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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 VTI Instruments EX1400 Product family features an advanced, full-featured data acquisition series designed to acquire precision data from temperature, strain, and voltage sensors. It 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 Ohms/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

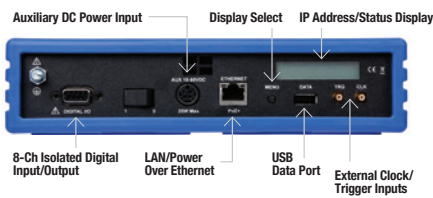
#### APPLICATIONS:

**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

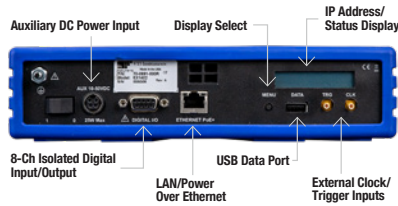
## EX1401



### 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 °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                                       |                                                                  |

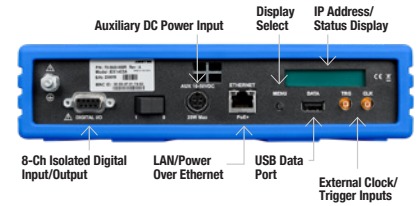
## EX1402



### 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 1/4 & 1/2 (40k $\mu\epsilon$ Vexc=5V GF=2)                                                                                            | 0.005 $\mu\epsilon$                                                              |
|                      | 200 $\Omega$                                                                                                                                 | 30 $\mu\Omega$                                                                   |
|                      | 2K $\Omega$                                                                                                                                  | 300 $\mu\Omega$                                                                  |
|                      | 20K $\Omega$                                                                                                                                 | 3 m $\Omega$                                                                     |
| Power Requirements   | 10VDC-50VDC, 12 W typical, 15 W max                                                                                                          |                                                                                  |
| PoE+                 | 12 W typical, 15 W max                                                                                                                       |                                                                                  |
| Accuracy - Typical   | 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                                                                                                                                    | $\pm [(0.10\%+10PPM/^\circ C)R_{dng} + 442\mu V + 50\mu V/^\circ C]$             |
|                      | 1/4 Bridge 120 $\Omega$                                                                                                                      | $\pm [(0.10\%+140PPM/^\circ C)R_{dng} + 15\mu\epsilon + 14\mu\epsilon/^\circ C]$ |
|                      | 1/2 & 1k 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                                                                                                                                        |                                                                                  |