IWS

Instrumented Water Sampler

OCEAN DRILLING PROGRAM

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Scientific Application

The Instrumented Water Sampler (IWS) is a formation fluid sampling tool with a motorized syringe-type sampling piston. The sampling rate is controlled by software to provide a constant fluid extraction rate. The controlled extraction rate reduces the likelihood of intake screen pack off. In addition, a thermistor and pressure sensor measure in situ formation properties. Internal tool data (e.g., temperature, motor current, and voltage) are recorded to diagnose and debug problems that may occur during sampling.

Tool Operations

The IWS is the next-generation replacement for the Water Sampler Temperature Probe (WSTP) and Fisseler Water Sampler (FWS). The IWS is 5.17 m (16 ft, 11½ in.) long and can be set up to sample formation in situ fluids or bottom water. The software allows the operator to either select a time to initiate sampling or rely on the frictional heat spike of probe insertion to initiate sampling. The operator also selects a maximum sampling period. Once deployed and sampling begins, the software monitors and adjusts the syringe motor current to maintain a controlled extraction rate. The variarable-speed syringe motor will run until the sampling period is completed (timed out) or until the sample coils are full. This feature improves the quantity and quality of the collected samples over predecessor water sampling tools.

Design Features

1) Probe Tip Design

The probe tip assembly comprises an intake port, a thermistor, and a pressure transducer to record formation pressure and temperature during water sampling.

Benefit: Measures in situ formation properties that correlate with the fluid sample and provides

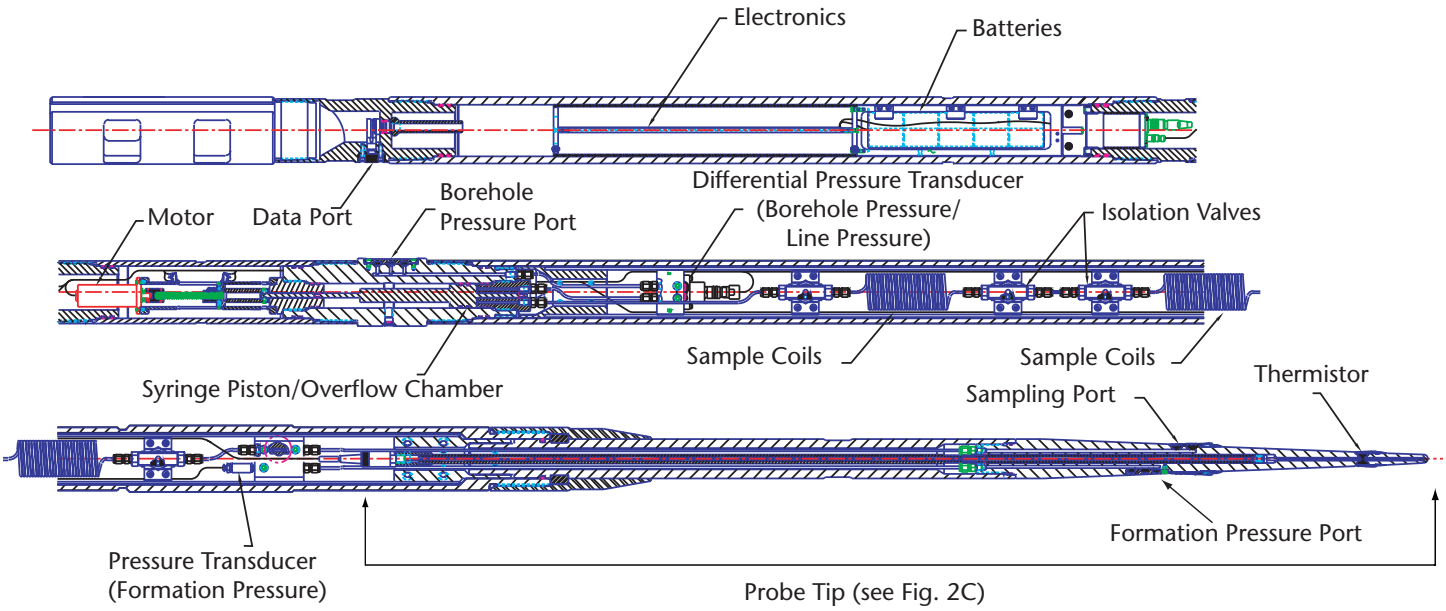

Figure 1. Schematic of the IWS tool.

