



Series RS – Remote Sensors Series PA – Probe Assemblies & Probes for Liquid Level Controls

For use with all Electronic Level Controls
Series 750, PCH/PCL, PS-800/850; LPC-2000,
RB-120, RB-122

Models RS-1-BR-1 & RS-1-HP

For High Pressure Steam & Conductive Liquid Systems

Models RS-1-LP & RS-1-LPS

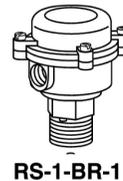
For Hydronic, Low Pressure Steam &
Conductive Liquid Systems

Series PA

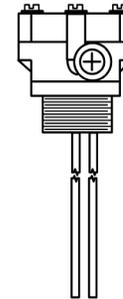
For Hydronic, Low Pressure Steam &
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Applications:

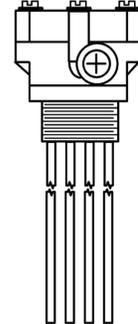
- Primary conductance type control for commercial or industrial hot water boilers with remote or integral sensing provisions.
- Secondary control for commercial or industrial steam boilers.
- For tank, hydronic and general level sensing.



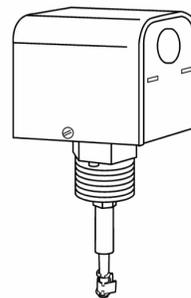
RS-1-BR-1



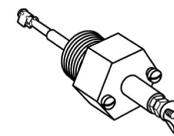
RS-2-BR-1



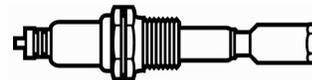
RS-4-BR-1



RS-1-LP



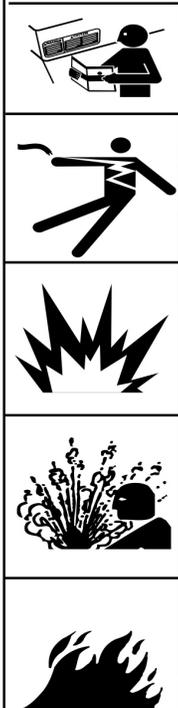
PA-800 &
PA-RB-120



PA-750-HP



WARNING



- Before using this 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 plumbing, steam, and electrical equipment and/or systems in accordance with all applicable codes and ordinances.
 - 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 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.
 - To prevent serious personal injury from steam blow down, connect a drain pipe to the control opening to avoid exposure to steam discharge.
 - To prevent a fire, do not exceed the switch contact rating.
 - California Proposition 65 warning! This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.
 - 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.

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.

Sensor Model #	Connection / Material	Enclosure Type	Probe Rods Required	Spacer & Collar Required	Maximum Pressure	Maximum Temperature
All PA Series (ex. PA-750-HP)	3/4" NPT Brass Barstock (1/2" PA-800-RX2)	None	None	None	Steam: 15 PSIG (1kg/cm ²) Water 160 PSIG (11.2 kg/cm ²)	250°F(121°C)
RS-1-LP RS-1-LPS	3/4" NPT Brass Barstock	NEMA 1				
PA-750-HP	3/8" NPTF Stainless Steel	None	1	None	Steam: 250 PSIG (17.6 kg/cm ²) or Water: 250 PSIG (17.6 kg/cm ²)	406°F (208°C)
RS-1-HP	3/4" NPT Brass Barstock	NEMA 1	1	None		
RS-1-BR-1	1" NPT Brass Casting	NEMA 4X	1	None		
RS-2-BR-1 RS-3-BR-1	2" NPT Brass Casting	NEMA 4X	2 3	Yes if probes longer than 36" (909mm)		
RS-4-BR-1 RS-5-BR-1	2-1/2" NPT Brass Casting	NEMA 4X	4 5			

SENSOR & PROBE ROD ASSEMBLY FOR RS-1-BR-1, RS-1-HP & PA-750-HP ONLY. FOR RS-1-LP AND SERIES PA ASSEMBLIES, PROCEED TO STEP 2 INSTALLATION

