![Data Physics logo] **Data Physics**

900 Series

A member of the N V T GROUP

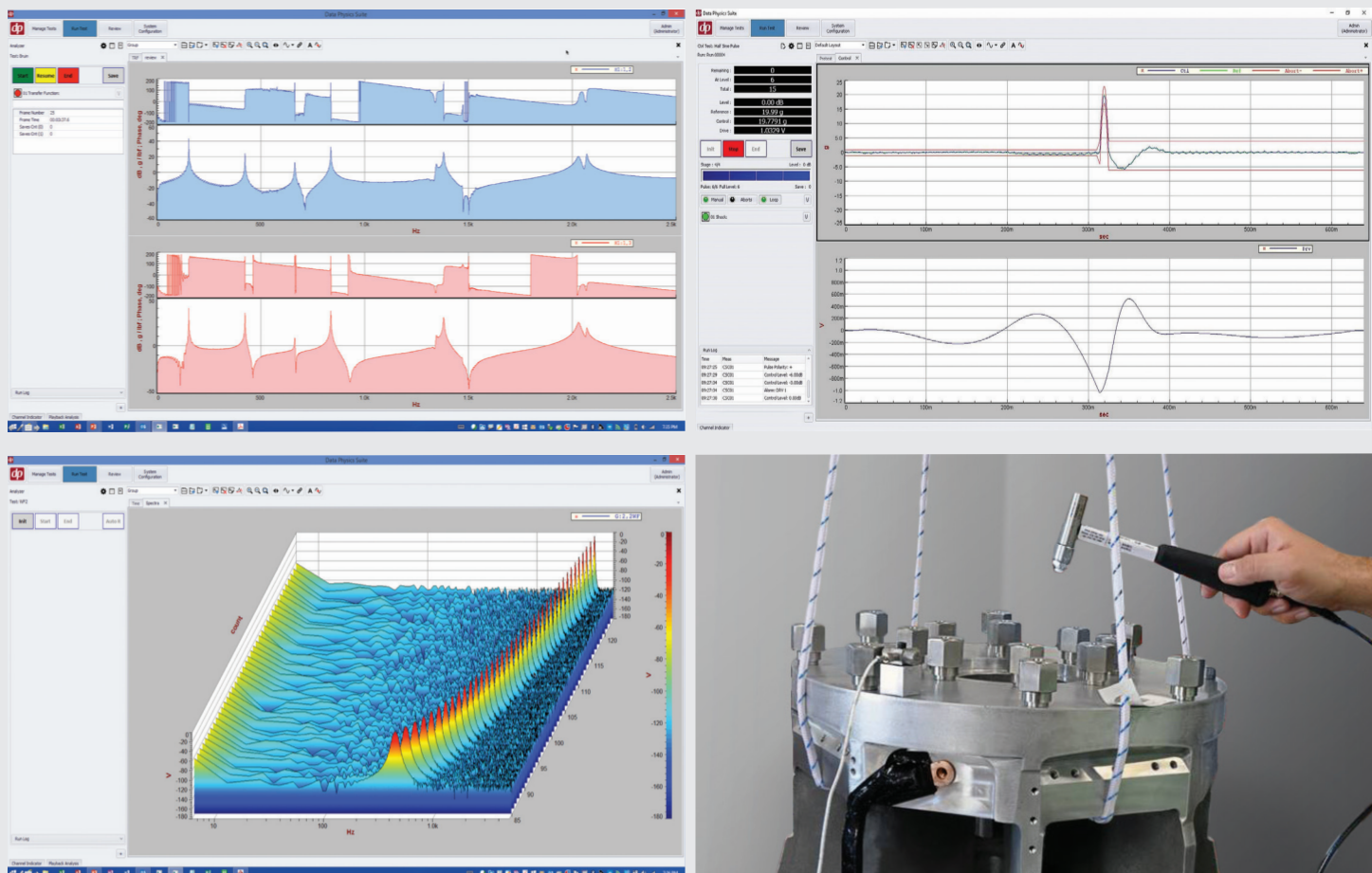# 900 Series Analyzers and Controllers

Whether you need comprehensive vibration control, intelligent signal analysis, or an all-in-one solution, the 900 Series delivers – with a new, distributed real-time signal processing engine for extraordinary dynamic testing performance. Leveraging advanced, scalable hardware and an intuitive software environment, users can now tackle the most challenging of test scenarios without compromising ease-of-use or accuracy.

