THE SZEWALSKI INSTITUTE OF FLUID-FLOW MACHINERY, PAS (IMP PAN)
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SYSTEM FOR CONTINUOUS MEASURING OF THE FLOW RATE TROUGH THE TURBINES USING A DIFFERENTIAL PRESSURE METHOD (E.G. WINTER-KENNEDY METHOD)

The differential pressure method, mainly the Winter-Kennedy method, is used for continuous measurements of flow rate through hydraulic turbines. This method provides a valuable alternative compared to expensive and often unreliable ultrasonic flowmeters.

It is based on the measurement of static pressure difference between the two appropriately selected points in the turbine flow system, e.g. in a spiral case, and the flow rate is calculated as proportional to this pressure difference taking into account some empirical coefficients.

This method belongs to the relative methods of measurement so it requires calibration to determine coefficients mentioned above.

The method is recommended by the international standard IEC 41, especially for optimization tests of classic or bulb Kaplan type turbines. It is assumed that the systematic uncertainty of this method is equal to the uncertainty of the measurement method used for calibration.

Apart from calibration testing, this method boils down to construction of a simple measuring system, which includes a precise differential pressure transducer, connected hydraulically to the pressure receptions in the spiral case, and electrically by the measurement module - to the computerized data acquisition system.

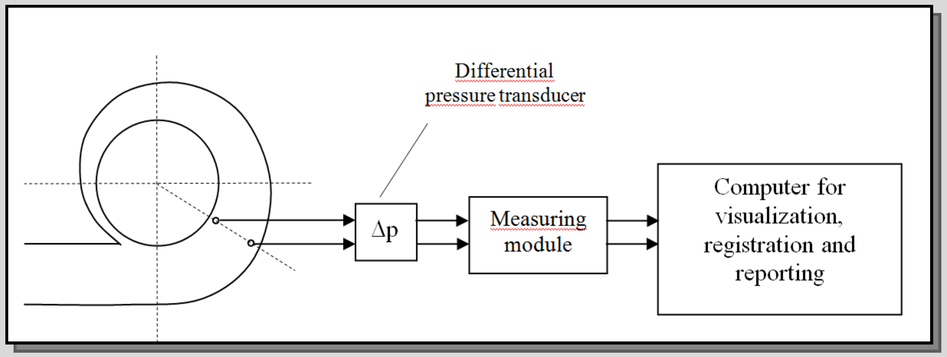

Fig. 1. Block diagram of continuous measurement of flow rate through the turbine by means of the differential pressure method .

Fig. 2. Differential pressure transducer for continuous flow rate measurement equipped with the automatic venting system.

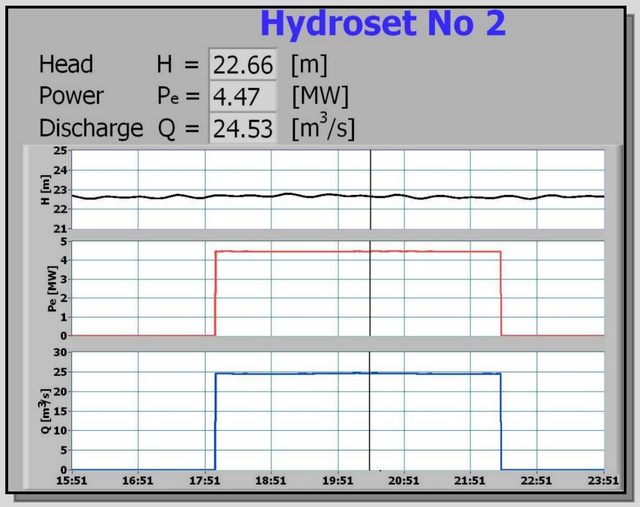

Fig. 3. Example of application for continuous flow measurement .

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References:

Adamkowski A., Janicki W., Steller J.: *Comparison between results of flowrate measurement by means of current-meter, pressure-time and ultrasonic methods*. Proc. of Conf. HYDROFORUM'2005, Kliczków, December 7-9, 2005 (in Polish).