SPECIFICATIONS

PXI-4130

±20 V, 40 W PXI Source Measure Unit

These specifications apply to the PXI-4130 with APS-4100 auxiliary power supply and to the PXI-4130 without auxiliary power supply.

Contents

Definitions........................................................................................................................................2
Conditions..................................................................................................................................2
Device Capabilities..................................................................................................................2
SMU Channel Specifications (Channel 1)..................................................................................4
  Voltage Programming Accuracy/Resolution.........................................................................4
  Current Programming Accuracy/Resolution.........................................................................4
  Voltage Measurement Accuracy/Resolution.........................................................................4
  Current Measurement Accuracy/Resolution.........................................................................5
Channel 1 Additional Specifications......................................................................................5
Utility Channel Specifications (Channel 0)............................................................................6
  Programming Accuracy/Resolution....................................................................................6
  Measurement Accuracy/Resolution....................................................................................6
  Channel 0 Additional Specifications.................................................................................6
Programming and Measurement Timing...............................................................................7
Protection..................................................................................................................................7
Calibration Interval..................................................................................................................7
Accuracy Specification Derating versus Load Current............................................................8
Maximum Sinking Power versus Ambient Temperature for Channel 1.................................8
Physical Characteristics.........................................................................................................8
Power Requirements................................................................................................................9
Environment............................................................................................................................9
  Operating Environment......................................................................................................10
  Storage Environment.........................................................................................................10
Shock and Vibration..............................................................................................................10
Compliance and Certifications...............................................................................................10
  Safety.................................................................................................................................11
  Electromagnetic Compatibility........................................................................................11
  CE Compliance ...............................................................................................................12
  Online Product Certification..........................................................................................12
  Environmental Management..........................................................................................12
Definitions

_Warranted_ specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

_Characteristics_ describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- _Typical_ specifications describe the expected performance met by a majority of the models.
- _Nominal_ specifications describe parameters and attributes that may be useful in operation.

Specifications are _Warranted_ unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- Ambient temperature\(^1\) of 23 °C ± 5 °C
- 30 minutes warm-up time
- _niDCPower Samples to Average_ property or _NIDCPower_ATTR_SAMPLES_TO_AVERAGE_ attribute set to 300 for optimal 50 Hz and 60 Hz rejection

Device Capabilities

<table>
<thead>
<tr>
<th>Channel</th>
<th>DC Voltage Ranges</th>
<th>Isolation</th>
<th>DC Current Source and Sink Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMU Channel (1)</td>
<td>-20 V to +20 V</td>
<td>60 VDC, CAT I</td>
<td>200 μA</td>
</tr>
<tr>
<td></td>
<td>-6 V to +6 V</td>
<td></td>
<td>2 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 A(^2)</td>
</tr>
<tr>
<td>Utility Channel (0)</td>
<td>0 V to 6 V</td>
<td>N/A</td>
<td>1 A (6 W)</td>
</tr>
</tbody>
</table>

\(^1\) The ambient temperature of a PXI system is defined as the temperature at the chassis fan inlet (air intake).

\(^2\) Current input/output for channel 1 is limited to 2 W or 300 mA when operating under internal power. Continuous sinking power for channel 1 is limited to 10 W, subject to derating above 30 °C. Refer to the figure _Maximum Sinking Power versus Ambient Temperature for Channel 1_.

---

1 | ni.com | PXI-4130 Specifications
Figure 1. Channel 0 Quadrant Diagram

Channel 0: 6W in Quadrant I

Figure 2. Channel 1 Quadrant Diagram

Channel 1: 40W in Quandrants I and III, 10W in Quadrants II and IV
## SMU Channel Specifications (Channel 1)

### Voltage Programming Accuracy/Resolution

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of Output + Offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±20 V</td>
<td>0.33 mV</td>
<td>0.034% + 1.8 mV</td>
</tr>
<tr>
<td>±6 V</td>
<td>0.1 mV</td>
<td>0.034% + 1.5 mV</td>
</tr>
</tbody>
</table>

### Current Programming Accuracy/Resolution\(^3\)

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of Output + Offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μA</td>
<td>10 nA</td>
<td>0.03% + 0.1 μA</td>
</tr>
<tr>
<td>2 mA</td>
<td>100 nA</td>
<td>0.03% + 1 μA</td>
</tr>
<tr>
<td>20 mA</td>
<td>1 μA</td>
<td>0.03% + 10 μA</td>
</tr>
<tr>
<td>200 mA</td>
<td>10 μA</td>
<td>0.03% + 100 μA</td>
</tr>
<tr>
<td>2 A(^4)</td>
<td>100 μA</td>
<td>0.12% + 1 mA</td>
</tr>
</tbody>
</table>

### Voltage Measurement Accuracy/Resolution

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of Reading + Offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±20 V</td>
<td>0.10 mV</td>
<td>0.03% + 1.5 mV</td>
</tr>
<tr>
<td>±6 V</td>
<td>0.10 mV</td>
<td>0.03% + 1.5 mV</td>
</tr>
</tbody>
</table>

\(^3\) Minimum programmable current limit/level is 2% of range.

