

## Series RS – High Pressure Sensors & Probes For Conductance Actuated Controls

### Series RS Sensors

#### Series-RS-X-BR-1:

- NEMA 4X Enclosure
- For sophisticated multi-level control in tanks, boilers and hydronic systems
- Remote sensors, which thread into the top of the boiler or tank, are available with 1, 2, 3, 4 or 5 probes of varying lengths that can easily be cut to desired set points
- Probe lengths 12 - 72" (2.5 - 183cm) in 12" (2.5cm) increments (purchased separately)
- Control, remote sensor and probe(s) must be ordered separately. Order Spacer S-4 when 2 or more probes greater than 36" (914mm) will be used
- No blow down required
- Maximum Temperature 406°F (208°C)
- Maximum Pressure 250 psig (17.6 kg/cm)

#### High Pressure Remote Sensors and Probes

Model Number	Part Number	Description	Weight lbs. (kg)
RS-1-BR-1	179524	Remote Sensor; 1 level	1.7 (.8)
RS-2-BR-1	179525	Remote Sensor; 2 levels	3.3 (1.5)
RS-3-BR-1	179526	Remote Sensor; 3 levels	3.3 (1.5)
RS-4-BR-1	179527	Remote Sensor; 4 levels	4.0 (1.8)
RS-5-BR-1	179528	Remote Sensor; 4 levels for non-metallic tanks	4.3 (1.95)

See page 71 for probe rods.

#### Dimensions, in. (mm)

Remote Sensor	A	B	C
1 Probe	1 NPT	1 <sup>11</sup> / <sub>16</sub> (43)	½ NPT
2 or 3 Probes	2 NPT	2 <sup>1</sup> / <sub>32</sub> (59.5)	½ NPT
4 or 5 Probes	2½ NPT	2 <sup>15</sup> / <sub>32</sub> (63)	½ NPT

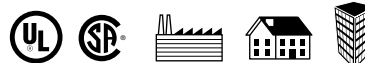
### RS-1-HP

#### Series-RS High Pressure Remote Sensor:

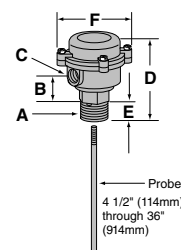
- NEMA 1 Enclosure
- Maximum Temperature 406°F (208°C)
- Maximum Pressure 250 psig (17.6 kg/cm)
- For single sensor applications with high-pressure environments. Requires additional probe rod. See page 71.

#### Ordering Information

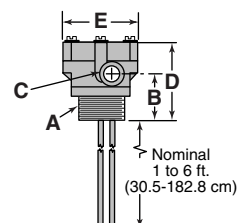
Model Number	Part Number	Description	Weight lbs. (kg)
RS-1-HP	176199	High pressure remote sensor	0.5 (.23)



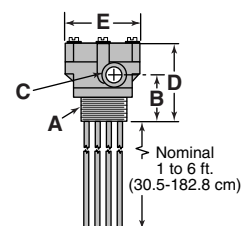
High Pressure Remote Sensor  
Model RS-1-BR-1



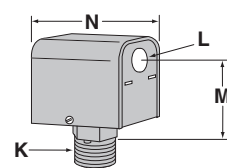
High Pressure Remote Sensor  
Model RS-2-BR-1  
Model RS-3-BR-1



High Pressure Remote Sensor  
Model RS-4-BR-1  
Model RS-5-BR-1



Remote Sensor  
Model RS-1-HP



Remote Sensor	D	E	F
1 Probe	4 9/16 (116)	1 ¼ (32)	3 ¼ (83)
2 or 3 Probes	3 7/8 (98)	4 (102)	–
4 or 5 Probes	4 (102)	4 (102)	–

#### Dimensions, in. (mm)



Model	K	L	M	N
RS-1-HP Remote Sensor	¾ NPT	7/8 (22)	3 (80)	3 3/8 (86)

