



Leak detection and localization system

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DIWICON-L

DIWICON-L

DIWICON-L is a member of the DIWICON technology family which offers a range vertical products and solutions for industries requiring mission critical reliability.

The DIWICON-L system is designed to detect and locate losses from liquid transport pipelines. Losses from pipeline networks, apart from environmental damage, can result in life threatening situations. Quick detection and precise localization of losses reduce or eliminate resulting damages.

ADVANTAGES OF THE DIWICON-L SYSTEM

- Continuous hydraulic monitoring
- Event detection within 1 minute
- Localization precision +/- 250 m
- Can be used on short pipelines
- Can be integrated into any SCADA system
- Standardized wireless data communication



The DIWICON-L system is an indispensable accessory for crude oil, petroleum product, and liquid gas pipelines. It gives the pipeline operator the possibility to quickly react to pipeline accidents.

SYSTEM ELEMENTS

- Ultrafast pressure transmitters
- Field signal processing units
- Field data communication devices
- Central server computer
- Monitoring software package

SYSTEM CHARACTERISTICS

- Unlimited expandability
- Modular
- Standard data interfaces
- Thin client technology
- Redundancy
- Distributed intelligence

TECHNOLOGICAL DATA *

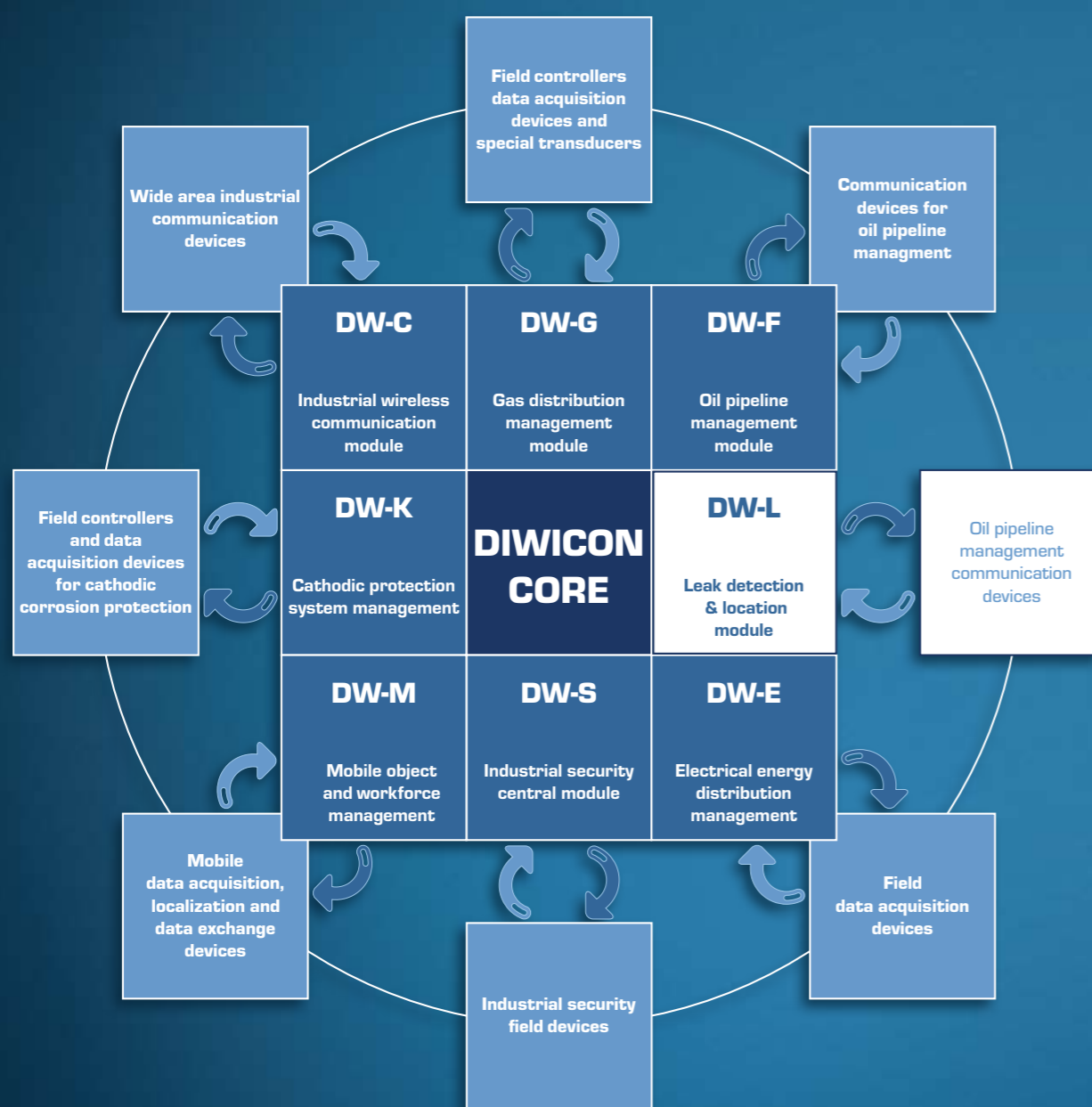
Standing pipeline:

- Detection threshold: 0.5 liter/min.
- Localization precision: +/- 100 m
- Alarm: within 2 minutes

Transit pipeline:

- Detection threshold: 0.5 liter/min.
- Localization precision: +/-250 m
- Alarm: within 2 minutes

*The data shown is based on a 100Km DN200/PN64 crude oil pipeline. The sensitivity, localization precision, and reaction time improve on shorter pipelines.



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DIWICON-L Technology

The leak detection system is based on CASON DIWICON technology.

The close cooperation between the hardware, software, and communication elements which make up the system provide monitoring, displays, and automatic analysis of the hydraulic events within the pipeline.

When a loss occurs, the system generates an alarm and the operators make the event data available.

DIWICON-L Operation

The CASON DIWICON-L technology is based on the monitoring and automatic evaluation of pressure variations within the pipeline.

Pressure waves are created when liquid escapes from a closed pipeline. The leak detection pressure transmitters detect these pressure waves at different times.

The transmission speed of the pressure wave through the entire pipeline is known based on previous hydraulic events.

Knowing the time of detection and the transmission speeds, the point of origin of the pressure wave can be localized.

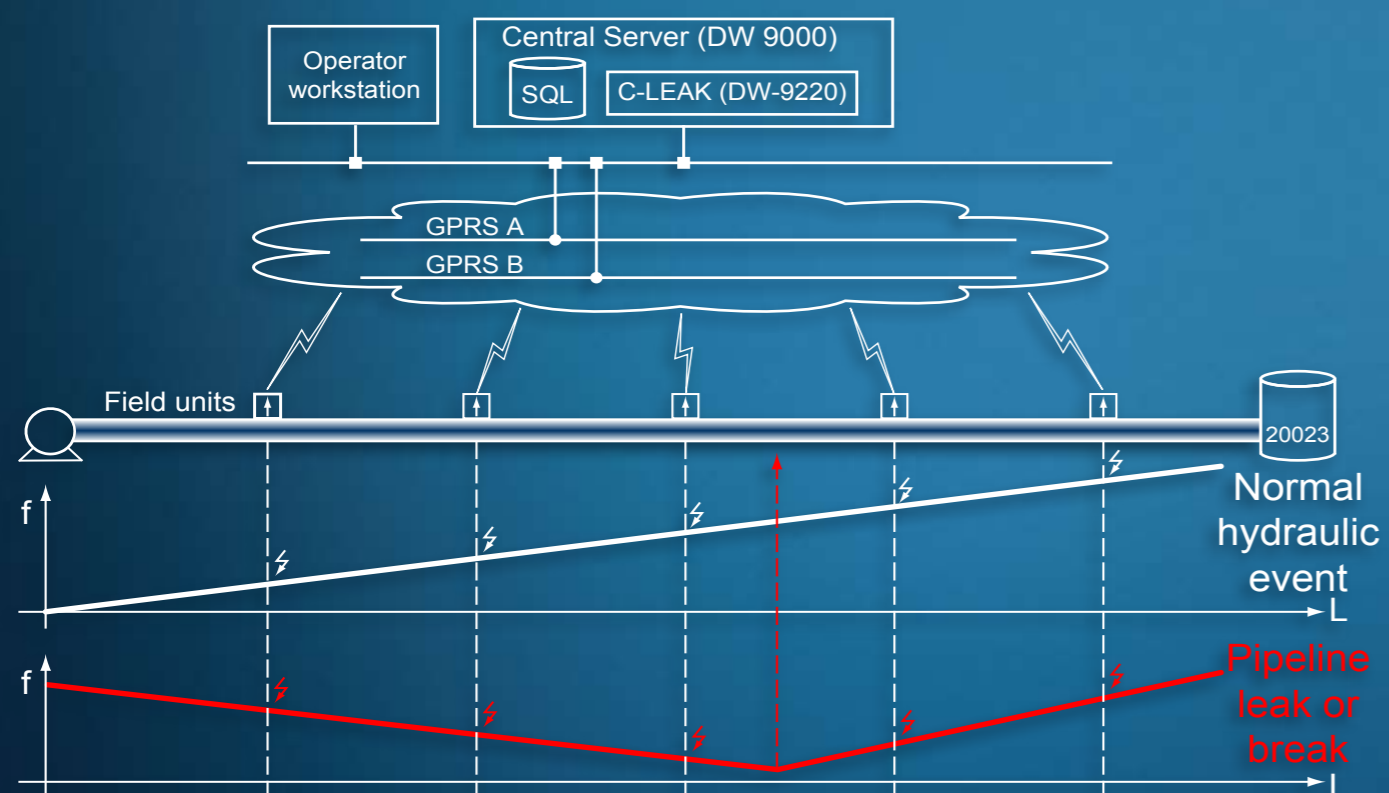
Sensitivity and precision

The amplitudes of the resulting pressure waves vary according to the type of event, and can be very small (10-30 mbar with 100 bar transport pressure).

Precise time synchronization of measurements ensures precise localization.

The DIWICON-L system's sensitivity is ensured by special pressure transmitters with a 0.1 mBar sensitivity which can perform 5,200 measurements per second.

The time synchronization of the system is performed by a separate GPS module with 1 ms accuracy.



DIWICON-L FIELD SYSTEM

The task of the field system is the local collection of pressure data, the detection of pressure waves, and communicating the data with the central system.

Timeserver (DW-712 UTC)

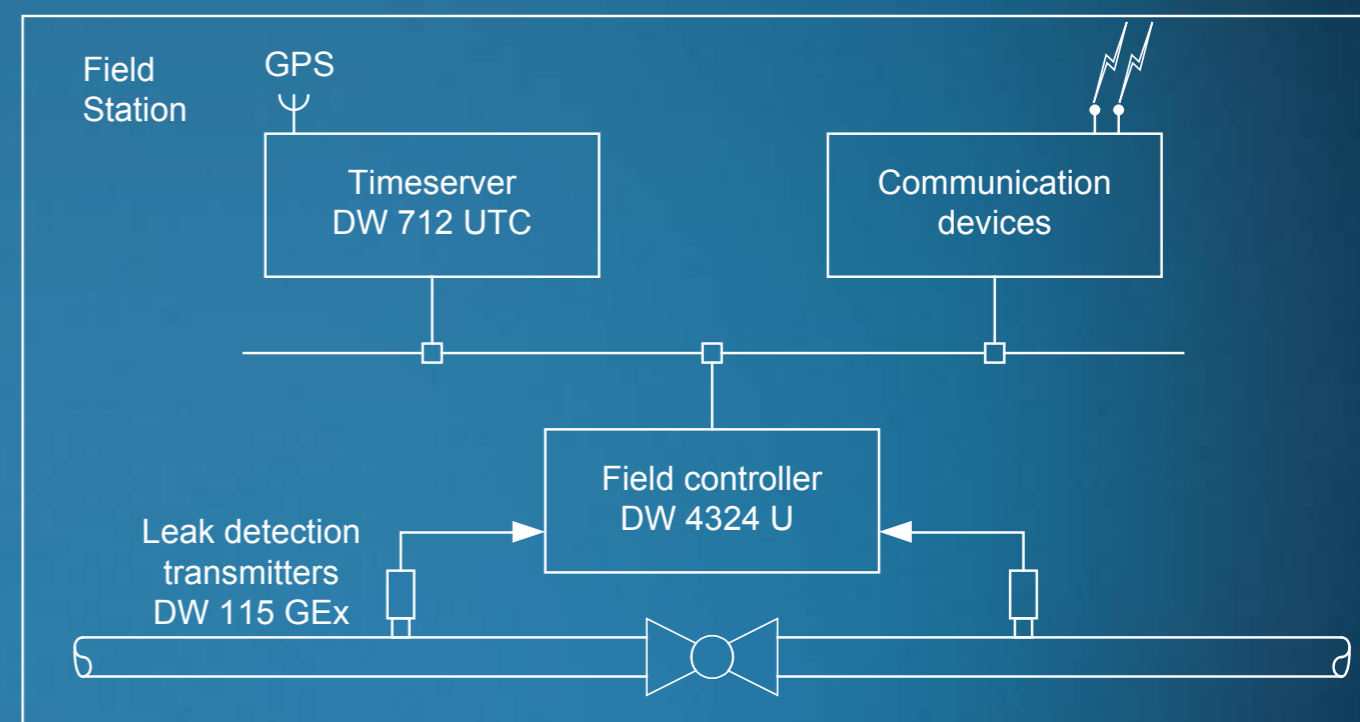
The role of the DIWICON 712 UTC exact time server is to provide exact system time synchronization to devices connected to the field Ethernet TCP/IP network.