Applications include:
- Vibration shaker control
- Structural and modal analysis
- Acoustic analysis
- Rotating machinery
- General vibration analysis

Delivering exceptional dynamic range and phase accuracy, Abacus 900 hardware offers users key new benefits such as flexible input/output/tach channel configuration and distributed signal processing on each channel card. For large tests and network applications, distributed data acquisition and signal processing conveniently enable remote and autonomous operation.

New SignalCalc 900 software greatly simplifies and enhances the user experience. A single, easy-to-use environment and relational database facilitate efficient management of testing, analysis, and reporting. Powerful new features such as Multi-Measurement and user-defined Math Channels enable even more real-time testing capability.

# Testing Made Easier Using SignalCalc 900 Series Software

The 900 Series system is driven by an all-new generation of Data Physics software for both control and analysis. While operation is familiar to existing Data Physics users, SignalCalc 900 software brings advanced features that streamline testing and take advantage of the 900 Series' exceptional distributed signal processing performance.

Integrated User Interface

A single, easy-to-use software environment built on a relational database structure makes the process of defining a test, making measurements, analyzing data, and generating high-quality reports easier than ever before.

Multiple Simultaneous Measurements

SignalCalc 900 Series software supports multiple simultaneous dynamic signal measurement in real time, leveraging powerful onboard signal processing. Simultaneous measurements simplify testing and shorten test time by combining measurements such as FFT, correlation, and order analysis in a single test. Each measurement can be triggered independently either by signal event or manual input. This also enables a single Abacus 900 Series front-end to serve as both analyzer and controller, with multiple analyzer measurements running concurrently with control of a vibration test profile such as random, sine, or shock.
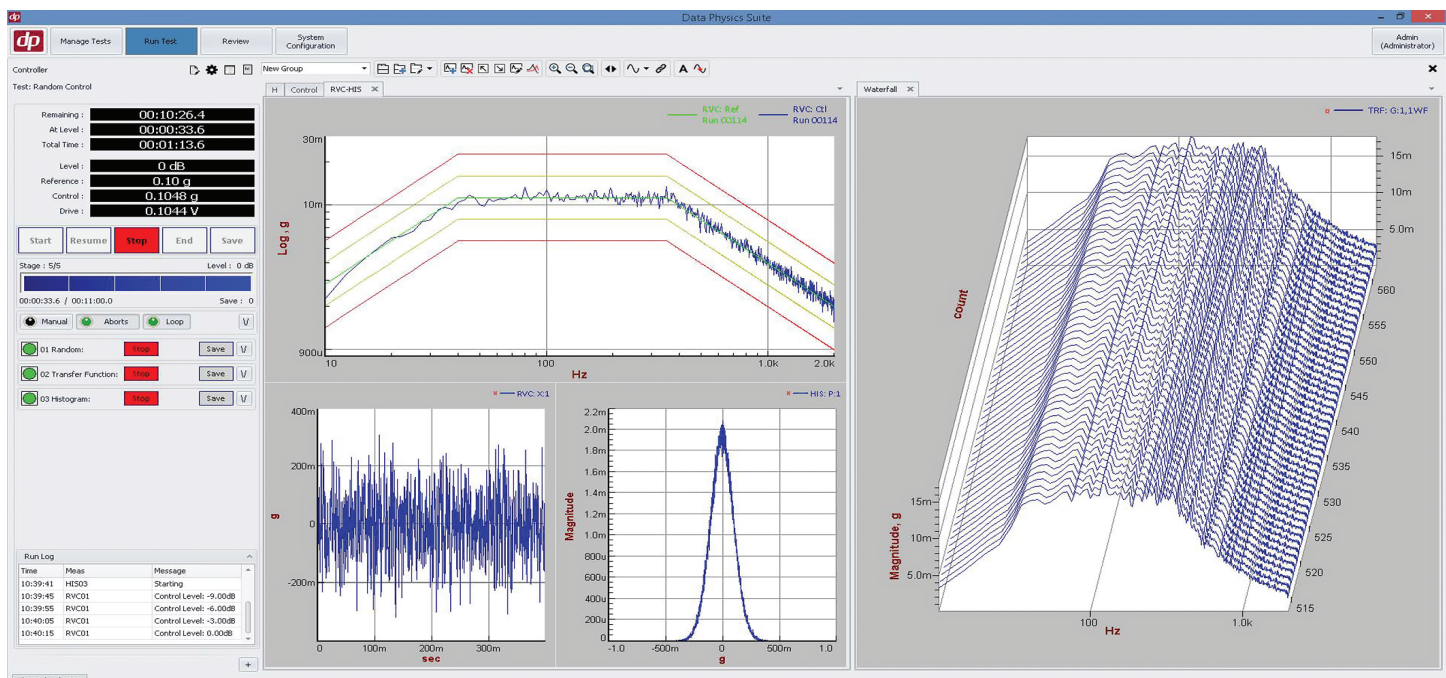
Signal Math

