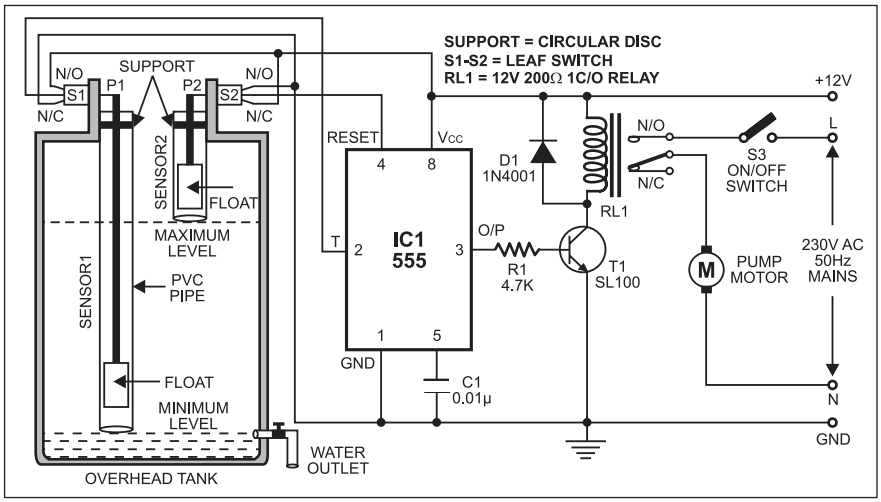
WATER-LEVEL CONTROLLER

K.P. VISWANATHAN

Here is a simple, automatic water-level controller for overhead tanks that switches on/off the pump motor when water in the tank goes below/above the minimum/maximum level. The water level is sensed by two floats to operate the switches for controlling the pump motor.

Each sensors float is suspended from above using an aluminium rod. This arrangement is encased in a PVC pipe and fixed vertically on the inside wall of the water tank. Such sensors are more reliable than induction-type sensors. Sensor 1 senses the minimum water level, while sensor 2 senses the maximum water level (see the figure).



Leaf switches S1 and S2 (used in tape recorders) are fixed at the top of the sensor units such that when the floats are lifted, the attached 5mm dia. (approx.) aluminium rods push the moving contacts (P1 and P2) of leaf switches S1 and S2 from normally closed (N/C) position to normally open (N/O) position. Similarly, when the water level goes down, the moving contacts revert back to their original positions.

Normally, N/C contact of switch S1 is connected to ground and N/C contact of switch S2 is connected to 12V power supply. IC 555 is wired such that when its trigger pin 2 is grounded it gets triggered, and when reset pin 4 is grounded it gets reset. Threshold pin 6 and discharge pin 7 are not used in the circuit.

When water in the tank goes below the minimum level, moving contacts (P1 and P2) of both leaf switches will be in N/C position. That means trigger pin 2 and reset pin 4 of IC1 are connected to ground and 12V, respectively. This triggers IC1 and its output goes high to energise relay RL1 through driver transistor SL100 (T1). The pump motor is switched on and it starts pumping water into the overhead tank if switch S3 is 'on.'

As the water level in the tank rises, the float of sensor 1 goes up. This shifts the moving contact of switch S1 to N/O position and trigger pin 2 of IC1 gets connected to 12V. This doesn't have any impact on IC1 and its output remains high to keep the pump motor running.

As the water level rises further to reach the maximum level, the float of sensor 2 pushes the moving contact of switch S2 to N/O position and it gets connected to ground. Now IC1 is reset and its output goes low to switch the pump off.

As water is consumed, its level in the overhead tank goes down. Accordingly, the float of sensor 2 also goes down. This causes the moving contact of switch S2 to shift back to NC position and reset pin 4 of IC1 is again connected to 12V. But IC1 doesn't get triggered because its trigger pin 2 is still clamped to 12V by switch S1. So the pump remains switched off.

When water level further goes down to reach the minimum level, the moving contact of switch S1 shifts back to N/C position to connect trigger pin 2 of IC1 to ground. This triggers IC1 and the pump is switched on.

The float sensor units can be assembled at home. Both the units are identical, except that their length is different. The depth of the water tank from top to the outlet water pipe can be taken as the length of the minimum-level sensing unit. The depth of the water tank from top to the level you want the tank to be filled up to is taken as the length of the maximum-level sensing unit. The leaf switches are fixed at the top of the tank as shown in the figure.

Each pipe is closed at both the ends by using two caps. A 5mm dia. hole is drilled at the centre of the top cap so that the aluminium rod can pass through it easily to select the contact of leaf switches. Similarly, a hole is to be drilled at the bottom cap of the pipe so that water can enter the pipe to lift the float.

When water reaches the maximum level, the floats should not go up more than the required distance for pushing the moving contact of the leaf switch to N/O position. Otherwise, the pressure on the float may break the leaf switch itself. The length of the aluminium rod is to be selected accordingly. It should be affixed on the metal/thermocole float using some glue (such as Araldite).