Mag610 and Mag611 used for Drill Navigation during Measurement While Drilling

Objectives

To provide orientation information for directional drill heads in oil and gas exploration, by measuring the direction of the Earth's magnetic field.

Instrumentation

- Mag610, Mag611, or Mag614, integrated into downhole directional tools

Background

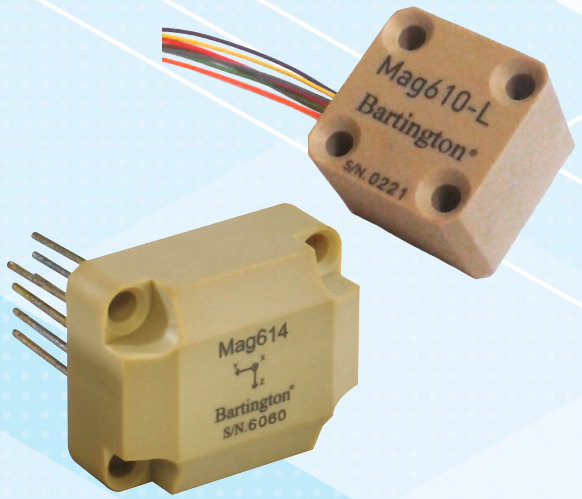
Drilling for oil and gas is no longer a case of drilling vertically down. To reach the reserves, or for extraction of non-conventional oil and gas, it has become necessary to drill at shallower angles and to steer the drilling tools to follow specific strata. The inability to operate traditional logging tools in shallow angle boreholes means that logging tools are also included in these tools. To navigate the drill and tools, the Earth's magnetic field combined with gravity are measured and used as a reference to determine the direction of the drill head. This technique is used to follow a predetermined path to reach desired reserves, or follow mineral seams.

Method

High-temperature fluxgate magnetometers are mounted on the drill string, to measure the Earth's magnetic field during the drilling process. Accelerometers are also used. This combination provides a complete package for determining the position of the tool. The physical environment during drilling is demanding on the probes, so Bartington's high temperature probes have been designed specifically to withstand high temperatures and sustained vibration. The drilling environment is becoming more challenging as demand for natural resources increases, which means the temperature requirements for MWD are increasing. While tools for operation at temperatures up to 150°C are available, finding fluxgate sensors for operation at higher temperatures is more difficult.

To meet this higher temperature specification, the Mag610 and Mag614 have been designed to operate up to 175°C, and the Mag611 to an even higher 215°C. The probes are designed to be integrated into the drill with high temperature electronics.

Schematics of the high temperature electronics required for integration are available from Bartington Instruments. An ambient temperature electronics unit is also available to facilitate testing and evaluation of the probes. We can provide Helmholtz coil systems for calibration of complete tools. Please refer to the Application Note AN0051, which describes the use of Helmholtz coil systems for calibration of compasses.



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