

ECHOMETER MODEL H DIGITAL RECORDER

Liquid Level Instrument

The Echometer Model H is a stand alone, battery powered microprocessor controlled digital acoustic signal processor, recorder and display unit that is certified for use in hazardous environments. It has been designed to facilitate and speed up acquisition of data by minimizing the number of steps to obtain a liquid level depth measurement.

The Echometer Model H permits better interpretation of reflections from downhole anomalies through application of digital filtering and processing that improve the ability of the operator to distinguish downhole obstructions from enlargements.

Key Features

- Advanced acoustic liquid level depth instrument.
- Digital signal acquisition, processor and display unit.
- Large internal memory for data storage.
- Wellfile data management for file organization.
- Software can be installed on a laptop for data transfer and analysis.
- Enhanced interpretation of acoustic data.
- New anomaly marker analysis for gas and gas lift wells.
- Certified for use in hazardous environments.
- Interpretation of reflections.
- Filter operation.
- Minimal number of steps to obtain a liquid level depth measurement.
- User manages the data acquisition and controls the flow of the program.



Other Model H Features

Interpretation of Reflections – The Echometer Model H permits better interpretation of reflections from downhole anomalies through application of digital filtering and processing that improve the ability of the operator to distinguish downhole obstructions from enlargements. The response from the liquid level, or a reduction in annulus area, is opposite to the response from an enlargement such as a hole in the casing or perforations.

Filter Operation – Fluid level instruments are designed to include various filters, which can be used to accent signals that correspond to these frequency ranges. Selecting the proper digital filter will result in more accurate determination of the number of tubing collar reflections from the surface to the liquid level. The Model H records the signal with the highest possible resolution and frequency content so that signal analysis and interpretation is optimized using digital signal processing techniques.

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Increase production while reducing operating costs...

Convenience Features – The Model H has been designed to facilitate and speed up acquisition of data by minimizing the number of steps to obtain a liquid level depth measurement. This is achieved by setting up the program for the “Quick Shot” mode so that once the instrument is powered up, it takes only three “clicks” to display the signal analysis screen.

The user manages the data acquisition and controls the flow of the program from the software Main Menu. Wells can be organized in logical groups to facilitate access to the well files and specific acoustic shots. The Model H Laptop Manager software is a more efficient tool for entry of well data and management of the acoustic records.

Before acquisition of the record, the software monitors the background acoustic noise in the well and displays a color bar indicating the acoustic signal level. This will allow the operator to take measures to minimize well noise or increase the pressure differential between the chamber and the wellbore when the noise exceeds the preset threshold level.

Model H Acquisition Options

The Model H user has two options to acquire data:

- Quick Shot Mode - once the instrument is powered up, it takes only three “clicks” to display the signal acquisition screen.
- Named Well Mode - the user may specify a pre-entered well file name where the acquired data is stored.

Model H Analysis Options

Gas Well Analysis – When an acoustic record is acquired in a gas well, the program will perform the analysis using the acoustic velocity of a known gas to determine the liquid level.

Deep Well Analysis – Through Automatic Analysis of the fluid level records in a deep well, the software analyzes the record to identify the most likely signals that could correspond to the echoes from the tubing collars and highlights the most prominent signal with a vertical dashed indicator for the liquid level. This signal is also displayed with an expanded time scale. The time scale is converted to a distance scale using the average acoustic velocity computed from a count of the collar echoes from time zero to the time indicated by the vertical dashed line labeled “C” on the monitor. This dashed line indicates the point in the record where the amplitude of the collar echoes is equal to the amplitude of the background noise. Past this point in time the collar echoes cannot be identified with certainty and the average acoustic velocity is used.

Anomaly Marker Method – The purpose of this method is to accurately calculate the distance to the liquid level echo using the known distance to one or more specific echoes that are generated by wellbore changes in diameter (defined as anomalies) that exist in the wellbore. This method accounts for the variation of acoustic velocity that is commonly observed in most deep wells due to the variation of temperature, pressure and gas composition in the wellbore.

Gas Guns

Certified only when wellhead attachments that are certified intrinsically safe and approved for use in the classified area.

Compact Gas Gun - The compact gas gun is manually operated either in the Compression (Explosion) mode or the Rarefaction (Implosion) mode. The operator should use the Compression (explosion) technique when the casing pressure is less than approximately 100 psi. The Rarefaction (implosion) technique may be used whenever the casing pressure is sufficient to obtain a good record.



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5000 PSI Gas Gun – The 5000 psi gas gun is normally operated in the implosion mode and has an excellent noise canceling microphone. The 5000 psi gas gun is designed to operate efficiently in high pressure wells up to 5000 psi.

Certification

The Model H instrument is certified:

- IEC ex ia IIB T4 ad Class 1 Div 1 Groups C & D

Contact SeniorTech (now Hamdon Wellsite Solutions) for more information regarding certifications.

Model H Specifications

The Echometer Model H is entirely contained in a weatherproof, dustproof case and is designed to be operated for users wearing work gloves.

The panel incorporates both soft-keys and a navigational 5-button star input keypad. A row of soft-key buttons below the LCD are used to execute the actions described in the labels at the bottom of the screen.

The Echometer Model H instrument will operate from the self-contained rechargeable battery. Battery **MUST NOT** be recharged while instrument is located in a hazardous area. The battery is rated at 9 Amp-Hour. The Model H current drain is approximately .825 Amps operating and .325 Amps standby. Thus the battery operating on-time is approximately 10.9 hours.

Weight & Dimensions

- Unit dimensions 11" x 10" x 5" (27.9 cm x 24.5 cm x 12.7 cm)
- Unit weight 11 pounds (5 kg)

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