



**McDonnell & Miller**  
Installation & Maintenance  
Instructions  
MM-238(H)

**Model RB-122-E**



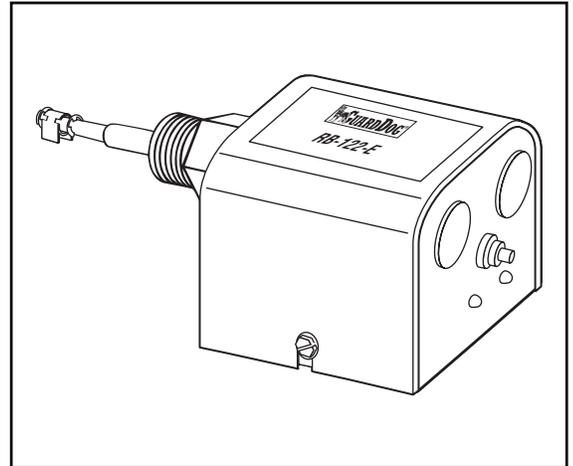
**Conductance Type  
Low Water Cut-Offs**

**For Residential Hot Water Boilers**

Requires 120 VAC power supply and can switch 120 VAC  
or 24 VAC burner control circuits

## OPERATION

The Model RB-122-E Low Water Cut-Off is specifically designed to provide burner cut-off if there is an unsafe water loss, which can result from a broken or leaking radiator or pipe, or a cracked section in the boiler.



## WARNING



- Before using product, read and understand instructions.

- Save these instructions for future reference.

- All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of HVAC systems in accordance with all applicable codes and ordinances.

- Boiler manufacturer schematics should always be followed. In the event that the boiler manufacturer's schematic does not exist, or is not available from the boiler manufacturer, refer to the schematics provided in this document.



- To prevent serious burns, the boiler must be cooled to 80°F (27°C) and the pressure must be 0 psi (0 bar) before servicing.

- To prevent dry fire, which could cause a fire, there must be a 2" (51mm) minimum width in the boiler section or 1¼" (32mm) pipe inner diameter for probe installation and operation.

- The probe control must be connected in series with all other boiler operating and safety controls.



- 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 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 cutoffs should be dismantled, inspected, cleaned, and checked for proper calibration and performance.

- To prevent an electrical fire or equipment damage, electrical wiring insulation must have a rating of 167°F (75°C) if the liquid's temperature exceeds 180°F (82°C).

Failure to follow this warning could cause property damage, personal injury or death.

# SPECIFICATIONS

## Temperature:

Storage: -40°F to 120°F (-40°C to 49°C)  
 Ambient: 32°F to 120°F (0°C to 49°C)

**Humidity:** 85% (non-condensing)

**Maximum Water Pressure:** 160 psi (11 kg/cm<sup>2</sup>)

**Maximum Water Temperature:** 250°F (121°C)

## Features:

- Automatic reset after power outage
- Test button to verify operation
- Short probe for installation in 1-1/4" or larger pipe
- Self-cleaning probe

## Electrical Contact Ratings

Voltage	Pump Circuit Rating (Amperes)		Pilot Duty
	Full Load	Locked Rotor	
120 VAC	5.8	34.8	125 VA at
240 VAC	2.9	17.4	120 or 240 VAC

**Control Voltage:** 120VAC

**HZ:** 50/60

**Power Consumption:** 3.1 VA

**Electrical Enclosure Rating:** NEMA 1 General Purpose

**Probe Sensitivity:** 20,000 ohms

Conductive liquid required  
 (water/glycol mixtures up to 50% concentration  
 may be used)

# INSTALLATION –

## STEP 1 - Where to Install the Probe Control

Determine where to install the probe control based on the following requirements:

