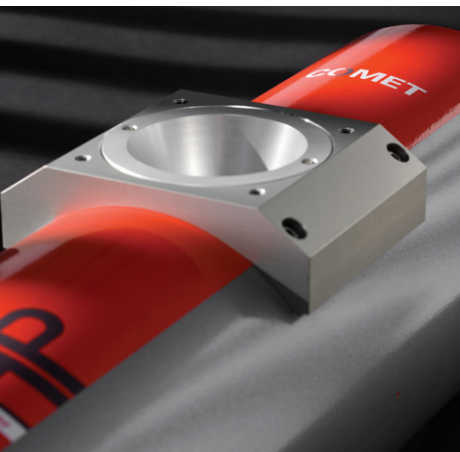
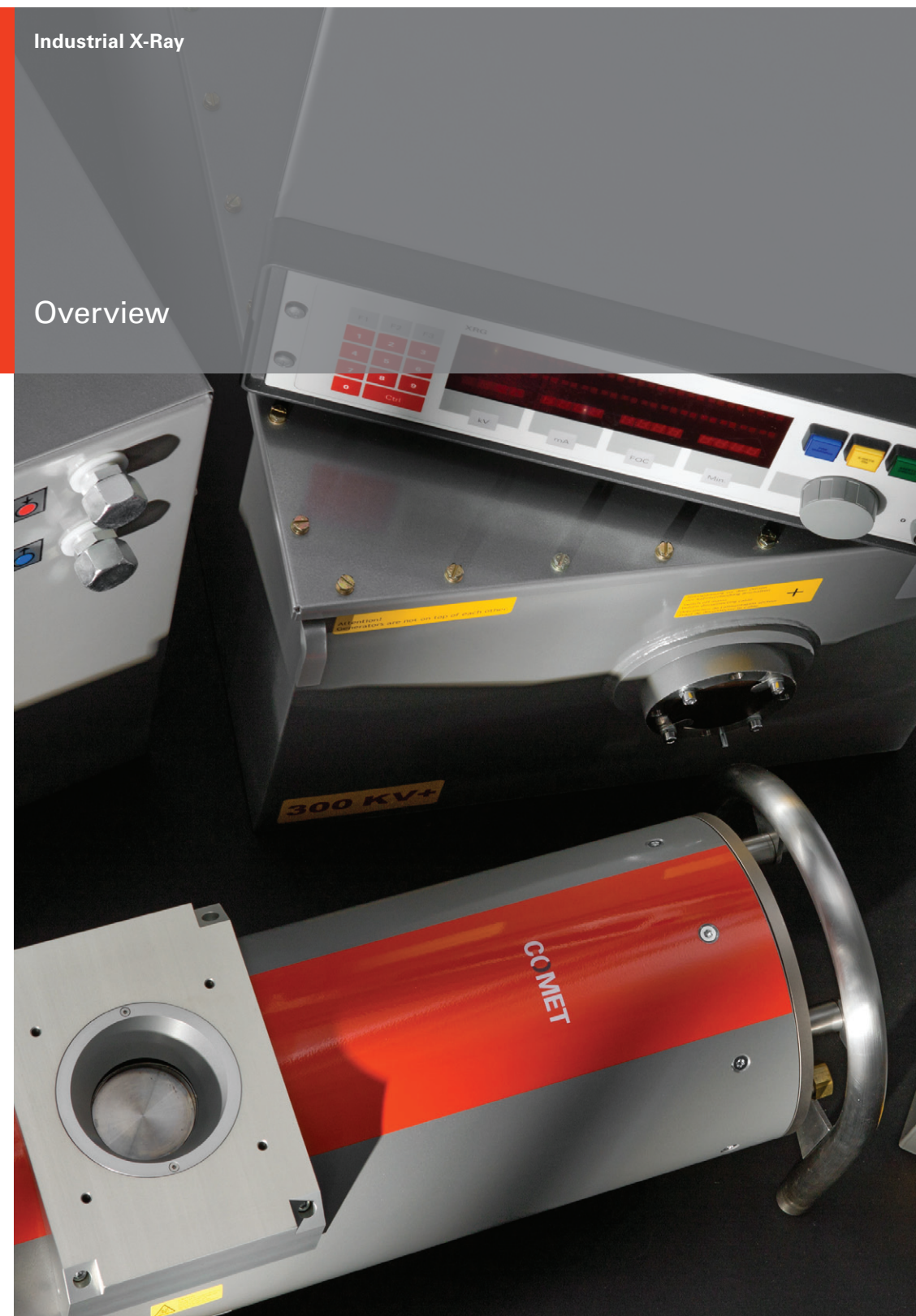


