

## DUAL NEUTRON AND SINGLE NEUTRON PROBE

The dual neutron probe provides an accurately calibrated borehole-compensated neutron porosity measurement in mud-filled open holes. It is the probe of choice for quantitative formation-fluid studies, including shallow oil and gas prospects. An uncalibrated single-detector neutron probe suitable for qualitative porosity logging under most borehole conditions including through steel or plastic casing and drillpipe is also available.

### PRINCIPLE OF MEASUREMENT:

The dual neutron measurement uses two  $^3\text{He}$  proportional detectors and a detachable, sealed neutron source. Fast neutrons emitted by the source are scattered and slowed by light elements (and principally hydrogen in the formation) until they reach thermal energy levels. The ratio of the flux of thermal neutrons reaching the near and far detectors depends on the Hydrogen Index and porosity. Use of the two detectors and a ratio method provides a porosity measurement which is independent of borehole size over a range of hole diameters.

### FEATURES

- Wide porosity range (0 to 60% sandstone equivalent)
- Compensation for borehole diameter using dual detectors
- Real-time porosity measurement with Videologger and Micrologger systems

### MEASUREMENTS

- Compensated porosity (Dual neutron)
- Neutron (Single neutron)
- Natural gamma
- Raw long-spaced neutron
- Raw short-spaced neutron
- Count ratio
- Casing-collar locator (CCL)
- SP/SPR (available as option on Single neutron)

### APPLICATIONS

**Minerals/Engineering/Water**

- Lithology identification
- Location of aquifer and aquitard
- Shale content
- Fracture analysis in coals
- Correlation between open and cased-hole logs
- Strata correlation between wells

### OPERATING CONDITIONS

**Borehole type:** Open/cased, water-filled  
Qualitative measurements are possible in air-filled boreholes

**Centralisation:** excentralised with bowspring

### SPECIFICATIONS

	Dual neutron	Single neutron
<b>Diameter:</b>	60mm	38mm
<b>Length of sonde:</b>	1.94m	2.08m
<b>Weight:</b>	18.8kg	8kg
<b>Max. temperature:</b>	70°C (extended range available)	
<b>Max. pressure:</b>	20MPa (extended range available)	

**Neutron detector type:**  $^3\text{He}$  proportional counter

**Source:**  $^{241}\text{Am-Be}$

**Range:** 0 to 60% apparent sandstone porosity

**Natural-gamma detector:** 50mm x 25mm NaI(Tl) scintillation crystal (larger sizes available)

### SALES INFORMATION

<b>Probes:</b>	
25 019 000	Dual neutron probe with source holder and source transport container
25 020 000	-includes natural gamma
25 021 000	-includes natural gamma and CCL
25 015 000	Single neutron probe with source holder and source transport container
<b>Accessories:</b>	
30 006 000	Dual neutron source (120GBq $^{241}\text{Am-Be}$ )
30 005 000	Single neutron source (37GBq $^{241}\text{Am-Be}$ )
20 091 000	Field neutron calibrator
20 070 000	Natural-gamma API calibrator without source
30 010 000	3.7MBq $^{137}\text{Cs}$ source for natural-gamma calibrator

**Note:** A range of Bowspring excentralisers are available for the Dual Neutron. Please specify borehole range required.

