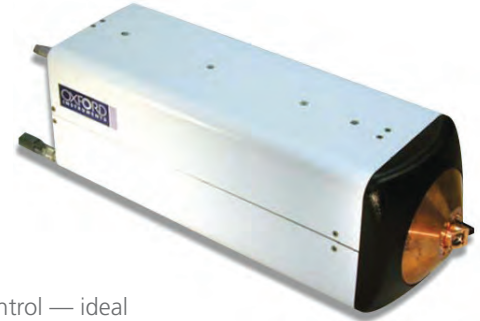


# 90kv Water-Cooled Microfocus X-ray Source Technical Datasheet

## Nova 600 Series

The Nova Microfocus System 600 Series is a 90kV, 80W, water-cooled X-ray source designed for applications where high power, high magnification and small spot size are important.

Operated by an external high voltage Smart Controller capable of providing variable voltage and power control, the Nova Microfocus System delivers exceptional magnification and image quality with full control of "Brightness." Maximum flux output is maintained through automatic matching of a given power setting to a corresponding optimal spot size.



### Benefits

- Exceptional magnification and image quality
- High power operation — ideal for high flux applications and experiments.
- Integrated package eliminates HV cable for improved reliability
- Complete range of user control — ideal for research applications
- Compact, lightweight design — ideal for portable applications
- Includes controller with Smart Brightness control

### Applications

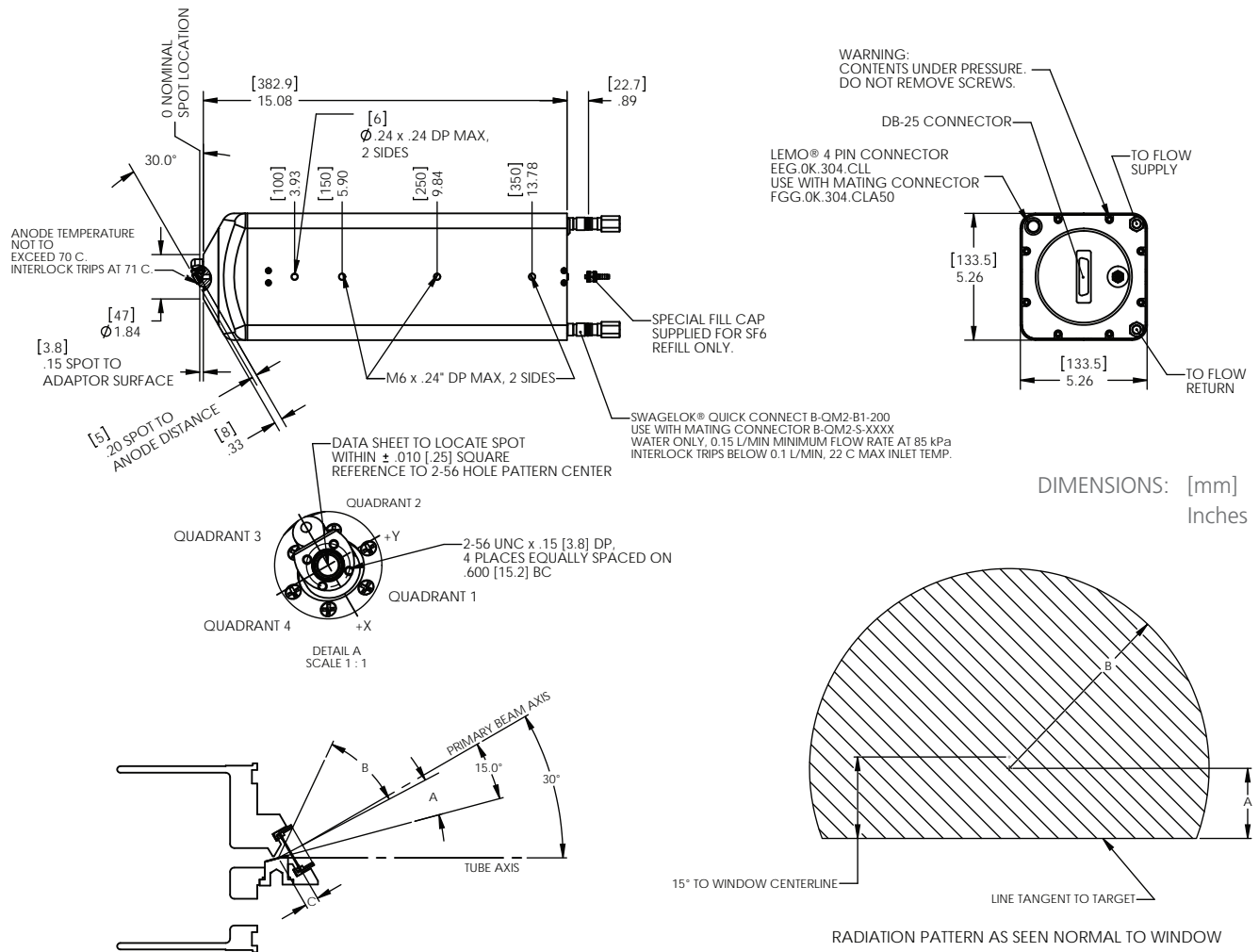
- Microtomography
- Microfluorescence
- CT imaging for life sciences and industrial inspection
- Microdiffraction

