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DYNAMIC SIGNAL ANALYSIS & DATA ACQUISITION

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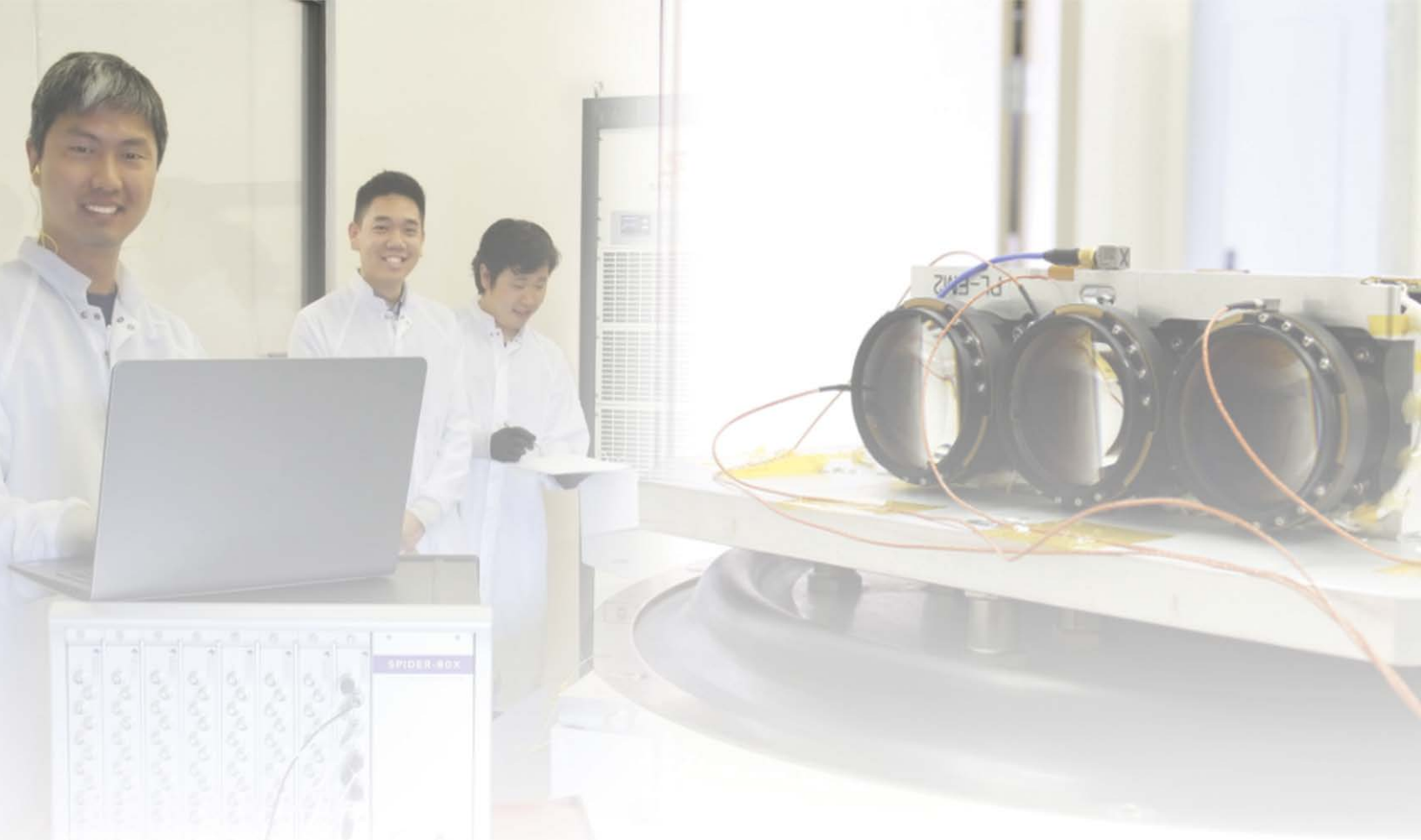


Spider-80X Front-end Diagram

Spider-80X & Spider-80Xi Dynamic Measurement Systems

Expandable Systems: Up to 512 Channels

The Spider-80X is designed for applications in three fields: dynamic data acquisition, vibration control, and machine monitoring. Each front-end features eight analog input channels and two channels that may be software selected as analog outputs for vibration control or tachometer inputs for the analysis of rotating machinery.

