Honeywell | Oil & Gas Solutions

LEAK DETECTION FOR LIQUIDS PIPELINES USING EXPERION® PKS EMBEDDED LDS

Product Information Note

Built-in API RP 1130 compliant leak detection.

Make the most of embedded LDS technology as a standard part of your pipeline SCADA system.

The Experion SCADA liquids leak detection application is hosted as part of the Experion Server and allows organizations in the liquid transmission pipeline industry to use a computational pipeline monitoring (CPM) leak detection method to monitor their flow and pipeline performance by taking advantage of the embedded Leak Detection technology.

EXPERION® PKS embedded leak detection system for liquid pipeline simplifies 49 CFR § 195.134 compliance.

The Experion SCADA leak detection application uses the compensated volume balance method which is a type of leak detection system that is currently employed in pipelines around the world. This methodology infers the existence of a leak based on the balance of mass inside the pipeline segment, adjusted by the change in the line balance. The line balance in the Mass-Volume Balance calculation is based on calculations defined in API TR 1149. The solution also employs multiple Sequential Probability Ratio Test (SPRT) analysis methods over the line balance results to improve leak detection sensitivity and reduce the occurrence of false alarms.

Key Features in Liquid LDS Offering

- API 1130 compliant as required by 49 CFR § 195.134
- Pipeline Hydraulic Model including pressure profiles
- Linepack Computation
- Leak Detection – Compensated Line Balance
- Leak Detection – Statistical Analysis
- Leak Location
- Static Leak Detection

FEATURES & BENEFITS

- Reduced system complexity and footprint. No need for another LDS server to buy, engineer, integrate and maintain.
- Simplifies compliance with 49 CFR § 195.134
- One service engineer can service or modify LDS and SCADA controls
- On process upgrades to future releases.
- Operates during steady state as well as transient conditions
- Suitable for single-phase liquids pipelines.
- Linepack, leak and operational data available to SCADA and other applications by default.
- Can be deployed on pipelines up to 100 miles / 160 km and up to 24” / 600 mm in diameter or on large pipelines based on Leak Sensitivity Analysis by Honeywell per API RP 1149.
- Easily scalable to include new additions to pipelines without interruptions
- Uniform engineering and operations environment for SCADA and Operational applications
- Uses flow, pressure, and temperature transmitters from SCADA, DCS, PLC or RTU.
- Pipeline Model is built using standard equipment templates covering all associated points, calculations, linepack, leak detection, batch tracking and leak location displays, trend definitions and alarms

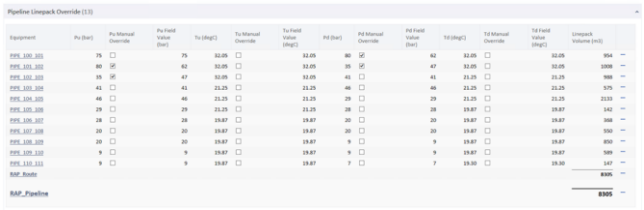
Computational Pipeline Model

The application leverages a pipeline model which reflects the physical pipeline system and is configured as Equipment points using Experion Configuration Studio. The pipeline model reflects real-world equipment such as meter stations, pump stations, pipeline segments and pipeline routes that reflect the components of the pipeline system.

Linepack

Linepack is the amount of liquid volume in the pipeline and is calculated for each segment in the pipeline and summarized for the routes and pipelines in the pipeline model.

Manual override of pressure and temperature measurements is supported. The linepack is also displayed along with change indicators showing whether the linepack is increasing, decreasing or constant.



Linepack override display allows the operator to override the field values when transmitters are offline or known to have unreliable data.

The linepack calculation in Experion compensates for the following:

- Effect of pressure on pipe
- Effect of pressure on product
- Effect of temperature on pipe
- Effect of temperature on product

Leak Detection – Compensated Line Balance

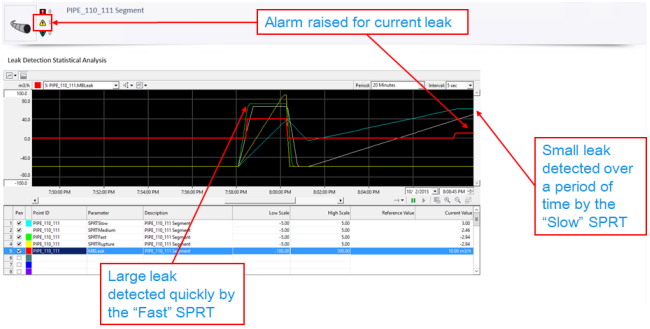
Line Balance leak detection is based on the principle of conservation of mass. For any given period, flow into the pipeline should equal to the flow out of the pipeline, adjusted by the change in the linepack. If the sum of inflow, outflow and linepack goes out of balance then a leak is suspected and further processed with Statistical Analysis.

To preserve the principle of conservation of mass, the inflow and outflow volumes are compensated to API calculations for the effects of pressure and temperature.

Leak Detection – Statistical Analysis

The compensated line balance is processed using hypothesis testing via the Sequential Probability Ratio Test (SPRT). This test determines the likelihood of the calculated line imbalance is a leak.

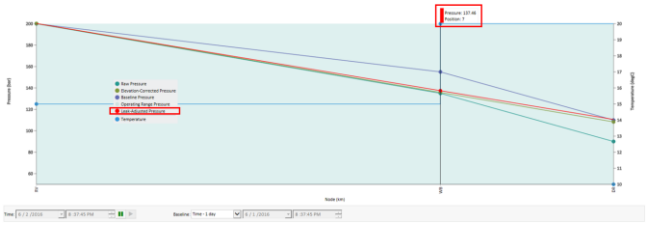
The SPRT requires a minimum leak rate to be configured. To ensure timely detection of leaks of various sizes, four leak rates are configured. Each leak rate is then used in a separate SPRT calculation.



A graphical representation of the statistical analysis results can be found on the Statistical Analysis View of the Pipeline segment.

Leak Location

Uses the pressure profile across a pipeline to locate a leak. Using this method, the flow / pressure characteristic of the pipeline is calculated during a leak free period. When a leak is detected the flow/pressure characteristic is used to predict the pressure profile from the inlet end, and separately from the outlet end. By comparing the two predicted profiles the leak location can be calculated.



Pipeline Profile display will indicate where a leak is located.

Static Leak Detection

Static, or shut-in, leak detection is the process of testing for leaks while the pipeline is “shut-in” (i.e., flow is 0, and the pipeline is closed at both ends). The decay of the pressure along the pipeline is monitored for a period. A second test run is then performed - if the difference in pressure drop between the two tests are over the threshold, a leak is detected.

Sensors Used

The following sensors are required for the Experion liquid leak detection solution.

- Pressure sensors at the pipeline supply and delivery, and optionally, at intermediate pump and valve stations along the pipeline.
- Flow meters at the pipeline supply and delivery.
- Temperature sensors at the pipeline supply and delivery.

Robust Architecture

The liquid leak detection data is stored on the Experion servers and takes advantage of its redundancy capabilities to provide increased robustness.

For More Information

Learn more about how Honeywell’s Experion SCADA can improve pipelines performance, visit www.honeywellprocess.com or contact your Honeywell Account Manager.

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