MARLEY®

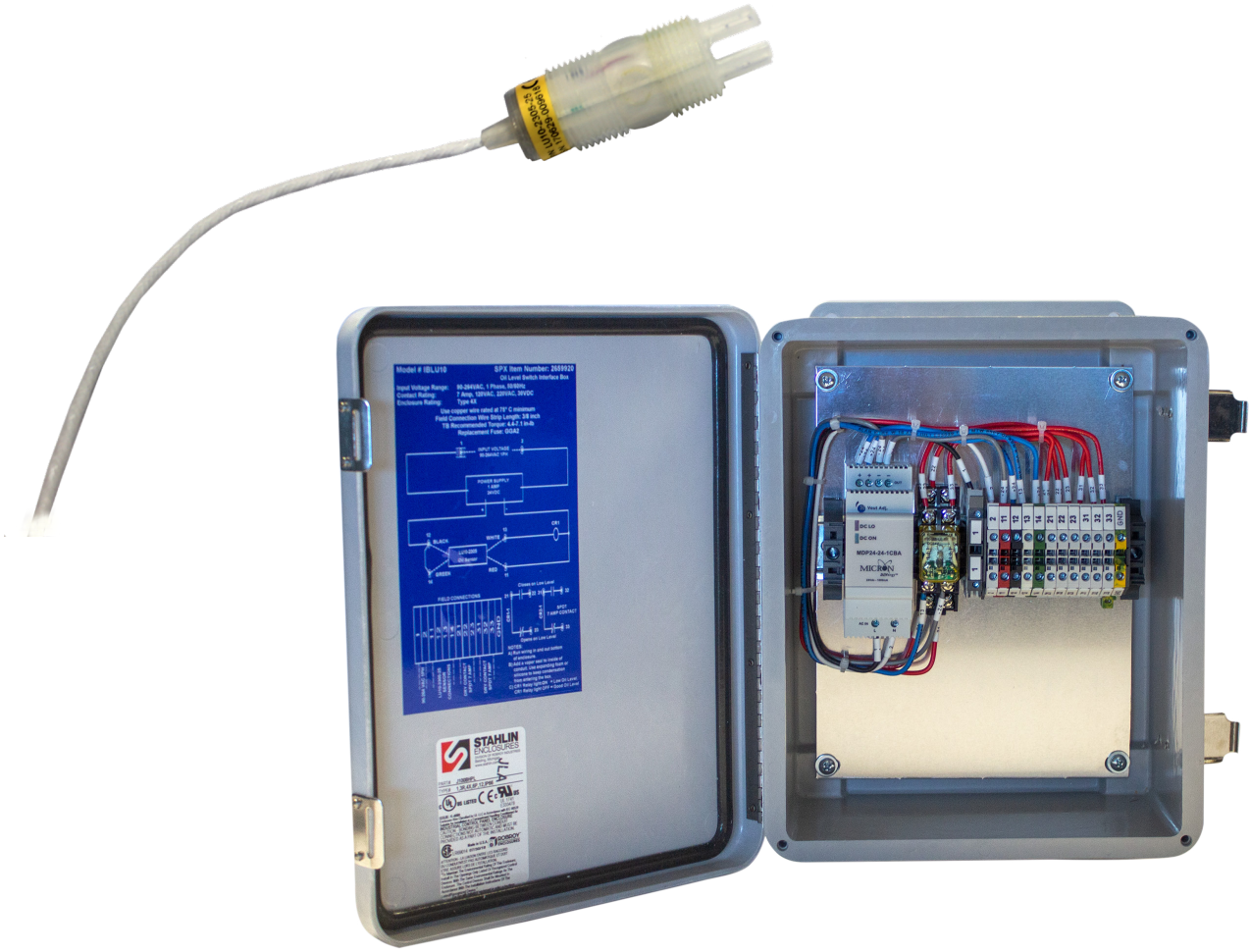
user manual

OLS+u ultrasonic oil level switch

INSTALLATION - OPERATION - MAINTENANCE

Z1095438 ISSUED 07/2019

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 Marley OLS switch. Carefully read the manual before installation or operation and follow all instructions. Save this manual for future reference.

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Note

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. Also, please observe all Caution and Warning labels on the tower.

⚠ Warning

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

⚠ Caution

Indicates presence of a hazard which will or can cause personal injury or 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. Consult a safety engineer for additional guidance.

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.

description

This manual covers two configurations of the Marley OLS ultrasonic switch to monitor oil level in the cooling tower gearbox.

Model OLS+u+BMS

Ultrasonic DC level switch with cord for direct connection to a BMS or PLC.

Use this package when the BMS or PLC can power the DC switch and interface with the level switch for alarming the operator of a low oil condition in the gearbox. Technical details of the level switch are shown later in this manual for the automation contractor to review (see Fig. 1).

Model OLS+u

Ultrasonic DC level switch with cord and AC to DC relay interface box.

