

GE
Sensing & Inspection Technologies

ISOVOLT *mobile* 160

Mobile Industrial Radiography



A versatile and reliable, high performance inspection system which significantly extends the areas of radiographic applications.



GE imagination at work

The ISOVOLT *mobile* 160 represents the latest generation of ISOVOLT Mobile technology. Its evolution has relied upon continuous assessment of the field performance of the ISOVOLT Mobile range and it incorporates a range of features which offer demonstrable benefit in terms of:

- Mobility
- Performance
- Versatility and Flexibility
- Ease-of-use.

Mobility Features

- Combines features of stationary systems (compact tube-housings, dual-focus, mini-focus, performance) with excellent mobility characteristics
- Very compact dimensions:
 - Width: 615 mm
 - Weight: 145 kg (with 10 m cable)
- Can be transported horizontally
- Cart equipped with integral metal lifting eyelet
- Integrated autonomous cooling circuit
- Balloon tires

Mobility Benefits

- Can be used in applications that cannot be solved by purely portable / stationary devices
- Excellent handling characteristics in narrow spaces or applications affording limited access
- Allows easy transport over stairs or loading / unloading into vans
- Supports crane lifts to difficult accessible positions
- Requires only power supply for field operation
- Easier to move

Performance Features

- Constant Potential Technology, with excellent Power Rating of 1600 W @ max. 10 mA
- Power mode and Dual Focus operation
- Operation with 100% duty cycle @ 30°C (water cooler on-board)
- Real-time-clock-based fully automatic warm-up

Performance Benefits

- Generates stable penetration power and provides higher material penetration
- Minimizes exposure times and improves imaging contrast. Can also be used for double-wall inspections
- Contributes to high performance / productivity ratio under harsh conditions
- Prolongs tube-life time, increases productivity in daily inspection routine

Versatility and Flexibility Features

- Set-up configurable with different HV cable lengths
- Set-up configurable with different tube types. Two tubes can be pre-configured and activated
- Removable control module
- Protection for HV cable and water-hose

Versatility and Flexibility Benefits

- A light and modular generator set, capable of reaching locations of normally difficult access
- Extends the range of potential applications
- Can be operated remotely
- Increases cable life, reduces operational wear, facilitates cable winding

Ease-of-Use Features

- New Graphical User Interface, featuring:
 - On-board exposure calculator
 - Monitoring and display of several parameters (temperatures, , mains voltage)
 - Programming and reporting features
 - 21 languages, 5 character sets

- Focal spot-selector
- Tube database
- Active tubes stored on slot A / slot B
- Automatic filament current calibration

Ease-of-Use Benefits

- Intuitive and safe operation



System Components

The ISOVOLT *mobile* 160 consists of an X-ray generator, a choice of 160 kV X-ray tubes, an integral water-cooling system, high voltage cable and a control module based on the field-proven MF4. All the components are carried in a compact, wheeled transport cart, which provides IP54 protection of the system in harsh operating conditions. The high voltage cable and the cooling hoses are also sheathed for added protection.

The X-Ray Generator and Tubes

The X-ray generator and tube arrangement has its own water-cooling system, so that only electrical power connection is required on site. Constant Potential Technology is employed to provide excellent power rating of 1600 W at a max. 10 mA. High voltage cable is available up to 20 m in length. Special warm-up routines optimize the performance of the X-ray tubes and maximizes their lifetime.

A range of 160 kV tubes is available, including High Power and Mini-Focus tubes, as well as panoramic tubes and special very small diameter tubes.

The complete system can also be suspended from a crane through an integral lifting eye, to allow work in elevated, difficult access locations, when start and stop functions can be carried out by means of an optional remote control unit.

Control Module

The ergonomically designed, control module offers intuitive operation and a highly visible, full graphic, trans-reflective display, with on-board exposure calculator and menu-driven set-up and operation. It can be conveniently operated in a number of user-selected configurations. There is constant monitoring and display of temperatures and mains voltage. Event logging and immediate interpretation is shown on the graphical user interface, which guides users through selected set-up or inspection procedures. The capabilities of the module are further complemented by productivity-focused, "Features on Demand", such as the optional Administrator Kit, which allows PC connectivity for the creation, modification and / or archiving of exposure programs, downloading of all stored events and exporting in spreadsheet form or print-off.

