

MODEL AP225

ELECTROMAGNETIC (EM) BASED HDD SYSTEM

FEATURES

- Does not require joint welding like traditional wireline
- AC and DC methods supported for surface locating
- Real time annular pressure, drill collar internal pressure, rotation sensing and gamma

APPLICATIONS

- Horizontal directional drilling in construction
- Utility pipelines
- Underground tunnels

The Applied Physics Systems Model AP225 Electric Dipole Transmission System measures and transmits downhole data to the surface, enabling the directional drilling of a borehole. Data transmitted typically includes the inclination and azimuth angles of the borehole, the drilling system toolface (roll angle), and the tool temperature. The system can also be configured to transmit accelerometer and magnetometer sensor values, which can then be used to calculate the borehole angles.

The System

The system consists of the following components:

- Antenna Loop or Coil (The coil is not supplied with the system.)
- Remote Uplink - Receiver (Model 560B/R or C)
- Model 750 Directional Sensor (DI) powered by the battery pack
- Applied Physics System Dipole
- Applied Physics Systems HDD AC Transmitter
- USB Hardware Key
- Surface Computer (MWD laptop with Applied Physics Systems' Locator Software (Detect + EM Software))
- 574 Downlink Box (this is optionally)

Downhole Probe Assembly

The downhole probe assembly consists of an shock mounted Orientation Sensor.



The Electric Dipole Transmission System is typically approximately 222 inches long and uses 1.875" diameter pressure barrels for system electronics and batteries. The same basic system can be used with 4.75", 6.5" and 8" drill collar sizes. Mounting spacers enable the use of drill collar sizes greater than 4.75".

Model 560 Top End Unit

The Top End Unit interfaces with the system and provides power for the downhole probe.

Model 574 Downlink System

The downhole system includes a laptop with a 16-bit A/D installed. An RS-232 port is required on the computer to display the azimuth, inclination, gravity toolface and magnetic toolface.

Software

Applied Physics Systems EM HDD Locator software is a component of a system for guiding directional drilling that includes a Model 750 DI for orientation of the drill and a magnetic field generator which generates a field that can be seen by the DI. Receiving the magnetic field from the antenna allows the software to calculate the location of the DI. Locator software works with both a DC applied field and an AC applied field. The AC field method is generally superior because the environmental noise is much lower, so the system can achieve longer range localization with less power to the magnetic antenna. Also, there is no need for an operator to switch the current direction.



HEADQUARTERS
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DOWNHOLE SYSTEM

Carrier Frequency	2 Hz to 10 Hz (user selectable)
Baud Rate	The baud rate is one half of the transmission frequency. A transmission frequency of 9 Hz has a baud rate of 4.5
Power	Batteries typically consist of 2 DD stacks of 8 moderate rate cells each, producing 29 V at a 29 ampere-hour capacity. Battery life: - At 10 Watts power level, battery life is 80 hours. - At 20 Watts power level, battery life is 40 hours. - At 40 Watts (maximum power), battery life is 20 hours.)
Gap Sub Sizes	4.75" (120.65 mm) OD x 67.375" (1711.325 mm) L 3.50" (88.9 mm) IF pin at bottom box at top 6.5" (165.1 mm) x 72.0" (1828.8 mm) L
Tool String Approximate Length (2 batteries)	222" (5638.8 mm)
Sensors	Directional Sensor: Model 750 Gamma Sensor: Model 751
Vibration Damage Threshold (Data is based on the averaged vibration data from the Model 751 Gamma Sensor as reported in the AP250 Dipole Log.)	Below 8 gees, damage is unlikely. Between 8 to 12 gees, damage is possible. Over 12 gees, damage is likely.
Dipole Head Annular and Bore Pressure Sensors	0 to 5000 PSI Tolerance: $\pm 2\%$ Units: PSI, bar, kPa (user selectable in Detect MWD software)

UPHOLE SYSTEM

MODEL 560 PREAMPLIFIER/FILTER SYSTEM

Preamp Gain Selectable	0 to 42
Amplifier Gain Selectable	0 to 96
Power	115 V @ 1 A 220 V @ 0.5 A
Size	19" (482.6 mm) W x 3.5" (88.9 mm) H x 13" (330.2 mm) D (rack mountable)

MODEL 574 DOWNLINK SYSTEM

Main Power	115 V @ 10 A 220 V @ 2.5 A
Size	16" (406.4 mm) W x 7.5" (190.5 mm) H x 12" (304.8 mm) D

The downhole system includes an MWD laptop with a 16-bit A/D installed. An RS-232 port is required on the computer for the Rig Floor Display.



MODEL 560B - UPHOLE SYSTEM

Specifications are subject to change without notice.