## Sensors – High Pressure

### Series 750B-C3 Chamber with 3 Probes

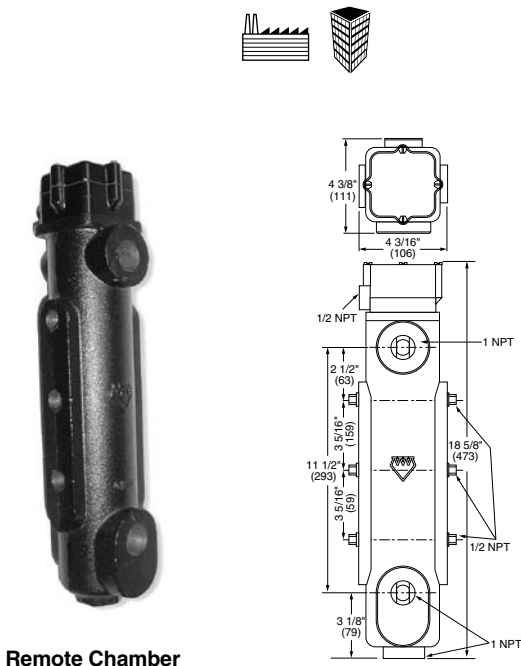
### Series 750B-C4 Chamber with 4 Probes

#### Specifications Chamber

- NEMA 4X chamber enclosure  and  APPROVED listed
- Maximum steam pressure 250 psig (17.6 kg/cm<sup>2</sup>)
- Designed for use with a remotely mounted controller to make a complete system for level control in a boiler or other vessel.

#### Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
750B-C3	176316	Cast iron chamber w/3 probes	26 (11.8)
750B-C4	176317	Cast iron chamber w/4 probes	26 (11.8)



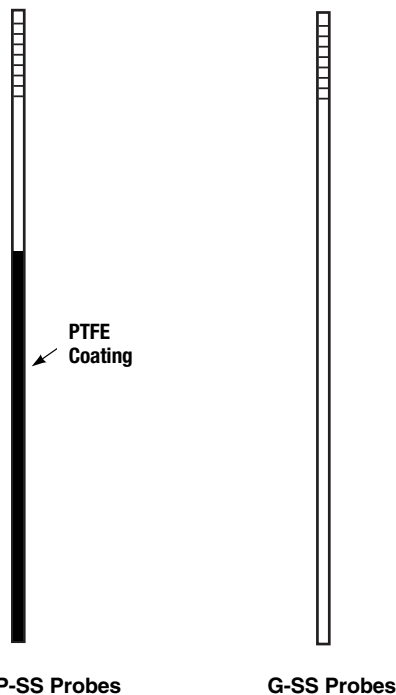
Remote Chamber

#### Probe Rods

- Stainless steel - Series 316 material
- PTFE coated probe ends provide protection from false signals [available on 24-72" (610 - 1829mm) probes]
- For use with RS sensors

#### Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
G-2-SS	179156	24" (610mm) Ground Probe	1.0 (.5)
G-3-SS	179157	36" (914mm) Ground Probe	1.5 (.7)
G-4-SS	179158	48" (1219mm) Ground Probe	2.0 (.9)
G-5-SS	179159	60" (1524mm) Ground Probe	2.5 (1.1)
G-6-SS	179160	72" (1829mm) Ground Probe	3.0 (1.4)
P-1/3 SS	176208	4 1/2" (114mm) Probe	0.5 (.23)
P-1-SS	179530	12" (305mm) Probe	0.5 (.23)
P-2-SS	179535	24" (610mm) Probe w/PTFE	1.0 (.5)
P-3-SS	179540	36" (914mm) Probe w/PTFE	1.5 (.7)
P-4-SS	179545	48" (1219mm) Probe w/PTFE	2.0 (.9)
P-5-SS	179550	60" (1524mm) Probe w/PTFE	2.5 (1.1)
P-6-SS	179555	72" (1829mm) Probe w/PTFE	3.0 (1.4)

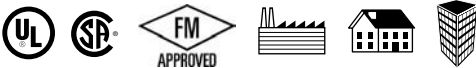


Selecting control according to anticipated use, the sensor should be selected according to the number of probes required. The probe rods are ordered separately according to length needed. The control, sensor and each probe rod must be specified separately, using the appropriate model and part numbers.