Create custom measurement signals by applying math operations directly to signals in real time. Functions include integration, differentiation, addition, subtraction, multiplication, division, matrix operations, filters (low pass, high pass, and band pass), Fourier transform, and inverse Fourier transform. Create virtual channels using mathematical operators.
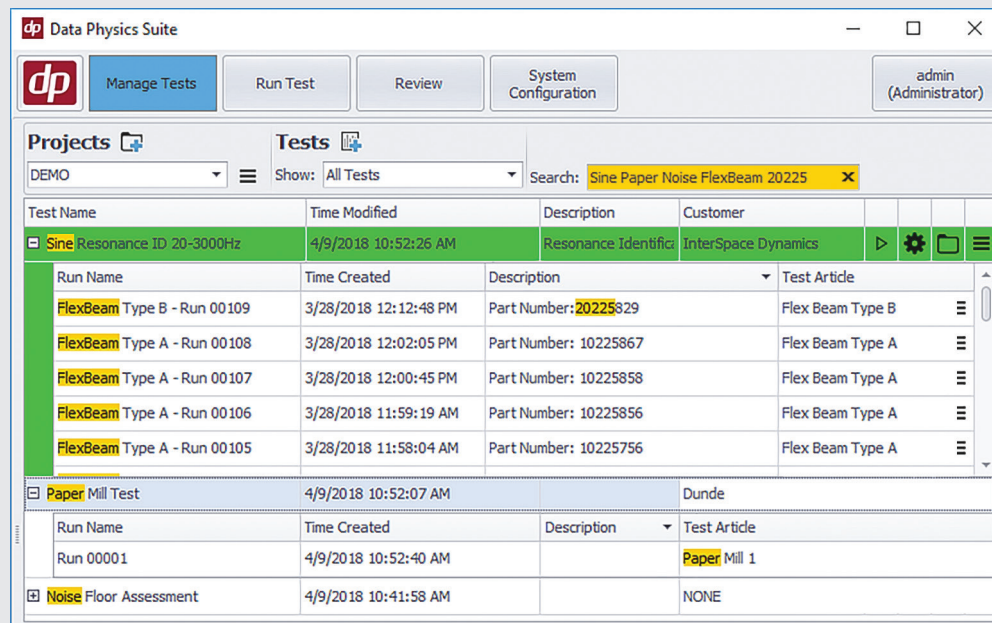
Flexible Reporting

Custom graphs support display of both measurements and test attributes. Reports update automatically with live data and can be easily generated after each test.

