

# Triple-Output Programmable DC Power Supply

## NI PXI-4110 **NEW!**

- 3 independent DC power supplies
  - 0 to 6 VDC, 1 A, nonisolated
  - 0 to +20 VDC, 1 A, isolated
  - 0 to -20 VDC, 1 A, isolated
- 16-bit voltage set point and current limit
- 16-bit voltage/current readback measurements
- 20 mA and 1 A current modes
- 2 power source options
  - Internal (PXI backplane) – 9 W output
  - Auxiliary – full 46 W output
- Isolated channels can be combined for 0 to +40 VDC operation

### Operating Systems

- Windows 2000/XP

### Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio

### Other Compatible Software

- Microsoft Visual Basic
- C/C++

### Driver Software (included)

- NI-DCPower



## Overview

The National Instruments PXI-4110 is a programmable, triple-output precision DC power supply in a single-slot, 3U PXI module. The NI PXI-4110 has two isolated channels, one from 0 to +20 V and the other from 0 to -20 V, and a single nonisolated 0 to 6 V supply, all capable of sourcing up to 1 A per channel. The PXI-4110 has 16-bit resolution for programming the voltage setpoint and current limit and for using the voltage and current readback measurement functionality. The versatile supply rails and high accuracy make the PXI-4110 an excellent general-purpose, single-quadrant power supply for design validation and manufacturing test applications.

## Power Supply with Precision Source Capability

The PXI-4110 has the ability to source both voltage and current from each of its three outputs. As a voltage source, it can be programmed in 120  $\mu$ V steps on the +6 V channel and 400  $\mu$ V steps on each of the 20 V channels. As a current source, it can be programmed in 20  $\mu$ A steps on each channel in the 1 A current range. Additionally, you can set each of the 20 V channels to a 20 mA current range for 400 nA programming resolution. You can use this impressive level of current resolution in traditional power supply applications or in many applications that typically require a separate precision source/measure unit.

## Internal/External Supply Options

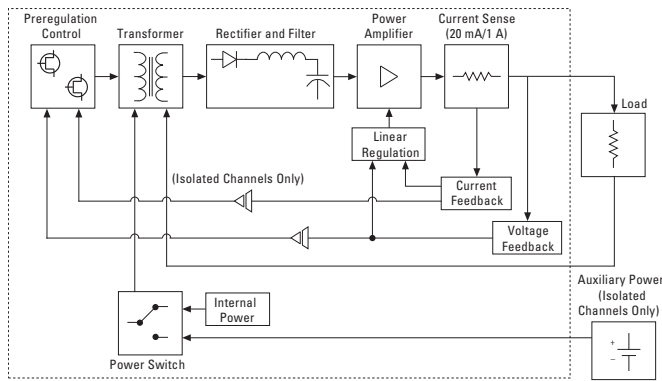
You can power the PXI-4110 either internally from the PXI backplane or externally through the NI APS-4100 - a front-panel-connected auxiliary DC supply. Using internal power reduces the number of connections required on the front panel but also limits the available output power because of per-slot PXI power restrictions. When internally powered, the nonisolated, 0 to 6 V channel can be operated at its full 1A current range, but the isolated channels are limited to 100 mA. When externally powered, all channels can be operated at full power of 1 A per channel for a total maximum output power of 46 W.

## Linear Supply with Switching Preregulation

The PXI-4110 uses a combination of switching and linear regulation to provide excellent output power and accuracy in the 3U PXI module. On each channel, input power (coming from either the PXI backplane or the APS-4100) is regulated to within a certain percentage of the desired output power. This preregulation stage is governed by an intelligent PID algorithm implemented onboard the module, ensuring the amount of power passed to the second (linear) stage is at the most efficient level, given the desired output.

After additional filtering, traditional linear regulation techniques and amplification are used to further regulate the signal and source the final voltage or current. Because the output is linearly regulated, it has very quick load response and high precision – even at levels as low as 0 V. Also, because the linear regulation occurs on the preregulated signal, the power dissipation is relatively small and easily cooled in a PXI slot.