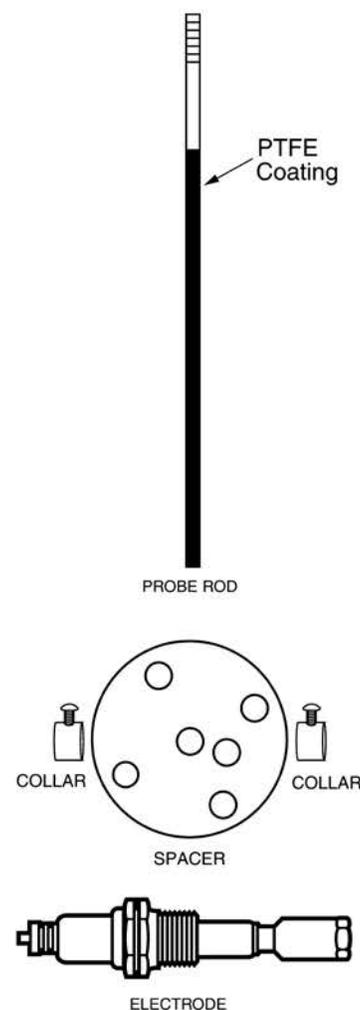
Cut probes to desired length before assembly to the electrode. When trimming probe to desired length, place end to be cut off in a vise. If the cut is made in the black PTFE coated region of a 2 to 6 foot electrode, remove about 1/8 inch of black PTFE coating from the bottom of the electrode by scraping with a knife or file. Be careful not to damage the remaining black PTFE coating which serves as an insulation to prevent shorting between the probes.

If two or more probes are greater than 3 feet, a spacer must be used to keep adjacent probes separated. Slide a collar over the longest probe and position the set-screw so that it is inside the outside diameter of the spacer and securely tighten set-screw to lock collar in position about 3-1/2 feet from the remote sensor body. Then, slide the spacer over the probes separating the longer probes. Finally, on the same longest probe, slide another collar so that the set-screw is in the same direction as the first

collar to firmly position the spacer against the first collar so both collars and spacer are in a tight arrangement. Securely tighten set-screw of second collar.

After the above assemblies have been completed, mark the wire connectors on electrodes inside electrical enclosure appropriately so the correct length probe can be wired to the correct terminal in the control.

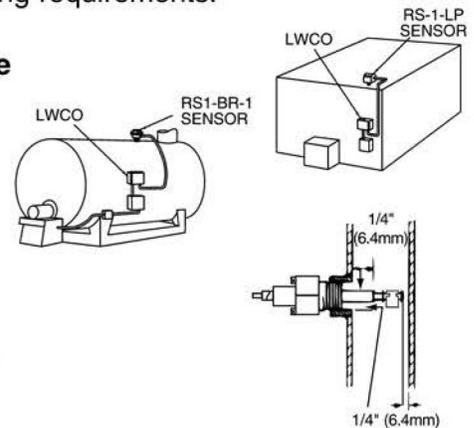
The material of the tank or vessel determines if an additional probe is required for grounding. Metal tanks do not require an additional probe because the tank can be used as the ground path needed to complete the current path. Plastic, concrete and lined metal tanks will require a ground probe for use to complete the current path. **It is highly recommended that a ground probe be added on all installations.** The less distance the current has to travel to complete the path the better the control operates, especially in liquids with high resistance.



STEP 1 - Where to Install the Remote Sensors

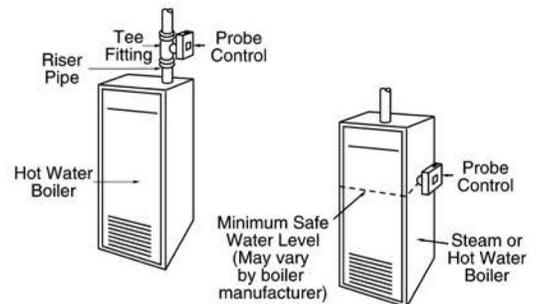
Determine where to install the remote sensor based on the following requirements:

- The tip of the probe or extension **must be installed above the minimum safe water level**, as determined by the boiler manufacturer.
- Probes must be installed vertically if they are more than 5" (127mm) long.
- Make sure that the ends and sides of the probe are at least 1/4" (6.4mm) from all internal metal surfaces. Make sure the probe is positioned to shut off the boiler before the water level falls below the lowest visible part of the gauge glass.



For Hot Water Boilers

- Refer to the boiler manufacturer's instructions to determine suitable tapping for the probe.
- Locate probe in supply piping using tee fitting.



