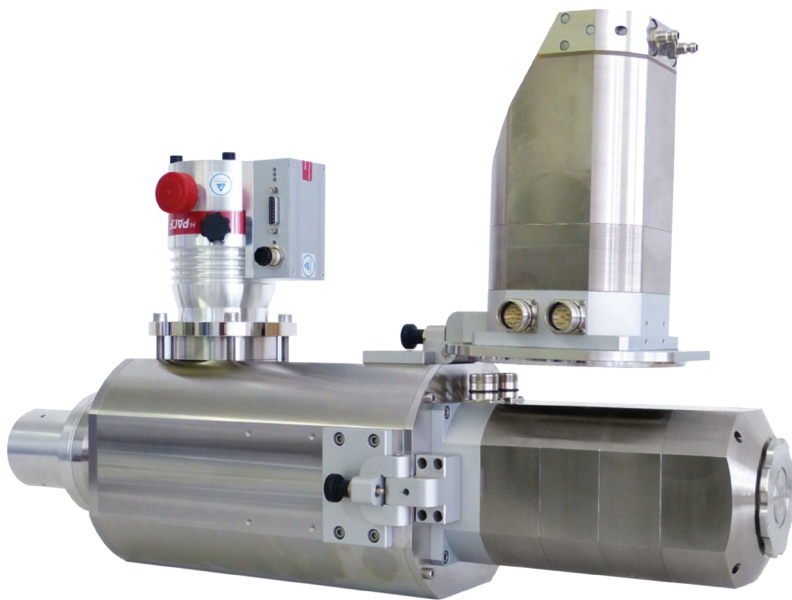


# MQMF Industrial Microfocus X-ray Systems

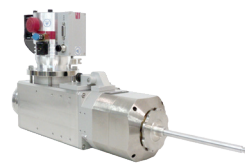
JIMA Resolution: Upto 0.5 $\mu$ m | kV Range: 160kV-300kV



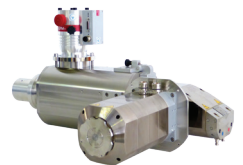
Reflection Tube



Transmission Tube



Rod Anode Tube



Dual Head Tube

# Benefits

## Voltage Ranges

Widest range of nominal voltage supporting various applications. Microfocus tubes are available in nominal voltage of 160 kV, 190 kV, 225 kV, 240 kV and 300 kV.

## Flexibility

Modular tube design allows for flexible adoption cater to individual requirements Including tube characteristics like target material and type, geometry of the X-ray beam, rod anode dimensions as well as custom labeling.

## Long Lifetime

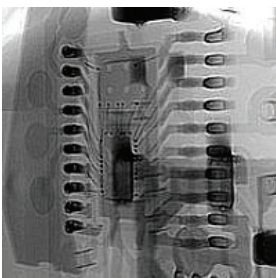
Due to the open tube design with vacuum unit, consumables like targets or filaments can be replaced easily. This allows for long lifetime of the system of up to 20 years.

## High Power

Efficient cooling solutions and high-performance materials allow for high power tubes. Micro focus high power tubes help to decrease exposure and scanning times without comprising on image quality.

## APPLICATIONS

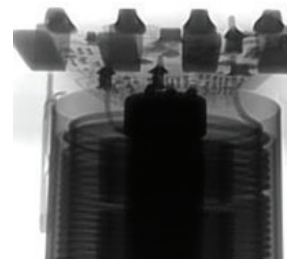
- ▶ Automotive Industry
- ▶ Aerospace Industry
- ▶ Electronics Industry
- ▶ Energy Industry



**Electronics Car Key**



**Toy Car**



**Transformer Coil**



**Car Key**



**Thermal Fuse**



**Toy Car**

# Transmission Tubes

- ▶ High resolution applications in electronic, automotive, aviation semiconductor industry, material science and space industries
- ▶ Down to 1 micron detail detectability and Down to 0.2 micron High resolution target for computed tomography (CT) applications
- ▶ Single or Double stage electron optics with condenser, centering and focusing coils
- ▶ Unsurpassed target power with target cooling and High Energy Target to reduce scanning time for computed tomography (CT) or Computed Laminography (CL) applications



Data	Product line THE			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	1	1	1	1
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, target (Watt)	10	10	10	10
Max. power, emission (Watt)	80	80	80	80
JIMA resolution (µm)	2	2	2	2
Tube type	Transmission			
Target type	High Brightness			
Target material	Beryllium/ Tungsten			
Min. focus-object-distance (FOD, mm)	0.25	0.25	0.25	0.25
Opening angle (approx. °)	160	160	160	160
Tube weight (approx. kg)	30	30	51	51

