Detecting Leaks and Reverse Flow with 100W Series ERT Modules

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INTRODUCTION

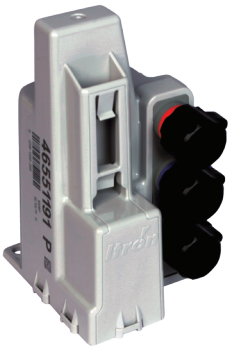
As demand on water distribution systems continues to grow, more and more utilities are striving to improve the quality of service they provide, reduce water loss, prevent theft or misuse, and educate customers on conservation strategies. Utilities seek to proactively create a smarter, more satisfied consumer, and ensure that Earth's most precious natural resource is used as efficiently as possible.

Itron's 100W Series water ERT modules feature robust leak and reverse flow detection capabilities to help utilities realize these goals.

ABOUT 100W SERIES WATER ERT MODULES

The intent of this white paper is to discuss the advanced leak and reverse flow detection capabilities of Itron 100W Series ERT modules (100W, 100W-R, 100WP and 100WP-R).

Designed for the water market, 100W series ERT modules are part of Itron's ChoiceConnect™ suite of data collection solutions. Created with simplicity and reliability in mind, these compact ERT modules provide superior performance in harsh pit environments and all manner of remote applications.



100W ERT Module

100W-R ERT Module

The 100W features advanced leak, reverse flow, and cut-cable tamper detection, as well as a 20-year battery life. With these advanced features, utilities deploy 100W ERT modules to reduce operations and maintenance (O&M) expenses and improve customer satisfaction.

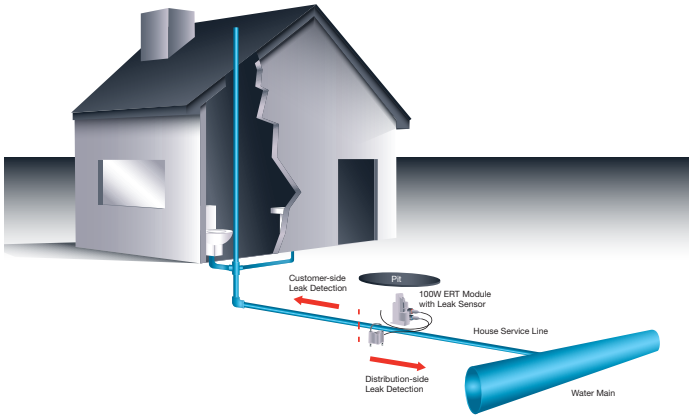
In fixed network mode, the 100W Series water ERT modules utilize 120 radio channels (50 in mobile mode) randomly, selecting one channel for each data message. This multi-channel approach delivers improved reading performance over competing products by reducing the effect of interfering radio signals. Itron also increased the 100W Series water module's radio frequency (RF) output power and employed an optional advanced remote antenna (available in the 100W and 100WP ERT modules) to optimize meter reading performance.

These water ERT modules work with the Itron ChoiceConnect radio-based handheld computers, mobile collection systems, and fixed networks.

DETECTING LEAKS WITH 100W SERIES ERT MODULES

The 100W Series ERT modules provide system leak detection for any leaks occurring after the meter register.

The specific leak detection operating range is controlled by three parameters. These parameters determine:



» Frequency
How often the ERT module checks for a leak.

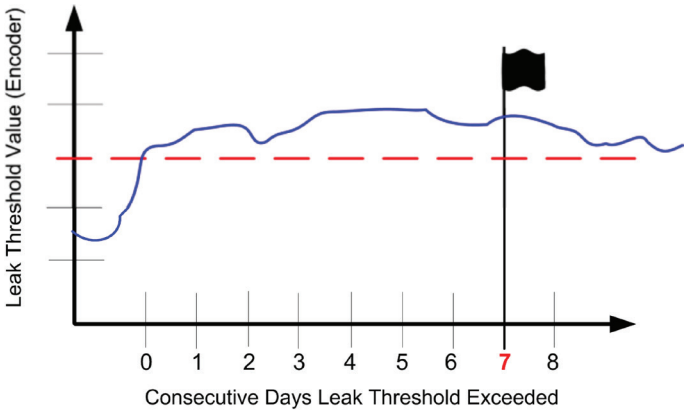
» Time Period
How many consecutive non-zero flow periods occurred and were reported by the ERT module.

» Threshold
How much water must flow during a presumed quiet period (the period of time when little to no flow is typically registered) to be reported as a leak.