A single Spider-80X front-end is a complete two-output controller with the same high quality patented dual ADC input technology of the Spider-81 series. The Spider-80X inputs provide single-end/differential and AC/DC/IEPE coupling choices; charge mode is an available option that can be installed at the factory. The Spider-80X also provides the same time sync Ethernet connectivity and 4 GB flash memory for data and program storage. Multiple Spider-80X front-ends may be linked together using the Spider-HUB Ethernet switch from Crystal Instruments. The data storage can be increased to 250 GB by adding a Spider-NAS mass storage device.

The Spider-80X front-ends are onsite swappable. Each front-end is metal-shielded. The user can quickly configure a system with an arbitrary number of front-ends.

The Spider-80SG strain sensing device has the same mechanical form factor as the Spider-80X. These two systems can combine into a system that measures various dynamic signals, including strains or other sensors requiring excitation. Multiple Spider-80X or Spider-80SG front-ends can be hosted in a 64-input chassis.

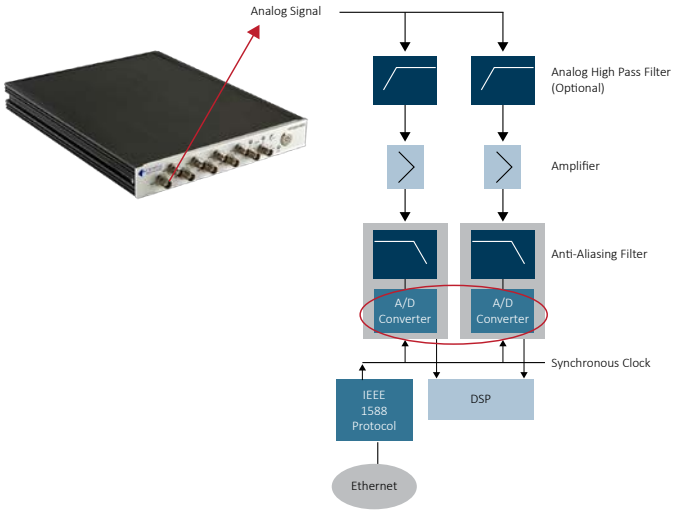
Spider-80Xi: 64 Channel Chassis

Spider-80Xi: 32 Channel Chassis

The Spider-80Xi is a compact version of Spider-80X with an extremely lightweight form factor. Featuring a 64 channel chassis weighing less than 10.5 kg, the Spider-80Xi can be carried in one hand and is optimal for field environment testing where portability is essential.

Like the Spider-80X, multiple chassis combine to create a system up to 512 channels, all sampled simultaneously. A dedicated massive storage hard disk (a solid state hard-drive with a capacity of 250GB) allows the time signals of all input channels to record at up to 102.4 kHz/channel. Accurate time synchronization results in excellent phase match in the frequency domain between all channels, either on the same Spider front-end or across different front-ends. Real time FFT, octave, order tracking or vibration control functions can be enabled. The modular boards of the Spider-80Xi are installed at the factory and are not onsite swappable.

The Spider-80Xi system consisting of the 64 channel chassis is powered by AC power, at 100 to 240 VAC. The Spider-80Xi system consisting of the 32 channel chassis is powered by the DC power, at 10V to 22V. The latter is also easily operable with an external battery pack. With the Spider-Battery, (developed by Crystal Instruments) a 32 channel Spider-80Xi system operates up to 4 hours without interruption.



