VTI Instruments

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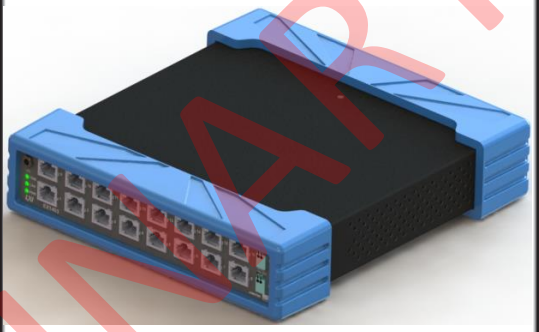
EX1403

16-CHANNEL BRIDGE
AND STRAIN GUAGE INSTRUMENT



FEATURES

- 16-channel Strain, Bridge and Voltage Measurements
- 24-bit ADC per Channel
- 102.4 ksamples/second/channel Sample Rate
- Supports ¼ (120Ω , 350Ω or 1kΩ), ½ and full-bridge
- Built-in Programmable Excitation
- Built-in Selectable Bridge Completion
- TEDS Support
- RJ-45 Input Connectors
- Built in Self-calibration and Shunt Calibration
- LXI Ethernet Interface
- IEEE 1588 Synchronization with data time stamping
- Power over Ethernet PoE or 10–30 V DC input
- Built-in Parallel Data Streaming
- Full-featured Embedded Web Interface
- Compact 1U Half-rack Form Factor

AMETEK®

Overview

The EX1403 Precision Bridge and Strain Gage Instrument sets a new standard for stress and fatigue testing, delivering the highest performance measurements possible while controlling overall test hardware costs.

16-Channels of strain or voltage, independent 24-bit ADCs converters per channel, software-selectable filtering, and independent signal conditioning paths deliver exceptional accuracy and reliability.

Built-in signal conditioning, programmable excitation, and selectable bridge completion, all integrated into the instrument and configurable on a per channel basis, greatly simplifies setup and configuration. With unmatched performance, accuracy and reliability, the EX1403 is the “go-to” solution for the most complex structural test applications worldwide.

A single system that can provide high-quality static or high speed strain measurements:

- Airframe structural and fatigue test
- Rocket and satellite structural test
- Wind tunnel flight load test
- General purpose bridge measurements
- Load frame materials testing

Scalable for High-Speed Synchronized Data Acquisition

In addition to the core set of features, the EX1403 integrates Extended Functions as defined in the LXI specifications to provide box-to-box synchronization to precisely correlate acquired data as well as time-stamping of data and LAN Event Messaging that facilitate intermodule communication and flexible triggering options over Ethernet, thereby eliminating overhead normally attributed to application software running on the host controller.

The EX1403 supports easy integration and synchronization of multiple devices through the IEEE-1588 v2 Precision Time Protocol standard for synchronization, providing an architecture that can be scaled from tens to thousands of channels.

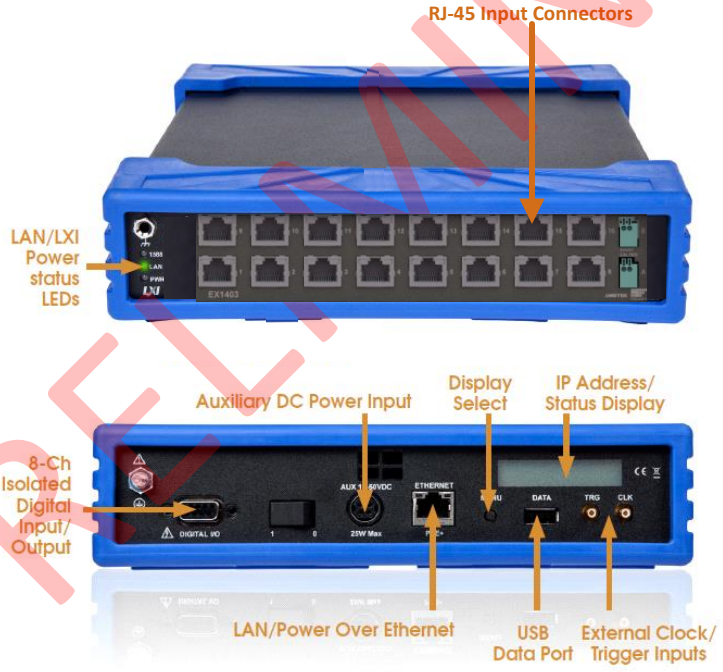
Multiple instruments can be easily distributed extremely close to the measurement points of interest reducing the run length of analog cable and minimizing errors induced by noisy environments.

Additionally, Power Over Ethernet (PoE) enables a single cable to be used for both power and data capture. All measurement data is returned with IEEE-1588 timestamp codes with typical accuracies of <200nS ensuring that acquired data is tightly correlated across the test article.

Confidence

Manufacturing and test environments of today are dynamic, dictating minimal downtime of test systems in order to meet increasing product throughput demands. Ensuring that acquired data is reliable and instrument calibration can be turned around quickly are keys to the success of any production team. VTI embeds intelligence into the EX1403 to facilitate maximum system 'uptime' and increase manufacturing efficiency.

Built-in self-test can be invoked under software control prior to each critical test. A simple pass-fail result will be returned after completing system health diagnostics, including temperature and voltage level measurements of the on-board processor and can be used to prevent a test from running in the event of a failure.



Connectivity

Created in 2004 and adopted by the test and measurement industry in 2005, LXI (LAN Extensions for Instrumentation) defines a core set of capabilities that ensure compliant devices interact consistently in an instrumentation network. As an LXI-certified device, the EX1403 provides the convenience of LAN communications and control with features such as an embedded web page for monitor and control and a consistent means of identification on the network. Connect the device directly to your network using industry-standard cables with the assurance that it will be a trusted and proven 'network citizen'.

