HITEK POWER XRG70

X-RAY POWER SUPPLY MODULES



Specifically developed for high-performance, compact x-ray applications, the HiTek Power® 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 70 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.

PRODUCT HIGHLIGHTS

- 72 W high-voltage output max
- 20 W grounded filament
- Exceptionally compact
- Local and remote operation
- Safety interlock
- High accuracy and stability

TYPICAL APPLICATIONS

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

©2018 Advanced Energy Industries, Inc.

ELECTRICAL SPECIFICATIONS

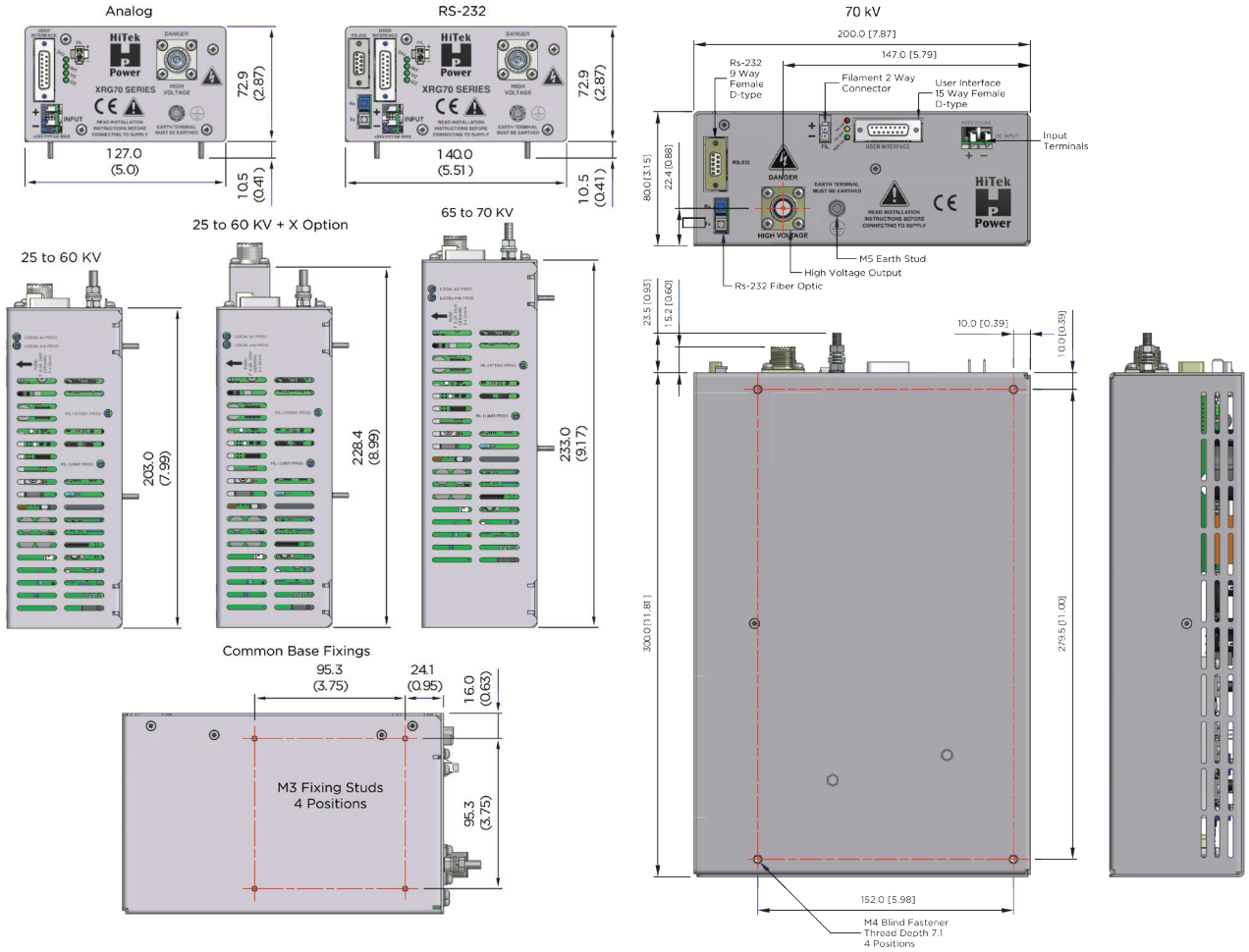
Output Power	72 W max, depending on model (constant power available)
Output Voltage	Models available from 25 to 70 kV, full spec above 5% output
Output Current	Models available from 0.8 to 2 mA
Input Voltage	24 VDC ±10%, 5.5 A max (efficiency ≈ 75%)
Ripple	0.05% +10 V peak to peak max
Filament	5.5 VDC, 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

ELECTRICAL SPECIFICATIONS (CONTINUED)

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')
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 per °C, applies to all analog controls and monitors
Stability	±0.1% over 8 h after 30 min warmup
Protection	
Input Voltage	Reverse polarity and over-current
HV Output	Continuous shortcircuit, intermittent arc, and over-voltage protection
Filament Output	Continuous shortcircuit 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 SPECIFICATIONS

Dimensions	See drawings
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 2 W minifit 39-29-1028



Drawing dimensions are in mm (inches).
HV output cable available upon request.

INTERFACE

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

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
	90 kV	0.8 mA	72 W
Accessories			
33400206-00	XRG70 1M HV cable		
33400206-01	XRG70 3M HV cable		
33400206-02	XRG70 5M HV cable		
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		

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.

ABOUT ADVANCED ENERGY

Since 1981, Advanced Energy (AE) has perfected how power performs for its customers. For both end users and OEMs, AE's comprehensive portfolio of standard and custom high voltage components precisely match system specifications to deliver unparalleled energy, quality, and performance. Through close customer collaboration, design expertise, application insight, and world-class support, AE creates successful partnerships and enables customers to push the boundaries of innovation and stay ahead of evolving market needs.

PRECISION | POWER | PERFORMANCE



CAUTION:
High Voltage

Read and understand all documentation before you install, operate, or maintain Advanced Energy high voltage power supplies. Follow all safety instructions and precautions to protect against property damage and serious or possibly fatal bodily injury. Never defeat safety interlocks or grounds.

Advanced Energy

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

HVSales@aei.com
+1.970.221.0108

Specifications are subject to change without notice. Not responsible for errors or omissions. ©2018 Advanced Energy Industries, Inc. All rights reserved. Advanced Energy®, AE®, and HiTek Power® are U.S. trademarks of Advanced Energy Industries, Inc.

CE RoHS

ENG-HV-XRG70-231-06 6.18