Use this package when DC power is not available for the DC switch. The AC to DC interface box accommodates an AC supply source then converts the AC to DC to power the switch. The interface box includes 2 Form C dry relay contacts for interfacing with the alarming control circuit (see Fig. 2).

Note

The OLS low-level oil switch is to be used to alarm the operator, not shut down the cooling tower fan motor.

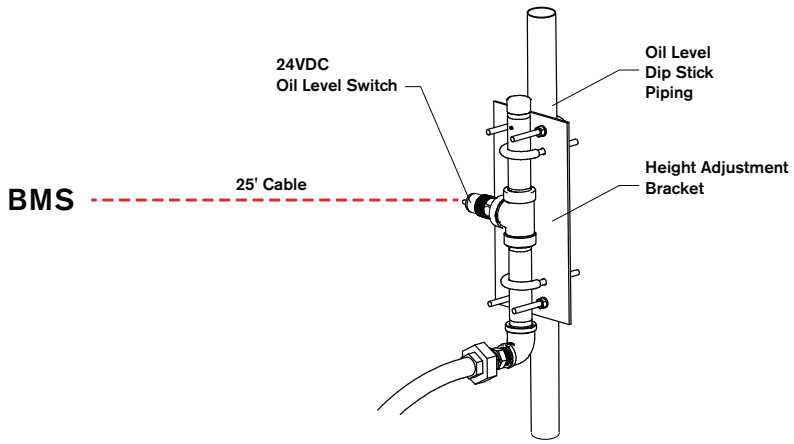


Figure 1

description

OLS+u+BMS — Ultrasonic Oil Level Switch Only

The Marley OLS ultrasonic switch is used to monitor and alarm a low oil level condition in the cooling tower gearbox via an oil immersed probe using ultrasonic sound wave technology.

The switch is factory mounted in the oil level piping, its height in relation to the gearbox is set at the factory so field calibration is not required. A sliding bracket, provided for height adjustments, allows the tower installer to make final adjustments if required.

Sequence Of Operation

The OLS ultrasonic switch is a 4-wire device, two wires for DC power from the BMS (Building Management System) and two wires for its internal switch. The switch includes an integrated ON-OFF dry relay contact used by the BMS to activate an alarm for the cooling tower operator. The OLS+u is a setpoint switch changing a relay state upon a low oil condition in the cooling tower gearbox. The switch may be wired as a NO (normally open) or a NC (normally closed) device simply by reversing DC polarity at the switch.

Typically, this operational sequence is not used to shut off the cooling tower fan motor but to provide notification only to the tower operator. Once oil level returns to a normal level, relay contacts revert to a normal non-alarming condition.



OLS Ultrasonic Switch – Flowline® Switch-Tek LU10 2305

- Contact type switch
- 25'-0 cable integrated into the switch and flying leads on opposite end (50' lead available for larger cooling towers)
- Fittings for mounting switch to oil piping
- Classification: Intrinsically safe
- Certificate: CSA, LR 79236
- Compliance: CE
- Approvals: Class I, Groups A, B, C and D; Class II, Group E, F and G; Class III
- Parameters: Vmax = 32V, Imax = 300mA, Pmax = 1.3W, Ci = 0µF, Li = µH

Note

A special controller is required for hazardous locations.

description

OLS+u Ultrasonic Oil Level with AC to DC Interface Box

The Marley OLS ultrasonic switch package is used to monitor and alarm a low oil level condition in the cooling tower gearbox via an oil immersed probe using ultrasonic sound wave technology. The OLS+u is a set point switch changing a relay state upon a low oil level condition.

The switch is factory mounted in the oil level piping. Its height in relation to the gearbox is set at the factory so field calibration is not required. A sliding bracket, provided for height adjustments, allows the tower installer to make final adjustments if required.

Sequence Of Operation

AC utility power applied to the AC to DC interface box provides DC power to the oil level sensing switch. 2 Form C relay contacts are provided in the interface box that change state if the oil in the gearbox drops to a low condition. The relay contacts complete the customers alarm circuit back to the BMS, warning the operator of a low oil level condition. Typically, this operational sequence is not used to shut off the tower fan motor but to provide notification to the tower operator. Once oil level returns to a normal level, relay contacts revert to a normal non-alarm condition.

During startup and commissioning, the relay inside the interface box has an integrated pilot light that activates when oil level is low.

