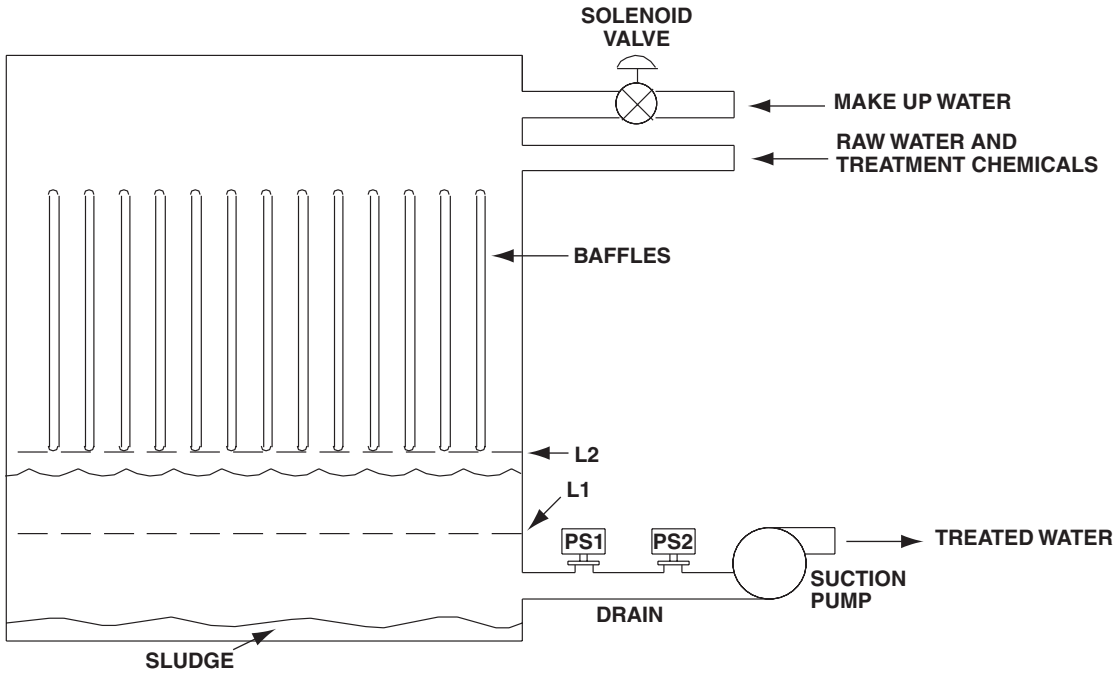
PRESSURE SWITCH CONTROLS SCRUBBER LIQUID LEVEL IN SEWAGE TREATMENT PLANT



OPERATION:

Under normal operating conditions, suction pump runs continuously, removing treated water at about the rate untreated water is let in. Water trickling through baffles is aerated.

PS1 shuts off suction pump if water level drops to L1. This prevents pump cavitation.

PS2 controls make up water solenoid, which is normally open. If water level reaches L2, it interferes with aeration in baffles.

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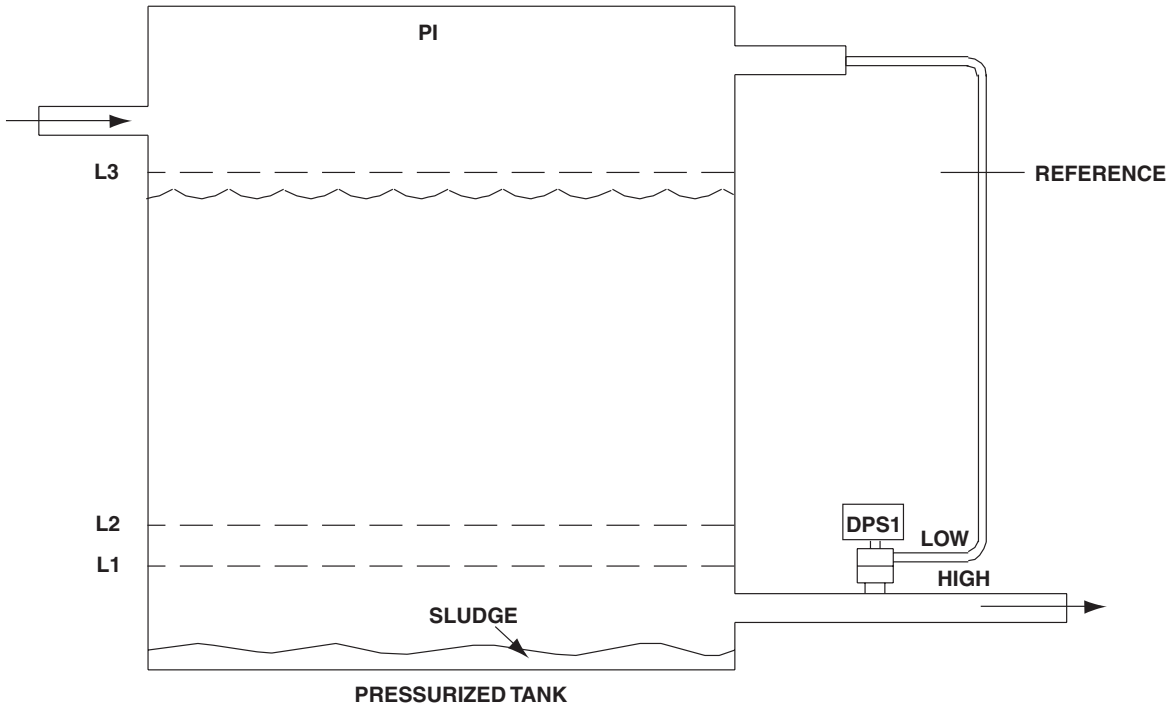
DIFFERENTIAL PRESSURE SWITCH LEVEL CONTROL ON PRESSURIZED SYSTEM



