MARLEY®

user manual

LLC+u+bms ultrasonic water level control

INSTALLATION - OPERATION - MAINTENANCE

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READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT

contents

Note

This manual contains vital information for the proper installation and operation of the LLC+u+bms controls. Carefully read the manual before installation or operation and follow all instructions. Save this manual for future reference.

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

⚠ Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

introduction

These instructions are intended to assure that field connections are completed properly and the control system operates for the maximum time possible. Since product warranty may depend on your actions, please read these instructions thoroughly prior to operation.

If you have questions about the operation and/or maintenance of this control system and you do not find the answers in this manual, please contact your Marley sales representative.

⚠ Warning

Hazard of electrical shock or burn. Be sure to turn off power to the panel before servicing. If working on equipment out of site of panel disconnect, lockout using standard lockout procedure.

Safety First

The Marley control system uses UL listed components installed in accordance with the National Electric Code. The location of the cooling tower and field installation of the control system can affect the safety of those responsible for installing, operating or maintaining the tower and controls. However, since SPX Cooling Technologies does not control the tower location, or field installation, we cannot be responsible for addressing safety issues that are affected by these items.

⚠ Warning

The following safety issues should be addressed by those responsible for installation, maintenance or repair of the tower and controls:

- Access to and from the control panel (including the customer supplied main disconnect/branch circuit protection.)
- Proper grounding of electrical control circuits.
- Sizing and protection of branch circuits feeding the control panel.
- Qualification of persons who will install, maintain and service the electrical equipment.

These are only some of the safety issues that may arise in the design and installation process. Marley strongly recommends that you consult a safety engineer to be sure that all safety considerations have been addressed.

Other safety issues are addressed in literature supplied with your tower. You should closely review the literature prior to installing, maintaining or repairing your tower.

installation

Description

The Marley ultrasonic water level control package is provided with the following components:

- Ultrasonic sensor
- 30' (9.1m)outdoor rated instrumentation cable
- NEMA 4X (IP56) fiberglass junction box with terminal strip

Note

Wiring and junction box are hard wired to the sensor and shipped as a single unit

Programming

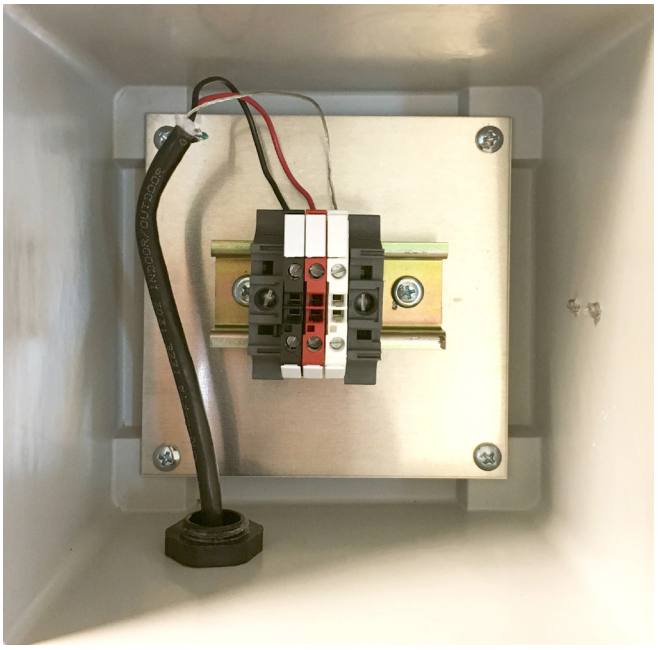
The ultrasonic sensor measures the distance between water surface and the ultrasonic sensor to determine water depth in the cold-water basin of a cooling tower. The sensor provides a 4-20mA output for a BMS system to monitor water depth. The sensor requires 24VDC loop power from the BMS.