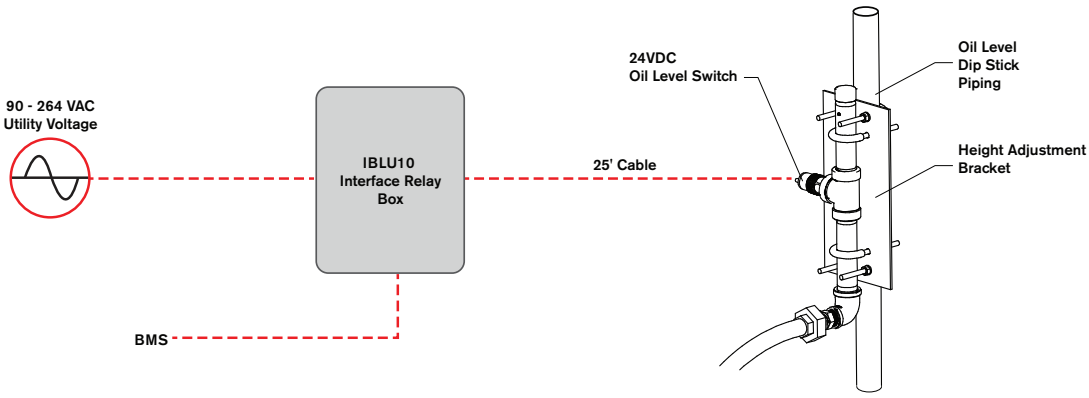
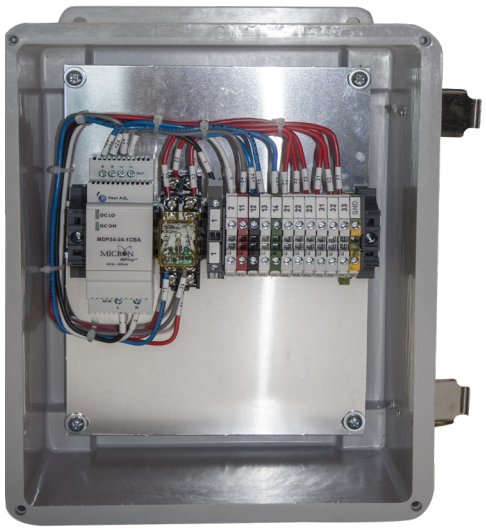


Figure 2

description



IBLU10 AC to DC Interface Box

- NEMA 4X fiberglass enclosure 10"H x 8"W x 5"D
- Swing and latch door
- 2 Form C, 7 Amp Relay output contacts
- User terminal strip

Requires 7 amp 90-264 VAC single phase 60/50 cycle supply source

The assembly is built to the following industrial control panel standards: UL 508A CUL 508A NFPA 70 (NEC)

Note

Interface box is not rated for hazardous location applications.

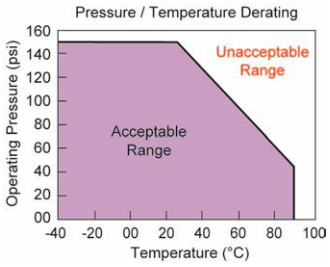
All wiring entering and exiting the interface box should be located at the bottom of the enclosure.

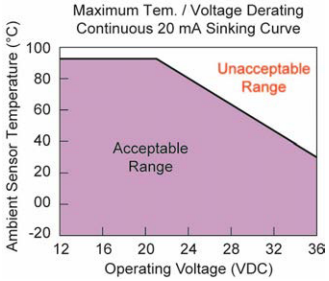
Prevent condensation from forming inside the interface box enclosure. Seal the inside of the conduit at the enclosure forming a vapor barrier. A vapor barrier may be created in the field using expanding foam or silicone injected in to the conduit after wiring connections have been made.

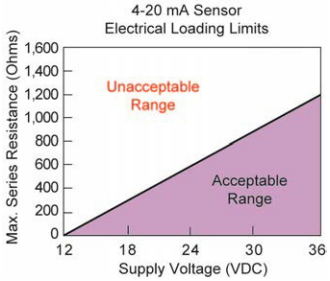
specifications

Common Specifications

Orientation	Universal
Accuracy	± 1 mm in water
Repeatability	± 0.5 mm in water
Supply voltage	12-36 VDC
Consumption	25 mA maximum
Contact type	(1) SPST relay
Contact rating	60VA (125 VAC max/1A max)
Contact output	Selectable NO/NC
Process temp	-40°F to 176°F (-40°C to 80°C)
Pressure	150 psi (10 bar) @ 25°C., derated @ 1.667 psi (.113 bar) per °C above 25° C.
Switch rating	NEMA 4X (IP65)
Cable type	4-conductor, #22 AWG (shielded)
Cable length	25' (7.6m)
Process mount	3/4" NPT (3/4" G/R)
Mount gasket	Viton® (G/R version only)
Classification	General purpose
CE compliance	EN 61326 EMC/EN 61010-1 safety

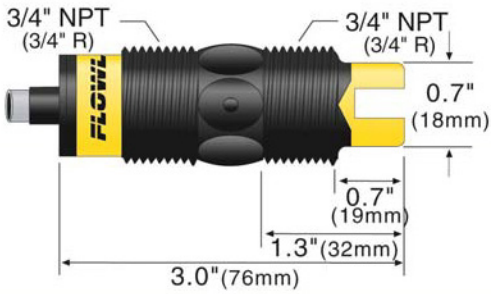






information

The ultrasonic switch generates a 1.5 MHz ultrasonic wave from a miniature piezoelectric transducer located on one side of the gap within its sensing tip. Another piezo transducer, located on the other side of the gap, acts as a microphone, picking up the sound wave. When oil enters the gap, there is a change in the speed the wave crosses the gap. This change in the speed of sound identifies whether the sensor is in oil or in air.



