

The XR2000 series incorporates a switching floating filament supply, allowing use of both large and small focus filament connections within an x-ray tube. The filament supply is automatically controlled by the integral beam loop. This series provides an RS-232 control interface and is based on the proven HiTek Power® IGBT converter, ensuring high efficiency and reliable operation.

## Features

- › 0 to -60 kv or -90 kV at up to 2 kW of output power
- › Constant power capability over 65 to 100% of HV output
- › Extensive tube and system protection functions
- › High stability after warmup, < 0.01% per 8 h, low Tc. < 100 ppm per °C
- › Precise regulation, line and load < 0.05%, fast settling < 350 msec
- › Low ripple, < 0.25%
- › High accuracy filament floating on the high voltage
- › High accuracy filament controlled beam regulation
  - Emission accuracy: 1.66%
  - Regulation: 0.05%
  - Stability: 0.1% per 8 h
- › Robust IGBT converter design
- › RS-232 control interface
- › CE marked for EU LV directive 73/23/EEC
- › RoHS compliant unit available on request

## Typical Applications

- › X-ray fluorescence (XRF)
- › X-ray diffraction (XRD)
- › X-ray reflectivity (XRR)
- › X-ray imaging (XRI)
- › Elemental analysis equipment
- › Industrial process x-ray systems
  - Process quality, safety, compliance
  - Materials monitoring
  - Food safety inspection
- › Digital x-ray imaging and inspection
  - Industrial
  - Veterinary
  - Pharma, cellular, biotech
  - Security

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**SPECIFICATIONS**

<b>Polarity</b>	Negative
<b>Specification Range</b>	Specifications apply above 5% of rated output voltage and current.
<b>Electrical Output</b>	
<b>Power</b>	2 kW, max, at full rated output voltage and current
<b>Voltage</b>	0 to -60 kV or 0 to -90 kV
<b>Current</b>	60 kV unit: 0 to 33 mA at 60 kV, increasing to 45 mA, max, at 45 kV; Constant power between 45 and 60 kV 90 kV unit: 0 to 22 mA at 90 kV, increasing to 33 mA, max, at 60 kV; Constant power between 60 and 90 kV
<b>Ripple</b>	< 0.25% of setting plus 0.25% of rating, peak to peak
<b>Electrical Input</b>	
<b>Voltage</b>	230 VAC ±10% (207 to 253 VAC) 47 to 63 Hz, single phase and earth
<b>Current</b>	Not exceeding 16 A <sub>RMS</sub>
<b>Voltage Regulation</b>	
<b>Line</b>	< 0.05% change in output voltage for a 10% change in line voltage
<b>Static Load</b>	< 0.05% change in output voltage for a 5 to 100% change in output current
<b>Dynamic Load</b>	< 5% change in output voltage for a 5 to 100% change in output current, recovery to within 0.1% or 45 V (whichever is greater) of previous setting within 350 msec
<b>Current Regulation</b>	
<b>Line</b>	< 0.05% change in output current for a 10% change in line voltage
<b>Load</b>	< 0.05% change in output current for a 60% change in rated output voltage
<b>Filament Specification</b>	
<b>Voltage</b>	12 VDC, max; referenced to the negative output voltage
<b>Current</b>	0.5 to 5 ADC
<b>Stability and Drift</b>	
<b>Temperature Coefficient</b>	< 100 ppm/°C
<b>Drift</b>	< 0.1% of rating over an eight-hour period after 30 min warmup
<b>Arc Count and Extinguish</b>	
<b>ACE</b>	Each time the ACE system detects an arc, it blanks the supply off for a brief period to extinguish the arc. The unit is then allowed to recover. If more arcs occur, they are counted to determine the arc rate; if this exceeds a safe level, the power supply is shut down. The parameters are factory set.
<b>Environmental</b>	
<b>Operating Temperature</b>	0 to +40°C (+50 to +104°F)
<b>Storage Temperature</b>	-20 to +70°C (-4 to +158°F)
<b>Humidity</b>	80% max relative humidity up to 31°C (88°F), reducing linearly to 50% at 40°C (104°F); non-condensing (ref BS EN61010-1)
<b>Altitude</b>	Sea level to 2000 m (6500')
<b>Installation Category</b>	II (BS EN61010)
<b>Pollution Degree</b>	2 (BS EN61010)
<b>Portability</b>	Non-portable
<b>Cooling</b>	Fan assisted with fan fail detection Air inlets at the rear of the unit with exhaust on the side panels and top cover Minimum air flow required is: 3 m/sec at the input to the fan
<b>Protection, Safety, and Compliance</b>	
<b>Protection</b>	Programmable x-ray tube filament current limit Programmable HV output power limiting HV output arc count and extinguish (ACE) HV energy reduction series resistance HVPS over-temperature, over-voltage, fan failure, and AC input fusing, interface, and control interlock Selectable filament output for dual filament x-ray tubes
<b>Safety</b>	Meets the requirements of the Low Voltage Directive (LVD), 73/23/EEC, by complying with BS EN61010-1:2001 when installed as a component part of other equipment and is CE marked accordingly.

