

Technical Article

Remote Monitoring Helps Growers, Water Districts Do Their Jobs

By McCrometer

Propeller flow meters have long been an important tool for agricultural irrigation management. As water scarcity and resource management have become increasingly critical, getting the most timely, accurate readings available from those meters is becoming more important than ever. Here is how growers and water conservation districts (WCDs) are each getting the best of both worlds for their own purposes.

Satisfying Two Needs With One Resource

Keeping track of water consumption within a watershed or aquifer region requires a centralized organization to monitor data shared from a variety of water consumers. Regional water boards or WCDs serving that function depend on metering at individual pumping locations to reflect the cumulative volume of irrigation water being used. The frequency and timing of that data collection has a big impact on its practical use.

- **Agricultural Water Users.** Growers want to provide every drop of water needed to produce optimum crop yields — but not a single drop more! U.S. Department of Agriculture (USDA) trends in water use and on-farm irrigation efficiency show that growers are using technical innovation for more efficient irrigation. Today, propeller meters with integrated wireless transmission capability can document irrigation water usage, natural rainfall, and even soil moisture data — without requiring travel to field locations — and put valuable data at the growers' fingertips via a secure server with password-protected web access.

- **WCDs.** Coordinating watershed impacts, particularly during times of water scarcity, depends on collecting as much timely data as possible. The ability to analyze that data throughout the growing season, instead of only at the season's end, can make the difference between managing water resources for a successful crop vs. incurring penalties for overuse. Growers willing to collect and share that data automatically with their local WCD via a telemetry-enabled water meter can help both parties better manage water information and irrigation activities day by day, using up-to-date information.

Harvesting Huge Benefits From A Modest Investment

Having timely access to water-use data without having to visit the fields for meter reading provides multiple cost-saving and resource-management benefits to users:

- **Curb Overwatering.** Accurate meter readings, complemented by the ability to adjust irrigation schedules according to rain-gauge or soil-moisture readings, help optimize both the cost and the horticultural balance required for maximum crop yield.
- **Save Money And Effort.** Eliminating meter-reading field trips optimizes staff deployment and equipment logistics and reduces farm vehicle mileage, travel time, and fuel expenses.
- **Minimize Waste.** Having timely readings to reduce unnecessary water use conserves

energy expended for pump operation. It also helps growers optimize the value of ag-chem treatments by making sure that oversaturated fields won't wash away or disrupt the efficacy of valuable fertilizers or pesticides.

- **Protect Valuable Limited Resources.** Timely water consumption tracking enhances the ability to build up water reserves against subpar rainfall or drought.

Easy Access For Remote Use

The concept behind automated metering infrastructure (AMI) used in residential data collection now extends remote metering capability to propeller meters used for agricultural irrigation.

- **Multiple Mode Access.** Two remote communication modes are available to meet the physical challenges of the most remote applications:
- **Cellular data transmission units** access reliable cellular communication networks where available.
- **Satellite-capable data transmission units** satisfy the most remote locations where cellular service is unavailable.
- **Field Proven.** Irrigation applications can change based upon available groundwater or surface water resources. Propeller meters handle both water sources equally well — even water from ponds, canals, or streams having a higher rate of total suspended solids (TSS).
- **Long Life.** Lithium-battery-powered units transmit collected data to a secure user interface program on a user-specified schedule (e.g., hourly, daily, etc.), providing from three to four years of daily water readings. Solar-powered rechargeable batteries are optional.
- **New And Retrofit Options.** Digital and mechanical registers are available preassembled on new propeller meters or as retrofittable units for propeller meters that have been in service for decades. Adding wireless transmission capability to an existing mechanical meter permits remote monitoring without affecting the meter's ability

to display flow rate and totalization for onsite visual confirmation.

- **Digital Accuracy.** If a digital register is used, the flow rate and totalizer values will always be identical between the onsite meter display and the web-based user interface, because it does not rely upon pulse readings to convert analog readings to digital values.
- **Add-On Capabilities.** In addition to providing accurate and up-to-date water consumption data, built-in telemetry units can accept other electronic inputs that empower growers to optimize control without repetitive trips to remote field locations:
- **Rain gauges** can track naturally occurring water accumulation of water to reduce the need for irrigation from groundwater or surface water sources.
- **Pressure gauges** can provide important diagnostic information to monitor pump operation and ensure uniform coverage of the irrigation pattern across a field.
- **Solar panels** can be used to recharge batteries automatically for longer unattended operation.
 - **Extended antenna cables** allow for better antenna positioning to improve data transmission in applications obstructed by vegetation or structures.
 - **Digital and voltage-based soil-moisture sensors** (not capacitance probes) can enable users to manage irrigation based on actual water need vs. a predetermined schedule.
- **User-Programmable Operation.** A dashboard-style user interface makes it easy for growers to manage system operation and monitor data through any web-enabled device.
- **Mobile-App Accessibility.** Access to timely data is also available through Android and iOS-based smartphones or tablets.

Helping Growers And WCDs Succeed

Having current and cumulative water consumption data lets growers pace their water allocation across

an entire season instead of being surprised with a costly penalty when a season-ending reading shows they exceeded their allocation.

For WCDs, having accurate snapshots of water use throughout the year is more useful than having to wait for an end-of-season report when it could be too late to protect a stressed aquifer. That is where a retrofittable telemetry solution can deliver a very affordable, yet valuable, benefit for existing propeller meter installations.

Some WCDs interested in incentivizing growers to adopt the electronic transmission approach offer cost-share programs to achieve that goal. Additional funding might be available through other government sources such as a state Department of Water Resources, a state Department of Natural Resources, or the federal Bureau of Reclamation Water Smart Grants.