Note

The switch should be installed so that the oil will drip out of the gap when the sensor becomes dry.

Switch material	PFA (Perfluoroalkoxy)
Classification	Intrinsically safe
Approvals	CSA: Class I, Groups A, B, C & D; Class II, Groups E, F and G; Class III EEx: Class 1, Division 1, Groups A, B, C, D; EEx ib IIC T6
Cable jacket material	PFA (Perfluoroalkoxy)
Parameters	CSA: Vmax = 32V, Imax = 300 mA, Pmax = 1.3 W; Ci = 0 µF, Li = 0 µH EEx: Ui = 32V; Ii = 300 mA; Pi = 1.3 W; Ci = 0 µF; Li = 0 µH
Certificates	CSA: LR 79326E Ex: LCIE 01.E6048 X

⚠ Caution

The supply voltage used to power the sensor should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

electrical

Supply Voltage

The supply voltage to the level switch should never exceed a maximum of 36 VDC.

Required Cable Length

Determine the length of cable required between the level switch and its point of termination. Allow enough slack to ensure the easy installation, removal and/or maintenance of the sensor. The cable length may be extended up to a maximum of 1000 feet, using a well-insulated, 14 to 20 gauge shielded four conductor cable.

Wire Stripping

Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1¼" of the sensor's cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last ¼" of the colored insulation from the signal wires.

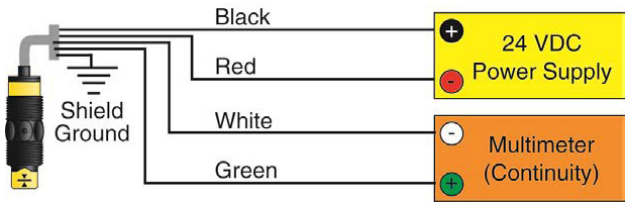
Signal Output (Relay Switching)

Allows the sensor to switch a small load on or off directly, using an internal 1A relay (60 VAC/60 VDC). The switch uses the relay and features 4 wires (red, black, white and green) and a shield wire. The NO/NC status is set by the polarity of the voltage feeding the red and black wires. The green wire is the common for the relay and the white wire is the NO or NC, depending on the polarity of red and black.

Normally Open Wiring



Normally Closed Wiring



Wiring the Relay Output

The level switch requires 12 - 36 VDC power to operate the sensor and switch the relay. All illustrations below identify a **dry** switch state as the normal position of the relay.

Switching a Normally Open DC Load

The red wire connects to positive (+) of the power supply and the black wire connects to negative (–). The **load** can be attached to either the green or white wires. Complete the circuit by connecting the green to (+) VDC power or white to (–) VDC power (see Fig. 3).

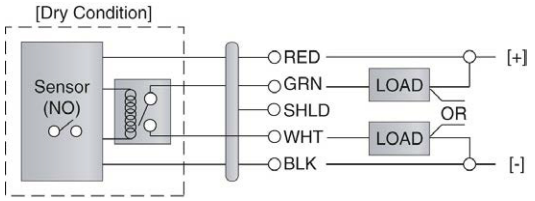


Figure 3

Switching a Normally Closed DC Load

The black wire connects to Positive (+) of the power supply and the red wire connects to negative (–). The **load** can be attached to either the green or white wires. Complete the circuit by connecting the green to (+) VDC power or white to (–) VDC power (see Fig 4).

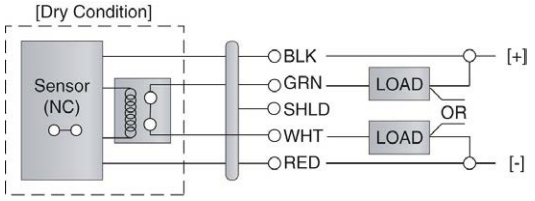


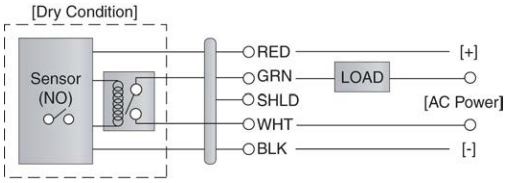
Figure 4

Sensor Power	Relay Rating
[RED and BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet	[GRN and WHT wires] / 60 VA

Switching a Normally Open AC Load

The red wire connects to positive (+) of the DC power supply and the black wire connects to Negative (–). The **load** can be attached to the green wire and the hot of the VAC power. Connect the white to the neutral of the VAC power (see Fig. 5).

