

# GAS GUN / ACOUSTIC WELLHEADS



**COMPACT GAS GUN**



**REMOTE FIRE GAS GUN**



**5000 PSI GAS GUN**



**15000 PSI GAS GUN**

Echometer's Gas Guns are intended for use with Acoustic Liquid Level recorders. Assemblies consist of a single unit gas gun and microphone.

The gun generates a single pressure pulse which travels down the casing annulus or tubing and is reflected by collars, downhole anomalies and the liquid level. The microphone converts the reflected pressure waves into an electrical signal and then sent it to one of Echometer's custom recorders for filtering, signal processing and display. All gas guns are constructed from 316 stainless steel and are suitable for H<sub>2</sub>S and corrosive service.

## Selecting a Gas Gun

Two important factors must be considered when selecting the type of gas gun:

- Gun pressure rating **MUST** exceed expected wellhead pressure.
- Determine if the convenience of the remote fire (explosion mode only) gun is a better fit than the more versatile manual fire (implosion/explosion) model gun.

## Compact Gas Gun

The Compact Gas Gun offers superior performance due to its rugged, noise-canceling, dual-disk microphone. The gun consists of a 10 cubic inch volume chamber and quick opening gas valve. The chamber is usually filled with carbon dioxide or nitrogen gas to a pressure in excess of the well pressure. When the valve is opened, a pressure pulse is generated which travels through the wellbore gas. The chamber can be charged as needed to obtain the desired record.

If the well pressure is sufficient, gas can be released from the well into the volume chamber to create a pressure pulse (implosion mode). An external gas source is not needed in this situation.

*Note: operating the Compact Gas Gun in the implosion mode allows debris from the well to be discharged into the gas gun volume chamber, resulting in greater maintenance requirements and the occasional replacement of o-rings.*

# GAS GUN / ACOUSTIC WELLHEADS

## Remote Fire Gas Gun

The Remote Fire Gas Gun offers the convenience of not having to manually open the gas valve on the gun to generate the pressure wave. A solenoid valve is triggered automatically from the Well Analyzer system or the Model M recorder that opens the internal gas valve and releases compressed gas from the volume chamber into the well. It also utilizes the same dual-disc noise canceling microphone with an excellent signal-to-noise ratio along with a 12 cubic inch volume chamber. It is required for automatic acquisition of pressure transient data. The Remote Fire Gas Gun is also available in a wireless version for use with the Wireless Well Analyzer System.

*Note: For single shot analysis, the 5000 psi implosion gun is preferred when the well pressure exceeds 1500 psi.*



## 5000 PSI Gas Gun

The 5000 psi Gas Gun is a manually operated gas gun used on wells where the wellhead pressure is in excess of 1500 psi. It is ideal for use in gas lift, flowing and high pressure shut-in wells. While it is most commonly used in implosion mode, it can also be operated in explosion mode. The 5000 psi Gas Gun can be operated in implosion mode on wells with a casing pressure greater than 200 psi.

The half inch ball valve is rapidly opened to release gas from the well into the volume chamber. This action generates a rarefaction (negative) pressure pulse. An external gas source is not needed in the implosion mode. Use the explosion mode on low-pressure wells (less than 200 psi), and where pressurized gas is available at a pressure greater than the casing annulus pressure. In the explosion mode, the gas gun volume chamber is pressured above the casing pressure. Opening the gas valve results in a positive compression pressure wave being generated which travels down the casing annulus.

## 15000 PSI Gas Gun

The High Pressure Gas Gun operates in implosion mode only, up to 15000 psi. The microphone is extremely rugged however it is not noise-canceling and is less sensitive than the microphones on the Compact Gas Gun, Remote Fire Gas Gun or the 5000 psi Gas Gun.

In implosion mode, the volume chamber in the gas gun is bled to a pressure less than the well pressure, after which a poppet valve is rapidly opened to release gas from the well into the gas gun volume chamber in order to generate the pressure pulse.

The 15000 psi Gas Gun performs best at pressures between 1500 and 15000 psi. Good results have also been obtained at pressures above 1500 psi (100 ATM) shooting through the 1/8" orifice needle valves which are standard on most high pressure wells.

## Gas Cylinders

Carbon dioxide or nitrogen gas is normally used with gas guns when operating in the explosion mode. The Compact Gas Gun and Remote Fire Gas Gun can be recharged from a gas cylinder furnished with the guns. The 5 lb CO<sub>2</sub> gas cylinders are constructed of aluminum and are filled with liquid CO<sub>2</sub> which give the operator a greater number of shot per cylinder. They have a test pressure of 3000 psi, and a service pressure of 1800 psi.



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If the well pressure exceeds the vapor pressure of carbon dioxide, then nitrogen gas is the most common gas to use for acoustic testing. Nitrogen bottles are filled to a higher pressure, are constructed of aluminum and will not freeze up in cold temperatures. They have a test pressure of 3694 psi and a service pressure of 2216 psi.

## Pressure Regulators

A pressure regulator is available for use with the nitrogen gas cylinder, which will reduce the pressure to a preset level that can be set by the operator ranging from 50 to 1500 psi. This can be used during single shot or pressure transient data acquisition.



**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 early 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



# GAS GUN / ACOUSTIC WELLHEADS

## Gas Gun Specifications

All gas guns are constructed from 316 stainless steel and are suitable for H<sub>2</sub>S and corrosive service.

FUNCTION	COMPACT GAS GUN	REMOTE FIRE GAS GUN	5000 PSI GAS GUN	15000 PSI GAS GUN
				
Volume Chamber Size	10"	12"	7"	1"
Working Pressure PSI (ATM)	15000 (100)	1500 (100)	5000 (333)	15,000 (1000)
Best Operating Pressure PSI (ATM)	0-1500 (0-100)	1-1500 (0-100)	0-200 (0-13) EXP 200-5000 (13-333) MP	1500-15,000 (100-1000)
Mode of Operation	Explosion/Implosion	Explosion Only	Explosion/Implosion	Implosion
Types of Operation	Manual	Automatic/Solenoid	Manual	Manual
Dimensions	3" x 4.5" x 12" (7.6 cm x 11.4 cm x 30 cm)	4.5" x 8.5" x 14.5" (11.4 cm x 21.6 cm x 36.8 cm)	2" x 2" x 16" (5.0 cm x 5.0 cm x 40.6 cm)	2.4" x 2.4" x 8" (6.1 cm x 26.1 cm x 20.3 cm)
Weight	8 lbs (3.6 kg)	12 lbs (5.5 kg)	10 lbs (4. kg)	10 lbs (4.5 kg)
Microphone	Dual Disc Noise Canceling	Dual Disc Noise Canceling	Dual Disc Noise Canceling	Single Disc
Echometer Unit Compatibility	Model M, E, H	Model M, E	Model M, E, H	Model M, E, H

*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.



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