Unipolar & Bipolar Metal Ceramic Tubes



Industrial X-Ray

Overview



01/2015 - V1 - specification subject to change without notice

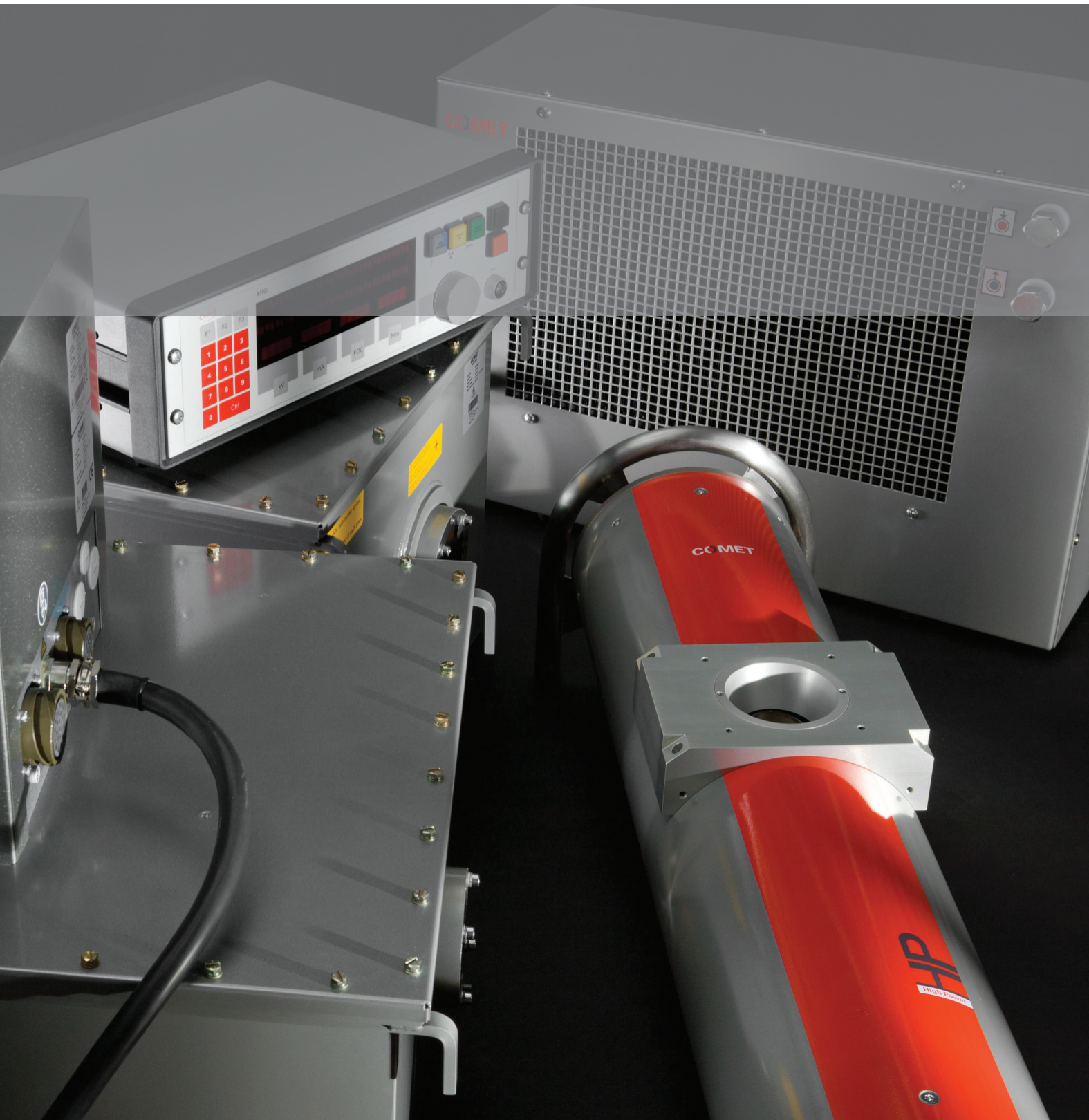
COMET
Technology with Passion

COMET AG
Industrial X-Ray
Herrengasse 10, CH-3175 Flamatt
T +41 31 744 90 00, F +41 31 744 90 90
www.comet-xray.com
info@comet-xray.com

COMET Technologies USA, Inc.
100 Trap Falls Road Extension
Shelton, CT 06484, USA
T +1 203 447 3165, F +1 203 925 0364
www.comet-xray.com
xray@cometusa.com

COMET China
1201 Guiqiao Road, Building 10, 1st floor
Pudong, Shanghai 201206/ P.R. China
T +86 21 6879 9000, F +86 21 6879 9009
www.comet-xray.com
xray@cometchina.com

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About Unipolar & Bipolar Metal Ceramic X-Ray Tubes

The COMET Metal Ceramic tubes are designed for use in demanding industrial applications such as Non-Destructive Testing, Security Inspection or Thickness Gauging. The main advantages are high power, small dimensions, low weight and rugged mechanical design.

“One Stop Shop” for Industrial X-Ray Sources: COMET’s XRS Modules

COMET is pleased to offer all of the necessary components for a customized X-Ray Source: The XRS Modules each contain a COMET X-Ray tube, high voltage generator with cables and coolers designed for easy integration that will optimize system performance. All XRS Modules are factory prepared and tested for hassle free installation and operation.

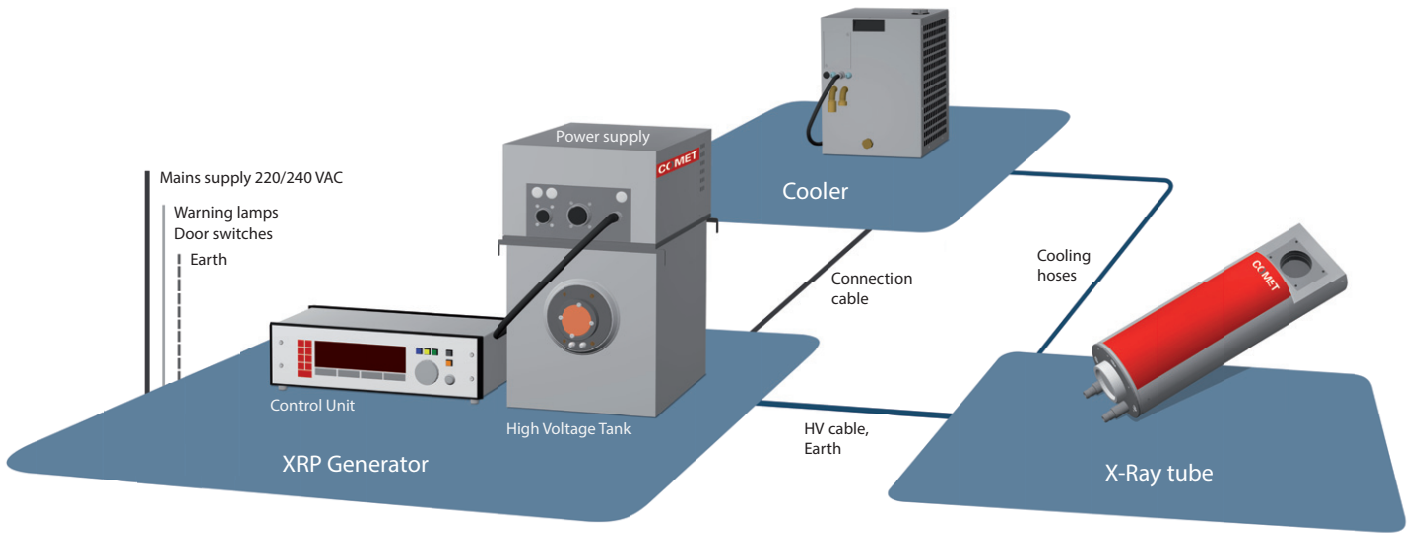
This novel solution demonstrates COMET’s continuous commitment and investment in delivering real added value to our worldwide customer base.

