

# LLC+u+bms

ULTRASONIC WATER LEVEL SENSOR

engineering data  
and specifications



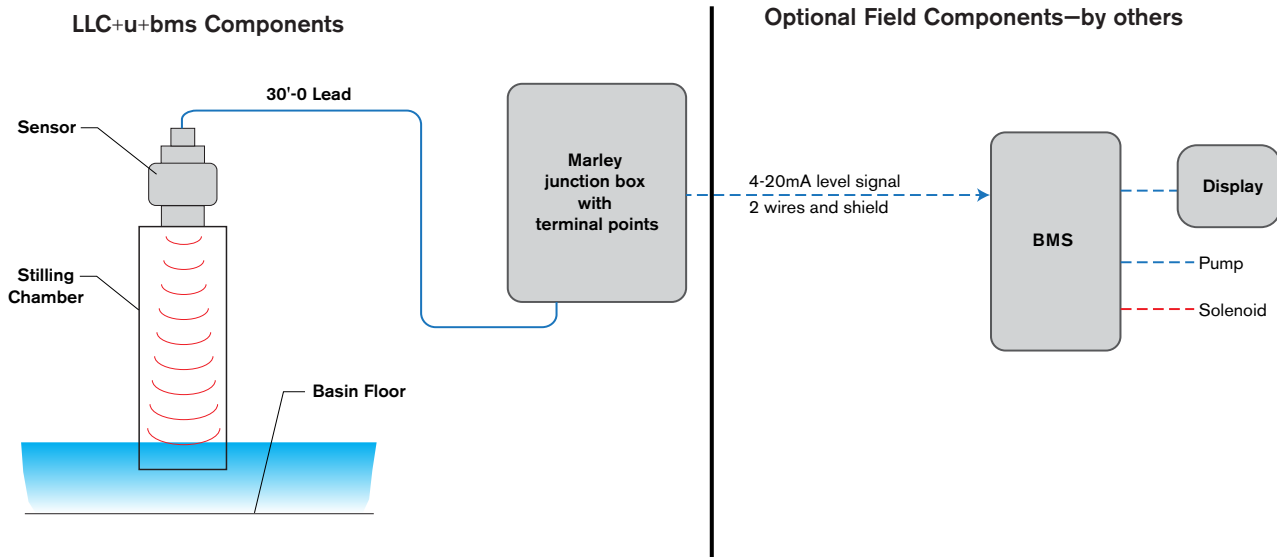
**LLC-u ULTRASONIC WATER LEVEL CONTROLS**

The Marley LLC+u+bms sensor is used to monitor water level in the cold water basin of a cooling tower cell using a non-contact ultrasonic sensor mounted on a stilling chamber. The sensor provides a 4-20mA continuous signal back to a BMS where alarming and controls are provided by the BMS.

**SEQUENCE OF OPERATION**

The BMS provides 24 VDC to power the 2-wire 4-20mA sensor loop. As water level rises and lowers so does the 4-20mA output signal in proportion to water level. The BMS reads the 4-20mA signal from the sensor and scales the signal to a water level readout within the BMS. The BMS is responsible for all alarming, cutoffs and makeup solenoid power and control.

**SYSTEM DIAGRAM**



**NOTE**

- 1 All wiring entering and exiting the control panel should be located at the bottom of the enclosure.
- 2 Prevent condensation from forming inside the control panel enclosure. Seal the inside of the conduit at the enclosure forming a vapor barrier. A vapor barrier may be created in the field using expanding foam or silicone injected in to the conduit after wiring connections have been made.
- 3 The ultrasonic sensor is provided with 30 feet of wire and a NEMA 4X fiberglass junction box with terminal strips.
- 4 Extension wire is available for extending the distance from the Marley junction box to the BMS.

**Voltage Ratings**

- Q What are the available voltage ratings?
- A BMS to power the 2-wire loop with 24VDC .5 watts.

**Junction Box Enclosure**

- Q Where is a typical mounting location?
- A Anywhere near the tower is fine limited by the length of the lead for the ultrasonic sensor. The enclosure is NEMA 4X fiberglass suitable for outdoor installation. Always route the conduit into the bottom of the enclosure and provide a drip line. The inside of the conduits entering the junction box should be sealed preventing vapor and condensation from entering the junction box enclosure.
- Q Why does the junction box enclosure have latches?
- A The latches secure the lid to the gasket providing a water tight seal.
- Q Are knock outs provided?
- A No.
- Q Are other enclosure options available?
- A Yes as a special – NEMA 3R 304 stainless steel.