SPECIFICATIONS	
GENERAL	
Channels	16
Sample Rate	102.4 k Samples per second
ADC	24-bit delta-sigma
Input Connector	RJ45
Input Type	Differential
	Single-Ended: Input needs to be connected to GND externally
Input Range	±10Vpk, ±1Vpk, ±0.1Vpk
Input Coupling	DC or AC
Input Impedance	10 MΩ Typical each input to ground
Common Mode Rejection, DC Coupling	-120dB Typical, <100 Hz
	-100dB Typical, 100Hz – 1kHz
	-90dB Typical, 1kHz – 10kHz
Channel-to-Channel Crosstalk	-120dB Typical, <1kHz
	Overdriving one channel does not affect performance of other channels
Input Protection	ESD: ±12V Bidirectional TVS IEC61000-4-2, ±30kV Contact, ±30kV Air
Bridge Balance	Software nulling
Bridge Types	Full, Half (½), Quarter (¼)
¼ Bridge Completion	Software Selectable: OFF, 120Ω, 350Ω, 1000Ω
½ Bridge Completion	10k-10k thin film RNET; Ratio Accuracy: 0.1%;
	Ratio Stability: ±25 ppm/°C; Ratio Drift: ±20 ppm/year
	DC Bias = Vexc * (0.5 ±0.1%)

DYNAMIC	
Gain (% Reading) Accuracy in Passband	DC Coupling: ±0.10% ±60ppm/°C ±100ppm/year
Analog Bandwidth (Anti-Alias Filter)	-86dB @ 5MHz
	±1% @ 65kHz; ±0.1% @ 10kHz
Slew Rate: 10% to 90% of FS Range	≥ 10 V/µs
Maximum Input Voltage	±10V, ESD protected
Input Impedance	Signal is pulled high by a 4.7k Ohm resistor
PROTECTION	
ESD	±12V Bidirectional TVS IEC61000-4-2, ±15kV Contact, ±30kV Air
External	Protected if driven by external voltage source: -0.3V to +12V
Crosstalk	Short does not affect Excitation accuracy in other channels

EXCITATION	
VOLTAGE	
Levels	+0.5V, +1V, +2V, +5V, +10V; selectable per channel
Stability	Stability: ±30 ppm/°C ±12µV/°C ±50ppm/year
Load Regulation	Load regulation: <0.05% for load change < 32mA
Crosstalk	Crosstalk: <0.01% effect on other channels from load changes
Current Limit	Current Limit: 35mA; Output Impedance: <0.1Ω
Noise	Noise: 20 µVRMS Typical, 50kHz bandwidth
CURRENT	
Levels	Levels: Selectable 1mA, 5mA; ±0.2%
Stability	Stability: ±230 ppm/°C ±50ppm/year
Load Regulation	Load regulation: <0.01% for Load change 0V to 5V
Crosstalk	Crosstalk: <0.01% effect on other channels from voltage changes
Compliance Voltage	>4.8V; Output Impedance: >10MΩ, DC to 20kHz
Noise	Noise: <3nA RMS 10Hz to 40kHz
TEDS (Transducer Electronic Data Sheet)	
Protocol	MicroLAN
Baud Rate	9600 Baud (default)
Electrical Specifications	5V
Driver type	Maxim Integrated DS2480B
Capacitance Loading (1-Wire input)	< 2000pF

HEALTH MONITORING	
Self Calibration	Yes
Self Test	Yes
Transducer Input Wire Resistance	Yes
Temperature	Yes
TRIGGER	
INPUT	
Maximum Input Voltage	-0.5V to 5V, ESD protected
Input Impedance	Signal is pulled high by a 4.7k Ohm resistor
Minimum Input Pulse Width Detection	1 µs
VIL	< 0.5V
VIH	> 2.5V
OUTPUT	
Level	0V to 5V
Input Impedance	Signal is pulled high by a 4.7k Ohm resistor
Output Pulse Width for trigger event	1 us
Output Drive	Can drive 50 Ohm coax. Source series termination for 50 Ω
CLOCK I/O	
Level	0V to 3V
Duty Cycle	40% to 60%
Frequency	10 MHz phase locked to the ADC sample rate
Enable/Disable	Software control
NETWORK / DATA PORT	
Connection	10BASE-T/100BASE-T/1000BASE-T with auto-negotiation
Connector	RJ45
USB Interface	USB 2.0 full speed (480Mbps)
Connector	USB type A

EX1403 BRIDGE AND STRAIN GUAGE INSTRUMENT

POWER	
POE+	IEEE 802.3at
Auxiliary Power	+10VDC to +30VDC
Max. Input Power Requirements	25 Watt (includes 5W maximum to bridge transducer)
Power Input Protection	+32VDC & Reverse polarity protection
Power Control	POE+ type 2 PSE or AUX power
Ripple	<1% pk-pk
ENVIRONMENTAL	
Temperature	Operating Temperature: 0°C to +55°C without loss of accuracy or reliability
	Storage Temperature: -40°C to +80°C MIL-PRF-28800 Class 3
Relative Humidity, non-condensing	Operating: 10%-90%
	Storage: 5% to 95%
	MIL-PRF-28800F Class 3
Vibration & Shock	MIL-PRF-28800F Class 3
Altitude	4600M, MIL-PRF-28800 Class 3
CE Compliance	Yes
EMC Directive	EMC EN 61326 Class A, Criteria A. Annex A
PHYSICAL	
Dimensions	8.7” x 2.23” x 8.44”
Weight	3 kg
ORDERING INFORMATION	
EX1403	16-channel Strain / Bridge Instrument
70-0626-900	Rack Mount Kit
56--739-120	PSE Certified Power Adapter