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WHEN ACCURACY MATTERS

ProDAQ LXI Instruments

ProDAQ 6171
Isolated Precision IEPE/Voltage LXI Instrument

OVERVIEW

The ProDAQ 6171, is an LXI instrument designed for up to 8- channel isolated precision IEPE or AC voltage measurements. Each channel is isolated from both the chassis and all other channels.

The 6171-BA provides an easy to use, cost effective and scalable solution for the most demanding IEPE measurement applications. As a standalone LXI instrument it can be directly connected to your network and operated either through the integrated web pages or integrated to your data acquisition application using the VISA I/O library. Measurement data can be read from the instrument or directly streamed to one or several servers. Multiple devices can be synchronized via the IEEE1588 precision time protocol. The unit is equipped with a redundant power supply and two Ethernet ports.

Features & Benefits

- **19", 1U** Solution for **8 IEPE Input Channels**
- **Channel Isolation** up to **300V continuous** (input to input, inputs to ground and between inputs, outputs and power supplies)
- **Simultaneous Sampling** of all channels
- **Programmable Current Source** per channel
- **Up to** 50kS/s sample rate
- **Gains** of 1, 10 and 100
- **Five Low Pass Filters** of 1kHz, 2kHz, 5kHz, 10kHz and 20kHz
- **Dual** Output Buffers per Channel
- **Redundant Dual** Power Supplies
- **Dual** Ethernet Ports

FEATURES

Analog Inputs: The ProDAQ 6171 provides an interface for IEPE sensors. This includes a per channel programmable excitation current source. The device also provides accurate measurement of AC signals with sampling rates up to 50k S/s. Each channel of the 6171 has a 24-bit Sigma-Delta ADC to provide the highest possible measurement resolution. Each channel has three independent gain and five independent filter settings.

Each channel is isolated from any other and also from the chassis, with a working isolation voltage up to 300V continuous. This allows any channel not only to float to different voltage potentials but also reduces the possibility of ground loop error. Each channel is protected against overvoltage, both short-term transient spikes as well as constant AC voltages up to $60V_{PP}$.

As well as the signal being captured by the ADC, the ProDAQ 6171 provides two per channel amplified, filtered and buffered output signals for monitoring purposes. These outputs are isolated from the input signal and sit at a safe potential. The filter bandwidth matches the bandwidth selected for the main signal path.

Simultaneous Sampling: The ProDAQ 6171 has a dedicated ADC per channel. This allows for true simultaneous sampling of all channels. The maximum scan rate per module is 50k S/s.

Various Mounting Options: The ProDAQ 6171 comes in a 1U high unit suitable for rack mount in a standard 19" rack if used with the ProDAQ 5725 Rack-Mount kit. The ProDAQ 6171 can also be desktop mounted using the ProDAQ 5726 Stackable Tabletop Feet Set.

SPECIFICATIONS

General		
Number of signal channels	8	
Isolation	300 V (Channel to channel and channel to chassis)	
ADC Resolution	24-bit	
ADC Sampling Rates	1 kHz to 50 kHz, 1 Hz resolution	
Linearity	±0.02 %FSO	
High Pass Filter	0.4Hz ±10 % typical	
Low Pass Filter	Programmable 6-Pole Butterworth	
Analog Bandwidths, 3dB	1 kHz, 2 kHz, 5 kHz, 10 kHz, 20kHz	
Analog BW Tolerance	±10 % typical	
Channel Input Protection	60 V_{PP}	
Input Impedance	≥1 MΩ//1.2 nF	
Input Connectors	Isolated BNC x 8	
Warm-up Time	≥ 30 minutes	
IEPE Measurement		
Excitation Current Range	2 mA to 16 mA	
Excitation Current Accuracy	±0.2 mA typical	
Exc. Current Resolution	0.1 mA	
Excitation Current Drift, I_{SET}	-0.013 %I_{SET} / °C typical	
Compliance Voltage	26 Volts	
Short Circuit Detection	Yes	
Open Circuit Detection	Yes	
Noise Floor, 100 Ω Load	-120dBV typical	
AC Performance, I_{SET} = 10mA, 1 kΩ load 19 V_{PP} 100 Hz signal, 20kHz Filter, 10 ksps,	SINAD	91 dB typical
	THD	-92 dB typical
	SNR	100 dB typical
	SFDR	94 dB typical
AC Voltage Measurement		
Input Signal Type	Single-Ended, AC coupled, Voltage	
Input Ranges	±0.1 V, ±1 V, ±10 V	
Gain Steps, G	1, 10, 100	
Input Offset Error	±0.5 mV typical	
Input Offset Drift	±22 µV/°C typical	
Full Scale Error	±0.02 % typical	
Full Scale Drift	±0.0025 %/°C	
Passband Flatness All Filters, 50 ksps, Gain 1, f<0.2f_C	< ±0.05dB	
CMRR 50Hz, R_S = 0 Ω	≥ 90 dB, 114 dB typical	
Typical Rise Time	0.45/f_C where f_C is the filter cut-off frequency	
Calibration	External calibration source	
AC Performance Sinewave, 10 Hz, Gain 1, 18.4 V_{PP} 20 kHz Filter, 10 ksps	SNR	105 dB typical
	SINAD	101 dB typical
	THD	-103 dB typical
	SFDR	105 dB typical

