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INSTALLATION & OPERATING INSTRUCTIONS FOR THE FLW CONTROL

This document should be used by trained personnel as a guide to install the ProtoDesign Inc. Dual-Function control. Follow necessary wiring practices as defined by the national electric code (NEC). Installation or selection of equipment should always be accompanied by trained technical personnel. Reset and probe wires runs should be separated from high voltage wire runs.

We recommend that secondary (redundant) Low Water Cut-Off controls be installed on all steam boilers with heat input greater than 400,000 BTU/hour or operating above 15 psi of steam pressure. At least two controls should be connected in series with the burner control circuit to provide safety redundancy protection should the boiler experience a low water condition. Moreover, at each annual outage, the low water cut-offs and probes should be dismantled, inspected, cleaned, and checked for proper calibration and performance. If used as a LWCO, the control must be installed in series with all other limit and operating controls.

SPECIFICATIONS:

Ambient Operation Temp: 0 to 150 deg. F.

Humidity: 85% (non-condensing)

UL Approval: UL353 limit control (FW function rated as an operating control, non-limit)

Supply Voltage: 120/220/240 VAC 50/60 Hz., +10/- 15% line variation.

Contact Ratings: SPDT, 10A, 1/3H.P. 120/240VAC. Rated 100,000 cycles rated load.

Power Consumption: 1.5VA

Wiring Terminals: Open board design ¼" quick connects on high voltage and 3/16" quick connects on low voltage.

Probe wire distances: 500 feet max. using MTW or THHN #14 or #16 AWG wire.

Reset terminal wires: 50 feet max. using same wire type described above.

OPERATION:

Test Feature (Option A) Allows the LLCO circuit to be tested. Holding down the reset button for 3 seconds will allow the LLCO circuit to trip, which simulates the loss of water without the need to drain the water in the boiler. The control will return to normal operation once the reset button is pressed a second time or after a one-minute timeout.

Manual Reset With a normally closed pushbutton installed across RESET terminals **TB9** & **TB10**, and after a low water condition, the relay will remain de-energized until the pushbutton is pressed after the liquid rises to the level of the probe. With no pushbutton installed control will be in **Automatic Reset**.

Single Level Service - Direct Mode: When the liquid rises to the HIGH electrode on terminal **TB3**, the control energizes (LED1 will be lit). The control remains energized until the liquid leaves the high electrode on terminal **TB3** de-energizing the load contacts (LED1 will not be lit). In **Inverse Mode:** the control logic is reversed.

Differential Service – Direct Mode: When the liquid rises to the HIGH electrode on terminal **TB3**, the control energizes (LED1 will be lit). The control remains energized until the liquid leaves the LOW electrode on terminal **TB4** de-energizing the load contacts (LED1 will not be lit). In **Inverse Mode:** the control logic is reversed.

LWCO - When the liquid rises to the LLCO electrode on terminal **TB11**, the control energizes, changing state of the (LW) load contacts (LED2 will be lit). The control remains energized until the liquid level recedes below LLCO electrode on terminal **TB11**. The control then de-energizes, (LED2 will not be lit) returning load contacts to original state. Unless otherwise specified, there is a three-second time delay on decreasing level. Liquid must be below probe on terminal **TB11** for a full three seconds before control de-energizes.

POWER OUTAGE FEATURE The power outage feature is a standard feature for the FLW. When using the manual reset feature, if power interruption occurs when the probes are in liquid the relay will de-energize. When power is restored if the liquid is in contact with the probe the relay will energize without a manual reset. This feature eliminates boiler lockouts due to power outages when using the reset function.

CSD-1 CODE COMPLIANCE On Manual Reset units, if the control is in a low-water condition (water off probe) when there is an interruption of power, the control will remain in a low-water condition when power is restored. The reset button will need to be pressed when the water level is restored to a level above the probe.