\(^4\) For currents ≥ 500 mA, refer to the additional derating information in the figure Accuracy Specification Derating versus Load Current.
# Current Measurement Accuracy/Resolution

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of Reading + Offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 μA</td>
<td>1.0 nA</td>
<td>0.03% + 0.02 μA</td>
</tr>
<tr>
<td>2 mA</td>
<td>10 nA</td>
<td>0.03% + 0.2 μA</td>
</tr>
<tr>
<td>20 mA</td>
<td>0.1 μA</td>
<td>0.03% + 2 μA</td>
</tr>
<tr>
<td>200 mA</td>
<td>1 μA</td>
<td>0.03% + 40 μA</td>
</tr>
<tr>
<td>2 A</td>
<td>10 μA</td>
<td>0.12% + 200 μA</td>
</tr>
</tbody>
</table>

## Channel 1 Additional Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settling time</td>
<td>500 μs, typical</td>
</tr>
<tr>
<td>Output capacitance</td>
<td></td>
</tr>
<tr>
<td>Low setting</td>
<td>10 nF, typical</td>
</tr>
<tr>
<td>High setting</td>
<td>6.8 μF, typical</td>
</tr>
<tr>
<td>Slew rate</td>
<td>0.08 V/μs, typical</td>
</tr>
<tr>
<td>Transient response</td>
<td>Recovers to &lt;0.1% of voltage range within 200 μs after a change in load current from 10% to 90% of current range, typical</td>
</tr>
<tr>
<td>Normal Mode noise (Source only)</td>
<td>15 mV&lt;sub&gt;p-p&lt;/sub&gt; into resistive load &lt;5 mV RMS 20 Hz to 20 MHz bandwidth, typical</td>
</tr>
<tr>
<td>Remote sense</td>
<td>Up to 1 V drop per lead using internal power or ≥ 12 V auxiliary power supply; Add 120 μV to accuracy specification per volt of lead drop.</td>
</tr>
<tr>
<td>Load regulation</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>20 mV per amp of output load using Local Sense</td>
</tr>
<tr>
<td>Current</td>
<td>0.01% of range per volt of output change</td>
</tr>
</tbody>
</table>

---

<sup>5</sup> Settled to 1%, 1 V step, 50% of current range at final value, output capacitance set to low, using auxiliary power supply.
Line regulation (% of output + offset, per volt of change in auxiliary power input)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>0.01 + 1 mV</td>
</tr>
<tr>
<td>Current</td>
<td>0.01 + 0.02% of range</td>
</tr>
</tbody>
</table>

Temperature coefficient (Tempco) is 10% of accuracy specification per °C.

Utility Channel Specifications (Channel 0)

Programming Accuracy/Resolution\(^6\)

<table>
<thead>
<tr>
<th>Output Function</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of output + offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Year 23 °C ± 10 °C</td>
</tr>
<tr>
<td>Voltage</td>
<td>+6 V</td>
<td>0.12 mV</td>
<td>0.05% + 4 mV</td>
</tr>
<tr>
<td>Current</td>
<td>1 A(^7)</td>
<td>0.02 mA</td>
<td>0.15% + 4 mA</td>
</tr>
</tbody>
</table>

Measurement Accuracy/Resolution

<table>
<thead>
<tr>
<th>Measurement Type</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy ± (% of reading + offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Year 23 °C ± 10 °C</td>
</tr>
<tr>
<td>Voltage</td>
<td>+6 V</td>
<td>0.06 mV</td>
<td>0.05% + 4 mV</td>
</tr>
<tr>
<td>Current</td>
<td>1 A(^7)</td>
<td>0.01 mA</td>
<td>0.15% + 4 mA</td>
</tr>
</tbody>
</table>

Channel 0 Additional Specifications

- Settling time: <1 ms, 10% to 90% of range, measured with full load, typical
- Output capacitance: 33 μF, typical
- Transient response: Recovers to <0.1% of voltage range within 50 μs after a change in load current from 50% to 100% of current range, typical
- Normal Mode noise and ripple (source only, voltage): <1.5 mV RMS, 20 Hz to 20 MHz bandwidth, typical

\(^6\) Minimum programmable current limit/level is 2% of range.