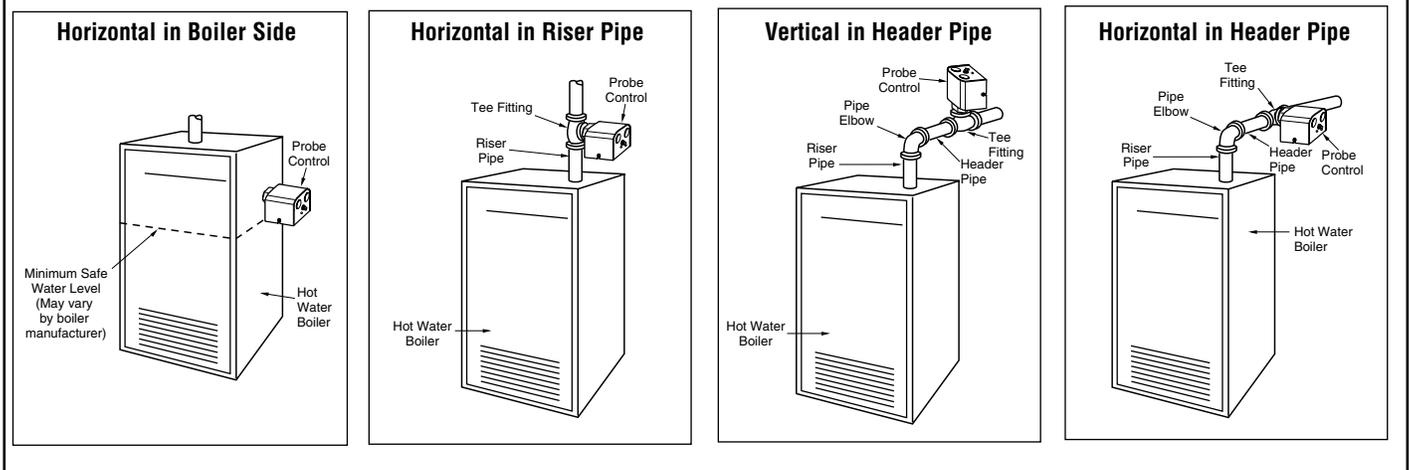
**a. If tapings are provided** on the boiler, install the probe control in one that is above the minimum safe water level, as specified by the boiler manufacturer. If no specified mini-

imum safe water level is designated, contact the boiler manufacturer.

**b. If no tapping is provided** on the boiler, install the probe control in a header or riser pipe above the boiler. Refer to the Typical Installation Diagrams below.

**IMPORTANT:** Avoid installing where water or air may be trapped.

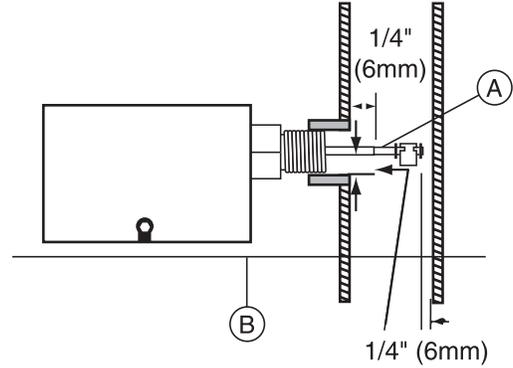
## TYPICAL INSTALLATION DIAGRAMS



## STEP 2 - Installation of the Low Water Cut-Off

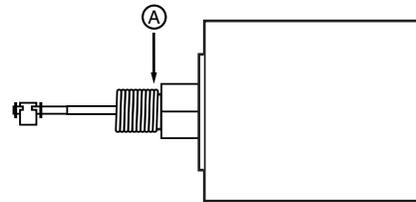
Based on the following criteria locate a suitable position for the probe (A):

1. Make sure that the end and sides of the probe are at least 1/4" (6.4 mm) from all internal metal surfaces to prevent shorting of the probe to ground.
2. Make sure that the probe extends into the boiler cavity in order to sense the water.
3. The probe (A) must be installed above the minimum safe water level (B) as determined by the boiler manufacturer.

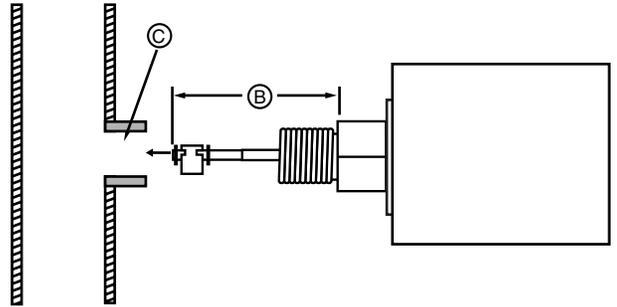


- a. Apply pipe sealing compound on the probe threads (A).