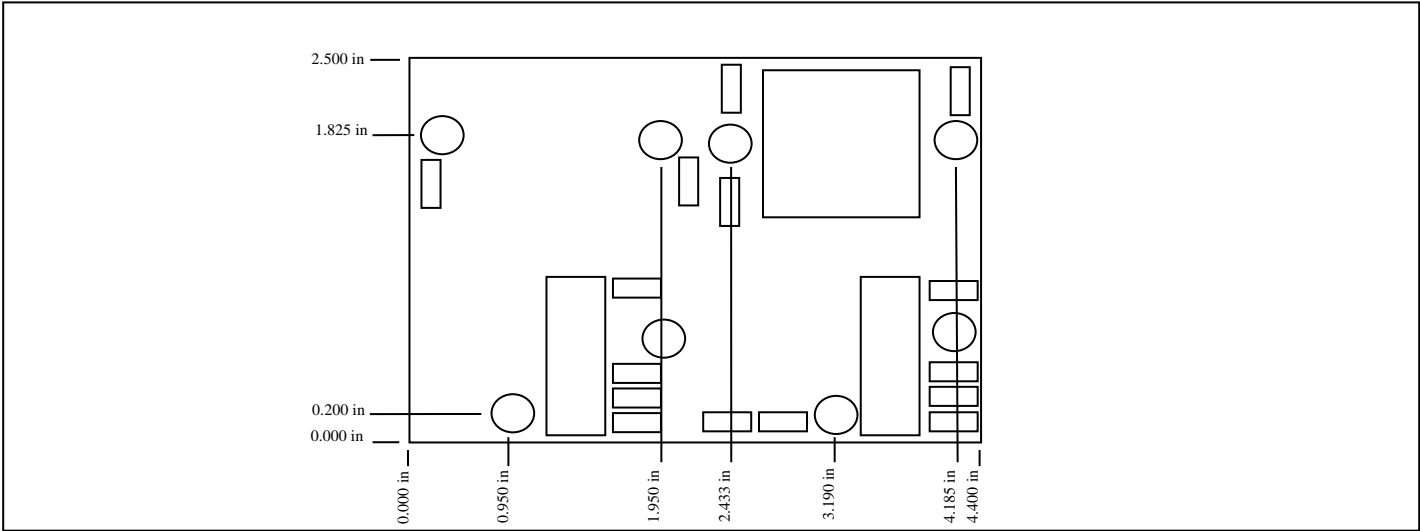
PROBE BUILD UP DETECTION If the resistance of the LLCO probe to ground increases to approximately 10K above sensitivity set point the control will turn off and indicate probe buildup (LED blinking). To clear error, clean or replace probes. In manual reset mode, probe must be in liquid and reset button pushed for 30 seconds. In automatic reset mode, error will clear 30 seconds after probe is in liquid. (Detection not available in Non-Limit Control version, Option E)

Time Delays: In Differential Service, rising level time delays begin upon liquid level contacting the high probe and falling level time delays begin upon leaving the low probe. In Single Level Service that uses the high probe and requires time delays on increasing and decreasing levels, terminals TB3 (high) & TB4 (low) must be jumped together. Otherwise, Single Level Service time delay will only be on decreasing level.

