LLC+ui

ULTRASONIC WATER LEVEL CONTROLS

engineering data
and specifications

MARLEY®

LLC+ui ULTRASONIC WATER LEVEL CONTROLS

The Marley integrated LLC+ui controls package is used to monitor, control and alarm water levels in the cooling tower cold-water basin via a non-contact ultrasonic sensor mounted on a stilling chamber. A PLC (programmable logic controller) performs set-point control and the color touch-screen provides a visual of the water level makeup set point and alarm set points. Changing set-point levels is easy via the touch screen allowing set up and fine tuning of levels without having to enter the cooling tower. A circuit powered with 120 VAC is provided to power a remote water makeup solenoid valve.

This system is designed to be integrated into a Marley control panel along with other cooling tower controls e.g. fan motor VFD and basin heater controls. For a water level monitoring system only with a 4-20mA level output see the Marley model LLC+u+bms system.

SEQUENCE OF OPERATION

Utility power applied to the integral main circuit breaker provides power to the internal and external circuits including the PLC and makeup solenoid. The internal circuit breaker provides thermal and short circuit protection for the control panel and acts as a supply voltage disconnect for servicing.

Set points are programmed into the PLC via the touch screen using SPX recommended cooling tower water levels and are displayed for future review. As water level rises or lowers in the cold-water basin the ultrasonic sensor provides level feed back to the PLC. The actual water level is also displayed on the main screen as a continuous reading.

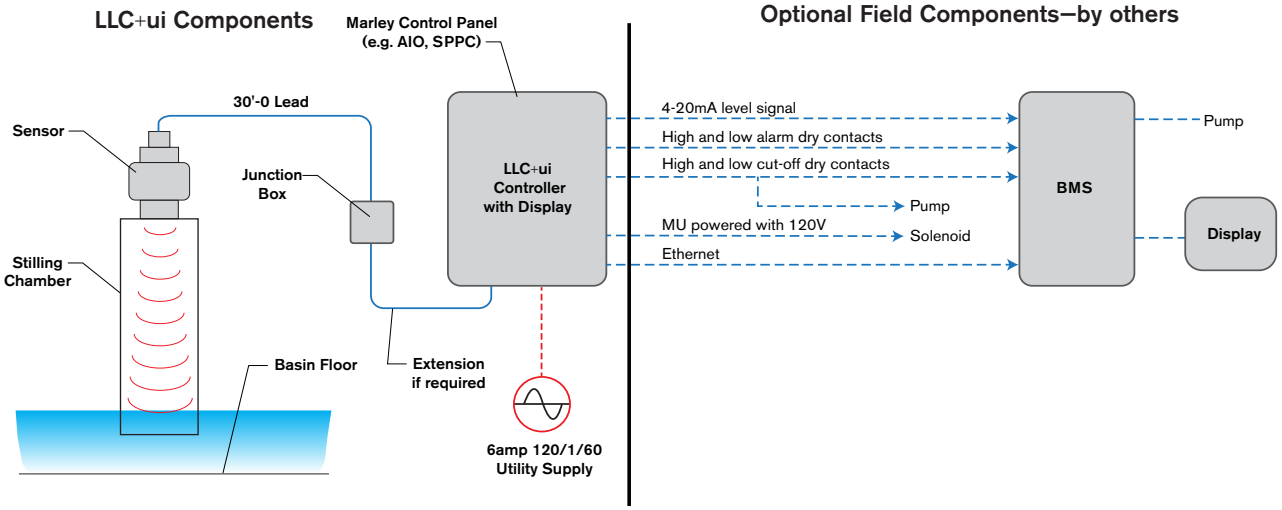
Set point circuits for high and low level alarms energize a N.O. dry relay contact which may be used by the BMS to complete an alarm circuit within the BMS.

Set point circuits for low and high cutoffs energize a N.C. dry relay contact which may be used as a pump cutoff. The makeup circuit is powered with 120 VAC and may be used to energize a remote water makeup solenoid valve. The ON-OFF operating band width is adjustable using the touch screen.

A two-position selector switch is provided to bypass the automated makeup circuit and manually energize the remote water makeup solenoid valve. This is a handy circuit to fill the basin during startup and troubleshoot the makeup solenoid valve.

Once the unit is programmed and the selector switch is in Auto the PLC will automatically monitor and react to water levels. Communication outputs are available and listed in the features section of this document.

SYSTEM DIAGRAM



CONTROLLER DETAILS

PLC controller with HMI color touch screen

Dry relay output contacts for HCO – HA – LA – LCO levels

MU relay is powered with 120 VAC for energizing a makeup solenoid

User terminal strip for status contacts, probes and solenoid wiring

H-O-A selector switch for manual makeup control

Note: Water level heights must be programmed in the field using the touch screen
Screen is password protected

COMMUNICATIONS

One (1) 4-20mA output for continuous water level reading at BMS

N.O. high and low alarm status dry contacts

N.O. makeup status dry contact

RJ45 Ethernet port supports remote Ethernet communication and Modbus TCP

USB-A port for downloading program updates in the field

ULTRASONIC SENSOR

Non-contact type sensor with 49" range (longer ranges available)

30'-0 cable integrated into the sensor and junction box on opposite end (longer leads available)

PVC fitting for mounting sensor to stilling chamber

STILLING CHAMBER

A stilling chamber is required for calming the water for an accurate reading and holding the ultrasonic sensor. The chamber will be either metal or PVC

FREQUENTLY ASKED QUESTIONS

Ultrasonic Sensor

Q Is the sensor furnished with wire?

A Yes – 30' is standard including a NEMA 4X junction box with terminal strip.

Q Can sensor leads be extended?

A Yes – use #18 gauge 2 wire stranded copper conductor plus a shield from junction box.

Q Are extension leads available from the factory?

A Yes – leads are available in 100', 150' and 200' lengths.

Q Can leads be cut to length?

A The lead attaches to the ultrasonic sensor as an integrated molded connection. The opposite end is connected to a junction box, lead may be shortened and reconnected to the junction box

Q Are sensor leads 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).

Stilling Chamber

Q How is the ultrasonic sensor mounted?

A A stilling chamber is provided 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. Some cooling towers use an external stilling chamber which would be a 3" diameter PVC pipe.

Wiring

Q How is the ultrasonic sensor wired back to the LLC+ui controller?

A The sensor cable is rated for outdoor use. Follow local codes to determine if cable should be place in conduit.

Controller

Q Is the controller solid state?

A Yes.

Q Is the controller factory programmed?

A No – Easy to set levels in the field using the touch screen.

Q Does the display show actual water level?

A Yes.

Q Can the set point level be locked out with a security code?

A Yes.

Q Does the display show all set point levels?

A Yes.

Q Is a 4-20mA water temperature signal available?

A Yes – as standard.

Integration

Q Is the LLC+ui designed to be integrated into other Marley control panels?

A Yes – the system my be integrated into the Marley AIO or SPPC control panel.

Q Can the LLC+ui be connected to a BMS system?

A Yes – see Communications on page 3.

Electrical Standards

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

UL 508A CUL 508A NFPA 70 (NEC)

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