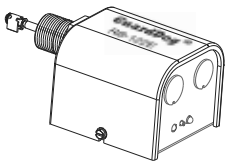


Model RB-122E

Conductance Type Low Water Cut-Off For Residential and Commercial Hot Water Boilers

1 General information

1.1 General Safety

WARNING:

Before using this product read and understand instructions.

Save these instructions for future reference.

WARNING:

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.

WARNING:

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

WARNING:

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

WARNING:

California Proposition 65 warning! This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

WARNING:

Previous controls should never be installed on a new system. Always install new controls on a new boiler or system. Failure to follow this warning could cause property damage, personal injury or death.

NOTICE:

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

CAUTION:

A more frequent replacement interval may be necessary based on the condition of the unit at time of inspection. McDonnell & Miller's warranty is one (1) year from date of installation or two (2) years from the date of manufacture, whichever shall occur first, unless a longer period is specified in the product documentation (the “Warranty”). See Commercial warranty.

2 Operation

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

The Model RB-122E 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.

2.1 Specification

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 (11.2 kg/cm^2)

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

Table 1: Electrical Contact Ratings

Voltage	Pump Circuit Rating (Amperes)		Pilot duty
	Full load	Locked rotor	
120 VAC	5.8	34.8	125 VA at 120 VAC

DOB: Up to 5 seconds

Enclosure Rating: NEMA 1 General Purpose

Probe Sensitivity: 20 000 ohms

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

Features:

- Automatic reset after power outage
- Test button to verify operation
- Short probe for installation in 1-1/4” (32 mm) or larger pipe
- Self-cleaning probe

Control Voltage: 120 VAC

HZ: 50/60

Power Consumption: 3.1 VA

3 Installation

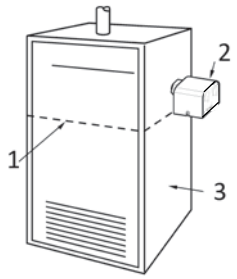
3.1 STEP 1 – Where to install the probe control

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

1. **If tappings 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 by the boiler manufacturer. If no specified minimum safe water level is designated, contact the boiler manufacturer.
2. **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.

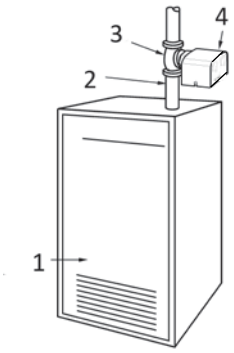
IMPORTANT: Avoid installing where water or air may be trapped.

TYPICAL INSTALLATIONS



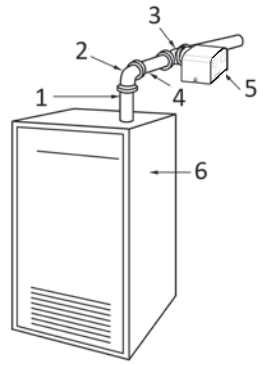
1. Minimum Safe Water Level (May vary by boiler manufacturer)
2. Probe Control
3. Hot Water Boiler

Figure 1: Horizontal boiler Side



1. Hot Water Boiler
2. Riser Pipe
3. Tee Fitting
4. Probe Control

Figure 2: Vertical in Riser Pipe



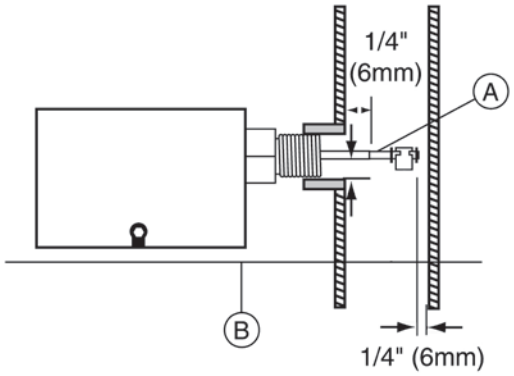
1. Riser Pipe
2. Pipe Elbow
3. Tee Fitting
4. Header Pipe
5. Probe Control
6. Hot Water Boiler

Figure 3: Horizontal in Header Pipe

3.2 STEP 2 – Installation of the Low Water Cut-Off

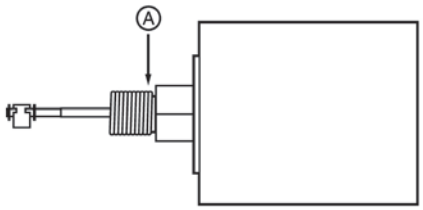
Based on the following criteria locate a suitable position for the probe (A):

1. Make sure that the end and sides of the probe are at least ¼" (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 to sense the water.
3. The probe (A) must be installed above the minimum safe water level (B) as determined by the boiler manufacturer.

