

**W A L C H E M**

IWAKI America Inc.

# **CONTACTING CONDUCTIVITY COOLING TOWER SENSORS**

## **Instruction Manual**

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## 1.0 Introduction

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

## 2.0 Specifications

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### 2.1 Measurement Performance

Range	Resolution	Accuracy
0-30,000 $\mu\text{S/cm}$	1 $\mu\text{S/cm}$	$\pm 1\%$ of reading

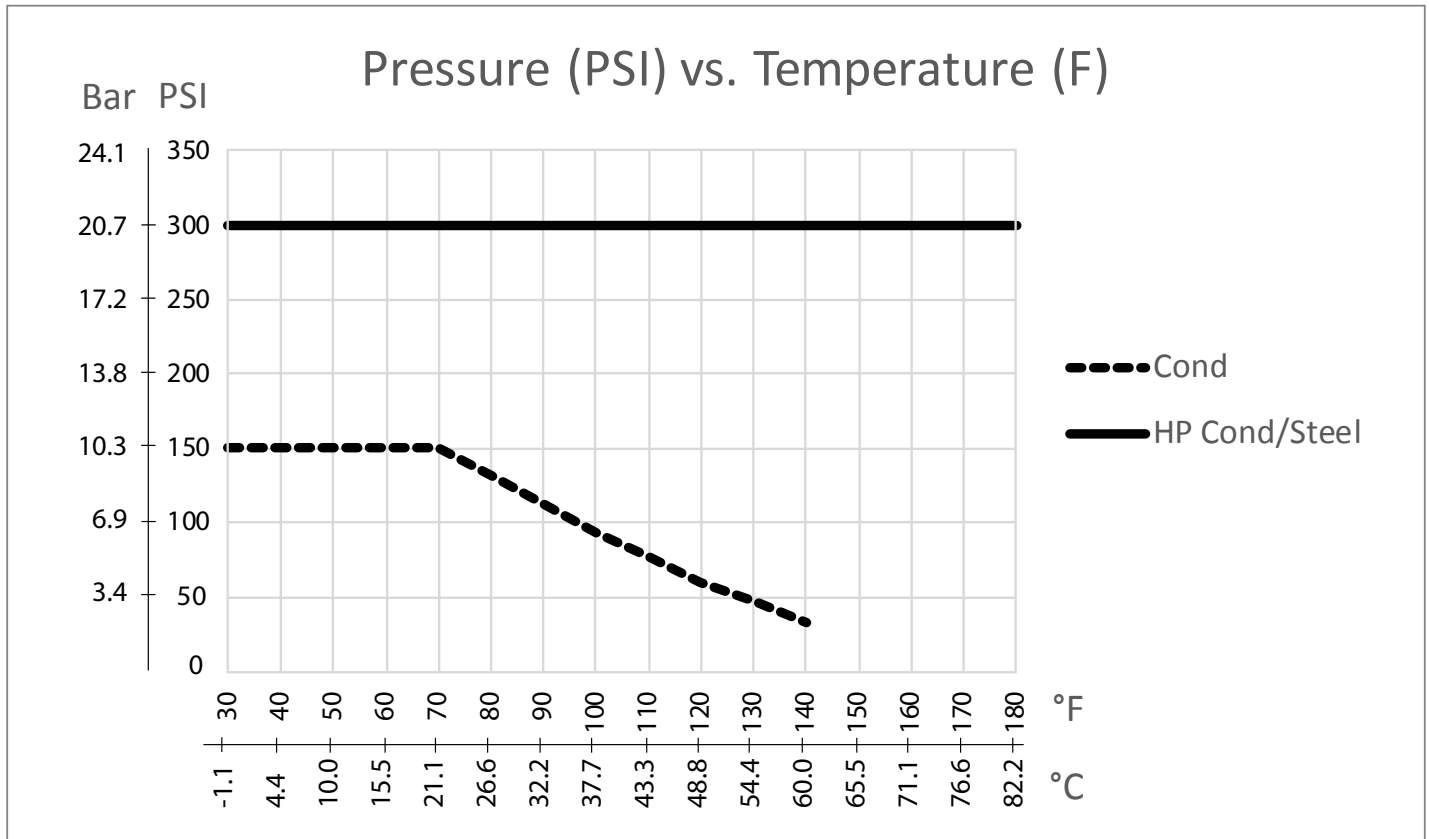
Note: Conductivity ranges above apply at 25°C. At higher temperatures, the range is reduced per the range multiplier chart.