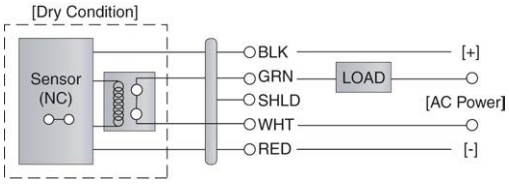
Figure 5



Switching a Normally Closed AC Load

The black wire connects to positive (+) of the DC power supply and the red wire connects to negative (–). The **load** can be attached to the green wire and the hot of the VAC power. Connect the white to the neutral of the VAC power (see Fig. 6).

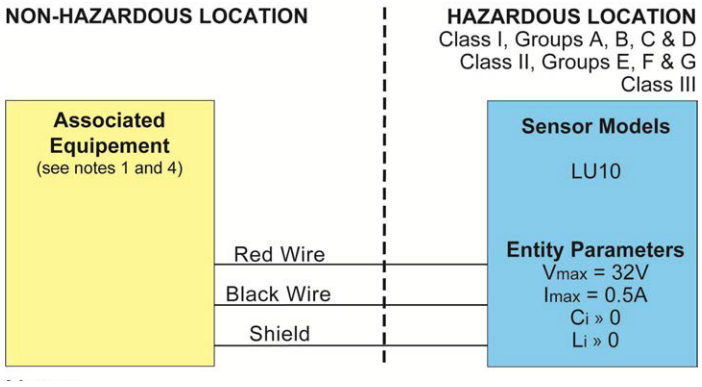
Figure 5



Sensor Power	Relay Rating
[RED and BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet	[GRN and WHT wires] / 60 VA

The LU10-2305 level switch has been approved for use in Class I, Groups A, B, C and D; Under certificate number LR 79326-4. The entity parameters for the LU10-2305 are:

Vmax = 32 VDC / Imax = 0.5 A / Ci = 0 µF / Li = 0 mH



Intrinsically Safe Control Drawing

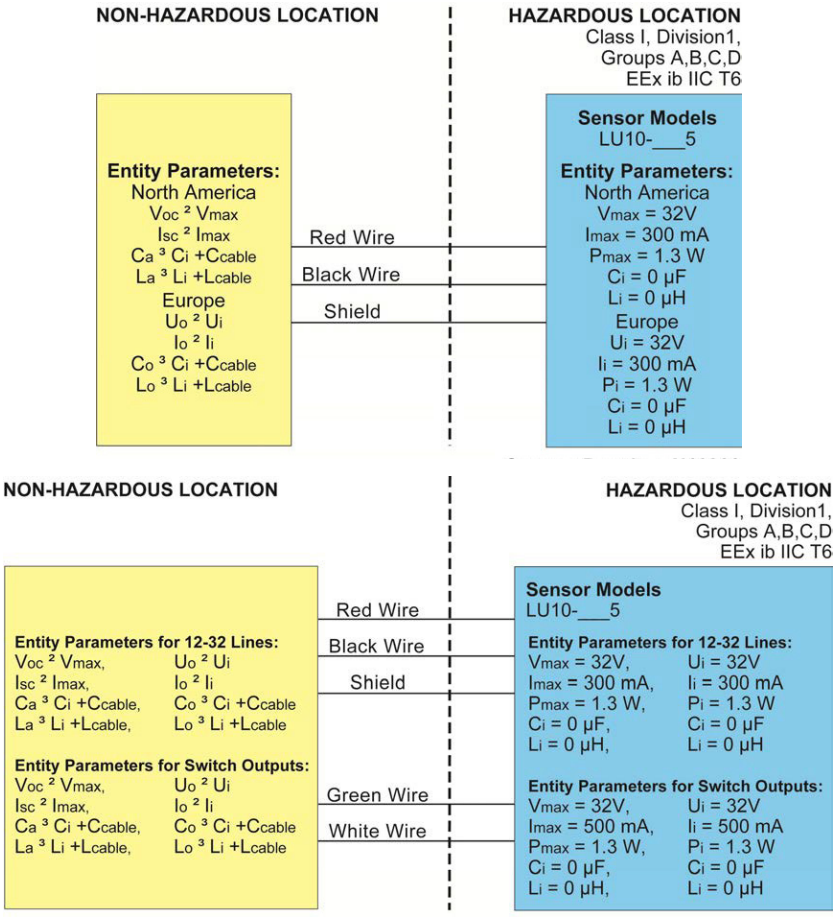
Note

1. CSA Certified associated equipment with entity parameters.
2. V_{max}^{3} Voc, I_{max}^{3} Isc, Ci + Ccable £ Ca., Li + L cable £ La.
3. Installation should be in accordance with CEC Part I or NFPA 70.
4. Associated equipment must be installed per manufacturer's instructions.