About the Business Unit Industrial X-Ray

COMET Industrial X-Ray is an experienced supplier of components and modules for industrial X-Ray applications and is proud of its reputation as the preferred engineering partner in terms of innovation potential, know how, flexibility and speed. Our product range features X-Ray tubes and sources with small focal spot resolution up to 6 kW in output for more power demanding requirements. From the smallest footprint for use in portable units to 600 kV fixed gantry systems that are suitable for cargo screening, we offer a solution.

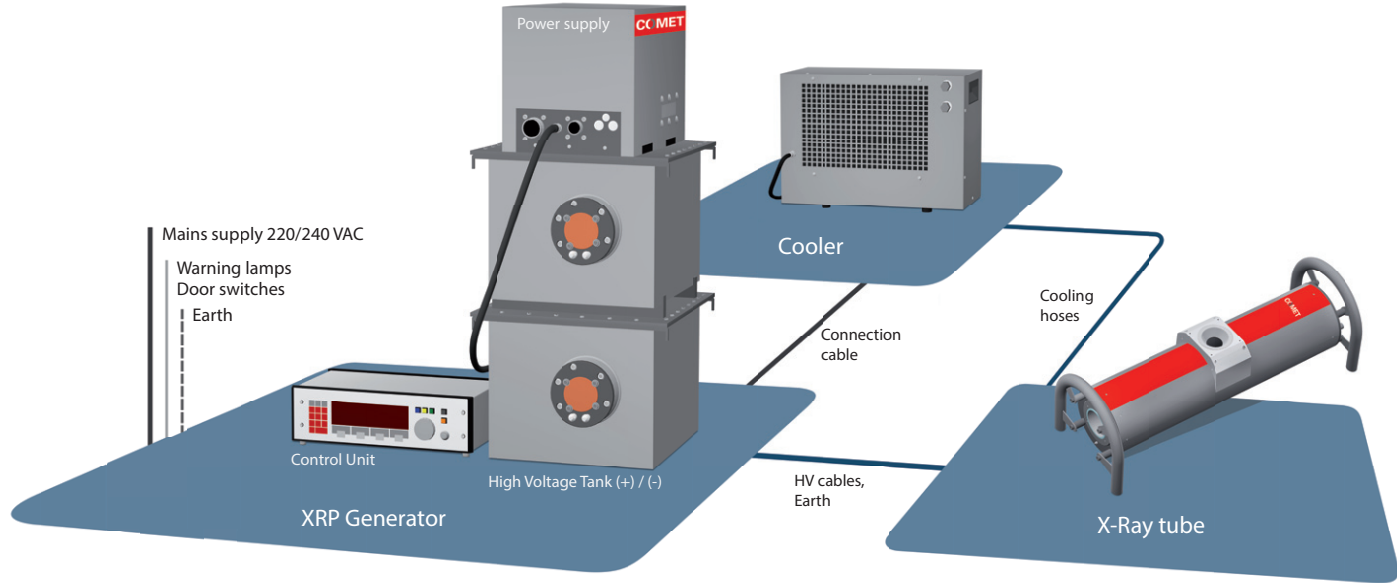
Unipolar XRS Module

Diagram of a Unipolar X-Ray tube and its environment.



Bipolar XRS Module

Diagram of a Bipolar X-Ray tube and its environment.



Unipolar & Bipolar Metal Ceramic Tubes – Configuration Information

Overview of tubes and fitting system components; high voltage generator, high voltage cable and cooler.

