SCXI Data Acquisition Systems – 16-Bit, 200 kS/s USB Data Acquisition Module

NI SCXI-1600

- 200 kS/s for up to 352 channels
- 16-bit resolution
- Controller and digitizer for SCXI chassis
- ±10 V input range
- USB 2.0 connectivity to PC
- BNC connectors for:
 - Digital start trigger
 - External clock source
 - External calibration
 - External calibration
- Internal calibration sourceNI-DAQmx 7.3 to simplify
- configuration and measurements

Operating Systems • Windows 2000/NT/XP

Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio

Measurement Services Software (included)

NI-DAQmx
Calibratian Cartificat

Calibration Certificate Included • See page 21



Device	Connection to PC	Analog Inputs	Resolution	Sampling Rate	Input Range	Triggers
SCXI-1600	USB 2.0	Up to 3521	16 bits	200 kS/s	±0.05 to ±10 V	Digital (1)
	full-speed					
	compliant					

¹Multiplexed through a single channel analog-to-digital converter

Table 1. SCXI-1600 Channel, Speed, and Resolution Specifications

Overview and Applications

The National Instruments SCXI-1600 USB data acquisition module acquires data from and controls SCXI signal conditioning modules installed in the chassis in which it resides, making the chassis a complete data acquisition system. Conditioned output signals from other SCXI modules in the chassis are automatically routed to the NI SCXI-1600, digitized, and transferred to the PC via USB. You can connect the SCXI-1600 directly to any standard USB port (1.0, 1.1, or 2.0).

Features

The SCXI-1600 is a full-featured 16-bit digitizer and control module for SCXI analog input, analog output, digital I/O, and switching modules. A USB 2.0 full-speed compliant connection makes the SCXI-1600 ideal for remote applications up to 150 ft away from the PC. In addition, the SCXI-1600 features an internal calibration source and external calibration connection to ensure absolute measurement accuracy over time.

Software

NI-DAQmx is the robust measurement services software included with all National Instruments data acquisition and signal conditioning products. This easy-to-use software tightly integrates the full functionality of your DAQ hardware to LabVIEW, LabWindows/CVI, and Measurement Studio. High-performance features include multidevice synchronization, networked measurements, and DMA data management. Bundled with NI-DAQmx, the Measurement & Automation Explorer utility simplifies the configuration of your measurement hardware with device test panels, interactive measurements, and scaled I/O channels. NI-DAQmx also provides numerous example programs for LabVIEW and other application development environments to get you started with your application quickly.

Ordering Information

BUY ONLINE!

Visit ni.com/info and enter SCXI1600.



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Specifications

These specifications are typical at 25 °C unless otherwise noted

Nominal	Absolute Accuracy					Relative	Accuracy		
Range at	Percentag	e of Reading	Noise + Quantizatio (µV)		Temperature	Absolute Accuracy	Resolution (µV)		
Full Scale (V)	24 Hours	1 Year	Offset (µV)	Single Point	Averaged	Drift (%/°C)	at Full Scale (mV)	Single Point	Averaged
±10	0.0546	0.0588	±1601	±1029	±92	0.0010	7.57	1205	121
±5	0.0146	0.0188	±811	±515	±46	0.0005	1.80	603	60.3
±0.5	0.0546	0.0588	±100	±66	±6	0.0010	0.40	78.4	7.9
±0.05	0.0546	0.0588	±29	±31	±3.0	0.0010	0.061	39.8	4.0

Note: Accuracies are valid for measurements following an internal calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ±1 °C of internal calibration temperature and ±10 °C of external or factory calibration temperature.

Analog Input

Input Characteristics

Type of ADC		Successive approximation		
Resolution		16 bits, 1 in 65,536 200 kS/s		
Sampling rate				
Device Gain		Range	_	
0.5		±10 V		
1		±5 V		
10		±500 mV		
100		±50 mV	-	
Input coupling		DC		
FIFO buffer size		4,096 samples		
Data transfers		USB		
Configuration memory size		512 words		
Max working voltage				
(signal + common mode)		Each input should remain wit	thin ±11 V of ground	
External calibration overvoltage pro	tection			
Powered on		±25 V		
Powered off		±15 V		
Accuracy Information				
Transfer Characteristics				
Integral nonlinearity (INL)		±1.5 LSB typ, ±2.0 LSB max		
Differential nonlinearity (DNL)		±0.5 LSB typ, ±3.0 LSB max		
No missing codes		16 bits		
Offset error				
Pregain error after calibration		±1.0 μV max		
Pregain error before calibration		±28.8 mV max		
Postgain error after calibration		±157 μV max		

Postgain error before calibration ±40 mV max Gain error (relative to calibration reference) ±74 ppm of reading max ±18,900 ppm reading max

±200 ppm of reading max

adjusted to 0 at gain = 1....

