

Foxboro® Flow-Through Conductivity

Boiler Blowdown Analysis and Control

Summary

Foxboro® flow-through electrodeless conductivity sensors, together with Foxboro analyzers or transmitters, are suitable for use in boiler blowdown applications and are extremely accurate due to the toroid technology.

Business Value

The proven reliability and robustness of the Foxboro conductivity flow-through sensor and analyzers will increase efficiency, reduce operating costs, and reduce waste-water generation when used to control and monitor boiler blowdown.

Benefits

- On-Line sensor and analyzer diagnostics communicate real-time measurement fault
- Savings and ease of use in installation, maintenance, replacement



Process Description

The boiler blowdown main purpose is to reduce and control the amount of solids and sludge in the boiler system. Although impurities in boiler water are removed in part by pretreatment of feed water using filtration, softeners, deionizers, or other, the remaining impurities still accumulate and increase in concentration over time as the boiler continues to operate. The blowdown process involves partially draining the boiler to the separator drum, to remove dirty surface water containing the suspended and/or dissolved solids, then adding fresh make-up water to the boiler. As the water is turned into steam in the separator drum, the solids remain behind. Unless there is 100% condensate return, the solid content tends to build up when the boiler takes on makeup water from the feed tank. This procedure reduces the concentration of total dissolved solids (TDS) to maintain a safe operating level.

Technical Challenges

If proper operating levels are not maintained, and dissolved solids are allowed to accumulate, the result might be corrosion, scaling of the boiler drum or carry over of contaminants to control valves, heat exchangers, and steam drum. Since the emergency shut down of equipment is extremely costly in terms of production down time and component replacement and repair, an optimal blowdown rate is a critical part of any boiler operation. The blowdown frequency can be controlled manually or automatically using a pre-set/pre-determined TDS level in either ppm or conductivity units (µS/cm).

Technical Challenges (continued)

Analytical instrumentation controls and optimizes blowdown rates by regulating the volume of water discharged from the boiler, in relation to the conductivity of the water (see figure 1). Many suppliers offer Contacting Conductivity (CC) sensors because of the lower price and small size. The down side to CC sensors is the need to clean them frequently, the shorter life span, and the high temperature limitations.

Figure 1.

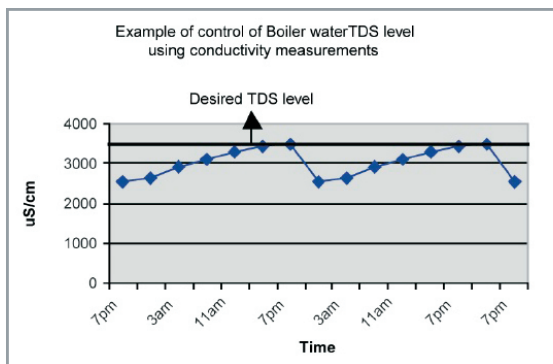


Figure 2: Electrodeless conductivity sensors generally consist of two encapsulated toroids, when immersed in electrolyte, form a conductive loop of solution shared by both. One toroid radiates an electric field, while the other detects a small (induced) electric current. Practically speaking, the two toroids are the coils of a transformer interconnected by the resistance of the electrolyte. This technology eliminates electrode polarization and electrode fouling typically found with CC sensors.

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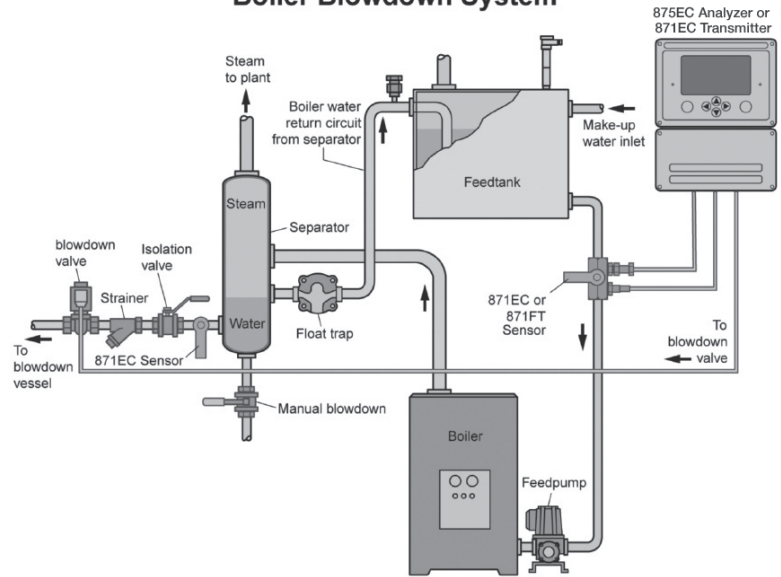
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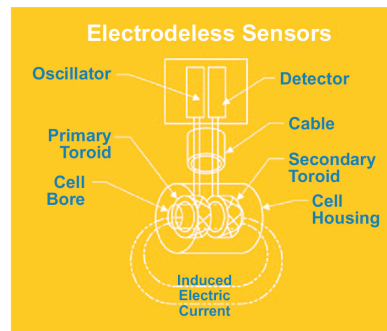
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Boiler Blowdown System



The Foxboro Solution

Foxboro's 871EC (electrodeless conductivity) sensors are low maintenance and extremely accurate due to the toroid technology (see figure 2 for an illustration). In addition, the EC sensors have threads for immersion and offer various line size fittings for insertion. When dictated by a specific line size or need, a Flow through (871FT) conductivity sensor can be used. The Foxboro conductivity sensors will increase efficiency, reduce operating costs, and



reduce wastewater generation when used to control and monitor boiler blowdown. The EC sensors have an integral temperature sensor to allow for accurate conductivity measurements over a process temperature range.

The Foxboro 876EC and 875EC analyzers, in conjunction with the 871EC and industrial 871FT sensors, are suitable for use in boiler blowdown applications. Menu driven analyzers allow for adjustable set points, up to three different operating conditions, continuous sampling, and temperature compensation. When the conductivity rises above the pre-set/pre-determined level, an alarm is triggered or a signal is sent to the controller to initiate a boiler blowdown cycle. These features will ensure an efficient boiler blowdown process, using first in class analytical instrumentation.

