

**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:** Badger Meter's 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.

**Digital Display with Analog Transmitter Installation:** Both the full featured Series 2100 Digital Flow Monitor and economical Series 1500 Digital Flow Monitor are available with a 4-20mA programmable transmitter. Either can be located up to 2000 feet from the Model 226B and operates on all voltages.

The Series 2100 is a full featured digital flow monitor with a two line by sixteen character LCD display, and up to two mechanical non-resettable totalizers. This very powerful product can be ordered with advanced options, such as dual channel inputs that permit monitoring and control of a second variable such as pressure or level. Up to four relays provide high or low flow set-points with time delay and dead band.

These relays can also provide remote totalization, chemical injection or water sampling control, or input to a Supervisory Control and Data Acquisition (SCADA) system. Analog input/output options provide powerful monitoring and control tools. RS232 and RS485 options provide remote access to all configuration, operating, and monitor functions. Precision crystal timing and microprocessor circuitry, with simple front panel menu

based configuration make the Series 2100 a very powerful tool in a municipal pump station.

The Badger® Series 1500 is an economical digital flow monitor with a two line by eight character LCD display of Rate and/or Total with many of the features of the Series 2100. Options include analog input/output, and two relays. Like the Series 2100 this product uses precision microprocessor circuitry and features simple front panel programming. The panel meter has a NEMA 4X rated front panel with an optional NEMA 4 rated wall mount enclosure. The Series 1500 may be field calibrated by the user. It accepts pulse, sine wave, or optional 4-20mA analog input signals. The Model 226B is calibrated by entering the "K" number and "offset" for a specific line size into the Series 2100 or 1500.

**CONTROL, COMMUNICATION, AND RECORDING****ANALOG**

Since our analog outputs are linear, no expensive square root extraction equipment is required. Although some devices still use 0-5VDC, and 0-10VDC inputs, 4-20mA 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/UNIT VOLUME ( EXAMPLE: 1 PULSE/100 GALLON)**

A non-isolated open collector transistor pulse output is standard in both the Series 1500 and 2100. Pulse resolution and duration are fully programmable from the front panel. Optional 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 4-20mA analog to this type signal.

**SET-POINT 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 Series 1500 can be ordered with up to two relays, and the Series 2100 with up to four. All relays feature independent high/low triggering, set-point, time delay, and dead band or latching.

**RS232/RS485**

The Series 2100 offers full function RS232 or RS485 communication. Using simple ASCII commands, and a modem



connected to a phone line, complete access to all display, control, and programming features from any remote location.

### **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.

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