



“Providing Innovation with Excellence”



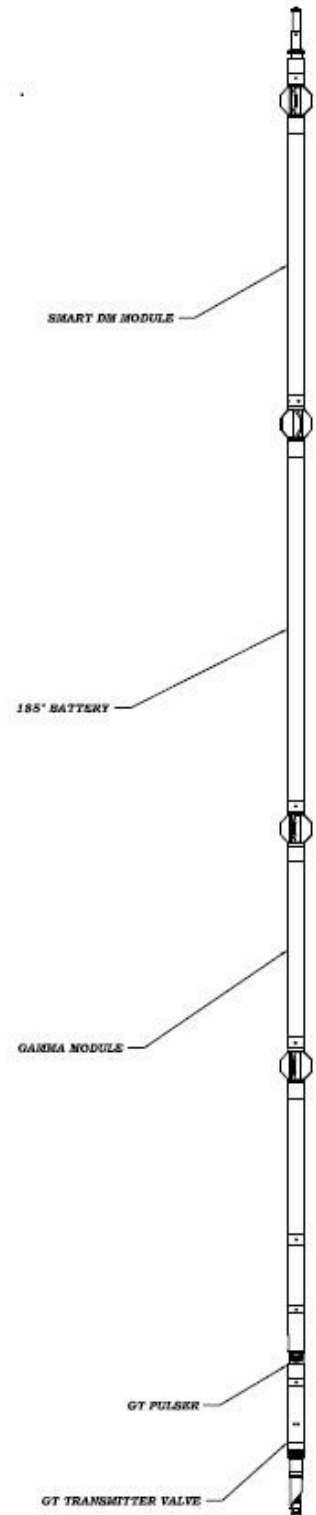


HEAT MISER MWD SYSTEM:

The Gordon Technologies HEAT MISER MWD System uses “State of the Art” technology to save oil companies time and money while operating in the most hostile drilling conditions.

ADVANTAGES:

- Fast data rates for minimizing rig downtime (up to 4 bits per second).
- Intelligent power management for maximum battery life up to 800 hours.
- Real-time and recorded 3 axis shock and vibration data at 3 separate locations.
- Fixed collar and retrievable MWD Options.
- Innovative module packaging resulting in shorter and easier MWD tool to build and service.
- Patent pending “**Shock Miser**” shock mounting system for hostile drilling conditions.
- Proprietary MWD centralizers and internal shock mounting for improved life of electronic components.
- High quality data transmission with decoding filter ensuring downhole communication performance.
- 185°C MWD Electronics and Sensor Packs, designed specifically for the Eagleford, Bakken, and Haynesville Shale formations.
- Optimized data management to utilize fast mud pulse data rates for high speed logging.
- Weatherproof ruggedized RFD with wireless transmission.
- 6 Axis 6 decimal place raw survey capability for Survey Management.
- Drilling Dynamics; axial and lateral shock and vibration, temperature, RPM for stick slip measurement.



Gordon Technologies MWD System Specifications

Directional Sensor

Parameters	Accuracy	Repeatability	Resolution
Azimuth (Degrees)	+/- 0.5	+/- 0.5	0.1
Inclination (Degrees)	+/- 0.05	+/- 0.05	0.1
Operating Temperature (°C)	+/- 2.0	+/- 1.0	0.1
Local Magnetic Field (Total Magnetic Field, microTeslas)	+/- 0.1 mT	+/- 0.1 mT	0.05 mT
Gravitational position – front of the unit (Highside Toolface, Degrees)	+/- 0.5	+/- 0.5	0.1
Magnetic position – front of the unit (Magnetic Toolface referenced to Grid or True North, Degrees)	+/- 1.0	+/- 1.0	0.1
Azimuth position – front of the unit (Magnetic Toolface referenced to Grid or True North, Degrees)	+/- 1.0	+/- 1.0	0.1

Transition Resolution; Selectable
 Speed (Data Rate): 0.625 bits/ sec nominal

Pulser

Parameters	DC Motor
Battery Life @ 1.5 DR	= 700 hours
Average Power	1.04 watts
Push-pull Force	≈ 150 lbs
Longevity	≈ 3000 hours
Holding force	Very High
EM Interference	Low
Service Time	2 Hours
Operating Temperature	185°C
MTBF	>2000 hours

