

MetalJet D2+ 70 kV



The MetalJet D2+ features Excillum's unique metal-jet anode technology and advanced electron optics. Achieving significantly higher brightness and smaller spot sizes than any other available microfocus X-ray source, the MetalJet can create very brilliant and small beams enabling the closest possible performance to synchrotron capabilities in the home lab.

Technical specifications

Target material¹	Ga or In rich metal alloy	Min. focal spot size	~10µm (~5µm offered on request)
Target type	Liquid jet	Focal spot size and shape	User variable
Voltage	21–70 kV	Take off angle	User variable
Power²	0-250 W	Emission stability³	< 1%
Max current	4.3 mA	Position stability³	< 1 µm
X-ray shutter	Optional	Min. focus-object distance⁴	18 mm
Dual port mode	Optional	Beam angle⁵	13°/30°
Communication protocol	TCP/IP	Integrated radiation shielding⁶	Yes

¹ The room temperature liquid metal alloys supplied for the MetalJet source consist mainly of gallium, indium and tin. They have low reactivity and low toxicity but should be handled according to their safety data sheets and local regulations. The currently available anode alloys are ExAlloy-G1 with 95% gallium and ExAlloy-I1 with 21% indium (see typical emission spectra on next page).

² The actual power used is dependent on spot-size and voltage. However, maximum output power of the 70 kV high-voltage-generator is 300 W.

³ Standard deviation.

⁴ Without a shutter (24.8 mm with shutter).

⁵ Without a shutter (10.5° with shutter).

⁶ In order for the source to be fully shielded it needs to be operated with the shutter mounted and closed, otherwise the source naturally emits X-rays through the window and in the window region.

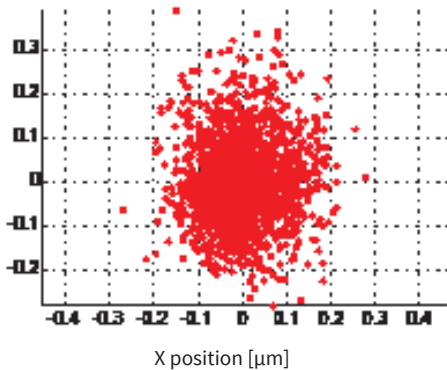
Performance examples

Jet material	Nominal X-ray spot size ⁷ [μm]	E-beam power [W]	Ga Kα (9.2 keV) peak brightness [photons/(s mm ² mrad ²)]	Ga Kα (9.2 keV) radiant flux [photons/(s mrad ²)]	In Kα (24 keV) peak brightness [photons/(s mm ² mrad ²)]	In Kα (24 keV) radiant flux [photons/(s mrad ²)]
ExAlloy-G1	10	125	4.3×10^{10}	6.3×10^6	6.0×10^8	9.0×10^4
ExAlloy-G1	20	250	3.2×10^{10}	1.1×10^7	4.7×10^8	1.6×10^5
ExAlloy-I1	10	125	2.6×10^{10}	3.7×10^6	1.7×10^9	2.6×10^5
ExAlloy-I1	20	250	1.8×10^{10}	6.4×10^6	1.4×10^9	4.7×10^5
ExAlloy-I2	10	125	1.6×10^{10}	2.3×10^6	2.9×10^9	4.4×10^5
ExAlloy-I2	20	250	1.1×10^{10}	4.0×10^6	2.3×10^9	7.9×10^5

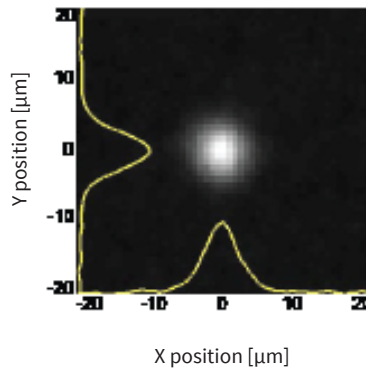
⁷⁾ Actual e-beam spot is 40×10 and 80×20 μm line focus respectively, but the apparent X-ray spot is essentially circular.

Characteristics

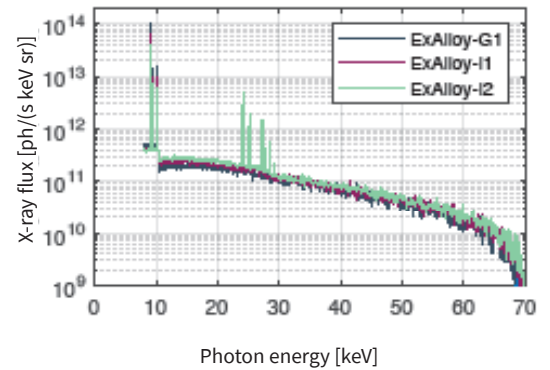
Spot stability over 24 h



Spot shape example



Emission spectra at 50 W, 70 kV, 20 μm (0.1 keV bin width)



Installation and operation

The source consists of the head and the pump system with dimensions shown in the drawing. The head has to be mounted essentially straight above the pump system. The coupling is semi-rigid, allowing some movement of the source head.

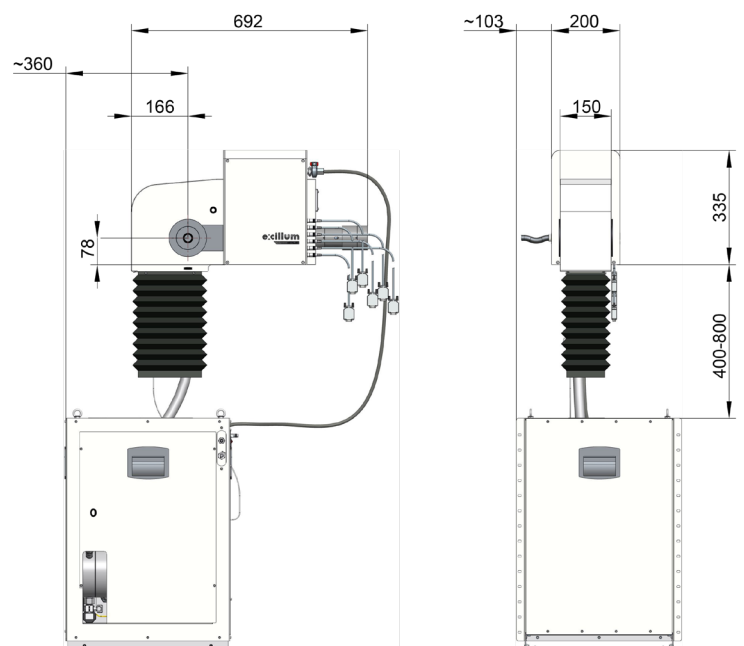
In addition, the MetalJet D2+ 70 kV consists of two 4U (176 mm height) 19" rack electronics boxes and a floor standing air/water chiller (69×36×62 cm), that can be mounted up to 4m from the head and pump system.

The source can be remotely operated through TCP/IP or directly through the GUI. The GUI can be operated on the source itself if it is equipped with monitor, keyboard and mouse, or on most computer platforms with a TCP/IP connection to the source.

The source cannot be operated as a standalone unit and must be integrated into a system providing the proper interlock connections.

Mains: AC, single phase, 200-240 V, 3.0 kW, 50/60 Hz.

Ambient: 20-25°C (stable within ± 0.2°C for optimal source stability), max 85% relative humidity.



Safety and compliance

For information about the safety and compliance of all Excillum X-ray sources, please visit our website: www.excillum.com/compliance

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This specification is subject to change without notice.

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