**IMPORTANT:** Do not use Teflon® tape. Only use pipe sealant.

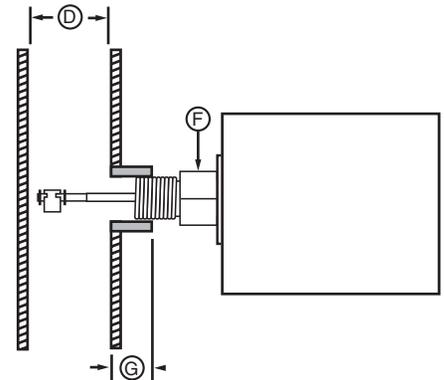
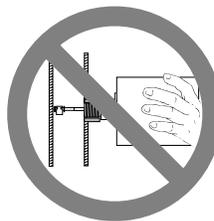


- b. Insert the probe portion (B) of the probe control into the 3/4" NPT boiler coupling (C), above the **minimum safe water level, as specified by the boiler manufacturer.**



- c. Using a 1-3/8" (35mm) open end wrench tighten the brass hex adapter (F) to 47 ft•lb (64 N•m).

**IMPORTANT:** Do not turn the housing cover to tighten the probe control or damage will result.



### **WARNING**



To prevent dry fire, which could cause a fire there must be a 2" (51mm) minimum width in the boiler section (D) and the 3/4" (20mm) NPT coupling must be 1/2" (12.7mm) in length (G) for probe installation and operation.

Failure to follow this warning could cause property damage, personal injury, or death.

## STEP 3 - Electrical Installation

### WARNING



- To prevent electrical shock, turn off the electrical power before making electrical connections.
- This low water cut-off must be installed in series with all other limit and operating controls installed on the boiler. After installation, check for proper operation of all of the limit and operating controls, before leaving the site.
- All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of plumbing, steam, and electrical equipment and/or systems in accordance with all applicable codes and ordinances.



Failure to follow this warning could cause electrical shock, an explosion and/or fire, which could result in property damage, personal injury or death.

### IMPORTANT

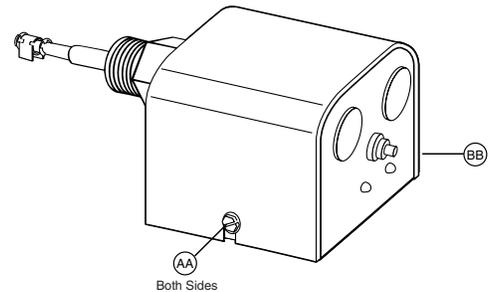
Boiler manufacturer schematics should always be followed. In the event that the boiler manufacturer's schematic does not exist, or is not available from the boiler manufacturer, refer to the schematics provided in this document.

### WARNING

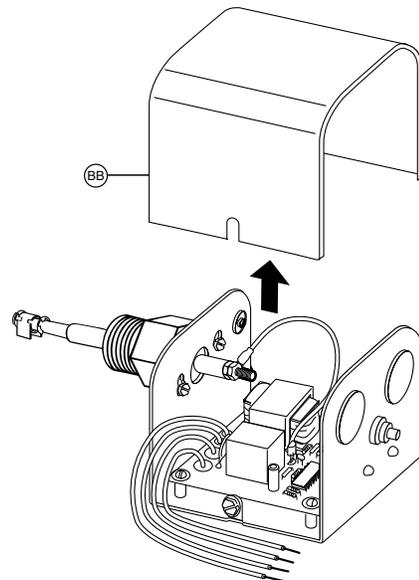


To prevent an electrical fire or equipment damage, electrical wiring must have a rating of 167°F (75°C) if the liquid's temperature exceeds 180°F (82°C). Failure to follow this warning could cause property damage, personal injury or death.

- a. Loosen, but do not remove the (2) two screws (AA) from the housing cover (BB).



- b. Remove the housing cover (BB).



