Advanced Energy®

# HITEK POWER® XRG70

## X-RAY POWER SUPPLY MODULE

**Exceptionally small and reliable** for high-performance, compact x-ray applications

**Specifically developed for high-performance, compact x-ray applications,** the XRG70 series is exceptionally small and reliable. It offers superior high voltage stability, stress control, and packaging. This series includes a variety of models from 25 to 90 kV, and is based on the grounded filament series of products for grounded cathode applications. The filament is automatically controlled by the integral beam current loop-control, and the power stage utilizes a current-fed resonant push-pull converter to provide high efficiency while ensuring reliable operation.

## Features

- 72 W high voltage output, max
- 20 W grounded filament
- Exceptionally compact
- Local and remote operation
- CE marked for EU LV directive 2006/95/EC
- EU RoHS compliant to 2002/95/EC
- Safety interlock
- High accuracy and stability

## Typical Applications

- X-ray fluorescence (XRF)
- X-ray diffraction (XRD)
- X-ray reflectivity (XRR)
- X-ray imaging (XRI)

**ASK US ABOUT DERIVATIVES AND SPECIAL PRODUCTS BUILT TO YOUR REQUIREMENTS.**

***Note:*** *Contact AE for custom versions with additional options for power control, interlock, and enable signals.*

| SPECIFICATION | |
|---|---|
| **Output Power** | 72 W, max, depending on model (constant power available) |
| **Output Voltage** | Models available from 25 to 90 kV, full spec above 5% output |
| **Output Current** | Models available from 0.8 to 2 mA |
| **Input Voltage** | 24 VDC ±10%, 5.5 A, max (efficiency ≈ 75%) |
| **Ripple** | 0.05% +10 V peak to peak, max |
| **Filament** | 5.5 VDC, 3.5 A, controlled by internal beam control loop |
| **Filament Disabled** | Filament Disabled: Apply V > 2.8 V on pin 12 |
| | Filament enabled: Apply V < 0.8 V on pin 12 |
| | Input Impedance: 10 kΩ, max input voltage 24 V |
| Controls (Analog Version) | |
| **Voltage (Remote)** | 0 to 10 VDC demands 0 to max voltage ±0.25% ±10 V (90 kV version: ±1%) |
| **Voltage (Local)** | Internal multi-turn potentiometer for full range setting |
| **Current (Remote)** | 0 to 10 VDC demands 0 to max current ±0.25% ±1 µA |
| **Current (Local)** | Internal multi-turn potentiometer for full range setting |
| **Filament Limit** | Internal multi-turn potentiometer for full range setting |
| **Filament Standby** | Internal multi-turn potentiometer for full range setting |
| Controls (RS-232 Version) | |
| **Voltage (Remote)** | 12 bit, 0 to FFF demands 0 to max voltage ±0.25% ±10 V (90 kV version: ±1%) |
| **Slew Rate** | 12 bit, 0 to FFF demands 50 msec to 204 sec |
| **Current (Remote)** | 12 bit, 0 to FFF demands 0 to max current ±0.25% ±22 µA |
| **Filament Limit** | 12 bit, 0 to FFF demands 0 to 3.5 A, ±2.5%, ±15 mA |
| **Filament Standby** | 12 bit, 0 to FFF demands 0 to 3.5 A, ±2.5%, ±15 mA |
| Monitors (Analog Version) | |
| **Output Voltage** | 0 to 10 VDC demands 0 to max voltage ±0.25% ±10 V |
| **Output Current** | 0 to 10 VDC demands 0 to max current ±0.25% ±1 µA |
| **Filament Limit** | Internal multi-turn potentiometer for full range setting |
| **Filament Standby** | Internal multi-turn potentiometer for full range setting |
| **Filament Current Monitor** | 0 to 10 V for 0 to 3.5 A, accuracy ±2% ±20 mV, output impedance 1 kΩ |
| Monitors (RS-232 Version) | |
| **Voltage (Remote)** | 12 bit, 0 to FFF represents 0 to max voltage ±0.45% ±90 V |
| **Current (Remote)** | 12 bit, 0 to FFF represents 0 to max current ±0.45% ±2 µA |
| **Filament Current** | 12 bit, 0 to FFF represents 0 to 3.5 A, ±2.5%, ±15 mA |
| **Filament Voltage** | 12 bit, 0 to FFF represents 0 to 10 V ±2.5% ±10 mV |
| **Voltage Demand** | 12 bit, 0 to FFF represents 0 to max voltage |
| **Current Demand** | 12 bit, 0 to FFF represents 0 to max current |
| **Filament Standby** | 12 bit, 0 to FFF represents 0 to 3.5 A |
| **Filament Limit** | 12 bit, 0 to FFF represents 0 to 3.5 A |
| Load Regulation | |
| **Output Voltage** | 0.01% ±1 V for a 100% change in output current |
| **Beam Current** | 0.01% ±1 µA for a 50% voltage change |
| Line Regulation | |
| **Output Voltage** | 0.01% for a 10% input voltage change |
| **Beam Current** | 0.01% for a 10% input voltage change |
| Environmental | |
| **Storage Temperature** | -20 to +85°C (-4 to 185°F) |
| **Operating Temperature** | 0 to +45°C (32 to 113°F), max case temperature |
| **Humidity** | 80% max relative humidity up to 31°C (88°F), reducing linearly to 50% at 40°C (104°F); non-condensing |
| **Altitude** | 2000 m (6500′) |