	GENERATOR						TUBE					CABLE		COOLER	
XRS Module	Type	Voltage range (kV)	Current range (mA)	Max. power (W)	Output connector	Ordering No. flange	Tube type example	Ordering No.	Focal spots (EN 12543)	Terminal type	Ordering No. flange	Type Ordering No.	Type	Ordering No.	
XRS-75	XRP-75/1000/1	5 – 75	0 – 17.5	1000	CA11	–	MXR-75/30	915376.51	d = 5.5 mm	CA11	–	L3/75-CA11-CA11-Xm	XRC-1001-WA	20033773	
XRS-75	XRP-75/1000/1	5 – 75	0 – 17.5	1000	CA11	–	MXR-75HP/20	915377.51	d = 1.0 mm						
XRS-75	XRP-75/1000/1	5 – 75	0 – 17.5	1000	CA11	–	MXR-75HP/20 FB	915380.51	d = 1.0 mm						
XRS-100	XRP-100/2250/2	5 – 100	0 – 22.5	2250	R24	4512-104-87101	MXR-100/30	915376.61	d = 5.5 mm	CA11	–	U3/100-R24SL-CA11-Xm	XRC-3001-WA	10008640	
XRS-100	XRP-100/2250/2	5 – 100	0 – 22.5	2250	R24	4512-104-87101	MXR-100HP/20	915377.61	d = 1.0 mm						
XRS-100	XRP-100/2250/2	5 – 100	0 – 22.5	2250	R24	4512-104-87101	MXR-100HP/20 FB	915380.61	d = 1.0 mm						
XRS-160	XRP-160/2250/2	7.5 – 160	0 – 22.5	2250	R24	4512-104-87101	MXR-160/20	915317.51	d = 1.0 mm / d = 1.0 mm	R24	4512-104-87121	N3/160-R24SL-R24SL-Xm	XRC-3001-WA or XRC-3001-WW	10008640 10008641	
XRS-160	XRP-160/2250/2	7.5 – 160	0 – 22.5	2250	R24	4512-104-87101	MXR-160HP/11	915370.51	d = 0.4 mm* / d = 1.0 mm						
XRS-160	XRP-160/2250/2	7.5 – 160	0 – 22.5	2250	R24	4512-104-87101	MXRP-160C	915311.51	l = 0.4 mm / w = 4.0 mm						
XRS-160	XRP-160/2250/2	7.5 – 160	0 – 22.5	2250	R24	4512-104-87101	MXR-160/21	915302.51	d = 1.0 mm / d = 3.0 mm						
XRS-160	XRP-160/4500/2	7.5 – 160	0 – 45	4500	R24	4512-104-87101	MXR-160/22	915301.51	d = 1.0 mm / d = 5.5 mm						
XRS-225	XRP-225/2250/2	10 – 225	0 – 15	2250	R28	4512-104-87111	MXR-225HP/11	915371.51	d = 0.4 mm* / d = 1.0 mm	R24	4512-104-87131	P3/250-R24SL-R28SL-Xm	XRC-3001-WA or XRC-3001-WW	10008640 10008641	
XRS-225	XRP-225/2250/2	10 – 225	0 – 15	2250	R28	4512-104-87111	MXR-225/21	915325.51	d = 1.0 mm / d = 3.0 mm						
XRS-225	XRP-225/4500/2	10 – 225	0 – 30	4500	R28	4512-104-87111	MXR-226	915332.51	d = 7.5 mm						
XRS-225	XRP-225/4500/2	10 – 225	0 – 30	4500	R28	4512-104-87111	MXR-225/26	915386.51	d = 1.2 mm / d = 5.5 mm						
XRS-225	XRP-225/4500/2	10 – 225	0 – 30	4500	R28	4512-104-87111	MXR-225/22	915326.51	d = 1.0 mm / d = 5.5 mm						
XRS-320	XRP-320/4500/2	15 – 320	0 – 22.5	4500	R24	4512-104-87101	MXR-320/23	915334.51	d = 1.9 mm / d = 3.6 mm	R24	4512-104-87141	N3/160-R24SL-R24SL-Xm	XRC-4501-OA or XRC-4501-OW	10008642 10008643	
XRS-320	XRP-320/4500/2	15 – 320	0 – 22.5	4500	R24	4512-104-87101	MXR-320/26	915358.51	d = 3.0 mm / d = 5.5 mm						
XRS-320	XRP-320/4500/2	15 – 320	0 – 22.5	4500	R24	4512-104-87101	MXR-320HP/11	915368.51	d = 0.4 mm** / d = 1.0 mm						
XRS-320	XRP-320/4500/2	15 – 320	0 – 22.5	4500	R24	4512-104-87101	MXR-320HP/11 FB	915388.51	d = 0.4 mm** / d = 1.0 mm						
XRS-420	XRP-450/4500/2	20 – 450	0 – 15	4500	R28	4512-104-87111	MXR-421/26	915366.55	d = 2.5 mm / d = 5.5 mm	R28	4512-104-87111	P3/250-R28SL-R28SL-Xm	XRC-4501-OA or XRC-4501-OW	10008642 10008643	
XRS-450	XRP-450/4500/2	20 – 450	0 – 15	4500	R28	4512-104-87111	MXR-451/26	915366.51	d = 2.5 mm / d = 5.5 mm						
XRS-450	XRP-450/4500/2	20 – 450	0 – 15	4500	R28	4512-104-87111	MXR-451HP/11	915369.51	d = 0.4 mm** / d = 1.0 mm						
XRS-450	XRP-450/4500/2	20 – 450	0 – 15	4500	R28	4512-104-87111	MXR-452/Y	915344.55	d = 2.5 mm / d = 5.5 mm						
XRS-600	XRP-600/4500/2	20 – 600	0 – 10	4500	R30	4512-104-87431	MXR-601HP/11	915395.51	d = 0.7 mm / d = 2.0 mm	R30	4512-104-87431	F3/300-R30-R30-5m	XRC-4501-OA	10008642	

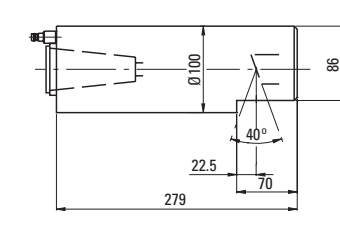
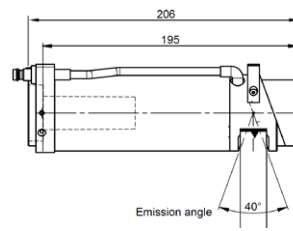
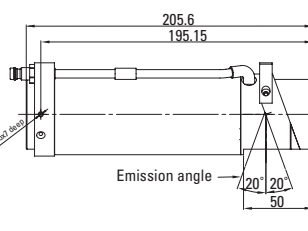
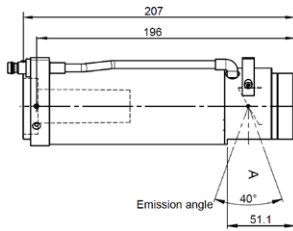
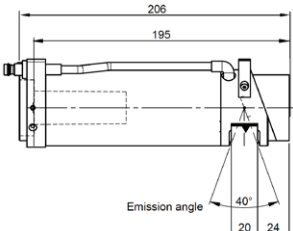
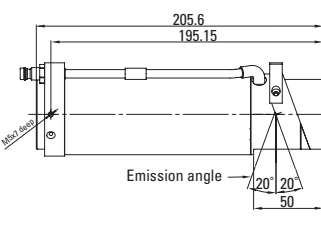
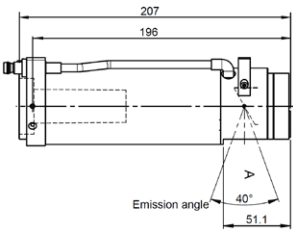
*Threshold: 30% / **Threshold: 25%

Unipolar Tubes

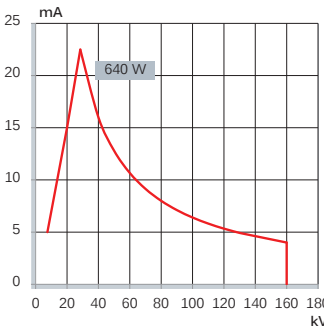
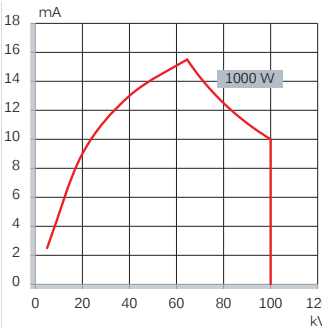
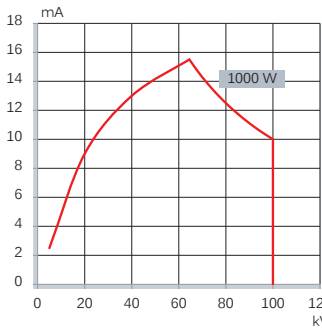
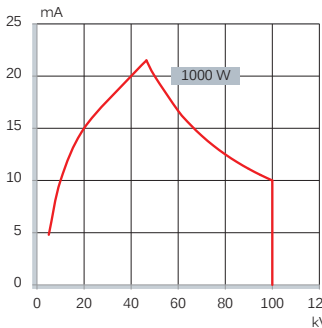
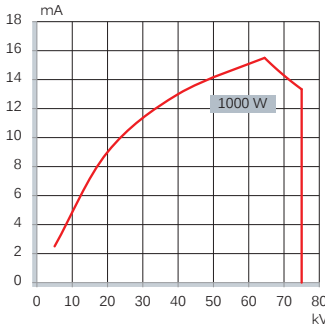
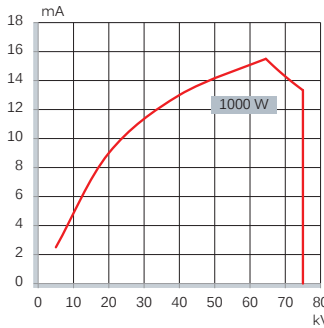
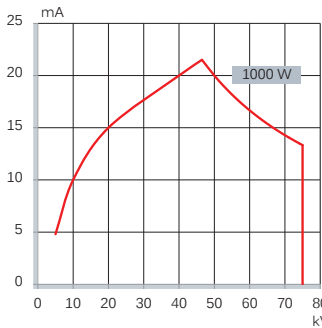


