

User's Manual

X-ray Preamplifier Power Supply

Model XPPS

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1 Overview

The **Model XPPS** X-ray Pre-amplifier Power Supply from XIA provides low-noise linear DC power to run x-ray and gamma-ray preamplifiers. The XPPS provides $\pm 24\text{V}$ and $\pm 12\text{V}$ on four industry-standard DB-9 connectors, and is specifically designed to provide power for multi-element x-ray detectors used at synchrotron beamlines. The XPPS is designed to power 50 or more preamplifier channels, based on the published preamplifier power needs for the most popular detectors. The $\pm 12\text{V}$ supplies produce 5.1 amps each, while the $\pm 24\text{V}$ supplies each produce 3.6 amps. Test points are available on the front panel to measure the voltages. A thick ground strap is provided to make a strong ground connection to the signal processing electronics in order to reduce possible ground loop noise.

1.1 XPPS Features

- Low noise, linear power supplies.
- $\pm 24\text{V}$ and $\pm 12\text{V}$ power for 50 or more preamplifiers.
- $\pm 12\text{V}$ at 5.1 amps each; $\pm 24\text{V}$ at 3.6 amps each.
- Four front panel DB-9 outputs.
- Front panel test points allow checking supply voltages.
- Use with DXP modules to control ground loops and lower noise.
- Intended to be mounted close to detector array.
- Eliminates noise pickup from long preamplifier signal cables.
- Works with all common AC line voltages (100V, 120V, 220V, 240V)
- Standalone 19", rack mountable chassis (4U height, 16 inches deep)

2 Application

The primary application for the XPPS is in detector array systems using XIA's DXP or DGF digital signal processors, where it provides a source of clean, low noise linear power for the detector's preamplifiers. For synchrotron applications, the XPPS is intended to be mounted in the x-ray hutch, close to the detector, along with the processing electronics. This provides the following benefits. First, it controls ground loops, which might arise if the DXP's and preamplifiers were powered from separate sources. Because the DXP input signal is referenced to its local power supply ground, such ground loop noise appears directly superimposed on the preamplifiers' signals and can seriously degrade energy resolution. Second, it allows the PXI chassis (or CAMAC crate) containing the DXP's or DGF's to be placed in close proximity to the detector array. This often allows the signal cables from the preamplifiers to the DXP's to be greatly shortened, which in turn can significantly reduce their noise pickup from the environment. This is particularly important in digitally noisy environments or in the presence of strong radio-frequency signals, such as in synchrotron applications. In the latter case, the PXI chassis can be placed in the hutch and only digital control and data signals being sent to the external control computer system.

3 Operation

The XPPS module is very simple to use. In most cases, all that is needed is to connect the XPPS to AC power, and connect the preamplifier cables, being mindful of connector and cable current ratings. For best results, it may be necessary to also connect the ground strap to the associated signal processing electronics in order to eliminate ground loop noise. Prior to connecting the AC power, it is necessary to select the proper input voltage on the AC power input module on the rear of the unit; see below for instructions. In most cases, the voltage will be set properly prior to shipment.

3.1 Connector Current Ratings

Note that the XPPS front-panel DB9 connectors are rated at 2 Amperes per pin. As a rule of thumb, each connector should carry no more than 1.5 Amperes on any voltage, no more than 3 Amperes total. Note: It is always safest to split the load between all four DB9 connectors.

<i>Current per Voltage</i>	<i>Total Current</i>	<i>Recommendation</i>
< 1.5 A	< 3.0 A	Use one or more DB9 connectors
< 3.0 A	< 6.0 A	Use two or more DB9 connectors
< 6.0 A	< 12.0 A	Use three or more DB9 connectors
> 6.0 A	> 12.0 A	Use all four DB9 connectors

For example, consider a 26-element detector system that draws 100 mA on +/-12 V and 50 mA on +/-24 V. The current required at +/-12V is 2.6 A, and the current required at +/-24 V is 1.3 A. The total current is 3.9 A. At a minimum, two DB9 connections must be made, however, the best cabling solution would use all four DB9 connections.

3.2 Preamplifier Connector Pinout

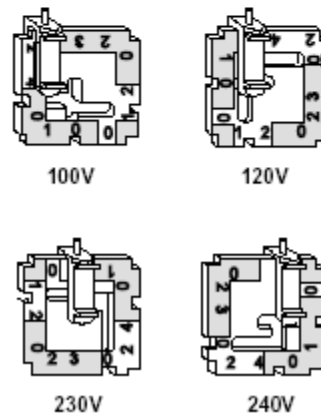
The female DB9 connectors on the XPPS conform to the standard pinout for detector preamplifier power connections:

<i>Pin</i>	<i>Description</i>
1 and 2	Ground
4	+12V
6	-24V
7	+24V
9	-12V
3, 5 and 8	Unused

Voltage Selection

To change selected voltage: open cover, using small blade screwdriver or similar tool; set aside cover/fuse block assembly; pull voltage selector card straight out of housing, using indicator pin; orient selector card so that desired voltage is readable at the bottom; orient indicator pin to point up when desired voltage is readable at bottom (note that when indicator pin is fixed, successive voltages are selected by rotating the card 90° clockwise); insert voltage selector card into housing, *printed side of card facing forward toward IEC connector and edge containing the desired voltage first*; replace cover, and verify that indicator pin shows the desired voltage.

Voltage Selector Card Orientation



Voltage Selector Card Orientation