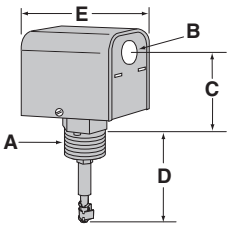
## Sensors – Low Pressure

### RS-1-LP

- Maximum Water Temperature:  
250°F (121°C) Model RS-1-LP
- Maximum Water Pressure:  
160 psi (11.2kg/cm²) Model RS-1-LP
- Maximum Steam Pressure:  
15 psig (1.0 kg/cm²)
- Can be installed in horizontal orientation



Remote Sensor  
Model RS-1-LP



### Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
RS-1-LP	176203	Remote Sensor	3.0 (1.4)
RS-1-LP-S	176218	Remote Sensor w/short probe	3.0 (1.4)

### Dimensions, in. (mm)

A	B	C	D	E
NPT				
¾	7/8 (22)	3 (80)	2¾ (70)	3⅝ (86)

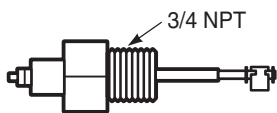
## Replacement Electrode Assemblies

### PA-800 Series Low Pressure

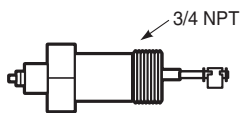
- Maximum Ambient Temperature: 120°F (49°C)
- Maximum Water Temperature: 250°F (121°C)
- Maximum Water Pressure: 160 psi (11.2 kg/cm²)

#### Ordering Information

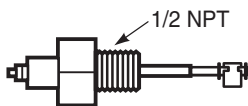
Model Number	Part Number	Control/Sensor Used On	Rod Req.	Weight lbs. (kg)
PA-800	354081	PS-800 Series & RS-1-LP		0.5 (.23)
PA-RB-122	354083	RB-122, RS-1-LP-S & RB-120		0.5 (.23)
PA-800-RX2	354140	PS-800-RX Series		0.5 (.23)
PA-800-U	354141	PS-800-U Series		0.5 (.23)



PA-800/SP/PA-RB Series



PA-800-U



PA-800-RX2

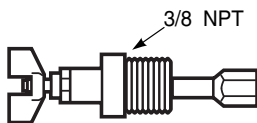
### PA-750 Series High Pressure

#### Operating Range:

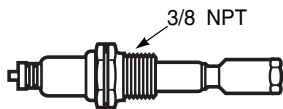
- Maximum System Pressure: 250 psi
- Maximum Temperature at Electrode: 406°F (121°C)

#### Ordering Information

Model Number	Part Number	Control/Sensor Used On	Rod Req.	Weight lbs. (kg)
PA-750-LP	176318	750P Series	X	0.5 (.23)
PA-750-HP	176319	750B-C & RS-BR Series	X	0.5 (.23)



PA-750-LP

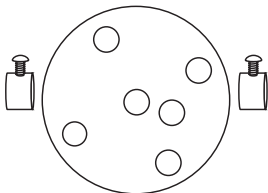


PA-750-HP

## Accessories

### Ordering Information

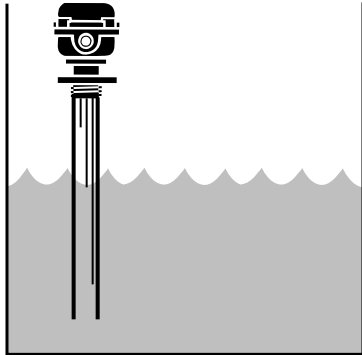
Model Number	Part Number	Description	Weight lbs. (kg)
S-4	179529	Spacer use with RS sensors and P&G probes	3.0 (1.4)



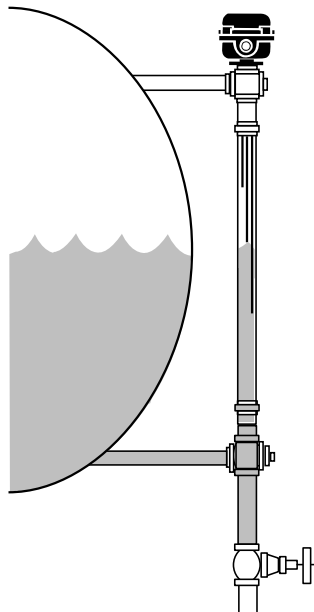
Spacer and Collar

## Remote Sensor Location

The location of the remote sensor is not limited to mounting on top of a tank. Depending on the application, it may be decided to mount the remote sensor in a stillwell or equalizing line. The following diagrams show typical locations for several applications.



Open tanks or vessels will probably require mounting the remote sensor on a stillwell to dampen the liquids' wave action. Use 3" or 4" perforated plastic drain pipe with a flange to thread connection at the top. The stillwell can rest on the bottom of the tank or be suspended and secured with brackets.



