sbRIO-9218 Getting Started

2024-04-24

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Before You Begin

Read the **sbRIO-9218 Safety, Environmental, and Regulatory Information** and complete the software and hardware installation procedures in your chassis documentation.

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sbRIO-9218 Pinout

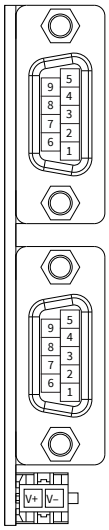


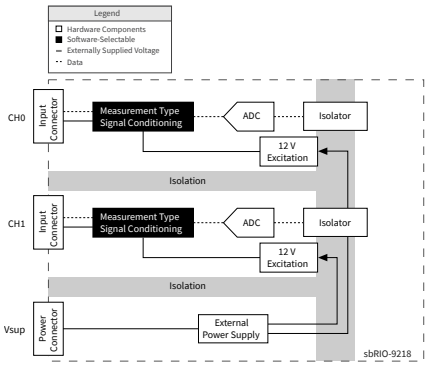
Table 1. Signals by Measurement Type

Mode	Pin								
	1	2	3	4	5	6	7	8	9
±16 V	EX+	—	AI-, EX-	—	—	AI+	—	—	—
±65 mV	EX+ [1]	—	EX- [1]	—	—	AI+	AI- [2]	—	—
Full-Bridge	EX+ [1]	—	EX- [1]	RS+	RS-	AI+	AI-	SC	SC
IEPE	—	AI+	AI-	—	—	—	—	—	—
TEDS	—	T+ [3]	T-	—	—	—	—	—	—

Table 2. Signal Descriptions

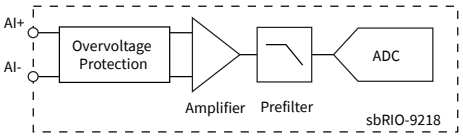
Signal	Description
AI+	Positive analog input signal connection
AI-	Negative analog input signal connection
EX+	Positive sensor excitation connection
EX-	Negative sensor excitation connection
RS+	Positive remote sensing connection
RS-	Negative remote sensing connection
SC	Shunt calibration connection
T+	TEDS data connection
T-	TEDS return connection

sbRIO-9218 Block Diagram



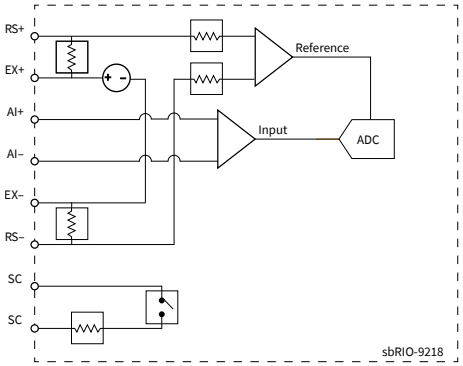
- Two 24-bit analog-to-digital converters (ADCs) simultaneously sample both AI channels.
- The sbRIO-9218 provides channel-to-channel isolation.
- The sbRIO-9218 reconfigures the signal conditioning for each measurement type.
- The sbRIO-9218 provides excitation for IEPE and bridge completion measurement types.
- The sbRIO-9218 can provide optional 12 V sensor excitation for ±16 V, ±65 mV, and ±20 mA measurement types.

±16 V and ±65 mV Signal Conditioning



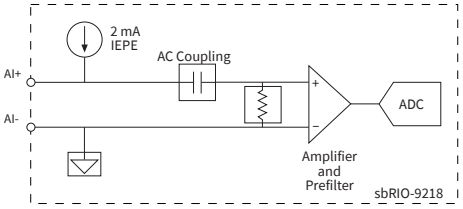
Input signals on each channel are buffered, conditioned, and then sampled by an ADC.

Full-Bridge Signal Conditioning



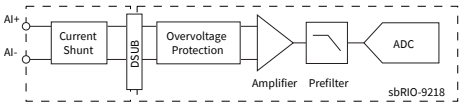
- The analog input connections sense then amplify the incoming analog signal.
- The excitation connections provide differential bridge-excitation voltage.
- Remote sensing continuously and automatically corrects for lead-wire induced excitation voltage loss when using the RS connections.
- Shunt calibration can be used to correct for lead-wire induced desensitization of the bridge.

