Borehole Deformation System BDS-01

Description

The borehole deformation system is based on the Fibre Bragg Grating technology and is designed to be put inside a borehole and will allow measuring the temperature and deformation in the longitudinal direction of this borehole. Figure 1 shows the principle of the deformation measurement system. The system consists of a number of extensometers outside the borehole which are placed in a canister. Within the borehole, different fixation points have been realized at well defined positions by using packers. From each fixation point, a carbon extension cable goes to the canister. The carbon extension cable is stretched using a spring mechanism. The extensometers in the canisters are connected to the outer ends of the carbon cable. In this way, any movement of the packers will be transduced to the extensometer. As a consequence, the displacement of the connected packer relative to the entrance of the borehole is measured. Furthermore, a temperature cable can be inserted to measure the temperature distribution inside the borehole.

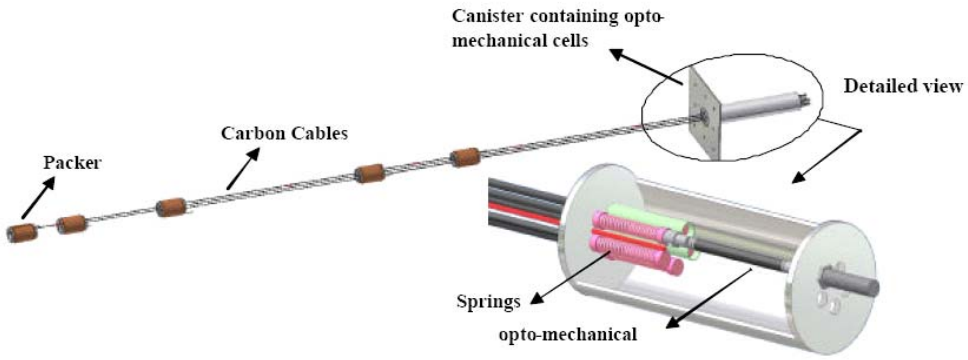

Figure 1: Schematic drawing of displacement measurement system

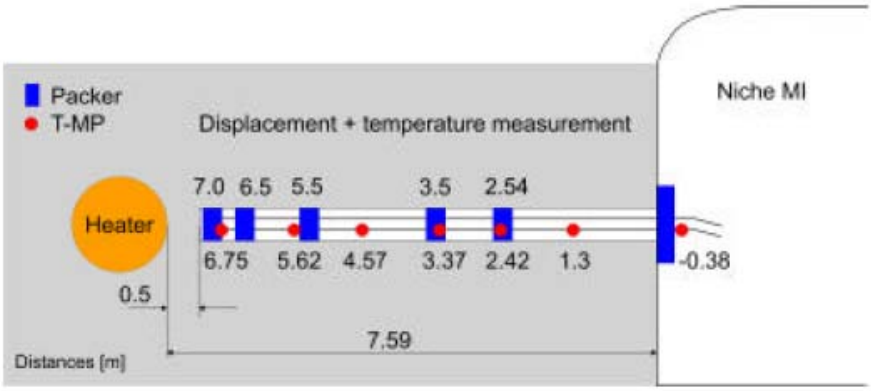

Figure 2: Example of the configuration of a Borehole Deformation

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Features

The system can measure borehole deformations with a resolution of 0,2 µm and an accuracy of 2 µm. The borehole deformation system is also sensitive to temperature changes inside the borehole with a resolution of 0,04°C and an accuracy 0,4°C.

Applications

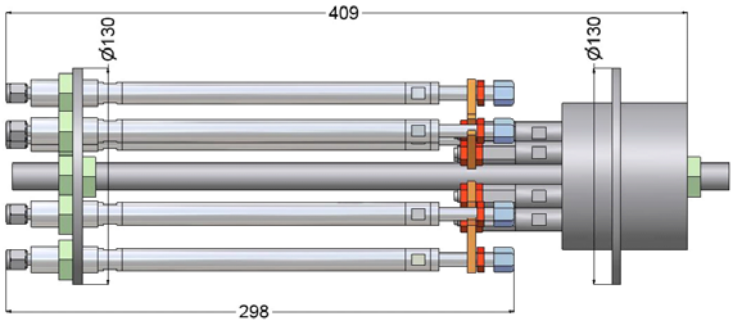
The borehole deformation system can be applied for borehole deformation movements and thermo-mechanical characterization of clay, rock, granite and salt mines.

Standard specifications

Parameter	*Unit*	*Value*
Number of extensometers		Maximum 6
Displacement range w/o reset	mm	6
Displacement range	mm	On request
Displacement resolution	µm	0,20
Displacement accuracy	µm	2,0
Temperature resolution	°C	0,04
Temperature accuracy	°C	0,4
Temperature range[1]	°C	0 to 85
Number of temperature sensing		On request
Depth of the borehole[2]	m	Up to 50
Diameter of the borehole	mm	Max 90
FBG central wavelength	nm	1530 to 1570 nm
Connector type	-	FC/PC, FC/APC

[1] *Extended temperature range possible on request*
[2] *Extended depths (borehole) possible on request*

Technical drawing (in mm)



Note: The reported resolution and accuracy values assume the use of a measurement unit with a resolution better than 1 pm and a relative wavelength accuracy better than 10 pm.

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