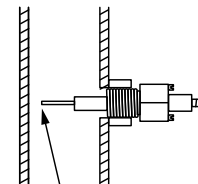
Mounting the remote sensor in an equalizing pipe is an alternative to top mounting. The equalizing pipe should be at least a 2" pipe and have a drain valve at the bottom for flushing.

## Probe Installation

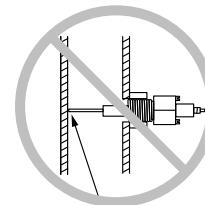
All boiler manufacturers designate the preferred (and sometimes secondary) location for installation of the probe on their boiler. They have determined that this location is above the minimum safe water level and provides the 1/4" clearance needed to ensure the probe is not grounded. Always install the probe in these locations, especially on a hot water boiler. If installed in other locations on a hot water boiler, this area could be prone to develop an air pocket.

Installation in piping external to the boiler on hot water systems has pitfalls. If the probe is too long and touches the wall of the pipe, the circuit is completed and the control "thinks" there is water in the system. If the water level drops below the level of the probe in this situation, the burner circuit will never be interrupted and a dry-fire could occur.

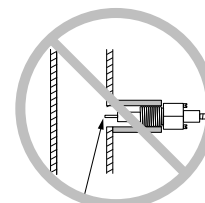
The most common problem with installation on hot water systems occurs when installing the probe in copper pipe. The sweat to thread adapters installed could result in the probe not being inserted in the pipe. An air pocket could develop or scale bridging could occur. While an air pocket causes nuisance shutdown of the boiler, scale bridging can result in a dry-fire if the water drops below the level of the probe. Always make sure at least 1/2 the length of the probe is in the run of the pipe to ensure proper operation.



Make sure tip of probe is in pipe with 1/4" clearance from wall of pipe.



If probe is installed too close to boiler wall, an electrical short could occur.



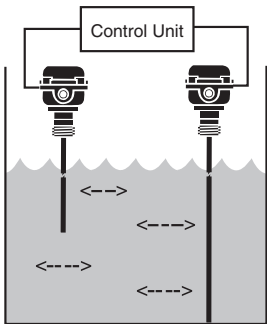
If probe is installed with extensions, an air pocket could develop shutting down the boiler. Debris could develop which can cause an electric short, rendering the low water cut-off ineffective.

# Liquid Level Controls

## OPERATION AND SELECTION

A conductance-type control will sense liquids up to 60,000 ohms resistivity. It can be used to activate a low level alarm, high level alarm, pumps to fill/drain a tank or any combination thereof. Typical applications include, but are not limited to, cooling towers, storage tanks, water fountains and condensate receivers.

The control utilizes the conductivity of a liquid to make or break circuits. Some liquids may be more resistive than the control can sense (above 60,000 ohms). The resistive and conductive properties of a liquid depend on several factors, including the amount of soluble material, temperature of the liquid, and placement of the probes. A TDS tester, which can be purchased from a supply house carrying boiler chemicals, is required to accurately measure a liquid's resistivity.



For many applications, water is the liquid being sensed. Raw or tap water usually has naturally occurring salts, chlorides and minerals that make it conductive enough to operate the control. Condensate receiver and cooling tower water are also very conductive due to evaporation. Ultrapure water (RO, deionized, demineralized, etc.) is highly resistive and is not able to conduct the current needed to operate the control.

Refer to the following charts to determine the resistivity of the liquid in an application. If it is above the 60,000 ohm rating, another type of control will be required.

### Conductivity Values of Water

Liquid	Resistivity (Ohms/cm)	Conductivity (Micromhos/cm)	Series 250B
Water - Deionized	2,000,000	0.5	
Water - Distilled	450,000	2	
Water - Condensate	18,000	50	X
Water - Chlorinated	5,000	200	X
Water - Hard/Natural	5,000	200	X
Water - Sewage	5,000	200	X
Water - Salt	2,200	450	X

### Converting Total Dissolved Solids to Resistivity and Conductivity

Total Dissolved Solids (ppm)	Resistivity (Ohms/cm)	Conductivity (Micromhos/cm)
0.0277	18,000,000	0.056
0.0417	12,000,000	0.084
0.0833	6,000,000	0.167
0.500	1,000,000	1.00
1.25	400,000	2.50
10.0	50,000	20.0
100	5,000	200
1,000	500	2,000
10,000	50	20,000

