

# 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

<b>Target material<sup>1</sup></b>	Ga or In rich metal alloy	<b>Min. focal spot size</b>	~10 $\mu$ m (~5 $\mu$ m offered on request)
<b>Target type</b>	Liquid jet	<b>Focal spot size and shape</b>	User variable
<b>Voltage</b>	21–70 kV	<b>Take off angle</b>	User variable
<b>Power<sup>2</sup></b>	0-250 W	<b>Emission stability<sup>3</sup></b>	< 1%
<b>Max current</b>	4.3 mA	<b>Position stability<sup>3</sup></b>	< 1 $\mu$ m
<b>X-ray shutter</b>	Optional	<b>Min. focus-object distance<sup>4</sup></b>	18 mm
<b>Dual port mode</b>	Optional	<b>Beam angle<sup>5</sup></b>	13°/30°
<b>Communication protocol</b>	TCP/IP	<b>Integrated radiation shielding<sup>6</sup></b>	Yes

<sup>1</sup> 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).

<sup>2</sup> 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.

<sup>3</sup> Standard deviation.

<sup>4</sup> Without a shutter (24.8 mm with shutter).

<sup>5</sup> Without a shutter (10.5° with shutter).

<sup>6</sup> 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.

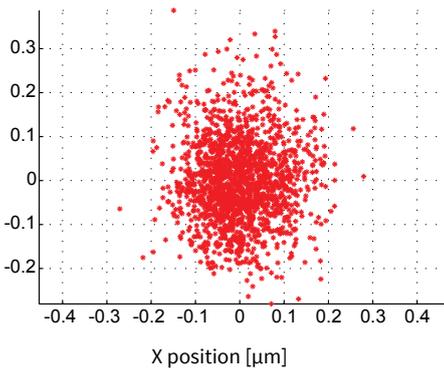
## Performance examples

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

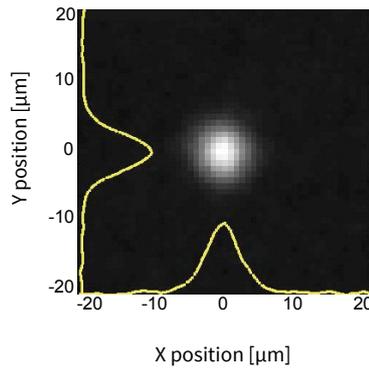
<sup>7</sup> Actual e-beam spot is 40×10 and 80×20 μm line focus respectively, but the apparent X-ray spot is essentially circular.

## Characteristics

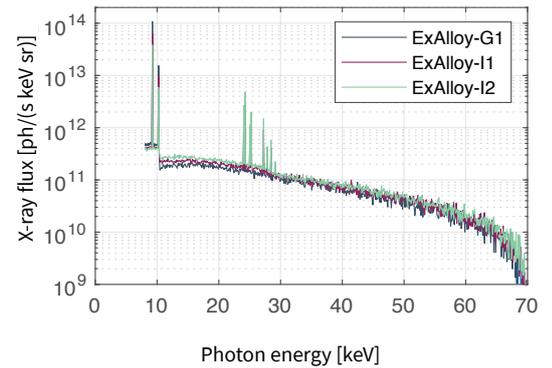
### Spot stability over 24 h



### 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.

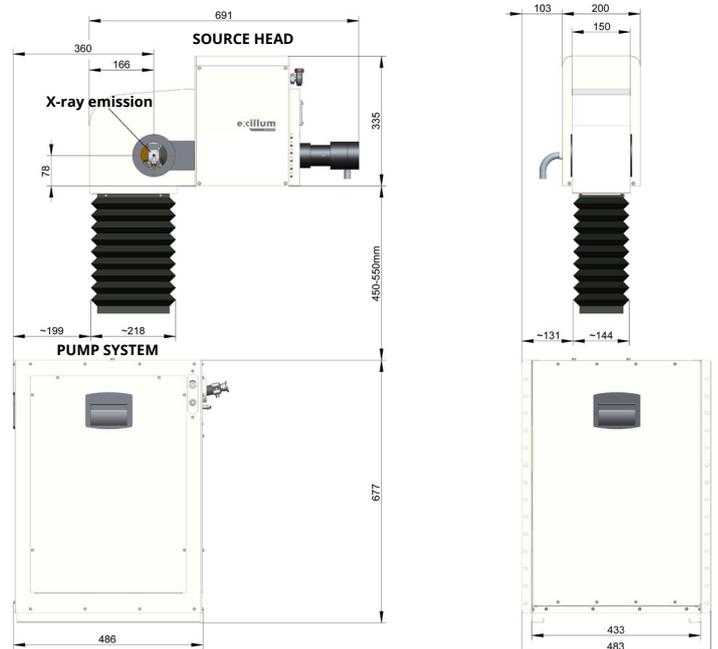
In addition, the MetalJet D2+ 70 kV consists of two 4U (176 mm height) 19" rack electronics boxes and a floor standing air/water chiller (69×36×62 cm), that can be mounted up to 4m from the head and pump system.

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](http://www.excillum.com/compliance)

## Intellectual property

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This specification is subject to change without notice.

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