Efficient Test Management

SignalCalc 900 Series software is built on a relational database with a Test Manager interface that makes management of tests more efficient than ever before.
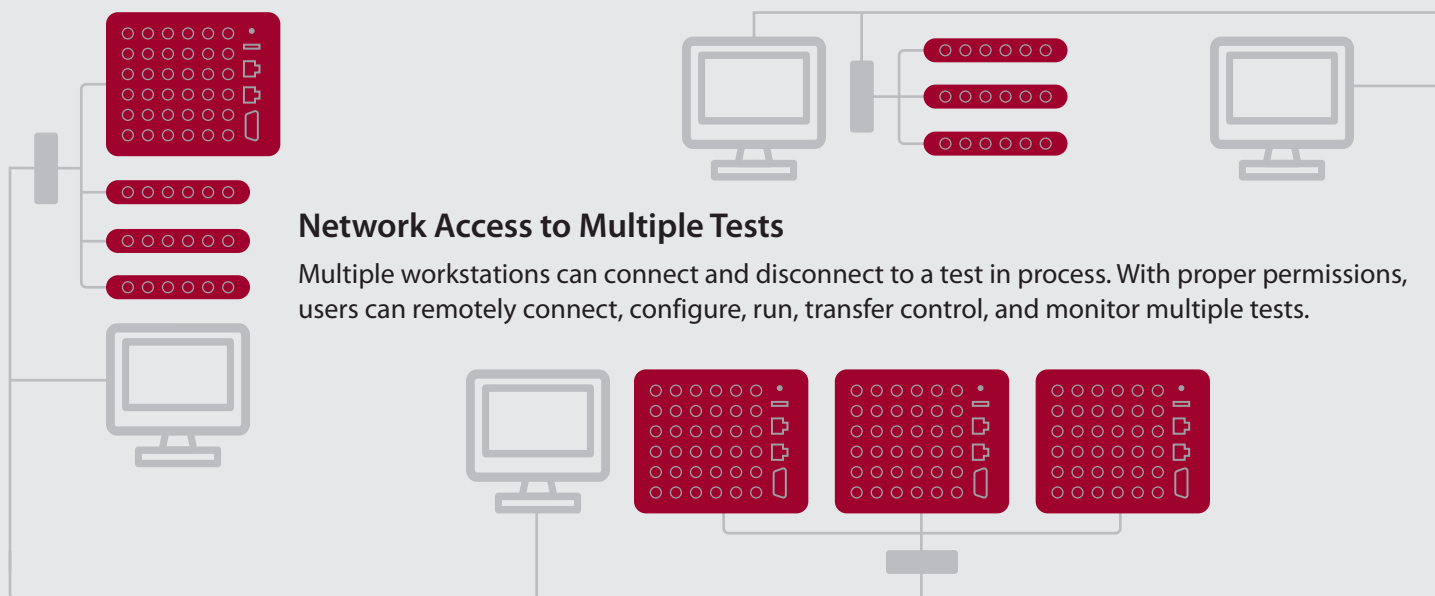
- Automatically saved and indexed test setups
- Flexible search criteria
- Easy retrieval, editing, and export of test setups and data
- Replay of recorded data
- Analysis and comparison of data from any type of test

Network Access to Multiple Tests

Multiple workstations can connect and disconnect to a test in process. With proper permissions, users can remotely connect, configure, run, transfer control, and monitor multiple tests.

Modular, Versatile, Expandable

Abacus 900 Series distributed data Architecture is designed to support a wide variety of configurations and advanced capabilities. With a modular Ethernet-based architecture, the 900 Series can be expanded to over 1,000 channels.

Multiple 901 and 906 chassis can be combined into a single system. A shared clock signal guarantees synchronized measurements between chassis. In all configurations, the channel-to-channel phase accuracy is better than 0.5 deg at 40 kHz. Chassis can be located up to 100 meters apart.

The system's network performance is resilient and is designed to operate across an existing local network. With distributed signal processing and data storage, the system does not require centralized processing control during test operation; the client PC can even disconnect from the system without interrupting the test.

Abacus 900 Series Hardware: Accurate, Portable, Modular

Compact and rugged, Abacus 900 hardware is designed for demanding field applications. With a modular, Gigabit Ethernet architecture, the 900 Series expands to over 1,000 channels. Systems are modular with six input/output/tach channels per card. Each card includes on-board real-time DSP processors. In addition, each chassis has local storage to save both raw time histories and processed signals. With dedicated processors and local data storage, the system is easily expanded to support large tests – without compromising performance.

901

The 901 is an ultra-portable system well-suited for field use. Multiple systems can be combined for larger tests.

- Six channels (input/output/tach)
- Passive cooling for silent operation
- Power over Ethernet
- Remote and autonomous operation

906

The 906 is a compact, durable system for both lab and field applications. Multiple 906 and 901 systems can be combined to create larger systems.