	MXR-75/30	MXR-75HP/20	MXR-75HP/20 FB		MXR-100/30	MXR-100HP/20	MXR-100HP/20 FB	MXR-160/20
Ordering No.	915376.51	915377.51	915380.51		915376.61	915377.61	915380.61	915317.51
Nominal tube voltage	75 kV	75 kV	75 kV		100 kV	100 kV	100 kV	160 kV
Continuous rating	1000 W	1000 W	1000 W		1000 W	1000 W	1000 W	640 W / 640 W
Focal spot acc. EN 12543	d = 5.5 mm	d = 1 mm	d = 1 mm		d = 5.5 mm	d = 1 mm	d = 1 mm	d = 1.0 mm / d = 1.0 mm
Filament current, max.*	3.6 A	3.7 A	3.7 A		3.6 A	3.7 A	3.7 A	4.1 A / 4.1 A
Filament voltage, typical	5.3 V	2.8 V	2.9 V		5.3 V	2.8 V	2.9 V	4.2 V / 4.2 V
Inherent filtration	0.8mm Be	0.8 mm Be	1.0 mm Be		0.8mm Be	0.8 mm Be	1.0 mm Be	0.8 mm Be
Target material	W	W	W		W	W	W	W
Target angle	30°	20°	20°		30°	20°	20°	20°
Radiation coverage	40° x 40°	40° x 40°	40° x 100°		40° x 40°	40° x 40°	40° x 100°	40°
Leakage radiation, max.	1.5 mSv/h	1.5 mSv/h	1.5 mSv/h		1.5 mSv/h	1.5 mSv/h	1.5 mSv/h	2.5 mSv/h
Cooling medium	Water	Water	Water		Water	Water	Water	Water
Cooling medium flow, min.	4 l/min	4 l/min	4 l/min		4 l/min	4 l/min	4 l/min	4 l/min
Temperature at inlet, max.	40°	40°	40° C		40°	40°	40° C	35° C
Weight	2.1 kg	2.1 kg	2.1 kg		2.1 kg	2.1 kg	2.1 kg	8 kg
Terminal type	CA11	CA11	CA11		CA11	CA11	CA11	R24
Mounting flange	–	–	–		–	–	–	4512-104-87121
Locking device	–	–	–		–	–	–	941002

Outline drawing



Tube diagram



*Setting the maximum Filament current above 4.0A may reduce the lifetime of the Filament to less than 2000 hours.

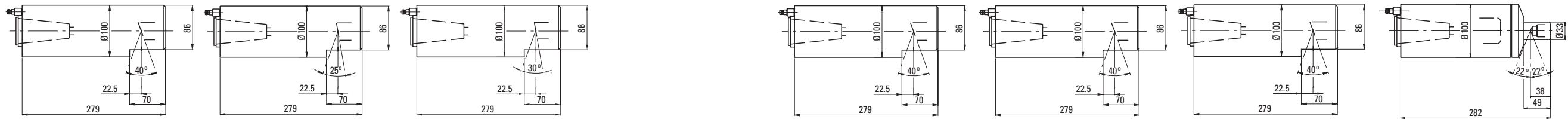
Unipolar Tubes



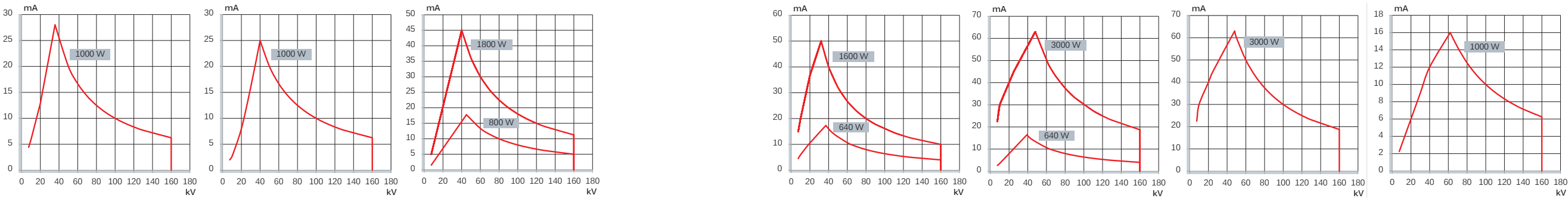
	MXR-160HP/20	MXR-160HP/FB	MXR-160HP/11	
Ordering No.	915357.51	915359.51	915370.51	
Nominal tube voltage	160 kV	160 kV	160 kV	
Continuous rating	1000 W / 1000 W	1000 W	800 W / 1800 W	
Focal spot acc. EN 12543	d = 1.0 mm / d = 1.0 mm	d = 1.0 mm	d = 0.4 mm* / d = 1.0 mm	
Filament current, max.*	4.1 A / 4.1 A	4.1 A	4.1 A / 4.1 A	
Filament voltage, typical	4.2 V / 4.2 V	3.0 V	2.9 V / 7.3 V	
Inherent filtration	0.8 mm Be	0.8 mm Be	0.8 mm Be	
Target material	W	W	W	
Target angle	20°	20°	11°	
Radiation coverage	40°	60° x 25°	40° x 30°	
Leakage radiation, max.	2.5 mSv/h	2.5 mSv/h	2.5 mSv/h	
Cooling medium	Water	Water	Water	
Cooling medium flow, min.	4 l/min	4 l/min	4 l/min	
Temperature at inlet, max.	35° C	35° C	35° C	
Weight	8 kg	8 kg	8 kg	
Terminal type	R24	R24	R24	
Mounting flange	4512-104-87121	4512-104-87121	4512-104-87121	
Locking device	941002	941002	941002	