# Triple-Output Programmable DC Power Supply



Architecture of Single Isolated Channel on the NI PXI-4110

## Extensive Device Protection Features

In addition to the standard voltage and current limiting functionality of the PXI-4110, several other features are also included to protect the supply and the load. Each output is protected against a reverse-polarity voltage application as well as excessive voltages – up to 15 V above the maximum channel voltage. Output fuses provide additional protection to prevent catastrophic failure as a last line of defense.

The operating voltage range for the auxiliary power input is 11 to 15.5 V. If voltages outside these limits are detected, the module will shut down until an input voltage within range is applied. If an input in excess of 20 V is applied, the input crowbar protection will turn on, protecting the input solid-state switching devices (and preregulator power supply) from overvoltage damage.

The PXI-4110 operates with only nominal temperature rises internally due to the intelligent PID control of the output devices. If an overtemperature condition occurs in the PXI chassis due to fan failure or intake blockage, the output channels will be shut down and a warning will be issued. This type of condition requires user software intervention to reset, thus preventing the module from damage at excessive temperatures.

## Software

NI-DCPower, an IVI-compliant instrument driver, offers complete programmatic control of the PXI-4110. You can use an available test panel to quickly troubleshoot or debug power supply operation and take advantage of the DC Power Express VI for an intuitive, configuration-based method of programming in the National Instruments LabVIEW graphical development environment.

## Ordering Information

NI PXI-4110.....	779647-10
Includes NI-DCPower and the DCPower Test Panel.	
NI APS-4100 .....	779671-01

## BUY NOW!

For complete product specifications, pricing, and accessory information, call (800) 813 3693 (U.S.) or go to [ni.com/modularinstruments](http://ni.com/modularinstruments).

# Triple-Output Programmable DC Power Supply

## Specifications

### Supply Characteristics

Number of channels..... 3

### DC Specifications

Channel	DC Voltage	Isolation <sup>1</sup>	DC Current (Power)			
			Auxiliary Power		Internal Power	
			20 mA Range	1 A Range	20 mA Range	1 A Range
0	0 to +6 V	N/A	N/A	1 A (6 W)	N/A	1 A (6 W)
1	0 to +20 V	60 VDC, CAT I	20 mA	1 A (20 W)	20 mA	100 mA (2 W) <sup>2</sup>
2	0 to -20 V	60 VDC, CAT I	20 mA	1 A (20 W)	20 mA	100 mA (2 W) <sup>2</sup>

<sup>1</sup>Channels 1 and 2 are isolated from ground but not from each other.

<sup>2</sup>Combined total power for channels 1 and 2 using internal power cannot exceed 3 W.

### Voltage Programming Accuracy/Resolution

Channels	Range (V)	Resolution (mV)	Accuracy ±(% of output + % of offset)	
			1 Year 13 to 33 °C	Tempco/C 0 to 55 °C
			Tempco = temperature coefficient	
0	+6	0.12	0.05 + 4 mV	0.005 + 0.3 mV
1	+20	0.40	0.05 + 10 mV	0.005 + 1 mV
2	-20	0.40	0.05 + 10 mV	0.005 + 1 mV

### Current Programming Accuracy/Resolution<sup>3</sup>

Channels	Range <sup>4</sup>	Resolution	Accuracy ±(% of output + % of offset)	
			1 Year 13 to 33 °C	Tempco/C 0 to 55 °C
			Tempco = temperature coefficient	
0	1 A	0.02 mA	0.15 + 4 mA	0.02 + 0.2 mA
1 and 2	20 mA	0.40 µA	0.15 + 35 µA	0.01 + 3 µA
	1 A	0.02 mA	0.15 + 4 mA	0.02 + 0.2 mA

<sup>3</sup>Applies for current settings greater than 2% of range.

