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## TECHNICAL PRODUCT INFORMATION

### Test & measurement instruments

- high - quality
- moderate prices
- excellent precision

#### **Your contact:**

Technical support, services, demo & rental equipment, price information  
& quotes, consulting:

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# EX1400 SERIES

## ADVANCED, FULL-FEATURED, PRECISION DATA ACQUISITION

The AMETEK VTI Instruments EX1400 Product family features an advanced, full-featured data acquisition series designed to acquire precision data from temperature, strain, and voltage sensors. Would rather put something common here like: The EX1400 family of instruments is designed to provide the highest level of performance and ease of use for any data acquisition application.



### EX1401

#### 16-CHANNEL ISOLATED THERMOCOUPLE AND VOLTAGE MEASUREMENT INSTRUMENT

##### FEATURES

- > Typical accuracies of  $\pm 0.20^{\circ}\text{C}$
- > 16-channel isolated universal thermocouple/voltage inputs
- > 20K samples/second/channel sample rate
- > 24-bit ADC per channel
- > 1000 V channel-channel isolation
- > 500 V channel-ground isolation



### EX1402

#### 16-CHANNEL ISOLATED HIGH VOLTAGE MEASUREMENT INSTRUMENT

##### FEATURES

- > 24-bit SAR ADC per Channel
- > 128k samples/second/channel sample rate
- > 1000V channel-channel isolation
- > 500V channel-ground isolation
- > Input voltage ranges peak:  $\pm 420\text{V}/\pm 10\text{V}/\pm 1\text{V}$
- > 3-Pin screw terminal input connector



### EX1403A

#### 16-CHANNEL BRIDGE AND STRAIN GAUGE MEASUREMENT INSTRUMENT

##### FEATURES

- > 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
- > 2-Wire & 4-Wire 0hms/RTD
- > Bridge Zero Balancing
- > Strain Lead Wire Calibration
- > Shunt Calibration: 50k $\Omega$ , 100k $\Omega$  & External provided by User
- > TEDS Support

#### OTHER COMMON FEATURES INCLUDE:

- > Data logger acquisition mode
- > Built-in parallel data streaming
- > Full-featured embedded web interface
- > LXI Ethernet interface
- > 8-bit bank isolated digital I/O
- > Compact 1U half-rack form factor
- > IEEE-1588 synchronization
- > Power over Ethernet+ (PoE+)
- > Built-In-Self-Test (BIST)
- > Driver support: IVI, Linux, Labview, driverless REST interface

#### APPLICATIONS:

**EX1401:** Battery and fuel cell test / Thermal data acquisition / Gas turbine test / HALT/HASS / In-vehicle automotive test / Electric motor test / Wind tunnel evaluation / Rocket motor reliability / Health monitoring

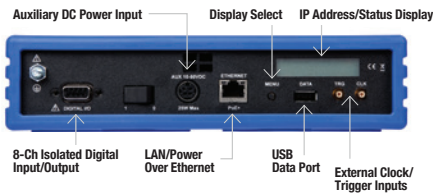
**EX1402:** Battery and fuel cell test / Data acquisition / Gas turbine test / HALT/HASS / Health monitoring

**EX1403A:** Airframe structural and fatigue test / Rocket and satellite structural test / Wind tunnel flight load test / General purpose bridge measurements / Load frame materials testing