OPERATION:

In a pressurized tank, the pressure at L1, is equal to the sum of the head of liquid (H) plus the pressure P1. Since P1 will usually vary, a differential pressure switch is needed. By connecting the low side of the differential pressure switch to the top of the tank, the D/P switch automatically compensates for changes in P1 and can be adjusted to give signals for alarm or control at any level above L1, such as L2 or L3.

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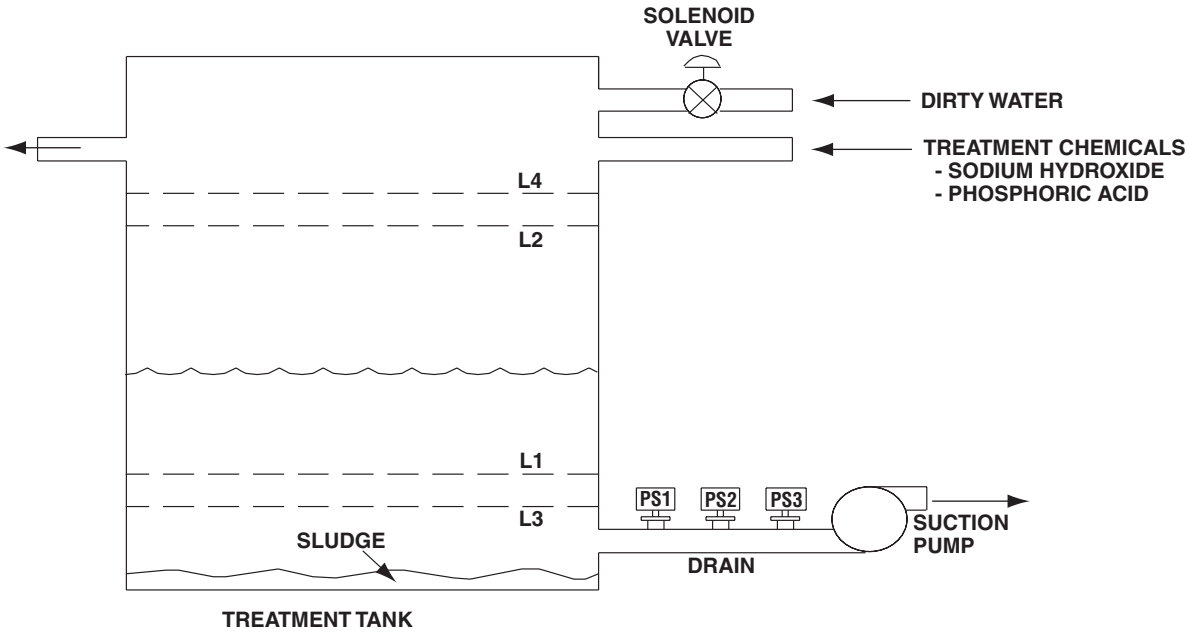
PRESSURE SWITCH CONTROLS LEVEL IN WATER TREATMENT SYSTEM



OPERATION:

PS1 is adjustable deadband pressure switch. When level drops to L1, PS1 opens solenoid to let dirty water in. PS1 closes solenoid when level reaches L2.

A separate control system adds the treatment chemicals, times the reaction and starts the suction pump.

PS2 is set at L3, just above the suction line, to cut out suction pump to prevent cavitation.

PS3 is set at L4, just below the overflow to prevent spillage.

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