IEPE Signal Conditioning



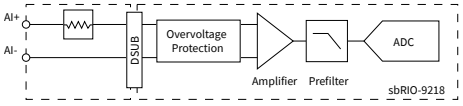
- The incoming analog signal is referenced to an isolated ground.
- Each channel is configured for AC coupling with an IEPE current.
- Each channel provides a TEDS Class 1 interface.

±20 mA Signal Conditioning



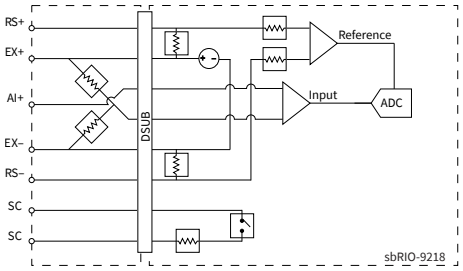
The NI-9983 provides a current shunt for the incoming analog signal.

±60 V Signal Conditioning



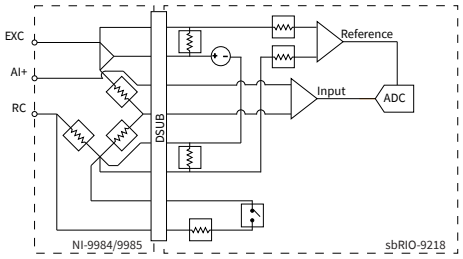
The NI-9987 provides an attenuator for the incoming analog signal.

Half-Bridge Signal Conditioning



- The NI-9886 provides half bridge completion resistors for the incoming analog signal.
- You must connect AI+, EX+, and EX-.
- RS+ and RS- connections are optional.
- You do not need to connect the AI- signal because it is connected internally.

Quarter-Bridge Mode Conditioning



The NI-9984 and NI-9985 provide a quarter-bridge completion resistor and half-bridge completion resistors.

Measurement Types

The sbRIO-9218 provides built-in support for the following measurement types.

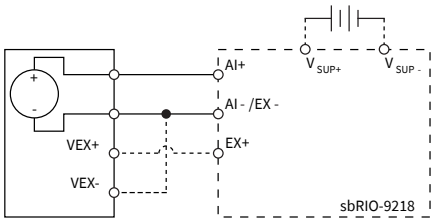
- ±16 V
- ±65 mV
- Full-Bridge
- IEPE

Tip NI-recommends using the NI-9982 screw-terminal adapter when using built-in measurement types on the sbRIO-9218.

The sbRIO-9218 provides additional support for the following measurement types when using a measurement-specific adapter.

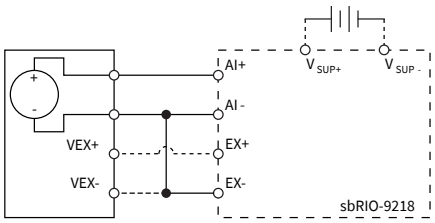
- ±20 mA, requires the NI-9983
- ±60 V, requires the NI-9987
- Half-Bridge, requires the NI-9986
- Quarter-Bridge, requires the NI-9984 (120 Ω) or NI-9985 (350 Ω)

±16 V Connections



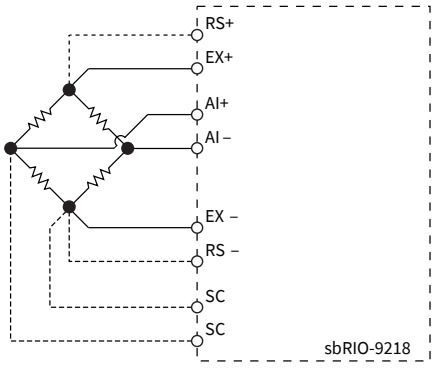
The sbRIO-9218 provides optional 12 V sensor excitation. To use the 12 V excitation, connect a 9 V DC to 30 V DC power supply to Vsup, connect the excitation terminals on your sensor to EX+/EX-, and enable 12 V excitation in your software.