(Follow the procedure below or on page 6, as appropriate for your application)

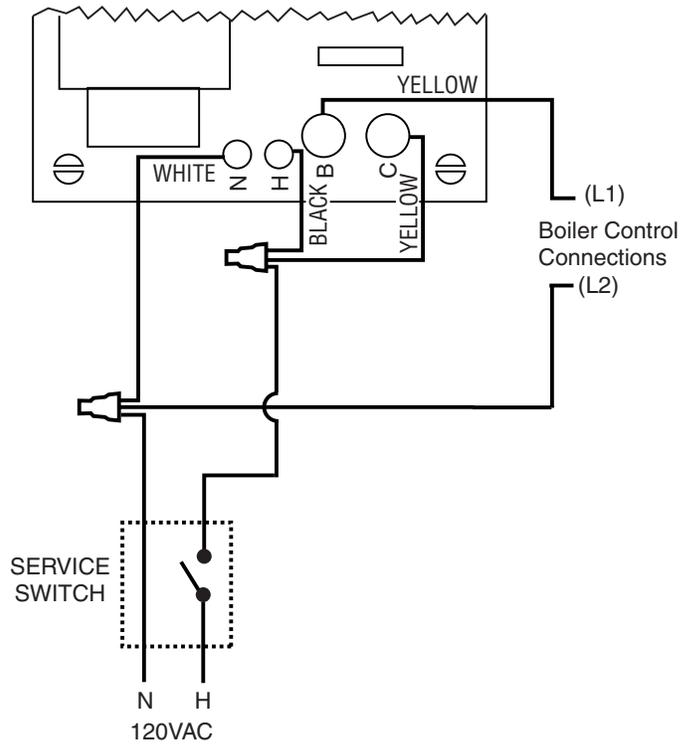
### Option 1:

This diagram can be used if you are wiring the RB-122-E to interrupt ALL power to the boiler when a low water condition occurs.

The control can be wired this way if the total amp load of the boiler does not exceed 5.8 amps @ 120 VAC when the boiler is running. If the total amp load exceeds 5.8 amps @ 120 VAC when the boiler is running, the control should be wired as shown in Option 2.

Using the boiler Service Switch as a reference, connect wires as shown. Use wire nuts (not furnished) to complete connections.

- Connect **White (N)** wire as shown to 120VAC circuit neutral wire.
- Connect **Black (H)** wire and **Yellow (C)** wire as shown to 120VAC circuit hot wire from Service Switch.
- Connect **Yellow (B)** wire as shown to L1 connection on boiler control panel.



Proceed to page 7, Step C.

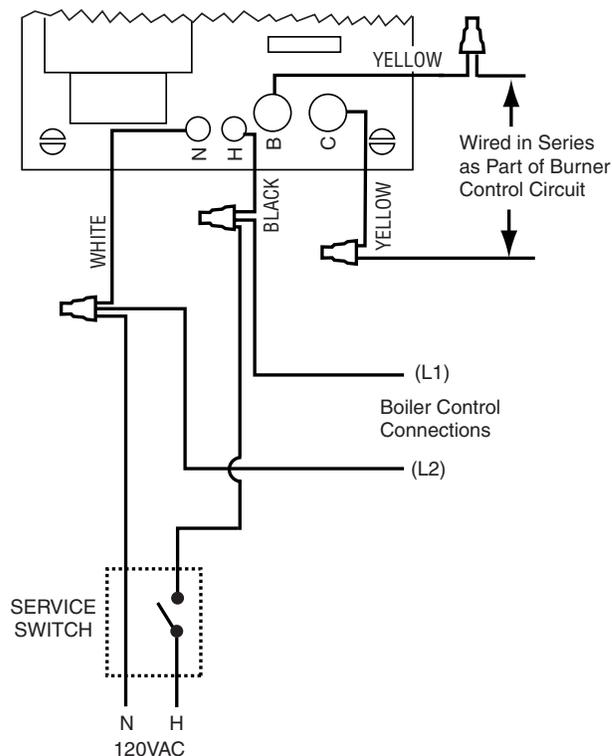
## Option 2:

This diagram can be used if you are wiring the RB-122-E to interrupt power to the boiler burner or safety circuit only.

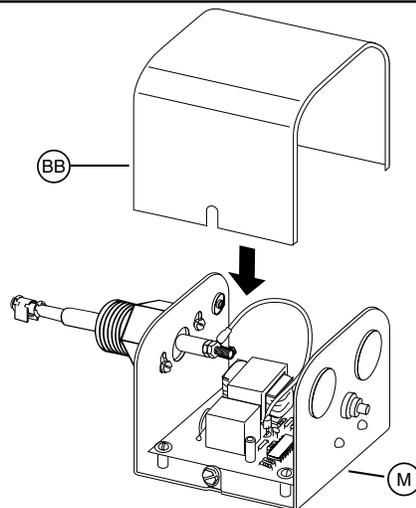
The control can be wired this way to interrupt either a 24 VAC or 120 VAC burner control safety circuit. Consult boiler manufacturers wiring diagrams to identify the safety circuit and recommended location to connect the **Yellow** wires.

