



Instruction Sheet

Low Water Cutoff

102-021

SUPERCEDES: REVISION H DATED: SEPTEMBER 13, 2004

EFFECTIVE: JULY 6, 2005

#5401116-REV J



US Patent 6,904,800

Contact Ratings			
Voltage	Motor Switch Rating		Pilot Rating
	Full Load	Locked Rotor	
24 VAC	--	--	50 VA
120 VAC	7.5 A	43.2 A	125 VA
240 VAC	3.75 A	21.6 A	50 or 60 Hz

Listings/Approvals:

- UL GUIDE (MBPR) for Limit Controls per UL Standard 353 Limit Controls
- UL GUIDE (MCUR2) for Electrode Assemblies - Component
- CUL per CSA Standard C22.2 No. 24-93 for temperature indicating and regulating equipment

Probe Fitting Thread: 3/4" NPT Brass

Enclosure:

NEMA Type 1 (For indoor use only.) Formed sheet metal with powder coat/plated finish. Four openings for 1/2" conduit fittings. (Not for use in hazardous locations.)

Maximum Pressures: Steam - 15 psi (1kg/cm²)
Hot Water - 160 psi (11.2kg/cm²)

Maximum Probe Temperature: 250°F (121°C)

Maximum Ambient Temperature: 120°F (49°C)

Probe Sensitivity: Adjustable 7K - 12K Ohms

Input Supply Voltage:

LNA120xx: 120VAC

LNA024xx: 24VAC to be supplied by an **EXTERNAL** Class 2 power source.

Control Power Consumption: 2.8VA at 120VAC
2.8VA at 24VAC

GENERAL

The LWCO is a control device to detect the presence of a conductive fluid in a vessel or tank. The electronic circuitry of the LWCO is primarily designed for use in low-pressure steam and hot water boilers not requiring manual reset or test features, to *cut off* the burner in low water level condition. (See each boiler manufacturers' specifications for recommended minimum safe levels.) The LWCO may also be used as a secondary low

water cutoff on low-pressure steam boilers.

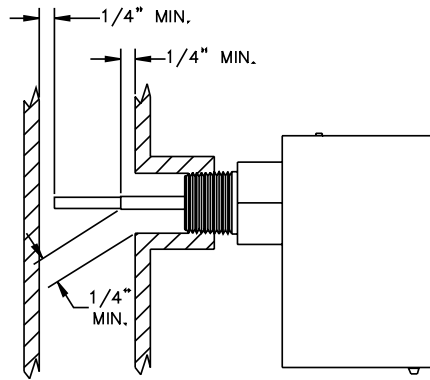
The LWCO is an automatic reset device which resumes operation after a power outage. A red LED will indicate the low water condition. The LWCO control may be used with an alarm or automatic water feeder to keep the boiler filled to the proper level. The LWCO will not lock out upon power loss provided water covers the probe.

WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Read all instructions carefully and understand them before starting installation and save for future use.
- This LWCO device must be installed in series ahead of other limit and operating controls installed on the boiler. When installations are complete, check for correct operation of **ALL** limit and operating controls!
- To prevent damage to the device and/or electrical fire, wire insulation must be rated at 167° F (75° C) – over copper wire only.
- Instruct user how to test and operate this cutoff device as described in these instructions.

PROBE SPACING REQUIREMENTS

FIG. 1

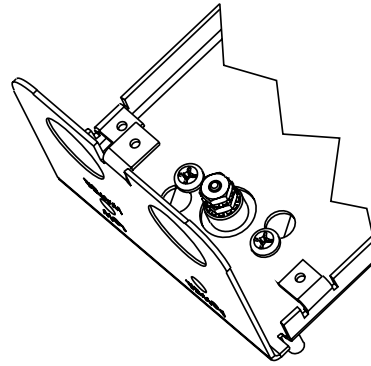


DWG. #1108-1

NOTE: Mount only with probe facing horizontally or vertically downward. Do not mount with probe angled upward. Maintain probe clearances as indicated.

