Downhole Monitoring Solutions

Wireless GEOEM

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The worlds most cost-effective wireless monitoring solution designed to deliver real-time data without hassle.

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Our GEOEM system is a part of an onshore based wireless downhole monitoring solution portfolio. Our GEOEM solutions utilize a finely tuned proprietary technology where the gauges transmits a wireless electromagnetic signal through the earth. The signal can be easily received, conditioned, and decoded at surface to provide critical real-time downhole production data. Depending on the sample rate and subsurface geology, this gauge can reliably transmit uninterrupted data for years at depths previously thought impossible.

Our Wireless GEOEM system can be utilized across a wide range of applications and completion types up to 125°C. The truly wireless nature of this system eliminates the needs for cable, clamps, or signal repeaters which can greatly reduce the overall cost of the system and make for greatly simplified work overs. Data acquired from our Wireless GEOEM monitoring solution can be stored locally and sent to the GEO AI cloud based visualization platform, or be exported to client SCADA infrastructure.

System Specifications

Gauge Type	Wireless Piezoresistive (GEOEM)
Gauge Sensing Option	Single Gauge
Measurement	Pressure, Temperature, Vibration, & Inclination
Gap Sub Test Functionality	Pre-Installation External Hydro Test
Tubing Gap Sub Sizes	2-3/8" and 2-7/8" (1)
Connection Type	EUE (2)
Maximum Pressure	Up to 10,000 psi
Maximum Temperature	Up to 125°C
Metallurgy	Sweet & Sour Compatible

(1) Designed to connect natively to these sizes or use a cross over on sizes up to 7".
(2) Designed to connect natively to EUE threads but can be crossed over to different connection types.

GEOEM 125 Run Life Calculation			
Sample Rate	**Samples Per Day**	**Battery Life** (Months)	**Total Samples**
1 Minute	1440	0.6	27,242
10 Minutes	144	5.9	25,668
30 minutes	48	15.6	22,749
1 Hour	24	26.6	19,433
6 Hours	4	65	7,908
24 hours	1	82.9	2,522

Features & Benefits

- True wireless repeater free design requiring no calibration to wellbore, production, or geological conditions
- High quality hybrid transducer platform utilized for improved performance in elevated temperature and high vibration environments
- Real-time wireless transmission of pressure, temperature, vibration, & inclination data stored locally, to your desktop or mobile devices
- Flexible metallurgy available for sweet and sour production conditions
- Advanced system firmware with a focus on optimizing battery life and diagnostic health monitoring of system performance
- Low power usage and data-on-demand tools extend battery life

Applications

- Traditional production and reservoir engineering applications
- Developed and optimized for use in PCP and SRP completions
- Installed where traditional wired solutions have high mechanical induced failure rates
- Deployed with snubbing rigs where external mounted cables and control lines cannot be utilized

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Common Equipment Used

For reliable wireless downhole monitoring with out GEOEM platform we offer a variety of components and accessories to assemble a complete system. Below is a list of products most commonly used for GEOEM applications:

GEOEM Downhole Gauge Package

GEOEM 125

Lithium Battery

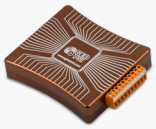
Tubing Gap Sub

Contact Springs & Centralizers

Casing Contact Spring

Non-Conductive Centralizers

Surface Electronics



EM6 Interface Card (GEOEM)