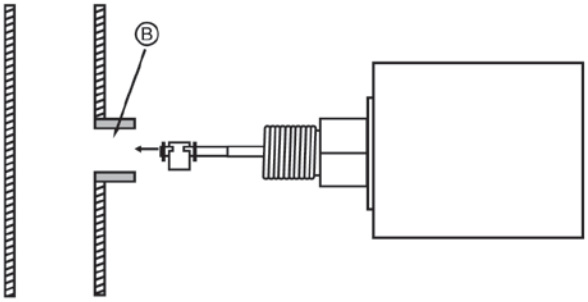


a. Apply pipe sealing compound on the probe threads (A).

WARNING:
Do not use PTFE tape. Only use pipe sealant. Failure to follow these instructions will cause the probe not to function as intended and could cause property damage, personal injury or death.



b. Insert the probe into the ¾" (19 mm) NPT boiler coupling (B).

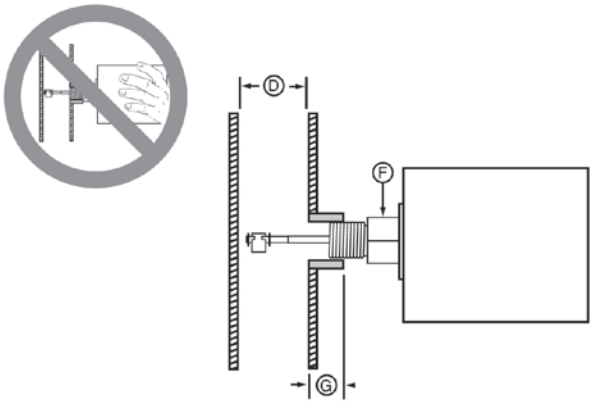


c. With a 1-3/8" (35 mm) open end wrench tighten the brass hex adapter (F).

NOTICE:
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" (51 mm) minimum width in the boiler section (D) and the 3/4" (20 mm) NPT coupling must be 1/2" (12.7 mm) in length (G) for probe installation and operation.

NOTICE:
Failure to follow warning could cause property damage, personal injury or death



3.3 STEP 3 - Electrical Wiring

WARNING:

To prevent electrical shock, turn off the electrical power before making electrical connections.

WARNING:

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.

WARNING:

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.

NOTICE:

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

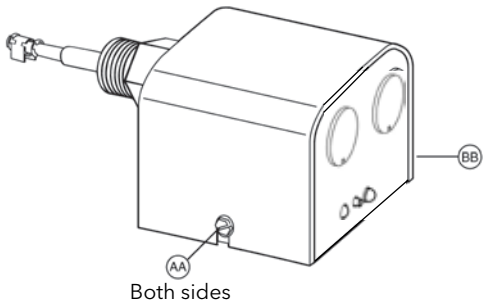
WARNING:

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:

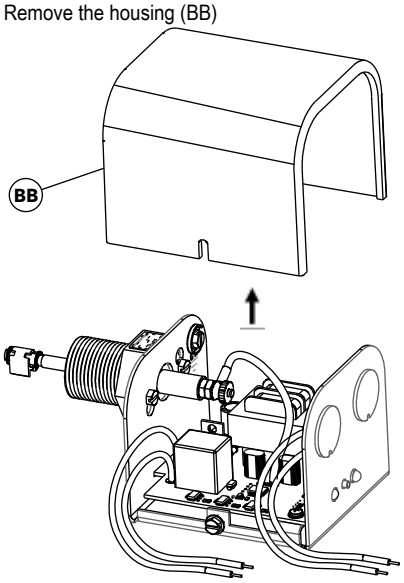
To prevent an electrical fire or equipment damage, electrical wiring insulation must have a rating of 167 °F (75 °C) if the liquid's temperature exceeds 180 °F (82 °C).

