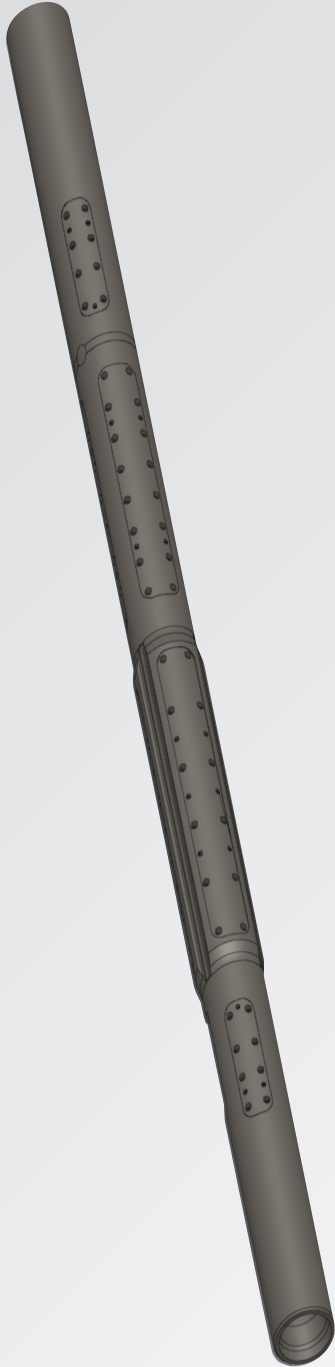


Azimuthal Gamma Ray Sensor (AZG™)

SureLog-AZG

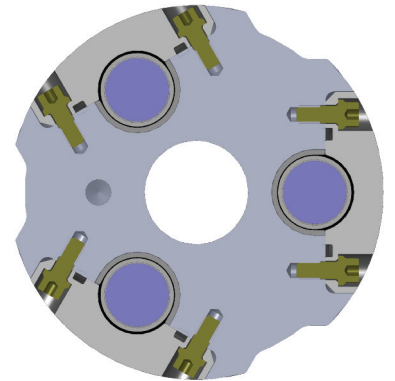


APS Technology's SureLog™ azimuthal gamma ray (AZG™) sensor enables accurate geosteering by adding imaging capabilities to existing APS Measurement-While-Drilling/Logging-While-Drilling (MWD/LWD) measurements. This sensor employs three ruggedized, shielded gamma ray detectors with photomultiplier tubes along with a directional package, which are mounted in a specially designed collar-based system. This system provides protection against the high levels of shock and vibration experienced during drilling, while also providing maximum measurement sensitivity to the formation. This new sensor is designed specifically for low power consumption and is backward compatible with APS's (MWD) system, including the WPR™ resistivity sensor.



Gamma Ray Image Log

APS's azimuthal gamma ray sensor can be programmed to acquire gamma ray data in up to 24 azimuthally sectored bins around the borehole, as well as provide a total gamma ray measurement. Binned data and total gamma data are both recorded in memory and telemetered to the surface for real-time steering decisions. The APS azimuthal gamma sensor is also capable of providing a calibrated API-standard gamma ray response. A well site check source is available to ensure proper pre/post run operational performance, both for use in the field and at the maintenance facility.



The easy-to-use SureLog surface system scales the gamma ray readings to API units, correcting for borehole size, mud weight, collar effects and KCl content of the drilling fluid. The SureLog system is capable of displaying both the total gamma ray log and the gamma image log in real time and as memory log plots. In addition to the log plot displays, the surface system provides user-defined hard copy output logs. Data can be exported in standard log copy formats such as WITS, LAS and ASCII.

Azimuthal Gamma Ray Sensor (AZG™)

Preliminary Product Specifications

Tool OD	4.75 and 6.75 in. (121 and 171 mm)
Sub Length	88 in. (2235 mm)
Measure Point	~ 30 in. (762 mm) from downhole end
Sensors	3 NaI scintillation detectors with PMTs
Measurement Range API	API-calibrated 0 - 800 API \pm 3 API @ 100 API 0.8 cps API per detector
Data Sampling Rate	Programmable, in up to 24 bins
Vertical Resolution	6 in. (152 mm)
Maximum Temperature	302°F (150°C) and 347°F (175°C)
Maximum Pressure	20,000 psi (137.9 MPa)