±65 mV Connections



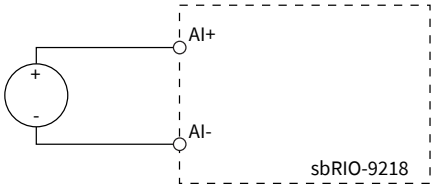
- You must connect AI- to EX- on the sbRIO-9218.
- The sbRIO-9218 provides optional 12 V sensor excitation. To use the 12 V excitation, connect a 9 V DC to 30 V DC power supply to Vsup, connect the excitation terminals on your sensor to EX+/EX-, and enable 12 V excitation in your software.

Full-Bridge Connections



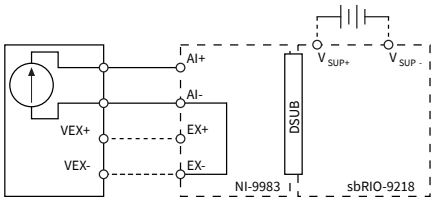
- The sbRIO-9218 provides 2 V excitation to loads ≥120 Ω or 3.3 V excitation to loads ≥350 Ω.
- The sbRIO-9218 provides optional connections for remote sensing (RS) and shunt calibration (SC). Remote sensing corrects for errors in excitation leads and shunt calibration corrects for errors caused by resistance within one leg of the bridge.

IEPE Connections



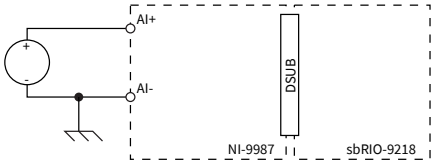
- The sbRIO-9218 provides an excitation current for each channel that powers IEPE sensors.
- AI+ provides DC excitation and AI- provides the excitation return path.

±20 mA Connections



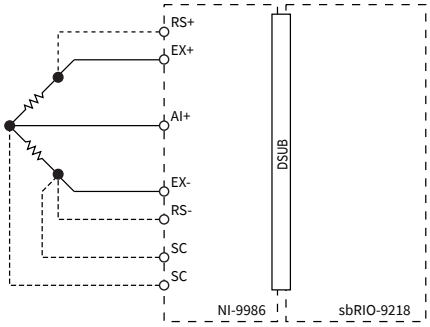
- Connecting ±20 mA signals requires the NI-9983.
- The sbRIO-9218 provides optional 12 V sensor excitation. To use the 12 V excitation, connect a 9 V DC to 30 V DC power supply to Vsup, connect the excitation terminals on your sensor to EX+/EX-, and enable 12 V excitation in your software.

±60 V Connections



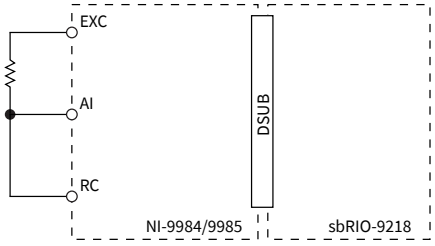
Connecting ±60 V signals requires the NI-9987.

Half-Bridge Connections



- Connecting half bridges requires the NI-9986.
- The sbRIO-9218 provides 2 V excitation to half bridges of ≥240 Ω total or 3.3 V excitation to half bridges of ≥700 Ω total.
- The sbRIO-9218 provides optional connections for remote sensing (RS) and shunt calibration (SC). Remote sensing corrects for errors in excitation leads and shunt calibration corrects for errors caused by resistance within one leg of the bridge.

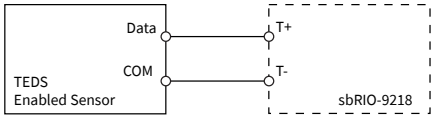
Quarter-Bridge Connections



- Connecting 120 Ω quarter bridges requires the NI-9984.
- Connecting 350 Ω quarter bridges requires the NI-9985.

Tip NI recommends 2 V excitation when using a NI-9984 with 120 Ω quarter bridges and 3.3 V excitation when using the NI-9985 with 350 Ω quarter bridges.

