excillum

MetalJet F1016

Brighter. Faster. Smarter.

Introducing
MetalJet F1016

Sharpen your focus.
Accelerate your throughput.

The next generation of high-performance microfocus X-ray sources is here. The result of twenty years of integrated innovations, MetalJet F combines unparalleled speed, precision and versatility to meet the highest demands of cutting-edge research and high-throughput industrial inspection. Among a series of advanced integrated technologies, the new MetalJet F platform combines the world's first high-pressure electromagnetic pump with significantly extended cathode lifetime to enable new levels of non-stop operation.

Accelerate industrial inspection
Enable sub-second in-line CT scanning. And ensure unprecedented yield in battery inspection. At 160 kV, the industry-leading MetalJet F1016 achieves the world's fastest CT scanning with micrometer resolution – now in a more compact, integrated format designed for 24/7 throughput.

Expand the horizons of scientific discovery
Measure smaller crystals. Perform ultra-fast micro XRF mapping. And explore new frontiers in materials science and biomedical imaging. Reengineered with insights from more than 230 MetalJet systems worldwide, the new MetalJet F series pushes the limits of research to offer higher resolution, faster scan times and more flux than any other microfocus X-ray source available in a home lab.

Sharpen your focus
MetalJet F brings even higher power to the world's brightest microfocus X-ray source. Add to this an innovative pump design with zero moving parts, fewer electronic components and automatic cathode alignment, and the result is an entirely new platform designed to get more pioneering work done, every day.

1.6x brighter

160% higher throughput

24/7 performance

Features and benefits

- Extreme microfocus power
  - Up to 27x higher Bremsstrahlung than conventional microfocus X-ray sources
- Increased brightness and radiant flux for:
  - Higher scan speed with maintained signal to noise and resolution
- Simplified and robust design for 24/7 industrial use
  - Higher uptime and lower cost of ownership
  - Very long life-time LaB_6 cathodes
- Selection of available target materials
  - Characteristic emission from Gallium (9.2 keV) or Indium (24 keV)
- ISO 13849-1 compliant
  - Tested and documented in accordance with standard for easy certification of integrated system

Technical specifications

Target material[1]	Liquid metal alloy	**Min. focal spot size**[3]	< 10 µm
Target type	Liquid jet	**Emission stability**[4]	< 1%
Voltage	30-160 kV	**Position stability**[4]	< 1 µm
Power[2]	0-1600 W	**Min. focus-object distance**	17.4 mm
Max current	10 mA	**Beam angle**	30°

1) The alloys supplied for the MetalJet source consist mainly of Gallium, Indium and Tin and are in liquid state in room temperature or near room temperature. They have low reactivity and low toxicity but should be handled according to their safety data sheets and local regulations.
2) The actual power used is dependent on spot-size and voltage. However, maximum output power of the 160 kV high-voltage generators is 2080 W, software limited to 1600 W.
3) Dependent on configuration.
4) Standard deviation.

Available target alloys

Target alloy	**Gallium** [weight %]	**Indium** [weight %]	**Tin** [weight %]
ExAlloy-G1	95	5	–
ExAlloy-I1	68	22	10
ExAlloy-I2[5]	47	37	16
ExAlloy-I3	75	25	–

5) Operation of ExAlloy-I2 requires that the MetalJet F source is equipped with a heater system to manage the alloy temperature.