## SPECIFICATION

| | |
|---|---|
| **Cooling** | By conduction through the mounting panel (case) and natural convection through the holes in the lid, one side panel, and the rear panel |
| **Stability and Drift** | |
| **Temperature Coefficient** | 100 ppm/ºC, applies to all analog controls and monitors |
| **Stability** | ±0.1% over an eight hour period after 30 min warmup |
| **Protection** | |
| **Input Voltage** | Reverse polarity and over-current |
| **HV Output** | Continuous short-circuit, intermittent arc, and over-voltage protection |
| **Filament Output** | Continuous short-circuit and over-voltage protection |
| **Safety and Compliance** | |
| **Safety** | Meets the requirements of the Low Voltage Directive (LVD) 2006/95/EC, by complying with BS EN61010-1 when it is installed as a component part of other equipment and is CE marked accordingly An M5 earth terminal is provided which shall be connected to a safety earth at all times when the unit is operational |
| **RoHS** | Meets the requirements of EU Directive 2002/95/EC on the Restriction of use of certain Hazardous Substances in electrical and electronic equipment (RoHS) |
| **Mechanical** | |
| **Dimensions** | See outline drawings, on page 6. |
| **Weight** | Analog models: 3 kg (6.6 lb) |
| | Models with RS-232: 3.2 kg (7 lb) |
| | XRG70-903 (90 kV): 5.43 kg (11.97 lb) |
| **Casing** | Aluminum, clear, non-chrome passivate finish |
| **Input DC Power Connector** | Twin 63.5 mm (¼") push on spade terminals |
| **HV Output Connector** | HiTek Power®-designed detachable connector |
| **Filament Output Connector** | Molex 2W minifit 39-29-1028 |

## CONNECTIONS

| Pin | Name | In/Out | Function |
|---|---|---|---|
| **1** | MONITOR RETURN | Output | Zero volt for commands and monitors |
| **2** | KV MON | Output | To read the actual voltage |
| **3** | mA MON | Output | To read the actual beam current |
| **4** | INTERLOCK SIGNAL | Output | Relay contact ground/open |
| | | | Ground = interlock open |
| | | | Open = interlock closed |
| **5** | +10 V REF | Output | To be used as a reference voltage |
| **6** | FIL CURRENT MON | Output | To read the actual filament current |
| **7** | KV PROG | Input | To set the output voltage |
| **8** | LOCAL KV PROG | Output | To be connected to pin 7 in local mode, adjust potentiometer and read demand |
| **9** | FIL I LIMIT | Output | Read and adjust the filament current limit demand via potentiometer. |
| **10** | mA PROG | Input | To set the output current |
| **11** | LOCAL mA PROG | Output | To be connected to pin 10 in local mode, adjust potentiometer and read demand |
| **12** | FIL ENABLE | Input | Active low |
| **13** | HV ENABLE | Input | Active low |
| **14** | FIL I STANDBY | Output | Read and adjust the filament standby demand via potentiometer. |
| **15** | INTERLOCK RETURN | Input | To be connected to front panel stud and not monitor return |

## LED DISPLAY

| LED | Function |
|---|---|
| **CC** | On when current limit loop is in control |
| **VC** | On when voltage loop is in control |
| **INT** | On when interlock is closed |
| **24V** | On when unit is live |

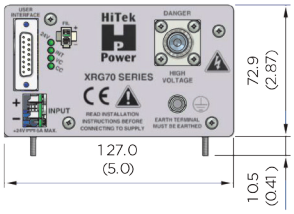
## OUTPUT AND ORDERING INFORMATION

| Model | Output Voltage | Output Current | Output Power |
|---|---|---|---|
| **XRG70-253** | 25 kV | 2 mA | 50 W |
| **XRG70-403** | 40 kV | 1.5 mA | 60 W |
| **XRG70-503** | 50 kV | 1.2 mA | 60 W |
| **XRG70-603** | 60 kV | 1.2 mA | 72 W |
| **XRG70-653** | 65 kV | 1 mA | 65 W |
| **XRG70-703** | 70 kV | 1 mA | 70 W |
| **XRG70-903** | 90 kV | 0.8 mA | 72 W |
| **Suffixes (Required; add to model number.)** | | | |
| **P or N** | High voltage output polarity (normally positive for grounded filaments) | | |
| **F** | Specifies if the internal filament is required | | |
| **X** | Extends the high voltage cable (to enable compatibility with other products, e.g. MH60, and a greater range of x-ray tubes) | | |
| **C** | RS-232 computer control (hard wired and fiber optic) | | |
| **Examples** | | | |
| **XRG70-603N** | Negative output | | |
| **XRG70-603PFC** | Positive with filament and RS-232 | | |
| **XRG70-603PFXC** | Positive with filament, extended cable, and RS-232 | | |