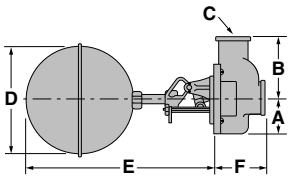
## Valve

### Series 27-W Liquid Level Controls

- For commercial and industrial liquid level open tank applications
- Materials of construction
  - Brass
  - Monel valve seat, EPDM disc
- Maximum pressure 35 psi (2.5 kg/cm<sup>2</sup>)
- Maximum supply pressure 100 psi (7 kg/cm<sup>2</sup>)
- Minimum liquid temperature 40°F (4.4°C)
- Maximum liquid temperature 212°F (100°C)



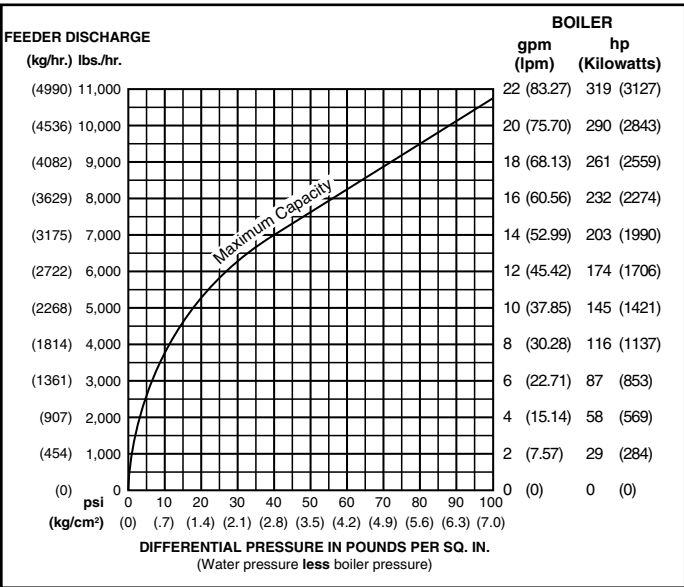
Series 27-W



### Dimensions, in. (mm)

A	B	C NPT	D	E	F
1 <sup>9</sup> / <sub>16</sub> (40)	2 <sup>7</sup> / <sub>8</sub> (73)	<sup>3</sup> / <sub>4</sub>	5 (127)	8 <sup>5</sup> / <sub>8</sub> (219)	2 <sup>7</sup> / <sub>16</sub> (62)

### Capacities



### Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
27-W	127200	Liquid level control	5 (2.3)

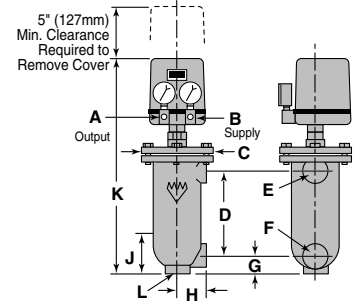
## Float Actuated Pneumatic

### Series PFC Liquid Level Controls

- For the actuation of pneumatic valves or relays in heating, air conditioning and process systems in hazardous or non-hazardous locations
- Provides an air pressure signal proportional to the liquid level
- Available as Direct Acting or Reverse Acting
- A float operated armature senses the liquid level
- Switch mechanism is completely sealed from the liquid
- Two gauges are provided to display the supply and output pressures
- Alternate air connection tappings are provided for greater flexibility in piping
- Operating range: 1 - 2" (25 - 51mm)
- Air pressure
  - Supply 20 psi (1.4 kg/cm<sup>2</sup>)
  - Output 3 - 15 psi (.2 - 1 kg/cm<sup>2</sup>)
- Maximum water temperature 406°F (208°C)
- Maximum pressure 250 psig (17.6 kg/cm<sup>2</sup>)



Series PFC



### Dimensions, in. (mm)

A NPT	B NPT	C	D	E NPT	F NPT	G	H	J	K	L NPT
1/8	1/8	7 (178)	8 (203)	1	1	1 3/4 (45)	2 5/8 (67)	4 (102)	20 3/4 (527)	1

### Water Level Adjustment

Model	Type	Level Adjustment Range in. (mm)
PFC-1-G	Direct Acting	1 - 2 (25 - 51)
PFC-1-GR	Reverse Acting	1 - 2 (25 - 51)

### Ordering Information

Model Number	Part Number	Description	Weight lbs. (kg)
PFC-1-G	180800	Direct acting pneumatic liquid level control	38.5 (17.5)
PFC-1-GR	180801	Reverse acting pneumatic liquid level control	38.5 (17.5)

### Output Air