Using the boiler Service Switch as a reference, connect wires as shown. Use wire nuts (not furnished) to complete connections.

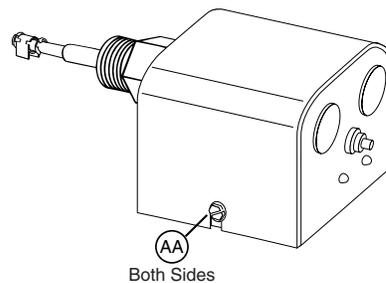
- Connect **White (N)** wire as shown to 120VAC circuit neutral wire.
- Connect **Black (H)** wire as shown to 120VAC circuit hot wire.
- Locate Boiler Burner Safety Circuit and connect **Yellow (B)** and **Yellow (C)** wires as shown to interrupt circuit.



- c. Place the probe control's housing cover (BB) over the housing (M).



- d. Tighten the (2) screws (AA).



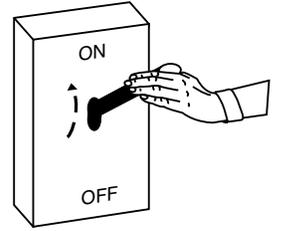
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## STEP 4 - Testing

### Start-Up

- a. **Before filling the system,** turn on the electric power to the boiler. The low water cut-off's green "Power On" LED should be illuminated. With the room thermostat set on "heat," confirm that the burner **will not** operate without water in the system. The low water cut-off's red LED should be illuminated.

NOTE: The burner will come on briefly (1 second or less) and then shut off to verify proper operation.



- b. Fill the system with water. The low water cut-off's red LED should shut off. Confirm that the burner and room thermostat are operating properly.
- c. Check for proper operation of all of the limit and operating controls, before leaving the site.
- d. Check the threaded connection of the low water cut-off for leakage. Tighten, if necessary.

### Testing Control Using "Test Button"

**Pressing the "Test Button" interrupts the probe circuit which simulates water off the probe.**

- a. Press and hold "test button" while burner is running.
- b. The burner should turn OFF and red light turn ON if burner circuit is wired correctly.
- c. Release the test button and the red light should turn off and the burner should turn on provided that the boiler water is in contact with the probe.



## MAINTENANCE

### SCHEDULE:

- **Test the low water cut-off annually or more frequently.**
- **Remove and inspect the self-cleaning probe every 5 years.**
- **Replace probe every 10 years.**
- **Replace the low water cut-off every 15 years.**

## TROUBLESHOOTING

Problem:

Refer to Step 2 on page 3.

### 1. Failure to Operate

- a. **Cause:** No voltage is being supplied to the probe control.

**Test:** Using a voltage meter, verify that voltage is being sent to wire (H) and (N) of the probe control.

**Solution:** If no voltage is being supplied, make necessary electrical modifications.

If voltage is supplied to the probe control but not the probe, verify that the electrical wiring connections are correct according to the instructions, pages 4–8.

If these solutions do not resolve the problem, replace the probe control.

- b. **Cause:** The probe end is making contact with the boiler or pipe wall.

**Test:** Remove the probe control. Using a ruler, verify that a 2" (51mm) minimum width in the boiler section or 1¼" (32mm) pipe inner diameter is provided for probe installation and operation.

**Solution:** Install the probe control where a 2" (51mm) width in the boiler section or 1¼" (32mm) pipe inner diameter exists.

- c. **Cause:** Teflon® tape was used on the probe.

**Test:** Remove the probe control and inspect probe threads.

**Solution:** Remove Teflon® tape. Apply pipe sealing compound on the probe threads.

- d. **Cause:** Air Pocket Surrounding Probe.

**Solution:** Remove the probe control, purge air from the system by opening the water feed valve until water flows from the tapping. Reinstall the probe control and shut off the water feed valve.

- e. **Cause:** Other system electrical wiring and/or operating control problems.

**Solution:** Determine cause and resolve problems.