Specifications	
Operating voltage range:	See product ordering table
Maximum power:	See product ordering table
Maximum beam current:	2.0mA
Focal spot size:	14-20µm @ maximum voltage and minimum power
Focus to Object Distance (FOD):	4mm
Cone of illumination:	50° x 74° (nominal) See chart on next page
Window material and thickness:	Be, 254µm
Window diameter (unobstructed):	9.5mm (0.37")
Window configuration	End window
Target material:	See product ordering table
Ambient operating temperature:	10°C to 40°C
Maximum operating temperature (anode):	70°C
Cooling method:	H <sub>2</sub> O 0.15 l/min @ 15 psi
Shielding:	Not shielded
Dimensions:	392.4mm L x 114.3mm W (15.5" L x 4.5" W)
Weight:	≤ 4kg (8.81 lbs)
Storage conditions:	-10°C to 55°C Barometric Pressure: 50-106kPa; Humidity: 10-90% (no condensation) Condensation on Be window will cause window corrosion, vacuum loss and X-ray tube failure



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# Nova 600 Series 90kv Water-Cooled Microfocus X-ray Source



Dimension	Description	Units	Emitted Cone and Spot Position		
			Farthest	Nominal	Nearest
A	Location of radiation cone center	Degrees	10.6	12.9	16.4
B	Radius of cone	Degrees	32.2	36.8	42
C	Window to spot distance	mm	4.47	3.14	1.82

For a complete understanding of how to use this product, please reference Application Notes: 3904010 Thermal Management on page 56 and AN001 Environmental Conditions on page 48.



The source (left) is connected to the controller (right) with a DB-25 cable (15' length).

The female end of the DB-25 cable connects to the source and the male end of the DB-25 cable connects to the controller.



# 90kv Water-Cooled Microfocus X-ray Source Technical Datasheet

## Nova 600 Series

### RS232 Control Command Set

Protocol: RS-232-C  
 Baud Rate: 9600 ASYNC  
 Flow control: None  
 Data bits: 8  
 Stop bits: 1  
 Parity: None  
 Connector: Type: 25 pin

### Functions

Anode voltage set: 10 to 90kV (example: VCN 50 = set 50kV)  
 Brightness set: 10 to 80W (example: WCN 40 = set 40W)  
 Command: X-ray ON/OFF  
 Command: Voltage min-max set  
 Command: Brightness min-max set

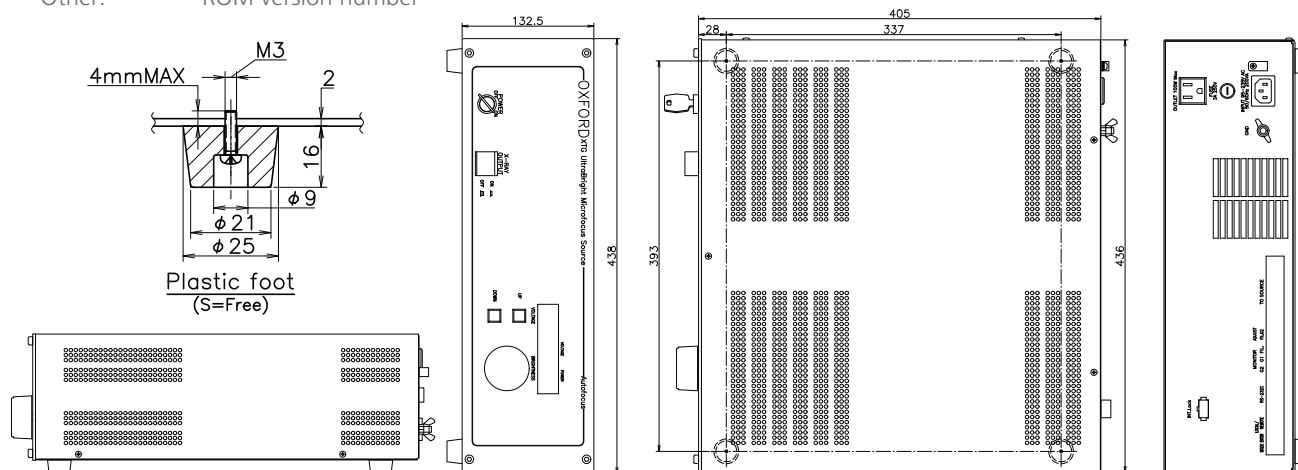
### Read Back

Voltage: (example: VM 30 = 30kV)  
 Brightness: (example: WM 20 = 20W)  
 Status: Stand-by, warm-up, output, fault modes in ASCII format  
 Fault: Display panel information except remote/local mode will be in ASCII format  
 Other: ROM version number