CONTROL UNIT MOUNTED ON PROBE

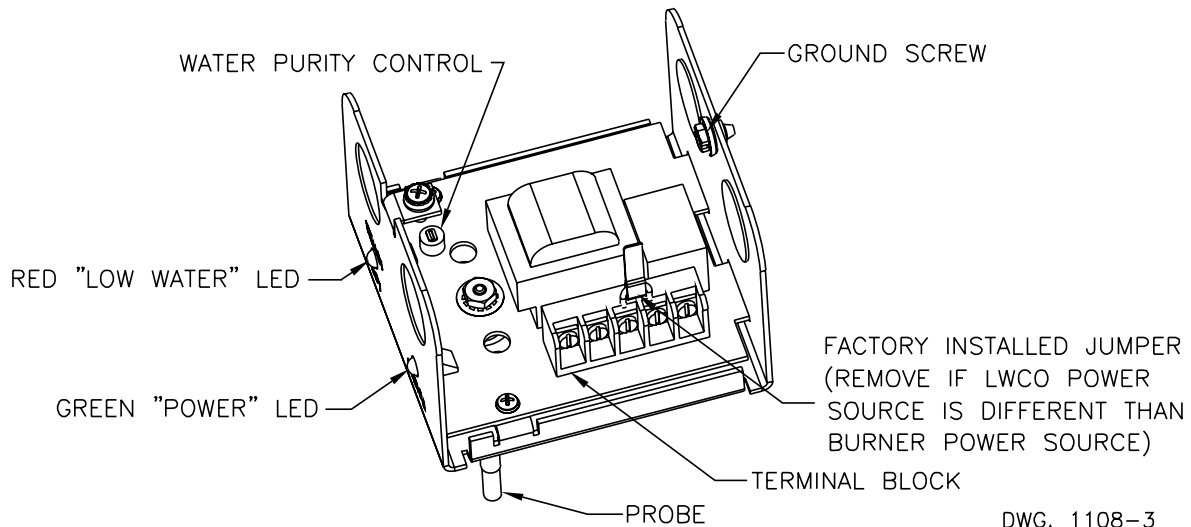
FIG. 2



DWG. #1108-2

LWCO

FIG. 3



DWG. 1108-3

INSTALLATION

IMPORTANT NOTES FOR PROBE INSTALLATION:

Apply a small amount of pipe sealant to external threads of the probe.

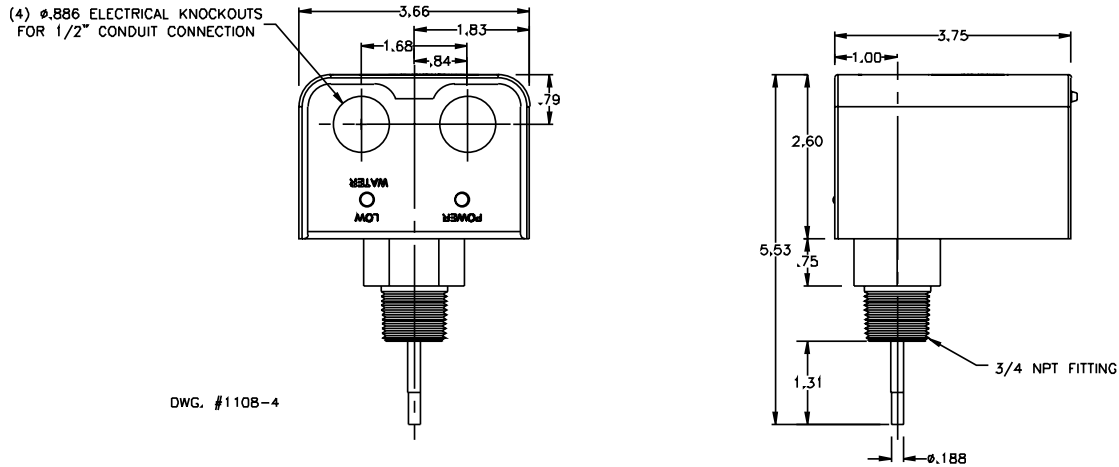
CAUTION: DO NOT use teflon tape!

1. Be sure the probe is installed above the **minimum safe** water level, as previously determined from the boiler manufacturer's literature.
2. Be sure the probe extends into the boiler cavity so that contact with the water is made.
3. Be sure the exposed portion of the stainless steel probe is a *minimum* of 1/4" from any grounding surface inside the boiler to prevent the probe from shorting (see Fig 1).

