

SPECIFICATIONS

NI PXIe-4113

Dual-Output Programmable DC Power Supply

このドキュメントには、日本語ページも含まれています。

This document lists specifications for the NI PXIe-4113 dual-output programmable DC power supply. Specifications are subject to change without notice. For the most current specifications, visit ni.com/manuals.

About These Specifications

National Instruments defines the capabilities and performance of its Test & Measurement instruments as *Specifications*, *Typical Specifications*, and *Characteristic or Supplemental Specifications*. Data provided in this document are *Specifications* unless otherwise noted.

Specifications characterize the warranted performance of the instrument within the recommended calibration interval and under the stated operating conditions.

Typical Specifications are specifications met by the majority of the instrument within the recommended calibration interval and under the stated operating conditions. The performance of the instrument is not warranted.

Characteristic or Supplemental Specifications describe basic functions and attributes of the instrument established by design or during development and not evaluated during Verification or Adjustment. They provide information that is relevant for the adequate use of the instrument that is not included in the previous definitions.



Caution Do not operate the NI PXIe-4113 in a manner not specified by the operating instructions. Product misuse can result in a hazard. You can compromise the safety protection built into this product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.



Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit ni.com/manuals, and search for the document title.



Caution The auxiliary power input port is sensitive to electrostatic discharge (ESD). When subjected to ESD during normal operation, a fault might result that requires user intervention to recover to normal operation. To ensure proper operation, make all I/O connections before attempting to use the device. In addition, take care to prevent ESD to the auxiliary power input port during normal operation.

Clean devices and terminal blocks by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a soft, lint-free, dampened cloth. Do not use detergent or chemical solvents. The unit must be completely dry and free from contaminants before returning to service.

Unless otherwise noted, specifications are valid under the following conditions:

- Ambient temperature 23 °C ±5 °C
- After 30 minute warm-up time
- niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency for optimal 50 Hz and 60 Hz rejection

To access the NI PXIe-4113 documentation, navigate to **Start»Programs»National Instruments»NI-DCPower»Documentation**.



Note If you are running Windows 8, you may not have a Start menu. To access National Instruments programs and documentation, open the Start screen, type the name of the file or folder you want to access, and select the appropriate icon from the search results.

For example, to access the *NI DC Power Supplies and SMUs Help*, open the Start screen, type *NI DC Power Supplies and SMUs Help*, and select the appropriate icon from the results. To access device specifications, open the Start screen, type your device number (for example, 4154), and select the specifications document for your device. Use this method any time the Start menu is referenced in this document.

Device Capabilities

DC voltage

Voltage range 10 V
Minimum programmable voltage limit..... 0.03 V

DC current

Current range 6 A
Minimum programmable current limit 0.02 A

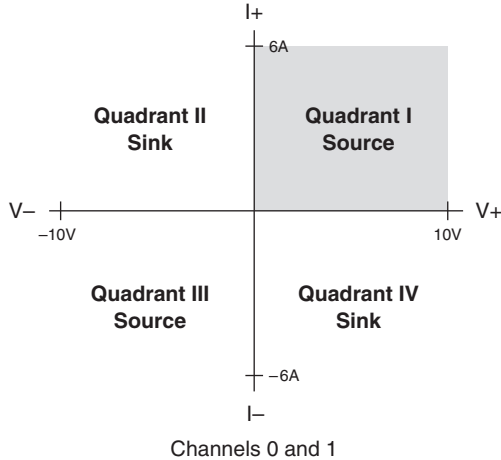
Output power 60 W/channel



Note The NI PXIe-4113 is a single-quadrant power supply with two output channels. Both channels are capable of delivering 10 V at 6 A current and are isolated from each other and from chassis ground.

The following figure illustrates the voltage and the current source capabilities of the NI PXIe-4113.

Figure 1. NI PXIe-4113 Quadrant Diagram, Characteristic



Voltage Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) 0.1% + 15 mV

Temperature coefficient/°C

(0 °C to 55 °C) 0.004% + 0.1 mV

Resolution 0.32 mV based on 16 bit DAC after calibration

Current Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) 0.15% + 20 mA

Temperature coefficient/°C

(0 °C to 55 °C) 0.015% + 0.14 mA

Resolution 0.19 mA based on 16 bit DAC after calibration

Voltage Measurement Accuracy/Resolution



Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) 0.1% + 15 mV

Temperature coefficient/°C

(0 °C to 55 °C) 0.004% + 0.25 mV

Resolution 3 mV based on 14 bit ADC with sign bit after calibration

Current Measurement Accuracy/Resolution



Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) 0.15% + 20 mA

Temperature coefficient/°C

(0 °C to 55 °C) 0.015% + 0.21 mA

Resolution 2 mA based on 14 bit ADC with sign bit after calibration

Load Regulation

Load regulation

Voltage (per amp of output load) 0.5 mV

Current (per volt of output change) 0.25 mA



Note Voltage load regulation is measured at the output channel terminals with the device configured for local sense.