Spider-80X 64-Channel Chassis shown with Spider-HUB & Spider-NAS

Spider-HUB Industrial Ethernet Switch

Spider-NAS Storage Device

High Precision Front-end Design

The Spider-80X/Xi analog input channels provide extremely high precision measurements. Each channel has single-ended or differential AC or DC input coupling. It can also provide IEPE (ICP™) input mode (AC coupling with a 4 mA constant current from a 22 VDC source) for use with industry-standard accelerometers with built-in amplifiers. The ability to read TEDS (Transducer Electronic Data Sheet) identification from the attached transducer completes the channel's compliance with IEEE 1451.4. Each channel provides an unprecedented dynamic range of 150 dBFS, detecting voltages as small as 600 nV and up to 20 V. This is accomplished by applying two 24-bit analog-to-digital converters to each channel and combining their outputs in accordance with our United States Patent number 7,302,354.

In the Spider-80X, built-in charge amplifiers are available. With Spider-80Xi the external charge amplifier, CA-08, can be used if charge mode is desired.

Black Box Mode

Black Box mode enables Spider-80X/80Xi operation without a PC. In this mode, a PC is used only to configure the control system before the system starts operation and to download data after the test is completed. During the test, the data acquisition system operates autonomously, according to a preset schedule or in response to external events such as input trigger or digital input.

Simple Network Connection

Ethernet connectivity allows Spiders to be located far from their host PC. This distributed structure greatly reduces noise and electrical interference in the system.

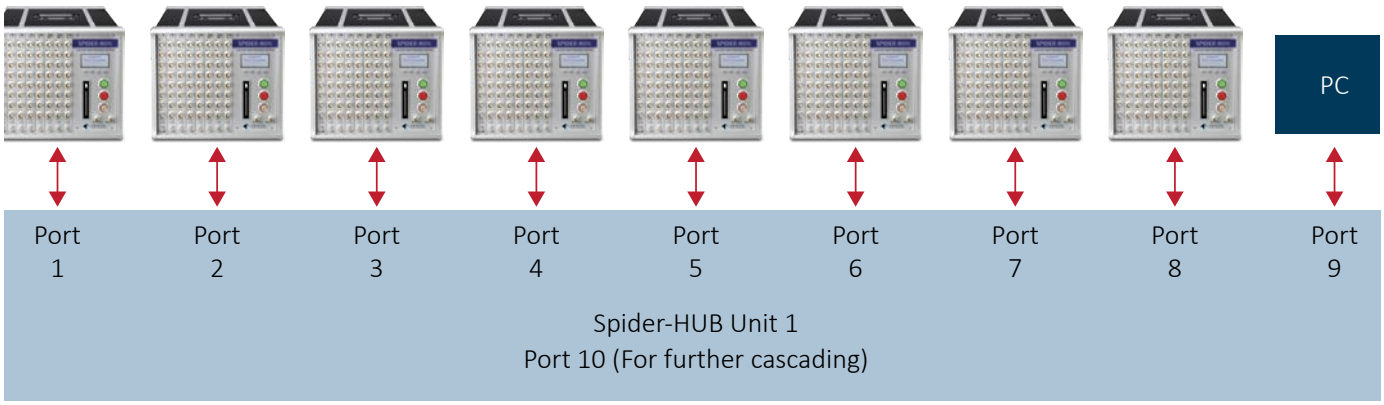
Spider-HUB Ethernet Switch

The Spider-HUB Ethernet switch made by Crystal Instruments supports the latest IEEE 1588v2 technology. The Spider-HUB guarantees time-stamping accuracy within 50 nanoseconds and can be configured for 1588v2 Master, Boundary Clock, and Transparent Clock functionality. Accurate phase match between all measurement channels across the modules are guaranteed. In a Spider-80Xi chassis the Spider-HUB is installed internally.

