Comparison Between Three Water Level Management Technologies Using a Float Valve, Marley LLC Conductivity and Marley LLC Ultrasonic Level Systems

Application

Cooling towers remove heat from incoming process water, flowing downwards through a fill medium. During the heat rejection process, air moves across the falling water capturing heat and expelling heat to the atmosphere along with evaporated water. During this process, water is used and must be replaced with new water.

Systems

A means shall be provided to monitor water levels in the cooling tower cold water basin replacing evaporated water back into process cooling loop. Various technologies are available, Marley uses three primary technologies:

- Mechanical float valve
- Conductivity using hanging probes
- Ultrasonic sound wave

Technical

Mechanical float valve shown in Figure 1 is the least expensive solution with the primary purpose of making up water into the cooling tower cold water basin. A float ball rises and falls, opening and closing a mechanical water valve maintaining water level in the basin.

Marley LLC conductivity control panel shown in Figure 2 is simple and economical. It has one reference probe, two probes for water makeup (on, off), and one probe each for the following events: high alarm, high cutoff, low cutoff and low alarm. During manufacture, the LLC hanging probe panel can be configured for various combinations of water events. Note that additional events cannot be configured in the field. The panel is UL/cUL listed. When adjusting water event levels, the probes are manually adjusted up or down within the metal stilling chamber. These circuits can be integrated into various Marley control panels, including the Can Do, SPPC (single point power connection), AIO (all in one) and Fluid Cooler Fan and Pump panels.

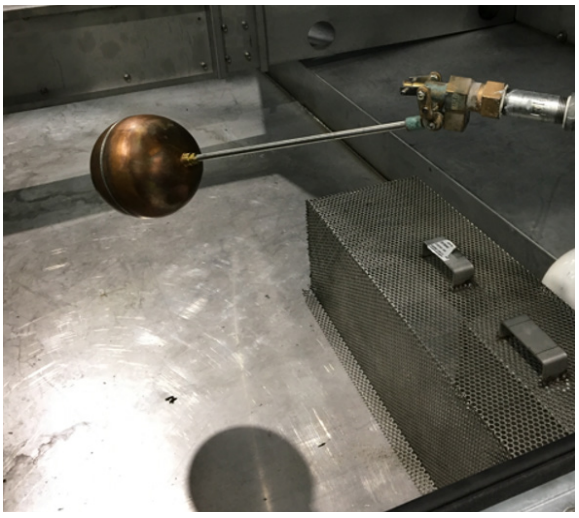

Figure 1 Float Valve

Hanging Probes

Marley LLC Control Panel

Figure 2

Marley LLC-U

Marley provides two Ultrasonic systems shown in Figure 3:

- Standalone system
- Sensor only

Both systems provide a continuous measurement of water level heights.

A standalone system uses an ultrasonic water level sensor, stilling chamber and a control panel with a PLC and touch screen. This system controls the makeup solenoid and provides relay contacts for a remote building management system.

An alternative to a standalone system is providing just the ultrasonic water level sensor with stilling chamber. Client will field wire the sensor to a building management system. In this application, the BMS system monitors water level, controls the water makeup device and provides alarming functions.

Figure 3

Ultrasonic Sensor

Ultrasonic Panel

Stilling chamber used to support hanging probes or ultrasonic sensor

	Mechanical MU Valve	Hanging Probe LLC	Ultrasonic+BMS Sensor	Ultrasonic LLC
	$	$$	$	$$$
Set Point System	✓	✓		✓
Continous Level System			✓	✓
Standalone System	✓	✓		✓
Contact Free			✓	✓
Modbus Communication				✓
High Alarm		Optional		✓
High Cutoff		Optional		✓
Low Cutoff		Optional		✓
Low Alarm		Optional		✓
Makeup	✓	Optional		✓
Dry Contact Relay Outputs for Events		✓		✓
Periodic Cleaning of Probes		✓		
4-20mA Output to BMS			✓	✓
Color Touchscreen Display				✓
UL/cUL Listed		✓	✓	✓

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