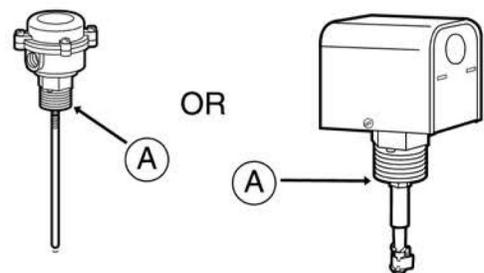
STEP 2 - Installing the Remote Sensor

For All Remote Sensors

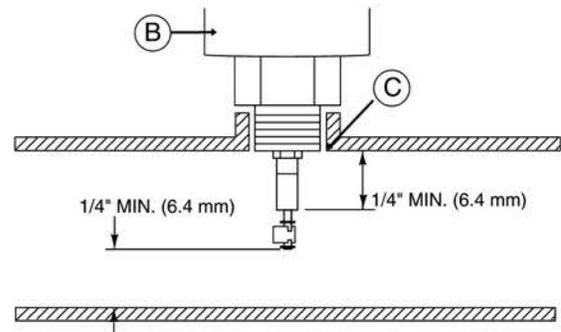
- Apply a small amount of pipe dope to the first threads (A) of the remote sensor.

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.

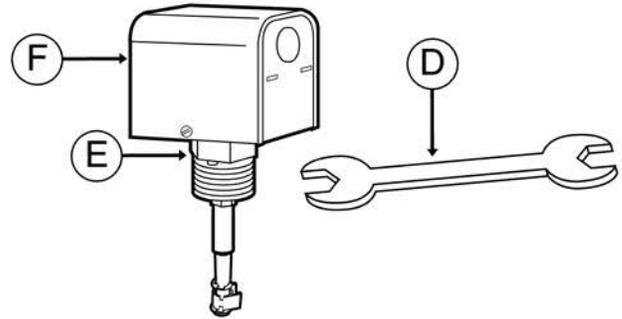


- Insert the sensor (B) into the boiler tapping (C) as determined in step 1.



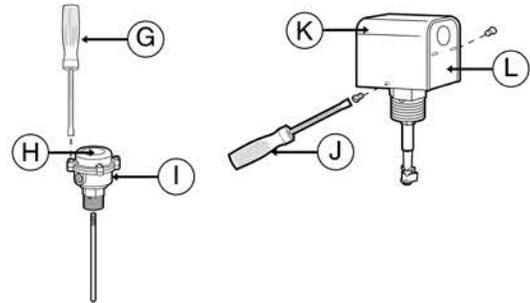
STEP 2 - Installing the Remote Sensor (cont'd)

- c. Using a wrench (D), tighten the brass hex adapter (E) on the remote sensor (F) to approximately 63 ft•lb (85 N•m). **DO NOT TIGHTEN BY TURNING THE SENSOR HOUSING.**



- d. Remove the sensor housing cover (K).

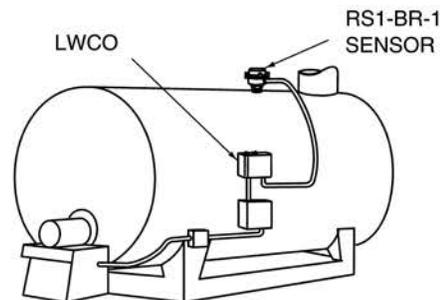
1. **For model RS-1-BR-1**, using a flatblade screwdriver (G), remove the four (4) screws and separate the housing cover (H) from the sensor (I).
2. **For model RS-1-LP**, using a flathead screwdriver or nut driver (J), loosen the two (2) screws and separate the housing cover (K) from the sensor (L).



Model RS-1-BR-1

Model RS-1-LP

- Install electrical conduit between **Probe Housing** and **Control Box**.



NOTE

Refer to and follow local codes and standards when selecting conduit and electrical fittings. Wires from Probe Housing and Control Box must be in their own conduit. If they are run in conduit with other wires, there may be interference that can affect the performance of the control.

STEP 3 - Electrical Wiring

WARNING

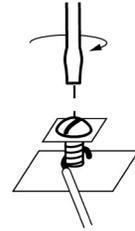
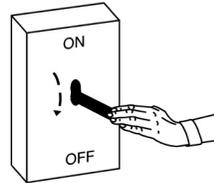


USE COPPER WIRE ONLY

- To prevent electrical fire or equipment damage, electrical wiring must have a minimum rating of 167°F (75°C) if the fluid's temperature exceeds 180°F (82°C). When sensors are used in fluids above 250°F (121°C), wire must be 18 AWG stranded with glass braided silicone jacket (UL 3071) suitable for high temperature (200°C) service.