Data	Product line THE			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	1	1	1	1
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, target (Watt)	25	25	25	25
Max. power, emission (Watt)	80	80	80	80
JIMA resolution (µm)	2	2	2	2
Tube type	Transmission			
Target type	High Energy			
Target material	Diamond/ Tungsten			
Min. focus-object-distance (FOD, mm)	0.3	0.3	0.3	0.3
Opening angle (approx. °)	160	160	160	160
Tube weight (approx. kg)	30	30	51	51

Data	Product line THE Plus				
Max. voltage (kV)	160	190	225	240	300
Min. voltage (kV)	20	20	20	20	50
Max. current (mA)	1	1	1	1	1
Min. current (mA)	0.05	0.05	0.05	0.05	0.05
Max. power, target (Watt)	50	50	50	50	50
Max. power, emission(Watt)	80	80	80	80	80
JIMA resolution (µm)	2	2	2	2	3
Tube type	Transmission				
Target type	High Brightness				
Target material	Beryllium/ Tungsten				
Min. focus-object-distance (FOD, mm)	0.3	0.3	0.3	0.3	0.3
Opening angle (approx. °)	160	160	160	160	160
Tube weight (approx. kg)	31	31	52	52	71

Data	Product line TCNF		
Max. voltage (kV)	160	190	225
Min. voltage (kV)	20	20	20
Max. current (mA)	1	1	1
Min. current (mA)	0.05	0.05	0.05
Max. power, target (Watt)	25	25	25
Max. power, emission (Watt)	80	80	80
JIMA resolution (µm)	2	2	2
Tube type	Transmission		
Target type	High Resolution Diamond		
Target material	Diamond/ Tungsten		
Min. focus-object-distance (FOD, mm)	0.3	0.3	0.3
Opening angle (approx. °)	160	160	160
Tube weight (approx. kg)	30	30	51

# Reflection Tube

- ▶ High power Computed Tomography (CT) and Digital Radiography (DR) applications in automotive, energy, aviation, and space industries
- ▶ Down to 1µm detail detectability
- ▶ Paramount target power and acceleration voltage
- ▶ Long term stability guaranteed by optimized cooling of tube head and target
- ▶ Flexibility by exchangeable tube heads and rod anodes



Data	Product line THE Plus				
Max. voltage (kV)	160	190	225	240	300
Min. voltage (kV)	20	20	20	20	50
Max. current (mA)	3	3	3	3	2
Min. current (mA)	0.05	0.05	0.05	0.05	0.05
Max. power, target (Watt)	300	300	300	300	300
Max. power, emission (Watt)	350	350	350	350	350
JIMA resolution (µm)	2	2	2	2	3
Tube type	Reflection				
Target type	High Power				
Target material	Tungsten				
Min. focus-object-distance (FOD, mm)	4	4	4	4	4
Opening angle (approx. °)	30	30	30	30	30
Tube weight (approx. kg)	36	36	50	50	66

Data	Product line CT				
Max. voltage (kV)	160	190	225	240	300
Min. voltage (kV)	20	20	20	20	50
Max. current (mA)	3	3	3	3	2
Min. current (mA)	0.05	0.05	0.05	0.05	0.05
Max. power, target (Watt)	300	300	300	300	300
Max. power, emission (Watt)	350	350	350	350	350
JIMA resolution (µm)	2	2	2	2	3
Tube type	Reflection				
Target type	High Power				
Target material	Tungsten				
Min. focus-object-distance (FOD, mm)	4	4	4	4	4
Opening angle (approx. °)	30	30	30	30	30
Tube weight (approx. kg)	36	36	50	50	69

# Rod Anode Tube

- ▶ High resolution Digital Radiography (DR) applications in automotive, energy, aviation, and space industries.
- ▶ Flexible rod anode solutions with up to 1.5m length.
- ▶ Exchangeable tube heads with panoramic, reflection, or transmission target.