# EX1400 SERIES

## ADVANCED, FULL-FEATURED PRECISION DATA ACQUISITION

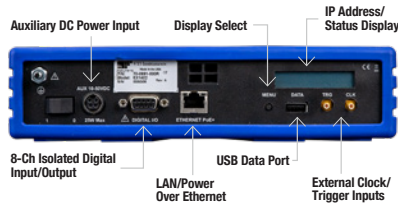
### EX1401



#### EX1401 GENERAL SPECIFICATIONS

|                      |                                             |                                                                  |
|----------------------|---------------------------------------------|------------------------------------------------------------------|
| ADC                  | 24-bit Sigma Delta                          |                                                                  |
| Acquisition Speed    | 20Ksa/S                                     |                                                                  |
| Digital IO Channels  | 8                                           |                                                                  |
| Measurement Type     | Thermocouples, $\pm 10V$                    |                                                                  |
| Ranges               | 0.01V, 0.1V, 1V, 10V                        |                                                                  |
| Transducers          | All TC types                                |                                                                  |
| Input Type           | Differential                                |                                                                  |
| Input Connector Type | Mini TC                                     |                                                                  |
| Isolation            | 500V to Ground, 1000V channel-to-channel    |                                                                  |
| Filtering Options    | Digital programmable                        |                                                                  |
| Resolution           | $\pm 0.01 V$                                | 1.7 $\mu V$                                                      |
|                      | $\pm 0.1 V$                                 | 150 nV                                                           |
|                      | $\pm 1.0 V$                                 | 13.5 nV                                                          |
|                      | $\pm 10.0 V$                                | 1.7 nV                                                           |
|                      | Thermocouple                                | $< 0.001 ^\circ C$                                               |
| Power Requirements   | 10VDC-50VDC, 12 W typical, 15 W max         |                                                                  |
| PoE+                 | 12 W typical, 15 W max                      |                                                                  |
| Accuracy - Typical   | $\pm 0.01 V$ Range                          | $\pm (0.050\% + 5\mu V)$ Max: $\pm (0.145\% + 9\mu V)$           |
|                      | $\pm 0.1 V$ Range                           | $\pm (0.020\% + 7\mu V)$ Max: $\pm (0.035\% + 15\mu V)$          |
|                      | $\pm 1.0 V$ Range                           | $\pm (0.020\% + 40\mu V)$ Max: $\pm (0.030\% + 50\mu V)$         |
|                      | $\pm 10.0 V$ Range                          | $\pm (0.020\% + 400\mu V)$ Max: $\pm (0.030\% + 500\mu V)$       |
|                      | TC Type J, K, T, E, N                       | $\pm (0.020\% + 0.2^\circ C)$ Max: $\pm (0.040\% + 0.4^\circ C)$ |
|                      | TC Type S, R                                | $\pm (0.020\% + 0.6^\circ C)$ Max: $\pm (0.040\% + 1.3^\circ C)$ |
|                      | TC Type B                                   | $\pm (0.020\% + 0.9^\circ C)$ Max: $\pm (0.040\% + 1.8^\circ C)$ |
| Interface            | Ethernet LXI                                |                                                                  |
| Clock Sync           | External 10MHz clock, and IEEE-1588 PTP-V2  |                                                                  |
| Data Logging         | Stream over Ethernet and / or Stream to USB |                                                                  |
| Onboard Memory       | 256Mb                                       |                                                                  |

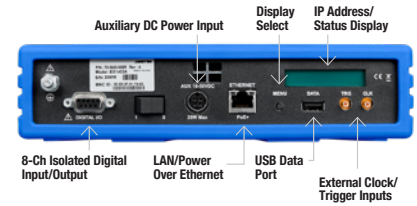
### EX1402



#### EX1402 GENERAL SPECIFICATIONS

|                      |                                                            |                                                                             |
|----------------------|------------------------------------------------------------|-----------------------------------------------------------------------------|
| ADC                  | 24-bit SAR                                                 |                                                                             |
| Acquisition Speed    | 128Ksa/S                                                   |                                                                             |
| Digital IO Channels  | 8                                                          |                                                                             |
| Measurement Type     | $\pm 420V$                                                 |                                                                             |
| Ranges               | 1V, 10V, 420V                                              |                                                                             |
| Transducers          | Voltage inputs                                             |                                                                             |
| Input Type           | Differential                                               |                                                                             |
| Input Connector Type | 3 Pin screw terminal block, 5mm pitch (0.197in) single row |                                                                             |
| Isolation            | 500V to Ground, 1000V channel to channel                   |                                                                             |
| Filtering Options    | Digital programmable                                       |                                                                             |
| Resolution           | $\pm 1V$                                                   | 150 nV                                                                      |
|                      | $\pm 10V$                                                  | 1.7 $\mu V$                                                                 |
|                      | $\pm 420V$                                                 | 63 $\mu V$                                                                  |
| Power Requirements   | 110VDC-50VDC, 12 W typical, 15 W max                       |                                                                             |
| PoE+                 | 12 W typical, 15 W max                                     |                                                                             |
| Accuracy - Typical   | 1V Range                                                   | $\pm [(0.03\% + 9PPM/^\circ C)R_{dng} + 0.002\%R_{ng} + 2\mu V/^\circ C]$   |
|                      | 10V Range                                                  | $\pm [(0.03\% + 10PPM/^\circ C)R_{dng} + 0.002\%R_{ng} + 5\mu V/^\circ C]$  |
|                      | 420V Range                                                 | $\pm [(0.05\% + 25PPM/^\circ C)R_{dng} + 0.002\%R_{ng} + 66\mu V/^\circ C]$ |
| Interface            | Ethernet LXI                                               |                                                                             |
| Clock Sync           | External 10MHz clock, and IEEE-1588 PTP-V2                 |                                                                             |
| Data Logging         | Stream over Ethernet and / or Stream to USB                |                                                                             |
| Onboard Memory       | 256Mb                                                      |                                                                             |