A Film Focus Distance conversion calculator is also a major feature of the control module, allowing rapid exposure set-up. Fast and safe set-up and interchange of tubes is also ensured because of the module's extensive integral database. This allows tubes to be pre-programmed for immediate operation during field operations.

Applications



Aerospace

During aircraft maintenance and servicing, it is often necessary to carry out radiography in very restricted spaces. The quality of images is therefore very much dependent on the inspection arrangement and requires that radiography systems are extremely flexible.

With its compact dimensions and flexible high voltage cable, the ISOVOLT *mobile* 160 can be aligned easily to suit the inspection task. The unit can also be used in the very tight spaces bounded by struts and skin, as there is just 5.6 cm between the centre of the exit window and the tube. The choice of tubes is also of great benefit in this sector and the intuitive user guidance feature can help to accelerate and simplify maintenance.

The extended programming and reporting features of the ISOVOLT *mobile* 160 allow it to be embedded in various documentation workflows encountered in the aerospace sector so that specific X-ray inspection information can be used for consistent reporting purposes.



Power Generation

The majority of inspection tasks in power generation relate to welds, which are fundamental to safety. Nearly always, these welds are in areas of difficult access and consequently demand a very compact design of radiography equipment. In addition the fact that a generator can also drive a panoramic tube is of great help in inspection of circumferential welds.

The compact design, pneumatic tyres, cable- and hose-sheathing, range of cable lengths and cranability also contribute to the equipments suitability for inspection of power station cooling and heat-exchanger systems.





Oil & Gas

In the oil and gas sector, radiography is carried out predominantly on welds during pipeline and vessel fabrication. In these applications, the ISOVOLT *mobile* 160 helps to provide simple, fast and reliable radiography of welds and pipe sections.

By using a panoramic tube of only 100 mm diameter, the X-ray tube can be inserted into narrow vessel nozzles and can also be used for the inspection of items such as flanges. Also by using different size shutters, it is possible to carry out a wide range of inspection tasks in the oil and gas sector, saving costs and increasing productivity.



Metals

As a versatile, mobile, and universal radiography system, with dual focus and panoramic X-ray tubes, ISOVOLT *mobile* 160 offers an optimum solution for weld inspection.

In shipbuilding, with wall thicknesses up to 20 mm, the ISOVOLT *mobile* 160, with its compact tubes and long High Voltage cables, offers significant advantages over competitive mobile units. This is especially the case when it is used between frames in very tight ship's bodies. In addition, its water-cooling is more efficient than air-cooled systems, which significantly increases productivity and facilitates handling. These same benefits also apply to radiography in offshore platform fabrication yards.