\(^7\) For currents ≥500 mA, refer to the additional derating information in the figure *Accuracy Specification Derating versus Load Current.*
Load regulation

<table>
<thead>
<tr>
<th>Voltage</th>
<th>0.42% of range per amp of output load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0.02% of range per volt of output change</td>
</tr>
</tbody>
</table>

Temperature coefficient (Tempco) is 15% of accuracy specification per °C.

Programming and Measurement Timing

<table>
<thead>
<tr>
<th>Maximum output update rate</th>
<th>3000 Updates/s, nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum measurement rate</td>
<td>3 kS/s, nominal</td>
</tr>
<tr>
<td>(samples to average = 1)</td>
<td></td>
</tr>
<tr>
<td>Single point update latency</td>
<td>600 µs, typical</td>
</tr>
</tbody>
</table>

Protection

<table>
<thead>
<tr>
<th>Auxiliary power input protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage</td>
</tr>
<tr>
<td>Overcurrent or reverse voltage</td>
</tr>
</tbody>
</table>

Calibration Interval

<table>
<thead>
<tr>
<th>Recommended calibration interval</th>
<th>1 year</th>
</tr>
</thead>
</table>

8 Does not include load dependent settling time.
Accuracy Specification Derating versus Load Current

![Graph showing derating versus load current for channels 0 and 1.](image)

Maximum Sinking Power versus Ambient Temperature for Channel 1

![Graph showing maximum sinking power decrease with ambient temperature for channel 1.](image)

Physical Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>3U, one-slot PXI/cPCI module</td>
</tr>
<tr>
<td></td>
<td>2.0 cm × 13.0 cm × 21.6 cm</td>
</tr>
<tr>
<td></td>
<td>(0.8 in. × 5.1 in. × 8.5 in.), nominal</td>
</tr>
<tr>
<td>Weight</td>
<td>312 g (11 oz), typical</td>
</tr>
</tbody>
</table>
User-replaceable fuses

<table>
<thead>
<tr>
<th>Channel 0 (internally-socketed)</th>
<th>1, Littelfuse 045301.5 (F 1.5 A 125 V), characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary power input (front panel mount)</td>
<td>1, 5 × 20 mm glass fuse (T 6.3 A L 250 V), characteristic</td>
</tr>
</tbody>
</table>

Note  NI recommends Littelfuse 21806.3 for Auxiliary Power Input fuse.

Front panel connectors

| Output channels | MINI-COMBICON, 3.81 mm (6 position), nominal |
| Auxilary power input | MINI-COMBICON, 3.5 mm (2 position), nominal |

Note  Front panel connectors can accept wire gauges from 16 AWG to 28 AWG.

Power Requirements

<table>
<thead>
<tr>
<th>PXI power requirement</th>
<th>10 W at 5 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 W at 3.3 V</td>
</tr>
<tr>
<td></td>
<td>6 W at 12 V</td>
</tr>
<tr>
<td></td>
<td>2.5 W at -12 V, typical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary power source input requirements</th>
<th>11 VDC to 15.5 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 A max</td>
</tr>
</tbody>
</table>

Environment

<table>
<thead>
<tr>
<th>Maximum altitude</th>
<th>2,000 m (at 25 °C ambient temperature)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution Degree</td>
<td>2</td>
</tr>
</tbody>
</table>

Indoor use only.

---

9  Optional; Channel 1 only.
Operating Environment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>0 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)</td>
</tr>
</tbody>
</table>

Storage Environment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-40 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)</td>
</tr>
</tbody>
</table>

Shock and Vibration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational shock</td>
<td>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.)</td>
</tr>
<tr>
<td>Random vibration</td>
<td>5 Hz to 500 Hz, 0.3 g rms (Tested in accordance with IEC 60068-2-64.)</td>
</tr>
<tr>
<td></td>
<td>5 Hz to 500 Hz, 2.4 g rms (Tested in accordance with IEC 60068-2-64. Test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)</td>
</tr>
</tbody>
</table>

Compliance and Certifications

⚠️ **Caution** You can impair the protection provided by the PXI-4130 if you use it in a manner not described in this document.

⚠️ **Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.
Safety

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

Isolation Voltage

| Channel-to-earth ground, continuous | 60 VDC, CAT I\(^{10}\), verified by dielectric withstand test, 5 s |

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

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

**Note** For UL and other safety certifications, refer to the product label or the Online Product Certification section.

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, certifications, and additional information, refer to the Online Product Certification section.

\(^{10}\) Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINs building installations of Measurement Categories CAT II, III, or CAT IV.
CE Compliance

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; 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, visitni.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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, 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.）