<sup>4</sup>Minimum programmable current limit is 5% of range.

### Voltage Readback Accuracy/Resolution

Channels	Range (V)	Resolution (mV)	Accuracy ±(% of output + % of offset)	
			1 Year 13 to 33 °C	Tempco/C 0 to 55 °C
			Tempco = temperature coefficient	
0	+6	0.06	0.05 + 4 mV	0.005 + 0.2 mV
1	+20	0.20	0.05 + 5 mV	0.005 + 0.5 mV
2	-20	0.20	0.05 + 5 mV	0.005 + 0.5 mV

### Current Readback Accuracy/Resolution<sup>5</sup>

Channels	Range	Resolution	Accuracy ±(% of output + % of offset)	
			1 Year 13 to 33 °C	Tempco/C 0 to 55 °C
			Tempco = temperature coefficient	
0	1 A	0.01 mA	0.15 + 4 mA	0.012 + 0.2 mA
1 and 2	20 mA	0.20 µA	0.15 + 35 µA	0.012 + 3 µA
	1 A	0.01 mA	0.15 + 4 mA	0.012 + 0.2 mA

<sup>5</sup>Applies for current outputs up to 500 mA. For current outputs greater than 500 mA, derate the accuracy by 0.3%.

### Ripple and Noise<sup>6</sup>

Channels	RMS Normal-Mode Voltage	RMS Normal-Mode Current (20 mA into 500 Ω load)
0	<1.5 mV	<8 µA
1 and 2	<1.0 mV	<8 µA

<sup>6</sup>From 20 Hz to 20 MHz.

### Voltage Output Speed<sup>7</sup>

Channels	Internal Power				Auxiliary Power			
	Rise Time <sup>8</sup>		Fall Time <sup>9</sup>		Rise Time <sup>8</sup>		Fall Time <sup>9</sup>	
	Full Load	No Load	Full Load	No Load	Full Load	No Load	Full Load	No Load
0	Same as auxiliary power				<1 ms	<1 ms	<1 ms	<25 ms
1 and 2	<2 ms	<2 ms	<15 ms	<56 ms	<1 ms	<1 ms	<2 ms	<56 ms

<sup>7</sup>Current limit set to 1 A for auxiliary power or 100 mA for internal power. For 20 mA range, use <60 ms for all programming speeds.

<sup>8</sup>Rise time is from 10 to 90% of programmed change at maximum current.

<sup>9</sup>Fall time is from 90 to 10% of programmed change at maximum current.

### Line and Load Regulation

Channels	Line Regulation <sup>10</sup> ±(% of output + offset)		Load Regulation ±(% of range selected)	
	Voltage	Current	Voltage (per A of output load)	Current (per V of output load)
	0	N/A	N/A	0.42
1 and 2	0.005% + 1 mV	0.005% + 0.01% of range	0.1	0.007 (0.003 for 20 mA range)

<sup>10</sup>Per volt change in auxiliary input.

### General Specifications

Sampling rate	Default .....	300 S/s
	Maximum .....	3000 S/s
Warm-up .....		15 minutes
I/O connectors		
	Supply channels.....	6-position Combicon (3.81 mm)
	External power.....	2-position Combicon (3.5 mm)
Dimensions.....		10 by 16 cm (3.9 by 6.3 in.)
		Single PXI slot, 3U
Auxiliary power (optional).....		11 to 15.5 VDC, 5 A max

### Environment

Operating temperature .....	0 to 55 °C
Storage temperature.....	-20 to 70 °C
Relative humidity .....	5 to 85% noncondensing
Pollution degree .....	2
Approved altitude .....	up to 2000 m

### Safety

This product 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

### Electromagnetic Compatibility

CE, C-Tick, and FCC Part 15 (Class A) Compliant	
Emissions .....	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity.....	EN 61326:1997 +A2:2001, Table 1

### CE Compliance

This product 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

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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](http://ni.com/pxiadvisor).

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