Ordering Information

- **6171** LXI Isolated Precision IEPE Input Instrument, 8 Channel

Accessories:

- **5725-AA** Rack-Mount Kit
- **5726-AA** Stackable Tabletop Feet Set

Related Products:

- **5725-AA** Rack-Mount Kit
- **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 6172** Isolated Precision Strain Gage LXI InstrumentXI Instrument

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SPECIFICATIONS (Model 6171-BA only)

AC Voltage Measurement (cont'd)		
AC Performance Sinewave, 10 Hz, Gain 10, 1.84 V_{PP} 20 kHz Filter, 10 ksps	SNR	98 dB typical
	SINAD	95 dB typical
	THD	-99 dB typical
	SFDR	102 dB typical
Crosstalk Sinewave all channels, G1, 20 V_{PP}, 50 R to GND on channel under test, 20 kHz Filter, 50 ksps	f_{IN} = 1 kHz	-125 dB typical
Noise 50 Ω Input, 50 ksps	20kHz G1	0.4mV_{PP} typical
	20kHz G10	0.08mV_{PP} typical
	20kHz G100	0.06mV_{PP} typical
	1kHz G100	0.01mV_{PP} typical

Monitoring Outputs		
Quantity	2 per channel, individually buffered	
Output Impedance	≤ 1 Ω	
Short Circuit to GND	Continuous	
Peak Output Current [1]	±5 mA	
AC Bandwidth [2]	20 kHz max.	
Passband Flatness 10Hz to 0.8f_C	±0.1 dB typical, ±1 dB maximum	
AC Performance Sinewave, -1dBFS, 50 kHz bandwidth All filters, f/f_C = 0.1, Gain 1	SNR	61 dB typical
	SINAD	61 dB typical
	THD	-80 dB typical
	SFDR	83 dB typical
Noise 1kHz Filter, 50Ω Input, 50kHz Bandwidth	4.5mV_{RMS} typical	
Buffer Output Gain Error	±0.2 % typical, ±1 % max.	
Buffer Output Gain Drift	±5 ppm/°C typical, ±25 ppm/°C max.	
Buffer Output Offset Error	±15 mV typical, ±100 mV max.	
Buffer Output Offset Drift	±0.2 mV/°C typical, ±2.5 mV/°C max.	

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

Environmental	
Temperature	5 °C to +50 °C (operational) -40 °C to +70 °C (storage only)
Humidity	5% - 95% (non-condensing)
Size	425 mm x 330 mm x 43.5 mm (excl. connectors)
Weight	5 kg

Power Supply	
Input	Two redundant inputs, 85 - 264V AC, 47 - 63 Hz each
Power	40 W typical

[1] The peak current depends upon the total load seen across all buffers. A single buffer can deliver up to ±10mA
[2] This is limited by the channel bandwidth. The minimum frequency is 0.4Hz due to the High Pass Filter

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BLOCK DIAGRAM (Model 6171-BA only)