Performance examples[6]

Jet material	ExAlloy-I1
Acceleration voltage	160 kV
Nominal X-ray spot size[7]	30 µm
E-beam power	1600 W

Energy range	**Peak brightness** [photons/(s mm^2 mrad^2)]	**Radiant flux** [photons/(s mrad^2)]
8-15 keV	4.3×10^{10}	4.0×10^{7}
Ga Kα 9.2 keV	3.3×10^{10}	3.0×10^{7}
15-30 keV	2.3×10^{10}	2.1×10^{7}
In Kα 24 keV	5.4×10^{9}	5.2×10^{6}
30-60 keV	1.7×10^{10}	1.5×10^{7}
60-160 keV	1.6×10^{10}	1.1×10^{7}

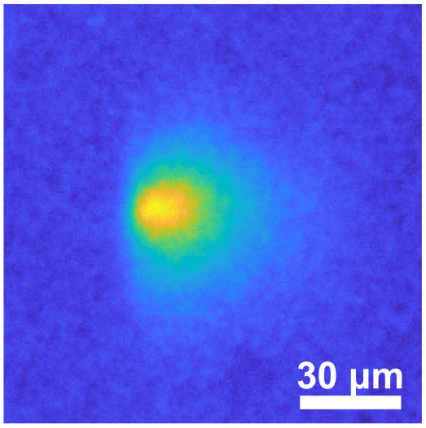
6) Examples are based on simulations that typically correspond well to experimental validation. Please contact us for details on such simulations vs. experiment validations including experimental method.

7) The spot size is measured as the full width at half maximum (FWHM) of the X-ray intensity distribution integrated in the horizontal and vertical directions respectively. The X-ray spots are realized by various degree of e-beam line focus. Actual spot size may differ depending on viewing angle and may have different width and height. Please contact us for more details.

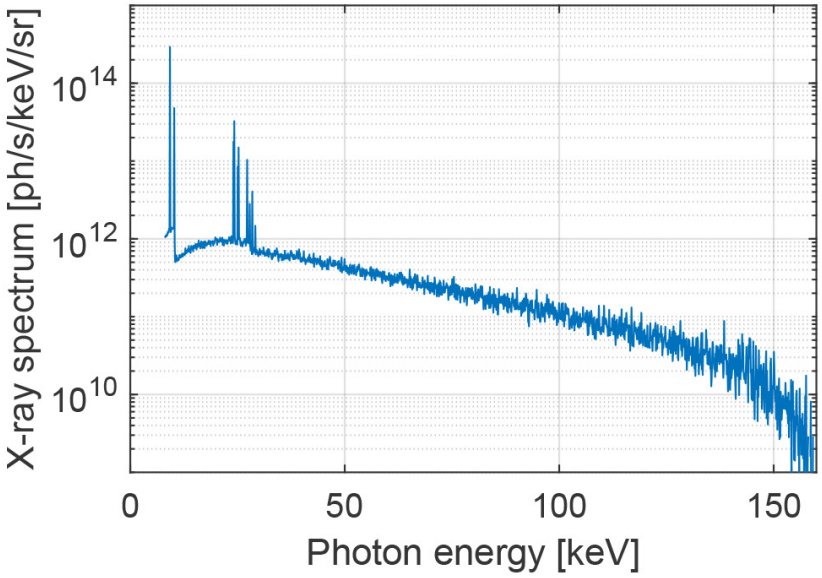
More detailed data based on other source parameters are available on our website.

Characteristics

Typical X-ray spot shape



X-ray spectrum for ExAlloy-I1 at
160 kV, 1600 W (0.1 keV bin width)



Installation and operation

The source consists of the head, the pump system, a high voltage generator and a cooling system as shown in the picture. The coupling is semi-rigid, allowing some movement of the source head. Sources operating with ExAlloy-I2 and ExAlloy-I3 are equipped with heater jackets around parts in the alloy recirculation loop (not shown).

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 MetalJet source is intended to be incorporated into or assembled with other components such as radiation enclosures, safety systems and radiation detectors.

For more information about the full scope of configurability, please contact us.

Mains: AC, single phase, 200-240 V, 2.6 kW-3.5 kW (depending on configuration), 50/60 Hz.

Ambient: 20-30 °C (stable within ± 0.5 °C for optimal source stability), max 85 % relative humidity.

1) Source head 2) Chiller 3) Jet pump module 4) Power module 5) High voltage generator.

Safety and compliance

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

Legal notice

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