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



Both sides

2. Remove the housing (BB)



Follow the procedure in "Option 1" or in "Option 2", as appropriate for your application.

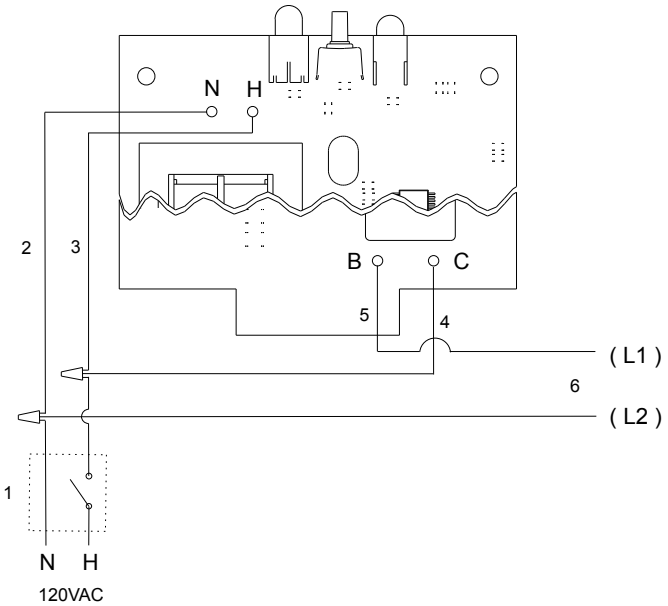
3.3.1 Option 1

This diagram can be used if you are wiring the RB-122E 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 A at 120 VAC when the boiler is running. If the total amp load exceeds 5.8 A at 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 120 VAC circuit-neutral wire.
- Connect **Black (H)** wire and **Yellow (C)** wire as shown to 120 VAC circuit-hot wire from Service Switch.
- Connect **Yellow (B)** wire as shown to L1 connection on boiler control panel.



1. Service Switch
2. White
3. Black
4. Yellow
5. Yellow
6. Boiler Control Connections

Proceed to Step 4- Testing.

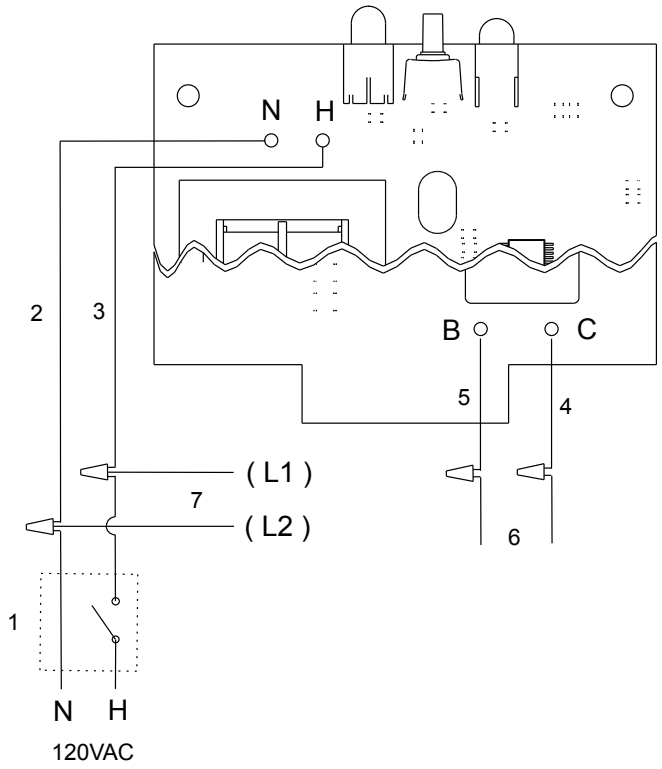
3.3.2 Option 2

This diagram can be used if you are wiring the RB-122E 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.