*Threshold: 30 %

Outline drawing

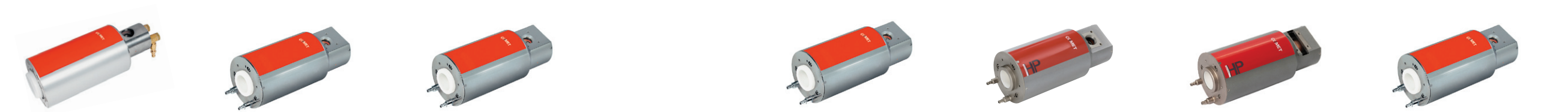


Tube diagram



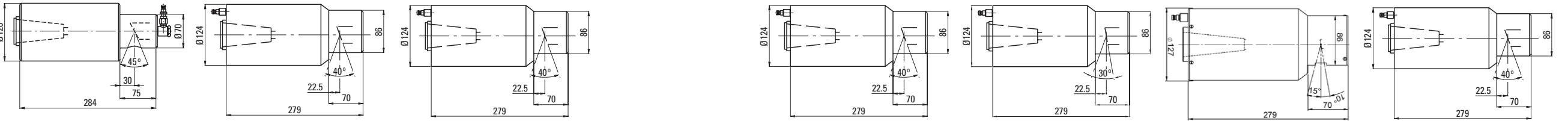
*Setting the maximum Filament current above 4.0A may reduce the lifetime of the Filament to less than 2000 hours.

Unipolar Tubes

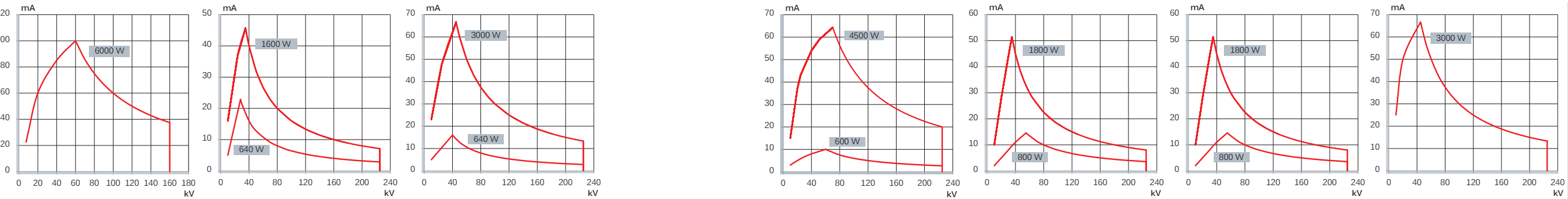


	MXR-165	MXR-225/21	MXR-225/22		MXR-225/26	MXR-225HP/11	MXR-225HP/11 FB	MXR-226
Ordering No.	915356.51	915325.51	915326.51		915386.51	915371.51	915362.51	915332.51
Nominal tube voltage	160 kV	225 kV	225 kV		225 kV	225 kV	225 kV	225 kV
Continuous rating	6000 W	640 W / 1600 W	640 W / 3000 W		600 W / 4500 W	800 W / 1800 W	800 W / 1800 W	3000 W
Focal spot acc. EN 12543	d = 5.5 mm	d = 1.0 mm / d = 3.0 mm	d = 1.0 mm / d = 5.5 mm		d = 1.2 mm / d = 5.5 mm	d = 0.4 mm* / d = 1.0 mm	d = 0.4 mm* / d = 1.0 mm	d = 7.5 mm
Filament current, max.*	4.2 A	4.1 A / 4.2 A	4.1 A / 4.2 A		3.8 A / 4.2 A	4.1 A / 4.1 A	4.1 A / 4.1 A	4.2 A
Filament voltage, typical	5.5 V	4.2 V / 5.5 V	3.0 V / 5.5 V		2.6 V / 5.5 V	2.9 V / 7.3 V	2.9 V / 7.3 V	5.5 V
Inherent filtration	4 mm Be	0.8 mm Be	0.8 mm Be		2.0 mm Be	0.8 mm Be	1.0 mm Cu	0.8 mm Be
Target material	W	W	W		W	W	W	W
Target angle	30°	20°	20°		30°	11°	11°	30°
Radiation coverage	45°	40°	40°		40°	40° x 30°	90° x 25°	40°
Leakage radiation, max.	2.5 mSv/h	10 mSv/h	10 mSv/h		10 mSv/h	10 mSv/h	10 mSv/h	10 mSv/h
Cooling medium	Water	Water	Water		Water	Water	Water	Water
Cooling medium flow, min.	5 l/min	4 l/min	4 l/min		4 l/min	4 l/min	4 l/min	4 l/min
Temperature at inlet, max.	30° C	35° C	35° C		35° C	35° C	35° C	35° C
Weight	9.4 kg	11 kg	11 kg		11 kg	11 kg	11 kg	11 kg
Terminal type	R24	R24	R24		R24	R24	R24	R24
Mounting flange	4512-104-87141	4512-104-87131	4512-104-87131		4512-104-87131	4512-104-87131	4512-104-87131	4512-104-87131
Locking device	940303	941002	941002		941002	941002	941002	941002
						*Threshold: 30 %	*Threshold: 30 %	

Outline drawing

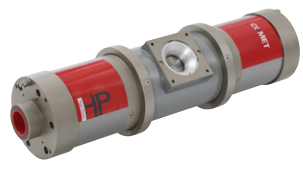
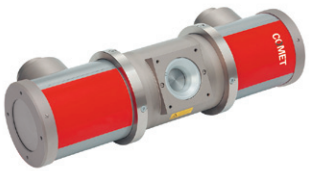


Tube diagram



*Setting the maximum Filament current above 4.0A may reduce the lifetime of the Filament to less than 2000 hours.

