

# EX1403A

16-Channel Strain/Bridge,  
Ohms/RTD, Volts Digitizer



## Overview

The EX1403A Precision Bridge and Strain Gauge Instrument sets a new standard for strain and bridge measurements, delivering the highest performance measurements possible while controlling overall test hardware costs.

Sixteen channels of strain or voltage, independent 24-bit simultaneous sampling ADCs per channel, extensive software-selectable digital 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 simplify setup and configuration. With unmatched performance, accuracy and reliability, the EX1403A 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



## FEATURES

- 16-Channel Strain/Bridge, Ohms/RTD & Voltage Measurements
- 24-bit, delta-sigma ADC, simultaneous sampling
- Programmable Sample Rate up to 128kSPS
- Full, Half & Quarter Bridge with 120 $\Omega$ , 350 $\Omega$  & 1k $\Omega$  bridge completion
- Voltage Excitation: 0.5V to 10V
- Current Excitation: 0.46mA
- 2-Wire & 4-Wire Ohms/RTD
- Bridge Zero Balancing
- Built-In-Self-Test (BIST)
- Strain Lead Wire Calibration
- Shunt Calibration: 50k $\Omega$ , 100k $\Omega$  & External provided by User
- TEDS Support
- LXI Ethernet Interface
- IEEE-1588 Synchronization
- Power over Ethernet (PoE) or 10-50 V DC input
- Built-in Parallel Data Streaming
- Full-featured Embedded Web Interface
- Compact 1U Half-rack Form Factor

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**AMETEK**

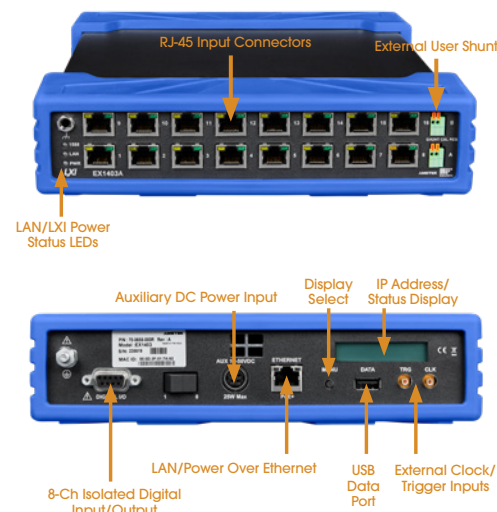
RELIABLE DATA FIRST TIME EVERY TIME

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# EX1403A 16-Channel Strain/Bridge, Ohms/RTD, Volts Digitizer

## General Specifications

Analog-to-Digital Converter	24-bit, delta-sigma ( $\Delta\Sigma$ ) simultaneous sampling
Sampling Rate	Programmable up to 128kSPS
Input Range	Volts: $\pm 10V$ , $\pm 1V$ , $\pm 0.1V$
	Strain: $\sim \pm 40\mu\epsilon$ ; Range= $0.1V$ , Exc.= $5V$ , GF=2
	Ohms: 20k $\Omega$ , 2k $\Omega$ , 200 $\Omega$
Accuracy (Total $\pm 3^\circ C$ )	Volts: 0.1V Range: $\pm ((0.10\% + 140PPM/^\circ C) R_{dng} + 9\mu V + 1\mu V/^\circ C)$ 1V Range: $\pm ((0.10\% + 60PPM/^\circ C) R_{dng} + 53\mu V + 5\mu V/^\circ C)$ 10V Range: $\pm ((0.10\% + 10PPM/^\circ C) R_{dng} + 442\mu V + 50\mu V/^\circ C)$
	Strain (Range= $0.1V$ , VExc= $5V$ , GF=2, 100SPS): $\frac{1}{4}$ Bridge 120 $\Omega$ : $\pm ((0.10\% + 140PPM/^\circ C) R_{dng} + 15\mu\epsilon + 14\mu\epsilon/^\circ C)$ $\frac{1}{2}$ & $\frac{1}{4}$ Bridge 350 $\Omega$ & 1k $\Omega$ : $\pm ((0.10\% + 140PPM/^\circ C) R_{dng} + 15\mu\epsilon + 6\mu\epsilon/^\circ C)$
	Full Bridge: $\pm ((0.10\% + 140PPM/^\circ C) R_{dng} + 2\mu\epsilon + 0.5\mu\epsilon/^\circ C)$ Note: excluding errors from lead wire resistance. Excitation to be applied to gage for >30min before zero balancing bridge (measure V unstrained) 2/4Wire-Ohms & RTD( $\Omega$ ): $\pm ((0.05\% + 140PPM/^\circ C) R_{dng} + 0.01\% R_{ng})$
Bridge Completion	$\frac{1}{4}$ Bridge Completion Software Selectable: OFF, 120 $\Omega$ , 350 $\Omega$ , 1000 $\Omega$ 350 $\Omega$ & 1k $\Omega$ : SMD Thin Film, 0.1% $\pm 13$ ppm/ $^\circ C$ 120 $\Omega$ : SMD Thin Film, 0.1% $\pm 60$ ppm/ $^\circ C$ Bridge completion resistance measured within $\pm 0.05\%$ and stored in memory for use during internal shunt calibration. $\frac{1}{2}$ Bridge Completion: 10k-10k thin film resistor network, 0.1% $\pm 25$ ppm/ $^\circ C$
Strain Shunt Calibration	Unit can shunt the strain gage or the internal $\frac{1}{4}$ bridge completion with either an internal 50k $\Omega$ or 100k $\Omega$ (12PPM/ $^\circ C$ measured with 0.05% accuracy and stored in memory) or an external resistor connected on the front panel provided by the user. Unit can compute a gain correction factor that compensates for errors due to lead wire, excitation, internal gain errors, and temperature.
Strain Lead Wire Calibration	Unit can measure lead wire resistance and verify connections to the gage are ok. The unit can compute a gain correction factor that compensates for errors due to lead wire.
Voltage Excitation	Software Selectable per channel: +0.5V, +1V, +2V, +5V, +10V with Sense lines Measured with $\pm 0.05\%$ accuracy and saved in memory to convert voltage to strain units $\pm 10$ ppm/ $^\circ C$ for +5V & +10V; $\pm 30$ ppm/ $^\circ C$ for +0.5V, +1V, +2V Current Limit: 35mA
Current Excitation	0.46mA. Stability: $\pm 230$ ppm/ $^\circ C$ $\pm 50$ ppm/year



## 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 that instrument calibration can be turned around quickly are keys to the success of any production team. VTI embeds intelligence into the EX1403A to facilitate maximum system "uptime" and increase manufacturing efficiency.

Built-In-Self-Test (BIST), Self-CAL, Lead-Wire CAL, or Shunt CAL can be executed prior to a critical test to have confidence that digitizer and connections to transducers are OK.