Control Unit Mounting onto Probe (See Fig. 2):

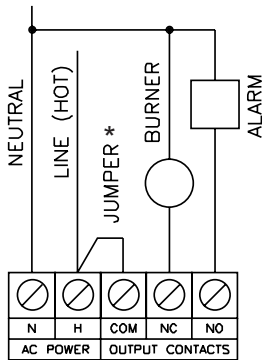
1. Tighten the probe into the tapped location of the boiler with a wrench, using the bushing flats provided.
2. Make sure the heads of the two mounting screws in the probe bushing are loosened approximately 1/8" from the bushing surface.
3. Then remove the first lock washer/nut from the probe threads.
4. Orient the slotted holes in the control unit over the heads of the mounting screws of the probe and turn control unit counter-clockwise so that the ends of the slots are fully under the mounting screw heads. Tighten mounting screws.
5. Replace the lock washer/nut onto probe and tighten.

**LWCO OUTLINE DWG.
FIG. 4**



**LWCO WIRING DIAGRAM USING
BURNER CIRCUIT POWER
SOURCE**

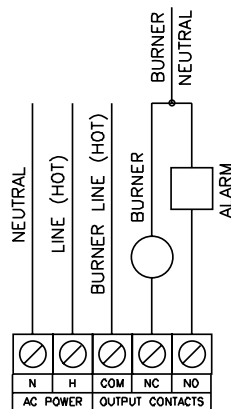
FIG. 5



***Factory Installed**

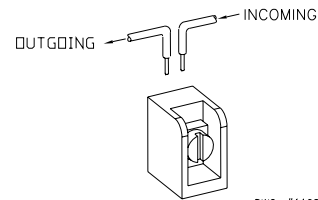
**LWCO WIRING DIAGRAM
USING POWER SOURCE
OTHER THAN BURNER
CIRCUIT**

FIG. 6



**TERMINAL BLOCK CONNECTIONS
CLAMPING PLATE
TERMINAL**

FIG. 7



CAUTION:

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal. Use 18 AWG (min.), or as required by local code. Wire insulation rating must be at least 167°F (75°C).

NOTE: For 24 VAC models, LNA024xx, 24 VAC to be supplied by an **EXTERNAL** Class 2 power source to terminals H and N. For 120 VAC models, LNA120xx, 120 VAC is supplied by an external circuit to terminals H and N.

LWCO Wiring Using the Burner Circuit Power Source (See Fig. 5):

1. Connect the hot lead wire from the power source to terminal **H**.
2. Connect the neutral lead wire from the power source to terminal **N**.
3. Verify that factory installed jumper is present or connect an 18 AWG (min.) jumper wire from terminal **H** to terminal **COM**.

CAUTION: Be sure power source for Control Unit and burner circuit are the same voltage. Make sure you are not introducing a second voltage source into the burner circuit via the jumper. This will bypass other operating, limit, and/or safety controls, which may result in property damage, personal injury or death.

4. Connect the neutral wire of the power source to the neutral side of the burner circuit. Connect wire from

the hot side of the burner circuit to terminal **NC**.

5. Connect the neutral wire of the power source to the neutral side of a water feeder or alarm. Connect wire from the hot side of the water feeder or alarm to terminal **NO**.

LWCO Wiring Using a Power Source Other than Burner Circuit (See Fig. 6):

1. **Remove Factory installed jumper.**
2. Connect the hot lead wire from the separate power source to terminal **H**.
3. Connect the neutral lead wire from the separate power source to terminal **N**.
4. Connect the hot lead wire from the burner circuit power source to terminal **COM**.
5. Connect the neutral wire of the burner circuit power source to the neutral side of the burner circuit. Connect wire from the hot side of the burner circuit to terminal **NC**.
6. Connect the neutral wire of the burner circuit power source to the neutral side of a water feeder or alarm. Connect wire from the hot side of the water feeder or alarm to terminal **NO**.

Test For Proper Function:

1. DO NOT fill boiler. Turn on electric power to the boiler and set the thermostat.

On initial start-up the LWCO will indicate low water condition, which indicates proper function. The burner **should not** operate without water in the system. The red LED on the Control Unit should be illuminated.

2. Fill boiler with water.

Once water covers the probe, the red LED on the Control Unit should turn off and the burner should ignite. If the red LED does not turn off, the water level may still be below the level of the Probe or the water may be too "Pure" (low conductivity). See Water Purity Adjustment section.

3. Once correct operation of the LWCO has been tested, then test **ALL** other safety, limit and control devices before finalizing system operation.

Water Purity Control Adjustments: If testing indicates proper operation, no adjustment is required.