Gamma Ray Sensor

Parameters	Resolution	Speed updated	Data resolution, SP = ROP
Gamma Ray Real Time	1.4 CPS per API	Average 14 seconds(with Dynamic Sequence enabled and .5 sec pulse Width)	.5 FT @50 Ft/ HR ROP 1.0 FT @ 100 FT/ HR ROP 1.5 FT @ 150 FT/ HR ROP
Gamma Ray Recording device, High Capacity	1.4 CPS per API	Adjustable, but limited by memory	
Accuracy	+/- 2% to 300°, +/- 5% to 350°		
Vertical Resolution	gamma ray sensor: 6.8"		
Shock: Z Axis	500g/ 0.5 milliseconds		
Vibration:	20g RMS		

Gordon Technologies MWD Data Rate Options

Directional Only Transmission Rates (sliding/rotating)

Data Rate	Raw survey from pumps on	Tool face	Sliding XYZ Shock /Temp	Rotating XYZ Shock	Rotating Temp
.375	1 min 54 sec	5 seconds	3.5 minutes	7 seconds	2 min 49 sec
.5	2 min 17 sec	7 seconds	5 minutes	9 seconds	3 min 45 sec
.6	2 min 35 sec	8 seconds	6 minutes	11 seconds	4 min 30 sec
.8	3 min 12 sec	11 seconds	8 minutes	14 seconds	6 min
1.0	3 min 49 sec	14 seconds	10 minutes	18 seconds	7 min 30 sec

Gamma/Directional transmission rates

Data Rate	Raw survey from pumps on	Tool face	Gamma Sliding	Gamma Rotating	XYZ Shock Sliding	XYZ Shock Rotating	Temp
.375	1 min 54 sec	5 sec	16 sec	5 sec	2 min 56 sec	17 sec	2 min 37 sec
.5	2 min 17 sec	7sec	21 sec	7 sec	3 min 55 sec	23 sec	4 min 02 sec
.6	2 min 35 sec	8 sec	25 sec	8 sec	4 min 50 sec	28 sec	4min 50 sec
.8	3 min 12 sec	11 sec	34 sec	11 sec	6 min 27 sec	37 sec	6 min 27 sec
1.0	3 min 49 sec	14 sec	42 sec	14 sec	8 min 04 sec	46 sec	8 min 04 sec

Gordon Technologies MWD System Tool Size and Flow Rate Ranges

Tool Size	Flow Rate Range	Dog Leg Severity Rotating/Sliding	LCM Restrictions (med/fine nut plug)	AVG/MAX Pressure Drop	Tool Length Dir/Dir-Gam
3-1/2" O.D.	60 -180 gpm	40/60 degrees/100 ft	20 lb/bbl	350/500 psi	19 FT/23 FT
4-3/4" and 5" O.D.	140 – 350 gpm	30/40 degrees/100 ft	40 lb/bbl	250/350 psi	19 FT/23 FT
6-1/2" O.D.	200 – 900 gpm	DS Dependent	40 lb/bbl	250/350 psi	19 FT/23 FT
8" O.D.	300 – 1,200 gpm	DS Dependent	40 lb/bbl	250/350 psi	19 FT/23 FT
9-1/2" O.D.	300 – 1,200 gpm	DS Dependent	40 lb/bbl	250/350 psi	19 FT/23 FT

Gordon Technologies Pulsar/UBHO Size, Flow Rate Range, and TFA

Sub Size	Flow Rate Range	TFA Open	Delta P @ Min Flow rate 9 / 14 ppg mud	Delta P @ Max Flow rate 9 / 14 ppg mud
4-3/4" UF	150 -230 gpm	.695 sq-in	100/150 psi	150-210 psi
4-3/4" LF	180 - 250 gpm	.787 sq-in	100/130 psi	150/190 psi
4-3/4" SF	220 - 280 gpm	.831 sq-in	120/150 psi	180/220 psi
4-3/4" HF	250 - 350 gpm	.976 sq-in	110/140 psi	180/220 psi
5" HF	250 - 350 gpm	.976 sq-in	110/140 psi	180/220 psi
6-1/2" LF	220 - 550 gpm	1.072 sq-in	150/200 psi	210/280 psi
6-1/2" SF	450 - 600 gpm	1.261 sq-in	150/200 psi	260/350 psi
6-1/2" HF	550 - 750 gpm	1.498 sq-in	180/230 psi	300/400 psi
8" LF	350 - 550 gpm	1.072 sq-in	150/200 psi	210/280 psi
8" SF	450 - 600 gpm	1.261 sq-in	150/200 psi	260/350 psi
8" HF	550 - 750 gpm	1.498 sq-in	180/230 psi	300/400 psi
8" XF	700 - 1200 gpm	1.742 sq-in	170/230 psi	270/360 psi
9-1/2" XF	700 - 1200 gpm	1.742 sq-in	170/230 psi	270/360 psi