GE
Sensing & Inspection Technologies

ERESCO MF4

Reliable, Lightweight, Portable X-Ray Generator



ERESCO MF4 – For the toughest of tasks

The ERESCO MF4 portable X-ray units are designed for reliability in some of the world's toughest conditions. With the ERESCO MF4 line, mobile X-ray inspection becomes lighter in the true sense of the word. By using the latest display technology, the new user interface to control and monitor the X-ray setup, has been fully utilized and features graphic visualization and menu driven operation to optimize productivity.

The robust construction of the control and the tube heads make them suitable for hostile environments. Due to its low power consumption, not only is energy cost reduced, but operation with portable power supplies are made easier. Special power electronics allow for an alternative operation in the field as well as integration in crawlers. Even with reduced weight, the new tube heads comply with the strict requirements of the European X-ray regulations.

Using modern compact electronics to minimize weight and provide a high power output with extremely low ripple, together with a sturdy metal ceramic X-ray tube, the ERESCO MF4 generates a high X-ray dose which allows the shortest exposure time, resulting in higher productivity.

A glance at the benefits



The **metal/ceramic technology** ensures both continuous operation and a long operating life.

The MF4 **cooling system** also assists in prolonging long trouble-free operation as its specially designed copper cooler optimises the air flow for maximum cooling effect.

The ERESCO MF technology allows the X-ray generator to be **operated in power mode,** because, unlike competitive generators, it can drive high tube currents. As a result, continuous power ratings of up to 900 W and high currents ensure that the ERESCO MF4 range of X-ray generators offer the best image definition in the 200 kV to 300 kV class.

Operation starts from 5 kV to enable **optimized exposure** of low-density materials, such as aluminum, composites and plastics resulting in **high-contrast images.**

The power electronics of ERESCO units provide extremely **low power consumption** between 1 to 2 kW/h.

Full graphic display and intuitive user interface for simple and guided operation.

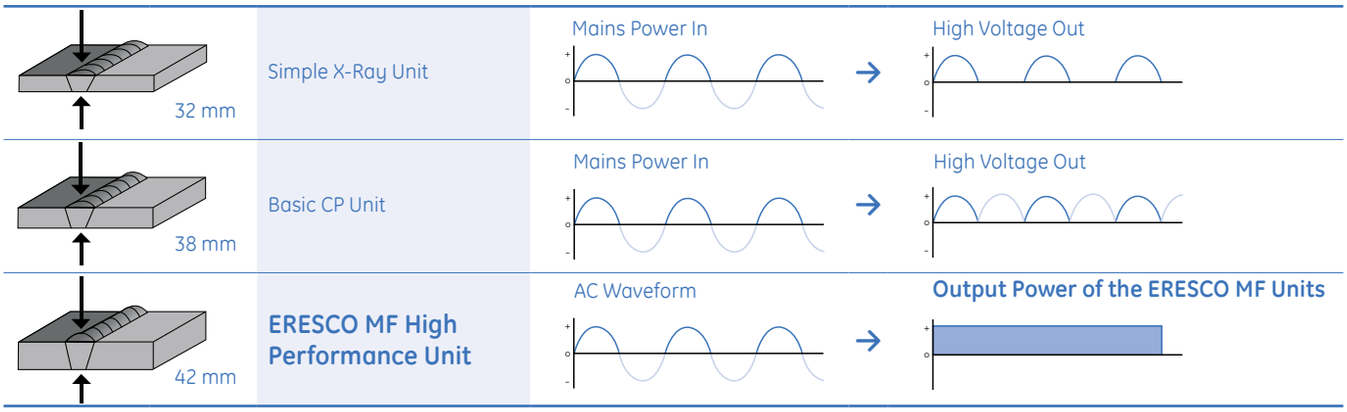
On-Board exposure calculator for determination of the optimum exposure settings and further exposure time reduction through unique ERESCO power mode.

Several programming and reporting features to shorten X-ray setup and evaluation times.

Microprocessor platform enables fast and safe unit control providing intelligent features, such as automatic tube head identification, autonomous operation with event recording, multi-lingual user interface and different exposure programs.

MF Technology for constant potential high dose output

A medium frequency output (around 20 kHz) can be used to produce a high power output with extremely low ripple.



Control Unit



The portable ERESCO X-ray digital control can operate any X-ray generator in the MF4 range. It features modern, power electronics and is ruggedly constructed to withstand heavy use in the field.

The MF4 Control faciliates a ergonomical interaction concept for safe and efficient operation unit operation. Several on-board features, such as Exposure Calculator, Parameter Monitoring or Programming / Reporting tools are simplyifing inspections.

A large, back-lit, full graphic, transreflective display allows easy viewing even in very strong sunlight and provides details of the system status in up to 19 languages supporting different character-sets. All operating and setup parameters can be entered by means of function keys, an alphanumeric keypad and cursor keys. Menu driven interfaces complete the ease of use. Alternatively setup parameters can be retrieved from a bank of 250, pre-entered exposure programmes, stored in a non-volatile memory. In addition, these programs can be uniquely named or commented and can be downloaded, modified, uploaded and archieved. In power operation, the maximum tube current is calculated and set, so minimising exposure times. Besides interfaces for warning lamps, interlocks and pumps, the MF4 control also offers a serial interface for external control or communication with PC based tools.