The devices make use of an internal GPS satellite receiver to serve precise 1 ms time synchronization over a standard SNTP protocol.

Communication devices

The pipeline monitoring system, depending on its configuration, can connect to the central server via the standard TCP/IP network of the leak detection system.

When an established communication method is not present, the long distance data communication DIWICON-C industrial GPRS data transmission devices can be used.



Leak detection pressure transmitters (DW-115 GEx)

The task of the special pressure transmitters is the detection of pressure waves.

Their most distinct characteristic is their high sensitivity and low reaction time.

The transmitters are capable of reliably detecting 10 mBar pressure waves with 100 Bar transport pressure.

The speed transmitter's makes possible 10,000 measurements / second pressure value samples.

Field Controller (DW-4324)

The signal processing unit performs the processing of signals from (the) two leak detection pressure transmitters.

The device performs 5,000 measurements per second for each input.

The 24 bit digitalized signals are processed locally using mathematical statistical algorithms.

Following the pressure wave selection and determination of propagation direction, the data is transmitted to the center via the communication system.

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THE DIWICON-L SERVER

The central server examines the pressure wave relationships occurring in the pipeline and decides whether their origin is technologically based or a leak event.

DIWICON 9220 C-LEAK software module

Software module tasks:

- Reception of field data
- Storing of data in SQL database
- Real-time analysis of measurement data
- Alarm generation for the operator
- Provides a simple and logical user interface
- Historical display of events for an unlimited time



Central Server

- High reliability industrial server
- Cluster architecture
- Windows Server 2003 operation system
- MS SQL 2005 Database
- IIS 7.0 publication server
- DIWICON C-LEAK leak detection application