The LU10-2305 level switch has been approved for use in Class I, Division 1, Groups A, B, C and D; EEx ib IIC T6; under certificate number LCIE 01.E6048X. The Entity parameters for the LU10-2305 are:

North America - Vmax = 32 VDC / Imax = 0.5 A / Pmax = 1.3 W / Ci = 0 µF / Li = 0 µH

Europe - Ui = 32 VDC / Ii = 0.5 A / Pi = 1.3 W / Ci = 0 µF / Li = 0 µH



Intrinsically Safe Control Drawing

Note

Parameters depend on output type

1. Installation should be in accordance with CEC Part I or NFPA 70.
2. Associated equipment shall be CSA certified with entity parameters connected in accordance with manufacturer's instructions

Wiring as a P-Channel or N-Channel Output

The level switch can be substituted for either a P-Channel (PNP, sourcing) output or an N-Channel (NPN, sinking) output.

Normally Open DC Load as a P-Channel Output

The red wire connects to positive (+) of the power supply and the black wire connects to negative (–). The green wire is jumped to the red wire while the white wire is connected to the **load**. Jumper the **load** to the negative (–) to complete the circuit (see Fig. 6).

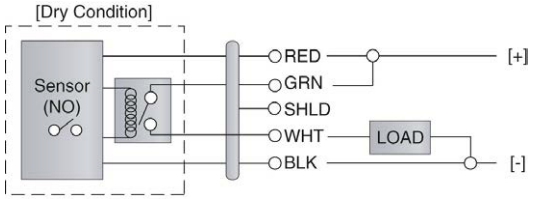


Figure 6

Normally Closed DC Load as a P-Channel Output

The black wire connects to positive (+) of the power supply and the red wire connects to negative (–). The green wire is jumped to the black wire while the white wire is connected to the **load**. Jumper the **load** to the negative (–) to complete the circuit (see Fig 7).

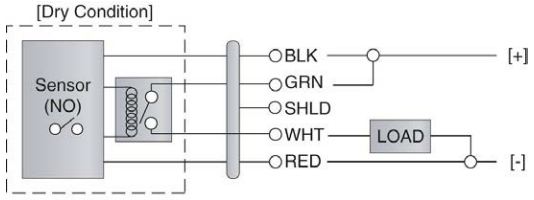


Figure 7

Sensor Power	Relay Rating
[RED and BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet	[GRN and WHT wires] / 60 VA

wiring

Normally Open DC Load as a N-Channel Output

The red wire connects to positive (+) of the power supply and the black wire connects to negative (–). The white wire is jumped to the black wire while the green wire is connected to the **load**. Jumper the **load** to the positive (+) to complete the circuit (see Fig. 8).

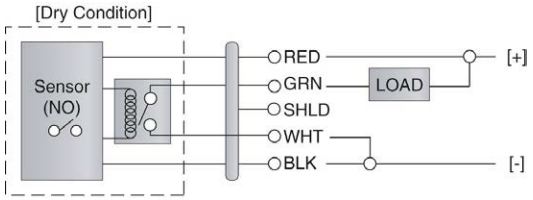


Figure 8

Normally Closed DC Load as a N-Channel Output

The black wire connects to positive (+) of the power supply and the red wire connects to negative (–). The white wire is jumped to the red wire while the white wire is connected to the **load**. Jumper the **load** to the positive (+) to complete the circuit (see Fig. 9).

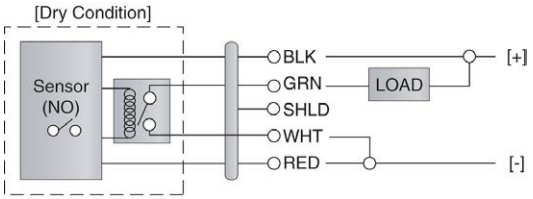
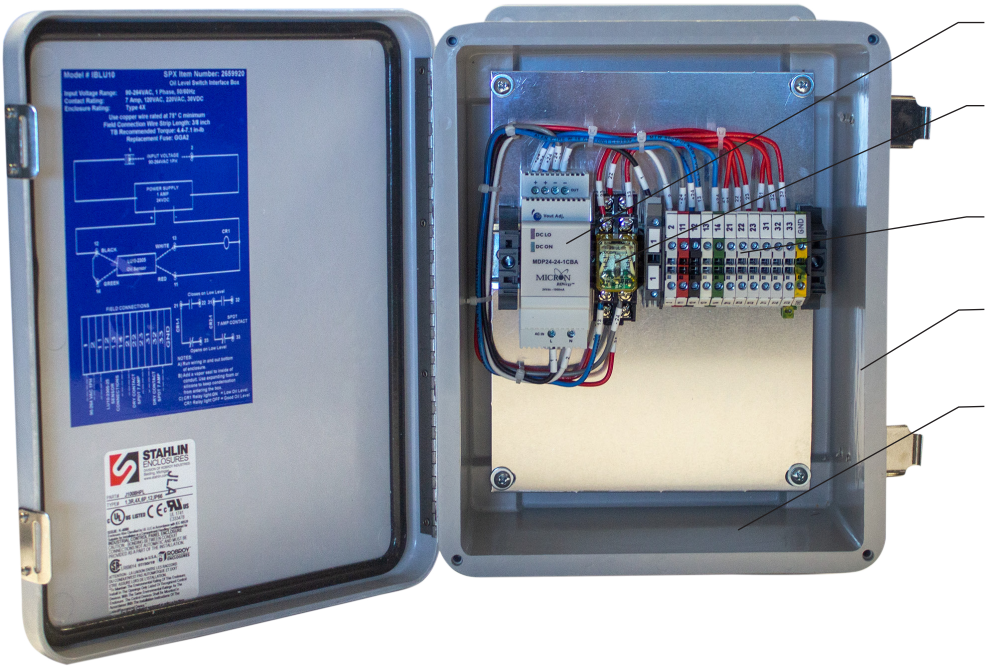