Applications

The ERESCO MF4 range of X-ray generators finds application throughout the industrial spectrum in the inspection of welds and in the examinations for structural integrity.



- Standard radiographic inspections, such as those carried out in fabrication yards in the oil and gas segment, in power plants, in the automotive sector and in general engineering.



- Oil and Gas segments require inspections in extreme conditions, such as pipeline inspections - both offshore and land-based applications - where equipment have to withstand hostile environment like very low or very high ambient temperature or permanent exposure to salt-water, sand or dirt.



- Structural integrity testing in the aerospace segment, where special materials, honeycomb sections and composites demand exceptional tube performance.

With direct emission and panoramic emission models and water- cooled and air-cooled versions, as well as small focal spot radioscopy units, the ERESCO MF4 range offers a comprehensive solution to meet virtually all customer portable X-ray generation needs.



Features Summary

ERESCO MF4 generators

- Highest power output, with best image definition in its class
- High X-ray dose permitting short exposure times with associated increases in productivity
- Operation with 100% Duty Cycle at 30°C
- Light weighted and compact design
- Robust construction of control and tube heads allowing operation in hostile environments (IP65)
- Lower power consumption meaning low energy costs, long battery endurance and providing flexible operation with portable power supplies or battery packs
- On-Board power electronics allow autonomous operation and integration within crawlers
- Range of designs, including air-cooled, water cooled, panoramic output and small focal spot, suitable for radioscopy
- Wide range of accessories, including stands and carriages to facilitate positioning during exposure set-up

ERESCO MF4 Control Unit

- Intuitive and menu driven user interface with multifunction-, numeric- and cursor keys input
- Transrefective, backlit, graphic display for contrast optimized indoor and outdoor operation
- Exposure Calculator
- Integrated, real time clock, enabling intelligent and automatic warm-up of the generating unit, taking past operational intervals into account
- Robust and ergonomic design for operation in different working position
- Automatic recognition of the type and serial number of the connected X-ray tube head
- Free configurable exposure programming mode
- Off-Line report generation and programming
- Multi-lingual graphical user interface
- Easily adapts to different mains supplies, including portable generators and batteries
- Built-in fail-safe warning lamp
- Emergency stop button, in compliance with international standards

Accessories

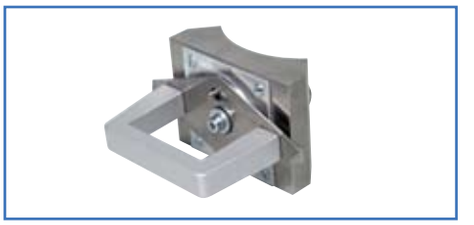
A wide range of accessories complements the ERESCO MF4 generators.



Four legged stands for tube heads to ensure stability



Laser centring device



Lead plug for the tube window



Remote warning flash lamp



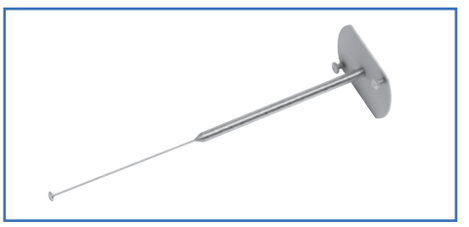
Exchangeable lead diaphragms



Aluminium transport boxes



Remote control



Telescope centering device



Adapter cables



Transport and Positioning Cart

Other available accessories

- Caster extensions for the pipe carriage
- Portable power generator
- Carrying cradle for the MF3 tube
- Door contact cable
- Bracing belts
- Interface cables
- Diaphragm caps for panoramic units
- 20 m extension cable
- PC based exposure calculator
- MF4 Administrator Kit (Serial Interface cable and SW CD-ROM)
- Crawler integration kit
- Pipe inspection carriage to facilitate transport and set-up

