

Successful pH Measurement in Pure Water



Introduction

The power generation industry has always been interested in technological advances to better monitor and control the quality of boiler feed water, steam condensate, and cooling water. Better control of water chemistry enables the operator to minimize contamination of the boiler water circuits, which in turn reduces the impact of corrosion and improves overall plant efficiency. pH is a critical water quality indicator in the high purity/low ionic strength water produced for the steam cycle. Accurate online pH measurement allows power generators to monitor the effectiveness of pH treatment strategies.

The Challenge: pH Analysis in Pure Water

Measuring pH in high-purity, low-conductivity water is extremely difficult. In addition to the challenge of low-conductivity, online pH measurements are further complicated by other potential interferences such as: electrostatic discharge, inconsistent flow rate, variable pressure, variable temperature, and liquid junction contamination. The Hach® 8362 High Purity Water pH Monitoring System addresses all these technical challenges through several solutions applied to the flow chamber and the electrode:

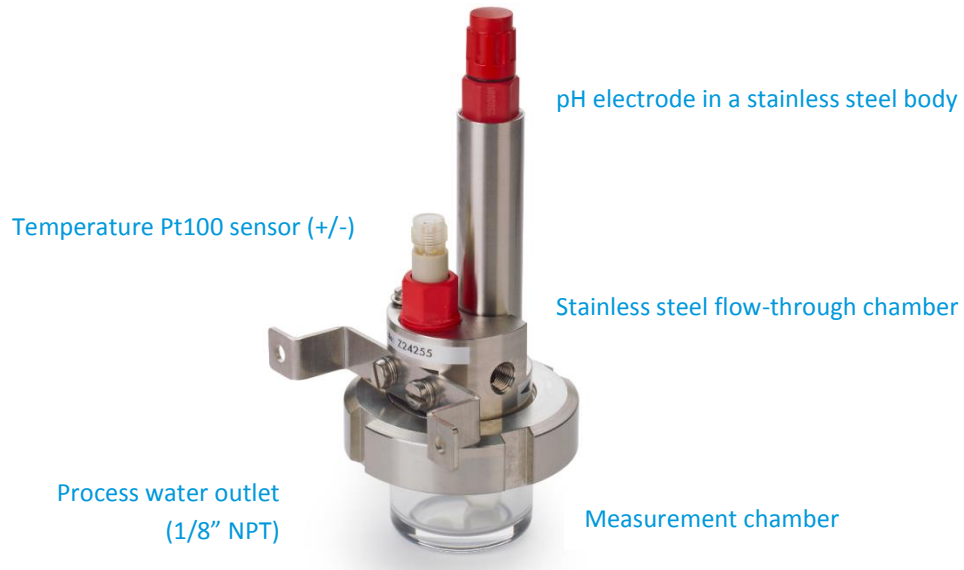
Flow chamber

- Stainless steel body avoids streaming potential and static electrical charges which generate noisy or drifting pH readings
- Airtight design removes pH shift due to CO₂ from air interference
- Inline flow through design and electro-polished surfaces eliminate both the influence of air bubbles and particle accumulation at the electrode surface
- Sample grounded at point of measurement to avoid streaming currents
- Premium temperature sensor for accurate response
- Temperature measured close to the pH electrode for optimal compensation according ASTM

Electrode

- Gel-filled and pressurized electrolyte reduces KCL leakages
- Special low conductivity glass membrane on the active electrode for accurate measurements in pure water
- No need for KCL injection

- Seven user selectable temperature compensation algorithms to ASTM standards
- Easy calibration with disposable flow chamber that requires no sensor removal
- Electrode visibility allows inspection for presence of deposits of iron oxides
- Detachable cable for easy removal (annual)



Successful Trial

A nuclear power generator in the UK commissioned an evaluation of the Hach 8362 to see if the improved technology made this application viable. The 8362 pH system was calibrated using standard pH buffers and installed on the plant’s boiler feed water with a conductivity of 7 μ S at 20°C and with an expected pH of 9.2 in water containing hydrazine. The monitor was then relocated to the demin polishing plant outlet with a conductivity of 0.06 μ S at 20°C and with an expected pH of 6.5 to 7.0. The results were impressive. After initial calibration, the process pH value was measured after just 20 minutes of stabilization, and the resulting analysis continued to track the process measurement.

A System Fit for Pure Water Applications

The 8362 has been specifically designed for ultra-pure water applications.

- **High system accuracy:**
 - ± 0.05 pH accuracy in water conditioned with ammonia.
 - ± 0.1 pH accuracy in ultra-pure water.
- **Insensitive to flow variation:** less than 0.05 pH variation from 5 to 15 L/h.

Recommended System Components

9500.99.00702 Ultra-Pure Controller: 100-240V AC with one Polymetron pH sensor input & two 4-20mA outputs
 Z08362=A=2000 pH probe with 3 m cable (0 ... 80°C) (Pmax = 6 bar)

See pH 8362 data sheet for more information.

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