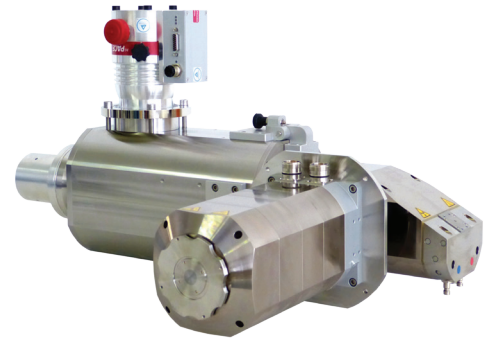
Data	Product line RA			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	1	1	1	1
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, emission (Watt)	20	20	20	20
Tube type	Rod/ Anode			
Target types	Reflection/ Transmission			
Rod anode length (mm)	10 - 250			
Rod anode diameter (mm)	08 - 20mm			
Tube weight (approx. kg)	30	30	51	51

Data	Product line RAC			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	3	3	3	3
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, emission (Watt)	320	320	320	320
Tube type	Rod/ Anode			
Target types	Panoramic/ Reflection			
Rod anode length (mm)	60-1000			
Rod anode diameter (mm)	12/ 15/ 25/ 45			
Tube weight (approx. kg)	40	40	50	50

Data	Product line RAC SUPERFOCUS			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	3	3	3	3
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, emission (Watt)	320	320	320	320
Tube type	Rod/ Anode			
Target types	Panoramic/ Reflection			
Rod anode length (mm)	580/ 730/ 960			
Rod anode diameter (mm)	10-Mar			
Tube weight (approx. kg)	45	45	66	66

# Dual Head Tube

- ▶ Product line XC - microfocus tubes with exchangeable tube heads
- ▶ Product line XC is recommended for computed tomography (CT) and high resolution applications in science and research.
- ▶ Exchangeable tube heads with automatic recognition.
- ▶ Different target materials (Cu, Ag, Mo, Cr) available.

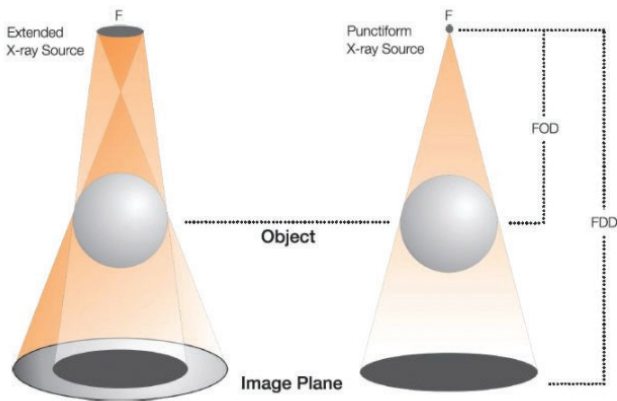


Data	Product line XC			
Max. voltage (kV)	160	190	225	240
Min. voltage (kV)	20	20	20	20
Max. current (mA)	3.0R/1.0T			
Min. current (mA)	0.05	0.05	0.05	0.05
Max. power, target (Watt)	300R/10T			
Max. power, emission (Watt)	350R/80T			
JIMA resolution (µm)	2.0R / 0.9T			
Tube type	Dual head			
Target type	Reflection/ Transmission			
Target material	Beryllium/ Tungsten			
Min. focus-object-distance (FOD, mm)	4.0R/ 0.25T			
Opening angle (approx. °)	30R/160T			
Tube weight (approx. kg)	53R/78T			

Operation mode	Span Target Power (W)	Span JIMA resolution (µm)
<b>Microfocus</b>	1.0 - 10.0W	1.5 - 3.0µm
<b>High power</b>	10.0 - 25.0W	3.0 - 15.0µm

The JIMA (Japan Inspection Instruments Manufacturers' Association) resolution test chart JIMA RT CT-01/ JIMA RT RC-02B/ JIMA RT RC-04/ JIMA RT RC-05 is a micro chart fabricated by using the latest semiconductor lithography techniques. It is used for calibration and monitoring of system resolution and ensures high quality results of your microfocus X-Ray inspection systems.

# Magnification and Unsharpness



FOD: Focus-Object-Distance

FDD: Focus-Detector-Distance

F: Focal spot size

$$\text{Geometric magnification: } M = \frac{FDD}{FOD}$$

$$\text{Geometric unsharpness: } U = (M-1) * F$$

## Our Clients



## About MQS Technologies

MQS Technologies (formerly MedeQuip Services) is a diversified firm with Design, manufacturing & maintenance capabilities that offers custom solutions for engineering & healthcare applications.

Focused on three business lines - Non-Destructive Testing, Aerospace & Defense and Healthcare, our USP lies in leveraging decades of multidisciplinary expertise in electronics, electro-mechanical, mechanical and software domains, to provide user-friendly products and services for a wide range of industries.



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