Figure 9

Sensor Power	Relay Rating
[RED and BLK wires] / 36 VDC Max. 5 ±1mA Dry / 22 ±1mA Wet	[GRN and WHT wires] / 60 VA

wiring



AC to DC power

Control Relay with
2 Form C dry contacts

Field connection
terminal strip

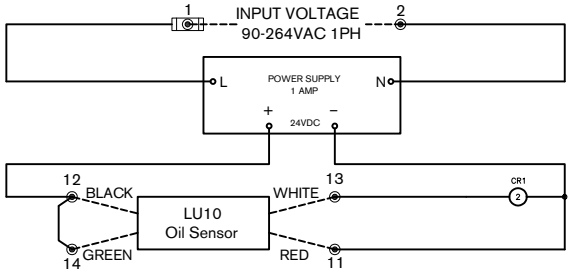
NEMA 4X fiberglass
enclosure 10" x 12" x 6"

Route all wiring into and out of the bottom of the enclosure.

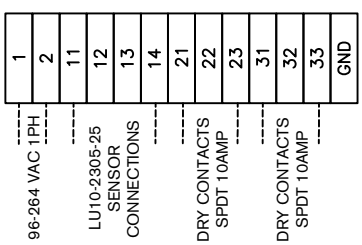
Seal field-added conduit holes with silicone or expanding foam to create a vapor barrier to prevent water vapor inside the enclosure

Model # IBLU10
Main Disconnect by Others
Input Voltage Range: 90-264VAC, 1 Phase, 50 / 60Hz
Contact Rating: 7 Amp, 120VAC, 220VAC, 30VDC
Enclosure Rating: Type 4X
Use copper wire rated at 75 C Minimum
Field Connection Wire Strip Length: 3/8 inch
TB Recommended Torque: 4.4-7.1 in·lb
Replacement Fuse: GGA2

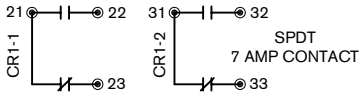
SPX Item Number: 2659920
Oil Level Switch Interface Box



FIELD CONNECTIONS



Closes on Low Level



Open on Low Level

NOTE:

- Run wiring in and out bottom of enclosure.
- Add a vapor seal to inside of conduit. Use expanding foam or silicone to keep condensation from entering the box.
- CR1 Relay light ON = Low Oil Level.
  CR1 Relay light OFF = Good Oil Level.

frequently asked questions

Interface Box Enclosure

Q Where is a typical mounting location?

A Anywhere near the cooling tower is fine limited by the length of the lead for the oil switch. The enclosure is suitable for outdoor installation. Always route the conduit into the bottom of the enclosure and provide a drip line. The conduits entering the control panel should be sealed preventing vapor and condensation from entering the enclosure.

Q Why does the enclosure have latches?

A The latches secure the lid to the gasket providing a water tight seal.

Q Are knock outs provided?

A No.

Ultrasonic Switch

Q Is the switch furnished with wire?

A Yes – 25' is standard. 50' lead is available for larger cooling towers.

Q Can switch leads be extended?

A Yes – use #18 gauge 4 wire stranded copper conductor plus a shield from junction box.

Q Can leads be cut to length?

A Yes – but suggest keeping extra length coiled for easy removal.

Q Are switch leads replaceable?

A No – the lead attaches to the ultrasonic switch as an integrated molded connection.

Q Does the switch require maintenance?

A No.

Q Does the switch lead need to be in conduit?

A The wire is rated for outdoor use (check local codes).

Q Is the controller solid state?

A Yes.

Q Is the controller factory calibrated for height?

A Yes – the switch can also can be field adjusted.

Q Should the switch be used to shut off the VFD or starter?

A No – the switch should be used to complete an alarm system for the cooling tower operator not as a shut-down circuit.

Wiring

Q How is the ultrasonic switch wired back to the interface box?

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

Integration

Q Can the OLS+u be connected to a BMS system?

A Yes – via dry relay contacts.

TESTING THE INSTALLATION – DC SWITCH ONLY

1. Power: Turn on power to the controller and/or power supply.
2. Immersing the switch: Immerse the sensing tip in a container filled with similar oil up to the switch's tip.
3. Test: With the switch being fluctuated between wet and dry states, the switch indicator light in the controller should turn on and off. If the controller doesn't have an input indicator, use a voltmeter or ammeter to ensure that the switch produces the correct signal (see Fig. 10).
4. Point of actuation: Observe the point at which the rising or falling fluid level causes the switch to change state, and adjust the installation of the switch if necessary.

