# ABSOLUTE AND DIGITAL ENCODERS – WHAT'S THE DIFFERENCE?

In 1964 the first absolute encoder was introduced to the water industry, and it took several years before the encoder displaced the pulser as the standard. Within the last decade several new technologies to communicate meter readings have been introduced – some are absolute encoders and some are digital encoders.

So what are the differences between an absolute encoder register and a digital encoder register?

## ABSOLUTE ENCODER REGISTERS

Absolute encoder registers (Figure A) are generally defined as registers in which the visual and remote readings are generated from the same source. Because the local and remote meter readings originate from the same source, there is no opportunity for discrepancies between these readings.

Absolute encoder registers are not dependent on battery power in order to maintain the register odometer reading. As a result, an absolute encoder will not lose its readings just because it loses power.

Because of these two key points, absolute encoders provide the Utility with confidence that the readings generated remotely are accurate and match those on the local register. Furthermore, manufacturers of absolute encoders are able to provide a warranty guaranteeing that the remote and local readings will always match.

New generations of absolute encoders have replaced the mechanical odometer with a Liquid Crystal Display (LCD). These devices provide higher resolution and enhanced diagnostic features to identify leaks, reverse flow, and tampering. Even though they have an LCD, the meter reading data is not dependent on a battery. The remote reading is accessed from the same non-volatile memory as the visual reading and therefore ensures there is no discrepancy between the readings.

Figure B: Cross-Section of a Digital Encoder

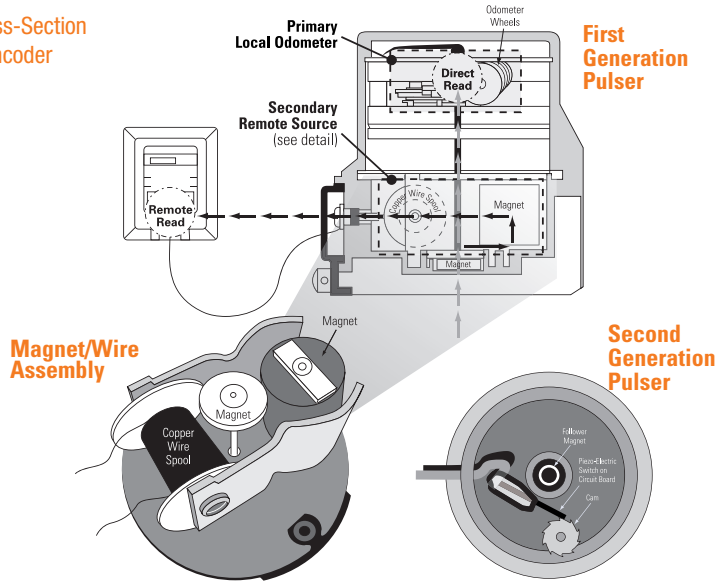
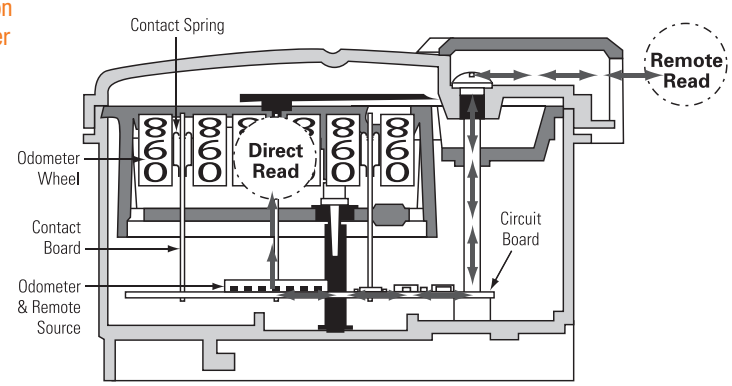



Figure A: Cross-Section of an Absolute Encoder




## DIGITAL ENCODER REGISTERS

In comparison, digital encoder registers (Figure B) typically generate pulses proportional to the flow of water through the measuring element. These pulses are counted and the count is stored, either in memory inside the register or in memory inside the meter interface unit (MIU) to which the register is connected. In addition to the stored pulse count, the register will typically have a local visual reading that is driven in parallel with the pulse generation.

The design of most digital encoders consists of a visual totalization, independent from its stored pulse count,

which drives the remote reading. As a result of this independence, there can be discrepancies between the remote and local totalizations. Pulses can be lost; as a result, the user may not be billed for all of the water consumed. While the loss of revenue can be significant, the Utility should not overlook the potential cost to its reputation in the event that the public becomes aware of meter inaccuracies.

Another issue with digital encoders is that the remote counter must be synchronized to match the local register. This requires programming of the MIU and brings with it the opportunity for incorrect entry of the initial totalization and incorrect programming of the pulse factor.

Digital encoders also typically depend on batteries to power the memory for the pulse count. Loss of battery power results in loss of pulse counts and the inability to extract the remote reading.

Some digital encoders attempt to compensate for the potential for discrepancies in readings by alerting the reader with an error flag if the wiring between the register and MIU has been disconnected. This error detection may catch some problems but is generally not effective in identifying lost pulses or situations where the connection is intermittent due to loose wiring, or shorts due to staples through the wiring.

Because of these many design issues, there is no way the digital encoder manufacturer can guarantee the remote reading will always match the local reading.

As a result of these shortcomings with digital encoders, some Public Utility Commissions require that the register and remote readings be synchronized annually. This often means that once a year someone has to visually read the meter and verify that it has the same reading as the remote. Gaining access to indoor meters often requires appointment setting and all of the issues inherent with having a meter reader enter a customer's home. Wasn't this the problem that remote systems were designed to address?

| | ABSOLUTE ENCODER | DIGITAL ENCODER |
|---|---|---|
| Are the remote and local readings generated from the same source? | Yes | No |
| Does the system rely on battery power to maintain its pulse count? | No | Yes |
| Does the installer need to program the MIU when it is retrofitted to an existing meter? | No | Yes |
| Does the Public Utility Commission require an annual verification of the remote and local readings? | No | Possibly, it depends on the state PUC rules. |
| Can the manufacturer guarantee that the remote and local readings always match? | Yes | No |

## SUMMARY

Absolute encoders provide many benefits over digital encoders, resulting in better reliability and accuracy that make absolute encoders the best solution for Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) systems. The Utility and its customers can be certain that the remote and visual reading match, providing assurance that the billed consumption is accurate.

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