GORDON TECHNOLOGIES

"Providing Innovation with Excellence"

Heat Miser MWD

Specifications

About Us

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Gordon Technologies is dedicated to the development of advanced MWD technologies, providing more efficient drilling processes.

In 2014, Gordon Technologies was created to provide innovative MWD technology to create a faster, more robust, and more reliable MWD system than any other on the market. Gordon Technologies' goal is to provide high quality operational support and engineering services to its customers. We continue to follow the philosophy of "Providing Innovation with Excellence" with the Shock Miser UBHO Sub and the GT MWD Systems.

The Heat Miser Advantage

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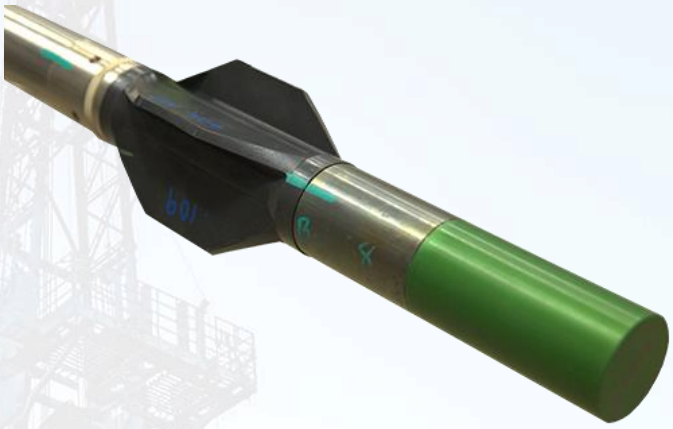
The Gordon Technologies heat miser MWD system uses advanced technology to save oil companies time and money while operating in the most hostile drilling conditions.



Features

Real-Time Data acquisition

- Drilling dynamics; axial and lateral shock and vibration, temperature, RPM for stick slip measurement
- 6-axis, 6-decimal place raw survey capability for Survey Management
- High quality data transmission with decoding filter ensuring downhole communication performance
- Optimized data management to utilize fast mud pulse data rates (up to 4 bits per second) for high speed logging
- Transmits a more detectible signal than any other MWD system

Advanced Mechanical Design

- Retrievable MWD options
- Innovative module packaging allows a shorter and easier MWD tool to build and service
- Proprietary MWD centralizers and internal shock mounting for improved life of electronic components

Advanced Electrical Design

- Intelligent power management for an optimized battery life
- 185 degC MWD Electronics and Sensor Packs, designed specifically for high-temperature environments

Specifications - Electronics

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Directional Sensor

Parameters	Accuracy	Repeatability	Resolution
Azimuth (Degree)	+/- 0.5 min	+/- 0.5	0.1
Inclination (Degrees)	+/- 0.1 min	+/- 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

Directional Sensor Parameters	
Operating Temperature	-20°C to 175°C
Vibration	20 Grms, 10 Hz – 500 Hz
Operating Shock	500 G
Operating Voltage Range	18 - 32 VDC
Current (@ 28 Volts)	125 mA max
Memory (logging environmental data)	24 MB
Service Time	2 Hours

Specifications - Electronics

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Gamma Ray Sensor

Parameters	Sensor 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 Sensor Parameters	
Accuracy	+/- 2% to 300°, +/- 5% to 350°
Vertical Resolution	Gamma ray sensor: 6.8"
Shock: Z-Axis	500g/ 0.5 milliseconds
Vibration	20g RMS

Pulser Parameters

Parameters	DC Motor
Battery Life @ 1.5 DR	500 hours
Average Power	1.04 watts
Push – Pull Force	≈ 150 lbs
Longevity	≈ 3,000 hours
Holding Force	Very High
EM Interference	Low
Service Time	2 Hours
Operating Temperature	175°C
MTBF	>6,000 hours

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Transmission Rates

Directional Only Transmission Rates (Sliding/Rotating)

