

# ProDAQ LXI Instruments

## ProDAQ 6172

### Isolated Precision Strain Gage LXI Instrument

#### OVERVIEW

The ProDAQ 6172 is an LXI instrument designed for 8-channel galvanically isolated precision strain gage measurements. It supports  $\frac{1}{4}$ ,  $\frac{1}{2}$  and full-bridge completion with  $120\Omega$  and  $350\Omega$  strain gage completion resistors fitted as standard. It provides an easy to use, cost effective solution for the most demanding strain gage or IEPE/IPC measurement applications.

Each channel is galvanically isolated from any other and also from the chassis, with a working isolation voltage up to 300VDC. This allows any channel not only to float to different common-mode voltage potentials but also eliminates the possibility of ground loop error.

As a standalone LXI instrument the ProDAQ 6172 can be directly connected to your network and operated either through the built-in web pages or alternatively integrated into your data acquisition application using the VISA-based industry standard plug & play drivers provided. Multiple devices can be synchronized via the IEEE1588 precision time protocol or optionally via the LXI trigger bus. The unit is equipped with a redundant power supply and two Ethernet ports.

#### FEATURES

**Analog Inputs:** Each channel of the ProDAQ 6172 employs a 16-bit SAR ADC to provide excellent measurement accuracy. The input range can be set from  $\pm 10\text{mV}$  to  $\pm 10\text{V}$  in a number of fixed steps. Auto-balancing is provided per channel in order to remove offset at higher gains, thus maintaining the full ADC range.

Each channel is protected against overvoltage, both short-term transient spikes as well as constant DC voltages up to  $\pm 30\text{V}$ . An EMI filter is included per channel to reduce the possibility of error due to high frequency conducted noise.

**Excitation:** The ProDAQ 6172 provides a per-channel programmable excitation voltage of up to 20VDC. The positive side excitation is programmable from 0 to +10V while the negative side excitation is programmable from 0 to -10V. Both sides are independent and have a resolution of 0.5mV. This allows the user to set the Common Mode point to 0V, thus reducing the effects of common-mode voltage on signal accuracy. Output current capability is 40mA per channel.

By using remote sense lines per channel any losses due to lead resistance will be automatically compensated. The excitation voltage is read back and calibrated using the ADC for the highest excitation accuracy. The channel excitation has a built-in current limit which, if reached, is signaled in software.

**Simultaneous Sampling:** The ProDAQ 6172 has a dedicated SAR ADC per channel. This allows for true simultaneous sampling of all channels. The sample rate can be varied from 1Hz to 5kHz with a resolution of 1Hz.

**Filtering:** The ProDAQ 6172 has a per channel programmable 6-pole Bessel anti-aliasing filter with cut-off frequencies of 10Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1kHz and Bypass.

**Other Features:** Has two analog outputs per channel for monitoring purposes. Each channel has an internal Shunt Calibration resistor which can be switched to either quarter-bridge completion resistor.

**Various Mounting Options:** The ProDAQ 6172 comes in a 1U high unit suitable for rack mounting in a standard 19" rack if used with the ProDAQ 5725 Rack-Mount kit. The ProDAQ 6172 can also be used on the desktop with the ProDAQ 5726 Stackable Tabletop Feet Set.



#### Features & Benefits

- ▶ **19", 1U Solution for 8 Strain Gages, Voltages or IEPE/IPC sensors**
- ▶ **120Ω and 350Ω bridge completion**
- ▶ **Channel Isolation up to 300 VDC** (channel to channel and channel to ground)
- ▶ **Up to 20V Programmable Excitation** per channel
- ▶ **16-Bit SAR ADC per channel**
- ▶ **1S/s to 5kS/s Sample Rate**
- ▶ **+/-10mV to 10V Input Range** per channel
- ▶ **Simultaneous Sampling** of all channels
- ▶ **Isolated Analog Output** Two analog outputs on all channels for monitoring purposes
- ▶ **Shunt Calibration** on all channels

## SPECIFICATIONS

General	
Number of signal channels	8
Isolation	300 VDC (Channel to channel and channel to chassis)
Isolated Analog Output	Two per Channel, $\pm 10V$ , Filtered, Short Circuit Protected, Continuous On with module power On
Analog Input	
Input Signal Type	Differential, DC Coupled
Input Ranges	$\pm 10mV$ , $\pm 20mV$ , $\pm 50mV$ , $\pm 100mV$ , $\pm 200mV$ , $\pm 500mV$ , $\pm 1V$ , $\pm 2V$ , $\pm 5V$ , $\pm 10V$
Gain Steps	1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, selectable per channel
ADC Resolution	16-bit
ADC Sampling Rates	1 S/s to 5 kS/s, 1S/s resolution
Filtering	6-pole Bessel anti-aliasing analog filter, Programmable, Cut-off frequencies: 10Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1kHz and Bypass
Gain Accuracy	$\leq \pm 0.06\%$ FSO
Gain Linearity	$\leq \pm 0.02\%$ FSO
Gain Temp Coefficient	50ppm/ $^{\circ}C$ typical
Input Offset Drift, gain 1	$\pm 0.007\%$ FSO/ $^{\circ}C$
Noise, 1kHz Bandwidth, gain 500, at Analog output	$\leq 1.5mV_{RMS}$ RTO
Input Impedance	20M $\Omega$ typical
CMRR, gain 500, DC to 50Hz	$\geq 110dB$
EMI Filtering	Yes, per channel
Channel Input Protection	Yes, $\pm 30V$ , max. input current 10mA, max. 3A $< 10ms$ .
Input Connector	D-Sub, 9-pin
Excitation	
Excitation Type	Constant Voltage with auto balancing
Excitation Range	0 to $\pm 10 V$ , Independent Positive and Negative Supplies
Excitation Current	maximum 40mA per channel
Excitation Setting	Programmable in 0.1V step
Excitation Accuracy	$\leq 0.07\%$ of set voltage
Excitation Stability	$\leq 70$ ppm/ $^{\circ}C$ , $\leq 0.01\%$ of set voltage over 8 hours
Excitation Monitoring	Offline read back to ADC
Excitation Sensing	Internal or Remote sense with line resistance compensation
Strain Gage	
Bridge Completion	$\frac{1}{4}$ , $\frac{1}{2}$ and Full Bridge
Completion Resistors	120 $\Omega$ , 350 $\Omega$
Gain, Filter, Excitation	Programmable per channel per software
Calibration	Through external calibration source and software
Bridge Balancing	Selectable, Up to $\pm 10mV$ RTO