XL4 Data Acquisition Cabinet

Surface Cabling

Signal Cables

Earth Cables

Ground Rods / Signal Stakes

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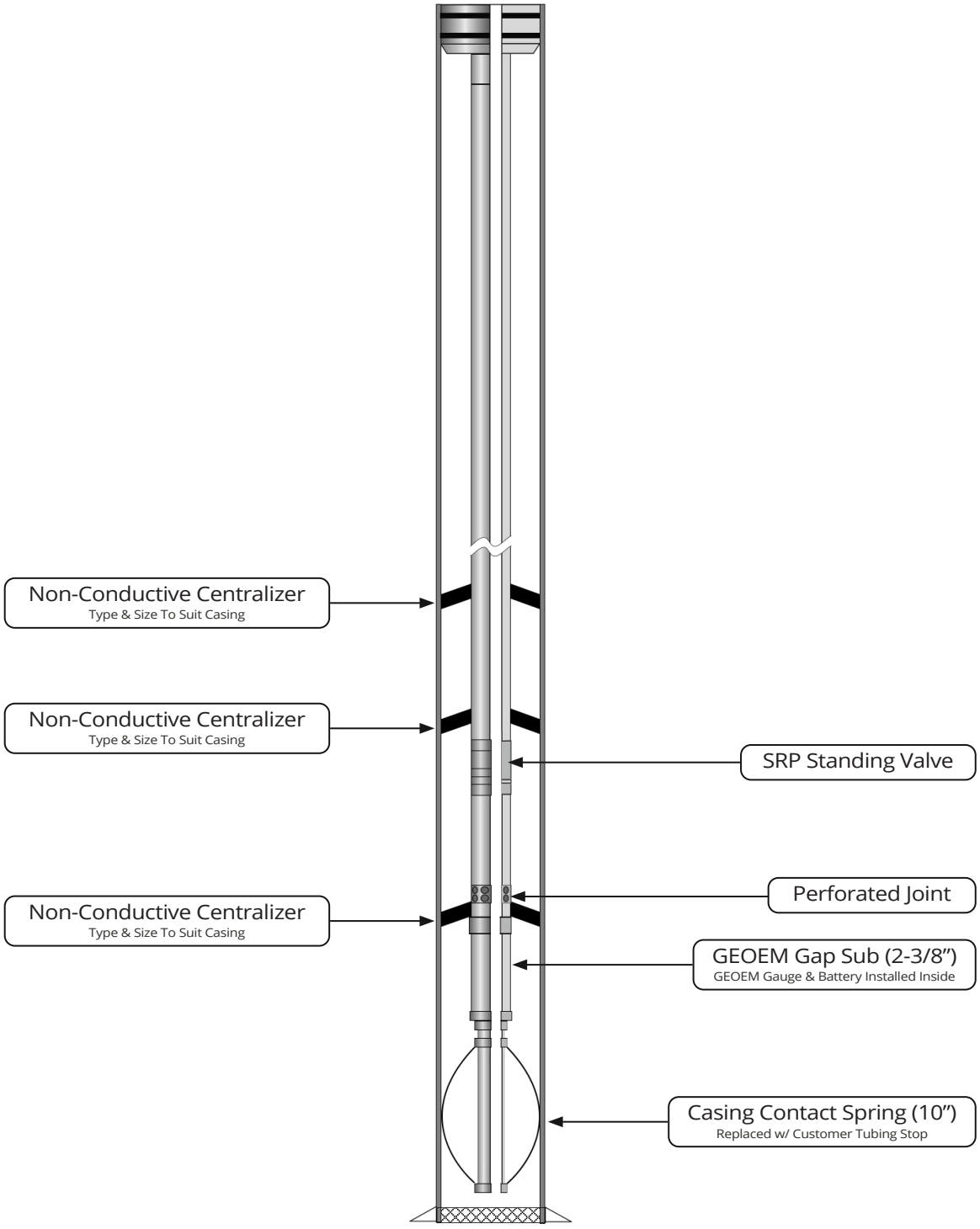
Common GEOEM Completion

Below is a diagram showing the typical components from our GEOEM system used in an SRP completion. While each system may vary, this represents how the necessary components tie into a well.