### EX1403A



#### EX1403A GENERAL SPECIFICATIONS

|                      |                                                                                                                                              |                                                                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| ADC                  | 24-bit Sigma Delta                                                                                                                           |                                                                                    |
| Acquisition Speed    | 128Ksa/S                                                                                                                                     |                                                                                    |
| Digital IO Channels  | 8                                                                                                                                            |                                                                                    |
| Measurement Type     | Full, Half & Quarter Bridge with 120 $\Omega$ , 350 $\Omega$ & 1k $\Omega$ bridge completion, 2-Wire & 4-Wire $\Omega$ / RTD, 0-20K $\Omega$ |                                                                                    |
| Ranges               | 200 $\Omega$ , 2K $\Omega$ , 20K $\Omega$                                                                                                    |                                                                                    |
| Transducers          | 120 $\Omega$ , 350 $\Omega$ , 1K $\Omega$ , 1/4, 1/2 and full bridge strain gauges                                                           |                                                                                    |
| Input Type           | Differential                                                                                                                                 |                                                                                    |
| Input Connector Type | RJ45                                                                                                                                         |                                                                                    |
| Isolation            | No Channel to ground isolation, ESD protected to $\pm 10kV$                                                                                  |                                                                                    |
| Filtering Options    | Digital programmable                                                                                                                         |                                                                                    |
| Resolution           | 0.1V                                                                                                                                         | 15 nV                                                                              |
|                      | 1V                                                                                                                                           | 150 nV                                                                             |
|                      | 10V                                                                                                                                          | 1.7 $\mu V$                                                                        |
|                      | Strain $\frac{1}{4}$ & $\frac{1}{2}$ (40k $\mu\epsilon$ Vexc=5V GF=2)                                                                        | 0.005 $\mu\epsilon$                                                                |
|                      | 200 $\Omega$                                                                                                                                 | 30 $\mu\Omega$                                                                     |
|                      | 2K $\Omega$                                                                                                                                  | 300 $\mu\Omega$                                                                    |
| Power Requirements   | 20K $\Omega$                                                                                                                                 | 3 m $\Omega$                                                                       |
|                      | 10VDC-50VDC, 12 W typical, 15 W max                                                                                                          |                                                                                    |
|                      | 12 W typical, 15 W max                                                                                                                       |                                                                                    |
|                      | 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                                                                                                                                    | $\pm [(0.10\% + 10PPM/^\circ C)R_{dng} + 442\mu V + 50\mu V/^\circ C]$             |
| Accuracy - Typical   | $\frac{1}{4}$ 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 $\Omega$                                                                              | $\pm [(0.10\% + 140PPM/^\circ C)R_{dng} + 15\mu\epsilon + 6\mu\epsilon/^\circ C]$  |
|                      | 2/4Wire-Ohms & RTD( $\Omega$ )                                                                                                               | $\pm [(0.05\% + 140PPM/^\circ C)R_{dng} + 0.01\%R_{ng}]$                           |
| Interface            | Ethernet LXI                                                                                                                                 |                                                                                    |
| Clock Sync           | External 10MHz clock, and IEEE-1588 PTP-V2                                                                                                   |                                                                                    |
| Data Logging         | Stream over Ethernet and / or Stream to USB                                                                                                  |                                                                                    |
| Onboard Memory       | 256Mb                                                                                                                                        |                                                                                    |