- Up to 36 channels per chassis – expandable to over 1,000
- Flexible input/output/tach configuration
- Quiet mode for acoustic applications

Hardware Summary

- Six channels per card, four dedicated inputs and two reconfigurable Flex Channels
- Flex Channels can be user-configured as inputs, outputs, or tachometers
- Large distributed systems are easily realized
- Multiple systems can be placed with up to 100 m between units
- Under all conditions, synchronized acquisition to within 40 nS
- Test data can be stored on the Abacus, host PC, or independent data server

Inputs

- 24-bit sigma delta converter with up to 150 dB dynamic range
- 80 kHz of alias-free bandwidth
- Up to 216 kSamples/sec
- Channel-to-channel phase accuracy better than 0.5 deg at 40 kHz

Outputs

- 24-bit Sigma Delta
- Sampling: up to 216 kSample/s

Tachometers

- Signal frequency: DC to 500 kHz
- Programmable: Threshold, Hysteresis, Hold-Off, Pre-Scaler, Polarity

Multi Function Bridge, Voltage and ICP Channel Card

DP900-4M

The Multi Function precision measurement card adds strain measurement to the 900 Series platform, and is an all-in-one solution for bridge, voltage and IEPE/ICP (including TEDS) signal conditioning.

Featuring 4 versatile input channels with secure micro-D9 connectors in the front-end, the Multi Function card can tackle a wide range of dynamic signal measurement applications.

The Multi Function card provides an integrated and synchronized solution for SignalCalc 900 analyzer and controller applications.

Performance Highlights

Supports Quarter, Half and Full Bridge configurations, IEPE/ICP and bridge sensors.

Includes 120 Ω and 350 Ω completion resistors and a 100 KΩ shunt resistors for each channel.

Supplies user configurable ±5 V bridge power with precision DACs.

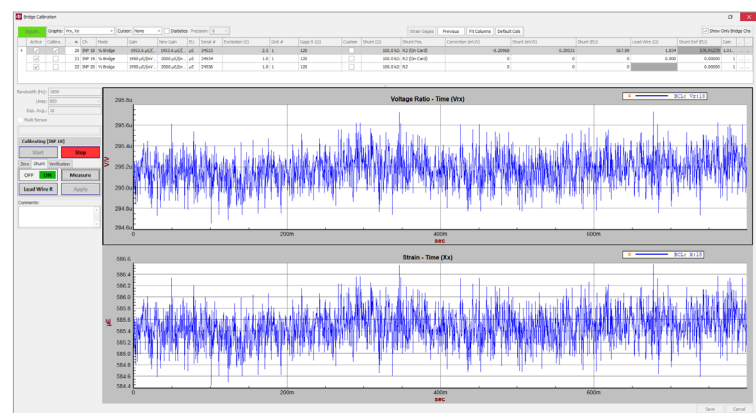Compensates high value bridge unbalance with nulling DAC during offset calibration.

New Software Features

Strain gauge database enables a quick and intuitive test setup.

Built in bridge balancing and shunt calibration for optimal performance.

Real-time temperature compensation of strain using thermocouple data.

Real-time principal strain and stress calculations for strain gauge rosettes.

Multi Function Bridge, Voltage and ICP Channel Card

Specifications

General

4 individually configurable inputs via micro-D9 connectors

Supported inputs:
- Voltage / ICP / IEPE
- Quarter, Half and Full Bridge

ADC Resolution: 24 bits Sigma Delta

Maximum Sampling Frequency: 216 kSamples/s, arbitrarily selectable

Coupling: AC (0.5 Hz) / DC, DIFF / SE

Input Range: 0.1 V, 0.31 V, 1 V, 3 V, 10 V

Impedance: DIFF: 1 MΩ / 100 pF + 1 MΩ / 100 pF
　　　　　　 SE: 1 MΩ / 100 pF + 50 Ω

Input Common-Mode Range: 200 % FS (100% FS, 10 V)

Common-Mode Rejection Ratio: 100 dB (0.1 V input range, at 50/60 Hz)

	SNR (20 KHz BW)	SFDR (20 KHz BW)
0.1V:	-95dB	-134dB
1V:	-110dB	-147dB
10V:	-114dB	-150dB

