Absolute vs. Incremental Encoders for AMR Applications

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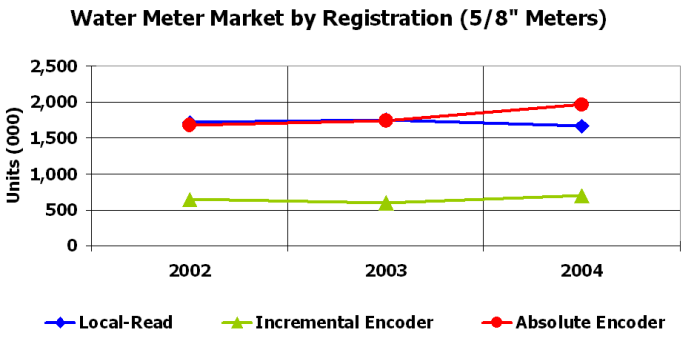
As the U.S. water AMR market continues to grow, sales of encoder registers exceed sales of their local-read counterparts (See chart below). Most encoder registers sold are absolute encoders, outnumbering incremental encoders ("pulse-type") by almost 3:1. While many of these absolute encoders go into touch-read service, many also are attached to new AMR units.



Data from Proprietary Publishing

Badger Meter introduced the ADE® (Absolute Digital Encoder) register in 2003 to address the portion of the utility market that prefers absolute encoders. Since then, the ADE has proven to be a valuable tool in helping Badger to be evaluated by these accounts.

The availability of the ADE means that utilities considering a Badger® AMR system now have a choice of registers. There are significant differences in the way AMR systems perform with absolute encoders as opposed to incremental registers, and these should be considered when that choice is made. The following discussion is intended to help clarify those differences.

LATENCY

An AMR device attached to an absolute encoder register does not automatically update its reading every time the register reading changes. That's because the process of obtaining the reading from the register (called "interrogation") consumes AMR battery power. Too-frequent interrogation would reduce battery life to an unacceptable level. To circumvent this, the AMR device will interrogate the register at fixed intervals. Badger's ORION® system is typical of others in the industry, interrogating the register at one-hour intervals. This means that even though the ORION transmitter broadcasts a reading every four seconds, the broadcast is always the same during the one-hour period between interrogations. This delay of up to one hour is referred to as latency. With each hourly interrogation, the AMR reading is "caught up" to the value on the register.

AMR devices connected to incremental encoders, on the other hand, are always up-to-date with the current register reading. These AMR devices constantly monitor their connections to the register, looking for the momentary closed-circuit condition that signals that the register has incremented another unit. In the case of the ORION system connected to an RTR® incremental encoder on a residential meter, this means that every gallon (or 0.1 FT^3) of water consumed immediately results in an update to the signal broadcast by the ORION transmitter.

Why is this significant? For a utility that needs nothing more than a monthly reading, a possible one-hour latency may be of no concern. It can be important, though, to anyone considering some of the value-adding accessories available with ORION. For example, the ORION Water Meter Monitor is a device that provides the water consumer, the utility's customer, with an in-home display of the water meter reading. The Water Meter Monitor receives ORION transmissions and displays them on an LCD screen. If the ORION transmitter is connected to an absolute encoder register, the ORION Water Meter Monitor will display the same reading for one hour at a time, even though water may be used during that period. This may reduce the value of the Water Meter Monitor in the eyes of the consumer. If the ORION transmitter is connected to an incremental encoder, the ORION Water Meter Monitor is always up to date with each gallon (or 0.1 FT^3) as it is consumed.

Another example is the ORION Data Profiler. The Data Profiler logs ORION readings at predefined intervals, which may be as often as every fifteen minutes. A minimum of 24,000 readings can be stored for later retrieval and analysis. When the ORION system is connected to an absolute encoder register, the Data Profiler would see the same reading for one-hour intervals, making more-frequent logging impossible. If the RTR is used, the readings logged by the Data Profiler are always current.

With the growing prevalence of fixed network AMR systems, utilities have increasingly high expectations of the quantity and quality of meter data that will be available. ORION will offer the utility a choice of network technologies, including Power Line Carrier, Wi-Fi, Broadband Over Powerline, and Adaptive Hierarchies. Users of these networks will expect access to real-time data, not chopped into hourly intervals.

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RESOLUTION

Most absolute encoders in the water industry have resolutions of ten or more gallons. Badger's ADE® register, for example, has an electronic resolution of ten gallons (or one FT^3) for residential service meters. The RTR® incremental encoder has a one-gallon (or 0.1 FT^3) resolution in similar applications.

This difference in resolutions has an impact on the usefulness of the ORION® Water Meter Monitor and Data Profiler. A consumer may find it confusing or frustrating to observe that, even after the one-hour latency period, a flow of up to ten gallons may not cause any change in the display of the Water Meter Monitor. Data obtained from the ORION Data Logger will be of much more value if it is accurate to the gallon, instead of tens of gallons.

CONCLUSION

With finer resolution and real-time data, incremental encoders such as the RTR offer significant advantages in AMR applications.

The RTR, with over five million units delivered, has enabled Badger to become the leading vendor of AMR systems to water utilities. The value that the RTR adds to the ORION system will help to ensure that the RTR is the encoder of choice for a long time to come. ■