Supplemental Specifications

Transient response (typical)..... Recovers to $\leq \pm 100$ mV within 200 μ s after a change in load current from 50% to 100% of current range.

Voltage Output Speed, typical

Rise time Measured from 10% to 90% of programmed voltage change from 0.03 V to 10 V with specified load

Full resistive load (1.67 Ω)..... <10 ms

No load <10 ms

Fall time Measured from 90% to 10% of programmed voltage change from 10 V to 0.03 V with specified load

Full resistive load (1.67 Ω)..... <10 ms

No load <10 ms

Settling Time, typical

Rise time Time to settle within 0.1% of final programmed voltage change from 0.03 V to 10 V with specified load

Full resistive load (1.67 Ω)..... 25 ms

No load 25 ms

Fall time Time to settle within 0.1% of final programmed voltage change from 10 V to 0.03 V with specified load

Full resistive load (1.67 Ω)..... 25 ms

No load 25 ms

Line Regulation



Note Line regulation applies to the auxiliary power input.

Line regulation (per volt of change in the auxiliary power input)

Voltage 0.2 mV

Current 0.5 mA

Ripple and Noise, typical

Voltage

Peak-to-peak..... <18 mV
RMS <3 mV



Note Voltage noise is measured from 20 Hz to 20 MHz at output voltages of 0.2 V to 10 V.

Current, RMS <2 mA



Note Current noise bandwidth is limited to 10 kHz, and is measured at 20 mA into a 500 Ω load.

Remote Sense

Maximum output lead drop..... Up to 1 V drop per lead
Maximum sense lead resistance..... Up to 1 Ω per lead

Protection

Output channel protection

Overcurrent or reverse voltage Reverse clamp diode,
protected by thermal overload circuit
Overtemperature Automatic shutdown

Auxiliary power input protection

Overvoltage, typical >52.8 VDC shut-off
Overcurrent or reverse voltage Fused

Absolute Maximum Limits

Out+/Out- Current..... 8 A



Caution Applying voltages beyond the ratings specified in this section can result in permanent damage to the device.



Caution Connect only voltages that are within these limits.

Voltage between any two terminals

on the same channel 20 VDC
Voltage from auxiliary power +
to earth ground 60 VDC
Voltage from auxiliary power -
to earth ground 1 VDC

Isolation Voltage



Caution Do not connect to MAINS. Do not connect to signals or use for the measurements within CAT II, III, or IV.

Channels 0- and 1-to-earth ground,
continuous..... 150 VDC, CAT I, verified by dielectric
withstand test, 5 s



High Voltage Take precautions to avoid electrical shock when operating this product at hazardous voltages.



Note Isolation voltage ratings apply to the voltage measured between any channel pin and the chassis ground pins of the front panel. When operating channels in series or floating on top of external voltage references, ensure that no terminal exceeds this rating.

Power Requirements

PXI power requirement 0.5 A from 3.3 V rail,
0.25 A from 12 V rail

Auxiliary power source
input requirements 45.6 VDC to 50.4 VDC, 3.5 A max

Measurement Timing

Measurement rate
Default 60/s (Line frequency set to 60 Hz,
aperture set to 1 PLC, measure record mode)
Maximum..... 5,250/s

Triggers

Input triggers

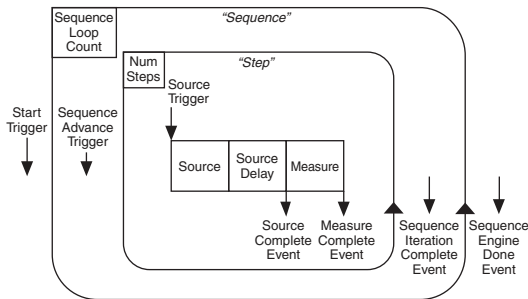
Types	Start, Source, Sequence Advance, Measure
Sources	PXI trigger lines 0-7 ¹
Polarity	Configurable
Minimum pulse width	100 ns
Destinations ²	PXI trigger lines 0-7 ¹
Polarity	Active high (unconfigurable)
Minimum pulse width	250 ns

Output triggers (events)

Types	Source Complete, Sequence Iteration Complete, Sequence Engine Done, Measure Complete
Destinations ²	PXI trigger lines 0-7 ¹
Polarity	Configurable
Minimum pulse width	Configurable between 250 ns and 1.6 μ s

Figure 2 illustrates the programming flow in NI-DCPower using Sequence source mode with automatic measurements. For more information about programming the NI PXIe-4113, refer to the *NI DC Power Supplies and SMUs Help*.

Figure 2. NI-DCPower Programming Flow



¹ Pulse widths and logic levels compliant with PXI Express Hardware Specification, Revision 3.0.

² Input triggers can come from any source (PXI trigger or software trigger) and be exported to any PXI trigger line. This allows for easier multi-board synchronization regardless of the trigger source.