## SPECIFICATIONS

<b>Safety Class</b>	Equipment class 1
<b>Usage</b>	Indoor use only
<b>EMC</b>	This power supply is intended for installation as part of a system; basic EMC filtering is provided.
<b>RoHS</b>	The XR2000 is currently built to non-RoHS standard. This unit can, however, be configured to meet the requirements of RoHS where significant customer demand requires it, although this will have an impact on delivery timescales.
<b>Metering</b>	Provided as part of an alphanumeric display; Voltages are displayed with a resolution > 0.5% of rated output. Current is displayed with a resolution of > 1.5% of rated output.
<b>Status Indication</b>	Alphanumeric display shows the status of the interlock and the reason for any trip condition.
<b>Mechanical</b>	
<b>Dimensions</b>	See outline drawing.
<b>Weight</b>	41 kg (90 lb)

## OUTPUT AND ORDERING INFORMATION

Model	Output Voltage	Output Current
<b>XR2000/603</b>	-60 kV	-45 mA
<b>XR2000/903</b>	-90 kV	-33 mA

## INTERFACE CONNECTIONS

<b>Mains</b>	Harting Han 6E (mating half supplied)																
<b>Safety Earth</b>	M5 stud																
<b>HV Output</b>	R24, 100 kV receptacle on rear of unit; cable available separately																
	Terminal C: HV output																
	Terminal L: Filament (switchable)																
	Terminal S: Filament (switchable)																
<b>Remote Interlock, 9-Way, Male, D-Type Connector</b>	<table border="0"> <tr> <td>X-RAY ENABLED NO</td> <td>1</td> <td>HV OUTPUT NO</td> </tr> <tr> <td>INTERLOCK</td> <td>2</td> <td>HV OUTPUT</td> </tr> <tr> <td>X-RAY ENABLED</td> <td>3</td> <td>HV OUTPUT NC</td> </tr> <tr> <td>INTERLOCK</td> <td>4</td> <td>NO CONNECTION</td> </tr> <tr> <td>X-RAY ENABLED NC</td> <td>5</td> <td></td> </tr> </table>	X-RAY ENABLED NO	1	HV OUTPUT NO	INTERLOCK	2	HV OUTPUT	X-RAY ENABLED	3	HV OUTPUT NC	INTERLOCK	4	NO CONNECTION	X-RAY ENABLED NC	5		
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<p>X-ray enabled and HV output are both a set of isolated changeover contacts. Interlock is an input; shorting the pins closes the interlock.</p>																	
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<p>RS-232 interface 9600 baud, 8 bit, 1 start, 1 stop, no parity</p>																	

Drawing dimensions are in mm (inches).  
Design developments may result  
in specification changes.