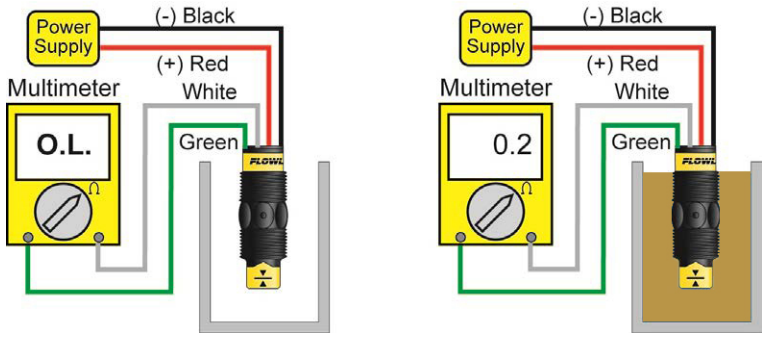


Figure 10

Example: Testing the LU10 switch with a multimeter set to read resistance (ohms). When wired NO [red to (+)], the meter will read O.L. when dry and will read some small amount of resistance (e.g. 0.2 Ohms) when wet.

PARTS LIST

Part Number	Description
2659920	Marley IBLU10 AC to DC interface box NEMA 4X fiberglass enclosure
2670450	Marley IBLU10 AC to DC interface box NEMA 4X stainless steel enclosure
2659922	LU10 switch with 25' cable
2659923	LU10 switch with 50' cable
2666663	Relay plus base with 2 Form C contacts and indicating light
2666664	AC to DC power supply

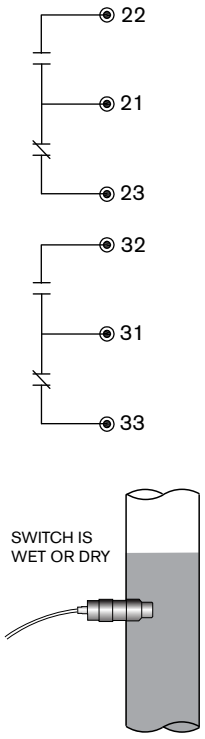
TROUBLESHOOTING

Check relay status for Marley IBLU10 AC to DC interface box using a continuity tester.

1. DE-ENERIZED
CONTROL PANEL
Power OFF

INTERNAL RELAY LIGHT

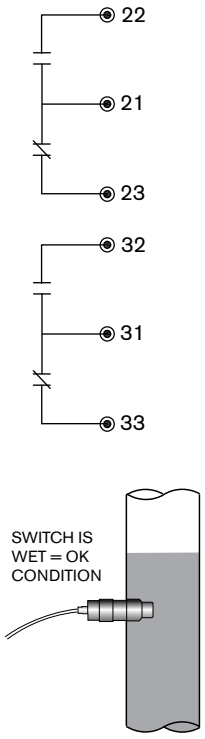
OFF ○



2. ENERIZED
CONTROL PANEL
Power ON

INTERNAL RELAY LIGHT

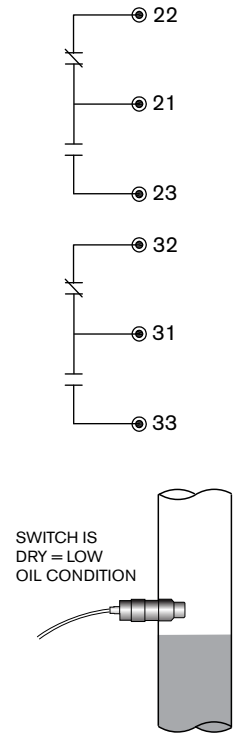
OFF ○

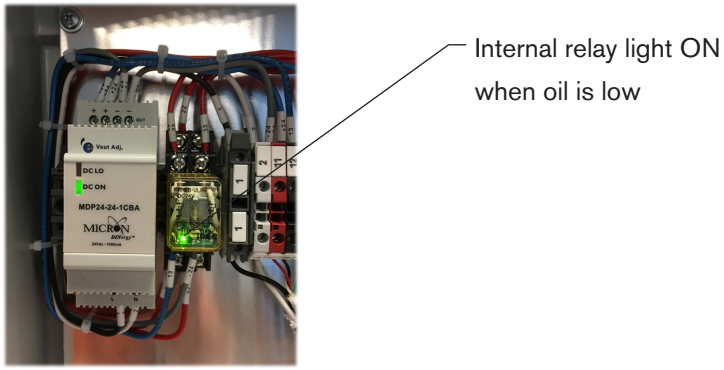


3. ENERIZED
CONTROL PANEL
Power ON

INTERNAL RELAY LIGHT

ON ●





OLS+**u** oil level switch

USER MANUAL

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