



# APPLICATION NOTE

**INDUSTRY: POWER GENERATION**

**MARKET NICHE: DE-MINERALIZED**

**WATER/POWER GENERATION**

**PRODUCT: DC-I POSITIVE DISPLACEMENT FLOWMETERS**

**FLUID: DE-MINERALIZED WATER**

**SERVICE: TURBINE BEARING COOLING & PRIMARY WATER**

**VISCOSITY: 1 cP**

## OVERVIEW

As with any large machinery, steam turbines and generators have certain components whose operation is absolutely critical to the unit's performance and reliability. The bearings of a steam turbine qualify as one such critical component in a power plant. Due to the extreme loads and temperatures generated in these bearings, external cooling systems are required to keep the bearings from seizing or galling. A typical method for cooling these bearings is to circulate water around the bearing housings in order to carry the generated heat from the bearing. The heat is then dissipated in a remote cooling unit. Insuring that an adequate supply of cooling water is provided to these bearings is extremely critical.

Primary water is also a very important water flow stream for any power plant. Monitoring this flow stream insures adequate flow is available for the steam generation requirements and to calculate a given unit's overall thermal efficiency. Reliable flow sensors are paramount for this application to prevent any possible interruption in service.

## SITUATION

A large utility company was in the process of rebuilding a generating unit. It was decided that installation of flowmeters on the turbine bearing cooling system and primary water supply system was desirable. The most important features desired for these new flowmeters was reliability, ease of maintenance, compact design to fit into existing piping, and flexibility in end connections. These last two requirements resulted from the fact that the cooling water piping system was already in place and was known to be significantly oversized for the flow rates.

The local Flow Technology representative visited the unit and surveyed the system with the plant's instrumentation engineer. Based on the design advantages of the Flow Technology positive displacement flowmeter and the success of other Flow Technology positive displacement flowmeters at different generating stations in this same utility company, this plant elected to use Flow Technology systems. The survey of the unit revealed that a total of four flow measurement systems were required, three for turbine bearing cooling and one for primary water supply. The three cooling water installations required 1", FD10I series flowmeters. The line size, however, was found to be 1-1/2" for all three of these installations. The primary water supply installation required a 1-1/2", FD15I series flowmeter but the existing line size was 4". Another consideration was a tight delivery requirement. The differences between meter size and end connection size was solved by designing and building modified versions of the FD10I and the FD15I series flowmeter using the requisite 1-1/2" and 4", 150# raised face flanges respectively. The delivery schedule of five weeks or less was also accomplished, even with the additional time required for redesign.

For electronic accessories, the utility selected RT80-A-3A-2-C-4 rate/totalizers with 16-point signal linearization for high accuracy. These rate/totalizers include two relay output contacts which can be actuated independently of one another based on a programmed set-point. For this installation, the utility elected to set the relays to trip under either a high flow rate or low flow rate condition. The relay contacts would signal the alarm condition to the plant's DCS system.

## ANALYSIS

The plant was very pleased at the responsiveness shown by Flow Technology in meeting their aggressive timetable with a custom solution. Delivery of the meters on time and with the custom end connections made the installation much easier and did not result in additional delay in getting the unit back on line. Commissioning and start-up of the systems was accomplished without problems or delays. In the months since entering service, no component of the flow measurement system has required servicing.

## TECHNICAL DATA

Flowmeters: DC10I-6115-5215-000 (was F010I-6115-2215-000),  
DC15I-6115-5240-000 (was FD15I-6115-2240-000) (3 each)

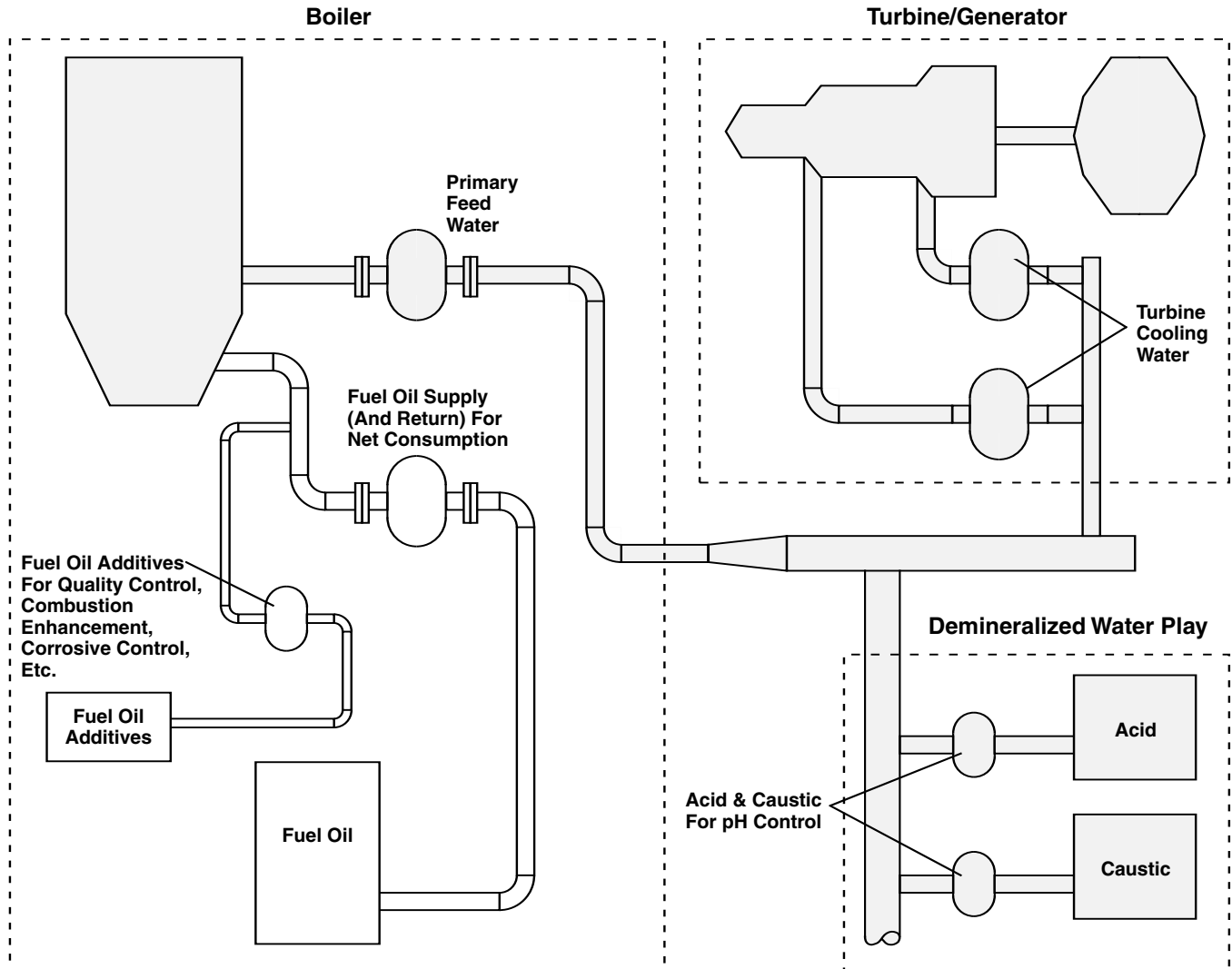
Fluids: Deionized Cooling & Primary Feed Water, 1 cP @ 120° F





# APPLICATION NOTE

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