Data Rate	Raw Survey from Pumps On	Tool Face	Sliding XYZ Shock/Temp	Rotating XYZ Shock	Rotating Temp/ Dynamic Inclination
.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	Gama Sliding	Gamma Rotating	XYZ Shock Sliding	XYZ Shock Rotating	Dynamic Inc.	Dynamic Azimuth
.375	1 min 54 sec	5 sec	16 sec	5 sec	2 min 56 sec	17 sec	4 min 9 sec	4 min 32 sec
.5	2 min 17 sec	7 sec	21 sec	7 sec	3 min 55 sec	23 sec	5 min 32 sec	6 min 3 sec
.6	2 min 35 sec	8 sec	25 sec	8 sec	4 min 50 sec	28 sec	6 min 38 sec	7 min 16 sec
.8	3 min 12 sec	11 sec	34 sec	11 sec	6 min 27 sec	37 sec	8 min 51 sec	9 min 41 sec
1.0	3 min 49 sec	14 sec	42 sec	14 sec	8 min 04 sec	46 sec	11 min 4 sec	12 min 6 sec

Specifications

Transmission Rates

Gordon MWD System Tool Size & Flow Rate Ranges

Tool Size	Flow Rate Range [gpm]	Dog Leg Severity Rotating/Sliding	LCM Restrictions (Med/Fine Nut Plug) [lb/bbl]	AVG/MAX Pressure Drop [psi]	Tool Length Dir/Dir-Gam [ft/ft]
3-1/2" O.D.	60 -180	40/60 degrees/100 ft	20	350/500	19/23
4-3/4" & 5" O.D.	140 – 350	30/40 degrees/100 ft	40	250/350	19/23
5-1/2" O.D.	250 – 425	30/40 degrees/100 ft	40	250/350	19/23
6-1/2" O.D.	200 – 900	DS Dependent	40	250/350	19/23
8" O.D.	300 – 1200	DS Dependent	40	250/350	19/23
9-1/2" O.D.	300 – 1200	DS Dependent	40	250/350	19/23

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Shock Miser UBHO Sub Sizes, Flow Rate Range, TFA

Sub Size	Flow Range (WBM) [gpm]	Flow Range (OBM) [gpm]	TFA Open [in^2]	ΔP @ Min Flow 9 / 14 ppg mud [psi]	ΔP @ Max Flow 9 / 14 ppg mud [psi]
4-3/4 & 5 ULF	150 – 230	150 – 250	0.695	100/150	150/210
4-3/4 & 5 LF	180 – 250	180 – 280	0.787	100/130	150/190
4-3/4 & 5 SF	220 – 280	220 – 320	0.831	120/150	180/220
4-3/4 & 5 HF	250 – 350	250 – 350	0.976	110/140	180/220
5-1/4 HF	280 – 375	280 – 375	0.976	140/170	200/280
5-1/4 XF	300 – 425	300 - 425	1.073	140/180	210/290
6-1/2 & 6-3/4 ULF	250 -500	250 - 550	0.976	150/180	180/220
6-1/2 & 6-3/4 LF	250 – 500	250 – 600	1.072	140/170	210/280
6-1/2 & 6-3/4 SF	350 – 650	350 - 650	1.261	160/200	260/280
6-1/2 & 6-3/4 HF	550 – 800	700 - 800	1.498	180/230	300/400
6-3/4 HF SUPER	550 – 800	700 – 800	1.498	180/230	300/400
6-3/4 XF SUPER	700 - 1000	700 - 1200	1.749	160/220	320/470
8 LF	350 – 550	350 – 690	1.072	150/200	210/280
8 SF	450 – 600	450 – 750	1.261	150/200	260/350
8 HF	550 – 750	550 – 940	1.498	180/230	300/400
8 XF	700 – 1200	700 – 1500	1.749	160/220	320/420
8 MF	1000 – 1300	1000 – 1625	1.98	210/330	360/560