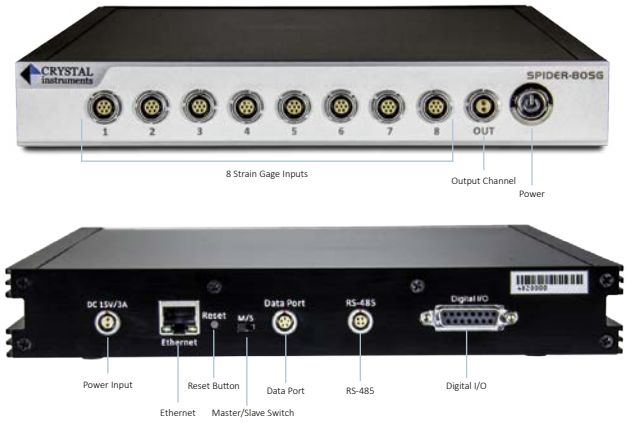
Spider-NAS Storage Device

The Spider-NAS (Network Attached Storage) is a dedicated storage device designed to work with Crystal Instruments Spider front-ends, including the Spider-80X and the Spider-81. Each Spider-NAS device supports up to eight Spider front-ends to collect both streaming time waveform data and spectral data. An Ethernet connection in back connects to a computer for data download and configuration. At the center of the Spider-NAS sits a removable 250 GB serial ATA (SATA) Solid State Disk (SSD). This SSD not only provides greater shock protection than a classic hard drive but it also features a faster boot up time (less than 15 seconds) and is particularly energy efficient. In a Spider-80Xi chassis the Spider-NAS is installed internally.

Spider-80Xi System (512 Channel Count)



The Front-ends of the Spider-80Xi and Spider-80M Platform			
Front-end Types	**Spider-80Xi**	**Spider-80SGi**	**Spider-80Ti**
Max Sampling Rate	102.4 kHz	102.4 kHz	2 kHz
Number of Inputs Per Front-end	8	8	16
Connector Type	BNC	LEMO	3-pin screwed terminal
Input Type	IEPE Voltage TEDS	Voltage Strain gage Strain gage-based sensors MEMS DC-based sensors	3-wire RTD K type thermocouple
Input Coupling	AC Differential DC Differential AC Single-ended DC Single-ended	AC Differential DC Differential	-------
Sensor Excitation	4.2 mA at 21 V for IEPE	2.5V, 5V, 10V	-------
Strain Gage Type	-------	Quarter Bridge Type I, II Half Bridge Type I, II Full Bridge Type I, II Excitation voltage: ±2.5, ±5	
Max Input Range	±20Vpk	±10V	-------
Input Protection Voltage	±220V	±40V	-------
Analog to Digital Converter Per Channel	Dual 24-bit ADC	24-bit ADC	-------
Cross Talk	< -100 dB	< -130 dB	-------
Amplitude Accuracy	±0.1% at 1kHz 1V	±0.1%	-------
Phase Match	< 1° up to 20kHz	< 1° up to 20kHz	-------



The Spider-80SG Strain Gage Measurement System

Strain Gage Measurement

The Spider-80SG Strain Gage Module

The Spider-80SG/SGi is a front-end in the Spider-80X/Xi hardware family platform. It is a high precision, general purpose data acquisition device featuring strain gage functionality. This device can be used in a variety of physical and measurement tests.

The Spider-80SG can acquire data from a strain gage or a wide range of sensors. With the help of precision excitation voltage, the Spider-80SG/SGi can support strain gage based sensors, MEMS sensors, and DC sensors (to name a few) thus expanding the scope of the Spider-80Xi hardware platform to support the synchronized acquisition of a wide range of measurement quantities including Force, Torque, Pressure, Acceleration, Velocity and Displacement. It can be used for strain measurement and many other types of sensors that requires external power. EDM-DSA and VCS software fully supports the Spider-80SG front-end in all its testing operations.

In addition to the features shared with the Spider-80Xi hardware platform, the Spider-80SG/SGi offers the following capabilities.

High Channel Count

Named for their networkable ability, the Spider hardware platforms (including the Spider-80X/Xi and the Spider-80SG/SGi) share the flexibility of scaling up in channel count and functionality. The Spider-80SG/SGi can combine with any Spider-80Xi device to create a high channel count system with up to 512 channels.