**Stilling Chamber**

- Q How is the ultrasonic sensor mounted?
- A A stilling chamber is required to calm the water and provide a support for the ultrasonic sensor above the water surface. Typical location for the stilling chamber is inside the cooling tower. The stilling chamber material is either steel or PVC depending on the cooling tower model.

**Controller**

- Q Is a controller furnished with this system?
- A No – The controller would be the customers BMS or PLC.

**Ultrasonic Sensor**

- Q Is the sensor furnished with wire?
- A Yes – 30' is standard.
- Q Can sensor leads be extended?
- A Yes – Starting from the terminal points inside the junction box use #18 gauge 2 wire plus shield stranded copper conductor.
- Q Are longer sensor leads available from the factory?
- A No – But extra wiring for adding extension leads from junction box to other equipment is available in 100', 150' and 200' lengths.
- Q Can leads be cut to length?
- A Yes – or coil and secure excessive length.
- Q Is just the sensor replaceable?
- A No – the lead attaches to the ultrasonic sensor as an integrated molded connection.
- Q Does the sensor require maintenance?
- A No.
- Q Does the sensor lead need to be in conduit?
- A The wire is rated for outdoor use (check local codes).

**Programming**

- Q Does the sensor require programming?
- A The sensor typically does not require programming as long as the distance between sensor and basin floor does not exceed 49" which is factory programmed into the sensor. The control contractor will scale their system to reflect actual height distance between sensor and basin floor which is typically less than 49".

**Assembly Standards**

The assembly is built to the following industrial control panel standards:

UL 508A CUL 508A NFPA 70 (NEC)

**ULTRASONIC SENSOR**

Non-contact type sensor  
 30'-0 (9m) cable integrated and molded into the sensor, flying leads on opposite end terminated to a junction box  
 Range: 49" (1.25m) longer ranges available  
 Accuracy: 0.125" (3mm)  
 Resolution: 0.019" (0.5mm)  
 Dead band: 2" (50mm)  
 Beam width: 2" (50mm)  
 Configuration: WebCal™ PC, Windows®, USB 2.0  
 Memory: Non-volatile  
 Supply voltage: 24 VDC (loop)  
 Consumption: 0.5W  
 Loop resist.: 400Ω max  
 Signal output: 4-20 mA, two-wire  
 Signal invert: 4-20 mA or 20-4mA  
 Loop fail-safe: 4 mA, 20 mA, 21 mA, 22 mA or hold last  
 Process temp.: 20° to 140°F (-7° to 60°C)  
 Temp. comp.: Automatic  
 Ambient temperature: -31° to 140°F (-35° to 60°C)  
 Pressure: MWP = 30 PSI (2 bar)  
 Sensor enclosure rating: Type 6P, encapsulated, corrosion resistant and submersible  
 Enclosure material: Polycarbonate  
 Strain relief material: Santoprene  
 Trans. material: PVDF  
 Cable jacket material: Polyurethane  
 Cable type: 4-conductor, shielded  
 Process mount: 1" NPT (1" G)  
 Mount gasket: Viton®  
 Classification: General purpose  
 Compliance: CE, RoHS  
 Approvals: cFMus

**JUNCTION BOX**

NEMA 4X (IP56) fiberglass enclosure 6"x 6"x 5"D  
 (15.2 x 15.2 x 13.7cm)  
 Terminal strip

**COMMUNICATIONS**

4-20mA output for continuous water level reading at BMS  
 BMS to provide 24 VDC loop power for sensor

**STILLING CHAMBER**

A stilling chamber is required for calming the water for an accurate reading and holding the ultrasonic sensor  
 Material: steel or PVC

**OPTIONS**

Extension wiring to extend from junction box to BMS or other equipment  
 Available lengths: 100', 150' and 200' (30.5, 46 and 61m)

**SPX COOLING TECHNOLOGIES, INC.**

7401 WEST 129 STREET  
 OVERLAND PARK, KS 66213 USA  
 913 664 7400 | spxcooling@spx.com  
[spxcooling.com](http://spxcooling.com)

TECH-LLCu-BMS-18A | ISSUED 11/2018

© 2018 SPX COOLING TECHNOLOGIES, INC | ALL RIGHTS RESERVED

In the interest of technological progress, all products are subject to design and/or material change without notice.