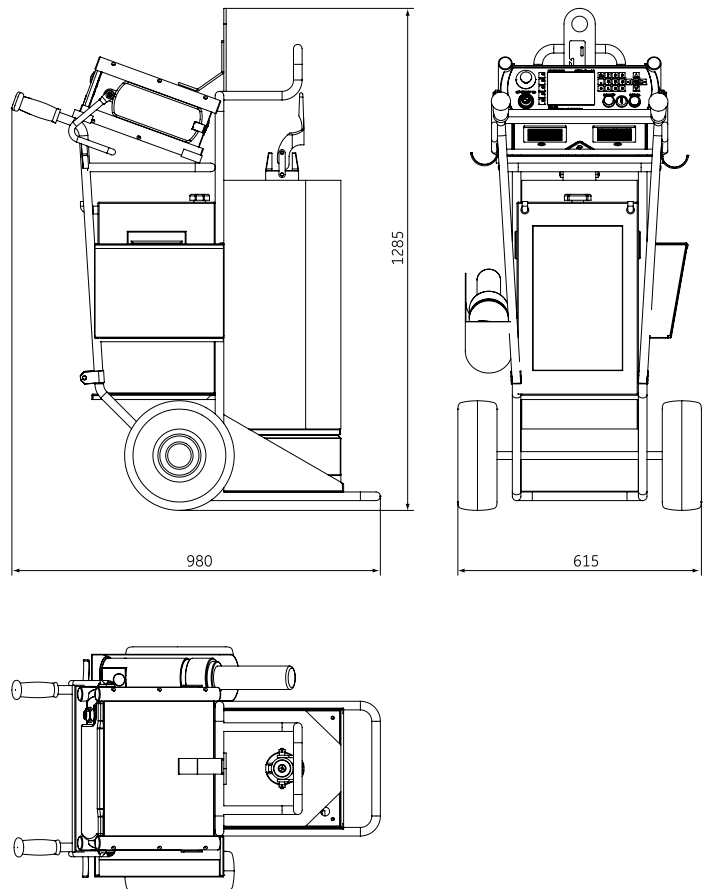
Delivery Scope

- 1 High voltage generator 160 kV
- 1 Control Unit ISOVOLT *mobile*
- 1 Water cooling pump WL 2001
- 1 X-ray tube head (see selection)
- 1 High voltage cable (10 m, 15 m or 20 m long)
- 1 Protective hose for high voltage cable and water hoses
- 1 Transport cart
- 1 Set of cooling water hoses and accessories

Accessories

- Pipe inspection stand for tubehousing
- Diaphragm and centering device
- Remote Control
- External fail-safe warning flash lamp
- External fail-safe warning blinking lamp
- Administrator Kit (including Interface cable, CD-ROM)

Dimensions



Supported tube heads

- ISOVOLT 160MM2/HP
- ISOVOLT 160M1/10-30
- ISOVOLT 160M2/0.4-0.4
- ISOVOLT 160M2/0.4-1.5
- ISOVOLT 160M2/0.4-0.4HP
- ISOVOLT 160MC2
- CXR 100-6
- MCD 100H-3



Technical Specifications - ISOVOLT *mobile* 160

High Voltage Generation	
Tube voltage	5 - 160 kV (in 1 kV intervals)
Tube current range	0.5 - 10 mA (in 0.1 mA intervals)
Maximum output power	1600 W
Duty cycle (∂ ambient temperature = 30°C)	100 %
Cooling	Installed water cooler WL 2001
Maximum cooling capacity (∂ ambient temperature = 30°C)	1600 W
Operating Module	
Exposure time, adjustable to intervals of 1 second or directly as min/seconds-value	1 to 5,994 seconds (optional display 99 min/99 sec), or clock deactivated for fluoroscopy operation
Pre-programmable exposure program	Maximum 250, administrable in list form, free naming of the program
Memory for operating and warm-up-events	256/128 administrable in list form
Display	Transflective, backlit graphic display, 320 x 240 pixels
Supported languages	21
Character sets	5, European (ISO), Japanese, Chinese, Cyrillic, Arabic
Exposure calculator	On-board,, Fe, Ti, Al pre-programmed / Characteristics for 3 materials freely programmable
Warm up	Fully automatic, based on real time clock
Parameter monitoring	Continuous, online display of device temperatures and supply voltage
RS232 serial interface	1
Safety Interlocks	2
Emergency off button	1
Keyswitch with 3 positions	OFF, STANDBY, ON
Additional functions	Change of focus, film-focus-distance correction, extended warm-up Comprehensive tube database, 2 slots for activated tubes, power mode
Ambient Conditions	
Protection class	IP 54
Operating temperature range*	-20°C to +40°C
Storage temperature range*	-30°C to +70°C
Connected Loads	
Power supply	1PE, 230 V ± 10 %; 50/60 Hz; 3.0 kVA; max. 16 A
Dimensions	
High voltage cable	10 m (optional 15 m/20 m)
Power cable	10 m
Dimensions (width x depth x height)	615 mm x 980 mm x 1,285 mm
Weight	With 10 m cable 145 kg
Certifications / Standards	
	CE-Conformity, NFC 74100, ANSI N43.5

* Anti-freeze has to be used for temperatures below 5°C



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GEIT-30193EN(09/09)

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