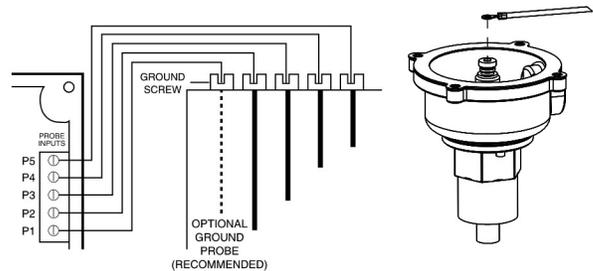
Failure to follow this warning could cause property damage, personal injury or death.

- Turn off all electrical power before making or breaking any electrical connections.
- For all wire connections to the terminal block.
 - Strip about 1/3" (8.5 mm) of insulation from the wire.
 - Loosen the terminal screw, **DO NOT REMOVE**.
 - Insert the stripped end of the wire under the terminal screw head, plate or clamp and securely tighten the terminal screw.



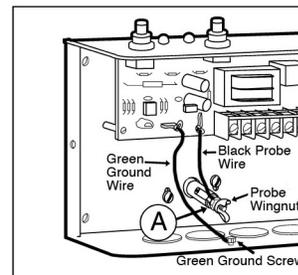
Remote Sensor Wiring:

- Connect each wire from probe end to its appropriate terminal in the control.
- Connect wire from remote sensor ground screw to low water cut-off controller chassis ground screw or ground terminal for non-metal connection.

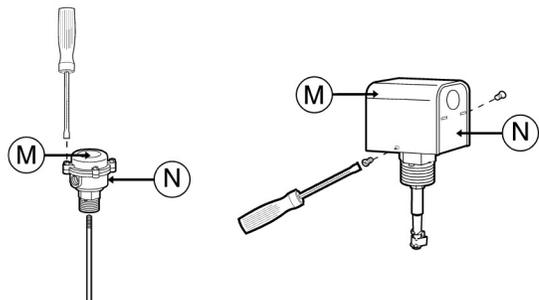


Unimount Sensor Wiring:

- Connect ring terminal of wire to probe end under wingnut (A). Do not attempt to loosen or tighten the factory installed hexnuts on the probe assembly. Place ring terminal on top of hexnuts and under the lockwasher and wingnut.
- Connect black wire from probe end to Terminal connection "PROBE" on PCB. Connect green wire from ground screw on the controller's metal chassis to Terminal connection "GND" on PCB.



Replace cover (M) and secure screws on assembly to 1-3 ft•lb (1.3-4.0 N•m) to complete installation of the sensor (N). Refer to the corresponding control Installation & maintenance instructions for proper testing of the system.



Troubleshooting

If control fails to operate as required, perform the following diagnostic checks:

1. Check to be sure that the water level in the boiler is at or above the level of the probe.
2. Re-check all wiring to ensure proper connections as specified in boiler manufacturer's wiring diagrams or these instructions.
3. Check to ensure that PTFE tape has not been used on the threaded connection of the electrode to the boiler.
4. Re-check the electrical ground connection for the remote sensor and control unit.
5. Check the quality of the boiler water to ensure adequate conductance.

MAINTENANCE

SCHEDULE:

- **Inspect probe annually or more frequently for scale build-up and clean or replace if necessary.** Make certain there is no scale or build-up on the probe or its white PFA insulator. Be careful not to damage the PFA 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, or in applications with high make-up water requirements.

NOTE

Clean probe by wiping with non-abrasive cloth and rinsing with clean water. DO NOT use sharp instruments to remove any accumulations of rust or scale.



CAUTION

Replace Probe if:

- PFA insulator is cracked or worn.
- Probe is loose. Failure to follow this caution could cause property damage, personal injury or death.

- **Replace the low water cut-off every 15 years.**

COMMERCIAL WARRANTY

Warranty. For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of one (1) year from the 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”).

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer’s failure to comply with Seller’s repair or replacement directions shall terminate Seller’s obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller’s written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller’s instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller’s supplier of such products.

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LIMITED CONSUMER WARRANTY

Warranty. For goods sold for personal, family or household purposes, Seller warrants the goods purchased hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be free from defects in material and workmanship for a period of one (1) year from the date of installation or two (2) years from the product date code, whichever shall occur first, unless a longer period is provided by law or is specified in the product documentation (the “Warranty”).

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To make a warranty claim, check first with the dealer from whom you purchased the product or call +1-847-966-3700 for the name and location of the nearest dealer providing warranty service.



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