TEDS Connections



For more information about TEDS, visit ni.com/r/rdteds.

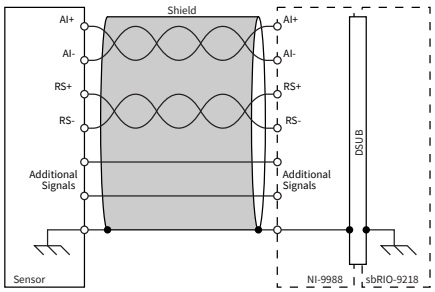
TEDS Support

TEDS Class 1 sensors provide an interface for transferring information from sensors. The sbRIO-9218 and NI-9982F support TEDS Class 1 sensors.

Custom Cabling Guidelines

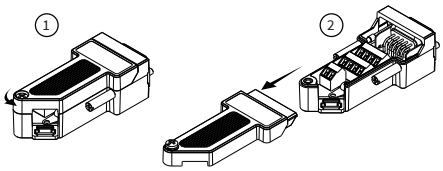
Observe the following guidelines when using the NI-9988 solder cup connector adapter to create custom cables.

- Use a shielded cable for all signals.
- Connect the cable shield to earth ground.
- Use twisted-pair wiring for the AI+/AI- and RS+/RS- signals to achieve specified EMC performance.



Opening a Measurement Adapter

What to Do



1. Unlock the measurement adapter housing/cover.
2. Slide the measurement adapter housing/cover to access the screw terminals.

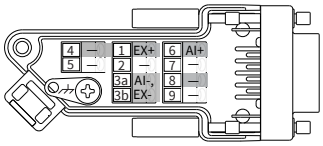
Measurement Adapter Grounding

The ground terminals on a measurement adapter are connected to chassis ground when the measurement adapter is connected to the sbRIO-9218 and the sbRIO-9218 is installed in a chassis.

Measurement Adapter Pinouts

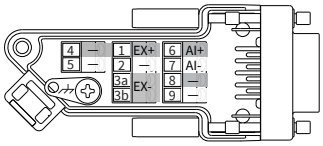
The following sections include pinouts for the sbRIO-9218 measurement adapters.

NI-9982F ±16 V Connection Pinout



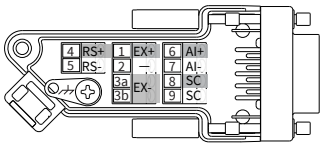
Pins 3a and 3b are tied together.

NI-9982F ±65 mV Connection Pinout



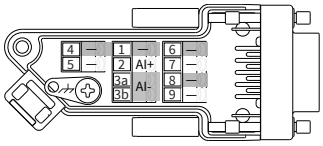
Pins 3a and 3b are tied together.

NI-9982F Full-Bridge Connection Pinout



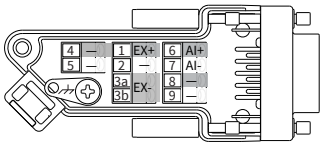
Pins 3a and 3b are tied together.

NI-9982F IEPE Connection Pinout



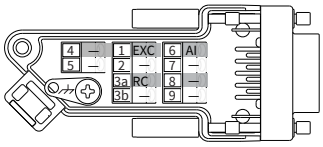
Pins 3a and 3b are tied together.

NI-9983F Pinout

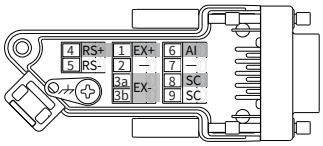


Pins 3a and 3b are tied together.

NI-9984F/9985F Pinout

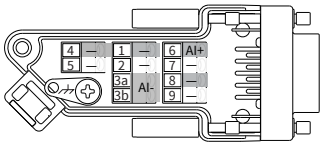


NI-9986F Pinout



Pins 3a and 3b are tied together.

NI-9987F Pinout



Pins 3a and 3b are tied together.

NI Services

Visit ni.com/support to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit ni.com/services to learn about NI service offerings such as calibration options, repair, and replacement.

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