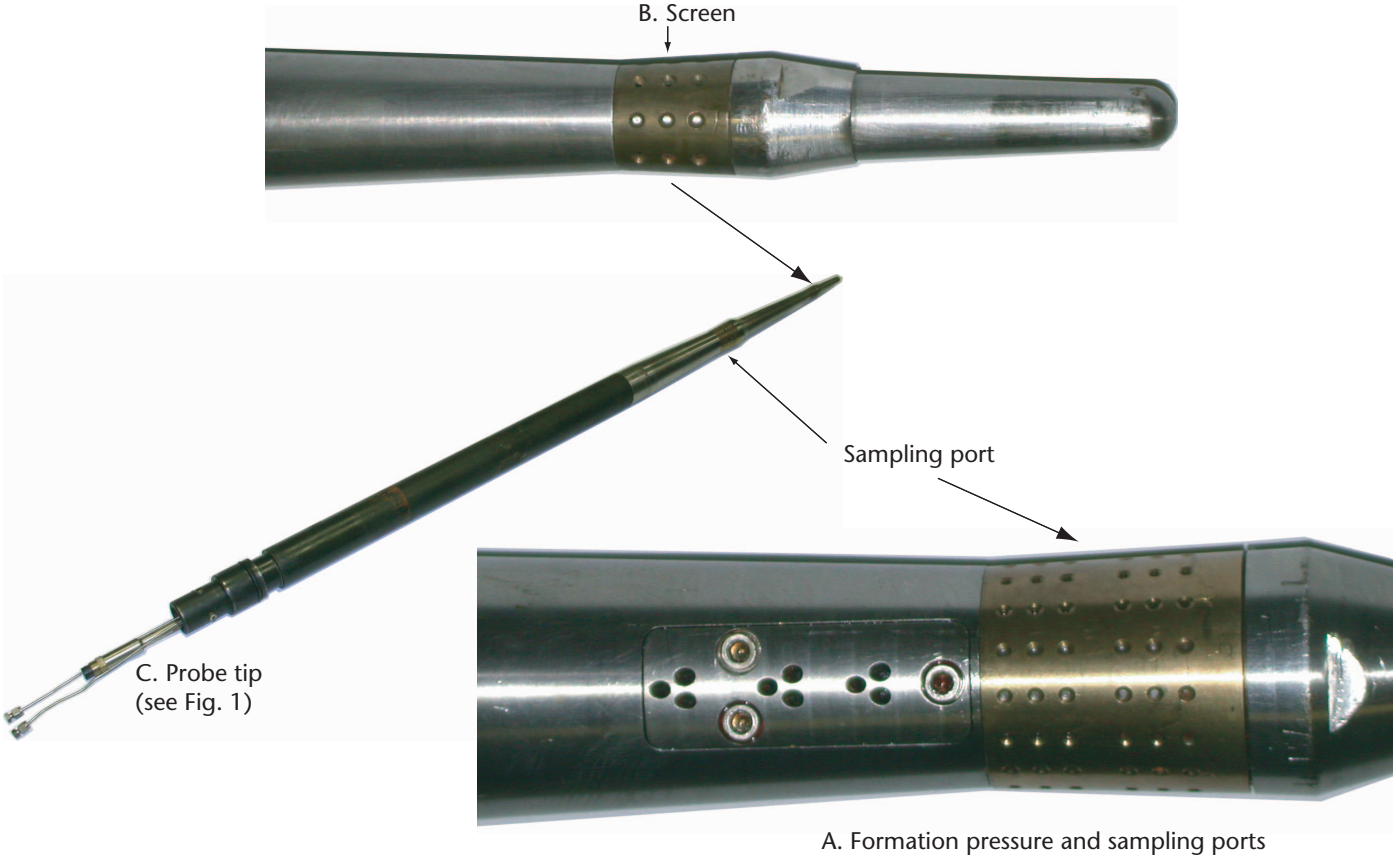

Figure 2. Photograph of the IWS probe tip. A. Close-up of the sampling and formation pressure ports. B. The fluid screen near the tip. The screen allows fluid to surround the thermistor, which eliminates air gaps. C. Probe tip (see Fig. 1).

diagnostic information to analyze sampling problems.

2) Heat Spike Trigger

The software can use the frictional heat spike caused by insertion of the thermistor probe into the formation as a trigger to start the sampling motor (instead of a preset timer as in the WSTP).

Benefit: Reduces unproductive tool down time while waiting for the preset timer to trigger the sampling operation, which in turn reduces exposure to potential hole problems. Using the heat spike also eliminates bad runs due to setup timing errors.

3) Sampling Rate

Sampling rate is controlled by feedback from the syringe motor current.

Benefit: Reduces the probability of screen pack off, which improves sample quantity and quality.

Specifications

Diameter: 9.5 cm (3¾ in.)

Length: 5.17 m (16 ft 11½ in.)

Weight: ~400 lb

Pressure: 15,000 psi

Temperature: -5° to 105°C

Electronics: 48 MB memory, 1 Hz sampling rate.

Typical Operating Range

-5°C to 105°C temperature measurement range.

The IWS can be deployed in soft to semiconsolidated sediments (e.g., chalks or firm clays) where the probe can penetrate without damage or formation fracture.

Limitations

Not used in hard rocks (e.g., chert, dolomite, limestone, or basalt).