



THE FIRST IN THE WORLD - FLOMIC TYPE SERIES BATTERY-POWERED ULTRASONIC WATER METERS

At the "VODOVODY A KANALIZACE" (Water Supply and Sewerage Systems) international exhibition in Prague in 2003, the Czech company ELIS PLZEN, a.s. exhibited its products for water-flow and consumption measurement including a new type series of the FLOMIC battery-powered ultrasonic water meters. The first presentation of this innovative product won general recognition and the FLOMIC meters were awarded a prize as the best exhibit. After more than 100 years of wide-spread use of conventional mechanical water meters, the FLOMIC meters represent a significant innovation in the flow-measurement technique where the improved parameters and higher user value of these products may lead to eventual replacement of the mechanical meters, in particular those of larger dimensions.

The main purpose of this article is to provide essential information to the flow-meter users and system designers in various industries on the principle of operation, basic characteristics, advantages and scope of application of the FLOMIC ultrasonic water meters in comparison with the conventional mechanical water meters.

Mechanical water meters: characteristics and application

To measure water flow rate and volume passed through piping, water supply companies generally use propeller- and turbine-type water meters. Meters based on these physical principles have been in service for more than 100 years and the meters have undergone so many design changes and modifications that it may be rightly assumed that no further significant improvements on their operational properties are achievable. Although the long era of development and application of mechanical water meters has resulted in near perfect solutions, it is clear that certain weak spots and disadvantages of mechanical meters are inherent to their methods of measurement and as such cannot be overcome. These disadvantages are:

- Mechanical water meters contain movable parts that are subject to wear and inevitably bring about higher measurement errors in long-term operation.
- Due to operational wear, the movable parts of mechanical water meters require regular maintenance and eventually replacement where the costs of complete replacement of mechanical parts in a meter amount to 30-50% of the new meter costs. This fact implies additional operational costs of water supply systems.
- To ensure correct functioning of a mechanical water meter, it is often necessary to use a filter on the input side to retain mechanical particles and impurities. Such filters not only increase the hydraulic losses in the piping, but also acquisition and operational costs of equipment installed at each measurement location.
- The propeller- and turbine-type meters themselves significantly increase hydraulic losses in the fluid piping.
- Unless special electronic accessories are used in combination with mechanical water meters, these can only measure and register the total volume of the fluid passed through the measurement location. In principle, mechanical water meters cannot measure or display instantaneous values of flow rate, or indicate the maximum or minimum flow rate values over a specified period of time.
- Data transfer from the measurement location to a remote station is limited to an impulse output signal indicating a specific flow volume passed through the meter. To indicate and evaluate data on instantaneous, minimum and/or maximum flow rates, the meter needs to be equipped with special electronic accessory, which would further increase the necessary investment costs into the water meter system.

Battery-powered ultrasonic water meters of the FLOMIC type series

Compared to conventional mechanical water meters, the FLOMIC meters utilise a completely different physical principle. The flow rate of a fluid in piping is determined using the "transit-time" ultrasonic method where the transit times of ultrasonic signal travelling between two probes in and against the fluid flow direction are measured and their difference is calculated. This difference is directly proportional to the instantaneous flow rate of the measured fluid.



Fig. 1: FLOMIC FL 102X battery-powered ultrasonic water meter

The type series of the FLOMIC FL 102X meters (see Fig. 1) has been designed to fit into pipes of rated dimensions DN 32 through to DN 200 according to international standard ČSN ISO 4064. The meters do not need any external power; all their power requirements are provided by an Li battery with the life time of 6 to 8 years. The meters measure and evaluate instantaneous flow rate and other flow parameters every second; this ensures meeting the requirements on dynamic characteristics in most applications. The FLOMIC meters have been approved for operation as commercial (invoicing) meters of precision class B. They find application in the fields of water flow rate and consumption measurement as both technological and invoicing meters; they also can be used to check the condition of complex water supply systems. Regarding user value, the FLOMIC meters offer similar advantages as line-voltage powered electronic water meters (induction or ultrasonic) in terms of electric outputs available (impulse or current), M-BUS communication interface, data-logging with data reading via optical interface, data transfer and others.

