

# ECHOMETER MODEL E WELL ANALYZER

## Well Management Instrument

Echometer's Model E Well Analyzer is an integrated artificial lift data acquisition and diagnostic system that allows an operator to maximize oil and gas production and minimize operating expense. It is a computerized instrument for acquiring liquid level data, acoustic pressure transient data, dynamometer data, and motor power/current data. Well productivity, reservoir pressure, overall efficiency, equipment loading and well performance are derived from the combination of measurements of surface pressure, acoustic liquid level, dynamometer, power and pressure transient response.

This portable system is based on a precision analog to digital converter controlled by a notebook computer with Windows-based application. The Well Analyzer acquires, stores, processes, displays and manages the data at the wellsite to give an immediate analysis of the well's operating condition. It is compact, rugged and designed for use in any climate.

### Key Features

- Notebook computer, software, analogue to digital converters and sensors.
- Total Well Management Software (TWM).
- Acoustic liquid level test and BHP calculation.
- Instant determination of percentage foam in the annulus.
- Dynamometer testing and analysis.
- Motor/Power current testing.
- Record and perform pressure transient testing and analysis.
- Plunger lift tracking.
- Data can be analyzed and saved to external sources or



sent electronically.

### Types of Analysis

**Total Well Management Software (TWM)** - The Well Analyzer is controlled by a user-friendly software package. The software controls the electronics and can acquire acoustic fluid level data, dynamometer data, pressure transient analysis, plunger lift, motor and power testing.

**Acoustic Liquid Level Test & BHP Calculation** - The Well Analyzer uses a gas gun assembly and pressure transducer. The pressure transducer permits a faster and more accurate determination of the casing pressure build-up rate, which is necessary to determine the casing annulus gas content or percentage of foam. The computer utilizes the acoustic and casing pressure build-up data in conjunction with the well's database to calculate the performance of the well.

The Echometer Well Analyzer can be used with a variety of gas gun/acoustic wellhead assemblies. The gas gun generates an acoustic pulse which travels down the casing annulus gas and is reflected by collars and the liquid level.

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The reflected acoustic pulse is converted into an electrical signal by the gas gun microphone. A remote fire gas gun can also be supplied with the Well Analyzer and is necessary for unattended pressure transient data acquisition. A manual fire 1500 psi compact gas gun can be operated in the explosion or implosion mode. High pressure gas from the well can be released into the compact gas gun to create the initial pulse so that an external gas supply is not required. A 5000 and 15000 psi gas gun are available for high-pressure applications. Precision pressure transducers with a wide range of pressure ratings are available for use with the various gas guns. For more information about available gas guns, visit [www.hamdon.net](http://www.hamdon.net)

**Dynamometer Testing** - The Well Analyzer is used with dynamometer load cells to gather data from PJ's, which is processed and analyzed to determine the loading and performance of the surface unit, rod string and the downhole pump. Two dynamometer load cells are available. The polished rod transducer (PRT) is attached to the polished rod below the carrier bar and provides a simple analysis for quick diagnostics.

The horseshoe transducer (HT) is a very accurate load cell for performing a more complete dynamometer analysis including precise measurement of valve loads and mechanical torque analysis. The HT is available in 30 Klb or 50 Klb version. The accelerometer built into both dynamometers provides an all-in-one compact, convenient and inexpensive technique to determine polished rod position and surface dynagraph by plotting load vs position. A downhole pump dynagraph is calculated for determination of pump performance. Traveling and standing valve tests can be performed. The horseshoe transducer can be used to obtain a mechanical torque analysis on the gearbox. A permissible load diagram is displayed. Motor current is acquired and displayed for determination of motor loading and gearbox balancing. An optional motor power sensor is available.

**Pressure Transient Testing** - The Well Analyzer with the pressure transient option can be used to obtain pressure buildup data. The operator programs the Well Analyzer to acquire data points while unattended. The rate may be specified in either in a linear frequency scale or a shots per log cycle frequency. Numerous diagnostic and analysis plots are available including casing pressure vs time, liquid level vs. time, bottomhole pressure vs time, log-log plot with derivative, Homer plot, MDH plot and radial flow type curves. Real time viewing of the plots ensures that the wells are returned to production as soon as the test objectives have been reached.

**Plunger Lift Analysis** - The Well Analyzer is used during the plunger lift cycle to continually acquire acoustic signals generated as the plunger travels in the tubing, plus simultaneously acquiring pressure signals from the tubing and casing. Key events such as plunger arrival at the liquid level in the tubing and plunger arrival at the bottom of the tubing are identified.

**Motor Power / Current Testing** - The power transducer measures both motor power and current. The power data is processed to determine electrical costs, gearbox torque and the distance of counterweight movement necessary to balance the pumping unit. The minimum size motor is recommended. The current data is processed to obtain thermal amp loading. A torque analysis is displayed in addition to the power/current analysis.