1. Verify that water covers the probe.
2. Slowly turn the water purity control, **RV1**, on the PC Board toward the "+" setting with a small screwdriver until the red LED turns off (see FIG. 3).
3. Once the red LED turns off, leave the water purity control in that position.
4. If adjustment to the maximum "+" setting does not cause the red LED to turn off, the water is too pure and must be treated.

Troubleshooting:

If the LWCO fails to function normally, perform the following steps to verify the proper installation:

1. Make sure the water level covers the probe.
2. Verify **ALL** LWCO wiring.
3. If teflon tape was used on the threads of the brass bushing for the probe, remove the tape and install with a small amount of pipe sealant.
4. Adjust the water purity control as indicated in the Water Purity Control Adjustment section.
5. Water treatment may be required.

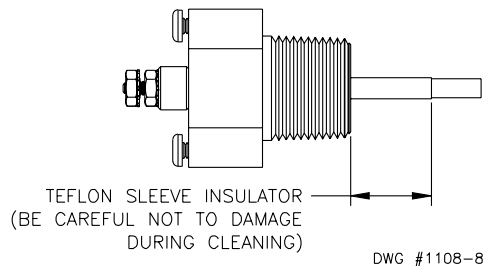
Cleaning and Replacement:

Probe must be inspected annually for scale build-up. Clean all scale from probe and teflon sleeve taking care not to damage the teflon sleeve (see Fig 8).

Probe should be replaced every 10 years. Replace more often if used in areas where heavy water treatment is required, when cleaning is needed more frequent than annually, and/or boiler demands for make-up water are high.

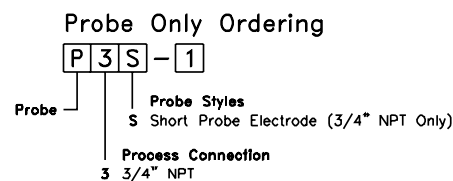
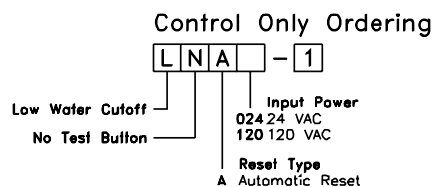
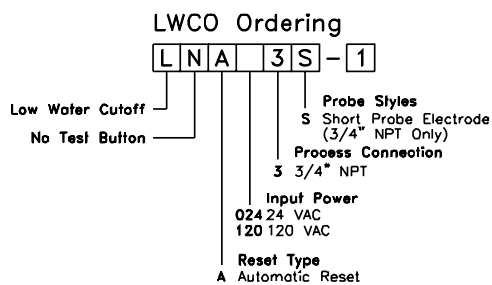
The Control Unit should be replaced every 15 years. In areas of high humidity and heavy dust or other airborne contaminants more frequent replacement may be required.

PROBE CLEANING FIG. 8



LN WIRING CROSS REFERENCE

Manufacturer	Device or Series	Power Connections		Output Contacts		
		Hot	Neutral	Common	To Burner	To Water Feeder / Alarm
Taco	LN Series	H	N	COM	NC	NO
McDonnell & Miller	PS-801/851 (Older Models w/Red & Amber LEDs)	1	2	3	5	4
McDonnell & Miller	PS-801/851 (New Models w/Red & Green LEDs)	H	N	C	B	W
McDonnell & Miller	PS-802/852 (Older Models w/Red & Amber LEDs)	H	N	C	B	W
McDonnell & Miller	PS-802/852 (New Models w/Red & Green LEDs)	H	N	C	B	W
McDonnell & Miller	Series 750	1	2	3	4	5
McDonnell & Miller	RB - 122	H (Black Wire)	N (White Wire)	C (Yellow Wire)	B (Yellow Wire)	-
McDonnell & Miller	RB - 120	1	2	3	4	5
McDonnell & Miller	RB - 24	Red Wire	White Wire	Yellow Wire	Yellow Wire	-
Hydrolevel	24	Black Wire	White Wire	-	Orange Wire	Brown Wire
Hydrolevel	170	H	GN	P1	P2	A
Hydrolevel	400, 500, 600, 700, 450, 550, 650, 750	1	2	P1	P2	A
Honeywell	RW700 Series (Except RW700A1098)	L1	L2	-	B	A
Honeywell	RW700A1098	T1	T2	-	B	A



Do it Once. Do it Right.

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