The ultrasonic sensor is factory programmed with a default distance of 4'-1"(1.25m). The controls contractor will typically scale this range in their BMS system to represent the actual distance between the sensor and the basin floor, which is typically less than 4'-1".

installation

Wiring

Red and Black wires: Red (Power) and Black (Return) leads are for connection to a 24 VDC power supply or to a 4-20mA loop power source. The Red and Black wires can be extended up to 1,000' (300m)using a 22-gauge or larger wire.



Terminal point descriptions (terminal strip located inside the Marley provided junction box).

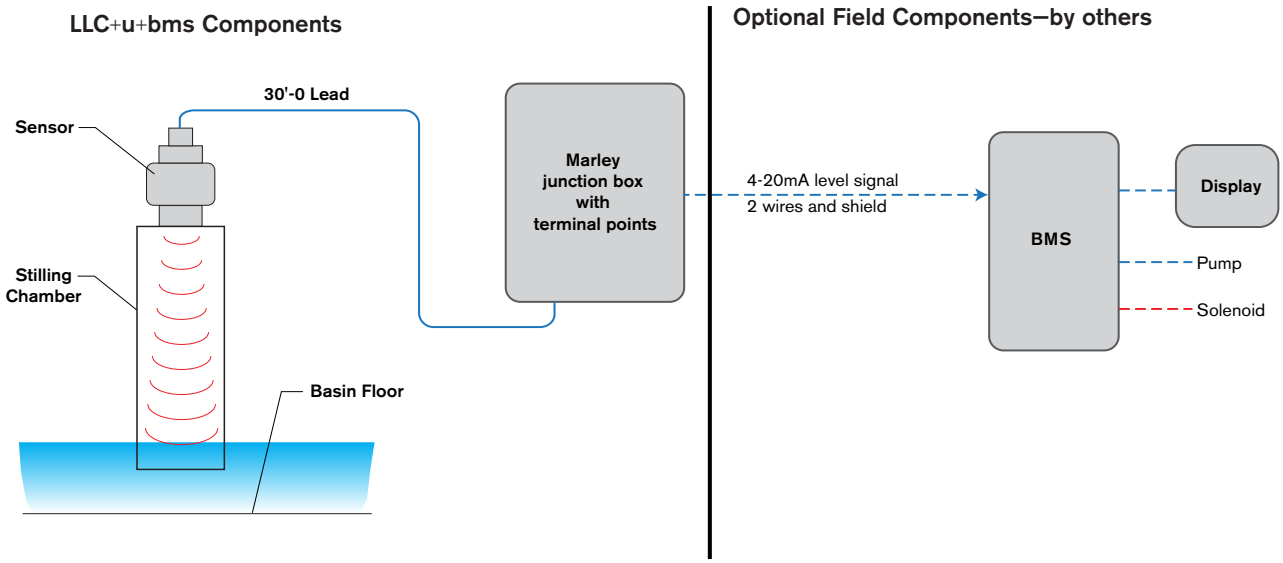
- Red = 24VDC Power (may be extended)
- Black = Return (may be extended)
- Shield ground

operation - parts list

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.

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



Part Number	Description
2588880	DL10 Ultrasonic sensor only with 30 ft cable (no junction box or fittings)
2586100	DL10 Ultrasonic sensor with 30 ft cable, junction box and 3" union slip fitting for round PVC stilling chamber located external to the cooling tower
2599330	DL10 Ultrasonic sensor with 30 ft cable, junction box and 3" threaded fitting for square metal stilling chamber located internal to the cooling tower
2586086	100 ft 4-18 AWG PVC cable
2586087	150 ft 4-18 AWG PVC cable
2586088	200 ft 4-18 AWG PVC cable

frequently asked questions

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 (IP56) 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 (IP54) 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 customer's 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).

Q Where should the shield wire be grounded?

A The shield wire should only be grounded to the customer's BMS panel.

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" (124.5cm)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)

Specifications

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: 2-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)

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