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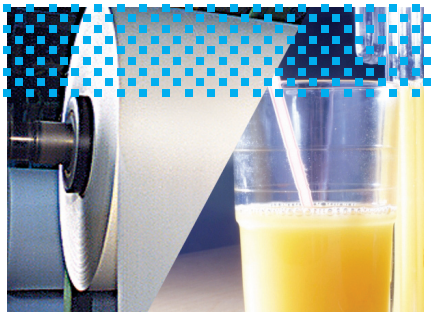
Boiler water flow measurements with Prosonic a "snap" – Paper and Food industry

Prosonic ultrasonic system measures in boiler water flow applications



Paper mills and food plants can realize cost savings by monitoring boiler water

Typical pulp processing plant

Checking vats at food processing plant

Company profile
If you measure it… you can control it.
If you control it you understand it.
If you understand it you can improve it.
If you improve it you will save money operating it.

In today's energy conscious world most everyone associated with utilities or industrial plants are investigating how to make their process more efficient and more economic to operate. A common practice has been to install boiler efficiency monitoring systems that acquire multitudes of process data from a boiler and do real time calculations on the efficiency of the machine. Some of the important parameters measured around boilers are main boiler feed water, condensate return and make-up water as well as fuel flow, level, pressure, temperature, water analysis and others.

Using ultrasonic transit time clamp-on non intrusive technology is an ideal solution for all the water flows because there is no need for pipe modifications, shut-downs and expensive labor costs. Today's clamp on technology can be as portable or as permanent as a customer desires with new age coupling pastes from basic grease to advanced adhesives that make the transducer connection to the pipe wall as permanent as welding.

Prominent paper and beverage manufacturers are using the Proline Prosonic 93P transducers to measure boiler feed water, condensate return and make up water to better understand the operation and efficiency of their system. In many cases calculations performed by the operating engineers find losses or excess of steam that are inconsistent with the observed and expected operation of the boiler. Water flow into a boiler is also a safety issue and if volumes fall below acceptable limits, the unit needs to be taken off line for investigation, resulting in production losses. Depending on the size of the facility and their steam needs the water flows to the boiler are typically found in 1 ½" pipes to as large as 12" pipes. Most of the time the piping is constructed of carbon steel, usually schedule 80 or higher due to the operating pressures and elevated temperatures. In most cases the boiler feed water as well as condensate return will range from 150 to 300°F depending on the boiler, operating conditions and system pressure. Make up de-mineralized water may be found in stainless steel pipes rather than carbon and may range in temperature from ambient to as high as 200°F.

Paper manufacturing requires large quantities of steam for process including heating and drying the product. For this reason we see large boilers in these types of applications. Food and beverage also use large amounts of steam for cooking product, sterilization, hot water, heating and other uses.

Customer requirements
Complete measuring technology to monitor water for boiler efficiency

Endress+Hauser solution
Prosonic 93 Transmitter, 93P Clamp-on Sensors

Customer benefit
- High level of accuracy
- No piping modifications
- Protects boiler from expensive repairs

Endress+Hauser
People for Process Automation

Complete single-source measuring technology

Endress+Hauser measuring technology in use:

- Boiler feed water/condensate return:
  Ultrasonic sensors
  Prosonic 93P
- Transmitter:
  Prosonic 93

Solution used

The measurement solution is achieved using the Prosonic 93 electronics with the Prosonic 93P ultrasonic sensors. The flow meter is programmed for the pipe material, pipe size and wall thickness and typically recommends a single traverse installation. The customer may be interested in a 4-20 mA volumetric flow rate as well as a pulse output for totalized flow.

Customer benefit

1) Understanding operating conditions of the boiler
2) Safely operating the boiler
3) With a ROCKWELL real time energy monitoring system, boiler efficiency can be calculated in real time

Boiler water flow applications typically offer good if not ideal straight pipe requirements before and after the point of measurement. In most cases the pipes are insulated but not painted. After removing the insulation pipe preparation typically only involves the use of a wire brush to remove some surface rust found on the pipe. In many cases the condensate return lines and boiler feed water are schedule 80 pipe. The operating temperature varies from boiler to boiler but the 93P transducers are highly recommended for best operation at the elevated temperatures.

To measure the water flows in a boiler application one of the solutions is to use the 93 Prosonic electronics either as a single or a dual channel unit. The Prosonic 93 can either measure one pipe with a single set of transducer or measure two completely independent pipes with one electronics and two sets of transducers. In rare cases that limited straight run is available, a two channel electronics can be used for the same pipe with two sets of transducers installed in an X pattern to improve measurement accuracy due to existing flow profile disturbances. For consistently reliable and trouble free measurements it is recommended to install the transducers as a single traverse configuration locating the transducers 180 degrees apart at the prescribed spacing at the 3 and 9 O'clock position on a horizontally oriented pipe. Because of typical system pressure, down flow in a vertical pipe is not a problem for these applications.

Typically a customer is interested in the volumetric flow GPM, sometimes converted to mass such as lb/hr, since 1 lb of water makes 1 lb of stream. The customer is also interested in the accumulated or totalized flow such as gallons or lb. These values may be simply noted from the flowmeter display or be sent to a ROCKWELL energy management system via 4-20, pulse or other communication protocol.

These measurement applications in power plants can also be found at universities, malls, hospitals, stadiums, casinos, theme parks, airport and others.

For more information, contact
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Prosonic 93P sensors mounted on water inlet piping

Prosonic 93P sensors mounted on condensate line

ISO 9001:2000 Certified

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