The superiority of the FLOMIC meters over mechanical water meters is based on the following advantages:

- they have no mechanical parts, which implies longer operational lifetime and lower time and cost requirements regarding the meter maintenance and repair;
- no filters need be used on the input side of the meter;
- significantly lower pressure losses, which will be reflected in lower power requirement on the pumps used within water supply systems;
- significantly higher long-term stability of measurement precision;
- the meter display may show not only aggregate flow volume data, but also the data on instantaneous flow rate;
- the measured and subsequently calculated data can be stored and retrieved as need be; such data include fluid volume passed through the meter, instantaneous flow rate, maximum and minimum flow rates over the given period of time;
- auto-diagnostic features;
- electric output signals (impulse and current 4-20 mA)
- M-BUS communication interface;
- optional connection to a battery-powered data transfer system using either conventional radio wave link or GSM technology.

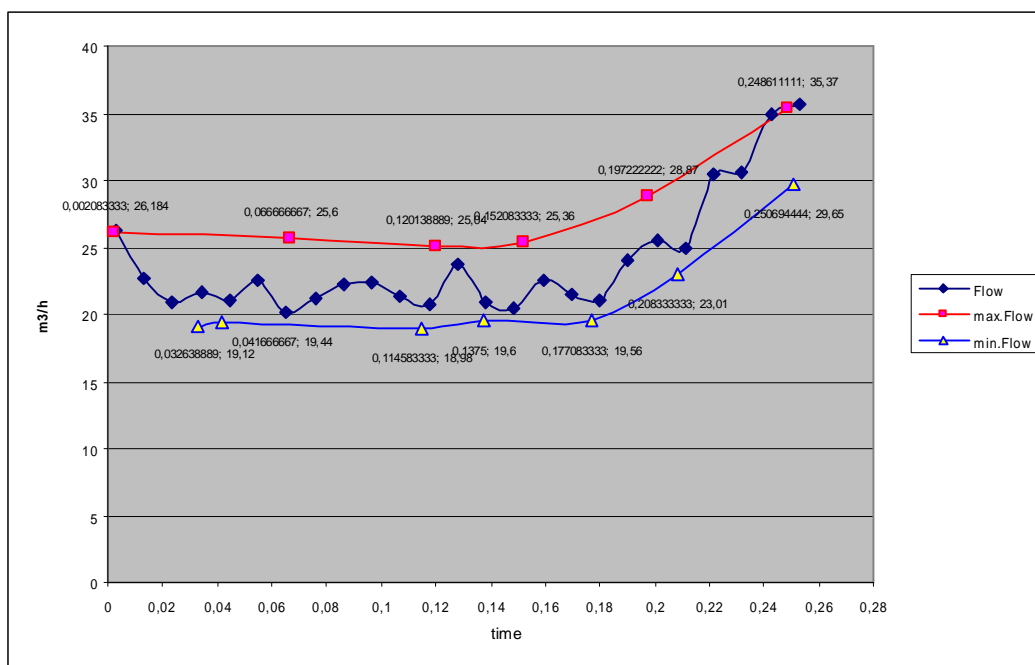


Fig. 2: Data storage and retrieval system: instantaneous flow rate, maximum and minimum flow rate data retrieved from the data-logger of a FLOMIC FL 102X water meter

More detailed information on the meter parameters and properties can be found on the Internet pages of the manufacturer (www.elis.cz).

The battery-powered ultrasonic water meters of the FLOMIC series represent a significant innovation in the area of industrial water meters. Both municipal and industrial water-supply companies will find that the FLOMIC technology may improve their capabilities in water consumption measurement and in monitoring the operation and condition of their water supply systems.

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