Temperature °C	Range Multiplier
0	181.3
10	139.9
15	124.2
20	111.1
25	100.0
30	90.6
35	82.5
40	75.5
50	64.3
60	55.6
70	48.9

Temperature °C	Range Multiplier
80	43.5
90	39.2
100	35.7
110	32.8
120	30.4
130	28.5
140	26.9
150	25.5
160	24.4
170	23.6
180	22.9

### 2.2 Mechanical

Part Number	191646-20	191646-03	191647-20	191647-03	191693-10
Pressure (see graph)	0-150 psi (0-10 bar)				0-300 psi (0-20 bar)
Temperature (see graph)	32-140 °F (0-60 °C)				32-158°F (0-70 °C)
Fitting Process Connection	3/4" NPTF Inline, 1" NPTM submersion				3/4" NPTM
Electrode Material	Graphite		316SS		
Insulator Material	Glass filled reinforced Polypropylene				PEEK
O-Ring Material	FKM				N/A
Temperature Element	Thermistor, 10K				
Cable length	20 feet (6 m)	3 feet (1 m)	20 feet (6 m)	3 feet (1 m)	10 feet (3 m)
Maximum cable length	250 feet (76 m)				



## 3.0 Installation

### 3.1 Mechanical Installation

#### General Guidelines

- Mount the sensor as close as possible to the controller. Less than 25 feet (8 m) is recommended.
- Take care to shield the cable from background electrical noise properly.
- Maximum cable length is 250 feet (76 m).
- Always route sensor cable with at least 6" (15 cm) separation from AC voltage wiring.
- Position the sensor such that a fresh, representative sample of the solution is available.
- Position the sensor such that air bubbles will not be trapped within the sensing area.
- Position the sensor where sediment or oil will not accumulate within the sensing area.
- If cable is installed in metal conduit (recommended), either flexible conduit should be used or some other provision made for removal of sensor from the process for maintenance.

#### In-Line Installations

In-line mounted sensors must be situated so that the tee is always full and the sensors are never subjected to a drop in water level resulting in dryness. Refer to Figure 1 for typical installation.

Tap off the discharge side of the recirculation pump to provide a minimum flow of 1 gallon per minute through the flow switch manifold. The sample must flow into the bottom of the manifold in order to close the optional flow switch, and return to a point of lower pressure in order to ensure flow. Install an isolation valve on both sides of the manifold to stop flow for sensor maintenance.

