

Series 300

High Shock, High Speed Pressure Gauge



Instrumentation and Engineering Services, Inc.

The NEW IES Series 300 Gauge

brings more advances to the Oil and Gas Industry, with a **150°C** rated, high shock (**+/-50,000 G's**), high sampling speed (**115,000 data points/second**) Pressure Gauge. 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 300** 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 from perforating and propellant guns.

The **SERIES 300** is typically used with **Perforation Guns, Dynamic Underbalance, Propellant Guns, the StimGun™ Assembly, and the StimTube™ Tool**. The pressure profile data collected, is used to verify proper gun and propellant burn, and Underbalance pressures. It can be used to determine the fracturing response of the formation by analyzing the post-job data with software models. Other applications include recording perforating jobs, hydraulic fracturing/stimulations, tool movement and design, and reservoir measurements.

Another **SERIES 300 first** in down-hole data collection is our "**Multi-Speed**" feature. This programmable feature allows flexibility in collecting pressure, at various sampling speeds and time intervals. The gauge starts sampling at a slow speed, and when a pressure pulse or acceleration/vibration event occurs, the gauge automatically switches



to an intermediate speed, and back to the slow sampling speed. This process can be repeated until the memory is full. The "Time Window" for these different sampling speeds is programmable.

The **SERIES 300** 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 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 **4,000,000 data points** of memory, and IES potted 80°C alkaline, 120°C Lithium, or 150°C Lithium batteries for power.

Each gauge comes with a IES "Shock Mitigator" 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.

Advanced Series 300 Gauge Features:

- Shock Hardened Design (**±50,000 G's** of Acceleration/Vibration)¹
- **VERY** High Sampling Speed (up to **115,000 data points/second**)
- Records Pressures up to **30,000 psi**
- Programmable Low, Intermediate, High Speeds, and Time Intervals
- **4,000,000** Data Points of Memory
- **120°C** (248°F) and **150°C** (302°F) Rated Gauges Available

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 they can determine from the data **IF** the gun actually went off.

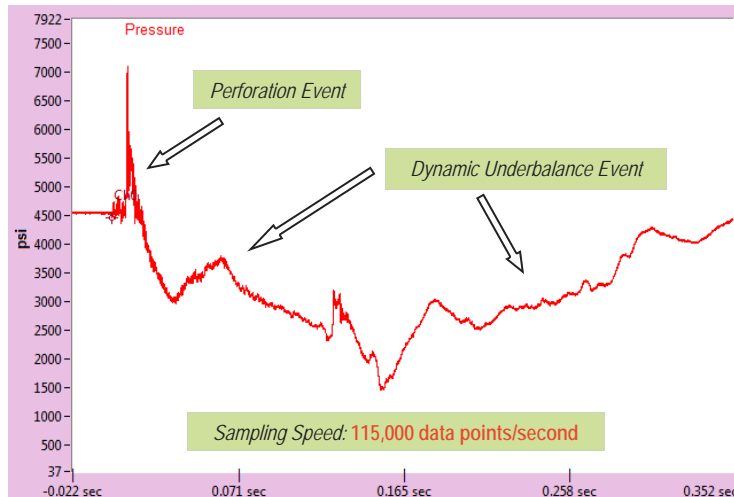
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Series 300 Software



Dynamic Underbalance High Speed Pressure Profile



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



Gauge Specifications

Battery Options	80°C Alkaline, 120°C Lithium, 150°C Lithium ("Two Battery" Option Available)
Maximum Acceleration / Vibration Rating	+/-50,000 G's of Acceleration / Vibration ¹
Sampling Rate (High, Intermediate, and Slow Speeds)	115,000 data points/second, and down to one sample every 10 seconds
Data Resolution	12 bits (4096 steps) @ 115,000 data points/sec (0.02% accuracy of full scale)
Pressure Range	30,000 psi (peak), 30,000 psi (static)
Power Requirements	IES Potted Alkaline or Lithium Batteries
Current Drain	1 mA sleeping / 20 mA recording
MAXIMUM Temperature Rating	120°C -or- 150°C
Sensor Frequency Response	0 to 10,000 Hz
Memory Capacity	4,000,000 data points (Volatile Memory)
Computer Requirements / Communications	1.5 MHz or greater Pentium III (2 GIG RAM) / Serial or USB
Software is included	Windows XP or VISTA (recommended)
Shock Mitigator - #IES-SM-11116	1-11/16" OD x 17" (8 lbs), 17-4 SS (Included with each Gauge)
Gauge Dimensions	1-11/16" OD x 50" (22 lbs), 17-4 SS

Gauge Options

#IES-GAUGE-211	1-11/16" OD, 120°C Rated, Gauge (Pressure and RTD). For Lease or Purchase.
#IES-GAUGE-311	1-11/16" OD, 150°C Rated, Gauge (Pressure and RTD). For Lease <u>ONLY</u> .

¹ 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