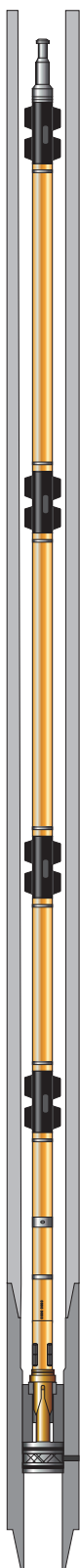


## Tensor MWD System



The Tensor MWD system's proven design is compatible with collar diameters from 89 to 214 mm and operates at flow rates from 275 to 4,500 lpm. Industry leading sensors and electronics, coupled with a trusted mechanical architecture create an MWD system which delivers exceptional accuracy and reliability while minimizing the total cost of ownership.

Tensor Drilling Technologies commitment to customer success is demonstrated by an exemplary support network encompassing market leading repair services, comprehensive training (both e-learning and hands-on), localized support teams, and a dedicated website delivering best in class support materials.

### Features and Benefits

#### Reliable

Drawing on an established reputation in the industry, Tensor Drilling Technologies provides high quality, reliable downhole systems for directional surveying and formation logging. Tensor Drilling Technologies quality processes ensure products are manufactured and maintained to a uniform high standard.

#### Cost Efficient

The system operates in standard non-magnetic drill collars. The positive pulser can be routinely serviced in less than one day enabling quick turnaround of equipment. Extended battery life is achieved through energy efficient hardware and intelligent power management software.

#### Configurable

A choice of solenoid positive pulser or motor driven pulser allows the customer to select the most appropriate for their application.

Additional modules for gamma and Centerfire resistivity are available to enable expansion of services into the LWD market.

#### Modular

Flexible module configuration enables alternative sensor positions. Modules are interchangeable between collar sizes for flexibility of use. Short, lightweight modules allow cost-effective logistics, assembly and maintenance turnaround.

#### Retrievable and Reseatable

The Tensor MWD probe can be retrieved and reseated. In the event that the pipe becomes stuck in a hole, the MWD probe can be "fished" reducing the risk of loss. This capability also enables efficient probe upgrade and battery replacement if operations require.

#### High Temperature as Standard

The Tensor system is recognized as the system of choice for hot hole applications, with 175 °C operating temperature as a non-price premium standard.

#### Optimized Telemetry

Downlink capability allows the operator to select the optimum transmission sequence and data resolution for each application with minimal impact on rig operations.

# Tensor MWD System - Specifications

## Technical Specifications

Collar O.D.	89 mm	121 mm	172 mm	203 mm	241 mm
Tool Connections	2 7/8 in. I.F.	NC 38	NC 50	6 5/8 in. API REG	7 5/8 in. API REG
Equivalent Collar Stiffness (OD x ID)	75.2 x 57.2 mm	120.7 x 71.4 mm	170.4 x 82.6 mm	201.4 x 101.6 mm	239.3 x 101.6 mm
Make-up Torque	4.8 kNm	13.0 kNm	40.7 kNm	73.2 kNm	84.1 kNm
Flow Rate Range	284 - 625 lpm	379 - 1136 lpm	568 - 3028 lpm	1514 - 4543 lpm	1514 - 4543 lpm
Max. Dogleg Rotation	50°/ 30 m	15°/ 30 m	10°/ 30 m	8°/ 30 m	4°/ 30 m
Max. Dogleg Sliding	100°/ 30 m	30°/ 30 m	21°/ 30 m	14°/ 30 m	7°/ 30 m
Probe OD	47.6 mm	Max. Pressure	137.9 MPa	Max. Mud Weight	2.16 S.G.
Max. Temperature Operating	175 °C	Max. Sand	1.0 % at maximum fluid velocity		
Max. LCM Tolerance	114 kg/ m <sup>3</sup> any type, thoroughly and evenly mixed, with use of surface drill pipe screens				

## Sensor Specifications

Directional	Tri-axial fluxgate magnetometers and Q-flex accelerometers		Gamma	Nal Scintillation
Measurement	Range	Accuracy	Parameter	Specification
Inclination	0 - 180°	+/- 0.1°	Memory Update	18 samples/ m at 20 m/hr
Azimuth	0 - 360°	+/- 0.25°	Real Time Update	9 samples/ m at 20 m/hr rotating 6 samples/ m at 20 m/hr sliding
Toolface - Magnetic	0 - 360°	+/- 0.5°	Resolution	1 API
Toolface - Gravity	0 - 360°	+/- 0.5°	Sensitivity	2.5 counts per API
TMF	0 - 100 µT	+/- 0.075 µT	Memory	32 Mb.
Dip	-90 - 90°	+/-0.15°	Sampling Period	Programmable 1-60 seconds
GT	0 - 2.000 g	+/- 0.001 g		
Temperature	-35 - 200 °C	+/- 0.5 °C		
Peak Shock	0 - 250 g	+/- 1 g		

## Surface System Specifications

Surface System	SAI - Safe Area Interface
Rig Floor Display	Certified Zone 1, Intrinsically safe
Pressure Transducer	4 - 20 mA, 0-5000 psi, Zone 1, intrinsically safe
Hook Load Sensor	4 - 20 mA, - 0 100 klb, Zone 1, intrinsically safe
Depth Encoder	Incremental, Two Channel in quadrature, Zone 1, intrinsically safe
Plotter	Printrex Thermal Plotter