Physical Characteristics

Dimensions	3U, one-slot, PXI Express/ cPCI Express module; 2.0 cm × 13.0 cm × 21.6 cm (0.8 in. × 5.1 in. × 8.5 in.)
Weight.....	458 g
User-replaceable fuse, auxiliary power input (PCB-mount)	F 6.3 A H 250 V (5 × 20 mm glass fuse)



Note NI recommends Littelfuse 021606.3MXP.

Front panel connectors

Output channels	COMBICON, 5.08 mm (10 position)
Auxiliary power input.....	OMNIMATE, 3.5 mm (2 × 2 position)



Note I/O connectors can accept wire gauges from 12 AWG to 24 AWG. NI recommends 14 AWG or smaller.

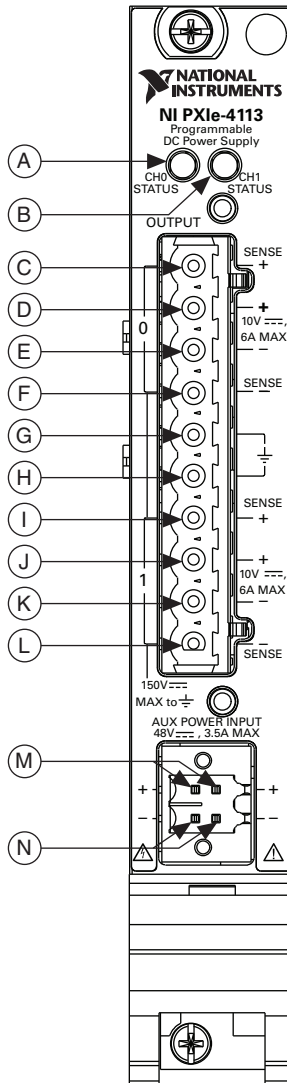


Note The NI PXIe-4113 ships with four sense jumpers installed on the output connector. The sense jumpers connect the sense terminals to their respective output terminals. Refer to the *NI PXIe-4113 Local and Remote Sense* topic in the *NI DC Power Supplies and SMUs Help* for more information about this configuration.



Note For information about operating multiple NI PXIe-4113 channels in series or parallel, refer to the *NI DC Power Supplies Help* at ni.com/manuals.

Figure 3. NI PXIe-4113 Front Panel



A	Channel 0 Status LED	H	Chassis GND
B	Channel 1 Status LED	I	Channel 1 Sense+
C	Channel 0 Sense+	J	Channel 1 Output+
D	Channel 0 Output+	K	Channel 1 Output-
E	Channel 0 Output-	L	Channel 1 Sense-
F	Channel 0 Sense-	M	Auxiliary Power Input +
G	Chassis GND	N	Auxiliary Power Input -

Calibration

Recommended calibration interval..... 2 years

Environment

Maximum altitude..... 2,000 m (at 25 °C ambient temperature)

Pollution degree..... 2

Indoor use only.

Operating Environment

Ambient temperature range 0 °C to 55 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range..... 10% to 90%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range -40 °C to 70 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range..... 5% to 95%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

Shock and Vibration

Operational shock..... 30 g peak, half-sine, 11 ms pulse
(Tested in accordance with IEC-60068-2-27.
Test profile developed in accordance with MIL-PRF-28800F.)

Random vibration

Operating 5 Hz to 500 Hz, 0.3 g_{rms}

Nonoperating 5 Hz to 500 Hz, 2.4 g_{rms}
(Tested in accordance with IEC-60068-2-64.
Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Accessories

Visit ni.com for more information about the following accessories.



Caution You *must* install mating connectors according to local safety codes and standards and according to the specifications provided by the manufacturer. You are responsible for verifying the safety compliance of third-party connectors and their usage according to the relevant standard(s), including UL and CSA in North America and IEC and VDE in Europe.



Caution For safety, always operate the NI PXIe-4113 with suitably rated cables and the backshell kit provided in the shipping kit. Operating the device without the provided backshell may expose users to high voltage.

Table 1. NI Accessories for the NI PXIe-4113

Accessory	Description	Part Number (P/N)
Additional connector kit	Replacement connectors and wiring accessories for output and auxiliary power ports	782887-01
Replacement auxiliary power supply	Replacement 48 V auxiliary power supply module	782888-01

Table 2. Third-Party Accessories for the NI PXIe-4113

Accessory	Description	Manufacturer	Part Number (P/N)
Auxiliary power input fuse	F 6.3 A H 250 V (5 × 20 mm glass fuse)	Littelfuse	021606.3MXP
Sense jumper	Insulated, 2 position insertion bridge for output connector	Phoenix Contact	1733169
Connector for third-party auxiliary power supplies	2 × 2 position auxiliary power supply connector	Weidmuller	1277860000

Compliance and Certifications

Device Symbols

The following symbols are marked on the NI PXIe-4113.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.



When this symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.

Safety

This product meets 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, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the [Online Product Certification](#) section.



Caution The protection provided by this equipment may be impaired if it is used in a manner not described in the product documentation.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



Note For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and 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.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit ni.com/environment/weee.

电子信息产品污染控制管理办法（中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

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