After calibration (gain = 1).....

Amplifier Characteristics

Before calibration...

Gain ≠ 1 with gain error

Amprimer Gharacteristics	
nput impedance (normal)	100 G parallel with 100 pF
External calibration BNC input impedance	
Normal powered on	100 G parallel with 100 pF
Powered off	820 Ω
Overload	820 Ω
nput bias current	±200 pA
Common-mode rejection ratio (CMRR), DC to 6	0 Hz

Gain	Bipolar
0.5, 1	85 dB
10, 100	96 dB

Dynamic Characteristics

Bandwidth

Signal	Bandwidth
Small (–3 dB)	413 kHz
Large (1% THD)	490 kHz

Settling time for full-scale step

±4 LSB, 5 µs typ Gain 100

¹This value is the input protection resistor in front of the analog input mux.

²The input bias current is taken from the AD829 op amp specification sheet. This value is much larger than the other op amps. Since the AD829 is used as a single-ended op amp, the input bias current is the same as the input offset current. Therefore offset current is not listed.

Gain 10, 1, 0.5.. ±2 LSB, 5 µs max

System noise (LSB_{ms}, including quantization) LSB, Gain 0.5, 1.0 1.0 10.0 13 100 6.6

Stahility

otability	
Recommended warm-up time	15 min
Offset temperature coefficient	
Pregain	±20 μV/°C
Postgain	±175 µV/°C
Gain temperature coefficient	±20 ppm/°0
Trimmer	

Triggers

Pulse width	10 ns min in edge-detect mode
Response	Rising or falling edge
Compatibility	5 V TTL
External sources	PFI <0, 7>
	AI Sample Clock
Output	Al Start Trigger,
	SI SOURCE
	AI GATE
	AI CONV CLK
	AI SAMP CLK
	AI REF TRIG
Input	AI START TRIG
Ai triggers	

Direction	Level	Min	Max
Input	Low voltage	0.0 V	0.8 V
	High voltage	2.0 V	5.0 V
Output	Low voltage (lout = 5 mA)	_	0.4 V
	High voltage (lout = 3.5 mA)	4.35 V	_

Calibration

Recommended warm-up time	15 min
Interval	1 year
External calibration reference	>6 and <10 V
Onboard calibration reference	
Level	5.000 V (±3.5 mV)
	(over full operating temperature,
	actual value stored in EEPROM)
Temperature coefficient	±5 ppm/°C max
Long-term stability	±15 ppm/1,000 h
Power Requirements	
+22 VDC	115 mA max
-22 VDC	135 mA max
Physical	
Dimensions	18.3 by 17.3 by 3.1 cm
	depth by height by width (7.2 by 6.8 by 1.2 in.)
I/O connector	3 BNC connectors, 1 USB front connector

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Maximum Working Voltage

Maximum working voltage refers to the signal	voltage plus the common-mode voltage.
Channel-to-earth	11 V, Installation Category I
Channel-to-channel	11 V. Installation Category I

Environmental

Operating temperature	0 to 50 °C
Storage temperature	-20 to 70 °C
Relative humidity	10 to 90%, noncondensing
Maximum altitude	2,000 m
Pollution Degree (indoor use only)	2

Safety

The SCXI-1600 is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

Note_ IEC 61010-1, EN 61010-1

Note_ UL 3111-1, UL61010B-1

Note_ CAN/CSA C22.2 No. 1010.1

For UL and other safety certifications, refer to the product label or visit *ni.com/hardref.nsf*, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

Emissions	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity	EN 61326:1997 + A2:2001, Table 1
EMC/EMI	CE, C-Tick and FCC Part 15 (Class A) Compliant
For EMC compliance, operate this device with shielded cabling.	

CE Compliance (E

The SCXI-1600 meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety)..... 73/23/EEC

Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit *ni.com/hardref.nsf*, search by model number or product line, and click the appropriate link in the Certification column.

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Hardware Services NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI[™] combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

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