



Applied Physics
Systems

Model 750

High Accuracy Orientation Sensor

Features

- Small size: 1.25" OD and 16.6" length
- High accuracy: $\pm 0.1^\circ$ for inclination, $\pm 0.3^\circ$ for azimuth
- Digital serial input/output
- Accurate inclination while drilling

Applications

- EM and Pulse-based MWD systems
- Orientation of borehole logging instruments
- Directional drilling



The Model 750 orientation sensor enables high-accuracy measurement of the toolface (roll), inclination (drift), and azimuth orientation angles in borehole logging and drilling applications. Because of its small size, it is particularly well suited for use with coiled tubing drilling and completion systems.

The Model 750 system contains both a 3-axis fluxgate magnetometer and a 3-axis accelerometer. The combination of these two sensor systems enables determination of the toolface, inclination, and azimuth angles of the directional sensor.

The Model 750 transmits the instrument temperature and either the magnetometer and accelerometer outputs or the system orientation angles. The maximum transmission rate is 3 times per second for magnetometer and accelerometer outputs and 2 times per second for orientation angles.

To maintain high accuracy over the temperature range of the system, the sensors are temperature-compensated. This enables the toolface, inclination and azimuth angles of the 750 frame of reference to be determined with an accuracy of $\pm 0.1^\circ$ for inclination and $\pm 0.3^\circ$ for azimuth through the entire operating temperature range of the system.

The Model 750 communicates over a serial bidirectional TTL interface. The serial in and serial out lines operate at TTL/CMOS levels and are normally set to operate at 9600 baud with one stop bit and no parity. The user can change the baud rate, as well as other user-definable settings, using the Directional Sensor Configuration Utility.

Two communication protocols are available, ASCII and binary:

- The ASCII protocol sends ASCII characters to the 750 to obtain data. The data returned by the Model 750 is transmitted as an ASCII data stream, complete with returns and line feeds, so that it can be easily displayed on a video terminal (provided a TTL-to-RS232 conversion is made by the user).
- The binary protocol is used for high-speed computer to computer interchange. In this case, one byte is sent to request data. The Model 750 then responds with a multibyte data packet containing the desired data plus header and checksum.

The Model 750 can also be configured to continuously send data in ASCII or binary protocol upon power-up. The 750 system is also available with an extended reach option, which includes an internal modem to enable communication of the data output over a single conductor (plus ground) wireline.

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PHYSICAL

Outside Diameter (O.D.)	1.25" (31.75 mm)
Length	16.6" (423 mm)
Weight	1.4 lbs (635 g)
Main Connector	MDM9SH003P (ITT Cannon)
Mating Connector	MDM9PH003L (ITT Cannon)

ELECTRICAL

Input Voltage Range	+12 V to +36 V
Current Draw	63 mA @ 15 V, 35 mA @ 28 V
Logic Level	TTL / CMOS
Baud Rate	User Programmable up to 38,400 Baud (9600 baud default)
Protocol	User Selectable, ASCII or Binary
Logging Size	4 Mbytes
Extended Reach Modem Voltage	2025 - 2225 Hz @ 300 Baud, 1 to 4 V peak to peak, on top of input voltage

ENVIRONMENTAL

Operating Temperature Range	0°C to 150°C
Storage Temperature Range	-55°C to +180°C
Shock	1000 G 1ms half sine wave
Vibration	10 G rms random 50 to 500 Hz
Azimuth Accuracy (@ n° inclination)	±0.3° @ 90°, ±1.0° @ 10°, ±2.0° @ 5°
Toolface (Roll) Accuracy	±0.5°
Inclination Accuracy	±0.1°

Specifications within this document are subject to change without notice.

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