MSK

INTEGRATED LOGGING MODULE

AN INTEGRATED LWD TOOL IS FEATURING AN INCLINOMETER, AZIMUTH GAMMA-RAY LOGS, ANNULAR PRESSURE SENSOR, WAVE PROPAGATION RESISTIVITY PROBES, AND BED BOUNDARY DETECTION PROBES.

The integrated logging module of the Corvette-3 LWD system is a full-featured tool delivering the following data items:

- Bed boundary imaging;
- Wave propagation resistivity logging;
- Annular pressure measurements (PWD);
- Directional survey measurements;
- Azimuthal gamma ray logging.

The integrated logging module includes transverse antennas, which, in combination with the axial antennas of wave propagation resistivity probes, form compensated bed boundary detection probes designed to determine the distance to the upper and lower boundaries of the target bed.

All wave propagation resistivity probes are compensated, operate at 3 frequencies, and record 12 resistivity curves.

The annular pressure sensor provides data to calculate the equivalent circulating mud density.
The dual azimuthal gamma-ray logging unit reduces the statistical error of gamma-ray measurements.

GENERAL CHARACTERISTIC

The module has a symmetrical design enabling its turn over when assembling the BHA. This approach allows moving azimuth sensors away from magnetic masses or, conversely, bring them closer to the drilling bit.
The implementation of the five logging methods in single housing significantly reduces the distance from the recording points to the bottom hole.

The module includes bed-boundary-detection probes to determine the distances to the boundaries of the bed with a measurement range of up to 5 m. This range depends on the bed resistivity contrast and the required measurement accuracy.

DESIGN CHARACTERISTICS

The integrated logging module is available in two outer diameters: 121 mm and 172 mm.

The design of the antennas uses a high-strength compound, which significantly increases the average time between maintenance. Elements of the directional survey module and azimuthal gamma-ray logging units have multi-stage protection against vibration and shock.

Each module's component undergoes lengthy limit tests under conditions of high vibration, temperature, and pressure.

The dual gamma-ray logging unit reduces the statistical error of gamma-ray measurements.

After the drilling pumps are turned off, the annular pressure sensor records a pressure build-up curve. After the drilling pumps are turned on, the sensor measures the maximum pressure.

Parameter	Value / Range
Module O.D.	121 / 172 mm
Length	4.5 m
Maximum Temperature	+120°C (+150°C as per request)
Maximum Pressure	80 MPa (100 MPa as per request)
Resistivity Phase-Shift Measurement Range	0.1–3000 Ω·m
Resistivity Amplitude-Attenuation Measurement Range	0.1–300 Ω·m
Phase-Shift Measurement Accuracy	± 1%
Resistivity Amplitude-Attenuation Measurement Accuracy	± 2%
Azimuth Measurement Accuracy	± 1°
Zenith Angle Measurement Accuracy	± 0.1°
Gamma-Ray Measurement Range	0.5–250 μR/hr
Gamma-Ray Measurement Accuracy	± 2%
Gamma-Ray Measurement Azimuthal Sectors	16
Annular Pressure Measurement Range	0-100 MPa
Annular Pressure Measurement Accuracy	± 1%