
W A L C H E M

IWAKI America Inc.

CONTACTING CONDUCTIVITY BOILER SENSORS Instruction Manual

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Notice

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1.0 Introduction

The contacting conductivity sensors measure a voltage drop between two electrodes which is inversely proportional to the conductivity of the solution.

2.0 Specifications

2.1 Measurement Performance

Part Number	Cell Constant	Range	Resolution	Accuracy
191694, 191695	1.0	0-30,000 $\mu\text{S}/\text{cm}$	1 $\mu\text{S}/\text{cm}$	$\pm 1\%$ of reading
191696	10	0-300,000 $\mu\text{S}/\text{cm}$	10 $\mu\text{S}/\text{cm}$	$\pm 1\%$ of reading

Note: Conductivity ranges above apply at 25°C. At higher temperatures, the range is reduced per the range multiplier chart.

Temperature	Range Multiplier
20°C, 68°F	111.1
25°C, 77°F	100.0
30°C, 86°F	90.6
35°C, 95°F	82.5
40°C, 104°F	75.5
50°C, 122°F	64.3
60°C, 140°F	55.6
70°C, 158°F	48.9
80°C, 176°F	43.5
90°C, 194°F	39.2
100°C, 212°F	35.7

Temperature °C	Range Multiplier
110°C, 230°F	32.8
120°C, 248°F	30.4
130°C, 266°F	28.5
140°C, 284°F	26.9
150°C, 302°F	25.5
160°C, 320°F	24.4
170°C, 338°F	23.6
180°C, 356°F	22.9
190°C, 374°F	22.4
200°C, 392°F	22.1
210°C, 410°F	22.0

2.2 Mechanical

Part Number	191694	191695	191696
Length	2.84" (72.1 mm)		
Immersion length	1" (25.4 mm)		
Diameter	0.75" (19.1 mm)		
Pressure	0-250 psi (0-17.2 bar)		
Temperature	32-401 °F (0-205 °C)		
Fitting Process Connection	3/4" NPTM		
Electrode Material	316SS		
Insulator Material	PEEK		
O-Ring Material	EPR		
Temperature Element	Pt1000 RTD	None	Pt1000 RTD
Cable length	6 inches (0.15 m)		
Maximum cable length	250 feet (76 m)		

3.0 Installation

3.1 Mechanical Installation

The conductivity sensor should be placed as close to the controller as possible, to a maximum distance of 250 ft. (76m).

Important Installation Notes:

1. Make sure the minimum water level in the boiler is at least 4-6 inches (10-15 cm) above the skimmer blowdown line. If the skimmer line is closer to the surface, it is likely that steam will be drawn into the line instead of boiler water. The skimmer line must also be installed above the highest tube.
2. Maintain a 3/4 inch minimum pipe ID with no flow restrictions from the tap for the boiler skimmer blowdown line to the electrode. If the ID is reduced below 3/4 inch, then flashing will occur beyond that point and the conductivity reading will be low and erratic. Minimize the usage of tees, valves, elbows or unions between the boiler and the electrode.
3. A manual shut off valve should be installed so that the electrode can be removed and cleaned. This valve must be a full port valve in order to avoid a flow restriction. Keep the distance between the tap for the boiler skimmer line to the electrode as short as possible, to a maximum of 10 feet (3m).
4. Mount the electrode in the side branch of a tee in a horizontal run of pipe. This will minimize entrapment of steam around the electrode and will allow any solids to pass through.
5. There MUST be a flow restriction after the electrode and/or control valve in order to provide back pressure. This flow restriction will be either a flow control valve or an orifice union. The amount of the flow restriction will affect the blowdown rate as well, and should be sized accordingly.
6. Install the motorized ball valve or solenoid valve per the manufacturer's instructions.
7. For best results, align the hole in the conductivity electrode such that the direction of water flow is through the hole.