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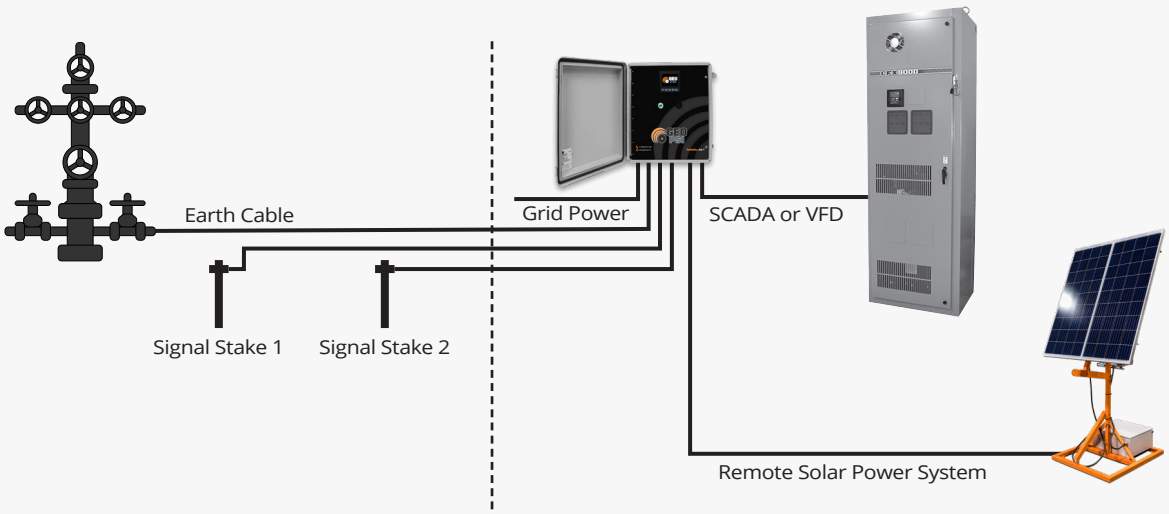
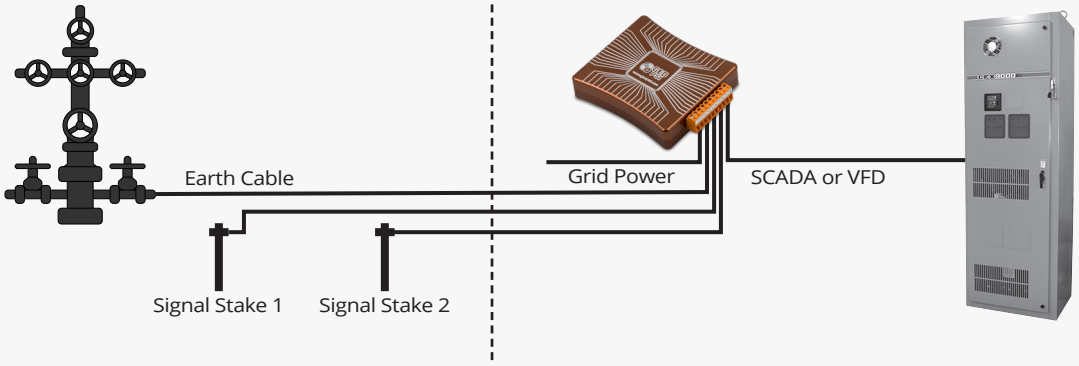
Surface Data Acquisition Setups

Below are diagrams showing the typical components of a Wireless GEOEM surface data acquisition setup. While each system may vary, this represents how users can expect to tie the monitoring system in at surface.

Standalone Data Acquisition Setup



Integrated Data Acquisition Setup



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Global Track Record

The GEOEM 125 case history and track record below highlights the installations that have been successfully completed since the GEOEM platform was commercialized.