Controller Unit Specifications	
Functions:	Key switched power, HV on/off, kV adjust, brightness/autofocus adjust
External control:	Remote control
Power consumption:	100W maximum
Input voltage:	110/240 AC autosensing
Approximate weight:	4kg
HV cable:	Not necessary
LV cable:	Std 25 pin D-type connector (15 feet long)

Item	RS232 Control	Manual Operation	Notes
Remote/local switch	No	Yes	Switch is located on rear panel
Power on/off	No	Yes	For remote operation, front panel on/off switch must be "On"
X-ray on/off:	Yes	Yes	For remote operation, front panel on/off switch must be "On"
Voltage up/down	Yes	No	Front panel switch disabled
Brightness control	Yes	No	Front panel switch disabled

Power on can be accomplished remotely by X-ray on/off command. However, if cathode emitter is turned off, power is restored only through front panel on/off switch. Safety interlocks available on real panel.



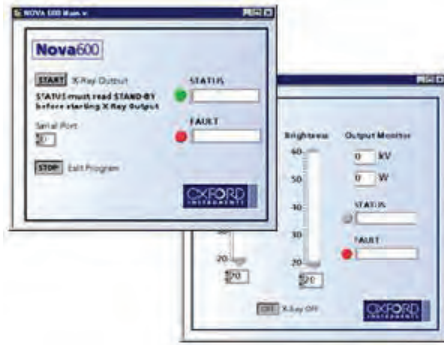
Controller Unit Reference Drawing  
 Dimensions in mm



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# Nova 600 Series 90kv Water-Cooled Microfocus X-ray Source

## Software Control Option



- Runs under LabVIEW RT & MS-Windows
- Works in conjunction with RS232 control interface
- Complete control of voltage, power, and focus
- Dynamic status display
- Open software architecture allows for modification with available additional development software
- Dynamic fault display
- Ideal for R&D applications



Functions	Software Control	Manual Operation	Notes
Remote/Local switch	No	Yes	Switch is located on rear panel
Power On/Off	No	Yes	For software operation, front panel On/Off switch must be "On"
X-ray On/Off	Yes	Yes	For software operation, front panel On/Off switch must be "On"
Voltage up/down	Yes	No	Front panel switch disabled
Power adjust	Yes	No	Front panel Brightness dial disabled

### Microfocus Source with the following Class-Leading Performance Characteristics:

- The Nova 600 Series is a fully integrated 90kV X-ray source. Its high voltage power supply and controller provide variable control of high voltage from 10-90kV and beam current from .33-2 milliamps with full control of "Brightness". The Smart Controller calculates spot size for a given power setting for maximum flux output.
- Voltage and current rating (90kV, 2.0mA) are subject to maximum power dissipation rating of 80W. The X-ray tube assembly is sealed, air-cooled, and rated for continuous operation.
- X-ray microfocus spot size is continuously adjustable from 14µm to 20µm. Power de-rating is provided at small spot sizes but source power is greater than or equal to 20W for a 20µm spot size.
- The anode target material is comprised of Tungsten as standard, however other targets are available (Cu, Mo). The target is inclined at a takeoff angle of 15 degrees with respect to the electron beam, and the exit window is aligned at an angle of 30 degrees with respect to the electron beam, so that a round microfocus X-ray spot is projected through the exit window.
- The stability of the microfocus X-ray spot shall be less than 5µm RMS over a period of 8 hours, as verified by test. A warm-up time of up to two hours is necessary in order to meet this specification.
- The system is supplied with a 254 micron Be exit window, allowing for close coupling (4mm) of object with the anode X-ray spot.
- LabVIEW RT Software Interface: The Smart Controller is outfitted with a software package that provides remote control of the various functions, such as kV, mA, Brightness, power etc. It includes an RS232 Communication package and an RT version of National Instruments LabVIEW. See Software control datasheet for complete description.

### Product Ordering Table

Part Number	Outline Drawing	Target	Operating Range (kV)	Max Anode Current (mA)	Max Anode Power (W)	Power Density	Spot Size (µm)**
96013*	8240	W	20 - 90	2.0	80	2.5W/µm	20 Max.
96016*	8240	Mo	20 - 60	2.0	60	1.5W/µm	20 Max.

Note: Part number specific copies of outline drawings and product specification sheets are available.

\*Includes a thermal switch which adds an additional level of protection to the cooling system safeguards.

\*\*Max. = Maximum, Typ. = Typical, Nom. = Nominal (per IEC60336, NEMA XR5-1999)

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