Technical Specifications

ERESCO MF4 – Series						
ERESCO Type	**160 MF4-R**	**160 MF4-RW**	**200 MF4-R**	**200 MF4-RW**	**32 MF4-C**	**42 MF4**
						
Description	A real time imaging device, with small focal Spot (EN12543), for applications requiring geometric enlargement	A water cooled real time Imaging device, with small focal Spot (EN12543), for applications requiring geometric enlargement	A real time imaging device, with small focal Spot (EN12543), for applications requiring geometric enlargement	A water cooled real time imaging device, with small focal spot (EN12543), for applications requiring geometric enlargement	Panoramic-Beam unit designed for pipeline and butt-weld inspection.	Air-Cooled unit, for a wide range of applications in weld inspection, Al casting and also composite materials
Emergent Beam	Direct Emission	Direct Emission	Direct Emission	Direct Emission	Panoramic Emission	Direct Emission
Penetration of Steel in 10 min	-	-	-	-	32 mm (1.26")	42 mm (1.65")
High Voltage Range	10 - 160 kV	10 - 160 kV	10 - 200 kV	10 - 200 kV	5 - 200 kV	5- 200 kV
Tube Current Range	0.5 – 10 mA	0.5 – 10 mA	0.5 - 10 mA	0.5 - 10 mA	0.5 - 10 mA	0.5 - 10 mA
Tube Current at U max	3.7 mA / 160 kV	3.7 mA / 160 kV	3.0 mA / 200 kV	3.0 mA / 200 kV	3.0 mA / 200 kV	4.5 mA / 200 kV
Continuous Rating	600 W	600 W	600 W	600 W	600 W	900 W
Nominal Focal Spot Value	1.0 mm (EN 12 543) 0.5 (IEC 336)	1.0 mm (EN 12 543) 0.5 (IEC 336)	1.0 mm (EN 12 543) 0.5 (IEC 336)	1.0 mm (EN 12 543) 0.5 (IEC 336)	0.4 x 4 mm (EN 12543)	3.0 mm (EN 12543) 1.5 (IEC 336)
Anode Material	Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)
Target Angle	20°	20°	20°	20°	22°	20°
Emergent Beam Range	Elliptical, 40° x 60°	Elliptical, 40° x 60°	Elliptical, 40° x 60°	Elliptical, 40° x 60°	40° x 360°	Elliptical, 40° x 60°
Inherent Filtration	0.8 mm ± 0.1 mm, Be	0.8 mm ± 0.1 mm, Be	0.8 ± 0.1mm, Be	0.8 ± 0.1mm, Be	0.4 mm Fe/Ni/Co + 2 mm Al	0.8 mm ± 0.1 mm, Be
Duty Cycle	100%					
Current and Voltage Stability	± 1 %					
Power Supply Requirements	160 V - 253 V AC, 80 V - 127 V AC, 50/60 Hz *					
Weight of Tube Head	26.8 kg (59.1 lbs)	26.8 kg (59.1 lbs)	26.8 kg (59.1 lbs)	26.8 kg (59.1 lbs)	31 kg (68.3 lbs)	26.8 kg (59.1 lbs)
Certifications	CE Conformity, NFC 74100 **, BfS Certification (PTB Approval) **					

* Operation with reduced output is possible at main voltages below 205 V and 108 V respectively
** Available for selected models



42 MF4-W	280 MF4-R	280 MF4-RW	52 MF4-CL	65 MF4	65 MF4-W
					
Water-Cooled unit, for a complete and flexible range of applications in weld inspection, Al casting and also composite materials	A real time limaging device, with small focal spot (EN12543), for applications requiring geometric enlargement	A water-cooled Real time imaging device, with small focal spot (EN12543), for applications requiring geometric enlargement	Panoramic unit designed for pipeline and butt-weld inspection where high penetration power is demanded	Air-Cooled unit for a wide range of applications in weld inspection, Al casting and composite materials, especially where high penetration power is demanded	Water-Cooled unit for a wide range of applications in weld inspection, Al casting and composite materials, especially where high penetration power is demanded
Direct Emission	Direct Emission	Direct Emission	Panoramic Emission	Direct Emission	Direct Emission
42 mm (1.65")	-	-	52 mm (2.04")	65 mm (2.55")	65 mm (2.55")
5 - 200 kV	10 - 280 kV	10 - 280 kV	5 - 300 kV	5 - 300 kV	5 - 300 kV
0.5 - 10 mA	0.5 - 4.5 mA	0.5 - 4.5 mA	0.5 - 6 mA	0.5 - 6 mA	0.5 - 6 mA
4.5 mA / 300 kV	1.2 mA /280 kV	1.2 mA /280 kV	2.0 mA / 300 kV	3.0 mA / 300 kV	3.0 mA / 300 kV
900 W	340 W	340 W	600 W	900 W	900 W
3.0 mm (EN 12543) 1.5 (IEC 336)	0.5 mm (EN 12543)	0.5 mm (EN 12543)	0.5 x 5.5 mm (EN 12543)	3.0 mm (EN 12543) 1.5 (IEC 336)	3.0 mm (EN 12543) 1.5 (IEC 336)
Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)	Tungsten (W)
20°	15°	15°	20°	20°	20°
Elliptical, 40° x 60°	Elliptical, 30° x 60°	Elliptical, 30° x 60°	38° x 360°	Elliptical, 40° x 60°	Elliptical, 40° x 60°
0.8 mm ± 0.1 mm, Be	0.8 mm ± 0.1 mm, Be	0.8 mm ± 0.1 mm, Be	0.4 mm Fe/Ni/Co + 3 mm Al	0.8 mm ± 0.1 mm, Be	0.8 mm ± 0.1 mm, Be
100%					
± 1 %					
160 V - 253 V AC, 80 V - 127 V AC, 50/60 Hz *					
25.8 kg (56.9 lbs)	40 kg (88.2 lbs)	40 kg (88.2 lbs)	36 kg (79 lbs)	40 kg (88.2 lbs)	40 kg (88.2 lbs)
CE Conformity, NFC 74100 **, BfS Certification (PTB Approval) **					



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