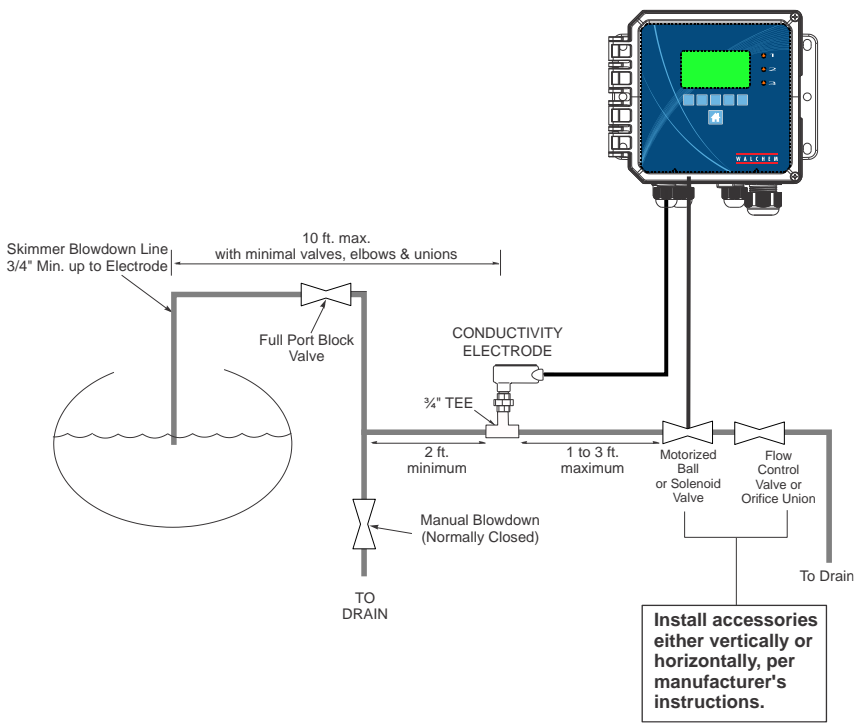


Figure 1 Intermittent Sampling

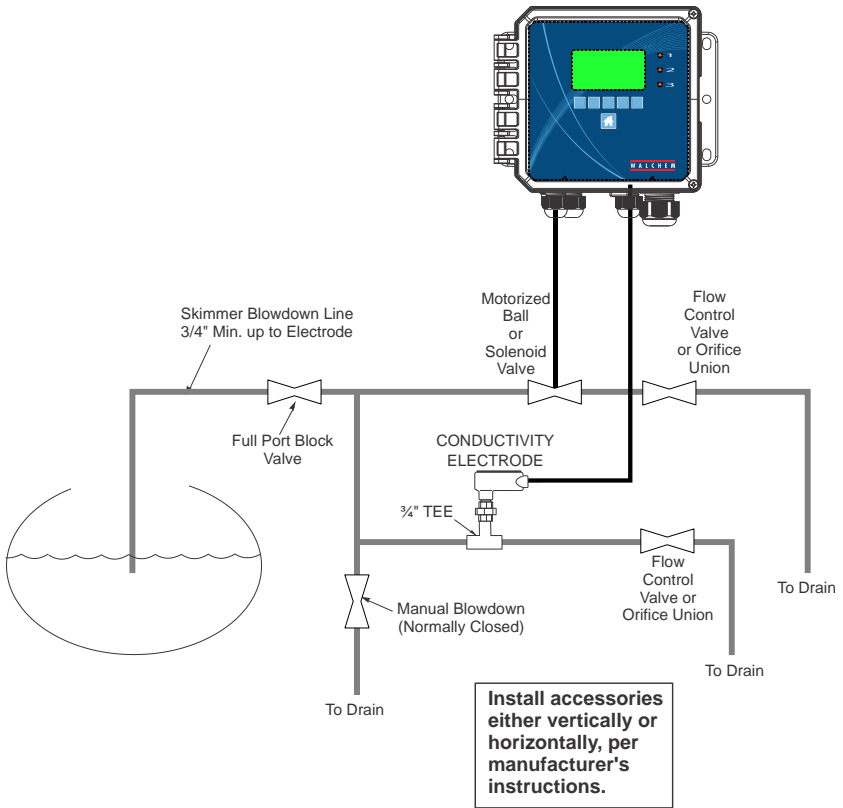


Figure 2 Continuous Sampling

3.3 Electrical Installation

Route the cable through one of the water tight cable glands on the W100, W600 or W900 series controller and connect the wires matching the wire label with the terminal block label. The cable *MUST* be shielded from background electrical noise. Use 24 AWG cable.

RED	XMT
BLK	RCV
WHT	TEMP-
GRN	TEMP+

4.0 Maintenance

4.1 Cleaning the sensor

Note: the controller must be recalibrated after cleaning the probe.

- The probe should be cleaned periodically. The frequency required will vary by installation. In a new installation, it is recommended that the probe be cleaned after two weeks of service. To determine how often the probe must be cleaned, follow the procedure below:
 1. Read and record the conductivity.
 2. Remove, clean and replace the conductivity probe.
 3. Read conductivity and compare with the reading in step 1 above.

- If the variance in readings is greater than 5%, increase the frequency of probe cleaning. If there is less than 1% change in the reading, the probe was not dirty and can be cleaned less often.

Cleaning Procedure

An accumulation of dirt or debris on the sensor can affect the accuracy and the thermal time constant. This accumulation should be removed periodically. This can be accomplished by scrubbing with a toothbrush or stiff bottle brush. Detergent or isopropyl alcohol cleaner may help remove oils. A mild acid will remove calcium scale. Harsh abrasives should be avoided. Rinse the sensor thoroughly before returning to service.

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