

Fibre Optic Leak Detection

FIBRE OPTIC SENSOR

FEATURES

- Distributed measurement of strain & temperature
- High spatial resolution
- Extended range
- Long-term stability
- Transportable system
- Single-fiber, single-end or loop operation
- Cost effective for large no. of measurement points
- Intrinsically safe

APPLICATIONS

- Pipeline leak detection
- Strain or curvature monitoring of pipeline
- Water industry / water pipelines
- Oil & gas pipelines
- Coal and metalliferous mining
- Slope stability
- Dam seepage monitoring
- Road & rail strain and settlement
- Structural monitoring



The DiTeSt® is a unique tool for the evaluation of distributed strain and/or temperature over several tens of kilometers. It is a powerful diagnostic instrument for the identification and localization of potential problems. It allows the monitoring of local strain and temperature at thousands locations by mean of a single optical fiber and in just one shot. Its inherent high stability and self-referenced principle of operation, allows on-line or off-line long-term monitoring of large structures.

The strain sensitivity of Brillouin scattering prompts to the use of such systems for distributed strain sensing, in particular to monitor local deformations of large structures such as pipelines, landslides or dams.

TECHNICAL SPECIFICATIONS

Measurement Range	Up to 30 km, 100 km using range extenders
Spatial Resolution *	1 m over 10 km 2 m over 30 km
Strain Measurement Range	Up to 2.5% *
Strain Resolution / Accuracy	2 $\mu\epsilon$
Strain Accuracy	20 $\mu\epsilon$
Temperature Measurement Range	-220°C to +500°C *
Temperature Resolution	0.1 °C
Temperature Accuracy	1 °C
Acquisition Time	20 seconds to 5 min (2 mins typical)
Number of channels	2 standard, up to 200 upon request
Dimensions	449 x 500 x 266 mm (19" rack), 20 kg
Power Supply	115 or 235 VAC, max. 400 W
Operating Temperature	0 to +40°C

* depending on type & installation of cable

TECHNICAL DESCRIPTION

The DiTeSt® is a laser-based measurement system using an optical scattering measurement principle within the sensing fiber: Stimulated Brillouin Scattering. It can operate using standard single mode telecommunication fibers and cables as sensing element, as well as with special single mode fibers. Stimulated Brillouin Scattering is an intrinsic physical property of the fiber material and provides information about the strain and temperature distribution actually experienced by the sensing fiber. The local characteristics of Stimulated Brillouin Scattering are measured thanks to an innovative and highly reliable configuration developed by the Metrology Laboratory of the Swiss Federal Institute of Technology of Lausanne. This measurement technique relies on the use of a single laser source and is therefore totally self-referenced allowing periodic measurements without any preliminary calibration.

The system can operate in two configurations: loop (with both ends of the sensing fiber connected to the measurement unit) or singleended (with a mirror at the end of the fiber). Multiple fibers can be automatically connected to the instrument through an integrated optical switch. Through the use of optional range extenders it is possible to monitor distances of up to 100 km.

The system includes an industrial PC with LCD screen and internal hard-disc storage, allowing great versatility in terms of connections:

LAN, wireless, remote control/configuration/maintenance. The integrated software is user-friendly and allows an easy setup of the parameter through the use of self-configuration wizards. Data retrieved from multiple measurements can be simultaneously displayed and compared on screen.

When pre-defined warning levels are exceeded, the system can generate alerts and activate relays (optional). The system can operate interactively or in automatic mode, gathering data according to a schedule.

The sensing optical fibers and cables are sold separately for the DiTeSt® reading unit, since different applications have different requirements regarding the integration of the fiber and the fiber type. SMARTEC will assist customers in the definition of the appropriate cables in order to get the best performances and reliability for the specific application.

The DiTeSt® system is fully compatible with other SMARTEC products. The results are stored in a standard SDB database and can be integrated with measurements from other sensors (e.g. SOFO®, ADAM, MuST®). The user can therefore view and analyze all its data with one single interface.

