



MRK

DENSITY - NEUTRON MODULE

DOWNHOLE TOOL FOR LOGGING WHILE DRILLING WITH LITHO-DENSITY AND NEUTRON LOGGING PROBES.

The density - neutron module of the Corvette-3 LWD system includes both neutron and litho-density logging sondes, enabling reliable measurements of the following rock properties:

- Azimuthal water-saturated porosity;
- Azimuthal bulk density;
- Photoelectric absorption index (photoelectric factor);
- Borehole diameter

The litho-density logging probe was developed in collaboration with a leading Russian company in the field of radioactive methods NPP "Energia." The device includes two gamma-gamma-ray logging sondes for measuring rock bulk density and a separate sonde for recording the gamma-ray spectrum to determine the photoelectric absorption index (photoelectric factor).

Data from both long- and short- spacing gamma-gamma-ray sondes integrated with rock bulk density provides a borehole diameter log. Water-saturated porosity results from a dual-spacing thermal-neutron logging tool.

GENERAL CHARACTERISTIC

Shielding of both neutron and density logging probes enables azimuthal density and porosity measurements and imaging. The images provide the intersection angle of the borehole with bed boundaries to clarify the location of the wellbore relative to geological objects and adjust the geosteering model in real time.

A replaceable stabilizer sustains a high quality of bulk density measurements. The outer diameter of the stabilizer depends on the diameter of the utilized drilling bit.

The design of the docking adapters allows repairing the connecting thread up to five times.

DESIGN CHARACTERISTICS

The density - neutron module is available in two outer diameters: 121 mm and 172 mm. The module parts are made of high-strength non-magnetic steels and specialized erosion-resistant alloys. The design provides for the use of special vibration isolators and shock absorbers when installing all the electronic and measuring components of the module. After manufacturing, each module undergoes lengthy tests under conditions of high vibration, temperature, and pressure.

The design of the litho-density logging probe as a separate unit facilitates its maintenance and testing.



The density probe stabilizer is a single part without a cut that significantly increases its operational reliability and ease of maintenance.



Parameter	Value / Range
Module O.D.	121 / 172 mm
Length	3.1 m
Maximum Temperature	+120°C (+150°C as per request)
Maximum Pressure	80 MPa (100 MPa as per request)
Density Measurement Range	1.7–3.0 g/cm ³
Density Measurement Accuracy	± 1.5% from 1.7 to 2.0 g/cm ³ ± 1.2% from 2.0 to 3.0 g/cm ³
Density Measurement Azimuthal Sectors	32
Water-Saturated Porosity Measurement Range	0–50%
Water-Saturated Porosity Measurement Accuracy	± 1.0% at value of 20% ± 4.0% at value of 30%
Water-Saturated Porosity Measurement Azimuthal Sectors	16
Photoelectric Absorption Index Measurement Range	1.0–7.0
Photoelectric Absorption Index Measurement Accuracy	± 0.2 at value of < 2.5 ± 0.25 at value of > 2.5