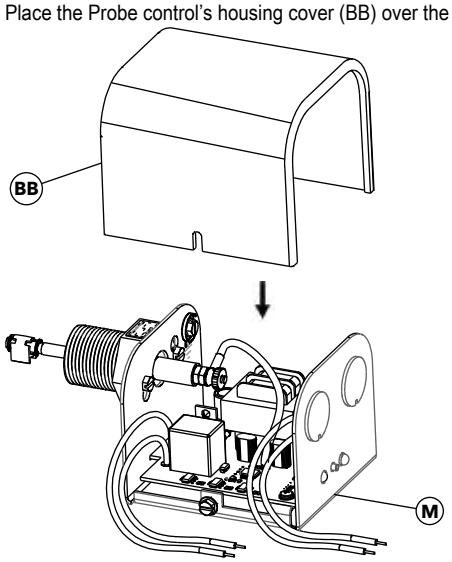
Using the boiler Service Switch as a reference, connect wires as shown. Use wire nuts (not furnished) to complete connections

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

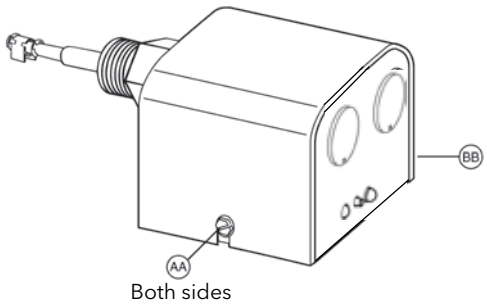


1. Service Switch
2. White
3. Black
4. Yellow
5. Yellow
6. Wired in Series as Part of Burner Control Circuit
7. Boiler Control Connections

1. Place the Probe control's housing cover (BB) over the housing (M).



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

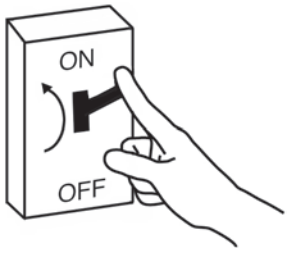


Both sides

4 Testing

Startup

1. **Before filling the systems**, 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.
2. 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 correctly.
3. Check for proper operation of all of the limit and operating controls, before leaving the site.
4. Check the threaded connection of the low water cut-off for leakage. Tighten, if necessary.
5. Turn on.



Testing Control Using "The Button"

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

1. Press and hold "test button" while burner is running.
2. The burning should turn OFF and red light turn ON if burner is wired correctly.
3. Release the test button and the red light should turn off and the boiler should turn on if the boiler water in contact with the probe.

5 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.**

6 Troubleshooting

6.1 Troubleshooting

Problem	Cause	Test	Solution
Failure to operate	No voltage is being supplied to the probe control.	With a voltage meter, verify that voltage is being sent to wire (H) and (N) of the probe control.	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. STEP 3 and STEP 4. If these solutions do not resolve the problem, replace the probe control.
	The probe end is making contact with the boiler or pipe wall.	Remove the probe control. With a ruler, verify that a 2" (51 mm) minimum width in the boiler section or 1 ¼" (32 mm) pipe inner diameter is provided for probe installation and operation.	Install the probe control where a 2" (51 mm) width in the boiler section or 1 ¼" (32 mm) pipe inner diameter exists. (Refer to the section 3.2 STEP 2 – Installation of the Low Water Cut-Off.)
	PTFE tape was used on the probe.	Remove the probe control and examine probe threads.	Remove PTFE tape. Apply pipe sealing compound on the probe threads.
	Air Pocket Surrounding Probe.		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.
	Other system electrical wiring and/or operating control problems.		Determinate cause and resolve problems.
Boiler does not turn ON and RB-122E green LED continues blinking 13 times	The probe is shorting at power on.		• Turn off boiler and check probe wiring connection. • Turn off boiler, drain boiler and remove control to check if the tip of the probe is touching a metal surface.
Boiler does not turn ON and RB-122E green LED continues blinking from 1 to 10 times	Internal faults	Press the test button for more than 1 second until the Red LED turns off or perform a power cycle to reset the device.	If the problem continues, replace the control with a new unit.