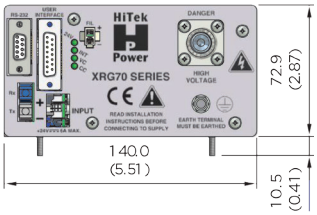
Please note that analog models with fixed constant power and RS-232 models with adjustable constant power, as well as many different interlock options, are available upon request.

CE These component power supplies meet the requirements of EC Directive 2006/95/EC (LVD).

Analog

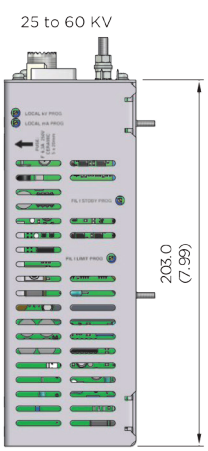


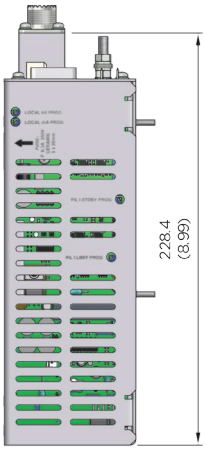

RS-232



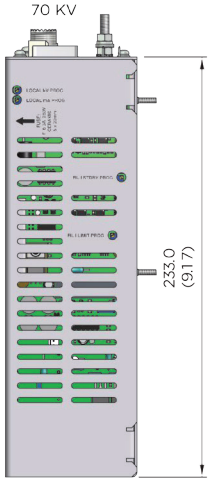

25 to 60 KV + X Option

25 to 60 KV

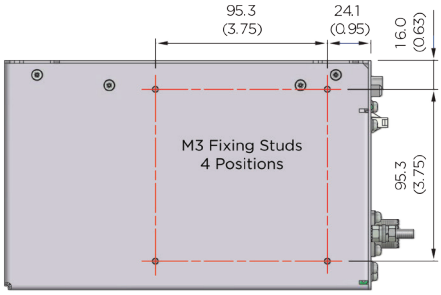


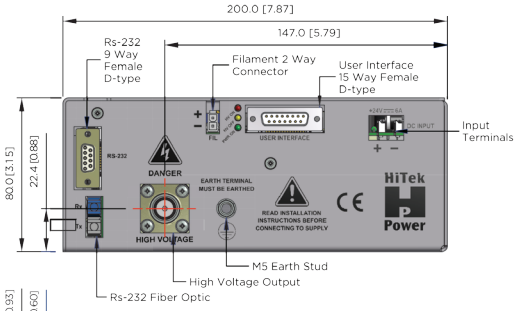

70 KV

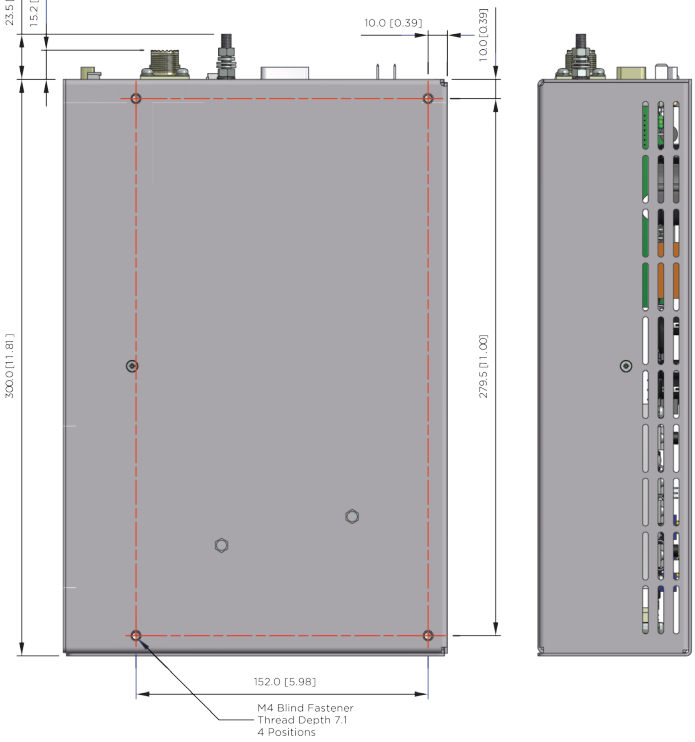



Common Base Fixings




90 KV




Drawing dimensions are in mm (inches).
Design developments may result in specification changes. HV output cable available upon request.

**For international contact information, visit**
**advanced-energy**.com.

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