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## Data Management

A complete well analysis is performed from the acquired data stored on the Well Analyzer laptop in conjunction with the well database. Graphical, text and Excel reports are generated and printed. The software can be downloaded from [www.hamdon.net](http://www.hamdon.net) and installed on other computers as necessary.

## Certification

CSA Certification, Certificate No. 1705541 for use in Class 1, Division 1, Groups A, B, C, & D, is available at additional cost for some of the sensors. The Well Analyzer can be modified for intrinsically safe service if the sensor is located in hazardous areas. Contact SeniorTech (now Hamdon Wellsite Solutions) to request this certification.

## Well Analyzer Specifications

- Dustproof Plastic Case
- Notebook Computer (Windows)
- Sigma-Delta Analog to Digital Converters
- Precision Sensors
- Shielded Cables
- Total Well Management Software (TWM)

## Weight & Dimensions

- Total Weight Complete System – 75 lbs (35 kg)
- Approximate Dimensions – 20" x 20" x 20" (50.8 cm x 50.8 cm x 50.8 cm)

**Senior Tech (now Hamdon Energy Solutions) maintains an inventory of Echometer units and accessories. Units typically ship within 24 hours of order confirmation.**

## Wellsite Optimization Services

Senior Tech (now Hamdon Energy Solutions) provides oil and gas well optimization services that both enhance and sustain well efficiency and production. With effective optimization solutions and a mobile service fleet, Senior Tech (now Hamdon Energy Solutions) offers professional expertise and a diverse selection of optimization equipment across Canada and internationally.

## Production Optimization

Senior Tech's (now Hamdon Energy Solutions) wellsite production optimization services are designed to optimize a company's producing assets through data analysis and hardware/system reviews throughout the primary and secondary lifecycles of oil and gas wellsites. Our production optimization services, delivered by experienced engineers and technicians, ease the workload of production engineers, enabling them to quickly understand the current state of each wellsite. Services include:

- Acoustic Fluid Level Monitoring
- Dynamometer Surveys
- Foam Depression Tests/Fluid Depression Testing
- Plunger Lift Optimization
- Static Bottom Hole Pressure Calculations

## Regulatory Compliance

As the demands placed on oil and gas companies by the government, private sector and environmental groups increase, it is important to ensure operations are current and meeting the ever-changing regulatory guidelines. In addition to production optimization, Senior Tech (now Hamdon Energy Solutions) provides a range of wellsite services that are conducted to maintain compliance within the parameters set out by the AER and other regulatory agencies. Typically these services are conducted on a yearly basis, reported and submitted to the local regulatory agencies. They include:

- AWS Pressure Transient Surveys
- Packer Isolation Testing
- Surface Casing Vent Flow Testing
- Gas Migration Testing



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## Echometer Model Comparison

FUNCTION	MODEL E (WELL ANALYZER)	WIRELESS WELL ANALYZER	MODEL H	MODEL M
Unit Image				
Readout	Digital	Digital	Digital	Dual Channel Paper Recorder
Data Storage and File Sharing	✓	✓	✓	✓
Intrinsic Safety Certification	ATEX Optional	Awaiting Certification	ATEX an IECEx	ATEX Optional
Fluid Level Determination	Automatic Collar Count Acoustic Velocity Downhole Marker	Automatic Collar Count Acoustic Velocity Downhole Marker	Automatic Collar Count Acoustic Velocity Downhole Marker	Manual Collar Count Acoustic Velocity Downhole Marker
Surface Pressure Acquisition	✓	✓	—	—
Dynamometer Testing	✓	✓	—	—
Motor/Power Current Data Acquisition	✓	✓	—	—
Pressure Transient Testing	✓	✓	—	—
Plunger Lift Analysis	✓	✓	—	—
BHP & IPR Calculations	✓	✓	AWP2000	AWP2000
Printing Reports	✓	✓	✓	AWP2000
Protective Case	✓	✓	✓	✓
Notebook Computer (Windows)	✓	Required/Not Included	—	—
Rechargeable Battery	✓	✓	✓	✓

Warranty Policy: The Echometer is guaranteed for a period of one year. The guarantee covers defects in material and workmanship and is limited to replacement of parts.

**Senior Tech (now Hamdon Energy Solutions)** is an authorized Echometer distributor in Canada and internationally, providing equipment sales, rentals, training and service. Echometer's Well Analyzer equipment is used to determine well productivity, reservoir pressure, overall efficiency, equipment loading and well performance, which are calculated based on a combination of measurements of surface pressure, acoustic liquid level, dynamometer, power and pressure transient response.



9415 - 27 Avenue NW  
Edmonton, AB T6N 1C9  
T: 780.448.0074  
TF: 866.448.0074  
E: info@hamdon.net

[www.hamdon.net](http://www.hamdon.net)