# Municipal Pumping Station Flow Monitoring

## Impeller Meters / FC-5000 Flow Display

## SYSTEM

A municipal pumping station draws water from deep well or surface water supplies, and pumps it to a water treatment facility. Once the water is treated, it goes directly into a water distribution system. A typical site consists of a control room and one or more pumps located nearby. In larger stations, an array of pumps permits available horsepower to be tailored to water demand to optimize pump efficiency and thus reduce power cost.

Provisions for both local and remote pump control are common. To accomplish this, telemetry systems are installed to transmit data such as pump status, flow rate, system pressure, fire security and other vital information.

## PROBLEM

Monitoring the flow in large pipes can be expensive to install and service. Older stations were commonly built around compound meters. These meters were difficult to install and costly to replace. Differential pressure devices make telemetering expensive due to the complex mechanical mechanisms required to convert the data to linear electronic signals suitable for transmission. Limited accessibility and complexity of piping configurations make compliance with standard requirements for straight pipe sections before and after sensors difficult or impossible. Accuracy losses are common. Compensation is difficult or impossible.

## SOLUTION

Sensor Installation: The Badger Meter® Model 226B hot tap sensor with isolation valve solves the problem of expensive installation and repair. The design permits installation into fully pressurized pipe lines without interference with water service, and can be located up to 2000 feet from the panel of flow monitors.

Display Installation: The FC-5000 flow display can be configured with frequency or analog outputs. Analog units can be configured to output 0...5V, 0...10V or 4...20 mA.

The FC-5000 display has a large graphical LCD display, dedicated scaled outputs, dedicated relay outputs and dedicated communication protocols. This very powerful product can be ordered with advanced options, such as dual channel inputs that permit monitoring of two meters. Two relays provide high or low flow setpoints with time delay and hysterisis.

These relays can also provide remote totalization, chemical injection or water sampling control, or input to a Supervisory Control and Data Acquisition (SCADA) system. BACnet or Modbus over EIA-485 (RS-485) provides remote access to all configuration, operating, and monitor functions.

## CONTROL, COMMUNICATION, AND RECORDING

### Analog Configurations

Since our analog outputs are linear, no expensive square root extraction equipment is required. Although some devices still use 0…5V DC, and 0…10V DC inputs, 4…20 mA is the most accepted analog interface. Devices of this type include chart recorders, graphing recorders, chemical injection and sampling equipment, and telemetry. Products are on the market that can convert analog to dedicated phone line, microwave, or radio communications.

### Pulse / Frequency Configurations

Pulse resolution and duration are fully programmable from the front panel. Relays are also available to provide isolated dry contact closures.

### Time Proportioned On/Off Signal

Early mechanical remote transmitters for chart recorders used a variable duty cycle contact closure. This approach is still used in some systems. A device such as the Model 60804, Current-to-Time Proportioning Converter, by TMC Services, Inc. (http://www.tmcservices.net/doc/60804-spec.pdf) can convert a 4…20 mA analog to this type signal.

IND-AS-01222-EN-03 (January 2022)

Application Data Sheet

## Setpoint Control/Signaling

Frequently, the only information required at the central station is verification that flow is within acceptable limits; not being limited by worn or damaged equipment, or excessive due to pipe breakage or other system failures.

The FC-5000 can be ordered with two relays. All relays feature independent high/low triggering, setpoint, time delay, and hysterisis or latching.

## EIA-485 (RS-485) Network

All FC-5000 Flow Displays come equipped with an EIA-485 (RS-485) physical layer, and use Modbus RTU protocols, selectable and programmed in the firmware. Up to 255 FC-5000 products can be run on a single daisy-chain network and be individually quieried for flow rate, positive flow accumulator, and other information.

### Advantages

1. Sensor installation without water service disruption.
2. Economically priced.
3. All functions can be configured in the field.
4. All parts interchangeable to reduce spare parts inventories and simplify field repair.
5. Analog and pulse outputs compatible with standard recording and telemetry devices.
6. Low installed cost per point of telemetered flow data.

**Control. Manage. Optimize.**

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