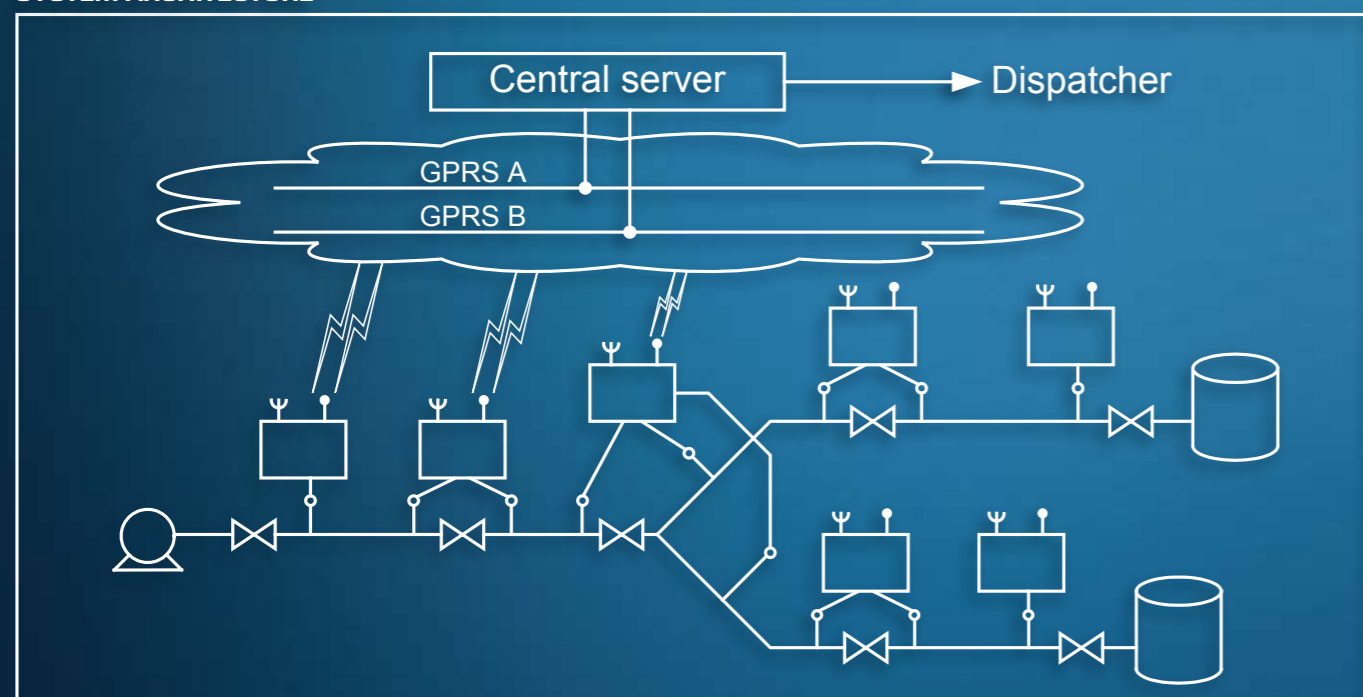
C-LEAK module characteristics

- Based on Microsoft standards
- Standard data interfaces
- Independent software module
- Easy integration with SCADA applications
- Thin client (web) display interface
- Event display on digital maps

Technological events corresponding to the process control application can be received over a standard interface. The leak detection system can automatically categorize such events as identified hydraulic occurrences.

The security of data is provided by a separate permissions system.

SYSTEM ARCHITECTURE



DW 9220 C-LEAK user interface

The leak detection alarms are typically displayed on the pipeline SCADA alarm display.

The leak detection system hands over the alarm event and the corresponding data to the SCADA system over standard OPC or XML interfaces.

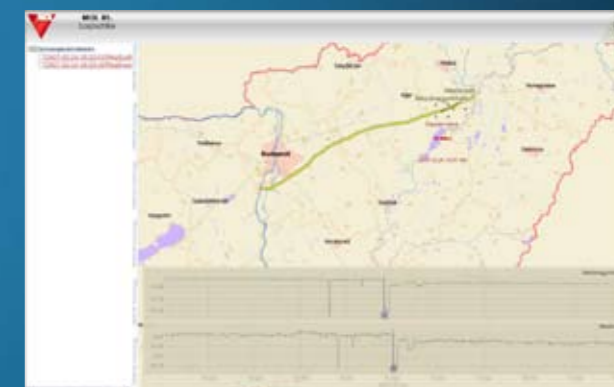
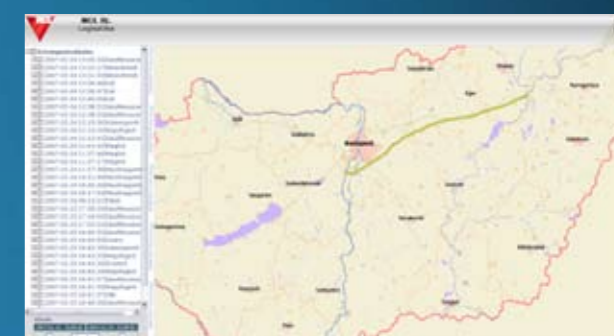
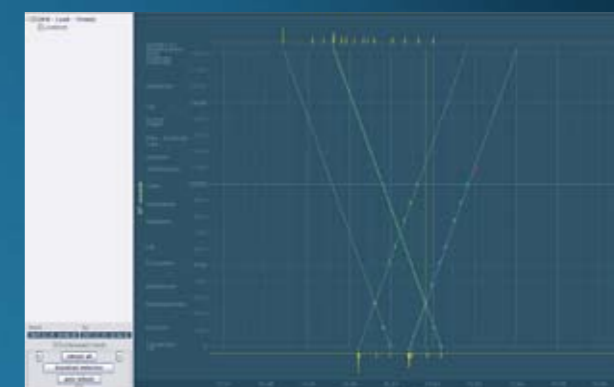
The detailed event data can be called up on a separate web interface which provides:

- The location and time of the event and GPS coordinates on a digital map.
- Alarm acknowledgement
- Pressure trend analysis for the hydraulic event
- Manual evaluation of the hydraulic event
- Viewing of the event log
- Display of hydraulic overview corresponding to the event

The hydraulic overview shows the operator the relationships between hydraulic events in the pipeline.

The cause and effect relationships of pressure waves, upon which the system's automatic decisions are made, can be examined through this interface.

In the rare cases where human intervention is required to reach a decision, an operator can override and correct the system's automatic decisions here.



MOL Nyrt. Product pipeline Operations Monitoring System
 MOL Nyrt. Product pipeline G Operations Monitoring System
 CONPET (Romania)
 PETROTRANS (Romania)
 MOL Nyrt. BT Product pipeline

DW-9220 C-LEA v1.5 1999
 DW-9220 C-LEAKv1.3 2000
 DW-9220 C-LEAK v2.7 2004
 DW-9220 C-LEAK v2.7 2004
 DW-9220 C-LEAK v3.1 2006