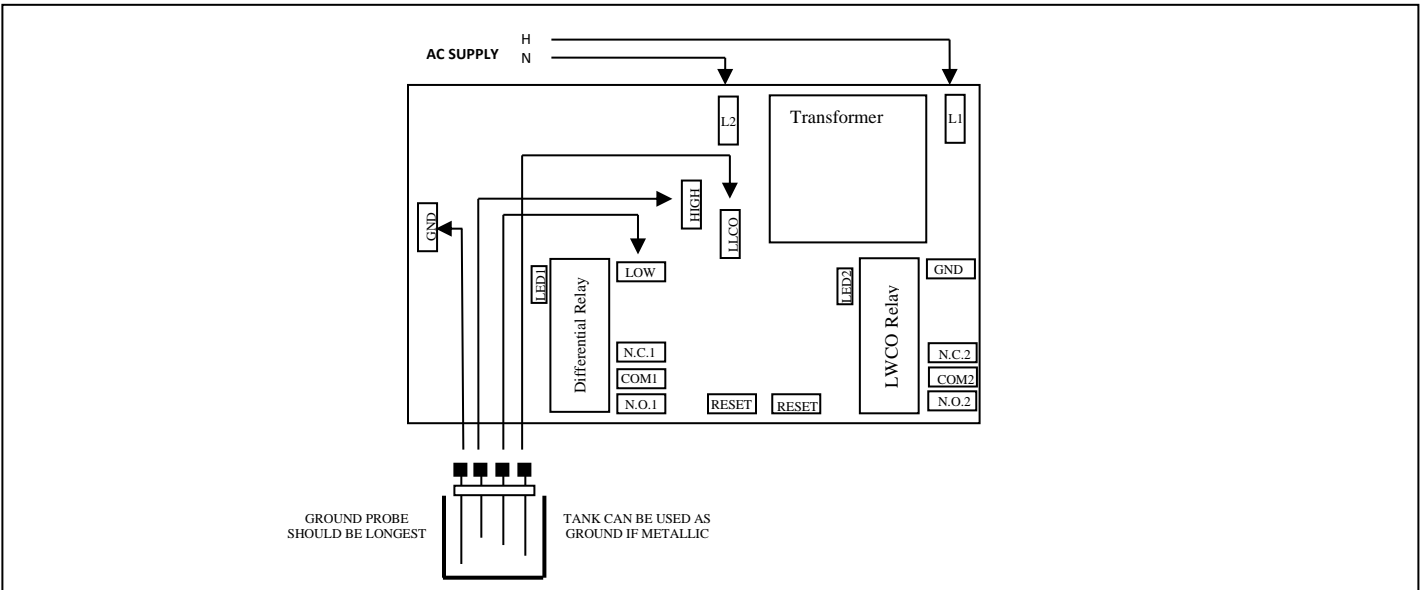
Maintenance Schedule

- Inspect probe annually for scale build-up and clean if necessary. Make certain there is no scale or build-up on the probe or its white insulator.
- Replace probe every 10 years. More frequent replacement of the probe is required if it is used in locales where significant water treatment is required, where more frequent cleaning is necessary, or in applications with high make-up water requirements.
- Replace the FLW Control every 15 years or after 100,000 cycles on the relay.

DIMENSIONAL DRAWING



TYPICAL WIRING DIAGRAM



MODEL NUMBER DESIGNATIONS

FLW - X - X - X - X - XX-XX-XX - X

OPTIONAL CHARACTERS (any combination):

A=Test Feature, C=Conformal Coating, D=RoHS,
E= UL353 operating control only, non-limit

FALLING LEVEL DELAY LWCO IN SEC:

03 = 3 SEC (Standard), 30 = 30 SEC.

FALLING LEVEL DELAY DIFFERENTIAL FEEDWATER IN SEC:

00 SECONDS (Standard), 01 – 60 SECONDS (optional in 1 second increments)

RISING LEVEL DELAY DIFFERENTIAL FEEDWATER IN SEC:

00 SECONDS (Standard), 01 – 60 SECONDS (optional in 1 second increments)

MODE (DIFFERENTIAL ONLY):

A=DIRECT (Standard) B=INVERSE

SUPPLY VOLTAGE:

1=120VAC (Standard) 2=240VAC 3=220VAC (220/240VAC operating control only, non-limit)

SENSITIVITY:

C=26K (Standard) (contact factory for other sensitivity options)

PACKAGE:

1=OPEN BOARD WITH SCREW MOUNT STANDOFFS 2=STANDOFFS FOR 1/8" PANEL

3=STANDOFFS FOR 1/16" PANEL (Standard)