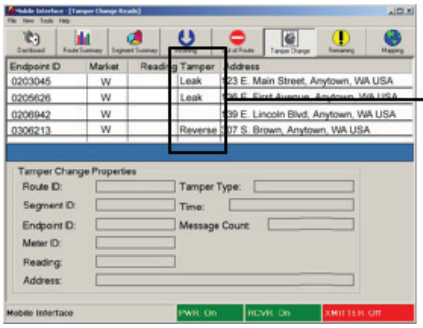
Detection Methodology for Encoder-Style Registers

For encoder-style registers, the least significant digit reported by the register determines the smallest amount of water loss that can be considered a leak. Itron sets the value for this parameter during the initial ERT programming phase of the manufacturing process.

After the lowest metered amount is repeatedly detected every hour over a monitoring period of seven (7) days, the defined parameters activate the leak detection flag in the ERT module.



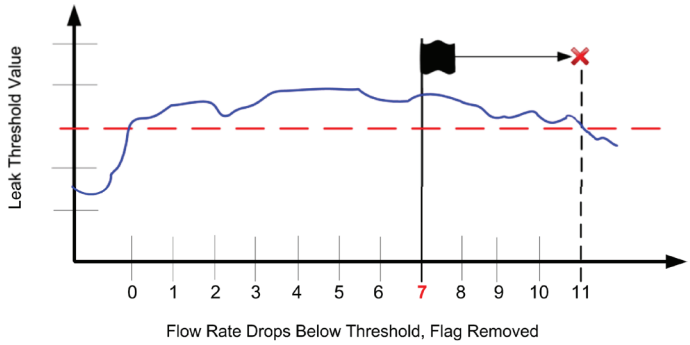
The leak detection flag is passed to the ChoiceConnect collection applications so system administrators or service representatives can alert customers about a potential leak.



Tamper flag indicator in the MC3 Mobile Interface software application (part of ChoiceConnect)

Utilities can depend on the 100W Series ERT modules to monitor their systems for leaks and enable them to quickly notify customers. Since the leak in the example occurs after the meter register, utilities will receive compensation for any lost water. Utilities can use the 100W Series ERT modules to educate customers and help them become proactive on stemming the tide of lost water. Customers can address potential issues and take action to correct the problem and prevent a higher-than-normal bill—and the utility eliminates a potential bill complaint—during the next cycle.

The leak detection flag remains set until the metered flow drops below the least significant encoder register value. Once this occurs, the leak detection flag will be removed and the seven day period will reset.

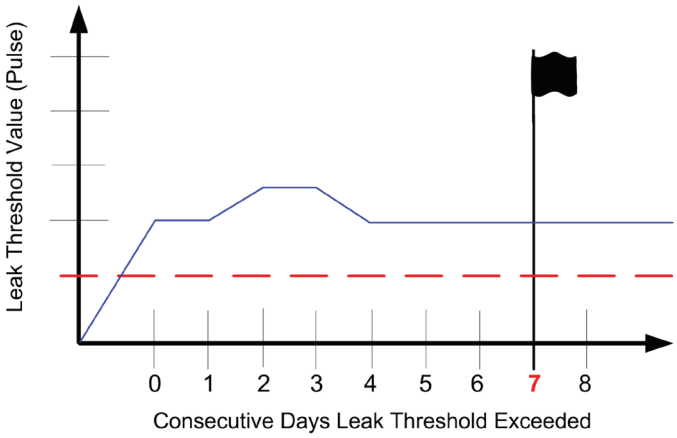


The ChoiceConnect collection system reflects the cleared tamper flag after a data packet is transmitted indicating the leak threshold is no longer exceeded.

Detection Methodology for Pulser-Style Registers

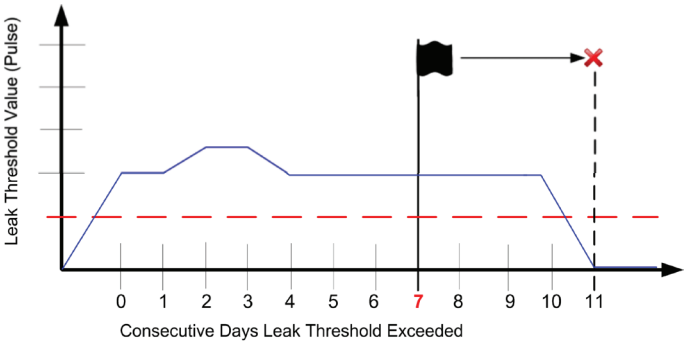
The detection methodology for pulser-style registers is similar to that for encoder registers. The metered flow that generates one pulse determines the smallest amount of water loss that can be considered a leak. Itron sets the value for this parameter during the ERT module programming phase of the manufacturing process.

