



Application of the FLOMIC ultrasonic water meters including pressure gauges for monitoring the conditions in water-supply networks

Indispensable for the functions of any efficient and reliable water-supply network is a control station monitoring the network condition so that any defects or critical situations can be readily identified as to the type of defect or criticality of situation and its precise location. The data to be processed by such control station need be generated at particular measuring points and transferred to the station. A very good way how to achieve the above objectives is use of the FLOMIC battery-powered ultrasonic water meters with integrated pressure-metering function.



Fig. 1

FLOMIC FL 1024 – battery-powered ultrasonic water meter

Conventional methods of flow-rate measurement in existing water-supply systems

For over 100 years, waterworks use mechanical water meters to measure flow rate and volume of the water passed through the meter. Throughout its long history, the mechanical water meter design has been brought to near perfection so that no further significant improvements can be expected in the future regarding measurement precision, operational efficiency or economy. To achieve such improvements, new physical principles of measurement need be sought and applied.

However, the main weak spot of mechanical water meters is their limited scope of application. A mechanical meter cannot monitor instantaneous flow rate or derive the important data on the maximum or minimum flow rates over given time periods. That is why the conventional mechanical flow meters find no more application in water networks where the operator wishes to have more detailed information on the network behaviour than just the total volume of water passed through the piping over a certain period of time. Not even the use of electronic data-loggers receiving and processing output pulse signals from mechanical water meters cannot completely eliminate this shortcoming, to say nothing of high acquisition costs of such equipment.

The importance of pressure measurement in water-supply networks

If pressure is measured at key points of a water-supply network, the operator obtains more complex information on the network behaviour with special regard to sectors subject to increased pressure, irregular fluid flow, defects or leaks in the piping. On the other hand, a decision to measure pressure in a water-supply network implies a number of undesirable complications such as the necessity to build-in the pressure gauges into the piping, or additional requirements concerning maintenance, power feeding, data transfer and others. Although the pressure measurement technology itself has recently been subject to indisputable improvements, one principle disadvantage remains: it is necessary to have a separate pressure gauge installed in the piping.

Advanced problem solution with the FLOMIC water meters

A new generation of the FLOMIC ultrasonic water meters manufactured by ELIS PLZEŇ a.s. offer, apart from the standard flow-rate measurement function, pressure metering using an integrated pressure gauge. The measured real-time pressure data can be displayed and stored in regular intervals. The FLOMIC water meters are battery-powered so that they can replace conventional mechanical water meters and pressure gauges even at measuring points with no alternative power-supply network.

The FLOMIC battery-powered ultrasonic water meters have been developed to meet the requirements of the customers who wish to have efficient tools for monitoring the main operational parameters of their water-supply networks. By offering multiple measurement functions, the FLOMIC meters make it possible to decrease the investment costs per measuring point, as well as the operational costs associated with the meter maintenance, control and data communication (if required). Among the advantages of the FLOMIC water meters are:

- design including no moving parts, which significantly extends the meter lifetime and decreases both the financial and time requirements on equipment maintenance and repair;
- extremely low hydraulic losses, which implies positive impacts on power requirement and operation of pumps within the water supply network
- independent power supply (an in-built battery) with the operational lifetime of 6 to 8 years, allowing meter application in locations where external (line) power supply is not available;

- flow-rate measurements based on the “transit-time” method (measurement of time an ultrasonic wave needs to cross a gap between the sender and receiver probes located in a water pipe) permitting use of high sampling frequencies and documentation of dynamic network processes;
- fluid pressure measurement function using a piezoelectric pressure gauge whose operational range and precision is fully adequate to the purposes of water-supply systems;
- internal memory unit for storage of measured data for subsequent reading and processing. No external data-logger is therefore necessary;
- if combined with a battery-powered GSM module, the meter will offer additional user value in that the measured data can be transferred from remote measuring points, independently of line power feeding and at low running costs.

If used correctly, the FLOMIC water meters may help provide for the system operator a very detailed picture of the network status and behaviour. Apart from displaying the real-time data on instantaneous flow rate, fluid volume and pressure, these data can be evaluated and stored in the internal memory unit in regular time intervals. The meter has its own clock so that the stored data are associated with the respective measurement times. Among other things, the electronic unit of the FLOMIC meter registers the measured instantaneous flow rate every second and processes these data to identify the maximum and minimum flow rates over the given time interval.

The network operator may select the data archiving mode for the following fluid flow parameters:

- instantaneous flow rate;
- total volume passed through the measuring point;
- maximum flow rate registered within a specified time interval;
- minimum flow rate registered within a specified time interval;
- water pressure in the piping.

The accumulated data can be retrieved from the meter memory using an optical probe and a portable PC in the standard configuration, or the meter can be connected to a battery-powered communication unit and the data transferred via a wireless link or a GSM network. The latter is the preferred cost-effective solution in the cases of far-off or inaccessible measuring points. In the superior control system, the collected data from several measuring points can be further processed and converted to graphic outputs such as shown in Fig. 2 below.

The FLOMIC water meters are available in sizes DN 32 through to DN 200, and they can be designed as compact devices or with remote electronic unit and protection class up to IP68. The meters have been certified for use in drinking-water supply systems, and can serve the purpose of invoicing meters.

For more information, see www.elis.cz

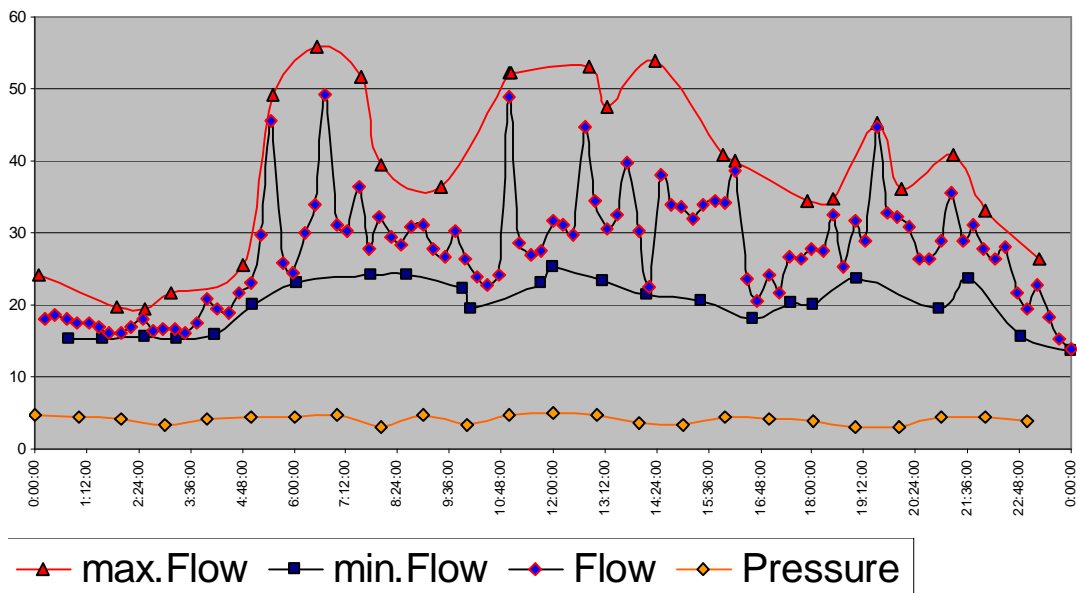


Fig. 2

Graphs of instantaneous flow rate, fluid volume, minimum flow rate and pressure as measured and evaluated by the data-logger associated with the FLOMIC FL water meter