## Did You Know?

► **Lord Kelvin** first reported on a relationship between strain and the resistance of wire conductors in 1856. The first notable use of bonded resistance strain gauges was made by Charles Kearns in the early 1930s. Kearns used carbon composite resistors, which were ground flat, mounted on an insulating strip and cemented to propeller blades in order to measure vibration. These devices were not very accurate due to poor resistance stability with both temperature and time.

► In the late 1930s, **Arthur Ruge** and **Edward Simmons**, working independently, both discovered that it was possible to bond small diameter wires made of electrical resistance alloys to a structure in order to measure surface strain.

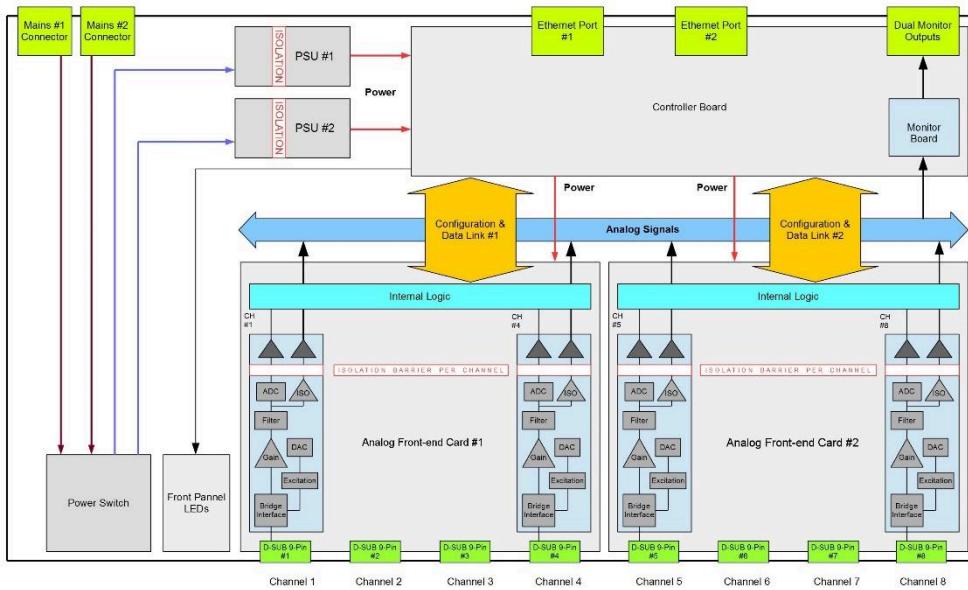
► In 1952 **Saunders-Roe** in the UK developed the idea of making a strain gauge by etching the pattern for the gauge from a thin foil. The advantage of this approach was smaller size and lower production cost. This allowed much more extensive use of strain gauges and foil type gauges are the most common type in use today.



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## Isolated Precision Strain Gage LXI Instrument

Shunt Calibration	499kΩ, 0.1%, per channel
Analog Output	
Output Voltage	±10V
Number of Outputs	2 per channel
Output Resistance	≤ 1Ω, short circuit protected
Control Interface	
Physical Interface	Two redundant network ports, 10/100/1000 Base-TX
Software Interface	SCPI over VXI-11 protocol (VISA), TCP/IP, Web Interface
Operating System Support	Windows 10
Environmental	
Temperature	5 °C to +50 °C (operational) -40 °C to +70 °C (storage only)
Humidity	5% - 95% (non-condensing)
Size	1U, 19"
Power Supply	
Input	85 - 264V AC, 47 - 63 Hz
Power	150W max.



## Ordering Information

► **6172-AA** LXI Isolated Precision Strain Gage Instrument, 8 Channel

**Related Products:**  
**ProDAQ 5725** Rack Mount Unit

**ProDAQ 5726** Stackable Tabletop Feet Set

**ProDAQ 6111** Isolated Digital Input LXI Instrument

**ProDAQ 6118** Isolated Precision Frequency Meter LXI Instrument

**ProDAQ 6131** Isolated Precision RTD input LXI Instrument

**ProDAQ 6132** Isolated Precision Voltage Input LXI Instrument

**ProDAQ 6151** Isolated Precision Thermocouple LXI Instrument

**ProDAQ 6171** Isolated Precision IEPE/Voltage LXI Instrument

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