

14.2010 DITEMP READING UNIT RAMAN OTDR

For distributed temperature sensing



GENERAL DESCRIPTION

The DiTemp[®] is a unique tool for the measurement of distributed temperature over several kilometers. It is a powerful diagnostic instrument for the identification and localization of potential problems. It allows the monitoring of local 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.

TECHNICAL DESCRIPTION

The measuring principle is based on the RAMAN effect and the Optical Time Domain Reflectometry (OTDR) method. Laser pulses are coupled into the fibres where the photons interact with the molecules of the fibre material. Some photons are scattered backwards and they carry information on the thermal motion of the molecules they were scattered by. Consequently, the spectrum of the backscattered light carries information on temperature of the fibres. This effect can be used to measure temperature along the optical fibre.

The spectral analysis is combined with measuring the propagation time of the laser pulses along the fibre (radar principle) as the speed of light in the fibre is known. Scanning the entire length of the fibre by short intervals (e. g. 1m) the temperature profile along the fibre is determined. It is important to know that the measured temperature of each interval is the average temperature of that individual fibre section. Due to the high speed of light, fibre lengths of many kilometers can be scanned within fractions of a second.

The system consists of reading unit, sensing cable and accessories (External multiplexer up to 8Ch, connection boxes, extension cables, splice protectors etc.). The optical fibres which are integrated into robust cables are the temperature sensitive elements and allow the measurement of temperature profiles at arbitrary times, quasi-continuously with a high spatial and temperature resolution along the cable. This is a requirement for the investigation of thermal processes.

The system is used in a wide range of applications requiring distributed temperature sensing, such as temperature monitoring of concrete in massive structures, waste disposal sites, on- and off-shore sites in gas and oil industry, hot spots, cold spots and leakage detection of flow lines and reservoirs, building installations, just to name a few.



FEATURES

- Wide temperature range
- High temperature and spatial resolution
- Short measuring time
- Long-term stability
- Easy and fast installation
- Cost effective

PERFORMANCES

Reading Unit RU	SR: Short Range RU up to 5 km - MR: Medium Range RU up to 8
Measurement Range	LR: Long Range RU up to 10 km - XR: Extreme Range RU up to 30 km
Number of channels	2, 4, 8 or 16 Ch trough external Multiplexer
Optical fibre typology	Multi Mode MM (SM, MR and LR RU) Single Mode SM (XR RU)
Spatial resolution *	1 m typical (SM, MR and LR RU) 2 m typical (XR RU)
Temperature Dynamic range	-25°C to +80°C with Ordinary Temperature sensing cable -25°C to +300°C with High Temperature sensing cable
Temperature resolution *	
At 5 km for spat. res. of 1 m	0.3°C for 10 seconds measuring time; 0.1°C for 1 minute measuring time; 0.05°C for 5 minutes measuring time
At 8 km for spat. res. of 1 m	1°C for 10 seconds measuring time; 0.4°C for 1 minute measuring time; 0.2°C for 5 minutes measuring time
At 10 km for spat. res. of 1 m	2.25°C for 10 seconds measuring time; 1°C for 1 minute measuring time; 0.5°C for 5 minutes measuring time
At 30 km for spat. res. of 2 m	2.7°C for 10 seconds measuring time; 1°C for 1 minute measuring time; 0.7°C for 5 minutes measuring time
Measuring time *	Min.10 seconds

* these parameters depend on each-other

TECHNICAL CHARACTERISTICS

Power supply	AC Power: 100 / 240 V (50 / 60 Hz) DC Power: 24 or 48 (optional power adapter)
Power consumption	120 W max.
Operating environment	Operating temperature: +5°C to +40°C Storage temperature: -15°C to + 65°C Relative humidity: 5% to 95% non condensing
Optical connectors	E2000 APC
Dimensions	H x W x D: 180 x 435 x 480 mm Weight: 21 kg

ORDERING INFORMATION

Option: External Multiplexer 2, 4 or 8 Ch

Option: External Relay Alarm Module 24 switches including alarm software

Option: DC power adapter



environmental systems & services
8 River Street, Richmond VIC 3121 Australia
T + 61 3 8420 8999 | F + 61 3 8420 8900
geotechnical@esands.com | www.esands.com