Well Designation	Install Date	Completion Type	Install Depth (mRKB)	Expected Life (Days)	Actual Life (Days)	GEOEM Reliability	Transmission Reliability
Well 1	22/08/18	PCP	867.90	37	41	110.8%	91.2%(3)
Well 2	22/08/19	PCP	900.21	272	270	99.3%	99.4%
Well 3	09/12/19	PCP	582.90	162	119	73.5%(1)	99.8%(3)
Well 4	12/12/19	PCP	925.60	669	655	100.0%	98.5%(3)
Well 5	14/12/19	PCP	537.50	165	130	78.8%(1)	61.9%(3)
Well 6	07/02/20	PCP	1050.20	669	131	19.6%(2)	100.0%
Well 7	22/02/20	PCP	899.25	669	583	100.0%	100.0%
Well 8	18/03/20	PCP	588.70	167	264	158.1%	100.0%
Well 9	24/03/20	PCP	505.50	167	264	158.1%	100.0%
Well 10	26/04/20	PCP	556.70	167	164	98.2%	100.0%
Well 11	08/05/20	PCP	551.60	167	93	55.7%(2)	100.0%
Well 12	10/05/20	PCP	568.80	669	438	100.0%	100.0%
Well 13	15/07/20	PCP	585.40	1340	312	100.0%	89.3%(3)
Well 14	10/09/20	PCP	492.80	669	382	100.0%	100.0%
Well 15	17/09/20	PCP	558.60	669	314	46.9%(2)	98.1%(3)
Well 17	01/10/20	PCP	537.80	1340	361	100.0%	95.5%(3)
Well 18	02/10/20	PCP	512.20	1340	360	100.0%	99.8%(3)
Well 19	03/10/20	PCP	577.90	1340	359	100.0%	100.0%
Well 20	12/10/20	PCP	586.30	669	261	100.0%	92.4%(3)
Well 21	27/02/21	PCP	556.10	1417	212	100.0%	100.0%
Well 22	02/03/21	PCP	500.30	1417	209	100.0%	100.0%
Well 23	04/03/21	PCP	610.80	1164	207	100.0%	100.0%
Well 24	04/05/21	PCP	822.63	1164	146	100.0%	100.0%
Well 25	09/05/21	PCP	1092.79	955	141	100.0%	100.0%
Well 26	23/05/21	PCP	814.32	753	127	100.0%	100.0%
Well 27	30/05/21	SRP	795.97	281	120	100.0%	100.0%
Well 28	19/06/21	LRP	837.39	753	100	100.0%	100.0%
Well 29	21/06/21	LRP	970.29	753	98	100.0%	100.0%
Well 30	21/06/21	PCP	681.69	758	98	100.0%	100.0%
Well 31	24/06/21	LRP	808.06	753	95	100.0%	100.0%
Well 32	26/06/21	LRP	849.46	753	93	100.0%	100.0%
Well 33	30/06/21	LRP	876.56	753	89	100.0%	100.0%
Well 34	02/07/21	LRP	760.29	753	87	100.0%	100.0%
Well 35	21/09/21	LRP	1263.92	753	6	100.0%	100.0%
Well 36	30/09/21	PCP	795.97	730	1	100.0%	100.0%

Notes.

GEOEM Reliability references the GEOEM tool successfully generating an EM signal for a certain calculated run life, whereby Transmission Reliability references a successfully decoded signal at surface.

(1) Sub optimal completion design led to excessive battery drain, and early completion of program.
(2) Sub optimal battery design led to battery failure in high vibration conditions.
(3) Transmission Reliability success impacted by surface noise. New and robust signal processing implemented.

Where GEOEM Reliability is > 100% then the battery life exceeded the expected battery life.

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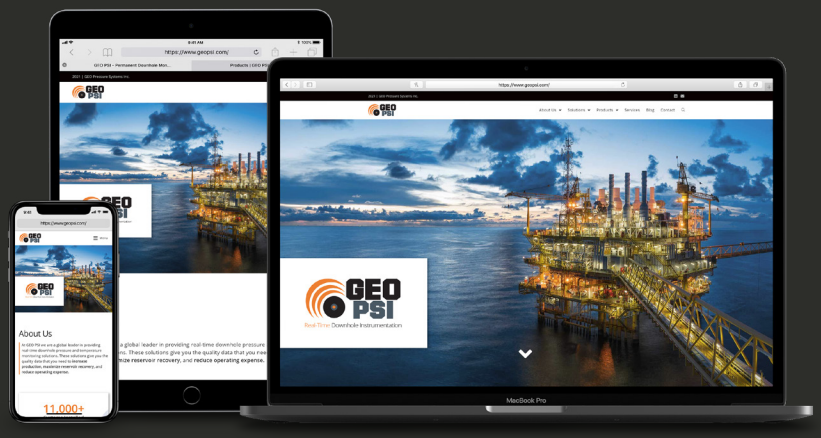

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Reliability Job 1™

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