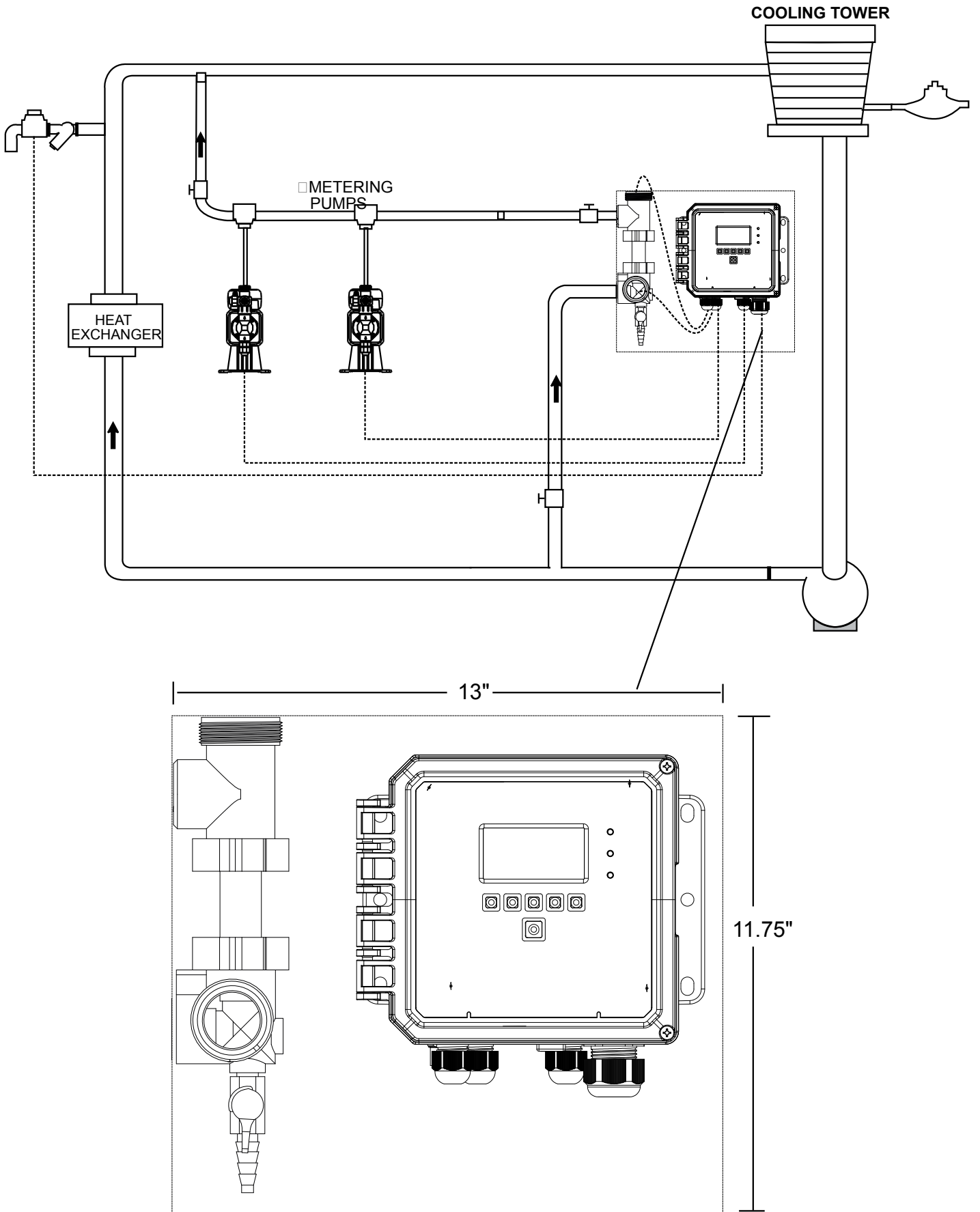
**IMPORTANT:** To avoid cracking the female pipe threads on the supplied plastic plumbing parts, use no more than 3 wraps of Teflon tape and thread in the pipe FINGER tight plus 1/2 turn! Do not use pipe dope to seal the threads of the flow switch because the clear plastic will crack!

If the sensor will be exposed to moisture (rain, hosing, etc.) the cable end must be protected.