Bipolar Tubes



Ordering No.	915334.51
Ordering No. with 90° housing	915334.56
Nominal tube voltage	320 kV
Continuous rating	640 W / 1600 W
Focal spot acc. EN 12543	d = 1.9 mm / d = 3.6 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320/23	
Ordering No.	915334.51
Ordering No. with 90° housing	915334.56
Nominal tube voltage	320 kV
Continuous rating	640 W / 1600 W
Focal spot acc. EN 12543	d = 1.9 mm / d = 3.6 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320/26	
Ordering No.	915358.51
Ordering No. with 90° housing	915358.56
Nominal tube voltage	320 kV
Continuous rating	1500 W / 4200 W
Focal spot acc. EN 12543	d = 3.0 mm / d = 5.5 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320/23AX	
Ordering No.	915334.58
Ordering No. with 90° housing	—
Nominal tube voltage	320 kV
Continuous rating	640 W / 1600 W
Focal spot acc. EN 12543	d = 1.9 mm / d = 3.6 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

Ordering No.	—
Ordering No. with 90° housing	—
Nominal tube voltage	320 kV
Continuous rating	1500 W / 4200 W
Focal spot acc. EN 12543	d = 3.0 mm / d = 5.5 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320/26AX	
Ordering No.	915358.58
Ordering No. with 90° housing	—
Nominal tube voltage	320 kV
Continuous rating	1500 W / 4200 W
Focal spot acc. EN 12543	d = 3.0 mm / d = 5.5 mm
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3 mm Be
Target material	W
Target angle	20°
Radiation coverage	40°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320HP/11	
Ordering No.	915368.51
Ordering No. with 90° housing	915368.56
Nominal tube voltage	320 kV
Continuous rating	800 W / 1800 W
Focal spot acc. EN 12543	d = 0.4 mm* / d = 1.0 mm
Filament current, max.	4.1 A / 4.2 A
Filament voltage, typical	2.3 V / 6.2 V
Inherent filtration	3 mm Be
Target material	W
Target angle	11°
Radiation coverage	40° x 30°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320HP/11AX	
Ordering No.	915368.58
Ordering No. with 90° housing	—
Nominal tube voltage	320 kV
Continuous rating	800 W / 1800 W
Focal spot acc. EN 12543	d = 0.4 mm* / d = 1.0 mm
Filament current, max.	4.1 A / 4.2 A
Filament voltage, typical	2.3 V / 6.2 V
Inherent filtration	3 mm Be
Target material	W
Target angle	11°
Radiation coverage	40° x 30°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

MXR-320HP/11 FB	
Ordering No.	915388.51
Ordering No. with 90° housing	915388.56
Nominal tube voltage	320 kV
Continuous rating	800 W / 1800 W
Focal spot acc. EN 12543	d = 0.4 mm* / d = 1.0 mm
Filament current, max.	4.1 A / 4.2 A
Filament voltage, typical	2.3 V / 6.2 V
Inherent filtration	0.5 mm Fe + 0.5 mm Ti
Target material	W
Target angle	11°
Radiation coverage	80° x 11°
Leakage radiation, max.	5 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	40 kg
Terminal type	R24

Mounting flange	4512-104-87141
Locking device	940303

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Locking device	940303

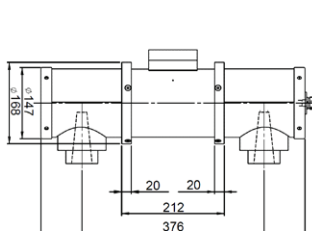
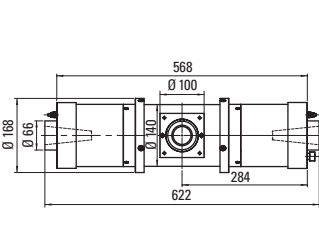
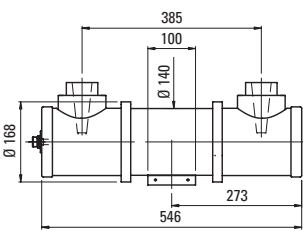
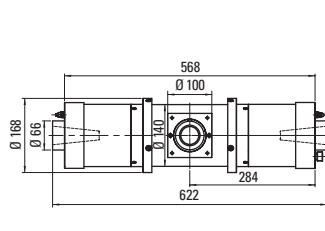
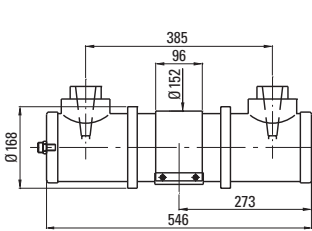
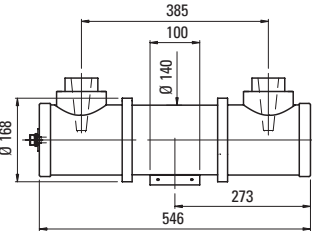
Mounting flange	4512-104-87141
Locking device	940303

*Threshold: 25 %

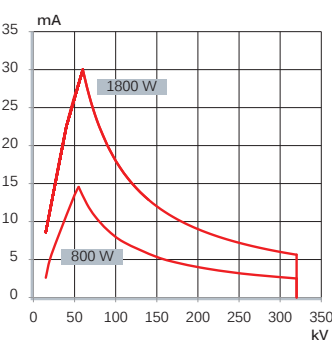
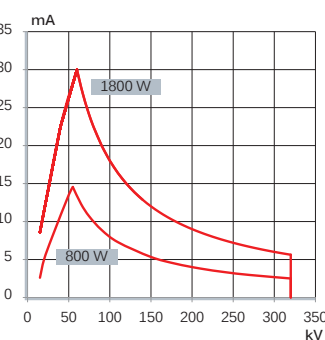
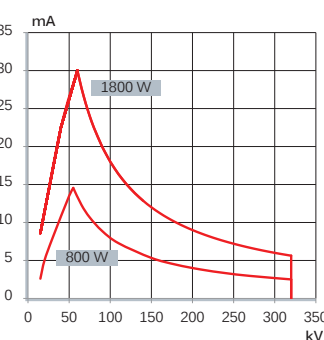
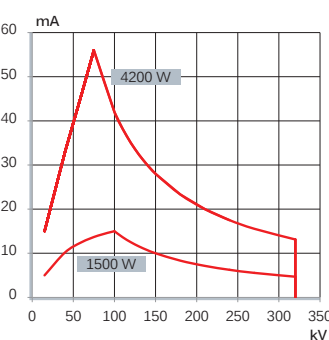
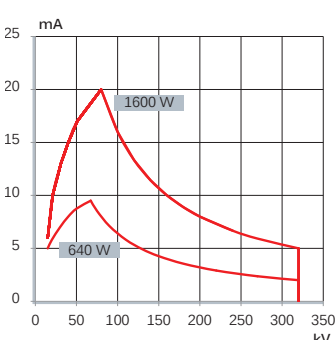
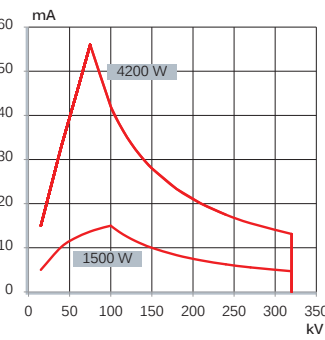
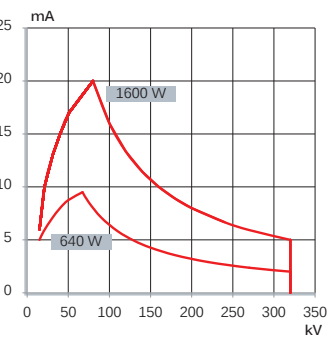
*Threshold: 25 %