The leak detection flag in the ERT module is activated once the minimum pulse value is repeatedly detected every hour over a monitoring period of seven (7) days.



Similar to encoder registers, this flag is then passed to the ChoiceConnect collection application so system administrators or service representatives can alert customers about a potential leak.

The leak detection flag remains set until the metered flow no longer produces a single pulse from the register. Once this occurs, the leak detection flag is cleared and the seven day period is reset. The ChoiceConnect collection system reflects the cleared tamper flag when a data packet is transmitted indicating the leak threshold is no longer exceeded.



DETECTING REVERSE WATER FLOW WITH ENCODER-STYLE ERT MODULES

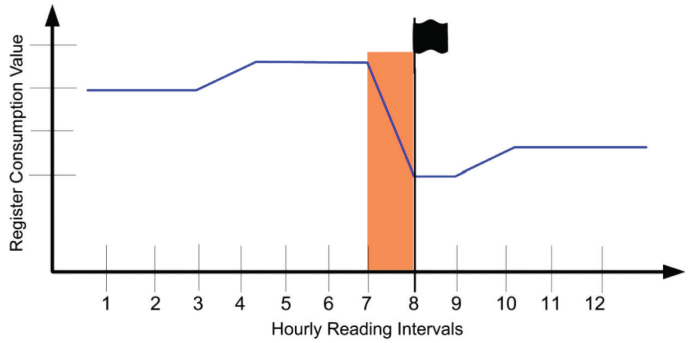
Reverse flow (also referred to as backflow) can occur for a variety of reasons:

- Water main breaks can produce a significant loss of system pressure downstream and cause water to flow in the opposite direction to equalize pressure
- To reduce bills and "outsmart" the utility, unscrupulous customers may tamper with or invert a meter
- During new construction, an untrained or inattentive contractor may inadvertently install the water meter incorrectly
- Water pumps (for both residential and large-scale commercial and industrial customers, as well as water utility pumping stations) may malfunction and lose the ability to distribute water through the system in the proper direction
- A meter register may report an inaccurate consumption value. The register dials may record accurate consumption but electronics in the register may not read those properly and return a lower consumption value than the previous reading. Even though a reverse flow event has not occurred, this error in the data indicates a problem with the meter or ERT module that may need to be addressed

The 100W Series encoder-style ERT modules (100W and 100W-R) feature reverse flow detection based on a simplified approach to determine revenue loss resulting from meter reversal.

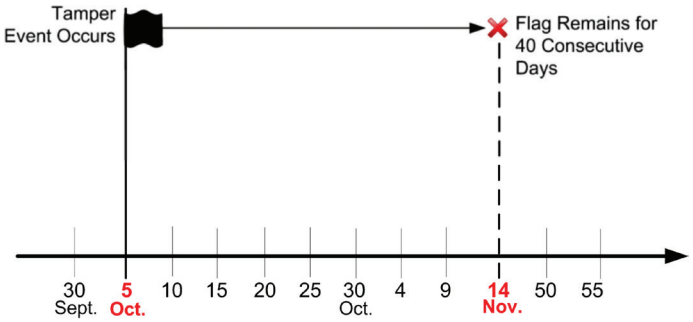
100W Series encoder-style modules detect reverse flow and theft by comparing differences in the register's consumption value recorded by the ERT module. When the current register reading is less than the previous reading, one of the following situations is true:

- An external pressure source caused water to flow backward through the meter
- The meter was reversed in an attempt to lower the future reported consumption value
- The register reported an incorrect consumption value



When the ERT module detects a reversal condition, an alarm flag is set that is reported to the utility by means of the meter reading equipment and associated ChoiceConnect collection software.

The reverse flow alarm remains set for a period of 40 days to ensure it is reported within a typical monthly reading cycle. The alarm is disabled at the conclusion of the required 40 day period—provided no additional reverse flow events occur in that timeframe. Each reversal event immediately initializes a new 40 day period.



SUMMARY

In addition to a low-cost of ownership, ease of installation, superior performance, and reliability, 100W Series water ERT modules provide robust leak and reverse flow detection capabilities. By deploying 100W Series ERT modules in water systems, utilities can help reduce high customer water bills, help educate their customers about water conservation efforts and alert customers about potential water usage problems in their residence, as well as more effectively identify and address potential theft or service quality issues.

Itron is a global technology company. We build solutions that help utilities measure, monitor and manage energy and water. Our broad product portfolio includes electricity, gas, water and thermal energy measurement and control technology; communications systems; software; and professional services. With thousands of employees supporting nearly 8,000 utilities in more than 100 countries, Itron empowers utilities to responsibly and efficiently manage energy and water resources.

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