### **Submersion Installations**

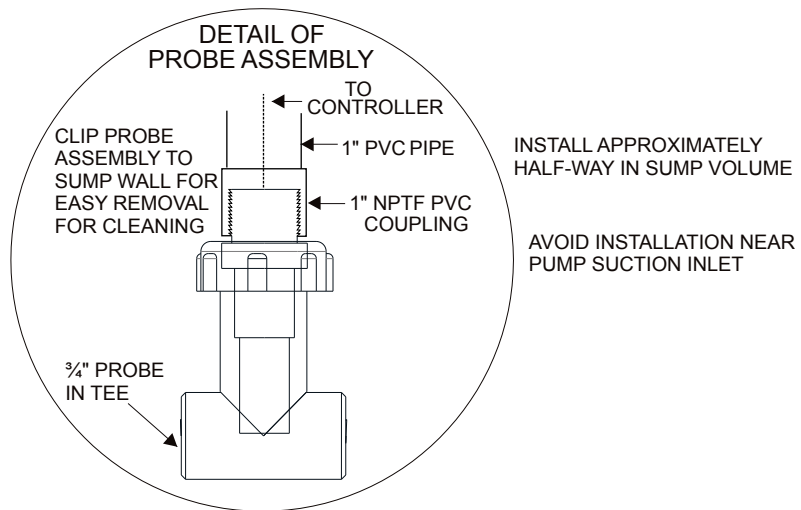
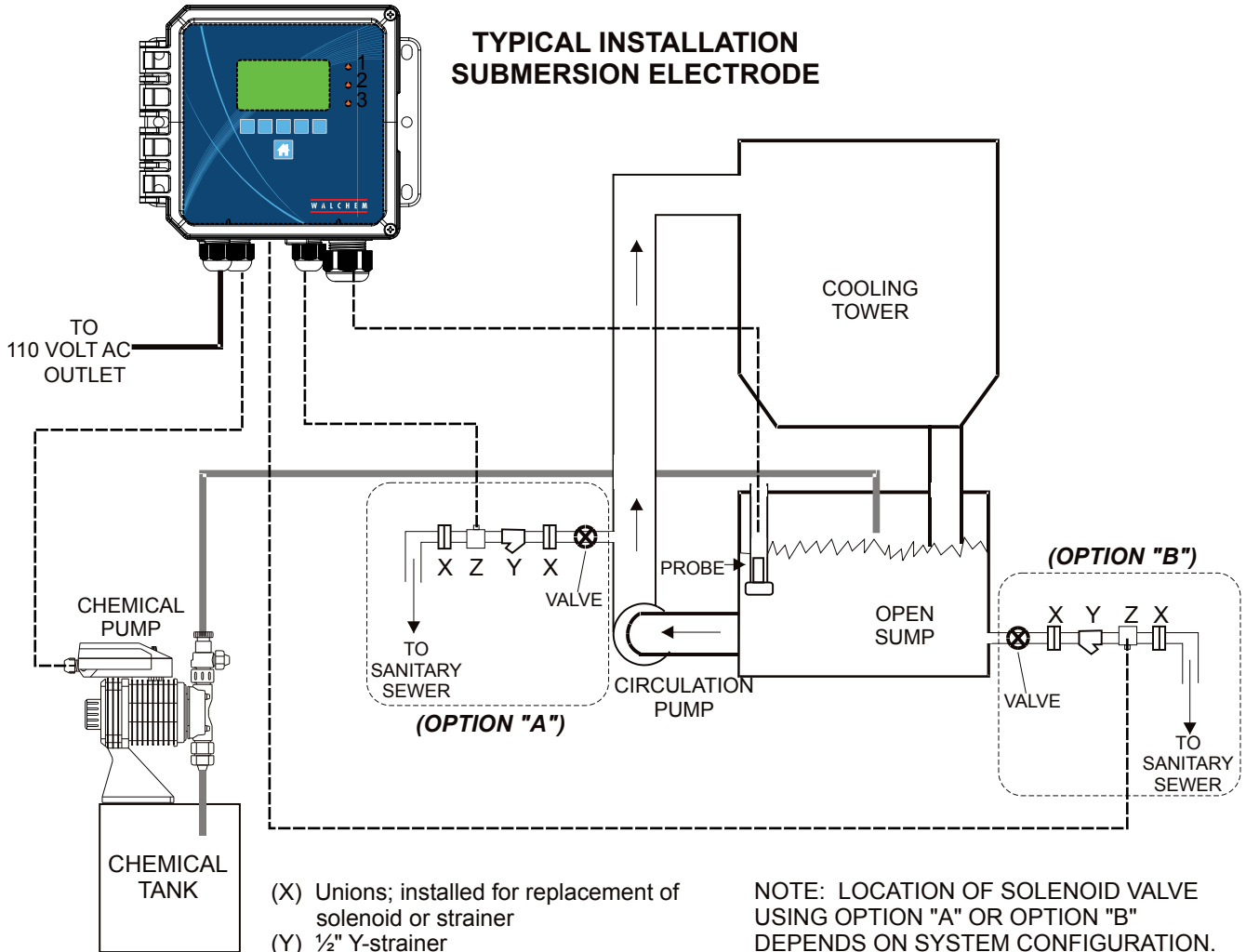
The submersion sensor requires a standard 1" NPTF coupling (user supplied) for connection of the sensor fitting to a standard compatible pipe. The sensor should be immersed away from the walls and floor of the tank by a minimum of 2 inches. The support pipe must be long enough to be above solution level. It should be sealed at the top, with a user supplied cable clamp, to prevent moisture from filling the pipe. See Figure 2. This pipe will usually be suspended from a bracket attached to the lip of the tank.

If the cable run will be exposed to moisture (rain, hosing, etc.), it must be protected with flexible conduit (preferably metal).



**Figure 1 InLine Installation**

**TYPICAL INSTALLATION  
SUBMERSION ELECTRODE**



**Figure 2 Submersion Installation**



### 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.

## 4.0 Maintenance

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### 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:
- Read and record the conductivity.
- Remove, clean and replace the conductivity probe.
- 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.

To clean a severely coated flat surface cooling tower electrode, use fine grit abrasive, such as emery paper. Lay the paper on a flat surface and move the electrode in a back and forth motion. The electrode should be cleaned parallel to the carbon electrodes, not perpendicular.