*Threshold: 25 %

Outline drawing



Tube diagram



Bipolar Tubes

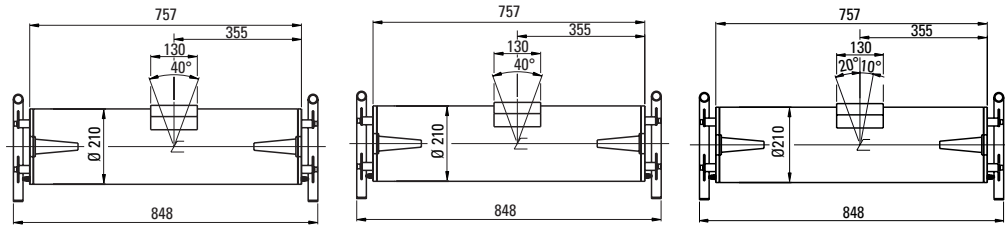


	MXR-421/26	MXR-451/26	MXR-451HP/11
Ordering No.	915366.55	915366.51	915369.51
Ordering No. with 90° housing	–	–	–
Nominal tube voltage	420 kV	450 kV	450 kV
Continuous rating	900 W / 4500 W	900 W / 4500 W	700 W / 1500 W
Focal spot acc. EN 12543	d = 2.5 mm / d = 5.5 mm	d = 2.5 mm / d = 5.5 mm	d = 0.4 mm* / d = 1.0 mm
Filament current, max.	4.9 A / 4.6 A	4.9 A / 4.6 A	4.1 A / 4.2 A
Filament voltage, typical	3.0 V / 6.8 V	3.0 V / 6.8 V	2.3 V / 6.2 V
Inherent filtration	3 mm + 2 mm Be	3 mm + 2 mm Be	3 mm + 2 mm Be
Target material	W	W	W
Target angle	30°	30°	11°
Radiation coverage	40°	40°	40° x 30°
Leakage radiation, max.	10 mSv/h	10 mSv/h	5 mSv/h
Cooling medium	Oil	Oil	Oil
Cooling medium flow, min.	14 l/min	14 l/min	14 l/min
Temperature at inlet, max.	50° C	50° C	50° C
Weight	95 kg	95 kg	95 kg
Terminal type	R28	R28	R28

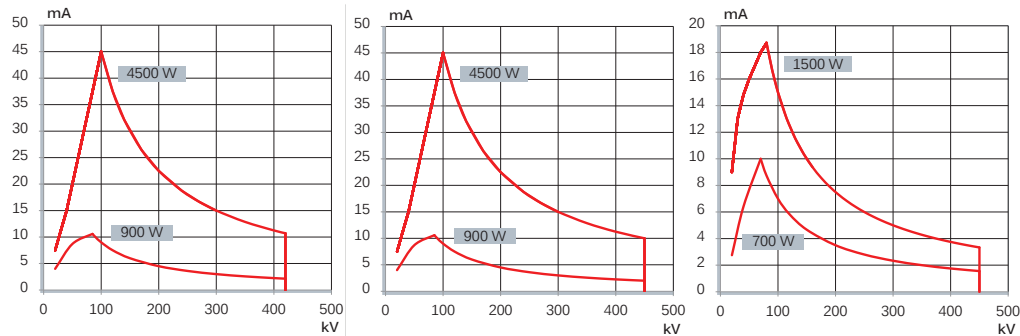
Mounting flange	4512-104-87111	4512-104-87111	4512-104-87111
Locking device	–	–	–

*Threshold: 25 %

Outline drawing



Tube diagram



	MXC-451HP/11	MXR-452/Y	MXR-601HP/11
Ordering No.	915705.51	915344.55	915395.51
Ordering No. with 90° housing	–	–	–
Nominal tube voltage	450 kV	450 kV	600 kV
Continuous rating	700 W / 1500 W	900 W / 4500 W	700 W / 1500 W
Focal spot acc. EN 12543	d = 0.4 mm* / d = 1.0 mm	d = 2.5 mm / d = 5.5 mm	d = 0.7 mm / d = 2.0 mm
Filament current, max.	4.1 A / 4.2 A	4.9 A / 4.6 A	3.7 A / 4.1 A
Filament voltage, typical	2.3 V / 6.2 V	3.0 V / 6.8 V	2.0 V / 4.9 V
Inherent filtration	3 mm + 2 mm Be	2.3 mm Fe + 1.0 mm Cu	3 mm + 2 mm Be
Target material	W	W	W
Target angle	11°	30°	11°
Radiation coverage	40° x 30°	90° x 20°	40° x 30°
Leakage radiation, max.	5 mSv/h	10 mSv/h	5 mSv/h
Cooling medium	Oil	Oil	Oil
Cooling medium flow, min.	14 l/min	14 l/min	14 l/min
Temperature at inlet, max.	50° C	50° C	50° C
Weight	45 kg	95 kg	145 kg
Terminal type	R28	R28	R30

Mounting flange	20032631	4512-104-87111	4512-104-87431
Locking device	–	–	–

*Threshold: 25 %