	SNR (2 KHz BW)	SFDR (2 KHz BW)
0.1V:	-104dB	-138dB
1V:	-117dB	-150dB
10V:	-120dB	-158dB

Amplitude Accuracy: ±0.2% FS at 1 KHz

Phase Accuracy: ±0.5° at 40 KHz

CrossTalk: -100 dB at 1 KHz

Residual Offset: ±0.1% FS Max

Total Harmonic Distortion (THD): -90 dB at 1 KHz

Bridge:

Bridge Configuration:
- Full Bridge (6 Wires + Shunt line)
- Half Bridge (5 Wires + Shunt line)
- Quarter Bridge (3 Wires)

Bridge Voltage: 0 to ±5V arbitrarily selectable and symmetrical excitation with 0.1% accuracy with excitation sense lines.

Bridge Current: 60 mA per channel pair, with overcurrent protection.

Completion Resistors (QB): 120 Ω and 350 Ω, ±0.02%, 0.2 ppm

Completion Resistors (HB): 2.5 KΩ / 2.5 KΩ, ±0.05%, 2 ppm

Zeroing / Offset Calibration: Automatic offset compensation with nulling DAC (HW) and zeroing (SW).

Shunt Calibration Resistor: 100 KΩ, ±0.1%

Gauge Resistance	Shunt Reference
120 Ω	599 µε
350 Ω	1744 µε

Voltage:

ICP: 24 V, 5 mA (±5%)

Transducer identification: TEDS v1.0, IEEE 1451.4

NOTE: Continued product improvement necessitates that Data Physics reserve the right to modify these specifications without notice.

Abacus 900 Series Hardware Specifications

Inputs

- ADC Resolution: 24 bits Sigma Delta
- Sample Resolution (Digital Filtering/Processing): 32 bits floating point
- Maximum Sampling Frequency: 216 kSamples/s
- Coupling: AC/DC, DIFF/SE, ICP, TEDS
- Input Impedance: 1 MOhm + 1MOhm (DIFF), 1MOhm + 50 Ohm (SE)
- Digital Anti-Alias Filter: -100 dB (0 to 40 kHz), -90 dB (40 to 90 kHz)
- Analog Anti-Alias: 3 poles
- Dynamic Range: 120 to 150 dB
- Input Ranges: 0.1V, 0.31V, 1V, 3.1V, 10V, 31V
- CMMR: 60 dB
- Max Voltage: 80 V max/1 MOhm; 5 V max/50 Ohm
- Amplitude Accuracy: +/-0.2% FS at 1 kHz for 0 deg < T< 55 deg C
- Frequency Response: +/- 0.5% 0 to 40 kHz, +/- 1% 40 to 80 kHz, +/- 2% 60 to 80 kHz on 30V Range
- Phase Accuracy: 0.5 deg at 40 kHz
- THD+N: 90 dB min @ 1kHz
- Offset: -/+ 0.1% FS Max (0.5% Max on .1V Range)
- Crosstalk between inputs: -90 dB
- Crosstalk between inputs and outputs: -90dB
- Frequency Accuracy: 25 ppm

Outputs

- DAC: 24 bits Sigma Delta
- Sampling: up to 216 kSample/s
- Ranges: 1V, 2V, 5V, 10V; SE
- Output Current: 10 mA
- THD: 90 dB
- Reconstruction Filter: 100dB Stop Band

Tachometers

- Input Ranges: 0.1V, 0.31V, 1V, 3.1V, 10V, 31V
- Max Voltage: 80 V /1 MOhm; 5 V/50 Ohm
- Coupling: AC/DC/DIFF/SE
- Signal Frequency: DC to 500 kHz
- Programmable: Threshold, Hysteresis, Hold-Off, Pre-Scaler, Polarity

Physical Measurements

901

Length:	7.32 in.	18.60 cm
Width:	4.64 in.	11.78 cm
Height:	1.40 in.	3.57 cm

906

Length:	10.00 in.	25.40 cm	(for the primary case)
	11.64 in.	29.57 cm	(including handles)
Width:	8.40 in.	21.34 cm	
Height:	6.92 in.	17.58 cm	(with feet folded)

ISO 9001:2015 CERTIFIED

A member of the N V T GROUP

3.26.25