SCXI Quarter-Bridge Strain Gage Input Module

NI SCXI-1521, NI SCXI-1521B

- 24 quarter-bridge strain gage inputs[1]
  - 350 Ω (SCXI-1521)
  - 120 Ω (SCXI-1521B)
- Programmable excitation (0 to 5 V) per channel
- Programmable shunt and null calibration per channel
- 10 Hz filter per channel
- Onboard quarter-bridge completion and shunt calibration resistors
- NI-DAQmx 7.3 simplifies configuration and measurements

Operating Systems
- Windows 2000/NT/XP

Recommended Software
- LabVIEW
- LabWindows/CVI
- Measurement Studio

Other Compatible Software
- Visual Basic, C, C++

Measurement Services Software (included)
- NI-DAQmx 7.3

Calibration Certificate Included

[1]For half-bridge or full-bridge strain gage measurements, please consider the SCXI-1520.

NEW

Overview

The National Instruments SCXI-1521 and SCXI-1521B are quarter-bridge strain gage input modules that offer all of the features you need for high-channel-count applications. Each NI SCXI-1521/B is shipped with a NIST-traceable calibration certificate.

Each SCXI-1521/B module can multiplex its signals into a single channel of the controlling DAQ device, and you can add more modules to increase channel count.

Analog Input

Each of the 24 analog inputs of the SCXI-1521/B consists of a quarter-bridge completion resistor (350 Ω for the SCXI-1521 and 120 Ω for the SCXI-1521B), and a 10 Hz, 2-pole Butterworth filter. You can program the excitation over 1024 different levels from 0 to 5 V. The 2-pole Butterworth filters provides lowpass filtering to block noise and ensure measurement accuracy.

Calibration

The SCXI-1521/B modules provide simple yet powerful calibration capabilities. Each module has an onboard calibration EEPROM that stores calibration constants for each channel; factory calibration constants are stored in a protected area of the EEPROM.

NI-DAQ traditional and NI-DAQmx transparently use the calibration constants to correct for gain and offset errors for each channel.

Null Compensation

Each input channel of an SCXI-1521/B includes a circuit to remove bridge offset voltage. Driver software nulls the offset voltage to zero in seconds. You do not need to manually adjust a potentiometer. By removing this offset through the measurement hardware, you can achieve better measurement resolution.

Shunt Calibration

Each input channel of an SCXI-1521/B includes an accurate and stable shunt calibration resistor with which you can progamatically simulate loading effects on your strain gage to compensate for strain gage errors. The shunt calibration resistors located inside of the module. You enable or disable the shunt resistors through software commands.

Measurement Services 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 for Visual Basic. High-performance features include multidevice synchronization, networked measurements, and DMA data management. Bundled with NI-DAQmx, the Measurement & Automation Explorer (MAX) 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.

Terminal Block	Type	CJ Sensor	Compatible Modules	Cabling	Special Functions	Part Number
SCXI-1317	Screw terminals	–	SCXI-1521 & SCXI-1521B Front-mounting	–	–	777687-17

Table 1. Terminal Block Options for the SCXI-1521/B

NATIONAL INSTRUMENTS™

SCXI Quarter-Bridge Strain Gage Input Module

Ordering Information

NI SCXI-1521 777966-21
NI SCXI-1521B 777966-21B
Includes NI-DAQmx software.
For more information on extended warranty and value-added services, visit ***ni.com/services***

BUY ONLINE!
Visit ***ni.com/info***

Specifications

This appendix lists the specifications for the SCXI-1521/B modules. These specifications are typical at 25 °C unless otherwise noted.

Analog Input

Number of channels	24
Voltage gain	42
Input coupling	DC
Overvoltage protection	±11 V powered on and off
Inputs protected	<AI0..23>

Transfer

Nonlinearity	0.02% max
Gain error	
After calibration[1]	0.1% of reading max
Before calibration[2]	4.0% of reading max
Input offset error	7 mV max
	1 mV typ

[1]This is the error after software correction. Gain error is taken into account in the software correction coefficients stored in the onboard EEPROM. These constants are applied automatically when using LabVIEW or NI-DAQmx.
[2]This is the error before software calibration.

Dynamic

Minimum scan interval (per channel, any gain in multiplexed mode)

±0.012% accuracy	3 µs
±0.006% accuracy	10 µs
±0.0015% accuracy	20 µs
Noise RTI[1]	
0.1 to 10 Hz	2.5 µVpp
> 10 Hz	1 μV_{rms} in 1MHz bandwidth

[1]Includes excitation voltage noise contribution

Filter

Lowpass filter type	2-pole Butterworth (12 dB/octave rolloff)
3 dB bandwidth	10 Hz

Stability

Recommended warm-up time	30 minutes
Gain drift	±11 ppm /°C max
	±4 ppm /°C typ
Offset drift	±3 µV /°C max
	±1 µV /°C typ

Offset Null Compensation

Range	±0.45% of excitation voltage
Resolutioin	4,096 counts of resolution (±9,000 me offset null compensation range, 4.4 me resolution for GF = 2.0)

Excitation

Type	Constant voltage
Settings	0.0 to 5.0 V in 1023 steps
Error	±20 mV ±0.3% max
Maximum output current	21 mA
Load regulation (open to 240 W)	0.08%
Temperature drift	±10ppm/°C ±30 µV/°C max
Protection	Surge arrestors in parallel with excitation terminals, shunt to ground, short circuit protected

Bridge Completion

SCXI-1521	350 Ω, 0.1%, 2 ppm/°C max, 55mW @ °50 C
Long term stability	0.02%/yr
SCXI-1521B	120 Ω, 0.1%, 2 ppm/°C max, 55mW @ °50 C
Long term stability	0.02%/yr

Shunt Calibration

Type	Shunt across quarter-bridge completion resistor
Shunt resistor	Fixed 100 kΩ, 0.1%, 10 ppm/°C , 150mW
Switch resistance	15 Ω max
	7.5 Ω typ

Power Requirements (from SCXI Backplane)

V+	18.5 to 25 VDC, +170 mA min
V-	18.5 to –25 VDC, –170 mA min
+5 V	+4.75 to 5.25 VDC, 50 mA min

Physical

Dimensions	3.0 by 17.2 by 20.3 cm (1.2 by 6.9 by 8.0 in.)

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth	Input should remain within ±11 V of ground. Installation Category I
Channel-to-channel	Input should remain within ±11 V of ground. Installation Category I

Environmental

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

Safety

The SCXI-1521/B is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1
- CAN/CSA-C22.2 No 61010-1

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

Electromagnetic Compatibility

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

CE Compliance

The SCXI-1521/B meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

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

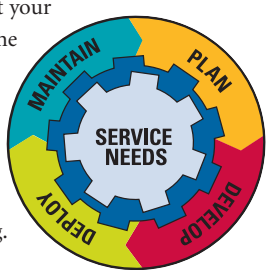
Electromagnetic Compatibility

Directive (EMC)	89/336/EEC

Note: 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/certification, search by model number or product line, and click the appropriate link in the Certification column.

NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit ni.com/services.



Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

Professional Services

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide NI Alliance Partner Program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

NATIONAL INSTRUMENTS™
Certified Alliance Partner

OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at ni.com/support.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit ni.com/ssp.

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

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit ni.com/services.

NATIONAL INSTRUMENTS™

ni.com • (800) 433-3488

National Instruments • Tel: (512) 683-0100 • Fax: (512) 683-9300 • info@ni.com