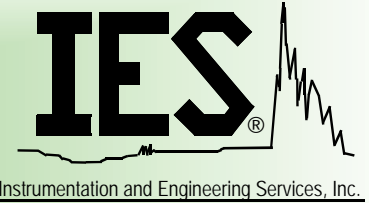


Series 200

High Shock, High Speed Pressure and Acceleration Gauge



The **NEW IES Series 200 Gauge** brings, for the first time to the Oil and Gas Industry, advances in miniature, high shock, high speed (115,000 data points/second) data recorders. Designing and building high tech, custom electronic recording devices exclusively for military and commercial test programs, has been the business of **IES** since 1987. We are excited to bring these advances in technology, with the SERIES 200 gauge. Not only can this down-hole gauge sample data at much higher speeds than the industry standard, but it can do it in high pressure, and severe shock/vibration environments, generated by explosive pressures.

The SERIES 200 not only records pressure and temperature data, but can be used to measure *Tool Movement and Acceleration/Vibration* up to $\pm 50,000$ G's². This **exclusive** feature of this **IES** gauge is very useful in monitoring the environment in which the gauge is located.

The SERIES 200 is typically used with the **StimGun™** Assembly or **StimTube™** Tool. The pressure profile collected, is used to verify proper propellant burn and determine the fracturing response of the formation by analyzing the post-job data with **PulsFrac™**. Other applications include recording perforating jobs, hydraulic fracturing/stimulations, tool movement and design, and reservoir measurements.

Another SERIES 200 **first** in down-hole data collection is our "**Multi-Speed**" feature. This programmable feature allows flexibility in collecting pressure, acceleration, and vibration data at various sampling speeds and time intervals. The gauge starts sampling at a slow speed, and when a

Advanced Series 200 Gauge Features:

- Shock Hardened Design ($\pm 50,000$ G's of Acceleration/Vibration)²
- VERY High Sampling Speed (up to **115,000 data points/second**)
- Records Pressure, Acceleration, Vibration, and Temperature
- Programmable Low, Intermediate, High Speeds, and Time Intervals
- Can be used as a "**DROP BAR**" pressure gauge
- Includes a **Shock Mitigator**¹



pressure pulse or acceleration/vibration event occurs, the gauge automatically switches to a very high sampling speed, then switches to an intermediate speed, and back to the slow sampling speed. This process can be repeated until the memory is full.

The SERIES 200 brings many **NEW** features to the down-hole gauge industry, including computer programming and data readout, internal micro-processor control, automatic sensor testing and balancing, selectable pressure, temperature, and acceleration/vibration ranges (over 130,000 combinations), current and internal/battery voltage readouts to verify proper gauge operation, internal temperature and battery data, selectable sampling rates up to 115,000 data points/second, Auto Start/Stop recording modes, up to 1,048,576 data points of memory, and IES potted AA alkaline batteries for power.

*Each gauge comes with a **IES "Shock Mitigator"**¹ which isolates the gauge from the tool, reducing shock and vibration (up to a factor of 10) that occurs when the gun ignites. This lengthens the life of the recorder, battery, and sensors.*

A **SPECIAL** application of the 1-11/16" OD gauge is its use as a "**Drop Bar**" to fire a propellant or perforating gun. The gauge can be used (with firing pin / fish neck attachments) as the "Drop Bar" to trigger a gun firing head. It can be left there as long as desired to collect pressure flow data, then retrieved, and the pressure pulse data read back. Not only can the **Customer** get pressure data from the gun, but he can determine from the data **IF** the gun actually went off.

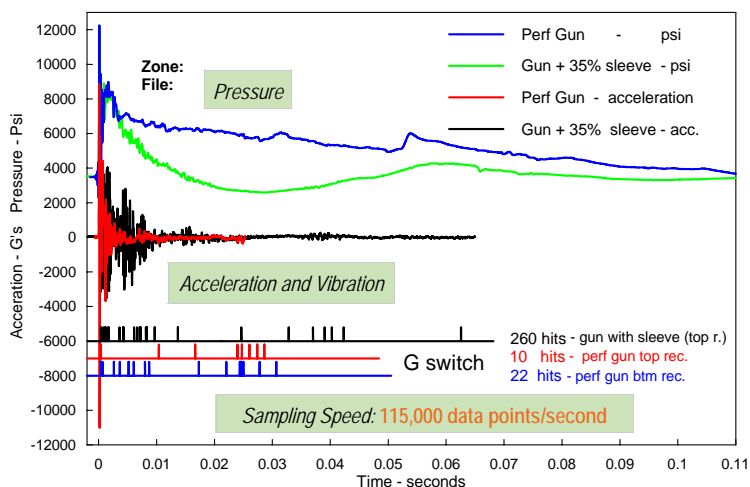
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Series 200 Software



High Speed Pressure Profile of a StimGun™ Assembly



1-11/16" Shock Mitigator¹
#IES-SM-11116



Gauge Specifications

Maximum Acceleration / Vibration	+/- 50,000 G's of acceleration/vibration
Sampling Rate (High, Intermediate, and Slow Speeds)	115,000 data points/second, and down to one sample every 10 seconds
Data Resolution	12 bits @ 115,000 data points/sec (0.02% accuracy of full scale)
Pressure Range	30,000 psi (peak), 15,000 psi (static)
Power Requirements	IES Potted AA alkaline batteries
Current Drain	500 uA sleeping / 100 mA sampling
Temperature Range	-40 Deg. C to 120° C
Sensor Frequency Response	0 to 10,000 Hz
Memory Capacity	1,048,576 data points
Computer / Communications	750 MHz or greater Pentium III
Software is included	Windows XP is recommended
Shock Mitigator ¹ - #IES-SM-11116	1-11/16" OD x 17" (8 lbs), 17-4 SS
Gauge Dimensions	1-11/16" OD x 50" (22 lbs), 17-4 SS

Gauge Options

#IES-GAUGE-211	1-11/16" OD Gauge (Pressure and RTD)
#IES-GAUGE-212	1-11/16" OD Gauge (Pressure, ±10 G's Accelerometer, and RTD)
#IES-GAUGE-213	1-11/16" OD Gauge (Pressure, ±60,000 G's & ±10 G's Accelerometers, and RTD)

¹ Patent Pending

² At 50,000 G's for a duration of 1 second, a mass will: Accelerate from 0 to 18,000 km/hr, and travel 250 km.



Specifications subject to change without notice.

StimTube™ Tool and StimGun™ Assembly are trademarks of Marathon Oil Company
PulsFrac™ is a trademark of John F. Schatz Research & Consulting, Inc.